

OPERATING MANUAL

AUTO-TIMS

Automatic Transmission Impairment Measuring Set



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Consultronics Auto-TIMS
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AUTO-TIMS MANUAL

1.0 INTRODUCTION

The Auto-TIMS is designed to test virtually any two or four wire data circuit for analog impairments. Unlike any other "TIMS" sets, the Auto-TIMS is fully automatic, eliminating the cumbersome and time-consuming set-up and operating procedures normally associated with the measurement of impairments.

In its automatic mode, the Auto-TIMS sequentially checks each measurement against pre-stored limits (masks), reporting any impairments which are out of tolerance.

In its manual mode, the user can do real-time measurements of each impairment. This is of particular interest during alignment and repair of data circuits.

The Auto-TIMS is extremely easy to use, however it is recommended that you read this operating manual in order to fully understand all the features of the unit. Once familiar with the Auto-TIMS, this manual can be used as a reference guide. Notice that each function is listed in the table of contents and again in the index.

1.1 UNPACKING THE AUTO-TIMS

The Auto-TIMS has been shipped to you in a durable cardboard container. Foam end caps protect the unit from physical shock and give the Auto-TIMS protection against damage during shipping. After the unit has been removed, it is recommended that the carton and foam caps be saved and used whenever the Auto-TIMS is to be shipped.

The Auto-TIMS you have received may also include options which are installed inside the machine. To check that the proper options have been received, perform a self test as described in section 2.1 SELF TEST. Performing the self test function will display a list of the options which are installed in your particular unit.

IMPORTANT! - BEFORE USING THE AUTO-TIMS, READ SECTION 2.0: POWERING THE AUTO-TIMS.

1.2 CARING FOR THE AUTO-TIMS

The Auto-TIMS has been designed to be a rugged and portable piece of test equipment. However, the unit should be kept away from extremes of heat, cold, moisture and dust. Failure to do this may shorten the life of the instrument.

The Auto-TIMS should be fully calibrated once a year by Consultronics, your Consultronics representative or using the methods described in the Auto-TIMS SERVICE AND REFERENCE MANUAL. In day to day use, the Auto-TIMS will calibrate itself automatically, each time a measurement is made. Refer to section 13.0 SERVICING THE AUTO-TIMS, for details about calibration practices.

The display on the Auto-TIMS is protected with a Plexiglas cover. This should be cleaned using a soft, lint-free cloth and an antistatic cleaning solution recommended for Plexiglas. Ordinary detergents and other cleaning solutions may cloud or scratch the surface and should be avoided. If this should occur, the cover may be replaced.

If the Auto-TIMS needs to be stored for a period of time, it is recommended that the optional battery pack be periodically charged. Failure to do this may lead to damage to either the batteries or the Auto-TIMS itself. The Auto-TIMS should be stored in a cool, dry place.

2.0 POWERING THE AUTO-TIMS

The Auto-TIMS is shipped to you with the mains voltage pre-selected for your country. However, it is important to check that this has been done correctly before powering the unit. Locate the power and fuse connector on the rear panel of the instrument. Near the top of this connector is an indicator of the voltage presently selected. To change this voltage, pry open the fuse holder, remove the selector wheel and re-insert it so that the proper voltage is showing. Replace the fuse cover and check that the desired voltage appears in the display window. The instrument is now ready to be powered. Note that the Auto-TIMS will operate on any line frequency from 50 to 440Hz.

To power the unit, connect the power cord to the connector on the rear panel of the Auto-TIMS and to the mains. Press the red button on the front panel marked POWER. The power switch will illuminate and the screen will display a self test. The Auto-TIMS is now ready to be used.

2.1 SELF TEST

The Auto-TIMS is equipped with a self-test feature. This function is performed each time the unit is turned on. To repeat a self-test, turn the instrument off, wait a few seconds and then turn back on.

OPTIONS	INSTALLED	VERSION N2.3
NON-LIN. DIST	YES	
HITS PACKAGE	YES	
P/AR	YES	
PRINTER PORT	YES	
RS232	NO	

CONSULTRONICS
AUTOTIMS

Figure 2.1a

The self-test screen shows a list of the options available for the Auto-TIMS at the top left hand side of the screen. Next to each listed option appears an indication whether or not that option is installed. Also the software version appears on the screen.

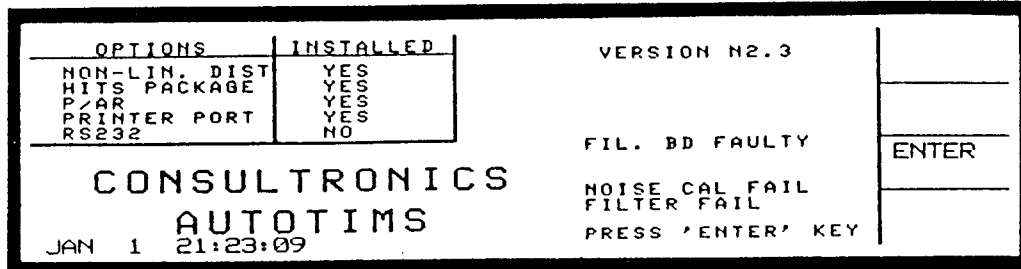


Figure 2.1b

If any of the circuit boards are missing or defective, the screen will display a list of the faulty boards and the key selection menu will display the **ENTER** command. If any boards are faulty, the unit should be sent for repair to your local Consultronics service representative. Pressing the key marked **ENTER** will still enable you to operate the Auto-TIMS. Note however that the defective or missing boards will affect the operation of the set.

Refer to the Auto-TIMS Reference and Service manual for details on the self-test.

2.2 CONNECTING THE AUTO-TIMS

There are four groups of connections that may be made to the Auto-TIMS. These are: A.C. mains power, test circuit, parallel printer and serial RS232C/V.24. The A.C. power configuration is in Section 2.0. The rest follow.

2.3 TEST CIRCUIT CONNECTIONS

There are provisions for connection of the circuit to be tested on the front and back panels of the Auto-TIMS. The front panel has Bantam jacks for transmit and receive and also a four contact modular jack. A terminal strip on the rear panel provides connection for transmit, receive and ground. Front and back panel connectors are all wired in parallel.

2.4 PARALLEL PRINTER CONNECTION

A screen dump from the Auto-TIMS is possible as outlined in Section 8.0. The parallel printer connector is on the rear panel and is a female 36 pin Centronics type. The pin assignments are as follows:

PIN	SIGNAL	DIRECTION	DESCRIPTION
1	DATA STROBE	FROM A.T.	SIGNALS PRINTER VALID DATA ON BUS
2	DATA BIT 1	FROM A.T.	INFORMATION TO BE PRINTED
3	DATA BIT 2	" "	" " " "
4	DATA BIT 3	" "	" " " "
5	DATA BIT 4	" "	" " " "
6	DATA BIT 5	" "	" " " "
7	DATA BIT 6	" "	" " " "
8	DATA BIT 7	" "	" " " "
9	DATA BIT 8	" "	" " " "
10	ACK	FROM PRINTER	ACKNOWLEDGES DATA RECEIVED
11	BUSY	" "	ACTIVE HIGH-DATA CAN NOT BE RECEIVED
12	PAPER OUT	" "	ACTIVE HIGH-PRINTER OUT OF PAPER
13	SELECT	" "	ACTIVE HIGH-PRINTER READY
18	V	" "	+5 VOLTS
20-27	GROUND		SIGNAL GROUND
31	PRIME	FROM A.T.	ACTIVE LOW-RESETS THE PRINTER
32	FAULT	FROM PRINTER	ACTIVE LOW-INDICATES FAULT

HIGH = LOGIC 1, LOW = LOGIC 0

Use a cable that is less than 15 feet long to avoid possible errors from low signal levels and noise. The connector should be securely fastened with the wire retaining locks on each side.

2.5 SERIAL INTERFACE CONNECTION

The serial interface is used for remote operation of the Auto-TIMS as described in Section 9.0. The connector for this is a female 25 pin D-type connector on the rear panel. This interface is compatible with the EIA RS232C and CCITT V.24 specifications. The pin assignments for this are as follows:

PIN	MNEMONIC	DIRECTION	DESCRIPTION
1	PG		PROTECTIVE GROUND (EIA)
2	TD	FROM A.T.	TRANSMITTED DATA
3	RD	TO A.T.	RECEIVED DATA
4	RTS	FROM A.T.	REQUEST TO SEND
5	CTS	TO A.T.	CLEAR TO SENT
6	DSR	" "	DATA SET READY
7	SG		SIGNAL GROUND
20	DTR	FROM A.T.	DATA TERMINAL READY
25		" "	4.166 Hz (This pin should not be connected)

Pin 25 is for testing of the Auto-TIMS only and is not used for the serial communication. This connector is configured as DTE (Data Terminal Equipment). It is recommended that the cable length be 50 feet or less to reduce the possibility of errors from signal distortion. Also the connectors should be secured with the proper screws to enable reliable operation.

3.0 OPERATING INSTRUCTIONS

The Auto-TIMS is easy to operate, with a simple front panel consisting of a large "Super Twist" back-lit Liquid Crystal Display, four black MENU selection buttons, a blue PRINT SCREEN button, a blue CONTRAST knob, easy access connectors and a red on/off switch.

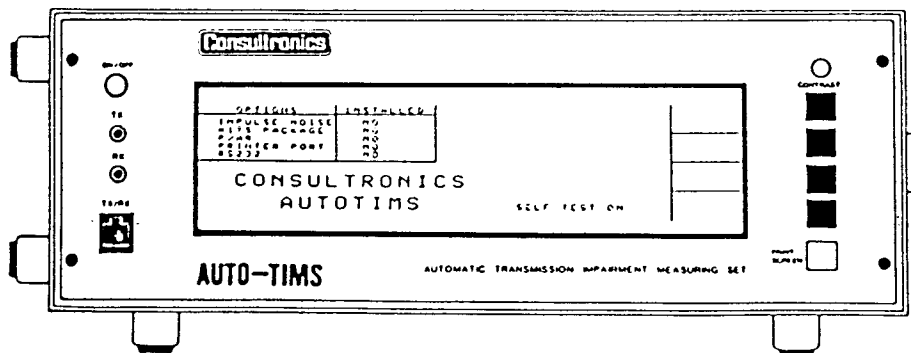


Figure 3.0

Press the power switch and the screen will light up and immediately display the Self-Test presentation for 7 or 8 seconds. During the Self Test presentation, a table in the upper left-hand corner indicates which options are available for the unit and which of those options have been installed. Once the 7 or 8 seconds have passed, the screen will automatically change to the Main Menu presentation if all self-test functions were successful.

3.1 AUDIO MONITOR/INTERNAL MICROPHONE

The Auto-TIMS contains an amplifier and speaker for monitoring the received signal. The speaker and volume control are located on the back panel. The audio monitor is connected after the internal receive gain control section to allow low level signals to be heard as easily as high level signals without constant adjustment of the monitor volume.

An optional microphone may be installed in the Auto-TIMS. This allows voice communication over the circuit under test. When a printer is not on-line or connected the print screen button functions as a press to talk button. Pressing this button will mute the audio monitor and transmit the signal from the internal microphone. The audio monitor is muted to prevent feedback of the received signal to the distant Auto-TIMS.

3.2 MAIN MENU

The Main Menu appears automatically once the unit has completed a successful self test.

```
MAIN MENU
AUTO. TEST SETTING # 1
MASK TYPE: CUST1
CIRCUIT TYPE: 4W LOOPBK
TRANSMIT LEVEL: -10 DBM
IMPEADANCE: 600
TERMINATION: TERMINATED
NOISE FILTER: C-MESG
NOISE MODE: DBRN
DISTANCE: 0-50
TX/RX CONNEC.: NORMAL

RUN
TEST
CHANGE
SETTING
RECALL
RESULTS
MANUAL
MODE

OCT 9 13:58:11
```

Figure 3.1

The command selection to the right of the Main Menu consists of the four major options available to the operator:

- RUN TEST (see section 4.0);
- CHANGE SETTING (see section 5.0);
- RECALL RESULTS (see section 6.0);
- MANUAL MODE (see section 7.0).

The clock display on the lower left hand side should be set to the correct date and time. If it needs correcting, see section 5.11.

The body of the Main Menu represents the test set-up for an automatic test. If these are not the parameters required, see section 5.0: **CHANGING THE AUTOMATIC TEST SET-UP.**

4.0 RUNNING AN AUTOMATIC TEST

To run an automatic end to end test, it is necessary to use an Auto-TIMS at each end of the data circuit for proper sequencing. The master Auto-TIMS will command the slave using a DTMF tone sequence sent through the line being tested. The slave transmits measurement results to the master the same way.

4.1 INITIATING THE TEST

Once the parameters on the Main Menu have been properly set up, (see section 5.0: CHANGING THE AUTOMATIC TEST SET-UP) all you need to do to initiate an automatic test sequence is to press the RUN TEST button. The "TEST RUNNING" presentation will automatically appear.

4.2 PASS/FAIL BAR GRAPH

As the test proceeds step by step, a bar will appear for each parameter that was tested.

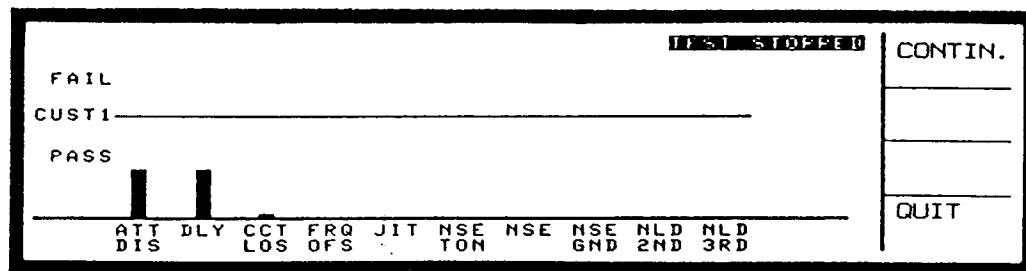


Figure 4.2a

If you need to stop the test press STOP TEST. The Auto-TIMS may not acknowledge the key press immediately if it is testing a parameter. The STOP TEST button should be held until the "TEST RUNNING" display changes to "TEST STOPPED". You can then press QUIT to return to the main menu or CONTIN., to continue the testing. At the end of the sequence the heading on the screen will change to "TEST COMPLETE" and the bar graph display will freeze.

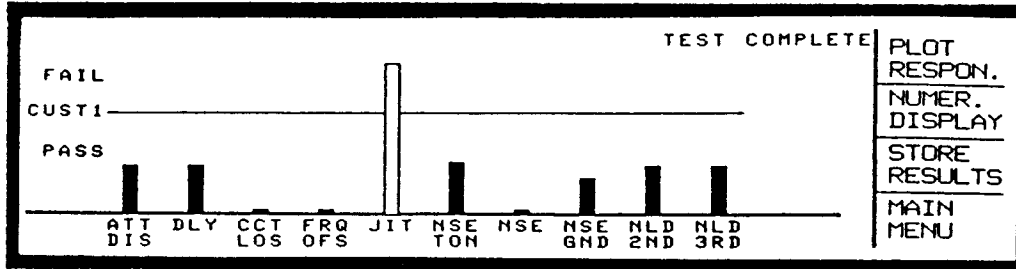


Figure 4.2b

A solid bar indicates a pass condition for the parameter tested whereas an outline bar shows a failed condition. The mask name is next to the "PASS/FAIL" line. The command selection on the right hand side of this display makes it possible to proceed to the PLOT RESPON or the NUMER DISPLAY. You can STORE RESULTS (see section 4.6) or return to the MAIN MENU.

4.3 NUMERIC RESULTS

Pressing the NUMER DISPLAY button displays the numerical results associated with the completed test sequence. This display lists the parameters tested, the limits set by the mask type chosen and the actual measured result. Note that each parameter has a "PASS" or "FAIL" indication next to it with the "FAIL" indication highlighted by inverse video display.

