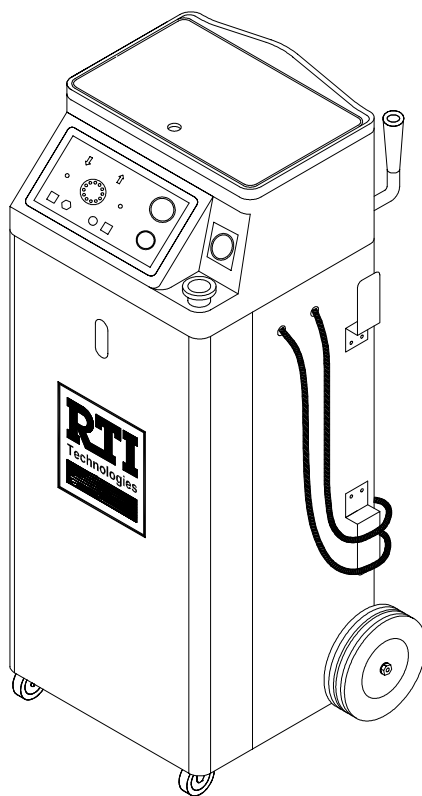


OPERATION MANUAL

ESX-2

Fuel System Cleaner



RTI Technologies, Inc
4075 East Market St.
York, PA 17402
800-468-2321
www.rtitech.com

Manual P/N 035-80873-00 (Rev A)

Table of Contents

Component Description	2
Safety Precautions	3
Keypad Functions	4
Fuel System Identification	6
Port Fuel Injection (PFI) Setup	7
Port Fuel Injection (PFI) Cleaning Procedure	10
Throttle Body Injection (TBI) Setup	11
Throttle Body Injection (TBI) Cleaning Procedure	14
Continuous Injection System (CIS) Setup	15
Continuous Injection System (CIS) Cleaning Procedure	18
Carburetor System Setup	19
Carburetor System Cleaning Procedure	22
Vehicle Diagnostic	23
Intake System Cleaning	26
Maintenance	27
Parts Identification	28
Flow & Wiring Diagram	29

BEFORE FIRST TIME USE

Pour one-half bottle (4 ounces) of the RTI FUEL SYSTEM CLEANER into the Fill Port.

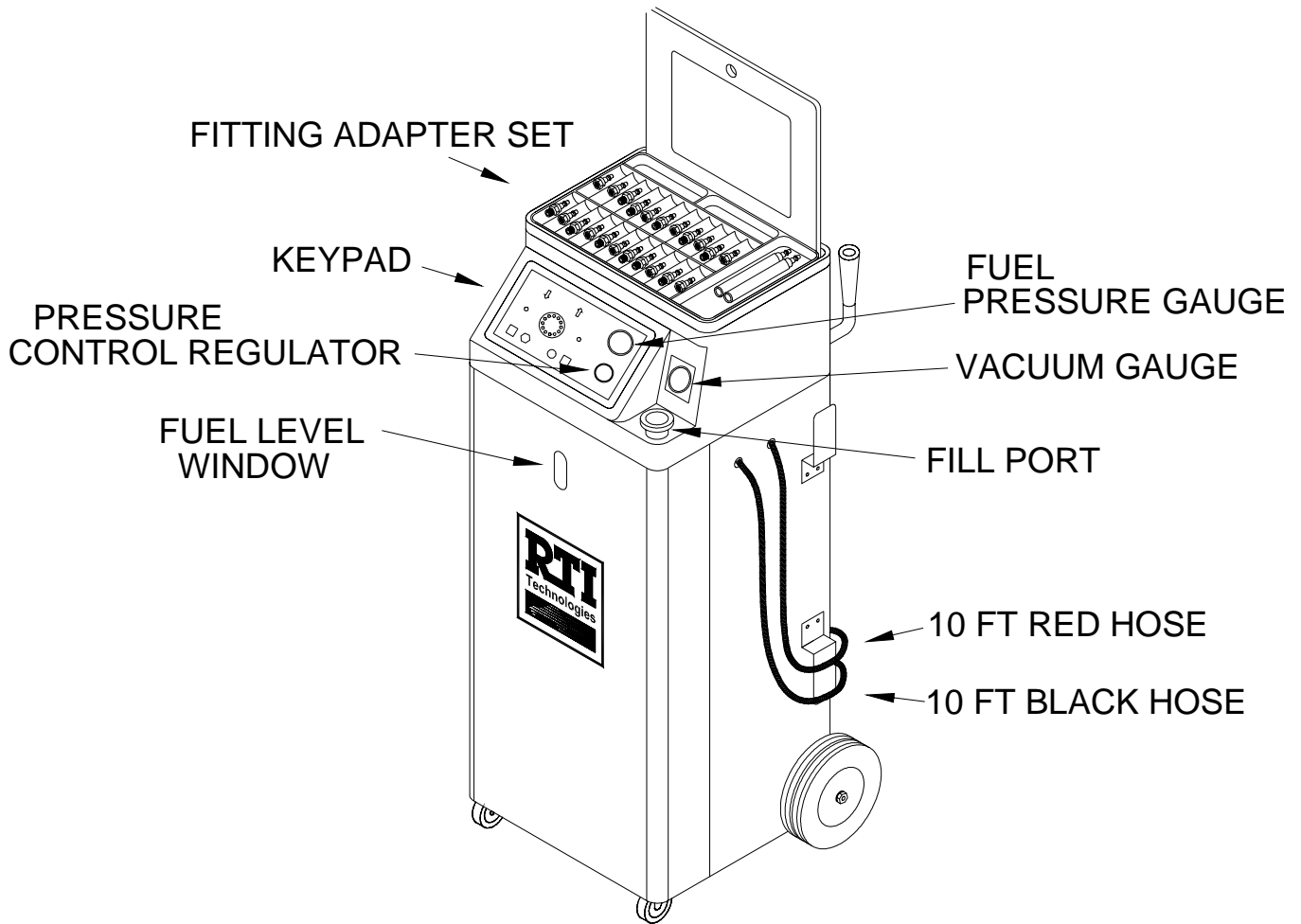
Then pour gasoline into the Fill Port until the level is at the EMPTY mark in the Fuel Level Window.

This will ensure precise concentration of fuel to cleaner.

Component Descriptions

Unpack all components. Use laminated placard to verify fitting adapter quantities. Items not shown are one RTI filter as well as 1 case (twelve bottles) of RTI FUEL SYSTEM CLEANER. Unpack RTI FUEL SYSTEM CLEANER and RTI filter. Store contents in the rear storage compartments of the ESX. (see Page 28)

Contact RTI if any items are missing or damaged.



BEFORE FIRST TIME USE

Pour one-half bottle (4 ounces) of the RTI FUEL SYSTEM CLEANER into the Fill Port.

Then pour gasoline into the Fill Port until the level is at the EMPTY mark in the Fuel Level Window.

This will ensure precise concentration of fuel to cleaner.

Safety Precautions

WARNING: Failure to follow these precautions can result in serious injury or death.

- Read and understand the Operation Manual completely before operating this unit.
- Always wear proper eye and skin protection when operating and maintaining this equipment.
- Take precautions to keep clothing, hair, hands, hoses, etc. away from all moving parts of the vehicle.
- Fuel systems can be under high pressure, even after the engine has been turned off, and engine parts can be extremely hot. **Always use extreme caution when connecting and disconnecting hoses and adapters.**
- Always keep a fire extinguishing device nearby when working with flammable liquids.
- **NOTE: Vehicle exhaust contains Carbon Monoxide, which is lethal and odorless.** Choose a well ventilated work area and avoid inhaling any fumes when operating the equipment.
- Check engine oil and coolant level. Refill if low. Do not perform the cleaning if either is low.
- Flush solutions are combustible and are harmful if swallowed. If swallowed call a doctor immediately and do not induce vomiting. If Flush Solution gets in the eyes flush with water immediately. For contact with skin wash with soap and water. Apply skin lotion if necessary to sooth irritation.
- Immediately clean up any gasoline or chemical spills and use a proper container for disposal.
- Comply with local, state, and federal regulations for fluid disposal.
- **Material Safety Data Sheets (MSDS)** must be obtained on all chemicals and placed in a shop file for reference.

