DSI 700

User's Manual

HUNTRON

HUNTRON INSTRUMENTS, INC.

DSI 700

USER'S MANUAL

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HUNTRON INSTRUMENTS, INC.

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CONTACTING HUNTRON

For technical support or to obtain information about service, accessories, and other products contact:

Huntron Instruments, Inc.
15720 Mill Creek Blvd.
Mill Creek, WA 98012-9980
U.S.A.

In North America, call 800-426-9265 or 206-743-3171.

Huntron is also accessible by fax at 206-743-1360.

Outside North America, call your local distributor for assistance or service.

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CHAPTER 1
INTRODUCTION AND SPECIFICATIONS

1-1. INTRODUCTION

The Huntron DSI 700 has been designed as a compatible accessory for the Huntron Tracker 2000. Together, they create an effective component troubleshooting system. Working with the Tracker 2000 the DSI 700 allows faster troubleshooting of components with the use of automatic signature comparison which points out differences in analog signatures. When the DSI 700 is connected to an IBM compatible PC, it becomes a digital storage interface for the Tracker 2000. Analog signatures can be digitized and stored in the PC as a reference database for troubleshooting.

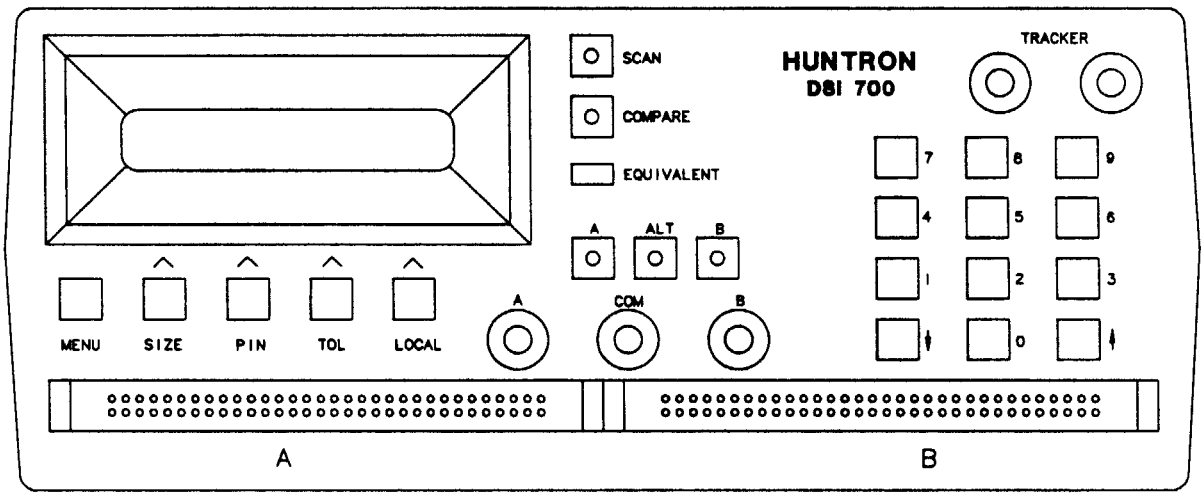


Figure 1-1. Huntron DSI 700.

1-2. SPECIFICATIONS

Table 1-1
DSI 700 Specifications

ELECTRICAL

Interconnections:

Discrete Components:

Channel A, B, and COM front panel jacks are provided for use with probes.

Number of Test Pins . . . . . 64(maximum)

Number of Channels 2

Connectors:

(2) 64 pin IDC (for devices of 64 pins or less)

Display:

16 character x 2 line LCD with LED Backlight

Input Voltage:

± 12 VDC (supplied by the Tracker 2000)

Interface:

IBM-PC parallel port

ENVIRONMENTAL

Operating Temperature: . . . . . 15° C to 30° C (+59° F to +86° F)

Storage Temperature: . . . . . -20° C to +60° C (-4° F to +140° F)

Humidity: . . . . . 0 to 50 % R.H.

MECHANICAL

Size: . . . . . 9"W x 4"H x 11"D
(23cm W x 10cm H x 28cm D)

Weight: . . . . . 4.0 lbs (1.8kg)

Shock and Vibration: . . . . . will withstand shock and vibration encountered in commercial shipping and handling.

1-3. SAFETY CONSIDERATIONS

This manual contains information, cautions, and warnings the user must follow to ensure safe operation, and to keep the instrument in safe condition.

WARNING

A warning denotes a hazard. It calls attention to a procedure or practice which, if not correctly performed or adhered to, could result in personal injury.

CAUTION

A caution also denotes a hazard. It calls attention to a procedure or practice which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the instrument.

1-4. ACCESSORIES

The following accessories are available:

HUNTRON P/N	DESCRIPTION
98-0314	Foot Switch
98-0146	ZIF Adapter
98-0086	Universal Edge Connector Adapter (UECA)
98-0093	Surf-Probe (Surface Mount Probe)
98-0312	PC-Pedal
07-1233	64 Pin DIP Clip
98-0027	64 Pin DIP Clip Cable

To order any of the above items or for further information on other accessories, please contact Huntron.

NOTES:

CHAPTER 2
OPERATING INSTRUCTIONS

2-1. INTRODUCTION

This chapter describes the basic operation of the DSI 700. Throughout the rest of this manual the Tracker 2000 will be referred to simply as a 2000. Take time to read this chapter carefully so that you can take full advantage of all of the features of the DSI 700. For information on analog signatures, refer to your 2000 manual.

2-2. UNPACKING YOUR INSTRUMENT

Your instrument was shipped with the following items:

QTY	DESCRIPTION	HUNTRON P/N
1	Demo board	06-3059
2	8 pin DIP clip	07-1235
2	16 pin DIP clip	07-1229
2	18 pin DIP clip	07-1237
2	20 pin DIP clip	07-1234
2	24 pin DIP clip	07-1239
2	28 pin DIP clip	07-1240
2	40 pin DIP clip	07-1230
1	User's Manual	21-1143
2	10kΩ resistor jumper	98-0028
1	Power/clock cable	98-0051
1	DSI 700 to PC interface cable	98-0052
1	Disk Set (DSI 700 software)	---------
1	6" red banana cable	98-0100
1	6" black banana cable	98-0101
2	40 pin DIP clip cable	98-0102
2	20 pin DIP clip cable	98-0103

Check the shipment carefully and contact the place of purchase if anything is missing or damaged in shipment. If reshipment is necessary, please use the original shipping carton and packing foam. If these are not available, be sure that adequate protection is provided to prevent damage during shipment.

2-3. PHYSICAL FEATURES

Before you begin to use the DSI 700, please take a few minutes to familiarize yourself with the instrument.

2-4. Front Panel

The front panel of the DSI 700 is designed to make function selection easy. All buttons are momentary action and some have integral LED indicators that show which functions are active.

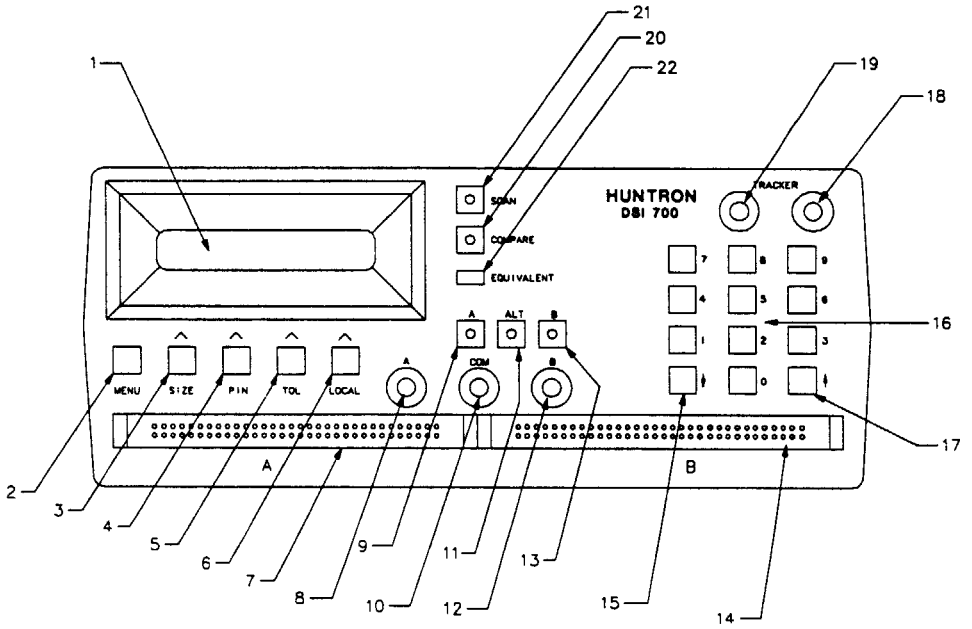


Figure 2-1. DSI 700 Front Panel.

Table 2-1
Front Panel Controls and Connectors

1	LCD	Displays the current status or menus of the DSI 700.
2	MENU button	Main Display: selects the Compare menu. Menu Mode: selects the previous menu or exits the menu mode.
3	SIZE button	Main Display: selects the Component Size entry display. Menu Mode: selects the left choice of a menu.
4	PIN button	Main Display: selects the Pin Number entry display. Menu Mode: selects the left middle choice of a menu.
5	TOL button	Main Display: selects the Tolerance entry display. Menu Mode: selects the right middle choice of a menu.
6	LOCAL button	Main Display: toggles between Local and Remote modes (in Remote mode only this button is active). Menu Mode: selects the right choice of a menu.
7	Channel A IDC socket	Socket for cable connection when channel A is active.
8	Channel A Probe jack	Test lead connector that is active when channel A is selected.

Table 2-1 (con't)
Front Panel Controls and Connectors

9	Channel A button	Selects channel A and cancels the channel B and ALT functions.
10	COM Probe jack	Test lead connector that is instrument common and the common reference point for both channel A and channel B.
11	ALT button	Causes the DSI 700 to alternate between channel A and channel B at a speed controlled by the RATE control on the 2000.
12	Channel B Probe Jack	Test lead connector that is active when channel B is selected.
13	Channel B button	Selects channel B and cancels the channel A and ALT functions.
14	Channel B IDC socket	Socket for cable connection when channel B is active.
15	↓ button	Decrements numeric and alpha entries. Decrements the current pin. Also, used to change to the next most different pin in Recall mode.
16	0-9 buttons	Buttons that enter the digits 0-9 in numeric entry fields.
17	↑ button	Increments numeric and alpha entries. Increments the current pin. Also, used to change to the next less different pin in Recall mode.
18	Black TRACKER jack	Test lead connector used to connect the 2000 common (COM) to the DSI 700.
19	Red TRACKER jack	Test lead connector used to connect channel A of the 2000 to the DSI 700.
20	COMPARE button	Scans through the pins and automatically compares the device connected to channel A with the one connected to channel B using the tolerance selected by the user. If the DSI 700 stops on a pin that is different, pressing the COMPARE button again continues pin scanning.
21	SCAN button	Scans through the pins so that signatures can be viewed on the 2000's CRT and visually compared by the user. If the DSI 700 is scanning, pressing SCAN will stop pin scanning. If pin scanning has been stopped, pressing SCAN again will restart scanning from the pin that you stopped on.
22	EQUIVALENT LED	Indicates that the signatures on channel A and channel B are the same within the selected tolerance.

2-5. Back Panel

Secondary connectors are on the back panel.

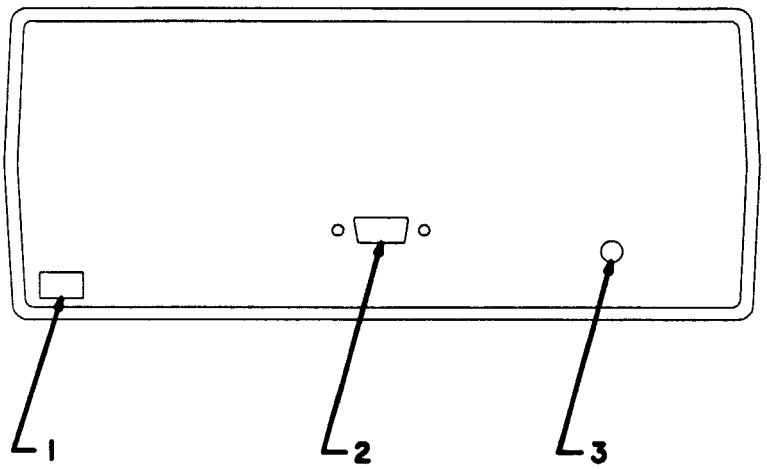


Figure 2-2. DSI 700 Back Panel.

Table 2-2
Back Panel Connectors

1	Power/Clock Input Connector	Connector which accepts power and rate clock from a 2000.
2	Computer Connector	Connector for the cable from the parallel port of the PC.
3	Foot Switch Connector	Connector for the optional foot switch.

2-6. OPERATION

The following sections detail how to setup and operate the DSI 700 with a 2000.

2-7. Tracker 2000 Setup

Follow the INITIAL SETUP instructions in the 2000 manual to adjust the CRT properly. The 2000 must have channel A, 50/60 Hz, and a single range selected. The Pulse Generator and ALT functions of the 2000 are not used with the DSI 700. The AUTO, 400Hz and 2000Hz features of the 2000 are not used with the Compare mode of the DSI 700.

2-8. DSI 700 Connections

The DSI 700 should be placed underneath the 2000.

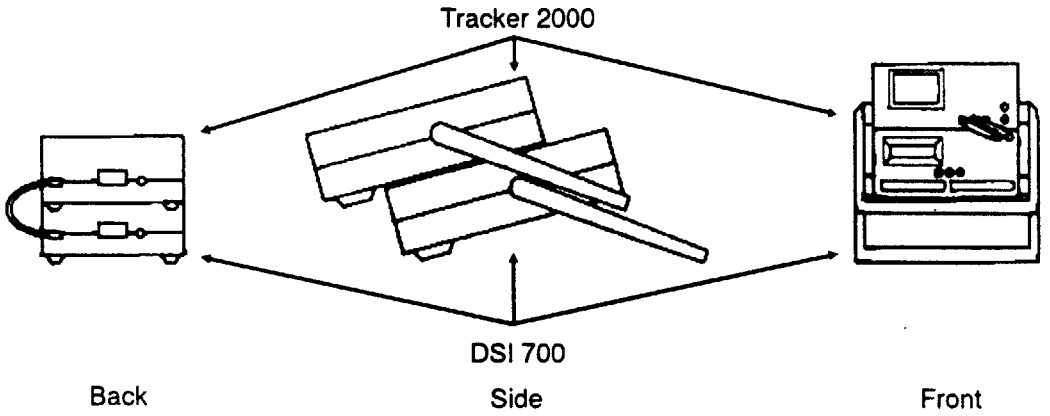


Figure 2-3. Stacking the DSI 700 and the 2000.

Connect one end of the supplied red banana cable to the channel A jack of the 2000. Connect the other end to the red TRACKER jack of the DSI 700. Connect one end of the supplied black banana cable to the COM jack of the 2000. Connect the other end to the black TRACKER jack of the DSI 700.

The DSI 700 is powered by the 2000. Connect one end of the supplied power/clock cable to the Accessory output connector (ACC) on the back panel of the 2000. Connect the other end of the power/clock cable to the POWER input connector on the back panel of the DSI 700. The DSI 700 and the 2000 are now ready to be used in all LOCAL mode functions.

To use the DSI 700/2000 with a computer, attach the 25 pin end of the interface cable to the parallel port on your computer. Attach the other end of the cable to the 15 pin connector labeled COMPUTER on the back panel of the DSI 700. Now the system can be operated in REMOTE (computer-controlled) mode once the DSI 700 software has been installed on your computer (see Chapter 3: Software Installation).

2-9. Accessory Connections

Foot switch: The optional Foot Switch (see Section 1-4: Accessories) can be used to operate certain DSI 700 functions in a "hands-free" mode. Refer to the following figure for connection information:

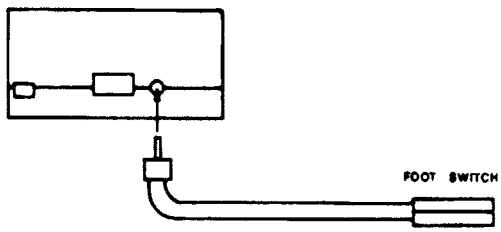


Figure 2-4. Foot Switch to DSI 700 Connection.

With the 2000/DSI 700 turned off, insert the foot switch plug into the foot switch connector on the rear of the DSI 700. Turn the 2000 power on and the foot switch is ready for use.

The foot switch must be connected to the DSI 700 while the power is off. The DSI 700 checks for the presence of the foot switch only during initial power up. If the foot switch is plugged in while the DSI 700 is on, it will not work. Turn the 2000 power off then on to activate the foot switch.

2-10. Initial Power Up

When the power/clock cable is connected and the 2000 is turned on, the DSI 700 should turn on. All of the LEDs should come on and the LCD should show the power up display which indicates the current firmware version.

Figure 2-5. Power Up Display.

Then all LEDs should turn off except for the channel A LED and the LCD should show the Main display. The Main display shows the currently activated pin, the number of pins on the device, the package type, and the tolerance for the compare function.

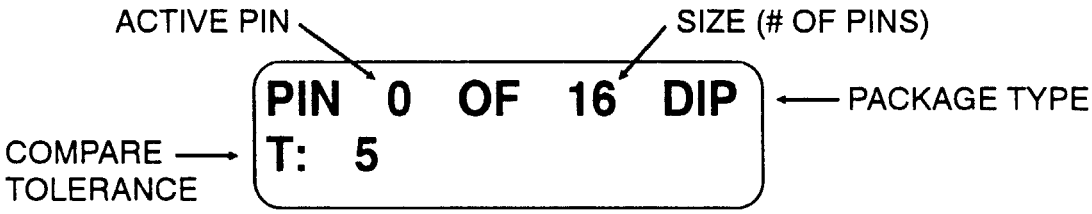


Figure 2-6. Main Display.

"Pin 0" means that all pin relays are turned off which disables the IDC sockets.

The ↑ and ↓ buttons will increment and decrement the pin number respectively. The foot switch can also increment the pin number if it is connected.

The functions that are accessible from the Main display are LOCAL, channel selection, SIZE, PIN, TOL (tolerance), SCAN, COMPARE, and MENU.

2-11. LOCAL/REMOTE Selection

When you are at the Main display the DSI 700 is in LOCAL mode. This mode allows you to do testing without a computer. All that is required is the DSI 700 and 2000 properly connected to each other. LOCAL mode is the power up default of the DSI 700.

REMOTE mode allows you to use the DSI 700 and 2000 as a computer-controlled system. To select REMOTE mode, press the LOCAL button. The LCD will show the REMOTE mode display.

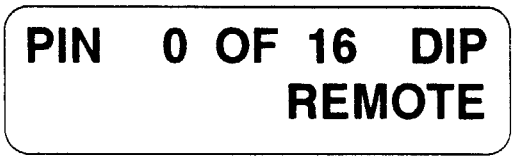


Figure 2-7. REMOTE Mode Display.

Note that the compare tolerance disappears. This is because the software controls tolerance in REMOTE mode. Also all DSI 700 buttons except LOCAL are disabled in REMOTE mode. To return to LOCAL mode, press the LOCAL button again.

Chapters 3 through 6 will cover REMOTE mode in detail. The balance of this chapter will cover LOCAL mode operation.

2-12. Channel Selection

There are two channels in the DSI 700 (channel A and channel B) which are selected by pressing the appropriate front panel button. Channel selection determines which probe jack and IDC connector are active.

The ALT button causes the DSI 700 to alternate between channel A and channel B at a speed set by the 2000 RATE control. Pressing the A or B button will lock onto the respective channel disabling the ALT mode.

The A/ALT/B buttons function the same way as the A/ALT/B buttons on the 2000.

2-13. Component Size

The Component Size is the number of pins that a component has. This must be set to match the component under test so that the pin number on the Main display indicates the correct physical pin of the component.

The SIZE button activates the Component Size entry display. Use the numeric buttons (0-9) to enter the number of pins on the component from 1 to 64. You can also press the ↑ and ↓ buttons to increment and decrement the size respectively.

The bottom row of the Component Size entry display contains the four package options: DIP, SIP, F&B and FRT. After the correct number of pins are selected, select the package type by pressing the button under one of the package options. DIP (dual in-line package) must have an even number of pins up to 64. SIP (single in-line package) may have an even or odd number of pins up to 64. F&B (front and then back) must have an even number of pins up to 64. FRT (front only) may have an even or odd number of pins up to 32 pins. The power up default is a 16 pin DIP.

When the size and package are correct, press the MENU button to enter the data and return to the Main display.

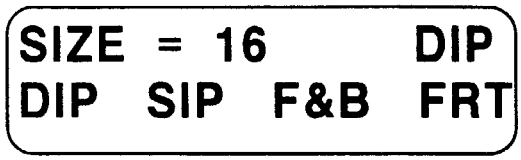


Figure 2-8. Component Size Entry Display.

The following figure shows the actual relay scanning sequence for a 20 pin DIP IC. DIPs are the most common package type on conventional through-hole PCBs.

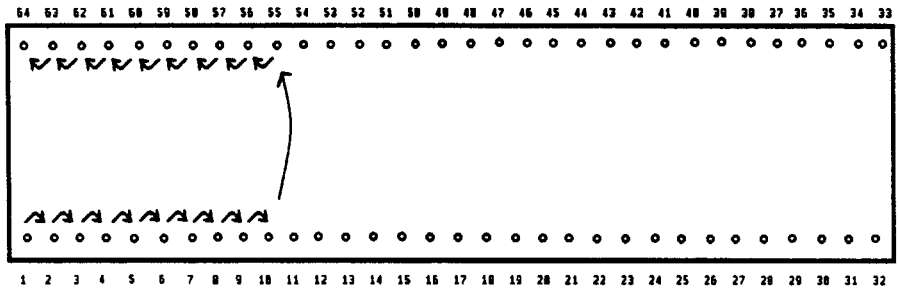


Figure 2-9. Relay Scanning Sequence for a 20 pin DIP.

The next figure shows the relay scanning sequence for a 20 pin SIP. This is useful when connecting to components with ribbon cable because the wire sequence is 1-2-3... etc.

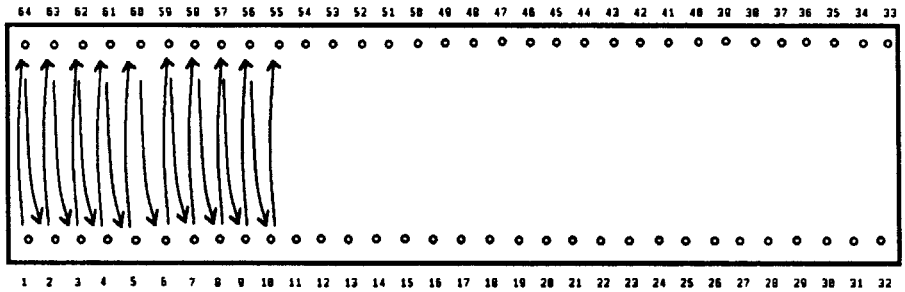


Figure 2-10. Relay Scanning Sequence for a 20 pin SIP.

A 20 pin F&B (front and then back) relay scanning sequence is shown in the following figure. It is similar to DIP except the top row of pins is scanned in the opposite direction. This could be used with edge connector testing where this type of sequence matches the actual numbering on the edge connector.

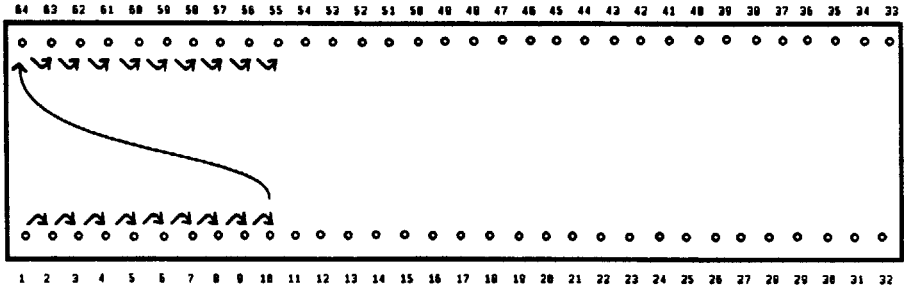


Figure 2-11. Relay Scanning Sequence for a 20 pin F&B.

The next figure shows the relay scanning sequence for a 20 pin FRT (front only). This could also be used with edge connectors where there is only a single row of contacts.

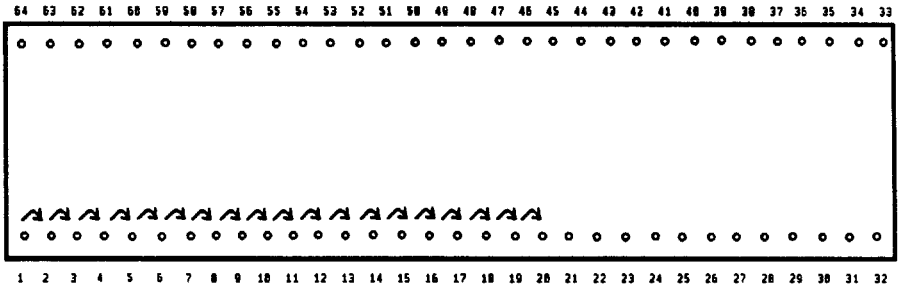


Figure 2-12. Relay Scanning Sequence for a 20 pin FRT.

2-14. Pin Number

The PIN button activates the Pin Number entry display. This feature allows direct random access of any pin without using the ↑ and ↓ buttons to scroll through all the pins. Use the numeric buttons (0-9) to select the desired Pin Number up to and including the Component Size setting. You can also press the ↑ and ↓ buttons to increment and decrement the Pin Number respectively. After the correct Pin Number is selected, press the button under ENTER (SIZE) on the display. The DSI 700 then returns to the Main display with the new pin number entered and that pin relay activated. Pin Number 0 (all pin relays off) is the power up default.

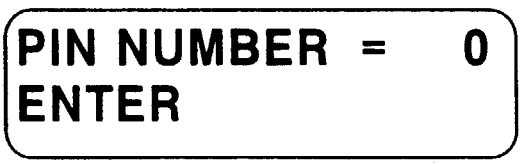


Figure 2-13. Pin Number Entry Display.

2-15. Tolerance

The TOL button activates the Tolerance entry display. Tolerance is used by the Compare mode and is the amount of allowable difference between the channel A and channel B signatures before they are considered different. See Section 2-17: Compare Mode for more information about tolerance. Use the numeric buttons (0-9) to select the desired tolerance from 0 to 99. You can also press the ↑ and ↓ buttons to increment and decrement the tolerance respectively. After the correct tolerance is selected, press the button under ENTER (SIZE) on the display. The DSI 700 will then return to the Main display with the new tolerance entered. Tolerance of 5 is the power up default.

Figure 2-14. Tolerance Entry Display.

2-16. Scan Mode

The Scan mode is used when you want to visually examine signatures on the 2000's CRT. It is activated by pressing the SCAN button. When active, the SCAN LED is on. The Scan mode increments through the pins of the component at a speed controlled by the 2000 RATE control and continuously displays the signatures. The channel A and B buttons allow scanning in each respective channel. This is useful when you do not have a known-good board to compare a suspect board against. The ALT button allows the channels to be displayed alternately. When SCAN and ALT are active, the DSI 700 alternates three times between channels A and B while staying on the same pin. This feature is necessary because if the DSI 700 only showed each channel/pin signature once, it would be hard to tell if you are comparing pin 5 - channel B to pin 5 - channel A (correct) or to pin 6 - channel A (incorrect). The Equivalent LED is disabled in SCAN mode. To stop Scan mode at the current pin, press the SCAN button.

If the foot switch is pressed and held down while holding down the SCAN button and then the SCAN button is released, scanning will not start until the foot switch is released. This facilitates "hands-free" operation.

The Scan mode display looks just like the Main display except when ALT is active: it shows the currently activated pin (continuously incremented), the number of pins on the device, the package type, the tolerance and '3X' (if ALT was active when SCAN was pressed). The '3X' refers to the three times that A and B are displayed for each pin.

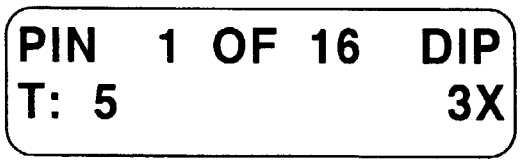


Figure 2-15. Scan Mode Display (with ALT active).

2-17. Compare Mode

The purpose of Compare mode is to find and display only those pins which have *different* signatures. Compare mode automatically scans through all the pins of the devices being compared while alternating between the two channels. Each signature of the known-good device is digitized into 100 samples and then compared sample-by-sample with the digitized signatures of the same pin on the suspect device. On any given pin, when all 100 samples from both devices match, that pin is *equivalent*. The tolerance value allows the samples to not be exactly the same and therefore lets normal signature variations be taken into account. A pin is *different* when any of the 100 samples have a difference that exceeds the tolerance value. The largest of these difference values for a given pin minus the tolerance is called the DEV (deviation) number for that pin. So if the tolerance value is increased by the DEV number of a particular pin and Compare mode repeated, that pin will then be *equivalent*. The allowed range of DEV is 1 to 99.

Typically the DSI 700 will find more than one pin with different signatures. These need to be presented to the user in an order that will help them to quickly troubleshoot the devices. The IDX (index) number provides the means to sort out multiple different pins. This number is the sum of all the DEV numbers for the 100 samples. The IDX number is designed to show how different one signature is from another. The IDX number increases as the visual difference between two signatures increases. IDX ranges from near zero when differences are very small to approximately 6000 when an open circuit is compared to a short circuit with the tolerance at zero.

Occasionally two signatures may not be comparable. If the DSI 700 detects any problem with the comparison, DEV will be displayed as "**" and IDX will be displayed as "****". When this indication appears either repeat the test or simply look at the 2000 CRT to see if there is a significant signature difference or not. If there is not, ignore the *different* indication for that pin.

The Compare mode is activated by pressing the COMPARE button. When active, the Compare LED is on. The A, ALT, and B buttons are disabled during the actual comparisons. Pressing the COMPARE button, while Compare is active, cancels the Compare mode.

After the COMPARE button is pressed, the DSI 700 first checks the frequency and range that are selected on the 2000. The frequency must be 50Hz or 60Hz (depending on the DSI 700's frequency option) and a single range must be selected (the 2000 AUTO feature is not allowed). **DO NOT CHANGE THE RANGE OR FREQUENCY ON THE 2000 ONCE THE COMPARE HAS STARTED.**

The Compare mode display shows the current pin which is incremented as the pins are scanned, the number of pins on the device, the package type, the tolerance, the word COMPARE and the current 2000 impedance range (LO = LOW; M1 = MED1; M2 = MED2; HI = HIGH).

Figure 2-16. Compare Mode Display.

If the foot switch is pressed and held down while holding down the COMPARE button and then the COMPARE button is released, the comparison will not start until the foot switch is released. This facilitates "hands-free" operation.

There are two settings for the Compare mode: STOP and ALL. These settings control what happens when a different pin is detected.

STOP Mode: the Compare mode setting of STOP compares the pins of the components and stops when a difference is found or the last pin has been compared. While stopped at a pin that is different, the DSI 700 goes into ALT mode and the channel A, channel B and ALT buttons are active. Also the display shows which pin was different and the DEV number for that pin (see the following figure).

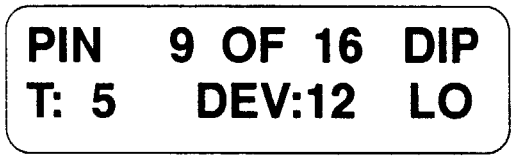


Figure 2-17. Compare Stop Display.

Pressing the COMPARE button again (or the foot switch if one is in use) continues the comparison process after stopping at a different pin.

Another variable is the Compare Cycle setting. A CYCLE setting of ONE causes the pins of the components to be scanned once. A CYCLE setting of LOOP causes the pins of the components to be scanned continuously which is useful for finding intermittent failures. If CYCLE = ONE, after the last pin of the component has been compared, the Recall mode display appears if differences were found.

ALL Mode: the Compare mode setting of ALL scans and compares all of the pins of the component without stopping. The effective Compare CYCLE setting is always ONE which causes the pins of the component to be scanned once (a CYCLE setting of LOOP is ignored with the ALL setting). After the last pin of the component has been compared, the Recall mode display appears if differences are found.

The Recall mode display allows the user to review the signatures of all different pins one at a time. The display shows the current pin, the sequence number, the number of different pins, the package type, the DEV number and the IDX number.

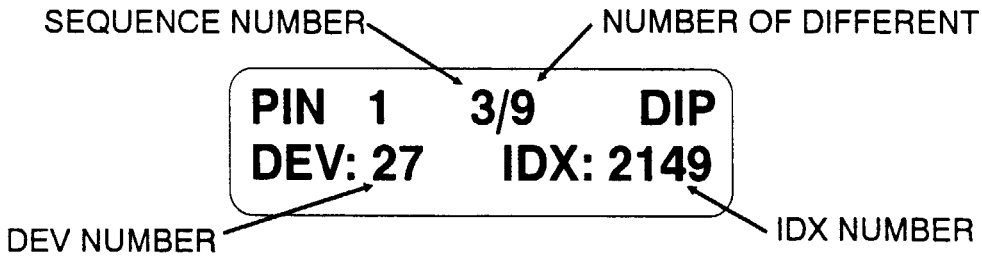


Figure 2-18. Recall Mode Display.

When the Recall mode display appears after a compare, the sequence number is set to 1. This indicates that the displayed pin number has the most different signatures (the highest IDX number). The DSI 700 uses the IDX number to sort and display the different pins. Pressing ↑ increments the sequence number and displays the next most different pin.

When the sequence number equals the number of different pins, the least different pin is displayed. Pressing ↑ again will cause the sequence number to wrap around to 1 and again display the most different pin. So the different pins can be viewed by pressing the ↑ and ↓ buttons. The foot switch has the same function as the ↑ button in this mode. The Recall mode starts in the ALT mode for each pin that is different. Pressing the channel A and B buttons lock on the respective channel. Pressing the ALT button alternates between channel A and channel B at a speed set by the 2000 RATE control. Pressing the MENU button will exit the Recall mode and return to the Main display.

2-18. Menu Mode

The Menu features of the DSI 700 control various operational aspects of the COMPARE feature mentioned earlier in this chapter. They are accessed by pressing the MENU button. To exit from a menu, press the MENU button and you will return to the previous display. Each menu has a name on the top line and two options on the bottom line. Select menu options by pressing the button under the desired option.

Pressing the MENU button at the Main display activates the Compare menu. The Compare menu options are: MODE (Compare mode) and CYCLE (Compare cycles). Press the button under the desired option to select it. Press the MENU button to return to the previous display.

Figure 2-19. Compare Menu Display.

The COMPARE MODE selection display options are: ALL (compare all of the pins without stopping) and STOP (stop the automatic comparison at every difference). Press the button under the desired option to select it. Press the MENU button to return to the previous display. ALL is the power up default.

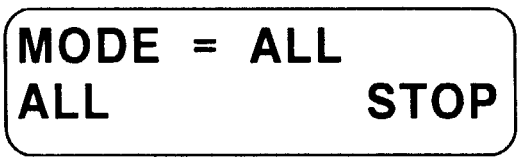


Figure 2-20. Compare Mode Selection Display.

The COMPARE CYCLE selection display options are: ONE and LOOP. ONE scans through the component pins only once and then goes into Recall mode if there are differences. LOOP scans through the pins until a difference is found (this can be used to find intermittent failures). The LOOP setting is ignored when COMPARE MODE = ALL. Press the button under the desired option to select it. Press the MENU button to return to the previous display. ONE is the power up default.

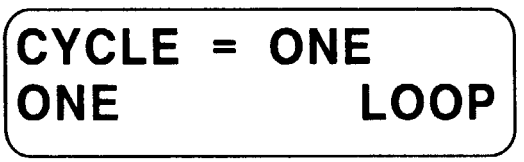


Figure 2-21. Compare Cycle Selection Display.

2-19. Error Messages

When an error occurs, pressing the MENU button will exit from the error display.

The NUMBER OF PINS INCORRECT error is displayed when the number of pins entered in the Component Size entry display does not match the selected package type or when a number of pins greater than 64 is entered.

The NUMBER>SIZE error is displayed when the pin number entered exceeds the number of pins (SIZE).

The TRACKER FREQ TOO HIGH error is displayed when the test signal frequency is above the 50/60 Hz needed for the Compare mode.

The TRACKER SIGNAL OUT OF SPEC error is displayed when the voltage on the inputs is not a proper 2000 range and Compare mode is selected.

The TRACKER SIGNAL NOT PRESENT error is displayed when the 2000 is not connected to the DSI 700 and Compare mode is selected.

The AUTO ERROR SELECT ONE RANGE error is displayed when the 2000 is in AUTO and Compare mode is selected or Scan mode is selected with ALT already active.

The RANGE CHANGED INVALID COMPARE error is displayed when the user changes the 2000 range during Compare mode.

The FREQ CHANGED INVALID COMPARE error is displayed when the user changes the 2000 frequency during Compare mode.

2-20. LOCAL MODE TUTORIAL — COMPARING INTEGRATED CIRCUITS

This tutorial provides you with an example of how to use the DSI 700 in a typical testing situation. This example will show you how to setup for comparison testing and highlight some of the many features of the DSI 700.

This example shows you how to use the DSI 700 with IC DIP clip cables to compare integrated circuits in dual in-line packages (DIP) and other components that can be connected to using DIP clip cables. This example is described from the power up condition. To use this example after trying other features, turn the 2000 off, then turn it back on.

You'll need the following:

— Two black clip leads

— Two 20 pin DIP clip cables

— Two 16 pin DIP clips

— Two of your boards to compare

Setup Procedures: refer to the following illustration for the proper connections.

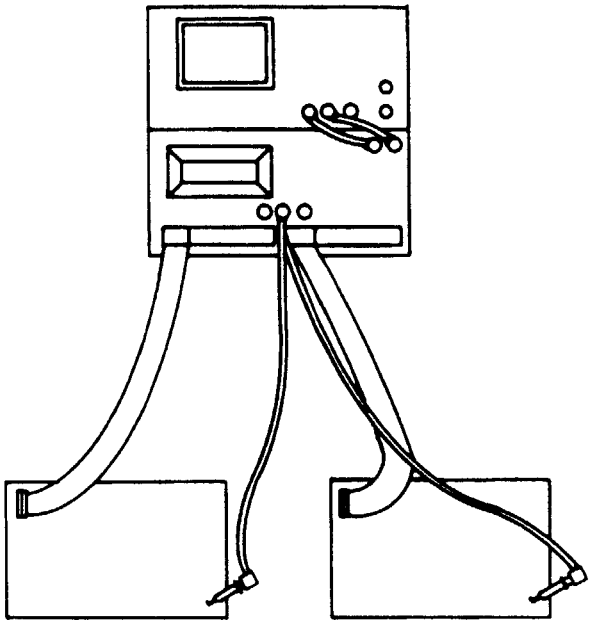


Figure 2-22. DSI 700 Setup for using DIP Clips.

First the 2000's output signal has to be routed to the DSI 700's input. Plug the two short dual banana plug leads between the 2000 channel A and COM jacks to the DSI 700's TRACKER red and black jacks respectively.

Plug a DIP clip cable (20 pin for this example) into the channel A IDC socket. Put a DIP clip (16 pin for this example) on the other end of the cable. Clip the DIP clip onto a known-good 14 pin DIP component. Plug the other 20 pin DIP clip cable into the channel B IDC socket. Put a 16 pin DIP clip on the other end of the cable. Clip the second DIP clip on the suspect component.

Connect each black clip lead to the DSI 700's COM jack. Then connect the clip leads to a common point (such as ground) on the known-good board and the suspect one.

NOTE

It is very important that you choose the same point on each board to ensure that the comparison will be valid between identical boards.

All necessary connections are now completed so we can proceed to the next part of this example.

— Push a range button (i.e. LOW, MED1, MED2 or HIGH) on the 2000 that is appropriate for the component you wish to examine. For this example, push the MED1 range button on the 2000.

NOTE

For more information on how to select ranges for components refer to the Tracker 2000 Operation and Maintenance Manual.

NOTE

To compare CMOS ICs, connect one of the 10kΩ resistor jumpers across the power supply of each of the two components being compared. This helps stabilize the signatures of CMOS ICs.

The DSI 700 allows the entry of the component size (the number of pins on the component) and the package type such as DIP, SIP, F&B, and FRT (the sequence in which the pins are scanned-for complete details refer to Section 2-13: Component Size in this manual). For this example, we will use a 14 pin DIP.

To select the number of pins (14 for this example) and package type (DIP for use with DIP clip cables):

— Press the SIZE button.

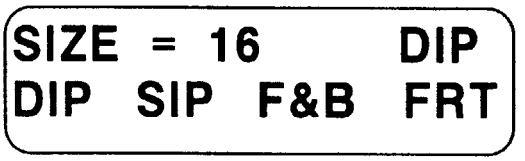


Figure 2-23. Component Size Entry Display (default).

— Press the 1 button followed by the 4 button. You can also set 14 by using the ↑ and ↓ buttons.

— Select the package type by pressing the button under one of the package types on the menu. For this example, press the button under DIP (SIZE).

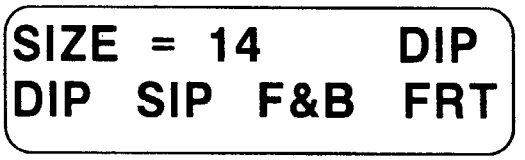


Figure 2-24. Component Size Entry Display (14 pin DIP).

— Press the MENU button to return to the Main display.

The DSI 700 Compare mode works by digitizing the signatures of both the known-good (reference) component and the suspect one and then performing a point by point comparison. During the point by point comparison, the DSI 700 factors in the tolerance value to determine whether the two components are equivalent or different.

NOTE

The tolerance is not a percentage of the reference but an actual number that is added to and subtracted from each point of the reference signature to create an equivalence window around it. The signature of the suspect component is compared to this window.

IMPORTANT NOTE

Signatures of good components will often vary. A majority of this is due to differences in manufacturing process between different manufacturers as well as the same manufacturer for identical (i.e. part number) components. Tolerance is necessary to account for these differences between good components and allow these to compare equivalent while still being able to find truly defective components with differences caused by physical failures.

On power up, the default tolerance is 5. This value is a useful starting value that may be adequate for much of your testing. The TOL button allows you to change tolerance from 0 to 99.

To start the comparison of the components:

— Press the COMPARE button.

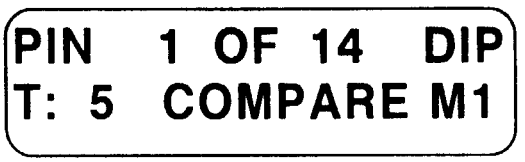


Figure 2-25. Compare Mode Display.

The DSI 700 will compare the signatures of each pin of the two components. After all of the pins have been compared, the Recall mode display appears if signature differences are found.

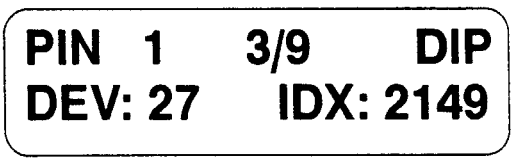


Figure 2-26. Recall Mode Display.

The Recall mode display shows the amount of difference for each of the *different* pins. The pins are displayed in order based on the IDX (index) number. The pin with the highest IDX number (sequence number = 1) is shown first followed by each pin down to the one with the smallest IDX number (sequence number = 9 for the above example in Figure 2-26). Press the ↑ button or the foot switch to change to the next less *different* pin. The ↓ button will change to the next most *different* pin. The sample display in Figure 2-26 shows there were nine different pins and pin 1 is the third most different pin based on an IDX value of 2149. Also since DEV = 27, increasing the tolerance from 5 to 32 would make pin 1 compare equivalent.

When done reviewing the differences, press the MENU button. The DSI 700 will return to the Main display.

2-21. EXTERNAL CLEANING AND LUBRICATION

WARNING

To avoid electric shock or instrument damage, never get water inside the case. To avoid instrument damage, never apply solvents to the instrument.

Should the DSI 700 case require cleaning, wipe the instrument with a cloth that is lightly dampened with water or a mild detergent solution. The DSI 700 requires no lubrication.

2-22. STORAGE INSTRUCTIONS

For optimum protection, store the unit indoors in a dry place.

2-23. SERVICE INFORMATION

The conditions of the DSI 700 Warranty are given at the front of this manual. Malfunctions that occur within the limits of the warranty will be corrected at no cost to the purchaser exclusive of one-way shipping costs to Huntron Instruments, Inc. Huntron service is also available for repair of instruments that are beyond the warranty period. In either case, please describe clearly the problems encountered with the instrument.

For in-warranty or out of warranty service in the United States, call (800) 426-9265 and request an RMA number and shipping instructions prior to shipment. This number must be clearly displayed on the exterior of the shipping carton. Only parcels displaying an RMA number will be accepted. For service outside the United States, contact your local Huntron distributor for information.

CHAPTER 3
SOFTWARE INSTALLATION

3-1. INTRODUCTION

This chapter tells you how to install the DSI 700 software onto your computer. Also covered are software conventions used throughout the rest of this manual, the README file and computer requirements for using the DSI 700 system.

3-2. CONVENTIONS USED IN THIS MANUAL

The following conventions are used throughout this manual to make it easier to understand.

Special keys which you should press will be bold, such as: press **Alt, Esc, F1.**

Many operations require the use of two keys to activate which will be indicated by bold and a plus sign between them. For example, **Alt+M** means to press and hold down the **Alt** key, then press the letter **M** key once and release the keys.

The " ↵ **Enter** " key at the right of your keyboard is also called the " ↵ **Return**" key on some computers. When"↵" is shown, press the Enter key.

For a series of nonspecific keystrokes, type in as directed, such as: Enter your instructions for the first component.

If specific text has to be entered, it will be bold and within quotes in this manual, such as: type **"DEMO BOARD"**. After the text has been typed in, press "↵".

3-3. THE README FILE

Before your software is installed, print out the README.DOC file on the DSI 700 software disk. This file contains the latest updates on the DSI 700 troubleshooting system, such as any operational tips or changes in the system operation that may have occurred since the printing of this manual.

