

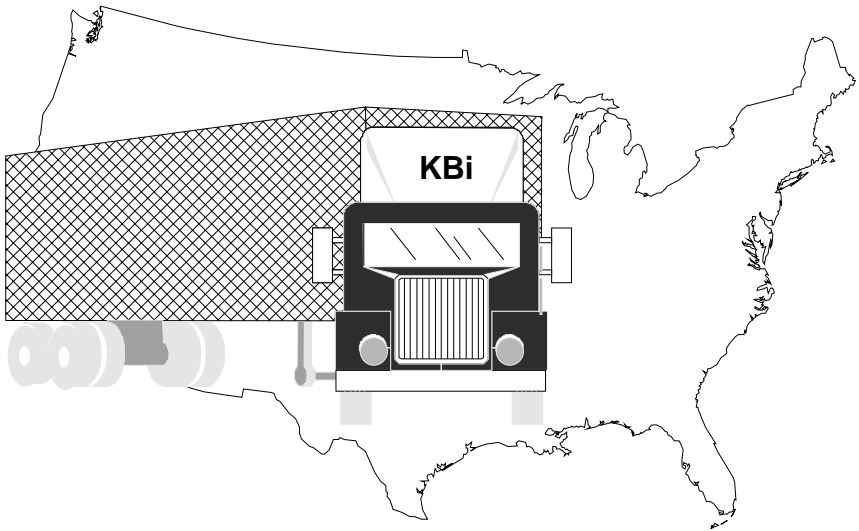


NEW AGE OF ENGINE STARTING SYSTEMS ...

DIESELMATIC® EC-II

**ELECTRONICALLY CONTROLLED
STARTING FLUID SYSTEM**

**INSTALLATION - OPERATION
MANUAL**



KBi/Kold-Ban International, Ltd.

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WARNING

Do not smoke when installing, maintaining, testing or troubleshooting a DIESELMATIC System. Make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear goggles when testing to avoid eye injury. Make sure that opening in the valve, tube, and nozzle (nozzle opening is indicated by red dot), are pointed away from yourself while testing.

The engine starting fluid used in DIESELMATIC Systems contains ethyl ether and is extremely flammable and toxic. The engine starting fluid can be harmful or fatal if swallowed. Avoid contact with skin or eyes or breathing fumes. If swallowed, DO NOT INDUCE VOMITING! Call a physician immediately.

If fluid enters the eyes or if fumes irritate the eyes, they should be washed with large quantities of clean water for 15 minutes. A physician, preferably an eye specialist, should be contacted.

Contents of cylinder are under pressure. Store in a cool dry area. Do not incinerate, puncture, or attempt to remove the cores from cylinder.

SAFETY

SAFETY AWARENESS SYMBOLS are inserted in this manual to alert you to possible SAFETY HAZARDS. Whenever you see these symbols:



OR



heed their instructions!

SAFETY AWARENESS SYMBOLS AND MEANINGS:



THIS WARNING SYMBOL IDENTIFIES SPECIAL INSTRUCTIONS OR PROCEDURES WHICH, IF NOT CORRECTLY FOLLOWED, COULD RESULT IN PERSONAL INJURY.



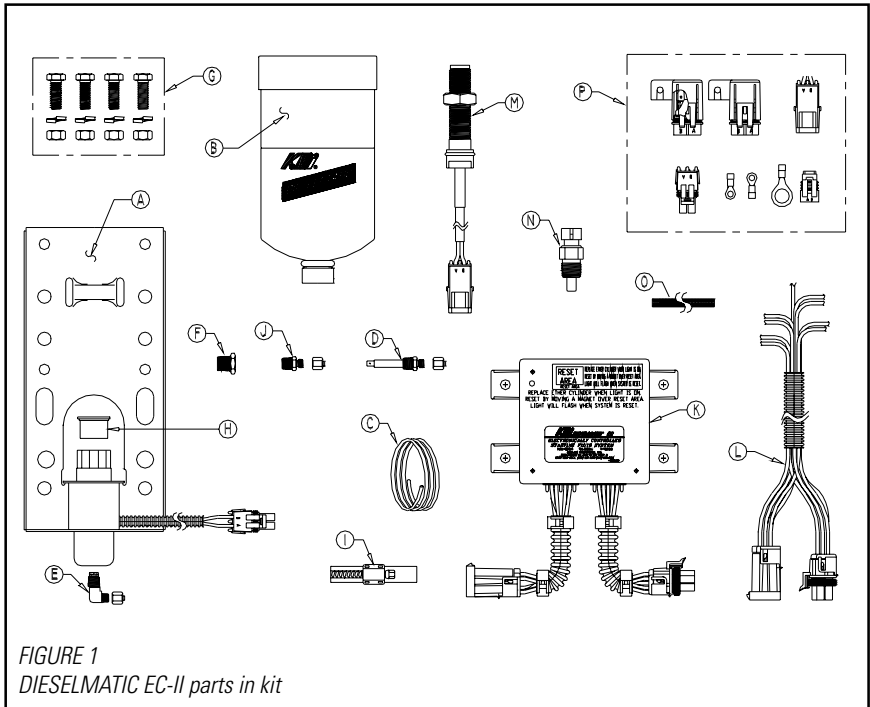
THIS CAUTION SYMBOL IDENTIFIES SPECIAL INSTRUCTIONS OR PROCEDURES WHICH, IF NOT STRICTLY OBSERVED, COULD RESULT IN DAMAGE TO EQUIPMENT.

Before installing, familiarize yourself with the parts contained in your kit. All necessary hardware for a normal installation is included. Note that you have the following items in DIESELMATIC EC-II Systems:

- | | |
|-------------------------------------|--------------------------------------|
| A. DIESELMATIC EC-II Valve Assembly | I. Cylinder Clamp |
| B. Starting Fluid Cylinder | J. Nozzle |
| C. Nylon Tubing | K. Electronic Control Unit (ECU) |
| D. Injector Nozzle | L. ECU Wiring Harness |
| E. BLOCKOR Fitting | M. Engine Speed Sensor |
| F. Reducer Bushing | N. Coolant Temperature Sensor |
| G. Mounting Hardware | O. Nylon Tubing Protective Sheathing |
| H. Valve Cap | P. Connector Kit |



Disconnect glow plugs. Indirect Injection Diesel Engines using glow plugs should have the glow plugs disconnected when using a KBI DIESELMATIC EC-II System.



INTRODUCTION

With the DIESELMATIC EC-II properly installed, you will have all of the benefits of the original KBi DIESELMATIC and more. The DIESELMATIC EC-II will:

- * Decrease initial cranking time to "first fire".
- * Eliminate additional cranking cycles on cold soaked engines.
- * Lessen engine vibration due to uneven firing, by monitoring entire warm-up period and providing starting fluid until the engine is running smoothly.
- * Help prevent dilution of engine oil from unburned fuel by reducing the time cylinders are not firing.
- * Reduce white smoke by shortening the time cylinders are not firing.
- * Indicate when the Starting Fluid Cylinder is low by activating a "Low Cylinder" light located on the ECU.
- * Totally eliminate operator error or abuse through fully-automatic controls that cannot be overridden.

