Installation Engineering Handbook 59
Western Electric
Hawthorne Works

LONG LINE CIRCUITS

CONTENTS

1. GENERAL INFORMATION

1.1 This section describes the tests to be made on the following Long Line Circuits

SD-96551-01 Long Line, Data-Phone Set to Crossbar Office #5
SD-96552-01 Long Line, Crossbar Office #5 to Data-Phone Set
SD-96555-01 Dial Long Line Circuit
SD-96592-01 Coin Dial Long Line Circuit

1,2 These tests consists of operating tests of the equipment units and should be completed before cross connections are installed.

1.3 Temporary cross connections are required when testing Coin Dial Long Line Circuits. Refer to Handbook 3, Section 4.

2. RECORDS AND REQUIREMENTS

2.1 Records

2.11 Forms SD-4-1313 and SD-4-1315 are required for recording the results of these tests. For further information on preparing records, refer to Handbook 3, Section 6B.

2.2 Requirements

2.21 The tests in this section are based on SD and CD information.

3. TEST EQUIPMENT

3.1 Test Sets

NOTE	AMT	CODE	DESCRIPTION
	1	ITE-4631	Test Receiver
	1	ITE-4011	Misc. Trunk Test Set
	1	ITE-4442A	Volt-Ohmmeter
1	1	500	Call Thru Telephone
1	1	1A	Coin Sub Set
2	1	ITE-9650	Telephone Set

3.2 Cords

Amt	Code	Lgth	Cord	One End	Other End	With ITE
2	9639	12'	3	310 Plug	3-2455 Plugs	4011
1	9598	12'	2	310 Plug	310 Plug	4011
As Req.	9548	9"	1	2455 Plug	2455 Plug	4011

3.3 Accessories

Note	Amt	Code	Description	With ITE
	As Req.	8507	Alligator Clip	4011
1,3,4	2	18DA	1510 Ohm resistor	-
1,3,5	2	18BJ	1200 Ohm resistor	
	1	-	Coin Subscriber Set	