A simple way to do this is:

1. Make sure your printer is turned on, connected to your computer, and the ON LINE or READY light is lit.
2. Insert the disk in drive A: and type in,

"A:TYPE README.DOC>PRN" or **"PRINT A:\README.DOC"**.

3-4. COMPUTER REQUIREMENTS

The following requirements are provided to assist you in purchasing the correct computer system to use with a DSI 700 or to determine if the system you already have will work.

MINIMUM

With a computer system meeting only the minimum requirements, you will be able to use the DSI 700 and all of its functions. However, you may find that certain functions are slow.

- IBM PC/XT or 100% compatible
- MS-DOS/PC-DOS 3.3 or later
- 640K RAM
- One 3.5" or 5.25" high density floppy disk drive
- Hard disk
- EGA video board
- EGA color monitor
- Parallel printer port
- Printer

RECOMMENDED

Using this configuration, the system will run faster resulting in better performance.

- IBM compatible 386 or 486
- MS-DOS/PC-DOS 5.0 or later
- 2 MB RAM
- 3.5" and 5.25" high density floppy disk drives
- Hard disk (100 MB or larger)
- VGA video board
- VGA color monitor
- 2 parallel printer ports (one for your printer and one for the DSI 700)
- Printer

ENHANCING AN EXISTING COMPUTER SYSTEM

Here are some upgrade suggestions that will help your system run faster and reduce test times.

- Install a math coprocessor in the computer to increase the display speed.
- Keep board directories close to the root directory (one level below) to shorten the file access time. Use DRIVE or Start-up path in SETUP to set the path for the board directories.
- Use a hard disk with a faster average seek time to increase the file access speed.
- Leave 512K of LIM expanded memory available for the DSI 700 software to use.
- If 512K of LIM memory is not available, leave 512K of XMS extended memory for the DSI 700 software to use.
- Remaining extended or expanded memory can be used to create a hard disk cache. This will speed up access to the hard disk.

3-5. INSTALLING THE SOFTWARE

NOTE

Before proceeding with software installation, make a backup copy of the disk supplied with the DSI 700. Keep your original DSI 700 disk in a safe place for storage and use your backup copy for installation. If you need further details on how to make backup copies, refer to the "DISKCOPY" command in your computer's DOS manual.

Insert the backup copy of the DSI 700 software disk into floppy disk drive A or B of your computer. Log onto that disk drive by typing either "**A:**" or "**B:**" and pressing ↵. Then type "**INSTALL**", press ↵ and follow the instructions as directed by the installation program.

NOTES:

CHAPTER 4
SOFTWARE OVERVIEW

4-1. INTRODUCTION

The DSI 700 software has a menu driven user interface and is divided into three parts: TREE, LEARN/TEST, and UTILITIES.

4-2. MAIN MENU

The Main menu is the hub of this troubleshooting tool. To select a function, either press the highlighted letter of the desired function or use the ↑ ↓ or ← → arrow keys to move to the desired function and then press the ↵ key to activate.

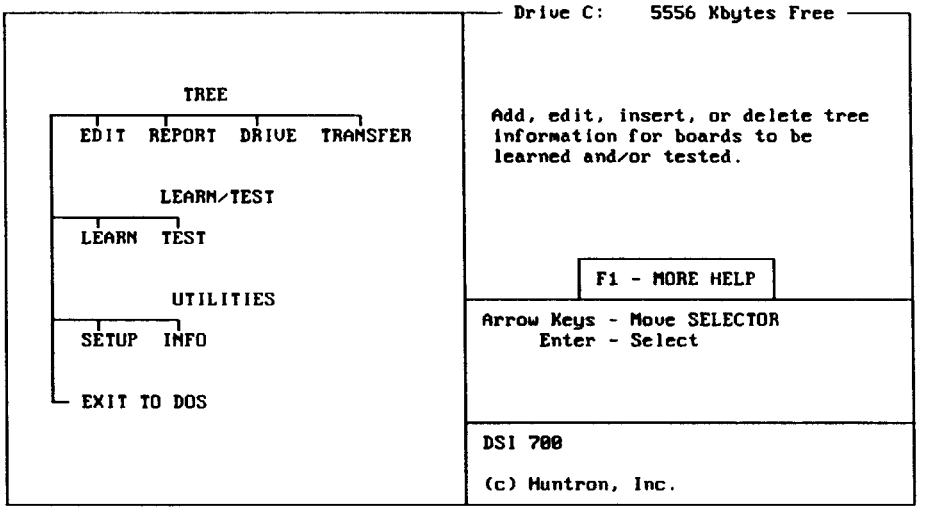


Figure 4-1. Main Menu.

4-3. DEVELOPING A DATABASE

Before a test can be performed, information about the board is needed by the DSI 700 software. There are several ways of describing the board to the DSI 700 that will help make it easier to maintain the test data and keep the test results organized to simplify troubleshooting.

One way of developing a database is to divide the system to be tested into logical levels. The DSI 700 software allows up to five levels of division. This scheme can be modeled after a tree type structure starting from the highest level at the overall system (tree trunk) downwards to units (limbs), boards (branches), sections (twigs), and finally to the lowest level with components (leaves).

A simple description of these levels is given below.

System Name — A descriptive name for the system, such as Personal Computer.

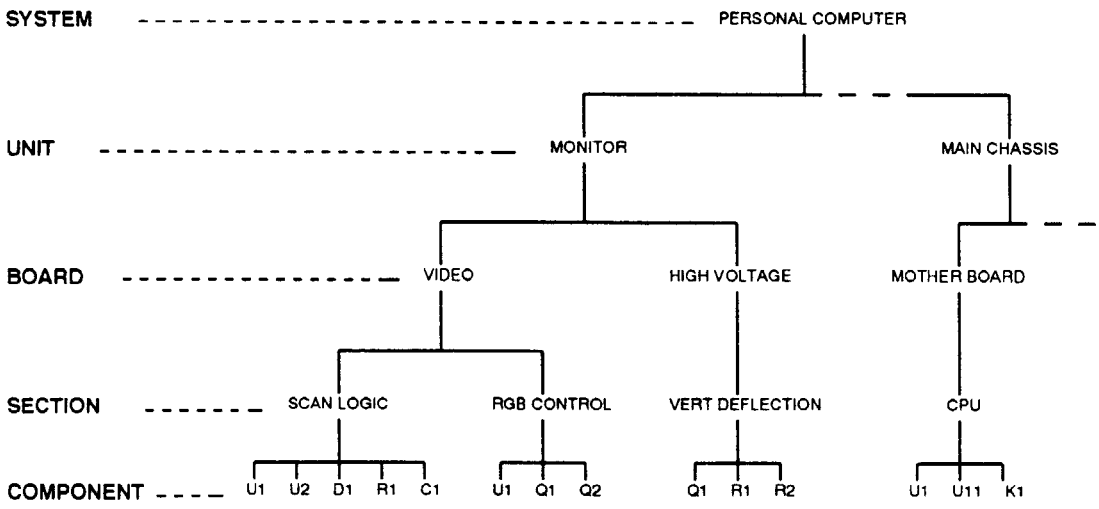
Unit Name — A descriptive name for each unit in the system, such as Monitor. A unit consists of one or more boards.

Board Name — A descriptive name for each board in the unit, such as Video. A board consists of one or more sections.

Section Name — A descriptive name for each section on the board, such as Scan Logic. A section consists of one or more components.

Component Name — A descriptive name for each component in the section, such as U1 for an integrated circuit (IC).

An example of a system tree divided by function for a typical board consists of the following:



Another way of developing a database is to divide the board into sections by physical location of components (i.e. all components on upper right corner), or by same package types (i.e., all 16 pin DIPs). If the board is not very complicated, or doesn't have a large number of components, the entire board may be entered as a single section.

Table 4-1 lists the maximum database capacity for the DSI 700 software.

Table 4-1. DSI 700 Database Capacity.

Number of Systems	= Number of Boards
Number of Units	= Number of Boards
Number of Boards	44 per path
Number of Sections	22 per board
Number of Components	330 per section

NOTE

The maximum number of Systems, Units, Boards, Sections, and Components that the DSI 700 software can handle is specified in Table 4-1 above. However, the actual capacity that your own DSI 700 system will handle will depend upon the hard disk storage capacity of your computer and may be less than Table 4-1.

4-4. TREE MENU

The TREE menu consists of four modes: EDIT, REPORT, DRIVE, and TRANSFER.

In EDIT, you can create a complete database for each board to be tested and make any changes to its database , if needed.

In REPORT, you can print a listing of the full database for any board that has been entered in the EDIT mode.

In DRIVE, you can select where the system tree and its signature database are accessed in your computer.

In TRANSFER, you can BACKUP or RESTORE the complete database for any board. You can also CONVERT a Tracker 5100DS/Prober RP388 board into the format required for use with the DSI 700.

EDIT MODE

In the EDIT mode, you will use the selection screen to choose a board for testing.

This screen utilizes pop-up windows or boxes for data entry and allows you to type in the same place on the screen for each entry in EDIT, leaving more of the screen available for display of the system and its levels and other vital information.

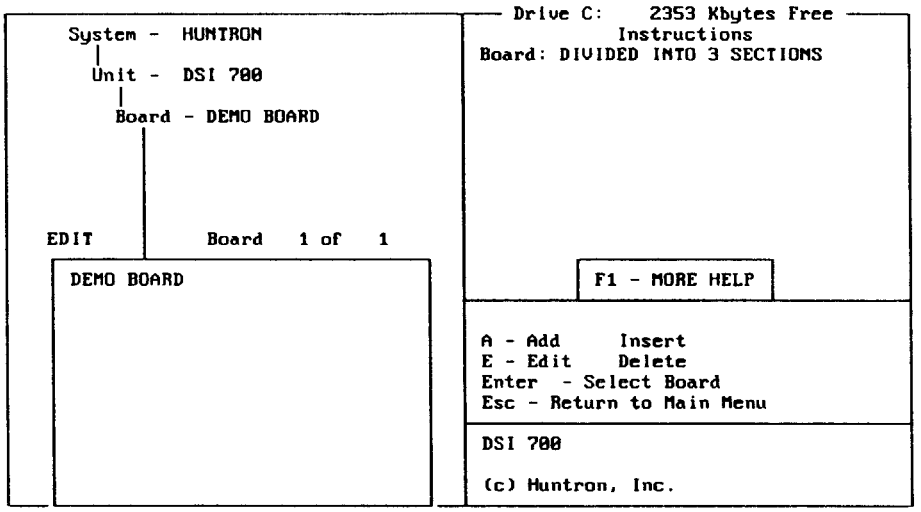


Figure 4-2. Board Selection Screen in EDIT Mode.

Initially, the screen displays the existing board information. Move the cursor to select the board on which you want to work, then press one of the following keys:

Table 4-2. Active Keys at the Board Edit Selection Screen.

KEY	FUNCTION	KEY	FUNCTION
A	Add a board.	Home	Go to first item.
E	Edit a board.	End	Go to last item.
Ins	Insert a board	Enter ↵	Select item.
Del	Delete a board.	Esc	Return to Main menu.
PgUp	Move to previous page.	PgDn	Move to next page.

Pressing the A(dd), E(dit), or I(nsert) key will activate one of the following pop-up windows on the Selection Screen.

The **BOARD ENTRY POP-UP WINDOW**, where you will enter system, unit, and board names, and specific test instructions or notes.

The **SECTION ENTRY POP-UP WINDOW**, where you will enter section names, and instructions or notes.

The **COMPONENT ENTRY POP-UP WINDOW**, where you will enter component name, component type, number of pins, common pin number(s), tolerance, package type, learn ranges, test ranges, special instructions or notes, select Filter on or off, select a Delay value, and select which DSI 700 channel to use.

EXITING EDIT MODE

After defining the board in EDIT, you will be ready for the next step which is to digitize and store component test signatures from known good boards. This is done in the LEARN/TEST menu so you must first return to the Main menu. Press **Alt+M** once or **Esc** a few times to get back to the Main menu.

REPORT MODE

In the REPORT mode, you can print out a report on any board, down to the component level including all special instructions and notes that you entered. REPORT also can print out a listing of component pin information if it has been created. These listings can be helpful in planning how to perform an effective board test that will lead to identifying defective components. Use the board tree report to check that a board's component information has been correctly entered.

DRIVE MODE

DRIVE mode allows you to select where the tree and data files are stored in your computer. This mode provides a means of better organizing your test database within your computer. For more details on DRIVE, refer to Chapter 6 of this manual.

TRANSFER MODE

This mode allows you to BACKUP or RESTORE a board to and from another disk drive or path. BACKUP and RESTORE transfer an entire board to a selected floppy or hard disk drive for archiving purposes. You can also CONVERT a Tracker 5100DS/Prober RP388 board into a DSI 700 board (the opposite is not allowed). For more information on TRANSFER, refer to Chapter 6 of this manual.

4-5. LEARN/TEST MENU

The LEARN/TEST menu consists of two modes: LEARN and TEST.

LEARN MODE

In the LEARN mode, the DSI 700 digitizes and stores "LEARN" signatures for each of the components defined in the EDIT mode for a board. Signatures are stored and used for later reference. Do this with known-good boards or components.

You will encounter five screens in the LEARN mode. These screens are described briefly as follows:

The **BOARD SELECTION SCREEN**. Board names will appear on the screen. Select the board for which you want to store data. The SYSTEM and UNIT names associated with the selected board will appear along with the rest of the tree information.

The **SECTION SELECTION SCREEN**. Displays all the sections of the selected board. Select the section you want to access.

The **COMPONENT SELECTION SCREEN**. Displays all the components of the selected section. Get LEARN signature data, and after the LEARN operation is complete, you can view the signatures, save them, relearn, or move on to another component . You can also display previously learned component signatures at this screen.

The **LEARN SIGNATURES SCREEN**. Shows signatures of up to eight pins of the selected component at a time.

The **ZOOM SCREEN** is a feature of the **LEARN SIGNATURES SCREEN**. It displays the learn signature for any pin at 250% of normal size for detailed analysis.

TEST MODE

In the TEST mode, you test any identically configured components against previously stored "LEARN" signature data and can optionally view these signatures on your computer's monitor.

You will encounter five screens in the TEST mode.

The **BOARD SELECTION SCREEN**. Board names will appear on the screen. Select the board which you want to test. The SYSTEM and UNIT names associated with the selected board will appear along with the rest of the tree information.

The **SECTION SELECTION SCREEN**. Displays all the sections of the selected board. Select the one against which you want to compare.

The **COMPONENT SELECTION SCREEN**. Displays all the components of the selected section. Start the comparison test by pressing ↵ after attaching clips to component. After the TEST operation is complete, you can view the signatures, remove a component that was DIFFERENT from the Troublesheet, retest, or continue on to another component.

The **TEST SIGNATURES SCREEN**. Shows signatures of up to eight pins of the selected component at a time. The stored, or reference signatures and the test signatures are superimposed for ease in determining differences.

The **ZOOM SCREEN** is a feature of the **TEST SIGNATURES SCREEN**. It displays the learn and test signatures for any pin at 250% of normal size for detailed analysis.

4-6. UTILITIES MENU

The UTILITIES menu consists of two modes: SETUP and INFO.

SETUP MODE

The SETUP mode allows you to select the visual aspects and other operational defaults of the software. The colors and style of the LEARN and TEST signatures can be set in this mode. The signature box and graticule displayed in the LEARN or TEST signatures screen can be turned on or off. The operational defaults include signature display order and setting the allowable tolerance if you choose to merge several LEARN signatures. Also, the default drive/path for the signature database files and your printer type is specified here.

INFO MODE

The INFO mode gives specific information about your computer. It provides a detailed internal description including computer type, DOS version, memory size, and number of disk drives. INFO may be helpful in troubleshooting any installation and operational problems between your computer and the DSI 700. The address and phone numbers for Huntron Instruments, Inc. are also displayed.

Refer to Chapter 6 in this manual for more information about the above features.

4-7. MENU SHORT CUTS

After you become accustomed to the operation of the DSI 700, there are a number of convenient short cuts:

KEY(S)	DESCRIPTION
Alt+F1	Displays the Alt key help screen.
Alt+B	In EDIT, increments name of the current item and adds a new item with that new name and with the data of the current item. The Build routine takes the current board, section, or component and looks at the name. If there is a number at the end of the name, it will be incremented by 1 and this entry will be saved as the next entry WITHOUT displaying the entry screen (also see **Alt+R**). Build is not allowed if the name that would be created already exists.
Alt+C	At the section level, this feature allows you to make global changes on all the components in the section. The LEARN ranges, TEST ranges, Test Tolerance, Filter settings and Delay values can be changed. All Common Pins can be set to zero. If the component data changes make the learned signature data invalid, signatures will be deleted. You can also delete all signatures without making any component data changes which sets the number of learns back to zero.
Alt+E	The EDIT mode can be accessed from LEARN or TEST modes without returning to the Main Menu.
Alt+G	When viewing signatures, toggles the graticule ON and OFF.
Alt+I	Initializes the data for the current troublesheet. All components are set to untested.
Alt+L	The LEARN mode can be accessed from EDIT or TEST without returning to the Main menu.

KEY(S)	DESCRIPTION
Alt+M	The Main menu can be accessed from the board, section, or component screens.
Alt+N	Displays Section Disk Space pop-up window.
Alt+O	Performs an alphanumeric sort of component names in a section.
Alt+Q	Quick change the test ranges and tolerance for the next test of the current component.
Alt+R	In EDIT, creates a new item with the data of the current item. The Repeat routine takes the current board, section, or component and makes a new entry by copying the previous information except for the item name which is cleared. The entry screen then displays all of the data from the last entry and the new item name can then be entered by the user (also see **Alt+B**).
Alt+S	When viewing signatures, toggles the signature style between DOT and LINE display modes.
Alt+T	The TEST mode can be accessed from EDIT or LEARN modes without returning to the Main menu.
Alt+#	When viewing signatures, allows random access zoom on any of the eight signature positions.
End	Moves the screen selector to the last item of the board, section, or component selection screens.
Home	Moves the screen selector to the first item of the board, section, or component selection screens.
Page Up	Moves the screen selector to the previous page of board, section, or component selection screens.
Page Down	Moves the screen selector to the next page of board, section, or component selection screens.

NOTE

Refer to Chapters 5 and 6 and Appendix C in this manual for information on how to use these features.

In Chapter 5, a DSI 700 tutorial will guide you through system operation for testing a board. It may be used as a keystroke reference if you use the DSI 700 to test your own board now, or as an in-depth training session to learn more about this easy to operate and powerful troubleshooting system before using it.

CHAPTER 5
SOFTWARE TUTORIAL

5-1. INTRODUCTION

In this section, you will use the Huntron Demo Board and the DSI 700 software to familiarize yourself with the capabilities of this powerful troubleshooting system. With the DSI 700, you will create a test routine and database in EDIT mode, record the signatures of each component on a good board in LEARN mode and do signature analysis by comparison in TEST mode. This demo board is specially designed to show a variety of components you can test, and give you practice entering a database and interpreting test results. In addition, you can simulate failed conditions, so that component signatures will differ when you perform comparison testing. Remove your demo board from its protective wrapping and orient it to match the following illustration.

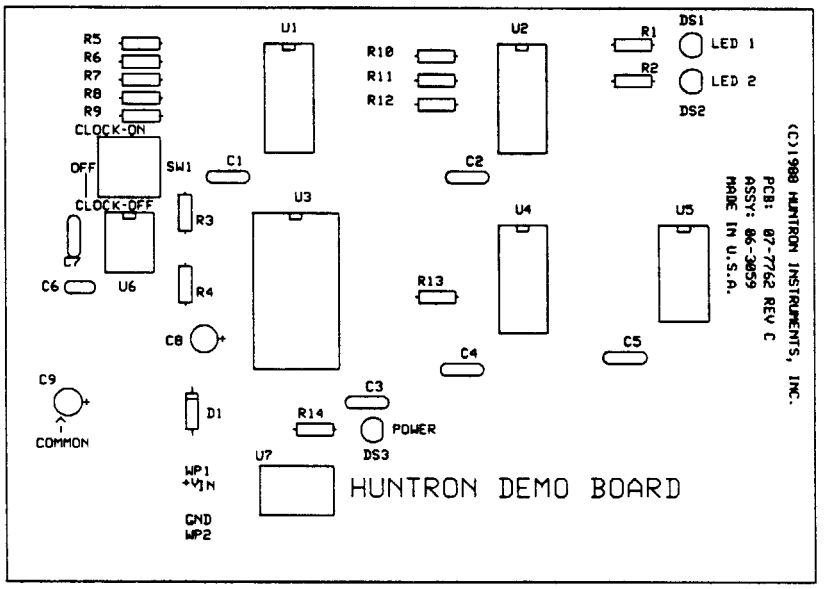


Figure 5-1. Huntron Demo Board.

There is a wide variety of components on the demo board which include linear (U6, U7) and digital (U1, U2, U3, U4, U5) integrated circuits (ICs), capacitors (C1 - C9), resistors (R1 - R14), diodes (D1, DS1-DS3), and a switch (SW1).

5-2. GETTING THE DSI 700 SOFTWARE STARTED

Turn on your computer and wait until your computer boots up. At your computer's DOS prompt (typically "C:>"), type "**DSI** ↵ "to start the program.

NOTE

At this point you may see the "Software Activation" screen depending on where you purchased your DSI 700. You can press Esc to continue on and use the DSI 700 software in DEMO mode which has limited capabilities (although it does allow you to fully complete this tutorial). However, to fully activate your DSI 700 software, call Huntron at 1-800-426-9265 to receive your activation code. Please have your serial number ready when you call.

The HUNTRON logo screen will appear as shown in the following figure.

Figure 5-2. HUNTRON Logo Screen.

NOTE

If you cannot see the HUNTRON logo on your computer monitor, your computer may not meet the minimum requirements to work with the DSI 700. Recheck the computer requirements in Chapter 3 of this manual. If you still have difficulties contact Huntron Technical Support for assistance.

Press any key to see the Main menu screen as shown in the next figure.

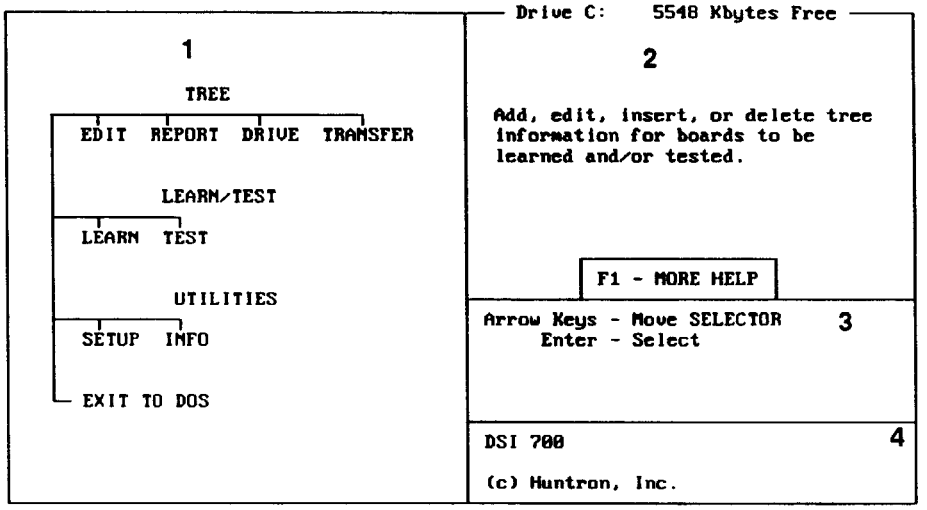


Figure 5-3. Main Menu Screen.

The Main menu screen is divided into four different areas. Area 1 is the menu selection box which displays the different modes to choose from. Area 2 is the on-line help box which provides information about the current mode selected from the Main menu. Detailed information for most selections is displayed in this area when the **F1** key is pressed. Area 3 is the active key selection box that displays specific keys which are used to select or access various modes. Area 4 shows the current version number of the DSI 700 software. From the Main menu, you can press specific keys and do the following:

- ← → ↑ ↓ keys highlight different items (this is called the SELECTOR).
- ↵ selects and accesses the highlighted item.
- **F1** gives detailed help on a highlighted item.
- A single highlighted letter from each item gives quick access of that mode.

Move the selector around the menu. ↑ ↓ arrows move up and down the menu, and ← → arrows move sideways. You can also use the arrows in your number keypad if the NUM LOCK is turned off. If you inadvertently access a mode, pressing **Esc** will return you to the Main menu.

NOTE

Press the F1 key for HELP if you need additional information about a specific mode or function that has been highlighted. Detailed information will appear in the right window of the screen. Press Esc to clear the HELP window and return to the previous screen.

5-3. DEFINING A SYSTEM

All boards must be broken down into sections and components for entry into the DSI 700 database. For this tutorial, the demo board will be divided into three functional sections and the information will be used later for testing. For a complete board test, you may wish to enter a board that includes all the components on the demo board. For now, all components will not be entered to keep this exercise to a reasonable length.

The following figure shows the diagram of the system that you will be entering into your database.

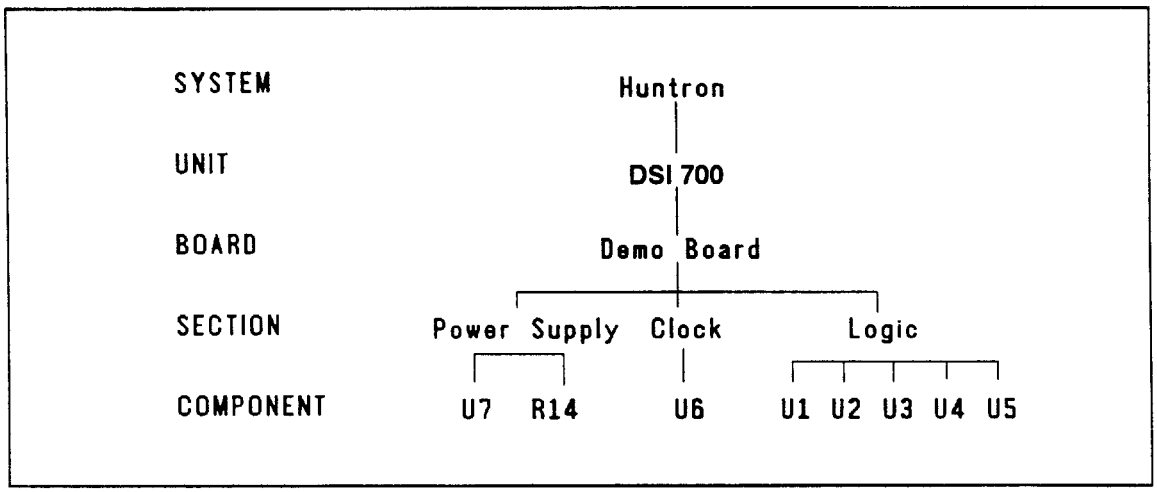


Figure 5-4. System Diagram for DSI 700 Tutorial.

5-4. ENTERING THE BOARD INFORMATION

You will now create a database for the demo board. EDIT starts with the EDIT board screen. Press **E** to activate the EDIT function and refer to the following figure.

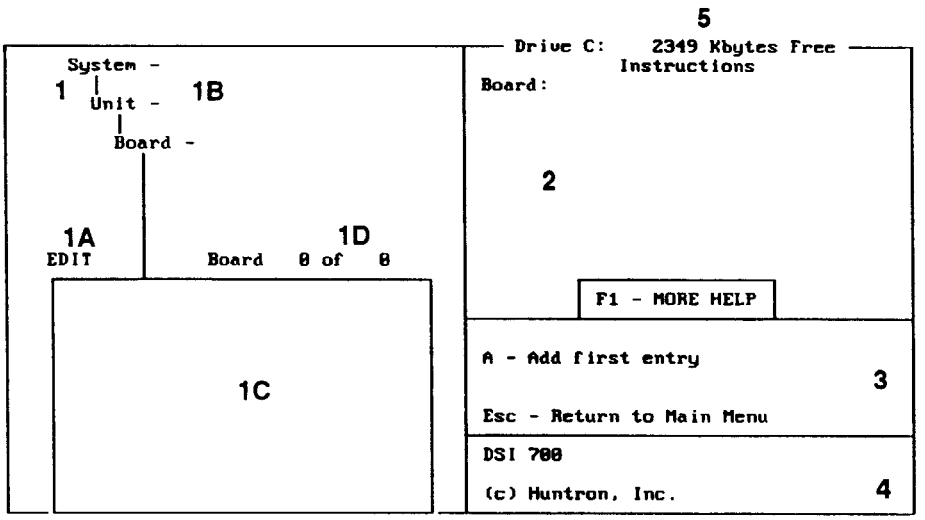


Figure 5-5. EDIT Board Screen.

The EDIT board screen is made up of five areas.

Area 1 on the left half of the screen is the database information box. **Area 1A** is the mode indicator and always tells you what mode is currently active. In this case, EDIT is displayed since this is the mode that was activated. **Area 1B** displays the associated tree type diagram for the system and unit of the board that is currently selected. **Area 1C** is the board window box which lists boards stored in the current drive/path. At this point no boards are displayed. **Area 1D** is the board counter indicator. It gives the total number of boards for the current drive/path. There are no boards yet so this counter shows zero.

Area 2 is the board instructions box and displays any user entered text for the selected board. Again, there is no text in this box now since this is the first time in this mode.

Area 3 is the active key box and displays which features are active in this mode. Only **A** (Add) and **Esc** are displayed now since this is the first time, however if there were previous entries, then other features would be available.

Area 4 is the program copyright and version box. In this manual, the version number is absent to avoid any confusion between any versions of the program that this manual covers. Look at your computer monitor to see the current program version.

Area 5 shows the disk drive that is currently selected and the remaining amount of free space left on it.

To enter your first board, press A for Add. A pop-up window will appear and ask for the following information:

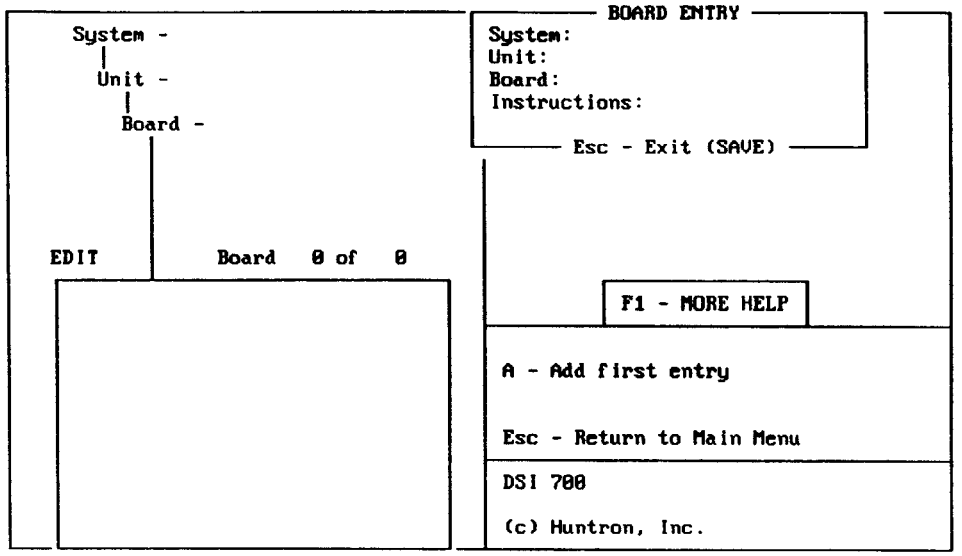


Figure 5-6. Board Entry Pop-up Window.

Each board must be given a name. The program uses it for keeping track of signature information. Each name can be made up of any combination of alphanumeric characters (alphabetic and numerical symbols) up to 14 characters in length. The program is case insensitive, that is, a name like "BOARD1" is the same as "Board1" or "board1". Names for System and Unit are optional but the program requires an entry for Board name.

In this tutorial, we will call this the HUNTRON system, the DSI 700 unit, and the DEMO BOARD. Enter the following:

For System, type **"HUNTRON"**↵ (14 characters maximum).
For Unit, type **"DSI 700"** ↵ (14 characters maximum).
For Board, type **"DEMO BOARD"** ↵ (14 characters maximum).

Instructions are used to provide specific details about the board, such as a part number, serial number, revision level, or a description (30 characters maximum). For Instructions, type **"DIVIDED INTO 3 SECTIONS"**. Press Esc to return to the EDIT board screen. Refer to the next figure for this discussion.

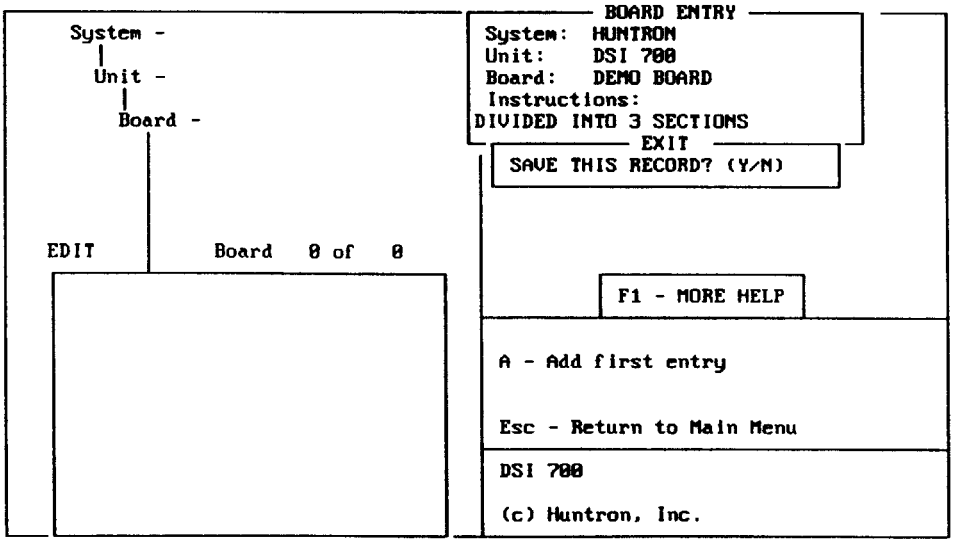


Figure 5-7. Demo Board EDIT Board Screen.

The save prompt appears: "SAVE THIS RECORD? (Y/N)". Press **Y** to save. Pressing **N** would have discarded the information you just typed.

IMPORTANT NOTE

Although you can define your board as a single section (each section can have a maximum of 330 components), dividing your board into sections (each board can have a maximum of 22 sections) has advantages such as more effective testing and troubleshooting. How you define board sections may depend upon the experience you have with the board under test.

Generally, you can partition your boards by following one of these procedures:

- By failure category based on a prior test history of the board, starting with most likely component to fail. This can be the fastest method if you already know what fails repetitively.
- By logical section (memory, input/output, etc.). This can be the fastest method if you have an idea of what is wrong.
- By component size especially if you're not familiar with the board or lack documentation on it. This procedure minimizes the number of times you need to change between different DIP clips during testing.

5-5. ENTERING THE SECTION INFORMATION

To enter section information, with the selector at DEMO BOARD, press ↵. Notice that the board window changes to section and the board counter changes to section. At this point there are no sections listed.

Press **A** (Add) to add a new section. A section entry pop-up window will appear and ask for the following:

For this tutorial, the demo board has been divided into three sections by function, i.e. power supply, clock, and logic.

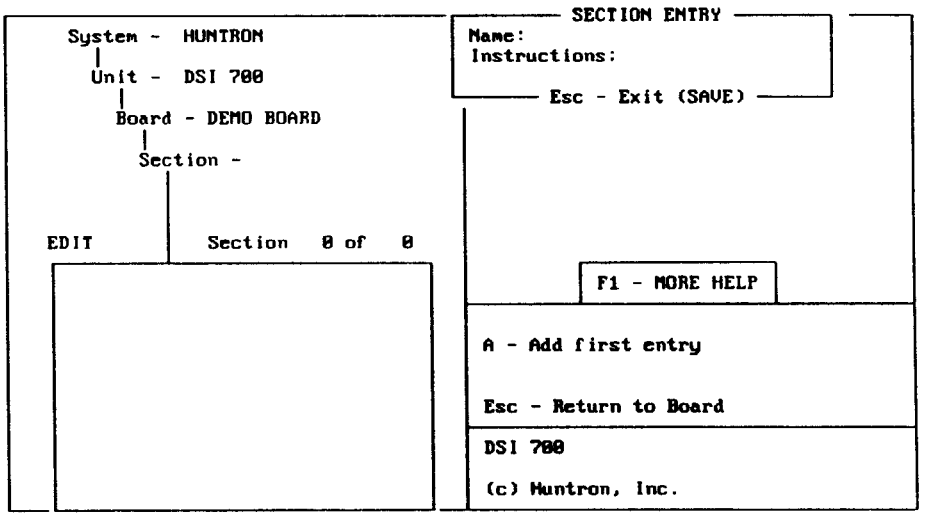


Figure 5-8. First Section Entry Pop-up Window.

Each of these sections will demonstrate different features to give you a fairly comprehensive introduction to the operation of the DSI 700.

You will now start entering information about each section into the database.

POWER SUPPLY SECTION

At Section Name, type **"POWER SUPPLY"** ↵. (Maximum 14 characters).

One use of the section instructions is to describe the physical location of the section on the board. At Instructions, type **"LOWER LEFT SIDE"** (30 characters maximum).

Press **Esc** to return to the section screen.

At the save prompt, "SAVE THIS RECORD? (Y/N)", press **Y** to save. The following figure shows the screen after the save operation.

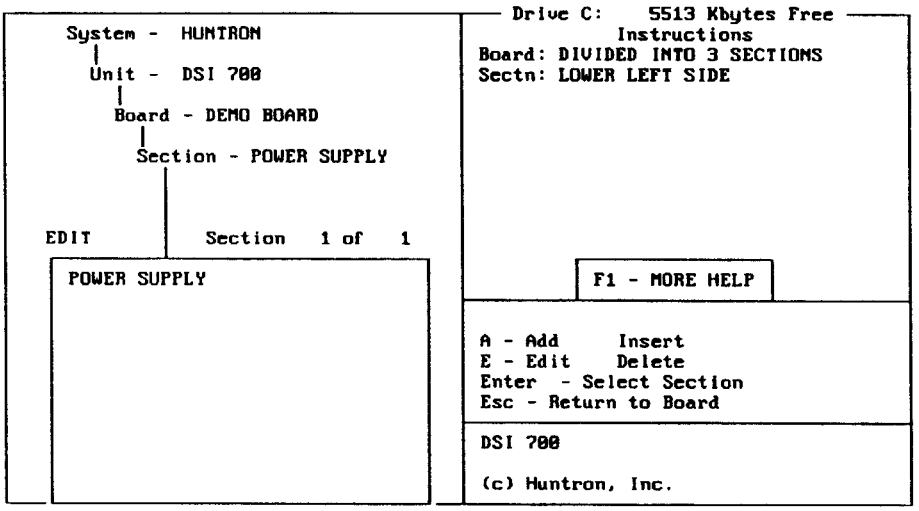


Figure 5-9. EDIT Screen with Power Supply Section.

CLOCK SECTION

To enter the next section's information into this database, press **A** (Add) to add this section after the power supply section. A section entry pop-up window will appear (see the next figure).

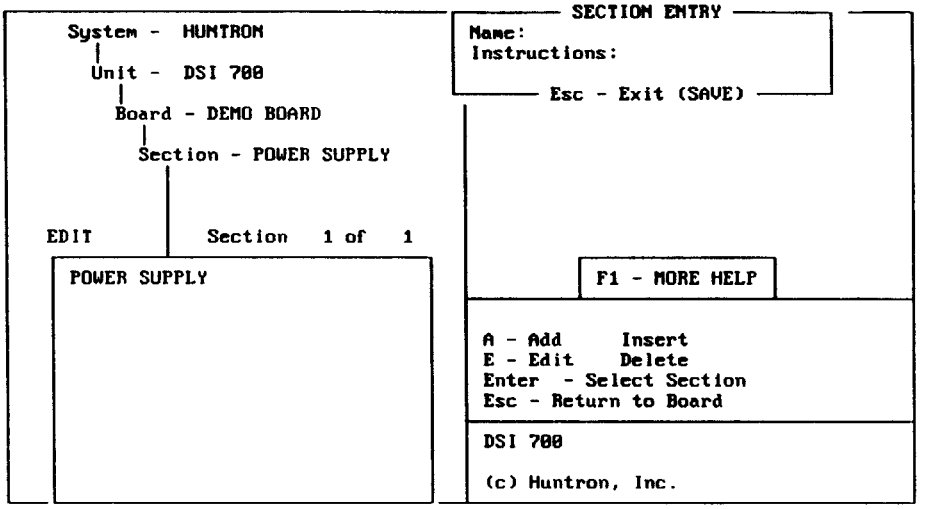


Figure 5-10. Second Section Entry Pop-up Window.

Enter information about the clock section on the demo board as follows:

At Section Name, type **"CLOCK"** ↵. (14 characters maximum).

For Instructions, type **"LEFT SIDE OF DEMO BOARD"** (30 characters maximum).

Press **Esc** to return to the section screen.

At the save prompt, "SAVE THIS RECORD? (Y/N)", press **Y** to save. The next figure shows the resulting screen.

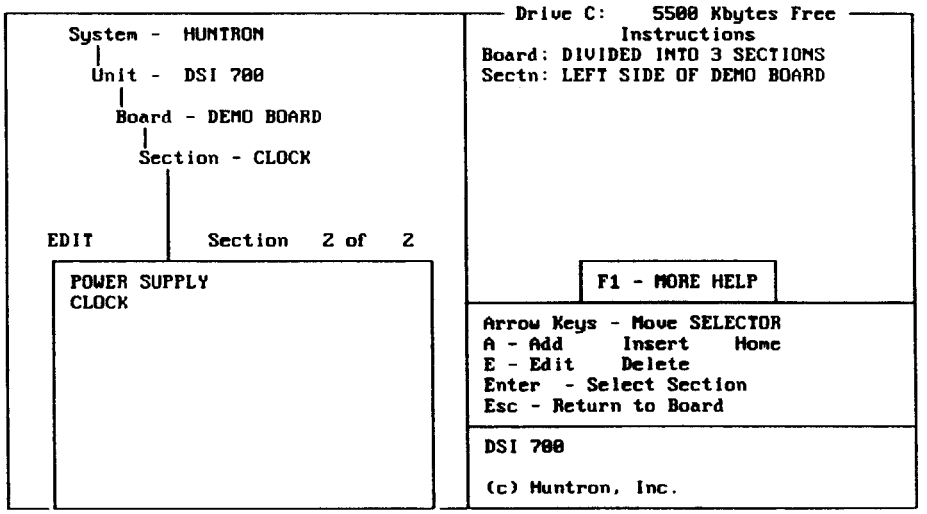


Figure 5-11. EDIT Screen- Power Supply & Clock Sections.

LOGIC SECTION

To enter the next section's information, press **A** (Add) to add the next section. A pop-up window will appear as shown below.

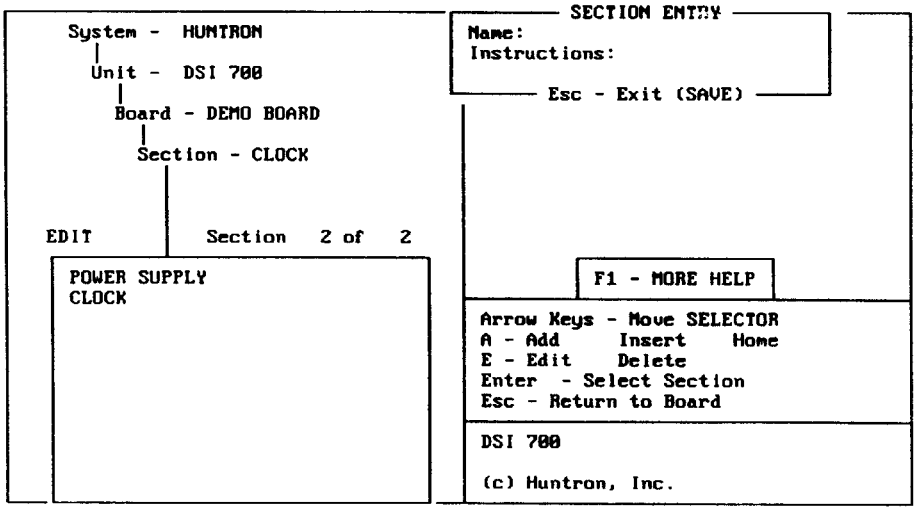


Figure 5-12. Third Section Entry Pop-up Window.

Enter information about the logic section on the demo board.

At Section Name, type **"LOGIC"** ↵. (14 characters maximum).

For Instructions, type **"ALL TTL ICS"** (30 characters maximum).

Press **Esc** to return to the section screen.

At the Save prompt, "SAVE THIS RECORD? (Y/N)", press **Y** to save. The figure below shows the saved information.

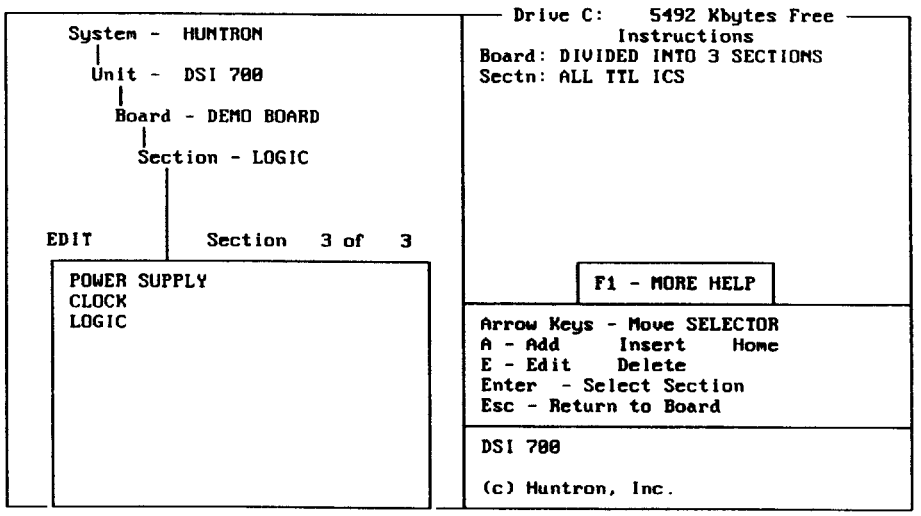


Figure 5-13. EDIT Screen with all three Sections.

