

Let's Demonstrate Dual Mode

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Whatever happened to dual mode? I will try to tell you.

Back on September 8, 1968, there was signed into law the New Transportation Systems Research Act. Under it the Secretary of Housing and Urban Development and the Secretary of Commerce were directed to

... undertake a project to study and prepare a program of research, development, and demonstration of new systems of urban transportation that will carry people and goods within metropolitan areas speedily, safely, without polluting the air, and in a manner that will contribute to sound city planning. The program shall (1) concern itself with all aspects of new systems of urban transportation for metropolitan areas of various sizes, including technological, financial, economic, governmental, and social aspects; (2) take into account the most advanced available technologies and materials; and (3) provide national leadership to efforts of States, localities, private industry, universities, and foundations. The Secretary shall report his findings and recommendations to the President, for submission to the Congress, as rapidly as possible and in any event not later than eighteen months after the effective date of this subsection.

The administration almost made the deadline. In May 1968, 20 months after the law was signed, it submitted the report, *Tomorrow's Transportation: New Systems for the Urban Future* (1). The report concluded:

1. Present modes of urban transportation are inadequate to meet total future urban needs;
2. Six types of new systems—dial-a-ride, personal rapid transit, dual-mode, pallet systems, new systems for major activity centers, and fast intraurban transit links—were found to possess not only a high expectation of technical and economic feasibility but also to contribute significantly to the solution of major urban problems such as automobile congestion and air pollution;
3. The capacity and the capabilities of American industry and private enterprise stand ready to develop these systems;
4. The vigorous leadership of the Federal Government is required;
5. The government should embark on a 5 to 15-year, \$530 million new systems research, development, testing, and urban demonstration program;
6. Automated dual-mode bus could be developed and its feasibility demonstrated very likely within 5 years at a possible cost of less than \$15 million.

That was in 1968. Since then, we have witnessed what government lassitude can do to a good idea.

According to a 1973 Library of Congress report prepared at my request, the Urban Mass Transportation Administration's new systems accomplishments since 1968 have been "disappointingly few" when "measured in terms of numbers of actual new systems... implemented and operating in cities" and "in terms of improving service to the hard-pressed urban traveler" (2). Let's review the status today of the six new systems proposed in the 1968 report (1).

1. The dial-a-ride demonstration in Haddonfield,

New Jersey, is the only project that has been funded by UMTA new systems money and that has advanced to urban revenue operation. Approximately 30 other demand-responsive bus systems (8 with UMTA service development assistance) are in operation throughout the country.

2. The first segment of a personal rapid transit system in Morgantown, West Virginia, was opened for testing in 1972. But the ridership potential there is not sufficient to justify the costs, and UMTA now faces the possibility of having to spend \$7 million to dismantle and dynamite an investment of \$64 million.

3. No dual-mode systems have been demonstrated.

4. No pallet systems have been demonstrated with federal assistance, although Auto-Train Corporation has made its Virginia to Florida service a big and profitable success and is opening a new route from Louisville to Florida.

5. With regard to new systems for major activity centers, the four people-mover systems exhibited during TRANSCO 72 at Dulles Airport, at a reported federal cost of at least \$10 million, are now dismantled. None has been constructed in a working urban environment, despite all the election-year hullabaloo given the exhibition. Four other people-mover systems (one funded in part by an UMTA capital grant) are operating at airports at Tampa, Dallas-Fort Worth, Seattle, and Houston; and another is under construction at Bradley Field outside of Hartford, Connecticut. The most successful people-mover systems demonstrated to date are those at Disneyland and Disneyworld. The Disney people have offered UMTA their designs, but have declined to join UMTA in any construction projects.

6. None of the possible fast intraurban transit systems, such as tracked air-cushion vehicles, has been demonstrated.

And that is all there is! How can this fiasco be accounted for? There are two main reasons.

First, there is financial chicken-heartedness. Because federal revenues have been squandered on war and other nonsense, only dribbles have been available for new forms of urban transportation. Second, since the piddling amounts of money available were insufficient to do much anyway, the mass transit administrators have sought to give the impression of action by endlessly proliferating first-stage research studies, thus avoiding ever having to come to grips with the hard realities of actual urban demonstrations.

Because I happen to have some experience with dual-mode transportation, let me give you my version of what caused that part of the total fiasco.

Shortly after the 1968 report (1), I began to talk to scientists and transportation experts about dual mode, which seemed to me a particularly lively prospect. By

August 1969, I was able to propose to the Milwaukee County Board of Supervisors that Milwaukee County, Allis-Chalmers Corporation (with a wide experience in propulsion systems), and American Motors apply for UMTA funding for a dual-mode transit demonstration, using abandoned railroad rights-of-way in metropolitan Milwaukee.

