

1A CONCENTRATOR MODIFIED FOR
MF SIGNALING - REMOTE END TESTS

CONTENTS

- | | |
|--|-------------------------------|
| 1. GENERAL INFORMATION | 5. FUSING |
| 2. RECORDS AND REQUIREMENTS | 6. TIMING TESTS |
| 3. TESTING EQUIPMENT | 7. SUPPLEMENTARY TESTS |
| 4. OPTIONAL STRAPPING AND CROSS-CONNECTION ASSIGNMENTS | 8. FUNCTIONAL OPERATION TESTS |
| | 9. MISCELLANEOUS TESTS |

1. GENERAL INFORMATION

1.1 Description

1.11 This section provides a method for testing various functional features of the following circuits:

SD-95972-01	MF Signaling Circuit for the 1A Concentrator - Remote End
SD-95957-01	1A Concentrator Remote Relay Unit - 50 Line Unit
SD-96537-01	1A Concentrator Remote Relay Unit - 100 Line Unit
SD-96557-01	Modification of 1A Line Concentrator for DTWX

1.12 The tests of this section are intended to apply only to the modified 1A Line Concentrator adapted for MF signaling for use in the dial TWX switching program and Wide Area Data Service (WADS). The remote unit for these applications is located in the central office and normally is supplied with central office battery. The standard 1A Concentrator remote unit is pole mounted at remote locations and is installed normally by operating company personnel.

1.13 The procedures covered in this section are arranged to test the remote end by simulating signals from the control end with test equipment. The tests are divided into three parts; optional strapping and cross connections, supplementary tests and functional operating tests.

1.14 Where both originating end and terminating end are tied together, operational and maintenance test information is provided in the following BSP sections:

<u>TITLE</u>	<u>NO.</u>	<u>AVAILABLE</u>
PREINSTALLATION TESTS	067-106-501	Issue 1, June 1962
CUTOVER PROCEDURES	067-106-201	Issue 1, June 1962
TROUBLE ANALYSIS	067-106-301	Issue 1, June 1962
SYSTEM TESTS	067-106-502	Issue 1, June 1962

2. RECORDS AND REQUIREMENTS

2.1 Records

2.11 The results of the tests of this section shall be recorded on forms ID-1313 and ID-1315. For further information on test records, see Section 3 of Handbook 50.

2.2 Requirements

2.21 The tests of this section cover the basic signaling and supervisory functions of the remote end relay unit and its associated MF Signaling Circuit, as described in the corresponding CD- sheets. The tests of the MF Signaling Circuit agree with the requirements of BSP 067-106-501.

3. TESTING EQUIPMENT

3.1 Test Sets

<u>Amt</u>	<u>ITE</u>	<u>Description</u>
1	4033B	Link Frame Test Set
1	4253 or 4253A	MF Key Pulsing Test Set (Optional - See Par. 8.14)
1	4325 or J24753A	Timing Test Set

3.2 Cords

<u>Amt</u>	<u>ITE</u>	<u>Lgth</u>	<u>Cdrs</u>	<u>One End</u>	<u>Other End</u>	<u>With ITE</u>
1 or 2	9962	12'	10	Jones Socket	10 ITE-2461 Sockets	4033B
1	9598	12'	2	310 Plug	310 Plug	4033B
1	9601	12'	3	310 Plug	310 Plug	Accessory Set
2	9547	12'	1	ITE-2455 Plug	ITE-2455 Plug	Accessory Set

3.3 Accessories

<u>Amt</u>	<u>ITE or Code</u>	<u>Description</u>	<u>With ITE</u>
1	R-9572	Receiver and Cords, Tester's	Accessory Set
1	ITE-4627	15-Point Jones Plug	Order from Hawthorne
12	ITE-4085	Push-On Clip	Accessory Set
4	ITE-8507	Allig. Clip	Accessory Set
10	KS-16887-L1 or	Relay Blocking Wedge	Order from Hawthorne
As Req	R-2231	Toothpick	Accessory Set

4. OPTIONAL STRAPPING AND CROSS-CONNECTION ASSIGNMENTS

4.1 At the remote end, the concentrator relay unit is mounted on relay rack framework and the outside hinged cover is removed. For a 50-line or 100-line unit, one MF Signaling Circuit is provided. For two 50-line units, two MF Signaling Circuits are provided.

4.2 Leads from the MF Signaling Circuit are cabled to a distributing frame and cross connect to leads from the concentrator relay unit. All leads to the relay unit are run normally from the distributing frame to terminal strips mounted directly under the terminal screw field of the relay unit. Cross connections are run vertically from the terminal strips to the individual screw terminations in the unit.

4.3 At the MF Signaling Circuit, straps are required to assign the proper series resistance on the signal leads. At the concentrator relay unit, straps are required to furnish proper battery and ground conditions for signaling purposes.

4.4 At the Remote MF Signaling Circuit, strap terminals at T.S. "C" as shown below:

T.S. "C" Strap Term.	Leads Strapped	SD-sheet Reference	Functional Purpose
41-51	A4-A5	B1-FS1-C1	700 ohms on TSO
42-52	B4-B5	B1-FS1-D1	700 ohms on RSO
43-53	C4-C5	B1-FS1-F1	700 ohms on TS1
44-54	D4-D5	B1-FS1-G1	700 ohms on RS1
E1-E2 E3-E6	15-25 16-35	-22 dbm	N Carrier
E1-E4 E5-E6	15-36 26-16	-30 dbm	K,O, ON, L Carrier

4.5 At the 50-line or 100-line remote concentrator relay unit, verify that the following straps are connected at T.S. "A".

