ALLISON TRANSMISSION SYSTEMS

We're pleased that you've chosen the Pro-Link® 9000 because we believe it's the easiest to use, most informative scan tool available today.

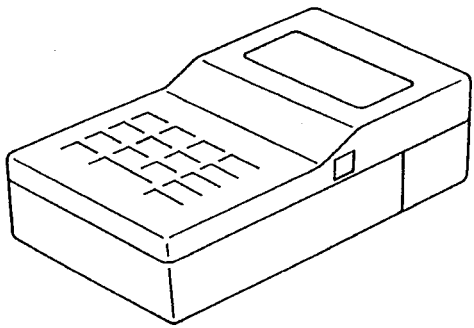
Your new Pro-Link® 9000 is designed to take advantage of its state of the art, high speed 8-bit microprocessor. What that means to you is that there is nothing to memorize, nothing to look up. Everything you need is programmed in, including step by step instructions and menus. In logical order and plain English.

The Pro-Link® 9000 features a high-impact ABS case for durability. A backlit LCD readout for good readability regardless of lighting conditions. A positive action soft-touch keyboard that's sealed against moisture.

But probably most important, the Pro-Link® 9000 is easily updated. You know how quickly on-board computer technology is changing, and each vehicle manufacturer uses a different system. With Pro-Link® 9000, you're prepared to deal with it. The data cartridge, where the specifics for each computer system are stored, is easy to change. So, you don't have to buy a separate tool for each type of vehicle. Simply snap in a different cartridge and cable adapters, and you're ready.

Because the Pro-Link® 9000 is a sophisticated electronic device, you should take the time to study this manual carefully. The Pro-Link® 9000 has a lot of capability for its hand-held size, and we wouldn't want you to overlook any of it.

Again, thanks for choosing the Pro-Link® 9000.



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SOFTWARE

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MANUAL

TABLE OF CONTENTS

SAFETY WARNINGS AND CAUTIONS

1. Always wear approved eye protection.

2. To protect yourself from injury and the test vehicle from damage, always refer to and follow the vehicle manufacturer's WARNINGS, CAUTIONS and service procedures.

3. Exhaust gas contains deadly poison. When testing a vehicle with the engine running, test in a well-ventilated area or route the exhaust out of doors.

4. Keep yourself and test equipment clear of all moving or hot engine parts.

5. Unless otherwise instructed, set the parking brake and place the gear selector in NEUTRAL. Block the drive wheels before performing a test with the engine running.

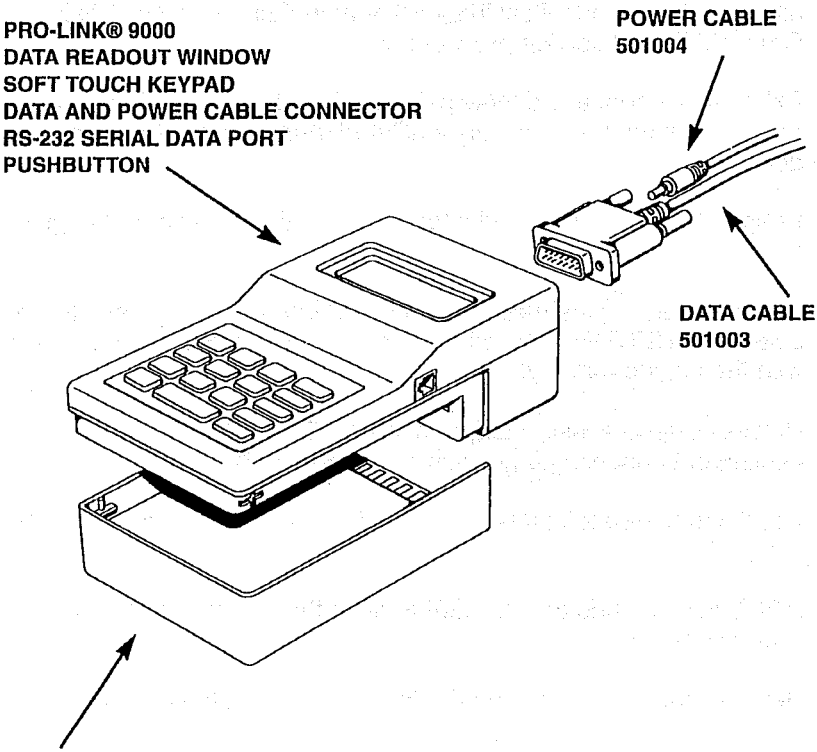
6. Unless otherwise instructed, turn the ignition switch OFF before disconnecting or connecting any electrical components.

7. Read and understand this manual before operating your Pro-Link® 9000.

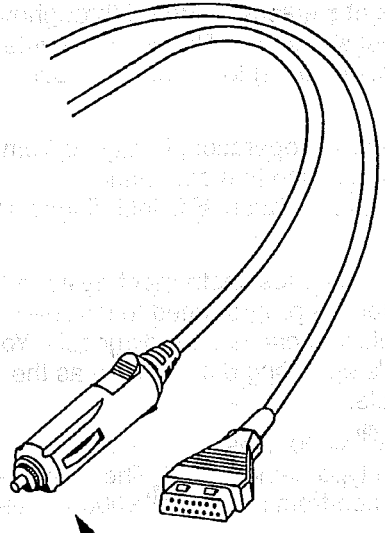
8. MPSI recommends an assistant to drive the vehicle while you use the Pro-Link® 9000.

9. Never leave the vehicle unattended while the engine is running.

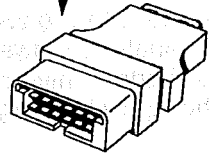
PRO-LINK® 9000 FEATURES



15-PIN VEHICLE CABLE AND POWER CABLE

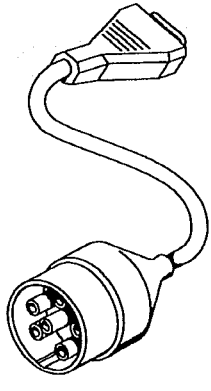


VEHICLE ADAPTER
401003



NOT NEEDED FOR
ALLISON
TRANSMISSION
APPLICATIONS

6-PIN DEUTSCH
ADAPTER
404024



WHAT YOUR PRO-LINK® 9000 WILL DO FOR YOU

Operation of a vehicle's on-board computer involves a series of inputs and outputs. The inputs come from a network of sensors scattered throughout the engine compartment, instrument panel and so on. The computer interprets these inputs, then sends outputs (commands) to various operating systems.

When something goes wrong with the vehicle's operation, it may be from a faulty input, a faulty command, or a faulty reaction to a command. Diagnosis involves finding which of these is the cause. Efficient diagnosis involves use of the Pro-Link® 9000.

The Pro-Link® 9000 is a microprocessor-based test instrument designed to tap into the vehicle's on-board computer. It's programmed to interpret the computer signals and provide readouts you can use for diagnosis. You have instant access to any of the vehicle's operating data as long as the Pro-Link® 9000 is connected to the vehicle.

There is nothing to memorize. Pro-Link® 9000 uses a series of messages to help you specify the transmission type being tested. Then, you can select the exact type of data you want to see from Pro-Link® 9000's built-in data lists and menus.

There is nothing to look up. The Pro-Link® 9000 is programmed to recognize variations between transmission types, so you don't have to refer to printed charts to interpret the readouts. Pro-Link® 9000 displays only the data that apply to the system being tested.

Your new Pro-Link® 9000 is just about ready to use as soon as you unpack it. And you're probably anxious to plug it in right away to see how it works. But we encourage you to take a few minutes to study this manual and become familiar with the Pro-Link® 9000's features first.

IDENTIFICATION TAG

Note the ID tag on the rear of the Pro-Link® 9000. It contains the manufacturer's name and address, the model number, and the serial number of your specific unit. Refer to this ID tag when you need service or repair parts.

CABLES

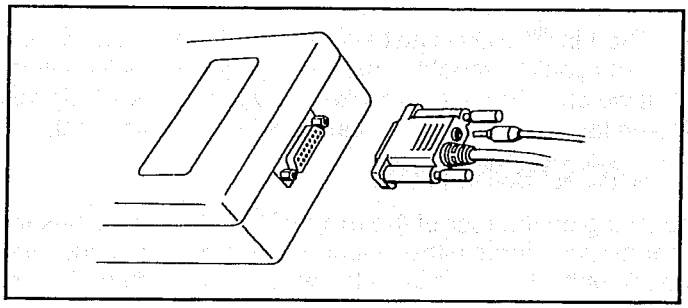
Your Pro-Link® 9000 is shipped with two cables that attach with a single connector. After you have connected it to your Pro-Link® 9000 the first time, it is not necessary to remove it again. Here's how.

Vehicle Cable

NOTE: Earlier cable versions consisted of a single assembly; both the vehicle cable and power cable were attached by a single molded connector. Later versions consist of two separate cables.

Early Version — Locate the vehicle cable with attached power cable, 501001. It has a large 15-pin terminal with two captive thumbscrews. Plug this terminal into the top of the Pro-Link® 9000 — it can be plugged in only one way, so don't force it if it doesn't seat on the first try. Then tighten the two captive thumbscrews to secure the cable. When connecting to Allison Transmissions, the power cable is not needed. Simply coil it up and secure it to the vehicle cable with tape. Untape the power cable to connect to remote power supplies.

Later Version — Locate the vehicle cable, 501003. It has a large 15-pin terminal with two captive thumbscrews. Plug this terminal into the top of the Pro-Link® 9000 — it can be plugged in only one way, so don't force it if it doesn't seat on the first try. Then tighten the two captive thumbscrews to secure the cable. For Allison Transmission applications, the power cable 501004 is not needed. Simply leave it in the storage case.



ATTACHING VEHICLE CABLE AND POWER CABLE

Power Cable

NOTE: Earlier cable versions consisted of a single assembly; both the vehicle cable and power cable were attached by a single molded connector. Later versions consist of two separate cables. In both cases, the power cable includes a cigarette lighter plug.

Because the Allison Transmission systems provides power to the Pro-Link® 9000 through the vehicle cable, the power cable and cigarette lighter plug are not needed.

FUSE

NOTE: The standard power cable contains a fuse inside the cigarette lighter plug. It is not used in Allison Transmission applications.

The Allison Transmission systems cartridge contains a fuse. It can be replaced by removing the cartridge cover. This is explained in Troubleshooting.

SYSTEM CARTRIDGE

Locate the system cartridge. Each cartridge is designed to work with one manufacturer's system. The cartridge is packed with the necessary cable adapters to fit the applicable vehicles and an operator manual. In the future, updated replacement cartridges and manuals will be available to keep up with rapidly changing system designs. To be sure you're using the cartridge that applies to the vehicle you're testing, refer to the identification tag on the rear of the cartridge.

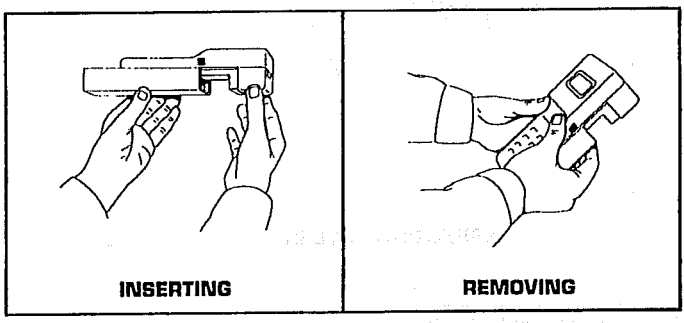
Identification Tag

The ID tag on the rear of the cartridge tells you which vehicle systems it covers. The ID tag also contains the manufacturer's name and address, the cartridge model number, the serial number of your specific cartridge. Refer to this ID tag when you need service.

Inserting and Removing the Cartridge

Seat the cartridge on the back of the Pro-Link® 9000. Do not hold the cartridge at an angle; it must sit flat. It will go only one way. Notice that the

connector (edgeboard) of the cartridge is automatically aligned with the connector in the Pro-Link® 9000 unit. Then slide the cartridge forward until it clicks into place. The unique latches provide positive retention and alignment. The body of the cartridge is provided with a rough texture for a better grip.



INSERTING REMOVING

The cartridge may be left in place indefinitely. If the occasion arises to use your Pro-Link® 9000 to test a different system or vehicle, first disconnect the vehicle adapter (which contains the 12 V power feed) from the vehicle. Place your thumbs on the slanted surface of the keyboard and your fingers on the cartridge. Then make a motion similar to snapping your fingers. The retention latches will release the outer end. Continue sliding the cartridge straight out until the edgeboard is clear of the connector in the Pro-Link® 9000.

CABLE CONNECTIONS TO VEHICLE

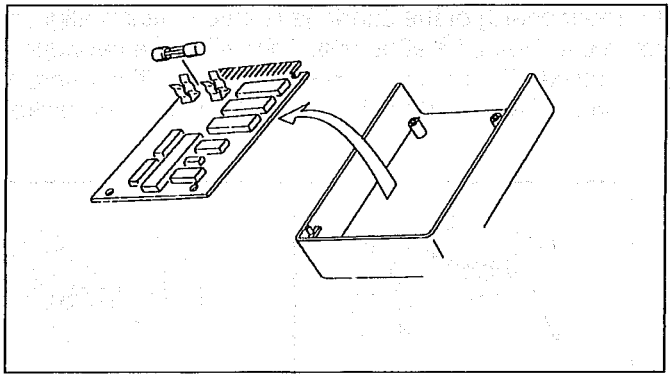
The data and power cable must be connected to the vehicle before the Pro-Link® 9000 can function. For details, refer to the section entitled **Diagnosing With Your Pro-Link® 9000** in the appropriate manual.

The Pro-Link® 9000 will energize as soon as it is connected to the vehicle's electrical system. If it does not, there are several things to check.

TROUBLESHOOTING

If the unit does not power up, check that the cartridge is plugged in correctly. Slide the cartridge out and plug it in again. If there is grease, oil or other grime on the edgeboard, carefully remove it with a soft cloth. DO NOT use solvents, and DO NOT attempt to clean the terminals in the Pro-Link® 9000 unit itself.

Check the 2-amp fuse located inside the cartridge. Remove the screws to disassemble the cartridge. Always use a 2-amp fuse for replacement.



INSPECTING FUSE INSIDE CARTRIDGE

READOUT WINDOW

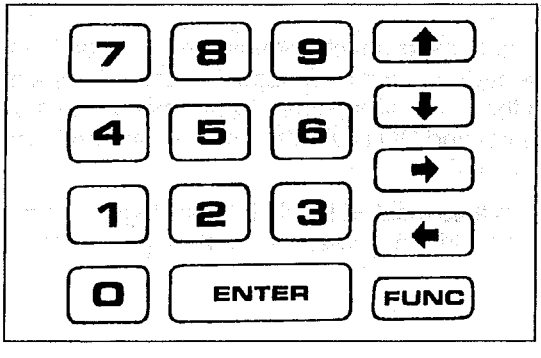
The readout window contains a liquid crystal display (LCD). It has 4 lines, each with 20 characters. This provides a great deal of information at one time. A built-in backlight ensures that you will be able to read the display regardless of the lighting conditions in the vehicle. The readout uses letters, numbers and special symbols.

KEYPAD

Features

The keypad features 16 keys. They are totally sealed against contamination, including grease and fluids. You can clean them with a damp cloth or mild cleaner. DO NOT immerse the Pro-Link® 9000 in fluids; the edge-board connector is NOT sealed.

The keys operate with a soft touch, but unlike membrane keys, they "give" to indicate that your entry has been made.



Layout and Functions

NOTE: Each vehicle manufacturer has chosen its own computer operating system. Of course, diagnosis of each system is unique, so the Pro-Link® 9000 cartridges are also unique. When you change cartridges, the key functions are automatically defined when you insert the new cartridge.

BASIC KEY FUNCTIONS

The 10 NUMERIC KEYS are arranged calculator-style for quick operation. Each key is imprinted with a single digit.

To the right side of the keypad, there are 4 ARROW KEYS, each imprinted with a direction arrow. The UP and DOWN arrow keys are used to scroll through the lines of the display. Each touch of a key causes the display to move one line, up or down. The LEFT and RIGHT arrow keys are used to toggle back and forth between choices given by the display; they may have other purposes, depending on which cartridge you're using.

The FUNCTION key, below the arrow keys, is imprinted FUNC. Use the FUNCTION key to choose various Pro-Link® 9000 modes, or jobs, depending on the cartridge in use. These include several operating modes and a printing mode, explained in the individual manuals.

The ENTER key lets you tell the Pro-Link® 9000 when to do something. Depending on what's showing in the readout window display, the enter key can make a selection, confirm an answer, or instruct the Pro-Link® 9000 to continue to the next step.

PUSHBUTTON

A pushbutton is located on the left side of the Pro-Link® 9000. Its function is determined by the cartridge inserted at the time. You will be specifically instructed when to use the pushbutton.

RS232 PORT

On the right side of the Pro-Link® 9000 case is an RS232 port. Using the proper cables, you can connect to a printer or terminal. These are explained later.

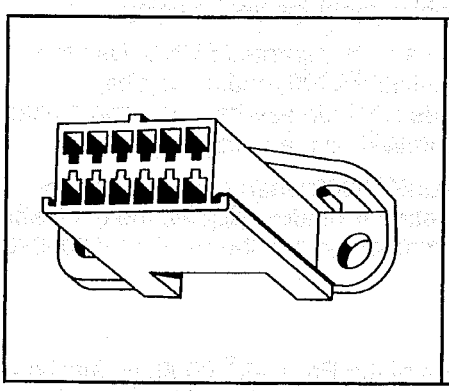
PRO-LINK® 9000 CARTRIDGE FOR ALLISON TRANSMISSION SYSTEMS
For Use With Cartridge 204009

NOTE: Before using this cartridge section, be sure you've studied the familiarization material at the front of this operator manual.

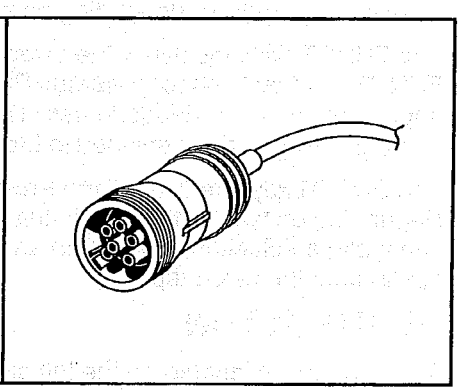
DDR CONNECTOR

The Pro-Link® 9000 receives information from the vehicle's on-board computer, the electronic control unit (ECU), through a connector called the Display Data Reader or DDR. (In World Transmission literature, this connector is called the Diagnostic Tool Connector or DTC. In Allison literature, it may also be called the Diagnostic Data Line or DDL.) The DDR has 12 terminal cavities.