BEFORE FIRST TIME USE

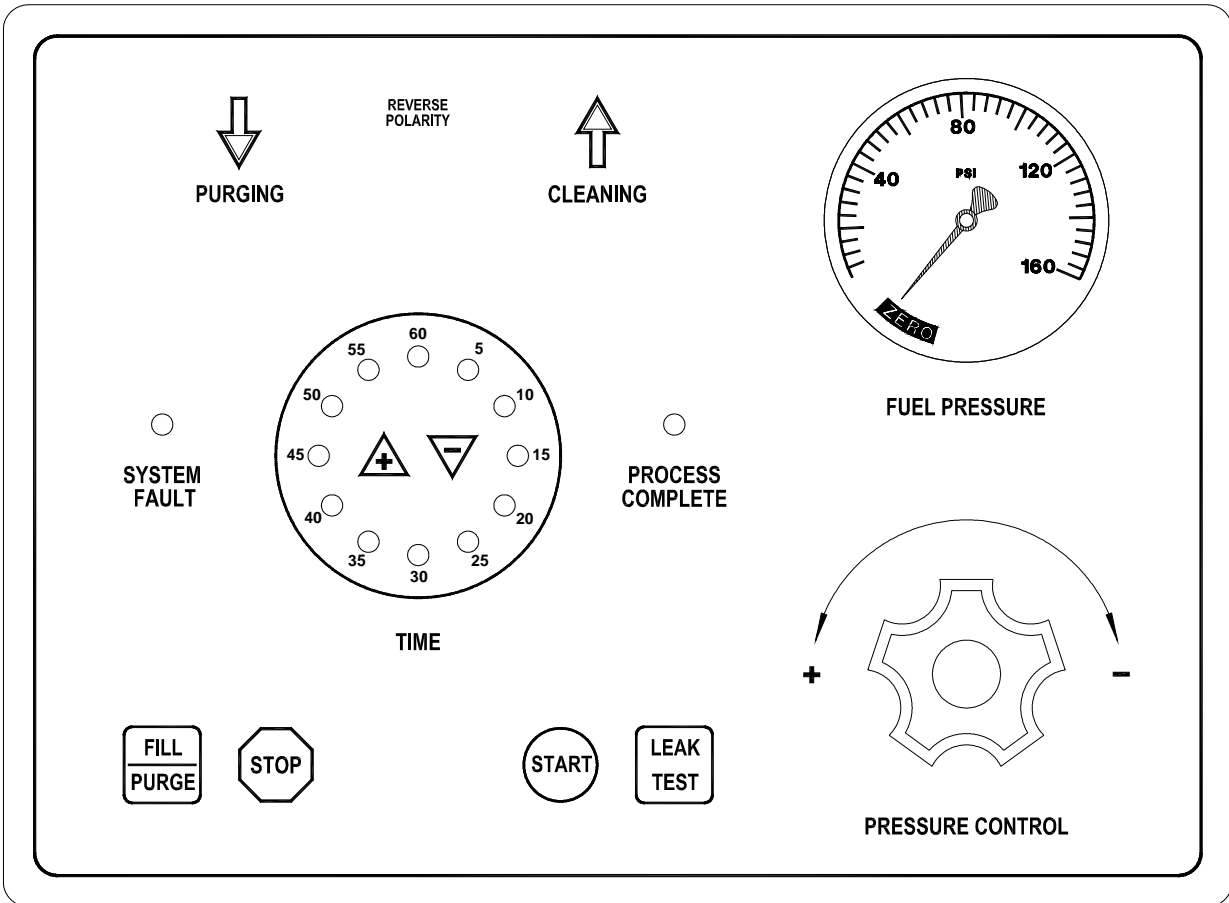
Pour one-half bottle (4 ounces) of the RTI FUEL SYSTEM CLEANER into the Fill Port.

Then pour gasoline into the Fill Port until the level is at the EMPTY mark in the Fuel Level Window.

This will ensure precise concentration of fuel to cleaner.

Keypad Functions

The ESX is an automatic fuel system cleaning machine that has state-of-the-art controls. Operation of this machine is intuitive and easy to master. Below is a list of the keypad functions.



Fills tank inside the ESX unit from the vehicle fuel system. Also used to purge or relieve the pressure in the pressure line in the fuel system before disconnecting.



Stops any procedure the moment it is pushed. Also acknowledges the completion of a process and is used to stop the buzzer.



Held to set pressure for the cleaning processes which in turn begins the cleaning procedure, also can be used to empty the system contents.



Holds pressure in the lines while the timer counts down a default or adjusted time. The default time is 5 minutes.

Keypad Functions



SYSTEM
FAULT

Illuminates whenever there is an error with the selected procedure.



PROCESS
COMPLETE

Illuminates when the selected process is complete. The buzzer will sound continuously when this is illuminated.



CLEANING

Illuminates when the ESX is pumping out of the red line. Examples of this are the cleaning procedure and when emptying the internal tank.



PURGING

Illuminates when the ESX is pulling from the red line. Examples of this are the purging procedure and when filling from the vehicle fuel system.



Increases and decreases by 5 minute intervals the remaining time on the LED timer.

BEFORE FIRST TIME USE

Pour one-half bottle (4 ounces) of the RTI FUEL SYSTEM CLEANER into the Fill Port.

Then pour gasoline into the Fill Port until the level is at the EMPTY mark in the Fuel Level Window.

This will ensure precise concentration of fuel to cleaner.

Fuel System Identification

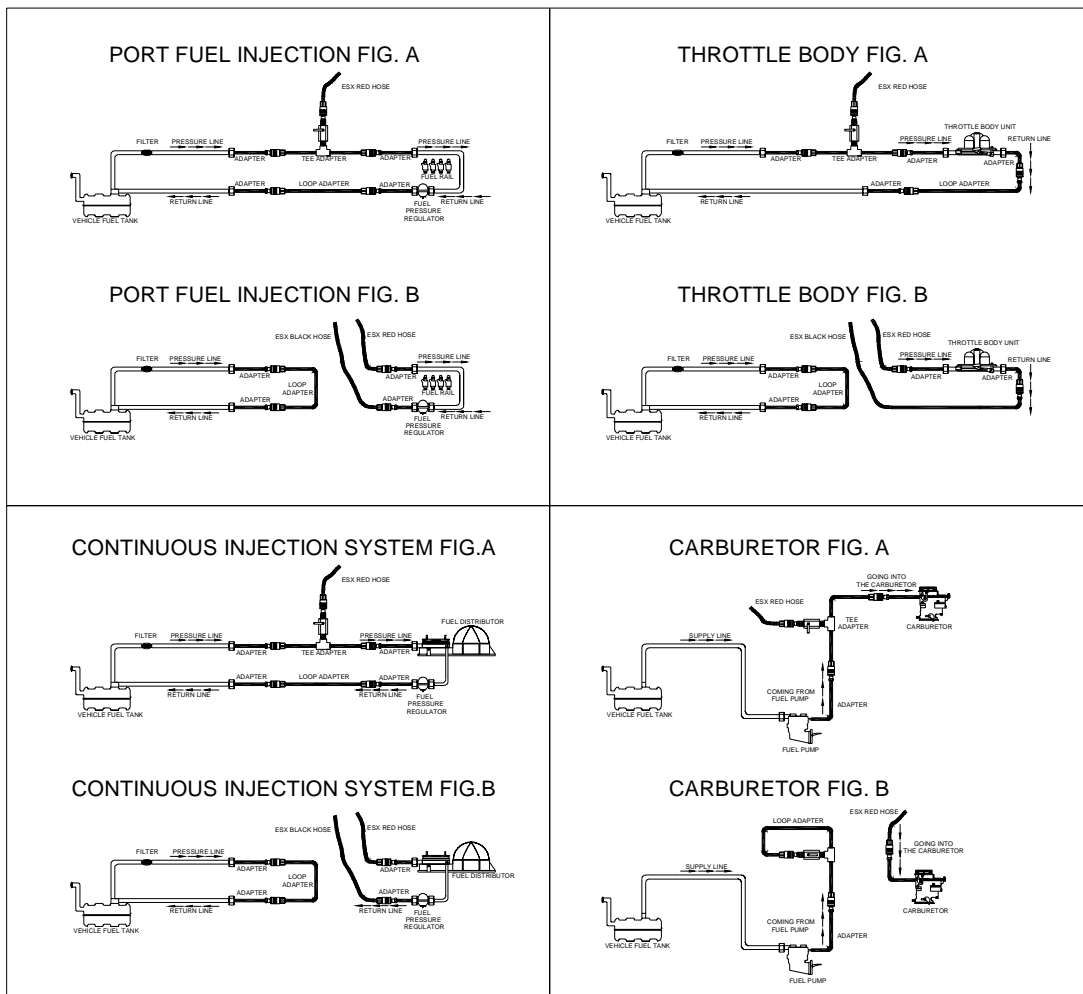
The Fuel System type must be determined before proceeding with any cleaning or diagnostic procedures. The following four systems are the only types that can be serviced with the RTI ESX unit.

Port Fuel Injection (PFI)- This system uses a single electronic injector per cylinder, mounted such that fuel spray is directed into the intake port. (See Page 7)

Throttle Body Injection (TBI) - Centrally mounted, like the carburetor system, but utilizes one or two electronic injectors. (See Page 11)

Continuous Injection System (CIS) - Look for the fuel distributor with solid steel or flex steel lines running from the fuel distributor to each individual injector. The fuel distributor controls the amount of fuel sprayed into the intake port while the injector controls opening and closing pressure. (See Page 15)

Carburetor System - Sizes and shapes vary, but these systems are easily identified by locating the choke plate underneath the air filter housing. (See Page 19)



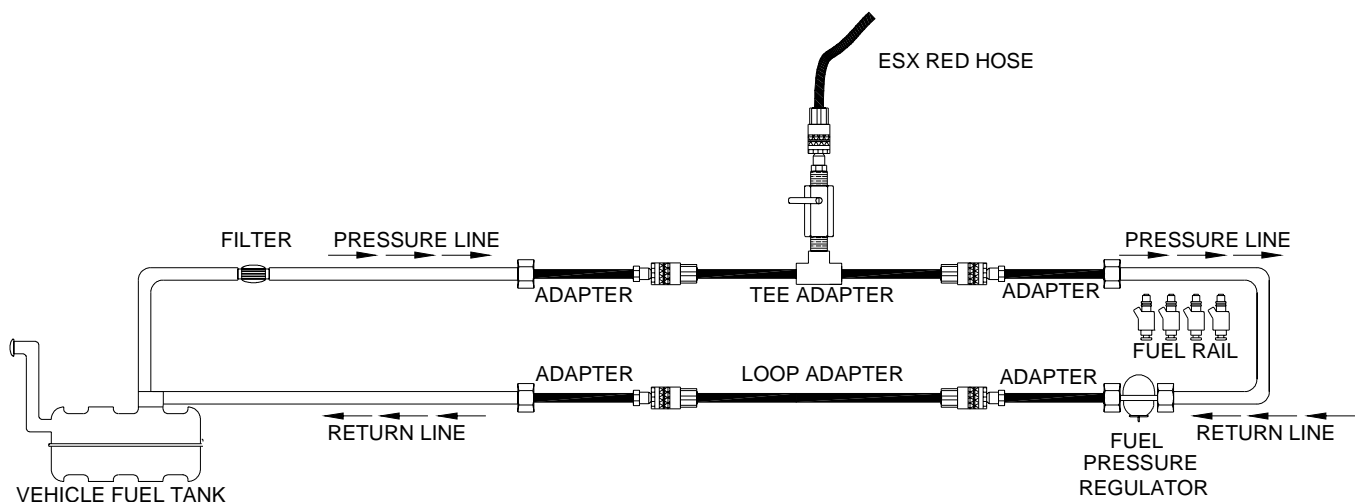
Port Fuel Injection (PFI) Setup

The following steps will prepare the ESX for the cleaning procedure. Make sure the vehicle fuel gauge reads at least 1/8th of a tank before continuing.

