

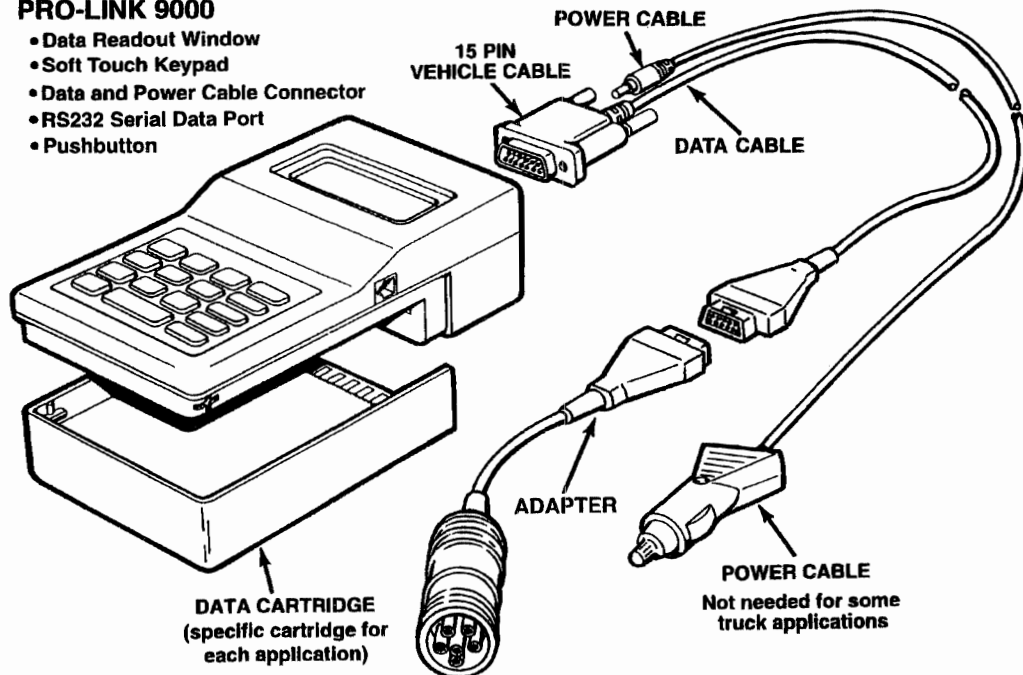
DIAGNOSTIC TOOLS

Section 5.1
Page 1

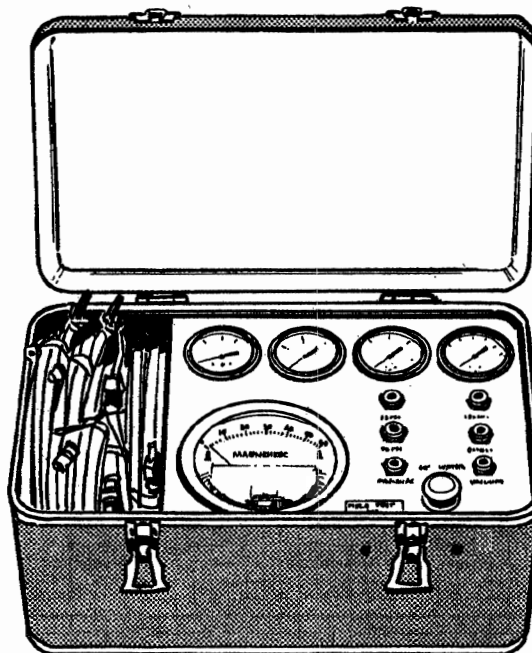
LISTED AND ILLUSTRATED IN THIS SECTION ARE THE NECESSARY DIAGNOSTIC TOOLS
REQUIRED TO PERFORM ACCURATE DIAGNOSTICS

PRO-LINK 9000

- Data Readout Window
- Soft Touch Keypad
- Data and Power Cable Connector
- RS232 Serial Data Port
- Pushbutton



PRO-LINK 9000
(ZTSE-43661)



