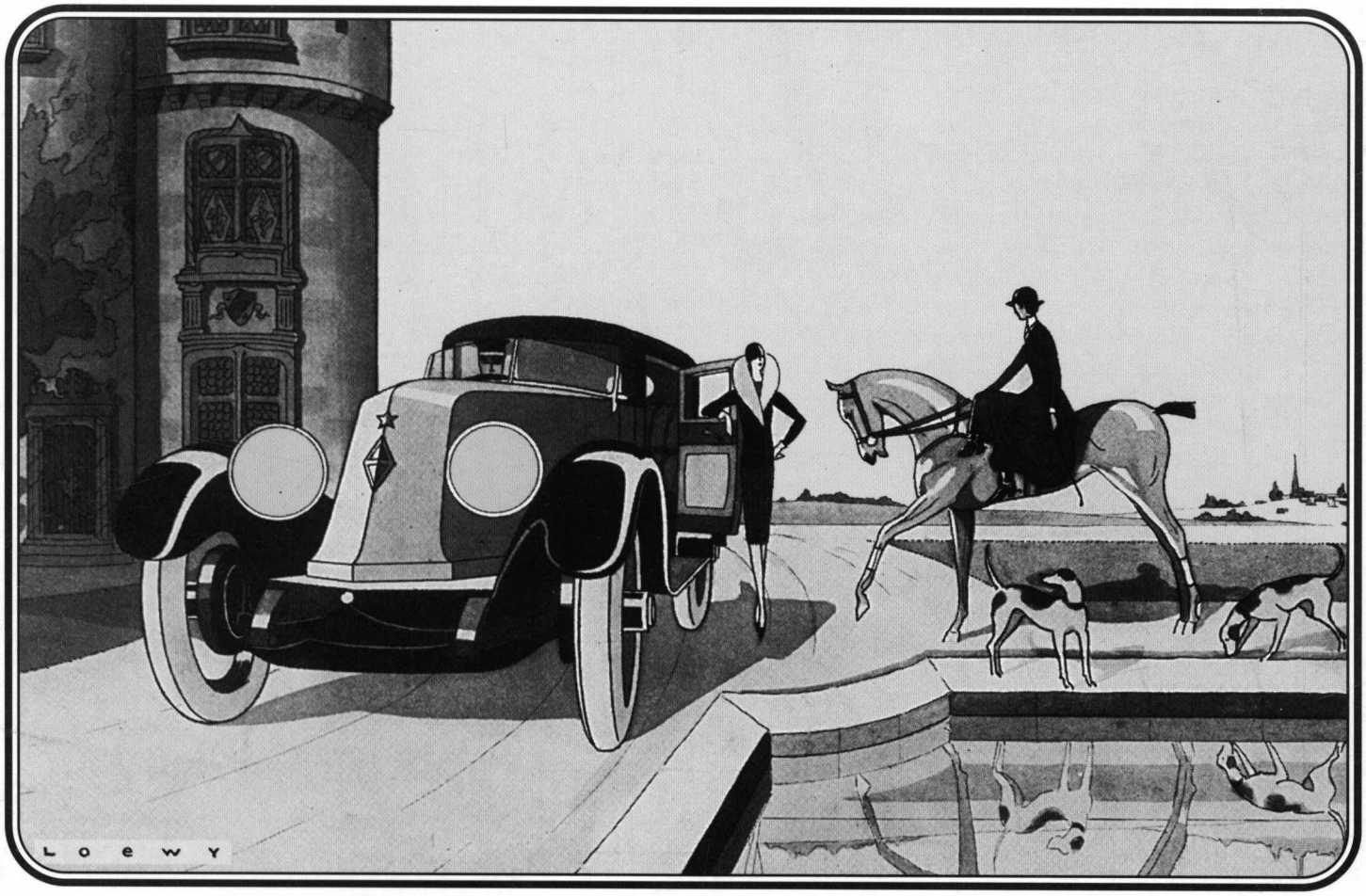
AUTOMOTIVE HISTORY REVIEW

Spring 2005 Issue Number 43



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EDITOR'S NOTES, LETTERS and CORRECTIONS

The novelist Thomas Wolfe is not much read anymore (least of all by me), but I understand that he was fascinated with American place names and would write pages of nothing but. I can understand the appeal of that. My task of applying the mailing labels to each of the 900 or so copies of the *Review* is always lightened by reading the mailing addresses of our members, some of which are so unusual as to be worthy of remark. As I prepared the last issue for mailing, I realized that in Britain we have members who live on The Lawn, The Walk, Ragamuffin Lane (shades of Charles Dickens), and most provocatively, Chick Hill (any "birds" about?). A member in France lives on the rue des Fruits while his American counterparts dwell on Blackberry Lane, Blackberry Farm Road, Cherry Drive, and Apple Tree Lane. I wonder if birds and critters outnumber members on Wild Duck Road, Bob White Road, Mockingbird Lane, and Deer Run? Rawhide Avenue must be home to a Mustang or two. Jade Avenue has an exotic ring to it. One wonders what transpires on Bulk Plant Road. With luck, Golf Drive and Tennis Court Road are populated with Chrysler Town and Country cars from the '40s. King Philip, of course, derives its name from an American Indian chief. My own Trinity Drive abuts Canterbury, Cathedral, and Coventry. But of names related to our primary interest, there are very few. One wonders if South Speed Street is a trap. I hope our member who lives on Cabriolet Avenue drives a convertible.

Now for the issue at hand. As we have learned from the five Conferences, the writing of automotive history is an evolving discipline. There are the traditional works on the individual marques or companies, and the men behind them. This has broadened into analyses of the economic factors that favored some manufacturers and were ill fortune for others. This has been followed by works examining the influence of the automobile and its infrastructure on society. Today, the academic community seems to encourage and be receptive to examination of the role of the automobile as related to sociological subjects of race or gender. It is this latter topic that interested *Adam C. Stanley*, to whom SAH has awarded its 2004 Student Paper Award for his provocatively-titled "Eve's Conquest of the Steering Wheel: Gender and the Automobile in Interwar France." This provides the first article in this issue. Adam has a BA in History and English from Millikin University in Decatur, Illinois, a Master's Degree in History from Purdue University, West Lafayette, Indiana, and is completing his work towards a Ph.D. at Purdue, with his major field of specialization being modern European social and cultural history.

We continue with the conclusion of "Reo and Diamond Reo: The Rise and Fall of the World's Toughest Truck, Part 2," by *Robert R. Ebert* and *Timothy Fijalkovich*. This completes the publication of their paper, presented at the Fifth Automotive History Conference, the first part of which appeared in *Review* No. 42. As noted before, Bob is a member of the SAH board of directors and Buckhorn Professor of Economics at Baldwin-Wallace College, Berea, Ohio. He enlisted the help of his student Tim in this project, who became a member of SAH at the Conference. The paper was peer-reviewed by *Tom Brownell*, former editor of *This Old Truck*, and a professor in the College of Technology (Automotive and Heavy Equipment), Ferris State University.

It has been some time since we presented an article relating to cars in South America (see "Cars Made in Uruguay (1955-1970" by *Alvaro Casal Tatlock*, *Review* No. 33). Thus, "Cars of Brazil 1891-1991" by *Albert Mroz* is especially welcome. The article was peer-reviewed by Alvaro, who is curator of the Montevideo Automobile Museum. Albert Mroz grew up in Palo Alto, California, attending the University of the Pacific and San Jose State University, where he studied English and Industrial Design. After completing his studies in 1976, he worked as a machine designer and technical writer. In the early 1990s, he began publishing articles on auto and truck history for such magazines as *AutoWeek*, *Pickup & Delivery*, *Go West*, *Trucker's News*, *Transport Topics*, *Vintage Truck and Antique Power*, and later for such magazines as *Army Motors*, *Militaria International*, *Convertible*, *Transport Topics*, *EuroSport*, *Wheels of Time* and *Old Time Trucks*. In 1996 Mroz updated *The Illustrated Encyclopedia of American Trucks and Commercial Vehicles* with Krause Publications. He is a member of SAE and American Truck Historical Society.

In *Review* No. 40, Keith R. Jones wrote the story of DeVaux-Hall Motors Corporation. The Hall in the company name refers to Col. Elbert J. Hall. He and his company, Hall-Scott Motors, were notable figures in the early world of engines. We learn more about this aspect of industrial history from *Ric Dias* and Francis Bradford in "The Rise and Fall of Hall-Scott, Engine Manufacturer." Like Reo, Diamond Reo, Pierce-Arrow, and Stearns-Knight previously covered by articles in the *Review*, this is a familiar saga of insufficient resources to met the competition. Ric received a Ph.D. in history from the University of California, Riverside, in 1995, then joined the faculty of Northern State University, in Aberdeen, South Dakota, where he is a Professor of History. Francis Bradford graduated from Stanford in 1934 (that's not a typo) with a BS in engineering, joining Hall-Scott in 1940. He was one of the last employees to leave when the company folded in 1958. He worked for Grove Valve until retiring in 1976, and lives in Berkeley, California. In his 90s, he is probably the oldest author ever published in the *Review*. Messrs. Dias and Bradford are working on a book-length history of Hall-Scott. The article was peer-reviewed by *Bill West* who has written for *Wheels of Time* and presented talks on Hall-Scott, as well as Fageol, Peterbilt, and W. Everett Miller.

I think there's a place in the *Review* for articles that are not really susceptible of peer review, and which are anecdotal, or tangential to the mainstream of automotive history. Issue No. 43 concludes with one such, the story of the efforts of a young Indian prince to obtain the car of his dreams, "A Buick for Bawani," by *Kit Foster* with *Keith Marvin*. Neither gentleman really needs an introduction to the members of SAH. Suffice it to say that at present Kit is the Society's Treasurer, and Keith the doyen of automotive book reviewers.

As with most of the issues which have appeared since I became editor, the

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Front Cover: Renault advertisement, *Vanity Fair*, February 1927. Art work by recent immigrant from France, Raymond Loewy (from the editor's collection).

Rear Cover: The first mass-produced car in France, the Citroën 5 CV, c.1922 (from the editor's collection)

Acknowledgments: Except as noted, the authors provided the illustrations used in their articles.

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Eve's Conquest of the Steering Wheel: Gender and the Automobile in Interwar France

by Adam Stanley

Introduction

In the aftermath of the Great War, France and indeed much of Europe underwent profound changes and experienced unprecedented instability. Popular anxiety at such upheaval concentrated particularly on gender, specifically the expanded roles in society enjoyed by women during World War I. To many, this disorder in gender roles represented a microcosm of larger political, economic, and social disarray. This disorder could be alleviated, according to popular thinking, by reasserting the prewar gender (and, by extension, wider social) order.[1] Given the dramatic changes all of Europe had undergone since 1914, however, the process of restoring gender order naturally involved not simply a return to earlier ways, but a combination of older ideals with a "restructuring and renovation" to account for real changes in society.[2] One aspect of everyday life where change was especially evident—and a source of questions about gender roles—was the proliferation of automobiles in the interwar period. In many ways, women's use of automobiles served as a wider symbol of the perceived independence and sexual liberation of women. As an article in the 1933 agenda of the Galeries Lafayette proclaimed, the greatest contributing factor to "feminine emancipation" in the interwar period was "the automobile in the hands of women" or, more bluntly, "the steering wheel conquered by Eve."[3]

This article will examine two different varieties of primary source material to analyze intersections between automobiles and gender in French popular discourse between the World Wars. The first sources are various promotional materials in French archives, including the annual *agendas* of department stores—calendar books printed and distributed for publicity purposes that were explicitly designed for women, and within whose pages issues purportedly of interest to a female audience were addressed in cartoons, short articles, and sometimes daily words of wisdom or advice. Falling also under the rubric of archival sources are various other advertising and promotional materials—booklets, flyers, and brochures, among others—of French retailers and manufacturers. The second set of sources consists of articles and, in particular, advertisements from the French popular press. Publications of various political orientations will be explored in order to illustrate how gender was defined in relation to motorized vehicles in the pages of, for example, the leftist newspaper *l'Oeuvre* and the influential, right-wing *l'Action Française*. The broad consistency of such publications' gender imagery across the socio-political spectrum and throughout the duration of the two interwar decades is not just striking in its uniformity, but, more importantly, reflective of a wider consensus on such issues in French culture over the course of the 1920s and 1930s.

By focusing on advertising-related materials, my work seeks to apply the findings of scholars regarding gender constructions in post-World War I France, such as Mary Louise Roberts, to a relatively unexamined set of sources. While Robert L. Frost, for one, does indeed give some attention to advertisements, the nature of these sources has been otherwise largely overlooked.[4] This oversight is a significant one, for in the 1920s and 1930s, popular ideology was linked more strongly than ever before with consumption, and advertising was an increasingly important component of consumer culture. As a result, an exploration of gender ideologies in these primary materials—in this case, specifically those related to images of automobiles—can be revelatory of wider notions of gender circulating in interwar France.

French culture, concerned about a perceived disorder in gender roles caused by the upheaval effected by the Great War and maintained by the turbulent circumstances of the interwar era, sought to reassert more traditional roles for women and re-subjugate them discursively to masculine authority. In the realm of automobiles, this cultural task was accomplished in three distinct ways. First, there was an emphasis in automotive imagery on women's domestic roles as wives and mothers in order to offset the worrisome potential of females operating cars in unfettered independence in the public sphere. Second, a male monopoly over technological knowledge was established, which constructed women as disinterested in or ignorant of the inner workings of cars. Third, women were excluded discursively from the crucial issue of maintaining and redefining a distinctive national identity, particularly in light of the dangers of "Americanization," which threatened to undermine the foundations of national culture in favor of an internationalized homogeneity. By employing these ideological strategies, French discourse restricted women's association with modernity—as embodied in automobiles—to culturally acceptable levels, thus negating the liberating and anxiety-producing possibilities of women's utilization of this technology.

Viewing gender ideology in the context of a technological good such as the automobile can bring larger cultural issues into clear focus. Technological inventions bear significance and meanings that extend well beyond their immediately evident utilities (as machines of transit, in the case of autos). Technology is more than just a material artifact; much like gender, it is a cultural construct that merits analysis in specific historical context.[5] Indeed, the importance of technological inventions is such that they may be considered to reside "at the center of lived experience."[6] Addressing intersections between gender and technology, then, can illuminate far broader aspects of society and culture.

If technology as a whole reveals wider social and cultural values, automobiles specifically are a particularly worthy subject of scholarly attention. As Nicholas Zurbrugg has noted, the car has been a major preoccupation in popular culture throughout the course of the 20th century, providing "a

fascinating index of successive dominant social, intellectual, and cultural concerns."[7] In the words of Wolfgang Sachs, "the automobile is much more than a mere means of transportation; rather, it is wholly imbued with feelings and desires that raise it to the level of a cultural symbol."[8] These cultural symbols in turn can and do send messages about those who use them. A car is in many ways "a mobile signifier, something which says something about you and which comes 'wrapped' in a web of meanings and values."[9] Indeed, during the 1920s and 1930s, cars were discussed in the wider context of what they portended for society and culture writ large – within which the specific issue of gender was a central theme. Before exploring the gendered elements of automotive ideology in the interwar period, however, a brief overview of the history of the automobile in France between the World Wars is in order.

The Automobile in Interwar France

Although they had been invented decades earlier, cars burst onto the European landscape in significant numbers only following the First World War, before which vehicle ownership had been limited to a very narrow range of elites. In the course of the war, automobiles made a favorable impression on ordinary Europeans for their service to the war effort—such as carrying food to civilians and soldiers as well as supplying front-line troops with necessary equipment.[10] As automobiles became objects of affection and, very soon, desire to the average European in World War I, the lessons learned by industrialists during the conflict likewise were pivotal to the history of the automobile. During the war years, most European automotive works were given over to military production, establishing industrial conditions under which auto manufacturing would flourish on a larger scale after the war.[11] Coupled with the increasing receptivity of the general public to motorized vehicles, the heightened productive levels of automotive factories suggested that the postwar era could well be one of unprecedented production and dissemination of cars.

Indeed, the 1920s were a time of striking expansion in automobile production in France. The decade witnessed a fairly steady upward climb, from a yearly output of 18,000 vehicles in 1919 to more than a quarter of a million in 1929.[12] France had led the world in automobile production at the turn of the century, and it remained in the 1920s the leading European automobile producer, although by the outbreak of the Great War the United States far outstripped it and all other European manufacturers in auto production.[13] Still, viewed within the European context, the French automotive industry seemed a success in the first postwar decade. There were several reasons for this period of prosperity in automobile manufacturing. One key factor was that the French "Big Three" firms—Citroën, Renault, and Peugeot—all converted their operations to the Fordist model of assembly-line production, allowing them to offer relatively low prices and produce a high number of cars.[14] The prosperity of the industry was exemplified by Citroën, whose Fordist methods and consumer-oriented approach facilitated the production of more than 100,000 vehicles by 1929, more than any other European automaker.[15] Higher tariffs enacted soon after World War I proved to be a second critical element of French auto manufacturing success in the 1920s.[16] With this significant impediment to foreign encroachment in place, French automakers faced reduced competition from other European and American firms.[17]

The onset of the Great Depression meant that the 1930s were often difficult years for the French automobile industry. French vehicle output dipped considerably in the early 1930s, and production improved only slowly and haltingly from there; it would not be until 1950 that France matched its output of 1929.[18] Moreover, during the 1930s, government policies generally hindered rather than helped French car manufacturers, damaging the potential for recovery in the motor industry. For example, the French government heaped an increasing amount of taxes on auto-related products, especially gasoline, in an attempt to make up for fiscal shortcomings.[19] Even the "Big Three" often had to fight to stay solvent. This was especially the case with Citroën, which by 1935 found itself on the cusp of bankruptcy. By 1937, the company had recovered enough to re-emerge as the largest producer of cars in France (a distinction it had lost a few years earlier), but its production figures were still well below the levels of the 1920s.[20]

Even in the best interwar economic years, however, the number of vehicles purchased by French consumers was relatively scant compared to American consumption levels. By 1938, there was still just one vehicle for every 18.5 French residents, whereas in the United States, the ratio was one for every 4.4 people.[21] It is difficult to argue, then, that France had been transformed into a society of mass consumption, particularly where automobiles were concerned. My interest, however, lies in the establishment of a consumer *mentality* rather than a consumer *economy*. As Robert L. Frost argues with respect to household appliances, the lack of actual purchases in the interwar era is less important than the adoption of a consumerist mindset by French citizens.[22] Moreover, dealing specifically with automobiles, Kristin Ross contends that the car was a focal point of attention in French consciousness well before it was a part of most people's actual daily lives.[23] The French formulated self-identities as consumers, regardless of whether or not they actually could afford or did buy commodities such as automobiles. Moreover, the culture in which they lived constructed them as consumers as well, based on the availability of products like automobiles in the marketplace. Patrick Fridenson's examination of the advertising budgets of French automakers, for instance, shows that they spent surprisingly hefty amounts of money on advertising, outspending (in terms of percentage of sales revenue) even American car manufacturers.[24] All this even as many French could not yet afford a car. Kristin Ross writes: "In France, the automobile occupied an intermediate status, that of being *within the purview* of most French. Neither a fantastic, luxurious dream nor a 'necessary commodity', an element of survival, the car had become a project: what one was going to buy next."[25]

The Automobile as Emancipator

The French aspired to be consumers, then, and in particular to be consumers of automobiles. Cars, in many ways the very embodiment of modernity, seemed to hold a promise of emancipation and "unchained mobility" in the modern industrial age.[26] As Wolfgang Sachs explains in a German

context, before the dawn of the automobile, modern forms of transportation had been psychologically problematic, especially for males of some social status. Traveling by rail, for instance, meant acceding to unwanted constraints and limitations, such as abiding strictly by a transit schedule. As Sachs puts it, riding the train involved subjugating one's autonomy and becoming a veritable prisoner to the rail system.[27] The automobile offered the tantalizing prospect of an escape from such proverbial incarceration, presenting instead an empowering image of pleasure, freedom, and self-determined mobility.[28]

This line of thinking became decidedly less celebratory, however, when applied to females. Whereas the emancipating and liberating nature of automobile travel was lauded with respect to men, placing women in the same conceptual position yielded far different discursive results. "Proper" feminine virtue dictated that women's lives centered upon the household and were subordinated to masculine authority, but cars threatened this traditional, idealized gender ideology through their immediate, individualized, and emancipating access to the public world. Images of female mobility and independence, then, which were closely associated with the automobile, were much less palatable in interwar culture. Dealing with the American case, Virginia Scharff recounts the words of *Motor* magazine editor Ray W. Sherman, who wrote in 1927 that "every time a woman learns to drive—and thousands do every year—it is a threat at yesterday's order of things."[29] As Nina E. Lerman reminds us with respect to technology in general, "gender ideologies play a central role in human interactions with technology, and technology in Western culture is crucial to the ways male and female identities are formed, gender structures defined, and gender ideologies constructed."[30] In the case of interwar France, this statement proves especially prescient, as images and commentary in publicity materials from the 1920s and 1930s sought to delimit the boundaries of masculinity and femininity via the era's most powerful technological icon, the automobile.

Home and Family

As far as the automobile was concerned, the preponderance of discursive efforts to construct a gender ideology in interwar France involved consigning women's use of this new technology within acceptable limits. Widespread anxieties about "modern women" who abandoned traditional feminine pursuits such as marriage and family in order to live and work independently attracted a great deal of criticism from observers across much of Europe. The car, from that standpoint, was particularly unsettling as it related to women, for it offered instant, unrestricted access to the public sphere—at a time when French cultural commentary repeatedly emphasized a "proper" feminine focus on home and hearth.

As a result, images of women with automobiles were carefully constructed so as to avoid potential connections to "improper" femininity. Such a strategy not only limited women's discursive roles, but also undermined any sense of female agency with respect to automobiles. In his study of Michelin, for instance, Stephen L. Harp states that, of all the tire company's publications printed between the World Wars, only one refers to a woman driving a car. She is a rural Frenchwoman headed to market for groceries for her family, thus fulfilling her "proper" domestic duties.[31] French promotional materials demonstrate such themes as well, as advertising images linked women's use of cars simply to their marital and maternal responsibilities, thus subverting the emancipating possibilities of automobiles.

An advertisement for Ford clearly demonstrates the connection to family in French marketing materials depicting women. In the ad, a woman is seated behind the wheel of a car; two older figures, perhaps the driver's parents, are seated in the back. Standing beside the car, apparently about to climb on board, is a child. The text of the ad, rather than expounding on the car's various technological features, focuses on its elegance and luxury. Even more notable is the ad's header: "The Car of the family" (Fig. 1).[32] Thus the threatening potential of a liberated female driver was defused by a focus on the familial; she obviously was not a "modern woman" headed off to a workplace but rather was undoubtedly embarking on a family outing of some sort.

Other advertisements performed a similar ideological function. Two ads from the summer of 1930 for Citroën, for example, also raise the issue of family when picturing women with automobiles. In the first, a woman stands outside the car holding the door as numerous family members (the ad's thrust was to demonstrate how many people could fit into the car—six people were shown sitting inside it) await their departure for a "happy excursion."[33] In the other ad, the car sits in the background, having already transported a large extended family (seven people in total, plus the family dog) to a park for a picnic.[34] Finally, even an advertisement for a window manufacturer, Huet, incorporates such imagery. The ad shows a close-up image of a mother and her son in a car; with a look of contentment yet concentration, the mother drives as her son laughs at something unseen to the reader out of the car's front window. From the activity of the windshield wiper, it appears that driving conditions are not ideal, yet the ad assures the reader that the car's Huet windshield will maintain visibility for the driver, keeping the passengers inside safe and secure.[35] Finally, in a short story published in *l'Illustration* in 1930 entitled "Madame Conduit . . . ," a young woman obtains a driver's license only after verbally jousting with her skeptical husband to convince him that it would not be pointless for her to have one. After experiencing a few unpleasant adventures behind the wheel when she drives for her own personal pleasure, Madame at the end of the story comes to recognize the value of using her newfound driving ability in order to chauffeur her children.[36] All of these images, then, depict women using cars only as part of their familial duties, eliminating any potential connections to the liberating features of the automobile.

In other cases, portrayals of men moving within the public sphere were directly counterpoised with women remaining tied to the household. An advertisement for Ocleir polish, for instance, contains two different images. On the left side of the ad, a man applies the polish to an automobile. On the right, a woman makes use of the polish inside the house to maintain the appearance of her furniture.[37] Hearth and home were thus asserted as women's sphere, while men were linked to the public world. Such a dichotomy was evident also in a pair of advertisements for Monet and Goyon motorized bikes. The first ad features a man riding one of these machines. An industrial setting serves as the backdrop for the ad, and the text

Fig. 1 – The Model T as a family car in France in 1925. (provided by the author)

Fig. 2 – A motorcycle is for monsieur . . . .
(1927 ad provided by the author)

Fig. 3 – . . . while a 3-wheeled "auto-mouche" is deemed more suitable for madame. (1927 ad provided by the author)

specifically mentions using the bike to go to work (Fig. 2).[38] The second ad, however, which shows a woman standing alongside a bike, has a decidedly residential setting; a house is clearly visible behind her (Fig. 3).[39] In such examples, no overt familial imagery comes into play, but the emphasis on the domestic sphere as women's realm—and the public arena of work and industry as men's domain—is unmistakable.

The Automobile and Technological Knowledge
Technological Men, Elegant Women

The most frequent and significant way in which masculinity and femininity were defined vis-à-vis automobiles in the interwar period was the delineation of technological knowledge as an exclusively masculine trait. Building on pre-

existing ideas of sexual difference, French commentary linked masculine involvement with automobiles to issues of practical and technical interest. Women's association with cars, on the other hand, was discursively much more closely related to traditional feminine aptitudes regarding taste, style, and judgment of beauty.[40] Thus a line was drawn, as Virginia Scharff notes in the case of the United States, between masculine function and feminine form, the latter of which was considered merely "cosmetic or superfluous."[41]

Auto advertisements that featured male figures tended to explore cars' technological and mechanical values at great length; indeed, technological features formed the centerpiece of most ads directed at men. In a 1937 Simca advertisement, for example, two men are shown in a car, and the surrounding text focuses on the automobile's steel bodywork, hydraulics, and transmission.[42] Much the same is true of an ad for Sizaire from the middle of the 1920s, which shows two men in the front seat of the car, while two female passengers are confined to the back seat. The ad discusses issues such as the car's fuel mileage, suspension system, and speed capabilities.[43]

Meanwhile, publicity materials that dealt with women in relation to automobiles centered upon different issues considered more appropriately feminine, especially a vehicle's appearance and comfort, and downplayed or completely ignored technical issues. This is not to say that there was never any overlap between the discursive poles of technology and elegance; certainly, at least some of the discourse directed at men did touch upon issues considered more womanly, and vice versa. By and large, however, those issues were relegated to a minor role in terms of their relative spatial arrangement within the discussion and the amount of content devoted to them.

In an ad for Lincoln automobiles, for instance, two women are shown sitting inside a very spacious interior. Arching across the top left side of the ad is the word "comfortable" in large print. A text box within the advertisement declares: "As comfortable as a *boudoir*, the LINCOLN offers all the refinements that an elegant woman can wish for," including spaciousness, soft seats, and good lighting. There is no mention at all of the car's technological features (Fig. 4).[44] Along the same lines, a Buick advertisement from 1928 shows a woman driving a car in front of a scenic landscape of greenery; an arrow pointing to Paris behind her suggests she has driven away from the bustle of the city in favor of spending some time in the French countryside. The ad declares that the car's "luxury and its comfort seduce the elegant woman."[45] A similar theme is evident in a 1925 advertisement for Renault. Below an image of a woman seated behind the wheel and another woman standing next to the car, the text of the ad declares that, for the French woman, taste is of utmost importance in an automobile. The ad goes on to assure that this car indeed is the most elegant and comfortable one a woman will find.[46]

Of further note is an article from the 1933 *agenda* of the Galeries Lafayette entitled "The woman driver or elegance in the automobile." The article comments upon women's ability to bring elegance to a vehicle, claiming that the "presence of a woman driver clarifies, emphasizes, perfects the elegance of an automobile."[47] Moreover, whereas a number of advertisements in the French press directed at men emphasized cars' speed capabilities among other technical qualities, this article contends that women's moderation, behind the wheel as "in all things," means that women generally drive at slower speeds than men.[48] All of the above images and ideas support the contention of Jenny Rice and Carol Saunders, whose essay dealing with contemporary British auto marketing argues that advertisements for cars directed toward women have historically almost never emphasized a car's power or speed (or, by extension, its technological merits more generally) as a significant selling point, unlike ads aimed at men.[49]

Even on those rare occasions in which practicality was raised in publicity materials concerning women, such references still ultimately returned to issues deemed less masculine or severely restricted the context in which practicality was brought into question. For instance, in an article from the 1921 *agenda* of the Grands Magasins du Louvre, the term "practical" is invoked with respect to women and automobiles, but it has nothing to do with the operation or performance of a car; instead, it is in the context of women's fashions. The article instructs women to be both elegant and practical in considering what to wear for a car ride, citing as an example a hat that will prevent one's hair from becoming unkempt and will not obstruct the view of the road.[50] A similar chord about women, driving, and dress is struck in an illustration in the 1928 *agenda* of the Bon Marché. It features two women inside a car as well as a mother and daughter standing outside of it looking at the vehicle. Text accompanying the illustration states: "Women have brought all of their charm to the automobile." At the same time, however, the text notes that "in exchange the auto has given them practical sense," for a woman who is preparing to go on a tourist excursion in an automobile "knows not to encumber herself with useless luggage and to dress in a rational and convenient manner."[51] Thus in this instance practicality originates in the automobile rather than the pictured women. Even after this "practical sense" has been given to women by the car, it does not apply to a car's power and speed, being prepared to deal with mechanical problems on a trip, or any other technological issues related to the car, but instead is once again centrally concerned simply with what to wear (and, in the latter example, what to pack).

An article dealing with an all-female driving event shows further distinction between the technological domain of men and the feminine realm of comfort, beauty, and luxury. This 1925 article from *l'Illustration*, "La Première Epreuve Féminine de Grand Tourisme Automobile, " recounts the first-ever all-women's touring trip across France. (Fig. 5) In describing several of the cars and drivers that took part in the event, the article states that the vehicles were all "comfortable and more or less luxurious," noting specifically the elegance of the entries. Moreover, the article highlights the fact that the women taking part became "a little emotional" when it came time to begin the excursion.[52] This association of women with emotionality was no coincidence. It fits with a pattern of gender ideology, particularly evident in marketing strategies, that defined females as emotional and impulsive in direct opposition to calculating, rational men, thereby further undermining any female agency in regard to technical abilities.[53] The previous article, then, reinforced traditional gender notions as it nonetheless—and as a

Fig. 4 – Lincoln, as comfortable as a boudoir, l'Illustration, *7 June 1930.* (provided by the author and the editor)

means of negating the extraordinary nature of this first-time event—described a powerful new manifestation of feminine appropriation of the automobile.

Lastly in this regard, a series of articles and pictures recounting the events at an annual French auto show in the late 1930s is illuminating. The auto show in question was a Grand Prix (or simply Competition, depending on the year) of Automobile Elegance. Well-illustrated articles written about this yearly event focused primarily on the issues of elegance on which each car was judged (although in some cases a cursory mention of the technological merits of the cars received attention near the end of the articles). Given that the competition involved a test of elegance rather than technological merit, it is not surprising that the pictures almost always featured women with the competing cars, standing beside them or driving them as part of a procession during the event. At the same time, however, the captions of these photographs were always careful to identify the (invariably male) designers of the cars.[54] As such, the women shown with the automobiles became mere passive instruments of male technological authority.

Fig. 5 – At Angers, in front of the Automobile Club de l'Ouest: the group of 24 competitors for the Paris-Le Baule trial, l'Illustration, *3 October 1925.*
(from the editor's collection)

Such images depicting women as dependent on male technical prowess appeared in other contexts as well. Their objective was to blunt the potentially transgressive impact of female utilization of the automobile by maximizing the masculine expertise involved in creating and building a car. Indeed, some of these materials went so far as to construct women as little more than children, able to operate a vehicle only due to its superior masculine conception, design, and construction. A good example is provided by a 1929 Citroën advertisement that shows a woman driving alone in a car. The ad announces that the car is "easy to handle" due to its excellent design and construction[55]—and it is crucial to recognize the implication that this design was conceived and the construction done by men. As another example, a set of advertisements alluded to previously for Monet & Goyon motorized bikes are instructive. The Monet & Goyon ad featuring a man boasts that the subject in the ad will reach his destinations quickly and without any mechanical failures (see Fig. 2).[56] In contrast, the ad that shows a woman preparing to use a bike, rather than emphasizing its efficiency, focuses on the vehicle's ease of use. The header of the ad reads: "In order for you to travel easily." The ad's text elaborates: "Of a remarkable simplicity, this device does not require any special knowledge and can be driven by a child" (see Fig. 3)[57]

These images illustrate clearly a gendering of technological expertise, an issue that Arwen Palmer Mohun has studied in relation to British and American laundry machine businesses in the 19th and 20th centuries. Mohun argues that laundrymen constructed an ideology that, while conceding that women were capable of using a technological product such as a laundry machine, insisted that "laundries as technological systems were essentially masculine; that they required masculine ways of thinking about and organizing technology in order to function properly."[58] As historians such as Gail Reekie and Ruth Oldenziel contend, such ideologies highlight the powerful discursive connection historically between technology and masculinity, in which men have been seen as the active producers of technology, and women merely passive consumers of it. This masculine monopoly over technical expertise asserted by extension men's mastery over women as well.[59] It was, as Janet Lungstrum maintains with respect to German ideologies of technology, "the ultimate Pygmalionesque fantasy of control."[60] A virtually identical process was at work in French automotive discourse. Women, it was viewed, mindlessly utilized technologies created by men, and over which men still held an intellectual monopoly. These articles and advertisements never claimed that women were incapable of driving a vehicle; they could drive, but only because an inherently technologically-oriented male designed the product so expertly that it was easy enough for anyone, even a child, to use.

Masculine Dominance, Feminine Incompetence

An advertisement for Hotchkiss automobiles from 1932 makes this masculine mastery over technology even more explicit (Fig. 6). In the ad, a man is shown driving a car. The ad's text asserts that "a good car must always be ready to obey" and be "submissive to all the demands of its masters."[61] Thus the man in the ad controls and dominates the technology embedded in the car. It is significant to note that there is no parallel for this kind of advertisement with respect to women; a language of dominance and authority over the vehicle is never invoked in advertisements portraying female figures.