Note: Do not proceed with this setup or any cleaning procedure if the engine oil or coolant level is low. If necessary add appropriate amount of coolant and/or oil to the engine.

Note: If Intake System Cleaning is desired refer to page 26 for proper instructions.

1. Start the vehicle and allow engine to reach normal operating temperature. Turn vehicle **OFF** when the proper temperature is reached.
2. Turn Pressure Control regulator counterclockwise until it is completely open.
3. Connect red (positive) clamp on power cable to red (positive) terminal on vehicle battery. Connect the black (negative) clamp to a ground on vehicle frame as far from the battery as possible. All LED's on keypad should illuminate for one second and buzzer should pulse. If not, check connections and make sure **REVERSE POLARITY LED** is not illuminated. If **REVERSE POLARITY LED** is illuminated reverse the battery connections.
4. Remove vehicle gas cap to relieve fuel tank pressure.
5. With the engine no longer running, disconnect the vehicle fuel lines from the fuel rail. There are now four open ends to connect to: the **Pressure Line from the fuel tank**, the other **Pressure Line going to the rail**, the **Return Line from the fuel rail**, and the other **Return Line to the fuel tank**.
6. Connect the proper adapters to the above listed connection points as shown in the following illustration.



Port Fuel Injection (PFI) Setup

7. Attach the Tee adapter to both pressure line adapters, the valve should be in the closed position. Then connect the ESX Red Hose to the valve on the Tee adapter as shown in the previous illustration.
8. Attach Loop adapter to both return side adapters as shown in the previous illustration. Note that the ESX Black Hose is not used at this time.
9. Start the vehicle, turn the Tee adapter valve counterclockwise to open it. Check for leaks. Watch the Fuel Pressure gauge on the ESX control panel. A drop in pressure could indicate a leak.

CAUTION - CAUTION - CAUTION

-DIAGNOSTICS-

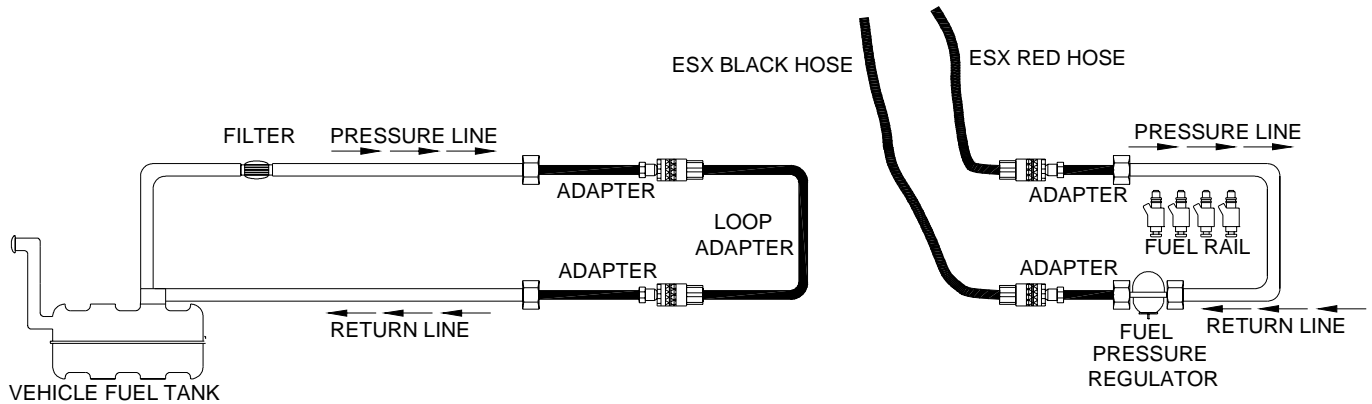
The fuel system is now ready to perform diagnostic tests. The Leakdown Test has to be performed prior to the pre-cleaning procedure to eliminate the possibility of a leaky injector. If an injector is leaking and the operator continues without testing, a cylinder may fill with gasoline and cause serious engine damage or possible engine failure. For instructions on how to perform all of the diagnostic tests, refer to the Vehicle Diagnostic section (see Page 23). Once completed, continue with Step 10 below.

10. Press and hold the **Fill/Purge** button on the Keypad until the Fuel Level window indicates an increase of 1/4 in the ESX fuel tank. If the vehicle stalls, turn the valve on the Tee adapter 1/8 turn clockwise. Restart the vehicle and slowly open the valve, by turning counterclockwise, until the engine starts to stutter. Ease the valve back until the engine smooths and continue filling. If the vehicle repeatedly stalls repeat this step until ESX fuel tank is 1/4 full.
11. **Turn OFF the vehicle.**
12. Add 8 oz. of RTI FUEL SYSTEM CLEANER, through the ESX fill port for every 1/4 added to the ESX fuel tank.
13. Press and hold the **Fill/Purge** button for five seconds to relieve the pressure in the ESX Red Hose.

CAUTION: Flammable liquid can squirt out of pressurized fuel lines when connecting or disconnecting. Always wear eye protection. Obtain zero pressure before connecting or disconnecting any fuel lines or adapters. Always wear chemical resistant gloves when connecting or disconnecting fuel lines. Wrap a shop rag around the pressure point when connecting or disconnecting. Avoid exposure to flames, sparks, hot engine parts, and/or ignition sources. By not following the above cautionary steps the operator will be subjecting himself to serious injury or possible death.

Port Fuel Injection (PFI) Setup

- Carefully disconnect the Loop adapter from the return lines. Close the valve on the Tee adapter and carefully disconnect the Tee adapter from the ESX Red Hose and the pressure lines.
- Connect one end of the Loop adapter to the pressure line coming from the vehicle fuel tank. Connect the other end of the loop adapter to the return line going back to the fuel tank. This forms a loop making it unnecessary to disconnect the fuel pump. This connection is illustrated below.



- Connect the ESX Red Hose to the pressure line going into the fuel rail. Connect the ESX Black Hose to the return line coming from the fuel rail. These connections are shown in the illustration above.

Port Fuel Injection (PFI) Cleaning Procedure

The following steps will circulate the cleaning mixture through the Port Fuel Injection System, cleaning the fuel rail, injector screens and pressure regulator.

1. Verify that the Port Fuel Injection Setup section is complete.
2. Press and hold the **Start** button.
3. Turn the ESX Pressure Control regulator clockwise until the Fuel Pressure Gauge displays at least 4 psi or the Cleaning Arrow LED stays illuminated. This will clean the PFI unit, injector screens, fuel rail, and pressure regulator and filter any contaminants through the ESX filtering system.
4. Release the **Start** button and continue to turn ESX Pressure Control regulator clockwise until it is completely closed. Make a note of the Fuel Pressure gauge reading. This is the true operating pressure of the vehicle pressure regulator without vacuum assist when the engine is running at normal operating temperature.
5. Press the **+** button to increase or the **-** button to decrease the time on the ESX LED timer display until the 10 minute LED is illuminated.

Caution: If a Leakdown test has not been performed, do not proceed with the following steps. Refer to the Setup procedure for the correct instructions.

6. After time has expired on the rail cleaning process press the **START** button until the pressure rises again.
7. Press the **+** button to increase or the **-** button to decrease the time on the ESX LED timer display until the 30 minute LED is illuminated. Run time may be adjusted depending on the condition of the vehicle fuel system.
8. Start the vehicle to begin the engine cleaning procedure. At this time if the vehicle is equipped with a cold start injector you may use an injector pulser to energize the cold start injector a few times to clean it.
9. When the time expires, the unit will automatically shut off and purge itself for five seconds. This will shut off the engine and illuminate the **PROCESS COMPLETE** LED as well as sound the buzzer. **Turn the vehicle ignition OFF.**
10. Turn the Pressure Control regulator counterclockwise to open it and press and hold the **FILL/PURGE** button for five seconds to relieve pressure in the ESX Red Hose.
11. Disconnect loop adapter and use a shop rag at all connection points before disconnecting.
12. Disconnect the battery leads, hoses, and adapters. Reconnect all of the vehicle fuel lines. Reinstall the vehicle fuel cap.
13. Start the vehicle and verify that there are no leaks in the fuel system.
14. Always test drive the vehicle for three miles or run at 3000 rpm for two to three minutes to flush all RTI FUEL SYSTEM CLEANER out of the vehicle fuel and exhaust system.

