

5.7 ENGINE PROTECTION

DDEC for MBE 900 and MBE 4000 engine protection system monitors all engine sensors and electronic components, and recognizes system malfunctions. If a critical fault is detected, the Amber Warning Lamp (AWL) and Red Stop Lamp (RSL) illuminate. The malfunction codes are logged into the ECM's memory.

The standard parameters which are monitored for engine protection are:

- Low coolant level
- High coolant temperature
- Low oil pressure
- High/low oil level

5.7.1 OPERATION

Engine protection is a vital part of DDEC-ECU/DDEC-VCU/ADM2 programming and software. The DDEC-ECU monitors coolant level, various pressures and temperatures, and compares these parameters against the allowable limits to determine when a critical fault is reached. The AWL is illuminated and a code logged if there is an electronic system fault. This indicates the problem should be diagnosed as soon as possible. The DDEC-VCU illuminates the AWL and RSL and stores a malfunction code if a potentially engine damaging fault is detected. Once a critical fault is reached, the AWL and RSL are illuminated and a 60 or 30 second timer starts a countdown to the desired level of protection. The AWL will flash for 20 seconds (programmable) and the RSL will flash for 10 seconds (programmable) before the engine shuts down. Temperature and pressure limits are established in the engine's calibration and may differ slightly from one engine model to another.

Engine protection consists of different protection levels:

- Warning Only
- Shutdown

Warning Only

The AWL and RSL will illuminate if a fault is detected. There is power and/or speed reduction when "Warning Only" is selected. The resulting engine protection is at the discretion of the engine operator.

NOTE:

The operator has the responsibility to take action to avoid engine damage.

Shutdown

The engine shuts down 60 seconds after the RSL is illuminated for coolant level, coolant temperature or oil level. The engine shuts down 30 seconds after the RSL is illuminated for oil pressure (see Figure 5-2). (The initial torque and/or speed which is used for reduction, is the torque and/or speed which occurred immediately prior to the fault condition.) The Stop Engine Override Switch is available to prevent engine shutdown at the operator's discretion.

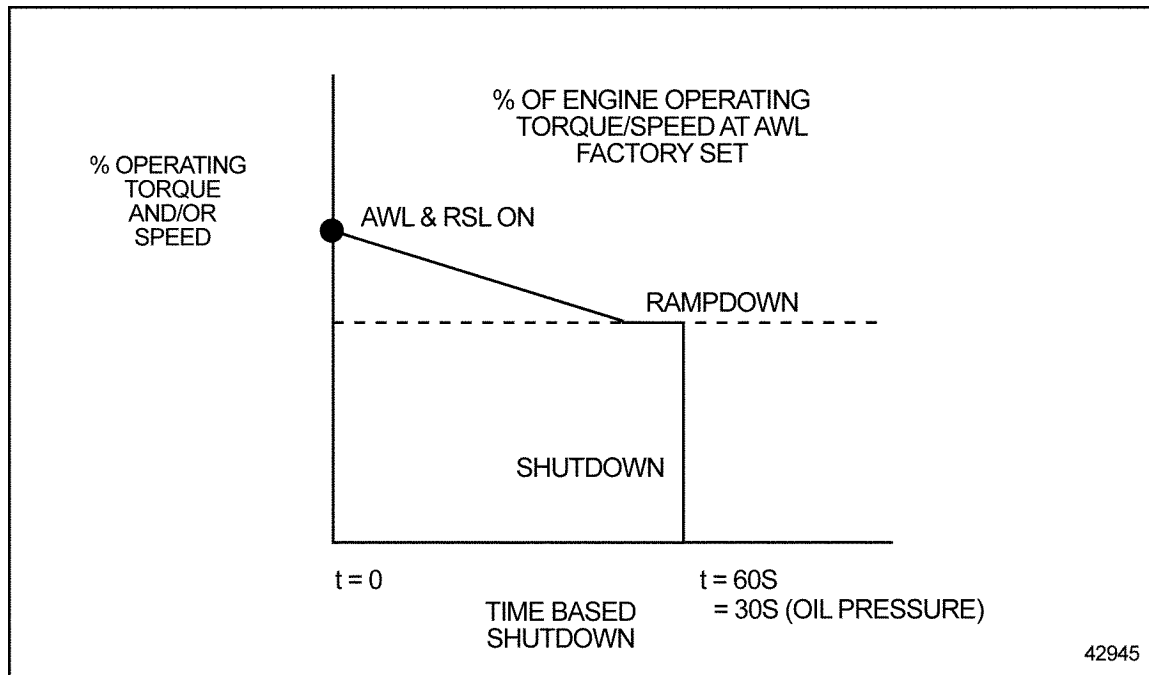


Figure 5-2 Engine Shutdown

An SEO Switch is required when this engine protection option is selected. Refer to section 5.7.3. The SEO options are available to prevent engine shutdown at the operator's discretion.

