

NO. 3 ESS
SYSTEM VERIFICATION
TRUNK AND LINE TEST PANEL
(TLTP)
GENERAL INFORMATION AND
OPERATING PROCEDURES

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1. GENERAL INFORMATION

1.1 Purpose

The purpose of this section is to describe the functions and operating procedures for using the Trunk and Line Test Panel (TLTP) to make various tests in the No. 3 ESS office.

1.2 Description of Objectives

1.21 The TLTP is designed as a manual testing facility for trunks, service circuits, lines, junctor circuits and tone and announcement circuits. It provides semi-manual facilities for:

- A. Operational and transmission tests of trunks and service circuits
- B. Leakage and continuity checks on lines and trunks
- C. Complete functional testing of subscribers' lines
- D. Transmission checks on subscribers' lines and PBX-type trunks

E. Removal of trunk circuits and service circuits from service and restoral to service under key control

F. Voice communications via private lines and regular telephone channels to other points within the No. 3 FSS office and to distant offices

G. Removal of peripheral decoder (PD) board from service under key control.

1.22 Jacks are provided for connecting any external test equipment which may be necessary to either or both of the two access trunks since only the voltmeter is required test equipment on the frame. The optional test equipment is supplied at the discretion of the operating company and space is provided on the frame for mounting the gear.

1.23 The TLTP circuit has appearance at the network via dedicated access trunks. There are two access trunks which provide switched (through the network) access to the circuits to be tested and key-controlled access to the test panel test facilities

(Figures 1 and 2). Originating and terminating services can be provided using the access trunks. Audible indication is provided via a ringer for incoming calls. A communication line is for use as a telephone line circuit. The test verticals are used for network access when performing junctor test.

2. SYSTEM CONNECTION

2.1 Testing cannot be performed from the TLTP until the TLTP software program is loaded. The TLTP program is nonresident and must be loaded into the system from the tape (magnetic) cartridge. The ON key on the TLTP is used to indicate to the system the request to load the TLTP software program. The purpose of the the TLTP software program is to provide the necessary interface between the TLTP and the circuit to be tested. The software recognizes originations from the TLTP and causes appropriate action.

2.2 To initiate a connection between the TLTP and a circuit to be tested, the ON key on the TLTP is first operated to request loading of the TLTP program (once loaded, reoperation of the ON key will allow a new program to

override the TLTP program in the buffer area). The ON lamp indicates the program loading status according to the following lamp states:

60 ipm (interruptions per minute) -- Loading request accepted by multiscan function control, program being loaded.

120 ipm -- Loading request denied by multiscan function control because system is too busy or a higher priority program is being run at the time of request.

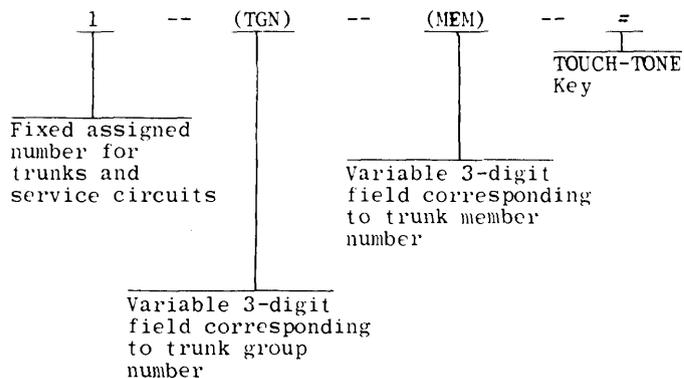
Steady -- Program has been loaded.

2.3 After the program has been loaded, the desired access trunk is connected to the network by depressing the ACCESS TRUNK 1 or ACCESS TRUNK 2 key.

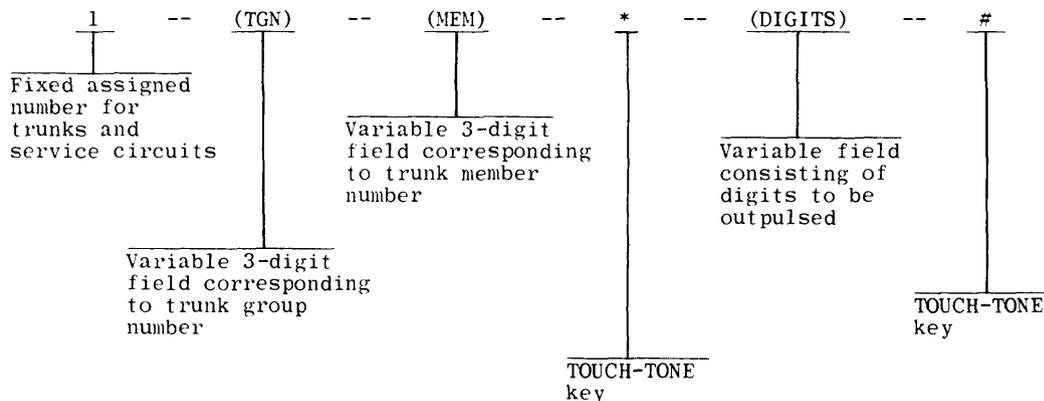
2.4 An origination is entered into the system by lifting the handset off-hook or inserting a headset into the transfer jack. The system recognizes an origination by providing dial tone on the selected access trunk. The TOUCH-TONE dial is then used to obtain the desired service, junctor, trunk, or line circuit by dialing assigned dial codes as follows:

