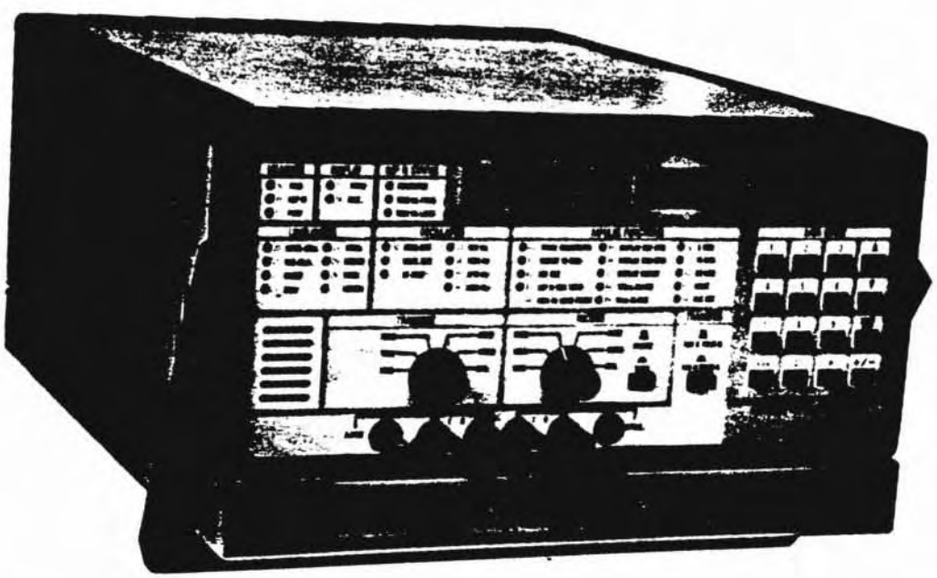
Telecommunications Technology, Inc.
A Unit of General Signal

SECTION 1125 - 301
Issue 2, October, 1986

1125 TRANSMISSION TEST SET

OPERATION MANUAL



GS TTI
A UNIT OF GENERAL SIGNAL

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1.01 ***Introduction:*** The TTI 1125 Transmission Test Set is a multifunction instrument designed for measuring transmission impairment with VF, program, and wideband telecommunications circuits.

(a) An internal oscillator provides calibrated test signals. The unit features full duplex circuit interface, ac operation, and a real-time clock with recall of the worst 15-minute period of impulse noise.

(b) A dc power option is available.

(c) A P/AR (Peak-to-Average Ratio) option is available.

(d) Appendix A lists the operating specifications.

1.02 ***Failure messages:*** The 1125 uses an onboard microprocessor to control all internal circuitry and to initiate a self-diagnostic routine when power is applied. Malfunctions are indicated by failure messages in the display.

1.03 ***Front panel:*** All operator commands to the 1125 are made through an entry keypad. Functions on the front panel are numbered, and the status of all selectable functions is indicated by light-emitting diodes (LEDs).

1.04 Throughout this section, references to front panel functions are designated by brackets around the numeric code corresponding to the function, i.e., [13] refers to the TRANSMIT function, while [30] is FREQUENCY SET.

1.05 ***Reference guide:*** Table 1-A lists each section of the front panel, and the selections available in each. Item numbers in the left-hand column refer to Fig. 1-1. Additional explanations of front panel selections and procedures are referenced in the table and start in Topic 2.