TEST COMPLETE - JAN 1, 01:03 MASK CUST1				BAR DISPLAY
PARAMETER	LIM	MEAS		
ATT DIST			PASS	PLOT RESPON. STORE RESULTS MAIN MENU
DELAY			PASS	
LOSS	10	0	PASS	
FRQ OFFS	5	0	PASS	
P. JITTER	10	40	FAIL	
NSE/TONE	-39	-62	PASS	
NOISE	-39	-91	PASS	
NSE/GND	-39	-70	PASS	
NLD 2ND	27	48	PASS	
NLD 3RD	32	52	PASS	

Figure 4.3

The command selections on the right hand side of the display make it possible to view other test results, STORE the results or return to the MAIN MENU.

5.0 CHANGING THE AUTOMATIC TEST SET-UP

Upon power-up the Auto-TIMS displays its present automatic test set-up. In order to change any of the parameters for an automatic test press the button marked CHANGE SETTING on the Main Menu. A cursor will appear on the list of parameters.

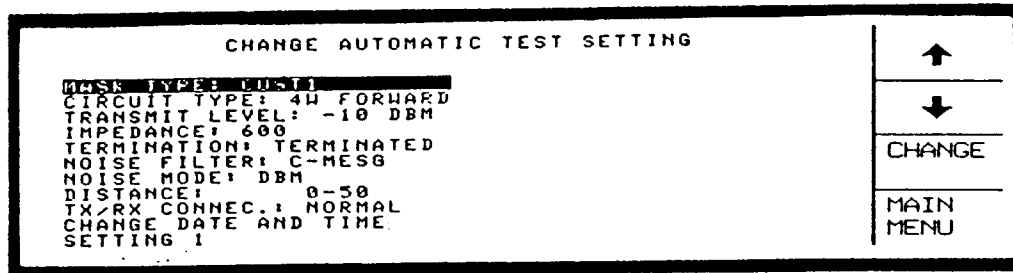


Figure 5.0

5.1 SELECTING A MASK TYPE

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0). Using the UP/DOWN arrow buttons, move the cursor to the Mask Type: line.

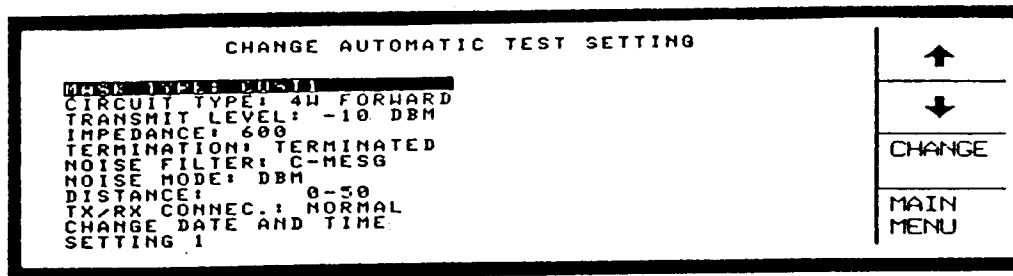


Figure 5.1a

Press the CHANGE button. The display will change to show the available mask types listed in a column on the left hand side. The majority of the screen is the limits for the mask selected.

MASK TYPE	CIRC. LOSS	10	DROPOUT	2			
3002	NOISE	-39	P/AR	100			
C1	NOISE /TONE	-39	TIMER	0			
C2	NOISE /GND	-33					
C4	FREQ. OFFSET		FREQ. RANGE		VAR.		
CUST1	PHASE JIT.	10	ATTN	500-2500	-32		
CUST2	NLD 2ND	27	DIST.	300-3000	-30		
	NLD 3RD	35			0		
	IMP. NOISE 1	1	ENV.	000-2600	1750		
	IMP. NOISE 2	9	DELAY	0-	0		
	IMP. NOISE 3	5		0-	0		
	PHASE HIT	8		0-	0		
	GAIN HIT	8		0-	0		

Figure 5.1b

Using the UP/DOWN arrow buttons, position the cursor over the mask type desired.

NOTE: Each mask takes about 5 seconds to be fully displayed on screen. During this time another mask cannot be selected.

Once the desired mask has been selected, press the PREVS. MENU button to return to the previous menu. The display will return to the "CHANGE AUTOMATIC TEST SETTING" screen showing the selected mask.

5.2 SELECTING A CUSTOM MASK

To select one of the custom masks follow the procedure in 5.1 and move the cursor using the UP/DOWN arrows to one of the custom mask positions.

MASK TYPE	CIRC. LOSS	0	DROPOUT	0			
3002	NOISE	-90	P/AR	0			
C1	NOISE /TONE	-90	TIMER	0			
C2	NOISE /GND	-90					
C4	FREQ. OFFSET	0	FREQ. RANGE		VAR.		
CUST1	PHASE JIT.	0	ATTN	0-	0		
CUST2	NLD 2ND	0	DIST.	0-	0		
	NLD 3RD	0		0-	0		
	IMP. NOISE 1	0	ENV.	0-	0		
	IMP. NOISE 2	0	DELAY	0-	0		
	IMP. NOISE 3	0		0-	0		
	PHASE HIT	0		0-	0		
	GAIN HIT	0		0-	0		

Figure 5.2a

Press the CHANGE button. A cursor will appear over the number opposite the first parameter (Circ. Loss).

MASK TYPE	CIRC. LOSS	3	DROPOUT	0				↑
3002	NOISE	-90	P/AR	0				
C1	NOISE /TONE	-90	TIMER	0				↓
C2	NOISE /GND	-90						
C4	FREQ. OFFSET	0	FREQ. RANGE	0	0	0	0	
CUST1	PHASE JIT.	0	ATTN	0	0	0	0	CHANGE
CUST2	MLD 2ND	0	DIST.	0	0	0	0	
	MLD 3RD	0						
	IMP. NOISE	1	ENV.	0	0	0	0	
	IMP. NOISE	2	DELAY	0	0	0	0	
	IMP. NOISE	3						
	PHASE HIT	0						PREV.
	GAIN HIT	0						MENU

Figure 5.2b

Pressing the CHANGE button a second time will cause the word CHANGE to disappear from the menu.

MASK TYPE	CIRC. LOSS	3	DROPOUT	0				↑
3002	NOISE	-90	P/AR	0				
C1	NOISE /TONE	-90	TIMER	0				↓
C2	NOISE /GND	-90						
C4	FREQ. OFFSET	0	FREQ. RANGE	0	0	0	0	
CUST1	PHASE JIT.	0	ATTN	0	0	0	0	
CUST2	MLD 2ND	0	DIST.	0	0	0	0	
	MLD 3RD	0						
	IMP. NOISE	1	ENV.	0	0	0	0	
	IMP. NOISE	2	DELAY	0	0	0	0	
	IMP. NOISE	3						
	PHASE HIT	0						DONE
	GAIN HIT	0						

Figure 5.2c

The UP/DOWN arrow buttons can now be used to change the value of the selected parameter.

MASK TYPE	CIRC. LOSS	4	DROPOUT	0				↑
3002	NOISE	-90	P/AR	0				
C1	NOISE /TONE	-90	TIMER	0				↓
C2	NOISE /GND	-90						
C4	FREQ. OFFSET	0	FREQ. RANGE	0	0	0	0	
CUST1	PHASE JIT.	0	ATTN	0	0	0	0	
CUST2	MLD 2ND	0	DIST.	0	0	0	0	
	MLD 3RD	0						
	IMP. NOISE	1	ENV.	0	0	0	0	
	IMP. NOISE	2	DELAY	0	0	0	0	
	IMP. NOISE	3						
	PHASE HIT	0						DONE
	GAIN HIT	0						

Figure 5.2d

Once the desired value has been obtained, press the DONE button. The menu will return to the previous format. Use the cursor to select the next parameter using the UP/DOWN arrow buttons.

When all entries or changes are completed, press the PREVS. MENU button. The display will change to the "CHANGE AUTOMATIC TEST SETTING" screen and the parameter values for this custom mask will be entered into memory. These parameters will be retained in memory until they are reprogrammed. This custom mask is now available during an automatic test.

5.3 FOUR WIRE/TWO WIRE MODE SELECTION

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0). Use the UP/DOWN arrows to place the cursor on the CIRCUIT TYPE line.

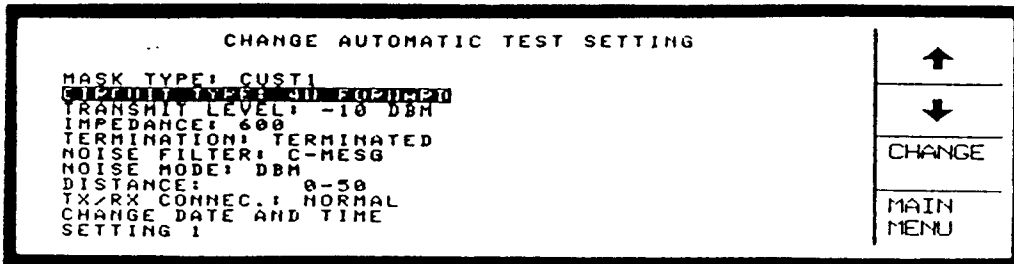


Figure 5.3

Press the CHANGE button until the desired testing mode is displayed.

The modes available are:

- 4W FORWARD
- 4W REVERSE
- 4W LOOP BACK
- 2W PULSE (OPTIONAL)
- 2W TONE (OPTIONAL)
- 2W LEASED (OPTIONAL)

In the four wire forward mode, an Auto-TIMS must be connected to both ends of the line under test. In this mode the two wire circuit connected to the Tx side of the "Master" Auto-TIMS (the unit on which the RUN TEST button is pressed) is tested. The measured results are sent back on the circuit connected to the Rx side of the "Master" unit.

In the four wire reverse mode, an Auto-TIMS must be connected to both ends of the line under test. In this mode the circuit between Tx of the slave unit and Rx of the master unit is tested. In the loopback mode, an Auto-TIMS is not required at both ends of the circuit. However, a loopback must be made from Tx to Rx at the far end of the circuit.

NOTE: During a loopback test, an Auto-TIMS at the far end will automatically establish a loopback.

5.4 SETTING THE TRANSMIT LEVEL

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0). Move the cursor to the TRANSMIT LEVEL: line. Press the CHANGE button. The word CHANGE disappears and the UP/DOWN arrow buttons can now be used to set any desired level between +10dBm to -40dBm in 1dB steps.

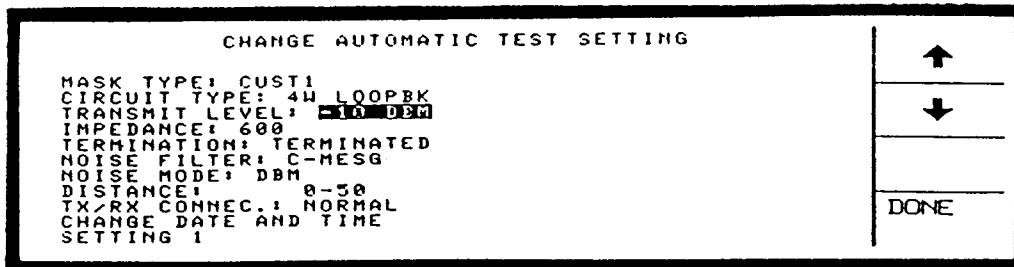


Figure 5.4

Once the desired level has been set press the DONE button. The display will return to the "CHANGE AUTOMATIC TEST SETTING" screen.

5.5 IMPEDANCE SELECTION

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0). Move the cursor to the IMPEDANCE: line.

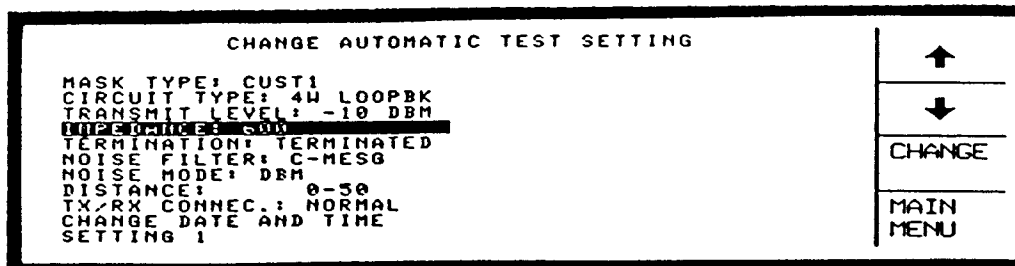


Figure 5.5

Repeatedly pressing the CHANGE button will step the impedance through the three factory set values. Transmit and receive impedances are selected together.

5.6 TERMINATION SELECTION

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0).
Move the cursor to the **TERMINATION:** line.

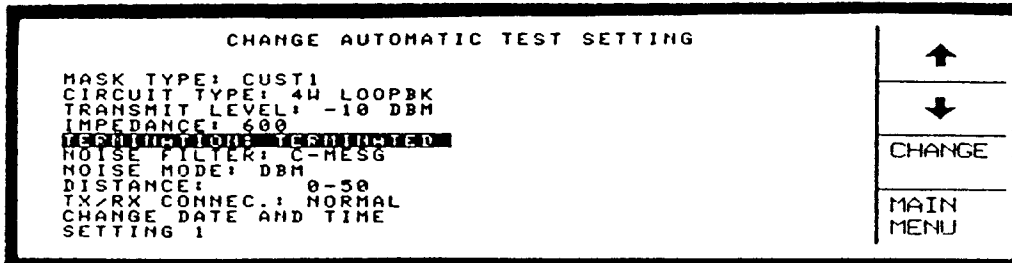


Figure 5.6

Pressing the **CHANGE** button will alternate between the terminated and bridging condition. This affects the receiver section only.

5.7 NOISE FILTER SELECTION

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0).
Use the UP/DOWN arrow buttons to move the cursor to the **NOISE FILTER:** line.

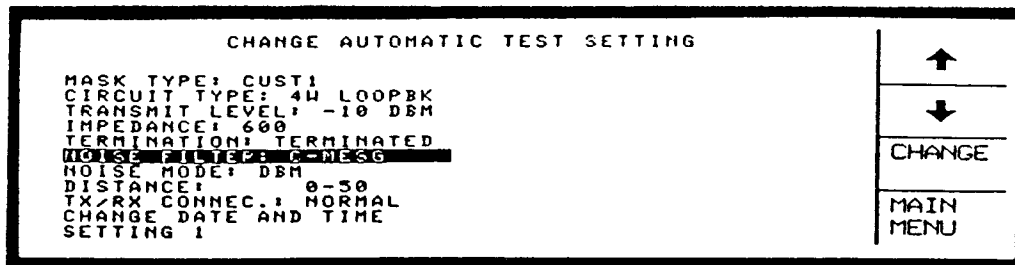


Figure 5.7

Repeatedly pressing the **CHANGE** button will step through the noise filters available in the instrument.

5.8 NOISE MEASURING MODE SELECTION

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0).
Move the cursor to the NOISE MODE: line.

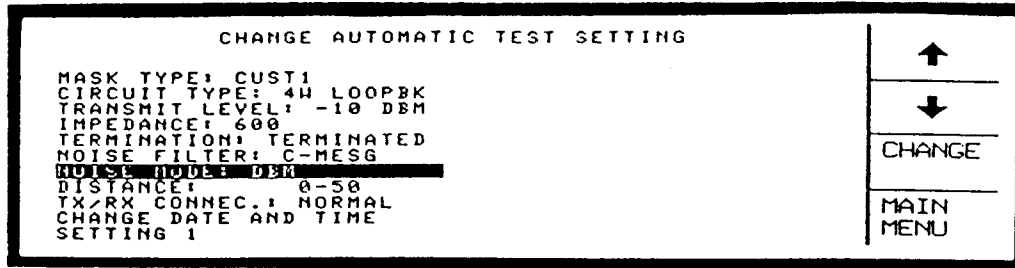


Figure 5.8

Pressing the CHANGE button will toggle the noise mode between dBrn and dBm.

5.9 CIRCUIT DISTANCE SELECTION

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0).
Move the cursor to the DISTANCE: line.

