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BY THE U.S. GENERAL ACCOUNTING OFFICE

Report To The Honorable Elizabeth H. Dole The Secretary Of Transportation

Bus Rehabilitation Issues Need Attention

The Department of Transportation's Urban Mass Transportation Administration (UMTA) provides funds both to purchase new buses and rehabilitate old buses Recently, UMTA recognized the need to study the costs and benefits of rehabilitating buses GAO believes that UMTA's planned study design needs several changes that would make the study more useful in developing UMTA's bus rehabilitation policy

UMTA's funding formula favors new bus purchases Until UMTA's cost-benefit study is completed, GAO recomends that UMTA make its rehabilitation funding formula identical to the formula for new bus purchases so that UMTA's funding does not unduly influence transit authority's decision to buy new buses or rehabilitate existing buses

The Department agreed to make the new and rehabilitated buses' funding formulas identical and address some of GAO's concerns with its cost-benefit study

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-207418

The Honorable Elizabeth H. Dole
The Secretary of Transportation

Dear Madam Secretary:

This report discusses transit bus rehabilitation issues which need attention. The report contains recommendations to you on page 11.

As you know, 31 U.S.C. §720 requires the head of a federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

In addition to the committees mentioned above, we are sending copies of this report to the House Committee on Public Works and Transportation and the Senate Committee on Banking, Housing and Urban Affairs. Copies are also being sent to your Assistant Secretary for Administration, and the Administrator, Urban Mass Transportation Administration.

Sincerely yours,

J. Dexter Peach
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE
SECRETARY OF TRANSPORTATION

BUS REHABILITATION ISSUES NEED ATTENTION

D I G E S T

Rehabilitating older buses, rather than purchasing new ones, is a means for local transit authorities to extend the life of old, worn-out vehicles. Rehabilitation includes cosmetic, electrical, mechanical, and/or structural improvements and can cost anywhere from about $30,000 to $80,000, depending on the degree necessary. A new bus costs about $150,000. (See p. 1.)

Because of increased bus ridership in the late 1970's, some transit authorities began to rehabilitate old buses rather than buy new ones. In 1979, the Department of Transportation's Urban Mass Transportation Administration (UMTA) began providing funds to transit authorities for bus rehabilitation projects.

Prior to 1979, UMTA made grants only for the purchase of new buses. In 1979, UMTA developed interim guidelines, established a funding formula, and began to grant funds for rehabilitation projects because (1) it could not fund the increase in new bus purchases requested by transit authorities and (2) it believed that bus rehabilitation offered a cost-effective alternative to bus purchases. (See p. 4.) Since 1979, UMTA has spent about $70 million to help transit authorities rehabilitate about 1,900 buses and about $1.8 billion to help them purchase about 15,000 new buses. (See p. 2.)

Although the initial cost to rehabilitate a bus is less than the cost to buy a new one, transit authorities have selected bus rehabilitation for only about 11 percent of the buses funded by UMTA since 1979. Recognizing that information on the costs and benefits of rehabilitation is limited, UMTA plans to gather such data during fiscal year 1984. The data will be used to (1) determine whether rehabilitation is a cost-beneficial alternative to new bus purchases and (2) establish a final policy on bus rehabilitation. (See p. 9.)

GAO reviewed UMTA's actions to develop a rehabilitation policy because of the large amount of federal funds involved in bus purchases and the difference in costs of new and rehabilitated buses. (See p. 2.)

UMTA NEEDS TO CHANGE FUNDING FORMULA FOR REHABILITATION PROJECTS

UMTA's current funding policy favors new bus purchases. For example, UMTA will grant $120,000 (80 percent) for a new bus costing $150,000; the transit authority's share is $30,000 (20 percent). On the other hand, for example, UMTA will grant $48,000 for a rehabilitated bus costing $80,000, whose life has been extended 8 years; the authority's share is $32,000. In cases like this, the transit authority might choose a new bus, and UMTA would be spending thousands more per vehicle. (See pp. 4 to 6.)

Since 1979, UMTA has been concerned about the long-term impact of bus rehabilitation, such as its costs and benefits and its impact on new bus manufacturers. GAO believes that UMTA should make its funding formula for bus rehabilitation identical to its formula for new buses until its data collection and study are completed, so that its funding does not influence transit authorities' decisions to rehabilitate or buy new buses. (See pp. 4 and 11.)

THE COSTS AND BENEFITS OF BUS REHABILITATION

In 1979, UMTA identified the need to study rehabilitation's costs and benefits and its impact on the bus industry. During fiscal year 1984, UMTA plans to collect up to 6 months of operation and maintenance data from six transit authorities on performance before and after rehabilitation. UMTA plans to use the results of this effort to establish UMTA's policy. However, the data collection as planned does not include vital elements:

--It will not include data on new bus performance so that UMTA can compare rehabilitation with new bus performance.

--It will not include a statistically valid sample of transit authorities.

--It will not cover a long enough time period to accurately estimate operation and maintenance cost increases over the useful life of the bus.

GAO believes these elements are needed for the study to have nationwide applicability. (See pp. 9 to 11.)

GAO attempted to define the costs and benefits but could not because (1) the transit authorities GAO visited have not kept extensive performance or maintenance records by individual bus or bus model and (2) most rehabilitated buses have not reached the end of their estimated extended useful life. (See p. 7.)

At some of those transit authorities GAO visited, information was available on the operation and maintenance costs of rehabilitated and new buses. While the data were inconclusive because the rehabilitated and new buses had not reached the end of their useful lives, the data indicated that rehabilitated buses' operation and maintenance costs were similar to those of new buses. In addition, the authorities also told GAO that, on the basis of operating performance to date, the rehabilitated buses could last at least as long as their estimated useful life. Although no final judgment could be made, GAO's analysis of the data shows the potential for bus rehabilitation to be a cost-effective alternative to new buses. (See pp. 7 and 8.)

RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

GAO recommends that the Secretary direct the Administrator, Urban Mass Transportation Administration, to:

--Make the funding formula for bus rehabilitation identical to that for new bus purchases until the results of its cost-benefit study are known.

