

MODEL 701A  
TRANSMISSION TEST SET



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**Model 701A**  
Transmission Test Set  
Operation Manual

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### SECTION 1 - INTRODUCTION

The CXR Telcom model 701A is a compact, portable analog transmission test set which performs level, frequency, idle channel noise and notch noise tests. When set to the 4 kHz mode, the set operates as a voice-band instrument; when 20 kHz is selected, it covers the program channel band.

The 701A has separate transmitter and receiver controls which provide versatile two- and four-wire test arrangements. Complete dial and hold functions are provided for testing two-wire dial-up circuits. Dual numeric displays are provided for simultaneous reading of frequency and level.

The 710B Network Access Unit is an applique which is designed for installation as a front cover on the 701A case. It provides additional features for testing two and four-wire dial-up or special service lines. These include loop pulsing (dial or DTMF), ring indication, line holding with loop current detection, ground-start operation, battery feed (C.O. emulation), 20 Hz ringing generator, and E & M pulsing (types I thru V).

The 701A TTS is powered by internal rechargeable batteries and may also be operated from 117 VAC commercial power. The 710B NAU also has internal batteries but some functions require external AC power.

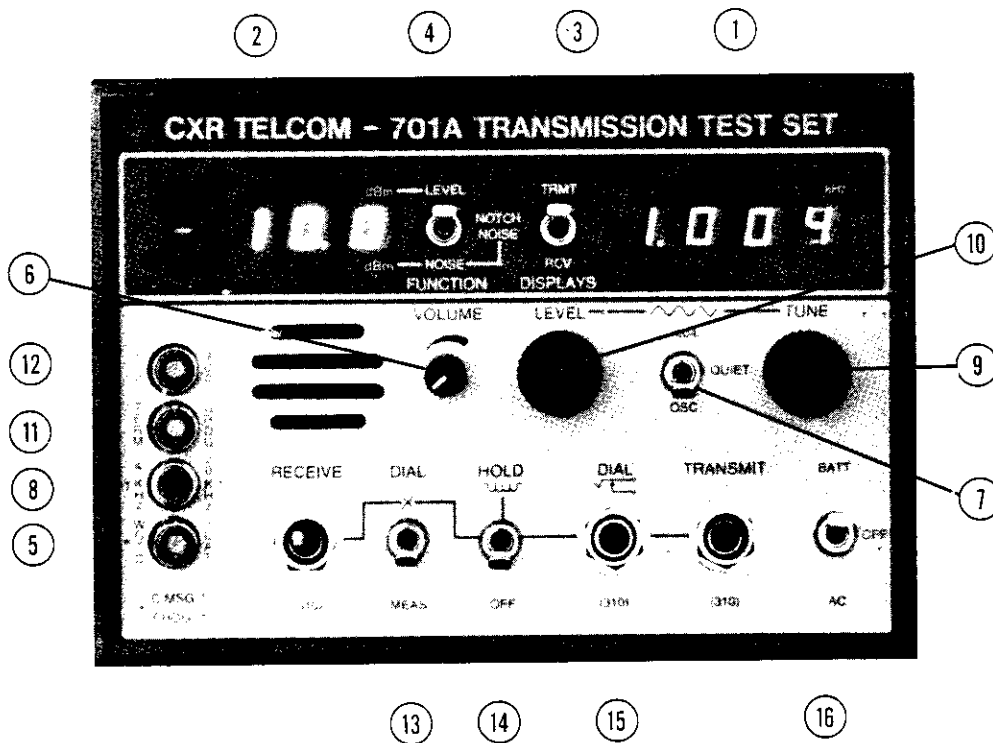


Figure 1. 701A Front Panel

## SECTION 2 - DESCRIPTION

## 2.1 701A Front Panel Controls and Indicators

The 701A front panel controls and indicators are shown in detail in Figure 1. The description is divided into five functional groups: Display, Receiver, Transmitter, Line Interface, and Power.

Reference	Name	Function
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	Display	
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1	<b>Frequency Display:</b>	The four digit right-hand (green) display shows frequency, in kHz. Resolution is 1 Hz in the VF band and 10 Hz in the PROGRAM band.
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2	<b>Level Display:</b>	The four digit left-hand (red) display shows the value of the parameter being measured. Signal level is displayed in units of dBm, to a resolution of 0.1 dB; noise is shown in dBm with a resolution of 1 dB.
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3	<b>Display Select:</b>	Two position switch connects the internal measuring circuits to either the receiver (RCV) or to the transmitter (TRMT). The position of the switch has no effect on the test set-up itself.
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4	<b>Function Select:</b>	Three position switch controls the test function of the set. In the LEVEL mode, an averaging detector and flat response are selected. The measured value is displayed in dBm. In the NOISE mode, a RMS detector and a shaping filter are selected. The measured value is displayed in dBm. NOTCH NOISE is measured with a RMS detector, a shaping filter, plus a 1010 Hz band elimination filter. The measured value is shown in dBm.
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Note: The displays are blanked when TRMT and either NOISE mode are selected simultaneously. This does not mute the transmitter if an active mode is selected.

