LINE CONCENTRATOR NO. 2A
REMOTE CIRCUIT
SUPPLEMENTARY TESTS

CONTENTS

1. GENERAL

1.1 This section provides methods for supplementary tests of the 2A Line Concentrator Remote Circuit SD-94816-01.

1.2 If the operating company requires Load Tests per Section 928, tests per this section and Sections 922, 923 (Control Circuit) and 925 must be performed first.

1.3 Refer to Section 921 of this handbook for use of ITE-4251 Rapidohm Test Set and ITE-4261A Whistler Test Set.

CAUTION: Observe precautions when testing electronic devices as written in Section 0.3 of this handbook. Never connect -24V, -48V, +130V or any test battery to a test point. Application of test battery will invariably damage the preceding transistor logic stage. Direct ground may be applied to any test point when necessary.

2. TEST EQUIPMENT

2.1 Test Sets

AMT	ITE	DESCRIPTION
1	4011	Universal Test Set
1	4251	Rapidohm Test Set
1	4261A	Whistler Test Set
1	4442	Volt-Ohmmeter

2.2 Cords: All cords necessary for tests of this section are included in the test sets specified.

3. RECORDS

3.1 The results of tests per this section shall be recorded on forms SD-4-1313 and SD-4-1315 as described in Handbook 50, Section 3.

4. FUSING AND ALARMS

4.1 These tests must be performed with Power Supply Circuit SD-81608-01 installed, but before circuit packs per SD-94817-01 have been installed.

4.2 Fuses: Verify the fuse panel for missing or operated fuses. If a fuse is missing or operated, verify the fuse terminal for absence of low resistance ground with ITE-4442 Volt-Ohmmeter. Clear any ground condition and install the proper fuse. At the completion of test the fuse panel should be fully equipped with proper fuses or dummies.

4.3 Alarms

4.31 Block operated relays TM1, TM2 and TM4 and block nonoperated relays TM3, TM5 and RT.

4.32 Block operated relay FA. Verify that lamp FA lights and that proper alarm and alarm sending circuits are activated according to SD-94816-01, Sheet B16, Table A. Remove blocking tool from relay FA. Alarm should be retired and lamp FA extinguished. Manually operate relay AL which should lock. Lamp AL should light and proper alarms activated per Table A. Operate key AR to release relay AL.

4.33 Insert an operated fuse under the first fuse cap. Relay FA should operate, lamp FA light and the alarm should be activated. Remove the operated fuse and the alarm should be extinguished. Repeat using the last fuse cap with same results.

5. SUPPLEMENTARY TESTS

NOTE: Perform these tests after all fuses have been installed, but before the circuit packs have been installed.

5.1 Cross Detection

5.11 At frame under test manually release any operated hold magnets (HM) and determine that all relays TK- are released. Momentarily operate relay RL1 to release any possible frame off normal condition.

5.12 With ITE-4251 Rapidohm test set verify the T and R leads of lines 00 to 77 at terminal strip FR. All T leads should read +0 and all R leads should read -950, or with option R, -500.

5.13 With ITE-4261A Whistler Test Set verify the T and R leads of trunks 00 to 15 at terminal strip FR. All leads should have approximately the same tone.

5.2 Linkage Test

5.21 Service Request, Disconnect and Terminating calls will be simulated as illustrated in Table 1 for switches A, B, and C and Table 2 for switch D. Each line will be verified to one even trunk and one odd trunk for continuity using ITE-4011. These tests must be performed in the numerical sequence of Tables 1 and 2 testing one switch at a time.

