LINE INSULATION TEST FRAME
MAINTENANCE AND CALIBRATION TESTS
NO. 5 CROSSBAR OFFICES

1. GENERAL

1.01 This section covers the method of performing the maintenance and calibration tests on the line insulation test frame in No. 5 crossbar offices.

1.02 This section is reissued to bring it in conformity with other material in the Plant Series. In this process marginal arrows have been omitted.

1.03 The tests and features tested are:

*A. **Short and Ring Ground Test:*** This test checks the ability of the test and control circuits to detect and register subscriber line insulation defects between the tip and ring conductors and between the ring conductor and ground.

*B. **Tip and Ring Ground Test:*** This test checks the ability of the test and control circuits to detect and register subscriber line insulation defects between the tip conductor and ground and between the ring conductor and ground.

*C. **Foreign EMF Test:*** This test checks the ability of the test and control circuits to detect and register subscriber line insulation defects between the tip conductor and battery and between the ring conductor and battery.

*D. **Off-Hook Test:*** This test checks the ability of the control circuit to recognize whether an off-hook condition exists and to record it as an OK line if the line is off-hook or as a trouble condition if the line is not off-hook.

*E. **Plug-Up Test:*** This test checks the ability of the control circuit to recognize a plugged-up line and to record it as an OK condition.

*F. **Calibration Check Test:*** This test checks that the test circuit is in calibration.

*G. **Calibration:*** This test provides the procedure for making calibration adjustments.

~~*H. Traffic Count Registration Test — No. 5 Crossbar:* This test checks the ability of the control circuit to recognize and record busy line links and trunk links.~~

1.04 No tests are included for the KS-16100 L1, L2 timers used to start line insulation tests. If the timer becomes defective, it should be replaced.

1.05 ***Lettered Steps:*** A letter a, b, c, etc, added to a step number in Part 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by the letter should be omitted.

2. APPARATUS

Test G

2.01 Screwdriver, KS-2631, 4-1/2 inches.

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3. PREPARATION

STEP	ACTION	VERIFICATION
Tests A through G		
1	Operate all switches to position OFF.	
2	Operate RN1 key momentarily.	All lamps extinguished.
3	Operate MT key momentarily.	MT lamp lights. MT1 lamp lights in approximately 60 seconds.

4. METHOD

STEP	ACTION	VERIFICATION
	A. Short and Ring Ground Test	
4	Operate S1 key momentarily.	S1 lamp lights.
5	Refer to Table 1. Operate LR1000Ω switch to lowest numbered position for which lamp indications are shown for the S1 key for the particular range limits used in the office.	
6	Operate MTS key momentarily.	MTS lamp lights and lamps light as shown in Table 1.
7	Operate MTR key momentarily.	Lamps specified in Step 6 extinguished.
8	Repeat Steps 5, 6, and 7 for the three remaining positions of the LR1000Ω switch associated with the S1 key.	
9	Operate RN key momentarily.	S1 lamp extinguished.
10	Repeat Steps 4 through 9, as required, using S2 and S3 keys.	Same as Steps 4 through 9 except S- lamp corresponding to S- key operated is substituted for S1 lamp.
11	Operate LR1000Ω switch to position OFF.	
12	Repeat Steps 4 through 10, as required, using LT1000Ω switch.	
13	Operate LT1000Ω switch to position OFF.	
14	Operate RN1 key momentarily if other tests are not to be made.	All lamps extinguished.
	B. Tip and Ring Ground Test	
4	Operate S4 key momentarily.	S4 lamp lights.
5	Refer to Table 2. Operate LR1000Ω switch to lowest numbered position for which lamp indications are shown for the S4 key for the particular range limits used in the office.	
6	Operate MTS key momentarily.	MTS lamp lights and lamps light as shown in Table 2.