CG-12449

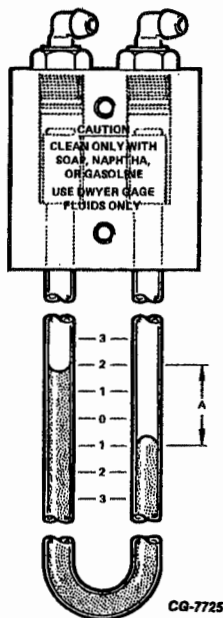
PRESSURE TEST KIT MODEL D-200
(ZTSE-2239)

EGES-125-1

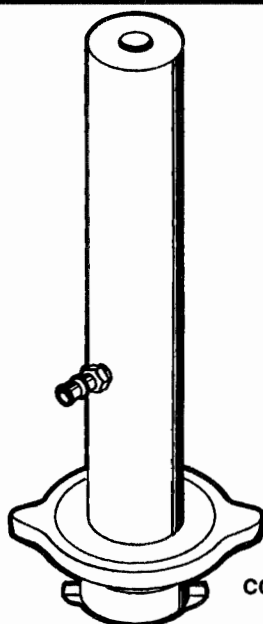
Printed in the United States of America

DIAGNOSTIC TOOLS

TOOLS (Continued)



SLACK TUBE MANOMETER
DWYER NO. 1211-48

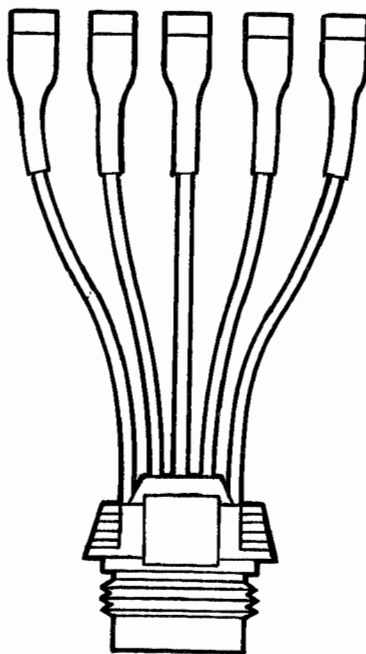


ORIFICED
RESTRICTOR TOOL
(ZTSE-4146A)

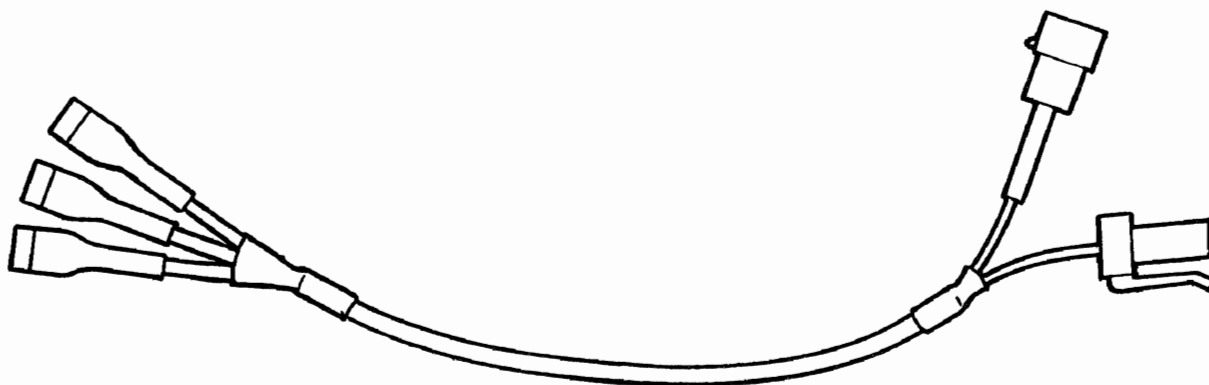


CRANKCASE
RESTRICTOR
ADAPTER
(ZTSE-4284)

TOOLS (Continued)



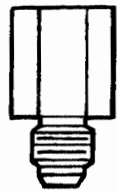
**GLOW PLUG / INJECTOR BREAKOUT
(ZTSE-4345)**