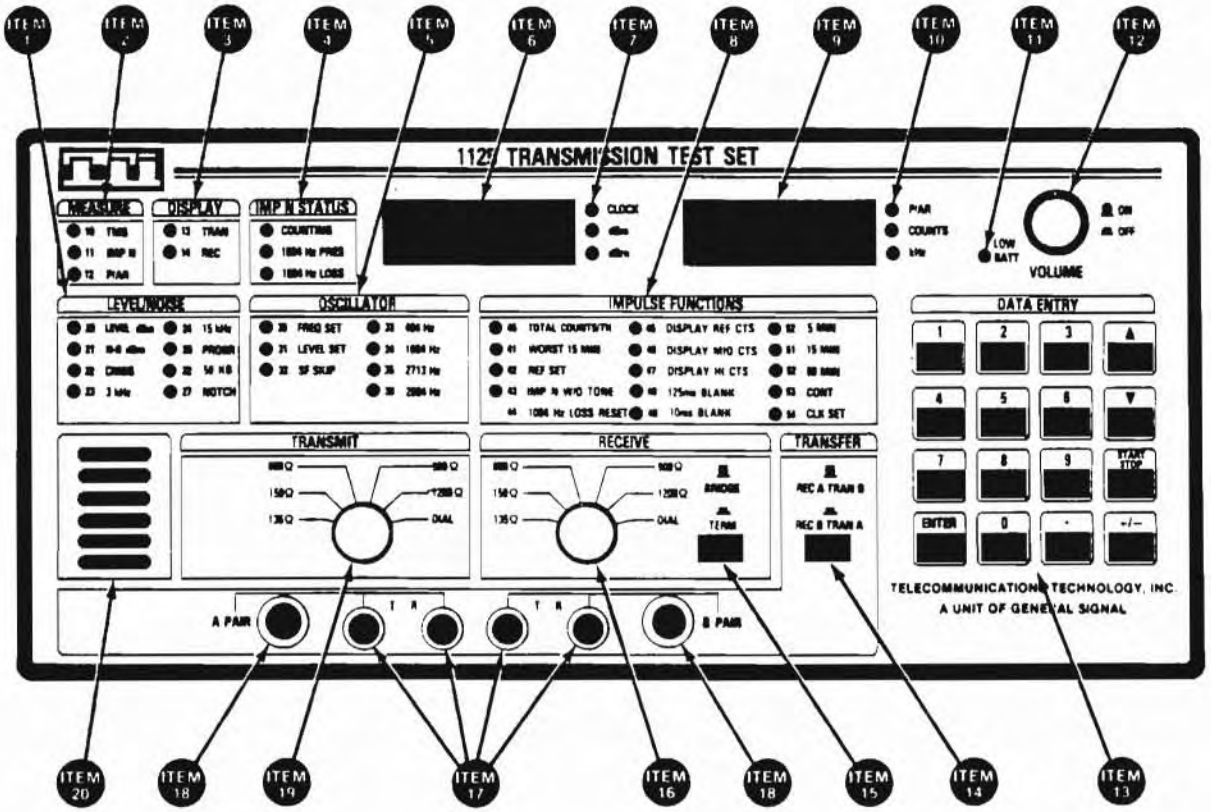


Fig. 1-1—1125 Transmission Test Set Front Panel

TABLE 1-A
FRONT PANEL REFERENCE GUIDE

ITEM #	SECTION	SELECTION #		REFERENCE
1	Level/Noise	20	LEVEL dBm	2.11
		21	N-G dBrn	
		22	CMSG	
		23	3 kHz	
		24	15 kHz	
		25	PROGR	
		26	50 KB	
		27	NOTCH	
2	Measure	10	TMS	2.10
		11	IMP N	
		12	P/AR	
3	Display	13	TRAN	2.07
		14	REC	
4	IMP N Status		COUNTING	2.14
			1004 Hz PRES	
			1004 Hz LOSS	
5	Oscillator	30	FREQ SET	2.12
		31	LEVEL SET	
		32	SF SKIP	
		33	404 Hz	
		34	1004 Hz	
		35	2713 Hz	
		36	2804 Hz	
6	Left Display			2.08
7	Left Display (Function)		CLOCK	2.08
			dBm	
			dBrn	
8	Impulse Functions	40	TOTAL COUNTS/TH	2.13
		41	WORST 15 MIN	
		42	REF SET	
		43	IMP N W/O TONE	
		44	1004 Hz LOSS RESET	
		45	DISPLAY REF CTS	
		46	DISPLAY MID CTS	

TABLE 1-A (Cont)
FRONT PANEL REFERENCE GUIDE

ITEM #	SECTION	SELECTION #	REFERENCE
8	Impulse Functions (cont)	47 DISPLAY HI CTS 48 125 ms BLANK 49 10 ms BLANK 50 5 MIN 51 15 MIN 52 60 MIN 53 CONT 54 CLOCK SET	2.13
9	Right Display		2.09
10	Right Display (Function)	P/AR COUNTS kHz	2.09
11	Low Batt		3.02
12	On/Off Volume		2.01
13	Data Entry Keypad		2.06
14	Transfer	OUT REC A TRAN B IN REC B TRAN A	2.02
15	Receive Bridge/Term	OUT BRIDGED IN TERMINATED	2.05
16	Receive	135 150 600 900 1200 DIAL	2.04
17	Binding Posts		2.03
18	310 Jacks		3.05
19	Transmit	135 150 600 900 1200 DIAL	2.04
20	Speaker		2.15

2. FRONT PANEL FEATURES

2.01 ***ON/OFF/VOLUME SWITCH (Item 12, Fig. 1-1):*** Pull to switch power on. Rotating the ON/OFF/VOL knob controls the output level of the internal monitor speaker. In the off (in) position, battery power is applied only to the real-time clock circuitry.

(a) Battery charging circuit is enabled whenever the unit is plugged into 110 V ac.

(1) If the unit is turned off, the battery will fully charge in approximately 16 hours.

(2) With the unit turned on, only a trickle charge is fed to the battery.

(b) Unit automatically switches to battery power in the event of ac power failure.

2.02 ***TRANSFER SWITCH (Item 14):*** Controls the direction of test operations. When the transfer switch is in, the A binding posts and 310 jack are connected to the transmit side of the circuit, and the B binding posts and 310 jack are connected to the receive side of the circuit under test. With the transfer switch in the out position, the A connections are connected to the receive side of the circuit and the B connections are connected to the transmit side of the circuit.

2.03 ***BINDING POSTS (Item 17):*** Labeled T (Tip) and R (Ring). Used to connect a butt-in handset to the telephone circuit connected to the 310 jack. Refer to Topic 11 for the dial-up procedure.

2.04 ***RECEIVE SWITCH (Item 16) and TRANSMIT SWITCH (Item 19):*** Matches the 1125's terminating impedance to the characteristic impedance of the line. When set to the DIAL position, the internal measuring circuitry (including line holding) is disconnected and a butt-in handset may be used to dial and hold through the 310 jack to the line, via the binding posts.

2.05 ***BRIDGE/TERM SWITCH (Item 15):*** Used only in receive mode. When in, provides the terminating impedance selected by the RECEIVE switch (see 2.04). When in the out position, the receiver circuitry of the 1125 presents a high impedance at its input (greater than 50 kohms).

2.06 ***ENTRY KEYPAD (Item 13):*** Used to enter the operator's instructions. All functions and selections are numerically coded on the front panel of the 1125, and the code corresponding to the desired selection is entered at the keypad.

(a) The (UP) and (DOWN) keys may be used to increment or decrement the values entered in FREQUENCY, LEVEL, or REFERENCE SET modes.

(1) Values change by +100 Hz in the FREQUENCY SET mode. Hold the key in for continuous incrementing/decrementing.

(2) Values change by +0.1 dBm in LEVEL SET mode.

(3) Values change by +1 dBrn in REFERENCE SET mode.

(b) The +/- key is used when entering positive values. A default negative value is assigned to all level inputs unless this key is depressed.

2.07 ***DISPLAY Section (Item 3):*** LEDs indicate whether the measurements on the TRANSMIT [13] or the RECEIVE [14] side of the circuit under test are being displayed.

2.08 ***LEFT DISPLAY (Item 6):*** Will display a value as determined by the mode selected; LED to the right of the display will indicate the unit of measurement.