"A" T.S. Strap Term.	Leads Connected	SD-Reference	Functional Purpose
94-104	SG0-SG1	FS3-loc. C3	Tie SG- leads together
104-105	SG0-GRD	FS3-loc. C3	Ground SG-leads
64-74	SBO-SB1	FS3-loc. G8	Tie SB- together
74-75	SBO-BAT	FS3-loc. G8	-24V on SB-leads

4.51 At the 100-line remote unit, verify that terminals 92 and 107 are strapped together at T.S. "B". This connects the "CF1" lead to the "ALM-1" lead.

4.6 50-Line Remote Concentrator Unit

4.61 Cross Connections

4.611 Verify that the following leads are cross connected from the lower frame terminal strip to the protector terminals at the lower section of the relay unit:

LINES	T00-T49 R00-R49
TRUNKS	T00-T13 R00-R13

4.62 At the 208A terminal strip mounted near the bottom of the control relay unit, cross connect terminal J to one of terminals E, F, G or H as determined by reference to Note 102 on SD-96557-01-D1.

4.63 At the distributing frame, verify that TSO, RSO, TS1 and RS1 leads from the MF Signaling Circuit are cross-connected to the corresponding leads from the control relay unit.

4.64 At the frame terminal strip, verify that the leads from the MF Signaling Circuit are terminated as follows:

MF SIG CKT Lead	Remote Unit Frame T.S.
TSO	TRUNKS - T10
RSO	" - R10
TS1	" - T11
RS1	" - R11
TL1	B T.S. - 01
TL2	B T.S. - 00

4.65 Verify that the leads from the Milliwatt Supply Circuit are terminated as follows:

MW Supply Lead	Remote Unit Frame T.S.
T2	04
R2	03
ST	02

4.66 Verify that the 8 ampere 24V battery feed is connected to terminal 07 of the frame terminal strip.

4.7 100-Line Remote Concentrator Unit

4.71 Verify that the following leads are cross-connected from the lower frame terminal strip to the protector terminals at the lower section of the relay unit:

LINES	T00-T99 R00-R99
TRUNKS	T00-T23 R00-R23

4.72 At the 208A terminal strip mounted near the bottom of the control relay unit, cross connect terminal J to one of terminals E, F, G or H as determined by reference to Note 102 on SD-96557-01-D1.

4.73 At the distributing frame, verify that TSO, RSO, TS1 and RS1 leads from the MF Signaling Circuit are cross-connected to the corresponding leads from the control relay unit.

4.74 At the frame terminal strip, verify that the leads from the MF Signaling Circuit are terminated as follows:

MF SIG CKT Lead	Remote Unit Frame T. S.
TSO	TRUNKS - T20
RSO	" - R20
TS1	" - T21
RS1	" - R21
TL1	SP3
TL2	SP4

4.75 Verify that the leads from the Milliwatt Supply Circuit are terminated as follows:

MW Supply Lead	Remote Unit Frame T.S.
T2	SP7
R2	SP6
ST	SP5

4.76 Verify that the central office alarm leads are connected as follows:

C.O. Alm. Lead	Remote Unit Frame T.S.
(Audible) 1	SP1
(Visual) 2	SP2

4.77 Verify that the 8 ampere 24V battery feed is connected to terminal 07 of T.S. "B".

5. FUSING

5.1 Remote MF Signaling Circuit - SD-95972-01

5.11 If fuses have not been shop installed, check fuse posts (A) and (C) for absence of false battery and ground. The (C) fuse will have resistance ground from the normally operated OT relay. Using a voltmeter or test receiver, check at location indicated for 48V battery when the designated fuse is installed:

CAPACITY	POTENTIAL	TEST FOR VOLTAGE AT
1-1/3 AMP	48V SIG(A)	Lower wdg. term. RR relay
1-1/3 AMP	48V SIG(B)	Lower wdg. term. T1 relay
1-1/3 AMP	48V SIG(C)	Lower wdg. term. GBA relay

5.2 Remote Concentrator Control Circuit SD-95957-01 or SD-96537-01

5.21 Fuses are shop installed at the remote concentrator and need not be verified. However, the change from the self-contained 24V storage battery to the provision of central office 24V battery must be checked.

5.22 In proving 24V central office battery for the remote unit, the 8A (8 ampere) and 5A (5 ampere) fuses are connected in series to feed the individual circuit fuses. Separate alarm pilot fuses are connected across the 8A and 5A fuses.

5.23 Remote the 8A, 5A, PF1, PF and B fuses. Using a voltmeter, test that -24V is present at the battery stud of the 8A and PF1 fuse blocks and is not present at the battery stud of the 5A fuse block.

5.24 Replace the 8A fuse and check that -24V is present at the battery stud of the 5A and PF fuse blocks and is not present at the B fuse block. Replace the 5A fuse and check that -24V is present at the B fuse battery stud. Replace the B, PF1 and PF fuses.

5.3 At some installations, the self-contained 24V storage battery is retained and no central office supply is furnished except for charging current leads. In such cases only the 5A (5 ampere) fuse is provided and the 8A fuse, PF1 fuse and FA lamp are not furnished with the unit. Adjust the CC potentiometer (if provided) to meet requirements shown in Notes 102 and 303 of SD-96557-01-D1.

6. TIMING TESTS

6.1 Timing tests are required for two relays of the MF Signaling Circuit, SD-95972-01. Timing requirements of the concentrator control relay unit are verified during shop tests and will require job verification only if trouble indications point to inaccurate timing adjustments.

6.2 The Timing Test Set, ITE-4325 or the maintenance test set per J24753A is used for these tests. Make calibration test of the test set per TMO-4325, Paragraph 3.3 for ITE-4325, or per maintenance BSP instructions for the J24753A test set.