5.7.2 ENGINE OVERTEMPERATURE PROTECTION

Engine Overtemperature Protection (EOP) is additional logic programmed into the DDEC-ECU and used in conjunction with standard coolant temperature protection. When EOP is part of the engine calibration, engine torque and/or speed is reduced as a function of temperature. The AWL illuminates and a fault code is logged when the EOP calibrated temperature is reached. If the temperature does not decrease as torque/speed is reduced, the RSL will illuminate when a still higher temperature is reached.

The subsequent action taken by the DDEC-ECU depends on customer selection of one of the following:

- Warning only (see Figure 5-3)
- Rampdown/Shutdown (see Figure 5-4)

Torque reduction is based on the average torque/speed in use prior to the fault condition.

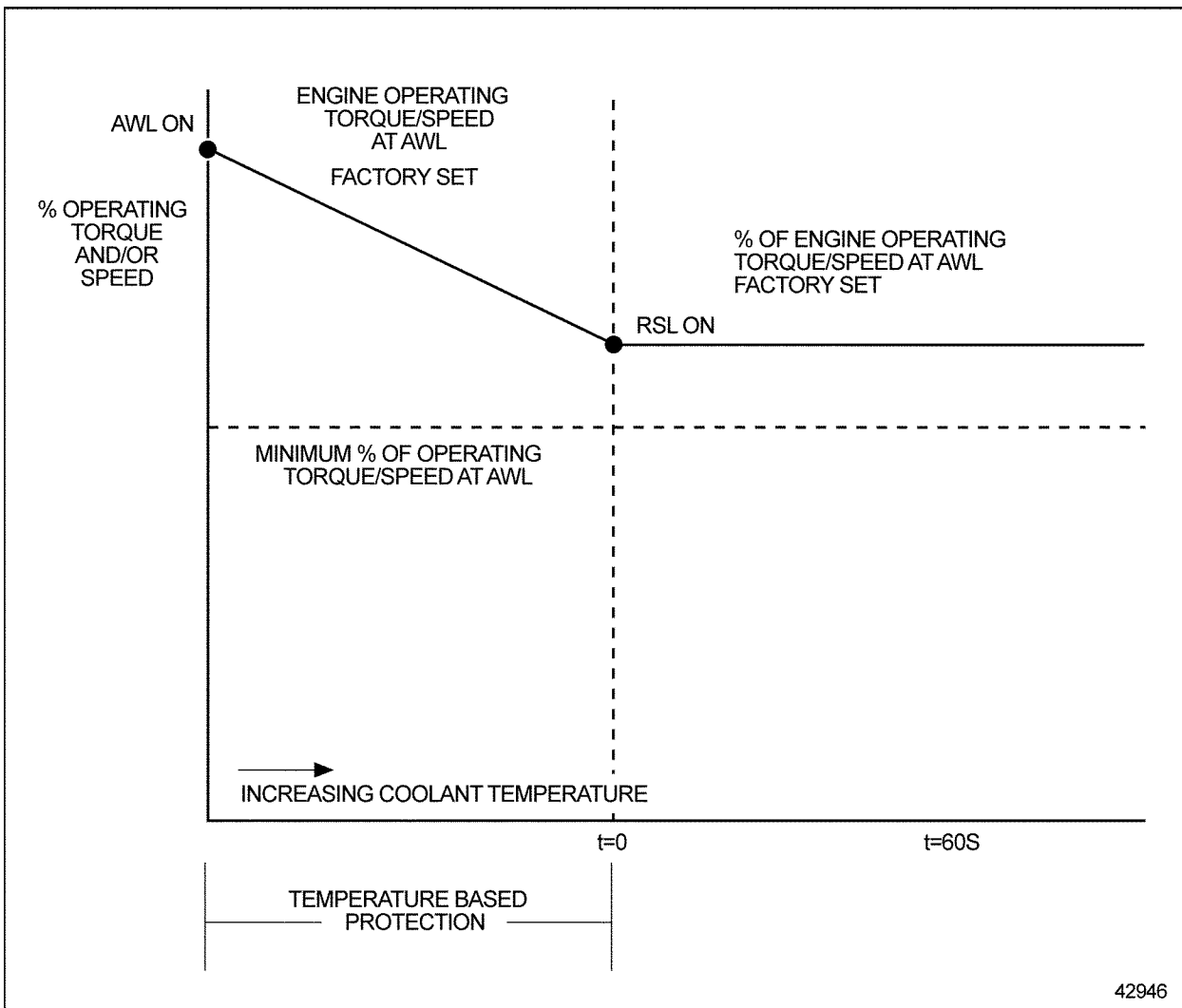


Figure 5-3 Engine Overtemperature Protection and Warning Only

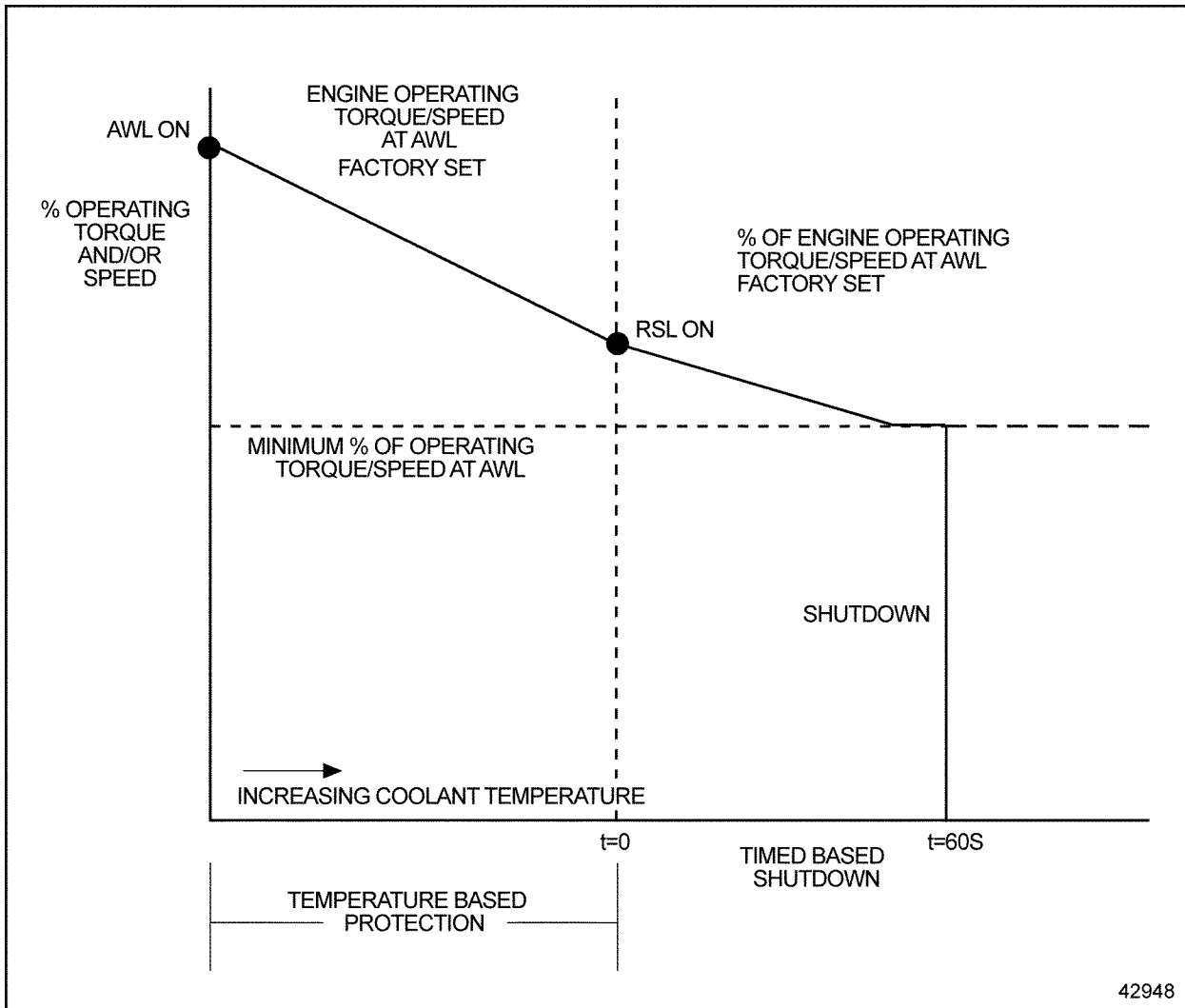


Figure 5-4 Engine Overtemperature Protection and Rampdown/Shutdown

5.7.3 STOP ENGINE OVERRIDE OPTION

The Stop Engine Override Switch is used for a momentary override. The DDEC-ECU will record the number of times the override is activated after a fault occurs. Continuous Override using the SEO switch is not available.