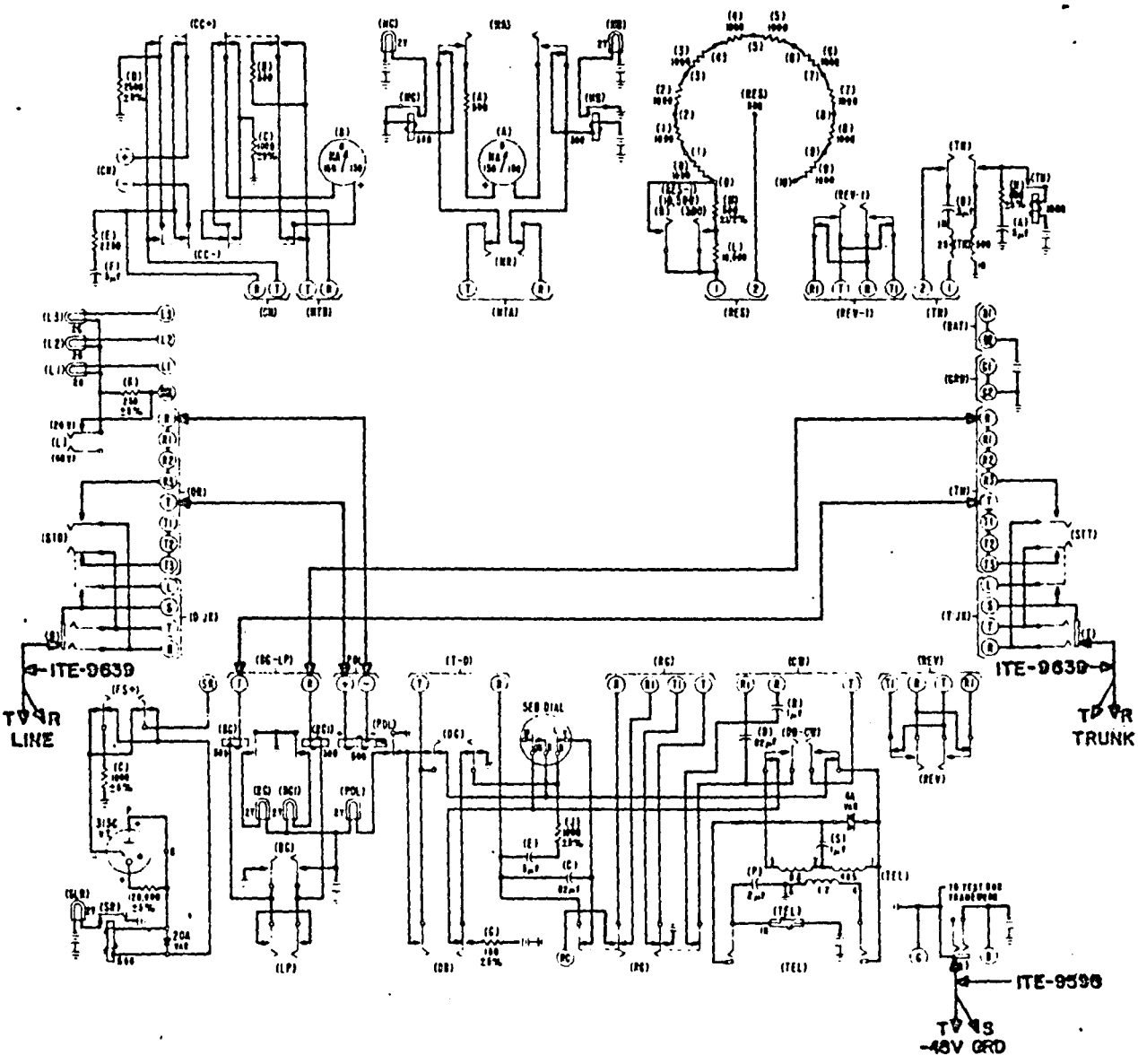

FIGURE A

5.211 At ITE-4011 operate key BG and using ITE cords and alligator clips furnished with ITE-4011, setup as follows:

JACK	ITE CORD	OTHER END
OR-T	9548	Jack POL+
OR-R	9548	Jack POL-
TM-T	9548	Jack BG-LP-T
TM-R	9548	Jack BG-LP-R
A	9598	Jack A (Frame - 48V Test Battery)
O	9639	T.S. FR Line - (T. to T and R to R respectively)
T	9639	T.S. FR Trunk- (T. to T and R to R respectively)

This setup is illustrated in Figure A.

5.22 Service Request Calls (SR)

5.221 At frame under test manually operate two of relays TK- as illustrated in Tables 1 and 2 which should lock.

5.222 Operate ITE-4011 key STO. Lamp POL should light, frame relay L- should operate in turn operating relays as illustrated in SC1.

5.2221 As a test of the SR lockout feature, on at least one call manually release and block nonoperated relay TM4. When relay L- operates per Paragraph 5.222 no other relays should operate. Remove the blocking tool from relay TM4 and the test should proceed normally.

5.223 As a test of the line lockout feature, manually operate an L-- relay of the next higher numbered ten and units.

Example: Relay L00 operated per Paragraph 5.222; operate relay L11.

The result should be that none of the remaining relays LT- or LU- operate.

5.224 Manually operate relay EP which should in trun operate relays as illustrated in SC2 and 3 resulting in the operation of HM- on switch-.

5.225 With ITE-4442 voltmeter using the 15V scale, test for +6 to +12 volts at test point E15 on at least one SR call.

5.226 Manually operate relay RL1. All relays operated in Paragraphs 5.221, 5.222, and 5.224 should release. HM- on switch- should remain operated and ITE-4011 lamp POL should be extinguished.