The Pro-Link® 9000 data cable contains 15 wires and has a molded connector with 15 pin sockets. This connector wil not attach directly to the DDR connector. You must install the appropriate adapter plug. The adapter plug will install to the cable in only one way. All adapters have 15 pins on one side, and the opposite side is customized depending on application. After installing the adapter to the data cable, plug the adapter into the DDR connector in the vehicle



TYPICAL DDR ADAPTER IN VEHICLE



ADAPTER 404024 6-PIN DEUTSCH

DDR Adapter Plug Location

Refer to the vehicle manufacturer's shop manual to determine the location of the DDR connector. It will look like the one shown in the illustration.

NO DATA

What To Do With NO DATA Readout

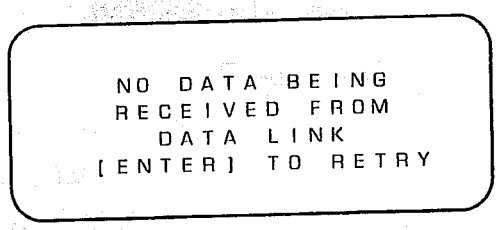
If you get the NO DATA message, there are several things to check:

Bad connection — Check the vehicle cable at each terminal for a good connection. In an extreme case, a wire may be broken in the vehicle cable or in the ECU wiring.

Ignition key off — Be sure it is turned on.

Bad ECU, or blown ECU fuse — If the ECU is incapable of transmitting data, the Pro-Link® 9000 will not receive any.

Should the Pro-Link® 9000 not detect the transmission type, the following screen is displayed.



The ENTER and FUNC keys are active on the Pro-Link keypad. Pressing the ENTER key causes the Pro-Link® cartridge to retry communications with the ECU. Pressing the FUNC key places the cartridge in the Short Function Menu.

FUNCTIONS

The Pro-Link® 9000's main purpose is to display data, and it does this automatically, as you've just seen. But it can do several other jobs, called functions. These functions are of two types. Some of them relate to the way Pro-Link® 9000 communicates with the ECU in the vehicle, such as diagnostic codes and ranges. Other functions relate to the way the Pro-Link® 9000 itself operates, such as Snapshot, RS-232 Serial Port and Contrast Adjustment.

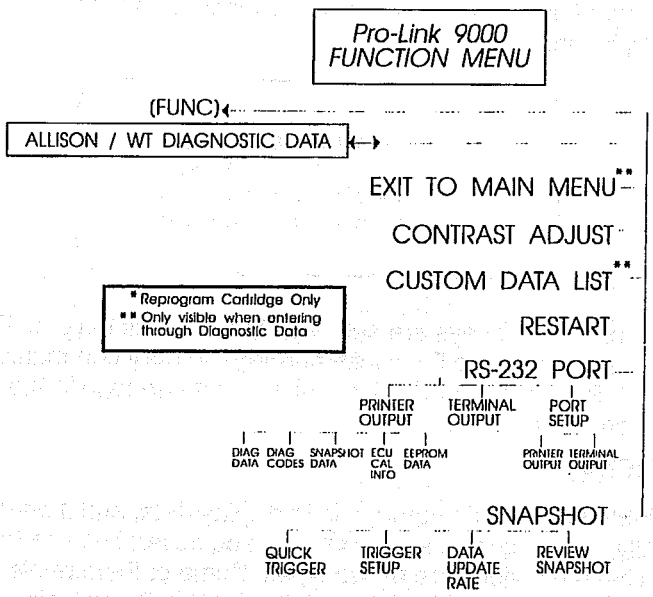
Use of the Function Key

For access to the functions. press the FUNC key. You don't have to worry about which functions are available at any point, or which functions apply to a particular system; there is nothing to memorize or to look up. The Pro-Link® 9000 is programmed to provide access to only those functions that apply. If you see it displayed, you can use it. If you don't see it, it does not apply. Simple.

SYSTEM DATA

The data programmed into the Pro-Link® 9000 was obtained from reliable sources and was verified on actual systems. Descriptions of the data contained in this manual were accurate at the time of printing. Because technology is constantly advancing, it is possible that some systems may be built whose data may differ. MPSI does not assume responsibility for manufacturers' changes.

PRO-LINK FUNCTION MENU



The Pro-Link Function Menu allows you to perform the following tasks:

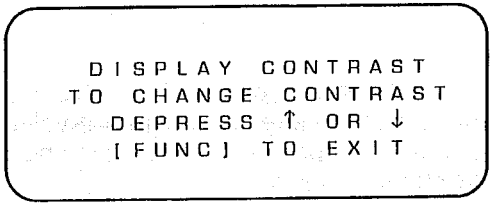
- Contrast Adjust
- Restart
- RS-232 Serial Port
- Review Snapshot

CONTRAST ADJUST

Contrast refers to the darkness of the readout letters and numbers when compared with the background. Under some viewing angles and at various air temperatures, you will be able to see the readout better if you adjust contrast.

NOTE: If you are using the Pro-Link® 9000 in direct sunlight, the heat of the sun may affect contrast. As temperature goes up, the display may darken. If so, adjust contrast.

To adjust contrast, select the Contrast Adjust function.



You can change contrast by holding down either the UP key or the DOWN key. Both of them cause the contrast to move through its entire range. You must hold the key down for several seconds. After the contrast reaches minimum, the readout will seem to disappear. This is normal. Simply keep holding the key down, and the readout will return.

To exit Contrast Adjust, press the FUNC key.

NOTE: Each time the Pro-Link® 9000 is powered up, the contrast is automatically set at an average value.

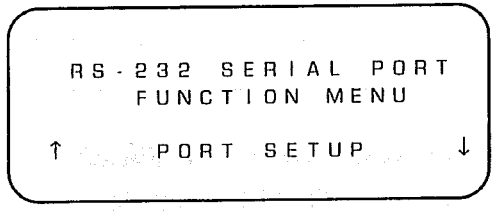
RESTART

When you select Restart and press ENTER, you will be returned to the beginning. The copyright screen will not appear. The display will read REQUESTING ALLISON TRANSMISSION DATA. Refer to System Selection Procedure earlier in this manual.

RS-232 SERIAL PORT

When you choose this function, you have the opportunity to control output from the Pro-Link® 9000 through the RS-232 port located on the right side of the case.

There are three choices in the RS-232 function menu: Printer Output, Terminal Output, and Port Setup.The first time you use this function, you will need to use Port Setup to be sure the Pro-Link® 9000 output parameters agree with those of your printer or terminal. Once this has been done, the non-volatile memory of the Pro-Link® 9000 will retain these settings for future use. So, although Port Setup is the third item to appear in the RS-232 menu, it is discussed first. Use the UP and DOWN arrow keys to locate it in the menu. Press ENTER.



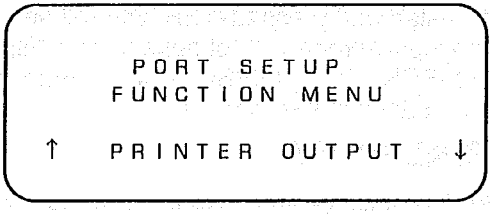
Port Setup

Once you have selected Port Setup, you will be able to set the output parameters for one printer and one terminal in non-volatile memory. If you later decide to use a different printer or terminal, the necessary output parameters can be changed again.

NOTE: The Model DPU-411 Pro-Link Printer offers high-quality, high-resolution output in a compact design. Contact MPSI for ordering information. MPSI also offers a terminal emulation program suitable for use in personal computers. Contact MPSI for details.

There are four parameters that need to be set correctly for your Pro-Link® 9000 to operate properly with various printers and terminals. These parameters are Handshake, Baud Rate, Parity, and Stop Bits. You must specify these four parameters separately for both printer and terminal.

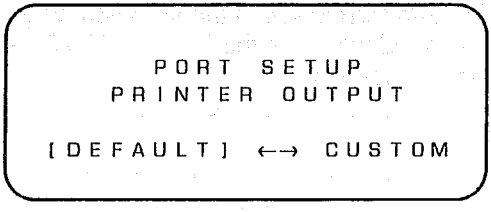
First, decide if you want to set up for a printer or a terminal. Use the UP and DOWN arrow keys to scroll the list.



Locate your choice and press ENTER.

PORT SETUP — PRINTER OUTPUT

You will first have a choice of using the DEFAULT settings built into the Pro-Link® 9000 or creating CUSTOM settings. Use the LEFT and RIGHT arrow keys to toggle your choice. Then press ENTER.



PORT SETUP — PRINTER OUTPUT — DEFAULT

When default is selected, the Pro-Link sets up the default printer values used for the MPSI Printer and returns you to where you were in the program.

PORT SETUP — PRINTER OUTPUT — CUSTOM

Selecting Custom displays the following screen.

```
↑↓TO SELECT PARAM
←→TO SCROLL VALUE
[ENTER] TO SELECT
  [FUNC] TO QUIT
```

This instruction screen is displayed for six seconds, during which time no keys are active. Then the following screen is displayed.

```
HANDSHAKE      BUSY  D
BAUD RATE      2400  D
PARITY         NONE  D
STOP BITS   2  BITS  D
```

At this point, HANDSHAKE is flashing to denote that it is selected. BUSY is the default value (shown by the letter D following it). To change the handshake value use the LEFT and RIGHT arrow keys to scroll through the list. When you have decided on the correct value for your needs press ENTER. Notice the C displayed after the handshake value. This tells you that it is a Custom value. Press the DOWN arrow key to select BAUD RATE (it will start flashing). Repeat the procedure used for handshake to configure baud rate, parity, and stop bits. Use the table below to determine what printer configuration values are available.

Handshake	Baud Rate	Parity	Stop Bits
Busy	300	None	1 bit
XON/XOFF	1200	Odd	2 bits
	2400	Even	
	4800		
	9600		
	19200		

Use any combination of the above values as required by your printer.

PORT SETUP — TERMINAL OUTPUT

Selecting Terminal Output from the Port Setup Function Menu presents the same screens as shown for Printer Output, except that *Terminal Output* is substituted for *Printer Output* on the screens.

NOTE: Baud rate default for printer is 2400; 9600 for terminal. Handshake default for printer is BUSY; XON/XOFF for terminal.

Printer Output

If this is the first time you have used this function, refer to Port Setup. If this is not the first time, your RS-232 port should be set properly to operate your printer.

The Printer Output menu allows you to print the contents of different memory buffers:

- Diagnsotic Data
- Diagnostic Codes
- Snapshot
- ECU/Calibration Information (World Transmission only)
- EEPROM Data (World Transmission Only)

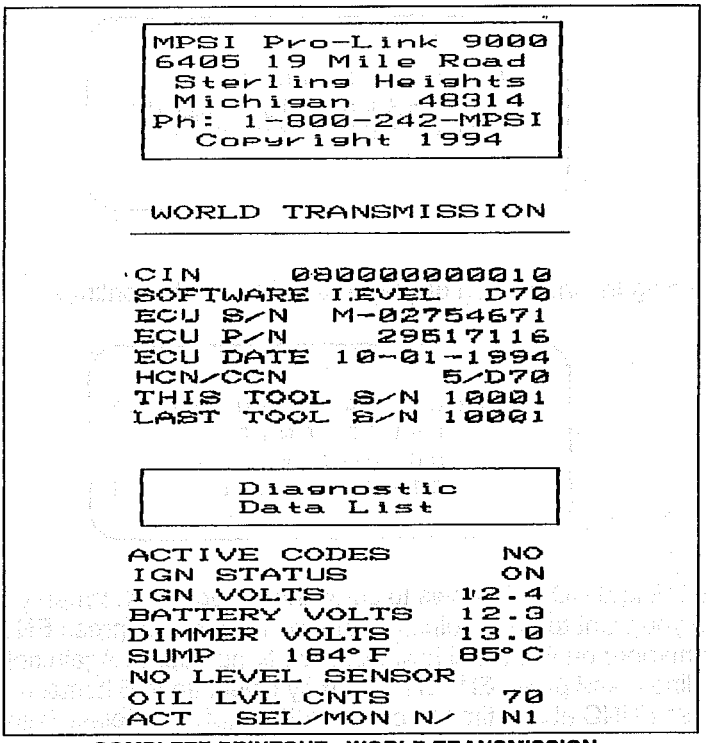
NOTE: You must have data stored in a buffer before it can be printed. Refer to the appropriate section.

Use the UP and DOWN arrow keys to scroll the list. When your choice appears, press ENTER. The printer will immediately begin printing.

NOTE: If you want to print the contents of other buffers, locate them in the menu and press ENTER. They will print out as soon as the first one is finished.

DIAGNOSTIC DATA

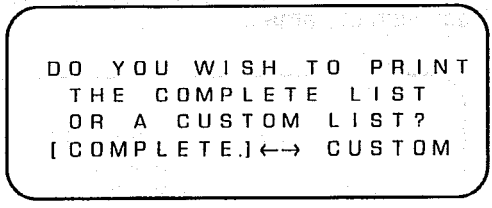
When you choose to print Diagnostic Data, the Pro-Link will print out the information in the format at right.



COMPLETE PRINTOUT - WORLD TRANSMISSION

SNAPSHOT DATA

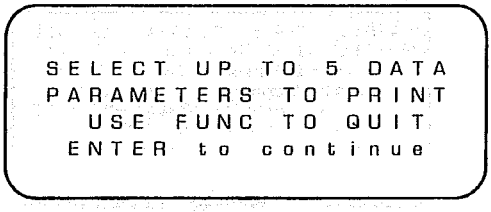
You will be given two choices. You may print the complete snapshot list, or you may print a custom list of up to five data parameters.



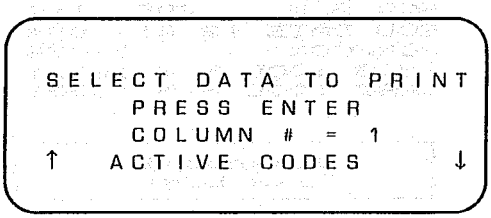
Use the LEFT or RIGHT arrow to select your choice and press ENTER.

If you choose COMPLETE — Refer to Select Frames display below.

If you choose CUSTOM — You will be given the opportunity to select the five items in your custom list. They are arranged in columns, numbered 1 through 5.



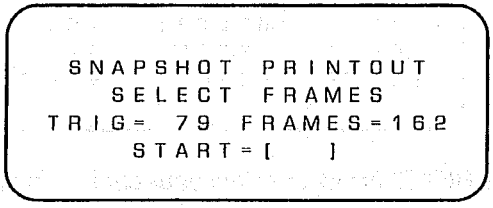
After reading the instruction display, press ENTER to continue.



Use the UP and DOWN arrows to scroll the list on line 4. When you see the item you want to be in column 1 of your custom list, press ENTER. The column number on line 3 will now advance to number 2. Again select an item on line 4 and press ENTER. You may select up to 5 items. And you may press FUNC at any time to end your list. Refer to Select Frames below.

Select Frames

The Select Frames display will appear. You must specify the frame numbers of the starting and ending points of the data you want printed. The number of available frames will vary depending on the system. Refer to Snapshot for a description of frames.

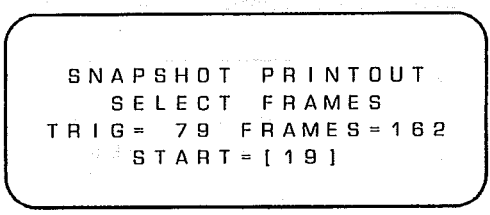


Notice that the total number of frames recorded in Snapshot is shown on line 3. The specific frame containing the trigger is also shown. You can use these frame numbers to help decide which frames you wish to print out.

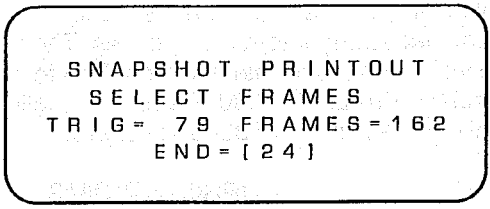
You have three choices of specifying frames. If you wish to print only the trigger frame, press ENTER **twice.** This will skip past the opportunity to input the start or end points.

If you want to print a specific frame only, simply input that frame number as the start point and press ENTER **twice.** This will skip past the opportunity to input the end point.

If you want to print a series of frames, for example 19 through 24, input the starting frame number using the numerical keys. Press ENTER.



Then input the ending frame number and press ENTER again.



Your Pro-Link® 9000 will now transmit the data to the printer.

NOTE: If you make a mistake at any time, press FUNC to return to the Printer Output menu and select Snapshot again.

DIAGNOSTIC CODES

You may print Diagnostic Codes. Refer to ***Diagnostic Codes*** later in this manual.

ECU/CALIBRATION INFORMATION

You may print ECU Calibration Information. Please refer to ***ECU Calibration Information*** later in this manual.

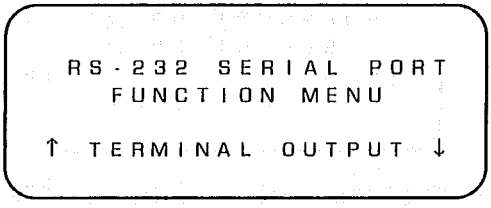
EEPROM DATA

You may print EEPROM Data. Please refer to ***EEPROM Data*** later in this manual.

Terminal Output

If this is the first time you have used this function, refer to Port Setup. If this is not the first time, your RS-232 port should be set properly to operate your terminal.

Several electronic engine analyzers include a video display and keyboard. You may also use a VT-100® display terminal or a VT-100® terminal emulation program on a personal computer. Make the proper set-up and connections to the terminal device. Then locate the Terminal Output choice in the Pro-Link® 9000 readout and press ENTER.



The readout will display a message for a few seconds while the Pro-Link® 9000 performs the necessary internal processes. Then the Pro-Link® 9000 readouts will be visible on the terminal screen. The terminal keyboard can be used to control the Pro-Link® 9000. Refer to the following chart for keyboard equivalents of the Pro-Link® 9000 keyboard.

Pro-Link® 9000 KEYBOARD	CORRESPONDING TERMINAL KEYS
FUNC	F
ENTER	ENTER/RETURN
↑	U
↓	D
→	R
←	L
NUMBERS	NUMBERS

The screen of the terminal will show the same information as the Pro-Link® 9000 display, but some of the characters may appear slightly different on the terminal screen, depending on the capabilities of the terminal or terminal emulation program. On a VT-100®, characters will appear double high and double wide for good legibility from a distance.

NOTE: If your terminal does not operate properly, you may need to select a different handshake option. See Port Setup.