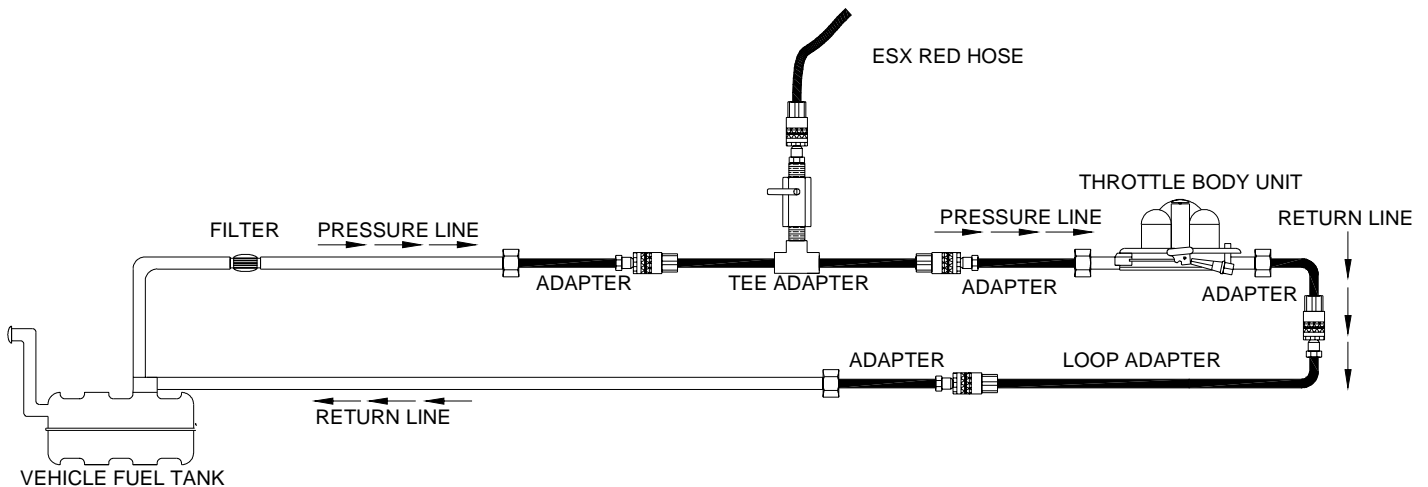
Throttle Body Injection (TBI) Setup

The following steps will prepare the ESX for the cleaning procedure. Make sure the vehicle fuel gauge reads at least 1/8th of a tank before continuing.

Note: Do not proceed with this setup or any cleaning procedure if the engine oil or coolant level is low. If necessary add appropriate amount of coolant and/or oil to the engine.

Note: If Intake System Cleaning is desired refer to page 26 for proper instructions.

1. Start the vehicle and allow engine to reach normal operating temperature. Turn vehicle **OFF** when the proper temperature is reached.
2. Turn Pressure Control regulator counterclockwise until it is completely open.
3. Connect red (positive) clamp on power cable to red (positive) terminal on vehicle battery. Connect the black (negative) clamp to a ground on vehicle frame as far from the battery as possible. All LED's on keypad should illuminate for one second and buzzer should pulse. If not, check connections and make sure **REVERSE POLARITY LED** is not illuminated. If **REVERSE POLARITY LED** is illuminated reverse the battery connections.
4. Remove vehicle gas cap to relieve fuel tank pressure.
5. With the engine no longer running disconnect the vehicle fuel lines from the fuel rail. There are now four open ends to connect to: the **Pressure Line from the fuel tank**, the other **Pressure Line going to the throttle body**, the **Return Line from the throttle body**, and the other **Return Line to the fuel tank**.
6. Connect the proper adapters to the above listed connection points as shown in the following illustration.



Throttle Body Injection (TBI) Setup

7. Attach the Tee adapter to both pressure line adapters, the valve should be in the closed position. Then connect the ESX Red Hose to the valve on the Tee adapter as shown in the previous illustration.
8. Attach Loop adapter to both return side adapters as shown in the previous illustration. Note that the ESX Black Hose is not used at this time.
9. Start the vehicle, turn the Tee adapter valve counterclockwise to open it. Check for leaks. Watch the Fuel Pressure gauge on the ESX control panel. A drop in pressure could indicate a leak.

CAUTION - CAUTION - CAUTION

-DIAGNOSTICS-

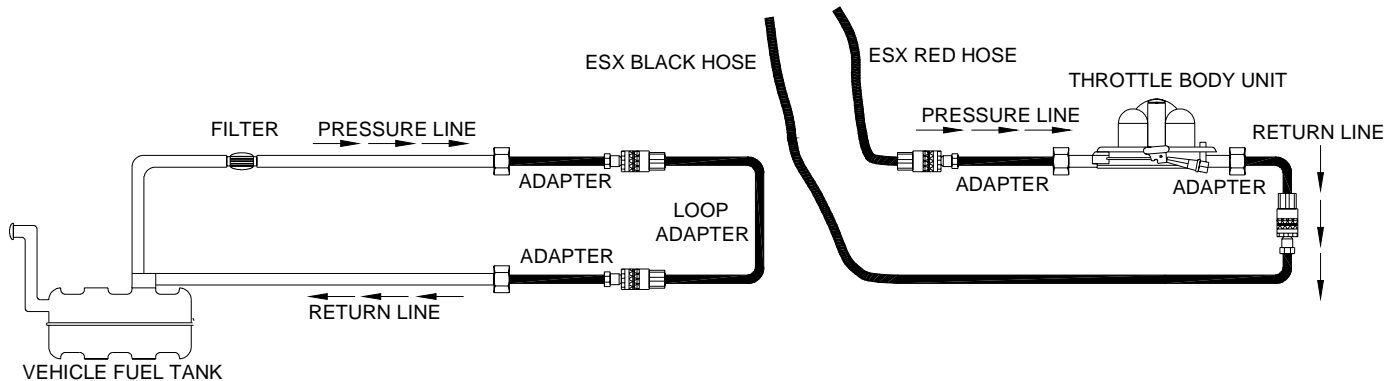
The fuel system is now ready to perform diagnostic tests. The Leakdown Test has to be performed prior to the pre-cleaning procedure to eliminate the possibility of a leaky injector. If an injector is leaking and the operator continues without testing, a cylinder may fill with gasoline and cause serious engine damage or possible engine failure. For instructions on how to perform all of the diagnostic tests, refer to the Vehicle Diagnostic section (see Page 23). Once completed, continue with Step 10 below.

10. Press and hold the **Fill/Purge** button on the Keypad until the Fuel Level window indicates an increase of 1/4 in the ESX fuel tank. If the vehicle stalls, turn the valve on the Tee adapter 1/8 turn clockwise. Restart the vehicle and slowly open the valve, by turning counterclockwise, until the engine starts to stutter. Ease the valve back until the engine smooths and continue filling. If the vehicle repeatedly stalls repeat this step until ESX fuel tank is 1/4 full.
11. **Turn OFF the vehicle.**
12. Add 8 oz. of RTI FUEL SYSTEM CLEANER, through the ESX fill port for every 1/4 added to the ESX fuel tank.
13. Press and hold the **Fill/Purge** button for five seconds to relieve the pressure in the ESX Red Hose.

CAUTION: Flammable liquid can squirt out of pressurized fuel lines when connecting or disconnecting. Always wear eye protection. Obtain zero pressure before connecting or disconnecting any fuel lines or adapters. Always wear chemical resistant gloves when connecting or disconnecting fuel lines. Wrap a shop rag around the pressure point when connecting or disconnecting. Avoid exposure to flames, sparks, hot engine parts, and/or ignition sources. By not following the above cautionary steps the operator will be subjecting himself to serious injury or possible death.

Throttle Body Injection (TBI) Setup

- Carefully disconnect the Loop adapter from the return lines. Close the valve on the Tee adapter and carefully disconnect the Tee adapter from the ESX Red Hose and the pressure lines.
- Connect one end of the Loop adapter to the pressure line coming from the vehicle fuel tank. Connect the other end of the loop adapter to the return line going back to the fuel tank. This forms a loop making it unnecessary to disconnect the fuel pump. This connection is illustrated below.



- Connect the ESX Red Hose to the pressure line going into the TBI unit. Connect the ESX Black Hose to the return line coming from the TBI unit. These connections are shown in the illustration above.

Throttle Body Injection (TBI) Cleaning Procedure

The following steps will circulate the cleaning mixture through the Throttle Body Injection System cleaning the throttle body, injector screens and pressure regulator.

1. Verify that the Throttle Body Injection Setup section is complete.
2. Press and hold the **Start** button.
3. Turn the ESX Pressure Control regulator clockwise until the Fuel Pressure Gauge displays at least 4 psi or the Cleaning Arrow LED stays illuminated. This will clean the TBI unit, injector screens, throttle body, and pressure regulator and filter any contaminants through the ESX filtering system.
4. Release the **Start** button and continue to turn ESX Pressure Control regulator clockwise until it is completely closed. Make a note of the Fuel Pressure gauge reading. This is the true operating pressure of the vehicle pressure regulator without vacuum assist when the engine is running at normal operating temperature.

Caution: If a Leakdown test has not been performed, do not proceed with the following steps. Refer to the Setup procedure for the correct instructions.

5. Press the **+** button to increase or the **-** button to decrease the time on the ESX LED timer display until the 10 minute LED is illuminated.
6. After time has expired on the rail cleaning process press the **START** button until the pressure rises again.
7. Press the **+** button to increase or the **-** button to decrease the time on the ESX LED timer display until the 30 minute LED is illuminated. Run time may be adjusted depending on the condition of the vehicle fuel system.
8. Start the vehicle to begin the engine cleaning procedure.
9. When the time expires, the unit will automatically shut off and purge itself for five seconds. This will shut off the engine and illuminated the **PROCESS COMPLETE** LED as well as sound the buzzer. **Turn the vehicle ignition OFF.**
10. Turn the Pressure Control regulator counterclockwise to open it and press and hold the **FILL/PURGE** button for five seconds to relieve pressure in the ESX Red Hose.
11. Disconnect loop adapter and use a shop rag at all connection points before disconnecting.
12. Disconnect the battery leads, hoses, and adapters. Reconnect all of the vehicle fuel lines. Reinstall the vehicle fuel cap.
13. Start the vehicle and verify that there are no leaks in the fuel system.
14. Always test drive the vehicle for three miles or run at 3000 rpm for two to three minutes to flush all RTI FUEL SYSTEM CLEANER out of the vehicle fuel and exhaust system.