Momentary Override - An SEO switch is used to override the shutdown sequence (see Figure 5-5). This override resets the 60 second (30 seconds for oil pressure) shutdown timer, restoring power to the level when the RSL was illuminated. The switch must be recycled after five seconds to obtain a subsequent override. See Figure 5-6.

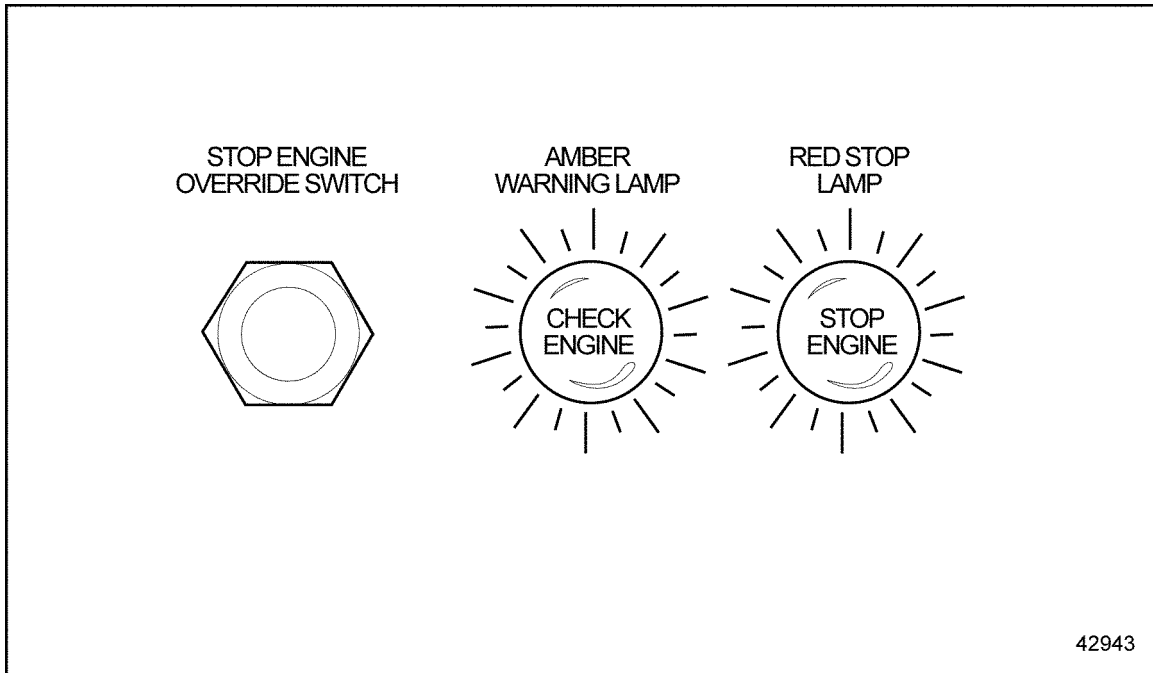


Figure 5-5 Typical SEO Switch and Warning Lamps

NOTE:

The operator has the responsibility to take action to avoid engine damage.