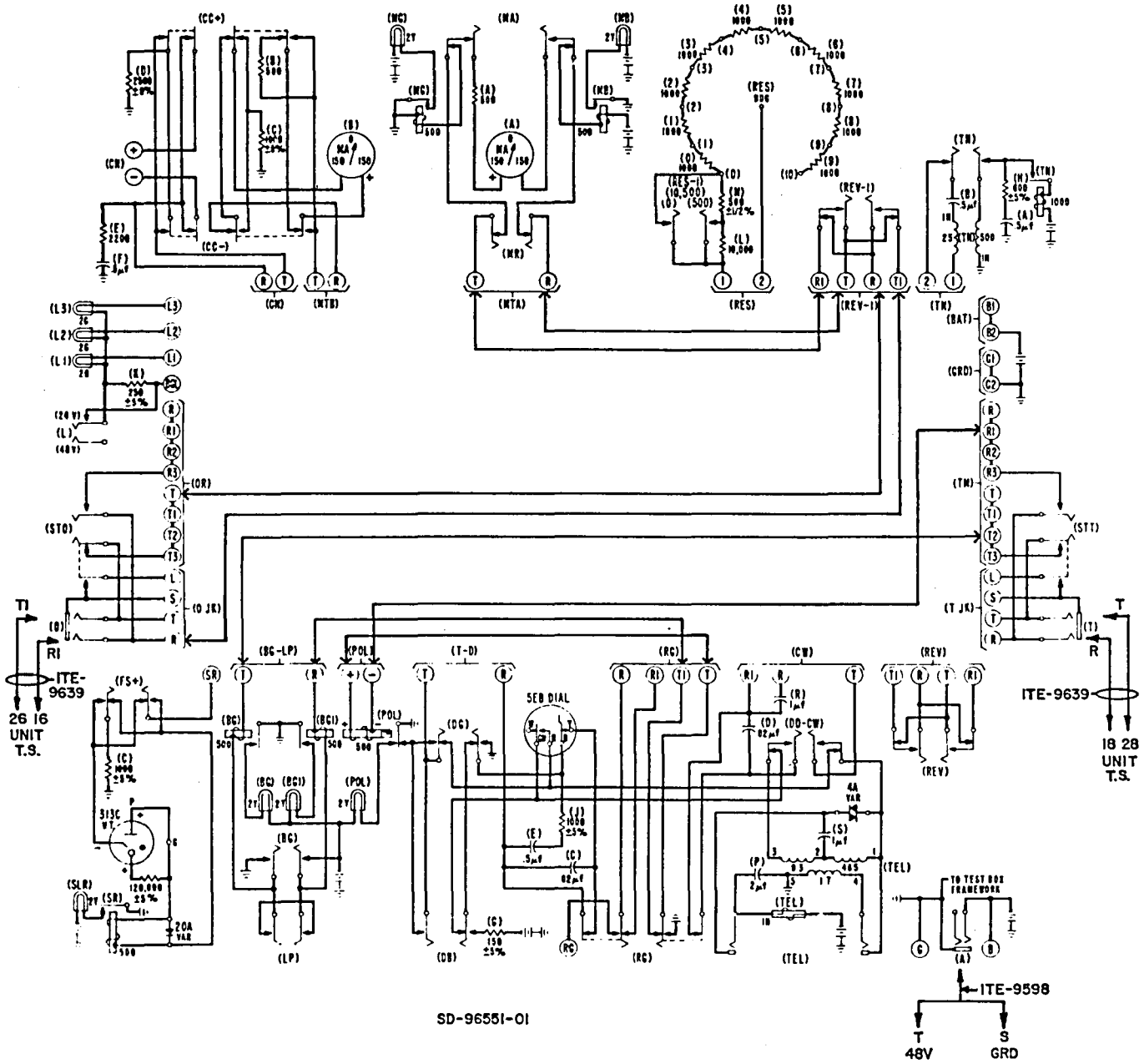
3.4 Notes

1. Required for testing Coin Dial Long Line Circuit only (SD-96592-01)
2. Required for testing Dial Long Line Circuit only (SD-96555-01)
3. To be requisitioned if comparable telephone company equipment is not available.
4. Use these resistors if the coin relay in the coin subset operates on 41MA. (See Par. 5.432)
5. Use these resistors if the coin relay in the coin subset operates on 48MA. (See Par. 5.431)

4. FUSING

4.1 Using a volt-ohmmeter, check each fuse post for absence of battery and ground.

4.2 Using fuses of correct type as indicated by circuit drawing and fuse panel designations, install fuses one at a time. Check that each fuse is associated with the correct equipment and is free from crosses with other unfused posts on the fuse panel.



NOTE ARROWS ON KEY CHART INDICATE KEYS OPERATED BEFORE START OF TEST

CIRCUIT REQUIREMENTS						
DESIG	CODE	RES %	TEST	SOAK MA	TEST MA	READ MA
POL	230FM	5%	0	-15	60	3
			R	15		1
			RO	15		18
POL	280J	10%	0	-12	–	* 3
			RO	-12	–	* 2
			0	-12	52	5
			RO	12	17	18
			R	12	9	1
TR	280C	5%	0		13	12
			RO		10 5	11
MB,MG1	1	5%	0		12	11
			RO		9	10
MG,MB	0-475	5%	0		95	83
			RO			59
SR		5%	0		7	

*APPLIED WITH TENSION OF BIASING SPRING RELEASED

REQ	CORDS AND ACCESSORIES						WITH ITE
	ANT	ITE	LENGTH	CORD	END	END	
	4	9547	12"	1	2455	2455	
	1	9601	12"	3	310	310	
	1	9695	12"	3	310	309	
	2	9639	12"	3	310	3-2455	
	14	9548	8"	1	2455	2455	
	1	9588	12"	2	310	310	
	2	9514	12"	3	310	3-4085	
	8	0507	ALLIGATOR CLIPS				
	6	2459	PLUGS				
	8	4188	SPADE TIPS				
	2	4412	CONNECTOR 2-POINT				
	2	4413	CONNECTOR 4-POINT				

