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Informal Working Note 26

YARD COMPUTER SYSTEMS: SUGGESTIONS FOR ADDITIONAL WORK

Purpose

The purpose of this note is to detail suggestions for additional work in the area of yard computer systems.

Background

Most railroads are convinced of the usefulness of computer systems to aid yard operations. New yards being built today almost always include provision for a sophisticated computer system to perform process control and car inventory functions. Rebuilding and upgrading of existing yards generally include the replacement of a manual retardation and switching operation with a computer automated process; also manual card PICKLE systems can be replaced by computerized car inventory systems.

The initial cost of a sophisticated yard computer system can be a million dollars or more. If one considers the operating costs associated with maintenance, computer operator, etc., then the railroads investment in a yard computer system can be sizable.

The sophistication of individual railroads in computer technology varies greatly. Consequently, the ability of individual railroads to make sophisticated judgments in the design and purchase of yard computer systems also greatly vary. This problem is exacerbated by the fact that computer and communication technologies are changing rapidly, and that generally each railroad sees its own needs as specialized.

Depending on the sophistication of individual railroads, they essentially have two choices in purchasing yard computer systems. First, they can essentially purchase a "turnkey" system from a vendor such as WABCO or GRS. Second, they can act as their own prime-contractor and develop their own computer design using the assistance of a vendor WABCO, GRS, IBM, DEC, or private consulting organization.

Distribution

Project 6364 team and file
Hopkins/TSC (3)

Work on Current Project

The aim of the current project was to synthesize and catalogue the current practice in yard computer systems. This would have been sufficient, if the current practice was "mature" (i.e., accepted practices were established). However, the current work has uncovered a myriad of conflicting design configurations and philosophies (i.e., centralized vs. decentralized, multiple computers vs. single computers). Consequently, no good guidelines can be generated without a great deal of additional work. As mentioned earlier, this problem is made difficult by the fact that computer and communication technologies are rapidly changing, and that each railroad generally sees its needs as unique and therefore they need a customized system.

Suggestions for Additional Work

The goals of additional work should be to develop a chapter in the handbook which would:

- (1) Present fundamental information on computer, communication, and software considerations.
- (2) Provide guideline considerations in making fundamental tradeoff decisions.
- (3) Allow the user to be "smart" so that they can interact intelligently with vendors and consultants to obtain the best computer system meeting their own needs at least cost.

A Sample Outline of Areas Covered

1. Data Processing Equipment
 - Computers
 - Size Considerations
 - Mainframe Memory
 - Peripherals
 - General Characteristics
 - Interactive Peripherals
 - I/O Devices
 - Mass Storage Devices
 - Some Configurations and Tradeoff Considerations
 - A Minimal System
 - An Intermediate System
 - A Large System
 - Lease-Buy Decisions

2. Fail-Safe Provisions
 - Peripheral Device Failure
 - Computer Failure
 - Communication Failure
3. Software Considerations
 - Applications Software
 - Data Transmission
 - Data Input Process
 - Real-Time Control Programs
 - Operator Interface Programs
 - Display Programs
 - Management and Statistical Programs
 - Off-Line Programs
 - Operating System
 - General
 - Handling of Interrupts
 - Job Scheduling
 - Computer Memory Management
 - Utility Functions
 - Programming Language Processors
 - Assembly Language
 - Compilers
 - Interpreters
 - Library Programs
 - Software Development and Implementation
4. Data Communications
 - Available Media
 - Voice-Grade Lines
 - Wideband Cable