**ICP / EBP BREAKOUT "T"
(ZTSE-4347)**

DIAGNOSTIC TOOLS

TOOLS (Continued)

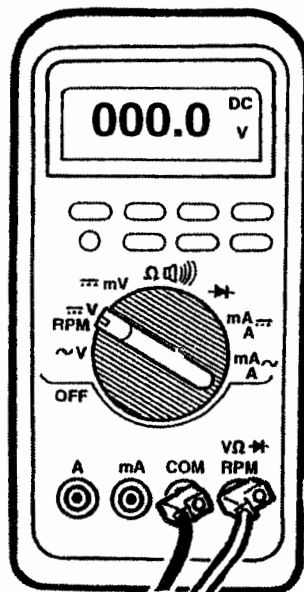


ADAPTER



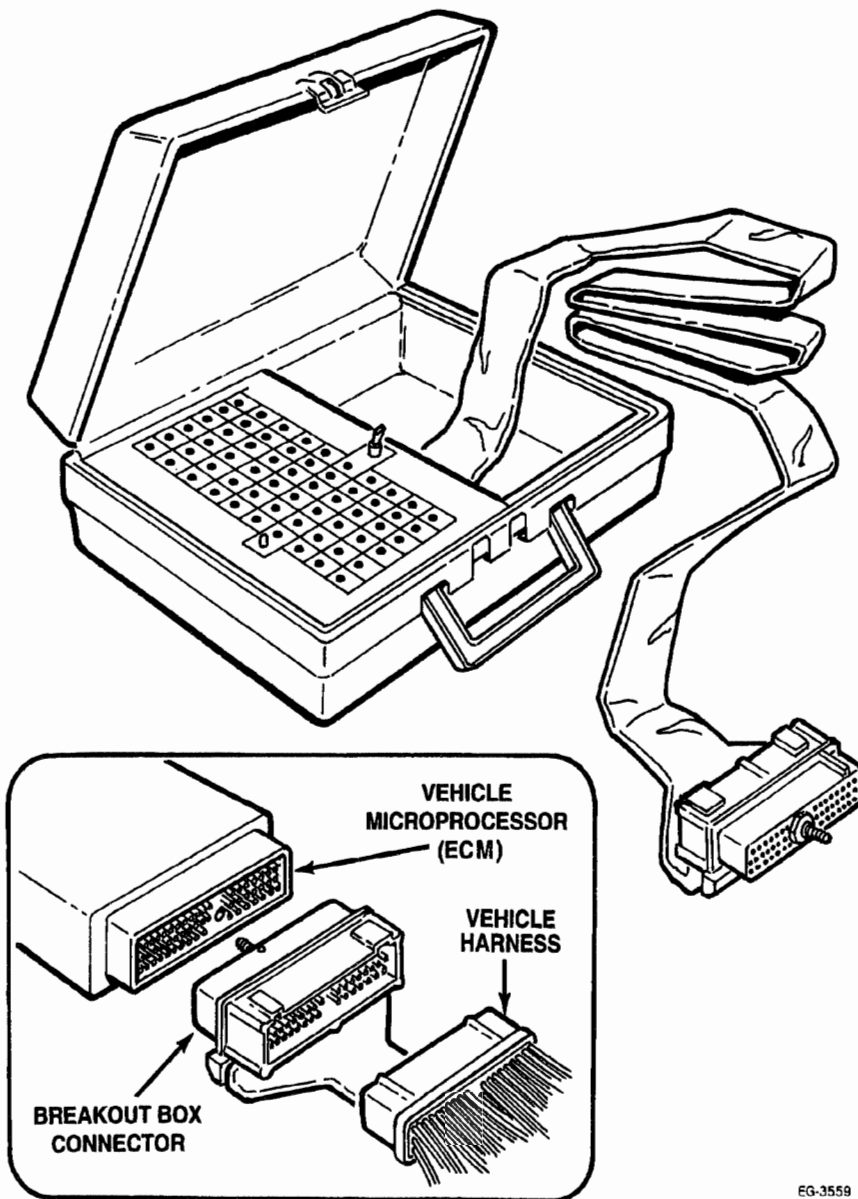
PLUG

INJECTION CONTROL PRESSURE ADAPTER/PLUG KIT
(ZTSE-4359)