TRUNKS, TESTS, AND SERVICE CIRCUITS

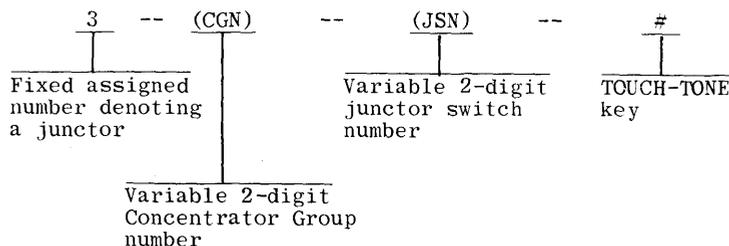
(a) Request



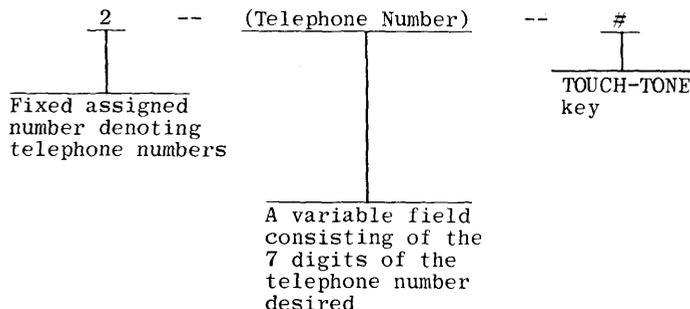
(b) Outpulsing



JUNCTORS



TELEPHONE NUMBERS (LINES)



NOTE: Parenthetical portions of the assigned dial codes vary depending on the trunk group number, member number, and/or digits to be dialed or outpulsed. All parenthetical options are to be entered in digital format. Nonparenthetical fields must be entered exactly as shown and consist of both digits and letters.

2.5 The PROGRESS OR ERROR lamp indicates the call progress per the following lamp states:

- Steady -- Request successfully completed.
- Momentarily Off -- Request has been recognized.
- 60 ipm -- Error in attempting to perform a valid request.
- 120 ipm -- Error in input information.

2.6 The EQUIPMENT STATUS (1 or 2) lamp indicates the state of the selected circuit when the initial connection is made between the circuit and the TLTP. The lamp states are:

- Steady -- Selected circuit was in idle state and successful connection was established.
- 60 ipm -- Selected circuit was busy (traffic busy). No connection was established.
- 120 ipm -- Selected circuit was out-of-service (maintenance busy). Successful connection was established.

2.7 Once a successful connection is established, the telephone set should be placed on-hook (or the headset disconnected). The access trunk is thus connected to the circuitry to be tested, and the desired test can be performed by operating the appropriate key on the TLTP.

2.8 In the event the second port is to be set up also, the HOLD key should be operated prior to placing the telephone set on-hook (or disconnecting the headset). The HOLD lamp will light and the ACCESS TRUNK (1 or 2) lamp will flash at 30 ipm to indicate an access trunk or communication line is on hold.

3. TEST SELECT CONTROL

3.1 Operation of the following keys will connect the equipment specified to the Access Trunks:

- BALANCE 1 or 2 - places a balanced termination across the tip and ring leads of the specified access trunk.
- VM 1 or 2 - connects the voltmeter to the specified access trunks and enables the controls on the voltmeter itself.

TRMT 1 or 2 - connects the Transmission Measuring Set (if equipped) to the specified access trunk.

MONITOR 1 or 2 - bridges the specified access trunk onto a busy connection.

4. TRANSMISSION MEASURING TESTS AND CONTROLS

4.1 General

4.11 The TLTP has the capacity to apply open and short circuit termination, send a milliwatt signal, or receive a milliwatt signal on both access trunks. Although the E and M leads are not monitored, transmission tests can be made from the TLTP. Outgoing trunk loss will be measured using a milliwatt tone supply. Individual trunks are tested for excessive signal loss as compared to the normal loss.

4.2 Calibration

4.21 Depressing the CAL key causes the Transmission Measuring Set (if equipped) to be connected directly to the Milli-Distributing Circuit of 0 dBm, allowing the test equipment to be calibrated.