NOTE ALL RESISTOR VALUES ARE ±1% UNLESS OTHERWISE SPECIFIED

	CC-	LP	CO-CW	
STO	CC+	BG	REV	REV-1
	TR	MA	DB	
STT	RG	MR	DG	FS+

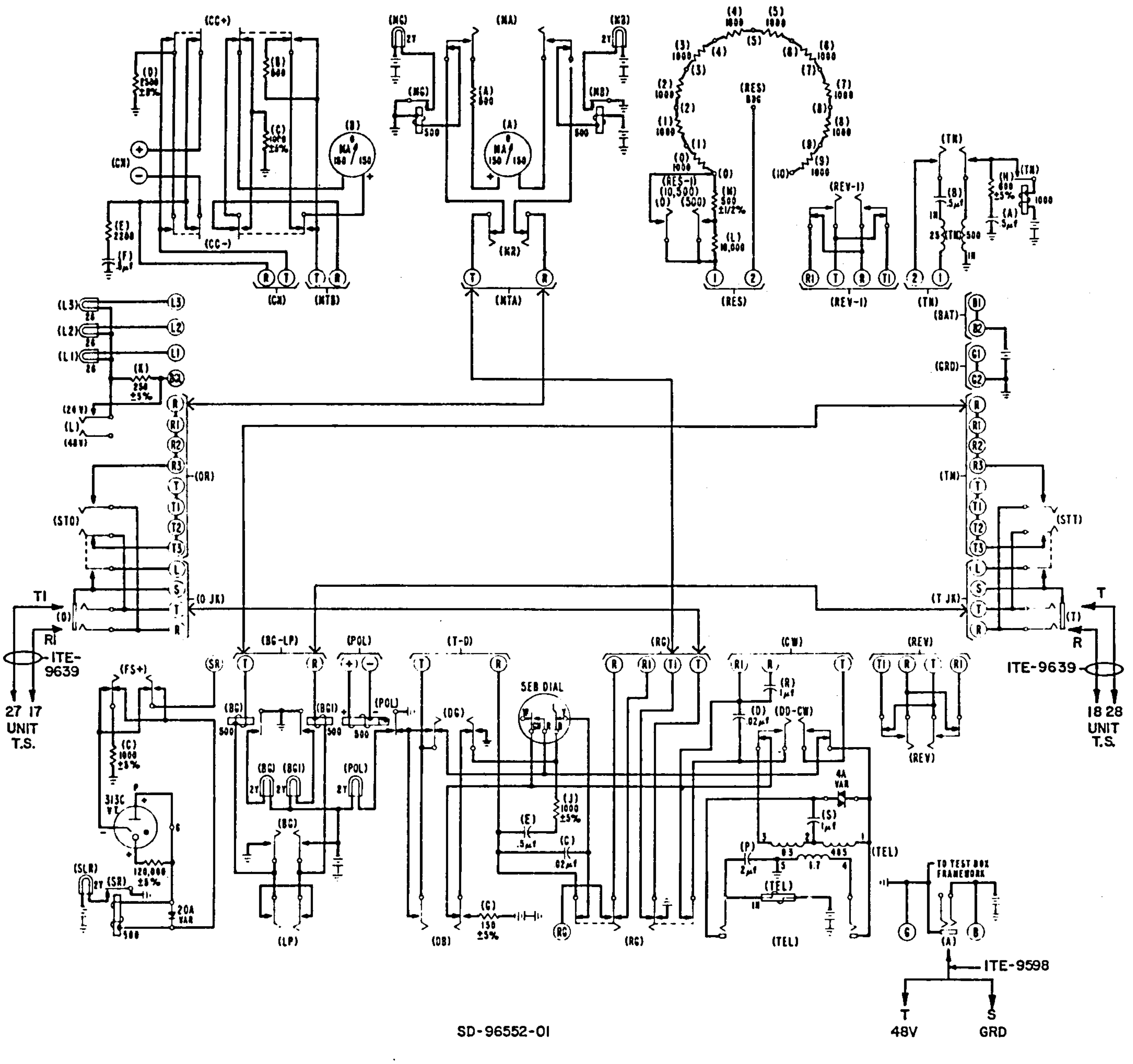
(24V) (48V) (L)

(10,500) (0) (500) (RES-1)

(5) (4) (6) (3) (7) (2) (8) (1) (9) (0) (10) (RES)