You have completed entry of the section information for the demo board and are now ready to proceed to the next step.

5-6. ENTERING COMPONENT INFORMATION

The final step in defining a system database is entering specific details about all components in each section of the board you wish to test. You can start with any of the sections that were just created, but for this exercise, begin with the power supply section of the demo board first.

Each component on the demo board has a reference name printed next to it and each IC has the manufacturer's part number marked on it as well. Use the component reference name and the part number for entries in the database. In other situations where there are no reference names or part numbers on your own board, you may be able to refer to a schematic or block diagram for this information. Otherwise, you will need to devise a scheme to identify all the components to be tested. Use Instructions to clearly explain and document your procedure, especially if another person might do the testing.

POWER SUPPLY COMPONENTS

To enter information about each component in this section into the database, move the selector to POWER SUPPLY on the EDIT section screen and press ↵. Note that the section box changes to component. Press **A** (Add) to enter the first component. A window will appear as shown below.

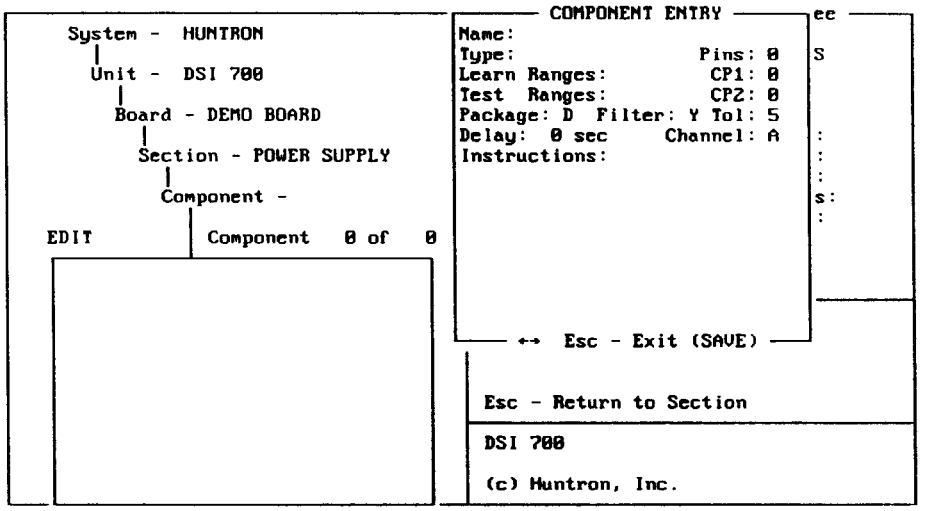


Figure 5-14. Power Supply Section Component Entry (U7).

For Name, type **"U7"** ↵. Use this field to enter a descriptive name (6 characters maximum).

For Type, use the manufacturer's part number on the component, i.e. type **"7805"** ↵ (14 characters maximum).

For LEARN ranges, you can learn in any combination of the four impedance ranges: Low, Medium 1, Medium 2 and High. In this exercise, type **"L1"** ↵ to specify Low and Medium 1 ranges (four characters maximum, from the following set: **L**(ow), (Medium)**1**, (Medium)**2**, **H**(igh),or **A**(ll)).

IMPORTANT NOTE

Although you can select any combination of the 2000's four ranges, it is usually not necessary or recommended to select testing in ALL ranges. Most components are best tested in certain ranges, and test time can be reduced by testing only those ranges. This also saves disk space.

For TEST Ranges, use these settings when testing components. Test ranges must be equivalent to or a subset of the Learn ranges for each component. Type **"L1"** ↵ (four characters maximum, from the following set: **L, 1, 2, H** or **A**).

For Package, use this setting to select the pin scanning sequence for the component. The choices are **S**(ingle in-line package or SIP), **D**(ual in-line package or DIP), **P**(robe), **F**(ront), or **B**(oth front and back). Choose **S** when a component has a single in-line row of pins like a header strip or card edge connector on a board. Choose **D** when a component has two parallel rows of pins like an IC. Choose **F** for a component (up to a maximum of 32 pins) that is only connected to the bottom row of the DSI 700 IDC connector. Choose **B** for a connector that matches this pin scanning sequence. Choose **P** if you will be using probes to access component pins that cannot be easily tested by standard test clips. The pins on the DSI 700 IDC connectors are not used when **P** is chosen. Instead, a test lead connected to the A or B jack on the front panel is used. For more information on package types and pin scanning sequences, refer to Chapter 2, section 2-13: Component Size.

In this example, U7 has only 3 pins and you will press **P** ↵ (Single character from the following set: **S, D, P, F, or B**).

For Filter, accept the default **Y** by pressing ↵. This feature removes oscillation from certain signatures.

For Pins, this component has 3 pins so type **3** ↵ (1 or 2 digits, 1 to 64 maximum).

All tests are made with respect to a reference pin which is called a common pin. With the DSI 700, the common connection is normally made by using one of the common leads supplied with your 2000. This lead is connected from the COM banana jack on the DSI 700 to the common point on the board. The common pin fields shown in this window (CP1 and CP2) are included for compatibility with Tracker 5100DS/Prober RP388 databases after TRANSFER-CONVERT is used. For this tutorial we will always accept the default of zero (none) and press ↵ twice to continue.

For Tol(erance), this is the amount of allowable difference between component signatures (learn and test) before the software alerts you that they are different.

Accept the default of **5** for the tolerance by pressing ↵ (1 or 2 digits, 0 to 99, maximum).

IMPORTANT NOTE

This is not a percent difference, but a discrete number you choose between 0 and 99. A low value of tolerance alerts you to subtle differences, and a high value of tolerance alerts you to catastrophic differences only. Refer to Chapter 6, section 6-8 for more information about tolerance.

For Delay, this is the amount of time that the DSI 700 connects a pin to the 2000 before the signature is digitized. See Appendix E for more information on the use of Delay.

Accept the default of 0 by pressing ↵.

For Channel, this selects which IDC socket/probe jack on the front panel is used. A or B can be selected. This is a convenience feature which could be used to put all 20 pin or less DIP components on channel A and all DIP components with 22 - 40 pins on channel B. Then the DIP clip cables can be left plugged in and only the actual DIP clips need to be changed.

Accept the default of A by pressing ↵.

For Instructions, you can specify type of clips, placement of probes, etc. Type **"PLUG RED PROBE INTO CHANNEL A JACK. PLUG COMMON LEAD INTO "COM" JACK AND CLIP TO C9(-). PIN 1 IS ON THE BOTTOM."**(180 characters maximum).

Press **Esc** to return to the EDIT Component Screen.

At the prompt, "SAVE THIS RECORD? (Y/N)", press **Y** to save.

To enter the next component's information, press **A** (Add). A pop-up window will appear as shown in the next figure.

For Name, type **"R14"** ↵ (6 characters maximum).

For Type, use the resistor value, i.e. type **"180 OHM"** ↵ (14 characters maximum).

For Learn Ranges, type **"L1"** ↵ to specify Low and Medium 1 ranges (4 characters maximum, from following set: **L**(ow), **1**(Medium 1), **2**(Medium 2), **H**(igh) or **A**(ll)).

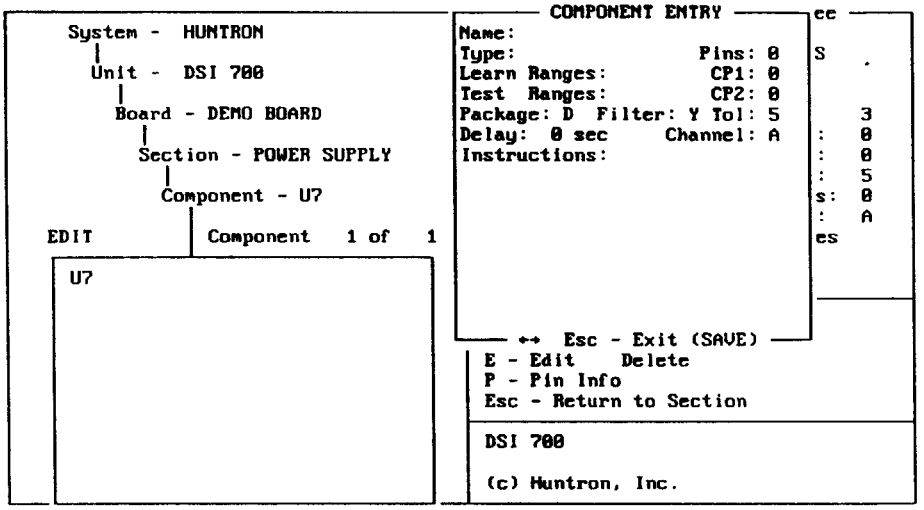


Figure 5-15. Power Supply Section Component Entry (R14).

For Test Ranges, type **"L1"** ↵ (4 characters maximum, from following set: **L, 1, 2, H**, or **A**).

For Package, type **P** ↵ to access this component with a probe (single character from the following set: **S, D P, F, B**).

For Filter, accept the default **Y** by pressing ↵.

For Pins, this component has 2 pins so type **2** ↵ (1 or 2 digits, 1 to 64 maximum).

For C(ommon) P(in) 1, type **0** ↵ because you will be connecting the common lead directly to the board.

For C(ommon) P(in) 2, accept the default of 0 by pressing ↵ .

For TOL(erance), accept the default of 5 for the tolerance, press ↵ (1 or 2 digits, 0 to 99 maximum.).

For Delay, accept the default of 0 by pressing ↵.

For Channel, accept the default of A by pressing ↵.

For Instructions, type **"PLUG RED PROBE INTO CHANNEL A JACK. PLUG COMMON LEAD INTO "COM" JACK AND CLIP TO C9 (-). PIN 1 IS ON THE LEFT."** (180 characters maximum).

Press **Esc** to return to the EDIT component screen.

At the prompt, "SAVE THIS RECORD? (Y/N)", press **Y** to save.

You have now completed entering component information for the power supply section of the demo board. Press **Esc** to return to the EDIT section screen to select the next section.

CLOCK SECTION

This section of the demo board has one component. To enter component information, move the selector to CLOCK on the EDIT section screen and press ↵. Note that the section box changes to component and the section counter changes to component. Press **A** (Add). The figure below shows the pop-up window that will appear.

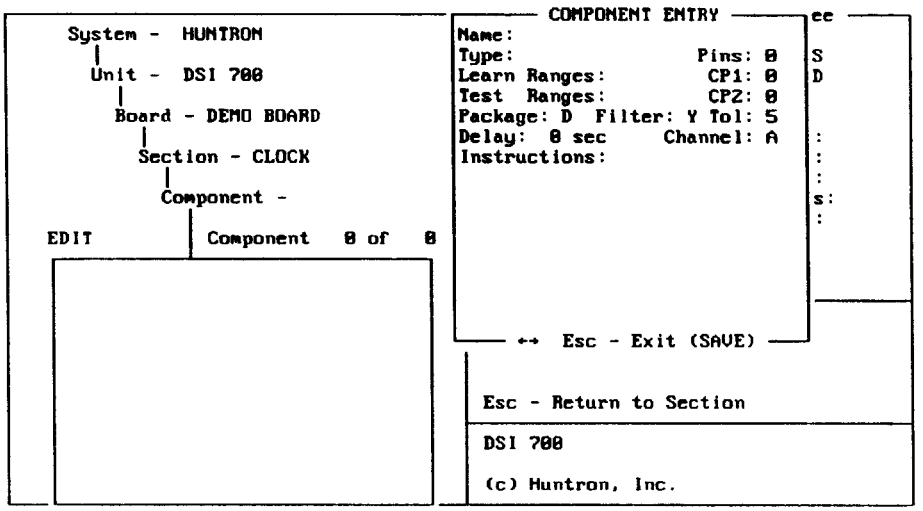


Figure 5-16. Clock Section Component Entry (U6).

For this component entry, a new feature called Autorange Select will be introduced. Autorange Select allows you to let the DSI 700 pick the range that gives the most descriptive signature. Type the following information in the component entry window.

Component Name:	**U6**
Component Type:	**NE555**
Learn Ranges:	**?**
Test Ranges:	**?**
Package:	**D**
Filter:	**Y**
# of Pins:	**8**
Common Pin 1:	**0**
Common Pin 2:	**0**
Tolerance:	**5**
Delay:	**0**
Channel:	**A**
Instructions:	**USE THE 8 PIN DIP CLIP FROM CHANNEL A. PLUG COMMON LEAD INTO "COM" JACK AND CLIP TO C9(-). MAKE SURE SWITCH SW1 IS SET TO "CLOCK-ON" FOR LEARN.**

For the LEARN and TEST ranges, "?" was entered instead of **L, 1, 2,H**, or **A**. The "?" enables the Autorange Select feature of the DSI 700. This feature will select a single TEST range for each pin of the component. The LEARN ranges are set to **"L12"** and the TEST range is determined after LEARN is completed. At this point the test ranges are set to "???" which indicates that the autorange has not occurred. Autorange Select is just one of the features of the Component Pin Info option. To edit the Component Pin Info, use **"P** - Pin Info" at the EDIT component screen instead of **"E** - Edit".

IMPORTANT NOTE

The Autorange Select feature is not a replacement for Analog Signature Analysis knowledge. This feature will select the TEST range based on the LEARN range that gave the most descriptive signature. There will be times that the selected test range will not be as useful in finding your particular faults on your boards as could be done by setting the test range manually. Autorange Select is intended to be used only for IC components. It is not recommended for discrete components.

For more information about the Autorange Select feature and the Component Pin Info option, refer to Chapter 6, section 6-2 in this manual.

Press **Esc** to return to the EDIT component screen when finished. At the save prompt, "SAVE THIS RECORD? (Y/N)", press **Y**. The EDIT component screen shows what has just been entered.

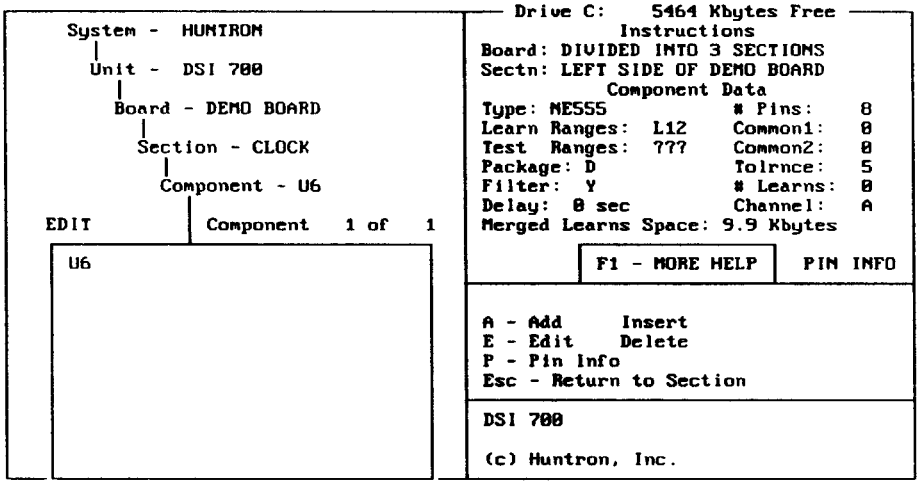


Figure 5-17. Clock Section Component EDIT Screen.

Press Esc to go back to the EDIT section screen and go to the next section.

LOGIC SECTION

Move the selector to highlight LOGIC and press ↵. At the EDIT component screen, press A to add a component and type the following information in the component entry pop-up:

Component Name:	**U1**
Component Type:	**74161**
Learn Ranges:	**L2**
Test Ranges:	**L2**
Package:	**D**
Filter:	**Y**
# of Pins:	**16**
Common Pin 1:	**0**
Common Pin 2:	**0**
Tolerance:	**5**
Delay:	**0**
Channel:	**A**
Instructions:	**USE THE 16 PIN DIP CLIP FROM CHANNEL A. PLUG COMMON LEAD INTO "COM" JACK AND CLIP TO C9(-).**

Press Esc to return when finished. At the prompt, "SAVE THIS RECORD? (Y/N)", press Y. The EDIT component screen shows what has just been entered.

NOTE

The software provides two handy functions, BUILD and REPEAT to speed up data entry. BUILD and REPEAT are available in the EDIT mode at the board, section, and component entry levels. In this example, we will only be using these functions at the component entry level. Use BUILD to shortcut entry of component information when you have identical devices. BUILD copies the current component's information to a new component if the current component name ends with a number. The number is incremented to create the new component's name (e.g. U1 is copied to U2). REPEAT is similar to BUILD in that it adds a new component by copying the current component's information except that no component Name is created. The Name field is left blank for you to complete before the new component is added to the section. For more information on BUILD and REPEAT, refer to Appendix C in the back of this manual.

Before you enter information for the next component U2, notice that the information for the previous component U1 is almost the same except for the Component Name and Type. Instead of pressing A to add the next component, use BUILD to add the next component. BUILD will copy the previous component's information and add it as a new component to the section. The component name will be incremented by one because the name contains a number at the end of it. If the component name does not end with a number, then BUILD is not available.

In order to use BUILD, move the selector to the component you want to BUILD on and press **Alt+B** . When BUILD is finished, look at the following figure to see the new component entry.

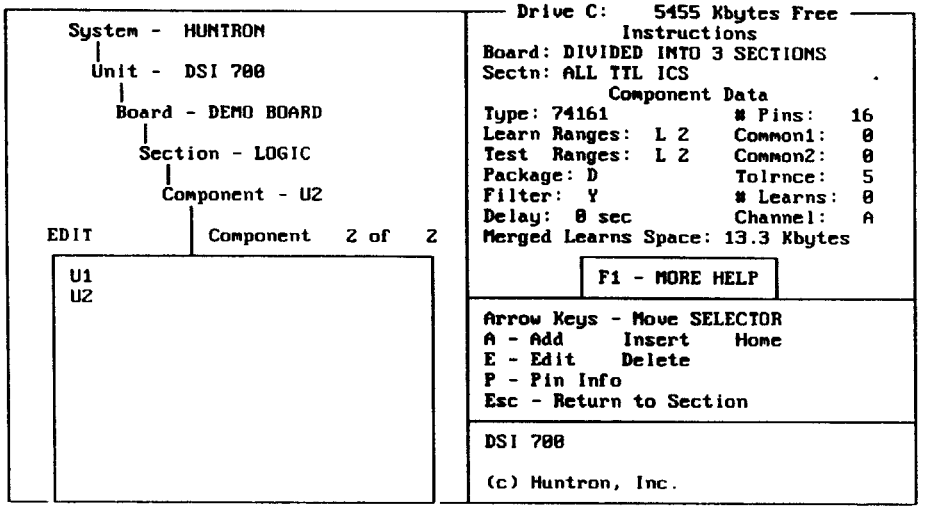


Figure 5-18. Using BUILD Feature for Component Entry.

After using BUILD to create and add U2, press **E** to edit and move the cursor to Component Type in the entry pop-up window. Change 74161 to **"74LS162"**, press **Esc** to exit and **Y** to save to complete this component entry.

For the next component, use the REPEAT feature. Press **Alt+R** to activate.

At the Component Entry pop-up, type in the following in place of the data from the previous component. If a particular line does not require any changes, then just skip over it by using the arrow keys or by pressing ↵ to go to the next line.

Component Name:	**U5**
Component Type:	**74LS02**
Learn Ranges:	**L2**
Test Ranges:	**L2**
Package:	**D**
Filter:	**Y**
# of Pins:	**14**
Common Pin 1:	**0**
Common Pin 2:	**0**
Tolerance:	**5**
Delay:	**0**
Channel:	**A**
Instructions:	**USE THE 16 PIN DIP CLIP FROM CHANNEL A. PLUG COMMON LEAD INTO "COM" JACK AND CLIP TO C9(-). MAKE SURE PIN 1 OF CLIP IS ON PIN 1 OF U5.**

Press **Esc** to exit when finished.

At the prompt, "SAVE THIS RECORD? (Y/N)" **press Y.**

The EDIT component screen shows what has just been entered.

For the next component, use the REPEAT function again. Press **Alt+R** to activate.

At the Component Entry pop-up, type in the following in place of the data from the previous component. If a particular line does not require any changes, then just skip over it by using the arrow keys or by pressing ↵ to go to the next line.

Component Name:	**U4**
Component Type:	**74LS138**
Learn Ranges:	**L2**
Test Ranges:	**L2**
Package:	**D**
Filter:	**Y**
# of Pins:	**16**
Common Pin 1:	**0**
Common Pin 2:	**0**
Tolerance:	**5**
Delay:	**0**
Channel:	**A**
Instructions:	**USE THE 16 PIN DIP CLIP FROM CHANNEL A. PLUG COMMON LEAD INTO "COM" JACK AND CLIP TO C9(-).**

Press **Esc** to exit when finished.

At the prompt, "SAVE THIS RECORD? (Y/N)", press **Y**.

The EDIT component screen shows what has just been entered.

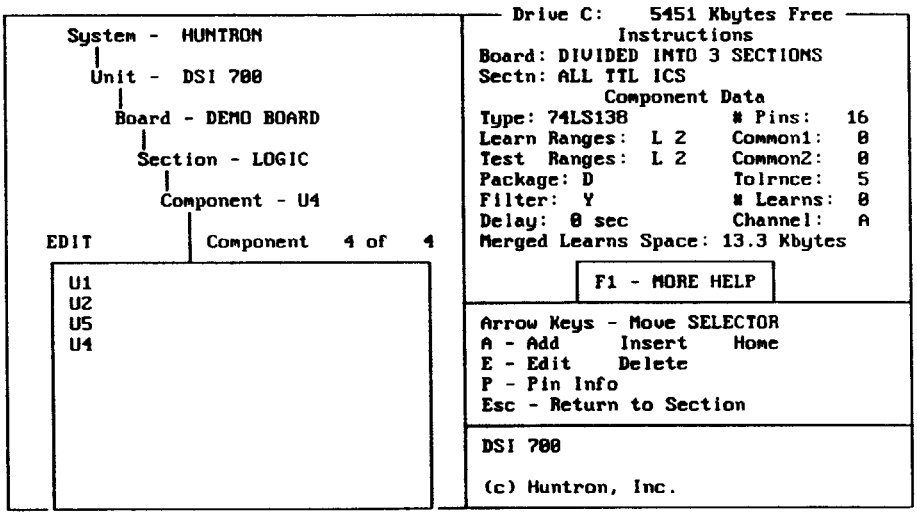


Figure 5-19. EDIT Component Screen for U4.

For the last component in this section, use REPEAT again. Press **Alt+R** to activate.

At the Component Entry pop-up, type in the following in place of the data from the previous component. If a particular line does not require any changes, then just skip over it by using the arrow keys or by pressing ↵ to go to the next line.

Component Name:	**U3**
Component Type:	**74154**
Learn Ranges:	**L2**
Test Ranges:	**L2**
Package:	**D**
Filter:	**Y**
# of Pins:	**24**
Common Pin 1:	**0**
Common Pin 2:	**0**
Tolerance:	**5**
Delay:	**0**
Channel:	**A**
Instructions:	**USE THE 24 PIN DIP CLIP FROM CHANNEL A. PLUG COMMON LEAD INTO "COM" JACK AND CLIP TO C9(-).**

Press **Esc** to exit when finished.

At the prompt, "SAVE THIS RECORD? (Y/N)" press **Y**.

The EDIT component screen shows what has just been entered.

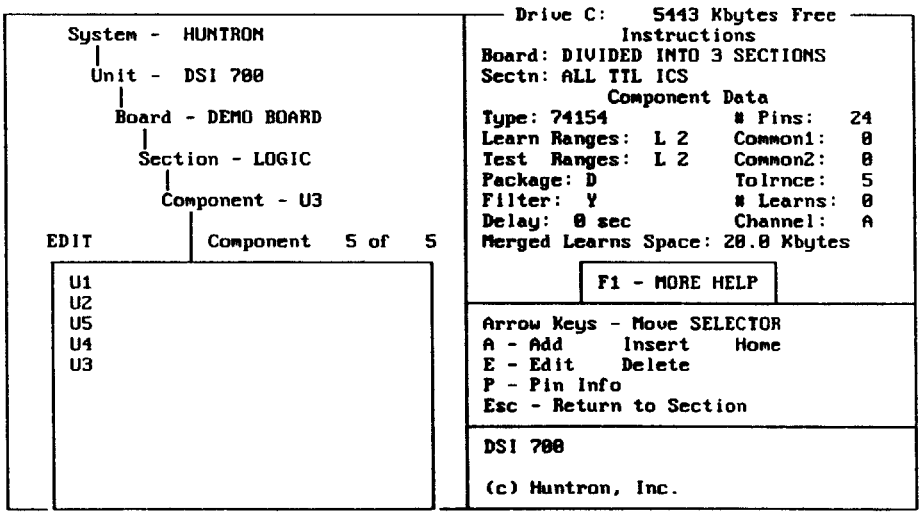


Figure 5-20. EDIT Component U3 Screen.

You have completed entering all the components and are ready to proceed with the next step, printing a TREE REPORT of the demo board. Press **Alt+M** to return to the Main menu.

5-7. GENERATING A TREE REPORT

You can print a hard copy of the board information database that was just entered with the REPORT function of the TREE mode. At the Main menu, select REPORT by pressing **R**. Make sure your printer is connected to your computer and is on-line. At the REPORT Board selection screen, select the demo board. Press ↵ to bring up the REPORT pop-up window. There are two choices, **T** - Tree and **P**- Pin Info, in this window. First, press **T** to print the TREE REPORT. When REPORT is done, the program will return to the REPORT selection screen. The TREE REPORT consists of a complete section by section listing of the selected board. Within each section, each component is listed by name, type, range (Rang), tolerance (Tol), filter (F), number of pins (#P), common pins (CP), package type (P), delay (D), channel (C) and Instructions. Refer to the following figures for samples of the TREE REPORT for each section of the demo board.

```
 System: HUNTRON                    TREE REPORT                    Page: 1
   Unit: DSI 700                                                   Date: 02/01/93
  Board: DEMO BOARD          DIVIDED INTO 3 SECTIONS               Time: 11:44:10
Section: POWER SUPPLY        LOWER LEFT SIDE

Name   Type          Rang Tol F #P CP P  D C Instructions
-------------------------------------------------------------------------------

U7     7805          L1     5 Y  3  O P  O A PLUG RED PROBE INTO CHANNEL A
                     L1           O          JACK. PLUG COMMON LEAD INTO
                                             "COM" JACK AND CLIP TO C9(-).
                                             PIN 1 IS ON THE BOTTOM.


R14    180 OHM       L1     5 Y  2  O P  O A PLUG RED PROBE INTO CHANNEL A
                     L1           O          JACK. PLUG COMMON LEAD INTO
                                             "COM" JACK AND CLIP TO C9(-).
                                             PIN 1 IS ON THE LEFT.

      ** This report lists all components on the selected board by  **
      ** section.  The learn and test  ranges are listed vertically **
      ** with the learn ranges on top.  The common pins are listed  **
      ** vertically with common pin 1 on top.                       **
```

Figure 5-21. Tree Report for the Power Supply Section.

NOTE

If you have your DSI 700 connected to LPT1 at this point you must unplug the DSI 700 interface cable from the computer and connect your printer cable. A better way to do this is to add a second parallel port configured as LPT2, change SETUP - Parallel Port to LPT2 and use that port for the DSI 700. Your printer can be then be left connected to LPT1 (the software always prints to LPT1). For best DSI 700 performance, use a parallel port that supports full Centronics protocols. If it is difficult to add a second parallel port to your computer, another alternative is a switch box so that a single port can be shared by the printer and the DSI 700.

```
 System: HUNTRON                TREE REPORT                    Page: 2
   Unit: DSI 700                                               Date: 02/01/93
  Board: DEMO BOARD       DIVIDED INTO 3 SECTIONS              Time: 11:44:12
Section: CLOCK            LEFT SIDE OF DEMO BOARD

Name   Type          Rang Tol F #P CP P  D C Instructions
-------------------------------------------------------------------------------

U6     NE555         L12    5 Y  8  O D  O A USE THE 8 PIN DIP CLIP FROM
                     ???          O         CHANNEL A. PLUG COMMON LEAD
                                            INTO "COM" JACK AND CLIP TO
                                            C9(-). MAKE SURE SWITCH SW1
                                            IS SET TO "CLOCK-ON" FOR
                                            LEARN.

      ** This report lists all components on the selected board by  **
      ** section.  The learn and test  ranges are listed vertically **
      ** with the learn ranges on top.  The common pins are listed  **
      ** vertically with common pin 1 on top.                       **
```

Figure 5-22. Tree Report for the Clock Section.

```
 System: HUNTRON                TREE REPORT                    Page: 3
   Unit: DSI 700                                               Date: 02/01/93
  Board: DEMO BOARD       DIVIDED INTO 3 SECTIONS              Time: 11:44:14
Section: LOGIC            ALL TTL ICS

Name   Type          Rang Tol F #P CP P  D C Instructions
-------------------------------------------------------------------------------

U1     74161         L 2    5 Y 16  O D  O A USE THE 16 PIN DIP CLIP FROM
                     L 2          O         CHANNEL A.  PLUG COMMON LEAD
                                            INTO "COM" JACK AND CLIP TO
                                            C9(-).

U2     74LS162       L 2    5 Y 16  O D  O A USE THE 16 PIN DIP CLIP FROM
                     L 2          O         CHANNEL A.  PLUG COMMON LEAD
                                            INTO "COM" JACK AND CLIP TO
                                            C9(-).

U5     74LS02        L 2    5 Y 14  O D  O A USE THE 16 PIN DIP CLIP FROM
                     L 2          O         CHANNEL A.  PLUG COMMON LEAD
                                            INTO "COM" JACK AND CLIP TO
                                            C9(-).  MAKE SURE PIN 1 OF
                                            CLIP IS ON PIN 1 OF U5.

U4     74LS138       L 2    5 Y 16  O D  O A USE THE 16 PIN DIP CLIP FROM
                     L 2          O         CHANNEL A.  PLUG COMMON LEAD
                                            INTO "COM" JACK AND CLIP TO
                                            C9(-).

U3     74154         L 2    5 Y 24  O D  O A USE THE 24 PIN DIP CLIP FROM
                     L 2          O         CHANNEL A.  PLUG COMMON LEAD
                                            INTO "COM" JACK AND CLIP TO
                                            C9(-).

      ** This report lists all components on the selected board by  **
      ** section.  The learn and test  ranges are listed vertically **
      ** with the learn ranges on top.  The common pins are listed  **
      ** vertically with common pin 1 on top.                       **
```

Figure 5-23. Tree Report for the Logic Section.

Next, return to the REPORT pop-up window to print the PIN INFO REPORT. Select DEMO BOARD and press ↵. At the REPORT pop-up window, press **P** to print. In each section, a component's information database will be listed by each individual pin when this feature has been activated. Only the clock section has any PIN INFO because U6 used the Autorange Select feature that sets a test range for each pin. The power supply and logic sections do not use any of the PIN INFO features. (PIN INFO features will not be covered in depth in this chapter. Refer to Chapter 6, section 6-2 in this manual for complete information.) The following figure shows the PIN INFO REPORT for the clock section of the demo board. The PIN INFO reports for the power supply section and logic section show "No pin information."

System: HUNTRON — PIN INFO REPORT — Page: 2
Unit: DSI 700 — Date: 02/01/93
Board: DEMO BOARD — DIVIDED INTO 3 SECTIONS — Time: 11:55:00
Section: CLOCK — LEFT SIDE OF DEMO BOARD

Name	Pin	Name	R	Tol	F	CP1	CP2	Pin	Name	R	Tol	F	CP1	CP2
U6	1	1	L	5	Y	0	0	5	5	L	5	Y	0	0
	2	2	L	5	Y	0	0	6	6	L	5	Y	0	0
	3	3	L	5	Y	0	0	7	7	L	5	Y	0	0
	4	4	L	5	Y	0	0	8	8	L	5	Y	0	0

Figure 5-24. Pin Info Report for the Clock Section.

IMPORTANT NOTE

This pin information will change after the LEARN process when autorange selects the range for each pin.

You are now ready to capture and store signatures of each component. **Press Esc** to return to the Main menu.

5-8. LEARNING COMPONENT SIGNATURES ON THE DEMO BOARD

In this section of the tutorial, you will practice storing good signatures of components in the demo board database you have previously created. They will be used for reference and comparison later. You will also discover how to view these signatures on your monitor and zoom in on the signature of an individual pin.

NOTE

Before starting with the next step, make sure you switch the demo board's toggle switch to the CLOCK ON (up) position. You will be changing the switch setting later in the TEST mode to simulate failed conditions. Also, turn on the 2000, turn the 2000 RATE control fully clockwise (maximum) and make sure the DSI 700 has been properly connected to your computer (refer to Chapter 2, section 2-8).

From the Main menu, move the selector to LEARN, then press ↵ to select.

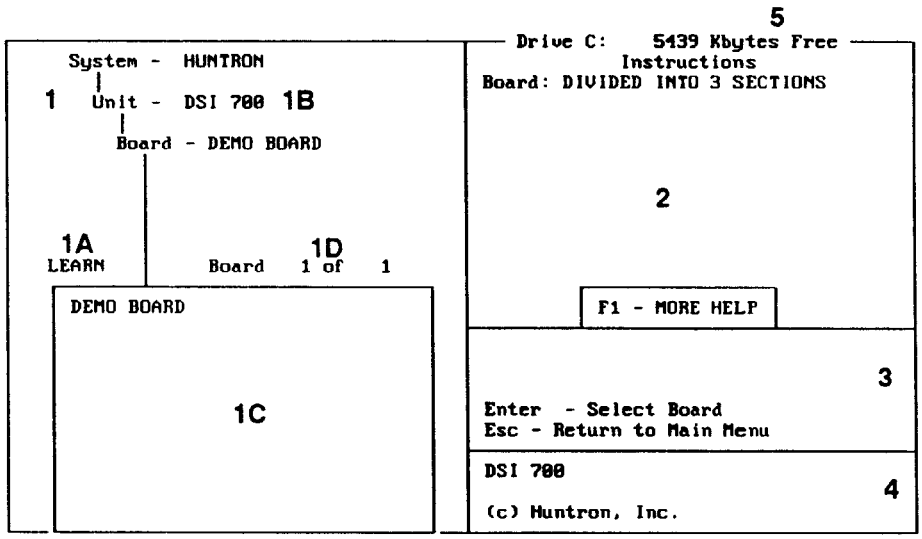


Figure 5-25. LEARN Board Screen.

Observe that the LEARN screen is quite similar to the EDIT screen. The LEARN board screen is made up of five areas.

Area 1 on the left half of the screen is the database information box. **Area 1A** is the mode indicator and always tells you what mode is currently active. In this case, LEARN is displayed since this is the mode that is activated. **Area 1B** displays the associated tree type diagram for the system and unit of the board that is currently selected. **Area 1C** is the board window box which lists boards stored in the current drive/path. **Area 1D** is the board counter indicator. It gives the total number of boards for the current drive/path. The demo board is the only one entered so far, so this counter shows one board.

Area 2 is the board instructions box and displays any user entered text for the highlighted board.

Area 3 is the active key box and displays what features are available in this mode. The **Enter** (↵) and **Esc** keys are active at this level.

Area 4 is the program copyright and version box. In this manual, the version number is absent to avoid any confusion between any versions of the program that this manual covers. Look at your computer monitor to see the current program version.

Area 5 shows the disk drive that is currently selected and the remaining amount of free space left on it.

At LEARN board, select DEMO BOARD in the board selection window, by pressing ↵ to select.

LEARNING THE POWER SUPPLY SECTION

At LEARN section, select POWER SUPPLY, then press ↵. The selection window changes to LEARN component and shows its components as in the figure.

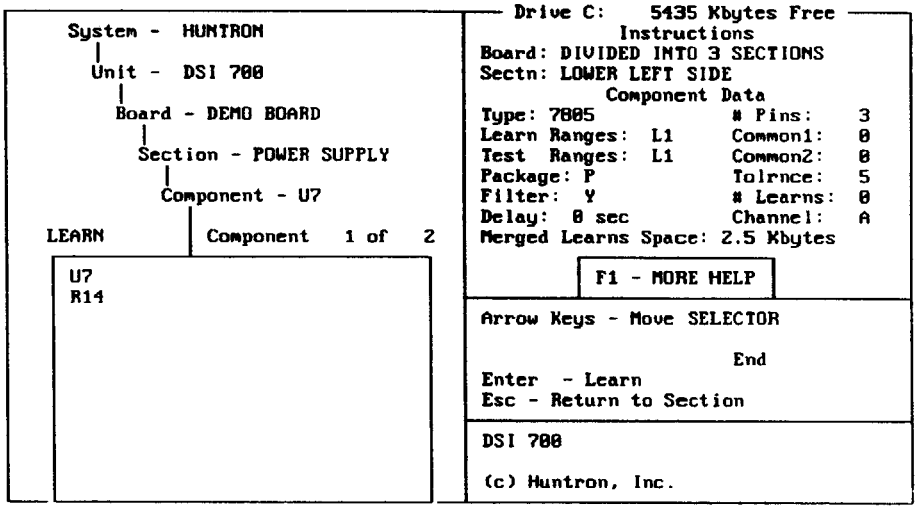


Figure 5-26. LEARN Component for Power Supply Section.

The LEARN component screen is similar to the EDIT component screen. The component data box has two entries that have not been discussed so far. The first one, "Merged Learns Space:" gives you information about how much space is needed for the selected component when creating a merged signature.

NOTE

If there are multiple samples of the known-good component available, then you can combine each sample's signature together in the same file. This is called a merged signature. A merged signature takes into account each sample component's minor differences that are due to the manufacturing process. This composite signature becomes the reference when comparing against a suspect one and can result in a better test. The drawback to using this feature is that merged signatures require twice as much storage space on your computer's disk drive. It is vital that each sample is known to be good. Merging a good component's signature with a faulty one will create a bad reference and when testing, faulty components will pass as good. For more information, refer to section 5-12 later in this chapter.

The second additional entry in the component data box is "# Learns:". This is a counter that keeps track of the number of times a component signature has been learned. This number is especially useful if you are using the signature merge feature and want to know how many signatures have been merged.

Make sure U7 is selected (if not, move the selector to highlight U7). You are now ready to activate the DSI 700, so press ↵. The Component Instructions pop-up window will be displayed.

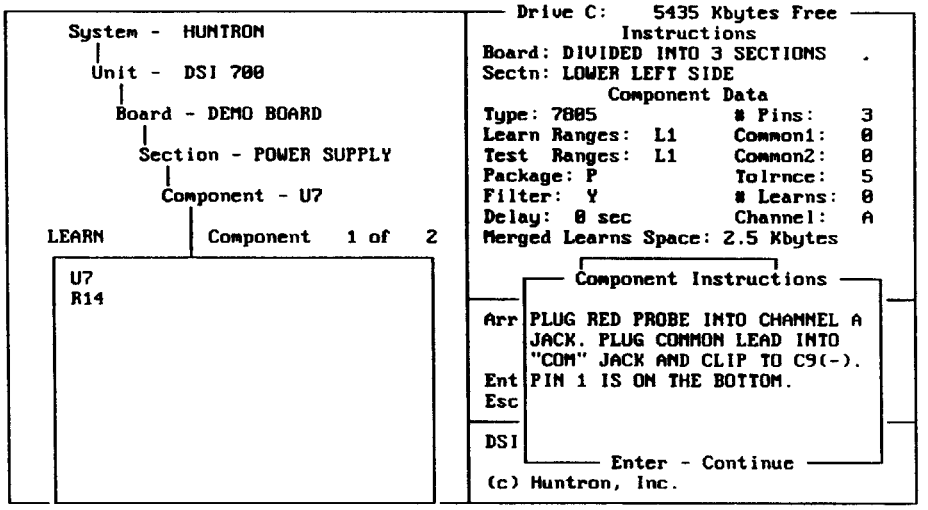


Figure 5-27. U7 Component Instructions Pop-up Window.

NOTE

The Component Instructions display may be disabled if not used or to streamline testing. Activate the SETUP mode at the Main menu to control this feature (refer to Chapter 6, section 6-8 in this manual for more details).

Locate the black common clip lead supplied with your 2000. This cable has a spring-loaded grabber hook or an alligator clip on one end and a banana plug on the other. Push the plug end of the common clip lead into the black banana jack labeled "COM" on the DSI 700 front panel. Clip the grabber end of the common lead to the negative leg of capacitor C9.

CAUTION

The probe tips are very sharp. Use caution and handle with care to avoid injury.

Next, locate the red probe supplied with the 2000 and insert the plug into the "A" jack on the DSI 700 front panel. Make sure the metal contact end of the probe is extended slightly. Adjust if needed by holding the body of the probe and twist the barrel near the tip counterclockwise to loosen. Extend the metal tip to the desired length by pushing or pulling on the probe wire. Twist the probe barrel clockwise to lock the tip in position.

Press ↵ to continue. The LEARN SCAN window will appear. This window prompts you to make sure the 2000 and the DSI 700 are properly configured for the LEARN operation. Observe that this window also displays "Connect to U7 - pin 1". Because the Package Type for this component was P (probe), this is a prompt to connect to the component's pin. Place the probe tip on pin 1 of U7. Remember that the Component Instructions have specified pin 1 to be the one closest to the edge of the board. Hold the probe steady and press ↵ to scan pin 1 in the Low range.

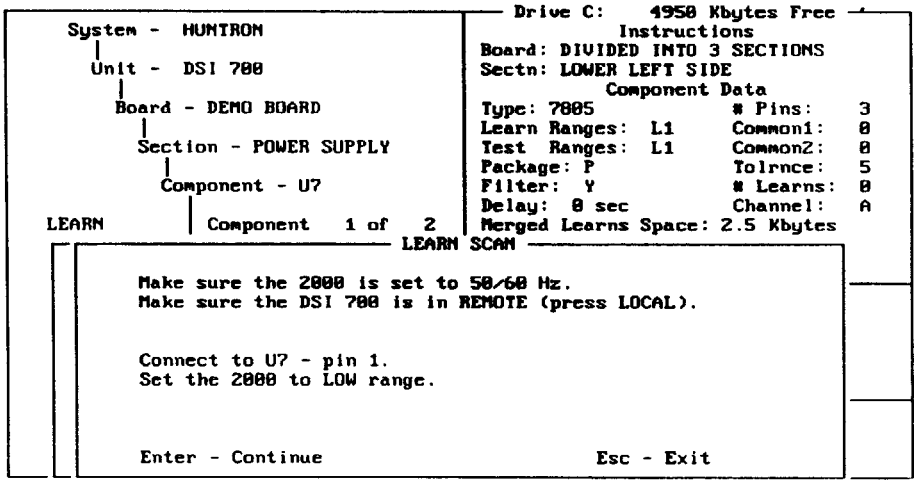


Figure 5-28. LEARN SCAN Prompt for U7, Pin 1, Low Range.

The LEARN SCAN window will show the "SCANNING" message.

NOTE

If your LEARN SCAN window shows "SCANNING (4 bit)", your computer's parallel port does not support high speed data transfer. For better performance, add a second parallel port that supports full Centronics protocols.

While the DSI 700 is scanning, the LCD shows the following screen:

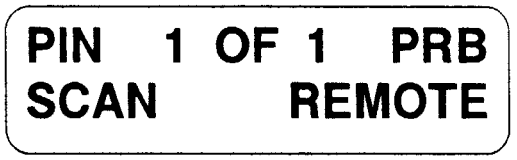


Figure 5-29. REMOTE Mode - Scan Display.

"PRB" refers to "PROBE" package. This package type can only happen in REMOTE mode.

NOTE

If AUDIO is set to YES (in SETUP), then the computer will make an audible beep after scanning to alert you to go to the next pin, range or component. After the beep, select the next range, move the test probe to the next pin when Package = P (probe) or move the test connector to the next component when Package = D (DIP), F (front), B (both front and back) or S (SIP). For more information on AUDIO refer to Chapter 6, section 6-8 in this manual.

When the DSI 700 has finished scanning pin 1 in the Low range, the LEARN SCAN window will prompt you for the next range. Press the Med 1 button on the 2000 and then press ↵ to scan pin 1 in the Medium 1 range.

Next, the LEARN SCAN window will prompt you for the next pin. Move the test probe to pin 2 of U7, change the 2000 back to Low range and press ↵.

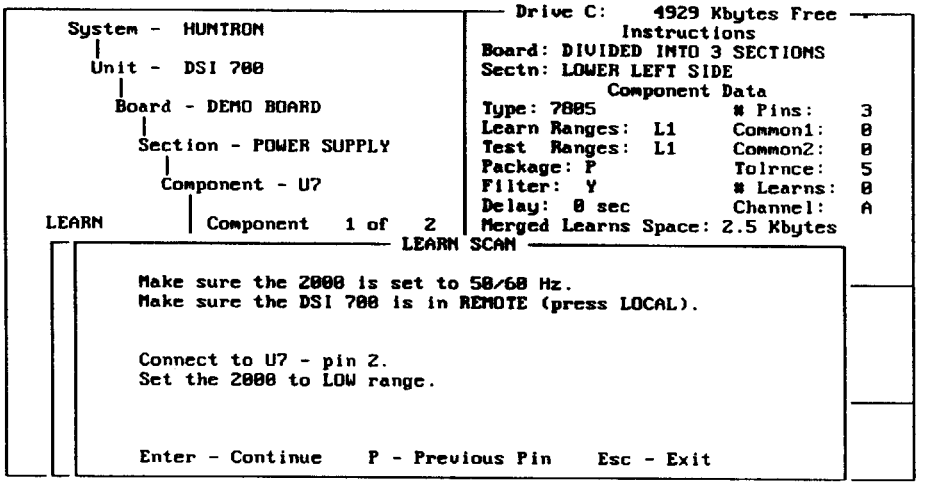


Figure 5-30. LEARN SCAN Prompt for U7, Pin 2, Low Range.

When pin 2 has been scanned in Low range, follow the LEARN SCAN window prompts to scan pin 2 in the Medium 1 range.

Finally, follow the prompts in the LEARN SCAN window and repeat the operation for pin 3 in both ranges.

