

**MANUAL TRUNK TEST POSITION AND AUXILIARY MANUAL  
TEST CIRCUIT DESCRIPTION  
2-WIRE NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS**

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C. System Action on Test Calls . . . . .	8	<b>1. GENERAL</b>	
MAINTENANCE STATE CONTROL . . . . .	16	1.01 This section describes the Manual Trunk Test Position (MTTP) (SD-1A418-01) and the Auxiliary Manual Test Frame (AMT) (SD-1A435-01) in the 2-Wire No. 1 and 1A Electronic Switching Systems (ESS) with HILO 4-wire feature. Effective with 1E5 (No. 1 ESS) and 1AE5 (No. 1A ESS), the MTTP and AMT can be used optionally in an office without the HILO 4-wire feature.	
AUXILIARY MANUAL TEST FRAME . . . . .	21	1.02 This section is reissued to incorporate the 1E7/1AE7 generic program. Since this reissue is a general revision, arrows ordinarily used to indicate changes have been omitted.	
4. REFERENCES . . . . .	21	1.03 The MTTP provides a facility to manually remove trunks from service, to manually return trunks to service, to test trunks and service circuits for transmission loss, noise, VM (for 2-wire trunks), and signaling. Associated with and located next to the MTTP is the AMT frame containing a	
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**NOTICE**

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TTY and optional transmission test equipment. This configuration enables quick and convenient trunk transmission testing, level measurements, and maintenance state control at the MTT.

**1.04** The MTTP and AMT may be optionally located in areas different from the ESS equipment. When this is specified, they may be powered and located up to 1500 cable feet from the transmission reference network of the 2-wire network or the associated test access trunk (SD-1A397) of the HILO 4-wire network. There is no change in function when this option is used. To determine this option and other options available for the MTTP and AMT, refer to Table A.

A typical arrangement of MTTP and AMT frames is shown in Fig. 1. One MTTP resides on each side of an AMT. If the office is engineered with an odd number of MTTPs, the MTTP may be placed on the left or right of the AMT. Each pair of MTTPs must have an AMT frame between them. An office may have up to 15 MTTPs and 15 AMTs.

**1.05** Each AMT contains a TTY and all AMT TTYs may be connected in series; thus, a minimum of one channel is used. Provisions are made for disabling or removing TTYs without interrupting service to the remaining TTYs on the channel. The TTY channel can optionally be a send/receive channel. Up to four trunk maintenance channels are optionally available. Thus, a maximum of four channels can be divided among a maximum of 15 AMT TTYs. These channels also may be equipped with send/receive TTYs.

**1.06** The trunk maintenance channels should be equally distributed among the AMT TTYs. The MTTP/AMT arrangements for a typical office for local and remote capability are shown in Fig. 1.

**1.07** The following abbreviations are used in this section.

AMT	Auxiliary Manual Test Frame
CCIS	Common Channel Interoffice Signaling
ESS	Electronic Switching System
MTF	Master Test Facility
MTL	Master Test Line

MTT	Master Test Trunk
MTTP	Manual Trunk Test Position
TAT	Test Access Trunk
TGN	Trunk Group Number
TLN	Trunk Link Network
TNN	Trunk Network Number
TMS	Transmission Measuring Set
TTY	Teletypewriter
TUT	Trunk Under Test

## 2. EQUIPMENT DESCRIPTION

### MANUAL TRUNK TEST POSITION

**2.01** The MTTP (Fig. 2 and 3) occupies a standard 1-bay frame. Mounted on the upper half of the MTTP is a control panel containing alarm, display, control, testing, and communicating apparatus. The top panel provides a loudspeaker and a clock (the clock is not available if the MTTP is equipped with the alphanumeric display). Forty-one inches from the floor is a 10-inch deep writing shelf with a built-in key telephone above and to the left. The lower half of the frame houses the fuse panel, miscellaneous apparatus, and relay circuitry associated with the control panel. The filter panel is located at the base of the frame. A terminal strip is mounted at the top of the bay. Provision is made for storing trouble record cards.

**2.02** The control panel of the MTTP has lamps, pushbutton keys, and optionally contains a voltmeter (used on 2-wire trunks only), a return loss measuring set, and a transmission measuring set for trunk testing.

**2.03** Power is supplied to the MTTP from a power distributing frame via connectors located in the upper rear of the frame. Power is cabled from the connectors through hollow frame uprights down to the filters located in the base of the frame. The frames have one -48 volt and one +24 volt feeder cables. Filter outputs are connected to the fuse blocks located on the lowest mounting plate. The ac power leads are fused at the miscellaneous power frame (see

**TABLE A**  
**MTTP AND AMT EQUIPMENT AND OPTIONS**

EQUIPMENT		OPTION	
		MTT SD-1A418-01	AMT SD-1A435-01
Master Test Trunk Originates	2WTLN	Z	—
	4WTLN	Y	—
Equipped With Voltmeter		T	—
Equipped With KS-20501 Return Loss		S	—
Equipped With KS-20805-L1A Transmission Measuring Set		V	Y
Powered and Located With Associated ESS		X	X
Powered and Located Remotely		W	W
Powered and Located Remotely With +24V Unavailable		W, R	W
Equipped With 58B Control Unit of 58-Type Echo Suppressor Measuring System		—	Z
4A Signaling Test Set J94743G-1*	W/E&M Interface Unit	—	App. Fig. 1 V
	W/Loop Interface Unit	—	App. Fig. 1 T
Alphanumeric Display		G, E	—

\* Options V and/or T are always required in addition to appropriate Fig. 1, option V provides for pulsing tests on all HILO trunk circuit (E&M and loop) and for E&M pulse tests on trunks of the 2-wire network. Option T provides for pulsing tests on loop trunks of the 2-wire network.

