



INDUSTRIAL DIESEL TUNE SYSTEM



OPERATORS MANUAL

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Introduction

Congratulations on your selection of the **INDUSTRIAL DIESEL TUNE**. By choosing this product, you are acquiring the most technologically advanced method available for cleaning harmful fuel system contaminants from diesel engines.

The **INDUSTRIAL DIESEL TUNE** is a self-contained cleaning system, designed to connect to any diesel engine. Once the unit is connected, it temporarily replaces the regular fuel supply with a mixture of diesel and the specially formulated **Detergent for Industrial Diesel Tune**.

With the engine idling, the unit pumps the diesel/detergent mixture through the engine's fuel system. As the mixture passes through the vehicles' fuel system, it loosens and dissolves accumulated deposits, which then pass harmlessly out through the exhaust system or are removed by the unit fuel filter. Removing contaminants from the combustion chamber creates a more even burn of fuel, which improves horsepower, increases fuel economy, and reduces exhaust emissions.

It is recommended that you perform the fuel system cleaning procedure on a vehicle every 60,000 to 100,000 miles (depending upon vehicle service) or 97,000 to 161,000 kilometers or 1600 to 1800 hours of operation to obtain the highest fuel system efficiency.

Please study this Operators Manual to become thoroughly familiar with the **INDUSTRIAL DIESEL TUNE** before using it.

IMPORTANT

**The Industrial Diesel Tune is designed to work
EXCLUSIVELY
with the Detergent for Industrial Diesel Tune.**

**Use of any other chemical during this process may cause operational failure of
the Industrial Diesel Tune and voids the manufacturer's warranty.
See warranty card for details.**

Notes:

Overview

This manual contains all the information you need to use the **Industrial Diesel Tune**. Please make sure all technicians using the unit read this manual and have it within easy reach whenever the unit is being used.

The following is a quick reference to the information in this manual:

System Features and Functions

This chapter describes the gauges, control functions, and connections.

Safety Information

Adhere to the safety guidelines in this chapter at all times!

Before You Begin

Follow the instructions in this chapter before using the unit for the first time.

Fuel System Cleaning Procedures

This chapter contains step-by-step setup and cleaning procedures for diesel fuel systems.

Troubleshooting and Additional Help

Turn to this chapter in the unlikely event you have problems with your **Industrial Diesel Tune** or need additional help.

Appendices - Maintenance, Accessories, and Parts

The appendices contain routine maintenance procedures for the your **Industrial Diesel Tune**, such as changing the fuel filter, lists of available accessories, adaptors and replacement parts, and the Material Safety Data Sheets.

System Features and Functions

System controls are all microprocessor-based. Solenoid valves, and electro-mechanical switches have been eliminated to increase reliability. A membrane switch operators panel and LED readouts provide an extremely simple operator interface.

The system operates on any D.C. voltage between 8 and 30. Automatic electronic voltage control reduces stress on the pump motor. An internal pressure regulator will maintain a stable pressure, and keep the maximum pressure to 12 PSI (0.83 bar). This unit can supply up to 50 gallons per hour (190 LPH) at 5 PSI (0.34 bar).

A built-in self-test at power up verifies electronic functions, while continuous monitoring during operation verifies that parameters are within tolerance.

The noise level of this equipment was tested and a maximum level of 63 dB (A) was measured.

A fill adapter allows the system mixture tank to be filled from the vehicle's fuel tank or another fuel source. Fuel level is continuously monitored. Fuel siphoning adaptor MV p/n 061-0001 comes with a 3/8" (10mm) in-line fuel filter. Any inline filter with minimum flow capacity of 3 to 5 gallons per minute (11 to 19 LPM) is acceptable as a replacement, or it can be purchased directly under MV p/n 050-0071.

A 4.6 U.S. gallon (17.4 liter) solution tank provides for multiple cleaning cycles without the need for refilling.

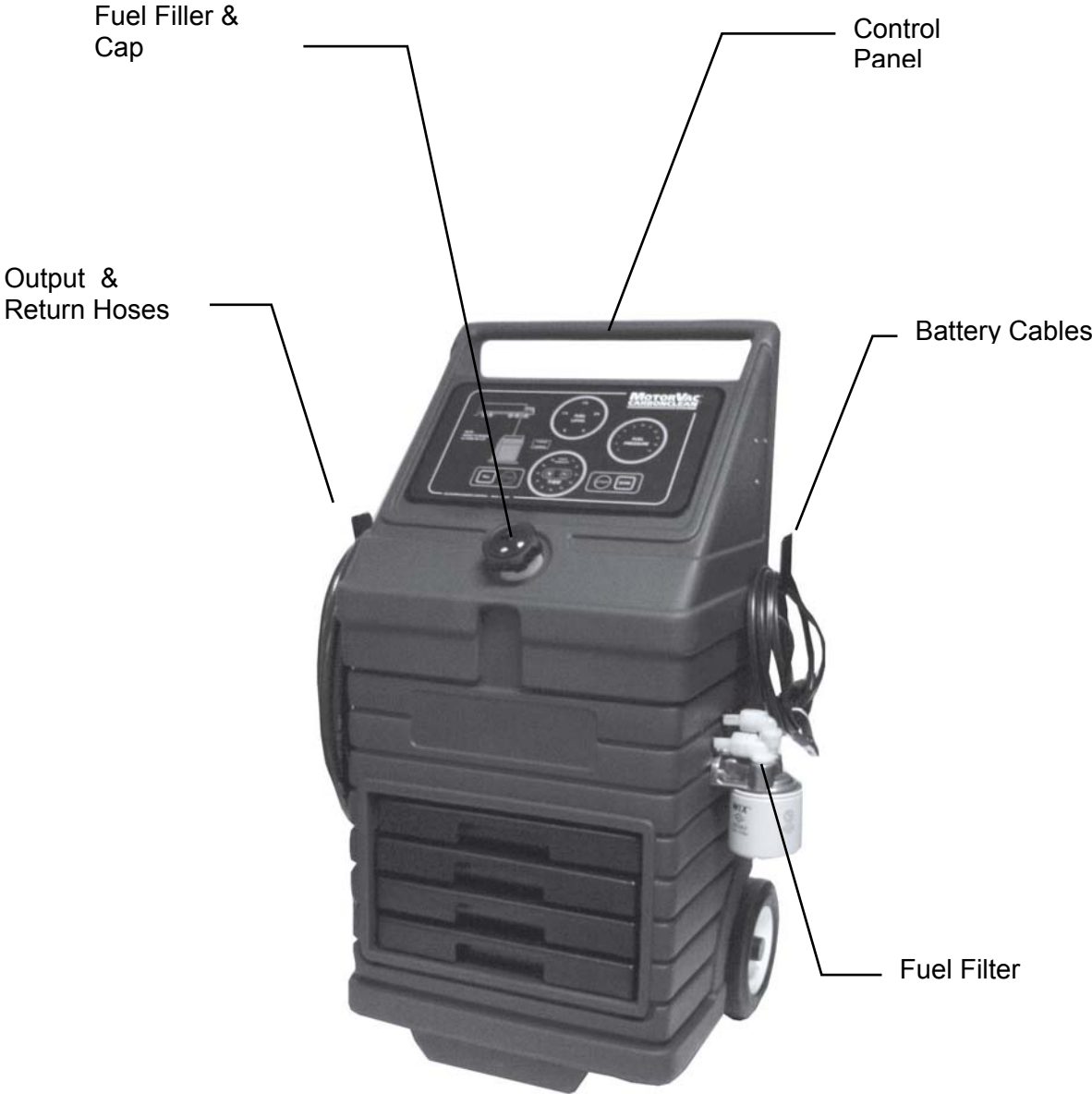
All parts in the fuel path, including the tank, hoses, fittings, and seals, are made from non-corrosive materials.