TABLE 1

Short and Ring Ground Test								
		S1- S3 KEYS (RANGE LIMITS X 1000Ω)						
		S1 0-80	S1 0-160	S1 OR S2 0-320	S2 0-640	S2 OR S3 0-1250	S3 0-2500	S3 0-5000
SWITCH	SW. POS.	LAMP INDICATIONS						
LR 1000Ω	15	T0,RTK						
	30.1	T1,RTK	T0,RTK					
	59.7	T2,RTK	T1,RTK	T0,RTK				
	120	OK	T2,RTK	T1,RTK	T0,RTK			
	240		OK	T2,RTK	T1,RTK	T0,RTK		
	481			OK	T2,RTK	T1,RTK	T0,RTK	
	953				OK	T2,RTK	T1,RTK	T0,RTK
	1870					OK	T2,RTK	T1,RTK
	3740						OK	T2,RTK
	7480							OK
	OFF							
LT 1000Ω	15	T0,RT0						
	30.1	T1,RT1	T0,RT0					
	59.7	T2,RT2	T1,RT1	T0,RT0				
	120	OK	T2,RT2	T1,RT1	T0,RT0			
	240		OK	T2,RT2	T1,RT1	T0,RT0		
	481			OK	T2,RT2	T1,RT1	T0,RT0	
	953				OK	T2,RT2	T1,RT1	T0,RT0
	1870					OK	T2,RT2	T1,RT1
	3740						OK	T2,RT2
	7480							OK
	OFF							

STEP	ACTION	VERIFICATION
7	Operate MTR key momentarily.	Lamps specified in Step 6 extinguished.
8	Repeat Steps 5, 6, and 7 for the three remaining positions of the LR1000Ω switch associated with the S4 key.	
9	Operate RN key momentarily.	S4 lamp extinguished.
10	Repeat Steps 4 through 9, as required, using S5 and S6 keys.	Same as Steps 4 through 9 except S- lamp corresponding to S- key operated is substituted for S4 lamp.
11	Operate LR1000Ω switch to position OFF.	
12	Repeat Steps 4 through 10, as required, using LT1000Ω switch.	
13	Operate LT1000Ω switch to position OFF.	
14	Operate RN1 key momentarily if other tests are not to be made.	All lamps extinguished.
	C. Foreign EMF Test	
4	Operate S7 key momentarily.	S7 lamp lights.
5a	If circuit is not arranged to retest on FEMF failures — Refer to Table 3.	
6b	If circuit is arranged to retest on FEMF failures — Refer to Table 4.	
7	Operate LR1000Ω switch to lowest numbered position for which a lamp indication is shown for the S7 key for the particular range limits used in the office.	
8	Operate MTS key momentarily.	MTS lamp lights and lamps light as shown in Table 3 or Table 4.
9	Operate MTR key momentarily.	Lamps specified in Step 8 extinguished.
10	Repeat Steps 5a through 9, as required, for the three remaining positions of the LR1000Ω switch associated with the S7 key.	
11	Operate RN key momentarily.	S7 lamp extinguished.
12	Repeat Steps 4 through 11, as required, using S8 and S9 keys.	Same as Steps 4 through 11 except S- lamp corresponding to S- key operated is substituted for S7 lamp.
13	Operate LR1000Ω switch to position OFF.	
14	Repeat Steps 4 through 12, as required, using LT1000Ω switch.	
15	Operate LT1000Ω switch to position OFF.	
16	Operate RN1 key momentarily if other tests are not to be made.	All lamps extinguished.

TABLE 2

Tip and Ring Ground Test								
		S4-S6 KEYS (Range limits x 1000Ω)						
		S4 0-80	S4 0-160	S4 or S5 0-320	S5 0-640	S5 or S6 0-1250	S6 0-2500	S6 0-5000
SWITCH	SW POS.	LAMP INDICATIONS						
LR 1000Ω	15	T0,RT0						
	30.1	T1,RT1	T0,RT0					
	59.7	T2,RT2	T1,RT1	T0,RT0				
	120	OK	T2,RT2	T1,RT1	T0,RT0			
	240		OK	T2,RT2	T1,RT1	T0,RT0		
	481			OK	T2,RT2	T1,RT1	T0,RT0	
	953				OK	T2,RT2	T1,RT1	T0,RT0
	1870					OK	T2,RT2	T1,RT1
	3740						OK	T2,RT2
	7480							OK
	OFF							
LT 1000Ω	15	T0 or T1,RTK						
	30.1	T1,RTK	T0,RTK					
	59.7	T2,RTK	T1,RTK	T0,RTK				
	120	OK	T2,RTK	T1,RTK	T0,RTK			
	240		OK	T2,RTK	T1,RTK	T0,RTK		
	481			OK	T2,RTK	T1,RTK	T0,RTK	
	953				OK	T2,RTK	T1,RTK	T0,RTK
	1870					OK	T2,RTK	T1,RTK
	3740						OK	T2,RTK
	7480							OK
	OFF							