SNAPSHOT

The SNAPSHOT function permits the Pro-Link® 9000 to record data while

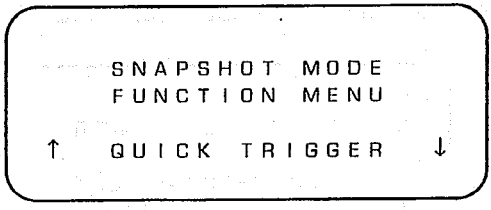
the vehicle is being driven. Then the data can be played back when you return to the shop. You can use this feature to locate operating problems that would be difficult to locate by any other method. Depending on vehicle type and the data rate, the Pro-Link® 9000 will record over 50 minutes of data.

NOTE: The amount of information that can be recorded is determined by the data update rate selected. Refer to Data Update Rate below.

When you are using Snapshot, the Pro-Link® 9000 is continuously recording data. When the memory is filled, the oldest data is dropped, and the new data is continuously added. When an operating condition occurs, the Pro-Link® 9000 puts a marker in the data recording so you can find the exact spot later during playback. We call this the **trigger.** Because driveability problems are often related to diagnostic codes, one of your choices is to use a diagnostic code as the trigger. You can choose **any** code, or a **specific** code to be the trigger. Or you can trigger the recorder yourself manually if a suspicious driveability condition occurs.

It is sometimes helpful to look at data that occurred before the operating condition happened, looking for an unnatural trend, for instance. And it is sometimes helpful to look at data that occurred after the operating condition happened. Pro-Link® 9000 allows you to decide ahead of time how much data will be retained before, as well as after, the trigger point.

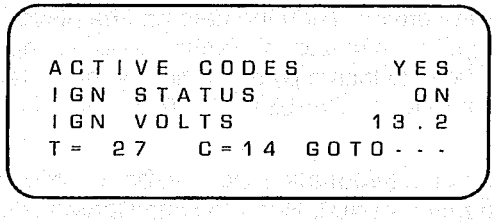
When you select the SNAPSHOT function, you will see the Snapshot menu selection readout. Choices include Quick Trigger, Trigger Set-Up, Data Update Rate, Review Snapshot.



Review Snapshot

NOTE: This mode choice appears in the Pro-Link Function menu or the Snapshot menu even if you have not actually triggered a recording. If no recording exists, the Pro-Link will respond with "NO SNAPSHOT DATA"

Choose this mode to play back the data recording.

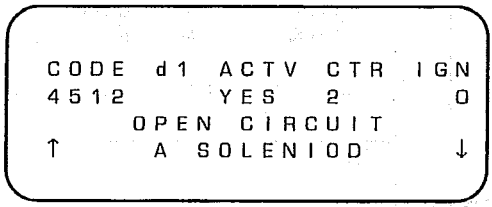


The top three lines contain data. Use the UP and DOWN arrow keys to scroll through the list.

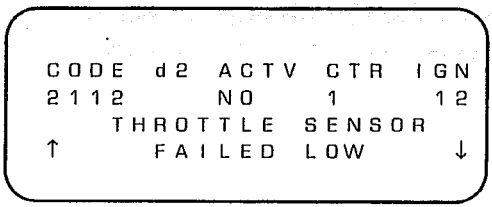
The bottom line contains the Snapshot operating information. The letter T indicates the **number** of the frame that contains the TRIGGER (this is the marker that the Pro-Link® 9000 puts into the recording to help you find the point at which the operating condition occurred). The letter C indicates the number of the frame you're CURRENTLY looking at. Use the LEFT and RIGHT arrow keys to increase or decrease the number of the CURRENT frame. Observe the data as you move from one frame to the next. The display will show you the changes that took place. If you want to jump immediately to a specific frame, use the numeric keys to input the desired frame number. The numbers you input will replace the dashes after the GOTO. When you press ENTER, you will jump directly to the specified frame.

Pressing the ENTER key without having pressed any other key presents the following screen showing the codes for that frame. Arrows appear on line 4 if there is more than one code.

NOTE: Each frame is one complete diagnostic data list.



These are the trouble codes for the current frame being viewed.



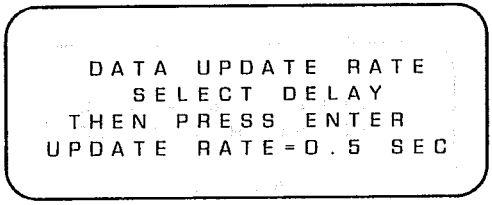
Pressing the UP or DOWN arrow key scrolls the code display. Pressing FUNC takes you back to the Review Snapshot Data List mode.

NOTE: If you tell the Pro-Link® 9000 to GOTO a frame number larger than the highest one stored, it will GOTO the highest one stored.

NOTE: If you plan to print out the data you've just recorded, write down the frame numbers of the data you want to print. You'll need to know these frame numbers when you enter the Print function.

Data Update Rate

The data displayed by your Pro-Link® 9000 is updated at specified intervals. You can specify how often you want this to happen using Data Update Rate.



The amount of time that elapses between updates is called the delay. This can be varied from 0.1 to 9.9 seconds. Use the numerical keys to input the NEW update rate you want. When your desired rate is displayed, press ENTER. You will be returned to the Snapshot menu.

Quick Trigger

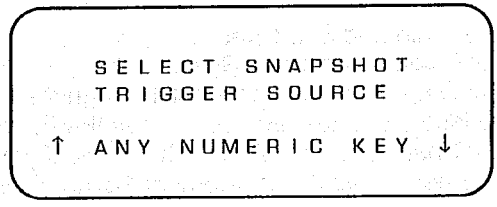
If you are using Snapshot for the first time, selecting Quick Trigger automatically chooses the default operation. This is the manual Any Numeric Key trigger.

If you are ready to take a second or third snapshot, using Quick Trigger permits you to use the operating parameters you used before. This means you don't have to constantly reset them.

Trigger Setup

When you choose this menu entry, you can specify what will be used as the trigger.

ANY NUMERIC KEY



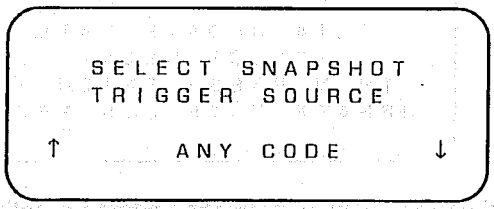
When you specify Any Numeric Key as the trigger, the Pro-Link® 9000 will place a marker in the recording at the time you depress any of the numeric keys. You will probably use this trigger when you want to find the cause of a driveability problem that you can feel or hear when driving the vehicle. When the condition occurs, trigger the Pro-Link® 9000 by depressing any numeric key.

After entering Any Numeric Key, you will be given the opportunity to adjust the memory trigger point. Refer to Adjust Memory Trigger Point.

DIAGNOSTIC CODE

If you decide to use a code as the trigger, you will be given two choices: Any Code or Specific Code.

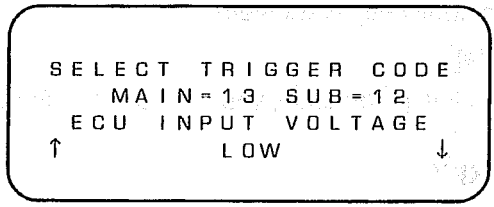
Any Code



If you use the ENTER key to choose Any Code, the Pro-Link® 9000 will recognize any diagnostic code as the trigger. You will now be given the opportunity to adjust the memory trigger point. Refer to Adjust Memory Trigger Point.

Specific Code — World Transmission

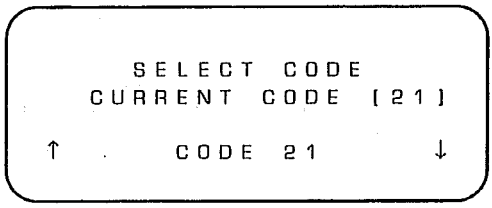
When you select Specific Code for the World Transmission, the following screen is displayed.



Line 2 displays the Main and Sub Code, while lines 3 and 4 display the plain English description of the code. By using the UP or DOWN arrow keys on the Pro-Link keypad, you can scroll through the list of diagnostic codes. When you locate the desired code, press the ENTER key to select it as the trigger for Snapshot. You will then be asked if you want to adjust the memory trigger point. See Adjust Memory Trigger Point.

Specific Code — Allison Transmission

If you use the ENTER key to choose Specific Code for the Allison Transmission, the Pro-Link® 9000 will give you the opportunity to specify which code you want as the trigger.

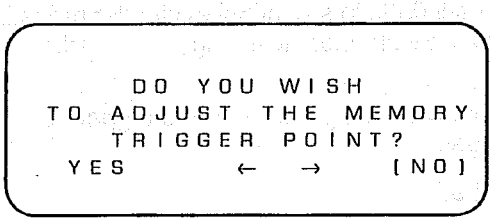


The code presently chosen is enclosed in the brackets on line 2. There are two ways to choose another diagnostic code. You can input your choice with the numerical keys and press ENTER. Or you can use the UP and DOWN arrow keys to scroll the list. The code number choices appear on line 4. When you see the code you desire, press ENTER.

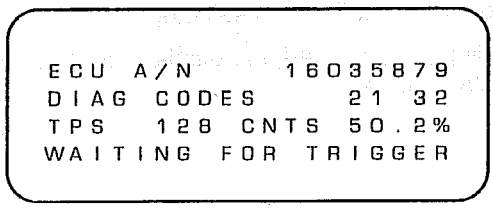
You will now be given the opportunity to adjust the memory trigger point. Refer to Adjust Memory Trigger Point.

Adjust Memory Trigger Point

You will get to this point, regardless of which trigger method you chose. Now you have the opportunity to determine where in memory you want the trigger to be.

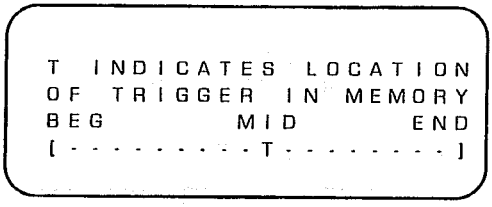


If you do not wish to adjust the memory trigger point, press ENTER. The snapshot function now begins. The readout displays WAITING FOR TRIGGER.



NOTE: To find out what happens when the trigger occurs, refer to Processing Trigger.

If you do wish to adjust the memory trigger point, use the LEFT arrow key to toggle the indicator to YES and press ENTER. The display will now permit you to choose how much data you want retained in memory before and after the trigger point.



Use the LEFT and RIGHT arrows to move the T to the place you want the trigger to be. If you do not move the T, the Pro-Link® 9000 will continue recording data after the trigger occurs, placing the trigger in the middle of the data recorded. If you place the T at the right, the Pro-Link® 9000 will quit recording data as soon as the trigger occurs. All of the data recorded will be before the trigger point. And if you place the T at the left, the Pro-Link® 9000 will continue recording data after the trigger occurs, placing the trigger at the beginning of the data recorded.

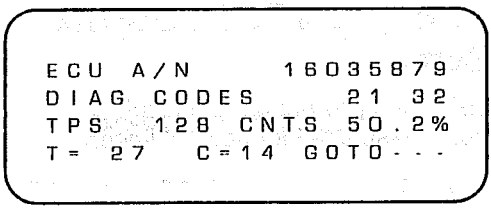
NOTE: Remember, the Pro-Link® 9000 begins recording data as soon as you see WAITING FOR TRIGGER on the bottom line of the readout. The Pro-Link® 9000 has no way of knowing when an operating condition is going to occur. So, when memory is full, the oldest data is dropped to make room for new data, in a continuing circular process. The trigger point you select actually determines how long the recording continues after the trigger occurs.

NOTE: To find out what happens when the trigger occurs, refer to Processing Trigger.

Processing Trigger

While the Pro-Link® 9000 is waiting for the trigger to occur, the bottom line reads WAITING FOR TRIGGER. As soon as the trigger occurs (numeric key, any code, or specific code), the bottom line reads PROCESSING TRIGGER. This notice remains until the Pro-Link® 9000 has taken data to satisfy the trigger point location you selected.

When the recording is completed, the display will change to permit you to play back the data recorded.



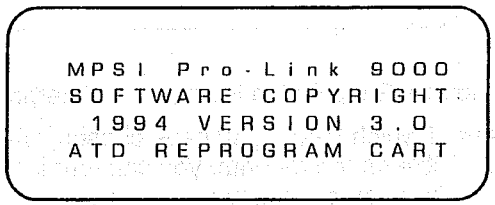
NOTE: Refer to Review Snapshot to learn how to interpret this display.

NOTE: Regardless of which trigger you have chosen, when PROCESSING TRIGGER is visible on the readout, you can terminate the recording process at any time by depressing any numeric key.

SYSTEM SELECTION PROCEDURE

Copyright Screen

When the Pro-Link® 9000 powers up, the display shows the copyright screen. This screen is displayed for several seconds.

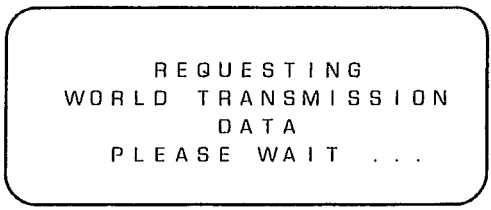


System Selection Process

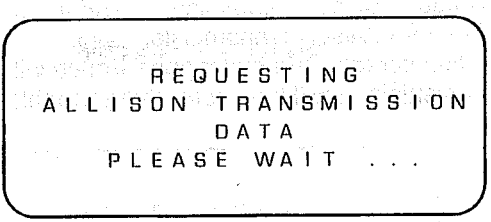
After the copyright screen, a system selection screen will appear. This is shown while the cartridge software is determining the type of transmission the Pro-Link® 9000 is connected to. If the Pro-Link® 9000 is connected to an Allison Transmission, refer to the information list in the section titled ***Allison Transmission.*** If the Pro-Link® 9000 is connected to a World Transmission, refer to the information located in the section titled ***World Transmission.*** The selection of the proper transmission type is automatic by the cartridge.

Since the Pro-Link® 9000 tries to initialize for a World Transmission first, then an Allison Transmission, you will see the following initialization sequence. When the cartridge determines which type of transmission it is connected to, the sequence will be interrupted and you will see the screens indicated in the appropriate section of the manual.

When an the initialization sequence begins, you will see the screen shown below.



If a World Transmisison is not found, this screen will remain visible for 5 seconds and the following screen will appear.



PUSHBUTTON

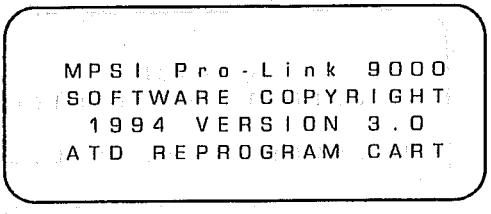
The pushbutton located on the left side of the Pro-Link® 9000 is not used when testing an Allison system.

DIAGNOSTIC DATA

Data Readout

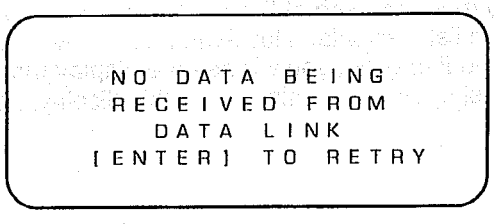
The main function of the Pro-Link® 9000 is to provide you with data from the vehicle's on-board computer, called the electronic control unit (ECU). This is what the Pro-Link® 9000 automatically does after the system type has been determined. Here's what happens.

Upon power-up, a copyright screen will appear for approximately 5 seconds.



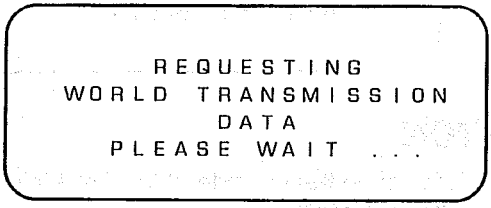
A screen will then appear telling you that the Pro-Link is requesting data from the vehicle's ECU.

If the Pro-Link® 9000 is unable to establish communication with the ECU in the vehicle, you will see a NO DATA display. Press ENTER to command the Pro-Link® 9000 to try again.

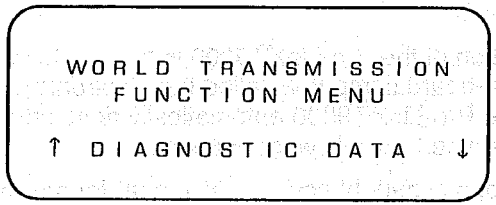


If communication cannot be established, and the NO DATA display reappears, refer to What To Do With NO DATA Readout on page 14.

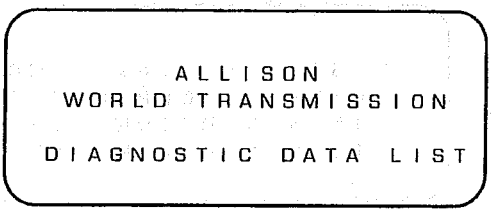
When communication has been established (and the correct transmission type has been input for Allison Transmission applications), you will see the system confirmation screen. The exact appearance will vary, depending on the system in the vehicle. It will look something like this.



This display will appear for about 3 seconds and then this screen will appear:



Press ENTER and the following screen will appear.



After a few seconds, the data list will appear. Use the UP and DOWN arrow keys to scroll through the entire data list. Pressing a key causes the display to move one line. Holding a key causes the display to scroll quickly. Pressing the LEFT arrow key causes the display to advance 4 lines. Pressing the RIGHT arrow key causes the display to move backward 4 lines. When you reach the end of the list, the header and the first entry will appear again; the list is circular. However, if you move backward through the list beyond the first entry, you will see the display that tells you which system you're testing. If you continue past this display, you will reach the end of the list.

NOTE: Parameters in the data list that do not pertain to options on the system you're testing will be designated by NA, meaning not available.

For an explanation of each of the items in the data list, refer to the OPERATING PARAMETERS section of this manual.

Data Freeze Operation

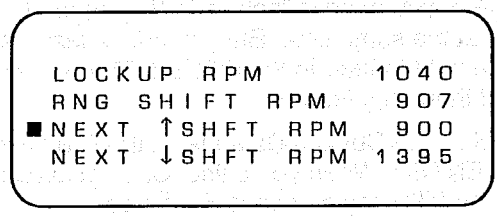
There are times when you want to be able to quickly view several operating parameters at the same time, even though they are not normally together in the data list. One way to do this is to create a custom data list using the Custom Data List function. Another way to do so is to use Data Freeze.

NOTE: There are two differences between Custom Data List and Data Freeze. In Custom Data, you can scroll the entire reorganized data list exactly like the normal data list. In Data Freeze, the items you "freeze" cannot be scrolled. The rest of the list scrolls normally. Also, you can use a custom list, but not a data freeze, when using Snapshot.

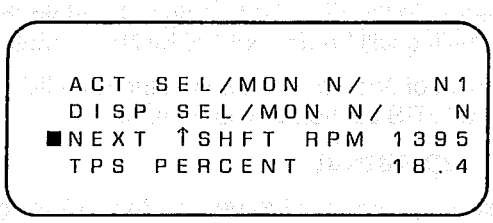
To Freeze a Line of Data

NOTE: You must be viewing the data list before you can freeze an item.

