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TranX 2000™

Automatic Transmission Electronics Tester

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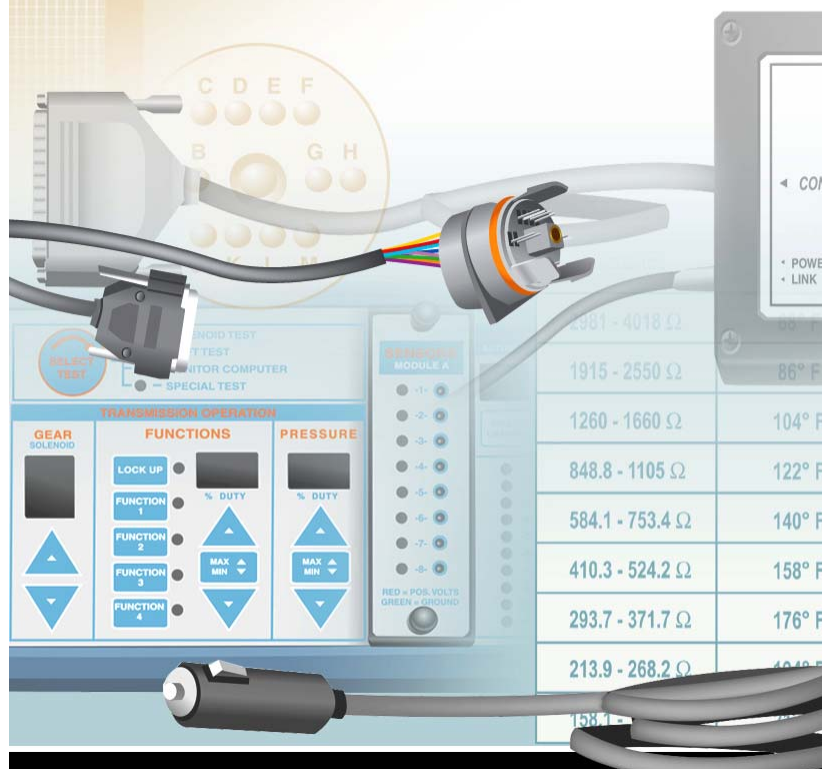


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1.0 Introduction

The TranX 2000™ Automatic Transmission Electronics Tester allows technicians to analyze automatic transmission functionality. This flexible system may be utilized stand alone or with other analytical devices, such as a multi-meter. This transmission tester may be upgraded as new transmissions appear on the market or change. Be sure to contact the supplier for the latest upgrades. While the transmission tester can test all transmission types, this manual focuses on transmissions for vehicles most often used by the Marine Corps.

2.0 Safety Warnings and Cautions



Warnings and cautions appear in numerous sections of this manual. This chapter lists all warnings and cautions together. Failing to adhere to these can result in personal injury and/or damage to the transmission tester.

- The transmission tester should be powered by 12 volt battery only.
- Use only use the cables that were supplied with the transmission tester.
- Always come to a complete stop and turn the engine OFF before switching test modes.
- The Solenoid Test must be performed with the engine OFF.

- When using the battery adaptor cable to supply power to the transmission tester, connect the black cable to a suitable ground and clip the red cable to a positive 12 volt battery terminal (see Figure 1). Do not ground the black cable by clipping it to the negative post on a *second* 12 volt battery.

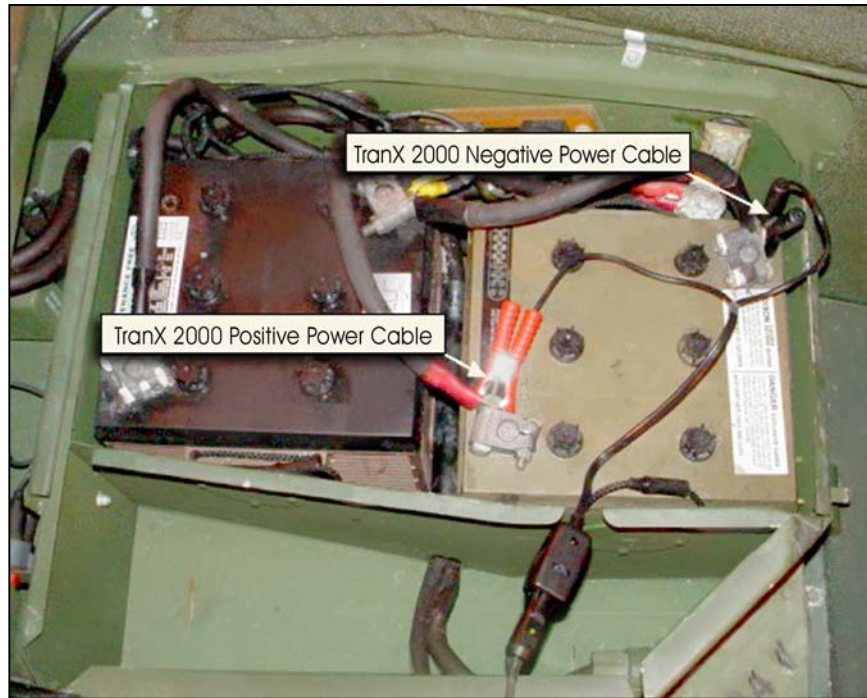


Figure 1 Correct Battery Connections

3.0 Components

This section reviews all the components included in the Marine Corps issued TranX 2000 Automatic Transmission Electronics Tester. Each component is presented with its part number, functional description and picture.

3.1 Controller

(P/N TX2-CNTRLR)

The Controller allows the technician to program the transmission type, test type and measurement parameters. The technician will also use the Controller to read test results. Additional instructions regarding this component are found in Section 6.0, Operation.

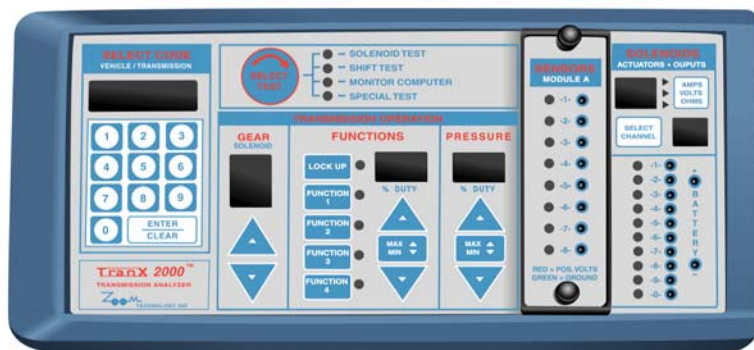


Figure 2 Controller

3.2 Vehicle Interface

(P/N TX2-I/F)

The Vehicle Interface provides a conduit between the transmission tester Controller and the transmission being tested. In addition, the Sensor Alligator Clips are linked to the Vehicle Interface. The Power Cord also attaches to the Vehicle Interface .