(a) ***TMS Mode:***

(1) Transmit signal level in dBm

(2) Receive noise measurement in dBrn

(3) Receive level measurement in dBm.

(b) ***IMPULSE NOISE Mode:***

(1) 24-hour real time while test is in progress, or when CLKSET 54 is selected

(2) Start time of worst 15-minute counting period

(3) Impulse noise reference level in dBrn

(c) ***P/AR Mode (Peak-to-Average Ratio):*** Receive or transmit P/AR signal level in dBm.

2.09 ***RIGHT DISPLAY (Item 9):*** Will display a value as determined by the mode selected; the LED to the right of the display will indicate the unit of measurement.

(a) ***TMS Mode:*** Receive or transmit signal frequency in kilohertz.

(b) ***IMPULSE NOISE Mode:*** Displays counts (hits) above threshold. Either total counts per threshold, worst 15-minute counts, or REF, MID or HI counts (depending on selection) may be displayed.

(c) ***P/AR Mode:*** Receive or transmit P/AR measurement reading in P/AR units.

2.10 ***MEASUREMENT Section (Item 2):*** Operator selects the measurement to be made by pressing the ENTER key on the keypad, followed by the numeric code of the desired measurement type.

10 TMS (Transmission Measurement Set)

11 IMP N (Impulse Noise)

12 P/AR (Peak-to-Average Ratio) (optional)

2.11 ***LEVEL/NOISE Section (Item 1):*** Operator may select the desired filter or function by pressing the ENTER key, followed by the numeric code of the desired filter or function.

20 LEVEL dBm (***Note 1***)

21 N-G dBrn (Noise-to-ground) (***Note 1***)

22 CMSG (C-Message filter) (***Note 2***)

23 3 kHz (3 kHz flat filter) (***Note 2***)

24 15 kHz (15 kHz flat filter) (***Note 2***)

25 PROGR (Program filter) (***Note 2***)

26 50 KB (50 kBit wideband filter) used for testing digital transmission local loops, including DSO level.

27 NOTCH (1010 Hz notch filter)

Note 1: If both the LEVEL LED and the N-G LED are off, then the 1125 is in the NOISE mode (for measuring metallic noise).

Note 2: Characterization of noise filter requires a continuous signal at a preferred reference level of -10.0 dBm.

2.12 ***OSCILLATOR Section (Item 5):*** Test operator selects the level and frequency of oscillator functions by entering the actual frequency and level desired, or by entering the numeric codes of the fixed frequencies provided.

30 FREQ SET (frequency set)

31 LEVEL SET

32 SF SKIP: When used, does not allow any frequency between 2450 Hz and 2750 Hz to be programmed in, to prevent accidental disconnection of lines. When 100 Hz stepping is being used, it will "jump over" those frequencies.

33 404 Hz

34 1004 Hz

35 2713 Hz

36 2804 Hz

2.13 ***IMPULSE FUNCTIONS Section (Item 8):*** With the 1125 in the IMP N mode and set to RECEIVE, the operator may set the threshold for measuring hits and select the total time for making measurements by pressing the ENTER key, followed by the desired function. An audible signal will sound on each occurrence of a noise spike. Tone volume can be adjusted with the volume control (Fig. 1-1, Item 12).

40 TOTAL COUNTS/TH: The 1125 will count all hits at or above the preset threshold value.

41 WORST 15 MIN: The 1125 will recall from its memory a record of the worst 15-minute measurement period, along with the real time of occurrence. The 1125 allows a maximum of 255 counts per threshold during any one minute; if exceeded, display will read "OR15".

42 REF SET: Enables the operator to set the reference value (threshold) for impulse noise measurements.

43 IMP N W/O TONE: Impulse noise without tone.

44 1004 Hz LOSS RESET: Resets and arms the 1004 Hz loss indicator LED (see 2.14).

45 DISPLAY REF CTS: The total number of hits above the reference threshold is displayed.

46 DISPLAY MID CTS: The total number of hits 4 dB above the MID threshold is displayed.

47 DISPLAY HI CTS: The total number of hits 8 dB above the HI threshold is displayed.

Note: The worst 15-minute [41] period may be called out for each threshold if 60 minutes [52] or Continuous [53] is selected and at least 15 minutes of counting has occurred.

48 125 ms BLANK: Disables counting for 125 ms after a hit.

49 10 ms BLANK: Disables counting for 10 ms after a hit.

50 5 MIN: Length of measurement period is 5 minutes.

51 15 MIN: Length of measurement period is 15 minutes.

52 60 MIN: Length of measurement period is 60 minutes.

53 CONT: Continuous measurement.

54 CLOCK SET: Used to set and/or display the real time.

2.14 ***IMP N STATUS (Item 4):*** Impulse noise measurement status is indicated by three LEDs.

(a) Counting LED: Lit during the counting intervals of 5 minutes, 15 minutes, 60 minutes, and continuous. The LED will light when the start button is pressed, and go out after the selected time interval has elapsed.

(b) 1004 Hz PRES: Lit when a 1004 Hz tone is present, and go out when the tone goes below −40 dBm for more than 125 ms. The LED will relight when tone reappears for more than 125 ms.

(c) 1004 Hz LOSS: Lit if a 1004 Hz tone is not present, or if the 1004 Hz has dropped below −40 dBm for more than 125 ms. To turn off the 1004 Hz LED:

ENTER 4 4

2.15 ***SPEAKER:*** Allows audible monitoring of the received or transmitted signal, entries keyed into the data entry keypad, and impulse noise spikes.

3. SETUP

3.01 This topic describes setup procedures for the use of the 1125 Transmission Test Set. Specific procedures for a variety of tests may be found in Topics 4 through 11.