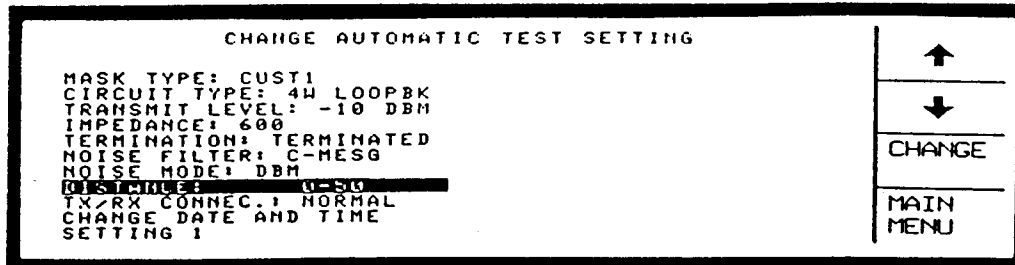


Figure 5.9

Repeatedly pressing the CHANGE button will step the unit through the seven distance settings available. These distance settings are in ranges of miles and affect the "Pass/Fail" limit for circuit noise.

5.10 TX/RX CONNECTION REVERSAL

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0).
Use the UP/DOWN arrows to select "TX/RX CONNECTION".

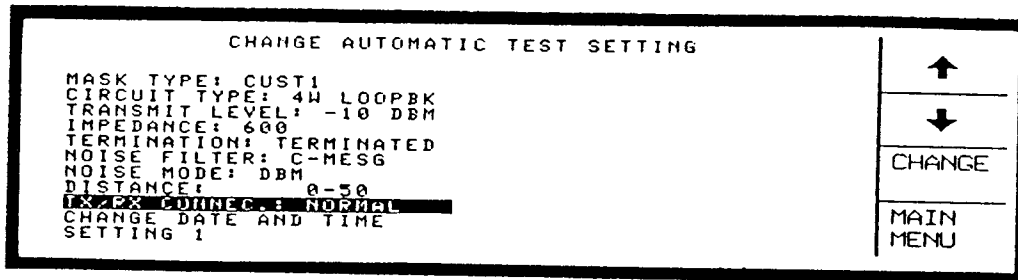


Figure 5.10

Pressing the CHANGE button will select between "NORMAL" and "REVERSE". The "REVERSE" selection will exchange the transmit and receive connections internally.

5.11 SETTING THE DATE AND TIME

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0).
Use the UP/DOWN arrow buttons to move the cursor to the CHANGE DATE AND TIME line.

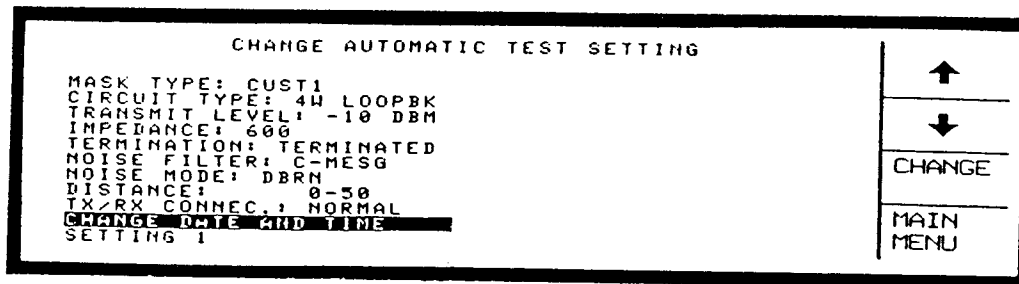


Figure 5.11a

Press the CHANGE button to call-up the "SET TIME" mode.

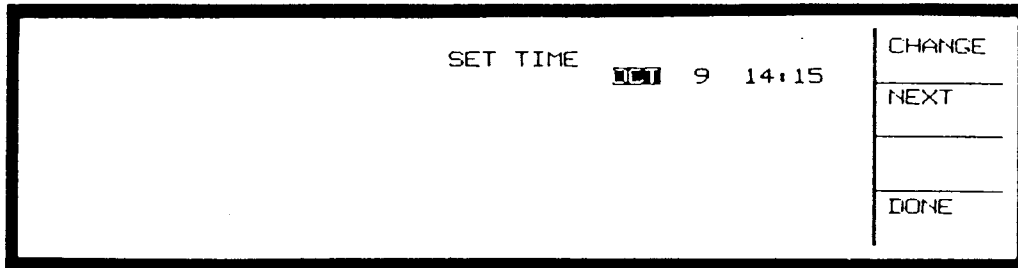


Figure 5.11b

With the cursor over the month, pressing the **CHANGE** button will cause the unit to step through the twelve months. Select the month required and press the **NEXT** button. Days, hours & minutes can be changed in a similar fashion.

Pressing the **DONE** button sets the seconds to zero. Wait for the correct moment then press the **DONE** button. The display will return to the "CHANGE AUTOMATIC TEST SETTING" mode.

5.12 CREATING A PRESET

Enter the "CHANGE AUTOMATIC TEST SETTING" mode (Section 5.0). Move the cursor to the **SETTING 1** line.

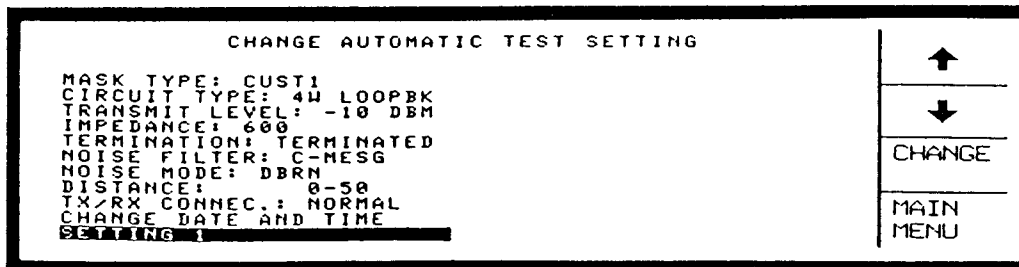


Figure 5.12

Pressing the **CHANGE** button will call up the next preset command. There are 4 customer programmable preset menus. To have different preset parameters in each of the four menus, just select the desired preset number and set all the parameters as above. Then press the **MAIN MENU** button. The preset conditions will appear on the Main Menu and will be retained in memory for future use.

6.0 RECALLING STORED RESULTS

With the "MAIN MENU" on the screen, press the **RECALL RESULTS** button. The screen will display the "RESULTS RECORDED IN MEMORY" presentation.

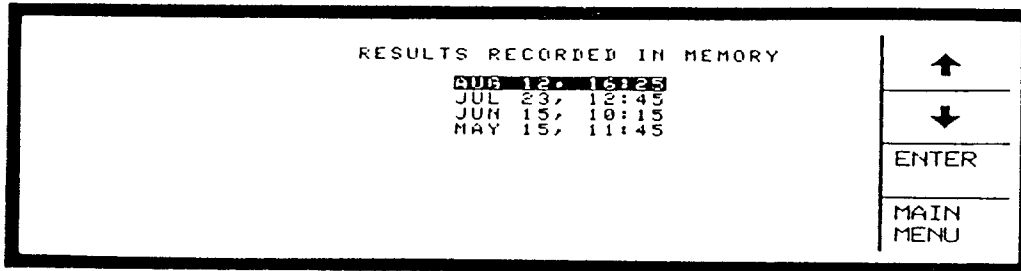


Figure 6.0

6.1 SELECTING A SET OF RESULTS

Using the **UP/DOWN** arrow buttons on the right hand side of the display, move the cursor to the date and time corresponding to the desired set of recorded results to be recalled. This date and time is the time the test results were stored.

6.2 RECALLING TEST SET-UPS

Press the **ENTER** button. The screen will display the "TEST SETTING FOR STORED RESULTS".

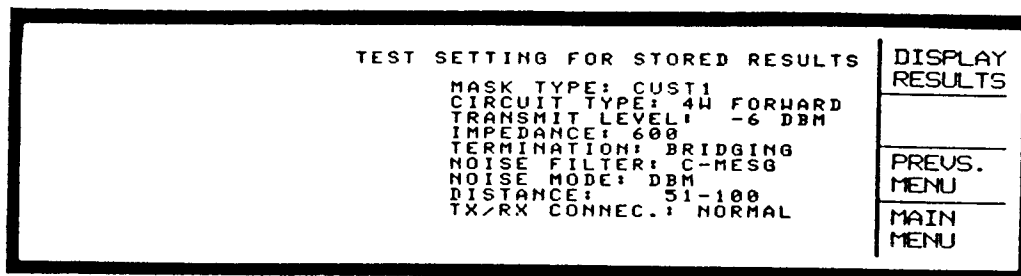


Figure 6.2

This shows the test set-up for the recalled test results that were chosen.

6.3 RECALLING PASS/FAIL BAR GRAPHS

With the "TEST SETTING FOR STORED RESULTS" presentation on the screen press the DISPLAY RESULTS button.

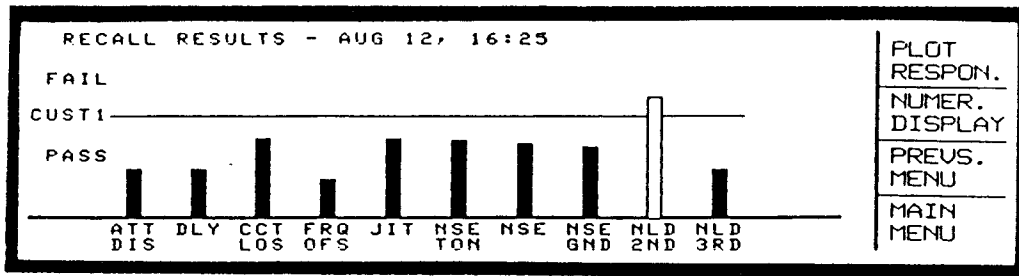


Figure 6.3

A bar graph will be displayed, showing pass/fail results against the chosen mask limits. A full bar indicates that the measurement met the limit, whereas a bar with only the outline shown, indicates that the test failed.

6.4 RECALLING NUMERIC DISPLAYS

With the "RECALL RESULTS" bar graph on the screen press the NUMER. DISPLAY button.

RECALL RESULTS - AUG 12, 16:25				MASK CUST1	BAR DISPLAY
PARAMETER	LIM	MEAS		PLOT RESPON.	
ATT DIST			PASS		PREVS. MENU
DELAY LOSS	10	8	PASS		
FRQ OFFS	5	2	PASS		MAIN MENU
P. JITTER	5	4	PASS		
NSE/TONE	-39	-50	PASS		
NOISE	-40	-52	PASS		
NSE/GND	-38	-52	PASS		
NLD 2ND	40	35	FAIL		
NLD 3RD	35	37	PASS		

Figure 6.4

The numerical values of the limits and the measured results of all single point measurements will be displayed. Failed results are highlighted.

6.5 RECALLING PLOTTED RESPONSES

With the "RECALL RESULTS" for either the bar graph or the numeric results on the screen, press the PLOT RESPON. button. Attenuation and delay vs. frequency plots will be displayed against the chosen mask.

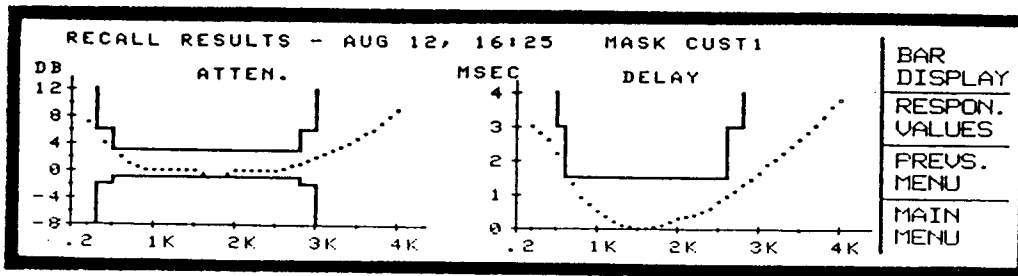


Figure 6.5

6.6 RECALLING PLOTTED RESPONSE VALUES

With the "RECALL RESULTS" plotted response graph on the screen, press the RESPON. VALUES button.

RECALL RESULTS - AUG 12, 16:25 MASK CUST1												BAR DISPLAY
FRQ	ATTN	DLY	FRQ	ATTN	DLY	FRQ	ATTN	DLY	FRQ	ATTN	DLY	
200	7.0	3.0	300	1.3	0.0	100	0.0	4.0	600	3.5	4.8	2680
300	6.0	3.0	400	1.4	0.0	500	0.0	5.0	800	3.6	5.5	2880
400	4.0	3.0	500	1.5	0.0	600	0.3	6.0	900	3.7	6.0	3080
500	3.0	3.0	600	1.6	0.5	700	0.8	7.0	1100	3.8	7.0	3300
600	2.0	1.0	700	1.7	1.0	800	1.0	8.0	1300	3.9	8.0	3600
700	1.0	1.0	800	1.8	1.0	900	1.6	9.0	1400	4.0	9.0	3800
800	0.3	1.0	900	1.9	0.5	1000	2.0	10.0	1600			
900	0.0	0.0	1000	2.0	0.0	1100	2.6	11.0	1800			
1000	0.0	0.0	1100	2.1	0.0	1200	3.0	12.0	2000			
1100	0.0	0.0	1200	2.2	0.0	1300	3.6	13.0	2200			
1200	0.0	0.0	1300	2.3	0.0	1400	4.0	14.0	2400			

Figure 6.6

A table of numeric measurement results for attenuation and delay will be displayed in 100 Hz steps.

6.7 SPECIAL RECALL NOTES

On every "RECALL RESULTS" display, the command menu at the right hand side of the display shows the choices PREVS. MENU and MAIN MENU. At any point in the recall sequence if the PREVS. MENU button is pressed, the unit will go back to the recall selection screen. If the MAIN MENU button is pressed, it will escape from the recall sequence and return to the Main Menu.

7.0 RUNNING A MANUAL TEST

In order to perform a real-time manual test using the Auto-TIMS, return to the MAIN MENU and press the button labelled MANUAL MODE. The Auto-TIMS will display a list of the possible tests which can be performed as well as selections for set-up and calibration. To select a test, simply use the UP/DOWN arrow buttons to move the cursor to the desired position and press the ENTER key.

NOTE: If a manual test that is not installed is selected the Auto-TIMS will respond with "OPTION NOT INSTALLED". (See appendix B).

7.1 LEVEL/FREQUENCY MEASUREMENT

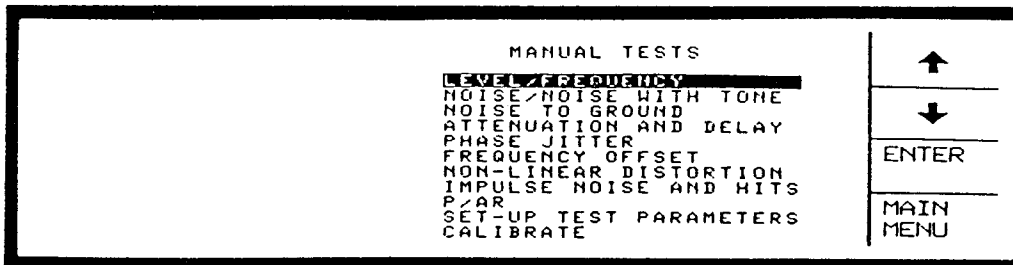


Figure 7.1a

Once a level/frequency test has been selected, the Auto-TIMS screen will be divided into two sections. The left hand side of the screen shows "TRANSMIT PARAMETERS" and the right hand side shows "RECEIVE PARAMETERS". The Auto-TIMS will always be set to the default values when a manual test is started. Note that the Auto-TIMS begins measuring as soon as a test is selected and will display the current measured results.

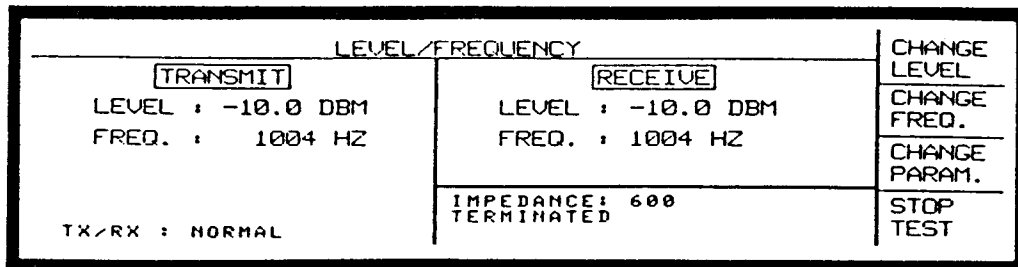


Figure 7.1b

To change the transmit level press the button marked CHANGE LEVEL. A cursor will appear on the tens column of the transmit level display. The command menu will show UP/DOWN arrows and a selection for NEXT DIGIT and DONE. Pressing the UP/DOWN arrow buttons will change the level in 10 dB steps. In order to change the level in 1 dB or 0.1 dB steps simply press the button marked NEXT DIGIT until the cursor is on the desired digit. After the transmit level has been selected, press the DONE button.