6.3 Using an ITE-9598 cord, connect 48V battery and ground to the 48V jack on the test set. Using an ITE-9303 cord, connect one end to the (TST 1) jack of the test set. Connect the three leads at the other end of the cord as indicated for the relay under test. Set SEND key and REC SW and MIL-SEC switches at the settings shown for the relay under test.

6.4 OT Relay

6.41 Remove GB relay from its socket. Block operated relay T1 and block nonoperated relay GBA. Insulate contact 6B of relay GBA. Connect timing test cord as follows:

BK to ground
 RED to 6F contact of GBA relay
 WH to 3F contact of T1 relay.

6.42 Set controls on test set as follows:

SEND KEY	REC SW	MIL-SEC SW
MK	START-OC STOP-GRD	0-20

6.43 After holding test key to OPR position for 5 seconds, check that time elapsed is within the following requirements:

MIN: 19 MIL-SEC (no tolerance)
 MAX: 19 MIL-SEC

6.44 If reading is not within limits, adjust OT potentiometer and repeat test until requirements are met. After test, remove test connections and blocks from relays. Remove insulator from GBA relay and replace GB relay in its socket.

6.5 TML Relay

6.51 Using any convenient single conductor cord, connect ground to contact 3F of relay TML. Connect timing test set cord as follows:

BK to ground
 RED to upper wdg. terminal of TT1 relay
 WH to upper wdg. terminal of DL relay

6.52 Set controls on test set as follows:

SEND KEY	REC-SW	MIL-SEC SW
MK	START-48V STOP-GRD	0-500

6.53 After holding test key to OPR position for 5 seconds, check that reading is within the following limits.

MIN: 110 MIL-SEC
MAX: 165 MIL-SEC

6.54 If reading is not within limits, change strapping at TML capacitors and repeat test. When limits are met disconnect test connections and ground from TML relay.

6.6 After completing timing tests, disconnect cords from ITE-4325 or J24753A Timing Test Set.

7. SUPPLEMENTARY TESTS

7.1 MF Signaling Circuit - SD-95972-01

7.11 Check Counter

7.111 At the MF Signaling Circuit, block nonoperated relay T11. Disconnect the P1 Jones Plug from the J1 or J2 Jones Socket to isolate the MF Signaling Circuit from the local MF Receiver Circuit.

7.112 Manually operate and release relay RK2 three times and observe results as shown below. If contacts on RK2 relay bunch (make before break) sequence will not function properly in manual operation. If fast manual operation does not eliminate bunching, operate relay electrically by connecting any convenient cord to the front upper winding terminal of relay RK2 and grounding the other end of the cord:

RK2 Relay	Observe Relays	
	Operate	Release
Operate	CC1	
Release	CC1, CC2	
Operate	CC1, CC2, CC3	
Release	CC2, CC3	CC1
Operate	CC3	CC2, CC1
Release	CC3	CC2, CC1

7.113 After completing tests, momentarily operate relay RL. Check that all relays CC1, CC2 and CC3 are released. Remove block from relay T11.

7.12 MF Signal Output

7.121 Using a voltmeter or a test receiver connected to high resistance ground, verify that there is no 48V potential at the relay contacts shown below. The false presence of 48V battery will damage the oscillator supply circuit. Check each of the following contacts for presence of a single MF tone as indicated. For this test the actual frequency need not be verified, but the relative change in pitch should be checked as the tests proceed from the lowest to the highest tone:

MF Tone or Frequency No.	(Test Receiver Conn. To HRG) Check at Relay
700(0)	T4 Relay, Contact 2F
900(1)	T1 " " "
1100(2)	T2 " " "
1300(4)	T5 " " "
1500(7)	T8 " " "
1700(10)	T11 " " 1F

7.122 Block nonoperated relay CC1 at the MF unit. Using the test setup shown in Figure 1, connect the MF output of the Signaling Circuit (jack J6) to the input of the MF Receiving Circuit or to the input jack J2 of ITE-4253A.

7.1221 The nominal output level at the J6 jack of the MF Signaling Circuit is -22 dbm for two frequencies using the strapping recommended for N carrier termination. Since this level is also the minimum input level for the MF Receiver Circuit, the receiver may not respond to the output tones of the Signaling Circuit. If the level is found to be too low to activate the receiver properly, change the test connection to the J7 jack of the MF Signaling Circuit. This will provide a higher output level but will not check the output pad resistances.

7.123 If the test setup is not available for these tests, exact identification of MF signals may be postponed until operation tests are performed. In this case, simply connect a test receiver across the T and R leads of the cord connected to the J6 or J7 jack of the MF Signaling Circuit.

7.124 Perform test operations as outlined in Table 1. Verify that the T(-) relay operates and output tones are received as shown for each test while the control relay or relays are operated. During these tests, verify that relay GBA operates while T(-) relay is operated. Since certain S(-) A relays are energized during the test, relays must be blocked down to obtain the desired combinations.

7.125 After completing tests of Table 1, momentarily operate relay RL. Check that relay CC3 is released and relays S2A and S4A are operated. Remove block from relay CC1.

7.2 Remote Concentrator Control Relay Unit

7.21 Test Circuit

7.211 First Test Line (50 or 100 Line Unit)

7.2111 Remove relay TML from its socket. If ITE-4033B is set up to operate R(-) relays, operate keys A2 and A5. If test set is not set up, block operated relays R2 and R10. Observe that relays TT1 and CL49 operate at the control relay unit.

7.2112 Release keys A2 and A5 or release relays R2 and R10. Check that CL49 relay remains operated and TT1 is released. At the control unit, verify that relay TL1 operates. Using a test receiver, check that 1000 cycle tone is audible across the T and R of Line 49 and is not audible across line 99.