3.02 ***DC power option:*** Units equipped with the dc power option operate on 110 V ac, with a battery back-up system. If the unit is connected to an ac outlet, the battery is charging. The 1125 may be used on battery power for up to 3½ hours. A low battery indicator on the front panel (Item 11, Fig. 1-1) indicates operational time is limited to 15 to 30 minutes; the unit should be connected to ac power to fully charge the battery.

(a) If the unit must be left on while charging, it will receive a trickle charge.

(b) With the unit turned off, battery will be fully charged in approximately 16 hours.

3.03 ***Power on:*** Pull the ON/OFF/VOL switch out to turn the unit on.

(a) All the front panel LEDs and all segments of both displays should light. No error codes should be displayed.

(1) The transmit signal is automatically looped through the filters to the receiver section.

(2) The output of each filter is checked to verify that the signal is within specified parameters. "Out-of-spec" signals generate error codes. Refer to Topic 12.

(b) The 1125 will default to TMS[10], TRAN[13], and LEVEL[20], at 0.0 dBm and 1.004 kHz.

(c) The operator may exit from any function mode by entering any other function.

3.04 ***Setting the clock:*** Set the real time clock by entering the following sequence:

ENTER 5 4

The time should appear on the left display, and the CLOCK SET LED should blink. Time is displayed on a 24-hour basis (3 p.m. is displayed as 15.00). If the time displayed is incorrect, enter the correct time at the keypad, then enter ENTER 5 4 again to exit from the CLOCK SET mode. The CLOCK SET LED will stop blinking. Note that the clock circuitry is powered by battery even when the 1125 is turned off and unplugged.

3.05 ***Test setup:*** Set up the unit for testing a circuit:

(a) Connect a 310 cord from the circuit under test to the front panel jacks on the 1125. Press the transfer switch to the appropriate position:

(1) If the receive side of the circuit under test is to be connected to the B 310 jack, the TRANSFER switch should be in.

(2) If the receive side of the circuit under test is to be connected to the A 310 jack, the TRANSFER switch should be out.

(b) Set the TRANSMIT switch (Item 19, Fig. 1-1) to the position which matches the impedance of the transmit side of the circuit under test.

(c) Set the RECEIVE switch (Item 16, Fig. 1-1) to the position which matches the impedance of the receive side of the circuit under test.

(d) If the RECEIVE circuit is to be measured in the BRIDGED mode, push the BRIDGE/TERM switch (Item 15, Fig. 1-1) so that it is in the out position.

3.06 Instructions for performing tests begin in Topic 4.

4. TRANSMITTER LEVEL AND FREQUENCY

4.01 ***Initial setup:*** Chart 4-A shows the keypad entries used to set up the 1125 to display the level and frequency of the signal being generated by the test set.

4.02 ***Changing level and frequency:*** Chart 4-B shows the steps used to set or change the level and frequency of a signal being transmitted by the 1125.

CHART 4-A
TRANSMITTER LEVEL AND FREQUENCY

OPERATOR ACTION (KEYSTROKES)	FUNCTION	INDICATORS
ENTER 1 0	TMS mode	[10] TMS LED lit
ENTER 2 0	Level mode—all filters bypassed	[20] LEVEL LED lit
ENTER 1 3	Display transmit signals	Left display shows level, right display shows frequency of the transmitted signal.

CHART 4-B
CHANGING LEVEL/FREQUENCY

OPERATOR ACTION (KEYSTROKES)	FUNCTION	INDICATORS
ENTER 3 1	Set level mode	[31] LEVEL SET LED blinking
1 0 . 4	Sets output level to -10.4 dBm (*Note 1*) and (*Note 3*)	-10.4 on left display; dBm LED LIT
ENTER 3 0	Set frequency mode	[30] FREQ SET LED blinking
Method A—Use for ANY frequency		
ENTER . 4 4 0	Set desired frequency	0.440 on right display; kHz LED lit.
ENTER 9 . 9 9 0	Change to new frequency (*Note 2*)	9.990 on right display; kHz LED lit.
Method B—Use with built-in standard frequencies		
ENTER 3 3	Sets the transmitter to a frequency of 404 Hz	[33] 404 Hz LED lit; 0.404 kHz on right display.
ENTER 3 4	Sets the transmitter to a frequency of 1004 Hz	[34] 1.004 Hz LED lit; 1.004 kHz on right display.
Method C—Used when SF (Single Frequency) signalling units are used in the circuit under test.		
ENTER 3 2	Disables the selection of any frequency in the range of 2450 to 2750 Hz to prevent accidental circuit disconnect.	[32] SF SKIP LED lit
Example:		
ENTER 3 5	Attempt to use 2713 Hz	Audible double-beep warning of an attempt to use a frequency in the SF range

Notes:

1. Refer to 2.06 to increment or decrement the value entered.
2. The most frequently changed parameter should be entered last to reduce the number of operator keystrokes.
3. Values entered are negative unless the + / - key is depressed. Depress the + / - key only when positive values are to be entered.

5. LEVEL AND FREQUENCY MEASUREMENTS

5.01 ***Monitoring level and frequency:*** The sequence given in Chart 5-A allows an operator to monitor the level and frequency of a signal on a circuit being tested by the 1125.

5.02 The level of the signal will be displayed on the left display; the frequency of the signal will appear on the right display.

5.03 ***Signal level range:*** If the signal level is greater than +10.3 dBm, an over range (Or) symbol will appear in the left display. If the signal is less than -50.0 dBm, an under range (Ur) symbol will appear.

5.04 ***Frequency range:*** If the frequency is less than approximately 20 Hz, LO appears in the right display. If the frequency is higher than about 110 kHz, HI appears in the right display.

CHART 5-A
LEVEL AND FREQUENCY MEASUREMENTS

STEP	ACTION	FUNCTION	INDICATORS
1	Set transfer switch as required	-	
2	ENTER 1 0	TMS mode [10].	TMS LED lit.
3	ENTER 1 4	Receive [14] side.	REC LED lit.
4	ENTER 2 0	Level [20].	LEVEL LED lit.