--Revise UMTA's proposed cost-benefit study of rehabilitation to include a comparison of the performance and costs of new as well as rehabilitated buses, a sufficient sample size, and an adequate time frame for data collection which would allow for recognizing changes in new and rehabilitated buses' operation and maintenance costs. (See p. 11.)

AGENCY COMMENTS

The Department agreed with GAO to make the funding formulas identical. The Department added that it is developing a plan for a cost-benefit study which will address the data to be collected and the time frame for its collection. (See p. 11.)

OTHER BUS REHABILITATION AND PURCHASE CONCERNS

In addition to identifying the costs and benefits of bus rehabilitation and new bus purchases, UMTA indicated in 1979 that it needed more information about bus rehabilitation before finalizing its policy. The information includes rehabilitation's impact on the industry, transit authorities' capability to rehabilitate buses, the effects of climate on rehabilitated buses' performance, and rehabilitation's effects on ridership. (See p. 13.)

Impact on industry

UMTA is concerned with bus rehabilitation's impact on the new bus industry because it believes that increases in bus rehabilitation will cause decreases in new bus orders. However, any changes in UMTA's policy will also affect the rehabilitation industry.

In response to a GAO questionnaire, the two largest bus manufacturers said that increases in bus rehabilitation will affect their business. However, the manufacturers also said that bus rehabilitation would have to increase by 50 percent for one manufacturer and by 30 percent for the other to have a moderate impact on their business. In response to the questionnaire, most bus rehabilitators indicated that they were operating at less than full capacity. For these reasons, UMTA needs to be sensitive to the impact of its bus policy on both the bus manufacturing and rehabilitation industries. (See pp. 13 and 14.)

Rehabilitation capabilities

UMTA expressed concern about transit authorities' ability to rehabilitate buses while maintaining adequate service. UMTA currently believes that rehabilitation should be done

through contract and should be done in-house only if it is cost effective and does not interfere with transit operations. (See p. 15.)

Climatic impact

UMTA was concerned about the effect of climatic conditions, such as ice and snow, on rehabilitated buses. An UMTA official told GAO that if rehabilitation efforts include replacing buses' frames, then rust and corrosion caused by climatic conditions should be the same for rehabilitated and new buses. (See p. 15.)

Impact on ridership

While UMTA has stated that people may prefer to ride new buses rather than rehabilitated ones, UMTA has not collected any data on such preferences. In some UMTA officials' opinion, people decide to ride buses on the basis of such factors as cleanliness, timeliness, and maintenance rather than on the basis of whether a bus is new or rehabilitated. (See p. 15.)

Contents

ABBREVIATIONS

APTA	American Public Transit Association
EPA	Environmental Protection Agency
GAO	General Accounting Office
UMTA	Urban Mass Transportation Administration

CHAPTER 1

INTRODUCTION

Bus rehabilitation includes a wide range of repair activities--cosmetic, electrical, mechanical, or structural. Rehabilitation usually applies to buses that are at least 12 years old. In the late 1970's, transit authorities began rehabilitating more buses than ever before. The Department of Transportation's Urban Mass Transportation Administration (UMTA) began funding bus rehabilitation projects in 1979.

BUS REHABILITATION IS DIFFICULT TO DEFINE

The term "rehabilitation" has numerous meanings because of the wide range of repairs involved. Depending on the extent of work done, bus rehabilitation normally extends the estimated useful life of a bus from 3 to 12 years. UMTA estimates that a new bus, at an initial cost of about $150,000, will have a useful life of 12 years. (In this report, we are referring only to standard-size buses which are about 35 to 40 feet in length). Rehabilitation efforts can be classified under three general categories:

--Refurbishing is basically repairing and cleaning the body and interior of the bus. Engine and structural work is minimal. Generally, refurbishing costs between $30,000 to $60,000 and extends the useful life of the bus from 3 to 5 years.

--Rebuilding returns the bus to its original standards. All major components of the bus are inspected and cleaned, replaced, or repaired. Generally, rebuilding costs from $40,000 to $70,000 and extends the useful life of the bus from 5 to 8 years.[1]

--Remanufacturing results in the bus' meeting current standards by including all the design changes and improvements in newer models of the bus. Generally, remanufacturing costs between $50,000 to $80,000 and extends the life of the bus from 8 to 12 years.

However, these general categories are not the only ways buses can be rehabilitated. Different approaches can be used, and bus rehabilitators will perform whatever scope of repair work the transit authorities require. To be eligible for UMTA funding, rehabilitation work (1) must be more than simply cosmetic, (2) cannot add components to the original specifications, and (3) must extend the life of the bus at least 5 years.

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[1]According to UMTA, rebuilding costs between $40,000 to $50,000.

TRANSIT AUTHORITIES AND UMTA HAVE ONLY RECENTLY TURNED TO REHABILITATION

Bus rehabilitation became popular with transit authorities in the late 1970's for several reasons. Gasoline shortages and higher gasoline prices generated increases in bus ridership, and some transit authorities could not handle the sudden influx of riders because many of their old buses were unreliable. These authorities found it necessary to rapidly replace their old buses and chose rehabilitation because at that time, it took considerably less time to rehabilitate buses than to acquire new ones.

Other authorities chose rehabilitation because they were concerned about the operating cost implications of new buses available at that time--some new models had lower fuel mileage and seating capacity than the older buses. Other authorities wanted to standardize their fleets and chose rehabilitation to minimize the number of different bus models. Adding a new bus model to the fleet increases costs for spare parts inventories and training costs for maintenance and operating personnel.

Then, in July 1979, UMTA provided its first capital assistance grants to transit authorities to rehabilitate buses because UMTA was unable to fund the increasing demand for new buses. On the basis of UMTA's data, UMTA has spent about $70 million to help transit authorities rehabilitate about 1,900 buses since 1979. However, during that same time period, UMTA gave transit authorities about $1.8 billion in grants to purchase about 15,000 new buses. Thus, transit authorities selected rehabilitation for only about 11 percent of the UMTA-funded buses since 1979.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of this review were to analyze the costs and benefits of bus rehabilitation, analyze UMTA's bus rehabilitation policy, and examine UMTA's efforts to determine the costs and benefits of bus rehabilitation. The relative efficiencies of any proposed actions can be determined by comparing their benefits--both tangible and intangible--with their direct and indirect costs. Once identified, each action's benefits and costs are expressed in a ratio.