5.227 Operate ITE-4011 key STT. Lamps POL, BG, and BG1 should light.

5.228 Release ITE-4011 keys STO and STT to extinguish all lamps before moving cords to next line and trunk to be tested.

5.229 Repeat Paragraphs 5.221 to 5.224 and 5.226 to 5.228 for each SR call illustrated on Tables 1 and 2.

5.23 Disconnect Calls (D)

5.231 Block operated relays IC, IC1, IC2, CO and C1. Relay D should operate. Block operated two A relays and two B relays as illustrated in Tables 1 and 2. A HM-- should release and two TK- relays operate per Tables 1 and 2. Manually operate relay SQ3 which should lock. Remove blocking tools from relays IC, IC1, IC2, CO, C1, A's and B's. Frame should return to normal with two TK- relays operated. Refer to SC 12.

5.232 Repeat Paragraph 5.231 for each D call illustrated in Tables 1 and 2.

5.24 Terminating Calls (T)

5.241 Block operated relays IC, IC1, IC2, C4 and C7. Relay TER should operate. Block operated two A relays and two B relays as illustrated in Tables 1 and 2. A HM-- should operate per Tables 1 and 2. Manually operate relay SQ3 which should lock. Remove blocking tools from relays IC, IC1, IC2, Cr, C7, A's and B's. Frame should return to normal. Refer to SC11.

5.242 At ITE-4011 operate keys STO and STT. Lamps POL, BG and BG1 should light. Release keys STO and STT to extinguish lamps before moving cords to next line and trunk.

5.243 Repeat Paragraphs 5.241 and 5.242 for each T call illustrated in Tables 1 and 2.

5.25 At the conclusion of these tests all hold magnets and all relays excepting relays TM1, TM2 and TM4 should be released. Remove the connections to ITE-4011. At this time install the circuit packs into their jacks.

5.26 When tests of this section are completed and unless tests of Section 925 are to be applied, remove the blocking tools from relays TM1, TM2, TM3, TM4, TM5 and RT.

→ Arrowed lines indicate new or changed information.

Manager, Crossbar Product Engineering
Control Center

ATTACHMENT
Tables 1 and 2 on Pages 4, 5 and 6.

Reason for Reissue:
To revise Paragraphs 4.31 and 5.26.

Replaces Section 924 dated 12-15-66.

TABLE 1

TEST NO.	TYPE CALL	CIRCUITS UNDER TEST ITE-4011 CONNECTED TO SWITCH A LINE	SWITCH B LINE	SWITCH C LINE	TRUNK	PRE-OPERATED RELAYS TK	HOLD MAGNET OPERATED	HOLD MAGNET RELEASED	OPERATE RELAYS C SWITCH A-C	OPERATE RELAYS A SWITCH A	OPERATE RELAYS A SWITCH B	OPERATE RELAYS A SWITCH C	OPERATE RELAYS B SWITCH A-C	RELAYS OPERATED TK	RELEASE RELAYS TK
1	SR	00	20	40	00	0.8	00								
2	SR	01	21	41	01	0.9	01								
3	SR	02	22	42	02	1.8	02								
4	SR	03	23	43	03	1,9	03								
5	SR	04	24	44	04	2,8	04								
6	SR	05	25	45	05	2,9	05								
7	SR	06	26	46	06	3,8	06								
8	SR	07	27	47	07	3,9	07								
9	SR	08	28	48	08	4,8	08								
10	SR	09	29	49	09	4,9	09								
11	SR	10	30	50	10	5,8	10								
12	SR	11	31	51	11	5,9	11								
13	SR	12	32	52	12	6,8	12								
14	SR	13	33	53	13	6,9	13								
15	SR	14	34	54	14	7,8	14								
16	SR	15	35	55	15	7,9	15								
17	D							00	0.1	4,7	4,7	4,7	4,7	0,8	
18	SR	16	36	56	00		16								
19	D							01	0.1	0.1	0,1	0,1	4.7	0,9	
20	SR	17	37	57	01		17								
21	D							02	0.1	4.7	4,7	4.7	0.1	1,8	
22	SR	18	38	58	02		18								
23	D							03	0.1	0,1	0,1	0,1	0,1	1,9	
24	SR	19	39	59	03		19								
25	D							04	0.1	4.7	4.7	4.7	0.2	2.8	X
26	D							05	0.1	0,1	0,1	0.1	0,2	2.9	
27	T	00	20	40	05		00		4.7	4,7	0.2	0,4	4,7		
28	D							06	0.1	4.7	4.7	4.7	1,2	3,8	
29	T	01	21	41	06		01		4.7	4.7	0.2	0,4	0.1		
30	D							07	0.1	0.1	0,1	0.1	1,2	3,9	
31	T	02	22	42	07		02		4.7	4.7	0,2	0.4	0.2		
32	D							08	0.1	4.7	4,7	4,7	0,4	4,8	
33	T	03	23	43	08		03		4.7	4,7	0.2	0.4	1.2		
34	D							09	0.1	0.1	0.1	0,1	0.4	4,9	
35	T	04	24	44	09		04		4.7	4.7	0,2	0.4	0.4		
36	D							10	0.1	4.7	4,7	4.7	1.4	5,8	
37	T	05	25	45	10		05		4.7	4,7	0,2	0,4	1,4		
38	D							11	0,1	0.1	0.1	0.1	1.4	5.9	
39	T	06	26	46	11		06		4,7	4.7	0,2	0.4	2.4		
40	D							12	0.1	4.7	4.7	4.7	2.4	6.8	
41	T	07	27	47	12		07		4.7	4.7	0,2	0,4	0,7		
42	D							13	0.1	0.1	0,1	0,1	2.4	6,9	
43	T	08	28	48	13		08		4.7	4,7	0,2	0.4	1.7		
44	D							14	0.1	4.7	4.7	4.7	0.7	7,8	
45	T	09	29	49	14		09		4.7	4.7	0,2	0.4	2.7		