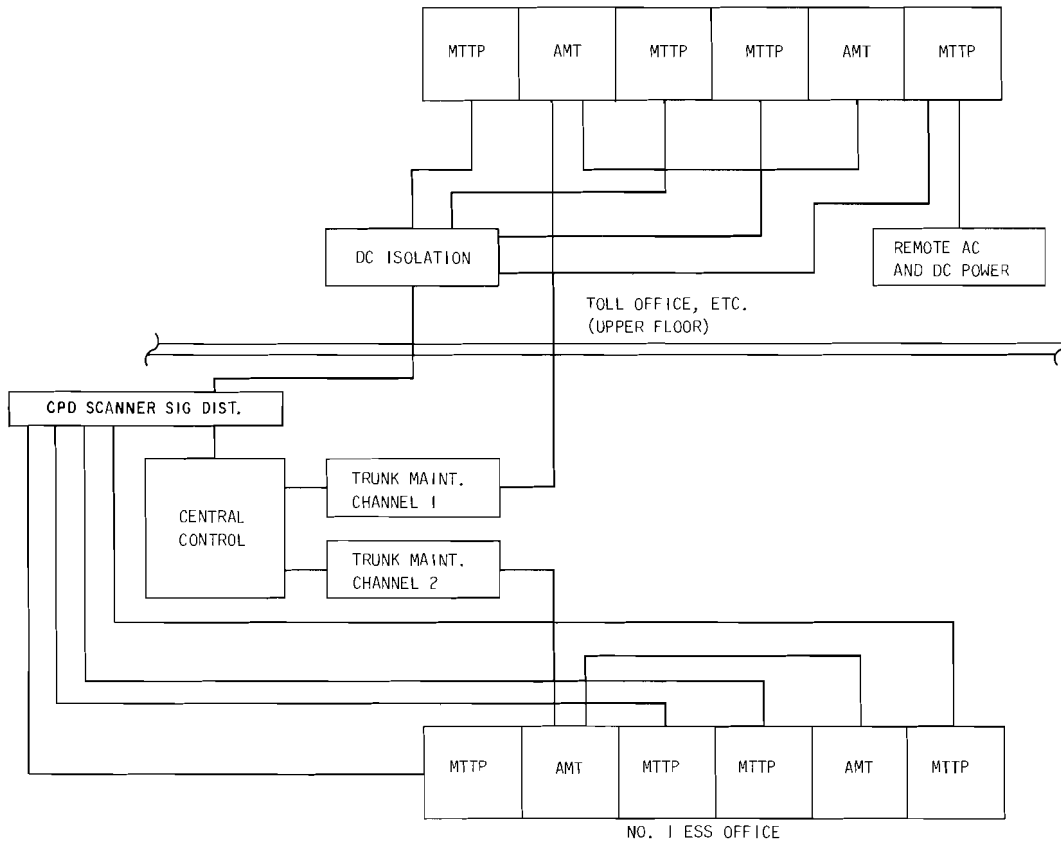


Fig. 1—Typical MTTP/AMT Arrangement

note). When the MTTP frame is installed in a remote location and no +24V power is available, a -48 to +24 volt power converter is provided on the MTTP frame.

**Note:** The ac power is provided for the clock. With alphanumeric display ac power is not required.

#### AUXILIARY MANUAL TEST FRAME

**2.04** The AMT (Fig. 4) is a standard 1-bay frame. Transmission test sets are mounted on the upper third of the frame. This frame is arranged so that one or more nonstandard test sets may be mounted in this or adjacent AMT frame and accessed by activating either SPR SEND or SPR MEAS keys. On a standard frame, these test sets include the following:

- 4A Signaling Test Set
- Echo Suppressor Test Set (58B ESTS)

- PAR Test Set (Not available at present).

Located below the test sets is a supplementary teletypewriter (TTY). If the MTTPs are equipped with the digital transmission measuring set (TMS) KS-20805-L1A, the master unit for this TMS is located below the TTY.

### 3. FUNCTIONAL DESCRIPTION

#### MANUAL TRUNK TEST POSITION

##### A. General

**3.01** For 1E6/1AE6 and earlier generics, a master test trunk (MTT) referred to as a master test line is provided for each test panel to serve as a point for originating calls and as a termination for incoming calls. For 1E7/1AE7 generics, the master test trunk is called an MTT, and in the remainder of this practice, these will be designated MTT.

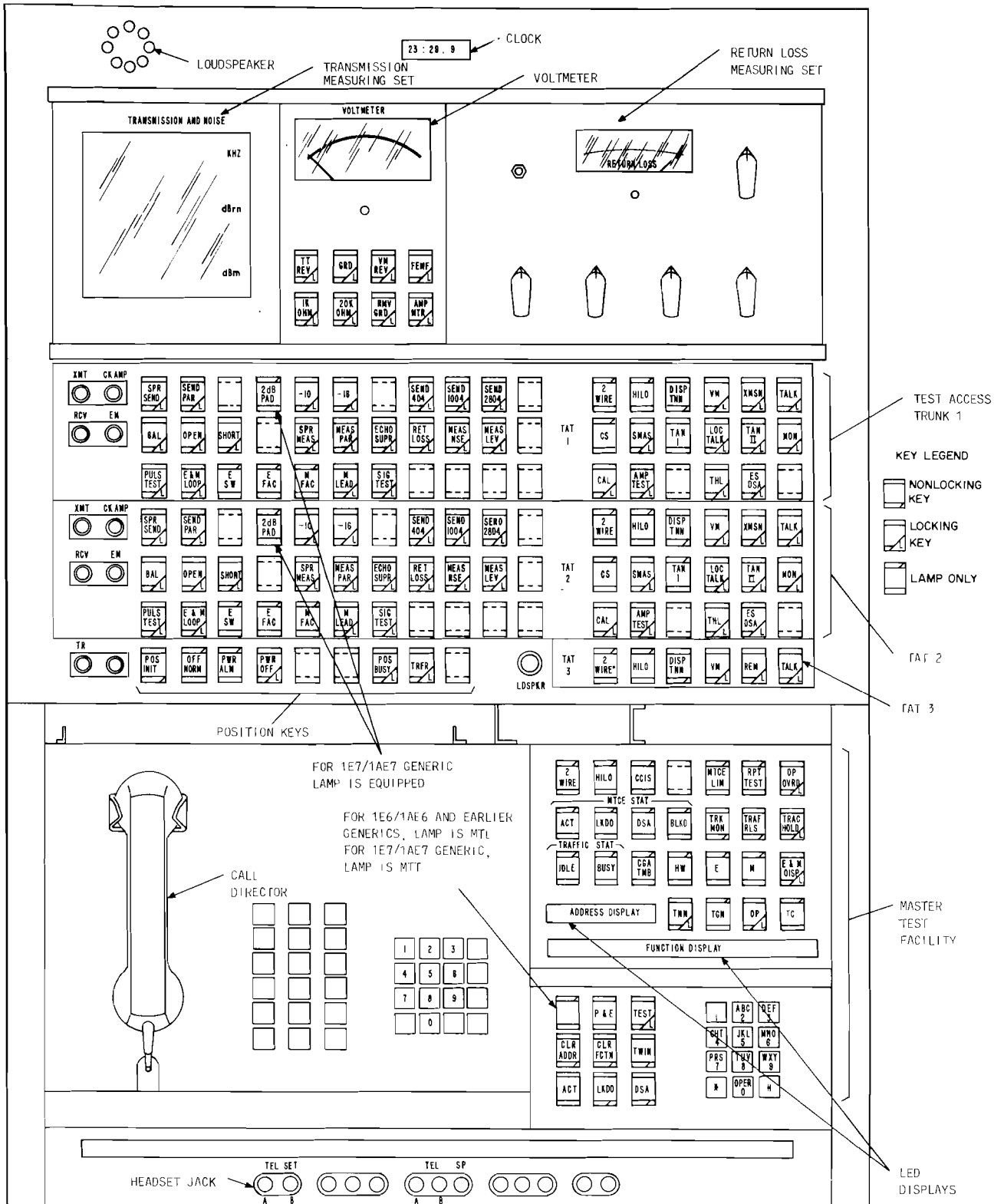


Fig. 2—Manual Trunk Test Position Key and Lamp Layout (Without Alphanumeric Display)