TABLE 3

Foreign EMF Test (Without Retest Feature)						
LR 1000Ω OR LT 1000Ω SWITCH	S7-S9 KEYS (Range limits x 1000Ω)					
	S7 0-320	S7 0-640	S7 or S8 0-1250	S8 or S9 0-2500	S8 or S9 0-5000	S9 0-10,000
SW. POS.	LAMP INDICATIONS					
15						
30.1						
59.7	T0					
120	T1	T0				
240	T2	T1	T0			
481	OK	T2	T1	T0		
953		OK	T2	T1	T0	
1870			OK	T2	T1	T0
3740				OK	T2	T1
7480					OK	T2
OFF						OK

TABLE 4

Foreign EMF Test (With Retest Feature)							
		S7 — S9 KEYS (RANGE LIMITS X 1000Ω)					
		S7 0-320	S7 0-640	S7 OR S8 0-1250	S8 OR S9 0-2500	S8 OR S9 0-5000	S9 0-10000
SWITCH	SW. POS.	LAMP INDICATIONS					
LR 1000Ω	15						
	30.1						
	59.7	T0,RT0					
	120	T1,RT1	T0,RT0				
	240	T2,RT2	T1,RT1	T0,RT0			
	481	OK	T2,RT2	T1,RT1	T0,RT0		
	953		OK	T2,RT2	T1,RT1	T0,RT0	
	1870			OK	T2,RT2	T1,RT1	T0,RT0
	3740				OK	T2,RT2	T1,RT1
	7480					OK	T2,RT2
	OFF						OK
LT 1000Ω	15						
	30.1						
	59.7	T0,RTK					
	120	T1,RTK	T0,RTK				
	240	T2,RTK	T1,RTK	T0,RTK			
	481	OK	T2,RTK	T1,RTK	T0,RTK		
	953		OK	T2,RTK	T1,RTK	T0,RTK	
	1870			OK	T2,RTK	T1,RTK	T0,RTK
	3740				OK	T2,RTK	T1,RTK
	7480					OK	T2,RTK
	OFF						OK

STEP	ACTION	VERIFICATION
	D. Off-Hook Test	
4	Operate S1 key momentarily.	S1 lamp lights.
5	Operate OHO key momentarily.	OHO, OK lamps light.
6	Operate MTR key momentarily.	OHO, OK lamps extinguished.
7	Operate OHNO key momentarily.	OHNO, T0, RT0 lamps light.
8	Operate MTR key momentarily.	OHNO, T0, RT0 lamps extinguished.
9	Operate RN key momentarily.	S1 lamp extinguished.
10	Operate RN1 key momentarily if other tests are not to be made.	All lamps extinguished.
	E. Plug-Up Test	
4	Operate S6 key momentarily.	S6 lamp lights.
5	Operate PU key momentarily.	PU, OK lamps light.
6	Operate MTR key momentarily.	PU, OK lamps extinguished.
7	Operate RN key momentarily.	S6 lamp extinguished.
8	Operate RN1 key momentarily if other tests are not to be made.	All lamps extinguished.
	F. Calibration Check Test	
4	Allow a minimum of 10 minutes before starting test.	
5	Operate S5 key momentarily.	S5 lamp lights.
6	Operate LR1000Ω switch to position CAL.	
7	Operate CAL1000Ω switch to position 160-OP-T0.	
8	Operate MTS key momentarily.	MTS, T0 lamps light. Disregard RT-, RTK lamps for this test. If T1 lamp lights proceed to Test G, Steps 7 through 15 and 34.
9	Operate MTR key momentarily.	MTS, T0 lamps extinguished.
10	Operate CAL1000Ω switch to position 160-NO-T1.	
11	Operate MTS key momentarily.	MTS, T1 lamps light. If T0 lamp lights proceed to Test G, Steps 7 through 15 and 34.
12	Operate MTR key momentarily.	MTS, T1 lamps extinguished.
13	Operate CAL1000Ω switch to position 320-OP-T1.	
14	Operate MTS key momentarily.	MTS, T1 lamps light. If T2 lamp lights proceed to Test G, Steps 16 through 24 and 34.