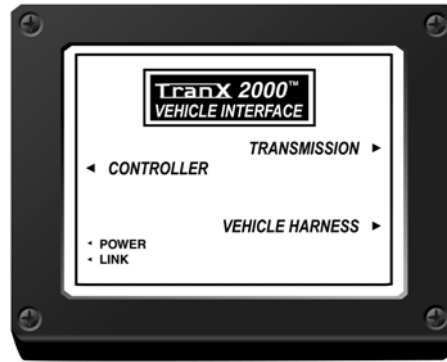


Figure 3 Vehicle Interface

3.3 Interface/Main Cable

(P/N TX2-Main)

The Interface/Main Cable is permanently attached to the Vehicle Interface and runs from the left side of the Vehicle Interface to the Controller. Information is sent from the Controller to the Vehicle Interface via this cable.

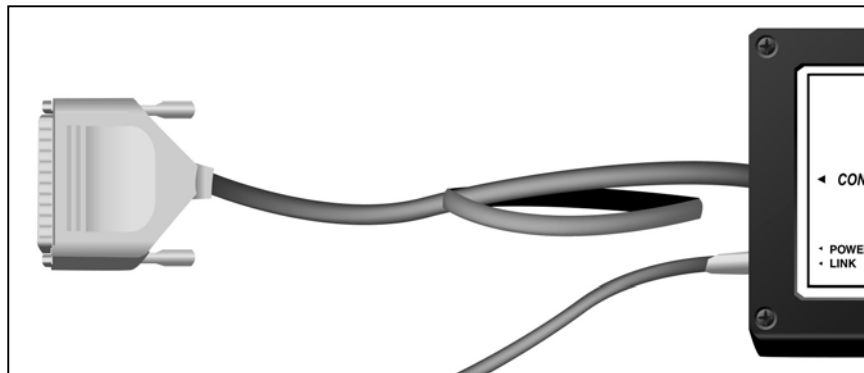


Figure 4 Interface/Main Cable

3.4 Power Cord

(P/N TX2-PWRCRD)

The Power Cord attaches to the left side of the Vehicle Interface and plugs into a lighter receptacle. The Power Cord may also be attached to the Controller. However, it is recommended that the technician apply power via the connector on the Vehicle Interface.

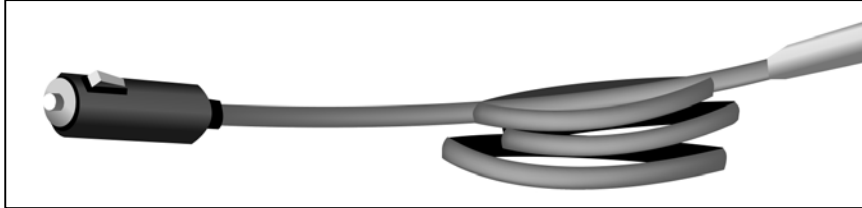


Figure 5 Power Cord

3.5 Transmission Cable

(P/N I-CABLE)

The Transmission Cable is permanently attached to the right side of the Vehicle Interface. This cable then attaches to any of the Transmission Adaptor cables.

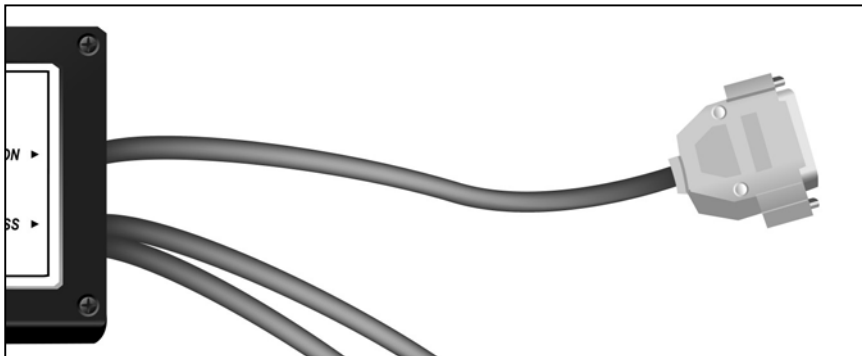


Figure 6 Transmission Cable

3.6 Vehicle Harness Cable

(P/N I-CABLE)

The Vehicle Harness Cable is permanently attached to the Vehicle Interface and connects to the Vehicle Harness Adaptor Cable.

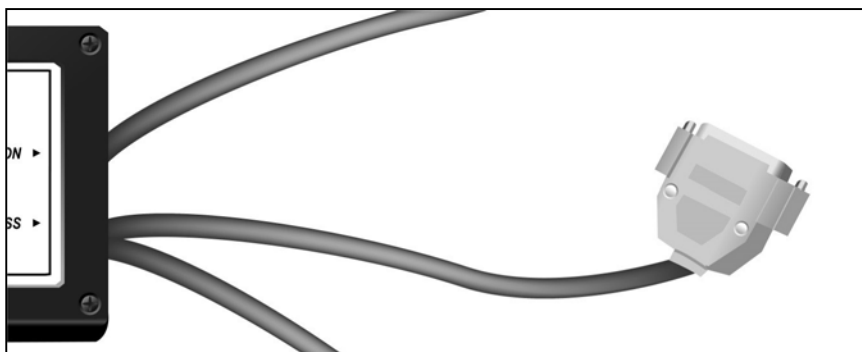


Figure 7 Vehicle Harness Cable

3.7 Testing Cable

(P/N I-CABLE)

The Testing Cable is used in conjunction with the Sensor Alligator Clips to provide additional testing capabilities (see Section 3.11).

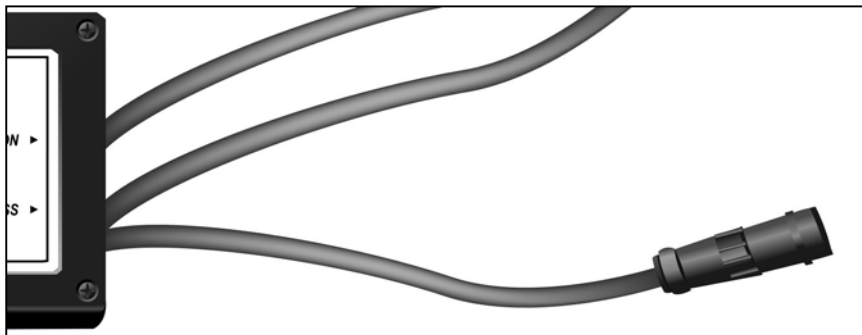


Figure 8 Testing Cable

3.8 Transmission Adaptor Cable

(P/N 07X106 or P/N 07X110)

The Transmission Adaptor Cable is a vehicle-specific cable that connects to the vehicle's transmission connector (see Figure 17). The 07X106 cable (Figure 9) is used for import model vehicles. The 07X110 cable (Figure 10) is used for HMMWVs.

