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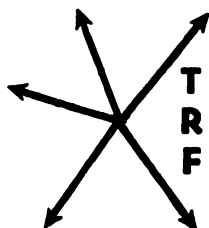
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Bus and Taxi Package Express— A Major Component of Urban Goods Movement

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A DISCUSSION of urban goods movement typically focuses on the familiar regular freight service by truck, rail, and air. Much attention is given to less than truck load (LTL) shipments since those shipments are moved with less efficiency than rail car load (CL) or truck load (TL) shipments. The lower efficiency of LTL shipments is, of course, because LTL freight must be picked up in a local delivery truck, taken to a terminal where the various shipments are consolidated before being placed on the line haul over-the-road vehicle, and then reversed at the destination when the freight is broken down and placed on local delivery units. An understanding of this process is important since the "urban goods problem" revolves around the efficiency (economic and social) of the pickup and delivery of small intercity shipments at each end of the trip. The efficiency of this process is significant since approximately 50 percent of the cost of shipping freight is involved in terminal operations including pickup and delivery. The major determinants of urban activity then are the number of shipments, the number of origins and destinations, and the number of carriers involved in local operation.

There is an area of urban goods movement, however, that has been largely ignored, probably because the carriers providing the service are typically thought of as passenger movers rather than goods movers. These passenger carriers, intercity buses and, where not prohibited by regulation, demand-responsive taxi cabs have become major movers of express shipments both between cities and within urban areas. Although intercity buses do not make local pickups and deliveries, they do generate extensive terminal activity as firms pickup and deliver their shipments at the bus station. Taxis, on the other

hand, operate primarily within the urban area and, where permitted by local regulation, haul express or courier items simultaneously with the hauling of passengers.

The significance and growth of these services becomes apparent once the strategies and functions of these firms are understood. It is time that the roles of bus package express and taxi goods movements were put in perspective.

Intercity Bus Package Express

Originally, intercity bus package express was conceived as an addition to the regular bus passenger service. The package express service was available as early as 1936, but was not seriously promoted until after World War II when regular route passenger service began to decline rapidly. In 1943, when intercity bus ridership was at an all time high of more than 750 million passengers, package express accounted for approximately one percent of bus revenue.

Table 1 indicates that by 1970 ridership had declined to 24.6 percent of the 1945 level (18 percent of 1943 level). Examination of this decline on the basis of market share amplifies its significance. In 1945, 9.1 percent of all intercity passenger trips were made by bus. By 1972 only 1.8 percent of these trips were made by bus. Airlines took some of these passengers, but most shifted to automobile travel.

Table 2 compares the decline in intercity bus ridership with the less expensive, but more recognized decline in intracity Bus Transit ridership that occurred during the same period.

The intercity bus companies have taken four steps to compensate for this decline and maintain profit levels. First, they have raised fares. Table 3 shows that fares have increased by 140 percent between 1945 and 1970. In addition, fares since 1970 have increased approximately one cent per mile and are now approximately \$.045 to \$.0475 per mile.

Second, the bus companies have been eliminating unprofitable routes. Table 4 indicates that total bus miles operated has declined by 13 percent since 1945

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INTERCITY CLASS 1 BUS RIDERSHIP TRENDS

Year	Regular Route Ridership (Millions)	Index 1945=100	Regular Route Revenue (Millions)	% of Operating Revenue	Index 1945=100
1945	546	100%	404	80%	100%
1950	330	60.4	320	86	79
1955	215	39.4	301	83	75
1960	167	30.6	354	76	88
1965	166	30.4	473	78	117
1970	134	24.6	511	71	126

Note: On January 1, 1969, the Class I classification was modified to include only those carriers with gross passenger revenue of \$1 million or over. From 1950 to 1968, all carriers receiving \$200,000 in annual gross passenger revenue were included. This change was minimal since only one Middle Atlantic carrier was dropped by the new classification system.

Source: *ICC Transport Statistics*, Part VII.

TABLE 1**COMPARISON OF INTER- AND INTRACITY BUS RIDERSHIP SINCE WORLD WAR II**

Year	Intercity Bus			Intracity Transit		
	Passenger (Millions)	Index	% Decline	Passenger (Millions)	Index	% Decline
1945	546	100		9,886	100	
1950	330	60.4	39.6	9,420	95.3	4.7
1955	215	39.4	60.6	7,250	73.3	26.7
1960	167	30.6	69.4	6,425	65	35
1965	166	30.4	69.6	5,814	58.8	41.2
1970	134	24.6	75.4	5,034	50.9	49.1

Note: Only Class I bus lines were considered.

