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# **Profiles of Automotive Suppliers Industries- Engineered Mechanical Components and Systems Volume I Text**

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**Transportation Systems Center  
Cambridge MA 02142**

**September 1981  
Final Report**

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16. Abstract <p>This profile describes and analyzes that segment of the automotive supplier industry which provides engineered mechanical components/assemblies/systems to the prime auto manufacturers.</p> <p>It presents an overview of the role and structure of this industry and of its historical business performance data (1975 through 1979). It profiles, in some detail, 76 leading companies in this industry, and discusses domestic and foreign markets for automotive components and accessories. It reviews recent technological changes and growing international competition. It provides an assessment of capital requirements, of structural changes in the industry, and of evolving suppliers' strategy and tactics.</p> <p>Volume II, <u>Profiles of Automotive Suppliers Industries - Engineered Mechanical Components and Systems - Appendices</u>, has 184 pages.</p>					
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## PREFACE

This report represents one in a series of studies of supplier industries that provide materials and components to the prime auto manufacturers.

While this profile deals with suppliers of engineered mechanical components, other reports in this series deal with industries that supply steel, aluminum, plastics, tires, glass, paint, castings, and machine tools.

The present study has been performed by the Transportation Systems Center under the sponsorship of the National Highway Traffic Safety Administration's (NHTSA) office of Passenger Vehicle Research, Technology Assessment Division.

Much of the detailed information on individual supplier companies has been provided by the Standard & Poor's Corporation, whose permission to use this material is hereby gratefully acknowledged.

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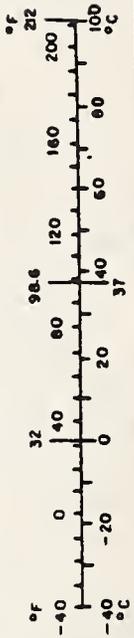
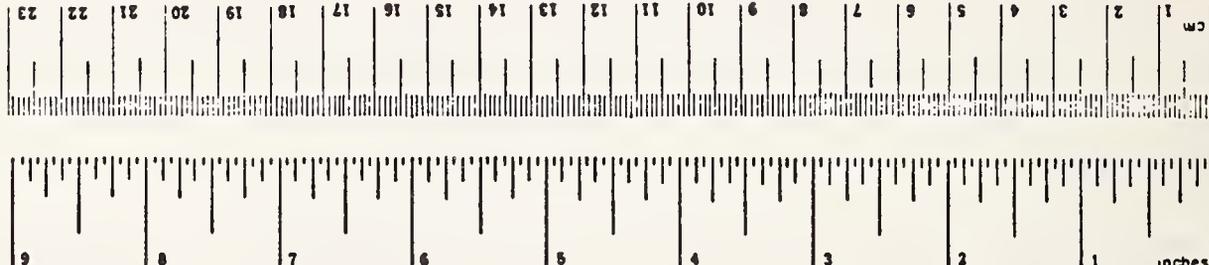
# METRIC CONVERSION FACTORS

## Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	ha
<b>MASS (weight)</b>				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
<b>VOLUME</b>				
sp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

## Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	ac
<b>MASS (weight)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	st
<b>VOLUME</b>				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



\* 1 in = 2.54 exactly. For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13 10 786.

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## EXECUTIVE SUMMARY

### 1. GENERAL BACKGROUND

It is a well-established fact that the automobile industry would be unable to function effectively and efficiently without the substantial support provided by the component supplier industry. Such support generally consists of:

- Product innovation, or conception of new product ideas
- Engineering research and product design
- Prototype fabrication, testing and product development
- Product manufacturing
- Product distribution to vehicle assembly points or other points of sale (the aftermarket).

It is clear that all of these supplier activities require a competent labor force, laboratory/shop/plant facilities, machinery/tools/equipment, and, above all, venture and operating capital, as well as managerial ability and an entrepreneurial approach to business. By providing all these services, the component supplier industry assumes the burdens and risks which would otherwise fall upon the prime auto manufacturers. In return, the supplier industry expects appropriate rewards resulting from long-term, large volume supply contracts for their products.

The industry produces products which include vehicle components, assemblies and systems, made of or containing all materials (solid, liquid, or gaseous), as well as all kinds of tools, machinery, equipment, and instruments used in the production, assembly, testing, and servicing of motor vehicles. Basically, all products which are essentially non-electrical and non-electronic in their functions are regarded as mechanical.

For the purpose of this profile document, the scope of engineered mechanical components has been arbitrarily narrowed to include:

- Engine system components (internal and external)
- Drivetrain system components
- Brake system components
- Steering and suspension system components
- Frame and structural components
- Safety and comfort system components.

Futhermore, industries which supply tires, glass products, castings and forgings, and machine tools have been specifically excluded, since they are treated separately in individual profiles. Also, for the purposes of this document, suppliers have been defined as independent producers that are not owned or controlled by the prime auto manufacturers. Thus, parts divisions of domestic or foreign automakers have not been considered in this profile.

## 2. CURRENT STRUCTURE OF THE INDUSTRY

The industry consists of literally thousands of supplier companies of various sizes, with the majority being either privately owned or closely held corporations, for whom financial and other data is not published. Directories compiled by specialized automotive trade publications\* list between 460 to 880 entries in all product categories, counting individual product divisions of conglomerates and component division of the prime auto manufacturers.

In this profile, the population of suppliers has been condensed to a group of 76 major companies in this field, as listed below:

---

\* Chilton's OEM Suppliers' Guide  
Ward's Automotive Yearbook  
Automotive News Data Book

COMPANY	PRODUCT CODE*
ACF Industries Inc. (Carter Carb.)	E,C
ALCOA	B,E,F
The Allen Group Inc.	D,F,C
Amsted Industries (Burgess-Norton Mfg.)	B,F,S
Armstrong Cork Co.	D,E,S
Armstrong Rubber Co.	D
Arvin Industries	E,C
Barnes Group Inc.	B,E,S,C
Bearings Inc.	E,D
The Bendix Corp.	B,E,S
Borg-Warner Corp.	E,D
Robert Bosch Corp.	B,E
Buckeye Intern'l Corp.	D,F,S
The Budd Co.	B,E,F,D
Bundy Co.	B,E,S,F,D
Champion Spark Plug	E,C
Colt Industries	E
Commercial Shearing	F,S
Copperweld Corp.	S
Cummins Engine Inc.	E
Dana Corp.	B,E,D,S,F
Dayco (Automotive Corp.)	E,S,C
Donaldson Co. Inc.	E
Dyneer	B,D
Eagle-Picher Industries	F
Eaton Corp.	B,E,D,S,C
Echlin Mfg. Co.	B,E
Eltra (Prestolite Co.)	E,S
Ex-Cello Corp.	E,F,C
FMC	E,D,S
Facet Enterprises	E
Federal Mogul Corp.	E,D
Firestone Tire & Rubber	E,D,S,F
Fruehauf (Kelsey-Hayes Co.)	B,F,D
GKN Automotive Comp'ts	E,D,S,F

\*See code explanation, p. xiv.

COMPANY	PRODUCT CODE*
Gates Rubber	B,E,C,S
Goodyear T&R (Motor Wheel Corp.)	B,D
Gould Inc.	B,E,F
Gulf & Western Indust.	E,F,S
Hoover Universal Inc.	C
Houdaille Indust. Inc.	F
IC Industries Inc. (Abex)	B,D
ITT	B,D,F,S
Ingersoll-Rand Co. (Torrington Co.)	E,D
International Packing	B,E,S,C
Irvin Industries Inc.	E,D,F,C
Lear Siegler	B,D,F,C,S
Lucas Indust.	B,E,S,C
Metal & Autom. Indust.	E,F,C
Metex	E
Midland-Ross Corp.	B,F
Modine Mfg. Co.	E,C
Parker-Hannifin Corp.	B,F
Purolator Inc.	E,S
Raybestos-Manhattan	B,D
Reynolds-Metals Co.	F
Robertshaw Controls	B,E,F,S,C
Rockwell International	B,F,D,S
Scovill Inc.	S,D
Sealed Power Corp.	E,B,F,S
Sheller-Globe Corp.	B,F,S,C
Signal Cos., Inc.	E,C
A.O. Smith Corp.	F,D
Stanadyne Inc.	E,F,S
Standard Products Co.	F,C
Stewart-Warner Corp.	E,C
TRW	E,S,C
Tecumseh Prod. Co.	C

\*See code explanation, p. xiv.

COMPANY	PRODUCT CODE*
Teleflex Inc.	E,S,F,D
Tenneco Inc.	E,S
Texas Instruments	B,F
The Timken Co.	E,D
Trico Products Corp.	C
United Technologies (Am. Bosch)	E,C
E.R. Wagner Mfg. Co.	B,D,S,F
Wagner Electric Corp.	B

\*See code explanation, p. xiv.

Almost all of them are organized as corporations, and with a few exceptions, are multi-divisional and multi-national. A number of these companies are highly diversified conglomerates serving many markets in the U.S. and abroad which are unrelated to the automotive industry and its products. Some of the companies in this group operate subsidiaries in other countries on several continents, and a few of them are owned by major foreign multi-national corporations.

Some of the suppliers in this group serve the original equipment market (OEM) exclusively, while other companies serve both the prime manufacturers and the replacement markets domestically and abroad. Very few suppliers specialize in a narrow product line; most are diversified into several product categories. This diversification results in the grouping shown below, which reflects the major product categories and their respective codes, as used in Tables 1 through 8.

- 31 suppliers make brake components and assemblies (Code B)
- 27 suppliers make safety and comfort components and assemblies (Code C)
- 28 suppliers make drivetrain components and assemblies (Code D)
- 48 suppliers make engine components and assemblies (Code E)
- 32 suppliers make structural components and assemblies (Code F)
- 33 suppliers make steering/suspension components and assemblies (Code S)

For the detailed product lineups and the organizational structure of each company in the selected group of 76 suppliers, see the individual corporate profiles in section 2.

### 3. THE STATUS OF THE INDUSTRY

#### 3.1 SALES OF AUTOMOTIVE MECHANICAL COMPONENTS BY U.S. PRODUCERS

Industrywide sales of engineered mechanical components by all U.S. producers during the period 1977 through 1979 are given below in current dollars,\* with the percent change from the previous year shown in parentheses:

	1979 <u>(\$ Billions)</u>	1978 <u>(\$ Billions)</u>	1977 <u>(\$ Billions)</u>
Sales to Domestic OEM Markets:	35.14(+12.0%)	31.36(+10.7%)	28.34
Sales to Domestic Replacement Markets:	6.65(+11.9%)	5.94(+10.6%)	5.37
Sales to Export Markets:	<u>7.59(+5.4%)</u>	<u>7.20(+18.8%)</u>	<u>6.06</u>
Total Sales:	<u>49.38(+11.0%)</u>	<u>44.50(+11.9%)</u>	<u>39.77</u>
Total Sales in Con- stant 1972 Dollars:	<u>29.84(+2.0%)</u>	<u>29.26(+4.2%)</u>	<u>28.09</u>

While annual current dollar figures indicate growth in all markets for mechanical components, in constant dollar terms there is almost no growth.

#### 3.2 WORLDWIDE SALES OF SELECTED SUPPLIERS AS A GROUP

Since the automotive component supplier industry is so broad and fragmented, the collective status of the selected group of companies discussed above will be used as representative of the entire industry. The collective consolidated worldwide sales in 1978 and 1979, posted by 72 selected suppliers\*\* as a group, is shown below (in current dollars), with the percent change from the previous year given in parentheses:\*\*\*

\*Based on data in Tables 14, 15 and 17.

\*\*Of the 76 suppliers listed in Table 1, four are privately owned for whom financial statements are not published.

\*\*\*Based on data in Tables 1 and 2.

	1979 <u>(\$ Billions)</u>	1978 <u>(\$ Billions)</u>
Consolidated Worldwide Sales	148.9(+17.3%)	126.9
Automotive-Related Sales*	63.6(+13.2%)	56.2
Automotive-Related Sales as a Percent of Consolidated Sales	42.7%	44.3%

It is clear that auto-related sales are becoming a smaller contributing factor to consolidated corporate revenues.

### 3.3 AVERAGE CONSOLIDATED SALES PER COMPANY OF SUPPLIER GROUP

Since complete historical data for each of the 72 supplier companies analyzed in the preceding section has not been available, the average consolidated sales per company (in current dollars) during the five-year period of 1975 through 1979 have been presented below<sup>†</sup> as a parameter indicative of general trends in the industry. The figures (in current dollars) indicate a brisk growth pattern well in excess of inflation rates prevailing in the respective years.

<u>Year</u>	<u>Average Consolidated Sales Per Company (\$ Millions)</u>	<u>Annual Change</u>	<u>Number of Companies Averaged</u>
1979	2,068.0	+17.3%	72
78	1,762.1	+14.1%	72
77	1,544.3	+14.3%	70
76	1,350.4	+12.3%	70
75	1,202.9	-	69

Similarly, and for the same reasons, other financial parameters for the same group of supplier companies are presented in the following sections.

\*Automotive-related sales include other than mechanical components.  
†Based on data in Tables 1 and 2.

### 3.4 CONSOLIDATED NET INCOME PER COMPANY OF SUPPLIER GROUP

The supplier companies as a group have had an average net income per company (in current dollars) during the period of 1975 through 1979 as shown below:\*

<u>Year</u>	<u>Average Net Income Per Company (\$ Millions)</u>	<u>Annual Change</u>	<u>Number of Companies Averaged</u>
1979	\$89.5	+22.1%	69
78	73.3	+12.0	70
77	65.4	+16.4	69
76	56.2	+28.4	69
75	43.9	-	68

It is evident that the net income of the supplier companies analyzed here has been showing a robust growth pattern, albeit of a cyclical nature. Naturally, this trend is based on consolidated sales of all products and services, of which auto-related business in 1978 and 1979 represented about 43 and 44 percent respectively. Notice that the annual growth rates are far in excess of inflation rates prevailing at the time.

### 3.5 CONSOLIDATED AVERAGE EARNINGS PER SHARE OF SUPPLIER GROUP

As a group, the supplier companies have posted average earnings per share in the period 1975-1979 (in current dollars) as given below:\*\*

<u>Year</u>	<u>Average Earnings Per Share (\$)</u>	<u>Annual Change</u>	<u>Number of Companies Averaged</u>
1979	\$4.54	+12.9%	66
78	4.02	+ 2.8	69
77	3.91	+10.1	69
76	3.55	+26.8	69
75	2.80	-	68

\*Based on data in Table 3.

\*\*Based on data in Table 4.

While the average earnings per share of this supplier group were cyclical (reflecting the nature of the auto industry in general), the growth trend, on the whole, was quite healthy. Again, the earnings per share discussed here reflect consolidated corporate operations involving, for the most part, a variety of non-automotive businesses.

### 3.6 AVERAGE RETURN ON SALES FOR SUPPLIER GROUP

The same group of supplier companies have collectively generated an average return on sales (in current dollars) during the years 1975 through 1979\* as follows:

<u>Year</u>	<u>Average Return on Sales</u>	<u>Annual Change</u>	<u>Number of Companies Averaged</u>
1979	4.7%	- 4.1%	69
78	4.9	-14.0	67
77	5.7	+18.7	67
76	4.8	+20.0	69
75	4.0	-	67
1975-79 Mean	4.8	-	-

The above figures indicate that the return on sales experienced a declining growth rate pattern in the years 1976/77, and an actual drop in return on sales in 1978 and 1979. A declining growth rate was also recorded for the U.S. manufacturing industry as a whole.

Notice that the mean return on sales for this group of suppliers for the five-year period shown was 4.8 percent. This compares with a 5.3 percent mean return on sales, recorded by all U.S. manufacturing during the same period.\*\*

\*Based on data in Table 5.

\*\*Source: Economic Report of the President (to Congress), Council of Economic Advisers, Jan. 1980 (Table B-83, p. 301).

### 3.7 AVERAGE RETURN ON EQUITY FOR SUPPLIER GROUP

This group of suppliers has collectively produced an average return on stockholders' equity (in current dollars) during the 1975-79 period as shown below:\*

<u>Year</u>	<u>Average Return on Equity</u>	<u>Annual Change</u>	<u>Number of Companies Averaged</u>
1979	14.9%	2.0%	64
78	14.6	1.4	66
77	14.4	4.3	63
76	13.8	24.3	63
75	11.1	-	62
1975-79 Mean	13.8	-	-

These figures show a pattern of increasing return on equity, but at a declining rate. There is also evidence of the beginnings of a potential trend reversal in 1979.

The 13.8 percent mean return on equity for this supplier group over the five-year period considered here compares with 14.3 percent mean figure recorded by all U.S. manufacturing during the same period.\*\*

It should be recognized that the above figures reflect some influence of corporate acquisitions.

### 3.8 CAPITAL EXPENDITURES PER COMPANY FOR SUPPLIER GROUP

As a group, the supplier companies have made the following capital investments per company (in current dollars) during the period 1975-1979:\*\*\*

---

\*Based on data in Table 6.

\*\*Source: Economic Report of the President (to Congress), Council of Economic Advisers, Jan. 1980 (Table B-83, p. 301).

\*\*\*Based on data in Table 7.

<u>Year</u>	<u>Capital Investments Per Company (\$ Millions)</u>	<u>Annual Change</u>	<u>Number of Companies Averaged</u>
1979	125.1	+28.4%	66
78	97.4	+23.1%	67
77	79.1	+19.7%	65
76	66.1	- 3.6%	61
75	68.1	-	60

For 1980, 13 companies in this group have reported intended capital expenditures which averaged \$284.9 million per company. (This figure is probably statistically too high, considering the small number of companies involved.) A more reasonable projection for 1980-81 would be a range of \$150 to \$200 million per company, based on an extrapolation of capital expenditures in the 1975-79 period.

Since the above amounts represent total corporate expenditures and include non-auto related businesses, it can be estimated that about 43 percent of these amounts (the ratio of auto-related sales to corporate consolidated sales) could be allocated to automotive business. Thus, the projected capital expenditures for 1980-81 will average in the range between \$64 and \$86 million per company.

### 3.9 EMPLOYMENT

In the aggregate, the group of suppliers analyzed in this profile employed approximately 2.5 million workers in all their diversified operations in 1979.\* The precise number of employees engaged in automotive-related operations cannot be determined from individual company sources, but the Bureau of Labor Statistics provides the following employment figures for the auto parts industry:\*\*

\*Based on data in Table 8.

\*\*See Table 9.

<u>Year</u>	<u>Average Employment (Thousands)</u>	<u>Annual Change</u>
1980	354.4*	-22.4%
1979	456.5	+ 2.9
1978	443.6	+ 4.5
1977	424.3	+ 6.3
1976	399.0	+13.2
1975	352.5	-

These figures evidence a declining growth rate pattern in employment between 1975 and 1979, and an abrupt drop between 1979 and 1980. In human terms, however, the statistics are more grim when the 1978 fourth quarter's peak employment of 466.9 thousand is compared with the lowest employment of 319.9 thousand in the 1980 third quarter.\*\* The difference in this case represents 147 thousand lost jobs, or a decline of 31.5 percent.

Clearly, the impact of unemployment on communities in which the industry is a major employer is disastrous, and shows in severe economic dislocation and serious personal (psychological and other) problems, affecting also large numbers of local businesses, community services, and local government, as well as the people involved with these.

### 3.10 MANUFACTURING PLANTS - 1979/80

Since no attempt has been made to perform a detailed count of all mechanical component suppliers, no absolute number of their manufacturing plants (and other supporting facilities) can be obtained. However, for the group of 76 major suppliers profiled in this document it was possible to identify the following manu-

\*Averaged over the first three quarters.

\*\*See Table 9.

facturing and/or related facilities in the U.S., Canada, and other foreign countries on several continents:\*

	<u>Number of Facilities</u>	
	<u>All Diversified Operations</u>	<u>Auto-Related Operations</u>
United States	2625	388
Canada	215	81
All Other Countries	<u>1194</u>	<u>338</u>
Total	<u>4034</u>	<u>807</u>

#### 4. INDUSTRY MARKETS

##### 4.1 THE DOMESTIC OEM MARKET

The domestic OEM auto components market is supplied by two sources, U.S. producers and imports. The values of U.S.-produced components have been presented in section 3.1 of this summary. The values of imported components are estimates in current dollars derived in the analysis of section 3.2 of the main text.

	<u>1979 (\$ Billion)</u>	<u>1978 (\$ Billion)</u>	<u>1977 (\$ Billion)</u>
U.S. Components	35.14 (93%)	31.36 (92%)	28.34 (91%)
Imported Components	<u>2.71 ( 7%)</u>	<u>2.80 ( 8%)</u>	<u>2.80 ( 9%)</u>
Total (Current Dollars)	37.85(100%)	34.16(100%)	31.14(100%)
Total in Constant '72 Dollars	22.87	22.46	22.00

During this period, 1977-1979, the domestic OEM market registered a growth of 21.5 percent in current dollars and a 4 percent growth in constant 1972 dollars.

During the same period imports to this market declined 3.2 percent in current dollars and 17.2 percent in constant 1972 dollars. The share of imports also declined from 9 to 7 percent.

\*Based on data in Table 8.

#### 4.2 THE DOMESTIC REPLACEMENT MARKET

The domestic replacement market for auto components has been supplied from domestic and foreign sources, as shown below. The values of U.S.-produced components appear in section 3.1 of this summary, and the values of imported components represent estimated figures in current dollars based on the analysis of section 3.2 of the main text.

	1979 (\$ Billions)	1978 (\$ Billions)	1977 (\$ Billions)
U.S. Components	6.65 (71%)	5.94 (68%)	5.37 (66%)
Imported Components	2.71 (29%)	2.80 (32%)	2.80 (34%)
Total (Current Dollars)	9.36(100%)	8.74(100%)	8.17(100%)
Total in Constant '72 Dollars	5.66	5.74	5.77

During the period, 1977-79, the domestic replacement market grew 14.6 percent in current dollars, which represented actually a decline of about 2 percent in terms of 1972 constant dollars.

During the same period imports to this market declined 3.2 percent in current dollars, or 17.2 percent in terms of 1972 constant dollars. At the same time the share of imports fell from 34 percent to 29 percent.

#### 4.3 THE EXPORT MARKET - OEM AND REPLACEMENT

There is considerable difficulty in differentiating between final destinations of exports of domestic auto mechanical component, the OEM and the replacement markets. For this reason the export figures below are combined totals in current and constant 1972 dollars,\* with the annual change shown in parentheses.

<u>Year</u>	<u>Export in Current Dollars (Billions)</u>	<u>Export in Constant 1972 Dollars (Billions)</u>
1979	7.59 ( +5.4%)	4.59 ( -3.0%)
1978	7.20 (-18.8%)	4.73 (+10.5%)
1977	6.06 ( +3.9%)	4.28 ( -1.6%)
1976	5.83 (+23.5%)	4.35 (+17.2%)
1975	4.72 -	3.71 -

\*Based on data in Table 17.

These figures indicate that exports, valued in current dollars, have been growing over the past few years, albeit in a cyclical pattern, while their value in constant 1972 dollars had shown a decline in 1977 and 1979, and a respectable increase in 1976 and 1978.

Overall, over the 1975-79 time period, the value of auto component exports registered an increase of 60.8 percent in current dollars, and of 23.7 percent in constant 1972 dollars.

Also during this period, exports of mechanical components exceeded imports by the "Net Exports" amounts shown in the following table:\*

<u>Year</u>	<u>Net Exports (Billions)</u>	
	<u>Current Dollars</u>	<u>Constant 1972 Dollars</u>
1979	2.17	1.31
1978	1.60	1.05
1977	0.46	0.32
1976	1.07	0.80
1975	1.58	1.24

## 5. ISSUES AND PROBLEMS - IMPACT OF CHANGES ON THE COMPONENTS INDUSTRY

### 5.1 CHANGES IN DEMAND AND PRODUCT MIX

The greatest impact on the U.S. automotive industry as a whole is the drastic decline in the total domestic demand for vehicles, resulting mainly from the steep rise in energy costs and the cumulative effects of inflation economics in the past several years, as reflected in vehicle prices and financing costs. The industry, which has been geared to an annual passenger car

\*Based on data in Table 13 (Imports) and Table 17 (Exports).

sales rate of 10 to 11 plus million units only a few years ago, has been able to market only a total of 8.95 million vehicles in 1980, of which 6.58 million, or 73.5 percent, were U.S.-made.\*

The energy situation has been also responsible for a change in the product mix demanded by car buyers in recent years, with greater preference for smaller and more fuel-efficient automobiles. This forced domestic auto producers to redesign their products and production facilities to manufacture a series of small, light-weight, fuel-efficient vehicles which meet pollution and safety standards.

This meant, of course, the development of new technologies in the areas of components, electronic controls, materials, manufacturing processes, assembly techniques, and machine tools.

## 5.2 CHANGES IN TECHNOLOGY

The technology for designing and building small cars has existed overseas for many years, as did the manufacturing capability to produce them.

Since many of the automotive component plants overseas are subsidiaries or affiliates of domestic manufacturers, many areas of small car component technology have been available to the U.S. parent companies. The problem has been one of developing an efficient and effective method of transferring this technology to the United States and applying it to domestic situations.

Component and system innovation are generally brought about by new or improved designs (mechanical/electrical/electronic), by development of new materials and/or new applications for existing materials, and sometimes by novel manufacturing processes and tools that permit the creation of a new or improved product not otherwise possible. In most cases of product innovation, it is a combination of these elements.

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\*Imported vehicles in 1980 accounted for 2.37 million units, or 26.5 percent, of which 80 percent were Japanese-made and 20 percent were European and other makes.

As far as automotive components and systems are concerned, some of the technological changes are related to reducing or increasing the size of existing or known components, while other changes are the result of completely new inventions or new application developments.

The examples of technological changes in components/systems of the various types mentioned above are too numerous to cite in this summary. In section 4 of this profile, more than 40 cases of technical innovations that have come on the market in the last 2 years or are awaiting introduction, are reviewed briefly.

It is clear that in order to design, develop, and produce components and systems for the new downsized American car equipped with front-wheel drive, transaxle, constant velocity joints, rack-and-pinion steering, MacPherson suspension, possibly a diesel engine, turbocharging, fuel injection, integrated electronic controls, and many other innovative features, massive capital investment will be required.

### 5.3 CAPITAL REQUIREMENTS

In addition to capital requirements for engineering, research, and development related to technological changes, auto component manufacturers are forced to invest time, money, and personnel into sophisticated planning for future new products, modernizing and building manufacturing facilities, and devising worldwide production and marketing strategies, in an effort to adapt to the changing demands of the prime auto manufacturers.

The need for capital for the component supplier industry can only be estimated parametrically on the basis of limited published data as presented in section 3.8 of this summary. Since a precise count of all suppliers has not been attempted, it is estimated that the average major supplier in the selected group profiled in this document will budget between \$150 million to \$200 million in 1980-81 for all their diversified business requirements. For a statistical group of 100 companies, the total corporate capital requirement may be in the range of \$15 to \$20 billion by 1982.

If the assumption is made that 43 percent\* of total corporate capital expenditures may be allocated to the automotive business, then, by 1982, the capital requirements for these 100 companies would be between 6.5 and 8.6 billion dollars.

#### 5.4 CHANGES IN SUPPLIER STRATEGY AND TACTICS

While domestic component manufacturers have had difficulty coping with the complex problem of sharply declining auto-related sales and profits, foreign competition, capital needs for the re-engineering of their products, and for retooling and modernizing of their production facilities, they have displayed an unusual talent for financial survival, remarkable adaptability to changed conditions, and great flexibility with respect to new products and markets. As a result, the component supplier industry (as represented by the group of selected suppliers profiled in this document) has demonstrated that the automotive sales/demand disaster of 1979-80 may be transformed into an opportunity for progress in the long run.

Opportunity in the component industry will be generated in great measure by the financial situation of the prime auto manufacturers. At present their need for and severe shortage of investment capital to produce the new generations of down-sized, fuel-efficient vehicles will not permit them to allocate much of their resources for component design, development, and production. The auto makers will place great reliance on the total capabilities of the component industry to perform the services which in better times they would have reserved for themselves.

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\*The ratio of auto-related sales to corporate consolidated sales. See section 3.2 of this summary.

Progress in the component industry will be evident in several forms listed below, all leading toward higher sales, better profitability, and more favorable competitive positions.

- Product innovation through the development of new components and systems, and/or through the refinement and adaptation of existing ones.
- Production facilities' modernization through closing old inefficient plants, making obsolete facilities produce new goods more efficiently, and installing new automated equipment to boost productivity.
- Devising and implementing new marketing and manufacturing strategies aimed at increasing exports of U.S.-made auto parts, establishing and/or expanding foreign production facilities which would be capable of supplying U.S. and foreign auto markets, and maximizing the degree of component standardization in line with the "world car" marketing concept.
- Diversifying into non-automotive products, industries, and markets, or into new automotive products and markets. For instance, traditional OEM suppliers might expand into the replacement market, which is generally up when OEM sales are down. Such diversification strategies are aimed at spreading inherent business risks, and flattening the cyclical patterns of sales, profit, and employment.

It must be concluded, therefore, that while the automotive industry as a whole is going through a period of severe strain, component suppliers as a group (at least those profiled in this document) have recognized a number of opportunities which, if properly exploited, would permit them not only to remain solvent, but also to expand their operations domestically and overseas.

If these suppliers had not been heavily diversified in many unrelated products and had not operated in international markets, the probability of their financial survival of the current U.S. automotive disaster would be slim.

The above analysis of the supplier situation is amply supported by the statements of 14 component industry executives,\* as summarized in section 5.1 of the main text.

Foreign component suppliers have also pursued aggressive strategies and tactics in their effort to penetrate American OEM and replacement markets. Three such companies may be cited as a classical example of this international competition: GKN and Lucas, both of the United Kingdom, and Robert Bosch of West Germany. These companies already have manufacturing and/or sales and distribution operations in the U.S. and Canada, or are currently planning expansions, additions, and general intensification of their activities.

#### 5.5 CHANGES IN THE STRUCTURE OF COMPONENT SUPPLIER INDUSTRY

The increased reliance of prime automakers on component suppliers for the design, development, and manufacture of parts (as discussed above) has resulted in a dramatic departure from the traditional self-sufficiency policies of the Big Three. This resulted in a situation where General Motors now purchases at least 50 percent of its parts from outside sources; Ford buys at least 55 percent from outside suppliers; Chrysler obtains at least 67 percent from vendors; and American Motors purchases even higher percentages from outside sources which include the Big Three. Some of the components purchased by the domestic automakers are produced in foreign countries (other than Canada).\*\*

Furthermore, as in Chrysler's case, the greater the auto company's financial difficulties, the more likely it is to depend on their component suppliers in the future, as it is forced to sell parts plants to help generate funds for its survival.

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\*Companies represented: Rockwell International, Borg-Warner, Budd Co., Eaton Corp., Kelsey-Hayes Co., International Packing Lear-Siegler, Motor Wheel, Sheller-Globe, Anderson Co., Schlegel Michigan, TRW, Alcoa, and Dana Corp.

\*\*References are cited in section 5.2 of the main text.

In spite of the depressed sales and production in the auto industry, most major suppliers indicated that the reduction in big car component sales has been offset by a significant increase in the demand for small car parts.\*

Other automotive industry surveys\*\* indicate that:

- U.S. automakers will increase their component purchases from overseas sources to 10 percent of the total by 1985, and 15 percent of the total by 1990.
- U.S. component manufacturers will experience a 10 percent gain in exports of parts to foreign OEMs in the 80s.
- Diversification into non-automotive businesses will continue, and will account for 35 percent of new investments during 1980-85, and 40 percent during 1985-1990.
- Significant advances will be made in cost reduction and productivity improvements in the 1980s, accompanied by expansion of production capacity for existing and new products.
- The number of U.S. automotive component manufacturers will decrease in the 80s (in the majority's opinion), which would reflect the continuation of a trend that started in the early 70s. This phenomenon is discussed below.

A very conspicuous element in the history of the auto components industry in the last 10 years is the fact that the independent medium-size supplier company has now disappeared from the scene. In some cases the old name may still be around, but the original identity has become submerged in the corporate organization of a new conglomerate parent company.

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\*As reported in "Business Week," Sept. 24, 1979.

\*\*As reported in section 5.3 of the main text.

While some of these highly diversified, multi-national, conglomerate parent companies have been traditionally in the auto components business (namely, Bendix, Eaton, Dana, Borg-Warner, etc.); others have branched out into the automotive field only in the last decade (namely ITT, Gulf and Western, Illinois Central, FMC, etc.).

To illustrate this trend, several examples are cited below:

- Bendix Corp. - now owns Toledo Stamping (metal components), Fram (filters), Autolite (batteries, spark plugs, electrical/ignition components)
- American Car & Foundry (ACF) Industries - now owns Carter Carburetor Company and Carter Automotive Company (miscellaneous components)
- Arvin Industries - now owns Calspan Corp. (a spin-off of Cornell Aeronautical Laboratories)
- Borg-Warner Corp. - now owns Morse Chain (engine components) and Borg & Beck (driveline components)
- Thyssen, A.G. (West Germany) - now owns Budd Company (wheels, frame and brake components)
- Champion Spark Plug Company - now owns the Anderson Company (windshield wiper systems) and DeVilbiss (automotive painting systems)
- Colt Industries - now owns Holley Carburetor and Garlock Company (seals and gaskets)
- Dana Corp. - now owns Weatherhead (hydraulic systems components), Perfect Circle (piston rings, engine components), Wix (filters)
- Eaton Corp. - now owns Yale & Towne (miscellaneous hardware) and Cutler-Hammer (electrical components)
- Ex-Cell-O - now owns McCord (radiators, oil coolers) Chicago Gear and Cadillac Gage (miscellaneous components)

- Fruehauf - now owns Kelsey-Hayes (wheels, brake and frame components)
- Illinois Central (IC) - originally a railroad, now owns Midas Mufflers
- United Technologies - now owns Ambac Industries and its American Bosch Division (engine, other mechanical and electrical components). Their Hamilton Standard division markets automotive test and diagnostic equipment. Their Inmont Corp. is a major supplier of automotive paint.

In addition to the group of medium-size suppliers (probably numbering in the hundreds), the automotive manufacturers have been historically served by literally thousands of small component suppliers, who may have originally started their businesses in their garages during and after World War II, with family members as the only employees. As the automotive industry grew in the 50s and 60s, some of these small enterprises grew in size and number. Some managed to become direct OEM suppliers, while many become suppliers to major OEM vendors, or to these vendors' suppliers. Most of these companies are either privately owned or are closely held family corporations, and for these reasons financial and product data for these companies is not published.

Some small companies that became direct suppliers to the Big Four deserve special mention. These are vendors that traditionally have provided technical services and components for experimental and prototype vehicle work, which has always been a high-dollar-value segment of the OEM's business.

The small suppliers as a group have fared the worst during the current slump in the automotive business. Most of them suffered heavy financial losses, and many went out of business or sold out, thus contributing to the unemployment statistics.

## 6. INTERNATIONAL COMPETITION

### 6.1 THE EUROPEAN AUTO PARTS INDUSTRY

In 1973 Europe produced 38 percent of the world's automobiles, but by 1979 that number shrank to 34 percent\* and, by all indications, continues to decline. This is due to the penetration of Japanese imports into European markets. If the trend continues, Europe will become a net importer of automobiles.\*\*

This situation has forced auto parts suppliers to change their national marketing strategy to a European one with a worldwide business orientation, as auto production has expanded into countries which have been traditionally export markets.

As in the case of U.S. suppliers, European auto parts manufacturers must now constantly search for new ideas, methods, and materials which would make their products more efficient in performance, more competitive in price, and require less or simpler maintenance and service. In Europe, unlike the U.S., the domain of the component manufacturer is being encroached upon by the prime automakers. Thus, Ford of Europe now produces its own carburetors and spark plugs for its "world car" engines, while vendors may be supplying that car's aluminum engine head. This reversal of traditional roles in component manufacturing illustrates the fact that suppliers must now work harder to provide products of higher intrinsic value to OEMs, while the latter pursue a policy of forward integration which assures them original equipment sales, as well as the aftermarket business.

Likewise, General Motors, while unwilling to make investments in component manufacturing facilities in the U.S., has invested \$2.4 billion in five new parts plants in Europe, and is expanding an existing one in Ireland. Similar investments are being made in Singapore and elsewhere.

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\*In 1979, estimated North American and Japanese production of the world's automobiles was 36 and 26 percent, respectively.

\*\*References are cited in section 5.4 of the main text.

As American automakers build more and more small cars of European size and design, the European component suppliers see a good opportunity to expand their business into North America. Thus German component manufacturers stand to benefit from the GM world car built by Opel, French suppliers will undoubtedly benefit from the Renault small car built by AMC, as do a variety of other international parts manufacturers who supply Ford's Fiesta and Escort/Lynx assembly plants in the U.S.

The basic attraction of foreign parts is their lower cost, resulting from lower wage rates in Europe and from economies of scale in production for markets on several continents. Thus, foreign suppliers experience a better return on investment, and are able to afford updated and efficient facilities, larger capacities, and better product quality, as well as better product availability.

On the negative side, dependence on foreign sources may be affected by domestic dock strikes, currency fluctuations, and political or labor unrest in the exporting foreign country.

Some European parts suppliers have seen better opportunities in establishing beachheads in the United States. These take the form of manufacturing and/or assembly facilities, warehouses, and sales and distribution operations. Companies, such as Robert Bosch (West Germany), Lucas and GKN (both of the United Kingdom) have been cited as examples elsewhere in this summary.

In addition to these major European manufacturers, the following companies are also active in the United States:

- Dunlop (U.K.) producing tires in Buffalo NY
- Mahle (W. Germany) producing pistons in Morristown TN
- Kieper (W. Germany) producing window cranks in Battle Creek MI
- Mann-Hummel (W. Germany) producing filters in Battle Creek MI.

In the last 3 years 40 foreign manufacturers (European and Japanese) are estimated to have built 22 plants, made 15 acquisitions, formed joint ventures, and set up sales/distribution operations in the U.S. to serve the American automotive after-market. The replacement market's size is, by some estimates,\* \$17 billion annually, and growing at a rate of 10 to 15 percent per year.

The OEM market is, of course, also a major target of European component manufacturers. According to some estimates\*\* nearly \$5 billion worth of auto parts per year are imported by American OEMs for their vehicles. This represents about 10 percent of the total, and is expected to increase to 15 percent of the total.

On the whole, the European auto parts industry has seen a slowdown in its growth rate in 1980. High interest rates combined with a decrease in corporate profits have depressed investments at a time of declining demand for consumer and industrial goods. British, German, French, and Italian auto industries have experienced varying degrees of economic downturn in 1980, some of the reasons being the penetration of Japanese products into European markets.

## 6.2 THE JAPANESE AUTO PARTS INDUSTRY\*\*\*

While Japanese-made small cars have made deep penetrations into the U.S. car market, their auto components industry has been just as aggressive in capitalizing on the opportunities so created. Japanese component manufacturers see their markets in a much broader scope than their European counterparts do. They see opportunities in supplying Japanese-made components to OEMs in Japan, North America, Europe and other countries, as well as replacement markets worldwide. They also recognize the opportunities in supplying U.S.-made components to the same OEM and replacement markets worldwide.

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\*"Forbes," Oct. 13, 1980 (p. 42-43).

\*\*Financial Times," Dec. 31, 1979.

\*\*\*References are cited in section 5.5 of the main text.

There are more than 400 Japanese companies currently in the business of producing automotive parts, accessories, and production machinery/tools/equipment. About 50 of these have auto parts operations in the United States, according to Japan Auto Parts Industries Association (JAPIA).

About 80 percent of JAPIA members' production is used by OEM, with 20 percent serving the aftermarket. The Japanese automakers exercise appreciable control over their parts suppliers by providing financing to the latter and by tying them up in long-term supply agreements. Under this so-called "kanban" system, the suppliers ship auto parts only on demand, in effect providing a free warehousing service for the automakers. However, this also gives the supplier an opportunity to exercise some leverage with his OEM customer.

This symbiotic arrangement between automaker and supplier, coupled with the fact that most supplier operations in Japan are physically located on or near the premises of their OEM customers' facilities, makes it very difficult for a foreign supplier to penetrate the Japanese market. Any such penetration into that market would inevitably take place through a "joint venture" arrangement with an established Japanese supplier, and would therefore, represent another "captive supplier" situation.

As in the case of European parts suppliers, Japanese component manufacturers have followed their prime OEM customers to the U.S., and it is clear that American automakers have been targeted for penetration. As a result of the trend toward the internationalization of the auto parts industry, there are currently more than 1000 licensing agreements between Japanese auto parts manufacturers and foreign parts producers; about 600 of these are with U.S. partners such as Eaton Corp., Borg-Warner, TRW and others, who earn royalties from licenses granted to Japanese companies.

While it has been historically almost impossible for non-Japanese companies to establish non-affiliated manufacturing operations in Japan, it has been very easy for Japanese companies to establish manufacturing beachheads in the United States.

Some of the 50 such operations referred to above, either ongoing or planned, may be mentioned:

- NGK Spark Plug Co. Ltd. operates a plant in Battle Creek MI
- Nippon Cable Systems operates a plant in Battle Creek MI
- Stanley Electric Co. Ltd., which makes headlights and wiring harnesses, operates a plant in Georgia
- Nippon Oil Seal Industry, Ltd. operates a plant in Pennsylvania
- Yuasa Battery Co. Ltd. operates a plant in Pennsylvania
- Kinugawa Rubber Industry Co. Ltd. (an affiliate of Nissan) plans to start operations in Michigan
- Nihon Radiator Co. Ltd (another affiliate of Nissan) plans operations in Michigan
- Nippondenso Co. Ltd, maker of ignition systems and other electrical components, has purchased land in Battle Creek MI for a planned manufacturing facility
- Izumi Motor Co. Ltd., maker of steering wheels is planning to establish operations in the U.S.
- Showa Mfg. Co. Ltd, maker of shock absorbers, is planning to start manufacturing operations in the U.S.

According to JAPIA, Japan's annual exports of auto parts is about \$3 billion, of which \$1.2 billion is to the United States. By comparison, only \$120 million worth of auto parts are exported annually to Japan by U.S. manufacturers. This heavy imbalance in auto parts trade between the two partners has led to a great deal of dissatisfaction among suppliers in this country, culminating in a Japanese trade mission to the U.S. in September, 1980. After a two-week series of discussions, the trade mission, composed primarily of Japanese car manufacturers, promised to increase their imports of U.S.-made auto parts to \$300 million annually. The talks also demonstrated that U.S. dealers of

Japanese makes have a strong loyalty to their foreign principals and, as a rule, do not carry American-made replacement parts.

The perception of Japanese auto parts manufacturers (as well as their European counterparts) is that now (1980-81) is a good time to invest heavily in manufacturing facilities in the U.S., because:

- The currency exchange rates are favorable
- Credit and money in this country is very tight, making it difficult for U.S. companies to get capital for expansion
- The trend toward a "world car" is gaining momentum and is internationalizing the entire automotive component industry
- The demonstrated reluctance of American auto makers to expand -- or even to maintain current levels of -- their in-house production of components.

It may be stated in conclusion, that the marriage of American technology and know-how with Japanese and European manufacturing efficiency will no doubt create better automotive products world-wide, albeit after a difficult period of adjustment.

## ENGINEERED MECHANICAL COMPONENTS AND SYSTEMS

### 1. DEFINITION OF THE INDUSTRY AND CORPORATE BUSINESS DATA

#### 1.1 BROAD INDUSTRY DEFINITION

The automotive mechanical components supplier industry is traditionally defined very broadly to include the producers of finished and semi-finished products which constitute components, assemblies and whole systems used by motor vehicle manufacturers and assemblers. Such products may be categorized as:

- Engineered mechanical components, assemblies, or systems
- Parts made of rubber, plastic, glass, or other materials
- Castings, forgings, stampings, sintered parts, welded assemblies, etc.
- Fasteners, adhesives, coatings, etc.
- Hydraulic fluids, coolants, lubricants; etc.
- Production machinery and equipment
- Quality control and testing machinery and equipment
- Non-production machinery and equipment (such as used in tool rooms, for pollution control, etc.)

Many, if not most, of the engineered mechanical components/assemblies consist of parts that fall into more than one of the above categories.

The scope of profiling this broadly defined industry is clearly too wide for easy treatment. For this reason, the present document will be limited to profiling the industry segment which supplies engineered mechanical components and assemblies, while industries which supply tires, castings, forgings, and machine tools are treated in separate profiles.

## 1.2 ENGINEERED MECHANICAL COMPONENTS/ASSEMBLIES - INDUSTRY SEGMENT DEFINITION

This industry segment comprises primarily the independent\* producers of engineered mechanical components and systems\*\* that are supplied as assembly parts to the prime automotive manufacturers.

The products manufactured by this industry segment may be grouped in one or more of the following categories:

- Engine Components
  - Internal (bearings, seals, valves, camshafts, etc.)
  - External (carburetors, turbochargers, radiators, fans, etc.)
- Drive Train Components (transmissions, axles, clutches, driveshafts, etc.)
- Brake System Components
- Steering and Suspension Components
- Structural Components (frames, bumpers, etc.)
- Safety and Comfort Components (seating and belts, air conditioning, etc.)

## 1.3 INDUSTRY STATISTICS

The exact number of automotive suppliers at any given time is very difficult to determine due to a diversity of classification and counting methods, resulting in overlapping product categories, double counts of corporate divisions and parent companies, as well as inevitable omissions. For instance, the current Chilton's OEM Suppliers' Guide\*\*\* lists 466 entries in all product categories, and includes component manufacturing

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\*Not owned or controlled by the prime automotive manufacturers.

\*\*Exclusive of casting and forgings, which are covered in a separate profile.

\*\*\*Automotive Industries, June 1980, pp. 152-156.

divisions of the prime automakers, as well as individual product divisions of diversified corporations. On the other hand, Ward's Automotive Yearbook (1980) lists about 560 OEM suppliers in all categories, counting individual product divisions of conglomerates and component-producing divisions of the auto manufacturers.

A narrower list of OEM suppliers of engineered mechanical components, as defined in section 1.2, has been derived from the Chilton and Ward directories, and is presented in Table 1\*, together with 1979 sales data on each company (wherever available).

The group of suppliers listed in Table 1 consists of 76 companies, most of which have multiple automotive product divisions. It is estimated, however, that this list understates the total number of OEM suppliers in the categories under consideration by some 30 to 50 companies, mostly small and privately owned, for which no financial data are published.

Indeed, Table 1 includes four companies\*\* which are important factors in the auto supplier industry, but due to their private ownerships, no financial data for them are available.

The suppliers listed in Table 1, as a group, are representative of the industry under consideration. Their collective corporate statistics will be used to describe the industry in the following parameters, based on data presented in Tables 1 through 9.

- Sales Data

- Industrywide - All U.S. Producers

On an industrywide basis, sales of automotive mechanical components\*\*\* by all US producers have been analyzed in section 3.1. The figures for the three-year period of 1977 through 1979 are given below, with the percent change from the previous year shown in parentheses:

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\*See section 7, which contains all tables.

\*\*The Budd Co., Houdaille Industries, Metal and Automotive Industries, Gates Rubber Co.

\*\*\*As opposed to sales of all "auto-related" components.

	<u>1979</u>	<u>1978</u>	<u>1977</u>
Total Sales of Automotive Mechanical Components by U.S. Producers (Billion Dollars):	49.38 (+11.0%)	44.50 (+11.9%)	39.77
Sales to Domestic OEM Markets:	35.14 (+12.0%)	31.36 (10.7%)	28.34
Sales to Domestic Replacement Markets:	6.65 (+11.9%)	5.94 (+10.6%)	5.37
Export Sales (All Markets):	7.59 (+ 5.4%)	7.20 (+18.8%)	6.06
	(See Tables 14, 15, and 17.)		

● Worldwide Consolidated Sales Data for Selected Group of Suppliers

With the exception of the four privately owned companies referred to above, the supplier group (72 companies) listed in Table 1 have collectively posted consolidated worldwide sales as follows:

	<u>1979</u>	<u>1978</u>
Consolidated Sales (\$ Billion)	148.9	126.9
Increase '78 to '79	17.3%	—
Auto-Related Sales (\$ Billion)	63.6	56.2
Increase '78 to '79	13.2%	—
Percent of Auto-Related to Consolidated Sales	42.7%	44.3%
	(See Table 1)	(See Table 2)

In the absence of complete sales data for prior years for each of the 72 companies being analyzed, the average sales per company may be regarded as a useful statistical parameter. Thus, Average Consolidated Sales Per Company for the last five years are:

<u>Year</u>	<u>Avg. Consolidated Sales/Company (\$ Millions)</u>	<u>Increase Over Prior Year</u>	<u>Number of Companies Averaged</u>	<u>Ref.</u>
1979	2,068.0	17.3%	72	Table 1
1978	1,762.1	14.1	72	Table 2
1977	1,544.3	14.3	70	Table 2
1976	1,350.4	12.3	70	Table 2
1975	1,202.9	—	69	Table 2

● Net Income Data

As a group, the supplier companies have had an Average Net Income Per Company in the last five years as shown (see Table 3):

<u>Year</u>	<u>Avg. Net Income/Company (\$ Million)</u>	<u>Increase Over Prior Year</u>	<u>Number of Companies Averaged</u>
1979	89.5	22.1%	69
1978	73.3	12.0	70
1977	65.4	16.4	69
1976	56.2	28.4	69
1975	43.9	—	68

● Earnings Per Share

The supplier companies as a group have posted Average Earnings Per Share in the last five years as follows (see Table 4):

<u>Year</u>	<u>Avg. Earnings Per Share (\$)</u>	<u>Increase Over Prior Year</u>	<u>Number of Companies Averaged</u>
1979	4.54	12.9%	66
1978	4.02	2.8	69
1977	3.91	10.1	69
1976	3.55	26.8	69
1975	2.80	—	68

- Return on Sales\*

The group of supplier companies have generated collectively the following Average Return on Sales over the past five years (see Table 5):

<u>Year</u>	<u>Avg. Return on Sales</u>	<u>Variation from Prior Year</u>	<u>Number of Companies Averaged</u>
1979	4.7%	-4.1%	69
1978	4.9%	-14.0%	67
1977	5.7%	+18.7%	67
1976	4.8%	+20.0%	69
1975	4.0%	—	67

- Return on Equity

The supplier companies as a group have produced an Average Returns on Equity over the past five years, as listed below (see Table 6):

<u>Year</u>	<u>Average Return on Equity</u>	<u>Variation From Prior Year</u>	<u>Number of Companies Averaged</u>
1979	14.9%	2.0%	64
1978	14.6%	1.4%	66
1977	14.4%	4.3%	63
1976	13.8%	24.3%	63
1975	11.1%	—	62

- Capital Expenditures

As a group, the supplier companies have incurred the following Capital Expenditures per Company over the last five years. Projected 1980 expenditures have been included (see Table 7):

\*Ratio of net income to sales.

<u>Year</u>	<u>Capital Expenditures Per Company (\$ millions)</u>	<u>Variation from Prior Year</u>	<u>Number of Companies Averaged</u>
1980	284.9*	—	13
1979	125.1	+28.4%	66
1978	97.4	+23.1%	67
1977	79.1	+19.7%	65
1976	66.1	- 3.6%	61
1975	68.1	—	60

● Employment

In the aggregate, the 72 supplier companies listed in Table 1 employed approximately 2.5 million persons in all their diversified operations in 1979 (see Table 8). The precise number of employees engaged in this group's auto-related operations could not be determined.

Labor Statistics (Employment & Earnings) indicates that the "automotive parts" industry employed 456,500 persons in 1979, and an average of 354,400 in the first three quarters of 1980 -- a decline of 22.4 percent from 1979 (see Table 9).

Historical employment figures for the automotive parts industry show the following relationships (see Table 9):

<u>Year</u>	<u>Employment Auto Parts</u>	<u>Variation from Prior Year</u>
1980***	354,400 (Avg.)	-22.4%
1979	456,500	+ 2.9
1978	443,600	+ 4.5
1977	424,300	+ 6.3
1976	399,000	+ 6.3
1975	352,500	+13.2

\*Based on a small number of companies, and therefore of questionable statistical validity.

\*\*"Automotive Parts" is a term used by the Bureau of Labor Statistics.

\*\*\*Averaged over the first three quarters.

However, comparing peak employment of 446.9 thousand in the fourth quarter of 1978 with the lowest employment of 319.9 thousand in the third quarter of 1980, the number of jobs lost during this period was 147 thousand, or a decline of 31.5 percent.

- Manufacturing Plants (1979/1980)

During the period of 1979-80 the supplier companies as a group operated a total of 2,625 plants in the U.S. covering all their diversified operations. Of these, it was possible to identify only 388 plants engaged in automotive product manufacturing, or in support of such activities. The actual number of plants involved in auto-related manufacturing is known to be much larger, but will have to be determined in a future investigation (see Table 8).

These companies as a group operated a total of 215 plants in Canada, covering all diversified operations. It was possible to identify 81 plants of this total which are engaged in automotive product manufacturing (see Table 8), but the actual number of such plants is known to be higher.

These companies, as a group, also operated a total of 1194 plants in other countries throughout the world. Again, only 338 of these could be identified as carrying on auto-related manufacturing, while the actual number of such plants is known to be higher.

Several observations regarding the statistical data presented above should be made.

Figures reflecting automotive-related sales are seldom disaggregated from other products' sales data in corporate reporting systems. This accounts for the fact that automotive sales figures were not available in many instances, and therefore could not be included in Tables 1 and 2.

The same observation can be made regarding financial data in Tables 3 through 6, capital expenditure data in Table 7, and most manufacturing plant information in Table 8.

The problem is further complicated by the fact that all auto-related data obtained from annual corporate reports, 10-Ks, business and trade publications, or by personal contact represent information on a composite business conducted by the suppliers in four distinct types of markets:

- OEM, domestic
- OEM, foreign
- Aftermarket, domestic
- Aftermarket, foreign

Futhermore, the composite information covers components and systems used in passenger cars, vans, utility vehicles, light and heavy trucks, buses, tractors and agricultural vehicles, off-the-road (construction, logging etc.) vehicles, and all manner of other automotive products, including all kinds of military vehicles. The data does not discriminate between mechanical, electrical, and electronic components, nor does it discriminate between types of mechanical components such as castings, forgings, or products containing parts made of rubber, plastic, or other materials.



## 2. INDUSTRY STRUCTURE

Almost all suppliers listed in Table 1 are organized as corporations, and, with a few exceptions, they are multi-divisional and multi-national. The majority of these companies serve primarily the automotive, aircraft, and the general transportation industries. Other suppliers, such as ITT and G&W, are diversified conglomerates, serving many other unrelated markets.

While many of the corporations listed in Table 1 operate subsidiaries overseas, a few are owned by foreign companies, or are joint ventures. Ownership details are provided in the profiles of individual companies presented below.

Of the suppliers who serve automotive OEMs exclusively, only a few specialize in a single product line (such as bearings or gaskets), or in a single family of product lines (such as drivetrain components). For the most part these suppliers are diversified into several product categories, as indicated in Table 1. Thus, the manufacturers of constant velocity joints are also the producers of axles, propeller shafts, differentials, U-joints, etc. Similarly, producers of turbochargers are also the manufacturers of carburetors, fuel injection systems, emission control components, and related items.

The products supplied by the companies listed in Tables 1 through 8 have been grouped into six categories shown below. The number of suppliers in each of these product categories is also identified:

- Brakes, Components and Assemblies (Code B) -- 31 suppliers
- Engines, Components and Assemblies (Code E) -- 48 suppliers
- Drivetrain, Components and Assemblies (Code D) -- 28 suppliers

- Steering/Suspension, Components and Assemblies (Code S)--  
33 suppliers
- Safety and Comfort Components and Assemblies (Code C) --  
27 suppliers
- Structural Members and Assemblies (Code F) -- 32  
suppliers.

This breakdown illustrates the degree of "intertwining" that exists among the hundreds of products in each of the six categories and the 76 suppliers listed in Table 1.

In the following pages, an attempt has been made to present as many corporate profiles of individual companies listed in the tables as were readily available from various publications. The emphasis in these profiles has been placed on product lineup and organizational structure.

Other information on the companies under study is presented in a series of tables as follows:

Table 2 - Sales History, 1975-1978

Table 3 - Net Earnings, 1975-1979

Table 4 - Earnings Per Share, 1975-1979

Table 5 - Return on Sales (Net Income/Sales), 1975-1979

Table 6 - Return on Equity, 1975-1979

Table 7 - Capital Expenditures, 1975-1980/81

Table 8 - Employment and Plants (U.S. and Foreign)

Table 9 - Historical Employment Statistics for Motor  
Vehicles and Parts Industry

● ACF INDUSTRIES (CARTER CARBURETOR)\*

Incorporated in New Jersey, Feb. 20, 1899, as American Car and Foundry Co., a consolidation of 13 companies engaged in the manufacture of passenger and freight railway cars, car wheels,

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\* Source: Standard & Poor's, 1980. All information from this source is used with permission.

malleable and grey-iron castings, axles, journal bearings, etc. Present title adopted June 1, 1954.

In September, 1969, acquired for cash the B.S. & B. Controls product line of Black, Sivalls & Bryson, Inc., which included air regulators, pneumatic relays and diaphragm actuators for utilities and for the chemical and petrochemical processing and oil and gas production industries.

Company operates through the following divisions, groups and subsidiaries:

Amcar Division builds railroad freight and tank cars, and produces railroad car components, piggy-back trailer hitches, ingot mold and mine cars, industrial size mixing bowls, and tank car valves.

Shippers Car Line Division leases, sells, and maintains special purpose railroad freight and tank cars for industrial customers.

Carter Carburetor Division, St Louis, MO, and Southfield, MI makes and sells automotive fuel systems (carburetors, fuel pumps, fuel filters, etc.), air conditioning components, water pumps, oil pressure switches, fluid systems valves, fan clutches, thermostats, and blower motors.

W-K-M Valve Group makes valves, wellheads, actuators, and safety systems for oil and natural gas production and distribution, and numerous other industries.

Polymer Corp., wholly owned, produces engineered plastic shapes and parts, hose and coating powders.

SUBSIDIARIES - wholly owned

Olivette First Corp.

St. George First Redevelopment Corp.

Polymer Corp.

Gay Hose Corp.

Harbison Industrial Products, Inc.

Carter-Sanford Corp.

Carter-Hickory Corp.

Shippers Car Line Inc.

Corning Distribution Co.,

Company has other subsidiaries with the names Carter, SHPX, Polypenco, W-K-M or ACF in their titles

#### AFFILIATES

Nippon Polypenco Ltd. (45 percent owned)

Polydrop S.A. (50 percent owned)

Polypenco (Pty.) Ltd. (50 percent owned)

Arrendadora de Carros de Ferrocarril de Atlantico S.A.  
(45 percent owned)

PROPERTY - Principal plants are in 14 states, Canada, and Scotland (see Table 8 for plant locations).

#### ● ALCOA\*

The company, based in Pittsburgh, PA, was incorporated in Pennsylvania Sept. 18, 1888, as The Pittsburgh Reduction Co. to acquire original patents covering electrolysis process for reduction of aluminum from ore commonly known as bauxite. Present title adopted Jan. 1, 1907. Upon merger with Canadian Mfg. and Development Co. on July 29, 1925, reincorporated in Pennsylvania under the same name.

Nov. 1, 1970, sold \$35,000,000 home improvement financing portfolio of wholly owned Alcoa Credit Co. to General Electric Credit Co.

In Sept. 1971, acquired Control Products Co., Inc. maker of electrical control and instrumentation systems.

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\* Source: Standard & Poor's, 1980  
"Automotive Industries," June 1980

In Nov. 1971, acquired Buckeye Molding Co., New Vienna, Ohio, maker of resealable plastic container lids.

Jan. 26, 1972, acquired remaining 49 percent interest in Alcas Cutlery Corp.

Company, with its subsidiaries, is an integrated producer of aluminum products. Its principal operations include the mining and processing of bauxite, refining of alumina from bauxite, smelting of aluminum from alumina, processing of aluminum and aluminum alloys into mill products and finished products; and recycling of used aluminum products. Principal products include primary aluminum, light-gauge sheet, sheet, plate, foil, extrusion, wire, rod and bar, tubing, permanent mold and premium castings, forgings, powder, pigments and paste, fasteners, ingot, as well as other mill products, such as screw machine products. WearEver cooking utensils, siding, windows and other building products, electrical conductor and accessories, architectural products, welding, brazing, and soldering products. Cutco cutlery, closures, highway products, and certain chemicals, including aluminas, aluminum fluoride, calcium aluminate cement, gallium, and gallium compounds.

Alcoa's Fastener Division is located in Lancaster, PA. It is a major manufacturer of aluminum fastener and specialty parts. Its major products are a complete line of aluminum machine screws, headed hex bolts, cap screws, nuts, wood screws, washers, and a range of self-tapping screws that can be either self-drilling or self-piercing.

Additionally, Alcoa has been producing a variety of complete screw machine parts since 1927. The Fastener Division's 83-acre Lancaster, PA Works facility produces these parts for many industries, including the automotive, aerospace, building products, machinery/equipment, and ordnance industries.

Aluminum Company of America is also largest supplier of aluminum mill products to the automotive industry.

In 1980, road proven automotive applications emerged in greater numbers on additional models. Chrome-plated aluminum bumpers, formed from Alcoa aluminum sheet, made their debut on 1979 model cars and are being used by more manufacturers in 1980.

Alcoa's 6009 and 6010 body sheet alloys are making similar inroads. The alloys permit significant down-gauging and, when properly heat-treated, are as dent-resistant as draw quality steel, at comparable or thinner gages. They are easier to form and join than previous aluminum body sheet alloys and their scrap value helps make them economically attractive.

At the Alcoa Technical Center, the world's most extensive facilities for aluminum research and development, Alcoa scientists and engineers work closely with the automotive community to adapt aluminum to the specific material performance needs of the automotive industry. The one-piece, chrome-plated, aluminum bumper and the 6000 series of body sheet alloys are just two of the many new developments to come out of Alcoa's Technical Center.

Other noteworthy Alcoa developments are forged aluminum car and truck wheels produced by its Wheel Products Division in Cleveland, OH.

Other corporate activities include real estate and housing, shipping, engineering and construction services, and fabrication of products from other metals such as copper wire, plastic, titanium, and steel and magnesium forgings.

MAJOR CONSOLIDATED SUBSIDIARIES - wholly owned

Companhia DeMineracao Santarem-Comisa

Buckeye Molding Co.

Lincoln Manufacturing Co., Inc.

Pep Industries, Inc.

Stolle Corp. (The)

H.C. Products Co.  
 Neumin Production Co.  
 Yadkin, Inc.  
 American Powdered Metals Co.  
 Northwest Alloys, Inc.  
 Alcas Cutlery Corp.  
 Alcomex, S.A.  
 Adam Metal Supply Inc.  
 Tifton Aluminum Co., Inc.  
 Rea Magnet Wire Co., Inc.  
 Lib Ore Steamship Co., Inc.  
 Suriname Aluminum Co.  
 Tapoco, Inc.  
 Victoria Aluminum Co.  
 WearEver Aluminum, Inc.

Company also has numerous other major subsidiaries, many with the name Alcoa in their titles.

MAJOR AFFILIATES;	Percent Owned By Co. or Parent
Aluminio, S.A. de C.V.	44
Companhia Mineira de Aluminio-Alcominas	50
Halco (Mining) Inc.	27
Furukawa Aluminum Co. Ltd	33

PROPERTY - Co. and its consolidated subsidiaries operate about 50 plants worldwide. Alumina and chemical production facilities are in AL, AR, FL, and TX; also in Australia (2), Brazil, Jamaica, Suriname (2), Japan and the Netherlands.

Smelting plants are in Ind., NY, NC, Tenn., Tex. (3), and Wash. (2); also in Australia, Brazil, Mexico, Norway (2), Suriname, and the U.K. Dec. 31, 1979. Co's. domestic rated primary aluminum capacity was 1,700,000 short tons.

Aluminum fabricating plants are owned at 24 domestic sites and owned or leased in Australia, France, Mexico, Wales, the Netherlands, U.K., and W. Germany (2).

Bauxite, alumina, and other commodities are transported to the U.S. for company and others in vessels owned or chartered by subsidiaries. Company also conducts general cargo shipping from U.S. ports to Caribbean and South America, and Bulk cargo shipping.

Other properties include a magnesium plant in Wash.; power generation facilities in the U.S. (5), Australia and Suriname, and the 31-story Alcoa Bldg. owned in Pittsburgh (see Table 8 for plant locations).

● THE ALLEN GROUP\*

The company, based in Melville, NY was incorporated in Delaware Feb. 3, 1969, as Allen Electric & Equipment Co., a wholly owned subsidiary of the concern with the same name, and on May 2, 1969, merged parent, share-for-share. Present title adopted May 5, 1972. Former parent was incorporated in Michigan Jan 13, 1928.

Early in 1970, acquired G & O Corp. Feb. 13, 1970, acquired Strangi Mfg. Co.

Apr. 1, 1970, acquired A. Rohe GmbH, West Germany, producer of car wash equipment.

In 1971, purchased Valley Grey Iron Foundry Co., Carvalette Services Africa (Pty.) Ltd. (51 percent interest). Harlem Engineering Ltd., G. Ochs Geraete-und-Bau Finanz GmbH, Romeico GmbH, Evans Avenue Car Wash Equipment Ltd. (51 percent interest). A Rohe K.G., and A. Rohe GmbH.

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\* Source: Standard & Poor's, 1980.

In Oct., 1974, acquired the minority interests in 86 percent owned Orion Industries, Inc.

Company and subsidiaries make automotive accessories (26.3 percent of net sales and 23.4 percent of pretax operating income in 1979), mobile communications products (5.4 percent and 7.2 percent deficit), automotive test and service products (52.8 percent and 65.4 percent), and truck products (15.5 percent and 18.4 percent). In 1979, international operations accounted for 30.2 percent of net sales and 26.8 percent of pretax operating income.

Automotive accessories include convenience and customizing items, replacement parts, and automotive tools and instruments.

Mobile communications products include citizen band and professional antennas and antenna products for the mobile communications market.

Automotive test and service products include automotive analyzing and testing equipment for use in servicing automotive equipment; automotive testing and production equipment for use by automobile, truck, and farm equipment manufacturers; rubber-based products for automotive and industrial markets; car and truck wash equipment; and automotive lifts, garage tools, and replacement radiators for automobiles.

Truck products consist of truck cabs and bodies; specialized interiors installed in special utility trucks and light vans; custom sheet metal fabrications; and heavy duty radiators and specialty heat exchangers for trucks and off-highway equipment.

PRINCIPAL SUBSIDIARIES - wholly owned

Crownfab of Canada Ltd.

California Car Wash Systems (Canada) Ltd.

Harlem Engineering Ltd.

Rhoe Mfg. Co. Ltd.

National Rubber Co. Ltd.

Orion Industries, Inc.

Cal Custom Accessories, Inc.

Pathfinder Auto Lamp Co.

A. Rohe GmbH

G. Ochs Gerate-und Bau-Finanz GmbH (non-consolidated)

Unicar Pty. Ltd.

A. Rohe Ges. mbH

Societe de Promotion et d'Exploitation Cal

276017 Ont. Ltd.

Canadian National Rubber Co.

Company has other subsidiaries with the names Allen, Allen Group, or Orion in their titles.

PROPERTY - Co. has 81 plants and other operating facilities in 18 states, P.R. and 9 foreign countries. Principal domestic facilities are in OH, Southern CA, IL, MI, CT, and P.R. Principal foreign facilities are in W. Germany and Ont., Canada (see Table 8).

● AMSTED INDUSTRIES, INC.\*

The company, based in Chicago, IL, was incorporated in Delaware in 1967 as Delam Inc. as a subsidiary of Amsted Industries Inc. which it merged Jan. 31, 1968 under the name Amsted Industries Inc. to effect a change in domicile from New Jersey to Delaware.

The parent was incorporated in New Jersey, June 28, 1902, as American Steel Foundries but changed its name to Amsted Industries Inc., Jan. 24, 1962. It initially acquired six steel foundry companies; Sargent Co. of Chicago; Reliance Steel Casting Co. of Pittsburgh; Franklin Steel Casting Co. of Franklin,

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\* Source: Standard & Poor's, 1980.

PA; Leighton & Howard Steel Co. of East St. Louis, IL; American Steel Foundry Co., Granite City, IL; and American Steel Castings Co., Chester, PA, Alliance, OH, Sharon, PA, and Norristown, PA.

In June 1970, acquired Extron Corp., Knoxville, TN, maker of plastic pipe and plastic extruded shapes.

In Mar., 1971, sold Asco Sintering Co. for cash.

Feb. 14, 1972, acquired substantially all the net assets and business of Glamorgan Pipe and Foundry Co., Lynchburg, VA, maker of ductile and cast iron pressure pipe, soil pipe, plastic pipe, and pipe fittings.

Dec. 31, 1972, acquired for cash the business of J & B Plastics Co., Inc. Fairfield, IA, producer of extruded and injection molded plastics. Operations combined with Plexco.

Company makes general industrial products (24 percent of sales and 20 percent of pre-tax operating income in fiscal 1979); construction and building products (26 percent and 11 percent); and railroad products (50 percent and 69 percent).

General industrial products include roller chains, wire rope, piston pins, rocker arms, fifth wheels for truck tractor-trailers, powder metal parts, extruded plastic parts, and equipment to purify and recycle industrial liquids. These items are used mainly in the automotive, agricultural equipment, machinery, recreational vehicle, oil drilling, mining, logging, and materials handling industries. Automotive products operations are centered in the Burgess-Norton Mfg. Division, Geneva, IL.

Construction and building products consist mainly of ductile iron pressure pipe for water transmission; pre-coated metal for commercial, farm and industrial buildings; pipe coatings and plastic pipe for gas distribution; vitrified clay pipe and cast iron soil pipe for waste removal; valves and fluid devices for water and sewerage systems and for power generating plants; and springs for construction machinery.

Railroad products consist mainly of side frames and bolsters (trucks), wheels, couplers, yokes, brake shoes and springs.

These components are made for new freight cars, and for repair and maintenance of used cars.

Company licenses to others in U.S. and abroad its Pressure Pouring Process, a method of casting molten steel into semi-finished mill shapes.

SUBSIDIARIES - wholly owned or noted - Productos de Aco Ltda.; Griffin Steel Foundries Ltd.; AMSTED-Siemag Kette GmbH (60 percent owned, non-consolidated); and several wholly owned subsidiaries with the name Hydromation in their titles.

PLANTS are owned in AL, CA (2), GA, IL (11), IN (3), IA (4), KS, LA, MI (3), NJ, OK, OH (2), PA, TN, TX, VA, WA, WI, Que., Man., England and Belgium; and leased in IL (2). Company planned to build a plant in Ohio in early 1980 (see Table 8).

● ARMSTRONG CORK CO.\*

The company, based in Lancaster, PA, was incorporated in Pennsylvania in Dec. 30, 1891, as successor to Armstrong, Brother and Co., Inc. partnership since 1864. Present title was adopted Jan. 14, 1895.

Apr. 1, 1969, sold packaging materials business and related assets to Kerr Glass Manufacturing Corp. July 20, 1969, sold wholly owned Armstrong Contracting and Supply Corp. to North Lime Corp. On Aug. 11, 1969, a Canadian subsidiary sold its packaging materials operations.

Sept. 1, 1969, acquired Knapp & Tubbs, Inc., a wholesale showroom furniture distributor which was sold Sept. 29, 1972.

June 30, 1972, acquired the assets, subject to certain liabilities, of Cryo-Therm, Inc., maker of Armalok rigid urethane foam insulation; operation was continued by Armalok, Inc., a subsidiary of company.

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\* Source: Standard & Poor's, 1980

Company makes a broad line of products for the interior furnishing of homes and other buildings, including resilient floor coverings and carpets, ceiling systems, and furniture, and a variety of specialty products for the building, automotive, textile, and other industries.

In 1978, floor coverings accounted for 57 percent of sales and 65 percent of operating profit (59 percent and 68 percent in 1977), ceilings 19 percent and 19 percent (19 percent and 16 percent), furniture 14 percent and 2 percent (13 percent and 1 percent), and industrial and other products and services 10 percent and 14 percent (9 percent and 15 percent). In 1978, foreign operations provided 16 percent of total sales.

Resilient floor coverings made include vinyl and rotogravure floorings, products for the installation and maintenance of such floor coverings, and tufted and bonded fiber carpets. Ceilings made include acoustical, nonacoustical, and multi-functional ceilings, and a fire-retardant, board-type product used as the base of its ceiling tiles.

Furniture made consists of traditional, contemporary, and modern household furniture. Company also makes gasket materials, adhesives, acoustical wall panels, noise control baffles, aprons, cots, and fiberboard.

SUBSIDIARIES - wholly owned:

E & B Carpet Mills, Inc.

I.W. Investments, Inc.

Empire Carpet Corp.

Thomasville Furniture Industries, Inc.

Fayette Enterprises, Inc.

Pacific World Wholesale, Inc.

Company has other subsidiaries with the name Armstrong in their titles in the U.S., Australia, Brazil, Canada, Belgium, England, Ireland, Spain, and W. Germany.

PROPERTY - Company operates 56 plants: 43 in the U.S.-20 in NC, 6 in PA, 5 in GA, 3 in VA, 2 in MS and one each in MA, NY SC, IL, FL, CA, and TN; and 13 in foreign countries- 4 in England, 3 in Australia, 2 each in Canada and Spain, and one each in India and West Germany (see Table 8).

● ARMSTRONG RUBBER\*

The company, based in New Haven, CT, was incorporated in Connecticut in Sept. 24, 1940, and acquired the assets of Armstrong Rubber Co., Inc., organized in New Jersey in 1916.

Feb. 2, 1970, Arco Wheel, Inc., subsidiary, acquired the assets and business of Hibbard Machine Co. (a wheel manufacturer).

Company and subsidiaries make tires and tubes as replacement equipment for cars, trucks, buses, and other vehicles. Tires are of radial, bias, and bias-belt construction. Company makes low and high speed wheels and assemblies for recreational and off-the-road original equipment and replacement markets.

Tires and tubes are sold under contract to Sears, Roebuck & Co. for distribution under Sears brands; in fiscal 1979, sales to Sears provided 36 percent of the total. Company's products are also sold to 1000 independent tire distributors for sale to over 19,000 retail tire dealers, to original equipment manufacturers; and to other distributors for sale under their brand names. Company also operates five retail tire outlets in New Orleans.

SUBSIDIARIES - wholly owned - Direct Tire Sales, Inc.; Richmond Converters, Inc.; Arco Wheel Inc.; Armstrong Acceptance Co., Inc.; Armstrong Rubber Intl., Ltd; Armstrong Rubber Export, Ltd.

AFFILIATE - Copolymer Rubber and Chemical Corp. is 50 percent owned.

PROPERTY - Plants are owned in TN, CT, MS, IA, NC, CA, and WI; and leased in AR, NC, MS, and TN (see Table 8).

\* Source: Standard & Poor's, 1980

- ARVIN INDUSTRIES - see p. 2-33
- BARNES GROUP\*

The company, based in Bristol, CT, was incorporated in Delaware, Jan. 30, 1925, as Associated Spring Corp.; present title adopted Apr. 7, 1976.

June 4, 1971, acquired Stece AB Industrifjadrar.

As of Oct. 31, 1971, through a British subsidiary, acquired the assets and business related to the spring manufacturing operations of Herbert Terry and Sons Ltd.

Mar. 7, 1978, company acquired all shares of Globe Industries, Inc. (RI). Globe was a privately owned distributor of automotive parts and hardware items from warehouses in Lincoln, RI, and Atlanta, GA with sales of \$37,000,000 in 1977.

Company operates through its Associated Spring Group (53.6 percent of net sales and 48.3 percent of operating profit in 1979; 55.7 percent and 45.7 percent in 1978), Bowman Distribution Group (33.1 percent and 45.4 percent; 33.6 percent and 47.5 percent), and Globe Distribution Group (13.3 percent and 6.3 percent; 10.7 percent and 6.8 percent). International operations provided 19.0 percent of operating profit in 1979 and 10.7 percent in 1978.

Associated Spring Group makes a wide variety of custom metal parts for mechanical purposes, including springs and metal precision components and assemblies. Group is the largest domestic manufacturer of precision mechanical springs. Its products range from fine hair springs for watches and instruments to large springs for heavy machinery, and are made principally to customer specifications. Group also produces cold rolled specialty steel for sale to others and for its own operations; through a British subsidiary produces leisure equipment and hardware items; and through a Mexican subsidiary makes cutlery. Associated Springs

\*Sources: Standard & Poor's, 1980  
 "Automotive Industries," 1980

produces a large number of metal parts for automotive applications. These parts - springs, engineered metal components, and assemblies - meet automotive needs for engine and transmission parts and body hardware. The company can also supply a broad variety of parts for prototypes or high-volume production runs.

The company is a major manufacturer of close tolerance parts such as: valve and injector springs for automotive engines, seat belt retractor springs, cruise control springs, torque converter clutch springs and clutch pack assemblies.

Versatility is a key ingredient in Associated Spring's capability. They can deliver from any one of 17 plants located throughout the U.S. and Canada and nine in Europe and Latin America. Currently, the company's plant in Burlington, Canada is being expanded and modernized to help meet automotive needs.

Bowman Distribution Group is engaged in merchandising and distribution, in the U.S. and through certain subsidiaries abroad, of replacement parts and other products, including automotive parts, specialties and accessories; general purpose electric, gas welding and industrial maintenance supplies; industrial aerosols, including adhesives, lubricants and sealants; and special purpose hardware and fasteners. Products sold by Bowman are mainly made by others.

Globe Distribution Group sells in the eastern and midwestern U.S. automotive replacement and maintenance parts, including automotive accessories, spark plugs, wiring sets, batteries, mufflers, ignition parts, and tune-up kits, and hardware items made by others. Sales are primarily to mass retailers.