	Receiver	
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5	<b>Filters:</b>	This two-position switch selects either a complex noise weighting filter (WGTD, switch out), or a simple low-pass network (FLAT). The exact form of filter selected is dependent on the position of the bandwidth select switch located just above it. If 4 kHz (VF) is selected, the filters are C-MESSAGE and 3-kHz FLAT respectively. If 20-kHz (PROG) is selected, the filters are PROGRAM and 15-kHz FLAT.
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6	<b>Volume:</b>	Controls the volume of the monitor speaker. This is derived directly from the measuring circuits, thus, is controlled by the AGC and is switched to either the receiver or the transmitter under control of the FUNCTION switch.
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### Transmitter

7 **Oscillator:** Three oscillator modes are provided. The 1004 position of the switch selects a standard 1004 Hz test tone; the QUIET position mutes the transmitter but retains the line termination; the OSC mode selects a variable frequency generator.

8 **Band:** The bandwidth select switch controls the frequency range of the TUNE control and the available noise filter group. In the 4-kHz (VF) position, (switch out) the frequency range is 50 Hz to 4 kHz. In the 20-kHz (PROG) position the frequency range is 250 Hz to 20 kHz.

9 **Tune:** Continuously variable control is used to tune the generator to the desired frequency. This control is active when the oscillator control is in the OSC position.

10 **Level:** Continuously variable control sets the generator output level.

### Line Interface

11 **Receiver Termination:** Selects either a TERM (switch out) or a BRDG condition for the RECEIVE line. The bridging impedance of the 701A is approximately 25k Ohms.

12 **Impedance:** Selects either 600 (switch out) or 900 Ohms as the impedance for both the receiver and the transmitter.

13 **Dial Control:** This two-position switch is used to swap the measuring circuits and generator behind the line interface jacks. The normal position is MEASURE which configures the test set in a conventional mode. In the off-normal position, (X), the RECEIVE jack is switched to the oscillator.

14 **Hold:** An electronic holding circuit, set to draw 20 mA, is connected to the RECEIVE jack when this switch is in the HOLD position.

15 **Dial Jack:** The Tip/Ring connections of this jack are wired to the RECEIVE jack. It is used to connect an external tel-set when dialing two-wire lines. All external connections should be removed before any measurements are made.

### Power

16 **Power switch:** The set is operated from AC power and a small charging current is applied to the internal batteries when this switch is in the AC position. No charge is applied to the batteries in the BATT position. A full charging current is applied when the switch is in the OFF position and the set is attached to an AC power source.

## 2.2 Rear Panel Description

The rear panel contains only an AC power connector. This may be set for either 115 or 230 VAC. A 250 mA fuse is used for 115 VAC operation.

### 2.3 710B Controls and Indicators

The front panel of a 710B Network Access Unit is shown in Figure 2. The following description groups the controls and indicators as follows: Setup, Supervision, Interface section, and Power.

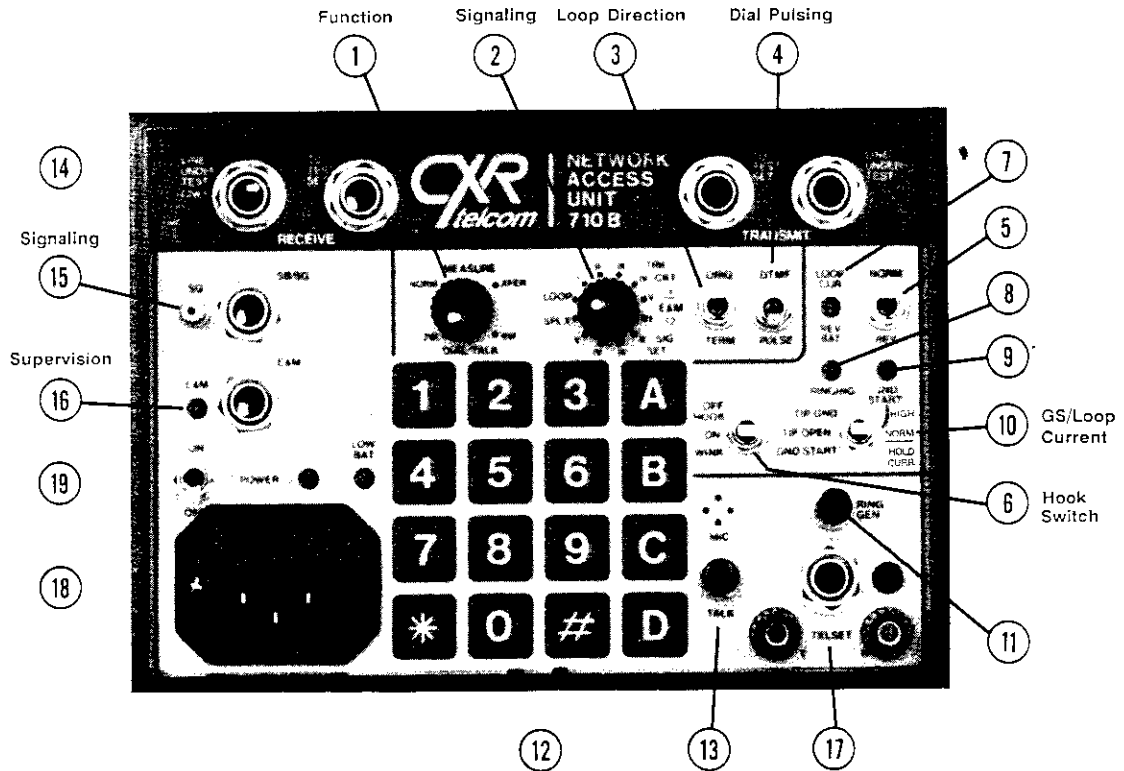


Figure 2. 710B Network Access Unit

Reference	Name	Function
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#### Setup Controls

1 **Function switch:** The DIAL/TALK positions enable the VF functions of the 710B; the MEASURE positions cut the Line pairs thru to the 701A for testing. In the NORM setting, a 2-wire line (LUT) is connected to the Receive jack of the associated test set; in the XFER position it is switched to the Transmit jack.