Source: *ICC Transport Statistics*, Part VII and ATA Transit Facts.

TABLE 2**INTERCITY BUS PASSENGER RATE COMPARISON**

Year	Revenue Per Passenger	Average Trip Length	Revenue Per Passenger Mile	Index 1945=100
1945	\$0.74	50.4 miles	\$.015	100
1950	.97	52	.019	127
1955	1.40	66.7	.021	140
1960	2.12	78.5	.027	180
1965	2.85	94.9	.030	200
1970	3.91	105.7	.036	240

Note: This includes only intercity passenger trip and excludes any commuter operations.

Source: *ICC Transport Statistics*, Part VII.

TABLE 3**OPERATING SUMMARY OF CLASS I INTERCITY BUS CARRIERS**

Year	Route Miles (000)	Index 1945=100	Vehicle Miles Operated (Millions)	Index 1945=100
1945	228	100%	1,001	100%
1950	231	101	1,012	101
1955	217	95	861	86
1960	212	93	843	84
1965	211	92	946	95
1970	191	84	870	87

Source: *ICC Transport Statistics*, Part VII.

TABLE 4

with most of this decline occurring since 1965. The lower density rural areas, usually the least profitable, have been the first to lose service. (The philosophy of regulation, user charges, taxes, and other public assessments against private bus companies should probably be reexamined in light of this rapid decline in service and the current pressures for publicly subsidized rural transportation systems.)

Third, intercity bus companies have also aggressively solicited charter business. Table 5 indicates that charter business has increased steadily since 1950, accounting for 11.1 percent of intercity bus revenues in 1970. (The National Association of Motor Bus Operators (NAMBO) has strongly attacked the use of publicly purchased transit buses for charter service. This is easy to understand, since publicly owned transit systems have not experienced such severe ridership declines nor do they pay full user charges or taxes.)

The fourth strategy has been an aggressive promotion of package express service. Table 5 indicates that package express now accounts for almost 15 percent of intercity bus operating revenue, an increase of almost 1200 percent since 1945.

Because of rapidly declining regular route ridership, it is certain that intercity bus carriers will continue to employ these four strategies, particularly the promotion of package express service. Package express freight has traditionally been carried in the luggage area under the passenger compartment. Now package service has become so important that some carriers have added doors to the rear of their coaches and removed all but a few rows of seats, enabling the bulk of the bus to be filled with package express shipments. Other operators have experimented with the use of special trailers that can be pulled behind the bus to increase package hauling capabilities.

Goods Movement by Package Express

The Interstate Commerce Commission (ICC) has placed size and weight restrictions on freight moved by intercity buses. Consequently, package express shipments are limited to items that are less than 100 pounds in weight, less than five feet long, and have a combined length, width and height of under 141 inches. These requirements have been modified for intrastate shipments in several states. Tennessee automobile dealers, for example, wanted to ship windshields, bumpers, and tailpipes to places within the state. Consequently, they applied to the Public Service Commission and the length lim-

itations for intrastate shipments were increased from 60 inches (five feet) to 85 inches.

A ten percent bus bill sample was taken at the Greyhound Terminal in

REVENUE SUMMARY OF CLASS I INTERCITY BUS OPERATIONS

Year	Reg. Route Pass. Rev. (millions)	% of Operating Revenue	Package Express Revenue (millions)	% of Operating Revenue	Index 1945=100	Charter Revenue (millions)	% of Operating Revenue	Index 1945=100
1945	404	80%	8.6 ^a	1.7%	100	16.6	3.3%	100%
1950	320	86	7.8	2.1	90.4	12.4	3.4	75
1955	301	83	15.2	4.2	173.3	22.3	6.2	135
1960	354	76	32.3	7.0	374.7	36.0	7.8	217
1965	473	78	61.0	10.0	707.2	64.4	10.6	388
1970	511	71	102.3	14.2	1185.0	79.9	11.1	482

Note: ^a) Package express revenue not specifically classified as of 1945.
Other income classification used.