4.22 The REVERSE ACCESS TRUNKS key causes the tip and ring leads of AT1 to be interchanged with the tip and ring leads of AT2.

4.3 Jacks

Jacks TM1 and TM2 are used to connect external test equipment to the access trunks via the TLTP. When a plug is inserted into the jack, the access trunk is disconnected from the test measuring set, test sets plugged into these jacks are connected through isolation capacitors. These capacitors isolate any dc voltage on the access trunk from the test set.

4.4 Trunk Terminations

4.41 BALANCE (1 or 2) key -- Energizes BAL relay and places a balance termination of 898 ohms and 2.15 microfarad across the access trunks (used to balance hybrid).

4.42 TRMT (1 or 2) (TRANSMIT) key -- Energizes XMS relay and connects selected access trunk to the transmission measuring set (TMS).

4.43 TRMT OPEN key -- Energizes TO relay placing open on access trunk.

4.44 TRMT SHORT key -- Energizes TS relay placing AC short on access trunk.

4.45 DBM key -- Applies DBM (0 or -10) signal on specified access trunk.

4.5 Receiving Tests: A connection is made to the milliwatt test line in the distant office. The TLTP is set up so that the signal returns to the transmission measuring set where the signal loss is measured. With the

TRMT1, TRMT2 keys operated, incoming signals can be measured by the transmission measuring set via access trunk jacks 1 and 2. The incoming signals on the access trunks can be measured by depressing the REVERSE ACCESS TRUNKS key. Releasing the TRMT keys causes the incoming signals to be heard in a headset inserted into the TEL A and TEL B jacks.

4.6 Transmitting Test: A milliwatt tone is supplied from the office over a connection to the distant office. The signal is measured at the distant office on its transmission measuring set to determine signal loss. The transmitted signal (0 or -10 dBm) is developed from the transmission measuring milliwatt distribution circuit. A resistor network provides the attenuation to decrease the 0 dBm level signal to -10 dBm level signal. Operation of either the 0 dBm or -10 dBm key connects the transmission measuring milliwatt distribution circuit to the access trunk 1 with the TRMT1 key operated. The receive part of the TLTP is disconnected from the transmit part (because the RT relay is released). This prevents the receiving test sets from being connected to the access trunk when signals are being transmitted.

4.7 Loop Around Test: Connections from both access trunks are made to the loop around test line in the distant office. The milliwatt tone is sent from the office to the distant office and back to the office through the loop around connection. The total signal loss is then measured at the office transmission measuring set. The receiving loss (office to distant office) can be calculated by subtracting known transmitting loss (distant office to office) from total loss.

To perform the loop around transmission tests, access trunk 1 becomes the sending facility and access trunk 2 becomes the receiving facility. Again selecting either 0 dBm or -10 dBm key puts known signal level onto access trunk 1, with TRMT1 key operated. With TRMT2 key operated, the receive signal is on access trunk 2. Operation of REVERSE ACCESS TRUNKS key permits sending on access trunk 2 and receiving on access trunk 1.

Local lines transmission tests can be performed in the same manner as trunk transmission testing with one change. The LINE TRMSN TEST key is operated to supply battery and ground to the ring and tip leads of the line connected to the transmission measuring set. Line transmission testing is available only on the access trunk 1.

5. VOLTMETER (VM) CONTROL

5.1 General

Depression of the VM (1 or 2) key connects the voltmeter to the circuit under test. Once connected, the voltmeter can test the voltage supply, resistance to ground, capacitance, foreign battery, voltage between tip and ring, short circuits between tip and ring, and line insulation for breakdown at 200 volts.

Operating the VM key energizes the VM relay. When the VM relay operates, the circuit connected to the corresponding access trunk is disconnected from the telephone circuit and connected to the voltmeter circuit.

Operation of the VM relay also enables the MVM, FEMF, 1K and 20K relays through respective keys. These relays are interlocked such that only one of the relays may be operated at a given time. When the respective key is operated, the holding path for a previous energized relay is interrupted (deenergized). This interlock prevents the use of the 1K and 20K ranges when measuring voltages.

5.2 Voltmeter Supply Voltage

With the VMR key operated and the MVM, FEMF, 1K, and 20K keys not operated, the voltmeter supply voltage can be checked.

Ground is connected to the negative meter terminal by operating the VMR key. The supply voltage is determined by the 1K and 20K relays. With both relays released, the level of the +100 volt supply is read by the voltmeter. If either relay is energized, the level of the +20 volt supply is displayed.