7.2113 Momentarily operate relay DL and check that relays CL49 and TL1 are released and tone is cut off from line 49.

TABLE 1
MF TONE OUTPUT TESTS - SD-95972-01

Test No.	Test Operations	Observe Results	
		Relay Operates	Check Tone Output
1	Momentarily operate RK2	T11 operated	1 & 10 (900 & 1700)
2	Block nonoperated S4A, block operated S1A	Relays S1A,S2A,T1 operated	0 & 1 (700 & 900)
3	Release S1A, block nonoperated S2A	S4A,T2 operated	0 & 2 (700 & 1100)
4	Release S2A, block operated S1A	S1A,S2A,S4A,T3 operated	1 & 2 (900 & 1100)
5	Release S1A, block nonoperated S4A	S2A,T4 operated	0 & 4 (700 & 1300)
6	Release S4A, block operated S3A	S2A,S3A,S4A,T5 operated	4 & 7 (1300 & 1700)
7	Release S3A	S2A,S4A,T6 operated	2 & 4 (1100 & 1300)
8	Block operated S3A, block non-operated S2A	S3A,S4A,T7 operated	0 & 7 (700 & 1500)
9	Release S2A, block operated S1A	S1A,S2A,S3A,S4A,T8 operated	1 & 7 (900 & 1500)
10	Release S1A and S3A relays. Momentarily operate CC3 relay.	CC3 locks operated. All T(-) relays and S(-)A relays released.	None

7.212 Second Test Line (100 Line Unit Only)

7.2121 If ITE-4033B is set up, operate keys A3 and A5. If test set is not set up, block operated relays R4 and R10. Observe that relays TT2 and CL99 operate.

7.2122 Release keys A3 and A5 or release relays R4 and R10. Check that relay TT2 is released and CL99 remains operated. At the control unit, verify that relay TL2 operates. Using a test receiver, check that 1000 cycle tone is audible across the T and R of line 99 and is not audible across line 49.

7.2123 Momentarily operate relay DL and check that relays CL99 and TL2 are released and tone is cut off from line 99.

7.3 Sequence Control

7.31 For this test, the TS1 lead from the remote MF signaling circuit is alternately grounded and opened to control the M relay in the remote concentrator unit. The successive operations of the M relay advance the sequence control circuit.

7.32 At the MF Signaling Circuit, block operated relay R7. Then manually operate and release relay R2 four times and observe that relays operate in the concentrator unit as shown below:

Relay R2	Relays Operate
Operate	W1
Release	W1,Z1,Z1A
Operate	W2
Release	W2,Z2,Z2A
Operate	W3
Release	W3,Z3,Z3A
Operate	W4
Release	(All above relays except W4 remain operated)

7.33 Remove block from relay R7 at the MF Signaling Circuit. Block operated relays R1 and R10 at the MF unit. Check that relay RL operates at the MF unit, and relays W1, W2, W3, Z1, Z1A, Z2, Z2A, Z3 and Z3A release at the concentrator unit. Then remove blocks from relays R1 and R10 at the MF unit. Observe that relay RL releases.

