Manufacturing Muscle: The Hot Rod Industry and the American Fascination with Speed, 1915-1984

by

David Nicholas Lucsko

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SUBMITTED TO THE SCIENCE, TECHNOLOGY, AND SOCIETY PROGRAM IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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ABSTRACT

This dissertation focuses on the pursuits of a particular subset of automobile users: *hot rodders*, those who modify their standard production automobiles for improved performance. More specifically, this project examines the history of the speed equipment industry – the aftermarket subsector which manufactures high-performance products for hot rodders – from its infancy in the 1910s through the mid 1980s.

The thesis begins by examining the role of technological enthusiasm in the early growth of hot rodding, focusing in particular on the ways in which this enthusiasm led a handful of individuals to begin to manufacture high-performance parts in the 1910s, 1920s, and 1930s. After tracing the wartime experiences of these industry pioneers, the project then explores the ways in which, in the midst of America's postwar affluence, the spectacular growth both of the high-performance industry and of hot rodding itself helped spawn the youth-oriented musclecar movement upon which the Big Three would later feed. In its examination of the 1940s and 1950s, the dissertation closely examines the evolution of this industry's production methods in an attempt to understand the manufacturing dynamics of a market-sensitive, flexibly-oriented, late-twentieth-century industrial sector. The thesis then explores the ways in which this industry dealt with automotive safety and environmental legislation in the 1960s and 1970s. It concludes with a discussion of the fragmentation of the hot rod market during the 1970s and 1980s, analyzing the manufacturing and marketing challenges this change has wrought.

This project sheds new light on the history of the automobile in America in four main ways. It highlights the survival of a flexibly-oriented, consumer-driven automotive industry in the shadow of the Big Three. It emphasizes the lingering importance of technological enthusiasm in the evolution of automobility. It uses the experience of the speed equipment industry to reexamine and revise our understanding of the relationship between the Big Three and governmental regulators. And, finally, it challenges the longstanding notion that the automobile had become a 'black box' by the 1920s, documenting the extent to which the social constructivists' 'end-user interpretive flexibility' has instead remained quite strong throughout the history of the automobile.

Thesis Supervisor: Merritt Roe Smith
Title: Leverett Howell and William King Cutten Professor of the History of Technology

For my parents,
Susan and Danny Lucsko

Table of Contents

Abbreviations

– Collections –

ARB-A	=	Air Resources Board Archives, California EPA Headquarters (Sacramento, California)
DWF	=	Dick Wells's Private Files (Santa Ana, California)
SEMA-RC	=	SEMA Research Center, SEMA Headquarters (Diamond Bar, California)
UCSB-RT	=	Romaine Trade Catalog Collection, University of California at Santa Barbara (Santa Barbara, California)
WGR-RC	=	Root Collection, International Motor Racing Research Center (Watkins Glen, New York)

– Publications –

HRM	=	*Hot Rod Magazine*
HRIN	=	*Hot Rod Industry News*
PHR	=	*Popular Hot Rodding*

– Associations and Agencies –

AAMA	=	Automotive Aftermarket Manufacturers Association
AHRA	=	American Hot Rod Association
AMA	=	American Model Association Automobile Manufacturers Association (the context in which this abbreviation is used in the text will preclude confusion)
ARB	=	(California) Air Resources Board
CARB	=	California Air Resources Board
EPA	=	(federal) Environmental Protection Agency
HEW	=	United States Department of Health, Education, and Welfare
IHRA	=	International Hot Rod Association
MRA	=	Muroc Racing Association
MVPCB	=	(California) Motor Vehicle Pollution Control Board
NHRA	=	National Hot Rod Association
NHTSA	=	National Highway and Traffic Safety Administration
NSRA	=	National Street Rod Association
Penn-DOT	=	Pennsylvania Department of Transportation
SCTA	=	Southern California Timing Association
SEMA	=	Speed Equipment Manufacturers Association (1963-1967) Specialty Equipment Manufacturers Association (1967-1979) Specialty Equipment Market Association (1979-present)
SFI	=	SEMA Foundation, Incorporated
UDRA	=	United Drag Racers Association
VESC	=	Vehicle Equipment Safety Compact

– Other Recurring Abbreviations –

AM / AMC	=	American Motors / American Motors Corporation
GM / GMC	=	General Motors / General Motors Corporation
OEM	=	"original equipment manufacturer"
WD	=	"wholesale distributor"

Preface and Acknowledgments

Technically, this project stems from a tentative and exploratory essay that I wrote for Merritt Roe Smith's research seminar in the history of technology during my first term at MIT, back in the fall of 1999. In a broader sense, though, it dates back much further. Back to a childhood spent playing with Hot Wheels replicas, sketching exotic sports cars on the backs of notebooks, and faithfully tuning in to the *Dukes of Hazard*, *Knight Rider*, and *Magnum P.I.* each week. Back to an adolescence spent carefully assembling plastic model car kits, handing wrenches to my friend and automotive mentor, Walter, and sitting in the stands at the Senoia Raceway with my dad. And, of course, back to those tender teenage years, which I spent drooling over automotive periodicals, scouring area salvage yards for treasure, and polishing the bright red paint and chrome accents of my first love. For I am – and have always been – an *automobile enthusiast*.

While pursuing an undergraduate degree in the history of technology at Georgia Tech, therefore, I gradually began to focus my attention on the history of the automobile and the automobile industry, and by the time I graduated in the fall of 1998, I knew that I had found my calling. Were it not for the year that I spent *away* from the academic community prior to the commencement of my graduate education here at MIT, however, my work as an automotive and technological historian might well have assumed a very different form. Almost certainly, that is, this particular project would never have materialized.

For you see, I am not a hot rodder. I have never built a high-performance engine, I have never taken part in a quarter-mile drag race, and only very rarely have I ever deliberately smoked my tires at a stoplight. Instead, I have always been a vintage, air-cooled Volkswagen enthusiast with a passion for restoration and factory authenticity, not modification and individual ingenuity. When I was younger, in fact, I actually spent a considerable amount of time *removing* high-performance parts and accessories from friends' VWs and replacing them with period-correct, original-specification components. It's not that I disliked modified cars and performance tuning, though. It's just that my particular automotive interests had always lain – and, right up through the end of my undergraduate years, would continue to lie – elsewhere.

But in the fall of 1998, all of this began to change when I reconnected with an old friend of mine. Like me, Chris was a VW enthusiast, but his was a passion for the later-model, water-cooled variety – in other words, he knew virtually nothing about the older, vintage models I enjoyed, and I knew virtually nothing about the newer "water-pumpers" he enjoyed. By the time he and I crossed paths that fall, however, I had recently acquired the keys to one of the first New Beetles to roll off Volkswagen's assembly lines. With my air-cooled cars mothballed and locked away in storage (in a short-term effort to save some money for graduate school), I decided that I ought to try to learn as much as I could about my newest, water-cooled Volkswagen. And Chris, a certified technician with a highly-tuned 1995 VW GTI, was more than happy to oblige. Before long, then, I was a counter clerk and graduate school applicant by day and a student of the culture and technology of the water-cooled VW community by night.

From time to time, therefore, I found myself in some peculiar places in the wee hours of the night. In shopping center parking lots, for example, where dozens of modified water-cooled Volkswagens and late-model Hondas – not to mention scores of twenty-somethings – would gather beneath the floodlights to show off their cars, to discuss the latest trends, and, on occasion, to pair off for a stoplight contest. In dimly-lit alleys in industrial complexes, too, where the VW crowd would sometimes gather on their own to talk shop, to barter parts and services, and to relive their on-road encounters with 5.0 Mustangs and Si Civics. And it was then, after I had been to a few of these impromptu gatherings of "import tuners," that I began to take a twofold interest in what they did. On the one hand, I began to find myself envisioning my own cars decked out with lowered springs, custom wheels, and high-performance mufflers. On the other hand (and, for our purposes here, more to the point), I began to reflect analytically upon the camaraderie, the bartering, the shop talk, the bench racing, and, of course, the technological creativity that seemed to me to be the vital core of this pursuit they all referred to as "performance tuning."

In particular, I began to wonder how, when, and why this activity first emerged, and how it might have evolved. In addition, I began to wonder about the process of performance tuning itself – about the informal, seat-of-the-pants engineering it implied, that is. Well aware that these folks had purchased most of the parts and accessories that they used to modify their cars not from Volkswagen or Honda, but from mail-order catalogs and specialty parts dealers, I also began to wonder about the companies that manufactured and sold these specialized performance products: what was *their* story?

With these random musings and experiences still fresh in my mind the following fall, when I enrolled at MIT, I decided to write a brief essay about performance tuning and speed equipment manufacturing for Merritt Roe Smith's aforementioned research seminar. In that essay, I suggested that these subjects were ripe for scholarly analysis, and Roe agreed. Within another year, I had written a substantial thesis on the high-performance aftermarket and environmental regulation, and by the end of my second year of graduate school, I had long since decided that this so-called "hot rod industry" was going to be the subject of my dissertation. And the rest, as they say, is history.

* * *

Over the past six years, the generous support of the following friends, colleagues, instructors, institutions, and family members has enabled me to see this project through. In a number of ways, in fact, this finished product is as much theirs as it is mine, although I alone deserve the blame for any errors of interpretation and/or fact that might appear hereinafter.

First, I would like to thank the Massachusetts Institute of Technology, the STS Department, and the Dibner Institute for the History of Science and Technology for their direct financial support of my graduate education. In this regard, I also owe a debt of gratitude to Debbie Douglas of the MIT Museum and David Kaiser of the STS faculty for their summertime assistantships that helped to keep me fed and clothed when times were lean. I would also like to thank the National Science Foundation for the dissertation improvement grant that enabled me to undertake the far-flung research necessary for this project. Additional travel grants and awards from the STS Department, the Kelly Douglas Fund at MIT, the Society for the History of Technology, and the Southern California Chapter of the Society of Automotive Historians have been of immeasurable help over the past six years as well.

I would also like to thank my dissertation committee members, Merritt Roe Smith, Rosalind Williams, Meg Jacobs, and Robert C. Post. Without their thoughtful advice, their prudent suggestions, and their collective eye for thematic postulation, this project would have been far longer and far less insightful, and the process of its drafting far less rewarding. In particular, I would like to thank Rosalind Williams for helping me to keep my own enthusiasm for this project and its subject in check; Meg Jacobs for always pushing me to think more broadly; and Robert C. Post for his resourcefulness, his tireless attention to detail, and, of course, his willingness to serve on my committee long-distance. My deepest debt, though, is to Merritt Roe Smith. From the moment I arrived in Massachusetts, he has been my staunchest supporter and my greatest source of intellectual inspiration. Without his guidance and encouragement – not to mention the way his eyes lit up the first time that I mentioned the word "hot rod" back in 1999 – a project of this magnitude (and of this topic) would have been unthinkable.

A number of my past and present colleagues here at MIT have read bits and pieces of this thesis over the course of the last six years, including Deborah Fitzgerald, Rob Martello, Tim Wolters, Brendan Foley, Bill Turkel, Shane Hamilton, Jenny Smith, and the members of the PXY Reading Group; for their thoughtful comments, their shrewd advice, and their inexplicably good-natured tolerance of my thick skull, I am forever grateful. I am also grateful for the crucial administrative support of the members of the STS departmental staff, especially Debbie Meinbresse, Judy Spitzer, Deb Fairchild, Kris Kipp, and Sarah Merrow. George Smith, Rita Dempsey, Trudy Kontoff, Bonnie Edwards, and Carla Chrisfield of the Dibner Institute were also of immeasurable help to me while I was a pre-doctoral fellow at their fabulous facility.

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without their assistance, I never would have been able to access the SEMA Research Center in Diamond Bar, California; without their intervention, I never would have been able attend the 2003 SEMA Show in Las Vegas; and, critically, without their friendly conversation and shop talk, the time that I spent in the desert and on the West Coast back in the fall of 2003 would have been far less memorable. I would also like to thank Don Garlits, Pat Garlits, and Ed Smith of the Don Garlits Museum of Drag Racing in Ocala, Florida for their gracious hospitality during the productive week I spent in their periodicals archive in October of 2003. In addition, I am deeply grateful to Dick Wells, Carl Olson, Bob Spar, Vic Edelbrock, Nancy Edelbrock, Camee Edelbrock, Delores "Dee" Berg, Kathy Flack, Wally Parks, Matthew Roth, Wayne King, David Boulé, Eugene Ciferno, Brian Brennan, Tom Lieb, Charlie VanCleve, and Doug Thorley, all of whom took time out of their busy schedules either to chat with me informally, to provide me with additional contacts, or, in some cases, to sit down with me for a formal interview. I am also grateful to Judy Ritchie, Jim Spoonhower, and Shirley Presecan of the Specialty Equipment Market Association, for their tireless assistance as I dug through their archival collections; to Ryan Rosales and Margarita Mora of the Cal-EPA Air Resources Board, for helping me to locate decades-old Board documents at the California EPA headquarters in Sacramento; to Mark Stiegerwald of the International Motor Racing Research Center at Watkins Glen, New York, for tracking down some obscure boxes in the Center's holdings; and to Sam Jackson of the National Hot Rod Association Museum in Pomona, California, for allowing me to use his office to conduct a portion of my interviews back in April of 2003. I would also like to thank the staff of the Library of Congress; of the Free Library of Philadelphia; of the Davidson Library Special Collections Room at the University of California, Santa Barbara; of the Boston Public Library at Copley Square; of the Harvard University Library System; and of the Interlibrary Loan and Retrospective Collections Departments of the MIT Library System. I am also grateful to Lisa Sweeney of the Global Information Systems Laboratory here at MIT, for her assistance in locating the software modules that were necessary for the creation of several of the detailed maps that appear in the third chapter of this thesis. And, finally, for helping me to ferret out a number of vital periodicals, articles, and documents related to the history of speed equipment manufacturing in the United States, I would also like to thank Amy and Bob Deull, Len Romanick, Vic McElheny, Kem Robertson, Phyllis DeVine (of *The Alternate*), and Charlie Yapp (of *Vintage Ford Speed Secrets Magazine*).

Heartfelt thanks as well to Walter Donila, for teaching me everything I now know about air-cooled Volkswagens, for his willingness to show up on a moment's notice anytime that I encounter an automotive problem I am unable to address on my own, and for his friendship these last seventeen years; to Chris Cox, for introducing me to import tuning, *Gran Turismo*, and parking-garage rally driving; and to Charles Robert Hogg, Sr., my grandfather and the man whose own enthusiasm for the automobile rubbed off on me at a very early age. In addition, I would like to thank the Topoloskys – my aunt, Megan, my uncle, Gary, and my cousin, Elizabeth – for their frequent hospitality and their boundless generosity these past six years; the Deulls – my aunt Amy and my uncle Bob – for introducing me to hydropneumatic suspensions, two-cylinder Panhards, and vintage grand prix racing, not to mention their willingness to loan me several thousand dollars' worth of 1950s periodicals for this dissertation; and my aunt Sandy, for her tireless support and words of encouragement these past six years. I would also like to thank the Taylors – my sister, Carolyn, her husband, Will, and their daughter, Kathryn – for helping me to maintain my sanity and my sense of perspective as I have progressed through graduate school.

Finally, for their love, their support, and their willingness to tolerate my automotive enthusiasm (and the boxes of parts, driveway oil stains, and rusting hulks that have sometimes come along with it), I would like to thank my parents, Susan and Danny Lucsko. To them, I dedicate this work.

David N. Lucsko
Somerville, Massachusetts
April 3, 2005

Introduction

By the age of 24, Robert E. Petersen was well on his way.[1] The ambitious Barstow, California native had left his desert home at the end of World War II, hoping to find a job in the bustling L.A. Basin. Within a few months, he had landed an entry-level position at MGM Studios in Hollywood, and by the end of his first year in the city, he had earned a spot on the company's team of publicists. Shortly thereafter, however, studio layoffs cut his stint with the company short. Undeterred, Petersen got together with a group of fellow casualties of the MGM contraction to found a new, independent consulting firm known as Hollywood Publicity Associates. Brimming with confidence, he eagerly set to work on his first assignment with the new company, which was to promote a winter exhibition at the Los Angeles Armory. It was the summer of 1947; Petersen was 21.

And that's when fate intervened. The show that he set out to publicize that summer was to be the first of its kind anywhere in the world, an automobile expo focusing exclusively on the burgeoning Southern California hot rod phenomenon. The Armory, in other words, was to be filled not with shiny new examples of Detroit's postwar renaissance, but rather with ragtag coupes and roadsters that had been modified to extract every last ounce of performance from their often decades-old designs. But as he worked to promote this "Hot Rod Exhibition," he noticed that there weren't any dedicated periodicals in which to advertise this unique show – no hot rod newspapers, no hot rod tabloids, no hot rod magazines. Curious, he began to investigate, and before long Petersen was convinced not only that the sport could use its own periodical, but also that he could be the one to produce it. Towards the end of the summer, he began to discuss the notion with a fellow publicist on the exhibition team, Robert Lindsay, and the two struck up a partnership. Early that autumn, Petersen and Lindsay left Hollywood Publicity Associates to

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[1] This biographical sketch draws heavily upon the following: Dean Batchelor, *The American Hot Rod* (Osceola, WI: MBI Publishing, 1995), 179-180; Ed Almquist, *Hot Rod Pioneers: The Creators of the Fastest Sport on Wheels* (Warrendale, PA: SAE, 2000), 90-91; and Steve Hendrickson, "Introduction," in *Hot Rod Magazine: The First 12 Issues* (Osceola, WI: MBI Publishing, 1998), 4-5.

begin working on their new project, *Hot Rod Magazine.*

After securing a $1,000 loan, assembling 24 pages of editorial and feature content, and sweet-talking a couple dozen Los Angeles automotive businesses into purchasing advertisements, the pair contracted with a local printer for a pilot run of 5,000 copies.[2] But with no subscribers and no distribution system to speak of, Petersen and Lindsay faced an uphill battle. Literally, they had to sell their new magazine themselves, copy by copy, all by hand. Remarkably, though, their first issue sold out quickly – exceptionally so, in fact. But it wasn't dumb luck: *Hot Rod Magazine*'s January, 1948 debut coincided with the Los Angeles Hot Rod Exhibition, and for three days the two were able to work the steps of the Armory, unloading thousands of copies and spreading the word. Their second issue sold out just as rapidly the following month, and by the end of the first quarter of 1948, it was clear that Petersen and Lindsay had a winner. Within another year, monthly sales had topped 50,000, and readers across the continent – indeed, across the globe – could find the latest issue at their local newsstands.[3] In 1950, Lindsay sold out to his partner, and Petersen, at the tender age of 24, now stood alone at the helm of a flourishing publishing empire.[4]

Thirty-two years later, when *Forbes* published its first annual list of the four hundred wealthiest Americans, Robert E. Petersen comfortably made the cut with an estimated net worth of $100 million.[5] Over the next fourteen years, his wealth – and his company, Petersen Publishing – continued to grow at a steady pace, and he became a fixture on the annual Forbes list. Finally, in 1996, a year in which his net worth stood at $450 million, Petersen sold his entire concern for $500 million.[6] By then, *Hot Rod* was but one of the thirty-two titles published each

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[2] Almquist claims that they ordered up 10,000 copies of their debut issue, but this is almost certainly a mistake: in the October, 1948 issue, Petersen and Lindsay claim to have only published half that. See "Editor's Column," *Hot Rod Magazine*, October 1948, 5. Hereafter, *Hot Rod Magazine*, also known as *Hot Rod*, will be cited as *HRM*.
[3] "Editor's Column," *HRM*, January 1949, 7. Three years later, monthly sales crossed the half-million mark.
[4] In September 1949, Petersen and Lindsay had launched *Motor Trend*, a general interest automotive publication designed to complement *Hot Rod Magazine*'s more specialized coverage, and by the following May, they had added a third, *Cycle* (see Batchelor, *The American Hot Rod*, pages 180-181). Although Petersen had bought him out in 1950, Lindsay continued to co-publish *Hot Rod Magazine* through April of 1952.
[5] *Forbes*, September 13, 1982, 153.
[6] *Forbes*, October 14, 1996, 286. In this edition, *Forbes* estimated that the sale of the Petersen Publishing empire had generated some $450 million for its founder; subsequent Forbes 400 lists corrected the figure to $500 million.

month under the Petersen banner, and it had long since ceased to be the company's biggest seller. *Hot Rod Magazine*, though, had been nothing short of an unqualified success for its founder and his company, for it had put them both on the map. Without it, there never would have been a Beverly Hills address for Mr. and Mrs. Robert E. Petersen – and, indeed, there likely never would have been a Petersen Publishing Company, either.

Hot Rod Magazine's phenomenal success over the years owed much to its internal management. Petersen himself, for starters, deserves much of the credit for the magazine's smooth launch. After all, it was he who had gone out to the dry lakes hot rod events in the autumn of 1947 to drum up advertising support for its debut.[7] It was he who had canvassed the L.A. area's hot rod meets, garages, and speed shops in order to recruit its staff. And it was he who had convinced Bob Lindsay to take the plunge and join him in the risky endeavor. Together, Petersen and his partner had worked tirelessly to promote *Hot Rod* during its critical formative years. It was they who had personally sold every copy of its first issue within weeks of its debut. It was they who had carefully managed its expansion as it grew from a measly 24 pages to a robust 50-plus within its first three years.[8] And it was they who had directed its sales as circulation of the magazine swelled some 10,000 percent – from 5,000 to more than 500,000 monthly copies – well before the fifth anniversary of its launch.[9] *Hot Rod*'s editorial and feature staff, too, deserves acclaim for its open-ended approach to the problem of orchestrating the "world's most complete hot rod coverage," for without a willingness to adapt to the shifting moods of its core audience, it never would have been able to maintain its status as the leading automotive enthusiast publication for so many, many years.[10] Let there be no doubt: *Hot Rod*'s prosperous run has been anything but lucky.

[7] Dean Batchelor, for example, vividly recalls meeting Petersen for the first time at the October 19, 1947 Southern California Timing Association (SCTA) meet at El Mirage Dry Lake, where Petersen had cornered Batchelor's friend and racing partner Alex Xydias in an attempt to sell an advertisement for Alex's fledgling speed shop. See Batchelor, *The American Hot Rod*, 179.

[8] *Hot Rod Magazine* first exceeded fifty pages of coverage in April 1951.

[9] Circulation of the magazine reached 500,000 copies in September, 1952.

[10] "World's Most Complete Hot Rod Coverage" was the magazine's first slogan. Today, *Hot Rod* remains the largest automotive enthusiast publication on the market, a title it has proudly claimed since the late 1940s.

And yet, especially during the magazine's first five or six years, its *timing* had as much to do with its success as anything else. *Throttle*, for example, a similar California-based hot rod publication, had hit the shelves back in January of 1941, only to be forced off the market by the beginning of the following year because of war-related shortages of personnel and paper.[11] *Hot Rod* had, of course, faced no such bad luck with its 1948 debut. But it wasn't Petersen and Lindsay's timing vis-à-vis the war per-se that had helped to ensure their endeavor's success. Instead, it was their timing vis-à-vis their subject. For with respect to hot rodding, their magazine had hit the streets at precisely the right moment.

Since at least the 1910s, enthusiasts across the United States had been building what *Hot Rod* would later define as its central concern, "automobiles whose bodies and engines have been rebuilt in the quest for better performance and appearance."[12] Early on, modified production cars of this sort were often put to use on oval racing tracks, but many – and quite possibly most – of them were built exclusively for street use. By the end of the 1920s, however, a group of gearheads based in Southern California had begun to take things in a new direction. Their altered rides, though built primarily for daily transportation, were also frequently used for racing. And when these enthusiasts competed with their dual-use machines, their "track" would be an open boulevard in what was then a relatively undeveloped region – that or the vast expanse of one of the Mojave Desert's many dry lake beds. In either case, their objective would be all-out, straight-line speed, with the clock as much their opponent as the fellows against whom they would actually line up. During the 1930s, the number of souped-up cars on the streets of Southern California swelled tremendously, and numerous clubs and organizations sprang up in support of this peculiar brand of modified motoring. Neither the Great Depression nor the Second World War proved sufficiently jarring to put an end to this activity, although the number of active participants did decline appreciably during the war. As early as the summer of 1945, however, modified prewar coupes and roadsters began to reappear en masse in the greater L.A. area, and in

[11] Batchelor, *The American Hot Rod*, 181.
[12] "Editor's Column," *HRM*, January 1948, 3.

the months and years that followed, hot rodding spread like wildfire throughout the United States.[13] *This* is when Petersen and Lindsay introduced their magazine, just as the phenomenon was first beginning to take off nationally. Their timing, in other words, could hardly have been better: *Hot Rod* was the first to catch the postwar wave, and although many, many others soon would hit the shelves to compete with it, none would ever overcome its first-to-market edge.

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Over the past five and a half decades, hot rodding has grown and evolved in ways that few in Petersen and Lindsay's time could ever have imagined. Today, those who modify their automobiles for improved performance and appearance are a diverse group, one that includes folks who drive everything from 150 horsepower flathead V8-powered prewar Ford coupes and roadsters to 500 horsepower 1960s Hemi-powered Mopar musclecars, 90 horsepower EMPI-equipped VW Beetles to 250 horsepower four-cylinder Honda screamers, and 400 horsepower Audi 1.8T sedans to 1,000 horsepower Ferrari monsters. Millions of enthusiasts attend thousands of meets, races, and shows across the United States each year, spending $26 billion annually on custom and performance equipment for their own cars.[14] And along the way, scores of periodicals and other published works have emerged to cover virtually every aspect of the sport from virtually every angle.

Currently, devotees of traditional 1930s-, 1940s-, and 1950s-style hot rods can choose from *Hot Rod*, *Popular Hot Rodding*, *The Rodders' Journal*, *Rodder's Digest*, and *American Rodder*, to name but a few. Those who prefer 1950s customs, on the other hand, might find the likes of *Rod and Custom* or *Car Craft* to be more to their liking. 1960s and 1970s American muscle car fans can select from among such magazines as *Super Chevy*, *Super Street*, *Mopar Muscle*, and *Muscle Mustangs & Fast Fords*. European automobile performance enthusiasts have *VW Trends*, *Dune Buggies and Hot VWs*, *European Car*, *MG World*, *Mercedes Enthusiast*,

[13] "Hot rod," as a term to describe these modified automobiles, and "hot rodding," as a term to describe the act of their creation, first appeared just after WWII. See below, pages 46-50.
[14] Specialty Equipment Market Association (SEMA), "2002 Automotive Specialty Equipment Industry Update," 2 (SEMA Research Center, SEMA Headquarters, Diamond Bar, California – hereafter, SEMA-RC). The figure of $26 billion dates from fiscal year 2001 and reflects the most current available data.

Excellence, and dozens of similar titles to which they can look for ideas, advice, and parts. And lest we forget the fastest-growing segment of the performance enthusiast market today, those who follow the Asian imports scene have *Sport Compact Car*, *High Performance Imports*, *Modified Mag*, *Import Tuner*, *Honda Tuning Magazine*, and many more that cater to their interests. What's more, gearheads looking for a bit more insight into the nuts and bolts of their own project cars can choose from literally hundreds of performance-oriented automotive manuals, instructive primers which cover everything from carburetor tuning to engine swapping. Likewise, those who want to catch up on one or another aspect of the history of the hobby have hundreds of popular books to choose from. Massive blinders, in short, would be required for one to stroll through his or her local Barnes & Noble, Borders, or Waldenbooks without noticing the voluminous popular literature devoted to the sport.

More to the point, one would need those blinders pretty much round the clock in order to overlook hot rodding entirely. Today, for example, town councils and neighborhood associations across the United States are struggling to deal with the problem of the excessive exhaust noise generated by modified Asian imports – and that includes even ritzy, gentrified locales like Boston.[15] On the other hand, for those who have had neither the pleasure of being kept awake at night by the roar of a tuned exhaust nor the experience of being passed by a booming, winged Civic on their local roads, there's still the matter of hot rodding's prominent place within our pop culture. To be sure, a steady diet of NPR and *The New Yorker* might well keep one from ever hearing about hot rod shows, drag racing meets, and local street-racing-related arrests, in much the same way that a bookshelf full of back issues of *Hot Rod Magazine*, a television set permanently tuned to ESPN (or the Speed Channel), and a pantry full of wing-dings might well prevent one from ever hearing about the comings and goings at the local symphony or the latest and greatest in high-end fashion and food. So be it. But how many among us – in particular, how many among us whose job it is to study the history of the United States in the twentieth century –

[15] Scott S. Greenberger, "Politicians, Residents Seek to Muffle Roaring Cars," *The Boston Globe*, March 30, 2003, B(1).

can honestly claim never to have heard of the Beach Boys, *American Graffiti*, *Grease*, or *The Fast and the Furious*? Modified automobility is a phenomenon that's been with us for nearly ninety years, and it's left its mark in nearly every imaginable nook and cranny of American life.

Until quite recently, however, academics have indeed managed to overlook it almost completely. Against the hundreds of popular titles dealing with hot rodding that have been published over the last fifty-odd years, for example, academics have turned out but three – H. F. Moorhouse's *Driving Ambitions*, Robert C. Post's *High Performance*, and John DeWitt's *Cool Cars, High Art*.[16] Beyond these, even passing references to the sport have been few and far between. In fact, apart from two short articles Moorhouse put out in the mid-1980s, Liz Cohen's brief and rather vague discussion of the matter in *A Consumer's Republic* is the only allusion to the world of hot rodding that has ever appeared in any scholarly work of American history; beyond Post's contribution, Cohen's reference is the only one to which historians of technology are likely ever to have been exposed as well.[17] But why?

The main reason, it seems, is actually fairly simple: since academic historians first began to turn their attention to the motorcar some forty-five years ago, their focus has remained fixed on the evolution of mass automobility in the United States. By and large, therefore, their story has been one of mass production and consumption, period. First set forth by John B. Rae in the 1950s and 1960s, and later refined by James J. Flink in the 1970s and 1980s, the received view of the history of the automobile goes something like this: In the beginning, it was simply an idea.

[16] Strictly speaking, H. F. Moorhouse's *Driving Ambitions: An Analysis of the American Hot Rod Enthusiasm* (NY, NY: Saint Martin's Press, 1991), Robert C. Post's *High Performance: The Culture and Technology of Drag Racing* (Baltimore, MD: The Johns Hopkins University Press, 1994), and John DeWitt's *Cool Cars, High Art: The Rise of Kustom Kulture* (Jackson, MS: University Press of Mississippi, 2002) are the only academic books ever published that deal with hot rodding. Figuring a bit more liberally, Brenda Jo Bright's anthropological work on lowrider culture in the American Southwest, a culture loosely related to the world of hot rodding, would push our total up to six if we count her M.A. and Ph.D. theses (*Style and Identity: Houston Low Riders* (M.A. Thesis, Rice University, 1986) and *Mexican American Low Riders: An Anthropological Approach to Popular Culture* (Ph.D. Thesis, Rice University, 1994)) as well as her recently published, edited volume on automotive art (*Customized: Art Inspired by Hot Rods, Low Riders, and American Car Culture* (NY, NY: H. N. Abrams, 2000)).

[17] Lizabeth Cohen, *A Consumer's Republic: The Politics of Mass Consumption in Postwar America* (NY: Knopf, 2003), 309. The two short articles by Moorhouse to which the present author is referring here are "Racing for a Sign: Defining the 'Hot Rod,' 1945-1960," *Journal of Popular Culture* 20 (1986), 83-96, and "The 'Work' Ethic and 'Leisure' Activity: The Hot Rod in Post-war America," in Patrick Joyce, Editor, *The Historical Meanings of Work* (NY, NY: Oxford University Press, 1987), 237-257.

During the 1880s, however, amateur tinkerers, mechanics, and engineers began to solve the basic technical problems that the notion of a horseless carriage inevitably raised. By the turn of the century, the automobile was a reality – for the fortunate few, that is. Expensive to purchase and operate, it languished as an elite toy until the Ford Motor Company managed to successfully implement the concept of mass production at its Highland Park assembly plant. Having delivered the automobile to the masses, however, Henry Ford ultimately proved unable to see beyond the Model T. During the late 1920s, General Motors was therefore able to step in and take command of the American automobile market, thanks in no small part to the dynamic leadership of Alfred P. Sloan and his commitment to a more flexible, consumer-oriented approach to mass production. Having proven itself invaluable to the well-being of the nation during World War II, the automobile industry entered into a short-lived golden age in the 1950s and the early 1960s. New suburban residential, commercial, and industrial developments implied a basic, auto-centric reconstruction of American life during these years. So too did the construction of the Interstate Highway system, in many ways both the crowning achievement and the swan song of the age of automobility. Consumer reaction, environmental legislation, and foreign competition together began to erode the economic, social, and cultural might of the "Big Three" in the 1960s and the 1970s. By the 1980s, therefore, American automobility had come full circle, its future as uncertain as it had been one hundred years earlier.

Typical narratives of American automotive history are, of course, far more nuanced as they appear in the standard syntheses. Nevertheless, whether developed over the course of four hundred pages or condensed into a half-page caricature, the basic milestones and the general thrust of the story remain the same. It is a relatively straightforward tale of the meteoric rise, triumph, and decline of an American industry. It is a narrative of rationalization which chronicles the evolution of the mass production paradigm. It is a story which details the emergence of a mass market. It is an account which emphasizes the achievements of prominent engineers and executives. It is, in short, a story of big business. Little wonder, then, that the scholars upon the work of whom our basic understanding of automobility in the United States is largely based were business and economic historians – John B. Rae, Alfred D. Chandler, Jr., and James J. Flink, most notably.[18]

To this fundamental mass production / mass consumption framework, which assumed its definitive form in Flink's *The Automobile Age*, scholars from a variety of disciplines have since added their own analyses of various aspects of mass automobility in the United States. That is, few who have written about the motorcar have ever thought to challenge the basic narrative – scholarship of a complementary nature is much more common. Among historians of technology, for example, David A. Hounshell's epic tome is a classic case in point. *From the American System to Mass Production* chronicles the emergence of mass production in the United States, focusing in particular upon its elaboration within the automobile industry.[19] Weaving a narrative of manufacturing development firmly rooted in shop floor reality, Hounshell's tale has given historians of technology an invaluable, in-depth look at the nature of early twentieth century automobile manufacturing practice we could never have surmised from the work of Flink or Rae. And yet, *From the American System to Mass Production* fully complements their work, marching as it does perfectly in step with them in heralding the triumph of such colossal firms as Ford and General Motors over their numerous smaller competitors. More recently, Thomas J. Misa's detailed examination of the early automobile manufacturers and their steel suppliers emphasizes the way in which the productive relationship forged by these industrial sectors gave rise to the push for parts and materials standards.[20] In this way, Misa's tale significantly

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[18] Chandler's study of the rationalization of managerial and corporate practices at General Motors was of course but part of a single project of much greater breadth; Rae and Flink, on the other hand, consistently focused their attention on the history of the automobile over the course of their entire careers. See John B. Rae, *American Automobile Manufacturers: The First Forty Years* (NY, NY: The Chilton Company, 1959), *The American Automobile: A Brief History* (Chicago, IL: University of Chicago Press, 1965), and *The American Automobile Industry* (Boston, MA: G.K. Hall and Company, 1984); Alfred D. Chandler, *Strategy and Structure: Chapters in the History of the American Industrial Enterprise* (Cambridge, MA: MIT Press, 1962); and James J. Flink, *America Adopts the Automobile, 1895-1910* (Cambridge, MA: MIT Press, 1970), *The Car Culture* (Cambridge, MA: MIT Press, 1975), and *The Automobile Age* (Cambridge, MA: MIT Press, 1988).

[19] David A. Hounshell, *From the American System to Mass Production, 1800-1932: The Development of Manufacturing Technology in the United States* (Baltimore, MD: The Johns Hopkins University Press, 1984), especially chapters 6 and 7.

[20] Thomas J. Misa, *A Nation of Steel: The Making of Modern America, 1865-1925* (Baltimore, MD: The Johns Hopkins University Press, 1995), chapter 6.

strengthens our understanding of the process of standardization as it unfolded within the early American automotive industry. Ultimately, however, Misa, like Hounshell before him, merely tacks another fully complementary chapter onto Rae and Flink's master narrative – standardization, after all, has long served as a load-bearing pillar of their story. Finally, even Philip Scranton's landmark celebration of specialty manufacturing fails to challenge the longstanding view that the history of the automobile is one of mass manufacturing and mass marketing.[21] For Scranton, in his zeal to shed light on the "other half" of the story of the development of American manufacturing, simply brushes the automobile aside, implicitly confirming its received status as a – or rather, *the* – symbol of the mass produced.

Among analyses of a more externalist bent, scholarship complementary to the standard narrative also dominates. A handful of European automotive historians, for example, have helped to place the American story more squarely within an international context, but they have done so without challenging the basic tenets of that story.[22] Likewise, a number of historians concerned with the relationship between the automobile and the built environment – Kenneth T. Jackson, Joseph Interrante, Ronald Bayor, Howard L. Preston, Clay McShane, and Bruce E. Seely, to name but a few – have published wonderfully insightful monographs and articles which situate the American automobile more firmly within the urban-, suburban-, and rural-transportation systems in which it has emerged; their work, however, takes the emergence of the automobile itself as something of a given.[23] In addition, labor historians such as Stephen Meyer and Nelson

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[21] Phillip Scranton, *Endless Novelty: Specialty Production and American Industrialization, 1865-1925* (Princeton, NJ: Princeton University Press, 1997).
[22] See, for example, Jean-Pierre Bardou, Jean-Jacques Chanaron, Patrick Fridenson, and James K. Laux, *The Automobile Revolution: The Impact of an Industry* (Chapel Hill, NC: University of North Carolina Press, 1982).
[23] On automobility and the growth of suburbia, see Kenneth T. Jackson, *Crabgrass Frontier: The Suburbanization of the United States* (NY, NY: Oxford University Press, 1985). On rural automobile use and the growth of the metropolitan environment, see Joseph Interrante, "You Can't Go to Town in a Bathtub: Automobile Movement and the Reorganization of Rural American Space, 1900-1930," *Radical History Review* 21 (1979), 151-168 and "The Road to Autopia," in David L. Lewis and Laurence Goldstein, Editors, *The Automobile in American Culture* (Ann Arbor, MI: University of Michigan Press, 1983), respectively. On the urban racial geography fostered by automobility, see Ronald Bayor, *Race and the Shaping of Modern Atlanta* (Chapel Hill, NC: University of North Carolina Press, 1995) and Howard L. Preston, *Automobile Age Atlanta: The Making of a Southern Metropolis, 1900-1935* (Athens, GA: University of Georgia Press, 1979). On the early urban market for automobiles, see Clay McShane, *Down the Asphalt Path: The Automobile and the American City* (NY, NY: Columbia University Press, 1994). And, finally, on the American highway system, see Bruce Seely, *Building the American Highway System:*

Lichtenstein have helped to impart upon the standard narrative a better understanding of the workers who have spent their lives actually assembling this most quintessential of American mass-produced technologies.[24] And, finally, scholars from a variety of disciplines have chimed in on the issue of the perceived decline of the American automobile industry, deepening our understanding of the role in this process of everything from foreign competition to environmental degradation.[25] In the end, though, the work of each of these scholars acts only to confirm the received truth of the standard account: the history of the automobile is a story of big business, big markets, big labor, and big government.

To be sure, there are those who have sought to question one or another aspect of the standard narrative. Donald Findlay Davis's *Conspicuous Production*, for example, attempts to revise one of John B. Rae's most fundamental arguments. According to Rae (and, later, Flink), one of the most remarkable features of the early history of the automobile is the way in which it proves possible the "rags-to-riches" mythology of American capitalism: among the early pioneers of the American automobile industry in this country, the overwhelming majority were self-made men. Davis, however, arrives at a very different conclusion after surveying the relevant biographical data: inherited wealth financed the endeavors of the automotive industry's pioneers. Davis's case is strong, but upon reflection it quickly becomes clear that, far from offering the revision of the standard narrative that his introduction promises, his work has only

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Engineers as Policy Makers (Philadelphia, PA: Temple University Press, 1987), and Tom Lewis, *Divided Highways: Building the Interstate Highways, Transforming American Life* (NY, NY: Viking Penguin, 1997).

[24] Stephen Meyer III, *The Five Dollar Day: Labor Management and Social Control in the Ford Motor Company, 1908-1921* (Albany, NY: State University of New York Press, 1981) and Nelson Lichtenstein, *The Most Dangerous Man in Detroit: Walter Reuther and the Fate of American Labor* (NY, NY: Basic Books, 1995).

[25] On the differences between the so-called "Japanese model" and the "American model" of manufacturing strategy, see Michael Piore and Charles Sabel, *The Second Industrial Divide: Possibilities for Prosperity* (NY, NY: Basic Books, 1984); James P. Womack, Daniel T. Jones, and Daniel Roos, *The Machine that Changed the World: The Story of Lean Production* (NY, NY: HarperCollins, 1991); and Laurie Graham, *On the Line at Subaru-Isuzu: The Japanese Model and the American Worker* (Ithaca, NY: Cornell University Press, 1995). On the environmental impact of the automobile, the literature is surprisingly thin. James E. Krier and Edmund Ursin, *Pollution and Policy: A Case Essay on California and Federal Experience with Motor Vehicle Air Pollution, 1940-1975* (Berkeley, CA: University of California Press, 1977) and Douglas H. Ginsburg and William J. Abernathy, Editors, *Government, Technology, and the Future of the Automobile* (NY, NY: McGraw-Hill, 1980), though weak, remain good places to start. Some of the work of Martin V. Melosi is also relevant, though only indirectly so; see for example *Effluent America: Cities, Industry, Energy, and the Environment* (Pittsburgh, PA: University of Pittsburgh Press, 2001).

helped to reinforce the standard paradigm – after all, whether it was truly "rags-to-riches" or simply "riches-to-other-riches," the story remains that of the rise and fall of a colossal industrial sector.[26]

During the 1990s, however, a promising new line of inquiry began to emerge. Their thinking deeply rooted in social constructivism, scholars including Trevor Pinch, Ronald Kline, and, more recently, Kathleen Franz began to seek to revise our understanding of the nature of American automobility by posing a deceptively simple question: what about the users? For Kline and Pinch, the answer lies in an examination of the ways in which rural Americans sought to integrate the Model T into their daily lives. In their article on the subject, they essentially argue that rural Americans came to embrace the Model T not because they bought into Henry Ford's vision of what the automobile made possible, but rather because they had their own: they saw in the automobile a basic source of mobile power the end use(s) of which it was theirs to decide.[27] Similarly, Franz's recent study reveals the extent to which early automobile travelers actively tinkered with and modified their cars in order to make them more comfortable and more versatile.[28] What Kline, Pinch, and Franz offer, in other words, is a history of the early automobile in which the industry did not hold all the cards: far from being a simple, straightforward story of industrial progress, the story of the automobile is a complex tale of users interacting with and actively shaping the role of the motorcar in their lives. "Users as Agents of Technological Change" and *Narrating Automobility* both conclude, however, that by the late 1920s, the automobile industry had successfully closed the black box, effectively ending the interactive phase of the history of the automobile and heralding the age of Big Three dominance. Thus, even Kline, Pinch, and Franz ultimately concede the applicability of the standard big business narrative for all but the first twenty-five-odd years of the history of the car.

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[26] Donald Findlay Davis, *Conspicuous Production: Automobiles and Elites in Detroit, 1899-1933* (Philadelphia, PA: Temple University Press, 1988).
[27] Ronald Kline and Trevor Pinch, "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States," *Technology and Culture* 37 (1996), 763-795.
[28] Kathleen Franz, *Narrating Automobility: Travelers, Tinkerers, and Technological Authority in the Twentieth Century* (Ph.D. Thesis, Brown University, 1999).

In the academic literature dealing with the history of the automobile in America, what we have, then, is a relatively straightforward master narrative of mass production and consumption. Adorned with countless complementary studies, this narrative has done much to account for the emergence and elaboration of mass automobility in the United States. And through the work of Rae, Flink, Jackson, Bayor, Seely, McShane, Davis, and the others that have contributed to this literature, we have therefore come to understand a great deal about the ways in which the vast majority of Americans have experienced the automobile over the course of the twentieth century. But if the so-called "car culture" has been done to death, the same cannot be said of what we might call the "culture of the car." For indeed, what of all of those for whom the automobile is something more than a means with which to ferry oneself to work each morning, pick up the kids at soccer practice, haul groceries, or get to the beach on weekends? What of all of those who cherish their cars – those who collect them, restore them, modify them, or race them? What, in other words, of the enthusiasts? Unfortunately, their fixation on the mass-produced and the mass-consumed has largely kept academic historians from saying much at all about these folks.

Then again, maybe they, too have been to Barnes & Noble and have seen the vast array of published literature geared towards the enthusiast, especially the hot rodder – that is, perhaps most academics have simply deemed it proper to leave hot rodding to the popular press and focus instead on other questions. After all, although many of the widely available popular volumes amount to little more than nicely-bound collections of photographs, a few of them are quite excellent and fully deserve our deference. Dean Batchelor's *The American Hot Rod*, for example, though filled with more than its fair share of pictures, is a thoroughly-researched, carefully-considered piece of work. The same is true of Peter Vincent's recent book, as well as those of Ron Roberson, Robert Genat and Don Cox, and Don Montgomery.[29] But as those academics

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[29] Peter Vincent, *Hot Rod: An American Original* (St. Paul, MN: MBI Publishing Company, 2001), Ron Roberson, *Middletown Pacemakers: The Story of an Ohio Hot Rod Club* (Chicago, IL: Arcadia, 2002), and Robert Genat and Don Cox, *The Birth of Hot Rodding: The Story of the Dry Lakes Era* (St. Paul, MN: Motorbooks International, 2003). Montgomery, a hot rodding enthusiast since the early 1950s, has written extensively on 1940s, 1950s, and 1960s hot rodding and drag racing. See, for example, *Hot Rods in the Forties: A Blast from the Past* (Fallbrook, CA: D. Montgomery, 1987), *Hot Rods As They Were: Another Blast from the Past* (Fallbrook, CA: D. Montgomery, 1989), *Hot Rod Memories: Relived Again* (Fallbrook, CA: D. Montgomery, 1991), *Supercharged Gas Coupes:*

who have chosen to delve into the world of the enthusiast clearly demonstrate in *their* work, much remains for they and their peers to explore, particularly with regard to hot rodding.

Consider the contributions of the aforementioned exceptions to the mainstream currents of academic automotive history, H. F. Moorhouse, Robert C. Post, Brenda Jo Bright, and John DeWitt.[30] Moorhouse, a British sociologist, has made three. His first, "Racing for a Sign," appeared in *The Journal of Popular Culture* in 1986. In this brief article, Moorhouse explores the ways in which the concept of the "hot rod" evolved over the course of the decade and a half following the end of the Second World War from a very narrowly-defined and somewhat derogatory label into a self-descriptive term of relatively broad applicability. It was a process, Moorhouse argues, that the popular enthusiast periodicals in particular spearheaded in an effort to broaden the appeal of the activity – and, presumably, to boost magazine sales. The following year, Moorhouse published another article on the subject of the so-called "hot rod culture," titled "The 'Work' Ethic and 'Leisure' Activity." In it, he argues that the pride and the skill of the unpaid labor that went into the construction of a hot rod during the postwar years acted as a sort of a leisure-time surrogate for the pride and the skill that had by then all but vanished from the realm of paid industrial labor. In addition, he explores the emergence of informal customs and norms among the hot rodders of the 1950s, again emphasizing the role of the popular magazines in this process of normalization and codification. Finally, in 1991, Moorhouse published a monograph dealing with the entire history of what he refers to as "the hot rod fraternity," *Driving Ambitions*. Though perhaps overly-dependent on the opening pages of *Hot Rod* back issues for its evidentiary support, Moorhouse's book nevertheless manages to provide a relatively detailed survey of the history of hot rodding from the 1940s through the mid-1980s. Unfortunately, as a work conceived primarily as a contribution to the field of the sociology of work and leisure, his narrative is often somewhat static, providing very little sense of the historical evolution of the

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Remembering the Sixties (Fallbrook, CA: D. Montgomery, 1993), *Authentic Hot Rods: The Real "Good Old Days"* (Fallbrook, CA: D. Montgomery, 1994), and *Those Wild Fuel Altereds: Drag Racing in the Sixties* (Fallbrook, CA: D. Montgomery, 1997); it would, however, be a stretch to call any of Montgomery's books "widely available."
[30] See above, page 23.

categories and the concepts he chooses to highlight. As a result, *Driving Ambitions* is at best a frustrating read for the historically-minded, for it leaves one wondering at nearly every turn whether there might in fact be a richer, fuller story behind the theoretical and rhetorical concepts Moorhouse so ably shuffles.

Robert C. Post's *High Performance*, on the other hand, is an historical analysis par excellence. Post, an historian of technology, traces the evolution of drag racing from its origins in the street- and lakes-racing of prewar hot rodders up through its elaboration as a high-dollar, competitive sport in the years since WWII. Whereas Moorhouse frames his project rather broadly, aiming to detail the rise not only of organized drag racing, but also of hot rodding as a whole, Post focuses on drag racing and drag racing alone. And it pays off: Post's treatment of its history is as complete and detailed a narrative as could be desired. Moreover, his decision to discuss the evolution of drag racing as an example of technological enthusiasm writ large renders his work an invaluable contribution to the field of the history of technology. One wonders, however, whether and how we might be able to feed Post's analysis back into the history of the automobile in America in a broader sense. Perhaps the pursuits of the average hot rodder – bridging conceptually as they do the chasm between those of the ordinary automobile user and those within the highly specialized world of professional drag racing – may well hold the key.

Brenda Jo Bright's work raises similar questions. Bright, an anthropologist, has written extensively on the subject of the lowrider as a phenomenon of profound cultural significance for Hispanics in the United States. In the simplest of terms, lowriders are automobiles that have been modified with custom paint schemes, flashy accessories, and, above all else, hydraulic suspension systems that enable them to cruise the streets with as little as a quarter-inch of clearance between the vehicle and the ground. As a technological phenomenon, lowriding represents the coming together of Detroit iron and a variety of customizing methods, tools, and traditions. As a cultural phenomenon, it represents a union of technology, individual creativity, and Hispanic identity. Bright's work attempts to detail both the technological and the cultural aspects of the lowriding culture, and although she succeeds admirably with the latter, her analysis of the former raises far more questions than it answers. More to the point, however similar they are in the abstract, lowriding isn't hot rodding, and therefore precious little of Bright's thick description sheds much light on the lives of those to whom *Hot Rod* caters.

Finally, there's the work of John DeWitt. *Cool Cars, High Art* is a masterful essay which explores the customized car scene of the 1950s and the early 1960s, arguing that in order to properly understand the significance of the work of those who created the "Kustom Kulture," we need to learn to see the cars that they produced as genuine works of modern art. Moreover, the revival of the Kustom Kulture in the 1980s and the 1990s should, according to DeWitt, be understood not simply as an exercise in nostalgia, but rather as a genuine postmodern artistic movement. Perhaps he's right: perhaps the customized automobiles of the 1950s and the 1960s do indeed deserve recognition as bona fide twentieth-century American art of the highest caliber. But in his decision to include *both* hot rods *and* custom cars in his definition of the "Kustom Kulture," DeWitt almost surely errs. For the essence of the phenomenon he details is aesthetic, and aesthetics, to the true hot rodder, is at best a secondary concern. In other words, hot rodding is and has always been *primarily* about the pursuit of speed, whereas car customizing is and has always been *primarily* about the pursuit of physical beauty. To be fair, the very first sentence of the very first article in the very first issue of *Hot Rod Magazine* in January of 1948 defined as "hot rods" those cars "whose bodies and engines have been rebuilt in the quest for better performance and appearance."[31] And indeed, as we will see, there was in fact a powerful set of informal aesthetic norms among the early Southern California hot rodders of the 1930s and the 1940s, norms that governed which cars were rebuilt – and in what manner.[32] What's more, as we will also see, the hot rodders of the early to mid-1950s began to place a higher premium on finished interiors and polished paint jobs than had their 1930s and 1940s predecessors, a trend that would ultimately render many of their cars as beautiful – and, indeed, artistic – as the average custom.[33] Nevertheless, to a greater extent than DeWitt admits, customization and hot

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[31] "Editor's Column," *HRM*, January 1948, 3.
[32] See below, chapter 3.
[33] See below, chapters 3 and 4.

rodding remained fundamentally different quests, particularly during the 1950s and the 1960s.[34] And as a result, though he often speaks of hot rods in his text, DeWitt seldom mentions hot rodding.[35]

Moorhouse, Post, Bright, and DeWitt have done much to open up the world of the enthusiast to academic study, but the history of hot rodding as such remains virtually untouched. Thanks to *Driving Ambitions*, we have an excellent historical sociology of the phenomenon, but no rigorous study of its development over time. Thanks to *High Performance*, we have gained tremendous insights into the development of the technological underpinnings of organized drag racing, but as yet we have no such understanding of the technical milieu of the ordinary hot rodder. Thanks in particular to *Mexican American Low Riders*, we now know much about the culture of lowriding in the American Southwest, but we remain almost entirely unschooled in the culture of hot rodding. And thanks to *Cool Cars, High Art*, we have begun to appreciate well-executed hot rods and custom cars as artistic expressions, but we still know very little about the mechanical art of modifying a production automobile.

This dissertation aims to fill in some of these gaps. Doing so properly, however, requires a suitable perspective, one from which to observe the evolution of hot rodding over the entire course of its history. Fortunately, precisely such a panoptic point of vantage does indeed exist – consider the business of speed equipment manufacturing. Long before the postwar hot rod boom, long before the first issue of *Hot Rod Magazine* hit the streets, and long before the first dry lakes hot rod racing events of the late 1920s and the early 1930s, dozens of small shops across the United States had already begun to design and manufacture add-on parts and components to facilitate the performance-oriented modification of otherwise run-of-the-mill cars. In other

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[34] To wit, customizers wanted their cars to look good, and they were willing to sacrifice acceleration, handling, and top speed in order to achieve this end. Hot rodders also wanted their cars to look good, but what *Cool Cars, High Art* overlooks entirely is that they remained willing, if necessary, to scrimp on the brilliant paint and the hand-stitched interiors in order to further refine their vehicles' mechanical underpinnings.

[35] If it seems as though the present author is splitting hairs inexplicably at this point, fear not. For more on the subtle differences between terms like "hot rod," "hot rodder," and "hot rodding," see below, pages 46-50. For a full (and nearly chapter-length) discussion the evolution of the concept of "hot rodding" (as distinct from the mechanical artifact of the "hot rod" itself), see below, chapter 3.

words, as early as the 1910s, high-performance cylinder heads, camshafts, intake manifolds, carburetors, ignition systems, pistons, valves, crankshafts, mufflers, gearboxes, brakes, springs, wheels, and tires were available commercially to those for whom the standard capabilities of the Model T were insufficient.[36] By the end of the 1930s, with the California hot rod craze in full swing, the manufacture of these aftermarket parts and accessories had begun to concentrate in the L.A. area, and by the time the hobby went national in the late 1940s, the overwhelming majority of the high-performance equipment hot rodders in every state of the Union used on their cars came from sunny Southern California. Consisting of a large number of very small firms, this fledgling industry grew by leaps and bounds in the decades that followed. During the 1960s and the 1970s, speed equipment manufacturing – by then a $1 billion-a-year enterprise – found itself caught up in the national debate over the human-safety and environmental impacts of automobility. Unlike the Big Three, however, this particular industry managed to deal with the onset of governmental regulation in a productive and profitable manner – the 1960s and the 1970s, in fact, rank among the most successful periods in its history. Although the later 1980s were slower than many within the industry had hoped, the early 1990s witnessed a renewed, surging growth as a new generation of enthusiasts breathed new life into the phenomenon. Today, this $26 billion-a-year business serves hot rodders young and old the world over, whether their interests lie in the modification of American, European, or Asian automobiles.

Dating back some nine decades, the rich and heretofore untold history of speed equipment manufacturing offers an ideal lens through which to observe the evolution and elaboration of hot rodding in the United States. On its own terms, though, the story of this industry is equally appealing. Its firms are small, and its market is fiercely competitive and almost entirely demand-driven – little room exists in this business, therefore, for poor merchandising decisions. Furthermore, because the high-performance wares its firms turn out are intended to enhance extant OEM[37] designs, its product cycles follow closely those of the

[36] Through the late 1920s, high-performance add-on parts were, with *very* few exceptions, only made available for the Model T Ford. The first chapter of this thesis attempts, among other things, to account for this limitation.
[37] OEM is common shorthand for "original equipment manufacturers" – Ford, GM, Honda, Chrysler, and so on.

mainstream automotive industry. And yet, hot rodders don't necessarily change their automotive interests with each new model-year release from Detroit, Wolfsburg, or Tokyo – aftermarket speed equipment manufacturers thus have not only to be ready to supply products for newer designs, but also for those that have been around 10, 20, 30, even 50 years or more. At the same time, governmental regulations define – and, on an almost yearly basis, redefine – the legal limits of what aftermarket companies and consumers can and cannot do with their cars. Consequently, flexibility is imperative within this industry. Residing conceptually at a unique nexus where engineering creativity, consumer desires, OEM automotive technology, and governmental regulations meet, the business of speed equipment manufacturing is in other words itself an interesting subject worthy of further consideration.

What follows, therefore, is a history of the American high-performance automotive aftermarket. Covering the years roughly spanning from 1915 to 1984, it traces the evolution of the industry's constituent firms, characteristic products, industrial organization, and relationship(s) with Detroit, DC, and its own customers. Among these points, the last is critical: this project treats the speed equipment industry and its customers as a single topic of inquiry. This is not to say that the one should be equated with the other – far from it, in fact. Rather, it means that this thesis considers seriously the ways in which the interaction between the two has affected the evolution not just of the industry itself, but of the average enthusiast and his beloved hot rod as well.

Structurally, the project begins with four chronological chapters which carry the story into the 1960s, and it ends with two overlapping, topically-oriented narratives which cover the 1960s, the 1970s, and the early 1980s. Each of the first four chapters features case studies of particular aftermarket companies in addition to their overarching stories; chapters five and six unfold as detailed narratives alone. Practical considerations have compelled the present author to conceive of the chapters in this manner, for as the history of the speed equipment industry enters the mid- to late 1960s, its mounting complexity begins to defy chronological exposition.

Chapter One explores the early history of this industry. It begins in 1915, when the very first over-the-counter aftermarket products for the Model T became available, and it ends in late 1927, when the Ford Motor Company's decision to replace the venerable Model T with an entirely new model sent the fledgling high-performance aftermarket into something of a tizzy. It documents the ways in which early enthusiasts sought to wrest a bit more power from their Model T engines; the rise of the Midwestern high-performance aftermarket industry; and the complex interrelationship that existed in the 1910s and the 1920s between oval track racing and on-road high-performance tuning. Case studies in this first chapter include The Laurel Motors Corporation, one of the very first to design, sell, and manufacture high-performance aftermarket parts for the Model T back in the mid-1910s; Frontenac, also known as the Chevrolet Brothers Manufacturing Company, an Indianapolis-based firm founded by Arthur and Louis Chevrolet after the latter sold out to General Motors in the mid-1910s; and Rajo, a Wisconsin company famous among prewar hot rodders for its high-performance cylinder heads.

Chapter Two focuses on the fate of performance tuning and the speed equipment industry during the late 1920s, the 1930s, and the very early 1940s. It begins with a discussion of the ways in which the advent of the Model A Ford brought changes both fundamental and superficial to the high-performance automotive aftermarket, including the onset of the Midwestern industry's slow decline into obscurity; the emergence of dry lakes racing and the ways in which it represented something of a revolution in American motorsports; the advent of the hot rod club as an organizational breakthrough for Southern California dry lakes racing enthusiasts; and, finally, the reasons why and the ways in which a handful of these California lakes racers began to fabricate and, before long, to sell their own hot rod parts in the 1930s. Case studies for this chapter include Ed Winfield, whose carburetors, camshafts, and cylinder heads, first manufactured in the 1920s out in California, earned him the nickname "the father of hot rodding"; Miller-Schofield, an early California company that went through several iterations before it finally found its niche in the early 1930s; and R&R Manufacturing, a tiny, niche-oriented Midwestern company whose founder, Robert M. Roof, had once been a leading personality in one of the largest and most diverse high-performance firms of the Model T era.

Chapter Three picks the story up in 1942 and carries it forward through the end of 1955. It begins, therefore, by examining the ways in which hot rodding and the fledgling California industry managed to survive the Second World War intact. It then delves into a detailed analysis of the many ways in which the narrowly-defined and exclusively Southern Californian hot rodding phenomenon of the immediate postwar years began to evolve, splintering into a number of distinct niches as it spread throughout the United States in the late 1940s and the early 1950s. The balance of the chapter then focuses on the growth and diversification of the speed equipment industry during the period in question, when the industry was overwhelmingly a Southern California phenomenon. Four brief case studies then punctuate the story of the postwar California speed equipment industry: Offenhauser, an indirect organizational descendant of a legendary prewar racing engine company; Horning, a postwar cylinder head manufacturer that quickly split into three distinct companies; Eddie Meyer Engineering, a full-line speed equipment manufacturer that served as an informal training center for more than a few prominent personalities within the postwar industry; and Iskenderian, a camshaft company founded in 1947 and run to this day by the legendary Ed "Isky" Iskenderian.

Chapter Four covers 1955 through 1970, a period of profound change both within the industry itself and within enthusiast circles as well. It begins with an examination of the late 1950s OEM "horsepower race" as well as the mid- to late 1960s musclecar boom, exploring the implications of these remarkable developments for the manufacturers of add-on high-performance parts and accessories. Its focus then shifts back to Southern California, where a long-term process of fragmentation within the hobby that had begun back in the late 1940s finally began to produce some fundamental shifts within the aftermarket industry itself. Case studies for this turbulent period include Crane Cams, a company based in Florida whose commitment to the latest high-tech research, development, manufacturing, and testing processes – not to mention a scrappy, confrontational approach to advertising and promotion – helped it to grow from relative obscurity to national prominence within the span of a few short years; Edelbrock, a manifold firm dating from the 1930s that survived not only the decline of flathead technology, but also the sudden death of its founder Vic Edelbrock in 1962 and its subsequent transfer into the hands of Vic's son, Vic Jr.; B&M Automotive, which pioneered the use of modified automatic transmissions for racing and street applications; and Gene Berg Enterprises, a high-performance company that specialized in aftermarket gear for modified Volkswagens.

Chapter Five represents the first of the topically-conceived chapters. Backtracking a bit to 1960, it begins with a detailed narrative that explores some of the more salient and fundamental changes that the industry began to undergo in the early to mid-1960s: the founding of its industrial organization, the Speed Equipment Manufacturers Association, or SEMA; the onset of a renewed period of manufacturing expansion and product diversification; the emergence of the first truly mass-produced high-performance aftermarket components; the virtual eclipse of the traditional, small-scale, service-oriented neighborhood speed shop in favor of mammoth wholesale distributors; the appearance of its first commercial trade journal, *Hot Rod Industry News*; and, finally, the arrival of a second generation of leaders. The chapter then focuses on the onset of federal, state, and local automotive safety legislation in the 1960s and the 1970s, detailing the ways in which SEMA led the aftermarket in a remarkably successful bid to keep the practice – and the business – of modifying street-going cars legal in an age when "speed" and "high-performance" had suddenly become among the least politically-correct automotive aspirations imaginable in the United States.

Chapter Six takes a second look at the period covered in the fifth chapter – 1960 through the early 1980s, roughly – in an effort to further clarify the relationship between the high-performance aftermarket and federal, state, and local governmental regulators. Adopting a cooperative, officially non-confrontational approach first to the California Air Resources Board (CARB) in the 1960s[38] and later to the Environmental Protection Agency (EPA) in the 1970s, SEMA managed to defuse another regulatory time bomb: air pollution standards. Although its ability to successfully negotiate with the CARB and the EPA ultimately hinged upon a very

[38] From 1960 until 1967, the Motor Vehicle Pollution Control Board (MVPCB) was the Golden State's air pollution regulatory body; in 1967, it was dissolved and replaced with the more powerful (and ultimately much more effective) CARB.

specific set of technical arguments regarding the relationship between aftermarket equipment and automotive emissions levels, SEMA also found it necessary to strike a number of compromises with the representatives of those regulatory bodies, compromises which tended to come at the expense of the average hot rodding enthusiast. The upshot, then, was that performance tuning and the high-performance business remained legal. However, the long-term cost to the average enthusiast was often quite substantial.

A brief conclusion follows Chapter Six. Wrapping up our story of the evolution of speed equipment manufacturing from 1915 through 1984, this conclusion also introduces several additional developments and themes that began to unfold within the industry during the 1970s, the 1980s, and the 1990s. These include, most notably, the accelerating aftermarket fragmentation of the 1970s, the adoption of sophisticated new machine tools and manufacturing strategies by many speed equipment companies in the 1980s, the onset of a period of pronounced stagnation in the very late 1980s, the emergence of "plug and play" computer chip performance-tuning in the early to mid-1990s, and the "import tuner" revolution of the mid- to late 1990s. However, because a substantial amount of additional research, and perhaps an entire second volume of text, would be required to fully account for these developments, the present author has deliberately structured these concluding remarks as *suggestive* rather than *demonstrative* or *conclusive*.

As its chapters unfold, this dissertation attempts to address a number of questions of interest not only to those academics who have studied similar topics, but also to historians of technology more generally. First and foremost among them is the oft-neglected matter of technological enthusiasm. Some – Tom Hughes and Joe Corn, most notably – have conceived of this issue in Progressive terms. The capitalization is deliberate: Corn's enthusiasts believed that a thorough application of aeronautical technology in the United States would help to deliver the nation into a utopian age, whereas the enthusiasts of Hughes's study believed technology more generally to be the wellspring of American greatness.[39] For both, in other words, technological enthusiasm is a belief in the transformative power of technological advance, a means-ends rationality in which an eager embrace of the means (technology) is predicated upon specific ideas regarding the ends they are expected to deliver. But is this really all there is to it, a simple means-ends rationality? Robert C. Post certainly has his doubts: indeed, *High Performance* is if nothing else an exploration of the extraordinary power that an enthusiasm for a particular piece or type of technology in and of itself – not for the ends the technology might deliver, but *for the technology itself* – is capable of exercising. The work of Eugene Ferguson addresses a similar brand of enthusiasm, exploring in particular the engineering profession's often irrational quest for technological elegance.[40] This thesis aims to further explore this more elemental technological enthusiasm of Post and Ferguson in two main ways. First, with regard to the consumer – the average hot rodder, that is – it attempts to tease out the extent to which their chosen hobby is indeed an expression of their technological enthusiasm, as opposed to a simple pastime they pursue for other, more conventional reasons. And second, with regard to those who founded individual speed equipment manufacturing companies, it tries to examine the ways in which their enthusiasm might have influenced their decision to enter into the business of performance parts manufacturing, as well as the extent to which their lingering enthusiasm might have come to conflict in later years with their business interests. Along the way, it also implicitly challenges one of the principle conclusions Donald Findlay Davis reaches in *Conspicuous Production*, for among those who founded the high-performance aftermarket, virtually all of them—including those whose ventures ultimately failed—persisted in their endeavors not because they believed it would improve their social status, but rather because their technological

[39] See Joseph J. Corn, *Winged Gospel: America's Romance with Aviation, 1900-1950* (NY, NY: Oxford University Press, 1983) and Thomas P. Hughes, *American Genesis: A Century of Innovation and Technological Enthusiasm, 1870-1970* (NY, NY: Viking Press, 1971).

[40] This is a recurring theme in all of Ferguson's work. See especially *Engineering and the Mind's Eye* (Cambridge, MA: MIT Press, 1992); "Enthusiasm and Objectivity in Technological Development" (Unpublished Manuscript, 1970); and "Presidential Address – Elegant Inventions: The Artistic Component of Technology," *Technology and Culture* 19 (1978), 450-460.

enthusiasm compelled them to continue to try to muddle through.[41]

A second major theme within the field of the history of technology to which this project contributes is that of the evolution of manufacturing techniques. For decades, historians of technology have eagerly explored the emergence of the ideas, processes, and machines that eventually enabled mass production to take off in the United States – uniform parts, precision machine tools, parts interchangeability, managerial and distribution systems, and scientific management, to name but a few.[42] More recently, a number of scholars have also begun to examine the evolution of manufacturing systems of a more flexible nature, challenging many of the most cherished and longstanding of the assumptions of those whose work has stressed the importance of the mass production paradigm.[43] The ensuing debate has been lively and productive; of interest in the case of the speed equipment industry, however, is the fact that it doesn't seem to fit neatly within the theoretical framework of either camp. To be sure, for much of its history, the high-performance aftermarket appears to mesh perfectly with Philip Scranton's model for the way in which batch manufacturers operate. For starters, *timeliness* has always been critical for aftermarket firms: their new products have to hit the shelves pretty much as soon as the mainstream manufacturers' new models hit the showroom floors each year, and this in spite of the fact that the design of their high-performance wares is quite literally dependent upon the

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[41] Virtually none of the pioneers of the high-performance aftermarket enjoyed the advantages of inherited wealth, either.

[42] See for example John E. Sawyer, "The Social Basis of the American System of Manufacturing," *Journal of Economic History* 14 (1954), 361-379; Hugh G. Aitken, *Taylorism at the Watertown Arsenal: Scientific Management in Action* (Princeton, NJ: Princeton University Press, 1960); Robert S. Woodbury, "The Legend of Eli Whitney and Interchangeable Parts," *Technology and Culture* 1 (1960), 235-253; Nathan Rosenberg, "Technological Change in the Machine Tool Industry," *Journal of Economic History* 23 (1963), 414-443; Daniel Nelson, *Managers and Workers: The Origins of the New Factory System in the United States, 1880-1920* (Madison, WI: University of Wisconsin Press, 1975); Merritt Roe Smith, *Harper's Ferry Armory and the New Technology: The Challenge of Change* (Ithaca, NY: Cornell University Press, 1977); Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, MA: Harvard Belknap, 1977); and Hounshell, *From the American System to Mass Production*.

[43] See Piore and Sabel, *The Second Industrial Divide*; Charles Sabel and Jonathan Zeitlin, "Historical Alternatives to Mass Production: Politics, Markets, and Technology in Nineteenth-Century Industrialization," *Past and Present* 108 (1985), 133-176; Philip Scranton, "Manufacturing Diversity: Production Systems, Markets, and an American Consumer Society, 1870-1930," *Technology and Culture* 35 (1994), 476-505, and *Endless Novelty*; and John K. Brown, *The Baldwin Locomotive Works, 1831-1915: A Study in American Industrial Practice* (Baltimore, MD: The Johns Hopkins University Press, 1995).

design of the new automobiles they are intended to fit. In addition, *product diversity* is a must, for it simply would not suffice to produce, say, a single type of intake manifold when there are literally hundreds of engines out there for which the average enthusiast might desire an improved intake system. The ability of aftermarket manufacturers to combine product diversity and timeliness implies as well that their operations remain *flexible*. Moreover, product diversity, timeliness, and even flexibility wouldn't matter in the least if the average speed equipment manufacturer weren't able to produce a *quality* product, for although the power of printed product advertising cannot be denied, a solid word-of-mouth reputation has always been critical to individual firms' ability to survive in the competitive high-performance marketplace. Finally, for much of its history, the speed equipment industry has been predominantly a Southern California phenomenon – *geographic concentration*, in other words, has characterized this business for many, many years.

Timeliness, diversity, flexibility, quality, and geographical concentration: because these trademark elements of Scranton's thesis are as critical to the speed equipment industry of the late twentieth century as they were to the textile industry of the late nineteenth, it would be easy to simply hop aboard the flexible manufacturing bandwagon and ride out the rest of this thesis without giving it a second thought. To do so, however, would be to ignore the fact that by the 1970s and the 1980s, many of the most successful aftermarket firms had begun to integrate vertically, buy up their smaller competitors, incorporate as publicly-traded companies, and even to mass produce some of their better-selling lines. In other words, over the course of the last seventy-odd years, many of these companies have grown from small, custom and batch manufacturing concerns into large-scale, mass-production enterprises. Most, however, remain small and batch-oriented, and among those who have made the leap from batch to mass production, nearly all have retained their flexible capabilities. In short, this industry defies easy categorization, and in order to make some sense of its manufacturing diversity, this dissertation scraps the abstractions and focuses instead upon the concrete realm of the shop floor. For in the end, the story of the speed equipment industry offers a unique opportunity to examine the ways in which an array of real-world manufacturing *practices* interact within a single industrial sector, an opportunity which would be difficult to seize if the present author were to remain obsessed with industry- or even company-wide manufacturing *strategies*.

Broadly conceived, the notion of feedback represents the third major theme with which this thesis engages. Because of the fact that the high-performance aftermarket is predicated upon the existence of mainstream automobile manufacturers, one would expect to see a substantial top-down flow of information and ideas. And indeed, this has always been the case. After all, if it weren't for the basic architecture of, say, the flathead V8 engine that the Ford Motor Company brought into the world, the speed equipment industry's diverse array of flathead parts would never have come to be. In the relationship between the aftermarket and the OEM, however, ideas tend to trickle up as well as down. How else to explain, say, GM's decision to introduce mechanical fuel injection immediately upon the expiration of speed equipment manufacturer Ed Winfield's patent of the concept? Or, more generally, how better to account for the sudden appearance in the 1960s of high-horsepower, lightweight "factory hot rods" or "musclecars" than by reference to the extraordinary popularity of the hot rodding phenomenon? Other examples abound; the point is simply to illustrate that in the relationship between the OEM and the high-performance aftermarket, ideas – everything from technical details to marketing strategies – flowed in both directions. Moreover, this project aims to demonstrate that this particular exchange was *recursive* – that it was, in effect, a permanent feedback loop in which the decisions taken, say, by Detroit in response to those of the aftermarket in turn influence the future decisions of the aftermarket. Conduits for this cyclical flow include everything from the automotive technology itself to the printed text of popular and industry periodicals, but none is as important as personnel. Indeed, the number of engineers and technicians whose careers began in the hot rod industry and ended in Detroit – and vice versa – is staggering, particularly in the decades after World War II, as is the number of folks who bounced between the two. Careful attention to the background, training, and career trajectory of each and every actor featured in this thesis should therefore help to make sense of the notion of feedback as it applies to the history of the speed equipment industry.

Fourth, and finally, this dissertation is in many ways a user-producer analysis of the high-performance aftermarket. In his study of the American steel industry, *A Nation of Steel*, Thomas J. Misa embraces this particular type of analysis in order to better explain the ways in which the interaction between the steel industry and its consumers in the producer-goods sectors helped to generate the industrial and artifactual landscape of the twentieth century. In other words, in each of Misa's four case studies, the steel industry's main customers – railroad, urban construction, military armorment, and automobile companies, respectively – are also manufacturers themselves, and thus the steel "users" are, in fact, steel "user-producers." This dissertation makes use of the basic concept of user-producer analysis in four main ways. First, and most fundamentally, it focuses primarily on the producers (the speed equipment manufacturers), but it keeps the users (the enthusiasts) in mind at all times in order to track the ways in which their interaction has determined the evolution of the industry itself and of the hobby to which it caters. Second, this thesis aims to demonstrate that the aftermarket companies it features are themselves users, in that they make use of OEM products in order to come up with their own. Third, most of those who founded aftermarket companies were themselves enthusiasts and therefore, at one time or another, users of aftermarket products, too. Fourth, and last, the primary end users in the case of the speed equipment industry – average hot rodders – are themselves producers, since they do not buy aftermarket products in order to enjoy them for their own sake, but rather so that they can build something themselves, namely, their own hot rods. Ultimately, therefore, this history of the high-performance aftermarket, framed as a user-producer analysis, aims to show just how blurred the line between the user and the producer actually is within aftermarket circles, in spite of how clear it might appear to be from the existence, say, of closed-circulation trade magazines like *Hot Rod Industry News*, *Speed and Custom Equipment Dealer*, and *Aftermarket Business*, or limited-entry trade expos like the colossal yearly SEMA Show in Las Vegas.

Methodologically, this dissertation draws on a number of sources in order both to satisfactorily cover the history of the high-performance automotive aftermarket and to make its theoretical claims. Periodicals are by far its most substantial source: hundreds of musty old issues of *The Fordowner*, *Ford Owner and Dealer*, *Ford Dealer and Service Field*, *Hot Rod Magazine*, *Popular Hot Rodding*, *Rod & Custom*, *Hop Up*, *Auto Age*, *Auto Sport Review*, *Car & Driver*, *Car Craft*, *Car Life*, *Cars*, *Custom Rodder*, *Drag News*, *Drag Racing*, *Hot Rod Industry News*, *VW Trends*, *European Car*, *Dune Buggies and Hot VWs*, *Motor Trend*, *Motorsport*, *Popular Customs*, *Speed Age*, *SEMA News*, *Speed and Custom Equipment Dealer*, *Sports Cars Illustrated*, *Super Chevy*, *Street Rodder*, and dozens more have provided a critical mass of editorial, technical, and commercial evidence without which this project would have been impossible. Likewise, scores of published books and how-to manuals have helped immeasurably. In particular, biographies such as Art Bagnall's *Roy Richter*, Jerry Burton's *Zora*, and Mickey Thompson's quasi-autobiographical *Challenger* – as well as the many hundreds of brief sketches published in works like Ed Almquist's *Hot Rod Pioneers*, both volumes of Tom Medley and Tex Smith's *Hot Rod History*, and Dean Batchelor's *The American Hot Rod* – have helped to flesh out the life stories of many of the individuals associated with the speed equipment industry.[44] Interviews, too, have proved to be a crucial source of data: the present author spent countless hours in the Spring and Fall of 2003 organizing, conducting, and transcribing sessions with many of the high-performance aftermarket's movers and shakers, including Bob Spar, Vic Edelbrock, Jr., Carl Olson, Dick Wells, and Dee Berg.

Unfortunately, archival sources have been much, much harder to come by. The California Air Resources Board in Sacramento maintains a fairly decent collection of documents related to the evolution of the Golden State's air pollution laws, and the sixth chapter of this thesis relies heavily upon them. A number of items housed at the International Motor Racing Research Center in Watkins Glen, New York have also proven to be quite useful, as have a few of the

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[44] Art Bagnall, *Roy Richter: Striving for Excellence* (Los Alamitos, CA: Art Bagnall Publishing, 1990); Jerry Burton, *Zora Arkus-Duntov: The Legend Behind Corvette* (Cambridge, MA: Bentley Publishers, 2002); Mickey Thompson and Griffith Borgeson, *Challenger: Mickey Thompson's Own Story of His Life With Speed* (NY, NY: Signet Key, 1964); Ed Almquist, *Hot Rod Pioneers*; Tom Medley and LeRoi Smith, *Tex Smith's Hot Rod History, Volume One: The Beginnings* (Osceola, WI : Motorbooks International, 1990) and *Tex Smith's Hot Rod History, Volume Two: The Glory Years* (North Branch, MN : CarTech, 1994); and Dean Batchelor, *The American Hot Rod.*

documents kept in the Romaine Trade Catalog Collection at the University of Southern California at Santa Barbara. Finally, the SEMA Research Center in Diamond Bar, California holds not only a number of publications and other documents relevant to the history of the speed equipment industry, but also several excellent volumes of videotaped interviews with industry insiders; both of these have been put to extensive use in the construction of this thesis. Apart from these scattered collections, very little else of an archival nature exists. None of the many hundreds of speed equipment manufacturers, past or present, have publicly-accessible archives. Nor, for that matter, have any of these firms been willing to allow the present author to peer inside their closed collections. Nevertheless, between the aforementioned periodicals, trade journals, books, manuals, and interviews, more than enough evidence exists to complement these limited archival resources and allow for the drafting of this thesis.

Before we continue, however, two brief terminological discussions are in order. The first involves the present author's extensive use of many of the slang and shorthand technical terms that are common in the pages of, say, *Popular Hot Rodding* but are seldom, if ever, seen or heard elsewhere. "Mill," for example, often appears in the pages which follow as a substitute for "engine," as does "powerplant." Similarly, "bumpstick" sometimes stands in for "camshaft," "slugs" for "pistons," "ride" or "wheels" for "car," and so on and so forth. Rest assured, however, that the present author has elected to do this *not* in order to baffle or confuse his readers, but rather to expose them to the rich and vibrant vernacular of the American hot rodder. For those for whom the context in which these terms appear occasionally proves to be insufficient, a brief glossary of performance jargon appears in the appendices.

The second set of terminological issues that we must consider here is far more critical, and it stems from a deceptively simple question: what exactly *is* a "hot rod?" Well, the term itself first emerged in the 1940s, most likely as a contraction of "hot roadster."[45] But is that really what a "hot rod" was, a "hot roadster?" Popular historians and automotive enthusiasts alike have debated the matter for decades. Purists insist that "hot rod" denotes a very specific type of

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[45] Post, *High Performance*, 126.

modified automobile built during a very specific historical period: 1930s- and 1940s-era stripped-down and souped-up prewar Ford roadsters, to be exact; sedans of the same era do not count, and neither do coupes or convertibles.[46] Others have been far more liberal. Dean Batchelor, for example, the author of an excellent popular history of the phenomenon, defines as a hot rod "*any* production vehicle which has been modified to provide more performance."[47] Later-model modified vehicles of any era – coupes, sedans, convertibles, and roadsters alike – would therefore qualify, as long as the principle which guided their construction was the pursuit of speed. Rather than attempting to resolve a long-standing and often bitter debate among enthusiasts, however, this dissertation concedes that there is substantial merit to both points of view. And indeed, for its purposes, what matters is not so much the establishment of any sort of universal definition as it is the shifting applicability of the concept over time.

As a noun, therefore, this thesis allows the records to speak for themselves: if a 1950s enthusiast describes his 1957 Chevy as a hot rod, then so be it. Far more critical, for the present author, is the question of how to deal with "hot rod" when it is used as a verb. To "hot rod" a car, or, to put it another way, the *act* of "hot rodding" an automobile is perhaps among the most frequently deployed concepts in the periodical and popular literature dealing with the phenomenon. Almost without exception, "hot rodding" is used to denote the act of creating precisely the sort of vehicle Dean Batchelor describes as a real hot rod – that is, to hot rod an automobile is to modify it so as to obtain better performance and, ultimately, higher speeds. It is therefore a *technical* concept: to hot rod a car is quite literally to reengineer the mechanical components of a mass-produced automobile. In more recent years, particularly among enthusiasts of European and Japanese automobiles, the concept of "performance tuning" – or simply "tuning" – has all but replaced "hot rodding" in common parlance. Nevertheless, because the basic concept is identical, "hot rodding" and "performance tuning" will be treated synonymously in this thesis.

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[46] See, for example, Don Montgomery's discussion of the matter in *Hot Rods in the Forties*, page 7.
[47] Batchelor, *The American Hot Rod*, 8 (the emphasis is mine).

Synonymous treatment of "hot rodder" and "performance tuner" is, however, impossible. "Hot rodder" simply denotes an individual enthusiast who modifies his car for improved performance – that is, one who participates in "hot rodding." "Performance tuner," on the other hand, is a term typically applied to those firms which actively develop new performance products for modern, particularly imported, automobiles. For example, Neuspeed, a company which manufactures high performance engine and suspension components for modern European and Japanese automobiles, is a performance tuner. An enthusiast[48] in his garage carefully constructing a modified automobile with those parts, however, is *not* a performance tuner, even though the activity with which he is engaged is in fact performance tuning and the final product of his efforts a performance-tuned automobile.

"Performance" is itself a problematic word as well. For indeed, as Robert Post points out in his analysis of organized drag racing, "performance," in the context of a community of automotive enthusiasts, "has a delicious ambiguity." On the one hand, he explains, "performance" is an engineering concept used in reference to the dynamic capabilities of an automobile. Thus, a "high-performance car" is one that is capable of higher speeds, faster (or more stable) cornering, and/or quicker acceleration than most. On the other hand, though, "performance," particularly among automobile racers, also implies what Post refers to as the "imagery of the theater."[49] Dragsters, for example, go through a process known as "staging" prior to a quarter-mile race, a ritual that is similar conceptually to the warm up laps that take place at an oval-track event prior to the green flag's signal. Similarly, the theatrics that accompany a low-slung, candy apple red custom as it slowly cruises down an urban boulevard – or, for that matter, those that go into competitive automobile show displays – are in every sense very real and valid forms of "performance," too. What's more, fuel efficiency, reliability, ease of maintenance, oil consumption, towing capacity, and even passenger comfort can be – and are –

[48] It warrants mention as well that while all hot rodders are automotive enthusiasts, not all automotive enthusiasts are hot rodders. For the purposes of this essay, however, the two can (and will) be used interchangeably – unless otherwise noted, that is, "enthusiast" is deployed as a convenient shorthand for "performance enthusiast" and/or "hot rodder" in the pages that follow.
[49] Post, *High Performance*, x.

construed by many to be critical components of a given car's "performance." For the purposes of this essay, however, the meaning of the term is relatively straightforward and wholly technological: here, "performance" refers to the ability to go fast. Hence, "high-performance" implies *speed*, "performance tuning" the pursuit of it, and "high performance parts and accessories" the means with which to achieve it.

Finally, there remains the issue of the "speed equipment industry" itself. In the context of the era of the traditional hot rod – that is, the 1930s, the 1940s, and the 1950s – one is tempted to refer to it as the "hot rod industry," for that is, after all, precisely what it was: an industry manufacturing parts for hot rods. However, this is not how the manufacturers themselves thought of it at the time. Instead, they tended to identify themselves as "speed equipment manufacturers" and their overall industrial sector as the "speed equipment industry." (The original name of their industrial organization, the Speed Equipment Manufacturers Association, bears witness to this fact.) By the end of the 1960s, however, the industry had come to recognize the extent to which "speed" had become a politically-incorrect designation; "specialty" therefore came to replace "speed" both in the official title of their association and in common usage. However, the 1960s also gave rise to another, now far more common label for the industry: the "high-performance aftermarket." During the 1960s and the 1970s, "specialty equipment industry" and "high performance aftermarket" remained synonymous; sometime after the 1970s, however, "high performance aftermarket" or, more commonly, "the aftermarket" seems to have taken over in common usage.

"The aftermarket," however, is very tricky label whose exact meaning is entirely dependent upon the context in which it is used. For in the strictest of terms, "aftermarket" refers to the entire industry responsible for manufacturing replacement *as well as* high-performance automotive parts. Consequently, when an enthusiast refers to "the aftermarket," he *might* mean the specialty equipment industry, but he could just as easily mean the industrial subsector which produced the generic, standard-duty replacement water pump he recently installed in his 1987 Caravan. In fact, among modern enthusiasts, "the aftermarket," when used to refer to the replacement parts industry, often implies a considerable amount of disdain, for aftermarket replacement components rarely, if ever, live up to the standards of fit, finish, and function of their more expensive original counterparts. However, when used to refer to the high-performance products manufactured by the industry with which this dissertation is concerned, “the aftermarket” tends instead to imply a certain level of respect.

Ultimately, therefore, the present author has been careful with the words he has chosen. In general, “speed equipment industry, “specialty equipment industry,” “high-performance industry,” “high-performance aftermarket,” and “aftermarket” are used interchangeably, the only major exception being those instances in which there arises a need to discuss the replacement parts aftermarket; whenever this is necessary, the context of the narrative should preclude undue confusion.

* * *

For the moment, though, forget about hot rods, performance tuning, and the speed equipment industry. Forget about Southern California, the dry lakes, and street racing. Forget about flathead V8 engines, fragmented market niches, and governmental regulations. For in the beginning, there were only amateur enthusiasts and millions of identical Model Ts.

Chapter One: Early Speed Equipment Manufacturing, 1915-1927

In the early to mid-1910s, automobile production, sales, registration, and use in the United States began to grow at a feverish pace. Total domestic production swelled nearly tenfold between 1911 and 1917, and new registrations rose by more than four hundred percent. Per capita automobile ownership and use was doubling every two years, and from New York to Los Angeles, new dealers, service stations, and parking garages were cropping up in droves. New highways, too, were in the works, as federal, state, and local officials across the country struggled to deal with the sudden and dramatic increase in motorized traffic. It was the beginning of a transportation revolution: within another five years, the American mass automobile culture would be firmly in place.[1]

At the heart of these developments was the Ford Motor Company. Between 1911 and 1916, more than one and a half million "universal cars" rolled out of the Highland Park Assembly Plant, fully thirty-six percent of all automobiles manufactured during those years in the United States. Annual output at the Dearborn company was growing at an average of sixty-five percent, and the firm's production costs were tumbling dramatically. Sales, too, were brisk, and as early as 1915, better than one in two new domestic registrations each year were for brand-new Model Ts.[2] How Ford managed to achieve all of this is now a well-known tale of manufacturing, marketing, and labor-relations breakthroughs that needn't be recounted here;[3]

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[1] In 1911, total annual domestic automobile production totaled approximately 210,000 units; by 1917, the figure stood at nearly 1,940,000 ("4,941,276 Cars and Trucks in the United States," *Automotive Industries – The Automobile*, March 14, 1918, 538). New registrations for calendar year 1917 totaled 1,396,324, up from approximately 330,000 back in 1912, and per capita car ownership stood at twenty cars per person in 1917, up from forty in 1915 and close to eighty in 1913 (Ibid., 538 and 534); the per capita figure for 1913 is the present author's calculation based upon the total number of registered vehicles in the United States that year, 1,253,875 (Ibid., 538) and the official census population figure for 1913 of 97,225,000 (www.census.gov). New-car market saturation occurred in the early 1920s in the United States; thereafter, the automobile was a legitimate mass phenomenon.

[2] Production and sales figures cited for the Ford Motor Company during these years are derived from David Hounshell, *From the American System to Mass Production*, 224, and the aggregate figures for the entire American automobile industry during the early to mid-1910s, as well as the registration data for the same period, are derived from "4,941,276 Cars and Trucks in the United States," *Automotive Industries – The Automobile*, March 14, 1918, 538.

[3] On the breakthrough at Ford from an organizational perspective, see John B. Rae, *American Automobile Manufacturers*; from a manufacturing perspective, see Hounshell, *From the American System to Mass Production*;

what matters, rather, is that Ford's spectacular success did much to usher in the age of mass automobility for millions of Americans. And for this feat, history has not forgotten – and will likely never forget – Henry Ford and his revolutionary Model T.

Apart from a handful of enthusiasts, however, few seem to remember that the Model T Ford also forever changed the face of American motorsports in the mid-1910s. Prior to the mass production of the universal car, high-performance motoring was a luxury far beyond the means of all but the very wealthiest of Americans. High-dollar, hand-built racing specials dominated on dirt, board, and brick tracks across the United States, and on the streets, low- and moderately-priced surrey-style horseless carriages simply were no match for high-end Deusenburgs and Benzes. But as the conventional front-engine, rear-drive Model T began to become available to ever-broader swaths of the American public in the early 1910s, it quickly earned an upstart's reputation among performance enthusiasts. As early as September of 1914, for example, the editors of one popular Ford periodical proudly reported that "[m]any a Ford owner has stripped the fenders and body from his car, strapped a pillow onto the gasoline tank, and entered the races at the home town fair or the more pretentious yearly event at the county seat."[4] The following summer, modified Model Ts built for high-speed street use were beginning to surface as well, and the editors of *The Fordowner* quickly found themselves celebrating, on the one hand, the fact that "in every community, no matter how small, some one has changed his Ford as to body and engine, so that he can get more speed than the average touring car," and condemning, on the other, the lawless driving habits these cars tended to encourage.[5] By the end of the decade, Model T-based racers had even begun to make a name for themselves on the national stage: in

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from a labor-relations perspective, see Stephen Meyer III, *The Five Dollar Day*; and for a broader, more general narrative, see James J. Flink, *The Automobile Age*.

[4] "Equipped for the Track," *The Fordowner*, September 1914, 22. *The Fordowner*, an independent publication put out by the Hallock Publishing Company of Cleveland, Ohio, had no official ties to the Ford Motor Company.

[5] In May of 1915, *The Fordowner* ran a lengthy article condemning lawless driving by owners of ordinary and modified Model T Fords, encouraging them to organize Ford racing clubs as a safe, off-street alternative ("Ford Racing," *The Fordowner*, May 1915, 23-25); the following month, the same periodical both welcomed the advent of modified street-going Fords and continued to encourage its readership to form local Ford racing clubs ("Ford Racing and Racers," *The Fordowner*, June 1915, 30).

1919, four such cars qualified for the prestigious Indianapolis 500.[6] But it was on the local, grassroots level that the impact of the Model T on track- and street-based motorsports was most substantial. Abundant and cheap, it enabled countless thousands of ordinary Americans to begin to enjoy the thrills of dirt track racing and high-speed highway travel as never before – that is, as *participants*.

Taking part in either, however, required a knack for things mechanical. The Model T was rugged, versatile, and even peppy, but it wasn't fast, and only very rarely was it possible to "show the differential to anything on the road" or track in an ordinary Ford simply by removing the fenders and donning a new pair of driving goggles.[7] At the very least, one had to make some basic changes to the Model T's gangly suspension and humble powerplant. Mechanics and reasonably competent enthusiasts could do both, but many, many more with both the means and the desire to get started could do neither. Here, then, was a latent market for an entirely new type of product, and as early as 1915, high-performance parts and accessories for the lowly Ford began to trickle into circulation. By the end of the decade, a handful of firms were supplying enthusiasts nationwide with hundreds of different aftermarket performance products for the Ford, and during the course of the 1920s, dozens more would join the fray. Performance tuning and the speed equipment industry began and grew up with the Model T; our story begins, therefore, in the era of the universal car.

Model T Accessories and Speed Equipment Manufacturing

Overview

More than fifteen million Model Ts were manufactured between 1908 and 1927, an

[6] "Indianapolis Speedway Adopts the 3-Liter Limit for Future Races," *Automobile Industries – The Automobile*, June 5, 1919, 1201-1207 and 1245.
[7] The quoted text is from "Ford Racing and Racers," *The Fordowner*, June 1915, 30. Model T differentials were most clearly visible from the rear.

international automotive production record that would stand for forty five years.[8] Urban, suburban, and rural residents alike bought them by the tens of thousands each month during the car's nineteen model-year run, putting them to daily use in a variety of contexts ranging from the civilized to the extreme. The Model T was versatile and durable – and it was a bargain, to boot. For all of these reasons, Henry Ford's beloved "universal" car was, in fact, precisely that. But it was also bare-bones basic, a no-frills economy car designed for utility and value, not comfort. Consequently, many of those who purchased Model T Fords during the 1910s and the 1920s sought to modify them so that they would better serve their individual automotive needs. For farmers across the United States, this often meant adapting the car's drivetrain for occasional use as a mobile source of power, as Ronald Kline and Trevor Pinch have so ably described.[9] For urban- and suburbanites, on the other hand, it sometimes involved extensive changes to the Model T's superstructure for more comfortable long-distance travel and touring, as Kathleen Franz has eloquently documented.[10] And for owners rural, suburban, and urban alike, it frequently entailed the addition of a floor heater, a set of auxiliary lights, or perhaps a pair of louder horns. In any case, the Model T Ford may well have been a perfectly capable car as-is, but in the eyes of more than a few of its users, it remained a tweak or two away from practical perfection.

This was true not only of the car's interior and exterior appointments, but of its mechanical underpinnings as well. The Model T motor lacked a water pump, an oil pump, a fuel pump, a self-advancing ignition system, and, prior to its introduction as an added-cost option for 1919, an electric starter, too.[11] Instead, the hand-cranked engine relied on thermodynamic currents to circulate its coolant, a series of crankshaft scoops to distribute its oil, gravity to feed fuel to the carburetor, and the user to maintain an appropriate degree of ignition advance while

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[8] With considerable pride, Volkswagen staged an on-track press event in 1972, during which its record-breaking 15,007,034th Beetle (a Superbeetle, actually) blew past a nicely-restored Model T on the straight.
[9] Ronald Kline and Trevor Pinch, "Users as Agents of Technological Change."
[10] Kathleen Franz, *Narrating Automobility*.
[11] Apart from the editorial, feature, and advertising content of the automotive periodicals of the era, an excellent source of technical information on the Model T is David Hounshell's *From the American System to Mass Production*, especially Chapter 7.

driving. Consequently, overheated, oil- and fuel-starved, misfiring Model Ts, not to mention frustrated owners and annoyed passengers, were rather common in the 1910s and 1920s. From the very beginning, therefore, a number of accessory firms offered aftermarket pumps, ignitions, and, for a brief while, self-starters designed to help the average owner render his basic Ford more reliable, longer-lived, and far more user-friendly by "completing" its otherwise rudimentary drivetrain. These mechanical accessory firms, together with the many companies that manufactured add-on comfort and convenience equipment for the universal car, comprised a rich and diverse aftermarket for the Model T that thrived throughout the period in question.[12]

It was within this prosperous milieu of add-on parts and accessories for the Ford that the speed equipment industry first emerged in the mid-1910s. In fact, much of what the pioneering speed equipment manufacturers offered for sale during their first few years of operation differed very little, conceptually or practically, from the aforementioned general improvement type of add-on merchandise. To be sure, early advertisements bearing giant banners promising "more speed for the Ford" are fairly unambiguous,[13] and in the vast majority of cases, red flags such as this have made it relatively easy to determine which firms should or should not be identified as part of the early speed equipment industry. Sometimes, though, the line was much less clear. Dozens of companies, for example, regularly advertised in the 1910s and 1920s that their add-on products would improve the performance of the Model T Ford engine. Closer inspection, however, reveals that by "performance," only a handful of these firms actually meant to imply horsepower, acceleration, and top-speed gains; typically, the rest meant simply that fuel mileage, oil usage, or cold-morning starting would improve. For the purposes of this project, of course,

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[12] In mid-1922, for example, *Ford Owner and Dealer* reported that the Ford accessory business had already developed into a $75 million annual trade ("The Truth of the Ford Accessory Market," *Ford Owner and Dealer*, June 1922, 30-31); by the end of the year, the figure had swelled to $90 million ("The Growth of the Accessory Market," *Ford Owner and Dealer*, January 1923, 48). For more on this "general improvement" Model T aftermarket, see Franz, *Narrating Automobility*; Kline and Pinch, "Users As Agents of Technological Change:' and James L. Kenealy, *Model "T" Ford Authentic Accessories, 1909-1927* (Seattle, WA: Kenealy, 1976). Following a brief lull in 1927 and 1928, this general improvement aftermarket continued to prosper well into the Model A and V8 Ford era of the late 1920s through the early 1940s. See, for example, Murray Fahnestock, *Those Wonderful Unauthorized Accessories for Model A Ford* (Arcadia, CA: Post Motor Books, 1971), and Dan Smith, *Accessory Mascots: The Automotive Accents of Yesteryear, 1910-1940* (San Diego, CA: D. Smith, 1989).

[13] Detroit Radiator and Specialty Company advertisement, *The Fordowner*, August 1915, 75.

only those borderline examples whose cumulative focus seems best to fit with the former group ought to make the final cut. Keep in mind, though, that the boundaries between the high-performance- and the general-improvement-aftermarkets were in those days porous, at best.

Who then were these early speed equipment manufacturers? What were their roots? Where were they located? For whom was their merchandise intended? What exactly did they produce, and how? Where did they advertise? How did they do business? And, finally, how did they fare in the long run?

According to the best available evidence, companies offering high-performance parts and accessories for the Model T Ford first surfaced in 1915, when the Detroit Radiator Company of Michigan, the Walker M. Levett Company of New York City, and an Indianapolis-based outfit known as Craig-Hunt, Inc. began to market their equipment.[14] Before the end of the following year, the Roof Auto Specialty Company of Anderson, Indiana and D. R. Noonan of Paris, Illinois had joined the fray, as, by 1918, had the McCadden Machine Works, Inc. of St. Cloud, Minnesota, the Dunn Counterbalance Company of Clarinda, Iowa, the PACO Manufacturing Company of Galesburg, Illinois, the Green Engineering Company of Dayton, Ohio, the Miller Carburetor Company of Los Angeles and Chicago, and the Turnbull Company of Wilmington, Ohio.[15] By 1920, the Cooper Manufacturing Company of Marshalltown, Iowa, Eastern Auto of Los Angeles, Morton & Brett of Indianapolis, Rajo of Racine, Wisconsin, Riley of Los Angeles, and the Chevrolet Brothers Manufacturing Company of Indianapolis had all brought new high-performance items for the universal car to market as well. And by the time Henry Ford reluctantly agreed to bring an end to Model T production in 1927, about another ten firms had entered into the business of manufacturing speed equipment for the Ford, including, most

[14] Dating Detroit Radiator is a relatively straightforward matter: see the aforementioned 1915 advertisement for the company (Ibid.). Levett, too, is easily dated from a half-page spread it ran on page 75 of the August, 1915 issue of *The Fordowner*. Information useful for establishing the dates of origin for many of the other early companies, however, is more scarce; in the case of Craig-Hunt, Inc., a short article from a 1920 issue of *Automotive Industries – The Automobile* mentions that the firm "has for the past five years been manufacturing Ford speed specialties." Craig-Hunt therefore likely dates from 1915. "Craig-Hunt to Make New Low Priced Car," *Automotive Industries – The Automobile*, April 15, 1920, 937.

[15] Harry A. Miller, a Los Angeles-based racing engine builder, designed and built the Miller line of high-performance carburetors, which were distributed, at least at first, by the Miller Carburetor Company of Chicago.

notably, the Ruckstell Sales and Manufacturing Company of Berkeley, California, the Fordspeed Company of New York City, the Beaver Manufacturing Company of Milwaukee, the Akron Motor & Manufacturing Company of Akron, Ohio, the Waukesha Motor Company of Waukesha, Wisconsin, the Zenith Automotive Manufacturing Company of St. Louis, the Williams Foundry and Machine Company of Akron, Ohio, and the Winfield Company of Los Angeles.[16]

A quick scan reveals that of the approximately two dozen firms that manufactured speed equipment during the Model T era, twenty were located in Minnesota, Iowa, Wisconsin, Illinois, Indiana, Michigan, Missouri, or Ohio, six in California, and two in New York City.[17] Geographically, therefore, the early industry was largely concentrated in the Midwest, with a sizeable contingent on the West Coast and a smaller clique along the Eastern Seaboard (see figure 1.1).[18] To those familiar with the early history of the automobile in the United States, this should come as no surprise, for long before the introduction of the Model T, the mainstream American automobile industry itself had also come to call the Midwest home.[19] Moreover, as of 1918, six of the top ten states in terms of automobile ownership were located in the Midwest, and both California and New York ranked within the top ten as well.[20] Speed equipment manufacturing, it seems, first appeared where the emergent automobile culture was already at its strongest.

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[16] Others included Berg, of Chicago, the Milwaukee Forge & Machine Company of Wisconsin, and Centri, of Oakland, California. A handful of additional speed equipment firms – Kant-Skore, Muskegon, and Gordon, for example – operated during the Model T era as well, but because their names are all that survive in the record, they have been excluded from this analysis.

[17] Because Miller Carburetors were designed and manufactured in L.A., the Miller Company counts as a California company for the purposes of this analysis, in spite of the fact that the part was distributed by a Chicago firm.

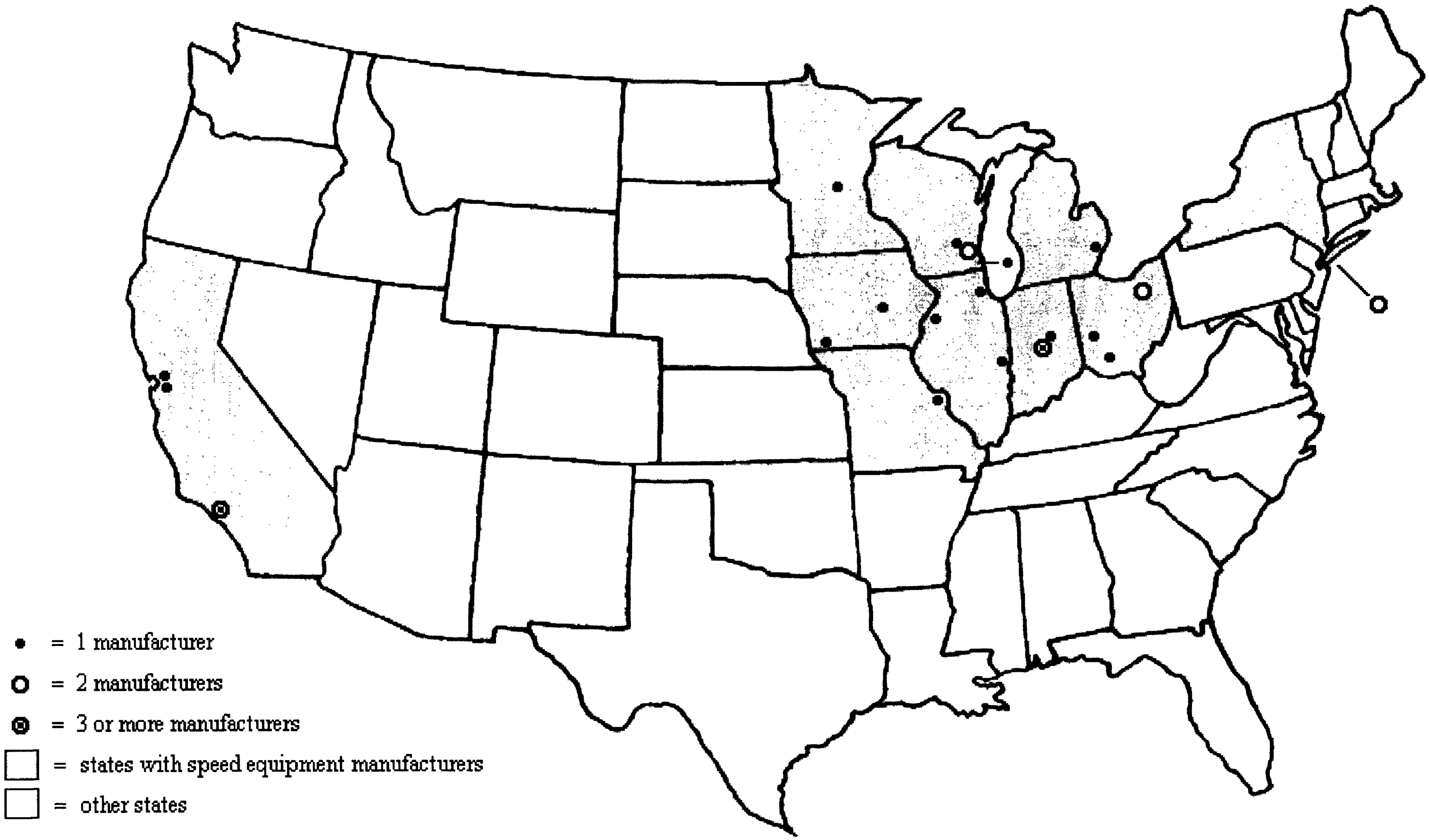
[18] Had the present author taken a more liberal approach to the initial classification of Model T era accessory firms as either speed equipment manufacturers or general-improvement aftermarket parts companies (see above, pages 55-56), these figures regarding the regional distribution of the early speed equipment industry would nevertheless have been statistically identical: the overwhelming majority of these firms would still have been Midwestern, with a strong California contingent and a smaller East-Coast faction.

[19] Flink, *The Automobile Age*, 24.

[20] Actually, New York led the nation with more than 404,000 total cars registered in 1918. Rounding out the list, in descending order, were Illinois, Ohio, Pennsylvania, Iowa, California, Texas, Michigan, Minnesota, and Indiana. See "4,941,276 Cars and Trucks in the United States," *Automotive Industries – The Automobile*, March 14, 1918, 535 (map).

Figure 1.1: Model T Era Speed Equipment Manufacturers

(author illustration)



As for their origins, many of these early firms started off as general machine shops, foundries, and subcontract manufacturers before they began to dabble in the realm of high-performance automobility. The Williams Foundry and Machine Company, for example, first opened its doors as a foundry and machine shop back in 1888, and only after it had done some high-performance engine subcontract work in the early 1920s did it decide to enter into the speed equipment market on its own.[21] Others first began as stationary powerplant and engine component subcontractors. This was true of the Beaver Manufacturing Company, whose motor-building operations dated back to 1902, and also of such firms as the Waukesha Motor Company and the Akron Motor & Manufacturing Company.[22] A few had roots in the mainstream American automobile industry, as well. The Chevrolet Brothers Manufacturing Company, for example, was founded by Arthur and Louis Chevrolet shortly after the latter's automotive company was absorbed by General Motors in the early 1910s.[23] Many, many more, though, first emerged, however indirectly, as a result of the accumulated racing experience of their founders. Joe Jaegersberger, the man behind Rajo, was a dirt track racer "of old fame" long before he brought his aftermarket gear to market in the 1920s.[24] Ed Winfield also began his career as an oval track racer, as did Robert M. Roof of the Roof Auto Specialty Company and both Arthur and Louis Chevrolet.[25] Harry A. Miller and George Riley, on the other hand, earned their

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[21] In a July, 1926 advertisement in which they announced the introduction of their new "Akron-Hed" overhead valve cylinder head conversion for the Model T, for example, Williams proudly boasts of its "[y]ears of experience in building overhead valve blocks for Fords." But because the Akron-Hed was, in fact, the firm's first solo foray into the realm of speed equipment manufacturing, those years of experience must have been on behalf of other manufacturers or engine builders. Williams Foundry & Machine Company advertisement, *Ford Dealer and Service Field*, July 1926, 18. A number of other firms, such as McCadden, also started off as general machine shops or foundries.

[22] Beaver Manufacturing Company classified advertisement, *Ford Dealer and Owner*, May 1925, 156.

[23] On the collapse of Chevrolet and its absorption by GM, see Flink, *The Automobile Age*, 67.

[24] Rajo advertisement, *Ford Owner and Dealer*, November 1920, 113. See also below, pages 85-92.

[25] On Ed Winfield's early racing career, see especially Ed Almquist, "Ed Winfield: The Reclusive Genius," in *Hot Rod Pioneers*, 4-5; Terry Cook, "Ed Winfield: The Father of Hot Rodding," *HRM*, January 1973, 107; and below, pages 93-100. On Robert M. Roof, see Kem Robertson, "Robert Roof, Man Extraordinaire," *The Alternate*, April 15 and May 15, 2003; Ed Almquist, "Robert M. Roof – A Granddaddy of Speed Equipment," in *Hot Rod Pioneers*, 10-11; and below, pages 77-85 and chapter 2. Arthur and Louis Chevrolet both raced throughout the period in question, as did their brother Gaston. On Louis Chevrolet, see Flink, *The Automobile Age*, 67; on Louis and Gaston, see "Indianapolis Speedway Adopts the 3-Liter Limit for Future Races," *Automotive Industries – The Automobile*, June 5, 1919, 1201-1207 and 1245; and on Arthur, Louis, and Gaston, see below, pages 92-97.

esteemed reputations building racing engines.[26] Machine and foundry work, motor building, OEM automobile production, and oval track racing: such were the diverse business and manufacturing roots of the Model T speed equipment industry.

Broad and diverse, too, was the range of products these firms offered. Dozens, at first, and ultimately hundreds of different high-performance aftermarket items were available for virtually every conceivable part of the standard Ford car during the 1910s and 1920s. For the most part, though, all of these early add-on parts and accessories for the Model T fell into one of four basic categories of product, each of which corresponded to a basic tuning strategy. The first of these focused on overall engine efficiency. That is, one way to extract a bit more power out of the Model T Ford engine was to fine-tune its standard parts and components to ensure that they operated at their highest possible potential. Sometimes, modifications of this sort were relatively basic and could be carried out by general automotive shops or even by enthusiastic owners, but aftermarket products often played a vital role as well. Bolting on an oil cooler, for example, would have enabled one to push his standard motor harder on a daily basis without risking engine damage, as would have the addition of a water pump or a pressure oiling system. Also beneficial in this regard would have been the use of an aftermarket ignition system, for although Ford's original equipment "timer" was perfectly adequate for low-speed use, higher rpms required far more precision in the distribution and timely delivery of the engine spark than the standard timer typically could muster. Plus, most aftermarket ignition systems were self-advancing, which meant that they required no attention from the driver in order to operate efficiently throughout the rpm band.

Interestingly enough, however, many of the add-on parts and accessories associated with this first approach to engine tuning weren't products of the speed equipment industry at all. This was true especially of add-on ignitions: almost without exception, prominent speed equipment

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[26] On Harry A. Miller's career, see Mark L. Dees, *The Miller Dynasty: A Technical History of the Work of Harry A. Miller, His Associates, and His Successors* (NY, NY: Barnes Publishing, Inc., 1981); Art Bagnall, *Roy Richter*, especially chapter 1; Dean Batchelor, *The American Hot Rod*, chapter 12; and below, chapter 2. On George Riley, see Batchelor, *The American Hot Rod*, chapters 2 and 3.

manufacturers and high-performance engine builders alike recommended the use of aftermarket ignitions in performance-oriented Model T rebuilds, but only occasionally did they offer them for sale themselves. Instead, the systems they suggested typically came out of the general-improvement end of the Model T aftermarket. Firms like Atwater-Kent of Philadelphia, American Bosch of Springfield, Massachusetts, and the Milwaukee Engineering and Tool Company, for example, had begun to sell improved ignition systems for general use by the mid-1910s; so good were their products, it seems, that they more than adequately served the needs of early performance buffs.[27]

The second general approach to Model T performance tuning focused on reducing friction and unnecessary weight within the engine itself in order to enable it to safely achieve higher operating speeds. Ford's three-bearing crankshaft, for example, was prone to flex and vibrate at speeds in excess of only 1000 rpm – fully 500 revolutions *below* the engine's advertised peak power point of 1500 rpm. Dunn, for one, sought to remedy this through the use of crankshaft counterweights, small metal wedges that, once bolted into place, would help to smooth the crank's rotation.[28] Robert Roof, on the other hand, advocated a more radical solution: junk the Ford's standard three-bearing crank in favor of an aftermarket five-bearing model. With two additional anchor points among which to distribute the reciprocating forces of the engine, these cranks would operate with substantially less flex, enabling the engine to spin faster with

[27] The Laurel Motors Corporation, which succeeded the Roof Auto Specialty Company in 1917, was one high-performance company that did in fact offer ignition systems for the Model T, and it did so from the very beginning (see, for example, the fine print of the company's advertisement in the April, 1918 issue of *The Fordowner*, on page 79). For the most part, though, general-improvement ignition systems – especially the Atwater-Kent – seemed to outshine those of the speed equipment industry, even in the context of high-performance engine build-ups. As early as 1917, for example, *The Fordowner* recommended the basic Atwater-Kent ignition system above all others (Mechanician, "Putting Speed in Speedster Type of Ford," *The Fordowner*, January 1917, 67-68), as did Murray Fahnestock in a piece detailing the use of add-on ignitions on high-performance engines published in *The Fordowner*'s successor in 1924 ("Modern Ignition Systems," *Ford Owner and Dealer*, January 1924, 72-76; over the course of many years, *The Fordowner* slowly evolved from an owner- to a trade-oriented publication, and its title therefore changed on several occasions in the 1920s, 1930s, and 1940s). Not until the late 1930s, when the Ford V8 began to pose new ignition tuning challenges, did high-performance aftermarket ignitions truly begin to outperform their general-improvement aftermarket counterparts in all important respects.

[28] Dunn sold its crankshaft counterweights, or counterbalances, throughout the Model T era; in 1918, a full set sold for $12.50 (Dunn Counterbalance Company advertisement, *The Fordowner*, January 1918, 105).

much less fuss.[29] Flywheels, too, could be cut – and balanced – for smoother motor operation and quicker spool-up, and many speed equipment manufacturers offered either complete, balanced and lightened flywheels or, more commonly, the machining service needed to balance and lighten a customer's original flywheel.

Other firms committed to this second basic method of engine tuning dealt more or less exclusively with the engine's reciprocating assembly.[30] Ford equipped the Model T with cast-iron pistons, which, though rugged and relatively easy to manufacture, were a frequent source of consternation. Heavy and almost always out of balance, these factory slugs hindered the engine's ability to freely rev, thereby limiting its ultimate power-producing potential. One way to attend to the problem was to shave some material off of the pistons' bottoms, or skirts, in order to bring them into balance. Even when balanced, though, cast iron was still a fairly heavy material for an engine to reciprocate several thousand times per minute, and many aftermarket equipment manufacturers therefore produced lightweight aluminum or aluminum alloy pistons. Green Engineering, for example, sold aluminum pistons in the late 1910s and into the 1920s, as did the Walker M. Levett Company. [31] The Model T's standard-issue connecting rods were another source of strain within the engine's reciprocating assembly; these, too, could be cut for balance, drilled for lightness, or altogether replaced with a new aluminum set. Green, Levett, and several others offered these for sale as well.

Equipped with a counterbalanced or five-bearing crankshaft, a lightened and balanced flywheel, and a set of lightweight, precision-balanced aluminum pistons and connecting rods, an otherwise ordinary Model T engine would have had the ability, at least in theory, to spin much, much faster than it ever could have in stock trim. The higher an engine revs, though, the more air and fuel it requires. However light and balanced its internal assemblies might in fact have been,

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[29] Roof's company manufactured five-bearing cranks for the Model T in the mid-1920s; a detailed description of their design and installation appeared in Robert M. Roof, "Power and Speed: The Overhead Cam Shaft and Five Bearing Crank Shaft for Greater Engine Efficiency," *Ford Owner and Dealer*, April 1924, 138, 140, and 142.
[30] The reciprocating assembly consisted of the pistons, connecting rods, and all of the hardware associated with them.
[31] Green Engineering advertisement, *The Fordowner*, January 1918, 85, and Walker M. Levett Company advertisement, *The Fordowner*, August 1915, 75.

therefore, a Model T Ford motor fitted with factory carburetion, intake and exhaust manifolding, and valvetrain components would have been unable, in practice, to spin much faster at all. Consequently, the third – and by far the most common – general approach to Model T performance tuning involved modifications designed to enable the engine to consume more air and fuel.

Improved carburetion and intake manifolding was one way to do this. Larger carburetors pulled from other makes of car would usually work, though fitting them to the Ford engine often entailed needless complication. Large-bore units for the Ford were therefore available from a very early date not only from speed equipment manufacturers like Miller, but also from general-improvement and replacement aftermarket firms like Chandler and Stewart-Warner.[32] Multiple carburetor systems were available from several manufacturers as well, though usually only in conjunction with a high-performance replacement cylinder head.[33]

Larger carburetors would allow more air and fuel to enter into the engine's intake passages, or ports, but once there, the Model T's small, low-lift intake valves would prevent much of the additional charge from actually reaching the cylinders. Fitting valves of a larger diameter was of course an obvious solution, though opinions varied within enthusiast and aftermarket circles regarding how best to accomplish this. Some engine builders advocated the use of larger Fordson tractor valves in high-performance Model T motors, but many aftermarket firms made special steel or tungsten-steel valves for this purpose as well.[34] Another way to increase the amount of fuel and air that could pass into the engine's cylinders was to impart more lift and/or duration upon the intake valves. In other words, by forcing the motor's valves to open

[32] Miller, for example, began to advertise its high-performance updraft carburetors back in 1918 (Miller advertisement, *The Fordowner*, February 1918, 4-5), two years after Chandler began to sell its units for the Ford (Chandler advertisement, *The Fordowner*, November 1916, 53) and several years before Stewart-Warner brought out theirs (Stewart-Warner advertisement, *Ford Owner and Dealer*, March 1922, 97).
[33] See below, pages 64-70.
[34] See, for example, William Morrow, "The Ford Speedster: Some Notes From One Who Is Experienced in Rebuilt Jobs," *Ford Owner and Dealer*, October 1924, 57. Morrow advocated the use of Fordson valves to improve engine breathing, as did Murray Fahnestock, the technical editor of *The Fordowner* and its many successors (see, for example, "Power and Speed, Article I: Using Fordson Valves in the Ford Cylinder Block," *Ford Dealer and Owner*, June 1925, 66, 68, and 70). Fordspeed of New York City, on the other hand, manufactured and sold larger valves for the Model T (Fordspeed advertisement, *Ford Owner and Dealer*, April 1922, 158), as did many others.

wider – or, alternatively, for a longer interval – more fuel and air could be made to pass through. One way to do this was to modify the camshaft, and skilled machinists and bold enthusiasts often reground Model T cams for this purpose, lobe by lobe, all by hand. Most of the time, however, it was far less risky and much more cost effective to simply replace the original camshaft with a high-performance unit; Laurel, the successor to the Roof Auto Specialty, as well as Beaver, Winfield, and many, many others sold new or reground "hi-speed" cams during the Model T era.[35] "Multi-Lifts," a mechanical accessory consisting of a series of compound levers designed to multiply valve lift, were available from Riley as a further alternative.[36] Reground camshafts and multi-lifts could also be used to advantage on the engine's exhaust valves, although considerable debate surrounded the issue of whether or not the Ford exhaust system itself required the attention of early performance enthusiasts interested in improved airflow.[37]

One final method of improving the flow of fuel and air within these engines was to replace the entire factory cylinder head with an aftermarket unit. Ford's original equipment Model T cylinder head was of a very basic design known as an "L-type" or "flathead."[38] This meant that the head itself was more or less a flat rectangular casting with four shallow combustion chambers on one side and provisions for fitting the radiator hose on the other. Thus,

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[35] As early as 1918, for example, the Laurel Motors Corporation began to advertise high-performance camshafts as part of its growing line of speed equipment (Laurel Motors Corporation advertisement, *The Fordowner*, April 1918, 79). By the mid-1920s, Beaver, Winfield, and many others had begun to do the same.

[36] George Riley & Company advertisement, *Ford Owner and Dealer*, November 1920, 172. "Multi-Lifts" bolted in place of the standard Model T lifters, which simply transferred the motion of the camshaft's lobes to the valve stems in a 1:1 ratio. In other words, in a standard Model T engine, if a camshaft lobe raised its corresponding lifter by, say, ½ inch, then the corresponding valve itself would open ½ inch. In an engine fitted with Multi-Lifts, however, compound levers would multiply the camshaft's ½ inch of lift, resulting in a lobe-to-valve-lift ratio of 1.2:1, say, or 1.5:1. Consequently, ½ inch of lift at the camshaft would result, on an engine with 1.2:1 Multi Lifts, in approximately $^{3}/_{5}$ inch of lift at the valves. Conceptually, therefore, Multi Lifts were identical to the "ratio rockers" that multiply camshaft lift in overhead valve engines (see below, chapters 3 and 4).

[37] As early as 1915, for example, how-to articles in the popular press began to advocate the use of exhaust "cut-outs," or muffler bypass valves, in order to allow the driver of a modified car to enjoy the benefits of an unmuffled, freer-flowing exhaust on demand ("More Speed," *The Fordowner*, January 1915, 15-18). By 1917, however, the editors of *The Fordowner* had begun to advise discretion in the use of exhaust cut-outs (Mechanician, "Putting Speed in Speedster Type of Ford," January 1917, 67-68), and in 1920, the magazine's successor ran a detailed analysis of the issue by an automotive engineer, G. I. Mitchell ("Does Muffler Impair Engine Efficiency?" *Ford Owner and Dealer*, June 1920, 167-168).