For the purposes of freezing data, the four lines in the readout display are numbered 1 through 4 from the top. Use the UP and DOWN arrow keys to scroll the data list. When an item you want to freeze is visible (on any readout line), press the numerical key that corresponds to the readout line that item is on. A solid black square appears next to that item. In the following example you have decided to freeze NEXT ↑SHIFT RPM. To do so, you have pressed numerical key 3 because NEXT ↑SHIFT RPM is displayed on line 3.



Now, when you use the UP and DOWN arrows to scroll the data list, NEXT ↑SHIFT RPM remains frozen in position on the third line of the display. Although the item is frozen, its value is able to change, according to system operation.



Now, suppose you also want to watch TPS PERCENT. Use the UP and DOWN arrow keys to scroll the list. As you can see above, the third line remains frozen. Eventually, your item appears on line 4. Press numerical key 4. The square will appear to indicate that line 4 is also frozen. You can continue doing this until you have frozen data on all four lines.

To Unfreeze Data

There are two ways to unfreeze data. To unfreeze just one line, press the numerical key corresponding to the line you want to unfreeze. The solid square disappears and the line can now be scrolled.

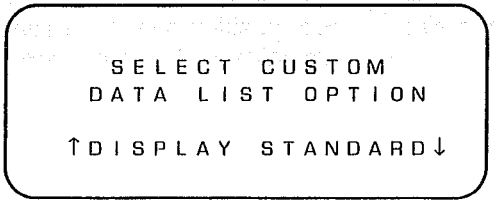
To unfreeze the entire display at once, press the zero numerical key. All solid squares disappear and all lines are unfrozen.

CUSTOM DATA LIST

When you use your Pro-Link® 9000 to read data for an Allison Transmission system, it will be displayed in the same order each time because the list is fixed in the Pro-Link® 9000's memory.

However, there may be some instances when the programmed order of the data list is not convenient. For example, in order to solve a particular driveability problem, you need to look at TPS, Range SEL/ATT, and Lockup RPM, all at the same time. But you notice that these three pieces of information are not together in the data list. There's no way you can watch all three of them at a time.

Yes, there is. Just locate Custom Data List in the Pro-Link® 9000 function menu and press ENTER. When you select Custom Data List from the Function Menu, the following screen is displayed.



The full list of Custom Data List menu items is:

- Display Standard
- Display Custom
- Edit Custom
- Reset Custom

Display Standard

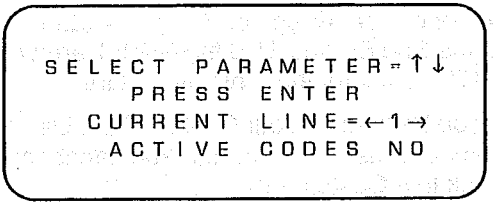
The Pro-Link® 9000 stores in memory both the Standard Data List and one Custom Data List that you create. Selecting Display Standard selects this list configuration for viewing and printing data. Pressing the ENTER key presents Diagnostic Data on the display in the Standard format for viewing.

Display Custom

Selecting Display Custom, selects the list configuration you created with the Edit Custom menu selection. The Pro-Link displays Diagnostic Data on the Pro-Link screen in your custom format. If no custom list exists, the Standard List is displayed.

Edit Custom

Selecting Edit Custom lets you configure how you want to view Diagnostic Data on the Pro-Link screen and for printing. The editing screen is shown below.



The table below shows the keys used for creating the Custom Data List and the result of the key.

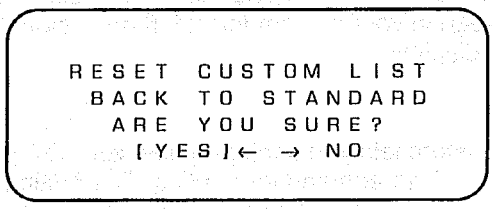
[FUNC]	Exits Edit Custom Mode
[←]	Scrolls up Current Line number and Parameter
[→]	Scrolls down Current Line number and Parameter
[↑]	Scrolls up the Parameter only, Current Line number unchanged
[↓]	Scrolls down the Parameter only, Current Line number unchanged
[ENTER]	Accepts the Current Line number and Parameter combination

To create your Custom Data List:

1. Select the data line you want as the Current Line number.
2. Select the Parameter you want displayed on that line.
3. Press the ENTER key. No change to the Data List occurs unless you press ENTER.
4. Repeat steps 1 through 3 above for each data line you want changed.
5. When you have completed your customized list, press the FUNC key.

Reset Custom

This selection resets your Custom Data List back to the Standard List form. When selected the following screen is displayed.

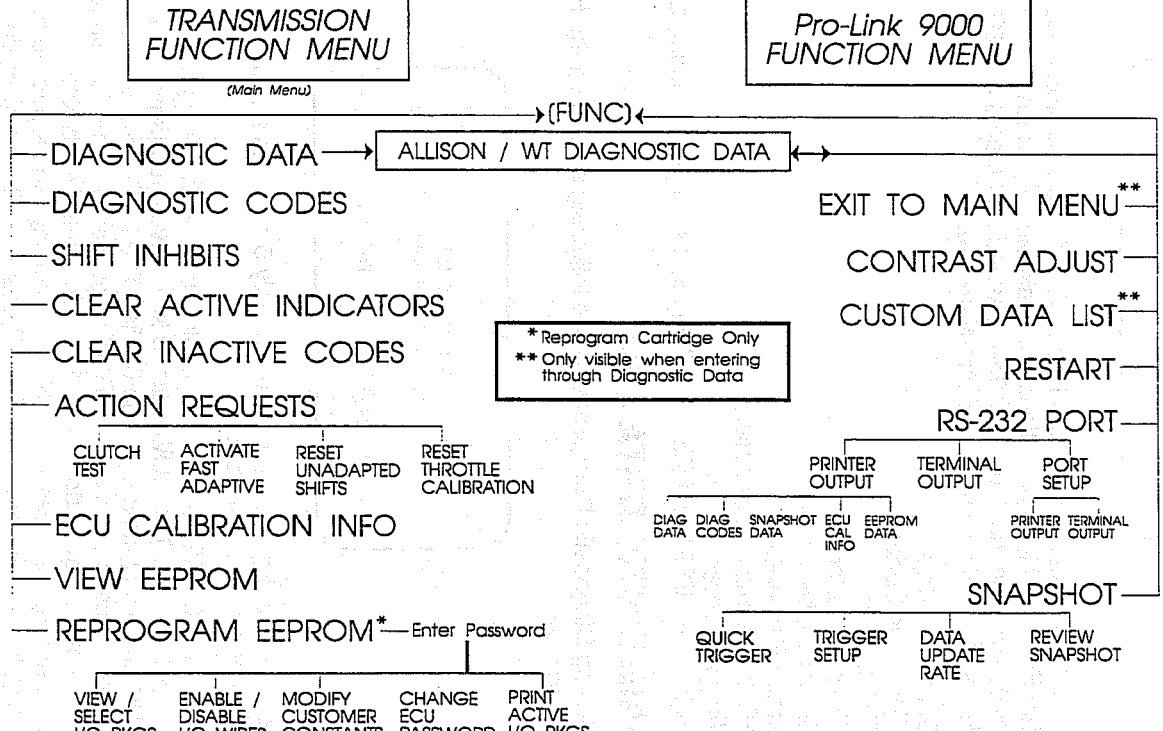


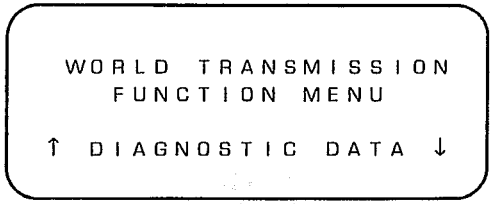
YES is the action of choice. Reset the Custom Data List to the Standard List by pressing the ENTER key. Use the RIGHT arrow key to select NO and press the ENTER key to abort this procedure.

Caution: Once you have reset your Custom Data List to the Standard List form, the Custom List must be recreated. You cannot automatically reset a Standard List back to a Custom List.

After you press the ENTER key the Diagnostic Data is then displayed using the form selected.

ALLISON / WT DIAGNOSTIC AND WT REPROGRAM CARTRIDGE



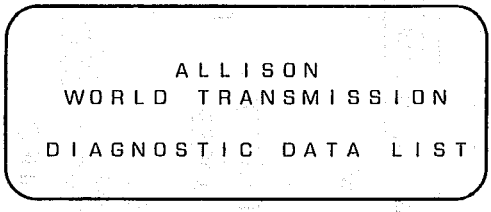


This is the first menu selection for the World Transmission Function Menu. Other Function Menu selections are available by pressing the UP or DOWN arrow on the Pro-Link® 9000 keypad and then the ENTER key to select that function. The menu selections are:

- Diagnostic Data
- Diagnostic Codes
- Shift Inhibits
- Clear Active Indicators
- Clear Inactive Codes
- Action Requests
- ECU/Calibration Information
- View EEPROM
- Reprogram EEPROM (Only available in the Reprogramming Cartridge)

DIAGNOSTIC DATA LIST

Selecting Diagnostic Data presents the following screen on the Pro-Link® 9000 display.



This screen is displayed for approximately 5 seconds and then scrolls up to display the diagnostic data.

The UP and DOWN arrow keys scroll you through the diagnostic data list one line at a time. The DOWN arrow key moves you down the list while the UP arrow key moves you up the list. The LEFT and RIGHT arrow keys scroll four lines at a time; the RIGHT arrow key goes up four lines and the LEFT arrow key goes down four lines. The four display lines can be *frozen* by pressing numeric keys 1, 2, 3, or 4, freezing the respective display line (1 being the top line of the display). Pressing 1, 2, 3, or 4 again unfreezes the display line. Pressing 0 (zero) unfreezes all lines. Frozen lines appear with a solid block at the left margin.

World Transmission Diagnostic Data List

A complete description of each line will follow in the ***Line Descriptions*** section following this list.

ACTIVE CODES		NO
IGN STATUS		ON
IGN VOLTS		12.0
BATTERY VOLTS		12.0
DIMMER VOLTS		12.0
SUMP	195ºF	91ºC
OIL LVL	+0QT	+0LT
OIL LVL CNTS		70
ACT SEL / MON		6 / 1C
DISP SEL / MON		6 / 1
TPS PERCENT		0.0
TPS CNTS		10
INPUT SPD RPM		550
TURBIN SPD RPM		0
OUTPUT SPD RPM		0
LOCKUP RPM		0
RNG SHIFT RPM		0
NEXT ↑SHFT RPM		0
NEXT ↓SHFT RPM		0
C3 PRESSURE SW		OFF
DO NOT SHIFT		NO
REVERSE WARN		OFF
NEUTRAL START		OFF
RTDR REQ		0.0%
RTDR REQ CNTS		85
RTDR	195ºF	91ºC
WIRE 117 IN# 0		OFF
INPUT NOT USED		
WIRE 118 IN# 0		OFF
INPUT NOT USED		
WIRE 119 IN# 0		OFF
INPUT NOT USED		
WIRE 137 IN# 40		OFF
SERVICE BRK STATUS		
WIRE 153 IN# 0		OFF
INPUT NOT USED		
WIRE 154 IN# 20		OFF
ANTI-LOCK BRAKE		
WIRE 155 IN# 0		OFF
INPUT NOT USED		
WIRE 163 IN# 34		OFF
RETARDER ENABLE		
MODE IN# 19		OFF

ENG BRAKE REQUEST	
WIRE 105 OUT# 0	OFF
OUTPUT NOT USED	
WIRE 112 OUT# 0	OFF
OUTPUT NOT USED	
WIRE 114 OUT# 0	OFF
OUTPUT NOT USED	
WIRE 125 OUT# 9	OFF
RETARDER INDICATOR	
WIRE 132 OUT# 17	ON
SERVICE INDICATOR	OFF
A SOLENOID	ON
B SOLENOID	ON
C SOLENOID	OFF
D SOLENOID	OFF
E SOLENOID	ON
F SOLENOID	OFF
G SOLENOID	OFF
H SOLENOID	OFF
J SOLENOID	OFF
K SOLENOID	OFF
N SOLENOID	OFF
CLTCH TST ENABL	NO

This data list can be customized (re-arranged) to view or print the data in the order you want to see it. For information on how to create a custom data list see the section ***Custom Data List***.

LINE DESCRIPTIONS

In this section, you will find the operating data readouts listed in the approximate order they appear in the read-out window of your Pro-Link® 9000. Note that no transmission system uses all of these operating parameters. Parameters in the data list that do not pertain to the system you're testing will be designated by NA, meaning not available.

NOTE: Refer to the system manufacturer's shop manual for detailed diagnostic and repair procedures as well as applicable specifications.

What The Symbols Mean

The name of the operating parameter appears to the left side of the read-out. The value of the readout appears on the right side.

DIAGNOSTIC DATA LIST

ACTIVE CODES (YES/NO)

Indicates that the ECU diagnostics have logged an active code. Refer to the "Diagnostic Codes" section of this manual to view all codes, active or not.

IGNITION STATUS

This is the ECU interpretation of ignition voltage. When voltage is below a calibration value, the ignition is considered to be off.

IGNITION VOLTS

This voltage is used to determine if the vehicle ignition is turned on. The ECU will shut off when ignition is turned off and output speed is too low to measure.

BATTERY VOLTS

This voltage is measured inside the ECU downstream of some power supply components. It is used for controlling the solenoid currents, and for detecting ECU supply voltage that is too high or too low for normal operation.

DIMMER VOLTS

This voltage is used to control the display intensity. When it is zero the ECU assumes that the headlights are off and sets the display to full intensity. When the dimmer voltage rises above a calibration level, the display is set to minimum intensity. As the dimmer voltage rises up to the same level as ignition voltage, the display intensity also rises.

SUMP °F °C

This temperature is measured by a thermistor in the transmission sump. It is used to detect cold oil and restrict transmission operation until the temperature rises above a certain value. Operation is also restricted when the transmission is too hot. The ECU also uses the temperature to estimate solenoid resistance, which it needs for current control, and to estimate clutch fill times, which affect shift quality. This value is of use when diagnosing transmission or vehicle functions when transmission temperature is a factor.

OIL LEVEL

The volume of oil that needs to be added or removed from the transmission to get the correct oil level.

OIL LEVEL COUNTS

Slight fluctuations in the counts indicate proper function of the sensor as it responds to variations caused by oil flow within the transmission.

ACTUAL RANGE SELECTED

This shows the "actual" gear selected by the operator. The transmission will automatically shift from its starting gear up to the gear range selected. "Actual" means that the gears are displayed in the ECU's internal naming scheme, L-6 , N and R.

ACTUAL RANGE MONITORED

This shows the "actual" gear that is engaged at the moment. "Actual" means that the gears are displayed in the ECU's internal naming scheme, L-6 with all the different neutral gears, and showing converter or lock-up operation. "Actual" range will always be the same for a given gear, while "displayed" ranges, described below are calibratable to display anything for a given gear.

DISPLAYED RANGE SELECTED

This is the gear selected by the operator as shown on the shift selector display. The ECU calibration determines what number is displayed for any given gear.

DISPLAYED RANGE MONITORED

This is the gear that is engaged at the moment as shown on the shift selector display. The ECU calibration determines what number is displayed for any given gear.

TPS %

This is the ECU's calculation of throttle opening, 0 to 100%. It can be used to troubleshoot problems with the throttle linkage/TPS system, or SAE J-1708 link to electronic engines.

TPS COUNTS

This is the raw voltage signal as read from the TPS. The ECU calculates the throttle percent from this value, the voltage at closed throttle, and the voltage at WOT. This value can be used to troubleshoot problems with the throttle linkage/TPS system. It is not applicable to vehicles that use the SAE J-1708 link to electronic engines instead of a TPS. Zero (Ø) counts will always be displayed when the transmission is communicating with an electronic engine on the serial communication interface lines.

INPUT SPEED

The same as engine speed when the engine is directly connected to the transmission. This value may not be reasonable if there is a problem anywhere in the speed system (i.e. broken wire, runout on speed gear, or ECU calibration with wrong number of teeth).

TURBINE SPEED

The same as input speed when the converter lockup clutch is applied. It can be compared to output speed to check gear ratios. This value may not be reasonable if there is a problem anywhere in the speed system (i.e. broken wire, runout on speed gear, or ECU calibration with wrong number of teeth).

OUTPUT SPEED

Output speed is used to determine shift points. The service tool can be used to verify that the transmission shifts when it is supposed to. It can also be compared to turbine speed to check gear ratios. This value may not be reasonable if there is a problem anywhere in the speed system (i.e. broken wire, runout on speed gear, or ECU calibration with wrong number of teeth).

LOCKUP RPM

This is the output speed when the last mode shift occured. A shift in to, or out of lockup is considered a mode shift.

RANGE SHFT RPM

This is the output speed when the last range shift occured. A shift from one gear range to another is a range shift.

NEXT UPSHIFT RPM

This is the output speed at which the next upshift will occur. Its value depends on throttle position and the range attained.

NEXT DOWNSHIFT RPM

This is the output speed at which the next downshift will occur. Its value depends on throttle position and the range attained.

C3 PRESSURE SW

The C3 Pressure Switch closes when the C3 clutch is applied. (EXAMPLE: Reverse, 3rd or 5th gears)

DO NOT SHIFT

Status of the Do Not Shift output from the ECU to the Do Not Shift light on the dashboard.

REVERSE WARNING

A command from the ECU to the reverse warning relay to activate the audible warning device which indicates that the vehicle is in reverse gear.

NEUTRAL START

A command from the ECU to a relay which allows the engine to be started in neutral only.

RETARDER REQUEST %

This is the ECU's calculation of the retarder request, 0 to 100%.

RETARDER REQUEST COUNTS

This is the raw voltage as read from the retarder modulation sensor. The ECU calculates the retarder request percent from this value. This value can be used to troubleshoot problems with the retarder modulation sensor.

RETARDER TEMPERATURE

This is the temperature of the oil in the retarder, not of the oil in the transmission sump.

WIRE XXX IN # OFF

INPUT NOT USED

This is the programmed input function, giving the wire circuit number, the input function number and the on or off state of that function. The following line in the data display is an English description of that function.

WIRE XXX OUT # OFF

OUTPUT NOT USED

Same as input but used as an output function.

A-N SOLENOID

This is the commanded state (ON or OFF) of solenoids A-N.

CLUTCH TEST ENABLED

The state (ON or OFF) of the Clutch Test Mode. See Clutch Test on Page 53.