MISCELLANEOUS TRUNK TEST SET, ITE-401I

FIGURE 1



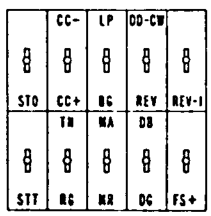
SD-96552-01

NOTE: ARROWS ON KEY CHART INDICATE KEYS OPERATED BEFORE START OF TEST

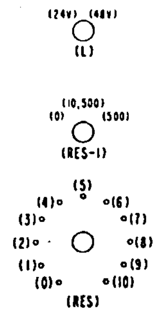
CIRCUIT REQUIREMENTS						
DESIG	CODE	RES %	TEST	SOAK MA	TEST MA	READJ MA
POL	238FW	5%	O	-15	8 8	3
			R	15		1
			NO	15		1.0
POL	280J	10%	O	-12	–	* .5
			NO	-12	–	* .2
			O	-12	3 2	3.
			NO	12	1 7	1 0
			R	12	8	1.
TN	280C	5%	O		13	12
			NO		10 5	11
BG, BGI	†	5%	O		12	11
			NO		9	10
MG, MB	R-473	5%	O		9 3	8 3
			NO			3 8
SR		5%	O		7	

*APPLIED WITH TENSION OF BIASING SPRING RELEASED

REQ	CORDS AND ACCESSORIES						WITH ITE
	AMT.	ITE	LENGTH	CDRS	END	END	
	4	9547	12'	1	2455	2455	
	1	9801	12'	3	310	310	
	1	9605	12'	3	310	309	
	2	9638	12'	3	310	3-2455	
	14	9548	9"	1	2455	2455	
	1	9598	12'	2	310	310	
	2	9314	12'	3	310	3-4085	
	8	8507	ALLIGATOR CLIPS				
	8	2455	PLUGS				
	8	4108	SPADE TIPS				
	2	4412	CONNECTOR 2-POINT				
	2	4413	CONNECTOR 4-POINT				