Fig. 6 – Hotchkiss, artwork by Alexis Kow, l'Illustration*, 16 April 1932.* (from the editor's collection)

Rather than being masters of technology, women were constructed, in the words of Virginia Scharff, "as incompetent and flighty behind the wheel, helplessly ignorant in the face of mechanical problems."[62] This construction of women as helpless and incompetent in terms of automotive skill and knowledge can be clearly seen by returning to the story of "Madame Conduit . . ." from *l'Illustration* in 1930, in which Madame has to convince her incredulous husband that it is worthwhile for her to have a driver's license. In one of the story's illustrations, Madame, with a look of trepidation and uncertainty on her face, is shown trying to remove the spare tire from the back of her car. She is looking behind her, as though hoping for someone to help her. The caption of the illustration says as much, declaring that she feels it more suitable for a man to change a tire (Fig. 7). The story itself, moreover, suggests Madame's incompetence as a driver. Soon after obtaining her license, Madame goes driving alone around Paris. Not long thereafter, despite the fact that she took driving lessons before acquiring her license, Madame causes an

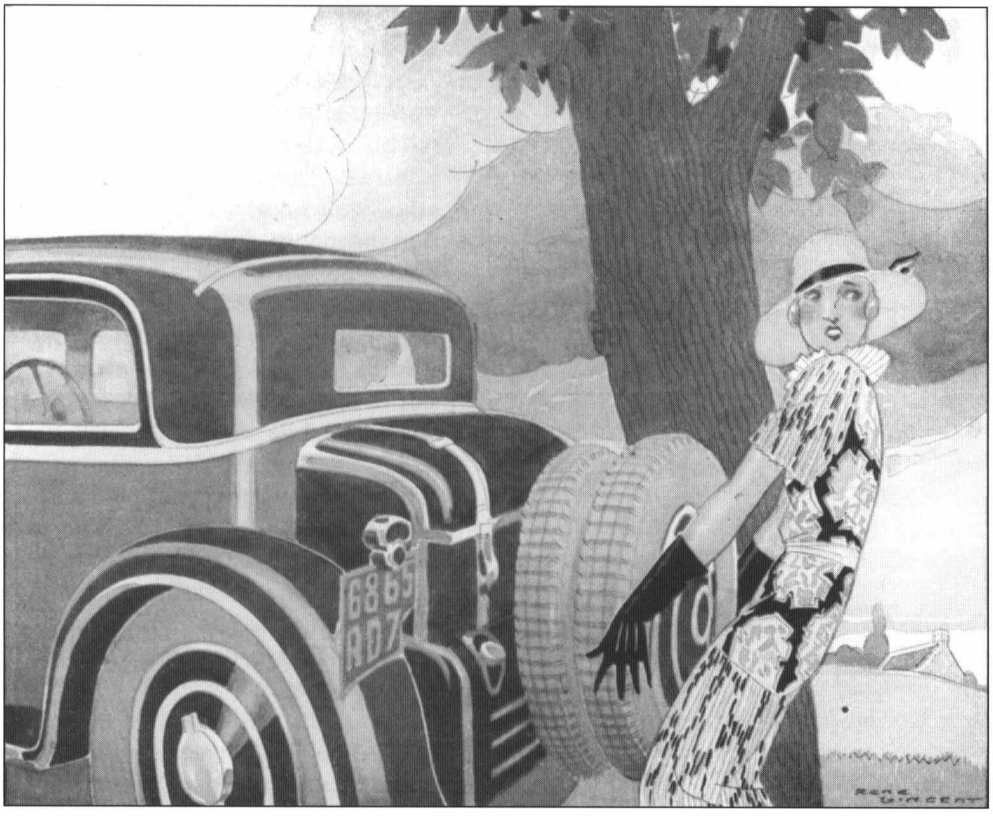


Fig 7 – All the same, she thinks it would be better for a man to change the tire. Artwork by René Vincent from "Madame Conduit . . . .". l'Illustration, *4 October 1930.* (provided by the author and the editor)

accident, damaging her car so thoroughly that it must be towed away. Virtually every part of the car was affected—"Madame alone was unscathed." An accompanying illustration shows the car being towed in the background; in the foreground, Monsieur, her husband (neither of them are given names in the story), literally and figuratively looks down on her as she cowers, her face downtrodden, from his contemptuous glare.[63]

Other images from French promotional materials make similar suggestions. An illustration from the 1926 *agenda* of the Grands Magasins du Louvre, contained within an article about women and automobiles, shows the incompetence of women in relation to issues of driving and, in particular, directions. The image depicts a uniformed man, evidently a chauffeur of some sort, alone in a car seated behind the wheel. He looks frazzled by the women who stand pointing on each side of the car. One of these women is pointing toward the front of the car, while the other gestures in the direction behind it.[64] It seems that this professional driver has inquired for directions, and the women cannot agree on which way he needs to go. Some sources demonstrate analogous themes related specifically to women as drivers. In a cartoon from 1938 satirically depicting a number of "public enemies," a woman is shown seated behind the wheel of a car applying cosmetics to her face. Behind her, a short line of stopped cars with flustered men inside make it evident that the woman has halted traffic in order to care for her personal appearance. The sole words attached are: "Public Enemy No. 3: lipstick" (Fig. 8).[65] Such images also demonstrate a phenomenon noted by Erving Goffman, whose study of gender in advertising contends that, in order to neutralize or trivialize the potentially disconcerting impact of an image or idea—in this case, a woman driving independently on her own, without any connections to home or hearth—an advertisement may portray the action in question as "a lark or a dare," something not to be taken seriously.[66]

One final discursive arena wherein the masculine mastery over technology and feminine ignorance of it was highlighted was automotive maintenance. As Deborah Simonton maintains with respect to gender ideologies and technology in the workplace, men were to be the ones to repair and maintain machinery. In an argument reminiscent of Mohun's analysis of laundry workers, Simonton states that women "were not supposed to understand machines and were only to tend and operate them."[67] Thus it should not be surprising that women were very rarely depicted in advertisements for goods such as motor oil. Utilizing that type of product would necessitate a wider understanding of the workings of an automobile, not simply passive and mindless operation of a vehicle. Even in the infrequent instances in which women did appear in such situations, moreover, their subjugation to the technological expertise of men was usually directly and unabashedly articulated.

In advertisements for motor oil, for instance, French imagery frequently showed a man either driving a vehicle or holding the advertised good.[68] Just as commonly, men in such ads displayed a more explicit mastery over or knowledge of the product. This variously involved picturing a man who provided a testimonial about the quality of the product based on his own experience and knowledge,[69] showing male figures working on their cars with the products in question,[70] or, in one case, male engineers working in a laboratory to "perfect" the product.[71] A rather singular example is an advertising flyer for an automotive service station from the early 1930s. It depicts a bustling scene as two cars, both driven by men, are being serviced at the station. Various masculine figures are shown working with either of the cars—under the hood, under the car, bringing in a tire. The reverse side of the flyer discusses in technical detail some of the services performed by the station, among them oil changes and brake adjustments.[72] Noteworthy as well in this regard is an advertising flyer from May 1923 for a liquid antiseptic, *Le Savolin*, that allows people to wash their hands without water, according to the flyer. The flyer concentrates on the applicability of this product to an automotive context. According to the advertisement, if one becomes stranded by a car problem and must tinker with the automobile while on the road, one's hands could become dirty and require cleaning,

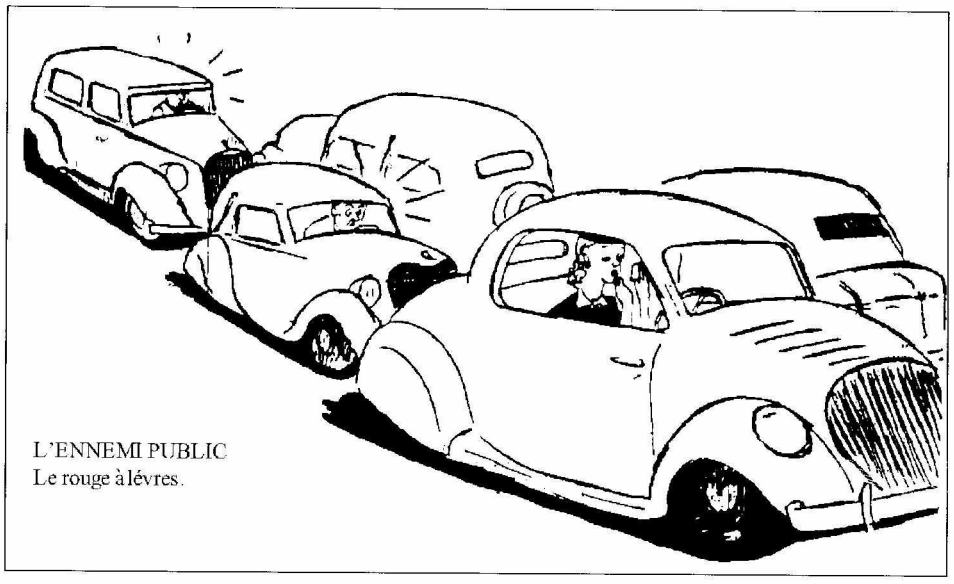


Fig. 8 – Public enemy No. 3 (1938). (provided by the author)

but water may not be immediately available in such a situation. In that case, the ad states, *Le Savolin* can get one's hands clean. All three people depicted in the flyer are male; there is no sign of a woman anywhere in the ad, demonstrating further a gendering of the act of repairing an automobile as masculine.[73] Such labor, according to popular thinking, required a level of expertise about vehicles that women allegedly did not possess.

Connections of women with automotive maintenance were occasionally made—though infrequently, particularly compared to images of masculine involvement in such situations. Even in those cases, women's association with maintaining their cars was normally strictly confined under the auspices of masculine supervision. For instance, a 1937 Solex advertisement shows two women riding together in a car. The ad cautions "not to wait until the moment you depart" on a trip to have the car's engine checked. However, the text of the ad makes clear that the intent is not that the women pictured will perform this check on their own; instead, the ad informs them to consult a Solex specialist or their mechanic.[74] An ad for Esso motor oil from 1937 makes this masculine expertise visually evident, as a man hands a woman an oil can at what appears to be a service station, and informs her of its high quality and reliability.[75] In a 1932 Shell oil advertisement, a man and woman are pictured talking to each other on the telephone; between the two of them, a column of text provides a transcription of their conversation. The woman has called the man, it turns out, in order to thank him for his "excellent advice" in suggesting that she use Shell oil in her car.[76]

An interesting set of images within an article from the Grands Magasins du Louvre *agenda* from 1926 present further evidence along these lines. Entitled "the automobile and the woman," the article discusses the increasing use of cars by women. Indeed, the article claims that women were driving frequently enough that they were beginning to try to fix cars themselves if breakdowns occurred while driving. The article's illustrations, however, tend to undermine this assertion. Only one illustration shows a woman performing any maintenance-related work on a car—in that image, a woman is changing a tire. In the article's other drawings, it is men who are working on or driving cars, including two illustrations in which men are performing repairs on vehicles while women stand by idly. In the first of these, a man is working on a car by the side of the road; meanwhile, several feet away, a female companion rests under the shade of a tree while reading a book. The other such illustration shows a woman similarly uninvolved and even lackadaisical about automotive troubles, leaving them instead to her male counterpart. In this illustration, the woman stands applying lipstick while nearby a man toils underneath a car.[77]

One final example of the gendering of automotive maintenance knowledge can be found in an article from 1929 in *l'Illustration* entitled "Express Diagnosis of the Automobile for a young woman troubled on the road." The article details several potential automotive problems that a woman might encounter on a trip (although the article reassuringly asserts that a serious problem is unlikely), offers troubleshooting tips for those problems, and also suggests various items to be sure to bring in the car, such as extra sparkplugs and a spare gasoline can. While some of the possible problems outlined were strictly mechanical– for example, a headlight going out—the problems given primacy of place in the article, and which were described as the most common difficulties besetting the female traveler, were troubles that resulted from the ineptness of the car's operator. For instance, the second most common cause of a general breakdown, "remarkable for its *naïveté*," is that the driver, neglecting to replenish the gasoline tank, finds that the car has run out of gas.[78] This article reveals multiple aspects of the discourse about automotive technologies. From its very title, it suggests that women are the only group that needs to be made aware of what these problems are and how they can be fixed; men, by implication, already know this information. Further, the article contributes to notions of feminine ignorance of proper maintenance of an automobile; the most common breakdowns, according to the article, are likewise "the most ridiculous" ones in terms of the low level of automotive sophistication needed to prevent them in the first place. Finally, the article presents another situation in which such technical knowledge is handed down to a woman by an expert masculine figure, for the article's author was French automotive guru Baudry de Saunier. Thus this article encapsulates a number of common themes in French discourse, illustrating yet again the gendering of technological prowess that constructed automotive– and larger technological—expertise as a solely masculine affair, of which women could only stand in awe or helplessness.

The Automobile and National Identity

Discourse surrounding the motor car was also linked to issues of national welfare, pride, and identity, particularly in the 1930s. As a powerful embodiment of modernity, cars occupied a privileged place in thinking about the relationship of the modern to the future of the nation-state. To many French in the interwar years, modernity represented a threat of international homogeneity at the expense of national identity and distinctiveness. Modernity was associated in the 1920s and 1930s above all with the United States, and widespread fears of "Americanization" claimed an inordinate amount of attention in French commentary. The most visible aspect of this threat in many ways was the automobile.

Although envious of America's economic success, French observers fretted about the larger consequences of adopting a US-based economic and industrial model. The worried expectation commonly put forward equated adopting American economic methods with invariably accepting an encroaching American social and cultural hegemony as well. As Richard F. Kuisel explains, there were concerns that "once equipped with automobiles and electric kitchens, the French would no longer be French."[79] Similarly, Marjorie A. Beale maintains that French elites despaired of the possibility of "the wholesale adoption of American cultural values and the concomitant destruction of everything French."[80] Confronting the modern, according to Beale, was above all an exercise in the preservation of French identity in the face of a myriad of outside influences.[81] Kuisel argues that the French throughout much of the 20th century have jealously guarded and reasserted their sense of national identity —their "Frenchness"—in opposition to the perceived infiltration of American culture: "America served as the other that helped the French to imagine, construct, and refine their collective sense of self."[82]

At the same time, vociferous objections to Americanization did not mean that the French stood in complete opposition to modernity. Rather, they sought to co-opt it into a more acceptably and distinctively French form as a means of enjoying its economic benefits without simultaneously accepting the cultural hazards with which it was associated. Thus a "peculiarly French solution" was sought to the question of modernization.[83] The French attempted to twist foreign notions of modernity into a form that was more compatible with pre-existing ideals about "Frenchness."[84] Stephen L. Harp addresses this issue directly in his book on the Michelin tire company. Harp demonstrates that Michelin strongly advocated the modernization of French industry, especially as it involved Taylorism, but was careful not to promote any sense of Americanization. Instead, Michelin used its unique position as the only major French tire manufacturer to its advantage, highlighting its French heritage to the point that, Harp argues, the company virtually merged itself with the image of the French nation, drawing on patriotic themes to emphasize that French incorporation of American methods did not necessarily entail a concession to American culture, but rather could remain quintessentially French.[85] Harp's study is revelatory as well of wider cultural currents beyond Michelin. As Victoria de Grazia observes with respect to Europe as a whole, by the 1930s there were significant efforts underway to counter the process of Americanization by "rerouting capitalist economic development within the framework of national values."[86]

Domesticating Modernity

Given the powerful ties between the concept of the nation and technology, it was logical that evidence in this regard would appear in publicity materials as well. Indeed, references to the nation began creeping into French auto advertising particularly in the 1930s. At the simplest level, invoking the nation often meant simply exhibiting a "made in France" tenor. Renault, for example, repeatedly proclaimed itself "*l'*Automobile de France" in many of its advertisements (Fig. 9).[87] Likewise, Citroën frequently invoked its French manufacture in advertisements, calling itself the "original" (mass-produced) French automobile (Fig. 10).[88] Other, smaller auto companies promoted themselves in quite similar ways. For instance, a 1934 advertisement for Rosengart cars calls attention to the fact that they were built in France,[89] and a Hotchkiss advertisement from 1932 points out the cars' "modern French construction" (see Fig. 6).[90] A 1930 advertising flyer, moreover, for an exposition of Peugeot motorcycles by dealer C. Bourdon is colored unmistakably in imitation of the French tricolor.[91]

Throughout the interwar era, of course, technology continued to be available also from foreign-based producers. As the 1930s progressed, foreign auto-related companies became increasingly concerned with promoting their ties to the nation in which they were doing business, and many of them began incorporating the same kind of "made in France" language that domestic manufacturers were utilizing. This process came across most clearly in the advertisements of the Shell oil company. A series of its ads in 1938, regardless of their other content, invariably ended with the same proclamation: "The new SHELL oil is *refined in France*."[92] The italicization is in the original ads; Shell was highlighting explicitly its ties to the French nation, printing it, no less, in distinctive type designed to grab the reader's attention.

In some instances, rhetoric built upon this pride in national work and technology in order to promote the worth of French automobiles on the worldwide stage. In a sense, this is not surprising, particularly in light of the observations of Ellen Furlough, who notes that French ideology constructed native-made goods as superior to foreign ones.[93] Nonetheless, the power and breadth of claims made in popular discourse with respect to automobiles are striking. Most notable in the French case is an article from *l'Illustration* summing up an auto show in 1936 at which Hispano-Suiza was accorded top honors. Although the article only mentions the mechanical merits of the car in its final paragraph, the last sentence of the article is nonetheless revealing. It states that the Hispano-Suiza automobile, by virtue of its French construction, attains a level of which auto production elsewhere on the globe "in its totality" possesses only a few examples.[94] This example and others like it illustrate a language of global reputation and competitiveness, providing a visible indicator of the ways in which French society attempted to respond to the challenge of modernity by, in a sense, domesticating it. Rather than modernity threatening to impose foreign values on the nation, the above example suggests that the flow of modernity could be reversed; French automotive accomplishment was such that it could now set the standard for the modern, and other nations would have to consider becoming more French as part of being modern, rather than the French needing to import foreign values. Modernity, then,

Fig. 9 – Renault, "the automobile of France," l'Illustration, *10 June 1939.* (from the editor's collection)

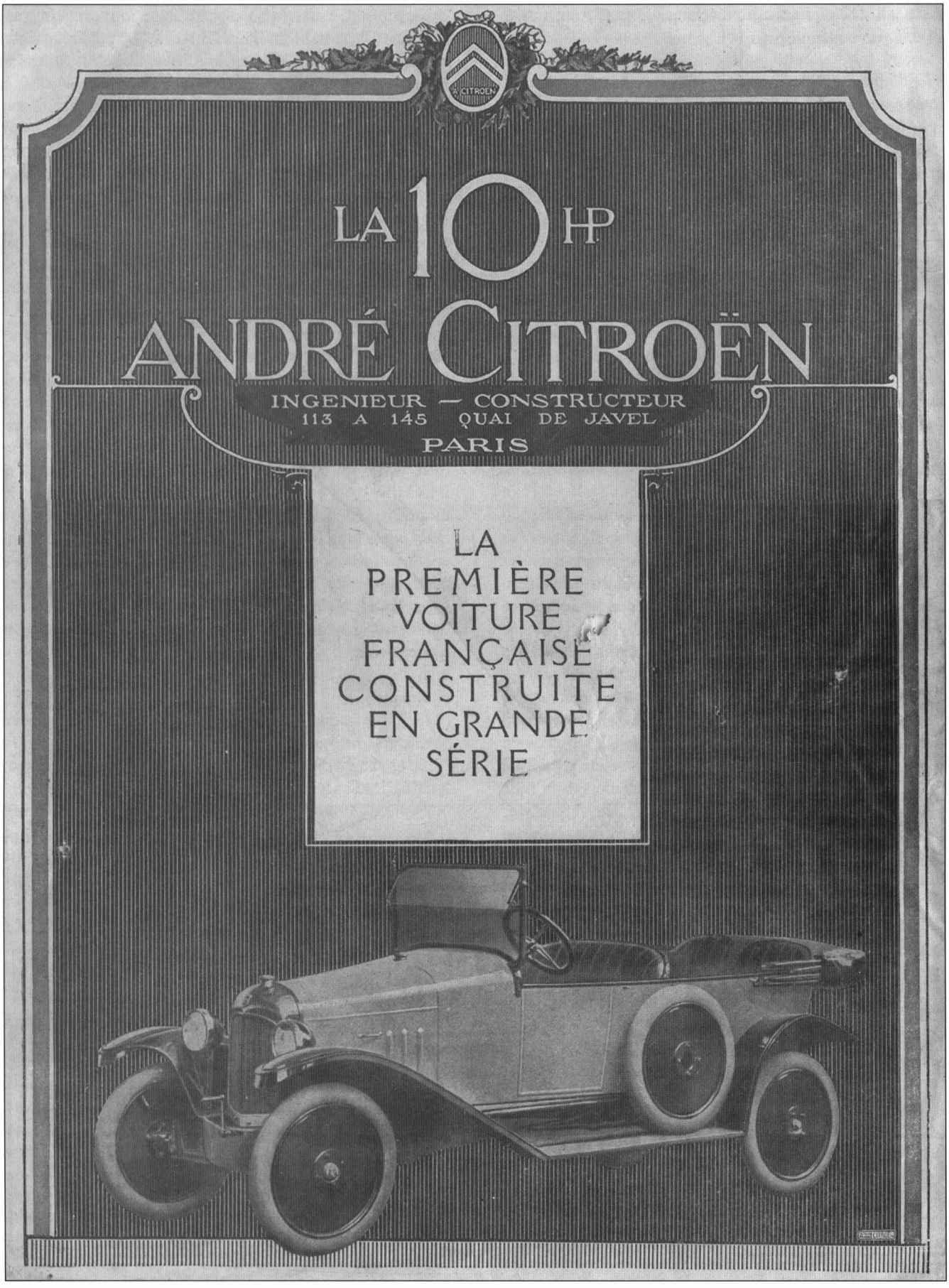


Fig. 10 – Citroën, "the first French car produced in large numbers."

was now not just being reconciled to national identity from outside sources, but was being home-grown as well.

Gender and the Nation

The preceding analysis, however, does little to advance the role of gender in this process of negotiating modernity on behalf of the nation. In large part, this is due to the fact that gender was almost never explicitly raised in relation to this issue. In most cases in which national concerns were invoked, a car was simply pictured in a still setting without a driver, or shown being driven along a road with a male figure inside. Even in this latter case, the text of the ads never explicitly addressed men as opposed to women. Still, it is inescapable that such advertisements virtually never showed a female driver—nor even a female passenger, for that matter. The implication is that women were left out of the process of reconciling the modern with national identity, unable discursively to participate in this important cultural task during the interwar period. They were, yet again, merely to be passive receivers of the technologies and messages produced by men.

The scholarly work of Stephen L. Harp can shed light on this issue, particularly as it relates to fears of Americanization. He explores the ways in which concerns about the impact of American culture intruding into France were intimately tied to perceived gender roles in the United States. Harp discusses the unease with which the French viewed American gender relations, especially the seemingly unending number of women in America who cast off their roles as wives and mothers in order to live independent lives, exemplified by such issues as their hairstyles, clothing, and the fact that they drove automobiles. Harp notes that "a woman behind the wheel of a car was the worst of what modern America had to offer France, constituting a threat to the very foundation of what many considered to be 'traditional' French society."[95] Thus women were part of the problem, rather than any solution, to the modernist quandary. For women to be privileged in this discourse would have been self-defeating, for their very use of cars was dangerous and destructive to the nation if undertaken outside of the bounds of their traditional roles. With women seen as antithetical to the project of transforming modernity in order to make it consonant with the nation, the discourse surrounding car and nation was, virtually by default, an exclusively masculine affair.

Conclusion

"As the cathedral is not merely a shelter, so the automobile is more than a means of transport; automobiles are, indeed, the material representation of a culture. Although both creations contain considerable engineering artistry, under the technical design lies a cultural plan in which the assumptions of an epoch find expression."[96] This statement by Wolfgang Sachs was never more applicable than in the 1920s and 1930s, when cars were the most immediately visible emblems of modernity (and all of the cultural baggage that accompanied it), and as such were used as a discursive tool to establish cultural boundaries of masculinity and femininity. During the interwar years, preoccupation with the perceived encroachment of women into the public sphere, particularly as independent operators financially and sexually, was rampant. Cars were the foremost expression of women's newfound liberation, providing instant, unfettered access to an unending array of public spaces. As a result, gender discourse in French publicity materials emphasized traditional, backward-looking notions of sexual difference as a means of confining feminine utilization of automotive technology within acceptable limits. Images of women with cars employed a variety of strategies in order to perpetuate an idealized gender order based on traditional female roles. Women were depicted as using cars in association with their duties as housewives and mothers, portrayed as only interested in and cognizant of automobiles' aesthetic features, and shown as laughably ignorant in the upkeep and repair of vehicles. French popular discourse constructed men, by contrast, as the exclusive bearers of technological knowledge and mastery, generally speaking and specifically with respect to automobiles. Finally, in the task of reasserting the primacy and heritage of the nation in the face of an internationalizing modernity, women were defined as inherently counterproductive to the perpetuation of a distinct national identity. Thus this critical discursive task was yielded *de facto* to men, who solely would create a conceptual space for the integration of a unique national culture with an Americanizing modernity. Eve's conquest of the steering wheel, then, was far from complete, as French cultural ideology sought to preclude any feminine agency in the realm of automotive discourse, national identity, and modernity by casting women's interaction with cars as conforming to longstanding sexual conventions and traditional gender roles, not as the actions of independent, modern women.

Footnotes

[1]See, for example, Mary Louise Roberts, *Civilization without Sexes: Reconstructing Gender in Postwar France, 1917-1927* (Chicago and London: The University of Chicago Press, 1994).

[2]Charles S. Maier, *Recasting Bourgeois Europe: Stabilization in France, Germany, and Italy in the Decade after World War I* (Princeton: Princeton University Press, 1975), esp. 7-15.

[3]Bibliothèque Forney (hereafter FORN), Galeries Lafayette agenda, 1933, 11-12. A similar claim about the centrality of the automobile as symbol of female independence was made in an article in FORN, Grands Magasins du Louvre agenda, 1926, 85-90, esp. 87.

[4]See Roberts, *Civilization Without Sexes*, and Robert L. Frost, "Machine Liberation: Inventing Housewives and Home Appliances in Interwar France," *French Historical Studies* 18 (1993), 109-130.

[5]Nina E. Lerman, Arwen Palmer Mohun, and Ruth Oldenziel, "Versatile Tools, Gender Analysis and the History of Technology." *Technology and Culture* 38 (1997), 1-4.

[6]Lerman, Mohun, and Oldenziel, "Versatile Tools," 5.

[7]Nicholas Zurbrugg, "'Oh what a feeling!'—The Literatures of the Car," in *The Motor Car and Popular Culture in the 20th Century*, ed. David Thoms, Len Holden, and Tim Claydon (Aldershot, England and Brookfield, Vt., Ashgate Publishing, 1998), 9.

[8]Wolfgang Sachs, *For Love of the Automobile: Looking Back into the History of Our Desires*, trans. Don Reneau (Berkeley, Los Angeles, and Oxford, University of California Press, 1992), vii.

[9]Tim O'Sullivan, "Transports of Difference and Delight: Advertising and the Motor Car in Twentieth-Century Britain," in *The Motor Car and Popular Culture in the 20th Century*, ed. David Thoms, Len Holden, and Tim Claydon (Aldershot, England and Brookfield, Vt., Ashgate Publishing, 1998), 289. See also Sachs, *For Love of the Automobile*, 91-92.

[10]Patrick Fridenson, "The Spread of the Automobile Revolution, 1914-1945," pt. 2 of *The Automobile Revolution: The Impact of an Industry*, by Jean-Pierre Bardou, Jean-Jacques Chanaron, Patrick Fridenson, and James M. Laux (Chapel Hill, The University of North Carolina Press, 1982), 90, and Joseph Jones, *The Politics of Transport in Twentieth-Century France* (Kingston and Montreal, McGill-Queen's University Press, 1984), 24.

[11]Jones, *The Politics of Transport in Twentieth-Century France*, 24, James M. Laux, introduction to *The Automobile Revolution: The Impact of an Industry*, by Jean-Pierre Bardou, Jean-Jacques Chanaron, Patrick Fridenson, and James M. Laux (Chapel Hill, The University of North Carolina Press, 1982), xiii-xvi, and D. G. Rhys, *The Motor Industry: An Economic Survey* (London, Butterworths, 1972), 220-221.

[12]James M. Laux, *The European Automobile Industry* (New York, Twayne, 1992), 74, Patrick Fridenson, "French Automobile Marketing, 1890-1979," in *Development of Mass Marketing: The Automobile and Retailing Industries*, ed. Akio Okochi and Koichi Shimokawa (Tokyo, Tokyo University Press, 1980), 140, Fridenson, "Spread of the Automobile Revolution," 103, Stephen L. Harp, *Marketing Michelin: Advertising and Cultural Identity in Twentieth-Century France* (Baltimore and London, The Johns Hopkins University Press, 2001), 192, and Rhys, *The Motor Industry*, 16.

[13]Fridenson, "Spread of the Automobile Revolution," 103, Harp, *Marketing Michelin*, 188-189, Jones, *The Politics of Transport in Twentieth-Century France*, 25, Rhys, *The Motor Industry*, 16, and Barnett Singer, "Technology and Social Change: The Watershed of the 1920s," *Proceedings of the Annual Meeting of the Western Society for French History* 4 (1976), 321.

[14]Laux, *The European Automobile Industry*, 76, Fridenson, "Spread of the Automobile Revolution," 103-104.

[15]Laux, *The European Automobile Industry*, 78, 100. See also Fridenson, "French Automobile Marketing," 133-134, and Fridenson, "Spread of the Automobile Revolution," 103-104.

[16]Fridenson, "French Automobile Marketing," 133.

[17]Fridenson, "Spread of the Automobile Revolution," 103, and Laux, *The European Automobile Industry*, 81-82.

[18]Rhys, *The Motor Industry*, 15-16. See also Erik Eckermann, *World History of the Automobile*, trans. Peter L. Albrecht (Warrendale, Pa., Society of Automotive Engineers, 2001), 102.

[19]Jones, *The Politics of Transport in Twentieth-Century France*, 55, 100.

[20]Laux, *The European Automobile Industry*, 120, 124.

[21]Ibid., 130.

[22]Frost, "Machine Liberation," 109-130.

[23]Kristin Ross, *Fast Cars, Clean Bodies: Decolonization and the Reordering of French Culture* (Cambridge and London, The MIT Press, 1995), 27-29.

[24]Fridenson, "French Automobile Marketing," 139, Patrick Fridenson, "Some Social and Economic Effects of Motor Vehicles in France since 1890," in *The Economic and Social Effects of the Spread of Motor Vehicles: An International Centenary Tribute*, ed. Theo Barker (London, Macmillan Press, 1987), 135-136, and Fridenson, "Spread of the Automobile Revolution," 117.

[25]Ross, *Fast Cars, Clean Bodies*, 29. Italics in original.

[26]Zurbrugg, "'Oh what a feeling!'," 19-20.

[27]Sachs, *For Love of the Automobile*, 92-97.

[28]Ibid., 92-109. See also Richard Overy, "Heralds of Modernity: Cars and Planes from Invention to Necessity," in *Fin de Siècle and its Legacy*, ed. Mikulas Teich and Roy Porter (Cambridge and New York, Cambridge University Press, 1990), 62-63, 71.

[29]Qtd. in Virginia Scharff, *Taking the Wheel: Women and the Coming of the Motor Age* (New York, Free Press, 1991), 117.

[30]Lerman, Mohun, and Oldenziel, "Versatile Tools," 1.

[31]Harp, *Marketing Michelin*, 221.

[32]*l'Oeuvre* (15 March 1925), 6.

[33]*Gringoire* (20 June 1930), 12.

[34]*Gringoire* (22 August 1930), 12.

[35]*l'Illustration* (4 July 1936), XVII.

[36]*l'Illustration* (4 October 1930), 113-116. Ellipsis in the story's title in original.

[37]*Gringoire* (12 July 1929), 10.

[38]*l'Oeuvre* (13 July 1927), 8. See also *Le Matin* (8 August 1923), 6, *l'Action Française* (10 May 1927), 4, and *Le Matin* (3 March 1928), 5.

[39]*l'Action Française* (10 April 1927), 6.

[40]Jill Greenfield, Sean O'Connell, and Chris Reid, "Gender, Consumer Culture and the Middle-Class Male, 1918-1939," in *Gender, Civic Culture and Consumerism: Middle-Class Identity in Britain, 1800-1940*, ed. Alan Kidd and David Nicholls (Manchester and New York, Manchester University Press, 1999), esp. 185, 192, Gail Reekie, "Impulsive Women, Predictable Men: Psychological Constructions of Sexual Difference in Sales Literature to 1930," *Australian Historical Studies* 24 (1991), 365-372, Ruth Oldenziel, "Boys and Their Toys: The Fisher Body Craftsman's Guild, 1930-1968, and the Making of a Male Technical Domain," *Technology and Culture* 38 (1997), esp. 86-87, 94-95, Ruth Oldenziel, *Making Technology Masculine: Men, Women and Modern Machines in America, 1870-1945* (Amsterdam, Amsterdam University Press, 1999), 10-11, and Scharff, *Taking the Wheel*, 119-126.

[41]Scharff, *Taking the Wheel*, 119, see also 120-122. See also Olenziel, "Boys and Their Toys," 94-95, and Sachs, *For Love of the Automobile*, 38.

[42]*Gringoire* (15 October 1937), 10. See also ads for Delage automobiles in *l'Action Française* (31 March 1921), 3, and *Le Matin* (28 May 1921), 3.

[43]Archives de Paris [hereafter ADP], Publicité (D 18 Z cart. 10), Folder Transports—Subfolder Automobiles. See also the ad for Oldsmobile in *Le Matin* (8 August 1929), 7.

[44]*l'Illustration* (7 June 1930), XXXIII. Emphasis in original. There is a quite similar advertisement for Goodrich tires in *l'Illustration* (31 May 1930), XLI.

[45]*l'Illustration* (20 October 1928), XXXI.

[46]This ad appeared in both *Le Matin* (29 November 1925), 6,

and *l'Oeuvre* (29 November 1925), 6. See also the ad for Monet and Goyon motorized bikes in *Le Matin* (23 May 1921), 4, the Berliet ad in *Gringoire* (27 April 1934), 6, and the series of ads for Peugeot in *Vendredi* (3 January 1936), 10, *Vendredi* (3 April 1936), 7, and *Vendredi* (29 May 1936), 8.

[47]FORN, Galeries Lafayette agenda, 1933, 14.

[48]FORN, Galeries Lafayette agenda, 1933, 12.

[49]Jenny Rice and Carol Saunders, "'Mini Loves Dressing Up', Selling Cars to Women," in *The Motor Car and Popular Culture in the Twentieth Century*, ed. David Thoms, Len Holden, and Tim Claydon (Aldershot, England and Brookfield, Vt., Ashgate Publishing, 1998), 277.

[50]FORN, Grands Magasins du Louvre agenda, 1921, 89.

[51]Bibliothèque Historique de la Ville de Paris, Bon Marché agenda, 1928, 101.

[52]*l'Illustration* (3 October 1925), 358-359.

[53]See Greenfield, O'Connell, and Reid, "Gender, Consumer Culture and the Middle-Class Male," 190, Reekie, "Impulsive Women, Predictable Men," 368-371, and Scharff, *Taking the Wheel*, 115.

[54]*l'Illustration* (18 July 1936), IX, *Gringoire* (2 July 1937), 6, *l'Illustration* (2 July 1938), 290-292, *l'Illustration* (9 July 1938), XIII.

[55]*Gringoire* (2 August 1929), 12. See also the ad for Ford in *l'Oeuvre* (23 October 1931), 3, which focuses on the vehicle's "docility."

[56]*l'Action Française* (10 May 1927), 4. See also *l'Oeuvre* (13 July 1927), 8.

[57]*l'Action Française* (10 April 1927), 6.

[58]Arwen Palmer Mohun, "Laundrymen Construct their World: Gender and the Transformation of a Domestic Task into an Industrial Process," *Technology and Culture* 38 (1997), 99.