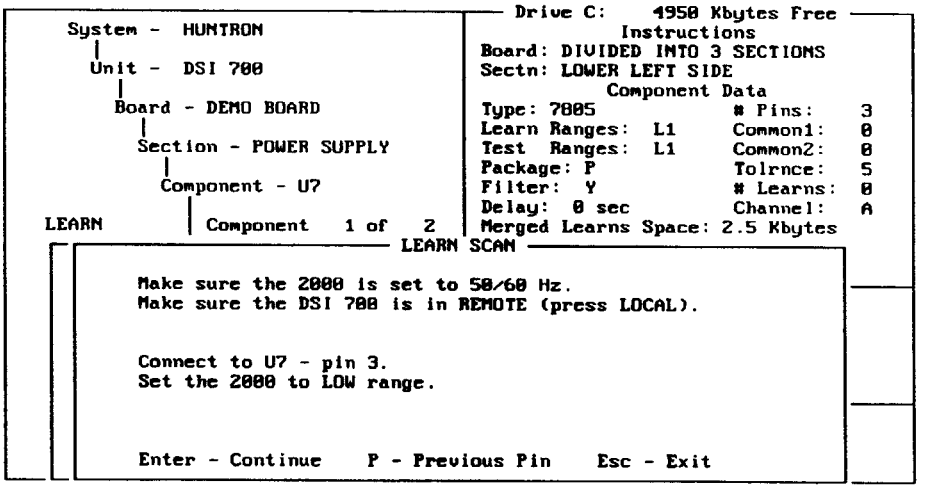


Figure 5-31. LEARN SCAN Prompt for U7, Pin 3, Low Range.

NOTE

After a pin is scanned, the program automatically prompts for the next pin. You can go back to the previous pin by pressing P and then ↵ to scan again in case the first attempt was questionable.

If "P - Previous Pin" is used more than once in succession each of the pins you go back over will have to be scanned again.

When all pins have been probed, the LEARN SCAN window will indicate "Scan completed". At this point you can press P to go back and scan the last pin again. For this tutorial, press ↵ to continue.

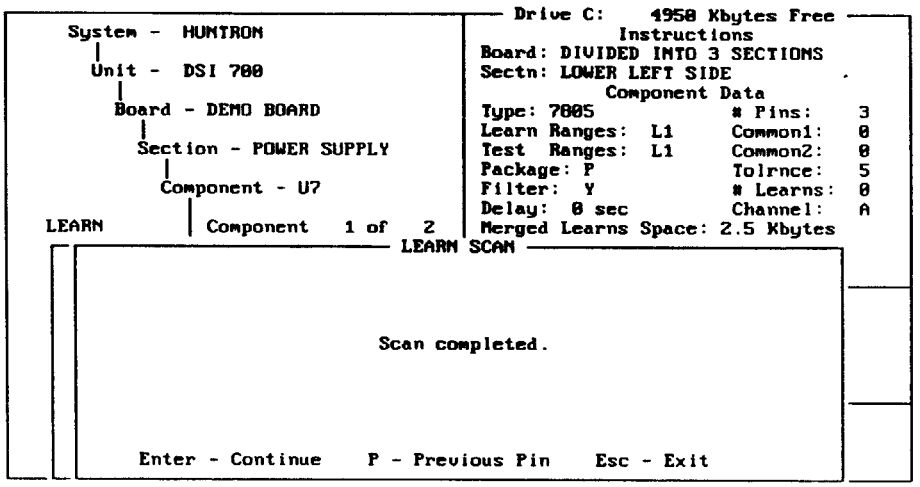


Figure 5-32. LEARN SCAN Window after scanning U7.

NOTE

While scanning in LEARN or TEST, component signatures are acquired and transmitted by the DSI 700 to the computer. Signatures will also flash on the 2000's CRT. This provides you with an immediate feedback on whether or not there is a good electrical connection between the 2000/DSI 700 and the component pin.

If you do not have a good connection, or if there are any pins that have open circuit signatures, the OPEN PINS window will appear and display the component's pins that were detected. The next figure shows what would be displayed if U7 was poorly connected.

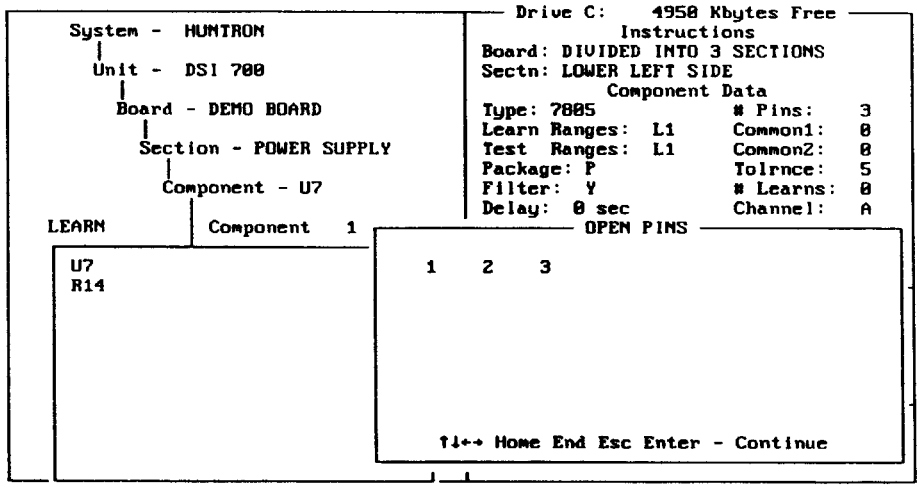


Figure 5-33. Open Pins of U7 due to Faulty Connections.

If you know that there are pins that are really not connected to anything else on the board, then you can just ignore this caution and save all the signatures. But if you are unsure, check the connections to the pins of the component to verify that a good contact has been made, then retest. The demo board's U7 does not have any open circuit pins.

Press ↵ to continue. The program then displays the LEARN results window showing that this is the "First Learn". At this point, you can either store U7's signatures to disk or display the signatures on screen. The following figure shows the "First Learn " screen.

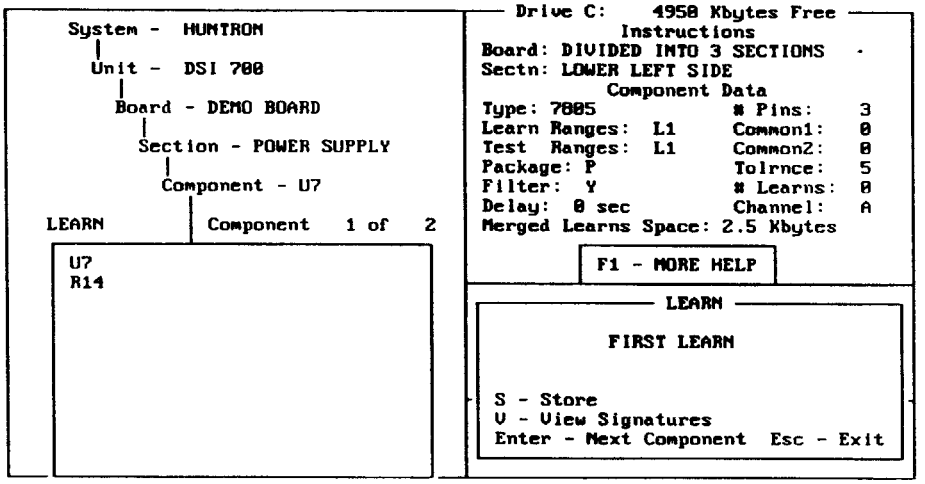


Figure 5-34. LEARN Screen for "First Learn" of U7.

Take a look at what signature results you have obtained for this component before continuing. Press V to view U7's pin signatures on the screen. The display changes to the LEARN SIGNATURES screen.

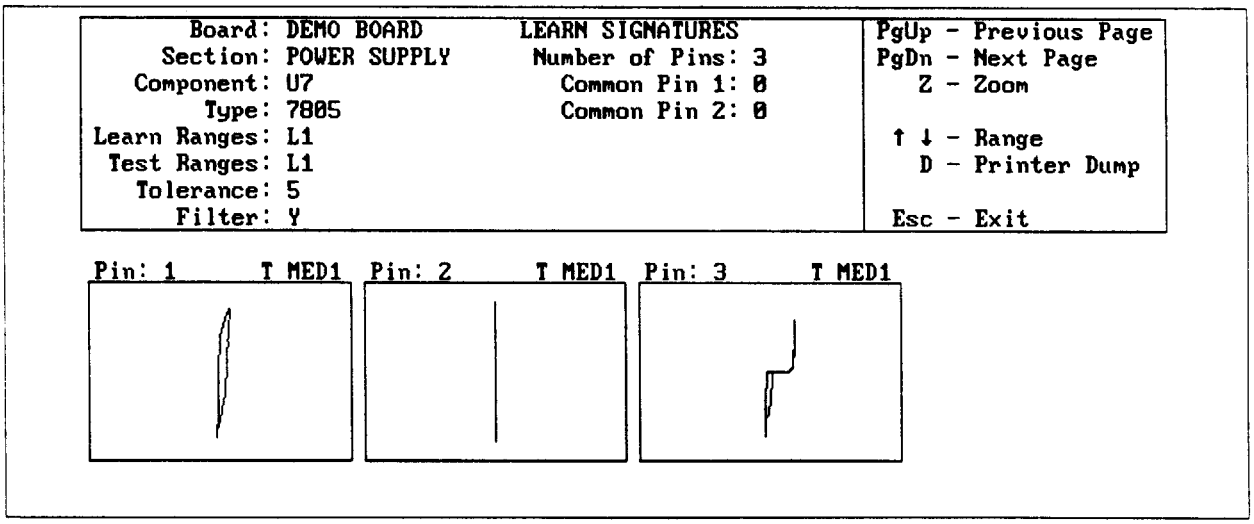


Figure 5-35. LEARN SIGNATURES Screen for U7 in MED1.

NOTE

This signature screen is shown with the graticule turned off so that the signatures can be seen more easily. You should be looking at these signatures WITH graticules on your computer monitor. We will show signatures without graticules in this manual where it is necessary for clarity. Alt+G toggles the graticule on/off.

The LEARN SIGNATURES screen displays up to eight pins of a component at a time. The signatures shown are from the highest range selected which is Medium 1 for this example. To see the next group of eight pins, press the **PageDown** key. Press the **PageUp** key to look at the previous pins. In this case, U7 only has three pins so only one screen is available.

You can also view other ranges in the LEARN SIGNATURES screen by pressing the ↑ and ↓ arrow keys. Press the ↓ arrow key to see the pin signatures in the Low range.

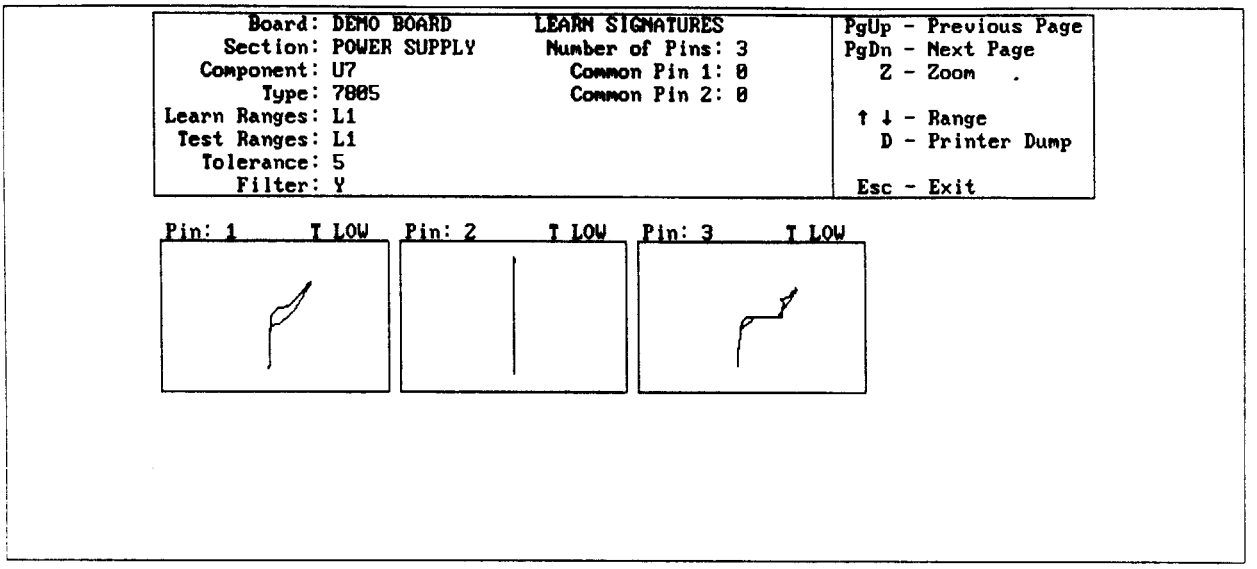


Figure 5-36. LEARN SIGNATURES Screen for U7 in LOW.

The entire signature screen can be printed to produce a hard copy by pressing **D**, but make sure your printer is attached to your computer, on-line, and has been configured correctly in SETUP.

NOTE

To configure your printer, you must run SETUP mode from the Main menu. The default configuration is for a IBM graphics compatible Okidata model 192/193 printer. If your printer is not configured correctly, the hard copy will probably be unusable. Refer to Chapter 6, section 6-8 for SETUP details. Also see note on page 5-20 for printer connection information.

Next, you will look at a single pin signature close-up in the LEARN SIGNATURES screen by activating the ZOOM feature.

Press **Z** to zoom to 250% of the original size.

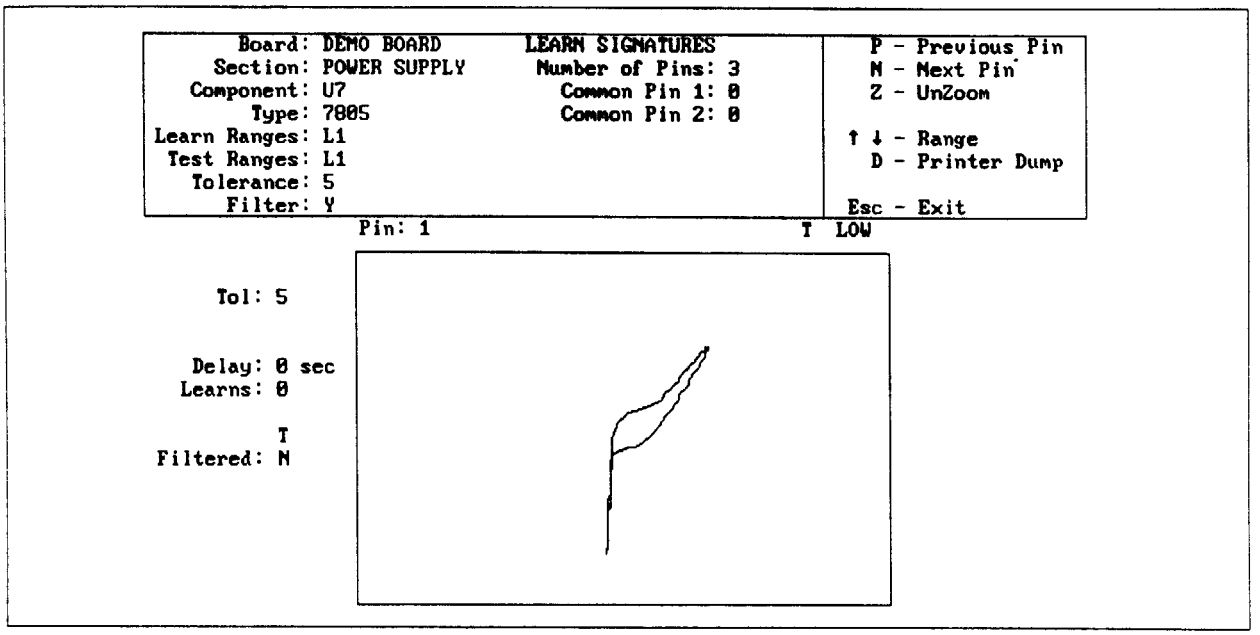


Figure 5-37. Zoom Signature Screen for U7, Pin 1.

ANALYZING A SIGNATURE IN THE ZOOM SCREEN

From here, you can press:

N to look at the next pin.

P to move back a pin.

↑ and ↓ arrow keys to view another range that was learned.

D (Printer Dump) if you want to print this single signature (but make sure you have your printer configured properly beforehand).

Z to unzoom and return to the multiple signatures screen.

Look on the left side of the signature zoom screen. A column of annunciators are displayed which show various parameters of the signature in the zoom screen. Starting from the top:

Tol: 5

This is the default tolerance setting. In LEARN, this value is only used to compare another LEARN with the first LEARN data. It is not used in this situation since this is the first LEARN.

Delay: 0 sec

This indicates that the learn was made with no delay selected.

Learns: 0

This number denotes the total times a LEARN has been saved for this particular component.

Filtered: N

Signature was not processed through the filter algorithm.

Press **Esc** to return to the LEARN results screen and press **S** to store the signatures for U7. The program will save the signatures and automatically move to R14, the next component in this section.

Press ↵ to select and follow the Component Instructions pop-up window as directed. Check that the black common clip lead is still connected to the negative leg of capacitor C9.

Press ↵ to continue. The LEARN SCAN window will appear. Observe that this window displays "Connect to R14 - pin 1". Since the Package Type for this component is P (probe), this is a prompt to connect to the component pin. Place the probe tip on pin 1 of R14. Note that the component instructions have specified pin 1 to be on the left. Press the Low range button on the 2000. Hold the probe steady and press ↵ to scan pin 1 in the Low range.

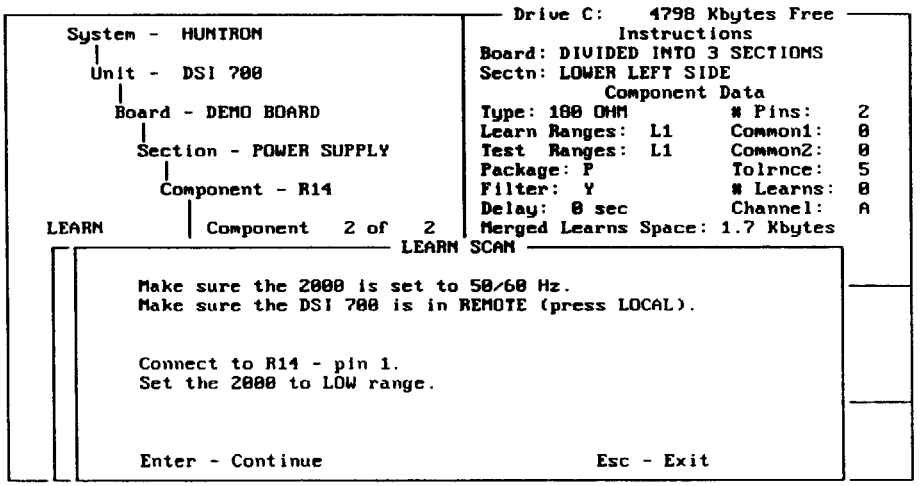


Figure 5-38. LEARN SCAN Prompt for R14, Pin 1, Low Range.

After pin 1 is scanned in the Low range, the LEARN STATUS window will prompt you to select the Medium 1 range on the 2000. The press ↵ to scan pin 1 in the Medium 1 range.

When the DSI 700 has finished scanning pin 1 in both ranges, the LEARN SCAN window will prompt you for the next pin. Select Low range again. Move the test probe to pin 2 of R14 and press ↵. After pin 2 has been scanned in Low range, follow the LEARN SCAN window prompts by selecting Medium 1 range on the 2000 and then press ↵. At the "Scan completed" prompt, press ↵ again to go to the LEARN results window.

If you wish to look at the signatures for R14 before storing, press **V**. After inspection, press **Esc** to return to the LEARN results screen and press **S** to store signatures. The program will then move to the first component of this section (i.e. U7). Press **Esc** to go back to the LEARN section selection screen. You are now ready to LEARN the next section of the demo board.

LEARNING THE CLOCK SECTION

Select CLOCK, then press ↵. The selection window now shows component names and instructions. There is only one component in this section.

Leave the black common clip lead from the DSI 700 front panel COM jack connected to the negative lead of C9.

Locate the 8 pin DIP clip and the 20 conductor DIP clip flat ribbon cable that was included with the DSI 700. Insert the pins of the DIP clip into the cable end with two single row connectors. Insert the other cable end in the channel A IDC socket on the front panel of the DSI 700. Make sure that the cable's colored edge is on the left side of the IDC.

Squeeze the DIP clip to open and position it with the colored edge of the cable at the same end as U6 pin 1 (notched end of IC). Make sure the clip is securely attached and seated properly. You can check this by gently moving the DIP clip from side to side.

Press ↵ to view the Component Instructions. Follow the instructions. Press ↵ again to view the LEARN SCAN window.

After setting your 2000 as prompted, press ↵ to scan the IC pins in the Low range. The LEARN SCAN window will show the "SCANNING" message. Repeat this step for the other ranges.

NOTE

If a poor connection is made between the IC clip and the component being tested, then an "OPEN PINS" message will appear. If this happens, recheck your clip connections and retest. If the error message reappears and the DIP clip connection is good, then the component may have opens that are part of the circuit so you need to verify the circuit. Select MED 2 or HIGH on the 2000 to verify opens.

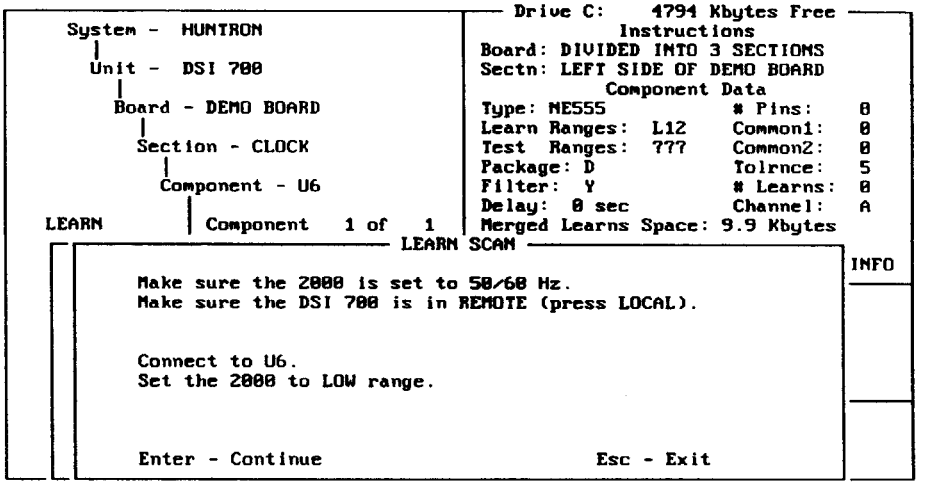


Figure 5-39. LEARN SCAN Prompt for U6, Low Range.

When the DSI 700 has finished scanning, the LEARN results window will appear and display the active keys.

If you wish to look at the signatures for U6 before storing, press **V**.

After inspection, press S to store signatures and return to the LEARN component screen.

Look at the Component Data box on the LEARN component screen. Since this component is using the Autorange Select feature, TEST range has changed to PIN to indicate that pin info is present. The Autorange Select feature selects a single test range for each pin of U6.

Press Esc to go back to the Section selection screen. You are now ready to LEARN the last section of the demo board.

LEARNING THE LOGIC SECTION

Select LOGIC, then press ↵. The selection window now shows component names and instructions.

There are 5 components in this section.

Remove the 8 pin DIP clip from U6 of the previous section if you have not already done so. Remove the 8 pin DIP clip from the 20 conductor cable. Locate the 16 pin DIP clip and attach it to the cable. Make sure that the colored edge of the cable is flush with the edge of the DIP clip.

The first component to be learned is U1. Verify that this IC is highlighted on the Component selection screen.

Place the 16 pin DIP clip on U1. Make sure that the colored side of the cable (i.e. DIP clip pin 1) is aligned with pin 1 of U1.

To start learning U1, press ↵. Follow the prompts in the LEARN SCAN window to scan U1 in each required range. After the LEARN results window appears and displays active keys, you are ready to store the signatures. Press S to store and continue to the next component.

Attach the DIP clip to U2, aligning DIP clip pin 1 with pin 1 of U2.

To start learning U2, press ↵. Follow the prompts in the LEARN SCAN window to scan U2 in each required range.

Press S to store data and continue to the next component.

Attach the DIP clip to U5, aligning DIP clip pin 1 with pin 1 of U5.

NOTE

Although U5 is a 14 pin component, you can use a 16 pin DIP clip on a 14 pin IC as long as pin 1 of the IC is aligned with pin 1 of the DIP clip (DIP clip pin 1 is the one connected to the striped wire of the test cable).

To start learning U5, press ↵. Follow the prompts in the LEARN SCAN window to scan U5 in each required range.

Press S to store data and continue to the next component.

Attach DIP clip to U4, aligning DIP clip pin 1 with pin 1 of U4.

To start learning U4, press ↵. Follow the prompts in the LEARN SCAN window to scan U4 in each required range.

Press S to store data and continue to the next component.

The last component of this section is a 24 pin IC. You will need to change the DIP clip and cable for this component. Locate the 24 pin DIP clip and the 40 conductor DIP clip cable. Remove the 16 pin DIP clip and 20 conductor cable from U4 and the channel A IDC socket. Assemble the 24 pin clip to the 40 conductor cable. Plug the 40 conductor cable into the channel A IDC socket.

Attach the DIP clip to U3, aligning DIP clip pin 1 with pin 1 of U3.

To start learning U3, press ↵. Follow the prompts in the LEARN SCAN window to scan U3 in each required range.

Press S to store data and press **Esc** to return to the section selection screen. Press **Esc** two times to return to the Main menu. You have now completed storing signatures for the demo board and are now ready to proceed to TEST where you can perform comparison testing.

NOTE

A keystroke short cut to return to the Main menu is to press Alt+M. Refer to Appendix C of this manual for a complete listing of all keystroke short cuts.

5-9. TESTING COMPONENTS ON THE DEMO BOARD

In this section, you will learn how to test suspect components and match their signatures against known-good signatures.

NOTE

Before testing these components, change the switch setting to the DOWN, or CLOCK OFF position to simulate failed conditions. Some of the component signatures will vary; others will not. Using the DSI 700, you can isolate those components which have different signatures.

From the Main menu, move the selector to TEST, then press ↵.

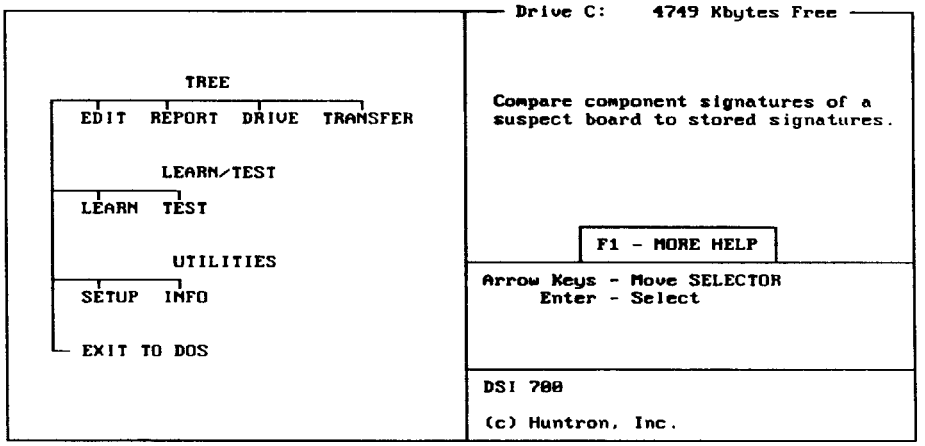


Figure 5-40. Selecting TEST Mode from Main Menu.

Select DEMO BOARD, then press ↵.

Section names and instructions will appear. Select LOGIC section, then press ↵.

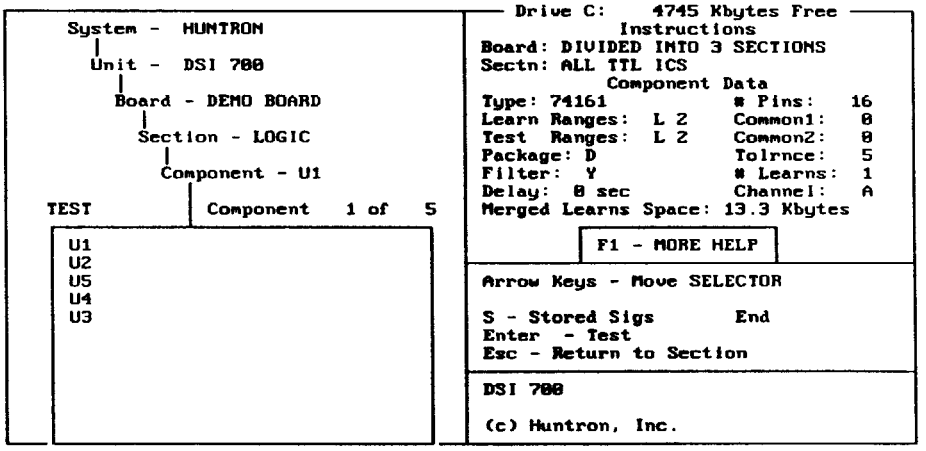


Figure 5-41. Logic Section TEST Screen.

Attach the proper DIP clip and cable to U1 according to instructions, making sure U1 pin 1 is aligned with pin 1 of the DIP clip.

To test U1, press ↵. After the Component Instructions appear, press ↵ again. The TEST SCAN window will appear in the middle of the screen. Follow the prompts in the window to scan U1 in each required range.

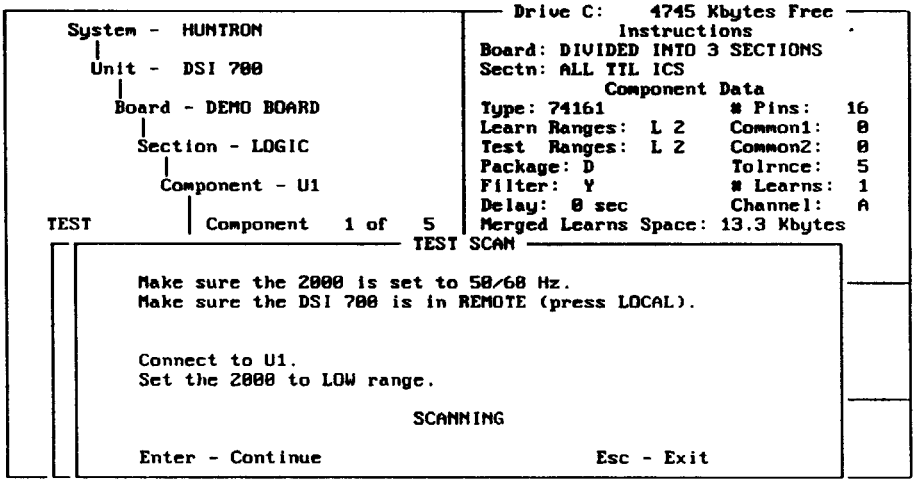


Figure 5-42. Testing U1 on the Demo Board.

When the DSI 700 is done testing, the TEST results window will display "1 DIFFERENT PINS".

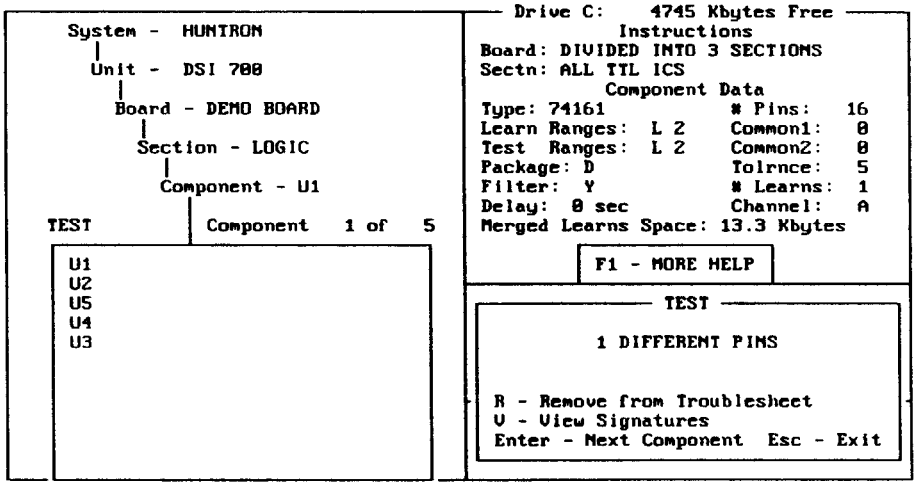


Figure 5-43. Test Results for U1 on the Demo Board.

VIEWING COMPONENT SIGNATURES

Take a look at the results before continuing. Press **V** to examine the signatures for U1 on the view TEST SIGNATURES screen.

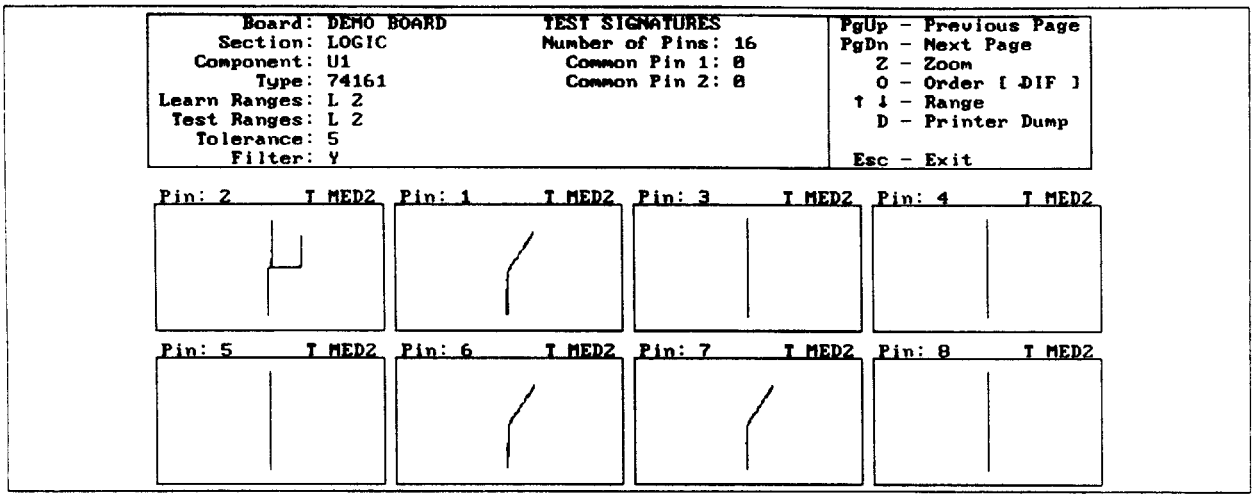


Figure 5-44. TEST SIGNATURES for U1, ORDER = DIF.

Each box contains two overlaid signatures. On your computer monitor, the green signature is the stored or LEARN signature and the red is the TEST signature.

The indicators above each signature box are color coded to help in quick visual analysis of signatures. The pin number, which appears to the right of "Pin:", is green if the pin was equivalent in all selected test ranges. The pin number is red if any selected test range was different. The range indicator (above the right side of the box) is red if the signature of that range was different and green if the signature was equivalent. So you can tell which pins are different by looking for red pin numbers and then see exactly which ranges were different by looking for red range indicators.

Signature order is set to DIF in the figure above so signatures of the pins are displayed in order of difference, from greatest to least. Since U1 only has one different pin, when order is set to DIF, pin 2 is displayed first and the remainder of the pin signatures are displayed in ascending numerical order. Signature order is set to NUM in the figure below so signatures of the pins are displayed in ascending numerical order (i.e. pin 1, 2, 3, ...16).

NOTE

DIF will display pins in order of greatest differences between LEARN and TEST signatures in the most different range.

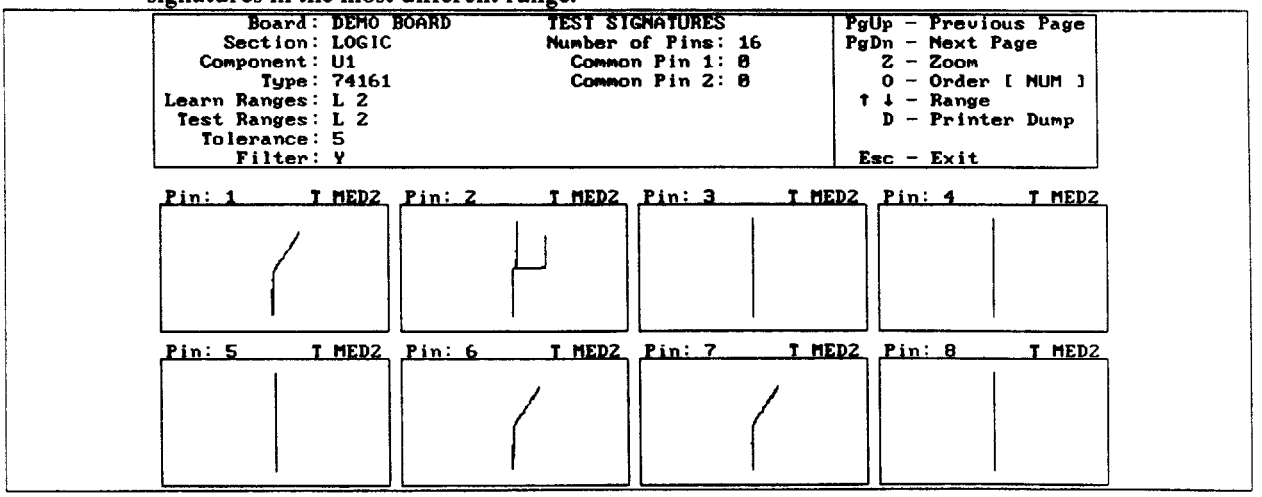


Figure 5-45. TEST SIGNATURES for U1, ORDER = NUM.

You can also view the signature differences in different ranges. Press ↓ to see how the signatures change in the Low range.

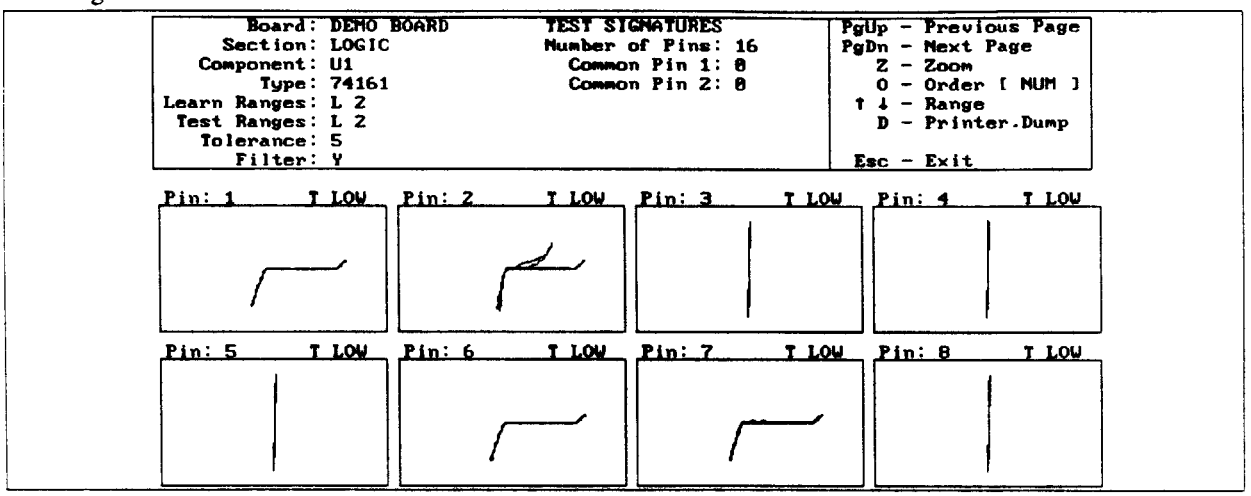


Figure 5-46. TEST SIGNATURES Screen for U1 in LOW.

Press O to return to the ORDER = DIF screen.

ANALYZING A SIGNATURE IN THE ZOOM SCREEN

Press Z to magnify the signature of Pin 2 250%.

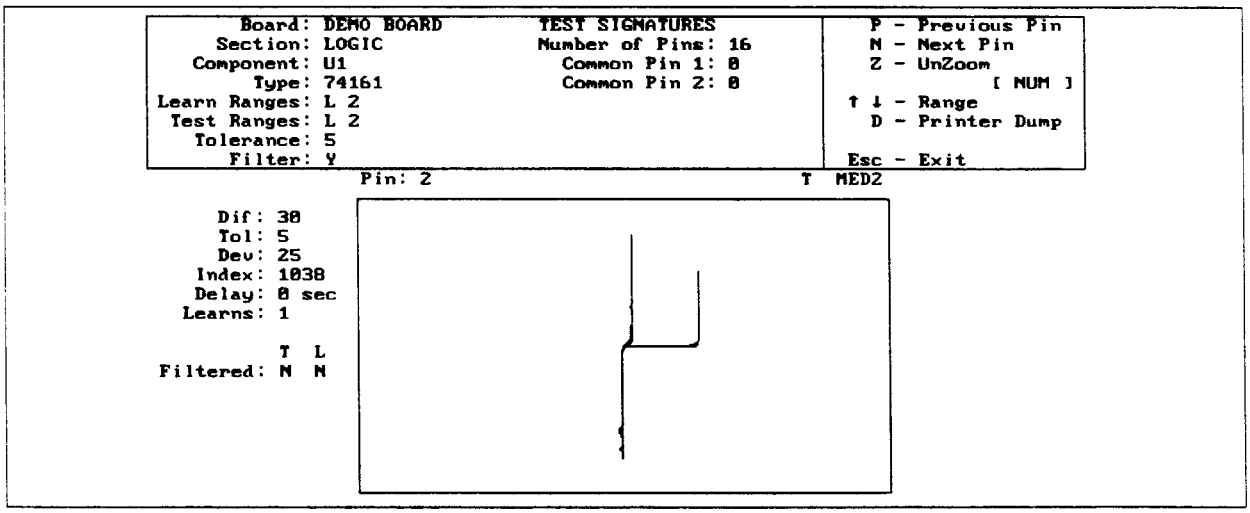


Figure 5-47. Zoom Signature Screen of U1 - Pin 2.

NOTE

When performing a LEARN or TEST on your own Demo Board, the test results may not be the same as in this tutorial. This may be due to variations in components used in the manufacturing of the board. Refer to Section 5-12 of this chapter for more discussion on this topic.

Look on the left side of the screen. A column of annunciators are displayed which show various parameters of the signature. Starting from the top:

Dif: 30

This number indicates the largest difference between the LEARN and TEST signature data points. If the pin/range was equivalent this number shows how close it was to being marked DIFFERENT (i.e. when DIF is greater than TOL).

Tol: 5

This is the TEST margin within which a component is still equivalent when being tested. The tolerance setting was selected in EDIT. In this case, the DIF value of U1 - pin 2 has exceeded this number.

Dev: 25

This number is the amount that DIF exceeds TOL and is the value that determines whether a signature is DIFFERENT or EQUIVALENT. When DIF is equal to or less than TOL, DEV is zero and the signature is EQUIVALENT because no data points have "deviated" outside the band of acceptable values formed by the LEARN signature and the value of TOL. When DIF is greater than TOL, DEV is equal to DIF minus TOL and the signature is DIFFERENT. In this example DIF was 30 and TOL was 5 so DEV is 25. This information helps to interpret the degree of failing or defective components. The larger the DEV number the more likely the component is defective.

Index: 1038

This number shows the total sum of all the deviations of the TEST signature data points from the LEARN signature data points. This information helps to interpret the degree of failing or defective components. A bigger INDEX means that there were more deviations found. So a component with INDEX = 1038 is more likely to be defective than one with INDEX = 300 even if DEV is the same. When Signature Order is set to DIF, the Index is used to sort all different signatures from largest index to smallest index.

Delay: 0 sec

This indicates that the test was made with no delay selected.

Learns: 1

This number denotes how many times this particular component has been learned.

Filtered: N

The signature was not processed through the filter algorithm.

The "T" and "L" columns above "Filtered" show TEST and LEARN status respectively.

Press Esc to return to the TEST results screen. To retest a component you just tested, press Esc to return to the component selection screen. For now, press ↵ to go to U2, the next component in this section.

Remove the DIP clip from U1 and attach it to U2 according to instructions, making sure pin 1 is aligned with pin 1 of DIP clip.

To test U2, press ↵. After the Component Instructions appear, press ↵ again. The TEST SCAN window will appear. Follow the prompts in the window to scan U2 in each required range. When finished, the TEST results window will display "1 DIFFERENT PINS".

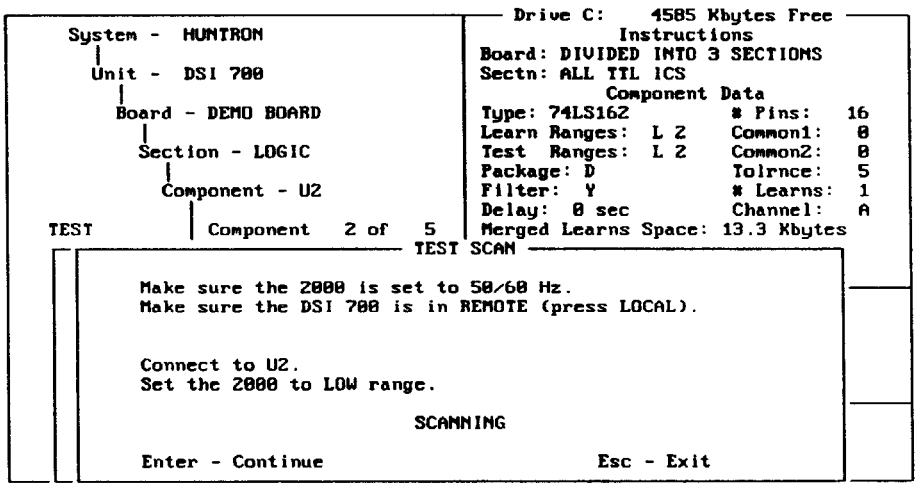


Figure 5-48. Testing U2 on the Demo Board.

You can inspect signatures by pressing V. When done, continue to the next component by pressing ↵.

Remove the DIP from U2 and attach to U5 according to instructions, making sure pin 1 is aligned with pin 1 of DIP clip.