A spin-on canister fuel filter provides quick filter changes.

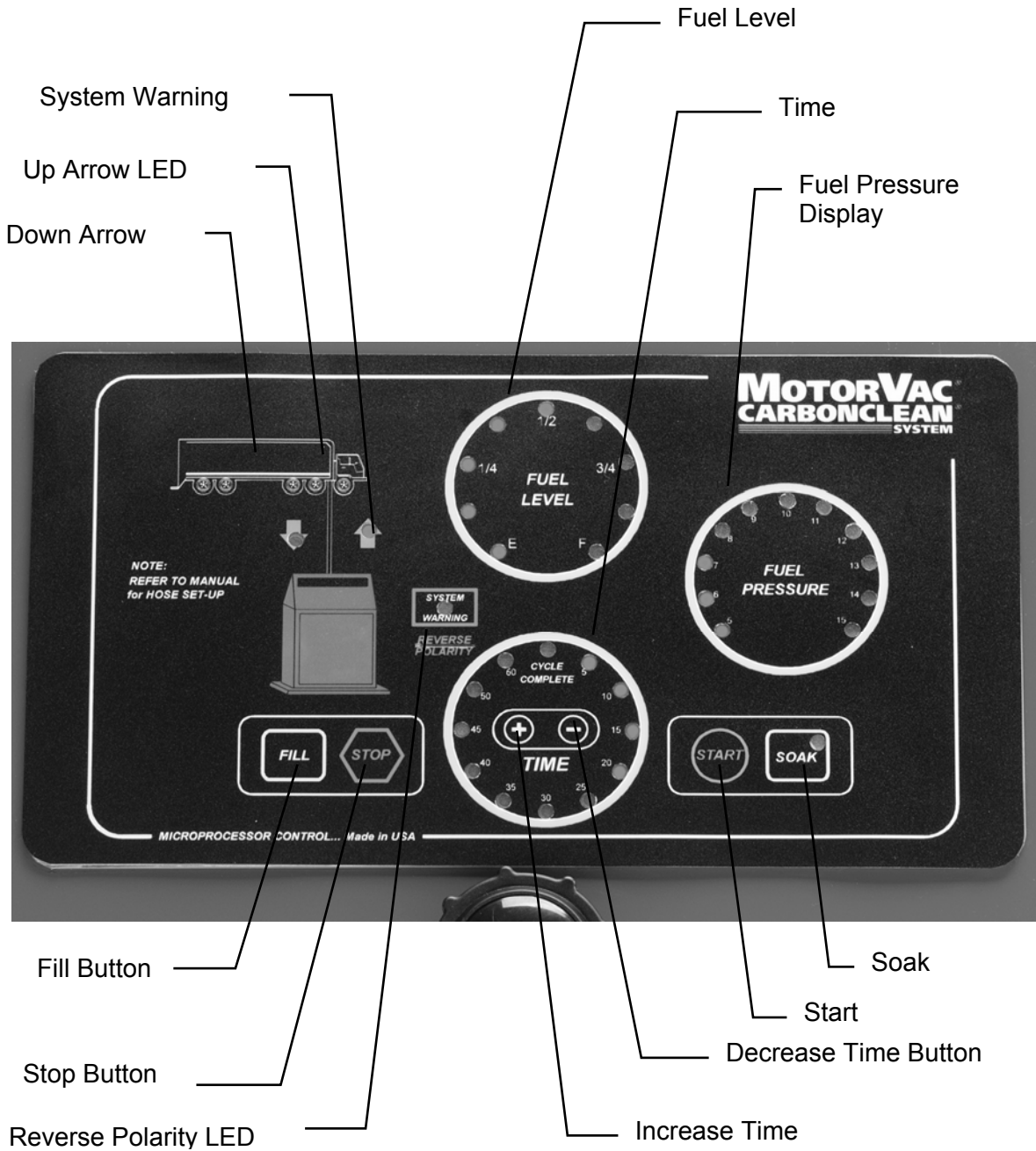
An two-stage electronic programmable timer monitors the elapsed time, and sounds both a soak alarm and a shut-down alarm. A mixture level monitor sounds an alarm for an impending fuel shortage or out-of-fuel condition.

System Features

The front of the **Industrial Diesel Tune** cabinet contains a manually and automatically operated control panel and the opening for the fuel reservoir.



Control Panel:



Features and Functions

Descriptions of the external components, displays, control buttons, and status indicators that make up the unit and control panel are listed below. Please become familiar with the control panel features and functions before using the unit.

Fuel Filler & Cap	Fill unit's fuel tank with cleaning detergent, fuel, or mixture. Fuel cap for tank.
Output Hose (red)	Connects to the input side of the vehicle's engine fuel system, or fill the units fuel reservoir.
Return Hose (black)	Connects to the return side of the vehicle's engine fuel system.
Control Panel	Contains displays, control buttons, and status indicators.
Battery Cables	Positive (red) and negative (black) battery connections (8.0-30 Volts DC, 8 Amperes at 12VDC)
Fuel Filter	Filters out contaminants that have been removed during the cleaning process. See Appendix A for replacement information
Down Arrow LED	Illuminates when the filling process is under way.
Up Arrow LED	Illuminates when the run cycle is under way.
System Warning LED	Illuminates when: <ul style="list-style-type: none">• The fuel/detergent mixture runs out before run time expires.
Fuel Level LED	A circle of LEDs displaying the amount of fuel/detergent mixture remaining in the unit's reservoir.
Time LED	A circle of LEDs displaying the remaining run cycle time in five-minute increments.
Fuel Pressure Display	Displays output pressure of the unit's output hose.
Fill Button	Transfers fuel from the fuel tank of the vehicle being serviced to the unit's reservoir. See Theory of Operation section for more details.
Stop Button	Stops all run and fill conditions.
Reverse Polarity LED	Illuminates when: <ul style="list-style-type: none">• Polarity is reversed on the connection between the vehicle battery and the unit.
Increase Time Button (+)	Allows the increasing of time set on the timer.
Decrease Time Button (-)	Allows the decreasing of time set on the timer.
Start Button	Starts the run cycle. See Theory of Operation section for more details.
Soak Button	Starts the soak cycle.

Notes:

Theory of Operations

Detailed descriptions of the various operations, control buttons, and LED indicators that make up the control panel are listed below.

IMPORTANT NOTE:

THERE IS A 5 SECOND DELAY REQUIRED BETWEEN PRESSING THE START AND FILL BUTTONS, IF THEY ARE PREESED SOONER THERE WILL BE 3 SECOND DELAY BEFORE THE PUMP WILL OPERATE.

Fill Operation:

- When the FILL button is pressed and released and the fuel tank is not full, the motor starts the pump in the fill direction. The FILL button does not need to be held.
- The pump will also stop while filling at the instant the fuel dial reads full. If the FILL button is pressed and held, when the fuel level reads full, the pump will run. The pump will run in the fill direction until the FILL button is released.
- The voltage to the pump motor is approximately 12 VDC whether the unit is operating from a 12 VDC battery or a 24 VDC battery.
- Whenever the pump is operating in the Fill direction, the DOWN ARROW LED (away from the truck) is illuminated.
- If the pump is operating in the Cleaning (Run) direction the FILL button is ignored.