2 **Signaling type:** This switch is used to setup the signaling options:

- Loop signaling - ordinary 2-wire C.O. line.
- Simplex signaling - loop signaling on a special service 4-wire C.O. circuit.
- E & M signaling, Trunk - emulates a trunk circuit of a switch. The M-lead transmits signaling and the E-lead receives signaling.
- E & M signaling, Signaling Set - emulates a signaling set associated with a facility. E & M signaling is available in all five standard configurations.

3       **Loop direction:** In the ORIGINATE configuration, the 710B functions as station equipment (it can originate dialing). In the TERMINATE mode, it emulates network equipment (supplies battery). Both modes are available for Loop but only ORIGINATE is active in the Simplex configuration.

4       **Dial pulsing:** Either standard DTMF tone dialing or dial pulsing is available. This function is fully active when the unit is configured for Loop or Simplex and Originating mode. Tone signaling is available at all times.

### Supervision Controls and Indicators

5       **Battery polarity:** In the NORMAL position, negative battery is applied to the Ring lead. This is limited to 23 mA and is active only in the Terminate / Loop mode. Battery may be reversed to simulate answer supervision on a loop-dial trunk.

6       **Hook-switch:** OFF-HOOK initiates a seizure towards a switch line circuit or on an E & M trunk. ON-HOOK releases a call. The WINK (momentary) position simulates a start-dial signal when the set is used in a Terminate mode. It consists of a 200 msec E-lead Off-hook or battery reversal, depending on the configuration.

7       **Loop Current indicator:** Tri-state LED shows Red for normal loop current and Green for reversed battery (Originate mode). Current flow through the LED illuminates it, thus, approximately 10 mA must flow for a visible indication.

8       **Ring indicator:** LED indicator shows the presence of ringing voltage on the loop. The threshold is approximately 70 VAC.

9       **Ground Start indicator:** Monitors the Ring lead for ground, i.e. differential current in Tip and Ring leads. Active in Loop / Terminate mode.

10       **Ground Start and Holding Current control:** This switch has two distinct functions. In the Originate mode, it controls the holding current at either 20 mA (NORM), or 26 mA (HIGH). It is also used to initiate a call on a ground-start circuit by placing a ground (momentary) on the ring lead. In the Terminate mode, the switch controls the tip lead connection. TIP GND is the normal position, TIP OPEN is used at the beginning of a call sequence on a ground-start circuit.

11       **Ring Generator:** Applies 20 Hz ringing voltage to the loop (Loop / Terminate mode). Sufficient power to drive a REN 3 load is available.

12       **Dial pad:** Conventional dial pad plus A,B,C,D tones are provided. (The latter are not used in network testing.) Pulse dialing uses only the numbers, 0 thru 9.

13       **Talk:** Push to talk feature is active in all modes. Speech is picked up by internal microphone and coupled to line under test. Listen feature is provided by associated transmission test set.



### Interface Section

14 **Line jacks:** Line jacks are wired T/R/S and are compatible with 310-type telephone plugs. During testing, the network access line is connected to the Line Under Test jacks and the transmission test set is connected to the Test Set jacks

15 **Signaling jacks:** These jacks are wired as follows:

Tip/Ring: E/M and SG/SB

Signaling ground may be provided to the unit via the SG lead (Tip) or the SG terminal. If the SG/SB jack is not in use, the third wire on the AC connector is automatically connected to the internal ground via the normally-closed contacts.

16 **E/M indicator:** This red LED shows the status of incoming signaling. ON = off-hook, and OFF = on-hook. (For the Trunk Circuit mode, the M-lead is monitored; for the Signaling Set mode, the E-lead is monitored.)

17 **Telset connection:** The Tip and Ring leads of the LUT (2W) jack are connected directly to this jack and also to the T/R terminals. This feature is used for monitoring with a butt-set.

### Power

18 **Power connector:** The front panel AC connector fits a standard instrument power cord. The 710B is designed for operation from 115 VAC, 60 Hz. The internal batteries are being charged when the unit is connected to AC power and the power switch is OFF.

19 **Power indicator:** This red LED is ON whenever the power switch is turned on, even if external AC is not connected.

**Low Battery:** Indicates that battery is exhausted when illuminated.

**Note:** Some functions (ringing generator, Loop Terminate mode, Simplex operation, and E & M signaling) operate with AC power only.

