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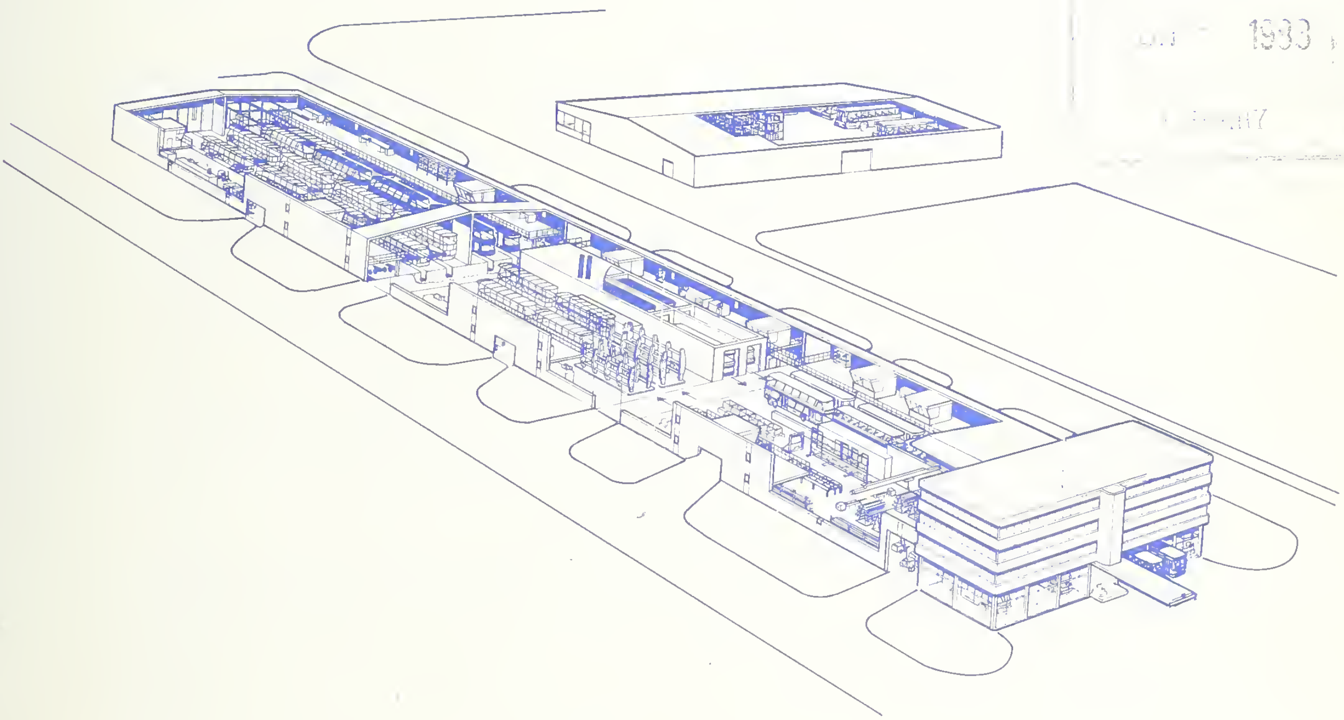
Entry and Competition in the United States Transit Bus Manufacturing Industry

Office of Technical Assistance
Office of Bus and Paratransit Systems

Prepared by:
Transportation Systems Center
Energy and Environment Office

October 1982
Final Report



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16. Abstract

The subject document presents an analysis of the causes for a recent increase in interest by foreign and domestic companies in entering the U.S. transit bus manufacturing industry. Since 1980 four new builders of standard and articulated transit buses have entered the U.S. industry. In addition, three major European and one Japanese company have announced an interest and have begun prototype testing in the U.S.

The causes for new entry are analyzed in terms of 1) the opportunities created by the strategic decisions of the established manufacturers; 2) the impetus provided to the new entrants by developments in the industries from which the entrants are coming and 3) a variety of contributing factors including Federal and local government policies.

New entry is seen to have important implications for the transit industry because of the proliferation of new bus designs and the increase in competition.

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PREFACE

This report was prepared by the Transportation Industry Analysis Branch, Office of Energy and Environment, of the Transportation Systems Center (TSC) as part of the Transit Bus Manufacturing Industry Analysis Project. This project represents one of several projects within the Bus and Paratransit Systems Program which is managed by the Urban Systems Division at TSC. The program is sponsored by the Office of Bus and Paratransit Systems, Urban Mass Transportation Administration.

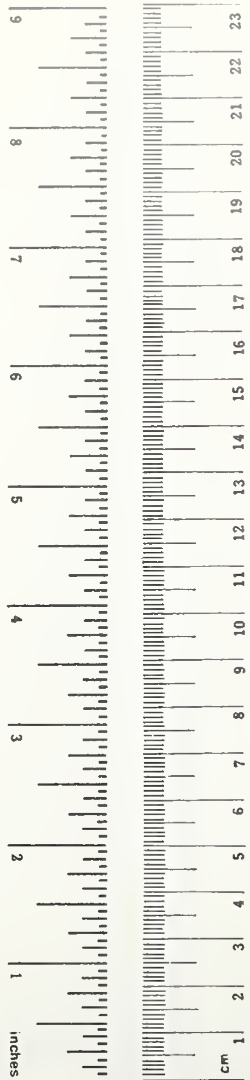
This report is, in essence, an analytic paper addressing the apparent trend toward entry into the U.S. transit bus market by new foreign manufacturers. A companion report, Transit Bus Manufacturer Profiles is intended as a reference work on individual companies, their products, history, facilities, and finance.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

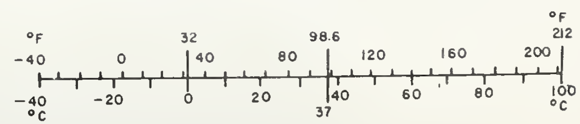
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	he
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	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^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*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. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
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
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
he	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
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^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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EXECUTIVE SUMMARY

This study develops an explanation for the emerging interest in the U.S. transit bus manufacturing industry which, since 1980, has seen two new producers of standard-size transit buses and two new producers of articulated buses enter the market. The rationale for this industry activity appears to focus on three elements:

1) opportunity

2) impetus

3) contributing factors

The <u>opportunity</u> the new entrants may be attempting to exploit was created by policies of product specialization and high plant investment pursued by the long-established builders. Throughout the 1970s, culminating with the introduction of their advanced design buses, GMC and Flxible tended toward specialization in a single product niche - premium, standard-size, urban, transit buses. In the process, they chose not to produce other vehicles such as intercity, medium-size, and articulated buses. Other firms exploited the opportunity represented by the unmet demand for these product types to come into the bus manufacturing industry.

With the introduction of the advanced design buses (ADBs), GMC and Flxible adopted manufacturing strategies centered on relatively large-scale, heavily automated facilities, in part to offset the disadvantage of highly-paid workforces. This, too, created an opportunity for a new manufacturer. The new manufacturer could be cost competitive with a smaller scale, less automated facility by using less highly-paid labor.

The new entrants come from industries where there is a strong <u>impetus</u> to seek new opportunities or to diversify. School bus manufacturers, facing a sharply declining market, are one example. Of the four new builders of standard or articulated transit buses, two were primarily school bus builders. School bus builders have also become very active as builders of medium transit buses.

Foreign truck and bus builders are also represented among the actual and potential entrants. This group may be the most important for the long-term future at the transit bus industry. The international truck industry (including many bus builders) is undergoing a process of globalization. It is commonly believed that only multinational truck builders operating worldwide will survive into the next century. Consequently, major foreign truck builders are scrambling to establish a foothold in the U.S., the largest national market for trucks in the world. One way to establish a foothold is through building transit buses, which use many truck powertrain and chassis components. Two of the new builders are foreign companies with international operations. At least four other major foreign truck manufacturers are actively pursuing programs which might lead them into the U.S. transit bus manufacturing industry.

Numerous other events and government policies have been contributing factors. Energy crisis rhetoric fueled high expectations for the bus market. National, state and local officials have encouraged the new entrants. Past UMTA programs such as Transbus and Superbus have attracted attention to the U.S. market; current activities, such as the New Bus Equipment Introduction Program could continue to encourage new entrants. Procurement practices in the industry have created an unusually open market.

This explanation lays bare certain trends in the U.S. transit bus industry which have important implications for both manufacturers and transit operators. For the manufacturers, there is greatly increased competitive pressure. This will be in direct contrast to the previous era in which two or three relatively large-scale producers composed the industry and all the builders used the same powertrain and chassis components. For the operator, there is a wider range of choice in bus size, design, and equipment; however, not without attendant inventory and training programs. This wider range of choice will increase the need to devote effort to the procurement decision.

1. INTRODUCTION

1.1 THE U.S. TRANSIT BUS MARKET

Between 3000 and 5000 transit buses are delivered each year in the United States, primarily to urban transit operators (or "properties"). These transit properties have a total fleet of over 60,000 transit buses. Buses carry nearly two-thirds of all passengers traveling on urban transit systems.

The vehicles used by transit systems range in size from 12-passenger compact van buses to 60-foot articulated buses seating 70. Convention divides transit buses by size:

- Small buses are those under 27 feet in length
- Medium transit buses are those around 30 feet in length (27 feet to 34 feet)
- Standard transit buses are either 35-feet or 40-feet long
- Articulated and double-deckers are grouped together as large capacity transit buses.

The standard and large-capacity buses, and some medium transit buses, are generally integral construction buses, meaning the chassis and body are designed and built as an inseparable unit. By contrast, small, and most medium, transit buses are of body-on-chassis designs in which a bus body is built on top of a separable chassis. School buses are typically of the body-on-chassis type, as well. Integral construction is usually considered to result in a heavier-duty bus. Individual manufacturers tend to specialize by producing exclusively either integral construction or body-on-chassis buses. The chassis for most body-on-chassis buses are built by companies other than the bus-body builder.

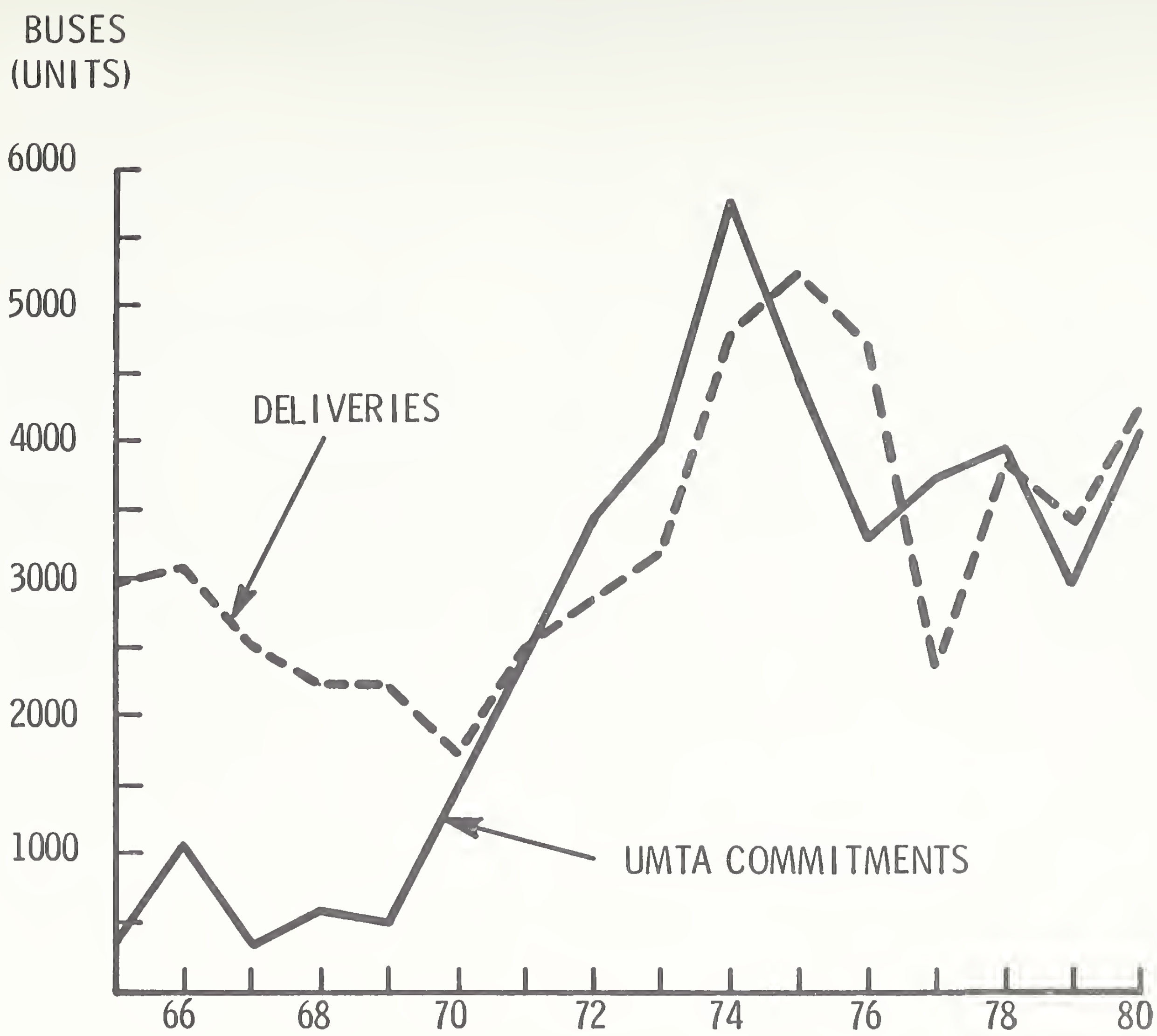
This report is concerned only with the producers of standard and large capacity, integral construction transit buses. Standard and large capacity buses make up the majority of all the transit buses used or sold.

Demand for new transit buses is driven primarily by Federal appropriations because most new transit buses sold are purchased with UMTA grants. These grants are made to local transit properties on the basis of an 80 percent subsidy. To receive an UMTA grant, the local transit property must put up 20 percent of the cost of the purchase. UMTA grants have been the predominant method for financing new bus purchases since about 1970.

Since 1970, deliveries of new buses have paralleled grant commitments by UMTA very closely. (See Figure 1-1.) Demand was declining in the late 1960s despite the introduction of a low level of Federal funding when UMTA was established in 1965. Around 1970, major increases in Federal funding caused demand to rise sharply. Actual unit deliveries peaked in 1975.

Since 1975, demand has been considerably more volatile. Federal commitments fell sharply and then stabilized somewhat. Changes in Federal procurement policies have added to the volatility of demand. In 1976, a controversy arose over whether UMTA would permit transit properties to choose the new advanced design bus (ADB) introduced by General Motors, over existing models offered by other builders, despite a higher price. The issue was settled after lengthy litigation during which many properties delayed new orders while awaiting the outcome. That, and the suspension of production by GM to changeover production facilities to produce the new ADB, resulted in the sharp drop in deliveries in 1977. Similar difficulties occurred in 1979 when a controversy arose over UMTA's proposal to permit purchase only of Transbus after September 30, 1979.