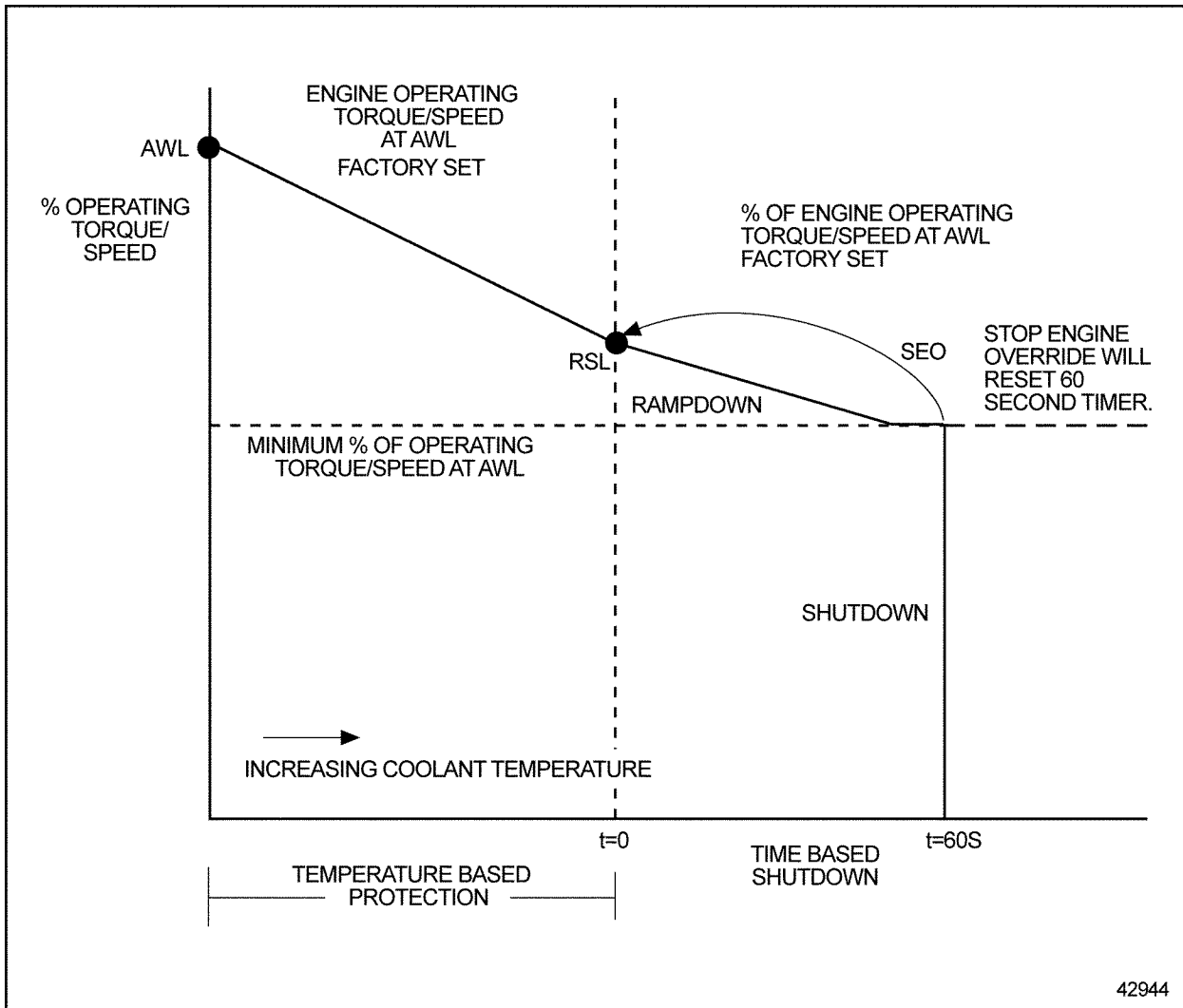


Figure 5-6 Engine Overtemperature Protection and Rampdown/Shutdown Protection with Stop Engine Override

5.7.4 PROGRAMMING FLEXIBILITY

All DDEC-ECUs are programmed with pressure, temperature, and level protection limits. The level of protection can be one of the two engine protection features (Warning, or Rampdown/Shutdown) for each parameter monitored by the DDEC-ECU. These can be set with VEPS or minidiag2.

DDEC for MBE 900 and MBE 4000 engine protection system parameters are listed in Table 5-33 .

Parameter	Description	Choice/Range	Default	Parameter ID	Access
Enable Engine Protection Shutdown on Coolant Temperature	Enable/Disable shutdown for high coolant temperature	0 = Disable 1 = Enable	1 = Enable	1 18 01	Nexiq DDR, DDDL, DRS, VEPS, or minidiag2
Enable Engine Protection Shutdown on Coolant Level	Enable/Disable shutdown for low coolant level	0 = Disable 1 = Enable	0 = Disable	1 18 02	Nexiq DDR, DDDL, DRS, VEPS, or minidiag2
Enable Engine Protection Shutdown on Oil Pressure	Enable/Disable shutdown for low oil pressure	0 = Disable 1 = Enable	1 = Enable	1 10 03	Nexiq DDR, DDDL, DRS, VEPS, or minidiag2
Enable Engine Protection Shutdown on Oil Level	Enable/Disable shutdown for low oil level	0 = Disable 1 = Enable	1 = Enable	1 18 04	Nexiq DDR, DDDL, DRS, VEPS, or minidiag2
Engine Protection Shutdown Time		1–120 sec	60 sec	1 18 05	VEPS or minidiag2
Engine Protection Shutdown Time for Oil Pressure		3–120 sec	30 sec	1 18 06	VEPS or minidiag2
Enable Counter for Engine Protection Overrides	Holds the count of shutdown overrides that have occurred (Read Only)	0–255	0	1 18 07	VEPS, DRS or minidiag2
AWL Engine Protection Shutdown Time	Time for the AWL to flash before the shutdown occurs	3–120 sec	20 sec	1 18 08	VEPS, DRS or minidiag2
RSL Engine Protection Shutdown Time	Time for the RSL to flash before the shutdown occurs	3–120 sec	10 sec	1 18 09	VEPS, DRS or minidiag2