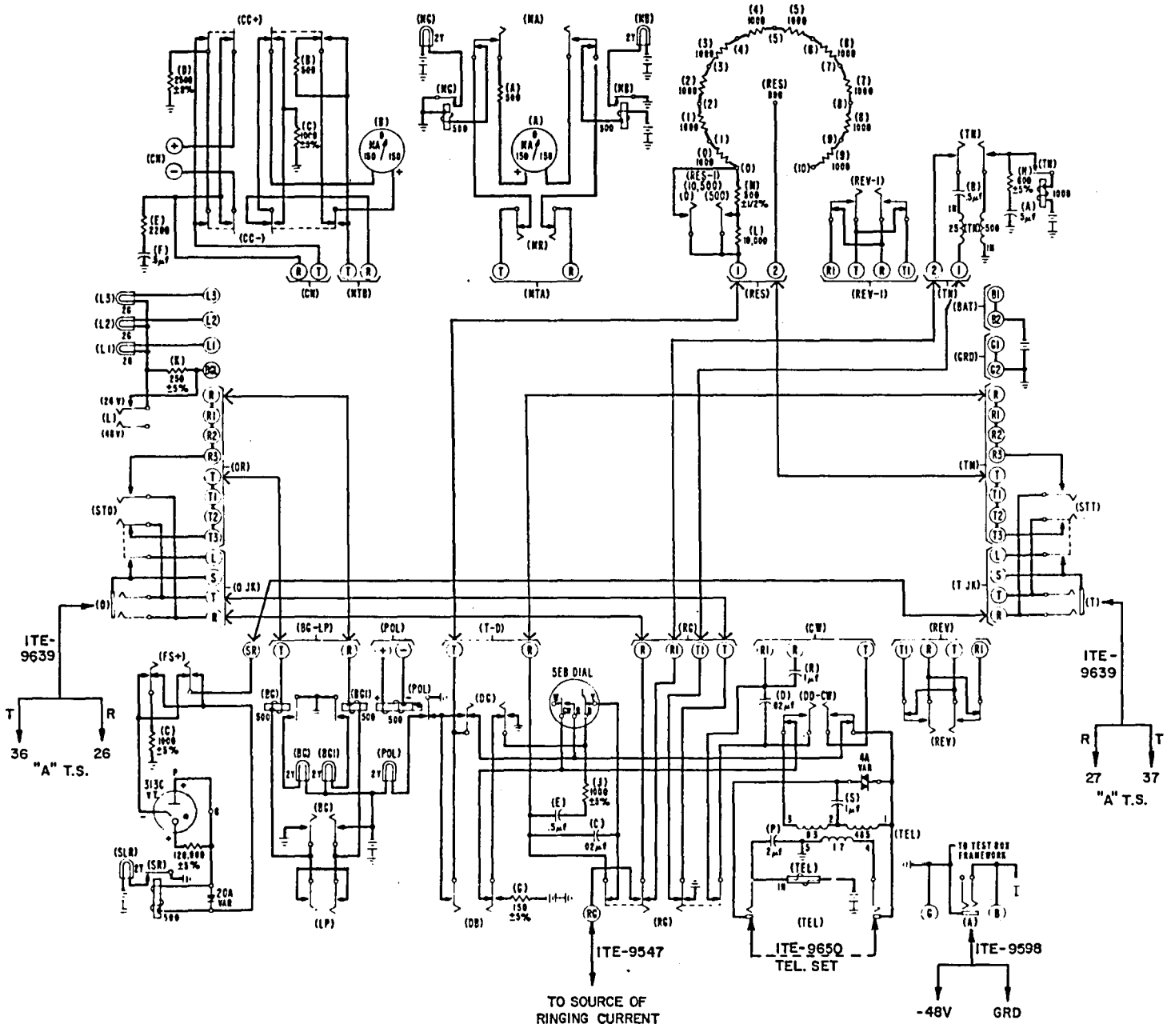


NOTE: ALL RESISTOR VALUES ARE ± 1% UNLESS OTHERWISE SPECIFIED



MISCELLANEOUS TRUNK TEST SET, ITE-4011

FIGURE 2



SD-96555-01

NOTE ARROWS ON KEY CHART INDICATE KEYS OPERATED BEFORE START OF TEST

CIRCUIT REQUIREMENTS						
DESIG	CODE	RES %	TEST	SOAK MA	TEST MA	READJ MA
POL	239FM	5%	0	-15	60	3
			R	15		1
			RO	15		10
POL	280J	10%	0	-12	–	R 3
			RO	-12	–	R 2
			0	-12	32	3
			RO	12	17	10
			R	12	0	1
TN	280C	5%	0	–	13	12
			RO		10.5	11
BG,BG1	1	5%	0		12	11
			RO		0	10
BG,HB	0-473	5%	0		0.5	0.5
			RO			3.9
SR		5%	0		7	

*APPLIED WITH TENSION OF BIASING SPRING RELEASED

REQ	CORDS AND ACCESSORIES						WITH ITE
	ANT	ITE	LENGTH	CORS	END	END	
	4	9547	12"	1	2455	2455	
	1	9601	12"	3	310	310	
	1	9605	12"	3	310	309	
	2	9639	12"	3	310	3-2455	
	14	9548	9"	1	2455	2455	
	1	9598	12"	2	310	310	
	2	9314	12"	3	310	3-4085	
	8	8507	ALLIGATOR CLIPS				
	8	2455	PLUGS				
	8	4109	SPADE TIPS				
	2	4412	CONNECTOR 2-POINT				
	2	4413	CONNECTOR 4-POINT				