2.4 Functional Description

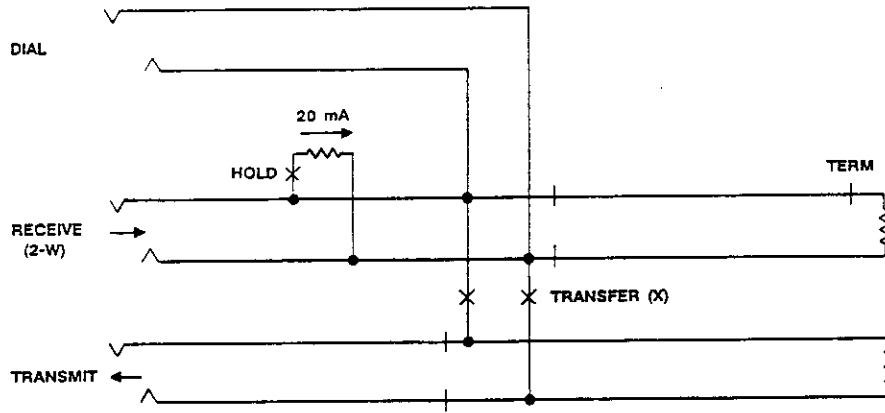


Figure 3. 701A Line Interface

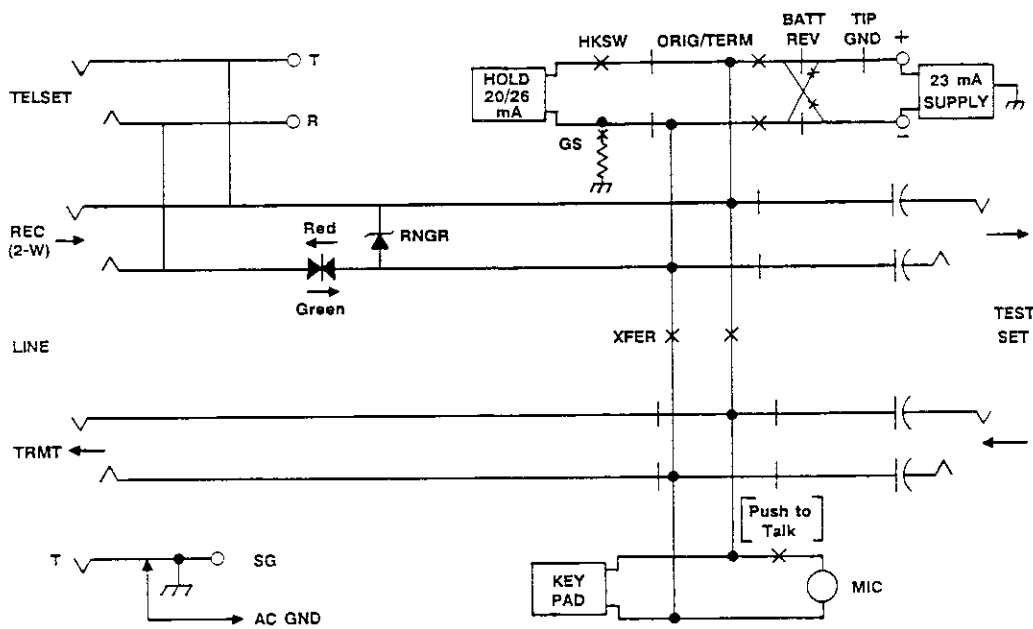


Figure 4. 710B Loop Function

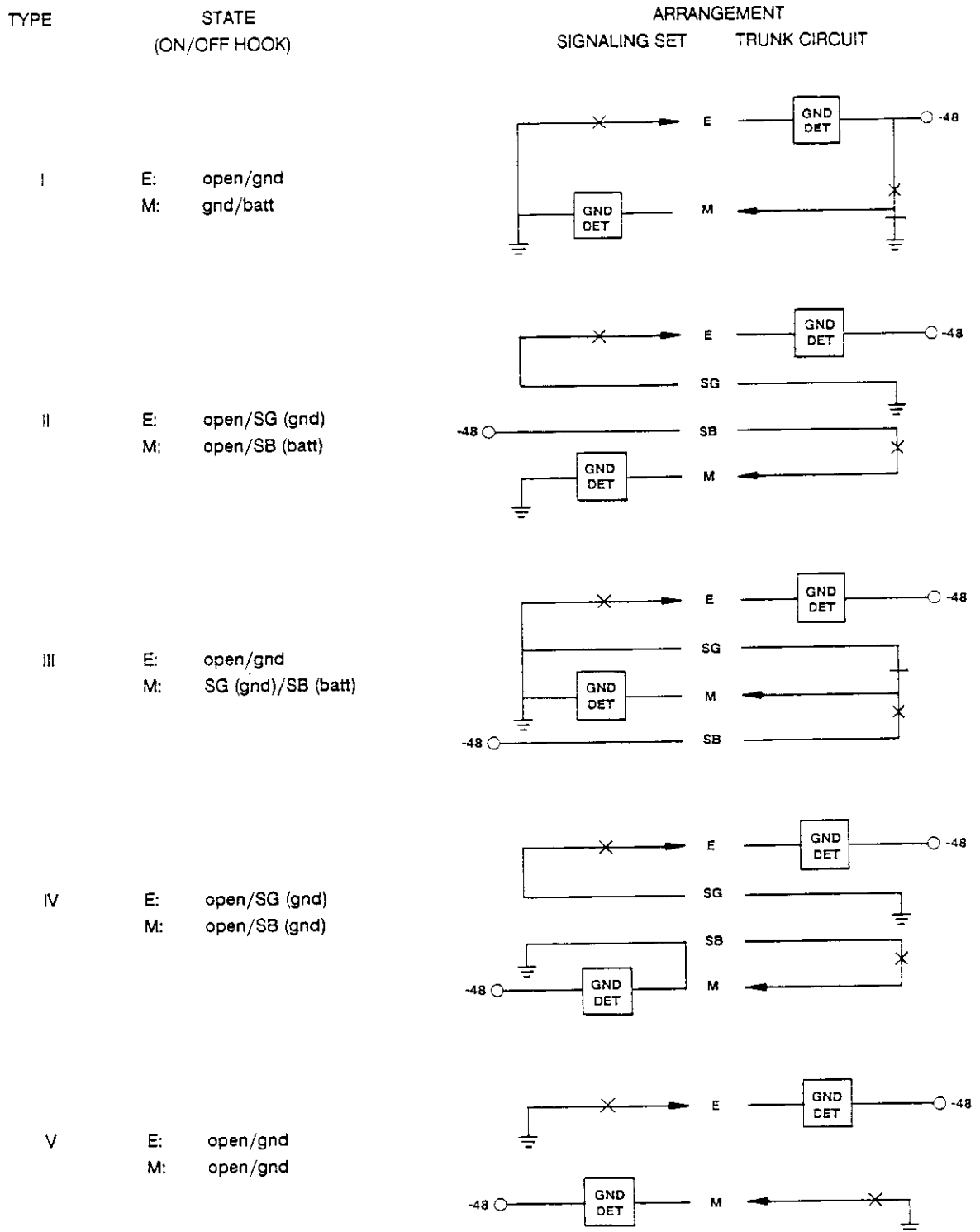


Figure 5. E & M Signaling

## SECTION 3 - TRANSMISSION LINE MEASUREMENTS

### 3.1 Connecting Line Under Test to Test Set

Preset test set switches as follows:

Display	TRMT
Function	LEVEL
Oscillator	1004
Level	Transmit test tone level
Dial	MEASURE
Hold	OFF

Impedance, Receiver Termination, Frequency Band, and Filter to match line.

Connect the RECEIVE and TRANSMIT jacks to the line to be tested. Two-wire lines are connected to the RECEIVE jack only.

To dial a test number on a two-wire line, proceed as follows:

- 1) Connect a telephone-set (butt-in) to the Dial jack. Set the Dial switch to the "X" (Transfer) position.
- 2) Seize the line, monitor for dial tone, and dial the telephone number.
- 3) When the test line answers, set the Hold switch ON and remove the telset to avoid double terminating the line.
- 4) Set the Dial switch to MEASURE to make receive measurements.
- 5) Place the Dial switch in the "X" position to send tone to the distant end. (This reverses the direction of the test without disconnecting the circuit).

### 3.2 Loss Measurement

#### *APPLICATION NOTE*

Loss is normally the first measurement made on an analog channel. If this parameter is not within specifications, it is likely that other parameters will also be out of tolerance. The test is made by transmitting a 1004 Hz tone at one end of the channel and measuring the signal level at the other end. Circuit loss is calculated by subtracting the measured level (dBm) from the Test Level Point and is stated in dB.

#### Setting the Transmitter

- 1) Select TRMT Displays and LEVEL Function.
- 2) Set the Oscillator control to 1004.
