7   TOOLS

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7.1   DIAGNOSTIC REQUEST SWITCH

The Diagnostic Request Switch is used to activate the CEL/SEL lights to flash codes. Active codes are flashed on the SEL and inactive codes are flashed on the CEL (see Figure 7-1). Inactive codes are flashed in numerical order, active codes are flashed in the order received, most recent to least recent. The Diagnostic Request Switch can be used as the SEO switch also. The codes are flashed out of the ECM connected to the switch.
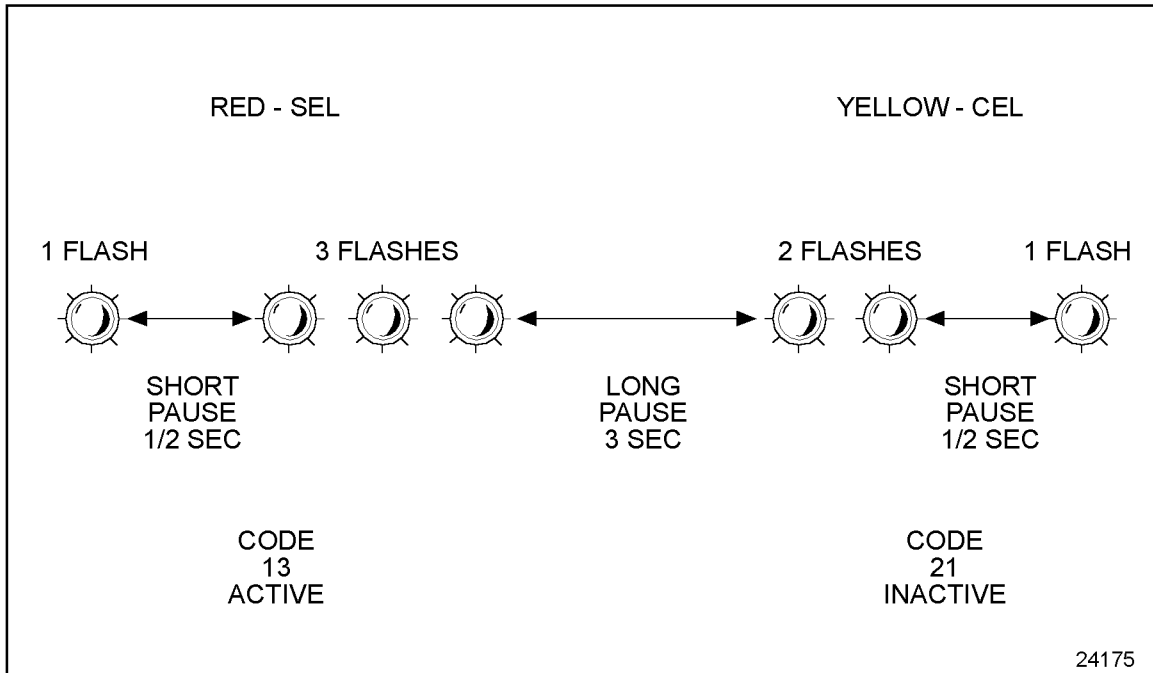
RED - SEL   YELLOW - CEL

1 FLASH   3 FLASHES   2 FLASHES   1 FLASH

SHORT   LONG   SHORT
PAUSE   PAUSE   PAUSE
1/2 SEC   3 SEC   1/2 SEC

CODE   CODE
13   21
ACTIVE   INACTIVE

24175

Figure 7-1   Flash Codes

NOTE:
For multi-ECM installations, the Diagnostic Request Switch and SEO are combined on the master ECM. All receiver ECMs have a separate Diagnostic Request Switch.

The Diagnostic Request Switch is used to flash codes in the following circumstances:

☐   The engine is not running and ignition is on

☐   The engine is idling and not in an "engine protection" condition

In both circumstances activating and holding the Diagnostic Request Switch will flash out the diagnostic codes. For additional information, refer to section 5.4, "Diagnostics."