5.05 ***Entering Quiet Termination Mode:*** The quiet termination mode can be entered from either a transmit level or noise level function by following the steps in Chart 5-B.

5.06 ***Exiting Quiet Termination Mode:*** The quiet termination mode is released from either a transmit level or transmit noise mode by following the steps in Chart 5-C.

CHART 5-B
ENTERING QUIET TERMINATION MODE

STEP	ACTION	FUNCTION	INDICATORS
1	ENTER . .	Transmitter is still on until receive mode is entered, or the frequency is changed.	Transmit level will display OFF. Frequency is blanked.
2	ENTER 1 4	Receive mode. Transmitter is turned off and stays off until a level set operation is performed.	REC LED lit.

CHART 5-C
EXITING QUIET TERMINATION MODE

STEP	ACTION	FUNCTION	INDICATORS
1	ENTER 3 1	Set level mode.	LEVEL SET LED BLINKS.
2	ENTER +/– 10.0	Set output level to + 10.0 dBm.	+ 10.0 on left display, dBm LED lit.

NOTE: ***Quiet termination is dropped after any valid level is entered during level set operation.***

6. METALLIC NOISE MEASUREMENTS

6.01 ***Procedure:*** Metallic noise level in dBrn may be measured by entering the sequence given in Chart 6-A (***Note 1***).

6.02 Metallic noise level (10 to 100 dBrn) will appear in left display. Ur indicates the noise level is less than 10 dBrn.

Note 1: If both the LEVEL LED and the N-G LED are off, the 1125 is in the (metallic) noise mode. The noise filter in use is indicated by the illuminated LED; 2.11 lists noise filters available.

CHART 6-A
METALLIC NOISE MEASUREMENTS

STEP	ACTION	FUNCTION	INDICATORS
1	Set TRANSFER SWITCH as required		
2	ENTER 1 0	TMS mode [10]	[10] TMS LED lit
3	ENTER 1 4	Receive [14] side	[14] REC LED lit
4	ENTER X X	Select desired filter ([22] through [27])	Filter LED lit

7. NOISE-TO-GROUND MEASUREMENT

7.01 ***Grounding:*** For accurate impulse noise-to-ground measurements, the 1125 must be properly grounded:

(a) Connect an external lead from frame (circuit) ground to the binding post on the rear of the instrument during battery operation, or

(b) Use a properly grounded 3-wire 110 V ac outlet.

7.02 ***Procedure:*** Refer to Chart 7-A for setup procedure. The impulse noise-to-ground level (between 50 and 130 dBrn) appears in the left display.

CHART 7-A
NOISE-TO-GROUND MEASUREMENTS

STEP	ACTION	FUNCTION	INDICATORS
1	ENTER 1 0	TMS mode	TMS LED lit
2	ENTER 1 4	Measure RECEIVE [14] side	REC LED lit
3	ENTER 2 1	NOISE TO GROUND	N-G LED [21] lit
4	ENTER 2 X	Select the desired filter	Filter LED lit

8. NOISE-WITH-TONE MEASUREMENT

8.01 ***Notch filter:*** The 1125 is equipped with a 1010 Hz filter for making noise with tone (notch noise) measurements.

8.02 ***Procedure:*** Chart 8-A shows the keypad sequence used for initiating noise-with-tone measurements.

8.03 Read the noise level (10 to 100 dBrn) on the left display.

CHART 8-A
NOISE-WITH-TONE MEASUREMENTS

STEP	ACTION	FUNCTION	INDICATORS
1	ENTER 1 0	TMS mode	TMS LED lit
2	ENTER 1 4	Receive side	REC LED [14] lit
3	ENTER 2 X	(Select filter)	Filter LED lit
4	ENTER 2 7	Notch filter	NOTCH FILTER LED [27] lit

9. IMPULSE NOISE MEASUREMENTS

9.01 The following parameters should be understood by the 1125 operator before attempting to measure impulse noise:

(a) ***Reference Level:*** This is an operator-selected threshold level; any impulse noises above this level register as hits or counts. The MID level and the HI level are automatically set at 4 dB and 8 dB above this reference level.

(b) ***Time Duration:*** Impulse noise, by its nature, is a random phenomenon; therefore, the longer the measurement period, the greater the reliability of the data. The 1125 offers a choice of four time intervals: 5, 15, or 60 minutes, or continuous. In any mode, counting may be stopped by pressing the START/STOP key.

(c) ***Blanking Time:*** Large noise spikes may cause oscillation or ringing. To prevent multiple counts of the same spike, it is necessary to disable the counter for a period of time after a hit. The 1125 operator may select either 10 milliseconds [49] or 125 milliseconds [48] of blanking. If no selection is made, the 1125 will default to a 125 ms blanking period.

Example: Refer to Fig. 9-1. The noise spike at (A) crosses the HIGH threshold, and triggers the blanking circuitry. This spike will count as a reference hit, a MID hit, and a HIGH hit, since it crosses all three thresholds. The spikes at (B) and (C) are oscillations (ringing) and are not counted as hits, because they occur during the time the counter is blanked. The spike at (D) crosses the reference threshold, and will count as a hit and trigger the blanking circuitry. It will not be included in the count of MID or HIGH hits. The spike at (E) would count as a MID and a HIGH hit, but not a reference hit, since the spike at (D) has blanked the reference threshold count. The spike at (F) triggers the blanking circuitry and is included in the count of reference hits and MID hits.

(d) ***1004 Hz Loss:*** Impulse noise measurements are normally done with a 1004 Hz tone. If the tone is lost, or if it falls below –40 dBm for more than 125 milliseconds, the 1125 stops counting impulse noises and the 1004 Hz LOSS LED lights. To turn off the 1004 Hz LOSS LED enter:

ENTER 4 4

The 1125 will start counting again when the 1004 Hz tone returns. Starting another IMP N measurement will also reset the LED.

