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BEFORE SUBCOMMITTEE ON AVIATION AND TRANSPORTATION, R&D, OF THE
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY ON RAILROAD,
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Mr. Chairman and Members of the Committee:

I appreciate the opportunity to appear before you today to discuss the research and development activities of the Federal Railroad Administration.

It is important to understand the direction the Federal Railroad Administration is taking in all of its programs at this time. We are focusing attention on near-term payoff and cost effective programs through increased emphasis to meet the national needs for efficient, safe and responsible operations. This effort is in response to and cooperation with state and local governments, the railroad industry, and the shipping community in a combined effort. In addition, our safety research has received new directions due to improved accident reporting and analysis.

So it follows that the research and development program (including software and hardware) should be directed to solve the more immediate problems facing the industry. This is an industry which has had a decline in market share, as well as earnings. The railroad industry must innovate by prudent use of research and development as one of the tools in the recovery process.

The request for Railroad Research and Development for FY 1977 is \$53,000,000, an increase of about 10% from FY 1976 after excluding programs terminated or transferred to other accounts. The request also provides for 161 positions, an increase of 17 over FY 1976, 11 of which are reorganization financing changes, and six are a net increase to support 1977 projects. We are requesting \$5.1 million for these 161 positions in FY 77.

In anticipation of the requirements of the Railroad Revitalization and Regulatory Reform Act, the cost and carrier financial analysis subprograms have been shaped to assist the Interstate Commerce Commission in carrying out the legislative requirements for a modernized uniform system of accounts for the carriers.

In FY 1977, our joint labor-management-government task force has agreed to expand the area of its activities. The work rule reform project in St. Louis has been expanded. In addition it will be expanded to other terminals and carriers. The Railroad Network Computer Model, which now provides a clear, flexible display of the characteristics of the rail system on a national, regional or individual company basis, will have the capability to handle nearly all key operational features by the end of FY 1977, including curvature, grades and maintenance status.

The commodity service program will move into the logistics of coal transportation, so important in a period when the Nation must reduce its dependence upon imported oil. This program is being shaped to procure the practical results of local and industry action obtained in earlier studies of grain movement. In a related subprogram, our waybill sample study was completed in December 1975 and the report was published. In FY 1977, efforts will involve continuation of processing current data and responding to special requests. (We have requested \$4.5 million for these program areas in FY 1977.)

The FRA intermodal freight program has progressed into the implementation phase, with preparations for demonstration service on certain routes now being selected. FRA will share the cost of initiating the experimental train service to be operated over these routes, offering many improvements intended to attract profitable traffic. The experiments are being designed by a joint labor/management industry task force. Supporting technology investigations in fuel consumption, aerodynamic drag and lighter-weight carts began in FY 1976 and will conclude in FY 1977. From the findings of these and related studies, systems engineers will

establish those technological advances in propulsion, rolling stock, highway-rail transfer equipment and terminal facilities that are required for more cost effective operations, and will provide the results of this analysis and study to the industry in the form of an intermodal freight system "prospectus." We are requesting \$6.5 million for this program in FY 1977, \$6 million for continuation of the demonstrations and \$500,000 for system engineering.

With the one possible exception of track structure upgrading, the most promising area for railroad return on investment improvement will come from freight car utilization improvement.

Since March 1975, there has been a joint Government/Industry National Steering Committee on freight car utilization improvement. Six task forces, consisting of industry contributed manpower for the most part, are addressing particular facets of the car utilization problem. Of note is the fact that this is the first time that all parties with any influence on car utilization have been brought into the same forum. Costs are being shared by the Federal Railroad Administration, Association of American Railroads, shippers, and railroads.

A representative project has already produced measurable benefits. With ICC concurrence, three railroads were allowed to pool general service equipment and, instead of engaging in empty cross-hauling, exchanged accounting debits and credits. This demonstration has been identified as the "Clearinghouse Project". Even during a period of sluggish economy, this pooled fleet achieved a reduction in cross-hauls of 18 percent. Slightly over 72,000 cars in the experiment achieved a 37 percent increase in revenue carloadings, and the average car cycle was reduced by 4.1 car-days and 450 car-miles.

Of equal importance, and of great prospective national impact on the railroad industry, is Missouri Pacific Railroad's Transportation Control System (TCS) of which freight car management scheduling (funded by FRA as a research development and demonstration activity) is a part. Total cost of the TCS is \$45 million with FRA providing \$5.5 million over a four year period starting in FY 1976 with \$1.5 million. In total, we are requesting \$2.5 million for Freight Car Management in FY 1977.