KBi DIESELMATIC EC-II ELECTRONIC CONTROL UNIT SPECIFICATIONS:

Operating Temperature Range -40⁰F to 212⁰F (-40⁰C to 100⁰C)

Electronic Modules Overall Dimensions 6 1/2" X 4 3/8" X 1"

Input Power:

Nominal Voltage 12 or 24 VDC - Negative Ground

Operating Voltage Range 6 to 36 VDC

Current Draw - Maximum 15 Amperes (Momentary)

Current Draw - Nominal 12 Amperes

Spike Protection 130 V - 400MS

Standard Sensor Inputs:

..... AC 25036979 Thermistor

..... RPM Magnetic Pickup

..... Activating Input

DIESELMATIC EC-II Valve Circuit Output Switched 12 or 24 VDC, Current - 12 Amperes

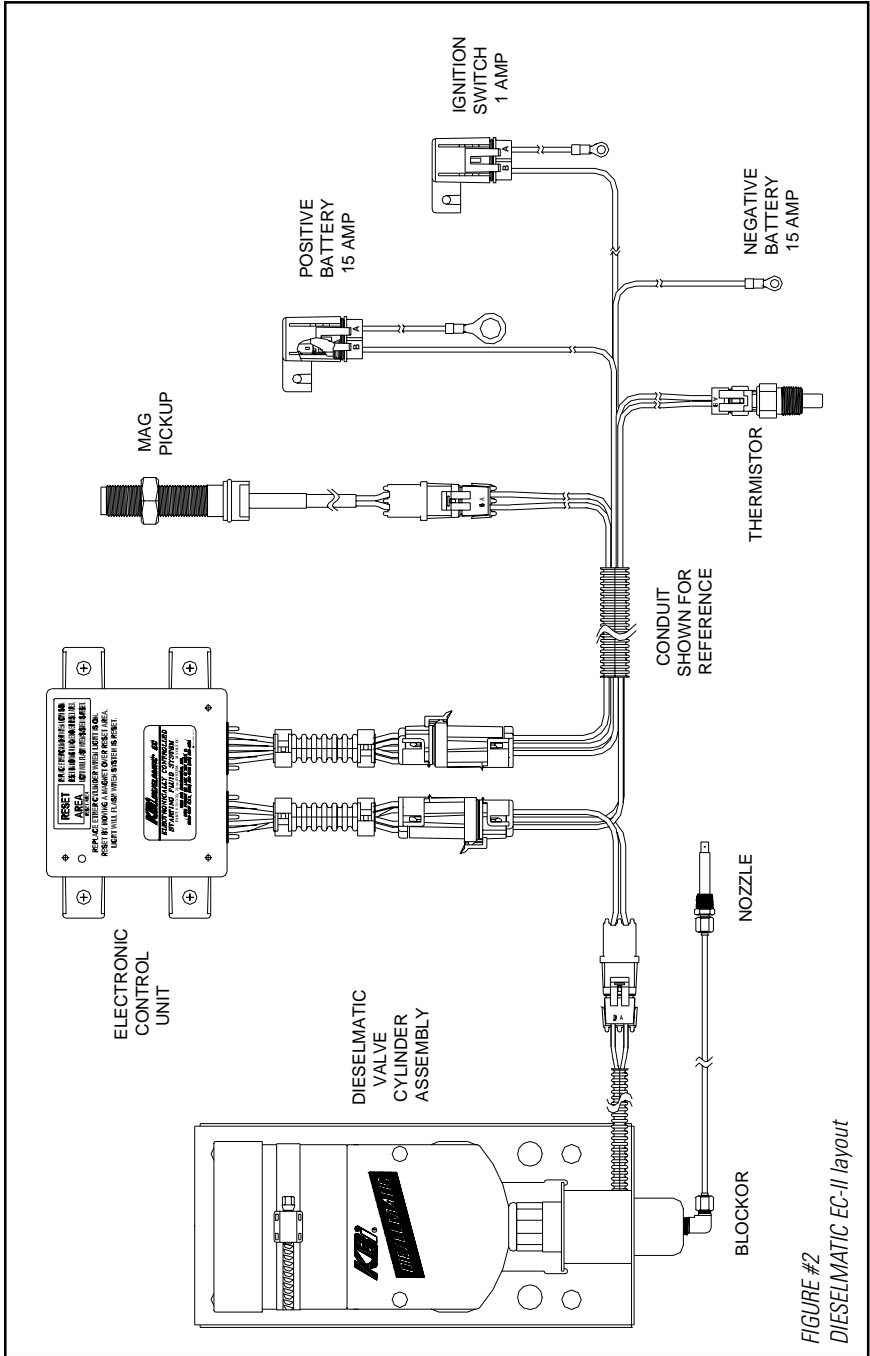


FIGURE #2
DIESELMATIC EC-II layout

ELECTRONIC CONTROL UNIT (ECU)

I. FUNCTION OF THE ECU

The DIESELMATIC EC-II will supply a predetermined flow of starting fluid to the engine as long as the Electronic Control Unit (ECU), receives inputs from the sensors determining that the engine requires starting fluid.

The three (3), parameters that determine if the engine requires starting fluid are:

- 1.) Engine Coolant Temperature.
- 2.) Engine Speed.
- 3.) A voltage source that is "live" when the engine is in the start and run mode.

All three parameters must be met before the ECU will activate the DIESELMATIC EC-II Valve. If any one input falls out of the predetermined criteria, the valve will deactivate.

All of the DIESELMATIC EC-II's input parameters have been preset and determined at the KBI factory. Contact KBI for more information on specific changes or requirements for this program.

The flow of starting fluid is determined by the size of the orifice in the DIESELMATIC EC-II BLOCKOR fitting. This flow rate has been predetermined and calibrated at the factory and is considered to be the optimum flow rate that will enable the engine to start and facilitate combustion until the engine "warms up". This flow rate should be sufficient to virtually eliminate white smoke from the engine's exhaust during the warm-up period. Certain applications may require a different flow rate or BLOCKOR fitting to totally eliminate white smoke. If your results are unsatisfactory, contact KBI for assistance.

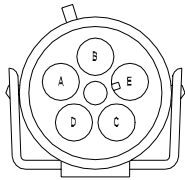
KBI has taken many precautions to ensure that under any circumstances this flow rate will maintain the most effective, yet minimal, engine starting fluid versus engine air intake ratio, that will promote combustion. Do not attempt to modify this flow rate without factory assistance.