OPERATING SUBSIDIARIES - wholly owned

Stece A.B.

Resortes Argentina S.A. (unconsolidated)

Bowman, S.A. de C.V.

Bowman Products (Canada) Ltd.

Cuchilleria Imperial, S.A. de C.V.

Globe Midwest Sales Inc., formed early in 1979.

Herbert Terry & Sons Ltd.

Resortes Industriales del Norte, S.A.

Resortes Mecanicos, S.A.

Tevema Fabriek van Technische Veren, B.V.

INDAP-ASC Industries e Comercio Ltda.

Pioneer Parts Distribution, Inc.

Wallace Barnes Co., Ltd.

Motalink Ltd.

Autoliaisons France S.A.

Stumpp & Schuele do Brasil Industria e Comercio Limitada

Stumpp & Schuele GmbH

PROPERTY - Company operates 17 plants (15 owned, 2 leased) and 18 warehouses (9, 9) in the U.S. and Canada. Foreign subsidiaries operate plants and warehouses at various locations. The company's automotive operations are headquartered in Livonia, MI, with plants in Plymouth, MI, Ann Arbor, MI, Hamilton, Ontario, and Pointe Claire, Quebec (see Table 8).

● BEARINGS, INC.\*

The company is based in Cleveland, OH. It was incorporated in Delaware Nov. 19, 1928, as Brown Fence & Wire Co. (established in 1901). Name changed to Jim Brown Stores Inc. Oct. 15, 1946, to Bearing Specialists, Inc. Feb. 28, 1953, and to present title on June 26, 1953.

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\* Source: Standard & Poor's, 1980

Company is a leading distributor of ball, roller, thrust and linear type bearings, industrial power transmission components, and related seals, lubricants, locking and sealing compounds, bearing retaining devices, and tools, purchased from more than 300 manufacturers and sold primarily in the replacement market.

June 30, 1979, company and subsidiaries operated 193 sales/service centers in 27 states.

SUBSIDIARIES - wholly owned

Bruening Bearings, Inc.

Dixie Bearings, Inc.

(See Table 8.)

● BENDIX CORP\*

The company, headquartered in Southfield, MI, was incorporated in Delaware April 13, 1929 as Bendix Aviation Corp.; present title adopted June 1, 1960. Upon incorporation, it acquired for stock all shares of Bendix Corp. (incorporated in 1924) and certain other assets.

Company and subsidiaries are engaged in the automotive (51.4 percent of revenues and 49.5 percent of operating profit in fiscal 1979), aerospace-electronics (28.2 percent and 33.8 percent), forest products (11.7 percent and 9.3 percent), industrial-energy (8.5 percent and 9.1 percent), and other business (0.2 percent and 1.7 percent decrease percent) in the U.S. and many other countries.

Automotive - Systems and components for use in automobiles, trucks, tractors and other vehicles, including braking and steering systems, electronic instrumentation and ignition components, and ignition parts. Wholly owned Fram Corp. makes replaceable oil, air and fuel filters, automobile engine fans, windshield wipers, and air cleaner assemblies.

Aerospace and Electronics - Space products include systems for space communications, guidance and control of space vehicles,

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\* Source: Standard & Poor's, 1980.

test and checkout equipment, and field engineering and management services. Aviation products include power generating systems, wheels, brakes, and landing gear systems fuel systems, electro-mechanical and hydraulic components.

Industrial Energy - Company develops, makes and markets grinding machines and perishable tools, precision inspection and gauging equipment, automatic transfer machines, numerical control systems, assembly systems, and other equipment.

Forest Products - Company makes building materials and other wood and aluminum products. Sept. 30, 1979, it owned about 171,000 acres of timberland in CA, with about 2.7 billion bd. ft. of merchantable timber.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Aerotech de Matamoros S.A.

Continental Controls Corp.

Toledo Stamping & Mfg. Co.

Parfield, Inc.

Bass & Co.

Tex. Pipe Bending Co.

Fram Corp.

Realdix Corp.

Skagit Corp.

Courter, Inc.

Societe Anonyme D.B.A. (92.3 percent)

United Geophysical Corp.

Jurid Werke GmbH (Germany)

Company has numerous other domestic and foreign subsidiaries, most with the name Bendix in their title.

## AFFILIATES

Air-Lab. S.A.R.L. (50 percent)

Armoricaïne de Fonderie le Chatelet, S.A. (49 percent)

D.B.A.-S.I.B.E., S.N.C. (50 percent)

Fram de Venezuela, S.A. (49 percent)

Metallugie Farnham, Inc. (49 percent)

PROPERTY - Sept. 30, 1979, company operated 60 principal plants in 24 states and six in Canada (see Table 8).

### ● BORG-WARNER CORP\*

The company is headquartered in Chicago, IL. It was organized in 1928 as Borg-Warner Motor Units Corp., and re-incorporated under present name in Delaware on Sept. 20, 1967. The company manufactures products in the following categories.

Transportation Equipment (37.1 percent of 1978 sales)- Automatic and manual transmissions, clutches, emission control devices, and other equipment for cars and other vehicles.

Industrial Products (20.4 percent) - Industrial pumps and power transmission components, mechanical seals, valves, and agricultural and other equipment.

Air Conditioning Products (22.2 percent) - Air conditioning, heating, and refrigeration equipment.

Chemicals and Plastics (20.3 percent) - Cycholac ABS resins, Blendex modifier resins, and other chemicals and chemical services.

Company also provides various protective and financial services.

The Transportation Equipment group, based in Troy, MI, operates the following product divisions:

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\* Sources: Standard & Poor's, 1980  
Ward's Automotive Yearbook, 1980

Borg & Beck Division, Sterling Heights, MI (clutches, torque converters, torsional couplings).

Borg-Warner Chemicals American Division, Parkersburg, WV, (plastics products).

Long Mfg. Division, Burlington, Ontario (Canada) (automotive radiators, oil coolers, heat exchangers).

Marvel-Schebler/Tillotson Division, Decatur, IL, (carburetors, fuel system components, emission control components, ignition components, temperature control components, vacuum operated devices, air conditioning, and other control valves and switches).

Morse Chain Division, Ithaca, NY, (automotive timing chains and sprockets, roller chains, chain couplings, timing belts, automotive transfer cases, transmission chains, chain tensioners).

Rockford Division, Rockford, IL, (clutches, torque converters, hydraulic control valves, power take-offs, fan drives, universal joints, other driveline components).

Spring/Brummer Division, Bellwood, IL, (engine and pump seals, molded rubber and plastics products, circuit boards, friction materials, clutches, precision stampings, metal components/assemblies).

Warner Gear Division, Muncie, IN, (transmissions, differentials, gears, gear box assemblies, four-wheel drive systems).

York Automotive Division, Decatur, IL, (air conditioning compressors and related products)

PRINCIPAL SUBSIDIARIES - wholly owned or noted

\*Arcadia Natl. Life Insurance Co.

\*Arcadia Insurance Co.

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\* Non-consolidated.

\*Baker Industries, Inc.  
Wells Fargo Armored Service Corp.  
Baker Protective Services, Inc.  
Pony Express Courier Corp.

\*Borg & Beck de Venezuela, S.A.

\*BWL, Inc.

NAL II, Ltd.

NAL III, Ltd.

Woodside Ltd.

Warneford Industries Pty. Ltd.

Weber Carburettors (Aust.) Pty. Ltd.

\*Refrigeracion York, S.A.

\*Creon Insurance Agency, Inc.

\*BWAC Insurance Agency, Inc.

\*B-W Credit Corp.

B-W Auto Parts of Puerto Rico, Inc. (60 percent)

Canberra Air Conditioning Services Pty. Ltd.

Centrilift, Inc.

Toolworks Ltd.

Byron Jackson Co., S.A.

\*Byron Jackson Argentina, S.A. (66.7 percent)

Cia. Importadora y Exportadora, S.A. de C.V.

York Intl. Corp.

Le Froid Industriel York, S.A.

Marbon Chemicals Ltd. (55 percent)

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\*Non-consolidated.

Company has numerous other subsidiaries, most with the name Borg-Warner, and several with the name Centaur, in their titles.

PROPERTY - Company operated more than 93 manufacturing facilities in the U.S. and abroad (see Table 8).

- ROBERT BOSCH GmbH - see p. 2-121
- BUCKEYE INTERNATIONAL, INC.\*

The company, based in Columbus, OH, was incorporated in Ohio on Nov. 18, 1894, as Buckeye Malleable Iron & Coupler Co., a consolidation of Buckeye Malleable Iron Co., organized in 1886, and Automatic Coupler Co. Name changes to Buckeye Steel Castings Co. in 1903 and to present title Oct, 9, 1967.

Company is a diversified maker of steel castings, injection molded and rotomolded plastic products, precision machined parts, and miniature components and systems for electronic data processing and word processing applications. Principal products include cast steel components for railroad freight and mass transit cars, military armor vehicles, and industrial and earth moving equipment, military armor vehicles, a wide variety of plastic parts and assemblies for the automotive, appliance, government and municipal, agricultural, furniture and recreation industries, precision machined metal parts for the auto and truck industries; and electronic products, including magnetic tape wafers, tape transports, and various combinations of read-write systems.

In 1978, steel castings accounted for 52.1 percent of sales from continuing operations and 28.2 percent of operating income; automotive products 45.9 percent and 148.3 percent, and other operations 2.0 percent and 76.5 percent deficit.

In 1979 steel castings accounted for 62.9 percent of sales from continuing operations and 103.1 percent of operating income; automotive products 35 percent and 32 percent, and other operations 2.1 percent and 35.1 percent deficit.

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\* Source: Standard & Poor's, 1980

SUBSIDIARIES - wholly owned

Warren Molded Plastics, Inc.

Hollowform, Inc.

B.I. Ltd.

B-I Sales, Inc.

Buckeye Energy Co., Inc.

Buckeye Intl. Development, Inc.

Waltham Magnetics Inc.

AFFILIATE - Railroad Dynamics, Inc. (50 percent owned) makes an improved stabilizing and cushioning device for railroad freight cars at a plant in Ontario, CA.

PROPERTY - Plants are owned in OH (3); and leased in OH (6), MA, IL, MI, and CA (see Table 8).

● BUDD COMPANY\*

The Budd Company was acquired by Thyssen A.G., Germany's largest steelmaker in April 1978.

The Budd Company is headquartered in Troy, MI and is known throughout the world as a leading producer of transportation components and equipment. A leading supplier to the automotive industry, the company produces automotive and truck body components of steel and plastics, chassis frames, wheel and brake products, castings, prototype stampings, automotive heating accessories, and hand tools.

Budd's activities are divided into four operating groups, each devoting a substantial amount of resources to serve the automotive, trucking, and railway industries.

Through its Stamping and Frame Products Group, the company offers a flexible package of skills and facilities in the development and production of automotive and truck body stamp-

\*Source: "Automotive Design & Development," April 1980.

ings and assemblies. With stamping plants in Detroit, MI, Gary, IN and Philadelphia, PA, Budd offers more than 1500 presses and related assembly equipment used for the manufacture of original equipment body stampings and assemblies for cars and trucks.

Within its Plastic Products Group, Budd markets fiberglass reinforced polyester compounds and molded products for the automotive, trucking, farm equipment, and business machine industries.

In addition, The Plastic Products Group manufactures cast nylon, Celoron<sup>®</sup> and molded products, spiral tubes and thermoset extrusions for automotive, industrial, and appliance markets.

Within its Commercial Products Group, Budd designs, engineers, and produces stainless steel railway passenger cars. In the past 10 years, Budd has delivered more of these cars than any other manufacturer. Also manufactured is a complete line of highway truck trailers.

Budd's Wheel and Brake Products Group produces a wide range of steel disc wheels to fit almost any type of commercial vehicle.

PROPERTY - Estimated 33 U.S. plants and 8 foreign plants  
(see Table 8).

● BUNDY CORP\*

The company, based in Detroit, MI, was incorporated in Michigan Jan. 30, 1929, as Bundy Tubing Co. Present name adopted Dec. 5, 1966.

Company, with subsidiaries, makes small diameter steel tubing, plastic products, powdered metal products, and plated brass watch-cases.

Tubing products are sold mainly to the automobile, appliance, truck and farm equipment industries under the names Bundyweld and Electricweld. The former is a double-wall steel tube designed to resist high internal pressure and is used as tubing for brakes, oil pressure gauges, windshield wipers, carburetors and cables,

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\* Source: Standard & Poor's 1980

and is also coiled for use in condensers, evaporators, compressors and other applications in the refrigeration and air conditioning industries. Electricweld is single-wall steel tubing designed for use in structural and low pressure applications where specifications are for lightness and strength, such as gas lines, push rods, transmission tubes, and fillers. Electricweld is also sold to the home appliance, toy, garden equipment, and furniture industries. In addition, company makes stainless steel tubing and powdered metal parts for the auto, appliance and other industries.

Dixon Industries Corp., wholly owned, makes molded, extruded and fabricated plastic parts sold to varied industries, including chemical and petrochemical, aerospace, electronic, computer, copy machine, and household appliance. Other products include polyimide plastic components for ball bearing retainers; foil and liner components for the audio, digital and video tape cassette markets; and thin-wall plastic extrusions from fluorocarbons, polyethylene and polyimide extrusions, and heat shrinkable tubings, used in the electrical, chemical and mechanical fields; and medical tubing. It also applies engineered plastic coatings to various components.

Titeflex Corp., wholly owned, makes high performance flexible metal and plastic hose and hose assemblies.

In fiscal 1979, steel tubing products provided 82 percent of total sales (83 percent in 1978), and plastic products 18 percent (17 percent).

PRINCIPAL SUBSIDIARIES - wholly owned

Bundy of Canada Ltd.

Dixon Industries Corp.

PennDixon Co.

Titeflex Corp.

Titeflex-Europe, SARL

## PRINCIPAL AFFILIATES

Bundy Tubing Co. (Australia) Pty. Ltd. (40 percent owned)

NTN-Rulon (Japan) (45 percent owned)

Mecano-Bundy GmbH (Germany) (40 percent owned)

Armco-Bundy Ror, AB (Sweden) (25 percent owned)

Affiliates and licensees operating in Argentina, Australia, Venezuela, Brazil, Colombia, West Germany, India, Japan, Mexico, South Africa, and Sweden.

PROPERTY - Plants are owned in MI (4), KY (2), PA (2), CT, MA, and Ont. (3); and leased in RI, PA, MA (2), AR, CT, TX, and GA (see Table 8).

### ● CHAMPION SPARK PLUG CO.\*

The company, based in Toledo, OH, was incorporated in Delaware Dec. 5, 1938, to acquire business of predecessor of same name incorporated in Delaware in 1916. Latter, in turn, succeeded a company of same name incorporated in Massachusetts in 1910.

Jan. 1, 1970 merged DeVilbiss Co. by issuing one Com. sh. for each Com. sh. of DiVilbiss held by minority stockholders. Company owned 85.6 percent of DeVilbiss, acquired in 1967 and 1968.

May 17, 1978, acquired, for \$38,110,000, all shares of the Anderson Co., Gary, IN, producer of auto windshield wipers and related products. Anderson had sales of \$52,000,000 in 1977.

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\* Source: Standard & Poor's, 1980.

Company is a leading producer of spark plugs throughout the world for practically every known application in the internal combustion engine field. Output includes many different types, sizes and adaptations of spark plugs, including resistor types for specialized aircraft and automotive use, and special purpose shielded plugs for automotive type engines where explosive vapors may be present, where waterproofing is required, or where heavy duty operations may bring about short circuiting of the engine block.

Spark plugs and related products are sold under the name Champion through numerous domestic and international distributors and to automobile, truck, motorcycle, and other manufacturers for use as original equipment.

Company also makes windshield wiper blades, arms and refills, windshield washer pumps, hose and tubing, and windshield washer solvent, and steering locks for the original equipment and replacement markets.

Coating application equipment includes air atomized spray systems, air-less sprayers, paint pumps, spray booths, drying ovens, air make-up systems, and hose and air compressors. Engineered finishing systems are custom-made for the production lines of automotive, household appliance and furniture makers and others. Components include coating equipment, spray guns, air compressors, and air and fluid hose.

Health Care Division makes vaporizers, nebulizers, ultrasonic nebulizers and oxygen concentrators used to treat respiratory diseases and sinus conditions, and room humidifiers for home and hospital use.

Baron Drawn Steel Corp. (100 percent owned) produces cold drawn steel bars and coils, a large portion of which is used by the company.

In 1978, automotive components provide 76.5 percent of net sales and 85.6 percent of operating earnings, coating application equipment 16.9 percent and 9.7 percent, and other 6.6 percent and

4.7 percent. Foreign sales accounted for 36.7 percent of volume.

PROPERTY - Principal plants are in OH (5), MI (2), PA (2), IA, IN (3), Ont. (2), England (4), Mexico (3), Venezuela (2), Australia, South Africa, Belgium (3), New Zealand, Brazil, West Germany, France, and Japan (see Table 8).

SUBSIDIARIES - wholly owned

Anderson Co. of Indiana

Anco-Matic Wiper Products of Canada, Ltd.

Baron Drawn Steel Corp.

Bujias AnCom. C.A.

Hellertown Mfg. Co.

Iowa Industries, Inc.

P B Marketing, Inc.

Arman, S.p.A.

Dario Arman (U.K.) Ltd.

Company also has numerous other subsidiaries, mostly wholly owned, with the names Champion, Champion Spark Plug, or DeVilbiss in their titles.

AFFILIATES - DeVilbiss (Japan) Co. Ltd. (50 percent owned-consolidated).

● COLT INDUSTRIES INC.\*

The company, headquartered in New York City, was originally incorporated in Pennsylvania Nov. 11, 1911, as Pennsylvania Coal & Coke Corp. succeeding Pennsylvania Coal & Coke Co. (sold under foreclosure), which was incorporated in 1900 as Fairview Coal Mining Co. Name changed to Penn-Texas Corp. May 4, 1954; to Fairbanks Whitney Corp. May 29, 1959; and to Colt Industries Inc. May 15, 1964. It was later incorporated in Pennsylvania Mar. 12, 1976, as Colt Industries Pennsylvania Corp., as a wholly owned subsidiary of Colt Industries Inc., and on May 6, 1976,

\* Sources: Standard & Poor's 1980  
Ward's Automotive Yearbook, 1980

merged parent on a share-for-share basis and changed its name to present title.

Earlier, Colt Industries Inc. was incorporated in Delaware Oct. 17, 1968, as a consolidation of Colt Industries Inc. (Old Pa.) and Crucible Steep Corp.

In 1970, acquired all shares of Fastcut Tool Co., maker of end mills.

In 1971, acquired all shares of Haber Industries, Inc. maker of cold header tools.

In Dec., 1975, acquired 92 percent of the Com. sh. of Garlock Inc., maker of industrial seals and components. Jan. 26, 1976, Garlock was merged into a subsidiary of Company which subsidiary adopted the Garlock Inc. name.

Company is a major producer of industrial and power equipment, fluid control systems, materials, industrial seals and components, and shock mitigation systems. Operations are grouped into major industry segments, as follows:

Industrial and Power Equipment - Company makes fabricated metal products, including welded pipe and tubing sold under the Trent name; permanent magnets and coil springs; manually, computer and numerically controlled metal cutting machine tools, including lathes and machine centers, jig bores, tracers, and contour milling machines sold under the names Pratt & Whitney; electrical discharge machining equipment sold under the Elox name; mechanical, electromechanical and electronic industrial weighing equipment ranging from simple bench scales to complex automatic bulk material and in-motion weighing systems; reciprocating, portable and industrial helical screw air compressors; metal cutting and forming tools, and precision electronic measuring instruments sold under the names Pratt & Whitney, Sterling, Haber and Fasticut; 10 to 500 KVA transformers, including overhead and underground distribution transformers; large medium speed diesel, gas and dual fuel engines, parts and accessories, including magnetos, clutches, rewind starters, torque converter, other starting aids

and controls, solid state and conventional ignition systems, and brakes; and firearms, including the M16 military rifle, handguns and commemorative arms sold under the Colt name.

Fluid Control Systems - Company makes Holley carburetors, parts and repair kits, emission control devices, fuel metering systems, intake manifolds, fuel and air pumps, heat regulators, ignition distributors and systems, engine and road speed governors; gaskets, power and PCV valves, valve covers, fuel filters, fittings, and other engine components. Company also makes a variety of fuel control systems and main fuel pumps, missile flight controls, engine and aircraft components, standard and custom engineered centrifugal, turbine, axial flow and peripheral pumps, and submersible and ejector pumps.

The following divisions in the Fluid Control System group manufacture products for the automotive OEM:

Holley Carburetor Division, Warren, MI (carburetor systems, fuel injection systems and related control components)

Holley Special Products Division, Warren, MI (emission system components)

Holley Replacement Parts Division, Warren, MI (carburetor and parts, intake manifolds, valve covers, fuel pumps, air cleaners, emission control system components)

F.D. Farnam Division, Necedah, WI (gasket products).

Materials - Company makes specialty steels; low alloy and specialty carbon steel materials sold mainly in the form of blooms, billets, tube rounds, hot rolled and cold finished bars, agricultural discs, and custom forgings; high alloys (high speed, tool, die, valve and vacuum-melted steels, titanium and its alloys, super alloys based upon nickel and cobalt, and other alloys), sold mainly in the form of billets, bar, wire, sheet and strip; and stainless steel sold mainly in the form of sheet, strip, billets, bar, rod, custom forgings, and wire products.

Industrial Seals and Components - Products include packing, gaskets, oil seals, custom molded rubber parts, truck products, compressor components, valve and other industrial components sold under the names Garlock, Stemco, and France.

Shock Mitigation Systems - Products include aircraft landing gear assemblies, parts and components; flight control systems' helicopter rotor assemblies; and other engineered and machined products. Company also provides overhaul services for landing gear made by itself and others.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Colt Industries Operating Corp.

Chandler Evans Inc.

Manufacturera Fairbanks Morse, S.A.

Colt Industries Credit Corp.

Colt Industries International Inc.

Crucible Inc.

Crusteel Ltd.

Crucible Center Co.

Crucible Disc Inc.

Colt Industries (Canada) Ltd (99.8 percent)

Garlock Inc.

Garlock Overseas Corp.

Chromex, S.A. (99 percent)

Manufacturas E.R.I.C.A., S.A.

Woodville Rubber Co. Ltd.

Louis Mulas, Sucs, S.A. (65.7 percent)

Stemco Inc.

Menasco Inc.

Menasco Canada Ltd.

Trent Tube B. V.

Company also has other subsidiaries with name Garlock in their titles.

PROPERTIES - Company operates 79 plants in 22 states, Canada, Mexico, Australia, the Netherlands, France, the U.K., Switzerland, Spain, and the Philippines. Also operates two industrial parks and warehouse facilities; and has other facilities, including offices, repair and service shops, light manufacturing and assembly facilities, and warehouses throughout the U.S. and several foreign countries (see Table 8).

● ARVIN INDUSTRIES\*

The company is based in Columbus, IN. It was incorporated in Indiana Dec. 31, 1921, as Indianapolis Pump and Tube Co., succeeding a partnership founded in 1919. Name changed to Noblitt-Sparks Industries, Inc., Dec. 27, 1927, and to present title July 5, 1950.

Company and subsidiaries operate through the following groups:

Automotive Group makes mufflers, exhaust and tail pipes, catalytic converters, corrosion resistant coatings and other metal tubular parts, interior trim parts and exterior trim mouldings, and vinyl metal truck and bus parts; also provides restraint systems and tire testing services.

Appliance and Hardware Group makes AM/FM stereo phonographs and tape players, fan-forced fireplace heat exchangers, portable electric heaters, electric fireplaces, and various painted and vinyl-laminated steel for appliance housings.

Government and Utilities Group provides research, development and testing services to the U.S. Government on a contract basis in such areas as aerodynamics, auto crash testing, automobile accident research, avionics, systems analysis, surface chemistry, thermodynamics, and computer simulation. It makes airport radar transmission video cameras, avionics airborne video recorders, security systems for power generating plants, reed switch machinery for telephone switching equipment,

\* Source: Standard & Poor's, 1980.

switchplates for telephone equipment and interior bulkhead panels for U.S. Navy and Coast Guard ships.

Commercial and Industrial Group makes camera case stampings; coated metal for various uses in products such as commercial refrigeration, water coolers, freezers, video recording, etc.; fabricated parts for barrels; interior panels for aircraft, subway and railway cars, boats and ships; linear array measuring devices; painted coils of steel for pre-engineered buildings; relay contacts for switches; relay fingers for elevators; resistance welders and controls; slow motion video recorder reproducers; switches and tape for cable TV; video disc recorders; video frame storage recorders; and vinyl-laminates for aircraft interior.

SUBSIDIARIES - wholly owned

Roll Coater, Inc.

Calspan Corp.

Supreme Distributors Inc. of Ind.

and several with Arvin in their names.

PROPERTY - Co. operates 17 major facilities (9 owned and 8 leased), including plants and warehouses in IN, AL, AR, GA, KY, MS, (see Table 8).

● COMMERCIAL SHEARING, INC.\*

The company is headquartered in Youngstown, OH. It was incorporated in Ohio on April 23, 1920, as Commercial Shearing & Stamping Co. Present name adopted March 1, 1972.

Company and subsidiaries design, make, sell, and service engineered metal components, including boiler and tank heads; underground support systems, including precast concrete final tunnel linings; oil hydraulic pumps, motors, control valves and

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\* Source: Standard & Poor's, 1980.

cylinders; upset forged parts; and pressed metal shapes, including medium to heavy custom stampings. A wholly owned foreign subsidiary makes pre-engineered buildings of metric design for markets where the metric system is used.

Principal markets for company's products include makers of machinery and equipment for the construction industry; contractors engaged in heavy construction, mainly tunnels and shafts; makers of transportation equipment, mainly trucks, truck bodies, and trailers; makers of pressure and non-pressure vessels for storage of liquids and gases; manufacturing mills for textiles, wood laminations, plastics, measuring and testing equipment; builder-dealers of pre-engineered steel buildings; makers of farm machinery and materials handling equipment; and mines and makers of mining machinery. Company also operates a steel service center with processing capabilities. In fiscal 1979, foreign operations provided 26.4 percent of net sales and 33.6 percent of net income.

PROPERTY - Principal plants are owned in OH (5), IN, IL, UT, CA, Canada, England, Brazil, Australia (3), and Luxembourg (3); and leased in AR, IA, OH (2), WV, TX, MD, England, and Japan. A plant under construction in NC was expected to be completed in late 1980 (see Table 8).

PRINCIPAL SUBSIDIARIES - wholly owned

Commercial Stamping & Forging, Inc.

Commercial Shearing Ltd.

Commercial Hydraulics A.G.

Commercial Hydraulics Pty., Ltd.

Commercial Hydraulics K.K.

Eurocast S.A.

Commercial Hydraulics Ltd.

Commercial Hydraulics S.A.

Commercial Shearing Intl., Inc.

Commercial & Hidraulics Ltda.

● COPPERWELD CORP.\*

The company, based in Pittsburgh, PA, was incorporated in Pennsylvania, Aug. 16, 1915, as Copperweld Steel Corp.; present title adopted April 30, 1973.

In Feb. 1972, acquired for cash Lear Siegler Inc.'s Regal Tube Division, operations of which continued by wholly owned Regal Tube Co.

Company makes and fabricates specialty metal products as follows:

Alloy Steel - Alloy and carbon steels in the form of hot rolled blooms, billets, slabs, flats, and bars; cold finished bars and vacuum degassed and thermal treated steels in alloy and carbon grades; and free machining steels in alloy, carbon, and Nitralloy grades. Major markets - automotive manufacturers and suppliers, company's other divisions, natural resource and energy industries, distributors and service centers, and industrial equipment manufacturers.

Speciality Tubing - Electric welded and seamless tubing from hot rolled or cold finished carbon, alloy, and stainless steels. Major markets - automotive manufacturers, distributors and service centers farm and industrial equipment manufacturers, the construction industry, oil companies and other energy producers.

Bimetallics - Copper-clad and aluminum-clad steel rod, wire, and strand; copper-clad aluminum rod and wire products; and copper, bronze, nickel, and nickel-coated copper fine wire. Major markets - cable television, automotive and railroad industries, telephone and electric utilities, wire mills, electrical equipment manufacturers, geophysical exploration and export.

The Copperweld Tubing Group is a leading producer of DOM (drawn-over-mandrel) mechanical tubing, available in one of the world's most extensive size ranges. In addition, the Tubing Group

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\* Sources: Standard & Poor's, 1980  
"Automotive Industries," June 1980.

produces a wide range of quality structural tubing and a broad selection of fine seamless mechanical tubing.

An operating and marketing organization, the Copperweld Tubing Group was formed in 1978 to unite Copperweld Corporation's wholly owned manufacturing subsidiaries - the Ohio Steel Tube Co., Shelby, OH and the Regal Tube Co., Chicago, IL - with a centralized sales and marketing operation headquartered in Pittsburgh, PA.

A recently completed \$47-million expansion program has increased the Tubing Group's capacity to produce DOM tubing by 70 percent and structural tubing by 30 percent. Newly approved plans call for additional capital improvements exceeding \$20 million.

Although the bulk of Copperweld's automotive business has been in the area of transmission related parts, the Tubing Group has been instrumental in the development of tubing applications for front-wheel drive related parts. A key factor in this development has been the conversion from seamless mechanical tubing to the welded DOM product.

Sales are made through district offices and representatives in leading cities throughout the U.S. Export business is conducted by the wholly owned Copperweld Industries International, Inc. which has foreign representatives and foreign licensed fabricators throughout the free world.

In 1978, alloy steel provided 45 percent of sales, specialty tubing 44 percent, and bimetallics 11 percent.

ACTIVE SUBSIDIARIES - wholly owned - Ohio Steel Tube Co.; Regal Tube Co.; Southern Cross Investment Co.; and several with the name Copperweld in their titles.

AFFILIATES (percent owned) - Japan Alumoweld Co., Ltd. (45 percent) makes aluminum-clad steel wire which serves the Far East and other world markets.

Copperico do Brasil - Bimetallicos LTDA (50 percent) produces copper-clad ground rods and copper-clad steel wire.

PROPERTY - Steel plant at Warren, OH, is on 502 acres and has annual rated capacity of more than 700,000 ingot tons of

special carbon and alloy steels. Copperweld Bimetallics Division plant at Glassport, PA, makes Alumoweld rod, wire, and strand. Plant of Ohio Steel Tube Co. at Shelby, OH - on a 106 acre site, makes seamless and welded tubing. Plant of Flexo Wire Division at Oswego, NY, on a 2-acre site, has annual capacity of 6,500,000 pounds of fine wire products. Plant of Regal Tube Co. at Bedford Park, IL, makes electric welded tubing. Plant of Copperweld Southern Division in Fayetteville, TN, produces rod and wire products. All of foregoing properties are owned except for the plants in Fayetteville and Bedford Park (see Table 8).

● CUMMINS ENGINE CO. INC.\*

The company, headquartered in Columbus, IN, was incorporated in Indiana on February 3, 1919.

Company is a leading producer of diesel engines used to power motor trucks, buses, power boats, shovels, industrial locomotives, logging equipment, farm and mining machinery, electric generator sets, construction and oil and gas equipment, and various other off-highway machines. The manufacture of service parts is an important phase of the business, and the company rebuilds Cummins engines and parts for resale. Engines are sold through network of distributors in the U.S., Canada, and abroad, and are offered as standard or optional equipment with every major U.S. truck manufacturer.

Company also makes crankshafts, turbochargers, and related components for diesel engines and industrial equipment; filters for oil, fuel oil, air and water; and re-conditioned diesel engines and parts.

In 1979, international sales contributed 32 percent of consolidated net sales, and sales to Intl. Harvester Co. 13 percent.

PRINCIPAL SUBSIDIARIES - wholly owned

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\*Source: Standard & Poor's, 1980.

Atlas Crankshaft Corp.  
B. H. D. Engineers Ltd.  
Fleetguard, Inc.  
Fleetguard Intl. Corp.  
Holset Engineering Co. Ltd.  
Holset Intl. Ltd.  
Manchester Holding Corp.

Company has other subsidiaries with the name Cummins in their titles.

PRINCIPAL AFFILIATES - 50 percent owned or noted -

Komatsu-Cummins Sales Co. Ltd.  
Kirloskar Cummins Ltd.  
CAEMI-Cummins Motores, S.A. (49 percent)  
Amer. Fletcher Bank (Suisse) S.A. (33 percent)

PROPERTY - Principal Plant and warehouse are owned in Columbus, IN. Other operating Plants are owned in OH, TN (2), IL, CA, IN (3), SC, Scotland, and England (5); and leased in NY and England (see Table 8).

● DANA CORP.\*

The company is based in Toledo, OH, which is also the headquarters for its Vehicular Group. The company was incorporated in Virginia, Oct. 12, 1916, as Spicer Manufacturing Corp., to succeed company of same name established in 1904. Present title adopted July 12, 1946.

In Mar. 1970, acquired Brentwood Plastics, Inc., June 20, 1970, acquired Michigan Wheel Co., maker of marine and industrial propellers. In Aug. 1979, acquired the Industrial Fluid Products Division of Lear Siegler, Inc.

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\*Sources: Standard & Poor's, 1980  
"Automotive Industries," June 1980,  
Ward's Automotive Yearbook, 1980

In Nov., 1970, acquired C&M Spring Co., Inc., maker of heavy-duty leaf springs.

In Aug. 1971, acquired Seco Electronics Corp., Hopkins, MN, producer of motor control systems for the electronic industries. In Nov. 1971, acquired Ludwig Motor Corp.

In Aug., 1972, acquired Gerbing Mfg. Corp., maker of industrial components, variable speed pulleys, flexible couplings and motor mounts. In 1972, wholly owned Michigan Wheel corp. acquired certain assets of Coolidge Propeller Co.

In Apr., 1973, acquired the net assets of Gerdes Products Co.

Aug. 24, 1973, a wholly owned subsidiary of Co. was merged into Formsprag Co. As a result of the merger, Co. acquired Formsprag Co.

June 29, 1979, acquired Wix Corp.

Company makes vehicular components and parts (79.4 percent of net sales in fiscal 1979), including axles, frames, transmissions, universal joints, clutches, engines, and other parts sold to makers of on-highway motor vehicles and for use as service parts; and makes products for industrial markets (20.6 percent).

Company has 175 plants and warehouses in 28 states and Canada; and 113 warehouse-distribution centers in the U.K., 14 in France, 7 in Switzerland, and 6 in Brazil (see Table 8).

PRINCIPAL SUBSIDIARIES (wholly owned or noted) -

Dana World Trade Corp.

Dana Western Hemisphere Trade Corp.

Dana Equipamentos Ltda, 99.9 percent owned

Gerdes Products Co., Inc.

Danair, Inc.

Weatherhead Co.

Weatherhead Co. of Canada, Ltd.

Weatherhead Export Corp.  
Wilson-Wichita, Inc.  
Wix Corp.  
Summey Building Systems, Inc.  
Gard Corp.  
Wix Foreign Sales Corp.  
Maumee Holding B.V.  
Maumee Holdings S.A.  
Dana Financial Holdings, Inc.  
Dana Engineering Ltd.  
Turner Mfg. Co.

Rapidsyn Inc.

Jamco Intl., Inc.

Dana Domestic Intl. Sales Corp.

Hayes-Dana Ltd., 66 percent owned  
30, Inc.

Brown Brothers Corp. Ltd., 69 percent owned

Dana Corp. literally "grew up" with the automotive industry. More recently, however, this 76-year-old manufacturer and supplier of systems for the transmission and control of power has broadened its base through acquisition and the development of new proprietary products in non-motor-vehicle markets - particularly industrial.

While motor vehicle parts will continue to dominate Dana's activities in the near future, the company has established long-range objectives of 30 percent industrial sales. From less than 3 percent of Dana's total in 1955, sales to the industrial market have grown to more than 21 percent in 1979.

Today, Dana is growing in three areas that form what it calls a market tripod: vehicular, service, and industrial. Dana's

tripod continues to grow through further expansion of existing product lines and through a carefully planned acquisition program in selected markets. Among recent acquisitions was Wix Corp., Gastonia, NC - a producer of liquid and gas filtration products for motor vehicles and farm, industrial and construction equipment.

Dana's automotive operations (the Vehicular Group) consist of the following divisional units (see Table 8):

Spicer Axle Division, Fort Wayne, IN (axles differentials, lock-out hubs)

Spicer Heavy Axle Division, Fort Wayne, IN (industrial vehicles and truck axles)

Spicer Clutch Division, Auburn, IN

Spicer Front Drive Systems Division, Edgerton, WI

Spicer Transmission Division, Toledo, OH

Spicer Universal Joint Division, Toledo, OH (propeller shafts, U-joints, const. veloc. joints)

Material Supply Division, Hagerstown, IN (casting, forgings)

Parish Division, Reading, PA (car, truck and trailer frames, leaf springs, trailer axles and suspensions)

Perfect Circle Division, Richmond, IN (cylinder sleeves, pistons & rings, valve seals, camshafts)

Victor Products Division, Lisle, IL (gaskets, seals)

Spicer Steering Gear Division, Santa Ana, CA, (power steering systems)

Heavy Truck Marketing, Toledo, OH.

As mentioned above, in addition to the Vehicular Group, Dana Corp. has a Service Group consisting of eight Divisions whose operations cover servicing, distribution, and marketing worldwide (other than O.E.M.), of all Dana products, and an Industrial Group, consisting of four divisions - which manufacture,

service and market typical Dana products designed for industrial applications. Many products made by the Industrial Group are also marketed as automotive O.E.M. items (viz., hydraulic systems components).

● DAYCO CORP.\*

The company, headquartered in Dayton, OH, was incorporated in Delaware Feb. 28, 1966, as a wholly owned subsidiary of Dayco Corp., and on May 1, 1966, merged parent, on a share for share basis.

Predecessor was incorporated in Ohio May 17, 1905, as Dayton Rubber Mfg. Co.; name changed to Dayton Rubber Co. Mar. 26, 1947 and to Dayco Corp. Apr. 1, 1980.

In fiscal 1971, merged wholly owned Seward Luggage Mfg. Co., Inc., Three Rivers Rubber Corp. and Springday Co.

May 11, 1978, merged Electric Hose & Rubber Co. (Electric) into a wholly owned subsidiary, which adopted Electric's name.

Company is a diversified manufacturer of engineered industrial components, plastic and chemical products and automotive products for original equipment and replacement. It also produces consumer products, including wall coverings, garden hose and luggage. In fiscal 1979, industrial components accounted for 41.6 percent of sales and 50.2 percent of pre-tax profits before certain charges (37.3 percent and 41.1 percent in 1978), aftermarket and original equipment transportation group 27.4 percent and 32.2 percent (28.8 percent and 29.5 percent) and plastic/distribution/consumer operations 31.0 percent and 17.6 percent (33.9 percent and 29.4 percent).

Industrial Components Group makes V-belts, hydraulic and industrial hose, fittings, and power transmission flexible couplings for various industries; graphic arts supplies for the printing industry; including lithographers blankets, inking rollers, and equipment to split colors on press runs; and replaceable

\*Source: Standard & Poor's, 1980

component parts for textile production machinery. Also, custom compounds and formulates of rubber and plastic for use by appliance, agricultural, energy, and automotive industries.

Aftermarket and Original Equipment Transportation Group produces automotive products including V-belts, hose clamps and radiator and heater hose; automotive components such as carpet, crash pads, door panels, seat covers, polyurethane seat cushioning and trunk liners, heat insulating panels and sound absorbing materials; and metal hose, bellows, expansion joints, and ducting systems for conveying high pressure gasses and corrosive liquids.

Plastics/Distribution/Consumer Group makes plastic sheets, rods, tubes and film; nylon staple fiber and other manmade fibers; insulating material for garments and home furnishings; engineered flexible plastic hoses for appliance, industrial, construction, marine, mining and medical applications; ventilating hose for commercial and residential use; engineered products for meat processing industry; sponge rubber, latex foam, and rubberized fiber-center carpet cushion; and fabricated and automatic molded plastic products and shoe foam. Also, distributes safety products (fire extinguishers, first aid kits, face shields, warning signs, welding goggles, and wheel chocks); and produces highstyle wall coverings and noise reduction systems for commercial and public use, footlockers, trunks, hard and soft-sided luggage, briefcases and leather luggage, and garden hose.

PRINCIPAL SUBSIDIARIES - wholly owned - Allen Industries, Inc.; Electric Hose & Rubber Co.

PROPERTY - Co. operates 32 plants in the U.S., 2 in Canada, and one in Scotland. Warehouses and distribution centers are located throughout the U.S. (see Table 8).

● DONALDSON CO., INC.\*

The company is based in Minneapolis, MN. It was incorporated in Delaware, Dec. 24, 1936, successor to a Minnesota company of the same name, which acquired a business established in 1915.

Mar. 31, 1974, acquired Torit Corp., St. Paul, MN, maker of industrial air pollution control equipment.

Company and subsidiaries design and make air cleaners, filters, and mufflers used mainly on farm tractors, trucks, and construction, mining and earth-moving equipment powered by heavy duty internal combustion engines. The company also makes mufflers and other acoustical devices for factories; dust collectors for in-plant dust control applications; air and gas filtration devices to protect precision instruments; and liquid filtration and inertial separation equipment to guard hydraulic systems and machine tools from abrasive contaminants. The company also engages in the technologies to pulverize, classify, and collect particles, transforming them into useful raw materials.

In fiscal 1979, air cleaners, filters and accessories accounted for 77 percent of sales (77 percent in 1978); acoustical products 14 percent (14 percent), and other 9 percent (9 percent) international sales accounted for 27 percent of volume (25 percent in 1978).

SUBSIDIARIES - Co. has several subsidiaries, the principal units having the name Donaldson in their titles.

LICENSEES are in England, Argentina, Australia, Italy, Brazil, South Africa, Japan, and Yugoslavia.

PROPERTY - Principal plants are owned in MN (2), France, Japan, W. Germany, and Australia; and leased in IA (3), MO (2), and IL (see Table 8).

\*Source: Standard & Poor's, 1980

● DYNEER CORP.\*

The company, based in Westport, CT, was incorporated in Delaware May 13, 1941, as Automatic Products Corp., succeeding an Illinois company of same name organized in 1929 as Warchell Corp. (name changed in Nov., 1933); name changed to Automatic Steel Products, Inc. Nov. 26, 1947, and to ASPRO, Inc. Dec. 3, 1969; present title adopted Nov. 28, 1978.

July 18, 1969, acquired Technitron, Inc. and associated firms, which represented in Europe U.S. manufacturers in the aerospace and electronic industries; Pegasus International Corp., which acted as an international management consultant to American and foreign countries engaged in the development of overseas markets; and 46.4 percent of Societe Europeene D'Instrumentation, S.A., a French maker of telemetry products and data signal conditioning systems for the aerospace industry. In Apr., 1972, acquired the rest of Societe Europeene D'Instrumentation, S.A.

Aug. 1, 1972, acquired the business and net assets of Detroit Automotive Division of Boise Cascade Corp., producer of mechanical traction devices for heavy construction equipment and truck markets.

Nov. 1, 1978, acquired all manufacturing operations of Dico Corp., producer of industrial wheel assemblies, and hydraulic and mechanical brakes for towed vehicles.

Company makes and sells mobile equipment and industrial products, including traction adding differentials, automatic centrifugal clutches, wheel/tire assemblies, hydraulic and mechanical braking systems, and security lockers and police products. The company also makes transportation products, such as fabricated metal alloy tubing assemblies, and auxiliary axle suspension systems; and electronic products consisting mainly of optoelectronic sensing devices and seismic instrumentation systems.

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\*Source: Standard & Poor's, 1980

Automotive products operations are centered in the Tractech Subsidiary (formerly Detroit Automotive) based in Warren, MI. Plants are in 12 states and 3 foreign countries (see Table 8).

In fiscal 1979, mobile equipment and industrial products accounted for 45.5 percent of net sales (27.6 percent in fiscal 1978), and 61.8 percent of operating profits (50.5 percent) transportation products 36.2 percent (51.3 percent) and 28.1 percent (40.7 percent); and electronic products 18.3 percent (21.1 percent) and 10.1 percent (8.8 percent).

SUBSIDIARIES - wholly owned or noted -

Kraftube Inc.

Change-O-Matic, Inc.

Wesco Manufacturing, Inc.

Adair Chair Co., Inc.

Spun Steel (Ala.), Inc.

Spun Steel (Miss.), Inc.

Granning Suspensions Inc.

Granning Suspension Ltd.

Dico Company, Inc.

Sprengnether Instruments, Inc.

Tracktech Inc.

Sensor Technology, Inc.

Photowatt International, Inc. (50 percent joint venture)

Company has other subsidiaries with the name Technitron in their titles.

AFFILIATE - Photowatt International S.A. (Less than 25 percent).

● EAGLE - PICHER INDUSTRIES, INC.\*

The company, based in Cincinnati, OH, was incorporated in Ohio in 1916 as Eagle-Picher Lead Co., a consolidation of Eagle White Lead Co., established 1843, and Picher Lead Co., founded 1880. Name changed to Eagle-Picher Co. Mar. 27, 1945, and to present title Apr. 1, 1966.

In Oct., 1971, purchased A.D. Weiss Lithograph Co., Hollywood, FL. In Nov., 1971, purchased Hillsdale Tool & Mfg. Co. Hillsdale, MI and Hillsdale's affiliate Daisy Parts, Inc.

May 1, 1972, sold the assets of the Davis Wire Division, maker of spring wire for furniture and bedding, baler wire and ties, and merchant wire products; including all shares of Davis Wire of Canada, Ltd.

In Oct., 1976, acquired Elmac Corp., a maker of products for mining industries, and Pritchett Engineering & Machine, Inc. a maker of castings, forgings, and bar stock.

Company operates through the following groups: Industrial Group makes diatomaceous earth products, rubber products, boron isotopes and rare metals, appliance parts and coatings, industrial chemicals, commercial printing, concrete pipe, and other industrial products.

Machinery Group produces earth moving equipment, special purpose batteries for aerospace and defense applications, coal mining equipment, tire building machinery, offshore drilling and materials handling equipment, aluminum and brass castings, and related products.

Automotive Group makes mechanical, structural and trim parts for passenger cars, trucks, buses, vans, and utility vehicles for the OEM and replacement markets.

\*Source: Standard & Poor's, 1980

In fiscal 1979, industrial group accounted for 33.5 percent of net sales and 33.7 percent of pre-tax income, machinery group 40.1 percent and 39.3 percent, and automotive group 26.4 percent and 27.0 percent. Ford Motor Co. provided 10.2 percent of total sales.

PROPERTY - Co. operates 83 plants in the U.S. and Canada (see Table 8).

● EATON CORP.\*

The company is headquartered in Cleveland, OH. It was incorporated in OH, Aug. 28, 1916, as Torbensen Axle Co. and acquired the business of Torbensen Gear & Axle Co. Name changed to Eaton Axle & Spring Co. in 1923; to Eaton Manufacturing Co. in 1932, to Eaton Yale & Towne Inc. Jan. 1, 1966; and to present title Apr. 21, 1971.

July 29, 1970, acquired Ballistics Control Corp.

Dec. 29, 1970, merged Char-Lynn Co.; and at the same time acquired Germane Corp. Also in 1970, acquired a 23 percent interest in Electron Corp.

May 31, 1972, sold its crane and monorail product lines. In 1972, acquired Holzer Group, a leading European manufacturer of appliance and automotive controls with operations in Germany and Italy, and a 70 percent interest in Fonderies Manil, S.A., a Paris-based firm which supplied castings to diversified industries throughout Europe.

In 1973, acquired the assets (including a truck transmission plant) of Transport Equipment Ltd., an 80 percent interest in Nova Werke S.p.A., Italy, producer of automotive components, and additional interests in several less than wholly owned subsidiaries.

\*Sources: Standard & Poor's, 1980  
"Automotive Industries," June 1980

In Nov., 1976, sold most of the assets and liabilities of the former McQuay-Norris Mfg. Co. (acquired Oct. 31, 1969), in connection with a Dec. 29, 1970, FTC charge that Co. violated antimerger provisions of the Clayton Act.

Jan. 2, 1979, through a wholly owned subsidiary, merged Cutler-Hammer, Inc., Milwaukee, WI.

Company and subsidiaries make components for trucks and automobiles; industrial power transmission systems and components; electrical and electronic control devices and systems; and various other products.

Principal products include drive axles; transmissions; brake assemblies; engine valves; hydraulic valve lifters; tire valves; leaf springs; road speed controls; thermostats; automotive and truck air conditioning equipment and components; industrial lift trucks; rubber-tired tractor shovels; log skidders, tree harvesters, and other utility vehicles; chain and powered hoists; hydrostatic and hydraulic transmissions; locking differentials; power steering pumps; hose and tubing; viscous fan drives; forgings; fastening devices of all types; molded rubber products; worm gear speed reducers; mechanical and electrical adjustable speed drives and controls; magnetic, pneumatic and mechanical clutches and brakes; hydraulic motors, cylinders, couplers and rotary servo valves; pressure and flow control valves; appliance, plumbing, automotive, and heating controls, industrial electrical and electronic control devices and systems, commercial and military grade electrical and electronic control components, advanced electronic devices, sub-systems and systems, and low voltage products for secondary distribution of electricity; automated storage and retrieval systems; industrial tubing and reinforced hose; avionics and defense electronics; electronic test instrumentation; and commercial controls and fasteners.

In 1979, vehicles and vehicle components accounted for 49.0 percent of net sales (including intersegment sales) and 63.3 percent of operating profit, industrial products including electrical

aid electronic services 36.8 percent and 29.3 percent, and materials handling vehicles 14.2 percent and 7.4 percent. In 1979, foreign operations provided 26.1 percent of sales and 20.1 percent of net income.

Eaton is organized into five areas of operation: Automotive Components Group, the Industrial Group, the Instruments and Diversified Products Group, the Materials Handling Group, and the Truck Components Group.

Eaton's Automotive Components Group manufactures valves and valve lifters for all types of engines, leaf springs for cars and light trucks, speed controls for passenger cars, emission controls, grey iron castings, tire valves and other air control products, limited slip and locking differentials, viscous fan clutches, hydraulic motors and steering control units, power steering pumps, and hydrostatic transmissions, as well as air-conditioning and heating systems.

Eaton's Truck Components Group manufactures steering, suspension and driveline components used in heavy duty trucks.

Eaton's corporate worldwide research and development efforts are concentrated in five major corporate facilities. In Southfield, MI, Eaton operates its Engineering and Research Center, where product innovations are conceived and tested. For example, the center carries out the design and development of new generations of truck transmissions and braking systems; new developments in more energy-efficient systems for industrial vehicles; development of technical computer programs for better product design, testing analysis and advanced engine systems and component design.

Eaton also maintains a proving ground in Marshall, MI and R&D facilities in Cleveland, Milwaukee, and New York.

Eaton Engineered Fasteners Operations, serving the automotive and other industries, is a five-plant complex strategically located to serve the mass-producing industries of the U.S., Canada, and the world. It is headquartered in Cleveland, OH, the home of its Tinnerman brand fasteners. Hard fasteners, wire forms, and wire

products are manufactured in Massillon, OH. A precision stampings facility is located in Whippany, NJ. The Hamilton, Ontario, Canada facilities mirror those in Cleveland and serve as a manufacturing point, as well as a prime distributor for products manufactured in the U.S.

Precision stampings range from tiny electronic components to materials used for space travel. Eaton sales engineering services are available from five regional offices, which are supported by a network of commercial distributors and agents. Overseas licensees make Eaton products available throughout the free world.

PROPERTY - Co. and subsidiaries operate plants, warehouses, research facilities and offices at 83 locations in the U.S. and 49 locations in foreign countries (see Table 8).

SUBSIDIARIES - Co. has numerous subsidiaries and affiliates, most of which have the name Eaton or Cutler-Hammer in their titles.

● ECHLIN MANUFACTURING CO.\*

The company is headquartered in Branford, CT. It was incorporated in Connecticut Jan. 13, 1959, as Echlin Mfg. Co. of Connecticut, Inc., and on Apr. 21, 1959, merged Echlin Mfg. Co. a California concern. Predecessor was formed in 1936 and transferred its operations from California to Connecticut in 1939-40. May 4, 1959, Co. changed title to Echlin Mfg. Co.

Apr. 1, 1970, acquired the Automotive Division of Xebec Corp., consisting of the net assets and businesses of Ace Electric Co., Kansas City, MO, and Jameson Parts Mfg. Co., Van Nuys, CA. May 1, 1970, acquired the net assets of Unex Products Corp. In Dec., 1970, acquired the stock of Britannic and European Auto Products, Inc.

\*Sources: Standard & Poor's, 1980  
Ward's Automotive Yearbook, 1980

In Feb., 1971, acquired the businesses and substantially all net assets of Berg Mfg. & Sales Co., all shares of Berg Mfg. (U.K.) Ltd., Berg Mfg. (Canada) Ltd., and Berg Europa GmbH, and certain real estate leased by Berg Mfg. & Sales Co.

May 1, 1972, acquired Auto Pecas Henrique Schenk-Industria E. Comercio S.A., Brazil, maker of automotive electrical parts.

Company and subsidiaries make parts and supplies used to maintain or improve the efficiency and safety of motor vehicles. Electrical and ignition parts include contact sets, condensers, complete distributors, distributor caps, ignition coils, rotors, control modules, pick-ups, sensors, voltage regulators, ignition wire, automotive test equipment, parts for rebuilders of alternators, starters, and generators. The company also sells high performance ignition products. The company makes hydraulic brake parts for cars and light trucks, air and brake parts for trucks and trailers, air brake systems for the original equipment truck and trailer industry, and anti-lock systems. Other products include turbochargers for diesel and gasoline engines, carburetor repair kits, positive crankcase ventilation valves, small engine parts and forklift truck replacement parts.

In fiscal 1979, international sales provided 13.7 percent of volume (14.7 percent in fiscal 1978).

PRINCIPAL SUBSIDIARIES - wholly owned

Automotive Controls Corp.

Sierra Supply Co.

Ace Electric Co. Inc.

Tekonsha Engineering Co.

Peerless Instrument Co.

Roto-Master, Inc.

Kravex Mfg. Corp.

Inversora Sabana S.A.

Emboabas Industria E. Comercio Ltda.

Berg Mfg. (U.K.) Ltd.

Berg Europa GmbH

Lift Parts Mfg. Co., Inc.

Company has other subsidiaries with the name Echlin in their titles.

AFFILIATES - Echlin de Venezuela C.A., 50 percent owned; Carmel Electronics Ltd., 40 percent owned.

PROPERTY - Principal plants are owned in MO , MN, CT, IL (3) FL , Canada and England; and leased in KS. (4), IL, and CA. A laboratory is owned in CT (see Table 8).

The company's domestic automotive manufacturing divisions are listed below:

Automotive Controls Corp., Branford, CT, (ignition components switches)

Automotive Controls Corp., Independence, KS (alternators, voltage regulators, solenoids, switches).

Berg Mfg. Co., Iola, KS (brake system components and related hardware)

Brake Parts Co., McHenry, IL (brake system components/assemblies, related parts).

Kravex Mfg. Co., Miami, FL (automotive wire and cable products).

Lift Parts Mfg. Co., Des Plaines, IL (lift truck components/assemblies).

Peerless Mfg. Co., Niles, IL (test equipment, engine analyzers).

Roto-Master, Inc., North Hollywood, CA (turbochargers for gasoline/diesel engines).

Tekonsha Engineering, Tekonsha, MI (electric brake controls).

● ELTRA CORPORATION/PRESTOLITE DIVISION\*

The company is based in New York City, while its automotive products operation is centered in the Prestolite Division, headquartered in Toledo, OH. The company was incorporated in New York Dec. 16, 1895, as Mergenthaler Linotype Co. to succeed to a business of same name which in 1886 produced the first commercial linotype machine controlled by finger keys; present title adopted June 28, 1963.

Dec. 3, 1968, purchased for cash certain assets of General Battery & Ceramic Corp. for the Prestolite Division.

In July, 1970, acquired Independent Cable, Inc. Also in 1970, acquired a 50 percent interest in Terra Equities Corp. and a 25 percent interest in ATI, Inc.; and wholly owned Prestolite Co. acquired the electric motor division of Sangamo Co., Ltd.

Oct. 2, 1971, acquired Converse Rubber Co., maker of sports and leisure footwear.

Company, with subsidiaries, makes electrical products, including batteries, battery chargers, traction motors and complete electrical systems for electrical vehicles; batteries and control equipment for the standby power market; motors, alternators, connectors, generators, wire, cable, batteries, ignition systems and certain non-electrical components for the automotive and other engine market; telephone cable and related equipment; and phototypesetting systems, hot metal linecastings and printing presses for the graphic systems market. Through its Converse Rubber Co. Division, the company makes consumer products including athletic and recreational footwear such as basketball shoes (Converse All Stars), tennis shoes, wrestling shoes, fishing footwear, casual fashion footwear and other related sporting and recreational gear. They also coat belts and sleeves with rubber for the paper industry. The company also makes industrial products including zinc and aluminum die castings, with complete engineering, machining,

\*Sources: Standard & Poor's 1980  
"Automotive Industries," June 1980

assembling, decorative plating and painting capacity; gauges used to measure pressure, temperature and density; pipe fittings used in the plumbing industry for joining pipes and for similar functions; and refractories including fireclay, silica and basic brick, mortars, cements, plastics, castables, and gunning mixes used in industrial furnaces and other manufacturing applications where high temperatures are encountered.

Equilease Corp., a wholly owned, non-consolidated subsidiary providing financing for commercial and industrial customers through the leasing of equipment, had \$3,470,643 net income after taxes in fiscal 1978.

In fiscal 1978, electrical products provided 70.6 percent of net sales and 65.5 percent of net income (69.1 percent and 62.1 percent in fiscal 1977); consumer products 11.6 percent and 3.3 percent (13.8 percent and 2.3 percent); and industrial products 17.8 percent and 31.2 percent (17.1 percent and 35.6 percent). International operations provided 21 percent and 18 percent (19 percent and 9 percent).

Automotive products of the company are manufactured by the Prestolite Div., whose full line of electrical systems and other components are available to all OE and replacement markets.

Headquartered in Toledo, OH, Pretolite has 27 plants in the U.S. and Canada with more than 6000 employees. Twelve of these plants are battery plants; four are devoted to the production of DC motors, five to the production of automotive and allied electrical and electronic components and parts, and five to wire production. In addition, the company also has a die cast plant.

Prestolite Motor Div.'s products include DC fractional and traction motors, actuators, alternators, hydraulic cylinders, pumps and shocks and mechanical lifts. The Prestolite Electronics Div.'s products include ignition systems, spark plugs, points, coils, condensers, distributors, controls, ignitors, relays, solenoids, regulators, switches, PCV valves and starter drives.

Prestolite offers a full line of capabilities through its

Wire Div. which provides wire and cable for all automotive electrical systems including both primary and secondary circuits.

The Prestolite Battery Div. has the latest in batteries including two lines of maintenance free batteries, the Liberator and the Roughneck. The company manufactures batteries for everything from small engines to earth movers.

Woodstock Die Casting Div. provides castings for any need generated by the automotive industry. This covers everything from grille housings to taillight assemblies.

OTHER PRINCIPAL SUBSIDIARIES - wholly owned or noted

North American Refractories Ltd.

Linotype & Machinery Ltd.

Edwards & Jones, Ltd. - 95 percent

Mergenthaler International S.A.

Mergenthaler Linotype, G.m.b.H. - 65 percent

ELTRA of Canada Ltd.

Linotipo Mexicana, S.A. de C.V. (not consol.)

Continental Circuits Corp.

Underwriters Safety Devices Co.

C&D Batteries Leasing Corp.

Eltra of Puerto Rico, Inc.

Eltra Intl. Sales Corp.

Rockdale Buildings, Inc.

-Non-Consolidated Subsidiaries-

Linotype Argentina S.A.I.y C.

Linotype Italia S.p.A.

Linotipo do Brasil, S.A.

Linotype France, S.A.

Burrus Mills, Inc. - 94.25 percent

Sociedad Linotype Espanola, S.A.

Linotipo Maquinas Espanola, S.L.

Equilease Corp.

Unilease, Inc.

Unilease Ltd.

Equilease Co., Ltd.

Equilease Capital Corp.

Unilease Madison, Inc.

Ohio National Leasing Corp.

Utility Leasing Corp., Inc.

Carbolease, Ltd.

Apex Leasing Corp.

Mid-Am Truck Sales Inc.

Mid-Eastern Truck Sales, Inc.

Railway Equipment Corp.

Automatic Vendors Credit Corp.

Tractor Credit Corp.

Can-West Truck & Equipment Sales, Ltd.

Digi-Log Leasing Corp.

Gen-Com Systems Leasing Corp.

IVB Leasing Co.

Marine Natl. Leasing Co., Inc.

Companhia Acumuladores Prest-O-Lite - 99.8 percent

Sofratype S.A. - 89 percent

AFFILIATES - Linotype Nebiolo, S.A., 50 percent owned;

Kavanau Real Estate Trust, 21.2 percent owned.

PROPERTY - Co. operates 69 plants in North America, and 12 in England, Germany and Brazil; plus related engineering and distribution facilities. Most plants are owned (see Table 8).

In 1979 Eltra Corp., Prestolite's parent company, became a wholly owned subsidiary of Allied Chemical Corp. and one of the latter's four new operating companies.

● EX-CELL-O CORP.\*

The company is based in Troy, MI. It was incorporated July 10, 1919, in Michigan as ExCell-O-Tool & Mfg. Co. In July, 1929, title changed to Ex-Cell-O Aircraft & Tool Corp.; changed to present title April 8, 1937.

In fiscal 1972, discontinued XLO Computer Products unit, resulting in a \$3,044,779 net extraordinary charge.

Jan. 27, 1978, merged 15 percent-owned McCord Corp. McCord supplied components to automotive and agricultural equipment, manufacturers, and distributors.

Company and subsidiaries make the following products:

Industrial Equipment includes machine tools packaging and materials handling equipment, and cutting tools and abrasives. Products are used in the automotive, farm, construction, aerospace, diary, and food industries.

Automotive Components include armrests and headrests, instrument panel pads, flexible bumper systems, exterior body fascia, engine gaskets, heat transfer equipment, windshield washer systems, and instrument pointers supplied to original equipment and replacement parts markets.

Aerospace Products include turbine engine blades, vanes, spacers, rotor assemblies, hubs and discs, and fuel accessories sold to jet engine makers.

Ordnance includes wheeled armored vehicles, turret and gun control systems, power and stabilization systems and related products.

Other products include power transmission equipment, structural foam parts, computer peripheral equipment, sprayers and portable heaters, precision metal and plastic parts, contractors' tools, and farm equipment.

In fiscal 1979, industrial equipment provided 33.5 percent

\*Source: Standard & Poor's, 1980

of sales and operating revenues and 35.3 percent of operating profit (35.5 percent and 27.8 percent in fiscal 1978) automotive components 25.1 percent and 18.9 percent (25.6 percent and 23.5 percent), aerospace products 17.4 percent and 20.0 percent (16.0 percent and 22.3 percent), ordnance 8.4 percent and 11.9 percent (8.1 percent and 12.5 percent), and other 15.6 percent and 13.9 percent (14.8 percent and 13.9 percent). Export sales contributed 14.3 percent of sales and operating revenues in 1979 (12.8 percent in 1978).

SUBSIDIARIES - wholly owned

Accurate Bushing Co.

Atlantic Machine Tool Works, Inc.

Bryant Grinder Corp.

Cadillac Gage Co.

Chicago Gear Mfg. Co.

Greenlee Bros. & Co.

Greenlee Toll GmbH

Rockford Machine Tool Co.

Forest City Tool Co.

McCord Corp.

Davidson Rubber Co., Inc.

Davidson Rubber Co., Ltd.

J.H. Winn Inc.

Century Engineering Corp.

Company has other subsidiaries, several with the name Ex-Cell-O in their titles.

PROPERTY - Co. owns 52 and leases 3 plants or other materially important physical properties in 17 states, Canada, England and West Germany. In addition, Co. leases floor space at certain locations (see Table 8).

● FMC CORP.\*

The company is based in Chicago, IL. It was incorporated in Delaware, Aug. 10, 1928, as the John Bean Manufacturing Co. to acquire the Bean Spray Pump Co., founded in 1884. Name changed to Food Machinery Corp. July 24, 1929; to Food Machinery & Chemical Corp. Sept. 10, 1948, when Westvaco Chemical Corp. was absorbed in merger; and to present title July 1, 1961.

October 19, 1972, merged Wayne Manufacturing Co.

In 1972, acquired the net assets of Polarmatic Corp., maker of frozen confection equipment; Italiana Pack S.p.A., an Italian maker of wrapping equipment; and Galis Mfg. Division of A. M. Byers Co., maker of coal mining equipment.

In 1976, discontinued operations resulted in a net loss of \$34,350,000 up to the time of sale and mainly included the sale of company's Fiber Division, most of the assets of the Pump Division, and 50 percent interest in Ketchikan Pulp Co.

In July, 1977, increased interest in Foret, S.A., Barcelona, Spain, from 50 percent to 91 percent. In Aug. 1977, acquired remaining 66 percent interest in LPW Equipamentos Ltda., Sao Paulo, Brazil. In Nov., 1977 purchased all shares of Marine Colloids, Inc., Rockland, ME., maker of custom formulated hydrocolloids. In Dec., 1977, sold its 50 percent interest in Perto-Tex Chemical Corp.

In 1978, acquired remaining 25 percent interest in FMC Food Machinery Europe, N.V., Belgium, remaining 30 percent of FMC-Filsan Equipamentos para Sanesmento S.A., Sao Paulo, Brazil, and 100 percent of shares of Sun Cleanser Co., Livonia, MI, and P.E. Van Pelt, Inc., Oakdale, CA.

\*Source: Standard & Poor's, 1980.

Company makes a diversified line of products including chemicals, machinery, and equipment. It also makes equipment and materials for the Armed Forces.

In 1979, industrial chemicals accounted for 22.9 percent of sales before eliminations and 32.6 percent of operating profits from continuing operations (23.1 percent and 30.7 percent in 1978), government and municipal equipment 15.8 percent and 24.2 percent (17.0 percent and 18.6 percent), food and agricultural machinery and chemicals 18.5 percent and 15.9 percent (18.3 percent and 18.0 percent), material and natural resource handling equipment 21.8 percent and 16.7 percent (22.4 percent and 23.6 percent), construction and power transmission products 16.8 percent and 7.9 percent (15.6 percent and 7.7 percent), and special products 4.2 percent and 2.7 percent (3.6 percent and 1.4 percent). Foreign sales accounted for 27.3 percent of total sales in 1979.

Industrial chemicals include chlor-alkalis-caustic soda, chlorine, soda ash; solvent chemicals - carbon tetrachloride, carbon bisulfide; petroxygen chemicals - hydrogen peroxide, persulfates, perborates; phosphorus and phosphates - phosphoric acids, sodium and potassium phosphates; barium and strontium chemicals; dry bleach chemicals; organic chemicals - organic phosphate chemicals and plasticizers, glycerine, alkyl alcohol, acetic acid, organic intermediates; and microcrystalline cellulose.

Government and municipal equipment includes tracked personnel carriers, automatic naval gun mounts and automated guided missile launching systems; fire fighting apparatus, and industrial street sweepers.

Food, agricultural machinery, and chemicals include machinery used to prepare and process canned and frozen food, to portion and package convenience foods and to prepare, process and pack fresh fruits and vegetables and other food products; packaging machinery to make set-up paper boxes to form and fill bags, pouches, and cartons to wrap and pack-in flexible films, sprayers, dusters, cutters, tilthers and crop harverters; and insecticides, nematicides, and fungicides.

Material and natural resource handling equipment includes a broad line of conveying, elevating, and processing equipment; small parts handling and assembly equipment; vibratory equipment; airline loading equipment; railcars and barges; coal preparation plants and handling systems for metallic and non-metallic mining; underground coal mining equipment (root drills, portal buses for transporting miners, and shuttle cars for transporting coal); petroleum and fluid control equipment (valves, unions wellhead completion units, and tanker loading systems); air and water treatment systems; and semiconductor devices. The company also provides engineering services for special purpose design and manufacturing to automate and systemize production processes and end-product warehousing and distribution.

Construction and power transmission products include power cranes, hoes, shovels, draglines, and clamshells; hydraulic cranes and excavators, woodlands equipment; and ball and roller bearings, drive and conveyor chains and sprockets, speed reducers, variable speed drives, electromagnetic clutches and brakes, and solenoid controls for industrial equipment.

Special products include automotive engine diagnostic equipment, wheel balancers and aligners, non-metallic strapping, lawnmowers and light tractors, and marine boiler feed pumps.

PRINCIPAL ACTIVE SUBSIDIARIES - wholly owned or noted

Surety International Ltd.

Chicago Pump Co.

Intertrade Corp.

Foret, S.A. (91 percent)

Marine MCI Corp.

Marine Colloids Intl.

Marine Colloids Ltd.

Acadian Sea Plants Ltd. (51 percent)

Atlantic Mariculture Ltd. (51 percent)

Marine Colloids (Philippines)

Intermountain Realty Corp.

Plasticos Extrudios, S.A.

Electro Quimica Mexicana, S.A. (50.5 percent)

Intermountain Research & Development Corp.

Company also has a number of subsidiaries with the names FMC or Wayne in their titles.

PRINCIPAL ACTIVE AFFILIATES - 50 percent owned or noted

Avicon, Inc.

Malco Industries, Ltd. - 12.9 percent owned

Oriental Chain Mfg. Co., Ltd - 25 percent owned

Tokai Denka Kogyo, K.K. - 25 percent owned

FMC Maroc. S.A.

Food Machinery Espanola, S.A. - 40 percent owned

Chlor-Chem. Ltd.

British Cardboard Box Machine Co., Ltd.

● FACET ENTERPRISES, INC.\*

Company headquarters are in Tulsa, OK. It was incorporated in Delaware, Feb. 10, 1975, as a wholly owned subsidiary of Bendix Corp. and on Mar. 31, 1975, acquired several businesses (oldest of which was established in 1883) of Bendix and its wholly owned Fram Corp. Apr. 1, 1976.

Company makes filters for automotive, aerospace and air conditioning applications; automotive components such as starter drives, carburetors, fuel pumps, and electric clutches; bicycles; and environmental protection and waste treatment equipment. Plant and warehouse facilities are in 11 states (see Table 8).

\*Source: Standard & Poor's, 1980

SUBSIDIARIES - wholly owned - Campbell Filter Co.; Facet Cycle, Inc.; Facet Export Corp.

AFFILIATE - Facet Iberica, S.A., 50 percent owned.

● FEDERAL-MOGUL CORP.\*

The company is based in Southfield, MI. It was incorporated in Michigan May 1, 1924, as Federal-Mogul Corp. to acquire properties and business of Muzzy-Lyon Co. (organized in 1899) and properties and business of Federal Bearing and Bushing Corp. (organized in 1915). Name changed to Federal-Mogul Bower Bearings, Inc. July 29, 1955, and to present title Apr. 30, 1965.

In Oct. 1970, acquired a controlling interest in Johnson Bronze do Brasil, maker of sleeve bearings. In Dec. 1970, acquired an interest in Manufacturas Metalicas Linan, S.A., maker of shaft seals.

Oct. 21, 1976, acquired Robert G. Evans Co., a maker and supplier of industrial saws.

Company and subsidiaries make and distribute vehicle and machinery components, consisting of engine and transmission products, including thin and heavy-wall engine bearings, bimetal bushings and washers, and pistons; ball and roller bearings, including cylindrical, tapered, and ball bearings; precision forged products; and sealing products, such as oil seals, O-rings, and gaskets. Other products include metal and masonry cutting tools, grinding wheels, industrial saws, and bearing spindles, and aerospace products. Certain products distributed by company in the automotive, truck, construction equipment, and industrial replacement markets, are made by others.

In 1979, engine and transmission products provided 34 percent of net sales (34 percent in 1978); ball and roller bearings 29 percent (33 percent); sealing products 17 percent (20 percent); and other products 20 percent (13 percent).

\*Source: Standard & Poor's, 1980

PRINCIPAL SUBSIDIARIES - wholly owned or noted - G. Trione & C. S.p.A. (Italy) - 69 percent owned; Hanaver Machine Works, Inc; Manufacturas Metalicas Linan S.A. (Mexico), Femo (Pty) Ltd. (So. Africa).

Company has numerous other subsidiaries with the name Federal-Mogul in their titles.

PROPERTY - company has 28 plants throughout the U.S. and eight plants in seven countries. Co. also has 55 warehouse and distribution centers. (See Table 8.)

● FIRESTONE TIRE AND RUBBER CO.\*

The company, based in Akron, OH, was incorporated in Ohio Mar. 4, 1910, as successor to a West Virginia corporation of same name incorporated in 1900.

In Oct. 1970, acquired a 65 percent interest in Radiation Dynamics Inc. for company's 50 percent interest in Radiation Processing Inc. (which had been jointly owned by the two concerns). In Nov., 1974, company sold its interest in Radiation Dynamics, Inc.

In fiscal 1971, sold minority interest in Phoenix Gummiwerke A.G., which marketed Firestone tires in West Germany.

In Sept. 1973, acquired the remaining majority interest in Fabrik für Firestone Produkte A.G.; name later changed to Firestone Switzerland Inc.

Company is a leading producer of tires and other rubber products, synthetic rubber, natural rubber, rim and wheels for vehicles other than passenger cars, and automotive seat belts and shoulder harnesses. The company also makes plastics, textiles, metal products, and other industrial goods; operates a chain of retail stores, selling its own products and distributing a varied line of household appliances, home and garden supplies, recreation and automotive items; distributes tires, batteries, and accessories through department stores; and furnishes the

\*Source: Standard & Poor's, 1980

government with research and production of many defense items.

In the fiscal year ended Oct. 31, 1979, operations in tires and related products accounted for 78 percent of sales and 54 percent of profits (79.9 and deficit of 660.9 percent, respectively in 1978); chemicals accounted for 13 percent of sales and 22.8 percent of profits (11.7 percent and 234.8 percent in 1978); metals and industrial rubber accounted for 13.2 percent and 326.1 percent in 1978). Included in these sales are 4.9 percent interdivisional sales in 1979 (4.8 percent in 1978).

Foreign subsidiaries provided 33.1 percent of sales (excluding interarea sales) and 21.1 percent of operating profit in fiscal 1979 (32.5 percent and 287.0 percent in fiscal 1978).

Major products include:

Tires for automobiles, aircraft, earth-moving equipment, trucks, motorcycles, trailers, buses, tractors, farm implements and industrial equipment for sale in the original equipment market to Ford, General Motors, Chrysler, and others, and in the replacement market through independent dealers, private brand marketers, oil companies, and company-owned and operated stores and leased departments.

Rubber - Natural rubbers and latices; synthetic rubber polymers and latices; natural and synthetic latex compounds; rubber-carbon black and rubber-resin masterbatches; and reclaim rubber.

Foam Products - Polyurethane foam for mattresses, pillows, furniture, carpet and automotive cushioning, pads, slabs; urethane foam for filtration packaging display, insulation and floatation.

Metals - Rims and wheels for trucks, buses, tractors, trailers, earth-moving equipment, and industrial applications; bumpers for buses; hub and brake drum assemblies for trucks, trailers, and buses; axles, hubs and spindles for farm implements and industrial applications; steel and aluminum stampings and fabrications; stainless steel containers for soft drinks, beer, milk, and acid, pre-mix beverage dispensers and barrels; milk cans; steel tire cord; and other metal products.

Plastics - Calendered film, resin and sheeting for industrial, commercial, and household uses.

Industrial Products - Automotive and fractional h.p. radiator hose; engine mountings; vibration isolators; Airide springs for trailers, trucks, and buses; Airmounts for isolation and actuation of industrial machinery; Air-Bloks for dunnage; hose for home appliances and railroad brakes. Flexite expansion joint material; molded goods; farm implement rolls; Fabritanks for transporting and storing liquids and dry materials; gaskets; rubber-to-metal molded parts; bushings, grommets; seat belts, shoulder harnesses, and other automotive safety equipment; and washers and other extruded, molded, and fabricated products.

Textiles - Nylon, steel and polyester tire cord; heavy denier nylon and polyester multifilament yarn for tire cord and industrial use; extruded monofilaments; nylon monofilament and cotton chafer fabrics, coated fabrics; and rubbercoated nylon liquid storage tanks and dams.

Chemicals - Butadiene; nylon resins; styrene resins; phenolic resins; vinyl stabilizers; chemical dispersions for natural and synthetic latices; Latite anti-corrosion coatings for metals; papercoating latex for decorative and functional uses; butadiene-styrene copolymer resins and latices; adhesive chemicals; reclaiming agents; fluorine containing vinyl resins; polyvinyl chloride homopolymer and copolymer resins and latices for many applications, including calendered film and sheeting, extruded shapes, electric wire and cable covering, injection molding, plastisol coating and molding, protective coating, and floor covering.

Defense Products - Tank tracks and rollers; inflatable rubber boats and floats; collapsible fuel systems; trailers and dollies; fuel cells, ship fenders, tires and tubes for all types of defense vehicles and aircraft; aircraft landing membranes; vehicle flotation devices; portable liquid and dry materials storage tanks; shock mitigation devices; urethane; transportable pneumatic structures; and military and aerospace research and development in many fields.

PROPERTY - Oct. 31, 1979 Co. operated 98 plants - 56 in the U.S.; 7 in Canada; and 35 in numerous foreign countries (see Table 8).

Company also operates rubber plantations in Brazil, Ghana, Liberia (2), and the Philippines and an experimental plantation in Guatemala. Other properties include more than 2,100 stores and numerous leased departments, mainly in department stores, for the sale of tires and related products directly to consumers, as well as warehouses to supply merchandise to such outlets.