- 3) Adjust the LEVEL to test tone level. For general use, 0 dBm is used frequently; data lines are always tested at -13 dBm0.

#### Measuring Loss

- 1) Select RCV Displays and the LEVEL Function.
- 2) Verify that the received frequency is 1004 Hz.
- 3) Read the received signal level in "dBm".
- 4) Correct receive level to "0" TLP and subtract from corrected transmit level.

Loss measurement example.

a) Transmit level	-13 dBm	
b) Transmit TLP	0	
c) Corrected transmit level		-13 dBm0
d) Received level	-15 dBm	
e) Receive TLP	0	
f) Corrected receive level		-15 dBm0
g) Loss		2 dB

### 3.3 Attenuation Distortion

#### *APPLICATION NOTE*

Attenuation Distortion is a measure of the variation in loss versus the frequency of a channel. For a VF line, this variation is referenced to the loss at 1004 Hz. Readings may be taken at only two additional points (404 and 2804 Hz) or at 100 Hz increments across the band. The abbreviated form is described as the GAIN-SLOPE test.

#### Setting the Transmitter

- 1) Set the Transmitter to make a loss test (section 3.2).
- 2) After the loss at 1004 Hz has been measured, select OSC and TUNE the oscillator to the lowest frequency at which the attenuation distortion is to be measured.
- 3) When this measurement has been completed, TUNE to the next highest frequency. Continue this process until the entire bandwidth has been covered.

#### Measuring Attenuation Distortion

- 1) Set the Function control to LEVEL and Displays to RCV.
- 2) Verify that the received signal is 1004 Hz and read level in dBm. This is the reference value for subsequent readings.
- 3) Read level when the next frequency is received. Subtract this reading from the reference value to obtain attenuation distortion at this frequency. More loss is (+) attenuation distortion, less loss is (-) distortion.