(e) ***Total Counts/TH:*** Entering

ENTER 4 0

will display the total number of counts above the selected threshold. This can be done during or after the counting period.

(f) ***Worst 15 Min:*** Impulse noise is a random phenomenon which generally occurs in bursts. The time of occurrence of these bursts may provide useful information regarding the nature of the fault. The 1125 allows the operator to see the starting time of the worst 15 minutes of a 60-minute or longer test. If more than 255 counts per minute are measured, the display indicates OR 15. The recall of the worst 15 minutes is valid only if the test has run for at least 15 minutes in the 60-minute or continuous mode.

9.02 ***Impulse Noise:*** Use Chart 9-A to initiate impulse noise measurements on the circuit under test. Note that the 1125 defaults to commonly used settings which may be manually altered.

9.03 Impulse noise specifications are listed in Topic 13. Specifications are from publication IEEE P743/01.

CHART 9-A
IMPULSE NOISE MEASUREMENTS

STEP	ACTION	FUNCTION	INDICATORS	COMMENTS
1	ENTER 1 1	Measure impulse noise	IMP N LED [11] lit	By default, the C-MSG and notch filters are selected, and the blanking time set to 125 ms with 60 dBrn reference threshold and 15-minute interval.
2	ENTER 1 4	Receive side	REC LED lit	Unit displays time and counts
Options:				
3	ENTER 2 X	Select filter		
4	ENTER 3 4	Set oscillator to 1004 Hz	1004 Hz LED [34] lit	
5	ENTER 4 2	Set reference level	REF SET [42] LED should blink	
6	ENTER X X	Enter the reference level	Digits entered appear in left display; dBrn LED next to left display lit.	
7	ENTER 4 8/9	Set blanking time	BLANK LED lit [48] or [49]	
8	ENTER 5 X	Select measurement time	LED [50] [51] [52] or [53] lit	
9	START/STOP	Start counting	The COUNTING LED should be on and the 1004 Hz PRES and LOSS LEDs will be activated	
10	START/STOP	Stop counting	The COUNTING LED will go out	
11	ENTER 43	Measure impulse noise without tone	IMPN without tone LED lit	1004 Hz tone and notch filter not required

CHART 9-A (Cont)
IMPULSE NOISE MEASUREMENTS

STEP	ACTION	FUNCTION	INDICATORS	COMMENTS
12	ENTER 41	Worst 15-minute recall	Worst 15-minute LED lit	Start time of worst 15 minutes shown on left display. Counts during worst 15-minute interval shown on right display.
13	ENTER 45 46 47		Display REF CTS lit Display MID CTS lit Display HI CTS lit	Counts for each threshold displayed in right display

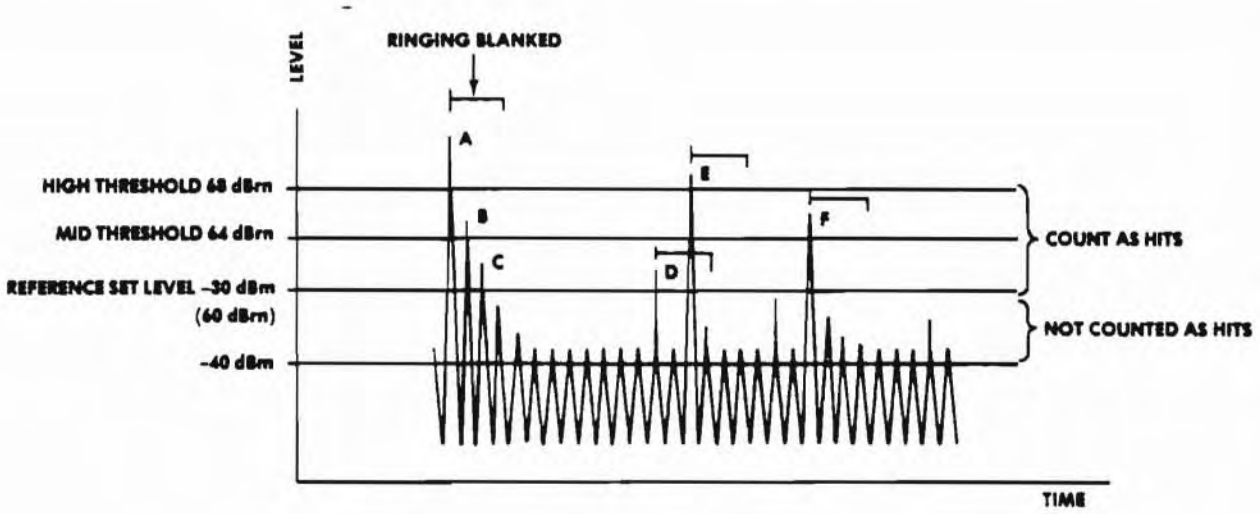


Fig. 9-1—Impulse Noise Reference Levels

10. P/AR MEASUREMENTS

10.01 ***Purpose:*** The optional P/AR system is designed to measure the simultaneous effects of bandwidth reduction, envelope delay distortion, and return loss due to gain and phase ripples on voiceband data signals.

10.02 ***Measurements:*** P/AR measurements are not affected by transient phenomena, frequency shifts, or noise.

10.03 ***P/AR system:*** The P/AR system consists of a transmitter and a receiver connected to opposite ends of a voiceband transmission system.

(a) The transmitter generates a complex line signal with no even harmonics, producing a pulse train with half-wave symmetry. The peak-to-average ratio of the signal is known.

(b) The receiver measures the peak and average values of the received signal, and displays their ratio, which is the basis for the P/AR rating.

(c) A P/AR rating of 100 signifies that the pulse train measured has suffered no degradation, compared to the pulse train transmitted.

(d) P/AR specifications are listed in Topic 13. Additional information on P/AR systems is in Bell System Publication 41009.