The improved rail freight service program strives to assist the railroads to improve the overall system performance and productivity. Research, including fact finding and problem definition, is designed to stimulate

technological advances desired by the railroad community. We are requesting \$3,100,000 for this activity in FY 1977.

The program objective is to encourage service improvements that result in economically viable, safe and reliable delivery of freight with the ultimate goal of reduced unit shipping costs for the shipper. Also, it permits efficient use of national resources in a manner that minimized adverse environmental characteristics of freight transport. In FY 1977, our Dynamic Analysis and Evaluation task will continue to validate analytical models through the collection of empirical data on the "truck hunting" phenomena which severely restricts train operation at higher speeds. When performance and design specification are implemented, this effort will produce significant decreases in component wear and train derailments.

Along with the above improvements in line haul operations, we will seek potential gains in yard operations. In FY 1977, we will assess the state-of-the-art in wheel sensors, continue our research to assist the industry in resolving persistent problems with optical automatic car

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identification (ACI), and place emphasis on cooperative research where the users and the suppliers provide significant inputs in the form of hardware, data collection, and technical expertise.

Wide-scale implementation of freight car improvements normally requires many years due to the long life cycle of rolling stock (20-40 years). Therefore, these improvements should be developed and introduced as quickly as possible to avoid further delay and resultant loss of benefits as large fleets of vehicles are purchased.

Within the Safety Program two approaches are being pursued; first, technology improvements to prevent accidents from occurring; and second, technology to reduce the severity of accidents and increase the chances of survival of persons involved. Recognizing that there is a crucial need to reverse the adverse trend in railroad accidents at the earliest possible time, FRA has a high priority for immediate incorporation of demonstrated and proven research and development outputs. The new Railroad Safety Research Board formed under the joint auspices of FRA, the Association of American Railroad (AAR), the Railway Progress Institute (RPI), and the rail labor brotherhoods, will look at problems, try to determine what changes need to be made in safety and accident prevention programs, and generally attempt to bring into sharp focus the safety research projects being conducted in and for the industry.

The Safety Research Program is aimed at enhancing railroad safety through the development of improvements in vehicle systems, inspection techniques, and maintenance procedures. The program is comprised of four subprograms: Rolling Stock Safety, Grade Crossing, Human Factors, and Accident Information Systems. We are requesting \$6,450,000 for this effort in FY 1977.

The goals of the Improved Track Structures Research are to reduce the number of track-caused accidents and improve the cost-effectiveness of track structures. Track safety has the higher priority because approximately 40% of all railroad accidents are attributed to defective track. FY 1977 is expected to be a high payoff year marked by the completion of several projects started previously. Safety-related outputs will include specification of allowable variation of track geometry as a function of train speed and maximum permissible deflection of rail joints under load.

\$8,850,000 is requested in our Improved Track, Inspection and Data Acquisition Technology Program in FY 1977.

One of the most important and beneficial research programs conducted in FY 1977 will be the operation of the Facility for Accelerated Service

Testing (FAST) now being constructed at the Transportation Test Center.

This program will provide urgently needed technological assistance to aid the deteriorating rail situation - that is, the capability to accumulate safety and performance life-cycle data for vehicle and track systems and components on an accelerated basis. The testing procedure will involve virtually continuous operation of a test train over an existing closed loop so as to accumulate years of over-the-road experience associated with candidate components in a compressed time period. Time compression values will vary substantially with the component being testing and the comparison being made, but during the first year of testing (in which fully loaded 100-ton cars will be used) the equivalent of 10 years of in-service experience for track and 20-30 years for vehicles will be acquired.

Measures taken by FRA to obtain industry cooperation and support for this program have resulted in enthusiastic and meaningful commitments. Railroads and equipment suppliers are actively participating in the planning and operation of FAST and will share testing costs by making large contributions of manpower and equipment.

The ultimate goals of our Improved Passenger Service program are reduced cost for passenger travel along with higher performance in such areas as trip time, ride comfort, reliability of equipment, and overall passenger acceptance of train travel. Past research and development efforts have

significantly reduced the failure rate and maintenance cost of four of Amtrak's upgraded Metroliner cars. In addition, using prior year funds, we will evaluate the world's latest passenger trains and equipment to support Amtrak's future equipment buys. We are requesting \$250,000 for FY 1977.

The lead role for magnetic levitation research was transferred from FRA to OST in FY 1976 and we expect to stay low-key with regard to TLV research unless a technological breakthrough or a socio-economic condition occurs which would warrant reinstating the program at a higher level. Therefore, we are requesting only \$100,000 for FY 1977 to carry out this technical assessment activity.

We are requesting \$2,000,000 for FY 1977 to continue the development of advanced propulsion equipment that is compatible with conventional railroad operation. The principal objectives of the program are to improve thrust and reduce weight and volume of traction equipment as well as improve efficiency and reliability.