The year 1979 also witnessed a further increase in gasoline prices. As a consequence, mass transit nationwide experienced an increase in ridership. Many transit properties placed orders for ADBs in 1979. The manufacturers were still in the start-up phase of producing the new buses and were producing at a limited rate. Moreover, recognizing that many of the new orders had been delayed by earlier controversies and uncertainties, the builders were skeptical concerning how long the apparent upsurge in demand would last.



NOTE: Deliveries and commitments are for buses of all types. Deliveries are for calendar year.
Commitments are for Federal Fiscal Year.

FIGURE 1-1. U.S. TRANSIT BUS MARKET

Therefore, they were unwilling to make major commitments to increase their production rate. The result was that backlogs built up to unprecedented levels in the late Summer and Fall of 1979, and delivery dates moved out to a year or more from initial order.

More recently (in 1980-81), some transit properties may have hesitated in their purchasing decisions, hopeful that a new Administration would remove the "wheelchair lift" requirement.

1.2 THE U.S. TRANSIT BUS MANUFACTURING INDUSTRY

This study is concerned primarily with the industry which builds standard and large capacity transit buses. Builders of other types of buses are mentioned only in relation to their transit bus activities.

For the purposes of this study, the companies of primary interest can be divided into three groups. The first group includes the long-established North American transit bus builders. This group will be referred to throughout the study as the "established" firms.

The second group is the "new entrants." These are the companies which have only recently established transit bus manufacturing operations in the U.S.

The third group is the "potential entrants." These are the companies which are actively considering investment in U.S. transit bus manufacturing, but have not yet committed themselves to a plant.

1.2.1 The Established Builders

The transit bus manufacturing industry in the U.S. traditionally has been dominated by two manufacturers* --- GMC Truck and Coach (a division of General Motors), and Flxible (a subsidiary of Grumman Corporation, also known as Grumman Flxible).

*From 1974 to 1978, AM General, a subsidiary of American Motors Corporation, also was a major transit bus producer.

Two long-established Canadian bus manufacturers also play a major role in the U.S. transit bus market. They are the Diesel Division, General Motors of Canada, and Flyer Industries.*

These four manufacturers are listed in Table 1-1, where information on their production and capacity is detailed.

GMC and Flxible both produce advanced design buses (ADBs). Although the GMC and Flxible designs are different in many respects, such as method of construction, componentry, and esthetics, they are both premium buses incorporating many advanced features.

1.2.1.1 GMC Truck and Coach Division - GMC Truck and Coach is a division of the General Motors Corporation. The division is descended from the Yellow Coach Manufacturing Company of Chicago which began building transit buses in 1923 and was taken over by GM in 1925. It has been the largest bus manufacturer in the U.S. for over 50 years.

GMC introduced the ADB it now builds in 1975, beginning production in 1977. It calls its ADB the RTS (Rapid Transit Series) and offers it in 35- and 40-foot lengths. The company plans to produce an articulated version by 1984, but currently offers only the standard size transit bus.

GMC currently estimates its production capacity at its plant in Pontiac, MI, to be about 5000 buses per year, based on a two-shift operation (with some overtime) building 20 buses per day. As of January, 1982, GMC was operating with one shift and producing eight buses per day. Actual production in 1981 was about 1900 units.

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*Ontario Bus Industries, a third Canadian transit bus builder, is not considered here because it concentrates primarily on the medium transit bus market.

TABLE 1-1. ESTABLISHED TRANSIT BUS MANUFACTURERS

COMPANY	EST. PRODUCTION CAPACITY: 2 SHIFTS	1980 PRODUCTION	1981 PRODUCTION
U.S.A.			
GMC TRUCK AND COACH	5,000	2,300	1,900
FLXIBLE	4,000	1,549	1,100
CANADA			
DIESEL DIVISION, GM OF CANADA	2,000	721	997
(DELIVERIES TO U.S.)		(174)	(483)
FLYER INDUSTRIES	1,000	351	378
(DELIVERIES TO U.S.)		(328)	(271)

Note: Information provided by the individual manufacturers.

1.2.1.2 The Flxible Company - The Flxible Company, also known as Grumman Flxible, is a subsidiary of the Grumman Corporation. Grumman purchased Flxible in 1978 from Rohr Industries which had acquired the company in 1970. Flxible has been a leading bus builder in the U.S. for many years. It is the heir to Fageol Town Coach, whose bus manufacturing operations it acquired in the 1950s. Fageol began building buses in the 1920s, and was the first to produce an integral construction bus (1926).

Flxible introduced its present model, the '870', in 1976, beginning production in 1978. The bus is available in 35- and 40-foot lengths. In October, 1981, Flxible introduced a new version of the basic 870 bus, with several design improvements and an expanded list of equipment options. Flxible calls this new version, the Metro.

Flxible's final assembly plant is in Delaware, Ohio. Flxible estimates their annual production capacity to be approximately 4000 units. This would require a two-shift operation to produce 16 buses per day.

As of January, 1982, Flxible was building five buses per day. In February, 1982, Flxible reduced the daily production rate to 2-1/2 per day. Actual production in 1981 was 1100 units.

1.2.1.3 The Diesel Division, General Motors of Canada - The Diesel Division, General Motors of Canada, produces a "New Look" transit bus. This "New Look" bus is derived from the same design used by GMC Truck and Coach Division in the U.S. before the introduction of the ADB. The Diesel Division has been producing the "New Look" bus since 1961, two years after it was introduced in the U.S.

The Diesel Division bus plant, located in St. Eustache, Quebec, is capable of producing about five buses per day on one shift and an additional two to three buses per day on a second shift, resulting in an annual capacity of about 1750 units. The actual rate of production was about four buses per day in January 1982. Actual production in 1981 approached 1000 buses. Of these, 483 were delivered to the U.S.

1.2.1.4 Flyer Industries - Flyer Industries is located in Winnipeg, Manitoba. The company was founded in the 1930s and produced trucks for the Canadian government during World War II, then later built intercity coaches. It has specialized as a transit bus and trolley-bus builder since 1969. In 1971, the company was taken over by the Provincial government of Manitoba, which continues as owner.

The Flyer transit bus design was licensed to AM General in 1971, and the buses produced by the two companies are similar. Flyer's plant is estimated to have a capacity, using two shifts, to produce 1000 buses per year. Actual production in 1981 was 378, of which 271 went to the U.S.

1.2.2 The New Entrants

Four companies have become U.S. transit bus builders since 1980, actually starting regular production of standard or articulated transit buses. Those four companies are listed in Table 1-2, and described below. Production statistics are shown in Table 1-3.

1.2.2.1 Gillig Corporation - Gillig, located in Hayward, California, near San Francisco, has traditionally relied on large-capacity school buses as the mainstay of its business. The company is a subsidiary of the Herrick Corporation, also headquartered in Hayward. Herrick is one of the largest fabricators and erectors of structural steel in the U.S. In recent years, Gillig has sought growth opportunities in the transit bus industry. In 1977, the company introduced a medium transit bus, the design for which was licensed from Neoplan (West Germany). This first venture in the transit bus business failed after problems developed with one of the first major buyers.

In 1980, Gillig introduced a transit bus of its own design which it is offering in 30-, 35- and 40-foot configurations. Gillig calls its transit bus the Phantom. It is designed as a utility type bus, with an in-line powertrain, heavy-duty brakes, pedestal-mounted seats, etc. The styling of the bus, however, shows the influence of the ADBs in smooth sides and clean lines.

TABLE 1-2. FOUR NEW MANUFACTURERS

COMPANY	ORIGIN	TRANSIT PRODUCT
GILLIG	CALIFORNIA SCHOOL BUS BUILDER	STANDARD-SIZE UTILITY TRANSIT BUS
CROWN COACH	CALIFORNIA INTERCITY BUS, SCHOOL BUS AND FIRETRUCK BUILDER	ARTICULATED BUS PURCHASED FROM IKARUS (HUNGARY)
NEOPLAN	W. GERMAN BUS BUILDER	STANDARD-SIZE AND ARTICULATED BUSES
M.A.N.	W. GERMAN ENGINEERING COMPANY AND TRUCK AND BUS BUILDER	ARTICULATED BUSES

TABLE 1-3. NEW MANUFACTURERS PRODUCTION CAPACITY AND 1981 ACTUAL PRODUCTION

NEW MANUFACTURERS	START	CAPACITY	1981 PRODUCTION
GILLIG	1980	800	120
CROWN	1981	160	112
NEOPLAN	1981	800	50
M. A. N.	1981	600	3

Gillig has the capacity to produce about 800 buses per year, with two shifts. However, a company official has indicated an intention to limit transit bus production to 500 per year.*

1.2.2.2 Crown Coach - Crown Coach of Los Angeles, like Gillig, has been a builder of transit-type school buses for well over 40 years. The company diversified in the 1950s to produce fire-trucks and intercity coaches. Seeking growth opportunities, the company initiated a venture building articulated transit buses with an Hungarian bus building company, Ikarus.

Ikarus is a bus specialist. That is, the company produces only buses, concentrating on the design and manufacture of the bus body. The company buys its main powertrain components. Ikarus may be one of the largest integral construction bus builders in the world. The company's annual production exceeds 13,000 units, including 3000 articulated buses. It is the principal supplier of large transit and intercity buses to the Eastern European countries and its largest market is the Soviet Union. Internationally, the firm, working through the Hungarian Trading Company, Mogurt, has established local assembly plants in Cuba, Angola, Mozambique and Iraq.

Ikarus and Crown Coach cooperated in demonstrating a prototype in several U.S. cities in 1977. Crown Coach subsequently entered the U.S. transit bus market with its articulated bus, bidding on and winning several small contracts. Crown Coach assembles the bus in Los Angeles, subcontracting to Ikarus for bus body parts. The major chassis parts (engines, transmission, brakes, etc.) are purchased from U.S. makers.

On the first buses built, the U.S. powertrain components were shipped to Hungary for installation, and only finish work was done by Crown Coach. On later orders, Crown Coach has done more

*John W. Oliviera, Vice-President of the Gillig Corporation, as quoted in Metropolitan, Jan-Feb, 1982, p. 19. (See Section 3.2.5 for the quotation.)

assembly work, including component installation. Crown's nominal capacity to produce articulated buses is about 160 per year. For its intercity and school bus models, Crown's capacity is estimated to be about 1200 buses per year.

1.2.2.3 Neoplan - Neoplan* is a West German firm specializing in building intercity, transit and special purpose buses. The company built its first integral construction bus in 1953 and today builds only integral construction buses. The company produces about 1100 buses per year in Germany, exporting about sixty percent.

The parent company has a full product range of luxury intercity (touring), transit, airport apron, and special purpose buses. The emphasis in its product range appears to be on specialty buses, including articulated units, double-deckers, and articulated double-deckers.

In 1980, Neoplan announced plans for a bus assembly plant in Lamar, Colorado,, and began bidding as a U.S. manufacturer on solicitations for ADBs, "New Look" and articulated buses. The company reportedly invested about $6 million in its Colorado plant. When the full production rate is reached in May, 1982, the plant will be producing at a rate of two buses per day and employ about 500 persons on one shift. Two-shift capacity at the plant is estimated to be 800 buses per year.

Neoplan has bid on both "New Look" and ADB procurements with its standard size bus. In bidding on ADB procurements, Neoplan has chosen to offer only an in-line powertrain, although it has built buses using the traditonal V-drive configuration for "New Look" purchasers. Neoplan has also bid on articulated bus procurements, and won one order for Atlanta. The company continues

*Neoplan is the trade name of a German private company, Gottlob Auwarter Gmbh & Co. and also the corporate name of a U.S. company having the same parent stockholders. For convenience, both companies are referred to here separately and collectively as Neoplan.

to promote its other German-made intercity touring and double-deck buses. The plant in Lamar was reportedly built to accommodate double-deck bus production, although none have been proposed.

1.2.2.4 M.A.N. - M.A.N. (Maschinenfabrik Augsburg-Nuernberg) is a diversified West German engineering firm whose business encompasses major civil engineering projects as well as truck and bus manufacturing. In motor vehicle manufacturing, the company has concentrated its efforts on medium and heavy vehicles. The company is also a major builder of diesel engines.

M.A.N. first entered the U.S. transit bus market in a joint venture with AM General in 1976. Having ended the relationship with AM General, M.A.N. established a U.S. subsidiary in 1980, the M.A.N. Truck and Bus Corporation, with headquarters in Southfield, MI, and announced plans for a U.S. manufacturing plant, to be built in Cleveland, North Carolina. That plant, was completed in 1981 at a cost of $14 million.

So far, M.A.N. has offered only an articulated bus in the U.S. However, it has been very successful in selling this bus. At the end of 1981, the company had a backlog of 635 orders, enough to carry the new plant through 1983. A production rate of 1-1/2 units per day is planned for mid-1981. Full production capacity is estimated to be 600 units per year.

M.A.N. is reportedly conducting preliminary research in the U.S. market to establish guidelines for design and production of a standard (40-foot) transit bus.*

1.2.3 The Potential Entrants

In addition to the companies which have actually entered the U.S. transit bus manufacturing industry, there are four major

*American Metal Market, November 16, 1981 "M.A.N. to lift Domestic Content."

companies known to be seriously and actively considering production of transit buses in the United States. These four are listed in Table 1-4. All four are currently involved in some form of prototype testing, a necessary first step toward developing a bus design appropriate to conditions in the U.S. The four companies and their activities are described in the following subsections.

1.2.3.1 Hino - Hino Motors, Ltd. is a Japanese motor vehicle manufacturer. An affiliate of Toyota, Hino manufactures passenger cars as a subcontractor. The company builds its own medium- and heavy-duty trucks, as well. Hino is known as one of Japan's leading bus manufacturers, although the company does no final bus assembly itself; final bus assembly is contracted to other companies. Hino builds only major chassis components such as the engine and transmission and also manufactures some of the major stampings.

Hino's involvement with the U.S. bus market began in February, 1981, when it was invited by Governor Carey to test prototypes in New York, with a view toward establishing a production plant in that state.

1.2.3.2 Renault - Renault is a French automobile and truck manufacturer owned by the French government. Renault is striving to establish a strong U.S. base by tieing up with U.S. motor-vehicle manufacturers. Since 1979, Renault has taken control of American Motors Corporation and has taken a 10 percent interest in Mack Trucks.* Renault is the only major transit or intercity bus manufacturer in France. The company also exports bus chassis internationally.

*Mack Trucks, however, remains a subsidiary of the Signal Companies, a U.S. corporation.