[38] "L-type" engines were very common on early cars, and remained in fairly widespread OEM use well into the 1950s.

the motor's intake and exhaust ports were mounted in the engine block, as were the valves, which were positioned adjacent to the top of their respective cylinders (see figure 1.2). The appeal of the flathead design was its simplicity: the cylinder head itself contained no moving parts, and the valve-actuating mechanism within the block was simple and direct. Its principal drawback, however, was the circuitous nature of its intake and exhaust passages, which substantially impeded engine breathing (see figure 1.3).[39] Early on, therefore, a number of speed equipment manufacturers began to produce replacement heads for the Model T that featured overhead valves (see figure 1.4).[40] Though more complex mechanically, these aftermarket overhead-valve cylinder heads greatly aided the flow of air through the engine by directing the incoming charge (and, in turn, the exhaust gases) through passages that were far more direct and less circuitous than those of the standard L-head design (see figure 1.5). Many of these high-performance cylinder head conversions simply replaced the standard Ford's eight in-block valves with eight overhead valves; others, however, featured as many as sixteen overhead valves, which effectively doubled overall engine breathing capacity – or, to put it another way, effectively doubled the amount of air and fuel that the engine could consume. Most, whether of eight- or

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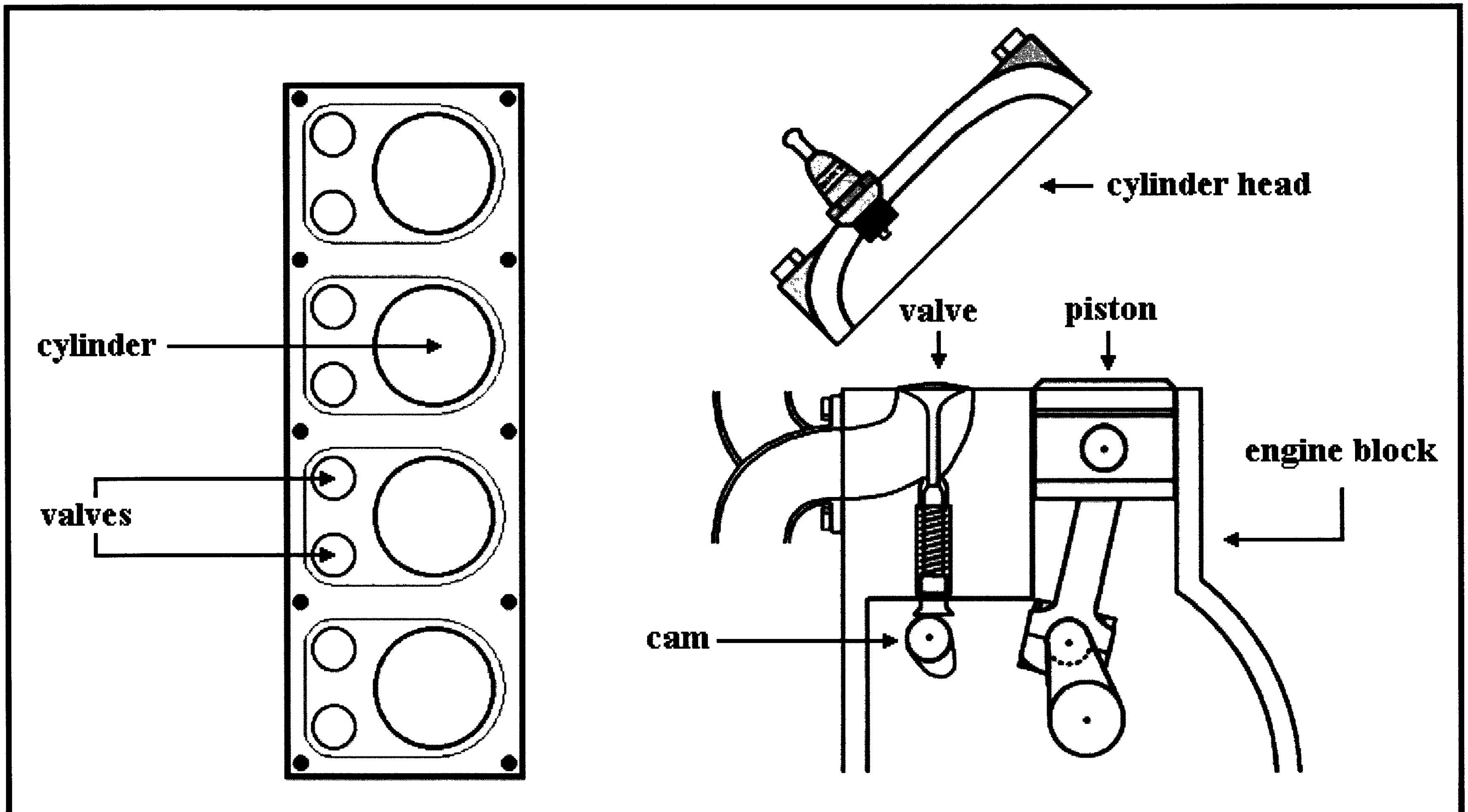
[39] The incoming charge would come from below, through the ports in the block, before passing upward through the valves and, following an abrupt ninety degree turn, into the combustion area. Once burned, the charge would then be forced out of the combustion chamber and back over to the valves, through which it would then pass downward – after making another abrupt ninety-degree turn – into the exhaust ports. See below, figure 1.5.

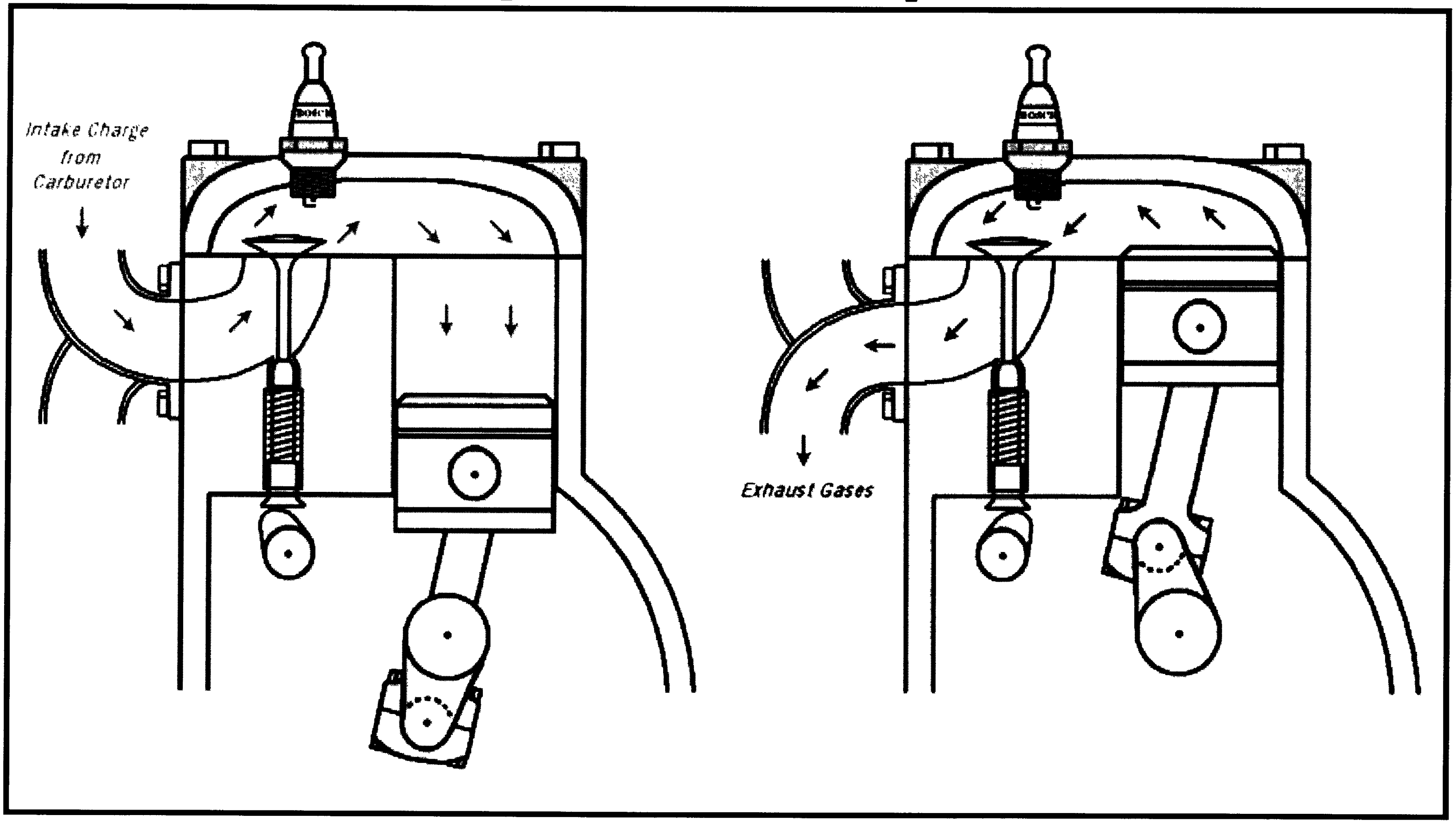
[40] Overhead designs allow the intake and exhaust valves to be positioned directly above the engine's cylinders, greatly simplifying the intake and exhaust passages and boosting overall engine breathing. Overhead-valve conversions were first available from the Roof Auto Specialty Company, which introduced its sixteen-overhead-valve pushrod conversion for the Ford towards the end of 1917, shortly before being absorbed by Laurel (see, for example, Kem Robertson, "Robert Roof," 2; the company's advertising from early 1918 (e.g., Roof Auto Specialty Company advertisement, *The Fordowner*, January 1918, 53, and Laurel Motors Company advertisement, *The Fordowner*, February 1918, 3); articles such as "Sixteen Valve Cylinder Heads," *The Fordowner*, January 1918, 44, 46, and 48; and below, pages 77-85). Craig-Hunt, Inc., however, introduced its conversion at almost exactly the same time as Roof / Laurel (see Roberson, "Robert Roof," 2, and "Sixteen Valve Cylinder Heads," *The Fordowner*, January 1918, 44, 46, and 48). Others quickly followed: by the end of the decade, Joe Jaegersberger had introduced the Rajo line of overhead-valve cylinder head conversions, and Arthur and Louis Chevrolet lagged only slightly in bringing out their "Frontenac" heads (on Rajo, see for example "The Rajo Valve-in-Head Motor," *Ford Owner and Dealer*, October 1920, 132, and below, pages 85-92; on the introduction of the Chevrolet Brothers' "Frontenac" heads, see "A New Cylinder Head," *Ford Owner and Dealer*, November 1920, 96, and also below, pages 92-97). Ultimately, overhead valve conversions for the Model T would also be available from the Williams Foundry and Machine Company (who made the "Akron-Hed" line of cylinder heads), the Zenith Automotive Manufacturing Company, and the Akron Motor & Manufacturing Company (makers of the "Hal" head), among others. Most overhead-valve conversions for the Model T featured higher compression ratios, as well, for a bit of additional power.

Figure 1.2: Flatheads



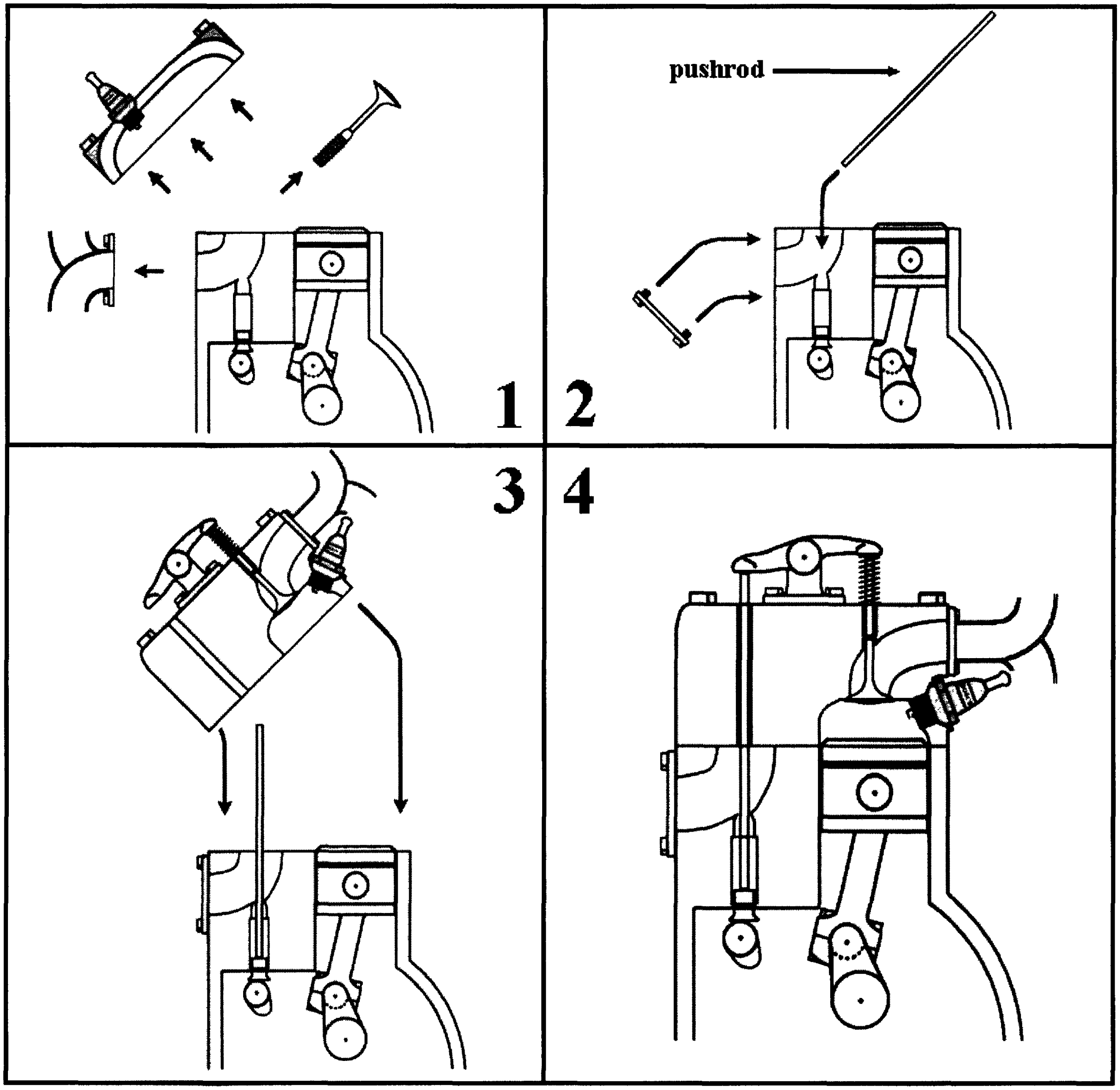
At left is a schematic drawing showing the arrangement of the in-block cylinders and valves in an L-type or "flathead" engine, looking straight down at the top of the engine with the cylinder head removed. The eight valves are positioned in a row, with each pair adjacent to its respective cylinder. At right is a side-relief sketch of a flathead engine (with the cylinder head detached from the block), showing the relative positioning of its ports, valves, and pistons (the piston resides within the cylinder). The open, inverted "dish" on the cylinder head is the combustion chamber, and the curved tubes on the engine block are schematic representations of intake and exhaust manifolds. (Source: author illustration)

Figure 1.3: Flathead Breathing



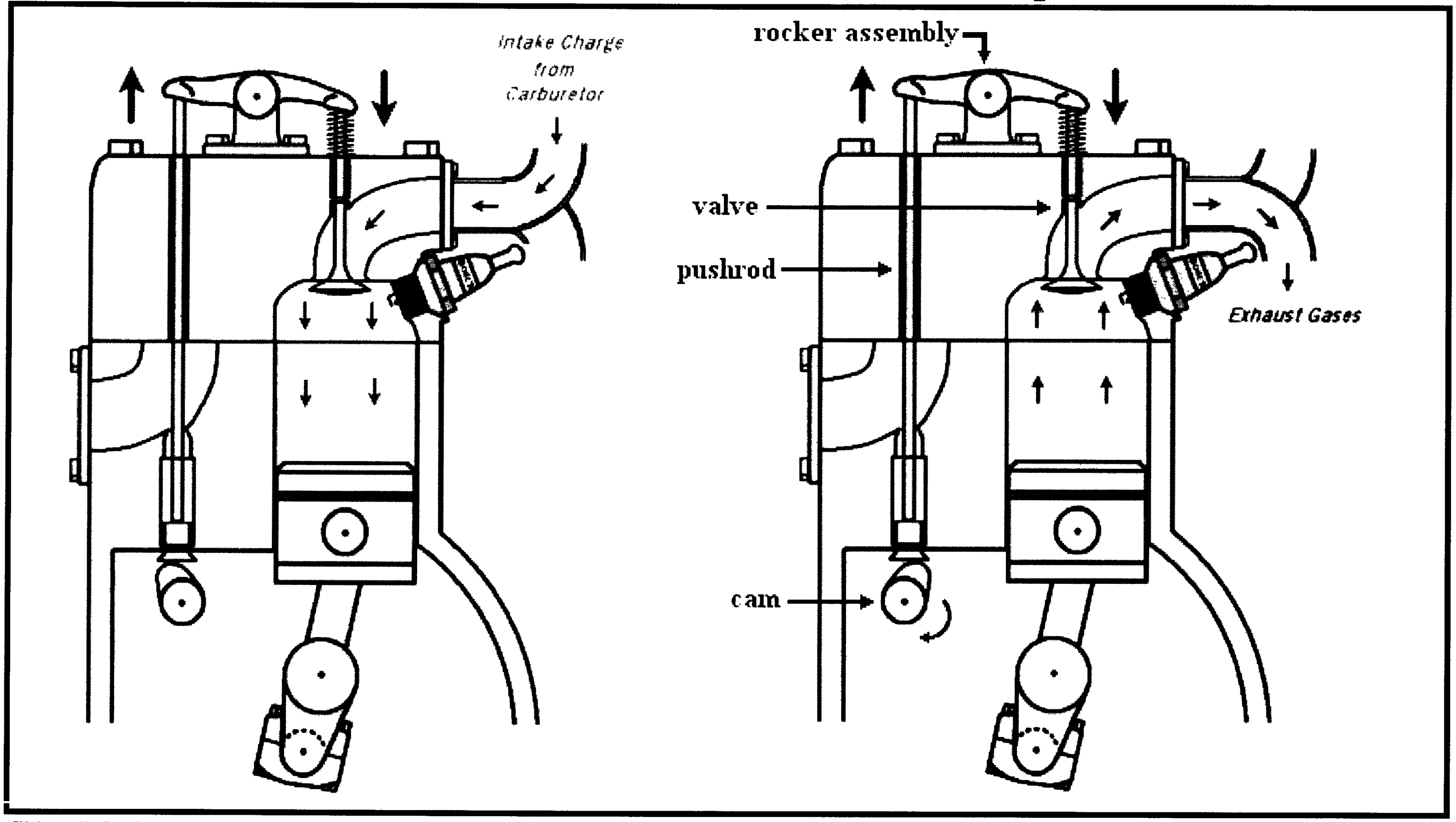
Side-relief schematic sketches illustrating the circuitous nature of the intake and exhaust passages in an L-type or "flathead" engine. At left is the cylinder on its intake stroke, and at right is the cylinder on its exhaust stroke; the arrows indicate the direction of the flow of gases.
(Source: author illustration)

Figure 1.4: Overhead-Valve Conversions



Side-relief schematic sketches illustrating the installation of an overhead-valve conversion. Image 1, at top left, shows the removal of the original L-type cylinder head, valves, and intake and exhaust manifolds. Image 2, at top right, illustrates the addition of a block-off plate to cover the old intake ports as well as the installation of the pushrods. Image 3, at bottom left, shows the installation of the aftermarket overhead-valve cylinder head itself, and image 4, at bottom right, shows the completed conversion. (Source: author illustration)

Figure 1.5: Overhead-Valve Conversion Breathing



Side-relief schematic sketches illustrating the much more direct intake and exhaust passages of an engine that has been fitted with an overhead-valve conversion (contrast this with figure 1.3). At left is the cylinder on its intake stroke, and at right is the cylinder on its exhaust stroke; the arrows indicate the direction of the flow of gases. Also labeled, in the illustration on the right, are the rocker assembly, camshaft, pushrod, and valve; notice how the action of the camshaft's lobe pushes the pushrod upward, and how the rocker assembly translates this upward motion (in a manner conceptually resembling a see-saw) into the downward motion of the valve. (Source: author illustration) sixteen-valve design, made use of the standard Ford camshaft to operate the relocated valves through a complex series of pushrods and levers, although some actually eliminated the OEM camshaft altogether in favor of a single- or even double-overhead camshaft arrangement.

Overhead valve conversions performed well, often boosting the performance of the standard engine by a factor of two or three, but they were almost always pricey. A few speed equipment manufacturers therefore offered high-performance replacement flatheads for the Model T Ford as a cheaper – and simpler – alternative. Ford's flathead design was decent enough for everyday low-speed use, but its poorly-shaped combustion chambers hindered top-end power, as did its relatively low compression ratio.[41] In addition, Model T flatheads weren't particularly well-finished: their rough-cast combustion chamber surfaces, for example, dissipated engine heat unevenly, which often led to the formation of power-robbing "hot spots" within the chambers. Aftermarket flatheads, on the other hand, typically featured fully-machined combustion chambers that were better shaped for improved flow and smaller in size for higher compression. Turnbull appears to have been the first to widely market such a head; its "Turko" performance flathead first appeared in 1918.[42] Others, however, were slow to bring out similar equipment, and by the end of the Model T era, only a handful of manufacturers had done so.[43] The Model T high-performance cylinder head aftermarket, it seems, heavily favored the far more radical overhead valve conversions to these basic improved flatheads.

The fourth and final general approach to Model T performance tuning involved

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[41] Increasing the Model T's compression ratio for a slight horsepower gain was a relatively easy task that involved little more than shaving a few thousandths of an inch off of the bottom of the head, thereby reducing the size of the combustion chambers and raising the engine's compression ratio. So poor was the Model T's flathead, however, that doing so without modifying the part in other critical ways would have increased the engine's propensity to self-destruct through detonation. See Fahnestock, "Shapes of Cylinder Heads," *Ford Dealer and Service Field*, September 1926, 68, 70, 72, 74, 76, and 78.

[42] Turnbull advertisement, *The Fordowner*, January 1918, 6.

[43] Among them were Green, Berg, and Waukesha, all of which introduced their improved flatheads in the 1920s. Of these, the Waukesha unit was perhaps the most interesting. Its essential design stemmed from the work of a British engineer named Harry R. Ricardo, who worked on tank engines during WWI. In the course of this military work, he hit upon an improved flathead combustion chamber shape, and, with the aid of the Waukesha Company in the United States, Ricardo patented his concept in the early 1920s (he filed in 1919 and was granted the patent, number 1,474,003, in 1923). Waukesha then proceeded to design and manufacture a line of heads for the Model T based upon Ricardo's ideas. See Fahnestock, "Shapes of Cylinder Heads," *Ford Dealer and Service Field*, September 1926, especially page 70.

modifications to the universal car's body and suspension. As for the former, dozens of streamlined replacement bodies for the Model T were available in the 1910s and 1920s. Laurel, for one, began to market a line of them in 1918, as did Morton & Brett in 1920, Fordspeed in 1922, and several others by the end of the Model T era.[44] Of course, none of these firms' aftermarket bodies did anything at all to boost the car's horsepower per se, but most of them did give the Model T a racier appearance, and a few of them actually aided top-end speed as well. Suspension modifications, though, were much more important from a performance standpoint. Lowering or "underslinging" the Ford chassis, for example, would bring the body of the car closer to the ground, lowering its center of gravity and improving its handling. As early as 1915, brief articles detailing some of the many ways in which this could be accomplished began to appear in the popular Ford press, and by the late 1910s, various speed equipment manufacturers had begun to market some of the special brackets and other hardware that the job required.[45] Stiffer springs would also result in a better-handling car, as would modified steering assemblies and other aftermarket suspension tricks.

Modifications to improve overall engine efficiency, to reduce friction and unnecessary weight in the rotating- and reciprocating-masses, to enhance engine breathing, and to better vehicle aerodynamics and handling: these were the performance tuning strategies most common in the days of the Model T, and they spawned a diverse range of aftermarket gear from a variety of companies during the 1910s and 1920s. Depending upon the equipment selected (and the care with which it was installed and maintained), Model T Fords modified in these ways were often capable of speeds in excess of 60 to 70 mph, while the standard universal car struggled to reach 45 mph even on long, straight, level roads. Perhaps more to the point, though, these modified

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[44] Laurel advertisement, *The Fordowner*, April 1918, 79; Morton & Brett advertisement, *Ford Owner and Dealer*, November, 1920, 187; and Fordspeed advertisement, *Ford Owner and Dealer*, April 1922, 158. Many enthusiasts also constructed their own replacement bodies; see, for example, "More Speed," *The Fordowner*, January 1915, 15-18.

[45] Early articles on underslinging included A. P. Hess, "How to Undersling a Ford," *The Fordowner*, March 1915, 23; Fahnestock, "Ford Speedster," *The Fordowner*, June 1916, especially pages 30 and 34; and Fahnestock, "Lowering the Ford Chassis: Underslinging the Ford Speedster, Sport Model or Special Car," *The Fordowner*, October 1919, 43-48, 50, 52, and 54. Craig-Hunt, Laurel, Eastern Auto, and several smaller custom shops made underslinging parts in the 1910s and 1920s.

Model Ts of the 1910s and the 1920s were fast enough to keep up with a number of more expensive makes of car, on and off the track.

Who exactly bought these early high-performance products, though, and for what ultimate purpose? Dean Batchelor claims in his epic work that "[t]he vast majority of this equipment was…for out-and-out racing cars," and street applications were at most an afterthought:

> The fact that customers soon started buying racing equipment to install on cars that were street-driven and would never see a race-track…probably surprised the speed equipment manufacturers. However, anyone capable of creating this equipment had to be resourceful, so it wasn't long before they took advantage of this bonanza and began advertising in both trade and racing publications for milder-tuned race car parts for your sports model.[46]

According to Batchelor, then, the industry first began by selling racing-oriented products to oval track drivers, and only after renegade enthusiasts began to use these racing products on the street did the manufacturers begin to market milder products specifically for on-road use.

The overwhelming majority of the evidence, however, suggests otherwise. Almost without exception, early speed equipment manufacturers produced, advertised, and sold add-on gear intended for street use from the very beginning. In fact, browsing through their initial advertisements, on-road products appear to have *always* been of equal, if not greater importance to these companies than were their racing lines. Detroit Radiator's first spot, for example, gave equal space to its racing- and its street-use gear sets.[47] Likewise, Levett's initial advertisement back in 1915 boasted of the proven on-track performance of its Magnalite Piston and Connecting-Rod Assemblies, but the company's actual pitch – "greater flexibility, quicker acceleration, less friction, absence of vibration, easier cranking, more speed and power, less gasoline consumption and virtually the smoothness of a twin six" – makes it clear that the Magnalite line was for street as well as track use.[48] Roof, too, claimed in one of its earliest advertisements that its equipment was intended for both "racing cars and fast road speedsters."[49]

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[46] Batchelor, *The American Hot Rod*, 37-41.
[47] Detroit Radiator and Specialty Company advertisement, *The Fordowner*, August 1915, 75.
[48] Walker M. Levett Company advertisement, *The Fordowner*, August 1915, 75.
[49] Roof Auto Specialty Company advertisement, *The Fordowner*, January 1918, 53. See also below, pages 77-85.

Green Engineering, Dunn Counterbalance, Turnbull, McCadden, and Miller Carburetors all made similar claims in their earliest spots.[50] Only Craig-Hunt appears to have actually evolved according to Batchelor's "track first" maxim: in one of its late 1910s campaigns, for example, the company proudly proclaimed that its 16-valve cylinder head was initially inspired by and designed for racing, but it had begun to prove its worth "on the Boulevard or Highway" as well.[51] For the most part, though, speed equipment for the street and for the track seem to have emerged together.

How, then, might we characterize the actual users – and end uses – of these products? Consider the broader context. In 1915, grassroots Model T-based circle track racing was just beginning to take off in the United States. So, too, was the practice of hopping up the universal car for street use. Early advertising, as we have seen, suggests that the two were of equal importance to the industry, but was this actually the case among enthusiasts as well? Were folks just as apt to build an out-and-out racer out of their Model Ts as they were to modify them for improved street use? No, they weren't. To be sure, racing was popular, and a lot of ordinary folks participated in it from the very beginning.[52] But it was as spectators that the majority of early enthusiasts enjoyed the visual and aural spectacle of an oval-track race, and when it came to their own cars, most were more than content to build a high-performance street car that was racing-inspired. This we know from two critical categories of early published source material.

The first, of course, is advertising. If, for example, we consider the sorts of pitches that the early speed equipment manufacturers made, not only as they first got into the business, but also as they grew and further evolved over the course of the Model T era, we find that aftermarket products intended for street use gradually assumed the majority of the emphasis. For some firms, this meant that the focus of their advertisements shifted during the 1920s. Laurel, for

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[50] Green Engineering Company advertisement, *The Fordowner*, January 1918, 85; Dunn Counterbalance Company advertisement, *The Fordowner*, January 1918, 105; Turnbull Company advertisement, *The Fordowner*, January 1918, 6; McCadden Machine Works, Inc. advertisement, *The Fordowner*, January 1917, 92; and Miller advertisement, *The Fordowner*, February 1918, 4-5.
[51] Craig-Hunt, Inc. advertisement, *The Fordowner*, February 1918, 108.
[52] See, for example, "Equipped for the Track," *The Fordowner*, September 1914, 22.

one, flooded its 1910s and early 1920s advertising with references to its racing products and their triumphs among the oval track crowd, but by the mid-1920s, street applications had come to dominate the company's spots.[53] For other companies, though, and particularly those that got into the business after 1920, no such shift was necessary. Rajo, Winfield, and the Akron Motor & Manufacturing Company, for example, launched their respective high-performance lines in the early 1920s with advertising blitzes that focused almost exclusively on street use.[54] With relative safety, therefore, we can infer from the overwhelming importance of on-road products in these advertisements that street-, rather than track-use aftermarket gear was the bread and butter of the early speed equipment industry.

The second type of published source material useful for determining the nature of speed equipment end-use during the Model T era is the "how-to" article.[55] As early as 1915, *The*

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[53] Typical of late 1910s and early 1920s Laurel advertisements, for example, were those from the April 1918, November 1920, and July 1921 issues of *The Fordowner* and *Ford Owner and Dealer*, all of which featured photographs of racing cars built with the company's speed equipment as well as detailed descriptions of the company's racing products; gear for street use, in these early Laurel campaigns, was described in much briefer terms. By early 1922, however, the company's advertisements instead featured photographs and detailed drawings of the firm's on-road offerings, almost to the exclusion of its racing products (see, for example, Laurel's advertisement in the May, 1922 issue of *Ford Owner and Dealer* (page 23), the basic format of which the company would use for several years). For more on Laurel generally, see below, pages 77-85.

[54] Rajo's initial spot, for example, doesn't mention racing at all (*Ford Owner and Dealer*, October 1920, 113); subsequent advertising from the company would often use the on-track success of the company's racing-only lines in order to sell more street-based gear, but the emphasis throughout all of them is also quite clearly upon the sale of high-performance products for on-road use (see Rajo advertisement, *Ford Owner and Dealer*, November 1920, 113; Rajo advertisement, *Ford Owner and Dealer*, July 1921, 6-7; and below, pages 85-92). Likewise, Akron's advertisements for its line of "Hal" overhead valve cylinder heads place quite a bit more emphasis on their street-use lines than on their racing lines; in one from February of 1923, for example, the company only spends three short, small-type lines on its racing line in the course of a full-page spot (*Ford Owner and Dealer*, February 1923, 29). Winfield, on the other hand, frequently made use of the its racing reputation to sell its products, but a scan of the company's initial advertisements from the mid-1920s reveals that the vast majority of what it pitched was for street use (see, for example, Winfield's ads in the September 1924 (page 13) and February 1925 (page 30) issues of *Ford Owner and Dealer*).

[55] A third type of source that also has the potential to be useful in this regard would be the feature article – write-ups and photographs, that is, of outstanding examples of the state of the art. Unfortunately, because there was no dedicated enthusiast-oriented magazine in the 1910s and 1920s, we have only a very limited number of such features from the period (less than five), all of which appeared in *The Fordowner* or its successors. On the basis of such a limited pool of evidence, generalizations are risky, at best, but what we can say about them is that they all focused on street-driven vehicles. See, for example, "Remarkable Ford Racer," *The Fordowner*, April 1915, 30 and 32 (don't be fooled by words like "racer" or "speedster," for the meanings of these terms were ambiguous in the era of the Model T, used as they were interchangeably to describe actual track cars and hopped-up street cars alike); "Some California Fords," *Ford Owner and Dealer*, May 1920, 82; and "Snappy Ford Speedster," *Ford Owner and Dealer*, December 1920, 82. With the advent of the enthusiast periodical in the late 1940s, feature articles became a much more common, and reliable, source of this sort of end-user information (see below, chapter 3).

Fordowner began to run occasional articles of an instructional nature, designed to bring interested readers up to speed on the sorts of performance-tuning methods commonly used at the time to modify the universal car. In the late 1910s and early 1920s, these pieces began to appear more frequently, and by the end of the Model T's run dozens of them had appeared. At first, these articles tended to be of a general nature, providing tuning overviews that typically dealt with ignition, intake, exhaust, oiling, internal assembly, body, and suspension modification strategies in one fell swoop.[56] In time, though, they came to be more focused and detailed. In October of 1919, for example, a nine-page article on underslinging the Ford chassis appeared in the magazine, as, in due course, would lengthy pieces on improving the Ford's oiling system for high-performance use, installing Fordson valves in the standard Model T block, choosing a suitable high-speed camshaft, drilling and counter-balancing the Ford crankshaft, installing an aftermarket ignition, and selecting an appropriate set of aftermarket transmission gears, among others.[57] Most of these were penned by Murray Fahnestock, the publication's technical editor, but guest authors – including several prominent speed equipment manufacturers like Arthur Chevrolet and Robert M. Roof – wrote a few of them as well. Although banner titles such as "Ford Racing and Racers" or "The Ford Speedster" may well seem intuitively to suggest that many, if not most of these pieces dealt exclusively with various aspects of race car construction, the opposite is in fact the case. Most of them, that is, actually were geared towards the needs of enthusiasts who wanted to build a high-performance Model T for the street. The pictures that

[56] General overviews began in June of 1915 with "Ford Racing and Racers," *The Fordowner*, 29-30 and continued to appear occasionally through 1918 (see, for example, Fahnestock, "Ford Speedster," *The Fordowner*, May 1916, 28, 30, 32, 34, and 36; Mechanician, "Putting Speed in Speedster Type of Ford," *The Fordowner*, January 1917, 67-68; and E. B. Williams, "Making the Ford Car Fast," *The Fordowner*, April 1917, 48, 50, 52, and 54).

[57] The nine-page 1919 article on underslinging was Fahnestock, "Lowering the Ford Chassis: Underslinging the Ford Speedster, Sport Model or Special Car," *The Fordowner*, October 1919, 43-48, 50, 52. On engine lubrication, see Fahnestock, "Power and Speed, Article 3: Speedster Lubrication Systems," *Ford Dealer and Owner*, September 1925, 65-68, 70, and 72; on the use of Fordson valves, see "Power and Speed, Article 1: Using Fordson Valves in the Ford Cylinder Block," *Ford Dealer and Owner*, June 1925, 66, 68, and 70; on high-speed camshafts, see "Power and Speed, Article 2: Increasing the Lift of the Valves – and High Speed Cam Shafts," *Ford Dealer and Owner*, July 1925, 66, 68, and 70; on drilled and counter-balanced crankshafts, see Fahnestock, "Power and Speed, Article 5: Drilled and Counterbalanced Crank Shafts," *Ford Dealer and Owner*, November 1925, 66, 68, 70, and 72; on ignitions, see Fahnestock, "Power and Speed, Article 7: High Speed Ignition Systems," *Ford Dealer and Service Field*, March 1926, 66, 68, 70, and 72; and on gears and transmissions, see Fahnestock, "Power and Speed: Gear Ratios and Transmissions," *Ford Dealer and Service Field*, July 1927, 39-40, 42 and 44.

accompanied Fahnestock's May 1916 "Ford Speedster" article, for example, were of high-performance Fords fully equipped for the street – headlights, fenders, license plates and all.[58] Likewise, the text of the piece he published the following month clearly focused on the construction of a Ford speedster for street use, as did his October 1919 and May 1923 articles on underslinging.[59] As was true of period advertising, road-based applications dominated these "how-to" pieces, strongly hinting that the interest of the average enthusiast was firmly rooted in the street.

Of course, one might reasonably object that these sorts of pieces actually tell us very little about what the end-users themselves were really up to at the time – that, in other words, these "how-to" articles better represent a top-down means of diffusing technical know-how than they do a reliable source for understanding Model T-era enthusiasts. Fair enough, for the most part. But buried within the text of many of these articles are clues which suggest otherwise. "To judge from the number of queries that the **Fordowner** receives from all parts of the country, for advice and instruction as to the converting of Fords into racing type roadsters…it would seem that there was a large demand for this type of car," wrote one author back in 1915 in order to justify the instructional piece that followed.[60] Similarly, a 1925 article on adapting Fordson valves for use on standard Ford car engines began as follows: "Judging from the letters which we have received, quite a few of our readers have tried Fordson valves and, in some cases, the results have been rather disappointing."[61] Likewise, Fahnestock divulged in a 1926 article on underslinging that he felt fortunate that "so many of our readers have tried their ingenuity at lowering Fords that we have been able to compile quite a variety of available methods" for

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[58] Fahnestock, "Ford Speedster," *The Fordowner*, May 1916, 34 and 36. The same is true of the pictures featured in "More Speed," *The Fordowner*, January 1915, 15-18.
[59] In the June 1916 piece, Fahnestock wrote for example about the importance of making sure that the underslung chassis can still support the weight of one or two passengers, and in the same article, he also wrote at great length about chassis balancing for use on rough roads (Fahnestock, "Ford Speedster," *The Fordowner*, June 1916, especially pages 34 and 36). See also Fahnestock, "Lowering the Ford Chassis: Underslinging the Ford Speedster, Sport Model or Special Car," *The Fordowner*, October 1919, especially page 43, and "Secrets of Speed: Semi-Speedster With Lower Chassis," *Ford Owner and Dealer*, May 1923, 65-68.
[60] "More Speed," *The Fordowner*, January 1915, 15. The boldface text appears in the original.
[61] "Power and Speed, Article 1: Using Fordson Valves in the Ford Cylinder Block," *Ford Dealer and Owner*, June 1925, 66.

publication.[62] Much of what these "how-to" pieces covered, then, actually trickled *up*. Whether designed to address a groundswell of interest in a certain area of Model T performance tuning or drafted, instead, in order to make use of its readers' technical advice and suggestions, these early "how-to" articles do in fact reveal a great deal about what average end-users thought and did. And in this period, they thought about circle track racers, but they actually built hopped-up road cars.

We mustn't overstate the case, though. Street-use speed equipment outsold racing-only products, and street-oriented "how-to" articles outnumbered those geared towards the technology of the track, but both scenes were popular among enthusiasts. More importantly, the two were mutually-reinforcing. In the era of the Model T, then, many speed equipment manufacturers drew their inspiration – and, in some cases, their fame – from the dirt, board, and brick ovals, but most of them actually earned their living on the highways and byways of 1910s and 1920s America. Nestled in the cradle of automobility and staffed by engineers, machinists, and racers of extraordinary technological capability and creativity, this early (some might say *original*) high-performance aftermarket industry would prosper for about a dozen years.

In order to better understand the origin and evolution of this sector, however, we need to shift our focus from the macro to the micro – we need, in other words, to more closely examine the history of a representative sampling of its constituent firms. And for this purpose, the businesses begun by Robert M. Roof, Joe Jaegersberger, and Arthur and Louis Chevrolet are ideal, both for their inherent diversity as well as for the characteristic traits they share. Let us turn, then, to their stories.

Robert M. Roof and Laurel Motors

In the summer of 1916, inspired by the growing popularity of Model T-based racers, an Anderson, Indiana man by the name of Robert Maurice Roof began to work on an engine

[62] Fahnestock, "Power and Speed: Lowering the Speedster Chassis – Many Available Methods of Lowering and Underslinging," *Ford Dealer and Service Field*, June 1926, 62.

accessory concept he thought might well boost the performance of these new circle track stars. Convinced that the Ford's original equipment L-type cylinder head was unsuitable for high-speed use, Roof aimed to develop a new and improved aftermarket unit to replace it. The chief engineer of a foundry and machine shop that specialized in stationary diesels as well as the recipient of several U.S. Patents, Roof was by no means new to engine design work. Thirteen years earlier, in 1903, the trained machinist had founded his own stationary gasoline engine firm in Muncie, the Robert Roof Machine Company, and by 1909, he had developed a successful air-cooled aircraft engine as well. In 1911, Civil War veteran and former Governor of the State of Indiana Winfield Taylor Durbin had recruited Roof, convincing the accomplished 29 year-old to sell his company and move to Anderson. There, he went to work for Durbin's nephew, William, at the Anderson Foundry and Machine Works, where he was instrumental in bringing a new line of heavy diesel engines to market in the early to mid-1910s. But Roof was more than just an engineer who happened to work on internal combustion engines; he was also an automotive enthusiast and an amateur racer. In 1908, he had built and raced his own stripped six-cylinder oval track machine, and throughout the late 1900s and the early 1910s, he had closely followed the Midwestern dirt, board, and brick racing scenes in his free time. In 1916, therefore, he was able to bring considerable engineering experience as well as an intimate understanding of the ins and outs of oval track technology to bear on his new pet project.[63]

What he came up with was clever, but it wasn't altogether new. Featuring sixteen overhead valves and hemispherical combustion chambers, Roof's high-performance cylinder head layout borrowed heavily from the phenomenally successful Peugeot racing engines of the period.[64] Designed to bolt directly to any OEM Ford engine block without modification, it used

[63] Some have claimed that Roof's inspiration for the 16-valve conversion grew out of "a chance encounter with Henry Ford at a Michigan speedway" in 1916 (Almquist, "Robert M. Roof," 10), but Roof claimed that the idea stemmed more from his having observed firsthand the growing popularity of Model T-based racers at Midwestern oval events in 1916, particularly at a major meet held at the Chicago Motor Speedway that year (Robert M. Roof, "'*Jazzing Up*' Model A Ford Engines," *Ford Dealer and Service Field*, March 1932, 16). Extensive details regarding Roof's background, training, and early business ventures can be found in Kem Robertson's recently published article, "Robert Roof."

[64] Ernest Henry had designed a sophisticated double-overhead-camshaft, 16-valve racing engine for Peugeot in 1911; in 1912 and 1913, Peugeot racers fitted with Henry's engine won the French Grand Prix and the Indianapolis

the standard Ford camshaft to operate the overhead valve mechanisms: long pushrods passed through the factory valve openings, linking the original camshaft lifters with the new, forked overhead valve rocker arms. Easy to install and yet remarkably sophisticated, the new head was, in Roof's opinion, a sure-fire hit. Over the winter of 1916-1917, therefore, he founded a new side venture called the Roof Auto Specialty Company to produce the equipment, with himself as president and William Durbin as secretary and treasurer. Shortly thereafter, his new high-performance aftermarket cylinder head – dubbed the "Model A" – made its debut in the racing market.[65]

Years later, Roof recalled that "[i]n 1916, the fastest speed obtained from racing Fords was 60 miles an hour;" cars fitted with his new "Model A" overhead valve equipment in 1917, however, were capable of speeds as high as 78.[66] More importantly, though, oval track racers equipped with his new head were winning often, and big. According to company advertising, in fact, "[i]n every official race for Ford cars in 1917 where entered, one of the drivers with ROOF-PEUGEOT CYLINDER HEADS on his Ford won. And it was common custom for others with Roof 16 Overhead Valves to follow second, third and fourth."[67] Even allowing for self-promotional exaggeration, Roof's new head was clearly a winner.

The Roof Auto Specialty Company was small, however, and its production capacity was limited. During the summer of 1917, therefore, Roof and Durbin began to search for another partner – an investor, perhaps, or possibly an independent company interested in their unique product and willing to merge to help produce it. Fortunately, Durbin's uncle had a lead. Laurel

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500, respectively (see Ray Thursby, "French Engineering: Innovations, Complexities, Oddities and Successes," *European Car*, May 1997, especially pages 96-97). Robert Roof's advertisements from the 1910s proudly proclaim that his aftermarket heads are of the "Peugeot Type" (see, for example, Roof Auto Specialty Company advertisement, *The Fordowner*, January 1918, 53).

[65] Kem Robertson speculates that this new company was founded in late 1915 or early 1916, but in light of the aforementioned evidence suggesting that Roof's work on the design of the new head itself didn't even begin until the summer of 1916 (not to mention the fact that production and sales of the unit commenced only in 1917), the present author believes the venture must instead have originated in late 1916 or early 1917. See Robertson, "Robert Roof," 2.

[66] Roof, " '*Jazzing Up*' Model A Ford Engines," *Ford Dealer and Service Field*, March 1932, 16.

[67] Roof Auto Specialty Company advertisement, *The Fordowner*, January 1918, 53. The capitalized text appears in the original.

Motors, a Richmond, Indiana company founded in the mid-1910s, was a would-be car manufacturer still struggling to bring its first vehicle to market when the former governor and his nephew contacted its founder, Charles Hayes, in mid-1917. The Durbins, who had close ties to their local banking community, were apparently a rather persuasive duo, and it wasn't long before they had convinced Hayes not only to make the fifty-seven mile move to Anderson, but also to give up the new car business altogether and focus his enterprise instead on speed specialties for the Model T Ford. Roof, for his part, agreed to dissolve the Roof Auto Specialty Company and assign his patents to Laurel in exchange for a share in the firm's ownership. That fall, the company was incorporated in Anderson with an initial value of $2 million. Hayes assumed the post of president, Roof those of vice president and chief mechanical engineer, and William Durbin that of second vice president. In order to assume his new full-time duties, Roof resigned his engineering position at the Anderson Foundry and Machine Works, although Durbin, whose duties at Laurel were to be light, elected to continue as the general manager of the foundry as well. By January, the transition was complete: the Laurel Motors Corporation now produced, sold, and distributed Roof's creation.[68]

Creations, actually. During the fall, while the negotiations and transactions that led to the Laurel deal were taking place, Roof had developed a second type of high-performance aftermarket cylinder head for the Model T Ford. Known as the "Model B," the new design was also of the hemispherical, sixteen-overhead-valve variety, but it was designed for ordinary touring cars and trucks and therefore was of milder tune than the original racing head. From the outset, then, Laurel offered high-performance cylinder heads *both* "for racing cars and fast road speedsters" – the "Model A" – *and* "for regular Ford touring cars and converted trucks" – the "Model B."[69] By April 1918, the company had further expanded its line of speed equipment for the Ford to include replacement speedster-style bodies, as well as aluminum alloy pistons and

[68] Robertson, "Robert Roof," 6. The first advertisement for Laurel Motors ran in the February, 1918 issue of *The Fordowner*; assuming a relatively standard one-month lead, that would date the end of the Roof Auto Specialty Company to January, 1918.
[69] Laurel Motors Corporation advertisement, *The Fordowner*, February 1918, 3. See also Robertson, "Robert Roof," 7.

rings, "Gray Iron Pistons and Rings complete, Parts for Underslinging Chassis, Nickel Steel Racing Gears 3 to 1 Ratio, Racing Carburetors, everything in Ignition Equipment, Counterbalances for Crank Shaft[s], High Speed Cam Shaft[s], [and] Wire Wheels."[70] Of these, however, Laurel was responsible for the manufacture only of the bodies, underslinging gear, and, of course, the cylinder heads. The rest – cams, counterbalances, gears, ignitions, and so forth – were distributed by Laurel but produced by other aftermarket companies. A brochure from 1923, for example, indicates that Laurel sourced its counterbalances from Dunn, its pistons from Green and McCadden, its carburetors from Miller and Zenith, and its ignitions from a variety of manufacturers.[71] The Laurel Motors Corporation, in other words, operated not only as a manufacturer, but also as a whole- and re-sale distributor of speed equipment for the Ford.

Wartime materials shortages appear to have slowed the company's growth during the summer and fall of 1918, but this was more than offset in November, when the War Department contacted Roof to express its interest in his sixteen-valve designs for light truck and tank use. Over the next several years, Laurel maintained a minor contractual relationship with the military, ultimately resulting in a successful sixteen-valve, four-cylinder tank engine, the Laurel "Model J," in 1921. Between its military contracts and the strong demand for Model T speed equipment, Laurel grew steadily throughout 1919, and in 1920, the company announced a major expansion of its facilities. By then, its distribution network spanned from coast to coast, and even beyond: as early as the end of 1918, Laurel products had penetrated nineteen foreign markets as well.[72]

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[70] Laurel Motors Corporation advertisement, *The Fordowner*, April 1918, 79. The speedster bodies, according to Kem Robertson, were of a design that was leftover from Laurel's days as an aspiring OEM manufacturer (see Robertson, "Robert Roof," 6).

[71] "Laurel Motors Corporation Dealer's Discount Sheet," Romaine Trade Catalog Collection, Box 6, Laurel folder, University of California at Santa Barbara (hereafter, UCSB-RT). Although this brochure is undated, the extensive inventory of parts and components it lists includes several items introduced in 1923 but none of those that came out the following year; with confidence, therefore, the present author believes that the brochure dates from 1923. Miller and Zenith are listed by name in the text of the document; Dunn, Green, and McCadden are not, but the accompanying pictures and descriptions closely match those of the products manufactured by these firms during the same period. That Laurel manufactured its own underslinging gear is apparent from a 1919 technical article on the subject by Murray Fahnestock ("Lowering the Ford Chassis: Underslinging the Ford Speedster, Sport Model or Special Car," *The Fordowner*, October 1919).

[72] Robertson, "Robert Roof," 6. On Roof's ties to the military, see also "Meet the Author – *Again*," a short biographical sketch that accompanied a 1936 technical article written by Roof ("Using the Ford V-8 for Dirt Track Racing," *Ford Dealer and Service Field*, September 1936, 28).

During the 1920s, Roof continued to expand Laurel's own line of speed equipment for the Ford, adding, by 1923, a large-capacity oil reservoir and pressure oiling system, as well as a cross-drilled five-bearing crankshaft; high-speed camshafts and a line of superchargers followed in 1925 and 1926, respectively.[73] In addition, Roof developed the company's first high-performance products for another make of car in the early 1920s, introducing two different sixteen-valve heads for four-cylinder Dodge automobiles by 1921.[74]

But it was towards the further refinement of the Laurel line of aftermarket overhead-valve cylinder head conversions for the Model T Ford that Roof devoted the majority of his time and effort during the early to mid-1920s. In 1921, he discontinued the original top-of-the-line "Model A" in favor of a new design based on the general-purpose "Model B." Dubbed the "Model BB," Roof's new head featured two spark plugs per cylinder and was intended for speedster and racing use. The following year, Roof introduced an entirely new line of high-performance cylinder heads equipped with eight overhead valves. Simpler in design than his B and BB sixteen valve heads, the new "Roof 8" was intended to be a low-cost alternative to the company's pricier options; at $65 for the touring car and truck model and $75 for the racing and speedster units, the new equipment was precisely that.[75] In the spring of 1923, he also added a

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[73] On the oiling components, see "Regarding Speedster Lubrication," *Ford Owner and Dealer*, June 1923, 65-69. On the crankshafts, see Robert M. Roof, "Power and Speed: The Overhead Cam Shaft and Five Bearing Crank Shaft for Greater Engine Efficiency," *Ford Owner and Dealer*, April 1924, 138, 140, and 142; evidence from the aforementioned Laurel brochure, however, suggests that these cranks were available by 1923 ("Laurel Motors Corporation Dealer's Discount Sheet," UCSB-RT). A "five bearing" crankshaft was stronger than the Model T's three-bearing unit because of its two additional bearings, or anchor points. On Laurel's line of high-speed cams, see "Power and Speed, Article 2: Increasing the Lift of the Valves – and High Speed Cam Shafts" *Ford Dealer and Owner*, July 1925; circumstantial evidence, according to Kem Robertson, suggests that D. R. Noonan of Paris, Illinois was Laurel's initial cam supplier ("Robert Roof," 2). Finally, on Laurel's superchargers, see Fahnestock, "Super Chargers Interest Ford Speedster Builders," *Ford Dealer and Service Field*, July 1926, 58.

[74] Laurel Motors Corporation advertisement, *Ford Owner and Dealer*, July 1921, 131.

[75] In 1922 and 1923, for example, the company advertised the Roof 8 equipment at $65 and $75, while the B and BB sixteen-valve units went for $125 and $150, respectively. See "Laurel Motors Corporation Dealer's Discount Sheet," UCSB-RT, as well as Laurel Motors Corporation advertisement, *Ford Owner and Dealer*, May 1922, 143. A further iteration of the Roof 8 line was available as well; dubbed the "Liberty Eight," it was a super-power racing head based on the speedster and racing version of the Roof 8 equipment but fitted with larger valves and special carburetors (see "Secrets of Speed: Overhead Valves for Added Power," *Ford Owner and Dealer*, January 1924, 65-71).

new flagship sixteen-valve design, the "Type C," which was meant for racing use only.[76] As of early 1923, therefore, Laurel offered no less than five different types of high-performance aftermarket cylinder heads for the Model T, as well as two further models for the Dodge. Roof, however, was not yet satisfied. In the fall of 1923, he brought out a patented double overhead-camshaft adaptation for the Type C head, followed in 1924 by a single overhead-camshaft version of the Roof 8 equipment known as the "Victory Eight," which he also patented.[77] Two years later, he redesigned his Roof 8 equipment to fit the new, "improved" Model T Ford engine introduced in the mid-1920s, dubbing the new eight overhead-valve conversion the "Model 40."[78]

Period literature often featured detailed descriptions of Roof's assorted aftermarket cylinder heads, as well as those of some of his competitors. Fortunately, reading through these published pieces carefully enables us to safely infer quite a lot about their actual manufacture. Take the 1922-1924 Roof 8 line of cylinder head conversions, for example. These began as rough, one-piece steel alloy castings. Skilled machinists then would tap and drill them for installation on a standard Ford engine block, and they would also machine the rough-cast combustion chambers "so as to give uniform compression in all four cylinders and to delay the accumulation of carbon deposits."[79] Eight removable valve guides then were fitted to the machined casting, along with eight large-diameter steel valves. The rocker-arm mechanism,

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[76] Laurel Motors Corporation advertisement, *Ford Owner and Dealer*, March 1923, 111. The Type C sold for a whopping $225 in 1923, making it the company's most expensive offering; the racing and speedster version of Roof's sixteen-valve Dodge head came in second at $200 (see "Laurel Motors Corporation Dealer's Discount Sheet," UCSB-RT).

[77] Laurel Motors Corporation advertisement, *Ford Owner and Dealer*, April 1924, 24. Roof was awarded U.S. Patent Number 1,509,611 for the double overhead-camshaft version of the Type C in September of 1924 (he had filed in September of 1923), and he received Number 1,561,666 in November of 1925 for the Victory Eight (for which he had filed in September of 1924).

[78] Laurel Motors Corporation advertisement, *Ford Dealer and Service Field*, March 1926, 75. This head replaced the touring car and truck versions of the Roof 8; later that year, the "Model 40-S" made its debut, replacing the racing and speedster versions of the Roof 8 line (on the 40-S, see "Power and Speed: Overhead Valve Cylinder Heads," *Ford Dealer and Service Field*, December 1926, especially pages 65-66, and Laurel Motors Corporation advertisement, *Ford Dealer and Service Field*, July 1927, 10). Laurel also added a line of overhead valve conversions for Overland cars in 1926 (see Laurel Motors Corporation advertisement, *Ford Dealer and Service Field*, May 1926, 129).

[79] "Secrets of Speed: Overhead Valves for Added Power," *Ford Owner and Dealer*, January 1924, 67.

which converted the upward action of the factory Ford lifters into the downward movement necessary to operate the overhead valves, was entirely of drop-forged steel: each individual drop-forged rocker arm was carefully machined and hardened before being installed on the ground and hardened drop-forged steel rocker shaft. Four forged steel brackets then were mounted on the head casting in order to support the rocker shaft assembly. Included with the kit was a finned and polished valve cover, held in place with a special, extra-length central cylinder head stud.[80] Hand-machined and hand-assembled from cast- and forged-steel and aluminum components specifically manufactured for Laurel, the entry-level Roof 8 overhead-valve conversion was a complex unit that required substantial time and manpower to complete.[81]

The same was true of the 1926 Laurel Model 40-S "Super-Power Head," the racing and speedster eight overhead-valve conversion kit for the "improved" Model T that replaced the older Roof 8 design. The 40-S was rough-cast out of steel, then tapped, drilled, and machined by hand to accept the valves and the valve mechanism. The valves themselves were drop-forged units of high grade steel – the same material, apparently, that was used on the high-end Miller and Deusenburg racing engines of the period. The high grade steel rocker arms were drop forged, hand machined, and fitted with bronze bushings. Cold-rolled steel was used to make the rocker shaft, which was then heat-treated before being fitted with the rocker arm assemblies and mounted on the cylinder head casting. Spring steel was used for the high-performance valve springs, and nickel steel for most of the other hardware. A special pressed steel valve cover also was included with the hand-assembled package.[82]

All of this labor-intensive machining, finishing, and hand-assembly work was done in-house at Laurel, but all of the rough castings and most of the heavy forgings were obtained from subcontractors.[83] Through mid-1924, the Anderson Foundry and Machine Works handled most

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[80] Ibid., 67-68.
[81] According to Robertson ("Robert Roof," 9), Laurel had fifty employees in 1925. This was unbelievably massive for a speed equipment manufacturer of the period – by comparison, not until the end of the 1960s would most of the celebrated, postwar California aftermarket companies come to employ so many. See below, chapters 3 and 4.
[82] "Power and Speed: Overhead Valve Cylinder Heads," *Ford Dealer and Service Field*, December 1926, 65-66.
[83] Subcontracted forgings were standard practice within the speed equipment industry of the time, and would remain so for at least another sixty years. See below, chapters 3, 4, and the conclusion.

of Laurel's casting and forging needs, with William Durbin acting as the principal mediator between the companies. In July of that year, however, the cozy relationship between Anderson and Laurel began to unravel when Durbin left the foundry in order to pursue another business interest. At the same time, Laurel itself was beginning to falter, even as the prolific Roof continued to unveil new products for the company. Charles Hayes, who had founded an airplane manufacturing company in 1923, steadily lost interest in Laurel Motors over the course of 1923 and 1924, and Arthur S. Sinclair of the St. Louis-based Zenith Company was brought in to join the Laurel management team in 1925. Almost certainly frustrated over the changes that had taken place at Laurel, Roof decided to sell his stake in the company to Sinclair in 1926; Hayes sold his share of the firm to the Zenith interests at about the same time. Over the course of 1926 and 1927, Zenith slowly integrated Laurel's product lines with its own, and in 1927, the company's operations were relocated to St. Louis. Shortly thereafter, the Laurel name was dropped entirely.[84]

Together with Myron Reynolds, one of Charles Hayes's fellow investors in the short-lived Airplane Corporation of 1923, Robert Roof went on to found the R&R Manufacturing Company of Anderson, Indiana in 1927.[85] By then, however, the era of the Model T was coming to a close, and not until the universal car's replacement had begun to hit the streets in sufficient quantities to support a high-performance aftermarket of its own would R&R begin to thrive as Laurel once had. Later on, we'll pick up the threads of Robert M. Roof's story once again, in the context of the Model A and V8 industries of the 1930s and 1940s. For the time being, however, let us turn our attention to one of his chief Model T era competitors, Joe Jaegersberger.

Joe Jaegersberger and The Rajo Motor Company

Three years after Robert Roof's original "Model A" high-performance cylinder head for the Ford first hit the market, a formidable competitor for the Anderson, Indiana company

[84] Robertson, "Robert Roof," 9. Zenith, incidentally, would itself relocate to the Milwaukee area before the end of the decade.
[85] Ibid.

emerged over in Racine, Wisconsin. Stiff competition in the cylinder head aftermarket was, of course, nothing new for Laurel Motors. Craig-Hunt, Inc., for example, had introduced a sophisticated single-overhead camshaft, sixteen-valve conversion kit in 1917, just as Roof's own unit was beginning to make a name for itself on Midwestern oval racing circuits.[86] But the Craig-Hunt company never seriously contemplated manufacturing a milder version of their high-performance cylinder head to compete with Laurel in the budding street-use market. Instead, J. R. Craig and W. L. Hunt had their sights set on the new car business, and as they pursued their dream of bringing a low-priced car to market in the late 1910s and early 1920s, their interest – and their presence – in the high-performance aftermarket waned appreciably.[87] For Roof, therefore, Craig-Hunt was at worst an ever-diminishing and relatively minor threat to Laurel's racing sales.

The Rajo Motor Company of Racine, however, was altogether different.[88] Harboring no delusions either of competing with Highland Park or of paying the bills with racing speed equipment sales alone, its primary aim from the outset was to manufacture and sell high-performance street-use cylinder head conversions for the universal car. The company's initial offering was an eight overhead-valve unit known as the Rajo Model 30 Valve-in-Head, introduced in 1920.[89] Designed to bolt directly in place of the OEM Model T flathead, the Model 30 Valve-in-Head bore a striking resemblance to the Roof 8 line of aftermarket heads brought

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[86] The Craig-Hunt conversion was intended for racing use only, although in due course the company began to advertise its on-road capabilities as well. See "Sixteen Valve Cylinder Heads," *The Fordowner*, January 1918, 48, and also Craig-Hunt, Inc. advertisement, *The Fordowner*, February 1918, 108.

[87] In the spring of 1920, the Craig-Hunt Motors Company was incorporated in Indianapolis with an initial capitalization of $1 million, absorbing Craig-Hunt, Inc. The new firm's stated purpose was to bring a small, affordable passenger car to market while maintaining the production, marketing, and sales of speed equipment for the Model T Ford (see "Craig-Hunt to Make New Low-Priced Car," *Automotive Industries – The Automobile*, April 15, 1920, 937). Ultimately, however, the company proved unable to do both, and by the end of 1920 it had folded altogether (see Robertson, "Robert Roof," 6).

[88] The name "Rajo" derives from a combination of the first two letters of its place of origin with the first two letters of its founder's first name: **Ra**cine + **Jo**e = **Rajo**. See Batchelor, *The American Hot Rod*, 35.

[89] Actually, development work on the Rajo line began as early as 1919, with extensive in-house and independent testing on the equipment taking place before the Model 30 finally hit the general market in 1920. Interestingly, some of the independent testing of the Rajo head was done by the military, and the company included a favorable testimonial from the Civilian in Charge of Motor Equipment at the Rock Island Arsenal in Illinois, Harry L. Rossiter, in its first advertisement in *Ford Owner and Dealer* (October 1920, 113). See also "Rajo Has New Model," *Ford Dealer and Service Field*, July 1926, 140.

out by Laurel two years later: long pushrods linked the standard Ford camshaft with a basic rocker arm assembly, operating the eight overhead valves. Far less complex mechanically than any other kit on the market, the Rajo conversion was intended for use on trucks, touring cars, and road-going speedsters.[90] Compared with Laurel's more expensive, sixteen overhead-valve "Model B" street-use equipment, not to mention Craig-Hunt's exotic overhead camshaft gear, the Rajo Model 30 was an entry-level speed equipment bargain.

Nevertheless, all-out racing never was far from mind at the Rajo shop. Joe Jaegersberger, the company's founder and president, was an oval track racer in the 1910s, as was Louis Disbrow, the firm's distributor for Iowa, Michigan, Illinois, and Indiana. From the very beginning, therefore, a racing version of the Model 30 also was available, and the company was never shy about the on-track exploits of its special Valve-in-Head equipment. In 1920 and 1921, for example, the firm boasted of the many victories posted by famed track racer Frank Cobb in a Rajo racing special, and in 1922, the company proudly celebrated Noel Bullock's victory at Pikes Peak in a racing-model Rajo Valve-in-Head-equipped Ford speedster.[91] In their advertising, though, Jaegersberger and Disbrow made use of these triumphs not in order to sell more of their racing gear, but rather in order to sell more Rajo road-going speed equipment. Thus, their November 1920 spot began with a brief description of Cobb's victories in several South Dakota races, but continued with the claim that "Ford pleasure cars and trucks have equal possibilities" – in other words, if you equip your Ford with the Rajo Model 30 cylinder head conversion, you too will be able to beat all comers on the byways of your hometown.[92] Similarly, Rajo's November 1922 campaign that featured Noel Bullock's Pikes Peak victory went on to

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[90] See "The Rajo Valve-in-Head Motor," *Ford Owner and Dealer*, October 1920, 132, and also Rajo advertisement, *Ford Owner and Dealer*, October 1920, 113. Truck applications for early cylinder head conversions were relatively common: since the basic Model T engine powered all of Ford's small trucks as well as its cars, commercial trucks also stood to benefit from the performance gains associated with overhead valve technology, and few of those who manufactured this sort of equipment neglected to appeal to this potential pool of customers.

[91] On Louis Disbrow, see Rajo advertisement, *Ford Owner and Dealer*, June 1921, 117. On Frank Cobb and the Rajo special, see "Built for Speed." *Ford Owner and Dealer*, October 1921, 100, as well as Rajo advertisement, *Ford Owner and Dealer*, November 1920, 113. Finally, on Noel Bullock, see B. J. Paulson, "Sitting on Top of the World," *Ford Owner and Dealer*, October 1922, 118, and Rajo advertisement, *Ford Owner and Dealer*, November 1922, 27.

[92] Rajo advertisement, *Ford Owner and Dealer*, November 1921, 113.

urge the reader to "[p]ut your Ford in the champion class."[93] Other period advertising for the company promised more power, higher top speeds, greater engine flexibility, and lower fuel consumption, emphasizing that its overhead-valve equipment would "[m]ake your FORD a Real Car," putting it "into the high-priced car class as regards mechanical performance."[94] Here, then, was a product that was racing-inspired, but designed above all else to enable the owners of the lowly, affordable Model T Ford to run neck and neck with the big boys on the street.

Prior to the formation of the Rajo Motor Company, Jaegersberger was a moderately successful oval-track driver and racing engine mechanic who was active in several minor circuits. In 1919, however, his driving career came to an abrupt halt when he was seriously injured in an accident at a dirt-track event; shortly thereafter, he began to work on his first overhead-valve cylinder head conversion for the Model T. For Jaegersberger, it was a natural move: twenty years earlier, he had studied engine design under Gottlieb Daimler's son at the Daimler factory in Germany, and this formal training, combined with his considerable hands-on racing experience, gave Jaegersberger the expertise he needed to successfully design and develop the Rajo line.[95]

In 1924, four years after the Model 30's debut, Jaegersberger brought out an entirely new and expanded line of Rajo overhead-valve equipment for the Model T. The centerpiece of this new and improved lineup was the "Model A," which was designed "[f]or those who wish[ed] added power and speed, with the least possible complication and noise."[96] This new cylinder head was effectively a cross between the standard L-type or flathead design, as fitted to the

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[93] Rajo advertisement, *Ford Owner and Dealer*, November 1922, 27. "Pikes Peak" was – and is – a yearly automobile hill-climbing competition held at Pikes Peak, a mountain in Colorado.

[94] Rajo advertisement, *Ford Owner and Dealer*, October 1920, 113. The capitalized text appears in the original.

[95] On Jaegersberger's technical background, see Griff Borgeson, "Accessory Trail: Rajo Returns…," *Motor Trend*, March 1952, 33 and 37. Curiously, period advertising the company listed him as the "designer and builder" of its overhead valve equipment, but it never mentioned anything about his technical credentials (See, for example, Rajo advertisement, *Ford Owner and Dealer*, June 1921, 117). Neither, for that matter, did the many write-ups on the Rajo gear that appeared in the popular Ford press over the course of the 1920s. In an age in which the engineering profession was widely revered, it is difficult to imagine any reason why Rajo would have neglected to mention Jaegersberger's illustrious engineering training – Robert Roof, after all, proudly bore his title of Chief Mechanical Engineer throughout his career, even though he was actually trained as a machinist and foundryman.

[96] "Secrets of Speed: Overhead Valves for Added Power," *Ford Owner and Dealer*, January 1924, 65.

universal car by Ford, and the popular overhead-valve type, as produced in aftermarket kit form by Laurel, Craig-Hunt, Rajo, and others: four monstrous overhead valves handled the admission of the intake charge, while the standard in-block Ford exhaust valves took care of the burned waste gases. In this design, long pushrods and a basic set of rocker arms linked the intake lobes of the standard Model T camshaft with the overhead intake valves, and standard lifters operated the in-block exhaust valves. By far the simplest overhead-valve conversion then available, the "Model A" was intended as an entry-level alternative to the company's new eight-overhead-valve models. The Rajo "Model B," introduced at the same time, was in effect a refined version of the old Model 30. "[D]esigned for speedsters and racing cars," the Rajo "Model B" featured two spark plugs per cylinder as well as a full set of eight overhead valves operated, as before, by the standard Ford camshaft.[97] Rounding out the new line of Rajo conversions that year was the "Model C," an eight-overhead-valve conversion with one spark plug per cylinder and a simpler intake and exhaust manifolding system, possibly intended for truck use.[98]

Two years later, Rajo made a bid for a larger share of the market for overhead valve conversions, announcing the introduction of the Model C-35 and proudly proclaiming that "quantity production has made it possible to quote a new 'Low Price' " for the equipment.[99] Designed for use on Ford cars and trucks, the C-35 featured eight overhead valves, a single-casting intake and exhaust manifold assembly, and an overall packaging scheme intended to make the unit easier to install with simple hand tools. From the pictures of the C-35 published in the new-product write-ups and technical features of the popular Ford press, as well as from those

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[97] Ibid., 66.

[98] Details on the "Model C" are sketchy: the popular Ford press never wrote a word about it, and Rajo's advertisements only mentioned it in passing, accompanied by a small photograph of one installed on a Ford block. From the picture, it appears as though the intake and exhaust ports are located on the same side of the cylinder head, which would all but rule out a sixteen-valve design. In addition, it is clear that only one plug was used per cylinder on the "Model C." This head would therefore have offered a level of performance somewhat below that of the "Model B," but probably greater than that of the "Model A." It would, in short, have been perfect for trucks, but it is impossible to verify this with absolute certainty. See Rajo advertisement, *Ford Owner and Dealer*, January 1924, 23. When discussing the Rajo "Model A," "Model B," and "Model C" cylinder heads, as well as Laurel's "Model B," the present author has elected to use quotation marks to help avoid confusion with Ford's Model A and Model B automobiles of the late 1920s and early 1930s.

[99] Rajo advertisement, *Ford Dealer and Service Field*, May 1926, 9.

in Rajo's own advertising, it appears as though this new head represented a further evolution of the 1924 Rajo "Model C" rather than of the company's much-vaunted "Model A" or "Model B" lines.[100]

In any event, what's interesting about the evolution of the Rajo lineup during the course of the 1920s is Jaegersberger's *timing*, especially vis-à-vis his chief competitor in the street performance cylinder head business, Robert Roof of Laurel. Less than two years after Rajo introduced its entry-level Model 30, for example, Laurel brought out its own eight-overhead-valve conversion, the Roof 8. Shortly thereafter, in 1924, Rajo responded with its simpler, four-overhead-valve "Model A." Thereafter, Roof seems to have decided to focus on the higher-end of the cylinder head aftermarket, coming out with several overhead-camshaft conversions as well as an expanded lineup of sixteen-overhead-valve kits while Rajo's entry-level units thrived at the market's bottom-end. In other words, Roof and Jaegersberger appear to have vied for the lower-end of the street-use market for several years before Rajo finally sealed its victory with the bare-bones "Model A."[101]

Jaegersberger's approach to the manufacture of his high-performance cylinder heads was similar to that of Laurel Motors. His first, the Model 30, began as a single casting of high-grade cylinder iron, sourced from a local foundry. The combustion chambers then were machined at the Rajo facility "to an accuracy of 1/1000 of an inch," both for uniform compression and for a smoother combustion surface less prone to knock.[102] Machine-finished tungsten steel valves then were fitted to the cylinder head casting, along with a ground and hardened steel rocker arm assembly and a set of cold-rolled pushrods with hardened concave heads. Customers were also supplied with a set of plugs to block off the OEM Ford in-block intake and exhaust ports, and a

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[100] Ibid. See also "Rajo Has New Model," *Ford Dealer and Service Field*, July 1926, 140, as well as "Power and Speed: Overhead Valve Cylinder Heads," *Ford Dealer and Service Field*, December 1926, 66-67.
[101] Production figures indicate that Rajo outsold Laurel by a narrow margin during the 1920s: 4,000 Rajo heads of all types were produced by the time the company dropped out of the speed equipment business in 1928, whereas Laurel only claimed 3,000 sales just before its absorption by Zenith. See Robertson, "Robert Roof," 6, and Laurel advertisement, *Ford Dealer and Service Field*, March 1926, 75.
[102] Rajo advertisement, *Ford Owner and Dealer*, July 1921, 7.

special cast exhaust and intake manifolding system came with the kit as well.[103]

The company's improved eight-overhead-valve head of 1924, the "Model B," was broadly similar in construction. Cast of high-grade gray iron, the "Model B" blank was tapped, drilled, and machine-finished at the Rajo facility, its head-to-block mating surface as well as its combustion chambers receiving the bulk of the attention. Eight hand-machined tungsten steel valves then were fitted to the casting, held in place by a set of removable valve guides. The rocker arm mechanism consisted of a hardened and ground steel rocker shaft that the Rajo machinists drilled for oiling, coupled with a set of eight nickel steel rocker arms mounted to the shaft with low-friction roller bearings. Pushrods for the "Model B" were of steel tubing with hardened tips, rather than of cold-rolled steel. The kit came complete with a choice of cast and machined intake manifolds, depending on whether the customer intended to use single or dual carburetion, as well as a set of four tapered exhaust stubs for use with an aftermarket steel-tube exhaust system. A set of secondary valve springs and a cast aluminum valve cover rounded out the conversion. With the exception of its four-overhead-valve design, the 1924 Rajo "Model A" was put together similarly.[104]

However, what exactly Rajo meant when it announced that "quantity production" of its new Model C-35 would begin in 1926 is entirely unclear. The C-35, like its predecessors, was cast as a single piece, then hand-machined and finished with a number of individually turned, ground, machined, and heat-treated components. In other words, while it is conceivable that the subcontracted production of the basic cylinder head casting – as well as that of some of the individual cast or forged components, like the rocker arms and the valves – might have been increased for the C-35, a lot of hand-finishing and fitting still needed to be done before it could actually be used.[105] Perhaps the company simply hired more machinists and assemblers to handle the volume. In any event, Rajo's "quantity production" maneuvering for the C-35 would be its

[103] Ibid., 6-7, and "The Rajo Valve-in-Head Motor," *Ford Owner and Dealer*, October 1920.
[104] "Secrets of Speed: Overhead Valves for Added Power," *Ford Owner and Dealer*, January 1924, 65-67.
[105] On the C-35's construction, see "Power and Speed: overhead Valve Cylinder Heads," *Ford Dealer and Service Field*, December 1926, 66-67. On the "quantity production" claim, see Rajo advertisement, *Ford Dealer and Service Field*, May 1926, 9, as well as "Rajo Has New Model," *Ford Dealer and Service Field*, July 1926, 140.

last: by 1928, the company had vanished from the high-performance industry, one of many Model T era speed equipment manufacturers that went under after Ford discontinued the universal car in 1927.[106] Used Rajo cylinder head conversions did, however, remain quite popular well into the 1930s, especially among California hot rodders who ran Model T-based roadsters on the dry lakes.[107]

Jaegersberger himself would continue to be involved in the speed equipment industry for many years to come. In the 1930s, for example, he designed and built a four-overhead-valve conversion for the four-cylinder Model A Ford motor, known as the Ramar Valve-in-Head, that was similar to Jaegersberger's mid-1920s Rajo "Model A" equipment for the Model T.[108] Years later, he would also surface as a manufacturer of high-performance cylinder heads for the inline six-cylinder GMC and Chevrolet engines of the 1940s and 1950s, for which he would revive the famous Rajo name.[109] In its original incarnation, though, Rajo came and went with the Model T.

The Chevrolet Brothers

Born in Switzerland, Louis Chevrolet was a talented mechanic and race car driver who first made headlines as a member of Buick's factory racing team towards the end of the first decade of the twentieth century. In 1911, he teamed up with William C. Durant, the former head

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[106] On the collapse of the Model T industry and the emergence of the Model A aftermarket, see Montgomery, *Hot Rods As They Were*, 23, and also below, chapter 2. After World War II, an accessory outfit known as "Rajo Motors" surfaced briefly in Chicago (see, for example, Rajo Motors advertisement, *Popular Mechanics*, July 1949, 246), but between 1928 and 1949, there is to the present author's knowledge absolutely no evidence that Rajo continued to manufacture any speed equipment at all.

[107] Used speed equipment was used frequently on late 1920s- and 1930s-era California hot rods, and some early speed shops – Bell Auto of Bell, California, for example – actually got started during that period by salvaging high-performance aftermarket parts from wrecked cars (on Bell, see Batchelor, *The American Hot Rod*, 169; Almquist, "Roy Richter: Bell Auto Parts," in *Hot Rod Pioneers*, 24-25; Bagnall, *Roy Richter*, chapter 1; and below, chapter 2). As for 1930s use of Rajo equipment on the dry lakes, a quick scan of the program from an event held at Muroc on May 16, 1937 indicates that of the ninety-plus total entrants that day, eight of them ran modified Model Ts, six of which were fitted with Rajo equipment. One year later, at the legendary SCTA Muroc event of May 15, 1938, only about ten of the 225-plus entrants ran Model Ts, but seven of these ten were Rajo equipped. See William Carroll, *Muroc, May 15, 1938: When the Hot Rods Ran* (San Marcos, CA: Auto Book Press, 1991), 7-8 and 18-21.

[108] See Ramar Automotive Company advertisement, *Ford Dealer and Service Field*, August 1931, 87, and "The Ramar Valve-in-Head," *Ford Dealer and Service Field*, October 1931, 77. Ramar operated out of Racine, Wisconsin as well, and though it might well be the case that Ramar was simply a reorganization of the old Rajo concern, the present author has found no substantive evidence to support this possibility.

[109] See, for example, Griff Borgeson, "Accessory Trail: Rajo Returns...," *Motor Trend*, March 1952, 33 and 37.

of General Motors, to design and produce an automobile for the American market. At $2,150, the 1912 Chevrolet Classic Six was far too expensive for its capabilities, and after less than a year, Durant pulled the Six off the market, bought out Chevrolet's stake in the company, and began to reorganize the company in preparation for the introduction of a low-cost model designed to compete with the Model T. The rest, as they say, is history: Durant's retooled Chevrolet Motor Company went on to become the cornerstone of a new General Motors automotive empire in the 1920s.[110]

After the Classic Six debacle, Louis returned to his Indianapolis home, where he joined with his brother Arthur to design, build, and race circle track cars. By the middle of the decade, the pair had begun to experiment with Model T-based racers, and in 1919, four of their so-called "Frontenac" machines qualified for the prestigious Indianapolis 500. Featuring chassis, steering, and bodies of their own design, these cars used a highly-modified powerplant loosely based on Model T underpinnings. Three of these four cars failed to finish the race due to suspension-related difficulties, and the fourth, driven by a third Chevrolet brother, Gaston, finished tenth.[111] Disappointed with the ultimate results but proud that they had even qualified to begin with, Arthur and Louis returned to the drawing board in the winter of 1919-1920 to refine their design. The following year, one of their Frontenac racers captured the checkered flag at Indianapolis, a feat the team managed to repeat in 1921.[112]

Now world famous, the Chevrolet brothers turned their attention to the budding Model T speed equipment business and determined that an overhead-valve cylinder head conversion inspired by their Frontenac racing engine designs might well be a winner. Together, they organized the Chevrolet Brothers Manufacturing Company, and in the fall of 1921, the Indianapolis-based concern introduced the Frontenac high-performance cylinder head for the

[110] On Louis's early racing career and his time with Durant, see Flink, *The Automobile Age*, 67, and Rae, *The American Automobile*, 65.
[111] Out of 33 starters in the 1919 race, only ten actually finished, which meant that Gaston came in dead-last. See "Indianapolis Speedway Adopts the 3-Liter Limit for Future Races," *Automotive Industries – The Automobile*, June 5, 1919, 1201-1207, 1245.
[112] "A New Cylinder Head," *Ford Owner and Dealer*, November 1921, 96.

Model T Ford. An eight-overhead-valve conversion not unlike the Rajo Model 30 and the soon-to-be-released Roof 8 units, the Frontenac cylinder head was designed to bolt directly in place of the OEM Model T flathead.[113]

From the outset, the Chevrolet Brothers offered three distinct versions of their overhead-valve equipment, the "Model T," "Model S," and "Model R."[114] The first two were intended for use on Ford touring cars and speedsters, and the last for use on Model T-based racers. The size of their respective combustion chambers was the chief difference between the three models: the T featured the largest chamber for a moderate compression ratio, the S a slightly smaller chamber for a modest increase in engine power, and the R a tiny chamber for maximum performance.[115] The T and S units featured steel alloy valves with carbon-steel stems for longevity, while the R made use of tungsten steel valves better suited for racing. All three featured a single intake port and three exhaust ports and came complete with an exhaust manifold designed to mate with the existing Ford exhaust system. Two different intake manifolds were available, one for use with the standard Ford carburetor and the other for use with larger-bore aftermarket units. The standard Ford camshaft was used to operate the overhead valves via a pushrod and rocker assembly, and an aluminum cover was included to keep the dust out and the oil in. Though designed to replace the OEM Ford flathead with a minimum of mechanical fuss, the Frontenac's external dimensions did exceed those of most of its competitors, and a bit of finesse was therefore necessary in order to install one in the engine bay of an unmodified Model T.[116]

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[113] Ibid.

[114] As with the various Laurel and Rajo cylinder head conversions, the present author has elected to place these Frontenac model designations in quotes to avoid undue confusion with OEM Ford vehicles.

[115] Generally speaking, the smaller the combustion chamber, the higher the static compression ratio, for, because of the inverse physical relationship between pressure and volume, by reducing the volume of the chamber in which the piston's upstroke compresses the fuel-air mixture, the ratio of compression necessarily rises.

[116] "Secrets of Speed: Overhead Valves for Added Power," *Ford Owner and Dealer*, January 1924, 65-71. This eight-overhead-valve line of heads was, according to Dean Batchelor, initially designed by an automotive engineer associated with the Chevrolet brothers by the name of C. W. Van Ranst (*The American Hot Rod*, 36). Period evidence, however, credits the brothers with the design ("A New Cylinder Head," *Ford Owner and Dealer*, November 1921, 96, and "Secrets of Speed: Overhead Valves for Added Power," op. cit., 69). The truth, of course, likely lies somewhere in the middle: perhaps Van Ranst made the initial design and then the Chevrolet brothers refined and developed it for practical use, or perhaps Arthur and Louis hired Van Ranst to help them turn their track prototypes into a viable, production-ready design.

By the mid-1920s, the original Frontenac line of heads was joined by a far more exotic racing cylinder head conversion designed by a Japanese-American associate of the Chevrolet Brothers, James Sakayama. Like its lesser brethren, this new unit also featured eight overhead valves, but it used a pair of chain-driven overhead camshafts to operate them.[117] A twin-intake-port version of the "Model R" racing overhead-valve conversion was introduced in 1926, and by the end of the 1920s, the Chevrolet Brothers were turning out water pumps, pressure oilers, crankshafts, pistons, high-speed transmission gears, and other speed equipment for the Model T Ford. In addition, the company also manufactured a limited line of aftermarket components for four-cylinder Chevrolets and Whippets.[118]

Though their company focused the bulk of its manufacturing and marketing capacities on its road-going speed equipment for the Model T Ford, Arthur and Louis continued to participate in organized track motorsports throughout the 1920s, using their on-track victories to leverage further street-use sales. In 1922, for example, two Frontenac Model T-based racers fitted with "Model R" cylinder heads qualified for the Indianapolis 500; through the following spring, the company ran a series of advertisements in which they boasted of this accomplishment and promised similarly blistering performance to potential street- and track-customers.[119] In 1923, another Frontenac racer finished fifth at the Indianapolis 500 "at an average speed of 82.25 miles an hour," using the standard "Model R" Frontenac overhead-valve cylinder head conversion. Impressed with the Frontenac's on-track triumphs, *Ford Owner and Dealer* invited Arthur Chevrolet to guest-author a "Secrets of Speed" article that fall in order to share some of his design strategies and construction methods with their readers, an offer that he graciously accepted.[120] By the middle of the decade, Arthur and Louis had also begun to build and race dirt-

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[117] Batchelor, *The American Hot Rod*, 36.

[118] Ibid., and Chevrolet Brothers advertisement, *Ford Dealer & Service Field*, March 1928, 46.

[119] For more on the technical specifications of these 1922 Frontenac racers, see "New 'Fronty' Racer Has Ford Features," *Automotive Industries – The Automobile*, May 18, 1922, 1096. For an example of the company's advertising campaign built upon the success of these 1922 cars, see Chevrolet Brothers advertisement, *Ford Owner and Dealer*, June 1923, 194.

[120] Arthur Chevrolet, "Building a 'Fronty-Ford' Race Car," *Ford Owner and Dealer*, September 1923, 65-72. The quoted text regarding the performance of Arthur and Louis's 1923 Indianapolis 500 entry is from page 65 of this piece. In 1923, Arthur and Louis Chevrolet also fielded four cars at Indianapolis in collaboration with Herbert

track cars, and *their* success led the popular Ford magazine to offer Arthur yet another chance to share his wisdom – and, of course, to freely advertise his company's products – in their pages.[121]

10,000 Frontenac cylinder head conversions for the Model T Ford were built and sold before the Chevrolet Brothers Manufacturing Company folded in the early 1930s, more than double Rajo's output and almost triple that of Laurel.[122] And yet, even the basic pushrod-action eight-overhead-valve T, S, and R Frontenac kits were just as sophisticated as were those of the company's main rivals. The Frontenac was not, in other words, a cut-rate head. "Model T," "Model S," and "Model R" units, for example, started off as subcontracted, semi-steel raw castings before the in-house machinists at the company milled their combustion chambers and drilled and tapped their fittings. The combustion chambers then were flame-swept to ensure the absence of hot spots, burrs, and other knock-inducing irregularities. Hand-machined tungsten steel valves, in the case of the R, or hand-finished semi-steel and carbon-steel valves, on S and T models, then were fitted within removable valve guides and slipped into the head casting. Drop-forged, carbonized, and hardened open-hearth steel rocker arms then were carefully finished and fitted to the hardened and hand-ground steel rocker shafts. Oil-tempered valve springs with pressed steel retainers then were added to the casting before the rocker assembly was at long last bolted into place. Wick oilers were also fitted to the heads to ensure a steady supply of lubricant to the overhead-valve rocker mechanism. Finally, the eight pushrods, which featured hardened tips, were turned from 5/16-inch round steel stock.[123] Complex and labor-intensive, the manufacture of even the lower-end of the Frontenac line of cylinder head conversions was a time-consuming and labor-intensive process. Fortunately for Arthur and Louis Chevrolet, sales of the kits more than made up for the cost of their manufacture.

Scheel. Dubbed the "Scheel-Frontenacs," these racers did not use the standard Frontenac overhead valve equipment, but rather a unique rotary valve mechanism that effectively combined the action of the camshaft and the valves (see "Scheel-Frontenac Entries Are Powered with Rotary Valve Engines," *Automotive Industries – The Automobile*, May 24, 1923, 1120-1123).

[121] Arthur Chevrolet, "Building a *Ford* Dirt-Track Racer," *Ford Dealer and Service Field*, August 1926, 70, 72, 74, 76, 78, 80, and 122-123.

[122] Robertson, "Robert Roof," 6.

[123] "Secrets of Speed: Overhead Valves for Added Power," *Ford Owner and Dealer*, January 1924, 69-70.

Or at least, they did for a while. Upon the introduction of the Model A Ford in 1928, Arthur and Louis Chevrolet quickly came out with a double-overhead-camshaft racing cylinder head conversion for the new car. But sales of their Model T staples went into a downward spiral, and when the American economy collapsed in 1930, it brought the struggling Chevrolet Brothers Manufacturing Company down with it.[124] Phenomenally successful during the era of the Model T, used Frontenac conversions remained popular among both amateur dirt-track racers and a handful of early California hot rodders for at least a few more years.[125] In time, though, as Model T technology forever passed from the performance scene, the Frontenac would do the same.

Summary

Laurel Motors, Rajo, and the Chevrolet Brothers Manufacturing Company shared a great deal in common. Most fundamentally, of course, all three produced and sold high-performance overhead-valve cylinder head conversions for the Model T Ford. Also, all three companies manufactured their conversions in roughly the same manner, starting off with raw castings obtained from a subcontracting foundry before pouring considerable amounts of time and hand labor into their assembly; relatively small production runs were the result in each case. What's more, their most popular designs – the Roof 8, the Rajo "Model B," and the Frontenac "Model T" – were all of the eight-overhead-valve type, and they were all nearly identical in design. In addition, all three of these firms operated during the same basic period, all three of them advertised in the same venues, and all three of them maintained close ties to the racing scene while earning the lion's share of their profits from the sale of street-use gear. Finally, Laurel, Rajo, and the Chevrolet Brothers were all based in the Midwest, the cradle of American automobility and the region where the overwhelming majority of the nation's automobiles were

[124] On the Frontenac double-overhead-camshaft conversion for the Model A Ford, see Batchelor, *The American Hot Rod*, 55. Arthur and Louis Chevrolet had also formed an airplane company in the 1920s, known as the Chevrolet Aircraft Corporation, which was sold to the Glenn L. Martin Aircraft Corporation in 1930, just as their automotive business was beginning to go downhill (see "Chevrolet Joins Martin," *Automotive Industries*, January 18, 1930, 105).

[125] Three of the ten Model T entrants at both the May 16, 1937 and the May 15, 1938 Muroc dry lake meets were Frontenac-equipped. See Carroll, *Muroc*, 7-8 and 18-21.

owned and operated at the time.

Below the surface, though, these firms were also very different, at least in several critical ways. First, their backgrounds varied noticeably. To be sure, Robert M. Roof, Joe Jaegersberger, and Arthur and Louis Chevrolet were all involved in organized circle-track motorsports prior to their entry into the speed equipment business. Roof, however, had considerable training in the foundry and machinist trades, and the company he teamed up with in 1917, Laurel, had been trying to crack into the new-car market for several years before he and the Durbin family convinced its management to consider the high-performance aftermarket instead. Louis Chevrolet had also dabbled in the OEM industry, but that was nearly ten years before he and his brother Arthur brought out their line of cylinder heads. Racing – big-stage, Indianapolis 500 racing, in particular – therefore had quite a bit more to do with the Frontenac's successful launch than did Louis's experiences with William Durant. Jaegersberger also dove right into the aftermarket business following his days as a circle track star, but his racing experience was on the less-prestigious, small-time local dirt track circuits; Rajo, in other words, had to build its national reputation from scratch.

Second, Laurel Motors, the Chevrolet Brothers, and Rajo differed considerably in their respective business strategies. Laurel, for example, manufactured not only high-performance cylinder heads, but also underslinging brackets, oil and water pumps, high-speed camshafts, cross-drilled and counterweighted crankshafts, and a whole host of additional add-on high-performance components for the Model T Ford. At the same time, though, Laurel also acted as a distributor for other speed equipment manufacturers, selling Dunn counterbalances, McCadden pistons, Miller carburetors, and other makes of aftermarket gear on the side. Neither Rajo nor the Chevrolet Brothers acted as distributors. Arthur and Louis Chevrolet did, however, manufacture a number of aftermarket components for the Model T Ford in addition to their successful line of Frontenac cylinder heads. Rajo, on the other hand, focused almost entirely on the manufacture and sale of its overhead-valve conversions for the Model T – in fact, Jaegersberger's company is the only one of the three that never branched out, even on a limited basis, into the production of speed equipment for other makes of car, like Dodge or Chevrolet.

Third, and finally, all three would be out of business by the beginning of the 1930s, but for very different reasons. Laurel crumbled from within: sales were still quite strong when Charles Hayes lost interest in the firm, Roof sold out to Sinclair, and the entire enterprise became a part of the Zenith Company. Rajo, on the other hand, was unprepared for the collapse of the Model T speed equipment aftermarket and went under shortly after the release of the much-improved Model A Ford. And Arthur and Louis Chevrolet went into a tailspin following the end of the Model T era and were crushed, at long last, by the onset of the Great Depression.

In spite of their differences – or perhaps, in some instances, precisely because of them – Laurel Motors, Rajo, and the Chevrolet Brothers Manufacturing Company were typical among the speed equipment manufacturers of their day. Small, Midwestern, closely associated with circle-track motorsports, and heavily focused on the production of high-performance aftermarket components for the Model T Ford, their stories are broadly similar to those of most, if not all of the other high-performance companies that operated during the 1910s and 1920s. Let us pause for a moment to consider the wider implications of some of the more salient of their characteristic traits.

Take, for example, the fact that the early speed equipment industry was largely concentrated in the Midwest. What exactly does this mean? Does it indicate that there was a geographically-bound community of producers during this period, and if so, how might this have affected the design, manufacture, and sale of aftermarket components for the Model T Ford? As it happens, the geographic concentration of the early industry was far too loose for it to have meant very much at all. "The Midwest" is a fairly large chunk of territory, and if we survey our list of equipment manufacturers from the region in the 1910s and 1920s, we find that they were scattered over thousands of square miles (see above, figure 1.1). Therefore, only inasmuch as Midwestern racing circuits *might* well have put some of these companies in occasional contact with one another *might* this overall " Midwestern concentration" have mattered. In other words, this was certainly not a regional cluster in Scranton's sense – it was nothing like the Grand

Rapids furniture industry, the Philadelphia textile district, or even the early 1950s Los Angeles hot rod industry.[126]

A closer look at the map, however, reveals several smaller clusters of firms. Indianapolis was one: three of the early speed equipment manufacturers were located there, and if we consider Anderson to be a part of the greater Indianapolis metropolitan area, there were four. Milwaukee was another: between Racine, Waukesha, and Milwaukee proper, four aftermarket companies were based in the area. And if we step back and consider the nation as a whole, we find that a third cluster was centered on Los Angeles, a city from which three of these early companies hailed. To be sure, three or four firms in no way constitute a critical mass of manufacturing expertise. Especially in the case of Indianapolis, however, it does hint at a limited motorsports-based clustering.

A second characteristic of the early speed equipment industry that warrants further consideration at this point is that of the larger milieu of aftermarket accessory manufacturers to which it clearly belonged. Unlike the California-based hot rod companies that would begin to supplant them during the course of the 1930s, these early high-performance firms, as a group, openly identified with the replacement-parts and general-improvement companies with which they shared their advertising space. None of these original speed equipment manufacturers ever seriously contemplated forming their own industrial organization, none of them seem to have ever thought of establishing their own trade press, and, to judge by the content of their ads, very few of them even sought to distinguish the nature of their businesses from those of their replacement-parts and general-improvement counterparts. Without the Model T accessory industry, in other words, these early high-performance companies likely would have found it much more difficult to reach their customers – if in fact they would have ever emerged at all.

The third noteworthy aspect of the early speed equipment industry is closely related to the second: the design, manufacture, and sale of high-performance automotive aftermarket components in the 1910s and 1920s was viable only because of the mass-automobility revolution

[126] See Scranton, *Endless Novelty*, and below, chapter 3.

that the Ford Motor Company had spearheaded. It was by no means coincidental that the speed equipment industry first emerged in the years immediately following the introduction of the mass-produced Model T Ford. Nor, for that matter, was it merely by chance that the overwhelming majority of the add-on high-performance components that were available during the period were made to fit the universal car. And, finally, it was no accident that when a handful of these early equipment manufacturers decided to branch out and produce parts for cars other than the Model T, they mostly chose the Chevrolet and the Dodge – number two and number three, respectively, in the American market of the late 1910s and early 1920s.[127] In short, speed equipment manufacturing was a byproduct of mass automobility in a very real and direct sense. Firms within the high-performance sector simply chose those makes of car for which the largest possible market existed, and then they made parts for them. This was true in the era of the Model T, and it would remain so for many decades to come.[128]

A fourth and final feature of the high-performance aftermarket of the 1910s and 1920s that deserves our attention at this point is perhaps the least obvious of the bunch: the manufacture of over-the-counter speed equipment for the Model T was an enterprise that was *enabling*. Without the factory-engineered and manufactured components available on the open market, there can be little doubt that far fewer would-be enthusiasts ever would have been able to modify their own machines. To be sure, there were many who hopped-up their Ford powerplants themselves, tweaking the carburetor or the ignition system and, in some cases, even venturing to shave a few thousandths off of the cylinder head for a compression boost. Most, however, simply bought new high-performance components from their local dealers and bolted them into place. For as the following chapter shall demonstrate, far from stifling individual ingenuity – as Kline, Pinch, and Franz collectively have asserted with regard to the decision of accessory manufacturers to enter the business of manufacturing auxiliary power drive kits or various

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[127] Bardou, Chanaron, Fridenson, and Laux, *The Automobile Revolution*, 85.

[128] In fact, Ford products alone would remain the basis for much of the industry's activity well into the 1950s, and up through the late 1980s (at the earliest), mass-produced automobiles were the sole recipients of manufactured high-performance gear. See below, chapters 2, 3, and 4.

camping attachments for the universal car[129] – the advent of the speed equipment industry in the 1910s and 1920s actually brought a lot more folks into the fold and served, in the long run, to *stimulate* their automotive creativity.[130]

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With the end of Model T production and the introduction of the Model A in the late 1920s, however, much of this would change. The thriving accessory market that had served so many Model T owners for so many years suddenly lost its footing, and the Model A Ford proved to be far less receptive to add-on bits and pieces than its predecessor. Among speed equipment manufacturers, too, considerable turmoil accompanied the shift, and although many of the original high-performance aftermarket manufacturers would soldier on into the 1930s, many more would not. Performance tuning and the speed equipment industry as a whole, however, would begin to thrive as never before in the late 1920s and the early 1930s, even as the Great Depression slammed the American economy and rendered laughable, for so many, the very notion of disposable income.

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[129] See Kline and Pinch, "Users as Agents of Technological Change," and Franz, *Narrating Automobility*.

[130] The California-based industry, for example, emerged from scratch from among a large group of creative enthusiasts in the 1930s, most of whom had first begun to turn wrenches at a time when the Model T and Model A industries were in their prime. See below, chapter 2.

Chapter Two: The Model A Interregnum and the Emergence of the California Hot Rod Industry, 1928-1942

By the mid-1920s, the Model T was out-of-date. Sales were slipping, and Chevrolet – whose cars were more expensive but also far more modern and better equipped – began to outsell Ford. Consequently, on May 25, 1927, the Ford Motor Company announced its plans to cease production of the universal car and replace it with an entirely new low-cost model. For six months, engineers wrangled over the design of the new car and struggled to retool the firm's facilities for its production, a costly and drawn-out episode now infamous among historians of manufacturing for the fundamental flaws it revealed in the company's Model T era manufacturing strategies. Meanwhile, hundreds of thousands of Americans placed deposits at their local dealerships in anticipation of the updated Ford, and others put their purchase plans on hold entirely. It was November before the new car finally began to trickle out of the Highland Park plant, and December before it made its official debut in New York City.[1]

For many, though, the Model A Ford was well worth the wait. Featuring a stiffer frame, a more powerful engine, a conventional transmission, and many creature comfort details that were never before available from the company, the new car was a runaway success: by the end of 1930, more than three million of them were on the road, and Ford appeared to have regained its competitive edge.[2] So good was the Model A, in fact, that the bustling Model T era accessory aftermarket rapidly began to dwindle in the late 1920s and the early 1930s. According to Kathleen Franz, this was due, at least in part, to the fact that the generation of automobiles to which the Model A belonged was far less amenable to end-user tinkering and modification than were the cars of the 1910s and 1920s. Kline and Pinch agree: with the passing of the Model T,

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[1] On the wrenching transition from the Model T to the Model A at the Ford Motor Company, see Flink, *The Automobile Age*, 230; Bardou, Chanaron, Fridenson, and Laux, *The Automobile Revolution*, 98; and Hounshell, *From the American System to Mass Production*, 278-283.
[2] See Flink, *The Automobile Age*, 230.

the age of open-ended automobility began to come to a close.[3]

For performance enthusiasts, however, the arrival of the Model A bore no such implications. To be sure, the mechanical underpinnings of the new Ford were a marked improvement over those of the Model T, and many of the tricks that aftermarket manufacturers and amateur enthusiasts had used to enhance the performance of the universal car had been incorporated into the design of its replacement. With more cubic inches, a stronger engine block, a stiffer crankshaft, aluminum pistons, an improved carburetion and exhaust manifolding scheme, a better-finished cylinder head, pressure oiling to most of its vital components, and a standard water pump, among other features, the Model A put out forty horsepower in stock trim – fully double that of an unmodified Model T mill of any vintage. But none of these changes discouraged enthusiasts. Instead, they welcomed the new and improved Ford because they knew that it was bound to raise the bar. In other words, they realized that with the Model A as the basis for a high-performance rebuild, the horsepower gains per dollar and hour spent would be far greater than ever before. For indeed, if a twenty-horsepower Model T could end up as a sixty or seventy horsepower screamer through the careful application of select aftermarket gear, then surely a forty-horsepower Model A could end up far stronger – and faster – with the help of a tweak here and a new part there.[4]

Fortunately for them, the Model A's motor was very similar to that of its predecessor. It was stronger and altogether new, of course, but its basic layout was familiar to those well-versed in Model T technology: it was a four-cylinder engine with an L-type cylinder head. Therefore, even though no Model T speed equipment would fit the new mill, the basic tuning techniques that had worked so well in the past would apply to the new car, too. Cylinder head modifications,

[3] Franz maintains that the golden age of the amateur tinkerer and the accessory aftermarket had begun to decline by 1930, coming to a definitive end by the mid-1930s (*Narrating Automobility*, especially 200-201). Kline and Pinch, on the other hand, focus on the era of the Model T as the time when the interpretive flexibility of the automobile was at its peak, but maintain that the mainstream industry didn't really manage to shut the user out of the design-use process until the early 1950s ("Users as Agents of Technological Change").

[4] On the mechanical advantages of the Model A Ford, see Fahnestock, "Another Thrill: High Compression Heads for *Increased Power* and Speed and Better Fuel *Economy*," *Ford Dealer and Service Field*, February 1931, 42, 44, and 46, and Batchelor, *The American Hot Rod*, 50.

larger or multiple carburetors, bigger valves, free-flowing manifolds, lightened flywheels, and other tried-and-true performance tuning methods thus would characterize the era of the Model A as well.

Not surprisingly, therefore, it wasn't long before over-the-counter speed equipment for the new Ford began to appear. Morton & Brett, for example, which had introduced a new overhead-valve cylinder head for the Model T just one month before the car was pulled, had a new unit of similar design ready for the Model A by the fall of 1928.[5] Others soon would follow, and by 1930, hundreds of high-performance components were available for the new Ford. The transition, however, was anything but smooth, and many aftermarket companies of the Model T era never made the switch to the Model A. Gone from the market, therefore, were Fordspeed, Levett, Beaver, Dunn, Centri, Cooper, Detroit Radiator, Rajo, Berg, McCadden, the Williams Foundry, Waukesha, PACO, Milwaukee Forge, Turnbull, and Noonan – not to mention Laurel and Craig-Hunt, both of whom had slipped away earlier. This is not to say that all, or even any of these firms actually went under as a result of the end of the Model T era. In fact, some of them continued to produce parts for the universal car for a few more years, and others simply left the high-performance industry to pursue other opportunities.[6] In most cases, though, it is impossible to determine their exact fate. What we do know, however, is that none of these firms went on to produce speed equipment for the Model A or other subsequent automobiles.

In their place, though, a whole host of new firms joined the high-performance industry during the era of the Model A. By 1930, the R&R Manufacturing Company of Anderson, Indiana, the Simmons Manufacturing Company of Cleveland, and the Milwaukee Engineering and Tool Company of Wisconsin had introduced their lines of high-performance products for the Model A Ford.[7] Within another year, speed equipment for the Model A was also available from

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[5] "New Cylinder Head," *Ford Dealer and Service Field*, April 1927, 104, and Morton & Brett advertisement, *Ford Dealer and Service Field*, September 1928, 70.
[6] The Waukesha Motor Company, for example, went on to produce heavy-duty stationary diesels and truck motors for a number of years after it left the high-performance industry at the end of the Model T era.
[7] On R&R, see R&R advertisement, *Ford Dealer and Service Field*, July 1929, 76. On Simmons, see "New Manifold for Model A Fords Announced by Simmons," *Ford Dealer and Service Field*, October 1930, 83, and

the Trojan Auto Products Company of San Francisco, the Auto Engineering and Machine Company of Philadelphia, Martin & Stoner of Chicago, the Reus Brothers Company of Baltimore, and the Ramar Automotive Company of Racine, Wisconsin.[8] And by the mid-1930s, when the Model A era was at its peak, the Forster Brothers of Chicago, Dreyer of Indianapolis, Scintilla of Sidney, New York, and McDowell, Bertrand, Harmon, Alexander, Gemsa, Sparks, Morales, and Moller of Los Angeles, as well as several others, had all begun to produce high-performance aftermarket gear for the Model A Ford.[9] Together with a handful of holdovers from the Model T years – the Chevrolet Brothers, Akron Motor, Eastern Auto, Ruckstell, Morton & Brett, Miller, Winfield, Zenith, Riley, and Green – these new companies were the cornerstones of the over-the-counter speed equipment industry of the Model A era.

It warrants mention, however, that although the period in question here spanned from 1928 through approximately 1937, the Model A itself was actually only produced until 1932. That year, Ford introduced its famous flathead V8, an engine that would ultimately come to dominate hot rodding for the better part of two decades. Upon its initial release, though, the V8

Simmons advertisement, *Ford Dealer and Service Field*, October 1930, 37. And, on the Milwaukee Engineering and Tool Company (a.k.a. Mallory), see Batchelor, *The American Hot Rod*, 55.

[8] On Trojan, see "New Trojan Products," *Ford Dealer and Service Field*, August 1931, 92, and Trojan advertisement, *Ford Dealer and Service Field*, August 1931, 41. On the Auto Engineering and Machine Company (a.k.a. Ambler), see "Interesting Valve-in-Head for Ford," *Ford Dealer and Service Field*, April 1931, 87. On Martin & Stoner, see Martin & Stoner advertisement, *Ford Dealer and Service Field*, July 1931, 87. On the Reus Brothers Company (a.k.a. Rallum), see "Increases Ford Power and Speed," *Ford Dealer and Service Field*, January 1931, 74, and Reus advertisement, *Ford Dealer and Service Field*, January 1931, 67. And, on Ramar, see "The Ramar Valve-in-Head," *Ford Dealer and Service Field*, October 1931, 77.

[9] On the Forster Brothers, see "Forster Brothers High Compression Cylinder Head," *Vintage Ford Speed Secrets Magazine*, January 2004, 28. On Dreyer, see Batchelor, *The American Hot Rod*, 55, and Tom Medley, *Tex Smith's Hot Rod History, Volume Two: The Glory Years* (North Branch, MN: CarTech, 1994), 101. On Scintilla, see "Scintilla Enlarges Plant," *Automotive Industries*, August 17, 1935, 194, and Batchelor, *The American Hot Rod*, 55. On McDowell, see Batchelor, *The American Hot Rod*, 55; Medley, *Tex Smith's Hot Rod History, Volume Two*, 101; and Albert Drake, *Hot Rodder! From Lakes to Street: An Oral History* (Portland, OR: Flat Out Press, 1993), 69. On Bertrand, see Drake, *Hot Rodder!*, 44-45. On Harmon, see Batchelor, *The American Hot Rod*, 20. On Alexander, see Batchelor, *The American Hot Rod*, 55; Montgomery, *Authentic Hot Rods*, 15; and Drake, *Hot Rodder!*, 171. On Gemsa, see Batchelor, *The American Hot Rod*, 55, and Medley, *Tex Smith's Hot Rod History, Volume Two*, 96. On Sparks, see Batchelor, *The American Hot Rod*, 55, and Medley, *Tex Smith's Hot Rod History, Volume Two*, 93. And, finally, on both Morales and Moller, see Batchelor, *The American Hot Rod*, 55. In addition to these companies, an Iowa outfit known as Gerber also appeared during the Model A era; Gerber was unique in that it focused on speed equipment for the Chevrolet, rather than the new Model A (see Medley, *Tex Smith's Hot Rod History, Volume Two*, 101, and Drake, *Hot Rodder!*, 57). About another half-dozen Model A companies had emerged by the mid-1930s as well, including Rutherford, Duray, Fargo, Acme, Murphy, and Lyons, although, with the exception of Lyons, which was based in L.A., little is known about them apart from their names and the types of products they manufactured (see, for example, Batchelor, *The American Hot Rod*, 55).

was largely shunned by performance enthusiasts, who preferred the Model B four-cylinder motor that Ford had also brought out in 1932.[10] Featuring a counterbalanced crankshaft and full pressure oiling, the Model B mill produced some fifty horsepower; more to the point, at least for performance buffs, was that most of the high-performance aftermarket components that had been designed for the Model A would bolt right on to the new powerplant. The same was true of the Model C four-cylinder that Ford introduced in 1933.[11] Among the general public, however, the V8 quickly proved to be far more popular than its revised four-cylinder siblings, and in 1934, Ford pulled its four-cylinder cars from the market entirely. But among enthusiasts, the Model A and its derivatives would remain the basic powerplant of choice for several years to come. In short, then, when we speak of the "era of the Model A," we are actually referring to a period within which the efforts of the high-performance aftermarket and those of the average enthusiast were focused on *three* different four-cylinder Fords, the A, the B, and the C.

At any rate, approximately thirty-five companies manufactured high-performance aftermarket parts during the period in question, which means that the speed equipment industry of the Model A era was slightly larger than was that of the 1910s and 1920s. This alone is rather unremarkable, of course. But if we take a second look at our roster of performance firms, we find that something far more interesting than modest sectoral growth occurred as the industry grew out of the Model T era. Leaving aside those firms for which sufficient comparative data has not survived, we find that twelve of these companies were located in the Midwest, three on the East Coast, and fifteen in California.[12] Compared with the geographic distribution of the speed equipment industry of the 1910s and the 1920s, that of the Model A era clearly suggests that a regional shift was underway: the Midwest's share of the high-performance automotive aftermarket was dwindling, while that of California – Southern California, in particular – was

[10] On the transition to the flathead V8 within enthusiast and aftermarket circles, see below, pages 132-144.
[11] For more on the finer points of Model A, Model B, and Model C technology, see Batchelor, *The American Hot Rod*, 52-53.
[12] Acme, Fargo, Duray, Rutherford, and Murphy are excluded from these figures because the present author has unfortunately been unable to unearth a single shred of verifiable evidence regarding their respective places of operation.

expanding (see figure 2.1).[13]

Part of the reason for the growing importance of West-Coast firms during the late 1920s and the early 1930s was that an entirely new type of automotive racing was emerging in the region at that time. Scattered throughout Southern California are a number of dry lake beds – flat expanses of land largely void of wildlife, foliage, and, interestingly enough, water. Some of these "lakes" are but a few hundred feet across, but many actually measure several (or even a dozen or more) miles from end to end. During the late 1920s, young enthusiasts, particularly those from the greater Los Angeles area, had begun to flock to these dry lake beds on the weekends. There, they would strip the fenders, windshields, and other superficial parts and accessories from their cars and charge out across the arid landscape. Running their modified roadsters full-tilt, often in chaotic clusters of five or more cars at a time, these enthusiasts raced not in a circle or oval, but rather in a straight line. The object? To find out just how fast their daily rides could go. Many of these young performance buffs also raced their cars on the street, and a few of them occasionally ran on oval tracks as well, but in time, the dry lake beds became their Mecca. This, many would vociferously argue in the decades to come, was the birth of hot rodding proper.[14]

Whatever it was, it steadily grew in popularity throughout the period in question. Many of those involved in the new activity performed their own automotive modifications, and many more sourced their high-performance parts from junkyards and, in some cases, from cars left unattended on dimly-lit streets.[15] Others, however, were less ambitious (and/or unscrupulous), and for them, over-the-counter speed equipment fulfilled most of their high-performance needs. What they bought, though, tended overwhelmingly to come from shops in the Los Angeles area rather than from those of the East Coast, the Midwest, or even the Bay Area. Data from mid- to late 1930s dry lakes meets, for example, suggests that among those who raced four-cylinder Model A Fords on the lakes, speed equipment sourced from Southern California was far more

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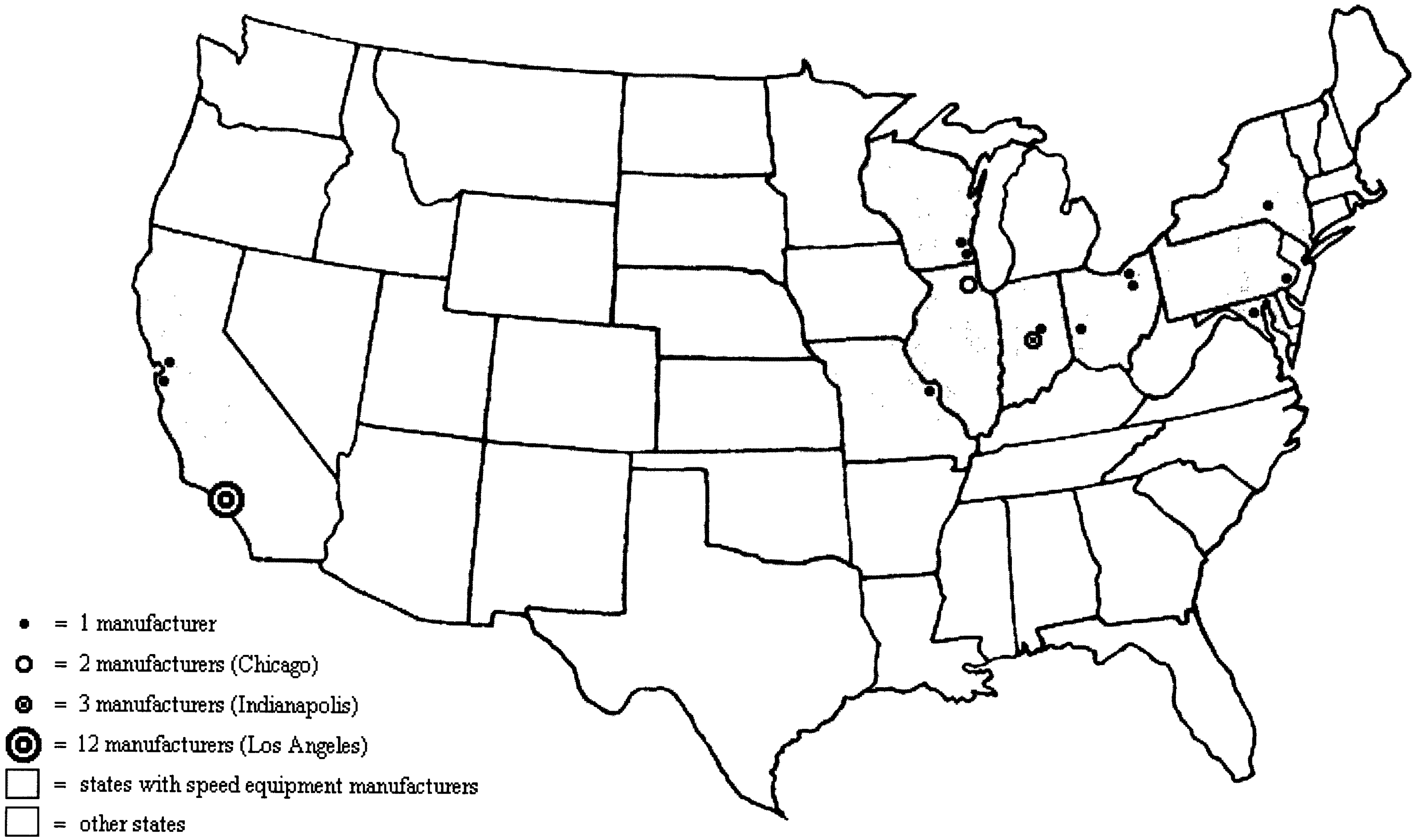
[13] Of the fifteen Model A era California companies, thirteen were located in or near L.A. and two in the Bay Area.

[14] On the dry lakes racing scene of the late 1920s and the early 1930s, see Batchelor, *The American Hot Rod*, chapter 1; Genat and Cox, *The Birth of Hot Rodding*, chapter 1; Montgomery, *Hot Rod Memories*, chapter 1, and *Hot Rods As They Were*, chapter 1; Carroll, *Muroc*, 6; and Moorhouse, *Driving Ambitions*, 26-29.

[15] See Batchelor, *The American Hot Rod*, chapters 1 and 3.

Figure 2.1: Model A Era Speed Equipment Manufacturers

(author illustration)



popular – often by a factor of more than ten to one – than that that came from any other part of the country.[16] And because those who raced at Muroc, Rosamond, and Harper Dry Lakes were the same folks who raced on public roads in Los Angeles, Riverside, Orange, San Bernardino, and San Diego Counties, we can safely infer that on the streets of Southern California, locally-sourced gear was also by far the most popular.

But why? Proximity had never mattered all that much within the industry before – firms like Laurel, the Chevrolet Brothers, and Rajo had, for example, managed to sell their speed equipment to circle track racers and road-going enthusiasts all across the country during the era of the Model T. Why, then, should the new period have been any different? One possible answer has to do with the technologically iterative nature of the dry lakes style of racing. Whether charging across the lakes alone or in a pack of cars, lakes racing was essentially a solo act. One raced not against his opponents per se, but rather against the clock. What mattered, then, was not so much whether you could consistently cross the finish line in first place, as with any type of track racing, but rather whether your times were improving. In other words, with every pass, lakes racers aimed to better their own personal best top speed, and at the end of each run, they sought to further tweak their vehicles so as to be able to go a bit faster the next time around. Of course, circle-track racers also sought to improve their cars between each race, and most lakes racers did indeed care about how their times stacked up against those of their competitors. But on the lakes, iterative improvement rapidly assumed an importance far greater than it had ever before held in any other form of motorsports. And this, in turn, translated into a sizeable sales advantage for area companies – after all, given the overarching goal of continuous improvement, it would have made perfect sense to buy locally. According to Don Montgomery, for example,

> [w]hen the decision was made to buy a high performance head, the rodder could, for example, just go into 'town' (L. A.) and talk to George Riley. And after installation of the hop up parts the car could be driven by so George could see how it ran. The rodder gained technical help and advice while the manufacturer

[16] At the May 16, 1937 Muroc time trials, for example, 64 of the four-cylinder entries used a California-sourced aftermarket cylinder head, and only 9 were equipped with gear from outside the Golden State. At the May 15, 1938 Muroc meet sponsored by the Southern California Timing Association, 117 of the entered four-cylinder cars used California equipment, as opposed to only 11 that did not. See Carroll, *Muroc*, 7-8 and 18-21.

quickly learned the good and bad points about his product.[17]

In other words, as an enthusiast sought to build upon his gains, he would have had relatively easy access to the folks who had designed and made his aftermarket parts – if, that is, he had bought them locally. High-performance companies, in turn, would have enjoyed the benefits of frequent contact with those who were actually using their components on a daily basis. Proximity to the action, then, worked to the mutual advantage of enthusiasts and entrepreneurs, giving the California industry of the early 1930s a bit of a boost.

All the while, though, the popularity of circle track racing continued to grow throughout the United States. Production cars equipped with aftermarket high-performance components were fast becoming the rule on local oval racing circuits, and by 1931, nine of the thirty-three starters at the prestigious Indianapolis 500 were modified passenger cars as well.[18] During the late 1920s and the early 1930s, dozens of new tracks sprang up all across the United States, including many on the West Coast. In short, however popular street racing and dry lakes events were becoming out in Southern California in this period, traditional circle-track motorsports more than held their own. And thus, while many of the California-based speed equipment manufacturers were finding it profitable to focus on the lakes scene, many of those in the Midwest continued to peddle high-performance gear developed through – or inspired by – oval track racing. This was true of Morton & Brett, for example, and also of R&R Manufacturing, Green, and Dreyer, to name but a few.[19]

Two years after the Model A's introduction, of course, just as speed equipment

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[17] Montgomery, *Hot Rods As They Were*, 23.

[18] "Pepping 'Em Up' for the Roaring Road," *Popular Mechanics*, September 1931, 360-363. The balance of the starters at the 1931 Indianapolis 500 race were purpose-built, specialized (read: fantastically expensive) race cars.

[19] Morton & Brett's Model A cylinder head conversion, for example, was called the Indianapolis and was inspired by the Midwestern oval track scene (see, for example, Fahnestock, "Secrets of Speed: Hopping Up the Model A – Some Suggestions from Morton & Brett, Builders of Speed Equipment," *Ford Dealer and Service Field*, February 1930, 26-28). On R&R's ties to the oval racing scene, see Robert M. Roof, " '*Jazzing Up*' Model A Ford Engines," *Ford Dealer and Service Field*, March 1932, 16-18. Green, for its part, built – in addition to its line of street-use speed equipment – custom dirt-track roadsters that were, according to Ed Almquist, "the Terror of Eastern Racetracks" (Green moved from Ohio to the New Jersey in the mid-1930s); see Almquist, "Carl 'Pop' Green: Gasoline Alley's Green Giant," in *Hot Rod Pioneers*, 8. Dreyer was an extreme example: its cylinder head conversions for the Model A were for racing only, and they were used exclusively on oval tracks (see Batchelor, *The American Hot Rod*, 55).

manufacturers in California, the Midwest, and on the East Coast alike were beginning to unveil their lines of high-performance aftermarket gear for the new car, the American economy collapsed. Within three years, the Great Depression had knocked the Chevrolet Brothers, Morton & Brett, and Ramar out of the picture. Miller's firm also briefly went into receivership, as did Zenith, and many other companies curtailed their advertising and their new-product research and development expenditures.[20] What's interesting, however, is that most – indeed, the overwhelming majority – of these companies survived the Great Depression largely intact. Moreover, dozens of altogether new firms sprang up during the period, although most of the new entrants sported Southern California addresses.[21] Enthusiasm for high-performance motoring, in other words, appears not to have waned at all during the Great Depression, and thus, although the era of the Model A was wrenching for some manufacturers, for many others it was more or less business as usual. Consider, for example, the mixed experiences of Winfield, Miller-Schofield / Cragar, and R&R Manufacturing during this tumultuous period.

