TR1~ FuelSaver User's Guide V1.0

Warning

The TR1 uses one of the truck's air supplies in order to dispense the catalyst. If you suspect that the TR1 is causing its air supply's pressure to drop, disconnect the power from the control box immediately. Disconnecting power defaults the air over electric solenoid valve to the closed position.

System Overview

The TR1 system is designed to simplify treating fuel with dry fuel catalyst and document the treatments. The system consists of a handheld controller unit, a dispenser box, and necessary hardware. The operator uses the handheld device to enter the desired number of gallons to be treated by the catalyst and the system then takes that information and dispenses the correct amount of catalyst. Figure 1 shows the uninstalled layout of the components in the TR1~Fuelsaver kit.

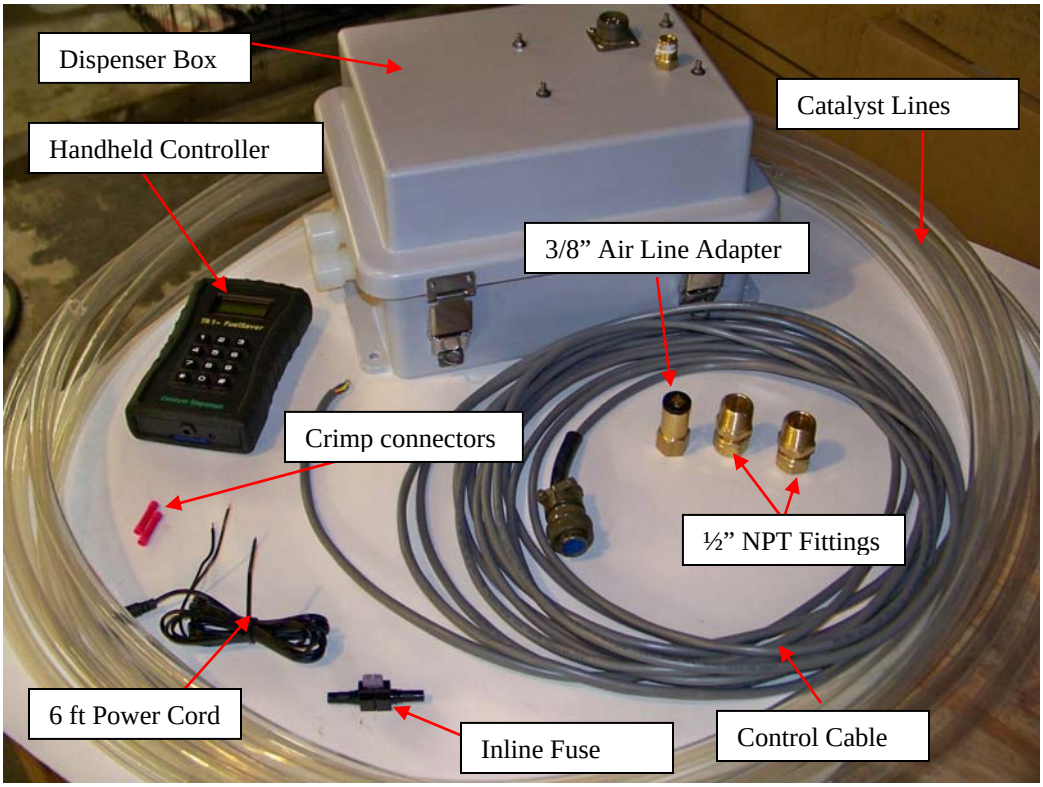


Figure 1. System Components

Handheld Controller

The TR1's handheld controller is equipped with a back-lit liquid crystal display (LCD). This display has two lines capable of displaying 16 characters each. The TR1's keypad has 12 characters, with the # key functioning as "enter" and the * functioning as a menu key. The TR1 stores information on a secure digital (SD) card. Key features are shown in figure 2 below.