MISCELLANEOUS TRUNK TEST SET, ITE-401I

NOTE ALL RESISTOR VALUES ARE ± 1% UNLESS OTHERWISE SPECIFIED

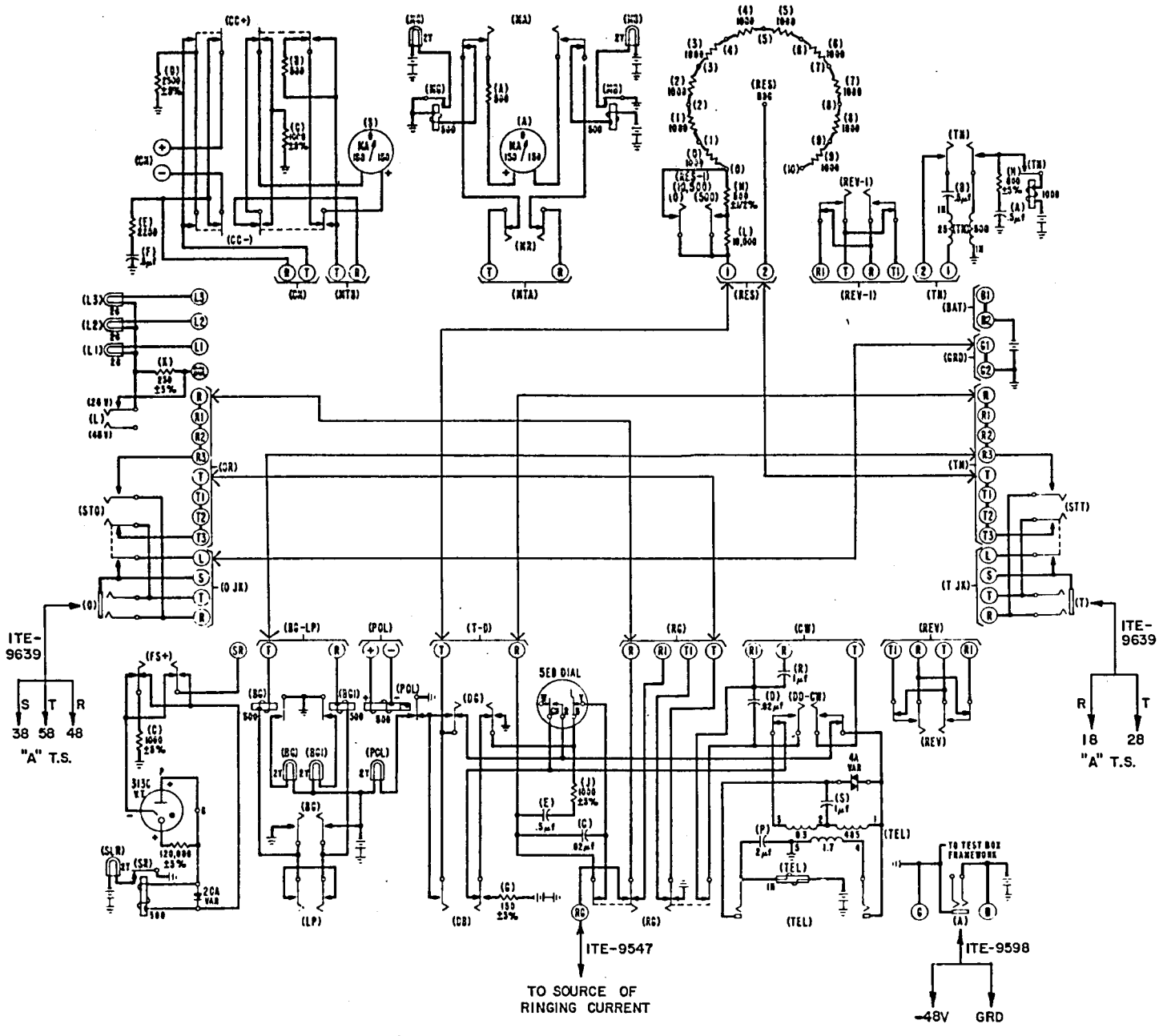
	CC-	LP	DD-CW	
STO	CC+	BG	REV	REV-I
STT	YN	MA	CB	
	RG	MR	DG	FS+

(24V) (48V) (L)

(10,500) (0) (500) (RES-I)

(5) (4) (6) (3) (7) (2) (8) (1) (9) (0) (10) (RES)

FIGURE 3



SD-96592-01

NOTE: ARROWS ON KEY CHART INDICATE KEYS OPERATED BEFORE START OF TEST.

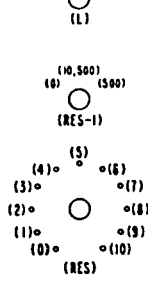
CIRCUIT REQUIREMENTS						
DESIG.	CODE	RES %	TEST	SOAK MA	TEST MA	READ MA
POL	230FH	5%	0	-15	0.0	3
			R	15		1
			RO	15		1.0
POL	230J	10%	0	-12	—	×.3
			RO	-12	—	×.2
			0	-12	3.2	3
			RO	12	1.7	1.0
			R	12	.6	1%
TB	230C	5%	0		13	12
			RO		10.5	11
BG,BGI	1	5%	0		12	11
			RO		9	10
HA,HB	R-475	5%	0		8.5	8.5
			RO			3.9
SB		5%	0		7	

*APPLIED WITH TENSION OF BIASING SPRING RELEASED.