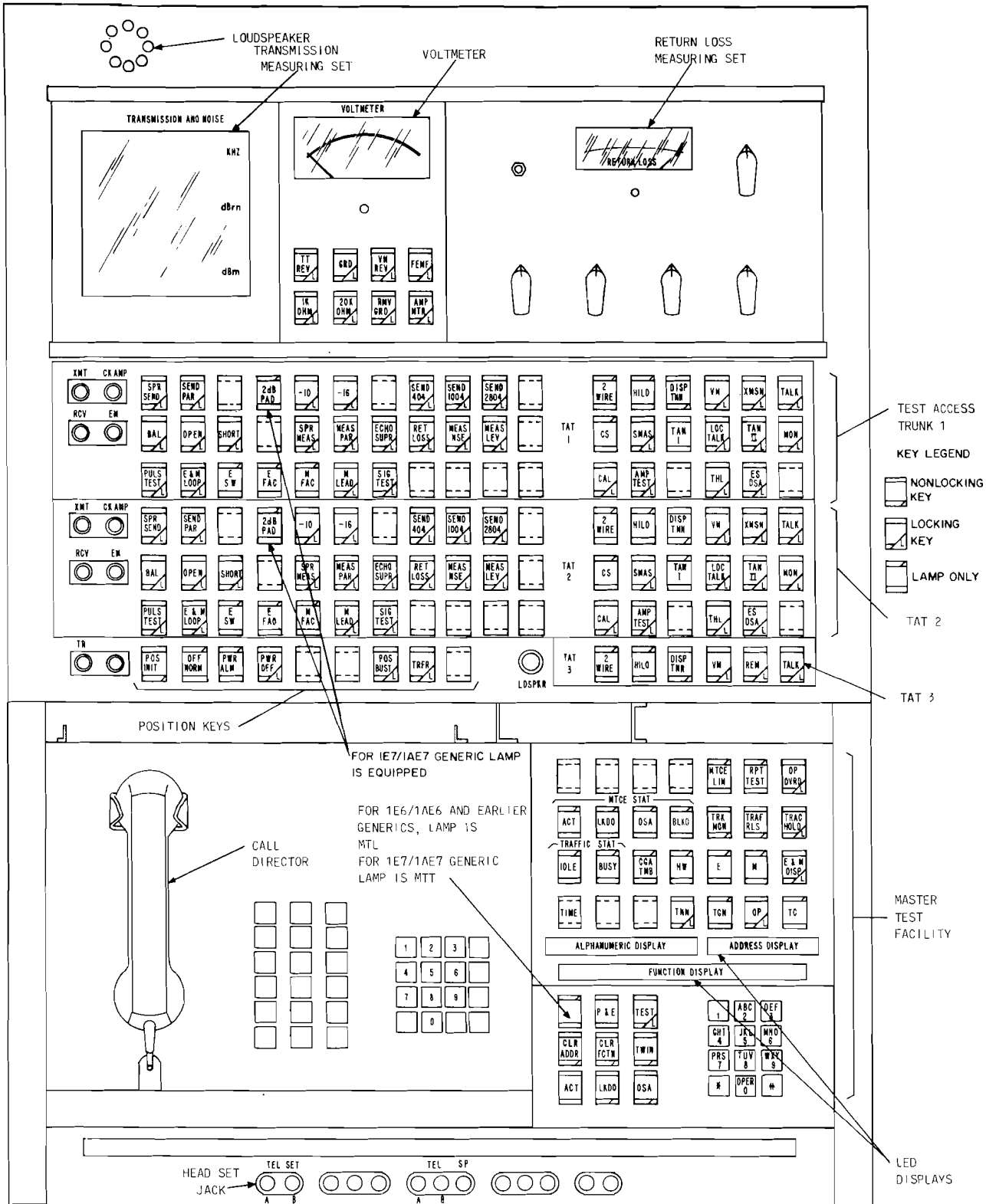


Fig. 3—Manual Trunk Test Position Key and Lamp Layout (With Alphanumeric Display)

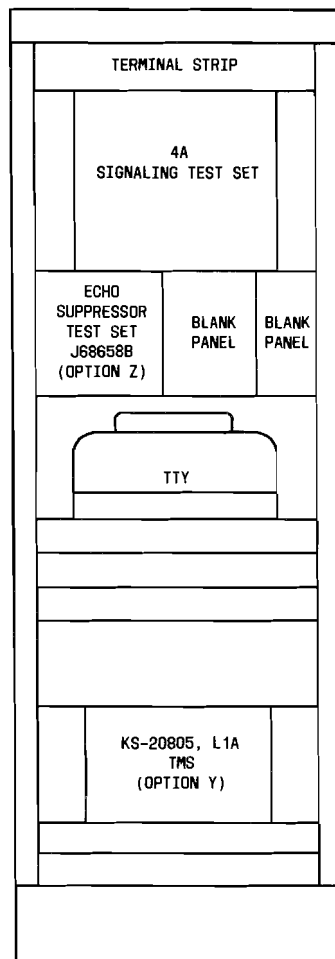


Fig. 4—Auxiliary Manual Test Frame

**3.02** The test panel may be assigned a directory number for the purpose of terminating incoming calls. In an office with a 2-wire only network, the MTT appears on that network. In an office with the HILO 4-wire feature, the MTT would appear on the HILO network. In a combined HILO and 2-wire office, the MTT would appear on the HILO network. Table B indicates the MTT appearance for the different office arrangements.

**3.03** Test call information is sent to the central processor by operating specific keys on the panel and dialing prescribed messages for a desired call using the panel mounted TOUCH-TONE® dial. Test panel keys include locking and nonlocking types.

TABLE B

MTT APPEARANCES

MTT APPEARANCE	OFFICE ARRANGEMENT
2-Wire TLN	2 W TLN only
HILO TLN	2 W TLN & HILO TLN
HILO TLN	HILO TLN only

The locking types have built-in lamps which light when the key is in the operated state.

**3.04** Call progress is indicated primarily by lamp signals with auxiliary information being supplied by maintenance TTY output messages and messages displayed on the alphanumeric display.

**3.05** Test paths are established to trunks via network paths which connect the circuit being tested to an MTTP access trunk. Test access trunks (TAT) 1, 2, and 3 are provided.

**Note:** The SD-1A322 trunk circuit (1 per 3 TATs) is used for 2W TLN with option for MTTP use. The SD-1A397 trunk circuit (1 per TAT 1, 2) and SD-1A361 (1 per TAT 3) are used for the HILO TLN.

**3.06** The operating of the VM, XMSN or TALK key on TAT 1 or 2 enables the TAT to be connected to the voltmeter circuit, the transmission measuring circuit, or the talk circuit. Operating the VM, TALK, or REM key on TAT 3 enables it to be connected to the voltmeter circuit, the talk circuit, or to be extended to a remote facility such as a local test desk.

(a) The voltmeter facility on the MTTP is functional only on trunks on the 2-wire TLN. There is no voltmeter access to trunks on the HILO 4-wire network.

(b) The talk facility on the MTTP allows bridging any combination of TATs 1, 2, and 3, the MTT and the lines of the key telephone.

**B. Jack, Key, and Lamp Functions**

**3.07** Jacks are located on front of the writing shelf and directly above the telephone set. Key and lamp displays located on panels are contained in the upper half of the frame.

**3.08** Jacks TEL SET A-B located in the lock rail of the writing shelf provide a means for connecting a hand or head telephone set to the position telephone circuit. This set can also be used in place of the handset associated with the key telephone set by operating TRFR key (located above telephone set in center of panel).

**3.09** Jacks TEL A-B located in the lock rail of the writing shelf provide a connection to the frame line talking circuit.

**3.10** Jack SP located in the lock rail of the writing shelf provides a spare access for external equipment.

**3.11** The following jacks are located on the side of the Test Access Trunk J1A042FF panel:

- Jacks CK AMP (TAT 1) and CK AMP (TAT 2) provide a means for calibrating internal amplifiers.
- Jacks XMT (TAT 1) and XMT (TAT 2) provide a means for connecting an external tone source for transmission measurements.
- Jack TR provides access for dc tests.
- Jacks RCV (TAT 1) and RCV (TAT 2) provide a means for connecting external meters for transmission measurements.
- Jacks EM (TAT 1) and EM (TAT 2) provide access for portable pulsing test sets equipped with type I signaling capability (conversion to type II is done internal to the MTTP).

