

revised as needed throughout the day's operation. As each load occurs, the operator enters the equipment number and gross weight. The necessary arithmetic calculations are performed by the system and the complete haul ticket is immediately printed. Ticket numbers are issued sequentially by the system. As the ticket is printed, key information from the ticket is stored in the mini-computer. At the end of the day's operations, a ticket accountability procedure checks the tickets received on the project with those stored in the mini-computer. Features are present to account for missing or invalid tickets. The system will produce all the material haul summaries and ticket accountability reports (similar to those currently in use) when requested by the operator.

During the course of this project, the demonstration system was shown to be portable by successfully transporting it to a distant point and conducting simulated operations. The portability of the system permits it to be moved from project to project as the need arises.

Experience with the demonstration system indicates that the concept of the portable system is valid. An operational prototype would be required to determine the environmental effects on hardware performance and to refine the overall system.

It is estimated that a production model would cost approximately \$10,000. Cost recovery would be through rental charges to projects of approximately \$250 per month.

The published version of this report may be obtained by addressing your request as follows:

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**SUMMARY REPORT 179-1F(S)**



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**A PORTABLE AUTOMATED DATA ACQUISITION SYSTEM  
FOR MATERIAL HAUL DOCUMENTATION**

**SUMMARY REPORT  
OF  
RESEARCH REPORT NUMBER 179-1F  
STUDY 1-19-74-179**

**Cooperative Research Study of the  
Texas Highway Department and U.S. Department of  
Transportation, Federal Highway Administration**

**February, 1975**

**TEXAS HIGHWAY DEPARTMENT  
Austin, Texas**

# Portable Automated Data Acquisition System

## For Material Haul Documentation

by

**Roger L. Merrell**

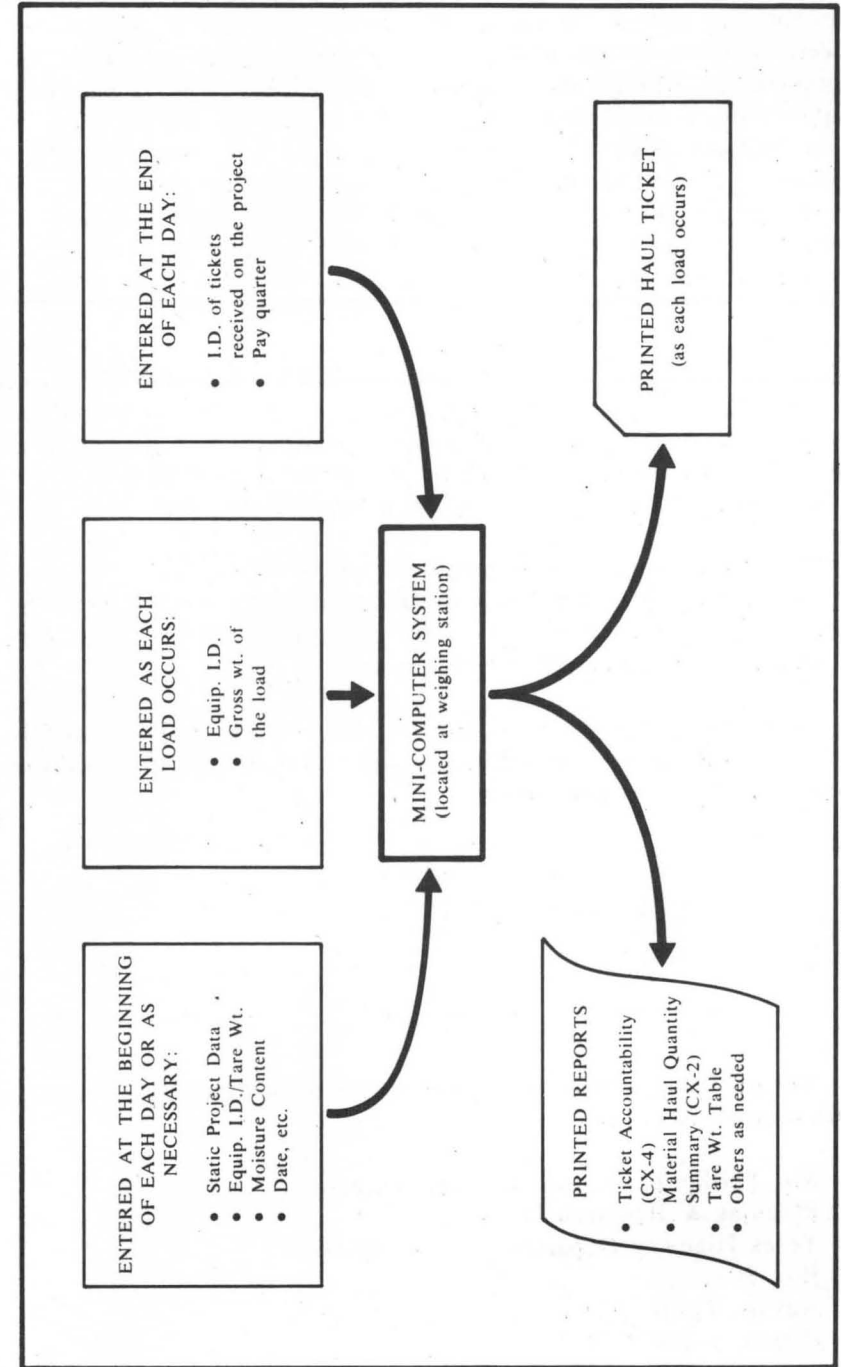
Existing manual procedures for material haul tickets when payments are by weight involve a considerable amount of manual checking, arithmetic calculations and ticket accountability. The availability of small mini-computers at reasonable cost permits the development of a portable, automated data acquisition system which is capable of issuing, checking and documenting the material haul tickets associated with highway construction projects.

The original objective of this research project was to develop and field test a prototype of such a system. However, the original objective was revised, and efforts were concentrated on developing the concept and investigating the operational characteristics of such a system. This was accomplished by developing a demonstration system using available hardware similar to that needed for a prototype. The hardware consisted of a 24K mini-computer, line printer (for printing tickets) and a keyboard data entry device. The physical size of the system is approximately the size of three typewriters.

The proposed automated system is based on the concept of capturing all of the required information at the weighing station. All of the functions of ticket generation, ticket accountability, and associated material summary reports are accomplished with the system as shown in the accompanying figure. In addition, the system is portable and can be easily moved from project to project since it is not interfaced with the weighing mechanisms.

The operating program developed for the demonstration system is interactive in nature. Control of the system is accomplished through a series of function codes which prompt the operator to respond with appropriate input. A technician can be taught to use the system in approximately one hour.

The static project data (project I.D., material source, date, etc.) is entered once at the beginning of the haul operation. An equipment number/tare weight table and the moisture content are entered and



Operational Theory of the Automated Operation