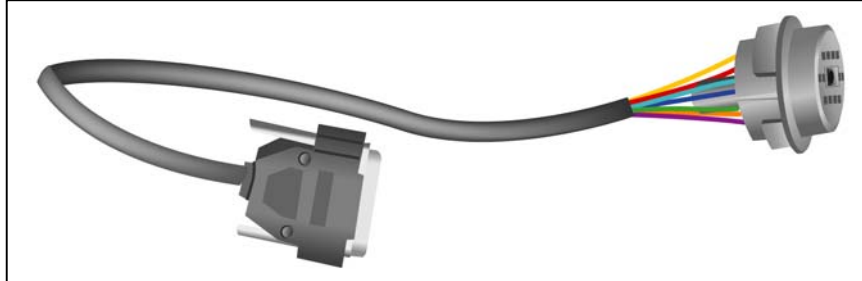


Figure 9 Transmission Adaptor Cable – Imports (P/N 07X106)

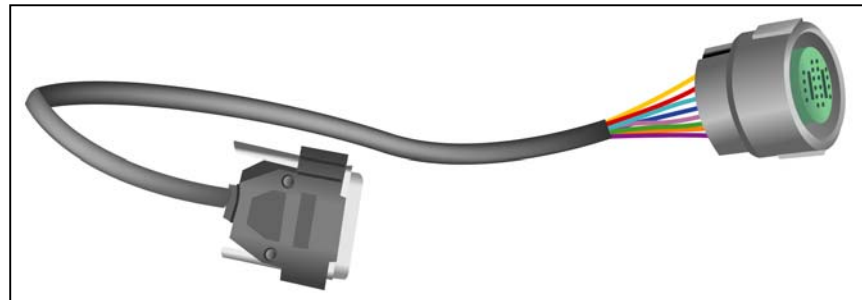


Figure 10 Transmission Adaptor Cable – HMMWVs (P/N 07X110)

3.9 Vehicle Harness Adaptor Cable

(P/N 07X006H or P/N 07X010H)

The Vehicle Harness Adaptor Cable is a vehicle-specific cable that connects to the vehicle's Transmission Control Module (TCM) Harness Connector (see note below). The 07X006H cable (Figure 11) is used for import model vehicles. The 07X010H cable (Figure 12) is used for HMMWVs.

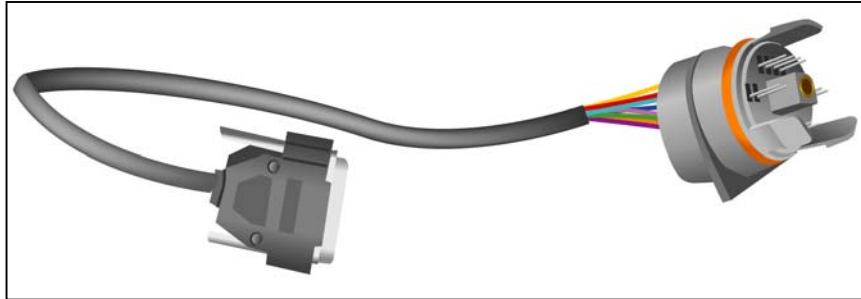


Figure 11 Vehicle Harness Adaptor Cable – Imports (P/N 07X006H)

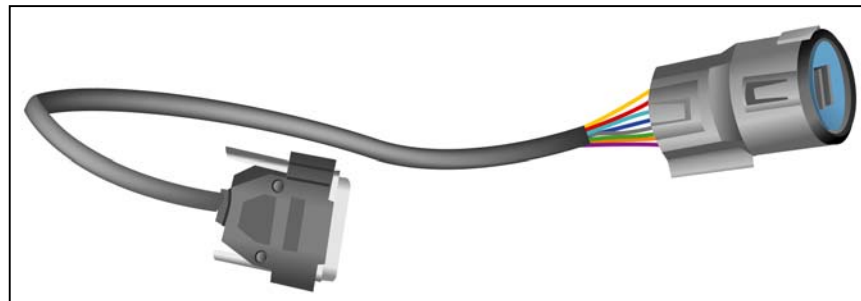


Figure 12 Vehicle Harness Adaptor Cable – HMMWVs (P/N 07X010H)

note: the Transmission control Moduel (TCM) is also know as the Equipment Control Unit (ECU)

3.10 Battery Adaptor Cable

(P/N 270-1527)

The Battery Adaptor Cable connects to the Power Cord so that the technician can power the transmission tester via the battery if no cigarette lighter is available.

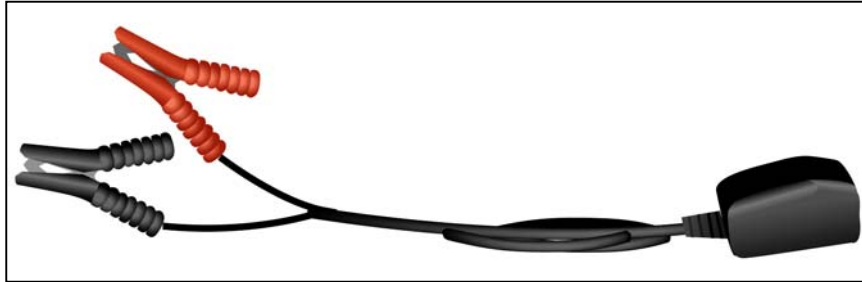


Figure 13 Battery Adaptor Cable

3.11 Sensor Alligator Clips

(P/N TX2-CLIPSET)

The Sensor Alligator Clips attach to the Testing Cable and are used to provide additional testing capabilities during road tests. The technician can attach the clips to vehicle sensors and then monitor throttle position, speed, etc. using additional shop equipment. The wire table included in Appendix A of this manual indicates which test points on SENSORS MODULE A (see Section 6.1.6) are already in use (test sockets 1 through 6). Ensure that only one sensor runs through these test points. Use the yellow and blue alligator clips to test through Sensors Module A socket 7 and 8 respectively (the black and red clips are not used with 4L80E transmissions).

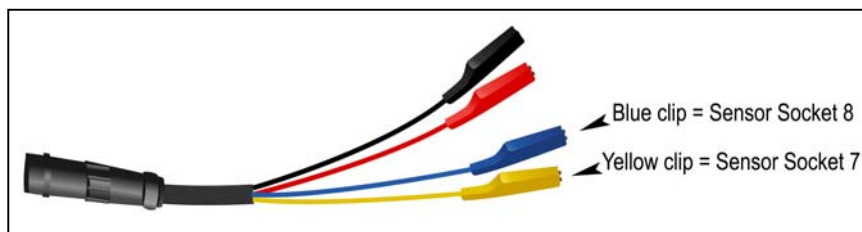


Figure 14 Sensor Alligator Clips

3.12 Test Point Leads

(P/N TPINSRT-RED and
P/N TPINSRT-BLACK)

Use the Test Point Leads whenever interfacing the transmission tester with other shop equipment, such as a multimeter. These leads have been specially designed to prevent excessive wear on the test point sockets.