8. FUNCTIONAL OPERATION TESTS

8.1 Test Layout

8.11 At the remote end location, the MF Receiver which normally receives signals from the control end and

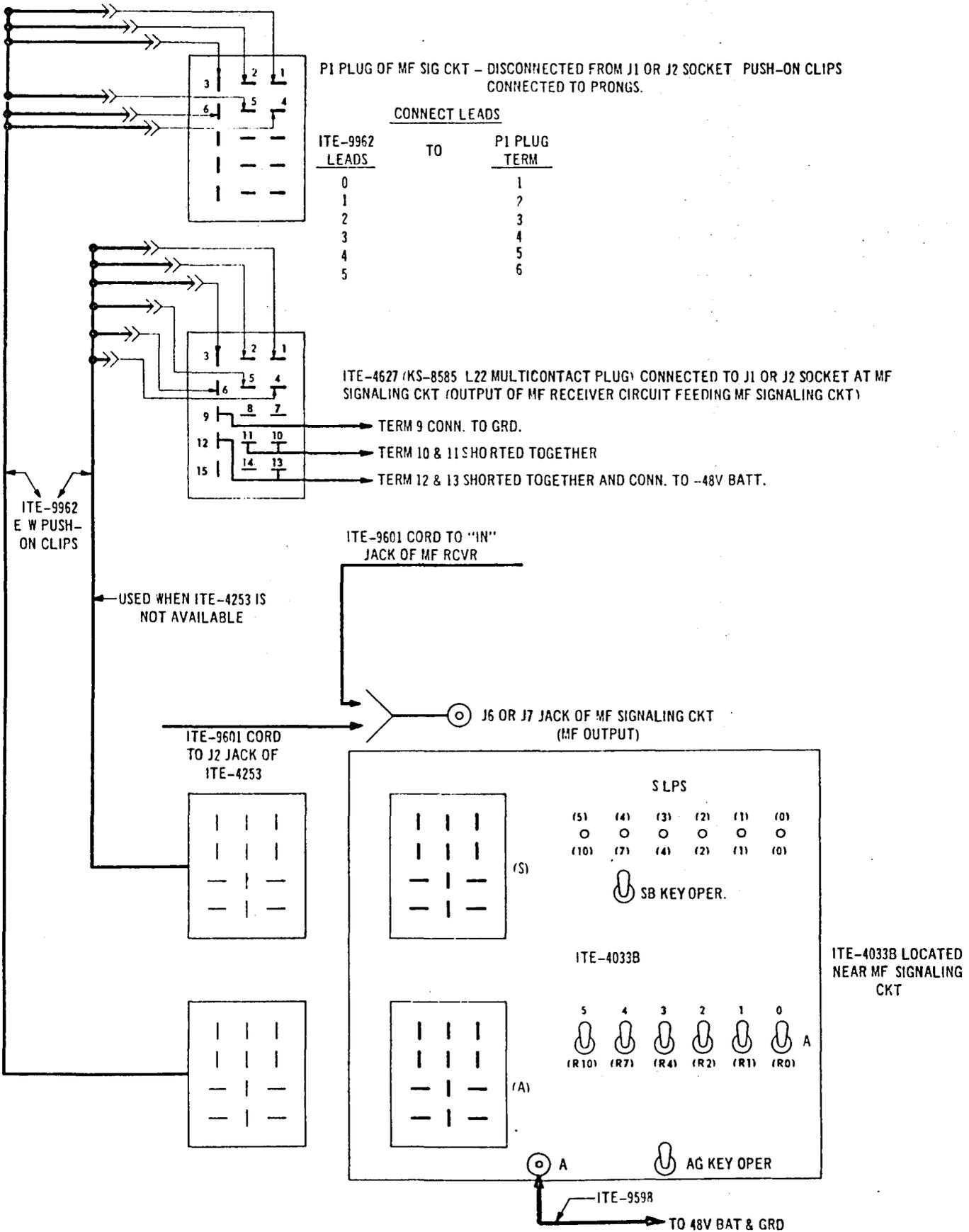


FIG. 1 TEST SETUP FOR OPERATION TESTS AT REMOTE END LOCATION

connects to the input of the MF Signaling Circuit, is disconnected from the signaling circuit. The ITE-4033B, Link Frame Test Set, is used to simulate the DC numerical output of the MF Receiver and is connected to the input of the MF Signaling Circuit. The MF output of the signaling circuit is detected by feeding the tones into the local MF Receiver and observing the numerical output of the receiver, or by feeding the signal into the ITE-4253A, MF Key Pulsing Test Set, and observing the digit indicating lamps on the test set.

8.12 At the MF Signaling Circuit, disconnect the P1 plug from the J1 or J2 multicontact socket. At the ITE-4033B, connect the socket of an ITE-9962 cord into the (A) plug on the test set. Insert ITE-4085 Push-On Clips into the ITE-2461 sockets of six leads at the other end of the cord and connect to the prongs of the P1 plug as shown below: (See Figure 1)

ITE-9962 Cord Lead	P1 Plug Terminal	Relay Winding Connection
0(A0)	1	R0
1(A1)	2	R1
2(A2)	3	R2
3(A3)	4	R4
4(A4)	5	R7
5(A5)	6	R10

8.13 At ITE-4033B, operate key AG and check that all (A) keys are normal. Using an ITE-9598 cord, connect 48V battery and ground to the (A) jack of the test set.

8.14 If the MF Receiver Circuit has been checked out and is in operating condition, the MF output of the concentrator control circuit may be connected to the input of the MF Receiver and the DC output of the receiver may be used to light indicating lamps in the ITE-4033B test set. If the receiver is not in operating condition, the ITE-4253A, MF Key Pulsing Test Set, may be used to receive the MF signals from the signaling circuit.

8.15 MF Signals Detected With Local MF Receiver (See Figure 1)

8.151 At the MF Signaling Circuit, connect an ITE-4627, 15-point blank multicontact Jones plug to the J1 or J2 socket for the working MF Receiver. Using an ITE-9962 cord, connect ITE-4085 Push-On Clips to the first six ITE-2461 sockets at one end of the cord. Connect the push-on clips to the wiring terminals of the ITE-4627 as shown in Figure 1. Connect sockets 0-5 to the 1-6 numbered terminals of the multicontact plug. Connect the socket end of the ITE-9962 cord to the (S) multicontact plug on ITE-4033B. Operate key SB on the test set. (See Figure 1).

8.152 Using an ITE-9601 cord, connect J6 jack of MF Signaling Circuit to the "IN" jack of the MF Receiving Circuit. Verify that "Q" option strap (term. 11 & 12 at T.S. A) is removed at the MF Receiver Circuit.

8.153 At the ITE-4627 Jones plug, strap together terminals 10 and 11 with bare strap wire. Then strap together terminals 12 and 13 and connect to 48V battery with an ITE-9547 cord equipped with insulated alligator clips. Using a second ITE-9547 cord, connect terminal 9 to ground. Check that relays KP1 and KP2 are operated in the MF Receiver Circuit.

8.154 With the above test setup, signals from the remote end are simulated by operation of A(-) keys in ITE-4033B to cause operation of R(-) relays in the MF Signaling Circuit. When the signaling circuit and concentrator control circuit function to send MF signals to the remote end, the output signal is patched into the local MF receiver. The resultant DC output is connected to the S(-) lamps in the test set to indicate the tones received.

8.16 MF Signals Detected With ITE-4253A, MF Key Pulsing Test Set

8.161 If the ITE-4253A is to be used, locate the test set near the MF Signaling Circuit. Using an ITE-9601 cord, connect jack J6 of the signaling circuit to jack J2 of the test set.

8.162 Connect the power cord of ITE-4253A into the nearest 110V AC receptacle and turn on power switch. Set SA and SR switches at position 11 (unconnected). Set SEL selector switch at KP position.

8.163 When MF tones are transmitted to the test set, frequency indicating lamps will light, showing the frequencies received. If lamps do not light or all lamps light while tones are received, adjust BIAS ADJ potentiometer on ITE-4253A until the desired 2 out of 6 lamps light. See Section 32 of Handbook 50 for description of the MF receiving circuit of ITE-4253A.