Figure 2. Handheld Controller

SD Card

The TR1 documents the treatment of fuel by saving information to an SD card each time the unit is used to dispense product. The SD card needs to be formatted using the FAT16 file system. FAT16 is standard for SD cards with memory between 16 MB and 2 GB. The SD card is inserted as shown below in figure 3.

Figure 3. SD Insertion Orientation

If the SD card is empty, the TR1 creates a file called FA_LOG.TXT and writes a line of text containing the number of gallons treated, the remaining number of gallons, the date, the time, the ratio, and the number of grams of product that were added. If the file already exists, the TR1 appends a new line to the existing file. A sample of this log file is shown below in figure 4. If the FA_LOG.TXT file is deleted, the TR1 will create a new one.

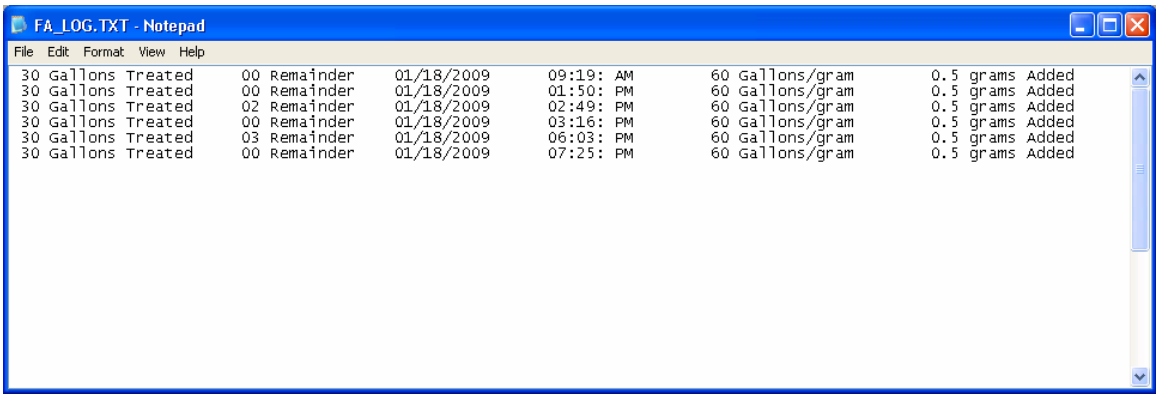


Figure 4. FA_Log text file sample

Internal Variables

There are five internal variables that can be configured by the user: 1) the date/time, 2) the ratio of catalyst to gallons, 3) the remaining untreated gallons, 4) the delay before adding the product, and 5) the estimated number of grams left in the dispenser box. These internal variables are stored even if power is lost.

Date/Time: The TR1 has an internal clock that keeps track of the time and date. This information is displayed as follows: Month/Day/Year Hour:Minute AM or PM. The user is able to reset the time, as described later in this manual.

Ratio: The user can adjust the ratio of gallons of fuel to product between 30 gallons of fuel to 1 gram of product and 198 gallons of fuel to 1 gram of product. The system defaults to 60 gallons of fuel to 1 gram of product.

Remainder: This system can only add product in 0.5 gram increments, so there is a possibility that the number of gallons a user enters does not divide evenly by one half the ratio. In this case, the remainder is saved in memory and added to the number of gallons entered at the next fill up. For example, if the ratio is set to 60 gallons/gram and the user enters 100 gallons, the system will add 1.5 grams of product and store the remaining 10 gallons in memory. If the user adds 110 gallons at the next fill up, the system will add the previous 10 gallons to the 110 gallons, and add 2 grams of product. The remainder is set to zero by default.

Delay: The user can add a delay of zero to five minutes before the product is dispensed. This is useful if the user would like to verify that the product was added. The delay allows the user to get out of the truck cab, pull both caps off the fuel tanks and begin filling. When the dispenser activates the user can watch the clear catalyst lines to look for the product being dispensed properly. The delay is set to zero by default.