[59] See Oldenziel, "Boys and Their Toys," esp. 60-63, 94-95, Oldenziel, *Making Technology Masculine*, 141-147, and Reekie, "Impulsive Women, Predictable Men," 364-366.

[60]Janet Lungstrum, "*Metropolis* and the Technosexual Woman of German Modernity," in *Women in the Metropolis: Gender and Modernity in Weimar Culture*, ed. Katharina von Ankum (Berkeley, Los Angeles, and London, University of California Press, 1997), 129.

[61]*Gringoire* (15 April 1932), 12.

[62]Scharff, *Taking the Wheel*, 167.

[63]*l'Illustration* (4 October 1930), 113-116.

[64]FORN, Grands Magasins du Louvre agenda, 1926, 88.

[65]*Gringoire* (20 May 1938), 8.

[66]Erving Goffman, *Gender Advertisements* (Cambridge, Harvard University Press, 1979), 37. See also Scharff, *Taking the Wheel*, 166-167.

[67]Deborah Simonton, *A History of European Women's Work, 1700 to the Present* (London and New York, Routledge, 1998), 267.

[68]For just a few examples, see the Zenith carburetor ad in *l'Action Française* (6 July 1923), n.p., the ad for Standard oil in *l'Oeuvre* (14 September 1927), 3, the Shell oil ads in *l'Oeuvre* (5 July 1929), 3, and *l'Illustration* (13 August 1932), XI, and the ad for Esso oil in *Gringoire* (1 July 1938), 18.

[69]For a few examples of this type, see the Shell oil ads in *l'Illustration* (4 June 1932), XXIII and *l'Illustration* (16 July 1932), XVII, as well as the ad for Mobil oil in *Gringoire* (20 April 1934), 11.

[70]A couple of ads for Spido oil provide good examples, see *Gringoire* (13 May 1932), 10, and *Gringoire* (3 June 1932), 10. Examples can also be found in Mobil Oil ads in *Paris-Soir* (7 November 1935), 5, and *Paris-Soir* (22 November 1935), 5; the ad for Schrader tire-pressure gauges in *l'Illustration* (28 June 1930), XXIX, and the advertising flyers for Peugeot motorcycles in ADP, Publicité (D 18 Z cart. 10), Folder Transports—Subfolder Cycles et Motos.

[71]This is a Shell oil ad from *l'Illustration* (12 July 1930), XXI.

[72]ADP, Publicité (D 18 Z cart. 10), Folder Transport—Subfolder Automobiles.

[73]ADP, Publicité (D 18 Z cart. 10), Folder Transports—Subfolder Automobiles.

[74]*Gringoire* (26 March 1937), 13. See also the ad for Northeaster car horns in *l'Illustration* (8 September 1928), XXI.

[75]*Gringoire* (25 June 1937), 18. See also the Esso oil ad in *Gringoire* (14 May 1937), 20, and the ad for Texaco oil in *Le Matin* (16 November 1928), 6.

[76]*l'Illustration* (14 May 1932), XXV.

[77]FORN, Grands Magasins du Louvre agenda, 1926, 85-90.

[78]*l'Illustration* (5 October 1929), 266.

[79]Richard F. Kuisel, *Seducing the French: The Dilemma of Americanization* (Berkeley, Los Angeles, and London, University of California Press, 1993), 233. See also Harp, *Marketing Michelin*, 187-188.

[80]Marjorie A. Beale, *The Modernist Enterprise: French Elites and the Threat of Modernity, 1900-1940* (Stanford, Stanford University Press, 1999), 6-7, see also 11-47.

[81]Beale, *The Modernist Enterprise*, 4-5.

[82]Kuisel, *Seducing the French*, xii, 6.

[83]Beale, *The Modernist Enterprise*, 80.

[84]Ibid., 71-82.

[85]Harp, *Marketing Michelin*, esp. 4-10, 189-200, 220-221.

[86]Victoria de Grazia, "Americanism for Export," *Wedge* 7-8 (1985), 80.

[87]For a few examples, see *Gringoire* (6 April 1934), 10, *Paris-Soir* (9 November 1935), 16, and *Gringoire* (23 April 1937), 13.

[88]For just a few examples, see *l'Action Française* (8 October 1922), Spring 4, *l'Action Française* (11 February 1923), Spring 6, and *Gringoire* (19 December 1930), 14.

[89]*Gringoire* (19 October 1934), 18.

[90]*Gringoire* (26 February 1932), 10.

[91]ADP, Publicité (D 18 Z cart. 10), Folder Transports—Subfolder Cycles et Motos.

[92]For just a few examples, see *Gringoire* (20 May 1938), 12, *Gringoire* (3 June 1938), 14, and *Gringoire* (17 June 1938), 16. Emphasis in original.

[93]Ellen Furlough, "Selling the American Way in Interwar France:*Prix Uniques* and the Salons des Arts Ménagers," *Journal of Social History* 26 (1993): 501.

[94]*l'Illustration* (18 July 1936): IX.

[95]Harp, *Marketing Michelin*, 221.

[96]Sachs, *For Love of the Automobile*, 91.

EDITOR'S NOTES—*continued*

design/layout is by Mountain Laurel Press, Silver Spring, Maryland, and printing by Fredy Hernandez's Arena Press, Washington, D.C. Both Mountain Laurel and Fredy have cheerfully accommodated themselves to my quirks and scheduling, and I am grateful for their support and friendship. Once more, the hawk eyes of *Pat Chappell* and *Kit Foster* have caught typos and inconsistencies that eluded me. Be grateful for their attention to detail.

Taylor Vinson

Corrections:

Review No. 42 (Fall 2004)

Reo and Diamond Reo: The Rise and Fall of "The World's Toughest Truck," Part 1

In Table 4 on page 14 of my article, captioned "U.S. Registrations of Representative Truck Manufacturers," in the line giving the names of the manufacturers, the word "Diamond" over "Chevrolet" should be deleted and added over "T." The words "Mack," "Peterbilt," Reo," and "White" should be moved one column to the left. The figures "5,923" and "9,271" in the rightmost column should be deleted.

Robert R. Ebert
Ohio, USA

For Official Use Only: The Army Goes Car Shopping

In the table on page 33 of my article, relating the numbers of Ford, Dodge, Cadillac, and White staff cars purchased, the totals under the column headed "Delivered" belong under the column headed "Ordered," and the numbers standing alone at the left of the table under the respective marque names belong under the column headed "Delivered."

Arthur W. Jones
Pennsylvania, USA

LETTERS TO THE EDITOR

Review No. 38 (Winter 2002)

The Soviet Auto Industry, 1917 to 1953

It was interesting to read some data from the Ford archives, though the author could not find what was the value of the contract with Soviets. I also had some problems with it and I've found in Russian sources that they had paid to Ford 72,000,000 rubles. I do not know if it is possible to match it with any data in the Ford archives.

The author found many interesting facts which were unknown to me, but the way Soviet industry (and indirectly the state) is described is wrong in my opinion. The article is written as if Soviet Russia were a normal state, but it was not. It was a totalitarian state and Stalin was a dictator, not a democratic politician. His goal was not the well being of the Soviet people (e.g. note the famine in the Ukraine during the Thirties, when many millions died), but the spread of Soviet revolution to the whole world.

If Stalin wanted to conquer the world, he had to build the most powerful assault army, so he settled on mechanized warfare. Of course Russia was a very poor state and that is why he cut all other expenses and grasped the society with his iron fist.

First Stalin developed raw industry. He created new mines, iron smelting plants, power stations and aluminum smelting plants. Having raw materials he could start to build machines. Again, he was short with time, so the only solution was to copy — in a legal or illegal way. Ford was the best known example, but there were others — mostly American companies like Autocar, Caterpillar, International Harvester and General Motors. Russians were convinced of American technical superiority and eagerly bought technology for tanks (from Christie) and planes. The biggest aircraft works were in Komsomolsk in the middle of the Taiga. They were built with American technology and American machine tools. Americans helped to build the aircraft works in Woronez and Kujbyszew and tank building works in Kcharkov, Niznyj Tagil and Tschelabinsk. Germany delivered its own share of machines, like big presses used by Russians to bend tank's armor plates. Since tens of thousands of tanks and hundreds of thousands of planes and guns need supplies, the Red Army had to have a lot of trucks. And that is why GAZ and ZIS works were enlarged in the early Thirties. Please note, that the picture on page 46 (Fig. 4) shows not a Ford Model A car but a Ford Model AA truck. Early versions had single wheels at the rear. By the way, this vehicle was assembled from Ford parts.

Stalin and his cronies had to travel in cars so several hundreds of luxury vehicles were built. Administration officials and police required some medium cars so they were built in bigger quantities—more than 20,000 per year. But trucks were the bulk of production at GAZ and ZIS. The GAZ works prepared heavy trucks and artillery tractors. Peak production was in 1938 and during later years the industry focused on manufacture of tanks, artillery, planes and ammunition. All this investment was so big, that hardly any money was left for people to consume. People were treated as slaves. Prisoners were sent to work camps digging inland water channels, cutting trees or working in factories. The NKVD (secret police) even had its own design bureaus, where planes, trucks and tank were designed. So there was no payment for those who created things. The average citizen of the Soviet Union could not even think of owning a bicycle or a watch. He was happy if he managed to escape with his life. In the late Thirties people were required to work six, not five as before, days a week. Even Lenin's birthday was not an excuse to have a day off. In June 1940 it became illegal to change jobs, and everybody had to work eight hours a day, seven days a week. Those who were late to work by more than 20 minutes were treated as those who changed jobs and were sent to work camps. I read a lot of memoirs of Poles who were under Soviet rule during World War II and all of them remember a slogan: "If you do not work you do not eat." During the war the working day was extended to 9, later 10 and eventually 11 hours per day. Those in work camps had to work 12 hours.

That is why you must not look at the Soviet automotive industry with a marketing approach because the whole story is completely different from other countries. An excerpt of Walter Carver saying in 1932 that he "noted a market gap: the lack of upper middle class car" is ridiculous. With all the respect for this gentleman, I expect he was treated by NKVD officers with special honors and he saw virtual reality. The secret police had special quarters of towns and special villages to be shown to visitors from other countries, especially intellectuals from the West. The Soviets were masters at this and a lot of people took the NKVD's theatre

as Soviet reality, writing nice stories about Soviet Union after their return. As far as Porsche is concerned, he was needed (both for Stalin and for Hitler), not as a designer of a people's car (Hitler had the KdF Wagen,; Stalin requested and got a KIM car—copy of the Ford Popular, and both cars did not reach volume production in a planned time—they were a good excuse to build another armament plant) but as an efficient designer of weapons. Please remember that Porsche's design bureau was responsible for the Tiger tank and the Ferdinand self-propelled gun, not to mention different lesser projects like artillery tractors. Porsche was quick to return to this market after the war.

I do not know if there is a book about Soviet-US technical cooperation during the Thirties, but it would be quite interesting to read.

Robert Przybylski
Poland

Review No. 40 (Summer 2003)

The Litigation of Auburn Automobile Company: The Historian's Use of Legal Resources

The following letter relates to the discussion of "Duesenberg Liberty Motors Litigation" on pp 30-31.

[This discussion] is seriously flawed in its presentation and interpretation of the background history regarding the Duesenberg involvement with the U.S. Government in the production of aircraft engines in World War I. . . . While their name was on the letterhead of three of the four companies involved in this prolonged period of production and litigation, the Duesenberg brothers were not principals in the companies and had very little, if any, influence on the business decisions made by their employers. . . . Dating back to 1913, in small shops under their own name, the Duesenbergs had achieved recognition from their racing activities involving cars that they built around engines of their unique design. [This led to adapting some engines for marine use] which attracted the attention of an industrialist in Chicago, J. R. Harbeck [who] arranged with the Duesenbergs to design and produce marine engines of their own design . . . and by 1916 had them relocate from St. Paul to Chicago. . . .

Mr. Harbeck foresaw an increased demand for engines for military use as a result of the ongoing war in Europe and formed a new corporation in 1917, Duesenberg Motors Corporation, for the express purpose of obtaining contracts for such material. . . . In April [1917] Duesenberg Motors Corporation began the construction of a new plant in Elizabeth, New Jersey, where they hoped to get military business. In the fall the plant was completed. Any Duesenberg motors designed for aircraft use, and there had been a very limited number, had been produced either in Chicago or in a temporary location in New Jersey, before the Elizabeth plant was completed. By then the Liberty design had been finished and the government initiated contracts for several thousands of them with large automotive factories, Packard and Marmon among them. Duesenberg Motors Corporation, with its relatively small new plant, was awarded a contract for 500 engines on November 20, 1917, and began to tool up for production. The Fiat plant in Poughkeepsie NY [mentioned in the article] was acquired, not for use in itself, but for the urgently needed machine tools that it contained, which were shipped to the Elizabeth plant.

Meanwhile, the government had sent a commission of engineers to Europe to look at other engines that might be acquired and produced in the U.S. as an alternate to the Liberty. They settled on a design by Ettore Bugatti that had only briefly been tried in prototype form . . . then decided to have Duesenberg withdraw from Liberty production and then prepare to build the Bugatti engine. Then the fun began.

The Liberty engine was basically a vee-type 12-cylinder design. A few V-8s were built but not in quantity. The Bugatti engine . . . was essentially two straight-eight engines, joined side by side, 16 cylinders total geared to drive one propeller. There were then and still are complications in translating European designs to U.S. practice. Not only do the metric dimensions have to be changed, but various production techniques differ and result in part having to be redesigned.. Charles Brady King (who had built and operated a 4-cylinder car on the streets of Detroit in 1896 before Henry Ford) was designated by the government to make the Bugatti prototype fit for production. . . . The near 1,000 alterations mentioned [in the article] were those needed to make the engine practical and to conform to U.S. production practices. A few engines had been produced by the time of the Armistice on November 11, 1918, and 40 are known to have been produced by the time the contract was cancelled in January 1919. Several exist, the Smithsonian has two and the Auburn Cord Duesenberg Museum has one.

[The article] notes only four motors produced before the Armistice. I think that maybe this figure refers to another project. What had the Duesenberg brothers been doing during 1918? They had been set to work on the design of a much larger aircraft engine, a 16-cylinder vee-type projected to develop some 800 horsepower. . . . There were four of these engines produced by the time construction was stopped. Again, the Smithsonian has one and the Auburn Cord Duesenberg Museum has one, these two being the only known survivors. [The article] states that one example of the "Duesenberg Liberty motor" exists. . . . There was no such animal.

In 1919, the Duesenberg brothers severed their connection with Duesenberg Motors Corporation and continued work on their own projects in a small plant two miles north of the factory bearing their name. They operated under the names "F. S. and A. S. Duesenberg," and "Duesenberg Brothers," and maintained their numerous racing enterprises under these names for many years. Duesenberg Motors Corporation was acquired by Willys Corporation, which was not the car manufacturer Willys-Overland Company, but a personal base from which John N. Willys planned to build an automotive empire. . . . In 1922, the bankers decreed the breakup of Willys Corporation and W. C. Durant bought the Elizabeth plant [to produce the Star car, and] by 1923 Willys Corporation and Duesenberg Motors Corporation existed only on paper. By 1924, the claims resulting from wartime government work were settled . . . and both Willys Corporation and Duesenberg Motors Corporation were dissolved.

[The article] then states "The case may provide reasons why Duesenberg, Inc. filed in bankruptcy and was reincorporated as Duesenberg Automobile & Motors Co. Inc." These two entities have no relation to the foregoing discussion and to each other.

Duesenberg Inc. was not created until the E. L. Cord era in the late 20s. The Duesenberg brothers were involved in Duesenberg Automobile & Motors, Inc., which was formed in 1920 to manufacture passenger automobiles of Duesenberg design. . . . The Duesenberg brothers were again employees, as engineers, and were supposed to receive various payments for their designs and patents as well. This company was never profitable and was forced into bankruptcy in 1924. A group of Fred Duesenberg's loyal adherents rescued the operation and installed Fred as its head. This is the operation that E. L. Cord purchased in 1926 to set Fred up to develop his prestige car.

[The article's] final paragraph concerns a suit involving a lubrication system. I cannot relate this to any Duesenberg development and believe that it may involve the regular Liberty engine and that at least one of its dates is incorrect.

Fred Roe
Massachusetts, USA

I found Thompson Smith's article on the litigious life of the Auburn Automobile Company most interesting. Of particular importance is his demonstration that exhaustive research on automobile companies can be conducted by venturing outside what many car people consider the "mainstream" of automotive history: company catalogs and the automotive press.

His description of the litigation involving W. H. McIntyre and Company and Lycoming is an eye-popper. If the description of the Model Y 6-cylinder engine is accurate, it gives new meaning and an early start to the term "short stroke." Its bore-to-stroke ratio (3.5 to 1.5 inches, or 2.33) puts the vaunted "Kettering" V8, introduced by Cadillac for its 1949 models, to shame (3.81 to 3.63 inches, or 1.5). The apparent "actual" ratio, 3.375 inches to 1 inch, or 3.375, is even more amazing. The questioning reader wonders whether the court documents actually quote these dimensions (they appear to reside in an Indiana courthouse inaccessible to most of us), and, if so, whether such a short stroke Lycoming engine really existed. *Marshall Naul*'s treatise on Lycoming automobile engines (*The Best of Old Cars*, Volume 1, p. 353) does not list a Model Y engine, nor any with such a prodigious bore-to-stroke ratio.

Smith's advice on the databases LEXIS and WESTLAW is valuable. . . . These "nontraditional" tools for automotive history research are fertile ground for learning "new history." However, it is my understanding that they are both subscription services, so we lay historians cannot just walk in off the street and use them the way we are often able to access public library holdings and newspaper morgues. It gives rise to an interesting notion, though. The first step in undertaking groundbreaking research in automotive history might be to call your lawyer.

Kit Foster
Connecticut, USA

Review No. 41 (Spring 2004)

Mini: The Creation of a Cultural Icon, 1959-2001

Dean Ruffili's footnote 9 refers to Alec Issigonis' mother, Hulda Prokopp. By a strange coincidence her cousin several times removed is the present head of Volkswagen, Bernd Pischetsrieder. He formerly headed BMW when they acquired Rover, maker of Issigonis' Mini, and launched the new MINI which is made by BMW, though at a British factory. Thus the family relationship links the two Minis.

Nick Georgano
United Kingdom

Arising from [this story] is the paradox of how a company could have such a trend-setting design . . . yet fail to profit from it, is the tale of the British Motor of Corporation's Mini, 1100, and 1800 family of cars.

The seed of corporate disaster was sown at the formation of B.M.C. as effected by amalgamating the former Austin and Nuffield (Morris) entities. This new enterprise was immediately placed amongst the big league motor producers. . . . This elevated status, unfortunately, went straight to the heads of those in the executive positions of the new corporation, who assumed that such a ranking was set in concrete and that their tenure was decreed by divine right. Australian automotive engineer Alan ("Bill") Chamberlain visited B.M.C. within the first few years of its inception and noted that lunches were early, long, and accompanied by cocktails and wine so that, in his words—"They were not much good for work for the rest of the day."

No one doubts that touch of genius in Alec Issigonis, but it must be said that . . . he was a total disaster as a productioneer. He had no idea, or any interest in, of such practicalities as costing or the imperatives of production line management. He continually interrupted the production line with an incessant stream of improvements which required new tooling and added difficulties in the provision of replacement parts to users.

In Australia the irony of the outcome was that the, by then, Leyland Australia had repudiated the Issigonis theme by reverting to conventional types by the early 1970s, having no virtue beyond the opposition offerings. Yet, after its demise, there was a wholesale move by most producers, to introduce f.w.d. models.

Max Gregory
Australia

An Even Smaller Crosley: An Oehrli Proposal

Powel Crosley . . . was quite a showman. Here are two examples: (1) He made it a point to personally sell one of his Crosley Shelvador refrigerators to an Eskimo! (2) Someone discovered that four Crosley automobiles would fit into one downtown Cincinnati parking meter space. The first one parked close to the curb all the way at the front of the space; the second one parked directly behind the first one. The third one parked next to the first one, all the way at the front of the space and the fourth parked behind #3 and next to #2. They made sure that all were within the white lines painted on the street. Someone put coins in the parking meter, then all drifted away and waited for the police officer to make his rounds. When the officer arrived he scratched his head for a moment, then wrote two citation tickets, one for each car (#3 and #4) parked on the outside for double parking. Crosley probably thought the cost of the two double parking tickets was a cheap price to pay for the publicity.

Nelson Bolan
Florida, USA

Reo and Diamond Reo: The Rise and Fall of the World's Toughest Truck, Part 2

by Robert R. Ebert and Timothy J. Falkovich

Diamond Reo in Decline

In its 1971 annual report, White explained the reasons for and details of the sale of Diamond Reo in these words:

> Since May 1971, the new management has . . . eliminated the overlapping and duplication of heavy-duty truck products and dealerships by selling the Diamond Reo Division. . . . Extraordinary charges, resulting primarily from major management decisions to sell the Diamond Reo Truck Division last August [of 1971] and to consolidate and restructure the company's farm equipment company totaled $15,917,000, net of related income taxes. . . . Adding to the company's liquidity improvement was the sale in August of the Diamond Reo Trucks Division for approximately $16,000,000.

After a financially problematic year in 1970 in which White lost nearly $21 million, it had an operating profit (before the charges mentioned in the quote above) of $2.4 million in 1971.

From a marketing perspective, the argument that Diamond Reo was sold because its product lines overlapped with White is persuasive. However, given White's financial problems in 1970-71, it is questionable whether White would have sold Diamond Reo if it had been making a substantial return on White's investment in it. White's situation in 1971 and subsequent developments at Diamond Reo suggest that financially White's disposition of Diamond Reo was forced by either or both of the following : (1) underperformance in unit sales and financially at Diamond Reo, and/or (2) the need for White to raise cash. White's statements regarding building liquidity support the second argument. What data that are available on U.S. registration of Diamond Reo trucks from 1968 to 1971 show the division's U.S. sales languishing while overall White unit sales were increasing in the late 1960s and early 1970s (see Table 4, *Automotive History Review* No. 42, p. 14, as corrected in this issue) which lends support to the first argument).

On August 16, 1971 Diamond Reo was sold to F. L. Cappaert for $13 million in cash and $3.2 million in notes. The sale was announced to dealers by Jack Adams, president of the Diamond Reo Division with the statement:

> Now . . . Diamond Reo employees and distributors throughout the world can, once again, be assured of a positive, aggressive direction as part of a manufacturing and marketing organization . . . we go forward as a tested and proved team with an unlimited market and an unlimited future.

The buyer of Diamond Reo was Francis Leo Cappaert, a wealthy entrepreneur who had investments in a number of enterprises including gas and oil, real estate, and farming (*Diamond Reo News* Summer 1971). In addition, he was chairman of Guerdon Industries, a firm he founded that was in the mobile home industry (*State Journal*, April 13, 1975).[5]

The operations of Diamond Reo after the purchase by Cappaert were not successful financially and in December 1974 the firm filed for bankruptcy protection. The Diamond Reo bankruptcy was a very complex case that ultimately took nearly 21 years (until 1995) to adjudicate. It would be nearly impossible to discuss all aspects of the last years of Diamond Reo operations in Lansing and the bankruptcy. However, Table 6 shows a chronological summary of the major developments in the years between 1971 and the ending of Diamond Reo production in Lansing in 1975.

Given the bankruptcy and failure of Diamond Reo, a fundamental question must be raised: was Diamond Reo an economically viable firm at the time of the purchase by F. L. Cappaert or at any time thereafter? Associated with this question must be an analysis of the management strategy at Diamond Reo in its last years of truck production in Lansing to discover whether that strategy was consistent with the realities of the Diamond Reo situation and heavy-duty truck market.

The 1970s Heavy-Duty Truck Market

The bottom of Table 4 (*Review* No. 42, p. 14) shows registration of several heavy-duty truck manufacturers in the 1968-1975 period. In addition to the firms listed, the industry consisted of Brockway Division of Mack and several small specialty custom-truck building firms such as Oshkosh Trucks Corporation and Hendrickson Manufacturing.

By the late 1970s several manufacturers were no longer in the heavy-duty truck business. Diamond Reo (Lansing) and Dodge ceased production of heavy-duty trucks in early 1975. Mack Trucks terminated all production activities at its Brockway Division in April 1977.

Truck manufacturers were faced with a series of challenges in the mid 1970s. These challenges included the energy crisis in 1973 and the attempt to implement Federal Motor Vehicle Safety Standard No. 121, *Air Brake Systems* (FMVSS 121).

Figure 11 shows the pattern of Classes 7 and 8 heavy-duty truck sales from 1968 to 1975. In general, Diamond Reo sales followed the pattern of the industry.[6] Commercial (non-military) heavy-truck registrations were fairly steady from 1969 through 1971. However, a cyclical upturn in the economy in 1972 and early 1973 stimulated the heavy-truck market. The advent of a 1973 war in the Middle East and consequent higher fuel prices and energy crisis contributed to a recession in the U.S. economy. Gross Domestic Product declined for two years in the recession with a decline of 0.6 per cent in 1974 and a decline of 0.4 per cent in 1975 (*Economic Report of the President*, 2003, Table B-4).

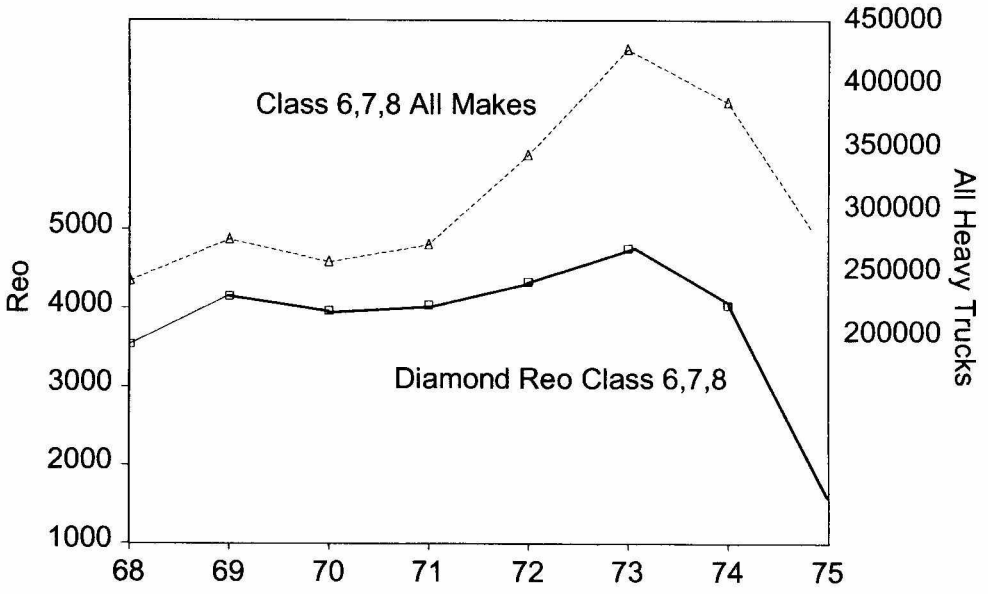
Fluctuations in the business cycle were one problem with which the heavy truck industry had to contend in 1974 and 1975. Government regulations caused further fluctuations which accentuated the cyclical factors. The major regulatory issue was

Table 6 Diamond Reo Trucks, Inc.
Bankruptcy Chronology

DATE	*EVENT*
August 16, 1971	F.L. Cappaert purchased the assets of the Diamond Reo Division of The White Motor Company for $16 million including $13 million in cash and $3 million in notes.[7]
May 12, 1972	Diamond Reo received $55.8 million contract for 4,993, 2 ? ton M600 series military trucks.[8]
1972, 1973, 1974	Diamond Reo losses for the years up to December 6, 1974 totaled over $18 million, including $3.1 million loss in 1973 on the military truck contract.[9]
August 11, 1974	Line of credit with FMC Financial Corporation expired, but was renewed at a lower limit. (FMC was owed $7 million by Diamond Reo.) Lower credit limit put Diamond Reo in a cash crisis.[10]
October 23, 1974	Diamond Reo held a meeting with suppliers to try to resolve cash flow problems. Suppliers were asked to take 10% immediately and 90% in nine monthly installments in 1975. Many agreed to the plan.[11]
December 6, 1974	Diamond Reo filed for protection under Chapter 11 of the Bankruptcy Act in the District Court of the United States for the Western District of Michigan at Grand Rapids, Michigan, Case No. BG74-1778 B5.[12]
January 2, 1975	First meeting of creditors.
April 16, 1975	Secured creditors (White Motor and FMC Financial Corporation) pressed the Court to have F.L. Cappaert indemnify creditors against Diamond Reo operating losses in April 1975 by putting in place an $800,000 cash bond. Cappaert and creditors agreed to a complex stock and mortgage plan to indemnify the creditors.[13]
April 22, 1975	Internal Revenue Service filed a $6 million claim against Diamond Reo inventory in the plant at the time F.L. Cappaert bought the firm. As a result, Cappaert withdrew his plan to indemnify the creditors previously agreed to on April 16, 1975.[14]
April 23, 1975	U.S. Army denied a request from Diamond Reo for $5.6 million in cost relief on its military truck contract.[15]
April 24, 1975	Judge Benson appointed Frank Hohman, Secretary of the National Association of Credit Management, as receiver to run Diamond Reo. The firm suspended all operations except for the sale of spare parts and finished trucks.[16]
May 2, 1975 to August 1975	Receiver Frank Hohman attempted to sell Diamond Reo as a going concern. Eleven prospective buyers were identified but only two were specifically named including an offer from two Lansing area businessmen, James Duncan and Arthur Aspengren, and a Swedish industrial firm Kockums Machine Shops. None of the deals materialized.[17]
June 2, 1975	Judge Benson ordered adjudicating Diamond Reo as a bankrupt and Frank Hohman was appointed as acting Trustee in Bankruptcy.[18]
July 8, 1975	An agreement was reached to finish 461 partially completed trucks for the U.S. Army.[19]
February 3, 1975-January 27, 1976	Proofs of Claims filed by the Pensions Benefit Guaranty Corporation as Trustee of Diamond Reo Trucks, Inc. UAW Local 650, and the International Union of United Plant Guard Workers of America Local 149. The claim on behalf of the UAW was about $3.9 million and on behalf of the UPGWA was about $60,000 for unpaid pension contributions for 1972, 1973, and 1974. F.L. Cappaert had issued three promissory notes as guarantees for the pension payments.[20]
September 19, 1975	The last two military trucks were completed by Diamond Reo which were the last Diamond Reo trucks produced in Lansing.[21]
September 24, 1975	Judge Benson issued a "Discharge of Bankrupt" through which Diamond Reo was released from all dischargeable debts.[22]
October 20, 1975	Consolidated International, Inc. of Columbus, Ohio, bought $35 million of Diamond Reo assets for $11 million at auction. Included were 163 vehicles and parts, machinery, and equipment.[23]
1976	Loyal Osterlund, Diamond Reo dealer in Harrisburg, Pennsylvania, purchased the engineering package, tooling, dies, blueprints, rights to the name, etc., for Diamond Reo Trucks from Consolidated International. Production of Diamond Reo "Giant" trucks by Osterlund, Inc., began in 1977 and continued in various forms and by various firms until 2001 on a limited basis of fewer than 200 trucks per year.[24]
July 28, 1995	The court issued a "Final Decree" discharging Lloyd Kempf (successor to Frank Hohman) as trustee for the estate of Diamond Reo Trucks, Inc., bankrupt.[25]

Parenthetical documentation in the table refers to entries in the "Works Cited" section.

Figure 11: U.S. Heavy-Duty Truck Registrations, 1968 - 1975



Source: Motor Vehicle Manufacturers Association Statistics Department

implementation of FMVSS 121 which required a type of antilock braking system for air brake-equipped trucks. FMVSS 121 increased the cost of an average heavy-duty truck tractor by approximately $2,000 (1975 *Motor Truck Facts*, 3). Anticipation of the implementation of FMVSS 121 and the added costs of trucks caused an artificial increase in demand for heavy-trucks in 1974 as buyers sought to avoid the price increase. After FMVSS 121 came into effect in March 1975, orders for new trucks dropped sharply which intensified the cyclical decline (Smith Barney, 10-12). (See Table 4). (In late 1975, too late to help Diamond Reo, FMVSS 121 was withdrawn by the U.S. Transportation Department) (Kenny May 1, 1975). Thus, general industry and economic conditions combined with economies of scale requirements for successful heavy-duty production created a difficult environment in which Diamond Reo was seeking to compete.

Diamond Reo: the Product

Diamond Reo presented a wide range of truck models in the market. News media reports at the time indicate Cappaert wanted to make Diamond Reo a major producer of heavy trucks and believed that maintaining a wide-ranging product line was one way to build volume. Expanding the product line gave Diamond Reo some distinctive products, but cost scarce cash for development and marketing and did not result in substantial volume (Kenny, August 24, 1975).

Whatever its financial problems, the Diamond Reo product strategy under Cappaert resulted in some interesting new truck models. Among the distinctive models introduced by Diamond Reo in the 1970s and complementing the flagship C-116 models brought to market in 1971, were the Royale, Raider and Rogue (Fig. 12). In late 1972 the Royale Series COE Series was announced. The Royale Series was updated in 1974 as the Royale II COE (CO-5464D and CO8864D Series) in which many cab refinements were made along with a distinctive grille design (*FleetOwner*, July 1974, 102-103).(Fig. 13).

Perhaps the most distinctive new product to emerge from Diamond Reo was the Raider (or C119) Series (Fig. 14). The Raider was a massive appearing, strikingly designed conventional truck with a distinctive grille that was an integral part of the radiator (*FleetOwner*, December 1973, 100). Neither the Raider nor the Royale II were produced in significant volume. Shortly after production start-up the company ran into its financial problems and regular production was terminated in December 1974.

Another new product introduced in 1974 was the Rogue which was a heavy-duty truck aimed at city markets for sanitation, in-town delivery, etc. The Rogue (Series CR-6042 and CR-6042D) had a unique cab which was a Diamond Reo modification of a design concept originated by U.S. Steel Corporation. The undressed weight of the cab was 750 pounds, more than 300 pounds lighter than prior Diamond Reo CF-65 cabs it replaced. The design provided for low-cost tooling, yet distinctive styling. The Rogue was available in diesel engines (Cummins, Detroit Diesel, and Caterpillar) as well as Diamond Reo's own Gold Comet gasoline engines (Walsh, July 1, 1974, 6).