We interviewed officials from UMTA headquarters in Washington, D.C., and its regional offices in Chicago and San Francisco to find out what UMTA had done to (1) assist transit systems to rehabilitate buses, (2) develop an UMTA bus rehabilitation policy, and (3) determine whether bus rehabilitation is cost beneficial.

We discussed rehabilitation with officials of the American Public Transit Association (APTA) and two consulting firms--Battelle Columbus Laboratories, and ATE Management and Service Company--which have studied rehabilitation under contract to UMTA.

The United States has about 13 bus rehabilitation companies and 22 bus manufacturers. To get information on potential bus rehabilitation and manufacturing issues, we sent questionnaires to 13 U.S.-based bus rehabilitation companies and nine U.S-based bus manufacturers to gather views on UMTA's bus rehabilitation policy and information on (1) the companies' capacity to produce or rehabilitate buses and (2) the potential impact of increases in bus rehabilitation on the companies. These companies, identified from APTA membership roles and a trade publication, were selected because they (1) were based in the United States and (2) manufactured or rehabilitated buses. We received information from 7 of the 13 bus rehabilitators and three of the nine bus manufacturers, including the two largest U.S.-based bus manufacturers. We interviewed officials from six bus rehabilitation companies and one bus manufacturer included in our questionnaire sample. We chose these companies because they were located near the two GAO regions which participated in this assignment. (See app. II.)

We interviewed officials and collected performance data on new and rehabilitated buses from six transit authorities--Santa Clara County Transit in California, Houston Metro in Texas, New Orleans Regional Transit Authority in Louisiana, Flint Mass Transit Authority and Southeastern Michigan Transportation Authority in Michigan, and the New York City Transit Authority in New York, New York. We selected these 6 authorities from the nation's approximately 385 transit systems because they had rehabilitated buses and had adequate data collection systems to allow us to obtain performance data. However, we were able to use data from only four of these six transit authorities because usable data were available at Houston for a 1-month period only, and data from New York City did not include mileage figures for new bus use, which are needed for comparing new and rehabilitated buses' performance.

The data we collected from the transit authorities were not adequate to completely develop the costs and benefits for rehabilitation (1) because of the lack of information on historical operation and maintenance cost trends of buses at these authorities and (2) because most of the rehabilitated buses had not reached the end of their estimated useful life.

In addition, we telephoned 13 other transit authorities to determine if they had or had not rehabilitated buses, what role UMTA policy played in their choice, and what steps UMTA could take to encourage more transit authorities to rehabilitate buses. We judgmentally selected these 13 authorities because they (1) were operating 500 or more buses and (2), on the basis of APTA data, were thought not to have used bus rehabilitation. We expected that they would provide information on their reasons for not using rehabilitation; however, during discussions with them, we learned that seven were in the process of rehabilitating buses.

Our audit work was performed between October 1982 and August 1983 in accordance with generally accepted government auditing standards. As discussed above, we were not able to develop the costs and benefits of bus rehabilitation and purchases.

CHAPTER 2

UMTA NEEDS TO CHANGE ITS REHABILITATION FUNDING FORMULA AND DETERMINE REHABILITATION'S COSTS AND BENEFITS

Increases in bus ridership in the late 1970's forced transit authorities to (1) replace worn-out buses by buying new buses or (2) extend the life of older buses through rehabilitation--a less expensive capital outlay. In 1979, realizing that it did not have the funds to help transit authorities buy as many new buses as they needed, UMTA issued interim guidelines for funding rehabilitation projects. The guidelines pointed out that, in many cases, rehabilitating older buses appeared to offer a flexible and cost-effective alternative to purchasing new buses. However, the funding formula that UMTA established for rehabilitation gave transit authorities a smaller percentage of the cost than the formula for new buses. Thus, UMTA's funding formulas favor new bus purchases. Until data exist, UMTA needs to make the two funding formulas identical.

The interim guidelines also expressed UMTA's concern about the long-term effects of expanded bus rehabilitation efforts. UMTA believed that the uncertainties surrounding bus rehabilitation--whether it is cost beneficial and what its impact on new bus manufacturers is--need to be resolved before it can establish a final rehabilitation policy. Accordingly, UMTA recognized the need to study bus rehabilitation's costs and benefits and consider its other impacts. As of December 1983, UMTA was in the process of designing a study to gather some of the cost-benefit data needed to finalize its rehabilitation policy. If found to be cost beneficial, rehabilitation could free a substantial amount of UMTA grant funds to be used for other mass transit projects since rehabilitating buses costs less than new bus purchases.

During fiscal year 1984, UMTA is planning to gather up to 6 months of operation and maintenance data from six transit authorities for certain buses before and after rehabilitation. An UMTA official told us that UMTA plans to use these data to evaluate rehabilitation's cost benefit and develop a nationwide bus rehabilitation policy. However, our analysis shows that the proposed data collection is not adequate to be used to develop a nationwide bus rehabilitation policy because it (1) does not include data on new buses for comparision purposes, (2) is not based on a statistical sample of transit authorities, and (3) covers too short a time period to identify long-term operation and maintenance cost trends for new or rehabilitated buses.

EXISTING FUNDING FORMULA FAVORS NEW BUS PURCHASES

Under the provisions of the Urban Mass Transportation Act of 1964, as amended (49 U.S.C. §1601 et seq.), UMTA is permitted to

fund up to 80 percent of the cost of a mass transportation project. UMTA funds 80 percent of the total cost of new buses[1] but uses a funding formula to determine its share of rehabilitation costs. The difference in the funding methods favors new bus purchases. Until data are available, we believe that UMTA should make its funding formula for bus rehabilitation identical to its formula for new buses so that it does not unduly influence transit authorities' decisions.