**3.12** A telephone set is provided as a termination for tie lines and official lines used with the MTTP. This set has bridging access to the MTT by operating the (MISC) TRFR key and (key TEL SET)

LINE 1 key along with any other active line which requires bridging.

**3.13** Table C is a tabulation of the keys, lamps, and controls on the MTTP and AMT.

**3.14** Locking and nonlocking keys are indicated by L or NL, respectively, in the TYPE column. Locking type keys have built-in lamps lighted by contacts which close when the key is in an operated state. Nonlocking keys do not have these lamps.

**3.15** The lamps on these panels which are lighted either by signal distributor or central pulse distributor action are indicated by a check mark in the DIST column. Absence of such a mark indicates that the lamp is lighted by local relay or key action.

**3.16** Most of the keys cause associated ferrod sensors to be activated as a signal to the system to perform some specific task such as setting up a network path, changing the state of a trunk, taking a network path down, etc. In some cases, key operation results in a relay operation which then activates the ferrod. A check mark in the SP (scan point) column indicates that a scan point is associated with a key (directly or indirectly).

**3.17** On the upper panel is a clock (not available if MTTP is equipped with alphanumeric display) and a loudspeaker. The loudspeaker is bridged across the headset for monitoring the TUT on the MTT. A volume control potentiometer is located on the bottom center of the TAT panel.

**C. System Action on Test Calls**

**General**

**3.18** A test call is started by operating the master test facility (MTF) instructional keys (TNN and OP) singly or in combination plus the TEST key.

**3.19** Scan points associated with the following operated instructional keys inform the central processor that a certain type of call is being made.

- TNN and OP—Trunk call with outpulsing digits
- TNN and OP Released—Call requesting miscellaneous system action (operation of a signal distributor [SD] or central pulse



**TABLE C**  
**MTTP KEYS AND LAMPS**

KEY			LAMP		FUNCTION OR INDICATION
DESIG	TYPE	SP	DESIG	DIST	
<b>MASTER TEST FACILITY</b>					
TEST	L				Originates test request.
CLR ADDR	NL	✓			Clears ADDRESS display.
CLR FCTN	NL	✓			Clears FUNCTION display.
ACT	NL	✓			Releases trunk in active state.
LKDO	NL	✓			Releases trunk in locked out state.
DSA	NL	✓			Releases trunk in disabled state.
TWIN	NL	✓			Performs a twin out-of-service on both circuits of a 2-circuit plug-in equipment plate. (a) Performs a twin lockout on outgoing trunk and circuits. (b) Performs a twin disable on incoming or 2-way trunk circuits.
			MTL/MTT	✓	Steady (when the TEST key is initially operated)—MTT is receiving dial tone.  Steady (after an outgoing call has been completed)—on hook at the distant end of test call.  60 ipm—an incoming call has seized the MTT.
			P&E	✓	Indicates result of a requested action. Steady—success 60 ipm—failure caused by inability of system to carry out an order (blocking etc) 120 ipm—human error.
OP	L	✓			The test call will involve out-pulsing or a special test code.

TABLE C (Contd)

MTTP KEYS AND LAMPS

KEY			LAMP		FUNCTION OR INDICATION
DESIG	TYPE	SP	DESIG	DIST	
TIME	N	✓	TC		Test code is being dialed.
			TGN		Trunk group number is being dialed.
TNN	L	✓			Displays system time in Alphanumeric display.
E&M DISP	L	✓			Trunk network lnumber is being dialed.
			M	✓	E&M display is active.
			E	✓	Displays the state of the M lead of the TUT.
			HW	✓	Displays the state of the E lead of the TUT.
			CGA/TMB	✓	The circuit is high and wet.
			BUSY	✓	Trunk on active CGA or TMB.
			IDLE	✓	Trunk is traffic busy.
TRAC HOLD	L	✓			Trunk is traffic idle.
TRAF RLS	NL	✓			Trace and hold direct distance dialed connection to locate an incomplete path.
TRK MON	NL	✓			Release from traffic a trunk which is traffic busy.
			BLKD	✓	Connects MON amplifier input to test path via no-test vertical.
			DSA	✓	Trunk is in blocked state.
			LKDO	✓	Trunk is in disabled state.
			ACT	✓	Trunk is in locked out state.
					Trunk is in active state (ready for call processing).

TABLE C (Contd)

## MTTP KEYS AND LAMPS

KEY			LAMP		FUNCTION OR INDICATION
DESIG	TYPE	SP	DESIG	DIST	
OP OVRD	L	✓			Override translation of out-pulsing digits.
			RPT TEST	✓	A repeat test cycle is in progress.
			MTCE LIM	✓	Maintenance limit exceeded.
			HILO*	✓	Trunk is on HILO network.
			2 WIRE*	✓	Trunk is on 2-wire network.
CCIS*	✓	Trunk is a CCIS trunk.			
<b>TOUCH-TONE</b>					
0 thru 9	NL				Furnish TOUCH-TONE signals to the digit receiver.
*	NL				Defines separation between the address and function code.
#	NL				Indicates end of message and initiates a start signal for the system to act upon the digits dialed.
<b>TEST ACCESS TRUNK</b>					
DISP TNN 1, 2, 3	NL	✓	2-WIRE 1, 2, 3	✓	Trunk is on a 2-wire network.
			HILO 1, 2, 3	✓	Trunk is on a HILO network.
VM 1, 2, 3	L	✓			Displays TNN on ADDRESS display at Master Test Facility.
					Connects via the switching network the TUT and the TAT.
					Connects the access trunk to the voltmeter circuit.
XMSN 1, 2	L	✓			Connects via the switching network the TUT and the TAT.
					Connects the access trunk to the transmission test termination circuit.

\* Lamp not available if MTTP is equipped with alphanumeric display.

TABLE C (Contd)

MTTP KEYS AND LAMPS

KEY			LAMP		FUNCTION OR INDICATION
DESIG	TYPE	SP	DESIG	DIST	
REM	L	✓			Connects via the switching network the TUT to TAT 3. Extends the test path to a pair of terminals at a remote point.
TALK 1, 2, 3	L	✓			Connects the position telephone circuit to the test conductors.
			CS 1, 2	✓	Indicates switchhook state of circuit connected to transmission testing circuit (lamp lighted for on-hook; lamp off for off-hook).
SMAS 1, 2	L	✓			TAT connected to SMAS circuit.
			TAN I 1, 2		State of circuit being tested in tandem 1 (2-wire only).
LOC TALK 1, 2	L	✓			Change circuit state of trunk being tested at TAT 1 or 2 to local talk state (2-wire only).
TAN II 1, 2	L	✓			Change circuit state of trunk being tested at TAT 1 or 2 from tandem I to tandem II state (2-wire only).
MON 1, 2	L				Monitors trunk at TAT 1 or 2.
CAL 1, 2	L				Calibrates TAT 1 or 2.
AMP TEST 1, 2	L				Test build out amplifier TAT 1 or 2.
THL 1	L	✓			Measures transmission-hybrid loss (THL) on TAT 1.
THL 2	L				Measures transmission-hybrid loss (THL) on TAT 2.
ES DSA 1, 2	L	✓			Disabled echo suppressor TAT 1 or 2
SPR SEND 1, 2	L				Spare signal source control on TAT 1 or 2.
SEND PAR 1, 2	L				Transmit PAR signal on TAT 1 or 2.