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7.2   VEHICLE ELECTRONIC PROGRAMMING SYSTEM

The purpose of the DDEC Vehicle Electronics Programming System (VEPS) is to give OEMs the ability to configure many ECM parameters. This allows DDEC features to be tailored to the specific customer requirements when the vehicle is assembled. Some of the features which may be configured by VEPS are the transmission type, cruise control, vehicle speed limit, idle shutdown, rating switches, digital inputs, and digital outputs.

7.2.1   SOFTWARE

The VEPS PC software package consists of the several files which are extracted when the software installation program is executed. A System Users Manual which defines the available parameters is included with the software package at the time of purchase.

The PC interface utilizes a communications driver which is defined in the TMC Recommended Practice RP1210A. The RP1210A software is used to translate the datalink signal of the ECM to the format required by Windows programs. The RP1210A communications driver is included as part of the VEPS software package.

7.2.2   HARDWARE

The hardware portion of the VEPS programming package includes the interface module and cables. The components that are included in the package are listed in Table 7-1.

Part Description	Part Number
100 Foot Cable	23512893
SAE J1708 6-Pin Dash Connector	23515957
J1708/RS-232 Translator Box	23512415
6 foot Cable	23515869

Table 7-1   VEPS Hardware

A cable kit, listed in Table 7-2, is also available.

Part Description	Part Number
Cable Kit (includes the 100 foot cable and the 6-pin dash connector)	23512980

Table 7-2   VEPS Cable Kit

A translator and cable kit, listed in Table 7-3, is also available.

Part Description	Part Number
Translator Kit (includes the J1708/RS-232 translator box, 100 foot cable and the 6-pin dash connector)	23512895

Table 7-3   VEPS Translator and Cable Kit

The VEPS software kit, listed in Table 7-4, is available.

Part Description	Part Number
Software Kit (includes the RP1202 Software and the VEPS Software)	Contact DDC Application Engineering

Table 7-4   VEPS Software Kit

7.3   DIAGNOSTIC DATA READER

The hand-held DDR plugs into the Diagnostic Data Link Connector located in the Vehicle Interface Harness (refer to section 3.10.4). This connection allows the DDR to receive data from the ECM. The DDR is used to display:

☐ Engine Description via the ENGINE DATA LIST menu

☐ Codes via the DIAGNOSTIC CODES menu

☐ View/reprogram certain operating parameters

A printout of the information displayed on the DDR can be obtained by attaching a printer.

NOTE:
Suite 8 is required for Rel 33.0 software and later.

7.3.1   REQUIREMENTS

The components and part numbers are listed in Table 7-5. Also see Figure 7-2.

Component	Part Number
Pro-Link Plus with Case	108004
Multi Protocol Cartridge (MPC)	208040
Detroit Diesel Application Suite 8 PC Card, DDEC III/IV	802015
Detroit Diesel MPC PCMCIA Manual	901012
Power and Data Cable (2 pc)	501002
Data Cable Only	501003
Power Cable Only	501004
PC Terminal Cable 8 ft	501005
6–pin Deutsch Adapter w/Atart End	408024
9–pin Deutsch Adapter w/Atari End	408028
6–pin and 9–pin Deutsch Adapter w/Atari End	408048
Storage Case	217003

Table 7-5   Diagnostic Data Reader/Pro-Link® Components and Part Numbers

Pro-Link® is a registered trademark of Micro Processor Systems, Inc.

NOTE:
Printers used in Europe must use a European power supply as listed in Table 7-6. Do not substitute an AC adapter for the European power supply.