TABLE 1-4. CURRENT ACTIVITY BY POTENTIAL NEW ENTRANTS

POTENTIAL NEW MANUFACTURERS	PROTOTYPE TESTS
HINO (JAPAN)	NEW YORK
RENAULT (FRANCE)	NEW YORK, MONTREAL
SCANIA (SWEDEN)	NORWALK, CONN.
VOLVO (SWEDEN)	NEW JERSEY

Mack Trucks announced in August, 1980 that it might market or assemble Renault transit buses in the United States. Since that time, Renault and Mack have advertised heavily in U.S. transit publications and have been participating in a prototype demonstration program in New York paralleling the testing of Hino buses. Renault also has one bus in a demonstration in Montreal and plans to begin a demonstration of a hybrid propulsion (diesel electric), articulated trolley bus in Seattle around July, 1982. Renault is reportedly studying plant sites in New York and New Orleans.

Renault is planning to introduce a new generation of transit buses in France in 1985, and this new generation could be available in the U.S., if Renault should decide to sell transit buses in the U.S.

1.2.3.3 Scania - Scania is a Swedish heavy truck and diesel engine builder, a part of the Saab-Scania group which also builds Saab passenger cars. Scania assembles some complete transit buses for the Swedish market, but it is primarily a builder of bus chassis. The company builds bus chassis for both integral-construction and body-on-chassis buses.

Scania has enjoyed rapid growth in the sales of its bus chassis, partly as the result of success in marketing bus chassis to Iraq and other Middle Eastern countries. A new plant for chassis assembly was established by Scania during 1981 in Sweden, increasing unit capacity in Sweden by nearly 50 percent. Most of the plant's output is exported. Scania also has bus plants in Brazil and Argentina.

Scania is currently demonstrating transit buses in Norwalk, Connecticut in connection with a Connecticut Department of Transportation demonstration project. The company plans to extend, on its own initiative, the demonstration of its buses across the U.S. during 1982.

Scania is actively seeking a partner in the U.S. although it may choose to build in the U.S. on its own. Scania is seeking to sell both standard size and articulated transit buses.

1.2.3.4 Volvo - Volvo is also a Swedish motor vehicle manufacturer with an international orientation. Some 75 percent of the company's sales originate outside Sweden. The company is moving aggressively to maintain its position in the global motor vehicle industry. It has joined with Renault in passenger car manufacture, conceding a 20 percent interest in its car business to the French company. In medium-heavy and heavy trucks, where it is a world leader, Volvo moved aggressively during 1981 by acquiring the assets of the bankrupt White Motor Co., thus establishing itself as a major U.S. truck builder.

Unlike Scania, Volvo does not itself build complete buses. Volvo sells only bus chassis, although it does maintain an engineering staff to advise its customers on bus-body design.

Volvo has persistently maintained an interest in the U.S. transit bus market since it demonstrated an articulated bus in the U.S. in 1974 as part of Superbus.

In 1976, Volvo completed a car assembly plant in Chesapeake, Virginia. A downturn in Volvo car sales prevented the company from initiating manufacture in the plant. However, the plant remains available for other operations, including bus assembly.

During 1982, Volvo is expected to demonstrate buses with New Jersey Transit.

1.3 THE PROBLEM

The actual entry of four companies into the transit bus manufacturing industry and the continued serious interest by four major international truck builders are causes for puzzlement.

This high degree of interest in the U.S. transit bus manufacturing industry is unprecedented. After the Second World War, there were five major transit bus builders in the U.S. Three of them dropped out of the industry during the 1950s, leaving the market to GMC and Flxible. When Federal financing for mass transit began to increase significantly around 1970, interest in the industry increased. Rohr Industries, an aerospace company, bought Flxible and began an expansion program. AM General, a subsidiary of American Motors Corporation, licensed a transit bus design from Flyer and established a plant in Indiana.

Federal funding for transit buses (on a unit basis) peaked around 1974. By 1978, bus demand had declined, and the industry was embroiled in the controversies over Transbus and the ADBs. AM General elected to end production and Rohr sold Flxible to the Grumman Corporation. No other entry into the industry has occurred in over 30 years. (Appendix B presents a chronology of the U.S. transit bus manufacturing industry.)

Since 1978, the demand for transit buses, reflecting changes in Federal policies and funding levels, has been extremely volatile with no growth apparent. The demand for buses, even if it increased dramatically, would not strain the production capacity of the existing producers. GMC and Flxible alone can claim a combined production capacity of approximately 9000 buses a year. During the past few years, however, demand has hovered around 4000 units annually.

Neither GMC nor Flxible has prospered since 1978. GMC's break-even volume for transit bus production is about 2200 buses per year. By that standard, the division has exceeded break-even only once since 1978. Flxible reports that it has lost money every year since 1978. Between 1978 and 1980, Flxible lost over twenty-million dollars.

In 1981 alone, primarily because of the cost of repairs to the cracked undercarriages of all its buses in service, Grumman Flxible lost $68 million.

So the question remains. Why are so many companies interested in entering this industry, when:

1. This is not an industry which has historically experienced frequent entry;
2. Demand is volatile and declining;
3. There is apparent excess capacity; and,
4. The established manufacturers are not prospering?

The purpose of this study is to provide an explanation, and outline the implications of this new interest. Chapter 2 presents and expounds an explanation. Chapter 3 discusses the implications for manufacturers and transit operators.

2. THE EXPLANATION

The behavior and motivations of businessmen and manufacturing companies entering the transit bus manufacturing industry are extremely complex. The simple answer to the question, "why?" - which is, "To make money" - is <u>too</u> simple. A satisfactory explanation must probe motives, must outline strategies and purposes, and must seek to identify the roles of other actors and events. The explanation developed here consists of three main categories of causes. These categories are <u>opportunity</u>, <u>impetus</u> and <u>contributing factors</u>.

<u>Opportunity</u> refers to those developments in the U.S. transit bus manufacturing industry itself which made new entry possible, plausible, and attractive. <u>Impetus</u> refers to the developments in related industries which may have provided the new entrants with a motive for seeking an opportunity outside their own industries. <u>Contributing factors</u> are all those events external to the firms themselves which may have called attention to the opportunity, enhanced the appearance of opportunity, or facilitated the marketing, plant construction or production start-up.

These three elements will be examined in this Chapter, each in turn, beginning with <u>opportunity</u>.

2.1 OPPORTUNITY

The new builders – Gillig, Neoplan, M.A.N. and Crown Coach – have each taken advantage of opportunities created by strategic decisions made by the two established U.S. transit bus builders – GMC Truck and Coach, and Grumman Flxible. Two strategies shared by GMC and Flxible stand out as the principal creators of opportunity.

The first was the strategy of product specialization which led both builders to concentrate on building only standard size, premium (advanced-design) transit buses. The second was the strategy of using large, relatively automated, plants with highly-paid labor.

2.1.1 Product Strategy

During the early 1960s, GMC and Flxible were the only major integral construction transit bus builders in the U.S. They were also the only major intercity bus builders. They built medium and standard size transit buses, suburban buses, and several intercity bus models. Since that time, each has tended to focus on a narrower range of buses.

The results of this repeated determination to specialize is summarized in Table 2-1. In each case, as GMC and Flxible chose not to produce certain bus types, other manufacturers have stepped in to fill the unsatisfied demand.

As early as 1956, Trailways sought intercity buses abroad. By 1961, Trailways was importing the Eagle Model 01 from Europe.

Between 1963 and 1967, Greyhound ended its intercity bus purchasing arrangement with GMC, turning for a few years to a Canadian bus builder, MCI; MCI had been fully acquired by Greyhound Lines of Canada by 1958. GMC then had to depend for intercity bus sales on independent carriers. Flxible withdrew from the intercity bus market in 1969, when it ceased production of its Twin Coach buses. GMC continued to produce intercity buses, but experienced declining sales. Rather than design a new model, GMC ceased production in 1979. Both Greyhound and Trailways were able to build sufficiently on sales outside their own systems to establish U.S. manufacturing subsidiaries by 1974 (see Section 2.2.2).

The medium transit bus market has always been small. GMC and Flxible traditionally offered 30-foot versions of their standard, "New Look" models. GMC ceased offering a medium transit bus in 1974, and Flxible withdrew its medium bus in 1976.

TABLE 2-1. SPECIALIZATION AND NEW ENTRANTS

OPEN NICHE	LAST PRODUCTION BY GMC AND FLXIBLE	NEW BUILDER
INTERCITY	FLXIBLE - 1969 GMC - 1979	TMC - 1974 EAGLE - 1974
ARTICULATED	NEVER PRODUCED	M.A.N. - 1977 CROWN-IKARUS - 1981 NEOPLAN - 1982P
UTILITY (NEW LOOK)	GMC - 1977 FLXIBLE - 1978	GM DIESEL DIV - 1979 GILLIG - 1980 NEOPLAN - 1981
SUBURBAN	GMC - 1977 FLXIBLE - 1978	EAGLE - 1981
MEDIUM	GMC - 1974 FLXIBLE - 1976	BLUEBIRD - 1976 TMC - 1979

The medium transit bus segment has attracted a large number of manufacturers including both integral construction and body-on-chassis builders. The two leading manufacturers in the last three years have been TMC, an intercity bus builder, and Bluebird, a school bus builder.

During the early 1970s, several transit properties in the U.S. developed an active interest in articulated buses, a type of large capacity bus which had been perfected in Europe in the late 1950s. In 1975, Seattle Metro issued a solicitation for articulated buses which went unbid. Two solicitations by transit properties in 1976 went to a sole bidder offering a bus designed and largely built in Europe. Neither GMC nor Flxible showed any interest in producing an articulated bus. GMC announced plans in 1981 to build articulated buses beginning in 1984.

In regard to servicing a market for articulated buses, M.A.N. was the first to respond. M.A.N. and AM General built articulated buses for U.S. cities in 1977 and 1978. M.A.N. has since established its own plant in the U.S. (independent of AM General), and began production in late 1981. Crown Coach, a Los Angeles school bus, intercity bus, and firetruck builder, also took advantage of the articulated bus opportunity. Crown Coach began an association with Ikarus, a Hungarian bus builder, in 1976, which led to Crown Coach offering an articulated bus on the U.S. market in 1979. Crown Coach began producing articulated buses in 1981, using Ikarus as a subcontractor.

Neoplan has also bid to produce articulated buses, selling 46 to Atlanta in 1981. Neoplan will produce these during 1982. Also, it might be noted that Neoplan U.S.A. can produce double-decker buses from its Colorado plant. It has sold a total of 22 to Los Angeles since 1976, supplying them from their German plants.

The "New Look" transit bus was essentially utilitarian in its design. It was designed, developed and introduced at a time when transit operators still ran private, for-profit businesses. In an environment of declining ridership and revenues, these buses delivered service at a minimum cost. When the advanced design bus

(ADB) was developed in the 1970s, the philosophy had changed somewhat to include the idea of promoting transit with a stylish bus possessing high-technology features.

GMC introduced its ADB in 1975, and began production in 1977. Flxible followed, introducing its ADB in 1976 with production starting in 1978. These two ADBs possessed many desirable features not found on the "New Looks," and they were both attractive designs. However, they usually were more expensive to purchase, and could be more expensive to operate. In short, they were premium buses in comparison to the utilitarian "New Look" buses.

When GMC and Flxible began to produce their ADBs, they discontinued their "New Look" models.

The first manufacturers to respond to the continued demand for "New Look" buses were the Canadian builders. Flyer had sold some buses in the U.S. for a number of years, but GM of Canada began delivering buses to the U.S. for the first time in 1979, after producing "New Look" buses since 1961.

Gillig and Neoplan, new builders in the U.S., began offering buses in this product niche in 1980 and 1981. Because they developed products for this niche deliberately, their buses differed somewhat from the traditional "New Look" type. Both strove for a more modern appearance. Both also offered an in-line powertrain configuration rather than the traditional V-drive.*

The bus builders claim better fuel economy and longer transmission life with the in-line powertrain configurations. The in-line transmission is also about $4000 cheaper per unit than the V-drive transmission. (The traditional advantage of V-drive has been greater accessibility of the engine and ease of maintenance. In common with the "New Look", Gillig and Neoplan have offered such traditional features as openable windows and pedestal-mounted seats.

*Gillig offers the in-line configuration exclusively. Neoplan has built buses with V-drive, but consistently responds to bids, in competition with GMC and Flxible, with in-line powertrains.

Suburban buses have not attracted much attention, perhaps because they do not represent a large product niche. (A suburban bus is a kind of hybrid transit and intercity bus, used for commuter services. It usually has only one door, better seats, luggage racks, and a powertrain appropriate to high speeds.)

Both GMC and Flxible had offered suburban configurations for their "New Look" buses. Neither company developed a suburban configuration for the ADBs. The intercity bus builders who might otherwise have responded more quickly with versions of their intercity models, have been inhibited by the difficulty of incorporating wheelchair accessibility in their designs. Nevertheless, Eagle began offering a suburban bus, based on its intercity model, in 1981.

Clearly, the strategy of product specialization created opportunities for new manufacturers by opening product niches by which they could enter the market.

2.1.2 Production Strategy

Open product niches, however, were not the sum of the opportunities available. Compounding the product strategy choice were other choices and developments involving production costs.

When GMC and Flxible designed and introduced their ADBs, they were also making implicit choices about manufacturing. The ADBs differed radically in design from their "New Look" predecessors. One of their advantages was supposed to be a greatly reduced number of separate parts which was to be reflected in lower production costs.

In equipping their plants to produce the new buses, both companies chose relatively highly automated plants. GMC went the farthest of the two in this direction, using a great deal of automated welding equipment, including welding robots. GM reported that it spent $50 million on tooling and equipment capable of producing 5000 buses per year. This is nearly equivalant to what the company would have spent at that time to completely revamp a 200,000 car-per-year assembly line. .

The advantage to a new bus manufacturer of a small-scale, less-automated plant lies in the reduced risk and initial investment. Although a new firm could theoretically invest in a large-scale, fairly automated plant, employ lower-wage labor, and attempt to drive GMC and Flxible out of business, such a venture would be highly risky and expensive. A large initial investment would be required, and the potential for failure exists.

Table 2-2 lists available information concerning plant capacity, wage rates, and investments by the various North American bus manufacturers. The information in Table 2-2 clearly indicates the magnitudes involved in terms of differences in scale, capital investment and wage rates. If further allowance is made for inflation between the time GMC and Flxible made their investments (1976-78) and when the investments of builders like Neoplan and M.A.N. were made (1980-81), the real differences can be seen to be even greater. Configured information on every point, unfortunately, is not available and so the designation N/A is used in the Table. However, unconfirmed data indicate that the unavailable information would also be in line with the general pattern. Flxible's wage rates, although not as high as GMC's are, nevertheless, above the national average. Actual plant and equipment investment for Flxible to build the ADB was probably around $25 million.* This would not include the cost of a new plant building constructed in 1974 in anticipation of building the ADB. Gillig and Crown Coach, although investing substantial amounts, have both probably invested less than any other manufacturer listed. The use of existing plant structures has aided both companies. Neoplan was reported by a Denver newspaper as paying "in the $3.60 - $7.00 per hour"* range.