5.3 Resistance to Ground

Operation of the VM key connects the ring lead to the voltmeter circuit. (The operation of the TRR key connects the tip lead to the voltmeter circuit. The meter deflection indicates that ground (GRD) or a foreign potential is present on the ring lead under test. If the meter deflects, a foreign potential or ground is present and the foreign battery test is required. If the meter goes to zero during the foreign battery test, ground is present.

5.31 The tip lead is checked for resistance (leakage) to ground by operating the TRR (tip and ring reverse) key which interchanges the tip and ring connections. This test is performed by the connection of the lead (tip or ring) to be tested to the negative meter terminal and +100 volts connected to the other meter terminal. If there is resistance or a foreign potential on the lead under test, a meter deflection will occur.

5.32 Operation of the 1K or 20K key on the voltmeter increases the meter sensitivity for more accurate resistance readings by changing the meter shunt resistance.

5.4 Foreign Battery Test

The foreign battery test is used to determine the magnitude and polarity of the voltage between ground and one of the leads (tip or ring) of the circuit under test. Operation of the FEMF (foreign electromotive force) key tests the ring lead for a negative potential with respect to ground. Operation of the TRR key at this time tests the tip lead for a negative potential. If the direction of the meter deflection is incorrect, the VMR (voltmeter reverse) key can be used to determine the positive voltage of the lead being tested.

With the FEMF relay energized the +120V side of the meter is grounded and the lead to be tested is connected to the negative side of the meter. With this connection the meter reads the magnitude of the voltage on the lead under test which is negative with respect to ground. If the meter

deflection is in the wrong direction, the meter connections are reversed by the operation of the VMR key.

5.5 Test for Voltage Between Tip and Ring

The test for voltage between the tip and ring determines the magnitude and polarity of a voltage between the tip and ring. Operation of the MVM (metallic voltmeter) key tests the ring lead for a negative potential with respect to the tip lead. If the VMR key is operated, the voltmeter tests for a positive potential on the ring with respect to the tip. The tip and ring are thus tested for continuity when battery and ground are supplied by the distant office.

Operation of the MVM relay places the tip lead of the circuit under test to the +120V side of the meter. The ring lead of the circuit under test is connected to the negative side of the meter. With this setup, the meter reads the negative voltage on the ring lead with respect to the tip lead. If the direction of the deflection is wrong, the VMR key is operated to reverse meter connections. This setup reads the positive potential on the ring lead with respect to the tip leads.

5.6 Test for Short Circuit Between Tip and Ring

The test for short circuit between tip and ring examines the tip and ring leads of the external circuit for a short circuit. Operation of the GRD (ground) key is required. If a short circuit exists, the voltmeter shows the same deflection when the VMR key is operated and restored.

The GRD key operation grounds the tip lead and the ring lead is connected to the test voltage (either +20 or +100 depending on range selected) through the meter. The meter current equals the test voltage divided by the sum of the meter resistance and the resistance of the external circuit. This reading approaches the test voltage as the external resistance approaches zero (short circuit). The VMR key is repeatedly operated and released. During operation of the key, the negative terminal of the meter is grounded: this ground path does not include resistance of the external tip and ring circuit which is included when the key is released. During this repeating action on the VMR key, the resistance in the circuit under test is switched in and out of the current path for the meter. If the external resistance is not zero (short circuit), the meter deflection varies with the VMR key position. If the external circuit is a short circuit, no change in deflection occurs.

5.7 Capacitance Test

To determine capacitance, the GRD key is operated. The TRR key is operated after the meter needle comes to rest causing a momentary deflection proportional to the capacitance of the ring lead. Restoring the TRR key causes a momentary deflection proportional to the capacitance on the tip lead. The greater the deflection the greater the capacitance and vice versa.

Operation of the GRD key grounds the tip lead, and the ring lead is connected to +100 volts. The trunk capacitance charges to this 100 volt potential (negative on tip, positive on ring) through a charging resistance of 10K ohms (meter) plus the external circuit resistance. The meter needle stabilizes. operation of the TRR key reverses the tip and ring connections (ring is grounded, tip is at +100V), and the trunk capacitance is charged to this potential. The TRR key is then released and the original voltage polarity (positive ring, negative tip) is placed on the trunk under test. The resulting meter deflections. from the operation of the TRR key, are proportional to the trunk capacitance.

6. LINE TESTS

6.1 Breakdown Test

The breakdown test is a test of line insulation for breakdown at 200 volts. The BT (breakdown test) key is operated. then the LK key is operated. A meter (current) reading will indicate an insulation breakdown. The LK key should be released before the BT key to avoid bell tapping. This test tests the ring lead. To test the tip lead, the TRR key is operated and the test repeated.

Operation of the BT key connects +200 volts through the 120-volt (100,000 ohms) terminals of the meter to the side of the line under test (ring or tip). The high resistance of the meter provides the capability for the line to charge without tapping any ringer bell. When the LK key is operated, the meter is changed to 24 milliamp meter by shunting it with a 1050 ohm resistor. A meter reading will indicate an insulation breakdown.