SUBSIDIARIES - wholly owned or noted

Brema S.p.A., Italy (80 percent owned)

Ghana Rubber Estates (Ghana) (53 owned)

L & C Marine Transport, Ltd. (Bermuda)

Corry Foam Intl., Inc. (51 percent owned)

Harbell Fire & Casualty Co., Ltd. (Bermuda)

U.S. Liberia Radio Corp.

U.S. Trading Co. (Liberia)

Ravenna Arsenal, Inc.

Company also has numerous other wholly owned subsidiaries, with the name Firestone in their titles.

● FRUEHAUF CORP./KELSEY-HAYES CO.\*

The company, based in Detroit, MI, was incorporated in Michigan Feb. 27, 1918, as Fruehauf Trailer Co. successor to business established by August C. Fruehauf in 1897. Present title adopted May 2, 1963.

July 1, 1970, Deutsche Fruehauf GmbH & Co. KG became a wholly owned subsidiary when 50 percent of its common shares was acquired by Fruehauf International, Inc.

Early in 1973, acquired Bellinger Shipyards. In mid-1973, sold real estate and equipment of Clifton, N.J., railcar facility, Oct. 31, 1973, merged Kelsey-Hayes Co. into wholly owned Fruehauf Manufacturing Co.

Company engages in the manufacture, sales, leasing, financing, distribution, and servicing of transportation equipment and components.

In 1979, automotive operations provided 32 percent of revenues (34 percent in 1978), trailer operations 58 percent (55 percent), and maritime and aerospace operations 10 percent (10 percent).

AUTOMOTIVE OPERATIONS - Products include wheels, hubs, drums, drum and disc brakes, disc brake rotors, and skid control braking devices, and related components for passenger cars and trucks for the original equipment and replacement markets; and disc brakes, complete running gear, and components for agricultural vehicles, mobile homes, travel trailers, and other recreational vehicles. The company also develops high technology products from powdered metal alloys.

TRAILERS OPERATIONS - Company is the world's largest maker of truck trailers (under names Fruehauf or Hobbs), containers, and container chassis. Truck trailers with various body and

\*Sources: Standard & Poor's 1980  
"Automotive Industries," June 1980

chassis designs and varying load capacities, include van, refrigerated, platform, liquid and bulk tank, dump and heavy-duty flat deck. Company makes trailer axles, suspensions, and other components and sub-assemblies for original equipment makers, and sells traded-in or repossessed truck trailers, and services others' trailers. Containers, used for shipment of cargo, may be interchanged among trucks, railcars and ships.

Company provides truck trailers to common carriers and industrial users on short term rental and long term lease bases.

MARITIME AND AEROSPACE OPERATIONS - Maryland Shipbuilding & Drydock Co., wholly owned, operates a shipyard in the Port of Baltimore, which mainly engages in ship repair. It also makes condensers, feedwater heaters, evaporators, and other heat transfer equipment for central station electric power plants, process industries and marine propulsion applications. Jacksonville Shipyards Inc., wholly owned, is engaged in drydocking, new ship construction, and repair work on commercial and military vessels. Maryland Shipbuilding and Jacksonville Shipyards have a total of 10 drydocks, which are among the largest on the East and Gulf Coasts.

Paceco, Inc., wholly owned, makes material handling equipment for container and bulk handling, mainly used in dockside loading and unloading; also makes barges, gates and hoists for dams, and cranes for transferring containers to and from ships, container chassis, and railcars.

Aerospace products include blades for jet aircraft engines and stationary turbines, transmission systems for military helicopters, and hydraulic components for military aircraft.

SUBSIDIARIES - wholly owned or noted

Fruehauf Trailer Co. of Canada, Ltd. - 91.4 percent

Trailer Acceptance Co. Ltd.

Trailer Rentals, Inc.

Jacksonville Shipyards, Inc.

Electro Lube Devices, Inc.

Maryland Shipbuilding & Drydock Co.

Fruekel, Inc.

Paceco, Inc.

Paceco International, Ltd.

\*Fruehauf Finance Co.; separately described

\*Transport Acceptance Corp.

\*Mercer Co.

Rentco Intl. Corp.

Kelsey-Hayes Co.

Kelsey-Hayes Canada, Ltd. - 72 percent

Company has other subsidiaries with the names Fruehauf or JAX in their titles.

PROPERTY - Dec. 31, 1979. Company operated 57 major plants in the U.S. and Canada, and 19 in other countries. Company also operated shipyards with 10 drydocks, on the East Coast (see Table 8).

Fruehauf's automotive components operations are concentrated in the Kelsey-Hayes Co. headquartered in Romulus, MI.

Kelsey-Hays presently supplies automotive manufacturers in the U.S., Canada, Latin America, and Europe with its product lines - steel and aluminum wheels, brake assemblies and components for both disc and drum brakes, spindle and wheel bearing units, transmission bands, and skid control for passenger cars and trucks. It also supplies the truck industry with air disc brakes, air relay valves, automatic slack adjusters, steerable drive axles and transfer cases, and heavy-duty wheels and brake drums.

In addition to exhibiting diversified manufacturing skills, Kelsey-Hayes has initiated R&D programs in several product areas.

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\*Non-consolidated

One major breakthrough has been the development of the fabricated aluminum wheel, saving up to 40 percent in weight over comparable steel wheels. Fabricated from rolled stock by conventional production methods, it can be manufactured to fill high-volume requirements. The aluminum surface lends itself to a wide range of decorative finishing.

The company recently introduced disc brakes incorporating a new low-drag (LD) design, presently producing them for U.S., European and Latin American car manufacturers. LD brakes provide uniform lining wear, increased brake life, reduced maintenance, and improved performance. New material alternatives such as aluminum caliper housings and composite brake rotors could save up to 40 percent in weight.

Kelsey-Hayes is also developing a wide range of mechanical and structural high-performance automotive components of light-weight composite materials. Weight savings of 60 percent could be realized using advanced processing techniques.

Kelsey-Hayes also makes a new front-drive spindle and wheel bearing unit offering improved performance, lower costs and less maintenance.

● GKN Ltd.\*

The company's acronym stands for GUEST KEEN & NETTLEFOLDS LTD., a U.K. corporation based in London, England. Its North American operations are centered in Troy, MI.

The company is engaged in the following main businesses:

- Automotive Components
- General Steels
- Special Steels and Forgings
- Fasteners

\*Source: Annual Report for 1979

- Wholesale and Industrial Distribution (including aftermarket automotive products)
- Industrial Service

Automotive products manufactured by GKN include: transmissions and power take-off equipment - ancillary gear drive units, axles and spiral bevel gears, clutches, agricultural and industrial drive shafts and coupling systems, overdrive units, propeller shafts, universal and constant velocity joints, bearings, bushes, camshafts, circlips, connecting rods, crankshafts, cylinder liners, fasteners, gudgeon pins, pistons, piston rings, push rods, thrust washers, valve rockers and rocker arms, steering joints, steering and suspension ball studs, suspension joint assemblies, aluminum and steel wheels, bumpers, chassis frames, fully assembled cabs for trucks and tractors, complete armoured vehicles, garage equipment, malleable castings, and a wide range of sintered metal parts.

Transmissions operations worldwide continued to benefit from the expansion of the production of front-wheel drive passenger cars requiring constant velocity joints. Manufacturing capacity in Europe is being expanded in line with demand for these components which have application also for vehicles with independent rear suspension. The new North American plant at Sanford, NC, was due to be commissioned in May 1980 and a second, larger plant is under construction in Alamance County, NC. Supported by an evaluation, test and prototype facility at Troy, MI, these plants will meet part of the requirements of the North American market. The level of demand for universal joints and propeller shafts also improved and new and more compact designs have found good customer acceptance. Against the trend of a general decline in the agricultural machinery industry, sales of agricultural power take-off shafts and couplings increased and European facilities for these products operated at a high level of capacity utilization.

Modernization and expansion are also being undertaken at the axle plants, situated in the United Kingdom, which produce a wide

range of axles and ancillary gear drive units for on- and off-highway applications. New markets for drive units have been developed including agricultural machinery, tracked military vehicles and road making equipment. Exports from the U.K. amounted to 26 percent of sales.

The demand for tractor cabs and tractor wheels improved slightly but that for truck cabs, chassis frames, and truck wheels was depressed by industrial relations problems at customers' works and by a program of destocking by manufacturers. Sales in these product ranges to the United States showed improvement, although in the later months of the year, exports of aluminum alloy wheels fell as the North American passenger car market faced some decline.

The acquisition of the Sheepbridge (U.K.) group of companies added a complementary range of engine parts to the bearings, bushes, and other engine components already produced, and plans are well advanced for expanding the range of piston, piston rings, and cylinder liners.

There was buoyant demand on the Indian operations from the indigenous truck, tractor, and scooter markets for a wide range of components including brake shoes, anchor plates and pressings, for which production facilities are being expanded.

The company produces automotive driveline components in plants located in the U.K., West Germany, France, Italy, Ireland, and U.S. Other products are made in plants located in Australia, New Zealand, South Africa, Brazil, and Spain. (See Table 8.)

● GOODYEAR TIRE AND RUBBER CO.\*

The company, based in Akron, OH, is principally engaged in the development, production, and distribution of tires and other transportation-related products. These products (including new tires and tubes, retreads, wheels, rims, automotive belting, hose,

\*Sources: Standard & Poor's, 1980.  
"Automotive Industries," June 1980.

molded parts, foam, auto accessories and repair services, and merchandise purchased for resale) accounted for 83.3 percent of net sales and 71.0 percent of operating income in 1979 (84.3 percent and 83.3 percent, respectively, in 1978). The balance of net sales and operating income was derived from various lines of business, including aerospace systems and components, chemicals, shoe soling materials, films, graphic products, and industrial rubber products. Sales to unaffiliated foreign customers provided 38.5 percent of total revenue in 1979 (36.2 percent in 1978).

**TIRES AND TUBES** - Company makes rubber tires and tubes for automobiles, trucks and buses, tractors and farm implements, earth-moving equipment, airplanes, motorcycles, and for various industrial uses. Several lines of tires featuring a combination of polyester cords and fiberglass belts are marketed under the name Polyglas. Company has several major lines of radial passenger tires, including the CUSTOM POLYSTEEL, CUSTOM THREAD, TIEMPO, and ARRIVA, using polyester cords with steel and fabric belts. Company also produces two lines of radial truck tires, one using fabric and steel and the other using all-steel construction; and makes retreading materials for aircraft tires.

**WHEEL, RIM, AND AUTOMOTIVE PRODUCTS** - include rims, wheels, hubs, brake drums, discs and rotors, and related products for passenger cars, trucks, buses, earth-moving equipment, and construction vehicles; heating and air conditioning equipment for mobile and module homes and recreational vehicles; automotive belts and hose products, air springs, engine mounts; rubber, urethane, and fiberglass body and polyurethane used as seating cushioning material and safety padding.

In addition to products of its own manufacture, company sells to dealers and through its own stores, a variety of items made by others. These include auto accessories, televisions and stereos, household appliances, home and garden equipment and supplies, and recreation equipment.

INDUSTRIAL AND ENGINEERED PRODUCTS - include belts and belt-  
ing, such as conveyor, transmission, elevator and V-belts; hoses  
for handling air, steam, oil, water, gasoline, and dry materials;  
tank and pipe lining; noise abatement materials; sheet packing;  
dock fenders; various auto body parts; rubber railroad crossings,  
urethane and fiberglass components for furniture, agricultural  
equipment and appliances; tank tracks; molded and extruded pro-  
ducts; and mattress cores and seating.

AEROSPACE PRODUCTS - include aircraft wheels; brakes and  
anti-skid systems; fuel cells; collapsible liquid containers made  
of rubberized fabric and other rubberized fabric products; plastic  
canopies and windows; guidance and navigation systems; missile  
transportation and radar systems; and electronic countermeasures.

CHEMICAL PRODUCTS - Company makes organic chemicals used in  
rubber and plastic processing; synthetic rubbers and rubber latices,  
vinyl resins and latices; polyester resins for textiles, films, and  
coatings; and adhesives.

FILMS AND FLOORING PRODUCTS - Company makes films for the  
packaging and food industries and for other purposes; vinyl  
laminating films and other rigid and flexible films; and printed  
woodgrain and opaque finishes for furniture and kitchen cabinets.

SHOE AND GRAPHIC PRODUCTS - Company makes heels, soles, and  
strips from rubber and other materials; and engraving rubber,  
matrix engraving rubber, and gums for the printing industry.

PRINCIPAL SUBSIDIARIES - wholly owned or noted -

Kelly-Springfield Tire Co.

Lee Tire & Rubber Co.

Renee Films Corp.

Motor Wheel Corp.

Gummiwerke Fulda GmbH

Litchfield Park Properties

Gran Industria de Neumaticos Centreamericana, S.A.  
(78.8 percent)

Cosmonex, Inc.

Luxwire S.A.

Company has numerous other subsidiaries with the name Goodyear in their titles

PROPERTY - Company at Dec. 31, 1979, operated 58 plants in 26 states, and 48 plants in 28 foreign countries; and had manufacturing affiliations in 8 foreign countries (See Table 8.)

Rubber plantations are operated in Brazil, Guatemala, Indonesia (2) and the Philippines (2).

The automotive hardware business is represented by the Motor Wheel Corp., a wholly owned subsidiary of the Goodyear Tire & Rubber Co. which manufactures styled wheels for passenger cars, vans and light trucks. Motor Wheel original equipment automotive products also include brake drums, hubs, and rotors.

The company has been building wheels for more than 50 years. The Automotive Div., headquartered in Lansing, MI, includes six plants in the U.S. and Canada.

Motor Wheel is credited with a number of "firsts" in the industry. The latest achievement involves a new method of manufacturing original equipment plain wheels. The process, called Centruel/Pierce, brings into better concentricity the three critical wheel diameters - tire bead seat diameter, pilot hole diameter, and stud hole bolt circle diameter. Because wheel uniformity is improved Centruel/Pierce wheels contribute to lower vibration, smoother ride and handling and reduced brake pedal pulsation.

First with original equipment stamped steel styled wheels, Motor Wheel Corp. continues to supply U.S. manufacturers with stamped steel designs.

Polycast is a popular Motor Wheel trademark for urethane designs molded on strength- and safety-proven, steel wheel "backbones." Polycast wheels give automakers advantages of vast design capability, economy, and fast design change. A new style Polycast wheel can come off the production line in as little as 16 weeks after design approval, especially advantageous for short runs and limited editions. Polycast wheels can be seen today as standard or optional equipment on many new model cars.

Work is proceeding on development of wheels made with high strength, low alloy (HSLA) steel, as well as composite wheels manufactured with fiber-reinforced resin.

● GOULD INC.\*

Headquartered in Rolling Meadows, IL, the company was incorporated Oct. 15, 1928, in Delaware as successor to National Lead Battery Co., which began to make storage batteries in 1918; name changed to Gould-National Batteries, Inc. Aug. 1, 1950, and to present title June 18, 1959.

Mar. 17, 1969, acquired all shares of Bers & Co. Apr. 30, 1969 merged Bomax, Inc., Watertown, N.Y. July 31, 1969, merged 20 percent owned Clevite Corp. Company acquired its 20 percent interest in Clevite Mar. 21, 1969, from U.S. Smelting, Refining & Mining Co. Company sold nickel-cadmium battery plants of Sonotone Division of Clevite Corp. at Cold Spring (102,000 sq. ft.) and Roe Park, N.Y., and the carbon-zinc battery operations of Marathon Battery Division in St. Paul MN, and Wausau WI, to Business Funds, Inc. Aug. 28, 1969, acquired the assets and business of H. W. Tuttle & Co., Tecumseh, MI. In Oct. 1969, acquired the Power Sources Division of Technical Operations, Inc., Burlington, MA. Dec. 24, 1969, merged Milwaukee Plastics, Inc.

In June, 1970, sold Piezo-Electric Division.

In Sept. 1970 acquired for about \$4,500,000 cash Ferralloy, Inc.

\*Source: Standard & Poor's, 1980.

Dec. 30, 1971, acquired Beta Instrument Corp.

Feb. 2, 1972, purchased the Medical Systems Division of Smith Kline Instruments, Inc. Feb. 8, 1972, acquired Contardo S.p.A. Milan, Italy, producer of heating and air conditioning equipment. June 12, 1972, acquired Century Electric Co., St. Louis, maker of integral horsepower electric motors and generators. In June, 1972, also acquired Axios, S. A., Sao Paulo, Brazil.

Acquired 23.2 percent of the shares of I-T-E Imperial Corp. through Jan. 16, 1976, and the remaining 76.8 percent in Apr. 1976. I-T-E designed and made equipment for the distribution transmission and control of electricity and products to convey, connect, and control fluid energy.

NEW JOINT VENTURE - Jan. 31, 1979, Company and BBC Brown, Boveri & Co., Ltd (BBC) formed an equally-owned joint venture to conduct the U.S. operations previously conducted by company's Electrical Systems Group (ESG). Company contributed certain technology and the operating assets of ESG in the U.S. to the partnership, which assumed certain liabilities related to ESG's U.S. operations. BBC contributed about \$49,000,000 in cash to the partnership. Company also agreed, subject to receipt of certain Canadian governmental approvals, to transfer the operating assets of ESG's Canadian operations (and all shares of an Australian subsidiary) to a Canadian joint venture to be formed with BBC. ESG made switchgear for electric power distribution, substations for use by electric utilities, power circuit breakers, disconnecting switches, porcelain insulators and transformers, and climatized power distribution centers.

Company makes electrical and industrial products.

Dec. 31, 1978, the company operated 101 plants in 27 states, and 36 plants in 12 foreign countries (see Table 8).

ELECTRICAL PRODUCTS - include automotive, industrial, and nickel-cadmium batteries; recording instruments, oscilloscopes, transducers, electronic testing and measuring equipment, programmable controllers and other precision measuring instruments;

copper foil; electric motors and generators; torpedos, marine instruments, training devices and simulators, and passive sonar systems; electrical distribution equipment; industrial control equipment; and construction products.

INDUSTRIAL PRODUCTS - include bearings, bushings, powder metal products, rubber-metal elastomer products, mechanical seals, precision engine parts, brake drums and discs, and fluid control products.

SUBSIDIARIES - wholly owned

Wilkening Mfg. Co. Ltd.

I-T-E Imperial Corp.

Imperial Eastman Corp. (Canada) Ltd.

Godart-Statham GmbH

Company has other subsidiaries with the names Gould, Clevite, Bio-Mation, Hoffman, Modicon, or I-T-E in their titles.

● GULF & WESTERN MANUFACTURING CO.\*

The company's parent, Gulf & Western Industries, Inc. is based in New York City, and is comprised of eight major groups:

- Manufacturing Group
- Natural Resources Group
- Automotive Replacement Parts Group
- Leisure Time Group
- Consumer and Agricultural Products Group
- Paper and Building Products Group
- Apparel Products Group
- Financial Services Group.

\*Sources: "Automotive Industries," June 1980.  
Standard & Poor's, 1980  
Corporate Annual Report

The Manufacturing Group is the largest of the eight groups and is headquartered in Southfield, MI. It is a major supplier to the automotive industry.

Gulf & Western Manufacturing has major capabilities in the following areas: lightweight materials, both metal and plastic; electrical and electronic components; and across-the-board design and application engineering capability coupled with 25 OEM-related production facilities in the U.S., Canada, Mexico, and the Dominican Republic.

Manufacturing's FCM Division, with plants in the U.S. and Canada, was the pioneer in chrome-plated plastics for exterior automotive use (1969). The division continues to expand its molding and plating capabilities.

Bohn Aluminum and Brass Division designed and is producing pistons for diesel engines powering U.S.-built passenger cars and light- and heavy-duty trucks.

General Products/Glasgow Industries Divisions, with plants in the U.S. and Dominican Republic, developed the first Hall Effect-based electronic ignition system to be approved for use on military vehicles.

In total, Manufacturing sold more than \$300 million in products to OE markets in fiscal 1979, including passenger cars, light- and heavy-duty trucks, off-highway and farm implements. Similar sales in 1978 were approximately \$275 million.

The Gulf & Western Manufacturing units serving OE-automotive markets includes: Bohn Aluminum and Brass; Gulf & Western Stamping; FCM-USA and FCM-Canada; General Products; Michigan Plating and Stamping; Young Spring and Wire; Windsor Bumper; Glasgow Industries; O & S Manufacturing; Pennsylvania Malleable Iron; Monroe Steel Castings; Producciones Automotrices, S.A. (Mexico); and Buckeye Forge. In all, G&W Manufacturing operates 74 plants in the U.S. and 13 plants in foreign countries (see Table 8).

Gulf & Western's replacement parts operations are handled by 84 percent-owned A.P.S. Inc., which distributes automotive

and motorcycle parts, industrial and electrical products, and marine hardware and supplies; and makes and sells automotive batteries and motorcycle accessories. Sales of automotive replacement parts represented:

	<u>1979</u>	<u>1978</u>
Dollar Amount:	\$391.8 million	\$350.1 million
Percent of total Corp. Sales:	7.4	8.1

● HOOVER UNIVERSAL INC.\*

The company, based in Saline, MI, was incorporated in Michigan, Sept. 23, 1975, under the name Hoover Ball & Bearing Co. of Michigan as a wholly owned subsidiary of Hoover Ball & Bearing Co. (DE), and on Aug. 1, 1976, Co. merged its parent on a share-for-share basis and adopted parent's name; present title adopted Jan. 17, 1978.

Former parent was incorporated in Delaware Sept. 23, 1968, as a wholly owned subsidiary of Hoover Ball & Bearing Co. (Michigan), and Dec. 31, 1968, merged its parent, share-for-share. Hoover Ball & Bearing Co. (Michigan) was incorporated in Michigan Mar. 12, 1913, as Hoover Steel Ball Co. and changed name to Hoover Ball & Bearing Co. in 1936.

In May, 1970, acquired all shares of Sanford Co., Inc., Sanford Construction Co., Inc., and American Modular Homes Corp. (operations of latter suspended early in 1972).

Sept. 15, 1971, acquired Franklin Aluminum Co. Inc., maker of aluminum products for the construction, automotive, and appliance industries.

In fiscal 1972, sold the business of wholly owned Guild Molders, Inc. for 15 percent of Risdon Mfg. Co.; acquired for cash

\*Sources: Standard & Poor's, 1980  
Wards Automotive Yearbook, 1980.

the plastic plumbing line of Certron Corp.; and acquired Karts, Inc., maker of a line of boat and snowmobile trailers.

Company and subsidiaries make steel products, which accounted for 36.0 percent of net sales and 52.1 percent of pretax earnings in fiscal 1979 (38.2 percent and 50.3 percent in 1978); plastic products and machinery 42.0 percent and 29.9 percent (37.4 percent and 28.1 percent); aluminum zinc, and brass products, 13.5 percent and 17.4 percent (15.3 percent and 17.9 percent); and other products, 8.5 percent and 0.6 percent (9.1 percent and 3.7 percent). In fiscal 1979, Ford Motor Co. provided 16 percent of total sales, General Motors 15 percent, and Chrysler 4 percent.

Steel products include seat frames and springs and component parts for the automotive industry; springs and other steel components for mattress foundations; hardware and fixtures for use in sofa beds, reclining chairs, and office furniture items; steel and steel alloy balls and rollers; cold finished steel bar and wire; Draw-Tite hitches and related trailer towing products; and miniature balls used mainly in writing instruments.

Plastic products and machinery include molded urethane foam automotive seating, instrument panel covers, arm rests, console covers and sun visors; vinyl plastisol for automotive arm rest covers, sealants, backing for rugs, and protective coatings; injection molded plastic products; Uniloy blow-molding machine systems; blow-molded plastic containers and family-size beverage bottles; and machine lines for handling plastic containers.

Aluminum, zinc, and brass products include die castings for the automotive, plumbing and appliance industries; and aluminum extrusions mainly for makers of appliances and business equipment, the automotive industry, and for the company's OMNI furniture.

Other products include roof trusses, wall sections, and other building components; Tote bulk material bins, metal beverage containers, and material handling systems; stainless steel and aluminum beer barrels; and chemically treated lumber.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Hoover Ball & Bearing Co. (UK) Ltd.

Hoover Ball and Bearing Co. (Canada) Ltd.

Manufacturers Jose Jover, S.A. (MAJOSA) (69 percent)

Juliar Precision Ball Corp.

PROPERTY - Co. operates 58 plants (49 owned) in 20 states, Canada, England and Spain; and 4 warehouses (3 owned) in FL, NJ, TX, and CA (see Table 8).

Plants involved in manufacturing automotive-related products are listed below:

- Aluminum Extrusions Division, Charlotte, MI (precision machined aluminum parts)
- Ball and Roller Division, Erwin, TN; plants in N. Charleston, SC; E. Granby, CT (balls and rollers of steel, stainless, brass, bronze)
- Blow-molding Machinery Division, Manchester, MI (industrial blow-molding machinery systems)
- Chemical Specialties Division, Ann Arbor, MI (plastisol formulations and urethane systems)
- Foam Division, Saline, MI (molded urethane foam for automotive seating)
- Metal Seating Division, Saline, MI (automotive seating assemblies/components)
- Plastic Products Division, Erie, PA (injection molded engineered plastics)
- Plated Plastics Division, Mansfield, OH (electro-plated plastic parts)
- Saline Die Casting Division, Saline, MI (automotive die castings)
- Spring Systems Division, Georgetown, KY (automotive spring seating assemblies/components)

- Steel & Wire Division, Solon, OH. (cold finished steel bar and wire)
- Structural Foam Machinery Division, Springfield, MA (structural foam machine systems)
- Towing Systems Division, Belleville, MI (towing hitches and related accessories)

● IC INDUSTRIES, INC.\*

The company, headquartered in Chicago, IL was incorporated in Delaware, Aug. 31, 1962, as Illinois Central Industries, Inc. and through exchange, acquired control of Illinois Central RR Co.; present title adopted May 21, 1975, Aug. 10, 1972, Illinois Central RR, and Gulf, Mobile & Ohio RR were merged into newly-formed Illinois Central Gulf RR Co. (ICG), wholly owned by company.

Feb. 2, 1970, merged Pepsi-Cola General Bottlers, Inc.

In Feb. 1972, acquired remaining shares of H.F. Philipsborn & Co.

Sept. 18, 1971 acquired Dad's Root Beer Co.

Jan. 25, 1972, acquired Midas-International Corp., Chicago, and Apr. 11, 1972 acquired Lincoln Financial, Inc. Houston.

In Aug. 1978, company increased its interest in Pet Inc. to about 96 percent, and in Nov. 1978, acquired the remaining shares.

Company, through subsidiaries, engages in Railroad Activities which accounted for 23.5 percent of sales and revenues from continuing operations and 13.5 percent of pretax income in 1979 (29.4 percent and 17.0 percent in 1978); Commercial Products, 24.3 percent and 47.7 percent (27.8 percent and 49.9 percent); Consumer Products 51.9 percent and 58.9 percent (41.5 percent and 54.8 percent); and other, 0.3 percent and 20.1 percent deficit (1.3 percent and 21.7 percent deficit).

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report, 1979

RAILROAD ACTIVITIES - This group consists almost entirely of the wholly owned Illinois Central Gulf RR Co., a Class I railroad which operates 8,704 miles of road in 13 states in the Midwest and Mississippi Valley region. Other railroad investments at Dec. 31, 1979, included all shares of Chicago & Illinois Western RR, a switching line operating 33 miles of track from Western Ave., Chicago to Hodgkins, IL.

COMMERICAL PRODUCTS - Abex Corp., wholly owned, makes automotive products, including brake linings, disc brake pads, metallic brake discs for aircraft, tire molds, signal and safety equipment, and other products for the automotive, farm implement, overhead door, and general industrial markets; castings for use in mining, earth-moving, steelmaking, petrochemical, and other applications; fluid power products, including pumps, motors, valves, presses, complete hydraulic systems, pneumatic cylinders, and work feeders for airpresses; railroad products, including brake shoes, cast steel wheels, custom-made trackwork, freight car bearings, and various items of equipment for use in the construction, repair, and rebuilding of freight cars. Abex also remanufactures and upgrades electric traction motors and generators for the railroad industry (see p. 2-91 for more details on the Abex Corporation).

Commercial Products Group operates 44 plants in the U.S., 4 in Canada, and 15 in several other foreign countries including Mexico (see Table 8).

CONSUMER PRODUCTS - Pet Inc. makes evaporated milk, modified milk products, diet products, fresh milk, ice cream, specialty dairy products. Mexican food products, apple and other fruit products, snack foods, canned and frozen shrimp, canned oysters, bakery items, waffles and other frozen foods, and nuts and candy; provides refrigerated food distribution services; and makes refrigeration equipment, display cases, shelving, insulated panels and refrigerated systems. Pet also operates Vendome and 9-0-5 Party Centers which are self-service wine, liquor, and

party supply stores; and operates or franchises Stuckey's Stores, which are roadside food and travelers' service centers.

Pet's facilities include 50 owned and 15 leased plants in the U.S., Canada, and Mexico, 49 dairy distribution facilities; 10 owned and one leased warehouses, and 190 owned, 48 leased, and 140 franchised retail outlets.

Pepsi-Cola General Bottlers, Inc., wholly owned, principally packages and distributes under exclusive franchises Pepsi-Cola and Diet Pepsi and other brand name soft drinks, including Dad's Root Beer, Bubble Up, 7up, Mountain Dew, Dr. Pepper, Orange Crush, Canada Dry, and Hawaiian Punch. It sells Pepsi-Cola products in parts of IL, IN, IA, KS, KY, and MO, which have a combined population of about 15,000,000, and sells its other soft drink products in certain of these areas. Company also packages and sells its own line of flavored soft drinks under the Hi-C trademarks.

It operates 11 bottling plants, one canning plant, and one combination bottling-canning plants; 27 distributions centers; and 5 storage warehouses. It owns 757 delivery trucks and 350 other vehicles.

Dad's Root Beer Co., Chicago, IL, wholly owned, makes root beer concentrate and extract, sold to over 189 licensees who market the finished product in the U.S. Bubble Up Co., Inc., Chicago, supplies a lemon-line concentrate to about 152 domestic and 31 foreign franchised licensees.

Midas-International Corp., and subsidiaries make component parts of replacement exhaust systems for automotive vehicles, including mufflers, exhaust, and tail parts and related fittings; and sell other automotive parts made by others, including shock absorbers and pollution control parts. Midas-Intl. also makes travel trailers, pickup truck campers, high-cube delivery vans, "fifth wheel" travel trailers, self-contained motor homes, and highway trailers. Automotive products are sold through wholesale jobbers and automobile accessory stores and through the Midas

Division to franchised dealers who sell and install company's exhaust system items and certain of the parts, and shock absorbers. Dec. 31, 1979, there were 1,243 Midas Muffler shops in the U.S., Canada, and other countries. Of these, Midas leased and operated 39 shops in the U.S., 22 in Canada, and 56 in six foreign countries. Midas and its affiliates also leased to franchisees 22 owned shops. Company planned to open 133 more by the end of 1980.

Midas operates 6 owned and 9 leased plants in the U.S. (14) and Canada (1); also 2 owned and 22 leased warehouses.

SUBSIDIARIES - wholly owned or noted

Illinois Central Gulf RR Co.

Chicago & Illinois Western RR Co.

Illinois Center Corp.

LaSalle Properties, Inc.

South Properties, Inc.

Pepsi-Cola Bottling of Kenosha & Racine

\*H.F. Philipsborn & Co.

Philipsborn Equities, Inc.

IC Industries Finance Corp. NY

Pet Inc.

Spartanburg Dairy, Inc.

Helvetia Redevelopment Corp.

Hussman Refrigerator Co.

American Refrigeration Products, S.A.

Hussman Refrigeration, Inc.

Hussman Store Equipment Ltd.

Krack Corp.

Applied Air Systems, Inc.

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\* Up for sale in early 1980.

Merchants Refrigeration Co.

Merchants Refrigeration Co. of California

Mountain Pass Canning Co.

Nine-O-Five Stores, Inc.

St. Louis Lithographing Co.

Southland Canning & Packing Co., Inc.

Stuckey's Inc.

Stuckey's Stores, Inc.

Vendome Stores, Inc.

IC Products Co.

Abex Corp.

Illinois Central Export Corp.

Denison Hydraulics, Japan, Ltd. (60 percent)

Amsco Mexicana, S.A.

Midas-International Corp.

Frolic Homes, Inc.

Huth Mfg. Corp.

Indiana Trailer Supply, Inc.

International Parts (Canada) Ltd.

International Stamping Co., Inc.

Ken-Craft Products, Inc.

Midas Automotive Ltd. (Canada)

Midas Realty Corp.

Midas Silencers Ltd.

Muffler Corp. of America

Muffler Corp. of Canada Ltd.

Norris Homes Inc.

Pepsi-Cola Kanter Bottling Inc.

Pepsi-Cola General Bottlers, Inc.

Danville Pepsi-Cola Bottling Co.

Pepsi-Cola Bottling Co. of Cincinnati

Kolmar Products Corp.

Genadco Adverstising Agency, Inc.

Dad's Root Beer Co.

Bubble-Up Co., Inc.

IC Leasing, Inc.

IC Industries Insurance Co. Ltd.

Company also has numerous subsidiaries with the name Abex in their title.

The Abex Corp., the IC Industries' Commercial Products Group, is based in New York City, while its automotive operations are directed from Troy, MI.

In 1979 Abex Corporation contributed a record \$85 million in pre-tax income on record sales of \$908 million. Incoming orders of \$1.1 billion and a year-end unfilled orders backlog of \$536 million - 48 percent ahead of 1978 - also set new records.

Considering the inherent strength of the markets it serves, its strong incoming orders rate and its record orders backlog position, Abex expects further record sales in 1980.

A worldwide leader in four basic market areas - fluid power, specialty castings, automotive, and railroad products - the diversified Abex enterprise has experienced significant growth through the combination of its farsighted management, its proven technology, its manufacturing efficiencies, and its creative marketing and sales expertise. In addition to record 1979 consolidated sales and earnings, Abex 1979 performance also reflected higher-than-1978 sales and orders in each of the four market areas. The year-end orders backlog also reflected 1979 growth in all four market areas.

In its automotive operations, despite the highly publicized downturn in production by the world's automotive manufacturers, the Abex Automotive Group has record 1979 sales of \$239 million - 14 percent ahead of its \$209.6 million sales in 1978. New orders of \$260 million received in 1979 also set a record. Even

with concern over the increasing cost and decreasing availability of petroleum, Abex original equipment manufacturer orders for automotive friction braking materials were especially strong in Europe during 1979 and this trend has continued into 1980.

Abex is maintaining its leading replacement market position for automotive friction braking materials both in the United States and in Western Europe. Quantitatively, these two markets rank first and second in number of automobile and light truck registrations respectively.

Additional manufacturing capacity has been provided for Abex plants in Mexico, Canada, and Italy to serve automotive markets in those countries. The Abex automotive joint venture in India became profitable in 1979 - its third year of operation. A new joint venture has been established in Morocco to produce automotive brake linings at a Casablanca plant.

Abex is applying its successful experience in aerospace technology to the challenge of eliminating asbestos and metal content of automotive brake linings. Extensive research and development efforts have been expended on non-asbestos and non-metallic automotive friction braking material compounds. Abex is now providing this new material for brake linings to Volkswagen as original equipment and in the replacement market. Additionally, Abex has already submitted non-asbestos material to U.S. automotive manufacturers for evaluation, and extensive marketing was scheduled for early 1980.

- INGERSOL-RAND CO.

See THE TORRINGTON CO., p. 2-171.

- INTERNATIONAL TEL. & TEL. CORP.\*

The company, based in New York City, was incorporated in Delaware, Jan. 28, 1968, as a wholly owned subsidiary of International Telephone & Telegraph Corp. (incorporated in Maryland

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\* Sources: Standard & Poor's, 1980,  
Ward's Automotive Yearbook, 1980

June 16, 1920), and merged its parent, effective Jan. 31, 1968. Parent was incorporated in MD June 16, 1920.

Jan. 3, 1969 Co. acquired the business and substantially all assets of Thorp Finance Corp.; (name changed to ITT Thorp Corp. in 1970).

Apr. 25, 1969, ITT merged Canteen Corp. and Oct. 31, 1979, merged Grinnell Corp.

On Dec. 31, 1973, company acquired Hartford Fire Insurance Co.

In Feb. 1977, acquired Carbon Industries, Inc., engaged in underground mining and sale of metallurgical coal to steel concerns in the U.S. and for export to Japan, Western Europe, and South America, and of steam coal to industrial concerns and electric utilities in the Eastern U.S.

In Aug. 1977, acquired Eason Oil Co., engaged in acquisition, exploration, development, and operation of oil and natural gas properties in North America, on and off-shore, and in the North Sea and of natural gas processing plants and several gas gathering and compression systems.

Company is engaged, directly and through subsidiaries, principally in the manufacture of telecommunications and electronics equipment; assembly and installation of defense and avionic systems; the conduct of telecommunications operations; manufacture and sale of automotive and industrial products, components and semiconductors; production and sale of food products and consumer appliances; operation of hotels; processing of timber and minerals; production of coal, oil, and natural gas; and rendering financial services and providing insurance. Dec. 31, 1978, ITT operated plants and carried on business in over 80 countries and employed 379,000 persons.

TELECOMMUNICATIONS & ELECTRONICS - Telecommunications Equipment Activities are carried on through divisions and subsidiaries, most of which are wholly owned, foreign subsidiaries, which

engineer, make, sell, and install communication and electronic equipment, including telephone apparatus, switching systems, automatic toll ticketing and transmission equipment, commercial microwave systems, private communication systems, marine navigational and communication aids, communication cable, teleprinters, UHF and VHF wideband radio links, railway signaling equipment, military communication equipment, data systems and data peripheral equipment, document and material handling equipment, and instrumentation controls.

Telecommunications Operations - Through ITT World Communications Inc., wholly owned, and other subsidiaries, company provides, by submarine cable, satellite and radio, international telegraph, telex and other record communication services to and from the U.S. and its principal possessions, the United Kingdom, the Philippines and several countries in Latin America and the Caribbean, as well as international telephone services in Indonesia, Puerto Rico, the Virgin Islands, Canal Zone, and Bolivia. These companies provide their respective services on a worldwide basis through interconnection arrangements with each other and with other telecommunication entities. An ITT subsidiary provides telephone service in the Virgin Islands.

Defense & Avionics Systems - Activities are carried on through divisions and subsidiaries that mainly engineer, make, sell, and operate telecommunications, electronic and related equipment and engage in research, development, and training in these and allied fields. Most of such work is done for the U.S. Government.

ENGINEERED PRODUCTS - Automotive Products, through divisions and subsidiaries, company engineers, makes, and sells automotive equipment and accessories for the original equipment market and aftermarket. Principal products include automotive brakes, shock absorbers, windshield wipers, stampings, moldings, accessories and parts. A more detailed list of products is given below.

Industrial Products for the construction, sanitary, and process industries include temperature and process controls and instruments, pumps and air compressors, plumbing fixtures, heating and air-conditioning equipment, vacuum devices and wire and cable. ITT Grinnell Corp., wholly owned, produces valves, pipe fittings, and hangers.

Through various divisions and subsidiaries the company makes and sells components, semiconductors, integrated circuits, electron tubes, and electrical connectors.

CONSUMER PRODUCTS & SERVICES - Food Products - ITT Continental Baking Co., wholly owned, makes and sells at wholesale breads, cakes, frozen foods, and related products in the U.S., principally under trademarks, Wonder for its bread products, and Hostess for its cake products. Frozen food products are sold under the Morton trademark. ITT Gwaltney Inc., wholly owned, processes fresh and processed pork products, ranging from fresh pork cuts to the aged and specially cured Genuine Smithfield Ham, and including bacon, sausage and luncheon meats. Gwaltney products are distributed primarily in the eastern seaboard states.

Consumer appliances - The company makes and sells consumer electronic products.

Hotels & Other - Sheraton Corp., 100 percent owned, owns and operates, or operates under lease and management agreements, or has granted franchises or refers reservations to independent operators of hotels and inns in about 292 communities in the U.S. and 64 communities in 41 foreign countries. Dec. 31, 1978, Sheraton had 402 units (335 in the U.S.).

ITT World Directories, Inc. - 75 percent owned, through subsidiaries and affiliates, compiles and publishes telephone directories providing classified directory services for telephone subscribers in five foreign countries. ITT Community Development

Corp., wholly owned, develops land at Palm Coast, Flagler County, FL. O.M. Scott & Sons Co., wholly owned, sells lawn grass seed, makes and sells lawn fertilizers, weed and insect controls, and sells other lawn care products. Other subsidiaries make and sell cosmetics and toilet preparations; and publish and provide post-high school resident and home study training in technical, trade, and business subjects.

NATURAL RESOURCES - Timber and Earth - This segment is engaged in the production of wood pulps, such as chemical cellulose, papermaking and specialty pulps, and other wood products, including lumber, plywood, treated wood products, logs and chemical products; and mines, beneficiates, and sells silica and attapulgite (a form of fuller's earth). ITT Rayonier Inc., wholly owned, owns 1.2 million acres of timberlands and leases about 179,000 more acres of timberlands in the U.S., and has long-term cutting rights on 968,000 acres of timberland in B.C. Rayonier Quebec Division of ITT Industries of Canada Ltd., wholly owned, operates a mill at Port Cartier, Que., primarily to produce chemical cellulose pulp.

Energy-Eason Oil Co., wholly owned, acquires, explores, develops, and operates oil and natural gas properties mainly in North America. It also owns and operates natural gas processing plants in several gas gathering and compression systems. Carbon Industries, Inc., wholly owned, engages mainly in the mining, preparation and sale of metallurgical coal to steel companies in the U.S. and for export to Japan, and of steam coal to industrial companies and electric utilities in the Eastern U.S.

INSURANCE AND FINANCE - Casualty and Life Insurances - Company's subsidiaries write most types of property/casualty and life, accident, and health insurance throughout the U.S. and Canada and also insure risks in certain foreign countries. Companies include Hartford Fire Insurance Co. (99.9 percent owned, non-consolidated) and its subsidiaries which write a broad range of insurance in the United Kingdom, the Netherlands and Germany as well as ITT

Life Insurance Corp. and Abbey Life Insurance Co. of Canada, both wholly owned and non-consolidated.

Finance Companies - Finance operations consist of domestic and foreign finance companies, including ITT Financial Corp., 100 percent owned and non-consolidated, which throughout its subsidiaries, engages throughout many parts of the U.S. in the consumer finance business, with related credit insurance, and the commercial finance business. Finance subsidiaries in Australia, Belgium, England, Germany, Luxembourg, and the U.S. hold installment sales contracts relating to products of other ITT companies and otherwise assist such companies in financing sales to their customers.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Federal Electric Corp.

Eason Oil Co.

Carbon Industries, Inc.

ITT Community Development Corp.

ITT Consumer Services Corp. (93.6 percent owned)

\*ITT Financial Corp.

\*Aetna Finance Co.

\*Lyndon Insurance Co.

\*ITT Industrial Credit Co.

\*ITT Thorp Corp.

\*ITT Diversified Credit Corp.

\*ITT Lyndon Life Insurance Co.

\*ITT Lyndon Property Insurance Co.

ITT Educational Services, Inc.

ITT Gwaltney Inc.

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\* Non-consolidated.

ITT Higbie Mfg. Co.  
Sheraton Corp.  
ITT World Directories, Inc. (75 percent)  
Qume Corp.  
ITT Electronic Travel Services Inc.  
Howard W. Sams & Co., Inc.  
O.M. Scott & Sons Co.  
ITT Holdings Inc.  
    ITT Continental Baking Co.  
    ITT Grinnell Corp.  
    ITT Rayonier Inc.  
    Pennsylvania Glass Sand Corp.  
    ITT Canada Ltd.  
        Rayonier Canada (B.C.) Ltd.  
            ITT Industries of Canada Ltd.  
International Standard Electric Corp.  
Bell Telephone Mfg. Co. (99.99 percent)  
Compania Standard Electrica Argentina  
Compagnie Generale de Constructions Telephoniques  
    (99.97 percent)  
ISE Canadian Finance Ltd.  
\*ISE Finance Holdings, S.A.  
Fabbrica Apparecchiature per Comunicazioni Elettriche  
    Standard SpA  
    ITT North Electric Co.  
    ITT Telecommunications Corp.  
    Standard Electrica, S.A. (70 percent)  
    Standard Elektrik Lorenz AG (85.9 percent)  
    Standard Telephon und Radio A.G.  
    Transelectronics Ltd. (Hong Kong)

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\* Non-consolidated

Standard Telephones and Cables Ltd.  
Ashe Chemical Ltd.  
Standard Telephones & Cables Pty. Ltd.

Rimmel Ltd.

ITT Industries, Inc.  
Grohe Handels GmbH (85 percent)  
ITT Gessellschaft fur Beteiligungen, GmbH  
Alfred Teves GmbH  
ITT Svenska AB  
SWF Spezialfabrik fur Autozubehor Gustav Rau GmbH

U.S. Telephone & Telegraph Corp.

Americana Cables & Radio, Inc.  
All American Cables & Radio, Inc.  
Commerical Cable Co.  
ITT World Communications Inc.  
ITT Industrial Transmissions Systems Inc.  
ITT Communications, Inc. - Virgin Islands  
Virgin Islands Telephone Corp.

\*Abbey Overseas Insurance Co. (Bermuda) Ltd.

\*ITT Credit Corp.

\*Hartford Fire Insurance Co.

Hartford Accident & Indemnity Co.

\*Abbey International Corp.

\*ITT Hartford Europe Ltd.

\*Abby Life Group Ltd.

\*Excess Insurance Group Ltd.

\*ITT Life Insurance Corp.

\*Hartford Life Insurance Co.

\*Transatlantische Versicherungs AG (99.2 percent)

\*Zwolsche Algemeene B.V.

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\* Non-consolidated.

\*Kellogg Credit Corp.

Company also has about 441 other subsidiaries (held directly or indirectly) carrying on the same lines of business as those listed above, including 228 operating in the United States and 213 operating in foreign countries.

PROPERTY - Dec. 31, 1978, domestic operations occupied 31,800,000 sq. ft. of floor space and foreign operations occupy 60,200,000 sq. ft. (see Table 8).

The company's automotive operations group is designated as ITT AUTOMOTIVE PRODUCTS WORLDWIDE and is based in Southfield, MI. It consists of the following divisions and subsidiaries.

ITT Aimco, Tonawanda, NY

ITT Automotive Distributors, Piscataway, NJ

ITT Automotive Electrical Prod., Oak Park, MI

ITT Hancock Industries, Jackson, MI

Milrod Metal Prod., Mississauga, Ont. (Canada)

ITT Higbie Mfg. Co., Rochester, MI

ITT Suspension Systems, Livonia, MI

ITT Thompson Industries, Southfield, MI

ITT United Plastics, Madison Heights, MI

Alfred Tevas, Frankfurt A/M, West Germany

Italian Automotive Oper., Turin, Italy

Koni, Oud-Beyerland, the Netherlands

SWF, Bietigheim, West Germany

ITT European automotive operations are headquartered in Brussels, Belgium. The products manufactured by ITT Automotive include: electrical, electronic, and electromechanical components and assemblies; lightweight power seat tracks, mechanical devices and mechanisms; brake systems and components; skid

\*Non-consolidated

control systems; energy absorbing components and assemblies; lightweight aluminum and plastic functional parts; corrosion resistant tubing; interior and exterior trim components; wheel ornamentation; shock absorbers, MacPherson struts.

● INTERNATIONAL PACKING CORP.\*

Headquartered in Bristol, NH., International Packing Corp. specializes in custom engineered rubber parts to meet the demands of OEM high-volume customers requiring precision molded solutions to unique application problems. Over 11 million rubber parts are shipped from IPC plants each week.

IPC serves the automotive industry from bumper-to-bumper. About 70 percent of production includes a complete spectrum of brake system parts, crankshaft and valve stem seals, automatic transmission and power steering seals, suspension seals and boots, emissions control diaphragms and seals, fuel system parts, and many other precision, molded rubber components.

At the newly completed corporate engineering wing in Bristol, R&D is heavily centered around elastomeric materials and compounding technology; evaluating performance and reliability of design configuration; metallurgy involved with seal case, bonding and garter spring processes; as well as development of specialized production equipment being fabricated in-house.

In addition to nine New Hampshire and Indiana plants, the TransTee Industries Division, Milan, OH, produces automotive rebuilding kits and provides custom packaging services for OEM customers. Another division, Armet Industries, Tillsonburg, Ontario, concentrates on forming silicone and other exotic elastomers into sheet goods, heavy-duty coolant hose, extrusions, insulation tapes, tubing and precision molded parts (see Table 8).

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\* Source: "Automotive Industries," June 1980.

These facilities occupy over 398,000 ft<sup>2</sup> (36.974 m<sup>2</sup>) and employ some 1600 IPC people. Incorporated in 1946, IPC growth has averaged 18 percent annually for the past 10 years. 1979 sales amounted to \$50.6 million.

- IRVIN INDUSTRIES, INC.\*

The company, based in Stamford, CT, was incorporated in New York, June 19, 1919, as Irving Air Chute Co., Inc.; present title adopted Jan. 24, 1968.

In Mar. 1973, acquired 80 percent interest (later increased to 100 percent) in Robinson Tool & Die, Inc., which was merged into the company in 1979.

Company and subsidiaries make automotive products (52.5 percent of net sales and 40.5 percent of operating income in 1979), aerospace products (31.3 percent and 50.1 percent), and industrial products (16.2 percent and 9.4 percent in 1979), foreign subsidiaries provided 30.8 percent of net sales and 54.7 percent of operating income. Sales to General Motors Corp. were about 40 percent of total sales.

Automotive products include seat belt system, bumper components, engine and transmission parts, retractable security covers to hatchbacks and vans, stamped metal assemblies and power tool accessories.

Aerospace products include military and special purpose parachutes; space vehicle and missile recovery systems; deceleration systems for high performance aircraft; precision opening, escape and release systems; and survival equipment and life-support systems.

Industrial products, consist of cargo handling equipment, can-making machinery, industrial safety harnesses and other safety equipment.

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\* Source: Standard & Poor's, 1980.

PRINCIPAL SUBSIDIARIES - wholly owned - AB Autoindustri; Michigan Corp.

Company has several other subsidiaries with Irvin in their titles.

PROPERTY - Principal plants are owned in CO, England, Canada, Sweden, W. Germany, and Italy; and leased in KY, CA, AR, MI, MS, Italy, and England. Warehouse space is leased in AR (see Table 8).

● LEAR SIEGLER, INC.\*

The company, headquartered in Santa Monica, CA was incorporated in Delaware, Dec. 21, 1950, as Siegler Heater Corp.; name changed to Siegler Corp. Nov. 23, 1954 on merger of Siegler Corp. (NY), and Siegler Enamel Range Co. (IL), former parent. Present title adopted in June 1962 on merger of Lear, Inc. Business established in 1921.

In fiscal 1969, acquired the business and net assets of several concerns, including National Twist Drill & Tool Co. (maker of rotary metal cutting tools); Bon-Aire Industries, Inc. (automotive accessories); Neway Equipment Co. (maker of truck and trailer suspension systems) and its wholly owned Hammer Blow Corp. (maker of axles, jacks, couplers, etc.); and 14 technical schools (mainly business and automotive). Also acquired a 52 percent interest in Societe No-Sag Francaise (mainly a maker of No-Sag springs for the automotive and furniture industries). In fiscal 1970, acquired the following concerns; Auto City Sheet Metal Co. (maker of short-run metal stampings and stamped assemblies), Trousdale Construction Co. (engaged in the development, improvement and subdivision of real property, and the construction, sale and lease of residential and commercial buildings), Dixie Tool Industries and Chaso/Royco Corp. (makers of

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\* Sources: Standard & Poor's, 1980  
Ward's Automotive Yearbook, 1980.

air distribution equipment for heating and air conditioning industry), Sherwood Brass Works (maker of pumps and hydraulic control equipment), Fearon Publishers (sold in fiscal 1975), National Electronics Institute, Inc. (an electronics school), and Bliss College (a four year business school).

In fiscal 1970, sold No-Sag Spring Co. (Great Britian) Ltd.

In fiscal 1971, made the following acquisitions: Cuckler Steel Span Co., Monticello, IA, maker of pre-engineered structural steel buildings; Applied Computer Time Share, Inc., Southfield, MI, which offered scientific time sharing and commercial data processing services; Hoodfoam Industries, Inc. Marblehead, MA, and Delany & Pettit Industries Ltd., Toronto, both makers of polyurethane foam for automotive and furniture applications, and Haas Corp., Mendon, MI, maker of plastic parts for a wide range of industries.

Nov. 10, 1971, acquired American Industrial Mfg., Inc., Paramount, CA. In Dec. 1971, acquired Lifestyle Homes, Manteca, CA, and a 70 percent interest in Medical Ancillary Services, Inc., Troy, MI.

In Jan. 1972, sold its Regal Tube Division, Chicago, to Copperweld Steel Co. Mar. 31, 1972, sold its Vac-U-Lift Division, Salem, IL, to American Chain & Cable Co.

In fiscal 1973, sold its Cimron digital multimeter line, acquired in Dec. 1965; its Middletown Mfg. Division, maker of steel products for the furniture industry; and its 72 percent interest in N. V. Vulcaansoord (Holland), maker of residential gas heaters and related products. Also, liquidated wholly owned Hoodfoam Industries, Inc., Hoodfoam Realty Trust. Waiahole Water Co., Ltd., and Krueger Air (Canada) Ltd.

Also in fiscal 1973, acquired an 80 percent interest in Spectrometrics of Florida, Inc. (merged into company in fiscal 1975), maker of air pollution control instruments; and acquired the remaining 14.9 percent interest in Farfisa, S.p.A., Italy.

Effective Jan. 1, 1977, acquired Royal Industries, Inc., maker of automotive farm machinery and energy products.

Company is engaged in the fields of technical products (31.2 percent of net sales and 34.4 percent of operating profit in fiscal 1979); automotive products (41.0 percent and 33.6 percent); machinery and machine tool products (14.1 percent and 17.5 percent); furniture and fixture products (7.6 percent and 9.6 percent); and other diversified products (6.1 percent and 4.9 percent). Foreign business provided 18.3 percent of net sales, and 23.5 percent of net earnings in fiscal 1979. U.S. Government provided 13 percent of total sales in fiscal 1979.

TECHNICAL PRODUCTS - Company designs, develops, and makes electronic and electromechanical instruments and systems, including automatic flight control, electric generating, and airborne computer systems; altimeters; starter-generators; control panels for the regulation of generators; gyroscopes; cargo door actuators; and fuel and other pumps for aircraft applications. A modular digital navigation and weapons delivery system has been developed for the Air Force. The company also supplies Attitude Heading Reference Systems for harpoon antiship missiles. Other military and industrial products include lubrication-free bearings, tactical navigation systems and aircraft ground air conditioning equipment. The company also furnishes aircraft maintenance, repair, modification, and retrofit services at Air Force bases through the world.

The company makes equipment for the modulation and transmission of sound and voice communications, including public address systems and emergency communication systems; electronic musical instruments; telephone switching, signal amplification, and other equipment; and hearing aids.

The company makes computer peripheral equipment and a self-propelled office delivery vehicle called the "Mailmobile."

The company markets electro-optical emissions monitoring equipment consisting of transmissometers and gas analysers sold

individually and as component of total stack monitoring systems.

The company also makes specialized valves used in liquified natural gas tankers and terminals, and nuclear reactor control rod drive mechanisms.

AUTOMOTIVE PRODUCTS - Company makes axle tubes, air and mechanical suspension systems, air suspension seats for trucks; transmission support assemblies, windshields, molded polyurethane foam for seats, metal stampings and molded plastic parts for automobiles; air and mechanical suspension systems for heavy duty trailers; seat assemblies, brake linings and disc brake pads, and backing plates for automobiles and trucks; and emergency spring brakes for trucks and trailers.

The company also makes tire changing, balancing and wheel alignment equipment, foundry patterns for engine and transmission castings, and traffic control devices.

MACHINERY AND MACHINE TOOL PRODUCTS - Company makes gear finishing and honing machines, gear shaving cutters, precision broaches, cutting tools and saws, ballscrews and ballsplines, handling machinery, tillage equipment, and hydraulic pumps.

FURNITURE AND FIXTURE PRODUCTS - Company makes stockroom and industrial shelving for retailers, manufacturers, and the Government; retail store check-out counters, including counters for electronic scanning systems; metal filing cabinets and office furniture; shopping carts; bed frames, springs, and polyurethane foam; housewares, including ironing tables and caddies, and laundry sorters and carts.

OTHER PRODUCTS - The company makes pre-engineered metal buildings, heating and air conditioning equipment, and small plastic and rubber parts.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Erma Werke GmbH

Electronica Musicale Europea S.p.A. (96 percent)

No-Sag Spring Co. Ltd.

Precision Gear Machines & Tools, Ltd.

Steinheil-Lear Siegler A.G.

No-Sag Drahtfedern GmbH (99 percent)

Farfisa Fabbriche Riunite Fisamoniche Italiane, S.p.A.

George Becker S.A.

Farfisa Musikinstrumente GmbH

Hagen S.p.A.

Farfisa U.K. Ltd.

No-Sag Francaise (56 percent)

Avitron International, Inc.

Avitron Italiana, S.p.A.

Avitron (UK) Ltd.

Deutsche Avitron GmbH

Arroyo Insurance Co.

Brake Specialty Inc.

Certified Automotive Products, Ltd.

Certified Automotive Products (Central) Ltd.

Certified Brake (U.K.) Ltd.

Peerless Page Industries, Inc.

Royal Industries Intl. Sales Corp.

Company has several subsidiaries with the name Lear Siegler in their titles.

#### AFFILIATES

Central de Industrias S.A. (48.96 percent owned)

Probel S.A. Industria a Comercio (20 percent owned)

No-Sag Drahtfedern Spitzer & Co. (50 percent owned)

PROPERTY - About 109 operating facilities are in 23 states and 8 foreign countries, including 41 plants owned in MI (9), CA (3), OH (2), KS (2), KY (2), OR, IA (2), MA, TN,

NC, AK, UT, MS, IL, IN (2), W. Germany (5), Canada (4), England, and Italy; and 16 plants leased in MN (3), OK (6), NJ, IL, CO, NC, KS, IN, and Canada (see Table 8).

Lear Siegler's fabricated automotive products operations are based in Troy, MI, and are organized into the following division:

Automotive Division, Detroit, MI (tubular components, metal stampings and assemblies)

Fabrication Technology Division, Zeeland, MI (metal cutting, numerical control for industrial applications)

General Seating Division, Livonia, MI (seating, stampings, welded assemblies, urethane foam)

Metal Products Division, Detroit, MI (metal stampings and stamped/welded assemblies)

Plastics Division, Mendon, MI (plastic parts/assemblies)

● LUCAS INDUSTRIES INC.\*

U.S. automotive operations are based in Troy, MI with a plant located in Greenville, SC. (The parent company is Lucas-U.K.)

The company manufactures air filters, fuel filters, carburetor components/kits, fuel injection components/systems; oil filters, shock absorbers; windshield wiper/washer components; brake components; auto lighting and ignition system components.

● METEX CORP.\*\*

Metex Corp. is based in Plainfield, NJ. It was incorporated in Delaware May 21, 1964, as Ferrodynamics Corp. to merge, effective July 1, 1964, Ferrodynamics (incorporated in NJ in 1956) and Metex Electronics Corp.; present title adopted Jan. 31, 1966.

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\* Source: Ward's Automotive Yearbook, 1980

\*\* Sources: Standard & Poor's, 1980  
"Automotive Industries," June 1980.

The company is a manufacturer of industrial products employing knitted wire materials technology. The transportation industry - automobiles, trucks, buses, and off-the-road vehicles - has been a major market for the company for more than a decade. In 1968, Metex developed a diesel fuel injection filter that remains, to this day, the only viable solution to problems encountered in that application. Similarly, Metex's work in the design, development, and manufacture of knitted metal reusable truck and bus air filters has set new performance standards in hostile environments.

Since 1973, Metex has pioneered in the design and has provided knitted wire mesh supports for the monolithic catalyst elements in catalytic converter assemblies.

Metex's Thermaseal<sup>®</sup> gasket, a compressed and formed composite construction of knitted metal mesh and other materials, has found wide application as the solution to difficult gasketing and sealing problems between the manifold and exhaust pipe connection. These Thermaseal gaskets are designed to withstand temperatures up to 1600°F (871°C), plus thermal and mechanical shock with a service life reportedly over three times that of a conventional exhaust system gasket.

Similar knitted metal technology has been applied by Metex to vehicular and industrial tool sound attenuation problems. Sound damping pads are employed in diesel air starter mufflers, for example, where sound attenuation of up to 40 dBA has been achieved.

Aside from the automotive market, Metex's other major area of concentration has been electronic shielding products. These are used to protect sensitive electronic equipment from electromagnetic and radio frequency interference (EMI/RFI). With the growing use of sophisticated electronics in automobile - and the rapid expansion of the use of electronically controlled automotive devices - Metex has expanded its intensive research and development of engineered products to solve automotive electronic shielding problems before they arise.

In 1979 shipments of knitted wire mesh components to Ford Motor Co. and Chrysler Corp. for use in exhaust emission devices accounted for 24 percent of sales (28 percent in 1978).

SUBSIDIARIES - wholly owned

Metex Automotive Products Corp.

Cal-Metex Corp.

Metex Export Corp.

Metex Process Equipment Corp

Metex European Sales Cor.

PROPERTY - Facilities are owned in Edison, NJ and leased in Edison, NJ (2), and Torrence, CA (see Table 8).

● MIDLAND-ROSS CORP.\*

The company, based in Cleveland, OH, was incorporated in Ohio, Mar, 21, 1923, as Standard Pressed Steel Co.; name changed to Midland Steel Products Co. Apr. 20, 1923, and to present title Dec. 7, 1957, on merger of J.O. Ross Engineering Corp. Latter was incorporated in NH in Jan. 1929, succeeding a business founded in 1921.

In 1970, acquired Cameron Machine Co. and Aero-Corry Division of Aero Flow Dynamics, Inc.

In 1971, acquired aircraft blower line of Benson Mfg. Co. and the Weston Air Products Department of Borg-Warner Corp.

In July, 1972, acquired for cash Hadley Mfg. Co., producer of automotive horns and compressors for load leveling devices for passenger cars. Oct. 1, 1972 acquired a 21 percent interest in Gilmore Steel Corp., maker of plate and other steel products.

In Jan. 1975, acquired the remaining 51 percent interest in Stein Surface S.A. (France).

Jan 30, 1976, sold Midland Frame Division, maker of automotive chassis frames; loss on the sale was \$2,832,000, recorded in 1975.

\*Source: Standard & Poor's 1980

July 1, 1979, Stein Surface S.A., subsidiary, acquired Heurtey Fours et Thermique, a French producer of heat-treating equipment, which reduced company's interest in Stein Surface to 67 percent. Oct. 28, 1979, acquired Electro-Nite Co., Phila., PA, maker of expendable sensors and related equipment for metal producers.

Company makes a wide range of thermal systems for steel, metal-working, paper, and other industries; mechanical controls for the automotive and aerospace markets; foundry castings products for the railroad and mining industries; and electrical products for the building and material handling markets.

In 1979, thermal systems provided 35 percent of net sales and 24 percent of operating income (30.5 percent and 26.6 percent in 1978); mechanical controls 20 percent and 26 percent (21.1 percent and 24.5 percent); foundry products 31 percent and 36 percent (32.7 percent and 34.5 percent); and electrical products 14 percent and 14 percent (15.7 percent and 14.4 percent).

THERMAL SYSTEMS include heat treat furnaces and other heat processing and steel mill equipment; industrial heating equipment and industrial electronic controls; web processing machinery; a book production system; engineered systems for the processing, drying, and curing of pulp, paper, rubber, chemicals, food, textiles, wood, and other materials; machinery for coating, laminating, embossing, and otherwise treating paper, film and textiles; metal coil coating and processing lines; air dehumidification and bacterial removal systems; and environmental control devices.

MECHANICAL CONTROLS - Major products include automotive brake systems, aircraft air control equipment, duct joints and supports, fuel system components, fans and blowers, electronic cooling equipment, heat transfer equipment, pneumatic and motor-actuated controls and valves, aircraft and liquid heaters, lighting equipment, and electrical, electronic, and mechanical controls.

FOUNDRY PRODUCTS consist mainly of couplers, draft gears, freight car trucks, adapters, cushioning devices and hopper doors, and frames for railroad, mining and industrial haulage systems; and cast alloy iron and steel grinding balls for the metal mining and cement industries. Iron and steel castings also are produced as components of machinery.

ELECTRICAL PRODUCTS include metal framing systems for lighting and supporting conduit; trolley power distribution systems; switch, outlet and floor boxes; conduit and cable fittings; hangers and supports; explosion-proof, vapor-tight and high intensity discharge fixtures, including mercury vapor; safety interlock receptacles; plugs, connectors and electrical control devices; electrical relays; telecommunications transformers; in-plant storage and handling containers; gravity conveyors; gravity flow racks; and automatic pallet storage and handling systems.

LICENSEES - Company licenses others to use certain of its processes. Licensees are worldwide.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Midro Ltd.

Electro-Nite Co.

M-R Development Co.

Robotron of Canada Ltd.

Stein Surface S.A. (67 percent owned), and several  
with Midland-Ross in their titles.

AFFILIATES

Talleres Electrometalurgicos Norte S.A. (35 percent owned)

Metalurgica Pervana S.A. (20 percent owned)

Volmarsteiner Vertriebsgesellschaft (49 percent owned)

Sanwa Midland, Ltd. (35 percent owned)

Girling Midland-Ross Air Actuation, Ltd. (30 percent owned)

PROPERTY - The company operates 44 plants (mostly owned) in the U.S. and 7 foreign countries. Leased warehouses are in 6 states (see Table 8).

● MODINE MFG. CO\*

The company, based in Racine, WI, was incorporated in Wisconsin, June 23, 1916. July 16, 1969, acquired Schemenauer Mfg. Co. (later renamed Modine Mfg. Co., Ohio), which made rooftop heating and air-conditioning systems for nonresidential buildings; certain products discontinued in Apr. 1972.

Company makes a line of heat-transfer products, including heating and air-conditioning equipment for non-residential buildings and components for residential air-conditioners; heat exchangers for cooling engines, transmissions, and auxiliary hydraulic equipment; and air-conditioning components for cars, trucks, tractors, and farm and construction machinery.

In fiscal 1979, engine-cooling equipment for trucks provided 39 percent of volume (43 percent in fiscal 1978), heat exchangers for earthmoving, agricultural, and other off-highway equipment 25 percent (26 percent), heating and air-conditioning equipment for buildings 10 percent (10 percent), vehicular air conditioning components 8 percent (9 percent), passenger car radiators 17 percent (11 percent), and all other 1 percent (1 percent). Foreign earnings provided 5.6 percent of total net earnings in fiscal 1979; 6.6 percent in fiscal 1978.

Licenses are in Mexico, Italy, and Japan.

Plants are owned in IL (2), OH (2), TN (3), VA, IN (2), CA, KY, MO (3), and KS. Warehouses are leased in GA, CA, and IL (see Table 8).

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\* Source: Standard & Poor's, 1980.

SUBSIDIARIES - wholly owned

Modine Mfg. Co. Ohio

Modine Auto-Cool, Inc.

Modine Intl. Sales Corp.

Modine Heat Recovery, Inc.

Modine Air Exchangers Corp.

● PARKER-HANNIFIN CORP.\*

The company, based in Cleveland, OH, was incorporated in Ohio, Dec. 30, 1938, as Parker Appliance Co. and acquired the business and assets (except patents which were purchased in 1943) of A.L. Parker, a proprietorship formed in Oct., 1924; present title adopted Sept. 30, 1957.

In fiscal 1970, acquired B. Appleton Co., Inc.; Hope Accessories Co.; and a majority interest in Compagnie des Raccords et Robinets S.A.

Dec. 31, 1971, merged Ideal Corp. into a wholly owned subsidiary which adopted the Ideal title.

In fiscal 1978, acquired EIS Automotive Corp. and affiliates, Andrews Industries, Inc.; VanSickle Industries, Inc. and Berteau Corp.

Company and subsidiaries make components for fluid power systems, devices which control, confine, and use the flow of fluids (liquids, gases, or air) under pressure; and make products for the automotive market.

In fiscal 1979, industrial products provided 61.2 percent of net sales before intersegment sales, and 64.2 percent of income before taxes and certain other expenses (59.7 percent and 58.1 percent in 1978); aviation, space, and marine products 19.1 percent and 17.6 percent (18.5 percent and 20.1 percent); and

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\* Source: Standard & Poor's, 1980.

automotive products 19.7 percent and 18.2 percent (21.8 percent and 21.8 percent). In fiscal 1979, net sales of foreign subsidiaries accounted for 16 percent of the total.

Industrial products include cylinders, pumps, valves, controls, tube fittings, filters, power systems, hose fittings, quick disconnect couplers, connectors, clamps, sealing devices, and metallic and semimetallic gaskets. These are sold in industrial, transportation, agricultural, petrochemical, textile, paper, energy, and other markets.

Aviation, Space, and Marine products include components and systems for ground fueling of aircraft, marine fueling operations, and commercial vehicle loading of fuel and bulk liquids; precision components for control and handling of gases under pressure and cryogenic and conventional fuels; hydraulic valves and precision hydraulic components; accumulators; pumps; actuation devices and flight controls; fluid systems for propellant handling and operational control of aircraft and space vehicles; aircraft fuel tank inerting and fire extinguishing systems; fuel injection nozzles; ancillary controls for gas turbine engines; and lightweight aircraft wheels and brake assemblies.

Automotive and auto service products include worm drive hose clamps, turn signal and hazard warning flashers, tire valves, gauges, air line couplers, tire hardware, windshield wiper blades, auto and truck mirrors, radio antennae, air conditioning components, radiator filler nozzles, thermostats, brake fluid pumps, lubricant handling devices, and hydraulic brake systems parts. These are sold as original equipment and in the after-market.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Ideal Corp.

Bertea Corp.

Fortner Accessory Services Corp.

Aviation Materials Management, Inc.

Aviation Hydraulics, Inc.

VSI de Puerto Rico, Inc.

JB Systems, Inc.

Crossroads Realty, Inc.

Brownsville Rubber Co., Inc.

EIS Automotive Export Corp.

Parker-Hannifin NMF, GmbH

Condor Werkzeuge und Steverungen GmbH

Parker-Hannifin (UK) Ltd.

Tell-Tale Filters Ltd.

Fernand Grando S.A. (80 percent owned)

Company also has numerous other subsidiaries, mostly wholly owned, with the names Parker-Hannifin, Airborne, or Bertea in their titles.

PROPERTY - Plant and distribution facilities are owned in AL (3), CA (3), CT (3), IL (2), KY (2), MI (4), MN (2), NJ (2), NY (3), TX, OH (14), AZ, FL, KS, MS, LA, UT (2), WI (2), Australia, Canada (3), Puerto Rico, England (3), France (2), Italy (2), Mexico, Netherlands, Japan, Singapore, Spain, and West Germany (5), and leased in CO, CA (3), MI (2), MS, AR, GA, MO, TX, NJ, OH (3), NV, OR, South Africa, Argentina, Brazil, England (2), Denmark, Sweden, Finland, and Spain (see Table 8).

- PRESTOLITE

See ELTRA CORP., p. 2-55.

- PUROLATOR, INC.\*

The company, based in Piscataway, NJ, was incorporated in Delaware, May 2, 1923, as Motor Improvements Inc.; name changed to Purolator Products, Inc. Sept. 20, 1940, and to present title Apr. 16, 1968.

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\* Sources: Standard & Poor's, 1980  
Corporate Annual Report for 1979.

In 1969 through a wholly owned subsidiary, acquired Protective Motor Service Co., Inc, Security Transport Corp., and Armored Motor Service Inc.

In 1970, acquired Oklahoma Armored Car, Inc. and Universal Guard Service, Inc. Also in 1970, acquired four other companies, customer contracts, and routes of certain courier companies.

In 1971, acquired 15 other companies, and customer contracts and routes of certain courier companies. Companies acquired included Armored Motor Service of Ariz., Inc., Securities Transport Co., Inc., Colorado Cartage Co., Inc., Mercer & Dunbar Armored Car Service, Inc., Dunbar Guard Service, Inc., Walters Armored Car Service, Inc., Armored Car, Inc., and Armored Carrier Corp., which provided armored car, courier and guard services; and Carrier Clinic and Carrier Farms, which, together, owned and operated a private psychiatric hospital in Belle Mead, NJ.

In 1972, acquired Armored Car Service, Ltd., Armored Express Corp. of Chicago, U.S. Guards Co., Lubbock-Amarillo, Armored Services, Inc., Armex Insurance Agency, Inc., Societe Anonyme Equipes P Ploegen (Belgium), and a 91.2 percent interest in Werner-Kennelly Co. and its wholly owned Record Controls, Inc.

Mar. 31, 1977, sold substantially all of the assets of the Medical Group to Carrier Foundation.

Company provides specialized transportation services consisting of time-sensitive delivery of commodities and documents and secure transportation of valuables for banks, industrial, and commercial business, and other customers mainly in the U.S. and Canada; and makes filters, caps, and other products mainly for automotive and specialized filtration markets.

In 1979, services accounted for 61.2 percent of net sales and operating revenues and 63.3 percent of operating profit before income taxes and certain expenses (61.4 percent and 72 percent in 1978); and products, 38.7 percent and 36.6 percent (38.6 percent and 28.0 percent).

The operations of the Products Group are described below.

PRINCIPAL SUBSIDIARIES - wholly owned

Purolator Services, Inc.

    Purolator Courier Corp.

        Purolator Security, Inc.

            Nevada Armored Transport, Inc.

Stant Mfg. Co., Inc.

Company has other subsidiaries, many with the name Purolator in their titles.

PROPERTY - Automotive products plants are operated in the U.S. (6) and Canada; and warehouses are maintained at distribution points. More than 266 specialized transportation terminals, garages, and other facilities are owned or leased in U.S. and Canada (see Table 8).

In the first quarter of 1979 company began construction of a plant and warehouse facility in IN.

PUROLATOR'S PRODUCTS GROUP manufactures and markets oil, air and fuel filters and gasoline, radiator and oil caps for automotive replacement and original equipment markets. Additionally, Purolator designs, engineers, and produces a wide variety of filtration products for general industrial, aerospace, medical, fluid power, and fluid processing applications. Total sales of the Products Group in 1979 were a record \$183,283,868, an increase of 19.4 percent over sales of \$153,460,387 the prior year, reflecting sharply higher sales of filters and Stant locking gas caps. Operating profit of the Products Group rose dramatically to \$15,177,000, or 45.1 percent greater than the \$10,458,000 recorded in 1978, but was adversely affected in the fourth quarter by excess production costs of some high-technology filters manufactured by Purolator Technologies.

A reorganization of the units within the Products Group was accomplished in 1979 and new names were given to each operating entity. The Filter Division, largest of the Products Group

units and formerly a division of Purolator, Inc., has become a wholly-owned subsidiary and will be known as Purolator Products Inc. The Canadian automotive filter company has become Purolator Products Ltd.

Stant Manufacturing Company, Inc., the cap manufacturing company, has taken the shorter name of Stant Inc., while Purolator California, producer of high-technology filters and related products, and previously a division of Purolator, Inc., has become Purolator Technologies, Inc.

These new subsidiary names were adopted to facilitate the extension of Purolator's manufacturing and marketing opportunities beyond historic filter and cap product lines and to aid in increasing customer awareness of Purolator and Stant brand label products.

**PUROLATOR PRODUCTS:** Sales of Purolator's U.S. filter company in 1979 exceeded \$100,000,000 for the first time and operating profit and profit margins were the highest since 1973. These excellent results reflect an increase in Purolator Products' share of the total vehicle filter market, a more favorable pricing environment in the industry, and continued improvement in the efficiency of Purolator Products' manufacturing and warehousing.

Purolator manufactures and markets oil, air and fuel filters and related products for the automotive replacement market under Purolator brand and house brand labels, as well as under a variety of private brand labels. Similar products are sold to manufacturers of trucks, farm equipment and off-road vehicles for both original equipment and replacement applications.

Sales in all of Purolator's filter markets increased, led by house brands under the Group 7 and XSV labels and private brand and original equipment filters. Purolator's new "Hot One" filter for vans, pickups, four-wheel-drive, and recreational vehicles, and the new foreign car oil filter line were launched in 1979. In 1980, a major advertising program was introduced

to enhance Purolator's image in the automotive products business.

In Canada, Purolator Products Ltd. manufactures and markets oil, air, and fuel filters for automotive, truck and off-road applications for replacement markets. Sales in 1979 were slightly ahead of the prior year, but operating profit declined due to higher costs of materials and manufacturing.

STANT: The gasoline crisis of 1979 created an enormous demand for locking gas caps and helped Stant achieve another record year in sales and operating profit. Stant sold over seven million locking caps during 1979, principally to the auto replacement parts market, more than offsetting the decline in sales of caps to the original equipment industry.

Stant, the nation's largest manufacturer of closure caps, produces a full line of fuel caps, locking gas caps, radiator pressure caps and oil filler caps. A variety of additional products is marketed under the Stant label including automotive thermostats, cooling system testers, heater cores, and other cooling system parts. Stant original equipment caps are sold to all U.S. automotive and off-road equipment manufacturers.

Construction was begun during the year on a new manufacturing facility in Pine Bluff, AR. The 133,000-square-foot plant will provide expanded production capabilities for original equipment and replacement closure caps, plastic and metal components, and other products and began operations in mid-1980.

A number of major organizational changes were made in 1979 to enhance Stant's marketing and product engineering design capabilities and expand new product development programs. Also, an aggressive advertising program was created to promote the sale of locking gas caps and to expand awareness of Stant in the consumer-oriented marketplace in 1980.

● ROBERT BOSCH GmbH\*

The company is based in Stuttgart, W. Germany, with U.S. operations headquartered in Broadview IL. It is a highly diversified company with corporate involvement in automotive equipment, industrial hydraulics and pneumatics, production equipment, communications technology, medical technology, film technology, surface-coating technology, household appliances, thermo-technology and audio-visual equipment.