Press ↵ to start scanning. After the Component Instructions appear, press ↵ again. The TEST SCAN window will appear. Follow the prompts in the window to scan U5 in each required range. When finished, the TEST results window will display "EQUIVALENT". Continue testing, press ↵ to move to the next component.

Remove the DIP clip from U5 and attach to U4 according to instructions, making sure pin 1 is aligned with pin 1 of DIP clip.

Press ↵ to start scanning. After the Component Instructions appear, press ↵ again. The TEST SCAN window will appear. Follow the prompts in the window to scan U4 in each required range. When finished, the TEST results window will display "EQUIVALENT". Continue testing, press ↵ to move to the next component.

NOTE

While the DSI 700 is scanning, you can abort the test by pressing Esc. The program will return to the TEST component screen.

Remove the DIP clip from U4. The next component is a 24 pin IC and requires a different DIP clip and cable. Remove the 16 pin DIP clip and 20 conductor cable from the channel A IDC socket and plug in the 24 pin clip and 40 conductor cable you used previously in LEARN. Attach the test clip to U3 according to instructions, making sure pin 1 is aligned with pin 1 of the DIP clip.

Press ↵ to start scanning. After the Component Instructions appear, press ↵ again. The TEST SCAN window will appear. Follow the prompts in the window to scan U3 in each required range. When finished, the TEST results window will display "EQUIVALENT".

You have now completed testing the logic section of the demo board. Press ↵ to return to the TEST component screen. The program will move back to the first component of this section (i.e. U1).

Press Esc to return to the section level.

5-10. PRINTING A TROUBLESHEET REPORT

After testing, you can print out a Troublesheet Report which summarizes test results. Make sure your printer is connected and on-line.

Press **T** to activate the Troublesheet report pop-up window. At the Troublesheet serial number pop-up window, you can type in a serial number for the board that has been tested. This feature takes the serial number of the board. Press ↵ if no serial number is desired or any keys up to 20 characters (maximum).

Once you have entered a serial number for the board, press **P** to select the Print Troublesheet mode. You can choose between two types of reports. The Simple Troublesheet report lists the failed components with only their names, type, number of pins, common pins, test ranges, filter, failed pins. The Detailed Troublesheet report contains all the information on the Simple report plus fail range, tolerance, deviation, and area for each failed pin. Both reports also include a summary at the end that lists the number of components found different and equivalent, and the number of components removed from troublesheet (see the next section for information on removing a component from the Troublesheet report).

```
------------------------------ TROUBLESHEET ------------------------------
                                SECTION
  Date: 2-1-1993      Serial No.: 1234567                        Page: 1
 System: HUNTRON
   Unit: DSI 700
  Board: DEMO BOARD     DIVIDED INTO 3 SECTIONS

             Component      * SIMPLE PRINTOUT *
Section      Name  Type          #P C1 C2 Ranges F Pins
-------------------------------------------------------------------------

LOGIC        U2    74LS162       16  0  0 L 2    Y 2

LOGIC        U1    74161         16  0  0 L 2    Y 2
```

Figure 5-49. Simple Troublesheet for Logic Section.

```
------------------------------ TROUBLESHEET ------------------------------
                                SECTION
  Date: 2-1-1993      Serial No.: 1234567                        Page: 1
 System: HUNTRON
   Unit: DSI 700
  Board: DEMO BOARD     DIVIDED INTO 3 SECTIONS

             Component      * DETAIL PRINTOUT *
Section      Name  Type          #P Ranges Pin  F C1 C2 Range Tol  Dev Index
-------------------------------------------------------------------------

LOGIC        U2    74LS162       16 L 2    2    Y  0  0 MED2    5   25  1007

LOGIC        U1    74161         16 L 2    2    Y  0  0 MED2    5   25  1006
```

Figure 5-50. Detailed Troublesheet for Logic Section.

5-11. REMOVING A COMPONENT FROM THE TROUBLESHEET

A helpful feature in TEST is the ability to prevent a component that has been tested from being listed on the Troublesheet. For example, after examining signatures of a component that were found to be DIFFERENT, you determine that these signatures are really fine because the test tolerance was set too low.

Go back to the component level, move the selector to U1 and press **T**. This will redisplay the Test results window. Press **R**. The TEST results window will display "Removed". Notice that in the active keys list, "R - Remove component" has changed to "R - Restore to Troublesheet" in the window. If you wish to unremove the component, press **R** again. Verify by watching the TEST results window for the correct message. The Troublesheet report will note any components that were removed. You can also remove components in the Troublesheet mode. Press **Esc** to continue. Print the Troublesheet to see this feature.

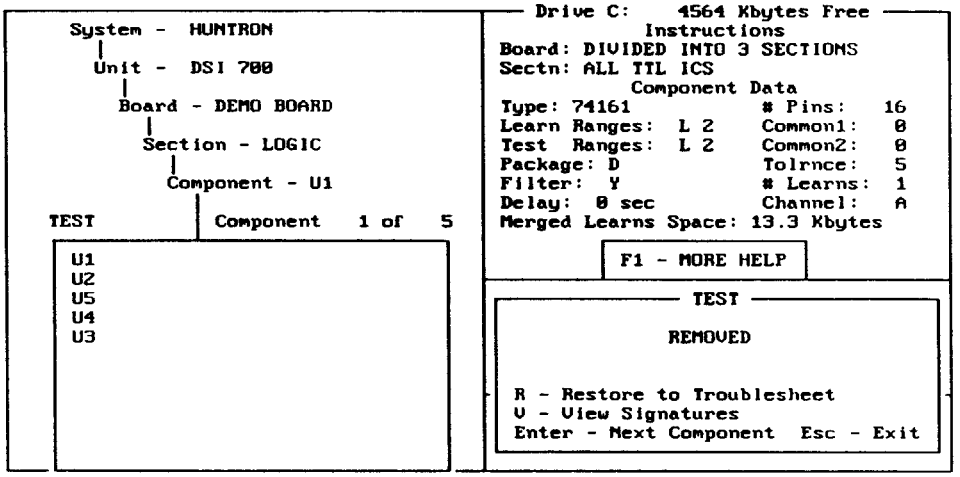


Figure 5-51. Removing a Component from Troublesheet.

You have completed testing the logic section of the demo board. The remainder of the testing for the power supply and clock sections are left up to the user. Using the previous logic section test as a guide, select each section and components and perform a TEST. Afterwards, continue the tutorial starting with the next section.

5-12. MERGING COMPONENT SIGNATURES

Analog signatures for components are unique and they can be compared for differences between a known-good component and a suspect component. Differences not only exist for suspect components but also between different known-good components. This is due to normal process variations of a manufacturer between batches of ICs, and variations in IC designs for the same part from multiple manufacturers or even a single manufacturer.

When the DSI 700 compares and finds signature differences, it is difficult to discern just by using a single TEST tolerance value whether the found differences are caused by physical failures or are just due to the variations listed above. In order to account for this situation, the DSI 700 gives you the ability to combine or "merge" good signatures. Thus, an equivalence band will be created from the merged signatures and used in testing suspect components. If the TEST signature falls within this equivalence band of stored signatures plus the tolerance, then it is probably fine. If the TEST signature is outside the merged signature plus the tolerance, then the component is most likely defective.

The following is an example of "merging" a component's signatures. We'll use the demo board and practice on U1 of the logic section.

To "MERGE" signatures, return to the LEARN mode. If you are at the Main menu, select LEARN, press ↵ and select the logic section of the demo board. If you are still in TEST, return to the component selection screen. Then you can jump quickly to LEARN mode by pressing **Alt+L** to activate the LEARN mode short cut (see Appendix C in this manual for a complete listing).

Remove any DIP clips from the demo board. Connect the 16 pin DIP clip and cable assembly to the channel A IDC socket on the DSI 700. Make sure the colored edge of the cable is aligned with pin 1 of the IDC connector. Attach the DIP clip to U1 and check to see that the clip is properly seated on the component. Also, make sure that U1 pin 1 is aligned with pin 1 of the DIP clip.

The stored signatures for U1 were created with the switch on the demo board in the CLOCK ON position so by turning this switch to the CLOCK OFF position, a different signature will result on pin 2 (see previous section on testing components). Turn the switch to the CLOCK OFF position.

Select U1 and note that the # of Learns = 1 since this was done in a previous section, and then press ↵ to start scanning. When done, the LEARN results window will display "1 Different Pins".

Press **V** to inspect these signatures. Pin 2 has two distinctive signatures. Press **Esc** to return to the LEARN results screen.

To MERGE signatures, press **M**. The Merge signature warning pop-up window appears on your screen.

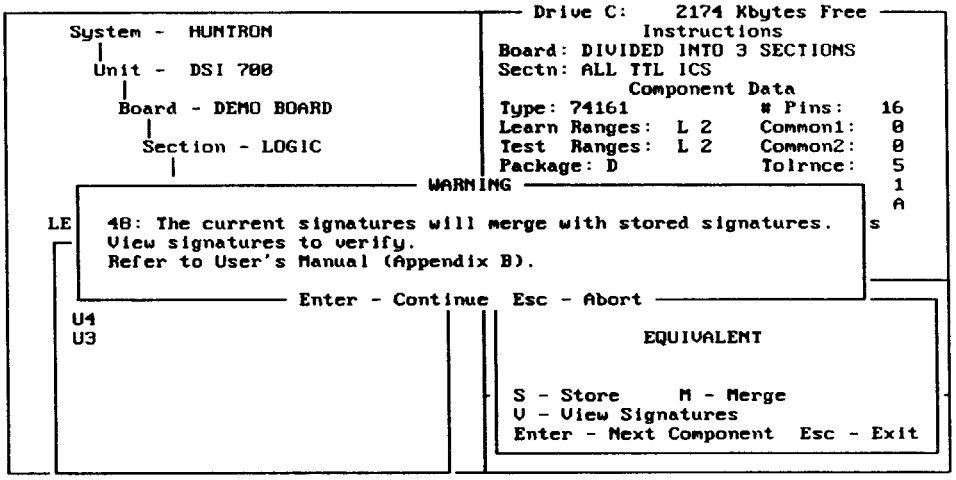


Figure 5-52. Merging Signatures for U1.

Press ↵ to activate. When the program is done, the display will return to the LEARN component selection screen with the next component, U2, highlighted.

Press ↑ to select U1 again and notice that the # of Learns = 2. Press **S** to look at the stored signatures and observe that pin 2's stored signature is a composite.

To verify the merged signature and obtain more practice using your DSI 700, go to TEST (use the shortcut **Alt+T** key). Retest U1 with the switch on the demo board set to both positions. The TEST signature should be equivalent to the stored signature in either switch position.

IMPORTANT NOTE

Signatures for known-good components can be continually merged to form a better model of a composite equivalence band to take account of normal variations due to manufacturing processes or design differences of the same IC from different manufacturers. When merging signatures, if the new signature falls within the equivalence band defined by the stored merged signature, then the stored signature will not be updated. However, if the new signature falls outside of the equivalence band, then a new merged signature is created and stored using the new signature to redefine the boundaries of the equivalence band.

You cannot selectively remove a single signature out of a merged signature. So always make sure the new signature is good by careful inspection and analysis before merging signatures.

You are now ready to return to the Main menu, so press **Alt+M**.

5-13. SUMMARY

The results you have obtained in this exercise show that for the logic section, U1 and U2 had different signatures which were induced by throwing the switch on the demo board. If this had been a real troubleshooting situation, those results would tell you that at least one of the two components should be replaced. After any device is replaced, the board should then be given a functional power-on test to verify that the problem is fixed.

The DSI 700 often points out several devices as being different, from most different to least different. Begin by replacing the most different components, then do a power-on test. If the problem is still not fixed, try replacing the next most different component until you have a functional board.

For more practice with the DSI 700, return to TEST mode and complete testing on the power supply and clock sections of the demo board. You can also go back to EDIT and define a new system. For example, make the demo board a single section and enter all the components on the board into it.

For more information on subjects not covered in detail by this exercise, refer to Chapter 6 and the appendices in the back of this manual.

NOTES:

CHAPTER 6
SOFTWARE REFERENCE

6-1. INTRODUCTION

This chapter serves as the DSI 700 software reference guide. The following sections will give you a summary of various menus and modes including a brief description and examples where applicable. For more information on how to use your DSI 700, refer to other chapters or the appendices in this manual or contact Huntron.

6-2. COMPONENT PIN INFORMATION

This feature allows separate settings of some of the component data fields enabling different values for each pin. Pin information can be created or edited for the current component by pressing **P** at the component level of EDIT. Eight pins are then shown in one window and the arrow keys plus the Tab key can be used to select which information to change. Use the **PageUp** and **PageDown** keys to select the page to edit when the component has more than eight pins. The lowest active LEARN range, common pin(s), filter setting, and tolerance that were set when the component was added become the default settings for each pin in the pin information file. An example of component pin information is located at the end of this section.

NOTE

If the TEST ranges are not set to "PIN" or "???" and no component data field is set to "*", the pin information for the current component can be deleted by pressing D at the component level of EDIT.

NAME PER PIN

Each pin of a component can be given a unique name with up to 3 alphanumeric characters. This name will be used in place of the pin number throughout the software (except in the LEARN SCAN and TEST SCAN windows which display both). This allows the user to use symbolic names such as DI1, OUT, and A21 instead of pin numbers 1, 2, and 3. The pin names default to the corresponding pin number of a component if no symbolic name is used. Pin names must be unique so that you can distinguish which pin is being referred to.

RANGE PER PIN

Components with test ranges of "PIN" or "???" (see TEST Autorange Select) allow each pin to be given an individual TEST range. For components with LEARN ranges of "PIN" this individual range is also used for learning.

TEST AUTORANGE SELECT

This feature selects a single range to test each pin of the component based on the LEARN signatures. The component will be learned in ranges "L12" or "L12H". If a particular pin is found to be more accurately tested in a different range, the pin information entry window can be used to select the new range. The component can then be tested in this new range without relearning the component.

The algorithm sets the TEST range to MED 2 unless it finds LOW or MED1 to be a better impedance match.

When the component signatures are stored, the range information is then stored in the pin information file. At this point the TEST ranges are changed from "???" to "PIN".

You can re-autorange on a later LEARN by editing the TEST ranges back to "???". Then the next LEARN will be used to determine the TEST range per pin information.

COMMON PER PIN

Each pin can be given separate common pin values. This is mainly used to support 5100DS/RP388 boards that have been converted to DSI 700 format.

FILTER PER PIN

Each pin may have the filter set to "Y" or "N". Since the filter algorithm is designed for certain types of oscillating signatures, pins that are stable on a given IC can be set to "N" while oscillating pins are set to "Y".

TOLERANCE PER PIN

Each pin can have a different test tolerance value. This option may be useful when some pins of a component have a greater or lesser signature difference than the rest of the pins and are still considered acceptable. For instance, a component with some of its pins connected to passive or linear devices may require a higher tolerance to take into account greater electrical and physical variations. The remainder of the pins of this component may be connected to other similar pins of other components that need a lower tolerance setting. Tolerance per pin allows the user to address the situation when a single tolerance for a multi-pin component may not be sufficient to identify possible failures during testing. The allowable Tolerance value is between 0 and 99.

PIN INFORMATION EXAMPLE

The following is an example of how to create a component using the per pin features just discussed.

1. Start up the software by typing "**DSI**" ↵.
2. At the Main menu, select EDIT by pressing **E**. Before any pin information can be entered, a component must be created.
3. In the EDIT selection screen, choose the board/section you wish to add a component to or create a new board/section for this component.
4. Go to the EDIT component selection screen and press **A** to add a component.
5. For this example, we will enter an 8 pin IC. Type the following into the component entry window until it matches what is shown in Figure 6-1.

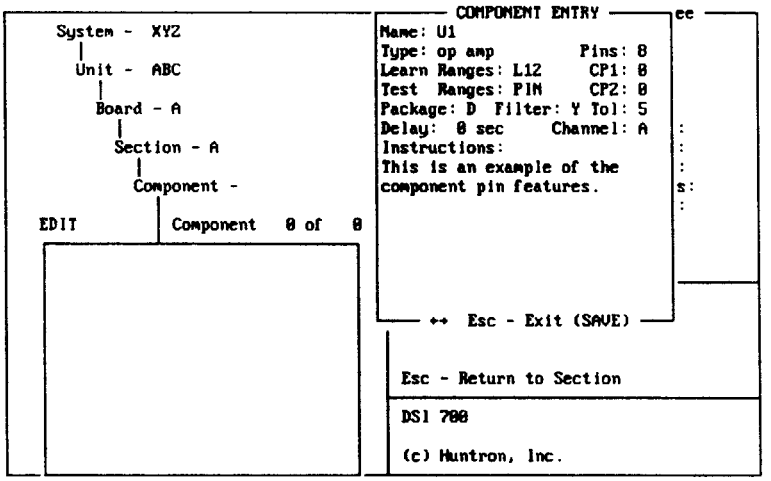


Figure 6-1. Component Entry Pop-up Window.

Name: **U1**

Type: **op amp**

Learn Ranges: **L12**

Test Ranges: **P** (changes to "PIN")

Package: **D**

Filter: **Y**

Pins: **8**

CP1: **0**

CP2: **0**

Tol: 5

Instructions: **This is an example of the component pin features.**

NOTE

When entering range information for LEARN in the component entry window, you can choose a single range (LOW, MED 1, MED 2, HIGH), multiple ranges, or PIN. When entering range information for TEST in the component entry window, you can choose a single range, multiple ranges, PIN, or ???. If you select PIN TEST ranges, then the pin entry "Range:" must be one of the LEARN ranges and that range will be used in TEST. If you select PIN LEARN ranges, then the pin entry "Range:" will be the same single range used for LEARN and TEST.

6. Press **Esc** and **Y** to save and exit back to the EDIT component screen. Note that "PIN INFO" is displayed just to the right of the HELP box. Also, look at the Active Key box and see that "P - Pin Info" is displayed.

7. Make sure U1 is still selected and press **P** to activate the EDIT PIN ENTRY pop-up window.

8. This pop-up window allows you to enter data for the component eight pins at a time. Note that the defaults are shown on the line under the column headings and that all eight pins are set to the default component data (see Figure 6-2).

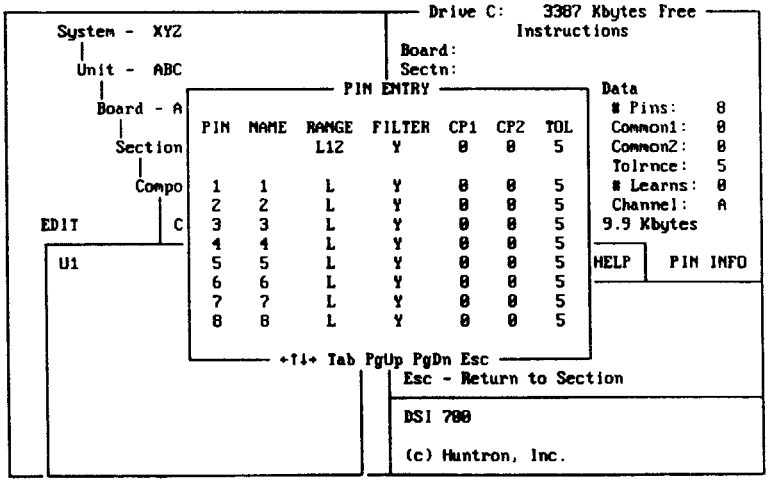


Figure 6-2. Pin Entry Pop-up Window for U1.

9. Note that the cursor is at the NAME field for Pin 1. Type in "**OS1**" (offset pin #1) and then press **Tab** (or ↵). The cursor will move to the RANGE column. Type in "**1**" to select the Medium 1 range for this pin and press **Tab** again. For the last four columns, type in "**Y**", **Tab**, "**0**", **Tab**, "**0**", **Tab**, and "**5**" (note that all you really need to do is press **Tab** three times to accept the default values). This completes pin information entry for Pin 1. Press **Tab** to move the cursor back to the NAME column and then press ↓ to move the cursor to the NAME field of Pin #2.

10. In the same manner as step #9, type in the following data for pins 2 through 8 (the comma will denote the **Tab** key):

Pin 2: **IN+, 2, Y, 0, 0, 5,↓**

Pin 3: **IN-, 2, Y, 0, 0, 5,↓**

Pin 4: **V-, L, Y, 0, 0, 10,↓**

Pin 5: **OS2, 1, Y, 0, 0, 5,↓**

Pin 6: **OUT, 2, Y, 0, 0, 5,↓**

Pin 7: **V+, L, Y, 0, 0, 10,↓**

Pin 8: **NC, 2, Y, 0, 0, 5**

Figure 6-3 shows the pin entry window after entering the data above.

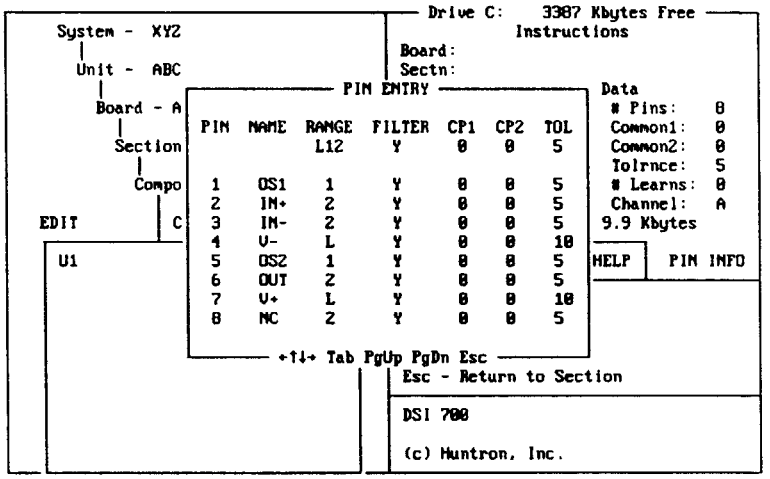


Figure 6-3. Pin Entry Pop-up Window after Data Entry.

If this had been a component with more than eight pins, you would press **PageDown** at this point to go to the next set of eight pins.

11. Press **Esc**, then **Y** to save and exit.

At this point if you were to learn U1 the following would happen: the DSI 700 would learn all the pins in L12 (since the pin entry for range only controls the TEST range in this example) and all pins would have Tolerance set to 5. In other words, the component pin information that you just entered would be ignored. This is because there is one more step to activate the use of PIN INFO. You must go back into the EDIT COMPONENT ENTRY window and change Tolerance to an asterisk (*).

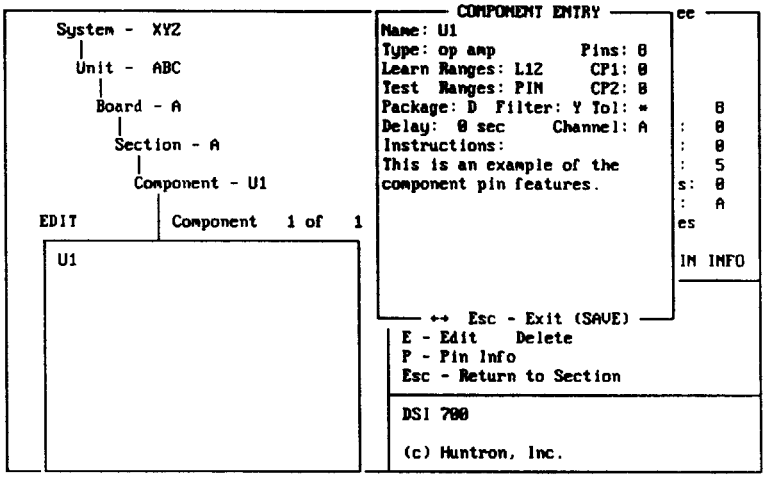


Figure 6-4. Component Entry: Tolerance = Asterisk.

The asterisk tells the software to look in the PIN INFO file for the setting per pin instead of using one setting for all the pins. If at a later time you want to go back to a global setting, you can edit the component and change the "*" back to a letter or a number. This does not change the PIN INFO file at all so you can essentially turn each one ON and OFF. Keep in mind that only the test ranges and the tolerance can be changed in PIN INFO (just as with global settings) without the need to relearn the component. In the TEST range field it is "PIN" that activates the PIN INFO file so that editing "PIN" to "L2" for example will cause the test range per pin information to be ignored.

Another method of component pin information entry is to put the asterisks in the component data fields when you are first adding the component to the section. When you do this, the default values that all pins are set to are: Range - 2 (Medium 2), Filter - Y, CP1/CP2 - 0 and Tol - 5. In the previous example these settings would be a good place to start entering the unique information for each pin.

To change a whole column of Pin Info, press the Shift key and the ↓ key at the same time. This combination sets the rest of the column (up to the number of pins) to the current value. For example, if you were on Pin 5 in any column, then **Shift** + ↓ would not affect pins 1 through 4 but would change pins 6 through 8 to the current setting of Pin 5. In a similar way **Shift** + ↑ would change pins 1 through 4 to the setting of Pin 5 and leave pins 6 through 8 unchanged. So the **Shift** + ↓ and **Shift** + ↑ key combinations allow you to change a whole column from the current position to the last pin or to the first pin, respectively.

6-3. GLOBAL CHANGE

The GLOBAL CHANGE, **Alt+C** allows you to change component data settings for an entire section. This is useful for cases where a lot of data was entered incorrectly. Let's say you wanted a Test Tolerance of 15 for all components in a section but you forgot to change the tolerance for the first component (left it set to the default, 5) and then used **Alt+B** (Build) to duplicate that first component's data multiple times. **Alt+C** can change every 5 to a 15 with a few keystrokes. Another example of the usefulness of this feature is the conversion of 5100DS based data to DSI 700 data, especially when the 5100DS data has common pins that are not set to zero and you want to use the DSI 700 which usually needs all common pins set to zero so that a discrete lead can be clipped to a common point on the board to be tested.

The changes caused by **Alt+C** are permanent unlike the **Alt+Q** quick change which does a temporary change of component test parameters for the current test. The following figure shows the GLOBAL CHANGE pop-up window that is activated by **Alt+C** at the section level of EDIT.

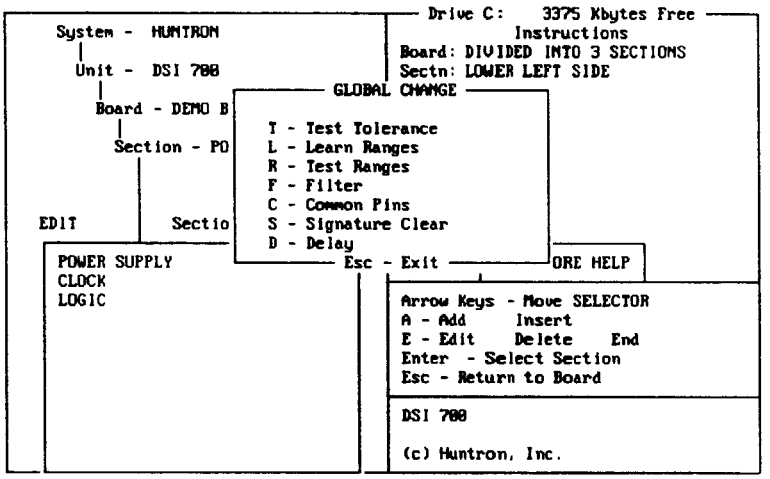


Figure 6-5. Global Change Pop-up Window.

An important factor when making these changes is that your signature data will usually have to be deleted. This is because the component data affects the way signatures are gathered so that when a change is made the existing learned signature data is no longer valid. When you select one of the GLOBAL CHANGE options that causes signature deletion, you will be prompted with several warnings of what is about to happen before the changes and deletions actually occur.

The following paragraphs summarize what you can do with **Alt+C**:

NOTE

If components have an "*" (or PIN for range) in one or more of their data fields so that the PIN INFO file normally controls the setting per pin, the "*" is changed to the global value you enter. The PIN INFO file is not deleted however; it can still be used again by editing any setting back to an "*" (or PIN for range). If Alt+C is used to change a setting back to an "*", then any components in the section that do not have PIN INFO files will have them automatically generated.

TEST TOLERANCE

This allows you to change the test tolerance for all components in a section to a value between 0 and 99. Signature data is not affected.

LEARN RANGES

The learn ranges for all components in a section can be changed to L12, L12H or PIN. Any changes to the learn ranges on a component that has been learned will cause signature data to be deleted (after warning messages). If necessary, any test range settings of (H)igh will be changed to Med (2) in the Component Data or PIN INFO files.

TEST RANGES

The test ranges for all components in a section can be changed to any combination of ranges provided that each range has been learned for all the components. For example, if a section has three components which have learn ranges of L12H, L12 and 12H, you can globally change the test ranges to "1" or "2" or "12". Including "L" or "H" will result in an error since all three components were not learned in those ranges. You then have a choice of aborting the change or making the change on only those components that have valid learn ranges for the change. Signature data is not affected.

FILTER

You can change the filter setting for all components in a section to (Y)es or (N)o. If a component has a different setting (including "*") than what the section is being changed to, the signatures of that component will be deleted (after warning messages).

COMMON PINS

All common pin settings in a section can be set to zero by using this selection. If no common pins is a change from what a component was learned with, the signature data will be deleted (after warning messages).

SIGNATURE CLEAR

This allows you to keep all the Component Data and PIN INFO entered in the EDIT mode while deleting all learned signature data (after warning messages). The number of learns will be set to zero for all components in the section.

DELAY

All Delay settings in a section can be changed to a new value using this selection. Changing the Delay setting does not cause any signatures to be deleted.

6-4. DRIVE

This feature, activated at the Main menu by selecting DRIVE or pressing the **D** key, allows the user to select a different disk drive and/or path. All subsequent data will be written to and read from the new drive/path (except for temporary files which use a separate drive/path controlled by the SETUP program). When you select a path that does not exist, the program will create the path. When DSI.EXE is started, the current path is set to the startup path which is controlled by the SETUP program. The path used most often should be the startup path and then DRIVE can be used to switch to other paths. Each drive/path can contain up to 44 boards depending on the storage capacity of the disk. If a floppy is selected, the floppy disk containing the stored data can be used on other DSI 700 systems, and it can be archived and protected until the stored data is needed.

A drawback of running off a floppy is its limited storage capacity and slower operating speed. The maximum number of SYSTEMS/UNITS/BOARDS, SECTIONS, and COMPONENTS stored on a floppy is limited by the maximum storage capacity of the floppy. It is highly recommended that you use the highest capacity floppy drive in your computer if using this option. A minimum recommended storage capacity would be 720K (3.5 inch floppy) or 1.2M (5.25 inch floppy). In addition, you must be careful and make sure that the floppy has adequate capacity for the number of components to be stored (the **Alt+N** feature at the component level of EDIT mode is quite helpful).

Another disadvantage of running off a floppy disk is that typical operating speed of a floppy drive, compared to a fixed hard drive, is considerably slower. Therefore, using your computer's floppy drive will result in slower overall operation of your DSI 700 system.

The following table shows what typical storage capacities you can expect when using floppy diskettes with the DSI 700 (EDIT, LEARN, and TEST):

Table 6-1. Floppy Disk Storage for the DSI 700.

IC SIZE	RANGES	PIN INFO	NUMBER OF IC's PER DISK			
			FLOPPY DISK TYPE			
			5.25" 1.2MB	5.25" 360KB	3.5" 1.44MB	3.5" 720KB
64 pins	4	YES	11	3	13	6
16 pins	2	NO	92	27	110	55

NOTE

The maximum storage capacity for each type of floppy disk includes the troublesheet report file which is generated during testing.

The following is an example of the DRIVE feature:

1. Start up the DSI 700 system: type **"DSI"** ↵.
2. Press **D** which tells the program to switch to a different drive/path.
3. A pop-up window will appear as follows:

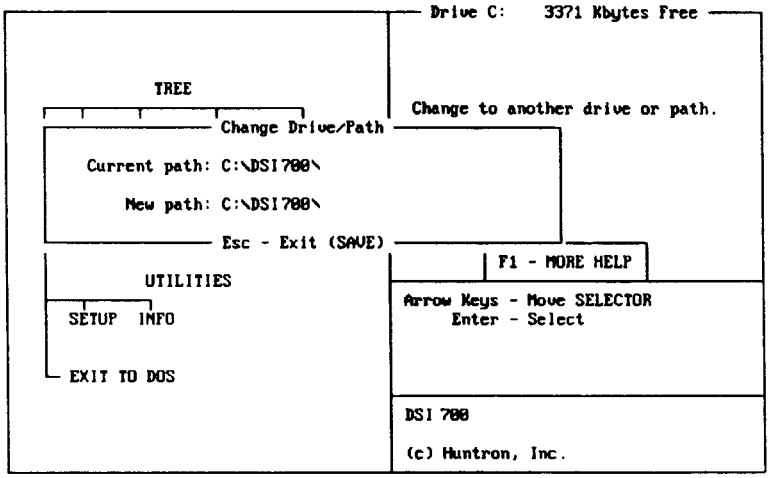


Figure 6-6. DRIVE Pop-up Window.

4. Type in the new drive/path **"C:\DATA\"** and press **Esc**.
5. Another pop-up window will appear asking "SAVE THE NEW PATH (Y/N)"? Press **Y** to save the new path (or switch to an existing path). Press **N** to return to the Main menu without changing from the original path.

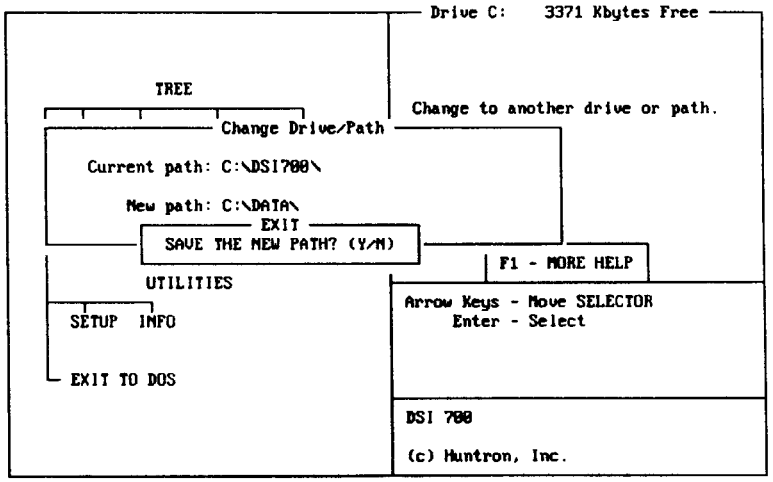


Figure 6-7. Save the New Path Prompt for DRIVE.

6. The program will return to the Main menu with the selected drive/path activated.

Proceed with the EDIT function to input your BOARD, SECTION, and COMPONENT information. See Chapter 5 for more information on EDIT. You can also RESTORE a board to the new path.

All data operations will be accessed from the selected drive/path for this current session.

IMPORTANT NOTE

If you exit from the DSI 700 program, the next time the DSI 700 program is started, it will go back to the SETUP startup path for data. You must use the "D" - DRIVE function to change the path in order to use the data that was generated by the DRIVE option.

6-5. INFO MODE

The INFO mode from the UTILITIES function of the Main menu is intended to help identify possible hardware and software compatibility problems that can arise when running the DSI 700 with your computer. It is activated at the Main menu by selecting INFO or pressing the **I** key. This mode provides useful information to Huntron Technical Support for solving these kinds of problems.

INFO displays detailed information about your computer's hardware and software configuration.

An example of a typical INFO screen is displayed below:

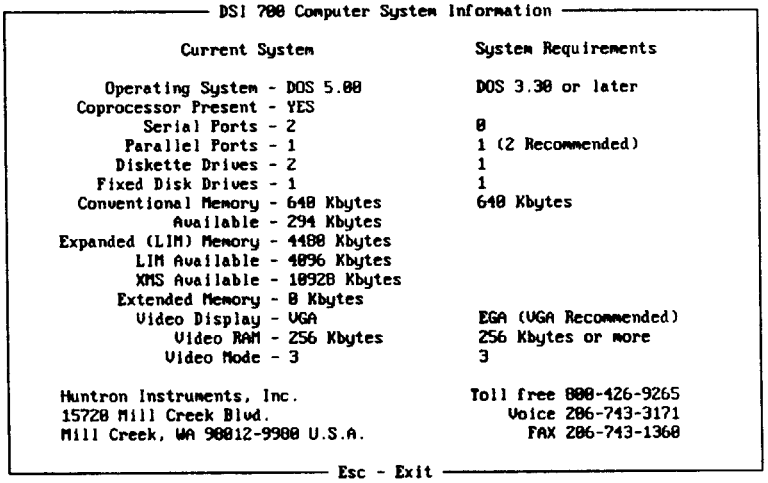


Figure 6-8. Typical INFO Screen.

The INFO screen displays the current state of your computer configuration and the computer system requirements that are needed in order to run the DSI 700. If any of the items displayed do not meet the system requirements, they will be highlighted.

When you need assistance from Huntron Technical Support on the DSI 700, run INFO and print this screen on your printer by pressing the **Print Screen** (or **Prt Sc**) key. This configuration information can be very helpful in solving any problems you may be having with your computer and the operation of the DSI 700.

6-6. TRANSFER MODE

The TRANSFER mode under the TREE function of the Main menu allows you to BACKUP or RESTORE the DSI 700 system information and signature database files for data protection, security, and transportability. You can also CONVERT 5100DS/RP388 boards into DSI 700 format. This mode is activated by selecting TRANSFER or by pressing the **F** key.

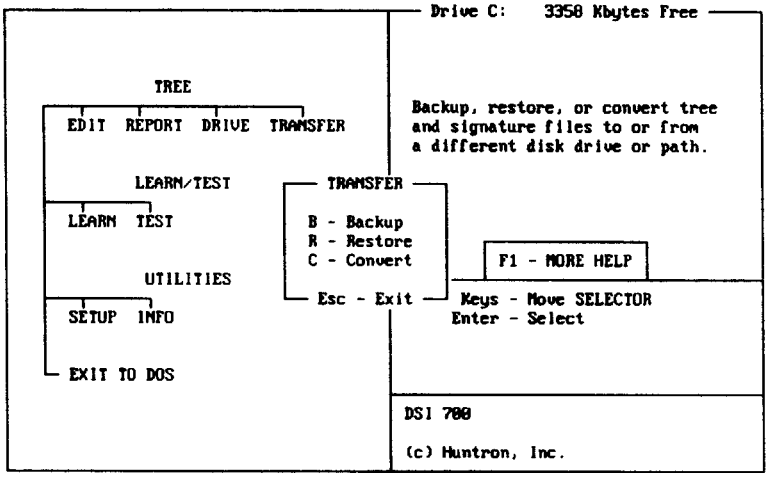


Figure 6-9. TRANSFER Pop-up Window.

BACKUP/RESTORE

BACKUP combines all files for a complete board into one file and creates a control file for the restore process. BACKUP and RESTORE can use any valid drive path combination. The two files are created on any drive or path you select. You can also compress the files so that less disk space is used. When using backup with floppy disks, each disk will be completely filled and then you will be prompted for another disk until backup is completed. The source files are not effected by backup.

There are three levels of compression used in backup, NONE, FAST and MAXIMUM. NONE is the fastest, but requires the most disk space. FAST is slightly faster than MAXIMUM, but requires slightly more disk space. MAXIMUM takes the longest to compress, but requires the least amount of disk space.

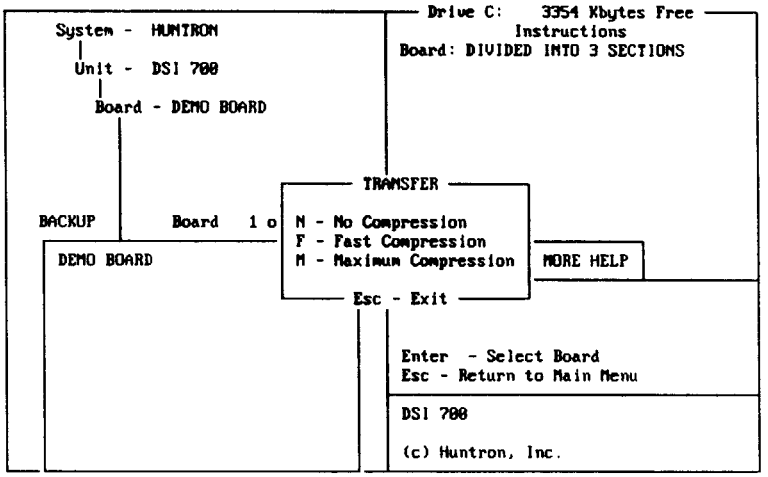


Figure 6-10. Compression Pop-up Window.

RESTORE reverses the backup process and recreates the original files. If you restore a board to a drive/path where a board with the same name exists, you will be prompted to rename the board being restored or overwrite the existing board.

The following is an example of using BACKUP and RESTORE.

BACKUP from hard disk to floppy disk(s).

1. Start up the DSI 700 system by typing "**DSI**" ↵.

NOTE

Be sure to have a supply of blank formatted floppy disks before starting the BACKUP to a floppy drive.

2. At the Main menu, select TRANSFER by pressing **F**. You will see the following screen:

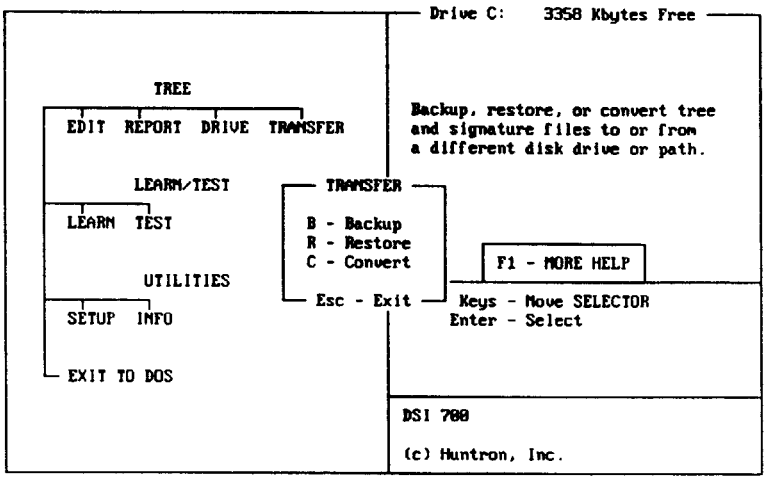


Figure 6-11. TRANSFER Pop-up Window.

3. Press **B** to access BACKUP. At the BACKUP board selection screen, select the DEMO board and press ↵.

4. For the first part of this example, we will BACKUP data from the hard disk to a floppy disk. Put a blank formated disk in floppy drive A. Type "**A:**" ↵ for "Path:" at the BACKUP destination path pop-up window to select drive A as the target.

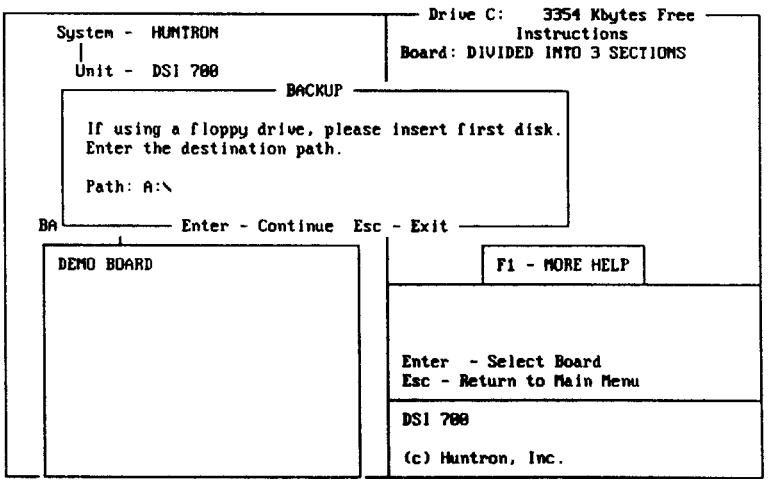


Figure 6-12. Backup Insert Disk/Enter Path Pop-up Window.

5. The Compression pop-up window will appear as shown in the next figure. Press F ↵ to choose the fast compression option.

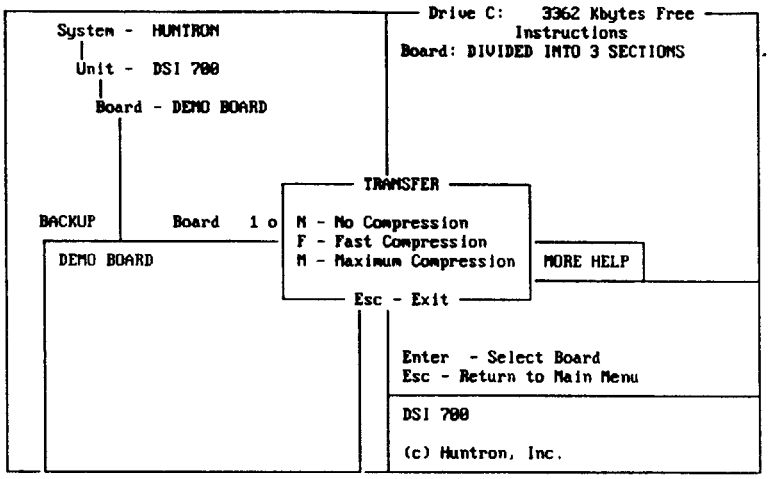


Figure 6-13. Backup Compression Options.

6. BACKUP will display a "Compressing..." pop-up window as shown below.

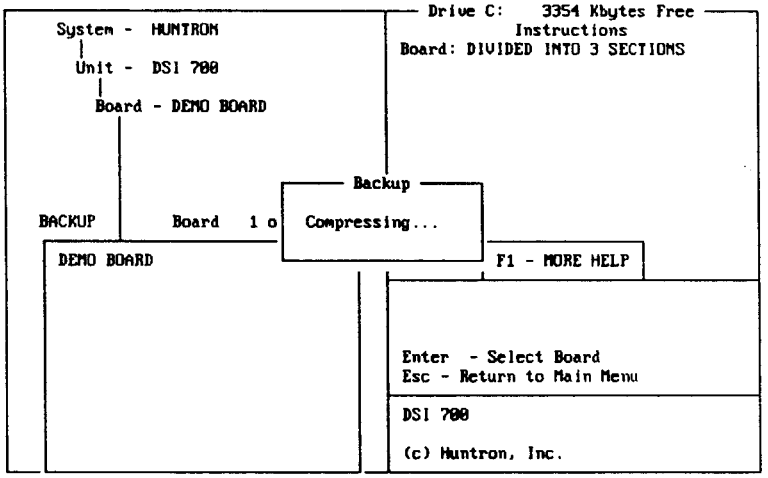


Figure 6-14. Backup - Compressing Pop-up Window.