In addition to the commercial truck models, Diamond Reo produced military trucks during this time. On May 12, 1972, Diamond Reo was awarded a contract initially for 4,993 trucks valued at about $55.8 million and ultimately extended for the

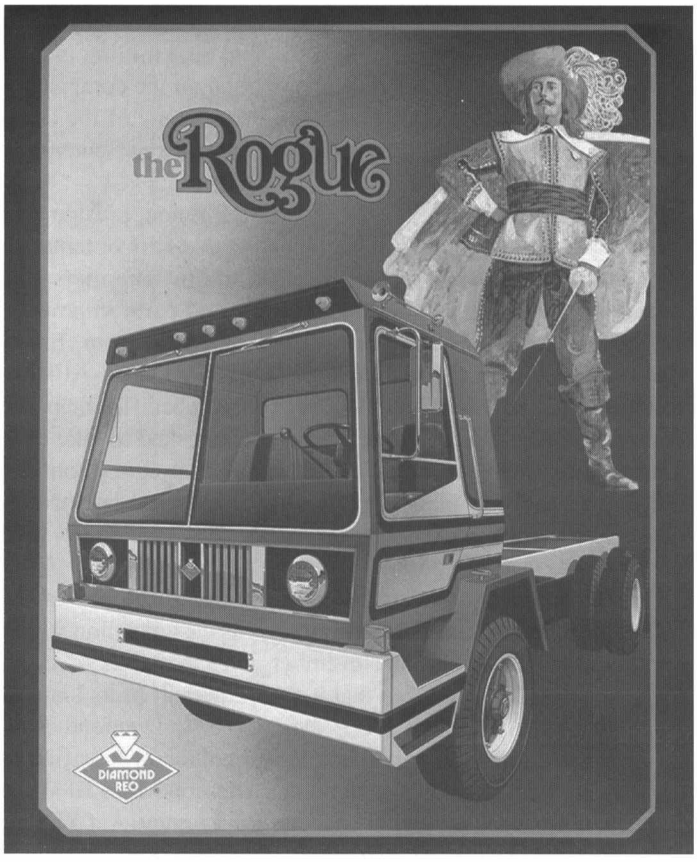


Fig. 12 — The Rogue was a 1970s Diamond Reo entry into the urban/municipal hauling market for refuse collection, etc.

production of 6,700 2 -1/2 tons, M602 Series military trucks. The per-vehicle price was $8,179.[80] plus loading costs of $28.44 (U.S. Army).

This military contract resulted in significant production volume for Diamond Reo. For example, in 1974, factory shipments at Diamond Reo were reported as 9,136. However, 4,646 of those, or over half, were military trucks (*Wards* 1975, 207). The military volume enabled Diamond Reo to operate at close to its full capacity of 40 trucks per day on two shifts and employ 1,600 people (*Diamond Reo News*, Summer 1971, 2).

The military contract led to financial problems. The contract was a fixed-price contract which meant that cost increases in materials to build the trucks could not be passed on through higher delivered prices on the trucks. This contract represents management failure to consider potential inflation in the 1973-75 era. The contracts were negotiated and awarded in 1972 which was during Phase II of President Nixon's economic stabilization program that initially began in 1971. (Phase II put ceilings of 2.5 per cent on price increases and 6.2 per cent on wage and fringe benefit increases). After Phase III was initiated in early 1973 with voluntary controls, the pent-up price and wage increases exploded on the economy (except for a brief period of a price-freeze in the summer of 1973). These pent-up increases plus the emerging energy crisis placed considerable inflationary pressures on the economy.

With a fixed-price contract Diamond Reo was faced with the increasing costs of inputs. However, it was precluded from passing those cost increases onto the purchaser, the U.S. Army. The ultimate result was a cash-flow crisis by 1974 as the company was having to pay out an increasing amount of money for components for each military truck it produced but was receiving a fixed amount back per unit.

In a meeting with suppliers on October 23, 1974, Mildred Johnson, chief financial officer of Diamond Reo under Cappaert, blamed the military contract for the company's financial problems:

> Two years ago Diamond Reo undertook a $55,000,000 contract for military trucks. Phase II controls were on at the time but were soon removed. All of you know what happened to the metal market after that. Well, for the past two years we have been taking a bath on this contract. . . . Over $6,000,000 of Diamond Reo profits from its commercial sales have gone to support this contract. That's what caused the crunch. We finally, 10 days ago, told the Government that Diamond Reo would no longer support this contract and we stopped our military production.

Although Diamond Reo applied to the government for cost relief on this contract, it was not forthcoming. Because Diamond Reo ceased production and shipment of military vehicles, the Government stopped making progress payments on the contract and was withholding $2 million in payments. That situation compounded Diamond Reo's financial difficulties.

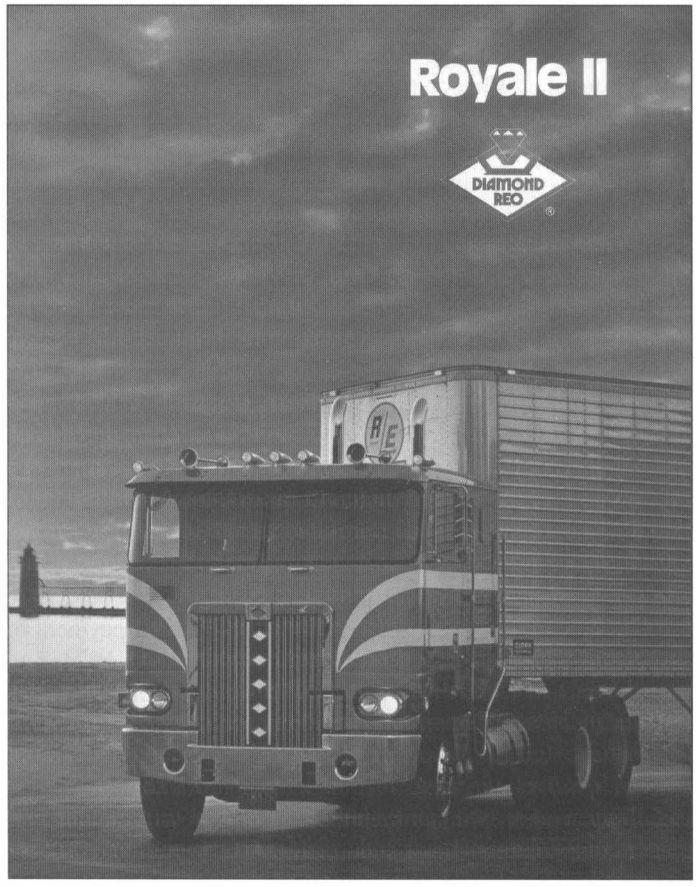


Fig. 13 – The Royale II was the last COE introduced by Diamond Reo in its final days in Lansing.

After the bankruptcy filing, agreement was reached with the Government to complete 461 military trucks in various stages of assembly and completion. The last of these trucks were two military trucks built on September 19, 1975 (Novick). They were the last trucks built at the Reo plants in Lansing.

Bankruptcy

A weak heavy-duty truck market, problems with the military contract, and what must be regarded as a high overhead operation relative to its volume of output put Diamond Reo in a difficult financial position. Table 7, which is constructed from data in the Diamond Reo bankruptcy proceedings, reports financial information for most of the 1972 to 1975 period.

The financial results reveal that Diamond Reo lost money through the whole period it was owned by Cappaert. What is critical for understanding the Diamond Reo financial situation is that in 1972, before military truck production began, Diamond Reo lost over $7.4 million on the production of 4,567 trucks. Given the eagerness of White to dispose of Diamond Reo, it may be inferred that Diamond Reo lost money on 5,078 trucks in 1971. Therefore, to conclude that Diamond Reo's financial difficulties in 1973 and 1974 primarily were the result of problems with the military truck contract would be erroneous. Clearly, there were problems in the commercial truck activities as well.

The pressure of continuing losses began to be evident in the summer of 1974. One of the first visible signs of the cash-flow crisis was in August 1974. Diamond Reo dealers had been having some difficulty arranging so-called "floor-plan" financing for their trucks. When Diamond Reo was a division of White, the White finance subsidiary handled floor plan financing for dealers. When Diamond Reo became independent the company had no finance subsidiary and banks were reluctant to finance inventory without some certainty the trucks would be sold and paid for.

Because of the difficulties in getting dealer financing, Diamond Reo consigned trucks to dealers. In August 1974, in order to raise cash, Diamond Reo asked some dealers for immediate payment for all trucks that had been shipped or consigned (Ford).

By October, 1974, the cash problems of Diamond Reo became very evident. It owed suppliers $14 million and a number of suppliers had begun to refuse to deliver parts to Diamond Reo unless they received cash on delivery (Walsh, October 28, 1974, 2).

The company met in late October with key suppliers to try and reach an agreement on a financing plan that would have kept components moving into the plant in return for payment of 10 per cent of what was owed in November 1974 and promissory notes that would have been paid off in nine monthly payments beginning March 1, 1975. Chief executive officer Mildred Johnson told the creditors that Diamond Reo was in the position of not being able to build trucks without parts but not able to pay its bills until parts were obtained to build and sell the trucks. She also reported that Diamond Reo had renegotiated a $7 million line of credit with FMC Financial Corporation (FMC). The new line of credit was between $2 and $2.5 million lower that the previous line of credit because of the weakened financial position of the firm. In addition to the money owed suppliers and FMC, Diamond Reo still had $3.2 million in debt it owed White from when F. L. Cappaert bought the company in 1971. Mrs. Johnson did state, though, that in spite of the cash-flow problems Diamond Reo operated at a profit in September, 1974 (Johnson, October 23, 1974).[7]

By early November, 1974, Stanley O. Eaton, president of Diamond Reo, reported to a dealer meeting that firm or tentative agreements had been reached with major suppliers for resumption or continuation of component and parts shipments. He reported shipments were being received from Eaton Corporation, Cummins Diesel, Detroit Diesel-Allison, Rockwell, Dana, and General Tire and Rubber. To help the company during the cash crisis dealers were asked to take cash awards due them under a sales incentive program on the installment payment plan or, preferably, in merchandise (trucks or service parts). Over half of the dealers elected to take merchandise instead of cash.

The cooperation of many suppliers and creditors was not sufficient to help Diamond Reo improve its cash position which continued to deteriorate in November. On December 4, 1974, FMC notified Diamond Reo that it was in default of its loan. In a meeting with FMC on December 5, 1974, Diamond Reo, through Eaton, stated it would not deliver collateral specified in the loan agreements. On the same day Diamond Reo filed for protection under Chapter 11 of the Bankruptcy Act (FMC, December 18, 1974). At that point, Diamond Reo became a debtor in possession and sought to continue to operate as it attempted to reorganize (Eaton, December 6, 1974). At the time of its Chapter 11 filing, Diamond Reo listed assets of $24 million and debts of approximately $40 million (*Automotive News*, April 28, 1975, 1).

Table 6 summarizes the events subsequent to December 6, 1974. The attempt to reorganize and later sell Diamond Reo as a going concern was unsuccessful. Operating losses continued and the secured creditors, White and FMC, were not satisfied that Diamond Reo assets were being protected for the benefit of the creditors. After several extensions of deadlines for Diamond Reo to present a plan to protect the creditors, bankruptcy judge Edward H. Benson formally declared Diamond Reo a bankrupt on June 2, 1975, and appointed Frank J. Hohman as acting trustee in Bankruptcy (Benson, June 2, 1975). Negotiations with a number of potential buyers then occurred. Hohman stated as late as August 6, 1975, that he wanted to sell Diamond Reo as a functioning company located in Lansing rather that sell it off piecemeal (Nixon, August 6. 1975).

During the period following the filing for protection from creditors under Chapter 11 of the Bankruptcy Act in December 1974, until being judged bankrupt in June 1975, Diamond Reo continued limited production of trucks, mainly to complete trucks partially assembled and in the float. Available data indicate 538 trucks were shipped from the Diamond Reo factory in 1975 but it is unclear if that included the 461 military trucks completed at the end of summer 1975. In mid-May 1975, there were 210 unfinished commercial trucks waiting to be assembled plus 137 factory-owned trucks in stock available for sale (Kenney, May 15, 1975). Production at the Lansing plant, therefore, was at near standstill and by mid-July, a small group

Table 7: Diamond Reo Trucks, Inc. Statement of Operations in F. C. Cappaert era.

	June 1,1975- Oct. 31, 1975 (1)	*Dec. 7, 1974- Apr. 21, 1975 (1)*	*9 Months 1974 (2)*	*1973 (3)*	*1972 (3)*
Net Sales/Revenues	$9,637,760	$17,265,004	$125,071,000	$120,820,550	$82,900,582
Other Income	0	0	0	377,743	254,247
Total Revenue	$9,637,760	$17,265,004	$125,071,000	$121,198,293	$83,154,829
Extraordinary Items*	0	1,163,063	0	0	0
Costs and Expenses,					
Cost of Products Sold	9,950,945	17,268,565	110,833,000	114,942,275	79,977,970
Selling, Engineering					
and Administrative Expense	1,181,329	3,538,634	13,312,000	12,226,762	9,604,882
Provision for loss					
on Government Contract	0	0	0	3,082,567	0
Interest and Misc. Expenses	225,024	411,501	856,000	1,681,112	1,002,815
Total Costs and Expenses	$11,357,298	$21,218,700	$125,001,000	$131,932,716	$90,585,667
Income or (Loss)	**($1,719,538)**	**($2,790,633)**	**($70,000)**	**($10,734,423)**	**($7,430,838)**

*Inventory adjustments

(1) Diamond Reo Trucks, Inc. "Statement of Income and Expenses For the Periods Ending April 21, 1975, April 30, 1975 and Oct. 31, 1975." U.S. Bankruptcy Court, District Court of the United States for the Western District of Michigan, Grand Rapids, Michigan. Bankruptcy No. BG74-1778B5, Accession No. 02196, 0259, Box #9, "Financial Reports" file.

(2) Diamond Reo Trucks, Inc. "Statement of Income and Expenses For The Month Ending September 30, 1974." As attachment to: Mildred Case Johnson, Letter to Suppliers, Lansing, Michigan, October 24, 1974.

(3) Touche, Ross & Co. "Diamond Reo Trucks, Inc. Financial Statements." April 26, 1974. U.S. Bankruptcy Court, District Court of the United States for the Western District of Michigan, Grand Rapids, Michigan. Bankruptcy No. BG74-1778B5, Accession No. 02196,0259, Box #7, "Trustees Reports and Accounts" file.

of 161 employees of all types remained on the job at Diamond Reo (Nixon, July 12, 1975). That employment figure was only about 10 per cent of the 1,600 workers regularly employed at Diamond Reo before the bankruptcy.

The attempt to keep production going and sell Diamond Reo intact was unsuccessful. After several extensions of time, Judge Benson ordered liquidation of the firm. During the week of September 15, 1975, bidding for the company was opened to all bidders whether they sought the company in bulk or piecemeal (*Automotive News*, September 22, 1975).

The Bankruptcy Court accepted a bid of $11 million for Diamond Reo on October 20, 1975 from Consolidated International Inc., a Columbus, Ohio, firm that was engaged in the buying and selling of automotive and truck parts (*Wall Street Journal*, Oct. 21, 1975). The assets of the firm at the time of the sale included 163 completed trucks valued at $3.4 million, parts for military vehicles worth $2.2 million, machinery and equipment appraised at $2.7 million, plus truck parts and work in process valued at $27 million, for a total value of about $35 million. Included in the sale to Consolidated was the Diamond Reo engineering package which included patents, trademarks, trade names, good will, product lines, drawings and plans. At the time of the sale it was estimated the market for the parts was a potentially lucrative one because there were about 55,000 Diamond Reo trucks in operation in the U.S. and 200,000 throughout the world, including military trucks (*Automotive News*, October 27, 1975).

The final chapter to the Diamond Reo (Lansing) story took place from June 7 to June 17, 1976 when Consolidated held a 10-day auction of equipment and furnishings at the old Diamond Reo facilities. Everything was put on sale except the engineering package and rights to the Diamond Reo name (Walsh, June 7, 1976).

With the auctioning of the contents of the Diamond Reo facilities the end came to the firm as a producer of a full line of commercial heavy-duty trucks. But the legacy of Diamond Reo did not end with the termination of production in Lansing. In two quite different and unique ways, the Diamond Reo heritage was continued by Spartan Motors of Charlotte, Michigan, and Osterlund, Inc. and successor firms of Harrisburg, Pennsylvania.

Spartan Motors, Inc.

As the Lansing operations of Diamond Reo came to an end in September 1975, a group of former Diamond Reo engineers and sales people decided to design and build a prototype fire-truck chassis for the fire-apparatus division of FMC Corporation. (FMC Financial Corporation, a subsidiary of FMC Corporation, was the firm to which Diamond Reo had been heavily indebted and whose actions were instrumental in the Diamond Reo bankruptcy filing in December 1974). FMC Corporation's fire apparatus division previously had bought and modified Ford chassis. Then, in 1975, FMC developed a new cab for its fire equipment and wanted a special chassis and approached the group of former Diamond Reo people to build a vehicle to the FMC specification (Walsh, January 17, 1977).

The prototype developed for FMC was built on speculation with no assurance that the chassis would be approved by FMC. But FMC accepted the chassis and promised future orders. On that basis, George W. Sztykiel, former Diamond Reo marketing vice president and his associates formed Spartan Motors of Charlotte, Michigan. Initially, Spartan set up operations in the facilities of Form-Rite Corporation which had supplied fiberglass parts to Diamond Reo. Form-Rite owner, Charles R. McNanamey, lost 60 per cent of his business when Diamond Reo collapsed and decided to join the Spartan effort by providing two-thirds of the financing (Walsh, January 17, 1977).

Originally, Spartan started as a Form-Rite subsidiary, but in April 1976 it became independent with its own officers and directors. Spartan went into the business of building special-purpose vehicles, particularly for the fire apparatus industry. In its first year in business, Spartan delivered 21 heavy trucks of which 20 were for FMC's fire equipment division (Walsh, January 17, 1977). One of the interesting early prototypes developed by Spartan was very closely connected to the firm's Diamond Reo heritage. Osterlund, Inc. of Harrisburg, Pennsylvania, commissioned Spartan to build a prototype Diamond Reo Giant Truck which eventually led to its production by Osterlund (Walsh, June 27, 1977).

Today, Spartan has evolved into a world leader in the production of high-performance custom chassis for Class A (large) motor homes, fire trucks, and emergency vehicles. Sales of Spartan in 2002 totaled $259.5 million which generated net profits of $11.7 million and yielded an outstanding 20.1 per cent return on invested capital for Spartan shareholders. The trade names used by the company include Spartan chassis, Crimson fire apparatus, and Road Rescue ambulances. The firm employs over 750 persons in its facilities in Michigan, South Dakota, Alabama, Minnesota, and South Carolina. Clearly, Spartan Motors does not represent a continuation of the old Diamond Reo operations. But nearly 30 years after the ending of production in Lansing, the vision of a handful of creative and enterprising former Diamond Reo employees has led to the development and continuance of a highly successful specialized vehicle manufacturer.

Osterlund, Inc., Manufacturers of Diamond Reo Trucks

Loyal Osterlund of Harrisburg, Pennsylvania had been a Diamond Reo dealer since 1958. When Diamond Reo went bankrupt, Osterlund felt it would be possible to restart production of the trucks he had sold for nearly 20 years and which he believed had an excellent reputation with strong customer loyalty (Osterlund, August 8, 1978).

In 1976, Osterlund initiated the building of a prototype Diamond Reo truck called the "Giant" by Spartan (Walsh, June 27, 1977). By late 1977, Osterlund's firm, called "Osterlund Incorporated, Manufacturer of Diamond Reo Trucks," in Harrisburg was producing Diamond Reo Giants on a regular basis (Giant Profit Machine).

From Consolidated, Osterlund bought a large amount of parts and the engineering package (tooling, dies, blueprints, etc.) for manufacture of six Diamond Reo models. Several important economic considerations had to be faced by Osterlund in his enterprise to manufacture Diamond Reo trucks. One decision was to limit the product line. Although

Osterlund obtained the rights to produce six Diamond Reo models the Osterlund product line initially was limited to the old Model C11664DB which served a key market for Diamond Reo Trucks. Specifically, the truck was a conventional, diesel-powered tandem with a setback rear axle. The model was designed for the ready-mix concrete, crane-mounting, flatbed trailer, riggers, and snowplow markets (Fig. 14). The only major change in the new Diamond Reo Giant as compared with the former models was elimination of the grille to make it easier to service the unit when the hood was tilted. The hoods for the Osterlund-built Diamond Reo Giant were made of fiberglass whereas the old Diamond Reo model had some steel in the hood and fenders (Osterlund, August 8, 1978).

The Giants were essentially a standard model truck with very few options. The standard engine was a Cummins diesel, model NTC290. Optional engines included a Cummins NTC230 and a 6V-92T, 335 horsepower Detroit Diesel. The only other options were a front Power Take Off adapter, a wheelbase option, and a companion seat (Giant Profit Machine). The trucks were delivered in prime finish with the assumption purchasers had the trucks custom-painted to their own specifications (Osterlund, August 8, 1978).

The limited number of options plus the producing of basically only one model were important factors in keeping overhead low for Osterlund. Limiting the models meant that fewer parts had to be kept in inventory storage. In every respect, then, Osterlund was a limited production, specialty manufacturer of heavy-duty trucks. Osterlund manufactured none of its own parts. The engines came from Cummins and Detroit Diesel. Drive lines were Dana-Spicer and axles were Rockwell Standard. The fiberglass hood was manufactured by a Harrisburg firm and the cab was supplied by the same cab manufacturing subsidiary of White that supplied Diamond Reo (Lansing) after the division was sold to Cappaert (Osterlund, August 8, 1978).

As an assembler, therefore, Osterlund was able to obtain significant economies from vertical disintegration. That is, the suppliers were able to enjoy economies of scale by producing truck components in large quantities and selling to a number of manufacturers. A truck assembler like Osterlund, in turn, minimized its investments in tooling and manufacturing equipment by buying the parts from outside vendors.

In the initial Osterlund plant in Harrisburg, the capacity was 1-1/2 trucks per day or about 375 per year. This compared with 40 trucks per day on two shifts at the old Lansing plant.

Osterlund was very definitely a limited output specialty producer of heavy-duty trucks. In a very nominal way it could be argued it was in competition with the large fully integrated firms like International, Ford, GMC, and Mack. However, Osterlund did not try to compete across-the-board in all product lines with the larger firms. Rather, it chose to operate as a pure assembler of a very limited line of specialized, high quality heavy-duty trucks.

Osterlund was successful enough in producing the Diamond Reo Giant that by 1984 operations were expanded by opening a new 122,000 square foot facility in Harrisburg with a capacity of 10 trucks per day. In 1984, Osterlund claimed 65 U.S. dealers and 14 dealers in foreign countries. By 1984, Loyal Osterlund's son, Jan Osterlund, was executive vice president of the firm and in charge of most operations. Another son, Gary, owned the company's heavy-truck dealership, located in Carlisle, Pennsylvania, while Loyal Osterlund remained president (Flax, 1984, p.16).

In 1986, the name of the trucks made by Osterlund were called simply the "Giant." However, Osterlund gave into pressure from dealers in 1989 and announced that the "Giant" name was being dropped and that they were going "back to the time honored Diamond Reo name" (Osterlund, Inc., March 31, 1989).

Some styling refinements were made on the conventional Diamond Reo line in 1991 with the adaptation of what was called a new "Ultra Dynamic" tilt fiberglass hood with a slight 10-degree slope. The sloped hood gave the Diamond Reos a somewhat more modern appearance, better visibility, and improved aerodynamics. Engine options were Cummins and Caterpillar models. The 1991 Diamond Reo line was available in single, tandem, or all-wheel drive configurations (*Heavy Duty Trucking*, April 1991).

In March 1992, Osterlund announced it had entered into an agreement to sell all of its manufacturing and service parts rights, patents, and trade names associated with the production and marketing of Diamond Reo and Giant trucks (Osterlund, March 12, 1992). The letter announcing the sale did not reveal the name of the buyer. However, evidence indicates that the proposed buyer was probably Joseph Whitman of Whitman Engineering Corporation who ultimately did buy the operation (Brom). The sale was not completed and the Osterlunds announced in May 1992 that all correspondence regarding the sale of the firm should be disregarded (Osterlund, May 28, 1992).

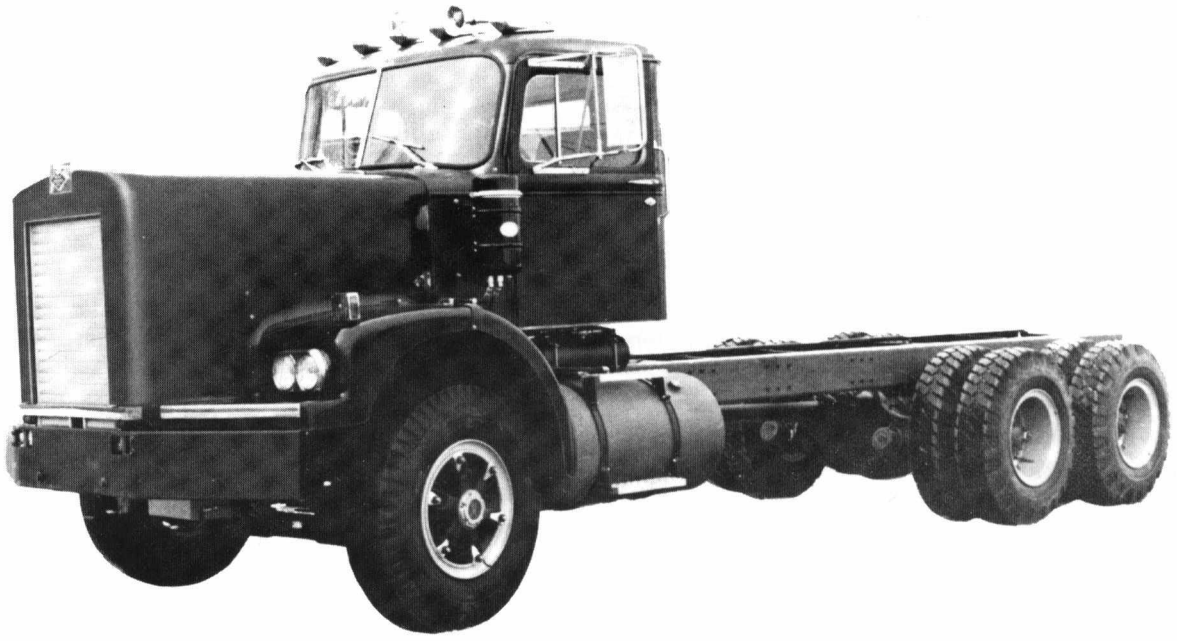
Specific production data on the output of the Osterlund operations are lacking. Events in late 1994, though, suggest that by the mid 1990s, the production level had declined from earlier years. In the fall of 1994 Osterlund, Inc. suspended production for a short period of time, sold the new plant on Gibson Boulevard in Harrisburg and reconsolidated into its older facility on Paxton Street in Harrisburg. A sentence in the letter announcing the move indicates that the action was taken due to problems in the industry (Osterlund, November 15, 1994). The company assured dealers at the time that it was in a debt-free position and had orders for trucks that would go into production as soon as the move was completed.

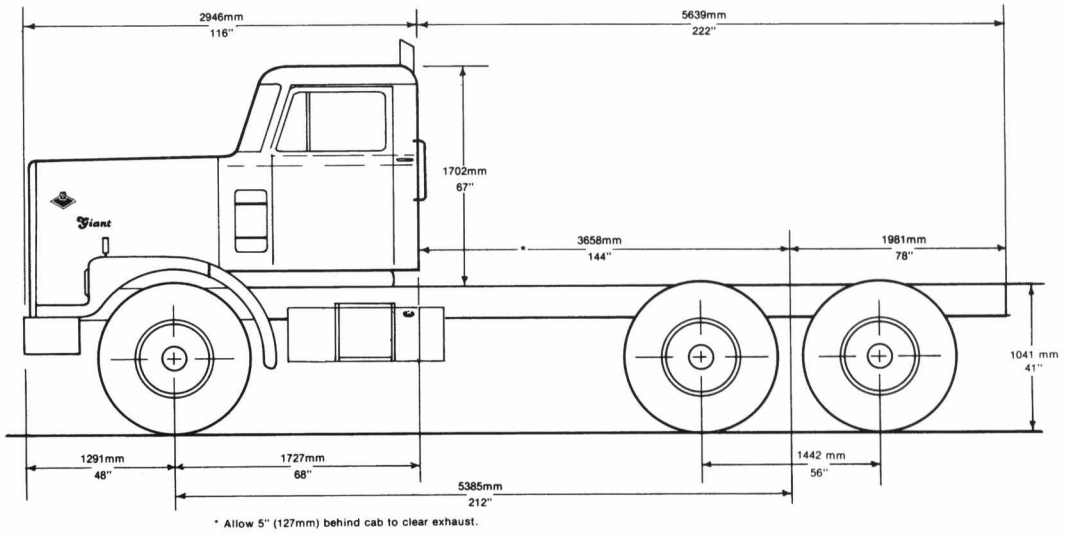
The Osterlunds, though, appeared willing, and perhaps, even eager to divest themselves of the Diamond Reo business. On December 15, 1995, Bill Snyder of Somerset, Pennsylvania, purchased the business. Corporate headquarters were moved to Somerset, but production continued at the Paxton Street location in Harrisburg (Snyder). Jan Osterlund stayed on for a time as a consultant to the new owners (Osterlund, January 2, 1996).

Snyder's tenure as a builder of Diamond Reo trucks was relatively short-lived. During 1996 the operation was sold to Joseph J. Whitman of Whitman Engineering of Lebanon, Pennsylvania (Brom). In early 1997, Whitman introduced a line of "Custom built" trucks under the Diamond T name (Whitman, March 12, 1997). Later, in 1997, operating as Whitman Specialty Vehicle Corporation, the firm displayed its Model 9164B dump truck chassis at an exposition in Miami, Florida.

DIAMOND REO

Giant C11664DBH





OSTERLUND INC.

MANUFACTURER OF

DIAMOND REO TRUCKS

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*Fig. 14 – An Osterlund-Diamond Reo Giant, Model 11664DBH (1980). (*from the editor's collection)

By now, the name of the vehicles being made by Whitman was "The 'T' Line" of trucks (Whitman, October 20, 1997). A number of models of T Line trucks were offered including heavy conventionals, (the 9100B series) with Caterpillar, Cummins, and Detroit Diesel engines, dump trucks (model 9164B) and medium-duty stake-bodied trucks (see "The 'T Line' and "Whitman Specialty Vehicle Corporation" literature).

Production volume of the Whitman T Line trucks is unknown. The last T-Line truck appears to have been built in 2001 (Brom). After output was discontinued, Wolfe Industrial Auctions of Frederick, Maryland held a public auction at the former Diamond Reo production facilities on Paxton Street in Harrisburg on November 23, 2002. Auctioned off were all assets, equipment, and parts of the Diamond Reo operations (Wolfe). With that auction the era of building Reo vehicles and their subsequent derivatives begun nearly a century earlier came to an end.

Conclusion

The thesis presented at the beginning of this article was that the economics of the heavy truck industry, as it had evolved by the early 1970s, combined with the substantial overhead of Reo and Diamond Reo, poor management decisions, and increasingly competitive industry conditions led to the Diamond Reo bankruptcy in 1975. The evidence causes us to accept the thesis. The major points we wish to emphasize in reaching this conclusion are:

> Until 1975, Reo and later Diamond Reo operated in a large plant with high overhead. Reo was not a low-cost producer.
>
> As soon as the post-World War II sellers market ended, Reo began to have volume problems.

The sale of Reo to Bohn Aluminum and, later, to White Motor Corporation probably was in the best interest of Reo stockholders, in the mid 1950s, given the direction the heavy truck market was taking.

When White acquired Reo and Diamond T, it appears that White overestimated the competitive strength of the two companies. The eventual combining of production in Lansing brought some production economies but also marketing problems which led to the eventual combining of the two divisions as the Diamond Reo Division.

While specific data on Diamond Reo's financial condition under White ownership are not available, a reasonable conclusion is that at best Diamond Reo was not earning an adequate return on investment for White. Given the operating results of Diamond Reo as an independent firm under F. L. Cappaert's ownership, there is a possibility Diamond Reo was actually losing money for White.

After the purchase of Diamond Reo by F. L. Cappaert, several events occurred which caused problems for the truck maker. These included:

> A volatile heavy truck market in the 1970s due in part to FMVSS 121 but also due to an energy crisis and relatively severe recession in 1973-75.

Strategic mistakes by Diamond Reo's management in the 1970s including:

> Marketing and production of a comprehensive, full product line which increased overhead and engineering costs;
>
> Failure to take all contingencies into consideration when bidding on the military truck order in 1972, an error that caused serious financial problems.
>
> Overall, an operation that was probably undercapitalized for the size facilities and product line Diamond Reo had.

Although at the time it became an independent truck producer again in 1971, Diamond Reo claimed to be a major builder of heavy trucks and the largest independent builder, it was in fact, caught in an intermediary position in the market. Diamond Reo was too large in Lansing to be a specialty producer but too small to compete adequately with larger firms such as International (later Navistar), Mack, PACCAR, White (its former owner) and Ford and GM. Given the production volumes it had and with a complex product line, Diamond Reo could not take advantage of economies of scale.

Later, after the bankruptcy, Diamond Reo enjoyed another quarter century of life as a specialty truck producer of only a few hundred units per year. The Osterlund and successor operations reflected simply a reality that a niche producer of a limited product line could be successful (at least in the late 1970s, 1980s and early 1990s). However, the Osterlund and successor operations could not be compared with the scale of the Lansing facilities.

Historical speculation on what might have been is always difficult, if not dangerous. However, we cannot conclude this analysis of the *Rise and Fall of the World's Toughest Truck* without speculating on what it might have taken to keep Diamond Reo in business as a major builder of heavy trucks after 1975.

By the late 1970s the structure of the heavy-duty truck market was changing dramatically. Mack discontinued Brockway. Dodge ceased production of heavy trucks. But larger and more profound changes came at the very end of the 1970s. Mack ultimately was purchased by Renault of France. After going bankrupt, White was purchased by Volvo of Sweden. Daimler-Benz purchased Freightliner, and in the late 1990s also purchased the heavy truck operations of Ford and created the Sterling Truck Division.

The consolidation and globalization of the heavy truck industry has changed the competitive structure of the U.S. heavy-truck market. Former independents, such as White, Mack, and Freightliner, became part of large global enterprises with deep pockets to provide serious competition to Navistar and PACCAR. Had Diamond Reo survived the problems of the mid 1970s (and that assumes that most of the strategic management errors chronicled above had not been made), it might have been in a position to be absorbed into one of the globalized, consolidated truck builders. This is merely speculation, but it suggests a scenario in which the sad fate of "The World's Toughest Truck" might have been avoided.

Footnotes

[5]More information on Cappaert may be found in:

> Stevenson, Jim. "Reo's Owner: a Mystery Man With Millions." The State Journal [Lansing]. April 13, 1975.

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[6]Diamond Reo continued to sell trucks in GVW Classes 6, 7, and 8 during the 1968-75 period. However, by 1973 and 1974 only about 1 per cent of Diamond Reo registrations were Class 6 trucks.

[7]The payment of part of the debt to the suppliers who agreed to this plan became an issue later in the bankruptcy proceeding. The Diamond Reo bankruptcy trustee, Frank J. Hohman, filed a complaint on behalf of the bankruptcy estate stating that the effect of the transfer of funds to suppliers was to enable each of them to obtain a greater percentage of its debt than other creditors [and asked the court to disallow other claims of these creditors] (Hohman, Frank J. Trustee in Bankruptcy of Diamond Reo Trucks, Inc. "Objections to Claims and Counterclaims for Affirmative Relief." USBC, October 26. 1976.).

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Diamond Reo was known for its premium trucks. The Raider was probably the marque's high-water mark for trucking luxury.

Brazil's Auto Industry— A Concise History 1891-1991

by Albert R. Mroz

Although the automotive industry may have germinated in Europe and blossomed in the United States, becoming ever more prolific in Japan, other countries around the globe have had the blessings and trappings of their own motor vehicle industry. Some of these countries have found little coverage by the mainstream press and have been neglected even by historians of the esoteric. One of those fascinating nations is Brazil, whose first involvement with the automobile began late in the 19th century.