Using the bus rehabilitation funding formula outlined in the 1979 guidelines, UMTA pays 80 percent of the costs derived from multiplying 60 percent of a new bus' annual cost (the new bus' cost divided by the estimated life of the new bus) by the estimated number of years the rehabilitated bus' life will be extended. The following table compares that formula with a flat 80 percent of the cost--the same formula that UMTA uses to fund new buses--and the effect on UMTA's and the local authority's costs of a bus rehabilitation project using both methods. In our example, a bus rehabilitation project, which extends the bus' life 8 years, costs $80,000, and a new bus with a 12 year-life costs $150,000.

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[1]In some cases, UMTA limits funding to 75 percent when the transit authority is expanding or substantially upgrading its transit system.

Comparison of UMTA Formula for Funding Rehabilitated Buses Under 1979 Policy with Funding Rehabilitated Buses at 80 Percent

Funding steps	1979 policy	80-percent funding
A. Rehabilitation cost	$80,000	$80,000
B. New bus cost	$150,000	N/A[a]
C. Average estimated life of new bus (years)	12	N/A
D. Annual cost (B divided by C)	$12,500	N/A
E. UMTA participation percentage	60	N/A
F. UMTA's participation cost (D times E)	$7,500	N/A
G. Life extension (years)	8	N/A
H. Funding bases (F times G)	$60,000	$80,000
I. UMTA funding percentage	80	80
J. UMTA share (I times H)	$48,000	$64,000
K. Transit authority share (A minus J)	$32,000	$16,000

[a]Not applicable.

Changing UMTA's funding formula for rehabilitating buses would increase UMTA's share while decreasing transit authorities' share of the rehabilitation cost. For example, using the new bus funding approach instead of UMTA's 1979 interim guidelines would increase UMTA's share by $16,000 (from $48,000 to $64,000) and decrease the transit authorities' share by the same amount. However, when compared with UMTA's share of funding a new bus--80 percent of $150,000, or $120,000--UMTA's total bus-related expenditures would decrease if transit authorities decided to rehabilitate rather than buy buses.

Transit authorities' decisions to buy new buses or to rehabilitate buses should not be influenced by UMTA's funding formula without a sound basis. For example, under UMTA's current policy, the transit authority's share for a rehabilitation costing $80,000 would be $2,000 greater--$32,000--than its share for a new bus--$30,000. While we realize that factors other than the authorities' shares do influence their decisions to purchase or rehabilitate buses, cost is a major consideration.

COSTS AND BENEFITS OF REHABILITATION

In 1980 and 1983, two consulting firms contracted by UMTA issued reports on studies of bus rehabilitation, including an economic comparison of new buses versus rehabilitated buses.[2] The studies pointed out that the lack of data precluded determining whether new or rehabilitated buses are most cost beneficial.

The 1980 study concluded that the cost effectiveness of bus rehabilitation compared with new bus procurements is difficult to ascertain because historical data are lacking on operation and maintenance costs for pre-rehabilitated and post-rehabilitated buses and new buses. The study pointed out that UMTA should contract with a firm to observe and evaluate several rehabilitation projects and monitor the operating performance of rehabilitated buses. The 1983 study said that the major obstacle to being able to conduct comprehensive economic comparisions was the lack of appropriate operation and maintenance data from transit systems. The study pointed out that it would take a substantial on-site effort to collect such data, which was not feasible as part of that study.

As part of our review, we planned to compare the costs and benefits of rehabilitating buses with those of buying buses for each of the authorities we visited to determine if, in these cases, bus rehabilitation was cost beneficial. To do this, we needed the following information for new and rehabilitated buses:

--capital or acquisition costs;

--expected economic life;

--scrap or salvage value;

--expected operating and maintenance costs; and

--operating characteristics, such as miles driven per year, types of service, and service reliability.

As stated on page 3, we could not get some of the data we needed because of certain limitations: (1) transit authorities have not kept extensive performance or maintenance records by individual bus or bus model and (2) rehabilitated buses generally have not reached the end of their estimated extended useful life, and the useful life cannot be estimated from available engineering studies. However, we were able to collect capital cost data and from 8 to 41 months of operation and maintenance data for 418 new buses and 227 rehabilitated buses for the four transit authorities visited. (See app. I.) The data collected were inconclusive to evaluate the costs and benefits of new and rehabilitated buses on

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[2]Survey and Analysis of Bus Rehabilitation in the Mass Transportation Industry, ATE Management and Service Co., Inc., Nov. 1980, and Economic Comparison of New Buses Versus Rehabilitated Buses, Battelle, Columbus Laboratories, Feb. 1983.

a nationwide basis but did show that bus rehabilitation has the potential to be a cost-effective alternative to bus purchases.

The capital cost outlay for rehabilitation varied in each of the transit authorities, depending on the extent of work done. The four authorities' average capital rehabilitation cost was $56,000 in 1983 dollars; its average capital cost for a new bus was about $146,341 in 1983 dollars.

In addition to capital costs, other factors should be considered such as whether (1) rehabilitated buses last at least as long as their estimated useful life, (2) operation and maintenance costs for rehabilitated buses are similar to those of new buses, and (3) rehabilitated buses are used in ways similar to new buses. Sufficient information on these factors was not available at the transit authorities to make a complete evaluation. However, we did find that:

--Southeastern Michigan Transportation Authority-rehabilitated buses were performing adequately beyond their estimated useful life. Officials at other transit authorities we visited believe that, on the basis of operating performance to date, their rehabilitated buses could last at least as long as their estimated useful life.

--Operating and maintenance costs over the 8 to 41 months that data were available at the authorities averaged 70.1 cents a mile for new buses and 65.7 cents a mile for rehabilitated buses in 1983 dollars. Transit analysts we talked to believe that costs for rehabilitated and new buses tend to be fairly stable for a period of time and then these costs begin to increase sharply. None of the analysts were aware of any data that would indicate the age at which this sharp increase would occur.

--Some transit authorities included in our review were not using rehabilitated buses as extensively as new buses. For example, the average mileage for rehabilitated buses was 22,676 miles per year while new buses were operated 36,377 miles per year. Three authorities--Flint, Michigan; New Orleans, Lousiana; and Santa Clara, California--used new and rehabilitated buses interchangeably and told us that rehabilitated buses were performing satisfactorily. In contrast, Southeastern Michigan Transportation Authority used rehabilitated buses for emergency service and/or during rush hours.