IMPORTANT

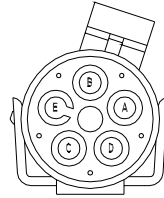
If a replacement BLOCKOR fitting is purchased, it is imperative that the replacement BLOCKOR fitting has the same part number as the original BLOCKOR fitting that was installed with the ECU. The BLOCKOR part number is a 5 digit stamped number, that can be found on the opposite side of where the patent number is stamped on the BLOCKOR. Because the BLOCKOR comes in different flow rates, and each ECU is configured for a particular BLOCKOR's flow rate, the ECU will not function properly if the BLOCKOR is of a different flow rate (part number), other than was originally configured for the ECU.

Engine Coolant Sensor

The engine coolant sensor provides the ECU with information that the engine is low enough in temperature to warrant the use of starting fluid. This input also "sets" a timer in the ECU that will allow the DIESELMATIC EC-II valve to be on for a predetermined amount of time, based upon coolant temperature. As coolant temperature decreases, the amount of valve "on" time increases.



- A BROWN MAGNETIC PICKUP
- B BROWN MAGNETIC PICKUP
- C GREEN TEMPERATURE SENSOR
- D GREEN TEMPERATURE SENSOR
- E PINK IGNITION SWITCH [FUSED 1 AMP]



- A RED BATTERY POS. [FUSED 15 AMP]
- B BLACK BATTERY NEG.
- C BLUE DM VALVE RETURN ["B" ON VALVE]
- D PLUGGED
- E RED/BLU DM VALVE SOURCE ["A" ON VALVE]

FIGURE #3
DIESELMATIC EC-II wiring diagram

- 1 - FUEL SOLENOID VOLTAGE SIGNAL, ("IGNITION")
- 2 - ENGINE COOLANT THERMISTOR
- 3 - FLYWHEEL MAG PICKUP FOR ENGINE RPM
- 4 - LOW STARTING FLUID CYLINDER RESET SWITCH
- 5 - LOW STARTING FLUID CYLINDER WARNING LIGHT

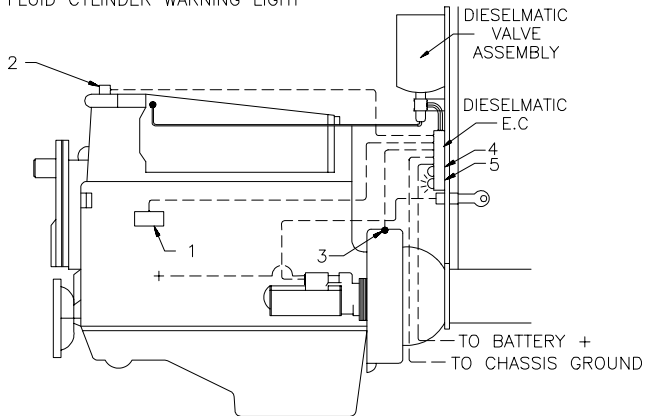


FIGURE #4
DIESELMATIC EC-II sensor locations

Engine Speed Sensor

The engine speed sensor supplies the ECU with information that the engine has obtained the minimum required RPM to allow the use of starting fluid. This input also has an upper limit so that starting fluid will not be supplied if the engine exceeds a specified RPM.

NOTE: The exceeded RPM limit WILL NOT be caused by the engine starting fluid flow rate versus engine air intake ratio since this ratio has been predetermined and kept to a minimum.

Voltage Source Sensor

The final input is a voltage source such as the engine's main fuel solenoid or the vehicles ignition switch. This voltage source should indicate that the engine is in the start and run mode. Without voltage to this input the DIESELMATIC EC-II valve will not activate.

II. OPERATION OF THE ECU

Single Winding Solenoid Coil

The DIESELMATIC valve assembly used in DIESELMATIC EC-II applications is a **POLARITY SENSITIVE** single winding solenoid coil. The coil has a current consumption of 12 amps at 12 volts, 8 amps at 24 volts.

Low Cylinder Warning Light

The DIESELMATIC EC-II's ECU also has an elapsed time counter function that keeps track of the total amount of valve "on" time. Based on this "on" time and the flow rate of the specified BLOCKOR fitting, the ECU will keep track of the starting fluid cylinder's contents. When the usable contents nears the empty level (only a few additional starts are left), the system's low cylinder warning light will flash continuously while the ignition switch is on.

To eliminate this flashing, the starting fluid cylinder should be replaced and the low cylinder reset switch should be activated. Simply replace the starting fluid cylinder per the instructions found on the cylinder or in this manual (page 21); reset the system's "counter" by passing a magnet over the indicated "reset" area, 3 or 4 times. The LED should "flash", indicating a reset.

This "reset" has to be done while the ignition switch is on.

IMPORTANT

To ensure the proper operation of the low cylinder function of the ECU, and to maintain the proper starting fluid versus engine air intake ratio, it is imperative that the starting fluid cylinder be replaced with the same type KBI starting fluid cylinder. Not all brands of starting fluid cylinders are alike!

Air Pressure Switch

On air starter equipped vehicles, an air pressure switch is installed to ensure that pressure is sufficient to start the engine. If pressure is less than 60 pounds, the ECU will not activate.

III. INSTALLING THE ECU

1. The ECU can be mounted in any position; however, mounting the unit with the top as shown is preferable. When selecting a location, hold the unit in place to determine if it will clear the hood and other movable parts. Be sure to select a location that does not exceed the wiring harness length from the ECU connector to the sensors and valve assembly.
2. The ECU should not be exposed to temperatures exceeding 212⁰F (100⁰C).
3. The ECU must be grounded to the vehicle's electrical system.
4. The middle of this instruction manual has a mounting template that may be pulled out and used for locating and drilling the appropriate mounting holes.
5. Use the supplied mounting hardware to securely fasten the ECU to the vehicle.
6. Do not connect the ECU to a power supply until all other wiring connections for the sensors and wiring harness have been made.

INSTALLING THE SENSORS AND WIRING HARNESS

The DIESELMATIC EC-II requires the input signals from two separate sensors: (1) Engine Speed, and (2) Coolant Temperature. In air starter equipped vehicles, a third sensor for the air pressure is optional. The engine speed sensor is a magnetic pickup on the flywheel housing. Select sensor locations that assure easy routing of the wiring harness.



DO NOT connect the ECU to a power supply until ALL other wiring connections have been made (including the connection of the ECU wiring harness to the valve - see page 12 for these connections).

1. Engine Speed Sensor

The magnetic pickup type engine speed sensor is mounted in a 3/4 - 16 threaded hole in the flywheel housing. Screw the sensor in until it contacts the flywheel ring gear, then back it out a half a turn (180⁰). Hold back on the sensor housing with the proper size wrench and tighten down the jam nut to about 25 ft lbs. If a tapped hole in the flywheel housing is not available, it will be necessary to drill and tap a 3/4" - 16 hole centered directly over the ring gear.

2. Coolant Temperature Sensor

The coolant temperature sensor is mounted in the engine block or cylinder head. Select a location that ensures the sensor tip will be submerged in the coolant at all times. The coolant temperature sensor has a 3/8 - 18 NPTF thread. It may require an adapter bushing on some installations. Use a good thread sealant and torque sensor to 15 ft lbs.