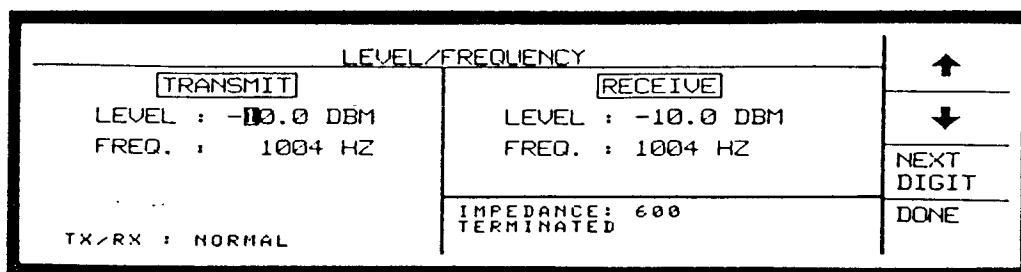


Figure 7.1c

To change the transmitted frequency, press the button marked CHANGE FREQ. A cursor will appear on the transmit frequency display. Again, the command menu will show the UP/DOWN arrow buttons and the keys marked NEXT DIGIT and DONE. Press the button marked DONE when the frequency selection is completed.

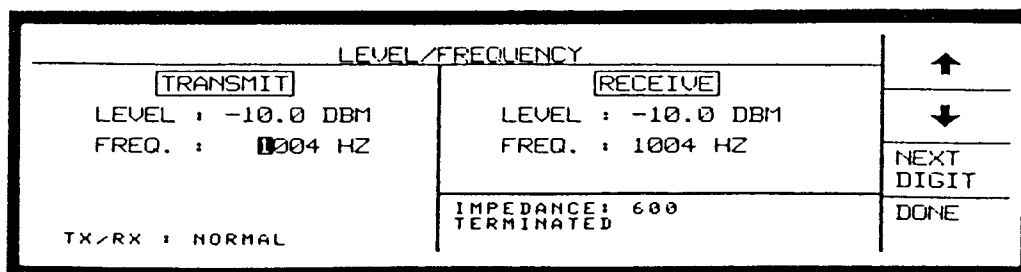


Figure 7.1d

Impedance and termination can be selected by pressing the button marked CHANGE PARAM. A cursor will appear at the "IMPEDANCE" display on the screen. Impedance can easily be changed by pressing the button marked CHANGE. Each time the button is pressed a new impedance is selected. Pressing the DOWN arrow button will move the cursor to the "Termination Display" portion of the screen. By pressing the CHANGE button, either terminated or bridging condition can be selected.

7.2 FREQUENCY MEASUREMENT

Frequency measurement is also displayed during a level/frequency test. Refer to section 7.1 to make this measurement.

7.3 NOISE MEASUREMENT

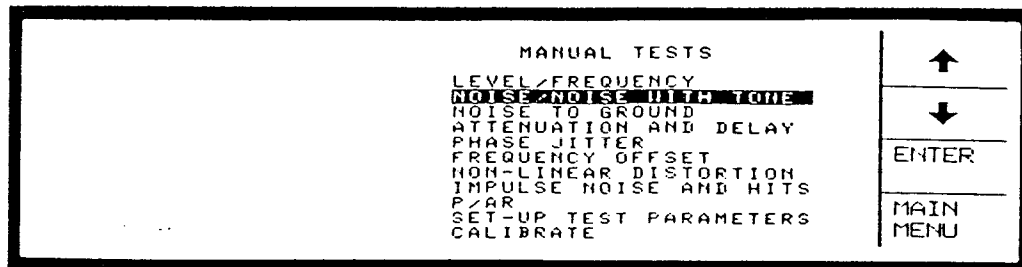


Figure 7.3a

To perform a measurement of circuit noise, enter the Auto -TIMS' manual mode (refer to section 7.0) and move the cursor to the **NOISE / NOISE WITH TONE** position. Press the **ENTER** button. The Auto-TIMS screen will divide into two sections, the left showing the transmitted parameters and the right displaying measured results and the parameters of the test.

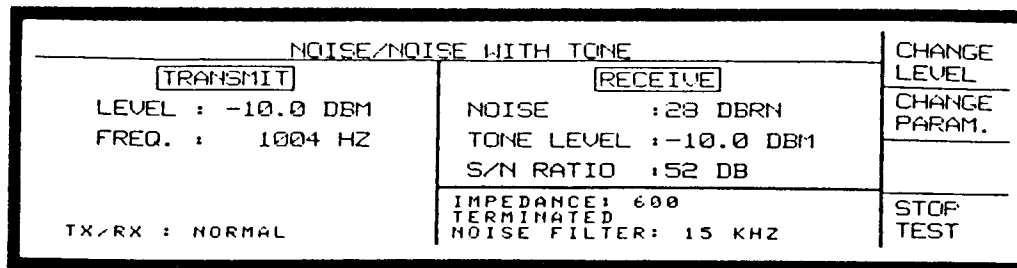


Figure 7.3b

To change the parameters of the test, press the button marked **CHANGE PARAM.** A cursor will appear on the impedance portion of the screen. To change the selected impedance press the **CHANGE** key until the desired value is selected. Pressing the **UP/DOWN** arrow buttons will select the next parameter to be changed. Note that impedance for transmit and receive are selected simultaneously and cannot be set to different values.

To select the termination on the receiver, move the cursor to the portion of the screen marked **TERMINATED** or **BRIDGING**. Press the button marked **CHANGE** to toggle between the two conditions.

To select the filter to be used during a noise measurement, move the cursor to the position marked **NOISE FILTER** using the **UP/DOWN** buttons. Press the **CHANGE** key to select the desired filter. Pressing the button marked **DONE** will return the Auto-TIMS to the **NOISE / NOISE WITH TONE** command menu.

If a noise without tone measurement is performed in the **LOOPBACK** mode, the transmitter should be silent. To achieve this, press the button marked **CHANGE LEVEL**. A cursor will be displayed on the tens column of the transmit level portion of the screen. Hold the **DOWN ARROW** button until **QUIET TERM.** appears. This will provide quiet termination on the transmit side of the Auto-TIMS during a noise measurement. Pressing the up arrow will disable the quiet termination and will present tone at the output of the Auto-TIMS. If a tone is not present the notch filter is automatically disabled. Also the "TONE LEVEL" and "S/N RATIO" will disappear.

NOISE/NOISE WITH TONE		↑
TRANSMIT	RECEIVE	
LEVEL : QUIET TERM.	NOISE : 14 DBRN	NEXT
FREQ. : 1004 HZ		DIGIT
	IMPEDANCE: 600	DONE
	TERMINATED	
TX/RX : NORMAL	NOISE FILTER: 15 KHZ	

Figure 7.3c

7.4 NOISE WITH TONE/SIGNAL TO NOISE RATIO MEASUREMENT

To perform a noise with tone measurement, enter the Auto-TIMS manual mode (Section 7.0) move the cursor to the **NOISE/NOISE WITH TONE** position and press the **ENTER** key. Select the desired test parameters as described in section 7.3. Press Done to return to the **NOISE/NOISE WITH TONE** command menu.

To set the level of the tone transmitted during the noise with tone measurement, press the button marked CHANGE LEVEL. A cursor will appear on the tens column of the level display portion of the Auto-TIMS. Tone level is selected using the the UP/DOWN and NEXT DIGIT buttons as described in section 7.3. Once selected, pressing the DONE button will return the Auto-TIMS to the NOISE / NOISE WITH TONE command menu. The screen will now show the Noise with tone measurement. This is of course only important if the same set sends and receives, i.e. in the loopback mode.

Notice that the frequency of the transmitted tone for Noise with Tone measurements cannot be changed. This frequency is fixed at 1004 Hz. If a tone is present, the built in notch filter is automatically enabled. Signal to noise ratio is displayed during a noise with tone measurement only.

7.5 NOISE TO GROUND MEASUREMENT

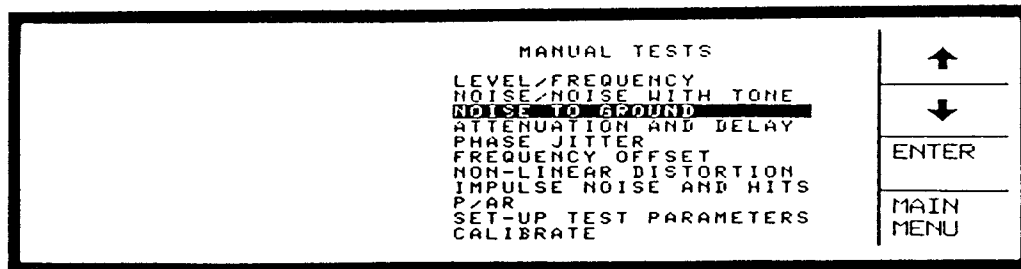


Figure 7.5a

To measure noise to ground in the manual mode select the NOISE TO GND. test from the manual test menu using the UP/DOWN buttons and press ENTER. The transmitter will shut down and only measurement results and parameters will be shown.

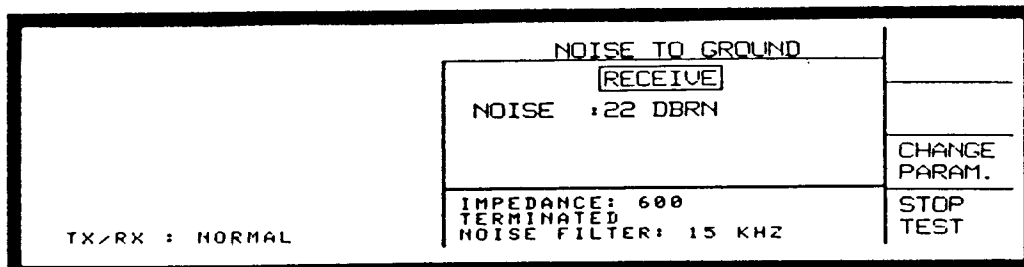


Figure 7.5b

Select the desired test parameters as in section 7.3.

7.6 ATTENUATION DISTORTION/ENVELOPE DELAY DISTORTION

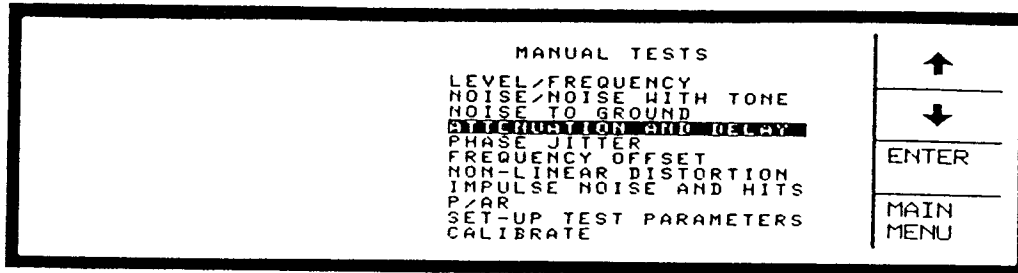


Figure 7.6a

To perform a measurement of attenuation distortion and envelope delay distortion, enter the Auto-TIMS' manual mode (refer to Section 7.0), move the cursor to the ATTENUATION AND DELAY position and press the ENTER button. The screen will show four choices for forward or return reference measurement or re-transmitting in the forward or return reference mode.

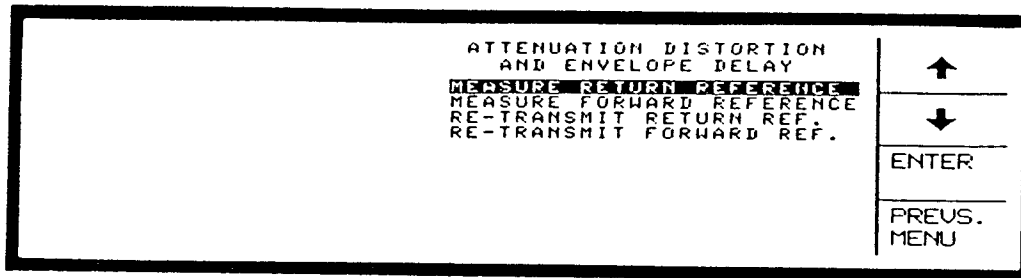


Figure 7.6b

"MEASURE RETURN REFERENCE" will measure the attenuation distortion and envelope delay for the forward circuit path (connected to the transmit side of the Auto-TIMS).

"MEASURE FORWARD REFERENCE" will measure the return circuit path (connected to the receive side).

"RE-TRANSMIT RETURN REF." allows the distant Auto-TIMS to measure the forward circuit path.

"RE-TRANSMIT FORWARD REF." allows the distant Auto-TIMS to measure the return circuit path.

Make your selection using the UP/DOWN command buttons and press ENTER. A test menu will appear.

RETURN REFERENCE MODE		START TEST
SWEEP METHOD	: AUTO	CHANGE PARAM.
LOWER FREQ.	: 300 HZ	
UPPER FREQ.	: 4000 HZ	
REF. FREQ.	: 1800 HZ	
FREQ. STEP	: 25 HZ	
SWEEP SPEED	: 0.2 SEC/STEP	
S.F. SKIP	: NO	
TX. LEVEL	: -10 DBM	
MASK TYPE	: CUST1	PREV. MENU

Figure 7.6c

Only the variables necessary to the mode selected will be shown.

"SWEEP METHOD" allows three sweep types. "AUTO" will continuously sweep up and down between the limits selected. "SINGLE" will sweep from the lower limit to the upper limit when triggered by a menu push button. "MANUAL" sweep is controlled by the FREQ. UP and FREQ. DOWN push buttons that appear on the manual control menu.

"LOWER FREQ." is the lower sweep frequency limit selected for the test. "UPPER FREQ." is the upper frequency limit selected for the test. "REF. FREQ." is the frequency at which the Auto-TIMS sets the zero reference points for plotting the graphs. "CARRIER FREQ." follows the "REF. FREQ." value and is used as a reference during the test.

"FREQ. STEP" selects the sweep frequency step size. "SWEEP SPEED" selects the length of time the sweep stays at each frequency step.

"S.F. SKIP" (Signal Frequency Skip) will cause the sweep to skip a preset frequency range. (See specifications).

"TX LEVEL" selects the level the Auto-TIMS transmits at.

"MASK TYPE" selects the masks that will be displayed on the graphs.

If you desire any changes, press the CHANGE PARM. button and a set-up screen will appear.

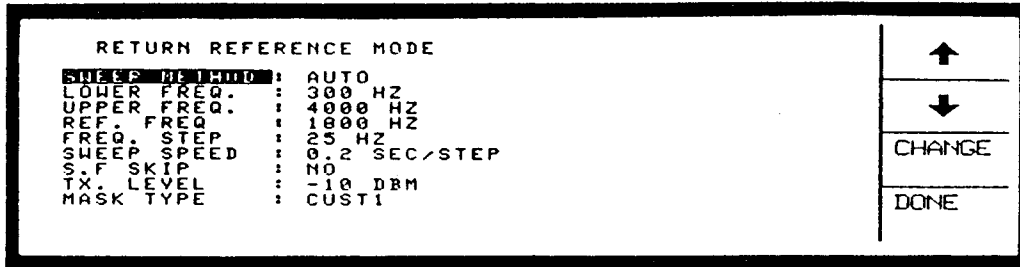


Figure 7.6d

To change the parameters of the test, move the cursor to the one that needs changing and press the CHANGE button.