In 1979, the plants of the parent company maintained favorable levels of operation. The major contributing factor was the strong demand for automotive equipment which persisted during the first three quarters of the year. In some divisions demand could only be met by hiring additional workers and by overtime work.

Within the Automotive Equipment Division of Bosch, the level of activity followed that of the automotive industry, as production of motor vehicles in the U.S., Great Britain and Italy, to some extent, declined significantly. Output in France, Sweden, Japan, Brazil and Mexico increased over the previous year. Automobile production in the Federal Republic of Germany also increased again and reached an all-time high. The number of commercial vehicles produced increased in all important manufacturing countries, with the exception of the United States and France; the growth rates were mostly higher than those for passenger cars. Rising fuel prices and sporadic fuel shortages affected the demand for motor vehicles. The trend towards fuel-efficient vehicles increased worldwide. Diesel engines were increasingly used in passenger cars. In Germany, production of passenger cars equipped with diesel engines increased by almost a third during the year. In the other West European manufacturing countries, sales of vehicles equipped with diesel engines also experienced remarkable growth rates. The automobile industry in the United States and Japan has become more active as regards the

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\*Source: Corporate Annual Report, 1979.

fitting of diesel engines in passenger cars.

Bosch realized significant increases in original equipment sales in Germany as well as in most important foreign markets. Bosch benefitted from increased demand for high-quality equipment, especially that designed to reduce fuel consumption. Despite substantial investments, Bosch was pressed to meet the still rising demand for distributor pumps for small, high-speed diesel engines, particularly those suited for passenger cars. Their production facilities for in-line pumps used in commercial vehicles and in passenger cars operated at full capacity.

Similarly, aftermarket sales of automotive equipment in Germany and in most European countries were good. Sales in the United States exceeded Bosch's expectations, in part due to greater demand for imported vehicles. In contrast, sales of their products on African and Asian markets were rather uneven. Political and economic problems in some of those countries hampered their business activities.

Bosch subsidiaries, their locations, and percent ownership of each are as follows (also see Table 8):

Consolidated Bosch Group Worldwide on December 31, 1979

<u>Company</u>	<u>Location</u>	<u>Owned %*</u>
Germany		
Robert Bosch GmbH	Stuttgart	
Robert Bosch Industrieanlagen GmbH	Stuttgart	100
Robert Bosch Versicherungsvermittlungs-GmbH	Stuttgart	100
Blaupunkt-Werke GmbH	Hildesheim	75
Hans Feierabend GmbH	Einbeck	98.8
Hamac-Höller GmbH	Viersen	100
Fr. Hesser AG	Stuttgart	96.6
Höfliger & Karg GmbH & Co	Waiblingen	100

\*Represents ownership by parent company and regional subsidiaries.

<u>Company</u>	<u>Location</u>	<u>Owned %</u>
Verwaltungs-und Beteiligungs-GmbH	Waiblingen	100
Junkers & Co GmbH	Wernau	100
Resicoat GmbH Beschichtungspulver	Reutlingen	100
Schäfer Einspritztechnik GmbH	München	100
Siba-Elektrik GmbH	Gerlingen	100
SIBA Elektrik GmbH & Co	Stuttgart	100
Strukturbau Bosch und Wüstenrot GmbH & Co	Gerlingen	100
Strukturbau Bosch und Wüstenrot GmgH	Stuttgart	90
H. Strunck GmbH & Co Maschinenfabrik	Köln	57.4

#### Europe\*

##### Belgium:

Robert Bosch België NV	Tienen	100
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##### Denmark:

Robert Bosch A/S	Ballerup	100
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##### France:

Robert Bosch (France) SA	Saint-Ouen	100
Blaupunkt (France) SA	Mondeville	100
FBC SA	Clichy	99.8
Femsa (France) SA	Trappes	100
Ets. Regamey & Cie	Paris	99.9
Sigma Diesel SA	Vénissieux	99.8

##### Great Britain:

Robert Bosch Ltd	Watford	100
Robert Bosch Packaging Machinery (UK) Ltd	London	100

##### Italy:

Robert Bosch SpA	Milano	100
Silma SpA	Rivoli Torines	90

\*Small regional subsidiaries are not included in this list.

<u>Company</u>	<u>Location</u>	<u>Owned %</u>
Luxemburg:		
Robert Bosch Finanz-Holding (Luxemburg) SA	Luxemburg	100
Femsa - Soci�t� Financiere et de Brevets SA	Luxemburg	100
Netherlands:		
Robert Bosch Verpakkingsmachines BV	Weert	100
Norway:		
Robert Bosch Norge A/S	Oslo	98
Portugal:		
Robert Bosch (Portugal) Lda	Lisbon	100
Sweden:		
Robert Bosch AB	Stockholm	100
AB ROBO	Link�ping	100
Switzerland:		
Robert Bosch Internationale Beteiligungen AG	Z�rich	90
Robert Bosch AG	Z�rich	100
Scintilla AG	Solothurn	82.9
Spain:		
Robert Bosch Comercial Espa�ola SA	Madrid	100
Robert Bosch Espa�ola SA	Madrid	86.8
F�brica Espa�ola Magnetos SA (Femsa)	Madrid	54.9
<u>America</u>		
Argentina:		
Robert Bosch Argentina SA	Buenos Aires	100
Brazil:		
Robert Bosch do Brazil Ltda	Campinas	100
Robert Bosch do Brazil-Nordeste Ind�stria e Com�rcio SA	Salvador	100
Robert Bosch M�quinas de Embalagem Ltda	S�o Paulo	100
Canada:		
Robert Bosch (Canada) Ltd	Mississauga, Ontario	100

<u>Company</u>	<u>Location</u>	<u>Owned %</u>
Mexico:		
Robert Bosch de México SA de CV	Mexico City	100
Venezuela:		
Fábrica Electro Magnética SA (Femsa)	Maracay	54.4
United States:		
Robert Bosch Corporation	Broadview IL	100
Robert Bosch North America Inc.	Broadview IL	100
Robert Bosch Packaging Corporation	Piscataway NJ	100
Surftran Corporation	Mad. Heights MI	100
<u>Asia</u>		
India:		
Motor Industries Co Ltd (MICO)	Bangalore	51
Japan:		
Robert Bosch (Japan) Ltd	Tokyo	100
Malaysia:		
Robert Bosch (Malaysia) Sdn Bhd	Penang	100
Singapore:		
Robert Bosch (South East Asia) Pte Ltd	Singapore	70
Taiwan:		
Bauer and Sun Optical Co Ltd	Taichung	100
Turkey:		
Robert Bosch Türk Sanayi AS	Bursa	60
<u>Africa, Australia</u>		
Republic of South Africa:		
Robert Bosch South Africa (Pty) Ltd	Brits	100
Auto Electrical & Engineering Co (Pty) Ltd	Brits	100
Australia:		
Robert Bosch (Australia) Pty Ltd	Clayton	100

● RAYBESTOS MANHATTAN, INC.\*

The company, based in Trumbull, CT, was incorporated in Connecticut Feb. 24, 1976, as a wholly owned subsidiary of former parent, Raybestos-Manhattan, Inc., which it merged on Apr. 6 1976, and adopted latter's title. Former parent was incorporated in NJ July 5, 1929, to acquire assets of the Raybestos Co., established in 1902; the Manhattan Rubber Mfg. Co., organized in 1893; and U.S. Asbestos Co., founded in 1906.

Aug. 1, 1971, disposed of abrasive and diamond wheel products line. Sept. 26, 1971, sold its 49.628 percent interest in Raybestos-Belaco, Ltd. Aug. 4, 1971, acquired Farrell Products Co., a maker of cold heading tools.

Company and subsidiaries make friction materials products, rivets, and related items, and other products.

In 1979, friction materials products accounted for 76.9 percent of consolidated net sales of continuing products and 89.1 percent of consolidated net profit before corporate expenses (76.9 percent and 77.2 percent in 1978); rivets and rivet-setting machine products 9.1 percent and 14.1 percent (8.5 percent and 5.4 percent); and other industrial and consumer products 14.0 percent and 3.2 percent decrease (14.6 percent and 17.4 percent).

Friction materials products include drum brake linings, disc brake pads, clutch facings, automatic transmission friction elements, automotive brake blocks, and reinforced plastic products sold in the automotive, farm implement, earthmoving, and general industrial fields. Reinforced plastic products include rods, sheets, tubes, engineered parts, felts, mats, and molding compounds for the transportation, chemical, and aerospace industries.

Company also sells hydraulic and other brake parts, made by others, to the replacement market.

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\* Source: Standard & Poor's, 1980.

Rivets and related items include rivets and rivet setting machines, cold headed specialties and cold heading tools sold to the automotive, appliance, hardware, and electrical industries.

Other products include engineered asbestos textiles, such as asbestos roving, lap, yarns, sewing thread, cords, wicking, tubing, tape, cloth, lagging, and felts; packing and sealing products; and business machine rolls. Textile products include mechanical packing and gasketing materials such as compressed sheet, rings and seals, fire sleeving, nonflammable coatings, fluorocarbon products, flexible expansion joints, and coated cloth.

PRINCIPAL SUBSIDIARIES - wholly owned

Milford Rivet & Machine Co.

Naja, Inc.

R/M Inc.

Company also has a number of other wholly owned subsidiaries with the name Raybestos-Manhattan in their titles.

AFFILIATES - Cassiar Asbestos Corp. Ltd., a British Columbia mining concern, supplies asbestos spinning fiber to company.

Manufacturas Multiples, S.A. (47.3 percent) operates a facility in Caracas, Venezuela.

ITAPSA, 19 percent owned, operates a facility in Mexico City, Mexico.

PROPERTY - Company owns 14 plants in CT (2), PA (2), IN, NC, OH, SC, MS, CA, Canada, W. Germany, Ireland, and Australia. Office and warehouse facilities are leased at 15 locations throughout the U.S. (see Table 8).

Under a joint venture, company operates a plant in Japan.

● REYNOLDS METALS CO.\*

The company is headquartered in Richmond, VA. It was incorporated in Delaware, July 18, 1928. Later acquired U.S. Foil Co., Canadian Reynolds Metals Co., Ltd. (CRM), and May Aluminum Division of Whittaker Corp. at El Campo, TX.

Company, with its wholly owned subsidiaries, is a major producer of primary aluminum and makes aluminum products for a variety of industries, including building and construction, transportation and automotive, electrical and communications, appliance and utensil, container and packaging, machinery and equipment, and chemical.

Reynolds products are generally sold to producers and distributors of industrial and consumer products in various markets. Sales of products by principal markets in 1978 and 1979 are given below:

	<u>Approximate Percent of Total Sales</u>	
	<u>1979</u>	<u>1978</u>
Domestic Markets:		
Packaging and Container	37%	38%
Transportation and Automotive	12	12
Building and Construction	8	8
All Other	26	27
Foreign Markets	<u>17</u>	<u>15</u>
	100%	100%

INTERNATIONAL OPERATIONS - Foreign subsidiaries and associated or related companies operate in 19 countries: Australia, Belgium, Brazil, Canada, Colombia, Egypt, France, Ghana, Haiti, Italy, Jamaica (W.I.), Japan, Mexico, Philippines, Spain, Thailand, the Netherlands, Venezuela, and West Germany. Foreign sales totaled \$688,500,000 in 1979, including \$307,900,000 for non-consolidated companies.

\* Sources: Standard & Poor's, 1980.  
Annual Report (10-K), 1979.

SUBSIDIARIES - wholly owned and consolidated

Caribbean Steamship Co., S.A.

Tilo Co., Inc.

Canadian Reynolds Metals Co., Ltd. (all common shares and 96.2 percent of preferred owned).

Unconsolidated subsidiaries and affiliates:

Alumina Partners of Jamaica (36-1/2 percent owned)

Aluminio del Caroni, S.A. (50 percent owned)

Aluminum Oxid Stade GmbH (50 percent owned)

Hamburger Aluminum-Werk GmbH (33-1/3 percent)

Industria Navarra del Aluminio, S.A. (50 percent owned)

Jamaica Alumina Security Co., Ltd. (37 percent owned)

La Compagnie Hydroelectrique Monicouagan-Manicouagan Power Co. (40 percent owned)

Robertshaw Controls Co. (27 percent owned)

Societa Lavorazioni Industriali Metalli S.p.A. (60 percent owned)

Company has numerous other subsidiaries and affiliates most of which have the name Reynolds in their titles.

PRINCIPAL PROPERTIES AND OPERATIONS - Production of primary aluminum involves the mining of bauxite, the conversion of bauxite into alumina and the reduction of alumina to aluminum in electrolytic cells requiring large amounts of electric energy. The primary aluminum in various forms is used to fabricate a wide variety of products.

Aluminum plants are at Hurricane Creek, AR, Corpus Christi, TX, Jamaica, W.I. and Stade, W. Germany.

Aluminum Reduction Works are in AR (2), AL, OR, TX, WA, NY, and Quebec. Annual rated capacity of these plants at Dec. 31, 1979, was 1,150,000 short tons of primary aluminum (see Table 8).

Company has 43 domestic and 9 foreign plants for fabricating aluminum and nonaluminum products. Company expected to begin operations at can-making plants in WA and MO in 1980. Principal products made at the fabricating plants are aluminum sheet, wire, plate, rod and bar, cable, tubing, extruded shapes, cans, foil and foil products, powder and paste, fabricated parts, printed products, plastic film, and building products. Annual capacity for sheet and plate exceeds 500,000 tons, and for other products is slightly greater.

Bauxite and Other Raw Materials - The company controls deposits of bauxite in Jamaica (which supplied about 61 percent of its alumina requirements in 1979), Arkansas, and Haiti. The company also has substantial U.S. reserves of laterities and clays that may be used in lieu of bauxite in the event of any interruption to overseas supplies. The company has also obtained an option to purchase up to 50,000,000 dry metric tons of Australian bauxite (not to exceed 3,500,000 dry metric tons per year).

In Mar., 1977, the company's wholly owned Reynolds Jamaica Mines, Ltd. (RJM) and the government of Jamaica entered into a final agreement whereby the company would sell to the government a 51 percent share in its mining facilities and equipment in Jamaica, 65,000 acres of land and all its agricultural operations in Jamaica. The cost to the government was \$16,900,000, with interest to be paid over a 10-year period. The agreement also provided for the government and company to form a long-term bauxite mining joint venture, called Jamaica Reynolds Bauxite Partners, which would have leases to lands containing bauxite reserves sufficient to support bauxite exports at existing capacity until 2020.

In 1974, the company joined a consortium with seven other companies to mine bauxite in the Trombetas area of the lower Amazon River Basin of Brazil. The company is entitled to

receive a minimum of 335,000 dry metric tons of bauxite a year.

Other raw materials are either purchased from others or supplied from the company's fluorspar concentrating plant in TX, limestone quarry in AR and a calcined coke plant in LA. For possible future use, the company's also holds mineral claims on fluorspar properties in CO and KY, and coal properties in KY and WY.

Reynolds Jamaica Alumina, Ltd. is a partner in an alumina plant with annual capacity of 1,300,000 tons. The company is entitled to receive about 37 percent of production.

● ROBERTSHAW CONTROLS CO.\*

The company is based in Richmond, VA. It was incorporated in Delaware, Dec, 23, 1926, as The Fulton Sylphone Co., and acquired properties and business of The Fulton Co., a Maine concern formed in 1904, Sept. 24, 1947, changed its name to Robertshaw-Fulton Controls Co. Present title adopted in Apr. 1963.

In 1970, dissolved wholly owned Phone Alert, Inc.

Apr. 28, 1972, acquired Simicon Co., Holland MI (controls for oil furnaces).

Company, through subsidiaries and divisions, designs, develops, makes, and services automatic control devices, equipment, and systems, sold to contractors, original equipment manufacturers, service and replacement parts wholesalers, utility service departments, certain governmental agencies, shipbuilders, automotive and aircraft manufacturers, and various other industrial users; and electric, pneumatic, and mechanical timing devices, including consumer clocks and timers, sold to retail and trading stamp premium stores, and wholesalers. Products are sold in numerous foreign countries.

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\* Source: Standard & Poor's, 1980.

Temperature controls for home and commercial buildings accounted for 38 percent of sales in 1979 (38 percent in 1978); controls for home appliances 29 percent (32 percent); industrial controls and instrumentation 19 percent (16 percent); and transportation, consumer, and other 14 percent (14 percent).

Principal product areas include temperature controls for homes and commercial buildings, total environmental control systems, heating and ventilating controls, central and space heating controls, wall thermostats, controls for gas and electric water heaters, and commercial air conditioning and refrigeration controls.

Controls for home appliances include gas and electric controls for domestic cooking appliances, precision miniature and sub-miniature snap-action switches, electric switches for appliances, controls for air conditioners, clothes washers and dryers, electric and mechanical timing mechanisms for kitchen and home laundry appliances, refrigeration controls, water systems controls, and temperature and pressure sensing bellows assemblies for home appliances.

Industrial controls and instrumentation include precision snap-action and proximity switches, process controls, vibration controls, capacitance-type level measurement controls, nuclear instrumentation and water quality analytical and control systems, engine control systems, valves, pressure gauges, metal bellows and bellows assemblies, gas and electric controls for hotel, restaurant, and institutional food preparation, industrial timing devices, temperature and pressure sensing diaphragm assemblies, and solid state motor protection systems.

Transportation, controls include automobile and truck thermostats, emission control devices, bellows assemblies, temperature and pressure controls. Consumer and military controls include airborne flight control amplifiers, aviation passenger oxygen breathing systems, military pilot oxygen helmet systems, aerospace controls, custom designed metal bellows and

bellows assemblies for aircraft engine fuel controls, controls for ships and submarines, pneumatic regulators and valves, and consumer electric and mechanical clocks and timers, including mechanical timers sold under the Minute Minder trademark.

PROPERTY - Company owns plants in OH (2), CA (4), TN, TX, GA, PA (2), CT (2), and NH; and leases plants in TN (2), VA (2), MI, GA, MA (2), and Canada. Unconsolidated foreign subsidiaries own plants in Australia, Brazil, and France, and lease a plant in Japan. Company also operates research and development center in VA (see Table 8).

ACTIVE SUBSIDIARIES - wholly owned

Lux Time (Canada) Ltd.

Compagnie Europeene des Thermostats, S.A.

New England Instrument Co.

Company also has numerous other subsidiaries with the name Robertshaw in their titles.

AFFILIATES

Precision, S.A. (40 percent owned)

Pardo Group (30 percent).

● ROCKWELL INTERNATIONAL CORP.\*

The company is headquartered in Pittsburgh, PA. It was incorporated in Delaware, Dec. 6, 1928, to acquire and hold stocks of other corporations; acquisition of several large manufacturing and operating units eventually put the company in the management field. To comply with the requirement of the 1934 air mail law, it was necessary for the company to divest itself of stock interest in several air transport organizations

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\* Sources: Standard & Poor's, 1980  
"Automotive Industries," June 1980.

and assume the status of an operating company. Name changed from North American Aviation Inc. to North American Rockwell Corp. Sept. 22, 1967; and to present title Feb. 16, 1973.

Apr. 8, 1970, merged Molded Fiber Glass Companies, Inc. In Sept. 1970, purchased Teleflex Ltd.

Dec. 8, 1971, acquired Amforge, Inc., Chicago.

In Mar. 1972, sold wholly owned Worcester Moulded Plastics Co.

In Apr. 1972, purchased Maudslay Motor Co. Ltd.

In May 1972, combined eight Canadian units to form North American Rockwell of Canada Ltd. - namely, Rockwell-Standard (Tilbury) Ltd., Rockwell-Standard Corp. of Canada Ltd. Canada Motor Lamp Co., Ltd., Ontario Steel Products Co., Ltd., Tycos Tool & Die Co., Ltd., MGD Canada Ltd., Boston Gear Works of Canada Ltd., and Les Produits d'Acier Lacolle Ltee.

In July 1972, acquired 75 percent of IEL-Rockwell Ltd.; continued as Rockwell-Standard of Australia, Ltd., maker of drive axles and related products for the heavy duty truck market in Australia.

In Sept. 1972, acquired Unicom Systems, Inc.

Feb. 16, 1973, merged Rockwell Manufacturing Co.

Nov. 14, 1973, merged Collins Radio Co.

Apr. 9, 1974, merged Admiral Corp. into a wholly owned subsidiary, which adopted the Admiral name.

During 1978 discontinued its Admiral television business. During 1979 sold its Admiral appliance business.

Company and subsidiaries make, research, and develop many products for commercial and government markets. Operations are conducted through the following groups.

ELECTRONICS OPERATIONS - Telecommunications systems and equipment; microelectric circuits and assemblies for micro-processor, modern subsystems, bubble domain memories, business

equipment, telecommunications and consumer electronics applications; navigation and flight control systems; command-and-control communications products and systems; and computerized communications switching systems.

AEROSPACE OPERATIONS - Development of B-1 bomber for U.S. Air Force and prototype V/STOL fighter/attack aircraft for U.S. Navy; other military aircraft; airplanes for business, and private uses; subcontract work on commercial aircraft made by others; nuclear reactors and components; prime contractor for Space Shuttle orbiter for U.S. Government; development of the NAVSTAR Global Positioning Satellite System for the Defense Dept., and rocket engines. Company also engages in laser research and development efforts as well as other development and research activities.

AUTOMOTIVE OPERATIONS based in Troy, MI - Products include axles, brakes, transmissions, special gear drives, mechanical and suspension springs, universal joints and drivelines, gear boxes, and plastic hood, door, and fender assemblies for heavy duty commercial and military vehicles, and special purpose vehicles (used in roadbuilding, heavy construction, mining, forestry and agriculture) used on and off the highway; universal joints and drivelines, plastic components and springs for light trucks and passenger cars; sun roofs, steel and cast aluminum wheels, window regulating and restraining belt systems and wheel covers for passenger cars; and steel castings such as undercarriages for mass transit cars and diesel locomotives (see below for more details of automotive operations).

ENERGY OPERATIONS - Measurement and control equipment for gas, water, and other fluids in the energy, utility, and construction markets; valves used in various applications in nuclear and fossil systems for the energy and power generation markets; and through a joint venture, wellheads, valves, and completion equipment for the drilling and production segments of the oil and gas industries. Other products include valve lubricants, pipe clamps, and couplings.

GRAPHICS, TEXTILE, POWER TOOL, AND OTHER OPERATIONS - High-speed printing presses and related equipment used mainly for printing newspapers; automatic mailroom equipment; and industrial sewing machines and various looms, loom components and accessories. Power tools, including stationary tools for both metal and wood-working; pneumatic and specialty tools for the general industrial market; portable electric power tools for the building trades; and home workshop power tools for the consumer market.

DIVISION OF SALES AND INCOME - In fiscal 1979, automotive operations accounted for 29.8 percent of sales from continuing operations and 39.5 percent of operating income (28.0 percent and 33.4 percent in 1978), aerospace 26.3 percent and 20.3 percent (27.4 percent and 17.4 percent), electronics 24.8 percent and 26.3 percent (23.8 percent and 23.2 percent), energy 7.7 percent and 8.6 percent (7.9 percent and 10.5 percent), and graphics, textile, power tool and other 11.4 percent and 5.3 percent (12.9 percent and 15.5 percent). In fiscal 1979, sales under U.S. Government contracts provided 36 percent of total sales (34 percent in 1978). In fiscal 1979, sales by foreign subsidiaries accounted for about 12.4 percent of sales and other income (11.4 percent in 1978).

SUBSIDIARIES - wholly owned or noted

McEvoy, Inc. (Del.)

MGD Graphic Systems, Inc.

Rockwell International Finance Corp.

Rockwell International Holdings Ltd.

McEvoy Oilfield Equipment Ltd. (Eng.) (51 percent)

MGD Graphic Systems Ltd. (Eng.)

Wilmont Breeden (Holdings) Ltd. (Eng.)

Compagne Industrielle de Mecanismes S.A. (France)  
(99 percent)

Rockwell International of Canada (Ontario) Ltd.

Rockwell International Sales Corp.

Company also has numerous other subsidiaries, many with the name Rockwell in their titles.

PROPERTY - Sept. 30, 1979, company and subsidiaries operated about 160 plants and research and development facilities throughout the U.S. and in Canada, Mexico, Australia, South America, and Europe. Company also had over 200 sales offices, warehouses and service centers (see Table 8).

Since July, 1975, company has been operating and managing the U.S. Government's Rock Flats, CO, nuclear weapons components plant under a 5-year contract.

Rockwell International's Automotive Operations posted sales of \$1.8 billion in 1979, representing 29.8 percent of consolidated corporate sales.

Among the products introduced for the passenger car and light truck market were:

A passenger car seat back rotary recliner for the Chevrolet Chevette that also is suitable for other cars and light trucks;

A variable rate coil spring for subcompact cars;

An all-plastic wheel cover; and

A concept passive restraint transport system that utilizes a motor and a cable to automatically move lap and shoulder belts out of the way of the passenger entering or existing the vehicle.

For the heavy-duty vehicle market, Rockwell Automotive introduced several new or re-engineered products in the last year. These include:

An electronic inter-axle differential locking system designed to improve the traction performance of tandem axles in heavy-duty trucks.

An electronic, on-board monitoring system called Trip-master<sup>®</sup> Trip Recorder, which will assist vehicle users in

reducing maintenance costs and improving fuel economy; and  
A sealed, wet disc brake for mining equipment that is  
designed to operate in that hostile environment for the life  
of the vehicle with no major overhaul.

Overall, the company's efforts in the heavy duty vehicle  
market are geared to the demand for components that will increase  
vehicle life and maintenance intervals and improve fuel economy.

In overseas markets, Rockwell Automotive has made significant  
moves to strengthen its role as a worldwide supplier to the  
vehicle producers. And to improve its position in the heavy duty  
vehicle market, Rockwell Automotive has under construction new  
manufacturing facility near Frankfurt that will significantly  
increase its capacity to produce heavy duty foundation brakes.

● SCOVILL INC.\*

The company is headquartered in Waterbury, CT. It was in-  
corporated under present charter by a special act of the Connecti-  
cut General Assembly Mar. 8, 1881, as successor to predecessors  
which had been in business continuously since 1802. Name changed  
from Scovill Mfg. Co. to present title July 6, 1979.

In 1970, acquired the following: Staylastic/Smith, Inc.,  
maker of elastic sewing notions for home and apparel manufac-  
turers; Udyco Industries, Inc. relating to manufacture of pneu-  
matic and hydraulic cylinders, welding guns and die cushions;  
Sterling Industries, Inc., maker of lighting fixtures, interior  
directional signs and commercial building markers; Ajax Hardware  
Corp. and Prestige Hardware Corp., producers of building supply  
hardware, and Namm & Singer, Inc., maker of plastic and metal  
high-fashion buttons for the women's wear market.

Mar. 12, 1971, acquired assets and business of Bathroom  
Cabinet Division of Grote Mfg. Co. Aug. 31, 1971, sold assets  
of Wood-Carv and Auricord Divisions to Triangle Pacific Forest  
Products Corp., and Conrac Corp., respectively.

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\*Sources: Standard & Poor's, 1980  
Ward's Automotive Yearbook, 1980

In July, 1972, acquired the small appliance product line of Westinghouse Electric Corp.: operations continued in Housewares Group.

Aug. 1, 1972, sold cosmetic container business to Arrowhead Assoc., Inc.

In Apr. 1976, sold to Century Brass Products, Inc., its Metals and General Products Division.

In Jan. 1979, acquired the Yale Lock & Hardware Division of Eaton Corp.

Company's operations are widely diversified and are divided by product lines as follows: housing, which provided 30.1 percent of net sales from continuing operations and 31.1 percent of total operating income in 1979 (39.1 percent and 43.4 percent in 1978); security products 13.6 percent and 16.0 percent (nil and nil); housewares 17.8 percent and 9.7 percent (20.3 percent and 11.7 percent); sewing notions and apparel fasteners 17.3 percent and 12.5 percent (18.4 percent and 14.8 percent); and automotive and automation products 21.2 percent and 30.7 percent (22.2 percent and 30.1 percent).

HOUSING PRODUCTS GROUP - NuTone Division makes built-in products including exhaust fans, ventilating range hoods, central vacuum cleaners, auxiliary heaters, smoke detectors, door chimes, high fidelity radio, stereo and intercommunication systems, mail boxes, security systems, and garage door openers, mainly used in homes and apartments, and for renovations. Division also produces bathroom accessories, vanitories, and built-in and surface mounted bathroom wall cabinets; a line of commercial ventilation products; a commercial and professional intercommunication system; and a line of products designed for the mobile home industry.

Sterling, Artolier, and Lightcraft Divisions make decorative, incandescent and fluorescent lighting fixtures for residential and commercial buildings.

Ajax Hardware Corp., wholly owned, makes cabinet and builders hardware, and industrial hardware.

Markel Electric Products Division makes a line of baseboard, wall and portable electric heaters for the residential and commercial markets.

SECURITY PRODUCTS GROUP - Security Products Division makes locks, builders' hardware, and door closers under the names of Yale, Norton, BKS and FAS, for commercial, office, and industrial buildings.

HOUSEWARES GROUP - Hamilton Beach Division makes portable electric motor driven appliances, personal care items, soda fountain accessories, and is an important producer of electric knives, hand and table mixers, irons, blenders, bacon fryers, corn poppers, food processors, and slow cookers, sold mainly under the Hamilton Beach name, and to a limited extent under private names to about 30,000 independent retail outlets.

Dominion Electric Corp., makes small appliances, most of which use heating elements including hair dryers, hot plates, portable ovens and broilers, fast cookers, and skillets, sold under the names Little Mac or Double Mac. It also makes mini-drip coffee makers and computerized small appliances.

SEWING NOTIONS AND APPAREL FASTENERS GROUP - Sewing Notions Division products are sold through over 70,000 retail outlets and include a broad line of notions, such as straight and safety pins, sewing aids and needlework products sold under the Clinton and Dritz trade names. About one-fourth of these products are purchased from others for resale. Division also makes paper clips and related stationery supplies.

Apparel Fasteners Division makes metal and nylon zippers, metal and plastic snap fasteners, a variety of wire formed products, and plastic buttons for the apparel trades and for various industrial users, including the automotive industry. Output is sold in the U.S. and abroad under the trade names Gripper, Nylaire, Nyguard, and Conmar. Division also makes and

leases specially designed machines to automatically attach the snap fasteners.

AUTOMOTIVE AND AUTOMATION GROUP - Schrader Automotive Products Division is an important producer of parts and assemblies for the automotive industry. Products include Schrader tire valves and related accessories, tire maintenance and service station equipment, and tire pressure maintenance systems; and a self-contained auto load-leveling system and wheel balancing weights for cars and trucks. The Division is based in Nashville, TN.

Schrader Bellows Division makes pneumatic and hydraulic products under trade names Universal Bellows, Scovill and Schrader, for automating industrial operations, including valves, gauges, cylinders, pressure filters, lubricators, regulators, and a line of miniature air control products. The Division is based in Akron, OH.

PROPERTY - Company operates 85 plants, of which 58 are in North America. Foreign operations are carried on in 17 countries.

Main plants are owned in CT, OH (3), GA, MI, NJ, NC, PA, England (4), Canada (3), Brazil (2), Australia, W. Germany, Sweden, Italy, France, India, Japan (3), and Mexico (2); and leased in OH (5), NC (5), CA (3), NJ, TN (4), KY (2), SC, MA, TX, IA, MI, VA, NY (2), Canada (3), Germany, South Africa, Australia, Puerto Rico, Mexico, England (2), New Zealand, Columbia, Venezuela, Scotland, Hong Kong, and France. (See Table 8.)

● SEALED POWER CORP.\*

The company, based in Muskegon, MI, was incorporated in Delaware, Feb. 9, '68, under name 2001 Sanford St. Corp., as a wholly owned subsidiary of Sealed Power Corp., and on Apr. 30,

\*Source: Standard & Poor's, 1980.

1968 merged and adopted the title of its parent. Latter was incorporated in Mich. in 1912 as Piston Ring Co., and changed its name to Sealed Power Corp. on May 18, 1932.

In Dec. 1970, acquired Rimer Precision Casting, Inc., Waterville, OH, maker of precision metal parts.

May 31, 1972, acquired Johnson Products Inc., Muskegon, MI, producer of tappets.

Company makes and sells piston and transmission rings, cylinder sleeves, valve tappets, transmission oil filters, precision die and investment castings, and powdered metal parts for automotive and other industrial engines. Company also purchases engine parts, mainly valves, pistons, and engine bearings, for resale in the replacement market.

Subsidiaries make and sell engine parts in Mexico and Canada. Company exports products to most countries in the free world.

In 1979, engine parts accounted for 78 percent of net sales (in 1978, 79 percent), and die and investment castings and powdered metals 22 percent (21 percent). General Motors Corp. accounted for 27 percent of net sales in 1979, and foreign operations 11 percent.

SUBSIDIARIES - wholly owned or noted

Sealed Power Corp. of Canada, Ltd.

Sealed Power de Mexico, S.A. de C.V. (96.9 percent)

Compania Americana-Mexicana Industrial, S.A. (98.4 percent)

PROPERTY - Company owns plants in MI (6), IN, OH, KY, IL, and Mexico (2); and a warehouse in IN. An owned plant in Canada was closed and up for sale in Mar. 1980. Distribution facilities are leased throughout the U.S. (See Table 8.)

● SHELLER-GLOBE CORP.\*

The company, headquartered in Toledo, OH, was incorporated

\*Sources: Standard & Poor's, 1980  
Ward's Automotive Yearbook, 1980

in Ohio, Feb. 23, 1929, as City Auto Stamping Co.; name changed to Globe-Wernicke Industries, Inc. July 1, 1957, and to present title Dec. 30, 1966 on merger of Sheller Mfg. Corp.

Sept. 2, 1970, acquired Brentwood, Inc. (name later changed to Continental Trailers, Inc.).

March 1, 1971, acquired Delta Homes Corp., maker of mobile and modular homes.

Sept. 28, 1973, acquired Concorco, Lda.

Sept. 30, 1974, acquired VLN Corp., Cleveland, Ohio, which was merged into Company.

Company operates in three major categories: automotive parts and assemblies which accounted for 75.9 percent of net sales in fiscal 1979 (74.8 percent in 1978); vehicles and transportation equipment 12.3 percent (13.1 percent), and other products 11.8 percent (12.1 percent). Ford Motor Co., Chrysler Corp., and General Motors Corp. accounted for 24.1 percent, 13.5 percent, and 11.3 percent of total sales, respectively, in fiscal 1979.

Automotive products include large metal stampings, truck cabs, steering wheels, dash pads, arm rests and other safety items, heavy duty alternators, starter motors, solenoid switches, gauges, decorative die casts and plastic parts and assemblies, interior trim parts, automotive aftermarket products, fractional horsepower motors, cork and cork-rubber products, weather stripping, gaskets and seals, carburetor floats, and oil, gas and air filters; also other products such as decorative appliance parts, plumbing fixtures, steering wheels for marine, farm and other off-the-road equipment, rubber pipe seals, and fan blades and blower wheels.

Vehicles include school and transit buses, funeral coaches, and special vehicles, most of which are mounted on chassis furnished by auto makers.

Other products include office supplies and accessories; radiation medical instruments and supplies; equipment for measuring radiation; special purpose electronic components; flexible polyurethane foam for the furniture industry; and electrical meters and gauges.

PROPERTY - Co. maintains 59 plants in MI, OH, KY, IL, IN, IA, GA, VA, TX, MS, CA, NJ, PA, FL, NY, CO, Portugal, Canada, and Mexico (see Table 8).

SUBSIDIARIES - wholly owned or noted

Sheller-Globe International Corp.

Sheller-Globe of Canada Ltd.

Concorco, Lda. (80 percent)

Ajax Fibre Envelope Corp.

Victoreen, Inc.

Leeca-Neville de Mexico S.A. de C.V.

Sheller-Globe Export Sales Corp.

Vanaire Mfg. Corp. (87 percent)

AFFILIATES - Mo-Car Internacional (Mexico)-40 percent; Fabrico Nacional de Carrocelias; Fabrico Superior de Centro America, S.A.

The company's automotive products operations are based in Detroit, MI, and comprise the following divisions which supply OEM and aftermarkets:

Accurate Parts Division, Kokomo, IN (starter drives and solenoid switches)

ARS Automotive Products Division, Denver, CO (starter solenoids)

City Auto Stamping Division, Toledo, OH (sheet metal stampings and assemblies)

City Machine and Tool Division, Toledo, OH (stamping dies, rubber/plastics molds)

Hardy Division, Union City, IN (decorative zinc die cast and plastic parts/assemblies)

Iowa City Division, Iowa City, IA (padded and plastic interior trim products, steering wheels)

Keokuk Division, Keokuk, Iowa (padded and foam rubber/plastic products)

Leece Neville, Cleveland, OH (alternators, starters, regulators, switches and other electrical components)

Morganfield Division, Morganfield, KY, (interior trim items)

Mitchell & Smith Division, Norfolk, VA (cork, rubber, gaskets)

Montpelier Division, Montpelier, IN (custom rubber products)

Niles Division, Niles, MI (padded interior trim products)

Norwalk Assembly Division, Norwalk, OH (aluminum and steel truck cabs and body components)

Paramount Fabricating Division, Detroit, MI (metal stampings and assemblies)

Plastics Division, Gabill, IN (steering wheels)

Portland Division, Portland, IN (molded rubber specialty products)

Sheridan Manufacturing Division, Wauseon, OH (carburetor and gas tank floats, metal stampings and assemblies)

Special Products Division, Livonia, MI (cold forged products)

Superior Division, Lima, OH (buses, commercial vehicles, funeral cars)

Steering Wheel Division, Brampton, Ontario, Canada (plastic steering wheels)

Kralinator Filters Division, Cambridge, Ontario, Canada  
(oil, fuel, air filters)

Manitoba Division, Morris, Manitoba, Canada (buses)

Superior Deseronto, Deseronto, Ontario, Canada (buses)

● SIGNAL COMPANIES, INC.\*

The company, based in Beverly Hills, CA, was incorporated in Delaware, June 25, 1928, to take over Signal Gasoline Co., Inc., and Signal Gasoline Corp. Apr. 30 1968 name changed from Signal Oil & Gas Co. to present title.

Apr. 30, 1970, purchased all assets of Precision Rubber Products Corp. Also in 1970, sold certain oil and gas refining marketing operations.

Jan. 28, 1974, sold wholly owned Signal Oil & Gas Co. (SOAG), representing company's oil and gas business.

May 1, 1975, acquired 60.5 percent of Universal Oil Products Co. (now UOP, Inc.). May 26, 1978 acquired the remaining 49.5 percent of the Company.

Company, through subsidiaries, is principally engaged in the making or heavy duty motor trucks and truck tractors, and aerospace and industrial products; and in commercial research and development resulting in processes, products, and services having proprietary positions in the energy and environmental improvement markets. Other activities include land development, radio and television broadcasting and shipping.

Mack Trucks, Inc., 90 percent owned, is one of the nation's oldest and largest manufacturers of diesel-powered heavy duty motor trucks (including truck tractors), ranging upwards from 33,000 lbs. in gross vehicle weight, and which are usually engineered and built to meet the particular requirements of its customers. It produces all the major components of its trucks.

\*Source: Standard & Poor's, 1980

Also, it furnishes parts and service for its vehicles, which are important parts of its business.

Mack trucks are sold and serviced through 848 sales and service outlets in the U.S., and 67 in Canada, and 93 independent distributors in 92 foreign countries. Mack trucks are also assembled in 9 countries, 3 of which Mack has an ownership participation.

In 1979, as part of a larger financial agreement which provided Regie Nationale des Usines Renault with a 10 percent stock interest in Mack, Mack was appointed exclusive distributor in the U.S. of medium duty Class 6 and Class 7 trucks made by Renault.

Principal plants are owned in PA (2), MD, and Canada, and leased in CA. A warehouse is leased in NJ.

Garrett Corp., wholly owned, is a principal supplier of environmental control systems, products and components for civil and commercial aircraft, military missiles and aircraft, and spacecraft. Products include turboprop, turboshaft, and turbofan aircraft engines; gas turbine engines and related turbomachinery; pneumatic control systems; electronic equipment and flight instruments; air traffic control transmitters; ground support equipment; area navigation systems; and inflatable survival equipment. Garrett also makes electric and turbo-electric propulsion systems; turbochargers for gasoline and diesel engines; industrial turbogenerator sets for remote generation of electric power; industrial gas turbine engines; and heat transfer equipment. Also designs and installs engine, avionics, and interior equipment for business, commercial, and military aircraft. Garrett also produces locator beacons, auxiliary power units for aircraft, heat transfer and cryogenic products, electric and hydraulic motors, flight inspection systems and hybrid micro-circuits. At Dec. 31, 1979, Garrett had a backlog of \$1,923,000,000 (\$1,142,500,000 at Dec. 31, 1978).

Principal Garrett plants are in CA, AZ, FL, NJ, Brazil, Canada, England, Singapore, Ireland, France, Japan, and West Germany. Aircraft modifications and service facilities are leased in CA, TX, NY, IL, and GA.

UOP, Inc., wholly owned, provides engineered products and services for petroleum refining, petrochemical and chemical industries, environmental systems, and other industrial applications. It conducts a worldwide construction and engineering business with projects including the construction of petroleum refineries, resource recovery facilities, solid waste recovery plants, and industrial plants. Other services include the licensing of Platforming Fluid Catalytic Cracking, Pacol-Detergent, Alkylation, Merox, and Parex processes. Other products include various catalysts; seamless copper, copper-alloy, and non-ferrous tubing; precision profile wire screens; flexible metal hose, expansion joints, ducting and bellows; suspension and fixed seating for vehicles, and custom van conversions; internal combustion engine pollution control catalysts and devices; seats and galleys for the aircraft and airline industries; copper-clad and unclad plastic laminates for use in the electronic, electrical and mechanical industries; organic and water treatment chemicals; reverse osmosis and ultra-filtration systems and modules; and hardwood veneer and pulpwood.

Construction segment has four owned and three leased facilities in the U.S. and Canada and one owned and two leased facilities in Europe. Other products and services segment has 22 owned and 21 leased facilities in the U.S. and Canada, and two owned and eight leased facilities elsewhere.

Dunham-Bush, Inc., wholly owned, designs and makes heat transfer, refrigeration, heating, and air conditioning equipment for commercial, industrial, and institutional application. Dunham's products include virtually all components of heat transfer equipment such as compressors, condensers, coils, and radiators for conditioning space, and various controls and accessories. Operations are conducted at six locations in the U.S. and Canada, and in England.

OTHER OPERATIONS - Signal Landmark Properties, Inc., wholly owned and unconsolidated, is engaged in building and marketing residences and commercial/industrial structures in southern CA; and owns, operates, and develops landholdings in CA and HI. In 1979, Signal sold 440 condominium units and single family homes and was developing 1,500 residential units in southern CA.

Golden West Broadcasters, 49.9 percent owned, owns and operates a Los Angeles television station and eight radio stations on the West Coast and in Detroit; and owns the California Angels Baseball team.

Natomas Co., apx. 14 percent owned, operates cargo-liners and engages in petroleum exploration, development and production, mainly off the coast of Indonesia.

SALES BREAKDOWN - In 1979, Mack Trucks, Inc., provided 42.7 percent of consolidated sales, before eliminations. Garrett Corp. 31.1 percent, UOP, Inc. 23.6 percent, and other 2.6 percent.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Garrett Corp.

AiResearch Domestic Intl. Sales Corp.

Aero Hydraulics, Inc.

Airsupply International

Airsupply Intl., GmbH

\*Industrial Turbines International, Inc. - 88 percent

Mack Trucks, Inc. - 90 percent

Mack Trucks Australia Pty. Ltd.

\*Mack Financial Corp.

UOP Inc.

Canos Filtros Johnson Argentina, S.A.I.C. - 66.7 percent

Cataleasco, Inc.

Crepines Johnson (France) S.A. - 60 percent

Filtros Johnson Do Brazil Ltd. - 75 percent

Fluid Systems Intl., Inc.

Organic Recycling, Inc.

\*Unconsolidated

Procon Intl., Inc.

Thai Industrial Constructors Ltd.

Procon Inc.

Procofrance, S.A.

\*Golden West Indemnity Co. Ltd.

\*Signal Oil & Gas Co.

\*Signal Properties, Inc.

\*Newport Realty Corp.

\*Signal Boisa Corp.

\*Signal Hawaii, Inc.

\*Signal Landmark, Inc.

\*Coronado Landmark, Inc.

\*Shoreland Escrow, Inc.

\*Signal Development Corp.

Company also has numerous other subsidiaries, mostly, wholly owned, with the names Dunham-Bush, Garrett, UOP, Procon, or Mack in their titles.

AFFILIATES -

Alhazza Procon Ltd. - 50 percent owned

Glenwood Properties, Inc. - 50 percent owned

Nikki-Universal Co., Ltd. - 50 percent owned

Universal-Matthey Products (Deutschland),  
GmbH, 50 percent owned

Universal- Matthey Products Ltd. - 50 percent owned

Natomas, Inc. - 14 percent owned

Golden West Broadcasters - 49.9 percent owned

Golden West Baseball Co. - 100 percent owned

Golden West Broadcasters, Inc. - 100 percent owned

Major Market Radio Inc. - 100 percent owned

Golden West Television Productions - 100 percent owned.

\*Unconsolidated

● A.O. SMITH CORP.\*

The company, based in Milwaukee, WI, was incorporated in New York, Nov, 11, 1916, successor to A.O. Smith Co., incorporated in 1904 to acquire business and assets of Federal Mfg Co.

Oct. 1, 1969, purchased a majority interest in Layne & Bowler Pump Co., which was increased to 97 percent on December 31, 1969 and subsequently to 99 percent. Oct. 25, 1971 sold Layne & Bowler's Raincoat Division to Irrigation Power & Equipment Co., and Jan. 1, 1972, sold all stock of Layne & Bowler to General Signal Corp.

Nov. 4, 1969, purchased all shares of Bull Motors, Ltd. (operations discontinued in 1975).

Dec. 30, 1969, acquired a 96 percent interest in Armor Elevator Co.; interest increased to 100 percent early in 1970.

Sept. 29, 1970, wholly owned Armor Elevator Canada Ltd. acquired Guardian Elevator Co. and Acadian Elevators & Machine Works Ltd. Dec. 30, 1970, wholly owned Armor Elevator Co., Inc. acquired Golden Gate Elevator Co., Inc.

Sept. 22, 1971, acquired Goetz Elevator Co., Chicago, Ill., an elevator service concern.

Nov. 30, 1972, sold its 50 percent interest in A.O. Smith Corp. of Texas, maker of welded line pipes.

Sept. 30, 1975, sold domestic elevator business (Armor Elevator Co., Inc.)

Jan. 1, 1976, sold meter systems business (incl. A.O. Smith Meter Systems GmbH).

Aug. 31, 1976, sold Armor Elevator Canada Ltd.

Company and subsidiaries make original equipment manufacturers, consumer, and agricultural products; and provide computer services. Sales to General Motors provided 36 percent of sales in 1978. Principal plants (17) are in CA, WA, NC, KY, IL, OH, WI, Ontario, Ireland, and the Netherlands (see Table 8).

\*Standard & Poor's, 1980

Automotive and electrical products include passenger and truck frames; auto components; hermetic, jet pump, and other electric motors; and railroad equipment.

Consumer products include water heaters and heating equipment.

Agricultural products include animal feed storage, handling and feeding systems; and liquid manure storage equipment.

PRINCIPAL SUBSIDIARIES - wholly owned

A.O. Smith Harvestore Products, Inc.

A.O. Smith Electric Motors (Ireland) Ltd.

A.O. Smith Export Corp., Ltd.

AgriStor Credit Corp., non-consolidated

Claymore Insurance Co. Ltd.

AFFILIATES - (percent owned) - A.O. Smith-Inland Inc. (50 percent); Howard Harvestore Ltd. (49.9 percent); Manufacturers Metalicas Monterrey, S.A. (40 percent); Tada-Smith Co., Ltd. (40 percent).

● STANADYNE, INC.\*

The company, headquartered in Windsor, CT, was incorporated in Delaware, Feb. 3, 1969, as Standard Screw Co. to succeed a business (on share-for-share basis) incorporated in NJ Mar. 27, 1900. Present title adopted April 1, 1970.

Company makes plumbing products, including single-handle and double-handle mixing faucets, stainless steel sinks, and related plumbing products for the housing industry (24.5 percent of sales in 1979; 27.0 percent in 1978); diesel fuel injection equipment, including fuel injection pumps, air starters, filters,

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\* Source: Standard & Poor's, 1980.

and nozzles for construction, transportation and agricultural markets (28.9 percent; 23.6 percent); automotive valve train products, including hydraulic and mechanical-valve tappets, push rods and PCV valves for automotive, construction, agricultural, aircraft, and marine equipment (10.3 percent; 12.6 percent); fabricated metal products, including standard industrial fasteners, saw blades, parachute hardware, and horseshoe nails for retail and wholesale hardware and industrial fastener distributors, original equipment manufacturers, and end-users (7.4 percent; 8.1 percent); ferrous materials, including carbon and alloy cold finished steel bars for various manufacturing industries (21.1 percent; 19.7 percent); and contract precision components and accessories including special fasteners and precision machined parts and assemblies made to customers' specifications, for aircraft, automotive, construction, and industrial equipment (7.8 percent; 9.0 percent).

SUBSIDIARIES - wholly owned

Stanadyne of Canada, Ltd.

Stanadyne, International

Zeigler-Harris Corp.

PROPERTY - Plants are owned in IL (2), CT (2), OH (2), IN, and NC; and leased in PA and NC (2). Distribution centers are owned in IN and NV, also leases a small warehouse and distribution center in Ontario, Canada (see Table 8).

● STANDARD PRODUCTS CO.\*

The company, based in Cleveland, OH, was incorporated May 1, 1936, in Ohio, as a consolidation of Standard Products Co. and Reid Products Co. incorporated in 1927 and 1930, respectively.

In Dec. 1971, acquired all shares of Tecelagem de Cadarcos Itatiaia S.A. (Brazil).

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\* Source: Standard & Poor's, 1980.

In Jan. 1972, acquired remaining 74 percent interest in Silent Channel Products Ltd. (England).

Company and subsidiaries mainly make extruded and molded rubber and plastic products for automotive, military, building, and marine use. Principal products are rubber window and door weather sealing devices, mechanical rubber parts and plastic decorative trims. These include such items as automotive, building, and marine channels and weatherstrips, automotive extruded sponge door, hood and trunk seals, automotive interior and exterior plastic decorative trims, building glazing gaskets, molded rubber tracks for military vehicles.

Pacquet Division prints and laminates cellophane and polyethylene packaging materials for the food industry.

Westborn Warehouse, Inc., wholly owned, operates a public warehouse serving the Detroit area; and its wholly owned Union Trucking Co. conducts a trucking operation for local cartage with limited I.C.C. authority.

Olive Tire & Rubber Co., wholly owned, makes precured and conventional tread rubber for the tire retreading industry.

In fiscal 1979, transportation equipment accounted for 85.8 percent of new sales; and other 14.2 percent. Sales to automotive original equipment makers, mainly General Motors, Ford, and Chrysler, accounted for 55 percent and 53 percent of company's revenues, and foreign customers provided 33 percent and 34 percent of company's business in fiscal 1979 and 1978, respectively.

Licensees are in Argentina, Japan, Australia, and South Africa.

SUBSIDIARIES - wholly owned

Standard Products (Canada) Ltd.

The Campbell Plastics, Inc.

Westborn Warehouse, Inc.

Union Trucking Co.

Cee-Bee Mfg. Corp.

Oliver Tire & Rubber Co.

Oliver Rubber Ltd.

Steechan Ltd. (England)

Silent Channel Products Ltd.

Tecniauto, S.A. (Spain)

Itatiaia Standard Industria e Comercio Ltde. (Brazil)

Standard Products Intl., Inc.

#### AFFILIATE

Hulva, S.A. (20 percent owned)

PROPERTIES - Plants are owned in NY (2), OH (2), CA, NJ, MI, Canada (5), United Kingdom (2), KY, GA, TX, and Spain; and leased in CA, NJ, GA, SC, and Brazil Warehouse space is leased in MI (see Table 8).

#### ● STEWART-WARNER CORP.\*

The company, based in Chicago, IL, was incorporated in Virginia, Dec. 20, 1912, as Stewart-Warner Speedometer Corp., and acquired the patents, business and capital stock of Stewart & Clark Mfg. Co. of Chicago and Warner Instrument Co. of Beloit, WI. Present title adopted Apr. 2, 1929.

Company mainly develops, makes and sells electronic and electromechanical systems and products which accounted for 47.9 percent net sales and 58.1 percent of income from operations in 1979 (46.1 percent and 56.3 percent in 1978); fabricated metal products and hardware 13.8 percent and 13.0 percent (15.0 percent and 18.4 percent); power vehicular service equipment and materials 17.9 percent and 26.1 percent (17.7 percent and 26.3 percent); specialty products and others 20.4 percent and 14.2 percent (21.2 percent and 8.5 percent), and other nil and 11.4

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\* Source: Standard & Poor's, 1980.

percent (nil and 9.5 percent deficit). Main classes of products included in these lines of business are as follows:

Mechanical - Air compressors for aircraft and ground support systems; automotive lubricating equipment; casters for office equipment, furniture, appliances, general applications, and for material handling and other industrial and institutional applications; chair controls; combustion heaters for aircraft, passenger cars, ordnance, trucks and off-highway vehicles and equipment; flexible drive shafts and connectors; fluid materials handling equipment; heat exchanger for aircraft, trucks and off highway vehicles and equipment, and industrial applications; hydraulic couplings and hose; industrial lubricating equipment; pressure, temperature, and level indicator gauges; furniture hardware, and speedometers, and tachometers.

Electronic and Electrical - Automotive wheel balancers; computer-directed information display systems; electronic stadium scoreboards; elapsed time indicators; electric fuel pumps and furnaces; facsimile transmission equipment; flashers, adapters, switches, wiring, and other related devices; industrial balancing equipment; military electronics systems, including height determining, identification and navigational equipment; photoelectric and numerical machine tool controls; pressure temperature, level indicator, and other gauges; primary and secondary lighting for passenger cars, trucks, military, and off-highway vehicles and equipment; and speedometers and tachometers.

Power Tools - Portable pneumatic and electric power tools, including wrenches, screwdrivers, suspension balancers, concrete breakers, and vibrators.

Other Products - Lubricants, oils, and motor oil additives.

SUBSIDIARIES - wholly owned

Icknield Instruments Ltd. and others with the name Stewart-Warner or Thor in their titles.

LICENSEES - Company has licensees in Argentina, Australia (3), and Japan.

PROPERTY - Main plants and related warehouse and office space are owned in IL (9), IN, CT, and NC; and owned or leased in TN, Canada, and Europe (see Table 8).

- STUDEBAKER-WORTHINGTON, INC.

See WAGNER ELECTRIC CORP., p. 2-177

- TRW, INC.\*

The company, based in Cleveland, OH, was incorporated in Ohio, June 17, 1916, as Steel Products Co. Name changed to Thompson Products, Inc. in May 1926; to Thompson Products, Inc. in Mar. 1954; to Thompson Ramo Woolridge Inc. Oct. 31, 1958; and to present title May 1, 1965.

In 1970, acquired the remaining interest in a European parts manufacturer.

June 7, 1972, acquired DeLeuw, Cather & Co., a consulting engineering firm, mainly engaged in transportation engineering. Also in 1972, acquired business and assets of one firm, majority interests in four more, and a minority interest in one other.

Company and subsidiaries engage in diversified, technically oriented businesses. They are mainly engaged in the design, manufacture and sale of products for industry and government and the performance of advanced systems engineering, research, and technical services. Products and services are primarily designed for the electronics, automotive, spacecraft and propulsion, industrial, and energy markets. Commercial and industrial businesses provided 81 percent of total sales in 1979 (80 percent in 1978); U.S. Government, 19 percent (20 percent).

Principal international operations are in Australia, Canada, United Kingdom, France, West Germany, Italy, Switzerland, and Latin America. In 1979-78, foreign operations provided 30 percent of net sales.

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\* Sources: Standard & Poor's, 1980  
"Automotive Industries," June 1980  
Ward's Automotive Yearbook, 1980.

CAR AND TRUCK GROUP makes chassis, engine and other components as original equipment for passenger car, truck, farm machinery, and other off-highway manufacturers, including manual and power steering gears, steering columns, pumps, hydraulic motors, suspension components and steering linkage, pistons, valves and valve train components, piston rings, passenger restraint systems, steering wheels, and other components. Company sells for use as replacement parts its own made car and truck products and products purchased from others. Such replacement parts are sold mainly to distributors, as well as mass merchandisers, through company's system of domestic and foreign warehouses. In addition, replacement parts made by the company are sold to original equipment makers and others for resale through their own distribution networks. (More details below.)

ELECTRONICS AND SPACE SYSTEMS GROUP makes a wide variety of electronic components, including capacitors, connectors, motors, printed circuit boards, resistors, semi-conductor products, and transformers. It also makes and sells electronic systems, equipment and services, including communications equipment for defense and space applications and related research and analysis; telephone transmission and central office equipment; communication and charge authorization systems, on-line transaction and point-of-sale terminals and systems and other equipment for retail, banking, and other business applications; and maintenance services and support systems for computer and computer-related equipment. Company also sells computer-based and analytical services, consisting of software systems and analytic services for defense and space applications and consumer and business credit data; and makes unmanned spacecraft and systems, subsystems, and components for space propulsion.

INDUSTRIAL AND ENERGY GROUP makes a line of metal and plastic fasteners, hand tools, thread cutting tools and expendable cutting tools, ball and roller bearings, and taps and dies; pumps, valves, and other energy products, including submersible electric pumping systems, power cables, valves, pumps and pump parts,

electronic equipment for oilfield and electric utility monitoring and control; components for nuclear reactors and gas and steam turbines. It also provides planning and management support services and research and development in energy-related fields; and makes aircraft components, including turbine and compressor airfoils for aircraft engines and fuel booster pumps.

BREAKDOWN OF NET SALES AND OPERATING PROFIT - In 1979, car and truck group accounted for 39 percent of net sales and 44 percent of operations profit (40 percent and 53 percent in 1978), electronic and space systems group 33 percent and 20 percent (32 percent and 21 percent), and industrial and energy group 28 percent and 36 percent (28 percent and 26 percent).

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Cam Gears Ltd. (97.37 percent owned)

Clifford Motor Components Ltd.

Carr Fastener Co. Ltd.

ESL Inc.

Reda Pump Co. (Singapore) Private Ltd.

Ramsey Corp.

Gemmer France S.A.

SMP, Inc.

The company has numerous other subsidiaries with TRW in their titles.

PROPERTY - Dec. 31, 1979, company operated more than 100 plants in the U.S., and more than 90 in Europe and the rest of the world (see Table 8).

#### AUTOMOTIVE WORLDWIDE OPERATIONS:

TRW's sales to the passenger car, truck, farm equipment, and off-highway markets totals almost \$1.8 billion in 1979. Of this, 55 percent was outside North America. Within North America,

sales to the passenger car OEM's accounted for about 11 percent of the \$1.8 billion. TRW is the major independent supplier of engine valves and both manual and power rack and pinion steering systems.

TRW Automotive Worldwide is one of four major operating organizations within TRW. It accounts for about 40 percent of the company's sales and operates manufacturing facilities in 16 countries: Argentina, Australia, Austria, Brazil, Canada, England, France, Germany, Italy, Japan, Mexico, South Africa, Spain, Korea, the U.S., and Venezuela.

Automotive Worldwide consists of four groups for engine, chassis, steering, and general components sold to original equipment and replacement markets.

Engine components include valves, valve train components, pistons, piston pins, piston rings, pumps, and cylinder sleeves.

Chassis and steering components include suspension, steering joints and steering linkage, power and manual steering gears for vehicles of all kinds, steering columns, and high torque hydraulic motors.

General components include seat belts, steering wheels, fasteners and precision forgings, including forged gears for European trucks and axle forgings.

TRW Automotive Worldwide operates the following product divisions in the U.S. and Canada:

TRW Carr Division, Cambridge, MA (fastening parts and assemblies, lighting components/assemblies, electric, mechanical assemblies, molded, decorative plastic components),

TRW Control Concepts Division, Newton, PA (electrically controlled hydraulic valves)

TRW Michigan Division, Sterling Heights, MI (steering and suspension assemblies, water pumps)

TRW Nelson Division, Lorrain, OH (stud welding equipment and related fasteners)

TRW Noblesville Casting Division, Noblesville, IN (iron castings)

TRW Palnut Division, Mountainside, NJ (fastener products)

Ramsey Corp. (TRW Subsidiary), St. Louis, MO (piston rings, valve stem seals, special coatings)

TRW Ross Gear Division, Lafayette, IN (steering gears, pumps, hydraulic motors)

Thompson Products, St. Catharines, Ontario, Canada (steering/suspension components, engine valves, extrusions, forged parts)

TRW Valve Division, Cleveland, OH (engine valves, valve assembly components, pistons, precision stampings and extrusions, cold headed parts)

United-Carr Division, Stoney Creek, Ontario, Canada, (electromechanical devices and deep-draw metal parts)

● TECUMSEH PRODUCTS CO.\*

The company, based in Tecumseh, MI, was incorporated in Michigan, Mar, 26, 1930, as Hillsdale Machine & Tool Co. Present title adopted in 1934.

Apr. 1, 1977, acquired all shares of Ilo Motorenwerk GmbH, Pinneberg, W. Germany, maker of small gasoline engines. May 1, 1977, acquired all assets of Jim Robbins Co., Troy, MI, producer of plastic parts for auto industry.

Company makes refrigeration products, including commercial and domestic hermetically sealed compressors, condensing units and refrigeration systems, mainly sold directly to manufacturers

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\* Source: Standard & Poor's, 1980.

for installation in their products, such as household refrigerators, food merchandising counters and refrigerated display cases, water coolers, dehumidifiers, room and auto air conditioners, central air conditioning systems, home and commercial freezers, and vending machines. The company also sells a limited amount of open type compressors made by others. It also makes two-cycle and four-cycle gasoline engines with 2 1/2-16 hp., and their parts and accessories, used mainly for outdoor power equipment such as lawn mowers, small garden tractors, chain saws, snow removal equipment, outboard marine engines, mini-bikes, and small devices used in agricultural operations; transaxle products, including transaxle gear drives and their parts and accessories, sold mainly for use in garden tractors and riding lawn mowers; pumps used in various machinery; injection molded plastic parts primarily for the automotive industry; metal stampings for itself and others; and aluminum die castings used in its own products.

Company buys from others certain major component parts for its products, including electric motors used in its compressors.

In 1979, refrigeration products provided 61.1 percent of sales before intersegment eliminations and 54.4 percent of income before income taxes, interest, and other expenses (64.1 percent and 55.3 percent in 1978); engine products 30.1 percent and 40.3 percent (27.2 percent and 36.7 percent); and other 8.8 percent and 5.3 percent (8.7 percent and 8.0 percent).

Foreign licensees are in France, Turkey, Argentina, Australia, Chile, Spain, Brazil, Japan, Mexico, Uruguay, India, Venezuela, Thailand, Yugoslavia, U.S.S.R., Columbia, and the Philippines.

#### PRINCIPAL SUBSIDIARIES - wholly owned

Tecumseh Products of Canada, Ltd. makes, sells, and services company's refrigeration products in the Canadian market.

Tecumseh Products Co., International Division Inc., sells company's products in foreign countries, except Canada.

Jim Robbins Co. produces and sells plastic parts mainly to the automotive industry.

Ilo Motorenwerk, GmbH produces small gasoline engines for outdoor power equipment and agricultural purposes.

AFFILIATE - Sicom, S.A. (23 percent owned).

PROPERTY - Plants are in MI (6), OH (2), WI (3), IN, KY, TN, MS, Canada and West Germany. Several warehouses are in MI (see Table 8).

● TENNECO INC.\*

The company, headquartered in Houston, TX, was incorporated in Delaware, June 9, 1947, as Tennessee Gas Transmission Co., and on July 18, 1947, consolidated its parent, Tennessee Gas & Transmission Co. (incorporated in TN, Apr. 1, 1940) on a share for share basis. Present title adopted Apr. 8, 1966.

May 1, 1980, subsidiaries of company acquired the Southwestern Life Corp.

Company and subsidiaries engage in natural gas transmission, integrated oil and gas, chemical packaging, manufacturing, shipbuilding, agricultural, land management, and other businesses.

Tenneco Corp., a major subsidiary, owns all stock of or controlling interests in various subsidiaries which explore for, produce, process, refine, and market oil and gas and refined petroleum products; and make various commodity chemicals and plastic products. Tenneco Corp. also wholly owns Packaging Corp. of America, which makes paperboard, corrugated shipping containers, folding cartons, molded pulp products and other packaging products; and Newport News Shipbuilding & Dry Dock Co., which builds, converts, repairs, and reconditions naval and merchant ships and makes nuclear component equipment for hydroelectric plants and other products. Other Tenneco Corp.

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\* Source: Standard & Poor's, 1980.

subsidiaries manufacture agricultural and construction equipment, and auto parts and equipment; sell ordinary life insurance and group life, accident and health insurance; and own large tracts of land devoted to crops, irrigation, and real estate development. The company also has other subsidiaries engaged in similar operations.

Division of Revenues and Income: Percent

	-1979-		-1978-	
	Revs.	†Inc.	Revs.	†Inc.
Integrated oil	24	50	23	41
Natural gas pipelines	24	21	23	27
Construction and farm equipt.	21	10	22	12
Automotive	7	4	9	7
Shipbuilding	6	2	8	1
Chemicals	13	8	9	6
Packaging	5	2	6	2
Agric., land mngt.	3	2	3	2
Investments	Nil	1	Nil	2
Intergroup sales	d3††	Nil	d3††	Nil
Total	100	100	100	100

†Before interest, federal income tax and minority interests.

††d - deficit

Pipe Line Operations - Company's multi-line natural gas transmission system extends from gas producing areas of TX and LA, including the continental shelf of the Gulf of Mexico, northeasterly to New England. System includes underground and aboveground gas storage areas to permit increased winter deliveries of gas. A smaller system serves the Midwest, including the Chicago area. Deliveries are made mainly under long term contract to transmission and distribution companies. Also, the company transports natural gas for others. Pipeline systems (including Tennessee Gas Pipeline, East Tennessee Natural Gas Co., and Midwestern Gas Transmission Co.) at Dec. 31, 1979, included 15,712 miles of pipelines, gathering lines and sales

laterals, with related facilities. East Tennessee and Midwestern are wholly owned subsidiaries.

Channel Industries Gas Company, wholly owned by Tenneco Corp. operates an intrastate pipeline system serving the Texas Gulf Coast Area.

Dec. 31, 1979, the average daily system capacity was 5,565,000 MCF. Daily deliveries in 1979 averaged 5,133,000 MCF.

Purchase Contracts - Company obtains its natural gas requirements principally under 927 (at Dec. 31, 1979) gas purchase contracts.

Reserves - Ralph E. Davis Associates reported that the company controlled as of Jan. 1, 1980, 8,661 billion CF of gas in 365 fields in the U.S., and gas imported from Canada and Mexico, including 93 billion CF pending Federal Energy Regulatory Commission authorization to connect.

Automotive Parts Operations - Walker Mfg. Division based in Cambridge, Ontario (Canada), makes exhaust systems and parts, emission control devices, jacks, and oil, air, and gasoline filters, sold to car, truck and tractor manufacturers for installation as original equipment and to the replacement market, with sales to the latter accounting for about 73 percent of Walker's domestic sales in 1979. Walker and related subsidiaries operate ten manufacturing facilities, nine distribution centers, and 12 field warehouses in the U.S.; and 17 plants in France, Ireland, Canada, U.K., Sweden, Denmark, and (through a subsidiary of Tenneco Corp.) West Germany.

Monroe Auto Equipment Company (wholly owned), based in Monroe, MI, mainly makes hydraulic, air adjustable and spring assisted shock absorbers, and McPherson struts and replacement cartridges for cars. Monroe also makes shock absorbers for railroad coaches, locomotives, and for airplane landing gear. Monroe has 3 plants in the U.S., and its principal foreign plants are in Belgium, Brazil, Canada, and Spain (see Table 8).

Oil and Gas Exploration - The company, through subsidiaries of Tenneco International, Inc. conducts oil and gas exploration operations in the three western provinces of Canada, Nigeria, Norway and the U.K.

PRINCIPAL SUBSIDIARIES - wholly owned

Tenneco Corp.

Monroe Auto Equipment Company

Philadelphia Life Ins. Company (non-consolidated)

J.I. Case Company

Tenneco West, Inc.

Newport News Shipbuilding & Dry Dock Company

Packaging Corp. of America

Tenneco Chemicals, Inc.

Albright & Wilson, Ltd.

Tennessee Gas Transmission Company

PRINCIPAL AFFILIATES - 50 percent owned

Tenngasco Gas Gathering Company

HT Gathering Company

Tees Storage Ltd.

GMB Proteins Ltd.

Arndale Fuels, Ltd.

Bracey Petroleum Products, Ltd.

Intertrac Viehmann & Company

● TELEFLEX INC.\*

The company is based in Limerick, PA, and its Automotive Products Division is headquartered in Troy, MI. The company was

\*Source: Standard & Poor's, 1980

incorporated in Delaware, June 25, 1943. Dec. 18, 1961, acquired Teleflex, Ltd. (incorporated in Canada Dec. 23, 1938).

In July 1970, acquired assets and business of Dynavalve Controls, Inc., maker of roller friction control systems.

In Dec. 1971, acquired Thompson Electric Co., Bedford Heights, OH, and its wholly owned Marmac Products, Inc. and Fargo, Inc., producers of industrial lighting fixtures (all merged Dec. 29, 1974).

Company makes commercial products for the automotive, marine, and other industries, which accounted for 56.8 percent of net sales and 44.0 percent of operating profit in 1979 (68.4 percent and 63.7 percent in 1978); and provides technical products and services for the aircraft industry and for nuclear power generation, 43.2 percent and 56.0 percent (31.6 percent and 36.3 percent). In 1979, General Motors Corp. provided about 13 percent of total net sales.

Commercial products for automobiles, buses, trucks, tractors, and other equipment include heater, ventilation and air-conditioning controls, hood releases, window and seat control systems, and transmission and brake release controls. Marine products consist of steering systems, engine controls, and electrical harnesses for pleasure and commercial boats.

Technical products and services include aircraft controls and control systems ranging from jet engine throttles to large cargo handling systems. Flux mapping systems are produced to measure nuclear reactor activity. The company's SermeTel inorganic protective coatings are used for severe problems with corrosion, high temperatures, and wear. The company also makes a variety of fluoroplastic extrusions that range from sterile tubing used for catheters to convoluted conduits in aircraft and industrial applications.

SUBSIDIARIES - wholly owned

Teleflex (Canada) Ltd.

SermeTel Inc.

Yacht Specialties Company, Inc.

Hoover Electric Company

Albert H. Surprenant, Inc.

JOINT VENTURES - Vehicle Controls Ltd., jointly owned with W.W. Ball & Sons Ltd. Billericay, Essex, (England) and Eurocontrol SARL (50 percent owned) supply European automotive and other markets with controls similar to those developed and marketed in U.S.

PROPERTY - Principal plants are owned in PA (2) and leased in PA, OH, FL, NJ, OK, CA, CT, NH, and England. Other plants are in CA, FL, OH, and Canada (see Table 8).

● TEXAS INSTRUMENTS INC.\*

The company is based in Dallas, TX, and the sales of its automotive products divisions are coordinated through their Southfield, MI office. The company was incorporated in Delaware, Dec. 23, 1938, as Geophysical Service Inc. In Jan. 1951, name changed to General Instruments Inc.; and in Dec. 1951, present title adopted.

Dec. 27, 1971, acquired remaining 50 percent interest in 50 percent-owned Texas instruments Japan Ltd.

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\* Sources: Standard & Poor's 1980  
Ward's Automotive Yearbook, 1980.

Company and subsidiaries develop and make semiconductor devices, including silicon and germanium transistors, integrated circuits, diodes, optoelectronic and microwave products, controls, and semiconductor materials, memories, and assemblies; thermostatic and electrical components; electronic and electromechanical equipment and systems for government and industrial use, including undersea warfare signal studies, space programs, digital data systems, target detection and acquisition programs, missiles and armaments, airport traffic control radars, and products for geophysical exploration, data gathering, and processing; and other types of instruments, including electronic calculators and watches. The company also produces specialized chemical materials, clad metals, precision controls motor protectors, switches, and circuit breakers; furnishes geophysical, geological, and geophoto exploration services; and distributes industrial and electronic supplies.

PROPERTY - Principal owned plants are in TX and MA. Other facilities are owned or leased at numerous locations in the U.S. and abroad (see Table 8)

SUBSIDIARIES - wholly owned

Geophysical Service Inc.

Geophysical Service Incorporated

Geophysical Service International S.A.

Company also has numerous other subsidiaries, most of which have the name Texas Instruments in their titles.

The products supplied to the automotive OE market are manufactured in the following divisions:

Control Products Division, Attleboro, MA (thermostats, thermal valves, electric chokes, sensors, control systems, pressure switches)

Metallurgical Materials Division, Attleboro, MA (clad metal components, exterior trim stock, clad bearings and wire)

Semiconductor Group, Dallas, TX (microcomputers, micro-processors, opto-electronic devices, LED's, source detector arrays, integrated circuits, other electronic devices).

● TIMKEN CO.\*

The company, based in Canton, OH, was incorporated in Ohio, Dec. 16, 1904, as Timken Roller Bearings Axle Co.; name changed to Timken Roller Bearings Co., June 5, 1909; present title adopted May 1, 1970. Business established in 1898 in St. Louis, MO, by Henry H. and William R. Timken, under name of The Timken Carriage Works.

Apr. 25, 1975, merged Latrobe Steel Co., Latrobe, PA.

Company is the largest manufacturer of tapered roller bearings in the world, supplying the major portion of domestic requirements. Principal outlets are automotive, farm equipment, industrial machinery, road building machinery, steel, and railroad industries.

Company also makes alloy steel products, including alloy, intermediate alloy, and carbon grade steels in seamless tube and bar form with a variety of finishes. Other products include Timken rock bits, used mainly in the mining and construction industries.

Latrobe Steel Co., wholly owned, makes specialty steels, mainly tool steels and special alloys in the form of ingots, billets, bars, drill rods, tool bits, precision castings, and heat-treated wear parts.

In 1979, bearings, rock bits, and sundry accounted for 72.2 percent of net sales and 61.3 percent of pretax income (71.0 percent and 51.0 percent in 1978), and steel products 27.8 percent and 38.7 percent (29.0 percent and 49.0 percent).

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\* Source: Standard & Poor's, 1980.

ACTIVE SUBSIDIARIES - wholly owned

The Tenax Company

Latrobe Steel Company

Latrobe International Sales Company

A number of other wholly owned subsidiaries with the name Timken in their titles.

PROPERTY - Plants are in OH (8), CO, NC, PA, SC, S. Africa, Great Britain (2), France, Canada, Brazil, and Australia.

Warehouses are located throughout the world (see Table 8).

● THE TORRINGTON CO.\* - SUBSIDIARY OF INGERSOL-RAND CO.

Founded in 1866, The Torrington Co. has a long standing reputation for innovation. Having pioneered the needle bearing industry, Torrington continues to design and produce precision quality bearings for use throughout the automotive industry.

Torrington's development of the drawn cup needle bearing in the early 1930s is a perfect example of market leadership. The introduction of the needle thrust bearing in the late 1950s had a profound effect on automobile manufacturing, particularly on transmissions. Research and development in recent years have led to many important new designs; a drawn cup, rear wheel bearing; tilt steering, wheel ball bearing; a new type of universal joint for steering mechanisms; and anti-friction tappet rollers for diesel engines.

Torrington's complete line of needle roller bearings in inch and metric standards offers significant advantages. Low coefficients of friction, thin cross sections and lighter weights provide substantial energy and material savings. Other major benefits include longer life, higher capacities, economical installation, and lower unit costs.

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\* Source: "Automotive Industries," June 1980.

Corporate headquarters, a new bearing test laboratory, and needle and roller bearings plants are in Torrington, CT. New production facilities are nearing completion in Dahlonaga, GA and Sulphur Springs, NC. Other manufacturing locations are in Clinton, SC; Sylvania, GA; and Cairo, GA. Torrington's heavy bearings are made in South Bend, IN and Union, SC. Torrington continues to grow internationally with eight bearing plants located outside the U.S. European sales are directed from Dusseldorf, Germany (see Table 8).

● TRICO PRODUCTS CORPORATION\*

The company, based in Buffalo, NY, was incorporated in April 1920 to acquire auto accessory business founded in 1917.

The company and its wholly owned foreign subsidiaries are engaged primarily in one line of business, which is the manufacture and sale of automotive safe driving products, principally windshield wiping and washing systems, for use both as original equipment and as replacement parts. Other products include headlight actuators and controls; reserve vacuum tanks; windshield washer solvents; die cast, screw machine and plastic fittings; vacuum and air pressure controls; small diameter tubing; and sintered metal parts. The windshield wiping/washing systems and components account for approximately 75 percent of sales.

The company has two major customers (not identified), accounting respectively for 29 percent and 27 percent of net sales in 1979 and 34 percent and 24 percent of net sales in 1978. Export sales for 1979 and 1978 were \$19,128,000 and \$19,454,000, respectively. Sales to customers in Canada were \$14,383,000 in 1979 and \$15,574,000 in 1978.

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\* Sources: Standard & Poor's, 1980  
Corporate Annual Report for 1979.

Sales by wholly owned foreign subsidiaries are primarily to customers in England and Australia. Export sales, for the most part to customers in Scandinavian and Western European countries, were \$8,017,000 in 1979 and \$7,449,000 in 1978.