6.2 +STA, -STA Test

This test is used to check the sets of gas tubes (located in the station ringer) on the line. Operation of the +STA or -STA key applies a voltage to the ring lead that ionizes the station gas tubes (+STA positive, -STA negative) and causes an appreciable meter deflection (one gas tube gives an approximate meter deflection of one-third of full scale). Sets of gas tubes on the tip lead may be checked in the same manner by operation of the TRR key.

6.3 Coin Collect and Return Test

Operation (depression) of the COIN COLLECT key applies coin collect potential to the tip lead. The coin relay should operate and collect the coin. Similarly, operation of the COIN RETURN key applies coin return potential to the coin relay to return coins. If the coin lamp remains lighted while the COIN COLLECTOR COIN RETURN key is operated, the coin is stuck in the coin box.

7. TALK AND MONITOR TESTS

The TALK LINE key is used to provide talking battery to the subscribers' line. This can only be done when the talk line relay is connected to the subscriber line and the junctor is in the

bypass state. Also the talking battery can be connected via the main distributing frame (MDF). MONITOR (1 or 2) keys are used to bridge the associated access trunk onto a busy connection.

The talk function is used in conjunction with the handset or speakerphone or a headset plugged into TEL SFT A and B jacks. The TALK LINE key, when operated, energizes the talk line relay supplying battery and ground to the telephone circuit. The monitor function is also accessible by connecting a headset into the TEL SET A and B jacks. Operation of the MONITOR key energizes the corresponding monitor relay placing the high impedance input of the MONITOR AMPLIFIER across the selected access trunk. The output of the MONITOR AMPLIFIER is connected to the TEL SET A and B jacks when the other relays (T1, T2, T3, and TRFR) are released.

8. STATE CHANGE CONTROL

8.1 General

The state change control circuitry is used to request that the system place a trunk in any of its possible states. The state of the trunk circuit depends on the condition of the state change control relays in that circuit.

8.2 Functions

The ACCESS TRUNK, ASSOCIATED JUNCTOR, AA, BB, CC, and PD TRIPLET switches are set up to select the desired test configuration. When the EXECUTE key is operated, the execute relay is energized and the 3A CC is notified by the scanner that a request is made by the TLTP. The system determines the validity of this request, and if the request is valid, the test setup is made. When the RING key is operated and the PD TRIPLET switch is in the (SPEC RING) position, ringing is requested to be applied to the line connected to the designated access trunk. The STATUS CONTROL lamps indicate the status of the requested action.

9. MISCELLANEOUS

9.1 The TLTP is supplied with the required voltages from the test frame. These voltages are as follows:

-48 volts which is supplied to the test frame from the -48 volt 151A power plant

+130 volts which is supplied to the test frame from the miscellaneous power frame

Test voltages (+20, +100, +116, -116, +200) which are derived from the KS-19412 rectifier located on the test frame. The KS-19412 rectifier receives its input power (115 volt 60 Hz) from the service entrance distribution panel.

10. LAMP AND KEY DEFINITIONS

TRUNK AND LINE TEST PANEL LAMPS AND KEYS

VOLTMETER			
KEY		LAMP	FUNCTION OR INDICATION
DESIGNATION	TYPE	DESIGNATION	
GROUND (GRD)	L	GRD	Puts ground on tip lead of the trunk.
VOLTMETER REVERSE	L	VMR	If VMR nonoperated meter reads negative voltage. If VMR operated, meter reads positive voltage.
TIP AND RING REVERSE (TRR)	L	TRR	Tip and ring reverse to voltmeter circuit. The tip lead of the trunk is checked for leakage resistance to ground.
FOREIGN ELECTROMOTIVE FORCE (FEMF)	L	FEMF	FEMF tests the ring lead for a negative potential with respect to ground.
METALLIC VOLTMETER (MVM)	L	MVM	MVM key tests the ring lead for a negative potential with respect to the tip lead.
1K, 20K	L	1K, 20K	Provides midscale deflection for meter measurements.
		100K	Indicates internal voltmeter resistance.
BREAKDOWN TEST (BT)	L	BT	A test of line insulation for breakdown at 200 volts.
+STATION (+STA)	L	+STA	Positive station gas tube breakdown test.
-STATION (-STA) SPARE (SP)	L	-STA	Negative station gas tube breakdown test.
ACCESS TRUNK CONTROL			
ACCESS TRK	NL	ACCESS TRK	Connects telephone set to network, closes supervision to scanner. Steady - access trunk connected to telephone set. 30 ipm - access trunk placed on hold. 60 ipm - incoming call on access trunk (accompanied by ringing).
HOLD	NL	HOLD	Holds network connection from access trunk or communication line but open connection to telephone set. Indicates an access trunk or the communication link is on hold.
RELEASE	NL		Initiates release of networks connection to access trunk.
COMM LINE	NL	COMM LINE	Connects telephone set to network. Steady - communication line connected to network. 30 ipm - communication line is on hold.
RELEASE COMM LINE	NL		Opens telephone set connection to network.