TABLE 5

Knoxville, Tennessee. This sample contained one hundred bus bills selected at random from one thousand shipments made over seven consecutive days during the spring of 1973. Table 5 shows a summary of the commodities shipped. Table 6 shows a summary of the bus

COMMODITY CLASSIFICATION OF BUS PACKAGE EXPRESS SHIPMENTS FROM KNOXVILLE

Commodity	Percentages
Auto Truck and Machinery	
Parts	60%
Cut Flowers	15%
Medical Supplies Especially	
Human Blood	5%
Personal Goods	5%
Printed Materials and	
Paper Products	4%
Film	3%
Paint and Paint Supplies	2%
Electrical Supplies	2%
Other	4%

TABLE 6

bill information gathered, including origins, destinations, shipment weights, and shipment values.

These tables indicate that buses provide a valuable service for the rapid delivery of packages from a major distribution point, such as Knoxville, to small communities that do not have local supplies of quickly needed products. Highly specialized products shipped from regional distribution centers serve as back-ups, supplementing local supplies. This is less costly than maintaining large inventories in each community.

SUMMARY OF KNOXVILLE, TENNESSEE BUS BILL SAMPLES

Shipments between	
Cities and Small	
Towns	70%
Shipments between	
Major Cities	25%
Shipments between	
Small Towns	5%
Average Weight	
per Shipment	35 lbs.
Average Value of	
Shipment	\$50.00
	(minimum declared
	insurance value)
Average Number of	
Pieces per	
Shipment	3
Average Charge	
per Shipment	\$5.00

TABLE 7

It would be prohibitively expensive, for example, for local blood banks to stock all possible types of blood. It is far cheaper for them to maintain a limited supply and to use a centralized distribution point to supplement that supply. Drug stores, industrial supply houses, and auto and farm machinery dealers also maintain inventories only of the more frequently needed items and depend on regional distribution centers, through bus package express shipments, for less frequently requested items.

Shippers of high perishable products depend extensively on bus package express. Cut flowers or fresh seafood are frequently flown to a regional airport, then distributed to widely scattered communities by bus package express service. Regional newspapers also depend on bus service for economical and timely delivery to scattered rural communities.

Bus package express also gives small towns access to specialized services otherwise available only in larger towns. Rural garages, for example, can ship crankshafts for grinding, unusual types of brake shoes for relining, or electric motors for rewinding, to urban machine shops equipped to perform these services. This service is particularly critical with items that must be repaired before a piece of equipment can be returned to productive use. A farmer who has a crop to harvest cannot wait weeks or months for a vital piece of equipment to be replaced or repaired.

These shipments are made by bus package express rather than by the more familiar motor truck lines for many reasons. First, since these shipments are small and go only short distances, the minimum charge of the bus service is far less expensive. Second, the bus service is more convenient than United Parcel Service (UPS) for shipping unusually shaped machinery parts because of the fifty pound weight restriction, the smaller size limits, and the limited terminal facilities of UPS. Third, the frequency and directness of bus routes gives these rural areas faster service than does any other mode of transportation.

The airline cannot provide this service because of the limited number of terminals in each region and the extensive time delays which frequently occur in air freight terminals. A recent article in "Business and Commercial Aviation" substantiates this point. According to this article Jet Fleet conducted an experiment by shipping "four to five pound shipments from Dallas to New York, Los Angeles and San Francisco by air, using air freight forwarder and thus

the air lines and by using Continental Trailways. In four out of five trials, the packages arrived at the final destination faster with the bus lines."

Since a large part of bus express service involves products with essential demand and critical time utility, where dependability is as important as speed of delivery, the major bus carriers have initiated a service similar to the "next flight out" concept of the airlines. This premium "next bus out" service guarantees that the package will be put on the first bus going to the desired destination. The receiver is notified by telephone as soon as the package arrives at the destination. This service presently represents less than 5 percent of express shipments, but is a more significant revenue factor because the service costs twice as much as regular package express.

Scale of Intercity Bus Express Operations

It is difficult to understand the magnitude of bus package express services without comparing them to the more familiar motor carrier operations. Bus express revenue in 1971 was slightly over 104 million dollars. Revenue for motor truck carriers was nearly 12 billion dollars. On this basis, bus lines received only 0.86 percent of motor freight revenue. If bus package express revenue is compared to motor carrier LTL revenue, however, the mode of primary concern to the urban goods transportation planner, then bus revenue was 2.1 percent of the nearly 5 billion dollars in LTL revenue accorded motor carriers.