Grams Left: This is a feature that keeps track of the number of grams of dry catalyst left in the dispenser box. When the user fills the dispenser drum unit with dry catalyst, he or she can set the number of grams of product that are in the dispenser box. Each time catalyst is removed from the dispenser box, this number is decremented accordingly. This number is only displayed as a whole number, but it keeps track of the half-grams internally. When the number of grams left reaches zero, it is no longer decremented. **Note: for this feature to work correctly, the user must accurately set it; the system has no way to tell how many grams of product are in the dispenser box, except for the user setting it.** The number of grams left is set to zero by default.

Viewing and Changing the Configuration of the Control Unit

As mentioned in the internal variables section, there are five internal variables that can be set by the user: 1) the date/time, 2) the ratio of product to gallons, 3) the remaining untreated gallons, 4) the delay before adding the product, and 5) the estimated number of grams left in the dispenser box.

Entering the configuration menu

From the default screen 

, first press a key to go to the main menu 

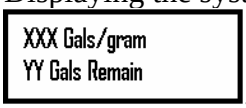
. Then press the * key to go to the configuration menu 

.

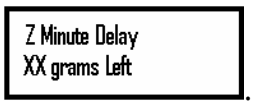
Viewing the Configuration

First enter the configuration menu; this screen should appear: 

. Then press 1 to view the current configuration. If the user does not press a key for five seconds, the system will go back to the default screen. Pressing the * key will return to the main menu.

Displaying the system's configuration requires two screens. The first one, 

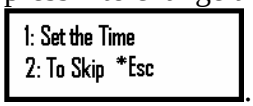
, displays the ratio of gallons of fuel to grams of product that the system is set to use. On the next line, the LCD shows how many untreated gallons remain.

After about five seconds, the display will change to the second screen, 

. The first line shows the number of minutes the system will wait between when the user enters the number of gallons to be treated and when the product is actually dispensed. The second line shows an estimate of how many grams of product remain in the dispenser box. This number is decremented by the number of grams of product the system adds at each fill up.

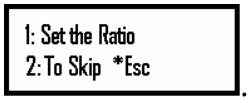
Setting the date/time

First enter the configuration menu; this screen should appear: 

. Then press 2 to change the configuration of the system, and this screen should appear: 

. Press 1 to set the time. Follow the on-screen instructions to set the date and time. These screens do not time out, so there is no need to rush. If the set-time sequence is not desired, the user may simply press * to return to the configuration menu.

Setting the ratio

If the time has just been set, this screen should appear: 

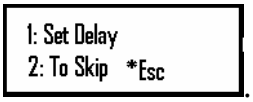
. *If this screen is desired at any stage other than just after setting the time, follow the instructions to set the time, except press 2 to skip rather than 1 to set the time, and the above screen will appear.* Press 1 to set the ratio. Then type in the desired ratio, from 30 gallons/gram to 198 gallons/gram, and then press #.

Setting the remaining gallons

If the ratio has just been set, this screen should appear: 

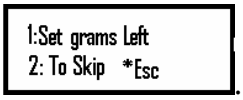
. *If this screen is desired at any stage other than just after setting the ratio, enter the configuration menu, then press 2 to skip setting the time, press 2 again to skip setting the ratio, and the above screen will appear.* Press 1 to set the remainder. Then type the desired remainder, between 0 gallons and 99 gallons, and press #.

Setting the delay

If the remainder has just been set, this screen should appear: 

. *If this screen is desired at any stage other than just after setting the remainder, enter the configuration menu, then press 2 to skip setting the time, press 2 again to skip setting the ratio, press 2 again to skip setting the remainder (press 2 three times), and the above screen will appear.* Press 1 to set the delay. Type the number of minutes desired to delay the dispensing of the catalyst (0 minutes to 5 minutes) and press #.

Setting the number of grams of catalyst left

If the delay has just been set, this screen should appear: 

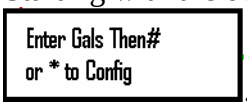
. *If this screen is desired at any stage other than just after setting the delay, enter the configuration menu, then press 2 to skip setting the time, press 2 again to skip setting the ratio, press 2 again to skip setting the remainder, press 2 to skip setting the delay (press 2 four times), and the above screen will appear.* Press 1 to set the number of grams of catalyst left. Then type the number of grams of catalyst (0 grams to 220 grams) followed by #.