Component	Part Number
Pro-Link Printer with Serial Adapter & AC Adapter	178001
Pro-Link Printer with 220–240 V Euro Adapter	171007
Printer AC Adapter	178003
Thermal Paper — 5 rolls	171002
Printer Battery Pack	178004
Euro Power Supply Only	400058

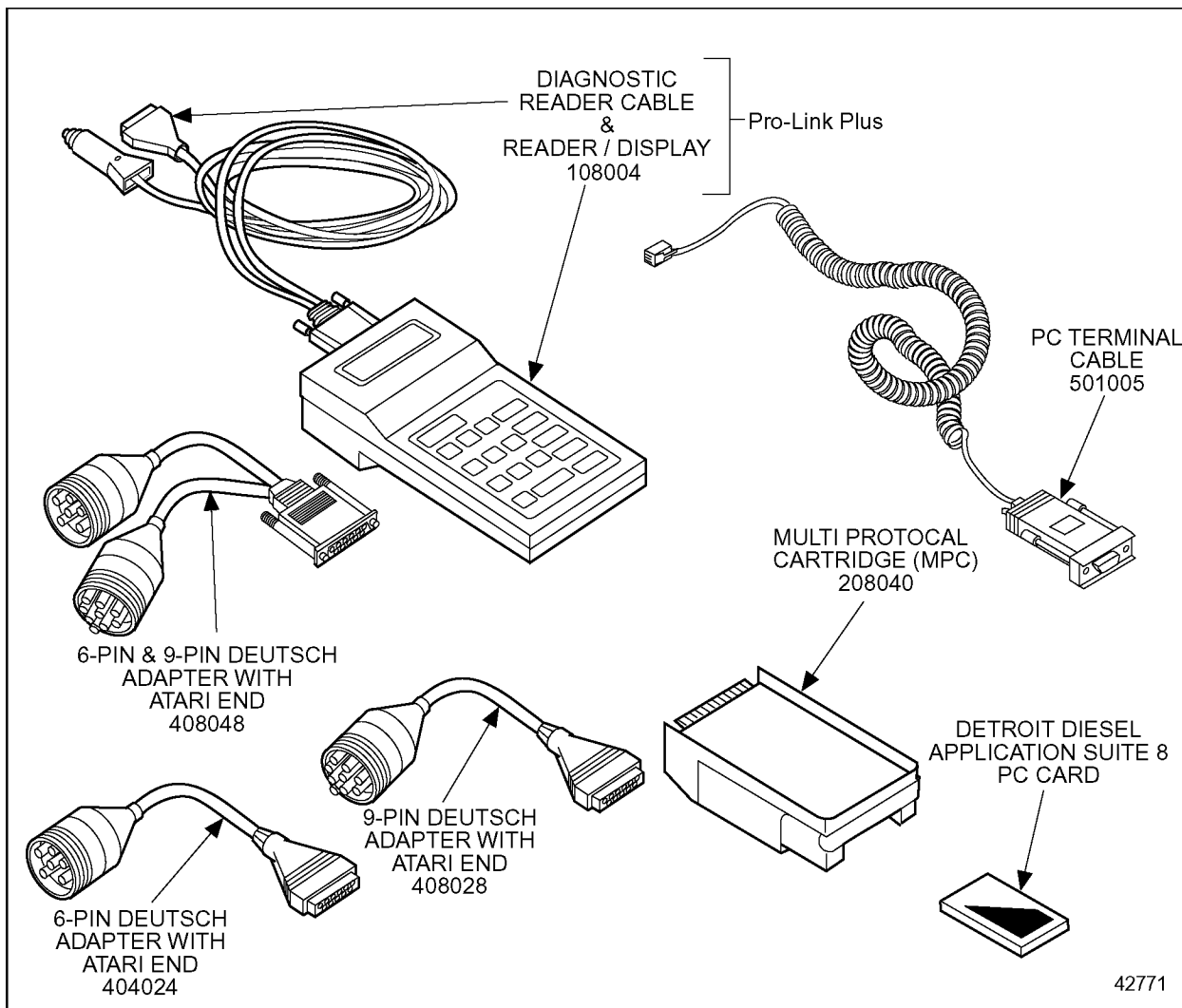**Table 7-6   DDR/Pro-Link® Printers and Power Supply**

Figure 7-2   Pro-Link Plus/Diagnostic Data Reader Components

⚠️ **CAUTION:**

To avoid injury from loss of vehicle/vessel control, the operator of a DDEC equipped engine must not attempt to use or read the Diagnostic Data Reader when the vehicle/vessel is moving.