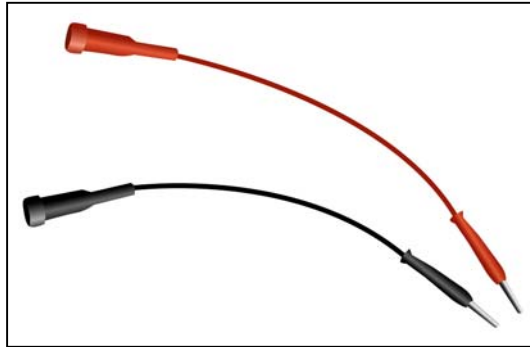


Figure 15 Test Point Leads

3.13 Fuses

The 10 amp fuse is located in the lighter plug. Replace the fuse by unscrewing the end of the lighter plug and swapping the blown fuse with a new 3AG10 Fast Blow Ampere fuse.

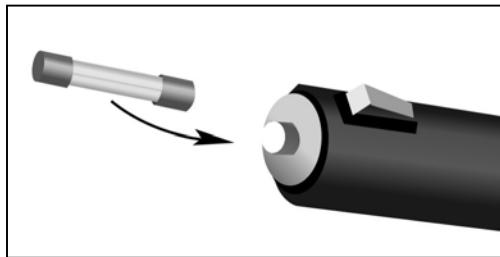


Figure 16 Fuse and Lighter Plug

4.0 Pre-Operational Checks

The wiring harness must be checked for serviceability prior to performing tests. Wiring should be checked for continuity, and if any repairs are performed on the wiring harness, the resistance must not exceed 2 ohms across the repair. Pin tests begin on page 2-428 of TM 2320-7B Vol 1 (troubleshooting section) for the wiring harness.

Use the Vehicle Automated Diagnostic System (VADS) to verify vehicle voltage, timing, RPMs and the throttle positioning valve setting prior to transmission testing. Failing to perform the aforementioned tests may cause the transmission tester to display erroneous readings. When adjustments based on erroneous readings are made, transmission malfunctions may occur.

5.0 Assembly and Connections

The information contained in this section provides step-by-step instructions for assembling the transmission tester components and attaching it to the transmission being tested. The following page contains a numbered connection diagram that corresponds to the steps that follow.

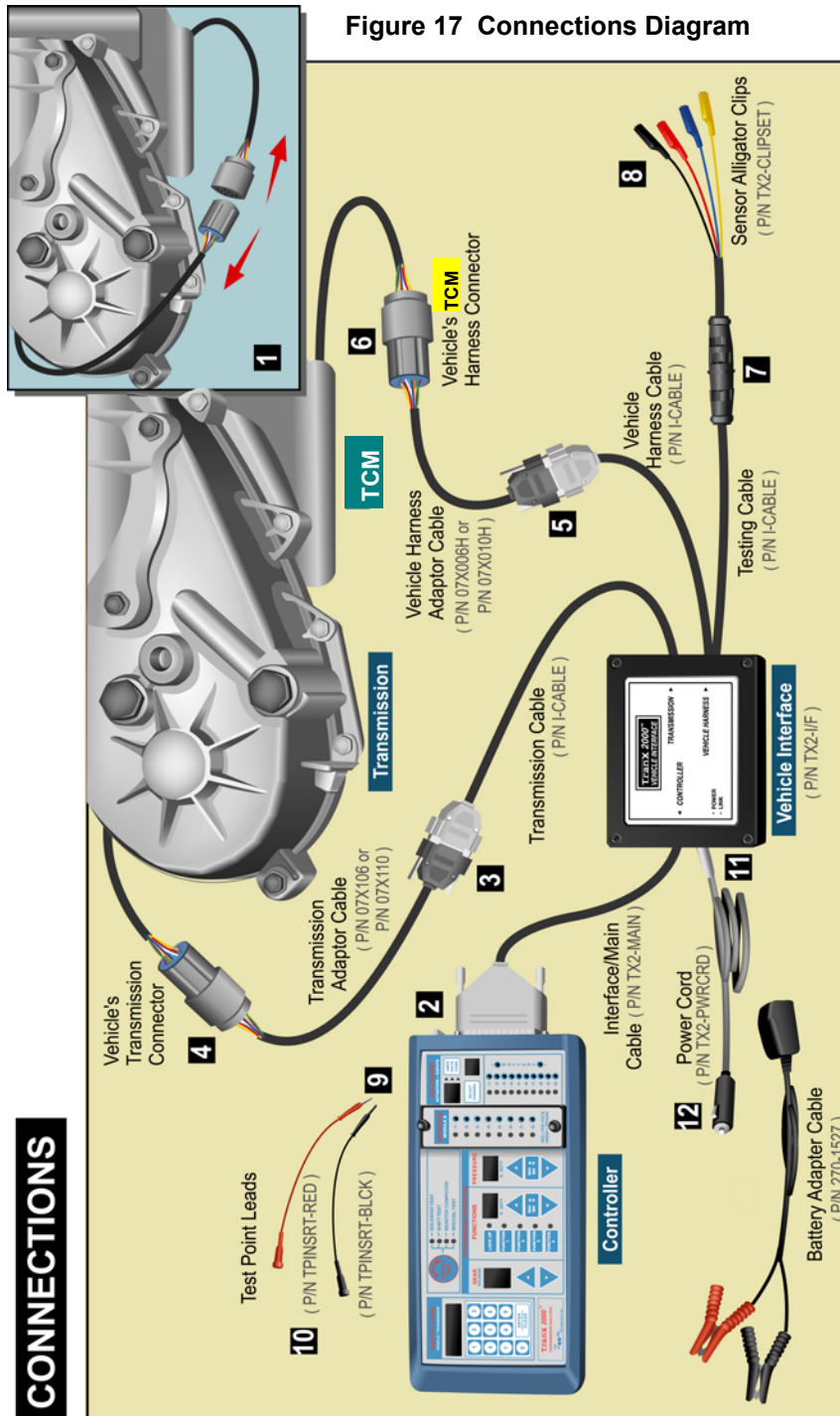


Figure 17 Connections Diagram

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1. Disconnect the Vehicle's Transmission Connector from the Vehicle's TCM Harness Connector.
2. Connect the Interface/Main Cable to the Controller.
3. Connect the Transmission Cable to the Transmission Adaptor Cable.
4. Connect the Transmission Adaptor Cable (use the appropriate cable) to the Vehicle's Transmission Connector.
5. Connect the Vehicle Harness Cable to the Vehicle Harness Harness Adaptor Cable (use the appropriate cable).
6. Connect the Vehicle Harness Adaptor Cable to the Vehicle's TCM Harness Adaptor Cable.
7. Connect the Testing Cable to the Sensor Alligator Clips (optional step).
8. Attach the Sensor Alligator Clips to the desired testing points on the vehicle (optional).
9. If sensor testing via the TranX 2000 is desired, attach the Test Point Leads to the appropriate test point sockets in the Sensors Module A section.
10. Attach the test equipment, such as a digital multimeter or VADS, to the free ends of the Test Point Leads and take desired readings.
11. Connect the Power Cord to the Vehicle Interface.
12. Connect the Power Cord from the Vehicle Interface to the lighter receptacle on the vehicle. Or, if the vehicle does not have a lighter receptacle, plug the Power Cord connector into the Battery Adaptor Cable and attach it to the vehicle's battery (12 volts DC only). See section 2.0 for important information regarding how to properly attach the Battery Adaptor Cable to the battery.