Analyzed this way, buses as an industry rank as the 13th largest carrier of motor freight and the sixth largest handler of LTL freight.¹ Greyhound alone, based on 1971 revenue received, is the 22nd largest carrier of motor freight and the eleventh largest carrier of LTL freight.

But the urban goods transportation planner is not particularly concerned with the market shares or the gross revenues of the various modes. His primary concern is the number of shipments and the number of vehicles required to effect local pick ups and deliveries. This is the area in which the importance of bus package express service to urban goods transportation becomes apparent.

It is important to note, first, that bus lines do not provide pick up or delivery service. Local transportation is the responsibility of the consignor and the consignee. Consequently, there is no consolidation of the pick up and delivery activities unless one shipper makes multiple shipments or several receivers

use a single vehicle trip to pick up their shipments.

Second, since bus package express shipments are smaller than motor carrier shipments, shipments make a better measure of terminal activity than revenue. According to Trinc's Blue Book of the Trucking Industry, the average cost of a LTL shipment by truck is \$20.38. If the Knoxville bus operation is at all typical of other parts of the country, the average cost of a bus package shipment is approximately five dollars. Using these as average charges, one may calculate that intercity buses carried almost 21 million shipments during 1971 and Class I motor carriers carried approximately 242 million shipments. On this basis, the number of shipments handled by buses was 8.6 percent of the number of shipments handled by Class I motor carriers.

It is important to remember, however, that truck lines take the responsibility for pick up and delivery. To do this at a reasonable cost, they consolidate local pick up and delivery of many shipments into one vehicle. There is no consolidation with bus package express. This difference in consolidation may erase the differences between bus package express and the combined operation of Class I motor carriers. Since the vehicles effecting pick up and delivery of bus package express shipments are indistinguishable from normal traffic, while motor carrier's local trucks are clearly marked, the impact of bus package express on urban goods movement is difficult to recognize and severely underestimated.

Urban Goods Movement by Taxicab

Urban goods movement and courier services have traditionally been provided by special carriers or by employees of the shipping and receiving companies. Now, however, rapidly increasing costs and resistance to rate increases have caught the specialized carriers in a profit squeeze. To compensate for this, the specialized urban goods movers have reduced schedules in an effort to move goods at a lower cost. Typical examples are merchant delivery services which may deliver to a given location only once each week and less frequently mail pick ups and deliveries.

Urban goods studies currently advocate higher levels of consolidation in goods movement through publicly owned or cooperative urban LTL terminals, emphasizing greater consolidation and routinization of the pick up and delivery function. Consolidation does lower costs, but unfortunately only at the expense of service levels. For many shippers the slower delivery schedules are

intolerable and they are willing to pay more for faster specialized service.

In the past shippers have had their own employees "run the errands" on an ad hoc basis, at the expense of their normal work assignments. As these errands became more frequent, firms have hired minimum wage employees to be messenger or errand runners. Increases in labor and vehicle operating costs have prompted businesses to re-evaluate this form of expedited pick up and delivery.

Along with the increasing pressure to discontinue the firm's own courier service, business pressures have increased the need for expedited courier service of some kind. The proliferation of product lines and the increasing costs of carrying inventory, for example, have encouraged interstore transfers of low volume items. This is a means of maintaining product availability and reducing stock carrying costs by maintaining major inventories at fewer locations. High interest rates have encouraged businesses to pick up mail before work so accounts receivable can be processed and deposited before the banks close. Likewise, the early receipt of mail allows orders to be processed a day earlier. This faster processing of mail allows more time for order processing and shipping without sacrificing services to the customer.

The pressures of increased demand for expedited urban goods delivery, reduced service levels from traditional package delivery services, and spiraling costs of using released time employees have provided a rapidly growing market for taxi systems willing to carry goods as well as passengers. In addition to the normal intracity movements, taxis are becoming pick up and delivery arms for express services which do not deliver beyond their terminals, such as intercity bus package express and air express. The new "Sky Cab" service of one air freight company offers expedited door-to-door service with guaranteed delivery times for packages with aggregate dimensions of 90 inches or less and a weight of 50 pounds or less. Examples of door-to-door times are five hours between New York and Washington, D.C., and ten hours between the east and west coasts. Intercity bus companies have not yet taken any initiative in establishing bus-taxi service, but many shippers have started their own bus-taxi service which requires that the shipper, not the carrier, coordinate the interline service.