Since different thermistors have different values it is imperative that the AC 25036979 thermistor is used.

3. Wiring Harness

Each sensor has been terminated with a connector that will mate to an appropriate connector on the wiring harness. Proper polarity and a good clean connection are essential (see Figure #3 for proper connections).

4. Low Cylinder Reset Switch

The low cylinder reset switch will need to be activated whenever a new KBi starting fluid cylinder is installed on the system. The switch is located on the ECU. Follow label directions on the ECU for resetting the switch.

5. Air Pressure Switch

For air starter equipped vehicles, an air pressure monitoring switch must be installed at the reservoir tank. See installation diagram (Figure #5).

- 1 - FUEL SOLENOID VOLTAGE SIGNAL, ("IGNITION")
- 2 - ENGINE COOLANT THERMISTOR
- 3 - FLYWHEEL MAG PICKUP FOR ENGINE RPM
- 4 - LOW STARTING FLUID CYLINDER RESET SWITCH
- 5 - LOW STARTING FLUID CYLINDER WARNING LIGHT
- 6 - AIR SWITCH (NORMALLY OPEN) KBI #301125

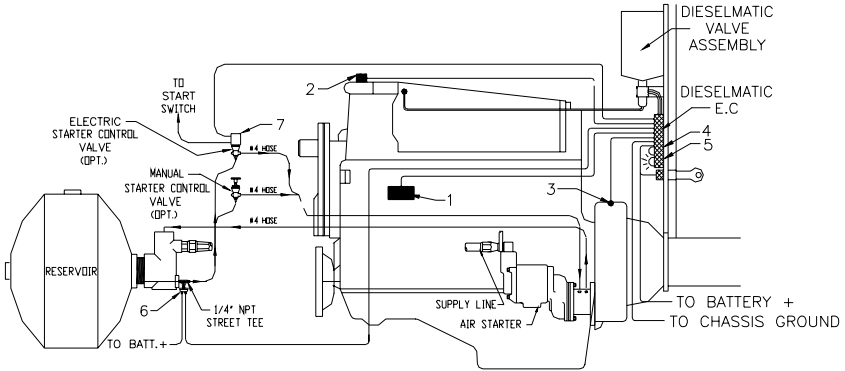


FIGURE #5
DIESELMATIC EC-II sensor locations for air starter equipped vehicles.

11.887
[0.468]

—TOP—
DIESELMATIC
MOUNTING PLATE
TEMPLATE

11.887
[0.468]

11.887
[0.468]

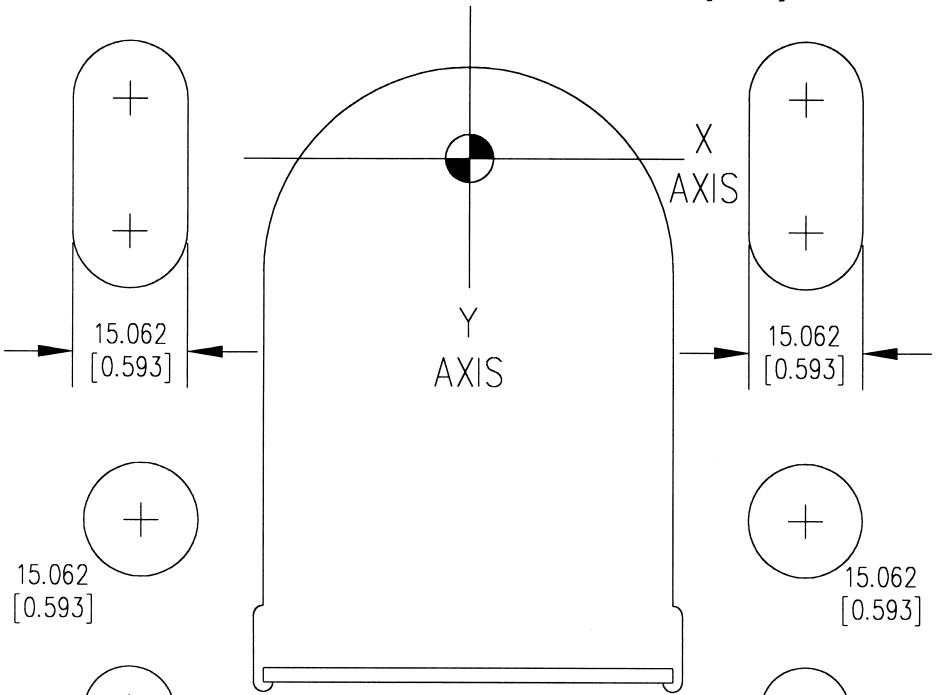
TEAR OUT TEMPLATE
AND SELECT HOLES
DESIRED

(SEE VALVE AND CYLINDER
INSTALLATION INSTRUCTIONS)

11.887
[0.468]

9.525
[0.375]

9.525
[0.375]



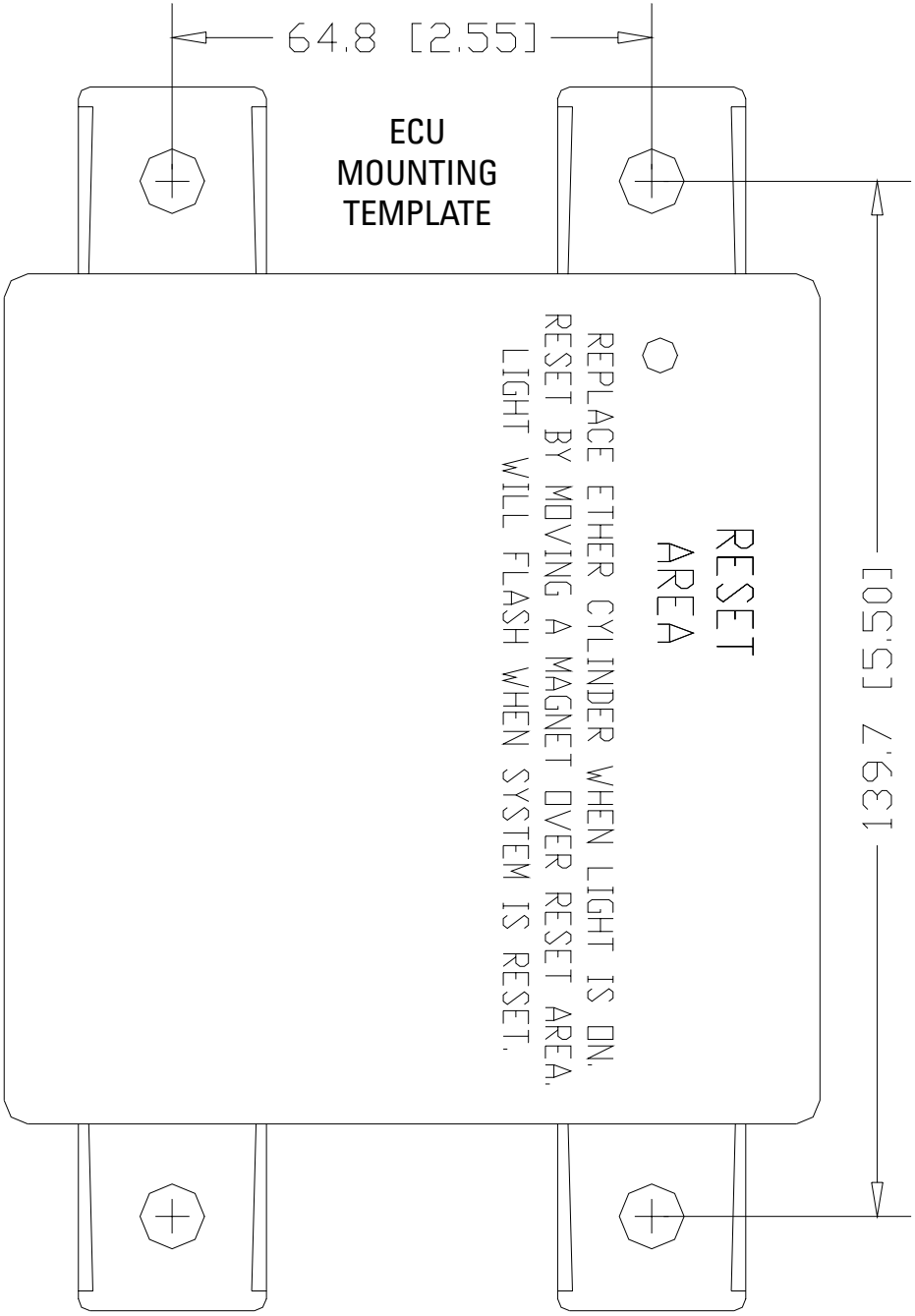
15.062
[0.593]