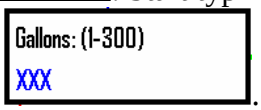
Dispensing the Fuel Catalyst

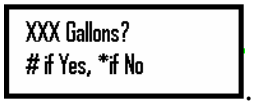
Quick reference: To dispense the catalyst, first press *, then enter then number of gallons of fuel to be added (1–300), then press #, and # again to confirm.

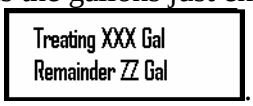
Full Explanation

Starting with the default screen 

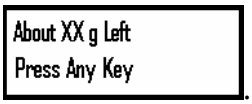
, press any key to enter the main menu 

. Start typing the number of gallons to be added, and the screen will change to 

. The numbers the user has typed will appear on the second line. If the numbers are correct, press #. If not, press * or wait 5 seconds for the screen to time out, and try again. Once the correct number has been entered and followed by #, the screen will ask if the number entered is correct: 

. If it is correct, press #. If not, press * and try again. Once the user has accepted the number of gallons to be added, the screen will display the number of gallons the TR1 is treating (which is the previous remainder plus the gallons just entered, divided by the gallons-per-gram ratio) and the new remainder 

. If the delay is set to greater than zero, the screen will display the number of minutes it will delay on the top line and a graph of the elapsed time on the second line 

. When the system is writing to the SD card, the backlight for the LCD will blink; this is normal. Once the catalyst has been added, the system will display a final screen: 

. On the top line, the system displays an estimate of the number of grams of catalyst that remain in the dispenser box; it is intended to alert the user as the TR1 gets low on catalyst. This number is initially set by the user and is decremented each time catalyst is dispensed, so this estimate can only be as accurate as it was originally set. This screen is displayed until the user presses a key, and the system will go back to the default screen.

Errors and troubleshooting

If there is a problem with the control box, unplug the power from the unit, wait at least 20 seconds and then plug the unit back in.

The LCD display is rated for -20˚C, but it will become increasingly sluggish as its temperature is decreased; this is normal.

The backlight for the LCD will blink when the control unit is writing to the SD card; this is normal.

Dispenser Box

The dispenser box houses the dispensing drum and associated electrical devices and hardware necessary for storing, measuring, and dispensing the dry fuel catalyst. See figure 5 below for an overview of the inner components.