10.04 ***Transmit procedure:*** To transmit a P/AR signal, use the sequence given in Chart 10-A.

10.05 ***Measurement procedure:*** To measure a P/AR signal, use the sequence given in Chart 10-B.

CHART 10-A
TRANSMITTING P/AR SIGNALS

STEP	ACTION	FUNCTION	INDICATORS
1	ENTER 1 2	P/AR mode	P/AR LED lit
2	ENTER 1 3	Display transmitted signal	TRAN LED [13] lit
3	ENTER 3 1	Set level	LEVEL SET LED [31] lit
4	ENTER 0 . 0	Level set to 0.0 dBm	0.0 in left display
5	Read level in dBm on left display and P/AR units on right display.		

CHART 10-B
MEASURING P/AR SIGNALS

STEP	ACTION	FUNCTION	INDICATORS
1	ENTER 1 2	P/AR mode	P/AR LED [12] lit
2	ENTER 1 4	Display received signal	REC LED [14] lit
3	Read the P/AR measurement on the right display.		

11. DIAL PROCEDURE

11.01 The 1125 has the ability to hold wet dial-up lines. Use the following sequence:

(a) Connect patch cord from circuit under test to the A or B 310 jack. Refer to Fig. 11-1 for butt-in and circuit connection to the 1125.

(b) Connect a butt-in handset to the binding posts of the selected 310 jack.

(c) Set either the TRANSMIT or the RECEIVE switch, as appropriate, to the DIAL position. Seize the circuit by switching the handset from "monitor" to "talk."

(d) Use the butt-in handset to dial the far end of the circuit.

(e) After the circuit is answered, switch to the desired impedance to continue testing.

(f) Disconnect the butt-in handset (preferable) or return its mode switch to the "monitor" position (***Note 1***).

(g) To disengage, put the switch back in the DIAL position.

Note 1: The bridging loss caused by leaving the handset connected may degrade the measurement of a tone on the circuit.

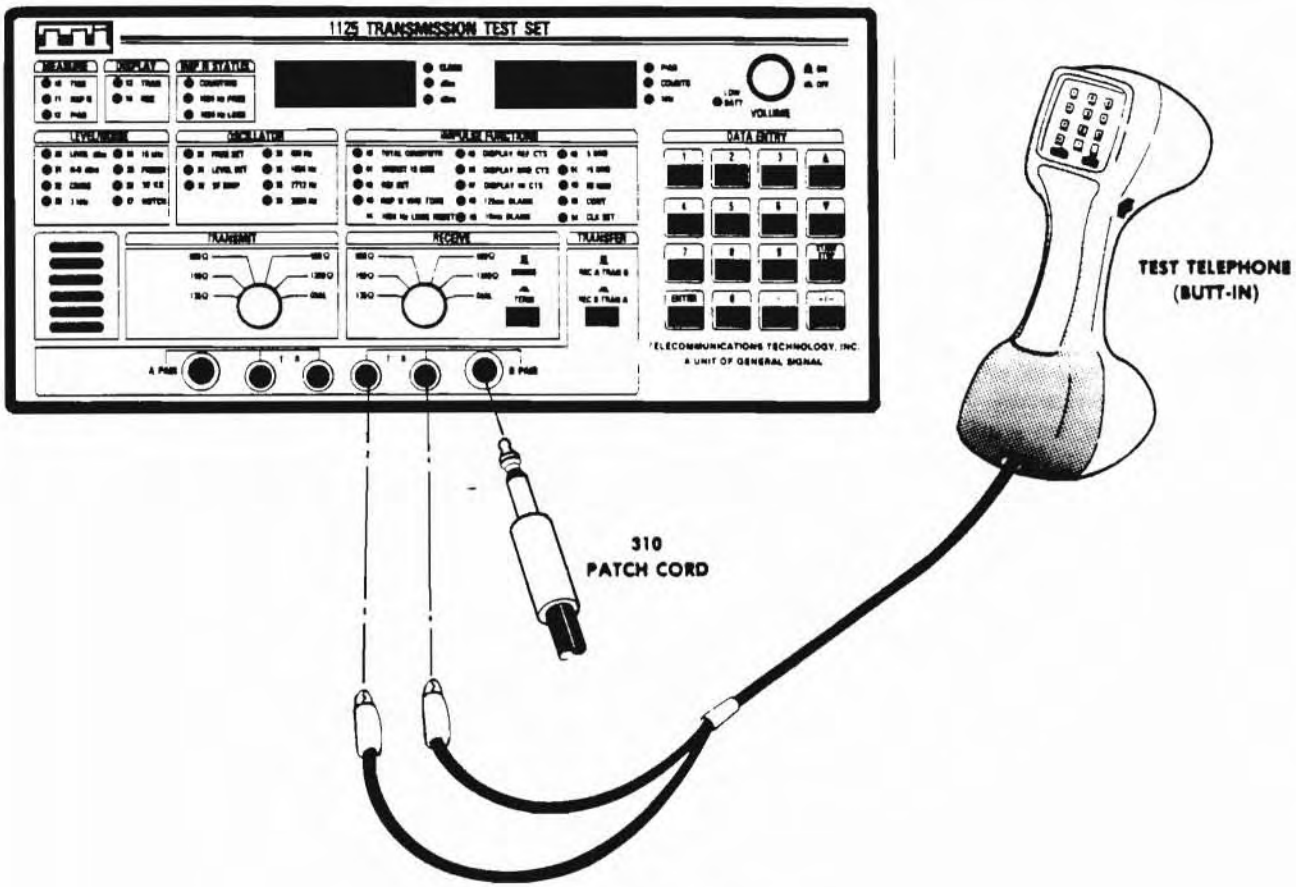


Fig. 11-1— Dial-Up Connections

12. FAILURE MESSAGES

12.01 When switched on, the 1125 will enter a self-test mode checking its internal circuitry. Results of each test appear in the left display as either PASS or FAIL. The test number appears in the right display.