Example:	<u>Frequency</u>	<u>Level</u>	<u>Distortion</u>
	1004	-12.0	REF
	404	-13.2	+ 1.2
	2804	-15.0	+ 3.0

### 3.4 Idle Noise Measurement

#### *APPLICATION NOTE*

Background noise measurements determine the amount of unwanted signal introduced by the transmission facility on a channel. Noise can be caused by nonlinearities in amplifiers, induction from power lines, crosstalk in multiplexing systems, cable, or wiring, various switching and signaling transients, and noisy power supplies.

Two different noise filters are available to weight the noise reading. The C-Message filter shapes the response to correspond to the subjective effect of noise. The 3-kHz Flat filter has no attenuation at the low frequency end, thus, is ideal for measuring power influence.

#### Setting the Transmitter

Idle channel noise is measured with the transmit end of the circuit terminated.

- 1) Set the Oscillator switch to QUIET.

#### Measuring Idle Channel Noise

- 1) Set the Function switch to NOISE and the Displays switch to RCV.
- 2) Select the C-Message noise filter. Read noise in dBrnC.
- 3) Select the 3-kHz Flat noise filter and read noise.
- 4) Monitor the nature of the noise, using the internal speaker.

If the two readings are similar, the noise is predominantly in the voice frequency range. If the Flat reading is considerably higher, power line induction may be the predominant source of noise.

### 3.5 Notched Noise (Noise with Tone) Measurement

#### *APPLICATION NOTE*

A 1004 Hz holding tone is applied to a channel under test in order to simulate actual working conditions. Such a test tone may be necessary to hold companders at the normal operating point and to measure quantizing distortion noise on PCM channels. The tone is notched out by a narrow band-elimination filter in the receiver prior to making a weighted noise level measurement.

The noise-with-tone measurement is normally converted into signal to noise ratio (S/N) in order to determine if the channel meets transmission requirements. This is a simple matter of converting the units (dBrnC to dBm) and algebraically subtracting this value from the test tone level. For example, if the noise-with-tone reading is 57 dBrnC with a tone level of -4 dBm, then:

$$S/N = -4 - (57 - 90) = 29 \text{ dB}$$

### Setting the Transmitter

- 1) Set the Oscillator control to the 1004 position.
- 2) Adjust the Level to test tone level.

### Measuring Notch Noise

- 1) Select the LEVEL mode and RCV display. Verify that 1004 Hz is being received and measure the level in dBm.
- 2) Select the NOTCH NOISE mode with the C-Notch noise filter. Read the noise in dBrn.
- 3) Convert the noise value into dBm by subtracting dBrn from 90. Subtract this result from the tone level (dBm) to obtain S/N (dB).

## 3.6 Noise-to-Ground Measurement

The model 700A Noise-to-Ground Adapter is required in order to make a noise-to-ground measurement with the 701A test set.

### *APPLICATION NOTE*

Noise-to-ground measures the amount of common mode interference which is present on a channel. Such common mode noise will be converted to metallic noise if there is any unbalance between the two leads and ground. This test is useful in locating the cause of excessive noise on a channel, especially on a metallic facility.

### Setting the Transmitter

- 1) Set the Oscillator control to QUIET.

### Measuring Noise-to-Ground

- 1) Connect a test cable to the line under test. This cable must have a ground lead which should be connected to frame ground.
- 2) Plug the other end of the test cable into the 700A input jack.
- 3) Insert the 700A plug into the 701A RECEIVE jack.
- 4) Set the impedance switches on both units to the same value, typically 900 Ohms. The 701A receiver must also be in the BRDG mode.
- 5) Select NOISE mode, RCV display, and the FLAT weighted filter.
- 6) Read noise (dBrn) and add 40 to obtain the true noise-to-ground value in dBrn.

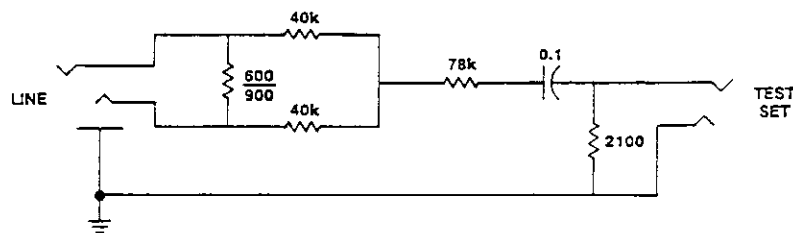


Figure 6. Noise-to-Ground Adapter

## SECTION 4 - NETWORK ACCESS PROCEDURES

The 710B Network Access Unit may be used with the following types of lines:

Loop Start or Ground Start (LS/GS) C.O. lines  
 Direct Inward Dial (DID) lines  
 Trunks with E & M signaling

### 4.1 LS/GS, Emulating CPE (Equipment)

In this arrangement, the 710B acts as a telephone or PABX trunk circuit. AC power is required to operate in Simplex mode. Preset switches as follows:

Function	DIAL, 2 or 4 wire
Signaling	LOOP (2W) or SPLX (4W)
Loop direction	ORIG
Dial pulsing	DTMF or DP
Loop voltage	not used
Hook-switch	ON HOOK
GS/loop current	NORM

Connect the 710B to the test set and to the line to be tested. **The 710B must be grounded properly, via the SB lead/terminal or by the AC line, for accessing a ground start line.**

Turn power ON; the POWER indicator should be illuminated. All Loop (2W) tests in this group can be done using the internal rechargeable batteries.