7. BACKUP displays the message "Backing up board..." while the backup operation is being done.

8. When BACKUP is done, the "Backup has been completed" pop-up window will appear. Press **Esc** to return to the BACKUP board selection screen.

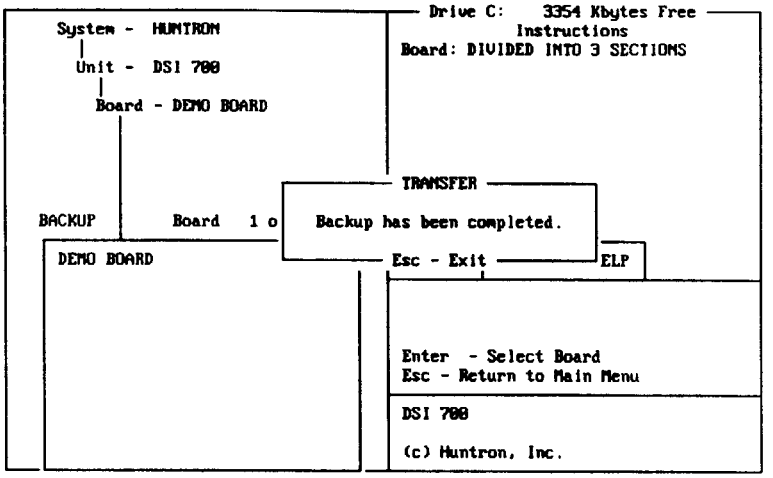


Figure 6-15. Backup Completed Pop-up Window.

9. Press **Esc** to return to the Main menu.

RESTORE from floppy disk to hard disk.

1. At the Main menu, press **F** to activate TRANSFER.
2. Press **R** for RESTORE. RESTORE will ask you to insert the first disk and enter the source path of the disk containing the data you wish to load. Type "**A:**" ↵ for disk drive A.

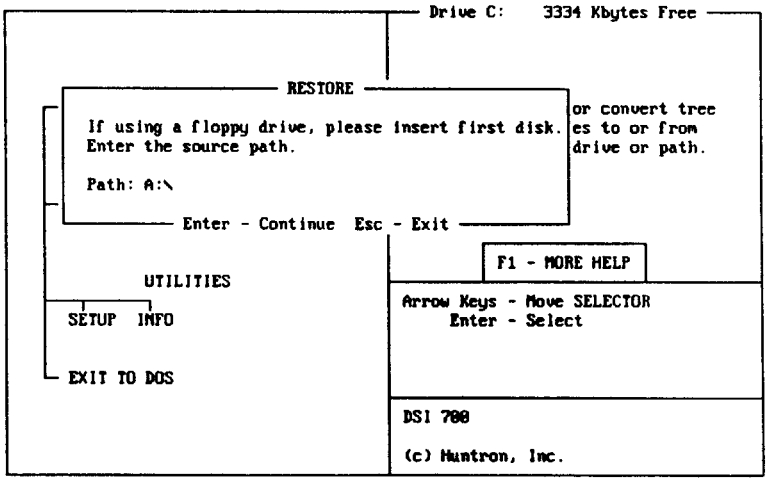


Figure 6-16. Restore Insert Disk/Enter Path Pop-up Window.

NOTE

A warning message will be displayed if the current hard disk drive/path has a board with the same name as the board on the floppy disk. You can choose to either rename the board or replace the board on the hard disk. Exit RESTORE and use the DRIVE function to select another drive/path if you don't want to overwrite the existing board and you want the same name.

3. Since you are restoring the board to the same path that it came from, the "Board already exists..." warning appears.

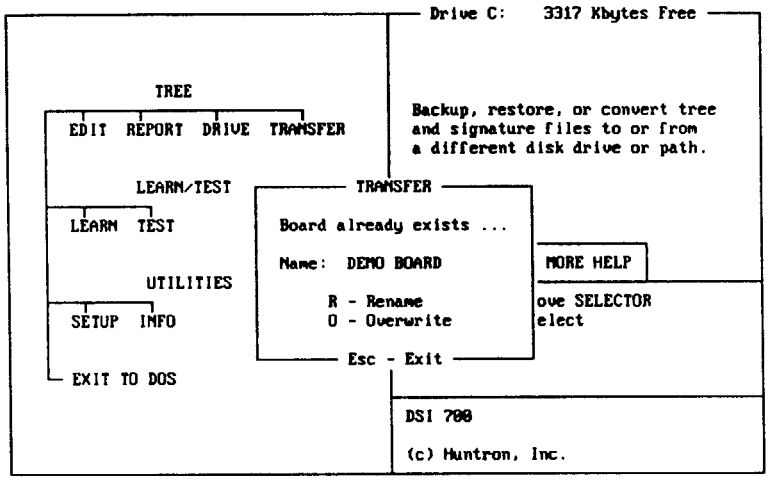


Figure 6-17. Restore - Board Exists Warning.

4. Press **R** to rename the board for this example. The RENAME BOARD window will be displayed. Use the Backspace key to delete the word BOARD from DEMO BOARD then press ↵.

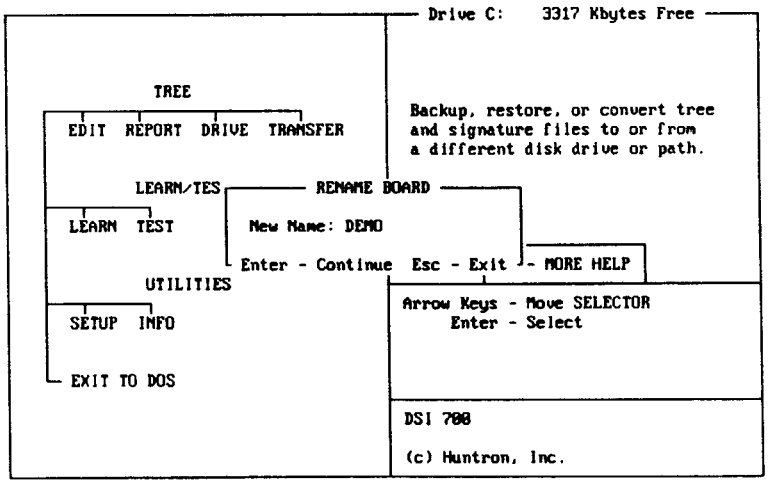


Figure 6-18. Rename Board Pop-up Window.

5. Next, the transitional message "Restoring board..." is displayed while the board is being restored. RESTORE will read the floppy disk and decompress the data if it was compressed in BACKUP. In this event, the transitional message "Decompressing..." appears.

6. When the RESTORE operation has been completed, the program will display the "Restore has been completed" pop-up window. Press Esc to return to the Main menu.

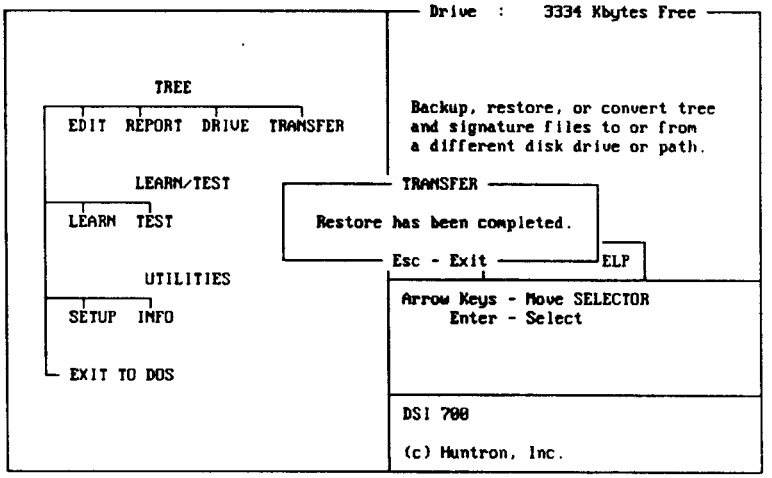


Figure 6-19. Restore Completed Pop-up Window.

CONVERT

The CONVERT option of TRANSFER works just like RESTORE except that it only works on boards that were backed up using 5100DS/RP388 software.

6-7. SETUP MODE

The SETUP mode from the UTILITIES function of the Main menu allows the user to set the visual characteristics including signature colors and operating defaults.

To activate this mode, press **U** or move the cursor to **SETUP** and press ↵. Observe that the SETUP screen appears on your monitor as follows:

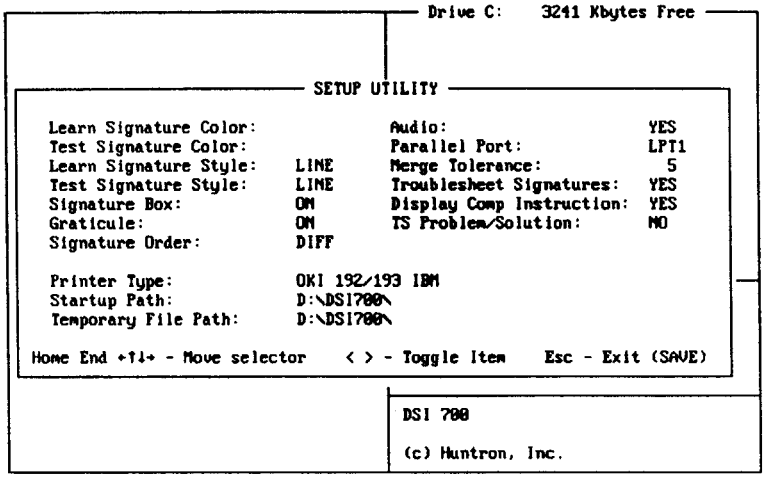


Figure 6-20. SETUP Screen.

LEARN SIGNATURE COLOR

When SETUP is started, the **Learn Signature Color** is highlighted in white by the selector. The learn signature color can be changed by pressing the < or > keys until the desired color is chosen.

TEST SIGNATURE COLOR

Press the ↓ key to move the selector to **Test Signature Color**. The test signature color can be changed in a similar manner.

NOTE

If you are using a computer with a LCD or gas plasma graphics display that is EGA color compatible, then selecting a dark color for one of the signatures and a lighter color for the other will give more distinct signatures from this type of monitor when using the DSI 700 software.

LEARN SIGNATURE STYLE

Press the ↓ key to move the selector to **Learn Signature Style**. The learn signature style can be changed between DOT and LINE mode by pressing the < or > keys until the desired style is selected.

TEST SIGNATURE STYLE

Press the ↓ key to move the selector to **Test Signature Style**. The test signature style can be changed between DOT and LINE mode by pressing the < or > keys until the desired style is selected.

NOTE

The signature dot style can be used to see the actual data points plotted. Also, signature style can be used for better contrast between LEARN and TEST signatures when the signatures are printed out.

SIGNATURE BOX

Press the ↓ key to move the selector to **Signature Box**. The signature box can be turned ON or OFF by pressing the < or > keys until the desired status is selected. The signature boxes can be turned off to speed up the drawing of the signature screens.

GRATICULE

Press the ↓ key to move the selector to **Graticule**. The graticule can be turned ON or OFF by pressing the < or > keys until the desired status is selected. The graticule can be turned off when printing out a hard copy and helps to see the signatures better. This feature can also be changed at the View Signatures screen with the **Alt+G** key combination.

SIGNATURE ORDER

Press the ↓ key to move the selector to **Signature Order**. The signature order can be changed between DIFF and NUM by pressing the < or > keys. In View Signatures screens (except View stored), NUM(eric) displays the TEST signatures in order by the pin number starting with pin 1. DIFF(erence) displays the signatures starting with the most different pin found when the current and stored signatures were compared (in its most different range). DIFF is recommended for normal troubleshooting use.

PRINTER TYPE

Press the ↓ key to move the selector to **Printer Type**. The printer type can be changed by pressing the < or > keys until the desired printer is selected.

Printer type is used to select the model of printer you are using so that the signatures can be printed out properly. If your printer is not listed, try selecting either the Epson FX 80 or OKI 192/193 (IBM) printer.

NOTE

When printing reports or troublesheets, your printer must be configured with NO Automatic Line Feeds (this is usually the default setting). Consult your printer manual for setup information.

STARTUP PATH

Press the ↓ key to move the selector to **Startup Path**. Then press ↵ to edit the drive and/or path. Type in the desired path and press ↵ to save.

The **Startup Path** is the default path which the program uses for board information and component signature database storage and recall when the DSI 700 software is first started from DOS. This path can be changed temporarily using DRIVE to select different sets of boards. After exit to DOS, the default path will be used the next time the software is started.

TEMPORARY FILES PATH

Press the ↓ key to move the selector to **Temporary Files Path.** Then press ↵ to edit the drive and/or path. Type in the desired path and press ↵ to save.

This setting is the location of the working files that the program uses internally. These files are deleted when the program has exited normally.

AUDIO

Press the ↓ key to move the selector to **Audio.** Use the < or > keys to select YES or NO.

A YES selection activates attention beeps for various DSI 700 activities. When using a DSI 700, the computer will beep once after a component has been scanned in LEARN or TEST. For PROBE packages, a beep occurs after each pin is digitized so that you know when to select the next range or move the probe to the next pin.

PARALLEL PORT

Press the ↓ key to move the selector to **Parallel Port.** This can be set to any available parallel port by pressing the < or > keys.

This setting determines which parallel port the program uses to communicate with the DSI 700. You may have your printer connected to LPT1 so you can use LPT2 for the DSI 700.

MERGE TOLERANCE

Press the ↓ key to move the selector to **Merge Tolerance**. The merge tolerance can be changed between 0 and 100 in increments of 5 by pressing the < or > keys.

Merge tolerance sets the allowable difference during comparison between a previously stored LEARN signature and another LEARN signature prior to storage. This allows the user to set the limit at which the two signatures will show as different.

TROUBLESHEET SIGNATURES

Press the ↓ key to move the selector to **Troublesheet Signatures.** Use the < or > keys to select YES or NO.

YES enables display of test signatures in the board or section Troublesheet View mode or when recalling the previous tested component. If your computer has limited storage space or you want to test at full system speed, then you should disable this option by choosing NO.

DISPLAY COMPONENT INSTRUCTIONS

Press the ↓ key to move the selector to **Display Comp Instruction.** Use the < or > keys to select YES or NO.

In LEARN and TEST, the display of the component instructions is selectable with this setting. YES results in displaying these instructions before each component is learned or tested. NO causes the DSI 700 to go directly to the LEARN SCAN or TEST SCAN window. In either case the component instructions can always be viewed at the component level by pressing **F2**.

TS PROBLEM/SOLUTION

Press the ↓ key to move the selector to **TS Problem/Solution.** Use the < or > keys to select YES or NO.

When you are storing an ASCII-Delimited troublesheet to a file, YES enables two text entry fields where you can record the problem which a board had and also the solution that was found. The ASCII-Delimited troublesheet is designed to be used with a database to track boards and look for failure patterns. If you are already using this feature and you do not want to change your database to accept the extra text fields, select NO.

When you are finished with SETUP, press **Esc**, then **Y** (yes) to permanently save your settings.

If you do not want to save your SETUP changes, press **N** (no). You will return to the Main menu.

6-8. TOLERANCE AND RELATED TOPICS

The component tolerance feature allows you to set the difference window on the stored LEARN signature. Tolerance is defined as the number of units added and subtracted from the horizontal component of the stored LEARN signature at all points to define an acceptable band of values. The allowed range of Tolerance is 0 to 99.

A sample horizontal signal is shown in the following figure (the designation *v(t)* means that this is voltage versus time). Adding the tolerance to v(t) for all points gives the upper bound; subtracting the tolerance from v(t) for all points gives the lower bound.

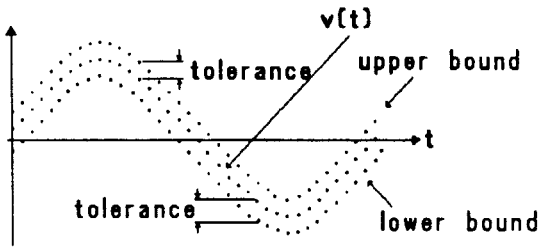


Figure 6-21. Signal Example and Tolerance Bounds.

During TEST, the signal from the component under test is compared to the upper and lower bounds. If all points of the test signal are within the bounds, that signature is EQUIVALENT. If any point is outside the bounds the signature is DIFFERENT.

The DSI 700 allows you to set the tolerance for each component in two different ways:

The first option sets the same tolerance value for all the pins of a particular component (e.g. for an 8 pin IC, all pins will have the same tolerance value). This is the most commonly used option.

The second option allows you to set different tolerances for each pin of a particular component. This option may be useful when some pins of a component may have a greater or lesser signature difference than the rest of the pins and are still considered acceptable. For complete details on this option refer to Section 6-2: COMPONENT PIN INFORMATION in this chapter.

The TOLERANCE setting can have a tremendous effect on test results. If set too high, faults may be missed while if set too low, minor differences of little or no consequence can cause the signatures to be classified as different and complicate the question of determining exactly which part or parts should be replaced.

DIFFERENCE, DEVIATION AND INDEX

There are three terms used in the DSI 700 software that are related to tolerance. **Difference** is the largest difference found when the TEST signature is compared to the stored LEARN signature. The **Deviation** is the Difference minus the Tolerance value. If the Difference is less than the Tolerance, then the Deviation is zero and the signature is EQUIVALENT. Deviation refers to whether the TEST signature "deviates" outside the upper and lower bounds established by the LEARN signature and the Tolerance value.

When a signature is DIFFERENT that means that Difference was greater than Tolerance for at least one data point of the digitized signature. In order to sort all signatures into order from most different to least different, the **Index** value is used. Index is the sum of the individual deviations for all 100 data points in the digitized signature. If a particular data point is within the bounds set by Tolerance, it has a deviation of zero and does not add to the value of Index. This takes into account differences from both the positive and negative halves of each signature.

Tolerance Example:

TOLERANCE is set to 15

- the software calculates the maximum Difference between TEST and LEARN data points is 35.
- 35 is greater than 15 (TOL), so the pin is marked DIFFERENT.
- Deviation = 35 - 15 = 20

In this example, the maximum Difference would have to be 15 or less to have the pin be EQUIVALENT.

i.e.	max. Dif. = 17	→	DIFFERENT	Dev = 2
	max. Dif. = 16	→	DIFFERENT	Dev = 1
	max. Dif. = 15	→	EQUIVALENT	Dev = 0
	max. Dif. = 14	→	EQUIVALENT	Dev = 0
	max. Dif. = 13	→	EQUIVALENT	Dev = 0

TIPS ON SETTING THE TOLERANCE

There is no single easy answer to the question of setting TOLERANCE and there is no such thing as an "ideal" setting. A number of factors must be taken into consideration and a number of questions should be asked, and answered, before deciding what value to use.

Here are the major factors in determining the setting for TOLERANCE:

1. If the DSI 700 is being used in a quality assurance application in a production facility, lab, or maintenance shop to screen new parts before they are taken into stock, the TOLERANCE should be set to a low number (1-5). This also applies in cases where libraries of good parts have been established and the user wishes to check a part against the library.

   Separate libraries may have to be established for different manufacturers because of the differences in signatures from one to another. Texas Instrument chips may look very different from Motorola or National, etc.

   Several samples should be examined to determine what represents a "good" signature, or, a range of "good" signatures. The "good" signatures should then be learned or if a range is acceptable, they can be merged to produce a "window of acceptance." Tight TOLERANCE will catch any that vary greatly from the samples. Settings of 1-3 mean the part tested will be almost exactly like the learned sample(s), while settings of 4-6 allow a little more leeway. Obviously higher numbers allow even more leeway. Components from different manufacturers or even the same components from the same manufacturer but different production runs or different production facilities can exhibit different signatures. Examination and comparison of the LEARN and TEST signatures will indicate when this is the case.

2. When testing circuit boards, the ideal way to use the DSI 700 is to learn and catalog individual boards, keeping the learned data for the day when THAT board fails. In this case, after the failure, the DSI 700 is testing the same parts it learned while the board was working. Tight TOLERANCE settings of 1-3 will most certainly locate the problem.

3. When testing boards that are similar to the learned board, a TOLERANCE setting of 10-15 will usually produce the best results when testing TTL ICs, bipolar transistors, diodes, resistors, capacitors and inductors. Through experimentation with a large number of TTL ICs it has been found that in most cases a setting of 15 will catch major faults while ignoring minor manufacturing differences. Most solid faults on circuit boards caused by failed ICs will produce signatures that are so dramatically different from the learned ones that there will be no doubt which pins are bad.

4. Due to the effect of the 2000's AC test signal, some ICs will oscillate in high or medium ranges. This does not normally create a problem since the filter algorithm will usually eliminate it. In cases where the oscillation is not completely gone, several learns may have to be merged to get a reliable signature. There are times when the action of the filter will mask leakage if the leakage only starts to appear in the HIGH range. If oscillation is also present, both the leakage and oscillation are cut off by the filter and do not appear in the signature. Several other bad pins usually show up on the same IC so that it is seldom overlooked.

   Increasing the TOLERANCE to 20, 30, 40 or more is not the way to overcome instability or oscillation because all that will happen is the system will probably fail to report any faulty parts. It would be much to take a close look at the signatures in these instances to determine if a fault really exists or is it just oscillation or manufacturing differences. If the same IC can be found elsewhere on the board, check it manually with the 2000 to see if it has similar signatures. If so, this is a good indication the part is not faulty.

5. The only time that the TOLERANCE should be set higher than about 20 is when the Tolerance per pin is in use (see Chapter 6, section 6-2) and you have signatures on some pins of a device that will not stabilize no matter what is tried. In this case you can set the TOLERANCE for those pins to 99 which will mean any signature will be EQUIVALENT. This effectively "turns off" the troublesome pins and allows the DSI 700 to work correctly with the remaining stable pins.

6-9. SORT COMPONENTS

This feature can be used to sort the components of the current section alphanumerically. Activate the sort by pressing the **Alt+O** key combination at the component level of edit. Once sorted the components cannot be unsorted. This can be useful when building a library of discrete components. See example below:

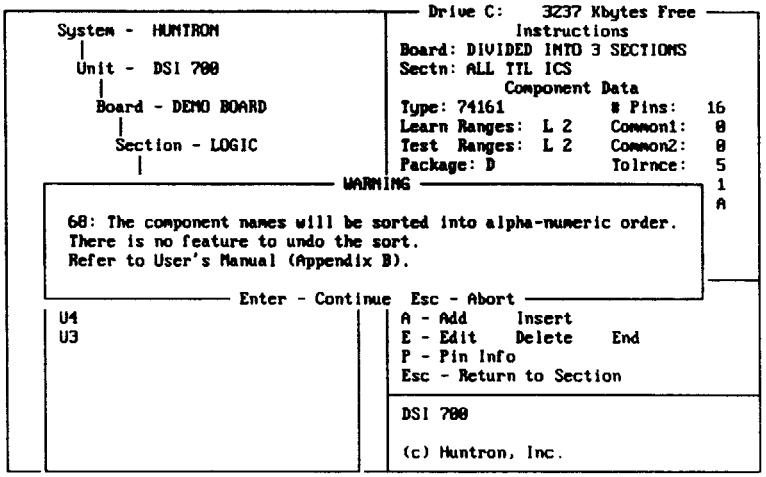


Figure 6-22. Sort Components Warning.

CURRENT	SORTED
7404	7400
7400	7402
7402	7404
U2	C01
U5	C02
U3	C1
C12	C12
C2	C2
C1	U2
C02	U3
C01	U5

6-10. TROUBLESHEET

A troublesheet is a collection of all of the difference and equivalent information on the components tested.

Troublesheet information is generated for each component as it is tested. The test signatures are stored if enabled in SETUP. The temporary files path in SETUP controls where the files of the troublesheet data and signatures are stored.

The troublesheet is different for each of the three levels of the tree. Activate in the TEST mode by pressing the **T** if at least one component has been tested. At the component level, the function is called T-Test Results and the component results window is displayed. At the section level you have a choice of viewing, printing or storing a troublesheet for the components of the current section. While viewing the troublesheet you can also view the signatures for all the different components. These same options are available at the board level for all the components of the current board.

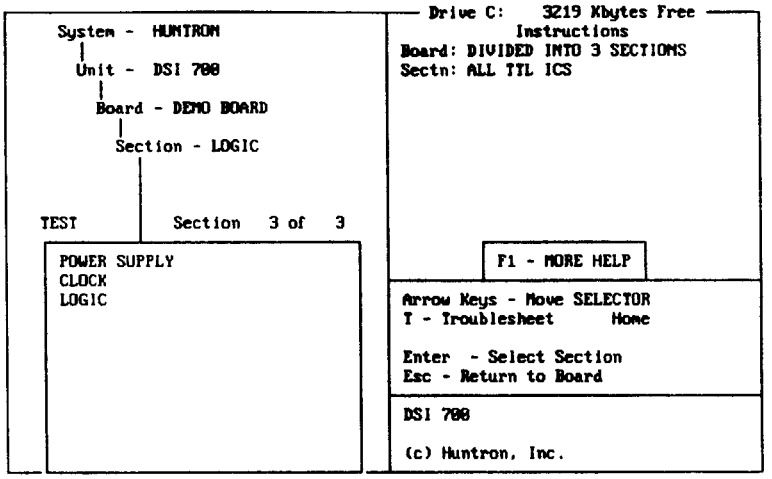


Figure 6-23. Section Troublesheet Selection Window.

The board serial number is entered to identify the troublesheet.

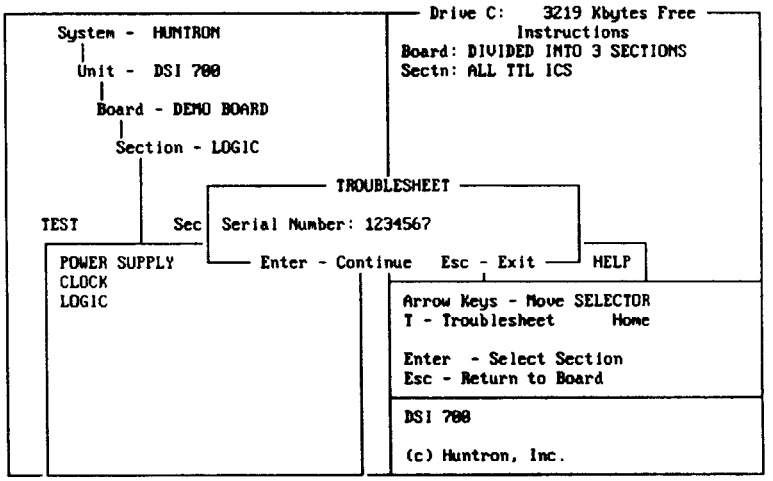


Figure 6-24. Troublesheet Board Serial Number Entry.

The display of the component results window shows the status of each component that has been tested in the current test session. If the component has different pins, viewing of the signatures or removing of the component from the troublesheet are allowed.

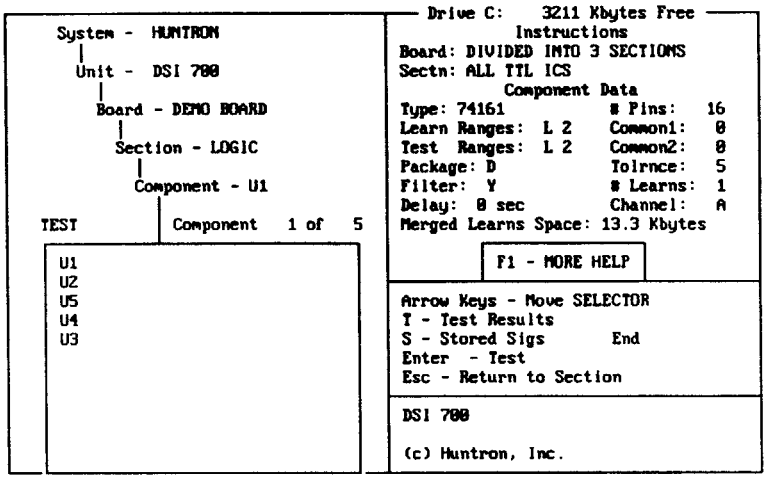


Figure 6-25.Select Troublesheet "T-Test Results" Screen

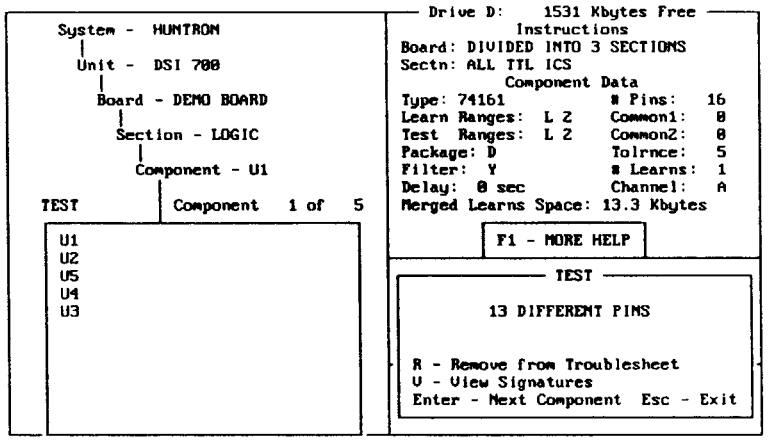


Figure 6-26. Troublesheet TEST Results Window.

Viewing of the troublesheet at the section and board level shows a difference order list of the components that failed. Each of the components can be made the current component by using the ↓ ↑ keys to move the selector (shown by highlighting the component). The current component can be removed from the troublesheet. The detailed pin difference information for the current component can be viewed in a pop-up window. The signatures for the current component can be viewed if enabled in SETUP. While viewing the signatures, all of the signatures for the different components can be viewed by choosing the next, previous, first or last component options. A summary displaying the number of different, removed and equivalent components is available.

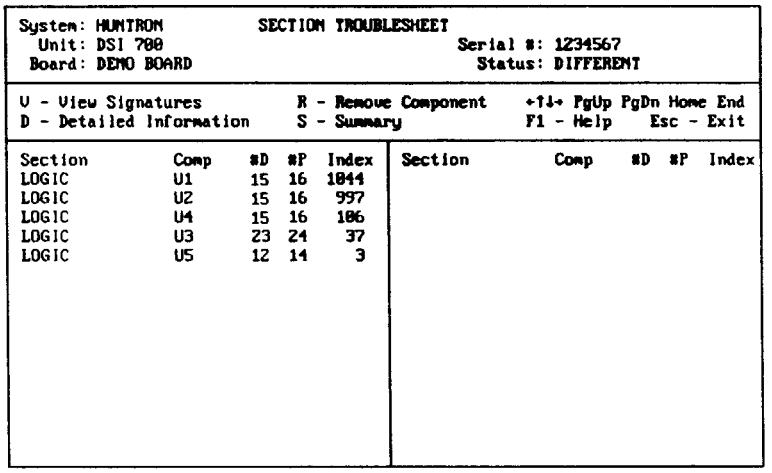


Figure 6-27. Troublesheet View Screen.

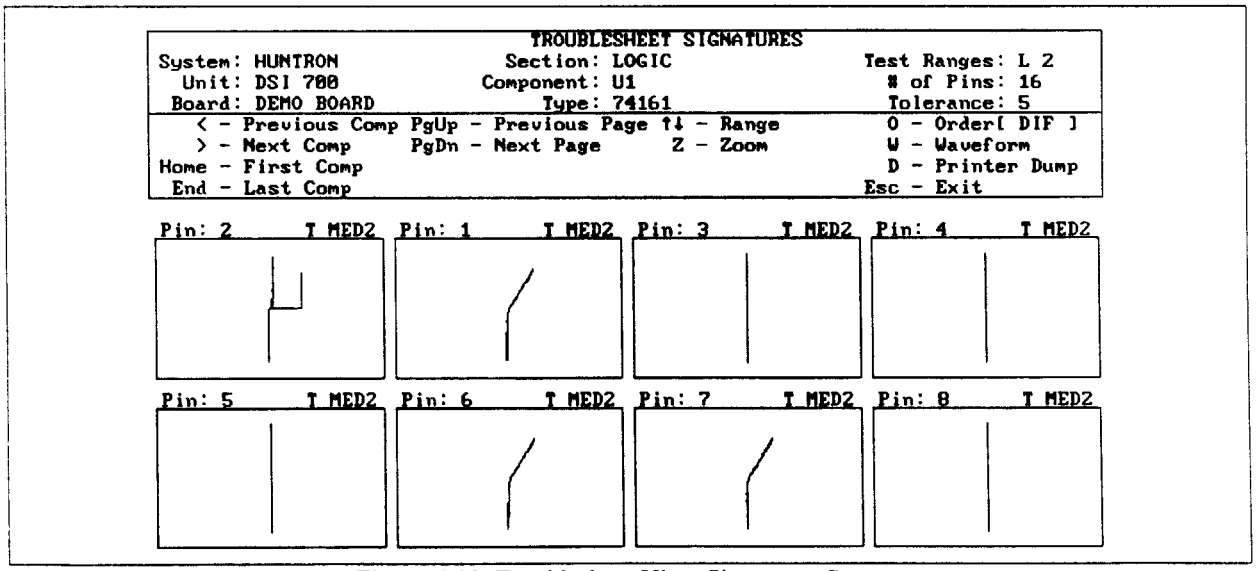


Figure 6-28. Troublesheet View Signatures Screen.

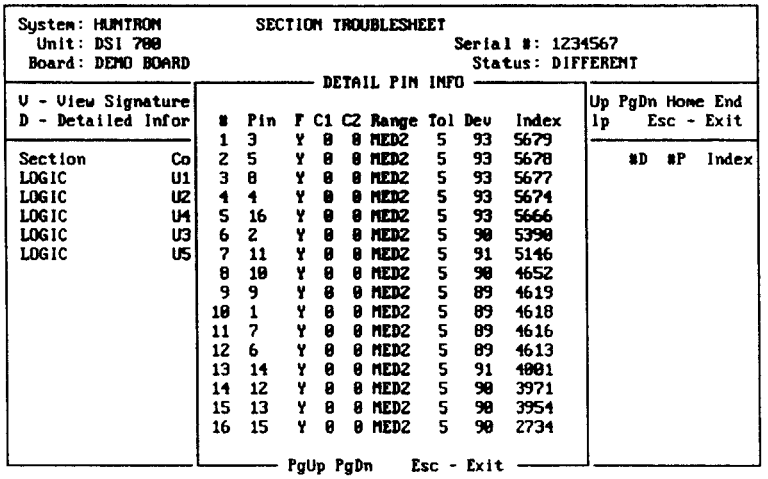


Figure 6-29. Troublesheet Detailed Window.

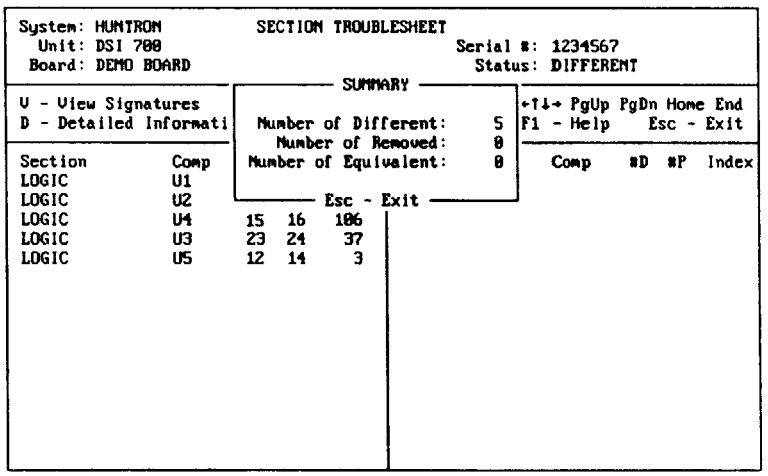


Figure 6-30. Troublesheet Summary Window.

Printing the troublesheet at the section and board levels allows the choice of either a simple or detailed report. The simple report lists the different components in difference order. The different pins are listed in difference order too. The detailed report also lists the different components in difference order. The different pins are listed in difference order with the most different range, tolerance, deviation and area.

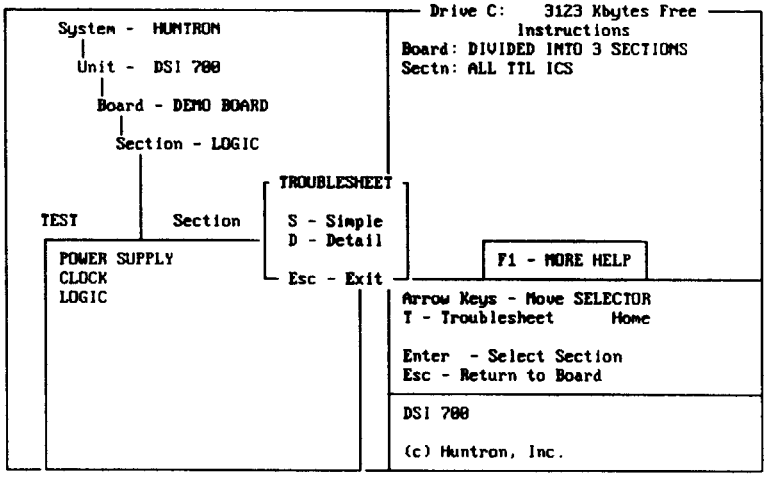


Figure 6-31. Troublesheet Simple/Detail Section Window.

Storing the troublesheet at the section and board levels allows the choice of either simple, detailed or ASCII delimited. All of the formats append to the file until it is deleted using DOS. The path and file name for the troublesheet can be specified or you can use the default path and file names (see the Troublesheet path entry window). The default path name is the "Startup Path" selected in SETUP. The default files names are:

Type	File Name
Simple	SIMPLETS.ASC
Detailed	DETAILTS.ASC
ASCII	ASCIITS.ASC

For the simple and detailed troublesheets an ASCII file containing the text of the corresponding printed report is written to the specified path/file name. The ASCII delimited troublesheet stores the information in a format readable by popular off-the-shelf database programs. These programs can allow repair tracking, fault analysis and other reports to be generated. The format of the file is as follows:

Board name [14 alphanumeric characters]

Serial number [20 alphanumeric characters]

Test date [8 alphanumeric characters]

Tech ID [10 alphanumeric characters]

Test time [10 alphanumeric characters]

Problem text (if enabled) [45 alphanumeric character]

Solution text (if enabled) [45 alphanumeric character]

Component Name [6 alphanumeric characters] (repeated)

Component Type [14 alphanumeric characters] (repeated)

The ASCII delimited troublesheet prompts for the entry of the Tech ID, Test time, Component limit and the delimiting character. Also, if **TS Problem / Solution** is set to YES in SETUP, you are prompted to enter a description of the problem followed by the solution that was found. The Tech ID defaults to the log on user name. The test time can be used to identify the amount of time used to test the board. The component limit sets the number of component name and component type combinations written to the file. If the number of different components is less than the limit, the file is padded with delimiters to the specified limits. All the fields of the file are separated by the selected delimiting character. The separate troublesheets are separated by a carriage return/linefeed.

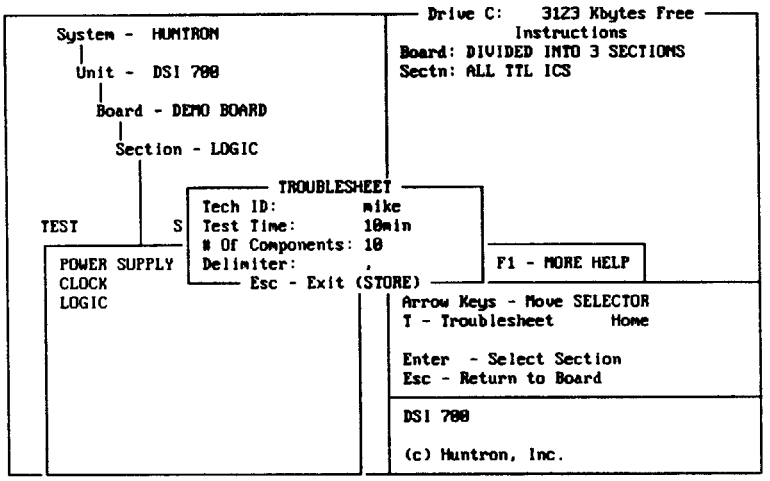


Figure 6-32. Troublesheet ASCII Delimited Entry Window.

The troublesheet can be initialized by using the **Alt+I** key combination. The troublesheet is also initialized by returning to the main menu or changing the current board. Initializing the troublesheet sets all of the components to untested and deletes all of the test signatures. This does not delete any stored files created with the store troublesheet options.

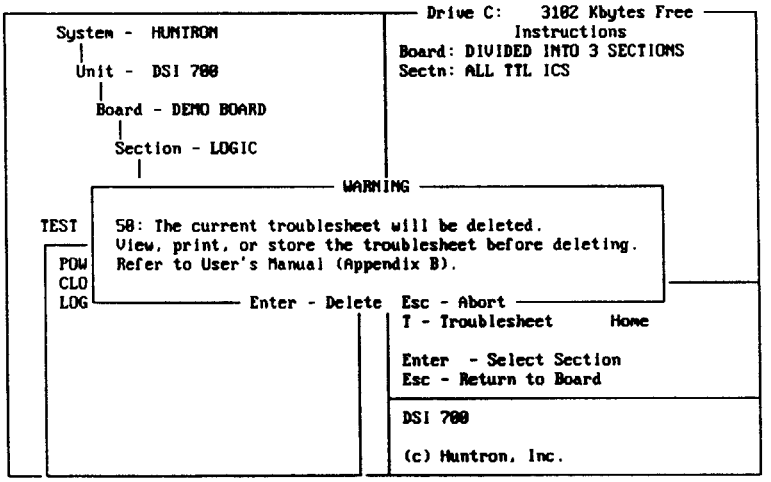


Figure 6-33. Troublesheet Alt+I Warning Window.

APPENDIX A
RELATED DOS COMMANDS

To use the DSI 700 software, you will find it necessary to use a few DOS commands. For more information, refer to your DOS manual.

COMMAND	SYNTAX	PURPOSE
cd	**cd** [*path*]	The **cd** command changes the working directory to the directory specified in *path*.

Examples: **cd\DSI** changes to your DSI 700 working directory, **cd** displays the name of the directory you are now in, and **cd** moves you back to your root directory.

dir	**dir** [*drive*] [*pathname*]	The **dir** command, typed by itself, lists all files in the working directory on the default drive. If you include a drive name, such as b:, with the **dir** command, all files in the root directory of the disk in the specified drive are listed, including sizes and modification dates.

Example: **dir** c:\DSI lists the files in the DSI 700 working directory of your hard disk if you used the default settings during installation.

If your directory contains more files than you can see at one time, type **dir** /p to display one screen at a time. Pressing any key will advance the directory one screen.

format	**format** [*drive:*]	The **format** command creates the directory and the file allocation tables on a disk. You must use this command to format all new disks before MS-DOS can use them. Formatting is necessary before creating copies of learn data on floppy disks.

WARNING

Formatting destroys any previously existing data on a disk. Make sure your specified drive does not have an original file in it.

NOTES:

APPENDIX B
ERROR MESSAGES

All error messages produced by the DSI 700 software appear in a pop-up window on your screen. The title at the top of the window will be one of the following:

SYSTEM ERROR — used for general errors

DEVICE ERROR — error involves an external device (e.g. the DSI 700 or the printer)

INVALID — the requested operation is not allowed

WARNING — alerts you to make sure the operation is what you really want to do

The bottom of an error pop-up window shows what options are available to you:

Esc - Abort

Pressing Esc aborts the current operation. This option is always available.

Enter - Continue

Pressing ↵ continues to execute the current operation.

Enter - Delete

Pressing ↵ deletes the current item.

CRITICAL ERROR Messages:

Please report errors of this type other than floppy drive errors to Huntron Technical Support.

LIST OF ERRORS:

1-3: These errors are not used.

4: The printer is off-line.

Set the printer on-line.

Consult the printer manual for on-line setting procedures.

5: The printer cable is disconnected.

Check the printer cable connections.

Make sure the printer cable is firmly connected at both ends. Verify the continuity of the printer cable.

6: The printer is out of paper.

Reload the printer with paper.

Consult the printer manual for paper loading procedures.

7: The printer is off.

Turn the printer power on.

Consult the printer manual for proper power up procedures.

8: Printer failure

Consult your printer manual.

The software cannot determine the problem with the printer. Check the printer manual for compatibility switch settings.

9: Open window failure

Please report errors of this type to Huntron Technical Support.

10: Close window failure

Please report errors of this type to Huntron Technical Support.

11: The maximum number of boards are already entered.

Transfer or delete an existing board.

The DSI 700 system is limited to 44 (2 in Demo Mode) boards per path. You can create a new path to store the boards, by using DRIVE, or you can make space in the current path by transferring and then deleting an existing board.

12: The maximum number of sections are already entered.

Delete an existing section or put in another board.

The DSI 700 system is limited to 22 (4 in Demo Mode) sections per board. Put the section in a different board or delete an existing section from the current board.

13: The maximum number of components are already entered.

Delete an existing component or put in another section.

The DSI 700 system is limited to 330 components per section. Put the component in a different section or delete an existing component from the current section.

14: Not enough memory to create a board.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a board record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

15: Not enough memory to create a section.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a section record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

16: Not enough memory to create a component.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a component record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

17: Not enough memory to create pin information.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a pin record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

18: Not enough memory to create minimum signatures.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a signature record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

19: Not enough memory to create maximum signatures.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a signature record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

20: Not enough memory to create troublesheet signatures.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a signature record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

21: Not enough memory to create troublesheet.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a troublesheet record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

22: Not enough memory to create help.

Check available memory (INFO).

The software has run out of available RAM to allocate space for a help record. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

23: Out of memory

Check available memory (INFO).

The software has run out of available RAM. Activate INFO from the Main menu and check available conventional memory. Remove memory resident programs and device drivers to increase available conventional memory.

24: A board name must be entered.

Enter a unique board name.

Each board in the DSI 700 system must have a unique name.