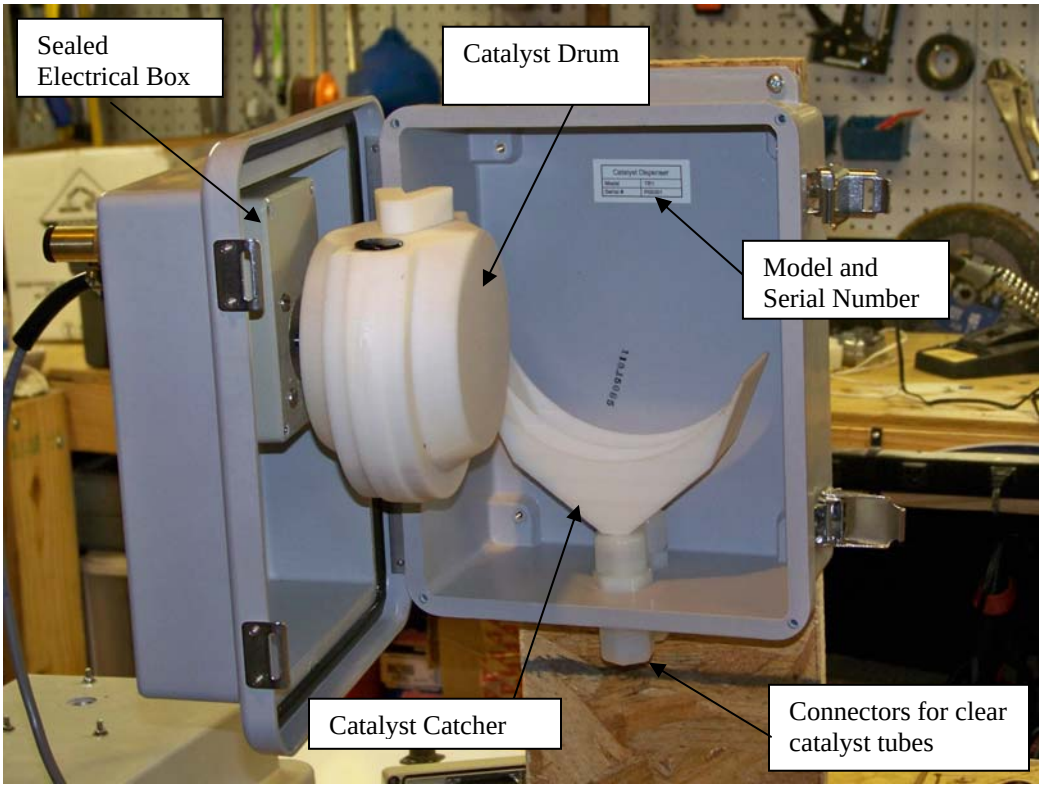


Figure 5. Inner components of Dispenser Box

Filling the Catalyst Drum

The dry fuel catalyst is stored in the Catalyst drum until it is dispensed. In order to fill the drum with catalyst the dispenser box must first be opened by unlocking the latches on the sides of the box. When the door is opened (as in figure 5) the drum can then be extracted by applying gentle but firm force to the drum in the direction away from the electrical box. See figure 6 for an illustration.