TRUNK AND LINE TEST PANEL LAMPS AND KEYS (Cont.)

ACCESS TRUNK CONTROL			
KEY		LAMP	FUNCTION OR INDICATION
DESIGNATION	TYPE	DESIGNATION	
FLASH	NL		Sends switchhook flash via network pair.
ACTIVE IDLE	NL	ACTIVE IDLE	Restores associated circuit to service when access trunk is released. (If ACTIVE IDLE key is not depressed the circuit is placed in the state it was in before tests were made.) Indicates request to restore circuit to service.
OUT OF SERVICE	NL	OUT OF SERVICE	Requests that associated circuit be removed from service when access trunk is released. Indicates request to remove circuit from service.
PD GROUP	NL	PD GROUP	Requests that all circuits which share the peripheral decoder board with the circuit connected to the access trunk marked out of service. Indicates request to perform multiple busy function.
TEST SELECT			
BALANCE	L	BALANCE	Connects balance termination to access trunk. Indicates balance termination is connected to access trunk.
TRMT	L	TRMT	Connects associated access trunks to transmission circuitry. Indicates connection of access trunk to transmission circuitry.
VM	L	VM	Connects associated access trunks to voltmeter circuitry. Indicates connection of access trunks to voltmeter circuitry.
MONITOR	L	MONITOR	Connects high-impedance monitor amplifier between circuit under test and associated access trunk via test access vertical. Indicates monitor circuit connected.
LINE TEST			
COIN COLLECT	NL	COIN	Applies coin collect potential via tip lead of access trunk.
COIN RETURN	NL		Applies coin return potential via tip lead of access trunk. Indicates presence of ground on tip lead while COIN COLLECT or COIN RETURN keys are operated.

TRUNK AND LINE TEST PANEL LAMPS AND KEYS (Cont.)

LINE TEST			
KEY		LAMP	FUNCTION OR INDICATION
DESIGNATION	TYPE	DESIGNATION	
ROH	NL		Applies receiver off-hook tone via selected access trunk.
CDF OUT	L	CDF OUT	Connects AT1 appearance to customer cable pair bypassing network. Indicates CDF OUT connections.
CDF IN	L	CDF IN	Connects AT1 appearance to network appearance of customer line (test line ferrod). Indicates CDF IN connections.
TALK LINE	L	TALK LINE	Connects battery to access trunk for talking to called line. Indicates TALK LINE key is operated.
TRANSMISSION TEST			
0 dBm	L	OddBm	Applies 0 dBm signal via access trunk. Indicates 0 dBm key is operated.
-10 dBm	L	-10 dBm	Applies -10 dBm signal via access trunk. Indicates -10 dBm key is operated.
TRMT OPEN	L	TRMT OPEN	Applies open circuit to transmission pair. Indicates TRMT OPEN key is operated.
TRMT SHORT	L	TRMT SHORT	Applies ac short circuit to transmission pair. Indicates TRMT SHORT key is operated.
LINE TRMSN TEST	L	LINE TRMSN TEST	Applies battery and ground to the access trunk l transmission test pair for line transmission testing. Indicates the LINE TRMSN TEST key is operated.
REVERSE ACCESS TRKS	L	REV ACCESS TRKS	Connects milliwatt signal (or TM1 jack) to AT2 and transmission measuring set (or TM2 jack) to AT1, the reverse of normal. Indicates REV ACCESS TRKS key is operated.
CAL	L	CAL	Connects transmission measuring set (or TM2 jack) to milliwatt distribution circuit. Indicates CAL key is operated.

TRUNK AND LINE TEST PANEL LAMPS AND KEYS (Cont.)