We were not able to find sufficient documentation to determine a scrap or salvage value for rehabilitated buses. Because rehabilitation of transit buses is a recent occurrence and these buses have not yet reached the end of their useful life, it is not possible to assign them an accurate scrap or salvage value.

The data collected show a potential for bus rehabilitation to be an alternative, in certain cases, to new buses for fleet

replacement purposes. What remains to be done to evaluate rehabilitation's cost benefit is extensive data collection and analysis of rehabilitated and new bus performances over their useful life.

UMTA PLANNED DATA COLLECTION

As of December 1983, UMTA was designing a study to gather operation and maintenance cost data for certain buses in fiscal year 1984 in order to compare the costs and benefits of the buses' before-and-after rehabilitation performance. UMTA's Program Office requested the study to evaluate the cost effectiveness of bus rehabilitation and to develop a nationwide bus rehabilitation policy.

On the basis of our discussion with the Chief, UMTA's Vehicles and Facilities Division, who is overseeing the study, the data collection, unless altered, will not accomplish the Program Office's purposes. We believe that the purposes of the study will not be met because it does not include (1) a statistically valid sample size, (2) data on new-bus performance, and (3) data that cover an adequate time frame. UMTA should include the above factors, in its study as well as how rehabilitated buses are used, their life expectancy, and the effect of climatic conditions. The following sections discuss UMTA's tentative plan and our suggested alterations.

Sample size

UMTA plans to collect data from six transit authorities. In order to get statistically valid results, the study should be based on a statistical sample of randomly selected transit authorities. On the basis of APTA data on transit authorities that have rehabilitated buses, we believe that the sample should include 15 to 20 transit authorities. The Chief of UMTA's Vehicles and Facilities Division agreed that a statistical sample of transit authorities is necessary for developing a nationwide bus rehabilitation policy, but added that limited resources preclude a statistically valid sample. We believe that data from only six sources will not be sufficient to formulate a nationwide bus rehabilitation policy and that a statistical sample should be used.

Cost-benefit comparisions of new and rehabilitated buses

UMTA's data collection does not include new buses. Consequently, UMTA will not be able to compare the costs and benefits of rehabilitated buses with those of new buses. By gathering cost data on rehabilitated buses and comparing only the performance of buses before and after rehabilitation, UMTA will not have established a broad enough base to use in formulating a definitive nationwide bus rehabilitation policy. Comparative information could also be used by transit authorities to decide whether to rehabilitate existing buses or buy new ones.

On the basis of our analysis of the data we collected, we believe that UMTA should also consider collecting data on the following factors:

--The operation and maintenance cost data on new buses as well as rehabilitated ones. The cost data should include such items as time in the repair shop, labor, road calls, and parts; and fuel, oil, and tire usage. The comparison should also include capital costs of new and rehabilitated buses.

--The use of the rehabilitated and new buses. Our data show that transit authorities use new and rehabilitated buses interchangeably or only in emergencies and to supplement their rush hour fleets. Rehabilitated bus usage affects their cost structure and their benefits.

--The extended life of the rehabilitated bus. Depending on the level of rehabilitation, a bus is generally estimated to have an extended life of 3 to 12 years. The expected life of the bus may be important in determining rehabilitation's costs and benefits.

--The climatic conditions faced by the transit authority. An UMTA official believes that climatic conditions would affect new buses and rehabilitated buses equally if the rehabilitation included structural work. However, this has never been proven, and thus should be a consideration in UMTA's study.

Data time frame

UMTA plans to collect 2 to 6 months of operation and maintenance data before and after rehabilitation at each authority. Because our analysis of UMTA grants for rehabilitated buses shows that most buses have an estimated extended useful life of 8 years and new buses have an estimated useful life of 12 years, we believe such a short time will not be sufficient to evaluate rehabilitation's costs and benefits.

The length of time for which data should be collected is difficult to establish. As previously stated, transit analysts from two consulting firms believe costs for both rehabilitated and new buses will, at a given time, begin to sharply increase, but they were not aware of any data that would indicate at what age this sharp increase would occur. UMTA's data collection should continue until this cost increase can be identified and estimated over the remaining life of the buses.

However, modeling may be of assistance to estimate operation and maintenance costs for buses over their remaining life as opposed to waiting until the cost increases are observed. This could also reduce the study's cost and completion time. Modeling would also require the use of existing data of in-service buses and engineering cost estimates of the buses to forecast the remaining costs over the lives of the buses. UMTA's confidence in the

model's ability to forecast the bus operating and maintenance costs should be considered in establishing its bus rehabilitation policy.

CONCLUSIONS

Since 1979, transit buses have been rehabilitated, but most bus replacements have been with new bus purchases. However, some transit authorities have used bus rehabilitation more than new bus purchases primarily because of shortages in capital funds and the longer time needed to acquire a new bus than to rehabilitate one.

Until UMTA's study of the costs and benefits of new buses and rehabilitated buses is completed, UMTA should change its funding formula so that bus rehabilitation is funded on the same basis as new bus procurement. This change would allow transit authorities to analyze the alternatives of new or rehabilitated buses when faced with bus replacement needs and not be influenced by UMTA's funding formula.

During fiscal year 1984, UMTA plans to collect some cost-benefit data on rehabilitation, but its study approach may not produce adequate data to set a nationwide policy.

RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

We recommend that the Secretary of Transportation direct the Administrator, Urban Mass Transportation Administration, to:

--Make the funding formula for bus rehabilitation identical to that for new bus purchases until the results of its cost-benefit study are known.

--Revise its proposed cost-benefit study of rehabilitation to include a comparison of the performance and cost of new as well as rehabilitated buses, a sufficient sample size, and a time frame for data collection which would allow for recognizing changes in new and rehabilitated operation and maintenance costs.

AGENCY COMMENTS AND OUR EVALUATION

In commenting on our draft report (see app. III), the Department said that it agreed with our recommendation that the federal/local matching ratio for funding bus rehabilitation should be in accord with the funding ratio for new bus purchases. If the Department's action results in its paying 80 percent of the total bus rehabilitation costs, then it will comply with our recommendation.