15.062
[0.593]

11.887
[0.468]

11.887
[0.468]

NOTE: THE DIMENSIONS SHOWN
ONLY INDICATE THE SIZE OF THE
HOLES IN THE MOUNTING PLATE.




VALVE AND CYLINDER ASSEMBLY INSTALLATION


WARNING

Cylinder Assembly should be mounted in an accessible location away from extreme heat - the exhaust system - and protected from road dirt, ice, and snow. If protected, it can be mounted in the engine compartment on the fire wall, radiator frame, inside fender, or any other convenient location. DO NOT mount the unit on the engine or drive train because excessive vibration can cause premature failure. The cylinder assembly must be mounted in a direct upright position (vertical), in order for the Low Cylinder Indicator function of the ECU to properly operate.

NOTE: Valve leads are polarity sensitive; white wire is Battery (+).

1. When selecting a location, hold the Assembly in place to determine if it will clear the hood and other movable parts, and that the distance from the Assembly's bottom to the nozzle location does not exceed the length of tubing provided. Be sure that there is adequate clearance to change the fluid cylinder after installation.
2. The mounting plate may be used as a template, but a paper template is provided in middle section of this manual. If the mounting plate is used and the cylinder is removed from the valve, the top of the valve should be protected from debris by installing the yellow valve cap.

NOTE: On the mounting template located in this manual,  represents the center of mass assembly. Four (4), point mounting is recommended for maximum resistance to vibration. Mounting point locations should be spaced symmetrical about the center of mass, above and below the "X" axis.

3. Four bolts, lock washers (or jam nuts), and nuts are provided for mounting the Valve and Cylinder Assembly. Preferably four bolt assemblies must be used; otherwise, warranty conditions may not apply. Space the mounting bolts as widely apart as possible to eliminate any unnecessary vibration of the unit during the equipment's operation.
4. Center punch and drill the holes for mounting. Bolt the Assembly into place.
5. If the mounting plate was used as a template, the starting fluid cylinder should be properly installed back onto the valve by turning the cylinder in direction of the arrow  (clock-wise), until the cylinder dirt and moisture seal ("O" Ring), contacts valve. Tighten the cylinder an additional 1 1/2 turns (540°). **DO NOT OVERTIGHTEN OR REMOVE CAP ON TOP OF CYLINDER!**

REMEMBER: When handling cylinder, OBSERVE WARNING NOTE ON PAGE 1 of this manual.

6. Make sure that the cylinder clamp is tightened.

NOTE: Do not neglect to occasionally check tightness of the cylinder clamp to make sure it has not loosened.

7. After securing the valve assembly, route the proper leads from the ECU wiring harness to the valve. Connect the wires, making sure to follow the color code of the wires (see Figure #3).

NOTE: Valve leads are polarity sensitive; white wire is Battery (+).

8. The wiring harness has a red lead and a black lead for the ECU power supply. Using the supplied fuse assembly, connect the red wire to the positive (+), side of a constant power source (such as the vehicles battery). The black lead should then be connected to a good ground (-).

NOTE: Whenever the engine does not start within a normal period of cranking, the DIE-SELMATIC fluid cylinder may be empty. Refer to "Servicing and Troubleshooting".

IMPORTANT

To ensure the proper operation of the Low Cylinder function of the ECU, and to maintain the proper starting fluid versus engine air intake ratio, it is imperative that the starting fluid cylinder be replaced with the same type KBi starting fluid cylinder. Not all brands of starting fluid cylinders are alike!

NOZZLE INSTALLATION




Installing the injector nozzle in a proper location is essential if the DIESELMATIC EC-II System is to work properly for your engine. Choose an installation point for the nozzle that will assure even distribution of starting fluid to all cylinders. On turbocharged engines the nozzle should be on the pressure side of the turbocharger.

The straight brass fitting "nozzle injector" supplied with your system should be used. The nozzle itself fits most engines; but, for some engines it may be necessary, or desirable, to also use the 1/4" NPT Reducer Bushing with the nozzle. An elbow fitting substituted in place of the straight fitting will interfere with proper vaporization of starting fluid. If an elbow fitting installation is necessary, use KBi Special Injector Nozzle P/N 220424 (end orifice), or P/N 220475 (side orifice), for engines over 741 CID. For engines under 740 CID, use KBi P/N 220401 (end orifice), or P/N 220375 (side orifice).

Drawing Notes

The following drawing notes should be used in conjunction with the engine diagrams on the following two (2), pages that indicates your air intake system.

NOTE: Some engine manufacturers' pre-tapped nozzle locations are not desirable to use because they will result in uneven distribution of starting fluid to all of the cylinders of the engine. Uneven distribution, or favoring only one or two cylinders of an engine, can cause engine lockup during cranking. The solution for this type of problem is to change the location of the injector nozzle or use a Special Injector Nozzle, which will direct the starting fluid into the main air flow when orientated correctly. To correctly orientate the nozzle, unless instructed otherwise upon installation, orientate the nozzle to spray against oncoming air stream. The punch mark on the fitting supplied with KBi's Special Injector Nozzles indicates spray direction.