25: A section name must be entered.

Enter the appropriate fields.

The DSI 700 system cannot store sections without a name.

26: Name, ranges, package, filter or # of pins are missing.

Enter the appropriate fields.

The DSI 700 system cannot learn, test or store components without a name, learn ranges, test ranges, package, filter and a non-zero number of pins.

27: Pin name, test range and filter must be entered.

Enter the appropriate fields.

The DSI 700 system cannot learn, test or store pins without a name, test range or filter.

28: The board name already exists.

Enter a unique name.

The name entered is the same as one of the other board names in this path. Names with the same characters, regardless of case (upper or lower), are considered the same.

Use ALT+R to create.

The name created by the BUILD function is the same as one of the other board names in this path. Names with the same characters, regardless of case (upper or lower), are considered the same. Use ALT+R to repeat the board and enter a new name.

29: The section name already exists.

Enter a unique name.

The name entered is the same as one of the other section names in this board. Names with the same characters, regardless of case (upper or lower), are considered the same.

Use ALT+R to create.

The name created by the BUILD function is the same as one of the other section names in this board. Names with the same characters, regardless of case (upper or lower), are considered the same. Use ALT+R to repeat the section and enter a new name.

30: The component name already exists.

Enter a unique name.

The name entered is the same as one of the other component names in this section. Names with the same characters, regardless of case (upper or lower), are considered the same.

Use ALT+R to create.

The name created by the BUILD function is the same as one of the other component names in this section. Names with the same characters, regardless of case (upper or lower), are considered the same. Use ALT+R to repeat the component and enter a new name.

31: The pin name already exists.

Enter a unique name.

The name entered is the same as one of the other pin names of this component. Names with the same characters, regardless of case (upper or lower), are considered the same.

32: The test ranges are not contained in the learn ranges.

The test ranges must be contained in the learn ranges.

The DSI 700 system cannot test in ranges that have not been learned. Set the test ranges to ranges that are contained in the learn ranges or change the learn ranges.

33: A DIP package was entered with an odd number of pins.

A DIP package must have an even number of pins.

The DSI 700 scans DIP packages by activating the relays. The first half of the pins are scanned from left to right on the bottom side of the front panel connectors. The second half of the pins are scanned from right to left on the top side of the front panel connectors. This algorithm will not work with an odd number of pins.

34: One of the common pins is larger than the number of pins.

The common pin(s) must be lower or equal to the number of pins.

The common pins cannot be specified outside of the size of the component.

35: Signature, pin and /or troublesheet information will be lost.

The related component information has been changed.

The signature, pin, and troublesheet information must be deleted because they are affected by the LEARN ranges, package type, filter, number of pins, and common pins.

36: Signature and troublesheet information will be lost.

The related pin information has been changed.

The signature and troublesheet information must be deleted because they are affected by the test range, filter, and common pins.

37: This error is not used.

38: There are no boards.

The current operation cannot be performed without any boards in the system. Make sure the current drive/path setting is correct.

39: This board contains no sections.

The current operation cannot be performed without any sections in the board. Make sure the proper board was selected.

40: This section contains no components.

The current operation cannot be performed without any components in the section. Make sure the proper board and section were selected.

41: This error is not used.

42: The path entered is not valid.

The path entered is an invalid DOS path.

43: This component has not been learned.

The DSI 700 system cannot test components that have not been learned.

Learn the current component on a known good board.

44: This component has not been tested.

The DSI 700 system cannot show the test results of a component that has not been tested. Test the current component on the board currently being tested.

45: The current learn signatures have not been saved.

To save the signatures, store or merge before exiting.

This message appears as a safeguard to make sure that you really do not want to save the current learn signatures. You will always see this when you realize something was wrong with the current learn and you press **Esc** to relearn the component.

46: The current signatures will replace the stored signatures.

View signatures to verify.

The stored signatures will be lost.

47: The current signatures will replace the merged signatures.

View signatures to verify.

The merged signatures will be lost.

48: The current signatures will merge with stored signatures.

View signatures to verify.

The stored signatures will be converted to merged learns, doubling the amount of disk space used.

49: The current signatures will merge with merged signatures.

View signatures to verify.

The merged signatures will be modified to include the current signatures.

50: The current troublesheet will be deleted.

View, print, or store the troublesheet before deleting.

When changing boards or returning to the Main menu, the troublesheet temporary files will be deleted. This will not affect stored troublesheets.

51: Board directory failure

Make sure you have selected a valid drive/path.

Check to make sure the current drive is not full.

52: Board file failure

Make sure you have selected a valid drive/path.

Check the available space on the current drive.

53: Section file failure

Check the available space on the current drive.

54: Component file failure

Check the available space on the current drive.

55: Pin file failure

Check the available space on the current drive.

56: Signature file failure

Check the available space on the current drive.

57: Minimum signature file failure

Check the available space on the current drive.

58: Maximum signature file failure

Check the available space on the current drive.

59: Troublesheet signature file failure

Check the available space on the current drive. Make sure that the temporary files path is valid.

60: Troublesheet file failure

Check the available space on the current drive. Make sure that the temporary files path is valid.

61: This error is not used.

62: Setup file failure

Check the available space on the current drive.

63: Help file failure

Help files are missing or file error.

64: The current board will be deleted.

Sections and components will be lost. There is no "undelete" function available.

65: The current section will be deleted.

Components will be lost. There is no "undelete" function available.

66: The current component will be deleted.

Signatures and pin information will be lost. There is no "undelete" function available.

67: The current component pin information will be deleted.

Pin information will be lost. There is no "undelete" function available.

68: The component names will be sorted into alpha-numeric order.

There is no feature to undo the sort.

The learn/test order of the components will be altered. Once changed there is no way to change it back.

69: Illegal selection

Please report errors of this type to Huntron Technical Support.

70: Compression failure

Make sure PKZIP.EXE is in the current directory.

The PKZIP.EXE file should be in the same directory as the other program files.

71: Decompression failure

Make sure PKUNZIP.EXE is in the current directory.

The PKUNZIP.EXE file should be in the same directory as the other program files.

72: Backup file failure

Check the available space on the current drive.

73: Break key disable failure

Please report errors of this type to Huntron Technical Support.

74: Cannot delete with component ranges set to 'PIN' or '???'.

Change the component ranges and then delete.

A component with learn ranges settings of PIN or ??? requires pin information to be learned and tested. Change the component ranges and then delete the pin information.

75 - 80: These errors are not used.

81: Cannot change with learn and test ranges set to "PIN".

Use Pin Info to change range per pin settings.

82: This error is not used.

83: The current component troublesheet information will be deleted.

Troublesheet signatures and difference information will be lost.

The Troublesheet status of the current component is changed to REMOVED. The Troublesheet summary will be updated and the component will be removed from the list of different components.

84: Board documentation file failure

The board documentation file BOARD.DOC is not present in the directory or the file has been corrupted. Check to make sure the file is present for the current board.

85: Board layout file failure

The board layout file LAYOUT.PCX or auxiliary graphics files GRAPH01.PCX, GRAPH02.PCX, GRAPH03.PCX or GRAPH04.PCX is not present in the directory or the file has been corrupted. Check to make sure the file is present for the current board.

86: Video failure

The computer is not capable of displaying the graphics file because of the video mode it was created under.

87: Expanded memory failure

Check expanded memory manager.

There is not enough expanded memory to perform the requested action.

88 - 111: These errors are not used.

112: A 'F' package was entered with more than 32 pins.

A 'F' package must have from 1 to 32 pins.

113: A 'B' package was entered with an odd number of pins.

A 'B' package must have an even number of pins.

114: This error is not used.

115: Common pins per pin settings will be disabled.

Common pins per pin values are not lost.

116: Learn signatures for the entire section will be deleted.

Number of Learns for all components of the section will be set to zero.

117: Common pins for the entire section will be set to zero.

Common pins per pin values are not lost.

118: Filter per pin settings will be disabled.

Filter per pin values are not lost.

119: Filter for the entire section will be modified.

Filter per pin values are not lost.

120: Test ranges and pin ranges of 'H'igh will be changed to Med '2'.

Learn ranges of 'H' are being disabled, so Test range of 'H' will be invalid.

121: Test ranges will be set to 'PIN'.

Test ranges must be 'PIN' if Learn ranges are 'PIN'.

122: Learn ranges for the entire section will be modified.

Range per pin values are not lost.

123: Test ranges for the entire section will be modified.

Range per pin values are not lost.

124: Tolerance per pin settings will be disabled.

Tolerance per pin values are not lost.

125: Tolerance for the entire section will be modified.

Tolerance per pin values are not lost.

126: Test ranges of (auto range) will be disabled.

Learn components before changing to auto range.

127: Test ranges of 'PIN' (per pin) will be disabled.

Test ranges per pin values are not lost.

128: Some components have invalid learn ranges.

Press Enter to update components with valid learn ranges.

129 - 136: These errors are not used.

137: Component signatures may not be valid with 'per pin' settings.

Relearn the component if signatures have changed.

In order to support components with pin info that were created with 5100DS/RP388 software, you can edit a component setting to an "*" without deleting signatures. This warning appears to let you know that signatures learned before the change may be invalid after the change.

138: This error is not used.

139: Time out waiting for DSI 700 Acknowledge.

Make sure the DSI 700 is in REMOTE and connected to the PC.

The computer is not receiving an Acknowledge response from the DSI 700. This could be due to the DSI 700 cable not connected, faulty DSI 700 cable, DSI 700 not turned on, or the DSI 700 not in REMOTE mode.

140: Time out waiting for DSI 700 Ready.

Make sure the DSI 700 is in REMOTE and connected to the PC.

The computer is not receiving a Ready response from the DSI 700. This could be due to the DSI 700 cable not connected, faulty DSI 700 cable, DSI 700 not turned on, or the DSI 700 not in REMOTE mode.

141: Time out waiting for DSI 700 Strobe Low.

Turn the 2000 off and on, press LOCAL and scan again.

This can occur when the DSI 700 is transmitting data. It can also be caused by disconnecting the DSI 700 cable during scanning.

142: Time out waiting for DSI 700 Strobe High.

Turn the 2000 off and on, press LOCAL and scan again.

This can occur when the DSI 700 is transmitting data. It can also be caused by disconnecting the DSI 700 cable during scanning.

143: The 2000 is not set to the correct range.

Press the range button on the 2000 for the specified range.

144: The 2000 is in AUTO mode.

Press the range button on the 2000 for the specified range.

145: The 2000 signal is not present.

Make sure the banana leads connect the 2000 to the DSI 700.

146: The 2000 signal is out of spec.

The signal applied to the TRACKER jacks is not a valid 2000 range.

147: The 2000 frequency is too high.

Select 50/60Hz on the 2000.

148: The 2000 range changed during scanning.

Scan again and do not change 2000 settings during scanning.

149: The 2000 frequency changed during scanning.

Scan again and do not change 2000 settings during scanning.

150: The 2000 range and frequency changed during scanning.

Scan again and do not change 2000 settings during scanning.

151: DSI 700 communication failure.

Turn the 2000 off and on, press LOCAL and scan again.

152: The DSI 700 returned an invalid scan status.

Turn the 2000 off and on, press LOCAL and scan again.

153: The DSI 700 returned an invalid range status.

Turn the 2000 off and on, press LOCAL and scan again.

154: Invalid parallel port selected.

Select a different parallel port.

155: Delay for the entire section will be modified.

156: Software activation failure.

Reinstall the software and try again.

157: The DSI 700 offset is invalid.

If this error appears, contact Huntron for repair instructions.

APPENDIX C
SHORT CUT KEYS

This appendix lists the summary of the short cut keystrokes using the combination of the Alt key and another designated key to move quickly from one mode or function to another.

NOTE
LEVEL refers to the BOARD, SECTION, or COMPONENT screen of the program.

Table C-1. Short Cut Keys.

KEY	MODE	LEVEL	ACTION
Alt+F1	ALL	ALL	Displays the list of Alt keys and their functions as a help screen.
Alt+B	EDIT	ALL	Builds a new component by incrementing the number at the end of the name of the current component. The component entry screen does not appear. (Refer to Chapter 5 for an example of this feature.)
Alt+C	EDIT	SECTION	Makes global changes to all components in the section. The LEARN ranges, TEST ranges, filter setting, tolerance and delay can be changed. All common pins can be set to zero. If necessary, signature data will be deleted. Also, you can delete signature data without making any changes (refer to Chapter 6, section 6-3 for more information).
Alt+E	LEARN	ALL	Changes to the EDIT mode.
	TEST	ALL	
Alt+G	LEARN	COMP	When viewing signatures, toggles the graticule on and off.
	TEST	COMP	
Alt+I	TEST	ALL	Initializes the data for the current troublesheet. All components are set to the untested condition. (Refer to Chapter 6 for more information.)
Alt+L	EDIT	ALL	Changes to the LEARN mode.
	TEST	ALL	

Table C-1. Short Cut Keys (con't).

KEY	MODE	LEVEL	ACTION
Alt+M	EDIT	ALL	Returns to the Main menu. Also works from the Results window.
	REPORT	BOARD	
	BACKUP	BOARD	
	COPY	BOARD	
	MOVE	BOARD	
	LEARN	ALL	
	TEST	ALL	
Alt+N	EDIT	COMP	Displays section disk space needed pop-up window. This shows the amount of disk space required for merged learns of all components in the current section.
	LEARN	COMP	
	TEST	COMP	
Alt+O	EDIT	COMP	Sorts component names in ascending alphanumeric order. (Refer to Chapter 6, section 6-9 for more information.)
Alt+Q	TEST	COMP	Quick change of the test ranges and/or tolerance for only the next test of the current component.
Alt+R	EDIT	ALL	Repeats the current component entry screen with a blank name.
Alt+S	LEARN	COMP	When viewing signatures, toggles between DOT and LINE display modes.
	TEST	COMP	
Alt+T	EDIT	ALL	Changes to the TEST mode.
	LEARN	ALL	

Table C-1. Short Cut Keys (con't).

KEY	MODE	LEVEL	ACTION
Alt+#	LEARN	COMP	When viewing signatures, allows user to select one of the eight signatures to zoom in on (# = 1 - 8). Alt+1 is the same as pressing the Z key.
	TEST	COMP	
SHIFT+F1	ALL	ALL	Function key help (F1-F9)
F1	ALL	ALL	Help
F2	EDIT	COMP	Displays the Component Instructions pop-up window.
	LEARN	COMP	
	TEST	COMP	
F3	EDIT	ALL	Displays the text file BOARD.DOC
	LEARN	ALL	
	TEST	ALL	
F4	EDIT	ALL	Displays the graphics file LAYOUT.PCX
	LEARN	ALL	
	TEST	ALL	
F5	EDIT	ALL	Displays the graphics file GRAPH01.PCX
	LEARN	ALL	
	TEST	ALL	
F6	EDIT	ALL	Displays the graphics file GRAPH02.PCX
	LEARN	ALL	
	TEST	ALL	
F7	EDIT	ALL	Displays the graphics file GRAPH03.PCX
	LEARN	ALL	
	TEST	ALL	
F8	EDIT	ALL	Displays the graphics file GRAPH04.PCX
	LEARN	ALL	
	TEST	ALL	

NOTES:

APPENDIX D
PCB TEXT/ GRAPHICS

INTRODUCTION

This feature supports six additional screen displays of text/graphics for a board. One screen displays a text file and the other screens display a graphical layout of the components on the board. You can view these screens by pressing the **F3** key for the text screen or **F4 - F8** for the board layout and other graphics screens.

The following guide is divided into two parts. The first part will explain how you can make a text file and board layout. The second part of this guide will show you how to use these features.

DETERMINING THE BOARD LOCATION AND NUMBER

The board text/graphics files must be stored in the same subdirectory as the board you have selected. If you have already created a board using the DSI 700 software then the first step is to determine where the board is located on your computer's hard disk. For this tutorial, we will use C:\DSI700 as the path\directory location. The DSI 700 software assigns each board stored in a particular path\directory on your computer a unique board number. This board number is not the same as the board name you used in EDIT, so we will need to determine what the board number is. The following figure is a simplified diagram of how the DSI 700 program organizes board data files on your computer's hard disk.

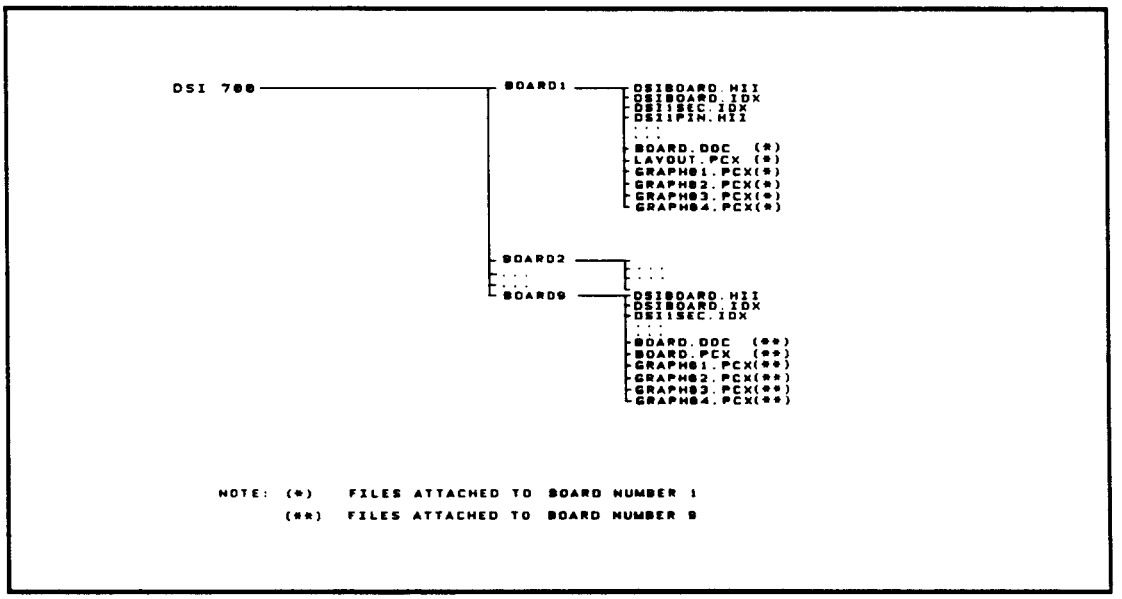


Figure D-1. Board Organization.

At your computer's DOS prompt (typically "C:"), start the DSI700 software by typing "**DSI**"↵. If the board you have chosen is in a different drive or path from the drive\path selected when the software is started, use the DRIVE feature to change to the correct drive\path. At the Main menu, press "**D**" and type in the drive\directory path where the board you have picked is located. For this example, you will use the "C:\DSI700" path\directory so make any changes that are needed using DRIVE. The figure below shows the Main menu with the DRIVE function activated.

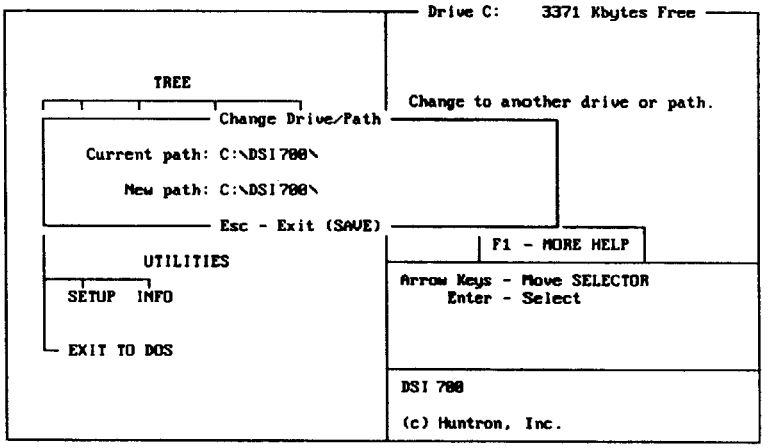


Figure D-2. DRIVE Function Selected.

Activate the EDIT mode by pressing "E" at the Main menu and select the board you have chosen. The board number of the selected board is listed above the board selection box near the center of the EDIT board selection screen. For this example, choose the demo board from the EDIT board selection screen. The figure below shows the EDIT board selection screen with the demo board as board number 1. Make note of this number for later use. Return to the Main menu and exit the DSI 700 software.

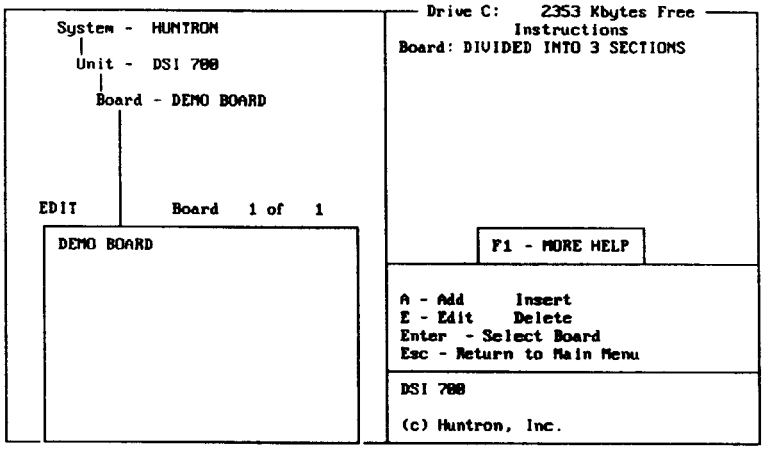


Figure D-3. EDIT Board Selection Screen.

CREATING A BOARD TEXT SCREEN

NOTE

Board text screens must be stored in an output file that is ASCII format. Make sure the word processor you use can support ASCII formated output.

This section will show you how to make a detailed parts list that can be displayed by the DSI 700 software.

NOTE

The maximum text file size is 11,000 lines (500 screens of 22 lines each). Also the maximum number of characters per line is 75.

At the DOS prompt, go to the directory where your word processor has been installed on your computer. For example if you have MS-DOS 5.0, you would type **"CD \DOS"** ↵ and then type **"EDIT"**↵ to start the program.

The parts list for the Huntron Demo Board will be used for this example. First, type in the parts list provided below:

HUNTRON DEMO BOARD PARTS LIST

ITEM	DESCRIPTION
C1- C5	Capacitor, 0.1 uF, mono ceramic, 50V
C6	Capacitor, 0.01 uF, mono ceramic,50V
C7	Capacitor, 0.47uF, mylar, 50V
C8-C9	Capacitor, 10uF,tantalum, 25V
D1	Diode, 1N4005
DS1-DS3	LED, Red, T1¾
R1,R2,R14	Resistor, 180 ohm, 1/4 W, 5%
R3,R5-R13	Resistor, 10K ohm, 1/4 W, 5%
R4	Resistor, 47K ohm, 1/4 W, 5%
SW1	Switch, toggle, DPDT
U1	IC, 74161, 4 bit binary counter
U2	IC, 74LS162, decade counter
U3	IC, 74154, 4 to 16 line decoder
U4	IC, 74LS138, 3 to 8 line decoder
U5	IC, 74LS02, quad 2 input NOR
U6	IC, 555, timer
U7	IC, 7805, voltage regulator

After the last component has been typed in, move down a few lines and type in the following:

"COMMENTS:
BOARD - DIVIDED INTO 3 SECTIONS; POWER SUPPLY, LOGIC, CLOCK
USE C9 (-) LEAD AS COMMON FOR ALL SECTIONS
USE F4-F8 KEYS FOR CIRCUIT BOARD DRAWINGS TO IDENTIFY PARTS"

You have now completed the parts list. Compare the parts list you just typed on your computer with the one above and make sure these are the same.

Before you are ready to save your parts list, make sure your word processor is configured to output in ASCII format. If you are using the DOS 5.0 editor, then the file format is ASCII. Consult your DOS manual or word processor's manual for more details. Save your parts list by naming this file "BOARD.DOC" and store it in the same path where the board you are creating this file for is located.

For example, the demo board is located in the C:\DSI700\BOARD1 path\directory, so type "**C:\DSI700\BOARD.DOC**" to save the text file there. Also, its always a good idea to make a backup copy of this file. Use a different name in order to distinguish between text files for other boards. Type "**DEMOBD.DOC**" for the backup file name and save it in your word processor directory. If you need to make changes, load "**DEMOBD.DOC**" into your word processor and perform your edits. Then, use the same procedure as before to save this file to the correct board location in your computer.

IMPORTANT NOTE

Make sure your word processor is configured to output in ASCII format. Consult your word processor's manual for more details on how to do this.

CREATING A PCB GRAPHICS SCREEN

This part of the tutorial will show you how to create a graphical layout of a board that then can be displayed by the DSI 700 software. Your graphics drawing program must be "PCX" format compatible and will be used to draw the board layout. For this exercise, use the demo board or refer to Figure 5-1 as a guide.

The first step is to start-up the paint program. For example when using Publisher's Paintbrush, at the DOS prompt, type "**CD \PBRUSH**" to go to the paintbrush subdirectory. Start the program by typing "**PAINT**"↵.

Select the background color for the board. For example if you want to use green as the board color, then move the mouse so that the cursor is over the color selection boxes. Choose green and activate the background by clicking the mouse button.

The next step involves specifying the size of board if your paint program allows you to adjust the size of the drawing area. For example when using Paintbrush, move the cursor to the top of the screen and activate the **PAGE** menu. Place the cursor on **Clear** and click the left mouse button to activate. Before entering the board layout dimensions, make sure PELS is selected on the screen. Refer to the following table for the correct pixel (PEL) setting for a variety of board sizes.

Table D-1. Paintbrush Setting for Different Board Sizes.

BOARD LAYOUT SIZE (WxH inches)	PAINTBRUSH SETTING (WxH PELS)
6.4 x 4.8	640 x 480
12.8 x 14.4	1280 x 1440
19.2 x 9.6	1920 x 960

Enter the "width" to the appropriate dimension (640 PELS = one screen width, which represents 6.4 inches of board width). Set the "height" to the appropriate dimension (480 PELs = one screen height, which represents 4.8 inches of board height). The maximum board layout size is limited by the amount of expanded memory in your computer. For 1 Mbyte of expanded memory, the maximum board size is about 19.2 by 9.6 inches (1920 by 960 PELS) which is about 3 screens wide by 2 screens high (six screens total).

NOTE

Up to 512K of LIM expanded memory or 512K of XMS extended memory is used by the DSI 700 software. To allow the graphics display program to use this 512K of LIM memory add the following line to your AUTOEXEC.BAT file:

SET RTVMEXP = 0,0

If your paint program does not allow adjusting the drawing area, then the maximum board size will be limited to the size and resolution of your PC's display.

The next step will be to tell the software that the standard component outline library is located in "\DSI700\PCXLIB".

If you are using Paintbrush, then move the cursor to the **EDIT** menu at the top of the screen and select **Name Is** option. Move the cursor to the ">>C:\PBRUSH" line and press the left mouse button. At the ">" prompt, enter the drive/path for the component library. Type **"C:\DSI700\PCXLIB"** ↵. The component names will be listed in alphanumeric order. Select a component from the list and click the left mouse button. To read other component names on the list, place the cursor on the scroll bars on the right side of the pop-up window and move the bar using the cursor and left mouse button. Refer to the following figure to see the complete standard library.

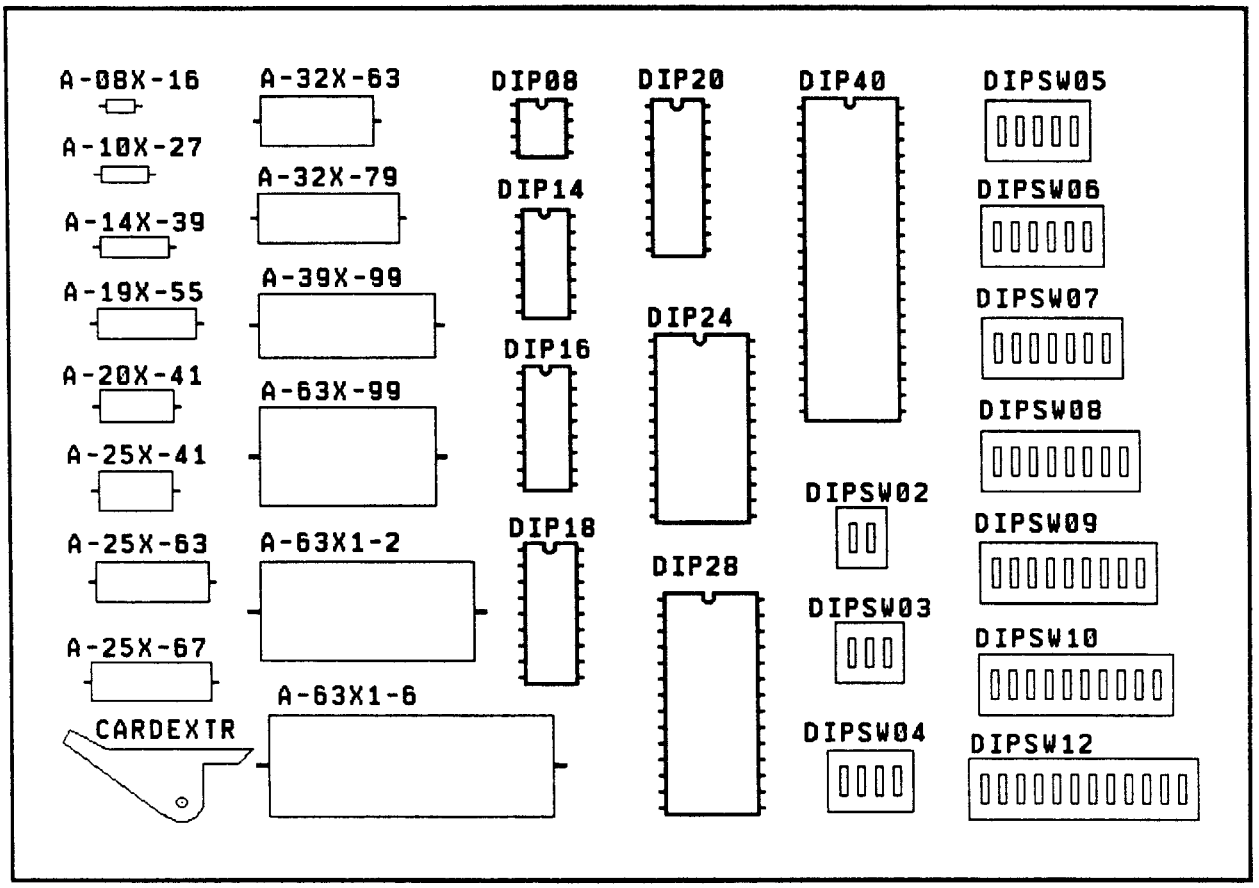


Figure D-4a. Standard Component Outline Library

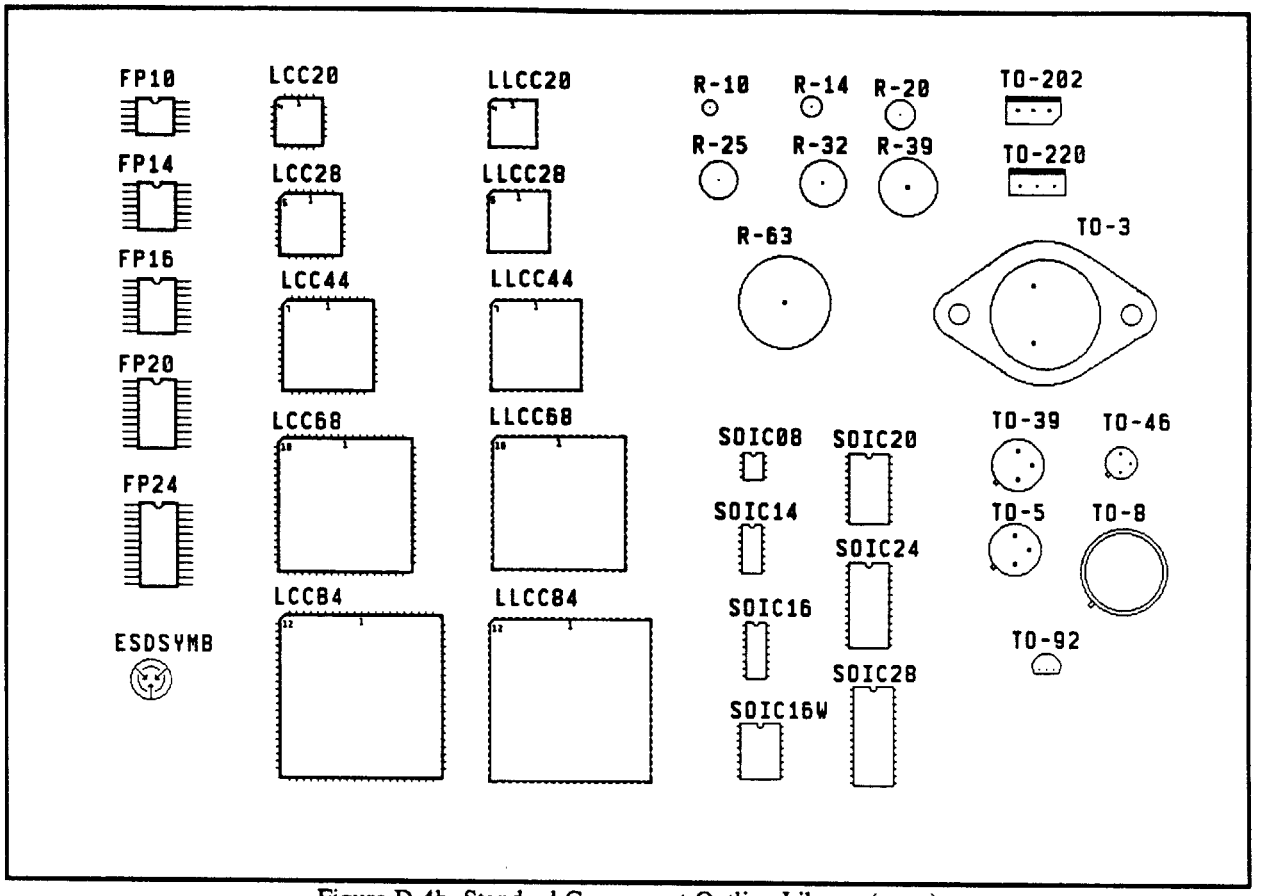


Figure D-4b. Standard Component Outline Library (cont.)

Locate the component you wish to place on your board layout from the standard library and type in its name to select it.

For example in Paintbrush, you would move the cursor to the top of the screen and select the **EDIT** menu, then the **Paste** option. Type "**A-10X-27**" to retrieve the resistor outline from the library. Use the demo board or refer to Figure 5-1 for correct component placement. Drag the component around the screen using the mouse and place it at the desired location. Release the left mouse button and click the right mouse button to freeze the component's position on the layout. Repeat this sequence for the rest of the components on the demo board.

The next step is to label each component on the layout. Position the cursor adjacent to a component and make sure there is enough clearance to type its label. For example in Paintbrush, click the left mouse button to activate text entry mode. Type in the correct label for the component you have selected. Use the demo board or refer to Figure 5-1 for the correct label names. After the label name has been typed in, hit ↵ on the keyboard, and move the cursor to another component. Repeat the previous steps to add label names for the remainder of the components on the demo board layout.

NOTE

The demo board used for this tutorial contains a few components that are not in the standard component library. These components will have to be created. Use your paint program to draw them and refer to your paint program's manual if needed.

Your screen should look like the following figure when you are done.

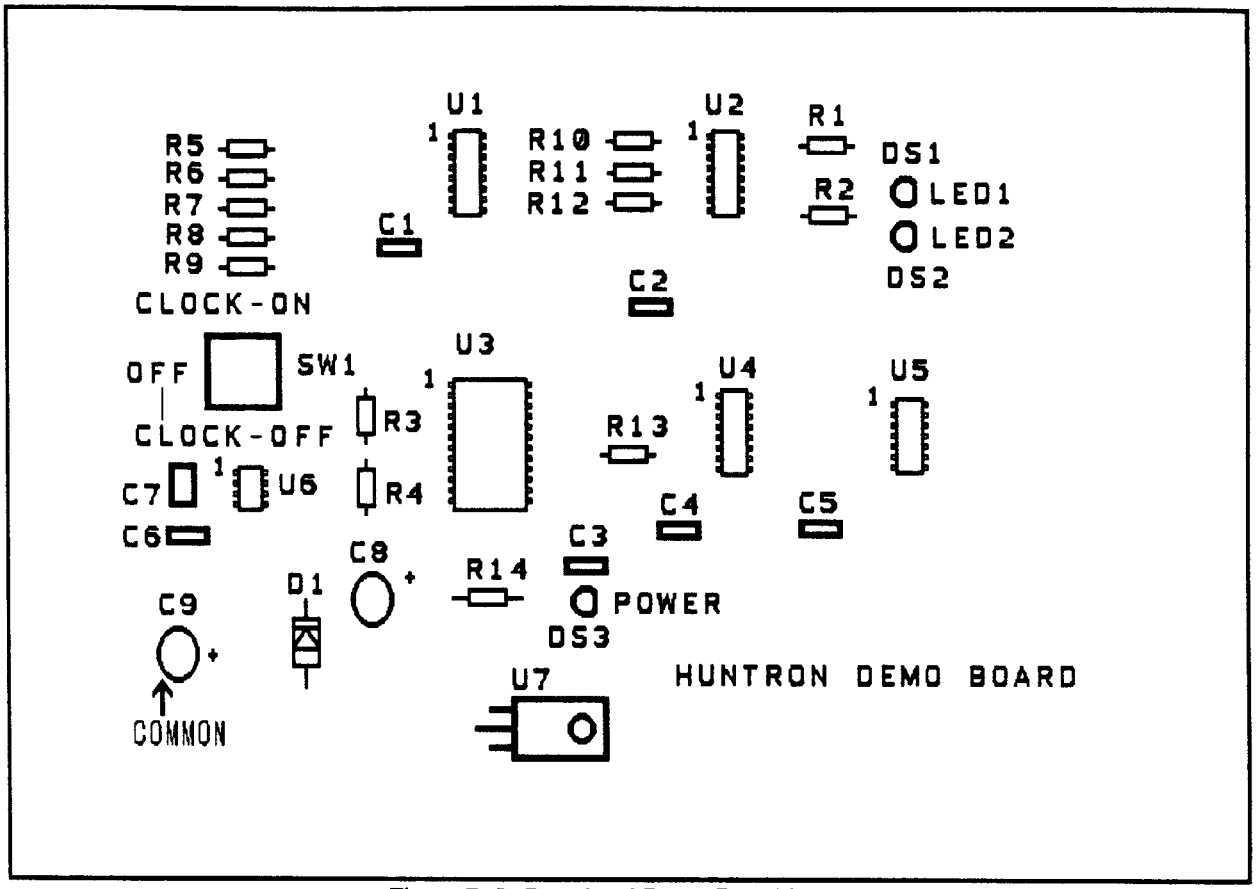


Figure D-5. Completed Demo Board Layout.

Now save this graphics file by naming it "LAYOUT.PCX" and make sure you save it in the same path where the board you are creating this file for is located. The demo board is located in the drive/path, C:\DSI700\BOARD1\. For example, when using Paintbrush, move the cursor to the top of the screen and select the PAGE, Save As option. At the ">>" prompt, type "**C:\DSI700\BOARD1**" ↵. Next, move the cursor to the line below the one you just typed in and press the left mouse button to select it. Type "**LAYOUT.PCX**" on this line to save this file. You can also make four more graphics screens that can be displayed by creating them in a similar manner as "LAYOUT.PCX" and saving each one with a specific name. Each of the graphics file can be accessed by pressing the appropriate function key as follows:

KEY	GRAPHICS FILE
F4	LAYOUT.PCX
F5	GRAPH01.PCX
F6	GRAPH02.PCX
F7	GRAPH03.PCX
F8	GRAPH04.PCX

USING THE PCB TEXT/GRAPHICS SCREENS

The second part of this guide will show you how to access the screens you have just created.

At your computer's DOS prompt (typically "C:"), start the DSI 700 software by typing "**DSI**"↵.

The text and layout screen can be accessed in the EDIT, LEARN, or TEST functions. In each of these three functions, the screens are accessable at the board, section, or component selection levels.

You can also access the text and layout screens at the component level while the component instructions pop-up window (F2 key) is displayed in LEARN or TEST modes. However, these screens are not available at the component level while the results pop-up window is displayed in LEARN or TEST. Press the Esc key to clear the results display and enable the board info screens.

To display the text screen, select the EDIT, LEARN, or TEST functions, choose the board that you have created a text screen file for and press the **F3** key. The text screen will appear and the following keys are active:

Home	Go to the beginning of the board text screen
End	Go to the end of the board text screen.
Pg Up	Move to the previous page (22 lines) of the board text screen.
Pg Dn	Move to the next page (22 lines) of the board text screen.
↑	Move to the previous line of the board text screen.
↓	Move to the next line of the board text screen.
Esc	Exit and return to the previous DSI 700 function screen.

To display the custom layout graphics screen, select the EDIT, LEARN, or TEST functions, choose the board that you have created a custom board layout screen for and press the **F4 - F8** keys. The graphics screen will appear and the following keys are active:

Home	Go to the far left side of the board layout screen.
End	Go to the far right of the board layout screen.
Pg Up	Move to the top of the board layout screen.
Pg Dn	Move to the bottom of the board layout screen.
↑	Move to the next upper half page of the board layout screen.
↓	Move to the next lower half page of the board layout screen.
←	Move to the next left half page of the board layout screen.
→	Move to the next right half page of the board layout screen.
Esc	Exit and return to the previous DSI 700 function screen.

This is the end of this short guide on how to create and use the PCB text/graphics screens for the DSI 700 software. If you have any specific questions about your word processing program or the graphics drawing software, refer to their respective manuals.

NOTES:

APPENDIX E
TESTING CMOS DEVICES

CMOS

There is a basic assumption made when performing comparison testing using Trackers. The assumption is that two pins on a given board will always produce the same signature given the same stimulus (i.e., a certain range).

When testing boards that contain CMOS ICs (particularly metal gate CMOS, like the 4000 series), there are certain effects which make the above assumption invalid.

Therefore, to test CMOS devices with the DSI 700, you must use special techniques to minimize those effects. The following information describes the problems that are often encountered with CMOS and a recommended procedure for dealing with them.

IDENTIFYING A CMOS DEVICE

CMOS devices are generally identifiable by their number codes. Look for a 4000 series in the number, such as CD4040BN, or a number that starts with 74 and is followed by a C, such as 74C138 or 74HC138.

CMOS EFFECTS

A normal practice in electronic design is to put capacitors across the power supplies of ICs to prevent undesired signals or noise from being distributed via the power bus. On a typical 5 Volt power supply board, there might be one capacitor with a value of 0.01μF to 0.1μF for every five ICs, plus a 10μF capacitor across the supply right at the point where it comes onto the board. These capacitors are usually called *decoupling* or *bypass* capacitors.

When this typical board is tested with a DSI 700, there are two effects that can occur due to the capacitance on the power supply pins of an IC. First, signatures will be slow in settling to their steady state. If you scan a CMOS IC, this slow signature time can be observed visually on the CRT of the 2000: after a pin is selected, the signature will move for a moment and then stop. Figure E-1 shows the initial signatures as dotted lines and the final stable signature as a solid line.

The second effect is that the horizontal portion of a normal "chair" signature (see Figure E-2) can move upwards until the signature looks like Figure E-3. The total value of power supply capacitance will affect which TEST ranges produce these effects.

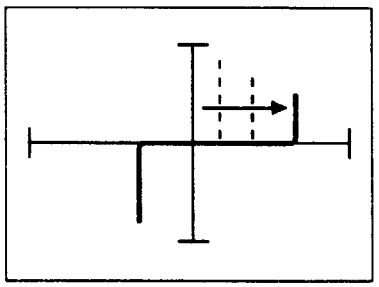


Figure E-1. Slow Settling CMOS Signatures

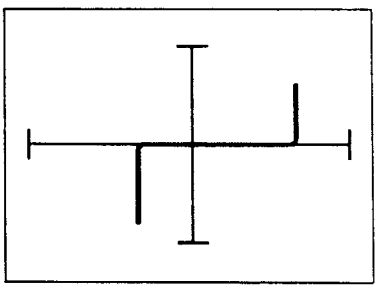


Figure E-2. Normal CMOS "chair" Signature

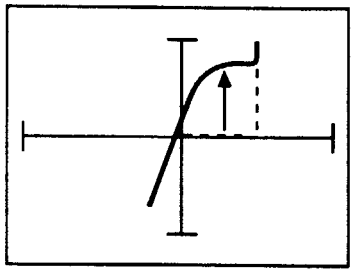


Figure E-3. CMOS Charging Effect Signature

The main problem with testing CMOS is the second one mentioned above: the *charging effect.* This is because the effect is not repeatable. Keeping all conditions the same (test pin, common pin, range, device under test) can result in either Figure E-2 or Figure E-3. The DSI 700 cannot work under those conditions: if the signature of Figure E-2 is learned and the signature of Figure E-3 shows up during TEST, the difference will be caught, even if you test the same IC that was learned.

To deal with these effects requires two steps which are covered in detail in the following section:

- Match the testing time to the settling time.
- Eliminate the charging effect by putting a suitable resistance across the power supply.

TESTING PROCEDURE

This information concerns how to set up the TREE and learn a CMOS board. To eliminate the charging effect, first try using a 10kΩ resistor clip (supplied with the DSI 700) across the power supply of the board to be learned while using the VIEW mode to observe a signature like Figure E-3. If that resistance is sufficient, the horizontal portion of the signature should move down and become like Figure E-2. Then, with the resistor still in place, check several other ICs on the board to make sure that no signatures like Figure E-3 are present (be sure to check all ranges).

If the 10kΩ resistor does not work, then use a jumper wire (zero resistance) across the supply. A short across the supply will eliminate the charging effect because the capacitance is shorted out and no longer affects the signatures; however, it also tends to mask out subtle differences in the signatures that will lower the troubleshooting efficiency of the DSI 700. Therefore, a short should be used only as a last resort.

One tip that can enable the use of the 10kΩ jumper is to desolder large capacitors on the power supply (e.g. the 10μF capacitor on the typical board mentioned above) if there are few of them. It is not practical to remove the smaller power supply capacitors which are usually quite numerous, but removing the larger capacitors can substantially reduce the total power supply capacitance, making a board much easier to test.