FLUKE 88 DIGITAL MULTIMETER
(ZTSE-4357)

TOOLS (Continued)



EG-3559

**BREAKOUT BOX
(ZTSE-4346)**

DIAGNOSTIC TOOLS

BEYERS MODEL 200 PRESSURE TEST KIT (ZTSE-2239)

DESCRIPTION

The Pressure Test Kit (Figure 5.1-1.) can be used to measure intake manifold (Boost) pressure, fuel pressure, air cleaner restriction, fuel restriction, exhaust back pressure and crankcase pressure. It may also be used to test the accuracy of the gauges within the kit.

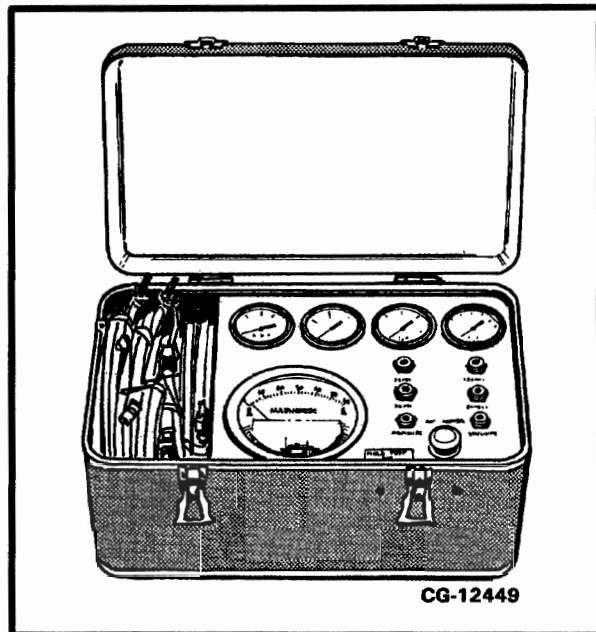


Figure 5.1-1. – Pressure Test Kit Model 200

The 0-30 psi gauge may be used to measure fuel pressure or intake manifold (Boost) pressure.

The 0-30 in. Hg. vacuum gauge (0-14.7 psi), is used to measure fuel system inlet restriction.

The 0-60 inches of water (magnehelic) gauge (0-2.16 psi), may be used to measure air cleaner restriction or crankcase pressure.



CAUTION !

THE QUICK DISCONNECTS HAVE SHUT-OFF VALVES IN THE PANEL CONNECTORS NOT IN THE PLUG. DO NOT CONNECT OR DISCONNECT LINES WHILE UNDER PRESSURE.

NOTE: When using the magnehelic gauge, be sure to plug the test line into the proper ("Pressure" or "Vacuum") port. Use the "Pressure" port to read exhaust back pressure and crankcase pressure. Use "Vacuum" port to read air cleaner restriction. In both cases, THE OPPOSITE CONNECTOR **MUST BE VENTED TO THE ATMOSPHERE** BY INSTALLING A QUICK CONNECTIVE PLUG IN THE PORT.

The 0-160 psi gauge may be used to check fuel pressure.

The 0-300 psi gauge is not normally used for any engine diagnostic check.