1. The usual engine manufacturers' pre-tapped nozzle location is indicated by . If more than one nozzle location is shown on your engine diagram and one is a preferred location, it is indicated by ; a non-preferred location is indicated by .
2. On engines that do not have a pre-tapped hole, or the tapped hole(s) are not in the recommended location, the crossover tube between the intake manifold and turbocharger (or between the intake manifold and air cleaner), should be removed. An "R" size, or 21/64" diameter hole can be drilled near where the tube connects to the intake manifold and tapped with a 1/8"-27 NPT tap. If the walls of the tubing are too thin to be tapped, a 17/32" hole may be drilled and the 1/4" to 1/8" reducer bushing can be inserted and brazed to provide a mounting place for the nozzle.

NOTE: Be sure all chips are cleaned out of the inside of the crossover tube before it is reinstalled on the engine.

3. If the engine is equipped with a plug in the intake manifold, the plug can be removed and drilled with an "R" size or 21/64" bit, and tapped with a 1/8"-27 NPT tap to provide an installation place for the nozzle.

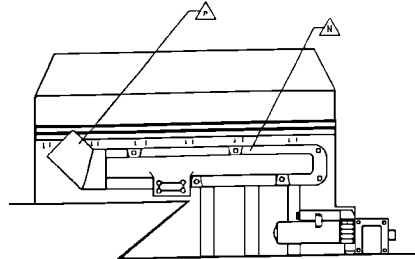
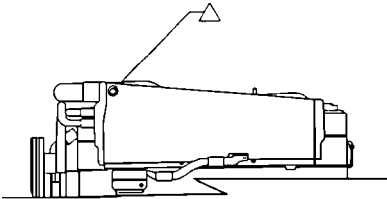
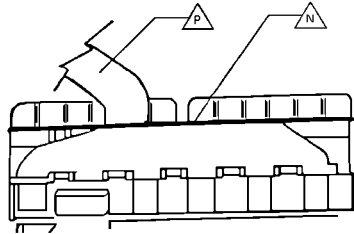
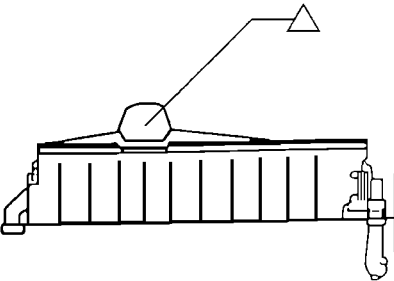
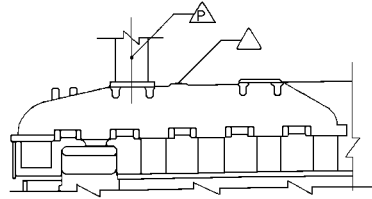
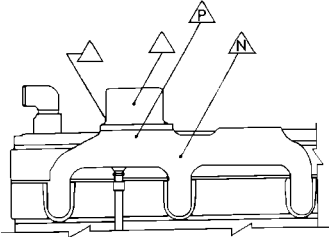
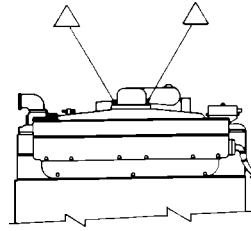
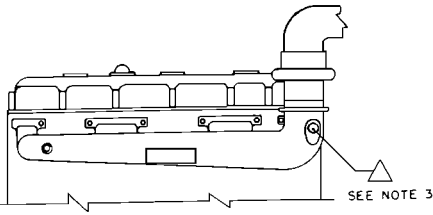
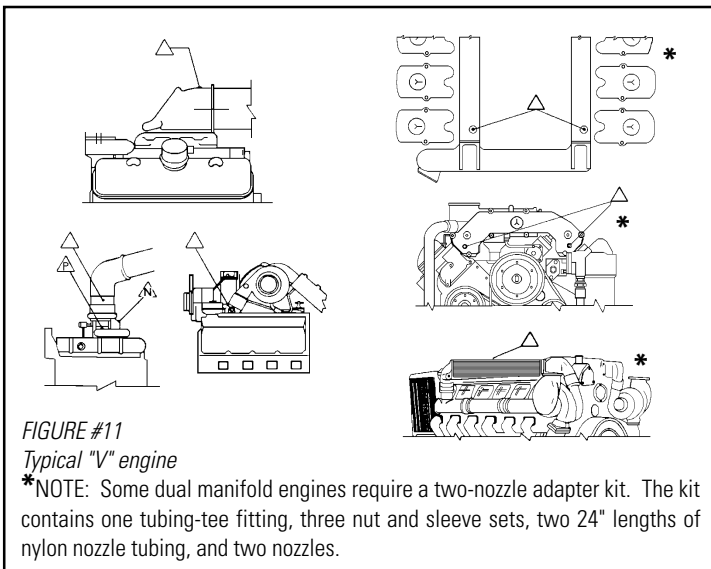
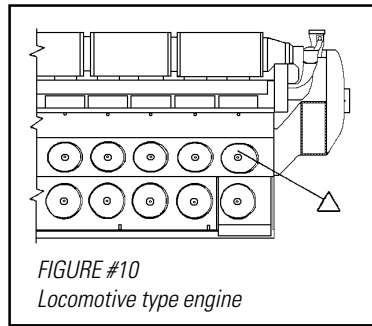
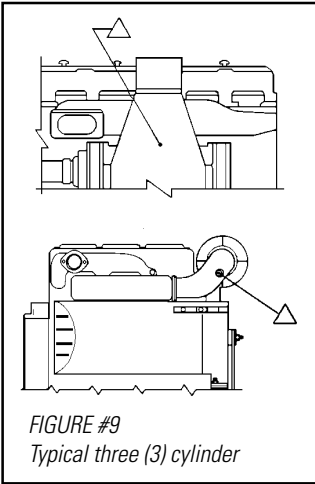
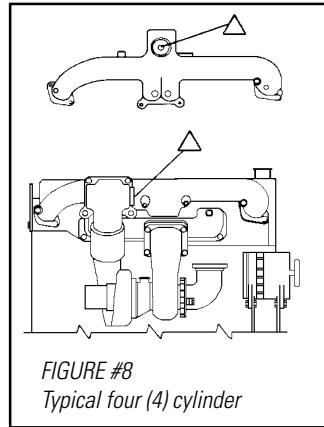
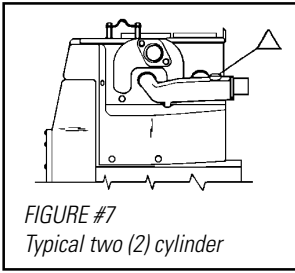


FIGURE #6
Typical six (6) cylinder engine



INSTALLING TUBING AND BLOCKOR FITTING



Nylon tubing length must not be shorter than two feet to assure the proper vaporization of the starting fluid as it is propelled from the BLOCKOR fitting to the injector nozzle.