This technique, as discussed so far, has mentioned only single supply boards. If there are multiple supplies, each one must be controlled with an appropriate resistance until the charging effect is gone.

Once the charging effect is eliminated, the slow settling time will probably still be present (refer again to Figure E-1 for a typical example). The second step takes care of this by introducing a delay before the data of each pin is read by the DSI 700 hardware.

The parameter that controls the timing is called Delay.

DELAY

You enter a value for Delay in the EDIT mode when entering the component information. After that, both learning and testing take place using that value of Delay in order to obtain consistent data.

Start with Delay = 1 sec and modify Delay depending on the consistency of results. After setting Delay, do a trial LEARN and watch the signatures on the CRT to see if they stop moving before the next signature appears. If signatures have stabilized, then the value selected for Delay is fine. If not, use a higher value for Delay until they do stabilize. To change Delay, go into the EDIT mode, and edit the component being learned to change the Delay value.

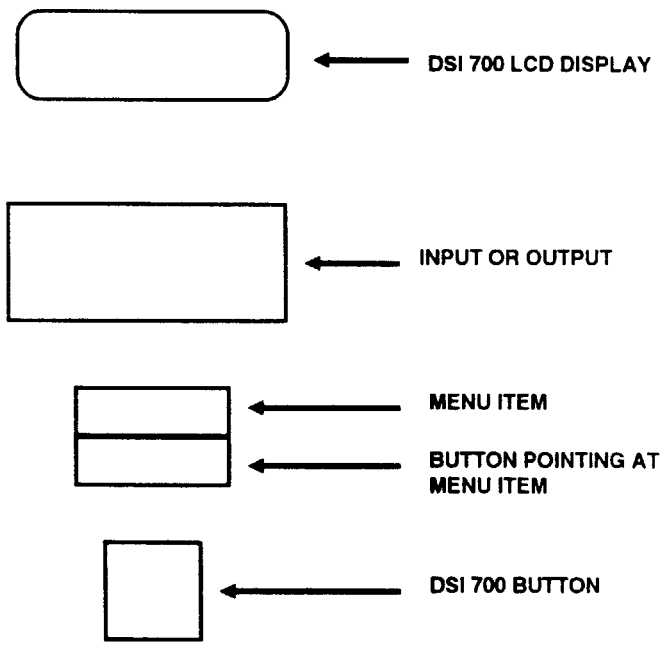
In general, if Delay is too small, then test results will be erratic and marked DIFFERENT, since signatures have not stabilized. Experiment with different values of Delay to find an optimum value for a particular section or device. Once that good LEARN data is obtained, the same conditions of power supply resistance must be repeated while testing.

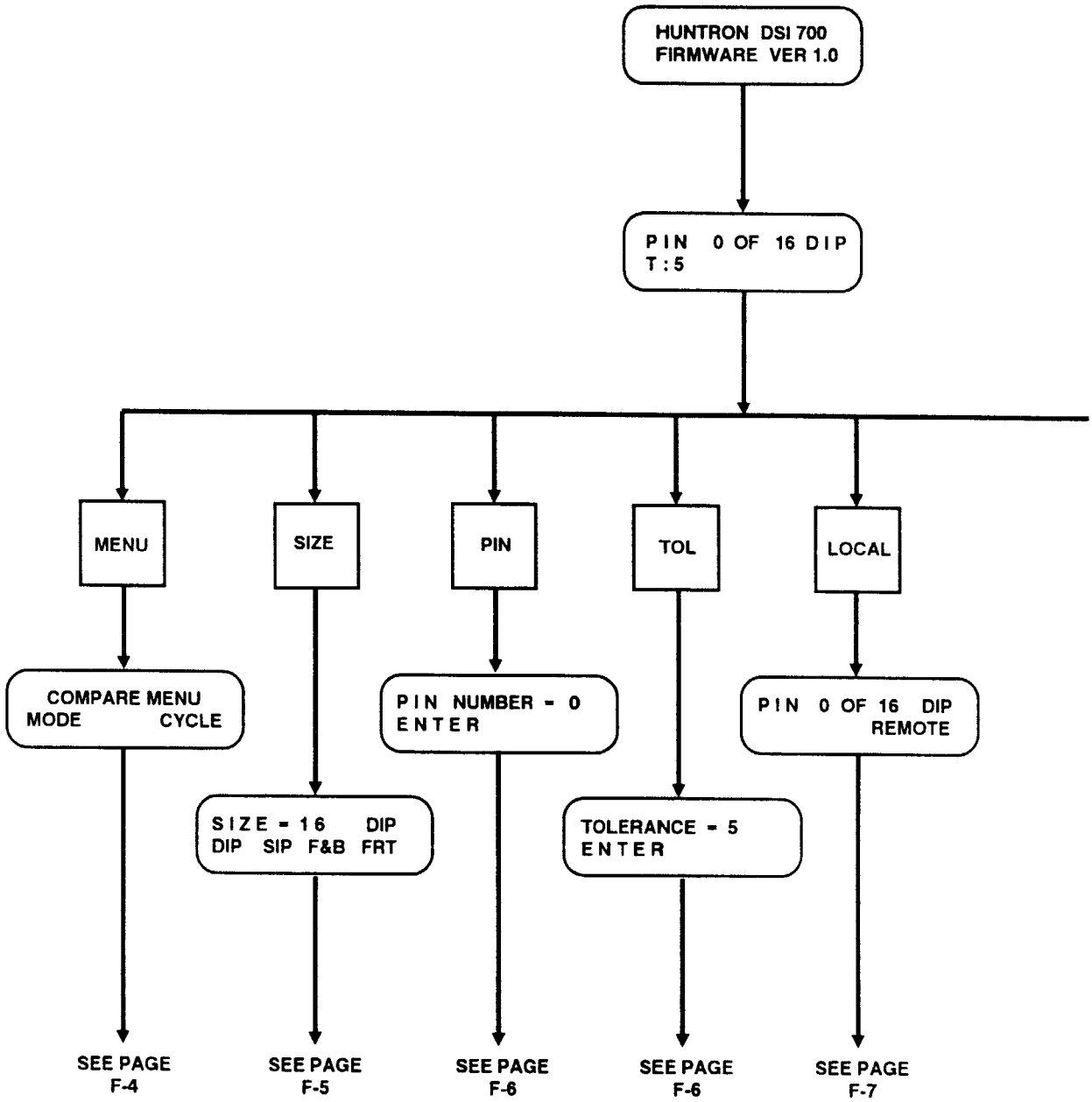
NOTES:

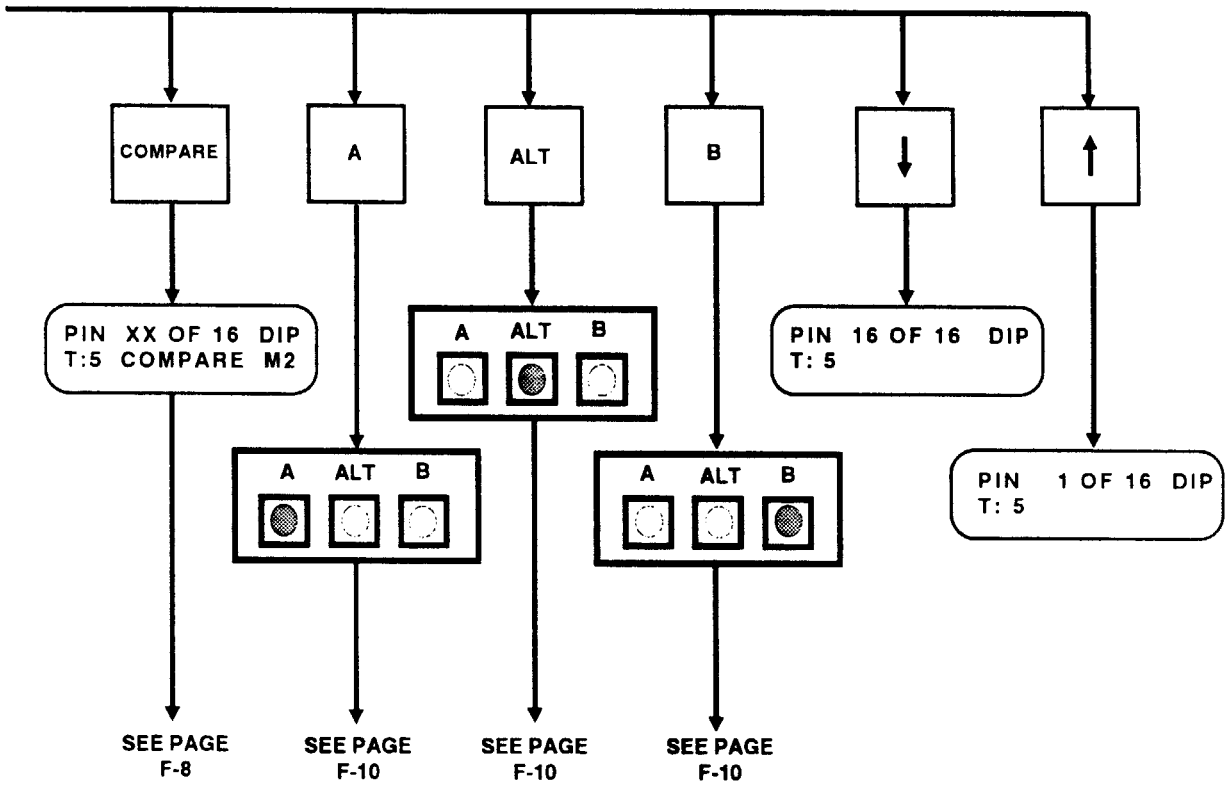
APPENDIX F
FIRMWARE MAPS

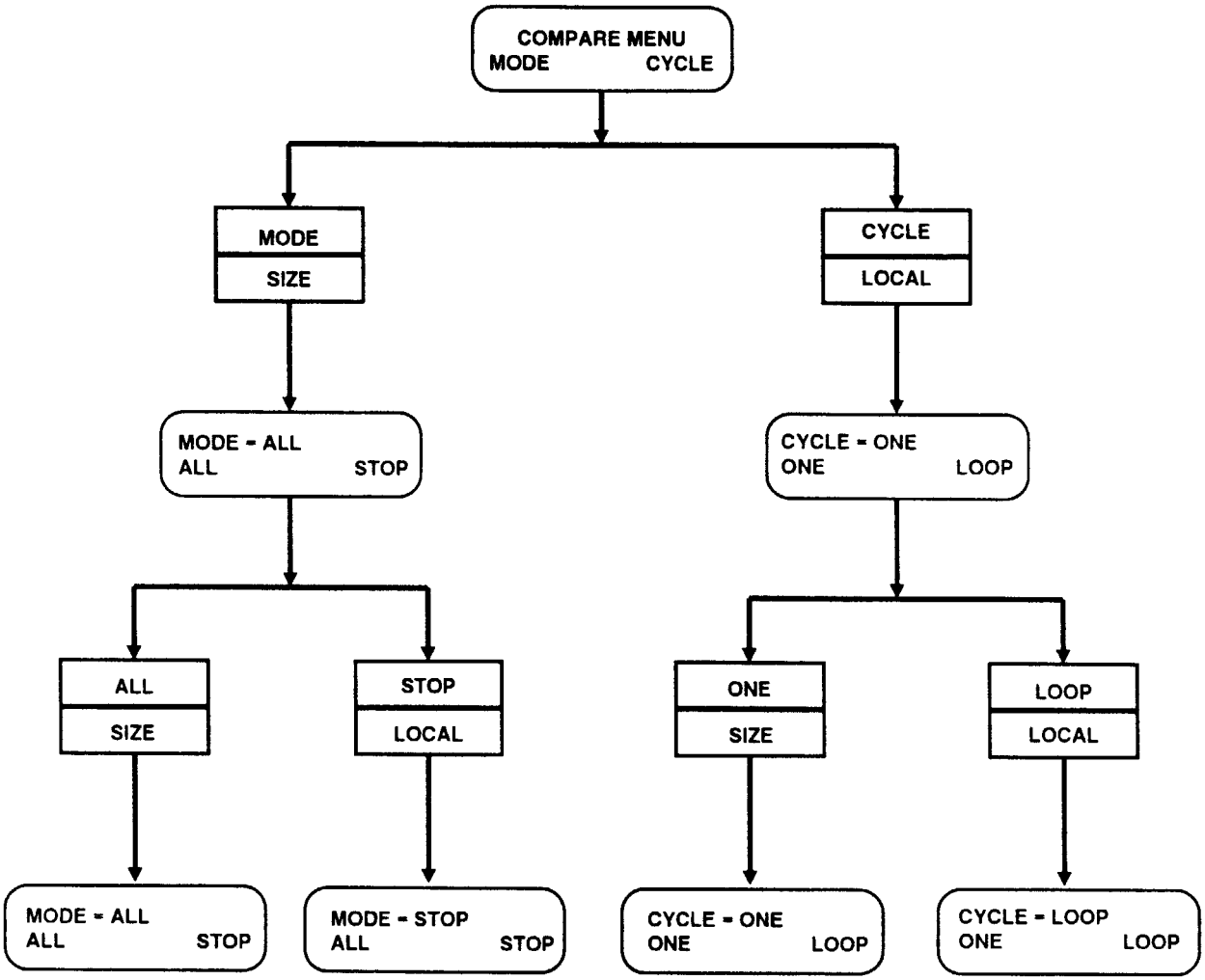
The following maps are provided to help you find your way through the menus and features of the DSI 700. They are based on Version 1.0 of the DSI 700 Firmware.

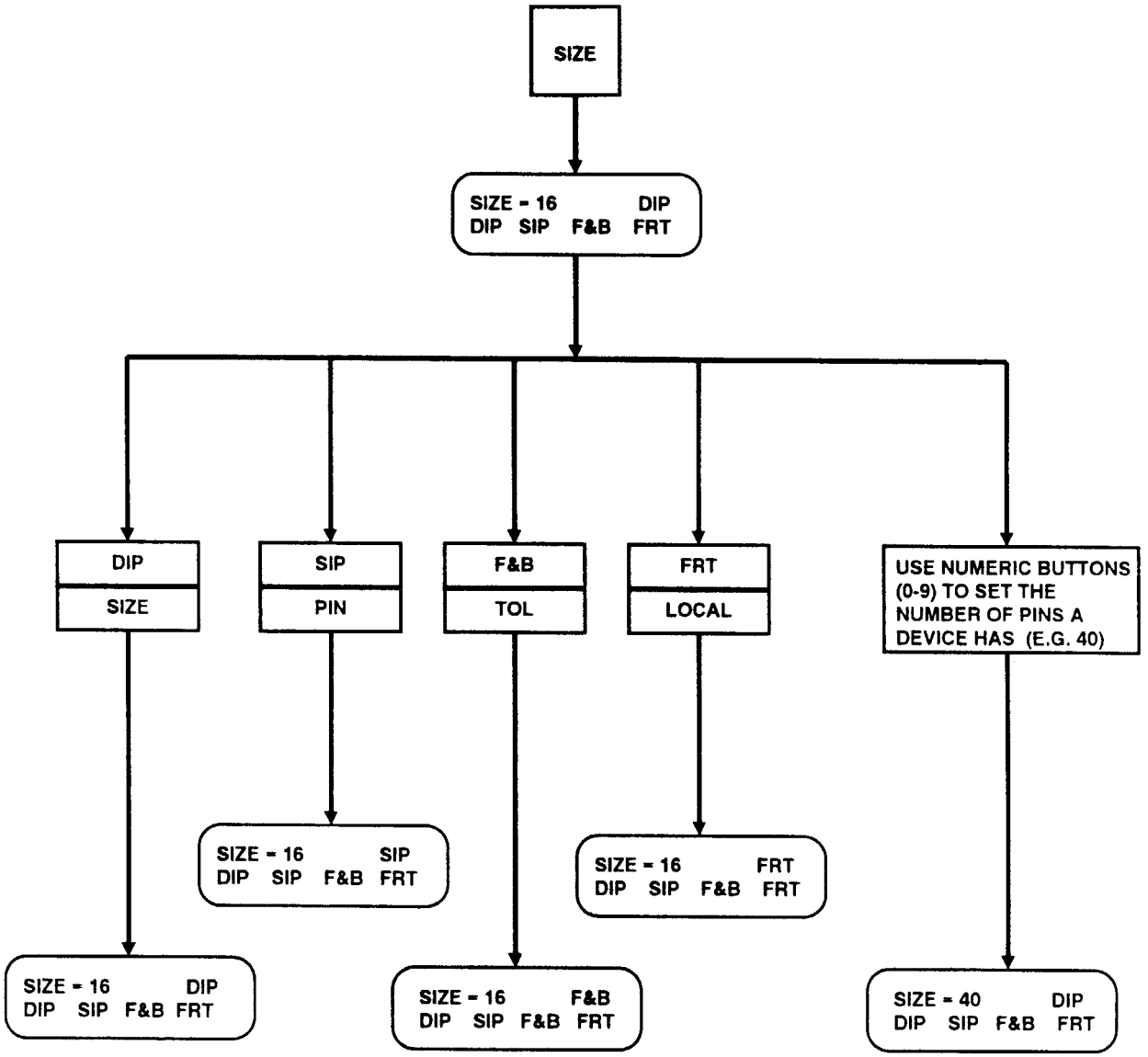
LEGENDS:

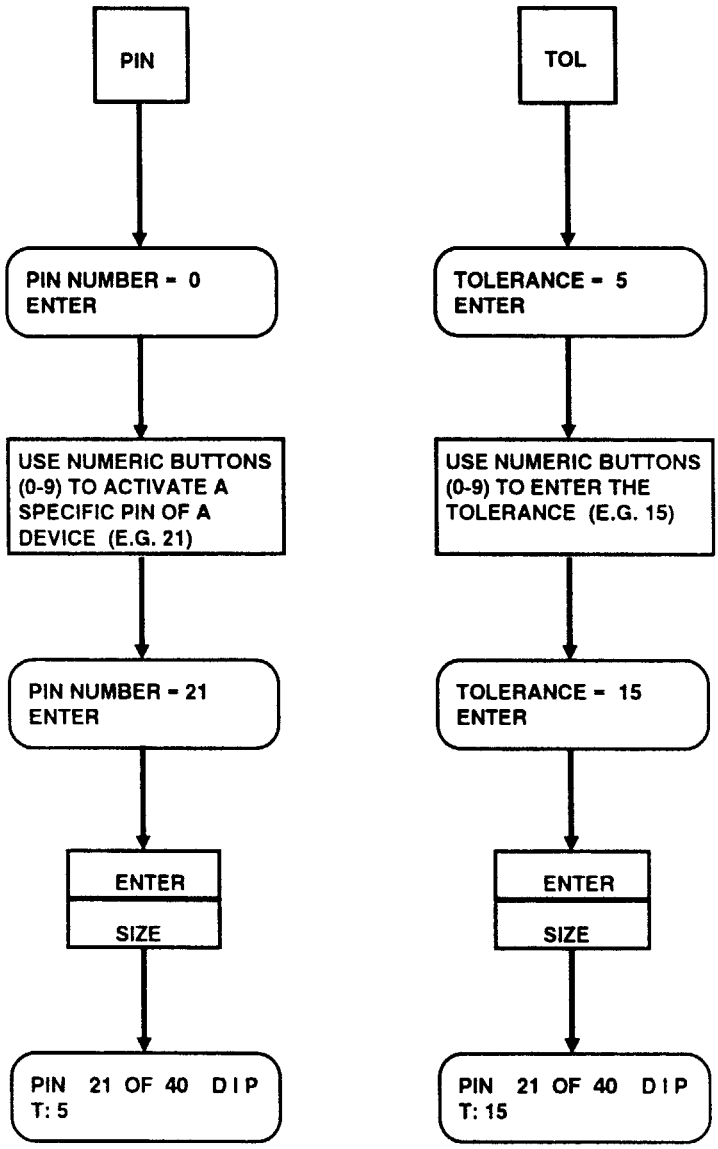


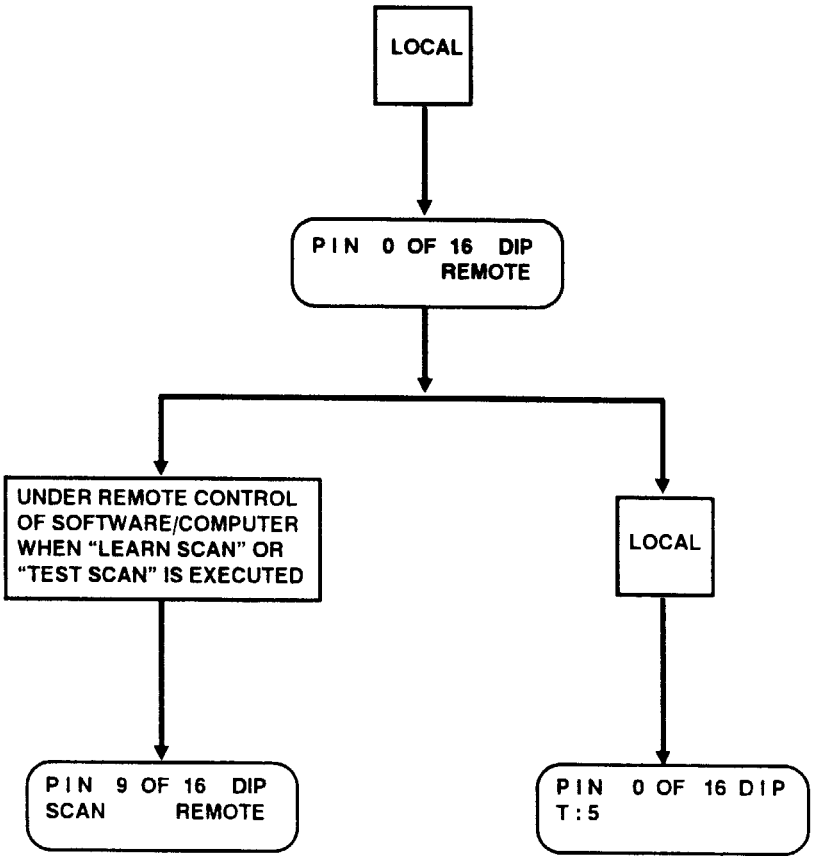

HUNTRON DSI 700
FIRMWARE VER 1.0
PIN 0 OF 16 DIP
T:5
MENU
SIZE
PIN
TOL
LOCAL
COMPARE MENU
MODE CYCLE
SIZE = 16 DIP
DIP SIP F&B FRT
PIN NUMBER = 0
ENTER
TOLERANCE = 5
ENTER
PIN 0 OF 16 DIP
REMOTE
SEE PAGE F-4
SEE PAGE F-5
SEE PAGE F-6
SEE PAGE F-6
SEE PAGE F-7

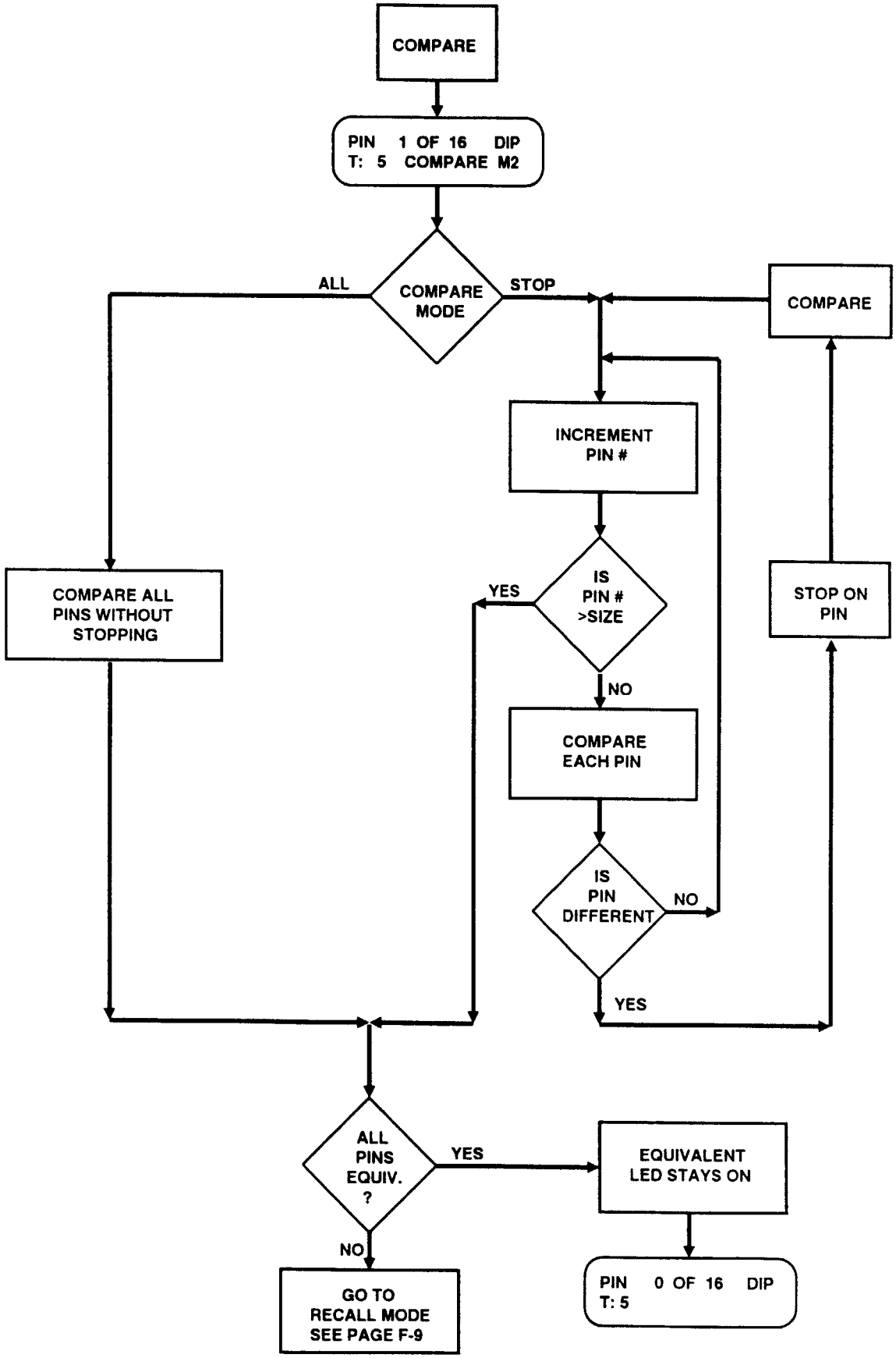

COMPARE
A
ALT
B
PIN XX OF 16 DIP
T:5 COMPARE M2
A ALT B
A ALT B
A ALT B
PIN 16 OF 16 DIP
T: 5
PIN 1 OF 16 DIP
T: 5
SEE PAGE F-8
SEE PAGE F-10
SEE PAGE F-10
SEE PAGE F-10

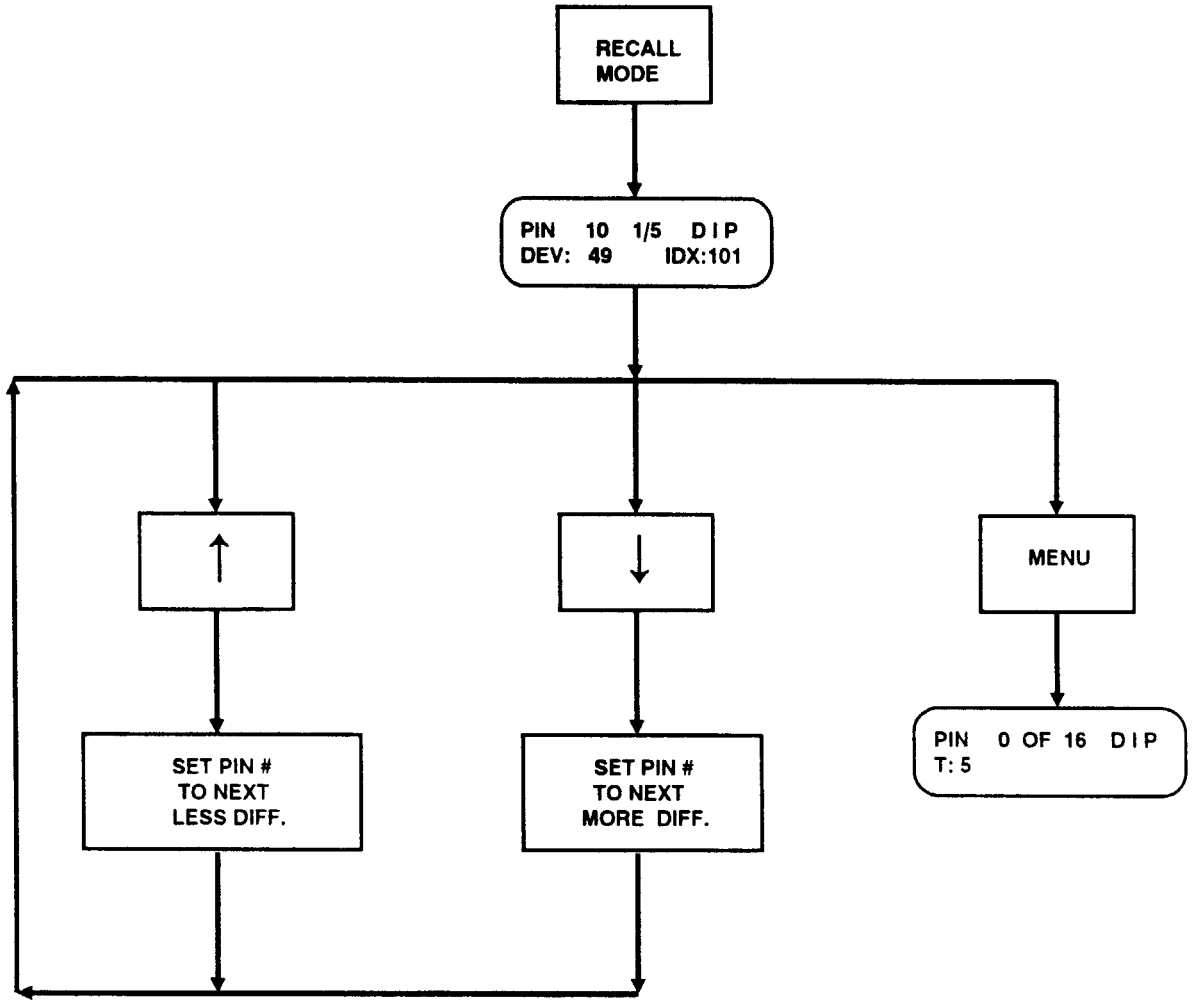

COMPARE MENU
MODE CYCLE
MODE
SIZE
CYCLE
LOCAL
MODE = ALL
ALL STOP
CYCLE = ONE
ONE LOOP
ALL
SIZE
STOP
LOCAL
ONE
SIZE
LOOP
LOCAL
MODE = ALL
ALL STOP
MODE = STOP
ALL STOP
CYCLE = ONE
ONE LOOP
CYCLE = LOOP
ONE LOOP

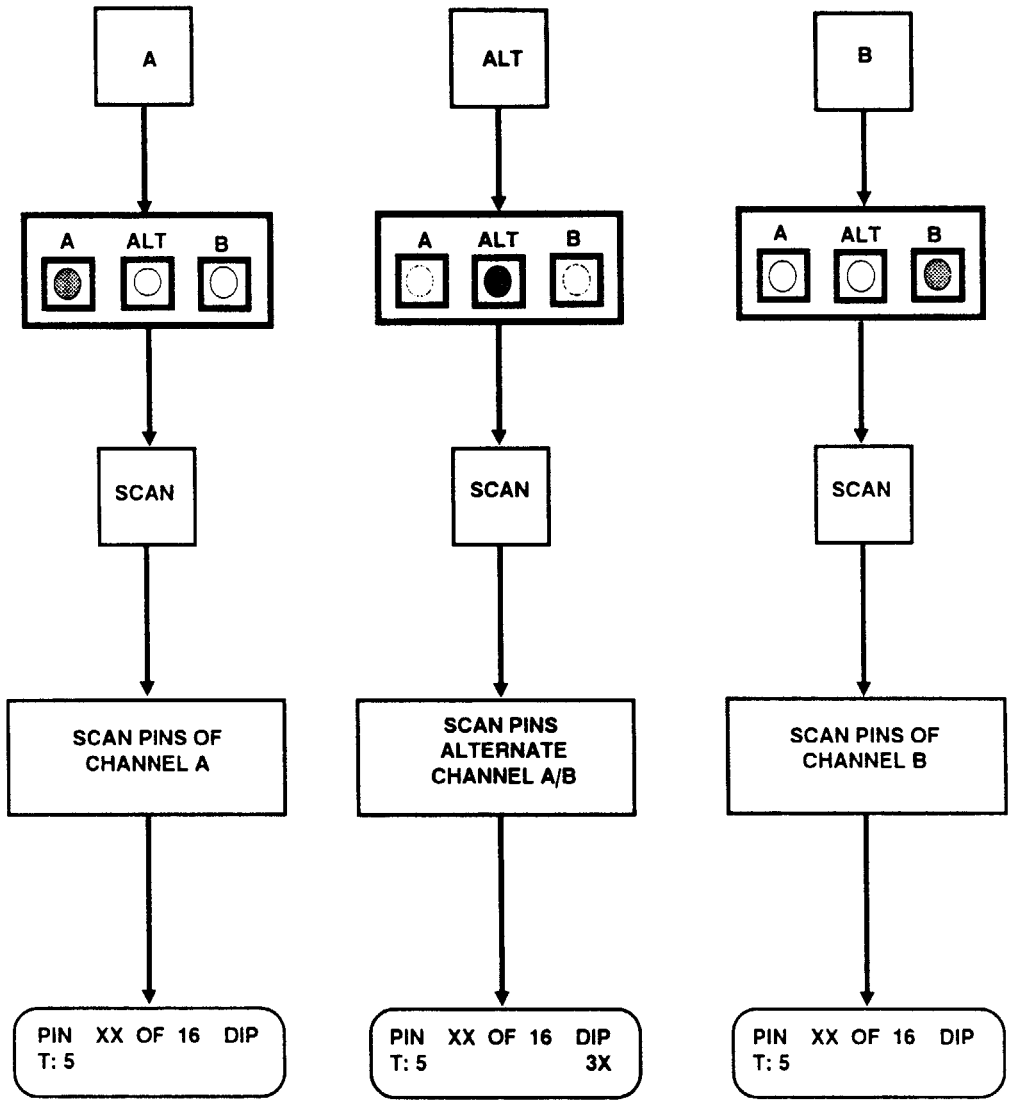

SIZE
SIZE = 16 DIP
DIP SIP F&B FRT
DIP
SIZE
SIP
PIN
F&B
TOL
FRT
LOCAL
USE NUMERIC BUTTONS (0-9) TO SET THE NUMBER OF PINS A DEVICE HAS (E.G. 40)
SIZE = 16 SIP
DIP SIP F&B FRT
SIZE = 16 FRT
DIP SIP F&B FRT
SIZE = 16 DIP
DIP SIP F&B FRT
SIZE = 16 F&B
DIP SIP F&B FRT
SIZE = 40 DIP
DIP SIP F&B FRT

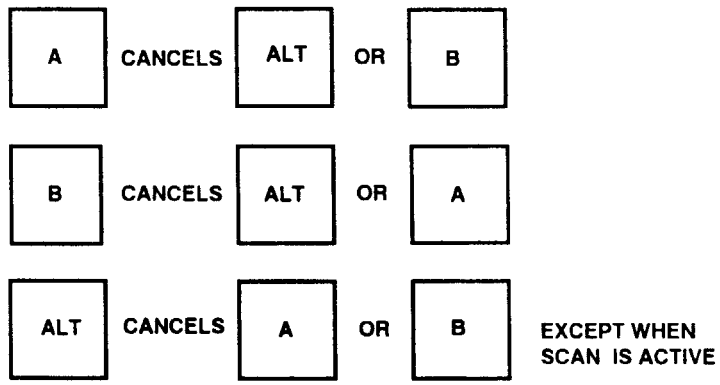

PIN
PIN NUMBER = 0
ENTER
USE NUMERIC BUTTONS (0-9) TO ACTIVATE A SPECIFIC PIN OF A DEVICE (E.G. 21)
PIN NUMBER = 21
ENTER
ENTER
SIZE
PIN 21 OF 40 DIP
T: 5
TOL
TOLERANCE = 5
ENTER
USE NUMERIC BUTTONS (0-9) TO ENTER THE TOLERANCE (E.G. 15)
TOLERANCE = 15
ENTER
ENTER
SIZE
PIN 21 OF 40 DIP
T: 15


LOCAL
PIN 0 OF 16 DIP
REMOTE
UNDER REMOTE CONTROL
OF SOFTWARE/COMPUTER
WHEN "LEARN SCAN" OR
"TEST SCAN" IS EXECUTED
LOCAL
PIN 9 OF 16 DIP
SCAN REMOTE
PIN 0 OF 16 DIP
T:5


COMPARE
PIN 1 OF 16 DIP
T: 5 COMPARE M2
COMPARE MODE
ALL
STOP
COMPARE
INCREMENT PIN #
IS PIN # >SIZE
YES
NO
COMPARE ALL PINS WITHOUT STOPPING
COMPARE EACH PIN
STOP ON PIN
IS PIN DIFFERENT
NO
YES
ALL PINS EQUIV. ?
YES
NO
EQUIVALENT LED STAYS ON
GO TO RECALL MODE SEE PAGE F-9
PIN 0 OF 16 DIP
T: 5


RECALL
MODE
PIN 10 1/5 DIP
DEV: 49 IDX:101
↑
↓
MENU
SET PIN #
TO NEXT
LESS DIFF.
SET PIN #
TO NEXT
MORE DIFF.
PIN 0 OF 16 DIP
T: 5


A
ALT
B
A ALT B
A ALT B
A ALT B
SCAN
SCAN
SCAN
SCAN PINS OF CHANNEL A
SCAN PINS ALTERNATE CHANNEL A/B
SCAN PINS OF CHANNEL B
PIN XX OF 16 DIP
T: 5
PIN XX OF 16 DIP
T: 5 3X
PIN XX OF 16 DIP
T: 5


A CANCELS ALT OR B
B CANCELS ALT OR A
ALT CANCELS A OR B
EXCEPT WHEN SCAN IS ACTIVE

APPENDIX G
GLOSSARY OF TERMS

Alphanumeric — Refers to letters, numbers or both.

Analog Signature Analysis — A unique, power-off troubleshooting technique that uses a sinewave stimulus to generate the current (I) vs. voltage (V) characteristics of an unpowered device. The IV characteristic is called an analog signature.

Arrow keys — These keys are the ↑, ↓, ← and → keys.

ASA — An abbreviation for Analog Signature Analysis.

Board — Any electronic circuit board.

Capacitor — An electrical component designed to store electricity. Capacitors are widely used in circuits for producing time delays and filtering electrical signals.

Character — A letter, digit, or other graphic symbol.

Circuit — An arrangement of components connected together in such a way that a useful function is performed.

CMOS — Complementary Metal-Oxide Semiconductor. A wide range of ICs are CMOS. They are characterized by low power consumption, making them useful in low-power, battery-operated devices. Their main disadvantage is that they are susceptible to damage caused by static electricity.

Common Jack — The black banana jack labeled "COM" on the front panel of the DSI 700.

Common Lead — The black lead with a banana plug and a clip used to connect the DSI 700 to the common point on the board.

Common Pin — The reference pin for the component. Typically, the common pin is the negative power supply pin or the ground pin of an IC.

Component — Any piece of electronic hardware having a particular purpose, such as an integrated circuit (IC), transistor, or resistor.

Component Name — Unique identifier for the component under test (such as U1), to indicate its location on the board.

Component Type — The part number (not the date code) on the IC (e.g. LM340, 74161, CD4011, etc.). For resistors with nothing printed on them, the component type is determined by the order and color of the bands.

Coprocessor — A math coprocessor IC optionally installed in a computer system to enhance the speed of math and graphics functions. It is highly recommended when using the DSI 700.

CRT — Cathode Ray Tube-specifically, in this manual, the screen on the Tracker 2000.

Cursor — The small moveable marker on your computer screen indicating where the next character will appear in a character entry field.

Demo Board — The electronic circuit board supplied with the DSI 700 to be used with the tutorial section of this manual. Demonstrates the capabilities of the software and hardware and also used as a training tool.

Dev	An abbreviation for Deviation.
Deviation	The amount that the value of one signature data point exceeds the value of the learn signature data point minus the tolerance.
DIF	Abbreviation for DIFFERENCE.
DIFFERENCE	This is one of the two signature orders. When in this mode, signatures are displayed from the most to least different pin in the most to least different range (also see NUMERIC).
DIFFERENT	This indicates that some of the signatures of the component exceeded the tolerance.
Digit	Any of the ten numbers 0 to 9.
Diode	A component which allows current to flow through it in one direction only. Diodes are used in power supplies to convert alternating current to direct current.
DIP	Dual In-line Package. An IC package having terminal pins in two parallel rows, one along each side of the package.
DIP Clip	The clips with 8 to 64 pins used to attach the DIP clip cables to an IC.
DIP Clip Cable	The cables used to attach the DIP clips to the DSI 700 IDC sockets.
Discrete Component	A component that is a single device with a single purpose, such as a resistor, capacitor or diode.
Disk Space Needed	A feature for displaying needed disk space for storing merged learns of an entire section.
Display	The computer monitor connected to your computer that displays the software screens.
DOS Prompt	The prompt of your computer system, when the DSI 700 software is not running. Frequently C:> or similar in nature.
DOT	This is one of the two signature styles. This mode displays only the actual data points of the signature (also see LINE).
EQUIVALENT	This indicates that none of the signatures of the component exceeded the tolerance.
EGA	Enhanced Graphics Adapter. A type of video card and monitor capable of displaying graphics in 16 colors at a resolution of 640 by 350 pixels.
Filter	This algorithm removes oscillations (spider webbing) from certain types of signatures. An 'N' disables the algorithm and a 'Y' enables it.
Filtered	This indicates whether or not the current signature was filtered or not. An 'N' indicates that it was not filtered and a 'Y' indicates that it was.
Graticule	The set of horizontal and vertical axes behind the signatures used to approximate turn-on voltages and aid in the comparison of signatures with the signatures of other pins. There is a permanent graticule for the 2000 CRT and a software-controlled graticule in the VIEW SIGNATURES screens.
High Range	This range is used most often for high impedance components and high voltage zener diodes. It has a resistance range of 3kΩ to 1MΩ.
IC	Integrated Circuit. An electrical circuit consisting of transistors, resistors, diodes, and sometimes capacitors formed and connected together on a single chip of silicon.

Index The sum of all the deviations (see Deviation).

Keypad The cluster of special keys to one side of the computer keyboard.

Learns This indicates the number of times the current component has been learned.

LINE This is one of the two signature styles. When in this mode, all of the signature data points are displayed and connected with lines (also see DOT).

Low Range This range is used most often for discrete components and determining shorts. It has a resistance range of 1Ω to 400Ω.

Medium 1 Range This range is most often used for analog ICs. It has a resistance range of 50Ω to 10kΩ.

Medium 2 Range This range is most often used for digital ICs. It has a resistance range of 1kΩ to 200kΩ.

Merge Tolerance This is the tolerance setting that alerts the user when learning a component after the first time.

Merged Learns After signatures for a component have been stored, the component may be learned again and again on different known-good boards and merged to create MIN/MAX signatures.

MIN/MAX Signatures When signatures are merged together the minimum value for each data point of the different learns is used to create the MIN signature. The maximum value for each data point of the different learns is used to create the MAX signature. When comparing to MIN/MAX signatures the tolerance is subtracted from the MIN and added to the MAX to create the EQUIVALENT limits.

Monitor The viewing screen of your computer, or the unit containing that screen, if separate from the computer.

NUM Abbreviation for NUMERIC.

NUMERIC This is one of the two signature orders. When in this mode the signatures are displayed sequentially by their pin number and from the highest to the lowest range (also see DIFFERENCE).

Order The current signature order setting (DIF or NUM).

Package This can be D (DIP), S (SIP), P (Probe), B (Both) or F (Front).

Pop-up Window A bordered block of information that overlays a rectangular portion of the screen.

Probe Probe (P) is an option for the component package type that disables all relays and instead steps through a multi-pin device pin by pin allowing the user to use probes to get signatures. This is especially useful for devices that are spaced too close together for use of the DIP clips or that are non-DIP package types.

Probes The red and black test leads with adjustable tips and banana plugs that connect to the banana jacks of the DSI 700. They are used to connect to components when DIP clips are not feasible.

RAM Random Access Memory. The memory of the computer in which the DSI 700 software resides when it is running.

Range The impedance range of the Tracker 2000 applied to the component under test, such as LOW, MED 1, MED 2 or HIGH.

REMOVED This indicates that a component that was DIFFERENT no longer affects the troublesheet.

Resistor	A component in a circuit which offers resistance to the flow of electrical current to create a difference in potential. Resistors can usually be recognized by their banded color coding system which gives their value in ohms.
Resistor Jumpers	The 10kΩ resistors with clips on both ends used to stabilize CMOS components.
Screen	The software information that is presented on the monitor.
Section	A group of components on a circuit board.
Sectn	An abbreviation for section.
SELECTOR	The highlighted area of the screen that changes position to choose the current item.
Signature Order	The sequence in which the signatures are arranged on the display.
Signature Style	The way signatures are presented on the screen or the printer (see DOT and LINE).
SIP	Single In-line Package. A component package having a single line of pins, such as a connector or resistor pack.
System	All the parts making up a working device, such as a computer, monitor and printer.
Test Pin	The current pin under test on a component.
TOL	The current tolerance setting.
Tolerance	The margin within which a component is still equivalent when being tested.
Tolrnce	An abbreviation for tolerance.
Tree	A structured group of Systems, Units, Boards, Sections and Components used to store all the information about a board that is to be learned and tested.
Troublesheet	A report showing all of the DIFFERENT pins and components of the current TEST.
Troublesheet Summary	A report showing the number of EQUIVALENT, REMOVED, and DIFFERENT components of the current TEST.
Unit	A group of one or more boards in a single enclosure.
VGA	Video Graphics Array. A type of video card and monitor capable of displaying graphics in 16 colors at a resolution of 640 by 480 pixels.