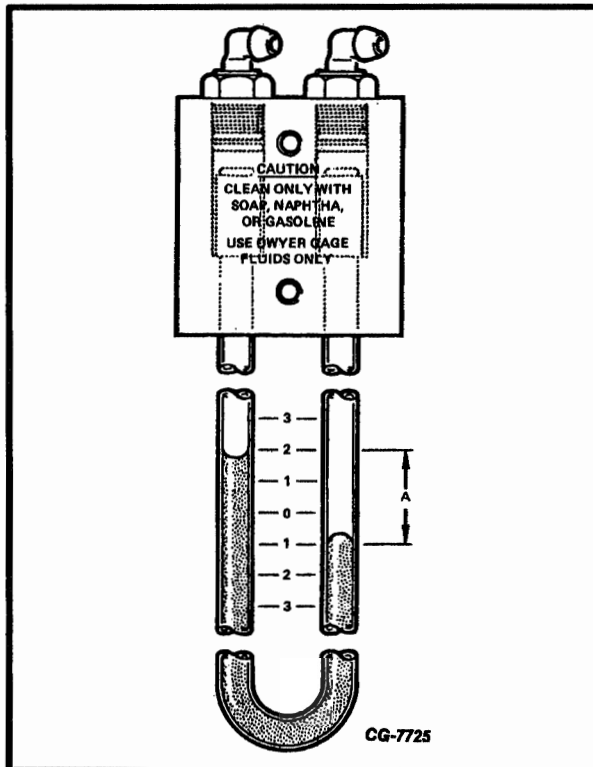
OPERATING INSTRUCTIONS

Connect tubes between the test ports on the panel and the test points shown on the (REAR SIDE) of HART START NO START AND PERFORMANCE DIAGNOSTIC FORM EGED-130-1.

DWYER SLACK TUBE MANOMETER

DESCRIPTION

The manometer (Figure 5.1-2.) is a "U" shaped tube with a scale mounted between the legs of the "U". Where the portability of the Model 200 Pressure Test Kit is not required, this manometer can be used to measure either low pressure or vacuum and may be filled with water.



**Figure 5.1-2. – Slack Tube manometer
(Dwyer No. 1211-48)
"A" Dimension Indicates Total Fluid Column**

Order from: Dwyer Instruments, Inc.
P.O. Box 373
Michigan City, Indiana 46360
Phone: (219) 872-9141

FILLING

The manometer may be filled with water, when checking very low pressures.

When filling with water, use only good drinking water without additives except for some colored water vegetable dye which enables the tester to read the scale easier. With both legs of the manometer open to the atmosphere, fill the tube until the top of the fluid column is near the zero mark on the scale. Shake the tube to eliminate any air bubbles.

IMPORTANT

NEVER USE AN ANTIFREEZE SOLUTION, SODA POP, TONIC, ETC. THE INCREASE IN DENSITY CAUSES FALSE READINGS.

INSTALLING AND READING

1. Support the manometer in a vertical position. Be sure the fluid is at the zero mark on the scale.
2. Connect one leg of the manometer to the source of the pressure or vacuum. Be sure the other leg is open to atmosphere.
3. Start the engine and when the engine is in the proper operating condition as specified, observe the manometer.
4. After about two minutes, record the average position the fluid level is above and below the zero mark. Add the two figures together. The sum of the two is the total column of fluid.

NOTE: At times both columns of the manometer will not travel the same distance. This is of no concern to the tester as long as the leg not connected to the pressure or vacuum source is open to the atmosphere.

CLEANING

1. Wash the tube thoroughly with a little pure soap and water. Avoid liquid soaps and solvents.

DIAGNOSTIC TOOLS

ORIFICED RESTRICTOR TOOL (ZTSE-4146A) and ADAPTER (ZTSE-4284)

DESCRIPTION

This Orificed Restrictor tool (ZTSE-4146A) in conjunction with the Restrictor Adapter (ZTSE-4284) (Figure 5.1-3.) are used to measure combustion gas flow out of the engine.

NOTE: ENGINE MODELS WHICH ARE EQUIPPED WITH A ROAD DRAFT TUBE DO NOT REQUIRE THE USE OF THE RESTRICTOR ADAPTER.

The Orificed Restrictor contains an integral oil fill cap which provides nearly effortless set-up when performing a crankcase pressure test on the T 444E Diesel Engine. The Model D-200 Pressure Test Kit may be used to perform the crankcase pressure test.

IMPORTANT

PRESSURE READINGS OBTAINED WITH THIS RESTRICTOR MUST NOT BE USED AS THE MAIN SOURCE OF ENGINE CONDITION. OIL CONSUMPTION TREND DATA MUST ALSO BE USED IF THE PRESSURE READINGS ARE BEYOND THE SPECIFIED LIMITS. NEITHER CHANGES IN OIL CONSUMPTION TRENDS NOR CRANKCASE DIAGNOSTIC PRESSURE TRENDS CAN ESTABLISH A SPECIFIC COMPONENT PROBLEM BUT ARE ONLY INDICATORS THAT SOME PROBLEM EXISTS.