Winfield

Ed Winfield's days as an enthusiast and speed equipment manufacturer spanned more than five decades, from the early 1910s up into the 1960s. Born near Los Angeles in 1901, he began working in a blacksmith's shop at the age of eight, where he learned the basics of forging and metalworking. Four years later, he enrolled in an automobile shop class at the local YMCA, and in 1914, he went to work for Harry A. Miller. Miller, a legendary manufacturer of high-performance carburetors and high-end, custom-built racing engines, put the young Winfield to

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[20] Harry Miller had teamed up with George Schofield to produce a line of cylinder heads for the Model A just before the Great Depression hit; Miller-Schofield went into receivership, but Miller himself continued to design and build world-class race cars (see below, pages 120-127). Zenith went into receivership in February of 1932 (see "Court Names Receiver," *Automotive Industries*, February 13, 1932, 240), although it would reorganize and go on to produce OEM carburetors and other general improvement and replacement parts aftermarket items for a number of years. Many firms began to advertise only every few months during the early 1930s, and the period also featured far fewer "new product" announcements than did the Model T era (or, for that matter, the V8 era that was to follow).

[21] The industry continued to shift away from the Midwest and towards the West Coast as the Depression progressed, but this movement only began to become pronounced at the end of the decade, and it had virtually nothing to do with the Great Depression. See below, pages 132-144.

work in his carburetor department. By the age of eighteen, though, the talented mechanic had been promoted into Miller's prestigious racing engine department, where he hand-assembled top-notch mills for those among the circle track crowd who could afford them.[22]

In his free time, Winfield raced. His board-track career began in 1916, when the fifteen-year-old managed to convince the operator of a local track that he was actually twenty-one and therefore eligible to run. Driving a Model T-based racer that he had extensively modified, Winfield steadily climbed through the ranks during the course of the late 1910s and the 1920s, becoming the star of the famous Legion Ascot track in Los Angeles by the age of twenty-seven. At twenty-eight, Winfield married, promising his new bride that he would never race again. But by the early 1930s, not only he was back on the boards, but he had also begun to race on the dry lake beds. He excelled at both: at Muroc, for example, he went on to set a class record of 119.60 mph in 1933 that would stand for more than a dozen years.[23]

Back in the mid-1910s, however, when he was just beginning to race on the local boards and when he was still just an entry-level technician in the Miller carburetor department, he had had an idea. The Miller carburetor was an excellent design in theory, but in practice, it was difficult to set up and even trickier to maintain. While working on them in Miller's shop, Winfield had thought of a way to simplify the carburetors, but he kept his mouth shut. Later, he would claim – tongue in cheek, perhaps – that his silence on the matter was due, quite simply, to the fact that no one in the carburetor department at Miller had ever asked him if he had any ideas for improving the design. Subsequent developments, though, suggest that it was anything but innocent humility that kept the young technician from sharing his thoughts. To wit, by 1919, Winfield had generated a prototype high-performance carburetor of his own, and in 1921, he left the Miller engine department to found the Winfield Carburetor Company with his brother, Bud,

[22] Terry Cook, "Ed Winfield: The Father of Hot Rodding," *HRM*, January 1973, 107, and Almquist, "Ed Winfield: The Reclusive Genius," in *Hot Rod Pioneers*, 4-5.
[23] Terry Cook, "Ed Winfield: The Father of Hot Rodding," *HRM*, January 1973, 107, and Almquist, "Ed Winfield," 4.

over in Glendale.[24]

For the first few years, Winfield's company was a small-time operation. Focusing on the racing market, Ed and Bud turned out a limited number of carburetors for use on Miller and Deusenburg racing engines. Within a couple of years, though, they decided to adapt the design for use on modified Fords, and with that, their business really began to take off. So successful was the new carburetor within the racing Ford aftermarket, in fact, that it led the Winfields to contemplate quantity production of the unit for street-use. In 1924, they took the plunge and contracted with an area firm, the Hammel-Gerke Company of Los Angeles, to market and distribute their product. Featuring either a one- or a one-and-one-quarter-inch bore, the Winfield carburetor offered better performance than the standard Model T unit, and with but two moving parts – the float mechanism and a rotary throttle – it was simpler and easier to maintain, to boot. Through Hammel-Gerke, Winfield also produced and sold street- and track-use carburetors for Dodge- and Chevrolet-based automobiles, but it was the model for the Ford that paid the bills.[25]

In 1926, Winfield broke with Hammel-Gerke and assumed control of his own marketing and distribution,[26] and in the following year, he released a new carburetor model after extensive on- and off-track testing. A progressive, double-well design, the new unit allowed for more economical operation at lower engine speeds, with a healthy reserve of power available on demand at higher rpms. It was an interesting way to avoid compromising driveability for peak performance (and vice versa), and it was highly effective. Because the new design sacrificed virtually nothing at the top end of the powerband, Winfield was able to "test" it prior to its release to the general public on the most prestigious and demanding of American stages

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[24] Terry Cook, "Ed Winfield: The Father of Hot Rodding," *HRM*, January 1973, 107, and Almquist, "Ed Winfield," 4.
[25] Terry Cook, one of *Hot Rod Magazine's* many editors over the years, has claimed that the Winfield carburetor was initially intended for street use but then found its way onto the tracks as well; period evidence, however, suggests that the opposite was in fact the case. See Terry Cook, "Ed Winfield: The Father of Hot Rodding," *HRM*, January 1973, 107, and also Hammel-Gerke Company advertisement, *Ford Owner and Dealer*, September 1924, 13, and "The Winfield Carburetor," *Ford Owner and Dealer*, December 1924, 144.
[26] In 1926, Winfield marketed his products as "Winfield Laboratories" (see, for example, Winfield Laboratories advertisement, *Ford Dealer and Service Field*, June 1926, 148), but in 1927, he went back to the tried-and-true "Winfield Carburetor Company."

imaginable: the 1926 Indianapolis 500, where all of the first ten finishers used the new double-well Winfield carburetor.[27] During the next two racing seasons, as Winfield's carburetors continued to prove their on-track mettle, Ed himself was making preparations to take his company to the next level.

In 1930, two years after the introduction of the Model A Ford, Winfield brought out an entirely new downdraft carburetor, the Model-S. As had come to be his custom, Winfield had "tested" the design at Indianapolis, where nine of the ten drivers who finished the 1930 event used the new Winfield model.[28] But it was with the new Model A Ford in mind that the Model-S had actually been conceived, and Winfield marketed the new unit aggressively to Model A owners who wanted more power and efficiency from their carburetors than the standard Ford induction system could deliver.[29] Popular among enthusiasts and racers, especially those who ran on the dry lake beds and the surface streets of Southern California, the Model-S – together with its later derivative, the Model-SR – solidified Winfield's reputation as a, if not *the* premier high-performance carburetor manufacturer in the country.[30]

But Ed Winfield was an ambitious man, and his success in the racing- and street-use speed equipment industry during the 1920s had convinced him that, with his new Model-S, the time had come to try his hand in the OEM-supply end of the market. Consequently, to coincide with the introduction of the Model-S, Winfield opened a new regional sales and distribution office in Detroit. Through this new office, he worked hard to win the approval of the mainstream industry, submitting samples to a number of companies for review. The response, however, was disappointing. Buick, for example, reported back to Winfield with the news that, while the Model-S was a superior carburetor that would surely help to make their cars a bit snappier, the

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[27] During the early 1920s, Winfield had established a solid reputation within racing circles, thanks to the on-track performance of his original carburetors. Ovals – and, by the middle of the decade, Indianapolis – thus became a proving ground of sorts for his designs. See "Winfield Announces New Model," *Ford Dealer and Service Field*, September 1927, 87.

[28] Winfield Carburetor Company advertisement, *Ford Dealer & Service Field*, July 1930, 1.

[29] Winfield Carburetor Company advertisement, *Ford Dealer & Service Field*, June 1930, 41.

[30] Take a look through any popular history of hot rodding, and you'll find Winfield Model-S or Model-SR carburetors in nearly every picture. The SR came out in 1933 (see "New Winfield Carburetor," *Ford Dealer and Service Field*, July 1933, 30).

additional cost per-unit was far too prohibitive for them to make a commitment with the Los Angeles-based company.[31] In time, Winfield would abandon his efforts to become an OEM supplier, but he did maintain his secondary Detroit address for many years to come.

Meanwhile, back in L.A., Winfield began to branch out into other areas of the Model A high-performance aftermarket. In 1931, for example, he introduced a line of high-compression cylinder heads for the new Ford. A cast-iron replacement flathead, Winfield's design was available either as a 6:1 compression ratio "yellow head" – nearly two points higher than the standard Ford's 4.22:1 ratio – or as a 7:1 "red head." Both produced substantial horsepower gains, although the latter, designed for use with higher-octane Ethyl fuels, would outperform the former by a margin of roughly thirty percent.[32] A single casting with no moving parts, the new head was relatively easy to manufacture, especially when compared with overhead-valve conversions. Raw castings would arrive at the Winfield facilities in Glendale, where Winfield and his employees would simply machine the combustion chambers, tap and drill the castings to accept the standard Ford fittings, and box them up. At a cost of $40 for the head itself, or $75 for the head along with a brand-new Model-S carburetor, the Winfield flathead was an instant and enduring hit.[33] Dry lakes racers, for example, overwhelmingly preferred the yellow and red heads not only over all other makes of high-compression aftermarket flatheads, but over most makes of overhead-valve conversions for the Model A as well.[34] Cheap and troublefree, the Winfield

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[31] Almquist, "Ed Winfield," 5.

[32] On the Winfield flathead, see Winfield Carburetor Company advertisement, *Ford Dealer and Service Field*, March 1931, 93; "Higher Speeds for Fords," *Ford Dealer and Service Field*, April 1931, 86; and Medley, *Tex Smith's Hot Rod History, Volume Two*, 98. For more on the specifications of the standard Ford flathead, see Fahnestock, "Another Thrill: High-Compression Heads for Increased Power and Better Fuel Economy," *Ford Dealer and Service Field*, February 1931, 42, 44, and 46.

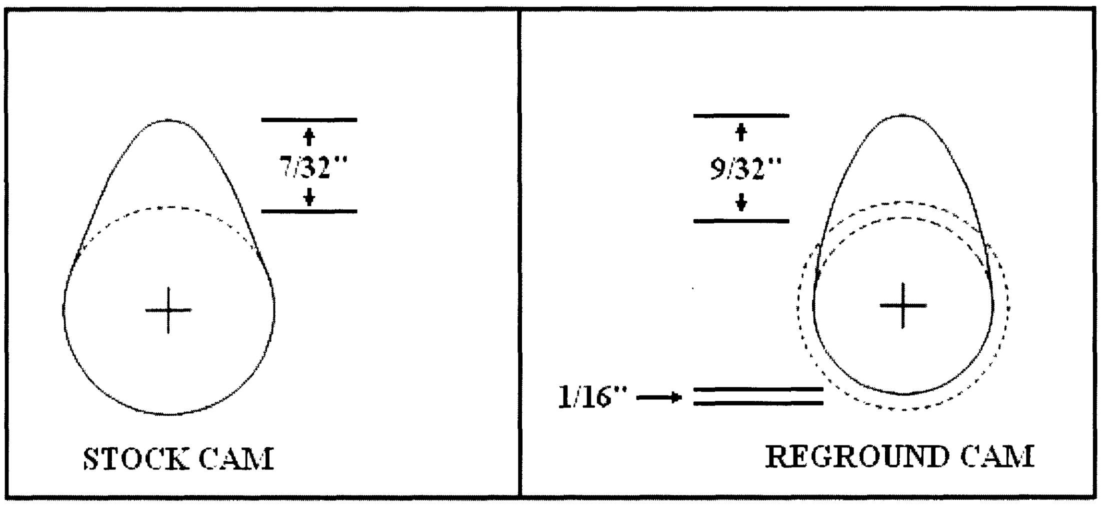
[33] "Higher Speeds for Fords," *Ford Dealer and Service Field*, April 1931, 86. Winfield also produced a very limited number of overhead-valve cylinder head conversions for the Model A Ford engine during the early 1930s; exactly five of these expensive, hand machined, assembled, fitted, and tuned heads were produced, all of them custom jobs intended for use on specific oval track cars that he sponsored. For more on Winfield's custom overhead-valve conversions, see Stan Ochs's technical discussion of the matter (in Drake, *Hot Rodder!*, 172).

[34] Later in the decade, for example, at the May 18, 1938 SCTA Muroc meet, Winfield flatheads outnumbered all other makes of high-performance Model A flatheads – *combined* – by a factor of more than five to one (42 Winfields to a combined eight others, including 1 Acme, 2 Federal-Moguls, 1 Miller, and 4 Rileys). Moreover, Winfield flatheads outnumbered all makes of overhead-valve conversions at the same event, besting its nearest overhead competitor by ten (32 entries at the event ran Cragar overhead-valve conversions). See Carroll, *Muroc*, 18-21.

flathead sold by the thousands to enthusiasts of all sorts over the course of the 1930s.

Carburetors and high-performance cylinder heads were his staples, but Winfield also turned out a steady trickle of reground camshafts for the Model A Ford during the early 1930s. High-performance cams had been an on-again, off-again hobby for Winfield ever since he was a teenager, and in the early 1920s, he had begun to regrind Model T camshafts by hand on a custom basis (see figure 2.2).[35] In the early 1930s, however, he began to devote a bit more of

Figure 2.2: Camshaft Regrinding



At left is a stock camshaft, giving 7/32" peak lift. At right is a camshaft from which 1/16" of material has been removed, resulting in 9/32" peak lift (when used with longer lifters). (Source: author illustration)

his time to the endeavor, experimenting with countless intake and exhaust lobe profiles for street, track, and lakes applications. His radical, long-duration camshafts proved to be solid performers, especially on the lakes, and demand for them quickly mushroomed among enthusiasts. In an effort to boost production, Winfield therefore designed and built a special machine that would copy hand-ground camshaft lobes, one by one. Similar conceptually to the key duplicators found in most hardware stores, Winfield's machine would trace the profile of a custom lobe he had ground beforehand and transfer its shape to the corresponding lobe on a standard Ford camshaft. The cams would then be shifted and the process repeated. Once all eight lobes had been duplicated, the operator could move on to the next unit. Unfortunately for enthusiasts eager to

[35] Terry Cook, "Ed Winfield: The Father of Hot Rodding," *HRM*, January 1973, 107.

get their hands on such a cam, however, Winfield trusted no one but himself to handle their production, even on the duplicator. Consequently, "delivery from the plant…often was slow – sometimes taking months," and as a result, "[t]hose who did business with Ed Winfield generally found it exasperating, if not impossible."[36] Nevertheless, the solid reputation of Winfield camshafts in the field would serve to win a lot of enthusiasts over to the brand during the course of the 1930s.

Winfield's unwillingness to trust anyone else with his camshaft operations probably stemmed less from a concern about product quality per-se than it did from a desire to keep his lobe profiles and his grinding methods a secret. Southern California hot rodders of the early 1930s who went by his facility, for example, were by all accounts lucky even to be admitted into the lobby, let alone the workshop itself.[37] For those that did get in, however, Winfield proved to be an excellent mentor and collaborator. Young, mechanically-inclined hot rodders like Kong Jackson, Eddie Meyer, and Ed Iskenderian, for example, all received their early hands-on training in Winfield's shop.[38] In addition, he also came to trust a fellow speed equipment manufacturer by the name of George Riley, with whom Winfield worked very closely to develop a unique overhead-valve conversion in the 1930s and to whom he eventually agreed to license his secret camshaft profiles for production and sale under the Riley name.[39] Instinctively, then, Winfield was distrustful and jealously secretive, but if you approached him properly and said and did the right things, he would open up and share his vast store of accumulated knowledge and

[36] Almquist, "Ed Winfield," 5.
[37] See, for example, Medley, *Tex Smith's Hot Rod History, Volume Two*, 59-60.
[38] Almquist, "Ed Winfield," 5. Jackson would go on to become one of the first manufacturers of high-performance ignitions for the flathead V8 engine in the late 1930s and the years immediately following the end of World War II. Meyer, for his part, would produce some of the first intake manifolds and high-compression cylinder heads for the flathead V8 in the late 1930s. And Ed "Isky" Iskenderian would go on to become one of the premier high-performance camshaft manufacturers of the postwar era.
[39] See Almquist, "Ed Winfield," 5. Winfield and Riley went a long way back, and the two even shared advertising space in the early 1920s, when both were under contract with Hammel-Gerke (see, for example, Hammel-Gerke Company advertisement, *Ford Owner and Dealer*, September 1924, 13). The Riley overhead-valve head that grew out of Winfield and Riley's collaboration used split rocker arms to operate two overhead intake valves per cylinder, retaining the standard in-block Ford exhaust valves for a total of twelve valves in a mixed overhead / flathead layout; Winfield carburetion came standard with the Riley conversion (see Riley advertisement, *Ford Dealer and Service Field*, August 1930, 8).

experience.

By the middle of the decade, Winfield had begun to grind camshafts for the new Ford V8 engine, and he had begun to experiment with induction systems for the new mill, too. By 1939, for example, he had designed, tested, and patented a complete fuel-injection system for the flathead V8, one so advanced that it is rumored not only to have inspired hot rodder Stuart Hilborn to design his own fuel injection equipment in 1940, but also to have been the basis for the Chevrolet OEM system that GM introduced, conveniently enough, immediately upon the expiration of Winfield's patent in 1957.[40] After the war, Winfield would continue to produce aftermarket components for four-cylinder and V8 Fords for a number of years, all the while maintaining his custom racing engine shop, continuing to turn out small batches of camshafts, and working on several postwar Indianapolis 500 projects. In the 1930s, though, it was his carburetors and his flatheads that sustained his business and made his name a household word – among hot rodders, at least.

In short, Ed Winfield was a bit of an enigma, a jack-of-all-trades whose activities over the course of several decades defy simple characterization. He was a track, street, and lakes racer, and he was also a manufacturer. He ran a high-volume production facility that turned out thousands of flatheads and tens of thousands of Model-S and Model-SR carburetors during the 1930s, and yet he also maintained a custom-oriented department that handled not only small-batch camshaft production, but also individualized racing engine projects. His company was based in Los Angeles, and yet he maintained a foothold in the Midwest. He had learned the trade in the famous Miller production facility, and his shop in turn became a place where others who would later go into business for themselves first learned the ins and outs of the high-performance business. He was jealously secretive with some, and yet remarkably open with others. And, finally, the most prosperous days of his entire career weren't in the boom years of the 1910s, the 1920s, or even the 1950s. They were, instead, in the early to mid-1930s, right smack in the midst of the Great Depression. Some of his contemporaries would be far less fortunate.

[40] See, for example, Medley, *Tex Smith's Hot Rod History, Volume Two*, 60, and below, chapter 4.

Miller-Schofield / Cragar

Towards the end of 1928, Harry A. Miller teamed up with George Schofield, Fred Keeler, G. E. Moreland, and Gilbert Beesmeyer to form a new manufacturing company based in Los Angeles. Keeler, Moreland, and Beesmeyer were from the Lockheed, Moreland, and Beach Aircraft Companies, respectively, and Schofield was an independent financier.[41] Miller, for his part, ran a world-famous shop that turned out expensive, hand-assembled racing engines, hand-ground camshafts, complete custom-built race cars, and other high-end circle track equipment during the 1910s and the 1920s.[42] Miller also manufactured high-performance aftermarket carburetors, and his workshop served as something of an informal school for high-performance technicians. Ed Winfield, for example, had started off at Miller, as had Fred Offenhauser, whose own racing engine designs would dominate American circle-track events from the mid-1930s through the late 1960s.[43]

The new company, popularly known as Miller-Schofield but officially chartered as Schofield Incorporated of America, was to manufacture lightweight aircraft engines, as well as select aftermarket components for the Model A Ford.[44] By the end of 1929, Miller's team had prepared a line of high-performance carburetors, camshafts, alloy pistons, and overhead-valve cylinder heads, and in early 1930, the firm began to advertise for dealers and distributors. Offering special introductory pricing to prospective retailers, these early advertisements proudly proclaimed that Miller-Schofield's substantial fiscal and physical resources had enabled "Miller products, which were formerly made in limited quantities only for the racing profession and for

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[41] On the genesis of the Miller-Schofield Company, which Miller actually began to contemplate forming in 1927, see "Miller to Produce Airplane Engines," *Automotive Industries*, September 24, 1927, 459; "Miller to Produce Airplane Engines," *Automotive Industries*, July 13, 1929, 63; and Bagnall, *Roy Richter*, 8.

[42] A typical Miller custom-built racing car of the 1920s, for example, would have cost in the neighborhood of $10,000 – astronomical for the time, but still much cheaper than, say, a Deusenburg or a Peugeot. See "Miller Plans New Stock Car and New Engine," *Automotive Industries – The Automobile*, July 19, 1923, 143, and Almquist, "Harry Miller: In Pursuit of Mechanical Perfection," in *Hot Rod Pioneers*, 14.

[43] On Offenhauser's history at Miller, see William J. Tandy, "Speed: Six Dollars a Pound," *Popular Mechanics*, August 1936, especially page 195.

[44] Bagnall, *Roy Richter*, 8. Period advertising for the firm never mentions "Miller-Schofield," instead listing "Schofield Incorporated of America" as its name. But among enthusiasts of the early 1930s, as well as popular historians of hot rodding, the company is known as "Miller-Schofield." To avoid confusion, the present author intends to stick with "Miller-Schofield."

wealthy sportsmen," to be "produced in quantities at prices which appeal to the general public."[45] Impressive dynamometer testing results also featured prominently in these initial spots. The Miller carburetor alone, for example, reportedly would bump the horsepower rating of the Model A from 41 to 50 at 2400 rpm, with a peak output of 57 horsepower at 3000 rpm. When coupled with the company's overhead-valve equipment, the gains were even more pronounced: 86 peak horsepower at 3200 rpm, more than double that of an unmodified Model A mill.[46]

Though its carburetors, camshafts, and pistons performed well, the Miller-Schofield Valve-in-Head quickly became the firm's signature product. Designed in 1929 by Leo Goosen, the star of Harry Miller's engineering staff, the company's conversion was relatively conventional, featuring eight overhead valves operated by the OEM camshaft via pushrods and an ordinary rocker assembly. Unique, however, was Goosen's attention to detail. The head's intake and exhaust ports, for example, mimicked the shape and layout of the standard Ford's in-block ports, which meant that factory Model A intake and exhaust manifolds could be used with the Miller-Schofield conversion.[47] In addition, Goosen's design called for the use of standard-issue Buick rocker arms, shafts, and springs, which made the assembly less of a chore to manufacture (and, presumably, to service and maintain as well).[48] Large-diameter Miller racing valves and a healthy 6.75-to-1 compression ratio, on the other hand, ensured that the bolt-on conversion would outperform its rivals. Complete with an aluminum rocker arm cover, the Miller-Schofield Valve-in-Head retailed for $137.50 in early 1930, and the company produced an average of fifty of them every day.[49] Goosen also designed a gear-driven, double-overhead

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[45] Schofield Incorporated of America advertisement, *Ford Dealer and Service Field*, February 1930, 32-33.
[46] Ibid.; see also Schofield Incorporated of America advertisement, *Ford Dealer and Service Field*, March 1930, 47, and "More Speed for the Ford," *Ford Dealer and Service Field*, March 1930, 70. The tests were conducted on a Ranzi engine dynamometer at the Miller-Schofield facility before an invited group of engineers and racing personalities on January 8 and February 5, 1930.
[47] Montgomery, *Authentic Hot Rods*, 23. A lengthened exhaust downpipe would have been required in order to retain the OEM Model A exhaust manifold, however, as the ports on the Miller-Schofield cylinder head were several inches higher on the motor than were the stock ports, due to their location in the cylinder head rather than in the block.
[48] Bagnall, *Roy Richter*, 8.
[49] Schofield Incorporated of America advertisement, *Ford Dealer and Service Field*, February 1930, 32-32, and Bagnall, *Roy Richter*, 8.

camshaft cylinder head for the new company: equipped with eight oversized, overhead valves, this complex conversion for the Model A was intended "exclusively for dirt track racing car and sports use," and sold, complete with a Bosch ignition and two Miller carburetors, for a whopping $500. Understandably, the company's standard Valve-in-Head was far more popular among cash-strapped 1930s enthusiasts.[50]

But it wasn't popular enough. By the end of April, 1930, the company was on the brink of insolvency, and in June, it went into receivership. Period evidence, however, strongly suggests that Harry Miller managed to flee the sinking ship before it actually went under. Towards the end of April, for example, the firm submitted an advertisement to the editors of *Ford Dealer and Service Field* that highlighted, as had each of its predecessors, Harry A. Miller's personal involvement with the company.[51] But by the end of the following month, Miller-Schofield had revised its pitch for what would prove to be its final advertising spot, deliberately avoiding the use of the name "Harry A. Miller" while still claiming that the company's "Miller Hi-Speed Head" was "[m]anufactured by the famous builder of World Champion racing cars and engines."[52] To readers, of course, this might well have seemed to have been little more than a stylistic choice on the part of Miller-Schofield's advertising gurus, but further contextual evidence suggests otherwise. To wit, Harry A. Miller ran an advertisement of his own in June of 1930, a full-page spread introducing a new overhead camshaft conversion for the Model A Ford in which the following announcement appeared in bold italics:

> I [Harry Miller]...wish to take this opportunity to announce to the motoring public that I have absolutely no connections with any other head for Ford engines.[53]

Miller, in other words, had severed his ties with Schofield of America and gone his own way. Critically, though, he also claimed in this spot that the production of his *new* cylinder head was

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[50] Bagnall, *Roy Richter*, 8; Schofield Incorporated of America advertisement, *Ford Dealer and Service Field*, February 1930, 32-32; and Medley, *Tex Smith's Hot Rod History, Volume Two*, 101.
[51] Schofield Incorporated of America advertisement, *Ford Dealer and Service Field*, May 1930, 65. Bear in mind that editorial and advertising content for monthly periodicals tends to be generated anywhere from a couple of weeks to a month or more before the actual date of publication. Thus, an advertisement for the May, 1930 issue of *Ford Dealer and Service Field*, would have been drafted and submitted no later than the second half of April.
[52] Schofield Incorporated of America advertisement, *Ford Dealer & Service Field*, June 1930, 79.
[53] Harry A. Miller advertisement, *Ford Dealer & Service Field*, June 1930, 13.

already underway. Even if we assume, therefore, that Miller had designed his new conversion earlier in the spring, when he was still affiliated with Miller-Schofield, he still would have had to have left the ailing company no later than the beginning of May in order to have his new design – and his advertisements – ready for a June launch.

In any event, Miller-Schofield was no more. George Schofield, for his part, went on to produce a limited run of high-compression flatheads for the Model A Ford engine in partnership with a North Hollywood High School shop teacher in the early 1930s before slipping into anonymity.[54] As for Leo Goosen, he continued to work with Harry Miller on a number of racing engine projects during the mid- to late 1930s. Then, in 1941, he teamed up with Ed Winfield and a handful of others to design an advanced engine and chassis combination for the Indianapolis 500, and in the 1960s, he worked with Bob DeBisschop, Dale Drake, and champion racer Louis Meyer in a highly successful bid to apply turbochargers to the aging Offenhauser racing engine.[55] Miller himself, of course, went ahead with the production of his overhead camshaft conversion for the Model A in mid-1930, although he had to sell off some of his independently-controlled plant and machinery in order to do so.[56] A sophisticated design, the new Miller cylinder head utilized a single overhead camshaft to operate four massive, in-head intake valves, while a second, specially-ground camshaft mounted in the standard position used all eight of the Ford's original in-block valves to expel the exhaust gases.[57] Complete with two camshafts, a chain-drive system, intake and exhaust manifolds, metric spark plugs, and a special Miller-Adamson carburetor, the kit sold for $165 and was intended primarily for street-use.[58] Pricey, and perhaps excessively complex, the conversion sold poorly, and very few of them were ever

[54] John Johnston, "Random Speedster Letters: Schofield-Hess Head," *Vintage Ford Speed Secrets Magazine*, April 2003, 42-43.
[55] For more on Goosen's career after Miller-Schofield, see Almquist, "Bud Winfield: Co-Designer of the Legendary Novi," in *Hot Rod Pioneers*, 6, and Almquist, "Robert DeBisschop: A Key Player in the Offy's Struggle for Survival," in *Hot Rod Pioneers*, 273.
[56] See Bagnall, *Roy Richter*, 8; Cragar Corporation advertisement, *Ford Dealer and Service Field*, April 1931, 37; and below, pages 124-125. Miller had retained independent possession of a portion of his racing engine facility when he formed the Miller-Schofield company with George Schofield and the others in 1928.
[57] Montgomery, *Authentic Hot Rods*, 21, and Harry A. Miller advertisement, *Ford Dealer & Service Field*, June 1930, 13.
[58] Harry A. Miller advertisement, *Ford Dealer and Service Field*, August 1930, 77.

made.[59] Undaunted, Miller returned to his roots, eventually abandoning the speed equipment industry altogether in favor of the all-out racing market with which he was much more familiar. In 1935, for example, he teamed up with Preston Tucker and the Ford Motor Company to produce a run of ten racing V8 engines for the Indianapolis 500, and by the end of the decade, he was back in the custom racing business for good.[60]

Meanwhile, the defunct Miller-Schofield concern had quickly attracted a new group of investors. In the summer of 1930, Harlan Fengler, a veteran Los Angeles area board track racer, and Crane Gartz, the heir to a prosperous plumbing-supplies manufacturing company, forged a partnership and chartered a new firm, Cragar.[61] In the fall, the Cragar Corporation purchased the remaining Miller-Schofield patterns, tools, and inventory. Under Fengler's direction, the company then established a manufacturing facility in Hollywood, equipped with "[p]recision machinery worth hundreds of thousands of dollars" and staffed by machinists and technicians formerly employed by Schofield Incorporated. Ultimately, the new company aimed to produce a full line of speed equipment for the Ford, but in the short-term, Fengler focused on the much more modest goal of re-introducing the popular Miller-Schofield Valve-in-Head conversion. Production of the high-performance cylinder head kit, now known as the Cragar Valve-in-Head, began in earnest in the early spring of 1931.[62] At $112.50, the new conversion was a bargain, especially when compared with its pricier, though virtually-identical predecessor, and it sold well.[63] By the summer, the firm had also begun to produce custom racing engines and even complete race cars as a low-volume complement to its overhead valve equipment sales. But in the end, in spite of their products' popularity, Gartz and Fengler were unable to sustain their

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[59] Montgomery, *Authentic Hot Rods*, 21. See also Carroll, *Muroc*, 9-10 and 18-21.
[60] On Miller's collaboration with Preston Tucker (who would go on to produce the famous, short-lived Tucker passenger car) on the 1935 Indianapolis cars, see Almquist, "Harry Miller," 15, and "First Ford V-8 Powered Race Car Ready for Test," *Automotive Industries*, May 18, 1935, 656. On Miller's later racing engine career, see for example Fahnestock, "Speedway Madness!" *Ford Dealer and Service Field*, July 1935, 16-17, and "Four-Cylinder Race Cars Used for Ease of Assembly," *Popular Mechanics*, September 1937, 355.
[61] "Cragar" was derived from Crane Gartz: "**Cra**ne" + "**Gar**tz" = "**Cragar**."
[62] See Batchelor, *The American Hot Rod*, 169; Bagnall, *Roy Richter*, 8; and Cragar Corporation advertisement, *Ford Dealer and Service Field*, April 1931, 37 (the quoted material is from the Cragar advertisement).
[63] Cragar Corporation advertisement, *Ford Dealer and Service Field*, May 1931, 4-5.

fledgling start-up in the difficult economic climate of the time, and in 1932, Cragar folded.

Leo Goosen's design, however, remained a spectacular hit among enthusiasts, especially those based in sunny Southern California. It wasn't long, therefore, before yet another investor decided to try his luck with the product. Only this time, the interested party didn't have the financial backing of a wealthy manufacturing heir, a large Los Angeles bank, or a group of aircraft companies. Instead, all he had was a quarter-acre automotive salvage yard, the confidence of dozens of young hot rodders, and the guts to take a risk. His name was George Wight.

Back in 1923, Wight had opened a small automotive wrecking yard in the tiny Southern California town of Bell. Then 46, Wight had been an amateur circle track racer for a number of years, and Bell Auto, as he named his new business, was supposed to have been a way for him to leave his racing days behind and settle into a much more stable and far less dangerous way of life. As an ex-racer, however, Wight knew speed equipment when he saw it, and before long, he had begun to amass quite a collection of high-compression cylinder heads, overhead-valve equipment, magnetos, racing carburetors, high-speed cams, and other high-performance components that he would rescue from the wrecked vehicles that circulated through his lot. Soon, he decided to set up a couple of shelves in his tiny office to display his used equipment, which he then began to sell to shoestring-budget enthusiasts. Word spread quickly, and by the middle of the decade the majority of Bell's business was in used aftermarket parts and accessories. In 1928, he built a small brick building on his site to house his growing inventory, and he also set up a machine shop so that he could recondition some of the more heavily worn components he was salvaging. By 1931, he had begun to sell new speed equipment, too, acting as a distributor for Riley, Winfield, and, as fate would have it, Cragar.[64]

His shop more or less a gathering spot for many local hot rodders, Wight was well aware of the extent to which Bell Auto had come to depend on the lakes- and street-racing crowds. In

[64] On the early history of Bell Auto, see Batchelor, *The American Hot Rod*, 14 and 169-170, and Bagnall, *Roy Richter*, 8.

the early 1930s, with the aid of Gilmore Oil, he therefore began to organize and sponsor a series of early events at Muroc dry lake, raising his profile considerably within enthusiast circles.[65] His finger on the pulse of the budding Southern California hot rodding phenomenon, Wight knew exactly what most enthusiasts wanted, and they, in turn, knew that Bell Auto was an excellent source of new and used equipment for their roadsters. Accordingly, when Cragar failed in 1932, Wight knew that it couldn't possibly have been for lack of demand. Curious, he contacted Crane Gartz, and when he learned that the defunct company's patterns, fixtures, and leftover inventory all were up for sale, he made an offer. Negotiations dragged on into the winter, but by the beginning of 1933, the sale was complete. Cragar, once a large and seemingly well-financed Hollywood manufacturing company, was now a wholly-owned subsidiary of a tiny salvage yard outside of the city.[66]

Wight, determined to succeed at what so many others before him had so miserably failed, quickly reconfigured the existing Bell Auto machine shop with his new Cragar jigs and tools. He then contracted with a local foundry for the raw cylinder head castings, and by the spring of 1933, the Cragar Valve-in-Head was back on the market. With the help of several machinists formerly employed by the Cragar Corporation, Wight soon managed to achieve an average daily output that enabled him to drop the price of the conversion, complete with a revised intake manifold, to $90.[67] By the mid-1930s, Wight had added a second model to his lineup, the so-called "Improved Cragar." Designed primarily for all-out racing, the new head featured a 7.5-to-1 compression ratio and larger ports, and it sold for $100 a piece.[68] Sales boomed, and by the end of the decade, Cragar overhead-valve cylinder heads were second only to the simpler Winfield flatheads among the Southern California lakes crowd.[69] Wight had done it: Leo Goosen's design

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[65] Bagnall, *Roy Richter*, 8-9, and Drake, *Hot Rodder!*, 57-58.
[66] Batchelor, *The American Hot Rod*, 169, and Bagnall, *Roy Richter*, 8-9.
[67] The foundry he contracted with, incidentally, handled the overwhelming majority of the raw casting needs for the prewar Southern California speed equipment industry; see Batchelor, *The American Hot Rod*, 173. On the production and pricing of the Cragar conversion under Wight's direction, see Montgomery, *Authentic Hot Rods*, 23.
[68] Montgomery, *Authentic Hot Rods*, 23. At about the same time, Wight also introduced a third model, the "Cragar Junior," which was designed for midget-car racing (see Medley, *Tex Smith's Hot Rod History, Volume Two*, 97).
[69] At the May 16, 1937 Muroc event, for example, 19 of the 90 entries used Cragar cylinder heads, tied with the Winfield flathead, and at the May 15, 1938 event, 32 of the entries used Cragar overhead-valve equipment, ten less

was at last a commercial as well as a racing success.

George Wight died during World War II, but in 1945, his business passed into the hands of one of the many young hot rodders who had frequented the Bell shop during the 1930s, Roy Richter.[70] Under his direction, Bell Auto would become one of the country's first mail-order speed shops in the late 1940s, and its Cragar speed equipment manufacturing subsidiary would continue to prosper as well, ultimately developing into one of the postwar speed equipment industry's most famous and prosperous brands. Its success, however, had originated not with the hundreds of thousands of dollars worth of assets at the disposal of Schofield Incorporated or its successor, the Cragar Corporation, but rather with the small-time, grassroots hot rodding contacts of George Wight and *his* successor, Roy Richter.

R&R Manufacturing

Close contact with the street- and lakes-racers of early 1930s Southern California had proven to be critical to Cragar's success under George Wight, and it had also worked to the advantage of Ed Winfield, George Riley, and other Los Angeles area speed equipment manufacturers during the era of the Model A. For those located well to the east of the Rockies, however, no such arrangement was possible. For them, the traditional circle-track and street-use markets would have to suffice, just as they had in the 1910s and 1920s. But in the context of a depressed economy, many of these Midwestern and East-Coast manufacturers quickly found it difficult to stay afloat on the basis of the ever-dwindling profits that these particular segments of the automotive aftermarket could afford them. This was the case with the Chevrolet Brothers, Morton & Brett, Forster, Joe Jaegersberger's new company Ramar, and a whole host of others, all of whom went under well before the beginning of Roosevelt's first term. For other, ostensibly similar companies, however, Eastern and Midwestern circle track racers continued to provide a

than those who used Winfield flatheads but eleven greater than Cragar's closest overhead-valve competitor, Riley. See Carroll, *Muroc*, 7-8 and 18-21.

[70] Richter, a war veteran fresh from the front, paid $1,000 cash, along with a customized 1939 Ford convertible, for the property. See "Bell Auto…World's First Speed Shop," *Drag Digest*, November 11, 1966, 27, and also Almquist, "Roy Richter: Bell Auto Parts," 24-25.

steady stream of income throughout the 1930s. This was true for Green Engineering, Zenith, and Dreyer, for example, and also for the R&R Manufacturing Company of Anderson, Indiana.

Together with Myron Reynolds, a local investor, Robert M. Roof founded R&R Manufacturing in the summer of 1927, about a year after he sold his interest in Laurel to the Zenith Corporation. Roof, a talented machinist and self-taught automotive engineer, was an expert in the art of Model T performance tuning, and he quickly brought out several low-cost items for the universal car that fall.[71] Shortly thereafter, however, Ford unveiled the all-new Model A, and Roof spent the better part of the following year developing a line of speed equipment for it. By the end of the summer of 1928, he had introduced a dual carburetor system for the Model A engine, and within another year, a high-performance exhaust manifold as well.[72] Intake and exhaust equipment for the Model A appears to have sustained the company through its first two years of operation, at least, but by the end of 1929, Roof had readied a whole range of internal and external components for the new mill, too.

In April of 1930, for example, *Ford Dealer and Service Field* ran a full-length feature article, written by Robert M. Roof and Murray Fahnestock, on Model A performance modifications that featured a number of add-on parts for the new Ford motor that were available from R&R Manufacturing. These included special brackets for mounting a high-tension magneto, high-pressure water and oil pumps, cross-drilled crankshafts, down- and updraft carburetor equipment, as well as an all-new overhead-valve conversion.[73] Roof, of course, was a seasoned veteran in the design and manufacture of high-performance cylinder heads for Ford automobiles, having done so for more than a decade at Laurel. His new head, an eight-overhead-valve pushrod model that utilized the standard Ford camshaft, was similar conceptually to many of those that he had designed before. Where it differed from its predecessors, however, was in

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[71] Robertson, "Robert Roof," 9. See also above, chapter 1.

[72] Robert M. Roof and Murray Fahnestock, "Secrets of Speed: Building a Dirt-Track Racer," *Ford Dealer and Service Field*, April 1930, 34, 36, and 38; this piece dates R&R's dual carburetor system to August of 1928 (see page 38). On the company's exhaust manifolds, see R&R Manufacturing advertisement, *Ford Dealer and Service Field*, July 1929, 76.

[73] Roof and Fahnestock, "Building a Dirt-Track Racer," *Ford Dealer and Service Field*, April 1930, 34, 36, and 38.

the unique positioning of its intake ports: the incoming charge would pass from the intake manifold straight down through the top of the overhead-valve head and into the cylinders. Higher intake velocities were the result, making the new design a remarkably strong performer. Fordson valves, compound valve springs, removable valve guide bushings, high-lift rocker arms, metric spark plugs, and a choice of up- or downdraft carburetion rounded out the package, which would double the factory horsepower rating of the Model A Ford engine. With the addition of a gear-driven overhead camshaft attachment, also available from R&R, the potential gains were even more impressive.[74]

The following year, R&R added a second cylinder head conversion to its line-up. Designed as a low-cost alternative to the company's original eight-overhead-valve equipment, the new head, dubbed the "Cyclone," featured four massive overhead valves centered directly over their respective hemispherical combustion chambers. Operated by the standard Ford camshaft via long pushrods, these valves measured a full two inches in diameter and were forged from a steel alloy. Handling the spent gases were four special flat-seat steel exhaust valves, mounted in the stock location in the engine's cylinder block. Complete with a choice of down- or updraft Winfield carburetors and a set of protective aircraft-style rocker arm boxes, the Cyclone retailed for $89.50.[75]

Neither the Cyclone nor its costlier siblings, however, were designed or marketed for street use. In fact, none of R&R's equipment for the Model A motor was suitable for every-day duty, and Robert Roof was not afraid to admit it. His eight-overhead-valve equipment, for example, was "especially designed for dirt track racing," as were his Cyclone, his dual carburetor conversions, his water and oil pumps, and his magneto brackets.[76] Never did the company's advertisements mention truck, touring car, or speedster applications, and never did Roof brag of their on-road passing or hill-climbing capabilities. In other words, R&R Manufacturing catered specifically – and solely – to circle-track racers. What's more, as the 1930s progressed, Roof

[74] Ibid.
[75] "New R. & R. Speed Equipment," *Ford Dealer and Service Field*, July 1931, 110.
[76] Roof and Fahnestock, "Building a Dirt-Track Racer," *Ford Dealer and Service Field*, April 1930, 36.

would spend an increasingly significant portion of his time at R&R working on custom engine, chassis, and complete racing car jobs for individual customers.[77] Narrowly focused on the dirt track scene, R&R Manufacturing apparently sought to weather the Great Depression by relying on its founder's core area of expertise.

It was a gamble that paid off handsomely. By the early 1940s, R&R Manufacturing was one of only a very small handful of high-performance aftermarket companies located east of the Rockies that had survived the 1930s intact. Continuing to specialize in speed equipment and custom-built racing engines for circle-track use, R&R thrived well into the postwar period. And it did so, to the very end, with virtually no involvement in the burgeoning hot rodding phenomenon.[78]

Summary

In hindsight, the era of the Model A was clearly a time of transition for the American high-performance automotive industry. For starters, Ford's retreat from the single-model philosophy – the very heart of its manufacturing and marketing strategies for the better part of two decades – made for an increasingly unstable aftermarket environment. Henceforward, that is, speed equipment manufacturers would no longer be able to rely on the same sort of long-term OEM product stability that had characterized the Model T years. At the same time, Midwestern manufacturers were beginning to lose their near-monopoly within the industry, as the growth of

[77] On R&R's custom work, see for example Fahnestock, "When the Car Owner Demands Speed!," *Ford Dealer and Service Field*, January 1931, especially page 36, which mentions some of the solutions to common hop-up snags that Roof had come up with in the course of his custom speedster jobs. See also Robert M. Roof, " '*Jazzing Up*' Model A Ford Engines," *Ford Dealer and Service Field*, 16-18, which gives a basic run-down of the steps Roof takes when modifying a Model A for track use; Robert M. Roof, "Secrets of Speed: Using the Ford V-8 for Dirt Track Racing," *Ford Dealer and Service Field*, September 1936, 28, 30, and 52, in which Roof runs through some of the tricks he uses when hopping-up the new Ford V8 engine for track use; Thomas Howe and Robert M. Roof, "Building a V-8 Midget," *Ford Dealer and Service Field*, January 1938, 18 and 34, in which Roof discusses some of the tricks he has learned by building Midget racers for his customers; "Speed and More Speed," *Ford Field*, June 1941, 18-19, which showcases some of Roof's circle-track and marine racing engines; and Thomas Howe and Robert M. Roof, "Speeding the '*Sixty*' for Midget Racing," *Ford Field*, December 1941, 16 and 27, which runs through some of Roof's methods for modifying the Ford V8 60 engine for use on the popular Midget racing circuits.

[78] No Roof equipment ever appeared at Muroc, for example, although gear from some of Roof's erstwhile Midwestern competitors – including Morton & Brett, the Chevrolet Brothers, and Rajo – did. See Carroll, *Muroc*, 7-8, 9-10, and 18-21.

lakes and street racing on the West Coast began to foster the emergence of a powerful and close-knit core of Southern California firms. With one foot in the flourishing 1920s accessory market and the other in the turbulent, enthusiast-driven 1930s hot rodding scene, the industry stood, in 1930, on the cusp of a critically transformative period.

At the time, though, none of this would have been apparent to anyone involved in the high-performance aftermarket. In fact, especially during 1928, 1929, 1930, and 1931, when production of the Model A Ford was in full swing, the new period probably would not have seemed very different at all. To be sure, the Model A was a more sophisticated, powerful, and capable automobile than its predecessor, but it was still a low-cost, high-volume, four-cylinder Ford. The same performance tuning tricks that had worked so well on the universal car also applied to the new model, and the types of speed equipment that became available for the Model A were very similar to those which had come before: overhead valve conversions, high-compression flatheads, ignition upgrades, high-speed camshafts, and so on and so forth. Manufacturing, marketing, and distribution channels remained virtually the same, as did the industry's overwhelming reliance on Ford products as its basic canvas. And, finally, with nearly two million Model As rolling out of Ford's assembly plants each year, few would have had any reason to doubt that the new car was destined for anything but a long and prosperous reign.

In the event, of course, it would prove to be neither. Less than two years after Henry and Edsel Ford unveiled their new Model A at the Waldorf Hotel in New York City, the stock market collapsed, bringing the booming economy of the late 1920s to a screeching halt. By the fall of 1931, the ensuing economic depression had begun to affect the speed equipment industry, forcing a number of firms into receivership and casting a pall over those fortunate enough to stay afloat. Shortly thereafter, when Ford announced its plans to discontinue the Model A just a few short years after its introduction, the illusion, for most, was over: the era of the Model A had turned out to be nothing at all like the period that had preceded it. Moreover, whatever relief some aftermarket entrepreneurs had subsequently found in the essential mechanical similarity between the Model A and its four-cylinder replacements – the 1932 Model B and the 1933

Model C – would quickly prove to have been fleeting, too when Ford, in 1934, decided to discontinue its four-cylinder models altogether.

And yet, the market for Model A/B/C speed equipment did not vanish overnight, and neither did most of the companies that produced it. In fact, the Great Depression and the end of four-cylinder Ford production notwithstanding, the Model A speed equipment industry soldiered on through the 1930s, into the early 1940s, and – in some cases – well into the postwar era as well. And this, in turn, would have an enormous effect on the way in which its successor, the California V8 industry, would emerge in the mid- to late 1930s.

Southern California and the Emergence of the V8 Industry, 1932-1942

Beginning in 1932, customers willing to part with an additional $50 could drive home from their local Ford dealers in a new car equipped with a V8 engine. A first within the low-cost bracket, the new Ford engine displaced 221 cubic inches and produced sixty-five horsepower, fully twenty-five percent more than the company's "new" four-cylinder engine, the Model B.[79] Even more impressive, however, was the manner in which the new V8 delivered its punch. With four additional cylinders, the motor benefited from twice the number of power strokes per revolution than its predecessors, making it a smoother, quieter, and considerably more refined powerplant than its four- and six-cylinder contemporaries.[80] Moreover, the new mill was fundamentally similar to most of Ford's previous designs, sharing the company's basic L-type cylinder head layout with its in-block camshaft, lifters, and valves.[81] Smooth, powerful, easy to maintain, and cheaper than most of the competition's six-cylinder models, the new V8 sold well

[79] On four-cylinder and V8 Ford pricing, as compared with its competitors, see "Comparative Price Chart," *Ford Dealer and Service Field*, April 1932, 42. For more on the V8's technical specifications, see Batchelor, *The American Hot Rod*, 87.
[80] Chevy, Willys, Pontiac, DeSoto, and Essex all sold six cylinder cars within the same price bracket as the Ford four-cylinder and V8 models. See "Comparative Price Chart," *Ford Dealer and Service Field*, April 1932, 42.
[81] Though openly biased in favor of the products of the Ford Motor Company, Murray Fahnestock penned an interesting piece in 1932 which compared the relative virtues (and the essential similarities) of four- and eight-cylinder engine designs. See Fahnestock, "The Engineering Principles of 4 & 8-Cylinder Motors: Proven Correct by Racing Results," *Ford Dealer and Service Field*, April 1932, 30-31.

– so well, in fact, that within two years, Ford no longer felt compelled to produce its entry-level four-cylinder models at all. Between 1932 and 1934, then, the Ford Motor Company, its dealers, and the overwhelming majority of its customers eagerly abandoned twenty-five years' worth of tradition and experience, hopping aboard the V8 bandwagon with an almost reckless enthusiasm.

Far less ecstatic, at least at first, were most of the country's average high-performance buffs. Naturally, they recognized that with sixty-five horsepower as delivered, the new V8 engine had tremendous potential. And when Ford upped the ante with seventy-five and eighty-five horsepower V8s in 1933 and 1934, respectively, a handful of enthusiasts did in fact begin to tinker with the new mill.[82] By and large, though, V8 engines remained a curiosity among lakes, street, and circle track enthusiasts until the second half of the decade. And even then, its adoption among shoestring-budget racers was tentative and slow.

Part of the reason, of course, was the new mill's cost. In 1932, for example, the cheapest V8 model that Ford offered, the roadster, would have set a buyer back some $460. Compared with contemporary estimates that placed the total cost – including extensive powertrain modifications – of a used, hopped-up Model A at around $400, labor and all, the new V8s were just too expensive, especially in the context of a depressed economy.[83] Plus, a reasonably well-modified $400 Model A would outrun a stock $460 V8 roadster any day of the week, and performance enthusiasts knew it. Consequently, not until V8 models started to appear on used car lots and in wrecking yards in the mid-1930s did it even begin to make sense for folks to bother with them. But even then, most enthusiasts were slow to abandon their well-worn Model As, primarily because there simply wasn't any speed equipment available for the V8 engine at the time. Apart from a few simple tweaks, therefore, those with V8s were largely limited to the factory horsepower rating of sixty-five to eighty-five, while their buddies' hopped-up Model As often sported well over one hundred. Cheap, abundant, and supported by an experienced speed

[82] On the incremental growth of factory V8 horsepower readings during the early 1930s, see Batchelor, *The American Hot Rod*, 87. On the gradual acceptance of V8 engines among lakes racers, see Montgomery, *Hot Rods As They Were*, 25.
[83] See Carroll, *Muroc*, 6, and "Comparative Price Chart," *Ford Dealer and Service Field*, April 1932, 42.

equipment industry, the Model A Ford thus remained the enthusiast's car of choice for much of the decade.

Circle-track racers appear to have been the first to adopt the V8 mill in considerable numbers. Sponsored stock-car teams went over to the new engine as early as 1932, of course, but among average racers, it wasn't until the middle of the decade that it began to become an economical choice. And here, the key to its adoption was the rapid emergence, mid-decade, of V8 speed equipment specifically designed for dirt and board track applications. High-compression cylinder heads, alloy pistons, stronger crankshafts, high-speed camshafts, dual carburetor manifolds, modified ignitions, and even complete racing engines were available from R&R Manufacturing and Green Engineering, for example, by 1935, and by 1936, the popular Ford press had begun to run occasional stories on the ins and outs of V8 tuning for circle track use. V8s even began to appear in limited numbers at Indianapolis in the mid-1930s, and with the advent of the tiny, 136 cubic inch sixty-horsepower V8-60 engine in 1937, eight-cylinder Fords quickly came to dominate the smaller Midget, dirt, board, and other circle tracks of the period.[84]

On the dry lake beds and open boulevards of Southern California, on the other hand, the circumstances were entirely different. There, enthusiasts who used their modified automobiles both for racing and for everyday transportation found little appeal in the circle track gear that was available for V8 applications, electing instead to stick with their tried-and-true Riley, Winfield, Cragar, or Alexander-equipped four-cylinders. What began to change *their* minds, in the mid- to late 1930s, was not a sudden spike in the availability of over-the-counter speed equipment for the V8 engine. Instead, for them, it was the overall growth and the competitive nature of early Southern California hot rodding, together with the increasingly experimental bent of its participants, that brought the flathead V8 to the fore.

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[84] On R&R Manufacturing's circle track V8 gear, see for example Robert M. Roof, "Secrets of Speed: Using the Ford V-8 for Dirt Track Racing," *Ford Dealer and Service Field*, September 1936, 28, 30, and 52. On Green's racing equipment for the V8, see Almquist, "Carl 'Pop' Green," 8-9. Period articles on V8 tuning for circle-track applications included, among many others, R. F. Havlin, "More Speed from the V-8: Some Ideas for Those Who Want Locomotion Faster Than Fast," *Ford Dealer & Service Field*, January 1936, 19; Thomas Howe, "Tuning for Top Speed," *Ford Dealer & Service Field*, November 1937, 25-26, 48; and Thomas Howe and Robert M. Roof, "Building a V-8 Midget," *Ford Dealer and Service Field*, January 1938, 18 and 34.

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Dry lakes racing had begun as a spontaneous and chaotic grassroots activity in the early 1920s, and although the American Automobile Association and several other independent companies and groups sponsored a number of major events at the lakes during the mid- to late 1920s, permanent organization of this new and peculiar form of racing did not come until the early 1930s. The first to bring some semblance of order to the dry lakes was the Muroc Racing Association (MRA), formed by a group of enthusiasts with the backing of the Gilmore Oil Company on May 8, 1932. Events held under MRA sanctioning in the early 1930s, however, were not much safer than the impromptu runs of the mid- to late 1920s: several cars would charge out across the lakes at a time, with only the leading driver enjoying a view of the course unobstructed by the dust of his competitors. Though it certainly gave participants a mighty powerful incentive to improve their cars from meet to meet in order to be able to stay at the head of the pack, this style of lakes racing was exceedingly dangerous, and many lost their cars – and some, their lives – in a cloud of dust at MRA events. Then again, safety was not among the top priorities of most early 1930s hot rodders. Instead, what mattered was going fast, and with average speeds in the neighborhood of 90 to 110 miles per hour, MRA events were enormously popular.[85]

The MRA, though, was at best a loose-knit association, an umbrella organization that *sanctioned*, but typically did not *sponsor*, the events held in its name. Instead, the task of organizing and staffing most of the early to mid-1930s lakes events fell to local area clubs. The first of these had begun to appear in the region in the early 1930s, and they usually consisted of a couple dozen or so teenagers and twenty-somethings who drove (and raced) modified production cars. Criteria for membership in these groups varied from club to club: some had very little in the way of prerequisites, while others required certain automotive performance benchmarks – the 90 mph barrier, for example – to be reached by prospectives before they would be admitted.

[85] On the history of the Muroc Racing Association, see Genat and Cox, *The Birth of Hot Rodding*, 10-17, and Batchelor, *The American Hot Rod*, chapter 7.

Frequently, club members would pool their resources in order to purchase or rent a shop or garage in their area, and these club headquarters quickly became centers for the generation and dissemination of performance tuning knowledge among the young enthusiasts of the period. Membership in one of these groups was a source of pride, and most of their members' cars sported license-plate sized plaques bearing the clever, if sometimes vulgar names of the clubs to which their owners belonged. Rivalries between these groups were often intense, though always good-natured. In fact, many of the MRA dry lakes events of the mid-1930s came about through the cooperation of competing clubs. Bragging rights, of course, would go to the group whose members' cars proved to be the better performers at these co-sponsored events.[86]

The problem, though, was that the number of clubs and would-be participants quickly began to multiply, particularly in 1935 and 1936. By the end of 1937, mounting casualties and the need for standardized events for more focused competition between the various clubs and groups therefore led to an historic meeting on November 29. On that day, "representatives from five Southern California car clubs met at the *Throttlers'* Hollywood clubhouse" and "agreed that an organization of several clubs would be of benefit to all club members and dry lakes racing."[87] Together, those gathered chartered the Southern California Timing Association (SCTA), and in May of 1938, the new group held its first event, at Muroc. Standardized timing equipment and a class-based points system made regular, consistent tracking of the various' clubs collective performance a reality, and rivalries intensified accordingly. Moreover, because the cars at SCTA events ran across the lakes one at a time, rather than in clusters, the new organization also made the lakes a safer place to run.[88] The downside, of course, was that folks could no longer run head-to-head at the lakes, which meant that illegal street racing – though officially shunned by the SCTA – began to grow as never before.

The bottom line, then, was that modified motoring in Southern California was becoming

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[86] For more on the 1930s hot rod clubs, see Genat and Cox, *The Birth of Hot Rodding*, chapter 3, and Batchelor, *The American Hot Rod*, chapter 7.
[87] Genat and Cox, *The Birth of Hot Rodding*, 17.
[88] Actually, the SCTA ran cars two at a time for its first few meets, but the organization quickly abandoned that format in favor of solo runs out of concern for the safety of the racers. See Batchelor, *The American Hot Rod*, 117.

an increasingly competitive endeavor during the mid- to late 1930s. And this fierce competition quickly led to quite a bit of mechanical experimentation among area enthusiasts. Most, of course, ran modified Model A Fords because they were abundant, cheap, and easy to modify with over-the-counter speed equipment. Others, however, raced with everything from hopped-up Model Ts to four- and six-cylinder Chevrolets, Dodges, Buicks, Oldsmobiles, Plymouths, and Austins. A handful of others used V8 Fords, and a few even ventured to run twelve-cylinder Lincolns, straight-eight Packards, and sixteen-cylinder Cadillacs. Though there was a bit of aftermarket gear available for those with Chevrolets and Dodges, for the most part, enthusiasts who did not own four-cylinder Fords were forced to come up with their own tuning tricks and powertrain modifications. Scouring area junkyards for stronger crankshafts and larger carburetors, fabricating intake and exhaust manifolds in their backyard workshops, and enlisting the aid of local automotive repair shops for things like cylinder head milling and porting, these hot rodders came up with some awfully creative ways to boost their cars' performance. Nevertheless, the majority of those who raced cars other than Model A Fords in the mid- to late 1930s did so not by choice, but rather because some other brand of car happened to have been what was available to them. Competition forced them to be creative with their Plymouths and their Oldsmobiles, in other words, but if they had had their druthers, most would have opted for the simpler and more familiar four-cylinder Ford.

The exceptions, though, were those who chose to trade their sure-fire Model As for the exotic and untested V8 Ford. By the middle of the decade, a critical mass of L.A. area enthusiasts had managed to get their hands on used V8s, and these folks began to experiment with them not because they *had* to, but rather because they believed in the motor's potential. And they tried anything and everything they could think of to make their flatheads fly. They built their own intake manifolds, to which they fitted two, three, and even four carburetors. They fabricated their own free-flowing exhausts. They hired local welding and machine shops to weld and mill their cylinder heads for more compression.[89] They bored the engine's cylinders and offset-ground their crankshafts for more displacement. They tried all sorts of different ignition systems. They reground their own camshafts, lobe by lobe. They fitted larger valves and stronger valve springs sourced from other makes of car. Some even tried overhead valve conversions that had been designed for commercial vans and trucks.[90] For the most part, though, their modifications were entirely home-made, hand-crafted, and unique.

By the time the SCTA began to bring real order to the lakes in 1937, some of the better-built of these V8 Fords were able to post times that were competitive with those of the four-cylinder cars. Critically, though, four-cylinder hot rods would continue to dominate the dry lakes racing scene, and not until 1941 would a majority of the cars run at SCTA meets be powered by the flathead V8 engine.[91] The reason for this was actually rather simple: no matter how fast a handful of home-built flathead V8-powered hot rods were proving to be, they just weren't going to inspire widespread emulation until the average enthusiast could easily get his hands on ready-made, bolt-on speed equipment for the new motor. And in the event, this would not be possible until the very end of the decade.

But why? Why was there so little high-performance gear available for the flathead V8 engine in the mid- to late 1930s? Why weren't Midwestern companies like R&R and Green marketing their circle-track V8 equipment to the West-Coast crowd? And, perhaps more to the point, why weren't local companies like Winfield, Riley, and Cragar actively pursuing the growing V8 market? Unfortunately, definitive answers to these questions remain elusive, but several critical factors almost certainly played a role. For starters, the V8 gear that a handful of Midwestern and East-Coast firms had begun to produce by 1935 was specifically designed for

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89 "Welding and milling" was a common way to increase the compression ratio of flathead V8 engines. Essentially, a technician would remove the cylinder heads, fill in the combustion chambers with large welds, and then machine new, smaller chambers in place of the old ones.

90 Dixon, Maxi, and Schaeffer, for example, came out with overhead-valve conversions for truck applications in the mid-1930s, and V8 enthusiasts lucky enough to find a used set eagerly tried them out on their engines. See Batchelor, *The American Hot Rod*, 82-83.

91 As of 1936, only 2% of lakes participants used V8s. Between 1937 and 1940, however, V8s accounted for about a third of lakes entries, on average, and in 1941, they became the majority, with 62%. See Montgomery, *Hot Rods As They Were*, 25.

circle-track racing applications, and thus, it wasn't likely to appeal to West-Coast enthusiasts who drove their cars *both* on the lakes *and* on the streets. Plus, by the time the V8 began to become popular among L.A. area hot rodders in the mid-1930s, most of the remaining Midwestern and East-Coast manufacturers had long since ceded the Southern California lakes and street aftermarket to local firms that enjoyed the competitive advantages of proximity to – and regular contact with – the area's automotive enthusiasts.[92]

As for the local companies, their delay appears to have had something to do with what can only be described as the V8's "newness." When the Model A appeared in 1927, many speed equipment manufacturers quickly discovered that the same sorts of high-performance tuning tricks that had worked so well on the Model T would work on the new car, too. All they had to do was retool so that their components would bolt directly to the newer mill. The V8, on the other hand, was an entirely different type of motor, and when it was introduced in 1932, very few within the high-performance aftermarket industry really knew what to do with it. To be sure, basic tweaks like raising the compression ratio or adding additional carburetors would still work, but most of the more fundamental sorts of modifications would require a bit of research and development. But in the context of a depressed economy, there really wasn't much incentive for these firms to work on V8 gear at all, since most West-Coast enthusiasts weren't able to obtain the expensive V8 models anyway. Consequently, with demand for Model A equipment remaining strong, California companies like Winfield and Riley were therefore able to plug along for much of the early to mid-1930s without giving the new V8 engine as much as a second thought. And when hot rodders began to tinker with the flathead V8 in substantial numbers towards the end of the decade, these existing four-cylinder companies thus were no more prepared to develop parts and accessories for the new mill than were the enthusiasts themselves. For example, when 1930s hot rodder (and, later, speed shop owner) Karl Orr went with fellow enthusiast Vic Edelbrock to visit an area camshaft grinder by the name of Pete Bertrand in the late 1930s to try to obtain a pair of cams for their respective roadsters, Bertrand reportedly told

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[92] See above, pages 91-92.

them he was not yet ready to offer a line of cams for the new motor:

> Fellows, I don't know, Ed Winfield don't know, Kenny Harmon don't know, no cam grinder knows yet what exactly is going to make a V-8 run. We've got to experiment a little.[93]

Experiment they did, and in due course Bertrand, Winfield, and Harmon all had V8 camshafts ready for sale. But it took some doing, and as they worked on the problem in the late 1930s, they were effectively in the same boat as the ordinary enthusiasts who were tinkering with their homebuilt manifolds, say, or hand-polishing their intake ports.

Nature abhors a vacuum; so, too does the marketplace. Thus, with existing California manufacturers like Riley, Winfield, Alexander, Bertrand, Cragar, and others struggling to come up with effective V8 tuning programs in the late 1930s, a window of opportunity opened up for some of the more talented of the amateur V8 tinkerers. Hot rodder Tom Spalding, for example, began to sell converted ignitions for the flathead V8 engine in 1936, when he was still in high school. Later, he explained that

> [i]t was the A-V8 that was responsible for getting me into the ignition business. The V8 would cut out at about 4500 rpm, so I built the first dual-point / dual-coil ignition in the machine shop, while still a sophomore in high school. I purchased the dual-coil from Coberly Lincoln / Mercury in L. A. and fabricated the rest myself...My first ignition system ran great, and the engine would turn 5500 to 6000 rpm. The system caught on, and soon I was building them for other racers at the lakes.[94]

Racer Tommy Thickstun, on the other hand, found his niche in the manifold business. Early in 1939, he sketched a design for a dual carburetor intake manifold for his V8 roadster and hired a local pattern-maker and foundry to produce a prototype, which he then polished and assembled in his own workshop. When it proved to be a strong performer, he called the foundry back and ordered a batch of castings, and his finished manifolds began to sell quite well among Southern California rodders.[95] Vic Edelbrock, who owned a local automotive repair shop and who drove and raced a 1932 Ford V8 roadster that he had won in a card game mid-decade, was one of Thickstun's dealers. Towards the end of 1939, after failing to convince Thickstun to work to

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[93] Quoted in Drake, *Hot Rodder!*, 44.
[94] Quoted in Medley, *Tex Smith's Hot Rod History, Volume One*, 76. An "A-V8" was a Model A Ford retrofitted with a V8 engine.
[95] On Thickstun's entry into the business, see for example Montgomery, *Hot Rod Memories*, 93 and 121, and also Batchelor, *The American Hot Rod*, 77.

improve the internal flow of his manifolds, Edelbrock designed his own aluminum intake manifold and began to market it to other enthusiasts.[96] Two years later, in 1941, speed shop owner and former racer Phil Weiand began to produce a manifold that combined what he believed to be the best features of the Thickstun and Edelbrock designs, and when it began to prove its mettle on the lakes, the Weiand "hi-riser" manifold quickly became a hot seller among enthusiasts.[97] Likewise, manifolds by Dave Burns, Joe Davies, Jack Henry, Wayne Morrison, Eddie Miller, Eddie Meyer, and Mal Ord emerged from the Southern California lakes and street racing scene in the late 1930s, as did camshafts from Ted Cannon and Harry Weber, ignitions from Joe and Tommy Hunt, and exhaust systems by Sandy Belond.[98] A handful of other enthusiasts began to make similar products and other odds and ends for the flathead V8 by the beginning of the 1940s, and one, Lee Chapel, even started to produce an aftermarket cylinder head for Chevrolets.[99] Figuring conservatively, something on the order of seventeen or eighteen altogether new aftermarket companies grew out of the efforts of average V8 tinkerers in the late 1930s and the very early 1940s, filling the void left by the extant manufacturers' considerable

[96] See Drake, *Hot Rodder!*, 44 and 170; Almquist, "Vic Edelbrock: Excellence in Overdrive," in *Hot Rod Pioneers*, 32-33; and Batchelor, *The American Hot Rod*, 77.

[97] See Almquist, "Phil and Joan Weiand: The Ultimate Team," in *Hot Rod Pioneers*, 46-47. Weiand, wheelchair-bound following an accident on the lakes in the mid-1930s, had close friends and associates test his manifold design on their roadsters.

[98] On Burns, see Batchelor, *The American Hot Rod*, 77, and also Montgomery, *Hot Rod Memories*, 119. On Davies, see Montgomery, *Authentic Hot Rods*, 20, and Drake, *Hot Rodder!*, 171. On Jack Henry, see Batchelor, *The American Hot Rod*, 77; Montgomery, *Authentic Hot Rods*, 92; and Drake, *Hot Rodder!*, 60-62 and 171. On Morrison, see Batchelor, *The American Hot Rod*, 77, and Montgomery, *Hot Rod Memories*, 117. On Eddie Miller, see Veda Orr, *Hot Rod Pictorial – Featuring Dry Lakes Time Trials of 1946, 1947, 1948* (Los Angeles, CA: Floyd Clymer, 1949), 7, and Batchelor, *The American Hot Rod*, 70. On Eddie Meyer, see Montgomery, *Authentic Hot Rods*, 20; Drake, *Hot Rodder!*, 171; Almquist, *Hot Rod Pioneers*, 19-20; and Batchelor, *The American Hot Rod*, 77. Curiously, a June, 1949 advertisement in *Hot Rod Magazine* for Eddie Meyer products (page 24) claims that the company had been in business since 1918, which is possible, since Meyer was born in 1896 and since he had two brothers, Louie and Bud, both of whom were active in racing circles by the 1920s. However, the present author has found no evidence regarding what Meyer might have made in the 1910s and 1920s; the overwhelming bulk of the available evidence, on the other hand, places Meyer's entry into the speed equipment business in the 1930s with the emergence of the V8 lakes racing scene. All things considered, Meyer probably made limited runs of racing equipment with his brothers prior to the 1930s, and then entered into the business full-time in the 1930s. On Mal Ord, see Montgomery, *Hot Rod Memories*, 116, and Batchelor, *The American Hot Rod*, 16 and 77. On Ted Cannon, see Batchelor, *The American Hot Rod*, 77. On Weber, see "Meet the Advertiser: Weber Tool Company," *Hop Up*, July 1952, 26-27. On the Hunt Brothers, see Batchelor, *The American Hot Rod*, 54. And, finally, on Belond, see Montgomery, *Hot Rod Memories*, 90; Montgomery, *Authentic Hot Rods*, 16; Medley, *Tex Smith's Hot Rod History, Volume One*, 22; and Almquist, *Hot Rod Pioneers*, 124.

[99] Chapel also operated one of the area's – and, by extension, the country's – first speed shops in the 1930s. See Batchelor, *The American Hot Rod*, 170, and Medley, *Tex Smith's Hot Rod History, Volume One*, 109.

delay and helping to make the flathead V8 engine the top choice of area enthusiasts by the end of 1941.

Together with the established California manufacturers that eventually began to produce V8 speed equipment of their own, including Alexander, Cragar, Moller (later, Adams-Moller), Winfield, Riley, Eastern Auto, and Sparks, these tiny new enthusiast-based companies helped to make Southern California the indisputable center of American speed equipment manufacturing by the late 1930s and the very early 1940s. Of course, they weren't the only newcomers. Eddie Edmunds, for example, an enthusiast based in Portland, Oregon, began to make manifolds for the flathead V8 engine in the late 1930s.[100] Aluminum Industries, a foundry located in Ohio, likewise introduced a line of high-compression aluminum cylinder heads for the new Ford mill in 1937.[101] And, finally, McCulloch Engineering, a Milwaukee company, had introduced a popular centrifugal supercharger kit for the flathead V8 back in 1936.[102] For the most part, though, the fledgling V8 industry of the mid- to late 1930s and the very early 1940s belonged to Southern California. And this, by 1941, meant that Golden State manufacturers had come to dominate the American speed equipment business by an overwhelming margin of more than three to one (see figure 2.3).

Moreover, the newly dominant Southern California V8 industry of the period was geographically concentrated in the strictest sense: by 1941, there was a critical mass of speed equipment manufacturers operating within the Los Angeles area that shared employees, customers, and even basic producer-industry contacts, such as rough-casting foundries.[103]

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[100] See Batchelor, *The American Hot Rod*, 96, and Almquist, "Eddie Edmunds: The Manifold Man," in *Hot Rod Pioneers*, 131. Edmunds moved to Los Angeles after World War II.
[101] "Permite Aluminum Alloy Heads Ready," *Ford Dealer and Service Field*, November 1937, 61.
[102] McCulloch was a well-financed, well-equipped company formed by an independently-wealthy airplane and automotive enthusiast, R. G. McCulloch, See "McCulloch Engineering Announces New Supercharger for Ford V-8," *Ford Dealer & Service Field*, November 1936, 50; McCulloch Engineering Company advertisement, *Ford Dealer & Service Field*, November 1936, 4-5; "Supercharger Kit for Light Cars Fits V-Eight Engines," *Popular Mechanics*, May 1937, 664; Batchelor, *The American Hot Rod*, 139; Montgomery, *Hot Rod Memories*, 110; Montgomery, *Authentic Hot Rods*, 25; and Drake, *Hot Rodder*, 27, 31, and 57. For a detailed look at the McCulloch assembly operations circa 1942, see Joseph Geschelin, "McCulloch Superchargers in the Making," *Automotive Industries*, January 1, 1942, 18-24 and 74.
[103] Thickstun, Edelbrock, and Weiand, for example, shared the same local foundry. See Batchelor, *The American Hot Rod*, 77.

Competitors on and off the lakes, these enthusiast-entrepreneurs were the seeds of the much-vaunted postwar American hot rod industry.

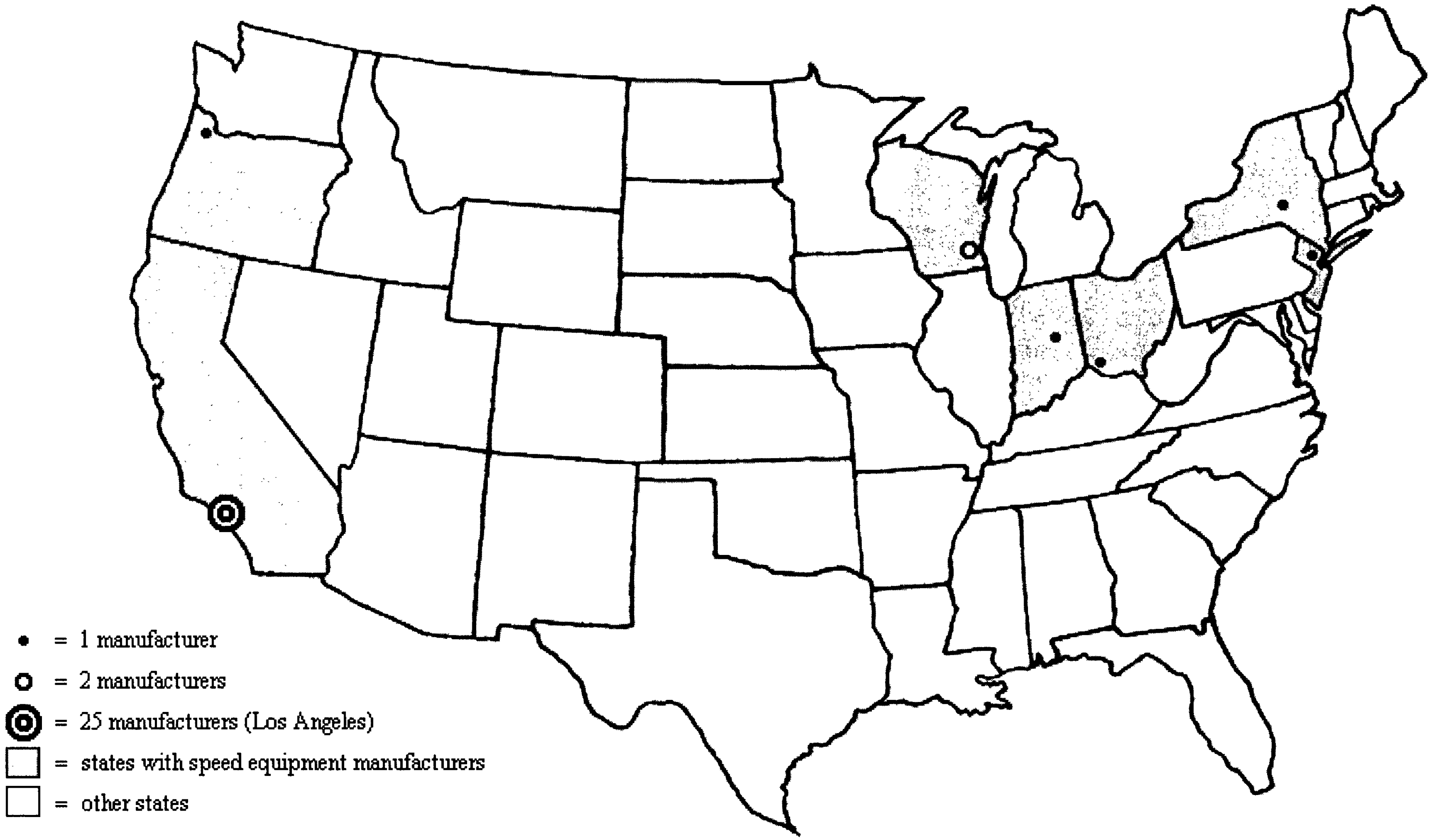
*   *   *

By the early 1940s, Southern California hot rodding had developed into a fully-fledged and self-contained phenomenon.[104] It had its own particular style(s) of racing. It had its own close-knit core of enthusiasts. It had its own clubs and organizations. It had its own lingo and technical jargon. It had its own industry. And, as of January 1941, it also had its own limited-circulation periodical, *Throttle*.[105] But then, in the blink of an eye, it all came to a sudden and tragic halt. Shortly after the events of December 7, 1941, *Throttle* closed its doors, the military closed off Muroc Dry Lake, and the overwhelming majority of young hot rodding devotees were called to serve in the armed forces. Fledgling manufacturers mothballed their patterns, tools, and jigs, and average enthusiasts parked their roadsters for the duration.

[104] It bears repeating, however, that "hot rod" was not actually coined until approximately 1944 or 1945.
[105] See Batchelor, *The American Hot Rod*, 181.

Figure 2.3: V8 Era Speed Equipment Manufacturers (circa 1942)

(author illustration)



Chapter Three: Postwar Rodding and the Los Angeles Speed Equipment Industry

From mid-1942 until the end of 1945, not a single roadster stormed across the dry lake beds of Southern California. Area clubhouses stood vacant, as did prewar hot spots like George Wight's speed shop in Bell. From time to time, the rumble of open-ended exhaust systems echoed through select neighborhoods as servicemen on leave fired up their A-V8s for old time's sake, but for the most part, the L.A. basin was abuzz with war materials production, not hot rodding. And yet, immediately following the end of the Second World War, the sport resumed with a remarkable vigor, as if the snowballing momentum it had generated by the end of 1941 had somehow managed to grow stronger during the wartime years of inactivity. By the end of 1945, the SCTA had regrouped, hot rods had begun to reappear en masse on the streets of Los Angeles County, Sunday time trials at El Mirage Dry Lake had resumed, and a handful of high-performance aftermarket manufacturers had returned to their prewar posts. By 1947, the ranks of weekend lakes racers had climbed into the thousands, and by 1948, the number of active SCTA clubs had reached an all-time high.[1] What's more, enthusiasts across the United States had begun to join in, and by the end of the 1940s, hot rodders based outside the Golden State outnumbered the L.A.-area pioneers by rather a wide margin. Nevertheless, hot rodding as it emerged in the remaining forty-seven states was but an extension of the original California phenomenon. To this day, in fact, Southern California remains the epicenter of American performance tuning, at least in a number of crucial respects. In the late 1940s and the early 1950s, however, no discursive qualifications would have been necessary: Southern California was *the* center of American hot rod enthusiasm. It was *the* source of trends, of know-how, of literature, and, critically, of aftermarket parts. Never before and never since has modified motoring in the United States had so clear and indisputable a regional bent as it did in the decade after World War II. Petty reservations aside, in other words, this – for California enthusiasts and manufacturers alike – was

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[1] Andrew Hamilton, "Racing the Hot Rods," *Popular Mechanics*, January 1947, 138, and Genat and Cox, *The Birth of Hot Rodding*, 33 and 36.

their time.

Between 1945 and 1955, however, the hobby grew substantially, and as it did, it began to change in ways both trivial and substantial. During these years, new participants, new goals, new forms of organized competition, and new automotive and high-performance technologies combined to transform what once had been a relatively homogenous and reasonably well-defined leisure-time activity into a multifaceted pursuit capable of satisfying the interests of a diverse array of performance-oriented automotive enthusiasts. Some of these new twists resulted from the hobby's importation into climates (social, political, and literal) that were less favorably disposed to modified motoring than were the sunny, open boulevards of Southern California; others – the majority, in fact – originated in the L.A. basin. And although a vocal minority of purists would lament these shifts, particularly as the 1950s wore on, few would have been able to deny that, realistically, there was no going back. For better or for worse, that is, hot rodding had changed.

So, too had the fledgling Southern California speed equipment industry. Going into the war, a couple dozen brand-new, tiny, backyard businesses had been the sector's core; heading into 1946, the same was true. But by the end of the 1940s, there were nearly one hundred high-performance aftermarket manufacturers in greater Los Angeles alone, and by the early 1950s, the largest of these had grown to become diverse, multi-million-dollar-a-year operations with large, dedicated production facilities and far-flung, nationally-oriented distribution networks. In other words, when hot rodding reemerged in Southern California after the war, so too did the industry. And as the activity grew by leaps and bounds in the late 1940s and the early 1950s, so too did the business of speed equipment manufacturing. And as hot rods began to appear in places as far-flung as Miami, Minneapolis, Pittsburgh, and Seattle, so too did manifolds by Edelbrock, heads by Weiand, exhausts by Belond, and cams by Cannon. And in each new twist, each new fad, and each new niche, entrepreneurs within the hot rod industry saw new opportunities, new openings, and new sources of profit. By the mid-1950s, of course, a handful of manufacturers based outside of the L.A.-area had begun to cash in on the postwar hot rodding craze as well. However, although their stories are often as remarkable and their founders as creative and enthusiastic as their Southern California counterparts, the real story of the period in question is that of the relative ease with which the tiny L.A. industry of 1945 grew to become the dominant force that it was in 1955.

Accordingly, this chapter examines the postwar growth and evolution of the California speed equipment industry from the end of the Second World War through the mid-1950s. It begins with a detailed examination of the ways in which hot rodding itself changed during those years, in order to establish an adequate and accurate backdrop. Then, its focus narrows as it delves into the nitty-gritty details of the people, products, workshops, production systems, advertising, and distribution networks of the Los Angeles hot rod industry. A brief discussion of some of the more remarkable characteristics of this regional clustering of related companies then brings the chapter to a close.

Postwar Automotive Enthusiasm: From Hot Rods to Hot Rodding

On April 28, 1946, the SCTA held its first official dry lakes meet since the summer of 1942. Although SCTA-sanctioned Sunday time trials technically had resumed at El Mirage the previous fall, the April meet nevertheless was special, for it marked something of a return to normalcy for the region's enthusiasts.[2] Specifically, the April meet *counted* – it was the first of five events scheduled for the 1946 season at which official SCTA standings points would be up for grabs. Hundreds of freshly discharged war veterans and eager teenagers representing dozens of newly-reconstituted hot rod clubs therefore made the trip from the L.A. basin up into the high desert to run their cars, catch up with old friends, and get reacquainted with their rivals. There were a few new faces in the crowd, but few new tricks: the cars, that is, were largely as they had been four years earlier, as was the sport itself. Plenty of daydreaming and bench racing had of

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[2] On the resumption of Sunday time trials in the fall of 1945, see "Hot Rods," *Life* (November 5, 1945), 86-88. On the April, 1946 meet, see Genat and Cox, *The Birth of Hot Rodding*, 30.

course gone on among the many enthusiasts who had fought in the war, thanks in no small part to an SCTA member by the name of Veda Orr. Orr, the only female member of the prewar SCTA, regularly raced at the dry lakes during the 1930s and would continue to do so well into the postwar period. During the war, though, Orr wrote, published, and distributed a mimeographed newsletter to her fellow club members stationed abroad.[3] Thus, while hot rodding certainly hadn't progressed in 1943, 1944, and 1945, it also hadn't regressed; postwar participants, in short, were able to pick up right where they had left off back in 1942.

Somewhere along the way, though, modified roadsters had acquired a new nickname: *hot rods*. No one seems to know exactly when or why it first was used, but what is clear is that in the weeks and months immediately following the end of the Second World War, "hot rod" quickly became the dominant moniker not only among the L.A.-area enthusiasts themselves, but also among their critics. To this day, in fact, widespread speculation holds that "hot rod" was originally intended to be a derisive term, an abbreviation of "hot roadster" meant to belittle the owners of these home-made high-performance machines. And indeed, as the 1940s wore on, many a journalist, police officer, and small-town official would make liberal use of the phrase in precisely that manner. But in the first use of the term of which the present author is aware, which appeared in the fall of 1945, "hot rods" weren't a menace, but rather were the artifactual end results of the technological creativity of their young and enthusiastic owners.[4] When Robert Petersen rolled the dice and decided to name his new magazine *Hot Rod* two and a half years later, therefore, he wasn't simply attempting to appropriate his enemies' language, as so many have so often claimed. Instead, he was trying to revive the positive connotations of an appellation that many 1940s enthusiasts believed was rightfully *theirs* to delimit and define.

In any event, by the time the SCTA reconvened at El Mirage in April of 1946, all of those who took part would have known exactly what a "hot rod" was. It was a domestic roadster

[3] In addition, Veda's husband, Karl, ran an area speed shop. See Batchelor, *The American Hot Rod*, 22; Drake, *Hot Rodder!*, 41-48; and Genat and Cox, *The Birth of Hot Rodding*, 22. "Bench racing" occurs whenever two or more enthusiasts get together and talk about races they've run, races other folks have run, races they'd like to run, and races they'd like to see others run.
[4] "Hot Rods," *Life*, November 5, 1945, 86-88.

manufactured in the late 1920s or the early 1930s, almost certainly by Ford, but possibly by Dodge or Chevrolet, too. It was devoid of fenders, running boards, and anything else its owner might have believed to be unnecessary. It was fitted with slightly larger tires in the rear than in the front. It was equipped with a modified engine, four-cylinder Model A and Model B Ford mills and V8 Ford and Mercury engines being by far the most popular choices.[5] It was home-made, with the overwhelming majority of its builder's attention and budget having gone into its engine and transmission rather than its suspension, steering, brakes, paint, or upholstery. It was a work in progress, a never-ending project always in the throes of a redesign or reconceptualization of some sort. It was used both for dry lakes racing and for daily transportation, and with the possible exception of the presence (on the street) or absence (at an SCTA event) of its headlights and windshield frame, it would have looked the same in either context. And, finally, it had California tags (see figure 3.1).[6]

In addition, everyone present at that April meet would have known exactly what a "hot rodder" was. A bone-fide hot rodder was a mechanically-inclined young man who built, drove, and raced a "hot roadster." He was almost certainly a resident of the greater Los Angeles area, and he was also likely to be a dues-paying member of an SCTA-affiliated hot rod club. He sourced his parts from wrecking yards, speed shops, and, increasingly, from some of the handful of his associates who had begun to manufacture high-performance equipment of their own design. He gathered with his friends at clubhouses, speed shops, automotive repair shops, and local diners to share ideas, plan events, and, of course, to bench race. If he had begun to participate back in the 1930s, he was likely on his second or third roadster, his fourth or fifth

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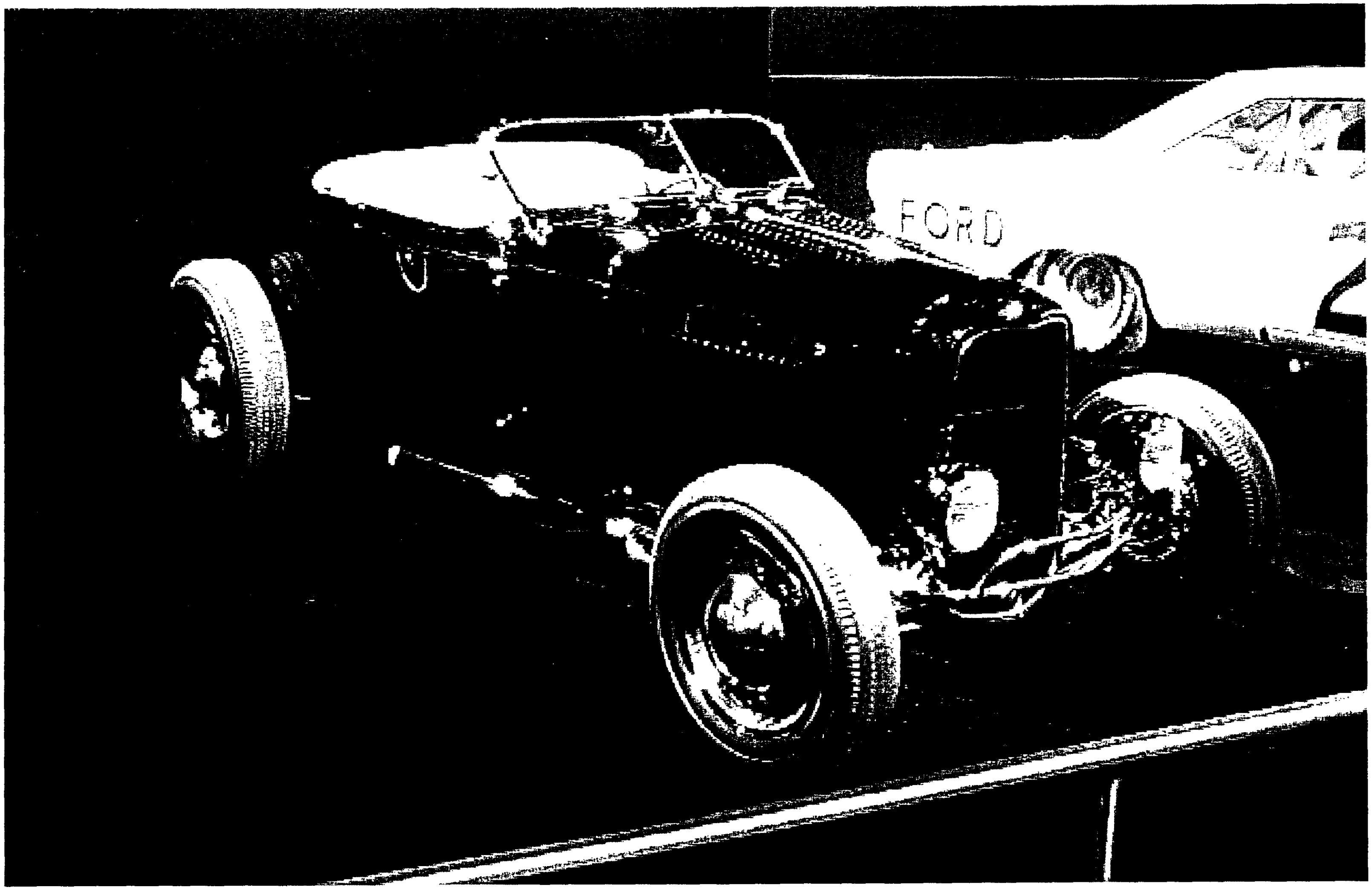
[5] Ford's mid-range subsidiary, Mercury, was available with a flathead V8 engine that was, apart from a handful of *very* minor details and a few more cubic inches of displacement, identical to – and interchangeable with – the Ford V8.

[6] On the informal rules which governed the meaning of "hot rod" immediately after the end of World War II, see Montgomery, *Hot Rod Memories*, 11; Montgomery, *Hot Rods As They Were*, 23; Montgomery, *Hot Rods in the Forties*, 7; Pat Ganahl, "The Hot Rod Culture," in Bright, *Customized*, 13; Philip E. Linhares, "Hot Rods and Customs: From the Garage to the Museum," in Michael Dobrin, Philip E. Linhares, and Pat Ganahl, Editors, *Hot Rods and Customs: The Men and Machines of California's Car Culture* (Oakland, CA: Oakland Museum of California, 1996), 14; "Hot Rods," *Life*, November 5, 1945, 86-88; and Hamilton, "Racing the Hot Rods," 138-141, 240, 244, and 248.

Figure 3.1: 1932 Ford Roadster



A typical, traditional 1940s- and 1950s-style hot rod: a modified 1932 Ford Roadster. This particular example (on display in Ford's exhibit at the 2003 SEMA Show in Las Vegas) was built in the later 1950s and is therefore better finished than most of the 1940s and early 1950s hot rods would have been. (Source: author photograph) engine, and often on thin ice with his girlfriend or wife for spending so much time – and money – on his car. If he was a newcomer, on the other hand, he was probably only just beginning to try out some of the many ideas and techniques he had learned from his friends and associates on his very own (first) hot rod. Performance would have been his top – and perhaps his only – concern, and money spent on chrome-plated grilles, elaborate paint jobs, or anything else that would not have helped propel him to a faster time at the lakes would have been, in his opinion, a fantastic waste.[7]

In short, hot rodding – i.e., active participation in the initial construction and subsequent driving and/or racing of a hot rod – was a close-knit, narrowly construed, and relatively homogenous pursuit in the months and years immediately following the end of the Second World War. Peer pressure helped to ensure that no one strayed too far from the hobby's informal technological standards, while the SCTA's rulebook saw to the official exclusion of those whose vehicles failed to conform to the activity's codified aesthetic norms.[8] Consequently, the roughly-finished, L-head V8-powered Ford roadsters that had only just begun to dominate the sport in the early 1940s would continue to rule the roost in 1945 and 1946. But as the ranks of the hobby swelled, and as its influence began to spread beyond the borders of the Golden State, it wasn't long before these prewar biases began to lose their grip. As a result, that which had been strict, homogenous, and localized in 1945 would come to be loosely-defined, diverse, and nationally-

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[7] On the overwhelming importance of performance and speed to the postwar hot rodder, see Ganahl, *The American Custom Car* (St. Paul, MN: MBI Publishing Company, 2001), 12-13; Ganahl, "The California Hot Rod," in Dobrin, Linhares, and Ganahl, *Hot Rods and Customs*, 24; and Hamilton, "Racing the Hot Rods," 244 and 248. On the importance of the clubhouse and the speed shop as centers for the generation and dissemination of hot rodding know-how, see Montgomery, *Hot Rod Memories*, 89.

[8] Ak Miller, for example, a prominent hot rodder and hot rod parts manufacturer in the 1940s and 1950s, faced considerable harassment from his friends and family (his brothers were active hot rodders) when, in the late 1940s, he began to drive a car equipped with an inline Chevrolet six-cylinder engine (see, for example, Tom Medley, *Tex Smith's Hot Rod History, Volume Two*, 58-62). Similarly, Fred W. "California Bill" Fisher reported in the introduction to his popular GMC / Chevrolet tuning manual in the early 1950s that he, too had often scorned those who worked on anything other than a flathead Ford V8 before he saw the light and switched to the less-popular inline mills (Fred W. Fisher, *Chevrolet Speed Manual* (Tucson, AZ: Fisher Books, 1995 [1951, 1954]), 2). Other examples abound. As for the activity's aesthetic norms, until the end of the 1940s, the SCTA's official rules declared that roadsters – and only roadsters – would be allowed to race under the body's sanctioning at the dry lakes; thus, convertibles, phaetons, coupes, and sedans – no matter how fast – were officially excluded from the sport (see, for example, Batchelor, *The American Hot Rod*, 119).

organized within ten short years. And thus, although the late 1940s and the early 1950s did in fact constitute what might reasonably be called the era of the California hot rod, period enthusiasts both in the L.A. basin and in the rest of the country were by no means stuck in a late-Depression mindset.

For starters, the participants themselves had changed. Hundreds of new faces were in evidence at the lakes as early as the spring of 1946, and in the years to come, popular perceptions of hot rodding as a "teenage craze" would begin to assume a considerable amount of truth.[9] Of course, the returning veterans who had begun to race on the streets and the lakes back in the 1930s were not to be outdone by their new and younger rivals: in spite of their experiences abroad, their cushy postwar jobs, and their advancing years (a few of them were pushing thirty), their enthusiasm hadn't waned a bit. Dean Moon, for example, a returning veteran who would go on to found one of the most successful high-performance businesses of the 1950s, actually served a brief jail term in the late 1940s for racing his hot rod on public streets.[10] But Moon's experience was exceptional. Postwar rodders often raced on the streets, to be sure, but far more often than not, it was the younger ones that did so. Older participants, somewhat more mature, tended instead to channel their enthusiasm either towards the dry lakes meets or, in a growing number of cases, towards the further refinement and perfection of the roadsters in which they slowly rumbled to work each day.[11] In other words, something of a generational gap was beginning to open up within the hobby's ranks, and although it would have been almost imperceptible in, say, 1945 and 1946, its impact on the postwar evolution of the sport would have been undeniable by the early 1950s.

Of course, hot rodding grew in the years immediately following the end of the Second World War not only because it attracted new blood within the L.A. basin, but also because it

[9] See Almquist, *Hot Rod Pioneers*, 142-143; Ganahl, "The Hot Rod Culture," 13; Genat and Cox, *The Birth of Hot Rodding*, 30; "Hot Rods," *Life*, November 5, 1945, 86-88; and Hamilton, "Racing the Hot Rods," 138-141, 240, 244, and 248.

[10] David A. Fetherston, *Moon Equipped: Sixty Years of Hot Rod Photo Memories* (Sebastopol, CA: Fetherston Publishing, 1995), 12-17.

[11] See Genat and Cox, *The Birth of Hot Rodding*, 30; Ganahl, *The American Custom Car*, 33; and Fetherston, *Moon Equipped*, 12-17.

quickly began to spread throughout the United States. And as it did, new participants from Massachusetts to Denver and from Billings to New Orleans began to add their own unique twists to the sport. Although many an East-Coast partisan has often argued that these variations are illustrative not of the ways in which hot rodding changed as it took root outside of the Golden State, but rather of the fact that the activity "occurred simultaneously throughout America right after World War II,"[12] the overwhelming majority of the evidence suggests that the opposite was in fact the case. Southern California was, in other words, quite literally the wellspring of the hobby, and localized differences within the sport sprang up only as it grew beyond the confines of the L.A. area. For indeed, as Arnie and Bernie Shuman explain in their marvelous book celebrating New England's postwar rodding scene, of which they were a part, "[e]ach region tried to be like [Southern California], but – like Chili – there were regional renditions, not all by preference."[13] Harsh winters, for example, fast made coupes, sedans, and proper convertibles acceptable alternatives to the traditional roadster across the Midwest, the Mid-Atlantic, and New England.[14] Tighter regulations in many states also made it much more difficult to register and drive a fenderless hot rod with the requisite booming exhaust. In addition, over-the-counter speed equipment was often tough to come by outside of the L. A. area, especially in the late 1940s, leaving many would-be rodders with little choice but to hack away at their projects unassisted. Finally, there were no dry lake beds in downtown Chicago, there were no open, rural boulevards in Boston's Back Bay, and there were no isolated, finely-surfaced roads in Southern Georgia on which area enthusiasts could safely test the capabilities of their freshly-built hot rods. And as a result, even the older, ostensibly more mature enthusiasts based outside of Southern California often joined their teenage peers in the L.A. basin, racing their souped-up rides on public – and often crowded – thoroughfares.

Consequently, official efforts to combat the growing "hot rod problem" by cracking

[12] Don Garlits, "Forward," in Almquist, *Hot Rod Pioneers*, xi.
[13] Arnie Shuman and Bernie Shuman, *Cool Cars, Square Roll Bars* (Sharon, MA: Hammershop Press, 1998), 6.
[14] Proper convertibles, while similar in profile to typical roadsters, were equipped with padded tops, fixed windshields, and roll-up windows, which made them far more pleasant to drive on a daily basis in climates less predictable than Southern California's.

down on anyone behind the wheel of anything that even remotely resembled a hot rod quickly sprang up across the United States in the late 1940s. To be fair, many an outlaw enthusiast certainly had it coming – rings of high-performance parts thieves, organized groups of street racers blocking off public roads for illegal stoplight races, and dishonest rodders using their connections to circumvent their states' official inspection programs in order to register their sub-par machines, to name but a few.[15] And in fact, many of those in positions of prominence within hot rodding circles often called for harsher penalties for those among them irresponsible enough to endanger the lives of others with their impromptu downtown races and their poorly-constructed "shot rods."[16] But by the end of the 1940s, many enthusiasts had grown suspicious of their local sheriff's policies. They began to complain that hot rod owners – even those who fastidiously obeyed the law – were being targeted unjustly, and many began to fear for the future of their beloved pastime. And in an era in which sensationalistic journalists often penned misleading missives detailing the alleged misdeeds of those pesky hot rodders who raced about in their ungainly "jalopies," one can readily appreciate, with the benefit of hindsight, the average enthusiast's growing sense of unease.[17]

This was particularly true for hot rodders based in states such as Minnesota, which launched an official "war on hot rods" in 1950; New Jersey, where a curious loophole allowed new cars like Cadillacs to be fitted with dual exhausts while prohibiting reconstructed automobiles of an earlier vintage from being so equipped; Massachusetts, where an official "registry police" had the authority to declare in-use automobiles noncompliant for even the most

[15] On the escalating problem of hot rod and speed equipment theft, particularly in the L.A. area, see "Hot Rod Hijackers: Steps Taken to Halt Speed Equipment Thefts on the West Coast," *HRM*, November 1948, 24. On the epidemic of illegal street racing, see for example Batchelor, *The American Hot Rod*, 159-160. And on the unscrupulous means with which some rodders would obtain their yearly tag renewals, see Arnie Shuman and Bernie Shuman, *Cool Cars, Square Roll Bars*, especially chapter 2.

[16] Wally Parks, for example, began to call for harsher penalties for habitual street racers towards the end of the 1940s ("Editor's Column: Street Racing," *HRM*, November 1949, 6), as did Dean Batchelor in the early 1950s ("By the Editor…," *Hop Up*, September 1952, 5). To the best of the present author's knowledge, "shot rods," a term used by "legitimate" hot rodders to describe the poorly-built roadsters of those who were giving their hobby a bad name among the authorities, first appeared in print in an editorial written by Wally Parks in 1950 ("Editor's Column: Hot Rods, not Shot Rods," *HRM*, May 1950, 7-8).

[17] See, for example, Wally Parks, "Editor's Column: What Price Publicity?" *HRM*, December 1949, 6.

minor of equipment infractions; and also California, where conflicting sections of the motor vehicle code afforded the police exceptional discretion with regard to the question of who was, and who was not, in violation of the law.[18] By all accounts, though, East-Coast states like New York, New Jersey, Connecticut, and Massachusetts were far less welcoming for hot rodders than were Western States like Washington, Oregon, Colorado, and, of course, California. New York State, in fact, was reportedly the worst: well into the 1950s, Long Island hot rodders in particular felt compelled to hold their weekly club meetings in unmarked buildings and under the cover of darkness, lest the local police have determined that the presence of more than one hot rod in one place at one time constituted evidence of gang-related activity.[19] But even in the Golden State, attempts to solve the "hot rod problem" through the legislative process soon began to cause their share of headaches among enthusiasts, as was the case, for example, when officials in Sacramento passed a law in 1951 requiring the use of fenders on all cars registered for street use. Although creative hot rodders quickly found that so-called "cycle fenders" allowed them to comply with the technical requirements of the law without seriously compromising their cars' clean lines, the message, for many, was frightfully clear: watch your back, no matter where you live.[20]

Not altogether surprisingly, California enthusiasts spearheaded much of their hobby's collective response to its escalating image problem. For starters, many L.A. rodders began to use their organizational affiliations – i.e., the hot rod club(s) to which they belonged – to generate some much-needed positive publicity. With the active encouragement of the editorial staffs of

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[18] On Minnesota, see Wally Parks, "Editor's Column," *HRM*, August 1950, 6; on New Jersey, see Thomas Mannuzza, "Correspondence: Law Says No Duals," *Hop Up*, November 1953, 8; on Massachusetts, see Arnie Shuman and Bernie Shuman, *Cool Cars, Square Roll Bars*, 7; and on California, see Carl Robertson, "Technical Tips: Illegal Taillights," *Rod and Custom*, June 1953, 66.

[19] In 1953, for example, *Cars* ran a lengthy exposé that highlighted the plight of Long Island hot rodders by contrasting their secret meetings, disguised cars, and frequent arrests with the open and generally cheerful world of their California counterparts. See Jerry Protola and Martin Abramson, "Reign of Terror Against Hot Rods," *Cars*, May 1953, 28-30 and 76-77.

[20] On the infamous "fender law," which went into effect in September of 1951, as well as the many ways in which California hot rodders went about complying with it in the months and years that followed, see "Fenders on Hop Ups?" *Hop Up*, October 1951, 3; Don Francisco, "What to Do About Fenders," *HRM*, February 1952, 12-15; and "Album of Best Hot Rods," in Eugene Jaderquist and Griffith Borgeson, Editors, *Best Hot Rods – 1953* (Greenwich, CT: Fawcett Publications, 1953), especially pages 41-42.

some of the more popular hot rodding periodicals of the day, a number of clubs therefore began to sponsor special events – voluntary, community-based automotive inspections, for example – with the cooperation of their local police. Meanwhile, others inaugurated the practice of requiring their members to carry a set of official club business cards in their back pockets, so that in the event that they were, say, in a position to assist a stranded motorist, he or she could be given a two-and-a-half-by-three-inch reminder of the name of the group to which the generous and helpful stranger in the hopped-up car had belonged.[21] Still others organized "reliability runs" with the assistance of their local authorities, day-long cruises somewhat akin to low-speed road rallies in which minor violations of the traffic code were heavily penalized and orderly, by-the-books motoring generously rewarded.[22] What's more, many L.A.-area clubs began to revise their charters to include strict penalties for members caught in the act of an illegal street race. Finally, on a more regional level, the SCTA joined with area speed shops, equipment manufacturers, enthusiast publications, and hot rod clubs in order to sponsor a yearly exposition at the Los Angeles Armory designed to showcase, to an often skeptical public, the technological creativity and the mechanical prowess of the average hot rodder.[23]

In the long run, though, organized drag racing was by far their most important innovation. Held at first on remote Santa Barbara boulevards that had been cordoned off with the cooperation of the local police, by the summer of 1950 this novel form of racing had graduated to local airstrips, where hundreds of spectators and competitors would gather for the tire-smoking action. Racers would pair off, line up, and then, when signaled, would accelerate in a straight line for a quarter-mile before frantically attempting to bring their roadsters to a halt. In other words, drag races closely resembled precisely the sort of impromptu stoplight contest that

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[21] On the clubs' efforts to generate positive publicity, see for example Almquist, *Hot Rod Pioneers*, 142-143; Mickey Thompson and Griffith Borgeson, *Challenger: Mickey Thompson's Own Story of His Life With Speed* (NY, NY: Signet Key, 1964), especially page 10; Wally Parks, "Editor's Column," *HRM*, February 1950, 6, and "Editor's Column: Hot Rods, not Shot Rods," *HRM*, May 1950, 7-8; Dick Van Osten, "Forming a Hot Rod Club," *HRM*, December 1950, 28-29, 31; and Lee O. Ryan, "The Hot Rod Story," *HRM*, March 1952, 30-31 and 62-63.
[22] George Fabry, "The 1949 PRC Reliability Run," *HRM*, January 1949, 8-9, and Ken Pratt, "Roadster Run: Hot-Rodders Find Low-Pressure Competition Can Be Fun – and the Cops are on Their Side," *Auto Sport Review*, August 1953, 4-5 and 48.
[23] On the Los Angeles Hot Rod Exposition, see for example "SCTA Again on Display," *HRM*, January 1949, 12.

had landed so many hot rodders behind bars, especially in the mid- to late 1940s. The difference, of course, was that the organized drags were wholly legal. And thus, although it first sprang up in Southern California, the notion of an off-road, safe, and legal alternative to street racing was especially important for enthusiasts in the rest of the country, where the absence of dry lake beds had long since left lead-footed drivers with little choice but to risk it all on the streets.[24]

It wasn't long, therefore, before the popular magazines began to wax enthusiastic about this new and exciting form of racing. *Hop Up*, for example, frequently encouraged its out-of-state readers to follow the example of their California peers by working with the local authorities to establish similar contests in *their* hometowns. In addition, the magazine's editorial staff explicitly endorsed the new activity as the only reasonable way to put an end to street racing, and they even went as far as to advocate the dragstrip as the proper place for rival clubs to settle grudges.[25] But it was the editor of *Hot Rod*, Wally Parks, who really did the most to promote the new sport outside of the State of California. With the cooperation of his employers at *Hot Rod*, Robert Petersen and Bob Lindsay, Parks successfully transformed his monthly editorial space into a soapbox from which he was able, in 1951, to successfully promote the idea of a "National Hot Rod Association" (NHRA) to organize and sanction dragstrip contests across the United States.[26] In 1954, Parks even embarked on an 18,000-mile "Drag Safari," traveling from coast to coast in a contemporary Dodge wagon – complete with an aluminum camping trailer emblazoned with the NHRA logo – in order both to enlist the support of countless local hot rod

[24] On the origin and early evolution of organized drag racing, see Post, *High Performance*, especially chapters 1 and 2; Batchelor, *The American Hot Rod*, chapters 4 and 11; Montgomery, *Authentic Hot Rods*, chapter 5; and Moorhouse, *Driving Ambitions*, chapter 3.

[25] See, for example, Louis Kimsey, "Saugus Drags," *Hop Up*, October 1951, 12-15; "Santa Ana Drags," *Hop Up*, February 1952, 30-33; and "By the Editor…," *Hop Up*, September 1952, 5.

[26] In March of 1951, *Hot Rod Magazine* printed what appeared to be a letter to the editor from an enthusiast by the name of Bob Cameron, Jr. In this letter (titled "Why Not a National Hot Rod Association?"), Cameron argued forcefully for the creation of a national association for hot rodders; Wally Parks's editorial reply was to announce the creation of just such an organization, the NHRA, with himself at the helm. Later, Parks would admit that the letter from Cameron was a forgery: it was actually penned by a *Hot Rod* staffer by the name of Lee O. Ryan, who had agreed to help Parks launch his campaign for the formation of the NHRA. See Bob Cameron, Jr. [Lee O. Ryan], "Why Not a National Hot Rod Association?" *HRM*, March 1951, 20, and Batchelor, *The American Hot Rod*, 121.

clubs and to coordinate the inauguration of a number of new drag strips.[27] Ultimately, organized drag racing would grow to become a colossal, semi-professional activity with its own, self-generated raison d'être.[28] But in the early 1950s, its primary purpose was to provide hot rodders with an alternative to illegal street racing. And in that aim, Parks and his collaborators were spectacularly successful.

By 1953, in fact, the NHRA boasted 12,500 members nationwide, and affiliated clubs everywhere from Arizona to Pennsylvania had begun to secure the cooperation of their local police and other civic authorities in their efforts to rent or build their own dragstrips. And as they did, street racing began to decline appreciably.[29] Apparently impressed, California police in particular began to praise their state's hot rodders, urging enthusiasts in other parts of the country to follow their example by behaving responsibly on the streets and letting it loose at the drags.[30] Enthusiasts in Ohio and suburban Boston, too, began to receive the unsolicited applause of their local authorities, and even on Long Island, some hot rodders began to make inroads with their police by organizing off-road drags and promoting civic programs through their local hot rod clubs.[31] The result, in short, was that hot rodding was becoming much more visible, less offensive, and better respected in the early 1950s. New competitive outlets were opening up across the United States, and the sport began to grow as never before.

However, the hobby's coordinated and relatively successful early 1950s public relations battles would never have been possible had it not been for the emergence of yet another source of postwar change within hot rodding, the publications.[32] By far the most famous and influential

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[27] The literature on Wally Parks's career is extensive; for a quick overview, see Batchelor, *The American Hot Rod*, 121, and Almquist, *Hot Rod Pioneers*, 66-67.

[28] See Post, *High Performance*, passim, and Moorhouse, *Driving Ambitions*, especially chapter 5.

[29] Jaderquist and Borgeson, "NHRA – A Progress Report," in *Best Hot Rods – 1953*, 118-121.

[30] See, for example, Ezra M. Ehrhardt, "Deodorizing Drags," *Motorsport*, April 1952, 16-17 and 22. Ehrhardt was a member of the California Highway Patrol.

[31] Ray Garrett, "Above Criticism? Hamilton Shafters Gear Sport Activities with Official Approval for Maximum Civic Torque," *HRM*, September 1953, 52-53; Arnie Shuman and Bernie Shuman, *Cool Cars, Square Roll Bars*, chapter 2; and Fred Horsley, "Draggin' in the East," *HRM*, July 1953, 52-53 and 73-75.

[32] Here, the present author offers only a brief glance at a handful of the more important titles; for a fuller discussion of the postwar publications business, see Post, *High Performance*, 387-397, and Batchelor, *The American Hot Rod*, chapter 13.

among them was *Hot Rod*, which appeared in January of 1948, but the honor of having been the first postwar hot rodding magazine actually went to a much lesser-known (and, ultimately, shorter-lived) monthly, *Speed Age*, which debuted in the summer of 1947.[33] By the early 1950s, *Hop Up*, *Auto Sport Review*, *Speed Mechanics*, *Car Craft*, *Rod and Custom*, and a whole host of others were available to enthusiasts on newsstands coast to coast. In addition, technical magazines like *Popular Mechanics* and *Mechanix Illustrated* began to run occasional stories on hot rods, as did general interest automotive periodicals like *Road and Track*, *Motor Trend*, and *Car Life*. Collectively, these publications helped to create and foster a sense of community among the nation's far-flung rodders.[34] They enabled enthusiasts in North Dakota, Massachusetts, West Virginia, and Louisiana, for example, to follow the West Coast trends. On the other hand, they made it possible for the Southern California boys to monitor the progress of their sport beyond the L.A. basin. And, critically, they provided folks like Wally Parks with a national forum in which to promote their ideas and their visions for the future of the hobby.[35] What's more, their advertisements helped not only to connect distant enthusiasts with the burgeoning Southern California market for speed equipment, but also to create a national marketplace for the sale and distribution of high-performance parts and accessories.[36] Finally, as a source of detailed technical information, the postwar publications were unparalleled.

In 1948 alone, for example, *Hot Rod* ran no less than 18 technical features, covering everything from proper cam profile selection to the hows and whys of crankshaft stroking.[37] Over the winter and spring months of 1948-1949, it also ran an extensive series of articles which detailed every imaginable procedure that would have been involved in the creation of a

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[33] *Throttle*, a prewar magazine aimed at dry lakes racers that made its debut in 1941, failed to reemerge after the end of the war (see above, chapter 2).
[34] Moorhouse, "The 'Work' Ethic and 'Leisure' Activity," especially 256-257.
[35] See for example Drake, *Hot Rodder!*, 32, and Arnie Shuman and Bernie Shuman, *Cool Cars, Square Roll Bars*, 6.
[36] Montgomery, *Hot Rods in the Forties*, 136, and Almquist, *Hot Rod Pioneers*, 98-99.
[37] For examples, see for instance Wayne Horning, "Overhead Valves," *HRM*, February 1948, 10 and 23; Harry Weber, "Choosing a Cam, *HRM*, March 1948, 10; and Don Blair, "Engine Stroking," *HRM*, July 1948, 9. Incidentally, Horning, Weber, and Blair were all involved in the fledgling high-performance industry: Horning manufactured aftermarket heads, Weber ground high-performance camshafts, and Blair ran a popular speed shop and built custom engines to order.

traditional, flathead-V8-powered Ford hot rod, and in 1949, it ran the first of literally dozens of "engine conversion" articles that would appear each month well into the 1950s.[38] *Hop Up*, for its part, tended instead to dwell on the theoretical, running a number of articles by Barney Navarro in the early 1950s that focused on things like combustion chamber efficiencies, disparate engine tuning philosophies, and the fundamental chemistry of the internal combustion process.[39] Combining the theoretical and the practical was *Car Craft*, which succeeded *Honk!* in 1954. Explicitly marketed as a hands-on guide for the do-it-yourselfer who was not afraid to pick up a welding torch or a hand-grinder, *Car Craft* therefore tackled complex performance tuning procedures that did *not* involve the use of bolt-on speed equipment. These included hand-polishing intake and exhaust ports; fabricating a free-flowing exhaust manifold, a high-performance ignition system, or a set of pushrods; and modifying an OEM intake manifold to accept multiple carburetors. For indeed, it warrants mention that however much the availability of over-the-counter speed equipment had rendered the task of modifying a production automobile simpler over the years, there remained – and, to this day, there remain – many tuning procedures that required individual ingenuity and/or skill. For those with the courage to attempt them, the hands-on *Car Craft* was an ideal place to look for advice and assistance.[40] General interest automotive magazines like *Motor Trend*, on the other hand, frequently offered much more distilled features that examined the process of performance tuning from an introductory or

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[38] The first of the magazine's winter / spring series on the construction of a V8 hot rod ran in December of 1948 (Walter A. Woron, "Building a Hot Rod: Classification and Selection," *HRM*, December 1948, 12-13), and the monthly feature concluded in July of 1949 (Walter A. Woron, "Building a Hot Rod: Roadster Completion," *HRM*, July 1949, 12-13, 19, and 21). *Hot Rod*'s first engine conversion article, on the other hand, ran in October of 1949 (C. E. Camp, "Cadillac Conversion," *HRM*, October 1949, 16-17). For a number of years, "conversion" was a common synonym for "hop-up," "hot rod," "soup-up," and any of a number of other terms which, when used as verbs, referred to the modification of a production automobile's powerplant for improved performance (i.e., more torque at the bottom end or, more commonly, more horsepower in the upper rpms).

[39] See, for example, Barney Navarro, "More 'Horses' Thru Chemistry," *Hop Up*, December 1951, 28-29; "No Miracles!" *Hop Up*, February 1952, 4-5; and "The Flame! Combustion Chamber Design and Problems," *Hop Up*, April 1952, 4-5 and 44.

[40] See, for example, Dean Moon, "Build Your Own Hot Ignition," *Car Craft*, May 1954, 36-41; Les Nehamkin, "Here's How: Big Lungs, Small Engine – Opening Up the Ford Four," *Car Craft*, June 1964, 22-25; Edward Munroe, "Build Your Own Chevy Dual Manifold," *Car Craft*, August 1954, 16-19; and Chuck Eddy, "Homemade Tubular Push Rods: Extra Strong and Lightweight for '55 Ford," *Car Craft*, June 1955, 14-15.

beginner's point of view.[41] Moreover, nearly every single one of these publications carried a forum of one sort or another, a monthly column in which the editors would address specific technical questions that had been submitted by their readers. Together with the yearly annuals many of the more prosperous periodicals were able to bring to market, these monthly technical features represented, for many a 1940s and 1950s enthusiast, a veritable gold-mine of hot rodding know-how without which he often would have been at a loss.

For those for whom the monthly periodicals just weren't enough, a number of nicely-bound how-to books were also available throughout the period in question. Ed Almquist, an East-Coast enthusiast who went on to found one of the largest speed equipment manufacturing companies headquartered outside of the State of California, published what is widely acknowledged to have been the first such book in 1946.[42] Four years later, Roger Huntington brought out a hugely-successful volume titled *Souping the Stock Engine*, an encyclopedic tome that balanced its detailed technical essays with a healthy dose of humor in order to educate its readers in the ways of intelligent hot rodding.[43] In addition, Daniel Roger Post of Arcadia, California published more than a few how-to books of his own during the period, most of which focused on streamlining and custom bodywork tricks.[44] Finally, Fawcett Publications in Connecticut assembled a popular volume in 1952 in which the expert advice of veteran hot rodders and speed equipment manufacturers featured prominently.[45] There were of course many others as well; the point, however, is that regardless of whether they chose a Post, Fawcett, Trend, or Almquist title or opted instead to stick to the monthly coverage in *Hot Rod*, *Car Life*, or *Rod and Custom*, enthusiasts across the United States were increasingly able to rely on these publications as a vital and often primary source of rodding know-how. In other words, particularly for rodders who lived in isolated areas, the printed word quickly assumed a

[41] Typical of these was Kenneth Kincaid, "If Detroit Won't Do It, Why Don't You?" *Motor Trend*, June 1952, 32-34 and 46-47.
[42] Edgar Almquist, *Specialized Automobile Tuning and Customizing Methods* (Brooklyn, NY: Almquist Engineering, 1946).
[43] Roger Huntington, *Souping the Stock Engine* (Los Angeles, CA: Floyd Clymer, 1950).
[44] See, for example, Daniel Roger Post, *Blue Book of Custom Restyling* (Arcadia, CA: Post Publications, 1951).
[45] *How to Build Hot Rods* (Greenwich, CT: Fawcett Publications, 1952).

prominent role in the distribution and transfer of technical knowledge within the sport. In larger towns and cities, clubs and speed shops remained – and, indeed, remain – a vital link, but the publications helped to bring a measure of the wisdom, if not the skill, of prominent personalities like Navarro to would-be rodders everywhere.[46]

Reading through these how-to books and articles, yet another source of change within the postwar hot rodding community is difficult to overlook: new engines and new high-performance technologies. By the early 1950s, Cadillac, Chrysler, Oldsmobile, Buick, Dodge, Lincoln, DeSoto, and Studebaker all had introduced new overhead-valve V8 engines. In addition, Ford and Willys both had brought out all-new overhead-valve six cylinder designs, and Crosley, for its part, had begun to market a tiny inline-four.[47] Almost immediately, hot rodders across the United States began to experiment with these new OEM mills in order to determine their potential. Rather quickly, Chrysler's overhead-valve hemi-chamber V8 emerged as a new favorite, particularly among those interested in building up an all-out competition engine.[48] For street and mixed-use applications, though, Studebaker, Oldsmobile, Buick, and Cadillac V8 mills – along with Chevrolet's older, overhead-valve inline six – were among the most popular alternatives to the venerable Ford L-head V8.[49] However, the countless engine conversion articles that were published during these years clearly attest to the fact that hot rodders were willing to try anything

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[46] On the enduring significance of clubs and speed shops as venues for the transfer and distribution of hot rodding knowledge, see Montgomery, *Hot Rod Memories*, 89. To his credit, though, Montgomery has also recognized the emerging importance of the periodicals in this same process (*Hot Rods in the Forties*, 136).
[47] On the new OEM mills, see for example "The New Engines," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 122-127.
[48] "Album of Best Hot Rods," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, especially 60-61, and Don Francisco, "Engine Conversions," in *Hot Rod 1954 Annual* (Los Angeles, CA: Petersen Publishing Company, 1954), 106-108.
[49] This we can surmise from the sorts of engine conversion articles and reader-submitted technical questions that appeared in the popular magazines during these years. See, for example, C. E. Camp, "Cadillac Conversion," *HRM*, October 1949, 16-17; C. E. Camp, "Engine Conversion: Chevrolet," *HRM*, November 1949, 10-11; C. E. Camp, "Engine Conversions: Studebaker," *HRM*, February 1950, 12-13 and 22-23; Don Francisco, "Engine Conversion: Buick," *HRM*, August 1950, 16-17 and 20-21; "Technical Tips," *Hop Up*, September 1951, 42-43; "Technical Tips," *Hop Up*, October 1951, 42-43; Don Francisco, "Don't Throw Rocks at Your Rocket! Economical Conversion Nets 66 Percent More Horsepower for Olds '88' Engine," *HRM*, May 1952, 16-19 and 56; California Bill, "Hopping Up the Olds and Cad," *Hop Up*, September 1952, 18-21 and 43; Bill Fisher, "Easy Does It: $100 Chevy Conversion," *Honk!*, November 1953, 56-59; and Edward Monroe, "Build Your Own Chevy Dual Manifold," *Car Craft*, August 1954, 16-19.

at least once: Pontiac and Hudson sixes, Hudson straight-eights, Auburns, industrial-application inline-four Fords, and even the lowly Rambler therefore received a share of the how-to coverage along with the much more common Cadillac, Buick, Chrysler, and Studebaker "bent-eights."[50] Over-the-counter speed equipment for most of these new mills quickly appeared as well, making it easier for young hot rodders with hand-me-down Chevys, Oldsmobiles, and Dodges to join their Ford-owner peers in the postwar engine hopping craze.