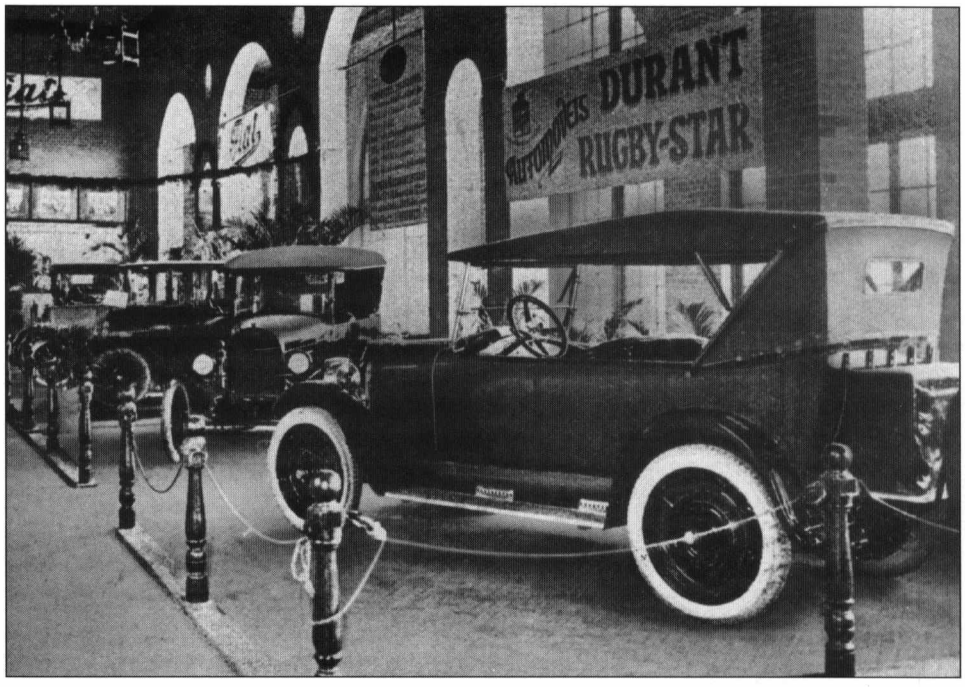

Fig. 1 – The Durant/Rugby/Star exhibit at the First São Paulo automobile show, 1926. (Courtesy ANFAVEA)

The Early Years

The first person to import a motor vehicle to Brazil was the aviation pioneer, Alberto Santos Dumont. According to Brazilian auto historian Ciro Dias Reis, Santos Dumont stated in his book *Os Meus Balões*, written in 1904:

> Automobiles were still scarce in Paris in 1891. I had to go to the factory of Valentigney to buy my first machine, a Peugeot with tall wheels and a 3.5-horsepower engine. It was a real wonder. In those days automobile registration and driver's license had not been introduced yet. Anyone driving the new invention on the street did so at his own risk. Furthermore, people were so interested in it that I was reluctant to park the car at certain squares, such as before the Opéra, where a crowd would gather and block street traffic. From then on I became a fervent enthusiast of the automobile. I buried myself in studying its various parts and their respective purposes. I learned how to handle and fix the machine. Seven months later, when my family returned to Brazil, I took my Peugeot with me.

That year, 1891, the first automobile arrived in Brazil (a nation of 14 million at the time). It was also the year the first Brazilian constitution was written. By 1903 there were 16 automobiles registered in São Paulo. A São Paulo businessman named William T. Right imported several 1904 Ford Model As, while industrialist Ermelino Matarazzo, an Italian immigrant, and Count Silvio Alvares Penteado were the first two Fiat owners in Brazil. Matarazzo's company by that name later became the exclusive importer, assembler, and resale agent for Fiat in Brazil.

O Automovel Club do Brasil was founded in 1907, publishing a magazine dubbed *Fon-Fon*, "alusive to the honking of car horns," according to Ciro Dias Reis. Soon various adventurers would test their skills at auto racing and setting records around the country. In 1908 Earl Pierre Lesdain climbed to the summit of Mount Corcovado in a 4-cylinder, 16 hp Brasier. Later that year it took him 36 days to drive from São Paulo to Rio de Janeiro. Another enthusiast named Antonio Prado drove a Ford from São Paulo to Santos in 25 1/2 hours. These were not so much record-setters as numbers set to surpass in a country where nearly all roads were still unpaved.

The first independent publication specializing in automotive subjects, including racing, was *Revista de Automoveis*, which started in 1911. It wasn't until after World War I that Brazil's automotive industry would get its full-fledged transplant in the form of Ford Brazil in 1919, initially capitalized on May 1 of that year with $25,000, which was soon increased to $30,000.

The 1920s

Henry Ford forecast in his *Principles of Prosperity* (Editora Brand, Rio de Janeiro) that "A country's development depends on the means of transport. In a large portion of the Brazilian hinterland the use of the automobile is only feasible during six months of the year. During the other six months the unkept (sic) roads do not offer any condition for traffic. . . . The automobile is destined to making Brazil into a great nation."

Fig. 2 – Hispano-Suiza in Brazil, 1926. (Courtesy ANFAVEA)

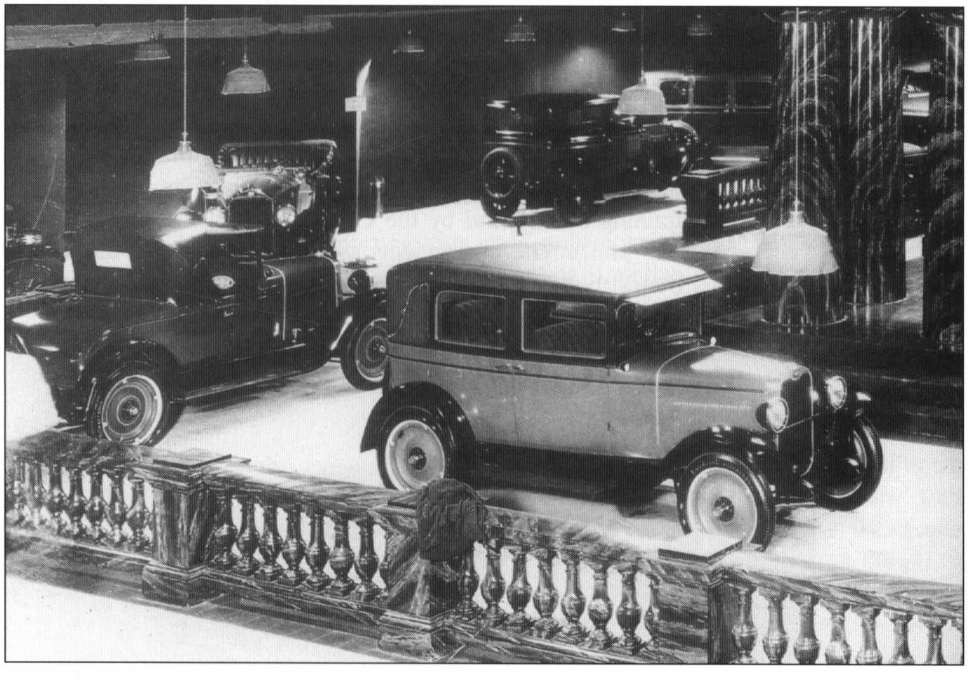

Fig. 3 – Exhibit of 1927 Chevrolets manufactured in Brazil. (Courtesy ANFAVEA)

Authorization for the Ford venture was granted by Brazilian President Epitacio Pessoa on May 12, 1920 and Brazil's transportation future would change dramatically. The first Model Ts were assembled by 12 employees. Only the seats, wheels, hood and windshield were shipped separately. By 1921 Ford occupied a small factory at Street Salon No. 2 (now No. 809) in São Paulo. Both Model T passenger car and Model TT trucks were assembled.

Brazil's first automobile show arrived in 1924 in São Paulo at the Palacio das Industrias. By this time the city of São Paulo had approximately 3,000 imported cars and buses, and Brazil counted 30,000 vehicles in its national fleet, all of them imports. The auto show of 1924 featured cars from Europe and the U.S. with some of the largest exhibits from Alfa Romeo, Buick, Cadillac, Chevrolet, Dodge, Durant/Star (Fig. 1), Fiat, Ford/Lincoln, Essex/Hudson, H.C.S., Hupmobile, Jordan, Lancia, Nash, Overland, Packard, Paige, Premier, Renault and Vauxhall. Motorcycles, tractors and trucks were also heavily advertised and exhibited. That same year the Ford factory in São Paulo, which was "a miniature of the Ford Center in Highland Park," had a production capacity of 4,700 vehicles and 360 tractors per year, employing 124 people, according to the organization Associacão Nacional dos Fabricantes de Veiculos Automotores (ANFAVEA).

General Motors established a Brazilian subsidiary in 1925. Observing the tremendous enthusiasm for the automobile in South America and its market potential, General Motors do Brasil S.A. leased a warehouse that year on President Wilson Avenue in São Paulo's Ipiringa District. Chevrolet sold very well in Brazil reaching the 18,000 per year mark in 1926.

Luxury cars such as Hispano Suiza also arrived by 1926 (Fig. 2). The following year GM boasted having assembled its 25,000th Chevrolet in Brazil (Fig. 3). The São Paulo show had 62 exhibits by this time. The year 1928 saw the 50,000th GM vehicle assembled in Brazil.

The 1930s

The U.S. stock market crash of 1929 sent the price of coffee tumbling, among other things, and the import and exhibit of automobiles in Brazil was severely interrupted. A 45,000-square-meter factory that GM had started in 1927 at São Caetano do Sul sat unproductive by 1930 when only 4,051 GM vehicles were sold in all of Brazil. Sales crashed to 1,566 in 1931. Frigidaire refrigerators began selling in Brazil as GM responded to the Depression, the company also focusing on public transportation and opening an assembly factory for wooden-bodied buses in 1932 (Fig. 4).

GM also expanded its marketing creativity with trains that pulled circus-like displays across the country, much as Charles S. Howard at Buick had done in the United States. This type of "sensational marketing" got lots of free press and

Fig. 4 – Assembly of GM buses in São Paulo, 1932. (Courtesy ANFAVEA)

publicity. The advertising budget was expanded at GM despite economic woes.

The year 1933 marked the first importation of Volvo vehicles to Brazil, specifically, one passenger car for Brazil's first Volvo representative, Attilio Marachetti, and four trucks, models LV70 and LV72. The trucks were sold to Usina Santa Luzia which was owned by the Carlo Paretta Bank. This would have considerable significance in the following years as the bank set up a partnership in Rio de Janeiro (then the capital), which was named Sociedade Volvo do Brasil Importadora Ltda.

At the same time, the world-wide need for natural rubber for motor vehicle tires and other rubber products induced Ford to obtain Brazilian Government concessions to 971,000 hectares of land on the banks of the Tapajos River in the middle of the rain forest jungle. The nearest town, Santarem, was 120 miles away. The city of Fordlandia was quickly built on cleared 150,000 hectares after some 18,000 hectares of rubber trees having been planted between 1928 and 1934.

Within a year of ground-breaking, 1,500 inhabitants had homes with piped-in water, paved streets, a sawmill, stores, churches and a power-generating plant. A portion of the rubber trees died and many of the Brazilian workers fell ill, so that by World War II Ford abandoned the entire project. Some rubber plantation business survived, but synthetic rubber invented during the war made rubber plantations nearly obsolete.

The 1930s brought much political upheaval to Brazil. The Constitutionalist Revolution took place in 1932, the Communist Conspiracy in 1935, and the authoritarian regime called Estado Novo (New State) began in 1937.

The 1940s

During World War II, Brazil was severely cut off from petroleum oil and gasoline importation, as well as from new vehicle imports, while other countries scrambled to build military vehicles and other materiel. GM's commercial marketing and manufacturing efforts had paid off, with 77 percent of Brazil's commercial vehicles being produced by GM at the São Caetano do Sul plant.

Brazilian vehicles, most of which were powered by gasoline, were converted to wood gas, called "gasogene," during World War II. Gasogene was created by burning charcoal (also used in Europe and Australia after gasoline shortages); however, it reduced both engine performance as well as life span. In São Paulo alone approximately 20,000 vehicles were converted during 1940-1945 (Fig. 5). GM built trucks and gasogene generators during the war, and due to strict government regulations, sold only 2,000 trucks to the general public. However, GM started its Etna (later Delco) battery plant in 1942.

By 1938, Fabrica Nacional de Motores (FNM) was established in Rio de Janeiro to produce aircraft parts that included the 450 hp motor used by the Brazilian air force in its training school, and by the Correio Aereo Nacional (National Air Mail). The components were to come from the United States, but this did not occur; the war began, and FNM built

Fig. 5 – 1942 Buick equipped with GM gasogene conversion. (Courtesy ANFAVEA)

appliances for the duration. After World War II, FNM began assembling trucks, the first of which, in 1949, was the FNM-R-80, built under license from the struggling Isotta-Fraschini.

Partly as a result of the international political, social and economic turmoil caused by World War II, Brazil's nationalist atmosphere placed pressure on the government and financial institutions to create an automotive industry within the country independent of foreign companies and diabolical upheavals. FNM began producing commercial vehicles in affiliation with Alfa Romeo, yet they were considered Brazilian in that a third of the parts would be manufactured in Brazil. After Isotta Fraschini went bankrupt in 1949, the FNM D-9500 appeared in 1953 under a license from Alfa Romeo. By mid-decade half of the trucks' components would be domestically manufactured. The diesel powered FNM D-1 100 heavy truck was introduced in 1957. However, half of all vehicles were still imported into Brazil during the 1950s albeit as CKD (Completely Knocked Down) units.

Brazil's then President Enrico Gaspar Dutra was forced to impose specific controls to prevent the entire depletion of the country's foreign currency reserves and to reestablish a trade balance. By 1949 the government's selective controls resulted in changing the nature of the vehicles which were being imported from CKD to SKD (Semi Knocked Down). This allowed Brazil to introduce its own components into the imported vehicles. Foreign vehicles now began using Brazilian wheels and tires, brake drums, batteries, fasteners, upholstery and other items. By 1949 GM was building complete metal-bodied buses under the Chevrolet name using only a few imported components.

The 1950s

Privately, individuals importing cars paid only a small tariff after the war. For example, Rodolfo Maerz, a Brazilian citizen of São Paulo, was the first to buy a VW Beetle. It was sold to him on November 17, 1950 for Cr. 59,000 and a tax of Cr. 1,493. That year Brazilian manufacturers of automotive components organized their first show at Parque da Agua Branca in São Paulo.

Coincidentally, the year 1950 was when Alfred Jurzykowski arrived in Brazil with the intent to find cocoa suppliers for his chocolate factory in the United States. As with all business enterprises, an individual or two with a few connections who are willing to take some risks are usually behind the development of any market venture. Alfred Jurzykowski's friendship with Baron von Korff, who was connected with the Daimler-Benz Company, led to his purchase of a small number of Mercedes truck chassis which were used to assemble buses in Rio de Janeiro. He also began to import the 180 and 190 Model passenger cars.

Another political change took place in 1951 when Getulio Vargas resumed power. That year, the Comissão de Desenvolvimento Industrial (the Commission for Industrial Development) was created; it was also the year that Mercedes-Benz agreed to build commercial vehicles in Brazil, which would turn out to be a milestone. Wilhelm Haspel, president of Daimler-Benz, came over for a visit to Brazil; the founding of Mercedes-Benz do Brasil took place just two years later with Jurzykowksi owning 75 percent and Daimler-Benz the remainder. Daimler-Benz retained the option of buying back 25 percent but remained fully responsible for lending support in the production of Mercedes trucks.

In 1952 the Subcomissão de Jipes, Tratores, Caminhoes e Automoveis (Subcommission for Jeeps, Tractors, Trucks and Automobiles) was responsible for introducing Article 288, which limited granting import permits for auto components which were already being manufactured in Brazil. That year was also the beginning of Willys Overland do Brasil as well as the first year that Toyota vehicles were imported;100 FXL pickups arrived on Brazilian soil.

Once a company established itself in Brazil, importation was much simpler, but in 1953 Article 311 prohibited import of all entirely-assembled vehicles. Brazil was protecting its fledgling component industry.

The year 1952 was also the first year of the National Industry of Auto Parts Show, which was held at Santos Dumont Airport in Rio. Article 311 had effectively prompted Volkswagen do Brasil to begin assembly of the Beetle and Kombi vans within the country using imported parts. The São Paulo Industry of Auto Parts also held its first exhibition, at Galeria Prestes Maia in São Paulo. Brazil's government policies were intended to bring foreign manufacturers into Brazil to create jobs in the assembly and component manufacturing segment of industry, and by and large these policies worked very well. Meanwhile, Daimler-Benz acquired a large tract of land in a rural area called Vila Pauliceia in São Bernardo do Campo near São Paulo.

In 1953, after the governor of São Paulo State (and future president) Janio da Silva Quadros visited Sweden, the first Scania trucks were imported into Brazil. Scania-Vabis quickly established itself in Brazil under an agreement with the Brazilian company Vemag, and Scania trucks arrived as CKD units at the Port of Santos. There, Vemag workers waited with tires and batteries and "assembled" the trucks on the spot, then simply drove them up the Serra do Mar mountain to São Paulo for sales and distribution.

By 1954 Brazil had established the Professional Association of Manufacturers of Trucks, Tractors and Automobiles. Under government auspices President Vargas created the Comissão Executiva da Industria de Material Automobilistico (the Executive Commission of the Industry of Automotive Materials), trying to consolidate the plans for nationalizing such manufacturing. The effort did not materialize as a result of his suicide in the summer of 1954, but other efforts ensued rapidly. Volvo imported its L385 trucks, called the Viking, and the L395, called the Super Volvo. GM had produced half a million car batteries in Brazil by 1954. It continued to manufacture refrigerators under the name Frigidaire, reaching the mark of 50,000 units nationally by 1955 and doubling the following year. The Volta Redonda steel mills began to play an important role in the region.

December 21, 1955 was marked as an important milestone in Brazil's automotive history when the first motor block was cast in Brazil, ordered by Mercedes-Benz (overcoming some type of urban myth that technically it would be impossible to cast an engine block in a tropical setting). Daimler-Benz president Wilhelm Haspel noted at the time the potential of

Fig. 6 – Vemag Fissore, the first Brazilian-designed car, 1965 model. (from the editor's collection)

building trucks and buses in order to connect the very long distances between large cities among Brazil's individual states. Brazil was spending nearly $250 million per year at the time to import vehicles. This was at a time when the entire country had 708,000 vehicles on the rudimentary roads, up from 426,000 in 1950. Road building in Brazil had become a national priority by 1956. The year 1956 was when the Professional Association of Manufacturers became ANFAVEA.

Because of government involvement the Grupo Executivo da Industria Automobilistica—GEIA (Executive Group of the Automobile Industry) was created. This development came as a result of the efforts of the new President of the Republic, Juscelino Kubitschek. Sumoc, the equivalent of the Banco Central, established the basis for the Brazilian vehicle industrialization plan. GEIA approved GM's proposal for the nationalization of the production of Chevrolet trucks in December of 1956. This agreement between the Brazilian government and GM would result in the creation of a modern foundry for engine blocks and cast iron components. In anticipation of this cooperation, GM had acquired a 1,600,000-square-meter plot of land on "an old half-abandoned farm bordering the Presidente Dutra highway . . . in São Jose dos Campos" according to GEIA notes. This was known as "Project 420, Production of Trucks in Brazil" in GM's internal memos. At the end of 1956, President Kubitschek inaugurated the plant stating: "Today's revolution is that of domestic development. No doubt that our domestic market is large enough to support its own automotive industry and is capable of replacing the huge volume of imports that are currently essential to meet the minimum needs of our country."

To further accelerate the industry's growth, it was announced in December of 1956 that ". . . the imports of machinery and equipment is exempted from taxes," according to ANFAVEA's historical notes, which subsequently lead to "the law that changes the customhouse tariffs" in August of 1957. Following the example of Mercedes-Benz, Scania-Vabis began importing diesel engines in 1957, sending technicians to Brazil for the start-up of the operation. Newspapers in São Paulo announced that these personnel would arrive speaking Portuguese, emphasizing this was possible "After six months of intensive lessons they had to take before traveling."

That year VWs first Brazilian Beetles called the "Fusca" (the Portugese word for beetle) rolled off the line, slowly gaining acceptance at a time when the trend was toward larger cars. VW founded its Brazilian subsidiary in 1953 and by 1957 twelve employees were assembling Kombi vans. VW began building a huge plant in São Bernardo do Campo on Anchieta Highway near São Paulo.

Ford produced the F-600 truck in Brazil starting in 1957. Scania-Vabis do Brasil was founded the same year, with Simca of France and Toyota of Japan following the next year. By 1958 Ford was manufacturing its V8 engine in Brazil instead of importing it, and Scania-Vabis followed suit by building a 10,000-square-meter shop in the São Paulo suburb of Ipiranga solely for the purpose of building engines. Toyota do Brasil Industria e Comercio was established that year, with the first utility vehicles assembled there being sold by December. These were the Land Cruisers assembled on a CKD basis. The following year the Land Cruisers were renamed Bandeirante and were 60 percent domestic content, always as 4x4s with diesel engines.

Mercedes-Benz was operating trucks and buses throughout the country by the late 1950s, including their new monobloc (i.e., unibody) O-321 bus, but the Brazilian auto industry did not enjoy a high level of prestige. Aldebert de Queiroz, a representative of Mercedes-Benz, publicly later stated, "At the time, every industrial product made in Brazil bore

Fig. 7 – The Brazilian Volkswagen Karmann Ghia, 1970 model. (from the editor's collection)

this image of a cheap, disreputable, surrogate product that did not deserve the consumer's trust. Japanese products were also regarded in the same way." Meanwhile, GM's São Jose dos Campos plant was inaugurated by President Kubitschek in 1959, who insisted on pouring a ladle of molten iron into the first engine block mold. GM do Brasil would grow at an astonishing pace as the auto industry in Brazil expanded rapidly.

The 1960s

Brazil's new decade began with another national automobile show, which arrived on November 25, 1960 in São Paulo at the Ibirapuera Park. It was the creation of Caio de Alcantara Machado, who said at the time, "The Show was organized more with the purpose of demonstrating to Brazilians the capabilities of their national industry than of attempting to make any association with international shows." But the show attracted much publicity, especially after opening day visits by Carvalho Pinto, the governor of the state of São Paulo, and subsequently by President Kubitschek, who was quoted in *Folha de S. Paulo*; "The country has advanced 50 years in 5 . . . with no regret of any action taken toward the development of the nation." Improvised as the new auto show was, new gimmicks were introduced, including raffles of cars and go-carts, movies, lectures, fashion shows and the auction of a Simca Chambord, selling in 24 installments at "the best sales offer."

The show featured some "new" vehicles, such as the Vemag Fissore, designed in Brazil and using DKW components (Fig. 6), Scania-Vabis L-75 (known as the "blow torch" for the flames that shot out the exhaust when changing gears), Amazonas trucks from GM and VW Karmann-Ghia (quite different in front sheet metal both from the European and U.S. versions) (Fig. 7). The first three Karmann-Ghias left the Brazilian assembly factory only one year after the official formation of Karmann-Ghia do Brasil; a result of the friendship between founder Wilhelm Karmann and the then-head of operations of Volkswagen do Brasil—Friedrich Wilhelm Schultz-Wenk. As in Germany, Karmann-Ghias were built on VW chassis and all components were brought into Brazil.

VW also showed off a sample of its assembly line in which Beetle bodies hung over finished chassis ready to bolt down by "invisible" workers, a symbolism not lost on members of the Brazilian workforce visiting the show. Ford's Brazilian production hit the 30,000 mark, including the 8-BR diesel.

In 1960, FNM began producing a copy of the Alfa Romeo 2000 automobile, the FNM 2000, first dubbed the JK after then President Juscelino Kubitschek (Fig. 8). It also continued to build its commercial vehicles.

The year 1961 was a milestone as Brazil began exporting its assembled buses (late 1960 according to some records, but 1960 is probably the date of signed contracts). A total of 380 units left Brazil for neighboring South American countries. The Karmann-Ghia plant was expanded to include the first large tool shop for die-pressed panels in Brazil, having great importance later for many projects including VW's SP-2 sports car and Ford's Escort convertible, as well as components for other vehicles including sunroofs, pickup beds, commercial and recreational trailers, ambulances, professional car components, fuel tanks and a variety of automotive tooling.

Indeed, Brazilians had something to be proud of; such as assembling a total of approximately 290,000 vehicles over the previous four years. Brazil's assembly plants were churning out vehicles at such a rate that by 1962, according to historian Ciro Dias Reis, "Manufacturers reached an index of nationalization of 97 percent and ranked Brazil the ninth world producer of automotive vehicles." He also quoted then-organizer, Luiz Fernando Rudge, in the *Folha de S. Paulo*:

> There is a recent enthusiasm of the Brazilian people for the domestic auto industry. Until a short time ago this industry was regarded as disreputable. The industrial park was surrounded by an aura of pessimism. In addition to distrusting the quality of products made in Brazil, the people believed that an underdeveloped country had little, if

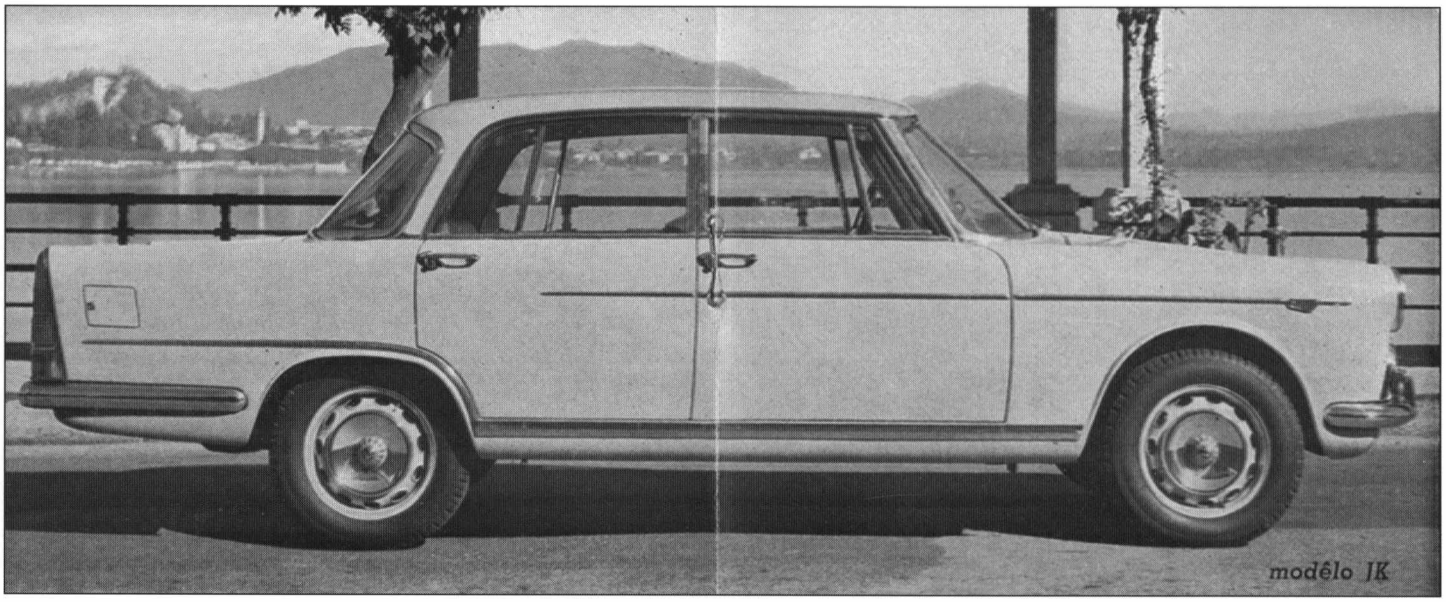

Fig. 8 – The FNM 2000, built under license from Alfa Romeo. (from the editor's collection)

any, possibility of reaching high-quality standards in automotive vehicle manufacturing. The public opinion, still mesmerized by imported materials, was concerned with the problem of quality eventually incurred by the progressive nationalization. However, auto makers did a good job and today the Brazilian auto industry enjoys a different image.

Brazilian Ford production shot up to 75,000 yearly by 1962. Toyota inaugurated its São Bernardo do Campo plant. (Toyota had launched its 25L Mercedes-powered diesel van in 1961). Most importantly in 1962, a new Scania-Vabis plant was inaugurated on December 7 by Brazil's President João Goulart, GEIA's founder Admiral Lucio Meira, Carlos Alberto de Carvalho Pinto, governor of the State of São Paulo, and Lauro Gomes, mayor of São Bernardo do Campo where the factory was located.

According to Scania company executives the logistics of being just 30 kilometers away from the city of São Paulo included such problems as having to wait three days to complete a phone call. Communication with Sweden was by mail only. Rain would make the roads impassable and executives, such as Scania's head, Gunnar Lindquist (president until 1984), were forced to sleep in their offices, according to *Carga* magazine for September 1985. The company's requirement that new workers were to be able to read and write were dropped, and Scania would have to teach basic literacy to employees who arrived from farms in other regions, filling the need for industry labor. Scania's L-76 Model truck was first exported to Uruguay, and subsequently to all Latin American countries, with the exception of Argentina which had its own plant. Scania's Brazilian trucks were also later exported to Africa and the Middle East.

The Fourth Automobile Show in Brazil trumpeted the one millionth vehicle built in that country. It took place November 27, 1964. The 200,000 square-foot exhibit area included the latest Aero-Willys, such as the radical Capeta sports car concept, DKW Vemaguet Rio and DKW Belcar Rio (Fig. 9), Brasinca GT 4200 sports car (later renamed the Uirapuru) and the GM Veraneio. But Brazil's economic and political woes continued without much help from nationalization. Rampant inflation continued, prompting the new government military regime to begin printing bills of 10,000 Cr. denomination, while the cost of food in 1964 shot up 87 percent.

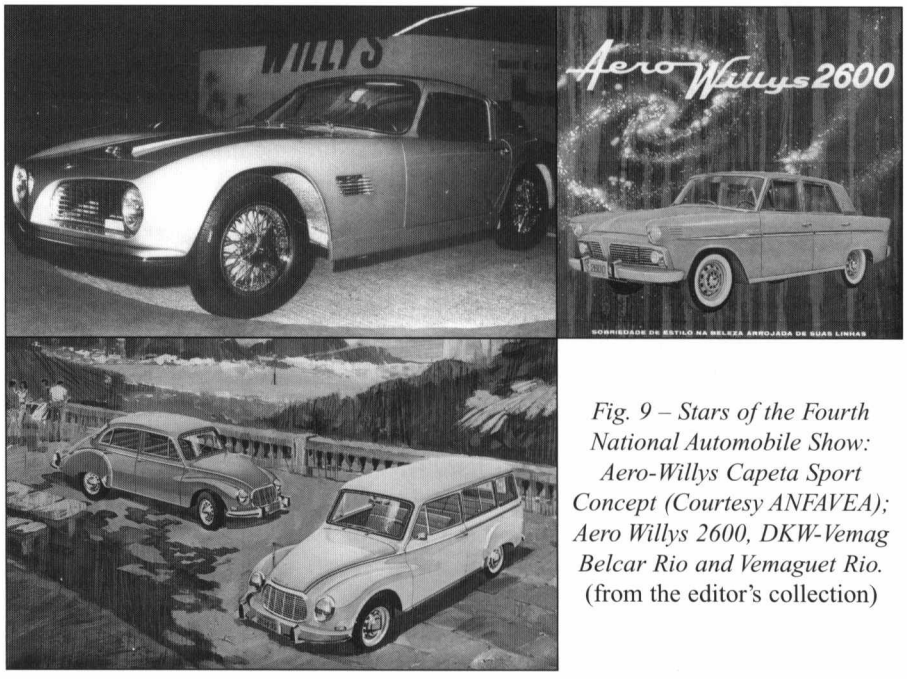

Fig. 9 – Stars of the Fourth National Automobile Show: Aero-Willys Capeta Sport Concept (Courtesy ANFAVEA); Aero Willys 2600, DKW-Vemag Belcar Rio and Vemaguet Rio. (from the editor's collection)

Fig. 10 – The Chevrolet Opala, 1971 model. (from the editor's collection)

The Fifth Automobile Show arrived on November 26, 1966. Although a number of companies were assembling and importing motor vehicles, GM was the largest, employing 5,130 people around São Paulo. Prior to any gasoline crisis, importers such as Ford showed off luxurious cars. The Ford Galaxie was introduced to Brazil, as was a short-lived limousine by the name of Itamaraty Executivo. The Puma sports car was unveiled for the first time in São Paulo. International Harvester of Brazil was taken over by Chrysler Corporation, which arrived to produce passenger cars as well as trucks. In 1966 Alfred Jurzykowski passed away, and "through a shareholding process that had been structured over the years" Daimler-Benz AG took over ownership of Mercedes-Benz do Brasil.

Willys Overland's Brazilian branch was absorbed by Ford of Brazil in 1967 in two steps, and Ford acquired the São Bernardo plant, the Taubate factory, the Jabotão plant, the Research and Development Center and the Tatui Testing Facility. Also in 1967, VW took over Vemag and its DKW-inspired cars.

The following year, on November 22, the Sixth show was opened by Brazil's President Costa e Silva. Chrysler launched the Esplanada and the GTX. Ford brought the four-door Corcel (selling 24,000 in one year) while GM showed the new Chevrolet Opala (derived from Opel) (Fig. 10). By 1968 GM employed 8,155 people in Brazil, and the following year it had built its 500,000th vehicle in the country since 1925.

In 1968 VW unveiled the 1600 four-door sedan. But this was the last year of car shows at Ibirapuera Park as political uncertainty, including student protests, continued to disrupt the country's industrial and social stability. Inflation was approaching the 20 percent level. In 1969 Brazilian-assembled VW passenger cars were exported for the first time, although at first only three such units were actually shipped. Toyota launched its OJ40L line with its own bodywork in September of 1969. The previous year Toyota's domestic component content became 100 percent according to company literature.

The 1970s

November 20, 1970 brought the Seventh Automobile Show to São Paulo. It was held at the new Parque Anhembi, a 670,000-square-foot facility. Chrysler displayed its Dodge Charger, Alfa Romeo its FNM 2150, Ford its Corcel GT and Ford Landau. Karmann-Ghia showed its TC 1600 model along with the VW TL sedan and Variant station wagon. Mercedes-Benz unveiled its line of L-608 light trucks and vans, as well as a model line of medium trucks; L-1313, L-1513, L-2013 and L-2213. Also in 1970, Scania and Saab merged in Brazil under the name of Saab-Scania do Brasil.

In 1971 Karmann-Ghia do Brasil discontinued its Model 143, of which 23,402 had been assembled since 1960, and its Model 141, of which just 176 had been built. The new Karmann-Ghia superseding these two models was the 145-TC, designed in Italy with full-size rear seats for adults. The 145-TC was launched in 1970 and discontinued in 1975 after 18,119 units had been built.