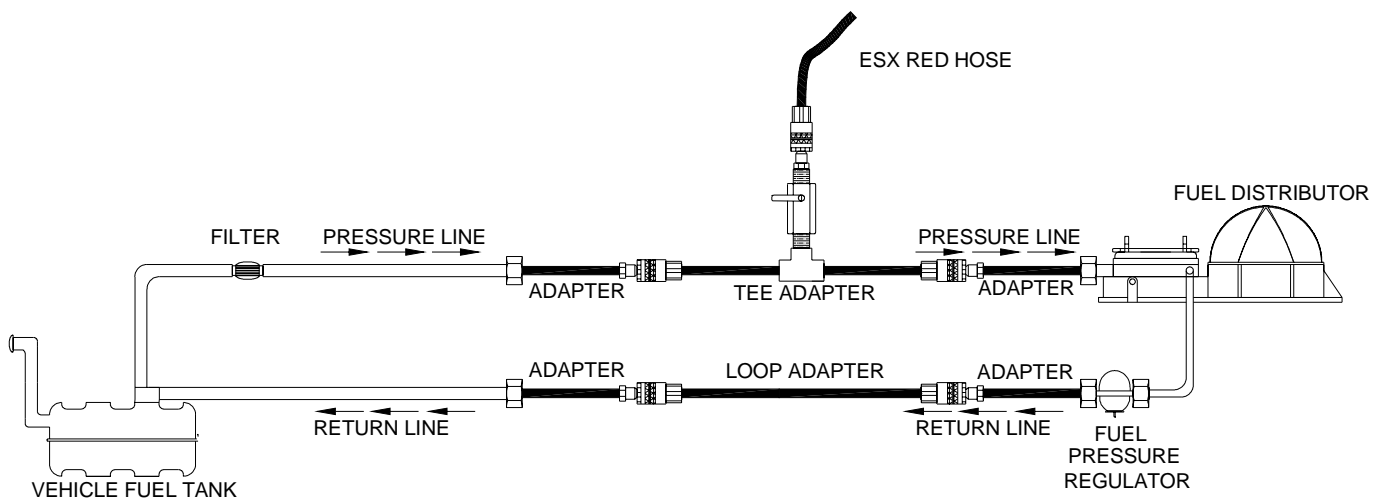
Continuous Injection System (CIS) Setup

The following steps will prepare the ESX for the cleaning procedure. Make sure the vehicle fuel gauge reads at least an 1/8 of a tank before continuing.

Note: Do not proceed with this setup or any cleaning procedure if the engine oil or coolant level is low. If necessary add appropriate amount of coolant and/or oil to the engine.

Note: If Intake System Cleaning is desired refer to page 26 for proper instructions.

1. Start the vehicle and allow engine to reach normal operating temperature. Turn vehicle **OFF** when the proper temperature is reached.
2. Turn the Pressure Control regulator counterclockwise until it is completely open.
3. Connect red (positive) clamp on power cable to red (positive) terminal on vehicle battery. Connect the black (negative) clamp to a ground on vehicle frame as far from the battery as possible. All LED's on keypad should illuminate for one second and buzzer should pulse. If not, check connections and make sure **REVERSE POLARITY LED** is not illuminated. If **REVERSE POLARITY LED** is illuminated reverse the battery connections.
4. Remove vehicle gas cap to relieve fuel tank pressure.
5. With the engine no longer running, disconnect the vehicle fuel lines from the fuel rail. There are now four open ends to connect to; the **Pressure Line from the fuel tank**, the other **Pressure Line going to fuel distributor**, the **Return Line from the fuel distributor**, and the other **Return Line to the fuel tank**.
6. Connect the proper adapters to the above listed connection points as shown in the following illustration.



Continuous Injection System (CIS) Setup

7. Attach the Tee adapter to both pressure line adapters, the valve should be in the closed position. Then connect the ESX Red Hose to the valve on the Tee adapter as shown in the previous illustration.
8. Attach Loop adapter to both return side adapters as shown in the previous illustration. Note that the ESX Black Hose is not used at this time.
9. Start the vehicle, turn the Tee adapter valve counterclockwise to open it. Check for leaks. Watch the Fuel Pressure gauge on the ESX control panel. A drop in pressure could indicate a leak.

CAUTION - CAUTION - CAUTION

-DIAGNOSTICS-

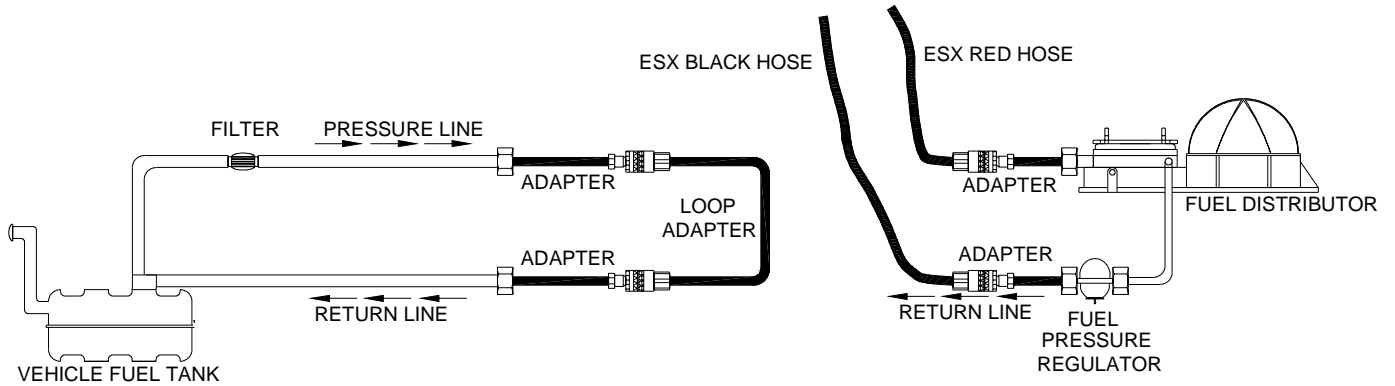
The fuel system is now ready to perform diagnostic tests. The Leakdown Test has to be performed prior to the pre-cleaning procedure to eliminate the possibility of a leaky injector. If an injector is leaking and the operator continues without testing, a cylinder may fill with gasoline and cause serious engine damage or possible engine failure. For instructions on how to perform all of the diagnostic tests, refer to the Vehicle Diagnostic section (see Page 23). Once completed, continue with Step 10 below.

10. Press and hold the **Fill/Purge** button on the Keypad until the Fuel Level window indicates an increase of 1/4 in the ESX fuel tank. If the vehicle stalls, turn the valve on the Tee adapter 1/8 turn clockwise. Restart the vehicle and slowly open the valve, by turning counterclockwise, until the engine starts to stutter. Ease the valve back until the engine smooths and continue filling. If the vehicle repeatedly stalls repeat this step until ESX fuel tank is 1/4 full.
11. **Turn OFF the vehicle.**
12. Add 8 oz. of RTI FUEL SYSTEM CLEANER, through the ESX fill port for every 1/4 added to the ESX fuel tank.
13. Press and hold the **Fill/Purge** button for five seconds to relieve the pressure in the ESX Red Hose.

CAUTION: Flammable liquid can squirt out of pressurized fuel lines when connecting or disconnecting. Always wear eye protection. Obtain zero pressure before connecting or disconnecting any fuel lines or adapters. Always wear chemical resistant gloves when connecting or disconnecting fuel lines. Wrap a shop rag around the pressure point when connecting or disconnecting. Avoid exposure to flames, sparks, hot engine parts, and/or ignition sources. By not following the above cautionary steps the operator will be subjecting himself to serious injury or possible death.

Continuous Injection System (CIS) Setup

- Carefully disconnect the Loop adapter from the return lines. Close the valve on the Tee adapter and carefully disconnect the Tee adapter from the ESX Red Hose and the pressure lines.
- Connect one end of the Loop adapter to the pressure line coming from the vehicle fuel tank. Connect the other end of the loop adapter to the return line going back to the fuel tank. This forms a loop making it unnecessary to disconnect the fuel pump. This connection is illustrated below.



- Connect the ESX Red Hose to the pressure line going into the fuel distributor. Connect the ESX Black Hose to the return line coming from the fuel distributor. These connections are shown in the illustration above.

Continuous Injection System (CIS)

Cleaning Procedure

The following steps will circulate the cleaning mixture through the CIS fuel distributor cleaning the top portion of the fuel distributor and pressure regulator.

1. Verify that the Continuous Injection System Setup section is complete.
2. Press and hold the **Start** button.
3. Connect red (positive) clamp on power cable to red (positive) terminal on vehicle battery. Connect the black (negative) clamp to a ground on vehicle frame as far from the battery as possible. All LEDs on keypad should illuminate for 1 second and buzzer should pulse. If not, check connections and make sure **REVERSE POLARITY** LED is not illuminated. If **REVERSE POLARITY** LED is illuminated reverse the battery connections.
4. Release the **Start** button and continue to turn ESX Pressure Control regulator clockwise until it is completely closed. Make a note of the Fuel Pressure gauge reading. This is the true operating pressure of the vehicle pressure regulator without vacuum assist when the engine is running at normal operating temperature.

Caution: If a Leakdown test has not been performed, do not proceed with the following steps. Refer to the Setup procedure for the correct instructions.