DIAGNOSTIC CODES

Pressing ENTER when this selection is displayed causes the cartridge to ask the ECU for any diagnostic codes. If no diagnostic codes are present, the following screen appears.

```
NO DIAGNOSTIC CODES

[FUNC] TO EXIT
```

The FUNC key is the only key active on the Pro-Link keypad. Pressing FUNC returns the Pro-Link to the World Transmission Function Menu, Display Diagnostic Codes screen.

If any diagnostic codes are present, a screen similar to the figure below is displayed.

```
CODE  d1  ACTV  CTR  IGN
36    00    NO    1   12
  HARDWARE/SOFTWARE
↑  NOT COMPATIBLE  ↓
```

The first line in this display is the Header Line. The Header Line defines each of the five fields.

Code — The Code is a four digit number as defined in the table below.
36 Main Code (first two digits)
00 Sub Code (second two digits)

d — The field d stands for Diagnostic Code List. Possible displays for d are the numbers 1 through 5. The d number relates to the single code you are viewing of the five possible.

ACTV — ACTV indicates if the code is Active Indicator not. The display shows either YES or NO. Active Indicator indicates a code which is currently active or which conditions for clearing the code have not been met. Restrictions to operation may or may not occur and vary by code.

CNT — CNT is the Event Counter. The Event Counter tells you how many times this event or condition occurred.

IGN — IGN is the Ignition Cycle Counter, telling you how many times the ignition switch was cycled since this code was detected.

Hardware/ Software Not Compatible (lines 3 and 4) — Lines 3 and 4 are a plain English description of the code meaning. The two lines are different for each code. Arrows on line 4 indicate more codes are present, and you can step through the codes using the UP and DOWN arrow keys. No arrows on line 4 indicate no other codes.

SHIFT INHIBITS

Selecting Shift Inhibits presents a list of shift inhibitors. These inhibitors are conditions present in the transmission which prevent shifting from taking place due to the state of the transmission. The inhibitor is followed by an Y or N (Yes/No) or a HI or LO. N means the inhibitor was not active and the state of this parameter allowed shifting of the transmission. Y means the inhibitor was active, preventing the shift from occurring. Listed below are the Shift Inhibitors with their associated condition type.

INPUT SPD INHIB	N	(or Y)
SPL FUNC RNG INHB	N	(or Y)
MED COLD OIL INHB	N	(or Y)
WHEEL LOCK INHG	N	(or Y)
SPLOGIC THROTTLE	LO	(or HI)
SPLOGIC OUT SPD	LO	(or HI)
SPLOG=INHIB WARN		

SPLOGIC THROTTLE and SPLOGIC OUT SPD inhibitors list the LO and HI state conditions. SPLOG=INHIB WARN is not followed by a state condition indicator. This parameter is a special pattern logic action code and can be different at various times.

The information available in this function would be used to determine what condition is inhibiting normal operation. No diagnostic codes are set, because nothing is broken. Looking at the shift inhibits would tell a technician why normal operation is inhibited. The Pro-Link displays "Y' when the following inhibits are active:

INPUT SPEED INHIBIT

If input (engine) speed is above a calibration value, and the "splogic output speed" is LO, then neutral to drive, and neutral to reverse, shifts are not allowed. This display updates instantly from N to Y but will only update from Y to N after a range selection.

I/O FUNCTION RANGE INHIBIT

This inhibit is active when a I/O function input wire (using the direction change enable function) disables the following shifts: Neutral to Drive, Neutral to Reverse, Drive to Reverse, and Reverse to Drive. This display will only update when a range is selected.

MEDIUM COLD OIL INHIBIT

When the transmission oil is cold, this inhibit limits operation to reverse, neutral, and second and higher forward ranges. This display updates instantly.

WHEEL LOCK INHIBIT

When rapid deceleration of the output shaft is detected, this inhibit will prevent downshifts. This condition only lasts for a few seconds.

SPECIAL PATTERN LOGIC

Depending on the status of "splogic throttle" (HI/LO) and "splogic output speed" (HI/LO), which updates instantly, the "special pattern logic" will do one of the following:

Inhibit Warning Direction change shifts are inhibited and the select digit flashes with a continuous warning tone.

CFNFR This response pre-selects down to a calibration gear ratio, and then shifts to neutral. There is no warning tone, and the select digit will not flash.

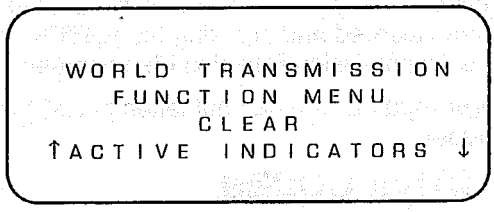
Neutral Warning The transmission will shift to neutral, and the select digit will flash with a continuous warning tone.

Enable shifts This allows normal transmission operation.

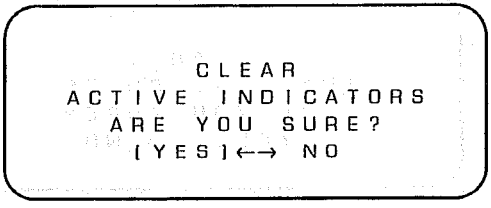
SP LOG Will only update as ranges are selected by the operator.

CLEAR ACTIVE INDICATORS

See page 47 for a description of active indicators. Pressing the UP or DOWN arrow key on the Pro-Link® 9000 keypad displays the World Transmission Function Menu screen as shown below.

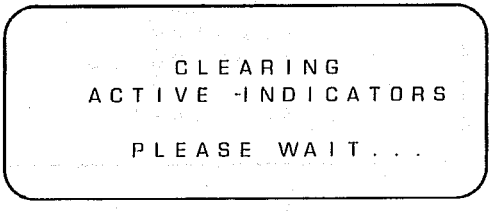


Pressing the ENTER key at this time presents the screen below on the Pro-Link® 9000 display.

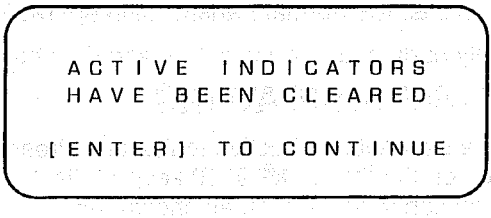


On this screen, YES is selected as the action to take. To abort this procedure, press the RIGHT arrow key selecting NO and then press ENTER or the FUNC key. The Pro-Link returns to the World Transmission Function Menu.

Pressing the ENTER key when YES is selected, clears all active indicators and the screen below is displayed.



When the Pro-Link has finished clearing all active indicators, the following screen appears.

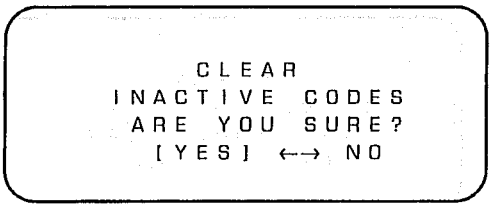


The only action available to you at this time is the ENTER key. All Active Indicators have been cleared and pressing the ENTER key returns the cartridge to the World Transmission Function Menu screen.

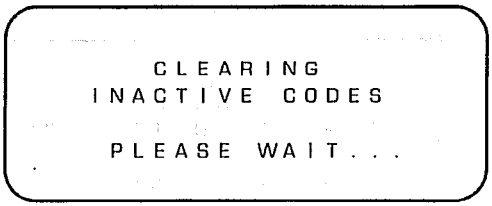
NOTE: If the proper repair action has not taken place, the active indicator will immediately reset.

CLEAR INACTIVE CODES

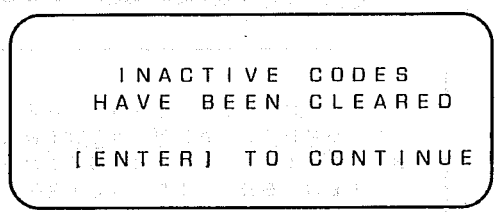
Pressing ENTER with the Clear Inactive Codes menu selection displayed presents the following screen.



This selection performs just like the Clear Active Indicators selection. YES is selected as the action of choice. Pressing the right arrow key selects NO. With NO selected, pressing the ENTER key returns you to the Function Menu screen. With YES selected, pressing the ENTER key clears all inactive diagnostic codes from the ECU and the following screen appears.



When the Pro-Link has finished clearing all inactive codes, the following screen appears.



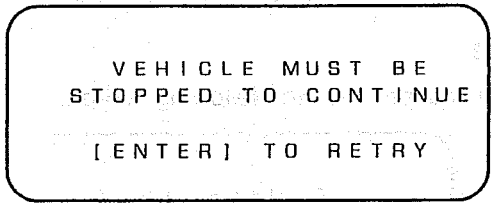
Pressing ENTER at this time returns you to the Function Menu screen.

ACTION REQUESTS

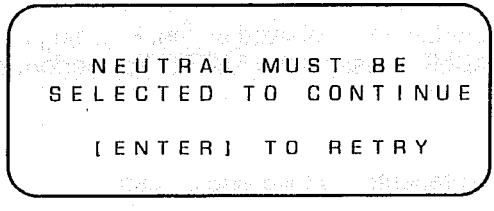
Pressing ENTER at this selection displays the Action Requests menu. The following tests are accessed from this selection.

- Clutch Test
- Activate Fast Adaptive
- Reset to Unadapted Shifts
- Reset Throttle Calibration

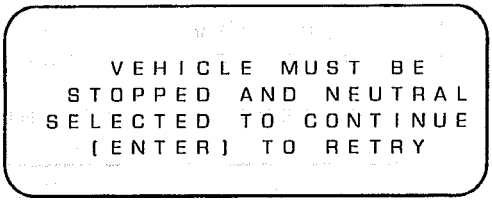
For each of these tests, certain conditions must prevail in order for the action to be performed. The following screens appear on the Pro-Link display when the associated condition is present, preventing the action requested from taking place.



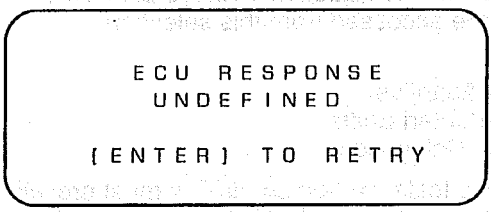
This screen appears when the vehicle is moving. Stop the vehicle in a safe place and then shift the transmission into Neutral. Press the ENTER key on the Pro-Link keypad.



This screen appears when the vehicle is not moving but the transmission is in any other selection but Neutral. Shift the transmission to Neutral and then press the ENTER key on the Pro-Link keypad.



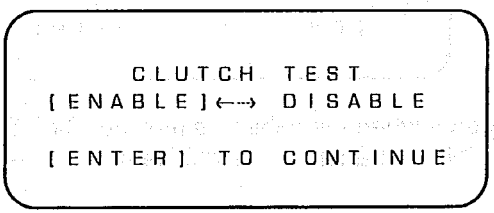
This screen appears when the transmission is in gear and the vehicle is moving. Bring the vehicle to a complete stop in a safe place, shift the transmission to Neutral, then press the ENTER key to continue the test.



The ECU transmitted a code the Pro-Link did not understand. Pressing the ENTER key causes the Pro-Link to retry the function.

Clutch Test

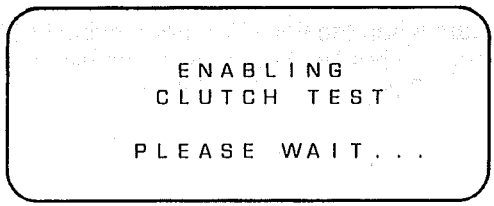
Selecting Clutch Test provides the following screen.



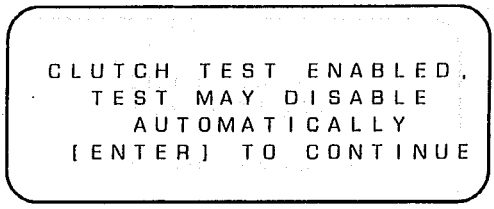
ENABLE is selected as the preferred action. Pressing the RIGHT arrow key selects DISABLE. Pressing the ENTER key performs the selected action.

ENABLE

Selecting Enable presents the following screen.

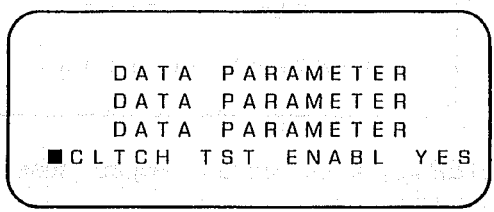


Once the Clutch Test has been enabled, the following information screen appears.



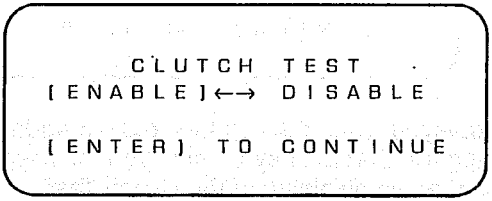
Once Clutch Test Mode is enabled, it is possible to manually select each forward range while the vehicle is stopped. Performing a clutch test (see Allison Service Literature for proper procedures) in each range allows clutch pressure testing while the vehicle is stationary. The Pro-Link can be used to watch TPS %, Input Speed, Turbine Speed, and Output Speed as well as to allow evaluation of clutch condition. Clutch test mode can also be used to select a higher range for stall checks which reduces torque multiplication in the drivetrain.

Pressing the ENTER key clears the information screen and presents Clutch Test data on the Pro-Link screen. The last parameter of the data list is *Cltch Tst Enabl.* This item gives you the status of the Clutch Test. Should the Clutch Test abort, this line indicates such. Using the UP arrow key, scroll the Pro-Link display until this parameter is on line 4, then freeze it there by pressing numeric key 4. This way you will always know the status of the Clutch Test. The figure below shows this display.



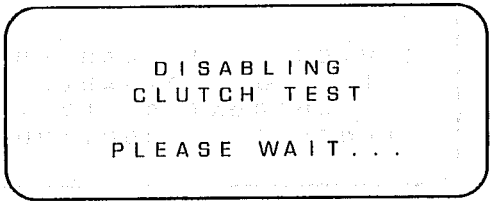
DISABLE

To access the Disable function, select DISABLE from the Clutch Test screen.

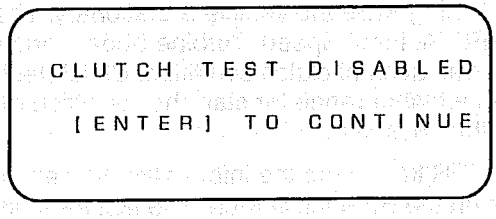


Selecting DISABLE aborts the Clutch Test and returns the Pro-Link to the

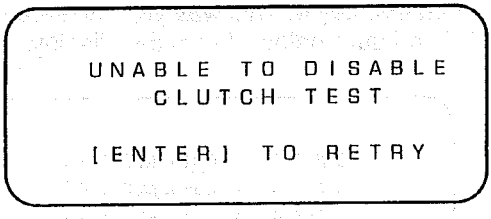
Data List. When DISABLE is selected and the ENTER key is pressed, the following screen appears.



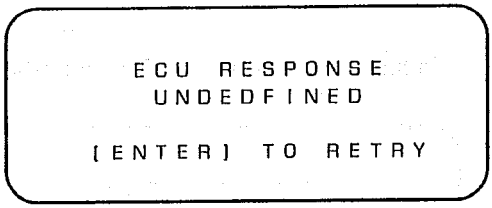
If conditions permit the disabling of the Clutch Test, the following screen is displayed.



Should conditions not favor disabling the Clutch Test, the following screen is displayed.



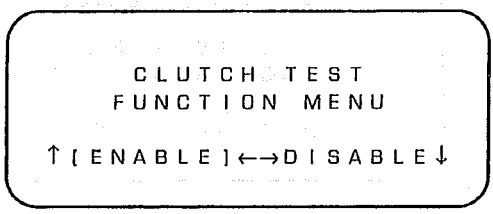
Pressing the ENTER key on the Pro-Link keypad causes the Pro-Link to attempt disabling again.



This screen is displayed when the Pro-Link did not understand the ECU's response. Pressing the ENTER key on the Pro-Link keypad causes the Pro-Link to request again disabling of the Clutch Test.

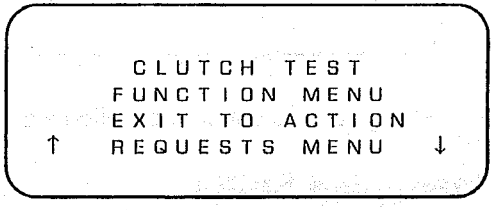
CLUTCH TEST FUNCTION MENU

Pressing the FUNC key at any of the above screens places the Pro-Link at the Clutch Test Function Menu screen shown below.



ENABLE is selected as the action of choice. The ENTER, FUNC, UP, DOWN, LEFT, and RIGHT arrow keys are active on the Pro-Link keypad. The UP and DOWN arrow keys scroll through the Clutch Test Function Menu, the LEFT and RIGHT arrow keys select either Enable or Disable, the FUNC key returns you to the data list with no change to Clutch Test status, pressing ENTER enables or disables the Clutch Test.

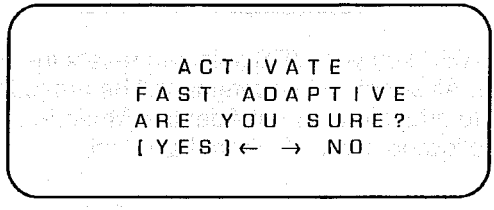
Pressing the DOWN arrow key presents the following screen.



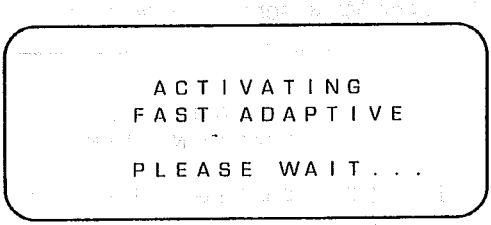
Pressing the ENTER key returns the Pro-Link to the Action Requests Menu. Contrast Adjust, Custom Data List, Restart, RS-232 Serial Port, and Snapshot functions are listed in the Clutch Test Function Menu. For information on these functions refer to the section titled ***Functions*** in this manual.

Activate Fast Adaptive

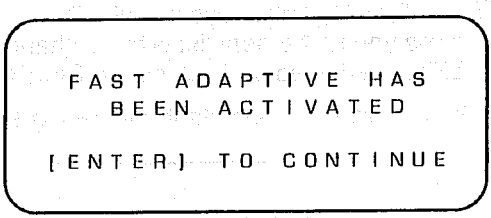
Selecting Activate Fast Adaptive from the Action Requests Menu presents the following screen.



If you select NO and press the ENTER key, the Pro-Link returns to the Action Requests Menu screen. Selecting YES presents the following display.