Throughout the period in question, though, none of these new mills even began to approach the level of popularity that the aging flathead V8 Ford and Mercury motors continued to enjoy. By 1954, the Chrysler hemi-chamber V8 was beginning to nudge aside the flathead Ford among serious racers, but for average rodders, the latter mill would remain the most popular choice well into the late 1950s.[51] Reader-submitted technical questions dealing with flathead-tuning issues in *Hot Rod*, *Hop Up*, *Rod and Custom*, and the other enthusiast periodicals, for example, continued to easily outnumber those which had to do with the new mills, as did most of the magazines' Ford-oriented how-to pieces. Because it was cheap, abundant, simple, and easy to repair, and also because it had been the focus of nearly two decades' worth of performance tuning and speed equipment manufacturing efforts, the flathead V8 was in other words the safe, if not entirely risk-free choice for period enthusiasts who were determined to get greasy.

Regardless of their choice of engines, however, all postwar hot rodders would have been able to enjoy the benefits of at least two other critical technical developments that took place in the 1940s and the early 1950s. The first, and perhaps the most important, was the advent of high-octane leaded fuels. Whereas prewar enthusiasts would have been lucky to come across a service station selling gasoline with octane ratings in the low 80s, by 1950, those same enthusiasts would

[50] See Don Francisco, "Engine Conversions...Hudson 8," *HRM*, March 1950, 14-15; Eddie Miller, Jr., "Engine Conversions: Pontiac 6," *HRM*, July 1950, 15 and 23-24; "Technical Tips," *Hop Up*, September 1952, 44; Chuck Eddy, "Industrial Dynamite: Horses for the Ford Four," *Car Craft*, June 1954, 16-21, 61, and 65-66; and Bill Schroeder, "Rodding a Rambler," *Speed Mechanics*, April-May 1955, 20-21, 32, and 34.

[51] On the enduring popularity of the flathead Ford V8, see "Album of Best Hot Rods," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 40; Roberson, *Middletown Pacemakers*, 41-42; and Almquist, *Hot Rod Pioneers*, 234.

have had easy access to mid-90s and even 100-octane fuel.[52] This enabled postwar rodders to bump their engines' static compression ratios up into the neighborhood of 9 or even 10 to 1 without the risk of severe detonation. And since a higher compression ratio almost invariably makes for a more efficient and more powerful engine, the 100-octane super fuels of the early 1950s were nothing less than a godsend to ordinary rodders.

So too was the second development: cheap, reliable, and effective superchargers. During the 1930s, McCulloch had brought out a centrifugal supercharger kit for the V8 Ford and Mercury engines that sold quite well, but because of its design, it was incapable of producing levels of boost – and, by extension, power increases – that were commensurate with its cost.[53] But by the early 1950s, a number of aftermarket companies had begun to produce supercharger units that were much more effective. L.A.-area hot rodder and camshaft grinder Jack McAfee, for example, began to manufacture a line of adapters that enabled enthusiasts to fit war surplus GMC superchargers to their motors in 1950.[54] In addition, Italmeccanica, an Italian company, began to market a bolt-on blower in the late 1940s, and in the early 1950s, McAfee assumed control of Italmeccanica distribution under the brand-name SCOT.[55] McCulloch also brought out an improved version of its centrifugal kit in 1953, and by 1955, the Judson brothers out in Conshohocken, Pennsylvania had introduced an effective unit of their own design.[56] Otherwise unmodified V8 engines fitted with any one of these add-on blowers would often make upwards of forty percent more horsepower on an otherwise stock engine, and usually far more when installed on a modified motor. Consequently, supercharged engines fast became the norm among serious drag racers and dry lakes competitors, and even on the streets, one would often have

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[52] See, for example, "What's New," *HRM*, August 1950, 25-27 and 31-32.

[53] Drake, *Hot Rodder!*, 27 and 57, and Montgomery, *Hot Rod Memories*, 110.

[54] "What's New," *HRM*, April 1950, 25-27, and "Trade Topics," *Motor Trend*, February 1951, 34.

[55] H. Weiand Bowman, "Super Charging for Speed," *Motorsport*, March 1951, 26-27; Don Francisco, "Packing the Punch," *HRM*, April 1952, 26-29 and 62-63; and California Bill, "Blowing the Chevrolet! An 8 Hour Procedure...Ha!" *Hop Up*, January 1953, 8, 10, 43, and 50.

[56] On the new McCulloch unit, see "The New McCulloch Supercharger," *Road and Track*, December 1953, 12-13; Barney Navarro, "Supercharging: The Fast Way to Horsepower," *Motor Life*, January 1954, 22-25 and 29; and Bob Pendergast, "Supercharging the Mercury," *Rod and Custom*, November 1954, 38-41 and 60-61. McCulloch, incidentally, had moved to L.A. towards the end of World War II. On the Judson supercharger, see "Supercharging Revival," *Car Life*, February 1955, 44-47.

heard the distinctive whine of an aftermarket blower in the early to mid-1950s.

Largely absent from the postwar hot rodding scene, however, was the once-ubiquitous overhead-valve conversion. In the 1910s, 1920s, and 1930s, aftermarket conversions of this sort were among the most popular add-on parts for those in search of more performance, as we have already seen. But in the period in question, very few speed equipment manufacturers even bothered to look into the idea. George Riley made a few sets for the flathead V8 engine in the late 1940s, as did Mark Cummins, Arnold Birner, and a handful of others.[57] Lou Madis turned out a trickle of overhead-valve conversions for the flathead Ford six-cylinder engine in the early 1950s as well.[58] By far the most successful among them was Zora Arkus-Duntov, a German-educated, Russian-born engineer based in Manhattan who manufactured a hemi-chamber overhead-valve conversion for the flathead Ford V8 in the late 1940s. Few hot rodders, however, were willing to plunk down the requisite $500 for one of his "Ardun" kits, forcing Arkus-Duntov to move laterally into the heavy truck aftermarket in an attempt to save his business by recasting the Ardun as a general improvement product. This too failed, though, and at the end of the 1940s, Arkus-Duntov sold his brainchild to a Southern California speed equipment company, C&T Automotive. There, additional development substantially bolstered its marketability as genuine hot rod equipment, but the Ardun still found but a handful of willing customers among enthusiasts. Part of the reason for the Ardun's failure was its timing: shortly after its reintroduction by C&T Automotive, Chrysler's similar, but cheaper, mass-produced hemi-chamber V8 hit the market, effectively pulling the rug out from under Arkus-Duntov's complicated kit.[59] But in a broader sense, overhead-valve conversions for the flathead engines were far more scarce in the postwar years precisely because of the widespread availability of

[57] See Batchelor, *The American Hot Rod*, 76 and 82-83, and "Overhead Valve Designs," *HRM*, April 1949, 12-14 and 26.
[58] Don Francisco, "Overhead Valves for Ford 6," *HRM*, March 1951, 16-17, 28-29, and 31. Madis's product would essentially be rendered obsolete when Ford introduced its all-new, overhead-valve inline six-cylinder engine in 1952 (see W. G. Brown, "132 Easy Horses for Ford Six," *HRM*, July 1953, 26-27 and 70).
[59] Contrary to popular belief, the Ardun was not originally developed for use on trucks; from the beginning, Arkus-Duntov wanted to be a hot rod parts manufacturer, and only as it became evident that the market for his conversion among enthusiasts was weak did he turn to the less exciting (and, ultimately, equally unprofitable) truck market. See Jerry Burton, *Zora*, especially pages 87-100.

OEM Dodge, Chrysler, DeSoto, Buick, Oldsmobile, Studebaker, Cadillac, and Lincoln overhead-valve V8 engines. In other words, whereas prewar rodders, particularly in the 1910s and 1920s, had had little choice but to base their projects on the abundant flathead four-cylinder Ford, Chevrolet, and Dodge engines of the period, their postwar counterparts had a veritable plethora of modern, mass-produced OEM overhead-valve designs to choose from. After all, why spend $500 to convert a flathead engine when, for but a tiny fraction of the cost, one could easily source a late-model overhead-valve V8 and drop it into place?

Why, indeed. Hundreds of hot rodders asked themselves that very question in the late 1940s and the early 1950s, the overwhelming majority of whom elected to swap out their flatheads entirely rather than face the arduous task of updating their outmoded mills. In fact, engine swapping was one of the most popular trends among postwar enthusiasts, many of whom were willing to go to absurd lengths to bring a dash of modernity to their modified roadsters. And the possibilities, of course, were nearly endless: folks put Cadillac engines into Studebakers, Studebaker engines into postwar Fords, Buick V8s into Mercurys, '51 Chrysler Hemis into '32 Fords, Oldsmobile V8s into Model A Fords, Dodge mills into Model Ts, and so on and so forth.[60] *Hot Rod*, *Hop Up*, *Rod and Custom*, and the rest of the monthlies quickly began to run detailed features regarding what to look for when shopping for a late-model overhead-valve V8 in a wrecking yard, for example, or the pitfalls of attempting to mate certain engines with certain chassis types.[61] In addition, a number of aftermarket manufacturers began to offer special brackets, flywheels, bellhousings, and other parts in order to facilitate the engine swapping process. Of course, very few enthusiasts would have gone to the trouble of dropping, say, a

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[60] See "Fordebaker," *Hop Up*, May 1953, 34-35; Bob Fendell, "How to Make a Studillac," *Road and Track*, December 1953, 30-31; John Kampp and Harless King, "Midwest 'Studillac,'" *HRM*, March 1954, 24-25 and 50-53; Joe Moore, "Bu-Merc Conversion: Presenting Another First in Engine-Chassis Conversions," *Motor Life*, January 1954, 40-41 and 54; "Fire Powering the Deuce - or, How to Turn 109 in the Quarter Mile," *Rod and Custom*, October 1954, 46-49; "One T-Bone, RARE...but well done!" *Rod and Custom*, November 1954, 22-25; and "Reader's Car of the Month," *Rod and Custom*, March 1955, 24-25. A "Studillac" was a Studebaker equipped with an OHV Cadillac engine, a "Fordebaker" was a Ford fitted with an OHV Studebaker V8 motor, and a "Bu-Merc" was a Mercury with an OHV Buick V8 mill. ("OHV" stands for "overhead-valve.")

[61] On the finer points of mid-1950s wrecking yard engine hunting, see Jack Phelps, "Bargains in Horsepower," *Motor Life*, November 1955, 26-27 and 66.

Dodge V8 into their Model A roadsters without also taking the time to modify their new engine. In other words, the majority of those who performed engine swaps in the early 1950s did so not in lieu of the basic steps that had characterized high-performance tuning for decades, but rather in addition to them. Enthusiasts thus would begin by swapping out their engines before tapping their local speed shop for a set of high-compression pistons, a dual-coil ignition system, high-lift rockers, a high-speed cam, a multiple-carburetor manifold, and a good-quality free-flowing dual exhaust system.[62]

Between the new engines, the new techniques, and the new cross-brand engine-chassis combinations, considerable technological variety thus had come to characterize much of the postwar hot rodding scene by the early 1950s. One must be careful, however, not to overstate the case. "Studillacs," "Fordillacs," "Fordebakers," and "Bu-Mercs," therefore, though certainly not uncommon, were nevertheless nowhere near as popular among enthusiasts as was the tried and true flathead-equipped Ford roadster. Variety there was, in other words, but not until the end of 1955 would the era of the L-head-powered hot rod truly begin to come to a close.

In fact, readily obvious though the increasing mechanical diversity of the period was, it alone had less to do with the gradual decline of the traditional dual-use Ford hot rod than did the mounting technical and competitive specialization that was taking place within modified motorsports more generally in the late 1940s and the early 1950s. In 1950 or 1951, for example, it would have been possible for an L.A.-area enthusiast to use his roadster not only on the street and at the lakes, but also at the local drag strip. Rather quickly, though, the mounting popularity of the new activity rendered it fiercely competitive, and as a result, many drag racers soon began to modify their dual-use street-lakes roadsters in ways that would have rendered them more competitive in the quarter-mile but much less tractable on Sepulveda Boulevard or the surface of El Mirage Dry Lake. Among others, these included the deletion of their cooling systems, the removal of their bodies – and, frequently, the addition of dozens of "speed holes" in their frames

[62] Many of the popular magazines' "engine conversion" articles, for example, were penned specifically in order to assist enthusiasts in the process of modifying their engines for use in an engine-swapping project. As a case in point, see Racer Brown, "Soup that Chev!" *HRM*, May 1955, 14-19 and 50-53.

– to save on weight, the use of miniscule front tires and massive rear slicks, and the assembly of radical racing engines that were difficult to put to good use on the street. To be sure, there always were and always have been special classes set aside for those who didn't want to sacrifice their automobiles' real-life utility at the alter of the quarter-mile, but for serious racers, specialized dragsters had become a virtual necessity by the mid-1950s.[63]

At the same time, dry lakes racing was beginning to assume a distinctive air of its own. It, too was becoming increasingly popular and competitive, but unlike the drags, which emphasized acceleration, the lakes had always been about top speed. Consequently, racers enamored of the dry lakes style of competition began to modify their cars with aerodynamics, say, or sustained rpms in mind. And before long, a number of them had therefore begun to trailer their highly-tuned, streamlined dry-lakes specials to the desert time trials rather than attempting to convert their daily-driven roadsters into competitive "lakesters" upon their arrival.[64]

By the early 1950s, however, the number of dry lakes meets began to decline precipitously, and by the end of the decade, the activity had for all intents and purposes ceased to be a major aspect of the hot rod racing scene. Common wisdom both among popular historians of the sport and among those who lived through the period holds that as drag racing's popularity swelled, that of the dry lakes time trials waned accordingly.[65] Though there is some truth to this, the fact of the matter is that it was the very popularity of the lakes events themselves that ultimately led to their relative decline. By the end of the 1940s, a number organizations had begun to sponsor regular time trials on the dry lake beds, including the Bell Timing Association,

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[63] On the increasingly specialized nature of drag racing – and dragsters – in the 1950s, see Post, *High Performance*, especially chapter 3; Montgomery, *Hot Rod Memories*, 14; Medley, *Tex Smith's Hot Rod History, Volume Two*, 102; and "Album of Best Hot Rods," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 53, 55, and 67. On the mounting popularity of drag racing in the early 1950s, see for example "Draggin' Demons," *Rods and Customs*, May 1953, 14-17, and "Drags," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 21.
[64] On the advent of the "lakester" as a distinct subcategory within hot rodding, see "The Lakes," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 6-17; John Christy, "The Hot Rod and You: Build for a Purpose," in *Hot Rod 1954 Annual*, especially 4-5; and Montgomery, *Hot Rod Memories*, 14.
[65] See, for example, Louis Hochman, "Hot Rods and Ends: 200-MPH Hot Rod Problems," *Cars*, May 1953, 75; Montgomery, *Authentic Hot Rods*, chapter 5; Batchelor, *The American Hot Rod*, 163; and Genat and Cox, *The Birth of Hot Rodding*, 36.

the Russetta Timing Association, and, of course, the SCTA.[66] Although this had enabled enthusiasts in Southern California to race their cars far more often than ever before, the lakes themselves soon began to suffer from overuse: cracked and brittle, the surface of El Mirage in particular was fast becoming an inappropriate place for high-speed trials.[67] At this point, some did indeed abandon the dry lakes altogether in favor of the local drags. But many died-in-the-wool lakes enthusiasts were unwilling to do so. They were, however, willing to race less often, and at a place much farther from the L.A. basin: Bonneville, Utah. By the end of the period in question, in fact, the SCTA's yearly time trials on the Bonneville Salt Flats were, along with a very limited number of scheduled events at traditional Southern California dry lake beds like Rosamond, essentially the last vestiges of that peculiar form of racing that had once been all the rage among area enthusiasts.[68]

But in the late 1940s and the very early 1950s, the lakester for a brief while joined the dragster as a highly-specialized type of hot rod that was beginning to contribute to the decline of the traditional dual-use roadster. So too did several others, including oval-track jalopies, oval-track roadsters, midgets, and off-roaders, to name but a few.[69] Meanwhile, ordinary street-driven hot rods had begun to change as well. Some, for example, began to sink a bit more cash into their roadsters' paint jobs and interior appointments as their vehicles' double-duty days began to

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[66] On the emergence of the RTA, the SCTA's main late 1940s and early 1950s rival (and one which, not coincidentally, allowed coupes and sedans to participate in its events), see Genat and Cox, *The Birth of Hot Rodding*, 30-36, and Batchelor, *The American Hot Rod*, 120. On the Bell Timing Association, see "Editor's Column," *HRM*, April 1949, 7, and Louis Kimsey, "Bell Timing Meet," *Hop Up*, October 1951, 24-27.
[67] See Jack Landrum, "Lakes Meet," *Motorsport*, August 1951, 7 and 29-30, and "Editor's Column," *HRM*, December 1953, 5.
[68] On the emergence and increasing popularity of the yearly Bonneville time trials, see "Bonneville," *Hop Up*, November 1951; "Just Before the Storm: Critical Seconds Before Bonneville," *HRM*, October 1953, 24-27; Genat and Cox, *The Birth of Hot Rodding*, 36-39; Montgomery, *Authentic Hot Rods*, chapter 5; and Batchelor, *The American Hot Rod*, chapter 10.
[69] On organized jalopy racing, see Louis Kimsey, "25 Hour Jalopathon," *Hop Up*, September 1951, 12-15. On the increasing popularity of oval-track roadster racing among hot rodders of the period, see "Racing Roadsters," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 18-20, and Medley, *Tex Smith's Hot Rod History, Volume Two*, 102. On midget racing, see "The Real Wheels Behind Hot Rodding," *Cars*, December 1953, 16-20, and "Offy Midget Engine," *Hop Up*, October 1951, 35. And, finally, on the emergence of off-roading, see "Arizona's Dune Bugs," *Rod and Custom*, October 1954, 18-23.

wane.[70] Others, wary of their local police, began to construct "sleepers," vehicles whose run-of-the-mill looks concealed red-hot powerplants of one sort or another.[71] And in the early 1950s, others still abandoned their prewar roadsters altogether in favor of newer cars that they then would "customize." Their bodies reshaped with generous amounts of lead filler and lavished with flawless paint jobs, these postwar customs were heavy and slow, but that was precisely the point: built to cruise and not to race, they were a very different type of car. Many hot rodders built them, and more than a few of them were inspired by the general aesthetic norms that were common among period hot rodders, but they were by no means high-performance cars. In other words, they weren't hot rods.[72]

Neither, for that matter, were many of the performance-tuned vehicles used on the streets in the early to mid-1950s – at least, not in the strictest sense. To be sure, many a rough-hewn prewar roadster with an exposed full-race engine continued to see daily use throughout the period in question and beyond. Increasingly, though, they were joined not only by the occasional "sleeper," but also by postwar coupes, sedans, and convertibles that featured powerplants as highly-modified as any of those that were nestled behind the grilles of the "real" hot rods. And *these*, in time, would come to outnumber traditional prewar roadsters within the ranks of street-driven performance-tuned cars. Many quickly began to refer to these postwar-bodied performance-modified automobiles as "street machines," while others of a more inclusive disposition have long insisted that they, too are "real" hot rods.[73] In any event, what is certain is

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[70] See Dean Batchelor, "The New Hot Rods," *True's Automobile Yearbook*, 1952, 30-31 and 98-99; Eugene Jaderquist, "Hot Rods Are Doomed: There's a Revolution on Wheels Rolling Through West Coast Drag Strips as More and More Enthusiasts Turn from Hots to Cools," *Cars*, November 1953, 30-33 and 62; Christy, "The Hot Rod and You," in *Hot Rod 1954 Annual*, 4-5; Almquist, *Hot Rod Pioneers*, 25; and Medley, *Tex Smith's Hot Rod History, Volume Two*, 102.

[71] One prominent example of this trend was a fire-breathing and yet altogether ordinary-looking 1934 Ford coupe that Dean Moon built in the late 1940s (see Fetherston, *Moon Equipped*, 23-29), although in Moon's case, the car's run-of-the-mill appearance failed to prevent him from being nabbed – and given seven days in prison – for street racing. See also Montgomery, *Hot Rod Memories*, 36.

[72] On customs, see DeWitt, *Cool Cars, High Art*; Dobrin, Linhares, and Ganahl, *Hot Rods and Customs*; Ganahl, *The American Custom Car*; and Joe Kress, *Lead Sleds* (St. Paul, MN : MBI Publishing Company, 2002).

[73] As for the former, see for example "Street Machines," in *Hot Rod 1954 Annual*, 10-22; Almquist, *Hot Rod Pioneers*, 25; Montgomery, *Hot Rod Memories*, 13; and Montgomery, *Hot Rods as They Were*, 11. Batchelor, on the other hand, has forcefully argued for a more inclusive definition of "hot rod" which would render terms like "street machine" unnecessary (*The American Hot Rod*, 8).

that by the mid- to late 1950s, they were in the majority not only among enthusiasts, but also among aftermarket manufacturers, most of whom had begun to rely upon them for their bread-and-butter speed equipment sales.

During the late 1940s and the early 1950s, therefore, what was happening within hot rodding can only be described as "fragmentation." Whereas hot rodders once had driven and raced prewar roadsters almost without exception, they now drove customs, sleepers, street machines, and/or roadsters on the streets and raced specialized dragsters, lakesters, midgets, off-roaders, and/or track-roadsters on the side; the hobby, in short, was "fragmenting" into a number of smaller niches, or, as Don Montgomery has so often put it, the sport was "splintering."[74] In his frequent ruminations on the subject, though, Montgomery fails to fully consider the broader implications of this process. To wit, he claims that with the decline of the traditional, dual-use hot rod in the 1950s, the activity known as hot rodding began to disappear as well. And intuitively, he appears to have a point. After all, how can there be hot rodding – or, for that matter, hot rodders – if in fact there are no longer any hot rods? What Montgomery misses, however, is that as this process of fragmentation unfolded, "hot rodding," both as an organized activity and as the act of modifying a production vehicle's drivetrain, was beginning to assume a considerable degree of conceptual independence from its artifactual origin, the "hot rod." In other words, by the mid- to late 1950s, one no longer needed a traditional, by-the-books "hot rod" in order to participate in "hot rodding." Instead, all one needed was an interest in performance tuning and some sort of production vehicle with which to experiment. And thus, although the broader applicability of the noun "hot rod" would continue to be the subject of considerable debate among enthusiasts and popular historians alike for decades to come, the same was by no means the case with "hot rod" as a verb or "hot rodding" as an activity. Few in 1955, for example, would have given a second thought to the *Speed Mechanics* feature titled "Rodding a Rambler."[75] Likewise, no one back in 1962 would have questioned the meaning of

[74] For Montgomery's take on the issue, see *Hot Rods in the Forties*, 7; *Hot Rods as They Were*, 7; and *Hot Rod Memories*, 13-14.
[75] Bill Schroeder, "Rodding a Rambler," *Speed Mechanics*, April-May 1955, 20-21, 32, and 34.

the title of Petersen Publishing's popular how-to manual, *Hot Rodding the Compacts*.[76] Similarly, few would have furrowed their brows at the appearance, in 1984, of a how-to manual titled *How to Hotrod and Race Your Datsun*.[77] And, finally, no one who happened to come across *European Car*'s 1997 reference to the "extreme 911 hot-rod procedure[s]" that went into the construction of Motorsport Design's 710-horsepower Porsche Biturbo would have considered it an inappropriate use of the term.[78] As a direct and perhaps somewhat paradoxical result of its 1950s splintering, therefore, "hot rodding" actually assumed a much broader applicability, one that it has largely retained to this day.

H. F. Moorhouse, well aware of this conceptual broadening, claims that it was little more than the result of a concerted effort by the editors and publishers of 1950s enthusiast periodicals to expand their readership. In other words, Moorhouse argues that it was the likes of Robert Petersen, Bob Lindsay, and Wally Parks who brought about this shift through their conscious attempt to bring more enthusiasts into the hot rodding community, thereby strengthening its civic and political clout – and, of course, its capacity to absorb ever-larger monthly runs of *Hot Rod*, *Hop Up*, and the like.[79] To be sure, publishers did in fact have an interest in growing their readership, and if you were to thumb through a representative sampling of editorial columns from the various magazines, you would find that the ways in which their authors made use of the concept of "hot rodding" did indeed expand considerably over the course of the early 1950s. What Moorhouse fails to realize, however, is that they weren't simply making it up to serve their own selfish interests. And neither, for that matter, were enthusiasts blindly following the editors' collective lead, changing the way they conceived of their beloved pastime as a result of what they read in the opening pages of *Hot Rod* each month. Instead, *they themselves*, the average hot rodders, were the ones that were driving the process of fragmentation. They were the ones who decided to build dedicated dragsters, one-use Bonneville machines, and late-model Chevys with

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[76] *Hot Rodding the Compacts* (Los Angeles, CA: Petersen Publishing Company, 1962).
[77] Bob Waar, Steve Smith, and Bill Fisher, *How to Hotrod and Race Your Datsun* (Tucson, AZ: HP Books, 1984).
[78] Jeff Hartman, "Illusions of Grandeur," *European Car*, July 1997, 72.
[79] Moorhouse, "Racing for a Sign," passim.

supercharged Buick V8s. They were the ones, in other words, whose conception of "hot rodding" was gradually growing more inclusive, and the magazines, for their part, were simply following suit. In fact, editors often had to defend their publications' relatively traditional definitions of what a "hot rod" was, or of precisely what it was that the activity of "hot rodding" encompassed, to readerships that often appeared to be far more progressive than were the publications.[80] From time to time, of course, angry purists would fire off missives to the periodicals, accusing them of "having sold the hot rod sport down the river," for example, because of their frequent coverage of vehicles which did not fit the traditional definition of what a "hot rod" was.[81] But Wally Parks, writing in defense of his particular magazine's position on the matter back in 1954, was absolutely right when he maintained that it was the average hobbyists themselves that were moving on, and that the magazines, by contrast, were simply trying to "keep apace."[82]

Unfortunately, John DeWitt's interpretation of the evolution of the sport during the 1950s is no less misleading than that of H. F. Moorhouse. According to DeWitt, the story of the 1950s is that of the decline of on-road high-performance tuning and the emergence, in its place, of the custom car and the so-called "Kustom Kulture." With the disappearance of the traditional dual-use hot rod, DeWitt maintains that those with an interest in serious performance moved into the ranks of the drags and lakes competitors, while those left on the street began to focus their attention on aesthetics to the virtual exclusion of tire-smoking performance. The end result, in his view, was that the mechanical creativity that had long characterized the activity of "hot rodding" all but vanished from the realm of the everyday-use car, replaced in toto by a remarkable surge in automotive artistry.[83] The problem with DeWitt's interpretation, however, is that it relies upon the grossly inaccurate assumption that with the decline of the traditional "hot rod" in the 1950s, performance-oriented on-road "hot rodding" must have disappeared as well. The truth, though, is that by the mid-1950s, "hot rodding" had come to no longer depend on the existence of the "hot

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[80] See, for example, "It's in the Bag," *HRM*, October 1949, 6, and "It's in the Bag," *HRM*, December 1949, 32-33.
[81] Wally Parks, "The Editor Says," *HRM*, June 1954, 5.
[82] Ibid.
[83] DeWitt, *Cool Cars, High Art*, passim.

rod." And thus, although the Kustom Kulture did indeed thrive in the 1950s and the early 1960s, so too did hot rodding, albeit in a much broader sense.

Ultimately, therefore, what was going on within the hobby during the course of the late 1940s and the early 1950s was not the end of hot rodding, as Montgomery suggests, and neither was it the absorption of its creative energies into the Kustom Kulture, as DeWitt maintains. Critically, too, it was by no means little more than a top-down process of expansion driven by the profit-seeking periodicals. Instead, it was a wholesale, grassroots broadening of what "hot rodding" was. And though it certainly made the likes of a Robert Petersen very happy, no one reaped the benefits of this transformation quite as openly as did the entrepreneurs behind the California speed equipment industry.

The California Hot Rod Industry

During the late 1940s and the early 1950s, as hot rodding spread throughout the United States and grew increasingly diverse, so too did the high-performance automotive aftermarket. Literally scores of new people and new companies joined the industry during this period, establishing manufacturing facilities in locations as far flung as Miami, Denver, St. Louis, Chicago, and Boston. Thousands of new products reached tens of thousands of new customers nationwide, thanks to the emergence of hundreds of new and widely scattered speed shops, regional distribution centers, and nationally-oriented mail-order houses. The result, by 1955, was that what had been a tiny, insular, and almost exclusively Southern-Californian business just ten short years earlier had grown to become a booming, national industry in nearly every respect. In fact, if we were to include in our conception of "the industry" the distribution centers, mail-order houses, speed shops, custom engine builders, engine machine shops, and other types of companies that self-identified with the high-performance aftermarket during the postwar years, we would find that L.A.-area firms' share of the pie had dwindled from nearly ninety percent just prior to World War II to less than half – and possibly as little as ten to fifteen percent – by

1955.[84] Why, then, ought we to conceive of this as the era of the so-called California hot rod industry?

It's simple, really. In terms of distribution, sales, and end-use, the industry did in fact go national. But in terms of the actual design and manufacture of high-performance aftermarket components, Southern California companies continued to dominate throughout the period in question – and well beyond. Consider the numbers: by mid-1948, for example, there were 94 speed equipment manufacturers in the State of California, 86 of which were located in the greater Los Angeles area; only 11, by comparison, were based elsewhere (see figures 3.2 and 3.3).[85] Three years later, in mid-1951, there were 132 active manufacturers in the United States: 107 in California as a whole, 98 in the L.A. area, and 25 or so in the rest of the country combined (see figures 3.4 and 3.5). Finally, by mid-1954, the ranks of the manufacturing end of the industry had swelled to 158, 122 of which were headquartered in the Golden State – 111 in Los Angeles

[84] Including manufacturers, distribution centers, mail-order houses, speed shops, engine builders, engine machine shops, and custom accessory retailers, the present author is aware of approximately 290 high-performance companies that operated in or near Los Angeles at one point or another during the period in question. This figure was derived by conducting a thorough tabulation of every company that appeared in advertisements, feature articles, and racing events coverage over the course of the decade in *Hot Rod*, *Hop Up*, *Motor Life*, *Speed Age, Cars*, *Car Life*, *Auto Age*, *Motor Trend*, *Rod and Custom*, and several other enthusiast magazines. Company names and dates of operation then were verified against the relevant data from several other period and secondary sources to arrive at the totals presented here. By contrast, it has proven nearly impossible to add up all of the similar firms that were in operation in the rest of the country during these years: period sources and enthusiast publications have proven to be far less accurate and far less reliable with regard to companies outside of the greater Los Angeles area than they are with those within. As a result, although the present author is indeed aware of references as early as 1951 to figures in excess of 2,000 ("Touring the Hot Rod Shops: Production is Theme at Southern California Muffler Company," *HRM*, May 1951, 32-33, for example), he has nevertheless only been able to verify approximately 300 outside of the L.A. area. And thus, a conservative estimate would place the total number of companies outside Southern California at about 300, against 290 within L.A., which translates to a split of roughly 50/50 by 1955. On the other hand, a liberal estimate might place the number of firms in the United States as a whole at 2,000 or more by 1955, which works out at the very most to a 10/90 L.A./U.S.A. split. (The available figures for speed equipment *manufacturers* specifically, however, are far more precise; see below, footnote 85.)

[85] Manufacturers – both those within L.A. itself and those located elsewhere in the United States – are far easier to track than are speed shops, local engine builders, engine machine shops, and the like. Consequently, the present author is *very* confident that the figures presented here are accurate: they are derived from a comprehensive survey of period books, racing programs, and enthusiast periodicals as well as the relevant secondary literature. And in the present author's opinion, if a given "manufacturer" fails to show up even once in any of these sources – that is, if none of his products ever show up in technical, racing, or feature-car coverage in the magazines; if his name fails to appear in any of the published memoirs or secondary sources; if his products fail to appear in period mail-order or speed shop catalogs; or, critically, if he failed to advertise even once in any of the enthusiast periodicals published during the course of the period in question – then that "manufacturer" was simply not a part of the American high-performance automotive aftermarket, period. Thus, although there may in fact be one or two that the present author has somehow overlooked, the total cannot possibly be more than can be counted on a single hand. After all, phantom companies that go out of their way to avoid recognition (and sales) are – and were – exceedingly rare.

alone – and 36 elsewhere (see figures 3.6 and 3.7).[86] Percentage-wise, therefore, Southern California companies did lose a bit of ground during the period in question – in 1948, their share stood at 82 percent, for example, as compared with only 70 percent in 1954. Nevertheless, it remains remarkable that after a decade's worth of coast-to-coast growth and diversification within the hobby as a whole, seven out of ten aftermarket manufacturers still hailed from a single metropolitan area. More remarkable still is the fact that as late as 1954, Chicago – the Los Angeles basin's closest rival throughout the 1950s – was home to but a paltry eight percent of equipment companies. Volume, though, was really the clincher. Almquist Engineering in Milford, PA, Gotha in Harvey, IL, and Mallory in Detroit were reasonably high-volume firms by the mid-1950s, but they were by no means representative: L.A.-area companies like Weiand, Offenhauser, Iskenderian, Harman & Collins, Edelbrock, Fenton, Jahns, and McCulloch were in fact responsible for the vast majority of the bolt-on high-performance components that were sold in the late 1940s and the early 1950s.[87] Any way you look at it, in other words, postwar aftermarket manufacturing was indeed a Southern Californian enterprise.

Who, then, were these L.A. companies? Who ran them, and how did they get their start? What did they produce, and how? How many and what sort of people did they employ? How did they go about merchandizing and distributing their products? And how, if at all, did the overwhelming concentration of the industry in their local area affect or otherwise influence their endeavors?

Their origins, for starters, were remarkably uniform. With very few exceptions, in fact, postwar L.A. companies were either carryovers from the enthusiast-based backyard "industry" of

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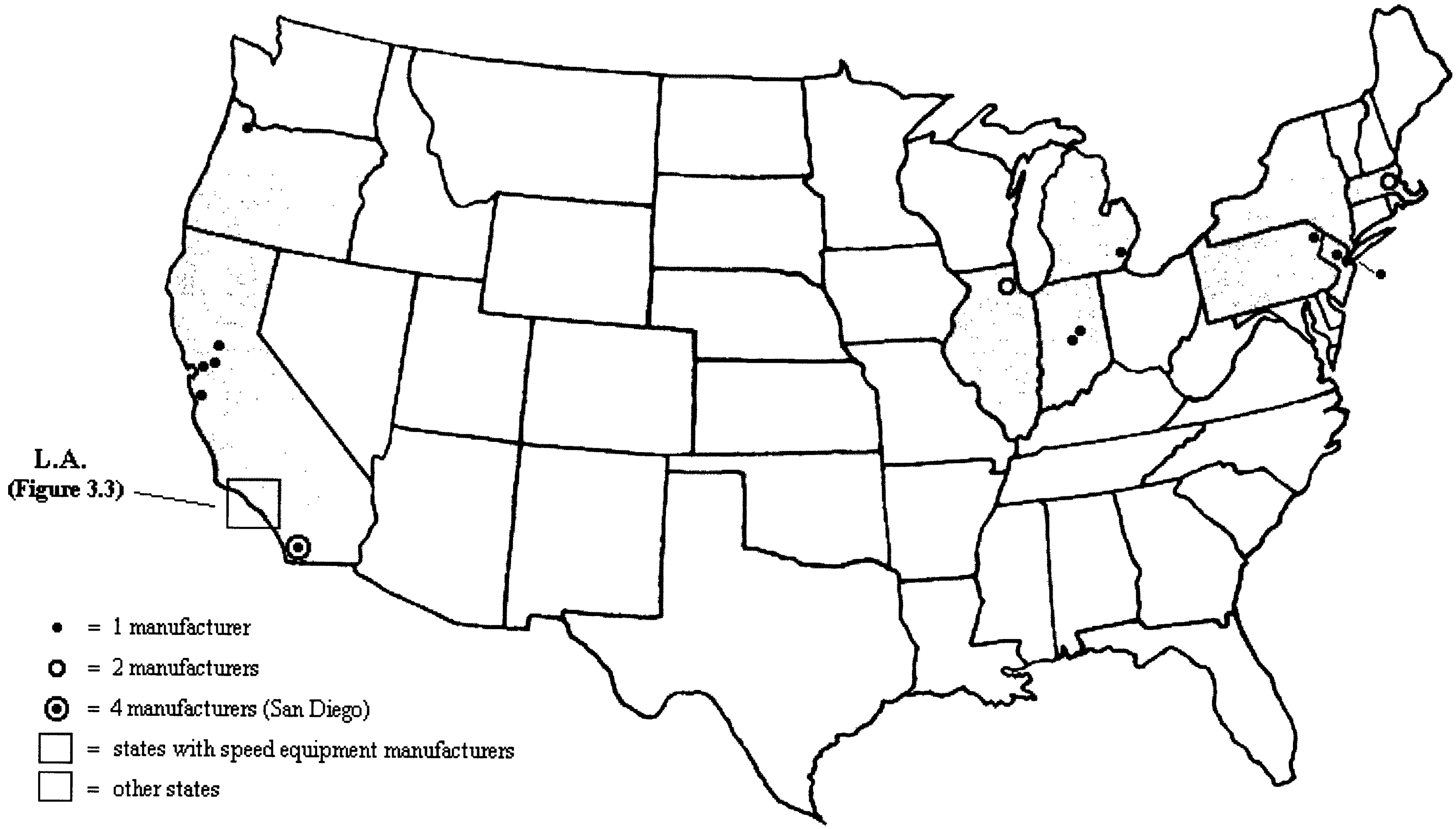
[86] The relatively miniscule rates of growth that these figures from 1948, 1951, and 1954 suggest are somewhat misleading, for they paper over the fact that there was a considerable amount of turnover during the period in question as various manufacturers came and went and combined and split. In fact, 182 different equipment manufacturers operated out of Southern California at one time or another during the late 1940s and the early 1950s, while approximately 75 came and went elsewhere. At any given moment, however, there were far fewer than 257 total firms in operation, and the figures cited here are simply a reflection of this fact.

[87] Apart from its own advertising claims, which are often suspect, at best, one reasonably reliable way to gauge the *relative* importance of a given manufacturer at a given time is to closely monitor (1) the extent to which its products show up in the feature, racing, and technical coverage of the popular magazines and how-to guides, and/or (2) the extent to which their products *consistently* featured in the advertising spreads of national mail order chains.

Figure 3.2: American Speed Equipment Manufacturers (June 1948)
(author illustration)



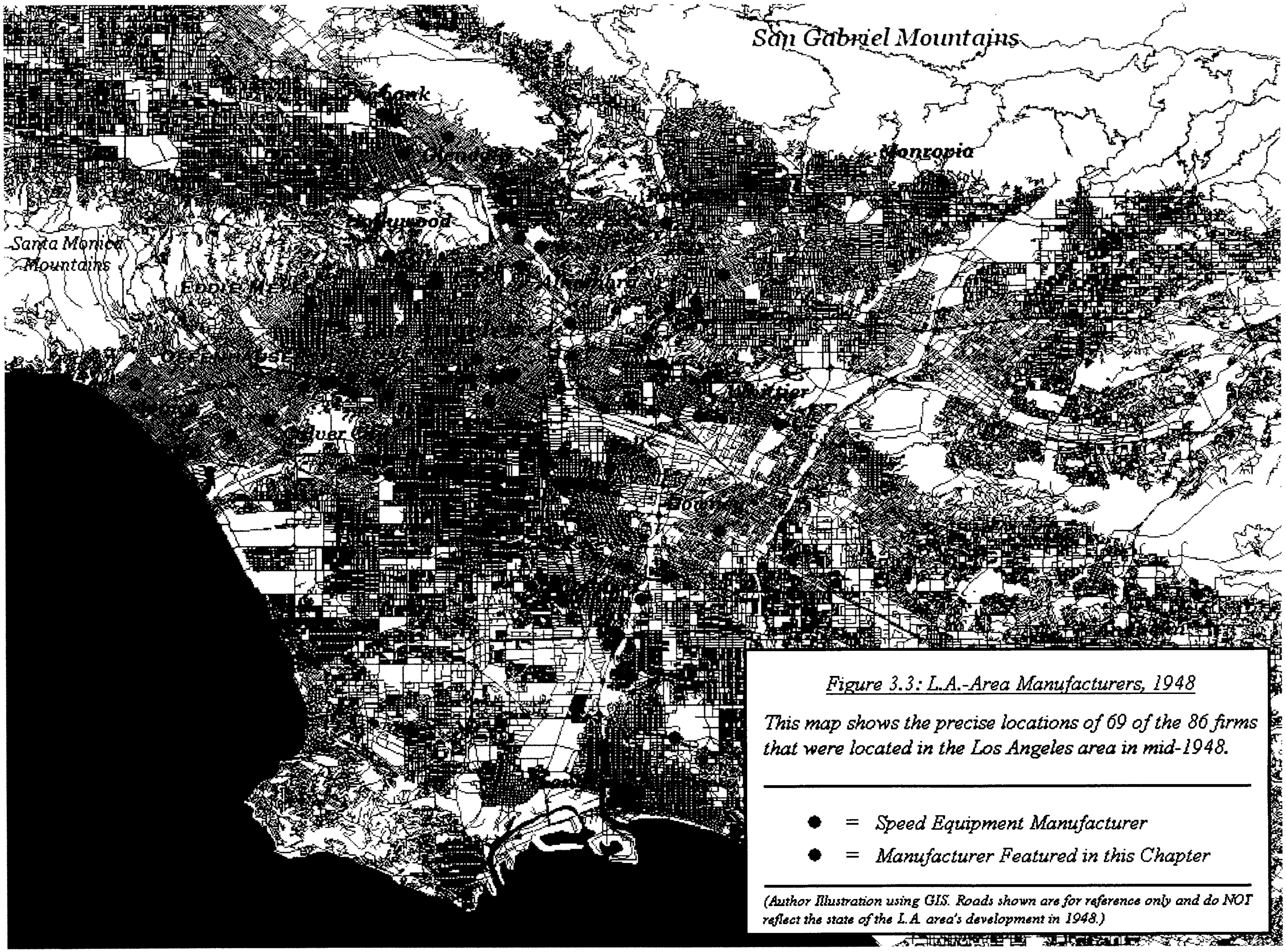


Figure 3.3: L.A.-Area Manufacturers, 1948

This map shows the precise locations of 69 of the 86 firms that were located in the Los Angeles area in mid-1948.

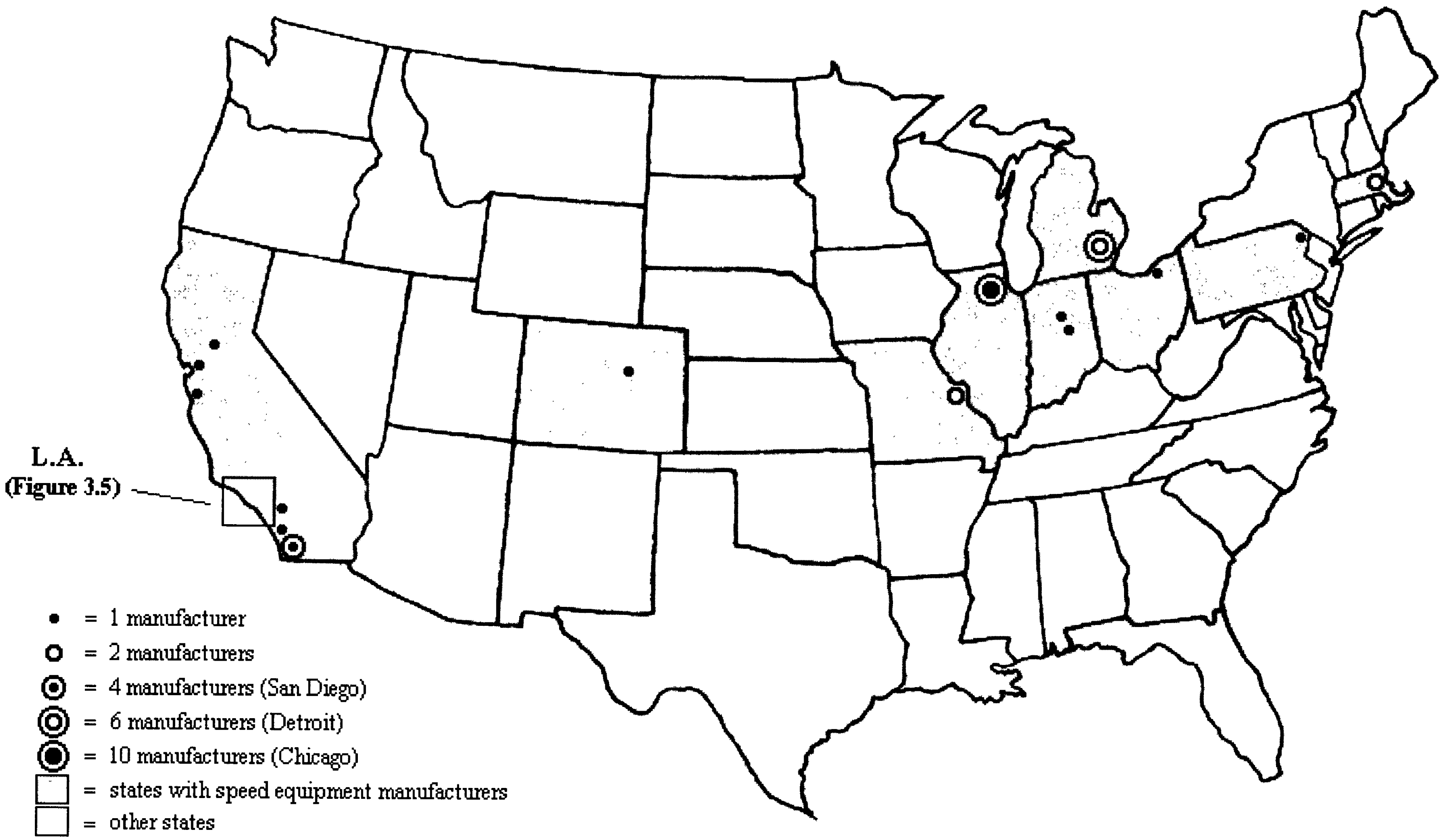
● = *Speed Equipment Manufacturer*

● = *Manufacturer Featured in this Chapter*

(Author Illustration using GIS. Roads shown are for reference only and do NOT reflect the state of the L.A. area's development in 1948.)

Figure 3.4: American Speed Equipment Manufacturers (June 1951)

(author illustration)



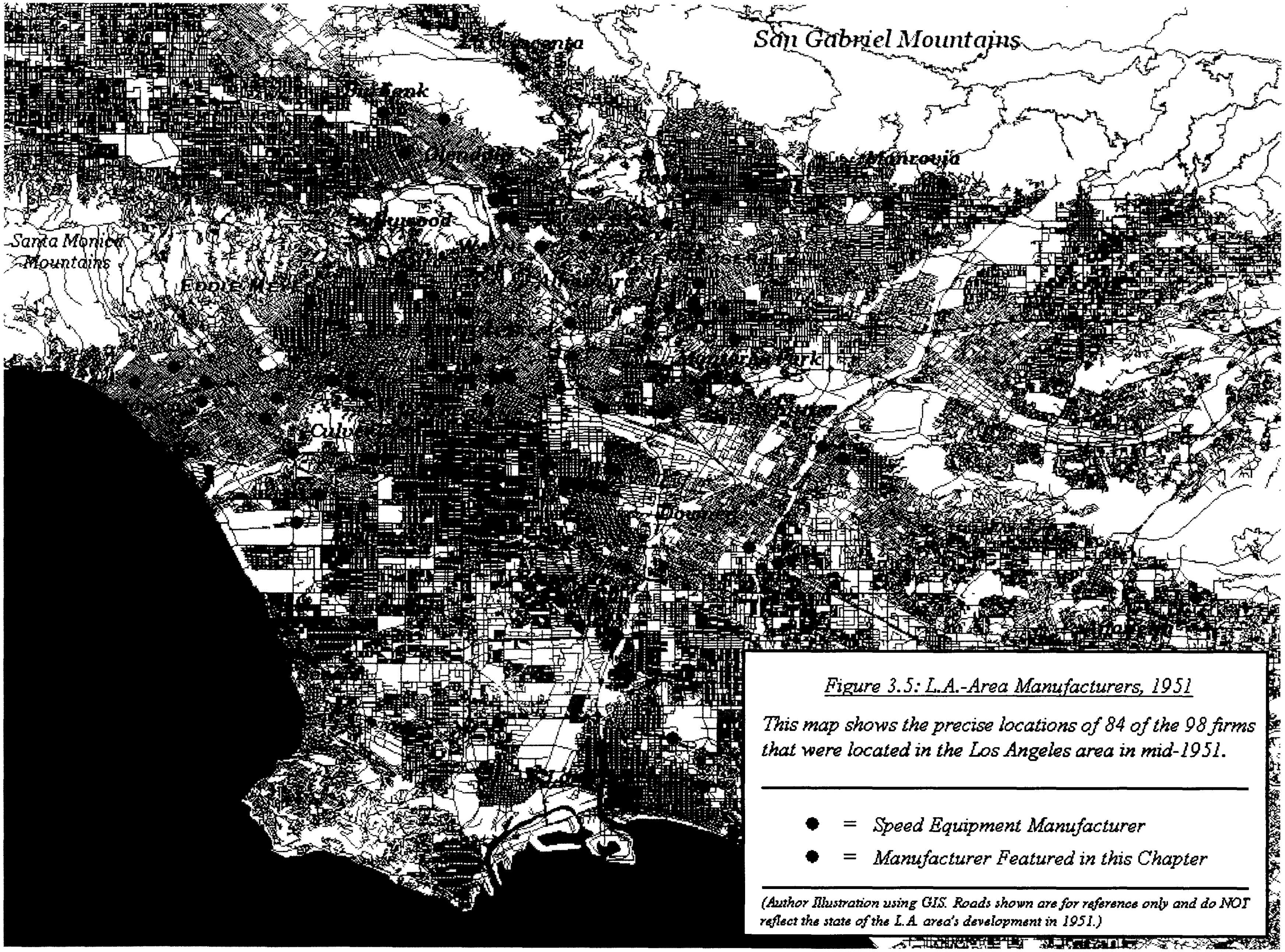


Figure 3.5: L.A.-Area Manufacturers, 1951

This map shows the precise locations of 84 of the 98 firms that were located in the Los Angeles area in mid-1951.

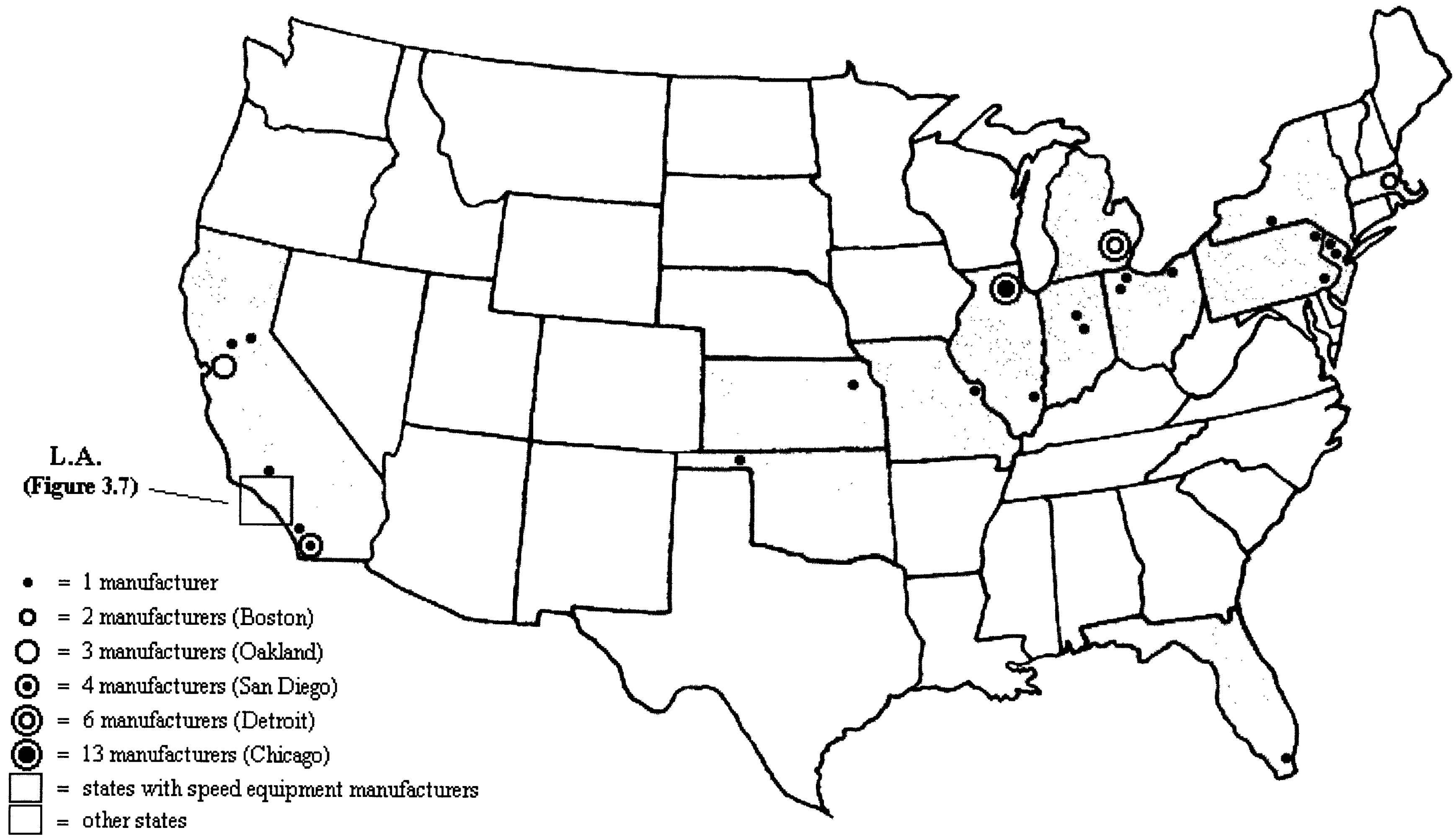
● = *Speed Equipment Manufacturer*

● = *Manufacturer Featured in this Chapter*

(Author Illustration using GIS. Roads shown are for reference only and do NOT reflect the state of the L.A. area's development in 1951.)

Figure 3.6: American Speed Equipment Manufacturers (June 1954)

(author illustration)



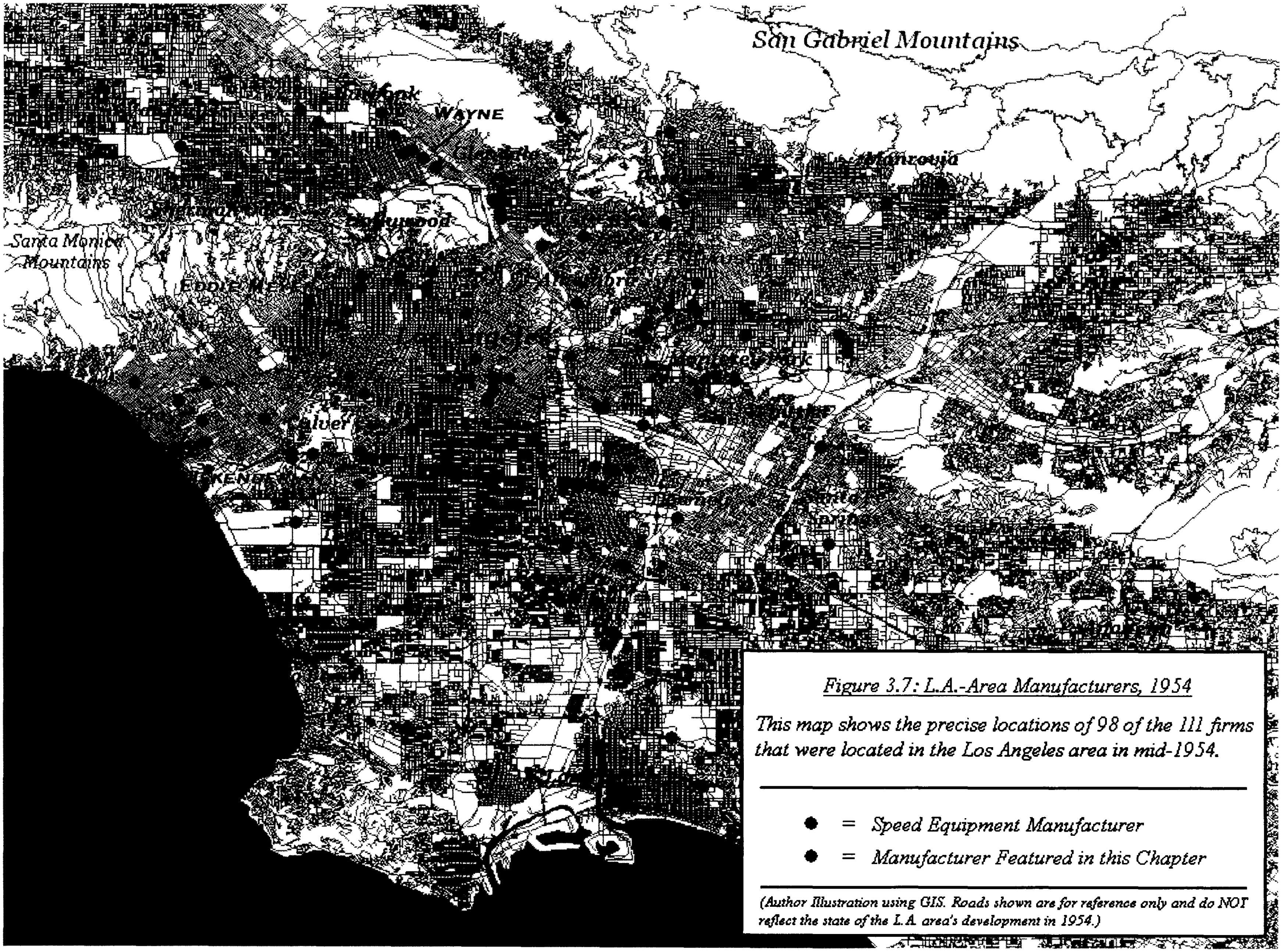


Figure 3.7: L.A.-Area Manufacturers, 1954

This map shows the precise locations of 98 of the 111 firms that were located in the Los Angeles area in mid-1954.

● = *Speed Equipment Manufacturer*

● = *Manufacturer Featured in this Chapter*

(Author Illustration using GIS. Roads shown are for reference only and do NOT reflect the state of the L.A. area's development in 1954.)

the late 1930s, existing automotive parts manufacturers that diversified into the high-performance market as hot rodding began to boom, or altogether new companies founded by prewar enthusiasts upon their return from active military duty. Among the first group, Thickstun, Edelbrock, Weiand, Burns, Davies, Cannon, Weber, Belond, Hunt, and Spalding were perhaps the most prominent.[88] These firms had been the heart of the fledgling high-performance industry when World War II broke out, and in the late 1940s, their founders would return to their prewar positions of prominence within the bustling aftermarket. For some, this meant starting over from scratch. Tom Spalding, for example, had abandoned his tiny ignition conversion business to serve in the armed forces, and upon returning to his home in Monrovia, he faced the unwelcome task of reestablishing himself within enthusiast circles.[89] Tommy Thickstun's case was similar, albeit far more tragic: after leaving behind his manifold business in order to serve as an aviation engineer in the war, the 34-year-old returned home only to die of a heart attack while vacationing outside Los Angeles in 1946; a lifelong friend of Thickstun's by the name of Bob Tattersfield subsequently built the business back up.[90] For others, like Harry Weber, the return of peace meant reconversion. During the war, Weber had of course ceased to produce his signature reground cams, dedicating his small L.A. machine shop instead to the production of tank and aircraft camshafts for the Allied effort. When the war ended, the Weber Tool Company resumed the production of high-performance flathead V8 cams.[91] Vic Edelbrock had also spent the war filling military contracts, but he was not content to simply resume his prewar status as *a* manufacturer of high-performance components once hostilities ceased. He therefore "sank his savings into machinery" immediately after V-J Day, updating and upgrading his L.A. business at what would prove to have been precisely the right moment: Edelbrock, within a few short years, had grown to become the *largest* equipment manufacturer in the country.[92]

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[88] See above, chapter 1.
[89] Almquist, "The Spalding Brothers: Famous for Ignitions and Cams," in *Hot Rod Pioneers*, 40.
[90] Almquist, "Tommy Thickstun: Early Dealer Option to Race Collectible," in *Hot Rod Pioneers*, 29.
[91] During the Korean War, Weber did a bit of contract work for the US Army as well. See "Meet the Advertiser: Weber Tool Company," *Hop Up*, July 1952, 26-27.
[92] "The Real Wheels Behind Hot Rodding," *Cars*, December 1953, 19.

Southern California firms like Witteman, Jahns, and Grant, on the other hand, were among a handful of well-established automotive parts suppliers that joined the speed equipment industry after World War II in order to capitalize on the postwar hot rod craze. Witteman, for example, was a valvetrain specialist that introduced a line of adjustable camshaft tappets for the popular Ford and Mercury flathead V8 engines in 1949.[93] Similarly, Jahns, an OEM-spec replacement piston manufacturer that had been in business since 1912, decided to test the waters by unveiling a line of high-performance aluminum pistons in 1950.[94] Apparently, Bill Jahns liked what he saw: for many years to come, his firm would remain a key player in the performance pistons market. Grant had also started off in the OEM replacement business, turning out piston rings for Fords, Chevys, and other domestic makes for a number of years before beginning to aggressively market a line of specialized rings for high-performance applications shortly after the end of the war.[95] There were others, too – Houdaille, for example, a pioneering shock absorber manufacturer that got into the high-performance end of the suspension business in the late 1940s; Mitchell Mufflers, which opened during the Second World War as a munitions contractor and subsequently moved into the high-performance exhaust business in the late 1940s; or Huth, which began during the late-Depression as a muffler repair shop before its founder decided to join the likes of Dave Mitchell in the booming postwar performance muffler trade.[96]

Firms in these first two groups, however, were vastly outnumbered by those in the third. In fact, reading through the scores of published interviews, memoirs, and "meet the manufacturer" shop-tour pieces that ran in *Hot Rod*, *Hop Up*, and *Drag News* over the years, it's often hard to believe that the stories of how so many different entrepreneurs first got into the

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[93] "What's New," *HRM*, September 1949, 7, and Witteman Company advertisement, *HRM*, September 1949, 6.
[94] Bill Jahns Company advertisement, *HRM*, May 1950, 28. See also Jahns advertisement, *HRM*, December 1951, 66.
[95] "Aggressive" may in fact considerably understate Grant's enthusiasm for the high-performance market: every single month from 1949 through 1955 (and sporadically for several years beyond), Grant advertisements graced the pricey terrain of *Hot Rod*'s back cover.
[96] On Houdaille, see for example Walter A. Woron, "Building a Hot Rod: Running Gear," *HRM*, February 1949, 12-13, and Houdaille advertisement, *HRM*, June 1949, 25. On Mitchell, see "Duals for a Chevy," *Rod and Custom*, November 1954, 26-31, 56, and 66, which focuses on the installation of a set of Mitchell mufflers and includes a brief but detailed synopsis of the company's history. And on Huth, see "Meet the Advertiser: Huth Muffler Company," *Hop Up*, February 1952, 34-35.

business could possibly have been so similar. Paul Schiefer, for example, was an automotive enthusiast in the late 1930s who drove a typical prewar "gow job" and regularly raced at the dry lakes. In World War II, he volunteered to serve in the United States Navy, and upon his honorable discharge he returned to Southern California and his beloved hobby. Slightly older and a bit wiser than he had been four years earlier, Schiefer decided to open an automotive repair shop in his native San Diego in 1947. Word of mouth – Schiefer's racing exploits were well-known throughout Southern California in the late 1940s – began to attract young rodders to his shop, and by the early 1950s he had begun to specialize in high-performance rebuilt engines. In addition, his business had slowly morphed into a popular area speed shop, with Schiefer actively retailing manifolds, headers, cams, and other high-performance products that had been manufactured 125 miles to the north. Soon, however, he discovered what he considered to be a gaping hole in the aftermarket's offerings, and by the end of the period in question, the Schiefer Manufacturing Company was one of the largest producers of lightened flywheels and clutch components in the industry.[97] Now, Schiefer's story is of course somewhat exceptional in that his business was based in San Diego and not L.A., but for the most part, a couple of substitutions here and there could easily transform his tale into that of many, many other postwar manufacturers. Replace "Navy" with "Army Air Corps" and "lightened flywheels" with "camshafts," for example, and you've essentially got the story of Ed Iskenderian.[98] Alternatively, substitute "Air Force" for "Navy" and "manifolds and heads" for "lightened flywheels," and suddenly, you're talking about Barney Navarro instead.[99] Jack Engle, Ak Miller, Alex Xydias, Roy Richter, and a whole host of others share similar origin stories; the point, however, is not simply to pigeonhole these folks for the purpose of deriving a simpler exposition, but rather to illustrate how very common it was for returning veterans to successfully transform their prewar

[97] On Schiefer, see "Meet the Manufacturer: Schiefer," *Drag News*, April 19, 1969, 8, and Ray Brock, "Paul Schiefer Eulogy," *Drag News*, September 5, 1970, n.p.
[98] See "Meet the Advertiser: Iskenderian," *Hop Up*, April 1952, 26-27; Almquist, "Ed 'Isky' Iskenderian: The Legendary Camfather," in *Hot Rod Pioneers*, 108; Montgomery, *Hot Rod Memories*, 95; and below, pages 200-201.
[99] On Navarro, see "California's Big Wheels," in Eugene Jaderquist and Griffith Borgeson, *Best Hot Rods* (Greenwich, Conn., Fawcett Publications, 1952), 32 (this was the first in a yearly series of books by the same title), and Almquist, "Barney Navarro: 'Oldfield' of the Hot Rod Industry," in *Hot Rod Pioneers*, 51-52.

passions into profitable postwar pursuits.[100]

And profits, for most of those involved in the late 1940s and early 1950s high-performance industry, largely derived from the production and sale of add-on parts for the venerable flathead Ford and Mercury V8 engines.[101] So good was the flathead business, in fact, that some firms never felt at all compelled to diversify their operations. Barney Navarro, for example, manufactured high-compression cylinder heads, manifolds, and other high-performance parts exclusively for the L-head Ford mill throughout the period in question, as did Eddie Meyer and Earl Evans.[102] Others – the majority, in fact – quickly took to the notion of supplementing their flathead incomes through the addition to their catalogs of various bits of speed equipment for other domestic and foreign makes of engine. Weiand, for one, therefore added a line of Studebaker products to his growing inventory of Ford components in 1948, and Edelbrock, Iskenderian, Offenhauser, Harman & Collins, Johansen, and many others quickly followed suit with boutique lines of components designed to fit everything from Chevrolet inline-sixes to Chrysler Firepower hemi-chamber V8s.[103] For others, though, these oddball products were actually mainstays: Frank McGurk, for example, elected to forego the flathead market entirely when he began to manufacture manifolds and other components for the Chevrolet engine in 1950, as did Wayne Horning with his GMC cylinder heads, Frank Morgan

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[100] On Engle, see Dave Wallace, Jr., "Jack Engle Walks Softly, Carries Big Bumpstick," *Drag News*, November 22, 1975, 16-17. On Miller, see "California's Big Wheels," in Jaderquist and Borgeson, *Best Hot Rods*, 32. On Xydias, who actually returned from the war to found a speed shop and not a manufacturing company, see Dick Wells, "Speed Shop History," *Street Rodder*, December 2000, 68-70 and 72, and Batchelor, *The American Hot Rod*, 170-171. And on Richter, who purchased the remnants of the Bell Auto / Cragar operation from George Wight's widow in 1945, see Bagnall, *Roy Richter*, chapter 1, and "Bell Auto...World's First Speed Shop," *Drag Digest*, November 11, 1966, 27.

[101] Almquist reports that this was the case ("Speed Equipment," in *Hot Rod Pioneers*, 134, and "The 'Heart' of Rodding," in *Hot Rod Pioneers*, 135-137), as do Roberson (*Middletown Pacemakers*, 41-42) and Montgomery (*Hot Rod Memories*, 11). But nowhere does the flathead engine's domination of the postwar speed equipment industry shine through in the record quite as clearly as it does in some of the mail-order and manufacturers' catalogs from the period – Bell Auto's 1952 catalog, for example, overwhelmingly favored parts for the Ford and Mercury V8 mill (Root Collection 99A104, Box 6, Watkins Glen International Motor Racing Research Center Archive, Watkins Glen, NY (hereafter, WGR-RC)), as did Sumar's 1954 catalog (WGR-RC).

[102] On Navarro, see Almquist, "Barney Navarro," 51-52, and any of Navarro's many advertisements over the course of the period (Navarro advertisement, *Rod and Custom*, December 1953, 68, for example). On Meyer, see Batchelor, *The American Hot Rod*, 65. And on Evans, see Montgomery, *Hot Rod Memories*, 92.

[103] On Weiand's addition of Studebaker components to his line of high-performance parts and accessories, see "Manufacturers News," *HRM*, June 1948.

with his line of Studebaker products, and Nicholas Brajevich with his Crosley gear.[104] And thus, although the L-head Ford and Mercury motors were in fact by far the most important targets of the postwar industry's research, development, and manufacturing efforts, the sheer variety of over-the-counter high-performance products that was available to the average enthusiast by the early 1950s was simply astounding. Of course, given the expansion and diversification of the hobby of hot rodding itself during these same years, the melange of different products that was available at the time is perhaps a bit less surprising. If, however, we consider that aftermarket product diversity was almost entirely nonexistent in the days of Laurel, Craig-Hunt, and, more recently, Miller-Schofield, the fact that postwar companies like Edelbrock, Weiand, and Offenhauser managed to juggle their numerous market niches small and large without ever being caught off-guard in any one of them is absolutely extraordinary. Though perhaps this speaks more to the ways in which the OEM market itself had changed since the early 1930s, it also suggests that there was something very different about the postwar industry's approach to the business of speed equipment manufacturing.

And indeed there was: the vast majority of postwar high-performance entrepreneurs were not simply racers who had decided to trade their leather gloves and goggles for a business suit, as were some of the more prominent prewar manufacturers like Jaegersberger, Roof, and Winfield. And neither, for that matter, were they elite racers and racing engine designers who profited on the side from the sale of aftermarket parts that often bore no resemblance at all to those that they generated for big-time races like the Indianapolis 500, as to a large extent were Arthur and Louis Chevrolet. Instead, the postwar industry was spearheaded by folks who drove and raced hot rods themselves – by folks, that is, who remained committed enthusiasts throughout their careers. Folks like Tony Capanna, Don Blair, Stuart Hilborn, Chuck Potvin, Arnold Birner, Jack McAfee, and Regg Schlemmer, speed equipment industry pioneers whose performances at the dry lakes

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[104] On McGurk, see "What's New," *HRM*, February 1950, 24 and 26. On Horning, see for example Don Francisco, "The Horning GMC: Converted Truck Engine with Special Cylinder Head Forms Nucleus of Capable Competition Powerplant," *HRM*, April 1951, 20-23 and *HRM*, May 1951, 20-23 and 42-43 (the article ran over the course of two months), and below, pages 174-175. On Morgan, see "Technical Tips," *Hop Up*, February 1952, 2. And on Brajevich (a.k.a. "Braje"), see "The O-Bones," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 98-103.

meets of the late 1940s were legendary.[105] Folks like Paul Schiefer, Ak Miller, Tom and Bill Spalding, Barney Navarro, Howard Johansen, Alex Xydias, Fred Carrillo, Ray Brown, Chet Herbert, Clem TeBow, Don Clark, and Doug Porter, all of whom found the time to prepare and race their own cars at Bonneville in the early 1950s while also running successful aftermarket companies.[106] Folks like Manuel Ayulo and Vic Edelbrock, who made the time to participate in local circle-track and midget events well into the 1950s, even as their businesses continued to grow.[107] And folks like Ed Iskenderian, Dave Mitchell, and Dean Moon, whose personal, daily-use hot rods were deemed sufficiently well-executed to grace the prestigious pages of *Hot Rod Magazine*.[108] In short, therefore, what set the postwar manufacturers apart from many of their predecessors was that they were run by men who were in every sense enthusiasts themselves – they and their competitors, in other words, were precisely the sort to whom they sought to sell their products. And this, in turn, was more than slightly advantageous, for it meant that they were perfectly positioned to closely monitor the latest fads and trends – *from within*.

Almost without exception, the equipment that they used to take advantage of this "insider's advantage" consisted of very basic, general-purpose machine tools such as planers, lathes, drill presses, table- and hand-grinders, and various sorts of cutting apparati. Chassis dynamometers were common as well, as were precision scales and flow benches, but things like in-house foundries and heavy-duty forges, stamps, and presses were exceedingly rare.[109] In other

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[105] An excellent reference for the names (and times) of those who ran on the lakes in the 1940s is Veda Orr, *Hot Rod Pictorial*.
[106] *First Annual Bonneville National Speed Trials Souvenir Program* (Los Angeles, CA: SCTA, 1949), 4-5, and "Just Before the Storm: Critical Seconds Before Bonneville," *HRM*, October 1953, 24-27.
[107] On Ayulo, see Eugene Jaderquist and Griffith Borgeson, *Auto Racing Yearbook* (Greenwich, CT: Fawcett Publications, Inc., 1954), 19 and 24-25. On Edelbrock, see "The Real Wheels Behind Hot Rodding," *Cars*, December 1953, 19.
[108] Iskenderian's V8-powered Model T roadster appeared on the cover of *Hot Rod* in June of 1948, as did Mitchell's hopped-up 1929 Ford pickup a few years later (see, for example, Montgomery, *Hot Rod Memories*, 90). Moon's beautiful 1934 Ford coupe "sleeper," on the other hand, appeared in the pages of *Hot Rod* many times over the course of the 1950s, typically in conjunction with an engine swapping article (Moon swapped engines in his '34 many, many times); see Fetherston, *Moon Equipped*, 23-29.
[109] Among the many firms with dynamometers were Potvin (Potvin advertisement, *Rod and Custom*, June 1954, 63), Braje ("Dyno for Lightweights," *HRM*, October 1953, 32-33 and 74-75), McGurk (Ray Brock, "Dual Exhaust Systems: What Can They Do for '53 Cars?" *HRM*, June 1953, 20-23 and 68-72), Nicson (Ivan T. Galanoy, "Headers: America's Most Misunderstood Speed Equipment," *Motor Life*, February 1954, 35-37 and 63), and Edelbrock (Batchelor, *The American Hot Rod*, 85-87); most of the units owned by aftermarket companies were

words, their tools were simple, small, and eminently scalable. Wayne Horning, for example, used nothing but a general-purpose lathe, an ordinary drill-press, and a hand-held grinder to finish his exotic 12-port GMC cylinder heads in the early 1950s, and the processes at Bell, Edelbrock, and other period companies were very similar.[110] To be sure, piston manufacturers like Speedomotive often relied upon more specialized tools like piston lathes, while cam companies like Iskenderian, Harman and Collins, and Clay Smith commonly made use of commercial camshaft duplicating machinery in order to simplify their operations.[111] But even among these firms, dedicated, single-product machinery and dies were virtually nonexistent. Camshaft duplicators, for example, could be used to grind bumpsticks for engines of all types and sizes, and the same was true of piston lathes. Growth, for most, therefore involved the purchase not of a larger, dedicated machine to handle higher volumes, but rather of additional tools of a general nature. Though in a number of cases the tools on hand at a given company might well have had more to do with what was available on the used market at rock-bottom prices than with what the owner might have believed to be optimal,[112] the general-purpose machinery that was so prevalent among the manufacturers of the period was nevertheless a strategic blessing. For indeed, not only did they enable companies like Weiand and Offenhauser to diversify their lines in the late 1940s,

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Clayton Chassis Dynamometers. Speedomotive and Evans were exceptional in that they had their own foundries (on Speedomotive, see for example "This is How it's Done...Special Racing Pistons Are Made in an Up to Date Plant," *Rod and Custom*, June 1953, 22-27, and on Evans, see Batchelor, *The American Hot Rod*, 173). Most, in other words, hired a subcontracting foundry to handle the rough-casting or rough-forging phases (see for example "Meet the Manufacturer: Venolia," *Drag News*, August 22, 1970, 18-19, and "Meet the Manufacturer: Schiefer," *Drag News*, April 19, 1969, 8), and this would be standard procedure within the industry for many years to come (Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003).

[110] On Horning's methods, see Don Francisco, "The Horning GMC: Converted Truck Engine with Special Cylinder Head Forms Nucleus of Capable Competition Powerplant," *HRM*, April 1951 (20-23) and May 1951 (20-23 and 42-43), and also below, pages 174-175.

[111] On Speedomotive, see "This is How it's Done...Special Racing Pistons Are Made in an Up to Date Plant," *Rod and Custom*, June 1953, 22-27. On the tooling used by Iskenderian, Harman & Collins, Clay Smith, and other camshaft manufacturers, see Almquist, "Ed 'Isky' Iskenderian," 108-110; "Meet the Advertiser: Iskenderian," *Hop Up*, April 1952, 26-27; Almquist, "Cliff Collins and Kenny Harman," 130; Clay Smith advertisement, *Rod and Custom*, February 1954, 63; Medley, *Tex Smith's Hot Rod History, Volume Two*, 59-60; Almquist, "Howard Johansen: The Quintessential Rodder," in *Hot Rod Pioneers*, 150; and Almquist, "Chet Herbert: Triumph over Adversity," in *Hot Rod Pioneers* 151.

[112] Iskenderian's first camshaft grinder, for example, was actually a second-hand cylindrical grinder for which he fabricated a make-shift camshaft-grinding attachment (Almquist, "Ed 'Isky' Iskenderian," 108), and, similarly, Howard Johansen's first cam machine was a home-made monster cobbled together from the remains of a used post grinder and a lathe (Almquist, "Howard Johansen," 150).

they also allowed those who remained dedicated to the production of flathead equipment, such as Barney Navarro, to incorporate quite a bit of variety into their lineups.

Given the general-purpose nature of their production machinery and the variety of products these tiny companies turned out, it certainly ought to come as no surprise to learn that none of these firms were in any sense mass producers. Instead, they carefully managed their warehoused inventories of their many different types and lines of products and adjusted their purchasing and production schedules accordingly.[113] Small batches of low-demand items, such as Studebaker single intake manifolds, would thus be mixed with much larger runs of higher-volume parts, like dual-plane manifolds for flathead engines. And as the warehoused inventory of any one of them fell to critical levels, further batches of raw castings could be ordered from the foundry and finished, upon their arrival, as needed to maintain an appropriate level of ready-to-ship stock. The typical aftermarket company of the period was therefore a remarkably flexible enterprise, strategically well-poised to manage the uncertainties that serving the fickle demands of hot rodding enthusiasts necessarily entailed.

In addition to their standard product lines, quite a few of these high-performance firms also performed custom-oriented work as part of their normal, everyday manufacturing operations. The Egge Machine Company, for example, stocked aluminum pistons in a variety of sizes but also offered custom-made slugs to those with special needs (and deep pockets). So, too did Speedomotive and Venolia. Howard Johansen, on the other hand, dedicated a corner of his camshaft facility to the assembly of special-order racing engines, as did Barney Navarro, Clay Smith, Wayne Horning, and countless others at their respective shops.[114] High-performance muffler and exhaust header manufacturers, for their part, typically performed in-house standard

[113] See for example "Meet the Advertisers: Southern California Muffler Company," *Hop Up*, November 1951, 24-25, and also "Meet the Advertiser: Iskenderian," *Hop Up*, April 1952, 26-27.

[114] On the custom-order ends of these respective businesses, see for example the following: Egge Machine Company advertisement, *Rod and Custom*, November 1954, 57; Speedomotive advertisement, *Rod and Custom*, March 1955, 61; "Meet the Manufacturer: Venolia," *Drag News*, August 22, 1970, 18-19; "California's Big Wheels," in Jaderquist and Borgeson, *Best Hot Rods*, 31 (on Johansen and Navarro); Bob Dearborn, "The Clay Smith Story," *Hop Up*, July 1953, 34-37; and Don Francisco, "The Horning GMC: Converted Truck Engine with Special Cylinder Head Forms Nucleus of Capable Competition Powerplant," *HRM*, April 1951 (20-23) and May 1951 (20-23 and 42-43).

and custom-application installations on a regular basis. Custom camshafts could also be finagled from most grinders, as could oddball stroker cranks and hand-contoured cylinder heads from others. In short, the rule of thumb, even among the largest of the manufacturers of the period, was that anything could be turned out at least once, provided that the price was right.

And by the early 1950s, no one involved with the industry would have hesitated for a moment if asked to name the most important advertising venue for their products, whether custom- or standard-stock. For clearly, spots in the nationally-circulated periodicals – *Hot Rod*, *Hop Up*, *Speed Age*, *Rod and Custom*, and so forth – were by far the best way to reach their many prospective customers across the United States. Prior to 1950, however, there were very few such titles, and a number of firms therefore took out regular advertisements and classified listings in less well-targeted national magazines like *Popular Mechanics*; others, particularly those in the L.A. area, often advertised in SCTA, Bell, and Russetta racing-event programs instead. By the late 1940s, car sponsorships were becoming increasingly common as well, as svelte streamliners and minimalist dragsters emblazoned with Edelbrock, So-Cal, Clymer, and other prominent names proved to be useful not only as rolling demonstrators of the effectiveness of a given company's products in open competition, but also as rock-solid federal and state income tax write-offs for all of those involved.[115] And throughout the period in question, word of mouth remained of paramount importance. Navarro, Evans, Edelbrock, and Weiand, for example, had managed to earn positive reputations very early on that served their businesses quite well in the late 1940s and the early 1950s, while others, such as Edmunds, Thickstun, Kogel, and L&S, were less-well thought of – and thus substantially less-popular – among enthusiasts.[116]

But if the question of how best to advertise one's products was becoming less difficult for many manufacturers to definitively answer as the 1950s wore on, that of how best to actually distribute and sell them was growing increasingly vexing. The problem, in this case, was that

[115] On car sponsorships as tax write-offs, see "The Competition Season," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 4-5.
[116] See Montgomery, *Hot Rod Memories*, 61.

alongside the traditional manufacturer-consumer and manufacturer-retailer-consumer sales channels that had existed within the industry for several decades, new twists – such as the regional distribution center or the national mail-order house – were beginning to complicate matters considerably. Throughout the period in question, most manufacturers continued to retail their products directly to consumers, as they had for many years. At the same time, though, most of them also contracted with jobbers, traveling salesmen who would peddle a given company's products to speed shops and auto parts retailers within a given region.[117] Meanwhile, a number of extant firms – larger speed shops like Bell Auto or Newhouse Automotive, typically – began to act as regional distributors for certain manufacturers, selling Evans heads, say, or Weiand manifolds wholesale to other speed shops and retailers while also continuing to sell them out of their own storefronts as well.[118] Further complicating matters, some manufacturers – Edelbrock, Southern California Muffler, and Moon, most notably – began to act as local and regional distributors for other manufacturers during this period as well.[119] At the same time, mail-order houses such as Eastern Auto in East Los Angeles bought either direct from the manufacturers or through middlemen (distributors or jobbers) before making their long-distance retail sales. In addition, more than a few speed shops also began to manufacture product lines of their own during the late 1940s and the early 1950s, high-performance parts and accessories which they then would retail directly from their storefronts or sell wholesale to other speed shops, jobbers, distributors, or mail-order centers. What's more, some companies were active on nearly every one of these many levels: Bell Auto, for example, was not only a speed shop, but also a manufacturer, a mail-order center, and a regional distributor. Throughout the period in question, the result was often a confusing mess, especially for consumers, since the various distribution channels meant that a certain high-compression head, manifold, or camshaft that sold for $75

[117] For more on jobbers, see Almquist, "Road Warriors: More than Parts Peddlers," in *Hot Rod Pioneers*, 245.
[118] On Bell, see Wells, "Speed Shop History," 69. On Newhouse, see "Meet the Advertisers: Newhouse Automotive Industries," *Hop Up*, September 1951, 26-27.
[119] On Edelbrock as a distributor, see "What's New," *HRM*, April 1950, 25-27. On Southern California Muffler, see "Meet the Advertisers: Southern California Muffler Company," *Hop Up*, November 1951, 24-25. And on Moon, see Fetherston, *Moon Equipped*, 19.

from the manufacturer would also often retail for $80 from the mail-order houses or $95 through their local speed shops.[120] Not until the late 1960s would this muddle begin to resolve itself definitively.[121]

Nevertheless, in spite of the tangled web of competing distribution outlets that evolved in the late 1940s and the early 1950s, the industry continued to grow at a phenomenal pace. By 1952, the top 12 high-performance aftermarket firms alone were doing $50 million a year in combined sales, and scores of smaller firms were pulling in enough not only to survive, but also to expand.[122] Facilities expansions, in fact, were so common within the L.A. industry that very few of the companies that survived for longer than a year or two failed to move into a larger plant at one point or another during the period in question, and some – Iskenderian and Wayne, for example – did so more than once.[123] By the mid-1950s, therefore, the tiny garages and backyard shed workshops that had once been the norm among the area's manufacturers had been replaced with production facilities of 5,000, 10,000, and in some cases even 20,000 square feet.[124] For most aftermarket firms, however, achieving a relatively high sales volume and filling ever-larger facilities during the late 1940s and the early 1950s rarely necessitated the full-time employment of more than a handful of machinists and other laborers. Most had less than a half-dozen employees, and even the largest rarely maintained a staff of more than ten to twenty. Edelbrock, for example, which had grown to become the largest manufacturer in the country by 1953, still employed only about ten to twelve machinists as late as the early 1960s.[125] Engle, too,

[120] Robert Lee Behne, "Speed Equipment," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 128.
[121] See below, chapter 4.
[122] G. G. Gordon, "Hot Rods are Big Business," *Auto Sport Review*, September 1952, 36-39.
[123] Period advertisements for speed equipment manufacturers always bore their addresses; consequently, these ads have made it possible for the present author to track the precise location of nearly every California-based company during the entire period in question. A comprehensive review of this data reveals that Iskenderian moved twice, first in the summer of 1949 and then in the summer of 1951. Evans on the other hand moved three times: first in the winter of 1948-1949, then in the winter of 1950-1951, and again in the summer of 1952. What's more, by cross-referencing these dates against the relevant period literature ("Meet the Manufacturer," "Manufacturers News," and "What's New" columns from the enthusiast magazines, for the most part), we find that not only did these and other, similar companies move repeatedly during the late 1940s and the early 1950s, but they did so overwhelmingly in order to move into larger facilities.
[124] Douglass, for example, occupied 20,000 square feet by 1951 ("Touring the Hot Rod Shops: *HRM* Takes a Look at One of the West's Leading Muffler Manufacturers - Douglass Muffler Shop," *HRM*, July 1951, 28-29).
[125] Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003.

maintained a staff of less than six well into the 1970s.[126] There were of course exceptions: Harman and Collins, for one, peaked in the late 1950s with an annual volume of $600,000 and a staff of thirty.[127] For the most part, though, the postwar California speed equipment industry consisted of a number of small firms that nevertheless managed to crank out ever-larger runs of high-performance manifolds, pistons, heads, and the like.

Flexible, diverse, open-ended, enthusiast-based, and small: these were the traits that characterized the postwar Southern California speed equipment industry as a whole. But what does any of this have to do with the Los Angeles area specifically? After all, companies scattered throughout the United States during the same period could very well have exhibited these same features – and indeed, many did. What, then, made the Southern California companies' experience(s) unique? Consider the clues that the following four brief company profiles afford.

Offenhauser

Shortly after Harry A. Miller's partnership with George Schofield began to go awry in 1930,[128] one of Miller's longtime employees, Fred Offenhauser, decided to jump ship. Offenhauser, a machinist by trade and Miller's racing-engine shop supervisor for more than twenty years, subsequently opened a shop of his own in which he and a small crew hand-assembled double-overhead-camshaft four-cylinder racing engines similar to those for which Miller had once been famous. By 1936, Offenhauser's motors powered nearly half of the field at Indianapolis, and from the late 1930s up through the early 1970s, the "Offy" was *the* big-stage American racing engine to beat.[129]

Offenhauser's nephew, Fred C. Offenhauser, went to work for his uncle in the early-1930s, while he was still in high school. Through the late 1930s and into the early 1940s, the

[126] Dave Wallace, Jr., "Jack Engle Walks Softly, Carries Big Bumpstick," *Drag News*, November 22, 1975, 16-17.
[127] Almquist, "Cliff Collins and Kenny Harman," in *Hot Rod Pioneers*, 130.
[128] See above, chapter 2.
[129] On Offenhauser's years at Harry Miller's shop as well as the early racing successes of the Offy engine in the mid-1930s, see William J. Tandy, "Speed: Six Dollars a Pound," *Popular Mechanics*, August 1936, 194-196 and 126A. On the Offy engine's later successes, see Almquist, "Robert DeBisschop: A Key Player in the Offy's Struggle for Survival," in *Hot Rod Pioneers*, 273.

young Offenhauser continued on at his uncle's shop, where he learned the tricks of the trade and was frequently told that the prosperous business would one day be his. In 1946, however, while the younger Offenhauser was serving abroad in the U.S. Navy, his uncle sold the entire business – shop, tools, patterns, and inventory – to Louis Meyer and Dale Drake. Meyer and Drake, already famous for their on-track exploits before the war, would go on to produce competitive Offy engines for more than thirty years.[130]

Upon his return from the service, the "[d]eeply disappointed young Fred left the Offy enterprise" he no longer had any hope of ever owning and struck out on his own.[131] Fred, who drove a souped-up prewar roadster, decided to try his hand at the manufacture of add-on high-performance parts. In 1947, he teamed up with another young enthusiast, Fran Hernandez, to found the Offenhauser Equipment Company in Los Angeles.[132] Hernandez, a trained machinist and fellow veteran of the Offenhauser racing engine company, worked with the young Fred Offenhauser for about a year and a half before leaving to manage a part of Edelbrock's growing enterprise. Later, Hernandez would go on to work (and race) for Mercury in conjunction with its motorsports-promotions efforts of the late 1950s and the early 1960s.[133]

The young Fred, for his part, continued to manage the Offenhauser Equipment Company with the help of his brother Carl and an experienced racing engine builder by the name of Ollie Morris.[134] Soon, their high-compression flatheads and well-executed intake manifolds for the flathead Ford and Mercury V8 engines began to earn the respect of postwar performance enthusiasts, and the business began to boom. In 1950, Fred moved his company to a larger facility across town, and in the early 1950s, he began to diversify as well, adding manifolds, cylinder heads, and other high-performance parts for various domestic overhead-valve V8 and straight-six engines to his growing inventory. Ten years later, Fred would play an important role

[130] Almquist, "Fred C. Offenhauser: A Credit to his Namesake," in *Hot Rod Pioneers*, 96-97, and Don Francisco, "Story of the 270 Offenhauser," *HRM*, June 1952, 22-29, 51-53, and 60-63.
[131] Ibid.
[132] Ibid.
[133] On Hernandez, see Almquist, "Fran Hernandez: Funny-Car Baptizer," in *Hot Rod Pioneers*, 73. Hernandez was also a key player in the first police-sanctioned drag race, held at Goleta in 1949. See Post, *High Performance*, 1-3.
[134] Almquist, "Fred C. Offenhauser," 96.

in getting the industry's first industrial organization off the ground, and in the early 1970s, Offenhauser's assistance in the aftermarket's effort to work with federal and state environmental regulators would prove to be critical.[135] In 1955, though, he was but one of many who had managed, with the help of a few close friends, to turn an interest in hot rods into a business dependent upon them.

Wayne / Horning

Just after World War II, a Southern California enthusiast by the name of Wayne Horning secured a loan from an older L.A.-area racer, Marvin Lee, for the design and construction of a 12-port aftermarket cylinder head for GMC and Chevrolet inline-six applications. Cast of iron, Horning's heads featured six intake ports on one side and six exhaust ports on the other, making it a cross-flowing cylinder head that was capable of producing dramatic results when bolted in place of the standard GMC or Chevrolet heads.[136] Very few of these heads were made before Horning decided to cash out of the operation in 1949. At that point, the patterns and tooling for his 12-port Chevrolet unit, which was known as the "Wayne," were sold to Harry Warner, who established a manufacturing company to produce it. Warner subsequently added a GMC cylinder head of his own design to his lineup, machining both out of cast iron much as Wayne Horning had. Horning's 12-port "Horning" GMC cylinder head design, however, was sold to a young hot rodding enthusiast, Fred W. Fisher, who worked at a small Long Beach machine shop called the Electronic Balancing Company.[137]

Fisher, a one-time flathead devotee, claimed to have "see[n] the light" in the late 1940s after riding in a friend's hopped-up Chevrolet coupe, and thereafter, he devoted most of his time

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[135] See below, chapters 5 and 6.

[136] On the Horning cylinder head's design and performance capabilities, see Batchelor, *The American Hot Rod*, 96 and 115; Almquist, "Chevy 'Stove Bolt' Six," in *Hot Rod Pioneers*, 87; and Don Francisco, "The Horning GMC: Converted Truck Engine with Special Cylinder Head Forms Nucleus of Capable Competition Powerplant," *HRM*, April 1951 (20-23) and May 1951 (20-23 and 42-43). On Marvin Lee's role in getting the project off the ground just after World War II, see Drake, *Hot Rodder!*, 70.

[137] On the split sale of the Horning design, see Batchelor, *The American Hot Rod*, 96 and 115. On the Electronic Balancing Company, see "Manufacturers News," *HRM*, July 1948, 27.

and energy to the overhead straight-six design.[138] In fact, Fisher, who often went by "California Bill," went on to publish numerous technical and how-to articles in the enthusiast periodicals on the Chevrolet and GMC engines in the early 1950s, and he also put out a full-length how-to book on the subject (and on the flathead Ford mill as well) in 1951.[139] Fisher took the patterns for the cast-iron "Horning" GMC head and contracted with a local foundry for a batch of rough aluminum castings. These he then machined, assembled, and placed on the market as the "Horning-Fisher" 12-port GMC cylinder head. Combining Horning's fundamentally-sound cross-flowing architecture with the superior heat-dissipating and detonation-suppressing characteristics of cast aluminum, the Fisher-Horning head was a smashing success in spite of the fact that it retailed for more than $230 in 1952.[140]

Horning, for his part, continued to be an active member of the high-performance industry, assembling complete, astonishingly capable six-cylinder racing engines and even a few special-order racing-spec 12-port heads in his Los Angeles workshop well into the 1950s. Chet Herbert, an area camshaft grinder and valvetrain specialist, produced the tappets and related components for the special-order Horning competition heads, while Offenhauser supplied auxiliary devices like high-pressure oil and water pumps for Horning's complete racing engines. Venolia pistons were also standard-issue in these mills, and Horning fitted quite a few of them with Hilborn fuel injectors as well.[141]

In the early 1950s, therefore, Horning heads were available from three different sources: Warner supplied street and mixed-use cast-iron Chevrolet units; Fisher built cast-aluminum

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[138] Fisher, *Chevrolet Speed Manual*, 2.

[139] See, for example, Fred W. Fisher, "5 Ways to Power!" *Rod and Custom*, June 1953, 57-58, 60-61, and 64 (this was the first of a three-part series that concluded in October of 1953); Bill Fisher, "Easy Does It: $100 Chevy Conversion," *Honk!*, November 1953, 56-59; and California Bill Fisher, "Got a Driveline Dilemma?" *HRM*, September 1955, 28-31. Fisher's Chevrolet/GMC tuning book, the *Chevrolet Speed Manual*, came out in 1951, and his Ford manual first appeared the following year (Fred W. Fisher, *Ford Speed Manual* (Tucson, AZ: Fisher Books, 1995 [1952])).

[140] Behne, "Speed Equipment," in Jaderquist and Borgeson, *Best Hot Rods – 1953*, 136, and Batchelor, *The American Hot Rod*, 96.

[141] On Horning's subsequent career in the racing engine business, see C. E. Camp, "Chevrolet Engine Conversion, Part II," *HRM*, December 1949, 16-17, and Don Francisco, "The Horning GMC: Converted Truck Engine with Special Cylinder Head Forms Nucleus of Capable Competition Powerplant," *HRM*, April 1951 (20-23) and May 1951 (20-23 and 42-43).

mixed-use GMC units; and Horning produced all-out competition units for GMC-based engines. All, however, stemmed from the same postwar, Marvin Lee-financed designs. And in the end, all would disappear in the late 1950s, victims of the new Chevrolet V8's emerging dominance.

Eddie Meyer Engineering

In the late 1930s, an L.A. hot rodder by the name of Eddie Meyer began producing dual-carburetor intake manifolds, high-compression flatheads, and converted ignitions for the L-head Ford V8 engine, selling them to fellow lakes- and street-racing enthusiasts in order to help finance his own hot rodding endeavors.[142] With the help of his brothers, Louie and Bud, not to mention a healthy dose of advice from the legendary Ed Winfield, Eddie managed to establish a solid reputation among area racers, and his business had only just begun to pick up steam when the events of December 7, 1941 suddenly brought it all to a halt. After the war, Meyer's West Hollywood shop picked up where it had left off four years earlier, prospering as never before in spite of his brother Louie's decision to leave in order to purchase a share of the Offenhauser engine facility in 1946.[143]

During the late 1940s, sales expanded, as did Meyer's line of speed equipment. Active on the lakes and, increasingly, within speedboat racing circles as well, Meyer remained firmly rooted in the world of the average enthusiast, honing and refining his flathead products as their needs changed over time.[144] Meyer, though, was an L-head V8 enthusiast through and through, and by the early 1950s, he was one of only a handful of manufacturers that had failed to diversify into the expanding market for overhead-valve V8 speed equipment. His sales therefore leveled off in the early 1950s, and by the end of the decade, the Meyer name was on the wane. According to his brother Bud, Eddie soon decided that "[t]he speed equipment business [had

[142] Batchelor, *The American Hot Rod*, 77.
[143] On Meyer's relationship with Winfield, see Almquist, "Ed Winfield: The Reclusive Genius," in *Hot Rod Pioneers*, 5. On the Meyer brothers, see Almquist, "Eddie and Louie Meyer," in *Hot Rod Pioneers*, 19-20; Almquist, "Robert DeBisschop," 273; and Don Francisco, "Story of the 270 Offenhauser," *HRM*, June 1952, 22-29, 51-53, and 60-63.
[144] Montgomery, *Authentic Hot Rods*, 20, and "Flying Water Bugs," *Popular Mechanics*, April 1946, 96-100, 244, and 246.

become] a rat race," and so, in the early 1960s, the brothers closed their hot rod shop and "went into the specialized world of exotic foreign car repair."[145]

Meyer manufactured a lot of flathead speed equipment during the 1960s, but his ultimate significance to the history of the industry had very little to do with any one of his items in particular. Neither, for that matter, did his importance stem from the sheer variety of flathead gear that he produced. To be sure, his L-head products were diverse, but he was not, as some have claimed, the first to offer a full line of speed equipment – that honor almost certainly goes to Robert Roof's first company, Laurel.[146] Instead, Eddie Meyer Engineering was a critical early aftermarket manufacturing firm because of the people Bud and Eddie Meyer hired and worked with – or rather, because of the people they *trained* in their shop, and what those people went on to do within the high-performance industry. The first, of course, was their brother Louie. The second was a young enthusiast by the name of Ray "Racer" Brown. Brown, a talented racer and a gifted engine builder, got his start in Eddie's shop shortly after Louie left in 1946; four years later, Ray went out on his own, and during the 1950s, magazines including *Car Craft* and *Hot Rod* would often tap his expertise for technical, how-to, and feature articles for their pages.[147] Likewise, Lou Senter went to work for Eddie Meyer just after World War II, assembling engines and manning various pieces of machinery for about a year and a half before leaving and teaming up with Jack Andrews to found Ansen Automotive in Los Angeles.[148] Likewise, Ed Pink, famous in the late 1950s, the 1960s, and beyond for his racing engines, started off in Eddie Meyer's shop just after the Korean War. There, he cut his teeth in the engine assembly business, learning the

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[145] Almquist, "Eddie and Louie Meyer," 20.
[146] Montgomery, for one, claims that Mayer was "perhaps the first to offer a full line of racing equipment," (*Authentic Hot Rods*, 20), but as we have already seen, a number of prewar and even Model T era companies had already done so many years earlier, including, most notably, Laurel Motors. See above, chapter 1.
[147] On Brown's time at Eddie Meyer Engineering, see Batchelor, *The American Hot Rod*, 65. For a few examples of Brown's 1950s technical articles, see Racer Brown, "Are Exhaust Headers Only a Gag?" *Motor Trend*, February 1953, 28-29; Racer Brown, "Building for Nitro: Sparking the Competition Engine," *Car Craft*, November 1954, 44-47, 61, and 65-66; and Racer Brown, "Do a Better Ring Job," *HRM*, March 1955, 14-19, 58-61, and 66.
[148] On Senter's work at Eddie Meyer's shop, see Almquist, "Lou Senter: Racers' Head Guru," in *Hot Rod Pioneers*, 53-54. On Ansen, see "Ansen Automotive," *Drag News*, May 2, 1964, 20-21; Karen Scott, "Meet the Manufacturer: Ansen," *Drag News*, July 12, 1969, 15; and Dick Wells, "Interview with Louie Senter, Jim Deist, and Ed Iskenderian, November 7, 2002," in *SEMA "Old Timers" Interviews*, Video Cassette #2, SEMA-RC.

tricks of the trade before venturing off on his own.[149]

Brown, Ansen, and Pink: in the long run these, far more so than anything else, would prove to be the most significant legacies of Eddie Meyer's two and a half decade reign among the speed equipment manufacturing elite.

Iskenderian

As a teenager in the late 1930s, Ed Iskenderian was an apprentice machinist who spent his spare time hanging around with L.A.-area automotive enthusiasts. Over the course of 1939 and 1940, he built a Model T Ford roadster fitted with a flathead V8 engine that was equipped with a set of relatively rare Maxi overhead-valve cylinder heads. Soon, he decided that a high-performance camshaft was in order as well, and so he got in touch with Ed Winfield in order to negotiate the purchase of one of Winfield's famous bumpsticks. These cams were so popular at the time that Winfield was having a difficult time keeping up with his orders, and it often took him several months to fill them once received. Ed's particular order was among the many that were delayed, so he motored on over to Winfield's shop to get a better handle on the situation. Winfield took a liking to the young man, welcoming him into his shop and showing him some of the tricks of the trade. However, just about the time Ed was beginning to wonder whether he, too, might be able to get involved in the camshaft market, given the backlog at Winfield's facilities, along came World War II.[150]

During the war, Iskenderian served as a B-24 tail gunner in the Army Air Corps, and upon his return he immediately got back in touch with Ed Winfield. Further tours of Winfield's shop and hours spent conversing with the "reclusive genius" convinced Iskenderian that his future was in camshafts. In 1947, he managed to secure the use of a small corner of a friend's

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[149] On Ed Pink's beginnings at Eddie Meyer Engineering as well as on his subsequent career, see Almquist, "Edward Pink: Master Engine Builder," in *Hot Rod Pioneers*, 288-289. See also Al Caldwell, "Meet the Manufacturer: Ed Pink Racing Engines," *Drag News*, August 18, 1967, 26-27, and Jerry Brandt, "Ed Pink," *Drag Racing*, May 1975, 60-62.

[150] On Iskenderian's early training as well as his time spent at Ed Winfield's shop, see Almquist, "Ed 'Isky' Iskenderian," 108-110, and Dick Wells, "Interview with Louie Senter, Jim Deist, and Ed Iskenderian, November 7, 2002," in *SEMA "Old Timers" Interviews*, Video Cassette #2, SEMA-RC.

machine shop, where he set up a cylindrical grinder that he had obtained for next to nothing, adapted it to the task at hand, and launched Iskenderian Racing Cams. The operation was simple: Ed's sole employee, Norris Baronian, would rough-grind five or six camshafts during the day, and Ed would then come in at night to finish them off. Sales, however, were somewhat sluggish. "At first, the California boys wouldn't buy my cams because they considered me a fellow racer who didn't know anything," Ed would later recall, explaining that he therefore turned to the burgeoning East-Coast stock car racing scene in order to generate his early sales.[151] Before long, West-Coast rodders began to join the bandwagon as well, although the Iskenderian name remained a tough sell for another couple of years.[152]

And that's when an old friend of Ed's, Vic Edelbrock, stepped in to help Iskenderian expand his sales – and improve his standing – within the hot rodding community. Edelbrock, whose manufacturing business was fast becoming the largest in the industry, had quite a bit of influence among area distributors and speed shops at the time, and he was therefore able to help Ed muscle his way into the inventories of speed shops coast to coast. And as a result, Iskenderian's operation quickly grew in the early 1950s, moving twice as Ed sought sufficient machining and warehousing space for what was quickly growing into one of the largest camshaft regrinding outfits in the country.[153]

An innovator and an aggressive salesman, Iskenderian would remain atop the camshaft field for many decades to come, but in the late 1940s, it was his friendships with Ed Winfield and Vic Edelbrock that helped to get his fledgling enterprise off the ground.

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Clearly, *people*, and the ways in which they flowed between companies, established spin-offs, and ultimately came to form thick webs of contact and experience during the period in question, were among the most significant end results of the speed equipment industry's postwar

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[151] Almquist, "Ed 'Isky' Iskenderian," 108-110.
[152] Almquist, "Ed 'Isky' Iskenderian," 108-110, and "Meet the Advertiser: Iskenderian," *Hop Up*, April 1952, 26-27.
[153] On Edelbrock's assistance, see Almquist, "Ed 'Isky' Iskenderian," 108-110. On his early growth and location changes, see "Meet the Advertiser: Iskenderian," *Hop Up*, April 1952, 26-27.

concentration in the greater Los Angeles metropolitan area. Offenhauser learned the ropes from his uncle, who had in turn learned what *he* knew about racing engine design from the famous Harry A. Miller. Likewise, Fran Hernandez started off at the elder Offenhauser's plant before splitting off with the younger in 1947, joining forces with Edelbrock in 1949, and ultimately leaving the speed equipment industry altogether to help direct the motorsports agenda of the Mercury Division at Ford. Another Harry Miller protégé, Ed Winfield, went on to influence the methods and strategies of a number of aftermarket personalities, including George Riley, Vic Edelbrock, Eddie Meyer, Ed Iskenderian, and Kong Jackson. Meyer in turn brought the likes of Ray Brown, Lou Senter, and Ed Pink into the ranks of the growing 1940s and 1950s speed equipment industry, while his brother Louie went off with Dale Drake to help ensure the future of the famous Offenhauser racing engine. Meanwhile, Edelbrock and Winfield helped propel a young Ed Iskenderian into a career in the camshaft business, and Wayne Horning, Harry Warner, and "California Bill" Fisher managed to spin a single cylinder head design concept into three distinct and successful early 1950s businesses.

Other examples abound. Barney Navarro, for one, got his start at Weiand just prior to World War II. And Clay Smith, for his part, learned the ins and outs of the camshaft trade from Pete Bertrand in the late 1930s, as did Karl Orr. Similarly, Bill Spalding briefly worked for Harman and Collins just after the war before going into the camshaft business for himself, and Howard Johansen's top cam grinder during the 1950s, hot rodder Al Barnes, spun off towards the end of the decade to found his own oiling and racing engines company, Barnes Systems. Likewise, one of Sandy Belond's top deputies at the Southern California Muffler Company in the 1950s, Bob Hedman, ultimately went on to start his own exhaust header manufacturing concern in the early 1960s. Finally, prewar cylinder head manufacturer Art Sparks teamed up with Fred Carrillo in the early 1950s to develop the virtually indestructible connecting rods for which Carrillo remains famous to this day.[154] And these, in fact, were but the tip of the iceberg:

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[154] On Navarro, see Almquist, "Barney Navarro," 51-52. On Clay Smith, see Bob Dearborn, "The Clay Smith Story," *Hop Up*, July 1953, 34-37. On Karl Orr, see Drake, *Hot Rodder!*, 41-43. On Spalding, see Medley, *Tex Smith's Hot Rod History, Volume One*, 77. On Barnes, see Montgomery, *Hot Rod Memories*, 91 and 105. On

many other spin-offs and incidents of cross-fertilization between companies would occur as the 1950s wore on, and subsequent periods would witness similar developments.

Ultimately, these webs of contacts and inter-firm relationships that were so prevalent within the Los Angeles speed equipment industry – both during the period in question and, in some cases, for decades prior – suggest at least a partial explanation for the region's postwar domination of this particular manufacturing sector. Consider, for a moment, Philip Scranton's concept of *networked specialists*, "clusters of smaller companies in urban industrial districts [that] offered diverse finished goods to households and enterprises, relying on thick webs of contact and affiliation to organize production and sales."[155] One of three distinct types of specialty manufacturers of the late-nineteenth and early-twentieth centuries that Scranton describes in *Endless Novelty*, these networked specialists were in many ways analogous to the firms that would constitute the California hot rod industry in the late 1940s and the early 1950s. After all, aftermarket companies were small, they were clustered in or near a particular city, they produced and sold a diverse array of products to their customers, and their business practices did in the end result in dense networks of contacts among them. Perhaps, in other words, the industry's overwhelming concentration within the L.A. area in the postwar period was merely a symptom of the way in which its constituent firms conducted their affairs.

Perhaps. But the fundamental question remains unanswered – why Los Angeles? Scranton's model suggests that regional clusters developed in part because of the presence in a particular area of large pools of skilled, often immigrant laborers that the specialist firms could "partake of" as needed. In addition, the presence of other companies that he calls "specialist auxiliaries" – foundries, general machine shops, and the like that could furnish rough castings and other producer services on demand – within a particular region was also likely to attract

Hedman, see Almquist, "An 'Exhausting' Business," in *Hot Rod Pioneers*, 124. And, finally, on Carrillo's relationship with Sparks, see Almquist, "Fred Carrillo: His Rods Make a Better Connection," in *Hot Rod Pioneers*, 250-251.

155 Scranton, *Endless Novelty*, 21. See also Sabel and Zeitlin, "Historical Alternatives to Mass Production," especially pages 142-156, which describes a similar clustering effect among 18th and 19th century American and European "flexible specialists."

specialist manufacturers.[156] And indeed, Los Angeles certainly had both of these in the late 1940s and the early 1950s: a large, government-contract-based aircraft industry ensured not only that the region was filled with skilled machinists of varying levels of experience, but also that a number of smaller foundries and machine shops operated there as well. Its economic climate was, in other words, one which would have been highly conducive to precisely the sort of specialty manufacturing practices that the speed equipment industry embraced. Nevertheless, a critical causal link is missing. Why Los Angeles, that is, and not for example Detroit, which had not only a number of small foundries and a large pool of experienced machinists, but also factories and personnel experienced in automotive parts production? Or Chicago, for that matter, where in addition to the necessary production inputs one would also have enjoyed the benefits of a location better situated to quickly serve the needs of what was fast becoming a national phenomenon?

The answer is simple, really, although it actually has very little to do with Los Angeles per se. Instead, it has to do with who was there at the time – who the industry's employees were, who its employers were, and who its customers were. For indeed, with very few exceptions, they were all hot rodding enthusiasts. They all raced at the lakes, the drags, or at Bonneville. They all built cars at one time or another. They all went to the shows at the Los Angeles Armory. They all read *Hot Rod*, *Hop Up*, and the rest of the periodicals. They were all, in short, integral members of a community of enthusiasts, one that had deep roots in the prewar lakes and street racing scenes of the Southern California region. The speed equipment industry of the late 1940s and the early 1950s thus emerged from within this community, and in seeking to organize their production and marketing strategies, the enthusiast-entrepreneurs behind such firms as Edelbrock, Weiand, Offenhauser, and Navarro called not simply upon an undifferentiated mass of skilled machinists, but rather upon their friends and associates from the lakes, the drags, the shows, and the local bench racing hot spots. Networked specialists they were, in other words, but their networks included not only the requisite contacts with other manufacturers, but also with

[156] Scranton, *Endless Novelty*, 18-21.

their employees and their end-use customers.

In a broader sense, then, the Los Angeles speed equipment industry of the 1940s and the early 1950s was more than just a clustering of "independent craftsmen."[157] Instead, it was part of a larger productive network based within the Southern California region, a network whose "product" was nothing less than the American hot rodding phenomenon itself. As Bruno Latour explains in his landmark analysis of the scientific community,

> [t]he word network indicates that resources are concentrated in a few places – the knots and nodes – which are connected with one another – the links and the mesh: these connections transform the scattered resources into a net that may seem to extend everywhere.[158]

For Latour, of course, the "knots and nodes" are scientists and scientific institutions, whose interaction within a network known as the scientific community results in the production of scientific knowledge. In the Southern California hot rodding community or "network" of the 1940s and the 1950s with which we are presently concerned, though, individual speed equipment companies and their factories certainly were among the critical "knots and nodes," but so too were the dry lake beds, the dragstrips, the clubhouses, the bench racing hot spots, and the average rodders' garages. Binding these nodes into a productive network – a vibrant community, that is, that "produced" the hot rodding phenomenon that seemed to "extend everywhere" – were the enthusiasts themselves.

* * *

Nowhere else did such a community or "network" of enthusiasts, entrepreneurs, and enthusiast-entrepreneurs exist in the postwar period, and although the Southern California industry's share of the pie was beginning to shrink perceptibly by the early 1950s, nowhere else did more than a handful of speed equipment manufacturing companies ever operate at once during the period in question. Nevertheless, by the spring of 1955, some within the L.A.-area aftermarket had come to believe that a very real and imminent threat to their industry's cohesion and prosperity was indeed beginning to gather steam "back East." It was not, however, Ed

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[157] Sabel and Zeitlin, "Historical Alternatives to Mass Production," 142.
[158] Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, MA: Harvard University Press, 1987), 180.

Almquist's Milford, Pennsylvania speed equipment factory that they feared. And neither, for that matter, was it Gotha in Harvey, Illinois, R&R in Anderson, Indiana, Crane in Hallandale, Florida, or Ardun on Manhattan Island in New York City. Instead, it was the OEMs and their escalating 1950s "horsepower race" that had begun to keep them up at night. As Barney Navarro lamented in *Rod and Custom* that March, for example, "Chevrolet can [now] supply a 4 throat carburetor and manifold plus a dual exhaust system for a much lower price than any speed equipment manufacturer will ever find possible." Factory "power packs," in other words, were beginning to infiltrate the street-use market to a degree that was more than a bit disconcerting to folks like himself, whose livelihood was dependent upon "bread and butter" aftermarket sales of bolt-on manifolds, headers, and the like.[159] Pessimistic in the face of such an overwhelming competitive challenge, Navarro could not help but wonder aloud whether the speed equipment industry would be able to continue to play a role in the evolution of American high-performance motoring in the years to come. Perhaps, that is, the aftermarket's fifteen minutes had already come and gone.

[159] Navarro, "Hopping Up the Chevy V8," *Rod and Custom*, March 1955, 19-23. All of the quoted material appears on page 19.

Chapter Four: Overhead Valves and OEM Muscle

What Navarro had witnessed – and openly feared – back in 1955 was the onset of the so-called "horsepower race." That year, using basic tuning tricks long common among ordinary hot rodders, mainstream American manufacturers like Chevrolet, Ford, and Chrysler had begun to compete for the performance-minded motorist's dollar by tweaking their overhead-valve V8 engines for superior horsepower ratings. By the end of the decade, in spite of a well-publicized truce that had gone into effect in late 1957, passenger-car horsepower figures had reached an all-time high, often exceeding 300 even in those models *not* equipped with optional performance-enhancing "power packs." And this was only the beginning. During the 1960s, fierce competition within the all-new musclecar segment quickly pushed the horsepower race into territory many considered irresponsible and even downright dangerous: by the end of the decade, 400, 450, and even 500-plus horsepower[1] "factory hot rods" were selling like hotcakes to lead-footed young baby boomers from sea to shining sea.

Now, according to legend, this OEM "horsepower race" – and, more specifically, its 1960s "musclecar" phase – all but wiped out shadetree hot rodding. Ron Roberson, for example, records in his delightful biography of a 1950s and 1960s Ohio hot rod club that, once the musclecar boom had begun,

> [t]he traditional hot rod with its club support system was dying. There was no [longer any] need to build a hot rod when you could buy one off the showroom floor and make monthly payments. It even had a warranty.

"Muscle cars," Roberson concludes, "replaced hot rods."[2] And in their respective popular histories, Ed Almquist, Pat Ganahl, and Gary and Marilyn Meadors all agree: OEM muscle may

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[1] Advertised horsepower ratings rarely exceeded 425, even at the height of the musclecar craze, but actual at-the-flywheel horsepower was often considerably higher in practice. In 1964, for example, Chrysler's 426 NASCAR Hemi was officially rated at 400 horsepower, although actual output was estimated to be in the neighborhood of 550; similar discrepancies were common among other brands and models as well (Ray Brock, "Modern Hemi from Chrysler," *HRM*, April 1964, 44-47).

[2] Roberson, *Middletown Pacemakers*, 118. Roberson's father had been a member of the Ohio club featured in his book.

well have been good for performance enthusiasm, but certainly not for traditional hot rodding.[3] Perhaps more to the point, Tom Wolfe ably chronicles the ways in which the horsepower race represented an attempt on the part of the OEM manufacturers to capitalize on the burgeoning hot rodding phenomenon by appropriating its grassroots methodology and incorporating it into their own automotive mass production juggernaut.[4] And H. F. Moorhouse, for his part, rightfully emphasizes the frustration that leading members of what he calls the "hot rodding fraternity" often expressed with regard to these unwelcome OEM incursions onto turf that they had long since come to regard as their own.[5]

But if this actually was the case – *if*, that is, the OEM horsepower race truly was responsible for a precipitous decline in traditional performance tuning and hot rodding during the late 1950s and the 1960s – surely, then, one would expect the history books to overflow as well with tales of once-prosperous speed equipment manufacturers forced to concede defeat as 400 horsepower factory beasts gradually rendered their businesses obsolete. However, apart from a few offhand and unsupported remarks that the aftermarket as a whole was outclassed, outmatched, and out-engineered by the OEM during the course of the 1960s, the secondary literature is all but silent on the matter.[6] So, too are the period sources. During the 1960s, a few outspoken critics would eventually begin to re-hash Barney Navarro's 1955 concerns, but on the whole, very few who were involved in the design, manufacture, distribution, or retail sale of aftermarket speed equipment during the late 1950s and the 1960s ever spoke of impending doom at the hands of the OEM. To a man, in fact, they all were far more likely to be concerned about the emergence of ever-stricter federal- and state-level automotive safety, noise, and

[3] See Almquist, "East Versus West: Drag Racing's Surprising Comeuppance," in *Hot Rod Pioneers*, 196-197; Ganahl, "The California Hot Rod," in Dobrin, Linhares, and Ganahl, *Hot Rods and Customs*, 24; and Gary and Marilyn Meadors, *Goodguys Hot Rod Chronicles* (Sebastopol, CA: Thaxton Press, 1996), 52-53.
[4] On Wolfe's research, see Cohen, *A Consumer's Republic*, 309.
[5] Moorhouse, *Driving Ambitions*, 123.
[6] This particular suggestion is buried deep within Roger Huntington's otherwise excellent history of OEM performance cars (*American Supercar: Development of the Detroit High-Performance Car* (Osceola, WI: Motorbooks International, 1990 [1983]), especially pages 36 and 73). Back in the 1950s and the 1960s, Huntington had been a technical and feature contributor for several of the enthusiast periodicals, including *Speed Age*, *Speed Mechanics*, and *Popular Hot Rodding*.

environmental regulations than they were with yearly sales of Pontiac GTOs or SS Chevelles. For as it happened, the decade and a half that followed on the heels of Navarro's ominous musings proved by and large to be a period of unprecedented growth and prosperity for the American speed equipment industry.

This was especially true of the 1960s. Modest annual growth in the mid- to late 1950s had, according to one conservative estimate, resulted in an industry worth well in excess of $36 million annually by 1961. Five short years later, however, speed equipment manufacturers would record $148 million in annual sales, and by 1970, the figure had climbed to a staggering $1.168 billion.[7] The fact that aggregate growth of this magnitude occurred at all is itself remarkable; that

[7] Back in 1952, *Auto Sport Review* reported that the 12 largest speed equipment manufacturers alone had racked up more than $50 million in sales that year (see above, chapter 3). At a glance, estimates of $36 million for the entire industry as of 1961 thus appear quite low – and, for that matter, they seem to show at least a 35 percent *decline* in high-performance sales over the course of the 1950s. Closer inspection of the numbers, however, reveals that this was almost certainly not the case. To wit: the figures for 1961 are estimates based on the recollections of those manufacturers who participated in *Hot Rod Industry News*'s 1967 survey of manufacturers. In that 1967 survey, respondents were asked to disclose their 1961 and 1966 sales totals, resulting in numbers that the editors then crunched to determine a very conservative estimate of the industry's 1966 aggregate value and of its growth over the previous five years. The numbers they came up with then went into their write-up, which was published in September of 1967 (Cec Draney, "Hot Rod Industry News Survey," *Hot Rod Industry News*, September 1967, 36-42; hereafter, *Hot Rod Industry News* will be cited as *HRIN*). However, according both to the survey itself and to the publisher's comments which preceded it that month (Ray Brock, "Publisher's Report," *HRIN*, September 1967, 6), the numbers were low by an estimated 66 percent – retailers, for example, whose numbers also appeared under a separate heading in the write-up, thus were likely to have done not $111 million in gross sales in 1966, as reported, but possibly as much as $333 million. Similarly, the number given for the manufacturing end of the industry for 1961, $36 million, may well have been closer to $108 million in reality, and the figure for 1966 of $148 million closer to $444 million. At worst, therefore, the industry stood at $36 million in 1961 and $148 million in 1966; at best, $108 million and $444 million, respectively. The aforementioned figure of $1.168 billion for 1970, on the other hand, is pretty much spot-on: though it comes from a survey published in 1971 that was similar to that published back in 1967, an independent survey conducted in the early months of 1969 indicated that the manufacturing end of the industry was already nearing the $1 billion mark, a milestone knowledgeable insiders believed was passed by the end of fiscal 1969; therefore, $1.168 billion for 1970 is probably reasonably accurate (see "Hot Rod Industry News 1971 Industry Survey, *HRIN*, August 1971, 26-32; Don Prieto, "Detroit Bulletin," *HRIN*, July 1969, 8 and 18; and Dennis Pierce, "A Look Into the 70's," *HRIN*, January 1970, 70). Incidentally, if were to reject the conservative estimate of $36 million for 1961 and opt instead to buy into the more liberal figure of $108 million, that would mean that the industry grew by more than 1,000 percent between 1961 and 1970. If, on the other hand, we accept the conservative estimate of $36 million instead, percent growth approaches an unbelievable (read: unlikely) 3,000 percent for the decade. More than likely, therefore, the actual figure for 1961 probably stood much closer to the more liberal estimate; absolute precision in the matter is unfortunately well beyond our reach. Further complicating matters, of course, is inflation, although its impact on the magnitude of growth suggested by these figures from the 1960s is fairly negligible: adjusted for inflation, for example, the conservative estimate of $36 million for 1961 works out to approximately $46.72 million in 1970 dollars, and the more liberal estimate of $108 million for 1961 works out to $140.15 million in 1970 dollars (calculations performed with the aid of the Bureau of Labor Statistics CPI Inflation Calculator, available online as of September of 2004 at stats.bls.gov). Compared with our figure of $1.168 billion for 1970, therefore, our inflation-adjusted figures for 1961 suggest a no less staggering rate of growth for the speed equipment industry of between 850 and 2,500 percent over the course of the 1960s. Hence, any way

it occurred precisely during those years in which the OEM's own musclecars had reportedly all but crushed traditional hot rodding is all the more striking – and a bit puzzling. On the one hand, we have widespread reports in the historical record that hot rodding declined appreciably during the 1960s because of the escalating popularity of musclecars and other OEM high-performance packages. And yet, on the other, we have a prosperous hot rod industry that was growing by leaps and bounds throughout the 1960s. How could this possibly have been the case?