A new budget item in FY 1977 deals with Energy/Electrification and reflects the increased emphasis of FRA in support of "Project Independence" for

which we are requesting \$1,450,000. The object of this research is to investigate energy conservation opportunities and to conduct the analysis and research required to support the Secretary on electrification issues. It will bring about an orderly development of electrification in support of the passenger improvement efforts of both the FRA Northeast Corridor program and Amtrak. Railroad electrification offers the only feasible means to utilize coal or nuclear power for intercity movements of general freight and passengers.

The basic mission of the Transportation Test Center (TTC) is to operate and administer an intermodal center for the conduct of comprehensive testing, evaluation, and associated development of ground transportation systems. There have been significant changes at TTC during the past year including:

- Mission shifted to emphasize testing of conventional railroad and transit equipment.
- Two miles of the high speed conventional rail loop redesigned to bolted construction which can be modified to simulate more "real world" trackage.

- Two major UMTA R&D projects were completed; the new gas turbine/electric transit car was tested and evaluated and two R-32 New York City Transit cars were modified with a flywheel storage system and completed their year-long test program.
- Construction is underway to build 1.8 miles of new track and to modify 3 miles of existing trackage to provide a Facility for Accelerated Service Testing (FAST) capability by next month.
- Construction was completed on the lower portion of the high speed test track.

The Transportation Test Center funding request of \$10,200,000 includes construction of facilities, procurement of support equipment, and the maintenance and the operation of the Test Center facilities, exclusive of individual test program support.

The Rail Dynamics Lab (RDL) facility being built at the Test Center will permit analytical and experimental studies of railroad and transit vehicles, systems, and components in a controlled and scientific manner that are representative of actual in-service conditions. Through the study of

vehicle dynamics, the number of dynamic related accidents and derailments and their attendant costs should be reduced significantly. We are requesting \$2 million in 1977 to continue work on the Vibration Test and Roll Dynamic Units.

Currently there is an extensive test program underway at the Test Center involving tank car safety. We are evaluating new concepts of thermal protection to reduce tank failure potential should a tank car be exposed to either a pool fire or torch after an accident. Also, we are testing designs of head shields to minimize the end puncture hazard.

I would also like to mention FRA's automated track inspection program which is operated jointly by the Office of Research and Development and the Office of Safety. FRA currently has a single track geometry measuring vehicle which has been used as both a research device and a safety enforcement tool. Using technology developed under the Inspection and Test Support Services Program, two additional FRA track

inspection vehicles are being fabricated and a fourth system will be completed in FY 1977. The three new systems will be used solely for enforcing Track Safety Standards and the existing system will be used part-time for this purpose and part-time for R&D. Our request for this program in FY 1977 is \$5,000,000, for which we have requested language to permit these funds to remain available until expended.

Lastly, I would like to close by listing a few of the major R&D efforts in which we are now and have been involved since our appearance before you last year.

Among our most significant accomplishments during the past 12 months, have been the following:

1. Redirection of FRA's R&D program to near-term payoff to be more responsive to industry problems and generate industry confidence and cooperation (e.g. FAST, ACI, Vertical Shaker).
2. FRA's track inspection vehicles were used to inspect 12,500 miles of track in compliance with safety standards this year.
3. FRA completed the demonstration tests of the ballast consolidator and implementation is under way. The Illinois Central Gulf Railroad ordered one machine, the Canadian National has received four and the Long Island Railroad is about to order two.

4. Metroliner Improvement Program was completed and met its objectives of increasing car availability from 75% to 95% and reducing maintenance cost from \$1.25 per car mile to .80¢ per car mile during their 25,000 mile road test.
5. A study of Automatic Car Identification (ACI) sensor equipment was completed in response to a rail industry request. Results indicated the current sensors can be improved from a readability and maintainability standpoint and based on this the AAR Board of Directors requested further study and investigation of this important system as part of a freight car management approach.
6. A Facility for Accelerated Service Testing (FAST) has been moved forward, in part at the suggestion of this committee, to provide a capability that can accumulate ten years of real-time life experience in a one year of testing. Operations should begin late this year.
7. The vertical shaker (one end version) at the Rail Dynamics Laboratory (RDL) is operational and is testing the vibration characteristics and loading experienced in lading of typical trailer-on-flat-car configurations.
8. FRA completed Phase I of the Truck Design Optimization (TDOP) which provides, for the first time, vibration characteristics of the standard general

purpose truck. Hundreds from industry have been briefed. Reports on the findings are in preparation, but most importantly, magnetic tapes which will help rail truck designers are being made available through the National Technical Information Service.

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