

Jacobsen Declaration Exhibit BA

1 Prototype cTc Dispatching with Track Driver professional

or

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5 Track Driver Professional 32

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25 Dealers

26 Engine Commander®

27 Computer Dispatcher® Pro¹

28 Computer Dispatcher® Lite

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A Discussion of control systems in actual usage
throughout Class I railroads in the US and
beyond.

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Train Track's Background

- n Software Development for Railroads
- n Newport Beach, CA - Since 1986
- n Data Recorders (Black Boxes)
- n Crossing Gates
- n Data Monitors
- n Control Systems

Railroad Electronics

Railroads are such interesting places. They are filled with a variety of important 'systems' that are neatly serviced with modern computer technology.

Train Track originally built data or event recorders. These were small, dedicated computers that provided a 'Black Box' type of function for railroads. Only, instead of riding along in the locomotive, they were permanently affixed to where the safety was provided - at crossing and 'interlockings' (switches between tracks, controlled by signals).

The Railroads were mired in turn of the century (the last - not the current) technology. The most modern component in 1980 was the relay. Only recently have micro-processors gained acceptance. This is part of the great allure of Railroads - where old technology meets new. Harsh temperatures and coal dust meet the prissy microprocessor. White collar professionals wear steel toed boots.

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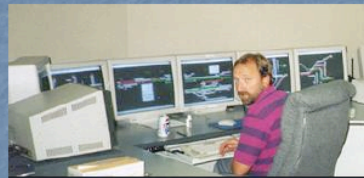
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Track Driver Professional 32



- Used by
 - Rail Traffic Controllers (RTC)
 - Dispatchers
 - Windows NT, Multi-user, Multiple screens
 - Client Server

The name for the first DOS product was Track Driver (1990). When we migrated to a network (Novell 2.0) we called the new system TD NET(1991) and the original became TD BASIC.

We next introduced a Windows 3.1 (16 bit) version in 1992. We called this TD Pro (professional).

When we re-wrote the system for Windows NT in 1993, we called the new version TD Pro32. But, it often gets shortened to TD Pro, now that the Windows 3.1 version is no longer supported.

The DOS version is still available!

This is actually an old picture (1995) of the Kansas City Terminal Railway in Kansas City, Missouri.

They are a terminal railroad, jointly owned by several of their customers, BN and SF chief among them.

They have two dispatchers and a few other computers to support the system. They control a small, but very busy territory just around their office.

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Multiple workstations

- n LAN based, Ethernet TCP/IP (Internet)
- n Client / Server
- n Central Logic Servers (DPU)
- n SQL Servers, Domain Servers, Other
- n Hot Standby Redundancy

Although Track Driver Professional can be a single workstation with only a connection to front end processor for the communications (Called a Codeserver), it is usually deployed as a network (LAN = local area network - common in most offices today).

The software is client / server based. Many support servers are required in large systems to provide a 'centralized' set of functions, including:

- User validation
- Logic Processing
- Playback and logging
- Data Base updates
- Communication with other RR centers
- Train Tracking
- Train Schedules

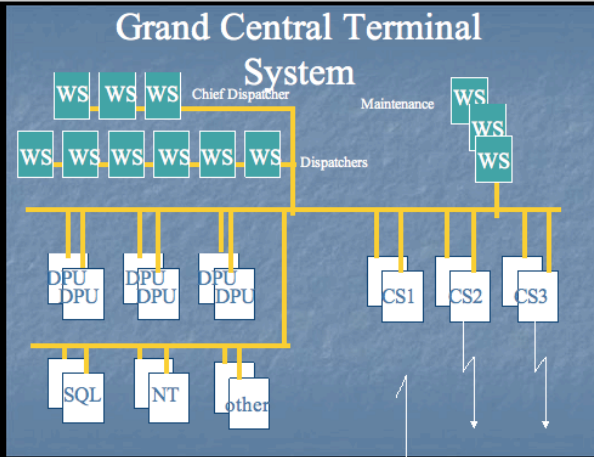
The Workstation is primarily a display device to show the data in the system in Real Time.

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This is roughly what is installed in Grand Central Terminal for Metro North. It controls three separate lines; Harlem, Hudson and New Haven.

Each 'server' is redundant in a hot / standby pair.

Each of the three territories is actually on its own central server (Distributed Processing Unit - DPU). They could have been all on one, but this provided more options. Each Territory has its own communication to the Field Server pair (Codeservers). But, any workstation can get data about all three territories as if they were all on one central computer. This is really a distributed system.

Additionally, there is a 120' by 8' high 'model-board with approximately 15,000 lamps driven by 10 other dedicated computers. This is a very expensive display. Most large display are video (Union Pacific, CSX). More common is no large overview display (no war-room) because the PCs and monitors are so easily located wherever you want a display

Each Codeserver has an A and B line (serial RS232) for each segment of the territory, typically three segments. There is an electronic 'gang' or 'T' switch that connects these to one of the Codeservers in the pair at a time.

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Dealers

- n GE Harris
- n Rail Services Corporation
- n Train Track
- n Union Switch & Signal, Australia
- n **KAM Industries**