Simply put, Ganahl, Roberson, Almquist, and the rest of the popular chroniclers have got it wrong. Hot rodding did *not* decline in the 1960s, and it certainly did not suffer at the hands of the OEM and its high-performance offerings. To be sure, enthusiasts were building fewer prewar roadsters in the 1960s than they had been in the 1940s and the 1950s, but this was nothing new: traditional hot rods of this sort had been dwindling in number since the early 1950s. Hot rodding, on the other hand, had soldiered on throughout the 1950s as enthusiasts turned their creative energies towards newer and slightly less orthodox sedans, coupes, specialized dragsters, trucks, customs, and even family cars, as the previous chapter discussed at length. This drawn-out process of "fragmentation" or diversification within hot rodding continued unabated well into the 1960s as hot rodders began as well to transform run-of-the-mill domestic compacts, imports, and small-displacement sports cars into their own unique high-performance machines. And for the add-on parts and accessories they required to do so, they looked, as they had for years, to the specialty manufacturers collectively known as the speed equipment industry.

But this is only half of the story. Aftermarket growth during the course of the late 1950s and the 1960s did not occur simply – or even *mostly* – because of the growing popularity among enthusiasts of Corvairs, Tempests, Volkswagens, MGs, and the like. Instead, it largely stemmed from booming sales of more traditional high-performance components: cams, cranks, pistons, cylinder heads, carburetors, intake manifolds, ignitions, and exhaust headers for American-made, large-displacement V8 engines. And especially during the course of the 1960s, a sizeable portion

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you look at it, the industry grew at a phenomenal pace (between 850 and 3,000 percent) during the tumultuous decade of the 1960s.

of these parts went *not* to the owners of 1932 roadsters, 1940 coupes, or 1955 Chevys, but rather to those with late-model Chargers, Mustangs, Chevelles, Barracudas, Javelins, 4-4-2s, or Camaros – to those, in other words, who already owned an OEM high-performance automobile. In other words, aftermarket manufacturers did not simply cede the high-performance market to the OEM onslaught of the late 1950s and the 1960s. Instead, they met the challenge head-on, successfully competing with Detroit's innumerable engineers, colossal factories, and cubic research and development budgets for their share of the 1960s high-performance spoils.

This chapter examines the ways in which the speed equipment industry managed to do so. It begins with an overview of the OEM horsepower race itself, followed by a detailed analysis of the partnerships, technological and manufacturing breakthroughs, and clever marketplace positioning that enabled the high-performance industry to face their would-be OEM challengers with optimism, vigor, and success. It continues with an exploration of the many ways in which the aftermarket itself changed during the period in question, 1955-1970, as new niches, new firms, new automotive technologies, generational shifts, buyouts, new distribution and sales channels, and eastward expansion forever changed the way the industry conducted its affairs. Four brief case studies then serve to better illustrate these manifold changes, and the chapter ultimately concludes with a concise analysis of the trends and forces that shaped the evolution of the American speed equipment industry during the course of its first 55-odd years. For in a very real sense, 1970 would prove to be the end of an era, and 1955-1970 the turning point that heralded its conclusion. Never again could the likes of a Vic Edelbrock hope to succeed merely by outsmarting his aftermarket competition – the Phil Weiands, Fred Offenhausers, and Harry Webers of the world. Instead, as the 1960s convincingly would demonstrate, he would also have to contend with General Motors, Chrysler, Ford, and, as the 1970s dawned, state and federal regulatory agencies as well.[8] In other words, the 1960s was indeed a time of plenty, but it was also the period in which the industry's carefree days were beginning to come to an end.

Call it an Indian Summer, if you will. For as the profits continued to roll in at a record

[8] On governmental regulation and the high-performance aftermarket, see below, chapters 5 and 6.

pace, year after year and in spite of the OEM's best efforts to cut them out of the high-performance loop entirely, by 1970 even the most cautious and unassuming of aftermarket leaders had begun to assume an air of invincibility. Invincible they weren't, of course. But during the 1960s – and, for that matter, well into the 1970s and even into the 1980s, regulatory difficulties notwithstanding – they sure seemed awfully close.

The Horsepower Race and the Emergence of the "Factory Hot Rods," 1955-1970

Prior to the early 1950s, the mainstream American automobile industry had shown very little interest in high-performance automobility of any kind. During the 1930s, of course, Ford had briefly dabbled in Indianapolis 500 competition, and from the very beginning, self-promoting automobile dealerships had often sponsored local oval-track cars as well.[9] For the most part, though, Detroit had always focused the overwhelming majority of its engineering and marketing efforts on its core enterprise: selling ordinary cars to ordinary people. And this, in fact, was precisely what Oldsmobile, Chrysler, Ford and the rest of the mainstream manufacturers had in mind when they began to unveil their new overhead-valve V8 engines in the late 1940s and the very early 1950s. Modern and reasonably efficient, these new mills were capable of shuffling around the hefty postwar sedans into which they were installed, but they were by no means "high-performance" motors – not as delivered, at least.[10]

By the mid-1950s, however, these relatively tame late-model engines had begun to undergo a radical transformation. Oldsmobile's overhead-valve "Rocket 88" V8, for example, generated a mere 135 horsepower from its 303 cubic inches when it was introduced in 1949, but its output had risen to 160 by 1953 and, thanks to several displacement bumps and a number of

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[9] In 1935, Ford had teamed up with Harry Miller to produce a set of Indianapolis 500 racers based on the company's new L-Head V8 engine. See above, chapter 2.

[10] Some of these new engines immediately began to arouse the interest of postwar hot rodders because of the enormous potential their new overhead-valve designs implied (see above, chapter 3). *As delivered*, however, these were relatively tame mills.

other external and internal refinements, 202 by 1955 and more than 300 by 1957.[11] Similarly, Chrysler's "Firepower" Hemi V8 engine, rated at 180 horsepower upon its introduction in 1951, had topped the 300 mark by 1958.[12] Concurrent developments at Ford and Chevrolet – most notably, the introduction of the 162- and 180-horsepower, 265 cubic-inch small-block Chevrolet V8 engines in 1955 – confirmed that by the middle of the decade, Detroit had finally begun to warm to the high-performance market.

What exactly caused this change of heart remains unclear some fifty years later. During the 1960s, some within the high performance industry would look back with an almost palpable sense of nostalgia and claim that General Motors's decision to hire erstwhile hot rod manufacturer Zora Arkus-Duntov to head a small team of powertrain engineers in 1953 was the turning point, while others have argued instead that rising compression ratios, cubic-inch displacements, and horsepower ratings were merely the result of the industry's need to power its two-ton "insolent chariots."[13] Period sources, however, suggest that at least part of the industry's inspiration came directly from the fenderless coupes and roadsters that were generating so much press at the time. In the fall of 1951, for example, the City of Detroit hosted a hot rod exhibition with the support of the mainstream automobile manufacturers, each of which dispatched a team of engineers to examine the reconfigured cars on display at the show.[14] Within months, Chrysler disclosed that it had managed to squeeze 310 horsepower out of a run-of-the-mill 331 cubic-inch Hemi engine simply by mimicking what hot rodders had been doing with production engines for years: fitting bigger valves, enlarging the engine's intake and exhaust ports, installing a special intake manifold fitted with multiple carburetors, modifying the camshaft for more optimal valve

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[11] Roberson, *Middletown Pacemakers*, 41-42.
[12] See Almquist, "Hemi Hopping," in *Hot Rod Pioneers*, 183. The factory 1951 Hemi rating of 180 horsepower cited here is from "'Full House' Firepower: 310 Horsepower without Supercharging – New Chrysler Achievement," *HRM*, March 1952, 52.
[13] For example, Jim McFarland, one of the editors of *Hot Rod Magazine* in the mid-1960s and a talented engineer who would go on to enjoy a long career within the speed equipment industry (most notably at Edelbrock), saw Zora Arkus-Duntov's arrival at GM as the turning-point for OEM high-performance (McFarland, "Publisher's Memo," *HRM*, December 1968, 6); see also Jerry Burton, *Zora*, chapter 8. On the "insolent chariots" claim, see for example Flink, *The Automobile Age*, chapter 15.
[14] Harry Cushing, "Detroit Looks at the Hot Rods," *HRM*, December 1951, 30.

timing, raising the static compression ratio, and installing a free-flowing exhaust.[15] And by the mid-1950s, when these sorts of performance tuning tricks began to become available to the general car-buying public as optional factory "power packs," many within the hot rodding fraternity would often brag that "[i]t was a happy day for motorists in general when the big wheels who design the automobiles most of us drive got the 'go' fever not so long ago and borrowed some of the hot rodders' sacred devices to make them stock equipment on their formerly dull machines," or that "[d]uring the past few years Detroit has been openly paying left-handed compliments to hot rodders and soup-up artists...[b]y offering as optional equipment...soup-up additions [that] were developed and used by hot rodders many years before."[16] Numerous contemporary and secondary sources confirm that this was indeed the case – that Chevrolet, Chrysler, Ford, and the rest did indeed learn their 1950s horsepower tricks from hot rodders by observing their activities and, in some cases, by actually hiring them as consultants and advisors, a critical point addressed at length later in this chapter.[17] For the moment, though, what matters is that by the mid-1950s, the OEM "horsepower race" was on, and for the average hot rodder, the substance of that race would have seemed awfully familiar.

Interested though the OEM clearly had become in the ways in which hot rodders managed to squeeze additional power out of production engines, none of the mainstream manufacturers ever seriously contemplated going after the do-it-yourself, straight-line-speed-obsessed young enthusiast's dollar – not in the mid- to late 1950s, at least. Instead, the likes of Chevrolet and Ford had become enamored of stock-car racing. For back in the 1950s, when the "stock" in "stock car" actually meant what it implied, the bragging rights (and subsequent sales)

[15] "'Full House' Firepower: 310 Horsepower without Supercharging – New Chrysler Achievement," *HRM*, March 1952, 52.

[16] The first quote is from Don Francisco, "Stude, Packard, Nash or Hudson Big 8," *HRM*, February 1957, 24, and the second is from Ed Almquist, "Soup for the Family Car: Every Day More and More American Motorists Are Finding That They Can Improve Their Car's Performance With Tricks Learned From the Hot Rodders – Here Are Some You Can Do," *Car Life*, August 1956, 18. Similar claims appeared elsewhere; see for example Louis Hochman, *Hot Rod Handbook* (Greenwich, CT: Fawcett Publications, 1958), 4.

[17] A partial list of those hot rodders and equipment manufacturers whose expertise the OEM would tap by the mid- to late 1950s includes Vic Edelbrock, Ak Miller, Ed Iskenderian, Ed Winfield, and Clay Smith; see below, pages 240-243.

that would accrue to those companies whose vehicles had proved their mettle on the oval track were prospects that were simply far too tempting for the OEMs to pass up. Fortunately for them, NASCAR[18] rules allowed competing cars to be modified appropriately, but there was a catch: all of the parts used to modify the cars had to have an OEM factory part number. All of the special camshafts, carburetors, exhaust system components, manifolds, pistons, and so forth that went into stock-car Fords, say, therefore had to be available through the ordinary Ford parts-supply channels and marked with a Ford part number. These high-performance factory parts, however, did not necessarily have to be *widely* available to qualify. Consequently, the OEMs quickly took to the practice of offering limited numbers of these add-on components through their official supply system either as "export-only" or as "police cruiser" parts. Would-be racers thus could get them if they wanted to – and Ford, Chrysler, Chevrolet, Hudson and the rest certainly made sure that serious drivers who were racing their brands of cars got them – but none of the OEMs ever advertised them to the general public.[19] Instead, your average Joe who had witnessed triumphant Chevrolet victory after triumphant Chevrolet victory at the stock car races could go over to his local dealership and order a brand-new V8 Bel-Air equipped with a "power pack" consisting of high-performance parts and accessories more appropriate for ordinary, spirited street driving. Naturally, the competition – on and off the track – quickly became quite fierce, and year after year, standard and optional factory horsepower ratings continued to rise to new heights. By 1958, in fact, the *lowest* advertised rating of *any* OEM V8 stood at 215, while the highest topped 400.[20] Hitched as it was to NASCAR's rising star, the horsepower race of the mid- to late 1950s had swiftly carried passenger-car performance levels into territory only the most optimistic of hot rodders would have dreamed of ten years earlier.

Critically, though, the cars to which these newer engines and optional "power packs"

[18] The National Association of Stock Car Racing, or NASCAR, was – and is – an influential racing association whose rules generally set the tone for the ways in which the majority of American stock car races were conducted.
[19] For more on NASCAR's mid-1950s rules and the ways in which OEMs met them, see Huntington, *American Supercar*, 19-20, and Peter Golenbock, *American Zoom: Stock Car Racing – From the Dirt Tracks to Daytona* (NY, NY: Macmillan USA, 1993).
[20] These figures are derived from data found in Jerry Titus, "Guide to the '58 Engines," *Speed Age*, February 1958, 16-19 and 69.

were fitted were not high-performance vehicles per-se. That is, they were not the sorts of cars that were likely to command the attention and respect of your average dyed-in-the-wool hot rodder. These were *ordinary cars* – uninspiring four-door sedans, station wagons, and the like. Their overhead-valve V8s were of course of interest, but only insofar as enterprising young rodders could envision pulling them from low-mileage, wrecked behemoths and dropping them into their own lightweight coupes, roadsters, or quarter-mile dragsters. What's more, the high-performance packages that were available for these 1950s family cars weren't over-the-counter, do-it-yourself kits, but rather factory-installed options available only in conjunction with a new-car purchase. In other words, inspired though the OEMs certainly were by the creativity and mechanical prowess of the average rodder, they weren't yet seriously attempting to lure them from their prewar coupes and roadsters, and they weren't yet making any concerted effort to bring them to their own parts counters, either. Instead, the 1950s phase of the postwar horsepower race was aimed to woo the ordinary middle-class consumer with the promise of space-age speed and vicarious oval-track mastery.

And at this, it was a phenomenal success. So much so, in fact, that it began to provoke a backlash both within the industry itself and among a number of its critics. According to Roger Huntington,

> Ford and Chevy were spending millions on their NASCAR programs, really butting heads. Safety authorities were upset about the emphasis on speed and acceleration in advertising and sales promotion. Insurance people were scrutinizing rates on sports and high-horsepower models. And worst of all, government officials in the regulation and anti-trust areas were watching the automakers closely.[21]

As a result, rumors began to circulate as early as the summer of 1957 that a premature end to the horsepower race was imminent. "[I]f current Detroit whisperings are accurate," *Motor Life* reported that July, "auto makers are on the verge of a 'tacit agreement' to discontinue emphasis on horsepower and top speed," which "would likely mean the end, or at least the curtailment, of factory participation in racing."[22] Sure enough, the Automobile Manufacturers Association

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[21] Huntington, *American Supercar*, 29.
[22] "Facts and Forecasts," *Motor Life*, July 1957, 6.

(AMA) voted that fall to enact a resolution that "not only banned direct factory participation in racing, but [also] gently suggested the companies should stop emphasizing horsepower and performance in their advertising."[23] And this, on the surface, is precisely what General Motors, Ford, Chrysler, Hudson, and the rest of the manufacturers did: their accountants severed their official ties to NASCAR racing, and their advertising no longer bragged of victory laps or cubic-inch advantages, but rather comfort, convenience, and, as the 1950s came to a close, the economic merits of their brand-new lines of compact cars.

It was a clever ruse, to be sure, but one which hadn't the slightest chance of holding up in the long run. For even as the OEMs proudly paraded their smaller and ostensibly more responsible Corvairs, Tempests, Falcons, Valiants, and Larks before the public and the press, behind-the-scenes developments confirmed their ongoing commitment to triple-digit cruisers. Oldsmobile and Ford, for example, both of which had dropped their optional power packs in 1958, continued nevertheless to sell their unadvertised "export" and "police" equipment to eager oval-track stars in 1958, 1959, and 1960. Pontiac, Chevrolet, and Chrysler, on the other hand, continued not only to offer limited numbers of these add-on components, but also to sell their factory-installed power packages.[24] And, thanks in no small part to a new generation of higher-octane fuels that the oil industry had begun to bring to market, static compression ratios on all domestic automobiles were on the rise in the late 1950s as well.[25] What's more, Dodge began to

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[23] Huntington, *American Supercar*, 29.
[24] Ibid., 33.
[25] Generally speaking, higher compression ratios make for a more efficient (read: powerful) engine, but as compression ratios rise, so too do fuel octane requirements. As late as 1955, regular gasoline octane ratings in the United States stood at about 80, and static compression ratios in most OEM passenger cars at about 6:1 (see W. G. Brown, "Compression Ratios on the Rise," in *Hot Rod 1955 Annual* (Los Angeles, CA: Petersen Publishing Company, 1955), 110-111). By 1960, however, compression ratios had risen considerably – often to 9:1 or even 10:1 – as the octane ratings of widely-available regular and premium leaded fuels broke into the 90s. In fact, period evidence suggests that the *minimum* octane fuel requirement of any domestic car stood at 91 in 1960, while some OEM vehicles actually required fuels rated at a heady 99 octane (see Robert Lichty, "What Octane Does Your Car Need?" *Cars*, October 1960, 78-82). And this was only the beginning: by the late 1960s, premium fuels well in excess of 100 octane were widely available throughout the United States, enabling many OEM cars to run with static compression ratios in the neighborhood of 11:1 to 12:1. It warrants mention, however, that during the 1970s, the method used in the United States to calculate advertised octane ratings changed, resulting in numbers 3 to 4 points lower in most cases. By today's standards, therefore, the fuels of the early 1950s would have rated in the high 70s, those of 1960 at about 87 to 95, and the top-notch premium fuels of the late 1960s at about 100 octane. At present, the highest available octane fuel sold at the pump anywhere in the United States is the 94 octane gasoline sold by

dabble in drag racing competition on an unofficial basis shortly after the AMA "racing ban" resolution went into effect, winking in assent as a group of its engineers formed the well-funded Ramchargers drag racing club.[26] Meanwhile, Ford unveiled an all-new line of larger, more powerful overhead-valve V8 engines in 1958, as did Chevrolet.[27] Clearly, the OEMs never actually intended to curtail their high-performance efforts, and as the 1950s came to a close, the rising tension between their private efforts and their public pronouncements had all but doomed their gentlemen's agreement.

It therefore came as no surprise when the dam at long last broke in 1960. That year, Ford upped the displacement of its big-block series of motors to 352 cubic inches and, critically, released a 360 horsepower power package for the mill as well.[28] Other manufacturers quickly followed suit. By 1962, in fact, Chevrolet's small-block V8 engine of 1955 had grown to 327 cubic inches, and its big-block V8, introduced at 348 cubic inches in 1958, had grown to 409. Buick had also entered the fray with a 401 cubic-inch V8, and Oldsmobile's Rocket 88 mill had swelled to 394. Not to be outdone, Ford had brought out engines of 390 and 406 cubic-inches by 1962 as well, and Chrysler, for its part, had begun to rework its legendary Hemi V8 mill for racing applications.[29] Each of these companies also brought out new and improved optional power packs for these and their other street-going engines, and Ford, Pontiac, Dodge, and several others jumped headlong into racing. Swiftly and with a vengeance, then, the OEM horsepower race had returned to the fore.

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some retailers in the Northeast; throughout much of the West, however, the best available gas rates at only 90 to 91. In other words, the fuels that were available in 1960 were pretty much the same, *at least in terms of their octane ratings*, as are the fuels of today. Those of the late 1960s, however, were much, much better. A more complete discussion of octane ratings and their gradual decline in the 1970s appears in chapter 6, below.

[26] See Almquist, "Rampaging Ramchargers: Dynasty of Fuelers, Funnies, and Stockers," in *Hot Rod Pioneers*, 236-238.

[27] On Ford's new engine 332 cubic-inch V8, see Dean Brown, "The Best Engines for Hot Rods," *Popular Hot Rodding*, August 1962, 10-17 and 70 (hereafter, *Popular Hot Rodding* will be cited as *PHR*). On Chevrolet's new "big block" series, see Huntington, *American Supercar*, 29.

[28] "Facts and Forecasts," *Motor Life*, February 1960, 6.

[29] On the small-block Chevrolet 327 V8 of 1962, see "Hop-Up Report on the 327 Chevy," *PHR*, November 1962, 26-31. On the new big-block mills from Chevrolet, Buick, Oldsmobile, and Ford, see Dean Brown, "The Best Engines for Hot Rods," *PHR*, August 1962, 10-15 and 70. And on Chrysler's all-new 426 Hemi, released for racing applications in 1964, see Ray Brock, "Modern Hemi from Chrysler," *HRM*, April 1964, 44-47.

According to Roger Huntington, however, this 1960s revival differed from its 1950s predecessor in at least three critical respects. The first had to do with the sorts of racing OEMs like Pontiac and Dodge became involved with in the 1960s. Specifically, these manufacturers sponsored and supported not only NASCAR-style stock-car racing, as they had in the 1950s, but also organized, NHRA-style drag racing.[30] During the late 1950s, quarter-mile competition had soared in popularity, and many enthusiasts had taken to racing their relatively-stock mid-1950s power-pack-equipped sedans at events across the country in spite of their inherent power-to-weight disadvantages. Consequently, the NHRA had begun to create special racing classes for these late-model "Stock" and "Super Stock" bombs,[31] classes which proved to be tremendously popular in part because they helped reverse a trend that had been gathering steam since the late 1940s: dual-use cars, once ubiquitous among hot rodders and lakes racers but on the wane in recent years, suddenly began to make a comeback in the late 1950s as enthusiasts began to race their late-model V8 sedans on the weekends while also continuing to use them for their daily commutes during the workweek. Perhaps it was only natural, therefore, that when the OEMs returned to racing in the early 1960s, they no longer felt obliged to shun the strips in favor of the ovals.

The second way in which the 1960s horsepower race differed from that of the 1950s, Huntington reports, was that these new early 1960s OEM motors were "literally re-engineered for performance."[32] In other words, whereas the high-performance engines of the 1950s had essentially been run-of-the-mill V8s that the engineers at Chrysler, Ford, and General Motors had improved largely through the addition of bolt-on, hot-rod-style parts and accessories, the engines of the 1960s were actually *designed* to be high-performance mills.[33] And to an extent, this was indeed the case – after all, high-compression pistons, fully-machined combustion

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[30] Huntington, *American Supercar*, 35.
[31] On the NHRA's stock classes and their rules, which interpreted the term "stock" in a manner far more literal than had even been the case with NASCAR in the 1950s, see Griffith Borgeson and Wayne Thoms, "Super Stocks for '61," in *Hot Rod Ideas* (NY, NY: Arco Publishing Company, 1961), 5-13; *Stock Cars for the Drags* (Los Angeles, CA: Petersen Publishing Company, 1963); and Montgomery, *Supercharged Gas Coupes*, introduction.
[32] Huntington, *American Supercar*, 35.
[33] Ibid., 35-36.

chambers, reinforced connecting rods, counter-weighted crankshafts, and thick-webbed heavy-duty engine blocks, standard fare on 1960s performance engines, certainly weren't in the same league as the bolt-on manifolds, carburetors, and ignitions of the 1950s. Huntington's implication, however, that these re-engineered mills demonstrated the superiority of the "college-trained engineers" vis-à-vis the "intuitive designers who had come up through the ranks via the hot rodding sport" is more than a bit off the mark.[34] For indeed, whether they were engineered into these new mills from the get-go or not, the fact remains that each and every one of these performance enhancements had been standard practice among hot rodders for decades – generations, even.[35] That they were making use of them in their new-car engines was indeed a breakthrough, in other words, but one of application and not conception.

Huntington's third point, though, is right on the money: during the early 1960s, the OEMs began to realize – and attempt to exploit – the potential of the market for do-it-yourself, add-on high-performance parts and accessories.[36] Above and beyond their factory-installed power packs, in other words, they began to advertise and sell bolt-on performance enhancing products for their various lines of engines. Dodge, for example, had a number of do-it-yourself components available by 1961, including special-ratio gears, ram induction manifolds, high-lift camshafts, and high-tension valve springs.[37] Ford, too, had an extensive line of add-on high-performance parts available by mid-decade, including 17 distinct, packaged kits of bolt-on parts for all of their V8 mills, even their 221 cubic-inch "economy" model.[38] In addition, the very nature of some of these manufacturers' 1960s mills encouraged parts-swapping with older models. The owner of a late 1950s 283 cubic-inch Chevrolet V8 optioned out with all of that company's power pack components, for example, could actually take them along, so to speak, if

[34] Ibid., 73.
[35] Fully-machined combustion chambers began to appear on aftermarket cylinder heads as early as the 1910s, for example, and high-compression pistons, counterweighted crankshafts, reinforced connecting rods, and even engine-block-strengthening bits such as multiple crankshaft bearing adapters had been available from speed equipment manufacturers since the 1910s as well. See above, chapter 1.
[36] Huntington, *American Supercar*, 16.
[37] Ray Brock, "Dodge's Hot Options," *HRM*, October 1961, 26-31.
[38] FoMoCo advertisement, *HRM*, May 1964, 76. FoMoCo was Ford's high-performance division.

he chose to upgrade to a later-model 327 V8 car because all of the parts and accessories designed for the former would bolt directly to the latter without a fuss.[39] On the other hand, the owner of an early 1960s 327 V8 Chevrolet could easily have installed a later-model 350-cubic-inch-series V8 crankshaft into his 327 block.[40] In other words, between their do-it-yourself bolt-on high-performance accessories and the inherent interchangeability of the various V8 models that they had introduced during the 1950s and the 1960s, the OEMs had actually begun to compete with the speed equipment industry in a very real and direct way, luring traditional speed shop and mail-order devotees to *their* official parts counters at a pace that certainly ought to have frightened even the most hard-nosed of speed equipment manufacturers.

What's more, by the mid-1960s the mainstream industry had begun to mass-produce an entirely new type of automobile that was conceptually identical to the classic hot rod itself. Compact, lightweight, and equipped with monstrous V8 engines, the legendary 1960s musclecars were specifically designed to appeal to those among the up-and-coming "baby boomer" generation who otherwise might seriously have considered building their own, more traditional hot rods. The first of these so-called "factory hot rods" appeared in 1964, when Pontiac dropped a 389 cubic-inch, 325 horsepower V8 engine into its compact Tempest, a combination the company marketed as the GTO.[41] Within another year, Plymouth and Dodge had followed suit with their V8 Valiants and Darts, respectively, and by the late 1960s all of the major manufacturers had joined in as well. 426 Hemi Barracudas, 455 SS Chevelles, and 427 Fords soon ruled the roads: by 1970, there were no less than 36 such models available from the American OEMs.[42] And although the story of their evolution over the course of the 1960s is rich

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[39] "Hop-Up Report on the 327 Chevy," *PHR*, November 1962, 26-31.
[40] Eric Rickman, "Inchin' Up On the 327," *HRM*, January 1967, 62-63.
[41] On the origin of the GTO, see Huntington, *American Supercar*, 49-53, and Roberson, *Middletown Pacemakers*, 118.
[42] On the 427 Fords, see Bob Leif, "Detroit Bulletin," *HRIN*, July 1967, 10. On the 455 engines from GM, see Steve Kelly, "Mister Muscle of 1970," *HRM*, November 1969, 34-36. On the 426 Street Hemi, see Plymouth advertisement, "The Hot Ones from Plymouth," *HRM*, March 1966, 63-69. And, finally, on the growth of the number of available musclecar models during the mid- to late 1960s, see Don Prieto, "Detroit Bulletin," *HRIN*, October 1969, 16.

and often gripping, it has already been told often – and at length – elsewhere.[43] For our purposes, though, it bears repeating that the musclecar was in fact the OEMs' long-overdue "answer" to the hot rod. Complete with warranties and easy financing, they were designed to win over would-be build-it-yourselfers with the promise of instant tire-smoking gratification. Consider the following pitch, for example, which appeared in a full-page ad for the Dodge Charger R/T in the July, 1969 issue of *Hot Rod Magazine*:

> There you are with your plug wrench clenched in a set of badly battered knuckles, wiping the other paw on the back of your jeans, when this black maw of a grille attached to a wingless Mach 2 jet throbs up. 'Ha,' you scoff. 'Bet he has to beat it with a whip to even get it out of the garage.' With a snick that can only mean close-coupled four-speed and a howl that says 440 cubes of mean, it disappears. Charger R/T just arrived. End of the road for the do-it-yourself kit, Charlie.[44]

Their message was crystal-clear: why waste your time, energy, and blood hopping up your present ride when you could obtain a brand-new and considerably faster Charger R/T from your local dealership? Not everyone bought into this sort of logic, of course, but hundreds of thousands of speed-obsessed young boomers did.[45]

During the 1960s, then, the OEMs had begun to compete with hot rodders, hot rodding, and hot rod manufacturers in a number of ways both trivial and substantial. In fact, between their large-displacement standard engines, their factory-installed power packs, their open engagement in organized drag racing, their do-it-yourself add-on parts and accessories, the broad interchangeability of many of their powertrain components between older and newer cars of their respective makes, their "factory hot rods" themselves, and the easy terms available on most of their high-performance vehicles, one cannot help but wonder how these years could possibly have been good ones for the American speed equipment industry. How, that is, could the aftermarket possibly have managed to enjoy quadruple-digit growth over the course of the

[43] Huntington's coverage of the matter is by far the best, and certainly the most comprehensive, although there are a number of coffee-table-style treatments of the subject that do an excellent job as well. See for example R. M. Clarke, *Plymouth Muscle Cars, 1966-1971* (Osceola, WI: MBI Publishing, 1984); *Petersen's Muscle Car Classics* (Los Angeles, CA: Petersen Publishing Company, 1985); and Steve Statham, *Muscle Cars: American Thunder* (Lincolnwood, IL: Publications International, 1997).

[44] Dodge advertisement, *HRM*, July 1969, 157.

[45] By 1970, for example, Ford's vice president and general manager, John B. Naughton, projected that the industry as a whole would sell in excess of 750,000 musclecars that year. See Alex Xydias, "Publisher's Report," *HRIN*, January 1970, 20.

1960s? How could prominent personalities within the industry possibly have been serious when they bragged, after a decade's worth of direct competition from the OEMs, that theirs was an industry on the up-and-up that ought to continue to grow at a record clip well into the 1970s?[46] How, indeed.

The Aftermarket Responds: The Speed Equipment Industry and OEM Muscle, 1955-1970

By the end of 1953, when it was discontinued after several million examples and more than twenty years, Ford's venerable flathead V8 engine had served as the technological foundation of American hot rodding – and speed equipment manufacturing – for more than fifteen years.[47] Ordinary rodders and industry insiders alike made every effort to embrace its "Y-block" overhead-valve V8 replacement, which was conceptually similar to the other postwar V8s that the hobby had by then begun to accept to a limited degree.[48] But by the end of 1954, the long-obsolete and now-defunct flathead V8 remained the dominant powerplant within the "hot rodding fraternity," and a clear, mass-produced successor to it had yet to emerge. In the short term, of course, this was really no big deal. After all, the flathead market remained huge, and in 1954 and 1955 especially, no one whose business depended on the sale of high-performance parts and accessories for the L-head mill was going to have any trouble paying the bills. But for the first time since the early 1930s – and only the second since the late 1920s – the speed equipment industry now relied for the overwhelming majority of its sales on the lingering popularity of a powerplant that was altogether out of production. And this, in the long term, was entirely untenable. The challenge for those within the industry, therefore, was to keep their eyes

[46] See for example Alex Xydias, "Publisher's Report," *HRIN*, July 1969, 6; Dennis Pierce, "New Car Dealers…New Business?" *HRIN*, October 1969, 90 and 92; and Dennis Pierce, "A Look Into the 70's," *HRIN*, January 1970, 70, 72, 80, 142, and 144.

[47] Prior to the flathead's reign, of course, 4-cylinder Fords had been the mechanical basis of American hot rodding, but by 1953, the days of 4-cylinder dominance had long since passed.

[48] For an example of an early report on the hop-up potential of the new Ford engine, see Racer Brown, " '54 Ford V8," *HRM*, September 1954, 26-29 and 44-45. "Y-block" simply referred to the shape of the engine when viewed from the front: below the standard "V" of the cylinder banks was a tall crankcase and oil pan assembly that gave the engine a profile closer to the letter "Y" than to a "V."

peeled for the "next flathead" and hope, not only that they'd recognize it if and when it came along, but also that they'd be prepared to work with it.

Fortunately for them, their anxious wait was brief. In 1955, Chevrolet brought out a new V8, an overhead-valve unit that displaced 265 cubic inches and developed 162 horsepower. Powerful, lightweight, and compact, the new mill certainly had potential, and dozens of manufacturers immediately set themselves to the task of unlocking it. By the spring of 1955, in fact, Huth, McGurk, and several others had already developed a number of bolt-on parts for the engine,[49] but it was not yet clear to anyone whether the new powerplant would ultimately prove to be the standout among an ever-growing crop of postwar overhead-valve mills. Not, that is, until the following January, when Vic Edelbrock and his son, Vic Jr., appeared on the cover of *Hot Rod Magazine* along with a Chevrolet V8 that they had managed to work over to the tune of an astonishing 229 horsepower. What's more, by then the new mill had also begun to prove its grassroots appeal: that same issue of *Hot Rod*, for example, carried a feature on a '34 Ford coupe into which one of the new V8s had been installed, the text of which waxed enthusiastic with regard to the compact nature of the Chevy powerplant and its resultant engine-swapping appeal.[50] Within another six months, intake and exhaust manifolds, crankshafts, flywheels, camshafts, camshaft gears, pistons, connecting rods, carburetors, valvetrain components, ignitions, engine adapters, valve covers, and air cleaners for the still-relatively-new V8 were available from no less than forty individual companies, and the list of available components and participating firms was growing each and every day. Rodders and equipment manufacturers alike were certain they had found the "next flathead," and they were right. Fifty years down the road, in fact, this so-called "small-block" V8 engine (and its many, many derivatives) continues to be the predominant choice of traditional, V8-oriented hot rodding enthusiasts across the country – and, indeed, the globe. And back in 1955 and 1956, when this technological sea-change had first

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[49] See Huth advertisement, *Rod and Custom*, March 1955, 5, and "Meet the Manufacturer: McGurk Engineering," *Drag News*, March 12, 1960, 8-9.
[50] For an excellent summary of Edelbrock's (and *HRM*'s) rather rapid shift to the new Chevrolet paradigm, see Ken Gross, "The Day the Flatheads Died," *Hemmings Muscle Machines*, December 2003, 45.

begun to unfold, the Southern California speed equipment industry was in the vanguard.

Not all of the region's aftermarket firms had been on board, of course. Barney Navarro's company, for example, continued to specialize in flathead gear, as did those of Jim Kurten and Earl Evans, to name but a few. In time, though, their businesses began to decline as the demand for flathead components slipped.[51] It wasn't that the market for flathead V8 parts and accessories had collapsed altogether – Edelbrock, Weiand, Offenhauser, and a number of other companies, in fact, would continue to profitably produce some L-head components for years to come[52] – but rather that by the early 1960s, it was no longer possible to base an aftermarket company entirely on the old Ford mill. Eventually, firms specializing in flathead components would remerge as one of many distinctive niches within the variegated high-performance industry of the 1970s and 1980s,[53] but during the late 1950s, to lose touch with the new-car market by instinctively clinging to the flathead technology of the past was for all intents and purposes to lose one's livelihood.

For every Southern California company that failed to make "the switch" to the new overhead-valve engine, however, there were at least five or six more that did. For the first time in the brief history of aftermarket manufacturing in the United States, in other words, the overwhelming majority of existing firms managed to survive a major OEM-level technological transition intact. This had not been the case back in 1927, when Ford dropped the Model T in favor of the all-new Model A, and neither had it been the case with the early 1930s advent of the V8 era. But in 1955 and 1956, the transition went quite smoothly, and the Southern-California-based concerns that had first emerged and risen to dominance during the late 1930s and the 1940s were therefore able to maintain their positions of prominence within the industry.[54] Rather

[51] Navarro, for his part, went into medical systems research and development, while Jim Kurten and Earl Evans went into the aircraft business and retired, respectively. On Navarro, see Montgomery, *Hot Rod Memories*, 91-92, and Almquist, "Barney Navarro," 51-52. On Kurten, see Montgomery, *Hot Rod Memories*, 92. And on Evans, see Almquist, "Earl Evans: Terror on the Tracks," in *Hot Rod Pioneers*, 56.
[52] On the enduring, albeit diminished popularity of the flathead V8 engine, see Larry Hurd, "Don't Forget the Flathead," *PHR*, July 1963, 32-35 and 81-82; Bob Leif, "Is the Flathead Dead?" *HRIN*, April 1967, 38-39; and Roberson, *Middletown Pacemakers*, 41-42.
[53] See below, conclusion.
[54] See below, pages 244-246.

quickly, though, the gurus at these companies came to the realization that simply having survived the transition to the "next flathead" wasn't going to suffice. For indeed, as we have seen, Chevrolet's optional "power packs" and the mainstream industry's obsession with stock-car racing had ignited an OEM horsepower race that threatened to leave the high-performance aftermarket in its dust. The question facing the likes of Ed Iskenderian, Ak Miller, and Frank McGurk therefore no longer centered on the issue of withstanding the flathead's decline, but rather on meeting the mounting challenge from the OEMs themselves.

For the most part, though, doing so – remaining competitive vis-à-vis the 1950s OEMs, that is – simply required a renewed focus on the part of the majority of the country's speed equipment manufacturers on what had always been their core competency: finding a way to wring more horsepower and torque out of standard production engines. This is precisely what Edelbrock and his son had done in the winter of 1955-1956 with their first overhead-valve Chevy V8 build-up, for example. After all, the 229 horsepower they achieved greatly exceeded not only the standard engine's rating of 162, but also that of Chevrolet's optional 180-horsepower "power pack"-equipped V8. And as the mainstream industry's mid- to late 1950s horsepower race escalated, speed equipment manufacturers would continue to find ways to offer similar performance gains to power-hungry motorists, even when OEM horsepower levels began to approach the 300 mark. For indeed, as Louis Hochman would observe in his popular how-to manual in 1958, "no matter how good an engine is, there's always room for improvement."[55] Thus, whether through dual exhausts, triple-carb manifolds, counterweighted stroker crankshaft kits, long-duration camshafts, high-compression pistons, or reworked heads, the key, for speed equipment manufacturers, was to locate and tap the additional horsepower hidden within each of the new mills. That they were able to continue to do so, even with those the OEMs had already "tuned" with high-performance parts of their own, proved Navarro's 1955 fears to have been unfounded. The OEMs, in other words, had yet to fully decipher the clever rodder's many secrets.

[55] Hochman, *Hot Rod Handbook*, 5.

But in the 1960s, the mainstream industry began to close the gap. Larger, better-engineered high-performance engines with an array of optional, factory-installed performance upgrades and even hotter over-the-counter, do-it-yourself add-ons threatened to diminish aftermarket opportunities and win away would-be rodders. Undaunted, though, most speed equipment manufacturers managed to stay on-message: *there's always room for improvement.* Writing in 1963, for example, *Popular Hot Rodding*'s Jerry McGuire insisted to his audience of average rodders that "factory assembly methods will never be able to produce engines with as much brute horsepower and torque – cubic inch for cubic inch – as you can build up by careful hand work in your own garage, using special speed equipment from the many commercial hot rod suppliers."[56] Mass-produced compromise, that is, would always be the hallmark of the OEMs, and thus, the independent speed equipment industry would always be the premier source for bolt-on improvements. Dennis Pierce of Petersen Publishing's *Hot Rod Industry News* struck a similar chord while preaching to the choir in 1967, reminding aftermarket leaders that

> [t]he industry itself is made up of men who have a desire to improvise, improve, invent and individualize on an existing product. They take the view that Detroit did a nice job, but they didn't quite finish it.[57]

Others, perhaps less optimistic that bolt-on aftermarket products would continue to be able to improve upon OEM-engineered muscle in the long-run, nevertheless maintained that theirs was certain to be a prosperous future. "As Detroit has borrowed from our bag of tricks and transformed their ugly ducklings into beautiful swans," Ray Brock wrote in the April, 1967 issue of *Hot Rod Industry News*, "we have been carried along by their momentum and have had more products to create and ultimately more items to sell to an ever-increasing clientele."[58] In other words, the pie had expanded: OEM performance advertising had helped to cultivate a growing interest in performance motoring, particularly among the up-and-coming baby boomers, and this in turn had helped *increase* equipment manufacturers' opportunities, sales, and profits.[59] And by

[56] Jerry McGuire, "Hop Up Secrets for Chevy Engines: The Hot Rodder's Guide to the Chevrolet V-8 Powerplant," *PHR*, June 1963, 28.
[57] Dennis Pierce, "An Influential Industry," *HRIN*, April 1967, 40.
[58] Ray Brock, "Publisher's Report," *HRIN*, April 1967, 6.
[59] On the baby boom and its implications for the high-performance industry in the late 1960s and on into the 1970s, see for example Dennis Pierce, "A Look Into the 70's," *HRIN*, January 1970, 70.

the end of the 1960s, all of these various justifications, explanations, and words of encouragement had coalesced into something of a standard aftermarket rallying cry, heard whenever errant naysayers within the industry dared to criticize the OEMs for horning in on "their" performance market. For indeed, the mainstream industry's involvement in the high-performance sector did in fact amount to "free publicity" for the speed equipment industry, and even if it hadn't, there would always be a place for specialty manufacturers and speed shops because no matter how high Chevrolet, Ford, and Chrysler might eventually raise the bar, there would always be considerable room for aftermarket improvements.[60]

Fortunately for Edelbrock, Iskenderian, and the rest, locating and exploiting these opportunities for improvement was often easy. After all, for every brand-new musclecar and high-performance-optioned sedan they moved in the 1960s, the mainstream industry sold at least four or five plain-jane models and one or two low-performance musclecar "look-alikes."[61] Often, these cars were but an intake manifold, carburetor, camshaft, and set of free-flowing exhaust headers away from achieving a level of performance comparable with that of their more expensive "factory hot rod" brethren, and speed equipment manufacturers were quick to profit accordingly. Chevrolet's expensive, top-of-the-line Z-28 Camaro, for example, could be duplicated by enthusiasts of ordinary means by purchasing a run-of-the-mill Camaro model and sourcing the parts and accessories needed to transform it into a home-made Z-28 clone – if, that is, said enthusiast were to avoid the pricey factory parts books and obtain his high-performance add-ons from the more reasonable speed shop counter or mail-order aftermarket catalog.[62] What's more, as rising insurance premiums began to price many a would-be owner out of the

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[60] Examples of this "rallying cry" abound; see, for example, Alex Xydias, "Publisher's Report," *HRIN*, July 1969, 6; Dennis Pierce, "New Car Dealers…New Business?" *HRIN*, October 1969, especially page 90; and Don Evans, "Editorially Speaking," *HRM*, March 1970, 8.

[61] As late as model-year 1970, for example, mainstream industry insiders estimated that models optioned out with factory high-performance engines and add-ons (including musclecars) would account for no more than twenty percent of their overall new-car sales, which meant that more than eighty percent of what they sold would in fact be ordinary, low-performance models (see Don Prieto, "Detroit Bulletin," *HRIN*, October 1969, 16). What's more, John B. Naughton of Ford reported in that same year the OEMs would sell some 750,000 high-performance musclecars in 1970, along with 750,000 low-performance "look-alikes" (see Alex Xydias, "Publisher's Report," *HRIN*, January 1970, 20).

[62] On Camaro Z-28 clones, see for example Bob Leif, "Detroit Bulletin," *HRIN*, May 1967, 8.

musclecar market entirely towards the end of the 1960s, aftermarket add-ons quickly emerged as a rate-dodging loophole of sorts. Ray Brock, for one, advised his readership in September of 1970 to circumvent their insurance agents' performance phobias entirely. "Get the low-horsepower V8 and skinny tires," he advised, "so that the insurance companies will set their rates on your driving record rather than what you are driving." Then, "[a]fter you are insured,...go ahead and put on the mag wheels and fat tires, big four-barrel carburetor – and whatever else you had in mind in the first place."[63] Often precisely because of the appeal of out-of-reach OEM supercars, therefore, owners of low-priced, insurance-friendly "look-alikes" and ordinary sedans were ripe for the picking – they were, in other words, ready-made and relatively easy sales for the speed equipment industry of the 1960s.

However, aftermarket manufacturers were by no means limited to those the OEMs had failed to sell or had otherwise been unable to accommodate. Those with high-performance sedans and musclecars – even those with top-notch SS Chevelles, 4-4-2 Oldsmobiles, Shelby Mustangs, and Z-28 Camaros – were potential aftermarket customers as well. Finding ways to improve upon these high-horsepower beasts was often difficult, to say the least, but far more often than not, talented speed equipment gurus were able to unearth a trick or two the OEMs had missed. The key, in most cases, was to have a keen eye either for minute details or for the unusual – and often, successful manufacturers had both. Don Alderson of Milodon Engineering, for example, came up with a unique, angled oil pickup tube in 1968 that swiveled through a 100-degree arc, virtually eliminating engine oil starvation by enabling its intake end to remain in contact with the oil pan's critical supply even when the car was cornering at the limit or accelerating hard.[64] Likewise, Fred Offenhauser developed an unusual, reconfigurable intake manifold in 1969 that allowed owners of late-model, dual-use Chevrolet V8s to switch from an efficient single-carburetor street setup to an all-out multiple-carburetor strip combination, and

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[63] Ray Brock, "Publisher's Memo," *HRM*, September 1970, 6. For more on insurance premiums and the eventual decline of OEM muscle, see below, chapter 6.
[64] Rus Kavich, "Inside the Problem of: Elusive Oil," *Drag Racing Magazine*, December 1968, 52-53.

vice versa, all in a matter of minutes.[65] B&M Automotive, for its part, pioneered the art of performance tuning automatic transmissions in the late 1950s and the early 1960s, elevating the much-maligned "slushbox" into a state of relative parity, performance-wise, with the famous four-speed manuals of the period.[66] Others devised transistor ignitions, friction-reducing (and thus power-enhancing) gear-based cam-drive setups for hot V8s, roller-bearing camshafts, super-lightweight rockers, one-piece main bearing caps, precision performance exhaust headers, fuel-injection systems, and similar enhancements during the 1960s, each and every one of which filled a particular void the OEMs had missed or otherwise left open on their top-notch musclecars.[67]

In addition to a fundamentally sound idea, speed equipment manufacturers also needed to be quick on the draw during the 1960s if they were to have any hope of competing with the OEMs. This was especially true in basic fields like performance camshaft and intake manifold manufacturing, for if a Potvin Cams, say, or a Weiand Racing Equipment were to be slow to bring their new designs to market, the chances were pretty good that they would lose a lot of sales to dealership parts counters. After all, why should the owner of an all-new Ford or Chevy wait for an aftermarket cam or manifold for the new car to hit the shelves when he could get an OEM one right away? The problem for aftermarket manufacturers of these and other add-on components, of course, was that new-part research and development not only took a great deal of

[65] John Thawley, "Triple-Duty Dandy," *HRM*, November 1969, 62-63.
[66] So good were B&M's high-performance automatics, in fact, that they became a mainstay in a number of popular drag-racing classes. For more on B&M, see below, pages 270-276.
[67] Aftermarket transistor ignitions, which eliminate distributor breaker-points and therefore make for a more consistent-performing motor, first began to appear in the early 1960s (see "Transistor Ignition System," *Drag News*, March 24, 1962, 7). Summers Brothers Equipment in Ontario, California was one of several that devised camshaft gear-drive setups for late-model overhead-valve V8s ("Rodding's '69½ Speed Secrets," *PHR*, April 1969, 27), and Crower was perhaps the best-known among the roller-bearing camshaft pioneers (see "Free 'n' Easy Cam," *HRM*, September 1964, 78-79). Gotha in Harvey, Illinois, among others, devised a set of lightweight rockers for the overhead-valve Chevy V8, doing so as early as 1961 ("What's New," *HRM*, October 1961, 18), while Ansen was among the first to develop quick-change one-piece crankshaft bearing covers, also back in 1961 (Ibid.). Hedman, Cragar, and many others developed performance-enhancing exhaust headers during the 1960s (see, for example, George Elliot, "Hedman's New Design for Header Efficiency," *PHR*, June 1966, 70-71, and (on Cragar) "Manufacturers News," *Drag News*, January 11, 1969, 9). Finally, on the increasing variety of aftermarket fuel injection systems available for late-model V8 engines in the 1960s, see Bob Vordell, "New Ideas in Speed Equipment: Quick Developments That Keep the Accessory Manufacturers One Step Ahead of Detroit," *PHR*, May 1963, especially page 57.

time, but also required the manufacturer to have access to the engines and/or vehicles to which the new parts were to be applied. Since very little could be done about the latter – only very rarely did the mainstream manufacturers make their new mills available for advance aftermarket research and development[68] – most speed equipment manufacturers focused instead on streamlining their new-product programs so that at the very least, their cams, manifolds, exhaust systems, and the like would reach the market in a timely fashion. Iskenderian, for example, devised a system of OEM powerplant evaluation that devoted part of every working day to new-mill dyno testing so that Ed and his technicians would have in-hand all of the information necessary to produce performance-enhancing camshafts for any new OEM engine that proved to be popular among enthusiasts.[69] Other companies hired additional machinists and engineers, setting them to work in dedicated research and development facilities so as to be prepared, at a moment's notice, to supply performance parts and accessories for whatever might turn out to be the "next big thing." And by 1970, most of them had it down to a science, their new-product releases often coinciding rather nicely with the OEM's own new-car launches.[70]

Another key to aftermarket success in the face of the OEM onslaught of the 1960s was for individual speed equipment manufacturers to focus on a particular niche. To be sure, a number of them remained remarkably diversified throughout the period in question, including Edelbrock, Weiand, Eelco, and several other top names. For many, though, niche marketing was – and had always been – a critical part of their overall business strategy. Iskenderian focused exclusively on camshafts and valvetrain components, for example, while Offenhauser concentrated on intake manifolding, Venolia on pistons, and the Crankshaft Company on stroker cranks. But in a broader sense, niche marketing within the high-performance aftermarket of the

[68] Zora Arkus-Duntov's decision back in 1955 to send an example of his company's yet-to-be-released overhead-valve engine to Edelbrock for advance testing was one of the few exceptions (Duntov worked for Chevrolet). See Dain Gingerelli, "Edelbrock" Hot Rodding's First Family," *Street Rodder Magazine*, December 2000, 214.

[69] On Iskenderian's research and development programs, see for example "Hop Up report on the 327 Chevy," *PHR*, November 1962, 26-31, and Iskenderian advertisement, *HRM*, May 1966, 3.

[70] By the time *Hot Rod Magazine* published its review of the all-new Chevy Vega in 1970, Edelbrock, Iskenderian, Offenhauser, Hooker, TRW, and a number of other aftermarket companies already had add-on high-performance items available for it. See Steve Kelley, "Vega: Small-Car Star," *HRM*, November 1970, 36-39.

1960s centered increasingly not on the *type* of product one produced, but rather on its *application*. Consider, for example, those that manufactured add-on parts strictly for all-out racing use. Some, such as Stuart Hilborn's Fuel Injection Engineering, were well-established aftermarket companies that had always focused on the racing-only market.[71] Others, however, were older firms that had originally produced parts for a variety of applications but had come, by the 1960s, to hone in on the racing-only scene. Schiefer, for one, had started off in the early postwar years as a manufacturer of street- and racing-use flywheels and clutches, but by the mid- to late 1960s, the majority of its business had come to center on racing clutches, magnetos, and camshafts.[72] Likewise, the Crankshaft Company of Los Angeles, once among the premier sources of stroked crankshafts for street-use flathead V8 engines in the late 1940s and the early 1950s, had come to depend almost entirely on the drag-racing market by 1960, when 95 percent of its reworked cranks went into quarter-mile cars.[73] Firms like Ed Pink Racing Engines, Keith Black, Donovan Engineering, Mondello, Sid Waterman, Tubular Automotive, Giovannoni, Lakewood Chassis, and Simpson Safety Equipment, on the other hand, all of which were new to the speed equipment industry in the 1960s, focused on the racing-only niche from the very start.[74] The point, though, isn't to over-emphasize the strength of the racing-only market – other niches, such as off-roading and V8 street performance, were equally strong – but rather to stress

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[71] On Hilborn, see Karen Scott, "Meet the Manufacturer: Fuel Injection Engineering," *Drag News*, May 10, 1969, 8.

[72] Schiefer's evolution over time can be traced through the many "meet the manufacturer"-style articles about the company that were published in the 1950s and the 1960s. See for example Scotty Fenn, "Meet the Manufacturer: Schiefer," *Drag News*, September 26, 1959, 7; "Meet the Manufacturer: Schiefer Mfg. Co.," *Drag News*, May 18, 1963, 20-21; "Schiefer Manufacturing," *Drag Sport*, April 23, 1966, 10; and "Meet the Manufacturer: Schiefer," *Drag News*, April 19, 1969, 8.

[73] "Meet the Manufacturer: Crankshaft Company," *Drag News*, November 26, 1960, 6-7.

[74] On Ed Pink, see "A Look at the Old Master's Shop," *Drag Sport*, September 6, 1965, 3-4 and 9, and Al Caldwell, "Meet the Manufacturer: Ed Pink Racing Engines," *Drag News*, August 18, 1969, 26-27. On Keith Black, see Jerry Mallicoat, "The Reverend Mr. Black and his 'Super Slipper,'" *Car Craft*, October 1968, 36-37 and 82-83. On Donovan, see Karen Scott, "Meet the Manufacturer: Donovan Precision Products," *Drag News*, June 28, 1969, 23. On Mondello, see "Mondello, the Head Magician," *Drag Racing Magazine*, January 1969, 42-45. On Sid Waterman, who got his start at Mickey Thompson Enterprises, see "News and Notes," *HRIN*, May 1967, 21. On Tubular Automotive, see Arthur H. Irwin III, "'To Breathe or not to Breathe?' Tubular Automotive," *Drag News*, February 18, 1966, 20. On Giovannoni, a Florida company that focused on stock-car racing parts, see Ken Weddle, "Meet the Manufacturer: Giovannoni Cams," *Drag News*, April 23, 1960, 8-9. On Lakewood Chassis, see "Meet the Manufacturer: Lakewood Industries," *Drag News*, November 20, 1971, 18-19. And, finally, on Simpson Safety Equipment, see "Meet the Manufacturer" Simpson Safety Equipment," *Drag News*, January 5, 1968, 16-17.

the increasing importance of application-based marketing, especially during the 1960s.

One final key to aftermarket success during the period in question that warrants mention here is what we might call the "personal touch." Essentially, what this involved was the realization, cultivation, and active promotion of one's aftermarket business as one that offered genuine one-on-one advice and service to its customers. This was especially true for small speed shops, who in the 1960s found themselves in the unenviable position of having to compete not only with large mail-order houses and distribution chains, but also with the OEMs' dealership-based high-performance parts centers.[75] For many equipment manufacturers, though, the "personal touch" was no less important. For some, in fact, it was a way of life. Norris Baronian, for example, built his tiny camshaft business on his reputation as a custom cam man for whom quality and personal service trumped outright growth and dollar volume in importance.[76] The same was true of Jack Engle, who deliberately controlled his company's growth during the 1960s in order to remain flexible and custom-oriented.[77] Even Edelbrock, long the largest high-performance company in the world, maintained a number of custom operations well into the 1960s in order to stay true to its tradition of personalized, hands-on craftsmanship, as did many, many others.[78] To be sure, there were at least a couple of aftermarket companies that sought to secure a competitive advantage by adopting the mass-production dogma of their OEM counterparts, such as Fenton and Eelco, but they were the exception: overwhelmingly, aftermarket manufacturers clung tenaciously to their reputation as specialists, and for most, it paid off handsomely.[79]

By emphasizing their specialty status, by focusing on their particular niche, by streamlining their research and development programs, and by falling back on what they had

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[75] See below, pages 256-258.
[76] Norris, in fact, had been Iskenderian's custom-grind machinist for years before he split off to found his own custom-oriented company in 1968. See Dave Wallace, Jr., "Meet the Manufacturer: Norris Performance Products," *Drag News*, May 17, 1975, 17.
[77] Dave Wallace, Jr., "Jack Engle Walks Softly, Carries Big Bumpstick," *Drag News*, November 22, 1975, 16-17.
[78] "Meet the Manufacturer: Edelbrock," *Drag News*, April 6, 1968, 16.
[79] On Fenton, see Almquist, "Aaron J. Fenton: A Born Salesman," in *Hot Rod Pioneers*, 190. On Eelco, see Scott Fenn, "Meet the Manufacturer: Eelco Mfg. & Supply Co.," *Drag News*, August 1, 1959, 7, and "Manufacturers News," *Drag News*, February 8, 1969, 2.

always done quite well – finding a way to improve upon the OEM's mass-produced automobiles, no matter how "hot" – the speed equipment manufacturers of the late 1950s and the 1960s more than held their own against the mainstream industry's incursions into their traditional markets, thriving as never before. And the more the OEMs advertised their own high-performance models, the better the aftermarket did. In fact, all of the "free publicity" of the period actually stoked the buying public's interest in high-performance automobility to such an extent that it began to open up a number of altogether new markets for add-on speed equipment manufacturers. Serious aftermarket high-performance research, development, and marketing for automobiles that were neither sporty nor equipped with large-displacement V8 engines, that is, began to take place on an enormous scale.

Consider, for example, the lowly domestic compacts of the late 1950s and the early 1960s. First introduced during the (in)famous AMA "racing ban," these were smaller automobiles that were usually less-garishly ornamented than their period counterparts and aimed at the consumer interested in economy and value. Equipped for the most part with inline four- or six-cylinder engines (though at least one was available with a small-displacement V8), these Tempests, Valiants, Falcons, and Darts were built for economy, not speed. Almost immediately upon their introduction, though, a number of hot rodders began to experiment with the diminutive vehicles, and it wasn't long before equipment manufacturers like Offenhauser, Iskenderian, Edelbrock, H&M, and Jahns began to offer camshafts, intake manifolds, ignitions, and exhaust headers for them.[80] Once the OEMs began to use these vehicles as the basis of their 1960s musclecars, however, the bottom largely dropped out of this still-new high-performance segment as Tempests, Falcons, and Valiants gave way in the small-car performance market to GTOs, Mustangs, and Chargers. The exception, though, was Chevrolet's Corvair.

Introduced in 1959, the Corvair was an unusual automobile that featured a rear-mounted, air-cooled six-cylinder engine built for utility and economy. Because of its unconventional

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[80] On the early 1960s high-performance market for domestic compacts, see Alex Wallordy, "Soup-Ups for the Compacts," *Cars*, June 1960, 57-59 and 68, and *Hot Rodding the Compacts* (Los Angeles, CA: Petersen Publishing Company, 1962), passim.

powerplant, the Corvair was not well-suited to the "shoehorn-in-a-large-V8" strategy that had begun to transform other compacts into musclecars by 1964, although Chevrolet did bring out a turbocharged version of the little car in 1962 to satisfy those among its buyers who craved a few more horses.[81] For the most part, though, the Corvair remained a popular economy car well into the 1960s, Ralph Nader's famous reservations notwithstanding. And because of this, it spawned a longer-lived and more diverse performance add-on aftermarket than its early 1960s compact competition ever managed.[82] But the Corvair's flat-six motor wasn't particularly easy to work with. Its intake manifolds, for example, were cast as single units integral with the motor's cylinder heads, which necessitated complex cut-and-weld procedures even for something as simple as fitting additional carburetors.[83] Similarly, clearances within the engine's case were awfully close, complicating the addition of a stroker crank or larger-diameter pistons.[84] What's more, air-cooled engines had a tendency to be far more sensitive to extreme temperatures, particularly in their cylinder heads, which made compression changes to the six far riskier than on, say, a standard water-cooled V8. Nevertheless, quite an impressive variety of aftermarket components were available for the engine during the 1960s. Camshafts, for example, could be procured from most of the major manufacturers, as could mufflers, ignitions, and rocker assemblies. Stroker cranks were also available from adventurous firms like Weber, and several companies also offered turbos and/or superchargers for the little air-cooled mill.[85] In spite of its disdain for convention, or perhaps precisely because of it, the Corvair remained a profitable market niche for many within the industry throughout the period in question.

In fact, apart from domestic V8s and musclecars, the Corvair's popularity among

[81] On the introduction of the turbocharged Corvair Spyder, see Roger Huntington, "Spyder – 150 hp!" *Motor Trend*, July 1962, 50-55.
[82] For an overview of the Corvair aftermarket of the period, see Griffith Borgeson and Wayne Thoms, "More Suds for the Corvair," in *Hot Rod Ideas*, 20-25, and *Hot Rodding the Compacts*, chapter 1.
[83] Don Francisco, "30 Giant Horses for Corvair," *HRM*, October 1961, 34-37.
[84] Ray Brock, "Stroker Kits for Corvair," *HRM*, August 1960, 34-37 and 92.
[85] On Weber's stroker kit, see Brock, "Stroker Kits for Corvair." Aftermarket turbos for the Corvair powerplant were available from Bell Auto, for example (see Ray Brock, "Turbochargers for Non-Spyders," *HRM*, April 1964, 40-43), while superchargers were available from companies like Paxton (see Chuck Nerpel, "Mor Air for the Corvair," *Motor Trend*, May 1960, 85).

performance enthusiasts and speed equipment manufacturers was eclipsed only by that of another unlikely candidate for high-performance modification, the Volkswagen. Every bit as unusual as the Corvair both mechanically and aesthetically, the lowly two-door Volkswagen sedan or "Beetle" had risen from the ashes of the war-torn German state of Lower Saxony to become the leading imported car in the American marketplace by the end of the 1950s.[86] Like the Corvair, the Volkswagen was powered by a rear-mounted air-cooled engine, only in the Beetle, it was a tiny single-carbureted four-cylinder unit that displaced well under 100 cubic inches and developed, at its evolutionary peak in 1971 and 1972, a mere 60 horsepower.[87] Low-revving and designed with longevity and fuel economy in mind, the Volkswagen was about as unassuming a vehicle as could be imagined. Yet, by 1957, the little car had attracted a handful of American boosters who began to promote it as a sound and reasonable basis for a high-performance build-up.[88] And within another ten to twelve years, in spite of the German company's strict policy forbidding its modification on pain of new-car-warranty forfeiture, the Volkswagen had become just that for countless thousands of American performance enthusiasts.[89] Looking back on the car's phenomenal rise as a high-performance player from the vantage point of 1969, though, Lee Kelley noted in the pages of *Hot Rod Magazine* that the Beetle's popularity was due, not to the 1950s efforts of boosters or equipment manufacturers, but rather to the inherent appeal of its tiny motor. Cheap, plentiful, easy to work on, interchangeable year-to-year, and responsive to simple bolt-ons, the flat-four was, Kelly maintained, not unlike

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[86] Excellent popular histories of the Volkswagen abound; by far the best available is Terry Shuler, Griffith Borgeson, and Jerry Sloniger, *The Origin and Evolution of the VW Beetle* (Princeton, NJ: Princeton Publishing, Inc., 1985).

[87] In the 1950s, Volkswagen engines for the American market displaced a mere 1132 to 1192 cubic centimeters (cc) and developed between 25 and 40 horsepower, depending on their model-year. By 1966, the mill had grown to 1300cc and 50 horses, and by 1967, 1500cc and 53 horsepower. Displacement rose again in 1970, to 1600cc, and further refinements through the early 1970s brought the engine's horsepower rating to a peak of 60 before environmental regulations necessitated a number of changes that brought them back down into the high 40s. See Shuler, Borgeson, and Sloniger, *Origin and Evolution*, pages 165-174.

[88] See, for example, Webber H. Glidden, President, Volkswagen Club of America, "Who Says Volkswagens Are Lousy?" *Speed Age*, May 1957, 24-27, 56, 58, and 60.

[89] On Volkswagen's official policies regarding the modification of its cars, see *Volkswagen Handbook* (Los Angeles, CA: Petersen Publishing Company, 1963), pages 2-3.

the popular small-block Chevrolet V8 – conceptually, at least.[90]

Indeed, its short-stroke, big-bore configuration gave the Volkswagen motor tremendous top-end potential, but as delivered, its undersized carburetor, long and circuitous intake manifold, small valves, weak ignition, conservative cam, low compression, restrictive exhaust system, and tiny displacement limited its real-world capabilities.[91] And this, of course, was where the speed equipment industry could be of great assistance to the owner of a Volkswagen who wanted a bit more power. Established manufacturers such as Iskenderian, Weber, Crower, Engle, Cragar, Jahns, and Mallory thus were quick to offer high-lift camshafts, stroker cranks, large-diameter piston and cylinder kits, exhaust headers, and ignition components for the Beetle's engine in the 1960s.[92] In addition, a number of altogether new companies joined the industry during the late 1950s and the 1960s specifically in order to specialize in high-performance parts and accessories for Volkswagens. European Motor Parts Incorporated (EMPI) of Riverside, California, for example, sold dual carburetor kits, suspension components, exhaust systems, and even complete, highly-modified Beetles.[93] Shoemaker of Long Beach, on the other hand, focused on the manufacture of performance exhaust headers and mufflers for the Volkswagen, while Revmaster

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[90] Lee Kelley, "Performance Ideas for VW Engines," *PHR*, January 1969, 36-41.

[91] Theoretically, the advantage of an engine with a short stroke and a large bore – i.e., one with short crankshaft throws and large-diameter pistons – is, all things being equal, that it will be able to achieve higher rpms with less difficulty than one with a long stroke and smaller pistons. Typically, therefore, short-stroke, large-bore engines tend to produce more horsepower at the top end of the rpm range, while long-stroke, small-bore engines will produce more low-end torque. The Volkswagen engine, however, limited as it was by its restrictive intake, exhaust, and other systems, often struggled to rev beyond 4000 rpm in stock trim. Consequently, it was unable to achieve its short-stroke, large-bore horsepower potential. Instead, in fact, its powercurve was rich in low-end torque and low on horsepower, more in line with a long-stroke, small-bore mill. Aftermarket tweaks to its intake, exhaust, and valvetrain systems could therefore unlock a *lot* of hidden potential simply by enabling the engine to achieve the higher revolutions per minute that were necessary for the generation of top-end power.

[92] On the Volkswagen parts from Iskenderian, see for example Karl E. Ludvigsen, *Your Sports Car Engine: Its Maintenance, Tuning, and Modification from Spark Plugs to Supercharging* (NY, NY: Sports Car Press, 1958), 74-76; Iskenderian advertisement, *HRM*, June 1966, 3; and Iskenderian advertisement, *HRM*, September 1968, 3. On those from Weber, see Len Griffing, "Small Size...Big Surprise!" *Motor Trend*, March 1960, 32-33. On those from Crower, see Crower advertisement, *HRIN*, August 1967, 5, and "Manufacturers News," *Drag News*, May 17, 1969, 2. On those from Engle, see Engle advertisement, *HRM*, September 1968, 8. On those from Cragar, see "Manufacturers News," *Drag News*, September 22, 1969, 2. On those from Jahns, see Ludvigsen, *Your Sports Car Engine*, 92. And, finally, on those from Mallory, see Bud Lang, "VW Dyno Tests: Bolt-On Power," *HRM*, June 1968, 50-52.

[93] On EMPI, see for example John Thawley, "Putten der Growl in der Beetle," *HRM*, May 1967, 98-99; Eric Dahlquist, "Small Wonder," *HRM*, July 1967, 32-35; and Patrick J. Berdard, "EMPI GTV: Southern California's Muscle Beetle," *Car and Driver*, July 1968, 64-66 and 93.

out in Riverside and Deano Dyno-Soars of Orange County cultivated esteemed reputations in the performance Beetle engine-building business.[94] Another Southern California firm, Scat, sold dual carburetors and exhaust systems as well, but they also manufactured stroker cranks, camshafts, and piston and cylinder kits as well.[95] Several European companies, including Okrasa of West Germany and British Racing Motors (BRM) of England, also produced performance parts and accessories for the little car in the late 1950s and the 1960s, though both sold them in the United States through domestic companies rather than attempting to establish American bases of their own.[96]

And what exactly could an owner expect if he were to plunk down the requisite cash, break out the hand-tools, and modify his Volkswagen? Anywhere from 25 to 100 percent more power, according to period sources.[97] Moreover, for those willing to remove their engines and send them, say, to Revmaster or Deano for a complete performance rebuild, horsepower gains in excess of 200 percent were entirely possible. Hence the tremendous popularity of the

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[94] On Shoemaker, see "Manufacturers News," *Drag News*, March 1, 1969, 2, and "Manufacturers News," *Drag News*, April 12, 1969, 2. On Revmaster, see Ed Orr, "More Power for VWs!" *PHR*, April 1969, 64-67. And on Deano's Dyno-Soars, see John Thawley, "43-HP VW Bolt-On: Give That 1500 an Impressive Performance Boost Without Splitting the Cases or Even Yanking the Engine," *HRM*, November 1969, 100-101, and below, pages 276-281.

[95] On Scat, see John Thawley, "Putten der Growl in der Beetle," *HRM*, May 1967, 98-99; "Bolt-On Horsepower for the VW," *PHR*, April 1968, 56-57; Bud Lang, "VW Dyno Tests: Bolt-On Power," *HRM*, June 1968, 50-52; and Ed O'Brian, "Stroker Kits for the VW," *PHR*, April 1970, 34-36 and 103. "Scat" doesn't stand for anything in particular, according to the company's Redondo Beach, California headquarters front office staff. A quick look in the dictionary reveals that the word "scat" has several (wildly disparate) meanings, all of which are slang: a type of jazz dancing, a type of jazz singing, animal excrement, heroin, or "to move or go off hastily" (*Webster's College Dictionary* (NY, NY: Random House, Inc., 1991), 1198). Period evidence seems to suggest that the last of these meanings had gained at least some currency among young performance enthusiasts of the 1960s, and since the company in question was founded in the mid-1960s, the present author believes – but cannot prove for certain – that the decision in favor of the name "Scat" must have had something to do with this meaning (for an example of the use of the term "scat" to imply "hasty movement" during the 1960s, see Dodge advertisement ("Dodge announces Scat City: The '70 Dodge Scat Pack is Road Ready"), *HRIN*, October 1969, 71-79. (Scat the company had nothing to do with Dodge.))

[96] Okrasa, which made high-performance replacement heads, and BRM, which made lightweight aluminum wheels, both chose EMPI as their American distributor. On Okrasa, see "Special Reports," *Motor Life*, March 1957, 7, and Len Griffing, "Small Size...Big Surprise!" *Motor Trend*, March 1960, 32-33. On BRM, see "What's New," *HRIN*, September 1966, 50 and 61.

[97] An extensive modification and testing session performed with assistance of a number of manufacturers at Iskenderian's dyno facility in 1968, for example, yielded an average gain of 25% for most combinations of simple bolt-ons (see Bud Lang, "VW Dyno Tests: Bolt-On Power," *HRM*, June 1968, 50-52), while another, similar session at Deano's Dyno-Soars the following year resulted in gains in excess of 100% (see John Thawley, "43-HP VW Bolt-On: Give That 1500 an Impressive Performance Boost Without Splitting the Cases or Even Yanking the Engine," *HRM*, November 1969, 100-101).

Volkswagen among enthusiasts, particularly those on a budget or those looking to learn the wrench-turning tricks of the trade on a relatively easy "starter" car.

Surprisingly, though, manufacturers were quick to jump aboard the Volkswagen bandwagon in the 1960s, but retailers and speed shops weren't. In fact, in spite of a relentless barrage of *Hot Rod Industry News* articles published during the late 1960s which extolled, ad nauseum, the profitable retail potential of this new and growing market segment and all but pleaded with their dealer and speed shop audiences to "look into this market now," the journal's editors remained dismayed that as late as 1968, "a great many speed shops...ignore the possibilities or merely pay lip service to VW equipment."[98] As a result, retailers were missing out because VW owners were quickly growing accustomed to ordering their parts direct, bypassing entirely the speed shop counters at which they had time and again been disappointed. What's more, speed shop owners across the United States were exhibiting a vexing reluctance to get into other new and profitable high-performance markets during the 1960s, including off-road dune buggies, kit cars, other imported cars, and sports cars.[99] Apparently unmoved by the lure of the almighty dollar, these traditional retailers chose instead to doggedly stick to the notion that "real" hot rods have V8 engines, even as their relative share of the V8 performance market shrank appreciably during the 1960s.[100] Manufacturers, on the other hand, were absolutely unafraid to jump head-first into these and other new markets for high-performance automotive

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[98] Examples of this *HRIN* barrage of Volkswagen equipment promotion included Ray Brock, "Publisher's Report," *HRIN*, December 1966, 6; Bob Leif, "Dolling Up the Bug," *HRIN*, December 1966, 22-27, 48, and 52-53; Dennis Pierce, "Information File," *HRIN*, March 1968, 44-45; Alex Xydias, "Editor's Report," *HRIN*, August 1968, 6; and Dennis Pierce, "Move Bug Parts," *HRIN*, August 1968, 22, 25, and 52. The quoted text appeared in Dennis Pierce's March and August 1968 pieces, respectively.

[99] *Hot Rod Industry News* led the promotional charge for these new markets as well, ultimately to no avail. See, for example, Ray Brock, "Publisher's Report," *HRIN*, July 1967, 6, which encouraged speed shop owners to look into off-roading, and Bob Leif, "Get Off the Road," *HRIN*, October 1967, 24-27, and 30, which did the same; Bob Leif, "Kit Cars," *HRIN*, August 1967, 24-27, 31, and 40-41, in which he pleaded with speed shop owners to pay attention to the growing market for build-it-yourself, kit-based sports cars and dune buggies; and Dennis Pierce, "Sports Car Equipment," *HRIN*, February 1967, 32-35, in which he explained, to a largely unreceptive audience, that "[m]ore and more speed equipment manufacturers are adding items for sports cars and imported sedans to their lines," and since "[t]hese are the same companies from which you buy Chevy and Ford goodies all the time...[a] little bit of research and promotion can make you bucks up and open up a whole new area of sales" without having "to look for new suppliers" (33).

[100] See below, pages 256-258.

add-ons during the period in question. And as a result, *their* profits soared, even if those of traditional speed shops and counter-based retailers did not.

Together with their top-end, late-model V8 speed equipment and their racing-only parts and accessories, sales of add-on components for these domestic compacts, imports, off-roaders, and other new markets helped ensure continued growth and prosperity for the high-performance aftermarket manufacturers of the 1960s. In the end, that is, it didn't really seem to matter to the Vic Edelbrocks, Fred Offenhausers, and Dean Moons of the world that the OEMs had gotten into the high-performance field for themselves. For indeed, at the very worst, speed equipment manufacturers lost but a tiny portion of their V8 hop-up sales to the Javelins, Camaros, and Barracudas of the period, while the OEMs' relentless performance advertising helped to create a more generalized and widespread interest in high-performance automobility that ultimately brought *more* opportunities, customers, and sales to specialty firms across the United States. The aftermarket's collective response to the OEM onslaught of the late 1950s and the 1960s, in other words, was utterly straightforward – and effective. Convinced that there would always be room for improvement, no matter what the OEMs turned out, equipment manufacturers simply embraced whatever opportunities happened to come their way, whether they involved 500-horsepower domestic V8s or 53-horsepower German flat-fours. And as a result, the industry more than held its own.

However, if we allow ourselves to dwell too much on the ways in which the aftermarket *responded* to the challenge of OEM competition during this period, we run the risk of overlooking an equally crucial element of the overall story. To wit: adversarial though their relationship often was during the late 1950s and the 1960s, speed equipment manufacturers and mainstream automotive firms weren't always at odds. Throughout the period in question, in fact, dozens of aftermarket companies and personalities lent their high-performance expertise to OEMs like Ford, Chevrolet, and Chrysler in a number of direct and explicit ways. Zora Arkus-Duntov, who was hired out of the speed equipment business in 1953 to head General Motors' fledgling high-performance team, was but the most famous of the many individuals that the

OEMs either hired away from the aftermarket entirely or tapped on a periodic consulting basis. As early as the late 1940s, for example, Ford hired the legendary Los Angeles camshaft grinder Clay Smith to assist with some of the company's racing-oriented special projects.[101] And in 1952, Ford also tapped the expertise of Bill Spalding, who traded his small Southern California camshaft business for what turned out to be a 23-year career at the Dearborn firm.[102] Later, Ed Iskenderian and Ed Winfield also consulted with several of the other mainstream manufacturers, including Chevrolet, enabling them to develop their first stock-car racing high-performance camshafts in the mid-1950s.[103] Right up to the onset of the AMA "racing ban" in 1957, these and other aftermarket gurus helped the OEMs to get their "horsepower race" in motion.

According to Roger Huntington, however, the mainstream industry no longer required the assistance of these "intuitive designers" once the horsepower race resumed in the early 1960s. For with their teams of college-educated engineers and high-tech testing gadgetry, their enhanced research and development capabilities had rendered obsolete the advice of these old-school hot rodders and accessory manufacturers.[104] But this is absolutely false. Ford, for instance, hired Ak Miller as a "performance advisor" in the mid-1960s, tapping his expertise to help the company develop high-performance systems for its smaller six-cylinder mills.[105] In addition, Fran Hernandez of Edelbrock joined Ford's high-performance team in 1966, and his influence within the company also won Ed Pink a number of racing engine-building contracts with Ford during the late 1960s and the early 1970s.[106] And Ford was not alone. Chrysler hired Keith Black to head its West-Coast marine division, for example, while American Motors secured the help of Barney Navarro for its late 1960s Indy racing program and Nissan paid Dean Moon to build its racing V8 engines for their 1960s circle track and road racing efforts over in

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[101] Almquist, "Clay Smith: Mr. Horsepower," in *Hot Rod Pioneers*, 88-89.
[102] Almquist, "The Spalding Brothers: Famous for Ignitions and Cams," in *Hot Rod Pioneers*, 40-41.
[103] Huntington, *American Supercar*, 19.
[104] Huntington, *American Supercar*, 73.
[105] On Miller's work with Ford, see Bob Leif, "Detroit Bulletin," *HRIN*, July 1968, 14; John Thawley, "The Whys, Wise, and Y's of Headers," *HRM*, October 1969, 60-63; and Steve Kelley, "Hot Stuff for Mavericks," *HRM*, January 1970, 90-92.
[106] On Hernandez and Ed Pink's 1960s role(s) at Ford, see Jerry Brandt, "Ed Pink," *Drag Racing USA*, May 1975, 61-61, and Almquist, "Fran Hernandez: Funny-Car Builder," in *Hot Rod Pioneers*, 73.

Japan.[107] What's more, above and beyond these direct hires and fee-based consulting arrangements, every single American OEM hired aftermarket companies to perform high-performance research and development for them, to produce add-on parts and accessories for them, or to join with them in the marketing and sale of performance-oriented products during the 1960s musclecar boom.

In fact, even Huntington himself admits as much. Edelbrock, he reports, not only sold its hi-riser ram-effect intake manifolds to Chrysler for it to use in its optional 440 Magnum package in the mid-1960s, but it also supplied add-on manifolds stamped with American Motors parts numbers to that firm in 1970.[108] And from period sources, it is clear that Vic Jr. and his employees also worked with American Motors on its Rambler racer in 1968.[109] But the phenomenon wasn't limited to the Edelbrock Equipment Company. American Motors also teamed up with Grant Piston Rings in 1967, delegating the task of assembling a supercharged funny car that the company planned to campaign in drag racing competition to the L.A. aftermarket firm.[110] In addition, American Motors entered into marketing agreements with Iskenderian, Doug's Headers, and Offenhauser in the late 1960s, which allowed their add-on high-performance components to be sold over-the-counter at American Motors dealership parts counters.[111] Likewise, Mickey Thompson (M/T) parts were available as factory options on Pontiac Catalinas as early as 1961, and in 1968, Buick placed a number of M/T parts on its official options list as well, along with camshaft options from Sig Erson's aftermarket company.[112] Oldsmobile, for its part, entered into an agreement with George Hurst not only to make his floor shifters available to Oldsmobile customers, but also to produce a limited number

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[107] On Keith Black's relationship with Chrysler, see Robert C. Post, "Interview With Keith Black," *Drag Racing Oral History Archive*, National Museum of American History, page 22, and "News and Notes," *HRIN*, February 1967, 39. On Navarro's work with AMC, see Almquist, "Barney Navarro," 51-52. And on Dean Moon's experiences with Nissan, see Fetherston, *Moon Equipped*, 20-22.
[108] Huntington, *American Supercar*, 63 and 99.
[109] See for example "Meet the Manufacturer: Edelbrock," *Drag News*, April 6, 1968, 16.
[110] "Rodding Roundup," *PHR*, August 1967, 5.
[111] American Motors advertisement, *HRM*, April 1969, 166.
[112] "Car Life Road Test: Pontiac Super Stock," *Car Life*, October 1961, 18-21, and "Detroit Bulletin," *HRIN*, December 1967, 10, respectively.

of tricked-out Hurst-Olds 4-4-2s in 1968; five years earlier, Plymouth and Dodge had also worked with Hurst to make his shifters an integral part of their optional power packs.[113] Ford, on the other hand, went all-out and hired Carroll Shelby, an aftermarket tuner who had joined the industry with the assistance of Dean Moon in the early 1960s, as its "official" performance parts manufacturer during the musclecar era.[114] On the research and development front, Bob and Don Spar of B&M Automotive worked with Chevrolet on an on-again, off-again basis during the 1960s.[115] Gary Hooker of Hooker Headers did the same for Chrysler in 1969, as did Joe Mondello of Mondello's Porting Service for Oldsmobile well into the 1970s.[116] In short, for many aftermarket manufacturers, the 1960s weren't about competing with the OEMs at all. Rather, it was a cooperative period, a time when they teamed up with the country's mainstream manufacturers in order to help bring high-performance motoring into the American mainstream.

Of course, speed equipment manufacturing in the mid- to late 1950s and the 1960s wasn't all about the Southern California industry's relationship(s) with OEMs, adversarial, cooperative, or otherwise. For as the aftermarket prospered and grew during those years, a number of critical internal developments began to unfold as well, changes in the ways in which the industry conducted its affairs that were every bit as consequential for it in the long run as were power packs, musclecars, and factory racing programs.

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[113] On George Hurst's 1968 partnership with Oldsmobile, see Bob Leif, "Detroit Bulletin," *HRIN*, June 1968, 16. On his work with Plymouth and Dodge back in 1963, see Hurst-Campbell advertisement, *HRM*, February 1963, 6.
[114] Carroll Shelby built his first Cobra sports car in the back of Dean Moon's Santa Fe Springs, California facility in the early 1960s (Fetherston, *Moon Equipped*, 93) before going on to produce high-performance accessories, kits, and packages for Ford (see, for example, LeRoi Smith, "Bolt On 80 Horsepower," *HRM*, October 1963, 78-81; FoMoCo advertisement, *HRM*, February 1964, 6-7 (FoMoCo was Ford's high-performance division, with which Shelby worked); and "New Cobra Supercharger by Shelby American," *Drag News*, December 30, 1966, 5).
[115] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003. See also below, pages 270-276.
[116] On Hooker, see Karen Scott, "Meet the Manufacturer: Hooker Headers," *Drag News*, June 14, 1969, 12, and "Manufacturers News," *Drag News & Equipment Industry Report*, December 6, 1969, 2 (towards the end of 1969, *Drag News*, which had regularly published stories, features, and news reports relating to the speed equipment industry for many years, briefly changed its name to *Drag News & Equipment Industry Report* to reflect this). On Mondello, see "Meet the Manufacturer: Mondello Olds Performance," *Drag News*, March 2, 1974, 8.

The Aftermarket "Comes of Age": Speed Equipment Manufacturing in the 1950s and 1960s

As the speed equipment industry's aggregate annual sales crept towards the $1 billion mark during the late 1950s and the 1960s, its ranks swelled as well. In 1955, prior to the OEMs' initial forays into the high-performance automotive market, there were less than 200 manufacturers of add-on, performance-oriented parts and accessories in the United States.[117] Fifteen years later, though, there were exactly 750 – more than three times as many.[118] What's more, a considerable number of the new firms that joined the industry during this period were located outside of the State of California. Writing in 1969, in fact, the publisher of *Hot Rod Magazine*, Ray Brock, reported to his readers that

> [e]ighty percent of the nation's population is east of the Rockies and that's where we sell 80% of our magazines. The same with speed equipment manufacturers.[119]

Brock was speaking of the industry's customer base, of course, the overwhelming majority of which no longer hailed from Southern California. Had he been referring to the retail end of the industry, however, he would have been no less accurate: by 1966, more than 75 percent of the speed shops, retail outlets, and mail order houses that dealt in performance-oriented products were based "east of the Rockies," too.[120] Lest we allow ourselves to be deceived, though, it warrants mention that although the geographic distribution of the *retail* end of the industry did indeed come to more closely match that of performance enthusiasts overall, the *manufacturing* end of the industry, with which we are chiefly concerned in this essay, absolutely did not.

To be sure, California's share of the nation's speed equipment manufacturers had been declining steadily since the late 1940s, falling from more than eighty percent in 1948 to less than

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[117] See above, chapter 3.
[118] *Hot Rod Magazine*'s comprehensive 1971 specialty equipment manufacturers directory, which was published in December of 1970, lists 757 individual speed equipment manufacturers, of which 7 were Canadian and 750 American. "1971 Automotive Specialty Equipment Manufacturers Directory," *HRM*, December 1970, 90-95.
[119] Ray Brock, "Publisher's Report," *HRM*, December 1969, 6.
[120] 76.4% of them, to be exact. See Cec Draney, "Hot Rod Industry News Survey," *Hot Rod Industry News*, September 1967, 39.

fifty percent by the end of the 1960s.[121] But even in 1970, California companies dominated the manufacturing end of the speed equipment industry by an overwhelming margin. Percentage-wise, of course, they no longer held an absolute majority. With 46 percent of the nation's high-performance aftermarket manufacturing companies, however, California trumped second-ranked Illinois by nearly 40 percent. In fact, against the shares of its six closest rivals combined, California still held a commanding advantage: Illinois, Ohio, Michigan, New York, New Jersey, and Pennsylvania together accounted for only 31 percent of the industry's manufacturing concerns.[122] Moreover, the same would hold true even if we were to narrow "California" down to the Los Angeles area alone, for in 1970, Southern California was home to a staggering 38 percent of American speed equipment manufacturers.[123] By the end of the 1960s, therefore, although performance enthusiasm and performance parts retailing had both spread throughout the United States so thoroughly that their geographic distribution had come to closely match that of the overall population, the same was simply not the case for those that actually produced performance-oriented add-ons. For them, Los Angeles remained the undisputed epicenter.

Within the L.A. area, though, the speed equipment industry began to spread out during the late 1950s and the 1960s. In 1954, there were but a handful of companies in greater Los Angeles that were not located within a 20 to 25 mile radius of the city center itself.[124] By 1970, however, in addition to the 235 companies that were located in the immediate vicinity of L.A. – defined here, however loosely, as the area encompassing Los Angeles, Southeastern Ventura, and western San Bernardino Counties – there were 37 more in suburban Orange County and 12 in Riverside.[125] Some of these more outlying firms were new, as was the case with Revmaster and EMPI of Riverside and B.F. Meyers and Deano Dyno-Soars of central Orange County.

[121] On the industry's geographical distribution in 1948 (and into the early 1950s), see above, chapter 3. By 1970, only 345 of the country's 750 speed equipment manufacturers, or 46%, were based in Southern California. See "1971 Automotive Specialty Equipment Manufacturers Directory," *HRM*, December 1970, 90-95.
[122] Ibid. Illinois accounted for 7% of the nation's manufacturers by 1970, Ohio and Michigan for 6% each, New York for 5%, New Jersey for 4%, and Pennsylvania for 3%. No other state accounted for more than 2%.
[123] Ibid. The Los Angeles area was home to 284 speed equipment manufacturers in 1970.
[124] See above, chapter 3.
[125] "1971 Automotive Specialty Equipment Manufacturers Directory," *HRM*, December 1970, 90-95.

Others, though, were older, well-established firms whose leaders sought either to expand their manufacturing facilities by taking advantage of the cheaper industrial real estate that then abounded in slightly more distant locales or, more simply, to escape the densely-populated urban core. Weber, for example, an anchor on Whiteside Avenue in Los Angeles for nearly 15 years, moved to Orange County in 1960 in order to add some 6,000 square feet of manufacturing space to its overall capacity.[126] And during the course of the 1960s, Eddie Miller, Clay Smith Engineering, and several other firms would do the same. Stuart Hilborn, on the other hand, moved his famous Fuel Injection Engineering Company from Los Angeles to secluded Laguna Beach in Southern Orange County in 1964 specifically in order to trade smoggy skies for ocean views without having to sacrifice the advantages, particularly in terms of shipping and receiving, that relative proximity to the L.A. basin held.[127] That these companies elected to flee to outlying suburban areas during the 1960s – or, more generally, that an ever greater portion of the region's speed equipment manufacturers, new and old, were located in Orange and Riverside Counties at the time – certainly ought to come as no surprise. For as Rob Kling, Spencer Olin, and Mark Poster argue in their edited volume on the postwar evolution of Orange County, *Postsuburban California*, the 1950s and the 1960s were a time when those towns that once had served primarily as bedroom communities for many of those who worked in downtown L.A. were gradually morphing into large, decentralized "postsuburban" zones largely independent from the urban core itself.[128] And as they did so, it was only natural that they should begin to attract industrial concerns like Fuel Injection Engineering and Weber's Speed Equipment.

In any event, whether located in downtown Los Angeles, in (post)suburban Orange

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[126] On Weber's move, see Ray Brock, "Stroker Kits for Corvair," *HRM*, August 1960, 35. Weber's original Whiteside Avenue location featured some 1,600 square feet (see Almquist, "Harry Weber: The Likeable Pioneer Cam Man," in *Hot Rod Pioneers*, 112-113), while the company's new 1960 headquarters in Santa Ana featured approximately 7,500 (*Speed & Custom Equipment News* reported in 1965 that Weber was adding 8,500 square feet to its 1960 building, bringing its total square footage in Santa Ana up to 16,000. Simple math thus reveals that Weber's 1960 building originally featured about 7,500 square feet of space. See "Weber in New Building," *Speed & Custom Equipment News*, July 1965, 1).

[127] Karen Scott, "Meet the Manufacturer: Fuel Injection Engineering," *Drag News*, May 10, 1969, 8.

[128] Rob Kling, Spencer Olin, and Mark Poster, Editors, *Postsuburban California: The Transformation of Orange County Since WWII* (Berkeley, CA: University of California Press, 1991).

County, or in a Midwestern city like Chicago, high-performance aftermarket manufacturers of the late 1950s and the 1960s were growing at a phenomenal pace not only in terms of their collective numerical strength and aggregate annual sales, but also individually. Contemporary accounts and news reports literally teemed with announcements to the effect that company X had moved into larger quarters or that company Y had annexed a neighboring building. Not *all* of them expanded during the period in question, of course, but most of them did – in fact, many did so two, three, and even four times in the span of a few short years. What's more, not a single report of floor-space contraction or company downsizing appeared at any time during the late 1950s and the 1960s, for overwhelmingly (indeed, near-universally), the trend was upward.

In 1965, for example, the six-year-old Hooker Headers company of Ontario, California burned to the ground, providing owner Gary Hooker and his partner Bill Casler with an opportunity to expand as they rebuilt.[129] Within two years, the company had already outgrown its new facilities, forcing Hooker and Casler to move into a brand-new 22,000 square foot building right across the street.[130] By the end of 1968, however, continuing rapid growth necessitated the addition of 29,000 square feet of floor-space to its still-new plant, but even this quickly proved to have been insufficient: less than a year later, construction was underway once again at Hooker, as Gary and Bill oversaw the addition of 17,000 *more* square feet.[131] Prosperity also blessed Lakewood Industries of Ohio. In 1959, the company had begun as a custom-oriented basement operation in the suburban Cleveland town of Lakewood, but strong demand quickly allowed its founder, Joe Schubeck, to move the fledgling firm into a nearby two-car garage. Steady growth soon enabled Schubeck and his partner, Bill Steiskal, to move into a 3,500 square-foot facility in Lakewood, where several innovations in the design and manufacture of racing bellhousings led to explosive growth throughout the rest of the 1960s.[132] By 1971, Lakewood had moved into a

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[129] On the fire and the company's mid-1960s rebirth, see Karen Scott, "Meet the Manufacturer: Hooker Headers," *Drag News*, June 14, 1969, 12.
[130] See "News and Notes," *HRIN*, August 1967, 20, and "News and Notes," *HRIN*, December 1967, 54.
[131] Karen Scott, "Meet the Manufacturer: Hooker Headers," *Drag News*, June 14, 1969, 12, and "Manufacturers News," *Drag News*, July 5, 1969, 2.
[132] On Lakewood's early years, see "Meet the Manufacturer: Lakewood Industries," *Drag News*, November 20, 1971, 18-19.

new plant nearly ten times larger than that which it had occupied nine years earlier, a 30,000 square-foot monster in Cleveland proper.[133] Similarly, Cragar, which had moved out of its parent company Bell Auto's Bell, California headquarters and into its own nearby facility in the mid-1950s, broke ground on a massive 90,000 square-foot, $1 million plant in the fall of 1968.[134] Even before the company moved into its new building the following summer, however, its phenomenal growth had forced its owner, Roy Richter of Bell Auto, to begin to plan for the addition of 30,000 more square feet.[135] Likewise, Crower, a San Diego-area manufacturer new to the industry in the early 1950s, moved out of a tiny workshop and into an 8,500 square-foot facility in 1962, only to find it necessary to add more than 10,000 additional square feet four years later.[136] Rapid growth during the late 1960s (and into the early 1970s) demanded several more additions of a more haphazard nature, and by 1975, in fact, the company had added on here and there so frequently that no one at the plant could say for sure precisely how large the place had become.[137] Mr. Gasket, Crane, Schiefer, Moon, Donovan, B&M, Jardine, Shoemaker, and many, many others all had similar 1960s-era plant-expansion experiences, but in our present context, it would be absurd to attempt to recount them all. Instead, it should suffice simply to bear in mind that the industry's impressive dollar-value growth during the period in question was accompanied by an equally impressive record of plant expansions across the board.

And what exactly were these speed equipment manufacturers adding on? Not altogether surprisingly, their frequent and often massive expansionary moves resulted primarily from their need for more warehousing, research and development, and manufacturing space. Critically,

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[133] Construction on its new 30,000 square-foot facility began in 1969, and the company moved in 1970 (see "Manufacturers News," *Drag News*, May 17, 1969, 2, and "Meet the Manufacturer: Lakewood Industries," *Drag News*, November 20, 1971, 18-19). The company's growth continued well into the 1970s; in 1974, for example, Lakewood began to plan an addition to its four-year-old Cleveland facilities (see "Meet the Manufacturer: Lakewood Industries," *Drag News*, June 1, 1974, 22).

[134] "Manufacturers News," *Drag News*, December 7, 1968.

[135] "News and Notes," *HRIN*, January 1969, 118 and 124, and "Manufacturers News," *Drag News*, July 26, 1969, 2.

[136] On Crower's early 1960s facilities, see "Crower: How the Shop Came to Be," *Drag News*, May 25, 1963, 20-21. On its 1966 move, see "Crower Cams in Expansion Move," *Drag News*, April 15, 1966, 21, and Crower advertisement, *HRM*, April 1966, 97.

[137] Dave Wallace, Jr., "And Now, from the Folks Who Brought You the U-Fab Intake Manifold...," *Drag News*, August 21, 1975, 16-17.

though, in nearly every case these moves amounted to an increase in the *scale* of these companies' operations, and only very rarely were they part of a more comprehensive change in *strategy*. In other words, equipment manufacturers across the country responded to the rapidly rising demand for their products during the late 1950s and the 1960s not by moving to adopt manufacturing processes more in line with mass production, but rather by adding more floor space and filling it with more general-purpose drill presses, lathes, boring machines, planers, hand grinders, and skilled machinists.[138] There were exceptions, of course. Eelco, for example, added a 25,000 square-foot facility to its Los Angeles headquarters in 1969 solely in order to establish its own chrome-plating area, further enhancing the company's all-in-house, Fordist approach to the manufacture of high-performance equipment.[139] Similarly, Fenton's 90,000 square-foot manufacturing center used a number of automatic welders, tube-benders, drill presses, polishing machines, and unskilled attendants to turn out massive quantities of its run-of-the-mill wares during the 1960s, as did Cyclone's 40,000 square-foot plant.[140] For most, though, the more familiar flexible manufacturing processes that they had used for decades remained their modus operandi.

Accordingly, aftermarket firms as diverse as Venolia, Engle, Cragar, Fuel Injection Engineering, Hooker, Crower, and Donovan all followed the same basic procedure throughout

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[138] In general, the number of employees at these companies remained relatively small, averaging approximately 12 to 24 per company during the late 1960s (according to the 1967 survey of manufacturers published in *Hot Rod Industry News*, aftermarket manufacturers employed an average of 8,343 workers over the course of calendar year 1966, and even if we assume that this figure had doubled by 1970, when *Hot Rod* published its comprehensive manufacturers' directory that listed 750 individual American companies, we arrive at an average of no more than 24 per company; see Cec Draney, "Hot Rod Industry News Survey," *Hot Rod Industry News*, September 1967, 41). Skewing that average, however, were firms like Mickey Thompson, which grew from 4 full-time employees in 1959 to more than 200 in 1969 (see Karen Scott, "Meet the Manufacturer: Mickey Thompson," *Drag News*, May 3, 1969, 8); Crane Cams, which grew from a handful of employees in 1953 to more than 80 by 1968 (see "Meet the Manufacturer: Crane Cams," *Drag News*, December 29, 1973, 16; Crane advertisement, *HRM*, July 1968, 117; and below, pages 237-241); and Crower, which grew from a full-time staff of 6 in 1960 to one of more than 75 fifteen years later (see Dave Wallace, Jr., "And Now, from the Folks Who Brought You the U-Fab Intake Manifold…," *Drag News*, August 21, 1975, 16-17).

[139] Eelco also had its own aluminum foundry, and with the addition of its chrome-plating facility in 1969, the company was able to do almost all of its manufacturing in-house, converting raw aluminum, steel, and rubber into finished and packaged products in a high-volume, assembly-line manner that would have made Henry Ford himself smile in approval. See "Manufacturers News," *Drag News*, February 8, 1969, 2.

[140] Karen Scott, "Meet the Manufacturer: Fenton Company," *Drag News*, August 2, 1969, 14, and Karen Scott, "Meet the Manufacturer: Cyclone Automotive," *Drag News*, July 19, 1969, 10.

the 1960s: raw aluminum, steel, or alloy castings (and/or forgings) would be obtained from an independent foundry on a contract basis and then machined, polished, and assembled in-house.[141] Often, the machining and assembly work would be done by hand, but in some cases, multiple drill presses, double boring machines, and other more specialized – but *not* dedicated – machine tools enabled larger batches of popular items to be produced more efficiently.[142] The trick in either case, of course, was to be prepared for the unexpected – to be prepared, that is, for the sorts of dramatic shifts in marketplace demand that might well make today's low-volume, custom-oriented products tomorrow's big sellers. And although few within the industry ever really mastered the art of long-term forecasting in a market segment as volatile as theirs, their general-purpose tools and skilled staffs allowed the unpredictable and the unforeseeable to be managed.

This is not to say that process refinement within the industry ground to a halt – quite the contrary, in fact. Ed Iskenderian, for example, developed a centralized machine-tool coolant filtration system at his plant during the mid-1960s that ensured that each and every one of his camshaft grinders received adequate and uncontaminated fluid for the grinding process. The problem, in Ed's case, was that with an ever-increasing number of machines on the shop floor, it quickly had become rather an onerous task to make sure each one's fluid was changed regularly. What's more, even with regular fluid changes, the machines were designed to recycle the same coolant over and over again, which meant that after the first cam had been ground on a freshly-serviced machine, the fluid would be filled with tiny metal shavings from the grinding process.

[141] On Venolia, a piston manufacturer, see "Meet the Manufacturer: Venolia," *Drag News*, August 22, 1970. On Engle and Crower, both of which were in the camshaft business, see Dave Wallace, Jr., "Jack Engle Walks Softly, Carries Big Bumpstick," *Drag News*, November 22, 1975, 16-17, and Crower advertisement, *HRM*, January 1966, 91, respectively. On Cragar, a highly-diversified firm that produced all sorts of aftermarket add-ons, from blower drive systems to mag wheels, see Cragar advertisement, *HRM*, July 1968, 23. On Fuel Injection Engineering, a firm which specialized in the racing market, see Karen Scott, "Meet the Manufacturer: Fuel Injection Engineering," *Drag News*, May 10, 1969, 8. On Hooker, see Karen Scott, "Meet the Manufacturer: Hooker Headers," *Drag News*, June 14, 1969, 12. And, finally, on Donovan, another firm that focused exclusively on the racing market, see Karen Scott, "Meet the Manufacturer: Donovan Precision Products," *Drag News*, June 28, 1969, 23.

[142] Ansen, for example, used multiple drill presses and a double boring machine to speed up the hand-machining processes at its Gardena, California plant (see "Ansen Automotive," *Drag News*, May 2, 1964, 20-21, and Karen Scott, "Meet the Manufacturer: Ansen," *Drag News*, July 12, 1969, 15).

By installing a maze of interconnected pipes linking each of his machines to a large, centralized coolant tank and filtration system, though, Ed was able not only to ensure that his machines would last longer, but also that his camshafts would be ground in pure, fresh coolant each and every time.[143] Period process refinements at Schiefer, Crower, Engle, and Lakewood, on the other hand, had less to do with machine-tool longevity than they did with quality control. In the late 1950s, for example, Paul Schiefer developed (and later patented) a hard-facing process for his clutches and flywheels designed to reduce friction, thereby lowering the units' in-use operating temperatures and all but eliminating the risk of warpage.[144] Wear-and-tear was also on Bruce Crower's mind when he adopted a patented camshaft-facing process known as "Tuff-Tiding" in the late 1960s, as it had been for Jack Engle back in 1959, when he purchased and installed his first cam-coating "Parkerizing" tank.[145] But at Lakewood Industries, quality control was all about ensuring their customers' safety. During the 1960s, therefore, the firm became the first within the industry to apply a process known as "hydroforming" to the production of its bellhousings, which reduced the risk of catastrophic in-use failure by ensuring that the metal in their housings was of a uniform thickness. Later, Lakewood also built an explosion test lab at its Cleveland plant in which its technicians could spot-check sample bellhousings from the assembly area in a safe and controlled environment.[146]

For the most part, though, whether developed with safety, quality control, or machine-tool longevity in mind, these process refinements and new manufacturing techniques found their way onto shop floors still firmly committed to a flexible overall manufacturing strategy. They enabled better-quality goods to be produced in volumes ranging from miniscule to massive, but they did not revolutionize the way in which the overwhelming majority of the firms within the

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[143] Details on Isky's fluid system appeared in "Iskenderian: America's Fastest Racing Cams," *Drag News*, March 7, 1964, 24-25.

[144] See Scotty Fenn, "Meet the Manufacturer: Schiefer," *Drag News*, September 26, 1959, 7, and "Manufacturers News," *Drag News*, February 15, 1969, 2.

[145] Karen Scott, "Meet the Manufacturer: Crower," *Drag News*, May 24, 1969, 23, and Harry Field, "Meet the Manufacturer: Engle Cams," *Drag News*, December 26, 1959, 8-9.

[146] On Lakewood's safety-oriented quality control innovations, see "Meet the Manufacturer: Lakewood Industries," *Drag News*, November 20, 1971, and "Meet the Manufacturer: Lakewood Industries," *Drag News*, June 1, 1974, 22.

industry conducted their affairs. What's more, they usually weren't used to produce new *types* of products. Camshafts, crankshafts, exhaust headers, mufflers, intake manifolds, pistons, and ignitions, in other words, remained the industry's stock in trade. For indeed, no matter how advanced its processes might have become, in the end, the industry's role – its basic task of providing add-on parts for performance tuning applications, that is – remained unchanged throughout the period in question. And since the late 1950s and the 1960s witnessed very little in the way of fundamental changes in automotive design at the OEM level, the same was true, by extension, at the aftermarket level. There were refinements, of course – 360-degree intake manifolds, hydraulic lifters, transistor ignitions, and roller-bearing crankshafts, to name but a few. Overwhelmingly, however, aftermarket products of the late 1950s and the 1960s were decidedly old-school.

Noteworthy exceptions to this general rule of thumb included high-performance automatic transmissions, turbochargers, and fuel-injection systems. A more complete discussion of the first of these appears later in this chapter; for now, consider the latter two, both of which exemplify the ways in which the aftermarket often led the way in the development of new automotive technologies. A turbocharger, also known as a "turbo-supercharger" or simply a "turbo," is a type of supercharger that uses an engine's exhaust gases to drive an impeller that forces additional air into the motor. As with standard belt-driven superchargers, therefore, turbos enable – or, more accurately, *force* – internal combustion engines to produce more power by *forcing* them to consume more air and fuel. However, whereas a mechanical supercharger will tend to provide a linear boost in engine performance, a turbo will instead produce an exponential power curve. Theoretically, that is, the more horsepower a turbocharged engine makes, the more it will be able to make. First applied en masse to airplane motors during the Second World War, turbos only began to become common on land-based vehicles in the 1950s, when large diesel-powered truck manufacturers began to use them to enhance the inherently poor breathing capabilities of compression-ignition engines.[147] In 1960, however, the ever-resourceful Barney Navarro published an article in *Motor Life* in which he discussed an experiment he had conducted with a diesel turbocharger and a Chevrolet Corvair. The unique modified engine that resulted from his efforts made for a far more powerful automobile, and Navarro boldly prophesized that the turbocharger "promises to be tomorrow's most highly touted hop-up accessory."[148] And he was right. Two years later, Chevrolet introduced the first production turbocharged automobile, the Corvair Spyder, but not until the mid-1980s would the OEMs begin to apply the technology in a more widespread, routine manner.[149] In the meantime, aftermarket companies like Bell Auto, Rajay, and AiResearch filled the gap, spearheading gasoline-engine turbo research and development efforts and making hop-up turbocharger kits available to rodders who were after something a little bit different for their high-performance build-ups.[150]

The story of the emergence of automotive fuel injection systems, aftermarket or otherwise, is considerably more complex, largely because definitive links in the web of ideas, patents, and engineering influences that led to its widespread, OEM-level application in the 1970s and 1980s are close to impossible to establish. The basic facts and milestones, on the other hand, are relatively straightforward. Essentially, fuel injection is a process that uses one or

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[147] Unlike gasoline engines, which use spark plugs to ignite the air-fuel mixture, diesel engines ignite the mixture through extremely high compression ratios; hence "compression-ignition engine," a common technical substitute for the more colloquial "diesel." Because they rely on compression pressures within the combustion chamber to ignite the fuel-air mixture, though, diesel engines tend to use camshafts with very short duration periods in order to introduce the mixture to the cylinder quickly and then close the valves promptly so that no compression is lost on the upstroke. Consequently, diesels do not benefit from the airflow advantages that a well-designed gasoline engine can enjoy. For in a gasoline engine, camshaft duration can be made longer than on a diesel, promoting a flow of air through the cylinder that enables the engine to consume its fuel-air mixture (or "breathe") more efficiently. Turbos therefore were a boon to the diesel engine industry of the 1950s, for by *forcing* more air into the cylinders before the valves closed, compression-ignition engines could be made to breathe a bit better, too.

[148] Barney Navarro, "Blown Corvair," *Motor Life*, September 1960, 34.

[149] On the Corvair Spyder, see Roger Huntington, "Spyder – 150 hp!" *Motor Trend*, July 1962, 50-55.

[150] Bell Auto, for example, brought out a bolt-on turbo kit for ordinary Corvairs in 1964 (see Ray Brock, "Turbocharger for Non-Spyders," *HRM*, April 1964, 40-43), and Rajay did the same for the air-cooled Volkswagen engine in 1970 (Hugh MacInnes, "Turbocharge!!!" *HRM*, October 1970, 58-60). Meanwhile, Garrett's AiResearch Division developed turbocharging solutions for racing applications beginning in the early 1960s (see, for example, Almquist, "Robert DeBisschop: A Key Player in the Offy's Struggle for Survival," in *Hot Rod Pioneers*, 273, and Drake, *Hot Rodder!*, 95).

another means of pressurization to reliably deliver vaporized fuel to an engine's intake stream, rather than depending, as do carburetors, on the motor's intake vacuum to accomplish the task. In 1939 and 1946, respectively, aftermarket pioneers Ed Winfield and Stuart Hilborn both filed (and received) U.S. patents for pressurized injection processes of this sort, but only Hilborn was ever able to translate his patented idea into a real-world, marketable system.[151] During the late 1940s and the 1950s, in fact, Hilborn's racing-only "constant flow" fuel injection set-up was a huge success, powering many a dry-lake streamliner and quarter-mile dragster to victory and bringing Hilborn and his company, Fuel Injection Engineering, the accolades of many within the hot rodding fraternity. During the early to mid-1950s, however, several OEM-style parts suppliers both in the United States and abroad – including Bendix, Borg-Warner, SU, Fuelcharger, Holley, Lucas, and Bosch – began to develop a variety of fuel injection systems more appropriate for everyday street use, and in 1957, Chevrolet became the first American OEM to bring the new technology to market with its optional Rochester system.[152] Inspired, a number of speed equipment manufacturers soon joined Hilborn in the fuel injection aftermarket, and a flurry of activity within the field during the early 1960s soon brought workable, if not affordable, add-on street-use fuel injection systems to the American market.[153] Meanwhile, European companies like Mercedes-Benz and Volkswagen worked with Robert Bosch GmbH to bring more advanced, electronically-controlled fuel injection systems to market by the end of the 1960s.[154] By the 1970s and 1980s, computer-controlled systems such as these were increasingly

[151] On Winfield's patent, see Medley, *Tex Smith's Hot Rod History, Volume One*, 60, and on Hilborn's patent, see Batchelor, *The American Hot Rod*, 70, and Almquist, "Stuart Hilborn: Racing's Fuel Injection Pioneer," in *Hot Rod Pioneers*, 68-69.

[152] On the Bendix, Borg-Warner, SU, Holley-Lucas, Bosch, Fuelcharger, and Rochester systems of the 1950s, see Roger Huntington, "Seven Systems for Detroit: What Types of Fuel Injection Are Auto Makers Considering? Here's the Rundown," *Motor Life*, January 1957, 24-25. On Chevrolet's introduction of the Rochester system in 1957 (and the skepticism with which it was often met), see Bob Fendell, "Fuel Injection: 1957's Greatest Myth?" *Car Life*, March 1957, 36-37 and 73, and "In 1960, Turbines Will Replace Fuel Injection," *Motor Guide*, March 1957, 36-38.

[153] Howard's Cams, Norden, Algon, and Scott, for example, all had systems in the works by 1959, as did Enderle by mid-1960. See Bob Pendergast, "New Fields in Fuel Injection," *HRM*, February 1959, 28-35, and "Meet the Manufacturer: Enderle Fuel Injection," *Drag News*, April 30, 1960, 6.

[154] On the Bosch system as applied to Mercedes-Benz 6-cylinders, see Barney Navarro, "Why Fuel Injection?" *Motor Life*, January 1957, 20-21. On the system as applied to air-cooled Volkswagens, see for example "Injecting Fuel into the VW," *Business Week*, September 23, 1967, 44, and "The 1968 SEMA Show," *HRIN*, February 1968, 28.

common, and by the 1990s, they were the universal norm among American-market gasoline automobiles.

Clearly, aftermarket companies and OEMs alike played active roles in the development of automotive fuel injection, but their relative contributions have long been the source of much debate. We know, for example, that Ford learned a great deal by assigning Ak Miller to the task of reverse-engineering Mercedes-Benz's six-cylinder Bosch injection system in the 1960s.[155] Equally apparent is the fact that Chevrolet's introduction of the Rochester system in 1957 led to a considerable amount of fuel injection R&D in Southern California. But what, if anything, did American giants like General Motors, Ford, and Chrysler learn from their diminutive aftermarket counterparts? The fact that Chevrolet's Rochester system hit the market one year after Ed Winfield's 1939 patent expired and just a few short years before Stuart Hilborn's was set to do the same led some at the time and many more since to cry foul, charging that Chevrolet did little more than apply the basic elements of one or another of these hot rodders' systems to their production engines. Writing in 1959, for example, *Hot Rod Magazine*'s Bob Pendergast explained that the technology behind Chevy's 1957 system had surprised no one in the rodding field, since "rods had [long] been the testing device for a form of fuel injection that had proven the practicability of the basic principle used in the Rochester," namely, Stuart Hilborn's constant-flow idea.[156] Ed Almquist agrees, charging in his massive collection of biographical sketches that "Chevrolet…copied the Hilborn system – adding only electronic controls."[157] Tom Medley, on the other hand, maintains in the first of his two volumes on the history of hot rodding that it was Winfield's more complex injection design that actually inspired Chevrolet's Rochester system.[158] Period evidence direct from Chevrolet, however, suggests that Pendergast and Almquist are correct – in other words, that Hilborn's basic principle was what the company

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[155] See Bob Leif, "Detroit Bulletin," *HRIN*, June 1968, 16, and Bob Leif, "Detroit Bulletin," *HRIN*, July 1968, 14.
[156] Bob Pendergast, "New Fields in Fuel Injection," *HRM*, February 1959, 28.
[157] Almquist, "Stuart Hilborn," 69.
[158] Medley was a member of the *Hot Rod Magazine* staff in the 1950s (actually, he was a cartoonist: his "Stroker McGurk" strip was a popular monthly feature in the Petersen publication for much of the 1950s). Here, in his history of hot rodding, his source on Ed Winfield's fuel injection system is Kong Jackson, an early equipment manufacturer who knew Winfield very well (see Medley, *Tex Smith's Hot Rod History, Volume One*, 60).

applied to its V8s in 1957. Unlike modern electronic systems, which use electric pulses to activate tiny solenoids in port-mounted fuel injection valves, Hilborn's system used a set of high-pressure fuel lines to carry fuel from a central pump and deliver it, in a constant flow, to each of the engine's intake ports.[159] And this, in fact, is precisely what the Rochester injector did, "offer[ing] constant-flow port injection," in Chevrolet's own words, to new-car buyers willing to pony up the extra cash for one.[160] However, whereas Hilborn's system was only able to adjust the pressure of the fuel delivered according to the position(s) of its eight individual throttle valves, Chevrolet's Rochester unit was also able to adjust the flow rate according to engine vacuum by way of an engine airflow metering device that was linked to a pressure regulator. Hence, Hilborn's system was less well-suited for street use, while Chevrolet's was more than capable of operating under a variety of on-road conditions.[161] The two systems, in other words, were actually quite different, even though the basic constant-flow idea underpinned them both. And in the absence of a smoking gun from General Motors's R&D archives, it's simply far too difficult to say with any degree of certainty whether Chevrolet's 1950s engineers actually "borrowed" from Hilborn's bag of tricks.[162] Circumstantial evidence, however, strongly suggests that they did.

In any event, as fuel injection evolved during the course of the 1950s and the 1960s, aftermarket manufacturers were in the vanguard, just as they were with turbochargers. Apart from what they spent on these new product types, however, the vast majority of their efforts went to the production of an ever more diverse array of traditional performance products – cams, cranks, manifolds, and the like. And in order to meet the ever-increasing demand for these add-on parts, especially during the mid- to late 1960s, speed equipment manufacturers from coast to coast expanded their facilities, bought new equipment, and hired new machinists. But as they did

[159] On the operation of the Hilborn system, see Almquist, "Stuart Hilborn," 69.
[160] Chevrolet advertisement, *HRM,* July 1957, 15.
[161] See Roger Huntington, "Seven Systems for Detroit," *Motor Life*, January 1957, 24-25, and Almquist, "Stuart Hilborn," 69.
[162] A week or two at General Motors's corporate archives in Michigan ought to help clarify this matter, and the present author plans to pursue the issue there as part of his ongoing research.

so, their collective capacity rapidly overwhelmed the existing distribution system, which since the 1940s had relied upon a combination of direct mail-orders and specialty speed shop sales to meet the needs of average enthusiasts. By the early 1960s, larger chains such as J.C. Penney and Sears therefore began to carry high-performance accessories, while middlemen such as manufacturers' representatives, independent jobbers, and wholesale distributors (WDs) began to handle an ever-larger percentage of manufacturer-level sales.[163] Though it was a boon to manufacturers, the emergence of these new distribution channels worried many independent speed shop owners, who often saw the new middlemen and the chain stores to which they sold as unscrupulous competitors bent on driving the little guy out of the business. *Hot Rod Industry News*, whose monthly circulation of 12,000 copies mostly went to smaller speed shop owners, quickly took up their cause, publishing numerous articles during the mid- to late 1960s which sought to educate speed shop owners on the many ways in which their status as speed equipment *specialists* could, with an adjustment here and a bit of effort there, enable them to stay afloat and even prosper in spite of the rapidly changing and ostensibly unfavorable market environment in which they found themselves. And indeed, many did continue to do well, but their grumbling never did entirely cease.[164] Among manufacturers, though, the verdict was nearly unanimous: apart from some minor complaints about the pricing policies of certain WDs and chain stores, they quickly realized that these new outlets broadened the scope of their market exposure and enabled them to better serve the ever-escalating demand for their products. But because they didn't want to alienate any of their retail outlets, including traditional speed shops, most

[163] On chain stores and their increasing involvement in the distribution of aftermarket products, see for example Karen Scott, "Meet the Manufacturer: Mickey Thompson," *Drag News*, May 3, 1969, 8. On manufacturers' representatives, see Dennis Pierce, "Manufacturers Reps," *HRIN*, April 1967, 23-25, 47, and 48. On "jobbers," see Almquist, "Road Warriors: More than Parts Peddlers," in *Hot Rod Pioneers*, 245. And, finally, on the emergence of WDs, see Dennis Pierce, "A Look Into the 70's," *HRIN*, January 1970, 70 and 72.

[164] For an overview of the mid- to late 1960s squabbles between traditional speed shops, on the one hand, and chains and WDs, on the other, see Moorhouse, *Driving Ambitions*, especially pages 127-131. For some specific examples of the concerted effort by the editors of *Hot Rod Industry News* to convince speed shop owners of the advantages their status as *specialists* gave them over the larger WDs and chains, see Alex Xydias, "Editor's Report," *HRIN*, July 1968, 6; "Is the Speed Shop Dead?" *HRIN*, September 1969, 22-24, 26, 50-52, and 55; and Alex Xydias, "The High Performance Market: An Address to the Automotive Research Council in Philadelphia in October of 1969," *HRIN*, January 1970, 54, 56, 58, 60, and 132.

equipment companies either held their tongues entirely or adopted a relatively neutral public stance on the matter.[165]

Besides, many 1960s manufacturers were far too busy with internal squabbles of their own to have had the time or the inclination to get involved in the brouhaha between the speed shops and the WDs. Competition within the speed equipment industry had always been intense, but in the late 1950s and the 1960s, it began to grow increasingly fierce. As a result, competing manufacturers would often publicly trade barbs in *Drag News*, *Hot Rod*, *Popular Hot Rodding*, and other widely-circulated enthusiast periodicals, using their precious advertising space to charge their rivals with everything from patent and copyright infringement to deliberate product misrepresentation. In 1960, for example, the California Equipment Company of Seattle noted, in an advertisement published in *Drag News*, that some of its competitors had begun to copy its popular floor-shift conversion kits and warned that it was prepared "to avail itself of the protected clauses provided by the U. S. Patent law and to proceed against anyone" that it believed was doing so.[166] California Equipment was not alone in its frustration with the "knock-off" problem, but it was one of the few to ever threaten legal action over it. For indeed, as Delores Berg of Gene Berg Enterprises would later explain, the very nature of the industry's unique type of product – parts and systems that modify other parts and systems, that is – made it very difficult to prove infringement in most cases.[167] Consequently, few among them ever tried – and even fewer ever bothered to file patents in the first place.

Far more common, though equally difficult to prove, were charges that one or another of a given company's direct competitors had lied, in *its* advertisements, with regard to the critical matter of racing and motorsports affiliations. When Venolia began to claim as its own several of Mickey Thompson's sponsored drag-racing champions in 1966, for example, Thompson called them on it in an open letter published in the pages of *Drag News*, challenging Venolia's leaders

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165 See Bob Leif, "Manufacturers Speak: Questions and Answers on Topics of Industry Interest," *HRIN*, May 1968, 20-23 and 50-51; "Bobbins on WD's," *HRIN*, July 1968, 24-26; and Dennis Pierce, "The Role of WD's," *HRIN*, December 1968, 26-29.
166 California Equipment Company advertisement, *Drag News*, April 30, 1960, 11.
167 Author Interview with Delores Berg, Orange, California, November 11, 2003. See also below, pages 276-281.

to a peaceful, mediated sit-down to sort out which racers actually used which company's pistons. And when representatives from his competitor failed to show up at the designated time and place, Thompson wasted very little time. Within a month, he had responded to Venolia's silence by securing a clever full-page spread in *Drag News*: the first half of the page repeated Thompson's claims in detailed fashion, and the second half was left entirely blank, apart from a tiny notice that the blank space had, courtesy of Mickey Thompson Enterprises, been "reserved for [the] Venolia Piston Company."[168] Similar charges were exchanged between a number of camshaft manufacturers during the late 1950s and the 1960s, though only very rarely were they anywhere near as civil as Thompson and Venolia's phantom exchange. For instance, neither Crane Cams of Hallandale, Florida nor Iskenderian Racing Cams of Southern California held back in their frequent 1960s exchanges. Ed Iskenderian, never one to err on the side of caution when selecting racing-related claims for his advertisements, nevertheless was taken aback when Crane Cams declared in *Drag News* in the summer of 1966 that it had surpassed his firm as the leading manufacturer of racing camshafts. Crane, borrowing from Ed's own bag of advertising tricks, had made the claim based on the number of entries and winners in select NHRA classes; according to this measure, Crane was in fact "number one." Iskenderian's response was to charge Crane with "mud-slinging" while re-asserting its traditional claim that across the board, in all associations and all classes, Iskenderian cams were the biggest sellers. Back and forth the two firms went in what must have been an entertaining exchange as far as the average *Drag News* reader was concerned.[169] But for Iskenderian and Crane, their squabbles were anything but trivial: in the competitive high-performance aftermarket, racing triumphs did in fact matter. And as these and other exchanges in the 1960s "ad wars" demonstrated, manufacturers were often

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[168] See Mickey Thompson Enterprises advertisement ("An Open Letter to Venolia Pistons"), *Drag News*, June 1, 1966, 5, and Mickey Thompson Enterprises advertisement ("An Open Letter to the Readers of *Drag News*"), *Drag News*, July 15, 1966, 3. The proposed meeting was to have taken place on June 15, 1966.