2.2 IMPETUS

The impetus for seeking to enter the U.S. transit bus industry arises out of developments in the related industries. Three industries are of particular interest because firms in these

*Assembly Engineering, "Why are We Telling You About a Bus?" November, 1978, p. 1.

TABLE 2-2. COMPARATIVE PLANT SCALE, INVESTMENT AND WAGES (1981)

COMPANY	CAPACITY	INVESTMENT	WAGES
GMC	5000	$50M	$11.50/HR
FLXIBLE	4000	$25M	N/A
GM DIESEL DIV.	1750	$20M	$9.45 - $11.70/HR
FLYER	1000	$ 6M	N/A
M.A.N.	600	$13M	$7.62/HR.
NEOPLAN	800	$ 6M	N/A
CROWN	160	N/A	N/A
GILLIG	800	N/A	$8.85/HR.

N/A = NOT AVAILABLE

* GRUMMAN PAID $55 MILLION FOR THE WHOLE COMPANY IN 1978, A FIGURE WHICH WAS REPORTEDLY $5 MILLION ABOVE BOOK VALUE

industries already have some involvement in bus building. These industries are:

1. The U.S. school bus manufacturing industry;
2. The U.S. intercity bus manufacturing industry; and
3. The international truck and bus manufacturing industry.

Each of these industries will be considered in turn.

2.2.1 School Bus Manufacturers

School bus manufacturers in the U.S. are faced with a decreasing demand for their products because of a decline in the school age population, compounded by budget considerations in many school districts.

School bus manufacturers fall into two categories, those building integral construction (also called transit-type) school buses, and those building body-on-chassis buses. The body-on-chassis builders produce the vast majority of all school buses --- over 30,000 in 1980. The integral construction builders produce only about 700 buses per year.

Business has been declining for the body-on-chassis school bus producers. Factory sales of bus chassis (19,501-26,000 pound GVW) for school buses have declined from almost 32,000 in 1978 to less than 21,000 in 1981.* For the integral construction school bus builders, the decline has also been great, extending over the last ten years.**

Of the integral construction school bus builders in the U.S., two have entered the U.S. transit bus market, but have shied away from producing either standard or large capacity buses which have traditionally required integral construction. They have restricted themselves primarily to building small and medium transit buses. Bluebird, a Georgia firm, entered the transit bus market in 1976 and is the apparent leader in that market segment. Bluebird builds its own chassis for the transit bus, although it uses truck manufacturer (i.e., I.H., Ford, GM, Chrysler) chassis for most of its school buses. Thomas-Built also has a medium

*Motor Vehicle Manufacturers Association.

**John Oliveira, Vice-President of Gillig, quoted in Metropolitan, Jan-Feb, 1982, p. 13.

transit bus, for which it has built its own chassis since 1977. Carpenter offers a medium transit bus using a Gillig chassis. Carpenter recently built a new plant to assemble transit buses. Wayne, an Indiana firm, offers a small bus built on a van chassis which it calls the Transette.

Activities of the various school bus builders in the transit markets are summarized in Table 2-3.

2.2.2 Intercity Bus Manufacturers

The intercity bus is the type used by the intercity carriers such as Greyhound and Trailways. These buses are of the integral construction type and most are 40 feet in length.*

There are currently five major suppliers to the U.S market, of which three are owned by intercity carriers. Greyhound controls MCI, a Canadian firm with a U.S. assembly plant, which sells in the U.S. primarily to operators other than Greyhound.** As of 1974 Greyhound has also owned TMC, a U.S. firm with a plant in New Mexico. TMC primarily supplies Greyhound itself. Trailways owns Eagle, a bus builder with a plant in Texas. The two independent builders are Crown Coach and Prevost. Crown Coach specializes in producing a utility intercity coach, for which a principal market is direct sales to the U.S. government. (Crown Coach also builds school buses, as was discussed in the previous section.) Prevost specializes in luxury touring coaches for tour operators.

All the intercity builders, except for Crown Coach, are engaged in a capacity expansion. Details of this expansion are provided in Table 2-4. All of the builders produced at or near capacity during 1980. The capacity expansion was prompted by an increasing demand for new buses for touring (as opposed to

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*Large capacity, i.e., articulated and double-deck intercity buses are built in Europe, and some have been used in the U.S.

**MCI is owned by Greyhound (Canada). Greyhound Corp. (U.S.) owns a controlling interest in Greyhound (Canada).

TABLE 2-3. SCHOOL BUS BUILDERS AND ACTIVITY

SCHOOL BUS BUILDERS	TRANSIT BUS ACTIVITY
LARGE CAPACITY	
CROWN	IKARUS ARTICULATED
GILLIG	STANDARD-SIZE TRANSIT BUS (1980)
TRADITIONAL BODY-ON-CHASSIS	
BLUEBIRD	MEDIUM TRANSIT BUS (1976)
THOMAS BUILT	MEDIUM TRANSIT BUS (OWN CHASSIS, 1977)
CARPENTER	MEDIUM TRANSIT BUS (NEW PLANT, 1981)
WAYNE	SMALL TRANSIT BUS

TABLE 2-4. INTERCITY BUS BUILDERS EXPANSION

FIRM	CAPACITY	
	1980	1983
TMC (GREYHOUND)		
INTERCITY	500	700
TRANSIT (30')	400	
MCI (GREYHOUND)	900	1600
EAGLE (TRAILWAYS)	600	1500
PREVOST (CANADA)	250	400

NOTE: Crown Coach has a capacity to produce about 1200 buses per year, including intercity, school, and articulated transit buses.

scheduled intercity travel) and by the withdrawal of GMC Truck and Coach from the industry in 1979. GMC had produced about 500 intercity buses per year during the mid-1970s, although the rate was declining.

Preoccupied with capacity expansion, the intercity builders have not shown much interest in the transit bus market. TMC (Greyhound) had entered the medium transit bus market in 1979 with a product licensed from Ontario Bus Industries of Canada, and had been the leader in that market. In late 1981, however, TMC sold the license back to Ontario Bus Industries and ceased production. TMC plans to use the freed resources to expand intercity bus production.

Eagle (Trailways) developed and introduced a suburban version of its intercity bus in 1981. This suburban bus would have applications in the commuter operations of many transit properties. Eagle may be regarded as reducing the risk represented by capacity expansion by making available to itself another potential market.

Crown Coach, which has been affected adversely in its school bus business, and which is not much affected by developments in the rest of the intercity market, has invested in building the Ikarus articulated transit bus.

Prevost has no apparent interest in the transit bus market.

The transit activities of the intercity builders are summarized in Table 2-5.

2.2.3 International Truck and Bus Manufacturers

The third industry akin to the U.S. transit bus manufacturing industry, and probably the most important to the future development of the U.S. industry, is the international truck industry. The international truck industry includes those truck and bus manufacturers who are operating plants and selling vehicles multinationally.

TABLE 2-5. NORTH AMERICA INTERCITY BUS ACTIVITIES

COMPANY	COMMENT
GREYHOUND (TMC/MCI)	TMC BUILT A MEDIUM TRANSIT BUS 1979 - 1981
TRAILWAYS (EAGLE)	EAGLE INTRODUCED A SUBURBAN VERSION OF ITS INTERCITY BUS IN 1981
PREVOST	NO CURRENT INTEREST IN TRANSIT

2.2.3.1 Globalization - The existence of an "international" truck industry is not new. The phenomenon of the major, multinational truck builder has gradually become commonplace since the 1950s. The phenomenon is called globalization. To some extent it is occurring in almost every major industry in which international trade and foreign investment are major factors. Globalization is happening in the closely related automobile industry. It has happened in television receivers, motorcycles and sewing machines, to name a few additional examples.*

Globalization means more than just the representation of a few multinational competitors in a national industry. It means that the multinational firms have an advantage because they are multinational, either from economies of scale or some other source.

The impetus for globalization originates primarily in Western Europe. There, truck manufacturers developed inside confined, small, national markets.

The potential for exploiting economies of scale was limited by the domestic sales potential, and European truck builders very quickly undertook export. In the 1950s and 1960s, these exports were primarily to South America. The exports were eventually replaced by local manufacture as Brazil and Argentina, especially, developed economically. Today, several European truck builders have major manufacturing operations in South America. More recently, export activity has centered on developing countries in Africa and Asia and the Middle East. South Africa, Nigeria, Pakistan, Malaysia, Algeria, Iraq, and Saudi Arabia are major markets for European trucks and buses.

*For more on globalization as a general phenomenon, see Michael Porter, Competitive Strategy (New York: The Free Press, 1981), Chapter 13.

Four factors are increasing the competitive pressure on the European truck builders.

First, the establishment of the European Economic Community (or "Common Market") has resulted in a gradual lowering of trade barriers among the various European countries. Where trucks are concerned, this process is by no means complete. But the process has gone far enough so that competition among European builders within Europe and across national borders is intense. This intense competition is especially threatening to the small builder who did not go aggressively international earlier. While before he may have been quite successful against one or two multinational competitors which shared the home market, now he faces six or seven multinationals from across Europe. "Small manufacturers are disappearing --- less than half of Europe's remaining two dozen or so medium- and heavy-truck builders are expected to survive the decade."*

Second, the prospects for continued growth in exports to developing countries are poor. The primary reason is that the developing countries would like to develop truck industries of their own. Local assembly and manufacture will cut down exports from Europe.

Third, sales of new trucks in Europe fell dramatically in 1980 and 1981, just as they did in the U.S. The Western European market is mature and even after economic recovery results in an increase in truck sales, secular growth will be very slow.

Fourth, the Japanese show signs of becoming major international competitors in large trucks in the 1980s. Japan has become an efficient low-cost producer in several industries, including most notably, automobiles, and has used this efficiency to dominate world markets and global industries. They have not yet achieved similar dominance in large trucks, but they must be taken very seriously. There are four large-, medium- and heavy-truck

*Thomas W. Duncan, "The World of the 'World Truck'" Fleet Owner, July, 1981, p. 61.

producers in Japan, and already they each possess a formidable production scale. The Japanese are handicapped in truck export in that the requirements of their domestic market are radically different from the requirements of the major potential exports. Japan is an archipelago. Truck travel is along extremely hilly terrain, and is limited to mostly very short hauls. The engines, transmissions, axles and chassis configurations appropriate to this environment would not find a large market in the continental nations of North America or Africa. The Japanese, therefore, are constrained to develop special export models.

Under the pressure of these four factors and the belief that only large, multinational companies will survive and prosper in the increasingly global truck industry of the 1990s, the major Western European truck manufacturers are devising strategies for survival. These strategies are usually focused on becoming even more broadly multinational with a presence in every major market. An important part of the strategies of many of these companies is to develop a base of operations in the U.S. The U.S. is important because it represents the largest single national market for trucks in the world. A significant share of the U.S. market can add greatly to an international truck manufacturer's scale, and economies of scale may become a vital factor in global competition.

The European truck builders have actively pursued three opportunities presented by the U.S. market.

Several European truckmakers began exporting Class 6 diesel trucks to the U.S. after this type of vehicle was made popular by increasing fuel prices.

More recently, European truck builders have taken advantage of the financial effects of the depressed U.S. truck market to acquire U.S. truck builders. Daimler-Benz acquired Freightliner in April, 1981, and Volvo acquired the truck manufacturing operations of White Motor two months later. Renault, which has a 46 percent interest in American Motors, bought a 10 percent interest in Mack Trucks in 1979 (along with bonds convertible to an additional 10 percent interest).

Finally, several European companies have shown a definite interest in the U.S. transit bus manufacturing industry. Two of the companies actually selling buses in the U.S. - Neoplan and Ikarus - are bus specialists. That is, they are bus builders exclusively, having no truck manufacturing operations.

One European truck and bus manufacturer - M.A.N. - has invested $13 million in a new U.S. bus assembly plant. Three other European truck builders are currently demonstrating prototypes in the U.S., and are contemplating bus production. They are Renault, Volvo and Scania.

The European truck builders demonstrating prototypes have been joined by one Japanese company, Hino.

The logic for seeking opportunity in the U.S. transit bus manufacturing industry in particular appears to differ between the bus specialists and the truck builders.

The bus specialists are in the business, primarily, of building the bus body. They buy most powertrains and chassis components from other companies. Like other firms in the international truck industry, the bus specialists entering the U.S. industry have been operating multinationally and exporting a large portion of their output. But, in entering the U.S. bus manufacturing industry, their motives must be ascribed to a desire to increase their worldwide <u>bus</u> sales.

For the truck builders, however, the logic of entering the U.S. transit bus manufacturing industry may be much more complex and involve ulterior motives. The European and Japanese truck builders are primarily producers of chassis and chassis components. Their business is focused on manufacturing and assembling the powertrain and chassis. <u>Buses merely represent a special type of truck</u> and, therefore, a special type of chassis. The extent to which they also involve themselves in building the bus body varies. Of the four European and one Japanese truck builders of concern here, two - Volvo and Hino - do <u>not</u> build complete buses in their domestic markets at all. They build only chassis which they sell to independent companies for assembly into a bus.* All of the others also make their chassis available for separate sale.

In entering the U.S. transit bus market, a truck builder will be interested in expanding the sale of his principal products, which are the powertrain and chassis components. While the bus specialists such as Neoplan and Ikarus have been content to adopt U.S.-produced powertrain and chassis components in their U.S.-built buses, a truck builder entering the U.S. bus industry will want to use his own components. M.A.N., which employs its own engine and axles in its articulated bus stands as an example.

Moreover, a truck builder is less likely than a bus specialist to limit his venture to buses. For the truck builder, building buses is more likely to be regarded as an entering wedge in the U.S. market. It is a place to train people and gain experience in U.S. business operations. Once a fleet of buses is sold and in service, providing service justifies building a parts and service organization which can be the basis for a truck parts and service organization. A parts and service organization for transit buses can be built city-by-city as buses are sold, but because trucks travel more unpredictably, a truck parts and service organization must be initially more extensive to be credible.

Entering the transit bus manufacturing industry may complement other strategies such as buying out an existing U.S. truck builder. Since the ultimate objective is an integrated, multinational truck manufacturing base, even after buying a U.S. truck builder, the international truck manufacturer must solve

*Readers familiar with U.S. practice may believe that what is referred to here is body-on-chassis construction, like that commonly used for school buses. These companies do produce full (beam) frame, forward-engine chassis like those used for school buses in the U.S. They also produce assembled sets of chassis components without a beam frame for use in rear-engine or mid-engine integral construction buses. Their standard and articulated transit bus chassis are of the integral-construction type.

the problem of introducing its own (foreign-built) components and setting up a parts and service organization that can cope with its own components.