Cleaning (Run) Operation:

- When the START button is pressed and released, and the FUEL LEVEL shows at least 1/8 tank, the motor will start the pump in the Clean (Run) direction. The timer dial will show the total Clean run time. The default total Clean time is 45 minutes. Refer to the Timer Operation section for operation of the timer buttons.
- The FUEL PRESSURE display dial monitors the output cleaning pressure at all times. The maximum pressure is 12 PSI (0.83 bar), which is control by an internal pressure regulator.
- Whenever the pump is operating in the clean direction the UP ARROW LED (towards the truck) is illuminated.
- If the pump is operating in the Cleaning direction and the FUEL LEVEL dial shows empty (the empty "E" LED is illuminated) for at least 5 consecutive seconds, the total cleaning cycle time will be completed and the CYCLE COMPLETE LED on the timer dial will be illuminated. The pump will continue to operate. The SYSTEM WARNING LED will flash and the alarm will sound continuously until the STOP button is pressed. If the STOP button is not pressed the pump and alarms will automatically shut off after 5 minutes.
- The voltage to the pump motor is approximately 12 VDC whether the unit is running from a 12 VDC battery or a 24 VDC battery.
- Initial Cleaning Cycle:

- The Initial Cleaning period is half the time of the total cleaning period. If the total cleaning period is greater than or equal to 40 minutes, the Initial Cleaning Cycle is 20 minutes.

- The Initial Cleaning Cycle is half the total time rounded down to the next 5 minute interval. For example, if the total cleaning time is 25 minutes, the Initial Cleaning Cycle will be 10 minutes.

- If the total cleaning time is only 5 minutes, there is *no Initial Cleaning time*, and the cleaning time will be 5 minutes with *no automatic Soak run*.

- The total clean time can be adjusted while the Initial Cleaning Cycle is running. Whenever the total clean time is changed, the Initial Clean time is recalculated. Refer to the Timer Operation section for operation of the timer buttons.

- Soak Cleaning Cycle:

-The Soak Cleaning Cycle is an optional procedure that enhances the cleaning process.

- When the Initial Clean time (see Initial Cleaning Cycle section for explanation) runs out, the timer dial will display the remaining cleaning time, and the SOAK LED will flash. A unique audible alarm will sound for 3 seconds.

- If the SOAK button is pressed and released at this time the timer dial will display the Soak time, and the SOAK LED will stay on to indicate the unit is in Soak Cleaning Cycle.

- The default Soak time is 15 minutes. The Soak time can be changed during the Soak time run. Refer to the Timer Operation section for operation of the timer buttons.

- If the SOAK Button is pressed and released while the system is running the Initial Clean time, the system will automatically go into the Soak Cleaning Cycle.

-If the Initial Clean time runs out and the SOAK Button is *not* pressed to enter the unit into Soak mode, a second alarm will sound for 3 seconds after two minutes has passed to warn that the Soak is about to be aborted. If the SOAK Button is not pressed within 30 seconds of the second Soak alarm the Final Cleaning timer countdown will begin.

- Final Cleaning Cycle:

- When the Soak time runs out, the timer dial will display only the CYCLE COMPLETE LED and the SOAK LED will flash. A unique alarm will sound for 3 seconds, and will sound again for 3 seconds every minute afterwards, until the Final Cleaning Cycle is started.

- The Final Cleaning Cycle is started by pressing and releasing the START button. If the Start button is pressed at any time during the Soak Cleaning Cycle, the Final Cleaning Cycle will start.

- If the SOAK Button is pressed while the system is running the Final Cleaning Cycle, the Soak Cycle timer will start again, even if a Soak Cycle has already been completed. This gives the user the ability to perform another Soak Cleaning Cycle if necessary.

- When the Final Clean time is complete, the end of cycle alarm will sound for 6 seconds. The Cycle Complete LED will be on, and the pump will continue to run. Every minute afterwards the end of cycle alarm will repeat for 6 seconds. This will continue until the STOP BUTTON is pressed and released, or until the FUEL LEVEL dial indicates empty. If the FUEL LEVEL dial indicates empty the SYSTEM WARNING LED will flash and the alarm will sound continuously until the STOP button is pressed. If the STOP button is not pressed the pump and alarms will automatically shut off after 5 minutes.

- If the tank is less than 1/8 full and the START button is pressed and held for approximately 3 seconds the pump will operate in the Cleaning direction until the button is released. This feature is used to completely empty the tank of fuel.

Fuel Pressure Display:

The FUEL PRESSURE dial displays the *actual* pressure in PSI that the unit is pumping. The displayed pressure range is 5 PSI (0.34 bar) to 15 PSI (1.03 bar) in 1 PSI (0.07 bar) increments. If the actual pressure is less than 5 PSI, the dial will still display 5 PSI. The pressure shown has an accuracy of " 1 PSI.

Stop Operation:

- When ever the STOP button is pressed, the pump will stop and timer display is turned off.

Timer Operation:

- The highest time value LED will blink. For example, if 12 minutes are left in the run cycle, the 15 minute LED will flash until the timer reaches 10 minutes.
- When the timer reaches 0 minutes left, the CYCLE COMPLETE LED will illuminate and the end of cycle alarm will sound.

Cycle Time Operation:

- The TIME + (Increase) and the , (Decrease) buttons are used to adjust the cycle time, while the Cleaning, or Soak Cycle is in progress.
- The maximum settable time is 60 minutes, the minimum settable time is 5 minutes. The time is adjusted in increments of 5 minutes. There is a 10 minute increment between 50 and 60 minutes, so a time of 55 minutes cannot be set.
- When the timer starts, the time can be adjusted. After the first minute from when the timer started the unit will check to see if the set time was changed. If it was, this new time will be stored as the cycle time for the next run. This applies to Cleaning, and Soak Cycle set times.
- If the , button is continuously pressed until the time reaches zero the end of cycle alarm will occur and the CYCLE COMPLETE LED will illuminated.

Fuel Level Operation:

- The FUEL LEVEL display shows the amount of fuel in the tank.
- The FUEL LEVEL LEDs that are illuminated indicate the level at or below the actual level in the tank. For example, the FUEL LEVEL display will not read 1/8 until the tank is at least 1/8 full, or if the tank is 9/16 full the FUEL LEVEL LEDs will display 1/2 full.
- When the FUEL LEVEL displays “E” the tank is at the empty level or below (there is approximately a gallon of fuel as a reserve below the empty level).
- When the unit is powered on, the FUEL LEVEL is displayed. If the tank is empty the “E” LED will be illuminated to indicate power is applied to the unit and it is ready for operation.
- The FUEL LEVEL display can be calibrated to the Fuel Level Sensor, see APPENDIX A for the calibration procedures.

Safety Information and Precautions

!/\ DANGER

Vehicle exhaust gases contain Carbon Monoxide, which is a colorless and odorless lethal gas.

Only run engines in well-ventilated areas and avoid breathing exhaust gases.

Extended breathing of exhaust gases will cause serious injury or death.

!/\ WARNING

Exhaust gases, moving parts, hot surfaces, and potent chemicals are present during the use of the Industrial Diesel Tune.

Read and understand the operator's manual before using the Industrial Diesel Tune.

When using chemicals always refer to the MSDS sheets and manufacturer's instructions for the proper procedure to handle emergency medical treatment, cleanup, handling, and storage requirements.

Improper use of the Industrial Diesel Tune or exposure to exhaust gases or cleaning chemicals can cause injury.

Flammable fuel chemical and vapors can ignite.

Avoid exposure to flames, sparks, hot engine parts, and other ignition sources.

Always keep fully charge fire extinguisher nearby. The extinguisher should have a class B rating and be suitable for diesel fuel, chemical, and electrical fires.

Cleanup any fuel or chemical spills immediately.

Dispose of contaminated cleanup material according to governing environmental laws.

Never look directly into the air induction plenum when the engine is operating.

Always plug or cap any open fuel lines during service.

Keep Cleaner and Detergent container closed except when filling reservoir.

Explosion or flame or exposure to flammable liquid and vapors can cause injury.

Flammable liquid can splash out of reservoir when pump is on and/or unit is being moved.