Table 5-33 Engine Protection

5.8 ENGINE STARTER CONTROL

MBE engine starters may be enabled by either the ignition-run key switch (KL-50) (see Figure 5-7).

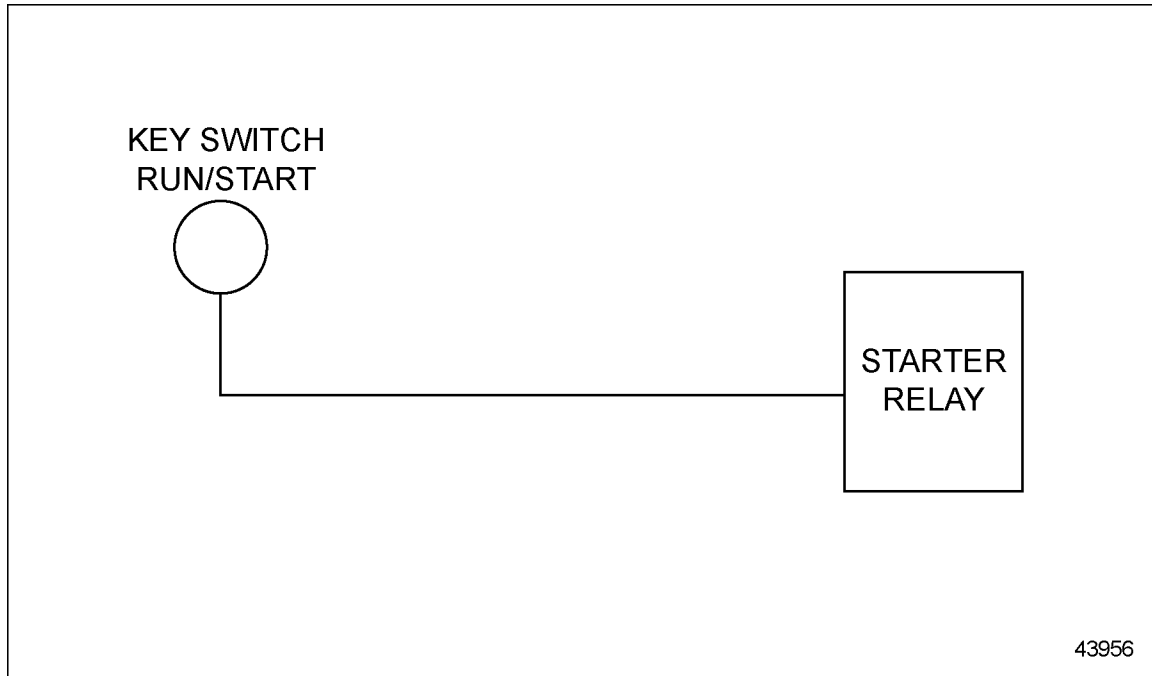


Figure 5-7 Key Switch - Controlled Starter

NOTE:

Direct starter control by the ignition key switch is only configuration used in North America.

5.8.1 PROGRAMMING REQUIREMENTS AND FLEXIBILITY

The Engine Starter Control settings are listed in Table 5-34.

Parameter	Settings	Default	Parameter ID DDEC-ECU Software 53	Parameter ID DDEC-ECU Software 56
Starter Type (JE / KB)	0 = Starter activated via DDEC-ECU 1 = Starter activated via key switch	0	0 06 09	0 01 03

Table 5-34 Engine Starter Control Settings

NOTE:

If the parameter is set for DDEC-ECU Starter Control and the starter is wired for Key Switch control, the engine will crank but will not start.