2.2.3.2 The Manufacturers - To put the foregoing observations in perspective, it may be useful to review the international stance, and U.S. activities, of the major foreign truck and bus builders interested in the U.S. transit bus market. Table 2-6 lists seven such truck and bus builders, showing the percentage of their vehicle sales in their home markets, along with comments on their general international position.

Volvo is also a Swedish motor-vehicle manufacturer with an international orientation. Some 75 percent of the company's sales originate outside Sweden. The company is moving agressively to maintain its position in the global motor vehicle industry. It has joined with Renault in passenger car manufacture, conceding a 20 percent interest in its car business to the French company.

Volvo has already moved aggressively into the U.S. truck industry by buying the truck manufacturing operations of White Motor Co. Despite this acquisition, it will be several years before any of the White truck models are replaced by models developed by Volvo. In that sense, Volvo's entry into the U.S. truck market will remain limited to offering the Class 6 diesel units it has imported for several years.

Volvo has persistently maintained an interest in the U.S. transit bus market, since it demonstrated an articulated bus in the U.S. in 1974 as part of Superbus.

Volvo built an assembly plant in the U.S. in 1976. It had been intended that the plant would be equipped to produce cars, but those plans were scrapped when Volvo car sales in the U.S. slipped. The plant, however, remains available for use by Volvo in some other manufacturing venture.

TABLE 2-6. INTERNATIONAL STANCE OF SELECTED COMPANIES

COMPANY	% DOMESTIC UNIT SALES		COMMENT
	TRUCK	BUS	
VOLVO	13%	18%	HAS MAJOR PLANTS IN SOUTH AMERICA
SCANIA	11%	10%	HAS BUS PLANTS IN BRAZIL, ARGENTINA; LARGEST MARKET FOR BUSES IS IRAQ
M.A.N.	52%	47%	EXPORT MARKETS IN ASIA AND THE MIDDLE EAST
HINO	68%	46%	HAS A SMALL PLANT IN CANADA; EXPANDING IN SOUTHEAST ASIA
RENAULT	60%	68%	HAS ACQUIRED INTEREST IN AMC AND MACK TRUCKS; SOLE TRUCK AND BUS PRODUCER IN FRANCE
IKARUS	-	17%	LARGEST HEAVY BUS BUILDER IN THE WORLD; BIGGEST MARKET IS THE SOVIET UNION; HAS A MAJOR PLANT IN IRAQ
NEOPLAN	-	40%	HAS PLANT IN GHANA; ACTIVE IN SOUTH AMERICA AND MIDDLE EAST

NOTE: "Domestic Unit Sales" in the table refers to sales in the company's own home market. For example, 13% of Volvo's truck sales are in Sweden.

Scania has sold one of its diesel engines in the U.S. for a number of years through Mack Trucks, which offered the Scania engine as an option on some of its truck models. Otherwise, the company's truck business in the U.S. has been very limited.

Scania has enjoyed rapid growth in the sales of its bus chassis, partly as the result of success in marketing bus chassis to Iraq, and other Middle Eastern countries. A new plant for chassis assembly was established by Scania during 1981 in Sweden, increasing unit capacity in Sweden by nearly 50 percent. Most of the plant's output is exported. Scania also has bus plants in Brazil and Argentina.

M.A.N. has been involved actively with the U.S. bus market since 1974, when it first demonstrated an articulated bus in several U.S. cities as part of Superbus. In a joint venture with AM General, M.A.N. successfully bid on two major orders for articulated buses in 1976 and eventually delivered 399 articulated buses in partnership with AM General.

Having ended the relationship with AM General, M.A.N. has now built its own bus plant in Cleveland, North Carolina at a reported cost of $13 million. Otto Voisard, managing board chairman of the company, has reportedly said that articulated-bus production could be the beginning of the production of a wider range of commercial vehicles in the U.S.* The bus venture is not the first evidence of M.A.N.'s interest in the U.S. truck industry. In 1979 the company actively negotiated to buy a majority interest in White Motor Co.

Beginning in the early 1970s, Hino began a drive toward increasing its international presence by the export of trucks and buses. Hino established a European subsidiary in 1974 to serve as a parts depot for Europe and Africa. The company established a series of joint venture firms to market Hino products, beginning

*"M.A.N. Might Expand U.S. Vehicle Production Beyond Stated Facility", Wall Street Journal, April 30, 1980, p. 2.

with the Philippines in 1975 and continuing with Malaysia (1977), Saudi Arabia (1977), and Thailand (1979). A special series of export-only trucks was launched in 1976. The company has a small assembly plant in Vancouver, British Columbia, where it assembles medium-heavy Hino diesel trucks from kits exported from Japan.

Although the largest producer of bus chassis in Japan, Hino does not itself build complete buses. It produces only the parts requiring high precision such as the crankcase, crankshaft, cam shaft, transmission and other gears, engine, transmission and rear axle assembly. If Hino were to produce in the U.S., it would probably export key parts, such as engines, from Japan.

Renault's truck building operations are an amalgamation of all major French interests in that field. Renault acquired Berliet, formerly a Citroen subsidiary, in 1975, adding it to its own Saviem subsidiary. More recently, Renault assumed a 50 percent stake in Peugeot's truck business (the bulk of which Peugeot had bought along with Chrysler Europe in 1978). Since combining Saviem and Berliet, Renault has been moving deliberately and aggressively to establish itself as an international competitor. In the U.S., Renault has acquired a 46 percent interest in American Motors Corporation, which builds Jeep trucks, and a 10 percent interest in Mack Trucks, through which it has been marketing a line of Class 6 and 7 diesel trucks (which Mack calls the Mid-Liner series). Should Renault choose to expand its U.S. product offerings to include transit buses, this venture may involve Mack Trucks as the U.S. assembler. (Mack was a major U.S. bus builder from the turn of the century until 1960.)

Ikarus is a Hungarian firm which can claim to be one of the world's largest producers of transit buses and of large, integral-construction buses in general. The company's annual production of buses is over 13,000 including some 1500 articulated transit buses.

The phenomenal size of Ikarus as a bus producer is the result of planned specialization in motor-vehicle production among the Comecon countries of Eastern Europe. In 1964 it was agreed among the Soviet Bloc countries, excluding Romania, to permit Hungary to establish a virtual monopoly in production of large buses. The other countries in the region would undertake complementary specialization in other types of vehicles

Ikarus is a bus specialist, building only the bus body. Major components are supplied by other firms.

Ikarus became involved in the U.S. transit bus market at the instigation of the McDonnell-Douglas Co., a manufacturer of commercial aircraft. McDonnell-Douglas has been attempting to sell commercial aircraft in Eastern Europe for a number of years. Such sales would require: 1) political influence, and 2) a means by which the planes could be paid for, such as offsetting trade. McDonnell-Douglas actively sought a market for Ikarus buses in the U.S. under an informal agreement with Mogurt, a Hungarian trading company,* by which Mogurt would support McDonnell-Douglas' efforts to sell planes in Hungary and the Hungarians would credit the sale of Ikarus buses in the U.S. in any trade offset agreement involving the purchase of McDonnell-Douglas planes.

McDonnell-Douglas identified the articulated-bus market as having potential, and Ikarus began designing a U.S. prototype in 1975. McDonnell-Douglas found a U.S. partner for Ikarus in Crown Coach, a Los Angeles bus builder.

Neoplan is a West German bus specialist. The company has traditionally concentrated on luxury intercity touring buses and specially designed airport apron buses. Double-deckers and articulated buses have been mainstays for the company. Neoplan has been expanding internationally since the early 1970s. Sixty percent of Neoplan's German production of 1100 buses per year is exported. The company has built a plant in Ghana and made major sales in the Middle East, including a sale of 500 buses to Saudi Arabia in 1979.

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*Mogurt is one of several government-owned trading companies in Hungary with responsibility for international trade.

Neoplan has been seeking opportunities in the U.S. at least since 1968. During the early 1970s, Neoplan was able to sell only a small number of its buses in the U.S. primarily for special purposes, such as special low-floor airport-apron buses and double-decker buses. In 1976, Neoplan licensed Gillig, in the U.S., to build a medium transit bus design. That venture was ended in 1979 when Gillig ceased production of the Neoplan buses.

2.3 CONTRIBUTING FACTORS

While the basic opportunity was created by developments within the transit bus manufacturing industry, and the impetus behind new entry can be traced to developments in related industries, a number of other circumstances and events acted as contributing factors. These contributing factors either attracted attention to the opportunity which existed and made that opportunity seem worth pursuing, or facilitated the process of actually entering the industry. Of special interest as contributing factors are those which relate to government policies.

A number of events during the 1970s served to attract attention to the U.S. transit bus market. Part of the political rhetoric of the energy crisis involved mass transit. The debate over using new energy taxes to finance mass transit, and the efforts of transit advocates to capitalize on the air of crisis and sudden jumps in ridership, tended to give the impression of a coming boom in transit. The public expression of dissatisfaction by some transit officials concerning the ADBs introduced by GMC and Flxible may have highlighted opportunity. Two UMTA programs – Transbus and Superbus – attracted a good deal of attention, each in its own way. The active promotion of new entries by some public officials was a major contributing factor as well. Secretary of Transportation Goldschmidt encouraged plant and capacity expansion and increased competition through numerous speeches prophesizing large increases in the U.S. bus market; Governor Carey of New York actively solicited foreign producers to locate in his state.

For the manufacturer intent on entering the industry, a number of factors made entry easier. The procurement practices in use in the industry create a very open market, and this was a major factor contributing to ease of entry. The Federal Buy America rule, which requires that domestic builders be given preference in bidding, provided an incentive to locate in the U.S. For the manufacturer building a new plant, a variety of state and local assistance programs has been available.

The following paragraphs expand on the major factors that contributed to the enticement of new entrants.

2.3.1 Energy Crisis Rhetoric

The energy crisis rhetoric which became popular after the increase in oil prices in 1979 was a potent force creating optimism about transit bus demand.

The American Public Transit Association (APTA) was among the first to join the campaign for increased financing for transit. In June, 1979, APTA released the results of a survey of transit properties. The survey showed a "need" for 8900 to 15,400 buses per year over the next four years. The lower figure represented the need resulting from an assumed increase in ridership of 26 percent over the whole period. The higher figure resulted from an assumption of an increase of 20 percent per year. The survey also produced a projection of actual demand for the period. Actual demand was projected to range from 4300 to 5500 buses per year. But, the "need" figures made headlines, and were more widely reported than the actual demand estimates. Sharp increases in ridership resulting from the fuel shortage seemed to make the assumptions behind the needs survey credible.*

*American Metal Market, August 13, 1979, pp. 4, 8.

President Carter's proposals for meeting the energy crisis added credibility to the assertion that something might be done to meet the "need" identified by APTA. A major, although controversial, element in President Carter's plans was the proposed windfall profits tax. To build support for the tax, the Carter Administration proposed using it to finance a number of different projects and programs. In July 1979, President Carter proposed using the windfall profits tax to finance mass transit. This proposal was later elaborated into a plan to spend $50 billion on public transportation in the 1980s (compared to $15 billion in the 1970s), including $5.6 billion for buses and bus-related facilities. President Carter, speaking before the APTA annual convention in September, 1979, said that the government in the 1980s "will double the production of buses, the only form of mass transit in 97 percent of America's cities."*

The appointment of Neil Goldschmidt as Secretary of Transportation in September 1979, brought to office a persuasive advocate of more competition in bus manufacturing. Secretary Goldschmidt's first major proposal after assuming office was to create a Federal stockpile – a strategic bus reserve – of some 1000 buses. An important element of the strategic reserve proposal was the idea that purchase of buses for the stockpile could be directed to encourage more companies to assemble buses in the U.S., including companies from abroad.**

In early 1980, APTA responded to Secretary Goldschmidt's strategic bus reserve proposal with a proposal that the Federal government guarantee sale of up to 150 percent of qualified bus manufacturers' 1979 production. Under the APTA proposal, the Federal Government would buy any buses not actually sold to

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* Wall St. Journal, Sept. 27, 1979, p. 31.

** Wall St. Journal, "New Cabinet Official to Seek U.S. Funds to Stockpile Buses," Sept. 27, 1979, p. 31.

transit properties. These buses could than be resold to operators who elected to skip the regular procurement process or leased to operators to meet short-term needs. It was hoped that this proposal would encourage manufacturers to increase capacity.*

Secretary Goldschmidt continued to promote the idea of new manufacturers entering the transit bus industry even after his strategic bus reserve proposal failed to win support in Congress. He, and his subordinates, met with officials of potential entrants to discuss their plans. In April and May of 1980, he encouraged plans to use the then-recently closed Ford assembly plant at Mahwah, New Jersey to build buses.**

2.3.2 Dissatisfaction with the ADBs

A major contributing factor to new entry has been the widely-expressed dissatisfaction with the ADBs. The dissatisfaction has arisen from many causes, some minor and others much more serious.

Some of the dissatisfaction relates to the fact that the ADB was a premium bus, and, in introducing it, GMC and Flxible ceased production of their older, utility bus.

> "They are beautiful buses. But they are bus-Cadillacs, available to us at a time when we need a small economy bus with a small price tag, low maintenance and good fuel economy."***

The magnitude of this dissatisfaction found a ready measure in the sales of Flyer and GM of Canada, two Canadian builders who continued to build "New Look" transit buses after the introduction of the ADBs. Their U.S. deliveries are shown in Table 2-7. These figures indicate clearly the continued demand for "New Look"-type buses.

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*Fleet Owner, February, 1980, p. 164.

**New York Times, May 13, 1980, Sec. II, p. 1w.

***Jack Gilstrap, Executive Vice-President, APTA, Quoted in Mass Transit, October, 1980, p. 38.

TABLE 2-7. CANADIAN MANUFACTURERS' U.S. TRANSIT BUS DELIVERIES, 1978-1981

COMPANY	1978	1979	1980	1981
GM OF CANADA	0	80	174	483
FLYER	0	132	328	271
TOTAL	0	212	502	754

ADB complaints have been registered concerning brake life, transmission life, fuel economy, passenger capacity, and the failure of the air conditioning systems. The dark, sealed windows, the height of the hand rails in the Grumman bus and the absence of a rear window have also been criticized. The most serious problem has been the cracks which appeared in the undercarriage of the Flxible bus. All of these problems have received wide publicity.*

The nature of these problems, however, is less important than the fact that they received wide publicity, and became issues for public debate in some cases. Public transit is a matter of public policy at both the local and national level, thus the high level of publicity is to be expected.

GMC and Flxible have been responding to many of the complaints with new designs and options. GMC relocated the air conditioning compressor on later models to reduce the incidence of failure. Flxible has fixed its cracked frames, and has begun offering many "New Look"-type features as options. Both manufacturers have been improving their buses.

The publicity surrounding the perceived deficiencies in the GMC and Grumman buses, however, served to make a much wider audience aware of an opportunity.