In some instances, the technician may need to access the transmission from inside the HMMVW. Long cables allow the transmission tester to be placed in the vehicle.

6.0 Operation

All transmission tester operations are supplied by the Controller. The unit sends commands to the Vehicle Interface which contains all switches, solenoid drivers and measurement electronics. In addition to housing the electrical components, the Vehicle Interface serves as a hub, linking all the cables.

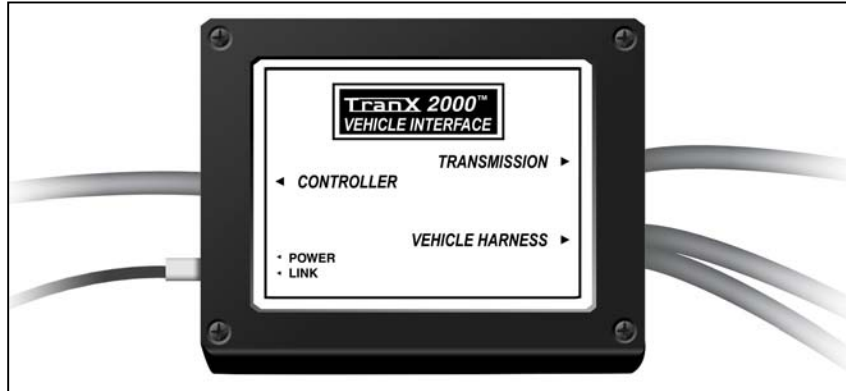


Figure 18 Vehicle Interface with Power Cord Attached

The right side of the Vehicle Interface has three permanent cables. The first cable, labeled Transmission, is used in conjunction with a vehicle-specific Transmission Adaptor Cable for connecting to the vehicle's transmission. This connection allows the Interface and Controller to receive and send signals directly to the transmission. The bottom two cables are labeled Vehicle Harness. The upper cable is used in conjunction with a vehicle-specific harness cable for connecting to the vehicle's TCM harness connector. This allows the Controller and Vehicle Interface to send and receive signals to and from the TCM. The lower cable is used to provide optional testing capabilities.

The left side of the Vehicle Interface has one permanent cable which connects to the Controller. Below the controller cable is the power cord input.

6.1 Using the Controller

This section provides an overview of the Controller's functions.

6.1.1 Select Code

The transmission tester requires that the technician enter a pre-defined three digit code to identify the transmission being tested and correctly control the vehicle's solenoids. The code for HMMWVs is 071 (transmission GM 4L80E). Additional codes are found on the individual transmission sheets provided in the manufacturer's user's manual.

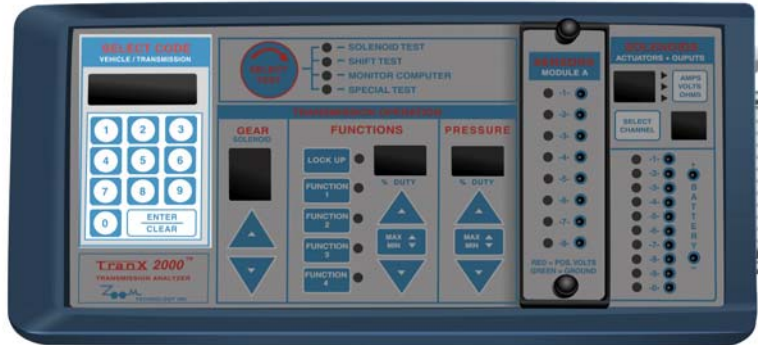


Figure 19 Controller: Select Code

To program the Controller for the correct transmission:

1. Press **071** on the keypad (for 4L80E transmissions).
2. Press **ENTER**.

6.1.2 Select Test

Pressing the **SELECT TEST** button allows the technician to toggle through the following tests:

- **SOLENOID TEST** - This test allows the mechanic to determine if a solenoid is open or shorted. This test must be conducted while the engine is OFF.
- **SHIFT TEST** – This test allows the mechanic to control the transmission while bypassing the TCM. This allows the

technician to isolate the transmission and determine the fault location.

- **MONITOR COMPUTER** - The system monitors the TCM and displays the current gear, special function (Lock Up), duty cycle and pressure.

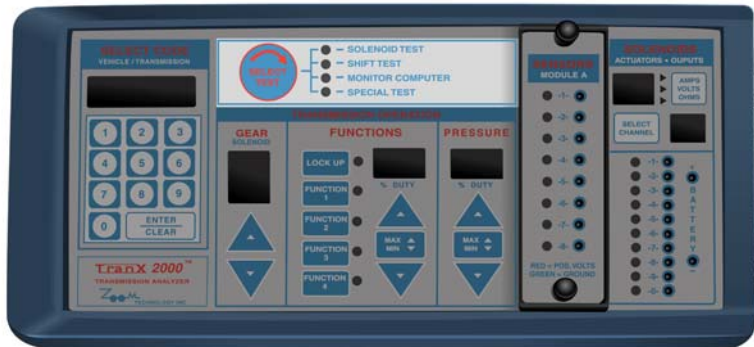


Figure 20 Controller: Select Test

Caution: Ensure the engine is OFF and the vehicle is stopped before switching between test modes.

6.1.3 Transmission Operation: Gear (Solenoid)

The buttons in the GEAR area are used to select the gear or solenoid required for the selected test.

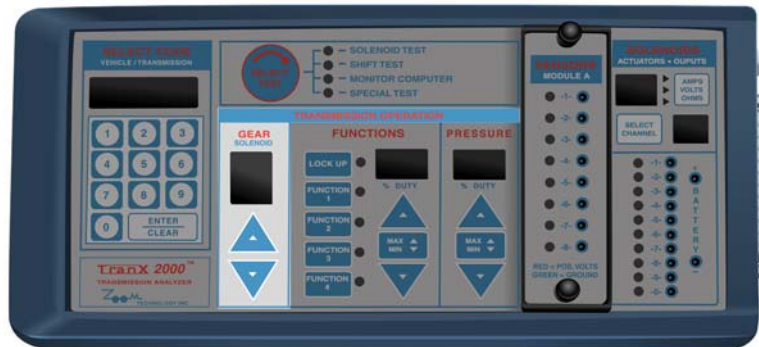


Figure 21 Controller: Gear (Solenoid)

When conducting the SOLENOID test, the **Up** and **Down** buttons are used to select a specific solenoid (Table 1 indicates which solenoids correspond to the GEAR setting). During the SHIFT test, these buttons are used to select a specific gear. Use the **Up** and **Down** arrow buttons to cycle through the gears. The corresponding number is displayed in the GEAR/SOLENOID display.

6.1.4 Transmission Operation: Functions

Use the Function buttons in the FUNCTIONS area to control special solenoids. 4L80E transmissions only require the LOCK UP function.