With respect to its cost-benefit study, the Department commented that UMTA's consultant is developing a study plan for a cost-benefit study of bus rehabilitation which will address the data to be collected and the time frame for data collection. The study plan will investigate several methods of approaching

this problem to identify the most promising evaluation technique. The Department said that it believes the sample size of six authorities, which represents approximately 17 percent of the transit authorities that rehabilitated buses proposed for the study, is adequate. The Department stated that it is investigating use of a larger sample size as well as the costs and benefits of such an increase.

We believe the study must use a statistical sample and data which include an adequate time frame in order to make the study more useful in developing a national bus rehabilitation position. However, until UMTA finalizes its study plan, we do not know if these concerns will be addressed.

In addition, the Department said that a basic problem exists with our belief that UMTA should consider collecting operating data on new buses and rehabilitated buses for comparison. It stated that a comparison of operating costs between new and old type buses as the only factors to be considered in a cost effectiveness study is not completely valid.

The Department pointed out that in the rehabilitation of the "new-look" buses--now the major vehicles for rehabilitation--the existing engine in almost all cases does not have the modifications and equipment that are part of the new bus engine required by the Environmental Protection Agency (EPA), state, and local environmental laws. Thus, when an older design engine is rebuilt to meet its original specifications, it has a fuel consumption advantage over present engines. In addition, the Department stated that other major differences in design affect operating costs.

We agree that a comparison of operating costs should not be the only factor considered in such a cost-effectiveness study. In discussing our planned cost-benefit study on pages 7 and 8, we identified a need to look at, in addition to operating and maintenance costs, such factors as capital or acquisition costs, expected economic life, scrap or salvage value, and operating characteristics. These factors and any other factors UMTA may consider important should be considered in developing its study.

However, we believe that the difference in operating and maintenance costs is a significant factor in any cost-effectiveness study of new and rehabilitated buses. A bus may have cheaper operating or maintenance costs, for such reasons as design differences, which could be a consideration in the study. But, once identified, such reasons should not diminish the importance of the operating and maintenance cost data in determining relative cost effectiveness.

CHAPTER 3

OTHER CONCERNS ABOUT BUS REHABILITATION AND BUS PURCHASE

In addition to identifying the costs and benefits of bus rehabilitation and new bus purchases, UMTA indicated in 1979 that it needed more information about various aspects of bus rehabilitation before finalizing its policy. UMTA's major concern is the impact on the new bus industry from an increase in bus rehabilitation. But as long as UMTA's funding approaches are different, UMTA's rehabilitation and new bus purchase policies will affect the rehabilitation industry and the bus manufacturing industry. If UMTA changes its rehabilitation formula so that it funds 80 percent of the total cost, UMTA's funding approach would not influence transit authority decisions and thus the impact on either industry would be based on the authority's decision rather than UMTA's formula. Once UMTA completes its study of the cost benefits of new and rehabilitated buses, it will be able to make policy decisions based on the costs and benefits of the two alternatives.

In an effort to determine rehabilitation's impact on bus manufacturers, we sent questionnaires to nine U.S.-based bus manufacturers. Bus manufacturers which responded to our questionnaire indicated that increases in rehabilitation will affect the new bus industry but that the impact may not be substantial.

OTHER CONCERNS

UMTA's concerns about rehabilitation center on the (1) impact on the bus industry, (2) transit authorities' capabilities to rehabilitate buses, (3) effects of climatic conditions, such as ice and snow, and (4) impact on ridership of using rehabilitated rather than new buses.

Rehabilitation's impact on the bus industries

From 1979 to the present, UMTA's major concern in determining a bus rehabilitation policy has been the effect on the bus manufacturing industry. UMTA officials told us that this effect would continue to be a consideration in determining its policy even if bus rehabilitation is found to be cost beneficial. Its rehabilitation policy also affects the rehabilitation industry.

UMTA officials told us that they are concerned because increases in bus rehabilitation would create decreases in new bus orders. Thus, they believe that the new-bus industry, already operating well under production capacity, will be substantially hurt by the decreases in new bus purchases. However, the impact of increases in rehabilitation on the bus industries has not been determined.

We sent questionnaires to nine bus manufacturers (see app. II) to obtain information on their production levels and their position on bus rehabilitation and its impact on them. We received data from only three manufacturers; however, two are the largest manufacturers of standard buses--General Motors Corporation Truck and Coach and the Flxible Corporation. These two manufacturers produced over 1,900 buses in 1982, which is about 78 percent of the buses purchased that year with UMTA grant funds.

The information from our questionnaire points out that increased rehabilitation will affect the two largest manufacturers, which are already producing under capacity. During the period from January 1982 through May 1983, the two manufacturers produced buses at less than 40 percent of their capacity. However, the impact of increased rehabilitation may not be substantial.

--General Motors Corporation Truck and Coach stated that an increase in bus rehabilitation of up to 50 percent in the next 5 years would have a moderate impact on its financial position. The Flxible Corporation felt that an increase of up to 30 percent would have a moderate impact.

--The Flxible Corporation is currently entering the rehabilitation market and is an advocate of rehabilitation. General Motors Corporation Truck and Coach believes rehabilitation is a secondary approach to solving transit authorities' transportation problems, but it would seriously consider entering the rehabilitation industry if rehabilitation increases more than 50 percent in the next 5 years.

We agree with UMTA that increases in rehabilitation may affect new bus orders. The results of our questionnaire indicate that increases in rehabilitation could cause some bus manufacturers to enter the rehabilitation industry. The extent of such action by manufacturers and this action's effect on their financial picture cannot be estimated at this time.

In response to our questionnaire, seven U.S.-based bus rehabilitators indicated that the length of time they had been in the business of rehabilitating buses varied from 1 to 12 years. Most bus rehabilitators were working at less than full capacity during 1982; for example, three of the seven were at 50 percent or less of capacity and two were at 80 percent. All seven bus rehabilitators said that if a large increase in bus rehabilitation occured, they could substantially increase their production levels within a year. This increase could occur by adding second and third shifts, buying additional equipment, and expanding plant space.