#### Outgoing Call

- 1) Place the hook-switch in the OFF-HOOK position. A Loop Current (red) indication shows that the loop-start line has been seized.  
 To seize a ground-start line, depress the Loop current switch to the GND START position momentarily. This places a resistance ground on the Ring lead.
- 2) If the line cannot be seized, place the loop current switch in the HIGH position. This raises the holding current from 20 mA to 26 mA.
- 3) Dial the test number and use the speaker in the TTS to monitor call progress.
- 4) If the C.O. provides answer supervision to the CPE, the Loop Current indicator will turn green to show reversed battery.
- 5) Place the function switch in the MEASURE/NORM position and proceed with testing. A two-wire line can be swapped from the Receiver to the Transmitter using the XFER position.
- 6) A dialed connection may be terminated by placing the hook-switch in the ON-HOOK position.

#### Incoming Call

- 1) Initiate a call to the line which is connected to the 710B.
- 2) The RINGING indicator illuminates during the ringing cycle. (The 710B does not monitor for Tip ground, which is provided by a ground-start line circuit.)
- 3) Answer the call by placing the hook-switch in the OFF-HOOK position.
- 4) Testing may proceed with the function switch in the MEASURE position.



#### 4.2 LS/GS, emulating C.O. (Line Circuit)

The 710B takes the place of the C.O., or other equipment, line circuit in this arrangement. Preset switches as shown. (Controls not listed are not used in this mode).

Function	DIAL, 2W	
Signaling	LOOP (2W only)	
Loop direction	TERM	
Loop battery	NORM	
GS/hold current	LS: TIP GND.	GS: TIP OPEN

Connect the 710B to the test set and to the line to be tested. A proper ground is necessary for testing ground start circuits.

##### Outgoing Call (CPE to Network)

- 1) Operate the ground start control at a GS station. The GND START indicator on the 710B lights.
- 2) Switch GS to TIP GND. This extinguishes the light.
- 3) Condition the station equipment to off-hook. This will draw loop current from the 710B, thus illuminating the Loop Current indicator (green).
- 4) Set the loop battery to REVERSE. The station equipment should recognize this as answer supervision.
- 5) Select MEASURE/NORM to conduct transmission testing using the attached TTS. If this set does not have a port transfer function, use the MEASURE/XFER position to transmit on a 2-wire connection.

##### Incoming call (Network to CPE)

- 1) Set the GS switch to TIP GND. The station equipment should recognize this as a line seizure.
- 2) Operate the Ring Generator key on the 710B to simulate ringing.
- 3) The Loop Current indicator will light (green) when the station answers the call.
- 4) Set the Function switch to MEASURE and proceed with transmission testing.

### 4.3 Direct Inward Dialing Trunk

DID trunks tie a PBX into the national numbering plan since stations are dialed directly from outside. Such trunks are one-way, incoming to the PBX, thus, are virtually identical to Loop start lines except reversed in direction.

#### Emulate PBX

- 1) Preset switches as listed in section 4.2 (emulate Line Circuit, loop-start mode).
- 2) Seize trunk at C.O. end. Loop current indicator lights red to show normal current flow.
- 3) Send WINK to simulate start dial signal.
- 4) Set Loop polarity switch to REVERSE to simulate answer supervision.
- 5) Set the function switch to MEASURE and proceed with transmission testing.

#### Emulate C.O. Switch

- 1) Preset switches as listed in section 4.1 (emulate Station Equipment, loop-start mode).
- 2) Place the hook-switch in the OFF HOOK position. The loop current indicator lights red to show normal loop current.
- 3) Observe the momentary REVERSE battery signal (green) to show "wink" from PBX end.
- 4) Dial test number.
- 5) Observe answer supervision signal (green loop current indication).
- 6) Set function switch to MEASURE and proceed with transmission testing.

#### 4.4 E & M Signaling

E & M signaling provides full-capability unidirectional signaling on tie trunks between PBX's. Of the five different arrangements shown in Figure 5, type I is the most common. Preset switches as follows:

Function	DIAL/TALK
Signaling	TRK CKT to emulate a switch, or SIG SET to emulate a facility terminal.
Dial Pulsing	Type I, II, III, IV, V to match trunk
Hook-switch	As required ON HOOK

Connect the line and the test set to the 710B. Connect signaling jacks as required.

##### Outgoing Call

- 1) Initiate a call from the 710B by placing the hook-switch OFF HOOK.
- 2) Monitor the supervision light for far-end dial control (wink or stop-dial).
- 3) Dial the test number. The E & M supervision lamp will light to show answer supervision.
- 4) Set Function switch to MEASURE and proceed with transmission testing.

##### Incoming Call

- 1) Monitor the E & M supervision light to show a seizure.
- 2) Operate the WINK switch if the trunk is set for wink-dial. This must be completed within one second of seizure.
- 3) Incoming pulsing may be observed (E/M) or heard on the test set speaker.
- 4) Select OFF HOOK to answer the call.
- 5) Proceed with transmission testing.