REQ.	CORDS AND ACCESSORIES						WITH ITE
	ANT.	ITE	LENGTH	CORS.	END	END	
	4	9547	12"	1	2455	2455	
	1	8601	12"	3	310	310	
	1	8605	12"	3	310	303	
	2	8833	12"	3	310	3-2455	
	14	9548	8"	1	2455	2455	
	1	8588	12"	2	310	310	
	2	8314	12"	3	310	3-4085	
	8	8307	ALLIGATOR CLIPS				
	6	2455	PLUGS				
	8	4109	SPADE TIPS				
	2	4412	CONNECTOR 2-POINT				
	2	4413	CONNECTOR 4-POINT				

	CC-	LP	DD-CW	
STO	CC+	BG	REV	REV-I
	TN	MA	DB	
STT	RG	M2	DG	FS+

NOTE: ALL RESISTOR VALUES ARE ±1% UNLESS OTHERWISE SPECIFIED.



MISCELLANEOUS TRUNK TEST SET, ITE-401I

FIGURE 4

5. OPERATION TESTS

5.1 SD-96551-01

5.11 Prepare the ITE-4011 test set with pin jack connections as shown in Figure 1. Connect battery and ground with an ITE-9598 cord to the A jack.

5.12 Connect ITE-9639 cords from unit terminal strip to T and O jacks as shown in Figure 1.

5.13 Test Operations

5.131 Operate RG and LP keys.

5.132 Operate STT key. POL AND MB lamps light.

5.133 Operate STO key. MG lamp lights and POL lamp goes out.

5.134 Release RG key. POL lamp lights.

5.135 Operate REV-1 key. POL lamp goes out.

5.136 Release STT key. MB and MG lamps go out.

5.137 Release STO and LP keys. Circuit is restored to normal.

5.2 SD-96552-01

5.21 Prepare the ITE-4011 test set with pin jack connections as shown in Figure 2. Connect battery and ground with an ITE-9598 cord to the A jack.

5.22 Connect ITE-9639 cords from unit terminal strip to T and O jacks as shown in Figure 2.

5.23 Test Operations

5.231 Operate BG and RG keys. BG1 lamp lights.

5.232 Release BG key. MG lamp lights.

5.233 Release RB and operate LP and STT keys. BG lamp lights and MG lamp goes out.

5.234 Operate STO key. MB and MG lamps light.

5.235 Release STO key. BG, BG1, MB, and MG lamps go out.

5.236 Release STT and LP keys. Circuit is restored to normal.

5.24 Failure of S relay to operate

5.241 Repeat operations in Paragraphs 5.231 to 5.233.

5.242 Release LP key. BG1 lamp goes out.

5.243 Release STT key. BG lamp goes out and circuit restores to normal.

5.3 SD-96555-01

5.31 Verification of Biasing Resistor (Z, Y or V Option)

5.311 Using an ITE-4442A Volt-Ohmmeter, measure voltage between terminal 8 of P relay and ground and refer to Table A.

5.312 Voltage readings shown in Table A are based on a nominal -48V supply when option ZK is provided and -72V supply when option ZL is provided.

TABLE A

Options	Bias Res. Value	Voltage Measured At Term. 8, P Relay	
		MIN.	MAX.
Z and ZK	16,500	-39V	-40V
Z and ZL	16,500	-58.5V	-60V
Y and ZK	10,000	-34.5V	-36V
Y and ZL	10,000	-51.5V	-54V
V and ZK	4,990	-27V	-29V
V and ZL	4,990	-40.5V	-42.5V

5.313 If voltage measured is outside of limits shown, physical check should be made to verify connection and proper value of bias resistor (Figure B of S.D.).

5.32 Setup for Test

5.321 Prepare the ITE-4011 test set with pin jack connections as shown in Figure 3. Connect battery and ground with an ITE-9598 cord to the A jack.

5.322 Connect RG terminal to source of machine ringing current and ITE-9650 tel. set to TEL jacks.

5.323 Connect ITE-9639 cords from "A" terminal strip to T and O jacks as shown in Figure 3.

5.324 Set (RES-1) to O and (RES) to position 1.

5.33 Test Operations

5.331 Perform this paragraph if options P or U or S are provided. This test checks the presence of continuous ring. Block operated the R1 relay, observe that the SLR lmap lights. If options S or U are provided, relay TP will not operate. Now operate the STT key, audible ringing will be heard. Release key STT and relay R1, the circuit will restore to normal.