The questionnaire responses indicate that both the new bus manufacturers and the bus rehabilitators are working at less than capacity. Whatever policy decisions UMTA makes after identifying the costs and benefits of new and rehabilitated buses will affect both industries.

Remaining bus rehabilitation questions

The other questions concerning bus rehabilitation included (1) the capabilities of transit authorities to rehabilitate buses, (2) the effect of diverse climatic conditions, and (3) a rehabilitated bus' ability to attract riders compared with a new bus'.

--UMTA was concerned about transit authorities' capability to rehabilitate buses and at the same time adequately maintain their bus fleets. To assure that regular fleet maintenance is not affected, UMTA now believes that rehabilitation should be carried out by competitive procurement and should be done in-house only if it can be performed more quickly and cost effectively and if it does not interfere with the normal operation of the transit authority.

--UMTA said that the impact of different climatic conditions--such as extreme heat or cold, or rust and corrosion caused by ice and snow and salt used to melt snow--could affect the performance, cost benefit, and life expectancy of a rehabilitated bus. The impact of different climatic conditions has not been evaluated. Although our review did not include such an evaluation, an UMTA official told us that if the rehabilitation effort includes replacing the bus' structure, the climatic conditions should have the same effect on rehabilitated and new buses.

--UMTA was concerned that more people may tend to ride buses if they are new rather than rehabilitated. However, UMTA officials told us they have made no study in this area but believe that decisions to use mass transit are based on clean, on-time, well-maintained buses rather than on whether the buses are new or rehabilitated. We found nothing during our review that would disprove UMTA's belief that mass transit use is based on clean, on-time, well-maintained buses.

CONCLUSIONS

UMTA believes that the concerns--the impact on the bus industries, including the viability and capability of the rehabilitators to rehabilitate buses, the impact of climatic conditions, and ridership decisions--will need to be addressed when it formulates a bus rehabilitation policy. Any changes in UMTA's policy will also affect the bus rehabilitation as well as the manufacturing industry.

DATA ON REHABILITATED AND NEW BUS CAPITAL AND OPERATION AND MAINTENANCE COSTS GATHERED BY GAO

Transit system	No. of buses	Bus model	Current acquisition/ rehabilitation cost[a]	Current cost per mile (cents)[b]	Time frame of data collected	Average miles operated per year[c]
NEW BUSES:						
Santa Clara	50	RTS II 35'	124,315	65	7/81 - 12/82	44,058.6
Santa Clara	66	RTS II 40'	105,100	82	7/81 - 12/82	32,688.7
New Orleans	185	RTS II 35'	102,543	[e]	1/80 - 5/83	34,778.3
New Orleans	59	Grumman 870	135,951	[f]	1/80 - 5/83	21,972.0
SEMTA[d]	48	Unknown	134,706	46.5	5/82 - 12/82	50,178.0
Flint	10	RTS II	98,617	53.5	1/82 - 12/82	34,584.0
REHABILITATED BUSES: OVER 5 YEARS[g]						
Santa Clara[h]	50	GM 4600	51,913	76	7/81 - 12/82	21,000.6
Santa Clara	81	GM 4800	68,306[i]	88	7/81 - 12/82	19,659.6
Santa Clara	11	GM 4700	55,622	82	7/81 - 12/82	13,962.7
REHABILITATED BUSES: 5 YEARS AND UNDER[g]						
New Orleans	43	GM New Look	51,000	[j]	1/80 - 5/83	21,998.8
SEMTA (Phase II)	13	GM New Look	44,150	34.5	5/82 - 12/82	22,990.0
SEMTA (Phase I)	17	GM New Look	27,588	36.1	5/82 - 12/82	24,544.0
Flint	12	GM New Look	34,875	32.8	1/82 - 12/82	34,576.0

[a]Acquisition costs and rehabilitation costs are given in current dollars.

[b]These figures include costs for parts, fuel, labor, and tires.

[c]Data for these figures are adjusted to 1 year.

[d]Southeastern Michigan Transportation Authority.

[e]The cost per mile by year is: 1980 - 57.7¢; 1981 - 78.2¢; 1982 - 98.6¢; 1983 (5 months) - 77.7¢.

[f]The cost per mile by year is: 1980 - buses were not in operation; 1981 - 67.2¢; 1982 - 78.4¢; 1983 (5 months) - 74.6¢.

[g]This is the estimated extended life of the rehabilitation effort.

[h]Rehabilitation costs for Santa Clara include acquisition costs.

[i]Buses were rehabilitated by two rebuilders. Costs were averaged to obtain one figure ($67,280 + $69,331/2).

[j]The cost per mile by year is: 1980 - 79.8¢; 1981 - 82.3¢; 1982 - 92.2¢; 1983 (5 months) -$1.10.

APPENDIX II

BUS MANUFACTURERS AND REBUILDERS

RECEIVING GAO QUESTIONNAIRES

BUS MANUFACTURERS

Crown Coach Corporation
GMC Truck and Coach Division[a]
The Flxible Corporation[a]
Thomas Built Buses
Transportation Manufacturing Corporation[a]
Chance Coach, Inc.
Eagle International, Inc.
Gillig Corporation[b]
MCR Technology, Inc.

BUS REBUILDERS

The Blitz Corporation[b]
Bus Industries of America, Inc.[a]
Columbia Coach, Inc.
Dickenson Lines, Inc.[a]
Dreamliner Bus Leasing and Service Company
Environmental Equipment Corporation[a,b]
Gillig Corporation[b]
Hauseman Bus Sales and Parts Company
Midwest Bus Rebuilders Corporation[b]
NIMCO Bus Division[a,b]
Pacific Bus Rebuilders, Inc.[a,b]
Stagecoaches Unlimited, Inc.[a]
Transportation Design and Technology, Inc.[a,b]

[a]Completed and returned questionnaire.

[b]Interviewed by GAO staff.