5. Press the **+** button to increase or the **-** button to decrease the time on the ESX LED timer display until the 10 minute LED is illuminated.
6. After time has expired on the rail cleaning process press the **START** button until the pressure rises again.
7. Press the **+** button to increase or the **-** button to decrease the time on the ESX LED timer display until the 30 minute LED is illuminated. Run time may be adjusted depending on the condition of the vehicle fuel system.
8. Start the vehicle to begin the engine cleaning procedure. At this time if the vehicle is equipped with a Cold Start Injector you may use an Injector Pulser to energize the Cold Start Injector a few time to clean it. When the cleaning process is halfway complete, step on the vehicle accelerator quickly three to four times and the hold at 2000 RPM for 30 seconds.
9. **Do not allow the CIS fuel system to run out of fuel. Turn off the vehicle engine before the time expires on the ESX timer.** When the time expires the unit will automatically shut off and purge itself for five seconds. This will illuminate the **PROCESS COMPLETE** LED as well as sound the buzzer.
10. Turn the Pressure Regulator counterclockwise to open it and press and hold the **FILL/PURGE** button for five seconds to relieve pressure in the ESX Red Hose.
11. Disconnect loop adapter and use a shop rag at all connection points before disconnecting.
12. Disconnect the battery leads, hoses, and adapters. Reconnect all of the vehicle fuel lines. Reinstall the vehicle fuel cap.
13. Start the vehicle and verify that there are no leaks in the fuel system.
14. Always test drive the vehicle for three miles or run at 3000 rpm for two to three minutes to flush all RTI FUEL SYSTEM CLEANER out of the vehicle fuel and exhaust system.

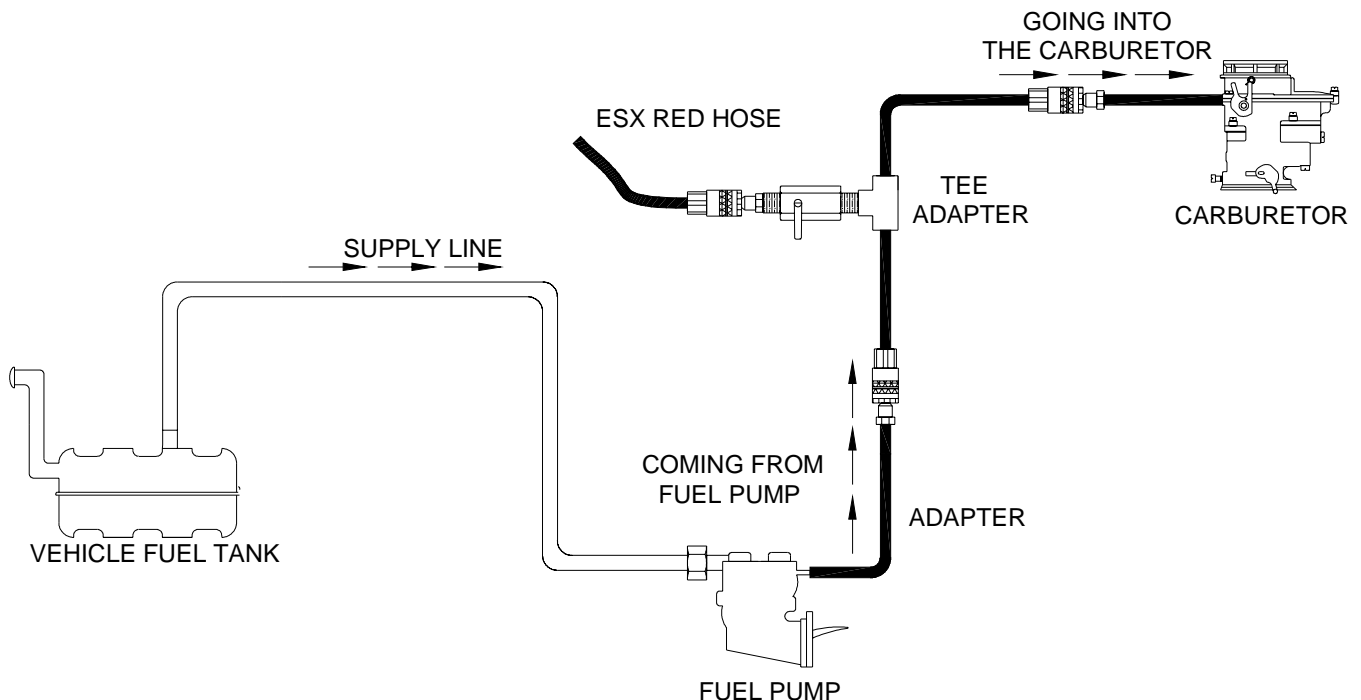
Carburetor System Setup

The following steps will prepare the ESX for the cleaning procedure. Make sure the vehicle fuel gauge reads at least an 1/8 of a tank before continuing.

Note: Do not proceed with this setup or any cleaning procedure if the engine oil or coolant level is low. If necessary add appropriate amount of coolant and/or oil to the engine.

Note: If Intake System Cleaning is desired refer to page 26 for proper instructions.

1. Start the vehicle and allow engine to reach normal operating temperature. Turn vehicle **OFF** when the proper temperature is reached.
2. Turn the Pressure Control regulator counterclockwise until it is completely open.
3. Connect red (positive) clamp on power cable to red (positive) terminal on vehicle battery. Connect the black (negative) clamp to a ground on vehicle frame as far from the battery as possible. All LED's on keypad should illuminate for one second and buzzer should pulse. If not, check connections and make sure **REVERSE POLARITY** LED is not illuminated. If **REVERSE POLARITY** LED is illuminated reverse the battery connections.
4. Remove vehicle gas cap to relieve fuel tank pressure.
5. With the engine no longer running, disconnect the vehicle fuel lines at the carburetor inlet or at the fuel pump outlet. There are now two open ends to connect to: the hose **coming from the fuel pump**, the other hose **going into the carburetor**.
6. Connect the proper adapters to the above listed connection points as shown in the following illustration.



Carburetor System Setup

7. Attach the Tee adapter to adapters. Then connect the ESX Red Hose to the valve on the Tee adapter as shown in the previous illustration.
8. Note that the ESX Black Hose is not used at this time.
9. Start the vehicle, turn the Tee adapter valve counterclockwise to open it. Check for leaks. Watch the Fuel Pressure gauge on the ESX control panel. A drop in pressure could indicate a leak. If there are no leaks, note the fuel gauge pressure at this time.

-DIAGNOSTICS-

The fuel system is now ready to perform diagnostic tests if desired.

For instructions on how to perform these tests, refer to the Vehicle

Diagnostic section (see Page 23). If fuel system diagnostics are not

desired, continue with the cleaning procedure beginning with Step 10 below.

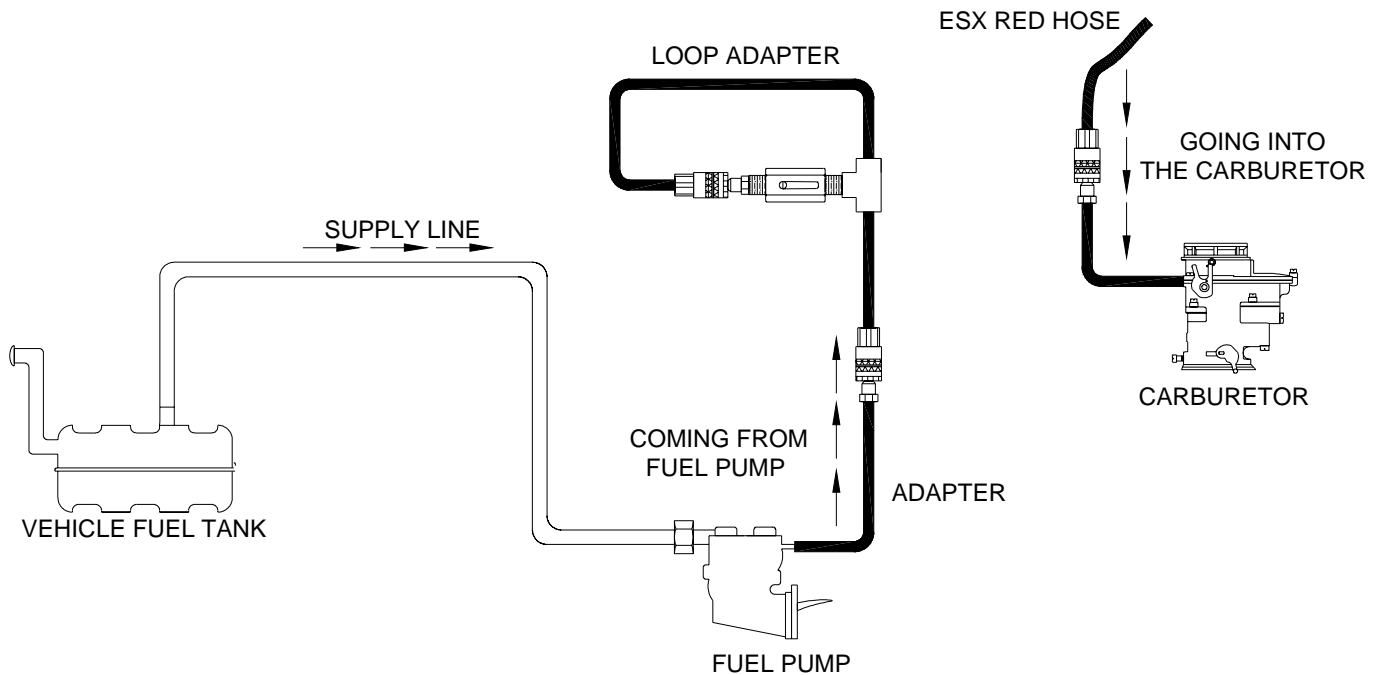
10. Press and hold the **Fill/Purge** button on the Keypad until the Fuel Level window indicates an increase of 1/4 in the ESX fuel tank. If the vehicle stalls, turn the valve on the Tee adapter 1/8 turn clockwise. Restart the vehicle and slowly open the valve, by turning counterclockwise, until the engine starts to stutter. Ease the valve back until the engine smooths and continue filling. If the vehicle repeatedly stalls repeat this step until ESX fuel tank is 1/4 full.
11. **Turn OFF the vehicle.**
12. Add 8 oz. of RTI FUEL SYSTEM CLEANER, through the ESX fill port for every 1/4 added to the ESX fuel tank.
13. Verify that the ESX Pressure Control regulator is completely open (counterclockwise). Press and hold the **Fill/Purge** button for five seconds to relieve the pressure in the ESX Red Hose.