STATE CONTROL			
KEY		LAMP	FUNCTION OR INDICATION
DESIGNATION	TYPE	DESIGNATION	
ACCESS TRK 1/2	T		Designates identity of access trunk on which state change, multiple busy, or ringing is to be applied.
ASSOCIATED JUNCTOR	T		Yes - designates that state change is to be applied to junctor circuit associated with the access trunk designated by the position of ACCESS TRUNK 1/2 switch.
A.B.C	T		When EXEC key is operated, designates states in which a triplet of state relays are to be placed. When RING key is operated and PD GROUP switch in SPECIFIED RING position - designates ringing combination to be applied to line.
		GROUP BUSY	Indicates denial of request to remove circuit from service since excessive number of circuits in group would be out of service.
EXECUTE	NL		Indicates that a state change is to be applied to a circuit on the access trunk designated by the ACCESS TRUNK 1/2 switch.
		EXECUTE	Indicates request has been entered to apply state change to a circuit.
RING	NL		Indicates that ringing is to be applied to line connected to the access trunk designated by the ACCESS TRUNK 1/2 switch.
		RING	Indicates that request has been entered to apply ringing to a line.
PD TRIPLET	RSW		When EXEC is operated: ABC, DEF, GHI, JKL designate triplet of state relays in circuit to which state change applies. When RING key is operated: SPECIFIED RING designates that ringing combination is set on ABC Switches. Not SPECIFIED RING designates ringing code is applied to line.
STATUS			
		EQUIPMENT STATUS	Lighted steady - selected circuit was in idle state and successful connection was established. 60 ipm - selected circuit was busy. 120 ipm - selected circuit was not out of service.

TRUNK AND LINE TEST PANEL LAMPS AND KEYS (Cont.)

STATUS			
KEY		LAMP	FUNCTION OR INDICATION
DESIGNATION	TYPE	DESIGNATION	
		PROGRESS OR ERROR	Lighted steady - request successfully completed. 120 ipm - error in either system action or input information. Momentarily off - request has been recognized. 60 ipm - unsuccessful system connection.
		CALLED SUPERVISION	Lighted - off-hook received from called office via outgoing trunk. Extinguish - on-hook received from called office via outgoing trunk.
ON		ON	Requests loading or abort of program. Steady - program has been loaded. 60 ipm - loading request accepted by MSFC: program being loaded. 120 ipm - loading request denied by MSFC.