The DIESELMATIC EC-II System's "metered flow" feature is controlled by the special fitting (BLOCKOR), which has to be installed into the bottom of the valve.

1. The BLOCKOR fitting end that is to be inserted into the bottom of the valve has left-hand dry seal threads. Install this end into the valve, finger tight. Seal insertion by tightening fitting with a wrench approximately one (1) or two (2) turns, depending upon desired orientation.
2. A length of protective sheathing for the nylon tubing, to protect the nylon tubing from chafing, has been supplied in your kit. Be sure to insert the nylon tubing into the sheathing prior to connecting the tubing to the BLOCKOR fitting and to the nozzle.
3. Route the nylon tubing from the BLOCKOR fitting installed in the valve, to the nozzle installed in the intake manifold, in such a way that it does not come in contact with the exhaust system. Be careful that the tubing is not damaged by vibration or by the engine enclosure, throttle linkage, etcetera. Avoid contact with all objects that may cut or wear the tubing. If tubing is cut to a shorter length, be sure to cut it squarely; a bias cut may cause leaks or it may cause the tubing to become disconnected since the nut sleeve will not seal properly.
4. When connecting the tubing to the BLOCKOR fitting and to the nozzle, keep the tubing fully seated while tightening the nut. Avoid over tightening since the sleeve can become distorted or collapsed, restricting fluid flow through the tubing. The nut should be tightened approximately one (1), turn after it is finger tight.
5. Check all fittings and tubing connections for leaks and make sure they are secure.

SYSTEM INSTALLATION IS NOW COMPLETED!

TIPS ON COLD WEATHER STARTING

1. Battery and Cables - To start in cold weather, a diesel engine must crank at a fairly high speed. Worn-out batteries, partially discharged batteries, and poor or loose cable connections will reduce the cranking speed. Batteries, cables, and connections should be cleaned and tightened regularly.
2. Fuel - For an engine to start and keep running, fuel must flow through the injection system. Unblended #2 diesel fuel "clouds", forming filter-clogging wax at temperatures around 15°F (-10°C), making starting and running impossible. Most engine manufacturers recommend that fuel have a cloud point at least 10°F (5°C), below the coldest anticipated temperature. If straight #2 fuel is to be used at temperatures lower than 25°F (-4°C), a fuel additive or a fuel heater may be necessary. A blend of 9 parts #2 fuel to 1 part kerosene (in Europe - paraffin), would lower the "cloud" temperature to approximately 5°F (-15°C). A 3:1 blend would lower the "cloud" temperature to approximately -4°F (-20°C); 1:1 for 22°F (-30°C).
3. Lube Oil - Engine lubricating oil gets thicker at lower temperatures. Many oils that flow freely at 70°F (21°C), are extremely thick at 0°F (-18°C). Follow your engine manufacturers' recommendations regarding oil viscosity for the coldest temperatures you expect your engine to encounter.

SERVICING AND TROUBLESHOOTING

REMEMBER: DANGER, GOOD VENTILATION, GOGGLES.

If a diesel engine is not injecting its primary fuel into its cylinders, the KBi DIESELMATIC EC-II will not start the engine even though it is functioning. The many possible primary fuel system failures are waxed fuel filter, water in fuel filter, injector pump has lost prime, fuel solenoid valve has failed, fuel tank is empty, fuel line is frozen, or injector pump is not supplying sufficient fuel at cranking RPM.

Many other equipment components or lubricants can affect cold starting. Review prior section, "Tips on Cold Weather Starting."

The following guide is limited to troubleshooting of the DIESELMATIC EC-II System. Its most common problems are an empty fluid cylinder (step 1), or a clogged metering orifice inside the BLOCKOR fitting (step 3).


1. Check fluid cylinder contents and valve gasket.

REMEMBER: When handling cylinder, OBSERVE WARNING NOTE ON PAGE 1 of this manual.

IMPORTANT

Replace gasket inside valve each time cylinder is removed. Read entire cylinder label for additional information on cylinder/valve gasket installation.

To ensure the proper operation of the low cylinder function of the ECU, and to maintain the proper starting fluid versus engine air intake ratio, it is imperative that the starting fluid cylinder be replaced with the same type KBi starting fluid cylinder. Not all brands of starting fluid cylinders are a like!

- a. Clean all dirt from neck of cylinder and top of valve before removing the fluid cylinder. Protect top of valve from dirt when cylinder is removed by installing the yellow valve cap.
- b. An empty net weight 21 oz. fluid cylinder weighs 16 oz. (454 gr.); a full fluid cylinder weighs 37 oz. (1049 gr.).
- c. To determine the amount of fluid remaining in cylinder, it should be weighed: subtract empty net weight, convert difference into liquid volume of fluid remaining using 39 ml. per oz. weight (1.4 ml. per g.).
- d. Check that the fluid cylinder has pressure. Minimum of 120 PSI at 68°F (20°C).
- e. Install a new KBi valve gasket, #300012, each time cylinder is replaced. All KBi replacement cylinders will have a New KBi valve gasket inside the thread protecting white cap on the cylinder. Remove old gasket from the valve and discard, BE SURE ONLY ONE GASKET IS USED. Spread a light film of clean oil on new gasket when installing.
- f. Coat the new cylinder threads with oil and install your engine starting fluid cylinder by turning cylinder in direction of arrow  (clockwise), until cylinder dirt and moisture seal ("O" Ring), contacts valve. Tighten an additional 1 1/2 turns (540°). DO NOT OVERTIGHTEN CYLINDER OR REMOVE CAP ON TOP OF CYLINDER! Be sure to retighten cylinder clamp.



Most times the fluid cylinder is shelf stored in a position opposite of its use when installed on a valve; therefore, when it is first installed onto a valve, its contents are agitated due to the turning over. Because of flux residue remaining from the manufacturing and brazing of the raw cylinder, the contents of the cylinder should be allowed to settle back down before the System is functioned. This settling takes approximately 15 to 20 minutes. Failure to allow this settling often causes premature clogging of the System and necessitates cleaning or replacement of the valve's BLOCKOR metering orifice filter. When installing our System, we recommend allowing time for this settling to take place before testing the System to see if it is functioning correctly. The design of the cylinder is such that the 1" 20 screw fitting also functions as a small stand pipe; therefore, once the flux residue settles it will not enter the valve and cause clogging.

- f. If fluid cylinder was empty and replaced with a new cylinder, reset "Low Cylinder" switch according to directions on the ECU.
2. Check of electrical system.
- The DIESELMATIC EC-II'S ECU has been designed to withstand even the most harsh diesel engine environments. However, if the system fails to function, there are a few diagnostics that can be performed.
- a. Check to see if the fuse in the system's power supply or ignition switch input is blown. If necessary, replace it with the same type fuse.
 - b. Using an OHM meter, check the solenoid valve resistance. The winding should have a resistance of 1.0 - 1.4 OHMS for 12 Volt; 2.8 - 3.4 OHMS for 24 Volt. If the readings are not correct, replace the DIESELMATIC EC-II valve assembly.
 - c. Remove the injector nozzle and place in an appropriate container. Unplug the connector to the Coolant Temperature Sensor. Temporarily install a 100 K 1/4 watt resistor across the terminals of the harness connector. Turn the ignition "on"; if the optional pre-load feature is enabled, the DIESELMATIC EC-II System should inject ether for about 3 to 10 seconds. Start the engine; the system should inject ether for about 10 to 80 seconds.
BE SURE TO REMOVE THE TEST RESISTOR AND RECONNECT THE HARNESS.
3. Check for clogging of flow metering orifice inside the BLOCKOR fitting.