The DDR can be purchased from:

Nexiq Technologies
Phone: 1-800-639-6774
www.nexiq.com

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7.4   DETROIT DIESEL DIAGNOSTIC LINK

The Detroit Diesel Diagnostic Link® (DDDL)is a sophisticated PC software package supporting the setting up, maintenance and repair of engines using the DDEC IV ECM. For additional information, refer to the on-line Help within the program.

7.4.1   CALIBRATION

You can use the DDDL to:

☐ Read and display the current calibration from an ECM.

☐ Create a calibration for the ECM on an individual engine.

☐ Save a single calibration with an ECM password so that the same calibration can be used conveniently for a fleet of vehicles with the same password, or can be used by a technician who does not have access to the password.

☐ Change the engine rating of a vehicle.

☐ Set the injector calibration when you replace the injectors.

☐ View an audit trail of ECM and injector calibration changes.

7.4.2   DIAGNOSTICS AND MAINTENANCE

You can use the Detroit Diesel Diagnostic Link to:

☐ Monitor a wide range of parameters while connected live to the ECM .

☐ Select a group of these parameters and plot how they have varied over the last two minutes.

☐ Take and save a snapshot of how the parameters vary over a period of time, so that you can replay the snapshot for detailed analysis.

☐ Monitor fault codes as they occur while connected live to the ECM. You can also clear any inactive fault codes stored in the ECM.

☐ Take a snapshot recording the fault codes occurring over a period of time, and relate their occurrence to the values of measurements made by the ECM.

☐ Test for the effect on performance of cutting out individual cylinders.

☐ View a record of the injector timings.

☐ Set the ECM output functions to particular values to support troubleshooting.

☐ Display specific troubleshooting help for any fault codes that occur, or have occurred.

☐ View engine and trip totals, and reset the trip counters in the ECM.

☐ Reset the ECM counters monitoring component usage when you replace the components.

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7.5   DDEC REPROGRAMMING SYSTEM

The DDEC Reprogramming System (DRS) is composed of Programming Software, DDECcomm Mainframe Communications software, all the hardware required to connect a Personal Computer to the ECM, and a user manual explaining the use of the software. The DRS software is used to reprogram calibrations, modify customer calibration values, upgrade ECM software versions, update injector calibration codes, and program blank ECMs. The DDECcomm software is used to communicate via modem to the DDC Mainframe computer which stores all the DDEC Calibrations.

7.5.1   REQUIREMENTS

The DRS and DDECcomm software require a Personal Computer which meets certain minimum requirements. These minimum requirements include a pentium microprocessor with 16 MB of RAM, a modem, and the Windows 95 Operating System. DDC also sells kits which include a Laptop PC, please contact your Detroit Diesel representative for current Laptop specifications.

7.5.2   DRS WELCOME SCREEN

There are several choices on the Welcome Screen. The following sections describe these menu options.

Program ECM

Reprogram ECMs with a customer calibration that has previously been downloaded from the DDC mainframe computer. The customer configurable parameters are retained through this type of a reprogramming.

Program Fleet ECM

Reprogram fleet units from a single customer calibration that has previously been downloaded from the DDC mainframe computer. The customer configurable parameters are retained through this type of a reprogramming.

Program ECM With Mainframe Data

Reprogram ECMs with a customer calibration that has previously been downloaded from the DDC mainframe computer. Unlike the standard Program ECM option, this option will overwrite the customer configurable parameters, resulting in a calibration exactly like the one created by the factory.

Display Customer Calibration

Displays electronic parameter settings currently programmed in an ECM.

Update Calibration at DDC

This function is used to store the ECM's electronic parameters on the PC. After performing this option, the Upload History function in the DDEC Mainframe Communications Program (DDECcomm) can be used to send the ECM data to the DDC mainframe computer.