The next Show, the Eighth, was in 1972, the year Brazil celebrated its 150th anniversary of independence from Portugal (on a Spanish-speaking continent Brazil has been the only Portuguese-speaking nation). Dodge showed its 1800 Model and Ford its Maverick. The diminutive Chevrolet Chevette was introduced to Brazil. The Puma GTB, based on the Opel chassis, was displayed, as were "concept cars" built by the Faculdade de Engenharia Industrial (FEI), which included the FEI X3 and the Lavinia. Clones of the MG TD series arrived in the form of the MP Lafer. VW exhibited its SP-2 model (Fig. 11).

Ford simplified its corporate name to "Ford Brasil" as it produced its 1,000,000th Brazilian Ford. By 1972 Fiat was trying to determine which model to build, since it had already embarked on auto production in neighboring Argentina with the Model 128.

By 1973 GM's accrued production of engines in Brazil reached the half-million unit mark, more than any other builder. Mercedes-Benz marked its 200,000th vehicle built in Brazil, and offered its 40-ton Model LS-1519 trucks for the first time in the country. Brazilian President Ernesto Geisel signed a manufacturing agreement with Fiat S.p.A. that year.

In 1974, the international oil crisis had a severe impact on Brazil's automotive industry, as it did in the U.S. and elsewhere. FNM was absorbed by Alfa Romeo, which had been FNM's "technology supplier." Not long after that this enterprise was taken over by Fiat, absorbing Brazil's Alfa Romeo at the same time. Fiat continued to road test the 127, which was "beefed up" and selected as the model line for Brazil.

President Geisel opened the Ninth Automobile Show on November 22, 1974. The Ninth Show's new models included the VW Passat and the VW Fusca (Beetle). GM displayed its Chevrolet Opala Caravan station wagon. (Fig. 12) Alfa Romeo brought its new truck line built from former FNM components. Mercedes-Benz showed off its 1516 Turbo and announced its 20,000th unibody bus built in Brazil.

Fig. 11 – Stars of the Eighth National Automobile Show: MP Lafer (Courtesy ANFAVEA)*; Dodge 1800 Polara, Chevrolet Chevette, Volkswagen SP-2.* (from the editor's collection)

Again, "concept" cars, such as those designed and built by George Barris in California, caught the imagination of visitors to the show. Their pocketbooks may already have been affected by the economic situation, but their imaginations had not. As a response to the world oil crisis, in 1975 Brazil enacted its Programa Nacional do Alcool (National Sugar-Cane Alcohol Program), called Proalcool, which also attempted to address the rising problem of air pollution, especially in the larger cities. At one point during this time 96 percent of all sales registered in Brazil accounted for sugar-cane alcohol-powered vehicles, according to ANFAVEA. Mercedes-Benz continued to expand operation by purchasing land in Campinas for a second plant, and the company announced that it had assembled its 300,000th vehicle in Brazil.

November 18, 1976 brought the Tenth Show in which a number of manufacturers continued to react to the gasoline crunch by adapting their vehicles to run on ethanol alcohol. Fiat introduced its 147 Model line that year. It was intended to compete with the VW Fusca, but in design it was totally different with a transverse water-cooled engine in front. Even the spare tire in the engine compartment was an innovation, albeit one that Fiat had to defend by pointing out that tires underwent higher temperature rises from road friction than those from heat radiating from the motor. As a latecomer to Brazil, Fiat struggled to develop a sales and maintenance network (similar to problems in the U.S.), even going as far as to build custom mobile repair vans (based on the 147 model) ". . . continually patrolling the main highways and providing assistance."

Another latecomer to Brazil was Volvo. Although Volvo had exported some trucks and buses to Brazil in the late 1950s, the company was stymied by government regulation and had concentrated its marketing on North America. In 1977 Volvo do Brasil Motores e Veiculos was launched, with the first cornerstone of the new plant laid in Curitiba, State of Parana, after much deliberation. Start-up of the B58 bus production began two years later.

Manufacturers were less economically constrained by the time the Eleventh Show arrived in 1978 although the oil crisis was not over. The economical Chevette Jeans was on display from GM, as was the much larger Opala Diplomata, the latter competing with the Alfa Romeo Executive, which was actually built by Fiat. Volvo offered the commercial vehicle market in Brazil its B-58 articulated bus assembled at Caio, while at the same time Mercedes-Benz do Brasil opened its new plant in Campinas in the interior of São Paulo State where all Mercedes bus production was transferred the following year.

Fig. 12 - Chevrolet Opala Caravan. (from the editor's collection)

Meanwhile at the 1978 Show, VW displayed its 4-door Brasilia. Concept cars included the Adamo, GTM Malzoni, SM-4.1 and Miura. (Fig. 13) Most noteworthy for that year, Chrysler do Brasil was bought by Volkwagen.

By this time Brazil's agricultural vehicle industry expanded its geographic presence under Agrale, and factories to build tractors and farm equipment were opened in Rio Grande do Sul, Caxias do Sul and Minas Gerais. In 1979 Ford introduced its F-1000 diesel pick-up in Sao Paulo.

Fig. 13 – Stars of the Eleventh National Automobile Show: Santa Matilde SM-4.1 Chevrolet Chevette Jeans, Miura.

The 1980s

The consortium of Volkswgen AG and Monteiro Aranba sold 50 percent of its stake to the nation of Kuwait in 1980. That year VW had also begun installing alcohol-powered engines in its Fusca 1300, Brasilia and Passat.

The Twelfth Automobile Show jumped a year to 1981 and was inaugurated by Brazil's Vice President Aureliano Chaves. The oil crisis had taken its toll and Brazil experienced a serious recession along with large unemployment at that time. The tough economic times translated into a 41 percent decline in automobile sales that calendar year in Brazil, down to 580,700 vehicles. Fiat was particularly hurt by the downturn. But since automobile shows don't necessarily reflect the current state of the economy, manufacturers did their best to put on a glamorous façade. The Twelfth Show featured such new attractions as the Gol (designed in Brazil), Voyage and Saveiro from VW, which were now being built in the new Taubate factory located in the Paraiba River Valley between São Paulo and Rio de Janeiro. Known for its small passenger cars, VW was now building 11-ton and 13-ton trucks in Brazil starting in 1981.

Also present at the 1981 Show was the Del Rey from Ford, the Panorama station wagon from Fiat, and a pert compact called Xef from Gurgel. Scania-Vabis showed its new line of R model trucks, which competed with the new Volvo N12 series. Also shown were Ford's Pampa pickup and Agrale trucks. In an effort to find additional sources of fuel, Fiat introduced its Model 1300 with a "sewage-gas" engine, as well as its Fiorino light commercial and the Panorma station wagon, both based on the Fiat 147. VW had its own "methane bio-gas" vehicle, the VW Model 140 truck, which was to be used by municipalities in fleets. São Paulo's Water Supply Company (Sabesp) was the first customer.

Hollywood had also infiltrated the auto industry in Brazil through pop culture by the time of the Thirteenth Automobile Show. The box office hit "Blade Runner" prompted several more aerodynamic concept cars to stimulate the public's imagination and desire for the latest and the greatest. Ford showed off its new Probe IV, considered at that time to be the best possible effort in aerodynamics. GM displayed a vehicle called the Lean Machine Tricycle, as well as another modernistic wind cheater called Citation IV.

But the public was also treated to vehicles that were actually available for purchase, such as the new Fiat Uno, VW Quantum and VW Santana, a seldom-seen Ford Escort convertible, as well as Brazil's Gurgel Jeeps (called Carajas) and EE12. Commercial vehicles were represented by Ford's Cargo model line in addition to their Pampa and FB-4000 microbuses. Scania-Vabis heavy H models, Fiat's 190 Turbo and the Mercedes-Benz Model 1929 were all part of the heavier commercial excitement.

In 1981 due to a lack of consistency in orders from the railroad industry, Mafersa began considering diversification of its product line. Because of economic problems Mafersa had been under the management of the National Economic Development Bank (BNDE) since 1964. However, its considerations of going into the business of manufacturing kitchen appliances did not meet with the approval of the BNDE for reasons that "The company would be entering into fields where private enterprise was already operating successfully. The purpose of state-owned companies at that time was to act only in areas where private initiative lacked sufficient interest, resources or technology." This socialized style of management along with the oil crisis redirected Mafersa to begin building trolley buses in order to save petroleum fuel. Market fluctuations forced Mafersa to build electric buses, and as the oil crisis eased, it switched to diesel buses. Its M-210 became very successful and by 1991 the company was privatized.

GM's Chevrolet Monza was unveiled in 1982 (Fig. 14). Though GM had used the name on various Chevrolet and Opel products, the Brazilian Monza was a new two-door design "produced in Brazil on the world car concept" according to ANFAVEA. General Motors do Brasil president J. J. Sanchez stated that "Now we must cross our fingers. The consumer will

Fig. 14 – Chevrolet Monza, 1982 model. (from the editor's collection)

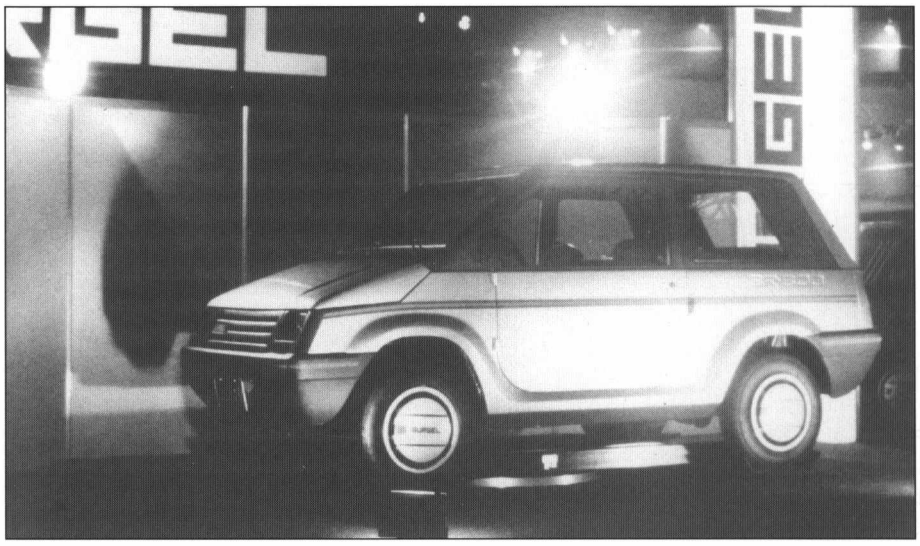

Fig. 15 – Gurgel's BR800 displayed at the 1988 show.

Fig. 16 – Mercedes-Benz Model 1941 Truck—1990-91.

judge if we had chosen the right path." By 1984 when the sedan version was launched, 200,000 Monzas had left the assembly line for local consumption.

The 1986 Show was minimized to include only some imported models, but the Spare Parts Show and the Brazilian contingent did appear that year. However, Brazil as a nation undertook important steps during 1986 in order to perpetuate its automotive and transportation industries by continuing the drive for improvement in efficiency and environmental safety. This was accomplished by the Programa de Controle de Poluicão do Ar por Veiculos Automotores (Program for the Control of Air Pollution by Auto Vehicles), which was called the PRONCONVE, created by the Conselho Nacional de Meio Ambiente (National Environmental Council). This governmental body, similar to those in other civilized nations, set emission standards for both gasoline and diesel engines of all kinds. Although the nation had to invest heavily in new technology and government oversight, the long-range pay-off has become apparent in recent years, albeit not so much in better air quality per se, but in a large increase in the number of motor vehicles, along with the growth and expansion of all of Brazil's industries.

It wasn't until 1988 that the São Paulo Automobile Show returned in full force. There, GM introduced the Bonanza and a new Veraneio. The Fifteenth Show also included Gurgel's small BR 800 (Fig. 15) and the VW Parati 1.8. Film-inspired vehicles also included the VW Scooter and Orbit, as well as the Ford Probe V, and from GM the Venture. Fuel injection made its debut in Brazil by way of the VW Gol GTi and the Chevrolet Monza Classic FI. Brazil's Engesa E4 Jeep filled a "special market segment." VW continued the production of heavier trucks, powered by MWM Turbo Diesel engines, in addition to Perkins and Cummins diesels, the latter powering the Garcão Forca model introduced in November of 1989.

1990-91

The Automobile Show of 1990 might have proven that Brazil's industry was turning over a new leaf. Privatization and trade liberalization was the new theme: The Sixteenth Show was sponsored by ANFAVEW and Sindipecas, the National Union of the Industry of Spare Parts for Automotive Vehicles, which also formed a welcome policy toward imported cars. However, between January and March of 1990 Brazil's inflation rate was in runaway mode, fluctuating between 70 percent and 80 percent. By the time the show began on November 1, inflation had slowed to a manageable 10 percent but not before doing damage to the overall national economy. GM, Alfa Romeo, Ford, Mercedes-Benz, Saab, Volvo, Fiat, and Toyota brought their full gamut of model lines, with many of them simply renamed models for the specific Brazilian market. (One notable exception was GM's Kadett). Gurgel showed its Moto Machine, derived from the BR 800. CBT showed its Javali Jeep. Karmann-Ghia displayed its new travel trailers.

One phenomenon of Brazil's maturation as an automotive industry giant was its own inter-competitiveness between local manufacturers and importers. This became the focus of a pioneering initiative called Camara Setorial da Industria Automobilistica (Auto Industry Sector Chamber) which was responsible for bringing together various representatives of the motor vehicle and transportation industries as well as workers, dealers and government administrators. According to ANFAVEA, "The Spirit of Camara Setorial is the combined efforts of the segments involved towards finding balanced solutions, with carefully distributed responsibilities. Each group gives up some level of demand so as to enable a higher level of competitiveness. The idea is that the effort to reduce production

costs and therefore the final retail price of the vehicles means higher sales, resulting in an increase of production and the volume of jobs generated in the sector and in the economy in general." Careful management at the helm was imperative for Brazil to be competitive, efficient but not overly protectionist or over-regulated.

Commercial vehicles for 1990-91 included the new Scania L 113 and F 113 HL buses and a new 6x6 truck called the 112HK. In Brazil Scania employed approximately 3,200 persons who produced about 18 percent of the output worldwide, its largest plant outside of Sweden. For the small commercial vehicle market, Toyota continued to build approximately 10,000 Bandeirantes per year; however, Toyota moved its manufacturing to Argentina to avoid Brazil's price control policy imposed up to July 1990.

Volvo brought its Brazilian version of the NL10 340 heavy truck, competing with the new Mercedes Model 1941 truck line (Fig. 16). By this time Mercedes-Benz do Brasil had become a market leader of truck and bus production in that country, which also exported those vehicles to 50 different countries by 1990. Agrale displayed mini-buses, cycle cars and Deutz Diesel-powered tractors to compete with the Maxion tractors, which showed its first air-conditioned Maxicab. The Camara Setorial set in motion the Programa do Carro Popular (Popular Car Program), meaning "low price-range car," a vehicle powered by a 1,000 cc motor and costing less than $7,200 in 1991 dollars.

According to Ciro Dias Reis, from its manufacturing genesis in the late 1950s to 1991, Brazil had assembled (and in many cases entirely manufactured) over 21 million vehicles of which 2.9 million had been exported to dozens of different countries. This achievement was reflected by the Sixteenth Show at Anhembi, which boasted 711,000 visitors and 330 exhibitors, including parts and components manufacturers.

Thus, from its first privately-imported Peugeot in 1891, one hundred years later Brazil's auto industry had not only become a leader on its own continent, but also a serious contender in the world market.

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Karmann Ghia 1600.
(from the editor's collection)

The Rise and Fall of Hall-Scott, Engine Manufacturer

by Ric A. Dias and Francis H. Bradford

Introduction

Beginning in the late 20th century, there has been considerable discussion concerning the decline of America's industrial sector. Numerous regions and states have been impacted by this fundamental change. For example, California's San Francisco Bay Area is not recognized today as a center for commercial engine production, but decades ago several such manufactures rose to great prominence through the engines they made. Among these largely forgotten companies is Hall-Scott of Berkeley. Between 1910 and 1958, Hall-Scott (which had several similar names over the years) built tens of thousands of engines for marine, rail, auto, truck, aviation, tractor, and stationary applications. This firm also manufactured motorized rail cars, truck and bus transmissions, automobile axles, and filled engineering requests for automotive and non-automotive applications. Hall-Scott enjoyed an enviable reputation for making products of high performance and quality. Small in output, Hall-Scott nonetheless pushed forward the evolution of the gasoline engine. Hall-Scott's story highlights some major trends in 20th century American business including one immutable constant: the importance of adapting to changing conditions as central to a company's "corporate culture."

The early 20th century was an exciting time to be in an automotive business. The era was marked by rapid technological advances, growing product acceptance, and openness to new, small-scale ventures. Into the 1920s, a skilled individual could build and market an engine or a vehicle with a minimum of capital or experience, and achieve some measure of success. Into this entrepreneur-friendly environment of the early 20th century, one in which industry icons Henry Ford and Ransom E. Olds rose, Elbert John Hall and Bert Carlisle Scott entered the engine business.

Elbert John Hall

Born in San Jose, California, in 1882, E. J. Hall gravitated towards engineering yet had almost no formal education in that field.[1] Hall proved his prodigious skills on the job, first at age 16 as a steam repairman where he also

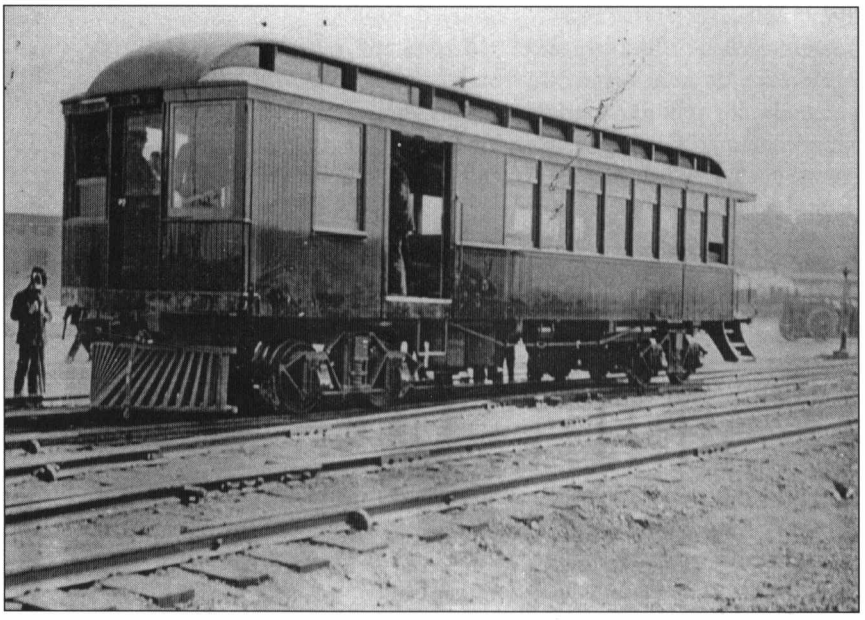


Fig. 1a – Hall-Scott's first product, a motor rail car, which launched the company in 1910. By the time it ceased building motor rail cars in 1921, Hall-Scott had produced a total of 23 units.
(Francis Bradford Collection)

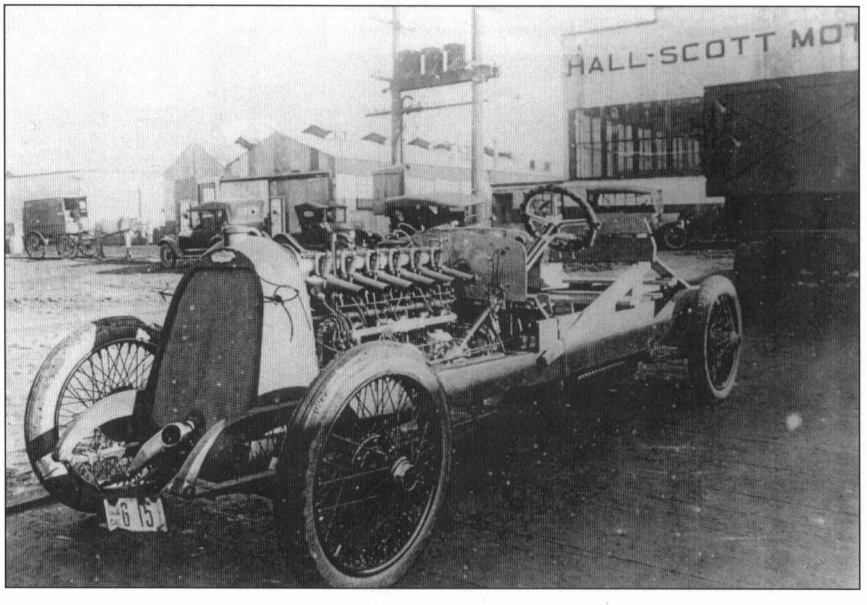


Fig. 1b – Fageol made a very small number of its very expensive and very fast Hall-Scott-powered cars before war production cut off its supply of A-5 engines in 1917. Shown here is a Fageol chassis. Note the horse-drawn wagon and Hall-Scott garage.
(Francis Bradford Collection)

assembled small gasoline engines from kits. His talents then led him to a job at a San Francisco machining company, I. L. Burton, where he quickly became part-owner. In 1901 while at Burton, the 19-year old Hall designed his first commercial power plant, and over the following years he improved and developed more, including engines for race cars. Extracting more power from engines fascinated Hall and high performance became a characteristic of the engines he designed. His love of speed led him to do some racing himself. In fact, E. J. Hall was part of an automotive racing team that set a new record in 1906, driving from San Francisco to Los Angeles in 18 hours and 13 minutes.[1]

In 1905, Hall began engineering for tiny Heine-Velox of San Francisco, one of thousands of American automakers that failed in the industry's infancy. The 1906 earthquake and fire leveled his employer, but Hall stayed in the car business by joining San Jose-based Comet in 1907 as designer and manager. Production could be measured on one or two hands, but the little Comet sported a sophisticated, overhead valve, high r.p.m., 25 h.p., 201 cu. in., 4-cylinder engine that Hall designed.[2]

After the Comet company folded in the 1907 business panic, Hall opened the Hall Auto Repair Company in San Francisco, which repaired cars and built a handful of second generation Comets. Hall's high-tech engines made the car live up to its suggestive name at California speed events, briefly making the Comet "a new star."[3] In 1909, Hall began a collaboration with engineer Bruce Kennedy, building engines that powered cars and even airplanes for enthusiasts and "barnstormers." Hall's free-thinking engineering created overhead valve in-line 6-cylinder and V-8 engines, too. V-8s, common today, were most unusual at the time. And Hall received patents on improvements to automobile carburetors and transmissions. He even swapped engine ideas with high profile automotive figures like Harry Miller, Ralph DePalma and Jimmy Murphy.[4] There seemed to be nothing engine-related that young Hall could not improve.

Bert Carlisle Scott

B. C. Scott was born in 1881 in Oakland, California, and received a degree from Stanford University, studying not business or finance, but political science.[5] Scott had a driving interest in automobiles and trains, likely influenced by his father's partial ownership of the Yreka Railroad. His father George was a major business magnate, with ties to timber, real estate, banking, real estate, and rail interests. While less is known about Scott than Hall, his family's strong history in business and his college degree suggested that Scott would become a corporate leader.

George Scott's rail line operated a small "motor car" on its tracks, a vehicle powered by an internal combustion engine that hauled a few passengers and some freight. Such cars were common at the time and moved modest loads when large steam locomotives were impractical. In 1908, Scott bought a Comet from "Al" (E. J.) Hall and was so impressed with its performance and Hall's skills that he proposed that together they build a motorized rail car, superior to the one used by his father's company.[6] So in his shop, Hall built a new engine and transmission for the motor car, which included a clever innovation that allowed the operator to shift all four of the car's gears going either forward or backward. Scott contracted with local fabricators for the rest. The car took three months to complete, after which the rail company purchased it. Scott described their creation as "very satisfactory, supplanting steam locomotive operation, and the saving offset cost of the car [was realized] within a few years." Scott and Hall's talents complemented each other.

The Hall-Scott Motor Car Company

With that first rail car project, the two young men, still in their 20s, entered into a formal business agreement in 1910, forming the Hall-Scott Motor Car Company.[7] Scott became president, a title he retained until his departure in 1938, and Hall became vice president and manager, titles he held until he left in 1930. George Scott provided the needed capital to start Bert's company, and Bert's brother Leland served as secretary. They erected a shop on Seventh Avenue and Snyder Street in Berkeley (later changed to Heinz Avenue when the food company of that name built there and convinced the city to change the name, over Hall-Scott's objections). Hall-Scott also maintained a business

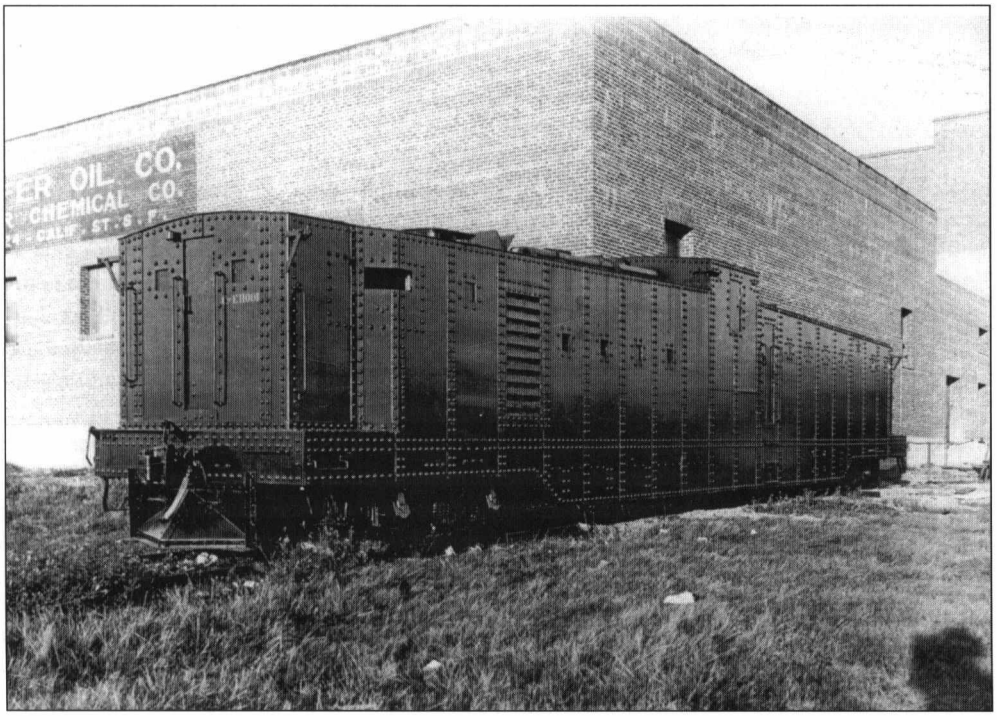


Fig. 2 – Hall-Scott's most awesome motorrail car, the 62 ft., 100 ton, armored fighting machine built for the U.S. government. A one-of-a-kind 7,536 cu. in. in-line 8-cylinder engine moved it; machine guns and 1/2 inch steel plate on its top and 1-inch plate on its sides protected it.
(Francis Bradford Collection)

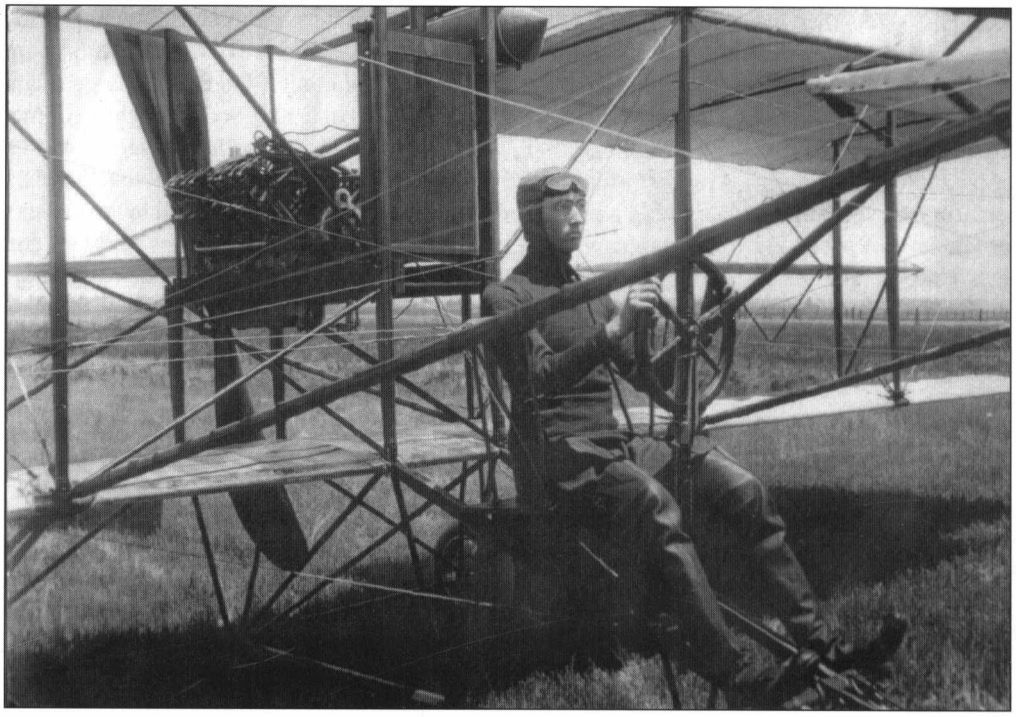


Fig. 3 – Glenn Martin, shown here in a photograph from 1911, was one of many aviation pioneers who used Hall-Scott engines in their flying machines.
(Taylor Scott Collection)

office in San Francisco. It was at the west Berkeley site, expanded later to 12 acres, where almost all Hall-Scott engine production took place over the next half century.

Throughout the 1910s, the new company acquired an increasing number of customers for its growing line of engines in rail, aviation, and automotive fields, although the number of Hall-Scott-powered automobiles was very small. (Figs. 1a and 1b). Hall-Scott never operated its own foundry, but this posed little problem because of its proximity to a first-rate "hot metal shop," Macaulay Foundry, literally around the block.[8] In the years ahead, Hall-Scott's location allowed it to take advantage of and facilitate the need for internal combustion engines in aviation, fishing, lumber, transportation, and other West Coast industries.

For customers who needed small rail cars for maintenance, inspection, or light hauling, Hall-Scott built a range of vehicles that burned gasoline or distillate (a cruder and cheaper petroleum fuel), less expensive to buy and operate than steam. Diesel was still undergoing basic development and the company did not venture into this field. Hall-Scott's early rail cars used gasoline engines driving through an automobile-like transmission and clutch. This arrangement limited Hall-Scott to making rather small rail cars, a niche it could easily fill. Its rail cars of the 1910s were powered by Hall-designed 8-inch bore and 10-inch stroke engines, which differed from each other only in the number of cylinders—four, six, or eight. Hall-Scott sold cars to over 30 companies, including some overseas. A record exists of a car sold to a Chinese rail line in 1921 that returned to their shop for an overhaul in the 1950s, a testimony to Hall-Scott quality.[9] But undoubtedly their most unusual vehicle was a single 100-ton armored rail car built for the U.S. Department of War around 1918 (Fig. 2). Hall-Scott made motor cars until 1921, other smaller rail cars a bit longer

Hall-Scott's Aviation Engines

Hall-Scott's first product was a rail car, but the company earned an international reputation for innovation, quality and high performance in aviation power. The aviation engines Hall designed by himself and, with Bruce Kennedy, were carried over into Hall-Scott production, then more followed (Fig. 3). Hall-Scott's first aviation engines were a water-cooled, in-line four and V-8, the A-1 and A-2.[10] They represented cutting edge technology, with excellent power-to-weight ratios and interchangeable parts between models. The A-1 engine developed about 30 horsepower, weighed 130 pounds (for a little over four pounds per horsepower) and cost $1,500.[11] With the release of the six-cylinder Model A-5 in 1915, Hall-Scott introduced what became a signature feature of its engines, an overhead camshaft (Fig. 4).[12] "Overhead cam" engines offer performance and maintenance advantages over their alternatives, but they are more expensive to build. Today overhead cam engines are common, but not so in the 1910s. The motor was a winner and sales jumped, even if Hall-Scott production was still measured in dozens per year. For example, the first Boeing aircraft, the B & W Model 1, used an A-5.[13] In 1916 with the first 4-cylinder Model A-7, Hall-Scott began to use die-cast aluminum pistons, making it perhaps the first American aircraft engine maker to do so.[14] Their remarkable performance made Hall-Scott motors popular among aviators. Lightweight, reliable, powerful engines were hard to find; the Wright brothers had to build their own in 1903. Hall-Scott engines propelled some of the fastest West Coast planes in the 1910s, sometimes powering half or more of the planes at air races. Said one writer of California aeronautics, "Soon a Hall-Scott motor was the ambition of every early experimenter."[15]

World War I provided an excellent opportunity for Hall-Scott to assist the nation's war effort and prove itself an industry leader. Hall-Scott made a name for itself indirectly through E. J. Hall's part in designing the famous aviation engines collectively called "Liberty Motors." Although the 400+ h.p. V-12 is often referred to as "the Liberty Motor," a V-8 appeared first, and a few four and six-cylinder versions were also made. Upon America's entry into the war, the U.S. Aircraft Production Board ordered the mass production of aircraft motors with maximum power, minimum weight, reasonable fuel consumption, and a large degree of standardization and parts interchangeability. The Allied Powers had used dozens of different aircraft motors, many with no

interchangeability of parts, creating a logistical nightmare, whereas the Germans used a few motors of great interchangeability and standardization. The Allied approach was no way to win a war, so the Board found the most talented aircraft engineers to streamline engine design. Jesse G. Vincent of Packard Motor Car Company and E. J. Hall contributed the bulk of the engineering genius.[16] In just one decade, E. J. Hall's achievements in air power had made him an obvious choice.

Drawing largely from engines with which they were most familiar, the two men completed most of the design work in a marathon five-day session, locked in a New York hotel room. But the Liberty Motor clearly bore Hall's signature.17 As with Hall-Scott engines, all Liberty engines shared the same bore and stroke (5 x 7 inches, the same as the A-5, A-7 and A-8), had interchangeable standardized parts, aluminum pistons, overhead camshaft, water cooling through steel water jackets, and separate cylinder design. Specifications and construction of the Liberty V-12 closely resembled Hall-Scott's V-12 Model A-8, first tested in May 1917. Hall used Hall-Scott dies for some Liberty parts. Automakers began mass-producing Liberty engines immediately. Hall-Scott was too small to contribute here; instead it made A-5s and A-7s for trainers, which increased its output several fold. Some 20,000 Liberty engines were produced, powering planes credited with 60 combat victories. The San Francisco Examiner called it "the fastest and finest airplane motor in the world," designed in part by a native son, to beat "the best in the German air fleet," an evaluation shared across America.18 The government commissioned Hall with the rank of Colonel and gave him a Distinguished Service Medal for his many duties in the Allied air war. Hall proudly referred to his wartime achievements until his death.