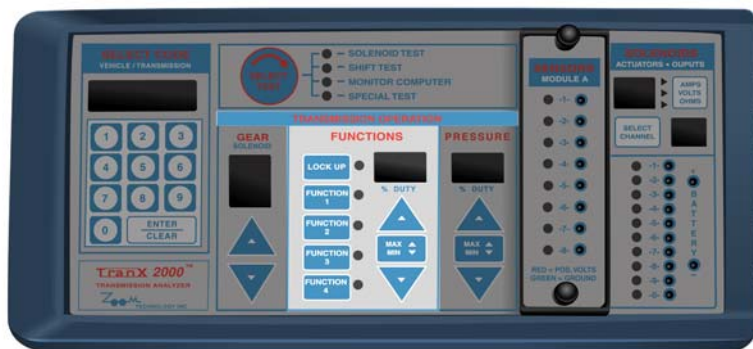


Figure 22 Controller: Functions

- The **Up** arrow, **Down** arrow and **MIN/MAX** buttons are used to apply duty to pulse width modulated functions, such as the Lock Up solenoid.
- The **Up** and **Down** arrows are used to provide incremented duty.
- To provide minimum or maximum duty instantly, press the **MIN/MAX** button and then the **Up** (for maximum) or **Down** (for minimum) arrow.

Note: Duty = % time the solenoid is energized.

6.1.5 Transmission Operation: Pressure

The buttons in the PRESSURE area are used to control the Pressure Control (EPC) solenoid.

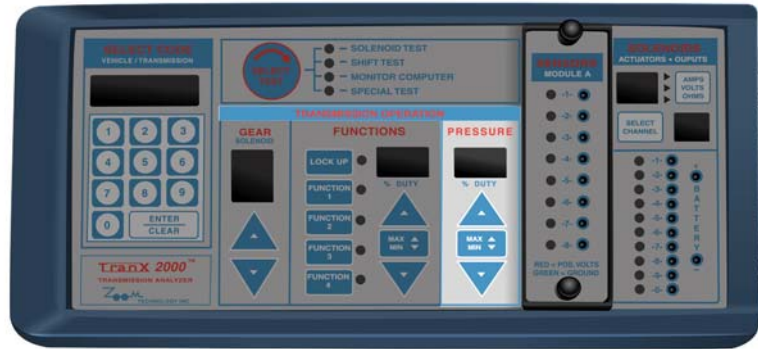


Figure 23 Controller: Pressure

The **Up** and **Down** arrows and **MIN/MAX** buttons function in the same manner as the controls described in section 6.1.4. Line pressure is controlled in 1% increments using the **Up** and **Down** arrow buttons. Apply maximum duty (minimum line) or minimum duty (full line) by pushing the **MIN/MAX** button and then the corresponding **Up** arrow (maximum duty) or **Down** arrow (minimum duty) button.

Note: Duty=% time the force motor is energized.

6.1.6 Sensors Module A

The Sensors Module A section of the controller allows the technician to monitor sensors.

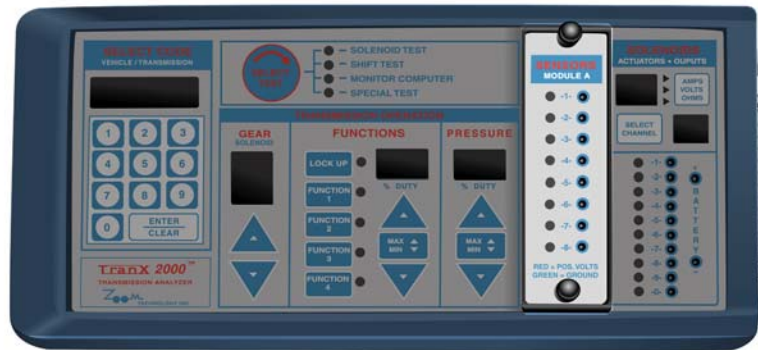


Figure 24 Controller: Sensors Module A

The first four LEDs indicate operation of the pressure switch manifolds. The LED's color indicates the following:

- Red: Positive Voltage
- Green: Ground
- OFF: No Voltage

The test sockets for Channels 5 and 6 are used to monitor the Transmission Oil Temperature sensors.

Sensor test sockets Channels 7 and 8 are used to monitor other sensors. Attach the Sensor Alligator Clips to the sensor on the system-under-test. Use the test point leads to access the appropriate sensor channel and interface with the shop equipment, such as a Digital Multi Meter (DMM), or VADS. Additional information on this function is presented in section 3.11.

6.1.7 Solenoids, Actuators, Outputs

In addition to the SENSORS MODULE A section, the technician measures testing results in the SOLENOIDS, ACTUATORS AND OUTPUTS section.

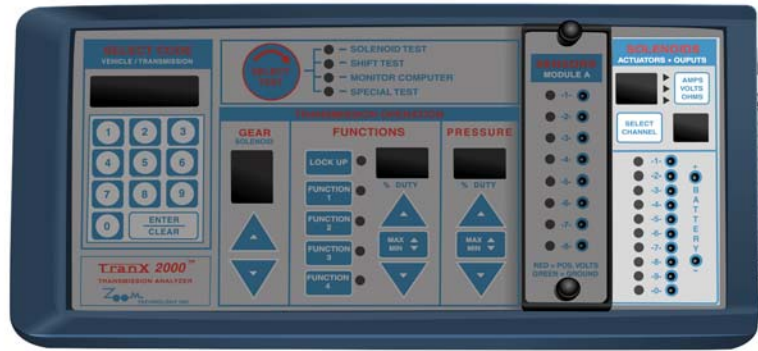


Figure 25 Controller: Solenoids, Actuators, Outputs

The first button, **AMPS/VOLTS/OHMS** toggles through the measurement options. When a measurement option is selected, the corresponding LED lights.

During the Solenoid test, the number in the SELECT CHANNEL window changes as the technician selects a gear setting (solenoid). In most cases, the number in the SELECT CHANNEL window coordinates the measurement in the AMPS/VOLTS/OHMS window with the correct gear. However, occasionally the channel number does not correspond with the gear selected. For example, gear 7 activates the EPC solenoid, however the output channel in the solenoid section must be set to 8 in order to read the amperage. This information is available in Table 1 located in Appendix A of this manual.

During the Shift and Monitor Tests, press the **SELECT CHANNEL** button to read the measurements for the desired channel (see note below).

The bottom portion of the SENSORS MODULE A section contains 10 channels with LEDs and corresponding test point sockets. The test point sockets are used to interface additional shop equipment, allowing for measurements from the solenoid circuits. Use the BATTERY test point sockets to check the voltage coming from the battery.

note: the only time this is used on HMMWVs is EPC.

6.2 Testing with the Transmission Tester

This section provides an overview and step-by-step instructions for performing several diagnostic tests. Before performing these tests, ensure that the transmission tester is connected to the transmission being tested, as described in section 5.0.

6.2.1 Solenoid Test Mode

The 4L80E transmission has four solenoids. Table 1 illustrates which transmission tester GEAR setting activates the 4 solenoids. The table also details the appropriate operation ranges in current (amps) and resistance (ohms) for each solenoid. For example, use Gear 7 to activate the EPC solenoid. Test the EPC solenoid on Output Channel 8.