INVESTMENTS held at Dec. 31, 1978, had a market value of \$40,881,000 and included 449,335 common shares of General Motors Corporation, 126,125 shares of Ford Motor Company, 104,044 shares of Exxon Corporation, and 37,534 shares of American Tel. & Tel. Company, comprising together 90 percent of such market value.

PROPERTY - Plants are in NY (3), Canada, England (2), and Australia (see Table 8).

EMPLOYEES - Dec. 31, 1978, 3,300.

SUBSIDIARIES - wholly owned (unconsolidated)

Trico Pty., Ltd. (Australia)

Trico-Folberth, Ltd. (U.K.)

● UNITED TECHNOLOGIES\*

The company is headquartered in Hartford, CT, and its automotive products manufacturing is centered in the AMBAC (American Bosch) subsidiary in Columbus, MS. United Technologies was incorporated in Delaware, July 21, 1934, as United Aircraft Corporation following reorganization of United Aircraft & Transport Corporation, to separate the transport system from equipment manufacturing units in compliance with air mail legislation enacted during 1934. Three independent entities were established: United Aircraft Corporation; United Air Lines Transport Corporation (now UAL, Inc.); and Boeing Airplane Company (now Boeing Company). Present company acquired all the eastern manufacturing concerns, while United Air Lines obtained all the transport lines, and Boeing Airplane took over the western manufacturing properties. Present title adopted May 1, 1975.

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\* Sources: Standard & Poor's, 1980  
Ward's Automotive Yearbook, 1980.

In 1973, acquired Terminal Communications, Inc., maker of computer data terminals for commercial and industrial markets.

Feb. 5, 1974, a subsidiary merged Essex Intl. Inc.

Nov. 14, 1975 acquired 70.2 percent of Otis Elevator Company, and on July 7, 1976, acquired the remaining shares of Otis.

July 6, 1979, acquired about 51 percent of the voting securities of Carrier Corporation. Previously, about 49 percent of the voting securities of Carrier has been acquired between Dec. 19, 1978, through Feb. 2, 1979.

Company and subsidiaries design, develop, and make high technology products for the aerospace, automotive, electrical, construction, and other industries. The company's products include power products (40.2 percent of revenues and 46 percent of operating profits in 1979; 45 percent and 46.3 percent in 1978), industrial products and services (48.0 percent and 48.3 percent; 42.4 percent and 46.8 percent), flight systems products (9.7 percent and 5.9 percent; 10.7 percent and 7.7 percent); and other products (2.1 percent and 0.2 percent deficit; 1.9 percent and 0.8 percent deficit). In 1979, 78 percent of total sales were to commercial customers and 22 percent to the U.S. Government; 73 percent and 27 percent, respectively in 1978.

Power products consist mainly of aircraft jet engines and spare parts for aircraft engines; also include gas turbine engines, solid propellant rocket boosters and motors, and spare parts and related equipment for electrical power generation and other commercial applications.

Industrial products and services include elevators and escalators and related service, maintenance and spare parts. Automotive products and systems include fuel injection systems; diesel engine components and accessories; windshield wipers and other actuating systems; automotive and industrial diagnostic and test systems; electrical wiring systems; magnet wire and winding machinery, integrated circuits and electronic subsystems;

and controls and devices for use in the generation, distribution, control, and application of electricity. Most of the automotive products are manufactured by Ambac Industries and its American Bosch Division. Diagnostic and test systems are manufactured by the Hamilton Standard Division for OEM and the aftermarket.

Flight systems products include airborne and space equipment; helicopters; propellers; and radar, cockpit and integrated display, environmental, and other systems.

Carrier Corporation, wholly owned, mainly makes and sells air conditioning (cooling and heating) equipment, including systems used for temperature control and related components for humidification, air cleaning, and air circulation. Carrier also makes chemical specialty products, including printing inks, automotive paints, and other surface coatings; energy process equipment, including centrifugal air and gas compressors and turbines; solid waste handling equipment, potentiometers, large electric motors, aquafoods, and other products; electric ranges, grills, and ovens for residential use; and powered ventilation products for institutional, commercial, and industrial buildings.

Jan 31, 1979, a court order was issued to the company to hold Carrier as a separate company pending the outcome of an action in which the Antitrust Division of the Justice Department claimed that the company's acquisition of Carrier was in violation of U.S. antitrust laws.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Essex Group, Inc.

Ambac Industries, Inc. (American Bosch)

Mostek Corporation (wholly owned at Jan. 11, 1980)

Norden Systems, Inc.

Pratt & Whitney Aircraft of Canada Ltd. (98.1 percent owned)

Otis Elevator Company

Otis Europe S.A. (72.7 percent owned)

UT Credit Corporation (non-consolidated)

Carrier Corporation

Jenn-Air Corporation

Inmont Corporation

PROPERTY - Company operates about 330 plants and numerous warehouses worldwide and owns two large land tracts for outdoor testing of engines -- 7,078 acres in West Palm Beach, FL (Pratt & Whitney), and 5,116 acres in Coyote, CA (United Technology Center). It also owns an airport at East Hartford, CT, helicopter airports at Bridgeport and Stratford, CT, and a rotary-winder aircraft test center in Palm Beach County, FL (see Table 8).

● E.R. WAGNER MANUFACTURING COMPANY\*

The company, based in Milwaukee, WI, was incorporated in that state on Jan. 5, 1900.

Wagner has long been a source of a variety of metal parts and components for the automotive industry. Hinges, stampings, stamping assemblies, bearings, and large precision-blanked parts are among OEM parts and components produced by the company's Engineered Products Division, located in Milwaukee, WI. The company has five separate operating divisions with manufacturing facilities in several Wisconsin communities and Denton, TX.

Manufacturing capabilities include extensive stamping facilities, assembly, plating, and other finishing operations, specialized high speed machinery and rolled tube forming.

A pioneer in the development of continuous hinges, the name Wagner has become synonymous with unusual or difficult hinging applications. The scope of applications for its hinges includes everything from cigarette lighters and camera backs to truck doors and mobile homes.

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\* Sources: "Automotive Industries," June 1980  
Standard & Poor's, 1980

The company recently began producing large, precision-blanked parts with the largest fine-blank press available for OEM work in North America. Housed in its own separate manufacturing facility, the huge, 1500 ton (1360 t) press can precision-blank parts of any configuration, complete with smooth walled, small diameter holes in one stroke. As many as eight secondary operations with their attendant time and cost are eliminated.

One of the newest developments in Wagner's precision-blanking is production of transmission parts, clutch and brake discs, as well as other parts from high strength low alloy steel.

Wagner's stamped assembly/components for automotive applications include such parts as gasoline filler pipe-panel doors, seat back releases, door latches, water pump impellers, glove box door panels, hinged seat back and deck panels, bumper mounts and suspension parts for compact cars. (See Table 8 for plant locations.)

● WAGNER ELECTRIC CORPORATION\*

The company, based in Parsippany, NJ, is a wholly owned subsidiary of Studebaker-Worthington, Inc. The latter was acquired on Oct. 1, 1979, by McGraw-Edison Corp. of Rolling Meadows, IL.

Studebaker-Worthington is the successor of the former Studebaker-Packard Corporation and the Worthington Pump & Machinery Corporation. It provides equipment and services for raw materials processing and energy industries throughout the world; and makes industrial products mainly for domestic markets including automotive products, generators, engines, industrial cleaning equipment, garden tractors, and chains.

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\* Source: Standard & Poor's, 1980.

PRINCIPAL SUBSIDIARIES - wholly owned or noted

Process Equipment Group:

Turbodyne Corporation makes steam turbine power systems and equipment used mainly in the petroleum refining, petrochemical, sugar processing, chemical, and other process industries and electrical equipment used in mining and process industries, electric utilities, and water and waste treatment operations.

Worthington Pump Inc. makes standard and engineered pumps, air ejectors, comminutors, water treatment plants, and concrete mixers.

Worthington Service Corporation provides in-shop and on-site industrial machinery, repair, and maintenance services for pumps, presses, engines, compressors, turbines, and other equipment of industrial, marine, and large commercial customers.

Worthington Compressors, Inc. makes a broad line of compressor products serving many industrial, utility, and construction markets.

Masoneilan International, Inc. makes and sells throughout the world automatic control valves, isolating and check valves, pressure regulators, liquid-level pressure control instruments and related items mainly for the chemical, petroleum, utility, and paper markets.

Industrial Products Group:

Wagner Electric Corporation makes automotive braking system products, including complete air and hydraulic braking systems, brake parts, master cylinders, shoes, disc brake pads, drum brake lining, combination proportioning, regulating and warning valves, and brake fluid; and automotive electrical products, including electroswitch devices, sealed beam headlamps, miniature incandescent lamps and electric cigarette lighters. It also makes hydraulic brake

systems and controls for heavy industrial equipment, and distributes automotive products such as brake lining and drums and air horns made by others.

Onan Corporation (63 percent owned) makes electric and mechanical powered generation systems and products.

Clark-Gravely Corporation makes commercial and industrial floor, surface and carpet cleaning and maintenance equipment, snowblowers and fillers; and lawn and garden tractors and attachments.

Campbell Chain Company (98 percent owned) makes commercial, industrial and automotive chains, forged steel fittings, tackle blocks, lifting clamps, and other chain and material handling products.

Finserv Corporation (non-consolidated) provides financing, leasing and other financial services to company and others.

NET SALES BREAKDOWN (Continuing Operations): Yrs. End,  
Dec. 31 - Mil. \$.

	<u>1978</u>	<u>1977</u>
Wagner	336.3	290.3
Turbodyne	121.9	128.3
Onan	222.4	178.9
Clarke-Gravely	89.2	77.7
Masoneilan	138.0	112.5
Worthington Pump Inc.	229.2	206.7
Worthington Service	67.2	56.1
Worthington Compressor Inc.	162.9	156.2
Campbell Chain Company	80.9	--
Total	1,424.1	1,185.6

In 1978, foreign sales provided 20.9 percent of sales and 21.9 percent of pre-tax income (21.2 percent and 21.3 percent in 1977).

PROPERTY - Company owns 52 plants and leases 11 (35 in the U.S.; 28 outside the U.S.) (see Table 8).

Company also owns and leases service centers, administrative and sales offices, and warehouses in the U.S. and throughout the world.

### 3. MAJOR INDUSTRY MARKETS

Major markets for automotive components (or "Motor Vehicle Parts and Accessories" - the nomenclature used by the U.S. Department of Commerce, Bureau of the Census) are :

- Domestic auto manufacturers (OEM)
- Domestic automotive replacement market ("Aftermarket")
- Foreign auto manufacturers (OEM)
- Foreign automotive replacement market ("Aftermarket").

While statistical data based on the above market segments would be very useful, it does not presently exist in this form. Data relating to "Value of Product Shipments" is collected by the Department of Commerce as:

- Shipments to domestic OEMs and others for replacement and resale - all of it assumed to be "aftermarket"
- Shipments to domestic OEMs or their suppliers for use in motor vehicle assembly - all of it assumed to be "original equipment"
- Shipments for export, including transfers to other divisions for export - all of it assumed as non-segmented, general automotive exports.

Export and import statistics gathered by the Department of Commerce do not differentiate between the replacement market and the OEM market. Nevertheless, in some cases individual products are designated as "New" (OEM) or "For Replacement" or "For Installation" (aftermarket). In the vast majority of cases, the ultimate use of a given automotive product remains unspecified.

Another shortcoming of the data published by the Department of Commerce is the absence of differentiation among major classes of motor vehicles, i.e., no distinction is made of factory

shipments and imports of components intended for passenger cars, light or heavy trucks/buses, for off-the-road equipment, or for other motor vehicles.

In all cases, the data on exports and imports covers mechanical and "Other Automotive" components, such as safety glass, tires/tubes, electrical items, etc. Although data on "Other Automotive" components was beyond the scope of this profile, such information is, nevertheless, presented in Tables 16 and 18 separately from the data on mechanical components.

### 3.1 PRODUCT SHIPMENTS OF DOMESTIC PRODUCERS

The Department of Commerce, Bureau of the Census, makes a distinction between "Value of Industry Shipments" and "Value of Product Shipments."

"Value of Industry Shipments" represents the total value of shipments of all establishments classified in a particular industry, such industry being identified by its SIC code number.

"Value of Product Shipments" represents "...the total value of product shipments classified as primary to an industry that were shipped by all manufacturing establishments regardless of [the manufacturers'] industry [SIC] classification."

It is clear from these definitions that the data of interest in this profile are related to the annual "Value of Product Shipments" by all U.S. producers. Table 10 presents such data for automotive mechanical components for the period 1972-1979. It should be observed that data for 1977 has just been released in August 1980, and represents the latest published information, detailed in Table 11. It should also be noted that the shipment figures for 1978 and 1979 (Table 10) are estimates. The data in Table 10 is presented in current dollars and in constant 1972 dollars. The percent change from previous year is shown in both cases, indicating clearly the healthy growth pattern in real terms experienced by the industry in 1976 (+25.4 percent) and

1977 (+17.8 percent), and the modest growth in 1978 and 1979 (+3 percent). It is also noteworthy that the overall seven-year growth between 1972 and 1979 was not insignificant, representing 142 percent in current dollars and 46 percent in constant 1972 dollars. This averages to an annual growth of about 20.2 percent and 6.6 percent, respectively over that seven-year period.

Product shipments of automotive mechanical components by domestic producers to major markets will be analyzed in succeeding sections. Section 3.2 will be devoted to the domestic OEM market, section 3.3 will be concerned with the domestic replacement market, and section 3.6 will deal with the export market. The results of these analyses for the years 1977-79 are given below for easy reference (See Tables 14, 15, and 17):

Automotive Mechanical Components-Value of U.S. Shipments in Current Dollars (Billions)					Total Value in Constant 1972 Dollars* (Billions) and Percent Annual Change	
Year	To Domestic OEM Market†	To Domestic Replacement Market†	For Export†	Total and Percent Annual Change		
1979	35.14 (71.2%)	6.65 (13.4%)	7.59 (15.4%)	49.38 (+11.0%)	29.84	(+2.0%)
1978	31.36 (70.5%)	5.94 (13.3%)	7.20 (16.2%)	44.50 (+11.9%)	29.26	(+4.2%)
1977	28.34 (71.3%)	5.37 (13.5%)	6.06 (15.2%)	39.77	28.09	

The total of U.S. shipments summarized above is about 4 to 6 percent higher than the corresponding values in Table 10. The difference is due to the fact that in the analysis of the various markets (see below), use has been made of different Bureau of Census data sources. Also certain assumptions have been made in Table 10 regarding the shipment values for 1978 and 1979 (see Note 6, Table 10). Since no statistical data is completely accurate, the small variations in question are considered quite acceptable.

\*See GNP deflation factors, Table 10.

†Percent of total shipments value in parentheses.

### 3.2 DOMESTIC OEM MARKET ANALYSIS

While the U.S. car market has been growing at about 2 percent per year\* during the last decade, sales of auto parts to the Big Three have been growing at about 3 percent annually in real terms.\* This is due to the fact that the automakers, faced with the costly move to smaller cars, are allocating less capital into expanding their own production of parts, relying more and more on independent component suppliers to develop and manufacture the needed parts and accessories. Historically, component suppliers have been willing to develop systems, components, and other hardware for automotive manufacturers, since the rewards of success have been lucrative contracts to supply a mass market.

This attitude and related business policies have not been limited to domestic component suppliers only. Many foreign manufacturers are currently supplying domestic automakers with a variety of mechanical and electrical components made in Canada, Mexico, Brazil, the United Kingdom, France, Belgium, West Germany, Sweden, Italy, Spain, and Yugoslavia, as well as in Japan, South Korea, Taiwan, Hong Kong, Singapore, the Philippines, and other countries throughout the world. The policy of global sourcing of automotive components has been pursued by Ford Motor Company to some degree for several decades and by General Motors for close to a decade. Chrysler has also been involved in world sourcing of components to some degree over the years.

Foreign suppliers of automotive components to domestic OEMs, apart from foreign subsidiaries and affiliates of the Big Three, have been either foreign units of American multinational corporations (Dana, Borg-Warner, Eaton, etc.), or independent foreign manufacturers (Bosch, Lucas, GKN, and others), or foreign automotive OEMs (Volkswagen, Volvo, Peugeot, Toyo Kogyo, etc.)

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\*Source: "Business Week," Sept. 24, 1979

Table 11 provides a detailed breakdown, by product class and market, of the 1977 value in current dollars of product shipments of mechanical components by all U.S. producers.\* (The total of such shipments is also presented in Table 10.) The markets identified in Table 11 are DOMESTIC OEM, REPLACEMENT, and EXPORT. Table 12 provides a similar breakdown of product shipments in 1972\*\*. Imports of mechanical components to the domestic OEM and replacement markets have been summarized in Table 13.

Because detailed product and market data is only for 1972 and 1977, it is necessary to make a number of assumptions, based on best available estimates, in order to arrive at figures for the years 1978 and 1979. One such assumption has already been mentioned in note 6, Table 10. The other assumption relates to the import data of Table 13. Unfortunately, the data on imports of mechanical (and other) automotive components published by the Bureau of Census is inadequate for the purposes of this analysis because it does not identify, either by product or in the aggregate, the shipments made to OEM and the replacement markets. There is, therefore, no basis on which to make a judgement regarding the allocation of imports to these two markets. This inadequacy is reflected in Table 13, in which the attempt to allocate all imported components on the basis of their description (as "new" or "for replacement/installation") has not been successful. This attempt resulted in only about 0.2 percent of the total being identified as "replacement", and none as specifically "OEM." Thus, 99.8 percent of the items in Table 13 had to be designated as "not specified."

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\*This data was published in August 1980, and is the latest available.

\*\*This type of detailed product and market analysis is performed by the Bureau of the Census every 5 years (in 1972 and 1977).

It was, therefore necessary to make an assumption as to the probable allocation of imported mechanical components to the two markets in question. As a reasonable "first approximation", let it be assumed that one-half of these imports by dollar value went to each of the domestic OEM and replacement markets. This would result in the following values of annual imports to each of these markets, based on the figures of Table 13 and as adjusted for constant dollars by the GNP deflating factors, given in Table 10.

Value of Imports to Each Market

<u>Year</u>	<u>In Current Dollars</u>	<u>In Constant 1972 Dollars</u>
1975	1.57 billion	1.23 billion
1976	2.38 billion	1.78 billion
1977	2.80 billion	1.98 billion
1978	2.80 billion	1.84 billion
1979	2.71 billion	1.64 billion

With this information, it is now possible to construct a profile of the domestic OEM market for mechanical components, as shown in Table 14. In summary, this market may be characterized by the following parameters:

<u>Year</u>	<u>Domestic OEM Market Size</u>		<u>Percent Contribution of Market Sources</u>	
	<u>Current \$ (Billions)</u>	<u>Constant 1972 \$ (Billions)</u>	<u>Domestic</u>	<u>Import</u>
1972	14.67 plus imports*	14.67 plus imports*	-	-
1977	31.14	22.00	91	9
1978	34.16	22.46	92	8
1979	37.85	22.87	93	7

\*Data not available at this time.

Reference to Table 14 also indicates that for the period 1977-1979, the market grew 21.5 percent in current dollars, 4.0 percent in constant (1972) dollars. The average annual market growth during the same period was 10.8 percent in current dollars, and 2.0 percent in constant (1972) dollars. During this period imports to this market actually declined 3.2 percent in current dollars, 17.2 percent in constant (1972) dollars, while the share of imports during these years dropped from 9 to 7 percent.

### 3.3 DOMESTIC REPLACEMENT MARKET ANALYSIS

The methodology employed in the analysis of the domestic OEM Market in the preceding section (3.2), may be also applied to the U.S. replacement market for mechanical components. Again, use is made of the data in Tables 11, 12, and 13, while the construction of this market's profile is shown in Table 15.

The major characteristics of the replacement market may be summarized as follows:

Year	Domestic Replacement Market Size		Percent Contribution of Market Sources	
	Current \$ (Billions)	Constant 1972 \$ (Billions)	Domestic	Import
1972	2.79 plus imports*	2.79 plus imports*	-	-
1977	8.17	5.77	65.7	34.3
1978	8.74	5.74	68.0	32.0
1979	9.36	5.66	71.0	29.0

Reference to Table 15 also indicates that during the period 1977-1979 this market grew 14.6 percent in current dollars, but declined nearly 2 percent in real terms. In the same period, the average annual market growth was 7.3 percent in current dollars, representing a decline of 1 percent in real terms. Imports to this market registered a decline of 3.2 percent in current dollars,

\*Data not available at this time.

representing a decline of 17.2 percent in real terms, while the share of imports during this period fell from 34.3 percent to 29 percent.

### 3.4 THE U.S. MARKET FOR IMPORTED AUTOMOTIVE COMPONENTS (MECHANICAL AND "OTHER")

The imports of automotive mechanical components for the years 1975 through 1979 have been summarized by product class in Table 13, using the MVMA's\* tabulations based on Bureau of the Census Report #IM-146 as sources. The same sources provided also import data on "other automotive" components such as electrical systems parts, tires and tubes, and glass. Such data on imports of other automotive components have been presented in Table 16, even though it is beyond the scope of this profile.

The information contained in Tables 13 and 16 is summarized as follows and provides a definition of the total U.S. market for imported automotive components of all kinds:

Component Type	Value of U.S. Imports of Automotive Components in Current Dollars (Billions)				
	1979	1978	1977	1976	1975
Mechanical Components (per Table 13)	5.4242	5.5963	5.6006	4.7596	3.1458
"Other" Components (per Table 16)					
Tires & Tubes	1.1654	.9142	.8391	.7667	.4889
Glass Products	.0569	.0584	.0487	.0357	.0274
Electrical Comp'ts.	1.0290	.9690	.5962	.5456	.2050
Total All Components	7.6755	7.5379	7.0846	6.1076	3.8671
Annual Growth	+1.8%	+6.4%	+16.0%	+57.9%	-
	IMPORT VALUES IN CONSTANT 1972 DOLLARS** (BILLIONS)				
Total All Components	4.6378	4.9559	5.0032	3.5546	3.0402
Annual Growth	-6.4%	-0.9%	+40.7%	+16.9%	-

\*Motor Vehicle Manufacturers Association

\*\*See GNP deflation factors, Table 10

It is clear that U.S. imports of automotive components in general have been rising at a slower rate in the last few years, while their value in constant (1972) dollars has been steadily decreasing.

### 3.5 U.S. IMPORTS OF AUTOMOTIVE COMPONENTS BY PRODUCT CLASS AND AREA/COUNTRY OF ORIGIN

An attempt has been made to analyze the value of U.S. imports of automotive mechanical components by product class and by area/country of origin. Such data is summarized on an annual basis by the Bureau of the Census in Report FT-210.\* Unfortunately, in the majority of cases the summaries do not distinguish between products imported for automotive use and similar items intended for other applications (Example: Parts for internal combustion engines, if not designated as "for motor vehicles," may be intended for use in car, truck, marine, aircraft, stationary, lawnmower, etc., engines). Only in a very few instances are products identified as specifically intended for automotive use, or are designated as APTA\*\* items.

As a result, the values in FT-210 do not reflect the true magnitude of imports of automotive components, mechanical or "other." Nevertheless, these imports for the years 1979 and 1978 have been summarized in Appendix A. All values are in current dollars, and the grouping of countries by geographic and trade areas has been defined in the notes preceding the tables. Appendix A consists of the following:

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\*These reports are published at irregular intervals. Report FT-210/Annual 1978 was issued in January 1980; Annual 1979 was issued in July 1980.

\*\*U.S.-Canada Automotive Parts Trade Agreement.

- Table A-1 Motor Vehicle Parts and Accessories - Value of U.S. Imports of Mechanical Components by Product Class and Area/Country of Origin - 1979 (Total: \$10.82 Billion)
- Table A-2 Motor Vehicle Parts and Accessories Value of U.S. Imports of "Other Automotive" Components by Product Class and Area/Country of Origin - 1979 (This covers Tires/Tubes and Electrical Components; Total: \$2.02 Billion)
- Table A-3 Summary of Tables A-1 and A-2 (1979 Total: \$12.84 Billion)
- Table A-4 Same as Table A-1, for 1978 (Total: \$10.51 Billion)
- Table A-5 Same as Table A-2, for 1978 (Total: \$1.84 Billion)
- Table A-6 Summary of Tables A-4 and A-5 (1978 Total: \$12.35 Billion).

Notice that the grand totals of imports per Table A-3 (for 1979) and Table A-6 (for 1978) overstate the total value of imports based on the data in Tables 13 and 16 (see section 3.4) for reasons outlined above. The overstated amounts are \$5.16 billion for 1979 and \$4.81 billion for 1978.

### 3.6 THE EXPORT MARKET

Data on U.S. exports of automotive mechanical components is found in several Bureau of Census reports, such as:

- Census of Manufactures (1977) for Motor Vehicle Mechanical Parts and Accessories, Report MC77-1-37A, issued August 1980. The data in this publication details U.S. exports by product class and market, and has been reproduced in Tables 11 and 12. Unfortunately, such data is collected only every five years (in 1972 and 1977), rather than annually.

- Report FT-410 which summarizes automotive-related exports on an annual basis, but does so by product class only, without discriminating between mechanical components used in motor vehicle assembly and non-mechanical components used in assembly, or tooling, equipment, and machinery used in the production of automotive products and vehicles.
- Report FT-450 which summarizes annual automotive-related exports by product class and by area/country of destination. The product classes in this report are too broadly defined to permit identification of unique automotive-related products, and those that are so identified cover many types of motor vehicles, from passenger cars to heavy trucks/buses, to off-highway equipment.

In analyzing the export market for the years 1975-1979, use has been made primarily of Report FT-410 and automotive product lists prepared by the MVMA based on it. These lists have been further combined into one, covering mechanical components used in motor vehicle assembly (Table 17), and another covering "Other Automotive" components (Table 18) and consisting of tires/tubes, electrical items, etc. Unfortunately, the information in these tables did not allow for a clear and consistent identification of shipments made to the OEM and replacement market segments.

Report FT-450 presents the same kind of problem that was inherent in Report FT-210 (see discussion in section 3.5). Very broad product class definitions used in FT-450 limit the usefulness of the data in it. Nevertheless, automotive-related exports for the years 1979 and 1978 have been judiciously extracted from it and summarized in Appendix B.

The information on auto-related components exports contained in Tables 17 and 18 may be summarized below in order to obtain a definition of the size of the U.S. export market for this type products:

Component Type	Value of U.S. Exports of Automotive Components in Current Dollars (Billions)				
	1979	1978	1977	1976	1975
Mechanical Components (Table 17)	7.59	7.20	6.06	5.83	4.72
Other Components (Table 18)					
Tires & Tubes	0.22	0.17	0.21	0.16	0.20
Electrical System Components	0.58	0.56	0.48	0.46	0.36
Truck/Bus Body Components	0.06	0.05	-	-	-
Service Equip't	-	-	0.02	0.02	0.02
Total All Components	8.45	7.98	6.77	6.47	5.30
Annual Growth	5.9%	17.9%	4.6%	+22.1%	-
Export Values in Constant 1972 Dollars* (Billions)					
Total All Components	5.10	5.25	4.78	4.83	4.17
Annual Growth	-2.9%	+9.8%	-0.1%	+15.8%	-

The above table clearly indicates that the exports' growth pattern has been cyclical, with the current dollar value of shipments steadily rising over time, while the constant (1972) dollar values have declined in 1977 and 1979 and have grown in 1976 and 1978. Over the 5-year period (1975-1979) the value of exports of auto components has risen 60.8 percent in current dollars and 23.7 percent in constant 1972 dollars. Also, during the same period exports have exceeded imports by the "NET EXPORTS" amounts shown in the table below:

\*See GNP deflation factors, Table 10.

<u>Year</u>	<u>Net Exports (Billions)</u>	
	<u>Current \$\$</u>	<u>Constant 1972 \$\$</u>
1979	2.17	1.31
1978	1.60	1.05
1977	0.46	0.32
1976	1.07	0.80
1975	1.58	1.24

Regarding the export market analysis on the basis of product class and area/country of destination (Bureau of Census report FT-450), the inadequacies of the source data have been mentioned earlier in this section, and the selected data has been presented in Appendix B in the following tables:

Table B-1. Motor Vehicles Parts and Accessories - Value of U.S. Exports of Mechanical Components by Product Class and Area/Country of Destination - 1979 (Total: \$12.85 Billion)

Table B-2. Motor Vehicle Parts and Accessories - Value of U.S. Exports of "Other Automotive" Components By Product Class and Area/Country of Destination - - 1979 (Total: \$2.32 Billion)

Table B-3. Summary of Tables B-1 and B-2, (1979 Total: \$15.17 Billion)

Table B-4. Same as Table B-1, for 1978 (Total: \$11.56 Billion)

Table B-5. Same as Table B-2, for 1978 (Total: \$1.95 Billion)

Table B-6. Summary of Tables B-4 and B-5 (1978 Total: \$13.51 Billion)

It should be noted that "Schedule E" numbers used in Tables B-1 through B-6 represent the standard international trade classification (SITC) numbering system, and all values are in current dollars. The grouping of countries by geographic and trade areas follows the system described in the notes of Appendix A.

The grand totals of exports per Table B-3 (for 1979) and B-6 (for 1978) overstate the total value of export based on the data in Tables 17 and 18 for reasons discussed in this section and in section 3.5. The overstated amounts are \$6.72 billion for 1979 and \$5.53 billion for 1978.

#### 4. TECHNOLOGICAL CHANGES AND CAPITAL REQUIREMENTS

In recent years, successive series of new model automobiles produced evidence of innovations resulting from efforts to reduce vehicle weight, improve fuel economy and safety, and reduce pollution.

The technology of designing and building smaller cars has, of course, existed overseas for many decades, as did the manufacturing capability to produce the many and varied components and systems for them.

Many of the automotive components plants overseas were (and still are) subsidiaries of US suppliers to domestic OEMs. Thus, when the car downsizing process in the United States began in earnest, domestic component manufacturers were faced with the problem of how to transfer technology from overseas in a speedy and effective manner. The rack-and-pinion steering gear is a good example of a system which has been produced overseas for a good many years but which has not been used on domestic cars and, therefore, not manufactured in the U.S.

Component and system innovations are generally brought about either by new or improved mechanical/electrical/electronic designs, or by the development of new materials and new uses of existing materials. In most cases it is a combination of both. Some technological changes are related to downscaling or upscaling of existing (and known) components and systems, while others are the result of completely new inventions or new application developments.

A few examples of such technological changes are given below.

- The introduction of U.S. passenger car diesel engines has opened an entirely new field of products and markets for domestic components manufacturers. It is clear that the process of developing the new products for such engines will be accompanied by substantial technological change. A

similar situation has been created when passenger car turbo-charging has become a popular automotive option, or when fuel injection of American gasoline engines has become the trend of the future.

- Valve selector system is used with variable displacement engines in which one or more cylinders may be deactivated to reduce power and achieve better fuel economy. This innovation, developed by Eaton Corporation, has been experimented with by Ford, and is being used in the '81 Cadillac; it will be also useful in truck applications.\*
- Hydraulic engine fan clutch. The need for this development resulted from mounting the engine transversely in FWD\*\* vehicles while the electrically driven fan was found to have drawbacks. The hydraulically actuated clutch being developed by Eaton Corporation can be disconnected automatically when the engine does not need cooling.\*
- Anti-skid brake systems, controlled by on-board microprocessors, are currently under development by Kelsey-Hayes Corporation. While similar systems have been used on large trucks in the past, their low cost application to passenger cars will be made possible by the electronic control components now becoming commonplace in automotive design.\*
- Microprocessor controlled electronic systems, although introduced into automobiles several years ago, are still in early stages of development. It is anticipated that the decade of the 80s will see wider control applications, increased function capability, and lower cost per function of such "transportation electronics" systems. (The automotive electronics industry is treated in a separate Profile.)
- The switch to smaller 4 and 6 cylinder engines in the U.S. has been projected by TRW\* to result in a decrease in the number of pistons (and related parts) from an average of 7.21 per car in 1979 to about 6.11 per car in 1983. However,

\*"Automotive Industries," June 1980 pp. 58-61

\*\* Front-Wheel Drive

engine components will be under higher stresses in future engines (higher rpm, temperatures, wear factors), so that better pistons, valves, and other internal engine components are likely to be developed. The use of "exotic" coatings on such components is also likely to be developed.\*

- Efforts to develop lightweight wheels for passenger cars continue in several companies. Kelsey-Hayes has developed styled aluminum wheels, and is also at work on a wheel made of composite reinforced plastic materials.\* Lighter wheels made of high strength steel are already in experimental use on GM cars.\*\* Other companies (Reynolds Aluminum, Alcoa, Rockwell) are also doing work in this area.
- A complete molded plastic seat has been developed for Ford vehicles\*\*\* and for GM's Corvette\*\*, while a new automatic seat belt system has been developed by a foreign manufacturer.†
- A GM-developed semi-metallic brake pad material has been recently licensed to a Japanese component supplier††. The new brake pad material represents a considerable improvement over conventional resin-cemented asbestos friction pads.
- New England Instrument Company has developed a type of temperature sensor capable of ratiometric voltage outputs for temperature measurements up to 650°C with an accuracy of  $\pm 3$  percent.††† Automotive applications of the sensor are expected to include exhaust temperature measurements in closed loop engine control systems.

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\*"Automotive Industries," June, 1980, pp. 58-61.

\*\*Ward's Automotive Yearbook, 1979.

\*\*\*"Modern Plastics," May 1980.

†"Automotive Development & Design," Feb. 1980

††"Japan Economic Journal," April 8, 1980, p. 8.

†††"Automotive Engineering," Vol. 88 No. 6, June 1980

- General Electric Company, has develop a bumper made of Lexan (a plastic material) which has the necessary collision resistance and is believed to represent the best combination of cost, reduced weight and styling flexibility of all known bumper systems, whether made of aluminum, urethane, steel, or a combination of these materials\*.
- Ford Motor Company has introduced in some of its '80 models a lightweight aluminum intake manifold which incorporates an integral exhaust gas recirculation (EGR) cooler\*\*. This development saves weight, improves fuel economy, eliminates a clutter of hoses and connectors, and saves cost.
- General Motors introduced in some of its '80 models rocker arm covers and oil pans made of fiberglass reinforced nylon\*\*.
- To achieve the proper fuel economy and emissions levels in its '80 passenger diesels, GM uses Lucas CAV (U.K.) small-sized poppet-type injector nozzles.\*\*
- Bendix Corporation supplied electronic fuel injection systems for GM's '79 and some '80 cars, while Ford Motors developed a version of single-point throttle body injection\*\*.
- Bendix Corp. has recently demonstrated to automakers its newly developed supercharger for small engines. The supercharger is specially designed for the new generation of small-displacement, low-rpm gasoline and diesel engines expected in the coming decade. Unlike exhaust-driven turbochargers that are only effective at high rpm, the Bendix engine-driven supercharger provides its boost throughout the engine's rpm range. It also runs cooler than turbochargers and does not suffer from the power lag generally associated with them. It is expected to contribute to further improvements in fuel economy.\*\*\*

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\*"Automotive Engineering," Vol. 88, No. 6, June 1980

\*\*Ward's Automotive Yearbook, 1980

\*\*\*Bendix Corporation press release, Sept. 30, 1980

- While carburetors appear to be on the way out, Holley Carburetor Division of Colt Industries, continues development work on electronic carburetor metering, believing that such devices can surpass fuel injection "in any practical measures of performance."\*
- While Chrysler introduced automatic transmissions with lock-up torque converter in '78, GM began using this type transmissions in late '79 and '80, taking advantage of a vendor design (Borg & Beck Division of Borg-Warner Corp.).\*\*
- The first four-wheel drive US passenger car, the '80 American Motors' Eagle, features a "Quadratrac" transfer case which has a limited slip feature via a viscous rather than mechanical friction design. This development was pioneered by FF Developments, Ltd. (U.K.)\*
- Ford Motor Company introduced an automatic overdrive transmission (AOD) in their '80 models, using an overdrive ratio of 0.67:1. Vital control and other components for this transmission have been computer-designed by Federal-Mogul Corporation, resulting in cost and weight saving.\*
- Unibody-type body/frame construction was used increasingly in place of full-frame construction in passenger cars. Such engineering developments forced major product mix decision of component suppliers, as did the anticipated massive move to front-wheel drive vehicles.\*
- In the area of constant velocity joints (CVU), GKN., Inc., a U.K. company and its French subsidiary affiliated with Spicer Company (a subsidiary of Dana Corporation), held strong patent positions on the CVU joints and licensed their manufacture to other suppliers. But competition encroached from Borg-Warner Corp. B-W was prototyping in '79 and is expected to manufacture its own patented CVU joint soon.\*

\*Ward's Automotive Yearbook, 1980.

\*\*"Automotive Engineering," Vol. 88, No. 6, June 1980.

- Kelsey-Hayes Company developed new front-wheel drive spindle and wheel bearing units which feature tapered roller bearings, resulting in improved performance and reduced costs and maintenance.\*
- Federal-Mogul and Timken Company developed a GM concept to manufacture an integrated one-piece hub which incorporated a permanently sealed oil bath instead of grease for lubrication.\*
- Dana's Spicer Axle Division, for '79 and '80 light trucks, made new, smaller axle sizes using stampings instead of forgings. Spicer used high strength steel (HSS) and aluminum for weight savings. Spicer also began experimenting with aluminum axle housings and cast gears. Already in production were light, more durable wheel-end designs for light-duty trucks.\*
- Reynolds Metals Company and the Aluminum Company of America were among the suppliers working to increase usage of aluminum in body sheet and structural members. Some '79 and '80 model cars used aluminum sheet in hood and decklid applications (as well as bumpers). Other applications are being explored. Reynolds created active programs to improve machinability, joining and finishing of body panels, frames, load boxes, tailgates and stepbumpers, styled wrought-wheels, drive shafts and tailpipes.\*
- Industry sources projected that steel content in passenger cars would remain about 60 percent through the 1980s. High strength steel and ultra-HSS used for many lightweight components would increase in use. The typical '80 automobile averaged about 180 lbs. of HSS, an increase of 9 percent from the '79 models. National Steel Corporation and other steelmakers were developing steel-plastic laminates which could save about 40 percent in weight.\*

\*Ward's Automotive Yearbook, 1980

U.S. Steel continued to explore different applications of sheet-steel stampings, which could save up to 50 percent in weight when substituted for thick-walled castings. In the works was a sheet-steel cone braking system, which was said to feature the best of lightweight drum and disc systems on a subcompact car. U.S. Steel also developed a sheet-steel stamped engine block which weighed 33 percent less than cast iron and reportedly ran cooler.\*

- PPG Industries supplied GM's X-cars with glass that was up to 25 percent lighter than the glass it replaced. PPG noted that 1 mm reduction in glass thickness equalled a 1/2 lb. per sq. ft. reduction in weight.\*
- Materials substitution became more feasible with technology developments from companies like Union Carbide Corporation and Hercules, Inc. Among other materials, they produced graphite for fiber-reinforced graphite for future component applications such as leaf springs, door hinges, drive shafts and body panels.\*

- Bendix used plastic and aluminum in designing new, smaller, more effective brake systems for '79 and '80 automobiles.\*

- Owens-Corning Fiberglass Corporation embarked on an ambitious program to perfect sheet molding compound (SMC) to meet the needs of high volume exterior panel applications. The value of the plastic body panels in weight savings slated the material for more extensive use in '82 when mpg mandates would jump by 2 mpg instead of 1 mpg per year.\*

- The Budd Co. had two major stamping contracts for the '80 model Lincoln and Thunderbird and decided to move more heavily into plastic substitutes. It introduced "Flex 2000", a modified polyester sheet-molding compound that claimed greater flexibility over other SMCs.\*

\*Ward's Automotive Yearbook, 1980

- The sale of resin and other plastics supplied by such firms as Dow Chemical Company and Borg-Warner, was expected to continue to help Detroit make the necessary, often critical, weight reductions. Plastics' flexibility permitted more intricate designs. Reaction injection molding (RIM) of urethane, for example, helped create the "soft" front ends on the two-door Horizon/Omni, Mustang/Capri, the Firebird models and '80-model Dodge Mirada.\*

- Borg-Warner's Cyclic ABS thermoplastic was used in the Chrysler's chrome-plated wheel cover on some '79 and '80 models. The '80 Mirada and Cordoba had Cyclic ABS exterior mirror housings.\*

- All of the Big Three used forms of RIM to test lighter, more durable "friendly fenders" for future use. In '80, Oldsmobile's two-piece station wagon tailgate was made from Owens-Corning's reinforced SMC, as was the hood on Ford's '80-model Econoline van.\*

- An all-fiberglass reinforced plastic GM truck door, standard on '80-model Astro and General heavy-duty trucks, was molded by Premix Inc. EMS Division from materials supplied by Owens-Corning. It was the first vehicle body component subject to mechanical stress to be successfully mass produced of reinforced plastics using no metal supports or stiffeners.\*

- By the '80-model year, the Minnesota Mining and Manufacturing Company (3M) had developed a two-part urethane adhesive for bonding SMC sheet material to itself and other materials. The adhesive both bonded well and provided shock absorption to protect plastic components.\*

- As new materials were phased in, products like fasteners and rivets took new form to adapt to the new breed of lightweight American vehicles.

\*Ward's Automotive Yearbook, 1980

- Bostich Division of Textron Inc. tried wire fastening methods to fasten dissimilar materials. Metal stitching and stapling provided instantaneous fastening without drilling, prepunching, cleaning or other fastening pre-preparation — a money saver on the assembly line. Bostich also offered pneumatic nailers for quicker fastening of carpet to wheel wells and floors.\*

- The New England Tubular Rivet Company increased efforts to re-engineer fastener dimensions and to substitute steel for brass and aluminum for steel whenever possible.\*

- In the same field, the Warren Division of USM Corporation introduced the Barrier Coat Stud Welding system in 1979 for the improved attachment of automotive trim. Warren, at the end of 1979, established an organization for the production and distribution of a high quality, plastic rigid trim.\*

● Paint Suppliers such as E.I. Dupont de Nemours & Company Inc. and Wyandotte Paint Products Co. supplied auto-makers with more acrylic based paints as Federal restrictions on pollution ruled against use of oil-base paints. Some of these companies also supplied zinc-rich primer for fending off vehicle corrosion.\*

● Even the way that vehicles were put together was taking new shape. Robots, for example, made by Unimation Inc., were put to work welding at Chrysler, Ford, and GM plants. PUMA robots from Unimation assembled parts at one Delco Product Division plant.\*

The contributions to the new technology in manufacturing U.S. cars and trucks extended to many other vendors not mentioned above. They all faced challenges on the financial front due to the traumatic changes taking place in the auto industry with product downsizing, materials substitution, and cost pressures at a time of sales recession in the industry.

\*Ward's Automotive Yearbook, 1980

All technological changes, such as those cited above, require capital for research, engineering and development, regardless of whether a given product ever reaches the market. More capital is needed once the decision to market the product has been made. Production facilities and tooling must be planned and ordered, and reliable material supplies must be secured. Concurrently, marketing and promotional programs must be planned and implemented to assure the successful launching of the new product.

No meaningful estimate of the total capital requirement of all component suppliers can be made, since no survey of the entire population of companies in the industry has been performed. Nevertheless, a parametric estimate may be attempted, based on published data for the group of selected major suppliers profiled in this document.

Table 7 provides figures on historical capital expenditures (1975-79) and projections for 1980-81, all of which have been summarized in section 1.2. While the 1980-81 projection is probably too high for the group as a whole (since it involves only a small number of companies), a more reasonable estimate, based on an extrapolation of historical data, might be a capital expenditure average in the range of \$150 million to \$200 million per company.

Since all expenditures represent corporate totals which include non-auto related businesses, one can estimate as a first approximation that about 43 percent of these amounts (the ratio of auto-related sales to corporate consolidated sales) could be allocated to automotive business, or between \$64.5 million and \$86.0 million per company in 1980-81. For 100 such "average" supplier companies, the total capital requirement by 1982 might be in the range of \$6.5 billion to \$8.6 billion.

## 5. CHANGES IN THE INDUSTRY STRUCTURE, POTENTIAL IMPACTS AND INTERNATIONAL COMPETITION

### 5.1 CHANGES IN SUPPLIERS' STRATEGY AND TACTICS

The swing to downsized cars, front-wheel drives, diesel power and electronic controls has forced automotive component suppliers to plan for new products, to improve their manufacturing facilities, and to devise worldwide production and marketing strategies, in an effort to adapt to the changing demands of the prime auto manufacturers.

While car makers must deal with the compound problem of a sharp decline in sales and the need to re-engineer and retool for their new lines of downsized cars, automotive component manufacturers make every effort to survive financially. Although corporate morale in supplier organizations is seemingly depressed (as it is in the entire automotive industry), they have demonstrated a great deal of flexibility and adaptability in attempts to transform a possible disaster into an opportunity for progress in the long run.

Such progress will manifest itself in several forms. First, there will be the development of a series of new systems and components and the refinement and adaptation of existing ones for the front-wheel drive, diesel powered, innovatively suspended and steered, and electronically controlled, fuel-efficient vehicles of the future. The new 1981 Ford E-cars, Chrysler K-cars, AMC Eaglet and the forthcoming 1981½ GM J-cars and 1982 Chevrolet mini-trucks, have all provided the major component manufacturers with the opportunity for active participation in the "American Automotive Revolution." Substantial progress in component technology, encompassing the fields of mechanical, electrical/electronic, and materials sciences, has already been seen, as partially detailed in section 4 of this profile.

Second, progress will be seen through plant modernization carried out during the period of reduced production activity.

This will take the form of closing some obsolete plant capacity, converting others, and installing new, more efficient equipment, all expected to contribute to productivity improvement and better profitability in the long run.

Third, progress will be seen in new marketing and manufacturing strategies developed by component suppliers, aimed at increasing exports of U.S.-made auto parts, at establishing or expanding foreign production facilities which would be capable of supplying American and foreign auto markets, and at maximizing the degree of component standardization in conformance with the world car marketing concept.

Fourth, many component suppliers are using the period of the business downturn to diversify into new products and into other, non-auto related industries, while suppliers who have been producing for the OEM market exclusively, often attempt to expand into the replacement parts market (historically, aftermarket business is up when new car business is down.) It must be concluded, therefore, that while the automotive industry as a whole is experiencing very difficult times, component suppliers as a group have recognized a number of opportunities which permit them not only to remain solvent but also to expand their operations domestically and overseas.

A 1980 survey by Chilton Company\*, in which executives of more than a dozen major U.S. component manufacturers were interviewed about their companies and the state of their industry, amply illustrates the situation described above. The survey revealed that many companies are drastically cutting their costs in an effort to reduce losses during the slump period. There is also widespread recognition of the fact that the prime auto-makers are experiencing a severe shortage of investment capital needed to produce the new generations of downsized vehicles, and as a result, there will be little or no cash available for their in-house component engineering and development work, or for investment in their own component manufacturing plants. This

\*"Automotive Industries," June 1980.

view was voiced by Robert B. Stone, (among others) GM's purchasing executive, as reported in "Ward's Auto World" of September 1980. Hence, auto parts suppliers see the future of their industry as taking over more and more of the component engineering and manufacturing function from the car makers' own parts divisions.

Cited below are some of the statements made by executives of major supplier companies in response to the Chilton survey referred to above and quoted in "Automotive Industries" of June 1980.\*

Rockwell International's Automotive Operations (car and truck components) posted sales of about \$1.8 billion in 1979. Thomas J. Connaughton, president of General Components Group, which is a unit within Rockwell's Automotive Operations, is quoted as follows:

"This is a challenging time not only for the auto companies, but also for us as suppliers. There are demands that we've got to respond to and I think the industry, both the OEMs and the suppliers, have the capability and wherewithal to do that. About 3 years ago, we started to recognize that the move toward more fuel-efficient cars would be important to us, and we began asking ourselves how we would respond to that. We've been working hard on our present products to make them lighter.

"For example, we really went to work on a recliner (seat), took 40 percent of the parts out and reduced the weight by 30 percent. And we've worked on window regulators to see how we can come up with better and more lightweight units." (A Rockwell window regulator will be used on 1981 Ford E-cars. It will be 30 percent lighter than regulators in other equivalent cars.)

"The other thing we've done is to work hard at transferring our overseas technology, particularly from our European operations. We've been making components for smaller cars for a number of years, and we're finding lots of opportunities in that area.

\*Similar statements quoted elsewhere will be so identified.

"It sometimes takes a while to really bring new products to fruition. But at our Tech Center we've been working with composites in different applications, such as leaf springs, to really get some weight out.

"Some measures don't get rid of significant chunks of weight, but it's a pound here and a half a pound there, until you get into a whole system or series of parts, and then it starts to add up in terms of reduced weight."

Connaughton added that in the past year Rockwell has strengthened its position in Europe by the acquisition of several companies in the United Kingdom, France, and West Germany.

Borg-Warner's Transportation Equipment Group has experienced reduced earnings and was forced to lay off some employees.

Frank E. Pilling, president of the Transportation Group, is quoted as follows: "I keep hoping we've hit the bottom. It's tough, but we've got our head above water. We're fortunate in having a number of other things going besides the car and light truck business. It looks like some of the other groups in Borg-Warner will make up what we're down."

Pilling went on to say that 18 percent of the Transportation Group's U.S. sales represented car components, 22 percent went to foreign automotive OEM, and 12 percent represented light truck components. The Group also sells to Caterpillar, Deere, and International Harvester (IH). Unfortunately, a prolonged strike at IH reduced Borg-Warner's (and other automotive suppliers') sales to that customer.

Pilling further stated that Borg-Warner plans to continue to make many of the same type components for the new generation of smaller cars as they did for the larger cars in the past. B-W's Morse Division, which is not in the Transportation Group, will continue to make timing chains and belts for vehicles such as GM's X-cars. The Transportation Group also supplies Chrysler with radiators and automatic transmission coolers for several lines of their cars and makes friction elements for lock-up clutches used

in GM's automatic transmission. The group also supplies the auto-makers with pneumatic sensors and controls for EGR\* valves, solenoids, dashpots, etc. The Transportation Group also supplies clutches for several front-wheel drive and rear-wheel drive automobiles, as well as for transmissions, such as a four-speed unit for AMC and the T-10, a high-performance four-speed transmission used in the Corvette, Firebird, and Camaro.

Budd Company has been hurt by a strike early in 1980 and by diminished demand for its automotive sheet metal products, its wheel hubs and rotor products. However, other operations are less affected, including plastic products which are supplied for smaller size cars. These statements were made by David Williams, senior vice president of Operations, who added:

"We have a rather broad mix of parts for trucks, vans and luxury cars... and a great deal of small-car experience because of our licences and operations in Europe.

"We're a multi-national conglomerate. Our operations in Mexico and Argentina are going along very well. We've just put \$16 million along with our new partners in our Mexican operation. We've finished a major foundry expansion in Argentina in a company we've owned 100 percent for 10 years. Our Waupaga foundry in Wisconsin, which is probably the second or third largest independent jobbing foundry in the U.S., has a lot of automotive work. And we've made some machine tool acquisitions. The machine tool business is strong these days. Also, we're concentrating more of our effort on our aftermarket operations."

As part of Budd's acquisition program, the company acquired recently a machine tool firm which makes transfer machines, and another which rebuilds truck transmissions for sale in the aftermarket.

Budd Company's chairman of the board, Gilbert Richards, was quoted in the "Iron Age" of July 14, 1980 as saying that auto

\*Exhaust Gas Recirculation

companies will either have to increase their productivity and cost competitiveness, or be burdened by overcapacity.

The chairman of the 69-year-old auto and mass transit supplier says he is concerned about the trend in some industries to move capacity offshore. That new capacity--created by the relatively small group of large companies which can afford it--in turn will compete against older capacity for what Richards sees as a general "downcurve" in market demand.

Budd, which in the last year has acquired about 10 diverse companies, has been aggressive in international trade and will continue to diversify, Richards notes. The trend among the larger auto suppliers with such ability is to diversify in order to reduce the amplitude of business cycles.

"Research and development is important to success in the auto business, but the inevitable ups and downs must be balanced by participation in another field of business," according to Richards.

Budd was acquired in 1978 by Thyssen, A.G. of West Germany. Richards thinks this was a good move for the company to have made, and he is actively looking for acquisitions abroad. And it seems to have found a likely candidate in a portion of the operations of a company that is concerned with architectural sound deadening material. It was understood that the material could be installed in a plant to improve the work environment by reducing noise. With OSHA requirements in the United States, the linkup may be a profitable one to make for Budd.

In terms of the welfare of the United States as part of the industrial world, Richards, scouting for acquisitions, said he has "never been a more global thinker."

Although Budd has not reported any plant closings, about 4500 workers have been laid off in its automotive operations, mostly in stamping facilities.

Eaton Corporation's J.B. Reilly, vice president of Automotive Marketing, indicates that the company has recognized

several years ago that cars would be downsized and that small, transversely mounted front engines would provide power to the front wheels.

The transverse engine configuration made Eaton's fan clutch impractical, while an electrically controlled fan clutch has some drawbacks. Eaton is, thus, developing a hydraulically driven fan clutch which operates off the car's other hydraulic systems.

"Eaton," said Reilly, "is quite diversified now. Only 9 percent of its business is still tied to cars, while 40 percent is based on trucks. The car (market) is always important to us. When we get a downturn like this, our Engine Component Division and our Fluid Power Division are really impacted. But it's not like the old days when those divisions had such a tremendous effect on the corporation as a whole. We assumed that the car producers would be running into capital crunches because of the billions of dollars they would be laying out for downsizing, and we concluded that this was an opportunity for us... We're also picking up more hydraulic valve lifter business in Europe, working with companies like Audi, VW, and Peugeot."

A recent, very important Eaton development is the valve selector system first used on the 1981 Cadillac gasoline engine (the so-called "8-6-4"). It can shut down as many as four cylinders in light load situations, cutting fuel consumption 10 to 15 percent. These selectors have an even greater potential for light trucks because of their great load variations.

Eaton reported that about 3,250 of their 12,000 automotive employees are currently on long term layoffs, but the company is not planning any plant closings, according to Reilly. "In fact," he said, "we are going ahead with expansion of capacity at the heavy truck transmission plant in Shenandoah, Iowa".

Kelsey-Hayes Company reported that while sales have declined, future profits are expected. The company's business includes

wheels, disc brakes, and rotors, and it has announced earlier this year a joint program with Timken to develop a new carrier for front-wheel drive cars.

In recent years Kelsey-Hayes has produced over 300,000 anti-skid brake systems, and although the demand for them no longer exists, they believe there is a good chance that interest in such systems for future cars will revive. The company estimates that with a microprocessor on board each car (to handle emission and fuel economy controls), the added cost for an anti-skid system would be only about \$75 per vehicle. The device would be particularly useful on light trucks.

Kelsey-Hayes is currently developing lighter weight wheels. Their efforts with stamped aluminum wheels, which suffered a setback from steeply rising costs of aluminum, continue at a high level of confidence, while a plastic wheel program is also underway.

International Packing Corporation (IPC) is a supplier of rubber hoses and other rubber products used on cars. The company, whose recent growth places it in a position of importance in the industry, finds the adjustment to new market realities difficult because the small cars which will become the way of automotive life will have fewer power assist options and accessories. Some new products, however, will take the place of low demand items. Among them will be rubber parts for diesel fuel pumps, parts for heaters and air conditioners on buses, seals, diaphragms, and other fuel system parts compatible with gasohol, and other similar products.

Lear-Siegler Corporation is adjusting to present conditions by consolidating some of their operations and by making efforts to develop new products and materials, according to Donald A. Long, vice president of Fabricated Products Operations. The company closed their plants in Marblehead, MA and in Somerset, KY, which produced automotive seating products, and have consolidated these operations in Morristown, TN. Also a Detroit plant, which has been producing tubular axles, small assemblies

and heavy stampings for light trucks of the Big Four has been closed with the loss of 900 jobs. The automotive division's sales have been reported to be off some 20 percent from last year.

Motor Wheel Corporation, which is a Goodyear subsidiary supplying wheels, hubs, drums, and rims to the automakers is adjusting to new conditions in the industry by reducing their labor force in hourly and salaried classifications, and by restructuring their parts manufacturing operations for greater efficiency and profitability. The company has recently developed a wheel made of a composite material, and is now producing it in small quantities in a pilot plan in Lansing, MI. The wheel will be premium priced, will be 5 to 10 percent lighter than its aluminum equivalent, and will be available in production quantities in about 2 years.

Dave Cyrill, Motor Wheel's sales manager, said, "We're probably working harder than we've ever worked because of the tremendous amount of changes coming on the '82, '83, and '84 models with the downsizing and changeovers in brakes, rotors, and wheels. We're working with all the big companies, trying to get new items into our system. We've got a lot of styled wheels on GM's larger cars now, but (these cars) are only going to be around for a couple more years."

Sheller-Globe Corporation, which is well diversified in a large variety of automotive products covering small and full size cars, has been suffering from the slump in car sales. Nevertheless, according to Allen L. Edwards, senior vice president, the company is not only responding to direct customer needs, but is also conducting R&D on their own initiative to develop new automotive products that might reduce vehicle weight. One example is the plastic and aluminum steering wheel. The company supplies steering wheels for GM's X-cars, Chrysler's Omni/Horizon, and Ford's Lincoln, as well as a good number of other components for a variety of vehicles.

Anderson Company, a wholly owned subsidiary of Champion Spark Plug Company, supplies windshield wiper systems and components to auto manufacturers and the replacement market. According to James Griffin, automotive sales manager, the company suffers from the decline in new car sales, but the size of the car has no great effect on their products.

It may be assumed that Anderson's aftermarket business is not affected by new car sales in the short term.

Schlegel Michigan, Inc., which supplies a variety of molded rubber products, such as weather stripping, is reported to be doing well by broadening product lines that are used on fast-selling GM X-cars and Chevettes. Hugh Gordon, president, said that, "We have broadened our product line to include some new ones, such as more sunroof seals, more door seals, and hood-to-cowl seals.

TRW has not been hurt too badly by the shift to small cars in the U.S. because 55 percent of its \$1.8 billion automotive sales in 1979 were to overseas customers, with only 11 percent going to domestic auto OEMs and 34 percent representing replacement market sales. John Guinness, vice president of Marketing and Planning of the company's Automotive Worldwide Group, stated that even though North American car sales in 1980 have been forecast to decline 15 to 20 percent, TRW sees a number of opportunities related to the trend to smaller, more fuel-efficient autos.

For instance, the company is expanding production in four plants in North America and Europe to make additional components such as rack-and-pinion steering, valves, rings, pistons, and electronic parts. Guinness predicted that the use of rack-and-pinion steering systems on U.S. vehicles will increase from 30 percent in 1979 to close to 75 percent in 1983. Since TRW is considered to be the largest producer of such systems worldwide, Guinness anticipates TRW's sales to grow at a compound rate of 20 percent per year through the first half of the 1980s.

On the subject of TRW's engine components, Guinness said "On the negative side, we think that the number of cylinders on North American cars will go from 7.21 (average) per car in 1979 to about 6.11 by 1983, as the four-cylinder engine increases its market share from 9 percent in 1979 to 26 percent in '83. We also think six-cylinder engines will grow from about 18 percent in '79 to roughly 35 percent by '83 and that V-8s will decline sharply from 72 percent last year to 40 percent. To us as a supplier of valves and rings, this means bad news.

"On the other hand, we're seeing that the components that go into these engines are under higher stress, so that may call for more expensive valves and pistons and possibly coatings on the pistons to withstand the more rigorous environment. Also, transportation electronics (for engines) are being strongly stimulated as the manufacturers comply with the Government regulations on emissions and fuel economy."

Addressing current automotive trends, Guinness said, "Our projections are that in the '80s probably 100 percent of the cars eventually will have microprocessors, that up to 20 percent will use turbochargers or some sort of electronically controlled performance device, and that 15 to 20 percent of the cars and up to 80 percent of the light trucks will be dieselized. If you couple that with a worldwide trend to diesels in which more than 10 million diesels will be produced in 1985, you can see substantial opportunities for us in fuel-management systems for both gasoline and diesel engines."

He concluded, "The fact that North American vehicles are tending to look more and more like European and Japanese vehicles and the fact that GM, Ford, and others are moving toward the world car concept is having a tremendous impact on suppliers. We're attempting to better integrate our worldwide marketing and long-range planning so that we can better serve our worldwide customers."

The optimistic note struck by Guinness was also echoed by R.F. Mettler, TRW's chairman of the board who stated in his 1980 message to stockholders that "...proprietary products, such as electronic sensors, advanced electro-hydraulic valves, and fiber optic components, were developed (by TRW in 1979) for cars, trucks and off-the-road vehicles."

ALCOA has similarly expressed an optimistic view of the future in the following statement to stock holders by the company's board chairman and president (W.H.K. George and W.B. Renner, respectively).

"The total automotive market for aluminum (in 1979) was not as good as we had hoped it would be, although orders for forged wheels exceeded our expectations. We were not seriously affected by the slowdown in the automobile industry because we had not committed large new capacity. We continue to believe that as Detroit designs for greater gas mileage, real growth of aluminum use in cars will occur."

Dana Corporation\*, which has over the years placed more and more emphasis on their truck business and the aftermarket, is now forced to re-orient its product and market strategies to achieve a balance among vehicular, aftermarket, and industrial business. As one result, the company had acquired five new companies since January 1980, including an entry into the financial services business (a savings and loan corporation which operates six banks and an insurance business). Financial services are expected to provide 15 percent of Dana's earnings by 1985.\*\*

The dramatic contraction of the truck market since 1979, affecting light trucks (down 38 percent), four-wheel drive

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\*Source: "Ward's Auto World," July 1980.

\*\*Source: "Business Week," July 21, 1980.

vehicles (down 52 percent), and heavy duty trucks (down 36 percent), has hurt Dana's profitability (down 32 percent\*) and forced it to:

- Postpone the startup of a new plant in Jonesboro, AR, built to manufacture seven-speed transmissions for class 7 and 8 trucks
- Shut down, perhaps permanently, a light truck frame plant in Ecorse, MI, an axle plant in Edgerton, WI, and a casting and engine gasket plant in Havana, IL
- Cut the work force by about a third (or about 10,000), including 2,900 affected by plant closings, the others on temporary layoffs or reduced by attrition.

So far, the small car market did not figure prominently in Dana's diversification plans, although this may change as 1985 small truck (class 1 and 2) market projections are being revised from 4 million units to 2 million units, with the other 2 million units representing mini-pickups and small 1/4-ton vehicles based on small car components. Similarly, the current estimates of the full size, four-wheel drive vehicle market has been revised from 1 million units/year to 600,000 units annually.

Nevertheless, Dana has recently won a contract to supply the frames for GM's new mini-pickup to be introduced in 1982, and is likely to be a major supplier of front-wheel drive systems in class 1 and 2 trucks (30 percent of such trucks are projected to have this feature in 1985). This business may partially offset the loss of orders for truck frames from Ford, Dana's principal customer for this type product.

In line with Dana's efforts to expand in other directions, the company recently acquired Inter-Truck Ltd, a U.K. company, which will help in penetrating the European heavy duty market. Domestically, Dana's business with International Harvester has experienced a modest upswing (a post IH strike phenomenon),

\*Source: "Business Week," July 21, 1980.

mainly based on sales of CM50 and 60 transmissions. There has also been a great interest in Dana's seven-speed gearbox for the low end of class 7 trucks powered by diesels, and there are rumors that a CM40 series transmission is being developed for this market.

Also being developed is a heavy duty automatic transmission for on-off highway use, which combines hydrostatic torque multiplication with mechanical gearing. Dana has been testing a prototype, but the market potential for this new development must await the rebound of the construction industry expected in the mid-80s.

Dana's financial recovery is expected to be made chiefly in the automotive aftermarket and industrial products areas. With the 1979 acquisition of Wix Corp. (air and oil filters), Dana's aftermarket sales have increased 50 percent so far in 1980.\* Nevertheless, the company continues its dependence on auto parts sales to GM and Ford for 40 percent of its total sales volume.\*

Foreign component suppliers have also pursued aggressive strategies and tactics in their effort to penetrate American OEM and replacement markets. A case in point is Lucas' (U.K.) hydraulically actuated clutch systems used with AMC's 2.5 litre L-4 engines on Spirits, Concords, and Jeep CJs. Such systems are new to U.S. compact vehicles, but have been used extensively on European and Japanese cars for many years.\*\*

Another example of foreign supplier penetration is Robert Bosch (West Germany), whose existing facilities in South Carolina represent a \$31.5 million investment and employ 600 workers. The company reports that by the end of 1980, an additional \$7.5 million will be invested there, with 100 people added to the work force.\*\*\*

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\*Source: "Business Week," July 21, 1980.

\*\*Source: "Ward's Engine Update," August 31, 1979.

\*\*\*Source: "Automotive News," December 24, 1979.

## 5.2 SUPPLY AND DEMAND OUTLOOK\*

As noted earlier, the U.S. car market has been growing only at a modest 2 percent a year for the past decade. Sales of auto parts to the Big Three auto companies are growing faster - about 3 percent per year in real terms - because the auto companies, faced with the costly move to smaller cars, are allocating less investment capital into expanding their own production of parts.

The most self-sufficient of the automakers in terms of original equipment manufacturing is General Motors, which currently purchases about 50 percent of its parts from outside vendors. Ford is only slightly less vertically integrated, buying about 55 percent of its parts from outside. Chrysler presently buys two-thirds of its parts from vendors, while American Motors Corporation purchases an even higher percentage. Chrysler is likely to become more dependent on its suppliers in the future, as it is forced to liquidate profitable parts plants to generate funds for its survival.

A new labor contract that the Big Three auto companies have signed with the United Auto Workers last fall (1980) is certain to widen the labor-cost advantage for parts made by outside vendors, whose wage-rate is often only 50 percent to 70 percent of that at GM, Ford, and Chrysler.

Despite the depressed state of the automobile industry, most major suppliers indicated that the reduction in big-car sales has been offset by a significant increase in demand for small car parts.

## 5.3 FUTURE TREND PROJECTIONS

A study conducted by Arthur Anderson and Co. in 1979\*\* indicated that short-term planning within the auto industry has been

\*Source: "Business Week," September 24, 1979.

\*\*Source: "Ward's Automotive Reports," November 19, 1979.

adequate, whereas the direction of long-term planning has been insufficient. The study shows that:

- (1) It will require more long term planning activities to bridge the gap between auto manufacturers and auto parts suppliers. Strategic planning by the auto companies is not available to mainline suppliers (presumably for reasons of confidentiality/competitiveness).
- (2) Four cylinder engines will constitute about 40 percent to 50 percent of 1985 U.S. auto production and 60 percent to 70 percent of that in 1990.
- (3) Front-engine, front-wheel drive cars will account for 50 percent of 1985 U.S. production and 70 percent to 75 percent in 1990, with on-board, computerized diagnostic instrumentation installed in about 50 percent of all cars in 1985 and 75 percent in 1990.
- (4) Steel usage will drop to about 1600 lbs. in the typical 1985 car and 1400 lbs. in the typical 1990 cars - a decrease of about one-third from 1978 cars. Plastic usage is projected to increase 70 percent from 175 lbs. in the 1978 car to 300 lbs. in the 1990 car.
- (5) Virtually all of the technology panelists predicted that HC, CO, and NOx emissions standards will not be tightened further by 1985. Corporate average fuel economy standards are predicted to increase to about 30 mpg by 1990.
- (6) U.S. automakers will increase parts purchases from overseas sources, averaging 10 percent of their total purchase in 1985 and 15 percent in 1990. U.S. auto parts supplies will experience a 10 percent gain in exports of U.S. produced auto parts to foreign auto manufacturers
- (7) The number of U.S. automotive parts supplies companies will shrink during the 1980s, according to about two-thirds of the suppliers surveyed. About one in five

predicts an increase in suppliers in the 1980s as shown in the chart below.

Projected Number of Auto Parts Suppliers

<u>No. of Suppliers will be</u>	<u>% of Respondents</u>	
	<u>1985</u>	<u>1990</u>
Much Smaller	6%	6%
Somewhat Smaller	61	58
Same	15	15
Somewhat Larger	18	18
Much Larger	<u>0</u>	<u>3</u>
	100%	100%

- (8) Auto parts suppliers will diversify into non-automotive sales which will account for 35 percent of new investments during 1980-1985; 40 percent during 1985-1990.
- (9) Cost reduction/productivity improvements will be the most important investments made in the 1980s, followed closely by capacity additions for new and existing products.

#### 5.4 THE EUROPEAN AUTO PARTS INDUSTRY\*

The European auto parts industry has been following the trends of their auto manufacturing customers, and the fortunes of the latter have been changing drastically in the last few years.

In 1973 Europe produced 38 percent of the world's automobiles, but by 1979 that number declined to 34 percent\*\* and by all indications, continues to decrease. This is due to the penetration of Japanese imports into European markets. If the trend continues, Europe will become a net importer of automobiles.

\*Sources: "Ward's Auto World," July 1980, p. 29.  
 "Forbes'," October 13, 1980, p. 42 to 43.  
 "Financial Times," December 31, 1979.

\*\*In 1979, estimated North American and Japanese production of world's automobiles was approximately 36 and 26 percent, respectively.

This situation has forced auto parts suppliers to change their marketing strategies from a national to European to a worldwide business orientation, as auto production has expanded into countries which have been traditionally export markets.

As in the case of U.S. suppliers, European auto parts manufacturers can no longer rely for their business on simply quoting on products in response to requests by the OEMs. Parts manufacturers must now constantly search for new ideas, methods, and materials which would make their products more efficient in performance, more competitive in price, and require less or simpler maintenance and service.

In Europe, unlike in the U.S., the domain of the auto parts manufacturer is being encroached upon by the prime auto manufacturers. While an aluminum head casting for a Ford four-cylinder engine has been displayed by a European supplier at the SITEV Exhibition in Geneva\* early in 1980, Ford/Europe is engaged in manufacturing its own variable venturi carburetors and special spark plugs for its world car engines. This reversal of traditional roles in component manufacturing illustrates the fact that suppliers must now work harder to provide products of higher intrinsic value to OEMs, while the latter pursue a policy of forward integration which assures them original equipment sales, as well as the aftermarket business.

General Motors has invested \$2.4 billion in five new component manufacturing facilities in Europe and in expanding an existing plant in Northern Ireland (GM has also constructed a plant to make radio parts in Singapore and will be purchasing Isuzu/Japan diesel engines for Chevettes beginning in 1981).

Since European auto manufacturers have been historically building light, compact cars, European producers of parts/assemblies/systems see a good opportunity to expand their business by

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\*An annual trade show of European manufacturers of automotive components and accessories.

capitalizing on the potential demand for their products by American automakers, as the latter convert to small size vehicles. Thus, German component suppliers stand to benefit from a GM world car built by Opel, as do French suppliers from a Renault small car built by American Motors.

The attraction of foreign parts is primarily their low cost. The current domestic cost of producing major car components is so immense that unless economies of scale can be easily achieved, companies experience difficulty in achieving acceptable rates of return on investments. In many cases, foreign suppliers, with updated efficient capacities and lower wage rates sharply undercut U.S. suppliers; moreover foreign parts are often more readily available. However, more is involved than mere comparison of price lists and availability. Automakers have to weigh the reinvestment of huge sums into their own parts plants, both locally and abroad, against the purchases of outside auto parts. They also have to consider the investment choices, because of the problems presented by wage rate, currency relationships and trade rules.

One negative aspect of heavy dependence on foreign sources for major parts is the fact that domestic automakers might be affected by dock strikes, currency fluctuations and overseas labor or political unrest.

The European auto parts industry is not always content just with exporting their products to North America, and a number of major component suppliers have established manufacturing operations in the United States. Companies such as Robert Bosch (West Germany), Lucas and GKN\* (both of the U.K.) are cases in point. All three companies have been described elsewhere in this profile.

According to Forbes', 40 foreign manufacturers -- British, German, French, Italian, Swiss, and Japanese -- have in the last 3 years built 22 plants, made 15 acquisitions, formed joint ventures and set up distributing/sales operations in the United States to serve the automotive aftermarket, which is estimated

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\*Guest, Keen & Nettlefolds, Ltd.

(by Forbes') to be \$17 billion annually, and traditionally growing at 10 to 15 percent per year. While the aftermarket has experienced some contraction in 1979 and 1980, it is believed (by Forbes) that deferred auto repairs during these years will rebound in 1983 to register a 25 percent growth rate in the auto parts business beginning in 1983.

In addition to the major European component manufacturers with U.S. operations mentioned earlier, the following companies have also been cited by Forbes':

- Dunlop (U.K.) producing tires in Buffalo, NY
- Mahle (W. Germany) producing pistons in Morristown, TN
- Kieper (W. Germany) producing window cranks in Battle Creek, MI
- Mann-Hummel (W. Germany) producing filters in Battle Creek, MI

The U.S. OEM market is, of course, also a major target of European component manufacturers. According to aftermarket analyst Henry Alessio\* of Hayes/Hill Inc., nearly \$5 billion worth of auto parts per year are imported by American OEMs for their vehicles. This represents about 10 percent of the total, and is expected to increase to 15 percent by 1985. In some domestically assembled cars the value of imported parts already approaches 15 percent of the total.

For instance, Chrysler's Omni/Horizon uses engines from VW, transaxles from Hardy-Spicer (a division of GKN, with plants in the U.K. and France), rack-and-pinion steering systems from Cam Gears Ltd. (U.K.) and drive shafts from GKN (U.K.), for a total foreign content of 14 percent\*\*; American Motors uses clutches made by Automotive Products (U.K.); Ford's Escort uses front drive systems from Japan, steering components from the U.K., front suspension from Spain, fuel pumps from Italy and rear brakes from

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\*Cited in "Forbes'," October 13, 1980, p. 43.

\*\*Cited in "Financial Times," December 31, 1979.

Brazil. Italy's Teksid (a subsidiary of Fiat) supplies aluminum engines and clutch housings to Ford and Chrysler.

The interest of foreign parts manufacturers in the domestic OEM and replacement markets is basically not new, although it is only now beginning to reach meaningful proportions as three conditions combine to make such penetration possible:

- American auto components begin to assume the size and other characteristics of foreign equivalents
- The foreign and domestic markets have become, as a result, a single world market which makes possible unprecedented economies of scale
- A favorable currency exchange rate has encouraged foreign companies to invest in the United States.

On the whole, the European auto parts industry has seen a slowdown in its growth rate in 1980. High interest rates combined with a decrease in corporate profits have depressed investments at a time of declining demand for consumer and industrial goods. British, German, French and Italian auto industries have experienced varying degrees of economic downturn in 1980, some of the reasons being the penetration of Japanese products into European markets.

#### 5.5 THE JAPANESE AUTO PARTS INDUSTRY\*

While Japanese-made small cars have made deep penetrations into the U.S. car market, their auto components industry has been just as aggressive in capitalizing on the opportunities so created. Such opportunities are manifold, and consist of:

- Supplying Japanese-made components to:
  - Japanese OEM
  - American OEM

\*Sources: "Forbes'," October 13, 1980, p. 42-43.  
"Ward's Auto World," July 1980, p. 31.  
"Business Week," October 6, 1980, p. 32-33.

- European and other foreign OEM
- Replacement markets worldwide
- Supplying U.S.-made components to:
  - Japanese OEM
  - American OEM
  - European and other foreign OEM
  - Replacement markets worldwide.

There are more than 400 Japanese companies currently in the business of producing automotive parts, accessories and production machinery/tools/equipment. About 50 of these have auto parts operations in the United States, according to Japan Auto Parts Industries Association (JAPIA).

About 80 percent of JAPIA members' production is used by OEM, with 20 percent serving the aftermarket. The Japanese auto makers exercise appreciable control over their parts suppliers by providing financing to the latter and by tying them up in long-term supply agreements. Under this system (so-called "kanban"), the suppliers ship auto parts only on demand, in effect providing a warehousing service for the automakers. However, this also gives the supplier an opportunity to exercise some leverage with his OEM customer.

The working of the "kanban" system may be illustrated in the case of Nissan Motors, maker of Datsun cars and the second largest auto manufacturer in Japan. Nissan has about 150 component suppliers, of which some 100 do business exclusively with that company. Nissan owns one-third or more of the stock of 25 supplier companies. Similar ties exist between other Japanese OEM and their suppliers.

This symbiotic arrangement between manufacturer and supplier, coupled with the fact that most supplier operations in Japan are physically located on or near the premises of their OEM customers facilities, makes it very difficult for a foreign supplier to penetrate the Japanese market. Any such penetration into that

market would inevitably take place through a "joint venture" arrangement with an established Japanese supplier, and would, therefore, represent another "captive supplier" situation.

As in the case of European parts suppliers, Japanese component manufacturers have followed their prime OEM customers to the U.S., and it is clear that American automakers have been targeted for penetration. As a result of the trend toward the internationalization of the auto parts industry, there are currently more than 1000 licensing agreements between Japanese auto parts manufacturers and foreign parts producers; about 600 of these are with U.S. partners such as Eaton Corp., Borg-Warner, TRW and others, who earn royalties from licences granted to Japanese companies.

While it has been historically almost impossible for non-Japanese companies to establish non-affiliated manufacturing operations in Japan, it has been very easy for Japanese companies to establish manufacturing beachheads in the United States. Some of the 50 such operations referred to earlier, either ongoing or planned, may be mentioned here:

- NGK Spark Plug Co. Ltd., operates a plant in Battle Creek, MI
- Nippon Cable Systems operates a plant in Battle Creek, MI
- Stanley Electric Co. Ltd., which makes headlights and wiring harnesses, operates a plant in Georgia
- Yuasa Battery Co. Ltd., operates a plant in Pennsylvania
- Kinugawa Rubber Industry Co. Ltd., (an affiliate of Nissan) plans to start operations in Michigan
- Nihon Radiator Co. Ltd. (another affiliate of Nissan) plans operations in Michigan
- Nippondenso Co. Ltd., maker of ignition system and other electrical components has purchased land in Battle Creek, MI for a planned manufacturing facility
- Isumi Motor Co. Ltd., maker of steering wheels is planning to establish operations in the U.S.