TABLE 1 (Cont.)

TEST NO.	TYPE CALL	CIRCUITS UNDER TEST ITE-4011 CONNECTED TO SWITCH LINE A	B	C	TRUNK	PRE-OPERATED RELAYS TK	HOLD MAGNET OPERATED	HOLD MAGNET RELEASED	OPERATE RELAYS C SWITCH A-C	A SWITCH A	A SWITCH B	A SWITCH C	B SWITCH A-C	RELAYS OPERATED TK	RELEASE RELAYS TK
46	D							15	0,1	0,1	0,1	0.1	0.7	7.9	
47	T	10	30	50	15		10		4,7	0.1	1.2	1.4	4.7		
48	D							16	0,1	4.7	4,7	4.7	4,7	0,8	
49	T	11	31	51	00		11		4,7	0,1	1,2	1.4	0,1		
50	D							17	0,1	0,1	0,1	0,1	4,7	0,9	
51	T	12	32	52	01		12		4,7	0,1	1,2	1.4	0,2		
52	D							18	0.1	4.7	4,7	4,7	0,1	1.8	
53	T	13	33	53	02		13		4.7	0.1	1.2	1.4	1,2		
54	D							19	0.1	0.1	0.1	0.1	0,1	1,9	
55	T	14	34	54	03		14		4,7	0.1	1,2	1.4	0,4		
56	T	15	35	55	04	2.8	15		4,7	0,1	1,2	1.4	1.4		
57	D							00	0.1	0.1	0.1	0.1	0,2	2,9	
58	T	16	36	56	05		16		4,7	0,1	1.2	1.4	2,4		
59	D							01	0,1	4,7	4.7	4,7	1,2	3,8	
60	T	17	37	57	06		17		4,7	0,1	1,2	1,4	0,7		
61	D							02	0,1	0.1	0,1	0,1	1,2	3.9	
62	T	18	38	58	07		18		4,7	0.1	1,2	1.4	1,7		
63	D							03	0,1	4.7	4,7	4.7	0,4	4,8	
64	T	19	39	59	08		19		4,7	0,1	1,2	1,4	2,7		
65	D							04	0,1	0,1	0,1	0,1	0,4	4,9	X
66	D							05	0,1	4,7	4,7	4,7	1,4	5,8	X
67	D							06	0,1	0,1	0,1	0,1	1,4	5,9	X
68	D							07	0,1	4,7	4,7	4,7	2,4	6,8	X
69	D							08	0,1	0,1	0,1	0,1	2,4	6,9	X
70	D							09	0,1	4,7	4,7	4,7	0,7	7,8	X
71	D							10	0,1	0.1	0,1	0,1	0,7	7,9	X
72	D							11	0,1	4,7	4,7	4,7	4,7	0,8	X
73	D							12	0,1	0,1	0,1	0,1	4,7	0,9	X
74	D							13	0,1	4,7	4,7	4,7	0,1	1,8	X
75	D							14	0,1	0,1	0,1	0,1	0,1	1,9	X
76	D							15	0,1	4,7	4,7	4.7	0,2	2,8	X
77	D							16	0,1	0,1	0,1	0,1	0,2	2,9	X
78	D							17	0,1	4.7	4,7	4,7	1,2	3,8	X
79	D							18	0,1	0.1	0,1	0,1	1,2	3,9	X
80	D							19	0,1	4,7	4,7	4,7	0,4	4,8	X