Table 1 Solenoid Test

Solenoid	TranX Setting	Output Channel	AMPS Cold-Hot	Resistance Cold-Hot
Solenoid A (1-2/3-4)	Gear 1	1	0.6 - 0.3	20 - 40 Ω
Solenoid B (2-3)	Gear 2	2	0.6 - 0.3	20 - 40 Ω
Lock-Up (pulsed)	Gear 5	5	0 - (0.6 - 1.2) Duty MIN - MAX	11 - 17 Ω
EPC (pulsed)	Gear 7	8	0 - (1.2 - 1.8) \square Duty MIN- MAX	3.5 - 4.6 Ω

As the technician changes the Controller's GEAR setting during the Solenoid Test, the number in the SELECT CHANNEL display on the far right of the Controller will change accordingly.

To adjust the duty cycle for the Lock Up solenoid, use the FUNCTION DUTY **Up** and **Down** arrows. To adjust the duty cycle for the EPC solenoid, use the PRESSURE DUTY **Up** and **Down** arrows.

Solenoids may be tested for current or resistance. Use the Solenoid Test Test table for the appropriate range of readings. Since the duty cycle is set at 50%, the relationship of Ohm's Law between volts, ohms (resistance) and amps (current) dictates that the amp reading must be **multiplied** by 2 to obtain the value to compare against the chart. If comparing ohms, the value displayed must be **divided** by 2 to obtain the value to compare against the chart.

Warning: The engine should be OFF when running the Solenoid Test.

1. Connect the transmission tester to the transmission being tested.
2. Enter code **071** on the keypad.
3. Press **ENTER**.
4. Ensure that the LED next to SOLENOID TEST is lit.
5. Press the **SOLENOID/GEAR Up** arrow to select gear 1/solenoid A. The SELECT CHANNEL window should have a 1 in it.
6. Ensure that AMPS is selected as the measurement.
7. If Solenoid A is operating properly, the reading in the AMPS/VOLTS/OHMs window should be between .3 and .6 amps.
8. Press the **SOLENOID/GEAR Up** arrow to select gear 2/solenoid B. The SELECT CHANNEL window should have a 2 in it.
9. Solenoid B should be operating between .3 and .6 amps.
10. Press the **SOLENOID/GEAR Up** arrow 3 times to select the gear 5/lock-up solenoid. The SELECT CHANNEL window should have a 5 in it.
11. In the FUNCTIONS area, apply 50% duty to the lock up solenoid by pressing the Up arrow. (You may hold Up arrow to allow "run-up" to 50%.)
12. Multiply displayed reading by 2. This value should be between .6 and 1.2 amps.
13. In the FUNCTIONS area, reset the lock up solenoid's duty to 0 by pressing the **MIN/MAX** button, followed by the **Down** arrow.

14. Press the SOLENOID/GEAR **Up** arrow twice to select gear 7, the EPC solenoid.
15. Press the **SELECT CHANNEL** button once to select Channel 8. (Remember, the results for Gear 7 are read on Channel 8.)
16. Apply 50% duty in the PRESSURE section using the Up arrow.
17. Multiply displayed reading by 2. This value should be between 1.2 and .8 amps

If the solenoid-being tested reads within the proper range, then it is operating properly electrically. If the solenoid reads 0 or too high, it is either open (0 amps) or shorted (amps significantly too high). This test does not evaluate the solenoid's hydraulic action.

6.2.2 Shift Test Mode

During the Shift Test, the technician uses the transmission tester in place of vehicle's TCM to determine if a problem is originating with the transmission or somewhere outside the transmission. For example, if a problem occurs when the TCM is commanding the transmission, and that problem disappears when the transmission tester is operating the transmission, then the problem is outside the transmission.

During the Shift Test, be sure to properly control the EPC pressure. If the pressure is too low, the transmission damage may occur. If the pressure is too high, the technician may miss minor transmission problems.

1. Connect the transmission tester to the transmission being tested.
2. Enter code **071** on the keypad.
3. Press **Enter**.
4. Press **SELECT TEST** until SHIFT TEST is selected.
5. Start the vehicle and shift to 1. (see note below)
6. Adjust the line pressure by using the Pressure % Duty arrows to raise or lower the duty cycle. Lower duty should provide a firmer shift and higher duty should provide a looser shift.

note: this will change the ECU and the change will remain in effect until another change is made.

7. Use the GEAR **Up** and **Down** arrows to select a gear.
8. Use the SHIFT/MONITOR TEST table to verify that the appropriate LEDs for the gear selected illuminate. For example, in first gear solenoid A should be on and solenoid B should be off. Therefore, LED 1 should be green and LED 2 should be red. In second gear both solenoid A and B should be off. Thus, both LED 1 and 2 should be red.

Table 2 Shift/Monitor Test

Gear	Solenoid A	Solenoid B	Lock-Up (pulsed)	EPC (pulsed)
1st	ON	OFF	OFF	Select Duty
2nd	OFF	OFF	ON/OFF	Select Duty
3rd	OFF	ON	ON/OFF	Select Duty
4th	ON	ON	ON/OFF	Select Duty

9. The Lock up solenoid may be activated in gears, 2, 3 and 4 by pushing the **LOCK UP** button in the FUNCTIONS area. Use the Duty **Up** and **Down** arrows to control the pulse width modulation (duty cycle). As adjustments are made, LED 7 glows orange to indicate that the solenoid is pulsing. Measure the current by pressing the **SELECT CHANNEL** button until channel 8 is selected.

6.2.3 Torque Converter Stall Test

1. To test the lock up torque converter, ensure that the parking brake is applied so that the vehicle will not move while in gear.
2. Press the SELECT TEST button until shift test is selected (a dash "-" should be displayed in the GEAR section).
3. Start the vehicle and place the transmission in gear 1 using the shifter selector lever. (Note: **DO NOT** apply pressure to the brake pedal, as this activates the TCC switch.)
4. Press the **LOCK UP** button after maximum duty (65%) is applied in the FUNCTION area.
5. If the torque converter is working properly, the vehicle should shudder and stall.

6.2.4 Monitor Computer: Testing the TCM

This test allows the technician to monitor the signals the TCM is sending to the transmission. As the vehicle is driven, the gear

controlled by the TCM is decoded and displayed in the GEAR/SOLENOID area of the controller.

The LEDs located in the SOLENOIDS area indicate which solenoids are actually engaged. Use the Shift/Monitor Test table to determine if the SOLENOIDS energized match the signal sent from the TCM. For example, if the GEAR window has a 1 in it, then in the SOLENOIDS section of the Controller, solenoid A (channel 1 LED) should be green and solenoid B (channel 2 LED) should be red.

Table 2 Shift/Monitor Test

Gear	Solenoid A	Solenoid B	Lock-Up (pulsed)	EPC (pulsed)
1st	ON	OFF	OFF	Select Duty
2nd	OFF	OFF	ON/OFF	Select Duty
3rd	OFF	ON	ON/OFF	Select Duty
4th	ON	ON	ON/OFF	Select Duty

Warning: Before switching test modes be sure the vehicle is completely stopped and the engine is OFF.