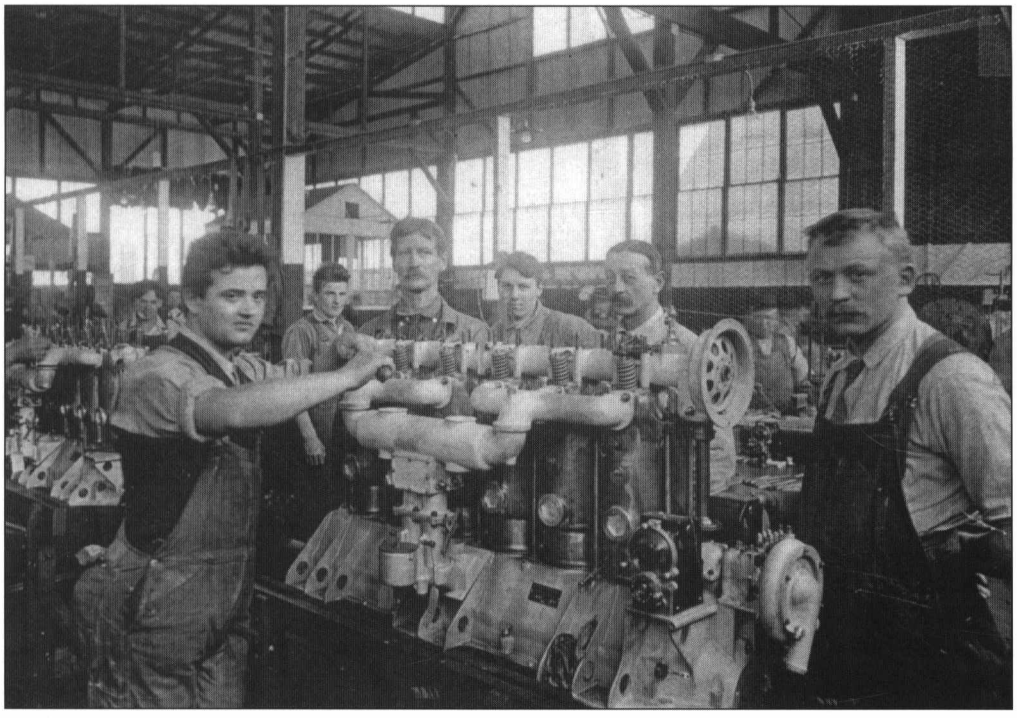


Fig 4 – Hall-Scott workers assemble an A-5, one of Hall-Scott's trailblazing aviation engines. The A-5 displaced 824.7 cu. in., weighed 525 lbs., and developed 125 h.p. @ 1250 r.p.m., rendering a power-to-weight ratio of just 4.2 lbs. per h.p. In the early 20th century, Hall-Scott was a recognized leader in American air power. (Francis Bradford Collection)

Hall-Scott in Peacetime

As Hall-Scott Motor Car Company entered its second decade, it switched the markets it served, continued to shape engine development, and underwent a leadership shakeup. In 1920, Hall designed a unique, high-speed, overhead cam engine for a new small tractor, the T-35, for Holt Manufacturing (which later became Caterpillar), located in nearby Stockton.[19] Pliny Holt liked the design, so Hall-Scott built 935 of the 4-cylinder engines between 1921 and 1922, when Caterpillar assumed production.[20] The Holt engine was Hall-Scott's first "en bloc" model, that is, without having its cylinders cast separately, and it constituted the lion's share of Hall-Scott's engine production those years. After seeing the success of the T-35, Fageol Equipment of Oakland turned to Hall-Scott to power its industry-leading Safety Coach buses. Fageol asked Hall-Scott to make it a modified T-35 engine, which resulted in the HS F-4 around 1922, and later the 6-cylinder HS F-6. Evaluating the Fageol bus, a writer from *The Motor Truck* said, "among the several power plants that the writer has seen, none is superior to the Hall-Scott, an engine designed by Col. E. J. Hall, one of the designers of the Liberty Aeroplane Engine."[21] The deals with these two companies moved Hall-Scott into powering buses, tractors, and trucks, with a spate of new engines emerging in the years ahead.

Although attached to a small firm, E. J. Hall was still recognized as one of America's outstanding automotive engineers. In the 1920s, Hall consulted for General Motors on new Buick engines, and Ford Motor Company; Henry Ford admired Hall's skills and he brought him back to Michigan to design a gasoline-powered rail car and a 6-cylinder engine for the Model T. Hall worked closely with Charles Winslow, a leader in lubrication and filtration. Arguably the first engine built with a full-flow oil filter was a Hall-Scott LM-6 marine engine in the 1920s.[22] E. J. Hall helped perfect a popular two-speed rear axle for the Ford Model T, known by this point as the Ruckstell Axle.[23] Bolting onto the axle, the Ruckstell unit provided one more reverse and two more forward gears, enhancing the performance of the anemic "Tin Lizzie." A production line went up in the Hall-Scott factory in 1922, in conjunction with the Ruckstell company, reaching up to 750 units daily through 1926. And in 1926, Hall-Scott signed a deal to make Models 151 and 152 for International Harvester, at the rate of up to 50 per week,

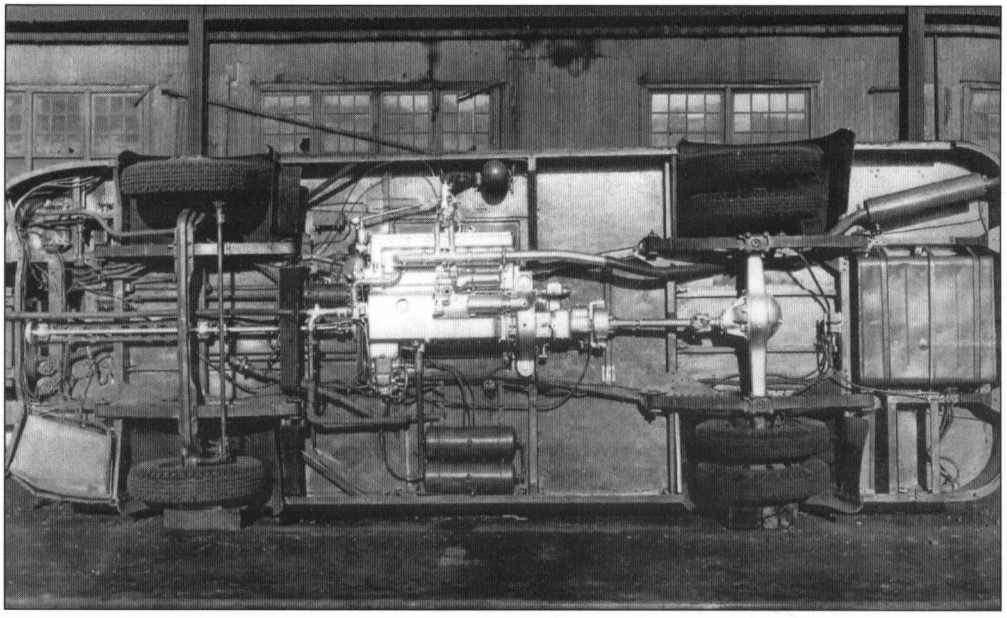


Fig 5 – In the early 1930s, ACF began mounting the engine in some of its models underfloor, laying the engine on its side, amidship in the bus, as seen in this Model 26-S. The 26-S used a 377-cubic inch, 6-cylinder, Hall-Scott Model 95. (Courtesy Motor Bus Society)

for use in its trucks.[24] Through the 1920s, Hall-Scott responded to opportunities with its in-house genius E. J. Hall creating new and improved products.

Hall-Scott's aviation engine program, prominent and growing in the 1910s, veered off on a surprising course in the 1920s. With the end of the war, the U.S. military surplused thousands of Liberty engines, inundating the market. A number of aviation companies failed and others combined. But even in such difficult conditions, aviation technology sped forward. Radial, sleeve valve and air-cooled horizontally-opposed engines pointed to the future. Hall-Scott never built any of these types of power plants. Instead, Hall-Scott dipped into the Liberty parts bin and introduced the L-6 in 1918, and the L-4 shortly thereafter.[25] Both were in-line, water-cooled, 6- and 4-cylinder models respectively, and briefly enjoyed some favorable press. But failing to keep abreast of industry changes, in the blink of an eye Hall-Scott's airplane engines became heavy and slow, a death sentence in aviation circles. The L-6 and L-4 were Hall-Scott's last aviation engines. In the mid-1920s, Hall-Scott abandoned air power to concentrate elsewhere.

In the 1910s, Hall-Scott leaders had hoped that their company would become known in the rail market, but the company never attained more than a regional presence. Hall-Scott engines powered an array of rail cars into the 1930s, but the company built its last 8 x 10 engined motor car in 1921. In 1921, E. J. Hall began work on the 350 h.p., 2,386 cubic inch, 6-cylinder Model 350.[26] This new engine boasted significant features including an aluminum lower crankcase (a weight reduction move that belied its 7,000 pounds), fully enclosed valve train (requiring no regular hand lubrication as did its earlier motors), and overhead camshaft. For trains, Hall-Scott bolted the 350 to a G E. generator that produced electricity for traction motors driving the wheels. With each locomotive having two engines, the 350 finally allowed Hall-Scott units to move heavier trains. Over the years the 350, which Hall-Scott sold into the early post-World War II period, also powered pumps, boats, drills, and generators. But the 350 did not become a huge seller, in part because around this time diesel engines began making inroads into the rail and commercial engine markets. Hall-Scott never mastered that technology. Rather than make the investment to compete with diesel, Hall-Scott instead turned its back on rail, just as it had aviation. It is ironic that Hall-Scott's first engines were for rail and aircraft, and they were also the first markets jettisoned. Former Hall-Scott engineer Francis Bradford, co-author of this article, attributes this move to man-agement's desire to focus on more lucrative sectors: trucks, buses and boats. They appeared to be slower moving targets.

In the marine sector, Hall-Scott products remained competitive through World War II. Marine engine historian Stan Grayson wrote that in the 1920s and 1930s, Hall-Scott built "high-performance engines that remained in the forefront of a fast-evolving technology," unlike the heavy, low r.p.m. units common in boats at the time.[27] Its first marine engine emerged around 1919, the LM, which as can be surmised by its name, was based on the Liberty.[28] Hall-Scott followed with the HSM, which was based on the Holt/Fageol engine. The HSM came out in 1924, while LM's were still being sold.[29] Both the LM and HSM came in 4- and 6-cylinder versions and realized some success. But Hall-Scott's water-going star was the Invader, a 180-290 h.p., 998-cubic inch, overhead cam, hemispherical combustion chamber, six-cylinder engine cast "en-bloc" of alloy iron to better withstand sea water.[30] Introduced in 1931, the compact, powerful, and smooth running Invader even had "clean lines." In spite of being introduced in the depths of the Depression, the Invader still sold, especially to yachters and the U.S. Coast Guard. And during the later years of Prohibition, ocean-going "rum runners" favored Invaders as their engine of choice to evade law enforcement.[31] The company built about 450 Invaders during the 1930s.[32]

In 1925, up and coming Hall-Scott was purchased by the large and innovative American Car and Foundry Company (ACF).[33] Philadelphia-based ACF was rumored to have been looking for "a motor company and speculative gossip linked the names of Mack Trucks Company and White Motors," but Hall-Scott attracted the attention of the rail car and bus maker. By picking up Hall-Scott, ACF followed a trend seen across American business in that era of vertical integration, giving ACF control over a key component in the production of its buses (and in smaller numbers, its boats). ACF did not buy Hall-Scott because it was a profit machine. In World War I it reported noteworthy net earnings ($1.74 million for 1917 and $2.64 for

1918), but in the 1920s performed unevenly, losing significant amounts some years, including a cumulative $477,290 between 1926 and 1930. This led ACF managers to question in 1931 "What is wrong with Hall-Scott?"[34] On the other hand, ACF's acquisition provided the engine maker with capital, protection from unprofitability, resources, and a buyer for its motors. The deal had something for both parties.

Now controlled by bus-maker ACF, Hall-Scott altered its product line to be more consonant with its parent company. In the 1920s, bus makers began radically changing bus construction, experimenting with gas-electric drive, moving the engine behind the rear axle or under the floor, etc. So ACF engineers called on Hall-Scott to convert one of its engines to operate 90 degrees on its side underfloor. E. J. Hall had worked with just such a set up with Ford for its rail streetcar program after World War I, so he was familiar with the notion.[35] Hall-Scott turned the "vertical" 707 cu. in., 186 h.p., Model 175 truck engine on its side to become the "horizontal" Model 180, finally releasing it around 1933 (Fig. 5).[36] The 180 was the first of many horizontal Hall-Scott models. The success of this engine insured that Hall-Scotts would continue to power thousands of buses in the years ahead, mostly ACF, and later ACF-Brill. But ACF refused to sell the engines to any major bus competitor, holding back overall Hall-Scott engine sales.

Assurances that Hall-Scott could provide ACF with the most advanced engines became much less likely after 1930. For reasons not completely known, but rumored to be because of "not liking company policies," creative dynamo E. J. Hall left Hall-Scott in 1930.[37] Auto executive Norman DeVaux lured Hall away to form the DeVaux-Hall Motors Corporation.[38] The new company quickly folded, but Hall continued his remarkable engineering career into the early 1950s on both sides of the Atlantic.[39] This included a few years in France working at Citroën. Any leadership Hall-Scott had in its industry ended in 1930. Hall-Scott's influence was never greater than during its first two decades, when E. J. Hall introduced one clever idea and competitive engine after another. Innovation promptly ceased emerging from Hall-Scott upon Hall's departure.

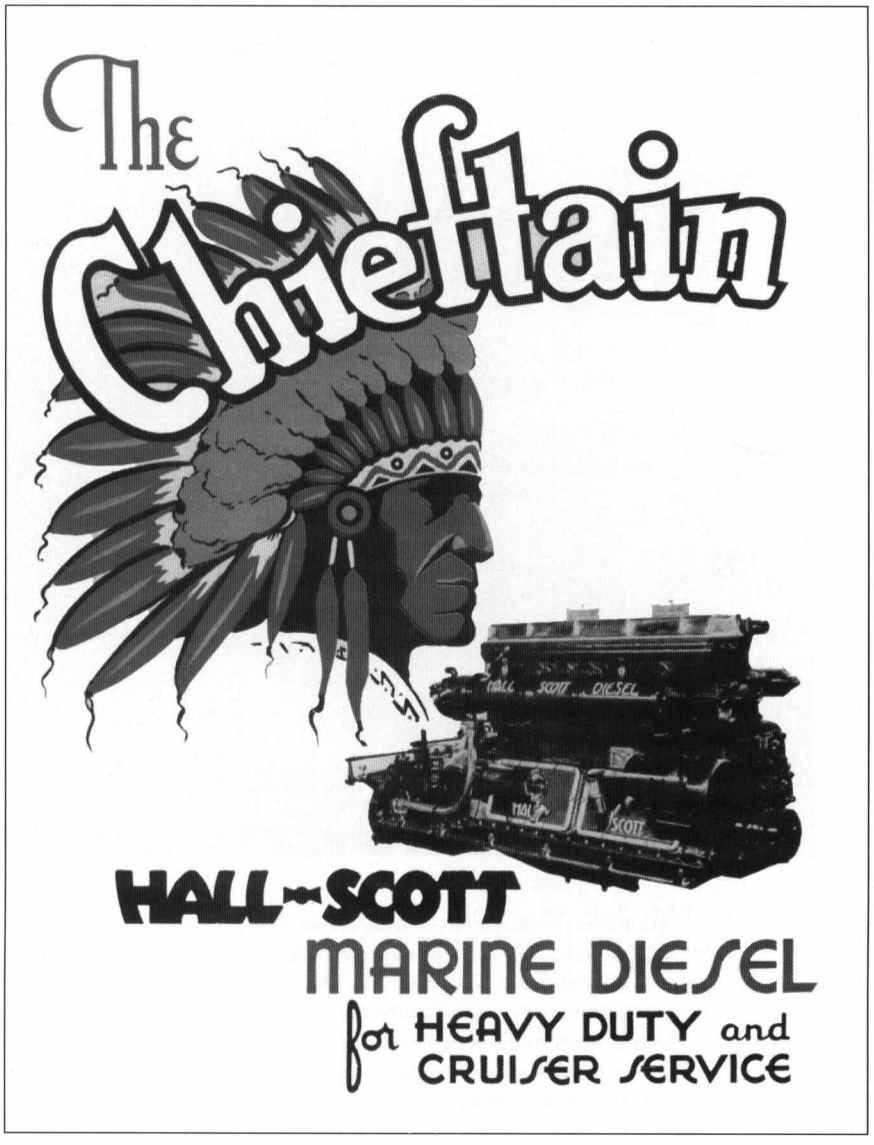


Fig 6 – This ad from 1937 could not create much demand for Hall-Scott's first, and last, marine diesel. The compromised Chieftain was based on the successful 707 cu. in. Model 175 truck engine, as was the horizontal Model 180. Hall-Scott generally named its marine engines, as opposed to giving just a numerical designation.
(Francis Bradford Collection)

Hall-Scott's Entry Into the Diesel Market

Their successes with gasoline engines notwithstanding, ACF and Hall-Scott leadership could hear the heavy clatter of diesels gaining ground. In 1930, Hall-Scott's parent company sent its top engineer, Charles Guernsey, to Europe to survey diesel production where development and market acceptance outpaced America.[40] Guernsey visited 22 engine makers and reported his findings, resulting in what Bradford called "panic development of a diesel engine" at Hall-Scott.[41] Unfortunately, the company rushed into production without spending the requisite time and money, overlooking a key finding in Guernsey's report that successful diesel development took at least two years. Hall-Scott signed a contract with Golden Eagle Bus Company of Los Angeles to deliver ten 180-190 h.p. diesel engines in 60 days. But the company had no such engine; it had to be created from scratch. By working around the clock and cannibalizing parts from existing gasoline engines, Hall-Scott delivered Golden Eagle its diesels, the Model 140, on time. The problems inherent in cobbling together a motor from pieces not suited for the greater stress in diesels soon manifested themselves in the 140. Golden Eagle's loaded long-distance buses became unwitting guinea pigs. The 140s failed on the road and were quickly pulled from service. Hoping to salvage some of its investment, Hall-Scott modified the 140 as a marine engine, dubbing the 707 cu. in., 150 h.p. six-

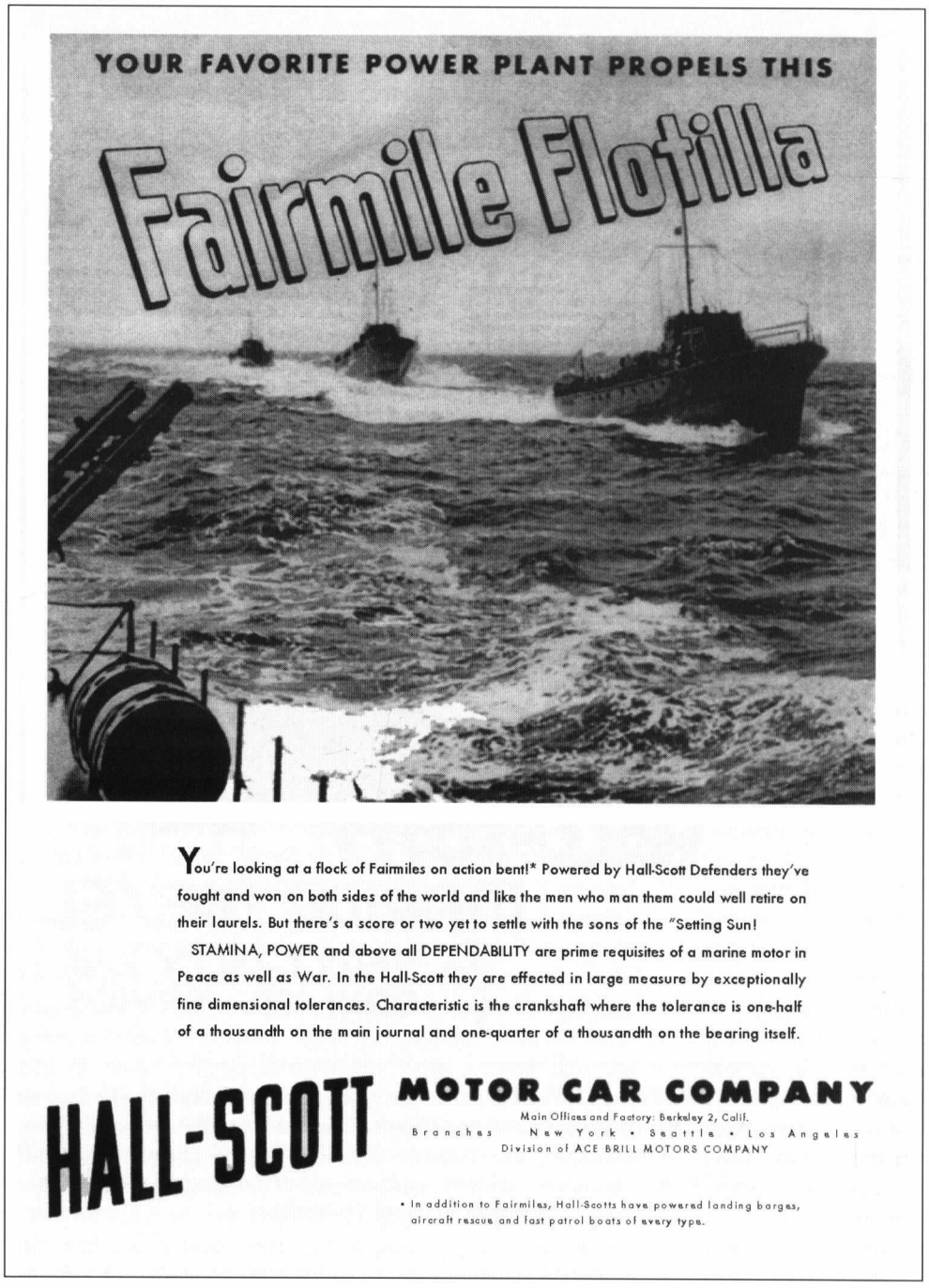


Fig. 7 – The Defender brought Hall-Scott international acclaim in World War II. Hall-Scott's V-12 powered many vessels for a number of Allied nations. The wooden Fairmile, each of which used two Defenders, was perhaps the most well known of these World War II applications. (Ric Dias Collection)

cylinder diesel the Model 142 "Chieftain." Hall-Scott marketed the Chieftain from about 1935 through World War II, but sold only a tiny number (Fig. 6). And the 140 did not become the basis for a viable diesel program. This was the first time Hall-Scott got burned playing with diesel.

Hall-Scott took a hit in its ledger books and reputation with the 140/142 debacle, but the company did not retreat from diesel development. ACF recognized the desirability of putting diesel engines in buses for both the import and export markets and it continued to pressure Hall-Scott to develop such a motor. This time Hall-Scott brought in consultants from Hercules Motors Corporation, a diesel builder, to help.[42] Spending the time and money needed to build a diesel properly resulted in a working engine, the horizontal Model 125. The motor did not have Hall-Scott's typical overhead camshaft or commonly-used dimensions, but performed well. Gearing up for World War II prevented further work on the 125, however; it was later determined that an engine of only 125 h.p. would be unattractive for truck or bus operators. Diesel engine development was critical to Hall-Scott's future, but managerial and engineering vision to see it through lagged.

Hall-Scott in World War II

World War II, like World War I, provided an opportunity for Hall-Scott to prosper and help the war effort. Hall-Scott continued to make engines during the war, and since bus production had been halted, the government absorbed almost all of Hall-Scott's output. The most significant Hall-Scott powerplants seeing duty in the war were a new Invader-based truck engine, the Model 400, and an Invader-based V-12 marine engine, the Defender. Fully occupied filling orders for these two models, Hall-Scott turned over production of its brawny Invader to auto maker Hudson. After moving dies, plans, and tools from Berkeley to Detroit, Hudson produced 4,000 Invaders from 1943 to 1944.[43] Even though Hall-Scott made no Invaders during the war, offspring of this model kept production humming in Berkeley.

Hall-Scott's Defender was an impressive creation. The new engine was developed in consultation with the U.S. Navy, which had submitted a request to the company in 1937 for a sea-going engine of 650 to 700 h.p. as a power source for landing, support, rescue, and light attack craft.[44] No longer having E. J. Hall to design a new engine, Hall-Scott re-engineered the existing Invader to meet the Navy's demands. It would be inaccurate to describe the Defender as simply two Invaders grafted together though. The Defender had its electrical, lubrication and fuel systems changed, and had an integral block and upper crankcase, unlike the separate

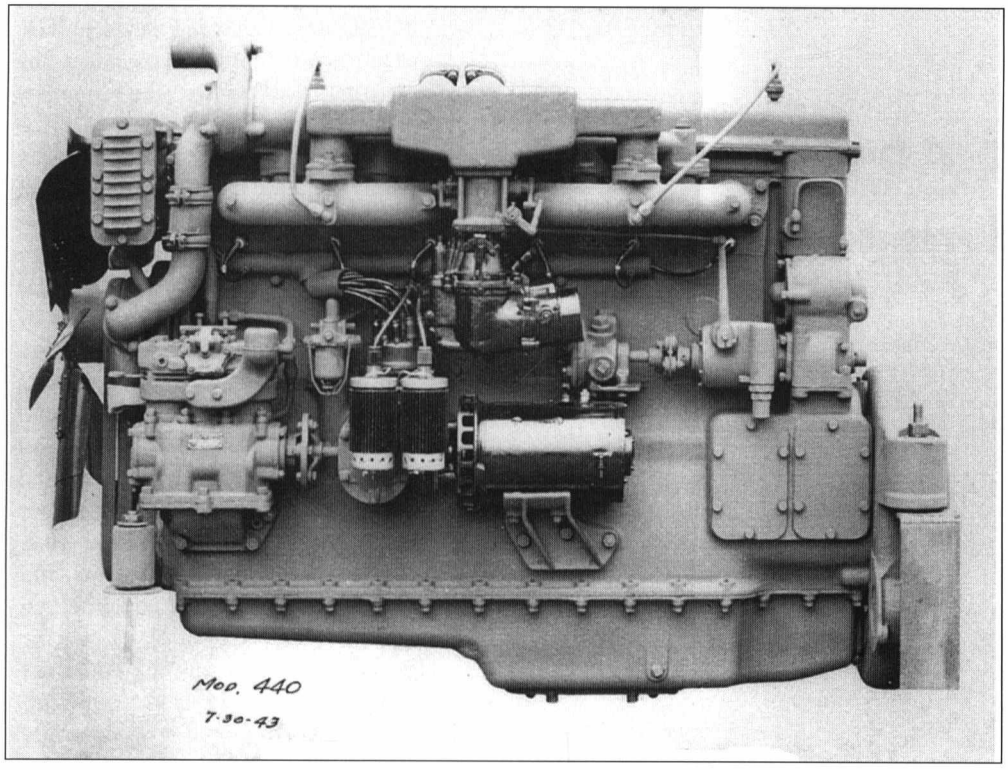


Fig. 8 – One of Invader's many indirect offspring, the Model 440. With the addition of a hydraulic steering pump, positive crankcase ventilation, oil cooler and oil filter bypass, the Model 400 became the 440, used in the M26. (Francis Bradford Collection)

arrangement in the Invader.[45] The Defender came in two displacements, 1,996 or 2,181 cu. in., a range of horsepower from 575 to 900, and weighed about two tons.[46] With supercharging, of which about 500 examples were produced, it developed an impressive 900 h.p. The V-12s were widely regarded as the best marine engine of its class, and Hall-Scott produced over 5,000 of them during the war.[47] The company sold Defenders to the U.S. Navy, and to the governments of the U.S.S.R. and Great Britain (many going to the 110 ft. Fairmile), which shared them with Commonwealth nations (Fig. 7).

The war also opened opportunities for Hall-Scott to power military trucks. To address this demand, Hall-Scott engineers altered the Invader for land duty, introducing the engine in 1940 as the Model 400, making it among the most powerful truck engines available.[48] When first announced, the 400 displaced 1,091 cu. in. and developed 295 h.p. and 940 lb. ft. of torque, very impressive numbers.[49] Eleven versions of the 400 appeared over the years, creating from 190 to 450 h.p., with a variety of displacements and numerical designations. Some models were even produced after Hall-Scott closed its doors, making the Invader an engine that almost refused to die.

The most famous wartime application for the 400 was in the M-26 tank retriever, among the largest vehicles the United States made in the war, weighing 43,000 pounds, and capable of hauling 50 tons.[50] Fitted with a power steering pump and several other minor alterations for the M-26, Hall-Scott re-badged the 400 as the 440. Hall-Scott shipped about 2,115 of the 440s to the Pacific Northwest, where Pacific Car and Foundry fitted them into the M-26's it produced (Fig. 8).[51]

For its reliable production of critical materiel, in 1943 the U.S. government bestowed upon Hall-Scott an Army-Navy "E" flag for efficiency. Over the next two years this was followed by four stars for continued achievement. At the award of a fourth star, Admiral C.C. Bloch called Hall-Scott's production record "splendid."[52] Praise for Hall-Scott came from many corners through the war. The engineering magazine *Machinery* wrote in 1942 that Hall-Scott's engines, "have been produced by manufacturing methods that were developed over a long period of years and that are comparable with the best practice anywhere."[53] Hall-Scott flourished during World War II, with employment reaching 900 and its wartime products confirming its long-standing reputation for quality.

Hall-Scott's Postwar Years

The old engine firm entered the postwar period in some strength, momentarily registering encouraging sales and profits after the war, but it received little stability from its parent company. In January 1946, ACF broke up after years of boardroom and stockholder squabbling.[54] From this action two different and closely named companies emerged, American Car and Foundry and ACF-Brill. The latter owned Hall-Scott. ACF-Brill was then immediately acquired by aviation giant Consolidated Vultee, which was part of AVCO, made famous by its wartime BT-13s, B-24s, and Catalinas. The *Berkeley Gazette* excitedly speculated that "the transaction eventually will mean an expansion of the Hall-Scott plant," which had seen its employment drop 50 percent since its wartime high.[55] This was about the last time Hall-Scott would seem like a firm other companies might want to own.

Its new owners had big plans for Hall-Scott, but they did not include re-entering aviation. Consolidated Vultee wanted to apply its wartime plant expansion and technical know-how as a springboard into the consumer market, much as wartime shipbuilder Henry J. Kaiser did. It gobbled up companies and bought plants from the government at rock bottom prices, planning to make everything from radios to transit buses. It planned to use the same technology making buses in a new Nashville, Tennessee, plant that it had used mass producing warplanes, which hitherto was a labor-intensive process.[56] Hall-Scott engines, made in a Lycoming factory in Pennsylvania (not California), would power these state-of-the-art buses. After considerable hoopla in the press, serious problems stalled the project and production of buses in Nashville stopped after the completion of about 50 units. ACF-Brill was not alone though; the bottom had fallen out of the American bus market. American postwar bus production plummeted, and ACF-Brill bus

Fig. 9 – Hall-Scott earned great profits in World War II, but the struggling ACF skimmed off much of this money, leaving none for much-needed improvements of Hall-Scott's products and facilities. Ill-prepared for changing demand, Hall-Scott sold few marine motors after the war; Defender and Invader sales numbered in the single digits most years. (Ric Dias Collection)

production tumbled from 1,004 in 1947 to just 375 in 1950.[57] No other major bus maker used Hall-Scotts so when ACF-Brill sneezed, Hall-Scott caught a cold. In 1951, AVCO sold ACF-Brill to Allen and Company because it failed to live up to financial expectations.[58] Struggling for survival, ACF-Brill and Hall-Scott were thrown a life preserver about this time in the form of the Korean Conflict, which allowed them to regain profitability for a few years.

Hall-Scott's postwar marine engine sales sank like a stone. After World War II, the company failed to change its products as customers demanded new engines. Hall-Scott continued to target the marine market, but the company found diminishing interest in those prized waters. According to Stan Grayson, "the big custom boats that had served as home to so many big Hall-Scott engines were now a rarity."[59] Furthermore, these popular smaller craft were often powered by lighter weight, mass produced, automotive-based engine blocks built by Chris-Craft, Hercules, "and most of all, perhaps, Chrysler." And an increasing number of boats used diesels, as they became more attractive in terms of initial cost, operating cost, size, weight, and safety compared to gasoline, so Hall-Scott pared back its marine models. Even the Invader could not escape this fate; in 1954, Hall-Scott pulled the plug on this important model (Fig. 9). Just as Hall-Scott had displaced the comparatively heavy and inefficient engines of a generation before, it suffered the same reversal of fortunes in the 1940s and 1950s. Hall-Scott had withdrawn from rail and aviation to concentrate more on marine, so this was an ominous sea change for the company.

In heavy-duty trucks, Hall-Scott clung to some market presence after World War II because of the peculiarities of that sector. Makers of big trucks used (and still do) "off the shelf" suppliers for major components like engines, which allowed customers to tailor trucks to specific needs. Hall-Scott had a product for which there was still some demand: high horsepower gasoline engines. The 400 and its related models such as 470, 480, 855, 935 and 1091, found some appeal with fire engines and long distance trucks. In this period, trucking mounted a serious assault on trains as America's chief freight haulers. A truck fitted with a 400 engine could substantially outperform almost all other trucks of the time, with its astounding torque characteristics that flattened hills. A 1945 edition of *Western Motor Transport* informed truckers how to "Save Eight Hours on L.A.-Salt Lake Run."[60] In the article, a Hall-Scott-powered Kenworth arrived in Salt Lake City eight hours faster than a truck powered by a different un-named engine. In spite of the Hall-Scott powered truck registering only 3.2 miles per gallon, the writer argued that

Fig. 10 – This 1954 ad shows how the company marketed its new 590 as a different kind of Hall-Scott engine - lighter, smaller and more fuel-efficient. Hall-Scott chief engineer John E. "Speed" Glidewell, who began working at the firm in 1920, designed the 590. (Courtesy *The Commercial Car Journal*)

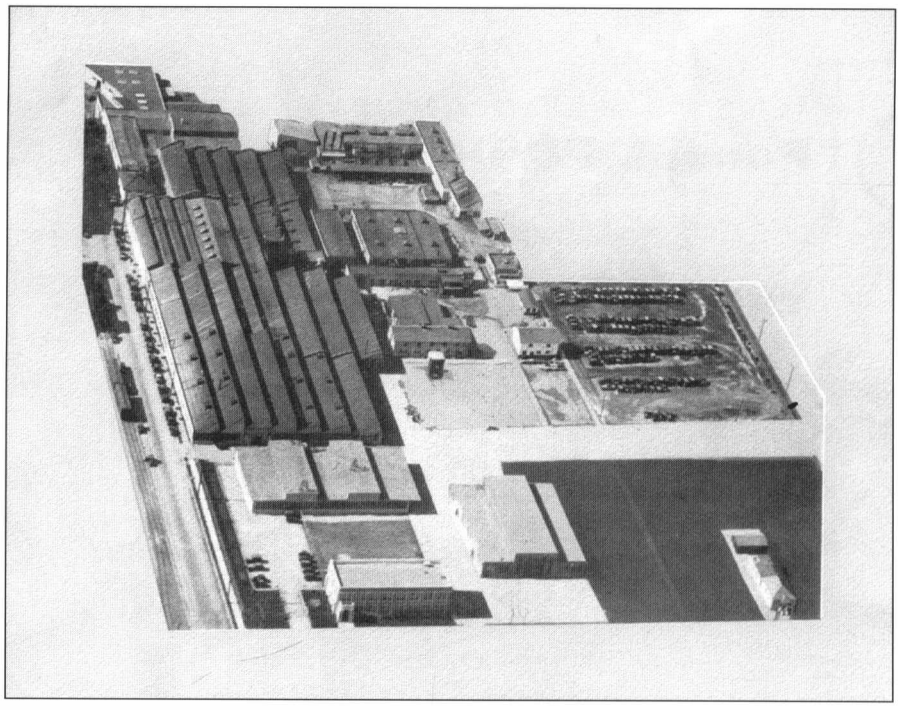


Fig. 11 – Hall-Scott manufacturing facilities, Berkeley California, as shown in a March 1938 catalogue on marine engines. (from the editor's collection)

"saving a few hours on each round trip means the difference between profit and loss." With more buyers looking for greater fuel economy, this angle attracted fewer customers.