A study of Royal Cab Company in Davenport, Iowa, has made the importance of this service increasingly apparent. Royal Cab operates a low fare,

broad based taxi service in a community of approximately 100,000 people. Davenport is an industrial midwest town covering an area of almost 20 square miles with a population density of 5,000 people per square mile. It has an active but declining Central Business District (CBD) and shows significant growth in its peripheral shipping centers. The taxi system typically carries from 1300 to 1550 persons each day. The local fixed-route, fixed-schedule transit system typically carries approximately 2600 persons per day. The average taxi passenger pays a fare of \$1.03 per trip, or \$.87 for each mile traveled.

The goods movement service is in addition to the passenger service, and averages 60 trips per week day and 15 trips on Saturday, with a few trips on Sunday. Approximately 10 of these trips (17 percent) involve delivering telegrams. Mercy Hospital, General Motors Acceptance Corporation, Red Jacket Pump Company, and Nicholas Wire, four area firms, have arranged to leave their post office box keys at the post office window. A driver from the taxi company stops at the Post Office each morning during the week, picks up the mail at 7:30 a.m. and delivers it to the company by 8:00 a.m. For a \$1.50 cab fare, the mail is ready for the office staff when they begin work rather than at the 11:00 mid-morning normal mail delivery time.

Case Studies

In addition to the regular daily moves, there are a number of intracity services provided by the taxi companies. The following brief case studies convey the scope and importance of these services.

Mercy Hospital

Until 18 months ago a part-time driver and vehicle provided transportation for the hospital and the local convent. The hospital found that one driver did not provide enough peak period coverage (one driver can only make one delivery at a time, while multiple cabs can be dispatched simultaneously) and so began to use cabs exclusively. The hospital currently saves between \$150 and \$200 a month by using taxis.

Typical assignments include taking the postage meter to the post office, mailing parcel post, insured and certified mail, and carrying inter-hospital loans of drugs and surgical supplies. Shipments received by bus or air express are also picked up by cab. The service is used to take ambulatory patients and test specimens to other hospitals for specialized tests available only at those hospitals, and to take biol-

ological wastes to an incinerator for disposal. Most deliveries are completed within 30 minutes of the telephoned request.

Drug Store Chain

One local druggist estimates that a pharmacy in a typical central business district needs 2000 customers to support its operation. Seventy products make up 70 percent of all sales; the remaining 30 percent consists of the remaining inventory of about 1000 pharmacy items. Approximately 5 percent of the items inventoried are only used by one customer and nearly 90 percent of the line items are only used by from three to five persons. Pharmacists want to be able to supply all the drug items used by their loyal customers on a regular basis, to maintain customer loyalty. They are reluctant to send a customer to a competing drug store for an item they themselves do not stock. Low profit margin (3 percent of gross sales) and high inventory costs (\$20,000), however, prohibit a pharmacy from carrying a large stock of the 1000 infrequently requested items.

If a customer comes in with a new drug request, which the pharmacy cannot fill, the druggist will call other stores in his chain or his cooperating competitors to locate one with the drug in stock. Once found, the drug is delivered by taxi while the customer waits, usually in about 20 minutes. The drug store sells the prescription for its average retail price of \$3.60 to \$4.00 and retains the markup of \$1.45 to \$1.60 which covers the cab fare. Using the taxis allows the pharmacy to provide a high level of customer service without maintaining a prohibitively expensive inventory of infrequently requested products. If the customer is going to require the item on a regular basis, the pharmacist will then include it in his stock.

County Blood Bank

There are two blood banks in the area which are responsible for serving seven hospitals in the city area and two rural hospitals. They supply the regular stock of blood which must be rotated between hospitals on a regular basis to insure that its limited shelf-life is not exceeded, and provide expedited shipments to meet emergency and surgical needs. The exact blood needs of a particular hospital are not known until pre-operation blood matching is completed, usually around 2:30 the previous afternoon.