1. Connect the transmission tester to the transmission being tested.
2. Enter code **071** on the keypad.
3. Press **Enter**.
4. Press the **SELECT TEST** button until MONITOR COMPUTER is selected.
5. Start the vehicle.
6. Shift the vehicle into drive and operate the vehicle.
7. The gear commanded by the TCM will be in the GEAR window. Observe the vehicle's behavior and confirm that the energized solenoids match the gear displayed. Determine which solenoids are energized by using the Shift/Monitor Test Table.

note: no input can be passed to the TCM or transmission via the controller in this mode.

6.2.5 Monitor Computer: Testing Pressure Switches

The transmission tester can also test the hydraulic operation of the transmission's pressure switches. While the engine is running move the shift lever through all possible positions. Confirm that the LEDs lit on SENSORS MODULE A match the results listed in the Pressure Switch Settings table.

Table 3 Pressure Switch Settings

Gear	Range A (Sensor 1)	Range B (Sensor 2)	Range C (Sensor 3)
Park	Red	GREEN	Red
Reverse	GREEN	GREEN	Red
Neutral	Red	GREEN	Red
Drive (1 to 4)	Red	GREEN	GREEN
Manual 3	Red	Red	GREEN
Manual 2	Red	Red	Red
Manual 1	GREEN	Red	Red
Illegal	GREEN	Red	Red

For example, when the vehicle is in reverse, LEDs 1, 2 and 3 should be the following colors:

- LED 1: Green
- LED 2: Green
- LED 3: Red

Warning: Before switching test modes, be sure the vehicle is completely stopped and the engine is OFF.

1. Connect the transmission tester to the transmission being tested.
2. Enter code **071** on the keypad.

3. Press **Enter**.
4. Press the **SELECT TEST** button until MONITOR COMPUTER is selected.
5. Start the vehicle.
6. While in Park, ensure that SENSORS MODULE A shows the following settings (see Table 3):
 - LED 1=Red
 - LED 2=Green
 - LED 3=Red
7. Using Table 3 to determine the correct LED color, repeat step 7 for the remaining shift positions. The technician should keep his foot on the brake at all times.
8. When all tests are complete, place the vehicle in park and turn OFF the engine.

6.2.6 Using TOT Sensor To Check Transmission Oil Temperature

The technician measures the resistance of the Transmission Oil Temperature (TOT) sensor using the test point leads and a multimeter. The Table 4 indicates the appropriate resistance levels for various temperatures.

1. Connect the transmission tester to the transmission being tested using only the Transmission Adaptor Cable (P/N 07X106 or P/N 07X110). DO NOT connect the Vehicle Harness Adaptor Cable as this will interfere with test.
2. Enter code **071** on the keypad.
3. Press **Enter**.
4. Press the **SELECT TEST** button until MONITOR COMPUTER is selected.
5. Start the vehicle.
6. Using the supplied test point leads and a multimeter, connect the multimeter to the SENSORS MODULE A's test points 5 and 6.
7. Ensure that the multimeter is set to ohms.

8. Use the TOT Sensor Testing Table (Table 4) to determine the temperature of the transmission oil based on the resistance shown on the multimeter.

Table 4 TOT Sensor Testing

Resistance	Temperature
2981 - 4018 Ω	68° F
1915 - 2550 Ω	86° F
1260 - 1660 Ω	104° F
848.8 - 1105 Ω	122° F
584.1 - 753.4 Ω	140° F
410.3 - 524.2 Ω	158° F
293.7 - 371.7 Ω	176° F
213.9 - 268.2 Ω	194° F
158.1 - 196.8 Ω	212° F

Appendix A Table Compilation

All the tables found within this manual are located in Appendix A to provide a quick reference for those technicians who already understand the basic testing capabilities of the transmission tester. In addition, early and late model connector diagrams are included with each pin labeled to correspond to the Wiring Table.

Table 1 Solenoid Test

Solenoid	TranX Setting	Output Channel	AMPS Cold-Hot	Resistance Cold-Hot
Solenoid A (1-2/3-4)	Gear 1	1	0.6 - 0.3	20 - 40 Ω
Solenoid B (2-3)	Gear 2	2	0.6 - 0.3	20 - 40 Ω
Lock-Up (pulsed)	Gear 5	5	0 - (0.6 - 1.2) Duty MIN - MAX	11 - 17 Ω
EPC (pulsed)	Gear 7	8	0 - (1.2 - 1.8) \square Duty MIN- MAX	3.5 - 4.6 Ω

Table 2 Shift/Monitor Test

Gear	Solenoid A	Solenoid B	Lock-Up (pulsed)	EPC (pulsed)
1st	ON	OFF	OFF	Select Duty
2nd	OFF	OFF	ON/OFF	Select Duty
3rd	OFF	ON	ON/OFF	Select Duty
4th	ON	ON	ON/OFF	Select Duty

Table 3 Pressure Switch Settings

Gear	Range A (Sensor 1)	Range B (Sensor 2)	Range C (Sensor 3)
Park	Red	GREEN	Red
Reverse	GREEN	GREEN	Red
Neutral	Red	GREEN	Red
Drive (1 to 4)	Red	GREEN	GREEN
Manual 3	Red	Red	GREEN
Manual 2	Red	Red	Red
Manual 1	GREEN	Red	Red
Illegal	GREEN	Red	Red

Table 4 TOT Sensor Testing

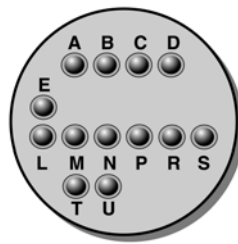
Resistance	Temperature
2981 - 4018 Ω	68° F
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1260 - 1660 Ω	104° F
848.8 - 1105 Ω	122° F
584.1 - 753.4 Ω	140° F
410.3 - 524.2 Ω	158° F
293.7 - 371.7 Ω	176° F
213.9 - 268.2 Ω	194° F
158.1 - 196.8 Ω	212° F

Table 5 Wiring Table and Connectors

Case Connector Pin Number		TranX 2000 Harness Wire	Vehicle Function	TranX 2000 Output Location	TranX 200025 Way Pin
ImportsHMMWV					
A	A	Blue	Solenoid A	Channel 1	7
B	B	Green	Solenoid B	Channel 2	8
C & K	E	Red or Red/Brown	Power to Solenoids		12 or 13
D	N	Orange	Pressure Switch (A)	Sensor LED 1	15
E	R	White	Pressure Switch (B)	Sensor LED 2	16
F	P	Light Green	Pressure Switch (C)	Sensor LED 3	17
G	M	White/Red Stripe	TOT Sensor	Sensor 6 Test Point	20
H	L	Red/Blue Stripe	TOT Sensor	Sensor 5 Test Point	19
J	S	Purple	Lockup Solenoid	Channel 6	3
L	D	Gray	EPC Power	Channel 8	2
M	C	Yellow	EPC Ground	Channel 7	1



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