The County Board on November 12, 1969, endorsed the proposal, and County Executive John L. Doyne on February 17, 1970, submitted a preliminary application outlining a 4-year, \$15 million program to demonstrate dual-mode transit using a 1.6-km (1-mile) guideway. The system would link the University of Wisconsin-Milwaukee campus with the Milwaukee central business district, and later could be expanded to satisfy a major part of Milwaukee's transit needs. The proposal was right in line with the finding in the report that dual-mode transportation could be demonstrated "within 5 years at a possible cost of less than \$15 million" (1).

Former UMTA Administrator Carlos C. Villarreal on April 14, 1970, informed the county that \$15 million would be a "disproportionate amount" of the limited funds in UMTA's research, development, and demonstration budget (only \$20 million for fiscal 1971), but that he would continue to review the proposal. On May 20, 1970, Villarreal suggested that the county submit an application for a "preliminary study phase," which would "develop a plan of action" for dual-mode development and demonstration. Pursuant to that suggestion, the Milwaukee consortium on August 24, 1970, submitted a \$1 million request for a 1-year feasibility study. UMTA reduced the funding to \$300,000 on October 28, 1970. The findings of the resulting Milwaukee County Dual-Mode Systems Study, presented to UMTA on September 14, 1971, were as follows:

1. No technological breakthroughs were necessary to demonstrate dual mode;
2. The benefits would exceed the costs; and
3. Remaining uncertainties such as ridership attraction could be resolved not by theoretical studies or small test-track experiments but only by a comprehensive urban demonstration.

The study outlined a detailed dual-mode system design and recommended that UMTA ask Congress for \$174 million for a 10-year development and demonstration program involving 200 to 300 minibuses and 24 to 40 km (15 to 25 miles) of guideway.

But the UMTA officials at the September 14, 1971, presentation balked at the \$174 million figure, and, on the very day of the presentation, the Transportation Systems Center of the U.S. Department of Transportation—temporarily replacing UMTA as the dual-mode program manager—announced that department's fiscal 1972 dual-mode effort would consist of 11 small, piecemeal research and development projects to be funded with the meager amount of \$1.5 million.

Allis-Chalmers Corporation—part of the Milwaukee County consortium—immediately responded to the Transportation Systems Center's September 14, 1971, announcement seeking research and development sources. Not until January 17, 1972—4 months later—did the Transportation Systems Center announce that, as part of its program, Allis-Chalmers and 13 other companies would be sent requests for proposals for "design, fabrication, testing and delivery of a dual mode test vehicle." On February 1, 1972, I wrote to Assistant Secretary of Transportation Robert Cannon, Jr., and UMTA Administrator Villarreal, urging that the requests for proposals be sent out as soon as pos-

sible. In a February 22, 1972, response, Villarreal promised that they would be issued "shortly." Unfortunately, the right hand did not know what the left hand was doing. Five days before the date on Villarreal's reassuring letter, the Transportation Systems Center had canceled its dual-mode test vehicle announcement.

In new letters to Cannon and Villarreal, on March 7, 1972, I wrote, "If there are major problems attendant to the development of a dual-mode system, let's hear about them so we may be of assistance in resolving them. If the problems are minor or nonexistent, then why the delay and cancellation?" Their responses informed me that, because of unexplained reappraisal, the transportation department was planning to fund—through UMTA—more dual-mode system design studies rather than move ahead to hardware development.

The Milwaukee County consortium was disappointed, but not defeated. On October 4, 1972, it tried to get UMTA's dual-mode program off dead center by submitting a preliminary \$3 million to \$4 million request for a 2-year program to develop a dual-mode bus for testing on a low-cost, temporary guideway 0.5 km (1/2 mile) long. While the program would not have resolved every question about the feasibility of dual mode, it would have reduced the lead time prerequisite to a comprehensive urban demonstration.

UMTA moved with all deliberate speed—to reject this proposal. Two weeks after the October 4, 1972, proposal, Villarreal informed Milwaukee County that UMTA planned to pursue a three-phase dual-mode program, beginning with the repetitious phase 1 system design studies. The Milwaukee County consortium, frustrated by UMTA's insistence on additional paper studies before hardware development, decided on January 30, 1973, to sit out phase 1. UMTA, after more delays, finally got phase 1 under way in September 1973 by awarding system design contracts to General Motors, Rohr, and Transportation Technology, Inc.

Thus, we have yet to see a dual-mode demonstration. Six years after its finding that dual-mode could be demonstrated within 5 years (1), UMTA still has not moved beyond the system design stage.