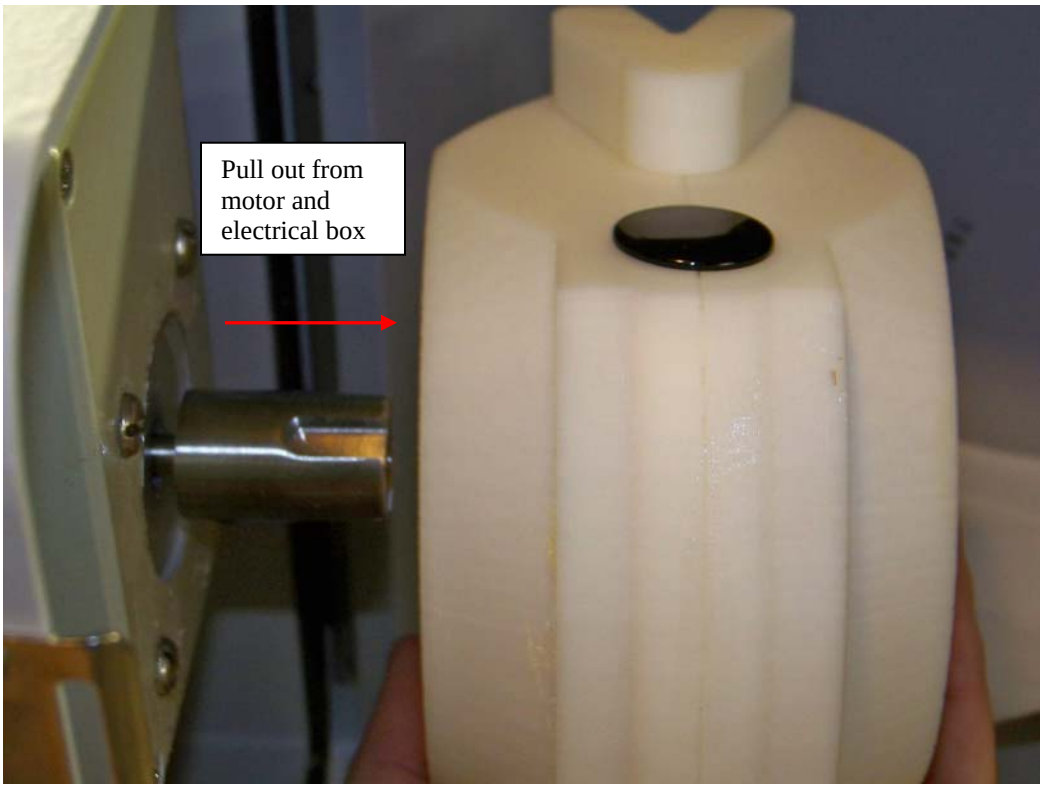


Figure 6. Removal of Catalyst Drum

The catalyst drum is held on the shaft by magnetic force. There are no tools required for removal of the drum from the shaft. After the drum has been removed the black plug can be removed from the fill hole in the drum and dry catalyst can be added to the drum. The drum is designed to hold up to 220 grams of product. The black fill plug is a friction fit and can be easily snapped on and off of the drum. Figure 7 shows the drum with the cap removed ready to accept dry catalyst.

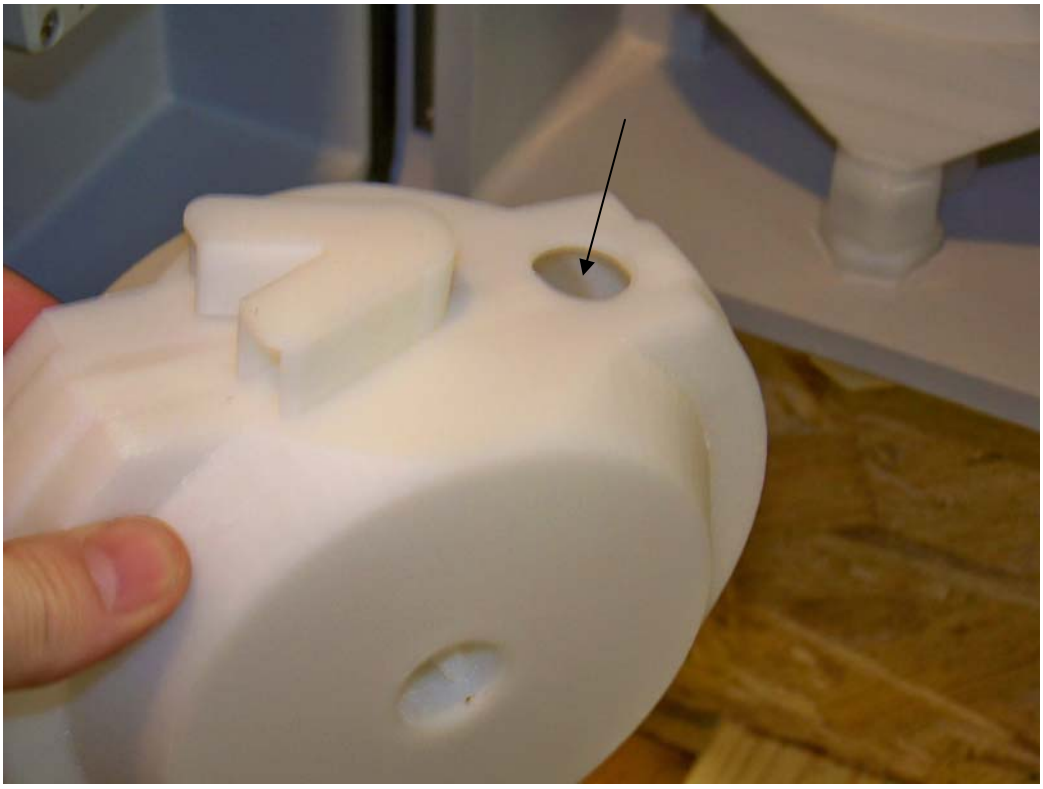


Figure 7. Cap removed and ready for Catalyst to be added

When the drum has been filled to the desired level the cap should be snapped back into the top of the drum and the drum placed back onto the shaft as shown back in figure 5. The drum has now been filled and the dispenser box can be closed and locked.