TABLE C (Contd)

## MTTP KEYS AND LAMPS

KEY			LAMP		FUNCTION OR INDICATION
DESIG	TYPE	SP	DESIG	DIST	
			2 dB PAD	✓	Indicated TP2 test (-2dBm)
-10 1, 2	L				Attenuates outgoing signal 10 dB.
-16 1, 2	L				Attenuates outgoing signal 16 dB.
SEND 404 1, 2	L				Transmits 404 Hz dBm0 tone.
SEND 1004 1, 2	L				Transmits 1004 Hz dBm0 tone.
SEND 2804 1, 2	L				Transmits 2804 Hz dBm0 tone.
BAL 1, 2	L				Provides a balanced termination (2-wire only).
OPEN 1, 2	L				Provides ac open termination (2-wire only).
SHORT 1, 2	L				Connects short circuit across access trunk 1 or 2 test path (2-wire only).
SPR MEAS 1, 2	L				Spare meter control for TAT 1 or 2.
MEAS PAR 1, 2	L				Measures PAR signal on TAT 1 or 2.
ECHO SUPR 1, 2					Connects Echo Suppressor test set to TAT 1 or 2.
RET LOSS 1, 2	L				Connects return loss measuring set to TAT 1 or 2.
MEAS NSE 1, 2	L				Connects noise measuring port to TAT 1 or 2.
MEAS LEV 1, 2	L				Connects level and frequency measuring port to TAT 1 or 2.
PLS TEST 1, 2	L	✓			Connects pulsing test set to TAT 1 or 2.
E&M LOOP 1, 2	L	✓			Loops E&M leads at trunk under test.
			E SW 1, 2	✓	E lead state on switch side of trunk under test.
			E FAC 1, 2	✓	E lead state on facility side of trunk under test.
			M FAC 1, 2	✓	M lead state on facility side of trunk under test.
M LEAD 1, 2		✓			Controls the state of the M lead of an E&M TUT connected to a TAT.

TABLE C (Contd)

MTTP KEYS AND LAMPS

KEY			LAMP		FUNCTION OR INDICATION
DESIG	TYPE	SP	DESIG	DIST	
SIG TEST 1, 2		✓			Activates signaling test functions.
<b>TEST POSITION AND POWER CONTROL</b>					
POS INIT	NL	✓	OFF NORM		Initiates memory and hardware for MTTP.
			PWR ALM		A request to remove power from the MTTP has been made.
PWR OFF	L				Indicates power removed from MTTP other than normal request.
POS BUSY	L	✓			Requests removal of power from MTTP circuit pack connectors.
TRFR	L				Position busy to incoming calls (Blocks incoming calls).
					Transfers headset to key telephone.
<b>VOLTMETER</b>					
TT REV	L				Transposes trunk test conductors (TT, RT) with respect to voltmeter.
GRD	L				Connects grond to the tip (T) test conductor.
VM REV	L				Reverses direction of current flow through meter.
FEMF	L				Disconnects battery and connects ground to the meter.
1 K OHM	L				Connects 1053-ohm shunt across meter and 20,000 ohm combination to provide 24-volt range.
20 K OHM	L				Connects 20-volt test battey to meter in series with 20,000 ohms to provide a 24-volt range.
RMV GRD	L				Disconnects ringing grond from line test path.
AMP MTR	L				Connects the 300-ma winding of the meter.

distributor [CPD] point, printing TOS list, requesting diagnostics, changing the maintenance state of a trunk, etc).

- 3.20** The TEST key operated associates a digit receiver (Fig. 5) with the MTT.
- 3.21** The dialed digits provide information regarding the call; for example, the identity of the circuit being tested, the called number (if any), special test codes, etc.
- 3.22** As call data is received by the central processor, it is stored in a memory area called the MTT register. Since this will be the chief reference point for the central processor during the call, the MTT register may be said to be in control of the call. A lighted 2-WIRE or HILO lamp on the MTT panel indicates that an ID (TNN or TGN) has been dialed and the TNN or TGN has been identified as either a 2-wire, CCIS, or a HILO 4-wire circuit. If the MTTP is equipped with the alphanumeric display, the device type (2-wire, HILO or CCIS, etc) will be displayed on the alphanumeric display.
- 3.23** After the digits are dialed, the \* plus function digits (information to be outpulsed or test code information), if any, and then # digit is dialed. The \* serves to separate the ID from the function digits and the # serves as an execute signal to the central processor which then proceeds to establish the test

call, ordering network controllers to set up paths, operating relays, etc.

- 3.24** As the call progresses, associated programs report to the central processor causing the MTT register to be updated. Thus, an up-to-date record of the call is maintained.
- 3.25** On calls incoming to the MTT, call data stored in the incoming call register (not associated with the MTTP) is transferred to the MTT register.
- 3.26** Call data remains in the MTT register until:
- The test call is transferred to one of the test access trunks.
  - The call is disconnected (incoming).
- 3.27** All or part of the data stored in the MTT register can be saved and used for subsequent calls, thereby eliminating the need for repeated dialing. Located in the center of the MTF panel and to the right of the telephone set are two digital displays. The upper display (6 digits) displays the address (TGN, TNN and in some cases other addresses) and the lower display (16 digits) displays the function (digits to be outpulsed or test code). The digits are displayed as they are entered via the TOUCH-TONE keys and can be observed by the maintenance person to confirm proper dialing. If the MTTP is equipped

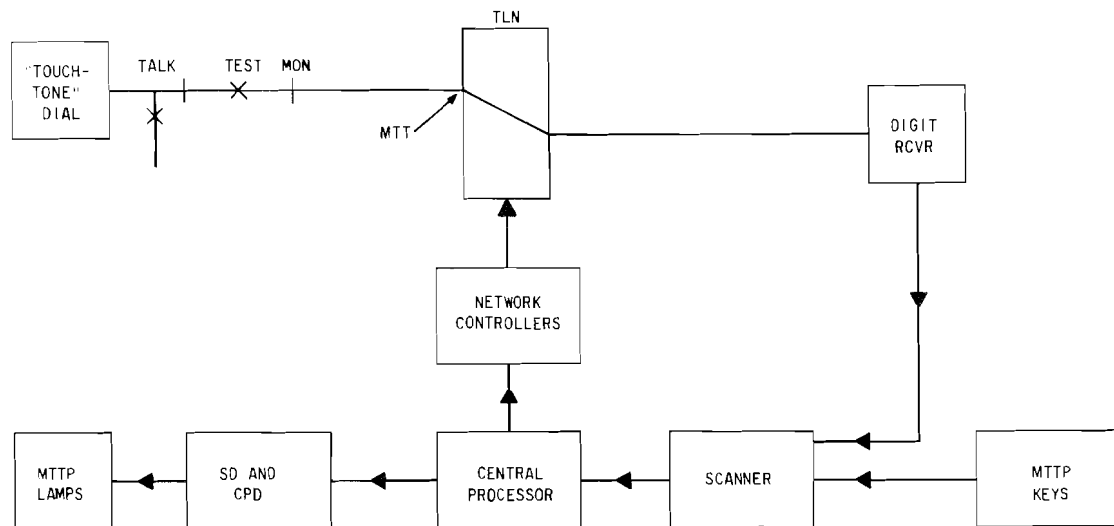


Fig. 5—Instructional Connection and Lamp Control

with the alphanumeric display, the 16-digit function display is unchanged in location; however, the 6-digit address display has been changed to an 8-digit address display and is located immediately above and to the right of the function display. The 10-digit alphanumeric display is located to the left of the 8-digit address display.