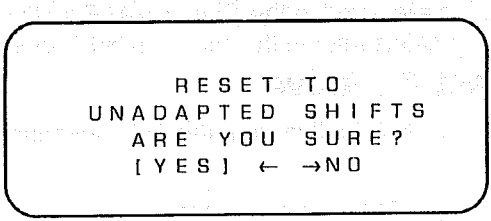
Once fast adaptive is activated the following screen is displayed. All shifts will now be in the Fast Adaptive Mode allowing a faster convergence to a smooth shift condition.



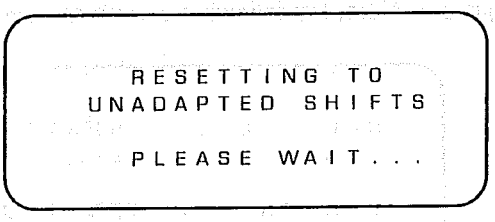
Pressing the ENTER key returns you to the Action Requests Menu screen.

Reset to Unadapted Shifts

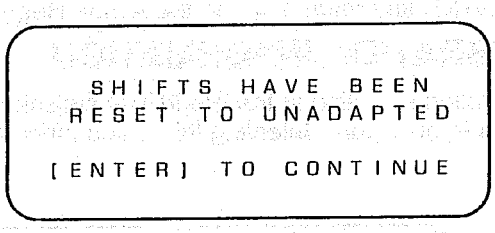
Selecting this menu item from the Action Requests Menu screen presents the following display.



Pressing the ENTER key with YES selected resets the shifts to an unadapted state. All adaptive information will be erased from the ECU and shifts will begin to adapt in the Fast Adaptive Mode from the base calibration state. The following screen is then displayed.



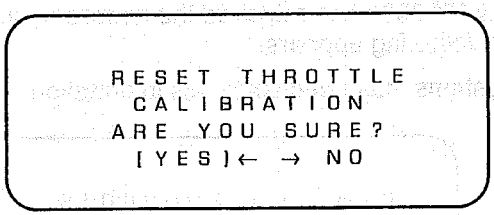
Once resetting is complete, the following screen is displayed.



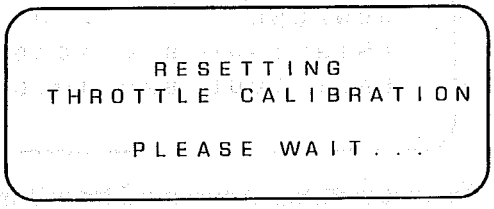
Press the ENTER key and the Pro-Link returns you to the Action Requests Menu screen.

Reset Throttle Calibration

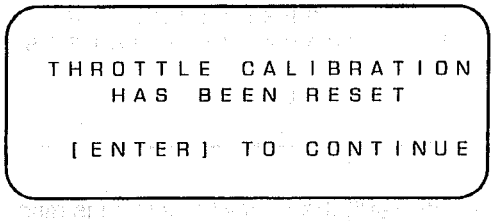
Selecting this menu item from the Action Requests Menu screen presents the following display.



Selecting NO returns you to the Action Requests Menu screen. Selecting YES resets the 0% throttle calibration to the count setting at the time the ENTER button is pressed and presents the following screen.



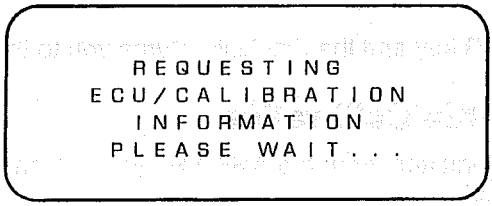
Once resetting is complete, the following screen appears.



Pressing the ENTER key returns you to the Action Requests Menu screen.

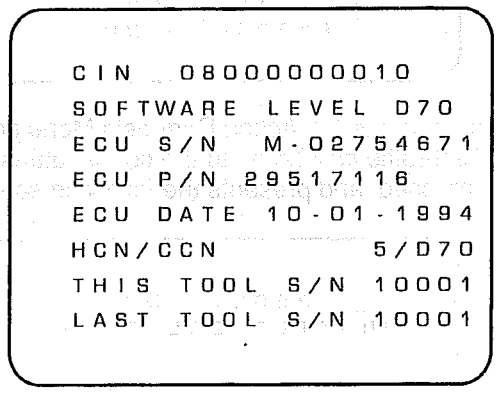
ECU/CALIBRATION INFORMATION

The ECU Calibration selection in the World Transmission Function Menu is ECU/Calibration Information. Selecting this menu function presents the following screen.



When the Pro-Link® 9000 has retrieved the necessary information, a data list similar to the following appears.

NOTE: Older systems may not display this information.



The ECU/Calibration Information function provides information on the transmission ECU. You can scroll through the parameters using the UP and DOWN arrow keys. The following parameters can be viewed:

- Calibration Identification Number (CIN; 11 characters)
- Software level of the transmission ECU software (not the Pro-Link cartridge)
- ECU serial number (ECU S/N; 8 characters; an "M" or "B" prior to the number identifies the ECM as a MAX feature or a Basic unit)
- ECU (without cover or shifter) part number (ECU P/N; up to 10 characters)

  NOTE: Part Number may not display on ECUs date coded prior to 09-01-92.
- ECU date (month-day-year)
- Hardware compatibility number and the calibration compatibility number (HCN/CCN)
- This tool serial number (THIS TOOL S/N; the electronic identification number of the Pro-Link reprogramming tool that is currently being used).
- Last tool serial number (LAST TOOL S/N; the electronic identification number of the last Pro-Link tool used to reprogram the ECU).

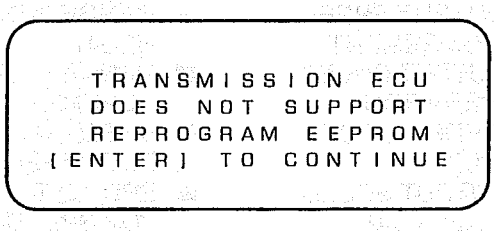
Press the FUNC key to return to the World Transmission Function Menu screen.

VIEW EEPROM

WORLD TRANSMISSION SOFTWARE SUPPORTING EEPROM REPROGRAMMING

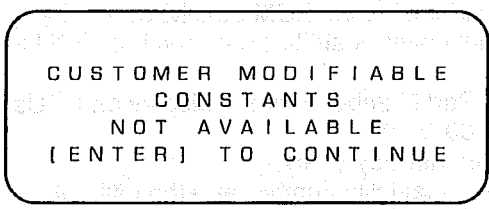
The Calibration in the transmission ECU has been programmed with one of as many as six packages of I/O functions. These packages are based on vehicle use and contain the enabled I/O functions and Customer Modifiable Constant setting appropriate for the vehicle's intended use. The following chart identifies all the Customer Modifiable Constants available. Not all of these Customer Modifiable Constants are used in each package. The Pro-Link will only display those Customer Modifiable Constants that are used by the enabled I/O functions in the package that is currently programmed in the ECU.

To access the View EEPROM function, press ENTER with VIEW EEPROM displayed at the World Transmission Function Menu screen. If the ECU in the vehicle does not have this function, the following screen will appear.

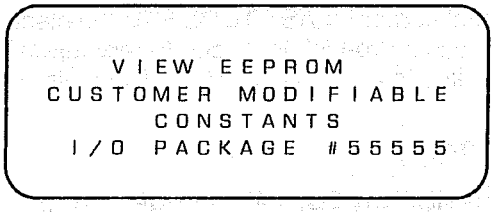


Pressing ENTER will return you to the Allison World Transmission Function Menu screen.

If the ECU does support this feature, but none of the I/O functions with Customer Modifiable Constants are enabled in this version transmission, then the following screen will appear.



If the ECU has the information available, the following screen will appear for approximately 3 seconds.



After this screen, the Customer Modifiable Constant list will show. Use the UP and DOWN arrow keys to scroll through the list. Not all the items will be visible. Only Customer Modifiable Constants for enabled I/O functions of the selected package will be displayed

VIEW EEPROM FUNCS

- D1 SELECT POSITION (PRIMARY)
- D1 SELECT POSITION (SECONDARY)
- MAXIMUM ENGINE SPEED FOR PTO ENGAGEMENT
- MAXIMUM ENGINE SPEED FOR PTO OPERATION
- MAXIMUM OUTPUT SPEED FOR PTO ENGAGEMENT
- MAXIMUM OUTPUT SPEED FOR PTO OPERATION
- ENG BRAKE PRESELECT SHIFT POSITION
- MAXIMUM OUTPUT SPEED AUTOMATIC NEUTRAL
- MAXIMUM OUTPUT SPEED LOW AXLE SELECT
- RANGE INDICATOR THIRD GEAR
- RANGE INDICATOR FOURTH GEAR
- RANGE INDICATOR FIFTH GEAR
- RANGE INDICATOR SIXTH GEAR
- RANGE INDICATOR NEUTRAL
- RANGE INDICATOR REVERSE
- SPEED TO TURN ON OUT PUT SPEED INTERLOCK
- SPD TO TURN OFF OUT PUT SPEED INTERLOCK
- ENG SPEED TO TURN ON PTO OVERSPEED IND

- RANGE INDICATOR LOW GEAR
- RANGE INDICATOR FIRST GEAR
- RANGE INDICATOR SECOND GEAR
- ENG SPD TO TURN OFF PTO OVERSPEED IND
- ENG SPEED TO TURN ON ENG OVERSPEED IND
- ENG SPD TO TURN OFF ENG OVERSPEED IND

REPROGRAM EEPROM

REPROGRAM CARTRIDGE ONLY

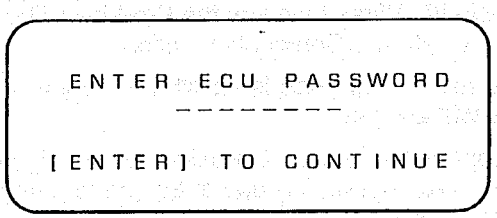
The Reprogram EEPROM function allows you to:

1. View the I/O package currently programmed in the ECU
2. Designate a different package of I/O functions for the vehicle
3. Enable/disable some of the inputs/outputs contained in the package selected
4. Modify Customer Modifiable Constants for enabled I/O functions contained in the package selected
5. Change the password.
6. Print out reprogramming information

In order to perform any modifications to the ECU, the following conditions must be met:

- the ECU must be capable of being reprogrammed
- Pro-Link cartridge must contain a software version (3.) capable of reprogramming
- the password must be correctly input by the third attempt
- data readings must be live; you cannot reprogram while viewing data you have recorded previously.

To select the Reprogram EEPROM function, press ENTER with REPROGRAM EEPROM displayed at the World Transmission Function Menu screen. A screen will appear telling you that the Pro-Link is requesting EEPROM data. If all the requirements for accessing the Reprogramming EEPROM function are met, a screen will appear requesting you to input the password.

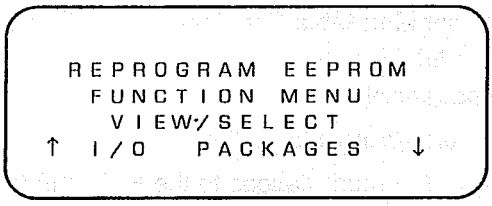


NOTE: You MUST input the ECU password correctly in order to continue the process for reprogramming the EEPROM. If you fail to do so after the third attempt, the Pro-Link will return to the World Transmission Function Menu screen and will not allow the ECU to be reprogramed during that session.

When you have correctly input the password, the Reprogram EEPROM Function Menu screen will appear.

The Allison ECU password is factory set at eight (8) zeroes (Ø) [ØØØØØØØØ].

NOTE: The password should not be changed unless the customer requests a change to prevent tampering with any sections or settings. A record of any password changes should be kept by the customer and with any fleet or vehicle files at the service outlet. If the password is not known, the owner of the "Last Tool No." can be contacted or the ECU must be recalibrated.



Your choices from this screen are:

- View/Select I/O Packages
- Enable/Disable I/O Wires
- Modify Customer Constants
- Change ECU Password.
- Print Active I/O Package

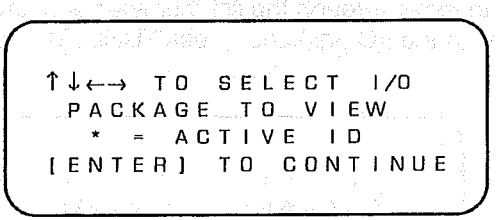
The first three items appear in the sequence in which they should be performed. When you are modifying the ECU programming, you may access the process at any point: I/O Packages, Enable/Disable I/O Wires, or Modify Customer Constants. The Pro-Link will automatically lead you through the remainder of the sequence. For instance, if you access Enable/Disable I/O Wires, when you are done modifying the parameters in the Enable/Disable I/O Wires function, the Pro-Link will automatically take you to the Modify Customer Constants function.

If the reprogramming sequence is aborted at any time, the changes you have made will be lost.

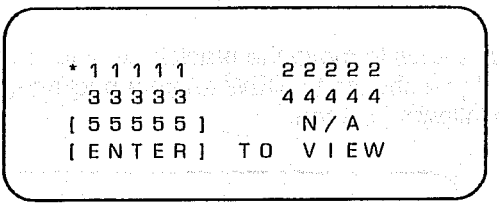
NOTE: Print a copy of the Active I/O Package currently programmed before beginning to reprogram. A copy of the printout might be required or desired for future reference.

View/Select I/O Packages

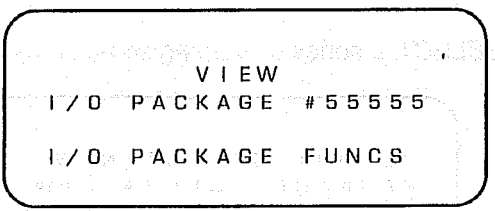
To select View/Select I/O Packages, press ENTER with VIEW/SELECT I/O PACKAGES showing at the Reprogram EEPROM Functions Menu screen. The following screen will appear.



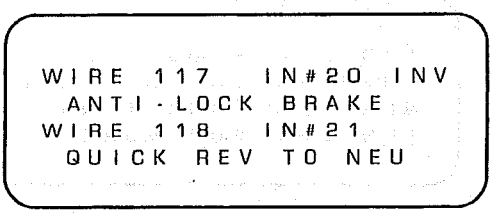
Press ENTER to continue.



Use the ↑ and ↓ keys to move the brackets and select a list of I/O packages. An asterisk (*) denotes the current active I/O package. Move the brackets to the package you would like to view and press ENTER. The following title screen will appear for approximately 3 seconds.



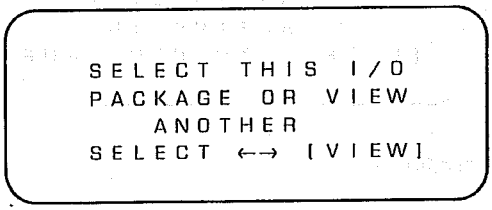
Then, you will see the list of wires that are included in that I/O package. That list will look something like this:



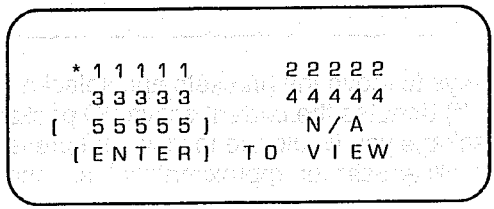
NOTE: IN#20 identifies input function #20, which is defined on the line below as "Anti-lock Brake" input.

NOTE: INV in this example means the input is inverted. Wire 117 must be grounded rather than opened to turn the function off.

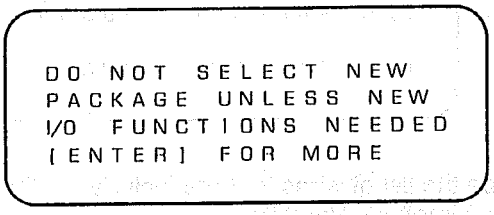
Use the ↑ and ↓ keys to scroll through the list one line at a time or use the ← and → keys to move through the list four lines at a time. To exit the list of wires included in the I/O package, press FUNC. The following screen will appear.

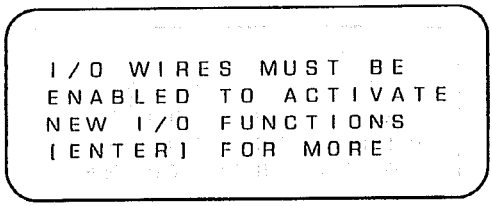


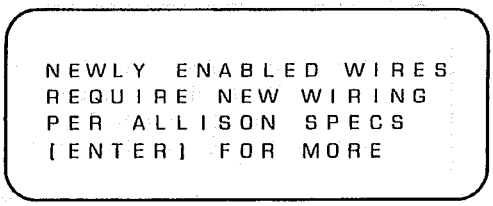
Use the ← and → keys to move the brackets to your choice and then press ENTER. If you choose to VIEW another package, you will be returned to the following screen.

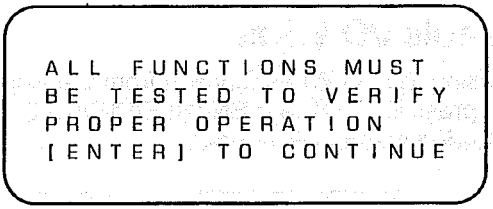


If you choose SELECT, a series of warning screens will appear.

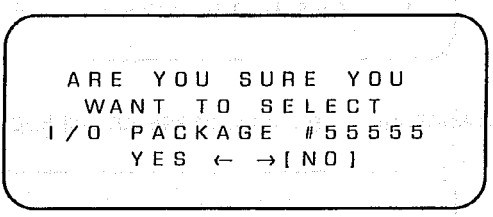






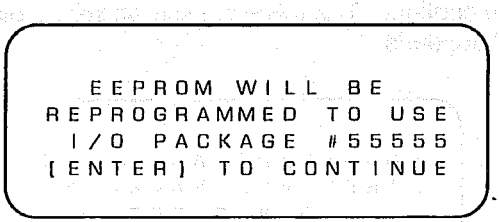


Then, the Pro-Link will ask you if you are sure you want to select the I/O package.

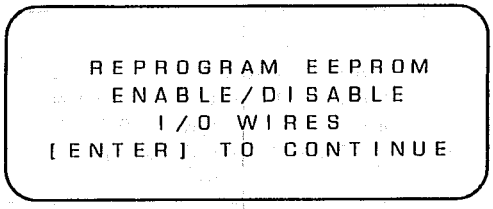


Use the ← and → keys to move the brackets to your choice and then, press ENTER. If you choose NO, you will be returned to the function selection screen and the active package will not be changed.

If you choose YES, the following screen will appear.