- Showa Mfg. Co. Ltd., maker of shock absorbers is planning to start manufacturing operations in the U.S.
- Nippon Oil Seal Industry, Ltd., operates a plant in Pennsylvania.

According to JAPIA, Japan's annual exports of auto parts is about \$3 billion, of which \$1.2 billion is to the United States. By comparison, only \$120 million worth of auto parts are exported annually to Japan by U.S. manufacturers. This heavy imbalance in auto parts trade between the two countries has led to a great deal of dissatisfaction among suppliers in this country, culminating in a Japanese trade mission to the U.S. in September, 1980. After a two-week series of discussions, the trade mission, composed primarily of Japanese car manufacturers, promised to increase their imports of U.S.-made auto parts to \$300 million annually. The talks also demonstrated that U.S. dealers of Japanese makes have a strong loyalty to their foreign principals and, as a rule, do not carry American-made replacement parts.

The perception of Japanese auto parts manufacturers (as well as their European counterparts) is that now (1980/81) is a good time to invest heavily in manufacturing facilities in the U.S., because:

- The currency exchange rates are favorable
- Credit and money in this country is very tight, making it difficult for U.S. companies to get capital for expansion
- The trend toward a "world car" is gaining momentum and is internationalizing the entire automotive components industry
- The demonstrated reluctance of American automakers to expand -- or even to maintain current levels of -- their in-house production of components.

It may be stated in conclusion, that the marriage of American technology and know-how with Japanese and European manufacturing efficiency will no doubt create better automotive products worldwide, albeit after a difficult period of adjustment.

## 5.6 CHANGES IN INDUSTRY STRUCTURE AND THE SMALLER U.S. SUPPLIER

Any discussion of the U.S. automotive component industry would be incomplete without mention of the smaller suppliers.

As the discussion in the foregoing sections reveals, the major suppliers to the prime auto manufacturers have been experiencing difficult times during the 1979/80 period, but have generally managed to keep just a little ahead of serious financial trouble, and some have even prospered modestly. This was accomplished mainly through diversification into more profitable non-automotive businesses, through consolidation and streamlining of their automotive operations at home, and through acquiring or expanding lower-cost operations abroad.

The most conspicuous element in the history of the auto component industry in the last 10 years is the fact that the independent medium-size supplier company -- which used to be a household name to the prime auto manufacturers for several decades -- has now disappeared from the scene. True, the old name is still around in some cases, but the individual company -- whether it was privately or publicly owned -- has lost its old identity, having been bought, absorbed or merged into one or the other of the major diversified, multinational conglomerates.

Some of these conglomerates have been traditionally in the automotive components business (Bendix, Eaton, Dana, Borg-Warner, etc.), while others have branched out into the automotive field in the last decade (ITT, Gulf & Western, Illinois Central, FMC, etc.).

This trend to conglomeration may be illustrated with just a few examples as follows:

- Bendix Corp. - now owns Toledo Stamping (metal components), Fram (filters), Autolite (batteries, spark plugs, electrical/ignition components)
- American Car & Foundry (ACF) Industries - now owns Carter Carburetor Co. and Carter Automotive Co. (miscellaneous components)

- Arvin Industries - now owns Calspan Corp. (a spin-off of Cornell Aeronautical Laboratories)
- Borg-Warner Corp. - now owns Morse Chain (engine components) and Borg & Beck (driveline components)
- Thyssen A.G. (West Germany) - now owns Budd Co. (wheels, frame and brake components)
- Champion Spark Plug Co. - now owns the Anderson Co. (windshield wiper systems) and DeVilbiss (automotive painting systems)
- Colt Industries - now owns Holley Carburetor and Garlock Co. (seals and gaskets)
- Dana Corp. - now owns Weatherhead (hydraulic systems components), Perfect Circle (piston rings, engine components), Wix (filters)
- Eaton Corp. - now owns Yale & Towne (miscellaneous hardware) and Cutler-Hammer (electrical components)
- Ex-Cell-O - now owns McCord (radiators, oil coolers, Chicago Gear and Cadillac Gage (miscellaneous components)
- Fruehauf - now owns Kelsey-Hayes (wheels, brake and frame components)
- Illinois Central (IC) - originally a railroad, now owns Midas Mufflers
- United Technologies - now owns Ambac Industries and its American Bosch Division (engine, other mechanical and electrical components). Their Hamilton Standard division markets automotive test and diagnostic equipment. Their Inmont Corp. is a major supplier of automotive paint.

Apart from the group of medium-size suppliers mentioned above, the automotive industry has been served by literally thousands of small component manufacturers whose humble beginnings may have been in a backyard garage or in the basement of their homes, and whose entry into the field came during or soon after the end

of World War II. As the auto industry grew in the post-war era, so did the group of these small, generally family-owned, businesses, as well as each business individually.

Some of these small enterprises managed to become direct suppliers to the automotive OEMs; others became suppliers to the prime vendors to the OEMs. The companies in the former group have been providing not only components and related technical services associated with car assembly, but also components and services for experimental and prototype vehicle development work, which has always been conducted on a high dollar-value scale by the Big Four.

It is this latter group of small suppliers which has fared the worst during the 1979/80 downturn. Most of these companies suffered heavy financial losses, and many went out of business, contributing materially to the industry's unemployment statistics.

Unfortunately, financial and product data for this group of small privately-owned enterprises is not published, and is, therefore, not readily available for analysis purposes. By the same token, employment/unemployment statistics for this group are not readily available.

Employment figures for the entire component supplier industry have been presented in Table 9, which shows the highest employment in the "parts" column to be 466,900 workers in the fourth quarter of 1978, and the lowest employment of 319,900 workers in the third quarter of 1980\*. This represents a decline in employment of 147,000 workers, or a reduction of 31.5 percent in that industry's labor force.

Somewhat different figures have been cited in an Associated Press release of December 21, 1980, written by Guy Darst, who put the unemployment number of the Big Three at Christmas 1980 at

\*Third Quarter 1980 figures are the latest available at the time of writing.

182,000. The AP release went on to estimate that... "perhaps twice as many people (364,000) lost jobs in the supplier industries."\*

While the figures cited by the Bureau of Labor Statistics (Table 9) and those cited in the Associated Press release may not agree, there is a strong belief that the former source has a tendency to undercount. If one considers employment figures of several tiers of suppliers (i.e., suppliers to other suppliers), the numbers quoted by the AP begin to look believable.

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\*Also quoted in the release was the fact that during the 1980 model year 1,643 car dealerships (or 1 in 14) went out of business.

## 6. GOVERNMENT-INDUSTRY RELATIONS

One of the aspects of the automotive components industry is the impact of the various parts and accessories on the compliance with Federal fuel economy, safety, and exhaust emissions regulations. It is obvious that the correct performance of appropriate parts, and their proper assembly in the vehicle will determine whether or not that vehicle will meet OE manufacturers' performance specifications.

The Federal Government and the component industry interface in four areas:

- Fuel economy regulations
- Safety regulations
- Emissions regulations
- Occupational safety and health regulations.

### 6.1 FUEL ECONOMY REGULATIONS

Corporate Average Fuel Economy (CAFE) is monitored by the EPA in activities which involve the prime auto manufacturers only, and are, therefore, outside the scope of discussion of the component supplier industry.

### 6.2 SAFETY REGULATIONS

Various safety-related parts sold to the prime manufacturers and the aftermarket must be in compliance with the Federal Motor Vehicle Safety Standards, of which there are 51. NHTSA's Office of Motor Vehicle Safety Compliance enforces the Federal equipment standard through a self-certifying statute. This statute makes the component manufacturer responsible for certifying that the equipment he produces meets the safety standards where applicable. The DOT does not approve or certify. It sets the standards and has the authority to levy penalties and fines against manufacturers who do not comply with the standard of manufacture.

Enforcement consists of surveillance testing of vehicle/ components during manufacture, and of buying and testing vehicles in use from the marketplace. The Office of Motor Vehicle Safety Compliance has 43 workers available for investigation duties, and has 18 testing laboratories throughout the country for verification of compliance by the manufacturers monitored. They also have vehicle/parts recall authority which was provided in the 1974 Amendment to the 1966 National Traffic and Motor Vehicle Safety Act.

Foreign vehicle/component manufacturers have the advantage of not having such surveillance testing during manufacture in their plants. Of course, their products may be tested after landing in this country.

### 6.3 EMISSIONS REGULATIONS

In 1980 the Environmental Protection Agency (EPA) proposed regulations which would institute a self-certification program for component manufacturers of emission-related parts destined for the aftermarket. Under this proposal, the manufacturer would certify such parts as being equivalent to the OEM components with respect to their impact on emissions.

As in the case of CAFE regulations, the EPA monitors only the prime auto manufacturers with respect to certification of compliance with emissions standards, regardless of the pertinent component's manufacturing origin. Matters relating to static source (plant) emissions, which may affect individual components manufacturers, are beyond the scope of this profile.

### 6.4 OCCUPATIONAL SAFETY AND HEALTH REGULATIONS

Consideration of issues within the jurisdiction of the Occupational Health and Safety Administration, which may affect individual component manufacturers, are outside the scope of this document.

7. TABLES

TABLE 1. OEM SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS AND THEIR 1979 SALES

COMPANY	PRODUCT CODE*	1979 NET SALES (\$ MILLIONS)**		AUTO-RELATED AS PERCENT OF CONSOLIDATED	REMARKS ON AUTO-RELATED SALES
		CONSOLIDATED	AUTOMOTIVE-RELATED		
ACF Industries Inc. (Carter Carb.)	E,C	865.7 <sup>c</sup> (+ 5.7)	168.7 <sup>c</sup> (1.0)	19.0	
ALCOA	B,E,F	4,847.0 <sup>b</sup> (+19.6)			
The Allen Group Inc.	D,F,C	343.2 <sup>b</sup> (+14.1)	90.3 <sup>a</sup> (+10.0)	26.3	
Amsted Industries (Burgess-Norton Mfg)	B,F,S	855.7 <sup>a</sup> (+22.3)			
Amstrong Cork Co.	D,E,S	1,341.1 <sup>c</sup> (+ 7.8)			
Armstrong Rubber Co.	D	393.7 <sup>b</sup> (+ 4.4)			
Arvin Industries	E,C	493.2 <sup>c</sup> (+ 1.0)	325.6 <sup>c</sup> (-4.5)	66.0 <sup>c</sup>	
Barnes Group Inc.	B,E,S,C	431.5 <sup>b</sup> (+18.5)			
Bearings Inc.	E,D	294.2 <sup>b</sup> (+18.2)	294.2 <sup>c</sup> (18.2)	100	
The Bendix Corp.	B,E,S	3,856.4 <sup>c</sup> (+ 5.7)	1,985.1 <sup>c</sup> (+4.6)	51.5 <sup>c</sup>	
Borg-Warner Corp.	E,D	2,717.4 <sup>a</sup> (+16.8)	1,413.0 <sup>a</sup> (44.6)	52.0 <sup>a</sup>	\$489 m. to domestic OEM (18% of total sales) \$598 m. to foreign OEM (22% of total sales) \$326 m. to light truck market (12% of total sales) <sup>a</sup>
Robert Bosch Corp.	B,E	5,402.0 <sup>c</sup> (12.3)	1,258.7 <sup>c</sup> (13.8)	23.3 <sup>c</sup>	\$2,467 m. to German customers (11.4% of total) \$2,567 m. to all other customers (11.9% of total) <sup>c</sup> Currency conversion based on 2 DM = \$1
Buckeye Intern'l Corp.	D,F,S	161.9 <sup>b</sup> (+34.2)	56.7 <sup>a</sup> (+2.3)	35.0 <sup>a</sup>	
The Budd Co.	B,E,F,D	PRIVATELY OWNED-----NO DATA PUBLISHED			
Bundy Co.	B,E,S,F,D	168.2 <sup>b</sup> (+30.5)	30.8 <sup>c</sup> (43.3)	18.3 <sup>c</sup>	
Champion Spark Plug	E,C	806.5 <sup>c</sup> (+16.4)	604.2 <sup>c</sup> (+14.0)	74.9 <sup>c</sup>	
Colt Industries	E	2,140.5 <sup>b</sup> (+18.4)			

\* See code explanation at end of Table 8.

\*\* Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

m. Million

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week" 9/24/79

TABLE 1. OEM SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS AND THEIR 1979 SALES (CONT.)

COMPANY	PRODUCT CODE*	1970 NET SALES (\$ MILLIONS)**		AUTO-RELATED AS PERCENT OF CONSOLIDATED	REMARKS ON AUTO-RELATED SALES
		CONSOLIDATED	AUTOMOTIVE-RELATED		
Commercial Shearing	F, S	247.5 <sup>a</sup> (+18.1)			
Copperweld Corp.	S	494.8 <sup>b</sup> (+17.9)	52.5 <sup>c</sup> (-13.7)	10.6 <sup>c</sup>	
Cummins Engine Inc.	E	1,770.0 <sup>b</sup> (+16.4)			
Dana Corp.	B, E, D, S, F	2,761.0 <sup>a</sup> (+22.6)	2,192.3 <sup>a</sup> (+59.5)	79.4 <sup>a</sup>	
Dayco (Automotive Corp.)	E, S, C	740.0 <sup>a</sup> (+13.3)	202.8 <sup>a</sup> (+ 7.8)	27.4 <sup>a</sup>	
Donaldson Co. Inc.	E	225.1 <sup>a</sup> (+25.6)	173.3 <sup>a</sup> (+25.6)	77.0 <sup>a</sup>	
Dyneer	B, D	141.3 <sup>a</sup> (+80.4)	51.2 <sup>a</sup> (+27.4)	36.2 <sup>a</sup>	
Eagle-Picher Industries	F	590.0 <sup>a</sup> (+12.1)	155.8 <sup>a</sup> (+15.6)	26.4 <sup>a</sup>	\$15.9 m. to Ford Motor Co. (2.7% of total sales) <sup>a</sup>
Eaton Corp.	B, E, D, S, C	3,359.9 <sup>a</sup> (+20.4)	1,646.3 <sup>a</sup> (+11.3)	49.0 <sup>a</sup>	\$302.4 m. for passenger cars (9% of total sales) \$1,343.9 m. for trucks (40% of total sales) <sup>a</sup>
Echlin Mfg. Co.	B, E	304.0 <sup>a</sup> (+ 9.2)			
Eltra (Prestolite Co.)	E, S	1,174.0 <sup>c</sup> (+15.1)			
Ex-Cellto Corp.	E, F, C	961.9 <sup>a</sup> (+31.8)	241.4 <sup>a</sup> (+29.2)	25.1 <sup>a</sup>	
FMC	E, D, S	3,307.5 <sup>a</sup> (+13.6)			
Facet Enterprises	E	136.1 <sup>c</sup> (+17.5)	68.4 <sup>c</sup> (+12.2)	50.3 <sup>c</sup>	
Federal Mogul Corp.	E, D	663.3 <sup>a</sup> (+16.6)	530.6 <sup>a</sup> (+ 7.3)	80.0 <sup>a</sup>	
Firestone Tire&Rubber	E, D, S, F	5,284.2 <sup>b</sup> (+ 8.3)			
Fruehauf (Kelsey-Hayes Co.)	B, F, D	2,451.3 <sup>a</sup> (+ 9.2)	784.4 <sup>a</sup> (+ 2.8)	32.0 <sup>a</sup>	
GKN Automotive Comp'ts	E, D, S, F	Worldwide 4,373.0d ( 11.8)	U.S. Sales 270.0d (+11.3)	6.2 <sup>d</sup>	All U.S. sales are auto-related Currency conversion based on .45£ = \$1 <sup>c</sup>

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

m. Million

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week" 9/24/79

TABLE 1. OEM SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS AND THEIR 1979 SALES (CONT.)

COMPANY	PRODUCT CODE*	1979 NET SALES (\$ MILLIONS)**		AUTO-RELATED AS PERCENT OF CONSOLIDATED	REMARKS ON AUTO-RELATED SALES
		CONSOLIDATED	AUTOMOTIVE-RELATED		
PRIVATELY OWNED-----NO DATA PUBLISHED					
Gates Rubber	B,E,C,S				
Goodyear T&R (Motor Wheel Corp.)	B,D	8,238.7 <sup>c</sup> (+10.0)			
Gould Inc.	B,E,F	2,023.9 <sup>c</sup> (+ 8.2)			
Gulf & Western Indust.	E,F,S	5,288.3 <sup>c</sup> (+22.6)	691.8 <sup>c</sup> (+10.8)	13.1 <sup>c</sup>	\$300 m. to OEM (5.7% of total sales) \$391.8 m. to aftermarket (7.4% of total sales) <sup>c</sup>
Hoover Universal Inc.	C	601.3 <sup>a</sup> (+20.8)	210.4 <sup>a</sup> (+ 5.6)	35.0 <sup>a</sup>	
PRIVATELY OWNED-----NO DATA PUBLISHED					
Houdaille Indust. Inc.	F				
IC Industriees Inc. (Abex)	B,D	3,734.6 <sup>b</sup> (+39.8)	239.0 <sup>c</sup> (+14.0)	6.4 <sup>c</sup>	
ITT	B,C,F,S	17,197.4 <sup>c</sup> (+12.7)	1,711.0 <sup>c</sup> (+11.0)	9.9 <sup>c</sup>	
Ingersoll-Rand Co. (Torrington Co)	E,D	2,542.1 <sup>c</sup> (+ 9.0)			
International Packing	B,E,S,C	50.6 <sup>a</sup> (+10.2)			
Irvin Industries Inc.	E,D,F,C	82.9 <sup>a</sup> (+ 3.4)	43.5 <sup>a</sup> (- 3.1)	52.5 <sup>a</sup>	
Lear Siegler	B,D,F,C,S	1,327.3 <sup>a</sup> (+14.9)	544.2 <sup>a</sup> (+14.3)	41.0 <sup>a</sup>	
Lucas Indust.	B,E,S,C	2,411.3 <sup>c</sup> (+10.4)	1,931.4 <sup>c</sup> (+10.5)	80.1 <sup>d</sup>	Figure for worldwide sales <sup>d</sup> Currency conversion based on .45£ = \$1 <sup>c</sup>
PRIVATELY OWNED-----NO DATA PUBLISHED					
Metal & Autom. Indust.	E,F,C				
Metex	E	21.2 <sup>b</sup> (+27.0)	5.1 <sup>d</sup> (+ 8.5)	24.0 <sup>d</sup>	Automotive customers: Ford and Chrysler
Midland-Ross Corp.	B,F	800.8 <sup>b</sup> (+38.4)			
Modine Mfg. Co.	E,C	211.9 <sup>b</sup> (+23.6)	135.6 <sup>a</sup> (+27.6)	64.0 <sup>a</sup>	
Parker-Hannifin Corp.	B,F	846.4 <sup>b</sup> (+38.1)	166.7 <sup>a</sup> (+ 9.9)	19.7 <sup>a</sup>	
Purolator Inc.	E,S	473.1 <sup>c</sup> (+19.0)	183.3 <sup>c</sup>	38.7 <sup>c</sup>	

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week" 9/24/79

TABLE 1. OEM SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS AND THEIR 1979 SALES (CONT.)

COMPANY	PRODUCT CODE*	1979 NET SALES (\$ MILLIONS)**		AUTOMOTIVE-RELATED	AUTO-RELATED AS PERCENT OF CONSOLIDATED	REMARKS ON AUTO-RELATED SALES
		CONSOLIDATED	AUTOMOTIVE-RELATED			
Raybestos-Manhattan	B,D	294.9 <sup>c</sup> (+ 3.4)	113.4 <sup>d</sup> (+ 3.4)		38.4 <sup>d</sup>	
Reynolds-Metals Co.	F	3,305.2 <sup>b</sup> (+16.8)				
Robertshaw Controls	B,E,F,S,C	327.3 <sup>b</sup> (+ 7.8)				
Rockwell Internat'l	B,F,D,S	6,180.0 <sup>a</sup> (+ 9.0)	1,841.6 <sup>a</sup> (+16.0)		29.8 <sup>a</sup>	27% of automotive sales, or \$497 million, are to foreign customers
Scovill Inc.	S,D	941.6 <sup>a</sup> (+24.5)	38.7 <sup>d</sup> (+ 3.5)		4.1 <sup>d</sup>	
Sealed Power Corp.	E,B,F,S	279.4 <sup>a</sup> (+14.0)	279.4 <sup>a</sup> (+14.0)		100.0 <sup>a</sup>	27% to GM 11% to foreign customers
Sheller-Globe Corp.	B,F,S,C	656.4 <sup>a</sup> (+ 9.3)	498.7 <sup>a</sup> (+11.1)		75.9 <sup>a</sup>	\$158.2 m. to Ford (24.1% of total sales) \$ 88.6 m. to Chrysler (13.5% of total sales) \$ 74.2 m. to GM (11.3% of total sales) \$177.2 m. to all other (27% of total sales) <sup>a</sup>
Signal Cos. Inc.	E,C	4,241.2 <sup>a</sup> (+18.7)				
A.O. Smith Corp.	F,D	836.4 <sup>d</sup> (+ 3.7)	447.4 <sup>d</sup> (- 7.2)		53.5 <sup>d</sup>	
Stanadyne Inc.	E,F,S	415.4 <sup>b</sup> (+18.6)				
Standard Products Co.	F,C	216.2 <sup>b</sup> (+24.6)	190.2 <sup>a</sup> (+26.0)		88.0 <sup>a</sup>	\$118.9 m. to domestic markets (55% of total sales) \$ 71.3 m. to foreign markets (33% of total sales) <sup>a</sup>
Stewart-Warner Corp.	E,C	365.9 <sup>b</sup> (+ 9.7)	76.8 <sup>c</sup> (+156.0)		21.0 <sup>c</sup>	
TRW	E,S,C	4,560.3 <sup>a</sup> (+20.4)	1,778.5 <sup>a</sup> (+17.4)		39.0 <sup>a</sup>	\$978.2 m. to foreign customers (21.4% of total sales) \$195.6 m. to domestic OEM (4.3% of total sales) \$604.7 m. to aftermarket (13.3% of total sales) <sup>a</sup>
Tecumseh Prod. Co.	C	880.6 <sup>b</sup> (+14.3)				
Teleflex Inc.	E,S,F,D	66.8 <sup>a</sup> (+21.9)	11.0 <sup>d</sup> (+10.0)		16.5 <sup>d</sup>	
Tenneco Inc.	E,S	11,338.0 <sup>c</sup> (+21.8)	793.7 <sup>c</sup> (- 5.2)		7.0 <sup>c</sup>	\$8.7 m. to GM (13% of total sales)
Texas Instruments	B,F	3,224.1 <sup>a</sup> (+26.4)				
The Timken Co.	E,D	1,282.1 <sup>a</sup> (+15.9)				

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

m. Million

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week" 9/24/79

TABLE 1. OEM SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS AND THEIR 1979 SALES (CONT.)

COMPANY	PRODUCT CODE*	1979 NET SALES (\$ MILLIONS)**		AUTO-RELATED AS PERCENT OF CONSOLIDATED	REMARKS ON AUTO-RELATED SALES
		CONSOLIDATED	AUTOMOTIVE-RELATED		
Trico Products Corp.	C	117.3 <sup>C</sup> (-11.5)	117.3 <sup>C</sup> (-11.5)	100.0 <sup>C</sup>	
United Technologies (Am. Bosch)	E,C	9,053.4 <sup>C</sup> (+44.5)	470.0 <sup>C</sup> (+ 4.2)	5.2 <sup>C</sup>	
E.R. Wagner Mfg. Co.	B,D,S,F	30.3 <sup>C</sup> (+ 8.6)	7.0 <sup>D</sup> (- 3.4)	23.1 <sup>D</sup>	\$254 m. to Ford Motor Co. \$216 m. to other auto: OEM
Wagner Electric Corp.	B	355.4 <sup>D</sup> (+ 5.7)	355.4 <sup>D</sup> (+ 7.9)	100.0 <sup>D</sup>	
SUMMARY:					
Total Consolidated Sales (72 Companies):		<u>\$148.9 billion</u>			
Estimated Total of Auto-Related Sales (72 Companies):					
Estimated Average Percent of Auto-Related to Consolidated Sales:				<u>42.7%</u>	

\$63.6 billion - See Note Below

Note: The total auto-related sales have been estimated by the following methodology: the average percentage of auto-related to consolidated sales for the 48 companies reporting such breakdown was found to be 42.7%. This value was then applied to the total consolidated sales figure to obtain the estimated total of auto-related sales.

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 2. SALES HISTORY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1978

COMPANY	PRODUCT CODE*	1978 NET SALES ( \$ MILLIONS)**		1978 SALES-AUTO-RELATED AS PERCENT OF CONSOLIDATED	CONSOLIDATED NET SALES ( \$ MILLIONS)**		
		CONSOLIDATED	AUTOMOTIVE-RELATED		1977	1976	1975
ACF Industries Inc. (Carter Carb)	E,C	819.0 <sup>a</sup> (16.1)	167.0 <sup>c</sup>	20.4 <sup>c</sup>	705.7 <sup>a</sup> (11.8)	631.1 <sup>a</sup> (11.3)	567.0 <sup>a</sup>
ALCOA	B,E,F	4,051.8 <sup>a</sup> (18.6)			3,416.5 <sup>a</sup> (16.8)	2,924.4 <sup>a</sup> (26.8)	2,305.9 <sup>a</sup>
The Allen Group Inc.	D,F,C	300.8 <sup>a</sup> (7.3)	82.1 <sup>a</sup>	27.3 <sup>a</sup>	280.4 <sup>a</sup> ( 6.5)	263.3 <sup>a</sup> (15.9)	227.1 <sup>a</sup>
Amsted Industries (Burgess-Norton Mfg)	B,F,S	699.8 <sup>a</sup> (28.2)			545.8 <sup>a</sup> ( 9.5)	498.5 <sup>a</sup> ( 0.0)	498.7 <sup>a</sup>
Armstrong Cork Co.	D,E,S	1,244.1 <sup>a</sup> (14.2)			1,089.4 <sup>a</sup> (11.0)	981.2 <sup>a</sup> (14.2)	859.4 <sup>a</sup>
Armstrong Rubber Co.	D	377.0 <sup>a</sup> ( 2.7)			367.1 <sup>a</sup> (11.4)	329.4 <sup>a</sup> (14.6)	287.4 <sup>a</sup>
Arvin Industries	E,C	489.1 <sup>a</sup> ( 6.2)	340.9 <sup>a</sup>	69.7 <sup>a</sup>	460.3 <sup>a</sup> (15.1)	399.7 <sup>a</sup> (17.5)	340.3 <sup>a</sup>
Barnes Group Inc.	B,E,S,C	364.0 <sup>a</sup> (26.5)			287.8 <sup>a</sup> (19.3)	241.3 <sup>a</sup> (13.6)	212.4 <sup>a</sup>
Bearings Inc.	E,D	249.0 <sup>a</sup> (13.8)	249.0 <sup>c</sup>	100.0 <sup>c</sup>	218.9 <sup>a</sup> (16.4)	188.1 <sup>a</sup> ( 4.3)	180.3 <sup>a</sup>
The Bendix Corp.	B,E,S	3,649.3 <sup>a</sup> (10.5)	1,897.6 <sup>e</sup>	52.0 <sup>e</sup>	3,302.5 <sup>a</sup> (11.4)	2,965.5 <sup>a</sup> (13.7)	2,607.6 <sup>a</sup>
Borg-Warner Corp.	E,D	2,326.0 <sup>a</sup> (14.5)	976.9 <sup>c</sup>	42.0	2,031.9 <sup>a</sup> ( 9.1)	1,862.4 <sup>a</sup> (13.6)	1,639.0 <sup>a</sup>
Robert Bosch Corp.†	B,E	4,808.9 <sup>c</sup> (12.8)	1,106.0 <sup>c</sup>	23.0 <sup>c</sup>	4,260.5 <sup>c</sup> (20.4)	3,540.0 <sup>c</sup> (26.4)	2,800.4 <sup>c</sup>
Buckeye Intern'l Corp.	D,F,S	120.6 <sup>a</sup> (-3.4)	55.4 <sup>a</sup>	45.9 <sup>a</sup>	124.8 <sup>a</sup> (15.8)	107.8 <sup>a</sup> (-3.5)	111.7 <sup>a</sup>
The Budd Co.	B,E,F,D	PRIVATELY OWNED-----NO DATA PUBLISHED					
Bundy Co.	B,E,S,F,D	128.9 <sup>a</sup> (14.5)	21.5 <sup>c</sup>	16.7 <sup>c</sup>	112.6 <sup>a</sup> ( 6.9)	105.3 <sup>a</sup> ( 9.0)	96.6 <sup>a</sup>
Champion Spark Plug	E,C	692.6 <sup>a</sup> (21.6)	529.0 <sup>a</sup>	76.5 <sup>a</sup>	569.4 <sup>a</sup> (10.8)	513.8 <sup>a</sup> (12.1)	450.2 <sup>a</sup>
Colt Industries	E	1,807.9 <sup>a</sup> (18.5)			1,525.5 <sup>2</sup> (20.5)	1,266.5 <sup>a</sup> (23.8)	1,022.8 <sup>a</sup>

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. Automotive Industries, June 1980

†See summary at end of Table 2.

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 2. SALES HISTORY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1978 (CONT.)

COMPANY	PRODUCT CODE*	1978 NET SALES ( \$ MILLIONS)**		1978 SALES AUTO-RELATED AS PERCENT OF CONSOLIDATED	CONSOLIDATED NET SALES ( \$ MILLIONS)**		
		CONSOLIDATED	AUTOMOTIVE-RELATED		1977	1976	1975
Commercial Shearing	F, S	209.6 <sup>a</sup> (33.1)			129.1 <sup>a</sup> ( 4.1)	124.0 <sup>a</sup>	
Copperweld Corp.	S	419.6 <sup>a</sup> (20.9)	60.8 <sup>c</sup>	14.5 <sup>c</sup>	298.5 <sup>a</sup> ( 5.5)	283.0 <sup>a</sup>	
Cummins Engine Inc.	E	1,520.7 <sup>a</sup> (20.3)			1,030.5 <sup>a</sup> (35.3)	761.5 <sup>a</sup>	
Dana Corp.	B, E, D, S, F	2,252.7 <sup>a</sup> (25.6)	1,374.1 <sup>e</sup>	61.0 <sup>e</sup>	1,444.4 <sup>a</sup> (27.1)	1,136.5 <sup>a</sup>	
Dayco (Automotive Corp.)	E, S, C	653.0 <sup>a</sup> (13.9)	188.1 <sup>a</sup>	28.8 <sup>a</sup>	493.7 <sup>a</sup> (23.0)	401.5 <sup>a</sup>	
Donaldson Co. Inc.	E	179.2 <sup>a</sup> (26.8)	138.0 <sup>a</sup>	77.0 <sup>a</sup>	121.2 <sup>a</sup> ( 1.7)	119.2 <sup>a</sup>	
Dyneer	B, D	78.3 <sup>a</sup> (22.3)	40.2 <sup>a</sup>	51.3 <sup>a</sup>	64.8 <sup>a</sup> ( 8.7)	59.6 <sup>a</sup>	
Eagle-Picher Indust.	F	526.5 <sup>a</sup> (11.0)	134.8 <sup>a</sup>	25.6 <sup>a</sup>	400.3 <sup>a</sup> (15.3)	347.1 <sup>a</sup>	
Eaton Corp.	B, E, D, S, C	2,790.5 <sup>a</sup> (32.0)	1,479.0 <sup>e</sup>	53.0 <sup>e</sup>	1,808.1 <sup>a</sup> (16.0)	1,558.3 <sup>a</sup>	
Echlin Mfg. Co.	B, E	278.3 <sup>a</sup> (16.3)			205.4 <sup>a</sup> (26.7)	162.1 <sup>a</sup>	
Eltra (Prestolite Co.)	E, S	1,019.9 <sup>a</sup> (10.6)			816.6 <sup>a</sup> ( 6.5)	766.6 <sup>a</sup>	
Ex-Cello Corp.	E, F, C	729.8 <sup>a</sup> (63.4)	186.8 <sup>a</sup>	25.6 <sup>a</sup>	416.1 <sup>a</sup> (-1.7)	423.5 <sup>a</sup>	
FMC	E, D, S	2,912.8 <sup>a</sup> (27.0)			2,144.7 <sup>a</sup> (-6.4)	2,291.9 <sup>a</sup>	
Facet Enterprises	E	115.8 <sup>a</sup> ( 8.3)	56.2 <sup>c</sup>	48.5 <sup>c</sup>	101.5 <sup>a</sup> (10.6)	91.8 <sup>a</sup>	
Federal Mogul Corp.	E, D	568.6 <sup>a</sup> (16.3)	494.7 <sup>a</sup>	87.0 <sup>a</sup>	437.4 <sup>a</sup> (23.5)	354.2 <sup>a</sup>	
Firestone Tire&Rubber	E, D, S, F	4,878.1 <sup>a</sup> (10.2)			3,939.1 <sup>a</sup> ( 5.8)	3,724.2 <sup>a</sup>	
Fruehauf (Kelsey-Hayes Co.)	B, F, D	2,244.5 <sup>a</sup> (24.9)	763.0 <sup>a</sup>	34.0 <sup>a</sup>	1,473.3 <sup>a</sup> (34.6)	1,094.4 <sup>a</sup>	
GKN Auto Comp'ts ††	E, D, S, F	Worldwide 3,912.9 <sup>c</sup> (31.3)	U.S. Sales (Est) 242.6 <sup>c</sup>	(Est)6.2	2,502.0 <sup>c</sup> ( 3.0)	2,428.4 <sup>c</sup>	

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

††See Summary at end of Table 2.

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 2. SALES HISTORY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1978 (CONT.)

COMPANY	PRODUCT CODE *	1978 NET SALES (\$ MILLIONS)**		1978 SALES AUTO-RELATED AS PERCENT OF CONSOLIDATED	CONSOLIDATED NET SALES (\$ MILLIONS)**		
		CONSOLIDATED	AUTOMOTIVE-RELATED		1977	1976	1975
Gates Rubber	B,E,C,S	PRIVATELY OWNED-----NO DATA PUBLISHED					
Goodyear T&R (Motor Wheel Corp.)	B,D	7,489.1 <sup>a</sup> (13.0)			6,627.8 <sup>a</sup> (14.4)	5,791.5 <sup>a</sup> ( 6.2)	5,452.5 <sup>a</sup>
Gould Inc.	B,E,F	1,869.9 <sup>a</sup> (15.4)			1,619.6 <sup>a</sup> (32.0)	1,225.4 <sup>a</sup> (66.5)	735.8 <sup>a</sup>
Gulf & Western Indust. \$350.1 m. to aft.mkt. (8.1 of total) <sup>c</sup>	E,F,S	4,312.0 <sup>c</sup> (18.4)	624.3 <sup>c</sup>	14.5 <sup>c</sup>	3,643.0 <sup>a</sup> (7.3)	3,395.6 <sup>a</sup> (30.5)	2,602.1 <sup>a</sup>
\$274.2 m. to OEM (6.4 of total)	C	497.9 <sup>a</sup> (20.0)	199.2 <sup>a</sup>	40.0 <sup>a</sup>	415.1 <sup>a</sup> (26.6)	327.9 <sup>a</sup> (21.2)	270.5 <sup>a</sup>
Hoover Universal Inc.	F	PRIVATELY OWNED-----NO DATA PUBLISHED					
Houdaille Indust. Inc.		PRIVATELY OWNED-----NO DATA PUBLISHED					
IC Industries Inc. (Abex)	B,D	2,670.5 <sup>c</sup> (45.7)	209.6 <sup>c</sup>	7.8 <sup>c</sup>	1,832.0 <sup>c</sup> (11.1)	1,649.5 <sup>c</sup> (11.9)	1,474.5 <sup>c</sup>
ITT	B,C,F,S	15,261.2 <sup>a</sup> (16.1)	1,541.4 <sup>c</sup>	10.1 <sup>c</sup>	13,145.7 <sup>a</sup> (11.7)	11,764.1 <sup>a</sup> ( 3.5)	11,367.6 <sup>a</sup>
Ingersoll-Rand Co. (Torrington Co.)	E,D	2,331.5 <sup>a</sup> (10.3)			2,112.8 <sup>a</sup> (10.0)	1,921.6 <sup>a</sup> (12.5)	1,708.3 <sup>a</sup>
International Packing	B,E,S,C	45.9 <sup>a</sup>					
Irvin Industries	E,D,F,C	80.2 <sup>a</sup> (13.6)	44.9 <sup>a</sup>	56.0 <sup>a</sup>	70.6 <sup>a</sup> (-16.6)	84.7 <sup>a</sup> (40.5)	60.3 <sup>a</sup>
Lear Siegler	B,D,F,C,S	1,155.2 <sup>d</sup> (25.5)	475.9 <sup>a</sup>	41.2 <sup>a</sup>	920.2 <sup>a</sup> (32.5)	694.3 <sup>a</sup> ( 7.8)	643.8 <sup>a</sup>
Lucas Indust. Inc.††	B,E,S,C	2,165.8 <sup>c</sup> (34.4)	1,732.6 <sup>d</sup> (Est)	80.0 <sup>d</sup> (Est)	1,611.1 <sup>c</sup> (34.4)	1,198.8 <sup>c</sup> ( 5.1)	1,140.4 <sup>c</sup>
Metal & Autom. Indust.	E,F,C	PRIVATELY OWNED-----NO DATA PUBLISHED					
Metex	E	16.7 <sup>a</sup> (-9.0)	4.7 <sup>a</sup>	28.1 <sup>a</sup>	18.4 <sup>a</sup> (12.2)	16.4 <sup>a</sup> ( 7.9)	15.2 <sup>a</sup>
Midland-Ross Corp.	B,F	578.7 <sup>a</sup> (22.8)			471.2 <sup>a</sup> (13.3)	415.9 <sup>a</sup> ( 1.4)	410.1 <sup>a</sup>
Modine Mfg. Co.	E,C	171.4 <sup>a</sup> (18.9)	108.0 <sup>a</sup>	63.0 <sup>a</sup>	144.1 <sup>a</sup> (22.5)	117.6 <sup>a</sup> ( 8.2)	128.1 <sup>a</sup>
Parker-Hannifin Corp.	B,F	695.7 <sup>a</sup> (38.2)	151.7 <sup>a</sup>	21.8 <sup>a</sup>	503.3 <sup>a</sup> (23.5)	407.4 <sup>a</sup> ( 1.0)	411.2 <sup>a</sup>
Purolator Inc.	E,S	397.8 <sup>a</sup> (11.9)	153.5 <sup>c</sup>	38.6 <sup>c</sup>	355.6 <sup>a</sup> (25.7)	329.9 <sup>a</sup> (10.7)	298.1 <sup>a</sup>

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

††See Summary at end of Table 2.

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

Est Estimate

TABLE 2. SALES HISTORY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1978 (CONT.)

COMPANY	PRODUCT CODE*	1978 NET SALES (\$ MILLIONS)**		1978 SALES-AUTO-RELATED AS PERCENT OF CONSOLIDATED	CONSOLIDATED NET SALES (\$ MILLIONS)**		
		CONSOLIDATED	AUTOMOTIVE-RELATED		1977	1976	1975
Raybestos-Manhattan	B,D	285.2 <sup>a</sup> (13.6)	109.7 <sup>a</sup>	38.5 <sup>a</sup>	251.0 <sup>a</sup> (5.2)	238.6 <sup>a</sup> (13.2)	210.7 <sup>a</sup>
Reynolds-Metals Co.	F	2,829.3 <sup>a</sup> (20.2)			2,352.8 <sup>a</sup> (12.9)	2,084.4 <sup>a</sup> (24.0)	1,679.3 <sup>a</sup>
Robertshaw Controls	B,E,F,S,C	303.7 <sup>a</sup> (12.8)			269.3 <sup>a</sup> ( 9.0)	247.1 <sup>a</sup> (27.8)	193.3 <sup>a</sup>
Rockwell Internat'l	B,F,D,C	5,670.0 <sup>a</sup> (-3.2)	1,587.6 <sup>a</sup>	28.0 <sup>a</sup>	5,858.7 <sup>a</sup> (12.8)	5,195.0 <sup>a</sup> ( 5.1)	4,943.4 <sup>a</sup>
Scovill Inc.	S,D	756.3 <sup>a</sup> (12.4)	37.4 <sup>d</sup>	4.9 <sup>d</sup>	672.6 <sup>a</sup> (12.7)	596.6 <sup>a</sup> (34.6)	443.1 <sup>a</sup>
Sealed Power Corp.	E,B,F,S,	245.0 <sup>a</sup> (18.5)	245.0 <sup>a</sup>	100.0 <sup>a</sup>	206.7 <sup>a</sup> (13.2)	182.6 <sup>a</sup> (28.7)	141.9 <sup>a</sup>
Sheller-Globe Corp.	B,F,S,C	600.3 <sup>a</sup> (12.6)	449.0 <sup>a</sup>	74.8 <sup>a</sup>	533.1 <sup>a</sup> (10.9)	480.5 <sup>a</sup> (11.6)	430.4 <sup>a</sup>
Signal Cos. Inc.	E,C	3,571.8 <sup>a</sup> (20.5)			2,964.4 <sup>a</sup> (20.9)	2,451.6 <sup>a</sup> (14.4)	2,142.0 <sup>a</sup>
A.O. Smith Corp.	F,D	806.5 <sup>a</sup> (10.9)	482.2 <sup>d</sup>	59.8 <sup>d</sup>	727.3 <sup>a</sup> (17.4)	619.5 <sup>a</sup> (37.1)	451.8 <sup>a</sup>
Stanadyne Inc.	E,F,S	350.3 <sup>a</sup> (20.4)			291.0 <sup>a</sup> (26.1)	230.8 <sup>a</sup> (22.3)	188.7 <sup>a</sup>
Standard Products Co.	F,C	173.5 <sup>a</sup> (14.0)	150.9 <sup>a</sup>	87.0 <sup>a</sup>	152.2 <sup>a</sup> (4.1)	146.2 <sup>a</sup> (33.4)	109.6 <sup>a</sup>
Stewart-Warner Corp.	E,C	333.6 <sup>a</sup> (14.1)	30.0 <sup>c</sup>	9.0 <sup>c</sup>	292.3 <sup>a</sup> (6.6)	274.2 <sup>a</sup> (13.7)	241.2 <sup>a</sup>
TRW	E,S,C	3,787.2 <sup>a</sup> (16.0)	1,514.9 <sup>a</sup>	40.0 <sup>a</sup>	3,263.9 <sup>a</sup> (11.4)	2,929.0 <sup>a</sup> (13.3)	2,585.7 <sup>a</sup>
Tecumseh Prod. Co.	C	770.4 <sup>a</sup> (18.4)			650.5 <sup>a</sup> (13.4)	573.8 <sup>a</sup> (45.9)	393.4 <sup>a</sup>
Teleflex Inc.	E,S,F,D	54.8 <sup>a</sup> (14.9)	10.0 <sup>d</sup>	18.2 <sup>d</sup>	47.7 <sup>a</sup> (14.1)	41.8 <sup>a</sup> (28.6)	32.5 <sup>a</sup>
Tenneco Inc.	E,S	8,877.0 <sup>c</sup> (19.3)	798.9 <sup>c</sup>	9.0 <sup>c</sup>	7,440.3 <sup>a</sup> (15.8)	6,423.4 <sup>a</sup> (14.1)	5,630.3 <sup>a</sup>
Texas Instruments	B,F	2,549.9 <sup>a</sup> (24.6)			2,046.5 <sup>a</sup> (23.4)	1,658.6 <sup>a</sup> (21.3)	1,367.6 <sup>a</sup>
The Timken Co.	E,D	1,105.8 <sup>a</sup> (13.5)			974.4 <sup>a</sup> (10.2)	884.4 <sup>a</sup> ( 9.9)	804.5 <sup>a</sup>

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. Automotive Industries, June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 2. SALES HISTORY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1978 (CONT.)

COMPANY	PRODUCT CODE*	1978 NET SALES (\$ MILLIONS)**		1978 SALES-AUTO-RELATED AS PERCENT OF CONSOLIDATED	CONSOLIDATED NET SALES (\$ MILLIONS)**		
		CONSOLIDATED	AUTOMOTIVE-RELATED		1977	1976	1975
Trico Products Corp.	C	132.5 <sup>a</sup> (12.4)	132.5 <sup>a</sup>	100.0 <sup>a</sup>	117.9 <sup>a</sup> (20.3)	98.0 <sup>a</sup> (30.7)	75.0 <sup>a</sup>
United Technologies (Am. Bosch)	E,C	6,265.0 <sup>a</sup> (12.9)	451.0 <sup>c</sup> (Est)	7.2 <sup>c</sup> (Est)	5,550.7 <sup>a</sup> ( 7.4)	5,166.3 <sup>a</sup> (33.2)	3,877.8 <sup>a</sup>
E.R. Wagner Mfg. Co.	B,D,S,F	27.9 <sup>a</sup> (13.4)	7.25 <sup>d</sup>	26.0 <sup>d</sup>	24.6 <sup>a</sup> (19.4)	20.6 <sup>a</sup>	
Wagner Electric Corp.	B	336.3 <sup>a</sup>	329.3 <sup>d</sup>	97.9 <sup>d</sup>			
SUMMARY- 1978 SALES:							
Total Consolidated Sales (72 Companies):		\$126.9 billion			Total for 70 Companies	Total for 70 Companies	Total for 69 Companies
Estimated Total of Auto-Related Sales (72 Companies):		\$56.2 billion - See Note Below			108,103.2	94,528.6	83,003.3
Estimated Average Percent of Auto-Related to Consolidated Sales:				44.3%			

Note: The total auto-related sales have been estimated by the following methodology: the average percentage of auto-related sales for the 47 companies reporting such breakdown was found to be 44.3%. This value was then applied to the total consolidated sales figure to obtain the estimated total of auto-related sales.

Currency Conversion

† 1978	-----	2 DM	= \$1
1977	-----	2.15 DM	= \$1
1976	-----	2.35 DM	= \$1
1975	-----	2.60 DM	= \$1
†† 1978	-----	.45 £	= \$1
1977	-----	.55 £	= \$1
1976	-----	.60 £	= \$1
1975	-----	.50 £	= \$1

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

Est Estimate

TABLE 3. NET INCOME OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979

COMPANY	PRODUCT CODE*	CONSOLIDATED NET INCOME (\$ MILLIONS)**						REMARKS
		1979	1978	1977	1976	1975		
ACF Industries Inc. (Carter Carb.)	E,C	47.8 <sup>c</sup> (16.0)	41.2 <sup>a</sup> (14.8)	35.9 <sup>a</sup> ( 5.6)	34.0 <sup>a</sup> (10.7)	30.7 <sup>a</sup>		
ALCOA	B,E,F	504.6 <sup>b</sup> (61.4)	312.7 <sup>a</sup> (60.2)	195.2 <sup>a</sup> (35.7)	143.8 <sup>a</sup> (121.9)	64.8 <sup>a</sup>		
The Allen Group Inc.	D,F,C	10.2 <sup>b</sup> (20.0)	8.5 <sup>a</sup> ( 8.9)	8.0 <sup>a</sup> (21.2)	6.6 <sup>a</sup> (73.7)	3.8 <sup>a</sup>		
Amsted Industries (Burgess-Norton Mfg.)	B,F,S	63.4 <sup>b</sup> (27.0)	49.9 <sup>a</sup> (40.2)	35.6 <sup>a</sup> ( 4.1)	34.2 <sup>a</sup> (-0.8)	34.5 <sup>a</sup>		
Armstrong Cork Co.	D,E,S	66.4 <sup>c</sup> (8.7)	61.1 <sup>a</sup> (51.2)	40.4 <sup>a</sup> (-22.7)	52.3 <sup>a</sup> (42.9)	36.6 <sup>a</sup>		
Armstrong Rubber Co.	D	8.5 <sup>b</sup> (-11.0)	9.5 <sup>a</sup> (-36.2)	14.9 <sup>a</sup> (73.2)	8.6 <sup>a</sup> (91.1)	4.5 <sup>a</sup>		
Arvin Industries	E,C	20.4 <sup>c</sup> (-11.7)	23.0 <sup>a</sup> (-20.4)	29.0 <sup>a</sup> (23.9)	23.4 <sup>a</sup> (38.7)	4.8 <sup>a</sup>		
Barnes Group Inc.	B,E,S,C	25.2 <sup>b</sup> (54.6)	16.3 <sup>a</sup> (25.4)	13.0 <sup>a</sup> (14.0)	11.4 <sup>a</sup> (35.7)	8.4 <sup>a</sup>		
Bearings Inc.	E,D	13.9 <sup>b</sup> (24.1)	11.2 <sup>a</sup> (1.6)	11.1 <sup>a</sup> (14.4)	9.7 <sup>a</sup> ( 3.2)	9.4 <sup>a</sup>		
The Bendix Corp.	B,E,S	162.6 <sup>b</sup> (25.4)	129.6 <sup>a</sup> ( 9.7)	118.1 <sup>a</sup> (12.8)	104.7 <sup>a</sup> (31.2)	79.8 <sup>a</sup>	From Auto. Business '79: \$4.12m <sup>c</sup> From Auto. Business '78: 3.9m <sup>c</sup>	
Borg-Warner Corp.	E,D	155.6 <sup>b</sup> (16.0)	133.8 <sup>a</sup> (28.6)	104.0 <sup>a</sup> (27.3)	81.7 <sup>a</sup> (83.6)	44.5 <sup>a</sup>		
Robert Bosch Corp. †	B,E	86.0 <sup>c</sup> (-23.2)	112.0 <sup>c</sup> (.4)	111.6 <sup>c</sup> (17.1)	95.3 <sup>c</sup> (80.8)	52.7 <sup>c</sup>		
Burkeye Intern'l Corp.	D,F,S	3.9 <sup>b</sup>	0.8 <sup>a</sup> D	1.9 <sup>a</sup> (-36.7)	3.0 <sup>a</sup> (-23.1)	3.9 <sup>a</sup>		
The Budd Co.	B,E,F,D							
Bundy Co.	B,E,S,F,D	8.4 <sup>b</sup> (2.4)	8.2 <sup>a</sup> (1.2)	8.1 <sup>a</sup> (17.4)	6.9 <sup>a</sup> (56.8)	4.4 <sup>a</sup>		
Champion Spark Plug	E,C	56.9 <sup>b</sup> (2.8)	55.3 <sup>a</sup> (11.5)	49.6 <sup>a</sup> ( 9.5)	45.3 <sup>a</sup> (-3.0)	46.7 <sup>a</sup>		
Colt Industries	E	111.4 <sup>b</sup> (28.1)	87.0 <sup>a</sup> (25.2)	69.5 <sup>a</sup> (12.8)	61.6 <sup>a</sup> (18.2)	52.1 <sup>a</sup>		

PRIVATELY OWNED-----NO DATA PUBLISHED

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

†See Summary at end of Table 3.

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 3. NET INCOME OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979 (CONT.)

COMPANY	PRODUCT CODE*	CONSOLIDATED NET INCOME (\$ MILLIONS)**					REMARKS
		1979	1978	1977	1976	1975	
Commercial Shearing	F, S	18.1 <sup>a</sup> (7.7)	16.8 <sup>a</sup> (60.0)	10.5 <sup>a</sup> (38.2)	7.6 <sup>a</sup> (16.9)	6.5 <sup>a</sup>	
Copperweld Corp.	S	23.1 <sup>b</sup> (204.4)	11.3 <sup>a</sup> (-30.7)	16.3 <sup>a</sup> (-13.7)	18.9 <sup>a</sup> ( 2.7)	18.4 <sup>a</sup>	
Cummins Engine Inc.	E	57.9 <sup>b</sup> (-10.0)	64.4 <sup>a</sup> (-4.0)	67.0 <sup>a</sup> (14.3)	58.6 <sup>a</sup> (11,620.0)	0.5 <sup>a</sup>	
Dana Corp.	B, E, D, S, F	164.2 <sup>b</sup> (22.0)	134.2 <sup>a</sup> (24.5)	107.8 <sup>a</sup> (20.8)	89.2 <sup>a</sup> (43.4)	62.2 <sup>a</sup>	
Dayco (Automotive Corp.)	E, S, C	21.1 <sup>b</sup> (22.0)	17.3 <sup>a</sup> (27.2)	13.6 <sup>a</sup> (9.6)	12.4 <sup>a</sup> (40.9)	8.8 <sup>a</sup>	
Donaldson Co. Inc.	E	14.2 <sup>a</sup> (26.8)	11.2 <sup>a</sup> (21.7)	9.2 <sup>a</sup> (10.8)	8.3 <sup>a</sup> (16.9)	7.1 <sup>a</sup>	
Dynaer	B, D	5.8 <sup>a</sup> (65.7)	3.5 <sup>a</sup> (34.6)	2.6 <sup>a</sup> (0.0)	2.6 <sup>a</sup> (18.2)	2.2 <sup>a</sup>	
Eagle-Picher Indust.	F	30.7 <sup>b</sup> (10.4)	27.8 <sup>a</sup> (6.9)	26.0 <sup>a</sup> (17.6)	22.1 <sup>a</sup> (18.2)	18.7 <sup>a</sup>	
Eaton Corp.	B, E, D, S, C	154.1 <sup>b</sup> (17.0)	131.3 <sup>a</sup> (12.6)	106.3 <sup>a</sup> (16.9)	90.9 <sup>a</sup> (93.4)	47.0 <sup>a</sup>	
Echlin Mfg. Co.	B, E	22.7 <sup>a</sup> (22.0)	18.6 <sup>a</sup> (15.5)	16.1 <sup>a</sup> (22.0)	13.2 <sup>a</sup> (67.1)	7.9 <sup>a</sup>	
Eltra (Prestolite Co.)	E, S	Eltra Corp. was acquired by Allied Chemical in 1979	47.9 <sup>a</sup> (12.7)	42.5 <sup>a</sup> (4.4)	40.7 <sup>a</sup> (11.5)	36.5 <sup>a</sup>	
Ex-Cello Corp.	E, F, C	54.2 <sup>b</sup> (38.0)	39.4 <sup>a</sup> (35.4)	29.1 <sup>a</sup> (14.1)	25.5 <sup>a</sup> (27.5)	20.0 <sup>a</sup>	
FMC	E, D, S	151.6 <sup>b</sup> (7.5)	141.0 <sup>a</sup> (16.9)	120.6 <sup>a</sup> (50.4)	80.2 <sup>a</sup> (-25.9)	108.2 <sup>a</sup>	
Facet Enterprises	E	4.5 <sup>c</sup> (544.6)	.7 <sup>a</sup>	1.7 <sup>a</sup> D	1.6 <sup>a</sup> (-27.0)	2.2 <sup>a</sup>	
Federal Mogul Corp.	E, D	42.1 <sup>b</sup> (16.7)	35.5 <sup>a</sup> (27.7)	27.8 <sup>a</sup> (17.9)	23.6 <sup>a</sup> (490.0)	4.0 <sup>a</sup>	
Firestone Tire & Rubber	E, D, S, F	112.9 <sup>b</sup>	148.3 <sup>a</sup> D	110.2 <sup>a</sup> (14.5)	96.0 <sup>a</sup> (-28.5)	134.3 <sup>a</sup>	
Fruehauf (Kelsey-Hayes Co.)	B, F, D	88.7 <sup>c</sup> (15.6)	76.7 <sup>a</sup> (25.7)	61.0 <sup>a</sup> (26.3)	48.3 <sup>a</sup> (92.4)	25.1 <sup>a</sup>	
GKN Autom. Comp'tst††	E, D, S, F	114.4 <sup>c</sup> (27.0)	90.1 <sup>c</sup> (38.4)	65.1 <sup>c</sup> (-31.3)	94.8 <sup>c</sup> (135.8)	40.2 <sup>c</sup>	

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

††See Summary at end of Table 3.

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

D Deficit

TABLE 3. NET INCOME OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979 (CONT.)

COMPANY	PRODUCT CODE*	CONSOLIDATED NET INCOME (\$ MILLIONS)**					REMARKS
		1979	1978	1977	1976	1975	
Gates Rubber	B,E,C,S						
Goodyear T&R (Motor Wheel Corp.)	B,D	146.2 <sup>c</sup> (-35.3)	226.1 <sup>a</sup> (9.9)	205.8 <sup>a</sup> (68.7)	122.0 <sup>a</sup> (-24.5)	161.6 <sup>a</sup>	
Gould Inc.	B,E,F	105.9 <sup>c</sup> (4.8)	101.0 <sup>a</sup> (8.8)	93.6 <sup>a</sup> (41.8)	66.0 <sup>a</sup> (45.0)	45.5 <sup>a</sup>	
Gulf & Western Indust.	E,F,S	227.4 <sup>b</sup> (26.0)	180.5 <sup>a</sup> (20.0)	150.3 <sup>a</sup> (-24.9)	200.2 <sup>a</sup> (42.9)	140.1 <sup>a</sup>	
Hoover Universal Inc.	C	31.5 <sup>b</sup> (7.3)	29.3 <sup>a</sup> (21.6)	24.1 <sup>a</sup> (33.1)	18.1 <sup>a</sup> (54.7)	11.7 <sup>a</sup>	
Houdaille Indust. Inc.	F						
IC Industries Inc. (Abex)	B,D	173.7 <sup>c</sup> (78.9)	97.1 <sup>c</sup> (22.3)	79.4 <sup>c</sup> (29.7)	61.2 <sup>c</sup> (27.8)	47.9 <sup>c</sup>	
ITT	B,C,F,S	380.7 <sup>b</sup> (-42.5)	661.8 <sup>a</sup> (19.9)	562.3 <sup>a</sup> (15.1)	488.7 <sup>a</sup> (22.7)	398.2 <sup>a</sup>	
Ingersoll-Rand Co. (Torrington Co.)	E,D	149.3 <sup>a</sup> (12.2)	133.1 <sup>a</sup> (13.1)	117.7 <sup>a</sup> (10.1)	106.9 <sup>a</sup> (-12.3)	119.2 <sup>a</sup>	
International Packing	B,E,S,C	2.0 <sup>b</sup> (-9.1)	2.2 <sup>a</sup>				
Irvin Industries Inc.	E,O,F,C	1.3 <sup>a</sup> (-23.5)	1.7 <sup>a</sup> D	0.7 <sup>a</sup> 0	1.5 <sup>a</sup> (25.0)	1.2 <sup>a</sup>	
Lear Siegler	B,O,F,C,S	63.3 <sup>b</sup> (31.0)	48.2 <sup>a</sup> (29.9)	37.1 <sup>a</sup> (46.0)	25.4 <sup>a</sup> (26.4)	20.1 <sup>a</sup>	
Lucas Indust. Inc.††	B,E,S,C	113.7 <sup>b</sup> (4.8)	126.9 (15.4)	110.0 <sup>c</sup>			
Metal & Autom. Indust.	E,F,C						
Metex	E	1.3 <sup>b</sup> (21.0)	1.0 <sup>a</sup> (-41.0)	1.7 <sup>a</sup> (-15.0)	2.0 <sup>a</sup> (53.8)	1.3 <sup>a</sup>	
Midland-Ross Corp.	B,F	41.0 <sup>b</sup> (32.0)	31.0 <sup>a</sup> (24.0)	25.0 <sup>a</sup> (10.1)	22.7 <sup>a</sup> (7.6)	21.1 <sup>a</sup>	
Modine Mfg. Co.	E,C	14.4 <sup>b</sup> (29.1)	11.2 <sup>a</sup> (20.4)	9.3 <sup>a</sup> (43.0)	6.5 <sup>a</sup> (25.0)	5.2 <sup>a</sup>	
Parker-Hannifin Corp	B,F	50.2 <sup>b</sup> (27.0)	39.6 <sup>a</sup> (40.0)	28.3 <sup>a</sup> (42.2)	19.9 <sup>a</sup> (8.2)	18.4 <sup>a</sup>	
Purolator Inc.	E,S	17.3 <sup>c</sup> (16.1)	14.9 <sup>a</sup> (413.8)	7.3 <sup>a</sup> (-40.6)	12.3 <sup>a</sup> (-14.6)	14.4 <sup>a</sup>	

\*See code explanation at end of Table 8.  
 \*\*Percent difference from prior year in parentheses.  
 a. Standard & Poor's, 1980  
 b. "Automotive Industries," June 1980  
 0 Deficit  
 ††See Summary at end of Table 3.  
 c. Corporate Annual Reports  
 d. Direct Communications  
 e. "Business Week," 9/24/79

TABLE 3. NET INCOME OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979 (CONT.)

COMPANY	PRODUCT CODE*	CONSOLIDATED NET INCOME (\$ MILLIONS)**					REMARKS
		1979	1978	1977	1976	1975	
Raybestos-Manhattan	B,D	5.2 <sup>c</sup> (-53.0)	11.1 <sup>c</sup> (18.0)	14.8 <sup>a</sup> (68.2)	8.8 <sup>a</sup> (12.8)	7.8 <sup>a</sup>	
Reynolds-Metals Co.	F	177.1 <sup>b</sup> (50.3)	117.8 <sup>a</sup> (36.5)	86.3 <sup>a</sup> (14.9)	75.1 <sup>a</sup> (25.2)	60.0 <sup>a</sup>	
Robertshaw Controls	B,E,F,S,C	8.6 <sup>b</sup> (-31.0)	12.5 <sup>a</sup> (42.0)	8.8 <sup>a</sup> (-6.4)	9.4 <sup>a</sup> (224.1)	2.9 <sup>a</sup>	
Rockwell Internat'l	B,F,D,S	261.0 <sup>b</sup> (48.0)	176.6 <sup>a</sup> (22.5)	144.1 <sup>a</sup> (16.8)	123.4 <sup>a</sup> (21.5)	101.6 <sup>a</sup>	
Scovill Inc.	S,D	32.0 <sup>a</sup> (4.2)	30.7 <sup>a</sup> (10.0)	27.9 <sup>a</sup> (25.7)	22.2 <sup>a</sup>	33.2 <sup>a</sup> D	
Sealed Power Corp.	E,B,F,S	20.9 <sup>b</sup> (40.0)	14.9 <sup>a</sup> (44.7)	10.3 <sup>a</sup> (4.0)	9.9 <sup>a</sup> (41.4)	7.0 <sup>a</sup>	
Sheller-Globe Corp.	B,F,S,C	13.7 <sup>b</sup> (-17.0)	16.5 <sup>a</sup> (0.0)	16.5 <sup>a</sup> (-20.7)	20.8 <sup>a</sup> (40.5)	14.8 <sup>a</sup>	
Signal Cos. Inc.	E,C	203.7 <sup>a</sup> (26.7)	160.7 <sup>a</sup> (58.3)	101.5 <sup>a</sup> (56.6)	64.8 <sup>a</sup> (63.2)	39.7 <sup>a</sup>	
A.O. Smith Corp.	F,D	23.6 <sup>b</sup> (-13.0)	27.0 <sup>a</sup> (44.4)	18.7 <sup>a</sup> (8.7)	17.2 <sup>a</sup> (95.4)	8.8 <sup>a</sup>	
Stanadyne Inc.	E,F,S	20.9 <sup>b</sup> (20.0)	17.3 <sup>a</sup> (15.3)	15.0 <sup>a</sup> (19.0)	12.6 <sup>a</sup> (38.5)	9.1 <sup>a</sup>	
Standard Products Co	F,C	5.3 <sup>b</sup> (43.2)	3.7 <sup>a</sup> (-41.2)	6.3 <sup>a</sup> (-4.5)	6.6 <sup>a</sup> (135.7)	2.8 <sup>a</sup>	
Stewart-Warner Corp.	E,C	21.7 <sup>b</sup> ( 1.9)	21.3 <sup>a</sup> (9.8)	19.4 <sup>a</sup> (7.8)	18.0 <sup>a</sup> (37.4)	13.1 <sup>a</sup>	
TRW	E,S,C	194.6 <sup>b</sup> (11.7)	174.2 <sup>a</sup> (13.0)	154.2 <sup>a</sup> (15.8)	133.1 <sup>a</sup> (28.1)	103.9 <sup>a</sup>	
Tecumseh Prod. Co.	C	54.9 <sup>b</sup> (10.2)	49.8 <sup>a</sup> (27.0)	39.2 <sup>a</sup> (12.0)	35.0 <sup>a</sup> (77.7)	19.7 <sup>a</sup>	
Teleflex Inc.	E,S,F,D	3.9 <sup>a</sup> (44.4)	2.7 <sup>a</sup> (50.0)	1.8 <sup>a</sup> (50.0)	1.2 <sup>a</sup> (200.0)	.4 <sup>a</sup>	
Tenneco Inc.	E,S	571.0 <sup>b</sup> (26.0)	452.0 <sup>a</sup> (9.1)	426.9 <sup>a</sup> (11.3)	383.5 <sup>a</sup> (11.8)	342.9 <sup>a</sup>	
Texas Instruments	B,F	172.9 <sup>b</sup> (23.0)	140.3 <sup>a</sup> (20.3)	116.6 <sup>a</sup> (56.9)	97.4 <sup>a</sup> (56.8)	62.1 <sup>a</sup>	
The Timken Co.	E,D	102.1 <sup>b</sup> (15.2)	88.6 <sup>a</sup> (19.0)	74.4 <sup>a</sup> (22.2)	60.9 <sup>a</sup> (-0.6)	61.3 <sup>a</sup>	

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

D Deficit

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 3. NET INCOME OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS , 1975-1979 (CONT.)

COMPANY	PRODUCT CODE*	CONSOLIDATED NET INCOME (\$ MILLIONS)**					REMARKS
		1979	1978	1977	1976	1975	
Trico Products Corp.	C	10.6 <sup>C</sup> (-43.6)	18.8 <sup>a</sup> (13.9)	16.5 <sup>a</sup> (81.3)	9.1 <sup>a</sup> (111.6)	4.3 <sup>a</sup>	
United Technologies (Am. Bosch)	E,C	325.6 <sup>C</sup> (39.1)	234.1 <sup>a</sup> (19.4)	196.0 <sup>a</sup> (24.5)	157.4 <sup>a</sup> (34.0)	117.5 <sup>a</sup>	
E.R. Wagner Mfg. Co.	B,D,S,F		2.1 <sup>a</sup> (23.5)	1.7 <sup>a</sup> (54.5)	1.1 <sup>a</sup>		
Wagner Electric Corp.	B						
SUMMARY:							
# Companies Used To Figure Avg Net Income		69	70	69	69	68	
Total Net Income All Companies		6,174	5,127.5	4,514.0	3,877.9	2,983.8	
Avg Net Income Per Co.		89.5 (+22.1)	73.3 (+12.0)	65.4 (+16.4)	56.2 (+28.0)	43.9	

Currency Conversion

† 1978	-----	2 DM	= \$1
1977	-----	2.15 DM	= \$1
1976	-----	2.35 DM	= \$1
1975	-----	2.60 DM	= \$1
†† 1978	-----	.45 £	= \$1
1977	-----	.55 £	= \$1
1976	-----	.60 £	= \$1
1975	-----	.50 £	= \$1

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 4. EARNINGS PER SHARE OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979

COMPANY	PRODUCT CODE*	CONSOLIDATED EARNINGS PER SHARE (\$) **				
		1979	1978	1977	1976	1975
ACF Industries Inc. (Carter Carb.)	E,C	5.44 <sup>C</sup> (15.3)	4.72 <sup>a</sup> (15.1)	4.12 <sup>a</sup> ( 5.1)	3.92 <sup>a</sup> (-26.7)	5.35 <sup>a</sup>
ALCOA	B,E,F	14.29 <sup>a</sup> (60.6)	8.90 <sup>a</sup> (61.8)	5.50 <sup>a</sup> (34.1)	4.14 <sup>a</sup> (121.6)	1.85 <sup>a</sup>
The Allen Group Inc.	D,F,C	2.44 <sup>a</sup> (16.2)	2.10 <sup>a</sup> ( 8.2)	1.94 <sup>a</sup> (-4.9)	2.04 <sup>a</sup> (67.2)	1.22 <sup>a</sup>
Amsted Industries (Burgess-Norton Mfg.)	B,F,S	5.88 <sup>a</sup> (27.0)	4.63 <sup>a</sup> (-30.1)	6.62 <sup>a</sup> ( 3.8)	6.38 <sup>a</sup> (-50.7)	12.93 <sup>a</sup>
Armstrong Cork Co.	D,E,S	2.58 <sup>C</sup> (9.3)	2.36 <sup>a</sup> (52.3)	1.55 <sup>a</sup> (-22.9)	2.01 <sup>a</sup> (43.6)	1.40 <sup>a</sup>
Armstrong Rubber Co.	D	4.39 <sup>a</sup> (-12.9)	5.04 <sup>a</sup> (-38.0)	8.19 <sup>a</sup> (82.0)	4.50 <sup>a</sup> (117.4)	2.07 <sup>a</sup>
Arvin Industries	E,C	2.88 <sup>C</sup> (-14.3)	3.36 <sup>a</sup> (-24.0)	4.42 <sup>a</sup> (22.8)	3.60 <sup>a</sup> (350.0)	.80 <sup>a</sup>
Barnes Group Inc.	B,E,S,C	3.68 <sup>b</sup> (2.2)	3.60 <sup>a</sup> (25.0)	2.88 <sup>a</sup> (13.4)	2.54 <sup>a</sup> (-32.4)	3.76 <sup>a</sup>
Bearings Inc.	E,D	3.49 <sup>a</sup> (24.2)	2.81 <sup>a</sup> ( 1.4)	2.77 <sup>a</sup> (13.5)	2.44 <sup>a</sup> (3.8)	2.35 <sup>a</sup>
The Bendix Corp.	B,E,S	7.10 <sup>a</sup> (23.7)	5.74 <sup>a</sup> ( 8.5)	5.29 <sup>a</sup> (11.6)	4.74 <sup>a</sup> (-3.1)	4.89 <sup>a</sup>
Borg-Warner Corp.	E,D	7.25 <sup>a</sup> (16.2)	6.24 <sup>a</sup> (26.6)	4.93 <sup>a</sup> (17.1)	4.21 <sup>a</sup> (82.3)	2.31 <sup>a</sup>
Robert Bosch Corp.	B,E					
Buckeye Intern'l Corp.	D,F,S	2.81 <sup>a</sup>	D 0.49 <sup>a</sup>	1.28 <sup>a</sup> (-36.9)	2.03 <sup>a</sup> (-26.7)	2.77 <sup>a</sup>
The Budd Co.	B,E,F,D					
Bundy Co.	B,E,S,F,D	2.05 <sup>a</sup> (2.0)	2.01 <sup>a</sup> (-1.1)	1.99 <sup>a</sup> (-21.7)	2.54 <sup>a</sup> (40.3)	1.81 <sup>a</sup>
Champion Spark Plug	E,C	1.49 <sup>b</sup> (2.8)	1.45 <sup>a</sup> (11.5)	1.30 <sup>a</sup> ( 8.3)	1.20 <sup>a</sup> (-3.2)	1.24 <sup>a</sup>
Colt Industries	E	8.40 <sup>b</sup> (26.1)	6.66 <sup>a</sup> (-17.8)	8.10 <sup>a</sup> (-2.4)	8.30 <sup>a</sup> (17.4)	7.07 <sup>a</sup>

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

D Deficit

PRIVATELY OWNED-----NO DATA PUBLISHED

TABLE 4. EARNINGS PER SHARE OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE*	CONSOLIDATED EARNINGS PER SHARE (\$)**				
		1979	1978	1977	1976	1975
Commercial Shearing	F,S	2.20 <sup>a</sup>	2.26 <sup>a</sup>	2.83 <sup>a</sup>	3.84 <sup>a</sup>	3.62 <sup>a</sup>
Copperweld Corp.	S	4.04 <sup>a</sup>	2.00 <sup>a</sup>	2.91 <sup>a</sup>	6.79 <sup>a</sup>	7.04 <sup>a</sup>
Cummins Engine Inc.	E	6.84 <sup>a</sup>	7.62 <sup>a</sup>	8.22 <sup>a</sup>	7.66 <sup>a</sup>	0.21 <sup>a</sup>
Dana Corp.	B,E,D,S,F	5.03 <sup>a</sup>	4.22 <sup>a</sup>	3.61 <sup>a</sup>	3.05 <sup>a</sup>	4.26 <sup>a</sup>
Dayco (Automotive Corp.)	E,S,C	3.87 <sup>a</sup>	4.07 <sup>a</sup>	3.82 <sup>a</sup>	3.70 <sup>a</sup>	2.70 <sup>a</sup>
Donaldson Co., Inc.	E	2.78 <sup>a</sup>	2.20 <sup>a</sup>	2.73 <sup>a</sup>	2.46 <sup>a</sup>	3.16 <sup>a</sup>
Dyneer	B,D	2.27 <sup>a</sup>	2.65 <sup>a</sup>	2.04 <sup>a</sup>	2.04 <sup>a</sup>	1.70 <sup>a</sup>
Eagle-Picher Indust.	F	3.03 <sup>a</sup>	2.75 <sup>a</sup>	2.57 <sup>a</sup>	4.45 <sup>a</sup>	3.81 <sup>a</sup>
Eaton Corp.	B,E,D,S,C	5.89 <sup>a</sup>	6.86 <sup>a</sup>	6.10 <sup>a</sup>	5.23 <sup>a</sup>	2.66 <sup>a</sup>
Echlin Mfg. Co.	B,E	1.50 <sup>a</sup>	1.30 <sup>a</sup>	2.25 <sup>a</sup>	1.85 <sup>a</sup>	1.24 <sup>a</sup>
Eltra (Prestolite Co.)	E,S	The Eltra Corp. was acquired by Allied Chemical in 1979	4.20 <sup>a</sup>	3.75 <sup>a</sup>	3.60 <sup>a</sup>	4.86 <sup>a</sup>
Ex-Cello Corp.	E,F,C	5.31 <sup>a</sup>	4.07 <sup>a</sup>	3.65 <sup>a</sup>	3.20 <sup>a</sup>	2.51 <sup>a</sup>
FMC	E,D,S	4.55 <sup>a</sup>	4.22 <sup>a</sup>	3.60 <sup>a</sup>	2.36 <sup>a</sup>	3.24 <sup>a</sup>
Facet Enterprises	E	0.12 <sup>a</sup>	0.25 <sup>a</sup>	0.58 <sup>a</sup>	0.52 <sup>a</sup>	0.71 <sup>a</sup>
Federal Mogul Corp.	E,D	3.31 <sup>a</sup>	2.83 <sup>a</sup>	4.53 <sup>a</sup>	3.83 <sup>a</sup>	0.54 <sup>a</sup>
Firestone Tire & Rubber	E,D,S,F	1.35 <sup>a</sup>	2.58 <sup>a</sup>	1.92 <sup>a</sup>	1.68 <sup>a</sup>	2.36 <sup>a</sup>
Fruehauf (Kelsey-Hayes Co.)	B,F,D	7.28 <sup>a</sup>	6.34 <sup>a</sup>	5.08 <sup>a</sup>	4.05 <sup>a</sup>	2.11 <sup>a</sup>
GKN Autom. Compts.	E,D,F,S	.73 <sup>c</sup>	.60 <sup>c</sup>	.45 <sup>c</sup>	.74 <sup>c</sup>	.31 <sup>c</sup>

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

D Deficit

TABLE 4. EARNINGS PER SHARE OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE*	CONSOLIDATED EARNINGS PER SHARE (\$)**				
		1979	1978	1977	1976	1975
PRIVATELY OWNED-----NO DATA PUBLISHED						
Gates Rubber	B,E,C,S					
Goodyear T&R (Motor Wheel Corp.)	B,D	2.02 <sup>a</sup> (-35.3)	3.12 <sup>a</sup> (9.5)	2.85 <sup>a</sup> (68.6)	1.69 <sup>a</sup> (-24.5)	2.24 <sup>a</sup>
Gould Inc.	B,E,F	3.78 <sup>c</sup> (0.3)	3.77 <sup>a</sup> (1.3)	3.72 <sup>a</sup> (12.4)	3.31 <sup>a</sup> (14.1)	2.90 <sup>a</sup>
Gulf & Western Indust.	E,F,S	4.62 <sup>a</sup> (30.9)	3.53 <sup>a</sup> (21.7)	2.90 <sup>a</sup> (-31.9)	4.26 <sup>a</sup> (-5.1)	4.49 <sup>a</sup>
Hoover Universal Inc.	C	3.57 <sup>a</sup> (7.2)	3.33 <sup>a</sup> (22.0)	2.73 <sup>a</sup> (-10.2)	3.04 <sup>a</sup> (3.8)	2.93 <sup>a</sup>
PRIVATELY OWNED-----NO DATA PUBLISHED						
Houdaille Indust. Inc.	F					
IC Industries, Inc. (Abex)	B,D	9.52 <sup>c</sup> (82.7)	5.23 <sup>c</sup> (20.9)	4.31 <sup>c</sup> (30.3)	3.35 <sup>c</sup> (37.5)	2.41 <sup>c</sup>
ITT	B,C,F,S	2.65 <sup>b</sup> (-43.1)	4.66 (12.6)	4.14 <sup>a</sup> (4.8)	3.95 <sup>a</sup> (23.4)	3.20 <sup>a</sup>
Ingersoll-Rand Co. (Torrington Co.)	E,D	7.51 <sup>a</sup> (12.9)	6.65 <sup>a</sup> (14.1)	5.83 <sup>a</sup> (9.4)	5.33 <sup>a</sup> (-17.0)	6.42 <sup>a</sup>
International Packing	B,E,S,C					
Irvin Industries Inc.	E,D,F,C	0.86 <sup>a</sup>	D 0.50 <sup>a</sup>	D 0.50 <sup>a</sup>	1.17 <sup>a</sup> (17.0)	1.00 <sup>a</sup>
Lear Siegler	B,D,F,C,S	4.50 <sup>a</sup> (26.8)	3.55 <sup>a</sup> (31.5)	2.70 <sup>a</sup> (54.3)	1.75 <sup>a</sup> (34.6)	1.30 <sup>a</sup>
Lucas Indust. Inc.	B,E,S,C	1.21 <sup>c</sup> (-9.7)	1.34 <sup>c</sup> (16.5)	1.15 <sup>c</sup> (36.9)	.84 <sup>c</sup> (35.5)	.62 <sup>c</sup>
PRIVATELY OWNED-----NO DATA PUBLISHED						
Metal & Autom. Indust.	E,F,C					
Metex	E	1.49 <sup>a</sup> (19.2)	1.25 <sup>a</sup> (-35.9)	1.95 <sup>a</sup> (-18.4)	2.39 <sup>a</sup> (54.2)	1.55 <sup>a</sup>
Midland-Ross Corp.	B,F	3.51 <sup>a</sup> (29.5)	2.71 <sup>a</sup> (-39.8)	4.50 <sup>a</sup> (11.1)	4.05 <sup>a</sup> (14.7)	3.53 <sup>a</sup>
Modine Mfg. Co.	E,C	5.00 <sup>a</sup> (27.6)	3.92 <sup>a</sup> (-41.05)	6.65 <sup>a</sup> (41.2)	4.71 <sup>a</sup> (25.9)	3.74 <sup>a</sup>
Parker-Hannifin Corp.	B,F	3.75 <sup>a</sup> (22.9)	3.05 <sup>a</sup> (7.02)	2.85 <sup>a</sup> (-14.7)	3.34 <sup>a</sup> (0.9)	3.31 <sup>a</sup>
Purolator Inc.	E,S	3.85 <sup>c</sup> (18.1)	3.26 <sup>a</sup> (106.3)	1.58 <sup>a</sup> (-40.4)	2.65 <sup>a</sup> (-15.1)	3.12 <sup>a</sup>

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

D Deficit

TABLE 4. EARNINGS PER SHARE OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE*	CONSOLIDATED EARNINGS PER SHARE (\$)**				
		1979	1978	1977	1976	1975
Raybestos-Manhattan	B,D	2.24 <sup>a</sup>	5.39 <sup>a</sup>	8.09 <sup>a</sup>	5.38 <sup>a</sup>	5.72 <sup>a</sup>
Reynolds-Metals Co.	F	9.25 <sup>a</sup>	6.11 <sup>a</sup>	4.61 <sup>a</sup>	4.16 <sup>a</sup>	3.29 <sup>a</sup>
Robertshaw Controls	B,E,F,S,C	2.86 <sup>a</sup>	3.20 <sup>a</sup>	2.25 <sup>a</sup>	2.42 <sup>a</sup>	0.76 <sup>a</sup>
Rockwell Internat'l	B,F,D,S	7.33 <sup>a</sup>	5.02 <sup>a</sup>	4.18 <sup>a</sup>	3.62 <sup>a</sup>	2.96 <sup>a</sup>
Scovill Inc.	S,D	3.46 <sup>a</sup>	3.35 <sup>a</sup>	3.18 <sup>a</sup>	2.73 <sup>a</sup>	0 5.03 <sup>a</sup>
Sealed Power Corp.	E,B,F,S	4.35 <sup>a</sup>	3.35 <sup>a</sup>	2.43 <sup>a</sup>	2.35 <sup>a</sup>	2.07 <sup>a</sup>
Sheller-Globe Corp.	B,F,S,C	1.84 <sup>a</sup>	2.31 <sup>a</sup>	2.40 <sup>a</sup>	3.14 <sup>a</sup>	2.22 <sup>a</sup>
Signal Cos. Inc.	E,C	5.28 <sup>a</sup>	4.17 <sup>a</sup>	5.13 <sup>a</sup>	3.14 <sup>a</sup>	1.82 <sup>a</sup>
A.O. Smith Corp.	F,D	4.79 <sup>b</sup>	5.50 <sup>a</sup>	3.81 <sup>a</sup>	3.51 <sup>a</sup>	0 1.80 <sup>a</sup>
Stanadyne Inc.	E,F,S	4.35 <sup>a</sup>	3.62 <sup>a</sup>	3.14 <sup>a</sup>	2.63 <sup>a</sup>	1.90 <sup>a</sup>
Standard Products Co.	F,C	4.37 <sup>a</sup>	3.02 <sup>a</sup>	5.20 <sup>a</sup>	5.47 <sup>a</sup>	2.30 <sup>a</sup>
Stewart-Warner Corp.	E,C	4.19 <sup>a</sup>	5.12 <sup>a</sup>	4.68 <sup>a</sup>	4.35 <sup>a</sup>	3.18 <sup>a</sup>
TRW	E,S,C	6.07 <sup>a</sup>	5.42 <sup>a</sup>	4.77 <sup>a</sup>	4.05 <sup>a</sup>	3.08 <sup>a</sup>
Tecumseh Prod. Co.	C	10.04 <sup>a</sup>	9.11	7.16	6.39 <sup>a</sup>	3.60 <sup>a</sup>
Teleflex Inc.	E,S,F,D	2.58 <sup>a</sup>	1.80 <sup>a</sup>	2.52 <sup>a</sup>	1.81 <sup>a</sup>	0.63 <sup>a</sup>
Tenneco Inc.	E,S	5.30 <sup>a</sup>	4.53 <sup>a</sup>	4.38 <sup>a</sup>	4.33 <sup>a</sup>	4.15 <sup>a</sup>
Texas Instruments	B,F	7.58 <sup>a</sup>	6.15 <sup>a</sup>	5.11 <sup>a</sup>	4.25 <sup>a</sup>	2.71 <sup>a</sup>
The Timken Co.	E,D	9.14 <sup>a</sup>	8.04 <sup>a</sup>	6.66 <sup>a</sup>	5.45 <sup>a</sup>	5.49 <sup>a</sup>

\*See code explanation at end of Table 8.