5.332 Momentarily hold operated the RG key and observe R1 relay operates and SLR lamp lights. Lamp is extinguished when RG key is released.

5.333 Operate STT key and observe P relay operated.

5.334 Operate STO and BG keys. Observe BG and BG1 lamps light.

5.335 Dial any three digits and observe the P relay follows the pulses and the BG and BG1 lamps flash.

5.336 Release STO key. BG and BG1 lamps extinguish.

5.337 Operate TN key. Dial tone is heard in telephone set.

5.338 Release all keys on test set. Trunk releases completely.

5.4 SD-96592-01

5.41 Setup for Test A

5.411 Prepare the ITE-4011 test set with pin jack connections as shown in Figure 4. Connect battery and ground with an ITE-9598 cord to the A jack.

5.412 Connect RG terminal to source of machine ringing current.

5.413 Connect ITE-9639 cords from "A" terminal strip to T and O jacks as shown in Figure 4.

5.414 Set RES-1 to 500 and RES to the 3 position for maximum Coin Subscriber conductor loop resistance of 3500 ohms.

5.42 Test Operations

5.421 If option (2) or (3) is provided, block operated relay S. Operate STT key. Relays R, LGD, and GDA operate.

5.422 Dial any three digits and observe that the P relay follows the pulses. The GDA and LGD relays may also pulse.

5.423 Release STT key and S relay. Circuit restores to normal.

5.424 Operate STO and RG keys. Relays R and CN1 operate. If option (2) or (3) is provided relay S operates. If option (4) is provided relay SS operates. If option (5) is provided relay SS1 operates.

5.425 Operate STT and BG keys. Observe that relay TR operates.

5.426 Release STT, STO, BG and RG keys. Circuit restores to normal.

5.43 Setup for Test B

5.431 For a Coin Relay Operate Current of 48MA:

Using 2 - ITE-9547 cords, connect one 1200 ohm resistor between the tip (28, T.S. A) and the tip of the Coin Station Subset, and one 1200 ohm resistor between the ring (18, T.S. A) and the ring of the Coin Station Subset.

5.432 For a Coin Relay Operate Current of 41MA:

Using 2 - ITE-9547 cords, connect one 1510 ohm resistor between the tip (28, T.S. A) and the tip of the Coin Station Subset and one 1510 ohm resistor between the ring (18, T.S. A) and the ring of the Coin Station Subset.

5.433 Temporary cross connections should be installed as required.

5.434 If an office telephone is not available or readily accessible it will be necessary to connect a 500 type subscriber set to a vacant subscriber's line. In Step-by-Step offices this requires cross connecting a jumper from a vacant connector terminal to a vacant line finder relay and connecting the 500 type subscriber set to the vacant line finder relay. In Crossbar office this requires connecting a vacan switch vertical on a line link frame to the 500 type subscriber set.

5.44 Test Operations

5.441 Dial Tone First: At the coin sub-set, with the receiver "off hook" check for dial tone. This feature enables the dialing of certain free codes. Whenever these free codes are not dialed, the completion of the call will be restricted until the appropriate coin or coins are deposited. Deposit coin or coins before proceeding with Paragraph 5.443.

5.442 Coin First: At the coin subset, with the receiver "off hook" check for the absence of dial tone. Deposit the appropriate coin or coins in the coin subset and check for dial tone.

5.443 Dial the office telephone or the vacant subscriber's line number. Audible ringing should be received in both sets. Answer the called telephone applying a talking test.

5.444 After hanging up handset on coin subset check for coin collection.

5.445 Repeat Paragraphs 5.441 or 5.442. Dial the office telephone or the vacant subscriber's line number. Do not answer the called telephone. After hanging up the handset on coin subset check for coin return.

5.446 After completion of test, restore circuit to normal and remove all associated cords, plugs, strapping, insulators and blocking tools if applicable.

→ Arrowed lines indicate new or changed information

Manager, Engineering and Manufacturing
Common Systems and Switching
Equipment PECC

ATTACHMENTS

Figures 1,2,3,4 on pages 2 through 5.

Reason for Reissue:
To add notes 4 and 5 and to change Paragraphs 5.431 and 5.432.