8.2 Test Operations

8.21 Using one of the test setups described above, perform the test operations of Table 2 and observe results as indicated. If test sets are not available for these tests, operations can be simulated by blocking operated R(-) relays in place of key operations at ITE-4033B. MF signal output may be detected by removing the protective cover at the MF Receiving Circuit and observing operation of the digit registration relays.

8.22 After completing tests of Table 2, perform tests of Table 3 to simulate features of a terminating call. The first part of Table 3 simulates a call in Group 0 or the first group of a dual 50-line unit. The second part of Table 3 simulates a call in Group 1 which is the second half of a dual 50-line unit. For single 50-line units, test only the first half of Table 3.

TABLE 2
TEST OF SERVICE REQUEST CALL FEATURES - REMOTE END

Test No.	Test Operations		Observe Results		
	At ITE-4033B	At Conc. Ckt	At ITE-4253A or ITE-4033B	At MF SIG Ckt	At Conc. Ckt
1	Operate keys A2,A3		1100 & 1300 or S2 & S3 lamps light	Relays R2,R4,S2A, S4A,T6,GBA operate	
2		Block operated LA00 relay	900 & 1100 or S1 & S2 lamps light	Relays S1A,S2A,S4A, T3 operated. T6 released	S1A,S4A operated
3	Release keys A2,A3			Relays R2,R4 release	
4	Operate keys A2,A4		900 & 1700 or S1 & S5 lamps light	Relays R2,R7 operate. S(-)A relays release.T11 operates. T3 released.RK2,CC1 operate	W1,CK,CGO (or CG) operate S1A,S4A release
5	Release keys A2,A4		Lamps out	Relays R2,R7,RK2 release. Relay CC2 operates	CK releases. Z1,Z1A operate
6		Block operated LB6 relay	700 & 900 or S0 & S1 lamps light	Relays S1A,S2A,T1, GBA operate	Relay S1A operates
7	Operate keys A2,A4		900 & 1700 or S1 & S5 lamps light	Relays R2,R7,RK2 CC3 operate. T1 releases. T11,GBA operate. S1A,S2A release	W2,B6,BA6,CK relays operate. S1A release. B9 select magnet operates on XBR switch
8	Release keys A2,A4		700 & 1100 or S0 & S2 lamps light	R2,R7,RK2,CC1,T11 release. S4A operates. T2 operates. GBA remains operated.	CK releases. Z2,Z2A operate. S4A operates
9	Operate keys A2,A4		900 & 1700 or S1 & S5 lamps light	Relays R2,R7,RK2 operate. CC2,T2 release. T11 operates. S4A releases. GBA remains operated	W3,A0,MK,CK operate. S4A releases. (If MK does not operate, release any falsely operated A(-) or B(-) relays)
10	Release keys A2,A4		Lamps out	Relays R2,R7,RK2, T11,GBA release	CK releases Z2,Z3A operate
11	Operate keys A0,A5	Remove blocks from LA00 and LB6		Relays R0,R10,RR operate. CC3 remains operated	TR operates
12	Release keys A0,A5			Relays R0,R10,RR release	TR remains operated
13	Operate keys A2,A4		900 & 1700 or S1 & S5 lamps light	Relays R2,R7, operate. RK2,T11,GBA operate. CC3 remains operated.	W4,SMK,TK9 operate. (If SMK does not operate, check that only TK9 and A0-2,A1-2, B0-9 & B1-9 select magnets are operated. A(09) and B(09) hold magnets operate. HMK,CK operate

(Cont'd)

TABLE 2 (Cont'd)

Test No.	Test Operations		Observe Results		
	At ITE-4033B	At Conc. Ckt	At ITE-4253A or ITE-4033B	At MF SIG Ckt	At Conc. Ckt
14	Release keys A2,A4	Block CK operated		Relays R2,R7 release	W4,TK9,SMK release
15	Operate keys A1,A5			Relays R1,R10,RL operate. CC3 released. RK2,T11,GBA remain operated	RLS operates momentarily. Relays TR,W1,W2,W3,CGO (or CG), BA6,B6,A0,Z1A,Z2A,Z3A,TK9,SMK,HMK and select magnets, release. Hold magnets remain operated
16	Release keys A1,A5			Relays R1,R10,RL release.	
17		Release CK relay	1100 & 1300 or S2 & S3 lamps light	RK2,T11 release.S2A,S4A operate. T6,GBA operate. CC1,CC2 operated.	CK releases
18		At MF SIG Ckt, momentarily operate RL relay		CC1,CC2 relays released.	
19		(See Note 1)	Lamps remain lighted	S2A,S4A,T6,GBA remain operated	Hold magnets release

NOTE 1: To release magnetically latched hold magnets:

- (a) Block nonoperated CGO and SMK relays.
- (b) Block operated DGO and TK9 relays.
- (c) Connect 300 ohm (or less) test receiver to -48V and touch test pick to contact 8F of relay DGO.
- (d) Remove blocks from relays.