\*\*Percent difference from prior year in parentheses.

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

D Deficit

TABLE 4. EARNINGS PER SHARE OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE*	CONSOLIDATED EARNINGS PER SHARE (\$) **				
		1979	1978	1977	1976	1975
Trico Products Corp.	C	5.72 <sup>c</sup> (-44.0)	10.21 <sup>a</sup> (14.3)	8.93 <sup>a</sup> (81.5)	4.92 <sup>a</sup> (109.4)	2.35 <sup>a</sup>
United Technologies (Am. Bosch)	E,C	6.49 <sup>a</sup> (19.08)	5.45 <sup>a</sup> (-3.7)	5.66 <sup>a</sup> (12.08)	5.05 <sup>a</sup> (-35.1)	7.78 <sup>a</sup>
E.R. Wagner Mfg. Co.	B,D,S,F		7.88 <sup>a</sup> (21.2)	6.50 <sup>a</sup> (57.0)	4.14 <sup>a</sup>	
Wagner Electric Corp.	B					
SUMMARY:						
# Companies Used in Averaging Earnings Per Share		66	69	69	69	68
Total Earnings Per Share - All Companies		299.34	277.06	269.67	244.76	190.38
Avg. Earnings Per Share		4.54	4.02	3.91	3.55	2.80

\*See code explanation at end of Table 8.  
 \*\*Percent difference from prior year in parentheses.  
 a. Standard & Poor's, 1980  
 b. "Automotive Industries," June 1980  
 c. Corporate Annual Reports  
 d. Direct Communications  
 e. "Business Week," 9/24/79  
 D Deficit

TABLE 5. RETURN ON SALES OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979

COMPANY	PRODUCT CODE	CONSOLIDATED RETURN ON SALES (%)* (NET INCOME TO SALES)				
		1979	1978	1977	1976	1975
ACF Industries Inc. (Carter Carb.)	E,C	5.5 (10.0)	5.0 (-2.0)	5.1 (-5.6)	5.4 (0.0)	5.4
ALCOA	B,E,F	10.4 (35.1)	7.7 (3.5)	5.7 (16.3)	4.9 (37.0)	2.8
The Allen Group Inc.	D,F,C	3.0 (7.1)	2.8 (-3.4)	2.9 (16.0)	2.5 (47.0)	1.7
Amsted Industries (Burgess-Norton Mfg)	B,F,S	7.4 (4.2)	7.1 (9.2)	6.5 (-5.8)	6.9 (0.0)	6.9
Armstrong Cork Co.	D,E,S	5.0 (2.0)	4.9 (32.4)	3.7 (-30.2)	5.3 (23.2)	4.3
Armstrong Rubber Co	D	2.2 (-12.0)	2.5 (-39.0)	4.1 (57.7)	2.6 (62.5)	1.6
Arvin Industries	E,C	4.1 (-12.8)	4.7 (-25.4)	6.3 (6.8)	5.9 (321.4)	1.4
Barnes Group Inc.	B,E,S,C	5.8 (28.9)	4.5 (0.0)	4.5 (-4.3)	4.7 (17.5)	4.0
Bearings Inc.	E,D	4.7 (4.4)	4.5 (-11.8)	5.1 (-1.9)	5.2 (0.0)	5.2
The Bendix Corp.	B,E,S	4.2 (16.7)	3.6 (0.0)	3.6 (2.9)	3.5 (12.9)	3.1
Borg-Warner Corp.	E,D	5.7 (-1.7)	5.8 (13.7)	5.1 (15.9)	4.4 (63.0)	2.7
Robert Bosch Corp.	B,E	1.6 (-30.4)	2.3 (-11.4)	2.6 (-3.7)	2.7 (42.1)	1.9
Buckeye Intern'l Corp.	D,F,S	2.4	(Neg. Inc.)	1.5 (-46.4)	2.8 (20.0)	3.5
The Budd Co.	B,E,F,D					
Bundy Co.	B,E,S,F,D	5.0 (-21.9)	6.4 (-11.1)	7.2 (9.1)	6.6 (4.3)	4.6
Champion Spark Plug	E,C	7.1 (-11.3)	8.0 (-8.0)	8.7 (-1.1)	8.8 (-13.7)	10.2
Colt Industries	E	5.2 (8.3)	4.8 (4.3)	4.6 (-6.1)	4.9 (-3.9)	5.1

\*Percent difference from prior year in parentheses.

Source: Calculated from previous Tables 1,2 and 3

PRIVATELY OWNED-----NO DATA PUBLISHED

TABLE 5. RETURN ON SALES OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE	CONSOLIDATED RETURN ON SALES (%)* (NET INCOME TO SALES)				
		1979	1978	1977	1976	1975
Commercial Shearing	F,S	7.3 (-8.8)	8.0 (19.4)	7.7 (13.6)	5.9 (13.5)	5.2
Copperweld Corp.	S	4.7 (7.4)	2.7 (-42.5)	4.7 (-25.4)	6.3 (3.1)	6.5
Cummins Engine Inc.	E	3.3 (-21.4)	4.2 (-20.8)	5.3 (-7.0)	5.7 (8,042.8)	0.07
Dana Corp.	B,E,D,S,F	5.9 (1.7)	6.0 (0.0)	6.0 (-3.2)	6.2 (12.7)	5.5
Dayco (Automotive Corp.)	E,S,C	2.8 (7.7)	2.6 (8.3)	2.4 (4.0)	2.5 (13.6)	2.2
Donaldson Co. Inc.	E	6.3 (0.0)	(6.3) (-3.1)	6.5 (-4.4)	6.8 (13.3)	6.0
Dyneer	B,D	4.1 (-8.9)	4.5 (9.8)	4.1 (2.5)	4.0 (8.1)	3.7
Eagle-Picher Indust.	F	5.2 (-1.9)	5.3 (-3.6)	5.5 (0.0)	5.5 (1.8)	5.4
Eaton Corp.	B,E,D,S,C	4.6 (-2.1)	4.7 (-6.0)	5.0 (0.0)	5.0 (66.7)	3.0
Echlin Mfg. Co.	B,E	7.5 (11.9)	6.7 (0.0)	6.7 (4.7)	6.4 (30.6)	4.9
Eltra (Prestolite Co.)	E,S	Eltra Corp. was acquired by Allied Chemical in 1979	4.7 (2.2)	4.6 (8.0)	5.0 (4.2)	4.8
Ex-Cello Corp.	E,F,C	5.6 (3.7)	5.4 (-16.9)	6.5 (6.6)	6.1 (29.8)	4.7
FMC	E,D,S	4.6 (-4.2)	4.8 (-9.4)	5.3 (43.2)	3.7 (-21.3)	4.7
Facet Enterprises	E	3.3 (450.0)	0.6	(Neg. Inc.)	1.6 (-33.3)	2.4
Federal Mogul Corp.	E,D	6.3 (1.6)	6.2 (8.8)	5.7 (256.3)	5.4 (390.9)	1.1
Firestone Tire & Rubber	E,D,S,F	2.1	(Neg. Inc.)	2.5 (4.2)	2.4 (-22.2)	3.6
Fruehauf (Kelsey-Hayes Co)	B,F,D	3.6 (5.9)	3.4 (0.0)	3.4 (3.0)	3.3 (43.5)	2.3
GKN Auto. Compts.	E,D,F,S	2.6 (13.0)	2.3 (4.5)	2.2 (42.1)	3.8 (123.5)	1.7

\*Percent difference from prior year in parentheses.

Source: Calculated from previous Tables 1,2 and 3

TABLE 5. RETURN ON SALES OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE	CONSOLIDATED RETURN ON SALES (%)* (NET INCOME TO SALES)				
		1979	1978	1977	1976	1975
PRIVATELY OWNED-----NO DATA PUBLISHED						
Gates Rubber	B,E,C,S					
Goodyear T&R (Motor Wheel Corp.)	B,D	1.8 (-40.0)	3.0 (-3.2)	3.1 (47.6)	2.1 (-30.0)	3.0
Gould Inc.	B,E,F	5.2 (-3.7)	5.4 (-6.9)	5.8 (7.4)	5.4 (12.9)	6.2
Gulf & Western Indust.	E,F,S	4.3 (2.4)	4.2 (2.4)	4.1 (-30.5)	5.9 (9.3)	5.4
Hoover Universal Inc.	C	5.2 (-11.9)	5.9 (1.7)	5.8 (5.4)	5.5 (27.9)	4.3
Houdaille Indust. Inc.	F					
PRIVATELY OWNED-----NO DATA PUBLISHED						
IC Industries Inc. (Abex)	B,D	4.6 (27.8)	3.6 (-16.3)	4.3 (16.2)	3.7 (15.6)	3.2
ITT	B,C,F,S	2.2 (-48.8)	4.3 (0.0)	4.3 (2.4)	4.2 (20.0)	3.5
Ingersoll-Rand Co. (Torrington Co.)	E,D	5.9 (3.5)	5.7 (1.8)	5.6 (0.0)	5.6 (-20.0)	7.0
International Packing	B,E,S,C	3.9 (-18.8)	4.8			
Irvin Industries Inc.	E,D,F,C	1.6	(Neg. Inc.)	(Neg. Inc.)	1.8 (10.0)	2.0
Lear Siegler	B,D,F,C,S	4.8 (14.3)	4.2 (5.0)	4.0 (11.1)	3.6 (16.1)	3.1
Lucas Indust. Inc.	B,E,S,C	4.7				
PRIVATELY OWNED-----NO DATA PUBLISHED						
Metal & Autom. Indust.	E,F,C					
Metex	E	6.1 (16.7)	6.0 (-34.8)	9.2 (-24.6)	12.2 (41.9)	8.6
Midland-Ross Corp.	B,F	5.1 (-5.6)	5.4 (1.9)	5.3 (-1.9)	5.4 (5.9)	5.1
Modine Mfg. Co.	E,C	6.8 (4.6)	6.5 (0.0)	6.5 (18.2)	5.5 (12.5)	4.0
Parker-Hafffin Corp.	B,F	5.9 (3.5)	5.7 (1.8)	5.6 (14.3)	4.9 (8.9)	4.5
Purolator Inc.	E,S	3.7 (0.0)	3.7 (76.2)	2.1 (-43.2)	3.7 (-22.9)	4.8

\*Percent difference from prior year in parentheses.

Source: Calculated from previous Tables 1, 2 and 3

TABLE 5. RETURN ON SALES OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE	CONSOLIDATED RETURN ON SALES (%)* (NET INCOME TO SALES)				
		1979	1978	1977	1976	1975
Raybestos-Manhattan	B,D	1.8 (-53.8)	3.9 (3.4)	5.9 (59.4)	3.7 (0.0)	3.7
Reynolds-Metals Co.	F	5.4 (28.6)	4.2 (13.5)	3.7 (2.8)	3.6 (0.0)	3.6
Robertshaw Controls	B,E,F,S,C	2.6 (-36.6)	4.1 (24.2)	3.3 (-13.2)	3.8 (153.3)	1.5
Rockwell Internat'l	B,F,D,S	4.2 (35.5)	3.1 (24.0)	2.5 (4.2)	2.4 (20.0)	2.0
Scovill Inc.	S,D	3.4 (17.1)	4.1 (0.0)	4.1 (10.8)	3.7	(Neg. Inc.)
Sealed Power Corp.	E,B,F,S	7.5 (23.0)	6.1 (18.0)	5.0 (-7.4)	5.4 (10.2)	4.9
Sheller-Globe Corp.	B,F,S,C	2.1 (-22.2)	2.7 (16.1)	3.1 (-27.9)	4.3 (26.5)	3.4
Signal Cos. Inc.	E,C	4.8 (6.7)	4.5 (32.4)	3.4 (30.7)	2.6 (36.8)	1.9
A.O. Smith Corp.	F,D	2.8 (-5.0)	3.3 (26.9)	2.6 (-7.1)	2.8 (47.4)	1.9
Stanadyne Inc.	E,F,S	5.0 (2.0)	4.9 (-5.8)	5.2 (-5.4)	5.5 (14.6)	4.8
Standard Products Co.	F,C	2.5 (19.0)	2.1 (48.8)	4.1 (8.9)	4.5 (73.0)	2.6
Stewart-Warner Corp.	E,C	5.9 (-7.8)	6.4 (-3.0)	6.6 (0.0)	6.6 (22.2)	5.4
TRW	E,S,C	4.3 (-6.5)	4.6 (2.1)	4.7 (4.4)	4.5 (12.5)	4.0
Tecumseh Prod. Co.	C	6.2 (-4.6)	6.5 (8.3)	6.0 (-1.6)	6.1 (22.0)	5.0
Teleflex Inc.	E,S,F,D	5.8 (18.4)	4.9 (28.9)	3.8 (31.0)	2.9 (141.7)	1.2
Tenneco Inc.	E,S	5.1 (-1.9)	5.2 (-8.8)	5.7 (-50.0)	6.0 (-1.6)	6.1
Texas Instruments	B,F	5.4 (-1.8)	5.5 (-3.5)	5.7 (-3.4)	5.9 (-31.1)	4.5
The Timken Co.	E,D	7.9 (-1.3)	8.0 (5.3)	7.6 (10.1)	6.9 (-9.2)	7.6

\*Percent difference from prior year in parentheses. Source: Calculated from previous Tables 1,2 and 3

TABLE 5. RETURN ON SALES OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE	CONSOLIDATED RETURN ON SALES (%)* (NET INCOME TO SALES)				
		1979	1978	1977	1976	1975
Trico Products Corp.	C	9.0	14.2 (1.4)	14.0 (50.5)	9.3 (63.2)	5.7
United Technologies (Am. Bosch)	E,C	3.6	3.7 (5.7)	3.5 (16.7)	3.0 (0.0)	3.0
E.R. Wagner Mfg. Co.	B,D,S,F		7.5 (8.7)	6.9 (30.2)	5.3	
Wagner Electric Corp.	B					
SUMMARY:						
# Companies Used in Averaging Return on Sales		69	67	67	69	67
Total Return on Sales, All Co's		326.2	330.9	380.5	331.0	269.6
Avg. Return on Sales Per Co. - %		4.7	4.9	5.7	4.8	4.0

\*Percent difference from prior year in parentheses. Source: Calculated from previous Tables 1,2 and 3

TABLE 6. RETURN ON EQUITY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979

COMPANY	PRODUCT CODE	RETURN ON EQUITY (%) * (NET EARNINGS/SHAREHOLDER'S EQUITY)				
		1979	1978	1977	1976	1975
ACF Industries Inc. (Carter Carb.)	E,C	13.7	13.0	12.3	12.5	12.1
ALCOA	B,E,F	21.7	15.8	11.0	8.8	4.2
The Allen Group Inc.	D,F,C	14.3	13.1	13.4	12.2	7.3
Amsted Industries (Burgess-Norton Mfg)	B,F,S	19.6	17.9	14.6	15.6	17.7
Armstrong Cork Co.	D,E,S	11.7	11.2	7.9	10.5	8.0
Armstrong Rubber Co.	D	7.1	8.3	13.8	9.0	5.0
Arvin Industries	E,C	12.3	15.4	22.6	24.3	6.4
Barnes Group Inc.	B,E,S,C	20.6	15.9	14.5	14.2	11.7
Bearings Inc.	E,D	15.1	13.8	15.4	15.4	17.1
The Bendix Corp.	B,E,S	16.5	14.5	14.8	14.0	11.3
Borg-Warner Corp.	E,D	14.4	14.6	12.9	11.4	6.6
Robert Bosch Corp.†	B,E	7.6	10.6	12.2	13.5	8.9
Buckeye Intern'l Corp.	D,F,S					
The Budd Co.	B,E,F,D					
Bundy Co.	B,E,S,F,D	12.3	12.9	13.8	12.8	8.8
Champion Spark Plug	E,C	14.3	14.9	14.5	14.2	15.9
Colt Industries	E	18.8	16.3	13.8	14.7	13.9

\*Percent difference from prior year in parentheses.

†See Summary at end of Table 6.

Source: Corporate Annual Reports

TABLE 6. RETURN ON EQUITY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE	RETURN ON EQUITY (%) * (NET EARNINGS/SHAREHOLDER'S EQUITY)				
		1979	1978	1977	1976	1975
Commercial Shearing	F,S	18.9	20.4	15.0	12.2	11.6
Copperweld Corp.	S	15.2	8.3	12.5	15.7	17.2
Cummins Engine Inc.	E	12.8	15.8	20.1	22.6	.2
Dana Corp.	B,E,D,S,F	17.5	18.3	17.9	17.7	14.4
Dayco (Automotive Corp.)	E,S,C	16.4	14.7	14.6	15.3	12.2
Donaldson Co. Inc.	E					
Dyneer	B,D	18.6	17.2	14.6	16.5	15.4
Eagle-Picher Indust.	F	14.9	19.8	16.6	16.0	16.1
Eaton Corp.	B,E,D,S,C	16.5	15.8	4.3	13.6	7.7
Echlin Mfg. Co.	B,E	15.9	18.4	18.5	20.7	15.9
Eltra (Prestolite Co.)	E,S	Eltra Corp. was acquired by Allied Chemical in 1979	12.2	11.9	12.5	12.2
Ex-Cello Corp.	E,F,C	15.4	12.6	12.2	11.6	9.8
FMC	E,D,S	13.1	13.4	12.7	9.2	13.1
Facet Enterprises	E	8.7	1.5	Neg. Inc.	3.3	4.7
Federal Mogul Corp.	E,D	18.6	18.0	16.1	15.3	3.6
Firestone Tire & Rubber	E,D,S,F	7.9	9.8	6.9	6.2	9.0
Fruehauf (Kelsey-Hayes Co.)	B,F,D	16.9	16.5	14.8	13.0	7.3
GKN Autom. Comp'ts††	E,D,S,F	6.6	5.2	11.2		

\*Percent difference from prior year in parentheses

††See Summary at end of Table 6.

Source: Corporate Annual Reports

TABLE 6. RETURN ON EQUITY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE	RETURN ON EQUITY (%) * (NET EARNINGS/SHAREHOLDER'S EQUITY)				
		1979	1978	1977	1976	1975
Gates Rubber	B,E,C,S,					
Godyear T&R (Motor Wheel Corp.)	B,D	6.8	10.7	10.4	6.6	8.9
Gould Inc.	B,E,F.	14.9	15.7	16.3	14.9	12.9
Gulf & Western Indust.	E,F,S	15.1	13.1	12.2	18.5	16.6
Hoover Universal Inc.	C	21.5	23.4	22.6	20.2	14.8
Houdaille Indust. Inc.	F					
IC Industries Inc. (Abex)	B,D	14.4	8.2	7.7	6.4	5.2
ITT	B,C,F,S	6.8	12.4	11.6	11.0	9.6
Ingersoll-Rand Co. (Torrington Co.)	E,D	13.8	13.3	12.6	12.3	14.9
International Packing	B,E,S,C					
Irvin Industries Inc.	E,D,F,C		(Neg. Inc.)	(Neg. Inc.)	12.1	11.1
Lear Siegler	B,D,F,C,S	22.7	20.5	18.3	14.1	11.6
Lucas Indust. Inc.††	B,E,S,C	25.3	30.2	29.7		
Metal & Autom. Indust.	E,F,C					
Metex	E	14.2	13.3	23.2	34.7	32.4
Midland-Ross Corp.	B,F	16.2	13.7	12.4	12.3	11.6
Modine Mfg. Co.	E,C	24.2	21.6	20.8	16.1	13.8
Parker-Hannifin Corp.	B,F	18.8	16.9	16.4	14.6	15.5
Purolator Inc.	E,S	16.0	14.7	7.8	12.9	16.3

\*Percent difference from prior year in parentheses.

††See Summary at end of Table 6.

Source: Corporate Annual Reports

TABLE 6. RETURN ON EQUITY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE	RETURN ON EQUITY (%) * (NET EARNINGS/SHAREHOLDER'S EQUITY)				
		1979	1978	1977	1976	1975
Raybestos-Manhattan	B,D	5.0	11.0	16.0	11.1	10.8
Reynolds-Metals Co.	F	14.6	11.0	8.7	8.6	7.3
Robertshaw Controls	B,E,F,S,C	7.6	11.4	8.7	9.7	3.2
Rockwell Internat'l	B,F,D,S	17.0	13.0	11.5	10.4	9.0
Scovill Inc.	S,D		16.3	16.3	14.2	(Neg. Inc.)
Sealed Power Corp.	E,B,F,S	17.7	14.5	12.8	13.7	10.7
Sheller-Globe Corp.	B,F,S,C	8.8	11.1	12.0	16.5	13.3
Signal Cos. Inc.	E,C	17.2	16.0	11.6	8.0	4.9
A.O. Smith Corp.	F,D	10.7	13.3	10.3	10.3	5.7
Stanadyne Inc.	E,F,S	17.7	16.7	16.3	15.3	12.2
Standard Products Co.	F,C	13.1	9.8	18.3	22.6	10.8
Stewart-Warner Corp.	E,C	13.0	13.8	13.7	13.8	10.9
TRW	E,S,C	16.9	16.9	16.7	16.0	13.8
Tecumseh Prod. Co.	C	19.3	19.1			
Teleflex Inc.	E,S,F,D	20.4	17.3	14.0	10.6	3.8
Tenneco Inc.	E,S	17.4	15.6	16.5	16.0	16.7
Texas Instruments	B,F	18.1	17.1	16.1	15.2	10.8
The Timken Co.	E,D	14.5	14.0	12.8	11.4	12.3

\*Percent difference from prior year in parentheses.

Source: Corporate Annual Reports

TABLE 6. RETURN ON EQUITY OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS, 1975-1979  
(CONT.)

COMPANY	PRODUCT CODE	RETURN ON EQUITY (%) * (NET EARNINGS/SHAREHOLDER'S EQUITY)				
		1979	1978	1977	1976	1975
Trico Products Corp.	C	9.3	16.5			
United Technologies (Am. Bosch)	E,C	13.0	13.2	13.5	12.6	12.2
E.R. Wagner Mfg. Co.	B,D,S,F					
Wagner Electric Corp.	B					
SUMMARY:						
# Companies Used in Averaging Return on Equity		64	66	63	63	62
Total Return on Equity All Companies		955.9	961.5	905.2	867.2	688.9
Avg. Return on Equity Per Company (%)		14.9	14.6	14.4	13.8	11.1

Currency Conversion

+ 1978--- 2DM = \$1  
 1977--- 2.15 DM = \$1  
 1976--- 2.35 DM = \$1  
 1975--- 2.6 DM = \$1  
 ++ 1978--- .45 £ = \$1  
 1977--- .55 £ = \$1  
 1976--- .60 £ = \$1  
 1975--- .50 £ = \$1

TABLE 7. CAPITAL EXPENDITURES FOR SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS 1975-1980

COMPANY	PRODUCT CODE	CAPITAL EXPENDITURES (\$ MILLIONS)						
		1980*	1979	1978	1977	1976	1975	
ACF Industries Inc. (Carter Carb)	E,C		88.4 <sup>c</sup>	90.1 <sup>c</sup>	68.9 <sup>c</sup>	63.8 <sup>c</sup>	43.7 <sup>c</sup>	
ALCOA	B,E,F	630.0 <sup>a</sup>	420.0 <sup>a</sup>	349.8 <sup>a</sup>	281.7 <sup>a</sup>	243.7 <sup>c</sup>	382.2 <sup>c</sup>	
The Allen Group Inc.	D,F,C	13.0 <sup>a</sup>	8.3 <sup>a</sup>	5.8 <sup>a</sup>	6.4 <sup>a</sup>	4.2 <sup>c</sup>	4.0 <sup>c</sup>	
Amsted Industries (Burgess-Norton Mfg)	B,F,S	150.0 <sup>a</sup>	24.5 <sup>a</sup>	43.2 <sup>a</sup>	28.4 <sup>a</sup>	35.4 <sup>c</sup>	25.2 <sup>c</sup>	
Armstrong Cork Co.	D,E,S		56.1 <sup>c</sup>	43.7 <sup>c</sup>	50.7 <sup>c</sup>	62.4 <sup>c</sup>	38.3 <sup>c</sup>	
Armstrong Rubber Co.	D		15.2 <sup>a</sup>	12.3 <sup>a</sup>	11.8 <sup>a</sup>	6.3 <sup>c</sup>	9.4 <sup>c</sup>	
Arvin Industries	E,C		23.7 <sup>c</sup>	18.3 <sup>a</sup>	15.9 <sup>a</sup>	10.1 <sup>c</sup>	10.2 <sup>c</sup>	
Barnes Group Inc.	B,E,S,C		19.4 <sup>c</sup>	10.5 <sup>a</sup>	8.1 <sup>a</sup>	8.1 <sup>c</sup>	5.3 <sup>c</sup>	
Bearings Inc.	E,D		4.0 <sup>a</sup>	2.0 <sup>a</sup>	2.8 <sup>a</sup>	1.9 <sup>c</sup>	2.6 <sup>c</sup>	
The Bendix Corp.	B,E,S		132.1 <sup>c</sup>	135.2 <sup>c</sup>	131.7 <sup>c</sup>	88.3 <sup>c</sup>	64.6 <sup>c</sup>	
Borg-Warner Corp.	E,D		130.7 <sup>c</sup>	115.3 <sup>c</sup>	77.0 <sup>c</sup>	36.0 <sup>c</sup>	55.9 <sup>c</sup>	
Robert Bosch Corp.†	B,E		202.0 <sup>c</sup>	173.0 <sup>c</sup>				
Buckeye Intern'l Corp.	D,F,S			7.5 <sup>a</sup>	9.7 <sup>a</sup>	3.5 <sup>a</sup>		
The Budd Co.	B,E,F,D							
Bundy Co.	B,E,S,F,D		9.6 <sup>a</sup>	5.2 <sup>a</sup>	3.6 <sup>a</sup>			
Champion Spark Plug	E,C		20.7 <sup>c</sup>	18.1 <sup>c</sup>	19.0 <sup>c</sup>	19.1 <sup>c</sup>	22.1 <sup>c</sup>	
Colt Industries	E		64.2 <sup>c</sup>	56.0 <sup>a</sup>	46.1 <sup>a</sup>	45.2 <sup>c</sup>	37.1 <sup>c</sup>	
			PRIVATELY OWNED-----NO DATA PUBLISHED					

\*Projected

a. Standard & Poor's, 1980  
 b. "Automotive Industries," June 1980  
 c. Corporate Annual Reports

d. Direct Communications  
 e. "Business Week," 9/24/79  
 †See Summary at end of Table 7.

TABLE 7. CAPITAL EXPENDITURES FOR SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS 1975-1980 (CONT.)

COMPANY	PRODUCT CODE	CAPITAL EXPENDITURES (\$ MILLIONS)					
		1980*	1979	1978	1977	1976	1975
Commercial Shearing	F, S		8.1 <sup>a</sup>	7.0 <sup>a</sup>	3.6 <sup>a</sup>	4.1 <sup>c</sup>	3.7 <sup>c</sup>
Copperweld Corp.	S		27.6 <sup>c</sup>	22.0 <sup>a</sup>	39.2 <sup>a</sup>	23.5 <sup>c</sup>	12.2 <sup>c</sup>
Cummins Engine Inc.	E		105.4 <sup>a</sup>	80.6 <sup>c</sup>	67.4 <sup>a</sup>	40.3 <sup>c</sup>	40.0 <sup>c</sup>
Dana Corp.	B, E, D, S, F		184.2 <sup>c</sup>	120.1 <sup>c</sup>	67.5 <sup>c</sup>	59.6 <sup>c</sup>	49.0 <sup>c</sup>
Dayco (Automotive Corp.)	E, S, C		35.9 <sup>a</sup>	19.7 <sup>a</sup>	26.4 <sup>a</sup>	16.9 <sup>c</sup>	14.8 <sup>c</sup>
Donaldson Co. Inc.	E		18.9 <sup>a</sup>	6.7 <sup>a</sup>	6.8 <sup>a</sup>		
Dyneer	B, D		5.6 <sup>c</sup>	2.4 <sup>c</sup>	3.1 <sup>c</sup>	2.1 <sup>c</sup>	2.2 <sup>c</sup>
Eagle-Picher Indust.	F		36.2 <sup>a</sup>	20.7 <sup>a</sup>	33.2 <sup>a</sup>	20.1 <sup>c</sup>	15.5 <sup>c</sup>
Eaton Corp.	B, E, D, S, C		135.2 <sup>a</sup>	99.5 <sup>a</sup>	81.1 <sup>a</sup>	73.9 <sup>c</sup>	87.4 <sup>c</sup>
Echlin Mfg. Co.	B, E		14.9 <sup>a</sup>	9.8 <sup>a</sup>	7.8 <sup>c</sup>	7.5 <sup>c</sup>	7.5 <sup>c</sup>
Eltra (Prestolite Co.)	E, S		35.0 <sup>a*</sup>	31.1 <sup>a</sup>	34.2 <sup>a</sup>	30.4 <sup>c</sup>	28.0 <sup>c</sup>
Ex-Cello Corp.	E, F, C		41.9 <sup>a</sup>	28.1 <sup>a</sup>	31.3 <sup>a</sup>	21.1 <sup>c</sup>	17.6 <sup>c</sup>
FMC	E, D, S	300.0 <sup>a</sup>	282.1 <sup>a</sup>	191.8 <sup>a</sup>	171.1 <sup>a</sup>	117.0 <sup>c</sup>	182.8 <sup>c</sup>
Facet Enterprises	E		2.8 <sup>c</sup>	2.2 <sup>c</sup>	8.2 <sup>c</sup>	2.6 <sup>c</sup>	1.5 <sup>c</sup>
Federal Mogul Corp.	E, D	47.0 <sup>a</sup>	42.0 <sup>a</sup>	30.8 <sup>a</sup>	17.3 <sup>c</sup>	8.6 <sup>c</sup>	10.1 <sup>c</sup>
Firestone Tire & Rubber	E, D, S, F		252.5 <sup>a</sup>	230.9 <sup>a</sup>	204.9 <sup>a</sup>	169.5 <sup>c</sup>	199.8 <sup>c</sup>
Fruehauf (Kelsey-Hayes Co.)	B, F, D		72.7 <sup>a</sup>	76.6 <sup>a</sup>	70.9 <sup>a</sup>	48.6 <sup>c</sup>	46.7 <sup>c</sup>
GKI Autom. Compt.††	E, D, S, F		212.0 <sup>c</sup>	159.6 <sup>c</sup>	115.8 <sup>c</sup>		

\*Projected

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

†† See Summary at end of Table 7.

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 7. CAPITAL EXPENDITURES FOR SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS 1975-1980 (CONT.)

COMPANY	PRODUCT CODE	CAPITAL EXPENDITURES (\$ MILLIONS)					
		1980*	1979	1978	1977	1976	1975
PRIVATELY OWNED-----NO DATA PUBLISHED							
Gates Rubber	B,E,C,S						
Goodyear T&R (Motor Wheel Corp.)	B,D		360.1 <sup>a</sup>	411.4 <sup>a</sup>	289.9 <sup>a</sup>	237.1 <sup>c</sup>	284.3 <sup>c</sup>
Gould Inc.	B,E,F		132.1 <sup>c</sup>	106.1 <sup>c</sup>	66.2 <sup>c</sup>	60.5 <sup>c</sup>	36.4 <sup>c</sup>
Gulf & Western Indust.	E,F,S		250.1 <sup>a</sup>	265.1 <sup>a</sup>	242.5 <sup>a</sup>	194.2 <sup>c</sup>	177.2 <sup>c</sup>
Hoover Universal Inc.	C		62.5 <sup>a</sup>	44.7 <sup>a</sup>	22.7 <sup>a</sup>	12.7 <sup>c</sup>	4.6 <sup>c</sup>
Houdaille Indust. Inc.	F						
PRIVATELY OWNED-----NO DATA PUBLISHED							
IC Industries Inc. (Abex)	B,D	368.0 <sup>c</sup>	409.4 <sup>c</sup>	238.2 <sup>c</sup>	232.2 <sup>c</sup>	140.4 <sup>c</sup>	175.4 <sup>c</sup>
ITT	B,C,F,S		1,049.4 <sup>c</sup>	940.7 <sup>c</sup>	815.0 <sup>c</sup>	637.0 <sup>c</sup>	540.0 <sup>c</sup>
Ingersoll-Rand Co. (Torrington Co.)	E,D		104.8 <sup>a</sup>	63.5 <sup>a</sup>	51.4 <sup>a</sup>	107.1 <sup>c</sup>	125.8 <sup>c</sup>
International Packing	B,E,S,C						
Irvin Industries Inc.	E,D,F,C		1.0 <sup>a</sup>	2.1 <sup>a</sup>	1.9 <sup>a</sup>	4.8 <sup>c</sup>	2.8 <sup>c</sup>
Lear Siegler	B,D,F,C,S		42.3 <sup>a</sup>	24.9 <sup>a</sup>	19.1 <sup>a</sup>	12.7 <sup>c</sup>	12.9 <sup>c</sup>
Lucas Indust. Inc.††	B,E,S,C						
PRIVATELY OWNED-----NO DATA PUBLISHED							
Metal & Autom. Indust.	E,F,C						
Metex	E	1.5 <sup>a</sup>	1.0 <sup>c</sup>	.6 <sup>c</sup>	.4 <sup>c</sup>	.5 <sup>c</sup>	.3 <sup>c</sup>
Midland-Ross Corp.	B,F		46.3 <sup>a</sup>	18.4 <sup>a</sup>	21.6 <sup>a</sup>	20.8 <sup>c</sup>	20.8 <sup>c</sup>
Modine Mfg. Co.	E,C		8.9 <sup>a</sup>	9.3 <sup>a</sup>	5.4 <sup>a</sup>	4.6 <sup>c</sup>	2.7 <sup>c</sup>
Parker-Hannifin Corp.	B,F	60.0 <sup>a</sup>	47.1 <sup>a</sup>	32.4 <sup>a</sup>	25.6 <sup>a</sup>	19.0 <sup>c</sup>	23.2 <sup>c</sup>
Purolator Inc.	E,S		31.5 <sup>c</sup>	21.4 <sup>c</sup>	22.7 <sup>c</sup>	14.4 <sup>c</sup>	13.9 <sup>c</sup>

\*Projected

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

†† See Summary at end of Table 7.

TABLE 7. CAPITAL EXPENDITURES FOR SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS 1975-1980 (CONT.)

COMPANY	PRODUCT CODE	CAPITAL EXPENDITURES (\$ MILLIONS)					
		1980*	1979	1978	1977	1976	1975
Raybestos-Manhattan	B,D		10.9 <sup>a</sup>	17.3 <sup>a</sup>	19.4 <sup>a</sup>	10.7 <sup>c</sup>	9.7 <sup>c</sup>
Reynolds-Metals Co.	F	250.0 <sup>a</sup>	230.1 <sup>a</sup>	162.1 <sup>a</sup>	99.1 <sup>a</sup>	77.8 <sup>c</sup>	109.5 <sup>c</sup>
Robertshaw Controls	B,E,F,S,C		6.4 <sup>a</sup>	9.8 <sup>a</sup>	8.6 <sup>a</sup>	6.5 <sup>c</sup>	4.3 <sup>c</sup>
Rockwell Internat'l	B,F,D,S	400.0 <sup>a</sup>	275.8 <sup>a</sup>	218.9 <sup>a</sup>	195.7 <sup>a</sup>	143.7 <sup>c</sup>	169.3 <sup>c</sup>
Scovill Inc.	S,D		33.9 <sup>a</sup>	27.9 <sup>a</sup>	22.8 <sup>a</sup>	21.5 <sup>c</sup>	10.7 <sup>c</sup>
Sealed Power Corp.	E,B,F,S	28.0 <sup>a</sup>	16.2 <sup>a</sup>	14.2 <sup>a</sup>	12.8 <sup>a</sup>	7.1 <sup>c</sup>	7.5 <sup>c</sup>
Sheller-Globe Corp.	B,F,S,C		21.4 <sup>a</sup>	15.1 <sup>a</sup>	25.6 <sup>a</sup>	11.5 <sup>c</sup>	10.1 <sup>c</sup>
Signal Cos. Inc.	E,C		143.1 <sup>a</sup>	97.4 <sup>a</sup>	45.0 <sup>a</sup>	53.7 <sup>c</sup>	75.2 <sup>c</sup>
A.O. Smith Corp.	F,D		41.2 <sup>c</sup>	29.7 <sup>c</sup>	34.2 <sup>c</sup>	16.2 <sup>c</sup>	14.2 <sup>c</sup>
Stanadyne Inc.	E,F,S		26.9 <sup>a</sup>	17.8 <sup>a</sup>	16.5 <sup>a</sup>	8.1 <sup>c</sup>	4.8 <sup>c</sup>
Standard Products Co.	F,C	5.9 <sup>a</sup>	5.7 <sup>a</sup>	7.9 <sup>a</sup>	3.3 <sup>a</sup>	3.2 <sup>c</sup>	3.1 <sup>c</sup>
Stewart-Warner Corp.	E,C		12.0 <sup>a</sup>	8.8 <sup>a</sup>	7.9 <sup>a</sup>	6.8 <sup>c</sup>	4.2 <sup>c</sup>
TRW	E,S,C		200.1 <sup>a</sup>	135.5 <sup>a</sup>	117.9 <sup>a</sup>	96.0 <sup>c</sup>	120.0 <sup>c</sup>
Tecumseh Prod. Co.	C		23.5 <sup>a</sup>	17.0 <sup>a</sup>	17.0 <sup>a</sup>		
Teleflex Inc.	E,S,F,D		1.9 <sup>a</sup>	1.5 <sup>a</sup>	1.1 <sup>a</sup>	.7 <sup>c</sup>	.7 <sup>c</sup>
Tenneco Inc.	E,S	1,450.0 <sup>a</sup>	1,477.0 <sup>a</sup>	1,008.0 <sup>a</sup>	714.0 <sup>a</sup>	620.0 <sup>c</sup>	550.0 <sup>c</sup>
Texas Instruments	B,F						
The Timken Co.	E,D		117.7 <sup>a</sup>	107.6 <sup>a</sup>	86.1 <sup>a</sup>	78.8 <sup>c</sup>	56.1 <sup>c</sup>

\*Projected

a. Standard & Poor's, 1980

b. "Automotive Industries," June 1980

c. Corporate Annual Reports

d. Direct Communications

e. "Business Week," 9/24/79

TABLE 7. CAPITAL EXPENDITURES FOR SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS 1975-1980 (CONT.)

COMPANY	PRODUCT CODE	CAPITAL EXPENDITURES (\$ MILLIONS)					
		1980*	1979	1978	1977	1976	1975
Trico Products Corp.	C		6.0 <sup>c</sup>	5.6 <sup>c</sup>			
United Technologies (Am. Bosch)	E,C		331.2 <sup>c</sup>	216.8 <sup>a</sup>	145.4 <sup>a</sup>	131.2 <sup>c</sup>	125.1 <sup>c</sup>
E.R. Wagner Mfg. Co.	B,D,S,F						
Wagner Electric Corp.	B						
<u>SUMMARY</u>							
# Companies used in Averaging Capital Expenditures		13	66	67	65		61
Total Cap. Expenditures All Companies		3,703.4	8,259.4	6,523.3	5,140.6		4,114.2
Avg. Capital Expenditures per Company		284.9	125.1	97.4	79.1		68.6
Change over Previous year (%)			(28.4)	(23.1)	(19.7)	(-3.6)	

Currency Conversion

+	1978	2DM = \$1
	1977	2.15 DM = \$1
	1976	2.35 DM = \$1
	1976	2.6 DM = \$1
++	1978	.45 £ = \$1
	1977	.55 £ = \$1
	1976	.60 £ = \$1
	1975	.50 £ = \$1

\*Projected

- a. Standard & Poor's, 1980
- b. "Automotive Industries," June 1980
- c. Corporate Annual Reports
- d. Direct Communications
- e. "Business Week," 9/24/79

NOTES ON TABLE 8

"X" indicates plants exist in that particular state or country but the exact number has not been identified. Plant localities, whenever identified in sources, have been indicated. More than one plant may exist in larger localities, in which case, the number, if known, is shown in parentheses following the city.

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\*

COMPANY ACF INDUSTRIES (CARTER CARB.)	PRODUCT CODE** E,C	TOTAL EMPLOYMENT (000) 14.2***	EFFECTIVE DATE 1979
Location and Number of Plants (See Notes preceding Table 8)			
United States		Outside the U.S.	
MI	X - Southfield and Other†	Canada	1
MO	X - St. Louis and Other†	Scotland	1
Total	14 (Estimate)	Total	2
Total for All Plants 16			

†Automotive products are manufactured in Southfield, MI and St. Louis, MO. Principal plants are in 14 states, Canada, and Scotland.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at the end of Table 8

\*\*\*Source: Corporate Annual Report

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY ALCOA	PRODUCT CODE** B,E,F	TOTAL EMPLOYMENT (000) 46.8***	EFFECTIVE DATE 1979
Location and Number of Plants			
United States		Outside the U.S.	
AL	1	Australia	4
AR	1	Brazil	2
FL	1	France	1
NC	1	Jamaica	1
NY	1	Japan	1
TN	1	Mexico	2
TX	4	Netherlands	2
WA	3	Norway	2
		Surinam	3
		United Kingdom	3
		West Germany	2
Total	37†	Total	23
Total for All Plants 60			

†In addition to the above, ALCOA owns alumina fabricating plants at 24 domestic sites.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

\*\*\*Source: Corporate Annual Report

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY THE ALLEN GROUP	PRODUCT CODE** D,F,C	TOTAL EMPLOYMENT (000) 5.5	EFFECTIVE DATE 12/78
Location and Number of Plants			
United States		Outside the U.S.	
CA	X - Southern CA	Canada	1
IL	X	West Germany	1
MI	X	All Others (Estimate)	7
NY	X-Melville and Others		
OH	X		
PR	X		
Total	59 (Estimate)	Total	9 (Estimate)
Total of All Plants 68			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY ARMSTRONG CORK	PRODUCT CODE** D,E,S	TOTAL EMPLOYMENT (000) 23.8	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
CA	1	Australia	3
FL	1	Canada	2
GA	5	England	4
IL	1	India	1
MA	1	Spain	2
MS	2	West Germany	1
NC	20		
NY	1		
PA	6 Lancaster and Others		
SC	1		
TN	1		
VA	3		
Total	43	Total	13
Total of All Plants 56			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY ARMSTRONG RUBBER	PRODUCT CODE** D	TOTAL EMPLOYMENT (000) 5.7	EFFECTIVE DATE 9/79
Location and Number of Plants			
United States		Outside the U.S.	
AR	X	None	
CA	X		
CT	X New Haven		
IA	X		
MS	X		
NC	X		
TN	X		
WI	X		
Total	11 (Estimate)		
Total for All Plants 11 (Estimate)			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8.

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
ARVIN INDUSTRIES	E,C	9.9	12/78
Location and Number of Plants			
United States		Outside the U.S.	
AL	X	None	
AR	X		
GA	X		
IN	X - Columbia and Others		
KY	X		
MS	X		
MO	X		
NY	X		
Total	17		
Total for All Plants 17			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at the end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY BARNES GROUP, INC.	PRODUCT CODE** B,E,S,C	TOTAL EMPLOYMENT (000) 7.0	EFFECTIVE DATE 12/78
Location and Number of Plants			
United States		Outside the U.S.	
CT	X - Bristol and Others	Canada	2
MI	X - Livonia, Plymouth and Ann Arbor		
Total	32 (Estimate)	Total	2 (Estimate)
Total for All Plants 34 (Estimate)			

Note: The company operates 32 plants in the U.S. including 18 warehouses.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY BEARINGS, INC.	PRODUCT CODE** E,D	TOTAL EMPLOYMENT (000) 2.6	EFFECTIVE DATE 6/79
Location and Number of Plants			
United States			
AL	11	MT	4
AR	3	NC	11
CA	3	NJ	4
DE	1	NY	6
FL	11	OH	27 Cleveland and Others
GA	17	OR	7
ID	1	PA	17
IL	2	SC	7
IN	7	TN	8
KY	6	TX	1
LA	3	VA	7
MD	2	WA	13
MS	4	WV	7
MO	3		
TOTAL 193			

Note: The company operates service/distribution centers. There are no plants outside the U.S.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
BENDIX CORP.	B,E,S	73.7	9/79
Location and Number of Plants			
United States		Outside the U.S.	
IN	1 South Bend	Argentina	2
KY	1 Frankfort	Australia	2
MI	1 St. Joseph	Brazil	2
MO	1 Nevada	Canada	7
NY	1 Troy	France	2
OH	4 Elyria, Fostoria, Greenville, Toledo	Italy	2
RI	1 East Providence	Japan	2
TN	2 Cleveland, Jackson	Mexico	2
UT	1 Clearfield	Netherlands	2
VA	1 Newport News	New Zealand	1
		Spain	2
		United Kingdom	2
		Venezuela	2
		West Germany	2
		Other	6
		(Estimate)	
Total	14	Total	38 (Estimate)
Total of All Plants 52 (Estimate)			

Note: The domestic plants listed here manufacture auto-related products. Company operates 60 principal plants in the U.S. and 6 in Canada, and its subsidiaries operate many other plants in Canada and abroad.

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
BORG-WARNER	E,D	55.4	1979
Location and Number of Plants†			
United States		Outside the U.S.	
AR	1 Blytheville	Australia	2
IL	7 Chicago and Others	Canada	3
IN	2 Muncie, Auburn	England	2
KY	1 Madisonville	France	1
MA	1 New Bedford	Ireland	1
MI	2 Sterling Hts., Cold Water	Netherlands	1
MO	2 Baldwin, Washington	So. Africa	1
NY	1 Ithaca	W. Germany	1
PA	1 York		
WV	2 Parkersburg and Others		
Total	20	Total	12
Total of All Plants 32			

†The plants listed here manufacture auto-related products. The company operates 70 manufacturing facilities in the U.S. and abroad.

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
ROBERT BOSCH	B,E	120.5	1979
Location and Number of Plants			
United States		Outside the U.S.	
SC	1 Charleston	Africa	2
		Asia	6
		Australia	1
		Canada	1
		Latin America	6
		West Germany	15
		Other European (Estimate)	23
Total	1	Total	54 (Estimate)
Total of All Plants 55 (Estimate)			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY BUCKEYE INTERNATIONAL CORP.	PRODUCT CODE** D,F,S	TOTAL EMPLOYMENT (000) 3.5	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
CA	1	None	
IL	1		
MA	1		
MI	1		
OH	9 Columbus and Others		
Total	13		
Total of All Plants 13			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY BUDD CO.	PRODUCT CODE** B,E,F,D	TOTAL EMPLOYMENT ***	EFFECTIVE DATE ***
Location and Number of Plants			
United States		Outside the U.S.	
AR	1 Temple	Argentina	1
CA	4 Los Angeles and Others	Brazil	1
CT	1 Windsor	Canada	2
GA	1 Atlanta	France	1
IN	1 Gary	Mexico	2
MI	4 Detroit (3) and Others	West Germany	1
MN	1	(Estimate)	
MO	1 Kansas City		
OH	5		
PA	10 Philadelphia and Others		
TX	1 Dallas		
VA	1		
WI	2		
Total	33 (Estimate)	Total	8 (Estimate)
Total of All Plants 41 (Estimate)			

\*Source: Ward's Automotive Yearbook, 1980

\*\*See Product Code at end of Table 8

\*\*\*Not Available

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY BUNDY CO.	PRODUCT CODE** B,E,S,F,D	TOTAL EMPLOYMENT (000) 3.5	EFFECTIVE DATE 1979
Location and Number of Plants			
United States		Outside the U.S.	
AR	1	Canada	2
CT	2		
GA	1		
KY	2		
MA	3		
MI	4	Detroit and Others	
PA	3		
RI	2		
TX	1		
Total	19	Total	2
Total of All Plants 21			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
AMSTED (BURGESS- NORTON)	B,F,S	12.3	9/79
Location and Number of Plants			
United States		Outside the U.S.	
AL	1	Belgium	1
CA	2	Canada	2
GA	1	England	1
IL	13		
IN	3		
IA	4		
KS	1		
LA	1		
MI	3		
NJ	1		
OH	2		
OK	1		
PA	1		
TN	1		
TX	1		
VA	1		
WA	1		
WI	1		
Total	39	Total	4
Total of All Plants 43			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY CHAMPION SPARK PLUG	PRODUCT CODE** E,C	TOTAL EMPLOYMENT (000) 16.0	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
IA	3	Australia	3
IN	3	Belgium	3
MI	2	Brazil	1
OH	5	Canada	2
PA	2	England	4
		France	1
		Japan	1
		Mexico	3
		New Zealand	1
		South Africa	3
		Venezuela	2
		West Germany	1
Total	15	Total	25
Total of All Plants 40			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY COLT INDUSTRIES	PRODUCT CODE** E	TOTAL EMPLOYMENT (000) 32.1	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
MI	X Warren (3) and Others	Australia	1
NY	X New York City and Others	Canada	3
WI	X Necadah and Others	France	1
		Mexico	1
		Netherlands	1
		Philippines	1
		Spain	1
		Switzerland	1
		United Kingdom	2
Total	67	Total (Estimate)	12
Total of All Plants 79			

Note: The company operates 79 plants in 22 states and countries.

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY COMMERCIAL SHEARING	PRODUCT CODE** F,S	TOTAL EMPLOYMENT (000) 3.2	EFFECTIVE DATE 10/79
Location and Number of Plants			
United States		Outside the U.S.	
AR	1	Australia	3
CA	1	Brazil	1
IA	1	Canada	1
IL	1	England	2
MD	1	Japan	1
NC	1	Luxembourg	3
OH	7		
TX	1		
UT	1		
WV	1		
Total	16	Total	11
Total of All Plants 27			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY COPPERWELD CORP.	PRODUCT CODE** S	TOTAL EMPLOYMENT (000) 4.3	EFFECTIVE DATE 12/78
Location and Number of Plants			
United States		Outside the U.S.	
IL	X - Bedford Park and Others	None	
NY	X - Oswego and Others		
OH	X - Warren, Shelby and Others		
PA	X - Glassport, Pittsburg and Others		
TN	X - Fayetteville and Others		
Total 9 (Estimate)			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
CUMMINS ENGINE, INC.	E	23.3	12/79
Location and Number of Plants			
United States		Outside the U.S.	
CA	1	England	6
IL	1	Scotland	1
IN	4 Columbus and Others		
NY	1		
OH	1		
SC	1		
TN	2		
Total	11	Total	7
Total of All Plants 18			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY DANA CORP.	PRODUCT CODE** B,E,D,S,F	TOTAL EMPLOYMENT (000) 36.0	EFFECTIVE DATE 1979
Location and Number of Plants			
United States		Outside the U.S.	
AL	1	Australia	8
AR	1	Brazil	15
CA	12 Santa Ana and Others	Canada:	
CO	3	Alberta	6
CT	1	Brit. Columbia	9
DC	1	Manitoba	2
GA	1	Ontario	25
IA	1	Quebec	2
IL	8 Lisle	Saskatchewan	2
IN	26 Fort Wayne (2) Auburn, Hagerstown, Richmond	France	23
		Mexico	9
KS	1	Switzerland	7
KY	1	United Kingdom	129
MA	1	Venezuela	14
MI	15	12 Other Countries	27
MN	2		
MS	1		
MT	1		
NC	11		
NJ	1		
NV	1		
OH	17 Toledo (3) and Others		
OK	1		
OR	2		
PA	5		
SD	2		
TX	8		
WA	2		
WI	1 Edgerton		
PR	1		
Total	129	Total	278
Total of All Plants 407			

\*Sources: Standard & Poor's, 1980, and phone communication with  
Dana Corp., 9/18/80

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY DAYCO (AUTOM CORP.)	PRODUCT CODE** E,S,C	TOTAL EMPLOYMENT (000) 12.0	EFFECTIVE DATE 10/79
Location and Number of Plants			
<p style="text-align: center;">United States</p> <p>The company operates 32 plants, as well as warehouses and distri- bution centers</p> <p>Total            32</p>		<p style="text-align: center;">Outside the U.S.</p> <p>Canada            2 Scotland          1</p> <p>Total            3</p>	
Total of All Plants 35			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY DONALDSON CO., INC.	PRODUCT CODE** E	TOTAL EMPLOYMENT (000) 3.6	EFFECTIVE DATE 7/79
Location and Number of Plants			
United States		Outside the U.S.	
IA	3	Australia	1
IL	1	France	1
MI	2	Japan	1
MO	2	West Germany	1
		Minneapolis and Others	
Total	8	Total	4
Total of All Plants 12			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY DYNEER	PRODUCT CODE** B,D	TOTAL EMPLOYMENT (000) 2.4	EFFECTIVE DATE 1979
Location and Number of Plants†			
United States		Outside the U.S.	
CT	X - Westport (Base)	Canada	1
MN	X - Warren	Two Other Countries	2
Total	12 (Estimate)	Total	3 (Estimate)
Total of All Plants 15 (Estimate)			

†Plants are in 12 states and 3 foreign countries.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY EAGLE-PICHER INDUSTRIES	PRODUCT CODE** F	TOTAL EMPLOYMENT (000) 10.2	EFFECTIVE DATE 11/79
Location and Number of Plants			
United States		Outside the U.S.	
OH	X - Cincinnati (Base)	Canada	3
Total	80 (Estimate)	Total	3 (Estimate)
Total of All Plants 83 (Estimate)			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT	EFFECTIVE DATE
EATON CORP.	B,E,D,S,C	(000) 57.8	1979
Location and Number of Plants			
United States		Outside the U.S.	
AL	2	Argentina	3
AR	1	Australia	2
CA	11	Austria	1
CT	1	Belgium	2
FL	2	Brazil	4
GA	1	Canada	9
IA	2	Costa Rica	1
IL	8	France	4
KY	6	Italy	9
MI	12 Marshall and Others	Malaysia	1
MN	1	Mexico	4
MO	1	Monaco	1
NE	2	New Zealand	1
NJ	2 Whippany and Others	Nigeria	1
NY	5 NYC and Others	Singapore	1
NC	9	South Africa	2
OH	17 Cleveland and Others	Spain	3
OK	1	Switzerland	1
OR	1	United Kingdom	11
PA	2	West Germany	3
TN	4	Zambia	1
TX	5		
UT	2		
VA	1		
WI	5		
WY	1		
Total	105	Total	65
Total of All Plants 170			

\*Sources: Standard & Poor's, 1980, and phone communication with Eaton Corp., 9/18/80

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY ECHLIN MANUFACTURING	PRODUCT CODE** B,E	TOTAL EMPLOYMENT (000) 5.8	EFFECTIVE DATE 8/79
Location and Number of Plants			
United States		Outside the U.S.	
CA	1 North Hollywood	Canada	1
CT	1 Branford	England	1
FL	1 Miami		
IL	4 Des Plaines, Niles, McHenry		
KS	4 Independence, Iola		
MI	1 Tekonsha		
MN	1		
MO	1		
Total	14	Total	2
Total of All Plants 16			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY ELTRA (PRESTOLITE)	PRODUCT CODE** E,S	TOTAL EMPLOYMENT (000) 22.5 (Eltra) 6.0 (Prestolite)	EFFECTIVE DATE 9/78
Location and Number of Plants			
United States		Outside the U.S.	
MI	X	Brazil	} 10
OH	X Toledo	England	
		Germany	
		Canada	4
Total	67 (Estimate)	Total	14 (Estimate)
Total of All Plants 81			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY EX-CELLO CORP.	PRODUCT CODE** E,F,C	TOTAL EMPLOYMENT (000) 16.9	EFFECTIVE DATE 1979
Location and Number of Plants			
United States†		Outside the U.S.	
MI	X Troy	Canada	6
		England	} 9
		West Germany	
Total	40 (Estimate)	Total	15 (Estimate)
Total of All Plants 55 (Estimate)			

†The company has plants in 17 states.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY FMC	PRODUCT CODE*** E,D,S	TOTAL EMPLOYMENT (000) 46.2	EFFECTIVE DATE 12/79
Location and Number of Plants†			
United States		Outside the U.S.	
IL	X Chicago (Base)	Canada	3
		All Others	38 (Estimate)
Total	102 (Estimate)	Total	41 (Estimate)
Total of All Plants 143 (Estimate)			

†The company operates some 143 plants in 34 states and 14 foreign countries.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY FACET ENTERPRISES	PRODUCT CODE** E	TOTAL EMPLOYMENT (000) 2.8	EFFECTIVE DATE 9/79
Location and Number of Plants†			
United States†		Outside the U.S.	
OK	X Tulsa (headquarters)	Spain	1 (Estimate)
Total	11 (Estimate)	Total	1 (Estimate)
Total of All Plants 12 (Estimate)			

†Plants and warehouses are in 11 states.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY FEDERAL MOGUL CORP.	PRODUCT CODE** E,D	TOTAL EMPLOYMENT (000) 14.7	EFFECTIVE DATE 12/79
Location and Number of Plants†			
United States†		Outside the U.S.	
MI	X Southfield and Others	Canada	2
		All Others	6
Total	83	Total 8 (Estimate)	
Total of All Plants 91			

†The company operates 28 plants and has 55 warehouses and distribution facilities in the U.S.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY FIRESTONE TIRE AND RUBBER	PRODUCT CODE** E,D,S,F	TOTAL EMPLOYMENT (000) 107.0	EFFECTIVE DATE 10/79
Location and Number of Plants			
United States		Outside the U.S.	
AR	3 Magnolia, Russelville, Prescott	Argentina	1
CA	3 Los Angeles (2), Salinas	Australia	3
GA	2 Albany, Thomasville	Brazil	3
IL	3 Quincy, Decator, Bloomington	Canada	7
IA	1 DesMoines	Chile	1
IN	2 Noblesville, Ellshart	Costa Rica	1
KS	1 Abilene	France	2
KY	3 Bowling Green and Others	Ghana	2
LA	2 Baton Rouge, Lake Charles	Guatemala	1
MD	2 Perryville, Salisbury	Italy	2
MI	6 Detroit area (2) and Others	Liberia	2
MS	1 Louisville	New Zealand	1
NC	3 Conover, Gastona, Wilson	Philippines	2
NJ	1 Caldwell	Portugal	1
OH	6 Akron (3) and Others	South Africa	2
OK	1 Oklahoma City	Sweden	2
PA	3 Pottstown (2), Corry	United Kingdom	3
SC	2 Bennettsville, Spartansburg	6 Other	
TN	4 Memphis and Others	Countries	6
TX	2 Fort Stockton, Orange	Venezuela	1
VA	1 Hopewell		
PR	1 San Juan		
Total	53	Total	43
Total of All Countries 96			

Automotive products, other than tires and tubes, are manufactured in plants in Arizona (1), Illinois (1), Indiana (1), Kentucky (1), Michigan (6), Mississippi (1), South Carolina (1), Tennessee (1), and Canada (3).

\*Sources: Standard & Poor's, 1980  
Corporate Annual Reports

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY FRUEHAUF (KELSEY-HAYES)	PRODUCT CODE** B,D,F	TOTAL EMPLOYMENT (000) 33.1	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
MI	X Detroit and others	Canada	4
		All Others	19 (Estimate)
Total	53 (Estimate)	Total	23 (Estimate)
Total of All Plants 76 (Estimate)			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY GKN AUTOMOTIVE COMPONENTS	PRODUCT CODE** E,D,S,F	TOTAL EMPLOYMENT (000) 104.0 (Total GKN) 1.9 (Total U.S.)	EFFECTIVE DATE 12/31/79
Location and Number of Plants			
United States		Outside the U.S.	
MI	1 Troy	Australia	
NC	2 Sanford (Alamance Co.)	Brazil	
		France	
		Holland	
		India	
		Ireland	
		Italy	} 18
		New Zealand	
		South Africa	
		Spain	
		United Kingdom	
		West Germany	
Total	3	Total	18 (Estimate)
Total of All Plants 21 (Estimate)			

\*Source: Corporate Annual Report, 1979

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY GATES RUBBER	PRODUCT CODE** B,E,C,S	TOTAL EMPLOYMENT (000) ***	EFFECTIVE DATE ***
Location and Number of Plants			
United States		Outside the U.S.	
AR	X Siloam Springs	Belgium	1
CO	X Denver	Brazil	1
IL	X Galesburg, Rockford	Canada	2
IA	X Sioux	Mexico	2
KS	X Iola	(Estimate)	
KY	X Elizabethtown		
NC	X Jefferson		
TX	X Wichita Falls		
Total 10 (Estimate)		Total	6 (Estimate)
Total of All Plants 16 (Estimate)			

\*Source: Ward's Automotive Yearbook, 1980

\*\*See Product Code at end of Table 8

\*\*\*Not Available

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY GOODYEAR T&R (MOTOR WHEEL CORP.)	PRODUCT CODE** B,D	TOTAL EMPLOYMENT (000) 150.3	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
AL	3 Decatur, Gadsden, Sottsboro	Argentina	1
AR	1 Litchfield Park	Australia	2
CA	2 Bakersfield, Merced	Brazil	3
DE	1 Newark	Canada	11
GA	5 Cedertown, Calhoun, Cartersville, Rockmart	Chile	2
IL	2 Freeport, Mindota	France	2
IA	1 Mt. Pleasant	Greece	1
IN	1 LaGrange	Italy	1
KS	1	Luxembourg	4
KY	2 Berea, Madisonville	Mexico	1
MA	1 New Bedford	South Africa	1
MD	1 Cumberland	Sweden	1
MI	3 Jackson, Lansing, Ypsilanti	Turkey	1
MO	1 Hannibal	United Kingdom	2
NC	1 Fayetteville	West Germany	2
NE	2 Norfolk, Lincoln	13 Other	
NY	1 Niagara Falls	Countries	13
OH	13 Akron (7) and Others		
OK	1 Lawton		
PA	1 Auburn		
TN	2 Alamo, Union City		
TX	4 Bayport, Beaumont, Houston, Tyler		
VA	1 Danville		
VT	1 Windsor		
WV	1 Point Pleasant		
WI	1 Sun Prairie		
Total	54	Total	48
Total of All Plants 102			

Automotive products, other than tires and tubes, are manufactured in plants in Ohio (3), Tennessee (1), California (1), Illinois (1), Missouri (1), Michigan (2), Nebraska (2), Iowa (1), and Delaware (1).

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT	EFFECTIVE DATE
GOULD INC.	B,E	(000) 36.4	1979
Location and Number of Plants			
United States		Outside the U.S.	
AR	1	Brazil	1
AZ	1	Canada	6
CA	9	Italy	1
CT	1	Japan	1
FL	2	Mexico	2
GA	2	Norway	2
IA	1	United Kingdom	2
IL	4	West Germany	2
IN	2		
KS	1		
LA	1		
MA	2		
MD	3		
MN	6		
MO	1		
MS	1		
NC	1		
NE	2		
NJ	1		
NY	3		
OH	18		
OR	2		
PA	7		
TN	4		
TX	4		
VA	1		
WI	3		
PR	1		
Total	85	Total	17
Total of All Plants 102			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report  
Phone communication with Gould, Inc., 9/19/80

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY GULF & WESTERN MFG.	PRODUCT CODE** E,F,S	TOTAL EMPLOYMENT (000) 126.0	EFFECTIVE DATE 7/79
Location and Number of Plants†			
United States		Outside the U.S.	
		Canada	3
		Other	10 (Estimate)
Total	74	Total	13 (Estimate)
Total of All Plants 87 (Estimate)			

†The company has 25 OEM-related production facilities in the United States, Canada, Mexico, and Dominican Republic.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
HOOVER UNIVERSAL	C	9.5	7/79
Location and Number of Plants***			
United States		Outside the U.S.	
CA	1 Los Angeles	Canada	1
CT	1 East Granby	England	1
FL	1 Starke		
IN	1 Vincennes		
KY	2 Georgetown, Cadiz		
MA	1 Springfield		
MI	6 Whitmore, Saline, Charlotte, Mancester, Balleville, Adrian		
NC	1 High Point		
OH	4 Solon, Mansfield, Mt. Vernon, Greenfield		
PA	1 Erie		
SC	3 Mauldin, North Charleston, Charleston		
TN	2 Erwin, Athens		
TX	1 Grand Prairie		
Total	48	Total	2
Total of All Plants 62			

\*\*\*The 27 plants listed (including 2 foreign plants) are engaged in auto-related product manufacturing. The company also operates 23 non-auto-related plants in the U.S. and 12 other unidentified facilities.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
HOUDAILLE INDUSTRY	F	—	—
This company is privately owned and there is no published data available.			

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE	
IC INDUSTRIES (ABEX CORP.)	B,D	65.0	12/79	
Location and Number of Plants				
United States		Outside the U.S.		
The company operates 44 plants in the U.S.		Canada	4	
		Mexico	}	
		India		15
		Italy		
		Morocco		
Total	44	Total	19	
Total of All Plants 63				

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY ITT	PRODUCT CODE** B,C,F,C	TOTAL EMPLOYMENT (000) 379.0	EFFECTIVE DATE 12/78
Location and Number of Plants***			
United States		Outside the U.S.	
MI	6 Livonia, Southfield Madison Heights, Jackson, Oak Park, Rochester	Belgium	1
NJ	1 Piscataway	Canada	1
NY	1 Tonawanda	Italy	1
		Netherlands	1
		West Germany	1
Total	8	Total	5
Total of All Plants 13			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

\*\*\*U.S. and foreign plants listed here are engaged in auto-related product manufacturing only.

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
INGERSOLL-RAND CO. (TORRINGTON, CO.)	E,D	47.5	12/79
Location and Number of Plants			
United States		Outside the U.S.	
CT	1 Torrington	Australia	1
GA	3 Danlonega, Sylvania, Cairo	Brazil	1
IN	1 South Bend	Canada	1
NC	1 Rutherfordton	United Kingdom	2
SC	3 Clinton, Union, Vallhalla	West Germany	1
Total	9	Total	6
Total of All Plants 15			

\*Sources: Standard & Poor's, 1980  
Phone communication with Ingersoll-Rand, 9/22/80

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY INTERNATIONAL PACKING	PRODUCT CODE** B,E,S,C	TOTAL EMPLOYMENT (000) 1.9	EFFECTIVE DATE 1978
Location and Number of Plants			
United States		Outside the U.S.	
IN	3 Scottsburg, Shelbyville, Morristown	Canada	1
NH	2 Bristol, Northfield		
OH	1 Milan		
Total	6	Total	1
Total of All Plants 7			

\*Sources: Standard & Poor's, 1980  
Phone communication with International Packing, 9/22/80

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
IRVIN INDUSTRIES	E,D,F,C	2.0	1979
Location and Number of Plants			
United States		Outside the U.S.	
AR	1 Blytheville	Canada	1
CA	1	England	2
CO	1	Holland	1
KY	1	Italy	1
MA	1	Spain	1
MS	1 Greenwood	Sweden	1
Total	6	Total	7
Total of All Plants 13			

Automotive-related manufacturing is conducted in plants in Arkansas, Mississippi, Italy, Spain, and Holland.

\*Sources: Standard & Poor's, 1980  
Phone communication with Irvin Industries, 9/22/80

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
LEAR SIEGLER	B,D,F,C,S	25.1	6/79
Location and Number of Plants***			
United States		Outside the U.S.	
AR	1	Canada	5
CA	9 Santa Monica and Others	England	1
CO	1	Italy	1
IA	2	West Germany	5
IL	2		
IN	3		
KS	3		
KY	2		
MA	1		
MI	9 Detroit Area (5) and Others		
MN	3		
MS	1		
NC	2		
NJ	1 Piscataway		
OH	2		
OR	1		
TN	1		
UT	1		
Total	45	Total	12
Total of All Plants 57			

\*\*\*The plants listed here are engaged in auto-related manufacturing. The company operates 42 other non-auto-related facilities.

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY LUCUS INDUSTRY INC.	PRODUCT CODE** B,E,C,S	TOTAL EMPLOYMENT (000) —	EFFECTIVE DATE —
Location and Number of Plants			
United States		Outside the U.S.***	
SC	1 Greenville	United Kingdom	51
		Other European	16
		All Others	40
Total	1	Total	107
Total of All Plants 108***			

\*\*\*There are numerous distribution centers in Canada (not included).

\*Sources: Ward's Automotive Yearbook, 1980  
Phone communication with Lucus Industry, 9/23/80

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY METAL AND AUTOMOTIVE INDUSTRY	PRODUCT CODE** E,F,C	TOTAL EMPLOYMENT (000) —	EFFECTIVE DATE —
This is a private company with no published data available.			

COMPANY METEX	PRODUCT CODE** E	TOTAL EMPLOYMENT (000) 0.4	EFFECTIVE DATE 3/80
Location and Number of Plants			
United States		Outside the U.S.	
CA	1 Torrence	None	
NJ	3 Edison		
Total of All Plants 4			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
MIDLAND-ROSS CORP.	B,F	13.5	12/79
Location and Number of Plants			
United States		Outside the U.S.	
AZ	2 Tempe, Chandler	Australia	1
CA	2 Long Beach, Oakland	Belgium	1
CT	1 Plymouth	Brazil	1
FL	1 Delray Beach	Canada	4
IL	2 Melrose Park, Cicero	France	2
IN	1 Goshen	Mexico	1
KY	1 Dawson Springs	United Kingdom	1
MI	7 Owosso, Caseville, Grand Rapids, Detroit Area (2), Bay City, Others		
NC	1 Morgantown		
NJ	4 Livingston, Somerset, Highland Pk., Fairfield		
OH	4 Toledo (2), Columbus, Urbana		
PA	5 Philadelphia, Pittsburgh (2), Sharon, Fallsington		
SC	1 Greenwood		
TN	2 Athens, Paris		
TX	1 Houston		
Total	41***	Total	11
Total of All Plants 52			

\*\*\*The company also operates 6 warehouses not listed above.

\*Source: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY MODINE MFG. CO.	PRODUCT CODE** E,C	TOTAL EMPLOYMENT (000) 3.6	EFFECTIVE DATE 3/79
Location and Number of Plants			
United States		Outside the U.S.	
CA	1	None	
GA	1		
IL	2		
IN	2		
KS	1		
KY	1		
MO	3		
OH	2		
TN	3		
VA	1		
Total of All Plants 17			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
PARKER- HANNIFIN	B,F	20.2	6/79
Location and Number of Plants			
United States		Outside the U.S.	
AL	3	Argentina	1
AR	1	Australia	1
AZ	1	Brazil	1
CA	6	Canada	3
CO	1	Denmark	1
CT	3	England	5
FL	1	Finland	1
GA	1	France	2
IL	2	Italy	2
KS	1	Japan	1
KY	2	Mexico	1
LA	1	Netherlands	1
MI	6	Singapore	1
MN	2	South Africa	1
MO	1	Spain	2
MS	2	Sweden	1
NJ	3	West Germany	5
NV	1		
NY	3		
OH	17		
OR	1		
TN	2		
TX	2		
UT	2		
WI	2		
Puerto Rico	1		
Total	68	Total	30
Total of All Plants 98			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY PUROLATOR INC.	PRODUCT CODE** E,S	TOTAL EMPLOYMENT (000) 14.4*** (Mfg. 2.9)	EFFECTIVE DATE 12/78
Location and Number of Plants			
United States		Outside the U.S.	
AR CA IN MD NC NJ PA	1 Pine Bluff 1 Newbury Park 1 Connersville 1 Hunt Valley 1 Fayetteville 1 Rahway 1 Ringtown	Canada (Estimate)	2
Total	8 (Estimate)	Total	2 (Estimate)
Total of All Plants 10 (Estimate)			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY RAYBESTOS- MANHATTAN	PRODUCT CODE** B,D	TOTAL EMPLOYMENT (000) 5.2	EFFECTIVE DATE 1979
Location and Number of Plants			
United States		Outside the U.S.	
CA	1	Australia	1
CT	2	Canada	1
IN	1	Ireland	1
MS	1	West Germany	1
NC	1		
OH	1		
PA	2		
SC	1		
Total	10	Total	4
Total of All Plants 14			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
REYNOLDS- METALS CO.	F	37.3	1979
Location and Number of Plants			
United States:		Outside the U.S.	
		Canada	1
		Jamaica	1
		West Germany	1
		Other	6
Total	43	Total	9
Total of All Plants 52			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
ROBERTSHAW CONTROLS	B,E,F,C,S	10.1	12/79
Location and Number of Plants			
United States		Outside the U.S.	
CA	4	Canada	1
CT	2	Unconsolidated foreign subsidiaries operate plants in:	
GA	2	Australia	1
MA	2	Brazil	1
MI	1	France	1
NJ	1	Japan	1
OH	2	(Estimate)	
PA	2		
TN	3		
TX	1		
VA	2 Richmond		
Total	22	Total	5 (Estimate)
Total of All Plants 27 (Estimate)			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
ROCKWELL INTERNATIONAL	B,F,D,S	114.0*** Auto. Operations 30.0	9/79
Location and Number of Plants***			
United States		Outside the U.S.	
CA	3 Fresno, Hayward, LaPalma	Australia	2
IA	1 Fairfield	Belgium	1
IL	2 Chicago, Centralia	Brazil	1
IN	2 Knox, Logansport	Canada	8
KS	1 Atchison	France	5
KY	2 Florence, Winchester	Italy	1
MI	4 Allegan, Battle Creek, Chelsea, Troy	United Kingdom	7
MO	1 St. Joseph	West Germany	2
MS	1 Grenada	Other	6
OH	5 Ashtabula, Kenton, Maryville, Newark, Wellington		
PA	1 New Castle		
TN	3 Chatanooga, Memphis, Morristown		
WI	1 Oshkosh		
Total	27	Total	33
Total of All Plants 60			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

\*\*\*The plants listed (U.S. and foreign) are engaged in manufacturing of auto-related products. The company also operates 60 non-auto-related plants in the U.S., 3 in Canada, 13 in Europe, and 8 in other foreign countries.