Always keep Reservoir Cap secure except when filling reservoir.

Explosion or flame can cause injury.

Many fuel systems maintain residual pressure in fuel lines even after the engine has been turned off.

Wear safety goggles.

Wear chemical resistant gloves when connecting or disconnecting fitting and adaptors.

Obtain ZERO psi (bar) before connecting or disconnecting any fuel lines or adaptors.

Explosion or flame or exposure to flammable liquid and vapors can cause injury.

Chemicals can cause harmful byproducts.

Use only approved chemicals (refer to operator's manual).

Do not swallow or ingest any chemicals.

Use with adequate ventilation. Avoid breathing vapors.

Do not store chemicals on the machine.

Improper use of chemicals can cause injury.

Over exposure can have harmful effect on eyes, skin, respiratory system and possible unconsciousness and asphyxiation.

Improperly blocked vehicles can move.

Set the parking brake and chock the wheels.

Moving vehicles can cause injury.

Moving engine parts.

The engine cooling fan will cycle on and off depending on the coolant temperature and could operate without the engine running.

Wear safety goggles.

Always keep objects, clothing, and hands away from the cooling fans and engine parts.

Moving engine parts can cause injury.

Hot surfaces are present during and after running the engine.

Do not contact hot surfaces such as, manifolds, pipes, mufflers, catalytic converters, or radiators and hoses.

Hot surfaces can cause injury.

Cracked fan blade can become airborne.

Examine fan blades for cracks. If found, do not service the vehicle.

Flying objects can cause injury.

Batteries produce explosive gases and can explode.

Wear safety goggles when working on or near batteries.

Use in a well-ventilated area.

Keep sparks and flames away from the battery and never lay tools, equipment, or other conductive objects on the battery.

When tools or equipment is connected to the battery, make sure the equipment power switch is off. Connect the positive lead of the equipment to the positive lead battery first; connect the negative lead of the equipment to a solid ground point as far from the battery as possible.

Keep battery acid away from skin or eyes. In case of eye contact, flush with clean water for 15 minutes and get medical attention.

Battery explosion and ignited gases can cause injury.

Before You Begin

First Time Operation

The unit system is tested at the factory with special test fluids then completely drained. These test fluids are compatible with diesel engine systems. Because the unit is dry, it will need to be primed before the machine is put into service.

1. Fill the units fuel filter completely with diesel fuel, approximately 1 quart (32 ounces, 0.95L). Verify that the unit's fuel filter is securely in place on the unit.
2. Check the OUTPUT/RETURN hoses, battery connections, and all external components.
3. Attach the unit to a vehicle battery by connecting the red battery clip to the positive (+) battery terminal and connect the black battery clip to a solid ground (**8 - 30** Volts DC, 8 Amperes at 12VDC).
4. Pour 8 1/2 - 16 ounce bottles (136 ounces, 4.0L) of **Detergent for Industrial Diesel Tune** into the unit's reservoir, and fill the tank up to the "1/4" LED on the Tank Level gauge with diesel fuel (which will require approximately 104 ounces, 3.0L).
5. Connect the OUT/FILL (RED) hose and the RETURN hose to each end of the purge coupling, using the Prime Adaptor (MV P/N 060-4700). This will allow the fuel to circulate and fill the system with fuel.
6. Press the **START** button. The pump will supply fluid to the OUTPUT hose. Operate the system in Prime mode for three minutes, then press the **STOP** button. Remove the Prime Adaptor. If necessary add more diesel fuel till the Tank Level gauge indicates "1/4".

The unit should now be primed and ready to add detergent and fuel for a full tank, if necessary:

7. Add another 9 - 16 ounce bottles (144 ounces, 4.25L) **Detergent for Industrial Diesel Tune** into the unit's reservoir. This amount of cleaner will provide enough solution to make a full tank mixture.
8. Add diesel to the reservoir until the indicator displays full tank (the **F** LED, which will require approximately 144 ounces, 4.25L). The fuel may be added through filler of the tank, or by using the Fill mode (see the Fuel System Cleaning Procedures Chapter). The unit is now ready for use.

The desired ratio is 1:1 - One part cleaning solvent to one part diesel fuel.

When mixing an external container, measure equal parts cleaner and fuel in a suitable container. Keep container sealed when not in use.

See note on next page.

NOTE

Repeat the above procedures any time the unit's reservoir and filter is completely drained of fuel. Unless filling from a container of premixed 1:1 ratio of detergent and diesel fuel.

- **The reservoir has a usable capacity of 3.0 gallons (11.3L). A reserve amount of mixture 1 gallon (3.8L) will remain below the last segment on the fuel level display. When filling an empty reservoir, extra cleaning solvent is required to maintain the correct ratio of cleaner and diesel fuel. This is why the extra mixture is added in Step 4 of the procedure above.**

Diesel Fuel System Procedures

Filling and Mixture Setup

Follow the steps below to connect the unit to the vehicle's fuel system in order to obtain fuel from the vehicle for use during the cleaning procedure. Make sure the vehicle has at least 5 gallons (18.9L) of fuel before beginning this process.

1. Start the vehicle and allow the engine to reach as close as possible to normal operating temperature.

NOTE:

The diesel engine cleaning system should be operated on a level surface. For best results, engine should be up to operating temperature and fuel filters should be changed prior to service. Check the engine's oil level and add oil if necessary. **DO NOT PERFORM AND STOP THE CLEANING PROCESS IF THE ENGINE OIL LEVEL IS LOW.** Check the coolant and add if necessary, If the engine is hot, check the level of the overflow tank. **DO NOT PERFORM OR STOP THE CLEANING PROCESS IF THE ENGINE IS OVERHEATING.**

2. Turn the engine **OFF** when normal operating temperature has been reached.
3. Add the **Detergent for Industrial Diesel Tune** to the system's reservoir according to the chart below.

The desired ratio is 1:1 - One part cleaning detergent to one part diesel fuel.

TANK LEVEL DISPLAYS	AMOUNT OF DETERGENT TO BE ADDED (16 oz. can):	AMOUNT OF DIESEL FUEL TO BE ADDED ¹ :
¾ Tank	3 cans (48 oz., 1.42L)	Fill the reservoir to Full LED
½ Tank	6 cans (96 oz., 2.84L)	Fill the reservoir to Full LED
¼ Tank	9 cans (144 oz., 4.26L)	Fill the reservoir to Full LED
"E" is Indicated	12 cans (192 oz., 5.68L)	Fill the reservoir to Full LED

Note 1: It is recommended that a full tank mixture should be used when working with engines that utilize electronically operated injectors.

4. Attach the Fill adapter (**MV P/N 061-0001**) to the system's **OUT/FILL (RED)** hose and place the end of the adapter hose into a fuel source, such as the vehicle's fuel tank or other fuel container. The unit should have been primed previously, as described in the Before You Begin Chapter.
5. Attach the unit to a vehicle's battery by connecting the **red** battery clip to the positive (+) battery terminal and connect the **black** battery clip to a solid ground. **8 - 30 Volts DC, 8 Amperes at 12VDC.**

6. If the **REVERSE POLARITY LED** illuminates then battery connections are incorrect, reconnect leads properly. The **FUEL LEVEL** Display LEDs should be illuminated and display the fuel level.

NOTE

If nothing appears on the display, check that the battery clips are attached to the proper terminals on the battery (**BLACK** clip to ground connection, **RED** clip to positive terminal). If the battery clips are connected correctly, check the condition of the vehicle's battery.

7. Press and release the **FILL** button to begin the **FILL** mode process.
8. When the unit reaches the Full level in the tank the pump will stop filling automatically. If using less than a full tank, press and release the **STOP** button to stop the filling process.