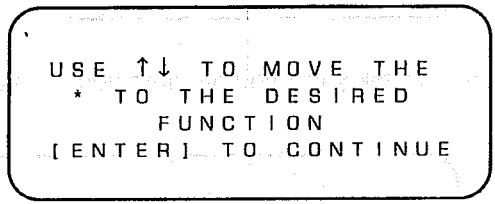


Press the ENTER key to continue on with the reprogramming process. The Pro-Link will take you to the Enable/Disable I/O Wires function, then you will see this screen.

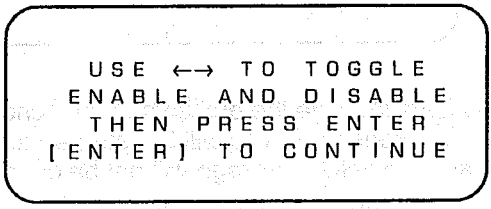


Enable/Disable I/O Wires

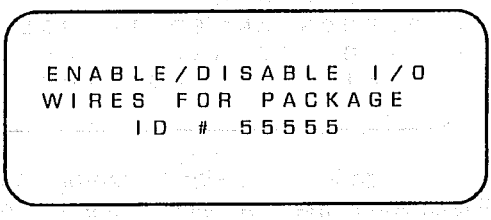
If you are accessing the I/O Wires function from the Reprogram EEPROM Function Menu, press ENTER with ENABLE/DISABLE I/O WIRES displayed. The following screen will appear.



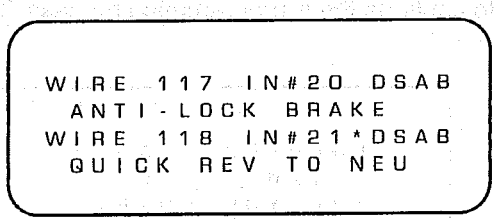
Press ENTER to continue. The following screen will appear.



Press ENTER to continue. The following screen will be displayed for approximately 3 seconds.



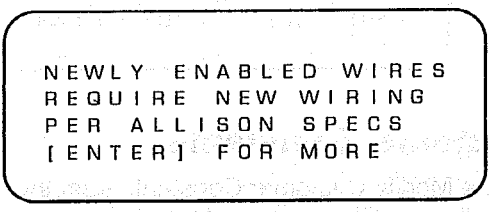
Then, a list of wires, similar to the following will appear.

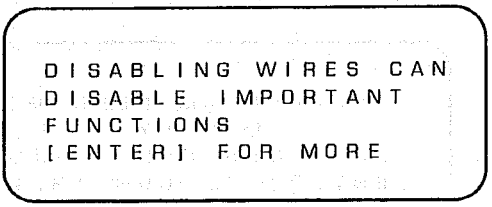


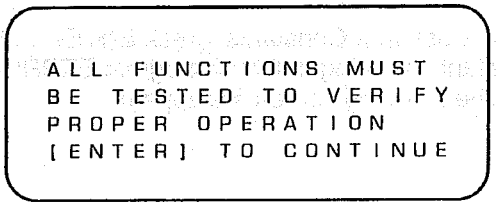
Use the ↑ and ↓ keys to scroll the list of wires. Use the ← and → keys to change the enabled/disabled status of the wire. When you have changed the status of a wire, press ENTER to accept that change. Wires that have a solid square (■) next to them are not modifiable.

NOTE: If you change the status of a wire, the asterisk will change to an arrow (→). You must press ENTER to accept that change. If you fail to press ENTER, the asterisk (*) will not return and you will not be able to move to the next item until ENTER is pressed.

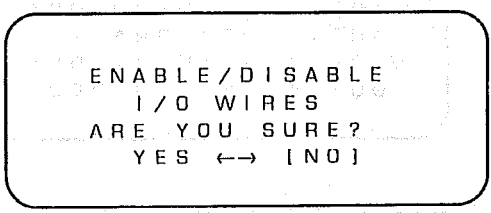
When you are finished modifying the enable/disable status of the I/O wires, press FUNC to exit the list of wires. The following series of warning screens will appear.





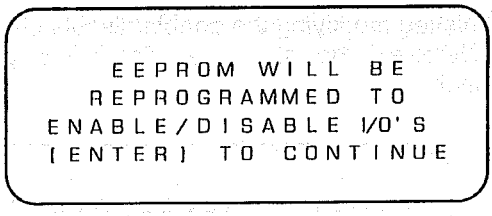


Press ENTER to continue the reprogramming process. The following screen will appear.



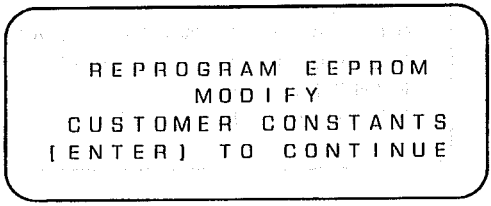
Use the ← and → keys to move the brackets to your choice and press ENTER. The Pro-Link will now take you to the Modify Customer Constants function. If you choose NO, all changes made to this point will be cancelled.

The following confirmation screen will appear after a YES selection is entered.

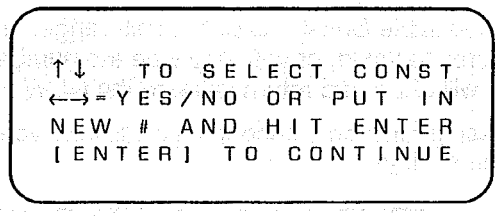


Modify Customer Constants

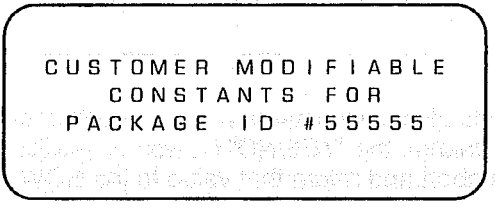
If you entered the Modify Customer Constants from the reprogramming sequence, the following title screen will appear.



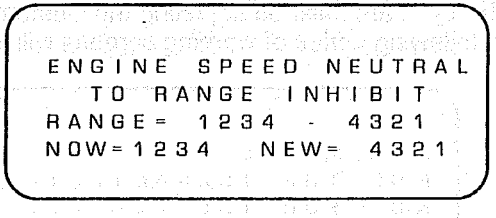
To select Modify Customer Constants, press ENTER with Modify Customer Constants showing at the Reprogram EEPROM Functions Menu screen. The following screen will appear.



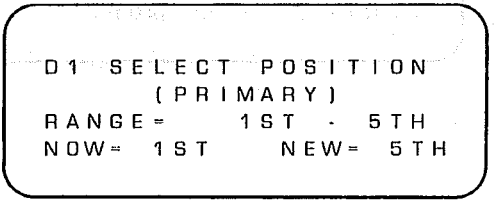
Press ENTER to continue. The following title screen will appear for approximately 3 seconds.



The list of customer modifiable constants will appear. Use the ↑ and ↓ keys to scroll through the list. You will see a screen in one of the following formats.

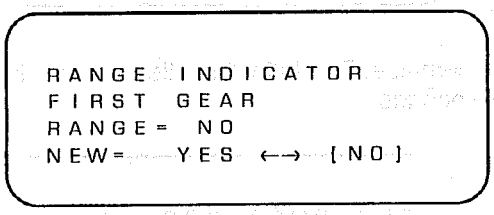


For Customer Modifiable Constants with a NUMERIC VALUE, use the numeric keys to input the new value. If you wish, you can use ↑ or ↓ to change the value by a single digit, and ← or → to change it by increments of 20. FUNC will abort and return the value to the NOW setting. When you have changed a Customer Modifiable Constant value, you must press ENTER to accept the new value.



For Customer Modifiable Constants with a shift range, pressing ← or → will increase/decrease value, or you may type the number value directly. Pressing FUNC will abort and return value to the NOW setting.

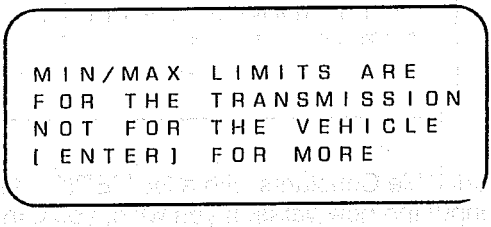
CAUTION: Pressing function a second time will take you to the acceptance of changes section.

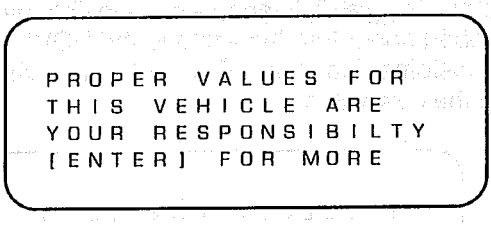


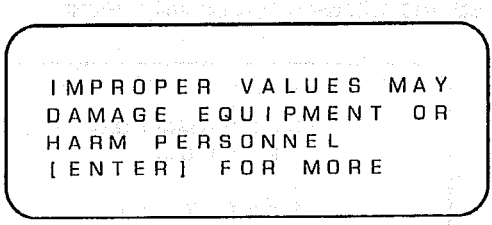
For Customer Modifiable Constants with a "YES/NO" choice, use the ← and → keys to change the "YES/NO" Customer Modifiable Constants setting. FUNC will abort and return that value to the NOW setting.

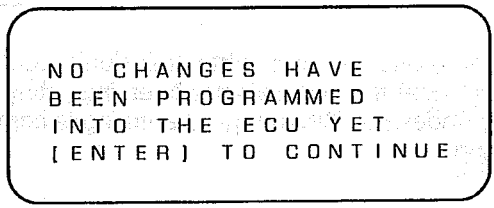
NOTE: If you change the status of a customer modifiable constant, you must press ENTER to accept that change. If you fail to press ENTER, you will not be able to scroll to the next item until ENTER has been pressed.

Press FUNC when you are finished adjusting the Customer Modifiable Cionstants. The following series of warning screens will appear:

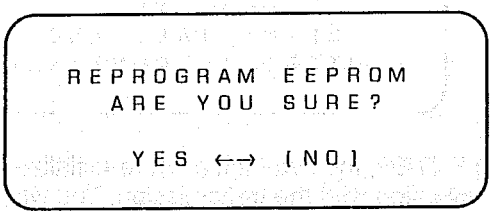








Press ENTER to continue. The following screen will appear.

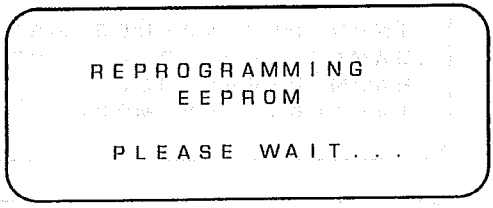


NOTE: At this point, the actual reprogramming of the ECU takes place. If you have made any mistakes or have changed your mind and you DO NOT wish to reprogram the ECU, select NO, and you will be returned to the selection menu.

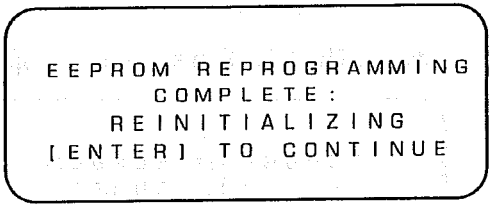
WARNING: ALL CHANGES YOU HAVE MADE WILL BE LOST IF YOU SELECT NO. YOU WILL ONLY BE GIVEN ONE CHANCE TO REPROGRAM THE EEPROM. IF THE VEHICLE IS MOVING OR IN GEAR (AT SELECTOR), THE REPROGRAMMING ATTEMPT WILL FAIL AND THERE WILL BE NO CHANCE TO RETRY. IF THIS HAPPENS, YOU MUST GO BACK TO THE BEGINNING OF THE REPROGRAMMING SEQUENCE AND START OVER.

Use the ← and → keys to move the brackets to your choice and press ENTER.

If you choose YES, the following screen will appear.



This screen will be present while the transmission's ECU is being reprogrammed. You will hear the shift selector beep indicating that reprogramming is currently underway. When reprogramming is complete, the following screen will appear.



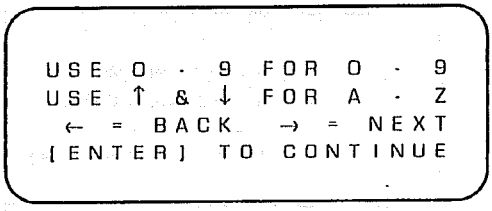
When you press ENTER, the Pro-Link must re-initialize in order to re-establish communication with the transmission. You will be returned to the Requesting Allison Data Screen as the tool restarts

NOTE: Print a copy of the Active I/O Package after reprogramming is complete. A copy should be retained with the vehicle/fleet records. A second copy can be kept with the vehicle if required or desired.

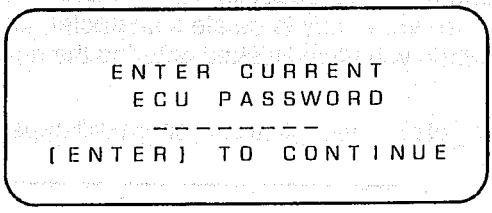
NOTE: The password should not be changed unless the customer requests a change to prevent tampering with any selections or settings. A record of any password changes should be kept by the customer and with any fleet or vehicle files at the service outlet. If the password is not known, the owner of the "Last Tool No." can be contacted or the ECU must be recalibrated. The ECU is factory set at eight (8) zeroes (ØØØØØØØØ).

Change ECU Password

To access the Change Password function, press ENTER with CHANGE PASSWORD visible on the Reprogram EEPROM Function Menu screen. The following screen will appear.



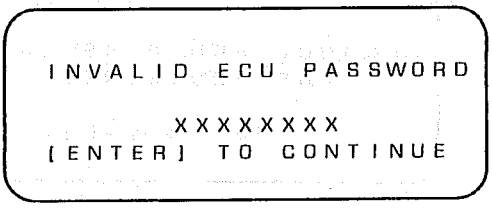
Press ENTER. The following screen will appear.



Input the password using the numeric keys to input numeric characters and the ↑ and ↓ keys to input alpha characters. To move from character to character, use the ← key to delete characters, and the → key to move forward when selecting an alpha character. When you have finished entering the password, press ENTER.

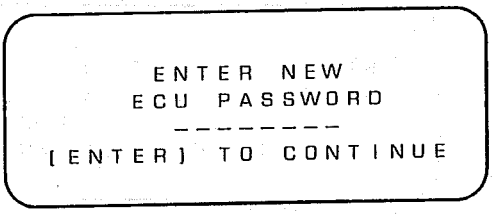
NOTE: There is a minimum of 5 characters required, and a maximum of 8.

You will be given three tries to input the password. If the password was valid, you will now be able to change the password. If the password was NOT valid, the Pro-Link display will read:



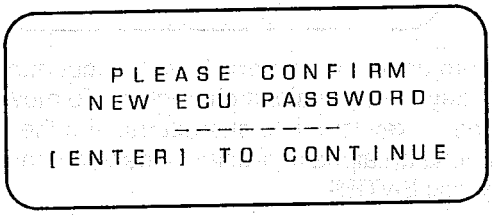
Press ENTER and you will be given another chance to input the password correctly. If you fail to enter the correct password on your third attempt, you will not be allowed to reprogram any of the programmable parameters stored in the ECU during that session.

If you have successfully entered the password, the following screen will appear.

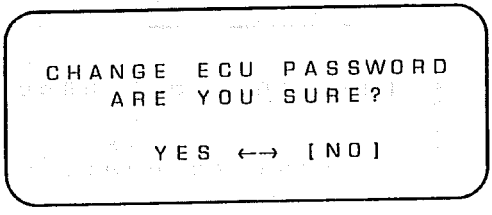


Input the new password using the numeric keys to input numeric characters and the ↑ and ↓ keys to input alpha characters. To move from character to character, use the ← key to delete a character, and the → key to move forward. When you have finished entering the new password, press ENTER.

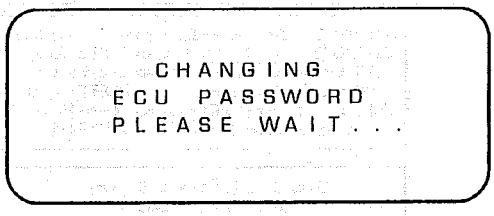
When you press ENTER, the following screen will appear.



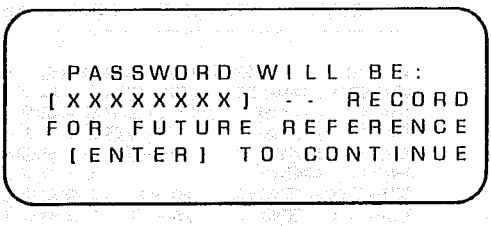
You must input the password exactly as you did the first time. If the passwords do not match, you will be asked to input them again. If the passwords match, the following screen will appear.



Use the ← and → keys to move the brackets to your choice and press ENTER. If you chose "NO", you will be returned to the Reprogram EEPROM Function Menu screen. If you choose "YES", the following screen will appear for several seconds. You will hear the transmission shift selector beep for several seconds while the reprogramming is underway.



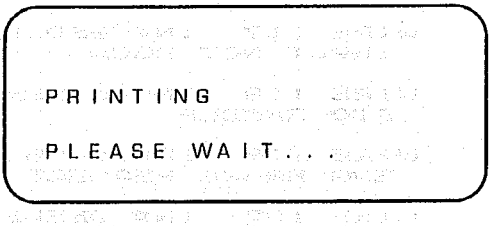
Then, the following confirmation screen will appear.



Press ENTER and the Pro-Link must re-initialize in order to re-establish communication with the transmission. You will be returned to the Requesting Allison Data Screen as the tool restarts.

