



## Em2000 MICROPROCESSOR CONTROL SYSTEM INTEGRATION

With the introduction of the EMD EM2000 retrofit, older locomotives can now benefit from the same control system available in current model SD70s, 80s, and 90s. The EM2000 features increased computer processing speed a user-friendly interface and comprehensive troubleshooting operations. During EMD's rigorous laboratory and field reliability growth testing (RGT) the EM2000 surpasses all reliability expectations ensuring optimum performance in all environments. As an added benefit, Elcon, Inc. now offers a complete range of EM2000 installation services, all performed by Elcon's staff of experts. Elcon's advanced technology and extensive testing provide performance and control that reduce downtime and improve operating efficiency to allow optimum fleet utilization and potential fleet reduction.

A primary goal of railroads and Elcon, is the pursuit of locomotive overhaul solutions that improve railroad fleet performance. The EMD EM2000 microprocessor meets that goal through its quality of information, improved locomotive reliability and increased locomotive performance. The flexible, user-friendly system is installed and serviced completely by Elcon experts. The EM2000 retrofit is a viable, value-added technology available to you now.



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## DIAGNOSTICS

### FEATURES

- Complete self tests of the following systems: radar, contactor/relay, self load, alternator excitation, wheel slip light, cooling fans, slow speed control, load regulator, governor ORS and traction motor blower
- Prioritized messages interrupt certain menu screens when necessary
- Ability to store up to 600 fault messages
- System displays any condition preventing engine loading

### BENEFITS

- Can reveal engine performance problems
- New self-test routines reduce trouble-shooting time
- Fault messages help isolate and identify trouble spots to keep maintenance personnel informed of locomotive conditions prior to experiencing failures.
- Faults detected in shop instead of in field
- Data collected before and during fault, providing a "snapshot" of operating conditions
- Virtual elimination of "No Trouble Found" reports

## EM2000 FLEXIBLE SERVICES

The EM2000 retrofit features a new worry-free service - customized installation by Elcon experts. Simply choose an option that best fits your requirements and let Elcon do the rest.

### -- OPTION A -- EM2000 Retrofit Part Kit

- Micro Chassis
- Required Sensors
- Diode Boards
- Display Unit
- Radar
- Wiring Diagram
- Software (EMD)
- High Voltage Cabinet Layout

**-- OPTION B --High Voltage Cabinet Equipped**  
EM2000 components installed in high voltage cabinet for "drop-in" installation.

### -- OPTION C -- Installed EM2000

- EM2000 installed by Elcon Team
- Railroad staff training
- Locomotive evaluation



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## DISPLAY

### FEATURES

- Six line, forty character display
- Cursor driven menu
- On-line help screens accessible from anywhere within system
- Improved ergonomics

### BENEFITS

- Data displayed in a clear, concise format, rather than numeric codes
- Interactive, user-friendly interface
- Create customized real time data screens from hundreds of parameters
- Data can be downloaded for later analysis

## Performance Features Available

- Slow speed control
- Air compressor low oil pressure detection
- Traction motor inlet guide vanes
- Engine purge
- Self Load Test
- Traction motor cut-out
- Start motor Thermal overhead
- Motor management system

## CONTROL SYSTEM

### FEATURES

- 32 Bit, 16.5 MHz Microprocessor
- Floating point math co-processor
- Non-volatile memory
- Speed-sensing K-band radar

### BENEFITS

- Increase speed and efficiency of information processing
- Co-processor capable of more complex functions, locomotive able to react instantly to changing operating conditions
- True ground speed based wheel control system-prevents simultaneous wheel overspeed
- Component integration improves overall reliability
- Reprogramming capability in the field via laptop computer by authorized hardware/ software experts
- Laptop reprogramming: 15 minutes



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## EM2000 RETROFIT - LIFE CYCLE ADVANTAGES

- Increased MTBUS (Mean Time Between Unscheduled Shoppings)
- Provides technology to support any level of locomotive equipment and adhesion requirement
- Overall life cycle improvement and system performance can vary depending on: traction motors, alternator, engine horsepower, or operator requirements
- Elcon works with your railroad to provide train simulations predicting locomotive operation
- Dispatchable adhesion to 22% on 3000hp SD40-2 equipped with D78 traction motors, 24% with D87 motors

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