TABLE 2

TEST NO.	TYPE CALL	CIRCUITS UNDER TEST ITE-4011 CONNECTED TO		PRE-OPERATED RELAYS	HOLD MAGNET		OPERATE RELAYS			RELAYS OPERATED	RELEASE RELAYS
		LINE	TRUNK	TK	OPERATED	RELEASED	C	A	B	TK	TK
1	SR	60	00	0,8	00						
2	SR	61	01	0,9	01						
3	SR	62	02	1.8	02						
4	SR	63	03	1,9	03						
5	SR	64	04	2,8	04						
6	SR	65	05	2,9	05						
7	SR	66	06	3.8	06						
8	SR	67	07	3.9	07						
9	SR	68	08	4.8	08						
10	SR	69	09	4,9	09						
11	SR	70	10	5,8	10						
12	SR	71	11	5.9	11						
13	SR	72	12	6,8	12						
14	SR	73	13	6,9	13						
15	SR	74	14	7,8	14						
16	SR	75	15	7,9	15						
17	D					00	0,1	4,7	4,7	0,8	
18	SR	76	00		16						
19	D					01	0,1	0,1	4.7	0,9	
20	SR	77	01		17						
21	D					02	0,1	4,7	0,1	1,8	X
22	D					03	0,1	0,1	0.1	1,9	
23	T	60	03		00		4,7	2,4	4.7		
24	D					04	0,1	4,7	0,2	2.8	
25	T	61	04		01		4,7	2,4	0,1		
26	D					05	0.1	0,1	0,2	2,9	
27	T	62	05		02		4.7	2,4	0.2		
28	D					06	0.1	4,7	1,2	3.8	
29	T	63	06		03		4.7	2.4	1.2		
30	D					07	0.1	0.1	1,2	3.9	
31	T	64	07		04		4,7	2.4	0.4		
32	D					08	0.1	4,7	0.4	4.8	
33	T	65	08		05		4.7	2.4	1.4		
34	D					09	0,1	0.1	0.4	4.9	
35	T	66	09		06		4.7	2.4	2.4		
36	D					10	0.1	4.7	1.4	5.8	
37	T	67	10		07		4.7	2.4	0.7		
38	D					11	0.1	0.1	1.4	5.9	
39	T	68	11		08		4.7	2.4	1.7		
40	D					12	0,1	4,7	2.4	6.8	
41	T	69	12		09		4,7	2.4	2,7		
42	D					13	0,1	0,1	2,4	6.9	
43	T	70	13		10		4,7	0,7	4,7		
44	D					14	0,1	4,7	0,7	7,8	
45	T	71	14		11		4,7	0,7	0,1		
46	D					15	0,1	0,1	0,7	7.9	
47	T	72	15		12		4.7	0,7	0,2		
48	D					16	0,1	4,7	4,7	0.8	
49	T	73	00		13		4,7	0,7	1,2		
50	D					17	0,1	0,1	4,7	0,9	
51	T	74	01		14		4,7	0,7	0,4		
52	T	75	02	1,8	15		4,7	0.7	1,4		
53	D					00	0,1	0,1	0,1	1,9	
54	T	76	03		00		4,7	0,7	2,4		
55	D					01	0,1	4,7	0,2	2,8	
56	T	77	04		01		4,7	0,7	0,7		
57	D					02	0,1	0,1	0,2	2,9	X
58	D					03	0,1	4,7	1.2	3,8	X
59	D					04	0,1	0,1	1,2	3,9	X
60	D					05	0,1	4,7	0.4	4,8	X
61	D					06	0.1	0,1	0.4	4,9	X
62	D					07	0,1	4.7	1,4	5.8	X
63	D					08	0,1	0.1	1,4	5.9	X
64	D					09	0,1	4,7	2.4	6.8	X
65	D					10	0,1	0,1	2,4	6,9	X
66	D					11	0.1	4,7	0,7	7,8	X
67	D					12	0,1	0,1	0.7	7,9	X
68	D					13	0,1	4,7	4,7	0,8	X
69	D					14	0,1	0.1	4.7	0,9	X
70	D					15	0,1	4,7	0.1	1,8	X
71	D					16	0,1	0,1	0,1	1,9	X
72	D					17	0,1	4,7	0,2	2,8	X