12.02 Table 12-A is a list of the test numbers and the circuit that is tested.

TABLE 12-A
FAILURE MESSAGES

TEST NUMBER	CIRCUIT TESTED
1	Accuracy of built-in 10 V reference
11	IMP N measurement
12	P/AR measurement
20	TMS measurement
22	C-MSG filter
23	3 kHz filter
24	15 kHz filter
25	PROG filter
26	50 kB filter
27	1004 Hz notch filter

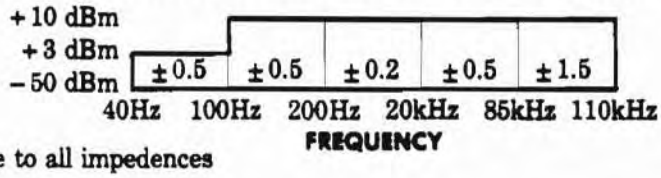
RECEIVER

Frequency Measurements:

Range	20 Hz to 110 kHz
Level	-50 to +10.0 dBm
Resolution	1 Hz below 10 kHz 10 Hz, 10 kHz to 99.99 kHz 100 Hz above 100 kHz
Accuracy	±0.01% and least significant digit
Update Range	5 times/second, nominal

Level Measurements:

Frequency Range	40 Hz to 110 kHz
Level Range	-50 to +10.0 dBm
Resolution	0.1 dB
Accuracy*	±0.1 dB at 1004 Hz



*Accuracy in dB applicable to all impedences

Noise Measurements:

Modes	Idle circuit noise (metallic) Noise with tone (notch) Noise-to-ground
Weighting filters	C-message 3 kHz flat 15 kHz flat Program 50 kBit wideband
Notch filter	1010 Hz (995—1025 Hz)
Range	10 to 100 dBrn metallic 50 to 130 dBrn, noise-to-ground
Accuracy	±1 dB metallic with or without tone ±1.5 dB, noise-to-ground with or without tone
Resolution	1dB

Impulse Noise Measurements:

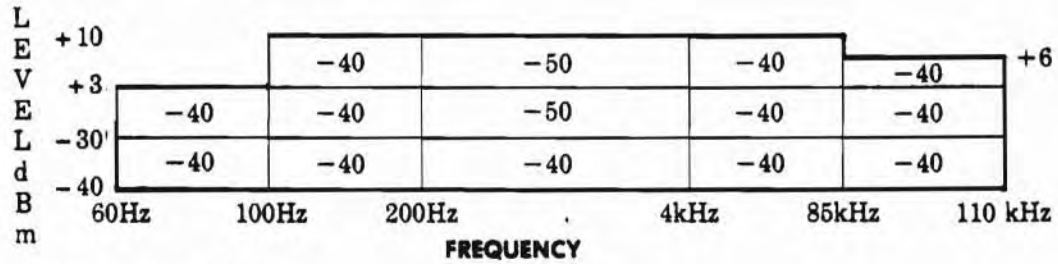
Ref (lo) threshold	30 to 110 dBrn, metallic 60 to 140 dBrn, noise-to-ground
Mid threshold	Ref +4 dB (max to 110 dBrn metallic, max 140 dBrn NG)
High threshold	Ref +8 dB (max 110 dBrn metallic, max 140 dB: NG)

Ref accuracy	±1 dB, metallic (40 dBrn to 100 dBrn) ±1.5 dB, noise-to-ground (70 dBrn to 140 dBrn)
Count capacity	0 to 9999
Count rate (nominal)	8 or 100 per second
Holding tone loss	-40 dBm ±1 dB threshold
Timer period	5, 15, 60 min. or continuous
Noise count display	Accumulated count and worst 15-Minute history with stored time of occurrence
Clock	24 hour (hrs., mins.)

Transmitter:

Frequency	40 Hz to 110 kHz
Output level	-40 to +10 dBm, ≧600 ohms -40 to +3 dBm (135 ohm and 150 ohm)
Resolution	1 Hz below 10 kHz 10 Hz, 10 kHz to 99.99 kHz 100 Hz above 100 kHz
Fixed tones	404 Hz, 1004 Hz, 2804 Hz, 2713 Hz (all ±0.1%)

Total distortion* (in dB from fundamental)



*Measured per Pub 41009, Table L

P/AR (optional):

Transmit spectrum	A composite signal of 16 frequencies between 140 Hz and 3890 Hz
Output level	-40 to 0 dBm (true RMS)
Receive input	-40 to +3 dBm (true RMS)
P/AR range	0 to 120 P/AR units
Resolution	1 P/AR unit
Accuracy	±2 (30 to 110 units)

General:

Impedances	135, 150, 600, 900, 1200 ohms Independent selection of TRAN and REC termination
Bridging impedance	≧50 k ohms
Longitudinal balance	≧80 dB at 60 Hz

Hold circuits	40 mA max. at 50V and 0 ohms 25 mA typ. at 48V and 1500 ohms
Primary power	115 V ac, 30 watts, nominal
Battery	Sealed gel cell 6 volts, 10 ampere hours
Battery capacity	3.5 hours, nominal at 25°C
Auto shut-off	Battery voltage ≤ 5.7 volts
Recharge cycle	16 hours (with unit off)
Operating temperature	0 to 50°C
Storage temperature	-40 to 50°C
Dimensions	5.70 inches high x 11.75 inches wide x 15.30 inches deep (14.5 cm x 29.8 cm x 38.9 cm) 7.0 inches high with retractable cover
Weight (with battery)	19.5 lbs (8.9 Kg)

Accessories:

Retractable front cover
Canvas carrying case
Rack mount 19 inches, or 23 inches, x 5.75 inches panel space

References:

BSTR Pub-41009 (May, 1975)
IEEE P743/D1 (July, 1982)

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