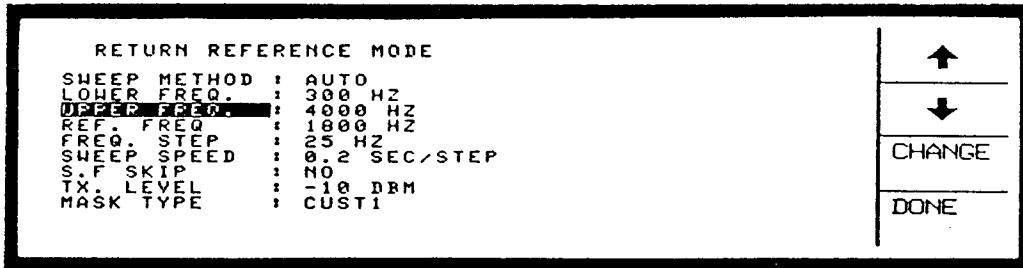


Figure 7.6e

The cursor will then jump from the name of the parameter to the current value. Use the UP/DOWN buttons or the CHANGE button to alter the value then press DONE. When all selections are complete press DONE again.

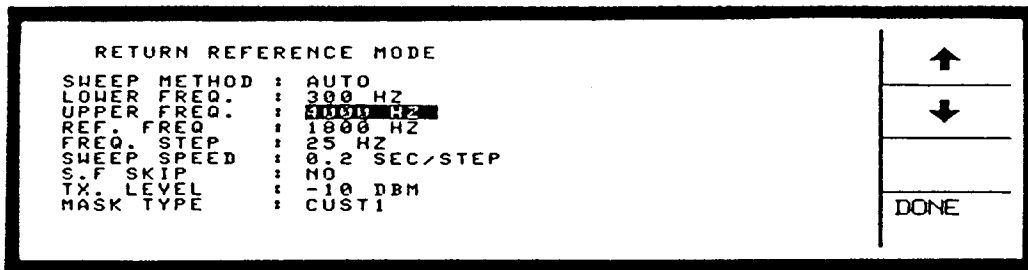


Figure 7.6f

NOTE: Usually this set-up will be common for many tests and will not need frequent changes. The last set-up is always stored in memory even if the instrument is switched off.

The next screen will show the set-up again but without the cursor. Now you are ready to press START TEST.

In this manual mode, there must be a re-transmitter at the other end of the circuit and reference delay and attenuation must be established. This is very easy with the Auto-TIMS. A step-by-step guide will appear on the screen. This will tell what the operator at the far end must do before the SET LVL REF or the SET DLY REF buttons are pressed.

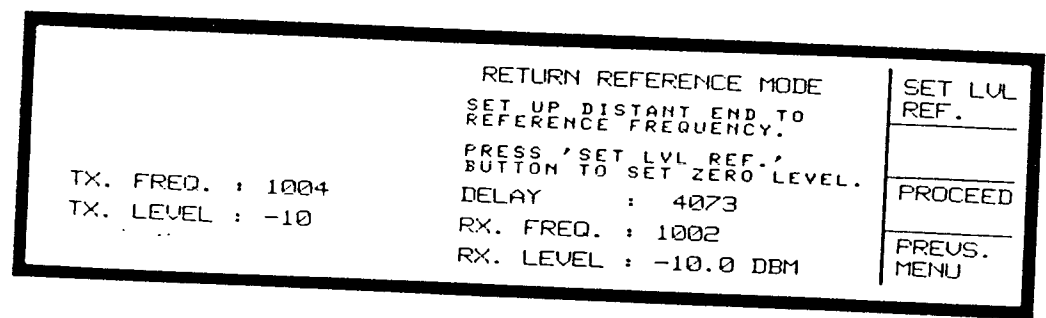


Figure 7.6g

After each reference is set, press PROCEED. After this, both Attenuation Distortion and Envelope Delay curves will be plotted simultaneously.

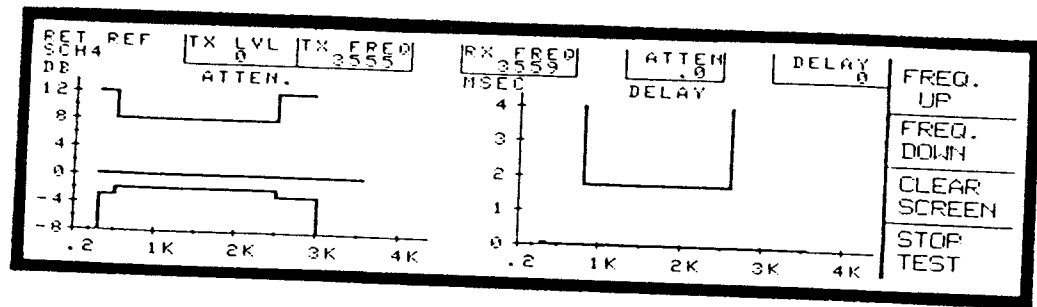


Figure 7.6h

If the manual sweep has been selected, the FREQ.UP button must be pressed to change the frequency.

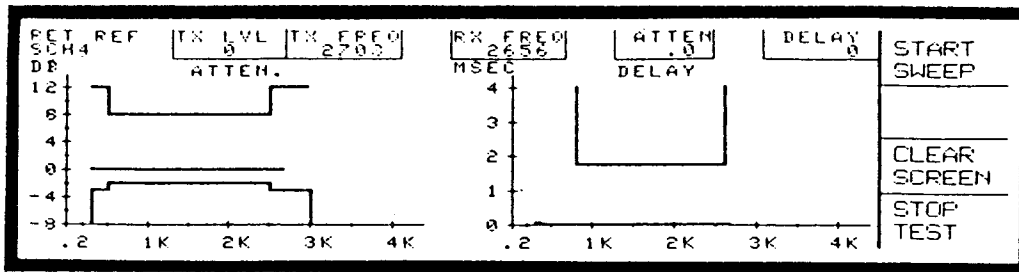


Figure 7.6i

If the single sweep has been selected START SWEEP will trigger a single sweep.

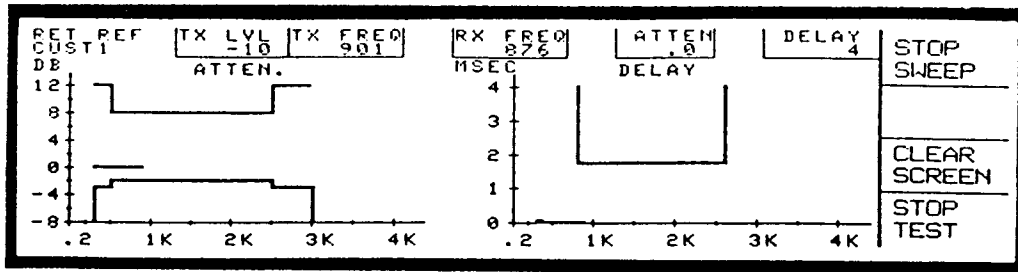


Figure 7.6j

If the automatic sweep has been selected the test will continuously sweep up and down to the upper and lower frequency limits.

Pressing STOP SWEEP will stop the test at the frequency the Auto-TIMS is currently at. You may then RESTART SWEEP to continue.

Pressing CLEAR SCREEN will restart the test with old plots removed. STOP TEST will stop testing and return the screen to the tests parameter display. The test can be exited with PREV. MENU.

NOTE: The Auto-TIMS will work with any re-transmitter unit using the method described in the IEEE 743 specifications.

The Auto-TIMS can also be used as a re-transmission unit with any Attenuation Distortion or Delay measuring instrument using the above mentioned method. Setting the Auto-TIMS for the re-transmission mode is similar to the description above.

7.7 PHASE JITTER MEASUREMENT.

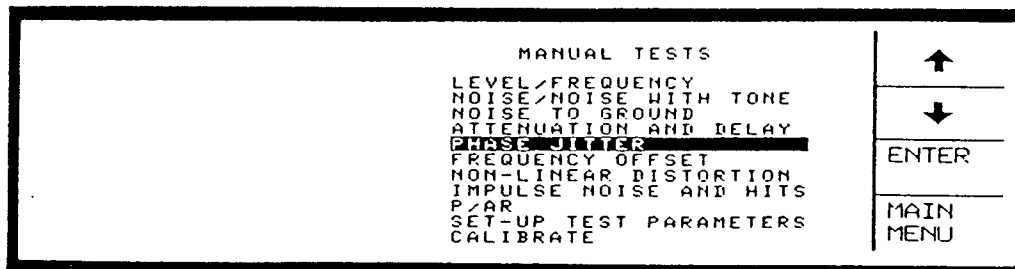


Figure 7.7a

To perform a phase jitter measurement, enter the Auto-TIMS' manual mode (refer to section 7.0), move the cursor to the PHASE JITTER position and press the ENTER key. The Auto-TIMS screen will divide into two sections, the left showing the transmit parameters, the right the phase jitter measurement and the test parameters.

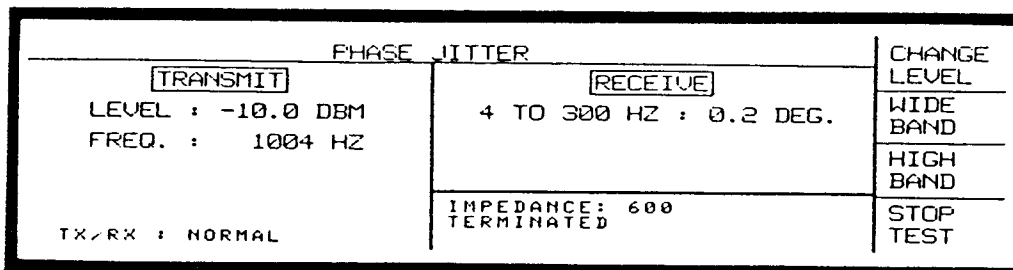


Figure 7.7b

You can select either the highband 20 - 300 Hz or the wide band 4 - 300 Hz by pressing the appropriate button. To change the test parameters, exit the phase jitter mode by pressing the STOP TEST button and go to the "SET-UP TEST PARAMETERS" (7.11). Note that impedance and termination will not affect the results of a phase jitter measurement.

If the test is done in the loopback mode you can change the level of the transmitted tone by pressing the button marked CHANGE LEVEL. Adjust to the desired level as described in section 7.1. Press the button marked DONE to return to the phase jitter command.

7.8 FREQUENCY OFFSET

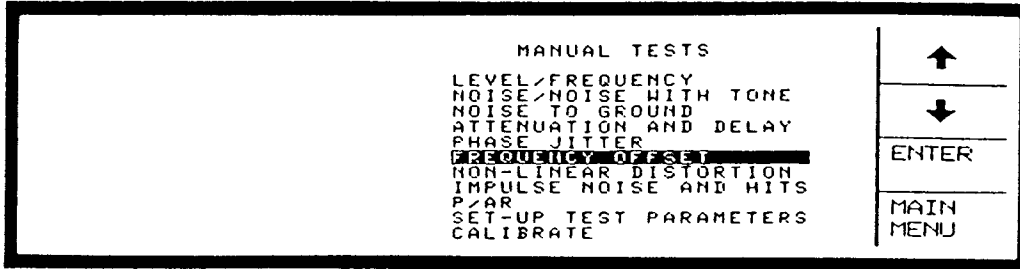


Figure 7.8a

To perform a frequency offset measurement, enter the manual mode (see section 7.0) and move the cursor to the position marked **FREQUENCY OFFSET**. Pressing the **ENTER** key will start the test. The Auto-TIMS display will divide into two sections, the left showing the parameters of the transmitted signal, the right showing the measured results.

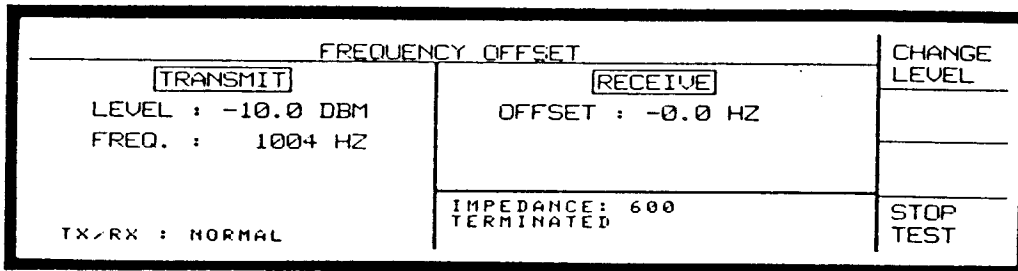


Figure 7.8b

The transmitted signals level may be changed by pressing **CHANGE LEVEL** and using the **NEXT DIGIT** and **UP/DOWN** arrows. When the level is satisfactory press **DONE** and the screen will return to the **CHANGE LEVEL** and **STOP TEST** options. The Auto-TIMS will continuously test the frequency offset even while the level is changing. If there is no signal detected, the **RECEIVE** will display **NO SIGNAL**.

7.9 NON LINEAR DISTORTION (Option)

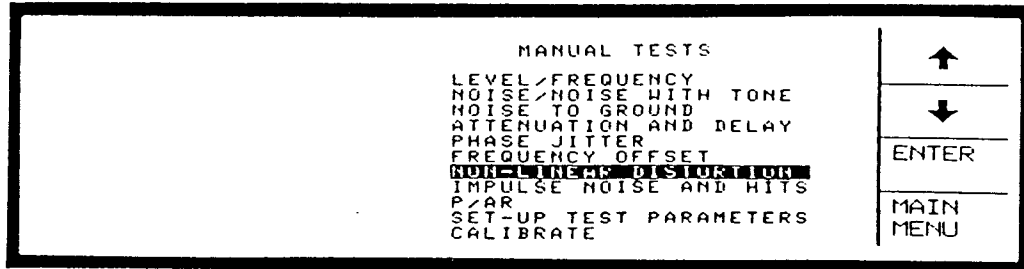


Figure 7.9a

To perform "NLD" measurement, enter the manual mode (see Section 7.0) and move the cursor to the position marked **NON LINEAR DISTORTION**. Pressing the **ENTER** key will start the test. The Auto-TIMS display will divide into two sections, the left showing the parameters, the right showing the measured results.

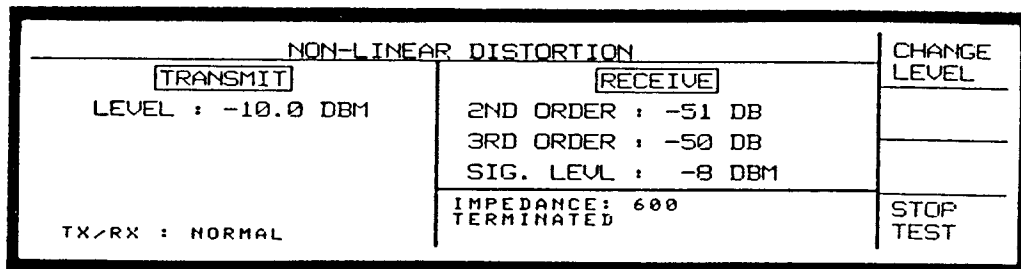


Figure 7.9b

The level of the transmitted signal can be changed by pressing the **CHANGE LEVEL** button. A cursor will appear on the tens column of the transmit level portion of the screen. Use the **UP/DOWN** arrow and **NEXT DIGIT** buttons to set the level.

NOTE: The transmitted signal consists of four tones as prescribed by IEEE 743. The signal must be received to perform the test. The intermodulation distortion technique is licensed under Hekimian Laboratories, Inc. US Pat. No 3862380.

The right hand side of the screen will display the values of 2nd and 3rd order harmonics as well as the received signal level in dBm.

7.10 IMPULSE NOISE AND HITS MEASUREMENT

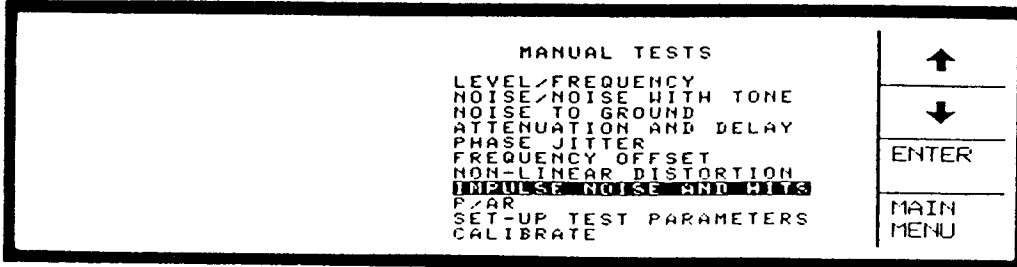


Figure 7.10a

The Auto-TIMS can measure impulse noise, phase hits, gain hits and dropouts. To enter this manual mode, select **IMPULSE NOISE AND HITS** from the **MANUAL TESTS** menu using the **UP/DOWN** arrows and press **ENTER**.