Engine Configuration Data

Displays engine and ECM data information.

Update Customer Calibration

Similar to the Display Customer Calibration option, this option allows the electronic parameters to be updated. A customer password is required to perform this function. The following groups of information, listed in Table 7-7, can be modified.

Parameters That Can Be Updated		
Air Compressor	Output Config	VSG Configuration
Auto Cruise Resume	Idle Adjustment	Vehicle Number
CLS Polarity	Idle Shutdown	Function Lockout
Cruise Control	Rating	Lockout Password
Cruise Switch VSG	Rating Receiver #1	Fan Timer
Customer Password	Rating Receiver #2	Engine Brakes
Droop	Rating Password	ESS Config
Dynamic Braking	Progressive Shift	Half Engine Idle
Engine Protection	Transmission	TOP 2 Switch
Receiver Protection	Vehicle Spd Limiting	Fuel Quality Factor
Pressure Sensor Governor	Vehicle Spd Sensor	Low Gear Torque Limiting
Fuel Econ Incentive	Vehicle ID Number	Sensor Configuration
Input Config	Smart Cruise	Governor Gain
PasSmart	Maintenance Alert System	Engine Overspeed
Data Pages / DDEC Data	—	—

Table 7-7   Parameters that can be Updated with the Update Customer Calibration Option

Update Injector Calibration

This option displays a graphical representation of the engine allowing the injector calibration code to be updated. An injector password is required.

Update ECM Accumulators

Update ECM with engine data such as idle hours, engine hours, cruise hours, miles, etc.

DDC Mainframe Communications

This option is used to select DDECcomm to communicate with the server.

Print ECM Parameters

This menu item queries the ECM for the Customer Calibration information and formats it into a report which can be printed out on a printer attached to the parallel port on the computer.

7.5.3   DRS MENU OPTIONS

Other functions available from the pull-down menu at the top of the screen are listed below.

Upgrade ECM Software

New versions of DDEC ECM software may be programmed into customer's ECMs with this option. There is a nominal charge each time this function is performed.

Reset Customer Calibration

Same function as update customer calibration.

Change Passwords

Allows changes to the customer, group lockout, or rating password.

Random Customer Password

This option creates a random customer calibration password.

Random Rating Password

This option creates a random rating password.

Random Lockout Password

This option creates a random lockout password.

Display Available ECM S/W Versions

Displays ECM software versions that are available on the PC. These versions are used to electronically upgrade ECM software for DDEC III and IV.

Display Station Log File

Displays a file containing system usage information.

Display Downloaded Units

This menu item displays the Unit Numbers of the engines which have been downloaded from the mainframe and are available for programming.

Comms Setting

This option allows changes to the comms protocol, interface hardware being used, and the baud rate.

Options

This option allows entry of the application ID for connecting to the DDC server.

7.5.4   DDECCOMM

DDECcomm is a Win95 program which can be invoked by selecting the DDEC Server Interface icon on the Windows desktop or through the Start button via Programs | DDEC Electronic Controls | DDEC Communications. The following menu options are available in this program.

Download Engine Serial Calibration(s)

This option is used to download any changed or desired unit calibrations from the DDC mainframe computer. These calibrations are stored on the PC for a maximum of 14 days, after that period they are automatically deleted.

Download Fleet Calibration(s)

This option allows the download of a single "fleet" unit from the mainframe to the PC. This "fleet" unit calibration may be used to program multiple units in a fleet via the Program Fleet ECM option discussed above.

Upload History

This option takes the programming history on the PC and uploads it to the DDC mainframe. This allows DDC to maintain a current image of the calibration status should further service be required. The history file must first be created by running the Update Calibration at DDC menu option in the DRS Programming Software.

Display Available ECM S/W Versions

Displays ECM software versions that are available on the PC. These versions are used to electronically upgrade ECM software for DDEC III and IV.

Display Station Log File

Displays a file containing system usage information.