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*1. Lee Smith, "The Bogged-Down Bus Business," Fortune, March 9, 1981, p. 58.

2. U.S. General Accounting Office, The Urban Mass Transportation Administration's Involvement in Bus Specifications and Testing (Washington, D.C. June 5, 1981).

3. David Young, "A World of Buses: Their Problems and Possibilities," Mass Transit, December, 1980, p. 6.

4. The Urban Mass Transportation Administration's Technology Development and Equipment Procurement Programs: Do We Know What We Are Trying To Do? Report of the Subcommittee on Oversight and Review of the Committee on Public Works and Transportation, U.S. House of Representatives, March, 1980.

2.3.3 UMTA Program

Two major UMTA technology programs of the past stand out as contributing toward entry by attracting a great deal of attention to opportunities in the U.S. transit industry. These programs were Superbus and Transbus.

Under the Superbus project, initiated in 1972, UMTA sponsored an examination of large capacity bus technology by a group of ten cities. In 1973, this examination included a European tour in which representatives of the group visited manufacturers and transit operations. In 1974, M.A.N. and Volvo demonstrated articulated transit buses in the United States under the sponsorship of the program. In a related development, Neoplan was able to sell two double-decker buses to Los Angeles, and British Leyland demonstrated eight double-decker buses in New York City.

The Superbus project* helped prepare cities to purchase articulated transit buses. In 1975, Seattle Metro issued the first solicitation for these buses. Although that first solicitation was not bid on by manufacturers, in 1976, two solications — one by Seattle Metro, the second by a consortium - did result in contracts. Both contracts were won by the sole bidder, a joint venture by AM General and M.A.N.

The Transbus program found its origin in a study published in 1968 by the National Academy of Engineering which called for the development of a new transit bus to replace the 1959 "New Look". That same year GMC demonstrated an experimental bus which it called the RTX.

*For further information, see the California Department of Transportation Report, The Development and Operation of High Capacity Buses in the United States. July, 1980.

UMTA initiated the Transbus program in 1971, aiming at the development of a bus which would replace the "New Look" as the standard of the industry. In 1972, UMTA signed contracts with three bus manufacturers, GMC, AM General and Rohr Flxible, each of whom was to develop prototypes.

Following the development and testing of prototypes, it was hoped that it would be possible to put a "Transbus" in production, incorporating advanced concepts of design.

In 1977, the Secretary of Transportation, Brock Adams, determined that no matching funding would be provided after September 30, 1979 for any bus not meeting the specification developed as a result of the Transbus project. A consortium was formed in 1978 to make the first Transbus purchase. The solicitation called for bids to be submitted by April, 1979. No one bid.

After investigations by the Department of Transportation and the National Research Council confirmed that the specifications were impractical, the September 30, 1979 deadline was revoked.

Transbus received much attention in the press. Some antagonism was generated between industry and government officials, a fact which may have made many government officials more receptive to proposals by new entrants.

At least two major European builders, M.A.N. and Volvo, seriously examined the Transbus solicitation.

In one of the more interesting episodes generated by Transbus, the entrepreneur, John Z. DeLorean, proposed building either Mercedes or M.A.N. advanced 'S80' buses in a New York City plant. Mr. DeLorean claimed that the 'S80' buses met many of the accessibility goals put forward for the Transbus, but not met by the ADBs. He sought funding from Federal and New York officials for prototype construction and testing and plant construction.*

*"Windfall Profits Tax May Revive Transbus," American Metal Market, March 10, 1980, p. 5.
"DeLorean's Proposed Bus Falls Short of Standards" Automotive News, October 1, 1979.

Based on lessons learned from the Transbus Program, UMTA proposed the National Bus Demonstration Program, subsequently renamed the New Bus Equipment Introduction (NBEI) Program. This program provides opportunities in a non-mandatory framework for design innovation and increased competition. The NBEI Program has recently been initiated with three transit properties who, with financial and technical support from UMTA, will procure small and articulated buses with innovative design features. These buses will then be tested in revenue service operation to assess their effectiveness and marketability in the U.S. transit environment.

2.3.4 Procurement Practices

Many features of the way buses are sold affect bus manufacturers and the structure of the bus manufacturing industry. In Table 2-8, three major features of the bus procurement process are highlighted. These three features are not exhaustively descriptive of the procurement process. They were chosen for their relevance to the problem of explaining new entry. The general effect of all these features is to create a more open market for new entry. Some aspects of the procurement process are being changed at the time of this writing. For example, the use of life-cycle costing in the procurement process has been mandated beginning with the use of 1982 fiscal year funding. Those changes are not discussed in this section because the problem is to explain the effect of procurement practices in the past on new entry that has already occurred. The effect of the current changes on future prospects is discussed in Chapter 3.

Transit bus procurements using the formal advertising procedure (the procurement method most commonly used by transit properties in buying buses) is particularly advantageous to new entrants. It is advantageous because of the amount of public information it generates concerning who is buying; how many buses they are buying; and how much past purchasers paid. In most markets, this information is difficult or impossible to obtain.

TABLE 2-8. COMMON PROCUREMENT PROCEDURES AFFECTING MANUFACTURERS - FEDERAL GRANT FINANCING AND PROCUREMENT

- FORMAL ADVERTISING (LOW BID)
  - ALL MAJOR POTENTIAL PURCHASES ARE KNOWN
  - PRICES IN PREVIOUS PURCHASES ARE KNOWN (DISCOURAGING PRICE COMPETITION)
  - CONTRACT AWARD IS NEARLY ALWAYS MADE TO THE APPARENT LOW BIDDER (WITHOUT BID EVALUATION)
- BUILD TO ORDER; PAYMENT ON ACCEPTANCE
  - NO MANUFACTURER INVENTORY OVERHANGS THE MARKET; PRICE WARS ARE DISCOURAGED
  - NO NEED TO FINANCE THE BUYER'S PURCHASE
- UMTA REVIEW
  - MANUFACTURER CAN DISPUTE BUYER'S PREFERENCE, DEMAND OBJECTIVE CRITERIA
  - NEW BUILDER CAN DISPUTE EXCLUSIONARY SPECIFICATIONS

A stranger to most markets (whether for cars, steel, or medical instruments) would find it difficult to find out the actual transaction price in all individual sales, or to find all the major customers for the product, or to find out when a major customer was ready to buy.

The large amount of information available is helpful in itself, but other aspects of one-step, formal advertising also aid the new entrants. The one-step nature of the solicitation allows for very little negotiation or clarification concerning technical specifications compared to a two-step process. The soliciting transit property must be prepared to be more flexible concerning the acceptability of what the manufacturer is offering than it would need to be in a two-step process. The new entrant is marginally less likely to find himself unable to accetably meet technical specifications in a one-step process than a two-step process.

The "low-bid" nature of the process (that is the fact that contract award is nearly always to the offerer of the apparent low price) makes winning a sale fairly predictable. Since the manufacturer knows what his competition has been bidding and what kind of bids win contracts, he has a fair idea of what level of bid is likely to win a contract.

This feature of the procurement process also may help the new entrant in carrying out certain entry strategies. Because the new entrant knows of all the major purchases, he can choose which ones to go after if he needs only a fraction of the total market. If he needs a large order to start-up a new plant, he can go after one of those. Since prices are well known from past purchases, he can plan his pricing strategy with a lower risk. And, if he is willing and able to underbid, he is fairly certain of winning key contracts. Thus a small manufacturer, needing to produce, say, 500 buses per year to operate his plant efficiently can be fairly certain of being able to obtain the necessary orders through careful bidding even in a depressed market.

An important factor discouraging entry in many industries is the fear of starting a price war. Although prices may be very attractive in the absence of new entry, the new entrant must consider the possibility that the addition of new capacity and competition in the industry may provoke a price war, depressing prices below an economically viable level. This possibility is minimized in a sealed bid system where there are many separate procurements, and prices are known afterwards. This aspect of competitive sealed bidding has long been acknowledged by economists.

> "... any firm tempted to cut its price below the prevailing industry level knows its action cannot escape the attention of rivals, and therefore it must fear retaliation on the next round. It will cut then only if the gain appears to outweigh this clear-cut risk. In addition, sellers may be reluctant to cut prices below current levels in a sealed bid competition because other large buyers will find out and demand similar price reductions."*

Or, as Paul Cook observed, "It would ... be hard to find a device less calculated to foster open and aggressive competition among sellers."**

The second feature of the procurement process listed in Table 2-8 is the tradition of building to order with payment on acceptance by the purchaser. This feature is not related to any written rule, it is simply the way things are done in the industry. Other ways of doing things might include building on speculation or having the manufacturer finance the purchase with a monthly payment plan like a car loan or with a leasing agreement. Building on speculation is militated against by the practice of using detailed, non-standard specifications, a practice effectively required in some instances by differing state laws on bus safety. The fact that manufacturers do not build on speculation means

*F.M. Scherer, Industrial Market Structure and Economic Performance (Chicago: Rand McNally, 1970) p. 210.

**Paul W. Cook, Jr. "Fact and Fancy on Identical Bids." Harvard Business Review, Jan-Feb 1963, pp. 67-72.

that there are no manufacturer inventories overhanging the market. For a new entrant in a stagnant market, this fact reduces the risk that his taking away sales another manufacturer was counting on will precipitate an avalanche of price-cutting as competing manufacturers struggle to reduce their costly inventories.

Financing bus purchases is unnecessary because the Federal Government is supplying 80 percent of the funds. Historically, however, before Federal funding, financing was a major problem. GM's ability to finance transit operator's bus purchases through its General Motors Acceptance Corporation (GMAC) and similar subsidiaries was thought by some to be a major factor in its gaining a near monopoly in the market of the 1950s.* Certainly, for the new entrant having to finance its customer's bus purchases, this would be a major obstacle.

The third feature highlighted in Table 2-8 is that UMTA reviews procurements financed in part by the Federal government and can be appealed to by a manufacturer in the event of a dispute touching on a Federal law or Federal procurement procedure. The Federal law which is most important in this regard is the one which forbids the use of discriminatory or exclusionary specifications.** Because UMTA can review the procurement procedure, the new manufacturer is assured that objective criteria will have to be developed to justify the choice of the transit operator buying buses. A decision to ignore the low bid of a new manufacturer for reasons of subjective prejudice - a decision that would go unquestioned in any market not involving public money and third parties - will not be sustainable. The new manufacturer is

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*See for example the complaint in the Federal civil antitrust suit against General Motors, U.S. vs. General Motors Corporation, filed July 6, 1956 in the U.S. District Court for the Eastern District of Michigan, Civil Action No. 15816.

**See Sections 3(a)(2)(c) of UMT Act of 1964, as amended; Attachment O, OMB Circular A-102; DOT Order 4600.9B; and UMTA Circular 4220.1, updated April 15, 1982.

protected since it can dispute the use of exclusionary specifications. (It should be noted that current UMTA policy is to encourage resolution of disputes at the local level, whenever possible, to curtail such involvement.)

Therefore, the new builder does not have to worry too much about the success of other aspects of his salesmanship. Although the transit property may be concerned about relying on a new manufacturer without an established reputation and although the property's maintenance department may worry, say, about the quality of the aftersale service and parts availability from a manufacturer who does not even have a parts and service network set up, it is difficult to translate these concerns into a formal finding that the builder is not responsible or not responsive.

To understand the potential importance of these procurement practices to the new entrant, reflect on the market structure of related industries. Consider first the intercity bus manufacturing industry. The three largest intercity bus manufacturers in North America are captive manufacturers. The two largest carriers, representing 60 percent of the potential market, buy primarily from themselves. The remaining buyers are mostly small and mostly private companies which are perfectly free to employ their subjective judgment in relying on proven equipment and traditional suppliers.

A second example can be taken from the truck manufacturing industry. Selling in most of the truck industry ordinarily requires a dealer network and an established, credible service infrastructure. Moreover, the truck builders maintain retail inventories. In the event that truck sales decline these inventories can become too large. The reduction of inventories in a slack market can put downward pressure on prices. Information, too, is limited in the truck industry. Although truck prices are listed, what is actually paid is a private matter. The desire of a major customer to buy is not advertised, and the knowledge may be available only to those builders he chooses to contact. The ability to provide attractive financing or even full-service leasing may be more important to the sale than the technical qualities of the product.

In summary, then, the common procurement practices in use in the late 1970s and early 1980s tended to create a more open market than exists for many other similar products. Good information on prices and purchases is available. The threat of cutthroat price competition resulting from new entry is low. There is no need to provide buyer financing. The need to create a service infrastructure in advance of bus sale is minimal.

2.3.5 Buy America

The "Buy America" (sic) rule is one that results from a provision of the Surface Transportation Assistance Act of 1978. Effective since late 1978, the rule requires transit properties using Federal grants to give qualifying domestic manufacturers preference in awarding major procurements. The important elements of the "Buy America" rule are summarized in Table 2-9

The preference given the domestic bidders is limited to a 10 percent premium over the lowest foreign bidder. In other words, if a foreign company bids more than 10 percent below the lowest domestic bidder, the contract can be awarded to the foreign bidder. If the foreign company's bid is only 9 percent below the lowest domestic bid, the contract must go to the domestic bidder, reflecting the required preference.

To qualify as a domestic manufacturer, the assured U.S. content of the bus must represent 51 percent of the bus cost, and final assembly must occur in the U.S. The combination of these requirements means that Canadian bus assemblers must be considered foreign bidders despite the typically high U.S. content of their vehicles (60-70 percent). Thus, they have been at a disadvantage vis-a-vis domestic U.S. builders since 1978. This disadvantage did not mean much because the Canadians offered a different type

TABLE 2-9. "BUY AMERICA" RULE

APPLIES TO:

- GRANT OBLIGATIONS OVER $500,000

REQUIRES:

- FINAL ASSEMBLY IN THE U. S.
- A 51% ASSURED DOMESTIC CONTENT

IS ENFORCED BY:

- REQUIRING THE GRANTEE TO REQUIRE THE MANUFACTURER TO CERTIFY COMPLIANCE
- REQUIRING THE GRANTEE TO, IN EFFECT, ADD 10% TO ANY NON-COMPLYING BID BEFORE COMPARING IT TO COMPLYING BIDS

SOURCE: CODE OF FEDERAL REGULATIONS., VOL. 49, PART 660 of bus — the "New Look" — from the type offered by GMC and Flxible. When a transit property solicits bids, it is almost always specifically for one of the two types. Thus, the Canadians almost never needed to bid against GMC and Flxible.

However, when Gillig and Neoplan entered the U.S. market as domestic manufacturers and offered buses of the same type and in direct competition with the Canadian producers, they were protected by "Buy America." Thus, Buy America facilitated their entry and their strategy of offering utility buses.

This should be contrasted with the domestic preference policies of Canada and European countries where non-domestic suppliers are generally precluded from competing in their bus market. This makes the United States the major available bus market, other than the countries of the Third World.