NOTE

The **DOWN ARROW LED** will appear steady on the display, as fuel is pumped from the vehicle's tank to the units tank. One LED (1/8 tank increments) corresponds to 5/16ths of a gallon (40 oz., 1.2L) will appear on the system's fuel gauge display.

IMPORTANT

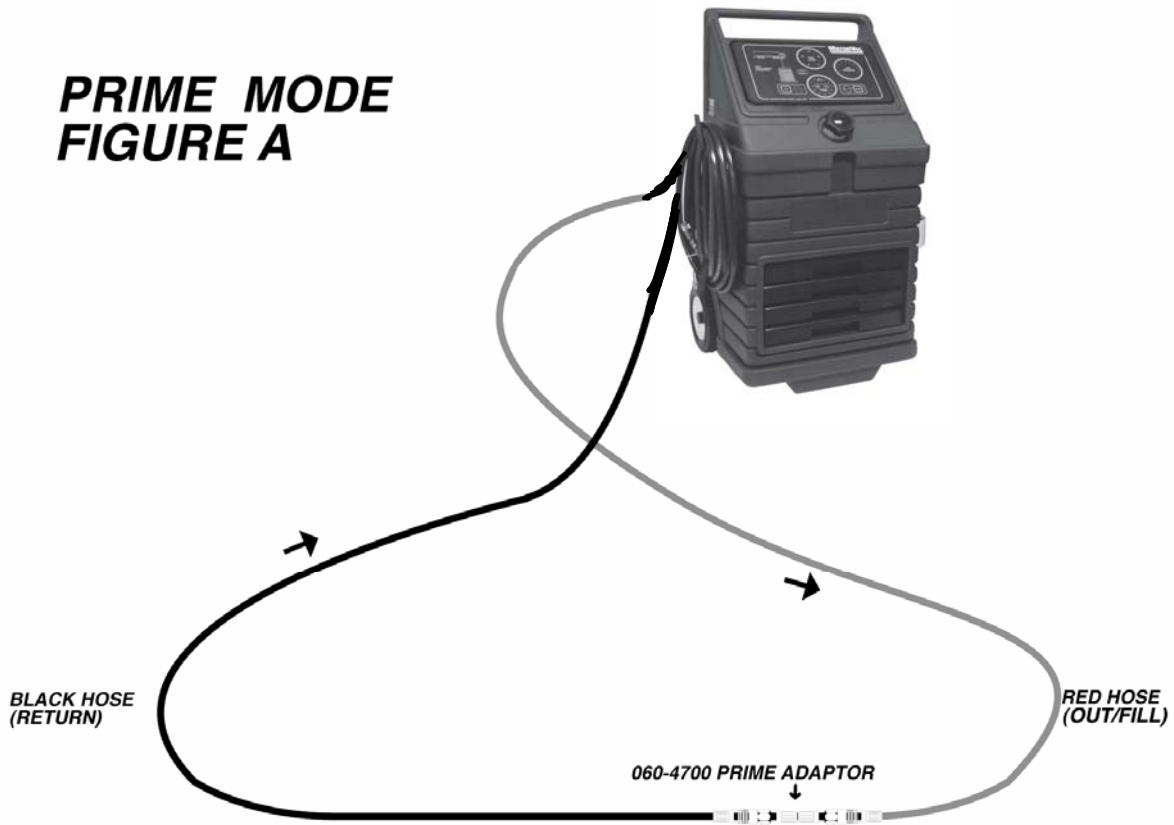
When mixing the cleaner in an external container, measure equal parts cleaner and fuel in a suitable container. Keep container sealed when not in use.

9. Remove the **OUT/FILL (RED)** hose from the fuel source container, and using a shop cloth to catch any spills, remove the Fill adapter.

Purging Air from the System (Priming)

It will be necessary to purge the air from the unit's plumbing prior to connecting to the engine's fuel system.

1. Connect the **OUT/FILL (RED)** hose and the **RETURN (BLACK)** hose to each end of **PRIME** adaptor (MV P/N 060-4700), as shown in **FIGURE A**.
2. Press and release the **START** button. Operate the system in Priming mode for one minute, then press and release the **STOP** button. The unit's filter and hoses should now be purged of air, that could possibly go in the engine's fuel system, if this procedure was not performed.
3. Disconnect the **PRIME** adaptor.



Diesel Fuel System Setup Procedures

1. Start the vehicle and allow the engine to reach as close as possible to normal operating temperature.

IMPORTANT

Do not perform the setup or cleaning process if the vehicle's engine oil or coolant level is low. If necessary, add oil and/or coolant to the vehicle. Stop the cleaning process if the engine is low on oil or overheats.

2. Turn the engine OFF when normal operating temperature has been reached.
3. Attach the unit to a vehicle battery by connecting the **red** battery clip to the positive (+) battery terminal and connect the **black** battery clip to a solid ground. **8 - 30 Volts DC**. The unit's **FUEL LEVEL** display should display **ON**.
4. Remove the vehicle's fuel cap to relieve fuel tank pressure, if necessary.
5. **Verify that the engine is no longer running.**
6. Disconnect the vehicle's fuel lines going into the engine's supply pump and the return line coming from the injectors (if applicable). There are now four open ends to work with:

Supply Line / Feed

- From the
tank

- To the
supply
pump.

Return Line

- From the
fuel
return
line

- To the
tank.

IMPORTANT

Try not to allow excessive fuel loss when connecting or disconnecting the hoses from the engine or the engine may be difficult to start.

NOTE

Use an adaptor to plug off or loop back the fuel lines going to the tank to avoid any spills.

NOTE

Some fuel systems have two return lines; one from the injector pump and one from the injectors. When connecting to these types of systems, verify that both return lines have been captured. Usually they will join together at some point before going back to the tank.

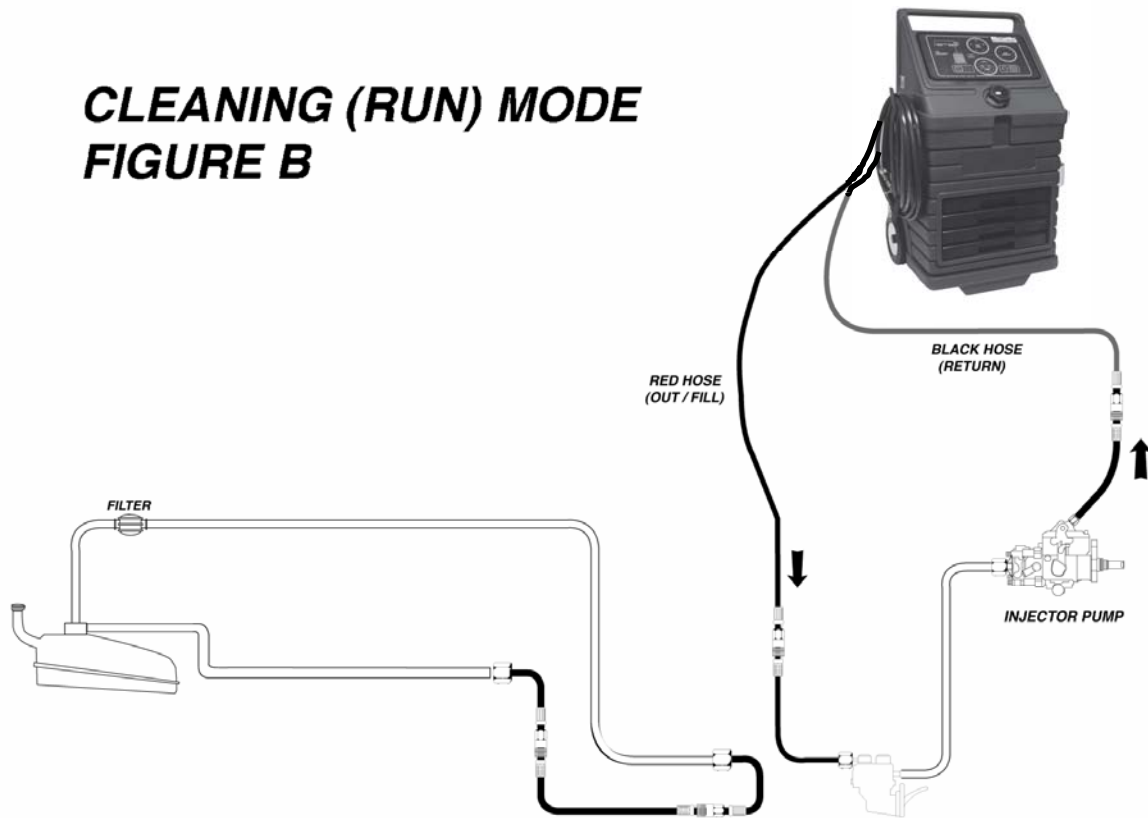
7. As shown in **FIGURE B** on the next page, connect the appropriate adaptors at the points listed in **Step 6**.