Remember to return to the controller after filling the drum and enter in the amount of product that the drum is holding. This enables the controller to keep track of the level in the drum and serves as a reminder when the product is running low. Refer to "Setting the number of grams of catalyst left" above for directions.

Dispensing Catalyst

No action is needed at the dispenser box to deliver the product under normal operation. However some steps can be taken to ensure the optimal operation of the unit. If a delay is configured in the handheld controller the operator can be in position outside the truck to watch the catalyst dispense. The operator will notice the dry catalyst drop into the clear lines and then a blast of air will carry the catalyst through the lines to the fuel tanks.

The catalyst dispenser will produce optimal results when the tank caps have been removed for filling. This removes any air restriction in the system and the catalyst can be pushed through the lines with optimal results. The catalyst dispenser should be able to push the product into a full tank with the caps closed but results may vary. Inspection of the clear lines should be done periodically to make sure there are no clogs or catalyst stuck in the lines as this could signal a problem with the dispenser.

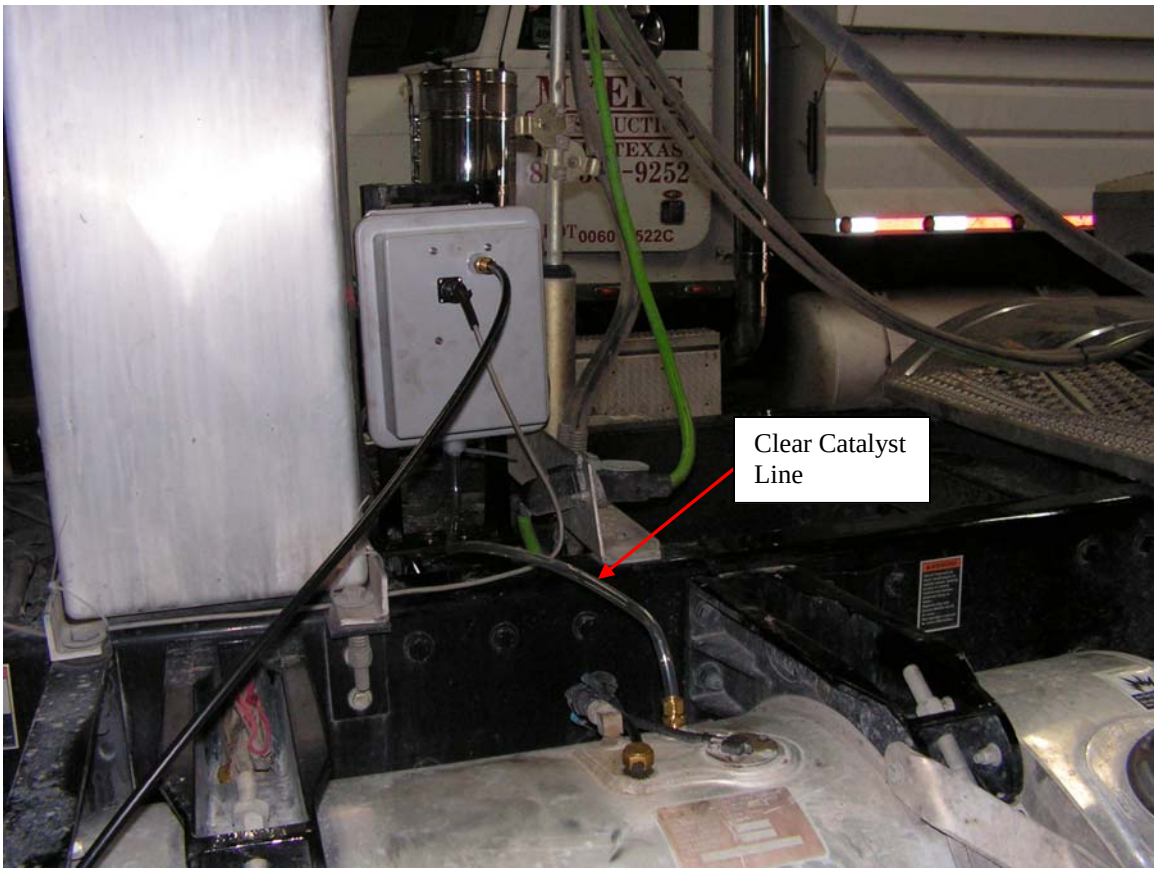


Figure 8. Dispenser Box and Clear Catalyst Lines

Troubleshooting

If catalyst is not dispensing check the level of the catalyst in the drum and make sure there are no large clumps or clogs in the drum, catcher, or lines. Remove any obstructions and retry.