TABLE 3

TEST OF TERMINATING CALL FEATURES - REMOTE END

Test No.	Test Operation		Observe Results		
	At ITE-4033B	At Conc. Ckt.	At ITE-4253A or ITE-4033B	At MF SIG Ckt	At Conc. Ckt
1	All keys normal		1100 & 1300 or S2 & S3 lamps lighted	S2A,S4A,T6,GBA operated	
2	Operate keys A0,A5		Lamps out	Relays R0,R10,RR,CC3 operate. T6,S2A,S4A,GBA release	RRA operates ←
3	Release keys A0,A5			Relays R0,R10,RR release	
4	Operate keys A1, A2 (Group 0)		900 & 1700 or S1 & S5 lamps light	Relays R1,R2,S2A,S1A,S4A,RK2,T11,GBA operate	Relays S1A,S4A,W1,CGO (or CG), CK operate

(Cont'd)

TABLE 3 (Cont'd)

Test No.	Test Operation		Observe Results		
	At ITE-4033B	At Conc. Ckt	At ITE-4253A or ITE-4033B	At MF SIG Ckt	At Conc. Ckt
5	Release keys A1,A2		Lamps out	Relays R1,R2,S2A,S3A,S4A,RK2,T11,GBA release	Relays S1A,S4A,CK release. Z1,Z1A operate
6	Operate keys A1,A4		900 & 1700 or S1 & S5 lamps light	Relays R1,R7,S1A,S2A,S4A,S3A,RK2,T11,GBA operate	Relays S1A,S3A,S4A,W2,B8,BA8,CK operate. B7 steering select magnet operates
7	Release keys A1,A4		Lamps out	Relays R1,R7,S1A,S2A,S3A,S4A,T11,GBA RK2 release	Relays S1A,S3A,S4A,CK release. Z2,Z2A operate
8	Operate keys A2,A3		900 & 1700 or S1 & S5 lamps light	Relays R2,R4,S2A,S4A,RK2,T11,GBA operate	Relays S4A,W3,A3,MK,CK operate. B1 select magnets operate
9	Release keys A2,A3		Lamps out	Relays R2,R4,S2A,S4A,T11,GBA,RK2 release	Relays S4A,CK release. Z3,Z3A operate
10	Operate keys A2,A4	If HMK does not operate, block HMK operated	900 & 1700 or S1 & S5 lamps light	Relays R2,R7,T11,RK2,GBA operate	Relays W4,TKO,SMK,HMK,CK operate
11	Release keys A2,A4			Relays R2,R7 release	W4,TKO,SMK release
12	Operate keys A1,A5	Remove block from HMK if blocked operated	Lamps out	Relays R1,R10,RL operate. Relays CC3,RK2,T11,GBA release	RLS operates momentarily. Relays W1,W2,W3,Z1,Z1A,Z2,Z2A,Z3,Z3A,HMK,RRA,CK,A3,B8,BA8,and B1 & B7 select magnets release.
13	Release keys A1,A5		1100 & 1300 or S2 & S3 lamps light	Relays R1,R10,RL release. S2A,S4A operate. T6,GBA operate	
14	Operate keys A0,A5		Lamps out	Relays R0,R10,RR,CC3 operate. Relays S2A,S4A,T6,GBA release	RRA operates
15	Release keys A0,A5			Relays R0,R10,RR release	
16	Operate keys A3,A4 (Group 1)		900 & 1700 or S1 & S5 lamps light	Relays R4,R7,S2A,S3A,S4A,RK2,T11,GBA operate	Relays S3A,S4A,W1,CK,CG1 operate
17	Release keys A3,A4		Lamp out	Relays R4,R7,S2A,S3A,S4A,RK2,T11,GBA release	Relays S3A,S4A,CK release. Z1,Z1A operate
18	Operate keys A0,A2		900 & 1700 or S1 & S5 lamps light	Relays R0,R2,S4A,RK2,T11,GBA operate	Relays W2,B1,BA1,CK operate. B8 steering select magnet operates

(Cont'd)

TABLE 3 (Cont'd)

Test No.	Test Operation		Observe Results		
	At ITE-4033B	At Conc. Ckt	At ITE-4253A or ITE-4033B	At MF SIG Ckt	At Conc. Ckt
19	Release keys A0,A2		Lamps out	Relays R0,R2,S4A,RK2,T11,GBA release	Relay CK releases. Z2, Z2A operate
20	Operate keys A0,A1	(See Note 1)	900 & 1700 or S1 & S5 lamps light	Relays R0,R1,S1A, S2A,RK2,T11,GBA operate	Relays S1A, W3,A5,MK,CK operate. B5 select magnet operates.
21	Release keys A0,A1		Lamps out	Relays R0,R1,S1A, S2A,RK2,T11,GBA release	Relays S1A,CK release. Z3, Z3A operate
22	Operate keys A2,A3	If HMK relay does not operate, block operated HMK	900 & 1700 or S1 & S5 lamps light	Relays R2,R4,S2A, S4A,RK2,T11,GBA operate	Relays W4,SMK, HMK,TK4,CK operate
23	Release keys A2,A3			Relays R2,R4,S2A, S4A release	W4,TK4,SMK release
24	Operate keys A1,A5	Remove block from HMK, if blocked oper.	Lamps out	Relays R1,R10,RL operate. Relays CC3,RK2,T11,GBA release	RLS operates momentarily. Relays W1,W2, W3,Z1,Z1A,Z2, Z2A,Z3,Z3A, HMK,RR,CK, A5,B1,BA1 and B5 and B8 select magnets release
25	Release keys A1,A5		1100 & 1300 or S2 & S3 lamps light	Relays R1,R10,RL, release. Relays S2A,S4A,T6,GBA operate	

NOTE 1: If any other A(-) relay operates and locks, manually release any relay other than A5.