REMEMBER: DANGER, GOOD VENTILATION, GOGGLES.

The DIESELMATIC's fluid flow rate is controlled by a serviceable filtered metering orifice inside the BLOCKOR fitting (see Figure #12 or #13), at the bottom of the valve assembly; therefore, the following procedure is recommended:



During the following procedures, some pressurized fluid may be trapped in the system. Loosen all connections slowly.

- a. Remove the System's injector nozzle from the engine.
- b. Activate the system, if starting fluid does not spray from the injector nozzle when the system is activated, disconnect tubing from the valve's fitting. Activate the system, if starting fluid sprays from the BLOCKOR fitting when the System is activated, reconnect tubing to the valve's BLOCKOR fitting, remove injector nozzle, and activate system. If fluid sprays from the tubing end, replace injector nozzle. If fluid does not spray from the tubing end, check tubing for kinks, burns, cuts, or clogs.

WHEN PERFORMING THESE OPERATIONS, BE SURE TO SPRAY FLUID INTO AN APPROPRIATE CONTAINER.

- c. **If starting fluid does not spray** from the valve's BLOCKOR fitting, remove the BLOCKOR fitting from the valve. REMEMBER: LEFT-HAND THREADS!

After removal of the BLOCKOR fitting from the valve, look at the stamping on the side of BLOCKOR to determine which BLOCKOR series you have; the third number will determine which BLOCKOR series you have.

For the BLOCKOR XX4XX series, remove its' filter and check to make sure that the "O" Ring that belongs in the tip of the filter, is not left inside of the valve fitting. If the "O" Ring remains in the valve fitting, remove it with a blunt item such as a broken toothpick. If filter is to be cleaned, the "O" Ring must be removed from the tip of the filter. Fitting and filter can be washed in clean solvent and blown with compressed air; but do not allow any solvents to come in contact with the "O" Ring, because they can destroy it. Reinstall the "O" Ring over the tip of the filter after cleaning and before attempting to insert the filter back into the fitting. Reassemble filter with "O" Ring into fitting. For best results, replace filter with a new one, KBi Part Number 300813.

For the BLOCKOR XX5XX series, remove its filter by unscrewing filter counter clockwise, being careful not to damage the sintered bronze material at the top of the filter. Fitting and filter can be washed in clean solvent and blown with compressed air. For best results, replace filter with a new one, KBi Part Number 301876. Reinstall filter into BLOCKOR fitting by turning clockwise, making sure that no foreign objects fall into the well of fitting. Tighten filter, again being careful not to damage the sintered bronze material at the top of the filter, finger tight; with pliers, tighten 1/8 turn to make sure filter seats firmly.

NOTE: If a replacement BLOCKOR fitting is purchased, it is imperative that the replacement BLOCKOR fitting has the same part number as the original BLOCKOR fitting that was installed with the ECU. The last three (3) digits of the five (5) digit stamped number that can be found on the opposite side of where the patent number is stamped on the BLOCKOR must match the last three digits on the replacement BLOCKOR part number that is ordered. Because the BLOCKOR comes in different flow rates and each ECU is configured for a particular BLOCKOR's flow rate, the ECU will not function properly if the BLOCKOR is of a different flow rate (part number), other than was originally configured for the ECU.

- d. It is suggested before the cleaned or new BLOCKOR fitting assembly is reinserted into the valve, that the system be flushed by activating the valve. WHEN PERFORMING THIS OPERATION, BE SURE TO SPRAY FLUID INTO AN APPROPRIATE CONTAINER.



To prevent damage to internal seals in the DIESELMATIC EC-II valve, do not repeat this valve flushing more than twice.

- e. Reinsert clean (or new), filtered BLOCKOR fitting assembly into valve. REMEMBER: LEFT-HAND THREADS. Reinstall System's nozzle into the engine. Reconnect tubing to the valve's BLOCKOR fitting and engine's injector nozzle.
- f. Check all fitting and tubing connections for leaks.

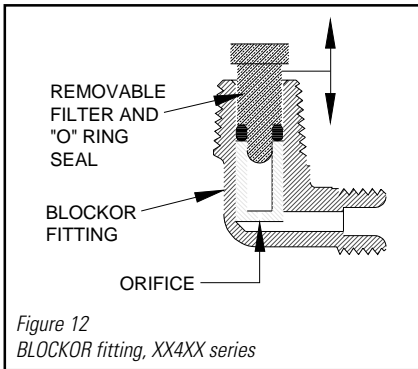


Figure 12
BLOCKOR fitting, XX4XX series

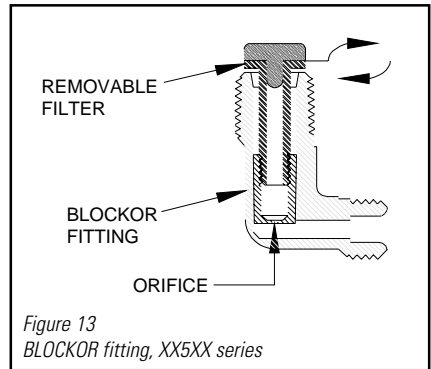


Figure 13
BLOCKOR fitting, XX5XX series

LIMITED WARRANTY

All products are guaranteed against defects in material and workmanship for one year from the date of purchase. The Valve, Electronic Control Unit (ECU), Magnetic Pickup, and Temperature Sensor are sealed units. If these components do not operate properly, they must be returned to the factory, prepaid, for replacement. If factory inspection determines the product to be defective under the terms of this warranty, it will be replaced without charge.

Failure due to accident, abuse, neglect, improper installation or maintenance, mishandling and repairs or attempted repairs which have been made by others, are not covered under the terms of this warranty.

Kold-Ban International, Ltd., shall not be liable for loss of use of the System or other incidental or consequential costs, expenses or damages incurred by the purchaser or user.

This warranty does not include labor for repair or replacement, nor does it apply to used fluid cylinders or BLOCKOR Fittings, injector nozzles, and atomizers clogged by dirt.

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KBI'S DIESELMATIC PRODUCTS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENT NUMBERS: 420239, 4326485, 4346683, 5474678. CANADIAN PATENT NUMBER 1,120,352, U.K. PATENT NUMBER 2026096 AND OTHER U.S. AND FOREIGN PATENTS PENDING.

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KOMPAC®
BLOCKOR®

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