



Reduce Fuel Usage, Emissions and Noise with EMD AESS for Pre-Microprocessor Controlled Locomotives

EMD AESS™ for pre-microprocessor controlled locomotives monitors critical operating parameters during locomotive idle operation—safely and effectively shutting down the engine when all factors are satisfied, and automatically restarting the engine when any of those criteria fall outside of predetermined limits.

The system consists of three components: the Operator Interface, the Engine Protector, and the Start/Stop Controller which leverage proven product technology to enhance AESS operation and reliability. These components are installed near the devices and sensors with which they interface – reducing the amount of wiring required and simplifying installation. While each component provides its unique functionality, the overall system operation is coordinated by the Operator Interface.

The **Engine Protector** is typically installed in the AC control cabinet and replaces the function of the mechanical engine protector which is disabled when the system is installed. It also controls the governor valves, monitors the coolant temperature, and controls start-up alarms and the governor assist pump.

The **Start/Stop Controller** is typically installed in the High Voltage Cabinet and controls the various relays and contactors used in starting the locomotive as well as shedding electrical loads not required when the engine is shut down. It also monitors battery charge, throttle and reverser positions, and main reservoir pressure, and controls the engine purge function.

The **Operator Interface** is installed in the locomotive cab and coordinates the operation of the other system components. The display informs the crew of system status, provides a START and STOP button to facilitate manual starting and shut down, and during installation or maintenance it is used to configure the system parameters.

The EMD AESS provides superior fuel and lube oil savings, reducing emissions and wayside noise, while keeping the locomotive in a ready-to-use condition. It complies with the latest AAR S-5502 standard and allows for individual customization to meet railroad operating and safety requirements.

The EMD AESS reduces unnecessary idle time by more than 50% and improves locomotive fuel efficiency up to 29 gal/day for switcher use and 18 gal/day for line haul operation.

The design of the EMD AESS allows easy and flexible application to a wide variety of locomotive models. This translates directly into a lower cost for the system and provides the flexibility necessary for the entire fleet to be equipped with a standard system, reducing maintenance and crew training costs.

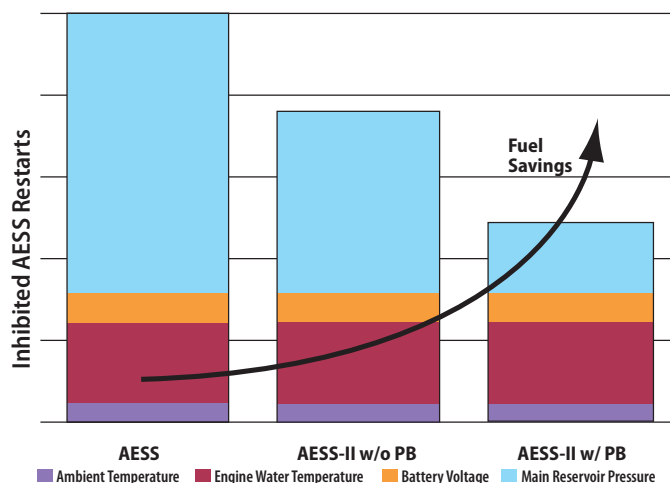
EMD AESS Savings per Locomotive

Year	AESS Net Savings-Switcher Duty Cycle	AESS Net Savings-Line Haul Duty Cycle
1	\$31,015	\$19,277
2	\$31,981	\$19,891
3	\$32,977	\$20,524
4	\$34,002	\$21,175
5	\$35,058	\$21,846
6	\$36,146	\$22,538
7	\$37,266	\$23,250
8	\$38,420	\$23,984
9	\$39,609	\$24,739
10	\$40,833	\$25,517
Total	\$357,308	\$222,740

Net savings are calculated less AESS-related maintenance – assuming a 16-645E baseline engine, \$3.00/gal fuel, and 3% inflation.

Latest AAR S-5502 AESS Standard allows fewer restarts and increases fuel savings

- **Parking Brake Applied indication**
Eliminates 50 to 75% of restarts due to main reservoir pressure.
- **Setup for isolated units in consist & lead trail pneumatic status**
Ignores request from train line and independent brakes, allowing the engine to stay shut down.
- **Elimination of speed as a start up requirement**
Allows movement of locomotives without requiring the engine to cycle.
- **Monitor main reservoir 2 as parameter**
Fewer leaks allow longer shutdown periods.



System functions and operating conditions for EMD AESS on pre-microprocessor controlled locomotives

SHUTDOWN PROCESS

SETUP CONDITIONS

- Locomotive not moving
- Operator Interface not in LOCKOUT
- Reverser centered
- Throttle in idle or low idle position

SHUTDOWN CONDITIONS

- Operator Interface set to STOP
- Engine Shutdown timer expired
- Battery recharge is complete
- Air pressure recharged
- Engine water temperature level

SHUTDOWN PREVENTION

- Operator Interface in LOCKOUT
- Ambient air temperature below configured limit
- Battery charge below configured limit
- Main reservoir pressure below configured limit

STARTUP PROCESS

STARTUP INITIATION

- Operator Interface in START
- Reverser moved from center position
- Throttle handle moved from idle position
- Ambient air temperature below configured limit
- Battery charge below configured limit
- Main reservoir pressure below configured limit

STARTUP CANCELLATION

Any one of the following signals will cancel startup when the signal occurs during the startup process.

- Set Operator Interface to STOP
- Center the reverser
- Move throttle to idle or low idle position

STARTUP PREVENTION

Any one of the following signals will inhibit the locomotive startup process.

- Operator Interface in LOCKOUT
- Locomotive not shutdown by AESS
- Number of startup retry attempts exceeds limit