NOTE

Fuel filters and water separators in the vehicles fuel supply line should be bypassed whenever possible, as they can interfere with mixture ratios and may release contaminants into the engine during cleaning. But when they can not be avoided replace the vehicle's fuel filter and add extra cleaner to compensate for large filter housings.

8. As shown in **FIGURE B** on the next page, connect the **OUT/FILL (RED)** hose from the unit to the adaptor on the pressure line going into the engine's fuel supply side.
9. As shown in **FIGURE B** on the next page, connect the **RETURN (BLACK)** hose from the unit to the adaptor on the return line coming from the engine's fuel return.

CLEANING (RUN) MODE FIGURE B



You are now ready to perform the Diesel cleaning procedure.

Diesel Cleaning Procedures

1. Verify that **Mixture, Priming, and Diesel Setup Procedures** above have been completed before continuing.
2. Press and release the **START** button. The unit will start and the pressure should rise to approximately 12 PSI (0.83 bar) depending on the fuel system being serviced. The pressure can be checked by observing the **FUEL PRESSURE** LED display.

Check for fuel leaks and correct as necessary.

3. Once the pressure has stabilized, start the engine.

Check for fuel leaks and correct as necessary.

4. Once the unit and engine are running, the **Run** time can be adjusted. Press and release the **INCREASE (+)** or **DECREASE (,) TIME** buttons to adjust the **Run** time either up or down. The default **Run** time is 45 minutes.

Soak Mode

Use of the **Soak Cycle** improves fuel system cleaning results, but may be bypassed if a shorter service is desired.

1. After **20** minutes of operation or half of the **Run** time, whichever is less, a **Soak Cycle** alarm will sound.
2. Turn off engine. Press and release the **SOAK** button to start the **Soak Mode**. The machine will enter into a **15 minute Soak Cycle**. The **Soak Cycle** is adjustable from 5 to 60 minutes, if a shorter or longer period is desired. The **Soak** time is adjusted the same way the **Run Time** is adjusted.
 - **WARNING:** Anytime the **SOAK** button is pressed (in **RUN** mode) the fuel flow to the engine will stop, so if the engine was not shut off previously, then it will run out of fuel.
 - If the **SOAK MODE** is not desired, do not press the **SOAK** button and do not stop the engine. The cleaning cycle will continue into the **Final Cleaning Cycle** after a second alarm sounds two minutes after the first one.
 - During the **Soak** period, the **TIME** display will show the remaining **Soak** time left.
3. Upon completion of the **Soak** time, a **unique 3 second alarm** will sound signaling the end of the **Soak Cycle**, and will continue to sound every minute until the unit has been taken out of the **Soak Mode**.
4. Press the **START** button to restart the unit and continue on with the **RUN MODE**. Verify that the **RUN** timer had gone back to the time last showed before the **Soak Cycle** began. Restart the

engine. The **RUN** mode and the cleaning cycle will continue for the remaining **RUN** time. The **Final Cleaning** time can be adjusted either up or down, if necessary. Press and release the **INCREASE (+)** or **DECREASE (,) TIME** buttons to adjust the **Run** time either up or down.

NOTE

Additional Soak Cycles can be initiated by repeating steps 2 through 4 as many times as needed.

Shut Down

1. When the **Run** time expires, a **unique 6 second alarm** will sound, and the **CYCLE COMPLETE LED** will be illuminated. When this alarm sounds, turn off the engine. During this time the pump will continue to run, and supply fuel to the engine.
2. Press and release the **STOP** button on the control panel. The **Cycle Complete Alarm** will repeat itself once every minute until the unit is stopped. If the **FUEL LEVEL** display indicates **Empty** during the service or after the **Run** time has expired then a continuous alarm will sound, and after five minutes the alarm and pump will be shut off.
3. Using a shop cloth to catch spills, disconnect the **OUT/FILL (RED)** and **RETURN (BLACK)** hoses and adaptors from the engine. Reconnect the engine's fuel supply and return lines, making sure to tighten each connection.

IMPORTANT

Try not to allow excessive fuel loss when connecting or disconnecting the hoses from the engine or the engine may be difficult to start.

4. Disconnect the system battery clips from the vehicle battery.
6. Start the engine and check for fuel leaks. Drive the vehicle or run engine to use up any remaining fuel mixture in the engine.

Glossary and Troubleshooting

Glossary of Error Indicators

Refer to the list below in the unlikely event that you have problems with your unit.

Error Indicator	Mode:	Description:
1. Reverse Polarity LED	Any	<p>Polarity is incorrect at the battery lead connections. The correct connections are as follows:</p> <ul style="list-style-type: none"> Attach the unit to a vehicle's battery by connecting the red battery clip to the positive (+) battery terminal and connect the black battery clip to a solid ground. 8 - 30 Volts DC, 8 Amperes at 12VDC.
2. System Warning LED	Run	<p>The FUEL LEVEL display indicates empty ("E") before the Run Time expires. The engine used up the mixture sooner than expected, or the hose connections are incorrect (return line most probable).</p>

Troubleshooting and Additional Help

Problem:	Solution / Explanation:
1. No Displays	<p>No Power. Check connection between cleaning system and battery, check polarity, adjust connection. Check battery, charge or replace.</p> <ul style="list-style-type: none"> Attach the unit to a vehicle's battery by connecting the red battery clip to the positive (+) battery terminal and connect the black battery clip to a solid ground. 8 - 30 Volts DC, 8 Amperes at 12VDC.
2. Pump does not start or there is delay in starting when either the START or FILL button is pressed.	<p>There is delay when going from a normal running mode to a fill mode. A 5 second delay is required before pressing the START or FILL buttons, after any mode where the pump was running. If these buttons are pressed sooner there will be a 3-5 second delay before the pump is activated.</p>

3. Unit stops filling, pump is running.	When the FUEL LEVEL display indicates Full the pump will stop automatically. <ul style="list-style-type: none"> • The filter is clogged or dirty in either the unit or the Fill adaptor. • The unit is not primed, see Before You Begin chapter to prime unit.
4. Unit stops filling, pump is not running.	Unit has become disconnected from power, or the STOP button was accidentally activated.
5. Unit stops supplying fuel, pump is running.	There may be a blockage or air in the system. <ul style="list-style-type: none"> • The filter is clogged or dirty in either the unit or the Fill adaptor. • The unit is not primed, see Before You Begin chapter to prime unit. • There may be some debris in the tank, blocking the supply port.
6. Unit stops supplying fuel, pump is not running.	Unit has become disconnected from power, or the STOP button was accidentally activated.
7. The SOAK button LED is flashing.	The unit is in the Soak Mode and Soak Time is indicated on the TIME display.
8. The FUEL PRESSURE display is erratic.	Some engines use fuel in a manner that causes the pressure to fluctuate, and this may show up on the display in an erratic manner.