Hall-Scott could not compete effectively when companies began to market more powerful, lightweight truck diesels in the 1950s. These demands inspired one last brand new engine from Hall-Scott, its first since 1931 - the 590 (Fig. 10).[61] Hundreds of pounds lighter, many inches smaller, and higher revving than comparable Hall-Scott engines, the 590 developed 190-245 h.p. As with many Hall-Scott models, it could be ordered to burn either gasoline or LPG, as either a horizontal or vertical engine. Furthermore, it shared the same long-wearing iron alloy, overheard camshaft, "hemi" cylinders, and tremendous torque that had made Hall-Scotts such respected truck and bus engines. Introduced in early 1954, the 590 was good, but was little match to the onslaught of diesels then available. While diesels are heavier and more expensive than gasoline engines of comparable power, diesels burn less fuel, fuel that is cheaper, and are touted to require less maintenance. These facts limited the modest heyday of the 400, and the leaner Model 590, to just a few years in the 1950s. Even with its new 590, Hall-Scott engine sales in the 1950s hovered around 500-700 units yearly.[62]

With sales failing to reach ACF's goals and the Korean Conflict ending, managers began selling company divisions. In October 1954, ACF-Brill stockholders voted to "spin-off" Hall-Scott as a separate company, making it independent for the first time since 1925.[63] It is doubtful there was much celebrating in Berkeley; this new-found autonomy was bad news for the engine maker.

A David in an industry increasingly dominated by Goliaths, in 1954 the company changed its name to Hall-Scott, Incorporated. The new name reflected the fact that the old company no longer made motor cars, and that it was diversifying. As Hall-Scott explained in a 1955 brochure, to meet the demands of "a new era" it opened an Electronics Division.[64] Bardwell & McAlister, Dynamic Analysis Inc., Douglas Roesch Inc., and Rosan Locking Systems were combined to form this new arm, located in Burbank. Hall-Scott now produced small computers, metal housings for computers, wiring harnesses. and thread locking inserts, much of it for the Department of Defense, spurred on by Cold War military spending. Being existing firms, they brought a dowry of buildings, contracts, and some 300 employees to the Electronics Division. The new division soon accounted for half of the company's sales volume. In addition, the new division was safe from the fortunes of the engine market. But the Electronics Division did not yield healthy profits and it did not breathe new ideas into the engine line. The world was indeed changing rapidly, but Hall-Scott had not changed its engines nearly enough. Hall-Scott had few large customers. Crown Coach's growing output of buses and firecoaches soaked up dozens of 180s, 190s, 590s, 835s, 935s, and 1091s yearly, but it was not enough to brighten the grim picture at Hall-Scott.

Hall-Scott engines still enjoyed a reputation for quality, but the company's commitment to gasoline engines left it at a competitive disadvantage. That situation reached a critical point in the 1950s. By then, Caterpillar, Cummins, and General Motors were selling plenty of successful truck, bus, marine and stationary diesels. Buda, Continental, Hercules, International, Mack, and Waukesha sold them, too. Hall-Scott stumbled haltingly into this field. The *1955 Hall-Scott Annual Report* stated that "a diesel engine line was placed in active development."[65] The Annual Report said that engineers had assembled two experimental diesels, a 160 h.p. 6-cylinder and a 225 h.p. V-8, as well as tinkering with turbochargers on existing models. But would they arrive in time?

Management struggled to keep Hall-Scott open after being spurned by ACF. Bowing to the inevitable, in August 1957 Hall-Scott's new president, William Nelson, argued that Hall-Scott needed to divest itself of its present money-losing operations. In April 1958, Nelson told *The Wall Street Journal* that the company was "receptive" to a merger, because "it is necessary for us to have a broader product base in order to operate profitably."[66] Displaying some moxie, Nelson added that any interested suitors would be required to "use our plants on the West Coast and utilize our engine[s]." (Fig. 11) Nelson wanted Hall-Scott to remain California-based, but was hardly in the position to dictate terms. Trying to put the best face on the situation, Nelson noted that while Hall-Scott had lost $555,000 on $9.6 million in sales in 1957, it was again operating profitably in early 1958. But the number of workers had tumbled from over 750 to 575, and unit sales had dropped 20 percent compared to 1957. Reorganizing the divisions lowered overhead

Fig. 12 – Why are these men smiling? Because Hall-Scott had ceased losing money building engines, dropped its name, and invested its money in the highly-profitable Du Bois. William Nelson, Hall-Scott's last president, stands far left the first day the stock was sold in August 1960. (Courtesy William Nelson)

and slashing the workforce raised output per employee, allowing this turnaround. It was difficult to make Hall-Scott look like a solid business investment in 1958.

In May 1958, long-time competitor Hercules Motors Corporation of Canton, Ohio, purchased Hall-Scott's Engine Division for $1.8 million.[67] Citing continued weak engine sales and ruinous competition, "especially from diesel power units," as well as the weak performance of its Electronics Division, the board of directors informed investors that money from the sale would be invested elsewhere.[68] Brushed aside was Nelson's earlier stipulation that any company acquiring Hall-Scott would have to use the Berkeley shop. The new Midwestern owners purchased Hall-Scott's inventory, tools, machinery, plans, and name. By July of that year, the first Hercules Hall-Scott engine emerged from the Ohio plant, installed into a new Crown bus.[69] In the meantime, Hall-Scott's Electronic Division was sold in July 1958 to Mandrel Industries of Texas.[70] No longer pulled down by money-sucking operations, in October 1958 Hall-Scott purchased a 50 percent interest in Du Bois Company, a producer of industrial detergents. Hall-Scott had washed its hands of engines and electronics and entered the chemical business. Du Bois was a growing, profitable company with plants across America. After sinking its assets into Du Bois, retaining the Hall-Scott name made little sense. So in April 1960, Hall-Scott and Du Bois consolidated as Du Bois Chemicals, Inc., burying the Hall-Scott name on its 50th anniversary (Fig. 12).[71]

Hercules continued to sell Hall-Scotts until around 1970, with hundreds going into fire trucks and buses, Crown remaining a loyal customer. Minimal changes were made to the line other than cutting models offered, and Hercules plowed little money into research and development. By the 1960s, the 400-based models, such as the 6152 and 6182, were coasting on 1930s era technology. Ultimately, Hercules ceased making Hall-Scotts due to what former Hercules President Joe Scheetz called a "lack of sales."[72] Actually, Hercules was more interested in selling parts for existing Hall-Scott engines (estimated to be about 27,000 in 1958) than it was in selling new engines.[73] Hall-Scott literally faded away over the span of a dozen years.

As the Hall-Scott name disappeared, few people outside the company took much notice. After all, Hall-Scott was hardly a household name. Within the engine business, most companies had far eclipsed the Berkeley firm in prominence. Its plant, records, and history met the same fate—remodeled, thrown out, and largely forgotten.

Analysis and Conclusion

References made to Hall-Scott's demise usually attribute its lack of diesel technology as the chief, or more commonly, the only factor involved. On one level this is a satisfactory answer, but Hall-Scott's problems were far larger. Hall-Scott could have remained a "diesel-free" company by focusing on aviation where diesels have never made serious inroads. Lycoming has done just that. But Hall-Scott abandoned serving aviation in the 1920s.

Hall-Scott's prime problem was not remaining as aggressive introducing new technology in its second 20 years as it was in its first 20. In addition, Hall-Scott perennially faced a host of vexing problems, such as a weak sales department, haphazard purchasing and inventorying practices, and expensive engines. If Hall-Scott had stayed the industry trendsetter as it had been early on, and had E. J. Hall remained with the company, it might well be making engines today. That is easier said than done, of course, but other companies have thrived by following the maxim of "change or die." In a recent history of the successful Cummins Engine Company, the authors highlighted the relentless push for change at that company.[74] A facet of modern American business has clearly been the tendency of firms in an industry to combine. The century-long consolidation of American auto, truck, and engine production has ground on inexorably. A small company such as Hall-Scott could not have bucked that trend; it needed the stability and capital of a parent company. While not meaning to oversimplify the complexities of staying in business in the modern global economy, Hall-Scott did not have to disappear. But perhaps it could have remained open as a division of a successful engine or vehicle maker, although not the struggling Hercules, which was itself floundering in the 1950s.

All of California's independent engine makers are long gone. Diesel makers Atlas, Enterprise, Imperial, and Union have not survived. Neither has Hall-Scott, which needed diesels, but it made engines longer than those other firms. And those many years of producing high-quality machinery left thousands of operators who raved about Hall-Scotts even decades later. Typical memories of operating Hall-Scotts include descriptions like "incredible

acceleration," "very responsive," "horsepower and torque virtually unmatched," "drivers loved them . . . they could go up hills 3 or 4 m.p.h. faster when loaded," and "we used to refer to them as 'Hop-Scotchers' since they would generally 'hop around' any other truck pulling a long grade."[75] But making powerful, smooth and responsive engines was not enough. Hall-Scott was the victim of not evolving in a dynamic market, led for too long by managers who followed the mistaken tenet that in the face of great change doing the same thing very well is good enough.

Notes

[1]Hall's early years are drawn from *The National Cyclopaedia of American Biography, vol. XLIII* (Ann Arbor: University Microfilms, 1967), 493-5, unless otherwise noted.

[2]Beverly Rae Kimes and Henry Austin Clark, Jr., *The Standard Catalog of American Cars, Third Edition* (Iola: Krause Publications, 1996), 365.

[3]"Comet is a New Star," *Motor Age*, September 3, 1908, 9.

[4]Griffith Borgeson, *The Golden Age of the American Racing Car* (Warrendale: SAE, 1998), 107, 155, 240; Letter from J. E. "Speed" Glidewell to G. Borgeson, July 5, 1984, Francis Bradford Collection.

[5]Scott's early years are taken from J.E. "Speed" Glidewell, "A History of the Hall-Scott Motor Car Company," unpublished manuscript, 1989, 4-5, Francis Bradford Collection, Bancroft Library, University of California, Berkeley, unless otherwise noted. Stan Grayson, *Engines Afloat, From Early Years to D-Day, vol. I*, (Marblehead: Devereux Books, 1999), 80.

[6]Letter from B. C. Scott to J. E. "Speed" Glidewell, May 8, 1956, Francis Bradford Collection.

[7]Ibid.

[8]Anthony Kirk, *Founded by the Bay; The History of Macaulay Foundry 1896-1996* (Berkeley: Macaulay Foundry, 1996).

[9]Glidewell, op. cit., 1.

[10]*Aeronautics*, September 1910, n.p.

[11]Ibid.; *Aeronautics*, May 1911, n.p.

[12]Bradford, op. cit., 12.

[13]Peter Bowers, *Boeing Aircraft Since 1916* (New York: Funk and Wagnalls, 1968), 32-3.

[14]Philip Dickey, *The Liberty Engine*, 1918-1942 (Washington: Smithsonian Institution Press, 1968), 25; *National Cyclopaedia of American Biography*, vol. XLIII, 493.

[15]Kenneth Johnson, *Aerial California; An Account of Early Flight in Northern & Southern California 1849 to World War I* (Los Angeles: Dawson's Book Shop, 1961), 75.

[16]"U. S. Airplane Production," *Motor Age*, December 5, 1918, 18.

[17]"Pertinent Facts about the Liberty Motor," pamphlet, Hall-Scott Motor Car Company, ca. 1919, F. Leroy Hill Collection, MS 95-03, Department of Special Collections, Wichita State University Libraries. The similarities can also be seen in Glenn Angle, *Airplane Engine Encyclopedia* (Dayton: Otterbein Press, 1921), 229-38, 305-14, although Angle does not give credit to one engineer more than the other. The best known book on the Liberty, by Dickey, likewise does not give Hall more credit than Vincent.

[18]*San Francisco Examiner*, September 15, 1917, 7.

[19]Letter from E. J. Hall to P.E. Holt, November 24, 1920, Holt Archival Collection, Haggin Museum/Library, Stockton, California. Found by Lorry Dunning, Davis, California.

[20]"Third Contract between Holt Manufacturing and Hall-Scott Motor Car Company," October 17, 1922, Holt Collection, Haggin Museum. Found by Lorry Dunning. There might have been a fourth contract and additional production.

[21]"Hall-Scott Engine Especially Developed for Bus Use," *The Motor Truck*, February 1925, 44.

[22]Grayson, op. cit., 85.

[23]"Ruckstell Two Speed Axle Uses Gear Reduction Between Ring Gear and Differential," *The Motor Truck*, January 25, 1925, 44; "Ford Gear Shifts Going Everywhere," *Motor West*, April 15, 1926, 26; *The Oakland Tribune Annual Year Book, 1922*, 92; Glidewell, op. cit., 2.

[24]*Commercial Car Journal*, December 20, 1926, 46.

[25]"Hall-Scott Develops New Six." *Motor Age*, October 18, 1918, 38-9; Angle, 234.

[26]Bradford, op. cit., 9-10.

[27]Grayson, op. cit., 80.

[28]"Hall-Scott Motor Car Company Incorporated Marine Engines and Installations," brochure, 1920.

[29]Grayson, op. cit., 83.

[30]"The New Hall-Scott Invader," *Motor Boating*, February 1931, 123; Bradford, op. cit., 91-98.

[31]References to Hall-Scott's attractiveness to rum runners are common, for example, Herschel Smith, *Aircraft Piston Engines* (Manhattan: Sunflower University Press, 1986), 48.

[32]"Hall-Scott Binder," n.p., William Nelson Family Collection.

[33]*New York Times*, September 4, 1925, 32.

[34]"Report on Hall-Scott Motor Car Co.," unpublished report, n.p., 3, 1931, Family of Leland Scott Collection.

[35]"Oral History Project Accession #65, Series I, reminiscences of Mr. Harold Hicks, vols. 1 & 2, Ford Motor Company Records, Benson Ford Research Center, The Henry Ford Museum at Greenfield Village.

[36]*Commercial Car Journal*, April 1937, 23.

[37]Letter from J.E. "Speed" Glidewell to G. Borgeson, July 5, 1984, San Diego Aerospace Museum. Glidewell worked at Hall-Scott from 1920 until the 1950s, rose to be chief engineer, and knew Hall well. Glidewell's departure date for Hall was 1928, which does not correspond with other sources.

[38]"The Men Behind the DeVaux," brochure, 1931, author's collection; see also Keith Jones, "If Only in Another Time. . . . The Story of The DeVaux-Hall Motors Corporation," *Automotive History Review* (Issue No. 40, Summer 2003), 43.

[39]The *National Cyclopaedia of American Biography, vol. XLIII*, 493-5; *San Francisco Chronicle*, October 25, 1955, 33.

[40]"Report of Investigation of European High Speed Diesel Engines," unpublished report, August 19, 1930, Francis Bradford Collection.

[41]Bradford, op. cit., 43.

[42]Ibid., 72-3.

[43]Don Butler, *The History of Hudson* (Osceola: Crestline, 1992), 264, 267.

[44]Glidewell, 3.

[45]Bradford, op. cit., 95.

[46]*Pacific Motor Boat*, February 1941, 42.

[47]*Hall-Scott Invader Exhaust*, April 1944, 2. This was Hall-

Scott's wartime newspaper. Grayson, 87, cites 8000 being built.

[48]Bradford, op. cit., 91-98. Those changes included increasing size of crank journals, new connecting rods, smaller valves, and new pistons; "Hall-Scott 400 Series High Output Truck Engine," *Automotive Industries*, June 15, 1947, 28-9, 70.

[49]*Automotive Industries*, June 15, 1947, 28.

[50]Thomas Berndt, *Standard Catalog of U.S. Military Vehicles, 1940-1965* (Iola: Krause Publications, 1983), 126. When hitched to its trailer, the M-26 was known as the M-25. The unarmored version was known as the M-26A1.

[51]Bradford, op. cit. 96.

[52]*Hall-Scott Invader Exhaust*, April 1945, 4.

[53]Herb Charles, "Hall-Scott Marine Engines Aid Invasion and Defense," Machinery, September 1942, 122.

[54]*Berkeley Gazette*, February 1, 1946, 1; *New York Times*, February 1, 1946, 31.

[55]*Berkeley Gazette*, February 1, 1946, 1.

[56]"A Radically Different Method of Building Motor Coaches," *Automotive Industries* October 1, 1947, 24-8; Bradford, 105-109.

[57]*1951 ACF-Brill Annual Report*, 3, Francis Bradford Collection.

[58]The *New York Times*, June 12, 1951, 46.

[59]Grayson, op. cit., 87.

[60]Reprint; W.J. Rellaford, "Save Eight Hours on L.A.-Salt Lake Run," *Western Motor Transport*, March 1945, n.p.

[61]*Commercial Car Journal*, January 1954, 18.

[62]"Hall-Scott, Incorporated Power Division Total Marketing Analysis and Plan,"unpublished report, July 22, 1957, 13, Pickering Advertising Agency, Francis Bradford Collection.

[63]*New York Times*, October 21, 1954, 45.

[64]*Hall-Scott Power/Electronics*, pamphlet, n.p., 1955, Francis Bradford Collection.

[65]1955 Hall-Scott Annual Report, 4, 6, Francis Bradford Collection.

[66]*Wall Street Journal*, April 14, 1958, 23.

[67]*Wall Street Journal*, May 9, 1958, 12; Letter from F. Harder and W. Nelson to Hall-Scott Stockholders, June 5, 1958, Francis Bradford Collection.

[68]Letter from F. Harder and W. Nelson to Hall-Scott Stockholders, June 5, 1958.

[69]*New York Times*, July 28, 1958, 30.

[70]*Wall Street Journal*, October 14, 1958, 10.

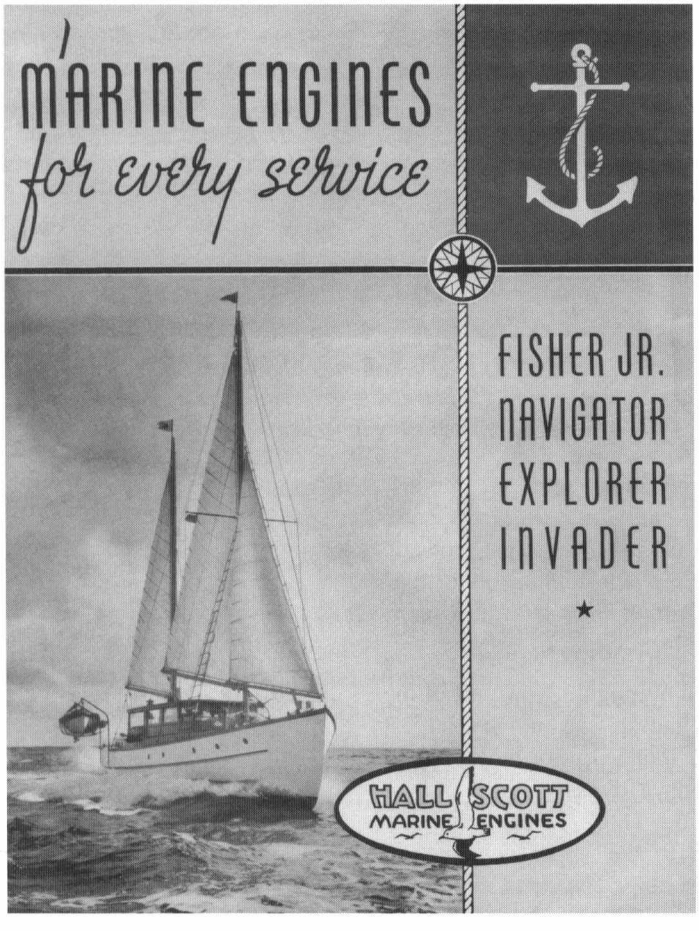
[71]*Wall Street Journal*, February 25, 1960, 2.

[72]Letter from J.G. Scheetz to R.A. Dias, November 11, 2003.

[73]"Hall-Scott Engines in the Field and/or on Books as of July 15, 1957," n.p., Hall-Scott Binder, William Nelson Collection.

[74]Jeffrey Cruikshank and David Sicilia, *The Engine That Could; Seventy-Five Years of Values-Driven Change at Cummins Engine Company* (Boston: Harvard Business School Press, 1997).

[75]Letter from C. R. Smith to R. A. Dias, January 10, 2004; letter from R. Brown to R. A. Dias, November 13, 2002.



A Buick for Barwani

An Indian Prince Buys an American Car

by Kit Foster with Keith Marvin

July 19, 1939 was a big day for His Highness Rana Sahib Devi Singh (Fig. 1). Not only was it his 17th birthday; after months of anticipation, the heir to the throne of the Indian Princely State of Barwani was about to take delivery of his new Buick phaeton.

Buying a new Buick in prewar India was a bit more complicated than in Idaho or Indiana. The most popular cars in India were British models, followed by European makes. Dealers tended to order basic models of Austin, Morris, or Vauxhall, along with a few MGs. Continental manufacturers were represented by Fiats, Citroëns, DKWs, and the lower-priced Mercedes-Benz models. American cars available "off the floor" were mostly Fords, Chevrolets and Pontiacs. British officials, not surprisingly, preferred English cars and were often seen in Daimler and Rolls-Royce models. Princely desires, however, could be met by special order, and thus a goodly number of Lincolns, Pierce-Arrows, Cadillacs, Packards and the like, found their way to India.

Fig. 1 – His Highness Rana Sahib Devi Singh as a young man. He learned to drive at age nine, and has been an enthusiast of American cars all his life.

Barwani was one of approximately 650 Princely States that existed in India prior to 1947. Since the 18th century, Britain had been successively annexing quasi-independent kingdoms in the Indian subcontinent under the mantle of the British East India Company. In 1857, a number of the kingdoms rose against the Company, and while the mutinies were not successful they did result in the British Crown taking back the Company's charter and instituting direct rule through a Viceroy. Annexation halted, and Britain came to an agreement with the ruling families, giving them authority for the administration of their kingdoms, from that time called Princely States, subject to British policy and oversight. Now part of the central Indian state of Madhya Pradesh, the nation's largest political subdivision, Barwani was founded prior to 1500, and ruled by members of the Shishodhya dynasty, apart from a period of British administration from 1861-73. Its hereditary salute of eleven guns ranked it in the upper echelons of importance in the subcontinent. The range of salutes, signifying order of precedence, ran from nine to 21 guns, but more than 400 of the states rated no salute at all.

Rana Sahib Devi Singh and his brother Udai Singh were the sons of Capt. His Highness Rana Sir Ranjit Singh, the twelfth ruler of Barwani. Neither of the boys had come of age at the time of their father's death in 1930, so Barwani was being administered by the Dewan and President Sir Harilal Gosalia, appointed by the British. ("Dewan" was a term used to designate a chief administrative officer or prime minister in the royal states of India.) The young princes were placed under the guardianship of Lieutenant Colonel A.S. Mackay, a Scots officer in the British Army. Initially appointed *in loco parentis* to Rana Sahib when the boy reached his 16th birthday, Col. Mackay later assumed that responsibility for Udai Singh as well.

Born in 1922, Devi Singh had been driving since he was nine years old, piloting his father's LaSalle, Packard and Oldsmobile cars in Barwani, and at the family's second home in Mhow. By the time he was 16, Rana Sahib was an accomplished driver, and often made the 535-kilometer trip from Barwani to Bombay, heading a caravan with Col. Mackay, his brother Udai Singh and other staff members following in other cars. At this time Devi Singh's principal car was a blue 1936 Chevrolet sedan issued by the State Garage; his brother was assigned a gray 1935 Studebaker.

Devi Singh avidly followed the news of the automotive world, the American scene in particular, in large part because he was attracted to the styling of American cars. In the latter part of 1938 he began to crave a new car, one more exciting than the Chevrolet. He entreated the Dewan, Sir Harilal Gosalia, to be allowed to buy one. Sir Harilal took up his case, writing a "*Strictly private and personal*" note to Col. Mackay on December 13:

> Rana Sahib does not like to use any car after it gets one or two years old. He has written to me to request that he may be allowed to purchase a new car. His request is very polite and gentle. I know he has a weakness for cars, but it strikes me that we should not ignore his wish in small matters,

because if we follow that policy his suppressed wishes will rebound with a terrible reaction as soon as he becomes master of his own State after a few years.

The colonel was not so indulgent. He wrote back to the Dewan:

> I fully realise his desire to have a new plaything and I know well how boys feel, but I contend that I must begin to teach him the care of money *now*, and a presentation of a new car at this time would be entirely contrary to my ideas.
>
> I must admit that there is a great deal in what you say about "suppressed wishes rebounding" but that is one of the responsibilities I have to face in my guardianship of your future ruler. If we give in to his every wish now there can be no *discipline of self* which counts so much in future life.

Col. Mackay set out four specific objections to the plan: The car would "be of little benefit or joy" since the prince could only drive it in Barwani; no budget allowance had been made; "a new and much improved model of car [would] come out to India sometime next year" (one wonders what model this could have been); and, summarily, "now is not the time to buy but rather to economise." He then went on to criticize the way the Barwani State Garage looked after "State Car No. 24" assigned to him and the Packard used by Udai Singh, whose "brakes were out of adjustment and the engine and chassis being astonishingly dirty," closing with three detailed suggestions for reform of the garage's operation. The Dewan concurred with the colonel's reluctance to purchase a car for Devi Singh, but went to some length to defend the State Garage, which had to deal with cars "run on very rough roads" in a state "a hundred miles from the railway on every side," and suffering "calls on the cars" which were "very uncertain and difficult to control or ignore on account of parties having traditional vested rights which if the Administrator of the State tried to control he [would] invite most embarrassing opposition and obstruction which [would] seriously interfere with his far more important work of general administration."

The prince bided his time. Col. Mackay reported to the Dewan on a heart-to-heart discussion:

> I decided to speak to Devi Singh about the new car as soon as I got an opportunity. During a talk before dinner tonight the opportunity arose and I told him all about it, in almost the same words as I expressed to you. I will say without hesitation that Devi Singh is a most thoughtful, considerate and unselfish boy. He saw my reasoning at once and accepted our decision in the very best spirit, and he is not in the least upset or annoyed. . . .

Referring to an upcoming trip, Devi Singh told his guardian "I do not think I ought to drive the car on the way to Bombay." The colonel replied "Why not? You are a careful driver and provided you do not drive in towns or traffic I have no objection." Col. Mackay's letter to the Dewan was telling:

> His reply was really fine. He said "My brother is very fond of driving too, and as I know you will not let him drive he might be very disappointed if I was allowed to drive and he was not." I think that is a most excellent spirit shows unusually unselfish outlook on things that may be minor to us, but quite major in youngsters.
>
> Having said *No* to his car now, I suggest with deference that you consider giving him a car of his own on his 17th birthday.

By the following May, the prince's campaign was bearing fruit, no doubt aided by excellent grades in his schooling. Col. Mackay evidently assented, though he had some misgivings about the choice of car—Rana Sahib Devi Singh was firmly set on having a LaSalle convertible. The Dewan wrote to the guardian again on the 24th:

> I think we should soon get for Rana Sahib a very good car of his choice. I agree with you that a Buick will probably be better than a LaSalle—Please do not be very strict about the limit of Rs 6000 (six thousand). [then equal to just under $2,000 US] The important thing is that he must have a car which would give him a real satisfaction without leaving a feeling in his mind that it would have been better if he were allowed a little bigger amount. *With you to guide him in his decision* I would lay down no limit as to price except the one which his own good sense determines. If the car is purchased soon he can drive it in Barwani during this vacation.

Barwani's closest Buick dealer, Ponwar Brothers, was located in Indore, where Rana Sahib was then studying at Daly College. Indore is some 150 kilometers from Barwani and is now Madhya Pradesh's largest city, though fate has decreed that the state's second-largest city, Bhopal, has become far better known. Most rulers of the surrounding princely states sent their male children to study at one of several colleges at Indore, and many established residences there, as the Barwani royal family maintains to this day.

Ponwar Brothers, dealers also for Cadillac, Pontiac, Opel, and GMC trucks, wrote to Col. Mackay on June 29, acknowledging the order:

> With reference to your order for one Buick 1939 Model 41-C Convertible Phaeton, our principals now inform us that one unit will be ready for delivery during the third week of next month, and this will be in cream colour with red leather upholstery. They also add that this is the only unit available and there is none to follow this year.

Though far from being the rarest 1939 Buick, the Series 40 phaeton was, with total domestic deliveries of 724, unusual even in its homeland (Fig. 2). The brothers Ponwar were not being hyperbolic in stating that it was the "only unit available." Although many Buicks destined for the British Empire were built in Canada and badged as "McLaughlin-Buicks" for tariff reasons, low-production body styles like the phaetons were built in the United States. Indeed, this car's serial number, 13583958, identifies it as manufactured in Flint, Michigan. According to Dunham and Gustin's *Buick — The Complete History*, just 106 Model 41-CX phaetons, "X" designating "Export," were built for 1939.

The colonel replied to the dealers on July 5 that

> Buick Model 41-C in cream and red upholstery is finally accepted for His Highness the Rana Sahib of Barwani. . . .

Fig. 2 – The 1939 Buick 41-C phaeton cost $1,406 in the United States, sixty percent more when delivered to India. (from the editor's collection)

The State Crest, a copy of which has already been forwarded to you may please be incorporated on all door panels. It is particularily request (sic) that the painting of these be most carefully done. The crest should please be in the same colour as the upholstery with the scroll in gold. . . . Number plates as already intimated to you, must be fixed before delivery. The unit will be sent to INDORE by Rail please. The date of arrival at INDORE RAILWAY STATION may please be intimated in due course to enable me to inspect the car before delivery is taken from the Railway Authority.

The matter of the number plates and State Crest is interesting. Although the rank and file of Indian princes were subject to Indian registration regulations, being issued unimaginative black markers with white letters and numbers, there was an "understanding" between the Government of the Raj and the princes that special plates could be used on vehicles owned and used by rulers and their families for formal affairs, or even as personal transportation. Only the princely families had this privilege. Most of these plates were painted red and carried the state name, generally with a low number (Fig. 3). The plates were valid if the cars to which they were attached carried the state coat of arms, generally on the doors, and flew the state flag from the front fender.

Fig. 3 – Special license plates were afforded to the rulers of India's princely states and their families. Made of cast aluminum with a red background, they carried the state name and a serial number. This Barwani plate is in the collection of Keith Marvin. (Kit Foster photo)

Ponwar Brothers replied on July 14 that the car was not yet in the country.

As regards to delivery, Messrs. Metro Motors [the Bombay distributor] write "we regret we shall not be able to rail the car on or about the 20th inst. as requested by you for the simple reason that the steamer is not due to arrive till the 17th inst, and then as unloading is

done in fair weather only, and as transport from Docks to the General Motors Plant, unboxing, setting up, tuning up, inspection &c. will take a few days, we shall not be in possession of the car till the end of the next week. The painting of the crest &c. will again take up a couple of days at least and so we do not expect to be able to rail the car before Monday the 24th or Tuesday the 25th inst. Kindly make this very clear to the Guardian to His Highness and also send us his instruction regarding the size of the crest."

By August 4 the Buick was finally on Indian soil, and a requested examination by the Western India Automobile Association of Bombay had been carried out. Mr. N. F. Delal, the Association's engineer, certified that "In accordance with your telephone message of July 31st, I examined Buick car Type 39-41 C, Engine No. 43746167, Chassis No. 13583958, in the possession of Messrs. Metro Motors of Hughes Road, Bombay, and have pleasure in certifying that this car is new and in perfect condition and that I could find no fault with it." It was fortunate that the Dewan had relaxed his 6,000 Rupee budget, for the car, delivered to the railway siding in Indore cost precisely 7,000 Rs. At the then-current exchange rate this represented just over $2,300, a 60 percent premium over its factory price in Michigan.

Sadly, the very next year the Buick was to prove source of sorrow. Devi Singh's youngest son, Maharaj Kumar Divyaraj Singh, explained in a letter to Keith Marvin:

I suppose at the time [my father] was very happy to get this new car, but sadly this Buick proved to the one thing that would bring him great grief and sorrow. [A]s much as he loved and still loves motor cars, he loved his younger brother the most, apart from his elder sister. [M]y uncle, who was soon to be married to the then Princess of Alirajpur, met with a tragic accident in this very same automobile, along with one of his tutors who was with him in the car, Mr. Bheram Shah, a [Parsee] gentleman. [T]he car punctured a tire [and] my uncle lost control. [On the] . . . 23rd of July [1940] both of them died as the convertible turned over . . . I do not know where the car went, nor have I heard my father talk about what happened thereafter; the memories are still very personal. . . .

The ensuing years, however, brought events to Rana Sahib Devi Singh, and all of India, that profoundly changed the Princely States and the lives of their rulers. The independence and partition of India on August 15, 1947 is well-remembered. Less so is the fact that the new nation was not completely operative until its constitution came into force on January 26, 1950. The intervening period was beset with difficulties, including the assassination of Mahatma Ghandi in January 1948, armed conflict in several of the states and devaluation of the Rupee. Most of the Princely States remaining at the time of partition consented to join the new India. The larger states, like Mysore and Hyderabad, retained their existing borders. Smaller states joined the larger provinces, like Bombay, Madras and Bengal, which had remained under direct British control, to form new states. Thus Barwani acceeded to the State of Madhya Bharat on June 15, 1948. The present state of Madhya Pradesh came into being in 1956, when Madhya Bharat, Vindhya Pradesh and Bhopal were joined with the Mahakoshal districts of the former Madhya Pradesh.

Still alive but no longer active in the governance of Barwani, Rana Sahib Devi Singh and his family have retained their fascination with the automobile and their fondness for American cars. Devi Singh has owned over 250 cars since 1940, nearly a dozen of them Cadillacs. Family interest in Cadillac goes back to the time of Devi Singh's father and has remained strong ever since. Devi Singh's sons have all grown up with Cadillacs, the first cars in which they rode. This interest extended to the toy cars they played with as children, memorable among them tin models of the 1959 Eldorado convertible. Devi Singh is not solely a Cadillac collector, however, and has at various times owned a Studebaker Golden Hawk, a Studebaker Conestoga station wagon, a Rambler Cross Country wagon and a Plymouth Belvedere convertible. Cars he would like to have owned include all Cord models, the Buick Y-Job, Packard Darrin, and most of the Virgil Exner concept cars. In 1947 he tried to order a Rolls-Royce with a thin grille, reminiscent of the 1939 LaSalle or 1940 Packard, but the company declined to build one for him.

His second son, Maharaj Kumar Manvendra Singh, educated at Daly College and Northwood Institute (now Northwood University) in Midland, Michigan, has made a career of the automobile. He attended the Jim Russell Racing School in Canada in 1971, and in 1977 established Classic Cars, the first full-service auto restoration business in India. He has also participated in the development of prototypes for Indian auto manufacturers Maruti, Mahindra & Mahindra, Telco and Hindustan Motors. Maharaj Kumar Divyaraj Singh, the youngest son, whose family histories and archives are the basis for this article, continues to enjoy American cars. He, too, was educated at Northwood Institute, and remains loyal to the Cadillac marque. He currently drives a 1988 Cadillac Brougham, which, he relates, is "what a Cadillac is all about."

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