[169] For some examples of the exchanges that comprised this particular 1966 scuffle between the two firms, see Iskenderian advertisement ("We All Know Who is Number One!"), *Drag News*, August 12, 1966, 7; Crane advertisement ("Mud?"), *Drag News*, August 26, 1966, 25; Iskenderian advertisement ("More Isky Winners at Indy Than All Other Cam Mfrs. Combined!"), *Drag News*, September 30, 1966, 11; and Crane advertisement ("Did Mr. Ed's Computer Break Down Again??????"), *Drag News*, October 7, 1966, 17.

willing to stretch and bend the truth – not to mention lash out at their competitors – in order to claim a plausible motorsports-related advertising advantage here or there.[170]

Lending a measure of desperate urgency to at least some of the claims and counter-claims of the 1960s "ad wars" was the fact that during the period in question, a number of aftermarket companies were gobbled up in a massive wave of mergers, acquisitions, and buyouts. In some cases, particularly towards the end of the 1960s and into the 1970s, large corporate umbrellas were the ones doing the buying.[171] But for the most part, the buyouts of the 1960s were peer-to-peer transactions. Moon, for example, purchased Potvin Cams from its founder, Chuck Potvin, in 1962. That same year, Schiefer obtained Harman & Collins's roller camshaft and magneto divisions, and in 1963, Mickey Thompson Enterprises made a successful bid for Autotronic Balancing, an engine balancing firm that had once topped Thompson's list of competitors in the field. Likewise, C&T Automotive went to Doc King and Ron Cisar in 1966, while Varicam, an up-and-coming Southern California firm, purchased a Minneapolis-based competitor, Filter Research, in 1967. Meanwhile, in an effort to expand its research and development capabilities, Crane Cams bought the Camcheck Company, moving the firm from Ypsilanti, Michigan to a building adjacent to its Hallandale, Florida headquarters. Grant Piston Rings diversified its operations in 1968 by merging with Van Tech, a performance motorcycle company, and in 1969, Hays Clutches did the same by merging with P&G Manufacturing. Looking to retire, Frank McGurk sold his successful company in chunks over the course of 1968 and 1969: his rocker lines went to Crane Cams, for example, while his camshaft operations went to Iskenderian.[172]

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[170] For more on the 1950s and 1960s "ad wars," see Montgomery, *Supercharged Gas Coupes*, 13-14, 52-53, 67, 74, and 92-94, and for more on Iskenderian's hyperbolical advertising, see Post, *High Performance*, 44-46. Ultimately, the advent and growth of the high-performance aftermarket's industrial organization, SEMA, coupled with the industry's external regulatory woes of the mid-1960s through the early 1970s, would help to diminish the harshness with which many aftermarket companies openly criticized one another in their advertisements, although traces of it remain in evidence to this day.

[171] In the early 1970s, for example, Els Lohn sold his aftermarket company, Eelco, to a conglomerate (see Almquist, "Els Lohn: Eelco Left a Footprint," in *Hot Rod Pioneers*, 286-287), as did Harry Weber and several others (on Weber's sale, see Almquist, "Harry Weber," 112-113).

[172] On Potvin's sale to Moon, see Al Caldwell, "Go With Moon!" *Drag News*, September 28, 1963, 8-9; "News and Notes," *HRIN*, January 1967, 20; and Fetherston, *Moon Equipped*, 19. On Schiefer and Harman & Collins, see "Meet the Manufacturer: Schiefer Mfg. Co.," *Drag News*, May 18, 1963, 20-21. On Mickey Thompson and Autotronic, see "M/T Balancing," *Drag News*, September 14, 1963, 20. On C&T, see "News and Notes," *HRIN*,

And the list goes on and on – what matters here, however, is not so much who bought whom, or when, but rather the very fact that this was going on at all. To be sure, a number (perhaps even the majority) of these transactions were amicable, voluntary, and mutually-beneficial, but many of them were not. Either way, though, these moves kept competitive pressures within the industry high. For indeed, at best, those that remained unaffected by them quickly found themselves facing larger, more powerful rivals; at worst, of course, they knew that they might well be the next to lose their independence.[173]

In any event, whether because of mergers and acquisitions or simply because of the explosive unit and dollar-value growth the industry as a whole experienced during the period in question, speed equipment companies were getting bigger, and this in turn lent an increasingly corporate feel to many of the firms. In other words, though their enthusiast-founders were for the most part still at the helm, their growth had forced many of them to adopt structural characteristics more in line with colossal firms like Chrysler or General Mills than with the sole-proprietorships of the 1930s and 1940s hot rod industry. Perhaps the most obvious among these was their adoption of independently-operating functional divisions of precisely the sort that Alfred Chandler details in *Strategy and Structure*.[174] For Chandler, of course, these sorts of operating divisions were a necessity for large corporate entities like General Motors, but the basic idea proved no less effective for the smaller speed equipment companies with which we are now concerned. Ed Iskenderian, for example, elected to establish McGurk Camshafts as an independent operating division of Iskenderian Racing Cams when he bought the McGurk enterprise in 1969.[175] Similarly, when Mickey Thompson bought Autotronic Balancing in 1963,

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February 1967, 18. On Varicam and Filter Research, see "News and Notes," *HRIN*, May 1967, 20. On Crane and Camcheck, see "News and Notes," *HRIN*, February 1967, 18, and below, pages 263-267. On Grant Piston Rings and van Tech, see "News and Notes," *HRIN*, February 1968, 36. On Hays and P&G, see Karen Scott, "Meet the Manufacturer: Hays Clutches and Flywheels," *Drag News*, May 31, 1969, 18. And, finally, on McGurk's piecemeal sale, see "News and Notes," *HRIN*, March 1968, 48; "Manufacturers News," *Drag News*, April 5, 1969, 2; and Karen Scott, "Meet the Manufacturer: Iskenderian," *Drag News*, April 12, 1969, 8.

[173] Vic Edelbrock, Sr., for example, feared that if his company ever got too big for him to manage, he might lose control of it in one way or another (Author Interview with Nancy and Camee Edelbrock, Las Vegas, Nevada, November 7, 2003; Nancy is Vic Jr.'s wife, and Camee is one of their daughters).

[174] Chandler, *Strategy and Structure*, passim.

[175] "Manufacturers News," *Drag News*, April 5, 1969, 2.

he set up its erstwhile owner, Bill Hitchcock, as the head of a new Mickey Thompson Balancing Division. Thompson, in fact, had spent much of the early 1960s reorganizing his entire operation along these lines: his balancing, light-metals foundry, piston manufacturing, engine assembling, and other departments had all been re-cast as independent operating divisions by the end of 1963.[176] B&M Automotive did the same thing in the late 1960s, establishing independent operating divisions to handle both its new recreational vehicle manufacturing operations and its traditional performance transmission business.[177] Other equipment manufacturers took the corporate conglomerate model a step further, establishing boards of directors, in some cases, and going public with large stock offerings, in others.[178] We mustn't overstate the case, though. After all, for every publicly-traded Mr. Gasket and every division-oriented Mickey Thompson Enterprises out there in the 1960s, there were literally dozens of family-owned, single-business aftermarket companies. Nevertheless, the sole-proprietorship was no longer the only form of business within the high-performance aftermarket – as the industry matured during the course of the late 1950s and the 1960s, that is, it wasn't any longer necessarily the case that "aftermarket" implied "small" or "owner-enthusiast-controlled." Diversity, in other words, had become the rule.

Ultimately, therefore, when OEMs like Ford, General Motors, and Chrysler decided to get into the high-performance market to try to win away would-be rodders from their traditional speed shops and add-on parts manufacturers, what they found among the ranks of their Southern California competitors were not the stereotypically tiny, garage-based hot rod manufacturers of the 1930s and the 1940s, but rather a collection of increasingly-prosperous performance specialists ready and willing to take on whatever technological challenges and/or marketing ploys might come their way. And take them on, they did: to date, aftermarket performance companies have outlived the OEM challenge of the 1960s by more than three decades. But

[176] See for example "Mickey Thompson Pistons," *Drag News*, April 23, 1963, 8-9; "Mickey Thompson's Mag Foundry," *Drag News*, May 11, 1963, 20-21; and "M/T Balancing," *Drag News*, September 14, 1963, 20.
[177] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003. See also below, pages 270-276.
[178] Mr. Gasket, for example, went public in the fall of 1969 with 220,000 shares of common stock ("News and Notes," *HRIN*, 138 and 141).

before we get too far ahead of ourselves, let us take a moment to further flesh out some of the developments that took place within the industry during the late 1950s and the 1960s by briefly examining the period experiences of Crane, B&M, Edelbrock, and Gene Berg Enterprises.

Crane Cams

In 1953, Harvey Crane decided that he'd had enough. An enthusiastic young rodder with a 1932 flathead V8 Ford, Crane had found that none of the commercially-available high-performance camshafts of the time were able to consistently produce the results he was after. A resident of Southern Florida, Crane was also unable to simply swing by one or another of the Los Angeles-area grinders' shops for tips, advice, or custom camshaft work. Frustrated, he began to examine the various bumpsticks he had tried, hoping to find an ailment or a flaw common to them all that might point him in the direction of a home-spun solution to his valvetrain woes. It wasn't long before he found one: all of the cams he examined were inconsistent lobe to lobe. That is, the difficulties Harvey Crane had experienced whenever he had tried a reground cam in his flathead mill were largely due to inaccurate machining and finishing – to poor quality control, in other words. And after "fixing" one of the camshafts by carefully regrinding each of its lobes to match the others, the proverbial light bulb went off. Convinced that he could do a better job manufacturing high-performance camshafts than the West-Coast boys had hitherto been doing, he began to work on a handful of custom camshaft profiles of his own. By the end of the year, he had struck a deal with his father to rent a portion of the elder Crane's general machine shop, and with the purchase of a Storm-Vulcan camshaft grinder, the "Crane Engineering Company" was born.[179]

At $600 per month, the Storm-Vulcan unit was by no means cheap, and at first, Crane struggled to make the payments. But there was a method to Harvey's apparent madness: the Storm-Vulcan camshaft machine was a high-end, precision tool that Crane believed would

[179] See "Meet the Manufacturer: Crane Cams," *Drag News*, December 29, 1973, 16, and Almquist, "Harvey Crane, Jr.: 'Professor' of Camshaft Technology," in *Hot Rod Pioneers*, 290-291.

enable him to grind his cams with a lobe-to-lobe precision the established grinders had not yet been able to achieve with their makeshift camshaft tools that they had cobbled together from old turret lathes, cylindrical grinders, and the like. Before he was able to really get going, however, Uncle Sam came calling, and Crane was forced to put his plans on hold and serve with the armed forces stationed in Korea. Upon his return, he began to turn out small numbers of his precision cams, selling them to local hot rodders and drag racers at a clip that soon enabled him to purchase an even nicer Van Norman camshaft grinding machine and move into his own 3,500 square foot facility in Hallandale.[180] Sales remained modest and locally-bound for several years, but when a loyal Crane customer, Pete Robinson, won the NHRA Nationals drag racing event in 1961, things began to pick up.[181] Orders soon flowed into the Crane shop from all over the United States, and by decade's end, the company employed more than eighty engineers, technicians, machinists, and other personnel in a sprawling Hallandale complex that totaled more than 50,000 square feet.[182] In a little more than fifteen years, in other words, Crane Cams had emerged from its obscure origins in Southern Florida to become one of the leading camshaft manufacturers in the industry.

And yet, the company never really lost its "upstart" character – not in the 1960s, at least. In fact, Harvey Crane appears to have relished the role, promoting himself as the East-Coast spoiler who had crashed the West-Coast grinders' exclusive little party, showing them up at their own game. Period advertising for the company, for example, often bragged of how the little Florida company had grown to prominence by stealing customers from the likes of Iskenderian and Howard's, established West-Coast firms too busy and perhaps too arrogant to notice the surging Hallandale firm until it was too late.[183] Though his aggressive, chest-thumping 1960s ads

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[180] Ibid.

[181] On the transformative effect of Robinson's win on Crane's business, see "Meet the Manufacturer: Crane Cams," *Drag News*, December 29, 1973, 16, and Post, *High Performance*, 83.

[182] By 1965, Crane employed 40 people (Almquist, "Harvey Crane, Jr.," 290); by 1966, the figure had swelled to 57 (Crane advertisement, *Drag News*, August 26, 1966, 25), and by 1968, the company employed 80 (Crane advertisement, *HRM*, July 1968, 117). By the end of the 1960s, the plant had reached 50,000 square feet (55,000 by 1973, in fact – see "Meet the Manufacturer: Crane Cams," *Drag News*, December 29, 1973, 16).

[183] See, for example, Crane advertisement ("The Great Crane Robbery"), *HRM*, July 1968, 117.

often embroiled his company in squabbles which appear in hindsight to have been rather silly – the 1966 "ad war" between Mr. Crane and Mr. Iskenderian, for example, which Crane had started, centered on tedious, hair-splitting details which both men claimed as proof that their respective firms were "number one" within the industry[184] – the tactics worked. Relative to the other, more established firms, that is, Crane Engineering continued to grow by leaps and bounds during the course of the 1960s. What's more, Crane never lost an opportunity to remind whomever was listening (or reading his advertisements) that his was an *East-Coast* firm. In other words, he quickly became something of an informal spokesman within the industry for all of the East-Coast manufacturers, racers, and ordinary enthusiasts who were by then fed up with the activity's lingering obsession with Southern California and the West Coast.[185] Of course, legendary East-Coast racers like Don Garlits had by the end of the 1950s begun to prove to the national rodding community at large that California didn't have all the champions, but what Crane brought to the spirited 1960s East-West rivalry was the forcefully-argued claim that California didn't have all the technical expertise, either.[186]

Technical expertise, in fact, was precisely what Crane claimed as his advantage vis-à-vis his competition. And to a large extent, he was right. To be sure, other camshaft firms, most notably Crane's archrival Iskenderian, had begun to adopt new testing devices, machine tools, and manufacturing processes during the late 1950s and the 1960s, transforming the camshaft business into one of the leading segments of the speed equipment industry as a whole. But Crane took things a step or two further. Content neither with his current means for product evaluation and quality control nor with the prospect of outsourcing the tasks, Crane therefore made a successful bid for the Camcheck Company of Ypsilanti, Michigan in the winter of 1966-1967, moving the company's precision, computer-controlled camshaft proofing equipment and highly-

[184] See above, pages 258-260.
[185] For a couple of choice examples of Crane's promotion of the East-West rivalry, see Crane advertisement, *Drag News*, October 7, 1966, 17, and Crane advertisement, *HRM*, December 1968, 23.
[186] On Garlits, see Post, *High Performance*, especially pages 83-103. Incidentally, Garlits, a spirited gentleman the present author had the privilege of meeting in the fall of 2003, remains an outspoken critic of the lingering West-Coast bias still evident within the sport today – see, for example, his introductory comments in Ed Almquist's epic tome, *Hot Rod Pioneers* (page xi).

trained staff to his Hallandale headquarters. With this move, Crane could legitimately claim to have had the most advanced quality assurance system in the business.[187] In addition, by the end of 1967 the company had begun to address its perceived limitations on the research and development front, breaking ground on an advanced, 10,000 square foot R&D facility adjacent to its manufacturing plant. Equipped with a custom-made dynamometer specifically designed to test the output of drag-racing engines within a brief 5-second window, the new facility enabled the company's engineers to evaluate their designs in-use without subjecting their sensitive quarter-mile racing engines to the strains of extended dyno testing and, critically, without sending an actual dragster (and an actual driver) down the strip with an unproven grind, either.[188] At the same time, Crane also went to great lengths throughout the 1960s to ensure that his manufacturing space was filled with the best available machinery and tools, including the sorts of computer-controlled machine tools and design programs that would eventually come to be rather common within the industry but which were, in the mid- to late 1960s, exceedingly rare.[189] For Crane, in other words, what mattered was precision, and he was not afraid to go out on a limb and do things a little bit differently if that's what it took to make sure that his cams were consistent and accurate.

Unfortunately, Crane's proclivity to do things a little bit differently ultimately cost him his company: in 1989, the privately-held firm's board of directors voted to fire Harvey Crane, and today, Crane Engineering is entirely owned and operated by its employees. You see, in an effort to retain his best employees, Crane had distributed a lot of company stock over the years to his machinists, engineers, and support staff, and in the end, when they discovered they could oust their demanding boss, they did. But in his thirty-six years with the business – and especially during its formative years of the late 1950s and the early 1960s – Harvey Crane had indeed proven that an upstart, precision-oriented East-Coast firm could succeed in an industry overwhelmingly made up of ensconced, old-school West-Coast hot rod manufacturers. And for

[187] "News and Notes," *HRIN*, February 1967, 18.
[188] "News and Notes," *HRIN*, December 1967, 58.
[189] See for example Crane advertisement ("The Stoneage Cam Co."), *PHR*, December 1969, back cover.

this, if nothing else, he is well-deserving of his hallowed place within the SEMA Hall of Fame.[190]

Edelbrock

By the end of 1959, things were beginning to look pretty good for Vic Edelbrock, Jr. A 1958 graduate of the University of Southern California, the 23-year-old had recently married his college sweetheart, Nancy, and he had also gone to work for his father, Vic Sr., in the familiar environment of the prosperous Los Angeles speed equipment manufacturing firm in which he had grown up. To be sure, the Edelbrock Equipment Company of 1959 was a very different place than it had been back in the mid- to late 1940s, when Vic Jr. had first begun to learn the ins and outs of the business from his father. For starters, the company was bigger, having grown from its 1940s status as *a* leading manufacturer of add-on performance components to become, arguably, *the* leading firm within the industry. What's more, the bulk its activities were no longer centered on the traditional flathead Ford mill, but rather on the newer Chevrolet overhead-valve V8 – a changeover Vic Jr. himself had helped his father's company to make back in 1955. Finally, Edelbrock was now part of a booming high-performance industry that served what 1930s and 1940s California hot rodding had become: a diverse and nationally-oriented automotive hobby. For Vic, though, none of this really mattered. For the Edelbrock Equipment Company, however much it had grown and changed over the years, was still a second home to him. With his father at the helm and longtime, fiercely loyal employees like Bobby Meeks and Don Towle on the shop floor, Vic Jr. settled into his new job comfortably in 1959, confident that he was learning the trade from the best in the business and secure in the knowledge that all of what his father oversaw would one day be his own.[191]

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[190] On Crane's loss of his position within his company, as well as his eventual election into the SEMA Hall of Fame, see Almquist, "Harvey Crane, Jr.," 290-291. The SEMA Hall of Fame honors prominent aftermarket individuals who made significant contributions to the evolution and course of the performance industry during their careers.
[191] On the state of the Edelbrock enterprise in 1959, see Scott Fenn, "Meet the Manufacturer: Edelbrock," *Drag News*, November 21, 1959, 8-9. On Vic Jr.'s background, see Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003, and Author Interview with Nancy and Camee Edelbrock, Las Vegas, Nevada, November 7, 2003.

Tragically, that day came several decades sooner than anyone could have imagined. In 1962, Vic Edelbrock, Sr. died rather suddenly of cancer at the age of 49, leaving the company to his grieving 26-year-old son. Fortunately, the elder Edelbrock had been relatively conservative when it came to financial matters, and as a result, the firm that he had run for nearly twenty-five years was altogether debt-free – with sizeable cash reserves, to boot – at the time of his death.[192] But even with a solid company, loyal employees, and cash to burn, Vic knew that assuming his father's role wasn't going to be easy. For indeed, Vic Sr. had been a talented, well-liked, and near-universally respected figure within the hot rod industry, whereas he himself, in 1962, remained a relative unknown. With the support of his wife and his father's faithful crew, however, Vic was determined that he wasn't going to turn out to be just some "kid who was going to spend the money in the bank and say, see ya," as many of his father's rivals reportedly hoped and assumed at the time.[193] The difficult task he faced, in other words, was that of convincing his suppliers, customers, and competitors that he was for real, and that the Edelbrock Equipment Company was not about to go gently.

Shy by nature but with his confidence in dealing with people bolstered by the four years he had spent in business school at USC, Vic hit the ground running, promoting his company through his own oval-track midget-car racing ventures and through the aftermarket trade show circuits of the period.[194] Back at the plant, Vic ensured that the operation stayed true to his father's basic business philosophy that combined an emphasis on customer service and next-day order-fulfillment with a commitment to managed, debt-free growth. Production remained a subcontracted-casting, in-house finishing affair that relied, as it had for more than two decades, on the skilled hands of the firm's machinists. And, as had been the case for many years, ideas for new products continued to come primarily from late-night bench-racing sessions with his

[192] Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003, and Author Interview with Nancy and Camee Edelbrock, Las Vegas, Nevada, November 7, 2003.
[193] Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003.
[194] Shows such as the yearly AAMA event, which alternated between Chicago and New York, were geared primarily towards OEM-style replacement aftermarket parts suppliers, though performance-oriented firms like Edelbrock often were in attendance as well (Ibid.).

employees on the shop floor, although Vic quickly made it clear that on his watch, new-product *development* at Edelbrock was going to rely less on the intuitive methods of the past and more on scientifically-oriented research and in-house testing.[195] But even though the company continued to grow throughout 1963 and 1964 – growth which made it clear to all concerned that the Edelbrock firm was indeed going to remain a force to be reckoned with under its founder's son – Vic himself remained a bit uncertain, particularly with regard to new product decisions. He trusted his employees' judgment, to be sure, but as the 1960s reached their mid-point, he didn't yet possess a comfortable grasp of the matter.

On a Friday evening in 1965, for example, one of his technicians suggested that the company should build an aluminum single four-barrel manifold for the popular Chevrolet small-block engine. Vic, aware that General Motors already produced an optional manifold of this type, decided at first to reject the idea on the grounds that a duplicate effort of that sort would be a losing proposition. After thinking things over that weekend, however, Vic returned on Monday and announced that Edelbrock was indeed going to produce an aluminum four-barrel manifold, setting his team to work on the design posthaste. Though his better judgment told him otherwise, his instincts held that there would be plenty of demand from young enthusiasts for a product of this kind to warrant going head-to-head with Chevy. And in the end, the essentially cautious Edelbrock had decided to roll the dice and go with his gut.[196]

It was a gamble that paid off handsomely: within three years, that manifold was the top-selling design in the business, a signature product that boosted the company's sales and profits, not to mention Vic's self-confidence.[197] By decade's end, the company had a new headquarters in El Segundo, a much-expanded line of products, contracts with several OEMs for high-performance add-ons for their "factory" catalogs, a profitable partnership with an established

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[195] Ibid.; "Meet the Manufacturer: Edelbrock," *Drag News*, April 6, 1968, 16; and "Edelbrock: The Man, His Business, and Success – Exclusive Interview on Topics of Major Importance to Your Success," *HRIN*, May 1977, especially page 46.
[196] Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003.
[197] Edelbrock advertisement, *HRM*, July 1968, 10.

OEM carburetor supplier, Holley, and higher annual profits.[198] What's more, it had a man at the helm who had more than risen to the challenge that had been thrust upon him back in 1962. And what *this* meant, for all of the industry pioneers of the 1930s and the 1940s who remained in charge of their own firms as the 1970s dawned, was that theirs, too, could be lasting companies capable of long-term prosperity under their descendants' stewardship.

B&M Automotive

In 1951, while in his senior year of high school in Hollywood, California, Bob Spar enrolled in what was known as the "four-four" plan, a vocational training program that allowed students to spend four hours a day at school and four hours working at an outside job. Spar, a lifelong automobile enthusiast, chose to go to work for a small, general automotive repair shop just across the street from his school. As it happened, one of that shop's regular customers was a colorful character known as "Madman" Muntz, a Hollywood-based used-car dealer who had recently begun to produce his own small-volume sports car. The car, a roadster of sorts equipped with a Cadillac V8 engine and a GM Hydra-matic automatic transmission, was based on tooling and designs that Muntz had purchased from Kurtis Kraft, a Glendale company that specialized in custom sports cars built around standard OEM running gear. Assembled in Chicago, Muntz's cars would arrive at his Hollywood dealership not yet fully prepped for sale, and he regularly left the necessary final adjustments and tuning to the tiny shop at which Spar worked. In the spring of 1952, several months after graduating from high school, Spar agreed to go to work for Muntz full-time, turning wrenches at a brand-new new-car dealership that the latter was then in the process of opening up on Sunset Boulevard.[199]

For the most part, Spar spent his days at the Muntz dealership doing routine new-car prep

[198] On the company's new headquarters, into which it moved in 1967, see "News and Notes," *HRIN*, December 1967, 56. On Edelbrock's relationship with OEM automobile companies in the 1960s, see above, page 242. On the firm's relationship with Holley, see Edelbrock and Holley advertisement ("Edelbrock + Holley Equals Performance Plus!"), *HRM*, September 1968, 5; Lee Kelley, "Holley Fixer," *HRM*, September 1968, 62-63; Edelbrock and Holley advertisement, *HRM*, August 1969, 9; and "Manufacturers News," *Drag News & Equipment Industry Report*, November 1, 1969, 2.
[199] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.

work, tune-ups, and run-of-the-mill repairs. From time to time, however, he and the others in the shop would be called upon to do some custom work. By mid-1952, for example, GM had cut off Muntz's supply of brand-new Cadillac V8 engines, forcing him to reconfigure his designs to accept the considerably less-desirable (though easily obtainable) Lincoln V8 motor. Consequently, Spar and his associates spent a great deal of time swapping heads, installing multiple carburetors, and the like – hot rodding the Lincoln engines, that is, for those among Muntz's customers who weren't satisfied with its standard performance. In addition, Spar performed a number of engine swaps for those who didn't want a Lincoln mill at all, replacing the stodgy motor with surreptitiously-sourced Cadillac and other GM V8s. And, finally, a number of Muntz's customers were dissatisfied with their standard Hydra-matic transmissions, and so, according to Spar, "we [at the shop]...came up with little tricks we could do here, and tricks we could do there" to boost the automatic's performance.[200] His confidence and experience growing day by day, Spar began to wonder if the time had come for him to leave the Muntz operation and found his own garage.

In September of 1953, therefore, he quit his job with Muntz and, teaming up with a friend of his from the Muntz shop, Mort Shuman, formed a small garage of his own in Van Nuys, California. Inspired by then-famous hot rod shops like Ray Brown Automotive and C&T Automotive, Spar and Shuman elected to call their new enterprise "B&M Automotive," although they weren't exactly in the hot rod business – not yet, at least. In fact, much of what they did in their first year or so of independent operation wasn't all that different from what they had done down in Hollywood: general repairs, for the most part, with a modification job or two thrown into the mix on occasion. In fact, Muntz himself was their first repeat customer, often hiring Spar and Shuman to fix a particularly problematic car or perform an especially grueling modification. However, by the time Muntz went under in 1954, Spar and Shuman had an established, general-repair customer base of their own that more than paid the bills. But Spar in particular continued to hold out the hope that B&M might someday morph into a hot rod shop a-la Ray Brown or

[200] Ibid.

C&T, and so on evenings and weekends, he did custom engine and drivetrain work for a handful of area hot rodders. Rather quickly, though, Spar came to the realization that if B&M was indeed to become a reputable hot rod shop, it would need a signature niche. From the rodding-related repairs he was doing on weekends and evenings, Spar knew that the standard transmissions fitted to flathead V8 Fords were especially prone to early failure when coupled to hopped-up engines, and he also knew that there weren't yet any hot rod shops that specialized in this oft-overlooked but increasingly-critical area of automotive modification. Bit by bit, he therefore began to focus on gearboxes in his spare time, and before long, area enthusiasts had come to regard B&M as "the transmission guys."[201]

Still, B&M Automotive remained a general repair shop, and though he spent a lot of time repairing and modifying manual Ford transmissions, Spar knew that his and Shuman's shop lacked a niche area of expertise sufficiently distinct to enable it to break into the hot rodding field full-time. Early in 1955, however, Bob's younger brother Don wrapped Spar's test-bed, manual-transmission 1940 flathead Ford V8 hot rod around a telephone pole. His brother was fine, but the car was a total loss, and Spar decided to replace it with something a bit different, a 1949 Oldsmobile equipped with a Hydra-matic automatic gearbox. From his time spent working on the Muntz cars, Spar knew that a tweak here and an adjustment there could transform a run-of-the-mill Hydra-matic into a surprisingly capable transmission well-suited to hot rod applications – and to hot rodders' lead feet. With his new car as a test bed, Spar, his brother Don, and his partner Shuman therefore began to experiment with the automatic, developing numerous tricks and testing them out at the local dragstrip and, when the coast was clear, on their local streets as well. By the fall of 1955, they felt that they had developed their modifications to the point where it was time to test the market, and so they started heading to the strips on the weekends, running Spar's Oldsmobile in open competition in the hope that a few victories might well spark some interest in what they were up to. And indeed, when Spar beat the local hero,

[201] Ibid. On the origins of B&M, see also Karen Scott, "Meet the Manufacturer: B&M," *Drag News*, April 5, 1969, 6.

Dick Harryman, at the Saugus strip in early 1956, Harryman himself became one of their first Hydra-matic customers.[202]

Shortly thereafter, however, Spar was drafted into the service, called by Uncle Sam to serve a two-year stint in the Army. In his absence, his brother Don and his partner Shuman managed to hold things together, but by the time Spar returned from the service in 1958, Shuman, who had grown increasingly frustrated with the smaller paychecks that had accompanied the shop's initial forays into the high-performance market, wanted out. Don Spar therefore purchased Shuman's share of the business, and B&M became a brother-brother operation. And with Spar's return, business began to pick up once again, and B&M, complete with its Hydra-matic niche, was well on its way to becoming the all-out hot rod shop that Spar had long believed that it could be. By the end of the decade, B&M had three different levels or "stages" of tune to which they would build their transmissions, depending on the intended application: the mildest was known as the "Street and Strip," the middle as the "Competition" model, and the hottest as the "Blown Competition." B&M, in other words, built and sold transmissions for street-use, mixed-use, and for all-out dragging use. And with a number of loyal racing customers, particularly among the growing ranks of those who raced blown Willys "gassers," their business boomed.[203]

In 1962, however, General Motors introduced an improved automatic transmission known as the Turbo Hydra-matic or Turbo 400. Chrysler, meanwhile, brought out a unit it called the Torque-Flite, and the following year, Ford followed suit with its C-6 automatic. Part and parcel of the resurgent horsepower race of the early 1960s, these new automatic transmissions from three of the four leading OEMs were superior to the standard Hydra-matics of the 1950s in every way. What's more, they were stronger and quicker-shifting than even the modified Hydra-matics B&M was building, as Bob and Don Spar soon learned to their dismay. It wasn't long,

[202] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.
[203] Ibid. See also Greg Curtis, "Stick vs. Automatic Transmission," *PHR*, April 1963, 40-43 and 89-90. On the "gassers," see Montgomery, *Supercharged Gas Coupes*; Montgomery, *Those Wild Fuel Altereds*; and Post, *High Performance*, chapter 7.

however, before died-in-the-wool hot rodders were breaking these new OEM units and searching, consequently, for ways to hop them up. In stepped Bob and Don Spar, and by 1964, B&M had abandoned the Hydra-matic altogether in favor of the newer Turbo 400, to which they were able to successfully apply their tried-and-true tweaks. Like their counterparts in the engine-modification business, in other words, Bob and Don Spar found a way to continue to prosper in the face of the OEMs' performance-oriented push of the 1960s.[204] And to this day, B&M remains among the premier manufacturers of performance transmissions, torque converters, and related accessories.

"Manufacturing," however, isn't quite what B&M was up to – not in the 1950s and the 1960s, at least. To be sure, the company did produce a handful of shifting-related accessories at the time, brackets and levers Bob, Don, and their employees would finish and assemble on basic machine tools in-house after obtaining the rough aluminum castings from outside foundries. For the most part, though, Bob and Don Spar sold OEM-built transmissions and torque converters that they had modified. Sourced, in the case of the Turbo 400, from a division of General Motors known as End Products, these transmissions would arrive at the B&M plant in stock trim, individually boxed and prepped for replacement duty. Bob and Don, however, would disassemble the brand-new units, apply their tuning tricks, reassemble them, and sell them as B&M-spec "Street and Strip," "Competition," or "Blown Competition" automatics. Theirs, in other words, was a manufacturing operation only in the loosest sense. Nevertheless, Bob and Don Spar were remarkably innovative, even daring, in their production techniques. By the end of the 1960s, in fact, the company had a number of automatic machines on their shop floor, and the brothers had set for themselves the goal of using the best available computer-controlled testing equipment to increase their volume of modified transmissions and torque converters without compromising quality or increasing their overhead too dramatically. Given the nature of their

[204] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003. By the winter of 1967-1968, in fact, the firm had grown sufficiently to warrant a move into a new facility in Van Nuys twice as large as their original building (Doug Paton, "It's What's Happening," *Drag News*, February 24, 1968, 22).

signature products, that they were able to do so was indeed an extraordinary feat.[205]

Extraordinary as well were the testing procedures and devices Bob and Don Spar developed at their Van Nuys shop. Chief among these was an automatic transmission dynamometer, a unique device that earned the brothers a lengthy feature article – and the cover shot – in the December, 1969 issue of *Hot Rod Magazine*. By 1969, engine dynamometers had been in use within the industry for decades, providing even the smallest of speed equipment manufacturers with critical data regarding the performance-enhancing potential of their add-on parts and accessories. But for B&M, whose business was in modified transmissions, engine dynamometer testing was of limited value, and as a result, Bob and Don Spar had spent a considerable amount of time over the years testing their products in actual street-use and racing-only cars. But because real-world testing of this sort is exceedingly difficult to control – everything from relative humidity and temperature to altitude and pavement conditions can have an effect on the results of in-use tests – Bob and Don began to work on a lab-based transmission dynamometer in the early to mid-1960s that would allow them to simulate real-world street and racing conditions in the controlled comfort of their own shop. And by the late 1960s, their resulting "automatic dyno" was fully operational. Capable of holding any automatic transmission (and of coupling it to any automotive engine), B&M's automatic dyno used an adjustable-weight flywheel to simulate the conditions and stresses the transmission would encounter in the intended vehicular application. Linked to a control panel complete with an oscillograph capable of recording multiple variables from sensors peppered throughout the device, the B&M automatic dyno was a versatile device that helped to give the firm a critical edge, particularly in the competitive period of the late 1960s.[206] So well-respected for its testing capabilities was their firm, in fact, that by the end of the 1960s Bob and Don were spending a considerable amount of

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[205] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003, and Karen Scott, "Meet the Manufacturer: B&M," *Drag News*, April 5, 1969, 6.

[206] John Thawley, "The Automatic Dyno: Perhaps the Greatest Advance Since the Racing Automatic Itself, B&M's New Trans Dyno Permits Lab Testing of Components While Simulating Actual Racing Conditions," *HRM*, December 1969, 32-35, and Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.

time doing contract-basis transmission testing for General Motors and Chrysler.[207]

In spite of the success of their high-performance automatic transmission business, by 1970, neither Bob nor Don Spar felt entirely comfortable pinning their futures on such a narrow niche. Casting about for a new market into which to diversify their operations, they hit upon the idea of establishing a new division under the B&M umbrella to manufacture recreational vehicles (RVs). The idea wasn't altogether new: back in 1964, when President Johnson first began to escalate the war in Vietnam, B&M had seen its youth-oriented business take a terrifying, albeit temporary nose-dive, and to fill the income gap, Bob and Don had begun to sell modified Turbo 400s to RV owners fed up with having to shift their GM-based vehicles manually. Confident that an RV division would complement their transmission business nicely, the brothers therefore sold one-third of their hitherto privately held shares of B&M stock to a group of outside investors in 1970 to raise some cash, using the money to establish the Sportscoach Corporation of America.[208] But for performance enthusiasts everywhere, B&M would continue to be synonymous with performance transmissions. And rightfully so.

Gene Berg Enterprises

Located in the City of Orange in central Orange County, California, Gene Berg Enterprises is unique among the firms selected for further analysis in this chapter in that it was not formally established as a business until December 15, 1969, the very end of the period in question. However, Gene Berg's personal involvement with performance tuning and the speed equipment industry actually dates back to the mid-1950s – his formative years within the aftermarket, in other words, were precisely those with which this chapter is concerned. Perhaps more to the point, during the thirteen years prior to the issuance of his official California business permit in the fall of 1969, Gene Berg played an active role in the emergence of the highly-specialized segment of the performance industry that focuses on air-cooled Volkswagens.

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[207] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.
[208] Ibid.

Remarkably significant though his later accomplishments within this particular field would be, his story – the pre-history of his company during the late 1950s and the 1960s, that is – therefore warrants our consideration here.

Back in 1956, Gene Berg, a resident of suburban Seattle, Washington and a lifelong performance enthusiast who had spent much of his youth tooling around in flathead-powered hot rods, spent some time behind the wheel of a 1955 Volkswagen while visiting a relative in Montana. Impressed with the way the little car drove, Gene placed an order for one at his local dealership upon his return home. Eight and a half months later, his turn on the waiting list was up, and he took delivery of a brand-new 1957 model Beetle. Equipped with a 36-horsepower engine, the car, while faster than the one that he had driven the previous year, nevertheless proved to be intolerably slow to Gene after only a few short weeks of use. Convinced of the car's potential – and determined, as a died-in-the-wool hot rodder, to unleash it – he therefore pulled the still-fresh engine from the still-new car, tore it down, and closely inspected its parts. After making a tweak here and an adjustment there, he carefully reassembled the mill and put it back in the vehicle. The results were astounding: the otherwise-ordinary car "would run 80 or 85 mph when other VWs were running 70 mph."[209]

Pleased with his accomplishment, he tooled around town in his "hot" VW for a couple of weeks before a problem with the front suspension prompted him to take it to the local dealership for some routine adjustments he felt certain would be covered under the terms of his new-car warranty. He was right; the dealer set one of its technicians to work on the car, but when he returned from the routine post-service test run, the technician looked confused. Subsequent test drives by the service advisor (or foreman), service manager, sales manager, and the owner of the dealership himself resulted in the consensus that although the suspension problem had been corrected satisfactorily, the car was simply way too fast. The group descended upon the

[209] T. L. Christian and Antwoine Alferos, "Gene Berg: A Force to be Reckoned With," *VW Trends*, April 1993, 34-37 (this was an interview that Christian and Alferos did with Gene Berg in 1993; the quoted passage is from page 34). Back in the mid-1950s, waiting lists for the popular Beetle were often several months long (see, for example, "Road Test: Volkswagen," *Road & Track*, October 1956, rpt. in R. M. Clarke, *VW Beetle Gold Portfolio, 1935-1967* (Surrey, England: Brooklands Books, Ltd., n.d.), 68-69).

unsuspecting Berg, demanding to know what he had done to the car to make it run so quickly. Well aware of Volkswagen's official pronouncements prohibiting the modification of their cars on pain of warranty forfeiture, Gene adamantly denied that he had modified the car – after all, he didn't want to wind up having to foot the bill for the front suspension fix. In the end, the dealer let him go, convinced that Berg had indeed fooled around with the car but lacking the evidence to prove it. Within a few days, the car developed a misfire, but rather than risking his new-car warranty all over again by returning to the dealership, Gene elected to repair the problem himself. On a whim, though, he called the dealer when he was done and reported not only that the car had been misfiring, but also that he himself had fixed the problem. Impressed with Gene's mechanical prowess – he was, after all, still convinced that Berg had modified his Beetle's engine – he offered the young man a position as a technician in his service department. And Gene, a bus driver for the Seattle Transit Authority who had been itching for an opportunity to go to work on cars full-time, gratefully accepted the offer.[210]

Gene worked at the dealership for several years, and by 1962, he was its service advisor. Unhappy with what he perceived to be an unspoken, across-the-board policy of overcharging customers for routine maintenance and adjustments among his fellow foremen, however, Gene soon felt compelled to complain to his boss, declaring that he didn't want to be a part of the scam. His boss obliged, firing him on the spot. With a wife and three young children to support, Gene needed work, and he needed it fast. Rather than seeking out another safe and steady dealer job, though, he decided to strike out on his own, and in 1962, he and his wife Delores (Dee) founded a small repair shop near their home. Gene's Service, as they called it, was a general Volkswagen repair shop, and a lot of folks who had been regular customers of his when he was turning wrenches at the dealership soon began to come to his independent shop instead. Word spread quickly, and before long Gene had a thirty to forty day waiting list for routine maintenance jobs alone. His regular business booming, Gene and his wife soon began to branch out a bit on the side, doing custom-basis VW modification jobs for a handful of customers in the

[210] Ibid., and Author Interview with Delores Berg, Orange, California, November 11, 2003.

evenings and on weekends. Gene, however, had never been a fan of the aftermarket "California trash," as he called it, and the more he dabbled in Volkswagen engine and transmission modification, the more convinced he became that he could do a better job building the special intake manifolds, rocker assemblies, and stroked crankshafts that went into most of his performance-oriented rebuilds.[211]

After checking out a couple of do-it-yourself books on casting from the local library, Gene and Dee decided to have a go at it. Their plan was to cast a magnesium intake manifold, but the molasses-and-sand molding they had crafted for the purpose wouldn't hold, and even after repeated experiments, they just couldn't get it all to come out as their books had promised. Determined to get into the parts-manufacturing business but convinced that they just weren't cut out for the delicate casting process, they started shopping around for a local foundry that would be willing to undertake a small-batch job or two. And once they did, they began to obtain small runs of rough magnesium castings, which Gene would finish by hand in his small shop and then use on his performance-minded customers' cars – all the while, of course, continuing to perform routine maintenance and repair work for his regular, mainstream customers. In his spare time, he also began to develop a small-scale racing program, building a small VW-powered rail dragster and a Beetle-based "stocker" that he began to campaign at drag-racing meets in the Seattle area in the mid-1960s. Before long, Gene began to travel to Southern California on a regular basis to race his cars as well, and it was there that he at last began to establish some firm contacts within the fledgling VW performance industry. For Gene, meeting and befriending Joe Vittone and Dean Lowry of EMPI – a booming firm that by then was building quality merchandise with which Gene was awfully impressed – was an inspiring and transformative experience. The feeling was mutual: Dean and Joe were struck by the quality of the hand-built parts Gene used on his dragsters, and during the latter half of the 1960s, EMPI often brought to market items Gene had pioneered in his Seattle shop, sometimes with and sometimes without his explicit

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[211] Author Interview with Delores Berg, Orange, California, November 11, 2003, and T. L. Christian and Antwoine Alferos, "Gene Berg: A Force to be Reckoned With," *VW Trends*, April 1993, 34-37.

permission. Nevertheless, Gene was genuinely fond of his California counterparts, and with each and every racing trip he took to the Los Angeles area during the latter half of the 1960s, Gene felt more and more a part of the growing VW performance business.[212]

Consequently, when Dean Lowry asked him to come to California early in 1969 in order to join him and his brother in a spin-off Volkswagen performance firm known as Deano's Dyno-Soars, Gene Berg didn't hesitate a whit: he and Dee packed their things, closed their shop, and left Seattle for Southern California. Within a few short months of their arrival, however, things began to go awry. To be sure, the company was doing well, and, bolstered by a smattering of coverage in the hallowed pages of *Hot Rod Magazine*, its reputation as a first-rate Volkswagen performance engine firm was beginning to solidify.[213] Gene's partners in the enterprise were brothers, however, and what's more, their wives were sisters. In the behind-the-scenes decision-making process, therefore, Gene and Dee began to feel as though they were the odd men out, so to speak. Confident in his abilities as an engine-builder and as a performance parts manufacturer, Gene decided to sell his share of Deano's Dyno-Soars to the Lowry brothers in December of 1969, using the cash to set up Gene Berg Enterprises.[214] After thirteen years of side jobs and garage-scale performance parts production, Gene Berg now was at the helm of a genuine high-performance manufacturing concern. And in the quarter-century that followed, Gene Berg built a unrivaled reputation of excellence within the VW performance aftermarket – among enthusiasts, in other words, his crankshafts, manifolds, close-ratio gears, five-speed conversions, and other signature products quickly came to be regarded as the best that could be had at any price.[215]

However, the story of Gene Berg Enterprises, its innovations, and its many spin-offs and

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212 Author Interview with Delores Berg, Orange, California, November 11, 2003, and T. L. Christian and Antwoine Alferos, "Gene Berg: A Force to be Reckoned With," *VW Trends*, April 1993, 34-37.

213 See, for example, John Thawley, "43-HP VW Bolt-On: Give That 1500 an Impressive Performance Boost Without Splitting the Cases or Even Yanking the Engine," *HRM*, November 1969, 100-101, and above, page 238.

214 Author Interview with Delores Berg, Orange, California, November 11, 2003.

215 So well-respected was Gene among enthusiasts that upon his untimely death in 1996, several groups joined forces to promote an annual Gene Berg Memorial Cruise (see for example Don Bulitta, "The Gene Berg Memorial National Cruise," *VW Trends*, December 1996, 36-39, and Don Bulitta, "Cruisin', Cruisin', Cruisin' – The 1997 Gene Berg Memorial National Cruise," *VW Trends*, December 1997, 34-38); to this day, classified advertisements in performance VW magazines often boast of the Berg equipment fitted to the vehicle in question as a sure-fire selling-point.

affiliated personnel is one that belongs to another, later era. For the moment, though, Gene Berg's 1960s comings and goings – the pre-history of his successful Orange business, in other words – warrant an additional word or two of emphasis. For here was a man who eased himself into the speed equipment industry over the course of many years, drawing upon his experiences on the street and at the strip to guide him in the production of small quantities of hand-built Volkswagen parts in a manner that closely echoes the way in which the Edelbrocks, Weiands, and Spaldings of the 1930s had backed into their roles as pioneering flathead equipment manufacturers. Thirty years down the road, that is, much within the industry had changed, often quite substantially, but the hobbyist-turned-manufacturer model of the 1930s and the 1940s certainly had not.

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The history of any one of these four firms could easily have filled an entire chapter, of course. For our present purposes, however, the foregoing accounts ought to have sufficed to further illustrate most of the critical developments and trends within the speed equipment industry of the late 1950s and the 1960s that the balance of this chapter seeks to bring to light. Harvey Crane, for example, was an East-Coast aftermarket pioneer and partisan, a relative newcomer to the speed equipment industry whose company relied upon the latest research and development, manufacturing, and testing techniques, coupled with an aggressive advertising strategy, to grow from obscurity to prominence within a few short years. Vic Edelbrock, Jr., on the other hand, was a man who had grown up with the industry. *His* 1960s story is significant primarily because of the way in which he managed, at a very young age, to pick up where his legendary father had left off; of Vic Jr., in fact, the remaining chapters of this thesis will have much to say. Our third example, B&M Automotive, was a brand-new firm that muscled its way into the performance industry by seizing the initiative in what hitherto had never been regarded as a category of automotive technology worth the average rodder's while, automatic transmissions. Furthermore, the ways in which B&M adapted to the better-performing OEM transmissions of the 1960s is illustrative of the responsive flexibility that was fast becoming the norm throughout the high-performance industry. Finally, Gene Berg's gradual evolution as an aftermarket manufacturer during the course of the 1960s demonstrates above all else that the established path from enthusiast to entrepreneur, though certainly well-trodden by December of 1969, nevertheless remained open and clear.

Summary and Conclusion: Speed Equipment Manufacturing, 1915-1970

Astute readers of the first four chapters of this thesis likely will have noticed that an overarching assumption of aftermarket *response* has been a central element of the present author's organizational, narrative, and argumentative structure. Thus the high-performance industry first emerged in response to the conformity and lackluster performance of the mass-produced Model T Ford in 1915. Thus a major shake-up within the ranks of the fledgling industry took place twelve years later, as performance automotive parts manufacturers struggled to respond to the end of the Tin Lizzy era and the advent of the Model A. Thus a group of Depression-era, speed-obsessed young men who spent their weekends racing their "hot roadsters" on the dry lake beds of the Southern California high desert felt compelled to respond to the lack of readily-available add-on parts and accessories specific to their needs by building their own. Thus the speed equipment manufacturers of the early postwar years responded to the increasing diversity of interests within the ranks of the hobbyists to which they catered by bringing to market high-performance parts and accessories for a variety of altogether new applications and drivetrain configurations. Thus the speed equipment industry of the mid-1950s collectively grappled for an appropriate response to the decline of the traditional flathead era and the emergence of a whole new crop of sophisticated overhead-valve V8s. And thus the aftermarket firms of the 1960s hunkered down and focused their productive energies on their particular areas of expertise in response to the perceived encroachment of the OEMs onto what for half a century had been their exclusive turf. Thus far, in other words, our story has unfolded in a manner that suggests that external events, rather than internal dynamics, have to a remarkable extent determined the course of the history of speed equipment manufacturing in the United States.

This is by no means accidental – and neither, for that matter, is it simply a convenient narrative technique the present author has imposed upon the material at hand in order to keep the story moving. For indeed, aftermarket manufacturing is and has always been a responsive endeavor. And for its tumultuous first fifty-five odd years, the speed equipment industry received the overwhelming majority of its cues from two specific sources. The first of these were of course the enthusiasts themselves, ordinary racers and hot rodders whose unrelenting desire to wring more power out of standard automobile engines has always been the high-performance industry's essential raison d'être. After all, had there never been a group of folks for whom the ordinary automobile simply wasn't fast enough, there never would have been a Laurel Motors, a Winfield Carburetor Company, or a B&M Automotive. Fundamentally, in other words, aftermarket companies historically have been responsive, in the first place, to the ever-shifting whims of the enthusiast.

Equally critical from the very beginning, however, has been the second source of the speed equipment industry's operative cues, the OEMs. Because each and every high-performance component that they've ever built or sold was intended to be used to modify an extant OEM automotive design in one way or another, it therefore follows that, at least in terms of their essential creative parameters, aftermarket companies have always operated well within the OEMs' collective technological wake. Speed equipment manufacturers of the 1920s, for example, primarily produced parts and accessories for what was then the dominant automotive paradigm, the L-head four-cylinder powerplant. Similarly, firms of the late 1930s and the 1940s focused on the popular flathead V8 Ford, while those of the late 1950s and into the 1960s were largely concerned with the overhead-valve V8s that Chevrolet, Ford, and Chrysler were selling by the millions every year. In a very real and direct sense, then, the pace and course of technological change within the aftermarket has historically depended on the pace and course of technological change among the OEMs.

This is not to say that the speed equipment industry hasn't been creative and dynamic in its own right. For indeed, as we have seen, aftermarket companies were often in the vanguard when it came to novel automotive technologies, leading the OEMs – by decades, in some cases – in the development of a variety of parts and systems, including balanced crankshafts, overhead-valve and overhead-camshaft cylinder heads, fuel injection systems, superchargers, turbochargers, and transistor ignitions. Conceptually, though, the majority of their efforts went towards the further refinement or enhancement of the automotive systems that the mainstream firms had already brought to market. Innovative though they certainly were, in other words, the speed equipment manufacturers of the 1910s through the 1960s were a fundamentally responsive bunch, juggling the demands of their discriminating customers with the limitations and realities of current OEM designs. And to this day, the high-performance aftermarket continues to operate in much the same way.

During the 1960s, however, an additional force was beginning to emerge that would forever complicate the industry's responsive calculus to an extent that is difficult to overstate. Local-, state-, and federal-level automotive safety, emissions, and noise regulations began to mushroom during the mid- to late 1960s, and with the passage in particular of the National Traffic and Motor Vehicle Safety Act of 1966 and the federal Clean Air Act of 1970, the speed equipment industry suddenly found that it was no longer necessarily free – legally, that is – to manufacture and sell whatever add-on parts and accessories it pleased. For better of for worse, that is, those within the industry quickly began to realize that they were going to have to learn to deal with legislatures, regulations, and enforcement agencies if they were to have any hope of remaining legal, much less profitable, in the years to come. In order to provide an accurate and comprehensive account of the ways in which they managed to do so, however, we need to momentarily abandon our chronological approach. Before we move on, in other words, we are going to have to spend some time examining and reexamining the 1960s and the 1970s with our focus turned away from quarter-mile strips and shop-floor methods and towards the Halls of Congress and the offices of regulatory agencies like the EPA.

Chapter Five: Organization and Challenge – SEMA and the Emergence of Governmental Automotive Regulations, 1960-1978

"The Detroit super car is dead." So mourned Lee Kelley, the editor of *Popular Hot Rodding* magazine, in October of 1971 as the leading American manufacturers began to curtail their production of high-performance automobiles for model year 1972. Gone forever were a number of performance icons, including Pontiac's GTO and Oldsmobile's 4-4-2, and, according to the automotive rumor mill, Chevrolet's Camaro was destined for the axe as well.[1] Within another year, Ford's 351 HO Mustang was arguably all that remained of the era of OEM muscle, and by the Fall of 1973, it too was gone.[2] The demise of the American super car had been swift – as the decade began, Ford, Chevrolet, Buick, Oldsmobile, and AMC had all introduced larger, more powerful engines to their musclecar lineups, and Dodge and Plymouth had added altogether new model lines to theirs.[3] Prospective buyers had literally dozens of high-performance models to choose from in 1970; two years later, they had but a handful, and within three they had virtually none.

What on earth had happened? Why were General Motors, Ford, Chrysler, and AMC so quick to abandon this lucrative segment of the new car market? Rising insurance rates seem to have had something to do with it, for during the mid- to late 1960s, a number of companies began to slap surcharges of $400, $600, and even $800 or more – *per year* – to the premiums of those who tooled around in Barracudas, SS Chevelles, and other "factory hot rods."[4] In addition,

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[1] Lee Kelley, "Can Performance Cars be Saved?" *PHR*, October 1971, 32-33 (the quoted material is from page 32). In the event, Chevrolet's Camaro lived on, although its performance capabilities in the 1970s and the 1980s never again matched those of its 1960s glory days.

[2] For a review of the 1973 351 HO Mustang, see Tom Madigan, "Last of the Street Super Cars?" *PHR*, October 1972, 74-75 and 107. The compact, low-performance Mustang II was announced in the Fall of 1973.

[3] See for example Dave Hetzler, "Here Come the '70s!" *1001 Custom and Rod Ideas*, Winter 1969, 51-59, and Steve Kelly, "Hot 70s: First of the New Muscle Cars," *HRM*, September 1969, 34-37, both of whom wax enthusiastic about Detroit's new performance offerings for model year 1970 without so much as a hint of the rapid decline to come.

[4] See, for example, Roger Huntington, "Don't Let Legislation Wipe Out Hot Rodding: Men Who Know Nothing About the Thrill of Acceleration, Cornering or Braking are Out to Set Government Regulations on What the Automobile Can Do for You!" *PHR*, July 1968, especially page 43; Don Evans, "Editorially Speaking, *HRM*,

the musclecars of the late 1960s were no longer the svelte and compact rockets that they had been when they first appeared. Longer, wider, and much, much heavier than their immediate predecessors, the super cars of 1969, 1970, and 1971 often struggled to haul their over-accessorized heft around with much authority, in spite of their larger and far more powerful engines. However, by the end of 1970, musclecar insurance premiums and gross vehicle weight ratings had been on the rise for years, but OEM performance-model sales had yet to even level off. The rapidity of the genre's subsequent decline, in other words, suggests that something else deserves the blame. And on this question, the period and secondary evidence is nearly unequivocal: more than anything else, tightening federal motor vehicle safety standards and the "ecological war on pollution" were what ultimately brought the prosperous era of OEM high-performance automobility to such an abrupt halt.[5] For as *Popular Hot Rodding*'s Lee Kelley explained to what must have been a distraught readership back in the Fall of 1971, governmental regulations had begun to "tak[e] the super out of super cars." After all, he claimed,

> [i]t's one thing to pay $5000 for a muscle car that'll run in the 13s off the showroom floor and another to pay $5200 (that $200 extra is for added safety and smog equipment) [for a car] that can barely get into the 14s! It would take an extra $500 (at least) to get this new 'muscle' car to run with the old one, and to lots of people the effort just [isn't] worth it.[6]

Hobbled by federal mandates, the musclecars of the early 1970s simply were no longer able to live up to the expectations of the average enthusiast. And thus, although insurance woes – together with a number of arguably inept engineering and marketing decisions on the part of the OEMs – may well have begun to erode the musclecar's intrinsic appeal by the end of the 1960s, the ever-stricter governmental safety and emissions regulations of the early 1970s were in fact its coffin's final nails.

Celebrated by insurers, safety advocates, and the environmental lobby and universally

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December 1969, 8; Ray Brock, "Publisher's Report," *HRIN*, October 1966, 6; and Ray Brock, "Publisher's Memo," *HRM*, September 1970, 6.

[5] Lee Kelley, "Can Performance Cars be Saved?" *PHR*, October 1971, 32. See also Huntington, *American Supercar*, chapter 10, and Almquist, *Hot Rod Pioneers*, 324-325.

[6] Lee Kelley, "Can Performance Cars be Saved?" *PHR*, October 1971, 32. "13s" and "14s" refer to quarter-mile elapsed times (E.T.s); hence, a car that could barely cover a quarter-mile dragstrip in under 15 seconds (in the 14s) would have been considerably slower than one that could easily do it in under 14 (in the 13s).

lamented by the sorts of folks who read *Hot Rod* each month, the passing of OEM muscle nevertheless did not mark the end of the affordable high-performance automobile in the United States, even in the short term. Neither, for that matter, had the so-called "power packs" of the 1950s and the GTOs of the 1960s marked its genesis. Rather, as we have seen, the era of the musclecar was itself but a single, relatively brief chapter within a much longer tradition of high-performance motoring in America, a tradition that began with the modified Model T "speedsters" of the 1910s and that continues to thrive among the highly-tuned compact imports of today. However, according to nearly every popular (and academic) history of hot rodding written during the last thirty years, the end of the musclecar era did not herald a return to normalcy within the hot rodding fraternity. Instead, it heralded the coming of a dark, dark age, a period in which precisely the same sorts of governmental regulations that had brought an end to the 400-horsepower factory beasts of the 1960s also swiftly brought the average American rodder to his knees. No longer free to tinker with his car as he saw fit, the sorrow of the ordinary enthusiast was eclipsed in the 1970s and the early 1980s only by that of the average speed equipment manufacturer, who was no longer free to make and sell whatever the marketplace might bear. Virtually blindsided by Big Brother as the "sexy sixties" gave way to the "sad seventies," in other words, desperate rodders and aftermarket leaders alike suddenly found themselves on the defensive.[7] Forced to wage a guerrilla campaign against those who sought to replace their '32 roadsters, '55 Chevys, and '69 Chargers with bland, low-performance "four-door shoe box[es] with a top speed of 40 mph,"[8] some enthusiasts searched for ways to circumvent the law, while others – including the editors of most of the popular periodicals – made use of the printed word to try to make their voices heard. But in the end, all of the legal loopholes closed, and much of what was published in the editorial pages of *Hot Rod*, *Popular Hot Rodding*, and *Hot Rod Industry News* ultimately mattered not a whit. For in spite of their best efforts, the "hot rod

[7] See Ed Almquist, *Hot Rod Pioneers*. Almquist's massive tome proceeds chronologically; his title for the section on the 1960s is "The Sexy Sixties," and his title for the 1970s is "The Sad Seventies."

[8] This quote appeared in *Hot Rod* later on in the decade, towards the middle of an editorial spot that carried a telling subtitle: "I'm mad as hell and I'm not going to take it anymore." See Lee Kelley, "Editorially Speaking," *HRM*, July 1978, 5.

apparatus," in the words of H. F. Moorhouse, "lost a lot of battles against the federal and local state."[9] The seventies, that is, were indeed quite "sad."

Or so it would seem. To be sure, the fears that inspired the fiery editorials and the dreary predictions which found their way into the opening pages of the popular periodicals each month were indeed quite real: during the late 1960s and the 1970s, performance enthusiasts were in fact afraid of the growing governmental regulatory impulse and the implications that it bore for the future of their beloved pastime. So too were speed equipment manufacturers genuinely concerned for their businesses. However, the ways in which these parties expressed their concern in print represents but part of a larger, far more complex story. In other words, Moorhouse, Almquist, and the rest of those who have written about the dire straits in which the hot rodding fraternity found itself during this period accurately capture the genuinely desperate rhetorical tone of the period, but in so doing, they have all but overlooked what actually took place. To wit, the speed equipment industry enjoyed a string of sales record-breaking years during the late 1960s and the 1970s and, language of doom notwithstanding, actually managed to win far more legislative battles – *both* for itself *and* for the average rodder – than it lost.[10] That it was able to do so under precisely the same legal and regulatory pressures that ultimately caused the OEMs so much grief in the 1970s – *and* that it was able to do so by relying upon the very market niche that Detroit so quickly had abandoned, high-performance automobility – renders its experience

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[9] Moorhouse, *Driving Ambitions*, 141.

[10] Following the publication of *Hot Rod Industry News*'s second performance industry survey in 1971 ("Hot Rod Industry News 1971 Industry survey, *HRIN*, August 1971; see also above, chapter 4), industry-wide sales data disappears from the pages of the journal until 1975, when the third performance industry survey was finally published. An annual "Outlook" feature which appeared in 1972, 1973, and 1974, however, offers us a glimpse of the industry's fortunes during those years. Although no hard figures were included in these features, each of which consisted of a series of state-of-the-trade type statements penned by industry leaders like Vic Edelbrock, Jr., Bob Spar, Roy Richter, and Harvey Crane, Jr., among others, their basic message is quite clear: 1971 was much better than 1970, 1972 was much better than 1971, and 1973 was much better than 1972 ("Outlook for '72," *HRIN*, January 1972, 28-32, 36, and 134-143; "Outlook '73," *HRIN*, October 1972, 30-32; and "Outlook '74," *HRIN*, November 1973, 60, 68, and 76). The 1975 performance industry survey (based on 1974 figures) reported industry-wide sales gains of 29% for 1974, on average, over 1973 ("Hot Rod Industry News 1975 Performance Industry Survey," *HRIN*, Summer 1975, 37-44); the 1976 survey reported average gains of 24% ("Hot Rod Industry News 1976 Performance Industry Survey," *HRIN*, Summer 1976, 31-38); and the 1977 survey reported gains of 24%, on average, over the previous year ("Hot Rod Industry News 1977 Performance Industry Survey," *HRIN*, April 1977, 31-38).

all the more remarkable. So remarkable, in fact, that one cannot help but wonder how and why it has escaped the notice of so very many for so very long.

To be fair, Almquist does inform his readers that the speed equipment industry "fought back" in the 1970s, and he also briefly mentions that an industrial organization known as the Speed Equipment Manufacturers Association played a leading role in its response.[11] However, with the exception of a passing reference to "a new crop of environmentally-friendly products" that the industry developed in the 1970s, Almquist shies away from the details entirely.[12] So does Moorhouse. A sociologist by training, Moorhouse explicitly frames his delightful academic monograph, *Driving Ambitions*, as a "social analysis of the American hot rod enthusiasm."[13] Consequently, when it comes to the late 1960s and the 1970s, Moorhouse focuses his attention almost exclusively on the *editorial* content of enthusiast publications such as *Hot Rod*, and also on that of the speed equipment industry's principal trade journal, *Hot Rod Industry News*, in an attempt to reconstruct the symbolic dimensions of the regulatory struggle. Although he acknowledges that the opinions published in these periodicals were often at odds, the bulk of his analysis emphasizes the rhetorical strategies that their editors shared: their attacks on the "uninformed bureaucrats" bent on eradicating the automobile, their appeals to the enthusiasm of the hot rodder and the specialty manufacturer, their doomsday prophesies of a world without supercharged Hemis, shadetree mechanics, and neighborhood speed shops, and, as the years wore on, their increasingly deflated and conciliatory tone. As a sociological analysis, in other words, *Driving Ambitions* hits the proverbial nail rather squarely on the head. But as a work of history, its blow is far less accurate, and its conclusions far less reliable, precisely due to its author's exclusive reliance upon the editorial material that appeared within the first few pages *Hot Rod* and *Hot Rod Industry News* each month. Had Moorhouse bothered to consistently turn beyond page ten in any one of the many periodicals that he consulted, that is, he would have found a veritable plethora of additional, behind-the-scenes details directly relevant to his

[11] Almquist, *Hot Rod Pioneers*, 325.
[12] Ibid.
[13] This, recall, is the subtitle of his book.

analysis. He would have read about negotiations between the speed equipment industry and the National Highway Traffic Safety Administration, the Environmental Protection Agency, and the California Air Resources Board. He would have read about industry-sponsored testing and self-certification programs. He would have read about courtroom victories and legislative triumphs. In short, he would have read about the many ways in which the "hot rod apparatus" diligently worked during the course of the late 1960s and the 1970s to ensure that its own desperate forecasts never actually came to pass.

What follows here, in chapters five and six, is an attempt to get to the bottom of what actually happened during the late 1960s and the 1970s. Looking past the heated rhetoric and the wounded egos of the period, the present chapter examines the emergence of federal, state, and local automotive safety and noise-control legislation, tracing their origin, evolution, and elaboration during the 1960s and the 1970s and highlighting the many ways in which the new laws did in fact pose challenges of an unprecedented nature to the so-called hot rodding fraternity; the following chapter does the same for automotive emissions regulations. Critically, though, the underlying focus of these chapters isn't on the gloom and doom that supposedly ensued, but rather, on the manner in which the speed equipment industry and the millions of ordinary American hot rodders rose to their collective defense. Bear in mind, however, that it is only for the sake of narrative and analytical clarity that our story here will unfold over the course of two short chapters. For in the minds of those within the "hot rod apparatus," the many new federal, state, and local safety, noise, and emissions mandates of the 1960s and the 1970s were of a single piece – *together*, that is, they amounted to an undeclared and manifestly unwelcome "war on high performance."[14]

For anyone who has ever cruised through downtown L.A. – or, for that matter, browsed through the automotive periodicals at Barnes & Noble – the fact that the rodding "apparatus" ultimately won this war is readily apparent. After all, there wouldn't be low-slung Jettas, winged

[14] The period evidence literally overflows with military and wartime metaphors; for a couple of particularly choice examples, see "Why All the Flag Waving? Because There's a War On," *HRIN*, August 1967, 22-23, and Jack Duffy, "War on High Performance," *HRIN*, May 1972, 18, 20, and 38-40.

Civics, and periodicals like *Hot Rod* and *Import Tuner* today if things had turned out otherwise. We must be careful, though, not to allow the benefit of thirty-five-odd years of hindsight to influence our discussion of this critical episode in the history of speed equipment manufacturing and high-performance enthusiasm in America. For in the late 1960s and the early 1970s, victories – for enthusiast and aftermarket manufacturer alike – were seldom certain, and they were almost always hard-won. Invariably, too, they involved the Speed Equipment Manufacturers Association, or SEMA, an L.A.-based performance aftermarket organization of which we have thus far made very little mention. Our story begins, therefore, with SEMA's genesis and early evolution.

SEMA: From L.A. Clique to Organizational Powerhouse

Back in the late 1950s, a handful of Southern-California speed equipment manufacturers began to get together on a regular basis to discuss a number of vexing problems associated with their burgeoning credit-basis sales. For at the time, wholesale distributors had yet to emerge as a significant link in the aftermarket distribution system, which meant that aftermarket manufacturers still dealt directly with their mail-order and speed shop wholesale customers.[15] And while this arrangement had worked well enough back in the days when *Hot Rod* only printed a few thousand copies each month, by the end of the 1950s, the task of keeping track of who had ordered what – not to mention who *owed* what – had come to be nearly overwhelming. Unpaid CODs and outstanding wholesale balances, in other words, were beginning to take their toll. Some among them toyed with the notion of eliminating their credit-basis options altogether, but for most, this was an unattractive option. After all, they were well aware that for every dishonest wholesale customer who bought on credit, there were dozens more who would in fact remit their payments on time, every time. What's more, they were well aware that if they were to

[15] Not until the mid-1960s would wholesale distributors begin to assume the critical role of "middleman" within the industry's evolving distribution system. See above, chapter 4.

drop their credit options, their sales volume probably would drop as well. Most therefore continued to take their chances in an open credit market, taking the good with the bad. But for a small minority, the risks associated with "business as usual" were simply unacceptable. They needed to retain their 30-day, 60-day, and 90-day cycles, to be sure, but they also needed to find a way to manage the risks involved. And in order to accomplish this, the heads of these select few aftermarket companies set aside their secrecy and textbook Type-A competitiveness and turned to an unlikely source for help: each other. So began the short-lived and informal "credit managers group."[16]

This group usually met at the home of Phil Weiand, one of the founding fathers of the Los Angeles speed equipment industry. There the likes of Els Lohn, Scotty Fenn, Paul Schiefer, Bob Spar, Howard Douglass, and others would discuss their credit problems in an open forum. Critically, though, they never talked about their own credit strategies per-se. What they did discuss, however, were actual, specific problems with actual, specific companies. Howard Douglass, for example, might bring up the fact that a certain speed shop – which he would identify by name – was unreliable on a COD basis, or the fact that a certain mail-order house – again, identified by name – had fallen behind on its 60-day installments. Paul Schiefer might then volunteer that he had had no problems with that particular speed shop, but that he had in fact experienced similar difficulties with the aforementioned mail-order house. Round and round the talks would go until everyone had had a chance to air their specific concerns, and then they would adjourn. Never once, though, did they explicitly agree to blacklist certain companies or otherwise rig the market; in fact, Weiand always made sure to invite a lawyer to attend the meetings so as to prevent the group from venturing into illegal collusive territory. Armed with what they learned, however, Weiand, Douglass, Schiefer, Spar, and the rest were able to more

[16] The period and secondary evidence is ambiguous with regard to the name of this group; most refer to it as the "credit managers group" or "credit managers association," although one source declares that it was in fact known as the "Speed Equipment Manufacturers Credit Association" (Dick Wells, "SEMA History," undated and unpublished manuscript, 7, Dick Wells's private files, Santa Ana, California (hereafter, DWF)). However, because the bulk of the evidence clearly indicates that this was an informal group, it is unlikely that it ever had so formal an official title – indeed, one wonders if Wells's sources aren't in fact confusing this early group's name with that of the later, larger, and formally-chartered Speed Equipment Manufacturers Association.

easily identify potential problem-customers and deal with them accordingly. And this went on, with meetings every few months, well into the early 1960s.[17]

By the beginning of 1962, however, credit issues were no longer all that the group discussed. In fact, they began to assume a secondary role, for during the course of 1961 and 1962, the NHRA had begun to re-write its official rules in ways that troubled many of the manufacturers who showed up regularly at Weiand's house. Driver and spectator casualties were on the rise at the nation's many sanctioned drag strips, and the NHRA was beginning to have trouble meeting its insurance and liability-coverage responsibilities. As a result, the NHRA had established a new program for its technical inspection procedures. Known as "NHRA-Approved," the program was designed to standardize and streamline the technical inspection process each and every entry had to go through prior to each and every officially-sanctioned meet. Seeking to ensure, largely for the benefit of its insurers, that the cars competing at its events actually met its class-based safety requirements, the NHRA's new program involved the development of a list of specific products – transmissions, superchargers, roll cages, seat belts, brakes, and the like – that were acceptable. And in order to more easily distinguish between what was approved and what was not, the NHRA also issued an official list of authorized *brand-names* to its technical inspectors. What was unclear, and what frightened those who regularly attended the credit managers group, was the critical question of how exactly the NHRA had determined which brands met its requirements and which brands did not. Fearing the worst, credit managers attendees began to air their conspiracy theories, wondering aloud whether back-room deals and outright bribery were soon to become the order of the day. For although none of them seriously doubted that the NHRA meant well, they were skeptical of its methods. And as a result, they began to cast around for a means through which they, the manufacturers, might be able to have a collective say in the proceedings. Fortunately for them, regular attendee Bob Spar

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[17] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003. See also Dick Wells, "SEMA History," undated and unpublished manuscript, 7, DWF.

of B&M Automotive had an idea.[18]

Back at the 1960 NHRA Nationals event in Indianapolis, several of Bob Spar's racing customers were turned away during the mandatory technical inspection process because their B&M automatic transmissions were not equipped with scattershields.[19] Metal engine bellhousing covers developed to contain clutch and flywheel fragments in the event of a catastrophic failure, scattershields were required for certain racing classes by the safety-conscious NHRA, and with good reason: when a flywheel or a clutch disintegrates at 6500 rpm, the shredded pieces literally become shrapnel, tiny shards of flying, red-hot metal that pose a serious hazard to drivers and spectators alike.[20] However, catastrophic failures of this sort, while common among dragsters equipped with manual transmissions, were almost entirely unheard of among vehicles with racing automatics. For Spar and his small band of customers, therefore, it seemed as though the NHRA's officials were missing the point. After spending the better part of an entire day sitting in a makeshift waiting area in the NHRA's temporary, on-site Nationals headquarters, Spar's raised hand finally attracted the attention of a harried official who happened to be passing by. After he explained his situation, the official, a man by the name of Jack Hart, told Spar that he would grant him a hearing in the presence of the technical inspectors the following morning. And at that meeting, it was in fact decided that the B&M cars should be allowed to run as-is.[21]

Two weeks later, back in Southern California, Spar received a phone call from Jack Hart,

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[18] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003; Dick Wells, "SEMA History," undated and unpublished manuscript, 8-9, DWF; and Author Interview with Carl Olson, Pomona, California, April 4, 2003.

[19] Bob Spar claims that this occurred at the NHRA Nationals (held every year in September) back in 1961 or 1962 (Author Interview with Bob Spar, Newbury Park, California, November 13, 2003); Dick Wells, on the other hand, claims that it was actually back in 1960 (Dick Wells, "SEMA History," undated and unpublished manuscript, 8, DWF), as does Kevin C. Osborn (Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), History File, SEMA-RC). In light of the balance of the evidence and the events which followed on the heels of the meet in question, though, the present author believes that this must have actually taken place at the 1960 Nationals, in September of 1960.

[20] On scattershields, which were a relatively new device in 1960 but which became increasingly common (and diverse) as the 1960s wore on, see for example Eric Rickman, "Why Be Half Safe? Contain the Results of an Overly Enthusiastic Engine with an All Steel Bell Housing / Scattershield," *HRM*, September 1961, 44-45; Jack Hart, "Armorplate," *HRM*, October 1961, 88-89, 112 (Hart was, as we will shortly see, an NHRA official at the time); and "Scattershields for Safety," *PHR*, February 1965, 63.

[21] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003, and Dick Wells, "SEMA History," undated and unpublished manuscript, 8, DWF.

who invited him to a one-on-one meeting to discuss what had happened in Indianapolis. Spar agreed, and over lunch, Hart told Spar that a big part of what had won the day for B&M back at the Nationals was Spar's frank and informed approach to the problem at hand. Before long, Spar and Hart were meeting for lunch once or twice a month, discussing racing safety issues and, as 1961 came to a close, Spar's concern over the ostensibly arbitrary nature of the new "NHRA-Approved" system. Hart's response was simple: if the speed equipment industry could find a way to band together formally and come up with its own product-safety specifications, then the NHRA wouldn't need its "Approved" program at all. In other words, as far as Hart was concerned, the NHRA was prepared to drop its program altogether if the manufacturers, as a group, would be willing to step up and fill the resulting void. And *this*, Spar began to tell his fellow credit managers, was the answer they'd been searching for. Why not form an actual association of manufacturers, a formal body through which their resources could be pooled in order to bring an end to the specter of the "NHRA-Approved" system and establish, in its place, their *own* drag-racing parts specification and certification program?[22]

However, it was one thing to get a small group of speed equipment manufacturers to meet occasionally and on an informal basis, as with the credit managers, and quite another to try to set up a genuine industry-wide association, as Spar and Hart were suggesting. Consequently, though the subject often came up during the course of the spring and summer months of 1962, nothing actually happened. They talked about it favorably, to be sure, but in the event, none of the regular attendees of the credit managers meetings seemed to know how to get the ball rolling. Enter a man by the name of Henry Blankfort. Blankfort, a vice-president at the Revell Model Car Company, had begun to pop up here and there during the late summer and early fall of 1962. Revell, it seems, was planning to launch a new line of plastic model kits based on championship dragsters and funny cars, and Blankfort's task, at which he was failing miserably, was to obtain permission to reproduce a number of aftermarket companies' official logos and racing-sponsor

[22] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003; Dick Wells, "SEMA History," undated and unpublished manuscript, 8-9, DWF; and Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 4, History File, SEMA-RC.

stickers in miniature decal form so that the company's kits would be more authentic. Blankfort's problem, though, was that Revell's rival AMT had had the same idea, and their point-man, Dick Day, always seemed to be a step or two ahead of him. It wasn't a question of timing, necessarily, but rather of extant contacts: prior to accepting his position with AMT, Day had been a major player at the Petersen Publishing Company, and so he already knew most of the key L.A.-area manufacturers personally. For him, in other words, it was simply a matter of calling up his old friends and asking for a favor. Blankfort, on the other hand, only had a couple of meaningful inside contacts; accordingly, Day was able to win a number of exclusive licensing deals for AMT, while Blankfort struck out nearly every time for Revell. However, through a friend of his, Ed Elliot of Elliot-McMullen Advertising, Blankfort was able to meet Dean Moon of Moon Equipment and Roy Richter of Cragar, neither of whom had signed with AMT. Although he was quick – and pleased – to seal a deal these two companies, Blankfort was also dismayed to learn, in the course of his negotiations with them, that there was no blanket association of speed equipment manufacturers through which he might be able to make a few more contacts – and perhaps a few more deals.[23]

Shortly thereafter, Blankfort placed a call to one of his few remaining contacts within the industry, Els Lohn of Eelco. In addition to being an old friend of Blankfort's, Lohn was one of the original members of the credit managers group, and over the course of 1962, he, like Bob Spar, had come to be a tireless advocate within that group for the formation of a formal, industry-wide association. Blankfort needed to sign a few more licensing agreements, and Lohn needed a spark to get the formal organizational process rolling; together, the two men hatched a scheme. Blankfort's firm, Revell, was an active member of a small trade group known as the American Model Association (AMA), and he offered to host a general meeting of speed equipment manufacturers at the Revell offices in Venice, California so that he could tell them all about the AMA – how it worked, what exactly its formation had entailed, and, critically, the

[23] Dick Wells, "Special to SEMA News – SEMA: Reasons for Being," undated and unpublished manuscript, 2, DWF, and Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 4-5, History File, SEMA-RC.

many benefits it showered upon its members. Lohn, for his part, was responsible for turning out the troops. On January 10, 1963, approximately two dozen manufacturers gathered at the Revell offices to listen to Blankfort's spiel, which ended, perhaps not altogether surprisingly, with an appeal to those that were gathered not to sign a deal with AMT.[24] Blankfort, in other words, had gotten what he wanted, and in the days that followed, he was able to secure a few more decal deals. Lohn, too, was happy, for as the meeting adjourned, those in attendance agreed that it was a good idea to go ahead and form an organization. Two months later, on March 23, 1963, thirty-five people, representing twenty-four different speed equipment companies, showed up at Dean Moon's Gay Nineties Bar to formally create the long-awaited organization. Blankfort was there as well – he had agreed to offer the AMA's bylaws as a model for those of the new body. After drawing up their rules and regulations, those in attendance voted unanimously to file a charter with the State of California, and two months later, on May 13, 1963, the Legislature up in Sacramento formally approved their request.[25]

By the time of its official launch that May, thirty-five L.A.-area companies had signed on to the idea of the Speed Equipment Manufacturers Association (SEMA). However, none among those thirty-five were particularly well-known among the general public, and so they voted – again, unanimously – to invite Ed "Isky" Iskenderian to join them as an additional charter member and to serve as their first president. Isky, a colorful character better-known outside the rodding fraternity than the likes of Roy Richter, Dean Moon, or Harry Weber, graciously accepted.[26] Association finances were tight;[27] fortunately for the fledgling group, Ed Elliot

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[24] "Industry History," anonymous and unpublished manuscript (2003), 2-3, History File, SEMA-RC; Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 5, History File, SEMA-RC; and Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.

[25] "Industry History," anonymous and unpublished manuscript (2003), 2-3, History File, SEMA-RC.

[26] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003; Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003; and Fetherston, *Moon Equipped*, 20. Incidentally, Isky hadn't been a member of the credit managers group, and he also hadn't attended any of Lohn, Blankfort, and Moon's initial organizational meetings.

[27] Each of SEMA's Charter Members paid yearly dues of $25 back in 1963; finances, therefore, were extremely tight. See Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 5, History File, SEMA-RC, and "Original SEMA Members," undated and unpublished document, History File, SEMA-RC.

agreed to serve as its Executive Director, and from a tiny corner of his offices at Elliot-McMullen Advertising, SEMA launched its first campaign.

Over the winter months of 1962-1963, the FTC had begun to investigate the business practices of the speed equipment industry, for it had received a number of complaints regarding pricing inconsistencies in a handful of manufacturers' and distributors' advertisements. With the backing of their newly-chartered industry association, four of SEMA's members flew to Washington, DC to meet with FTC officials. The agency's complaint was relatively minor, it seems, and after a brief discussion, SEMA's representatives were able to secure its resolution.[28] Little did they know, as they boarded their plane for the long flight home, that within a few short years, flights to DC of this sort – on behalf of SEMA, that is – would be all too common.

For indeed, back in the summer of 1963, federal automotive regulations were unheard of, and several years would pass before they would even become a minor problem for the OEMs, let alone a major concern for the high-performance industry. Instead, what troubled SEMA's charter members at the time wasn't any different from what had bothered many of Weiand's credit managers back in 1961 and 1962 – namely, the new "NHRA Approved" program. Rather quickly, therefore, charter members Bob Spar of B&M Automotive and Holly Hedrick of Schiefer Manufacturing moved to create a SEMA Technical Committee, volunteering their time and their companies' resources in an effort to develop an industry-based replacement for the NHRA's much-maligned new system. With the full support of Wally Parks and Jack Hart of the NHRA, Spar and Hedrick's new committee got to work that fall. What they aimed to do was to develop a set of minimum performance-based specifications for each of the NHRA's many different product categories; their goal, in other words, was to replace the NHRA's hated list of approved brand-names with a list of categorized specifications. Under the new system, individual aftermarket companies would need to submit proof – independent test results, that is – to the SEMA Technical Committee in order for their clutches, say, to be approved for racing use. Once approved, they would be allowed to self-certify, in their catalogs and on their product packaging,

[28] "Industry History," anonymous and unpublished manuscript (2003), 3, History File, SEMA-RC.

that this particular clutch meets that particular set of specifications, or that this particular supercharger drive meets that particular set of specifications. Yearly reviews of the standards would help to ensure that the program kept up with the frantic pace of technological change within the racing world, and participating companies would need to submit further independent testing results should the Committee's annual reviews reveal the need to modify an extant standard. NHRA technical inspection officials, for their part, would be obliged to accept the manufacturer's word: all that they would need to worry about was the question of whether or not the aftermarket parts that were fitted to a given racing entry carried SEMA's seal of approval. From the point of view of the average weekend warrior, therefore, very little was actually going to change. After all, would-be racers still would need to build their cars using only officially-sanctioned parts and accessories. For the industry, however, the difference would be night and day: *they*, and not the NHRA, now would be responsible for setting the relevant standards and policing their enforcement.[29]

"They" of course meant SEMA – or, more specifically, the SEMA Technical Committee. And in order to ensure that each new set of standards that it issued would appear to be less arbitrary than the NHRA's outgoing lists, Spar and Hedrick conceived of their new Committee as one whose membership would change with each new specifications project. Spar and Hedrick would retain their permanent chairs, in other words, but the remainder of the Committee would consist of individual SEMA members considered to be experts in the particular product category then under review. At the behest of Jack Hart of the NHRA, for example, the Technical Committee's first project was to develop a set of standards for racing clutches and flywheels.[30] Accordingly, Spar and Hedrick called upon Bill Hays of Hays Clutches, Paul Schiefer of Schiefer Manufacturing, and Harry Weber of Weber Speed Equipment – each of whom was best-

[29] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003; Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 10-11, History File, SEMA-RC; Dick Wells, "Special to SEMA News – SEMA: Reasons for Being," undated and unpublished manuscript, 2, DWF; and "SEMA Technical Committee: Their Job's for Safety's Sake & Nothing Else!" *HRIN*, January 1967, 36 and 38.
[30] "SEMA Technical Committee: Their Job's for Safety's Sake & Nothing Else!" *HRIN*, January 1967, 36, and Dick Wells, "Special to SEMA News – SEMA: Reasons for Being," undated and unpublished manuscript, 2, DWF.

known for their clutches, flywheels, and related products – to serve as Technical Committee "experts" for the clutch and flywheel specifications project. Nearly forty years later, Bob Spar vividly recalled the skepticism with which many SEMA members greeted his and Hedrick's plan at the time. "You're never going to get Paul Schiefer and Bill Hays and Harry Weber in the same room at the same time," he was told on more than one occasion as he was preparing for their first meeting. "You're just not – they *hate* each other."[31] And indeed, Spar and Hedrick's chosen "experts" were fierce rivals. But on the appointed day, all of them showed up, swallowed their pride, and shook hands. And together, they developed SEMA Spec 1-1. Subsequent iterations of the SEMA Technical Committee looked at everything from dragster chassis construction to driver firesuits, and in every case, "expert" members of the group were able to put aside their differences and work together to develop the new SEMA Spec.[32] After all, it was in their interest to do so, for it was a chance for each of them to have a say in what would ultimately be required of them and their products. Plus, each of them knew that if they declined to participate, they might well be forced, within a few short months, to manufacture their racing-application parts to the SEMA standards set by their participating rivals. A case in point is Bill Hays: Hays wasn't even a SEMA member when the plans for a set of clutch and flywheel standards first were announced,[33] but he was quick to answer Bob Spar's call to join the association – and the Technical Committee – so that Schiefer and Weber wouldn't be able, however indirectly, to put him at a disadvantage in the marketplace.[34]

It was never simply a matter of rival manufacturers sitting down to broker a compromise, however. For in every case, the overriding concern, according to longtime Technical Committee member Carl Olson, was *liability exposure*. Olson, who managed the Trans-Dapt Company in the mid- to late 1960s while its owner, Willie Garner, served as SEMA's president, was a lifelong racing enthusiast who campaigned his own rail dragster in his spare time. In 1966, the

[31] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.
[32] "SEMA Technical Committee: Their Job's for Safety's Sake & Nothing Else!" *HRIN*, January 1967, 36.
[33] According to the relevant evidence in SEMA's Research Center ("Original SEMA Members," undated and unpublished document, History File, SEMA-RC), Hays Clutches was not one of the original 36 SEMA members.
[34] Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.

chair of the Technical Committee, Bob Spar, decided that the time had come to bring another permanent member on board, preferably someone with real-world racing experience. Garner recommended Olson, who reluctantly agreed to assume the additional responsibility. Olson therefore missed the Technical Committee's formative first few years, but what he witnessed during the course of the late 1960s is rather telling: Committee members, in everything they did, always assumed the worst. If, for example, they were talking about lightweight flywheels, they would frame their work in terms of disintegration and explosion – the worst in-use flywheel-failure scenarios imaginable. What's more, they would always assume end-user incompetence – i.e., mis-torqued bolts, off-center installations, and even inappropriate applications. And in so doing, they would ultimately arrive at a set of flywheel specifications that were designed to minimize the impact of the worst-case outcome that the worst-case, bone-headed user might inadvertently unleash upon himself, his opponent, and the crowd in the course of a standard quarter-mile run. This is turn would help to minimize the Specs-compliant manufacturers' individual product liability concerns, and it would also help to mitigate the liability exposure of the average dragstrip owner and the major sanctioning bodies.[35]

On the other hand, *SEMA's* liability exposure spiked considerably, for in the end, *it* was the organization that was setting the standards, and *its* was the official seal of approval that was appearing on Specs-compliant product packaging.[36] Not until the early 1970s, however, would the association's Board of Directors come to be at all concerned with the liability nightmares implicit in its Technical Committee's work. Instead, the Board actually sought to broaden the applicability and the appeal of its Committee's actions during the course of the 1960s. In the fall of 1965, for example, SEMA arranged a meeting between its Technical Committee and a number of officials from the American Hot Rod Association (AHRA), the United Drag Racers Association (UDRA), and the NHRA both in order to obtain the input of these rival racing sanctioning bodies and in order to better position itself as *the* official and trustworthy source of

[35] Author Interview with Carl Olson, Pomona, California, April 4, 2003.
[36] Ibid.

racing safety specifications.[37] Two years later, towards the end of 1967, SEMA's Board of Directors voted to formalize its Technical Committee's work, establishing the SEMA "Specs" Program – also known as the "Meets SEMA Specs" Program – as a partially-independent functional division of the Specialty Equipment Manufacturers Association.[38] By the early 1970s, the program had resulted in the establishment of literally dozens of separate racing-product specifications, but at the same time, it was no longer the unqualified success it had been when it first was launched. For as its lists of specifications continued to expand, verification steadily became a far more serious problem.

After all, the SEMA "Specs" Program was a program based on *trust*: SEMA trusted that participating companies would actually manufacture their off-the-shelf parts to the very same specifications as their initial, officially-approved prototypes. And because the specifications SEMA issued were *performance-* rather than *design*-based, it wasn't always easy to determine whether a given firm's run-of-the-mill products actually met the standards. Abuse, it seems, actually was quite rare, but it was always very much a possibility – and a growing one, at that.[39] As early as 1967, therefore, SEMA's Technical Committee had begun to develop an extensive and ongoing random testing process as an integral part of its fledgling SEMA "Specs" Program, as we will shortly see.[40] But by the early 1970s, the looming specter of widespread "Specs" Program abuse had nevertheless begun to trouble a number of SEMA members. By the middle of the decade, in fact, many of them had begun to wonder aloud whether the "Specs" Program, for all of its success, might in fact be far more trouble, at least in terms of the association's liability exposure, than it was actually worth. In 1978, SEMA therefore voted to further distance itself

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[37] "Roddin' at Random," *HRM*, October 1965, 100.
[38] Dick Wells, "Special to SEMA News – SEMA: Reasons for Being," undated and unpublished manuscript, 2, DWF, and Bob Leif, "Meets SEMA Specs," *HRIN*, January 1968, 24-27 and 36-37. Organizationally, the new SEMA "Specs" Program actually was for all intents and purposes a subcommittee of the SEMA Technical Committee, which continued to oversee its progress for another six or seven years (see below, chapter 6). In 1967, SEMA also voted to change its name, replacing "speed" with "specialty" (see below, page 319).
[39] Author Interview with Carl Olson, Pomona, California, April 4, 2003.
[40] See for example "News and Notes, *HRIN*, October 1967, 50-53; "SEMA's Wheel Committee," *HRIN*, January 1969, 66-67, 68, 76, 86, and 88; and "SEMA News," *HRIN*, August 1973, 36-37. See also below, especially pages 330-331.

from the Program legally, re-establishing it as a fully-independent, wholly-owned subsidiary known as the SEMA Foundation, Incorporated (SFI). Ten years later, lingering liability concerns finally prompted SEMA's Board of Directors to sever its ties with SFI entirely.[41]

But now we're twenty years ahead of ourselves. For back in 1968, the SEMA "Specs" Program *was* indeed an unqualified success for the association. In fact, it was in many respects SEMA's sole raison d'être. It was where the bulk of the association's dues were spent, and it was by most accounts responsible for winning over countless erstwhile doubters – the many hundreds of manufacturers who simply weren't interested in the notion of an industry-wide organization back in 1963, that is – and swelling the association's ranks.[42] What's more, it had also given SEMA a considerable taste of things to come. For although no one could have known it back in 1963, 1964, and even 1965, the "Specs" Program would ultimately serve as a strategic prototype for SEMA's response to local, state, and federal regulations in the late 1960s, the 1970s, and beyond. Worst-case assumptions, performance-based specifications, round-table discussions, inter-firm cooperation, and a measure of self-restraint, in other words, all of which were vital to SEMA's self-regulatory efforts of the early 1960s, would inspire and directly inform its approach to the challenges later posed by the National Highway Traffic Safety Administration, the Environmental Protection Agency, and the California Air Resources Board.

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During the early to mid-1960s, the Technical Committee's racing-specifications program may well have been the Speed Equipment Manufacturers Association's *major* cause, but it was by no means all that the new group did. Take, for example, the very fact that SEMA's charter members had insisted, back in 1963, that their first president be someone with at least a modicum

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[41] Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 10-11, History File, SEMA-RC; "SEMA Scene," *HRM*, August 1978, 17; and Author Interview with Carl Olson, Pomona, California, April 4, 2003.

[42] On the relationship many SEMA members drew between the successes of the "Specs" Program and the Association's swelling membership rolls, see Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 11, History File, SEMA-RC. By 1972, one year shy of its ten-year anniversary, SEMA had some 450 dues-paying members nationwide, more than ten times as many as it had had at its inception (*SEMA: Serving the Automotive High Performance and Custom Industry*, informational pamphlet (1972), History File, SEMA-RC).

of star power outside of the rodding fraternity. For in the early 1960s, "hot rods" and "hot rodders" had once again begun to attract their share of negative publicity, particularly through television and newspaper exposés on illegal street racing and the dangers of the quarter-mile strip.[43] SEMA, therefore, as sort of a secondary institutional cause, immediately began to try to nip this problem in the bud by hosting meetings with law enforcement agencies and community leaders, by encouraging professionalism among its members, and, it seems, by putting a respectable name at the top of its letterhead.[44] Isky was chosen, in other words, largely for his million-dollar smile – he was seen, that is, as someone who could help the industry to burnish its image. For the most part, though, the association spent its first few years promoting a number of internal projects. First and foremost among these was of course its fledgling "Specs" Program, but in addition, SEMA negotiated a group-rate health-insurance contract for its members and their employees, hosted frequent seminars to deal with pressing issues such as manufacturer-wholesaler and wholesaler-dealer relations, and, perhaps most critically, began to hold a few of its regular meetings in places like Indianapolis and New York in order to foster stronger ties between its East- and West-Coast members.[45] Important though these efforts were, however, none of them – with the possible exception of the "Specs" Program itself – could even hold a candle to the group's *pièce de résistance*, the Annual High Performance and Custom Equipment Trade Show.

Better known as the SEMA Show, this yearly exposition remains the focal point of the aftermarket calendar to this day, and it is truly a sight to behold. Hundreds of thousands of exhibitors, representatives, and journalists from all over the world gather every November in Las Vegas, Nevada, where the show has now been held for nearly thirty years, to catch up with old friends, to show off their new products, and, of course, to conduct business. Though it is closed

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[43] See below, pages 314-315.
[44] "SEMA: Coming of Age," *HRIN*, September 1966, 36-37.
[45] On SEMA's health-insurance program, see "News and Notes," *HRIN*, March 1967, 14, and "News and Notes," *HRIN*, August 1967, 20. On SEMA's "seminars," see Willie Garner, "Comments from the President – Why a Seminar?" *HRIN*, March 1968, 38-39. And, finally, on SEMA's efforts to better serve its non-Californian constituents, see "News and Notes," *HRIN*, April 1967, 16-17, and "SEMA Indy Seminar," *HRIN*, October 1967, 46.

to the general public, the SEMA Show nevertheless ranks among the largest trade shows in the world today. In fact, the show itself literally fills the city's massive convention center on Paradise Road, spilling over into nearly every parking lot and hotel conference room for several blocks in each direction. Steeped in tradition and long-enshrined in SEMA's official mission statement, the Annual High Performance and Custom Equipment Trade Show[46] is an event that is largely taken for granted these days, especially among younger high-performance enthusiasts and aftermarket entrepreneurs. Like the Super Bowl, that is, it is a yearly spectacle that almost seems too big to have a past at all. But as recently as 1966, there was no SEMA Show – in fact, there was no annual high-performance exhibition of any kind. Consequently, speed equipment manufacturers who wished to showcase their products at all were forced to do so either at drag racing events or at marginally-relevant venues like the yearly Automotive Aftermarket Manufacturers Association (AAMA) Show.[47] What's more, SEMA was a very new group back in those days, a cash-strapped association entirely without the means to launch an annual high-performance show of its own. Several of its members grumbled regularly that this ought to be among its top priorities, but on its own, there was really very little SEMA could have done.

Robert Petersen of the Petersen Publishing Company, on the other hand, was an interested party with the means – and, by 1966, the motivation – to see just such a project through. That September, Petersen had launched a new, closed-circulation magazine called *Hot Rod Industry News*, a trade publication sent free of charge each month to literally thousands of manufacturers, wholesale distributors, and speed shops across the United States.[48] Billed as "The Voice of the High Performance and Custom Industry," Petersen and his editors hoped that *Hot Rod Industry News* would help to unite the notoriously factious speed equipment industry in the

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[46] This was the official name of the SEMA Show for its first few years; today, the week-long affair is officially known as "Automotive Aftermarket Industry Week."

[47] The AAMA was a replacement-parts aftermarket trade association; its annual show, which alternated between Chicago and New York, therefore wasn't particularly useful to the somewhat-less-than-mainstream high-performance segment of the automotive aftermarket. Nevertheless, many larger speed equipment manufacturers did in fact attend the event during the early to mid-1960s (Author Interview with Vic Edelbrock, Jr., Torrance, California, November, November 19, 2003).

[48] See "Post Entry," *HRIN*, September 1966, 8 and 10; "Post Entry, *HRIN*, October 1966, 48-51; Ray Brock, "Publisher's Report," *HRIN*, September 1967, 6; and Alex Xydias, "Publisher's Report," *HRIN*, October 1968, 8.

interest of its long-term stability and growth. This, too, was one of the reasons SEMA had been formed, and from the very beginning, the editors of the new publication – men pulled directly from among the ranks of the country's many speed equipment manufacturers and distributors – therefore gave considerable editorial space to the association and its tentative endeavors. As a result, Petersen and his editors knew that there were many within the new association who wished to see a yearly trade show launched. Moreover, for their part, they believed that "a trade show was a 'must' activity for the[ir new] magazine,"[49] an easy way through which to further establish their fledgling publication as *the* voice of the speed equipment industry.[50] That fall, Petersen and SEMA's Board of Directors therefore hammered out a deal. The show, they agreed, would be sponsored by the editors of *Hot Rod Industry News* and the Speed Equipment Manufacturers Association, although much of the responsibility for the actual planning and organization would fall to Petersen Publishing's Special Events Department – or, more specifically, to a young man within that Department by the name of Dick Wells.

Wells, a lifelong enthusiast who had moved to Southern California from Lincoln, Nebraska in the late 1950s in order to be closer to the action, had managed to secure a job at *Hot Rod Magazine* shortly after his arrival on the West Coast. There, he advanced through the ranks rather rapidly, eventually earning a promotion into the company's Special Events Department in the mid-1960s, just in time to be the point man for the all-new SEMA Show project. But he wasn't simply given a carte blanche. For as it happened, Petersen was good friends with the owner of the Los Angeles Dodgers, Walter O'Malley, and somehow, O'Malley had already managed, long before the project ever fell into Wells's lap, to convince Petersen that the covered area under the grandstands at Dodger Stadium would be the perfect venue for the show. "It was a terrible, terrible thing to do," Wells would later claim, for the area under the grandstands was

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[49] Robert Petersen, "Welcome to the 1st Annual High Performance & Custom Trade Show," *HRIN*, January 1967, 28.

[50] *Hot Rod Industry News* did in fact have some competition: a publication geared almost exclusively towards the retail end (as opposed to the manufacturing end) of the industry known as *Speed & Custom Equipment News*, for example, had been launched by a rival company back in 1964. Petersen therefore needed a way to give *his* new magazine a boost. See, for example, Ray Brock, "Publisher's Report," *HRIN*, May 1967, 6.

cramped and dank.[51] What's more, SEMA wasn't even slated to be the only group at the facility on the days appointed for the show, January 10-12, 1967: the Soviet Union's men's soccer team was scheduled to be in town, and it had already arranged to hold practice sessions on the field at Dodger Stadium on those very days.[52] Nevertheless, in spite of the additional security and the somewhat less-than-ideal nature of the facilities, the show went off without a hitch, and by the standards of its day, it was a phenomenal success. Wells sold 98 booths for the three-day pipe-and-drape affair, at which 120 industry representatives played host to more than 3,000 distributors, dealers, and speed shop owners from across the United States and Canada.[53] Planning for the 1968 Show began almost as soon as the gates had closed, and Wells and the Special Events crew at Petersen quickly managed to secure the necessary space at a larger and far more appropriate facility, the all-new Anaheim Convention Center down in Orange County.[54] Attendance in 1968 shot up to 3,800, with more than double the number of booths, and from that point on, the future of the show wasn't any longer in doubt.[55] To date, in fact, it has outlived its erstwhile sponsor, *Hot Rod Industry News*, by more than 25 years.

Together with the "Specs" Program, the Annual High Performance and Custom Equipment Trade Show helped establish SEMA as a legitimate, purpose-driven industrial organization. Long before the ink had dried on its first Spec and the turnstiles had begun to rotate over at Dodger Stadium, however, external events far beyond the immediate control of the Speed Equipment Manufacturers Association had begun to gather steam, events which would require a radical revision of the new group's core mission. For in the early to mid-1960s, urban air pollution and automobile safety had swiftly worked their way onto the national agenda. And as Congress and a number of State Legislatures scratched and clawed for ways to "solve" these pressing issues, both the OEMs and the entire automotive aftermarket industry quickly found

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[51] Author Interview with Dick Wells, Santa Ana, California, April 2, 2003.
[52] Ibid.
[53] Ibid., and "1967 High Performance and Custom Equipment Trade Show," *HRIN*, February 1967, 22.
[54] See Ray Brock, "Publisher's Report," *HRIN*, May 1967, 6, and "Announcing the SEMA Show," *HRIN*, June 1967, 22-23.
[55] Ray Brock, "Publisher's Report," *HRIN*, February 1968, 8.

themselves on the defensive, their practices and their products intensely scrutinized as never before.

Governmental Regulation: Origins and Implications

Back in 1960, American automobility had very nearly reached its zenith. Automobile ownership was at an all-time high, the OEMs were prospering as never before, Eisenhower's Interstate Highway Project was well underway, and new, auto-centric suburban development was springing up, in metropolitan areas large and small, all across the United States. Just below the surface, though, all was not well. Fifteen years earlier, just after World War II, residents of the booming Los Angeles area were puzzled by a brownish haze that had begun to envelop their city with increasing frequency during the daylight hours. Subsequent research conducted during the course of the 1950s would verify that this haze, known as photochemical smog, was largely due to automobile exhaust emissions – the car, that is, was literally poisoning the air.[56] Meanwhile, highway deaths were on the rise, steadily creeping towards the 40,000-per-year mark as aggregate highway miles and average highway speeds continued to climb.[57] Together with widespread reports of dishonest practices at American automobile dealerships, a general level of new-car fit and finish that was hit or miss, at best, and the specter of neighborhoods and cities torn apart by endless ribbons of elevated superhighways, these growing problems had, in the words of James J. Flink, led "many Americans [to begin] to have critical second thoughts about the automobile industry and its product" by the end of the 1950s.[58] In other words, many began to doubt the wisdom of Charles E. Wilson's famous dictum, for indeed, it wasn't any longer

[56] For an example of an early investigation of this haze, see N. Robert Heyer, "Smog Sleuths," *Popular Mechanics*, April 1949, 178-181, 252, and 254. For a more complete discussion of the substance, conclusions, and implications of the smog research of the 1950s, see James E. Krier and Edmund Ursin, *Pollution and Policy: A Case Essay on California and Federal Experience with Motor Vehicle Air Pollution, 1940-1975* (Berkeley: University of California Press, 1977), 6-8; Douglas H. Ginsburg and William J. Abernathy, Editors, *Government, Technology, and the Future of the Automobile*, Regulation of American Business and Industry (New York: McGraw-Hill Book Company, 1980), 406-407; and below, chapter 6.
[57] Rae, *The American Automobile Industry*, 136-139.
[58] Flink, *The Car Culture*, 191.

crystal clear to everyone involved that what was good for General Motors actually was good for America.[59]

Nevertheless, in spite of their nascent concerns, Americans continued to purchase new cars at a record pace as the 1950s gave way to the 1960s. And as they did so, they continued to express an unambiguous preference for luxury options such as radios, automatic transmissions, power windows, and large-displacement engines over those geared more towards safety or economy.[60] What's more, neither the automobile companies nor the federal government seemed to be particularly concerned about any of this. To be sure, the OEMs had made fleeting gestures towards the goal of greater highway safety during the late 1950s, enacting an industry-wide, AMA-backed "racing ban" in 1957, for example, and establishing a formal body to develop automobile safety standards, known as the Vehicle Equipment Safety Compact (VESC), in 1958.[61] And the government, for its part, had begun to fund extensive initiatives during the 1950s in order to explore the root causes and the long-term implications of urban air pollution.[62] But as the 1960s dawned, all of this was ancient history. As we have seen, the OEMs never actually took their self-imposed "racing ban" very seriously, and by 1960, all of them were once again not only emphasizing horsepower and performance in their advertising, but also openly

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[59] Famous though this dictum was by 1960, Charles E. Wilson never actually claimed that "what is good for General Motors is good for America." Wilson, an executive at General Motors during the 1940s who was later nominated by Eisenhower to serve as Secretary of Defense, actually proclaimed, at his Senate confirmation hearings in 1953, that he believed that "what's good for the country is good for General Motors, and vice versa." Pundits immediately seized on the implications of the words "vice versa," however, and, thus, it wasn't long before the mis-quote was well-known. See Rae, *The American Automobile Industry*, 107.

[60] The spectacular failure of Ford's 1956 "safety package," for example, ultimately would be surpassed only by its Edsel project as the greatest of its 1950s blunders. In addition, though most of the other major manufacturers had begun to offer seat belts as optional equipment by the end of the 1950s, very few new car buyers were actually willing to pay for them (see, for example, "Spotlight on Detroit," *Motor Trend*, October 1965, 6-8 and 9). Alternatively, a number of critics – both at the time and since – have argued that the industry's inability to sell safety during the 1950s was its own fault: its emphasis on performance and style in its advertisements and in its designs, they claim, came at the expense of any real attempt to sell (or engineer) meaningful safety features (see, for example, Daniel P. Moynihan's famous 1959 missive, "Epidemic on the Highways," which was originally published in *The Reporter* magazine before appearing, verbatim, in the general-interest automotive publication *Motor Life* in February of 1960 (62-67); see also Flink, *The Car Culture*, chapter 7).

[61] On the AMA-backed "racing ban," see above, chapter 4. On the VESC's origins, see Flink, *The Automobile Age*, 290.

[62] See Krier and Ursin, *Pollution and Policy*, 6-8, and Ginsburg and Abernathy, *Government, Technology, and the Future of the Automobile*, 406-407.

sponsoring various racing associations and teams.[63] In addition, the industry's underfunded, understaffed new VESC had only managed to produce a single new-car safety standard.[64] Moreover, although the State of California recently had made the quantum leap from passive research to meaningful action with the passage of its landmark Motor Vehicle Pollution Control Act of 1960, Congress had yet to even consider following suit with a similar federal initiative.[65]

By 1963, however, the federal government was no longer able to ignore the obvious. Urban air pollution was by no means new, of course, but it was definitely getting worse – and not just in the L.A. Basin. Even more to the point, at least for many elected officials, was the fact that public opinion had begun to shift as well. Few, of course, were willing to give up on (or even to curtail) their new auto-centered lifestyles, but an ever-larger share of the voting public was equally unwilling to allow its representatives to continue to stand idly by. For even if they didn't live in New York, Chicago, Philadelphia, or Los Angeles, they had certainly heard of smog. And even if they hadn't personally read through Rachel Carson's recent exposé, they had certainly heard about it in the news.[66] Consequently, Congress felt compelled to step in, passing the first of what would become a series of Clean Air Acts in 1963. That same year, all new cars sold in the State of California were required to be fitted with a rudimentary pollution-control device known as a Positive Crankcase Ventilation Valve (PCV); soon, the same would be true for new cars sold in the remaining states as well.[67] So began the era of the regulated automobile.

Not until the end of the 1960s, however, would any of these new federal and state pollution-control acts begin to have a measurable impact on the speed equipment industry's affairs, and not until the early 1970s would they begin to pose a serious problem for the majority

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[63] See above, chapter 4.
[64] Flink, *The Car Culture*, 215.
[65] See Krier and Ursin, *Pollution and Policy*, 6-9, 156-160, and 174-175; Robert W. Crandall et al., *Regulating the Automobile*, Studies in the Regulation of Economic Activity (Washington, DC: The Brookings Institute, 1986), 85-86; and below, chapter 6.
[66] Carson's *Silent Spring*, published in 1962, helped to spark the American environmental movement. See for example James T. Patterson, *Grand Expectations: The United States, 1945-1974* (NY, NY: Oxford University Press, 1996), 443-444.
[67] See Krier and Ursin, *Pollution and Policy*, 6-9, 156-160, and 174-175; Crandall, *Regulating the Automobile*, 85-86; and below, chapter 6.

of the country's rodders.[68] Instead, what troubled enthusiasts and entrepreneurs alike, in the early to mid-1960s, was the growing furor over automotive safety. By the late 1950s, the total number of annual highway fatalities in the United States had been on the rise for years, but the highway fatality *rate* – whether expressed as a function of total population, aggregate miles, or number of registered vehicles – had been on the wane for more than twenty years.[69] During the early 1960s, however, the rate began to edge up marginally, rising from a seventeen-year low of 20.8 deaths per 100,000 people in 1961 to 27.1 five years later.[70] Some blamed this sudden turnaround on individual drivers, for their carelessness and lack of proper training, while others blamed it on organized motorsports, for the "competitive driving habits" that oval-, drag-, and road-course-racing supposedly encouraged among American drivers.[71] But in the end, those that blamed it on the OEMs were the overwhelming victors. In 1965, for example, a young attorney by the name of Ralph Nader published a scathing little book, *Unsafe at Any Speed*, in which he claimed that the major American automobile manufacturers had deliberately ignored their products' "designed-in dangers" for the sake of their respective bottom lines.[72] Flawed though his analysis was in some of its specifics,[73] Nader's overarching, two-pronged argument – that something needed to be done about automotive safety, on the one hand, and that the automobile industry

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[68] For a comprehensive treatment of emissions regulations and the speed equipment industry, see below, chapter 6.
[69] Rae, *The American Automobile Industry*, 136.
[70] Ibid., 138-139 (on these pages, Rae's book includes a comprehensive table of highway fatalities and death rates, compiled from governmental data, that covers 1913-1980).
[71] An example of the former, at least in Daniel P. Moynihan's eyes, was the National Safety Council, a non-governmental group that meant well but whose morbid statistics and "emphasis on individual responsibility for accidents" had a tendency to mislead the general public into believing that a few bad (and possibly drunken) apples were responsible for the escalating death rate (see Daniel P. Moynihan, "Epidemic on the Highways," *Motor Life*, 63). An example of the latter, according to *Hot Rod*'s editor, Bob Greene, was the Commonwealth of Pennsylvania's Commissioner of Traffic Safety, O. D. Shipley, who published a lengthy editorial in the *Saturday Evening Post* in the spring of 1962 in which he claimed that motorsports – NHRA-style drag racing, in particular – fostered "competitive driving habits" and therefore contributed directly to the nation's death toll (see Bob Greene, "The Editor Says," *HRM*, July 1962, 5, and Bob Greene, "The Editor Says," *HRM*, August 1962, 5).
[72] Ralph Nader, *Unsafe at Any Speed: The Designed-In Dangers of the American Automobile* (NY, NY: Grossman, 1965).
[73] On the shortcomings of Nader's *Unsafe at Any Speed* as well as his later book, *The Volkswagen: An Assessment of Distinctive Hazards* (Washington, DC: Center for Auto Safety, 1971), see John Tomerlin, "Ralph Nader vs. Volkswagen: A Road & Track Report," *Road & Track*, April 1972, 25-33. As compared with that of Nader, of course, *Road & Track*'s bias leans toward the automobile industry; caution is therefore of paramount importance when evaluating either side's claims.

shouldn't be allowed to decide what that something ought to be, on the other – seems nevertheless to have been exceedingly influential.[74] One year after Nader's book first hit the shelves, in fact, Congress passed, and President Johnson signed, the National Traffic and Motor Vehicle Safety Act of 1966.

This piece of legislation established a new governmental agency, the National Highway Traffic Safety Administration (NHTSA), under the broader organizational umbrella of the Department of Transportation. NHTSA's primary task, at least at first, was to develop a set of automobile safety requirements, mandatory standards that were to be applied to all new cars sold in the United States after January 1, 1968.[75] However, new-car model years do not begin on New Years Day, but rather several months before. And thus, by the time that Johnson signed the new bill into law in September of 1966, the automakers had already released their 1967 model-year cars. In other words, NHTSA effectively had less than a year, from the date of its inception, to develop the necessary standards, issue them to the automakers, and come up with a way to enforce them. Fortunately for its administrators, though, another federal agency, the General Services Administration (GSA), had already established a set of standards for all cars purchased by the federal government back in the early 1960s. NHTSA therefore borrowed liberally from the GSA's list, and by the end of 1966, it had released its own.[76] Necessarily piecemeal, NHTSA's list established a set of basic safety performance guidelines – and required manufacturers to obtain pre-sale certificates of compliance – for twenty different groups or categories of automotive components. Dashboards, for example, were to be padded. Seatbacks were to have integral headrests. Braking systems were to be of the fail-safe, dual-circuit variety. Windshields were to be of safety glass. And so on and so forth – the government, in short, was doing just what Nader wanted, holding the OEMs accountable for the carnage on the nation's

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[74] Flink, *The Car Culture*, 216, and Rae, *The American Automobile Industry*, 136-137.
[75] Rae, *The American Automobile Industry*, 137; Flink, *The Automobile Age*, 384; and Crandall, *Regulating the Automobile*, 47-49.
[76] Rae, *The American Automobile Industry*, 137, and Flink, *The Automobile Age*, 384. Flink dates the GSA's original standards to model-year 1967, which means that they must have been in place by early 1966, while Rae implies that they were already established and well-known *before* Ralph Nader's book first hit the shelves in 1965. In any event, the GSA's standards definitely preceded – and directly informed – NHTSA's 1966 requirements.

highways and seeking, through a set of independent and specific mandates, to ensure that in the future, drivers and passengers alike would be better protected.

However, the National Traffic and Motor Vehicle Safety Act of 1966 *also* charged NHTSA with the task of generating "used car" (or, more accurately, "in-use") safety standards – standards, that is, that could be applied to new cars once they left the showroom floor. Brake shoes, for example, were to be allowed to wear down only to a certain point before the vehicle's owner would be required to replace them. The same was to be true of tires, shocks, tie rods, control arms, and any other part of a car that normal wear and tear might ultimately render unsafe. This the agency declared in a list of "in-use" automotive safety standards that it ultimately published in the fall of 1968.[77] Clearly, though, NHTSA wasn't going to be able to enforce these "in-use" standards – after all, how on earth could its administrators possibly know for certain whether Mr. Smith's Ford down in Miami was equipped with adequate brake shoes, say, or that Mrs. Jones's Cadillac over in Seattle had a decent set of tires? Congress, well aware that this would be the case, therefore had devised a simple mechanism for the enforcement of its "in-use" standards back when it had drafted the National Traffic and Motor Vehicle Safety Act in 1966. Simply put, each of the fifty states would be required to develop its own annual inspection program in order to enforce the federal government's "in-use" mandates. Technically, however, the federal government was unable to *require* the states to do this, but it was entirely within its power to withhold federal highway funding from those states which chose not to participate. Under the terms of its 1966 Act, Congress therefore stipulated that 10% of a non-participating state's annual federal road construction and maintenance subsidies would be withheld until its lawmakers literally got with the program. Some states already had an annual inspection system; for them, it was simply a matter of registering their existing programs with NHTSA. Many others had no program, though, and for each of them, a simple calculus ensued. Rather predictably, the carrot in question was simply much too large for most state legislatures to

[77] Robert Herzberg, "Washington Report," *HRIN*, July 1968, 8. Herzberg was the first Washington, DC correspondent for Petersen's *Hot Rod Industry News* in the mid-1960s.

ignore, and by the end of 1968, forty-five states either had an annual inspection program in place or had one in the works.[78]

From the standard master narratives of American automotive history, of course, we know full well how the OEMs initially received, subsequently rejected, and ultimately acquiesced to these new measures.[79] Less well-known, though, is the precise manner in which the aftermarket responded to them. For indeed, the National Traffic and Motor Vehicle Safety Act of 1966 was a rather comprehensive piece of legislation, and in a number of ways, its provisions were as problematic for the likes of Bob Spar, Els Lohn, and Roy Richter as they were for anyone in Detroit's top-floor offices. First and foremost, the new law *directly* targeted the products of the automotive aftermarket: NHTSA's 1966 new-car standards, for example, applied to any company that produced any of the parts in any of its twenty different categories. In other words, Chevrolet manufactured seats, brakes, and bumpers, say, but so too did a number of general-replacement and high-performance aftermarket companies, and these, just like Chevrolet, therefore were required to submit and certify their designs with the new NHTSA.[80]

Indirectly, too, the new law was replete with landmines, particularly for the high-performance end of the automotive aftermarket. For starters, it provided more than a measure of legitimacy for those who sought to associate performance enthusiasm in general – and anything having to do with "speed," in particular – with highway fatalities. It wasn't long, therefore, before NHTSA would float the idea of requiring top-speed limiters on new cars, before insurance companies would begin to hike their musclecar premiums, and before the hot rodding fraternity would find that it had once again been saddled with precisely the same sorts of negative associations against which it had fought so earnestly a decade and a half before.[81] Even more

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[78] Robert Herzberg, "Washington Report," *HRIN*, April 1967, 12; Robert Herzberg, "Washington Report," *HRIN*, September 1968, 10; and "Inside Detroit: Used Car Safety," *Motor Trend*, November 1968, 11. To this day, a handful of states still have no annual automotive safety inspection requirements, among them the present author's home state, Georgia.

[79] See, for example, Rae, *The American Automobile Industry*, chapter 11; Flink, *The Car Culture*, chapter 7; and Flink, *The Automobile Age*, chapter 20.

[80] Crandall, *Regulating the Automobile*, 47-49, and "SEMA Bulletin on Safety Legislation," *HRM*, July 1967.

[81] On NHTSA's proposal to mechanically limit automobile speeds – which was seriously discussed for years but which ultimately resulted only in the limitation of automobile speedometer readouts to 85 mph – see Robert

problematic, in the long run, was the fact that the new law delegated the task of enforcing its "in-use" standards to state and local officials. For in so doing, whether by design or not, the legislation actually granted considerable interpretive leeway to these lesser officials. After all, the 1966 Act simply charged them with the task of making sure that local motorists maintained their cars' original performance capabilities – never once did it define "original," however, and never once did it declare NHTSA's word to be the final say. Consequently, many of them took NHTSA's list of "in-use" standards to be little more than a convenient starting-point. As they formalized their programs, that is, many of them felt compelled to go the extra mile in order to ensure that the motor vehicles under their immediate jurisdiction were in fact maintained in accordance with their own particular notions of "original performance." By the end of the 1960s, therefore, many local transportation departments and inspection officials across the United States had, under the open-ended authority granted them by the 1966 Act, begun to rule out modified suspensions, for example, on the grounds that cars with stiffer springs, shorter shocks, and thicker anti-roll bars would no longer handle as they had when they were new. Similarly, custom wheels of smaller (or larger) diameter (or width) than stock were often seen as problematic, as were things like aftermarket seats, auxiliary lighting schemes, and add-on airfoils. In other words, in the eyes of a growing number of local officials, automotive parts that weren't stock simply weren't needed.[82]

For those with modified cars, of course, this was an ominous development. But for the speed equipment industry, it was downright perilous, for it indirectly posed a fundamental challenge to the very core of its activities. To be sure, the notion of governmental automotive regulation wasn't altogether new in the mid- to late 1960s, neither for enthusiasts nor for speed

Herzberg, "Washington Report," *HRIN*, May 1967, 10; Don Evans, "Editorially Speaking," *HRM*, February 1971, 6; Robert Herzberg, "Washington Report," *HRIN*, June 1971, 10; and "Legislation," *HRIN*, May 1977, 14-15. On musclecar insurance premiums in the late 1960s and the early 1970s, see for example Don Evans, "Editorially Speaking," *HRM*, December 1969, 8, and Alex Xydias, "Publisher's Report," *HRIN*, April 1970, 8 and 63. On the re-emergence of hot rodding's roguish image, see Robert Herzberg, "Washington Report," *HRIN*, September 1966, 18 and 20, and "Post Entry," *HRM*, October 1969, 12, 14, 16, and 18. And, finally, on the ways in which the rodding fraternity had worked to combat this roguish image in the past, see above, chapter 3.

[82] For a more complete discussion of this issue (and a number of specific examples of it), see below, pages 332-342.

equipment manufacturers. Back in 1951, for example, California's hot rodders had learned to live with a new state law that required their roadsters to be equipped with fenders, and throughout the 1950s, as we have seen, motorists elsewhere dealt successfully with local laws that covered everything from aftermarket dual exhausts to headlight height.[83] What *was* new, though, was the sheer breadth of the new laws. Together with a wave of municipal- and state-level noise-control acts – not to mention federal and state emissions control requirements – that had also begun to emerge during the late 1960s and the early 1970s, these automotive safety mandates therefore quickly sparked a multifaceted response from ordinary rodders, well-placed journalists, and speed equipment manufacturers alike.

Enthusiasts and journalists, for their part, swiftly launched a war of words. In May of 1966, for example, *Hot Rod Magazine*'s Bob Greene fired off an editorial missive in which he ridiculed the federal, state, and local officials who pioneered these new laws as "[o]verenthusiastic or ink-happy do-gooders."[84] Later that same year, one enthusiast suggested that the government's decision to regulate hot rodding was in fact but part of a larger and manifestly un-American socialist conspiracy,[85] and by the mid-1970s, letters characterizing governmental regulation as an unconstitutional assault on individual liberties, as an unjust attack on free enterprise, and even as incontrovertible evidence that Orwell's dystopian vision was beginning to come true were common fare in *Hot Rod*, *Hot Rod Industry News*, and *Popular Hot Rodding*.[86] What's more, legislators, bureaucrats, and safety advocates quickly came to be portrayed within these magazines as downright ignorant, as did anyone who dared to rise to their defense.[87] In addition, the Petersen Publishing Company itself began to run a series of regular

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[83] See above, chapter 3.
[84] Bob Greene, "The Editor Says," *HRM*, May 1966, 5.
[85] John P. Keelan, M.E., P.E., "Post Entry: It Can't Happen Here – Can It?" *HRM*, September 1966, 6 and 8.
[86] See for example Jim McCraw, "Editorially Speaking," *HRM*, September 1975, 7; John G. Rako, "Hot Rodders' Bill of Rights," *HRM*, March 1976, 12; Alex Xydias, "Publisher's Report," *HRIN*, June 1971, 4; and "Rodding Readers: More Sport Saving," *PHR*, March 1972, 6 and 15.
[87] On the alleged ignorance of the authorities, see for example Roger Huntington, "Don't Let Legislation Wipe Out Hot Rodding: Men Who Know Nothing About the Thrill of Acceleration, Cornering or Braking are Out to Set Government Regulations on What the Automobile Can Do for You!" *PHR*, July 1968, 42-44, and Jim McCraw, "Editorially Speaking," *HRM*, April 1975, 10. For two particularly choice examples of the way in which the popular

editorials in its periodicals in 1973, scathing two-page spreads that typically combined outrageous commentary with an equally-audacious cartoon.[88] Letters that often teemed with paranoid suggestions, editorials that often embraced a numbing pessimism, and publisher's remarks that often boiled over: *these* are what the only extant history of the episode, H. F. Moorhouse's *Driving Ambitions*, relies upon to capture the essence of the hot rodding fraternity's response to the advent of governmental regulation in the 1960s and the 1970s. And while it therefore manages to cover quite exquisitely this so-called war of words, it altogether overlooks the many other more creative and proactive ways in which a number of enthusiasts, journalists, and speed equipment manufacturers actually sought to deal with the challenges they faced. They were mad, of course, but they were also motivated.