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
SCOVILL, INC.	S,D	23.3***	1979
Location and Number of Plants			
United States		Outside the U.S.	
CA	3	Australia	2
CT	1	Brazil	2
GA	1	Canada	6
IA	1	Columbia	1
KY	2	France	2
MA	1	India	1
MI	2	Hong Kong	1
NJ	2	Italy	1
NC	6	Japan	2
NY	2	Mexico	3
OH	8 Akron and Others	New Zealand	1
OR	1	South Africa	1
SC	1	Sweden	1
TN	4 Nashville and Others	United Kingdom	7
TX	1	Venezuela	1
VA	1	West Germany	2
Puerto Rico	1		
Total	38	Total	34
Total of All Plants 86			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

\*\*\*Includes 14 unidentified plants

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY SEALED POWER CORP.	PRODUCT CODE** E,B,F,S	TOTAL EMPLOYMENT (000) 5.3	EFFECTIVE DATE 4/80
Location and Number of Plants			
United States		Outside the U.S.	
IL	1	Mexico	2
IN	1		
KY	1		
MI	6 Muskeegan and Others		
OH	1		
Total	10	Total	2
Total of All Plants 12			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY SHELLER GLOBE CORP.	PRODUCT CODE** B,F,S,C	TOTAL EMPLOYMENT (000) 13.5	EFFECTIVE DATE 9/79
Location and Number of Plants			
United States		Outside the U.S.	
CA	1 Fresno	Canada	4
CO	1 Denver	Columbia	1
FL	2 Melbourne, Ft. Lauderdale	Mexico	3
GA	1 Gainesville	Portugal	1
IL	1 Quincy	San Salvador	1
	5 Union City, Kokomo and Others		
IA	2 Iowa City		
KY	1 Morganfield		
MI	3 Detroit, Niles, Livonia		
MS	2 Tupelo, Kosciusko		
NJ	1 South River		
NY	1 Carle Place		
OH	8 Cleveland, Toledo and others		
PA	2 Dublin, Bristol		
TX	1 Brownsville		
VA	1 Norfolk		
Total	33	Total	10
Total of All Plants 43			

\*Source: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY SIGNAL COS. INC.	PRODUCT CODE** E,C	TOTAL EMPLOYMENT (000) 53.0	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States ***		Outside the U.S.	
AZ	1	Brazil	1
CA	1	Canada	1
FL	1	England	1
NJ	1	France	1
		Ireland	1
		Japan	1
		Singapore	1
		West Germany	1
Total	4 (Estimate)	Total	8 (Estimate)
Total of All Plants 12 (Estimate)			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

\*\*\*Plants listed in the United States reflect the manufacturing facilities of the Garrett Corp. only. The company reports that it operates a total of 1,490 facilities of all kinds: 1,120 in the U.S., 95 in Canada, and 275 in other countries.

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
A.O. SMITH CORP.	F,D	12.7	12/79
Location and Number of Plants			
United States		Outside the U.S.	
AR	2 Little Rock	Canada	1
CA	2 Irvine, Newark	England	1
IL	4 Eureka, Kenkakee, Arlington Hts., DeKalb	Ireland	1
KY	1 Mt. Sterling	Japan	1
NC	1 Mebane	Mexico	1
OH	1 Tipp City	Netherlands	1
SC	1 McBee		
TN	1 Milan		
WA	1 Seattle		
WI	2 Milwaukee, Elkhorn		
Total	16***	Total	6
Total of All Plants 22			

\*Sources: Standard & Poor's, 1980  
Phone communication with A.O. Smith Corp., 9/24/80

\*\*See Product Code at end of Table 8

\*\*\*Automotive products are manufactured in two of the plants listed,  
Milwaukee, WI and Milan, TN

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY STANADYNE INC.	PRODUCT CODE** E,F,S	TOTAL EMPLOYMENT (000) 7.1	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
CT	2 Windsor	Canada	1
IL	2		
IN	2		
NC	3		
NV	1		
OH	2		
PA	1		
Total	13	Total	1
Total of All Plants 14			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY STANDARD PRODUCTS	PRODUCT CODE** F,C	TOTAL EMPLOYMENT (000) 4.8	EFFECTIVE DATE 6/79
Location and Number of Plants			
United States		Outside the U.S.	
CA	2	Brazil	1
GA	2	Canada	5
KY	1	Spain	1
MI	1	United Kingdom	2
NJ	2		
NY	2		
OH	2		
SC	2		
TX	1		
Total	15	Total	9
Total of All Plants 24			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY STEWART- WARNER CORP.	PRODUCT CODE** E,C	TOTAL EMPLOYMENT (000) 9.0	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
CT	1 Bridgeport	Belgium	1
IL	9 Chicago (5) and Others	Canada	1
IN	1 Indianapolis	England	2
NC	1 Winston-Salem	France	1
TN	1 Johnston City	Italy	1
		Mexico	1
		West Germany	2
Total	13	Total	9
Total of All Plants 22			

\*Source: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY TRW	PRODUCT CODE** E,S,C	TOTAL EMPLOYMENT (000) 97.9	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
IN	X Noblesville, Lafayette	Canada	11
MA	X Cambridge	All Others	79
MI	X Sterling Heights		
MO	X St. Louis		
NJ	X Mountainside		
OH	X Cleveland, Lorain		
PA	X Newton		
Total	100+	Total	90+
Total of All Plants 190+			

\*Sources: Standard & Poor's, 1980  
Phone communication with TRW, 9/25/80

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY TECUMSEH PROD. CO.	PRODUCT CODE** C	TOTAL EMPLOYMENT (000) 10.8	EFFECTIVE DATE 12/79
Location and Number of Plants			
United States		Outside the U.S.	
IN	1 Elkhart	Canada	1
KY	1 Somerset	West Germany	1
MI	6 Owosso, Welled Lake, Clinton, Tecumseh, Detroit, Troy		
MS	1 Tupelo		
OH	2 Marion, Toledo		
TN	1 Paris		
WI	3 Sheboygan Falls, New Holstein, Grafton		
Total	15	Total	2
Total of All Plants 17			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT (000)	EFFECTIVE DATE
TELEFLEX INC.	E,S,F,D	1.4	12/79
Location and Number of Plants			
United States		Outside the U.S.	
AR	X	Canada	1
CA	1	England	1
CT	1	(Estimate)	
FL	2		
MI	1 Troy		
NJ	1		
NV	1		
OH	2		
OK	1		
PA	1 Limerick		
RI	3		
Total	15+	Total	2 (Estimate)
Total of All Plants 17+ (Estimate)			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY TENNECO	PRODUCT CODE** E,S	TOTAL EMPLOYMENT (000) 107.0	EFFECTIVE DATE 12/79	
Location and Number of Plants				
United States		Outside the U.S.		
MI	X Monroe	} ***	Argentina	1
TX	X Houston		Belgium	1
WI	X		Brazil	4
			Canada	1
			Denmark	1
			France	1
			Ireland	1
			Japan	1
			Spain	1
			Sweden	1
			Switzerland	1
			United Kingdom	4
			West Germany	3
Total	34	Total	21	
Total of All Plants 55				

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

\*\*\*These plants are engaged in auto-related operations.

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY TEXAS INSTRUMENTS	PRODUCT CODE** B,F	TOTAL EMPLOYMENT (000) 85.8	EFFECTIVE DATE 12/79
Location and Number of Plants***			
United States		Outside the U.S.	
MA	2 Attleboro	None	
TX	1 Dallas		
Total of All Plants 3			

\*Sources: Standard & Poor's, 1980

Ward's Automotive Yearbook, 1980

\*\*See Product Code at end of Table 8

\*\*\*Plants engaged in automotive product manufacturing only.

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY	PRODUCT CODE**	TOTAL EMPLOYMENT	EFFECTIVE DATE
TIMKEN CO.	E,D	(000) 23.8	12/79
Location and Number of Plants			
United States		Outside the U.S.	
CO	1 Colorado Springs	Australia	1
NC	1	Brazil	1
OH	8 Columbus and Others	Canada	2
PA	1 Latrobe	France	1
SC	1	South Africa	1
		United Kingdom	2
Total	12	Total	8
Total of All Plants 20			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY TRICO PRODUCTS CORP.	PRODUCT CODE** C	TOTAL EMPLOYMENT (000) 3.3	EFFECTIVE DATE 12/78
Location and Number of Plants			
United States		Outside the U.S.	
NY	3 Buffalo and Others	Australia	1
		Canada	1
		England	2
Total	3	Total	4
Total of All Plants 7			

\*Sources: Standard & Poor's, 1980  
Corporate Annual Report

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY UNITED TECHNOLOGIES (AM. BORCH)	PRODUCT CODE** E,C	TOTAL EMPLOYMENT (000) 197.7	EFFECTIVE DATE 12/79
Location and Number of Plants***			
United States		Outside the U.S.	
CA	1	Canada	1
CT	1	Europe	4
FL	1		
IN	X		
KS	1		
MI	X		
OH	X		
Total	21	Total	5
Total of All Plants 26			

\*Sources: Standard & Poor's, 1980

Phone communication with United Technologies, 9/26/80

\*\*See Product Code at end of Table 8

\*\*\*The plants listed here are engaged in auto-related manufacturing only.  
The company operates an aggregate of 330 facilities worldwide.

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY E.R. WAGNER MANUFACTURING CO.	PRODUCT CODE** B,D,S,F	TOTAL EMPLOYMENT (000) 0.5	EFFECTIVE DATE 2/79
Location and Number of Plants			
United States		Outside of U.S.	
TX WI	1 Denton 3 Milwaukee	None	
Total of All Plants 4			

\*Source: Standard & Poor's, 1980

\*\*See Product Code at end of Table 8

TABLE 8. EMPLOYMENT AND PLANTS OF SUPPLIERS OF  
ENGINEERED MECHANICAL COMPONENTS\* (CONT.)

COMPANY WAGNER ELECTRIC	PRODUCT CODE** B	TOTAL EMPLOYMENT (000) 4.3	EFFECTIVE DATE 9/80
Location and Number of Plants***			
United States		Outside of U.S.	
AL	1	None	
KY	1		
MO	1		
NC	1		
PA	2		
TN	2		
Total of All Plants 8			

\*Source: Standard & Poor's, 1980  
Phone communication with Wagner Electric, 9/29/80

\*\*See Product Code at end of Table 8

\*\*\*These plants are engaged in automotive product manufacturing.

PRODUCT CODE FOR TABLES 1-8

- B - Brake Components, Assemblies, and Systems
- C - Safety and Comfort Component Assemblies, and Systems
- D - Drivetrain Components, Assemblies, and Systems
- E - Engine Components, Assemblies, and Systems (Internal and External)
- F - Structure Members (Frames, Bodies, and Bumpers)
- S - Steering/Suspension Components, Assemblies, and Systems

TABLE 9. HISTORICAL EMPLOYMENT STATISTICS FOR MOTOR VEHICLES AND PARTS INDUSTRY

YEAR	EMPLOYMENT IN MOTOR VEHICLE AND PARTS*						TOTAL AS % OF ALL EMPLOYMENT
	TOTAL	THOUSANDS			PARTS	TOTAL AS % OF ALL MANUFACTURING	
		AUTOS	TRUCKS				
1960	724.1	361.2	30.9	313.0	4.3	1.1	
1970	799.0	382.1	66.0	351.3	4.1	1.0	
1971	848.5	420.2	67.7	361.3	4.6	1.1	
1972	874.8	415.2	76.5	383.0	4.6	1.1	
1973	976.5	461.6	85.0	429.9	4.9	1.2	
1974	907.7	416.2	88.9	402.7	4.5	1.1	
1975	792.4	375.3	64.7	352.5	4.3	0.9	
1976	861.0	415.9	66.0	399.0	4.6	1.0	
1977	938.0	439.8	73.9	424.3	4.8	1.0	
1978	977.1	451.5	82.0	443.6	4.8	1.0	
1979	982.8	444.2	82.1	456.5	4.7	1.0	
1980							
YEAR QTR							
1978 IV	1031.9	475.0	83.3	466.9	5.0	1.1	
1979 I	996.8	450.2	87.7	458.9	4.8	1.0	
II	998.6	452.7	88.9	456.9	4.8	1.1	
III	928.3	409.9	81.8	436.6	4.4	1.0	
IV	936.2	425.5	79.1	430.5	4.5	1.0	
1980 I	861.1	384.5	74.7	401.9	4.2	0.9	
II	750.3	339.5	69.4	341.4	3.7	0.8	
III	715.2	328.6	65.7	319.9	3.6	0.7	
AVERAGE							
1960-76					4.4	1.0	
1977-79					4.8	1.0	

\*By SIC Code. This major group includes establishments engaged in Manufacturing.

DEFINITIONS:

- Employment includes establishments primarily engaged in manufacturing or assembling complete passenger automobiles, trucks, commercial cars and buses, special purpose motor vehicles, and motor vehicle parts & accessories. Source: U.S. Department of Labor, Bureau of Labor Statistics, Employment & Earnings.

TABLE 10. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES - VALUE OF ANNUAL PRODUCT SHIPMENTS\* BY ALL U.S. PRODUCERS, 1972 THROUGH 1977

YEAR	VALUE IN CURRENT DOLLARS (MILLIONS) - % CHANGE	GNP PRICE DEFULATOR	VALUE IN CONSTANT 1972 DOLLARS (MILLIONS) - % CHANGE
1972	19,417.0 <sup>1&amp;2</sup>	100.0 <sup>3</sup>	19,417.0 -
73	22,855.7 <sup>2</sup>	105.8 <sup>3</sup>	21,602.7 +11.3
74	22,669.7 <sup>2</sup>	116.0 <sup>3</sup>	19,542.8 -9.5
75	23,023.4 <sup>2</sup>	127.2 <sup>3</sup>	18,100.2 -7.4
76	30,384.7 <sup>2</sup>	133.9 <sup>3</sup>	22,692.1 +25.4
77	37,841.8 <sup>1</sup>	141.6 <sup>4</sup>	26,724.4 +17.8
78	41,867.2 <sup>6</sup> (Estim)	152.1 <sup>5</sup>	27,526.1 <sup>6</sup> (Estim) +3.0 <sup>6</sup>
79	46,922.4 <sup>6</sup> (Estim)	165.5 <sup>5</sup>	28,351.9 <sup>6</sup> (Estim) +3.0 <sup>6</sup>
1972-79	7-Year Period	-	7-Year Period +46.0 (Estim)
1972-79	Average Annual Growth	-	Average Annual Growth +6.6

<sup>1</sup>Source: 1977 Census of Manufacturers, U.S. Department of Commerce, Bureau of the Census, Aug. 1980.

<sup>2</sup>Source: Annual Survey of Manufacturers, 1977, U.S. Department of Commerce, Bureau of the Census.

Note: This is the latest Annual Survey published as of Aug. 1980.

<sup>3</sup>Source: Business Statistics, 1977, U.S. Department of Commerce, Bureau of Economic Analysis (p. 5 - General Business Indicators).

<sup>4</sup>Source: Survey of Current Business, Dec. 1978, U.S. Department of Commerce, Bureau of Economic Analysis (p. 11 - Table 19).

<sup>5</sup>Source: Survey of Current Business, Sep. 1980 (p. 16 - Table 19).

<sup>6</sup>Source: "Business Week," Sep. 24, 1979. Estimated growth of automotive parts sales to the Big Three is 3 percent annually in real terms. Such OEM sales represent 75 percent of all shipments.

\*"Product shipments" are defined by the Bureau of the Census as..."the total value of shipments of products classified as primary to an industry that were shipped by all manufacturing establishments regardless of [the manufacturers'] industry classification."

EXPLANATION OF NOTES IN TABLES 11 AND 12

Note: In 1977 Census of Manufactures, shipments data for establishments of small single-unit companies with up to 20 employees were estimated from administrative records data rather than data actually collected from respondents. Employment cutoff used for administrative records for each industry and shipments figures are included in code ending with "002." In both 1977 and 1972 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (5 digits) followed by "00" or, in some cases, to appropriate product group code (4 digits) followed by "0 00."

- Represents zero. (D) Withheld to avoid disclosing operations of individual companies. (NA) Not available. n.s.k. Not specified by kind. (S) Withheld because estimate did not meet publication standards. (X) Not applicable. (Z) Less than 50 thousand dollars or hours; under 50 employees.

<sup>1</sup>Quantity and value reported by all producers of product, not just those with shipments of \$100,000 or more.

<sup>2</sup>For some establishments, data have been estimated from central unit values, which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figures:

\* indicates 10 to 19 percent estimated, \*\* indicates 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

<sup>3</sup>In 1972, product code 37112 32 was included with product code 37112 48.

<sup>4</sup>For 1977, data for product classes 37113, 37114, 37115, and n.s.k. product code 37110 00 were combined to avoid disclosing operations of individual companies.

<sup>5</sup>Industry 3713 and product class 37132 were revised for 1977 to exclude motor homes built on purchased chassis, which are now classified in Industry 3716, MOTOR HOMES. 1972 data are revised downward by \$509.6 million from values previously published.

<sup>6</sup>For 1977, data for product code 37131 12 were included with product code 37131 55 to avoid disclosing operations of individual companies.

<sup>7</sup>For 1972, data for product codes 37131 00 and 37132 00 were included with product code 37130 00.

EXPLANATION OF NOTES IN TABLES 11 AND 12 (CONT.)

<sup>8</sup>Limited to shipments of products classified in industry 3714. Additional shipments of motor vehicle parts were classified outside industry 3714. For 1977, those with greatest value were: stampings, \$9.3 billion; tires and tubes, \$6.8 billion; motor vehicle hardware, \$2.2 billion; engine electrical equipment, \$2.2 billion; and diesel engines, \$1.3 billion.

<sup>9</sup>Includes \$1,286.8 million for which respondents did not indicate whether shipments were for replacement, OEM, or export.

<sup>10</sup>Limited to rebuilding on a factory basis. Rebuilding operations performed in service stations, garages, etc., were excluded from census. Figures may be somewhat understated because of exclusion of data for establishments with less than 10 employees. Such establishments were typically not included in mail portion of census, but were included in published data by use of data from administrative records. These estimates are included in value shown for product code 37140 02. Although use of such administrative records tend to create a small understatement for most specific products, effect is more significant for those products typically produced in small establishments, such as rebuilding facilities.

<sup>11</sup>For 1972, data for product codes 37141 67 and 37141 98 were combined to avoid disclosing operations of individual companies.

<sup>12</sup>Includes \$1,336.6 million for which respondents did not indicate whether shipments were for replacements, OEM, or export. Difference was distributed proportionately using ratios of reported data.

TABLE 11. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES -  
 VALUE OF PRODUCT SHIPMENTS IN 1977 BY ALL U.S.  
 PRODUCERS BY PRODUCT CLASS AND MARKET†

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE		VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		
3714- --	TOTAL.....	(NA)	(X)	<sup>8</sup> 37,841.8	(X)	(X)	(X)	(X)
37141 --	Motor Vehicle Parts and Accessories, Including Gasoline Engines, but Excluding Kits and Re- built Parts.....	(NA)	(X)	36,735.4	(X)	(X)	(X)	(X)
37141 11	Motor Vehicle Parts and Accessories, Excluding n.s.k.....	(NA)	(X)	36,629.3	(X)	5,373.3	28,342.6	2,913.4
37141 17	Gasoline Engines, New (With or Without Cylinder Heads, Fuel Pumps, Water Pumps, and Other Standard Acces- sories).....	6	10.0	5,528.4	.2	128.2	4,933.4	466.8
37141 21	Hub and Drum Assemblies....	13	31.9	479.5	1.1	34.3	429.5	15.7
37141 23	Fuel Pump Assemblies.....	10	19.3	88.1	7.8	39.0	46.5	2.6
37141 24	Water Pump Assemblies.....	14	10.4	112.4	3.9	45.5	62.6	4.3
37141 25	Filters:							
37141 26	Fuel.....	17	**57.8	44.9	**33.7	32.4	9.0	3.5
37141 27	Oil.....	24	*340.9	424.6	*259.3	333.6	75.3	15.7
37141 28	Air.....	23	**131.7	190.0	**100.9	148.9	32.1	9.0
37141 29	Hydraulic.....	8	*5.3	13.1	1.4	4.7	(D)	(D)
37141 30	Coolant.....	4	(S)	4.6	(D)	(D)	(D)	(D)
37141 31	Exhaust System Components: Mufflers, Including Regular or Standard, Sports or Glass Pack, and Resonators.....	31	**44.4	419.6	**24.3	192.4	211.4	15.9
37141 32	Pipes, Including Exhaust Tail, Intermediate, Connecting, and Crossover.....	34	**80.8	341.0	**40.6	171.5	164.1	5.5
37141 33	Radiators, Complete.....	23	*17.9	719.3	.9	35.4	674.1	9.8

TABLE 11. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES -  
 VALUE OF PRODUCT SHIPMENTS IN 1977 BY ALL U.S.  
 PRODUCERS BY PRODUCT CLASS AND MARKET† (CONT.)

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE		VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		
37141 32	Brake Parts and Assemblies: Brake Cylinders: Wheel.....	7	35.5	69.8	*9.4	28.2	40.2	1.3
37141 34	Master.....	8	21.4	275.8	7.4	54.7	191.9	29.2
37141 33	Brake Valves.....	7	*28.7	50.5	(D)	(D)	38.6	(D)
37141 36	Brake Shoe Assemblies (Drum Brake).....	20	30.3	221.3	2.9	13.7	198.6	9.0
37141 38	Brake Caliper Assemblies (Disc Brake).....	14	37.8	346.1	*1.1	11.4	313.8	20.8
37141 14	Brake Discs.....	15	30.9	109.9	(D)	(D)	99.3	(D)
37141 35	Wheels: Passenger Car Type.....	19	*66.0	626.6	**14.5	197.0	408.3	21.3
37141 37	Truck and Bus Type, Including Those for Truck Trailers and Trailer Coaches.....	15	20.4	356.9	3.4	61.2	271.8	23.9
37141 41	Transmission, Except Auxiliary, and Parts: Manual: Passenger Car Type.....	4	.4	66.7	(D)	(D)	60.1	(D)
37141 45	Truck and Bus Type.....	12	1.5	598.3	(Z)	3.8	513.1	81.4
37141 48	Parts for Manual Trans- missions..... Automatic: Passenger Car Type.....	10	(X)	110.1	(X)	84.1	10.8	15.2
37141 43	Truck and Bus Type.....	3	9.8	2,081.3	(D)	(D)	1,807.2	(D)
37141 47	Parts for Automatic Trans- missions.....	5	3.5	812.3	(D)	(D)	727.4	(D)
37141 51	Universal Joints.....	20	(X)	390.1	(X)	95.5	246.9	47.7
37141 53	Turn Signal Flashers.....	10	23.2	171.7	4.0	38.6	126.5	6.5
37141 55	Ball Joints.....	3	(D)	(D)	(D)	(D)	(D)	(D)
		8	48.0	134.2	(S)	49.8	73.9	10.5

TABLE 11. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES -  
 VALUE OF PRODUCT SHIPMENTS IN 1977 BY ALL U.S.  
 PRODUCERS BY PRODUCT CLASS AND MARKET† (CONT.)

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE		VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		
	Engine Bearings:							
37141 56	Main (Halves).....	5	194.4	61.8	34.1	14.2	41.8	5.8
37141 57	Connecting Rod (Halves).....	11	405.8	123.5	84.8	29.6	80.4	13.5
37141 58	Camshaft (Halves).....	6	93.8	25.2	23.0	6.3	16.4	2.5
37141 61	Shock Absorbers.....	61	*100.9	482.5	47.3	278.6	178.8	25.1
37141 63	Oil Pumps, Engine.....	8	8.5	52.7	(D)	(D)	31.9	(D)
37141 64	Oil Pumps for Power Steering..	6	3.5	75.1	.2	3.0	62.4	9.7
37141 65	Thermostats (Engine, Cooling System).....	7	46.0	30.7	20.7	17.9	7.3	5.5
37141 66	PCV (Positive Crankcase Ventilation) Valves.....	8	(S)	16.3	(D)	(D)	8.4	(D)
37141 67	Tie Rod Ends.....	10	11.9	50.7	(D)	(D)	23.4	(D)
37141 68	Steering Idler Arms, Drag Link, and Control Arms.....	11	*56.7	341.3	(D)	(D)	273.6	(D)
37141 71	Universal Joint Repair Kits...	2	(D)	(D)	(D)	(D)	(D)	(D)
37141 73	Windshield Wiper Blades and Arms.....	8	(D)	(D)	(D)	(D)	(D)	(D)
37141 12	Crankshafts, Engine.....	10	**1.0	29.0	.1	3.8	25.0	.2
37141 75	Camshafts, Engine.....	14	3.3	54.2	1.0	17.4	31.9	4.9
37141 76	Rocker Arms and Parts.....	12	139.7	62.2	(S)	13.7	44.3	4.2
37141 78	Valve Guides, Seats, Tappets..	11	178.7	118.3	(D)	(D)	74.2	(D)
37141 81	Clutch Disc and Facing Assemblies.....	14	30.5	173.6	*8.7	55.3	103.2	15.2
37141 87	Convertible Tops.....	7	.2	13.5	.1	7.9	(D)	(D)
37141 91	Automotive Air-Conditioning Hose Assemblies.....	5	(D)	(D)	(D)	(D)	(D)	-
37141 93	Automotive Power Steering Hose Assemblies (Power Transfer and Cooling).....	5	13.6	31.6	2.6	6.2	(D)	(D)

TABLE 11. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES -  
 VALUE OF PRODUCT SHIPMENTS IN 1977 BY ALL U.S.  
 PRODUCERS BY PRODUCT CLASS AND MARKET† (CONT.)

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE		VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		
37141 95	Automotive Brake Hose Assemblies.....	6	(D)	(D)	(D)	(D)	(D)	(D)
37141 98	All Other Parts and Acces- sories for Passenger Cars, Trucks, and Buses.....	(NA)	(X)	9,19,831.1	(X)	2,902.9	15,350.2	1,578.0
37141 00	Motor Vehicle Parts and Acces- sories, Excluding Kits and Rebuilt Parts, n.s.k.....	(NA)	(X)	106.3	(X)	(X)	(X)	(X)
37143 --	Rebuilt Automotive Components, Including Gasoline Engines, But Excluding Carburetors, Generators, Alternators, and Starting Motors <sup>10</sup> .....	(NA)	(X)	592.9	(X)	(X)	(X)	(X)
37143 21	Fuel Pumps.....	14	*1.3	5.3	(X)	(X)	(X)	(X)
37143 23	Water Pumps.....	47	*7.5	63.5	(X)	(X)	(X)	(X)
37143 24	Oil Pumps.....	2	.1	1.0	(X)	(X)	(X)	(X)
37143 26	Clutch Discs and Pressure Plates.....	41	**4.7	67.0	(X)	(X)	(X)	(X)
37143 31	Gasoline Engines.....	43	*.7	117.4	(X)	(X)	(X)	(X)
37143 44	Automatic Transmissions.....	9	.2	11.1	(X)	(X)	(X)	(X)
37143 45	Manual Transmissions.....	3	(S)	1.0	(X)	(X)	(X)	(X)
37143 46	Brake Shoe Assemblies (Drum Brake).....	40	(S)	45.1	(X)	(X)	(X)	(X)
37143 47	Brake Caliper Assemblies (Disc Brake).....	18	(S)	7.9	(X)	(X)	(X)	(X)
37143 98	All Other Rebuilt Parts.....	(NA)	(X)	267.7	(X)	(X)	(X)	(X)
37143 00	Rebuilt Engines and Parts for Motor Vehicles, Except Carburetors, n.s.k.....	(NA)	(X)	5.9	(X)	(X)	(X)	(X)

TABLE 11. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES -  
 VALUE OF PRODUCT SHIPMENTS IN 1977 BY ALL U.S.  
 PRODUCERS BY PRODUCT CLASS AND MARKET† (CONT.)

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE		VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		
37140 00	Motor Vehicle Parts and Accessories, n.s.k., Typically for Establish- ments with 5 Employees or more (See Note).....							
37140 02	Motor Vehicle Parts and Accessories, n.s.k., Typically for Establish- ments with Less Than 5 Employees (See Note).....	(NA)	(X)	203.8	(X)	(X)	(X)	(X)
Total Shipments to Replacement Markets (Millions)..... \$5,373.3 Total Shipments to OEM Markets (Millions)..... \$28,342.6 Total Shipments to Export Markets (Millions)..... \$2,913.4 <b>TOTAL ALL SHIPMENTS: \$37,841.8 Million.</b>								

See explanation of notes on pp. 7-114 to 7-115.

Source: 1977 Census of Manufactures, Bureau of the Census, U.S. Department of Commerce #MC77-1-37A, Aug. 1980.

†Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of the products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included.

TABLE 12. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES - VALUE OF PRODUCT SHIPMENTS IN 1972 BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKETS<sup>+</sup>

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE		VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		
	MOTOR VEHICLE PARTS AND ACCESSORIES							
3714- --	Total.....	(NA)	(X)	19,417.0	(X)	(X)	(X)	(X)
37141 --	Motor Vehicle Parts and Acces- sories, Including Gasoline Engines, but Excluding Kits and Rebuilt Parts.....	(NA)	(X)	18,766.8	(X)	(X)	(X)	(X)
37141 11	Motor Vehicle Parts and Accessories, Excluding n.s.k.....	(NA)	(X)	18,573.7	(X)	2,788.1	14,665.9	1,119.7
37141 17	Gasoline Engines, New (With or Without Cylinder Heads, Fuel Pumps, Water Pumps, and Other Standard Acces- sories).....	(NA)	8.0	2,516.5	.2	52.8	2,229.0	234.7
37141 21	Hub and Drum Assemblies.....	(NA)	67.2	600.7	8.5	61.1	531.0	8.6
37141 23	Fuel Pump Assemblies.....	(NA)	20.8	57.5	7.9	27.1	28.8	1.6
	Water Pump Assemblies.....	(NA)	11.6	75.9	6.6	42.4	28.9	4.6
	Exhaust Systems:							
37141 27	Mufflers, Including Regular or Standard, Sport or Glass Pack, and Resonators.....	(NA)	54.5	235.2	32.5	129.7	99.4	6.1
37141 29	Pipes, Including Exhaust Tail, Intermediate, Con- necting, and Crossover.....	(NA)	66.6	165.7	42.3	98.8	63.5	3.4
37141 31	Radiators, Complete.....	(NA)	11.6	312.8	.8	27.3	285.5	

TABLE 12. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES - VALUE OF PRODUCT SHIPMENTS IN 1972 BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKETS+ (CONT.)

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE	VALUE OF SHIPMENTS TO U.S. MOTOR FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)		VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	
37141 32	Brake Cylinders:	(NA)	46.4	63.0	5.5	11.4	6.8	
37141 34	Wheel.....	(NA)	15.2	100.2	(S)	92.9	7.3	
37141 35	Master.....	(NA)	47.9	223.0	7.9	68.6	154.4	
37141 37	Wheels:	(NA)	21.0	231.8	2.3	40.3	181.3	
	Passenger Car Type.....	(NA)						
	Truck and Bus Type, Includ- ing Those for Truck Trailers and Trailer Coaches.....	(NA)					10.2	
	Transmissions, Except Auxiliary, and Parts:							
	Passenger Car Type:	(NA)	.6	51.6	(S)	44.9	6.7	
37141 41	Conventional Transmission....	(NA)	9.6	1,518.0	(S)	1,518.0		
37141 43	Automatic Transmissions....t...	(NA)						
	Truck and Bus Type:							
37141 45	Conventional Transmissions...	(NA)	1.5	349.0	(S)	320.8	28.2	
37141 47	Automatic Transmissions.....	(NA)	1.1	168.4	(S)	168.4		
37141 51	Universal Joints.....	(NA)	18.6	134.1	.6	10.7	7.3	
37141 61	Shock Absorbers.....	(NA)	111.8	306.3	53.8	193.4	14.6	
37141 81	Clutch Disc and Facing Assemblies.....	(NA)	16.1	107.1	6.8	46.1	11.9	
	Filters:							
37141 24	Fuel.....	(NA)	25.2	14.1	18.9	12.1	2.0	
37141 25	Oil.....	(NA)	250.7	266.8	208.9	223.5	36.4	
37141 26	Air.....	(NA)	59.2	94.9	49.7	59.4	6.0	

TABLE 12. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES - VALUE OF PRODUCT SHIPMENTS IN 1972 BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKETS + (CONT.)

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE	VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)			
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)			
37141 56	Engine Bearings: Main (Halves).....	(NA)	289.6	39.0	28.5	8.5	2.4
37141 57	Connecting Rod (Halves).....	(NA)	193.3	37.5	44.6	10.4	2.0
37141 58	Camshaft (Halves).....	(NA)	45.7	7.4	3.2	.8	.5
37141 63	Oil Pumps, Engine.....	(NA)	2.9	16.5	(S)		
37141 64	Oil Pumps for Power Steering.....	(NA)	3.6	45.7	.2		
37141 65	Thermostats (Engine, Cooling System).....	(NA)	18.5	16.5	12.3	3.4	4.0
37141 67	Tie Rod Ends.....	(NA)	( <sup>11</sup> )	( <sup>11</sup> )	( <sup>11</sup> )	9.6	6.9
37141 71	Universal Joint Repair Kits..	(NA)	10.3	19.5	(S)	( <sup>11</sup> )	( <sup>11</sup> )
37141 73	Windshield Wiper Blades and Arms.....	(NA)	(S)	124.0	(S)		
37141 75	Camshafts, Engine.....	(NA)	3.5	25.9	2.5	23.1	.5
37141 76	Rocker Arms and Parts.....	(NA)	(S)	22.8	(S)	2.1	2.5
37141 78	Valve Guides, Seats, Tappets.	(NA)	56.2	38.4	15.4	8.9	
37141 53	Turn Signal Flashers.....	(NA)	18.4	13.0	(S)		
37141 55	Ball Joints.....	(NA)	35.7	65.9	8.9	30.0	3.3
37141 87	Convertible Tops.....	(NA)	1.3	11.2	(S)		
37141 91	Automotive Air Conditioning Hose Assemblies.....	(NA)					
37141 93	Automotive Power Steering Hose Assemblies (Power Transfer and Cooling).....	(NA)	(S)	24.3	(S)		

TABLE 12. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES - VALUE OF PRODUCT SHIPMENTS IN 1972 BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKETS+ (CONT.)

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE		VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		
37141 95	Automotive Brake Hose Assemblies.....	(NA)	27.5	25.2	(S)		25.2	
37141 98	All Other Parts and Acces- sories for Passenger Cars, Trucks, and Buses.....	(NA)	(X) <sup>11</sup>	<sup>12</sup> 10,448.3	(X) <sup>11</sup>	<sup>12</sup> 1,726.5	<sup>11</sup> 128,067.9	<sup>11</sup> 12653.9
37141 00	Motor Vehicle Parts and Accessories, Excluding Kits and Rebuilt Parts, n.s.k....	(NA)	(X)	193.1	(X)	(X)	(X)	(X)
37143 --	Rebuilt Engines and Parts for Motor Vehicles, Except Carburetors <sup>10</sup> .....	(NA)	(X)	365.6	(X)	(X)	(X)	(X)
37143 21	Fuel Pumps.....	(NA)	2.5	9.7	(X)	(X)	(X)	(X)
37143 23	Water Pumps.....	(NA)	6.2	31.6	(X)	(X)	(X)	(X)
37143 26	Clutch Discs and Pressure Plates.....	(NA)	5.4	44.5	(X)	(X)	(X)	(X)
37143 31	Gasoline Engines.....	(NA)	.3	72.1	(X)	(X)	(X)	(X)
37143 44	Automatic Transmissions.....	(NA)	.1	7.1	(X)	(X)	(X)	(X)
37143 98	All Other Rebuilt Parts.....	(NA)	(X)	189.4	(X)	(X)	(X)	(X)
37143 00	Rebuilt Engines and Parts for Motor Vehicles, Except Car- buretors, n.s.k.....	(NA)	(X)	11.2	(X)	(X)	(X)	(X)
37140 00	Motor Vehicle Parts and Acces- sories, n.s.k., Typically for Establishments with 5 Employees or More (See Note).....	(NA)	(X)	211.6	(X)	(X)	(X)	(X)

TABLE 12. MOTOR VEHICLE MECHANICAL PARTS AND ACCESSORIES - VALUE OF PRODUCT SHIPMENTS IN 1972 BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKETS† (CONT.)

1977 PRODUCT CODE	PRODUCT CLASS	NUMBER OF COMPANIES WITH SHIP- MENTS OF \$100,000 OR MORE	PRODUCT SHIPMENTS <sup>1</sup>		SHIPMENTS FOR REPLACEMENT INCLUDING SHIP- MENTS TO U.S. MOTOR VEHICLE MANUFACTURERS FOR RESALE		VALUE OF SHIPMENTS TO U.S. MOTOR VEHICLE MANU- FACTURERS OR THEIR SUPPLIERS FOR USE IN ORIGINAL EQUIP- MENT (MILLION DOLLARS)	VALUE OF SHIPMENTS FOR EXPORT INCLUDING TRANSFERS TO OTHER DIVISIONS FOR EXPORT (MILLION DOLLARS)
			QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)	QUANTITY <sup>2</sup> (MILLION UNITS)	VALUE (MILLION DOLLARS)		
37140 02	Motor Vehicle Parts and Acces- sories, n.s.k., Typically for Establishments with Less Than 5 Employees (See Note).....	(NA)	(X)	73.0	(X)	(X)	(X)	(X)
	Total Shipments to Replacement Markets (Millions)					\$2,788.1		
	Total Shipments to OEM Markets (Millions)						\$14,665.9	
	Total Shipments to Export Markets (Millions)							\$1,119.7
	<b>TOTAL ALL SHIPMENTS: \$19,417.0 Million.</b>							

See explanation of notes on pp. 7-114 to 7-115. Source: 1977 Census of Manufactures (as Table 11).

† Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of the products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Appendix A, Value of Shipments).

TABLE 13. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF IMPORTS OF AUTOMOTIVE MECHANICAL COMPONENTS BY PRODUCT CLASS AND MARKETS - 1975 TO 1979\*

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
207.0100 APTA - Wood Articles, NSPF As			.009			.003			.067			.047			.270
220.4900 APTA - Cork Disks, Wafers, Etc. Exc Tapered			.045			.002									
357.9600 APTA - Hose for Liquids or Gases for Textile Fibers, NES			.262			1.2			2.6			2.0			1.2
358.0300 APTA - V-Belts for Textile Fiber or Fiber and Part Rubber, Etc.			.119			.048			.192			.007			
361.9000 APTA - Floor Coverings Pile N-hnd and Underlays of Textile Material			5.2			3.2			1.9			.606			.9
389.8000 APTA - Articles NSPF of Textile Mat Not Orn			.222			.439			1.5			.248			.2
544.4120 - Laminated Glass, Automotive or Framed or Both			19.0			17.4			12.5			11.6			
544.4140 - Other Laminated Glass, Whether or not Shaped or Framed or Both			4.0			3.7									
544.4200 APTA - Laminated Glass, Whether or not Shaped or Framed			19.6			20.0			23.3			19.3			12.2
544.5200 APTA - Glass Mirrors NES Not Over 1 sq. ft. in Reflection Area			4.0			4.8			2.7			5.8			3.1
544.5500 APTA - Glass Mirrors NES Over 1 sq. ft. in Reflection Area			.039			.001			.008			-			.003
547.1600 APTA - Clock and Other Protective Glass Curved Surface except Options NES			.009			.012			.017			.019			11.5
610.8100 APTA - Pipe Tube Fittings Iron or Steel NES			.300			.311			.178			.118			.233
613.1600 APTA - Pipe Fittings of Copper, Nickel, Silver, and Copper-Nickel									.005			.004			.029
613.1900 APTA - Pipe & Tube Fittings of Copper Alloy NES			.157			.163			.154			.05			.231
618.4800 APTA - Aluminum Pipes Tubes Blanks Fittings NES			.009			.027			.002			.001			.016

\*Source: MVMA Facts & Figures for U.S. Automotive Imports based on listings by U.S. Department of Commerce (IM-146), 1975-1979

NOTE: NES = Not Elsewhere Stated  
NSPF = Not Specified

TABLE 13. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF IMPORTS OF AUTOMOTIVE MECHANICAL COMPONENTS BY PRODUCT CLASS AND MARKETS - 1975 TO 1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
620.4700 APTA - Nickel Pipe & Tube Fitting						.458									
642.2100 APTA - Wire Strand Rope Etc. Fitted or Made into Article			4.8			6.3						5.1			3.3
642.8800 APTA - Wire Cloth Etc Cut to Shape, NES			.19			.026						.032			.006
646.7900 APTA - Staples, Rivets, Bolts & Other Fasteners												38.2			18.3
646.7910 APTA - Bolts			10.0			10.1									
646.7920 APTA - Nuts			13.8			8.9									
646.7930 APTA - Screws			18.8			20.7									
646.7940 APTA - Bolts, Nuts Screws, Etc. NSPF			4.0			4.4									
646.9230 - Locks Designed for Motor Vehi- cles NSPF			4.9			5.0									
646.9300 APTA - Locks & Padlocks of Base Metal, NES			.521			.377						.116			.6
647.0100 - Hinges, Fittings, Mountings for Motor Vehicle, of Iron, Steel, Aluminum, Zinc			25.5			20.5						18.0			10.4
647.0200 APTA - Hinges, Fittings, Mountings for Motor Vehicle			40.0			42.3						34.1			19.7
647.0600 APTA - Hinges, Fittings, Mountings of Base Metal, NES			.681			.484						.370			.022
652.1000 APTA - Flexible Metal Tubing Covered with Wire, Etc. with or without Fit			2.0			1.8						.713			.326
652.3900 APTA - Chains and Parts, Base Metal Not Plated			.497			.098						.082			14.4
652.7600 APTA - Sign Plates Numbers Other Base Metal Signs			.569			.489						.388			.596
652.8400 - Springs and Leaves for Springs for Motor Vehicle Suspension			48.9			49.2						38.8			20.1
652.8500 APTA - Springs and Leaves for Springs for Motor Vehicle Suspension			119.7			160.1						134.2			81.3
652.8700 APTA - Hairsprings of Base Metal			-			.004						.001			-

TABLE 13. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF IMPORTS OF AUTOMOTIVE MECHANICAL COMPONENTS BY PRODUCT CLASS AND MARKETS - 1975 TO 1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
662.8900 APTA - Springs and Leaves for Springs of Base Metal, NES			11.4			8.8						12.6			6.5
658.1000 APTA - Articles of Base Metal NSPF Not Coated with Prec Metal			11.5			13.3						12.3			4.0
660.4220 - Piston Type Diesel Engines for Automobiles, Trucks & Buses			84.7			95.1									
660.4300 APTA - Piston-Type Comp-Ignition Engines			7.5									.378			.010
660.4430 - Piston-Type Engines, Automobile, Truck and Bus			283.8			279.0						119.5			57.1
660.4500 APTA - Piston-Type Engines, NES			510.0			853.3						767.7			434.0
660.4700 APTA - Non-Piston Type Engines			.002												.007
660.5000 - Cast-Iron Parts except Maliable Not Allowed or Adv for Internal Combustion Engine Lb			26.3			22.1						26.8			15.5
660.5100 APTA - Cast-Iron Parts Not Advanced, Etc. for Internal Combustion Engine			17.3			22.7						25.6			16.5
660.5210 - Parts of Piston-Type Automotive Engines except Diesel			245.7			237.0									
660.5300 APTA - Parts of Piston-Type Engine except Comp Ignition Engine			130.7			106.3						101.4			68.8
660.5410 - Parts of Piston-Type Diesel Automotive Engines			104.4			84.0									
660.5500 APTA - Parts of Internal Combustion Engines NES			1.6			5.4						.780			1.0
660.8600 APTA - Non-Electric Engines, N.S.P.			.126			70.3						.004			2.3
660.9300 APTA - Fuel Injection Pumps F Comp-Ignition and Parts			.419			33.5						.193			34.2
660.9402 - Motor Vehicle Pumps for Liquids						37.7									
660.9500 APTA - Pumps for Liquids, NES and Parts						22.7						18.2			12.8

TABLE 13. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF IMPORTS OF AUTOMOTIVE MECHANICAL COMPONENTS BY PRODUCT CLASS AND MARKETS - 1975 TO 1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
660.9702 - Motor Vehicle Pumps for Liquids			40.5												
660.9800 APTA - Pumps for Liquids, NES and Parts			29.5												
661.1020 - Fans and Blowers for Motor Vehicles			10.6			6.1									
661.1100 APTA - Fans and Blowers for, NES and Parts			15.4			21.3						18.1			12.2
661.1300 APTA - Compressors and Parts			.264			.495						2.0			1.7
661.1600 APTA - Air Pumps, Vacuum Pumps and Parts						.019						.082			.031
661.2100 APTA - Air Conditioning Machines and Parts			2.5			3.9						3.4			2.2
661.3600 APTA - Refrigerators and Refrigeration Equip a PTS			.005												
680.3100 APTA - Antifriction Balls and Rollers			2.3			2.2						1.1			.6
680.3400 APTA - Ball Bearings with Integral Shafts			4.6			4.5						4.9			2.8
680.3620 APTA - Ball Bearings			10.9			7.2						4.5			4.2
680.3630 APTA - Parts of Ball Bearings			.436			.124						.231			.32
680.3640 APTA - Tapered Roll Bearings Cup and Cone Assembly, In Sets			.146												
680.3644 APTA - Tapered Roller Bearings, Cup Assemblies & Parts			5.0			3.9									
680.3648 APTA - Tapered Roller Bearings, Cone Assemblies & Parts			6.2			6.3									
680.3650 APTA - Tapered Roller Bearings and Parts												11.9			6.6
680.3652 APTA - Tapered Roller Bearings and Parts			.040			.163									
680.3660 APTA - Other Bearings Including Parts															9.0

TABLE 13. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF IMPORTS OF AUTOMOTIVE MECHANICAL COMPONENTS BY PRODUCT CLASS AND MARKETS - 1975 TO 1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
680.3670 APTA - Roller Bearings, NPSF, Including Com. Roller & Ball Bearings			3.7			4.3			7.6			5.9			.036
680.5800 APTA - Lubrication Fittings			.157			.013			.006			.009			
680.7000 - Kits for Repair of Hydral-Brake Cylinder or Internal Combustion Engine Pumps and Crb		10.9			12.8			10.5			8.9			7.4	
692.2000 - Automobile Truck and Bus Chassis and Bodies									735.5			663.0			342.6
692.2100 APTA - Truck and Bus Chassis and Bodies									784.8			671.9			417.8
692.2200 - Bodies and Chassis for Motor Vehicles NES									3.8			2.9			1.9
692.2220 - Bodies for Passenger Automobiles			.5			.4									
692.2240 - Bodies for Motor Vehicles NSPF			.4			.3									
692.2260 - Chassis for Passenger Automobiles			.1			.2									
692.2280 - Chassis for Motor Vehicles NSPF			.9			1.2									
692.2300 APTA - Bodies and Chassis for Motor Vehicles, NES									1.1			.085			.534
692.234D APTA - Bodies for Motor Vehicles, NSPF			.8			.5									
692.2360 APTA - Chassis for Passenger Automobiles			-												
692.2380 APTA - Chassis for Motor Vehicles			3.2			1.8									
692.2400 - Cast Iron Parts of Motor Vehicles, Not Altd, Not Advanced			19.0			17.3			19.4			16.4			9.5
692.2500 APTA - Articles Included in Item 692.24			.050			.045			.122			.024			.157

TABLE 13. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF IMPORTS OF AUTOMOTIVE MECHANICAL COMPONENTS BY PRODUCT CLASS AND MARKETS - 1975 TO 1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
692.2710 - Motor Vehicle Body Stampings			88.7			75.3			45.4			36.3			29.8
692.2720 - Motor Vehicle Bumpers			31.3			32.5			24.0			18.9			16.7
692.2730 - Motor Vehicle Wheels Designed for Pneumatic Tires			61.0			73.7			44.3			36.0			27.3
692.2740 - Hubcaps and Wheel Covers			13.7			11.1			5.8			5.3			4.3
692.2750 - Radiators, Motor Vehicle			11.4			11.1			7.7			5.2			4.1
692.2760 - Mufflers and Tailpipes			89.8			84.2			51.2			61.8			53.9
692.2770 - Parts NES of Motor Vehicles									704.0			512.2			406.1
692.2772 - Brakes and Parts Thereof Motor Vehicles			135.1			106.9									
692.2774 - Transmissions for Automobile, Trucks, Trck TR Trailers & Motor Bus			52.2			54.9									
692.2776 - Transmissions for Passenger Automobiles			313.5			235.3									
692.2778 - Transmissions for Motor Vehicles, NSPF			4.0			4.9									
692.2782 - Shock Absorbers for Motor Vehicles			46.9			41.6									
692.2785 - Parts NSPF of Motor Vehicles			770.3			655.4									
692.2810 APTA - Motor Vehicle Body Stampings			8.3			8.9			5.0			.189			.105
692.2820 APTA - Motor Vehicle Bumpers			33.3			46.7			63.5			62.1			34.7
692.2830 APTA - Motor Vehicle Wheels Designed to be Mtd with Pneu Tires			83.2			90.3			90.3			71.9			52.1
692.2840 APTA - Hubcaps and Wheel Covers			12.3			5.6			13.3			17.2			14.6
692.2850 APTA - Radiators, Motor Vehicle			38.1			50.0			52.8			52.2			39.4
692.2860 APTA - Mufflers and Tailpipes			22.5			21.2			17.3			11.3			10.7
592.2870 APTA - Parts NES of Motor Vehicles									1412.6			1178.8			759.9

TABLE 13. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF IMPORTS OF AUTOMOTIVE MECHANICAL COMPONENTS BY PRODUCT CLASS AND MARKETS - 1975 TO 1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
692.2872 APTA - Brakes and Parts Thereof for Motor Vehicles			154.8			98.7									
692.2874 APTA - Transmissions for Auto Trucks, Truck Trailers & Motor Bus			.009			.099									
692.2876 APTA - Transmissions for Passenger Automobiles			108.8			107.7									
692.2878 APTA - Transmissions for Motor Vehicles NSPF			.058			.462									
692.2880 APTA - Shock Absorbers for Motor Vehicles			6.7			7.0									
692.2890 APTA - Parts NSPF of Motor Vehicles			1305.9			1328.1									
711.8500 APTA - Pressure Gauges, Thermostats Etc.			5.3			8.2									2.2
711.9000 - Taximeters and Parts			1.0			.649									.2
711.9100 APTA - Taximeters and Parts			.004												
711.9820 - Speedometers NSPF a Tachometers, a Parts			26.6			20.6									10.5
711.9900 APTA - Speedometers, Tachometers a Parts			.323			.327									1.3
721.2000 APTA - Clocks and Parts, Vehicle			.413			.672									.36
728.3000 APTA - Floor Mats, Nontextile, for Vehicles						.002									.3
745.8000 APTA - Buckles and Fasteners for Vehicles			.118			2.7									.052
772.6600 APTA - Pipe and Tubing, Rubber or Plastic			11.2			8.9									2.6
772.8100 APTA - Handles and Knobs, Rubber or Plastic			6.8			6.6									.9
772.8600 APTA - Closures, Rubber or Plastic			.337			.359									.1
773.2600 APTA - Gaskets, Rubber or Plastic			14.4			12.6									6.1

TABLE 13. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF IMPORTS OF AUTOMOTIVE MECHANICAL COMPONENTS BY PRODUCT CLASS AND MARKETS - 1975 TO 1979\* (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
774.7000 APTA - Rubber or Plastic Articles NSPF			14.4			14.2						9.9			5.9
Total Identified As OEM	-			-			-								
Total Identified As Replacement		10.9			12.8			10.5			8.9			7.4	
Total Not Specified			5413.3			5583.5			5590.1			4750.7			3138.4
Total All Markets			5424.2			5596.3			5600.6			4759.6			3145.8

\*Source: MWMA Facts and Figures for U.S. Automotive Imports based on listings by U.S. Department of Commerce (IM-146), 1975-1979

NOTE: NES = Not Elsewhere Stated

NSPF = Not Specified

TABLE 14. THE DOMESTIC OEM MARKET FOR MECHANICAL COMPONENTS

YEAR	SOURCE OF SHIPMENTS	VALUE OF PRODUCT SHIPMENTS		CONSTANT 1972 DOLLARS (BILLIONS)	PERCENT CHANGE IN REAL TERMS FROM PREVIOUS YEAR
		CURRENT DOLLARS (BILLIONS)			
1972	U.S. Producers	14.67		14.67	-
	Imports	<u>Not Available</u>		<u>Not Available</u>	-
	Total	<u>Not Available</u>		<u>Not Available</u>	-
1973/4/5/6	Not Available	Not Available		Not Available	-
1977	U.S. Producers	28.34 (91%)		20.02 (91%)	-
	Imports	<u>2.80 (9%)</u>		<u>1.98 (9%)</u>	-
	Total	31.14 (100%)		22.00 (100%)	-
1978	U.S. Producers	31.36 (92%)		20.62 (92%)	+3.0%
	Imports	<u>2.80 (8%)</u>		<u>1.84 (8%)</u>	-7.0%
	Total	34.16 (100%)		22.46 (100%)	+2.1%
1979	U.S. Producers	35.14 (93%)		21.23 (93%)	+3.0%
	Imports	<u>2.71 (7%)</u>		<u>1.64 (7%)</u>	-10.9%
	Total	37.85 (100%)		22.87 (100%)	+1.8%

For 1977 - 1979 Period

OEM Market Growth: 21.5% in current dollars; 4.0% in constant '72 dollars

Average Annual Market Growth: 10.8% in current dollars; 2.0% in constant '72 dollars

Growth of Imports to OEM Market: - 3.2% in current dollars; - 17.2% in constant '72 dollars

TABLE 15. THE DOMESTIC REPLACEMENT MARKET FOR MECHANICAL COMPONENTS

YEAR	SOURCE OF SHIPMENTS	VALUE OF PRODUCT SHIPMENTS		PERCENT CHANGE IN REAL TERMS FROM PREVIOUS YEAR
		CURRENT DOLLARS (BILLIONS)	CONSTANT 1972 DOLLARS (BILLIONS)	
1972	U.S. Producers	2.79	2.79	-
	Imports	Not Available	Not Available	-
	Total	Not Available	Not Available	-
1973/4/5/6	Not Available	Not Available	Not Available	-
1977	U.S. Producers	5.37 (65.7%)	3.79 (65.7%)	-
	Imports	2.80 (34.3%)	1.98 (34.3%)	-
	Total	8.17 (100.0%)	5.77 (100.0%)	-
1978	U.S. Producers	5.94 (68.0%)	3.90 (68.0%)	+3.0%
	Imports	2.80 (32.0%)	1.84 (32.0%)	-7.0%
	Total	8.74 (100.0%)	5.74 (100.0%)	-0.5%
1979	U.S. Producers	6.65 (71.0%)	4.02 (71.0%)	+3.0%
	Imports	2.71 (29.0%)	1.64 (29.0%)	-10.9%
	Total	9.36 (100.0%)	5.66 (100.0%)	-1.4%

For 1977 - 1979 Period

Replacement Market Growth: 14.6% in current dollars; - 1.9% in constant '72 dollars

Average Annual Market Growth: 7.3% in current dollars; - 1.0% in constant '72 dollars

Growth of Imports to Replacement Market: - 3.2% in current dollars; - 17.2% in constant '72 dollars

TABLE 16. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF U.S. IMPORTS OF "OTHER AUTOMOTIVE" COMPONENTS BY PRODUCT CLASS AND MARKET, 1975-1979\*

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
638.6010 - Battery Charging Generators			14.5			19.3						8.6			8.1
683.6020 - Battery Charging Generators			34.7			30.1						17.5			15.1
683.6040 - Starting Motors			29.2			26.1						19.7			16.9
683.6060 - Spark Plugs			12.0			12.1						5.2			
683.6065 - Distributor Contact Point Sets for Int. Combustion Engines			6.6			5.8						60.7			56.0
683.6070 - Ignition Coils for Internal Combustion Engines			9.1			5.8						5.7			2.5
683.6080 - Electric Start. and Ignition Equip. NES for Int. Comb. Eng.			53.4			50.9						31.5			18.5
683.6100 APTA - Electric Start. and Ignition Equip. for Int. Comb. Eng.			7.2			6.3						3.7			2.6
683.6500 - Electric Light. Equip. for Motor Vehicles and Parts			4.5			3.2						2.2			.69
683.6600 APTA - Electric Lighting Equip. for Motor Vehicle and Parts			.2			.4						.3			.15
684.4100 APTA - Electric Furnaces, Heaters and Ovens NES and Parts			29.4			32.9									
517.8200 - Brushes, Graphite for Electric Mach. or App.			78.4			99.4									
685.2110 - Radio Rec. Sol. St. Entertain Brcast. Bd. Motor Veh. Instal.			17.0			19.5									
685.2115 - Radio Rec. Sol. St. Entertain Brcast. Bd. Motor Veh. Instal. AM/FM			.323			2.5									
685.2125 - Radio Rec. Sol. St. Entertain Brcast. Bd. Motor Veh. AM/FM															
685.2150 - Radio Rec. Sol. St. AM, FM & AM/FM Other Designed for Motor Veh. Instal.															

\*Source: MVMA Facts & Figures for U.S. Automotive Imports based on listings by U.S. Department of Commerce (IM-146), 1975-1979.

NOTE: NES = Not Elsewhere Stated

MSPF = Not Specified

TABLE 16. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF U.S. IMPORTS OF "OTHER AUTOMOTIVE" COMPONENTS BY PRODUCT CLASS AND MARKET, 1975-1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
685.2600 - Low Power Radiotelephonic Transceivers Freq. 49.82 to 49.90 M			8.5			10.5									
685.5520 APTA - Radio Receivers			40.6		8.2	30.2		6.3	23.5			19.4			24.1
685.5540 APTA - Radio Telegraphic and Telephonic App. NES		7.4												5.4	
685.7100 APTA - Electric Sound and Visual Signaling App. and Parts			4.6			3.5			4.0			1.7			.9
685.8100 APTA - Electrical Capacitors, Fixed or Variable			2.7			2.0			1.8			1.8			1.6
686.1100 APTA - Resistors, Fixed or Variable Exc Heating Elements			2.9			4.0			3.2			1.8			.6
686.2200 - Aut. Voltage Ref. etc. for 6, 12 and 24 Volt System & Parts			11.6			10.8			9.9			7.8			4.4
686.2300 APTA - Aut. Volt. Regulators for 6, 12 and 24 Volt System & Parts			.030			.012			.003			.006			
535.1500 APTA - Ceramic Magnets, Insulators Electric Wires NES												.011			
545.6200 APTA - Glass Lenses Filters Parts for Light Signal Purp.			.041			.015			.056			.123			.017
545.6400 APTA - Glass Reflecting Lenses, Etc for Signs or Signals			.015			.003			.003			.004			.028
678.5027 - Audio Tape Players for Motor Vehicles, Cartridge Type			15.5			28.0			21.6			31.4			
678.5029 - Audio Tape Players for Motor Vehicles, Except Cartridge Type			35.8			37.2			22.7			21.5			
678.5051 - Radio Tape Player Comb Stereo Cartridge Type for Auto Instal			118.8			157.1			129.6			130.4			
678.5052 - Stereo Radio Tape Comb. exc Cartridge for Motor Veh. Instal.			289.8			228.7			123.5			90.3			

TABLE 16. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF U.S. IMPORTS OF "OTHER AUTOMOTIVE" COMPONENTS BY PRODUCT CLASS AND MARKET, 1975-1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
678.5053 - Radio Tape Player Comb. Cartridge exc Stereo for Motor Vehicles			13.6			12.5			9.7			6.5			
678.5054 - Radio Tape Player Comb. exc Stereo and Cartridge for Motor Vehicle Instal.			6.4			8.1			9.7			6.3			
683.1000 - Lead Acid Type Storage Batteries and Parts Thereof			36.3			25.0			17.3			11.7			12.5
683.1100 APTA - Lead Acid Type Storage Batteries and Parts			8.6			4.9			4.6			3.1			3.0
683.1600 APTA - Storage Batteries and Parts, NES			.117			.004									.009
686.6000 - Sealed Beam Lamps, Electric Filament									2.1			1.5			1.0
686.6010 - Sealed Beam Elec. Filament 6 in. (measured diagonally)			5.2			2.3									
686.6020 - Sealed Beam Elec. Filament 6 in. and over (measured diag.)			4.3			1.8									
686.6100 APTA - Sealed Beam Lamps, Electric Filament			3.0			2.2			.726			.319			.249
688.0500 APTA - Ins. Elec Cond w/o Fittings, over 10% Cu.						.003									
688.0700 APTA - Ins. Elec. Cond. w/o Fittings NES						-			-			.003			.019
688.1200 - Ignition Wiring Sets and Wiring Sets for Transportation Equip.			69.7			42.8			30.8			22.9			15.0
688.1300 APTA - Ignition Wiring Sets and Wiring Sets for Transportation Equip.			22.5			21.1			15.8			16.6			15.4
688.1600 APTA - Insulated Elec Cond w/ Fittings NES			9.9			8.5			5.1			6.6			6.2

TABLE 16. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF U.S. IMPORTS OF "OTHER AUTOMOTIVE" COMPONENTS BY PRODUCT CLASS AND MARKET, 1975-1979 (CONT.)

PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
	OEM	REPLACE- MENT	NOT SPECIFIED												
686.8100 APTA - Elec. Filament Lamps for Oper. under 100 Volts NES			1.9			2.6			1.5			1.1			.25
712.5100 APTA - Electrical Measuring Etc Apparatus			10.9		.315				.457			.109			.05
773.3100 APTA - Electric Insulators, Rubber, Plastic			1.8		3.0				2.4			3.2			1.4
Total Electrical System Components	17.0	115.5	896.5	19.5	143.0	806.5	-	6.3	589.9	-	6.7	538.0	-	5.4	199.6
Total All Markets - Electrical System Components		1029.0			969.0			596.2			545.6			205.0	
772.5105 - Pneumatic Tires, Passenger Car, New			529.3			404.2			388.5			389.1			287.4
772.5115 - Pneumatic Tires, Truck and Bus, New			597.4			478.9			429.6			355.1			186.3
772.6000 - Tubes for Tires, NSPF			38.7			31.1			21.0			22.5			15.2
Total Tires, Tubes, Etc			1165.4			914.2			839.1			766.7			488.9
540.7200 APTA - Glass Fibers, Bulk etc not over 25 lb/cft			.019			.041			.021			.034			-
544.1800 - Glass Processed, NES			13.1			9.6			4.6			4.0			2.8
544.2000 APTA - Glass			.369						.016			.011			.008
544.3100 - Toughened Glass Shaped or Framed or Both			17.7			17.5			11.1			8.0			6.2
544.3200 - Toughened Glass Shaped or Framed			25.7			31.3			33.0			23.7			18.4
Total Glass, Etc.			56.9			58.4			48.7			35.7			27.4

\* Source: MVA Facts & Figures for U.S. Automotive Imports based on listings by U.S. Department of Commerce (IM-146), 1975-1979

Note: NES = Not Elsewhere Stated

NSPF = Not Specified

TABLE 17. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF MECHANICAL COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKET 1975-1979\*

SCHEDULE E	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
891.0240	Motor Vehicle Bolts and Belting of Rubber, of Plastic			17.8												5.4
629.4005	Automotive Transmission Belts and Belting, Rubber			55.3												
663.8055	Brake Linings & Disc Brake Pads, Motor Vehicle Asbestos			9.3												
663.8065	Clutch Facings and Linings, Motor Vehicle Asbestos															
663.8202	Asbestos Clutch Facing, for Automotive Use, Including Linings															1.3
663.8215	Asbestos Brake Linings for Automotive Use															6.6
664.7020	Toughened Safety Glass															24.0
664.7025	Automotive Glass, Toughened															
664.7040	Laminated Safety Glass			54.7												24.5
664.7060	Laminated Glass, Automotive			35.0												
664.8015	Glass Mirrors for Automotive Use			14.9												10.0
664.8020	Glass Mirrors for Automotive Use															
698.1115	Automotive Door Locks and Lock Sets of Base Metal															10.1
698.1204	Automotive Hardware, exc Hinges and Butts of Base Metal															4.3
699.1310	Automotive Hardware, Except Hinges and Butts of Base Metal			42.6												
698.1245	Automotive Hinges and Butts of Base Metal															
699.1305	Automotive Hinges and Butts of Base Metal			5.2												2.7

\*Source: MMA Facts & Figures for U.S. Automotive Exports based on listings by U.S. Department of Commerce (FT-410), 1975-1979  
 NOTE: Schedule E Numbers are based on the Standard International Trade Classifications, (SITC)  
 REC = Not Elsewhere Classified  
 NSPF = Not Specified

TABLE 17. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF MECHANICAL COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKET 1975-1979 (CONT.)

SCHEDULE E	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
699.1160	Locks for Motor Vehicles, Base Metal			9.9			12.4									
698.6120	Steel Springs and Leaves for Springs, Except Wire Springs			21.5			12.5									
699.4140	Springs and Leaves for Springs, for Motor Vehicle Suspension Iron or Steel			33.1			106.9									10.1
699.7360	Parts, NSPF of Motor Vehicles, Cast Iron Not Alloyed and Not Finished															
711.5002	Diesel Engines, Automotive, for Assembly							99.9						69.6		
711.5004	Diesel Engines, Automotive, for Replacement								22.9						25.3	31.9
711.5034	Gasoline Engines, Automotive, for Assembly							455.8						458.0		341.9
711.5036	Gasoline Engines, Automotive, for Replacement								11.9							14.4
711.5062	Parts and Accessories, NEC, for Automobile Truck and Bus Engines for Assembly							254.4						225.8		177.0
711.5064	Parts & Accessories, NEC, for Automobile, Truck and Bus Engines for Replacement															
713.5050	Diesel Engines Specially Designed for Use in Autos, Trucks, and Buses			198.6			143.7									
713.5055	Gasoline Engines, Specially Designed for Use in Autos, Buses, and Trucks			692.6			575.4									
713.9010	Parts NSPF of Gasoline Engines for Automobiles, Trucks and Buses			366.3			345.5									
713.9050	Parts NSPF of Diesel Engines for Automobiles, Trucks and Buses			373.6			298.9									

TABLE 17. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF MECHANICAL COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKET 1975-1979 (CONT.)

SCHEDULE	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
719.1509	Air Conditioners Automotive															
741.5020	Air Conditioners for Use in Motor Vehicles			175.0			153.6									7.2
742.4008	Motor Vehicle Pumps for Liquid NSPF			19.1			15.7									
719.2155	Pumps, Measuring and Dispensing for Liquids															
719.7010	Ball Bearings, Complete, Annular, Ground or Precision, Not Thrust															8.3
719.7020	Ball Bearings, Complete, New															41.9
719.7025	Parts, NEC, for Ball Bearings							20.7						23.9	21.6	
719.7030	Roller Bearings, Complete, Cylindrical Not Thrust															2.8
719.7040	Roller Bearings, Complete, Spherical															21.5
719.7050	Roller Bearings, Complete, Taper, Not Thrust															3.8
719.7060	Roller Bearings, Complete, NEC															77.2
719.7070	Rollers for Roller Bearings															13.3
719.7075	Parts, NEC, for Roller Bearings															6.6
732.8100	Truck, Bus & Passenger Car Bodies, New															11.5
732.8910	Motor Vehicle Stampings							26.0						28.7	28.6	
732.8932	Wheels, New for Assembly for Motor Vehicles NEC															591.3
732.8936	Brakes and Parts, New, for Assembly for Motor Vehicles, NEC							64.1						320.3	53.3	
732.8938	Parts and Accessories, NEC, New for Assembly, for Motor Vehicles, NEC							145.8						138.4	100.0	
								2705.1						2468.3	2113.5	
																644.1

TABLE 17. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF MECHANICAL COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKET 1975-1979 (CONT.)

SCHEDULE E	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
784.3022	Mufflers and Tailpipes, Motor Vehicle			39.4			34.5									
732.8942	Mufflers and Tailpipes, New for Replacement for Motor Vehicles, NEC								14.0					12.7		9.8
732.8943	Shock Absorbers and Parts, NEC, for Replacement for Motor Vehicles, NEC								24.9					14.2		9.9
784.3042	Shock Absorbers for Motor Vehicles			82.7			64.1									
784.3026	Motor Vehicle Brakes and Parts NSPF			391.3			364.0									
732.8944	Brakes and Parts, New, for Replacement, for Motor Vehicles, NEC								33.0					35.7		31.1
732.8948	Parts and Accessories, NEC, New, for Replacement, for Motor Vehicles NEC								899.1					802.2		668.8
732.8950	Parts and Accessories, NEC, Used for Motor Vehicles, NEC								15.6					13.7		13.4
743.4040	Fans and Blowers Suitable for Use With Motor Vehicles			5.4			4.5									
749.1017	Ball Bearings, Unmounted, With Integral Shafts			5.3			3.1									
749.1025	Radial Ball Bearings (Unmounted) With Outside Diameter Between 9mm-30mm			4.8			5.3									
749.1030	Radial Ball Bearings (Unmounted) Outside Diameter Between 30mm-52mm			6.3			5.6									
784.2040	Bodies, Passenger Automobile			8.9			10.5									
784.2050	Bodies, Motor Vehicle, NSPF			9.1			7.5									
784.3002	Body Stampings, Motor Vehicle			867.6			914.9									
784.3006	Bumpers, Motor Vehicle			62.8			55.0									

TABLE 17. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF MECHANICAL COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKET 1975-1979 (CONT.)

SCHEDULE	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
784.3010	Motor Vehicle Wheels to be Mounted with Pneumatic Tires			88.1												
784.3014	Hubcaps and Wheel Covers, Motor Vehicles			13.9												
784.3018	Radiators, Motor Vehicle			32.9												
784.3030	Transmissions for Automobile Track Tractors and Motor Buses			282.2												
784.3034	Transmissions for Passenger Automobiles			292.3												
784.3038	Motor Vehicle Transmission NSPF			64.2												
784.3046	Parts, NSPF of Motor Vehicles for the Transport of Persons or Articles			3181.7												
784.3054	Floor Coverings of Rubber Designed for Motor Vehicles			4.3												
784.3058	Floor Coverings of Plastics Designed for Motor Vehicles			9.5												
784.3062	Gaskets of Rubber or Plastics for Automobiles, Aircraft and Other Vehicles			11.6												
861.9742	Engine Instrum. Motor Vehicle for Measuring, Checking, and Controlling Variable Liquid or Gas									11.8					10.3	7.6
861.9748	Instrum. Motor Vehicle exc Engine Instrum. for Measuring, Checking, Controlling Variable of Liquid or Gas									1.9					1.8	1.8
861.9950	Parts and Accessories, NEC, for Vehicle Instruments, NEC									18.5					18.4	14.2
873.2040	Speed Indicators and Tachometers, Stroboscopes, Nonelectrical			2.0						1.5						

TABLE 17. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF MECHANICAL COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS AND MARKET 1975-1979\* (CONT.)

SCHEDULE E	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
	Total Identified As OEM	-	-		-	-		3771.8	1166.7		3747.9	1094.5		2905.5	907.4	
	Total Identified As Replacement			7590.8			7205.2									
	Total Not Specified									1122.5						
	Total All Markets	7590.8			7205.2			6061.0			5834.6			4720.9		
																908.0

\*Source: MWMA Facts & Figures for U.S. Automotive Exports based on listings by U.S. Department of Commerce (FT-410), 1975 - 1979

NOTE: Schedule E Numbers are based on the Standard International Trade Classifications, (SITC)

NEC = Not Elsewhere Classified

NSPF = Not Specified

TABLE 18. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF "OTHER AUTOMOTIVE" COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS, AND MARKET, 1975-1979\*

SCHEDULE	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
621.0220	Tire Sundries and Repair Materials						8.8					7.4			5.8	
621.0230	Tread Rubber or Camelback						14.2					12.9			11.3	
625.1000	Passenger Car Tires Pneumatic, New Except Recapped			130.4				114.2								
625.2000	Truck and Bus Tires, Pneumatic, New Except Recapped			71.7				44.5								
625.8060	Tires Tubes NSPF			16.4				12.8								
629.1010	Tires, Passenger Car and Motorcycle Pneumatic									129.4					116.3	
629.1020	Tires, Truck and Bus, Pneumatic									45.4					47.3	
629.1080	Inner Tubes for Vehicles									12.2					15.6	
	Total Tires, Tubes, Etc.			218.5				171.5							196.3	
723.1030	Ignition Harness and Cable Sets, Insulated															
724.2030	Automobile Radios Other Than 2-way Radios									77.0					61.4	
729.1210	Storage Batteries, Lead-Acid Type, Automotive, 6 and 12 Volt									28.4					16.5	
729.1240	Battery Boxes of Hard Rubber									26.0					22.4	
729.1255	Parts, NEC for Storage Batteries									4.3					3.3	
729.4110	Cranking Motors, Complete, Electric, for Internal Combustion Engines									15.4					9.9	
729.4120	Spark Plugs, Complete Automotive Type									32.0					26.5	
729.4135	Generators, Alternators and Regulators, for Internal Combustion Engines									26.3					22.1	
										47.4					39.5	

\*Source: MYMA Facts & Figures for U.S. Automotive Exports based on listings by U.S. Department of Commerce (FT-410), 1975-1979.

NOTE: Schedule E numbers are based on the Standard International Trade Classifications (SITC)  
 HEC = Not Elsewhere Classified  
 NSPF = Not Specified.

TABLE 18. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF "OTHER AUTOMOTIVE" COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS, AND MARKET, 1975-1979 (CONT.)

SCHEDULE	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
729.4145	Ignition Coils, Distributors, Magnets and Ignition Equip. NEC for Internal Combustion Engines															49.7
729.4150	Parts NEC for Electrical Starting and Ignition Equip. for Int'l Combustion Engines															38.8
729.4210	Sealed Beam Cams for Motor Vehicles															10.0
729.4220	Lighting Equip for Motor Vehicles Electric, NEC															37.5
729.4230	Windshield Wipers, Horns and Defrosters, Electric for Motor Vehicles															22.8
762.0020	Radio Receivers, AM and AM/FM, Designed for Motor Vehicle Installation			39.1												
772.1080	Voltage and Voltage-Current Regulators for Use in 6, 12, and 24 Volt Systems and Parts Thereof NSPF			9.8												
773.1020	Ignition Wiring Sets, Including Wiring Sets for Use in Motor Vehicles			71.1												
778.1220	Storage Batteries, Lead Acid Type			43.8												
778.1920	Parts for Lead Acid Type Storage Batteries			18.3												
778.1940	Parts for Storage Batteries			26.2												
778.2510	Sealed Beam Electric Filament Lamps under 6 in. (measured diagonally)			16.5												
778.2520	Sealed Beam Electric Filament Lamps, 6 in. and over (measured diagonally)			15.5												



TABLE 18. MOTOR VEHICLE PARTS AND ACCESSORIES - VALUE OF "OTHER AUTOMOTIVE" COMPONENT SHIPMENTS FOR EXPORT BY ALL U.S. PRODUCERS BY PRODUCT CLASS, AND MARKET, 1975-1979\* (CONT.)

SCHEDULE E	PRODUCT CLASS	1979 MARKETS (\$ MILLION)			1978 MARKETS (\$ MILLION)			1977 MARKETS (\$ MILLION)			1976 MARKETS (\$ MILLION)			1975 MARKETS (\$ MILLION)		
		OEM	REPLACE- MENT	NOT SPECIFIED												
784.2010	Bodies (Including Cabs) for Trucks			18.7			15.1									
784.2020	Bodies (Including Cabs) for Truck Tractors			30.6			19.5									
784.2030	Bodies, Motor Bus			7.5			15.0									
	Total Body Components (Truck and Bus)			56.8			49.6									
719.3154	Automobile Lifts									3.0					1.9	2.2
719.5320	Lubricating Equip., Force-Feed Pneumatic Hand Hold, and Parts NEC									21.7					20.8	17.0
	Total Service Equipment									24.7					22.7	19.2

\*Source: MMMA Facts & Figures for U.S. Automotive Exports based on listings by U.S. Department of Commerce (FT-410), 1975 - 1979

NOTE: Schedule E Numbers are based on the Standard International Trade Classifications, (SITC)

NEC = Not Elsewhere Classified

NSPF = Not Specified

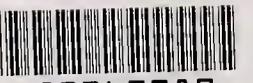
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