The motor and air solenoid can be checked for operation by removing the drum and then running the dispenser with the box open and drum removed. See figure 9 for illustration.

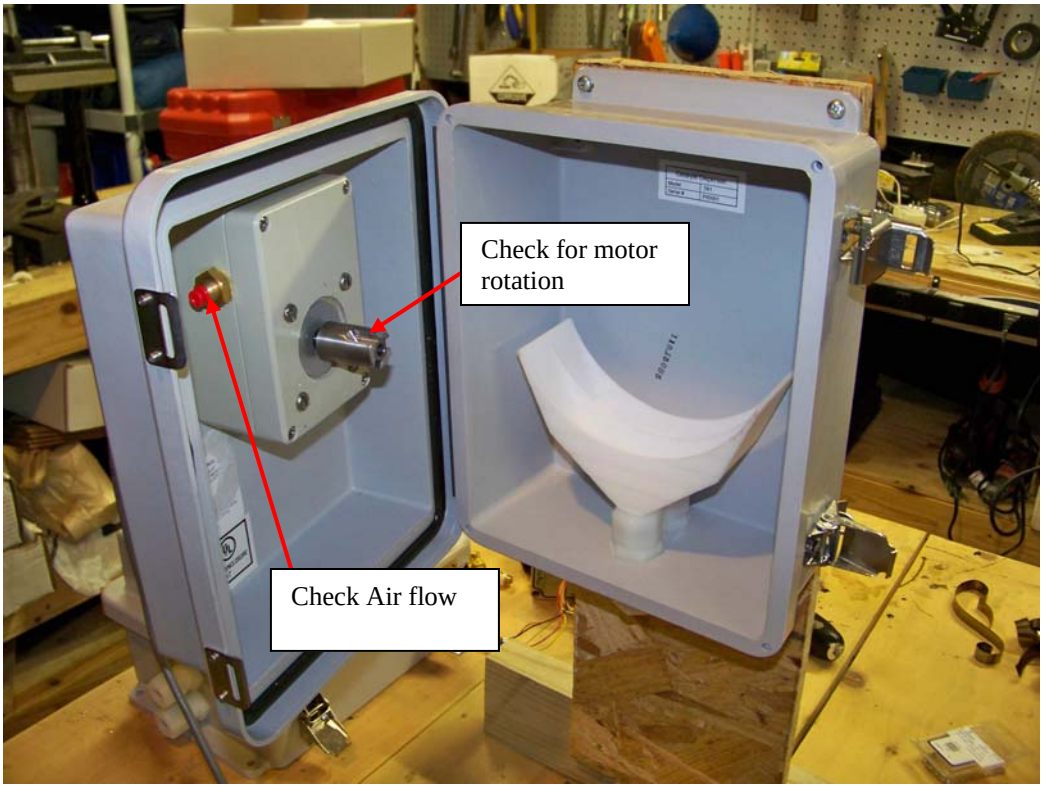


Figure 9. Troubleshooting Operation

When the cover is open and the drum has been removed, use the handheld controller to simulate a normal dispensing of the product. Observe shaft first and make sure that it turns after the shaft turns then the solenoid should open and air should flow from the port shown in figure 9. If either of these are not operating discontinue using the dispenser by unplugging the power supply from the bottom of the handheld controller and call for service.

Small amounts of catalyst may fall outside of the catcher under normal operation and can be scooped up and returned to the drum at the next filling. However, if a large amount of product is noticed on the box floor an adjustment may be necessary and service should be called for proper diagnosis.