**3.28** When a test call is transferred from the MTT to a TAT, call data is transferred from the MTT register to the associated TAT register. The latter register is then in control and the MTT is ready for the next call.

**3.29** As part of the procedure for transferring a test call to a TAT, either a VM (voltmeter), XMSN (transmission), or TALK key associated with the TAT is operated. The central processor notes the key request and, after establishment of the network path between the TAT and the trunk being tested, operates or releases relays in the trunk circuit to provide a circuit state suitable for the requested test.

**3.30** On each test call, the central processor examines the busy status of the circuit being tested and reports via the MTCE STAT and TRAFFIC STAT lamps.

**3.31** When a trunk test call is released, the central processor leaves the trunk either active, locked-out, or disabled as specified by the operation of keys at the MTF.

**3.32** If the maintenance status of the trunk is changed or a traffic busy trunk is camped on for a maintenance state, the processor causes a TTY printout appropriate for the request.

**3.33** In most cases, if the system encounters difficulty in setting up a test call, the call is aborted and the MTT register is cleared. Appropriate TTY printouts are also given, specifying the nature of the difficulty. The Progress and Error (P&E) lamp will flash at 60 ipm, and when appropriate for 1E7/1AE7, an alphanumeric display error message will be displayed in the alphanumeric display and the TTY message will be inhibited.

**3.34** Availability of the MTT for a call is indicated when a dial tone is returned and the MTT lamp is lighted if the TEST key is in the operated state.

### Trunk Test Calls (Fig. 6)

**3.35** The TNN and OP keys operated singly or together indicate to the system what type of action is being requested.

**3.36** When the TNN and OP keys are operated, the result depends on whether the TNN dialed is outgoing or incoming.

(a) If the TNN dialed is an outgoing or 2-way trunk, a network connection is set up and outpulsing occurs over the trunk.

(b) If the TNN dialed is an incoming trunk or service circuit, an invalid indication is given.

**3.37** If the TNN key is operated and the OP key is released (and a TNN is dialed), the TC lamp lights. The call is being made to request the trunk status, a diagnostic test, or possibly to make the trunk busy or idle. The network connection is not set up on this type of call. These key states are also used to request scan row displays, call store word displays, and TNN scan point displays.

**3.38** If the OP key is operated and the TNN key is released (and a TGN is dialed), the TGN lamp lights. The most idle trunk in the dialed trunk group will be selected and be displayed in the 6-digit display (8 digit if equipped with alphanumeric display). Actions on the displayed trunk are then as described in paragraph 3.36.

**3.39** When the TNN and OP keys are released (and a TGN is dialed), the TGN and TC lamps light. A trunk group diagnostic is requested on the dialed trunk group.

### MAINTENANCE STATE CONTROL

**3.40** A trunk can be made active by operating ACT key or can be placed out-of-service by operating LKDO or DSA key. The TWIN key is provided to make both trunks on a chassis out-of-service in one operation. This is done by operating the TWIN key. If either trunk is traffic busy, it is camped on; that is, it will be taken out-of-service upon the termination of the call. However, each trunk circuit must be made active separately.

**3.41** The trunk states that are controlled by keys from the MTTP are as follows:

(a) ACTIVE (ACT)—Trunk is fully available for service (call processing).



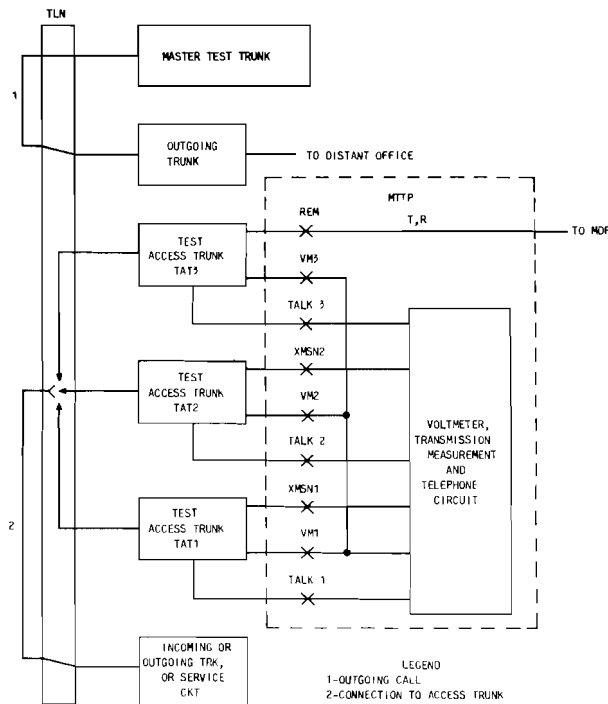


Fig. 6—Trunk Test Call Connection

- (b) Out-of-Service, Maintenance, LOCKED-OUT (LKDO)—Trunk is not used for outgoing call processing, but it can be used for incoming call processing and test calls.
- (c) Out-of-Service, Maintenance, DISABLED (DSA)—Trunk is not used for outgoing call

processing and supervision is turned off to prevent the trunk from being used for incoming call processing but may be used for outgoing test calls (see Table D for MTTP keys).

**Transfer of a Trunk Test Call to an Access Trunk**

**3.42** A trunk test call can be transferred to a TAT if voltmeter tests, signaling tests or transmission measurements are to be made or if the test path is to be extended to a remote point, or if the crafts-person wishes to use the talking facility at the TAT. A VM, XMSN, or REM key associated with the chosen access trunk is operated as part of the transfer procedure. The operated key identifies the access trunk and the type of test being made. The system sets up a path as shown in Fig. 6, connection 2. It also sets the relays of the circuit under test in an appropriate configuration for the test requested. Thus, for voltmeter tests, the trunk is set in most cases in a *bypass* state. This presents a clear metallic path with no shunt or series elements attached. Certain transmission tests, on the other hand, may require that particular circuit elements be connected to the talking path. The system, knowing the type of trunk and the requested test, operates and releases trunk circuit relays as required to obtain the appropriate circuit state. Voltmeter tests cannot be made to trunks on the HILO 4-wire network.

**3.43** The change of circuit state also takes place if a different test is to be made on a trunk already connected to a TAT. For example, a transmission test may be desired on a trunk originally transferred for a voltmeter test. The system detects the release of the VM key and the subsequent opera-

TABLE D

MTTP KEYS

KEY	FUNCTION
ACT	Puts trunk in active state.
LKDO	Performs a lock-out on outgoing trunks, service circuits, and 2-way trunks.
DSA	Performs a disable on incoming or 2-way trunk. All supervision turned off.
TWIN	Performs a twin lock-out on outgoing trunk and service circuit. Performs a twin disable on incoming or 2-way trunks.

tion of the XMSN key and orders the circuit state changed for the new test demand.

### Monitoring a Busy Trunk

**3.44** A trunk which is busy on a call can be monitored if desired. The TRK MON key is operated and the connection as shown in Fig. 7 is set up. The use of a monitoring amplifier provides a high input impedance bridging connection. The telephone set receiver is connected to the amplifier output and the transmitter is open circuited to prevent interference on the call. If the call being monitored is completed, the network path involving the trunk is taken down, but the path between the MTT trunk and the no-test vertical stays up until the test call is released.