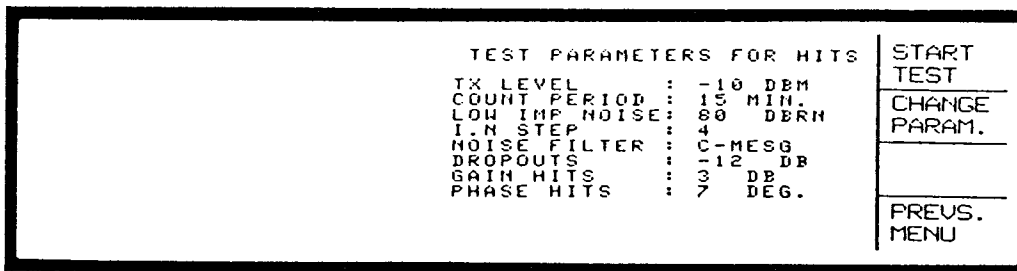


Figure 7.10b

The **TEST PARAMETERS FOR HITS** menu will now appear. To change a test parameter press **CHANGE PARAM.**.

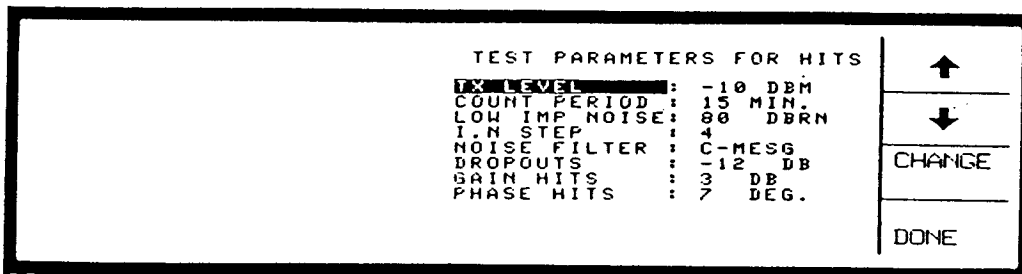


Figure 7.10c

Select the parameter to be changed with the UP/DOWN arrows and press CHANGE. The cursor will move to the present value and a new value may be selected using the UP/DOWN arrows.

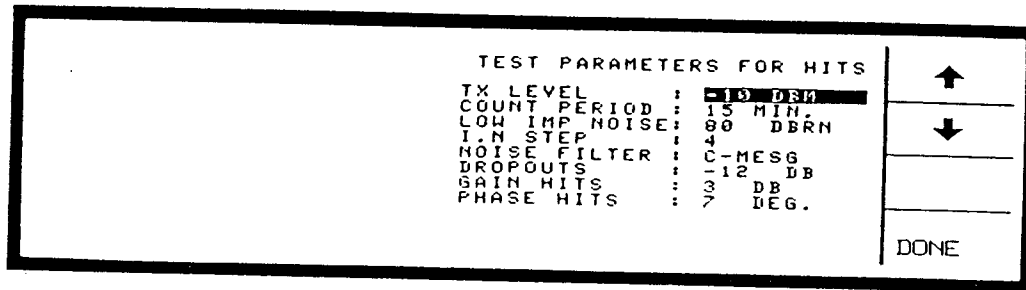


Figure 7.10d

Press DONE to return the cursor to the selected parameter name. Another parameter may be selected or DONE pressed again to escape from the CHANGE PARAM. mode. These parameters will be retained in memory when the unit is powered off.

START TEST can now be pressed. The Auto-TIMS will self-calibrate and enter the test. The left side of the screen displays the transmit level and frequency. Additional test parameters are displayed below.

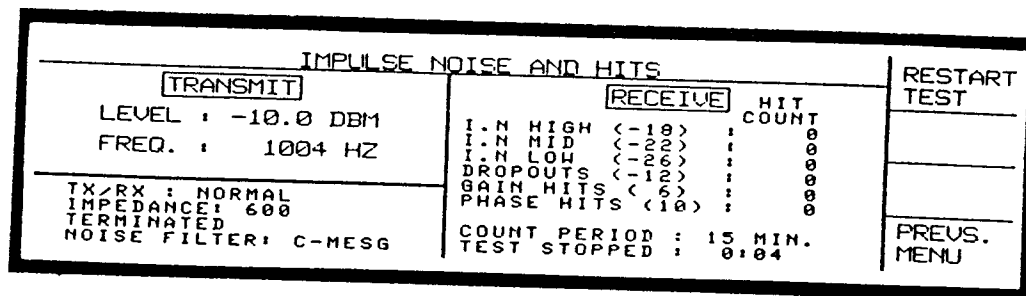


Figure 7.10e

The right side of the screen displays the impulse noise and hits thresholds in brackets and the actual count for each measurement.

If there is no test tone received when the test is initiated, the displays for DROPOUTS, GAIN HITS and PHASE HITS will not appear. These measurements can not occur with no signal present.

IMPULSE NOISE AND HITS		RESTART TEST
TRANSMIT	RECEIVE	
LEVEL : -10.0 DBM	I.N HIGH (-18) : 0	
FREQ. : 1004 HZ	I.N MID (-22) : 0	
	I.N LOW (-26) : 0	
	NO TEST TONE	
	COUNT PERIOD : 15 MIN.	PREVS. MENU
	TEST STOPPED : 0:02	
TX/RX : NORMAL		
IMPEDANCE : 600		
TERMINATED		
NOISE FILTER : C-MESG		

Figure 7.10f

The selected duration of the test is shown as COUNT PERIOD: and ELAPSED TIME is also displayed. To stop the test before the count period has elapsed press STOP TEST. You may exit the test by pressing PREVS. MENU or RESTART TEST to continue. RESTART TEST will automatically clear the hit counters and ELAPSED TIME display to zero.

IMPULSE NOISE AND HITS		RESTART TEST
TRANSMIT	RECEIVE	
LEVEL : 0.0 DBM	I.N HIGH (-18) : 0	
FREQ. : 1004 HZ	I.N MID (-22) : 0	
	I.N LOW (-26) : 0	
	DROPOUTS (-30) : 0	
	GAIN HITS (-8) : 0	
	PHASE HITS (-10) : 0	
	COUNT PERIOD : 15 MIN.	PREVS. MENU
	TEST COMPLETE	
TX/RX : NORMAL		
IMPEDANCE : 600		
TERMINATED		
NOISE FILTER : C-MESG		

Figure 7.10g

When the test is completed the ELAPSED TIME display will change to TEST COMPLETE and the counters will no longer increment. To exit press PREVS. MENU. To exit from the test parameters press PREVS. MENU again.

7.11 P/AR PEAK TO AVERAGE RATIO (Option)

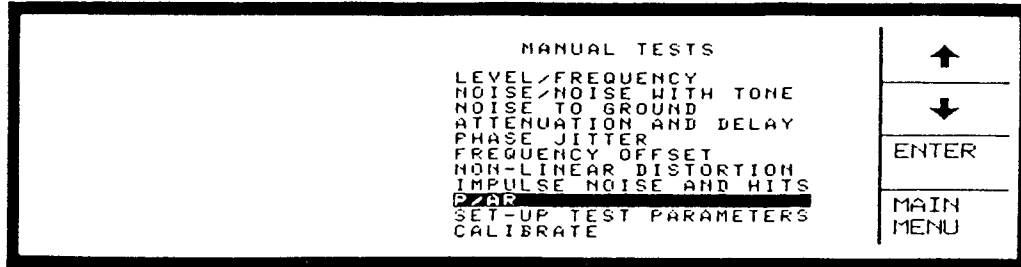


Figure 7.11a

To perform a P/AR test enter the manual mode (see Section 7.0) and move the cursor to the P/AR position. Press ENTER to begin the test. The screen will divide into two sections; transmit and receive. The P/AR signal generated by the Auto-TIMS is a precise complex pulse train which has a known peak to average ratio. This signal is produced as is described by IEEE 743. The Auto-TIMS displays 100 for a signal which is received with the same P/AR as the transmitted signal. Degradation of the signal by the line under test will change the P/AR number. A P/AR value of 100 is considered "perfect".

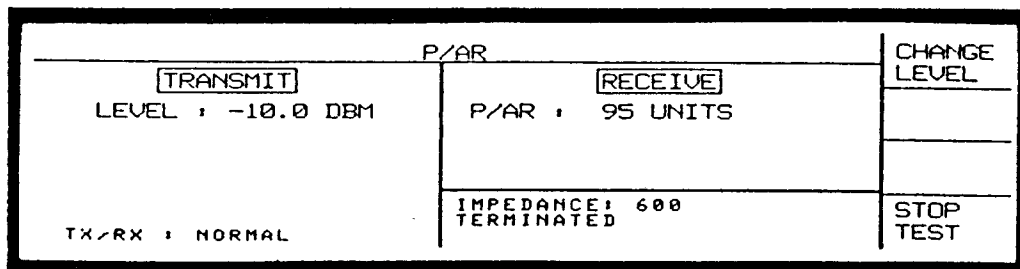


Figure 7.11b

To change the level of the transmitted signal press CHANGE LEVEL. A cursor will appear on the tens column of the transmitted level portion of the screen. Use the UP/DOWN, NEXT and DONE buttons to select the desired level.

The measured P/AR value is displayed in real time.

7.12 SET-UP MANUAL TEST PARAMETERS

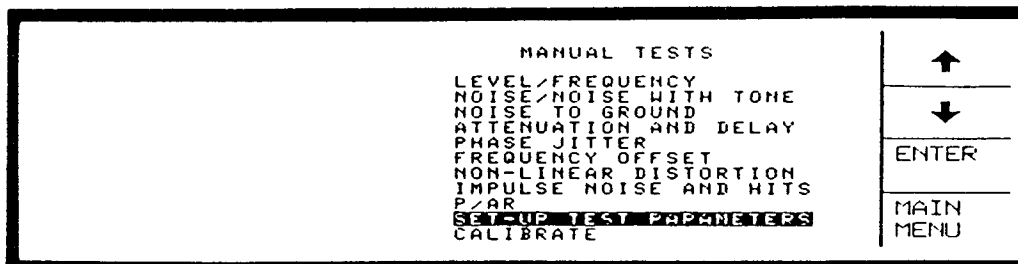


Figure 7.12a

Before a manual test is run, the operator should be aware of the MANUAL TEST PARAMETERS selected. To enter this mode, use the UP/DOWN arrows in the MANUAL TESTS mode (Section 7.0) to position the cursor on SET-UP TEST PARAMETERS and press ENTER.

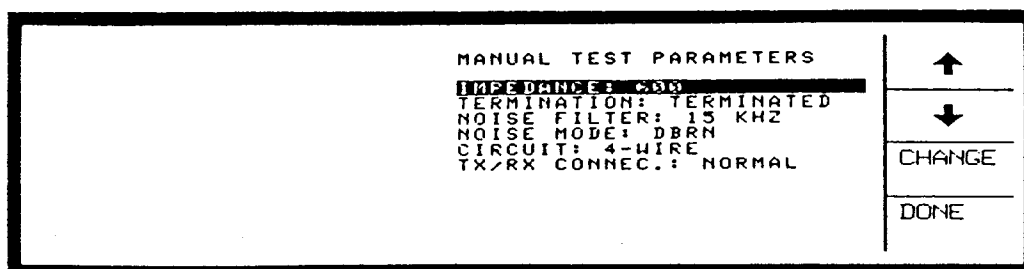


Figure 7.12b

To change a parameter use the UP/DOWN arrows to select and press CHANGE to step through the options. When all parameters have been selected as needed, press DONE to return to the MANUAL TESTS menu.

NOTE: The NOISE FILTER, NOISE MODE and CIRCUIT settings will be retained in memory after power down. The other settings will be set to default values on power up as follows:

```

IMPEDANCE: 600
TERMINATION: TERMINATED
TX/RX CONNec.: NORMAL
    
```

7.13 SELF CALIBRATION

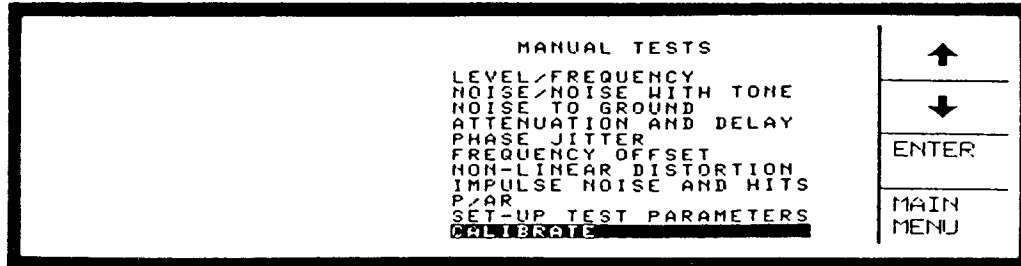


Figure 7.13a

The Auto-TIMS is equipped with a self-calibration feature. To perform this function, put the Auto-TIMS in the manual mode and move the cursor to the position marked CALIBRATE. Press ENTER to initiate the calibration routine. At the end of each calibration test, the Auto-TIMS will display an indication of the result of the test and the correction factor. If all tests pass, press DONE to return to the manual mode command. If any of the tests fail, the unit should be sent to your local Consultronics service representative.

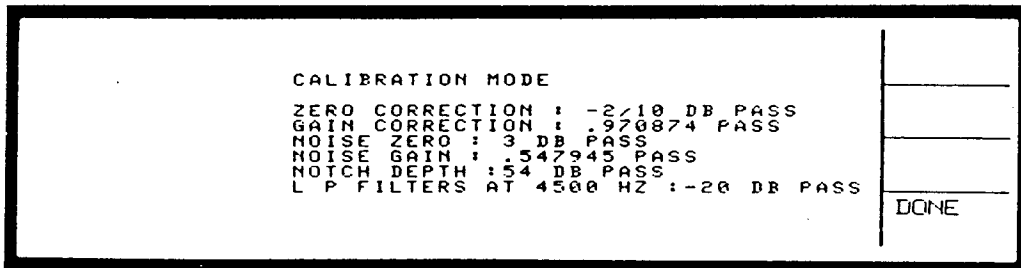


Figure 7.13b

A calibration routine is performed automatically each time a test mode is selected in the manual or automatic mode. Therefore the special manual calibration step is only needed for factory testing or servicing.

NOTE: CALIBRATION MUST BE DONE WITHIN THE ENVIRONMENTAL CONDITIONS SPECIFIED IN SECTION 10.0 OF THIS MANUAL.

7.15 RETURN LOSS

To perform a return loss measurement, enter the manual mode (section 7.0) and move the cursor to the **RETURN LOSS** position.

MANUAL TESTS		
LEVEL / FREQUENCY	4N DIAL	↑
NOISE / NOISE WITH TONE	RETURN LOSS	↓
NOISE TO GROUND		ENTER
ATTENUATION AND DELAY		
PHASE JITTER		
FREQUENCY OFFSET		
NON-LINEAR DISTORTION		
IMPULSE NOISE AND HITS		
P/AR		
SET-UP TEST PARAMETERS		
CALIBRATE		MAIN MENU

Figure 7.15a

Press the **ENTER** button and the "RETURN LOSS" selection menu will appear.

RETURN LOSS		
	ECHO RETURN LOSS	↑
	SINGING HIGH RETURN LOSS	↓
	SINGING LOW RETURN LOSS	ENTER
		MAIN MENU

Figure 7.15b

Each of the return loss tests is listed. Move the cursor to the test desired and press **ENTER**.

For the echo return loss measurement select **ECHO RETURN LOSS** and press **ENTER**. The "ECHO RETURN LOSS" screen will appear.

ECHO RETURN LOSS		
TRANSMIT	RECEIVE	CHANGE LEVEL
LEVEL : -10.0 DBM	ECHO PATH LOSS : 21 DB	CHANGE PARAM.
	EQUAL LEVEL EPL : 21 DB	STORE THL
	THL CORR'D. EPL : 21 DB	STOP TEST
IMPEDANCE : 600 OHM TERMINATED	RX TLP : 0 DBM THL : 0 DB	

Figure 7.15c

The Auto-Tims screen will divide into two sections; the left side showing the transmitted level with the selected termination parameters, and the right the return loss measurements and parameters.