SEMA, Safety, and Noise, 1966-1980

When President Johnson signed the National Traffic and Motor Vehicle Safety Act into law in the fall of 1966, SEMA was still a relatively marginal association. This is not to say that its first three years had been unproductive, of course. Its fledgling "Specs" Program, for example, had already begun to transform the ways in which the largest drag racing associations in the United States handled the delicate matter of self-regulation. In addition, it had also begun to draw up firm and final plans for the first industry-wide trade show, scheduled to take place the following January. Finally, and perhaps most importantly, the new association had by the fall of 1966 proven to most of the naysayers within the Los Angeles speed equipment industry that it was indeed possible for rival manufacturers to work together to promote their common interests. In other words, SEMA had already proven its worth, and few among its members would have considered its first few years to have been anything but an astonishing success. Critically,

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magazines responded to those who dared to defend the "do-gooders," see "Rodding Readers: Don't Worry?" *PHR*, October 1972, 6, and "Rodding Readers: Do-Gooder!" *PHR*, November 1972, 10 and 16.

[88] These Petersen Publishing Company editorials typically appeared both in *Hot Rod Magazine* and in *Hot Rod Industry News*.

though, the association remained small. Its funds were limited, its staff was part-time and entirely voluntary, and, in the fall of 1966, its name was virtually unknown, even among enthusiasts.[89]

Nevertheless, in the wake of the new act's passage, the members of SEMA's governing Board of Directors quickly realized that *they* were going to have to step up to the plate. Fearful of what they believed to be the ominous implications of the National Traffic and Motor Vehicle Safety Act of 1966, that is, the association's leaders were convinced that the hot rodding fraternity was in desperate need of an organized means through which to promote its cause. What's more, they knew that none of the extant, broad-based rodding associations were likely to act decisively to defend on-road hot rodding. The NHRA, for example, had gradually lost interest in the street scene during the late 1950s and the early 1960s, and by 1966, its exclusive focus was the promotion of championship drag racing events. The same was true of its main rivals, the UDRA and the AHRA.[90] SEMA, though, could not afford to write off on-road rodding – after all, its members' profits overwhelmingly derived not from motorsports per-se, but rather from the sale of street-use products. Unwilling to sit idly by – and, for that matter, unwilling to stake their collective future on the power of the written word – SEMA's Board of Directors therefore voted to act.

At the time, according to industry pioneer and longtime SEMA member Willie Garner, their top priority was "to get [their] industry's side of the picture before the public and the lawmakers."[91] Consequently, SEMA's first move, in the winter of 1966-1967, was to hire a Washington, DC representative. After interviewing several candidates, SEMA opted for a man by the name of Earl Kintner, a partner in the DC law firm of Arent, Fox, Kintner, Plotkin, and

[89] One could easily count on a single hand the number of times "SEMA" appeared in the pages of *Popular Hot Rodding* and *Hot Rod Magazine*, combined, prior to 1966.
[90] On the NHRA, the UDRA, and the AHRA in the 1950s and the 1960s, see Post, *High Performance*, especially chapter 7.
[91] "*HRIN* Interview: SEMA President Garner," *HRIN*, August 1967, 30. Garner was elected SEMA president in 1967.

Kahn.[92] SEMA hoped that Kintner would be able to open a dialogue between the association and the new NHTSA, but Kintner, a seasoned veteran of the DC scene, suggested to the group that it ought to consider tweaking its name a bit before sending him on his rounds. "A name change would assist greatly our representation," he reportedly explained to the Board of Directors in February of 1967, because "[e]lderly bureaucrats are not likely to appreciate the 'swinging' generation's preoccupation with 'speed.'"[93] SEMA's members agreed, and by the time Earl Kintner placed his first phone call on their behalf in March, they had voted to amend their body's appellation: henceforward, "SEMA" was to stand for the more politically-correct "*Specialty* Equipment Manufacturers Association."[94]

By the end of the spring, Kintner had established a working relationship with Dr. William Haddon, Jr., the head of NHTSA's parent agency, the Department of Transportation.[95] In a series of meetings, Kintner explained to Haddon that above all else, SEMA hoped to obtain an official clarification of NHTSA's expectations vis-à-vis its "new car" standards. How exactly was the pre-sale certification process going to work for aftermarket firms? Was it to be a centralized program with official inspectors, or was it instead to be something more along the lines of SEMA's own self-regulatory "Specs" Program? Were any of the specific standards that had been established for the twenty applicable product categories open to further negotiation? If so, which – and to what extent? By the beginning of June, Kintner had his answers; dutifully, he reported them first to SEMA, and then to the editorial staff of *Hot Rod Industry News*. For starters, Haddon had agreed to relieve the entire automotive aftermarket – its high-performance and its standard-duty sectors alike – of the responsibility for no less than four-fifths of the initial 1966 "new car" regulations. Aftermarket manufacturers, that is, would be required to demonstrate compliance through certification for only four of the original twenty categories of automotive

92 "News and Notes," *HRIN*, February 1968, 38, and Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 13, History File, SEMA-RC.
93 Dick Wells, "Special to SEMA News – SEMA: Reasons for Being," undated and unpublished manuscript, 2, DWF.
94 Ibid.; "News and Notes," *HRIN*, June 1967, 48; and "SEMA Indy Seminar," *HRIN*, October 1967, 46.
95 Actually, Haddon was officially in charge of both NHTSA and the Department of Transportation.

parts: brake lines, glazing materials, seat belt assemblies, and wheels. In addition, Haddon had explained to Kintner that the final certification procedures for the automotive aftermarket had yet to be determined, but that they would be open to further negotiation; as a stopgap measure, though, he had also agreed to allow aftermarket companies to self-certify, a-la SEMA's "Specs" Program, that their products actually met the applicable standards. In return, Kintner had explained to Dr. Haddon that the speed equipment industry fully supported the spirit and the goals of the 1966 Act and that SEMA would do everything in its power to ensure that in the years to come, hot rods, hot rodders, and the hot rod industry would be part of the solution, rather than the problem.[96]

SEMA's leadership was pleased, to say the least, but it was also well aware that Kintner's compromise was temporary, and that the "victory" it represented might well turn out to be fleeting. After all, no one knew for certain when NHTSA's final certification procedures would be handed down, and more to the point, no one knew exactly what they might entail. During the fall of 1967, therefore, SEMA officials focused on *their* end of the bargain. For indeed, they knew full well that there were plenty of hot rodders out there who were furious with the "do-gooders" in DC,[97] and they were also well aware that many of them still raised hell in their local communities by racing on the streets.[98] Consequently, SEMA's leaders felt compelled to try to rein these overzealous rodders in. The challenge, though, was to find a way to do so without alienating the *average* rodder – SEMA, that is, had to find a way to straddle the proverbial fence. On the one hand, the organization needed to remain firmly on the side of the authorities when it came to highway safety, lest its late-spring bargain with Dr. Haddon and NHTSA ultimately break down. But on the other hand, the organization also needed to make sure that average

[96] Earl W. Kintner, "SEMA Bulletin on Safety Legislation," *HRIN*, July 1967, 53-54 and 56.
[97] After all, Bob Spar, Roy Richter, Willie Garner, and the rest of the folks who ran SEMA did in fact read *Hot Rod* and *Popular Hot Rodding* each month, and as a result, they knew *exactly* what their customers (and many of the popular journalists) thought of the regulatory authorities.
[98] Throughout the 1960s and well into the 1970s, street racing remained one of the dirty little secrets of the performance enthusiast community (and it remains one to this day, particularly among the "import tuner" crowd). See Rob Ross, "The Subterranean World of Los Angeles Street Racing," *UCLA Daily Bruin*, December 15, 1965; "Big Willie…King of the Street," *Drag Racing Magazine*, December 1968, 42-47; and Author Interview with Dick Wells, Santa Ana, California, April 2, 2003.

enthusiasts understood that SEMA, too, was adamantly opposed to any regulations that would unduly restrict their freedom to tinker with their own cars as they saw fit.

Ultimately, the association opted to attack the problem from two angles. In August, for example, *Hot Rod Industry News* published a lengthy interview with SEMA's new president, Willie Garner of Trans-Dapt, in which Garner urged dealers and speed shop owners to lead the charge.

> [H]owever odd it may sound to some, one of the best courses we can take is to make a conscious effort to cooperate with local law enforcement agencies…Currently, dealers would be wise to encourage their customers to obey all local laws. The worst thing to happen could be a rash of arrests on 'hot rodders.' That kind of adverse publicity can't help anybody, especially our industry.[99]

Garner's charge was simple: ordinary speed shop owners ought to try to convince their die-hard customers that compliance in the short-term would serve their long-term interests. And in the pages of *Hot Rod Industry News*, many other speed equipment manufacturers would continue to push the same speed-shop-based strategy for several more years to come.[100] However, rodders had always been a fiercely independent bunch, and Garner's crew was therefore well aware that many of them simply weren't likely to actually heed the legal counsel of their local counter man. Hence their second angle, a direct appeal to rodding enthusiasts to stand in an *equal partnership* with SEMA to pursue their common regulatory interests. To do so, SEMA called upon a well-respected, old-school rodder by the name of Don Francisco, who published his appeal to the hot rodding fraternity that October in the pages of a popular, hard-core racing tabloid known as *Drag News*.

> The problem both SEMA and hot rodders have is to convince the legislators that safety and smog programs don't have to outlaw hot rodding. To do this, we will have to prove that we are willing to work with the legislators in any way possible, and demonstrate that parts and methods used by responsible rodders do not make a car more unsafe nor cause it to add to the smog problem. (In many instances the car is made safer and the amount of smog it produces is reduced.) This is a big and important project. It will require the complete cooperation of everyone who is even remotely concerned with hot rodding.[101]

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[99] "*HRIN* Interview: SEMA President Garner," *HRIN*, August 1967, 31.

[100] See, for example, Bob Leif, "Manufacturers Speak: Questions and Answers on Topics of Industry Interest," *HRIN*, May 1968, especially page 51.

[101] Don Francisco, "Hot Rodding, SEMA, and You," *Drag News*, October 13, 1967, 19. Francisco, active within the Southern California hot rodding scene for more than two decades, was well-known among enthusiasts, particularly

Clearly, Francisco hoped that enthusiasts and entrepreneurs would stand side-by-side in order to promote responsible rodding, but whether or not his appeal (or Garner's, for that matter) actually swayed a single soul is nearly impossible to determine with any degree of certainty. It *did*, however, seem to give Earl Kintner an ounce of reassurance, as he continued to meet with NHTSA officials during the course of the fall of 1967, that his client was indeed attempting to clean up its act. And whether Dr. Haddon ever actually saw these published appeals or not, he certainly *did not* find any reason to believe that SEMA wasn't living up to its end of their temporary arrangement. Indeed, he remained impressed with the association and its commitment to highway safety – so much so, in fact, that in November of 1967, he decided to formalize his certification arrangements with it. Henceforward, Haddon announced, the "stopgap" measures that he and Kintner had agreed upon earlier that year would be NHTSA's final and official aftermarket "new car" parts certification procedures. Firms, that is, would be required, a-la SEMA's "Specs" program, to self-certify, on their product packaging, that their brake lines, glazing materials, seatbelt assemblies, and custom wheels met all of the applicable federal safety standards.[102]

For SEMA, this was truly a major triumph. The speed equipment industry was going to be regulated, of course, but because of SEMA's active intervention, the task of actually meeting the government's safety-oriented mandates was going to require no more effort or expense, on the part of the typical manufacturer, than that of meeting the industry's own self-regulatory motorsports requirements. Nevertheless, the news of Kintner's success was greeted neither with the widespread popping of champagne corks nor with the celebratory smoke of parking-lot burnouts. Instead, SEMA's leadership was cautiously optimistic, at best, for they were fully conscious of the fact that things could just as easily have turned out very differently for them, their businesses, and their customers. Consequently, Garner and his allies quickly began to study what had actually happened over the course of the past year, seeking to learn from their

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for the detailed technical articles that he published during his lengthy tenure as the technical editor of *Hot Rod Magazine*.

[102] Robert Herzberg, "Washington Report," *HRIN*, December 1967, 14 and 48.

experiences with NHTSA. Their fear, it seems, was that they had only dealt with the tip of a much larger iceberg. For the time being, that is, they knew that things had calmed down considerably, but who could say for certain that NHTSA wouldn't call for stricter standards in the years to come? Likewise, who could say for certain that in the long run, SEMA's procedural deal with the Department of Transportation and NHTSA would remain secure? Unwilling to take anything for granted, SEMA's leaders therefore sought, in the wake of Kintner's announcement, to further strengthen their association's technical capabilities, to further burnish their hard-won reputation among the authorities, and to further refine their overall regulatory strategy.

They began by reevaluating their successful "Specs" Program – or rather, by continuing to reevaluate it. For during the summer and fall of 1967, when Kintner's deal with Haddon remained tentative, SEMA's Board of Directors had already instructed its Technical Committee to begin to look for ways to broaden the program's scope, to streamline its specifications-development procedures, and to strengthen its enforcement. As a result, the Technical Committee had already launched a pilot program for product testing by the time the final deal with NHTSA was announced.[103] Still, SEMA's Board of Directors wanted to be sure that no one could accuse their organization of resting on its laurels – it wanted, that is, to use its "Specs" Program to demonstrate to anyone who cared to notice that SEMA was a dynamic organization committed to pushing the envelope on automotive safety. During the course of 1968, 1969, and 1970, therefore, the program's home-brewed racing specifications continued to grow stricter, and its product-testing procedures came to be more comprehensive.[104] Perhaps most significantly, though, the Board at long last voted, in the early months of 1970, to transform the program from a *function* performed by its Technical Committee into a stand-alone project known as the "Meets SEMA Specs" Program.[105]

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[103] "News and Notes," *HRIN*, October 1967, 50-53; Bob Leif, "Meets SEMA Specs," *HRIN*, January 1968, 24-27 and 36-37; and Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.
[104] "*HRIN* Interview: Dale Herbrandson on the SEMA Specs Program," *HRIN*, September 1970, 22, 42-43 and 48-49, and Author Interview with Bob Spar, Newbury Park, California, November 13, 2003.
[105] SEMA's Technical Committee continued to administer the "Specs" Program for another couple of years, however. See "SEMA Section," *HRIN*, May 1970, 60, and "*HRIN* Interview: Dale Herbrandson on the SEMA Specs Program," *HRIN*, September 1970, 22, 42-43 and 48-49. Some maintain that SEMA's Board of Directors formalized

In addition, SEMA's leaders continued to try to boost the association's membership rolls in the late 1960s, out of the hope that when it came to legislative lobbying, "strength in numbers" would amount to more than just a catch phrase. To be sure, SEMA's Board of Directors had diligently worked to swell their body's ranks from the very moment of its founding back in 1963. In 1965, in fact, the Board had even voted to allow interested parties who were not manufacturers to join their association as non-voting "sustaining members,"[106] and as a result, SEMA had 141 dues-paying members by the fall of 1967.[107] During the late 1960s, though, SEMA's leaders, convinced that the need for further additions to their body's ranks was pressing, opted to take their ongoing recruitment efforts up a notch. In August of 1967, for example, they ran a two-page spread in *Hot Rod Industry News* that claimed, in part, that

> [w]ell-meaning, but misinformed, federal and state legislators are launching tireless attacks against the manufacturers and sellers of automobiles and automotive accessory equipment, all in the name of safety and cleaner air. And, unless these lawmakers are made aware of the harmful effects their efforts could produce, we could all be in danger of losing our livelihoods. The Specialty Equipment Manufacturers Association is currently leading the battle to save our industry...we need your ammunition.[108]

Less apocalyptic appeals from folks like Willie Garner followed during the course of 1968, 1969, and 1970, and in 1969, the Board of Directors voted once again to loosen SEMA's membership-eligibility requirements.[109] Much to their delight, their efforts soon began to pay off handsomely: by the end of 1970, SEMA was collecting dues from more than 400 different manufacturers,

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the program in 1967 (see, for example, Dick Wells, "Special to SEMA News – SEMA: Reasons for Being," undated and unpublished manuscript, 2, DWF), and indeed, Bob Leif's use of the phrase "Meets SEMA Specs" in his January 1968 *HRIN* article on the program seems to suggest that Wells is right (see Bob Leif, "Meets SEMA Specs," *HRIN*, January 1968, 24-27 and 36-37). On the other hand, the evidence in the pages of several *Hot Rod Industry News* issues from 1970 suggest that the program was in fact formalized earlier that year ("SEMA Section," *HRIN*, May 1970, 60, and "*HRIN* Interview: Dale Herbrandson on the SEMA Specs Program," *HRIN*, September 1970, 22, 42-43 and 48-49). In any event, what is clear is that by the beginning of 1970, at the very latest, "Meets SEMA Specs" was in fact a formal, stand-alone project under the larger organizational umbrella of the Specialty Equipment Manufacturers Association.

[106] "Industry History," anonymous and unpublished manuscript (2003), 4, History File, SEMA-RC.

[107] "*HRIN* Interview: SEMA President Garner," *HRIN*, August 1967, 30.

[108] "Why All the Flag Waving? Because There's a War On," *HRIN*, August 1967, 22-23.

[109] For a couple of choice examples of the association's late 1960s recruitment efforts, see Willie Garner, "Comments from the President," *HRIN*, July 1968, 40-41, and "SEMA Section," *HRIN*, June 1970, 46. On SEMA's 1969 decision to loosen its membership requirements, see Alex Xydias, "Publisher's Report," *HRIN*, August 1969, 6.

distributors, retailers, and publishing houses.[110] And dues, in the end, were what SEMA *really* needed in the late 1960s and the early 1970s. Washington representation, for example, was exceedingly expensive, as was SEMA's "Specs" Program.[111] Beginning with its second iteration in the winter of 1967-1968, therefore, twenty percent of the profits from the Annual High Performance and Custom Equipment Trade Show went to fund these efforts, which helped tremendously.[112] But ultimately, SEMA's leaders knew there simply was no substitute for steady organizational income in the form of dues. *Hence* their ongoing quest for "ammunition," which would continue unabated well into the 1970s.

Strategically, too, the late 1960s through the very early 1970s was a vital period for SEMA. As we have seen, Willie Garner, Don Francisco, and other SEMA point men had begun to try to calm things down as early as 1967, urging average rodders, speed shop owners, and equipment manufacturers not to overreact to the burgeoning wave of new regulations, but rather to cooperate and comply with the new laws as a sign of good faith.[113] For "[i]f we are to stay in business," Ray Brock explained to his *Hot Rod Industry News* readership that spring, "we must cooperate, particularly in those areas where we will be under constant observation from governmental agencies."[114] Critically, though, compliance was but part of SEMA's budding regulatory strategy. After all, none of the association's members were actually willing to simply comply with whatever the folks in DC might dream up on their own, and neither, for that matter, were any of the popular hot rodding journalists, nor the millions of ordinary enthusiasts. SEMA's overarching strategy therefore combined its emphasis on self-control, cooperation, and compliance with a concerted effort to establish solid working relationships and ongoing dialogues with the relevant regulatory agencies. SEMA's hope, of course, was that through these level-headed conversations with the authorities, *its* opinions, *its* concerns, and, crucially, *its* years

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[110] *SEMA: Serving the Automotive High Performance and Custom Industry*, informational pamphlet (1971), History File, SEMA-RC.
[111] Not to mention SEMA's full-time staff, which Garner helped establish in the summer of 1968. See below, pages 328-329.
[112] "Why All the Flag Waving? Because There's a War On," *HRIN*, August 1967, 23.
[113] See above, pages 320-322.
[114] Ray Brock, "Publisher's Report," *HRIN*, March 1967, 6.

of accumulated hands-on automotive experience might be taken into account. Kintner's successful negotiations with NHTSA in the spring and summer months of 1967 had proven to SEMA' leaders that the authorities were indeed willing to listen; during the course of 1968, 1969, 1970, and 1971, therefore, they continued to refine their approach. "We shall police ourselves, we shall work with the established governmental bodies, and we shall continue to be creative," declared SEMA's Eric Grant with confidence towards the end of 1970,[115] and most within the industry agreed.[116] By the end of 1972, in fact, association members had enshrined these basic tactics in their first official policy statement.[117] Cooperation, compliance, and constructive dialogue: *these*, much more so than *Hot Rod*'s inflamed editorials, actually formed the basis of the speed equipment industry's collective response to the regulatory challenge.

During the late 1960s, though, SEMA's cooperative and collaborative approach was still quite new – and tentative. It took a great deal more than Kintner's 1967 success, in other words, to actually convince the bulk of SEMA's dues-paying members that this would indeed be the proper way for them to proceed in the years to come. In 1968, 1969, 1970, and 1971, SEMA's leaders therefore continued to try it out. In Washington, for example, its representatives maintained their working relationship with NHTSA officials, "assisting Dr. Haddon in choosing which direction to take" on a number of regulatory matters.[118] Back in 1967, for example, the Department of Transportation and NHTSA had begun to toy with the idea of requiring mechanical governors on all new cars in order to limit their top speed to 95 mph.[119] The notion fizzled in the early months of 1968, but towards the end of 1970, NHTSA's new director, Douglas Toms, resurrected the idea by proposing a new federal motor vehicle safety standard known as "High Speed Warning and Control." Toms's idea was simple: new cars would be limited mechanically to 95 mph, and at 85 mph, their hazard lights would flash and their horns

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[115] Eric Grant, "The High Performance Market Today and in the '70s," *HRIN*, November 1970, 24.
[116] See, for example, "Outlook for 71," *HRIN*, January 1971, especially 65-66, 72, and 94; A. B. Shuman, "Editorially Speaking," *HRM*, October 1971, 6; and "Who's Doing What for HP?" *HRIN*, July 1972, 26-28.
[117] See "SEMA Policy Statement," *HRIN*, November 1972, 26, and below, chapter 6.
[118] Robert Herzberg, "Washington Report," *HRIN*, February 1968, 13.
[119] Robert Herzberg, "Washington Report," *HRIN*, May 1967, 10.

would sound a continuous tone in order to warn other drivers – and, presumably, the police – that the car was approaching its terminal velocity.[120] Toms solicited opinions on the idea from the mainstream industry and the aftermarket in the winter of 1970-1971,[121] and SEMA dutifully submitted its response in March.

In spite of the fact that the popular periodicals had gotten wind of the proposal and had begun to kick and scream about this blatant example of "bureaucratic over-reaction,"[122] SEMA nevertheless declared that it supported the idea, in theory. Specifically, the association agreed with NHTSA that there was no conceivable reason for a car used on the street to have the capability to exceed 95 mph, but it also warned Toms that in its opinion, flashing lights and honking horns were no less hazardous than speeding cars. Furthermore, SEMA warned NHTSA of the dangers of mechanical governors – if, for example, the low-speed performance of the average car were in any way restricted as a byproduct of the 95 mph limit, then it would in fact become a much *less* safer vehicle because of its inability to successfully deal with everyday situations like low-speed passing and freeway merging.[123] SEMA also pledged to work with NHTSA and the Department of Transportation to further refine the standard, if necessary, but in the event, resistance from the mainstream industry would ultimately consign the notion to the regulatory scrap heap.[124] Still, SEMA's willingness to cooperate and work together with the authorities on this (and other) federal automotive safety proposals had not gone unnoticed. As early as January of 1971, for example, Douglas Toms himself had accepted an invitation to address the members of the Specialty Equipment Manufacturers Association at their annual trade show in Anaheim, California; there, he had told those in attendance that they if they would continue to work closely with the authorities in the future, as they were at the time with NHTSA

[120] See Robert Herzberg, "Washington Report," *HRIN*, February 1971, 10 and 35. Toms, a Nixon appointee, had taken Haddon's place in 1969.
[121] For some examples of the mainstream industry's response to Toms's idea, see Robert Herzberg, "Washington Report," *HRIN*, March 1971, 12 and 32, and Robert Herzberg, "Washington Report," *HRIN*, June 1971, 10.
[122] "Rodding Readers: 1973 – a 95 mph Limit?" *PHR*, March 1971, 12.
[123] "SEMA Section," *HRIN*, April 1971, 34-35, and Robert Herzberg, "Washington Report," *HRIN*, July 1971, 14 and 35.
[124] Ultimately, all that would come out of this idea was a decision, taken towards the end of the 1970s, to limit the speedometer readings on new cars to 85 mph. See, for example, "Legislation," *HRIN*, May 1977, 14-15.

on the question of the 95 mph limit, then their industry would continue to enjoy considerable success in their regulatory negotiations. "You fellows have too many resources, too much talent and far too much inventive power to allow any other conclusion," he declared to thunderous applause as he wrapped up his remarks.[125] One year later, also at the SEMA trade show, Undersecretary of Transportation James M. Beggs echoed and elaborated on Toms's claims:

> We're not regulators. We're not automotive dictators. We're not the engineering and manufacturing experts. You are. And we need your help and support. I'm very optimistic about the degree of vehicle safety that can be built into an automobile...[t]his is not to say that original equipment must be maintained. Doug Toms tells me, in fact, that aftermarket equipment is often of a higher quality than the original. Your contributions toward producing high-quality equipment can actually increase safety performance.[126]

Clearly, SEMA's cooperative and collaborative approach was beginning to work to the association's advantage, winning it some key allies within the ranks of those in charge in Washington, DC. Toms, in fact, was so impressed with SEMA that he soon made a practice of consulting closely with it, and SEMA, equally delighted with Toms, unanimously voted him its 1972 "Man of the Year."[127]

We must be careful, though, not to overstate the extent of SEMA's involvement with the authorities in DC during the years that immediately followed Kintner's 1967 success. To be sure, SEMA did in fact maintain its working relationship with NHTSA, and it did in fact continue to refine its regulatory strategies in the federal city. However, SEMA's leaders also quickly realized, during the spring of 1968, that Kintner's deal with Haddon had ushered in a period of relative calm on the federal level. In other words, they recognized that at least for the time being, there wasn't any longer much of a need for full-time legal counsel in DC. Back in California, on the other hand, the speed equipment industry was facing stricter regulations from the Golden State's pollution-control authority, the Motor Vehicle Pollution Control Board (MVPCB).[128]

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[125] "SEMA Section: DOT's Toms and Ford's Jensen 'Tell It Like It Is' at SEMA Luncheon," *HRIN*, March 1971, 38.

[126] James M. Beggs, "The Administration Speaks: Remarks by U. S. Under Secretary of Transportation James M. Beggs before the Specialty Equipment Manufacturers Association Annual Meeting," *HRIN*, February 1972, 10 and 34.

[127] "Hot Rod Reports on the SEMA Scene: Doug Toms Named SEMA's Man of the Year," *HRM*, March 1972, 22.

[128] See below, chapter 6.

Association finances in 1968 were tight – not for another couple of years, as we have seen, would SEMA's membership drive efforts actually begin to pay off. Consequently, Willie Garner and the SEMA Board of Directors opted to redirect their organization's scarce resources to the areas in which they were most urgently required. And in the spring of 1968, that was Sacramento, California. Within the span of a few short months, SEMA therefore fired Kintner and his DC law firm, set up an expanded L.A. office, hired an experienced industry insider by the name of Dan Roulston to act as its first paid and full-time Executive Director, and, critically, lured a young lawyer from the staff of the MVPCB, Eric Grant, to serve as SEMA Counsel in the State of California.[129] All of this was done to better enable the association to deal with the pressing issue of California emissions, and for several years, it proved to be a gamble more than worth its while.

By the end of 1971, however, SEMA's fortunes in DC began to shift – the lull of the late-1960s, that is, was beginning to come to an end. The passage of the Clean Air Act of 1970, for example, meant that smog control was soon to become as much, if not more of a challenge for the speed equipment industry on the federal level than it had been during the late 1960s out in California.[130] This development alone would surely have sufficed to bring about a change in SEMA's regulatory priorities, but as it happened, it coincided with a renewed push within NHTSA for stricter oversight of aftermarket manufacturers as well. More specifically, SEMA's newly inaugurated president, Vic Edelbrock, Jr., received a phone call from NHTSA's Douglas Toms in the fall of 1971. Toms told Edelbrock that he and his associates had begun to receive reports of quality-control problems within the aftermarket custom wheel industry, and he warned Edelbrock that if the speed equipment industry should fail to whip its wheel producers into

[129] "Roddin' at Random," *HRM*, June 1968, 112; "News and Notes," *HRIN*, January 1969, 118 and 124; Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 13, History File, SEMA-RC; Author Interview with Carl Olson, Pomona, California, April 4, 2003; and Author Interview with Bob Spar, Newbury Park, California, November 13, 2003. Not incidentally, Roulston's résumé was impressive: he had been employed as the Editor of the popular periodical *Car Craft*, he had served as the Publicity Director for the NHRA, and he had also spent some time in the promotions department at a colossal Pennsylvania-based equipment manufacturer, Hurst Performance Products.

[130] See below, chapter 6.

shape, then NHTSA would have no choice: stricter standards and a mandatory, federally-operated certification program would have to be developed.[131] Edelbrock's response was twofold. First, he set the wheels in motion within SEMA for the re-establishment of a strong association presence in DC, securing a substantial grant from Robert Petersen of the Petersen Publishing Company with which to hire a permanent Washington representative, Dale Hogue.[132] And second, he sat down with members of the SEMA Wheel Committee to develop an appropriate approach to Toms's new challenge.

Formed in 1966 at the request of the SCTA officials who were in charge of the annual time trials held at the Bonneville Salt Flats, the SEMA Wheel Committee's work had begun in earnest in 1967. That year, the committee, headed by Roy Richter of Cragar Industries, had begun to develop a set of strict, performance-based aftermarket wheel specifications, a centralized testing program, and a rotary fatigue test rig adequate for their purposes. In other words, the committee's task was to develop the official SEMA "Specs" Program standards for custom wheels, and as a result, it worked alongside Spar and Hedrick's Technical Committee throughout the latter half of the 1960s.[133] But in the fall of 1971, Edelbrock informed the group of Toms's new sentiments and pleaded with them to redouble their efforts and further refine both their standards and their testing procedures. One year later, Richter's crew presented their new Spec to Edelbrock and SEMA's Board, who reported it in turn to ordinary rodders in the pages of *Hot Rod Magazine*. SEMA's basic wheel Spec, known as 5-1, now required not only that participating firms submit their testing data for initial SEMA "Specs" approval, but also that they then submit a sample wheel to SEMA once per year for further testing, verification, and "requalification."[134]

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[131] Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003.
[132] Author Interview with Carl Olson, Pomona, California, April 4, 2003, and Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 13, History File, SEMA-RC.
[133] "News and Notes," *HRIN*, October 1967, 52, and "SEMA's Wheel Committee," *HRIN*, January 1969, 66-68, 76, 86, and 88.
[134] See "Hot Rod Reports on the SEMA Scene," *HRM*, November 1972, 38. Earlier iterations of the 5-1 Spec had simply required participating firms to submit their own ongoing testing data for the purposes of annual renewal.

Pleased with what the committee had accomplished, Edelbrock also dispatched Dale Hogue to the NHTSA offices in DC, where he presented the details of SEMA's revised 5-1 Spec to Douglas Toms. Toms was impressed, but he was also not yet sold. Specifically, the quality-control provisions of 5-1 remained unsatisfactory to him: Toms, Hogue reported back to SEMA in the winter of 1972-1973, wanted to see random sampling, independent testing, and greater organizational oversight.[135] Consequently, by the summer of 1973, SEMA's Wheel Committee had once again revised its 5-1 Spec, incorporating provisions for random, off-the-shelf wheel testing and stricter annual renewal requirements.[136] In addition, SEMA also pledged to establish a permanent testing facility, mostly (though not entirely) in order to enable it to meet the demands of its new 5-1 guidelines.[137] By the summer of 1973, though, Toms had resigned his post at the request of Richard Nixon, one of many within the president's administration who were shown the door as part of a massive, second-term shake-up. SEMA's leaders mourned the loss of their close friend and ally in DC, but on the bright side, at least in the eyes of folks like Richter, stricter aftermarket wheel requirements quickly vanished from the federal agenda in the wake of Toms's departure from NHTSA.[138] SEMA and its Wheel Committee, though, were proud of what they had accomplished, and they went ahead and implemented their new wheel Spec anyway. For as an association spokesman explained in a press release that July, "[i]f and when [NHTSA] decides to set wheel standards" down the road, "SEMA's quality control and qualification program will be of great value to them in the custom wheel category."[139]

And so it went with SEMA and NHTSA. Following Kintner's 1967 "victory," that is, the speed equipment industry maintained a productive working relationship with NHTSA and the Department of Transportation, dealing with the occasional new federal requirement or two with

[135] "SEMA Bulletin," *HRIN*, April 1973, 67-68.
[136] "The SEMA Scene: New Quality Control Program Assures Safer Custom Wheels," *HRM*, July 1973, 38.
[137] See for example "SEMA News," *HRIN*, August 1973, 36, and "SEMA Test Lab: Another Step Forward," *HRM*, October 1973, 38.
[138] On Toms's departure from NHTSA, and SEMA's response to it, see Terry Cook, "Editorially Speaking," *HRM*, March 1973, 10-12, and "The SEMA Scene: If Only Somebody in Washington Understood Us..." *HRIN*, April 1973, 40.
[139] "The SEMA Scene: New Quality Control Program Assures Safer Custom Wheels," *HRM*, July 1973, 38.

the same commitment to cooperation, compliance, and communication that had gotten it through the initial challenges of the late 1960s and the early 1970s. In other words, federal automotive safety requirements were more than just a temporary "problem" that the speed equipment industry felt compelled to "solve." Instead, they were a new and ever-present *constant*, both for SEMA and for ordinary rodders, one that by the early 1970s the speed equipment industry had simply learned to take in stride.

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Local automotive safety developments, on the other hand, were much less constant and far more troubling. Recall that under the terms of the National Traffic and Motor Vehicle Safety Act of 1966, state and local authorities were charged with the task of actually interpreting and enforcing the federal government's so-called "in-use" automotive safety standards. Innumerable local variations quickly sprang up as a result of this decentralized "in-use" system – suspension modifications that were legal in one state (or even in one local jurisdiction), for example, may well have been illegal in others, and the same was true for certain exterior lighting arrangements, custom wheels, and even basic body modifications. By the end of the 1960s, rodders, speed shop owners, and equipment manufacturers therefore faced an increasingly vexing array of local prohibitions and regulations.[140] Further complicating matters, by the early 1970s, were a growing number of disparate, provincially-oriented automotive noise requirements. Not until 1972 would Congress authorize the Environmental Protection Agency to develop a *national* standard for the regulation of automobile exhaust noise levels, and not until 1977 would that federal Agency actually begin to work on the matter in earnest.[141] In the meantime, though, state and local authorities were free to deal with the problem as they saw fit. During the late 1960s and the early 1970s, therefore, enthusiasts soon found that if they chose to modify their cars, they had to deal not only with their local automotive safety requirements, but also with their local- and state-level noise control ordinances. In addition, many of them quickly found that even if their

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[140] See above, pages 313-316.
[141] See, for example, Russ Deane, "Legislation," *HRIN*, November/December 1977, 32, 34, 36 and 43.

modifications were legal in their hometowns – and their vehicles legally registered accordingly – neighboring towns, counties, and states weren't always willing to allow them to pass through *their* jurisdictions without citing them for one infraction or another.[142]

It wasn't long, therefore, before the Specialty Equipment Manufacturers Association began to search for a way to deal with these disparate "in-use" safety regulations and noise ordinances. After all, the greater the number of local variations, the greater the level of involuntary fragmentation within the speed equipment market. Certain types of mufflers, say, that once were legal nationwide now were apt to be illegal in a number of jurisdictions, and the same was true of lowered springs, exhaust headers, custom wheels, form-fitting seats, and countless other aftermarket staples. In other words, disturbing though these local laws of the late 1960s and the early 1970s certainly were for period enthusiasts, they were an even greater hassle for an industry that had to worry about such things as marketing and advertising, product distribution, and legal liability. In an ideal world, of course, SEMA's leaders would have simply dealt with each of these new laws and local variations on a case-by-case basis, just as they had begun to deal with a number of local-level problems in the State of California during the course of 1967, 1968, and 1969.[143] California, though, was SEMA's home turf, and so it was relatively easy for the association's leadership to keep up with the local challenges that were emerging there. Difficulties in Wisconsin, on the other hand, were an entirely different matter, as were those in Pennsylvania, Ohio, New Jersey, and the rest of the states. What SEMA's leaders needed, that is, was a way to monitor local- and state-level regulatory and legislative developments *throughout* the country as effectively and efficiently as they could in their own home state of California. And by the summer of 1968, Willie Garner and his crew had hit upon a simple approach they hoped would do the trick.

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[142] Author Interview with Dick Wells, Santa Ana, California, April 2, 2003, and Author Interview with Carl Olson, Pomona, California, April 4, 2003.

[143] For example, SEMA had dealt with a California seat belt retrofit proposal and a California drive-by noise proposal back in the fall of 1967 (see Ray Brock, "Publisher's Report," *HRIN*, December 1967, 6), and it had also begun to deal with the Golden State's pollution control authority, the Motor Vehicle Pollution Control Board, earlier that same year (see below, chapter 6).

That July, Garner published an article in *Hot Rod Industry News* in which he urged speed shop owners, wholesale distributors, and equipment manufacturers to "keep our SEMA Headquarters advised as to local developments affecting the automobile."[144] Local firms, in other words, were going to have to serve as SEMA's eyes and ears. Well aware that this arrangement might be insufficient, Garner also issued an identical appeal to average enthusiasts that summer in a brief and open letter to the editors of *Hot Rod Magazine*.[145] Three years later, Eric Grant would do the same in an editorial in the NHRA's publication, *National Dragster*, asking ordinary rodders "to serve as part of a nationwide early warning system to alert SEMA of newly proposed restrictions on vehicle use."[146] During the late 1960s and the early 1970s, *Hot Rod*'s editorial staff frequently reminded their readers of SEMA's request for their assistance as well, as did the Petersen Publishing Company in its own *Hot Rod* spots.[147] Consequently, SEMA did begin to receive word of a number of troubling local developments by the early 1970s; accordingly, it was able to begin to dispatch representatives, send out letters, and otherwise organize and execute an effective response. Many of these local problems ultimately fell through the cracks, of course – after all, SEMA's California-based staff had neither the time nor the resources that would have been necessary to address them all. Still, as a result of this informal watchdog system, the association was beginning to get a handle on the problem of local variation by the end of 1973.[148] Garner's plan, in other words, was panning out quite nicely.

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[144] Willie Garner, "Comments from the President," *HRIN*, July 1968, 41.
[145] "Post Entry: SEMA Speaks," *HRM*, June 1968, 10.
[146] Quoted in A. B. Shuman, "Editorially Speaking," *HRM*, October 1971, 6.
[147] See, for example, "Post Entry," *HRM*, April 1969, 12 and 14; "Post Entry," *HRM*, October 1969, 12, 14, 16, and 18; A. B. Shuman, "Editorially Speaking," *HRM*, October 1971, 6; "The SEMA Scene," *HRM*, October 1971, 124; "Post Entry," *HRM*, April 1972, 18 and 22; and Fred Gregory, "PPC Editorial," *HRM*, May 1973, 16-17. Interestingly enough, the editors of *Popular Hot Rodding* never seem to have mentioned SEMA's call for enthusiasts and aftermarket manufacturers to act as SEMA's local eyes and ears, and they certainly never echoed *Hot Rod*'s call for their readers to actually do this. Instead, *Popular Hot Rodding* encouraged its readers to join large, enthusiast-based lobbying groups such as the "National Automotive Racing Enthusiasts Association" (see Roger Huntington, "Don't Let Legislation Wipe Out Hot Rodding: Men Who Know Nothing About the Thrill of Acceleration, Cornering or Braking are Out to Set Government Regulations on What the Automobile Can Do for You!" *PHR*, July 1968, especially page 44). *Perhaps* this reluctance on the part of the editors of *Popular Hot Rodding* to endorse the SEMA program had something to do with SEMA's close ties their major rival, Robert Petersen of the Petersen Publishing Company.
[148] See, for example, SEMA president Vic Edelbrock's praise of the informal, local-level watchdog system in "SEMA News," *HRIN*, May 1973, 58-59 and 62, and also in "Outlook '74," *HRIN*, November 1973, 60, 68, and 76.

In Colorado, for example, state legislators passed a new requirement in mid-1971 that "outlawed any modifications to suspension or steering [systems] that would cause [them] to differ from original equipment."[149] Colorado enthusiasts as well as a number of local aftermarket companies quickly passed word of this new development to the SEMA headquarters back in L.A., and in the fall, Eric Grant and SEMA member Ray Brown flew to Denver to meet with the administrator of the Colorado safety inspection program. After lengthy discussions, SEMA's representatives and the Colorado authorities were able to reach a compromise: *extreme* modifications, such as pavement-scraping lowering jobs or sky-high lift kits, would be outlawed, but more ordinary modifications, such as custom wheels, heavy-duty shocks, and traction bars, would continue to be allowed.[150] Similarly, in the spring of 1972, enthusiasts in the state of Wisconsin alerted the SEMA staff to an effort that was then underway in their state capital to introduce a number of changes to their state's motor vehicle code, among them strict bans on modified suspensions, custom wheels, and custom interior appointments. Consequently, SEMA member Don Prieto was dispatched to Madison in October of 1972 to attend a public hearing on the changes, and "[a]s a result of the hearing and Prieto's suggestions," *Hot Rod Magazine* reported the following winter, the proposals were amended to allow the use of custom steering wheels, custom alloy wheels, and custom suspension arrangements so long as none of them were of the extreme variety.[151] It was a compromise solution, in other words, much like that which Grant and Brown had brokered the previous year in Colorado. And by the end of 1973, similar compromise agreements had been reached between representatives of the aftermarket industry and transportation department officials in the states of Minnesota, Washington, Oregon, and Virginia.[152] Critically, though, SEMA's intervention in each and every one of these state-level cases would not have been possible had ordinary enthusiasts and aftermarket businessmen not taken the time to alert the association to them in the first place.

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[149] "The SEMA Scene," *HRM*, January 1972, 110.
[150] Ibid.
[151] "The SEMA Scene: Hot Rods May Get the Axe on Wednesday," *HRM*, February 1973, 32.
[152] On the developments in Minnesota, see "SEMA News," *HRIN*, May 1973, 58-59 and 62. On those in Washington, Oregon, and Virginia, see "Outlook '74," *HRIN*, November 1973, 60, 68, and 76.

Negotiations between SEMA representatives and state and local officials did not always go as smoothly as they did in Colorado and Wisconsin, though. Consider, for example, the so-called "Pennsylvania Crisis" of 1970-1974. In the Keystone State, the motor vehicle code, which had been amended in the wake of the passage of the National Traffic and Motor Vehicle Safety Act in the mid- to late 1960s, read in part that any automobile "with an exhaust system which has been modified or altered in any way from that furnished by the vehicle manufacturer" would be denied registration. During the late 1960s, nobody within the Pennsylvania Department of Transportation (Penn-DOT) had ever bothered to take the matter very seriously, and local inspection centers acted as if it the provision didn't even exist. But when Pennsylvania-based aftermarket gurus Jere Stahl of Stahl Headers and Herb Lipton of Kay Automotive Warehouse learned of the existence of this provision in 1970, they immediately contacted the Specialty Equipment Manufacturers Association and their local representatives. Their fear, of course, was that if Penn-DOT should ever choose to stage a "crack down," this particular provision might well come into play, virtually eliminating the custom exhaust business in the State of Pennsylvania in the process. Consequently, during the course of 1970 and 1971, Stahl, Lipton, and SEMA's Eric Grant began to try to work with Pennsylvania lawmakers in an effort to officially purge the books of this particular restriction once and for all. But in the fall of 1971, their efforts were pre-empted when the State of Pennsylvania's newly-elected Governor, Milton J. Shapp, ordered Penn-DOT to begin to enforce the state motor vehicle code a bit more carefully, particularly its provisions for the prevention of unnecessary exhaust noise. Rather quickly, Stahl and Lipton's 1970 nightmares began to come true, as state inspection officials began to deny registrations all across the state for infractions that were often as minor – and utterly meaningless, especially with regard to automobile exhaust noise levels – as the substitution, say, of an exhaust clamp for a spot weld in replacement muffler installations. During the course of 1972, SEMA stepped up its efforts to open a meaningful dialogue with Penn-DOT on the matter, and local enthusiasts even staged a "rod run" to the capital city of

Harrisburg,[153] in an attempt to reverse the troubling course that events had taken there. But by the winter of 1973, all of this had come to naught – SEMA's efforts, that is, had reached an impasse.[154]

Not until November of 1973 would SEMA finally succeed in breaking this impasse, but for our purposes, the way in which this breakthrough came about is infinitely more significant than what it may or may not have meant for rodders in the Keystone State. For as it happened, the so-called "Pennsylvania Crisis" ultimately came to a close not through the persistence of Stahl, Lipton, and Grant, but rather through the intervention of an influential character that SEMA officials Don Prieto and Dale Hogue first met at a Vehicle Equipment Safety Compact (VESC) meeting in the fall of 1973.[155] The VESC, as we have seen, was an organization founded by the OEMs in the mid- to late 1950s.[156] Charged with the task of formulating voluntary automobile safety standards, the VESC had been spectacularly unsuccessful during the late 1950s and the early 1960s, its feeble efforts rendered meaningless when Congress passed the National Traffic and Motor Vehicle Safety Act in 1966. But by the early 1970s, the VESC had been reborn as a loose alliance of industry representatives, state transportation officials, and local police officers. Their job, it seems, was to meet periodically in order to come up with safety-standard recommendations for those states that had opted to participate in NHTSA's "in-use" enforcement program. By 1973, 44 states therefore were affiliated with the VESC, and although none of them were bound to adopt each and every one of the group's recommendations, most of them did. The VESC's major limitation, though, was that it was highly selective: it did not try to deal with every little interpretive difference that might emerge between its members, that is, but rather only with the biggest, the most difficult, and/or the most pressing issues at hand. In other

[153] A "rod run" is essentially an organized, (often) long-distance cruise event in which dozens of hot rodders gather together and then drive their rods to a designated location (and back).
[154] On the origin and evolution of these Pennsylvania problems (and the failure of SEMA officials and organized enthusiasts, through the winter of 1972, to open a meaningful dialogue with the Penn-DOT on them), see for example "Hot Rod Reports on the SEMA Scene," *HRM*, February 1972, 124; Steve Green, "The Pennsylvania Crisis!" *HRM*, May 1972, 26-27; and "Rodding Readers: The Right Way," *PHR*, January 1973, 11.
[155] This "influential character" was the chairman of the VESC, a man by the name of Brainard. See below, page 339.
[156] See above, pages 309-310.

words, it is important for us to understand that the VESC was *not* meant to rein in local variations altogether, but instead to handle those that seemed particularly troubling to the bureaucrats, cops, and industry representatives who were its members.[157] And by the fall of 1973, "reconstructed vehicles" had reached the top of the Compact's list of pressing issues.

"Reconstructed vehicles," in the eyes of VESC members, included hot rods, street rods, 1950s-style customs, dune buggies, and any other type of automobile that was either entirely home-built or so extensively modified from its original configuration that the ordinary "in-use" safety standards would be difficult for them to apply. The Compact therefore voted to hold a series of meetings on the issue in the fall of 1973, determined to come up with a uniform set of safety standards for these "reconstructed vehicles." Critically, the VESC's chairman thought it might be wise to invite interested parties from within the automotive aftermarket to join the group's discussions as well, and on August 1, 1973, SEMA therefore dispatched Don Prieto and Dale Hogue to San Francisco to attend the Compact's first official meeting on the matter.[158] By the spring of 1974, the VESC's series of meetings had run their course, and the body issued a set of preliminary recommendations for its members to consider further during the summer months. Prieto and Hogue dutifully presented the VESC's findings to the SEMA Board in April, and within a few short weeks, SEMA had prepared its own official comments on the VESC's preliminary recommendations and had mailed them back in to the Compact's chairman.[159] Meanwhile, Don Prieto published his thoughts on the VESC's proposals in *Hot Rod Magazine* that May, urging readers not to overreact to them but instead to recognize that what the VESC *really* wanted from the average rodder was a measure of responsibility:

> I think the key is responsibility. If a person wants to operate a street rod on the highways of America, there are certain responsibilities he must accept...certain considerations he must make towards others... The responsible rodder will see the immediate necessity for seat belt use, the windshield made of safety glass, wipers that work, coverings for hot, exposed exhaust pipes, bumper protection, etc.[160]

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[157] On the VESC's duties in its new and improved 1970s form, see for example "SEMA News," *HRIN*, September 1973, 28, and "The SEMA Scene," *HRM*, November 1974, 20.
[158] "SEMA News," *HRIN*, September 1973, 28, and "The SEMA Scene," *HRM*, November 1973, 22.
[159] Terry Cook, "Editorially Speaking," *HRM*, May 1974, 10 and 127.
[160] "The SEMA Scene," *HRM*, May 1974, 26.

In other words, the pending street rod or "reconstructed vehicle" recommendations of the VESC were fundamentally sound and reasonable, and the average, responsible hot rodder therefore oughtn't fear them.

In the fall of 1974, the VESC issued its revised and final recommendations, and many of its member states immediately began to implement them at the local level.[161] For SEMA, the VESC's final standards were of course a major compromise, but the association was nevertheless pleased with them – or, more precisely, it was pleased with the way in which they had been developed. For indeed, dealing with the VESC over the fall and winter months of 1973-1974 had been akin to dealing with NHTSA in the late 1960s. SEMA, that is, had been working with a single body on a single set of safety standards for the first time in a number of years, and needless to say, aftermarket leaders very much preferred this style of legislative negotiation to that of the chaotic and haphazard local- and state-level meetings that its members had been involved with in recent years. What's more, SEMA's Don Prieto and Dale Hogue had represented the association well in San Francisco, and the aftermarket's reputation therefore could not but have enjoyed something of a slight boost, at the very least, among the various authorities who were involved in the discussions. Finally, the VESC episode confirmed once again the wisdom of the Specialty Equipment Manufacturers Association's official regulatory strategy: cooperate, comply, and inform.

SEMA's dealings with the VESC in 1973 and 1974 also had two further implications. First (and in the short term, foremost), Prieto and Hogue's participation in the meetings led directly to a resolution of the lingering "Pennsylvania Crisis." For as it happened, the chairman of the VESC, a man by the name of Brainard, once had served as a high-ranking official at Penn-DOT. Hogue and Prieto therefore cornered Brainard during a coffee break at one of the early VESC "reconstructed vehicles" meetings in the fall of 1973 and explained their difficulties to him. Brainard assured them that he would do whatever he could to try to get things rolling once again, and he kept his word: by the time the next Compact meeting was called to order, Brainard

[161] "The SEMA Scene," *HRM*, November 1974, 20.

had pulled some strings in Harrisburg in order to arrange a meeting between SEMA representatives and the head of Penn-DOT. In October, Hogue and Prieto therefore flew to Harrisburg, met with Brainard's contact, and managed to jump-start the long-stalled Pennsylvania dialogue. Penn-DOT, for its part, "indicated that they [were] in the process of revising the entire code and that they would welcome technical assistance from SEMA," and SEMA in turn not only promised to assist the agency, but also offered its word that the aftermarket would continue to respect the law, regardless of the ultimate outcome of their efforts. Pleased, Prieto and Hogue "left the meeting with strong feelings that this initial conference had been productive and that things were looking a little brighter in Pennsylvania."[162]

The second major consequence of SEMA' participation in the VESC's "reconstructed vehicles" discussions of the fall of 1973 was that it brought SEMA into a closer working relationship with a man by the name of Dick Wells. Wells was certainly no stranger to the Association: as we have seen, he was the point man within the Petersen Publishing Company's Special Events Department that had organized the very first SEMA Show at Dodger Stadium back in 1967,[163] and during the late 1960s and the early 1970s, he had continued to produce the SEMA Show for Petersen each year. In fact, Wells was actually a member of the Specialty Equipment Manufacturers Association in the early 1970s, serving alongside Els Lohn, Harry Weber, Lou Baney, Ray Brock, and Alex Xydias on SEMA's "Special Events and Show" committee.[164] This, though, was the full extent of Wells's involvement with the association prior to 1973 – he served, that is, on none of SEMA's "Specs" committees and on none of SEMA's legislative subcommittees. And yet, during the early 1970s, he was actually gaining a considerable amount of hands-on experience in the regulatory and legislative realms that might well have been useful to the association. To wit, in addition to his duties at Petersen Publishing,

[162] On the resolution of the Pennsylvania crisis (and the role of Brainard of the VESC in it), see "The SEMA Scene," *HRM*, November 1973, 22, and "The SEMA Scene - Update: The Pennsylvania Crisis...A Brighter Picture," *HRM*, December 1973, 30 (the material quoted here appeared in this December article).

[163] See above, pages 306-307.

[164] See *SEMA: Serving the Automotive High Performance and Custom Industry*, informational pamphlet (1972), History File, SEMA-RC.

Wells was also the president and CEO of the National Street Rod Association (NSRA), and in the early 1970s, the NSRA had been forced to begin to deal with precisely the same sorts of local- and state-level automotive safety and noise regulations that were bedeviling SEMA at the time.[165] Consequently, Brainard had invited Wells to take part in the VESC's "reconstructed vehicle" discussions in the fall of 1973, too, and *this* is therefore when Prieto and Hogue first began to closely work with Wells on legislative and regulatory issues.[166]

During the course of the VESC meetings, Prieto and Hogue learned from Wells that the NSRA's strategy for dealing with local variations in the regulatory landscape differed markedly from that of SEMA. Whereas the Specialty Equipment Manufacturers Association relied on an informal network of enthusiast- and entrepreneur-watchdogs to keep it abreast of local developments across the United States, the National Street Rod Association had a formal system of state representatives. The duties of these representatives, all of whom were volunteers from within the NSRA's ranks, included not only the task of keeping the association's L.A. headquarters informed of what was going on in the rest of the country, but also those of meeting with local officials, attending public hearings, and leading local members in their grassroots campaigns. By 1973, the NSRA had thirty of these state representatives in place, and on balance, Wells was very pleased with how the system worked.[167] By contrast, Prieto and Hogue knew full well that recent legislative developments in several states had begun to expose fundamental flaws in *their* association's more informal system. In Pennsylvania, for example, Stahl and Lipton had served SEMA well as early-warning watchdogs, but once the association had learned of the so-called "Pennsylvania Crisis," it had been entirely up to SEMA's L.A. staff to find a way to deal with it. And while this system had in fact worked well in places like Wisconsin, where a simple trip to Madison by Don Prieto had sufficed to bring the matters there to an acceptable conclusion, in Pennsylvania, the problem had dragged on unabated for a number of

[165] The National Street Rod Association was actually a private corporation, and Wells, who was its president, therefore also served as its corporate CEO. Author Interview with Dick Wells, Santa Ana, California, April 2, 2003.
[166] Ibid.; SEMA News," *HRIN*, September 1973, 28; and Terry Cook, "Editorially Speaking," *HRM*, May 1974, 10 and 127.
[167] Author Interview with Dick Wells, Santa Ana, California, April 2, 2003.

years.[168] After hearing of the NSRA's system, Prieto and Wells therefore began to wonder whether an official state-level committee or a set of official state-level representatives might have made the task of dealing with their drawn-out difficulties in the Keystone State a bit less taxing.

Discussions subsequently ensued among the members of the association's Board of Directors, and by the fall of 1974, they had decided to emulate the NSRA's system and establish formal state committees.[169] By the beginning of 1975, thirty-two of them had been set up, and during the course of 1975 and 1976, SEMA would continue to add new committees and representatives to its fledgling new system and to further define and refine their duties and responsibilities.[170] Unexpected difficulties soon began to crop up, though, and in early 1977, SEMA therefore lured Dick Wells from his post within the NSRA and hired him to serve as their Executive Director, largely in order to draw on his accumulated expertise in the establishment and maintenance of state-level regulatory and legislative representatives.[171] And with Wells's help, the system finally took firm root in 1977 and 1978. Thus did SEMA's exclusive reliance on enthusiast- and entrepreneur-watchdogs come to an end, their informal roles officially replaced with a much more stable, capable, and reliable system.

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Make no mistake: SEMA never actually "solved" its state-level regulatory problems of the late 1960s and the 1970s, certainly no more so than it had "solved" its troubles with NHTSA in DC. But it *did* succeed in implementing an effective *system* with which to manage the uncertainties that were implicit in the National Traffic and Motor Vehicle Safety Act's

[168] The same was true of noise-related difficulties in Iowa during the course of 1973, 1974, and 1975 (see, for example, "The SEMA Scene: SEMA's Good Guys – Who They Are," *HRM*, September 1973, 32; Fred M. H. Gregory, "Big News from Illinois," *HRM*, January 1974, 54-55; "HRIN Opinion: Panic Turns to Progress," *HRIN*, May 1974, 24; "The SEMA Scene: Positive Progress Announced on Illinois Noise Problem," *HRM*, June 1974, 32; and "SEMA News," *HRIN*, Winter 1975, 66, 68, and 74).
[169] "Legislative Front," *HRIN*, November 1974, 50.
[170] See Lou Baney's comments in "Performance Industry Leaders Project Business Trends for the Coming Year," *HRIN*, Winter 1975, 12, and also "SEMA News," *HRIN*, March 1975, 14-15.
[171] See *SEMA '78*, informational pamphlet (1978), History File, SEMA-RC; "SEMA News," *HRIN*, May 1977, 10-13; and Author Interview with Dick Wells, Santa Ana, California, April 2, 2003.

decentralized approach to "in-use" automotive regulation. And at the heart of SEMA's system was a deceptively simple and level-headed strategy that stood in marked contrast to the heated, knee-jerk rhetoric that all too often filled the popular automotive periodicals of the 1960s and the 1970s: cooperate with the authorities, comply with the law, and, whenever possible, calmly present the reasoned opinions of the speed equipment industry to the legislative and regulatory powers that be.

As we have seen, this basic approach did serve the speed equipment industry quite well in its working relationships with NHTSA, the VESC, and the countless other, local agencies that were concerned with automotive safety and noise during the period in question. A brief digression is perhaps in order, though, before we move on to examine its importance and effectiveness in SEMA's dealings with the California Air Resources Board in Sacramento and the federal Environmental Protection Agency in DC. For you see, the speed equipment industry's cooperative regulatory strategy stood in marked contrast not only to much of the editorial and feature content of best-selling magazines like *Hot Rod* and *Popular Hot Rodding*, but also to the words and deeds of the mainstream American automobile industry of the late 1960s and the 1970s. In order to better understand and more fully appreciate the speed equipment industry's regulatory experience, in other words, it behooves us to step back for a moment and attempt to place the aftermarket's cooperative approach within a broader theoretical and explanatory context that explicitly includes the OEMs. To do this, though, we need to momentarily shift our focus away from the sunny boulevards and polished hot rods of the Southern California region and towards the snowy expanse of the Upper Midwest. Not towards Detroit and the mass-produced American automobile, mind you, but rather towards the open spaces of Wisconsin, Minnesota, and the Michigan U.P. – and their dead-of-winter mainstay, the snowmobile.

Chapter Six: Negotiating Performance – SEMA, the Speed Equipment Industry, and Environmental Regulation, 1966-1984

In 1999, Leonard S. Reich published a fascinating article in the pages of *Technology and Culture* on the origin and evolution of recreational snowmobiling in the United States. Titled "Ski-Dogs, Pol-Cats, and the Mechanization of Winter," Reich's synopsized history of this peculiar enthusiast-based activity ends with a critical analysis of the strategies employed by the recreational snowmobiling industry during the course of *its* prolonged encounter with governmental regulators in the 1960s, 1970s, and 1980s. Critically, Reich contends that the snowmobiling industry's relatively successful political maneuverings of these decades contrast sharply with those the American automobile manufacturers attempted during roughly the same period. More specifically, he contends that "with dedicated associations and a cadre of enthusiasts, the snowmobile community stood up very well to pressures from alarmed politicians, irate citizens, and aggressive environmentalists." Meanwhile, the automotive community ultimately proved to be "far less effective in dealing with [these] outside pressures," precisely because its short- and long-term strategizing lacked the sorts of "strong influences" which could only have been "exerted by organized enthusiasts and industry-led programs."[1] Dedicated enthusiasts and a powerful industrial organization (the International Snowmobile Industry Association), in other words, are what enabled the snowmobiling industry, regulatory advances notwithstanding, to continue to prosper during a time in which the majority of the mainstream automobile manufacturers languished haplessly.

At a glance, recreational snowmobiling and hot rodding appear to share a lot in common: both are leisure-time activities which are "lacking" in any "obvious utility,"[2] both appeal to relatively minor slices of the overall population, both are supported by powerful and politically-active industrial organizations, however indirectly, and both produce and are in turn maintained

[1] Leonard S. Reich, "Ski-Dogs, Pol-Cats, and the Mechanization of Winter: The Development of Recreational Snowmobiling in North America," *Technology and Culture* 40 (July 1999), 514.
[2] Ibid.

by bands of rabidly enthusiastic devotees. It stands to reason, therefore, that the regulatory experiences of their respective industries might also have advanced along similar lines. According to Reich, the recreational snowmobiling industry's regulatory defense required, in equal measure, *both* the active participation of the ISIA *and* the grassroots efforts of its organized enthusiasts, a combination of forces that does indeed appear to have been the basis of the speed equipment industry's successful automotive safety campaigns as well. For in fact, as we have seen, the high-performance aftermarket was able to withstand the formidable federal-, state-, and local-level challenges that the novel safety legislation of the 1960s and the 1970s posed precisely because it was able to rely on its "enthusiast watchdogs," at first, and ultimately on the creativity and level-headedness of SEMA's leadership.[3] Thus far, in other words, our story simply seems to have added weight to Reich's claims. Perhaps, that is, the one-two combination of a devoted base of enthusiast-customers and a pervasive sense of industrial unity truly *is* the key to regulatory survival – and perhaps, by extension, it is indeed precisely what the OEMs were missing.

Perhaps. But before we jump to any conclusions, let us not forget that automotive safety legislation was but part of the overall governmental regulatory challenge that the speed equipment industry of the 1960s and the 1970s faced. Long before the passage of the National Traffic and Motor Vehicle Safety Act of 1966, in fact, legislative measures that were designed to combat urban air pollution through the regulation of automobile exhaust emissions had already begun to crop up at the local and the federal levels. Pioneered in the State of California,[4] most of these new anti-pollution regulations targeted the products of the OEMs exclusively, at least at first. But by the middle of the 1960s, a handful of them had begun to take aim at the very heart of the speed equipment industry's endeavors as well, seeking to curtail or even to outright ban performance-oriented engine modifications in order to achieve the greater good of cleaner air.

[3] See above, chapter 5.
[4] California, cursed with arguably the worst air pollution problem in the nation, led the way in researching the matter during the 1950s and passed its first anti-pollution legislation years before Washington, DC followed suit. See below, pages 348-349.

As these new measures took shape, however, so too did the resolve of the speed equipment manufacturers, none of whom was willing to abandon the essential raison d'être of the American hot rodding phenomenon without a fight. Through SEMA, they therefore launched a passionate, decades-long, and ultimately successful rhetorical, technological, and legal battle to defend the affordable American high-performance tradition, a battle that was striking not only for the intensity with which it was fought, but also for the cooperative spirit upon which its final resolution hinged. It was an effort that was broadly similar to their contemporaneous engagement with federal, state, and local officials on the pressing issue of automotive safety, for through it all, SEMA's leaders rarely lost sight of their essential strategic commitment to cooperation, compliance, and level-headed negotiation. Where their experience with air-pollution legislation differed, however, was with regard to the involvement of the average enthusiast. To wit, in their efforts to prevent the legal prohibition of performance-oriented automotive engine modifications, the leaders of the speed equipment industry would ultimately find that ordinary rodders were entirely inconsequential, at best, and an outright liability, at worst. In other words, throughout the 1960s, the 1970s, and into the early 1980s, SEMA faced the task of challenging the legislative methods of the environmental regulatory movement on its own.

That it was able to do so – that it was able, that is, to *successfully* and all but *single-handedly* ensure that hot rodding would remain a legal and legitimate pursuit – therefore raises the intriguing possibility that Leonard Reich has got it wrong. For the emissions regulations with which SEMA was concerned during the course of the 1960s, 1970s, and 1980s were precisely the same measures with which the OEMs were so famously ill-prepared to cope, and if the high-performance industry was able to deal with them without the assistance of its "cadre of enthusiasts," why then should the OEMs have been unable to do the same? By closely examining the ways in which SEMA and the high-performance automotive aftermarket handled this particular regulatory challenge, in other words, perhaps we will ultimately manage to arrive at a clearer and more accurate assessment of the OEMs' own shortcomings than Reich's somewhat less analogous example of the snowmobiling industry affords.

Our story begins in downtown Los Angeles, California, on a hazy summer day when gasoline cost 36¢ a gallon, the American-made V8 engine was the undisputed king of the highway, and a thick blanket of photochemical smog obscured the features of the city skyline. It was 1966.

Emissions Regulations: Origins and Implications

That day, Eric Grant and Miles Brubacher of the California Motor Vehicle Pollution Control Board (MVPCB) had called together a small group of journalists and hot rod industrialists to explain the latest addition to their state's Motor Vehicle Code, Section 27156. After a brief introduction, they explained to their assembled guests that the new law prohibited the advertising, sale, and installation of any "add-on…or modified part which adversely affects the emissions performance of any emissions-related component of a vehicle intended for street use in California."[5] Consequently, they continued, *any* equipment manufactured to *any* specifications other than those set forth by the original equipment manufacturers for a specific application would henceforward be illegal for use on model-year 1966 and newer automobiles. Much to the relief of their astonished guests, however, Grant and his associate quickly added that, for practical purposes, Section 27156 simply meant that aftermarket products sold in California would no longer be allowed to exceed the design parameters of certified OEM products, and in an age in which Detroit's parts bins included all of the add-on high-performance components necessary for the construction of a 500-plus horsepower, NHRA-approved "Super Stock" drag-racing monster,[6] the new regulation was unlikely to seriously limit the business of

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[5] The legal wording of Section 27156 appears frequently both in the minutes of the MVPCB (later restructured as CARB, the California Air Resources Board) and in the pages of *Hot Rod Magazine*, *Hot Rod Industry News*, *Speed and Custom Equipment Dealer*, and *Popular Hot Rodding*. However, the clearest, most accessible summary of the original wording of 27156 (as well as that of its later, much-amended iterations) appears in the minutes of a CARB meeting which took place in August of 1977 (State of California, "Meeting Summary: Air Resources Board," August 25, 1977, archived online at www.arb.ca.gov/board/mi/mi.htm).

[6] Recall that during the 1960s muscle-car boom, the OEM parts catalogs produced by Ford, General Motors, Chrysler, and American Motors all included, for the sake of NHRA homologation, dozens and dozens of add-on high-performance parts and accessories (many of which were actually designed and/or manufactured by the speed

manufacturing speed equipment. Convinced for the most part that they had very little to fear from this new law, most of those who had gathered in L.A. that day simply filed their knowledge of this peculiar new piece of legislation in the back of their minds and returned to their businesses as if nothing at all had changed.[7]

The disregard with which those aftermarket representatives received the news of Section 27156 that day was nothing new. Indeed, for the most part, speed equipment industry insiders had greeted the enactment of nearly every environmental regulatory initiative of the early to mid-1960s in exactly the same manner, and with good reason. From the State of California's pioneering Motor Vehicle Pollution Control Act of 1960 to the federal government's somewhat less-pathbreaking Motor Vehicle Air Pollution Control Act of 1965, none of the new regulations had ever directly applied either to the activities of the high-performance industry itself or to those of the ordinary hot rodders to which it catered. What's more, the basic environmental regulatory framework had evolved so slowly and with such an air of uncertainty over the course of the previous two decades that it must have seemed to many a reasonable mid-1960s equipment manufacturer that meaningful reforms of any consequence to their endeavors weren't likely to actually surface any time soon – if at all.

Consider the record: photochemical smog had first began to appear in the greater L.A. area back in the mid-1940s, but its root cause remained a total mystery until 1950. That year, A. J. Haagen-Smit, a talented young biochemical researcher at Cal-Tech, announced that he had discovered a causal link between the automobile and smog. More specifically, Haagen-Smit claimed that the unburned hydrocarbons, carbon monoxide, and oxides of nitrogen that were so abundant in the typical 1940s automobile's tailpipe emissions underwent a chemical reaction in direct sunlight, a reaction that converted them into the problematic brownish haze. However, five

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equipment industry) designed to enhance the performance of their already breathtakingly potent V8 musclecars. See above, chapter 4.

[7] For additional details regarding this particular meeting (and the reactions of the speed equipment manufacturers who were in attendance), see Jim McFarland, "SEMA Scene," *HRM*, November 1979, 17 and 98; Jim McFarland, "Clean Air Costs Money! How fast…?" *HRIN*, July 1971, 19-20 and 22-23; and Vic Edelbrock, Jr., "Political Activity," *HRIN*, June 1971, 24-27 and 38.

more years passed by before anyone – in this case, an independent research group known as the Air Pollution Research Foundation – managed to verify Haagen-Smit's work to the satisfaction of the scientific community. Still skeptical, Congress simply passed a resolution calling for – and funding – further research into the matter, as did the State of California. Five years later, the California Legislature, convinced at long last that Haagen-Smit was more than likely right, enacted a piece of legislation known as the Motor Vehicle Pollution Control Act of 1960. This Act gave rise to the California MVPCB, charging the new board with the task of developing a set of statutory emissions control standards for new cars sold in that state by the middle of the decade. Right on cue, in 1964, the MVPCB announced the establishment of emissions control requirements for all new cars sold in the State of California, effective model-year 1966. Meanwhile, Congress passed the first federal Clean Air Act in 1963, a weakly-worded measure that established the legal framework for the federal regulation of automobile emissions but which did very little else to actually address the problem at the time. Two years later, though, in the fall of 1965, Congress passed its own, slightly-distilled version of the State of California's 1960 initiative, the federal Motor Vehicle Air Pollution Control Act, which empowered the Department of Health, Education, and Welfare to develop emissions control standards for all new vehicles sold in the United States beginning in 1968. *All* of these measures were conceived in terms of the mainstream automobile industry and the average consumer, and *none* of them so much as mentioned the activities of the high-performance automotive aftermarket. [8] In other words, they barely warranted the passing notice of the so-called "rodding apparatus."

Prior to 1966, in fact, the only context in which environmental concerns of any sort ever made it into the pages of the popular periodicals was with regard to the deteriorating condition of the Southern California dry lake beds in the early 1950s. Well aware that they themselves and their incessant use of these lake beds as racing venues was to blame for the increasingly loose and pockmarked character of their surfaces, early 1950s rodders had taken it upon themselves to

[8] See Krier and Ursin, *Pollution and Policy*, 6-9, 156-160, and 174-175; Crandall, *Regulating the Automobile*, 85-86; Rae, *The American Automobile Industry*, 133-135; and Flink, *The Automobile Age*, 386-387.

better manage their time on the lakes in order to preserve them.[9] The urban air pollution problem of the 1950s and the 1960s, on the other hand, was neither here nor there: *Hot Rod*, *Hop Up*, *Popular Hot Rodding*, and the rest of the popular magazines never brought it up, and ordinary enthusiasts and speed equipment manufacturers never seem to have given it a thought. Governmental environmental regulations, in short, were a problem for the OEMs, *not* the high-performance aftermarket and the hot rodding fraternity, and given the loose interpretation of the MVPCB, the passage of Section 27156 in 1966 did little to shake the industry's indifference.[10]

As the summer of 1966 drew to a close, however, the aftermarket's nonchalance had clearly begun to fade, and by mid-fall, it had given way to a rather pervasive sense of alarm. The catalyst for this transformation came in September, when the passage of the National Traffic and Motor Vehicle Safety Act served, as we have seen, as something of a wake-up call for SEMA and the high-performance industry.[11] Matters grew worse for the rodding fraternity later that month, when the Department of Health, Education, and Welfare (HEW) submitted its formal recommendations for the establishment of federal motor vehicle emissions standards to Congress.[12] Broadly resembling the measures adopted in 1964 by the California MVPCB, HEW's proposals called for the establishment of statutory tailpipe emissions standards – standards, incidentally, which mirrored those that the State of California had adopted two years earlier – for all new cars sold in the United States, effective model-year 1968. In addition, HEW's preliminary proposals called for the adoption of strict language which would have prohibited the sale or use of any automotive part or accessory believed to adversely affect the exhaust emissions of these regulated 1968-and-newer vehicles. Although this particular recommendation failed to make it into the final, Congressionally-approved package of anti-

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[9] On the deteriorating condition of the dry lake beds (and the hot rodding fraternity's reaction to the problem), see for example Jack Landrum, "Lakes Meet," *Motorsport*, August 1951, 7 and 29-30, and "Editor's Column," *HRM*, December 1953, 5.
[10] See Jim McFarland, "SEMA Scene," *HRM*, November 1979, 17 and 98; Jim McFarland, "Clean Air Costs Money: How fast…?" *HRIN*, July 1971, 19-20 and 22-23; and Vic Edelbrock, Jr., "Political Activity," *HRIN*, June 1971, 24-27 and 38.
[11] See above, chapter 5.
[12] See above, page 349.

pollution guidelines which soon followed, the very fact of its inclusion in HEW's initial proposals sufficed to confirm what the passage of the National Traffic and Motor Vehicle Safety Act had already begun to suggest: the long-unrestricted activities of the high-performance industry had suddenly begun to attract serious governmental attention on multiple fronts.[13] With this in mind, Robert Herzberg, the Washington correspondent to *Hot Rod Industry News*, summarized the legislative developments of the 89th Congress the following month by expressing his concern that the new laws were only the tip of the regulatory iceberg. Readers, he warned, should "look out for anti-hot rod legislation" in the 90th.[14]

Taking Herzberg's message to heart, the leaders of the high-performance trade together began to plan for their collective defense. Through SEMA, performance aftermarket executives spent the rest of the fall of 1966 addressing each of the legislative fronts in which they perceived a threat. The Association therefore secured the services of a Washington lobbyist to represent its interests in the federal city, opened a dialog on the requirements of the National Traffic and Motor Vehicle Safety Act with the federal Department of Transportation and the newly-chartered NHTSA,[15] and even initiated talks with the California MVPCB over the terms of Section 27156 – the very same terms over which they had expressed so very little concern only months before. Their efforts first began to pay off the following summer, as we have seen, when Dr. William Haddon, Jr., the Director of the federal Department of Transportation, announced that he had decided to amend the initial requirements of the National Traffic and Motor Vehicle Safety Act in ways that would render them far more manageable for the high-performance industry.[16]

Negotiations with the California MVPCB, on the other hand, were getting nowhere fast. Since the fall of 1966, SEMA representatives had met regularly with Board officials to try to persuade them to amend the terms of Section 27156 so that it would no longer constrain the

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[13] See Robert Herzberg, "Washington Report," *HRIN*, October 1966, 10 and 14.
[14] Ibid., 14.
[15] See above, chapter 5.
[16] See above, chapter 5.

aftermarket's product development efforts to the limits of OEM design.[17] SEMA's argument was simple: if the MVPCB truly had an interest in improving ambient air quality, then its parts-acceptability guidelines should be *performance*- rather than *design*-based. If, for example, an aftermarket manufacturer were able to prove that a given high-performance part whose design specifications happened to fall outside the OEM limits was nonetheless capable of producing tailpipe emissions within the range of the state's requirements, then the MVPCB should allow the item to be sold and used. Board officials, though, remained convinced that their design-based aftermarket guidelines were absolutely necessary – and they had the evidence in hand to prove their case.[18]

Federal- and state-supported research into the nature of urban air pollution conducted over the course of the 1950s and the 1960s had demonstrated time and time again that photochemical smog was the result of the interaction, in direct sunlight, of three distinct compounds associated with automobile exhaust emissions: carbon monoxide (CO), unburned hydrocarbons (HC), and oxides of nitrogen (NOx).[19] Theoretically, therefore, the air pollution crisis had a relatively straightforward solution, for if the average automobile could be made to generate less NOx, HC, and CO at the tailpipe, then the severity and the rate of incidence of smoggy summer days would dwindle appreciably. In practice, of course, this was much trickier than it sounds, and the MVPCB had spent much of its time in the early 1960s trying to come up with a reasonable set of legal guidelines that would force the OEMs to begin to produce the requisite cleaner cars.

Beginning in 1961, for example, the Board required that all cars sold in the State of California be equipped with a simple hydrocarbon pollution-control device known as a Positive Crankcase Ventilation Valve (PCV). For decades, the overwhelming majority of the internal

[17] Ray Brock, "Publisher's Report," *HRIN*, February 1967, 6. Although initially content with the OEM design limits, the speed equipment industry had since grown fearful of the measure's potential: after all, should the MVPCB ever decide to begin to enforce the law more strictly, performance products could very well have been altogether disallowed in the State of California.
[18] Ibid., and Ray Brock, "Publisher's Report," *HRIN*, March 1967, 6.
[19] See above, pages 348-349.

combustion engines used in passenger cars had been equipped with ventilation tubes that allowed the crankcase to "breathe," relieving the counterproductive internal pressures that were generated under normal operating conditions by the movement of the reciprocating assembly.[20] The problem, though, was that the air that these tubes "ventilated" typically was saturated with unburned hydrocarbons picked up from the engine's oil supply. PCV-equipped automobile engines, on the other hand, actually recycled these hydrocarbon-rich crankcase vapors by feeding them back into the incoming fuel-air mixture through a simple one-way valve fitted either to the engine's intake manifold or to its air-cleaner assembly.[21] Board officials also sought to control exhaust-borne hydrocarbon emissions in the early to mid-1960s, ruling in 1964 that effective 1966, all cars sold in the Golden State would need to be equipped with a device that would reduce the concentration of these pollutants at the tailpipe. Most of the OEMs elected to meet this particular requirement of the MVPCB through the use of an exhaust afterburner system – also known as an "air injection system" – that used a belt-driven air-pump mounted alongside the engine's generator to force fresh air into the exhaust manifold(s). There, the oxygen-rich air would react with the superheated, unburned hydrocarbons in the motor's exhaust, "burning" them in order to prevent them from escaping into the air through the tailpipe.[22] MVPCB officials also found that subtle changes in camshaft profiles, ignition timing curves, and carburetor fuel-air ratios also helped to further reduce hydrocarbon emissions and, in certain circumstances, carbon monoxide concentrations as well.[23]

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[20] Recall that the "reciprocating assembly" consists of the pistons, connecting rods, and all of the hardware associated with them (see above, chapter 1).

[21] On PCVs, see Joseph M. Callahan, "What Smog Control Will Cost You," *Motor Trend*, September 1967, 60-61 and 70-73; Ray Brock, "Publisher's Report," *HRIN*, March 1967, 6; *Motor Trend* staff, "Who's Kidding Who? Part 1" *HRIN*, July 1970, 24 and 68-69; and Tex Smith, "Performance-Tuning the "Smoggers," *PHR*, April 1971, 46. Incidentally, the mainstream American automobile manufacturers agreed among themselves to install PCVs on all cars sold in the United States in 1963, some five years before the federal government would formally require them to do so.

[22] See Eric Dahlquist, "One for the Road," *HRM*, May 1966, 32-35 (a review of the California-model 1966 Chevrolet El Camino in which Dahlquist describes – and derides – the new car's air-pump system); Joseph M. Callahan, "What Smog Control Will Cost You," *Motor Trend*, September 1967, 60-61 and 70-73; and *Motor Trend* staff, "Who's Kidding Who? Part 1" *HRIN*, July 1970, 24 and 68-69.

[23] Joseph M. Callahan, "What Smog Control Will Cost You," *Motor Trend*, September 1967, 60-61 and 70-73, and *Motor Trend* staff, "Who's Kidding Who? Part 1" *HRIN*, July 1970, 24 and 68-69.

Oxides of nitrogen proved to be trickier to control, however, and not until the early 1970s would the MVPCB begin to require substantial reductions in exhaust-borne NOx pollution. The problem in this case was actually something of a Catch-22, for the better the average engine did in terms of hydrocarbon and carbon monoxide emissions, the worse it tended to do in terms of oxides of nitrogen. This was especially true of automobile engines assembled with relatively high compression ratios, for the simplest way to reduce NOx pollutants was to reduce combustion temperatures through reduced compression pressures, but all things being equal, reductions in compression ratios tended to be counterproductive in terms of HC and CO. By the mid-1960s, the MVPCB was well aware of the dilemmas posed by NOx emissions, and it was also well aware of a potential solution: exhaust gas recirculation, or EGR. Using a simple one-way valve, EGR allows a small amount of exhaust gas to mix with the incoming fuel-air mixture, resulting in lower combustion temperatures and, by extension, lower concentrations of NOx. Not until the very end of the 1960s, though, would the MVPCB's successor, the California Air Resources Board, feel comfortable enough with the technology of EGR to require its use on California-bound automobiles.[24]

Nevertheless, by the time the Speed Equipment Manufacturers Association began to try to win concessions from the MVPCB regarding Section 27156 in the fall of 1966, Board officials felt that they had come a long way in their efforts to control HC and CO emissions. More precisely, they believed that their efforts had finally resulted in the introduction of cleaner new cars in the State of California. Tuned for leaner fuel-air mixtures, reconfigured for more conservative ignition curves, and equipped with PCVs and exhaust afterburners, these new OEM "pollution-controlled" vehicles were just what Board officials wanted to see advertised and sold in the Golden State. Consequently, hot rodders were meddlers, as far as they were concerned, hooligans whose engine modifications only tended to "add to the smog problem."[25] Waving their

[24] Even then, in fact, EGR was phased in rather gradually: not until 1972 would all cars sold in California be equipped with EGR devices. See Joseph M. Callahan, "What Smog Control Will Cost You," *Motor Trend*, September 1967, 60-61 and 70-73; "Over the Counter 'Clean Air,'" *HRIN*, June 1973, 48-53; and C. J. Baker, "Emissions Systems," *HRM*, July 1974, 112, 114, 116, and 118.
[25] Ray Brock, "Publisher's Memo," *HRM*, March 1967, 6.

own test results on hopped-up engines in the faces of the SEMA representatives with whom they met, Board officials flatly declared that in their opinion, any changes to the OEM package of ignition timing, carburetion, manifolding, and camshaft profiles that the MVPCB itself had approved for a given automobile would upset the balance of a system designed to work in concert and would therefore continue to be unacceptable. What's more, Board officials presented the aftermarket's chosen representatives with anecdotal testimony from the California Highway Patrol in the fall and winter months of 1966-1967, testimony which suggested that in spot-checks that the police had conducted throughout the state since 1961, automobiles with highly-modified powerplants were far more likely than their run-of-the-mill, general-service counterparts to have disconnected, circumvented, or otherwise inoperative PCVs. In short, the Board was none too pleased with the so-called "hot rodding fraternity" in 1966 and 1967, and it was therefore altogether disinclined to rule in SEMA's favor.[26] For the time being, that is, Board officials made it perfectly clear to their aftermarket petitioners that they had no plans to amend the MVPCB's established and well-publicized interpretation of Section 27156.

To a large extent, the MVPCB was right, and SEMA knew it. Radical, long-duration racing camshafts, for example, did indeed result in higher concentrations of unburned hydrocarbons and carbon monoxide at the tailpipe, as did too much carburetion and too much ignition advance. The problem, of course, was that in the 1960s, many equipment manufacturers, speed shop owners, and ordinary enthusiasts alike chose not to differentiate between those engine modifications that were appropriate for improved everyday performance around town, on the one hand, and those that were only appropriate for use in quarter-mile drag racing, on the other. As a result, there were more than a few "overbuilt" cars tooling around the Golden State in the mid-1960s, cars that were hopped-up for occasional strip use but which actually spent the majority of their time on the streets. *These* were the vehicles that the MVPCB was concerned with, that the California Highway Patrol had begun to notice in their spot checks, and that were

[26] Ray Brock, "Publisher's Report," *HRIN*, February 1967, 6; Ray Brock, "Publisher's Report," *HRIN*, March 1967, 6; and Ray Brock, "Publisher's Memo," *HRM*, March 1967, 6.

by virtue of their presence on the streets endangering the future of the high-performance industry within the State of California. Well aware that this was why they had failed to convince the MVPCB to seriously consider their proposals in the fall and early winter months of 1966-1967, the leaders of the high-performance industry therefore turned their attention inward. Convinced, that is, that they needed to begin to try to project an image of the ordinary hot rodder and the typical hot rod parts manufacturer as reasonable, responsible adults who wanted cleaner air as much as anybody, industry insiders therefore launched a concerted campaign in 1967 that was designed to help clean up their image.

Not coincidentally, this "campaign" began to unfold at precisely the same moment that SEMA also began to try to curry favor among the nation's automotive safety experts by promoting the idea of the safety-conscious and responsible hot rodder.[27] For in truth, the two endeavors were inextricably linked. SEMA's decision to change its name from the *Speed* Equipment Manufacturers Association to the *Specialty* Equipment Manufacturers Association in March of 1967, for example, served not only to distance the Association from the scourge of organized street racing, but also to establish that the irresponsible hot rodders who drove hydrocarbon-spewing racecars on the streets were the exception, not the rule. Likewise, SEMA's efforts to promote cooperation and compliance applied not just to NHTSA and the VESC, but also to the MVPCB. Where the emissions-related campaign of 1967 differed from its safety-oriented twin, however, was in its explicit formulation and emphatic promotion of the idea that equipment manufacturers, retailers, and ordinary enthusiasts needed to begin to differentiate between those aftermarket parts intended only for the strip and those intended only for the street.

As early as March of 1967, for example, Ray Brock, the editor of *Hot Rod Industry News*, began to urge his readers to exercise some commonsensical restraint in their high-performance sales:

> It's no secret that many dealers have been guilty of 'over-selling' performance equipment. If your customer has a...machine which he uses principally on the street, let's face facts, he doesn't need four Weber carburetors, a roller cam with rev-kit, and a fixed-advance magneto. Not only will this customer be generally

[27] See above, chapter 5.

> unhappy with this hard-starting, rough-running, gas-eating combination, but he will also have an engine which spends a good share of its time spitting unburned hydrocarbons into the atmosphere. At this point, the Air Pollution authorities enter the picture and get unhappy.[28]

Eight months later, Brock felt compelled to repeat his March appeal, reminding his readers of their responsibility

> to sell [their] customer only that speed equipment which he can really use if the car is to be operated on the street. The California Air Pollution Control Department [sic] has shown us statistically that excesses in carburetion, compression, camshaft timing, and the like can contribute greatly to the unburned hydrocarbon content in the atmosphere. In other words, a six-carburetor log manifold, 12½:1 compression and a hi-rev roller cam will cause the average engine to produce more smog than horsepower when driven on the streets. Don't oversell the exotic speed equipment. The more cooperation we give to the people in charge of limiting smog, the longer we are all going to be in business.[29]

In addition, SEMA's leaders and the editors of *Hot Rod Industry News* began to push retailers both to educate their customers about the nature and maintenance requirements of their vehicles' anti-pollution devices and to encourage their retention when performing engine modifications.[30] Popular magazines like *Hot Rod*, *Popular Hot Rodding*, and *Drag News* also picked up on this theme during the course of 1967, encouraging their readers to think twice before disconnecting their new cars' anti-pollution equipment.[31]

Well aware, however, that several hundred thousand cooperative and law-abiding hot rodders, speed shop owners, and equipment manufacturers weren't actually going to change the MVPCB's collective mind just by virtue of their willingness to comply with the law, SEMA's leaders therefore sought to bolster their organizational clout as well. For starters, they were quick to add the air-pollution crisis to their standard list of reasons why *every* retailer and manufacturer

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[28] Ray Brock, "Publisher's Report," *HRIN*, March 1967, 6.

[29] Ray Brock, "Publisher's Report," *HRIN*, November 1967, 6. Clearly, the "California Air Pollution Control Department" to which Brock refers in this particular piece is the "California Air Resources Board," or "CARB," which replaced the MVPCB in mid-1967 (see below, pages 359-360).

[30] See, for example, Ray Brock, "Publisher's Report," *HRIN*, March 1967, 6; Dennis Pierce, "Information File," *HRIN*, April 1967, 45-46; and "*HRIN* Interview: SEMA President Garner," *HRIN*, August 1967, 30-31. Back in the early 1960s, when PCV systems first began to appear on new cars, aftermarket manufacturers had begun to incorporate provisions for their retention into the design of their performance products. This they would continue to do with regard to the air-pumps, carburetor preheat systems, dashpots, EGR valves, and other emissions components that came into use during the late 1960s and the 1970s – in other words, from the beginning, enthusiasts who wished to modify a pollution-controlled motor vehicle's motor could easily do so without removing or disconnecting its emissions control devices.

[31] See Ray Brock, "Publisher's Memo," *HRM*, March 1967, 6; "Detroit's Hot Cars for '68," *PHR*, September 1967, 30-33; and Don Francisco, "Hot Rodding, SEMA, and You," *Drag News*, October 13, 1967, 19.

in the high-performance business ought to join their organization. This applied not only to those California-based firms that were beginning to feel the pinch of Section 27156, but also to those located elsewhere. For indeed, Congress's decision to adopt the MVPCB's 1966 new-car standards for *all* new cars in *all* jurisdictions in the United States, beginning in 1968,[32] appeared to many speed equipment industry insiders as an indication that their legal troubles in the State of California were about to spread.[33] They feared, that is, that Section 27156 would soon "go federal" as well. Consequently, SEMA began to run a series of urgent advertisements in the pages of *Hot Rod Industry News* in 1967. According to one such spot, "the high performance and custom equipment industry is currently engaged in a fight for its very existence," a fight which "[t]he Specialty Equipment Manufacturers Association is currently leading" but which it is certain to lose without sufficient "ammunition" (money, in the form of membership dues) for the duration of the fight.[34] Manufacturers across the United States quickly responded to SEMA's appeal by sending in their checks and new-member application forms, but never to the extent that the Association's leaders hoped. Consequently, in 1968, 1969, and throughout the 1970s, SEMA would continue to push for new members – and for more overt member activism. As late as 1973, however, Noel Carpenter noted that the closed-circulation trade magazine *Hot Rod Industry News* had some 18,500 monthly subscribers, whereas SEMA itself still had only 600 dues-paying members.[35] Irritated with this count, Lou Baney, who became the Association's Managing Director in 1972 (and its Executive Director two years later),[36] personally began to work the phones in 1973, 1974, 1975, and 1976. According to Carl Olson, SEMA's Technical and Legislative Coordinator during the mid-1970s, Baney would

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[32] See above, pages 348-349.
[33] See, for example, "Detroit's Hot Cars for '68," *PHR*, September 1967, 30-33, and Ray Brock, "Publisher's Memo," *HRM*, March 1967, 6.
[34] "Why All the Flag Waving? Because There's a War On," *HRIN*, August 1967, 22-23.
[35] Noel Carpenter, "The Industry Scene," *HRIN*, May 1973, 8. Recall that because *Hot Rod Industry News* was a closed-circulation magazine, it only went out to members of the high-performance industry (see above, chapter 5). Consequently, 18,500 could be – and, in Carpenter's case, was – taken as a *rough* estimate of the size of the industry.
[36] On Baney's rise within the Association, see for example "News Makers," *HRIN*, February 1971, 12; "Hot Rod Reports on the SEMA Scene," *HRM*, October 1972, 34-35; and "Performance Industry Leaders Project Business Trends for the Coming Year," *HRIN*, Winter 1975, 12.

> [get] on the phone every day and for an hour he'd call different manufacturers, saying, "next month, when I pick up *Hot Rod Magazine* and see your ad, if I don't see the little logo that says 'proud member of SEMA,' I'm gonna come over there and kick your ass! And *then* I'll get serious!"[37]

His tactics worked: by the end of 1975, SEMA had 800 members, and by the time Baney stepped down from his position as Executive Director in 1977, the Association's rolls had swelled to 1,500.[38]

Throughout the period in question, in other words, readers were "encouraged" to join the ranks of the organization, but back in 1967, SEMA's leaders maintained that their overarching goal was to represent the interests of *all* of the members of the performance trade, regardless of organizational affiliation. SEMA president Willie Garner, for example, argued in a *Hot Rod Industry News* interview that ran in August that "a dealer or wholesaler, or manufacturer, doesn't…have to be a SEMA member to have his opinions" heard. "Members or not," he continued, "SEMA is pledged to further the interests of the industry as a whole, and that includes everyone."[39] Thus, "members or not," SEMA's aim, in 1967, was to achieve a sense of *unity* so that it could confidently engage its regulatory adversaries with a single voice. In other words, SEMA's leaders clearly were steeling themselves and their Association for what they honestly believed would be a difficult and prolonged battle on the federal, state, and local levels alike.

As it happened, though, federal and state developments actually slowed to a crawl in 1967, 1968, and 1969. By the end of the decade, in fact, only two significant new pieces of anti-pollution legislation had emerged, both of which actually worked to the industry's long-term advantage. First, the California Legislature passed a resolution in mid-1967 terminating the Motor Vehicle Pollution Control Board and establishing in its place a stronger state environmental agency with a broader mandate, the California Air Resources Board (CARB, or ARB).[40] Though by no means a friend of the high-performance trade, this new body would

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[37] Quoted in Author Interview with Carl Olson, Pomona, California, April 4, 2003.
[38] See "Performance Industry Leaders Project Business Trends for the Coming Year," *HRIN*, Winter 1975, 12; *SEMA '76: Get in the Spirit*, informational pamphlet (1976), History File, SEMA-RC; and *SEMA '78*, informational pamphlet (1978), History File, SEMA-RC. When Baney stepped down in 1977, he was replaced by Dick Wells (see above, chapter 5).
[39] "*HRIN* Interview: SEMA President Garner," *HRIN*, August 1967, 31.
[40] Krier and Ursin, *Pollution and Policy*, 178-179. This legislation took effect in the winter of 1967-1968.

however ultimately prove to be far more willing than its predecessor to at least consider the aftermarket's input and concerns. Second, Congress voted to amend the Clean Air Act of 1963 with the so-called "Air Quality Act" of 1967. Although the primary aim of this new law was to strengthen the federal government's ability to enforce the new emissions guidelines set to take effect the following year, it also declared that, with the exception of the State of California, no state or local government would be permitted to establish emissions control standards exceeding the stringency of those set by the federal government.[41] With the passage of the Air Quality Act, therefore, aftermarket businessmen surely were relieved, for one of their worst regulatory nightmares – having to deal with fifty individual sets of anti-pollution guidelines, in much the same way that they were beginning to have to deal with fifty individual sets of "in use" automotive safety specifications[42] – was no longer a realistic possibility; at worst, they would only have to deal with two.

In the midst of this regulatory lull, speed equipment manufacturers were able to relegate their air-pollution-oriented legislative battle to the back burner and return their focus to what they would rather have been doing all along: selling high-performance parts. And business boomed. In fact, the emergence of several explosive new markets for its products (off-road dune-buggies, mini-bikes, and Volkswagen's Beetle, most notably), the continuing demand for more traditional street- and strip-performance parts, the free publicity for high-performance equipment generated by Detroit's commitment to the musclecar phenomenon, and the ongoing growth of its core base of baby-boomer customers enabled the specialty equipment industry to break the $1 billion mark in annual sales by the end of the decade, as we have seen.[43] Looking toward the future, those in the know therefore expressed their confidence that the high-performance trade would continue to prosper well into the 1970s, and perhaps beyond. "Long live performance and the industry which created [the] excitement of driving we...all enjoy today," concluded Ray

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[41] Ibid., 179-184.
[42] See above, chapter 5.
[43] See above, chapter 4.

Brock in his final *Hot Rod* editorial of the 1960s. "It's here to stay."[44]

Radicalization: SEMA, the EPA, and the ARB, 1970-1977

Brock was right: the high-performance industry *was* "here to stay." So too, however, was environmental regulation, whose proponents began to push for a more effective approach to the air pollution crisis on the federal level in 1970. On Capitol Hill that year, Senator Edmund Muskie of Maine proposed a new package of amendments to the Clean Air Act of 1963 that were designed to fundamentally alter the federal government's conservative approach to the air pollution problem. Prior to 1970, federal-level pollution control initiatives had always "pa[id] heed to economic and technological feasibility," subordinating the pursuit of cleaner air to the maintenance of industrial prosperity.[45] The new proposals introduced in 1970, however, called for a shift in governmental priorities. As Muskie argued before the Senate in September of 1970, the responsibility of Congress is not to make "technological or economic judgments," but rather "to establish what the public interest requires to protect the health" of individuals.[46] Enacted later that year as the Clean Air Act of 1970, the new amendments therefore required the automobile industry to reduce its vehicles' current (1970) levels of carbon monoxide and hydrocarbon pollutants by 90% beginning with model-year 1975, technological feasibility notwithstanding; further reductions of a previously unregulated category of pollutants, oxides of nitrogen, were to take effect the following year. To better supervise the enforcement of these statutory requirements, the legislation also called for the establishment of a federal Environmental Protection Agency (EPA) modeled, in many respects, after California's ARB.[47] In addition, the new Act declared illegal any engine modifications believed to adversely affect a given vehicle's emissions performance, effectively establishing a "federal Section 27156," and it also required

[44] Ray Brock, "Publisher's Memo," *HRM*, December 1969, 6.
[45] Krier and Ursin, *Pollution and Policy*, 204.
[46] Quoted in Krier and Ursin, *Pollution and Policy*, 204.
[47] Krier and Ursin, *Pollution and Policy*, 204-207.

the OEMs to provide their customers with five-year, 50,000-mile warranties on all emissions-related systems and components.[48]

For the mainstream automobile industry, the passage of the Clean Air Act was nothing less than a declaration of war – an unreasonable, unwarranted, and manifestly unjust attack on their operations which demanded immediate countermeasures. Consequently, OEM leaders quickly abandoned their low-profile, compliant approach to environmental regulation in favor of an openly-hostile, reactionary stance against what they perceived to be an unnecessary radicalization of the federal agenda for air pollution control.[49] Interestingly enough, General Motors, Chrysler, Ford, and American Motors were joined in their assessment of the new law and the new Environmental Protection Agency by none other than A. J. Haagen-Smit, the head of the California ARB. In February of 1971, Haagen-Smit declared, in a prepared speech before the ARB in San Francisco, that

> [the standards] recently proposed by the Environmental Protection Agency for oxidants, hydrocarbons, carbon monoxide and oxides of nitrogen are very restrictive. Whereas the ARB [has] indicated that its air quality standards [are] long-range goals, federal law [now] states that the federal standards must be met within three to five years. It is clear from the ARB staff report on hydrocarbons and oxides of nitrogen that the proposed federal standards for these compounds cannot be met in the short time schedule prescribed and under the present program.[50]

The EPA, Haagen-Smit continued, seemed to be pursuing an unreasonable and needlessly radical schedule for the reduction of automobile air pollution, and he wondered aloud whether the ARB would be forced to adopt extreme measures, such as "restrictions on land use [and] limit[s] on the growth of cities," in order to meet its new federal obligations.[51]

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[48] The engine modification prohibition was set to begin immediately (even though effective enforcement mechanisms had yet to be established), but the warranty provision was set to take effect at the discretion of the EPA. See, for example, "Late News File: Washington, Detroit, the World," *HRIN*, February 1973, 20-21, and "The SEMA Scene," *HRM*, June 1973, 38.

[49] See, for example, Jerry M. Flint, "Auto Industry, Changing Strategy, Opens Counterattack on Environmental and Consumer Movements," *New York Times*, November 18, 1970, C(29). See also Flink, *The Automobile Age*, 376-403, and below, pages 392-393.

[50] "Board Meeting Minutes + Attachments," February 17, 1971, 1-2, Binder "Agendas, Resolutions, Minutes, 1971," ARB Archive, California EPA Headquarters, Sacramento, California (hereafter, ARB-A).

[51] Ibid., page 2. California remained free to set its own pollution-control standards, but they had to be at least as strict as those put forth by Congress and the EPA, and for all of their work during the course of the 1960s to clean up the air in Southern California, Haagen-Smit and the ARB immediately recognized that the statutory requirements of the federal Clean Air Act of 1970 were far stricter than the ARB's had ever been. Hence Haagen-Smit's concern that

The leaders of the high-performance industry, on the other hand, approached the new legislation with an outlook that was far less apocalyptic and confrontational than that of the OEMs. In November, SEMA's new managing director, Eric Grant, delivered a speech in which he urged the members of the speed equipment industry to continue to cooperate with the nation's anti-pollution laws. For indeed, as he assured his audience, *whatever* the ultimate technological solution to the air-pollution crisis and the EPA's accelerated schedule might turn out to be, the high-performance aftermarket "will learn to live with it, improve it, and make it individually unique, legally acceptable, and most important, a little bit better than the product was originally."[52] Others – outsiders and insiders alike – endorsed a similar brand of optimism. For example, the director of NHTSA, Doug Toms, praised the aftermarket's record of compliance with his agency's automotive safety requirements at a gathering of SEMA dignitaries in January of 1971, arguing that a similar approach to the newly-enacted federal anti-pollution measures would surely earn the attention – and the respect – of the new EPA. "[I]f you give your legislators facts, not fantasy; help, not hindrance, and alternate solutions to the ones you oppose," he advised, "you will stand a far better chance of succeeding in your efforts to preserve your business and industry."[53] Later, in an April speech before the Specialty Equipment Manufacturers Association in Dallas, SEMA vice-president Vic Edelbrock, Jr. concurred. "We are **not** in an impossible situation," he explained, adding that a level-headed, cooperative approach to environmental regulation remained, as before, essential to the industry's ability to survive in the long-run.[54]

To all appearances, the members of the high-performance trade took their leaders' advice to heart: while Chrysler, Ford, American Motors, and General Motors spokespersons took to the press – and the courts – in a series of confrontational attacks on the environmental movement,

February that the ARB might not be able to live up to the demands of the new, radical legislation out of Washington, DC.

[52] Eric Grant, "The High Performance Market Today and in the '70s," reprinted in *HRIN*, November 1970, 20, 24, and 26-27. Recall that SEMA hired Grant away from the ARB in 1968 (see above, chapter 5).

[53] Quoted in "SEMA Section," *HRIN*, March 1971, 38.

[54] Vic Edelbrock, Jr., "Political Activity," reprinted in *HRIN*, June 1971, 26-27. The emphasis appears in the original.

the aftermarket gurus behind such firms as Crane Cams, Racer Brown, Edelbrock, Offenhauser, and Hooker quietly retreated to their shops in search of a solution. Or rather, more precisely, they began to labor in search of a way to prove what they and others in the know suspected, namely, that performance-tuned engines could outperform their OEM counterparts not only in the quarter-mile, but also in the emissions-booth.

The notion was not as far-fetched as it might seem. To be sure, these manufacturers were very well aware of the fact that radical, long-duration racing camshafts, excessive carburetion, fixed-advance magnetos, and many other popular engine modifications of the period would do the opposite – that is, they would result in engines far, far dirtier than their unmodified OEM counterparts. *Milder* performance modifications and add-on parts that were more appropriate for everyday use, however, were an entirely different matter. Or so they hoped. After all, they knew that high-performance engine tuning was above all else a quest for *circumstantial efficiency.* Drag-racing engines, for example, needed to be at their most efficient at the upper end of the rpm band, where complete combustion, fuel consumption, and overall engine flexibility were of little consequence and the goal of achieving maximum horsepower-per-cubic-inch through maximum airflow meant everything. This was why they were so inappropriate for on-road use. OEM engines, on the other hand, needed to be reasonably powerful and flexible, but only insofar as the significant constraints associated with mass production, maintenance, fuel quality, and cost effectiveness allowed. This was why the average, run-of-the-mill OEM powerplant typically responded so well to bolt-on high-performance accessories like intake manifolds, exhaust headers, larger carburetors, and mild camshafts, for in the design and manufacture of these add-on parts, the speed equipment industry was not constrained in these critical ways – or at least, not to the extent that most of the OEMs were most of the time. High-performance manifolds, for example, could be costly. Exhaust headers could be difficult to install. High-compression pistons could assume the use of high-octane, premium-quality leaded fuel. And so on and so forth, for *this* was what the speed equipment industry was all about, at least when it came to street-use parts: the elimination of efficiency-robbing, production-oriented compromises. Consequently, it stood to reason that an engine that had been tweaked for optimal airflow, precise fuel-air mixture delivery, and complete combustion through the use of street-performance aftermarket parts and accessories would generate not only more useable horsepower and torque, but also a cleaner exhaust. In order to prove this, aftermarket engineers began by measuring the effects of their companies' street-use products on the emissions composition of the vehicles to which they were applied. By the middle of 1971, the preliminary verdict was in: an engine equipped with any of a number of off-the-shelf performance products could – and usually did – produce far fewer pollutants than its unmodified, run-of-the-mill OEM counterparts.[55]

A closer look at a particular type of aftermarket product, the high-performance intake manifold, might help to explain why. A manifold is a simple device with no moving parts whose job it is to distribute the incoming fuel-air mixture flowing from the carburetor to each of the motor's cylinders through the intake ports. On a typical V8, the manifold rests in the cradle of the "V," between the cylinder banks, with a single carburetor mounted centrally on its crown. Unfortunately, this means that the carburetor will be much closer, physically, to the engine's middle intake ports than it is to its outer ports. Consequently, OEM intake manifolds, particularly those of the 1950s and the 1960s, tended to dump more than enough fuel into the inner cylinders and less than enough into the outer ones. As a result, part of the engine would run rich, part of it would run lean, and none of it would run just right. It would, of course, run well enough to meet the demands of the average consumer and the OEMs' bean-counters, but it certainly wouldn't run well enough for the typical performance enthusiast. In theory, however, the remedy for this was – and is – fairly straightforward: construct a manifold with equal-length intake runners, and you will achieve an even distribution of the fuel-air mixture – and unlock a lot of hidden horsepower. But because this is actually a geometric impossibility for single-carburetor applications, the only practical "fix" is to *simulate* these equal passages by manipulating the intake velocity of each individual runner. The technical basis of most aftermarket manifolds, this particular tweak had long been the business of a number of speed equipment manufacturers,

[55] Jim McFarland, "Clean Air Costs Money! How Fast…?" *HRIN*, July 1971, 19-20 and 22-23.

including, most notably, Southern California's Edelbrock Equipment Company and its longtime rival, Offenhauser.

It just so happened that both of these firms planned to release new lines of single-mount four-barrel performance intake manifolds in 1971, and due to their concern with the requirements of the new Clean Air Act of 1970, both of these firms had also closely studied their new products' "emissability" during the course of their research and development. That summer at Edelbrock, for example, an otherwise unmodified 396 c.i.d. Camaro had been fitted with the company's new TM-2 "Tarantula" intake manifold and run through a standard series of federally-approved emissions trials. Compared with the results of a baseline test performed prior to the installation of the Tarantula, the modified engine generated 14.7% less hydrocarbons, 27.6% less oxides of nitrogen, and 34.5% less carbon monoxide on average, throughout the rpm band. (On the track, the Tarantula-equipped Camaro also managed to pick up approximately two miles-per-hour and more than a tenth of a second in the quarter-mile.) At a press conference held in the fall, Edelbrock explained that these remarkable emissions reductions were due quite simply to the Tarantula's ability to more evenly distribute the incoming fuel-air mixture to each of the engine's cylinders – precisely the same reason cited for the vehicle's performance gains. More specifically, whereas the OEM Camaro manifold had allowed the air-to-fuel ratio delivered to each of the engine's cylinders to vary from 15.7:1 to 20.4:1, the Tarantula permitted a variation of only 14.9:1 to 16.6:1. Over-rich and over-lean combustion conditions had in other words dramatically been reduced, making for a far more powerful – and clean – V8.[56] Subsequent testing performed during the course of 1972 would verify that Edelbrock's TM-1 and TM-2 Tarantula manifold lines were capable of achieving similarly impressive emissions reductions on 350 and 402 c.i.d. engines as well.[57] Offenhauser, for its part, performed a similar series of tests on its new "Dual Port" V8 manifold design during the summer of 1971, achieving

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[56] "Super Tarantula," *PHR*, September 1971, 46-47, and "Industry Notes: Edelbrock Emits," *HRIN*, October 1971, 32. "c.i.d." stands for "cubic inches of displacement."

[57] Edelbrock advertisement ("Breathe Easier with Edelbrock"), *PHR*, September 1972, 2. TM-1 manifolds were for small-block V8s, and TM-2 manifolds were for large-block V8s.

emissions and horsepower gains which lent additional credence to the notion that the quest for improved street performance and the pursuit of cleaner air actually were compatible.[58]

In December of 1971, however, *Hot Rod Industry News* featured a far more comprehensive analysis of the emissions-performance relationship that its editor, Don Prieto, had conducted over the summer months. Whereas the testing done at Edelbrock and Offenhauser focused on the ways in which the addition of a *single*, *isolated* piece of performance equipment would affect an engine's exhaust composition, Prieto's goal was to measure and analyze the emissions characteristics of an engine fitted with a typical *combination* of aftermarket products. Starting with an unmodified small-block Chevrolet V8 engine, "selected primarily because it is an engine that most represents the type of equipment sold by the high-performance industry," Prieto proceeded to tear down the original motor and reconstruct it using as many standard, off-the-shelf performance products as he could.[59] Compared with the results of a series of baseline emissions tests conducted on the original motor, the reconstructed powerplant generated far less hydrocarbon, oxide of nitrogen, and carbon monoxide emissions across the powerband while also delivering markedly improved performance. Prieto's conclusion? Performance-tuned engines do indeed appear to make for cleaner air.[60]

Others followed in Prieto's footsteps during the course of 1972 and 1973. Early in the summer of 1972, for example, a member of the advertising staff of *Hot Rod Magazine*, Bob Weggeland, teamed up with Ollie Morris of the Offenhauser Equipment Company to rebuild the 327 c.i.d. small-block engine from his wife's 1968 Corvette with one eye towards improved performance and the other towards improved emissions.[61] After performing a standard, federally-

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[58] Steve Green, "Clean and Mean: Who says you can't put horsepower into the air…and still breathe?" *HRM*, November 1971, 152. Offenhauser would continue to test its manifold lines on a variety of engines in 1972, 1973, and 1974, as would Edelbrock (see, for example, Offenhauser advertisement, "Clean, Mean, and Legal Dual Port 360," *PHR*, October 1973, 4; Steve Kelly, "Sweetie for the Streeter," *HRM*, March 1972, 74; and C. J. Baker, "Brave New Manifold," *HRM*, November 1974, 59).
[59] Don Prieto, "Clean Air Engine," *HRIN*, December 1971, 23-27 (the passage quoted appears on page 25).
[60] Ibid.
[61] See "Corvette Clean-Up," *HRIN*, July 1972, 24 and 44, and Steve Green, "Clean-Air Corvette," *HRM*, September 1972, 112-113.

approved 7-mode emissions test[62] on the original, low-mileage 327,[63] Weggeland and Morris rebuilt the engine, broke it in, and then re-tested it. Like Prieto, Weggeland and Morris used ordinary, off-the-shelf speed equipment when rebuilding their Corvette's mill, but they also sought to more accurately replicate the typical performance rebuild by avoiding "fancy super tuning" tricks as they proceeded.[64] Their results, therefore, were all the more impressive: 58 additional horses, a quarter-mile E.T. reduction of a whopping 1.8 seconds, and nearly 8 more miles per hour at the quarter-mile traps.[65] The Corvette, in other words, was much, much faster following their street-performance rebuild. More to the point, though, it was also much, much cleaner. Carbon monoxide emissions, for example, dropped from 7.25% to 5.30% at maximum rpm, from 1.80% to 0.04% at idle, and from 2.25% to 1.65% overall. Likewise, hydrocarbon emissions were substantially reduced, from 2250 parts-per-million (ppm) to 1400ppm at maximum rpm and from 1050ppm to 637ppm, on average, across the entire powerband. Idle hydrocarbon emissions, however, jumped from 200ppm prior to the rebuild to 300ppm after. Nevertheless, in light of the substantial HC and CO reductions that they had achieved in every other segment of the 7-mode test *and* in light of the fact that they hadn't even tried to "super tune" their V8 for emissions performance, Weggeland and Morris were quite pleased with what they had accomplished.[66]

So too, by the summer of 1973, were the editors of *Popular Hot Rodding*. That January, they had launched an emissions-performance rebuild project similar to those that *Hot Rod Magazine* and *Hot Rod Industry News* had featured back in 1971 and 1972.[67] Their methods and

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[62] At the time, the "7-mode test" was the standard test used by the EPA and by the California ARB to test new vehicles. This particular 1968-model Corvette was unregulated in terms of NOx emissions, and so Weggeland and Morris only tested its CO and HC levels.
[63] The original engine had but 32,000 miles on the clock ("Corvette Clean-Up," *HRIN*, July 1972, 24).
[64] Ibid., 24.
[65] Ibid., 44. This car was intended for use on the street, not the strip. Nevertheless, the quarter-mile dragstrip was – and, to this day, still is – commonly used in magazine tests as a standard measure of a car's performance, not to mention a convenient means with which to compare a given car's capabilities with those of other, similar makes and models.
[66] Ibid., and Steve Green, "Clean-Air Corvette," *HRM*, September 1972, 112-113.
[67] See "Build a Low-Emission Street Engine," *PHR*, January 1973, 24-25; "Build a Low-Emission Hi-Performance Chevy Engine," *PHR*, February 1973, 36-39 and 107; "Build a Low-Emission Hi-Performance Chevy Engine, Part

materials, in fact, very nearly mirrored those of Weggeland, Morris, and Prieto: teaming up with several aftermarket manufacturers, including Edelbrock and its chief engineer, Jim McFarland, they set out to rebuild a 1967 model-year 350 c.i.d. small-block Chevrolet V8 in order to improve its overall performance and to render its exhaust emissions cleaner. The same was also true of their dyno and dragstrip results, which showed that as a result of their performance rebuild, their 350 had gained 87 horsepower at the rear wheels, enabling their Chevrolet to lower its quarter-mile E.T. into the 13-second range.[68] Where their project differed from those that had preceded it, though, was with regard to the sorts of emissions-related comparisons that they wished to draw. For whereas Prieto, Weggeland, and Morris had sought to demonstrate that a high-performance engine could be made to run much cleaner than its OEM counterparts, the editors of *Popular Hot Rodding* sought instead to compare the emissions numbers generated by their performance-tuned 350 with those that the California ARB required of pollution-controlled vehicles sold and used in the Golden State. Consequently, they deliberately chose a 1967 model that had originally been sold in Arizona and was therefore entirely devoid of the emissions control equipment required of cars sold that year in California.[69] Compared with the ARB's official specifications for California-model cars of the same year, their performance-tuned 350 generated 57.5% fewer hydrocarbon emissions (170ppm for the project engine versus 400ppm allowed) and 80% less carbon monoxide (0.8% for the project engine versus 4.0% allowed).[70] What's more, compared with the ARB's requirements for 1970 and 1971 models, their modified 1967 model produced 51.4% fewer hydrocarbon emissions and 80% less carbon monoxide.[71] Finally, when compared with the state's requirements for 1972 and 1973 models, their project

3," *PHR*, April 1973, 50-51; and "87 HP Chevy Hop-Up!" *PHR*, July 1973, 24-27. See also Steve Kelly, "Rated G," *HRIN*, June 1973, 46-47, and below, pages 379-380.

[68] "87 HP Chevy Hop-Up!" *PHR*, July 1973, 24-27.

[69] Ibid.

[70] Ibid., 27. These figures reflect the project engine's performance as compared with the State of California's strictest emissions requirements for 1966-1969 model cars – those equipped with air-pumps. Compared with the slightly less-restrictive standards set for 1966-1969 model California cars *without* air-pumps, the project engine did even better, producing 66% fewer HC and 88.6% fewer CO emissions (170ppm versus 500ppm allowed and 0.8% versus 7.0% allowed, respectively).

[71] Ibid. Here, the maximum allowed by law was 350ppm HC and 4.0% CO.

engine ran 38.2% cleaner in terms of hydrocarbons and 68% cleaner in terms of carbon monoxide.[72] In other words, their 1967 Chevrolet, equipped with a high-performance V8 engine and no pollution-control apparati whatsoever (except for a PCV), nevertheless was able to undercut the State of California's legal limits for OEM cars that were a staggering six full model-years newer. Clearly, street-use aftermarket high-performance products weren't poisoning the air – certainly no more so, at any rate, than were their OEM equivalents. Performance-tuned engines, in other words, were fact entirely compatible with cleaner air.

Meanwhile, long before its full extent was fully understood, speed equipment industry leaders had wasted little time in putting this new argument to work for them. In the fall of 1971, Vic Edelbrock, jr. was elected to the presidency of the Specialty Equipment Manufacturers Association, his intimate knowledge of the emerging performance-emissions relationship serving as the cornerstone of his strategy for SEMA's ongoing legislative negotiations.[73] Before running off to the EPA and the ARB to spread the newfound performance-emissions gospel, however, Edelbrock spent the first half of 1972 making certain that SEMA would be able to adequately defend the seemingly outlandish claims that it was about to make to the government. That spring, in order to enable the Association to better manage its independent research activities, his administration voted to split the SEMA Technical Committee into three new and functionally-independent groups, the Noise, Safety, and Emissions Committees.[74] During the summer of 1972, as the new Emissions Committee feverishly accumulated a mountain of testing data regarding the emissions-performance relationship from a number of individual aftermarket firms, SEMA's governing body set itself to the task of constructing an official policy statement, a formal declaration of the Association's position on everything from marketing ethics to emissions controls. The resulting document, released in July, recognized the high-performance aftermarket's "responsibility to provide safe products" for street use, as well as products

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[72] Ibid. These numbers reflect a comparison of the project engine's HC and CO output with the State of California's strictest, air-pump-equipped new-vehicle HC and CO standards for 1972-1973 (275ppm HC and 2.5% CO; California's standards for 1972-1973 vehicles without air pumps were 250ppm HC and 4.0% CO).
[73] Vic Edelbrock, Jr., "Acceptance Speech," reprinted in *HRIN*, September 1971, 34 and 38-41.
[74] Vic Edelbrock, Jr., "Hot Rod Reports on the SEMA Scene," *HRM*, June 1972.

"designed and produced in such a manner that they will not...pollute the air."[75] In addition, a second statement released at the same time urged the editors of enthusiast periodicals to avoid the publication of any material "that would encourage anyone to degrade or alter any motor vehicle component intended for emission control or occupant safety."[76] Having managed to secure, in writing, the commitment of the members of the trade to the production of environmentally-responsible equipment, Edelbrock confidently dispatched his representatives to the offices of the EPA and the ARB for a spirited round of wintertime negotiations. He would not be disappointed.

Since the passage of the Muskie amendments back in 1970, SEMA had actively lobbied the EPA for a clarification of its position on the aftermarket industry. Following another series of meetings at which SEMA's representatives presented their new data on the emissions-performance relationship, the EPA finally decided to issue a ruling in February of 1973. According to the Agency's statement, automotive aftermarket equipment – including everything from OEM-style replacement sparkplugs to high-performance camshafts, exhaust systems, and intake manifolds – would henceforward be acceptable for sale and use in the 49-state market as long as the party responsible for its installation had a "reasonable basis" for believing that it would not adversely affect the subject vehicle's original emission control systems. In addition, no official certification procedures or exemption hearings would be required, for, as far as the EPA was concerned, the manufacturers' willingness to stand behind the results of their own testing would more than suffice to provide the end user with the "reasonable basis" upon which

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[75] Excerpts from this statement were first published in *Hot Rod Industry News* in July of 1972 ("Who's Doing What for HP?" *HRIN*, July 1972, 26-28), and the entire declaration was reprinted in the same publication that November ("SEMA Policy Statement," *HRIN*, November 1972, 26).

[76] "Who's Doing What for HP?" *HRIN*, July 1972, 26-28. In the present author's extensive survey of the editorial, technical, and feature content of *Hot Rod*, *Hot Rod Industry News*, *Dune Buggies and Hot VWs*, *Super Chevy*, *Popular Hot Rodding*, *Drag News*, and several other periodicals published between 1972 and the end of the 1980s, he was unable to find a single instance in which the editors failed to heed this request. The closest that *Hot Rod* ever came to violating this request, in fact, appeared towards the end of a 1981 article on General Motors's new throttle-body fuel injection system (TBI), when C. J. Baker, the author of the piece, wondered aloud, tongue-in-cheek, whether "a pair of 4-barrel carbs [wouldn't] look neat atop a modified twin TBI manifold," in place of the TBI system. See C. J. Baker, "Throttle Body Fuel Injection," *HRM*, October 1981, 46-48.

its decision had turned.[77] A favorable ruling for the industry, to say the least.

Far less promising in the long run, though equally welcome in the short, were the results of SEMA's ongoing negotiations with the California Air Resources Board. In May of 1973, after reviewing the emissions-performance data SEMA had presented to it that winter, the ARB issued a new "Policy on Replacement Parts" which granted the speed equipment industry a temporary reprieve from the design-based restrictions of Section 27156. In its new policy statement, the Board declared that, until it could manage to complete its plans for a statewide aftermarket parts certification program, "[a]ny part offered in the market as a replacement for original equipment will be presumed to be in conformity in the absence of specific evidence to the contrary."[78] High-performance carburetors, ignitions, manifolds, camshafts, exhausts, and any of a number of other components could, in other words, legally be offered for sale and use in California on pollution-controlled motor vehicles, at least for the time being. Hailing the decision as "a breakthrough…that may well lead the way to sensible and fair guidelines for replacing of stock parts without violating emissions laws," SEMA nevertheless cautioned businessmen and enthusiasts alike not to read too much into the ARB's new interim policy.[79] After all, it would only be a matter of time before the ARB would finish its plans for a permanent aftermarket parts-certification program, plans whose proposed requirements remained entirely unknown – and therefore potentially problematic, as far as industry leaders were concerned – to all of the members of the so-called rodding fraternity. Still, even if only for a brief while, the ARB's decision meant that for the first time in nearly seven years, most of the commercially-available, street-use high-performance products of the speed equipment industry were wholly legal in the Golden State.