2.3.6 State and Local Assistance

In their efforts to enter the U.S. transit bus manufacturing industry, several companies have received encouragement and assistance from local or state governments.

In one of the best publicized efforts to encourage new entry, the State of New York has been running a bus demonstration and prototype development program involving Hino and Renault. Although neither company receives financial assistance, New York State has acted to cooperate in putting the buses into revenue service in New York City and Buffalo. There has also been speculation concerning aid that the State might provide, should one of the two manufacturers commit themselves to building a plant in New York State.

In actually establishing new plants, M.A.N. and Neoplan enjoyed substantial assistance from North Carolina and Colorado, respectively, and also from the local communities. This assistance included the provision of industrial revenue bonds to finance plant construction and labor training assistance in forming a workforce.

3. TRENDS AND IMPLICATIONS

The explanation presented in Chapter 2 analyzed the trends and events which led to new entry. New entry will lead to new developments in the transit bus manufacturing industry that have implications for both the transit bus manufacturers and the transit operators.

This Chapter addresses both the short- and long-term trends affecting developments in the transit-bus manufacturing industry and the implications for manufacturers and operators.

3.1 THE SHORT-TERM COMPETITIVE SITUATION

The new entries which have occurred have not yet had their full impact on the established manufacturers. The total number of buses built by these new firms was insignificant in 1980 and still fairly small in 1981. The new builders are expanding their output gradually as they are able to train workers and build a reputation with transit properties. It is only when their share of production becomes significant that the established manufacturers will feel the competitive pressure. This may happen during 1982 and 1983.

Of greater importance, however, to the prospects of GMC and Flxible will be the level of total industry orders. The new builders are so small that even all together their combined production capacity would not be as great as that of GMC or Flxible taken singly. Moreover, given their actual production targets for 1982, it is highly unlikely that they could account for much more than one-third of the industry's production in 1982. However, they have proved more competitive in bidding, so that even if they take less than a third, it appears to have been the first third, leaving GMC and Flxible to scramble for the rest.

Another factor in the situation is the competitive position of the Canadian builders. Diesel Division, GM of Canada, and Flyer

Industries are at a competitive disadvantage because of the Buy America rule.* The Canadian builders have been offering "New Look"-type buses. These buses are much more in direct competition with the utility offerings of Neoplan and Gillig than are the premium ADBs built by GMC and Flxible. Therefore, the Canadians can be expected to take the brunt of any expansion by Gillig and Neoplan.

The actual competitive situation as of the first week of March, 1982 is depicted in Table 3-1. The increasing impact of the new builders can be seen in the estimated production figures for 1982 which are substantially above 1981 figures. Canadian shipments to the U.S., although still large, are expected to decline in 1982.

Particularly indicative of the relative competitive position of the established builders are the backlog estimates. The new builders, with the exception of Crown, have been able to fill their backlogs through the end of the year even while increasing their production rates. GMC's backlog, as of the first week in March, gave it production starts only up until the first week in June, 1982. (A six-month backlog is ordinarily carried as a regular business practice to cover the time it takes to order and receive parts and materials for manufacturing.) Flxible has been able to extend its production starts into August, 1982 but only by resorting to a cut in its production rate from the break-even level of 5 per day to 2½ per day.

As new orders materialize, of course, the new builders may be at a competitive disadvantage because their longer backlogs will force them to quote extended delivery dates. Therefore, GMC and Flxible can be expected to improve their positions somewhat. The extent to which they are able to do this will depend on the number of new orders received.

*A third Canadian builder, Ontario Bus Industries, is not considered here because it concentrates on medium (30-foot) buses.

TABLE 3-1. IMPACT OF NEW ENTRIES ON PRODUCTION AND CAPACITY

MANUFACTURER	CAPACITY 1980	CAPACITY 1983	PRODUCTION 1980	PRODUCTION 1981	PRODUCTION 1982^E	BACKLOG MAR '82
GMC TRUCK AND COACH	5000 (2200)	5000	2300	1900	*	JUNE
GRUMMAN FLXIBLE	4000 (1600)	4000	1549	1100	**	AUG
NEOPLAN	0	800	0	50	450	OCT
GILLIG	15	800	10	120	350	FEB, '82
CROWN-IKARUS	0	160	0	112	20	N/A
M.A.N.	0	600	0	3	350	'83
G.M.-CANADA	1750	1750	721 174(U.S.)	997 (483)	995 (275)	SEPT***
FLYER	1000	1000	351 328(U.S.)	378 (271)	400 (172)	DEC

E = Estimate based upon current backlog or target production.

( ) = Break-even.

* = No estimate possible on the strength of the current backlog. Daily production rate is 8 per day.

** = No estimate possible on the strength of the current backlog. Daily production rate was reduced from 5 per day to 2-1/2 per day in mid-February.

*** = Production rate may be reduced in May which would extend production starts to October or November 1982.

Note: Information in Table 3-1 was obtained through phone conversations with the manufacturers.

The size and timing of new orders, of course, is impossible to predict. A rough calculation can serve to illustrate the established builders' competitive prospects, however. If total U.S. deliveries in 1982 reach 4000 units, the same level as in 1981, the Canadian share will be approximately 450 units, if the estimates in Table 3-1 bear out, and the share of the new entrants will be approximately 1150. This leaves 2400 for GMC and Flxible. If Flxible continues producing 2½ buses per day through the end of the year, and GMC falls somewhat short of last year's level, they would divide with approximately 700 buses for Flxible and 1700 for GMC, both well below break-even.

If Flxible produced no more than its current backlog, its production for the year would be about 450 buses. GMC would then be eligible for 1950, a slight gain on 1981. If GMC produced no more than its current backlog, it would produce about 900 buses, leaving Flxible eligible for 1500 --- very close to break-even.

The competitive situation is clearly acute, and the pressure in 1982 will be on GMC and Flxible.

As new orders become available, these two firms may be able to push up 1982 production by offering early delivery on orders which otherwise would have been delivered in 1983. They may also be able to adjust their products and production costs to be more competitive vis-a-vis their competition. If they succeed, they may postpone the crisis to 1983, and shift the competitive burden onto one or more of the new builders.

The longer-term actions of both the established and new builders which may affect the competitive situation in the period from 1983 to the end of the decade are discussed in the next Section.

3.2 LONG-TERM TRENDS

The questions as to what are long-term trends and implications for the future, can only be answered speculatively. Relying on the analysis of present developments, factors which are changing can be identified, and probable directions indicated. To make this review of causative factors systematic, the outline used to present the explanation of entry will be used here again. Opportunity, Impetus and Contributing Factors will be examined, each in turn. This time, however, the focus will be on factors which have changed, or are changing, from the time when the entry decisions were made in 1979 and 1980.

To supplement the review of causative factors, the actual strategic behavior of the transit bus manufacturers will be reviewed as well. The responses of the established manufacturers to new entry and the competitive directions being taken by the new entrants indicate some of the trends in the industry.

3.2.1 Opportunity

Reflecting first on opportunity, it should be clear that the main opportunities originally exploited by the new entrants are reduced. There are no major, empty product niches. While in 1978, U.S. producers built only standard size, premium transit buses, today, buses in several different size and quality descriptions are available. There is still no U.S. builder of double-decker buses, but this is probably too small a market segment to justify new entry.* The gap in wage rates between the large-scale and small-scale producers persists, but an additional new entrant would now face several existing companies with similar small-scale, low-wage cost structures. In addition, the difficulty facing the automobile industry in competition with Japan appears certain to

*A total of 22 have been purchased to data with UMTA funds, all manufactured by Neoplan in Germany. Neoplan's Colorado plant may be capable of assembling double-deckers at some future time.

put downward pressure on wages in the whole motor vehicle industry relative to general manufacturing.

Other potential opportunities in the transit bus manufacturing industry remain untested. One is to combine the efficiencies of large-scale, relatively automated facilities with those of relatively low wages, and then use those efficiencies to undercut both the established builders and the new entrants. This is clearly a highly risky strategy for a new entrant to undertake in one act. It involves a large investment. The full efficiency of the plant would only be reached after a lengthy, and costly, start-up phase. The entire strategy might be thwarted by a competitor's actions to reduce his own costs. However, this is also an opportunity which might be exploited over the long-term by an existing builder by more gradual means. One of the established builders may seek to bring wage rates more in line with the national average, or one of the new entrants may expand his operations.

A second opportunity which has not been exploited is to use a comparative advantage in international trade to obtain low-cost components and, with them, a price advantage. The "Buy America" regulation militates against importing a complete bus in most cases. But, if major components should be built at a substantially lower cost in some other countries and shipped to the U.S. economically, this might provide a bus builder a competitive cost advantage. This would be especially true if he could prevent his competition from doing the same thing.

It is not clear that this second opportunity even <u>exists</u> for any of the manufacturers which have been discussed in this document. If it does exist, or could be created, the company most likely to try to develop it is Hino. The Japanese have developed significant cost advantages through more economical manufacturing methods in several industries, most notably steel and automobiles. Hino does not assemble buses, per se. Hino builds engines, transmissions, axles and other parts. These components may easily comprise 25 percent or more of the manufactured cost of the bus. A substantial cost advantage in their manufacture could translate into a significant price advantage in the U.S. while still meeting the requirements of "Buy America."

3.2.2 Impetus

In the area of impetus, the explanation developed in Section 2.2 examined prospects in three industries related to the transit bus manufacturing industry --- School Bus, Intercity Bus and International Trucks and Buses. The impetus in each case, respectively, was a declining demand, capacity expansion and globalization. Each of these developments is likely to continue to provide impetus for a close examination of opportunities in the transit bus industry.

The decline in school bus demand will continue, although some of the pressure may be relieved by the withdrawal of some firms from the industry because of financial failure.

Capacity expansion in the intercity bus industry should be completed by 1984, after which time these companies will be looking for new opportunities to keep their new or expanded plants operating fully. Some of the new transit bus builders may offer intercity buses,* encouraging the intercity bus builders to do the same in reverse.

The globalization of the truck industry will continue, and these firms will continue to seek footholds in the U.S. heavy-vehicle markets, including transit buses.

3.2.3 Contributing Factors

Of the contributing factors cited in Section 2.3 most seem likely to continue to apply to some extent. Dissatisfaction with the ADBs may be relieved somewhat as it becomes apparent that many design and production problems which afflicted earlier models have

*Gillig and M.A.N. have publicly indicated that they are considering intercity bus models. Neoplan, whose parent company is primarily an intercity bus builder, certainly has the potential to build intercity buses.

been solved. The most far-reaching impacts, however, may result from changes in procurement practices.

The Congress and the Reagan Administration are both pressing for changes in the rules governing the procurement of transit buses with Federal funds. The general direction of these changes has been toward increased local decision-making. UMTA has removed the requirement which forced most transit properties to purchase buses with wheelchair lifts. UMTA has moved gradually to eliminate the use of the standard procurement document ("White Book"). The Congress has been pressing for an evaluation process in transit-vehicle procurements since 1978. Effective with Fiscal Year 1982, transit properties are required to certify that they have evaluated "performance, standardization and life-cycle costs" before awarding procurement contracts.* In implementing the Congressional mandate, UMTA has been encouraging the development of better methods of life-cycle cost evaluation and procedures for reflecting these life-cycle cost calculations in bid evaluations.**

If use of life-cycle cost evaluations becomes commonplace, the effect on the market structure will be profound. It could make it possible for a builder to develop a significant competitive advantage with proprietary equipment or product features. Emphasis on standardization may dampen the enthusiasm for product variations between manufacturers. Product life-cycle cost data generation expenses may become significant for small builders.

Of the contributing factors which remain unchanged in 1982, one of the most decisive may be state and local assistance. The New York State project, with Renault and Hino participating, is

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*Federal Register, February 18, 1982, Vol. 47, No. 33, pp. 7361-7364. "Rolling Stock Procurements Additional Statutory Requirements and Program Guidelines."

**See Appendix C. for a more complete discussion of life-cycle cost and bid evaluation.

a case in point. Should one of these two manufacturers undertake to build a plant in New York State, the state and local governments can be counted on to reduce the initial costs and risks to the manufacturer as far as possible. In addition to financing and training assistance, such as M.A.N. and Neoplan received, New York may even arrange to purchase a certain quantity (perhaps 500 buses) of the initial production of the plant with its own (non-UMTA) funds.

In similar developments, New Orleans is offering a site to Renault for a bus plant and the State of Pennsylvania is looking for sites to offer Neoplan for a new plant.

3.2.4 Responses of the Established Manufacturers

GMC and Grumman Flxible have responded to the new entrants primarily with new product offerings. GMC has developed an articulated version of its RTS bus which it is marketing across the country, with regular production planned for 1984. Flxible has re-introduced its standard size bus, originally called the '870', as the Metro. The Metro has an expanded list of options, including many features such as openable windows and pedestal-mounted seats, which used to be identified with the "New Look."

The response on production scale and costs has been slower. GMC's wage rates are tied to wages in the General Motor's automobile business, and their level there in relation to the national average may change gradually over the long term as a result of negotiation and the competitive pressure from the Japanese in the automobile industry. Grumman Flxible is seeking ways to reduce its break-even volume.

The two established Canadian manufacturers have been affected adversely by new entry in the U.S. as well, although for them, there is the complicating factor of "Buy America." Both GM-Canada and Flyer Industries have updated the appearance and style of their bus models. In addition, GM-Canada brought out an articulated transit bus in 1981.

"Buy America" hobbles the Canadians in production on the basis of cost since it gives the U.S. builders a ten percent advantage. Although there have been a few attempts at underbidding more than ten percent, neither Canadian producer has made any commitment to U.S. assembly.*

3.2.5 Competitive Directions of the New Entrants

The new entrants, with the exception of Crown Coach, appear to be planning on expanding their model ranges. The purpose of this strategy would seem to be to reduce the risk of specializing too narrowly.

Neoplan already has the widest model range in the industry. Its standard size bus has been offered to both "New Look" and ADB buyers; it also has an articulated bus. Neoplan is also marketing (but not yet producing in the U.S.) double-decker transit and intercity buses, and a small bus suitable for paratransit and handicapped services. The Colorado plant was built with a height of 25 feet to allow for the construction of double-decker buses.

Neoplan's manufacturing philosophy is to limit an individual plant's productions to about 500 buses per year. Further growth beyond that level may lead Neoplan to establish a second manufacturing facility in the U.S.

As of this writing Neoplan is the apparent low bidder in an order for 1000 buses put together by the Pennsylvania Department of Transportation. At the time Neoplan was choosing a U.S. plant site, Pennsylvania was also considered, and following the decision to build in Colorado, Neoplan made informal assurances to Pennsylvania officials that Pennsylvania would be considered for an additional plant if one should be needed. Because of the large size of the Pennsylvania order, Neoplan may choose to establish either an additional assembly plant or a smaller finishing plant in Pennsylvania to provide capacity relief.