To alter the transmitted level, press **CHANGE LEVEL**.

ECHO RETURN LOSS		↑
TRANSMIT	RECEIVE	↓
LEVEL : -10.0 DBM	ECHO PATH LOSS : 17 DB	NEXT DIGIT
	EQUAL LEVEL EPL : 17 DB	
	THL CORR'D. EPL : 17 DB	
IMPEDANCE : 600 OHM TERMINATED	RX TLP : 0 DBM THL : 0 DB	DONE

Figure 7.15d

A cursor will appear on the tens value of the transmitted level. This may be increased or decreased with the **UP/DOWN** arrows. **NEXT DIGIT** will move the cursor to the next digit displayed to allow all the digits to be changed. When the desired level is selected press **DONE**.

The "RECEIVE" side of the display will read "ECHO PATH LOSS", "EQUAL LEVEL EPL" (Equal Level Echo Path Loss) "THL CORR'D. EPL:" (Trans Hybrid Loss Corrected Echo Path Loss).

Echo Path Loss is the measured four wire return loss with no compensation for circuit losses. This is the loss encountered by an echo.

Equal Level Echo Path Loss is the difference between the measured echo level and the specified receive TLP (Transmission Level Point) when the transmitted test level is equal to the specified transmit TLP. For this reading to be accurate the transmitter must be at the specified transmit TLP and the "RX TLP:" should be selected to equal the specified receive TLP.

Trans Hybrid Loss is the circuit loss measured through the four wire side when the two wire side of the hybrid is shorted. Shorting presents a total mismatch so only four wire circuit losses and the hybrid loss is measured.

Trans Hybrid Loss Corrected Echo Return Loss gives the return loss for the two wire side. This is done by subtracting the THL from the echo path loss. The "THL" on the screen should be selected by measuring the THL of the circuit and pressing **STORE THL** or by entering the **CHANGE PARAM.** mode and entering a value.

Pressing **CHANGE PARAM.** will enter the "CHANGE PARAMETER" mode.

ECHO RETURN LOSS		
TRANSMIT	RECEIVE	↑
LEVEL : -10.0 DBM	ECHO PATH LOSS : 20 DB	↓
	EQUAL LEVEL EPL : 20 DB	NEXT PARAM.
	THL CORR'D. EPL : 20 DB	DONE
IMPEDANCE : 600 OHM TERMINATED	RX TLP : 20.0 DBM THL : 6 DB	

Figure 7.15e

The cursor will appear on the current "RX TLP:" value. Using the **UP/DOWN** arrows, select the desired Receive TLP. **NEXT PARAM.** will move the cursor to "THL:". Select the value required or press the **NEXT PARAM.** button again to move to the next parameter. When all the parameters have been selected as desired, press **DONE**.

To stop the "ECHO RETURN LOSS" test press **STOP TEST**. This will return the screen to the "RETURN LOSS" menu.

For a singing high return loss measurement move the cursor to **SINGING HIGH RETURN LOSS** and press **ENTER**. The "SINGING HIGH RETURN LOSS" screen will appear.

SINGING HIGH RETURN LOSS		
TRANSMIT	RECEIVE	CHANGE LEVEL
LEVEL : -10.0 DBM	SING.HI.PATH LOSS : 25 DB	CHANGE PARAM.
	EQUAL LEVEL SHPL : 15 DB	STORE THL
	THL CORR'D. SHPL : 7 DB	STOP TEST
IMPEDANCE : 600 OHM TERMINATED	RX TLP : -10 DBM THL : 18 DB	

Figure 7.15f

The "SINGING HIGH RETURN LOSS" works the same as the "ECHO RETURN LOSS" screen.

"SING.HI.PATH LOSS" is the Singing High Path Loss measured.

"EQUAL LEVEL SHPL" is the Equal Level Singing High Path Loss measured.

"THL CORR'D SHPL" is the Trans Hybrid Corrected Singing High Path Loss measured.

These values are calculated using the same method as the Echo Return Loss measurements.

Press **STOP TEST** to exit to the "RETURN LOSS" menu.

For a Singing Low Return Loss measurement move the cursor to **SINGING LOW RETURN LOSS** and press **ENTER**. The "SINGING LOW RETURN LOSS" screen will appear.

SINGING LOW RETURN LOSS		CHANGE LEVEL
TRANSMIT	RECEIVE	CHANGE PARAM.
LEVEL : -10.0 DBM	SING.LO.PATH LOSS: 25 DB	STORE THL
	EQUAL LEVEL SLPL: 15 DB	STOP TEST
	THL CORR'D. SLPL: 7 DB	
IMPEDANCE : 600 OHM	RX TLP : -10 DBM	
TERMINATED	THL : 18 DB	

Figure 7.15g

Again, the "SINGING LOW RETURN LOSS" measurement works the same as the other return loss measurements.

"SING. LO. PATH LOSS" is the Singing Low Path Loss measured.

"EQUAL LEVEL SLPL" is the Equal Level Singing Low Path Loss measured.

"THL CORR'D SLPL" is the Trans Hybrid Loss Corrected Singing Low Path Loss measured.

Press **STOP TEST** to exit the test. Press **MAIN MENU** to exit the "RETURN LOSS" MENU. This will return the Auto-tims to the manual test menu.

8.0 PRINTER OPERATION

When the Printer interface option is installed in the unit the PRINT SCREEN push button on the front panel is active.

With the unit connected to a compatible graphics printer (See specifications) through the graphics printer interface connector on the rear panel, the operator is able to print any screen display by simply pushing the PRINT SCREEN button.

During the printing operation the unit WILL NOT respond to any other command selection. The operator MUST wait for the printing operation to be completed before choosing another command selection.

NOTE: The Auto-TIMS supports Epsom graphics printers unless otherwise specified at the time of order. IBM graphic printers are compatible provided that "line feed" is disabled when optioning the printer. Failure to do this will produce blank horizontal lines in the Auto-TIMS printout.

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9.0 REMOTE OPERATION (RS232/V.24)

The Auto-TIMS is capable of remote operation through the RS-232C communications port on the rear panel. (See Section 2.5 for serial port connections.) All commands for the remote operation of the Auto-TIMS are ASCII and require a carriage return to enter.

9.1 HELP MENU

Enter a "?" at the ">" prompt to list the help menu commands:

>?

HELP MENU

AT - Run Automatic Test (Type S to verify settings)

S - Display current settings

S? - Help menu for CHANGE SETTING

R - Recall Results

ATDT xxx...x - Dial number using tone, where x is a digit or a comma

A comma will cause a 2 sec. pause, maximum x's is 25

NOTE: Separate any option/value from command with space

An option consists of a single letter

9.2 AUTOMATIC TEST

To run an automatic test, enter "AT" :

>AT

TEST RUNNING -- Please Wait

There will be a waiting period as the Auto-tims performs the tests. When this is finished the "PASS/FAIL" results will be displayed:

TEST COMPLETE - JUL 29, 01:37

PARAMETER LIM MEAS

```
-----  
ATT DIST          PASS  
DELAY             PASS  
LOSS              6  0 PASS  
FRQ OFFS          2  0 PASS  
P.JITTER          5  0 PASS  
S/N               24 48 PASS  
NOISE             50  4 PASS  
NSE/GND           40 17 PASS  
NLD 2ND           45 47 PASS  
NLD 3RD           50 56 PASS
```

Strike the RETURN key to continue...

To see the Attenuation Distortion and Envelope Delay Distortion values, press the return key.

The Auto-TIMS will display a table of measurements:

FRQ	ATTN	DLY	FRQ	ATTN	DLY
300	- 0.1	35	2303	- 0.1	0
400	- 0.1	19	2403	- 0.1	0
500	- 0.1	13	2503	- 0.1	1
600	- 0.1	8	2603	- 0.1	1
701	- 0.1	7	2703	- 0.1	1
801	- 0.1	6	2804	- 0.1	0
901	- 0.1	4	2904	- 0.1	0
1001	- 0.1	3	3004	- 0.1	0
1101	- 0.1	3	3104	- 0.1	1
1201	- 0.1	2	3204	- 0.1	0
1301	- 0.1	2	3304	- 0.1	0
1402	- 0.1	3	3404	- 0.1	1
1502	- 0.1	2	3505	- 0.1	1
1602	- 0.1	1	3605	- 0.1	1
1702	- 0.1	2	3705	- 0.1	0
1802	- 0.1	0	3805	- 0.1	1
1902	- 0.1	2	3905	- 0.1	0
2002	- 0.1	2	4005	- 0.1	0
2103	- 0.1	0			

Store Results? (Y/N) >N

The Auto-TIMS will ask if you want these results stored. If you do, enter "Y". These results will be stored and time stamped to enable later recall. If you enter "N" as shown, the results will be discarded and cannot be retrieved.

9.3 AUTOMATIC TEST SETTING DISPLAY

To display the current automatic test settings, enter a "S" :

```
>S
MASK TYPE: CUST2
CIRCUIT TYPE: 4W FORWARD
TRANSMIT LEVEL: -10 DBM
EXPECTED RX LVL.: -10 DBM
IMPEDANCE: 600
TERMINATION: TERMINATED
NOISE FILTER: C-MESG
NOISE MODE: DBM
TX/RX CONNec.: NORMAL
D1 CONDITION: NO
```

This will show all the test settings for an automatic test.

9.4 CHANGING THE AUTOMATIC TEST SETTINGS

The commands to change these settings can be obtained by entering "S?". This will display the CHANGE SETTING help menu:

>S?

CHANGE SETTING help menu

SMT Display current MASK TYPE Parameters
SMT option Set MASK TYPE
[Option: A) S4 , B) S4/2 , C) S4/3 , D) S4/4 , E) S4A ,
F) S4B , G) S4B/2, H) S4B/3, I) S4B/4, J) S4C ,
K) CUST1 , L) CUST2 ,]

SMP Modify current MASK TYPE Parameters
SCT option Set CIRCUIT TYPE
[Options: A) 4W FORWARD, B) 4W REVERSE, C) 4W LOOPBACK]

STL value Set TRANSMIT LEVEL [Range: -40 to 10 (DBM)]
SER value Set EXPECTED RX LVL.
SI option Set IMPEDANCE [Options: A) 135, B) 600, C) 900]
ST option Set TERMINATION [Options: A) TERMINATED, B) BRIDGING]
SNF option Set NOISE FILTER
[Options: A) C-MESG, B) 3 KHZ, C) 15 KHZ, D) 50 KBIT]

SNM option Set NOISE MODE [Options: A) DBM, B) DBRN]
SC option Set TX/RX CONNECTION [Options: A) NORMAL, B) REVERSED]
SCLK Display current clock setting
SDATE date Set DATE [Format: MM/DD]
STIME time Set TIME [Format: HH:MM]
SD1 option Set D1 CONDITION [OPTIONS: A) NO, B) YES]

Enter "SMT" to display the current Mask Type parameters:

>SMT

MASK TYPE: CUST1

CIRC. LOSS	10		
NOISE	-39		
S/N	24		
NOISE/GND	-39		
FREQ.OFFSET	5	FREQ.RANGE	VAR.
PHASE JIT.	15	ATTN	500-2500 -2.0/ 8.0
NLD 2ND	27	DIST.	300-3000 -3.0/12.0
NLD 3RD	32		0- 0 0.0/ 0.0
IMP.NOISE 1	15		0- 0 0.0/ 0.0
IMP.NOISE 2	9	ENV.	800-2600 1750
IMP.NOISE 3	5	DELAY	0- 0 0
PHASE HIT	8		0- 0 0
GAIN HIT	8		0- 0 0
DROPOUT	2		
P/AR	100		
TIMER	0		

To change the mask type, enter "SMT{space}{option letter}". For example; to change to the mask at letter K, enter "SMT K":

```
>SMT K
```

```
MASK TYPE: CUST1
```

When a Custom mask has been selected, it can be modified by entering "SMP":

```
>SMP
```

```
MASK TYPE: CUST1
```

```
CIRC. LOSS 0 (Range: 0 to 40) >
```

The first parameter will appear with the current value and the range of selectable values, followed by the ">" prompt. Enter the value desired or just enter a carriage return to keep the present value:

```
CIRC. LOSS 0 (Range: 0 to 40) >6  
NOISE -90 (Range: -70 to 10) >
```

The next parameter will automatically appear. This continues until all the mask parameters are completed:

```
CIRC. LOSS 0 (Range: 0 to 40) >6  
NOISE -90 (Range: -70 to 10) >-40  
S/N 0 (Range: 0 to 50) >24  
NOISE /GND -90 (Range: -70 to 10) >-50  
FREQ.OFFSET 0 (Range: 0 to 10) >2  
PHASE JIT. 0 (Range: 0 to 45) >5  
NLD 2ND 0 (Range: 10 to 50) >45  
NLD 3RD 0 (Range: 10 to 50) >50  
IMP.NOISE 1 0 (Range: -60 to 0) >-30  
IMP.NOISE 2 0 (Range: -56 to 4) >-32  
IMP.NOISE 3 0 (Range: -52 to 8) >-34  
PHASE HIT 0 (Range: 5 to 45) >15  
GAIN HIT 0 (Range: 2 to 10) >3  
DROPOUT 0 (Range: -25 to -5) >-10  
P/AR 0 (Range: 0 to 120) >90  
TIMER 0 (Range: 0,5,...,60) >15
```

The Attenuation Distortion entries will now follow. These are entered in the same sequence as displayed on the front panel, when entered manually. The lower frequency limit is entered first, the upper frequency limit is next, followed by the lower attenuation limit (Gain), and the upper attenuation limit (Loss) last. See Section 5.2 to calculate values and proper level sequence.

```

ATTN DIST.  #1 -  FREQ.  (Range: 100,200,...,1000) >800
                RANGE  (Range: 1000,1100,...,3700) >1600
                VAR.   (Range: -5.0 to 0.0) >-2.0
                /      (Range: 0.0 to 12.0)>1.0
ATTN DIST.  #2 -  FREQ.  (Range: 100,200,...,1000) >400
                RANGE  (Range: 1000,1100,...,3700) >2000
                VAR.   (Range: -5.0 to 0.0) >-4.0
                /      (Range: 0.0 to 12.0)>1.5
ATTN DIST.  #3 -  FREQ.  (Range: 100,200,...,1000) >200
                RANGE  (Range: 1000,1100,...,3700) >3200
                VAR.   (Range: -5.0 to 0.0) >-3.0
                /      (Range: 0.0 to 12.0)>2.0
ATTN DIST.  #4 -  FREQ.  (Range: 100,200,...,1000) >
                RANGE  (Range: 1000,1100,...,3700) >
                VAR.   (Range: -5.0 to 0.0) >
                /      (Range: 0.0 to 12.0)>

```

If less than four levels are to be programmed, enter carriage returns for the blank values.

Envelope Delay will follow the Attenuation Distortion. This is entered in a similar fashion, but with only one value for the delay:

```

ENV. DELAY  #1 -  FREQ.  (Range: 100,200,...,1000) >700
                RANGE  (Range: 1000,1100,...,3700) >1500
                VAR.   (Range: 0,25,...,4000) >500
ENV. DELAY  #2 -  FREQ.  (Range: 100,200,...,1000) >500
                RANGE  (Range: 1000,1100,...,3700) >2300
                VAR.   (Range: 0,25,...,4000) >1500
ENV. DELAY  #3 -  FREQ.  (Range: 100,200,...,1000) >200
                RANGE  (Range: 1000,1100,...,3700) >3200
                VAR.   (Range: 0,25,...,4000) >3000
ENV. DELAY  #4 -  FREQ.  (Range: 100,200,...,1000) >
                RANGE  (Range: 1000,1100,...,3700) >
                VAR.   (Range: 0,25,...,4000) >

```

This completes the Mask programming.