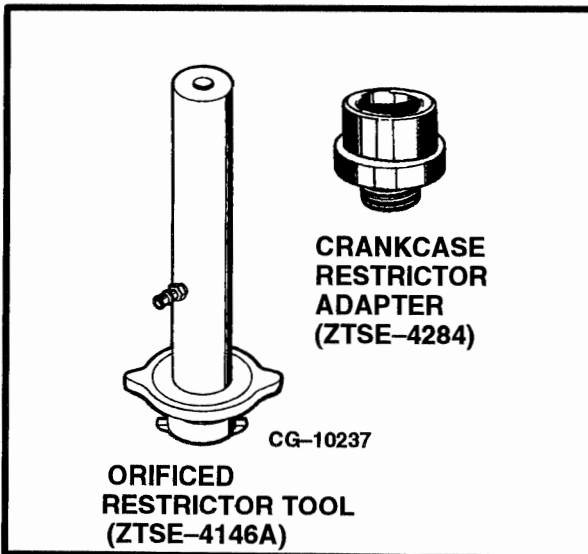


Figure 5.1-3. – Crankcase Pressure Diagnostic Tools

GLOW PLUG / INJECTOR BREAKOUT (ZTSE-4345)

DESCRIPTION

The Glow Plug / Injector breakout tool (ZTSE-4345) (Figure 5.1-4.) is used to check injector solenoid continuity and glow plug resistance to ground. Refer to Mechanical Diagnostics Section, 2.2 (Hard Start/No Start Diagnostics) for use of this tool.

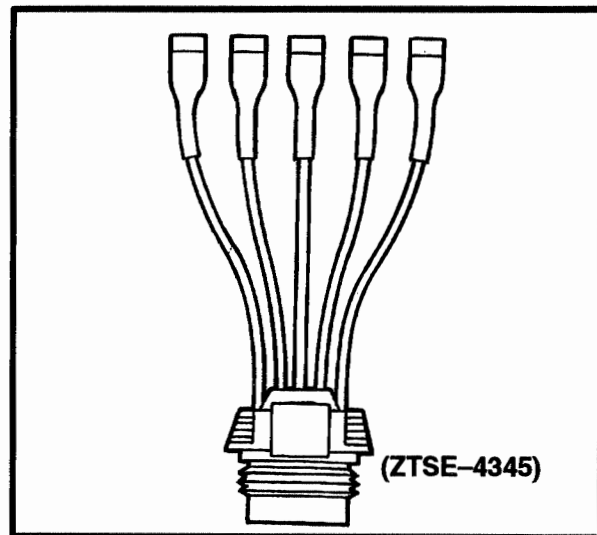


Figure 5.1-4. – Glow Plug / Injector Breakout

ICP / EBP BREAKOUT "T" (ZTSE-4347)

DESCRIPTION

ICP Injection Control Pressure / Exhaust Back Pressure Sensor Breakout "T" (ZTSE-4347) (Figure 5.1-5.) is used to gain access to Injection Control Pressure and Exhaust Back Pressure signal voltages. The "T" enables the technician to quickly connect a voltmeter to read voltage (pressure) signals at each of the sensors. Use of the "T" to measure Injection Control Pressure is shown in Hard Start/No Start Diagnostics Section 2.2. For use in measuring exhaust back pressure, refer to Performance Diagnostics Section 2.3.

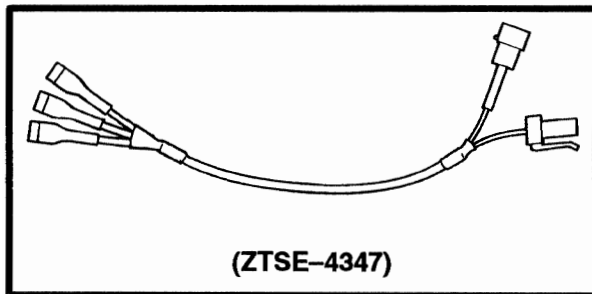


Figure 5.1-5. – ICP / EBP Breakout "T"