Print Active I/O Package

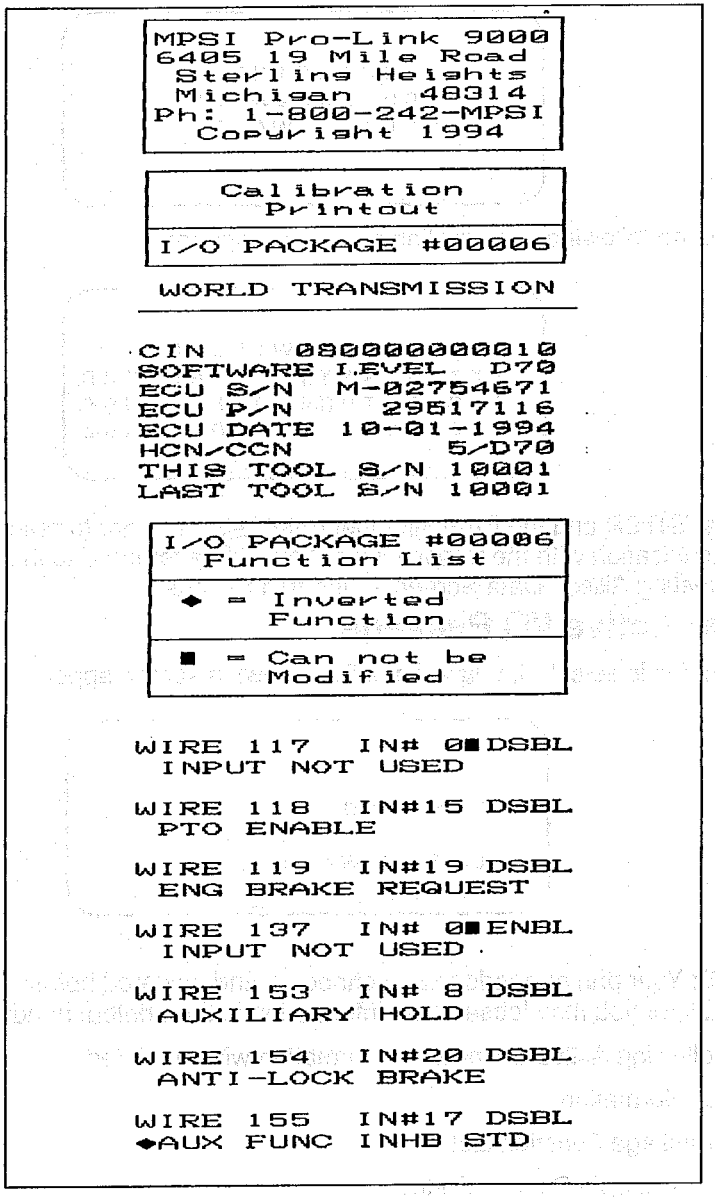
When this is selected, you will see the following screen appear



NOTE: Your printer needs to be connected and powered before pressing ENTER, or you may loose some information in the printout header.

The following Active Calibration Information will be printed:

- ECU Information
- I/O Package Function List
  - Enable/Disable Status
  - Modifiability Indicator
  - Inversion Status
- Modifiable Constants List

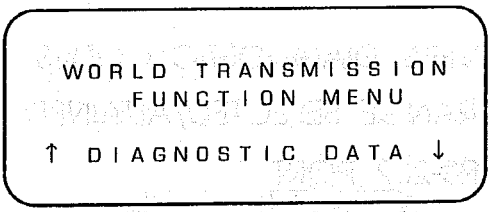


```
MPSI Pro-Link 9000
6405 19 Mile Road
 Sterling Heights
 Michigan    48314
Ph: 1-800-242-MPSI
  Copyright 1994

   Calibration
     Printout
I/O PACKAGE #00006

WORLD TRANSMISSION

CIN          000000000010
SOFTWARE LEVEL    D70
ECU S/N     M-02754671
ECU P/N       29517116
ECU DATE   10-01-1994
HCN/CCN            5/D70
THIS TOOL S/N  10001
LAST TOOL S/N  10001

I/O PACKAGE #00006
  Function List
◆ = Inverted
    Function
■ = Can not be
    Modified

WIRE 117   IN# 0■DSBL
  INPUT NOT USED

WIRE 118   IN#15 DSBL
  PTO ENABLE

WIRE 119   IN#19 DSBL
  ENG BRAKE REQUEST

WIRE 137   IN# 0■ENBL
  INPUT NOT USED

WIRE 153   IN# 8 DSBL
  AUXILIARY HOLD

WIRE 154   IN#20 DSBL
  ANTI-LOCK BRAKE

WIRE 155   IN#17 DSBL
◆AUX FUNC INHB STD
```

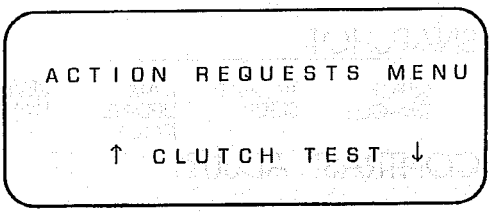
SAMPLE PRINTOUT OF ACTIVE I/O FUNCTION MENU

EXIT

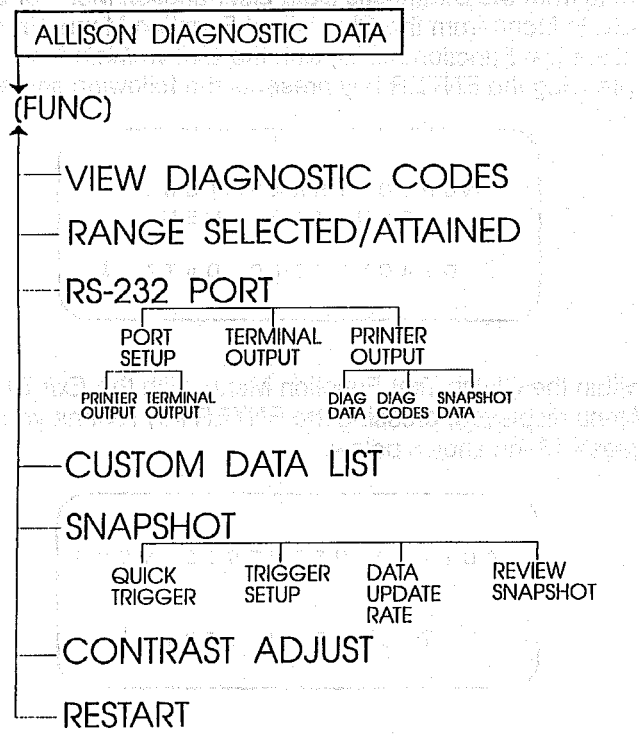
This selection returns the cartridge to either the World Transmission Function Menu from the Diagnostic Data List Function Menu or back to the Action Requests Menu from the Clutch Test Function Menu. From the Diagnostic Data List Function menu, with the *Exit To Main Menu* message displayed, pressing the ENTER key presents the following screen.



If you are within the Clutch Test Function Menu, with the *Exit To Action Requests Menu* displayed, pressing the ENTER key returns you to the Action Requests Menu shown below.

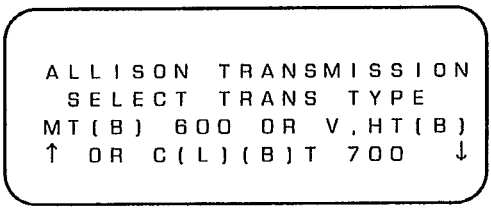


ALLISON DIAGNOSTIC MENU



ALLISON TRANSMISSION

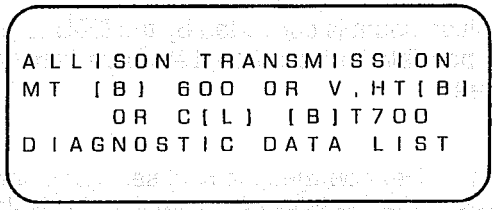
In the Allison Transmission system, you must select the transmission type (on-highway or off-highway) from the Transmission Type menu.



Note the arrow symbols in the Pro-Link® 9000 display. They remind you to use the UP and DOWN arrow keys to scroll to the desired transmission type. Each touch will move the display up or down by one item. If you hold

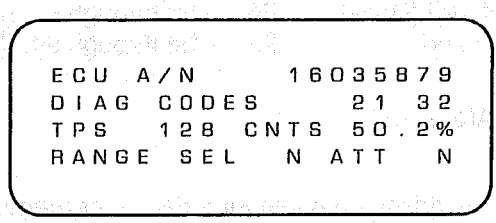
an arrow key down, the display will scroll quickly. The list is circular; that is, it will return to the beginning after the last one is viewed.

When you see the proper transmission type on the display, press the ENTER key. A system confirmation screen will then display. The exact appearance will vary depending on the system, but it will look similar to this:



This will display for about three seconds and the the data list will display..

DATA DISPLAY



Use the ↑ and ↓ keys to scroll the entire list. Pressing a key causes the display to move one line. Holding a key causes the display to scroll quickly. Pressing the ←key causes the display to advance four lines. Pressing the → key causes the display to move backward four lines. When you reach the end of the list, the first item will appear again (the list is circular).

ECU A/N

The Electronic Control Unit (ECU) and the calibration PROM together are identified by an 8-digit assembly number. Consult the appropriate Allison Transmission service literature to determine specific ECU part number and PROM part number.

DIAGNOSTIC CODES

When certain operating conditions occur, a diagnostic code will be set in one of two memory locations of the ECU. Both memory locations are displayed, and the code in the left position is usually more severe to transmission operation. Consult the appropriate Allison Transmission troubleshooting manual to determine system response for the various codes.

TPS COUNTS AND %

The throttle position sensor (TPS) monitors the position of the fuel control lever on the engine. The resulting voltage signal is converted to digital counts by the ECU. It is possible for the readout to range from 255 counts at idle to nearly 0 counts at open throttle. Idle counts greater than or equal to 233 or Wide Open Throttle counts less than or equal to 14 counts will set Fail Codes.

The throttle position count is converted by the ECU to percentage of throttle applied. It is possible for the readout to range from 0% (closed) to 100% (fully open).

RANGE SEL

When the vehicle driver operates the shift selector in the vehicle cab, the readout indicates the range selected. Note that this is the range selected, not necessarily the range the transmission actually attains. The readouts include:

R - Reverse
F4 - 1st through 4th (Drive)
F3 - 1st through 3rd (Drive)
F2 - 1st through 2nd
F1 - 1st
R2 - Second reverse
N - Neutral
F6 - 1st through 6th (Drive)
F5 - 1st through 5th (Drive)

Also refer to RANGE ATT.

RANGE ATT

In response to the driver's request for a particular range, the ECU issues commands for the transmission to shift. Due to operating conditions, the range actually attained may or may not match the range selected. The readouts include:

R2 - Second reverse
R - Reverse
N - Neutral
1C - 1st converter
1L - 1st lockup
2C - 2nd converter
2L - 2nd lockup
3C - 3rd converter
3L - 3rd lockup
4C - 4th converter
4L - 4th lockup
5C - 5th converter
5L - 5th lockup
6C - 6th converter
6L - 6th lockup

NOTE: In the diagnostic mode, the ECU data stream update rate is approximately 1.25 seconds. If the transmission is shifting rapidly, it is possible that the transmission may pass through several "attained" ranges more quickly than the readout can display them. This is not a fault of either the ECU or the Pro-Link® 9000. If a faster update of range attained information is required, go to "Range Selected/Range Attained" section on page 83.

Also refer to RANGE SEL.

RANGE SHFT RPM

The readout displays the transmission output shaft speed (rpm) when the transmission made its last range upshift or downshift. Converter lockups are excluded. Due to the slow update rate of the ECU, be careful to match the displayed value with the proper shift. If you are not certain, use the transmission HOLD feature to inhibit unwanted shifts.

LOCKUP RPM

The readout indicates the transmission output shaft speed (rpm) when the last converter lock-up (engage or disengage) occurred. When the converter is locked up— engaged — it provides a direct mechanical link from the engine through the converter. When the converter is not locked — disengaged — the converter pump and turbine are connected by hydraulic fluid only. Lockup rpm is generally different at closed and open throttle positions.

OUTPUT RPM

A speed sensor is located on the rear cover of the transmission to detect output shaft rpm.The readout shows actual transmission output shaft speed in revolutions per minute; the readout lower limit is 60 rpm.

OIL TEMP

A temperature sensor is located in the transmission sump on MT(B) 600; V, HT(B); AND C(L)(B)T 700 transmissions. It is located in the lock-up valve body assembly on C(L) (B)T 5/6/9000 and DP8000 transmissions. High oil temperature may result from overfilling or cooling system problems. Low oil temperature may result from cold weather conditions.

The readout provides both Fahrenheit (-60°F to 350°F) and Celsius (-51°C to 177°C).

FWD PRESS SW

NOTE: Not used on C(L)(B)T 5/6/9000 or DP8000 transmissions.

A pressure switch in the transmission detects if the transmission has attained a forward range. The readout is ON when there is forward pressure, and it is OFF when there is no forward pressure. Because the ECU needs input from both forward and reverse switches to determine neutral range, refer to REV PRESS SW below. Neutral is indicated when both readings are OFF.

REV PRESS SW

NOTE: Not used on C(L)(B)T 5/6/9000 or DP8000 transmissions.

A pressure switch in the transmission detects if the transmission has attained a reverse range. The readout is ON when there is reverse pressure, and it is OFF when there is no reverse pressure. Because the ECU needs input from both forward and reverse switches to determine neutral

range, refer to FWD PRESS SW above. Neutral is indicated when both readings are OFF.

REV WARN SIG

As a reverse warning signal when the transmission has been placed in reverse range, the readout indicates ON. When the transmission is shifted from reverse range, the readout is OFF.

OIL LUBE/LVL SW

NOTE: Not used on C(L)(B)T 5/6/9000 or DP8000 transmissions.

There are three types of oil condition indicators (pressure, level, or fluidic) used in the various Allison electronically controlled transmissions. Consult the appropriate Allison Transmission service publications for your transmission model to determine which of the three is used in a specific transmission.

A lubrication pressure switch is used to detect low lubrication pressure. The readout is ON when the lubrication pressure reaches 6 to 12 PSI. The readout is OFF when lubrication pressure is below 6 to 12 PSI.

Oil level and fluidic sensor systems are used to detect low oil level conditions. The readout is OFF when a low oil level condition is detected. The readout is ON when the oil level is above the low oil level detection point.

Consult the proper Allison Transmission service publication to determine the correct operating oil level for each transmission model.

RETARD REQUEST

On most vehicles, an instrument panel-mounted control is used to request operation of the retarder. The readout indicates ON when the retarder is requested and OFF when the retarder is not requested. Refer to RETARD COMMAND for further information.

RETARD COMMAND

When the retard control is operated (see RETARD REQUEST) the ECU gives a command to operate the retarder. The readout indicates YES when the retard command is given and NO when the command is not given.

SPECIAL INPUT

This readout indicates the position of a special input switch used for certain options, ON or OFF.

RANGE COMMANDED

This is the output signal to indicate that a specific gear range has been attained. The readout is YES or NO.

INPUT VOLTAGE

The readout indicates the voltage available to the ECU.

WORD 23

A display of eight ones [11111111] indicates the primary mode is engaged. A display of eight zeroes [ØØØØØØØØ] indicates the secondary mode is engaged

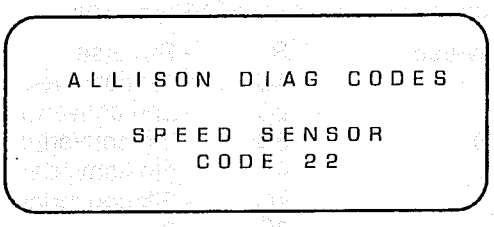
WORD 24

This readout is for engineering use only and has no significance for troubleshooting.

DIAGNOSTIC CODES

When the ENTER key is pressed on the Diagnostic Codes selection, the Pro-Link will display the code number, along with a description of the code(s) stored in the ECU.

The readout contains the name of the system or component that caused the code to be set.

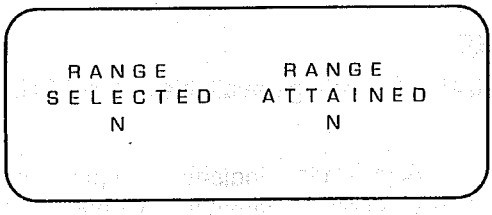


When viewing DIAG CODES in the normal data list the number on the left is usually a more severe code than the code on the right side of the display. If both memory locations have a code stored, the code on the left will be displayed first, while in this function selection. Also if there are two codes stored in the ECU the arrows will appear on the bottom line of the code display screen.

RANGE SELECTED/RANGE ATTAINED

When the driver selects a specific range for the transmission, the ECU begins shifting the transmission through the various ranges, depending on operating conditions, until the selected range is attained. Under some conditions, the range selected and the range attained will be the same. In other cases, the transmission will not attain the range selected. This information is of diagnostic value.

When you select this function, the Pro-Link® 9000 reads out the range selected and the range attained.



In the Range Selected/Range Attained mode, the update rate is about 1/4 of a second, so the values received will be more accurate than in the normal data list mode. The data stream updates every 1.25 seconds.

Here's how to translate the RANGE SELECTED readout:

R2	- Second reverse	R	- Reverse
N	- Neutral	F6	- 1st through 6th (Drive)
F5	- 1st through 5th (Drive)	F4	- 1st through 4th (Drive)
F3	- 1st through 3rd (Drive)	F2	- 1st through 2nd
F1	- 1st		

Here's how to translate the RANGE ATTAINED readout:

R2	- Second reverse	R	- Reverse
N	- Neutral	1C	- 1st converter
1L	- 1st lockup	2C	- 2nd converter
2L	- 2nd lockup	3C	- 3rd converter
3L	- 3rd lockup	4C	- 4th converter
4L	- 4th lockup	5C	- 5th converter
5L	- 5th lockup	6C	- 6th converter
6L	- 6th lockup		

RS-232-SERIAL PORT

Refer to RS-232 Serial Port in the ***Pro-Link Functions*** section of this manual.

CUSTOM DATA LIST

Refer to Custom Data List in the ***Pro-Link Functions*** Section of this manual.

SNAPSHOT

Refer to Snapshot in the ***Pro-Link Functions*** section of this manual.

CONTRAST ADJUST

Refer to Contrast Adjust in t he ***Pro-Link Functions*** section of this manual

RESTART

Refer to Restart in t he ***Pro-Link Functions*** section of this manual.

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Detroit, MI 48207

FORD MANUALS

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Detroit, MI 48207

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Chrysler Motors Service Training
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Center Line, MI 48015

DETROIT DIESEL MANUALS

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25215 Glendale
Redford, MI 48239
(313) 255-9300

ALLISON TRANSMISSION MANUALS

Service publications are available through any Allison Transmission Division authorized distributor.

MACK TRUCK MANUALS

Mack Trucks, Inc.
SERVICE PUBLICATION DEPT.
P.O. Box 1791
Allentown, PA 18105
(215) 439-3361

AFTERMARKET MANUALS

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The sole remedy for breach of warranty or any other obligation (including and arising out of statute or regulation, strict liability, negligence or the law of torts) is repair or replacement of defective parts by MPSI or, at the option of MPSI, refund of the purchase price. This is the exclusive remedy. ALL LIABILITY OF MPSI FOR CONSEQUENTIAL OR OTHER DAMAGES IS EXCLUDED AND DISCLAIMED. In no event shall the Buyer be entitled to damages for lost profits, down time, attorney fees, or business, economic, or commercial loss or damage of any kind. Action on any claim must be commenced within one (1) year after the cause of action has accrued.

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Out-of-warranty service is obtained by shipping the product, shipping charges prepaid, to

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Out-of-warranty repairs will be provided for a fixed fee. This fee does not apply to products which have been misused or abused, or to tools over three (3) years old.

Most problems are due to misunderstanding of the product rather than any fault in it. Please call MPSI at (810) 731-6410 in Michigan or (800) 242-MPSI outside Michigan if you are having problems with the product's operation.