### Substitute Trunk

**3.45** A feature of the MTTP is the ability to insert a substitute trunk between the SD-1A165 outgoing trunk (2-wire only) being tested and a test circuit as shown in Fig. 8. This essentially permits an SD-1A165 outgoing trunk of known reliability to be substituted for another SD-1A165 trunk believed to be encountering difficulty. If difficulty is still encountered with the substitute trunk connection, the diagnostic determines that the trouble is *not* in the trunk circuit. Upon completion of the diagnostic, the connection will stay up until the trunk is released by maintenance personnel. The *substitute trunk* diagnostic can be requested from the MTTP only on a single trunk basis; not for a trunk group. When the TNN plus a diagnostic code (first digit of diagnostic is 1, 3, or 5) is keyed, the trunk being tested is put into the bypass state to reduce it to merely a pair of wires and the connection shown in Fig. 8 is set up.

### Incoming Call

**3.46** Interoffice test calls to the MTTP may be made using a directory number (DN), using the 101 test line code, or using 7XX over CCIS trunks (where xx = member number of called panel). The 101 test line is typical in a toll environment (with the HILO 4-wire switching feature). When the digit analysis program for trunks detects a call received over an incoming trunk to be terminated to a busy MTTP, translations are checked to determine if series completion to the panels is available. If so, the call can be completed to an idle panel in the series. If all panels are busy, a busy tone is returned to the calling party. When completing to an idle panel, the MTTP pro-

gram has control of the ringing process. Figure 9 shows the connections established when calling to an idle MTTP. When the TEST key is operated to answer the call, a bridge is put across the trunk conductors, saturating the ferrod in the trunk. This is detected by the system which takes down the connection shown in the dotted line and sets up the one shown by the solid line. With the 1E7/1AE7 generic, the capability to transfer an incoming call terminated at the master test trunk (MTT) if any No. 1/1A ESS test panel (TLTP, MTTP, STTP, and RTTU) to the MTT of any other test panel in an office is provided. The transfer can be accomplished by transferring the call to a TAT and dialing a four digit code containing the TAT number, transfer code digit 4, and the test panel member number where the call is to be transferred.

**3.47** Type 101 calls may be routed to a test panel or group of test panels having responsibility for the incoming trunk group. MTTP member numbers are stored in the trunk group number supplementary translator. If the member number designated as first choice for receiving the call is busy, an attempt is made to complete the call to the next choice(s) specified in this same translator. This feature allows Telco to assign primary maintenance responsibility for certain trunk groups to a particular MTTP. Thus, an administrative tool for dividing a large number of MTTPs into groups of maintenance responsibility is afforded. To assign trunk group maintenance responsibility, refer to the appropriate section as follows:

231-118-323	No. 1 ESS prior to 1E6
231-318-303	No. 1A ESS prior to 1AE6
231-048-303	No. 1 ESS with 1E6 and later generics or No. 1A ESS with 1AE6 and later generics.

**Note:** An idle remote trunk test unit (RTTU) may request that all 101-type calls be preferentially routed to it.

**3.48** Intraoffice calls can be completed to an MTTP. When the digit analysis program for lines detects a call to be terminated to a busy MTTP, translations are checked to determine whether series completion is available. If so, the call is completed to the next directory number in the series. When completing to an idle panel, the MTTP program has control of the ringing process. When the test key is operated the call is answered. The subsequent release of the test key will disconnect the intraoffice call.