To select the circuit type to be selected, enter "SCT{space}{option letter}". For example; the four wire loopback mode would be selected with "SCT C":

[Options: A) 4W FORWARD, B) 4W REVERSE, C) 4W LOOPBACK]

>SCT C

CIRCUIT TYPE: 4W LOOPBK

The transmit level is set by entering "STL{space}{value}". For a transmit level of -12 DBM, the command would be "STL -12" :

```
>STL -12
```

```
TRANSMIT LEVEL: -12 DBM
```

The expected receive level is used by the Auto-tims to calculate if the circuit loss is a pass or fail for the automatic test. To set this level enter "SER{space}{value}". For an expected receive level of -12 DBM, the command would be "SER -12" :

```
>SER -12
```

```
EXPECTED RX LVL: -12 DBM
```

"SI{space}{option letter}" will select the impedance for the transmitter and receiver. 600 ohms would be selected with "SI B" :

```
>SI B
```

```
IMPEDANCE: 600
```

Termination is selected by entering "ST{space}{option letter}". Bridging mode would be selected with "ST B" :

```
>ST A
```

```
TERMINATION: TERMINATED
```

The noise filter is selected with "SNF{space}{option letter}". The 3 kHz filter would be selected with "SNF B" :

```
>SNF B
```

```
NOISE FILTER: 3 KHZ
```

The transmit and receive connections can be reversed and returned to normal with the "SC{space}{option letter}" command. To reverse the connections, enter "SC B" :

```
>SC A
```

```
TX/RX CONNEC.: NORMAL
```

"SCLK" displays the current clock setting:

>SCLK

Date: JAN 4 Time: 1:34

To set the date, enter "SDATE{space}{MM - month}/{DD - day}". August 6 would be "SDATE 08/06" :

>SDATE 08/06

Date: AUG 6 Time: 1:35

To set the time, enter "STIME{space}{HH - hour}:{MM - minute}". 2:46 PM would be "STIME 14:46" (Remember the Auto-TIMS is 24 hour time) :

>STIME 14:46

Date: AUG 6 Time: 14:46

"SD1{space}{option letter}" will select D1 conditioning status. "SD1 A" would disable D1 conditioning:

>SD1 B

D1 CONDITION: YES

9.5 RECALLING STORED TEST RESULTS

To recall results from the Auto-TIMS for previously stored tests enter "R" :

>R

Available RESULTS:

- A) AUG 12, 16:25
- B) JUL 23, 12:45
- C) JUN 15, 10:15
- D) MAY 15, 11:45

Enter A, B, C, or D for results or just RETURN for none of the above>

The test results stored will be listed by the time each one was stored at. To select a set of results enter the letter of the results desired and the test settings when the test was run, followed by the PASS/FAIL measurements will be shown:

Enter A, B, C, or D for results or just RETURN for none of the above>A

RECALL RESULTS - AUG 12, 16:25

MASK TYPE: S4/3

CIRCUIT TYPE: 4W FORWARD

TRANSMIT LEVEL: -6 DBM

EXPECTED RX LVL.: 1 DBM

IMPEDANCE: 600

TERMINATION: BRIDGING

NOISE FILTER: C-MESG

NOISE MODE: DBM

TX/RX CONNEC.: NORMAL

D1 CONDITION: NO

PARAMETER LIM MEAS

ATT DIST PASS
DELAY FAIL
LOSS 10 8 PASS
FRQ OFFS 5 2 PASS
P.JITTER 5 4 PASS
S/N 51 40 FAIL
NOISE -40 -52 PASS
NSE/GND -38 -52 PASS
NLD 2ND 40 35 FAIL
NLD 3RD 35 37 PASS

Strike the RETURN key to continue...

Enter a carriage return to see the attenuation distortion and envelope delay distortion values:

FRQ	ATTN	DLY	FRQ	ATTN	DLY
200	7.0	3000	2200	0.0	400
300	6.0	2800	2300	0.0	500
400	4.0	2600	2400	0.0	600
500	3.0	2200	2500	0.0	800
600	2.0	1700	2600	0.3	980
700	1.0	1300	2700	0.8	1100
800	0.5	900	2800	1.0	1300
900	0.0	700	2900	1.6	1480
1000	0.0	500	3000	2.0	1680
1100	0.0	350	3100	2.6	1900
1200	0.0	200	3200	3.0	2050
1300	0.0	100	3300	3.6	2280
1400	0.0	50	3400	4.0	2480
1500	0.0	0	3500	4.8	2680
1600	-0.5	0	3600	5.5	2880
1700	-1.0	50	3700	6.0	3080
1800	-1.0	100	3800	7.0	3300
1900	-0.5	200	3900	8.0	3600
2000	0.0	300	4000	9.0	3800
2100	0.0	350	4100	10.0	3900

9.6 DTMF DIALLING

"ATDT{space}{xxx...x}" will dial DTMF tones for each "x" entered. This includes; the digits "0 to 9", letters "A,B,C,D", and the symbols "*", "#". A "-" or a space will be ignored, but counted as digits and a "," (comma) will cause a two second pause. For example "ATDT 738-3741,B5#" will dial the digits "7383741", pause for two seconds and then dial the digits "B5#":

```
>ATDT 738-3741,B5#
Dialing 12 digits/commas
```

```
>
```

10.0 SPECIFICATIONS

GENERAL

Impedances: (Terminated) 135 ,600 ,900 others upon request
(Bridging) >100k ohms

Return Loss: >40 dB from 200 Hz to 4000 Hz

SF Skip Range: 2450 to 2750 Hz, others on request.

Level Detector Type: True RMS for noise, average for level.

Dimensions: 5.3"H x 14.4"W x 13.0"D(135mm x 366mm x 330mm)

Weight: 16.4 lbs. (7.3 kg.) approx.
22.5 lbs. (10.0 kg) with battery - approx.

Operating Temperature: 32 deg. to 120 deg. F (0 deg. to 50 deg.C)
10 to 98% relative humidity noncondensing

Connectors: Bantam and RJ11

Power Requirements: 120 /240 VAC \pm 10%
50 to 440 Hz, 40 VA approx.

Holding Tone: 1004 Hz, -50 to 0 dBm and Quiet Termination
(Other frequencies available on request)

DTMF Generator: -10 dBm approx.

DTMF Receiver: -27 dBm minimum acceptable level

TRANSMITTER

Frequency Range: 40 Hz to 150 kHz.

Resolution: 1 Hz

Accuracy: \pm 0.1%

Level Range: -50 to +13 dB at 600 ohm termination

Resolution: 0.1 dB

Accuracy: at 0.0 dBm, 25 degrees C
40 Hz to 100 Hz \pm 0.25 dB
100 Hz to 20 kHz \pm 0.1 dB
20 kHz to 110 kHz \pm 0.5 dB
110 kHz to 150 kHz \pm 1.0 dB

Step Size: 1, 10, 100, 1000, 10,000 Hz

LEVEL MEASUREMENT

Frequency Range: 40 Hz to 150 KHz.

Level Range: -70 to +13 dBm

Resolution: 0.1 dB

Accuracy: at 0.0 dBm, 25 degrees C
40 Hz to 100 Hz \pm 0.25 dB
100 Hz to 20 kHz \pm 0.1 dB
20 kHz to 110 kHz \pm 0.5 dB
110 kHz to 150 kHz \pm 2.0 dB

FREQUENCY MEASUREMENT

Range: 40 Hz to 150 KHz.
Resolution: 1 Hz from 40 Hz to 9999 Hz
10 Hz from 10 KHz to 99 KHz
100 Hz from 100 KHz to 150 KHz
Accuracy: ± 1 Hz

FREQUENCY OFFSET MEASUREMENT

Reference Frequency: See GENERAL specifications - Holding Tone
Measurement Range: 0.0 to ± 10.0 Hz
Resolution: 0.1 Hz
Accuracy: ± 0.1 Hz

CIRCUIT NOISE MEASUREMENT

Transmitter: Quiet termination.
Receiver:
Inherent Noise: Less than -85 dBm at 600 ohm termination
(Transmitter in Quiet Termination and
C-message filter enabled.)
Range: < 5 to 100 dBrn (-85 to +10 dBm)
Resolution: 1 dB
Accuracy: ± 1 dB from 10 to 90 dBrn (-80 to 0 dBm)
 ± 3 dB from 5 to 10 dBrn and > 90 dBrn
(-85 to -80 dBm and > 0 dBm)
Filters: C-Message(C-MESG), 3 kHz Flat(3 KHZ),
15 kHz Flat(15 KHZ), 50 kbit(50 KBIT)

NOISE WITH TONE AND SIGNAL TO NOISE RATIO MEASUREMENT

Holding Tone: See GENERAL specifications.
Notch: > 50 dB, 995 to 1025 Hz
Filters: See CIRCUIT NOISE MEASUREMENT
Signal Level Range: 50 to 100 dBrn (-40 to +10 dBm)
S/N Ratio Range: 10 to 50 dB(Limited by Inherent Noise)
Resolution: 1 dB
Accuracy: ± 1 dB with S/N from 10 to 40 dB
 ± 3 dB with S/N from 40 to 50 dB

NOISE TO GROUND MEASUREMENT

Transmitter: Quiet termination.
Filters: See CIRCUIT NOISE MEASUREMENT
Range: 40 to 110 dBrn (-50 to +20 dBm)
Resolution: 1 dB
Accuracy: ± 1 dB

ENVELOPE DELAY MEASUREMENT

Transmitter
Reference Frequency
Range: 300 Hz to 4000 Hz
Carrier Frequency
Range: 300 Hz to 4000 Hz
Step Size 25 Hz, 50Hz, 100 Hz, 200 Hz, 400 Hz.
Step Rate: 0.2, 0.5, 1, 2, 5 sec / step.
Level Range: -40 to 10 dBm
Modulation Frequency: 83.33 Hz

Receiver
Level Range: -40 to 0 dBm
Measurement Range: 0 to 10,000 microseconds.
Resolution: 5 microseconds
Accuracy: ± 10 microseconds
Modes: Forward and return reference measurement
Forward and return retransmit.

ATTENUATION DISTORTION MEASUREMENT

Transmitter: See ENVELOPE DELAY SPECIFICATIONS

Receiver
Signal Range: -40 to 0 dBm
Measurement Range: +12 to -20 dB
Plot Range: +8 to -12 dB
Resolution: 0.1 dB
Accuracy: ± 0.25 dB
Masks: SCHED 4 TYPE 4 - Basic, A, B, C, D1
3002, C1, C2, C4, D1
(OTHER MASKS AVAILABLE UP TO A TOTAL OF 12)

PHASE JITTER MEASUREMENT

Transmitter
Holding Tone: See GENERAL specifications

Receiver
Holding Tone Range: 990 Hz to 1030 Hz, -40 to +10 dBm
Jitter Range: 0 to 45 deg.
Resolution: 0.2 deg.
Accuracy: 5% of reading ± 0.2 deg.
Bandwidths: 20 to 300 Hz and 4 to 300 Hz

TRANSIENT MEASUREMENTS

Transmitter
Holding Tone: See GENERAL specifications.

Receiver
Holding Tone Range: 995 to 1025 Hz, -40 to +10 dBm.
Counter: 0 to 9999
Timer: 1 to 60 min. and continuous
Timer Increment: 1 min.
Qualification Interval: 4 ms (gain and phase hits and dropouts)

Impulse Noise Counting (3 thresholds)
Low Threshold: 30 to 90 dBm
Threshold Separation: +1 to +6 dB
Blanking: 125 ms \pm 25 ms
Accuracy: \pm 1 dB with S/N from 10 to 40 dB
 \pm 3 dB with S/N from 40 to 50 dB
Filters: See CIRCUIT NOISE MEASUREMENT

Phase Hit Counting
Threshold: 5 to 45 deg in 1 deg steps.
Accuracy: 5% of setting \pm 1.0 deg.
Blanking Time: 125 ms \pm 25 MS

Gain Hit Counting
Threshold: \pm 1 dB to \pm 10 dB in 1 dB steps
Accuracy: \pm 0.5 dB
Blanking Time: 125 ms \pm 25 ms

Dropout Counting
Threshold: -5 to -25 dB in 1 dB steps
Accuracy: \pm 0.5 dB
Blanking Time: 1 sec

NON LINEAR DISTORTION MEASUREMENT*

Transmitter

Signal: 4 tones as per IEEE 743
Level Range: -40 to 0 dBm
Resolution: 0.1 dB
Accuracy: \pm 0.1 dB

Receiver

Level Range: -40 to 0 dB
Distortion Range: 10 to 70 dB below signal level
Measured parameters: Input Level and 2nd and 3rd order products
Filters: As per IEEE 743
Resolution: 1 dB
Accuracy: + 1 dB

PEAK TO AVERAGE RATIO (P/AR) MEASUREMENT

Transmitter:

Signal: Pulse train of 16 tones as per IEEE 743
Level Range: -40 to 0 dBm
Resolution: 0.1 dB
Accuracy: \pm 0.5 dB

Receiver:

Level Range: -40 to 0 dBm
P/AR Range 0 to 120 units
Resolution: 1 P/AR unit
Accuracy: \pm 2 P/AR units

In the interest of service to the customer, Consultronics reserves the right to change or upgrade the specifications at any time.

* The intermodulation distortion technique is licensed under Hekimian Laboratories, Inc. US Pat. No.3862380.

11.0 WARRANTY

Consultronics warrants all equipment manufactured by it and bearing its nameplate to be free from defects in workmanship and materials, during normal use and service, for a period of twelve (12) months from the date of shipment. In the event that a defect in any such equipment arises within the warranty period it shall be the responsibility of the customer to return the equipment by prepaid transportation to a Consultronics service centre prior to the expiration of the warranty period for the purpose of allowing Consultronics to inspect and repair the equipment. If inspection by Consultronics discloses a defect in workmanship or material it shall, at its option, repair or replace the equipment without cost to the customer, and thereafter return it to the customer by the least expensive mode of transportation the cost of which shall be prepaid by Consultronics. In no event shall this warranty apply to equipment which has been modified without the written authorization of Consultronics, or which has been subjected to abuse, neglect, accident or improper application. If inspection by Consultronics discloses that the repairs required to be made on the equipment are not covered by this warranty, the regular repair charges shall apply to any repairs made to the equipment.

This warranty constitutes the only warranty applicable to the equipment sold by Consultronics and no other warranty or condition, statutory or otherwise, express or implied shall be imposed upon Consultronics nor shall any representation made by any person including a representation by a representative or agent of Consultronics be effective to extend the warranty coverage provided herein. In no event (including, but not limited to the negligence of Consultronics, its agents or employees) shall Consultronics be liable for special or consequential damages or damages arising from the loss of use of the equipment and on the expiration of the warranty period all liability of Consultronics whatsoever in connection with the equipment shall terminate.

If warranty service becomes necessary, please phone, telex or fax Consultronics to advise us and return the unit to:

Consultronics Ltd.
160 Drumlin Circle
Concord, Ontario
L4K 3E5
Telephone: (416) 738-3741
Telex: (ITT) 499-6695 Consult
Fax: (416) 738-3712

or your nearest local Consultronics representative.

12.0 SHIPPING THE AUTO-TIMS

If the instrument is to be shipped on a regular basis, a transit case is recommended.

To prepare the Auto-TIMS for shipment, turn the power off and disconnect all cables including power cable.

If a transit case is not available, pack the instrument in the original carton using the foam end caps. Do not place any cables or accessories directly on the front panel as this may scratch the Plexiglas surface. Please mark all shipments with labels indicating the contents are fragile.

13.0 SERVICING THE AUTO-TIMS

NOTE: POWER MUST BE OFF BEFORE CIRCUIT BOARDS MAY BE REMOVED OR REPLACED.

The Auto-TIMS has been designed for ease of servicing. The unit is very modular in design and uses a Euro-card system. Using the Auto-TIMS' self-test and self-calibrate functions, defective boards can be quickly isolated. Access to these boards is gained by removing the four Allen head screws located on the panel on which the unit's carrying handle is located.

To replace a board, unplug the harness and pull down on the ejector located at the bottom of the board and remove the board. The reverse procedure is used to re-insert a board.

To RESET the Auto-TIMS keep the top menu button depressed while powering up. **WARNING!!!** This will clear ALL user programmed information. This includes custom masks, time, stored test results and configurations.

For further service information refer to the Auto-TIMS REFERENCE AND SERVICE manual.

AUTO-TIMS SCREEN FLOWCHART