CAUTION: Flammable liquid can squirt out of pressurized fuel lines when connecting or disconnecting. Always wear eye protection. Obtain zero pressure before connecting or disconnecting any fuel lines or adapters. Always wear chemical resistant gloves when connecting or disconnecting fuel lines. Wrap a shop rag around the pressure point when connecting or disconnecting. Avoid exposure to flames, sparks, hot engine parts, and/or ignition sources. By not following the above cautionary steps the operator will be subjecting themselves to serious injury or possible death.

14. Close the valve on the Tee adapter and then carefully disconnect the Tee adapter from the ESX Red Hose.

Carburetor System Setup

15. Disconnect the female end of the Tee adapter from the carburetor and connect it to itself at the Tee adapter valve. This stops the flow of fuel from the vehicle to the carburetor during the cleaning process. This connection is shown in the illustration below.



16. Connect the ESX Red hose to the adapter going into the carburetor. This connection is shown in the illustration above.

Carburetor System Cleaning Procedure

The following steps will circulate the cleaning mixture through the carburetor.

1. Verify that the Carburetor Fuel System Setup section is complete.
2. Press and hold the **Start** button.
3. Slowly turn the ESX Pressure Control regulator clockwise until the Cleaning Arrow LED stays illuminated or the Fuel Pressure Gauge displays at least 4 psi. The pressure may have to be increased to the pressure previously noted in step 9 of the Carburetor Fuel System Setup.
4. Release the **Start** button and press the **+** button to increase or the **-** button to decrease the time on the ESX LED timer display until the 30 minute LED is illuminated. Run time may be adjusted depending on the condition of the vehicle fuel system.
5. Start the vehicle to begin the engine cleaning procedure. When the cleaning process is halfway complete, step on the vehicle accelerator quickly three to four times and hold at 2000 RPM for 30 seconds.
6. When the time expires the unit will automatically shut off and purge itself for five seconds. This will shut off the engine and illuminate the **PROCESS COMPLETE** LED as well as sound the buzzer. **Turn the vehicle ignition OFF.**
7. Turn the Pressure Control regulator counterclockwise to open it and press and hold the **FILL/PURGE** button for five seconds to relieve pressure in the ESX Red Hose.
8. Close valve on Tee adapter and use a shop rag at all connection points before disconnecting.
9. Disconnect the battery leads, hoses, and adapters. Reconnect all of the vehicle fuel lines. Reinstall the vehicle fuel cap.
10. Start the vehicle and verify that there are no leaks in the fuel system.
11. Always test drive the vehicle for three miles or run at 3000 rpm for two to three minutes to flush all RTI FUEL SYSTEM CLEANER out of the vehicle fuel and exhaust system.

Vehicle Diagnostics

Fuel System Pressure Test - PFI, TBI, CIS, and Carburetors

1. Verify that Steps 1-9 from the appropriate fuel system setup have been completed.
2. Verify that the engine is running and check all connections for leaks.
3. Make a note of the fuel pressure reading from the ESX Fuel Pressure gauge. This is the vehicle running pressure. If the pressure is erratic or the vehicle is slow to reach maximum pressure, the vehicle fuel filter may be clogged or its fuel pump may be weak.
4. Return to the appropriate Fuel System Cleaning procedure to continue the cleaning process. Otherwise, continue with the steps below.
5. Turn off the vehicle.
6. Close the valve on the Tee adapter and use a shop rag at all connection points before disconnecting. Disconnect the battery leads, hoses, and adapters. Reconnect all of the vehicle fuel lines and reinstall the vehicle fuel cap.

Fuel Volume Test - PFI, TBI, CIS, and Carburetors

1. Verify that Steps 1-9 from the appropriate fuel system setup have been completed.
2. Verify that the engine is running and check all connections for leaks.
3. Press and hold the **Fill/Purge** button on the Keypad until the Fuel Level window indicates an increase of 1/4 in the ESX fuel tank. If the vehicle stalls, turn the valve on the Tee adapter 1/8 turn clockwise. Restart the vehicle and slowly open the valve, by turning counterclockwise, until the engine starts to stutter. Ease the valve back until the engine smooths and continue filling. If vehicle repeatedly stalls repeat this step until ESX fuel tank is 1/4 full. The fuel volume flow is sufficient if a 1/4 tank of fuel appears in the Fuel Level window within 15-20 seconds.
4. Release the **Fill/Purge** button. Note: If proper fuel level is not reached within the 15 - 20 seconds, this could indicate a blocked or clogged fuel filter or fuel line on the vehicle.
5. Return to the appropriate Fuel System Cleaning procedure to continue the cleaning process. Otherwise, continue with the steps below.
6. Turn off the vehicle.
7. Close the valve on the Tee adapter and use a shop rag at all connection points before disconnecting. Disconnect the battery leads, hoses, and adapters. Reconnect all of the vehicle fuel lines and reinstall the vehicle fuel cap.

Vehicle Diagnostics

Deadhead Test - PFI, TBI

DO NOT PERFORM THIS TEST ON THE CIS FUEL SYSTEM.

1. Verify that Steps 1-9 from the appropriate fuel system setup have been completed.
2. Verify that the engine is running and check all connections for leaks.
3. Bend the Loop adapter in half for one second to create a restriction in the pressure line and then release it.
4. Observe the ESX Fuel Pressure gauge. This will give a good indication of the maximum output capabilities of the pump.
5. Return to the appropriate Fuel System Cleaning procedure to continue the cleaning process. Otherwise, continue with the steps below.
6. Turn off the vehicle.
7. Close the valve on the Tee adapter and use a shop rag at all connection points before disconnecting. Disconnect the battery leads, hoses, and adapters. Reconnect all of the vehicle fuel lines and replace the vehicle fuel cap.

Vacuum Pressure Test - PFI, TBI, CIS, and Carburetors

This test should be performed in conjunction with the cleaning process.

1. Verify that Steps 1-9 from the appropriate fuel system setup have been completed.
2. Verify that the engine is running and check all connections for leaks.
3. Attach the ESX Vacuum hose to any manifold vacuum source on the vehicle and leave it in place throughout the cleaning process.
4. Make a note of the reading on the ESX Engine Vacuum gauge before and after the cleaning process is completed on the vehicle.

Note: The vacuum gauge allows the operator to have a comparison point from before the ESX cleaning service and after the ESX cleaning service without the use of other diagnostic equipment. The operator should see a significant improvement after the cleaning procedure is completed.

Vehicle Diagnostics

Leakdown Test - PFI, TBI, CIS

1. Verify that Steps 1-9 from the appropriate fuel system setup have been completed.
2. Verify that the engine is running and check all connections for leaks.
3. Turn off the vehicle.
4. Note the pressure reading on the ESX Fuel Pressure gauge. The pressure should stay the same or increase marginally due to heat expansion (refer to the manufacturer's specifications for a CIS system, the pressure may initially drop).

If there is a pressure drop, this indicates a leak in the system. Re-pressurize the system to isolate the leak. Use steps below to re-pressurize fuel system.

- A. Press and hold the **Start** button.
- B. Turn the ESX Pressure Control regulator clockwise until the ESX Fuel Pressure gauge displays 3/4 of the pressure noted in Step 4.
- C. Release the **Start** button.
- D. Press the - button to decrease time until the LED timer displays five minutes.
- E. Press the **Leak Test** button on the ESX Keypad.

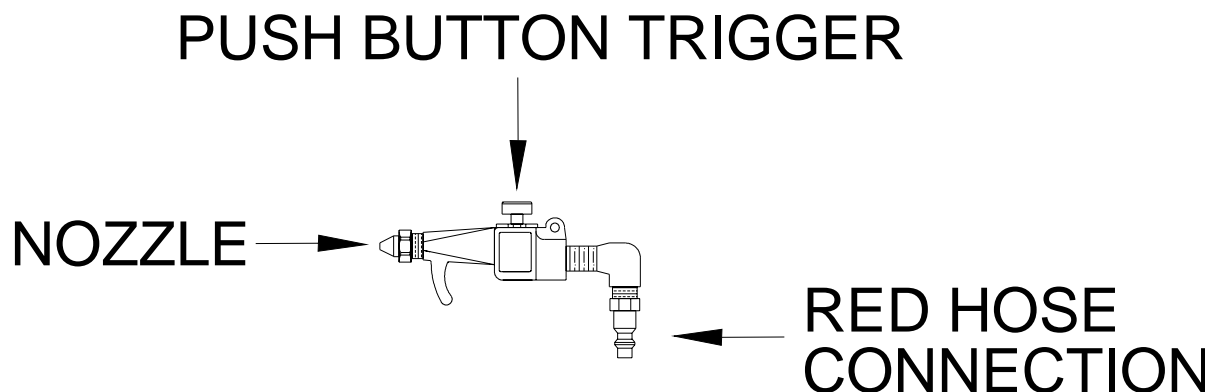
If needed, use the steps above to re-pressurize the fuel system during the Leakdown Test.