It may never. The statement in UMTA's fiscal 1974 budget justification that the purpose of phases 1 and 2 is to qualify dual mode for phase 3—urban demonstration—is missing from the 1975 justification. And UMTA Administrator Frank C. Herringer on April 24, 1974, told the House Appropriations Committee that he was "not at all fully convinced" that we should proceed even to phase 2—prototype development and testing—despite the fact that the budget request on which he was testifying contains \$7.75 million for the very purpose of starting that phase in August 1974.

This vacillation by UMTA is discouraging. Study after study has pointed out the benefits of dual mode and recommended action. Yet we continue to move backward.

With today's energy shortages, dual mode is even more needed. According to a 1973 UMTA study, dual mode is more energy efficient than any other ground transportation system now in operation or on the drawing boards because of its high efficiency in taking people where they want to go, its projected high occupancy rate, and the elimination of congestion (3).

According to the UMTA study (1), the gasoline consumption by mode is as follows (where 1 passenger-km/

↑ liter

1 of gas = 2.35 passenger-miles/gal of gas):

<u>Mode</u>	<u>Passenger-Kilometers per Liter of Gas</u>
Automobile	45
Rail rapid transit	75
Transit buses	96
PRT vehicles	108 to 118
Dual-mode minibuses	125

Dual mode and other new transit systems could save the equivalent of 125 Mm³ (32.3 billion gallons) of gasoline a year, about a third our total annual consumption of gasoline (4).

To get new transportation systems rolling, UMTA's budget must be increased. Compared to the 1968 proposal (1) that \$530 million be spent on new systems during 5 to 15 years, UMTA's funding of new systems from fiscal 1970 through 1974—a 5-year period—amounts to just \$112 million.

Both the Office of Management and Budget and the Congress can be blamed for paring down UMTA's requests. For its part, Congress will be more willing to approve larger sums when it starts hearing some coherent UMTA testimony and sees some promise of tangible results. Despite complaints in 1970 from members of the House Appropriations Committee that UMTA had been "planning and studying long enough" and ought to get on with demonstrations, UMTA's budgets in the past several years have indicated a shifting of priorities away from urban demonstrations and toward endless research and development paper shuffling.

Only by urban demonstrations of dual mode and other new systems will we know whether the paper feasibility studies are correct. As the Library of Congress report said (2), "Actual urban demonstrations are needed to gain revenue operating experience as well as some indication of customer acceptance and necessary institutional arrangements. . . . Questions of this nature are not likely to be resolved solely by prototype testing."

Back in 1966, Congress mandated "national leadership" for a program of research, development, and demonstration of new systems. Dual mode was one of the brightest and best of these. Eight years later, with an environmental crisis, an energy crisis, and several other crises exploding in our faces, national leadership on new systems, particularly dual mode, is nonexistent. Leadership, anyone?

REFERENCES

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ANALYSIS OF URBAN DUAL-MODE TRANSPORTATION¹

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The automobile provides convenient, flexible, relatively low-cost transportation, and is thus the overwhelming choice of urban travelers. Currently, increasing concern is being voiced over relatively uncontrolled growth of automobile travel. Noise and air pollution, the divisive effect of ribbons of concrete cutting through neighborhoods and the plight of minority groups and the poor traditionally displaced by new urban freeways are being recognized. Consequently, public pressure has developed in opposition to new highway construction. In fact, in a number of urban areas, new roadway construction has come to a virtual standstill.

While demand for transportation continues to grow, conventional transit systems have been unable to attract significant ridership or provide the service desired by travelers. What is needed is a transportation system with the apparent advantages of the automobile but without the associated congestion, pollution or large right-of-way requirements.

Dual-mode transportation systems have been suggested as alternative transportation forms with the potential to meet this need. A dual-mode vehicle is one which travels under manual control on the street network for some portion of its trip, and operates under automatic control on an exclusive guideway for some other portion. Thus low-density collection/distribution functions could be accommodated at low capital cost using existing street facilities, while high-density routes with common origins and destinations for many travelers could be automated.

Automation provides the potential for:
 1) achieving increased guideway capacity through close-headway operation, 2) allowing safe high-speed travel without congestion, and 3) providing increased free or productive time to drivers by relieving them of their duties. Electrically powered

dual-mode vehicles may help to reduce air pollution, and guideway design may permit minimization of noise transmission to adjoining areas. Dual-mode transportation systems have the potential to provide door-to-door transportation equivalent to the automobile in convenience, and thereby may attract ridership from highways and reduce the problems of congestion.

The U.S. Department of Transportation, through the Systems Analysis Division of the Transportation Systems Center has conducted an economic feasibility analysis of dual-mode transportation systems in order to provide information upon which to base research and development priority decisions.