Display Downloaded Units

This menu item displays the Unit Numbers of the engines which have been downloaded from the mainframe and are available for programming.

Update Logon Parameters

This option is used to configure mainframe logon and network settings. All user information may be updated when this option is selected.

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7.6   DDEC ENGINE PROTECTION SIMULATION KIT

The DDEC Engine Protection Simulation Kit is used to reduce diagnostic troubleshooting time for DDEC sensors. The normal use for these false sensors is to simulate an engine fault that would result in the engine protection system triggering a code in the DDEC ECM. This kit can also be used for testing and verification of the engine shutdown system, fan control outputs, and coolant level outputs. This will also be useful in simulating an engine protection fault to show customers how the DDEC protection system will react in the event of a failure that would normally cause damage to the engine.

To use, plug the simulator into the connector currently used for the appropriate sensor. Start and run the engine and DDEC will trigger the appropriate code for that fault.

The DDEC Engine Protection Simulation Kit components and part numbers are listed in Table 7-8.

Component	Part Number
Coolant Low Level Simulator	23524785
High Oil/Coolant Temperature Simulator	23524787
Low Oil Pressure Simulator	23524786

Table 7-8   DDEC Engine Protection Simulation Kit, P/N: 23526923

The High Crankcase Pressure Simulator (P/N: 23524784) is for the Series 4000 only and is not included in kit.

7.6.1   COOLANT LEVEL LOW SIMULATOR

This simulator is preset to advise the ECM that the coolant is low. Use only for DDEC III or IV. This simulator can be used to:

☐ Verify protection function.

☐ Test low coolant level light output to ensure it is configured to the correct output and correct polarity (activates the output).

☐ Determine if the actual sensor is bad/shorted. A bad/shorted CLS can result in other fault codes.

7.6.2   HIGH OIL/COOLANT TEMPERATURE SIMULATOR

This simulator is preset to provide a 250°F (121°C) signal to the ECM. Use for any DDEC. This simulator can be used to:

☐ Test coolant temperature shutdown logic/protection.

☐ Test oil temperature shutdown logic/protection.

☐ Test coolant temperature high output.

☐ Test oil temperature high output.

☐ Fake coolant temperature high to test fan control circuit.

☐   Fake oil temperature high to test fan control circuit.

7.6.3   LOW OIL PRESSURE SIMULATOR

This simulator is preset to provide oil pressure signal of 0 psi (0 kPa). This simulator can
be used to:

☐   Provide a known pressure (oil pressure) for engine protection testing.

☐   Provide a known pressure (fuel pressure) for fault code testing.

☐   Provide a known pressure (coolant pressure) for engine protection testing.

☐   Verify if correct output is configured for low oil pressure (activates the output).

☐   Test current OPS to determine if a shorted sensor is causing other codes.

☐   Test current FPS to determine if a shorted sensor is causing other codes.

☐   Test current CPS to determine if a shorted sensor is causing other codes.

7.6.4   HIGH CRANKCASE PRESSURE SIMULATOR (SERIES 4000 ONLY)

The High Crankcase Pressure Simulator (P/N: 23524784) is not included in the kit. This simulator
is preset to provide a crankcase pressure signal of 12 psi / 83 kPa.

7.7   DDEC MANUALS

The following DDC manuals provide more information about troubleshooting and specific DDEC features:

☐ *Construction & Industrial EDM and AIM Installation and Troubleshooting* (7SA801)

☐ *Construction & Industrial EDM and AIM User Manual* (6SE710)

☐ *ProDriver DC User Manual*(6SE703)

☐ *Electronic Fire Commander Installation and Troubleshooting* (6SE476)

☐ *Optimized Idle - DDEC III/IV - Installation and Troubleshooting* (7SA741)

☐ *DDEC III/IV Single ECM Troubleshooting (6SE497)*

☐ *IRIS User and Installation Guide*(6SE0036)

☐ *Ether Start Installation (7SA727)*

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