INJECTION CONTROL PRESSURE ADAPTER/PLUG KIT (ZTSE-4359)

DESCRIPTION

Injection Control Pressure Adapter/Plug Kit (Figure 5.1-6.) is used in performing High Pressure Leakage Tests on the Injection Control Pressure system. The adapter allows the ICP sensor to be installed in either of the high pressure oil hoses during the leakage tests. The plug is used to block off flow of oil in the high pressure hoses. Refer to High Pressure Leakage Tests in Hard Start/No Start Diagnostics Section 2.2 of this manual for proper use of this kit.

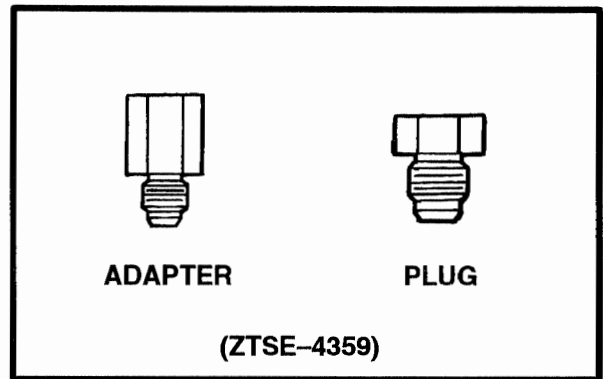


Figure 5.1-6. – ICP Adapter/Plug Kit

FLUKE 88 DIGITAL MULTIMETER (ZTSE-4357)

DESCRIPTION

The Fluke 88 multimeter (ZTSE-4357) (Figure 5.1-7.) allows the technician to troubleshoot the electrical components (sensors, injector solenoids, relays, wiring harnesses etc.) associated with the T 444E Diesel Engine. In addition, it measures engine RPM. This feature allows the technician to measure engine cranking RPM when the Electronic Service Tool (EST) is not available or is unable to receive ATA data. This meter has a high input impedance which allows testing of sensors while the engine is running, without loading the circuit which is being tested. This ensures the signal voltage measurement will not be affected by the voltmeter.

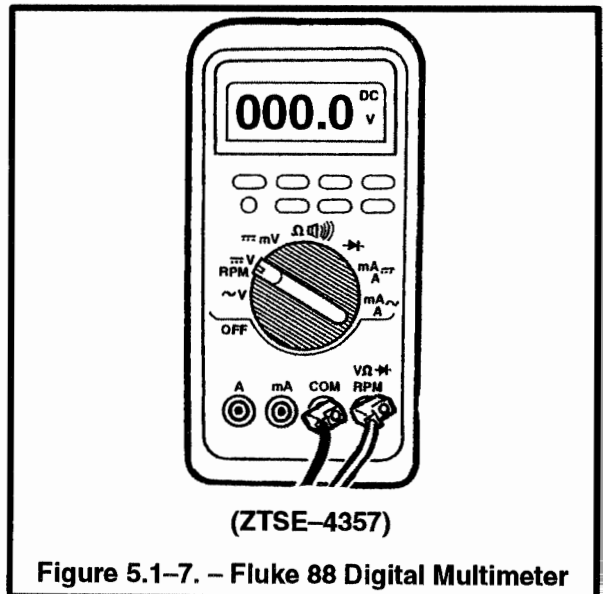


Figure 5.1-7. – Fluke 88 Digital Multimeter

DIAGNOSTIC TOOLS

BREAKOUT BOX (ZTSE-4346)

Breakout Box (ZTSE-4346) (Figure 5.1-8.) was designed to allow testing of the electronic control system components without disturbing connections or the piercing of wire insulation to gain access to the various signal voltages in the electronic control system.

BREAKOUT BOX INSTALLATION

1. Remove the weather cover at the engine cowl located on the upper driver's side of vehicle.

2. Remove the 60 way connector from the ECM. Attach the adapter of the breakout box to the ECM and secure the bolt in the center of the adapter to the ECM.
3. Reattach the 60 way connector to the adapter and secure the bolt in the center of the plug to the adapter.