*Ontario Bus Industries, a Canadian producer of medium transit buses, will begin producing medium transit buses in a plant in Utica, N.Y., in the Summer of 1982 under the name Bus Industries of America.

M.A.N. has a backlog of orders for articulated buses stretching through 1983, but has already announced that it is developing a standard size bus for sale in the U.S. Since the parent company is a truck builder, extension of the U.S. subsidiary's activities into truck assembly is also possible.

Gillig is actively looking at a variety of opportunities to expand its product line and to diversify its business, while remaining a relatively small company.

Gillig is exploring the possibility of exporting buses and the possibility of building intercity buses.

> "... we do not want to be, nor do we plan to be, a giant... We would like to produce no more than 500 transit coaches per year, we would like to sell 400 to 500 export coaches per year and we would like to sell a couple of hundred over-the-highway coaches per year."*

In addition to expanding its product range, Gillig may also consider the bus rehabilitation market.

There are no reports that Crown Coach or Ikarus plan to expand the range of their transit bus offerings.

3.2.6 Summary

Any number of different scenarios for the changing structure of the U.S. transit bus manufacturing industry could be drawn reflecting the trends described above. Two contrasting scenarios will be instructive. The U.S. transit bus manufacturing industry may develop into one in which there is a large number (5-8) of small-scale** transit bus builders, each producing a range of buses (including non-transit types in some cases) and several with foreign parent companies. Powertrain component suppliers would include both the traditional U.S. sources and foreign companies affiliated with U.S. builders. Some of the small scale builders

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*John W. Oliverira, Vice-President of the Gillig Corporation, as quoted in Metropolitan, Jan-Feb, 1982, p. 19.

**400-1200 buses per year per manufacturer plus 0-1000 buses per year of other types.

may receive substantial assistance in getting started from local and state governments interested in industrial development.

Alternatively, the U.S. transit bus manufacturing industry may go through a long period of dynamic adjustment in which one or two large-scale transit bus builders eventually emerge as the dominant producers. A number of other companies may remain available for a time as peripheral builders, building transit buses as a diversification or as a stepping-stone to manufacturing other products. These peripheral builders may gradually fade out of the transit bus market as dominant transit bus producers emerge. For example, a company which came into existence as a transit bus builder may become a builder of luxury intercity buses. Another small builder may become the basis for a truck assembly operation which eclipses the original venture.

3.3 IMPLICATIONS

There are implications in the explanation presented in this report, and in the trends described, for both market structure and for the transit operator.

In terms of the market structure, it is clear that the recent era in which two builders completely dominated the industry has, for the time being, closed. There are today six standard and articulated transit bus builders in the U.S. and two more in Canada. The severe competitive pressures of the next few years may reduce that number. Additional new entry by international truck manufacturers or others may increase the number. In either case, a return to two companies, although possible eventually, will not happen soon.

Another feature of the bus market which has faded is specialization. The day when a school bus builder built only school buses and an intercity bus builder built only intercity buses appears to be over. In addition to the transit bus builders, the school bus builders and intercity bus builders will be represented in one way or another in the transit market. In the same way, it seems likely that transit bus builders will seek product niches in the intercity and school bus markets.

The range of product choice, a third feature of the market structure, has broadened. When GMC and Flxible dominated the market in the 1960s, they offered two very similar "New Look" designs as medium and standard size transit buses. In 1977-1978, they replaced those "New Look" buses with radically different (in their body construction) ADBs with nearly identical powertrains and a narrow range of options.

The new entrants have brought articulated and modern utility bus designs to the transit market. They offer an in-line powertrain configuration in contrast to the traditonal transverse engine, V-drive configuration. The range of options available has expanded.

The result is a far more segmented market, with utility and premium, articulated and standard buses available. Product choice and competition on the component level has also increased. The V-730 transmission must "compete" with the HT-740.* M.A.N. has introduced its own engine and drive axle along with a foreign-built automatic transmission. Crown-Ikarus has a Cummins engine. Neoplan offers an independent front suspension of its own manufacture. Gillig offers the largest brake in the industry.

If any of the international truck manufacturers choose to enter the U.S. transit bus industry, the choice of powertrain components will certainly increase, because these companies will want to use engines, and other components, of their own manufacture.

A fourth feature of market structure which has changed is the insulation of U.S. transit bus design from developments abroad. U.S. bus designs now reflect European as well as American

*Both transmissions are built by Detroit Diesel Allison Division of General Motors and use many common parts. The V-730 is used in V-drive configuration buses. The HT-740 is an in-line transmission, which also finds a market in trucks and intercity buses.

concepts because some U.S. builders will be dependent on European parent companies for design and engineering services.

For the transit operator and bus purchaser, the implications may seem good --- broader product choice in terms of design, size, quality and components plus whatever other benefits may come from having more companies competing for business. To take advantage of the broader range of choice, the transit operator will have to improve his skills in making the choice. If he fails to make intelligent, informed, skillful choices, the transit operator will become the victim of a proliferation of different bus designs, sizes and components.

There was a time when the choice was between two nearly-identical buses with identical powertrains. The impact of a poorly-informed choice was minimal. In terms of bus performance, costs of inventory, mechanic training, equipment service, fuel economy, or frequency of repair, one bus could only be so much different from the other.

The buses available today differ widely in design concept and in components. Only a carefully evaluated choice will result in the transit operator benefiting. By failing to evaluate his choice in this new market, the transit operator risks buying a bus which may be inappropriate for his operating requirements.

APPENDIX A

ASSOCIATED STATISTICS

This appendix contains three tables of statistics useful as source data in analyses of the transit bus industry. The tables are:

Table A-1. Transit Bus Production Statistics

Table A-2. New Buses Delivered to Public Transit Operators

Table A-3. UMTA Grants for Buses

TABLE A-1. TRANSIT BUS PRODUCTION STATISTICS

Manufacturer	1976	1977	1978	1979	1980	1981
GMC Truck & Coach Division	1,500	250	1,100	1,580	2,300	1,900
Diesel Division,						
- GM of Canada Total	823	683	601	527	721	997
- To the US	0	0	0	80	174	483
Flxible	1,581	1,165	803	994	1,549	1,100
AM General Total[1]	1,505	87	1,036	382	89	-
- M.A.N. Articulated	-	-	236	163	-	-
Flyer Total[1]	479	190	135	198	351	378
- To the U.S.	376	80	0	132	328	271
M.A.N. Truck and Bus	0	0	0	0	0	3
Crown Coach (Ikarus)	0	0	0	0	0	112
Neoplan	0	0	0	0	0	50
Gillig	0	0	0	0	15	120
TOTAL	6,264	2,455	3,911	4,056	5,184	5,424

NOTES: All figures refer to standard-size or articulated transit bus production. All figures were received from the respective manufacturers.

[1]Includes trolley coach production.

TABLE A-2. NEW BUSES DELIVERED TO PUBLIC TRANSIT OPERATORS

CALENDAR YEAR	TROLLEY COACHES	MOTOR BUSES			
		29 SEATS OR FEWER	30-39 SEATS	40 SEATS OR MORE	TOTAL BUSES
1940-44	1,377	—	—	—	21,842
1945-49	3,492	6,369	10,817	16,114	33,300
1950-54	1,003	441	3,879	9,120	13,440
1955-59	43	19	854	9,165	10,038
1960-64	0	22	620	12,279	12,921
1965-69	0	202	1,131	11,725	13,058
1970	0	77	73	1,274	1,424
1971	1	95	70	2,349	2,514
1972	1	124	199	2,581	2,904
1973	1	182	317	2,701	3,200
1974	0	345	251	4,222	4,818
1975	1	419	128	4,714	5,261
1976	260	395	251	4,099	4,745
1977	198	549	308	1,580	2,437
1978	0	610	222	2,973	3,805
1979	141	408	130	2,902	3,440
P1980	98	287	143	4,142	4,572

SOURCE: American Public Transit Association, 1981 Transit Fact Book, Washington, DC 1981, p. 63.

NOTE: Trolley Coaches are electrically powered vehicles usually derived from buses.

TABLE A-3. UMTA GRANTS FOR BUSES

FISCAL YEAR	STANDARD (35' AND 40')	MEDIUM (30' AND LESS)	VANS	ARTIC-ULATED	DOUBLE-DECK	TROLLEY COACHES
1965	266	92	-	-	-	-
6	951	159	-	-	-	-
7	216	95	-	-	-	-
8	525	112	-	-	-	-
9	416	85	-	-	-	-
1970	1,435	52	-	-	-	-
1	2,086	225	-	-	-	210
2	3,235	267	-	-	-	-
3	3,439	473	-	-	-	160
4	4,777	634	6	150	-	249
1975	3,710	586	25	60	-	45
6	2,896	181	73	138	-	30
TQ	264	81	14	-	-	-
7	3,280	410	74	50	-	(16)
8	2,388	423	141	20	20	-
9	2,168	399	323	49	-	-
1980	3,230	492	236	265	-	-
1						
TOTAL	35,282	4,766	892	732	20	694 (16)

NOTE: TQ - Transition quarter
Figures do not include Sec 16(b)2 grants
( ) - Indicates de-obligation

APPENDIX B

CHRONOLOGY OF IMPORTANT EVENTS IN THE HISTORY OF THE BUS INDUSTRY (1895-1981)

1895 First bus (an 8-passenger vehicle, driven by a single cylinder, 4-6 hp engine) is built in Germany by Benz (later, Daimler-Benz).

1900 Mack Trucks begins bus production in the U.S.

1922 Fageol Safety Coach Co. builds the first bus with a chassis especially designed for bus use (instead of a car or truck chassis).

1921 Four-wheel air brakes are used for the first time in a specially-constructed, experimental motor coach, built by International Harvester. All I.H. motor coaches are using air brakes by 1924. Yellow (GM) adopts four wheel air brakes in 1925.

1925 General Motors takes control of Yellow Cab Manufacturing Co. of Chicago, a bus and taxicab builder.

1926 Fageol builds the first integral construction bus. Twin engines were mounted amidships under the floor.

1931 Yellow (GM) produces its first buses using "monocoque," aluminum body construction.

1932 Syncromesh manual transmissions are introduced on buses.

1938 Two-cycle diesel engines are offered as a regular production option for the first time, by GM.

GM begins the first regular production of buses with fully automatic hydraulic transmissions, using a Spicer unit.

1940 Fageol builds an articulated trolleybus for Cleveland. The primitive articulation was only vertical and not horizontal so the bus had manuveuring problems. Some 47-foot motor buses with this articulation were sold in 1948.

1943 GM buys out the remaining minority stockholders in Yellow, and forms the GMC Truck and Coach division.

1948 GMC introduces the first 40-foot, 51-55 passenger transit coach.

1950 Italian bus designer Viberti initiates modern articulated bus development.

1953 GMC incorporates air suspension in its transit models, the first bus manufacturer to do so.

Shakeout among major bus producers. White Motor Co. and A.C.F. Brill cease bus production. Fageol transfers its bus manufacturing operations to Flxible. The U.S. is left with three major bus builders: GM, Flxible and Mack Trucks.

1956 Continental Trailways begins importing intercity buses from Europe.

The Justice Department Institutes a civil antitrust suit against GM for monopolizing the transit and intercity bus manufacturing industry.

1957 Continental Trailways acquires six articulated buses for intercity service from the German firm, Kassbohrer (Setra).

1959 GM introduces the "New Look" transit bus. Mack Trucks ceases bus production one year later. Flxible develops its own "New Look" bus and introduces it in 1961.

1963 Greyhound (U.S.) begins using MCI (Canada) buses.

1964 UMTA established.

1965 GM settles the antitrust suit instituted in 1956 by agreeing to a consent decree.

1967 Greyhound purchases its last GMC Bus.

1968 A National Academy of Engineering study recommends development of a new transit bus design.

GM demonstrates the RTX, an experimental, advanced design transit bus.

1969 Flxible ceases production of its Twin Coach intercity buses.

1970 Congress passes the Urban Mass Transportation Assistance Act, committing $10 billion to mass transit over a twelve year period.

Rohr Industries acquires Flxible.

1971 DOT announces $25 million Transbus program to develop a new, advanced design, transit bus. Contracts to build prototypes are signed with GM, Flxible and A.M. General in 1972.

A.M. General acquires the right to produce a transit bus design from Flyer Industries, a Canadian bus producer.

1973 GM announces its intention to produce the RTS advanced design bus.

1974 A.M. General begins producing transit buses.

M.A.N. and Volvo demonstrate articulated buses in the U.S. under the superbus project.

GMC stops selling the 30 foot version of its "New Look" bus.

Greyhound establishes TMC in Roswell, N.M. and begins bus production, supplementing MCI production.

Production of the Eagle Model 05 intercity bus began in Brownsville, Texas. The Eagle, used primarily by Trailways, had formerly been built in Europe and imported.

1975 GMC demonstrates a prototype of its RTS transit bus and begins soliciting orders. Flxible announced their ADB, the model 870, and began demonstrating a prototype in July, 1976.

A Seattle Metro solicitation for articulated buses (the first in the nation) goes unbid.

1976 A joint venture of M.A.N. and A.M. General wins two bids for articulated transit buses.

Bluebird, a school bus manufacturer, begins building a medium (30') transit bus.

Neoplan (West Germany) licenses Gillig, a California school bus builder, to build a medium transit bus. Problems develop with the first buses produced in 1977 and Gillig ends production after the first order.

1977 GMC begins production of its RTS II advanced design transit bus. Grumman Flxible begins production of its own ADB, the model '870,' in 1978.

A.M. General announces its intention to end regular transit bus production.

1978 TMC (a Greyhound bus manufacturing subsidiary) begins producing a medium transit bus, based on a design acquired from a Canadian producer.

Grumman Corp. purchases Flxible from Rohr for $55 million.

1979 GMC ends intercity bus production.

The first procurement based on Transbus specifications goes unbid.

1980 Interest in entering the U.S. transit bus industry increases. Crown Coach of Los Angeles begins building Ikarus articulated buses. Gillig Corp., of Hayward, California, introduces its Phantom transit bus. M.A.N. (West Germany) announces plans to build a plant to build articulated buses in Cleveland, North Carolina. Neoplan announces its intention to build buses in Lamar, Colorado. Mack Trucks announces that it is considering production of Renault buses.

Cracks are found in the frame structure of the Grumman. Flxible '870' transit buses in service in New York City.

1981 Hino Motors (Japan) announces that it is considering bus production in the U.S. at the invitation of the Governor of New York State. Hino demonstrates buses in New York City. Renault participates in the same New York State demonstration project.

Saab-Scania (Sweden) announces that it has formed a Scania division within its U.S. subsidiary to explore the possibility of marketing buses. Scania demonstrates buses in Norwalk Conn. as part of a DOT project.

GMC Truck and Coach announces plans to produce articulated transit buses by 1984.

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