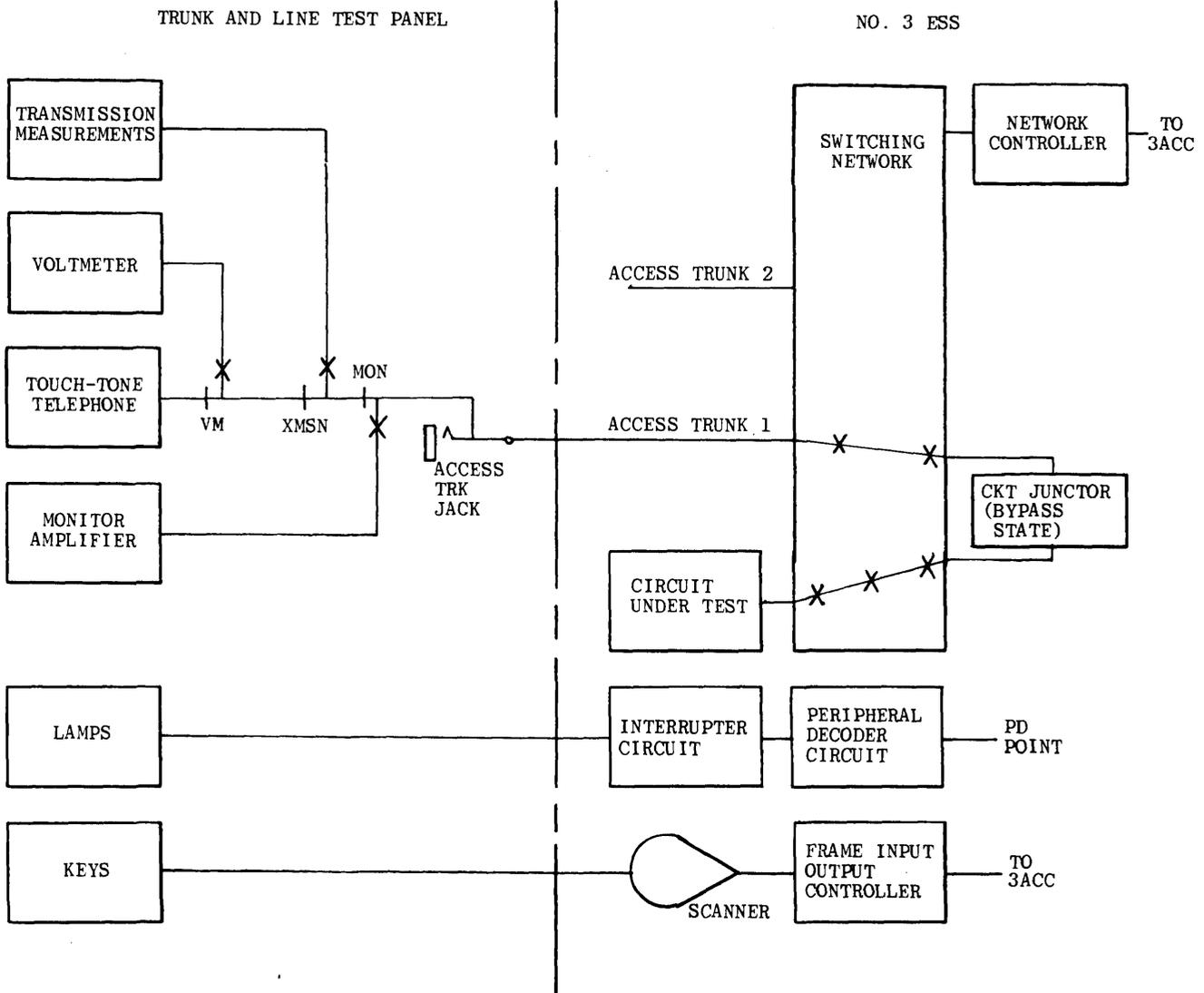


FIGURE 1

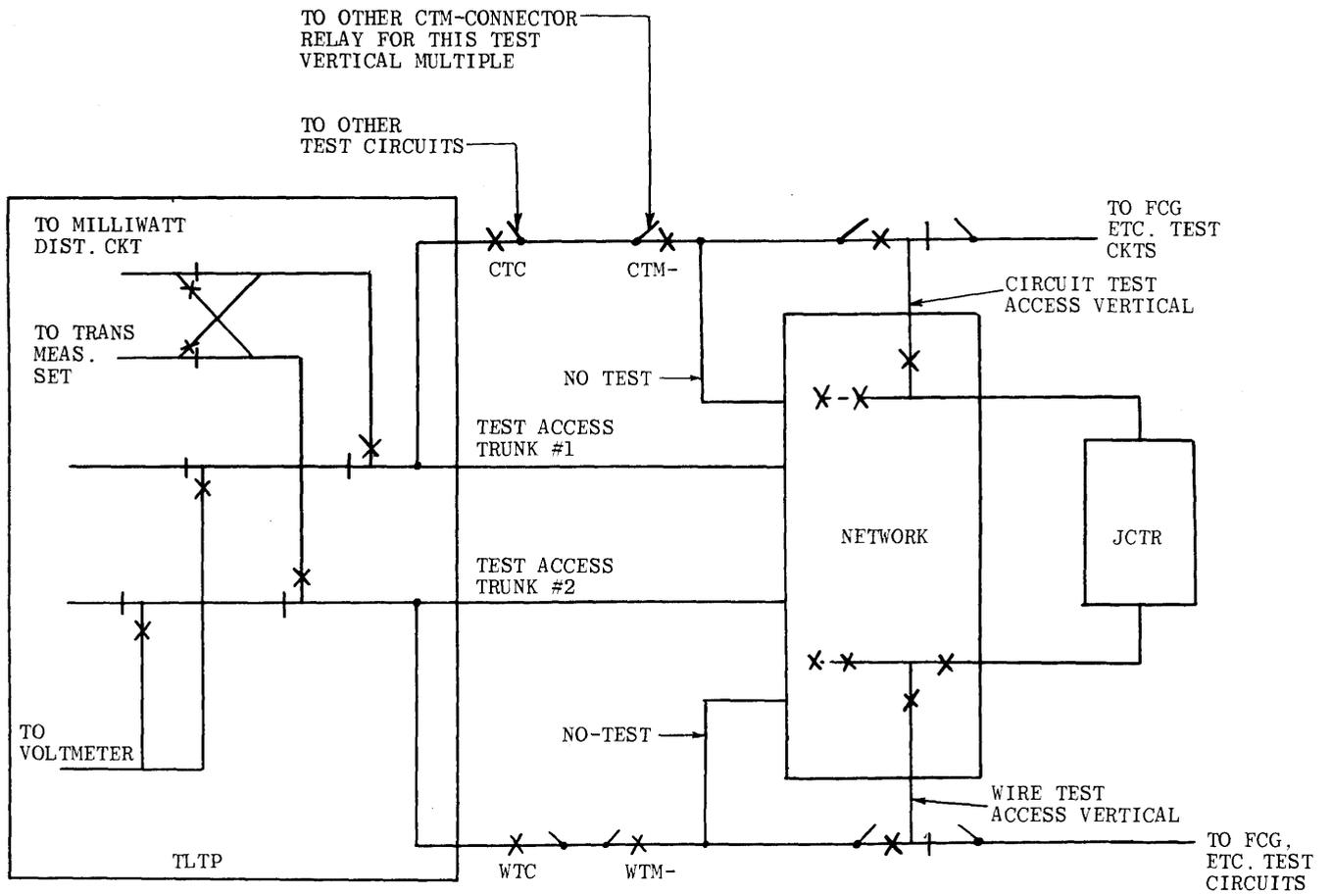


FIGURE 2