APPENDIX III

U.S. Department of Transportation

Assistant Secretary for Administration

400 Seventh St., S.W.
Washington, D.C. 20590

FEB 14 1984

Mr. Oliver W. Krueger
Associate Director, Community and
Economic Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Krueger:

This is in response to your letter requesting Department of Transportation (DOT) comments on the General Accounting Office (GAO) draft report, "Bus Rehabilitation Issues Need Attention," RCED-84-81, dated January 3, 1984.

GAO recommends that the Secretary direct the Urban Mass Transportation Administrator to:

- make the funding formula for bus rehabilitation the same as new bus purchases until the results of its cost-benefit study are known;
- revise the Urban Mass Transportation Administration's (UMTA) proposed cost-benefit study of rehabilitation to include a comparison of the performance and costs of new as well as rehabilitated buses, a sufficient sample size, and an adequate time frame for data collection which would allow for recognizing changes in new and rehabilitated buses' operation and maintenance costs.

The Department agrees with the recommendation to make the funding formula for bus rehabilitation the same as that for new bus purchases.

UMTA, through a consultant, is developing a study plan for cost-benefit study of bus rehabilitation which will address the data to be collected and the time frame for data collection. Detailed comments are outlined in the enclosure.

If we can be of further assistance, please let us know.

Sincerely,

Robert L. Fairman

Enclosure

APPENDIX III

ATTACHMENT

DEPARTMENT OF TRANSPORTATION REPLY TO A GENERAL ACCOUNTING OFFICE (GAO) DRAFT OF A PROPOSED REPORT ENTITLED "BUS REHABILITATION ISSUES NEED ATTENTION"

SUMMARY OF GAO FINDINGS AND RECOMMENDATIONS

GAO found that since 1979 the Urban Mass Transportation Administration (UMTA) has provided funds to transit authorities for bus rehabilitation projects. However, UMTA has not yet determined the cost and benefits of bus rehabilitation. GAO attempted to define costs and benefits but could not because (1) the transit authorities GAO visited have not kept extensive performance or maintenance records by individual bus or bus model, and (2) most rehabilitated buses have not reached the end of their estimated extended useful life.

GAO recommends that the Secretary direct the UMTA Administrator to:

--make the funding formula for bus rehabilitation the same as new bus purchases until the results of its cost-benefit study are known;

--revise UMTA's proposed cost-benefit study of rehabilitation to include a comparison of the performance and costs of new as well as rehabilitated buses, a sufficient sample size, and an adequate time frame for data collection which would allow for recognizing changes in new and rehabilitated buses' operation and maintenance costs.

SUMMARY OF DEPARTMENT OF TRANSPORTATION'S POSITION

The Department agrees with the recommendation to make the funding formula for bus rehabilitation the same as that for new bus purchases.

UMTA, through a consultant, is developing a study plan for a cost-benefit study of bus rehabilitation which will address the data to be collected and the time frame for data collection.

POSITION STATEMENT

The Department agrees that the Federal/local matching ratio for funding bus rehabilitation should be in accord with the funding ratio for the purchase of new buses.

APPENDIX III

UMTA's consultant, Battelle Columbus Labs, is developing a study plan for a cost-benefit study of bus rehabilitation which will address the data to be collected and the time frame for data collection. The study plan will investigate several methods of approaching this problem to identify the most promising evaluation technique. While we believe that the sample size (6) proposed for the study is adequate (it represents approximately 17% of the transit agencies that have rehabilitated buses), we are also investigating the use of a larger sample size as well as the costs and benefits of such an increase.

OTHER COMMENTS

Specific comments regarding the draft report are as follows:

1. The cover summary of the report states that UMTA began funding bus rehabilitation in 1979 "because it lacked sufficient grant funds to meet the demand for more costly new buses." This statement is a quotation from the background section of a July 1979 UMTA Notice providing interim guidelines on bus rehabilitation. Currently, UMTA does not consider this a reason for providing Federal capital assistance for bus rehabilitation, but rather a cost-effective option for transit operators who may have local reasons to consider rehabilitation instead of purchasing new buses. UMTA feels that recent and current appropriations are adequate to fund the demand for new bus purchases.

2. Chapter I, Page 1, regarding the definition of three categories of bus rehabilitation.

   --It should be noted that UMTA policy does not permit the use of Federal capital assistance for purely cosmetic rehabilitation or for any rehabilitation that would extend the useful life of the vehicle less than five years.

   --The second level of rehabilitation should be described as "rebuilding" and may include a somewhat lesser extent of work than "remanufacturing" which should be the third, and highest, level. In addition, rebuilding should not be construed to include all design changes and model improvements, since this could run over a prior period exceeding ten years and would result in major expenses not envisioned under the basic UMTA guidelines. Refer to Section 5d of UMTA Notice 9501.1 dated July 9, 1979, which indicates that the formula established for rehabilitation funding does not include improvements which add components to the bus' original specifications and that new equipment should be minimized in keeping with the idea of rehabilitation rather than new capital procurement. Rebuilding costs, although difficult to separate from remanufacturing, should be in the $40,000 to $50,000 range, with the useful life extended by 5 years minimum.

APPENDIX III

3.

3. Chapter II, Page 4, cost-benefit comparisons of new and rehabilitated buses.

GAO believes that UMTA should consider collecting operating data on new buses and rehabilitated buses for comparison. There is a basic problem in attempting to compare operating data of new buses with new-look type buses, now the major vehicles for rehabilitation. In rehabilitation of the old new-look buses, the existing engine in almost all cases does not have the modifications and equipment that are part of the new bus powerplants required by Federal EPA, State and local environmental laws. When an older design engine is rebuilt, it is to meet its original specifications, which give it a fuel consumption advantage over present powerplants. In addition, there are other major differences in design which affect operating costs. The comparison of operating costs between the new and the old type buses as the only factor to be considered in a cost-effectiveness study is not completely valid.

4. Chapter II, Page 9, regarding the "data collection plan."

The draft report refers to "Our analysis of the data collection plan...." The implication is that a document or a formal plan existed which could be analyzed. The fact is that no formal plan existed and the findings are based on information conveyed in conversation and are tentative in nature.

[GAO note: Page references in this appendix which referred to the draft report were changed to reflect their location in this final report. With respect to point 4, GAO changed the wording to reflect the Department's concern that its plan was not finalized.]

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