The analysis was conducted in a 1990 Boston scenario, in which an extensive dual-mode system was presumed to exist. The scenario was chosen only to provide meaningful base data. The study was not a proposal for a dual-mode system in Boston or a transportation plan for that area. As a basis for comparison a 1990 transportation plan for Boston projected by the Eastern Massachusetts Regional Planning Project was also analyzed. The analysis was oriented toward examining urban-wide applications of the dual-mode concept, as opposed to limited-service systems for specific purposes.

For the purposes of the analysis, performance levels were specified with the assumption that the appropriate technologies (such as command and control) would be developed sufficiently to permit their attainment. Continued technological development is required to achieve these capabilities.

BASELINE DESCRIPTIONS

The proposals for dual-mode systems that have been made by various institutions, companies, and developers were examined

¹This paper is a summary of a four-volume report entitled Analysis of Dual Mode Systems in an Urban Area. The full report is available from The National Technical Information Service, Springfield, Virginia, 22151.

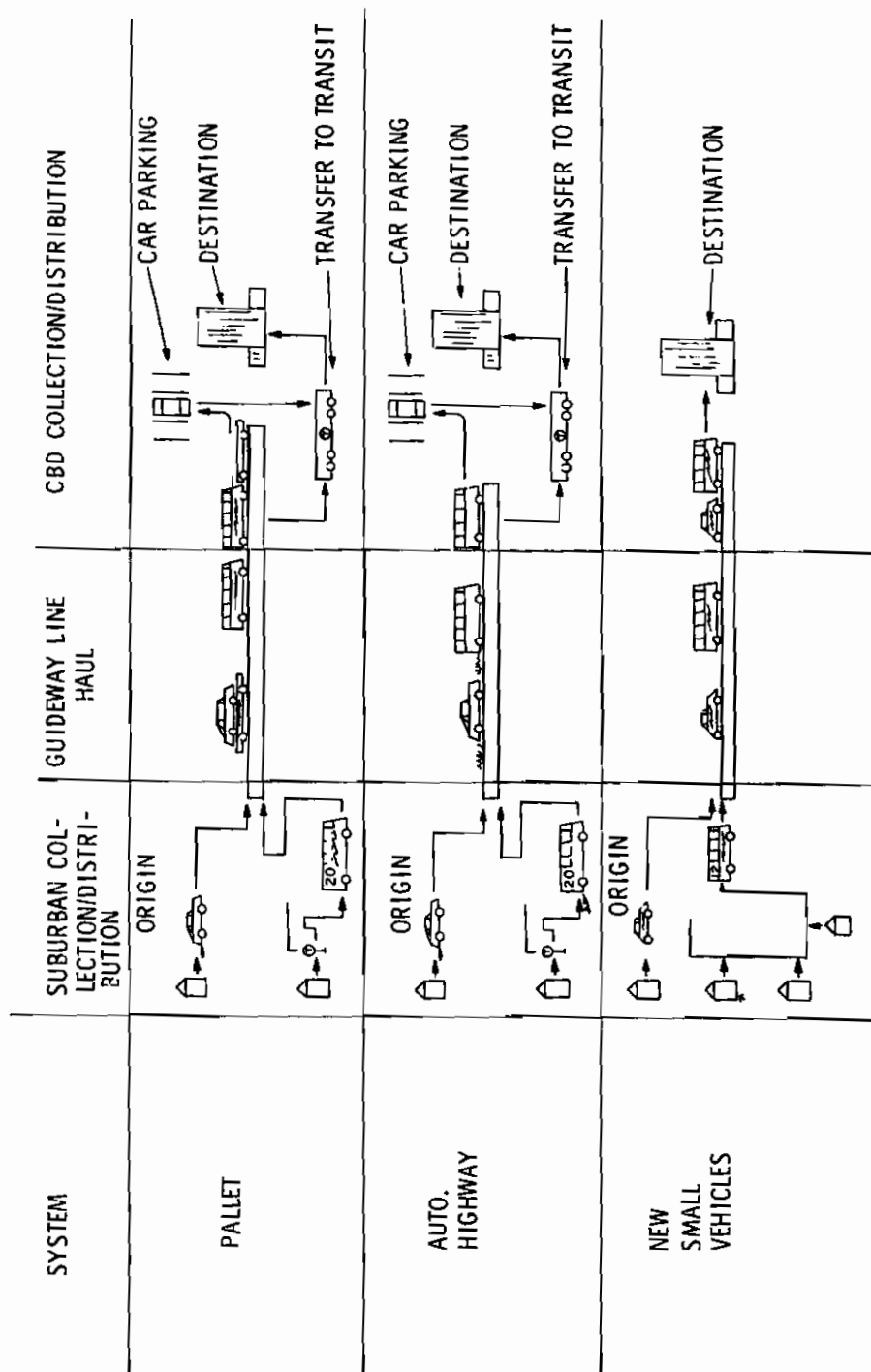


Figure 2. Typical Dual-Mode Trips