Note: Signaling send and receive functions are associated with the E & M leads respectively when the unit is configured as a Signaling Set. The functions are reversed when the unit is set up as a Trunk Circuit.

## SECTION 5 - SPECIFICATIONS

## 5.1 701A Transmission Test Set

Transmitter	
Frequency	50 Hz to 20 kHz, in two ranges, VF: 50 Hz to 4 kHz; PROG: 250 Hz to 20 kHz
Fixed Frequency	1004 Hz
Output level	-40 to +13 dBm
Distortion	<-50 dB, 200 to 4000 Hz; <-40 dB, other frequencies
Level Measurement	
Range	-50 to +13 dBm
Accuracy	0.1 dB, 1004 Hz -19 to 0 dBm 0.2 dB, 200 Hz to 15kHz 0.5 dB, <200 Hz and > 15 kHz
Resolution	0.1 dB
Detector	averaging
Frequency Measurement	
Range	50 Hz to 20 kHz
Level range	-50 to +13 dBm
Resolution	1 Hz, VF mode; 10 Hz, PROG mode
Noise Measurement	
Modes	Idle line, Notched
Filters	C-Message, 3-kHz Flat, Program, 15-kHz Flat
Notch filter	-50 dB, 995 to 1025 Hz
Range	10 to 99 dBrn
Resolution	1 dB
Accuracy	1 dB, 20 to 90 dBrn
Detector	quasi-RMS
Noise-to-Ground Measurement (700A Adapter)	
Range	50 to 130 dBrn
Accuracy	1.5 dB
Impedance	100k Ohm, lead to ground
Line Interface	
Impedance	600, 900 Ohms
Bridging	>25k Ohms
Balance	90 dB at 50 Hz, decreasing 20 dB per decade
Hold current	20 mA
Environmental	
Operate temp.	0 to 50°C
Storage temp.	-25 to +75°C
Relative humidity	0 to 90%, non-condensing
General	
Size	5" x 7" x 12"
Weight	9.2 lbs.
Power	115/230 VAC, 50/60 Hz
Recharge time	Internal NiCd batteries, 6 hour (typical) capacity approximately 8 hours

**5.2 710A Network Access Unit**

Interface	
Loop signaling	2-wire, T/R 4-wire, simplex A/B leads derived from T/R AND T1/R1
E & M signaling	Types I - V
Supervision	
Loop	Loop start; ground start Originate or Terminate dialing
E & M	Trunk circuit; signaling set
Dialing	
Type	DTMF and pulse
Pulse rate	10 pps, 60% break, 840 msec IDT
DTMF	Standard tone pairs
Keypad	DP; 0 - 9 DTMF; 0 - 9, *, #, A - D
Station Equipment Emulation	
Holding current	Electronic control, 20 and 26 mA
Line Circuit Emulation	
Loop battery	Electronic control, 23 mA
Polarity	NORM: Ring (-) REV: Tip (-)
Ring generator	20 Hz; 70 VAC; REN 3
Trunk Signaling	
E & M supervision	- 22 = BATTERY
Wink	200 msec
General	
Size	5.1 x 7 x 2.2 inches
Weight	2.8 pounds
Battery	NiCd
Recharge time	approximately 8 hours

All specifications are subject to change.

## WARRANTY

*Products manufactured by CXR Telcom Corporation are guaranteed to be free of defects in materials and workmanship for a period of two years from the date of shipment. CXR Telcom will accept returned items, transportation prepaid to the service center, for repair during the warranty period at no cost to the customer, provided that the products have not been subjected to improper installation, accident, misuse, neglect, or unauthorized alterations.*

### Certification

CXR Telcom Corporation certifies that all instruments are thoroughly tested and inspected and found to meet published specifications when shipped from the factory.

### Inspection

All products manufactured by CXR Telcom are carefully inspected and thoroughly tested prior to shipment. Modern packaging techniques are used to prevent damage during shipment. If goods are received in a damaged condition, A CLAIM SHOULD BE FILED WITH THE TERMINATING CARRIER IMMEDIATELY. Normally, the carrier will want to inspect the shipping carton and packing materials.

### Repair Service

If equipment does not operate properly when tested in accordance with the instructions, it should be returned to an authorized service center for repair. **Call or write Customer Service for a Return Material Authorization prior to shipping any equipment to the factory.** When returning equipment for repair, utmost care should be taken to avoid shipping damage. If available, use the original cartons and packing material. Shipping charges should be prepaid.

If the equipment is covered by warranty, it will be repaired free of charge or replaced, at the Company's option, and returned prepaid. Unauthorized field repairs or modifications will invalidate the warranty.

For out-of-warranty repair work, Customer Service will provide a quotation for repair charges first, unless the shipment is accompanied by a purchase order. Repair work will be performed after authorization to proceed (in the form of a purchase order) is received.

### Service Centers

CXR TELCOM  
47971 FREMONT BLVD.  
FREMONT, CA. 94538  
TEL. (800) 537-5762  
FAX (510) 353-9186

CXR TELCOM  
47971 FREMONT BLVD.  
FREMONT, CA. 94538-6502  
TEL. (800) 537-5762  
FAX (510) 353-9186