ADDITIONAL HELP

Please verify that the above items reviewed before calling for additional assistance. In the unlikely event that problems persist with the unit, call:

**MotorVac Technical Support at:
800-841-8810 or Your Local Distributor**

Appendix A - Maintenance

Maintenance Procedures

The following maintenance procedures should be performed on a routine basis:

1. Drain the unit's fuel reservoir and replace the fuel filter after every 10 cleaning services or more often when servicing heavily contaminated fuel systems. See **Replacing the Fuel Filter** section, in this chapter, for the replacement procedure.
2. Clean the exterior with a non-abrasive cleaning agent or similar product to keep the cabinet looking new. Check the cabinet for dents or impact markings.
3. Check all hoses and wires for cuts or frays.

Replacing the Fuel Filter

The unit's fuel reservoir should be drained and the fuel filter replaced after every 10 cleanings to ensure maximum system performance and pump life.

Drain the Fuel Reservoir

1. Connect the **OUT/FILL (RED)** hose to the **060-4700** prime adaptor and place the open end in a suitable storage container.
2. Press and release the **START** button. The fuel mixture will be pumped out until the **FUEL LEVEL** reaches the **Empty ("E")** level.
 - Once the **Empty** level has been reached, press and hold the **START** button, after 3 seconds the pump will start again. Continue to hold the **START** button till the fuel has been drained from the unit. Do not run the unit excessively without fuel, or the pump may be damaged.

Replace the Fuel Filter

1. Unscrew the dirty fuel filter from the filter mount on the side of the unit's cabinet.
2. Fill a new filter (see appendix C for the part number) with some of the fuel mixture that was removed when draining the reservoir, or use a prepared clean mixture of diesel fuel and cleaner at a 1 to 1 ratio.
3. Lightly grease the seal of the new filter and hand-tighten it onto the filter mount.

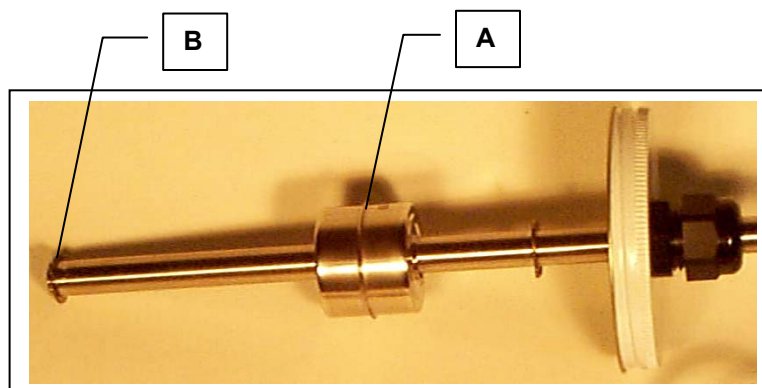
4. Add the remaining fuel to the unit's reservoir, or use a prepared clean mixture of diesel fuel and cleaner at a 1 to 1 ratio.
5. Check the filter for leaks.
5. Enter your initials, the date, and a check mark in the appropriate boxes of the Maintenance Record at the end of this chapter.

The unit is now ready for the next cleaning service.

Fuel Level Sensor to Control Panel Calibration Procedures

The following procedures should be performed if the FUEL LEVEL display does not show the correct fuel level in the tank.

1. Disconnect the unit from power and remove the back panel.
2. Loosen the black holdown nut on the fitting that the stainless steel level sensor stem goes through, so the the stem may easily rotate in the fitting. While holding the stem in place, loosen the white tank cap. Remove the cap and level sensor together, from the tank, but leave wires connected to control PCB.
3. Hold down **TIME INCREASE (+)** and **TIME DECREASE (,)** buttons, while reconnecting the unit to power. Continue to hold buttons for 15 seconds, and then release. Verify that the **UP** and **DOWN ARROW LED's** are lit, this will indicate that the unit is in the calibration mode.
4. The unit must be in the calibration mode, before proceeding.
5. Check travel of float for sticking or binding. Ensure float is at **Empty** position, which is at the bottom of it's travel on the stem. Press and release the **START** button, this will set the **Empty** level.
6. Raise float to **Full** position. Raise the float up until the middle of the float, at ridge (see A in figure below), is 5.25" (133.35 mm) from the end of the stem (see B in figure below), not the snap ring. Press and release the **FILL** button, this will set the **Full** level.



7. Press and release the **START** button again to store both of the settings into the Control Panel's memory.

8. Check that the **FUEL LEVEL** display LED's follow the travel of the float, by raising and lowering the float.
9. With the level sensor still able to move within the fitting, position the assembly into the tank and tighten down the white cap. Move the stem upwards and while holding the stem vertical, slowly lower it until it rests on the bottom of the tank.. Tighten the bulkhead fitting till the stem is held firmly in place without moving, and remains in a vertical position.
10. Reinstall unit's back panel, and return the unit to service.

Maintenance Record

Use the following table to keep a record of maintenance performed on the **INDUSTRIAL DIESEL TUNE**.

Initial/Date	DRAIN FUEL RESERVOIR ✓	REPLACE FUEL FILTER ✓	CLEAN EXT. CABINET ✓	CHECK HOSES AND WIRES ✓	OTHER ✓
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Initial/Date	DRAIN FUEL RESERVOIR ✓	REPLACE FUEL FILTER ✓	CLEAN EXT. CABINET ✓	CHECK HOSES AND WIRES ✓	OTHER ✓
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NOTES:

IDT-4000P System Accessories

BASIC Adaptor Kit (200-3021-A) DIESEL Service Unit

This 'basic' adaptor kit and the light truck kit #200-3117 are included with your system. The most commonly used applications are listed, however, other applications may apply. Other 'available' adapters are listed on the optional list.







PART & NO.	QTY	APPLICATION
 060-1000	2	GENERAL APPLICATIONS UTILIZING 1/4" FUEL LINE - MALE. (USE WITH SUITABLE HOSE CLAMPS.)
 060-1100	2	GENERAL APPLICATIONS UTILIZING 5/16" FUEL LINE- MALE. (USE WITH SUITABLE HOSE CLAMPS.)
 060-1200	2	GENERAL APPLICATIONS UTILIZING 3/8" FUEL LINE - MALE. (USE WITH SUITABLE HOSE CLAMPS.)
 060-1300	2	GENERAL APPLICATIONS UTILIZING 1/4" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
 060-1400	2	GENERAL APPLICATIONS UTILIZING 5/16" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
 060-1500	2	GENERAL APPLICATIONS UTILIZING 3/8" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
  060-0440 060-0450	1 1	HOSE CLAMPS. USE WITH 060-1000 THROUGH 060-1500.

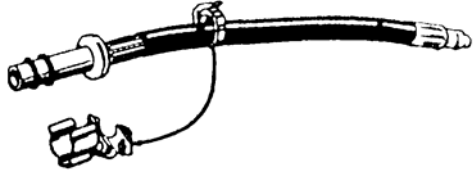







 <p>060-3200</p>	<p>1</p>	<p>1/4" MALE NPT. FORD TBI. THREADED DIRECTLY INTO THROTTLE BODY.</p>
 <p>060-4501</p>	<p>1</p>	<p>Tee Adaptor For Single Line Fuel Injection Systems</p>
 <p>060-4700</p>	<p>1</p>	<p>PRIME ADAPTOR</p>
 <p>060-2501</p>	<p>1</p>	<p>FORMS "TANK TO TANK" LOOP ON ALL VEHICLES. USED TO EXTEND VEHICLE'S RETURN LINE DURING DIAGNOSTICS.</p>

Appendix B - System Accessories

Diesel Light Truck Kit (200-3117)

The most commonly used application is listed however, other applications may apply.