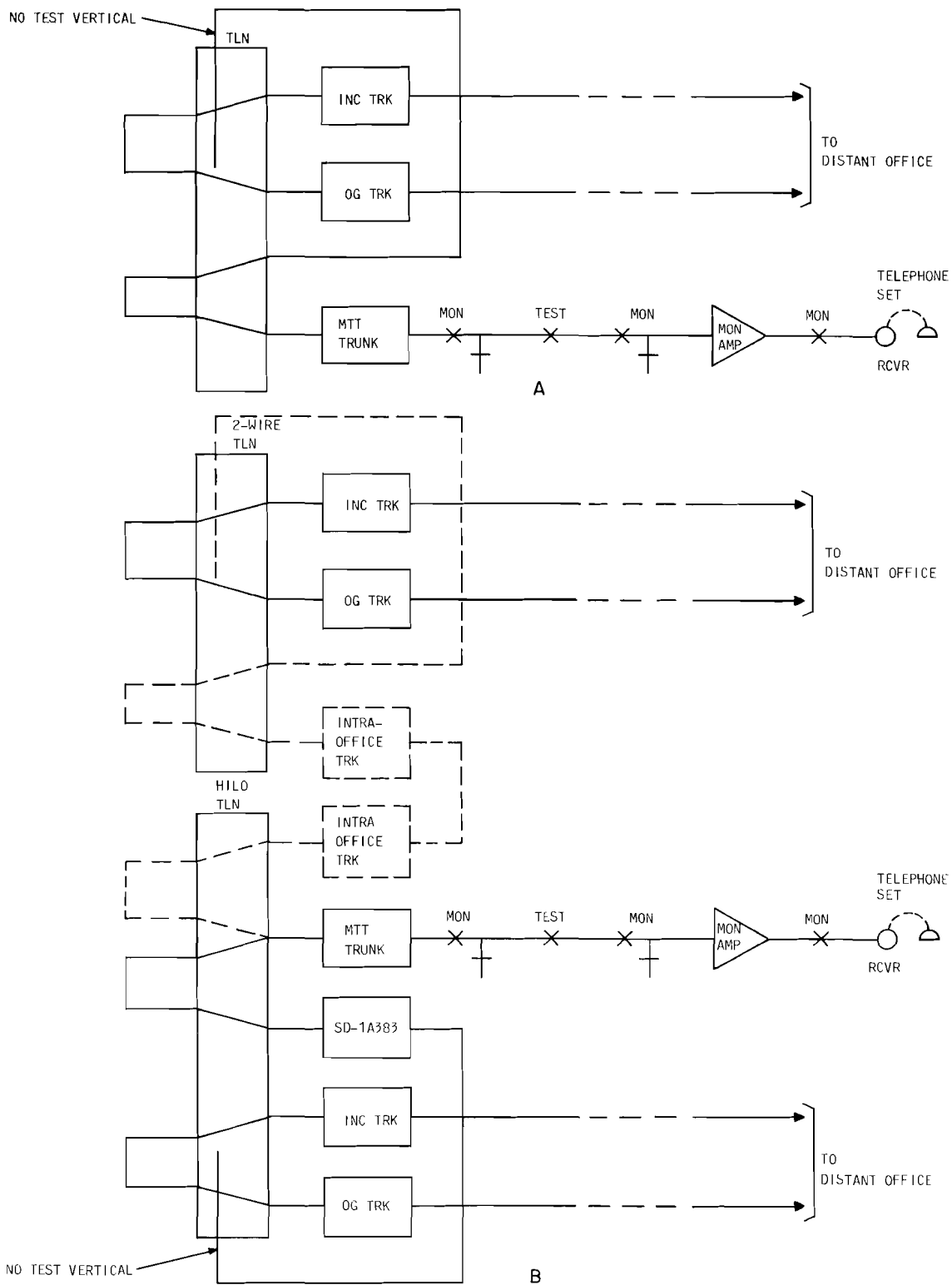


Fig. 7—Monitoring Connection

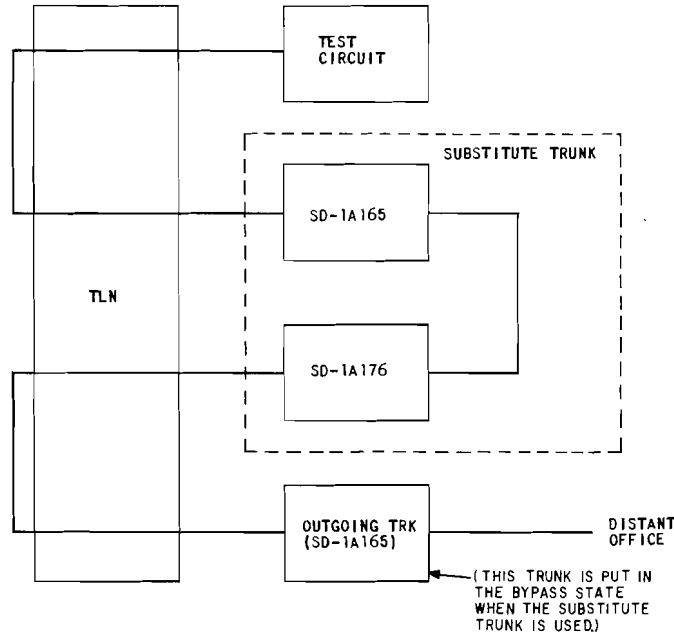


Fig. 8—Substitute Trunk Connection

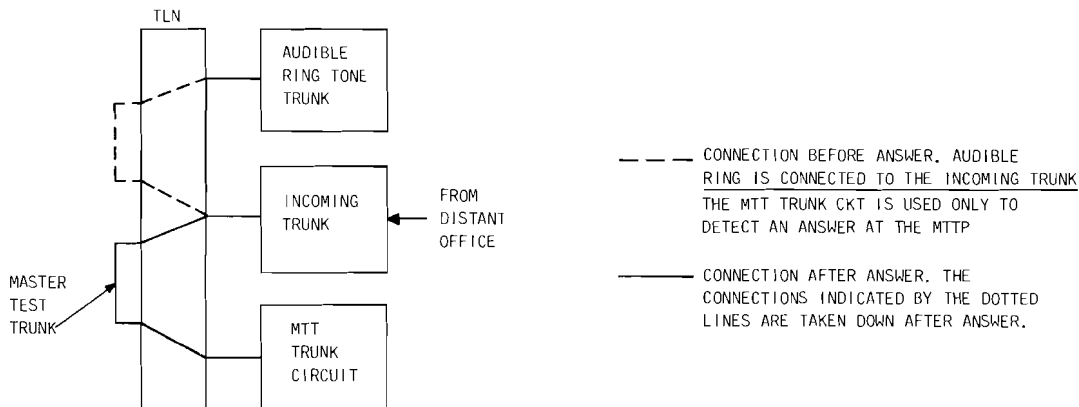


Fig. 9—Incoming Call to Master Test Trunk

**Trace and Hold**

3.49 When a trouble is detected in the direct distance dialing network resulting in an incomplete path, the path may be held and traced by the use of the trace and hold feature. Maintenance personnel are informed of the trouble by the operator who also specifies the incoming trunk. By dialing the TNN at the MTP, a traffic busy indication should be received and should be verified by monitoring the

trunk. Upon verification, the TRAC HOLD key is operated and the network path is printed on the maintenance TTY. The trunks in the connection are held in an MTTP register until the TRAC HOLD key is released.

**Traffic Release**

3.50 This feature is provided to give maintenance personnel the ability to release from traffic a

trunk which is marked traffic busy but which is not involved in a valid network path. This is done by monitoring the trunk to verify that the erroneous condition truly exists, and then by operating the TRAF RLS key. This causes the trunk to be idled and appropriate audits to be requested. TTY output TL01 is generated to indicate success.

**Caution:** *This function should not be required, or used, in the normal course of maintaining an office. It should not be used to tear down a valid traffic condition.*

#### Signaling Lead Tests

**3.51** These tests provide a method of allowing switchroom access to trunk E&M leads via key operations at the MTTP. The signaling lead tests consist of three test features designated as E&M display feature, signaling test feature, and E&M pulsing test feature.

#### E&M Display Feature

**3.52** This feature provides maintenance personnel at the MTTP with the ability to monitor the states of the E&M leads of a trunk involved in a talking connection.

#### Signaling Test Feature

**3.53** This feature provides key control of the state of the M lead of an E&M TUT that is connected to an MTTP test access trunk. The states of the E&M leads are monitored and displayed by appropriate lamps at the MTTP. The test is accomplished by dialing up the TNN of the trunk to be tested at the master test facility and transferring the test call to TAT 1 or TAT 2. After operating the SIG TEST key associated with the chosen TAT (1 or 2) and operating the M LEAD key, the E and M lamps are observed for an M lead off-hook indication.

#### E&M Loop Around Test

**3.54** This test verifies the cross-office signaling feature of HILO 4-wire switching. It is valid only on HILO 4-wire circuits.

#### E&M Pulsing Test Feature

**3.55** This feature provides for the connection of a pulsing test set (either mounted in an adja-

cent AMT frame or portable) to the E&M or T and R leads of a TUT using jack appearances at the AMT or at the MTTP test access trunks. Both the E&M leads (E&M supervised trunks) and the T&R leads (loop supervised trunks) may be accessed at the EM jack at the appropriate TAT or at the PT jack at the AMT.

#### Signal Distributor Exerciser Feature

**3.56** This feature is provided with 1E7/1AE7 generics and can be used to test the signal distributors (SDs) associated with the MTTP. It will operate and release most of the SDs for the MTTP. The feature is initiated by operating the MASTER TEST FACILITY TEST key and dialing \* 209 # test code. Releasing the MASTER TEST FACILITY TEST key will abort the exerciser. This feature will not begin if any other activity is being performed at the panel when the \* 209 # test code is dialed.

#### AUXILIARY MANUAL TEST FRAME

**3.57** The test equipment contained in the AMT (Fig. 4) is connected to the MTTP transmission measuring circuit at a point where jacks are provided for portable test equipment. These connections are under key control at the MTTP.

**3.58** The readouts and controls for the digital transmission measuring set (TMS) are located on the MTTP. A single digital TMS master (KS-20805-L1A) can serve up to five MTTPs.

#### 4. REFERENCES

**4.01** Procedures for adjusting the milliwatt distributing network to compensate for office wiring loss are found in Section 103-335-513.

**4.02** Refer to Section 231-032-005 for Trunk Testing Capabilities.

**4.03** Refer to the following TOP documents for operating and alignment procedures for the MTTP and AMT: 231-050-006 Trunk Test Panel and Test Lines (1E6/1AE6) and 231-050-007 MTTP (1E7/1AE7).

**4.04** Refer to the following TOP documents for testing from the MTTP.

- 231-050-001 Trunk Transmission Tests
- 231-050-003 Trunk Circuit Tests (1E5/1AE5)

**SECTION 231-032-020**

- 231-050-004 Service Circuit Tests (1E5/1AE5)
- 231-050-023 Trunk Circuit Tests (1E6/1AE6)
- 231-050-024 Service Circuit Tests (1E6/1AE6)
- 231-050-010 HILO 4-Wire Trunk Transmission Tests
- 231-050-011 HILO 4-Wire Trunk Operational Tests.

**4.05** The 3756A telephone set is associated with the MTTP. Connection information for the 3756A set is given in Section 231-032-400.