In light of the decisions that the California ARB and the federal EPA had made with regard to the legal standing of their products, high-performance aftermarket businessmen had

[77] See "Late News File," *HRIN*, February 1973, 20-21.
[78] California Air Resources Board, "Policy on Replacement Parts," May 16, 1973, Binder "Minutes, 1973," ARB-A. See also "The SEMA Scene: Some Good News for a Change," *HRM*, August 1973, 26.
[79] "The SEMA Scene: Some Good News for a Change," *HRM*, August 1973, 26.

every reason to be happy in the spring of 1973. Ordinary enthusiasts, on the other hand, did not, for on an entirely new environmental regulatory front, their troubles were only just beginning. Three years earlier, in the spring of 1970, the California ARB had begun to discuss the possibility of phasing tetraethyl lead-based additives out of the state's gasoline supply by the end of the decade, and by the end of 1971, the federal EPA had begun to do the same.[80] Their reasoning was twofold. First, both agencies considered tetraethyl lead to be a serious pollutant in its own right, and both therefore believed that its eventual elimination was to be desired. Second, both the EPA and the California ARB were well aware that in order to meet their respective emissions guidelines for 1975 model-year cars, many OEMs were going to equip their vehicles with catalytic converters, sensitive emissions-control devices which would require the use – and, of course, the widespread availability – of unleaded gasoline.[81] By the beginning of 1972, therefore, the California phase-out had begun, and by the middle of the decade, the same was true throughout the United States.[82] The immediate result, both in California and in the rest of the country, was that octane ratings suddenly began to plummet in the early to mid-1970s. Whereas leaded fuels of 97 to 100 octane had been available all across the United States as late as 1969, for example, unleaded premium fuels topped out at approximately 91 to 93 octane – good enough for the low-compression engines of the 1970s but entirely unsuitable for high-compression, high-performance motors.[83] Further exacerbating what many hot rodders

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[80] See California Air Resources Board, "Board Meeting Minutes + Attachments," March 18, 1970, 2-9, Binder "Minutes, 1968 thru 1970," ARB-A; California Air Resources Board, "Board Meeting Minutes + Attachments," January 20, 1971, 9-16, Binder "Agendas, Resolutions, Minutes, 1971," ARB-A; Kent Carlton, "Can Hot Rodding Survive?" *PHR*, January 1971, 18-19 and 76-79; and "Tech Tips: Lead Blues," *PHR*, January 1972, 88.

[81] On the introduction of the catalytic converter, see Ray Brock, "Publisher's Memo," *HRM*, July 1970, 6, and Flink, *The Automobile Age*, 388.

[82] The difference, though, between California's plan to phase out leaded fuels, on the one hand, and that of the EPA, on the other, was that in the State of California, the phase-out was accelerated: leaded fuels were to be entirely eliminated from Golden State pumps by the end of the 1970s, and they were. By contrast, leaded fuels remained available elsewhere in the United States well into the 1980s, for the EPA's main concern was to ensure the availability of an adequate supply of unleaded grades of fuel for catalyst-equipped cars.

[83] On the quality of late 1960s gasoline, see for example "Tech Tips," *PHR*, April 1969, 106 (in this piece, *PHR*'s technical editor advised a letter-writer that the premium leaded fuels of 100 to 103 octane that were widely available at the time were more than adequate for his highly-modified, high-compression musclecar engine; because the methods used to rate fuel quality in the late 1960s differed somewhat from those that came into widespread use in the 1970s, the present author has taken the liberty of adjusting the 1960s "100 to 103" figure that appears in this 1969 article to "97 to 100" in the body of his text in order to render it compatible with the other, 1970s figures that

considered to be the "fuel quality crisis" of the mid-1970s, of course, was the actual fuel crisis of the fall of 1973. Less gas meant less driving, for one thing, and this was especially true for those who tooled around in 10 to 15mpg musclecars and street rods. More significantly, though, at least in the long run, was the oil industry's realization that the production of high-octane unleaded fuels used more barrels of crude oil per unit than did the production of low-octane unleaded.[84] Consequently, 91 to 93 octane unleaded fuel would remain – as it does to this day[85] – the best grade of pump gasoline available to performance enthusiasts in the United States.

Fuel quality and fuel availability, in short, had quickly became problematic for the average rodder of the early to mid-1970s, most noticeably in the fall of 1973 and the early winter of 1974. For many speed equipment manufacturers, though, *both* the slow and long-term decline of octane ratings *and* the sudden exposure of the country's vulnerability to sudden and dramatic fuel shortages were actually welcome developments. To be sure, they were well aware that the rapid return of low-octane fuels meant fewer sets of 12.5:1 pistons, for example, would be sold in the years to come. Nevertheless, for many of them, lower octane ratings actually presented a new opportunity to innovate – and to turn additional profits. On the one hand, OEM cars of the early to mid-1970s performed poorly, especially when compared with those that had been offered in the mid- to late 1960s. With their low compression ratios (often as low as 7.5:1, though typically closer to 8:1 or 8.5:1), lean carburetion, and timid ignition advance curves – all developed to allow them to meet federal and state emissions requirements while operating on low-octane, unleaded gasoline – these cars often struggled to produce 200 horsepower even when their motors' displacement exceeded 400 cubic inches. Consequently, sales of reasonable 9:1 and 10:1 piston sets, larger carburetors, more aggressive ignition systems, cleverly-

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he cites). On the best-available unleaded fuels of the 1970s and the 1980s, see for example California Air Resources Board, "Board Meeting Minutes + Attachments," March 18, 1970, especially pages 2-9, Binder "Minutes, 1968 thru 1970," ARB-A; Robert Herzberg, "Washington Report," *HRIN*, October 1971, 12; and David Vizard, "Sky High," *Dune Buggies and Hot VWs*, February 1980, 70-73.

84 See "Detroit Hotline," *HRIN*, August 1974, 12.

85 Actually, 94 octane is available today at some Sonoco stations in the Northeast, but for much of the country, 93 octane unleaded premium remains the best pump gasoline that money can buy. Stations in the State of California and throughout much of the American West, in fact, only offer fuels of 91 octane or less.

engineered intake manifolds, and the like all grew appreciably during the mid-1970s.[86]

On the other hand, the high-compression, high-performance automobiles of the 1960s – most of which remained in service in the early to mid-1970s – still required the use of high-octane leaded fuels in order to run properly. For indeed, even one tankfull of 91 octane unleaded could have severely damaged their engines. The reason was simple enough, and by the mid-1970s, it was relatively well-understood: "detonation." Fuels with lower octane ratings tend to be more susceptible to higher temperatures and pressures than those with higher octane ratings. That is, lower-octane fuels ignite more easily under extreme temperatures and pressures than do higher-octane fuels. In a high-compression engine, therefore, lower-octane fuels are apt to ignite prematurely, often as the piston is still travelling upward on its compression stroke and long before the spark plug fires. This means that the piston would suddenly be jarred by an unplanned fuel-air "detonation" that would work against the piston's upward motion. Severe stresses would result, often leading to failed connecting rods and, in some cases, to nasty tears and holes on the surface of the piston itself.[87] The challenge for the speed equipment industry, then, was to find a technological fix that would allow these cars to continue to be operated on the sorts of fuels that were available in the mid-1970s, without inducing detonation *and* without resorting to the installation of power-robbing low-compression pistons. Crower, Edelbrock, Holley, and several other firms immediately began to work to refine and perfect a type of anti-detonant that had first appeared within the automotive aftermarket way back in the late 1940s: water injection. As its name implies, this concept involved the timed injection of small amounts of water vapor into the

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[86] See, for example, Edelbrock advertisement, *HRM*, April 1975, 24; "1975 Performance Industry Survey," *HRIN*, Summer 1975, 37-44; and "1976 Performance Industry Survey," *HRIN*, Summer 1976, 31-38.

[87] "Detonation" should not be confused with "pre-ignition," although both result from the use of low-octane fuels and both can result in similar sorts of engine failures. Unlike detonation, in which the fuel-air mixture ignites spontaneously under the extreme pressures and temperatures of a high-compression engine, pre-ignition occurs when the fuel-air mixture ignites prematurely due to excessive ignition-timing advance. Excess ignition advance is desirable in high-compression, high-performance engines that use high-octane fuels, because high-octane fuels burn at a slower rate than low-octane fuels. Consequently, the spark plug must be made to fire *in advance* of the optimum moment in the piston's travels in order for the fuel to burn completely by the time the piston reaches the end of its compression stroke and the beginning of its power stroke. Lower-octane fuels, on the other hand, will burn completely long before the piston reaches the end of its compression stroke if the spark plug fires too far in advance, leading to counterproductive pressures that result in burned pistons, failed connecting rods, and the like.

engine's incoming fuel-air mixture, vapor which would help to cool the inner surfaces of the engine's combustion chambers. And this, in turn, would result in lower combustion temperatures and would therefore render the average high-compression engine less susceptible to detonation. Back in the 1940s and the 1950s, firms that sold water injection systems of this sort had done fairly well,[88] but as pump-gas octane ratings continued to climb in the 1950s and the 1960s, the need for these systems all but vanished. Crower, Edelbrock, and Holley therefore picked up where these older firms had left off, further developing the concept in order to deal with the reemergence of low-grade fuels. In the event, however, it took them several years to perfect their respective water-injection systems, most of which only reached the market en masse in 1980 and 1981.[89]

However, aftermarket products designed to enable the speed equipment industry to "cash in" on the energy crisis appeared far more rapidly. As early as February of 1974, for example, *Hot Rod* began to suggest to its readers that performance tuning could not only make their cars run faster, but also more efficiently. *Popular Hot Rodding* followed suit in March, and in the fall, *Hot Rod Industry News* ran a lengthy series designed to encourage retailers to more aggressively market the "economy-performance package."[90] But what exactly was this "package?" How, that is, could high-performance, modified street engines actually be made to use less fuel than their OEM counterparts? The answer, as with the emissions-performance link, involved moderation. Certain types of street-use aftermarket products could, in other words, produce both moderate

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[88] For some examples of companies that produced water injection systems in the 1940s and the 1950s, see "What's New," *HRM*, July 1949, 29 (on the Auto-Jet company's water injection system), and Vapojet advertisement, *Popular Mechanics*, December 1949, n. p.

[89] Actually, this was OK, since leaded fuels did not vanish completely from the State of California until 1980 and from pumps across the rest of the United States until the mid- to late 1980s. On Edelbrock's water-injection system, see "Vara-Jection," *PHR*, September 1980, 28-30; Edelbrock advertisement ("My Secret Formula to Stop Detonation"), *HRM*, October 1980, 13; and Edelbrock advertisement, *HRM*, June 1981, 92. On Crower's system, see Crower advertisement, *Super Chevy*, July 1981, 75. And, finally, on Holley's system, see Holley advertisement, *Super Chevy*, October 1981, 76.

[90] See "The SEMA Scene," *HRM*, February 1974, 36; Roger Huntington, "Economy and Performance: It Can Be Done," *PHR*, March 1974, 80-83 and 108; Gray Baskerville, "Selling the Economy-Performance Package – Part One," *HRIN*, August 1974, 34-35; Gray Baskerville, "Selling the Economy-Performance Package – Part Two," *HRIN*, September 1974, 30-31; and Gray Baskerville, "Selling the Economy-Performance Package – Part Three," *HRIN*, October 1974, 30-31.

horsepower and slight fuel-efficiency gains precisely because an engine tuned for complete combustion would, at least in theory, squeeze every bit of possible horsepower out of every drop of fuel. For some manufacturers, the only challenge was to prove to skeptical customers that their extant street-use parts were capable of doing this, and before long, advertisements and feature articles replete with testing data and percentage-gain claims from such firms as Edelbrock, Hooker Headers, and Crower thus began to appear regularly in the popular hot rodding periodicals.[91] For other manufacturers, though, new products specifically designed to provide more low-end power for street driving while also reducing overall fuel consumption were needed in order for them to take advantage of their customers' fuel-supply fears. This was particularly true of high-performance camshaft companies, many of which quickly brought out "economy" bumpsticks in the mid- to late 1970s precisely for this reason.[92] In any event, the implication, for the speed equipment manufacturers of the mid- to late 1970s, was that the fuel shortages of the time needn't necessarily translate into dwindling high-performance sales.

Nevertheless, all was not well for the likes of Vic Edelbrock, Bruce Crower, and Gary Hooker. Back in 1973, just as ARB and EPA officials released their favorable rulings on the legal status of aftermarket high-performance products, a new and somewhat unexpected problem had surfaced in Detroit. There, the mainstream automobile manufacturers had announced that, in order to provide their customers with the five-year, 50,000-mile emissions systems warranty required under the terms of the Clean Air Act of 1970,[93] they would need to be granted complete control over the maintenance and repair of the entire automobile for the duration of the warranty contract. Replacement parts options, in other words, would be restricted to those offered through the official manufacturer-dealer networks, and any and all repair work required during the

[91] See, for example, Edelbrock advertisement, *HRM*, February 1974, 6; C. J. Baker, "The Great Header Emission, Mileage and Noise Flap," *HRM*, May 1974, 35-37; and Edelbrock advertisement ("Further Up the Road with Streetmaster"), *HRM*, January 1975, 14.
[92] See "Energy Crisis," *HRIN*, January 1974, 16-21, which discusses Bruce Crower's efforts to develop fuel-efficient high-performance products; Iskenderian advertisement ("Mile-A-Mor Cam"), *HRM*, January 1975, 26; and Crane advertisement ("Crane Thriftmaster Cams"), *HRM*, June 1980, 49.
[93] This 5-year, 50,000-mile emissions warranty should not be confused with the ordinary new-car warranties offered by most manufacturers, for legally, the two are independent contracts.

warranty period would need to be completed by an official dealership.[94] In response, SEMA argued that Detroit's proposal, although understandable in light of the strict emissions warranty requirements then facing the OEMs, would be disastrous for the automotive aftermarket. "Restricting parts replacement to OEM pieces," explained SEMA in a press conference addressing the thorny new issue, "restricts trade and eliminates the market for independently produced parts."[95] After patiently listening to both sides of the argument over the course of the spring, the EPA came up with what it felt to be an ideal solution: certification. Prior to sale, aftermarket equipment could be brought to a national testing center, run through the standard federal emissions trials, and certified as having either passed or failed; passing equipment could then be offered for sale in the market without the fear that its installation would prompt the voiding of an unfortunate motorist's emissions warranty.[96]

SEMA, though, was less than enthusiastic about the idea. In a polite, but strongly-worded rejection of the EPA's proposal, the organization began by suggesting that "certification…is an unproductive way of approaching the [problem]," primarily because "[s]imply certifying a part, either publicly or privately, does not thereby impose a duty on auto manufacturers to accept" its legitimacy. In addition, SEMA objected to the way in which the EPA proposed to carry out its program, arguing that the testing procedures the agency favored – the 40 CFR 85 test used at the time to certify *new* cars to the 5-year, 50,000-mile criteria – would "work to the disadvantage of smaller parts manufacturers who [would] be unduly burdened by the costs" of such a process. Instead, SEMA proposed the development of "Dynamic Performance Standards," using "procedures easily duplicated in manufacturers' facilities," as an alternative to the extensive, expensive 40 CFR 85 process. Finally, hoping perhaps to address the OEM's liability concerns, SEMA also suggested that neither Detroit nor the aftermarket should be held responsible for the emissions performance of modified vehicles. Instead, consumers – average enthusiasts, in this

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[94] "SEMA Bulletin," *HRIN*, April 1973, 67-68.
[95] "The SEMA Scene: Aftermarket Parts to be Illegal," *HRM*, June 1973, 38 (this is a summary discussion of the entire episode that was published several months after the events actually transpired).
[96] Ibid.

case – should bear the final burden of proof, if necessary. [97]

Apparently impressed, the EPA agreed to allow SEMA to develop its proposed "Dynamic Performance Standards," conditioning its agreement on the aftermarket's ability to produce a new and far more systematic evaluation of the emissions-performance relationship. To be sure, the results of earlier evaluations of this sort had been well received in the offices of the EPA, where they had played almost an instrumental role in the agency's decision regarding the theoretical permissibility of aftermarket products.[98] Now, however, in order for it to be able to approve the hot rod industry's self-regulatory emissions-related proposal with confidence, the agency wanted further proof – proof, in this case, that high-performance products were indeed reliably benign when applied in combination by an average backyard mechanic in a real-world setting.[99]

As it happened, SEMA's Emissions Committee had already established a long-term testing program in January of 1973, the goal of which was to systematically evaluate the emissions performance of a group of commonly-modified vehicles – or rather, commonly-modified engine types – fitted with various combinations of high-performance equipment. Dubbed the SEMA Combination Testing Program and largely modeled in Don Prieto's earlier work, the project appeared to be a perfect means through which to obtain the information requested by the EPA *and* to develop "Dynamic Performance Standards."[100] Unfortunately, the Combination Testing Program was a complicated project not slated for completion until mid-1975, and the EPA was pushing for positive results *now*. Stalling for time, SEMA dispatched Edelbrock engineer Jim McFarland to the offices of the EPA in June. There, McFarland presented the findings of the emissions study that he had conducted with the cooperation of

[97] "SEMA Bulletin, *HRIN*, April 1973, 67-68.
[98] See above, pages 371-372.
[99] See Vic Edelbrock, Jr., "SEMA News," *HRIN*, July 1973, 36 and 39-40, and "The SEMA Scene: Legislative Outlook for 1974 – Good News or Bad?" *HRM*, January 1974, 30 (a piece reviewing the legislative developments of 1973 in anticipation of those to come in 1974).
[100] An explanation of the proposed "Dynamic Performance Standards" is perhaps in order. Simply put, the proposed standards would make use of a series of existing federally-approved emissions testing procedures in order to simulate, in a much faster, cheaper, and simpler manner, the conditions experienced during the course of a full 40 CFR 85 50,000-mile OEM test. See, for example, Donna Imrie, "The SEMA Scene," *HRM*, October 1976, 31.

several aftermarket manufacturers and the editors of *Popular Hot Rodding* that spring on a highly-modified small-block (350 c.i.d.) Chevrolet V8.[101] Installed on a 1967 Camaro, this modified engine was fitted with "[a]bsolutely no so-called emission control equipment."[102] Nevertheless, as we have seen, it was able to meet "all established emission control regulations for the model year car in which it [was] used," *and*, as Jim McFarland stressed in his presentation, the modified engine "is also lower in total emissions than [the] standards [called for by the EPA and the ARB] for the *present* model year."[103] A series of similar presentations followed over the course of the ensuing months, culminating in a September, 1974 meeting at which Rick Kozlowski of the EPA warned SEMA that his agency was growing weary of the industry's delays.[104] Consequently, in order to speed along the completion of its Combination Testing Program, SEMA's Board of Directors voted to reassign the project to a newly-formed Product Evaluation Subcommittee.[105] Chaired by Don Prieto, the new group, which included representatives from a number of aftermarket firms, saw to it that the first phase of the program was completed on schedule the following spring.

The results of Phase One of the Combination Testing Program, presented to the EPA in the summer of 1975 and summarized in a lengthy feature article in *Hot Rod Magazine* that fall, overwhelmingly corroborated SEMA's earlier claims regarding the "emissability" of performance-tuned engines and set the wheels in motion for the EPA to approve the "Dynamic Performance Standards" that had been used to carry it out. The objective of Phase One had been to measure the impact of the installation of a combination of aftermarket products on the emissions composition of a group of typical "stock, production automobiles built *before* [the] national clean air legislation came in."[106] Consequently, only 1968 and 1969 model-year vehicles were used for the study, and in order to ensure that they were representative, it was decided "that

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[101] See above, pages 368-370.
[102] Steve Kelly, "Rated G," *HRIN*, June 1973, 46-47.
[103] Ibid. (the emphasis appears in the original). See also above, pages 368-370.
[104] "SEMA News," *HRIN*, October 1974, 32-33.
[105] "SEMA News: SEMA Vehicle Combination Emission Testing Program," *HRIN*, November 1974, 62.
[106] Jim McCraw, "The Four Most Important Used Cars in California," *HRM*, September 1975, 88-90 and 92. The emphasis is mine.

the cars obtained should be of common engine/transmission combinations sales-weighted according to the national car population and to the aftermarket industry."[107] Selected, therefore, were 327 and 396 cubic-inch Chevrolets, 318 and 383 Mopars (Chryslers), and 289 and 390 Fords, although the Fords, "due to circumstances beyond the control of the Combination Testing Group," were not included in the evaluations.[108] Moreover, the aftermarket equipment chosen for the tests was installed "with no particular attention to supplied instructions and *without* optimizing performance by retuning [sic] the car[s] to other-than-stock specifications."[109] Doing so, SEMA officials believed, would enable the industry to demonstrate that even in careless, worst-case scenarios, the use of their products was entirely benign.[110] The testing procedures were relatively straightforward, if time-consuming: each of the vehicles first received a complete engine overhaul, followed by a generous break-in period and a series of baseline tests, before being fitted and tested with six different combinations of aftermarket products from Edelbrock, Weiand, Cragar, Appliance, Doug Thorley, and Mallory.[111] Testing was conducted at Edelbrock's 7-mode emissions laboratory, and the results were then verified at an independent, EPA-approved emissions research center.

"At the end of the program," according to the *Hot Rod* feature, "there was an overwhelming body of scientific evidence acceptable to the manufacturers and to the [EPA] that aftermarket parts of the type described will reduce output of photochemical smog components significantly even when installed right out of the boxes with no attempt at optimization of engine tuning."[112] In addition, the EPA tentatively concluded that the 7-mode, "Dynamic Performance" procedures used to sample emissions levels during the course of the program did in fact appear to

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[107] Ibid.
[108] Ibid.
[109] Ibid. The emphasis appears in the original.
[110] Recall that in the early days of its SEMA "Specs" voluntary racing parts certification program in the 1960s, SEMA had discovered the inherent value of worst-case assumptions of this sort. See above, chapter 5, and also Author Interview with Carl Olson, Pomona, California, April 4, 2003.
[111] Edelbrock and Weiand supplied the intake manifolds, Cragar, Appliance, and Doug Thorley the exhaust headers, and Mallory the ignition systems.
[112] Jim McCraw, "The Four Most Important Used Cars in California," *HRM*, September 1975, 88-90 and 92.

be an acceptable alternative to the 40 CFR 85 program.[113] Following the release of the results of Phase Two later that year, which verified the aftermarket's claim that high-performance parts would also help to reduce the emissions of newer (1974-model) vehicles equipped with a variety of OEM pollution control devices, the Agency was convinced.[114] Thereafter, SEMA enjoyed the full support of the EPA with regard to the warranty debate.

It was, however, up to *Congress*, not the EPA, to compel Detroit to accept the legitimacy of aftermarket products. After all, according to the letter of the law (the Clean Air Act of 1970), OEMs could still choose to reject the use of add-on parts – and void the emissions warranties of those who chose to use them – regardless of whether they had the EPA's "approval." So, over the course of 1976, SEMA and the EPA met regularly to hammer out the details of a Congressional proposal.[115] Their plan was simple: the OEMs would be barred from requiring the exclusive use of its own replacement parts during the warranty period, the EPA would establish a voluntary automotive aftermarket product self-certification program based on SEMA's "Dynamic Performance Standards," and the end user would be assured, via a product-labeling system, that the replacement parts – high-performance and OEM-style alike – that he chooses to install will neither prompt the termination of his emissions warranty nor cause his vehicle to fail his hometown's inspection program.[116] To SEMA's delight, the plan found its way into the Rogers Bill of Amendments to the Clean Air Act of 1970, which cleared both houses of

[113] Ibid. The specific results of Phase One were as follows: the 327 Chevrolet exhibited average HC, CO, and NOx reductions of 25.4%, 15.4%, and 25.9% across the six tests, respectively; the 396 Chevrolet demonstrated average reductions of 20.9% HC, 20.8% CO, and 46.9% NOx; the 318 Mopar 31.4% HC, 45.7% CO, and 31.2% NOx average reductions; and the 383 Mopar 25.1% HC, 35.2% CO, and 57.6% NOx reductions, on average.
[114] The results of Phase Two were summarized the following fall in Donna Imrie, "SEMA Scene," *HRM*, October 1976, 31.
[115] Also present at these meetings were the representatives of another organization, the Automotive Service Industry Association, a standard-replacement-parts aftermarket group that had also begun to actively lobby the EPA on the warranty issue during the mid-1970s. See M. S. Greicus, *Automotive Service Industry Association, the First Twenty-Five Years – Study of an Association, History of the Aftermarket* (Chicago, IL: Automotive Service Industry Association, 1984), 81-82.
[116] By the mid-1970s, a number of cities and states had begun to require the motor vehicles registered under their jurisdiction to undergo a periodic emissions inspection, and SEMA actively fought to make sure that each and every one of these programs – which, in theory, SEMA fully supported – would be performance- rather than design-based.

Congress and was signed into law in the fall of 1977.[117] The "warranty flap," as it was known in aftermarket circles, had finally been brought to an end, and the 49-state market secured. And in the process, the Specialty Equipment Manufacturers Association had once again proven the merit of its cooperative strategy.[118]

SEMA also submitted the results of both phases of its Combination Testing Program to the California Air Resources Board in 1977, hoping that the favorable results of the program – and the EPA's acceptance of the aftermarket's methods – would convince the ARB to allow the high-performance aftermarket to "self-certify" its products for use in California as well.[119] However, the ARB was more than a little bit wary of SEMA's proposals, and in August of 1977, it released its own recommendations for the long-term enforcement of Section 27156. Essentially, what the ARB proposed was the establishment of a centralized waiver program through which automotive aftermarket manufacturers could apply, on a part-by-part basis, for individual Executive Order (EO) exemptions to the modification prohibitions of Section 27156. To do so, manufacturers would need to submit to the ARB "a description of the device, drawings, installation instructions, a list of vehicle makes and model-years" for which it was

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[117] "SEMA News," *HRIN*, July 1977, 13-19 and 58, and Russ Deane, "Legislation," *HRIN*, November/December 1977, 32, 34, 36, and 43. This 1977 Act made it illegal for OEMs to void a customer's 5-year, 50,000-mile *emissions* warranty if that customer installed non-OEM parts (whether standard-duty or high-performance), but it did *not* prevent the OEMs from voiding a customer's *new-car* warranty for the same reason. In the 1980s, another Act of Congress, the Magnusson-Moss Warranty Act, made it illegal for the OEMs to void a customer's new-car warranty on the basis of the use of replacement OEM-style parts as well, although this later Act does *not* prevent the OEMs from doing so when high-performance products are involved. In other words, to this day, if you were to install a high-performance product on a new car, the OEMs *would not* be able to void your emissions warranty, but they *would* be able to void your new-car warranty. See Ray and Tom Magliozzi, "Car Talk: High-Performance Replacement Parts Can Void Warranty," *The Atlanta Journal-Constitution*, July 7, 2000, S(1).

[118] Some, both at the time and in the years since, have claimed that this warranty-related victory was SEMA's *first* regulatory triumph of the 1960s and the 1970s (see, for example, Kevin C. Osborn, "The Specialty Equipment Market Association: A Synopsized History," unpublished manuscript (September 1988), 13, History File, SEMA-RC, and Dick Wells, "Special to SEMA News – SEMA: Reasons for Being," undated and unpublished manuscript, 2-3, DWF). However, this is only true if we require that a victory be *legislative* in nature for it to count, for indeed, the warranty-flap victory *was* SEMA's first legislative triumph. Critically, though, SEMA had enjoyed a number of *interpretive* triumphs in its dealings with various regulatory agencies (including NHTSA, the VESC, the MVPCB, the ARB, and the EPA) during the 1960s and the 1970s, and these smaller victories were what would ultimately make its regulatory experiences positive and productive.

[119] Recall that the ARB's 1973 ruling on aftermarket products was temporary (see above, page 372), but as of 1977, the Board had yet to finalize its plans for the establishment of an aftermarket parts-certification program for the Golden State.

designed, "part numbers associated with the device, and any relevant test data which support the request."[120] To these basic requirements, SEMA offered no objections. However, further ARB certification requirements – that aftermarket manufacturers use full-scale federal emissions testing procedures for their waiver applications, for example, or that they refrain from advertising or selling contested goods during the certification process – quickly drew the ire of industry leaders.[121] Further wrangling, including the threat of legal action, secured for the aftermarket a slight tempering of some of the more objectionable features of the ARB's plan, but in the end, the agency's final ruling embraced most of its original August recommendations.[122]

Somewhat disappointed, the Specialty Equipment Manufacturers Association, determined to forestall any additional setbacks, turned to what it believed to be its final trump card, held in reserve all these years: the enthusiast. To be sure, the average hot rodder had assisted greatly in the industry's early attempts to get a handle on its mushrooming state-level automotive safety-related difficulties of the late 1960s and the very early 1970s.[123] In addition, enthusiasts had been kept abreast of the latest environmental legislative developments all along – since the mid-1960s, at least – through the editorial and feature coverage of the popular periodicals. *Hot Rod Magazine*, for example, published a steady stream of venomous attacks on the environmental regulatory movement throughout the late 1960s and well into the 1970s in an attempt to motivate the average enthusiast to stand up for his hobby, either by writing letters to his Congressman (which many did) or by joining together with his closest buddies to form a local action group

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[120] State of California, "Meeting Summary: Air Resources Board," August 25, 1977, archived online at www.arb.ca.gov/board/mi/mi.htm.
[121] Russ Deane, "Legislation," *HRIN*, November/December 1977, 32, 34, 36, and 43.
[122] "SEMA Scene: Four Problem Areas," *HRM*, January 1978, n. p., and Author Interview with Dick Wells, Santa Ana, California, April 2, 2003. A far more detailed analysis of the ARB's final ruling regarding the establishment of an exemption program for Section 27156 appeared in the pages of *Hot Rod Magazine* much later, in the fall of 1984 (Pat Ganahl, "Can They Outlaw Hot Rods?" *HRM*, October 1984, 22-26, 28, 33-34, 36, and 112-113). Incidentally, the ARB's unwillingness to consider SEMA's proposals earned the Board a radical and uncompromising reputation among performance industry insiders, whereas the federal EPA was widely believed, within aftermarket circles, to be a more reasonable and pragmatic body (Author Interview with Carl Olson, Pomona, California, April 4, 2003). This, as you will recall, was precisely the opposite of the way the ARB viewed things, for ever since the passage of the Clean Air Act of 1970, the ARB had always seen *itself* as the more pragmatic and reasonable of the two (see above, page 362).
[123] See above, chapter 5.

(which fewer did).[124] Working with an enthusiast-based pro-automobile group known as "Motorists United," *Popular Hot Rodding* also began to run a regular series of grassroots motivational pieces in the early 1970s.[125] What's more, as we have seen, the National Street Rod Association lobbied throughout the 1970s in an attempt to persuade performance car buffs to do their part to save their hobby, often – especially in the late 1970s – through explicitly anti-regulatory membership drives.[126] However, it was not until the end of the 1970s that a serious, concerted effort was made to form an organized, national enthusiast front specifically to support the regulatory and legislative efforts of the high-performance industry. It was SEMA that finally took this step in 1977, announcing the creation of an all-new "Enthusiast Division" in the spring. According to the plan, ordinary automotive enthusiasts would be allowed to join the Association as "Supporting Members" for a yearly membership fee of $10, all of which would help to fund the organization's burgeoning state-level lobbying programs.[127] In a press release published in the pages of *Hot Rod Industry News* that May, SEMA's new Executive Director, Dick Wells, confidently projected that some 16,000 "concerned car owners" would elect to join the organization by the end of its first six months.[128]

In the event, though, the new program failed to generate much interest. This was especially true during its first six months, for it was not until the ARB issued its final ruling on

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[124] See above, chapter 5.

[125] See, for example, Miles Brubacher, "Motorists United: Save Fun Cars," *PHR*, March 1972, 82 and 84-85, and "Motorists United: Will Hot Rods Be Nader's Next Target?" *PHR*, July 1972, 100. Miles Brubacher – who, along with SEMA's Eric Grant, once had been a staffer with the California MVPCB – headed Motorists United.

[126] See, for example, National Street Rod Association advertisement ("Street Rodders Unite!"), *Street Rodder*, January 1977, 66. See also above, chapter 5.

[127] By 1977, a variety of new state-level noise and safety regulations had begun to crop up across the country, under the terms of which many "traditional items...such as glasspack mufflers, side pipes, window treatments, heavy-duty shock absorbers, wide tires, some models of custom wheels and other equipment used in modification and dress-up/customizing operations" had been ruled illegal. Consequently, SEMA had begun to step-up its state-level lobbying activities in an attempt (at which it was ultimately successful in the vast majority of cases) to secure the elimination – or, at the very least, the modification – of these new laws. In addition, state- and local-level emissions inspection programs had begun to crop up in certain areas of the country, each of which required SEMA's attention in order to ensure that it conformed to the wishes of the high-performance industry *and* to the performance-based expectations of the EPA. Doing all of this, however, placed an enormous strain on SEMA's extant state-level system for the management of local issues (on this "system," see above, chapter 5). Consequently, SEMA needed to raise additional monies; hence the formation of the new Enthusiast Division. See "SEMA News," *HRIN*, May 1977, 10-13.

[128] Ibid.

Section 27156 in the winter of 1977-1978 that the SEMA Enthusiast Division actually began to receive any publicity whatsoever in the pages of the popular magazines.[129] Even then, however, most enthusiast continued to choose to hold on to their money, and with good reason. For one thing, by 1978, SEMA had already managed to ward off most of the dangers associated with the environmental regulatory movement on its own. High-performance engine tuning, for example, was perfectly legal in the 49-state market, and even in the State of California, which lacked effective user-level enforcement for Section 27156, many an average rodder was able to continue to drive his cherished, performance-modified automobile.[130] In addition, precious few of the doomsday prophesies which had appeared in the pages of *Hot Rod Magazine*, *Popular Hot Rodding*, and the other enthusiast periodicals during the 1960s and the 1970s had actually come to pass; why, then, should the average hot rodder have bothered to worry when confronted with contentions that the legislative situation was "getting worse?"[131] Moreover, SEMA's adamant support throughout the 1970s of the establishment of periodic, performance-based inspection programs throughout the country had probably done little to endear the organization to the average enthusiast. Consequently, for a variety of reasons and in spite of a concerted effort during 1978, 1979, and 1980, the SEMA Enthusiast Division ultimately flopped, dashing the industry's hopes that the ordinary hot rodder could be counted upon to support its efforts.[132]

[129] According to a program update published in the summer of 1977, the Enthusiast Division was attracting new members to the organization at a rate of only 150 per month – less than 6% of the monthly figure of 2,667 that would have been required to achieve the original projection of 16,000 new members by the end of the program's first six months. See "SEMA News," *HRIN*, July 1977, 13-19 and 58.

[130] Beginning in the late 1960s, the California Highway Patrol did perform emissions spot-checks on vehicles stopped for moving violations, but this was by no means a systematic enforcement program. For a lengthy discussion of California's lax enforcement of Section 27156 prior to 1984, see Pat Ganahl, "Can They Outlaw Hot Rods?" *HRM*, October 1984, 22-26, 28, 33-34, 36, and 112-113.

[131] See, for example, "SEMA Scene: Four Problem Areas," *HRM*, January 1978, n. p.

[132] In 1978, SEMA announced that it had decided to issue a coupon book worth $150 in discounts on aftermarket products to each new member of the Enthusiast Division, to no avail (see, for example, "SEMA Scene," *HRM*, December 1978, 92). In 1979, it ran full-page advertisements for the Enthusiast Division in *Hot Rod Magazine* that featured drag racing legend Don "The Snake" Prudhomme in an attempt to drum up support, also to no avail. In the fall of 1979, however, Enthusiast Division membership applications virtually flooded SEMA's offices following the publication of a provocative article on the problems facing ordinary rodders in *Hot Rod Magazine*, but this would ultimately prove to be a very short-lived aberration (see Donna Imrie, "Post Entry," *HRM*, October 1979, 13; the provocative article in question was Dave Wallace's "Hot Rodders – An Endangered Species?" *HRM*, July 1979, 52-52). Consequently, in 1980, *Hot Rod* and SEMA joined forces to more actively and explicitly promote the program in the pages of *Hot Rod Magazine*, but here, too, the campaign ultimately fell short of the mark. Finally, in 1981, the

SEMA, as before, would continue to have to go it alone.

Still, if in 1980 the average speed shop owner, high-performance parts manufacturer, or SEMA Board member had stepped back and surveyed the events of the 1970s, he would have had plenty of reason to smile. The potentially-disastrous performance-aftermarket and emissions warranty provisions of the Clean Air Act of 1970, for example, had been altogether eliminated. So, too, had the worst-case outcome in the State of California: although aftermarket parts were indeed going to be required to undergo a stringent evaluation in order to receive the necessary EO exemption for sale in the California market, the prospect of a total ban on modified cars in that state – very real in the late 1960s – had been all but quashed in the 1970s. And finally, speed equipment sales had continued to explode, resulting once again in an uninterrupted string of sales-record breaking years in the 1970s.[133] Little wonder, then, that *Hot Rod Magazine* editor Lee Kelley so confidently exclaimed in 1980 that "hot rodding is going to continue to flourish," for the state of the high-performance trade as the new decade dawned was better than it had ever been before.[134]

1984

Sacramento, however, had yet to play its final hand. Back in 1973, the California Legislature had passed a bill, SB473, which empowered the ARB to develop a statewide motor vehicle emissions inspection program. As originally drafted, SB473 required that the program begin, in the mid-1970s, with change-of-ownership inspections, followed by the gradual introduction of annual testing for all motor vehicles in the state by the end of the 1970s. Several legislative delays then followed during the course of the 1970s, pushing the change-of-ownership phase back to January 1, 1979 and the universal phase to January 1, 1981.[135] In the event, the

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editor of *Hot Rod Magazine*, Lee Kelley, conceded defeat, announcing that the Enthusiast Division was "on the verge of being dissolved" (Lee Kelley, "Editorially Speaking, *HRM*, January 1981, 4).

[133] See above, chapter 5.

[134] Lee Kelley, "Editorially Speaking," *HRM*, February 1980, 4.

[135] "Board Meeting Minutes + Attachments," February 16, 1977, 1, Binder "Minutes, 1977," ARB-A.

first phase did indeed begin in 1979, but technical difficulties encountered during the course of that year forced the indefinite postponement of the annual phase. Under mounting pressure from environmentalists, the federal EPA, and its own ARB, though, the California Legislature relented in 1980, voting to establish a statewide, biannual motor vehicle inspection program known to most as "Inspection/Maintenance," or "I/M." Set to begin in the spring of 1984, the new I/M program would require all vehicles registered in the Golden State to pass *both* a tailpipe emissions performance evaluation *and* an under-hood visual inspection every other year in order for their tags to be renewed. Automobiles whose emissions-related components had been modified or removed were to be denied registration renewal – regardless of the results of their tailpipe tests – as were those vehicles equipped with unauthorized high-performance equipment. For the first time, in other words, the ARB was going to be able to fully enforce California Motor Vehicle Code Section 27156 at the user-level. Consequently, the California hot rod, long an icon as American as apple pie itself, appeared to be set for extinction.[136]

Actually, it wasn't quite as bad as it seemed. Vehicles built prior to the pollution-control era – those built before 1966, that is – were exempted from the new biannual I/M program. Owners of by-the-book 1930s hot rods, 1940s and 1950s street machines, and even a number of early to mid-1960s musclecars thus had nothing to fear. Owners of newer modified cars, on the other hand, suddenly faced the grim reality that by 1984, their beloved cars would have to be de-tuned entirely. Golden State enthusiasts quickly began to panic, and *Hot Rod Magazine*'s mailbags swelled with letters from concerned rodders wondering both how this Orwellian nightmare had come to pass and what, if anything, they could do to help to bring it to an end. Responding to his beleaguered Pacific-Coast readership in the final issue of his editorial tenure at *Hot Rod*, Lee Kelley explained that his

> biggest disappointment as editor of *Hot Rod* was our failure to motivate you, the automotive enthusiast, to organize nationally to save your hobby. This is my last chance, so 'm going to tell [it to] you like it is. Tomorrow is 1984, and you will not be allowed to modify your vehicle...Oh, so now you're worried and you want

[136] Dave Wallace, "Endangered Species – Annual Inspections: Clean Air or Dirty Deal?" *HRM*, November 1980, 48-50; Kevin Boales, "The Politics of Clean Air," *HRM*, March 1984, 98-99; and Pat Ganahl, "Can They Outlaw Hot Rods?" *HRM*, October 1984, 22-26, 28, 33-34, 36, and 112-113.

> to know what you can do to stop this dreadful conspiracy? Well, I don't have an answer for you now; a year ago *Hot Rod* tried to get you all to join the Enthusiasts Division of the Specialty Equipment Market Association, but so few of you responded...that the organization is on the verge of being dissolved. I know of no other national group that will stand up for your rights as an automotive enthusiast, so if you're not willing to do some hard work to organize such a group, maybe you'd better take up knitting, because your street-driven performance cars are going to be impounded just as sure as there's an Environmental Protection Agency. And if you want to know who to blame, just look in the mirror; a little action on that person's part could have changed the whole picture.[137]

In other words, the time – and the opportunity – for the average California enthusiast to act had long since passed, and the bitter reality he now faced was no one's fault but his own.

For the speed equipment industry, the prospect of a mandatory statewide inspection program was no less troubling. To be sure, SEMA had been calling for the establishment of a California inspection system for years, but only because it believed that it would be performance-, rather than design-based.[138] California's plans to require an under-hood visual inspection along with a standard tailpipe evaluation therefore drew an angry response from the industry, whose representatives charged that the ARB clearly was far more interested in persecuting hot rodders and performance enthusiasts than in than it was in ensuring improvements in the state's air quality.[139] It was an argument as old as the ARB itself – older, actually, for SEMA had first made use of it during its opening round of negotiations with the MVPCB back in the fall and winter of 1966-1967.[140] It was also an argument that proved to be as ineffective in the early 1980s as it had been in the late 1960s: the ARB was not about to change its plans.

In the short run, this meant that aftermarket manufacturers and California hot rodders

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[137] Lee Kelley, "Editorially Speaking," *HRM*, January 1981, 4. Recall that SEMA had changed its name once more in 1979, substituting "Market" for "Manufacturers." See above, chapter 5.

[138] See, for example, Jim McFarland, "Clean Air Costs Money! How Fast...?" *HRIN*, July 1971, 19-20 and 22-23; "SEMA Bulletin, *HRIN*, April 1973, 67-68; and above, pages 378-379. A performance-based system was favored by the speed equipment industry because such a test would measure the level of tailpipe pollutants and nothing else; high-performance parts, in other words, would be perfectly acceptable under such a system as long as the vehicle's emissions levels were within the legal limits. By 1980, performance-based inspection programs had been established in a number of other states, and SEMA had hoped that California would follow this model should it ever choose to initiate an inspection system of its own.

[139] Kevin Boales, "The Politics of Clean Air," *HRM*, March 1984, 98-99, and Pat Ganahl, "Can They Outlaw Hot Rods? *HRM*, October 1984, 22-26, 28, 33-34, 36, and 112-113.

[140] See above, pages 351-352.

alike were going to have to get sneaky in order to continue their pursuits within the borders of the Golden State. And in the early 1980s, this is precisely what both groups did. Manufacturers and retailers, for example, were required by California law to include a warning in their advertisements that read, in part, that high-performance engine parts that had not been granted EO exemptions from Section 27156 were "not legal for use in California on any pollution controlled motor vehicle."[141] By 1985, though, they were permitted to add a critical, qualifying phrase to this notification, warning customers that these non-exempted products were "[l]egal in California only for racing vehicles which may not be used on highways."[142] As far as many manufacturers were concerned, this new allowance effectively let them off the hook, for all they had to do now was include the warning in their advertisements – after all, what the end-user actually chose to do with these "racing-only" products technically was out of their hands.[143] Enthusiasts, for their part, came up with some interesting schemes of their own. Some removed their high-performance add-on parts in order to pass inspection and then re-installed them once their renewal stickers were firmly affixed to their license plates. Others actually kept complete OEM engines on hand in their garages to use on inspection day.[144] Nevertheless, these were short-term patches, at best, and everybody knew it.

In the long run, then, the ARB's new visual I/M requirement meant that the speed equipment industry would need to begin to try to obtain EO exemptions from the ARB in order to legally advertise or sell certain types of products to their California customers. And consumers, for their part, would need to begin both to actually heed the manufacturers' warnings

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[141] The *exact* phrasing of this warning varied from advertisement to advertisement, but the basic thrust remained the same (the wording quoted here is from Edelbrock advertisement, *HRM*, March 1982, 3). For more on the advent of these warnings, see Kevin Boales, "The Politics of Clean Air," *HRM*, March 1984, 98-99, and "Post Entry," *HRM*, July 1984, 13.

[142] Again, the *exact* phrasing varied; this particular example is from Performance Automotive Wholesale, Inc. advertisement, *HRM*, August 1985, 84-85. By the early 1990s, some firms had begun to combine the two, coming up with shorter warnings such as "Legal in California only for racing vehicles which may never be used upon the highway" (Car Custom advertisement, *Dune Buggies and Hot VWs*, December 1991, 104-105) or "Legal in California for racing vehicles which may never be used upon the highway" (Fast Freddy's advertisement, *VW Trends*, March 1982, 41). To this day, the phrasing still varies, often considerably.

[143] Author Interview with Delores Berg, Orange, California, November 11, 2003.

[144] See, for example, "Bug Mail," *Dune Buggies and Hot VWs*, November 1983, 7-8, and "Bug Mail," *Dune Buggies and Hot VWs*, November 1984, 10.

and to actively seek out exempted aftermarket products (or exempted model-year cars) in order to remain within the law. Consequently, by the time the biannual program began in the spring of 1984, many manufacturers had indeed begun to seek California Air Resources Board EO exemptions for some of their products, and by the end of the 1980s, many firms had in fact received a number of them.[145] Nevertheless, the EO process was – and, to this day, is – onerous and expensive, and many products that were perfectly legal in the rest of the country therefore remained – and, to this day, remain – illegal in California. Section 27156, that is, would continue to haunt the California scene.

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Haunt, it has; crush, it has not. Over the last twenty-odd years, high-performance aftermarket manufacturers have learned to live with Section 27156, fully aware that their failure to secure a more lenient interpretation of this law during the course of the 1960s, the 1970s, and the 1980s was an aberration. For indeed, in all but a tiny handful of cases, their defense of hot rodding and speed equipment manufacturing against what they perceived to be unreasonable regulatory requirements and unruly agencies had been remarkably successful. With the benefit of hindsight, in fact, the advent of I/M in the State of California actually seems to have been the closing act of the governmental regulatory saga – at least as it pertained to hot rodding, at any rate. For in the years that have passed since the introduction of I/M back in 1984, the "battle" to save the American hot rod industry has lost most of the dire urgency with which it was fought in the late 1960s and the early 1970s. This is not to say that I/M somehow marked the definitive "end" of the industry's encounter with environmental regulations and regulators, certainly no more so than its deals with NHTSA and the VESC in the mid- to late 1970s had marked the "end" of its encounter with automotive safety-related requirements. Likewise, this is not to say that SEMA has somehow been able to back off, for in a lot of ways, it remains as active in the

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[145] Dozens and dozens of EO exemptions were issued by the ARB by the end of the 1980s, according to a comprehensive list of EO numbers and descriptions that appears in a massive reference volume, known as *The Black Book*, that SEMA makes available to its members for $150 (State of California Air Resources Board, "Modifications to Motor Vehicle and Emissions Control Systems exempted Under Vehicle Code Section 27156" (1994), reprinted in SEMA, *The Black Book*, 2nd Edition (Diamond Bar, CA: SEMA, 1996), i-xxxiv and 1.1-25.1, SEMA-RC).

regulatory scene today as it was some thirty years ago. Instead, it simply means that since the early 1980s, a working resolution to its air-pollution crisis has emerged, sustained through the ongoing cooperation between industry insiders and environmental regulators. Speed equipment manufacturers, in other words, have learned to incorporate the wishes and requirements of governmental regulatory agencies into their overall approach to the design and manufacture of high-performance parts and accessories. And in the process, environmentalism, safety activism, and performance enthusiasm have learned to coexist – and to thrive.

Summary: Environmental Regulations and the Hot Rod Industry

Recall Leonard Reich's thesis: the recreational snowmobiling industry's successful defense against the regulatory pressures that *it* faced in the 1960s, the 1970s, and the 1980s required, in equal measure, *both* the active participation of its industrial organization *and* the grassroots efforts of ordinary snowmobiling enthusiasts, a combination of forces decidedly absent in the case of the mainstream automobile industry of the 1960s and the 1970s. Reich's overarching implication, of course, is that if the OEMs had enjoyed the support of a strong industrial organization, on the one hand, and of a rabid band of automotive enthusiasts, on the other, then perhaps they would not have fared quite so poorly in their attempts to win concessions from NHTSA, the EPA, the ARB, and other governmental regulatory agencies. In this chapter, however, we have seen that in the case of the speed equipment industry's successful encounter with environmental regulation in the 1960s, the 1970s, and the 1980s, the second of Reich's requisite forces was entirely lacking. Never, in fact, was the speed equipment industry able to rely upon the activism of the average rodder or hot rodding club to aid it in its environmental regulatory struggles. SEMA, in other words, was always on its own.

Exactly how was it, then, that SEMA was nevertheless was able to mount so successful a defense? Contrast the ways in which the high-performance aftermarket and the mainstream automobile industry handled their respective regulatory crises. Prior to the summertime debate which led to the passage of the Clean Air Act of 1970, the OEMs had more or less complied with federal and state anti-pollution initiatives, enjoying generous new-standard lead times and a polite, if not friendly relationship with the authorities.[146] The mainstream automobile manufacturers suddenly changed their tune in the summer of 1970, however, following an unsuccessful Nixon Administration attempt to amend the Muskie Bill so that its tougher federal new-car standards would take effect in 1972, rather than in 1975.[147] Crying foul, the industry elected to change "from [its] low-profile strategy of not arguing against proponents of safer or cleaner cars to a fighting stance,"[148] and thereafter, relations between the OEMs and the government soured appreciably. So too did the relations among the automobile companies themselves, for as the 1970s wore on, they often proved willing to try to curry favor with the regulators at the expense of their rivals.[149] In short, it was with an openly-hostile, fractured voice that the mainstream automobile industry chose to confront the environmental regulatory movement, a strategy for which it appears to have paid most dearly: in the end, *it* "lost a lot of battles against the federal and local state."[150]

The high-performance aftermarket, on the other hand, was for the most part able to

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[146] Jonathan Spivak, "Battle Looms Between U.S., Auto Firms Over New Proposals to Limit Pollution," *The Wall Street Journal*, July 27, 1970, A(2).
[147] Jerry M. Flint, "Auto Industry, Changing Strategy, Opens Counterattack on Environmental and Consumer Movements," *New York Times*, November 18, 1970, C(29).
[148] Ibid.
[149] For example, Honda announced in 1973 that its CVCC-equipped line of economy cars would easily meet the 1975 new-car standards, standards which General Motors, Ford, and the rest of the American manufacturers actively had denounced as technologically unattainable. ("CVCC" stands for Compound Vortex Controlled Combustion, an emissions-control system developed by Honda.) Pouring salt on the wound, Honda also announced that it had fitted its CVCC system to a small-block (350 c.i.d.) Chevrolet V8 and a Vega inline-4, both of which, thus equipped, were able to meet the 1975 standards as well. So much for mainstream automotive industrial solidarity. See "Late News File: Washington, Detroit, the World," *HRIN*, June 1973, 9-12.
[150] Here, the present author is appropriating the words that Moorhouse used to describe the hot rodding fraternity's experience with governmental regulation (*Driving Ambitions*, 141). As chapters 5 and 6 of this thesis have shown, however, Moorhouse's remark is more than a bit off the mark; the hot rodding fraternity actually did quite well during the 1960s and the 1970s. By contrast, however, the OEMs' hostile and fractured approach to the challenge of governmental regulation won them a series of regulatory implementation delays, at best (see for example Flink, *The Automobile Age*, 387-388); Moorhouse's words therefore seem to better fit the experiences of the OEMs. More precisely, the stonewalling and foot-dragging techniques that the OEMs chose to deploy during the early 1970s – that is, their decision to fight the EPA and the ARB tooth and nail rather than actually trying to come up with an acceptable means through which to meet the federal and state mandates – ultimately resulted in poor-running automobiles fitted with emissions-control afterthoughts that barely met the applicable air quality standards and that fewer and fewer Americans wanted to purchase (see Flink, *The Automobile Age*, 387-388).

maintain its commitment to a cooperative policy throughout the regulatory era. Neither the passage of the Clean Air Act of 1970, the lingering difficulties associated with the so-called "warranty flap," the California ARB's final aftermarket certification ruling of 1977, nor even the advent of the Golden State's design-based I/M program in 1984 managed to persuade the industry to change it course: through it all, SEMA continued to meet with the EPA and the ARB, patiently presenting its case and, far more often than not, successfully arriving at some form of negotiated compromise. In addition, the members of the speed equipment industry were able to put aside their day-to-day differences and stick together throughout the period in question, enabling SEMA to present a unified aftermarket front and facilitating genuine inter-firm cooperation on important projects like the Combination Testing Program. SEMA appears to have succeeded, in short, because of the powerful esprit de corps it managed to instill among its members, because of its cooperative approach, and, above all else, because of its willingness to strike a compromise whenever necessary.

Whether a similar cooperative approach involving genuine inter-firm collaboration would have worked for the OEMs, though, isn't entirely clear. For indeed, as John Rae explains, the American automobile manufacturers "were not permitted to cooperate in the development of emission control techniques," for "[t]hey were advised" by the Department of Justice in the 1960s "that any such collaboration would be considered to be in violation of the antitrust laws."[151] One wonders, however, whether this is actually what prevented them from working together. After all, as we have seen, dozens and dozens of speed equipment manufacturers were able to work together on *their* emissions-related challenges in the 1960s and the 1970s without winding up before a federal judge. Perhaps the difference lies in the extent to which Edelbrock, for example, cooperated with its rivals Offenhauser, Weiand, and Holley: not once did these aftermarket companies actually collaborate to *develop* their emissions-friendly high-performance products. Instead, they pooled their resources in order to *test* their respective emissions-compatible lines. What's more, there was absolutely nothing wrong – *legally*, that is – with the

[151] Rae, *The American Automobile Industry*, 135.

way in which these aftermarket companies lobbied and negotiated collectively, through SEMA, in Washington, DC and in Sacramento, California. In other words, there was plenty of room for legal cooperation between the mainstream automobile manufacturers in the 1960s and the 1970s. That they deliberately chose not to do so – that they chose division over unity and confrontation over compromise, that is – stands, in short, as the most significant difference between their handling of the environmental regulatory crisis, on the one hand, and the speed equipment industry's approach to it, on the other.

However, although the negotiated compromises that the speed equipment industry's regulatory approach necessarily entailed seem to have caused very little, if any concern among the members of the high-performance manufacturing community, they did indeed create a major stir among the hordes of enthusiasts who turned to the pages of the popular periodicals each month for the latest on the legislative state of the rodding art. By and large, rodding enthusiasts wanted nothing to do with regulatory compromise, and rarely, if ever, did they miss an opportunity to express their disapproval of, say, *Hot Rod Magazine*'s tacit support of the idea.[152] In other words, regardless of the fact that it was a strategy which ultimately won the war for high-performance businessman and enthusiast alike, the average rodder seems to have held an abysmally low opinion of SEMA's cooperative policy of friendly negotiation. Performance enthusiasm, as far as he was concerned, was an experience that should never be open to compromise.

One wonders, though, whether the uncompromising nature of the average 1970s hot rodder was something new – something, that is, that grew out of his experience(s) with governmental regulation in the 1960s and the 1970s – or whether it had in fact been an integral part of his psyche all along. Superficially, of course, it would appear to be the former. After all, it

[152] When, for example, the editors of *Hot Rod* decided to title their December, 1981 review of the all-new 1982 Z-28 Camaro "The Best One Yet," they seem to have angered quite a few of their readers, several of whom responded in the March, 1982 issue by denouncing the magazine for its willingness to rank an "under-powered, over-regulated fraud" above the classic Z-28s of years gone by; one particular respondent, in fact, concluded his brief editorial tirade with the admonition that he, like most true hot rodders, places a "heavy negative value on obvious mass market designs, *compliance with dumb regulations*, and poor first impressions" ("Post entry: No New Z for Me," *HRM*, March 1982, 6-8 (the emphasis is mine)). Other examples abound.

is difficult to reconcile the image of a 1950s NHRA club member (organizing events with his local police, for example) with that of an angry 1970s NSRA club member (railing against all things governmental in the pages of *Hot Rod Magazine*) without coming to the conclusion that the average rodder's *Weltanschauung* had somehow radicalized during the regulatory era. But if we try to pinpoint when exactly this shift took place, that it actually happened at all becomes exceedingly difficult to prove. For indeed, 1940s and 1950s hot rodders were in many ways just as hard-headed as their 1970s counterparts. They too hated compromise, especially when it came to their hot rods. They too got excited about intake manifolds, multiple carburetors, and loud exhausts. And, critically, they too got upset whenever lawmakers attempted to rein them in.[153] In short, they too were automotive – and, more broadly, *technological* – enthusiasts.

Theirs was an *elemental* technological enthusiasm, though – an enthusiasm for the technology of the automobile itself, rather than one for the ends that automobile use might ultimately deliver.[154] Up until the middle of the 1960s, however, the differences between *their* enthusiasm for automotive technology and, say, that of the architects of the Interstate Highway Act would have been difficult to discern. For as Thomas Hughes has demonstrated, the United States as a whole was a nation of technological enthusiasts in a broader, Progressive sense for much of the twentieth century.[155] And as a result, the average rodder's efforts to improve his automobile's performance meshed quite nicely, conceptually, with the American public's more generalized faith in the transformative power of technological progress. It mattered not a whit that the hot rodder sought not to improve the lives of his fellow Americans, but rather to travel across a dry lake bed at a higher rate of speed. What mattered, instead, was that rodders were always able to justify their pursuits in terms of the Progressive technological enthusiasm of the

[153] See above, chapter 3.
[154] Among historians of technology, Eugene Ferguson and Robert Post have done the most to explore this "elemental" type of enthusiasm; see Eugene Ferguson, "Enthusiasm and Objectivity in Technological Development" (Unpublished Manuscript, 1970); Eugene Ferguson, "Presidential Address – Elegant Inventions: The Artistic Component of Technology," *Technology and Culture* 19 (1978), 450-460; and Post, *High Performance*, passim.
[155] Hughes, *American Genesis*, 3.

broader American public.[156]

During the 1960s, however, mounting concerns over the social, economic, and environmental impact of technological and industrial development began to erode the public's faith in what they once had overwhelmingly regarded as the wellspring of American greatness, technological advance. According to Hughes, these doubts ultimately led, by the early 1970s, to the end of a century's worth of progress he refers to as the "American genesis."[157] In other words, the Progressive embrace of technological advance that had so clearly defined the American character for more than a hundred years had come to an end.

This, then, is what had changed. Ordinary hot rodders, still motivated by their elemental enthusiasm for automotive technology, suddenly found that their pastime was no longer necessarily compatible with the ways in which a number of Americans had come to conceive of technology, in general, and automobility, in particular.[158] Unable – or unwilling – to comprehend this broader shift, rodders were therefore baffled – and angered – whenever news of legislative and/or regulatory proposals to ban the internal combustion engine, to outlaw engine modifications, or to enforce lifestyle changes aimed to lessen our dependence on the automobile reached their ears.[159] *Hence* their disdain for the EPA, say, or for NHTSA. And *hence*, therefore, their radical and altogether uncompromising attitude towards the regulatory process.

And yet, we would surely be mistaken if we were to conclude on the basis of the average

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[156] Examples of this sort of justification abound; for two particularly choice illustrations of it, see "Detroit Never Satisfies Them," *Popular Mechanics*, June 1948, 114-120, and Kenneth Kincaid, "If Detroit Won't Do It, Why Don't You?" *Motor Trend*, June 1952, 32-34 and 46-47.

[157] Hughes, *American Genesis*, 3.

[158] Whether the average American's faith in technological progress actually vanished is, however, highly doubtful – certainly, Congress did not lose *its* faith in it. After all, vital to the federal approach to the air pollution crisis was the assumption that, somehow, the OEMs would find a technological "fix" that would enable them to meet the government's new standards (see above, pages 361-362). In addition, it warrants mention as well that automotive enthusiasts were by no means the only subset of the American public at large that was motivated by an elemental technological enthusiasm during the 1970s and the 1980s – during, that is, the two decades that followed the end of Hughes's century of American (Progressive) technological enthusiasm. Consider, for example, the outlook and approach of computer enthusiasts during the same time (see Martin Campbell-Kelly and William Aspray, "The Shaping of the Personal Computer," in Merritt Roe Smith and Gregory Clancey, Editors, *Major Problems in the History of American Technology: Documents and Essays* (NY, NY: Houghton Mifflin Company, 1998), 476-486).

[159] See, for example, Don Evans, "Editorially Speaking," *HRM*, October 1969, 8; "SEMA Scene," *HRM*, May 1978, 21; "SEMA Scene – Your Engine Compartment: Off-Limits?" *HRM*, February 1978, 9; and "Ruckelshaus: 'The Public Must Start Paying,'" *Business Week*, February 24, 1973, 62-64.

rodder's apparent intransigence that the high-performance aftermarket and, by extension, hot rodding itself were somehow saved from their potential regulatory oblivion in spite of the machinations of the ordinary enthusiast. After all, even given SEMA's remarkable string of negotiated victories, the speed equipment industry would never have been able to survive the regulatory era had the lingering power of performance enthusiasm suddenly ceased to compel the smitten, young and old, to continue to fill the coffers of their local speed shops in exchange for the latest and greatest in rodding gear. Over-sold, overly-zealous enthusiasts aside, in other words, it appears as though the average rodder did in fact do his part to save performance tuning, however unwittingly, for it was because of his frequent equipment binges – which enabled the representatives of the high-performance aftermarket to continue to attend to their legal affairs without the fear that their regulatory war chests might someday run dry – that such a "battle" could be fought.

Conclusion: Dusk or Dawn? Performance Tuning and Equipment Manufacturing in the 1970s, the 1980s, and Beyond

In 1991, the speed equipment industry experienced a setback. Total sales, which had been on the rise for nearly thirty years, actually fell by four percent between 1990 and 1991. Sales picked up again in 1992, however, and the high-performance aftermarket has enjoyed steady annual growth ever since.[1] Consequently, 1991 appears at a glance to have been an aberration, a temporary setback associated with the economic recession that followed on the heels of the First Gulf War.[2] Closer examination of the data, though, reveals that it was a dip that had been several years in coming: as early as 1987, the industry's aggregate rate of annual growth began to taper off, falling from almost seventeen percent in 1987 to less than ten in 1990.[3] It was a short lull, to be sure, but it was still a lull – one that dated back a bit further than 1991, at any rate. With the benefit of hindsight, in fact, we can trace the origins of what transpired on the industry's collective ledger in the late 1980s and the very early 1990s back to the 1970s and the early 1980s.

Back then, aftermarket sales grew by leaps and bounds, year-in, year-out. Up through 1975, much of this growth was associated with the musclecar boom of the 1960s and, to a lesser extent, the lingering afterglow of the first OEM horsepower race of the 1950s. For indeed, the sale of add-on street and strip components for the high-output, domestic V8-powered automobiles of the 1950s and the 1960s – "street machines," in the parlance of the average rodder – accounted for more than sixty percent of the industry's aggregate sales right up through

[1] "2002 Automotive Specialty Equipment Industry Update," 1, SEMA-RC. Much additional research and many additional pages of text would be required to adequately and conclusively deal with the developments and trends discussed in the first part of this conclusion. Consequently, the following discussion of equipment manufacturing and performance enthusiasm in the 1970s and the 1980s is intended to be *suggestive* rather than *conclusive*. It is meant, that is, to briefly introduce the reader to some of the more salient developments of these decades in order to better enable us to conclude our overall analysis.
[2] "Market Watch," *SEMA News*, August 1992, 22-23.
[3] "2002 Automotive Specialty Equipment Industry Update," 1, SEMA-RC.

the Ford Administration.[4] OEM musclecars began to disappear in the early 1970s, however, and by 1975, there were very few cars left on the showroom floor with more than 200 horsepower lurking under their long, pin-striped hoods.[5] Enthusiasm for new American cars dwindled accordingly, as did late-model speed equipment sales.[6] Nevertheless, *total* high-performance aftermarket sales continued to rise each year, as equipment manufacturers discovered a number of new and highly-profitable market niches that more than made up for their losses in the street machine market. We shall return to these new niches momentarily; for the moment, though, what matters is that business boomed, right on through the 1970s and well into the 1980s.[7]

SEMA continued to grow during these years as well. By 1978, the Association boasted more than 1,500 members nationwide, and by 1979, its activities and income had expanded so dramatically that its Board of Directors elected to move out of their rented office space and into a brand-new, stand-alone headquarters building in Santa Fe Springs, California.[8] Attendance at the annual SEMA Show continued to rise, too, reaching record-setting levels each year as the event steadily matured into one of the largest trade shows in the country.[9] Many individual firms also grew considerably during the 1970s and the 1980s, figuratively and literally, adding zeros to their bottom lines and square footage to their plants. In addition, many of them began to adopt new machine tools and new manufacturing processes as the 1970s and the 1980s progressed.

Consider the example of the Edelbrock Equipment Company. Consistently one of, if not *the* largest aftermarket manufacturer in the world since the mid-1950s, Edelbrock enjoyed a period of remarkable growth during the late 1960s and the early 1970s, growth which accelerated

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[4] Street machine speed equipment accounted for 61% of aftermarket sales through 1975, dropping to 60% in 1976. See "1975 Performance Industry Survey," *HRIN*, Summer 1975, 37-44, and "1976 Performance Industry Survey," *HRIN*, Summer 1976, 31-38.
[5] See above, chapters 5 and 6.
[6] Sales of speed equipment for street machines accounted for only 45% of the industry's aggregate total for 1977, down from 60% the previous year. See "1977 Performance Industry Survey," *HRIN*, April 1977, 31-38.
[7] Ibid. See also John Duke, "Editor's Note," *HRIN*, May 1977, 8, and "2002 Automotive Specialty Equipment Industry Update," 1, SEMA-RC
[8] *SEMA '78*, informational pamphlet (1978), History File, SEMA-RC, and "SEMA Ready to Build New Office," *Specialty & Custom Dealer*, January 1979, 42.
[9] Lee Kelley, "Editorially Speaking," *HRM*, February 1980, 4, and "Dramatic Growth Reported," *SEMA News*, March 1989, 1-5 (this *SEMA News* piece reported that the 1988 SEMA Show ranked as the 35th largest trade show – out of more than 3,300 – in the United States).

during 1975, 1976, and 1977.[10] As a result, in the winter of 1976-1977, the company added 24,000 square feet of new warehousing space to its sprawling El Segundo, California manufacturing complex, and by May of 1977, plans were already underway for an additional 70,000.[11] In its engineering department, computerized testing equipment helped to streamline the firm's new-product research and development efforts, and on the shop floor, automatic drill presses and other labor-saving machine tools enabled the firm's annual output to swell considerably. By 1984, Edelbrock had invested in its first computer-numerical-control (CNC) machines, enabling further boosts in productivity without sacrificing flexibility or product variety.[12] In fact, the variety of high-performance parts and accessories that the Edelbrock Equipment Company turned out in the late 1970s and the early 1980s was staggering, and nearly every year, they added an additional product line or two to the mix. In 1975, for example, the company began to produce electronic ignition components, and in 1980, it added an all-new fuel-injection system to its catalog.[13] Water-injection systems followed in 1980, and by 1982, Edelbrock had expanded into the lucrative market for chrome and anodized engine dress-up items, too.[14] None of this came at the expense of the firm's core business, though: in 1981, the firm still produced some thirty individual *lines* of intake manifolds for all sorts of domestic and imported vehicles.[15] What's more, it still produced aluminum cylinder heads for the venerable flathead V8 engine, an item that Vic, Sr. himself had introduced way back in the 1940s.[16] By 1987, the company had outgrown its El Segundo location, and Vic, Jr. and his crew moved into a new and much larger facility in Torrance, California, just a few miles southwest of downtown

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[10] Edelbrock advertisement, *HRIN*, January 1973, 20, and "Edelbrock: The Man, His Business, and Success – Exclusive Interview on Topics of Major Importance to Your Success," *HRIN*, May 1977, 46.

[11] Edelbrock advertisement, *HRIN*, April 1977, 19, and "Edelbrock: The Man, His Business, and Success – Exclusive Interview on Topics of Major Importance to Your Success," *HRIN*, May 1977, 49.

[12] Dave Wallace, Jr., "An Afternoon on the Dynamometer," *Drag News*, July 12, 1975, 18; Dain Gingerelli, "Edelbrock: Hot Rodding's First Family," *Street Rodder*, December 2000, 216 and 218; and Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003.

[13] See Edelbrock advertisement, *HRM*, February 1975, 6, and "Industry Report," *HRIN*, April 1977, 25, respectively.

[14] See above, chapter 6, and Edelbrock advertisement, *HRM*, March 1982, 3, respectively.

[15] Edelbrock advertisement ("And for Me...Edelbrock Performance"), *HRM*, December 1981, 9.

[16] Dain Gingerelli, "Edelbrock: Hot Rodding's First Family," *Street Rodder*, December 2000, 216.

Los Angeles.[17] Work began in earnest on an off-site foundry in 1989,[18] and by the end of 1990, the company had come to look much less like the stereotypical speed equipment manufacturer of the 1950s and the 1960s and much more like its vertically-integrated OEM counterparts.

And in this process, Edelbrock was not alone. Cragar, Hedman Headers, and countless other firms added massive warehousing facilities, CNC machines, and sophisticated engineering facilities to their plants in the 1970s and the 1980s as well, utterly transforming the shop-floor character of this suddenly much less peculiar American industry.[19] Nevertheless, an overarching commitment to product diversity and manufacturing flexibility remained paramount at each of these companies – none, that is, actually began to mass-produce in the same sense that Ford, GM, and Chrysler did. In other words, the speed equipment industry's manufacturing methods changed considerably, as did their scale, but their core strategy remained exactly as it had been for more than sixty years.[20]

Fueling these shop-floor changes of the 1970s and the 1980s was, of course, the relentless growth of aftermarket sales that took place during those years. But what exactly fueled this growth? As we have seen, the bread-and-butter new-car street machine market had already begun to lose some steam by 1977, and yet the industry continued to grow unabated for another decade. Why, and how? Simply put, *both* the industry-wide growth of the late 1970s and the 1980s *and* the ways in which a number of firms chose to handle it (through the adoption of volume-boosting, flexible machine tools) relate directly to the emergence of a renewed period of aftermarket fragmentation that began to take shape in the early 1970s. Recall that back in 1950, "hot rodding" was for all intents and purposes a relatively homogenous phenomenon: young enthusiasts modified flathead V8-equipped early 1930s Ford roadsters and drove them on the streets and on the dry lake beds. During the 1950s, though, the hobby splintered noticeably as

[17] Author Interview with Vic Edelbrock, Jr., Torrance, California, November 19, 2003.
[18] Ibid. The foundry opened in February of 1990.
[19] On Cragar, see Lawrence Donald, "Building a Better Mousetrap – The Philosophy that Governs at Cragar Industries," *HRIN*, July 1977, 34-37. On Hedman, see "Industry Report," *HRIN*, June 1977, 16-19.
[20] See "Performance Industry Leaders Project Business Trends for the Coming Year," *HRIN*, winter 1975, 10-12, 14, 58-59, and 116-123, in which more than a few top-name manufacturers stated unequivocally that they remained firmly committed to *flexibility*, above all else, as their firms grew.

dragsters, customs, street-driven 1930s hot rods, and later-model V8 coupes and sedans gradually evolved into distinct niches.[21] By the end of the 1960s, further fragmentation had added compact cars and off-roaders to the list, but customs and traditional 1930s hot rods all but vanished as the aforementioned late-model "street machines" assumed a position of overwhelming dominance within the hot rodding fraternity.[22]

During the 1970s and the early 1980s, however, a whole host of new and distinct niches began to emerge. Street rods, for example, first began to appear in the late 1960s as a reaction against the newer-model street machines and musclecars that had come to dominate the performance scene. 1930s and 1940s domestic coupes, sedans, phaetons, convertibles, and roadsters equipped with modern drivetrain components and comfortable interiors, street rods therefore represented an attempt to get the traditional style of hot rod back onto the street, but in a much more refined and civilized form than in the pioneering days of the 1930s and the 1940s. Wildly popular among older enthusiasts and family men, street rodding grew rapidly during the early 1970s, spawning the National Street Rod Association (NSRA), countless street-rod-only cruises and events, and a whole new reproduction-oriented market for street rod parts.[23] Fortunately for the speed equipment industry, though, most street rodders used modified late-model V8 engines, transmissions, and suspension components on their new toys.[24] As a result, as the market for new-car street machine equipment began to sag, the booming street rod niche easily took up the slack – and then some.[25] Rivaling street rods in their importance to the speed equipment industry of the late 1970s were several other, newer niches, including nostalgic

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[21] See above, chapter 3.
[22] See above, chapter 4.
[23] On the emergence of street rodding, the associations and events it gave rise to, and the sorts of enthusiasts among whom the phenomenon was the most popular, see Noel Carpenter, "The Industry Scene," *HRIN*, October 1973, 8 and 39; Gray Baskerville, "New Old Stuff," *HRM*, November 1976, 48-50 and 52; "Hot Rod Magazine Street Rod Market Survey," *HRIN*, June 1977, 20-21; Lawrence Donald, "9 Reasons Why You Should be in the Street Rod Business – As Predicted by Nine Leaders in this Explosive Market," *HRIN*, June 1977, 22-29; Gray Baskerville, "Bolt-On Bonanza," *HRM*, August 1978, 90-92, 94, and 96-100; and Author Interview with Dick Wells, Santa Ana, California, April 2, 2003 (Wells, recall, was the first president of the NSRA).
[24] "Hot Rod Magazine Street Rod Market Survey," *HRIN*, June 1977, 20-21, and "Exclusive Consumer Report to HRIN Readers," *HRIN*, November/December 1977, 94, 96, and 98.
[25] John Duke, "Editor's Note," *HRIN*, June 1977, 4.

1950s-style customs, mini-cars, trucks, motorcycles, custom vans, and, to a lesser extent, European imports.[26] Combined with lingering demand for 1950s and 1960s street machine products, not to mention traditional drag racing gear, these new market niches of the 1970s were what fueled the speed equipment industry's ongoing growth. What's more, the variety of aftermarket products that were necessary in order to satisfy these distinct niches forced the industry to carefully manage its growth – and to carefully consider each new machine tool acquisition – in order to retain its flexibility and product-range diversity.

In a sense, then, market fragmentation saved the day – or at least, it gave the speed equipment industry the opportunity to continue to grow during the course of the 1970s and the 1980s. Inherent in this renewed splintering of the 1970s, however, was a fundamental structural weakness that would ultimately contribute in a very real and direct way to the industry-wide slump of 1991. To be sure, the *immediate* trigger for the aftermarket losses suffered that year was the economic recession of the early 1990s. Recessions, though, had never really seemed to bother the industry before – certainly not in the 1970s, at any rate, when the speed equipment business boomed while much of the rest of the economy suffered intermittently from "stagflation," energy crises, and manufacturing job losses. The difference, in the late 1980s and the early 1990s, was that the high-performance aftermarket of the time was particularly soft in a particularly critical niche that had not been weak, in a time of economic recession, since the very early 1930s: the new-car market.

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[26] On nostalgic 1950s-style customs, see Timothy Remus, *Custom Cars and Lead Sleds: America's Best Customs, 50s-90s* (Osceola, WI: Motorbooks International, 1990); Dan Burger and Robert Genat, *Retro Rods* (Osceola, WI: MBI Publishing Company, 2001); and John DeWitt, *Cool Cars, High Art.* On mini-cars, which were domestic compacts of the 1970s and the 1980s (Vegas, Pintos, Capris, and the like), see Alex Xydias, "Publisher's Report," *HRIN*, November 1972, 6; Steve Kelly, "Calling It," *HRIN*, May 1973, 10; Will Hertzberg, "Industry Profile: Cannon Industries – Diversification Spurs Growth of Mini, Foreign Sports Car Specialists," *HRIN*, April/May 1974, 28-29; "Roddin' at Random," *HRM*, December 1975, 14, 16, and 18; and "New Products: Mini-Cars," *HRIN*, April 1977, 58. On trucks, motorcycles, and vans, see Noel Carpenter, "The Industry Scene," *HRIN*, August 1973, 6; "Roddin' at Random," *HRM*, November 1975, 15-17; Carl Olson, "SEMA Scene," *HRM*, May 1976, 12; and "1977 Van Market Survey – A summary of the current trends in the exciting world of marketing van products...and a revealing look at your best customer's buying habits," *HRIN*, May 1977, 26-29. Finally, for brief but excellent surveys of the emergence of the European import high-performance scene during the 1970s and the 1980s, see "VW Tuner Timeline: 20 Years of Tweaks," *VW Trends*, January 1997, 82-85, and Kevin Clemens, "Forward Progress: Thirty Years of Automotive Technology," *European Car*, December 1999, 44-49.

By the late 1980s, that is, the street rod niche remained strong, as did the nostalgic custom market, the street struck market, and the performance aftermarket for 1950s, 1960s, and early 1970s street machines. The problem, though, was that with the possible exception of the street truck niche, each of these market segments was naturally limited by the supply of the older-model cars upon which they were based. In other words, in the short-term, they had enabled the speed equipment industry to continue to grow, but in the long-term, these were niches that were going to level off eventually, and they did. What's more, vans turned out to be a passing fad that all but disappeared by the early 1980s. The same was true of Detroit's "mini-cars" of the 1970s, which quickly fell out of favor among enthusiasts as soon as the oil-related fears of the 1970s began to wane. Motorcycles remained popular, but aftermarket gear for bikes had never accounted for more than about one percent of total aftermarket sales.[27] Similarly, European imports continued to grow in popularity during the course of the early 1980s, but with the exception of water-cooled Volkswagens, this particular niche was for the most part a high-dollar, top-end, lower-volume enterprise that centered on Mercedes-Benz, BMW, Porsche, and other expensive imported makes. What was missing, in the late 1980s, was a strong, entry-level new-car niche upon which the industry could rely for continuing, solid growth.

Actually, this niche had largely been missing since the mid- to late 1970s, when the production of new, affordable OEM performance cars effectively came to a halt. For indeed, when Chrysler, GM, and Ford stopped producing genuine high-performance cars in the mid-1970s, die-hard performance enthusiasts turned either to the classic street machines of the 1950s, the 1960s, and the early 1970s or to the street rods of the 1930s and the 1940s for their projects, largely shunning Detroit's newer models in the process. To be sure, late-model Z-28 Camaros, Mustang GTs, and Pontiac Firebirds would remain popular among enthusiasts right up through the 1980s; accordingly, aftermarket products for these smaller-engined, lower-output descendants of the 1960s musclecar boom remained strong as well. Not as strong, however, as

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[27] This was true even in the late 1970s, when aftermarket insiders and journalists often listed them, with excitement, among the new and growing trends. See, for example, "1977 Performance Industry Survey," *HRIN*, April 1977, 31-38.

the market for their *older* predecessors. For indeed, throughout the 1980s, 1950s and 1960s street machines and musclecars consistently received far more editorial, feature, advertising, and technical coverage – not to mention cover space – in popular periodicals like *Hot Rod* and *Popular Hot Rodding* than did the newer performance models of the time.[28]

Other later models fared far worse. Performance enthusiasm for, say, the new Ford Escorts, Chevrolet Citations, and Chrysler K-Cars of the early to mid-1980s never really materialized at all – certainly not to the extent that it had in the 1960s for the entry-level Dusters, Tempests, and Falcons of the day. Why this was the case depends on whom you choose to believe. Perhaps it was because of governmental regulations and annual emissions inspection programs, which made it difficult for many hot rodders to legally extract acceptable performance gains out of these newer, smaller-engined vehicles.[29] Their performance could be *improved* legally, of course, but never as simply or as cost-effectively as could that of the older, V8-powered cars that rodders consequently favored. Then again, many states had – and, to this day, have – no emissions inspection programs whatsoever. Consequently, for a number of enthusiasts across the United States, late-model modifications could have been as radical as they wished, and newer-model cars could therefore have remained as popular as they had ever been. But they did not.

Another possible explanation for the waning popularity of newer-model cars has less to do with regulations per-se than with the sorts of computerized controls – such as electronic fuel injection and computerized ignition and carburetor adjustments – that the OEMs were beginning to use in the late 1970s and the early 1980s to enable their new cars to meet the emissions and fuel-mileage mandates of the time. For indeed, many of these devices were virtually "tamper-

[28] In fact, when ranking their choices for the best American-made performance cars of all time in 1987, the editors of *Hot Rod Magazine* chose only three late-models, each of which dated from the mid- to late 1980s: the 1987 Iroc Z and GTA 350 Camaro, the 1986 Intercooled V6 Buick Grand National, and the 1985-1987 Mustang GT. Rounding out the list were nine performance models from what the magazine considered to be the good old days: the 1965 Pontiac GTO, the 1968 428 Mustang Cobra Jet, the 1969 Camaro Z-28, the 1969 Plymouth Road Runner 440 Six-Pack, the 1969-1970 Oldsmobile 4-4-2 W-30, the 1970 Chevrolet Chevelle LS6 454, the 1970 Buick GS Stage 1, the 1970 AAR 'Cuda / Challenger, and the 1973-1974 Pontiac Firebird SD455. See "Best of the Breed: Our Choices for the Best Musclecars Ever, Then and Now," *HRM*, June 1987, 31, 33-34, and 36-38.
[29] See, for example, "*HRIN* Predicts," *HRIN*, June 1977, 3.

proof – that is, their computer chips were specifically designed to work with the OEM camshafts, exhaust systems, intake manifolds, carburetion (or fuel injection), and ignition curves of the engines to which they were applied. Changing camshafts, in other words, could often render these computer-controlled engines inoperable, as could changes in compression ratios, ignition components, carburetor jetting, and so on and so forth.[30] By the mid-1980s, however, a handful of aftermarket companies began to produce replacement, high-performance P-ROM computer chips that enthusiasts could simply "plug in" in place of their OEM chips, enabling other high-performance engine modifications to be carried out with much less hassle.[31] In other words, computerization seems at worst to have been a temporary setback for the potential for new-car enthusiasm. Something else, in short, must have been keeping the average rodder away from the cars of the late 1970s and the 1980s.

All things being equal, the simplest explanation tends to be correct, and this is almost certainly the case here. Perhaps, that is, the new cars of the period in question weren't particularly popular among hot rodders precisely because they weren't the sorts of cars that enthusiasts could get excited about. During the 1970s and the 1980s, popular- and trade-periodical journalists often tried to drum up enthusiasm for Detroit's new and smaller-engined cars, informing readers, for example, that "the best is yet to come as we accept the challenge of extracting performance from small engines,"[32] or that, because hot rodding began with 4-cylinder engines in the 1910s and 1920s, average enthusiasts of the 1980s oughtn't be discouraged by the tiny powerplants beneath their hoods.[33] One journalist even went so far as to predict that "the V6 may well be the small-block Chevy of the 1980s."[34] He was wrong, of course – in fact, they were

[30] C. J. Baker, "Throttle Body Fuel Injection: Improvement or Impairment? To Modify GM's New Fuel Injection You Have to Get With the Program," *HRM*, October 1981, 46-48, and Jim McFarland, "*PHR* Fundamentals: On-Board Computer Performance," *PHR*, June 1987, 12.
[31] See, for example, Hypertech advertisement, *Car Craft*, August 1986, 32, and Autothority advertisement, *VW & Porsche*, November/December 1990, 96.
[32] Lee Kelley, "Editorially Speaking," *HRM*, June 1980, 4.
[33] See, for example, John Christy, "Small Cars are Big Business," *HRIN*, May 1973, 56-57 and 72, and Bruce Crower, "Hot Rod Forum: Turbocharging – The Only Game in Town for Small Engines (or, Keeping the Go-Fast Syndrome Alive)," *HRM*, December 1980, 116.
[34] Lee Kelley, "Editorially Speaking," *HRM*, June 1980, 4. Here, of course, "small-block Chevy" is a convenient shorthand for "the basis of ordinary hot rodding," for by the end of the 1970s, the small-block V8 had been *the*

all wrong. For in the event, the small-block Chevy V8 remained by far the most popular engine for performance enthusiasts of the 1980s, ultimately rivaled neither by the new V6s nor by the 4-cylinders of the period. More generally, the tried-and-true V8 format remained the dominant choice among ordinary hot rodders, who tended to prefer any make and model of V8 to its alternatives, even if that meant sticking with much, much older automobiles. In other words, most seem to have looked at their 130-hp V6 or 80-hp inline-4 new-car options, done the math, and ultimately figured that a well-used, V8-powered 1955 Chevrolet – or 1969 Duster, or 1967 Camaro, or 1965 Mustang – would offer a whole lot more bang for the buck. However, when the supply of older cars began to dry up and prices began to rise towards the end of the 1980s, there wasn't anywhere for the low-buck, ordinary enthusiast to turn. With new cars uninspiring and older models increasingly out of their reach, that is, they were left with very few reasonable options – few, in particular, that were attractive enough to compel them to make high-dollar aftermarket purchases in a time of economic recession. *Hence* the 1991 dip.

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In a broader sense, performance enthusiasm faced a lull in the late 1980s and the very early 1990s that was comparable to that which it had faced way back in 1927-1930, for example, or in 1953-1957. For in the late 1920s, when Ford no longer manufactured brand-new Model Ts, it wasn't clear to anyone within the high-performance field just what exactly would replace the Tin Lizzy as the preferred basis for their "speedsters" and Ford "racers." In the event, of course, the Model A picked up the slack, but this did not occur until the very early 1930s.[35] Likewise, when Ford phased its L-head V8 engine out of production in 1953, it wasn't clear to anyone within the hot rodding fraternity just which of the new domestic engines would ultimately come to take its place. Certainty, in this instance, did not come until the late 1950s, when Chevrolet's low-cost, small-block V8 began to dominate the speed equipment industry's endeavors.[36] What

engine for hot rodders for nearly 15 years. Its predecessor, as you will recall, had been the venerable flathead Ford V8. See above, chapters 3 and 4.

[35] See above, chapter 2.

[36] See above, chapters 3 and 4.

took place in the late 1980s was remarkably similar: although street rodding and various new performance segments did a reasonably good job masking its effects until the late 1980s, the demise of the high-output domestic V8 engine in the early to mid-1970s had once again left the enthusiast community without a clear *new-car* alternative.

And in this case, the period of uncertainty was extended. For as it happened, the "next big thing" did not begin to emerge en masse until the early 1990s, and even then, it was not yet clear to anyone that it would prove to be anything more than just another passing fad – like vans, for example, or domestic "mini-cars." By the middle of the decade, though, it was virtually undeniable: the future of performance tuning and speed equipment manufacturing in the United States was going to involve the omnipresent, low-cost import. To be sure, import tuning wasn't entirely new – back in the 1960s and the early 1970s, in fact, equipment manufacturers had sold quite a few manifolds, exhaust systems, camshafts, carburetors, and other speed equipment for the Volkswagen Beetle.[37] But the Beetle ceased to be a new-car aftermarket force in 1975, when VW introduced a tamper-proof electronic fuel injection system known as L-Jetronic for its air-cooled cars.[38] By the end of the 1970s, however, water-cooled VW Rabbits, GTIs, and Sciroccos had begun to attract a core of die-hard devotees, and a specialized branch of the speed equipment industry that served their interests grew, haltingly at first, during the 1980s. By the early 1990s, when VW's new "Motronic" fuel injection system made plug-and-play P-ROM chip-tuning a realistic possibility for owners of late-model VWs, things began to pick up noticeably.[39] Not coincidentally, chip-tuning and other performance hardware development for other imported makes and models – Hondas, Toyotas, and Nissans, most notably – quickly followed in the early to mid-1990s, as import enthusiasts began to tinker with these ubiquitous (and often cheaper)

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[37] See above, chapter 4.

[38] L-Jetronic was an airflow-based electronic fuel injection system in which everything from the air cleaner assembly right down to the muffler itself was tied into a closed loop. Modest gains of 2 or 3 horsepower could conceivably be gained through the use of marginally-larger pistons or high-lift rocker arms on these engines, but for the most part, standard hop-up tricks simply would not work. Consequently, older, carbureted Volkswagens remained the preferred choice of the performance-minded.

[39] "VW Tuner Timeline: 20 Years of Tweaks," *VW Trends*, January 1997, 82-85, and Kevin Clemens, "Forward Progress: Thirty Years of Automotive Technology," *European Car*, December 1999, 44-49.

peers of the water-cooled Volkswagen. Over the past ten years, imported cars have become a mainstay, spawning present-day, silver-screen equivalents of 1972's *American Graffiti* (*The Fast and the Furious*, for example) and re-igniting precisely the same sorts of debates over street racing and exhaust noise that had gotten rodders into trouble in the 1940s and the 1950s.[40] Particularly popular among younger enthusiasts, the "import tuner" craze has definitely turned out to be the next big thing in hot rodding, filling the new-car void in the performance industry's endeavors and providing an affordable outlet for the up-and-coming enthusiast' passion.

Nowhere – save, perhaps, for the magazine racks at Barnes & Noble – is this new reality more evident that at the annual Las Vegas SEMA Show. There, aftermarket displays featuring wildly-painted Civics and Sentras with booming exhaust systems, polished wheels, and enormous spoilers are interspersed with displays focused on performance add-ons for musclecars, 1950s street machines, street rods, trucks, and old-school dragsters. And in spite of the derogatory things that musclecar enthusiasts (and musclecar-oriented magazines) might say about the import fans, and vice versa, on the floor of the SEMA Show it's all the same. For there, it's all about business. The business, that is, that ties it all together. The business that dates back to the earliest days of mass-produced automobility. The business that helped to make high-performance motoring a reality for those with ordinary cars – and those of ordinary means. For indeed, the business of speed equipment manufacturing has never been about a certain brand of car, a certain type of engine, or a certain class of enthusiasts. Instead, it has always been about *adaptability*. Writing in 1979, for example, Jim McFarland explained to the readers of *Hot Rod Magazine* that

> SEMA manufacturers work with what O.E.M. provides. If it's a small-block Chevrolet V8, then we work with small-block Chevrolet V8s. If it's a turbo-supercharged four-cylinder Pinto, then we work with that. Or a V6. Or an in-line six-cylinder. Or an X-body. Or a turbine. We don't originate the plan. We *play* the game, using *their* toys, not ours.[41]

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[40] See, for example, Scott S. Greenberger, "Politicians, Residents Seek to Muffle Roaring Cars," *The Boston Globe*, March 30, 2003, B(1), and above, chapter 3.
[41] Jim McFarland, "The SEMA Scene," *HRM*, November 1979, 98.

To say the least, their "toys" have changed considerably since McFarland typed these lines, but the rules of the "game" most certainly have not. To date, in fact, they have remained essentially unchanged for more than ninety years. For if there's one thing that the Model T enthusiasts of the 1910s, the dry-lakes gearheads of the 1930s, the quarter-mile racers of the 1950s, the musclecar fanatics of the 1960s, the street rodders of the 1970s, and the import devotees of the 1990s have shared in common, it's their need for technical and artifactual assistance in transforming their mass-produced and otherwise mundane cars into personalized, high-performance machines. And as long as this need persists, so too will the speed equipment industry.

Appendix A: Glossary of Technical Jargon and Hot Rod Slang

(note: slang terms appear in quotation marks)

2-barrel (also ***double-barrel***, ***double-well***, ***two-barrel***, or ***twin barrel***) – a carburetor featuring two throttle bodies.

"4-banger" (also ***"four-banger"***) – a four-cylinder engine.

4-barrel (also ***four-barrel***) – a carburetor featuring four throttle bodies. See also ***"quad."***

4-OHV – *abbr.*, "***four overhead valve***," used to describe a particular type of cylinder head fitted to certain inline 4-cylinder engines, one that features one intake valve per cylinder positioned above the piston and one exhaust valve per cylinder positioned in the engine block (or vice-versa). See also ***F-head***.

8-OHV – *abbr.*, "***eight overhead-valve***," used to describe a particular type of cylinder head fitted to certain inline 4-cylinder engines, one that features one intake valve and one exhaust valve per cylinder, both of which are positioned above the piston.

16-OHV – *abbr.*, "***sixteen overhead-valve***," used to describe a particular type of cylinder head fitted to certain inline 4-cylinder engines, one that features two intake valves and two exhaust valves per cylinder, all of which are positioned above the piston.

"advance" – general shorthand for ***ignition advance***.

air-cooling – a method of regulating engine temperatures through the use of air, sometimes (but not always) through the use of a belt-driven fan mounted on the engine itself.

balance – to ensure, through an iterative process of careful weighing and machining, that each of an engine's pistons (and/or connecting rods and crankshaft throws) are of equal weight, in order to reduce undesirable engine vibrations as higher rpms are reached.

"bank" – enthusiast shorthand for "cylinder bank," a set of inline cylinders that makes up one half of a V-type engine (i.e., a V8).

"barrel" – 1. *n.*, enthusiast slang for a carburetor's throttle body. 2. *n.*, enthusiast slang for an engine's cylinder, particularly on air-cooled engines in which the cylinders are not cast as integral parts of the engine block.

"bay" (also ***engine bay***) – the space within the body of a car in which the engine is installed.

"beefed-up" – enthusiast slang for "strengthened" (e.g., "I replaced the standard connecting rods with beefed-up units").

bellhousing – a large metal case, shaped like a bell, that fits between the transmission and the flywheel-end of the engine block and houses the clutch and pressure plate.

"bent-eight" – enthusiast shorthand for "V8."

"big-block" – *adj.*, used to describe a given automobile company's larger class or "family" of V8 engines, typically those which displace more than 350 cubic inches.

"bench race" (also ***"bench racing"***) – that which occurs when two or more enthusiasts get together and talk about races (especially drag races) that they have run, that they have seen run, that they would like to run, or that they would like to see run.

"Big Four" – a less-common enthusiast shorthand for the mainstream American automobile industry that includes the now-defunct American Motors Corporation in the count.

"Big Three" – a common enthusiast shorthand for the mainstream American automobile industry (the "Big Three" are Chrysler, Ford, and General Motors).

"block" – enthusiast shorthand for "engine block."

"blower" – enthusiast slang for "supercharger."

"blown" – 1. *adj*., used to describe an engine equipped with a supercharger. 2. *adj*., used to describe an engine that has ceased to function, typically (but not always) in a catastrophic manner involving shards of metal and/or fire.

"boards" – enthusiast slang for the wood-surfaced oval tracks that were common in the 1910s-1940s.

"boost" – enthusiast slang for the pressurized intake air that superchargers and turbochargers generate.

bore – 1. *n*., the diameter of a given engine's pistons. 2. *n*., the internal diameter of a carburetor throttle body. 3. *v*., to increase the size of a given engine's pistons and cylinders.

"bolt-on" – used to describe speed equipment that can be added to a given production engine with simple hand tools – i.e., equipment that can be added without performing major and/or irreversible modifications to an engine. Thus, a high-performance intake manifold is almost always considered "bolt-on," while the installation of a stroked crankshaft typically is not.

"breathe" – enthusiast slang used to refer to the process whereby an internal combustion engine consumes an incoming charge of fuel and air and then subsequently expels burned exhaust gases, a process that is similar (conceptually) to the way in which animals breathe (by taking in oxygen-rich air and then expelling carbon dioxide).

"buff" – enthusiast slang for "enthusiast." See also ***"gearhead."***

"build-up" – to assemble a modified engine, usually from the ground-up.

"bump" (also ***"bump up"***) – enthusiast slang for "increase," typically used to refer to increases in compression or displacement (i.e., "I installed larger-diameter pistons to bump the engine's displacement").

"bumpstick" – enthusiast slang for "camshaft."

"cam" – enthusiast shorthand for "camshaft."

camshaft – a metal shaft with a series of individual, eccentric lobes that operates an engine's intake and/or exhaust valves.

carbureted – *adj*., refers to an engine that is equipped with one or more carburetors, as opposed to fuel injection.

carburetion – refers to the carburetor (or the system of carburetors) on a given engine.

carburetor – a mechanical device that accomplishes the task of vaporizing fuel and mixing it with the incoming charge of air, primarily through the use of engine vacuum.

"charge" – refers to the incoming fuel-air mixture on an internal combustion engine.

c.i.d. – *abbr*., "***cubic inches of displacement***," a common measurement of the swept volume of an engine's pistons, calculated by multiplying the length of the crankshaft stroke by the area of a cross-section of the piston (πr^2, or 3.14159 x (piston radius)^2), in inches, and then multiplying the result by the number of cylinders. For example, a V8 engine with 4-inch pistons and a 4-inch stroke would yield (4 x (3.14159 x 2^2)) x 8 = 402 c.i.d. See also ***cubic inches***, ***"cubes,"*** and ***displacement***.

"clock" – 1. to measure the speed of a vehicle, especially when involved in a dry lakes race or in a drag race. (This was commonly expressed in the following way: "My rod was clocked at 121.57mph.") 2. the device used to measure the aforementioned speed of a vehicle.

CO – *abbr*., "***carbon monoxide***," a chemical compound found in automobile exhaust.

combustion chamber – the cavity in which the fuel-air mixture of a given cylinder burns in an internal combustion engine.

compression ratio (also ***static compression ratio***) – a ratio of volumes used to express the extent to which the fuel-air mixture is squeezed or compressed during the course of an internal combustion engine's compression stroke (i.e., a compression ration of 9:1 indicates that the fuel-air mixture is compressed by a factor of 9 during the compression stroke).

connecting rods – metal rods with round journals on both ends that connect the pistons to the crankshaft in an internal combustion engine, transferring the reciprocating motion of the pistons to the off-set "throws" of the crankshaft.

counterweighted – used to describe a crankshaft whose off-set "throws" have been balanced to prevent vibration and flexing at higher engine speeds.

"crank" – general shorthand for "crankshaft."

crankcase – the portion of an engine block in which the crankshaft is housed.

crankshaft – a metal shaft with off-set beams or "throws" that converts the reciprocating motion of an engine's pistons into the rotating motion needed to power a car.

cross-flowing – an engineering term used to describe a cylinder head in which the intake ports and the exhaust ports are located on opposite sides of the head, resulting, conceptually, in a flow of intake and exhaust that passes across the cylinder head (many cylinder heads are not cross-flowing, which means that the intake and exhaust ports are all located on one side of the cylinder head; though this is often convenient for the purposes of packaging and production, it is not optimal in terms of fluid motion through the engine).

"cubes" – enthusiast shorthand for "cubic inches (of displacement)."

"cubic inches" – enthusiast shorthand for "cubic inches of displacement," a common means of expressing the size of an engine.

cylinder – the hollow passage in which an engine's piston reciprocates.

cylinder head – a metal casting that bolts to the engine block directly above the cylinders.

cylinder bank – a set of inline cylinders that makes up one half of a V-type engine (i.e., a V8).

detonation – an undesirable explosion in an engine's combustion chamber that results from the premature ignition of the fuel-air mixture , typically due to an excessive compression ratio, the use of low-octane gasoline, or both.

"Detroit" – enthusiast shorthand for the mainstream American automobile industry.

differential – a set of gears that distributes driven power to an automobile's wheels.

displacement – the total swept volume of a given engine's cylinders, expressed in cubic inches, cubic centimeters, or liters and calculated by multiplying the length of the crankshaft stroke by the area of a cross-section of the piston (πr^2, or 3.14159 x (piston radius)^2), and then multiplying the result by the number of cylinders.

distributor (also ***ignition distributor***) – a mechanical device with a rotating internal assembly that distributes high-voltage electrical signals to each of the engine's spark plugs.

DOHC – *abbr.*, "***double overhead camshaft***," an engine configuration in which two camshafts are mounted in the cylinder head and are both driven by a chain, a belt, or by a set of bevel gears. DOHC inline engines, which have but a single cylinder head, therefore have a total of two camshafts, whereas DOHC V-type engines, which almost always have two cylinder heads, therefore have a total of four camshafts (an exception is VW's VR6 engine, introduced in the early 1990s, which is a narrow-angle V6 with a *single* cylinder head and therefore only two camshafts). See also ***OHC***.

downdraft – a type of carburetion in which the incoming air passes downward through the carburetor, where it is mixed with fuel.

"drag" – to engage in a drag race.

"drag race" – a type of automobile contest in which two cars line up and race in a straight line from point A to point B, typically over the distance of a quarter-mile (1320 feet).

"dragster" – an automobile that has been specifically constructed (or reconstructed) in order to take part in a drag race.

"dragstrip" – a paved track at which off-road drag races occur, typically ¼-mile in length.

drivetrain – the entire set of automotive components and systems related to the mechanical powering of the vehicle, including (but not necessarily limited to) the engine, the transmission, the driveshaft(s), and the differential. See also ***"powertrain."***

duration – the length of time, expressed in degrees of rotation, during which a camshaft holds the valves of a given engine open.

dynamometer – a testing apparatus that measures the output of an engine (usually in foot-pounds of torque, which is then converted into horsepower).

dynamic compression ratio (also ***effective compression ratio***) – an expression of a given engine's compression ratio that takes into account the extent to which the intake and exhaust valves remain open during the compression stroke; typically, therefore, the dynamic compression ratio is somewhat lower than the static compression ratio.

"dyno" – enthusiast shorthand for "dynamometer."

EGR – *abbr.*, "***exhaust gas recirculation***," an emissions-control device that reduces NOx emissions levels by lowering engine combustion temperatures through the controlled admission of small quantities of exhaust gas into the engine's incoming air-fuel mixture.

"E.T." – *abbr.*, "***elapsed time***," a drag-racing term used to describe the length of time it takes a car to travel from the starting line to the finish line in a drag race.

engine block – the large metal casting into which major engine components (including, but not limited to the crankshaft, pistons, and rods) are bolted, and which therefore forms the basis of a complete internal combustion engine.

exhaust header – a particular type of exhaust manifold, typically found on high-performance or modified engines, that is precisely calibrated to more efficiently evacuate the exhaust gas and transfer it to the exhaust system.

exhaust manifold – a series of tubes that gathers the exhaust gas from an engine's exhaust ports and transfers it to the exhaust system. See also ***exhaust header***.

exhaust port – a tubular passageway, integral either with the cylinder head (in overhead-valve engines) or with the engine block (in L-head engines), through which engine exhaust gases pass after being expelled from the cylinder through the open exhaust valve(s) but before passing into the exhaust header or manifold.

F-head – an engine configuration in which either the engine's exhaust valves or its intake valves are situated in an OHV (overhead-valve) configuration, while its other set of valves are situated in-block, as with a standard L-head engine.

"factory" – enthusiast slang for unmodified cars and/or engines – i.e., those which are precisely as the original equipment manufacturers designed and/or assembled them. See also ***"stock"*** and ***"OEM."***

"flathead" – 1. *n.*, general shorthand for any engine of the L-head type, in which the intake and exhaust valves are located in the engine block, adjacent to the cylinders. 2. *n.*, enthusiast shorthand for the popular Ford L-head V8 engine, produced from 1932-1953.

flywheel – a heavy metal wheel bolted to the end of the crankshaft that helps to smooth out the rotation of the engine by masking the jerking motion naturally imparted upon the crankshaft by the reciprocating pistons.

fuel injection – a type of induction system that uses pressurized fuel, delivered to the incoming stream of air through one or more metering nozzles or "injectors," to generate the fuel-air mixture that is necessary for combustion.

fuel injector – a nozzle or solenoid valve that sprays pressurized fuel into the incoming stream of air in a fuel-injection-equipped engine.

"gear" – enthusiast slang for "speed equipment."

gearbox – general shorthand for "transmission."

"gearhead" – enthusiast slang for "enthusiast." See also ***"buff."***

glasspack – a type of high-performance muffler that uses fiberglass packing to muffle the sound of the engine.

"gow job" – a pre-WWII term used to describe what would eventually be known as a "hot rod," i.e., a production automobile that has been modified for improved performance.

HC – *abbr.*, "***hydrocarbons***," a type of chemical compound found in automobile exhaust.

"head" – enthusiast shorthand for "cylinder head."

"header" – enthusiast shorthand for "exhaust header."

"hemi" – 1. *n.*, shorthand for "hemispherical combustion chamber." 2. *n.*, (usually "Hemi") shorthand for the Chrysler Corporation's hemispherical-chamber V8 engine, first introduced in 1951, discontinued in the early 1970s, and revived in the early 2000s.

hemispherical combustion chamber – a combustion chamber configuration in which the valves and spark plug are arranged so as to give a hemispherical shape to the top of the chamber.

"hop-up" – 1. *v.*, to modify a production automobile for improved performance. 2. *n.*, (rare) an automobile that has been modified for improved performance. See also ***"hot rodding," "hot rod," "hop up,"*** and ***"soup-up."***

"hopped-up" – enthusiast slang for "modified" (e.g., a "hopped-up Ford").

"hopping-up" – the act or activity of modifying a production automobile for improved performance. See also ***"hot rodding," "performance tuning,"*** and ***"soup-up."***

"hot rod" – 1. *n.*, any production automobile that has been modified for improved performance. Some purists will insist that the only "real" hot rods are those that are based on pre-WWII American-made roadsters, and some will actually insist that they must be Fords, but the present author prefers a more inclusive definition (see above, introduction). 2. *v.*, to modify a production automobile or automobile engine for improved performance. See also ***"gow job"*** and ***"rod."***

"hot rodder" – one who modifies a production automobile for improved performance. See also ***"performance tuner," "rodder,"*** and ***"tuner."***

"hot rodding" – the act or activity of modifying a production automobile for improved performance. See also ***"performance tuning," "hop up,"*** and ***"soup-up."***

ignition advance – the amount of time, measured in degrees of engine rotation, between the firing of a cylinder's spark plug and the point at which its piston reaches the end of its compression stroke. Generally speaking, the faster an engine is rotating, the more ignition advance will be required for optimum combustion efficiency, because the amount of time it takes to burn the fuel-air mixture does not vary, whereas the speed at which a piston travels does; consequently, the amount of ignition advance must be varied as engine speed changes. In some early cars (the Model T, for instance), this was accomplished manually by the driver, but in most cars built since the 1910s, it is done automatically.

"injection" – enthusiast shorthand for "fuel injection."

inline-4 (also ***inline-four***) – a four-cylinder engine in which the cylinders are arranged in a single row.

intake manifold – a part, consisting of a series of passages, that distributes the incoming fuel-air charge (in the case of a carbureted and certain types of fuel-injected engines) or the incoming air (in the case of multi-port fuel injected engines) to the cylinders.

intake port – a tubular passageway, integral either with the cylinder head (in overhead-valve engines) or with the engine block (in L-head engines), through which the incoming air-fuel mixture passes after leaving the intake manifold but before passing through the open intake valve(s) and into the cylinder.

intercooler – a core, similar to a radiator, through which the compressed air exiting a turbo or a supercharger passes in order to cool the incoming air before it enters the cylinders.

"knock" – enthusiast shorthand for pre-ignition and/or detonation.

L-head – a engine configuration in which the intake and exhaust valves are located in the engine block, adjacent to the cylinders. This contrasts with an engine of the OHV (overhead-valve) type. See also ***"flathead."***

"lakes" – enthusiast shorthand for the "dry lakes" of the Southern California high desert, where early hot rodders would gather to race their modified roadsters.

"lakes pipes" – a type of exhaust system that expels the exhaust gases directly into the air, typically underneath the engine or to one or another side of the car, rather than allowing the gases to pass through a muffler first. The name of this type of system derives from the fact that it was first widely used among dry lakes racers in the 1930s and the 1940s.

"lead sled" – enthusiast slang, typically (but not always) derogatory, for a 1950s custom car whose body has been so extensively reworked that it is weighed down (and hence slowed down) by the weight of its lead body filler.

lift – the amount, usually expressed either in fractions of an inch or in millimeters, that a given engine's valves open as a result of the action of the camshaft.

lifters – metal cylinders that transfer the action of a camshaft's lobes to the engine's valves, either directly (by acting upon the valve stems themselves) or indirectly (by acting on a set of pushrods).

lobe – an eccentric metal protrusion on a camshaft that operates the lifters.

magneto – an ignition distributor that uses a series of magnets to generate its own electricity.

"mags" – enthusiast shorthand for "mag wheels," which are lightweight custom wheels. Originally, "mag wheel" specifically referred to a wheel cast from magnesium, but it has since come to be a more widely applicable label for all custom wheels.

manifold – shorthand either for "intake manifold" or "exhaust manifold," depending on the context.

"mill" – enthusiast slang for "engine."

"motor" (also ***"motor around"***) – to drive a car. See also ***"tool."***

NOx – *abbr.*, "***oxides of nitrogen***," a type of chemical compound found in automobile exhaust.

octane (also ***octane rating***) – a measure of the detonation and/or pre-ignition resistance of a given grade of gasoline. The higher a fuel's octane rating, the slower it will burn, and vice-versa; consequently, fuels with higher octane ratings are less prone to pre-ignition and/or detonation than are fuels with lower octane ratings.

"OEM" – 1. *abbr.*, *n.*, general shorthand for "original equipment manufacturer," a mainstream automobile company such as Ford. 2. *abbr.*, *adj.*, enthusiast slang for unmodified cars and engines – i.e., those which are precisely as the original equipment manufacturers designed and/or assembled them. See also ***"stock"*** and ***"factory."***

OHC – *abbr.*, "***overhead camshaft***," an engine configuration in which the camshaft (or, on engines with multiple camshafts, at least one of them) is mounted in the cylinder head (and driven by a chain, a belt, or a set of bevel gears) rather than in the engine block. See also ***DOHC*** and ***SOHC***.

OHV – *abbr.*, "***overhead valve***," an engine / cylinder head configuration in which at least some of the intake and/or exhaust valves are mounted above the piston, in the cylinder head itself rather than in the engine block. See also ***valve-in-head***.

"over-the-counter" – used to describe speed equipment that is commercially-produced.

overlap – the extent, usually expressed in degrees of rotation, to which a camshaft holds both the intake and the exhaust valves of a given engine open at the same time. In general, camshafts with longer overlap periods tend to improve airflow at higher engine speeds, resulting in more top-end power, while those with minimal or no overlap periods tend to result in the production of more low-end torque.

PCV – *abbr.*, "***positive crankcase ventilation valve***," an emissions control device that lowers HC emissions by admitting engine crankcase vapors into the incoming air-fuel mixture rather than allowing them to escape through a draft tube.

"performance tuner" – a company that specializes in the production of high-performance automotive parts, accessories, and (especially) complete high-performance packages.

"performance tuning" – the act or activity of modifying a production automobile for improved performance. See also ***"hot rodding," "hop up,"*** and ***"soup-up."***

"ping" – enthusiast shorthand for pre-ignition and/or detonation.

piston – a round metal part that reciprocates within an engine's cylinder.

"pot" – enthusiast slang for carburetor.

"power curve" (also ***"powercurve"***) – refers to the curve obtained on a standard graph when revolutions per minute occupy the X-axis and engine output, typically expressed either in foot-pounds of torque or horsepower, occupies the Y-axis.

"powerband" – refers to the operating range of an automobile engine, expressed in revolutions per minute. See also ***"power curve."***

"powerplant" – enthusiast slang for "engine."

powertrain – the entire set of automotive components and systems related to the mechanical powering of the vehicle, including (but not necessarily limited to) the engine, the transmission, the driveshaft(s), and the differential. See also ***"drivetrain."***

pre-ignition – an undesirable explosion in an engine's combustion chamber that typically results from the use of low-octane gasoline in an engine with substantial ignition advance.

"progressive" – technical shorthand for "progressive carburetor," a double-barrel carburetor in which only the first or "primary" chamber is used to deliver the fuel-air mixture at low engine speeds (in order to achieve decent fuel economy), while the "secondary" chamber kicks in at higher rpms to supplement the primary chamber (for more top-end power). Progressive 4-barrel carburetors also exist; on those, two chambers work at low speeds and all four at high speeds.

pushrod – a straight metal rod used to transfer the action of a camshaft's lobes to the rocker arms, as in an OHV (overhead-valve) engine (only very rarely are pushrods needed in OHC (overhead-cam) engines). Pushrods are often (but not always) hollow, performing the additional function of carrying engine oil from the crankcase to the rocker assembly.

pushrod tube – a hollow metal tube that covers and protects an engine's pushrods, often also performing the additional function of carrying engine oil from the rocker assembly back to the crankcase.

"quad" – a four-barrel carburetor. See also ***4-barrel.***

"quarter-mile" – enthusiast slang for "dragstrip." (Most dragstrips measure ¼-mile in length.)

ram induction – 1. a type of induction system that uses one or more hood-mounted scoops or vents to force more air into the engine. 2. a type of induction system that uses precisely-calibrated intake passages to induce pressure waves in the incoming charge.

ramp-up – the speed, usually expressed in degrees of rotation, with which a given camshaft opens and/or closes an engine's valves.

ratio rocker – a high-performance ***rocker arm*** designed to multiply valve lift by translating the upward motion of the pushrod into the downward force on the valves at a ratio greater than that of the OEM rocker arms. For example, ratio rockers with a ratio of 1.5:1 would open the valves 1.5 units of measure for every 1 unit of measure of pushrod action (so, for example, a pushrod that moves ½ inch would, with ratio rockers, result in 1.5 x ½ inch = ¾ inch of lift at the valves).

"ride" – enthusiast slang for "car." See also ***"sled"*** and ***"wheels."***

rings – circular strips of metal fitted to the outside of a piston that prevent the incoming charge from passing over the edges of the piston and into the crankcase on the compression stroke and that prevent engine oil from passing into the combustion chamber.

rocker arm – a metal lever, similar conceptually to a see-saw, that mounts on the rocker shaft and converts the upward motion of the engine's pushrods into downward motion that acts upon the valve stems. See also ***"rockers."***

rocker assembly – refers to entire assembly of the rocker arms and the rocker shaft.

rocker shaft – a metal rod on which an engine's rocker arms are mounted.

"rockers" – enthusiast shorthand for "rocker arms."

"rod" – enthusiast shorthand for "hot rod."

"rodder" – enthusiast shorthand for "hot rodder."

"rodding" – enthusiast shorthand for "hot rodding."

roller-bearing – a type of crankshaft or camshaft bearing that utilizes oiled ball-bearings in place of a more conventional smooth steel or alloy oiled "shell bearing."

"screamer" – enthusiast slang for an engine capable of extremely high rpms (or an automobile equipped with such an engine). Honda's S2000 engine, for example, which is capable of reaching 9000 rpm, is a screamer, whereas an engine capable of only 4500 rpm is not.

single-barrel – a carburetor featuring a single throttle body.

"shoehorn in" – to install an engine from another make and/or model into an automobile's engine bay. Typically, this refers to the installation of an engine that has more cylinders or that has a larger engine block than that which was originally installed in the car, and therefore must be "shoehorned in."

"shot rod" – a term, popularized in the late 1940s and the early 1950s, that was used to describe the poorly-built, worn-out, and/or unsafe roadsters that "true" hot rodders did not want journalists, policemen, and average citizens to confuse with their "hot rods."

sidedraft – a type of carburetion in which the incoming air passes horizontally through the carburetor, where it is mixed with fuel.

skirt – the cylindrical section of metal that extends below the surface of a piston, stabilizing the piston as it reciprocates within the cylinder and providing space for the piston's rings.

"sled" – enthusiast slang for "car." See also ***"ride"*** and ***"wheels."***

"sleeper" – a vehicle whose hum-drum, run-of-the-mill appearance is used to disguise the fact that it has been fitted with a highly-modified engine.

"slicks" – enthusiast slang for racing tires, which have little or no tread and therefore appear smooth or "slick."

"slug" – enthusiast slang for "piston."

"slushbox" – enthusiast slang for "automatic transmission."

"small-block" – 1. *adj*., used to describe a given automobile company's smaller class or "family" of V8 engines, typically those which displace no more than approximately 350 cubic inches. 2. *n*., enthusiast shorthand for "small-block Chevrolet V8."

SOHC – *abbr*., "***single overhead camshaft***," an engine configuration in which a single camshaft is mounted in the cylinder head (and driven by a chain, a belt, or a set of bevel gears) rather than in the engine block. See also ***OHC***.

"soup-up" – to modify a production automobile for improved performance. See also ***"hot rodding," "hop up,"*** and ***"performance tuning."***

"souped-up" – used to describe a production automobile or automobile engine that has been modified for improved performance. See also ***"hot rod," "hop up,"*** and ***"tuned."***

"speed equipment" – automobile parts and accessories, especially engine parts and accessories, that can be added to a production automobile (or that can be used on a production automobile in place of its corresponding original parts) in order to improve its performance. See also ***"gear."***

"spool up" – 1. enthusiast slang for "rev." 2. enthusiast slang for the amount of time it takes a turbo to begin to produce positive pressure once the accelerator pedal has been pushed down (i.e., "At 3000 rpm, I was still waiting for the turbo to spool up, but once I hit 3500, I could feel the power beginning to build").

steelpack – a type of high-performance muffler that uses steel-wool packing to muffle the sound of the engine.

"stock" – enthusiast slang for unmodified cars and/or engines – i.e., those which are precisely as the original equipment manufacturers designed and/or assembled them. See also ***"factory"*** and ***"OEM."***

straight-eight – an eight-cylinder engine in which the cylinders are arranged in a single row.

straight-six – a six-cylinder engine in which the cylinders are arranged in a single row.

"strip" – enthusiast shorthand for "dragstrip."

"stripped" – enthusiast slang used to refer to an automobile that has been lightened (in order to achieve a more favorable power to weight ratio) through the removal of those parts its owner deems unnecessary, often including (but certainly not limited to) fenders, running boards, chrome trim, and interior upholstery.

stroke – 1. *n*., the distance that a given engine's pistons travel each way as they reciprocate. 2. *v*., to increase the distance that a given engine's pistons travel as they reciprocate by offset-grinding the connecting rod journals of the engine's crankshaft.

"stroker" – an engine the displacement of which has been increased through the use of a stroked crankshaft, i.e., a crankshaft that permits the pistons to travel a greater distance as they reciprocate than does the original, production crankshaft.

supercharger – a mechanical device, powered by the crankshaft either directly or through a system of tensioned belts, that forces more air into an engine's incoming charge than would otherwise be possible, allowing the engine to consume more fuel and therefore to produce more power.

throttle body – a metal tube through which the incoming flow of air must pass (on both fuel-injected and carbureted engines) en route to the intake ports.

throttle butterfly – a flat disk or flap of metal within a throttle body (on both carbureted and fuel-injected engines) that regulates the incoming flow of air by pivoting on a central shaft connected, either electronically or by means of a cable, to the vehicle's accelerator pedal.

"throws" – enthusiast slang for the off-set beams on a crankshaft to which the connecting rods are bolted.

"time" – enthusiast slang, common among early dry lakes racers, that referred to the top speed – *not* the elapsed time – that a given car had achieved at a given dry lakes meet. (This was commonly expressed in the following way: "My rod's best time is 121.57mph.")

"tool" (also ***"tool around"***) – to drive a car. See also ***"motor."***

"traps" – 1. enthusiast slang for the end of a dragstrip, where a car's speed is measured. 2. enthusiast slang for that point along a dry lakes course where a car's speed is measured, a point which typically was located *not* at the end of the course, but rather somewhere in its middle. 3. the optical or mechanical triggering system that was used in early dry lakes racing to measure a car's top speed.

"tuned" – enthusiast slang for "modified" (e.g., a "tuned engine").

turbo (also ***turbo-supercharger***) – a type of supercharger that uses the flow of exhaust gases to drive a small turbine that forces additional air into the engine's intake system.

"underslinging" – enthusiast slang (from the Model T era) that refers to the act of lowering a vehicle through the modification of its suspension.

updraft – a type of carburetion in which the incoming air passes upward through the carburetor, where it is mixed with fuel.

V5 (also ***V-5***) – a (rare) 5-cylinder engine in which one set or "bank" of two inline cylinders is joined at a common crankshaft with another set of three inline cylinders, forming, when viewed from the front, the shape of a V.

V6 (also ***V-6***) – a 6-cylinder engine in which two sets or "banks" of three inline cylinders are joined at a common crankshaft, forming, when viewed from the front, the shape of a V.

V8 (also ***V-8***) – an 8-cylinder engine in which two sets or "banks" of four inline cylinders are joined at a common crankshaft, forming, when viewed from the front, the shape of a V.

V10 (also ***V-10***) – a 10-cylinder engine in which two sets or "banks" of five inline cylinders are joined at a common crankshaft, forming, when viewed from the front, the shape of a V.

V12 (also ***V-12***) – a 12-cylinder engine in which two sets or "banks" of six inline cylinders are joined at a common crankshaft, forming, when viewed from the front, the shape of a V.

V16 (also ***V-16***) – a 16-cylinder engine in which two sets or "banks" of eight inline cylinders are joined at a common crankshaft, forming, when viewed from the front, the shape of a V.

valve – a metal engine part, *roughly* resembling a large thumbtack, which regulates the passage of the fuel-air mixture into an engine cylinder (and the passage of exhaust gases out).

valve cover – a metal housing that bolts in place over the camshaft and / or rocker assembly on overhead-valve engines.

valve guide – a metal tube, either integral with or fitted to the engine block (in L-head engines) or the cylinder head (in overhead-valve engines), in which the valve stem reciprocates.

valve head – the round, flat portion of an engine valve, situated inside of a given cylinder's combustion chamber, that forms a flat seal when the valve is closed.

valve-in-head – an engine / cylinder head configuration in which at least some of the intake and/or exhaust valves are mounted above the piston, in the cylinder head itself rather than in the engine block. See also ***OHV***.

valve seat – the round, recessed portions of a given cylinder's combustion chamber into which the valve heads nestle (and seal) when the valves are closed.

valve springs – metal coil springs that keep an engine's valves closed whenever the camshaft does not force them open.

valve stem – the slender, shaft-like portion of an engine valve that is situated outside of its corresponding combustion chamber.

valvetrain – the entire engine assembly related to the valves, including the camshaft, lifters, pushrods, rocker assembly, and the valves themselves.

water-cooling – a method of regulating engine temperatures through the use of a liquid coolant medium (i.e., water or antifreeze) which flows throughout the engine block and cylinder head in dedicated passages.

"wheels" – enthusiast slang for "car." See also ***"ride"*** and ***"sled."***

"winged" – refers to an automobile, especially a 1990s import, that has been fitted with an oversized, aftermarket rear spoiler, or "wing."

"work over" – to modify a production automobile engine for improved performance.

Appendix B: Comprehensive Bibliography

Part One: Archives and Unpublished Collections

Air Resources Board Archive, California EPA Headquarters, Sacramento, California.

Periodicals Archive, Don Garlits Museum of Drag Racing, Ocala, Florida.

Private Files of Dick Wells, Santa Ana, California.

Romaine Trade Catalog Collection, University of California at Santa Barbara.

Specialty Equipment Market Association (SEMA) Research Center, SEMA Headquarters, Diamond Bar, California.

Watkins Glen International Motor Racing Research Center Archive, Watkins Glen, New York.

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(Note 1: dates appear only for those periodicals which changed names over the years)
(Note 2: individual periodical article citations, secondary and primary, appear only in the footnotes of this thesis)

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Automotive Industries (1925-present; succeeded *Automotive Industries – The Automobile*).

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