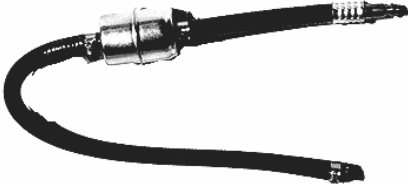



PART & NO.	QTY	APPLICATION
 <p>060-3100 080-3402 (O-Ring)</p>	1	PRESSURE LINE - MALE. G.M. M16 x 1.5
 <p>060-3105</p>	1	PRESSURE LINE - FEMALE. G.M. M16 x 1.5
 <p>060-3300 080-3302 (O-Ring)</p>	1	RETURN LINE - MALE. G.M. M14 x 1.5
 <p>060-3305</p>	1	RETURN LINE - FEMALE. G.M. M14 x 1.5
 <p>060-3500 080-3402 (O-Ring) 080-3501 (Clip)</p>	1	3/8" MALE SPRING LOCK WITH CLIP (GREY). RETURN LINE. FORD POWERSTROKE
 <p>060-3505</p>	1	3/8" FEMALE SPRING LOCK. RETURN LINE. FORD POWERSTROKE




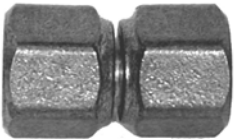



PART & NO.	QTY	APPLICATION
 <p>060-3600 080-3602 (O-Ring) 080-3601 (Clip)</p>	1	<p>1/2" MALE SPRING LOCK WITH CLIP (BLACK).</p> <p>PRESSURE LINE. FORD POWERSTROKE</p>
 <p>060-3605</p>	1	<p>1/2" FEMALE SPRING LOCK</p> <p>PRESSURE LINE. FORD POWERSTROKE</p>
 <p>060-3900</p>	2	<p>5/16" QUICK DISCONNECT</p> <p>FORD POWERSTROKE</p>
 <p>060-4200</p>	2	<p>5/16" MALE DODGE CUMMINS FORD POWERSTROKE</p>
 <p>060-4300</p>	2	<p>3/8" DODGE CUMMINS</p>
 <p>060-3901</p>	2	<p>3/8" FEMALE DODGE CUMMINS</p>
 <p>062-2040</p>	1	<p>1/2" Male Tube with Locking Quick Connect Chrysler V-10 Diesel Use with 061-1550</p>
 <p>061-1550</p>	1	<p>1/2" Open End Hose Chrysler V-10 Diesel Use with 062-2040</p>










Appendix B - System Accessories




OPTIONAL DIESEL ADAPTER LIST

The most commonly used application is listed; however, other applications may apply.

PART & NO.	APPLICATION
 <p>060-0440 060-0450</p>	HOSE CLAMPS. MEDIUM AND LARGE.
 <p>060-1400</p>	GENERAL APPLICATIONS UTILIZING 5/16" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
 <p>060-4700</p>	PRIME ADAPTOR
 <p>061-0001</p>	FILL ADAPTOR
 <p>061-0008</p>	#8 FLARE , 45 DEGREE MALE
 <p>061-0010</p>	#10 FLARE, 45 DEGREE MALE
 <p>061-0605</p>	MALE FLARE #5 JIC X #6 JIC

PART & NO.	APPLICATION
 <p data-bbox="475 369 591 401">062-2040</p>	<p data-bbox="857 247 1401 436">1/2" Male Tube with Locking Quick Connect Chrysler V-10 Diesel-trans connector or Chevrolet Duramax return fuel line. Use with 061-1550</p>
 <p data-bbox="451 594 566 625">061-1550</p>	<p data-bbox="857 516 1422 615">GENERAL APPLICATIONS UTILIZING 1/2" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)</p>
 <p data-bbox="451 747 566 779">061-5500</p>	<p data-bbox="857 663 1352 726">HOSE CONNECTOR FOR AIR BRAKE TYPE FITTINGS 1/2"</p>
 <p data-bbox="435 989 550 1020">061-1212</p>	<p data-bbox="857 852 1219 951">FEMALE FLARE COUPLER #12JIC x #12 JIC</p>
 <p data-bbox="456 1230 571 1262">061-1008</p>	<p data-bbox="857 1125 1219 1188">FEMALE FLARE COUPLER #8 JIC X #10 JIC</p>
 <p data-bbox="456 1465 571 1497">061-1210</p>	<p data-bbox="857 1350 1203 1413">45 DEGREE FLARE MALE #10 JIC X #12 JIC</p>
 <p data-bbox="456 1671 571 1703">061-0026</p>	<p data-bbox="857 1633 1130 1665">MALE FLARE #6 JIC</p>

 <p>061-0016</p>	<p>FEMALE FLARE #6 JIC</p>
 <p>060-2402</p>	<p>14MM BANJO FITTING</p>
 <p>060-2501</p>	<p>FORMS "TANK TO TANK" LOOP ON ALL VEHICLES.</p>
 <p>060-2740 (Bolt) 060-2741 (Washer) 060-2742 (Nut)</p>	<p>CONNECTS 14MM BANJO</p>
 <p>060-3200</p>	<p>1/4" MALE NPT.</p>
 <p>061-0004</p>	<p>#4 FLARE, 45 DEGREE MALE</p>
 <p>061-0005</p>	<p>#5 FLARE, 45 DEGREE MALE</p>
 <p>061-0006</p>	<p>#6 FLARE, 45 DEGREE MALE</p>
 <p>061-0505</p>	<p>#5 X #5 FEMALE FLARE (45E) COUPLER</p>

PART & NO.	APPLICATION
 <p data-bbox="451 338 566 365">061-0604</p>	<p data-bbox="857 226 1390 260">#6 X #4 FEMALE FLARE (45E) COUPLER</p>
 <p data-bbox="451 491 566 518">061-3510</p>	<p data-bbox="857 407 1459 506">GENERAL APPLICATIONS UTILIZING 3/16" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)</p>
 <p data-bbox="451 657 566 684">061-5800</p>	<p data-bbox="857 560 1430 621">HOSE CONNECTOR FOR AIR BRAKE TYPE FITTINGS 5/8"</p>

Appendix C - Parts

External Parts for the Industrial Diesel Tune

Please refer to the part numbers below when ordering parts for the unit.

MotorVac Part Number	Description
M 010-0026 V	Wheel, hub cap
M 010-0027 V	Wheel
M 010-6060 V	Reservoir Cap (tank cap)
M 020-0028 V	Power Harness with battery clips
M 050-0073 V	Filter, spin-on, 10 microns (US & Canada)
M 050-0071 V	Filter, inline for Fill adaptor (3/8" I.D. line), 20 microns
M 050-1908 V	Filter, w/bowl (2 microns), fits International models only
M 050-1909 V	Filter, cartridge (2 microns), fits International models only
M 080-0230 V	Female Quick Disconnect Coupler
M 200-3021- V A	IDT Basic Adaptor Kit, Domestic
M 200-3117 V	IDT Light Truck Kit, Domestic
M 200-3040 V	IDT Master Adaptor Kit, International models only
M 200-8241 V	Operators Manual
M 200-4023 V	Return Hose Assembly, (Black)
M 200-4024 V	Output Hose Assembly, (Red)
M 300-3015 V	(Optional) Adaptor Holder bag, black
M 400-0010 V	IDT Detergent, case 12 - 16oz. (0.47L) containers
M 400-0057 V	IDT Detergent, 15 gallon (56.8L) drum