5. With the system re-pressurized, locate the pressure line adapter closest to the Tee adapter and the vehicle fuel tank. Bend the pressure line adapter in half and squeeze tightly. If the pressure stabilizes, this indicates a leak in either the pressure fuel line or a bad one-way check valve in the vehicle fuel pump.
6. Locate the return line adapter closest to the vehicle pressure regulator. Bend the return line in half and squeeze tightly. If the pressure stabilizes, then this indicates a leak in the vehicle pressure regulator. This problem should be resolved by the cleaning process because it is generally dirt related. However if there is fuel in the vacuum line from the regulator, this indicates a leaking diaphragm.
7. If the steps above do not stop the leak, bend both adapters simultaneously. If a leakdown is still present, the leak is probably the result of one or more injectors leaking. This problem should be resolved by the cleaning process because it is generally dirt related.
8. Close the valve on the Tee adapter and use a shop rag at all connection points before disconnecting. Disconnect the battery leads, hoses, and adapters. Reconnect all of the vehicle fuel lines and reinstall the vehicle fuel cap.

Intake System Cleaning

Caution: Take extreme care when performing this process. Failure to follow the precautions and instructions may result in engine failure. Always wear proper eye and skin protection when operating and maintaining this equipment.

1. Verify that ESX tank level is at least at the 1/4 full mark and that there are 8 oz of RTI FUEL SYSTEM CLEANER to every 1/4 tank.
2. Connect red (positive) clamp on power cable to red (positive) terminal on vehicle battery. Connect the black (negative) clamp to a ground on vehicle frame as far from the battery as possible. All LED's on keypad should illuminate for one second and buzzer should pulse. If not, check connections and make sure **REVERSE POLARITY** LED is not illuminated. If **REVERSE POLARITY** LED is illuminated reverse the battery connections.
3. Warm up vehicle to operating temperature.
4. Shut off vehicle and disconnect air cleaner or air inlet hose.
5. Turn the Pressure Control regulator on the control panel fully counterclockwise.
6. Connect ESX intake cleaner gun to the Red Hose on the ESX.
7. Hold down the **Start** button on the ESX control panel while simultaneously turning the Pressure Control regulator closed or clockwise until the ESX System Pressure gauge reads 120 psi (the operator can adjust the regulator to achieve a more desirable spray pattern). Release the **Start** button.
8. Take a shop rag and place it over the spray nozzle of the intake cleaner gun and hold the push button trigger down for 3-5 seconds to purge all air out of the system. This allows the intake cleaner gun to operate correctly.
9. Start the vehicle.
10. Spray air intake, choke plate, air horn, etc. with a generous amount of cleaner mixture. If the engine starts to stutter or stall, discontinue spraying for 3-5 seconds or until the engine idle resumes. Continue cleaning as long as necessary.
11. Once cleaning is complete, turn the engine off and reinstall air cleaner or air inlet hose.
12. Press the **Stop** button on the ESX control panel. After automatic purge, hold down the manual **Fill/Purge** button and then depress the push button trigger on the intake cleaning gun. This will drain all fluid from the intake cleaning gun.
13. Disconnect intake cleaning gun and return to appropriate setup procedure.



MAINTENANCE

The ESX will provide many years of reliable service if properly maintained. The following checklist will ensure that the ESX will run at peak efficiency and present an image to your customers that your shop performs high tech fuel system cleaning services.

1. Use tool tray for storage of tools and adapters only.
2. Keep the exterior surface clean. Use a mild all purpose cleaner to wipe fuel and dirt off the cabinet.
3. Do not allow the unit to sit outside in direct sunlight or inclement weather. Excessive exposure to sunlight or moisture will cause serious damage and will void the warranty.
4. Periodically check all internal (by lifting out the tool tray) and external hoses for leaks or excessive wear. Any weak hoses should be replaced immediately to avoid possible injury.
5. Check air pressure in rear tires periodically (should be 30 psi), add air if needed.

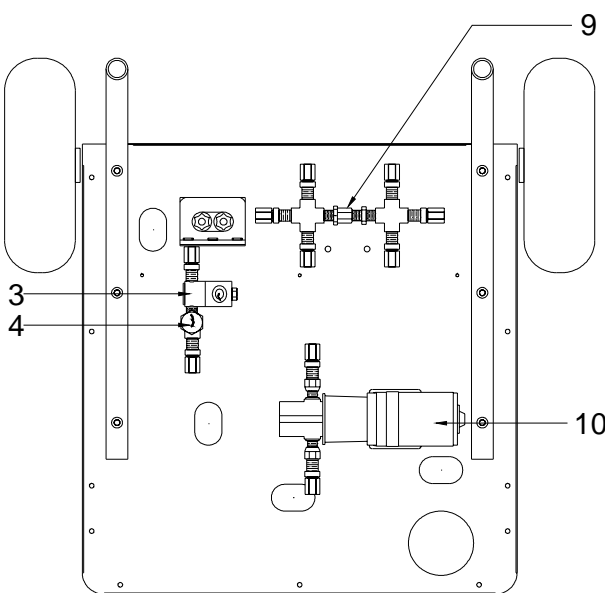
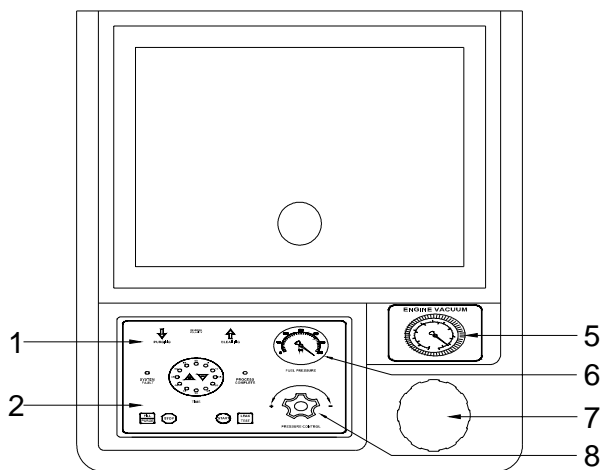
ESX fuel filter removal and replacement:

The ESX Fuel Filter should be replaced every 30 cleaning cycles. Follow the steps listed below for a safe and proper filter change.

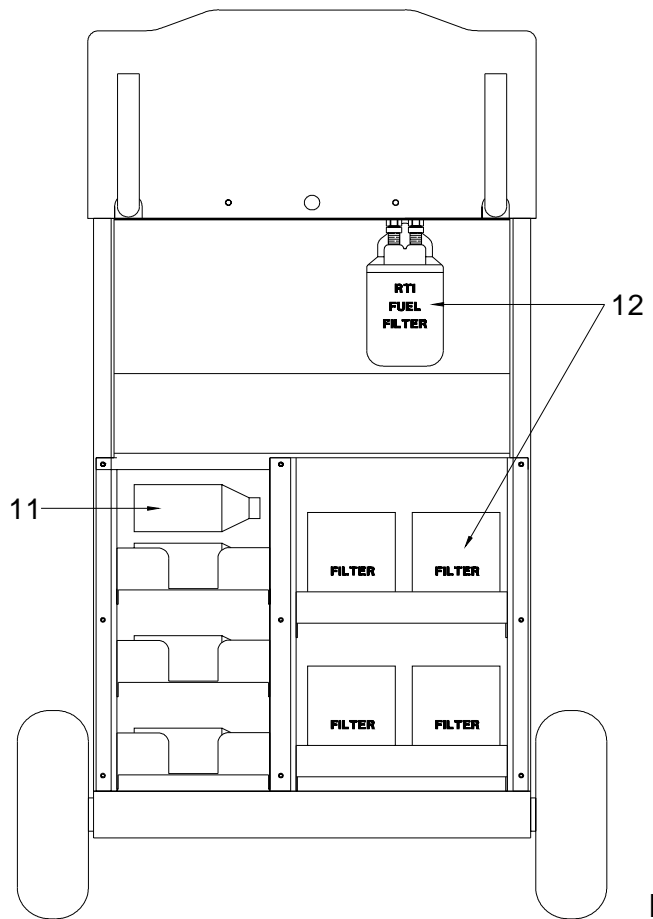
1. Turn the ESX Pressure Regulator clockwise until it is completely closed.
2. Connect red (positive) clamp on power cable to red (positive) terminal on vehicle battery. Connect black (negative) clamp to a ground on vehicle frame as far from battery as possible.
3. Connect any fitting adapter to the ESX Red Hose and place opened end into an appropriate container.
4. Press and hold the **Start** button on the ESX keypad until the fuel from the ESX fuel tank has been emptied into the storage container.
5. Release the **Start** button and allow the ESX to finish procedure.
6. Dispose of or store fuel within local and federally approved methods.
7. Unscrew used RTI fuel filter from the mounting base on the rear of the unit.
8. Apply grease to the seal of new filter and hand tighten into the filter into the mounting base.

The ESX is now ready for fuel system cleaning services.

PARTS IDENTIFICATION



	Part No.	Description
1	024-80080-00	Keypad Overlay ESX
2	024-80081-00	Circuit Board ESX (12VDC)
3	025-80333-00	2-Way Solenoid (Viton) 1/4 FPT (12VDC)
4	022-80111-00	Pressure Switch 4-6 psig
5	026-80238-00	Gauge 30"- 0 PSIG (2 1/2")
6	026-80252-00	Gauge 0 - 160 PSIG (2 1/2")
7	021-80164-00	Spout Fill Assy ATX/ESX
8	022-80113-00	Needle Valve (Viton) 1/4 FPT X 1/4 MPT
9	022-80114-00	Relief Valve 115 PSIG 1/4 FPT X 1/4 FPT (Viton)
10	026-80251-00	Pump Gear .33 GPM 12VDC
11	310-80024-00	RTI FUEL SYSTEM CLEANER Case of 12 (8 oz bottles)
12	026-80253-00	RTI SPIN-ON FUEL FILTER



FLOW & WIRING DIAGRAM