TABLE 4

TEST OF DISCONNECT CALL FEATURES - REMOTE END

Test No.	Test Operation		Observe Results		
	At ITE-4033B	At Conc. Ckt	At ITE-4253A or ITE-4033B	At MF SIG Ckt	At Conc. Ckt
1	All keys normal		1100 & 1300 or S2 & S3 lamps lighted	S2A,S4A,T6,GBA operated	
2	Operate keys A0,A5		Lamps out	Relays R0,R10,RR,CC3 operate. Relays T6, GBA,S2A,S4A release	RRA operates
3	Release keys A0,A5			Relays R0,R10,RR release	
4	Operate keys A0,A3 (Group 0)		900 & 1700 or S1 & S5 lamps light	Relays R0,R4,S2A, RK2,T11,GBA operate	Relays W1,DG0 or DG operate. CK operates
5	Release keys A0,A3		Lamps out	Relays R0,R4,S2A, RK2,T11,GBA release	Relay CK releases. Z1, Z1A operate

(Cont'd)

TABLE 4 (Cont'd)

Test No.	Test Operation		Observe Results		
	At ITE-4033B	At Conc. Ckt	At ITE-4253A or ITE-4033B	At MF SIG Ckt	At Conc. Ckt
6	Operate keys A1,A5			Relays R1,R10,RL operate. Relay CC3 releases.	RLS operates momentarily. Relays W1,Z1, RRA,Z1A,DGO or DG release
7	Release keys A1,A5		1100 & 1300 or S2 & S3 lamps light	Relays R1,R10,RL release. Relays S2A,S4A,T6,GBA operate	
8	Operate keys A0,A5		Lamps out	Relays R0,R10,RR, CC3 operate. Relays S2A,S4A,T6,GBA release	RRA operates
9	Release keys A0,A5			Relays R0,R10,RR release	
10	Operate keys A0,A2 (Group 1)		900 & 1700 or S1 & S5 lamps light	Relays R0,R2,S4A, RK2,T11,GBA operate	Relays W1,DG1, CK,S4A operate
11	Release keys A0,A2		Lamps out	Relays R0,R2,S4A, RK2,T11,GBA release	Relays CK,S4A release. Z1, Z1A operate
12	Operate keys A1,A5			Relays R1,R10,RL operate. Relay CC3 releases	
13	Release keys A1,A5		1100 & 1300 or S2 & S3 lamps light	Relays R1,R10,RL release. Relays S2A, S4A,T6,GBA operate.	

8.23 After completing tests of Table 3, perform tests of Table 4 to simulate a disconnect call. The first part of Table 4 simulates a call in a single 50-line or the first half of a 100-line unit. The second part of Table 4 simulates a call in the second group of a 100-line remote unit.

8.24 After completing tests of Table 4, disconnect ITE-4033B from the MF Signaling Circuit and disconnect leads from the ITE-4627 Jones Plug. Remove the blank Jones plug from the J1 socket at the signaling circuit. Leave P1 plug from the MF Receiver disconnected for the final miscellaneous tests.

9. MISCELLANEOUS TESTS

9.1 Fuse Alarm

9.11 Insert an operated fuse into the PF1 fuse socket. Observe that the red FA lamp at the top of the frame lights, the aisle pilot lights and the office audible alarm is sounded. Check that relay CF operates but FAL is not operated.

9.12 Remove the operated fuse and replace with a good fuse in the PF1 fuse socket. Check that FA lamp is extinguished, aisle pilot lamp goes out, office alarm is silenced and relay CF is released.

9.13 Insert an operated fuse into the PF fuse socket. Observe that the red FA lamp lights inside the control relay unit, aisle pilot lamp is lit, and office audible alarm sounds. Verify that relay FAL is operated and CF is not operated.

9.14 Remove the operated fuse and replace with a good 1/4 ampere fuse in the PF fuse socket. Check that FA lamp is extinguished, aisle pilot goes out, audible alarm is silenced, and relay FAL is released.

9.15 Insert an operated fuse into the B fuse socket. Observe that the same alarm indications are received as with the PF fuse.

9.16 Remove the operated fuse and replace with a good fuse in the B fuse socket. Check that alarm lamps are extinguished and audible alarm is silenced.

9.2 Miscellaneous Leads

9.21 At the test terminals on the front of the remote concentrator unit, test for ground, high resistance ground and 24V battery, at terminals G, HRG and -24V, respectively, using a volt-ohmmeter or a test receiver.

9.22 At the MF Signaling Circuit, verify that relays S2A and S4A are operated with no R(-) relays operated.

9.23 At the MF Signaling Circuit, insert P1 plug into the J2 socket for the standby MF Receiver Circuit and check that relays KP1 and KP2 operate in the standby unit. Disconnect P1 plug from the J2 socket and insert into the J1 socket for the regular MF Receiver. Check that relays KP1 and KP2 release in the standby unit and operate in the regular unit.

9.24 Lines and Trunks

9.241 To check line circuit leads, all CO(-) relays must be magnetically unlatched. To unlatch relays, obtain a 4.5 volt dry cell battery from the telephone company maintenance supplies. Connect two leads to the terminals of the battery and perform tests as follows:

(a) Connect positive terminal of 4.5 volt battery to frame ground at control relay unit.

(b) Momentarily touch negative terminal of battery to terminal 1 on each CO relay.

(c) Using a voltmeter or high resistance test receiver, verify that there is no ground on terminal 2 of each CO relay, and that there is no battery on terminal 5 of each CO relay.

9.242 Verify continuity of leads for LINES (00-49 or 00-99) and TRUNKS (00-09 or 00-19) from the frame terminal strip to the distributing frame at which the cable terminates. Test for crosses, reverses and transposition of leads.

9.243 After completing tests, leave CO relays in the unlatched condition for cut-over procedures to be applied by telephone company personnel.

➤ Arrowed lines indicate new or changed information.

R. W. HILLEGAS

Superintendent, Installation Engineering

Reason for Reissue:
To add references to BSP test information and correct key references in Table 3.

Replaces Section 907 dated 10-18-62.