Readings can now be taken at the test connections in the breakout box. The numbers at the test connections correspond to the ECM terminal numbers.

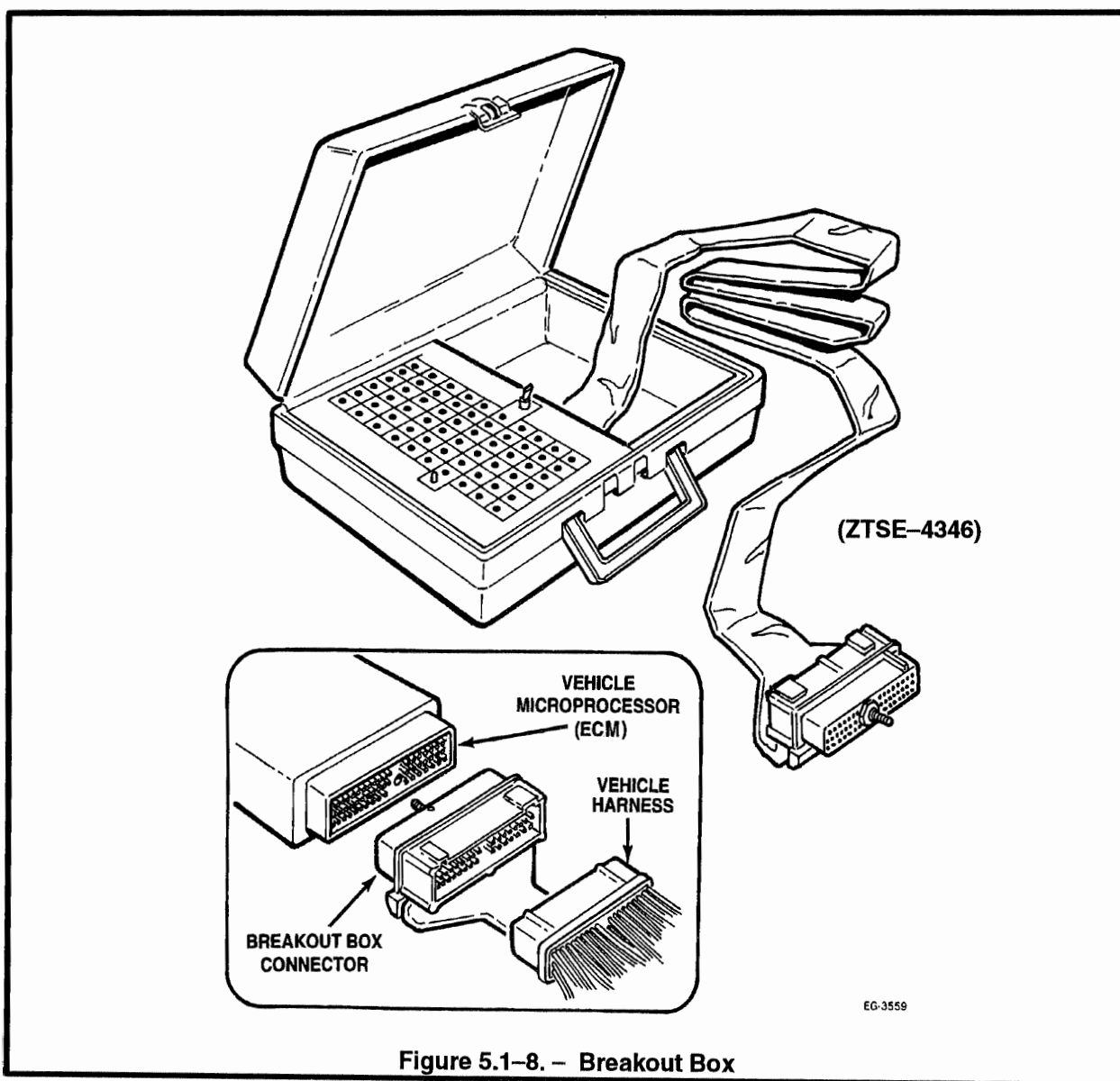


Figure 5.1-8. – Breakout Box