The blood bank has alternated between using their own van and driver and using the taxi service exclusively to deliver the 10,000 units of blood

transferred each year. The taxi service, with more vehicles available for multiple deliveries during peak periods, is faster and cheaper. The monthly bill, when taxis are used exclusively, is approximately \$600. The blood bank vehicle and driver can meet only about 75 percent of the delivery demands, so taxis must still be used as a supplement to deliver pre-surgery rush requests. Consequently, using in-hour delivery increases the cost by nearly \$400 a month. In-house delivery is still used because cab drivers do not reflect the professional image the blood bank wishes to project and because hospital lab employees do not always cooperate with cab drivers whom they perceive as being of lower status.

Telephone Company

The telephone company, averaging three movements per hour, is the second largest user of the taxi delivery service. There are a variety of ways in which the telephone company uses the service:

a. The Distribution of Installation Equipment

There are over 80 combinations of telephone models—desk, wall, trim-line—and colors. An installer carries kits to make approximately 50 of these regular combinations. If a customer changes their mind or the installer can sell a more expensive unit, he calls the central office which dispatches the required equipment by phone. By the time the installer can make the necessary wiring modifications, the phone can be delivered by cab.

b. The Distribution of Directories and Numbers

When the person requesting service is willing to accept the equipment already installed, the circuits are connected and a directory and telephone number label for the phone are delivered to the location by taxi.

c. Disconnect Notices

The law requires the telephone company to send a disconnect notice before disconnecting a subscriber's phone for non-payment, illegal use, or various other reasons. Mail delivery is too slow and does not provide witness of delivery. The taxi can deliver a notice within one hour, provides witness of delivery, and serves as a buffer between the subscriber and the telephone company. ("Look, Lady, I'm just a taxi driver delivering a message; call the phone company if you want to complain.")

d. After-hours Mail

The taxi picks up the mail after-hours and on Saturdays and delivers mail to the post office after the close of business. In addition, connect orders

are sent from the central office to the principal switching center twice a day by cab.

All of these services could be supported in-house at a fully loaded labor cost of \$15 an hour, including wages, vehicles, supervisors, overhead and so on. The average taxi fare is \$1.50 per trip and up to 15 taxis can be used simultaneously.

Manufacturing Plants

The manufacturing firms originally sent their employees to pick up locally available parts needed on an emergency basis. Increases in wages and production demands have made this practice too costly, so taxis have replaced in-house employees in providing this service.

In each of these cases, cabs are frequently used to pick up or deliver shipments at the bus station. The telephone company uses the bus service to get parts and supplies from the Des Moines home office. Blood bank shipments to the two rural hospitals are made by bus, and emergency shipments from the Red Cross or other blood banks are received by bus or air express. The hospital also receives drug supplies by bus from a supplier in Des Moines. Most of the farm implement manufacturers send parts by bus when a rural dealer has an emergency request. Invariably, the taxi service is involved in a high percentage of these trips.

SUMMARY AND CONCLUSIONS

Intercity bus and taxi package express are rapidly evolving into profitable urban goods movement services. The Davenport taxi service has gone from a gross revenue of \$213,000 in 1968 to \$481,000 in 1972 without a rate increase. The taxi package express service has grown as rapidly as the taxi passenger service and shows promise of greater growth. Intercity bus package express is growing faster than motor carrier freight. Based on the trips made and the vehicles involved with the movement of goods in the urban area, these modes must be considered important components of the urban goods picture.

FOOTNOTES

1 LTL freight is defined as shipments weighing less than 10,000 pounds. Thus a comparison of bus package express (under 100 pounds),

UPS (under 50 pounds) and LTL motor freight (under 10,000 pounds) actually examines different service. In spite of the differences the comparison does emphasize the relative economic importance of each of the services. Trinc's Bluebook of the Trucking Industry lists LTL revenue by motor carrier as follows:

1. UPS	\$836,883,000
2. Consolidated Freightways	235,508,000
3. Roadway Express	217,141,000
4. Yellow Freight System	129,900,000
5. McClean	125,437,000
Bus Express	104,081,883
6. Pacific Intermountain Express	96,073,000
7. TIME-DC	96,037,000
8. Associated Transport	77,442,000
9. Spector Freight System	68,462,000
10. Transcon Lines	65,188,000
11. Greyhound	62,090,158
12. Ryder	59,462,000

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