STEP	ACTION	VERIFICATION
15	Operate MTR key momentarily.	MTS, T1 lamps extinguished.
16	Operate CAL1000Ω switch to position 320-NO-T2.	
17	Operate MTS key momentarily.	MTS, T2 lamps light. If T1 lamp lights proceed to Test G, Steps 16 through 24 and 34.
18	Operate MTR key momentarily.	MTS, T2 lamps extinguished.
19	Operate CAL1000Ω switch to position 640-OP-T2.	
20	Operate MTS key momentarily.	MTS, T2 lamps light. If OK lamp lights proceed to Test G, Steps 25 through 34.
21	Operate MTR key momentarily.	MTS, T2 lamps extinguished.
22	Operate CAL1000Ω switch to position 640-NO-OK.	
23	Operate MTS key momentarily.	MTS, OK lamps light. If T2 lamp lights proceed to Test G, Steps 25 through 34.
24	Operate MTR key momentarily.	MTS, OK lamps extinguished.
25	Operate LR1000Ω switch to position OFF.	
26	Operate LT1000Ω switch to position CAL.	
27	Repeat Steps 7 through 24.	
28	Operate CAL1000Ω switch to position OFF.	
29	Operate LT1000Ω switch to position OFF.	
30	Operate RN key momentarily.	S5 lamp extinguished.
31	Operate RN1 key momentarily if other tests are not to be made.	All lamps extinguished.

G. Calibration

Disregard "G" Tests if "F" Test All OK.

4	Allow a minimum of 10 minutes before starting test.	
5	Operate S5 key momentarily.	S5 lamp lights.
6	Operate LR1000Ω switch to position CAL.	
7	Operate CAL1000Ω switch to position CAL-160.	
8	Operate MTS key momentarily.	MTS and either T0 or T1 lamps light. Disregard RT-, RTK lamps for this test.
9	If T0 lamp is lighted, rotate AGC potentiometer very slightly in a counterclockwise direction. If T1 lamp is lighted, proceed to Step 13.	

STEP	ACTION	VERIFICATION
10	Operate MTR key momentarily.	MTS, T0 lamps extinguished.
11	Repeat Steps 8, 9, and 10 until a change from T0 to T1 lamp occurs. If AGC potentiometer reaches adjustment limit before change occurs, it indicates a wiring change is required in line insulation test circuit. In this case, remove N wiring, if provided, or change wiring from S to R option and then repeat test starting at Step 8.	
12	Operate MTS key momentarily.	MTS, T1 lamps light.
13	Rotate AGC potentiometer very slightly in a clockwise direction.	
14	Operate MTR key momentarily.	MTS, T1 lamps extinguished.
15	Repeat Steps 12, 13, and 14 until a change from T1 to T0 lamp occurs. If AGC potentiometer reaches adjustment limit before change occurs, it indicates a wiring change is required in line insulation test circuit. In this case, change R option to S option, if not already provided, or add N wiring and then repeat test starting at Step 8.	
16	Operate CAL1000Ω switch to position CAL-320.	
17	Operate MTS key momentarily.	MTS and either T1 or T2 lamps light.
18	If T1 lamp is lighted, rotate M potentiometer very slightly in a counterclockwise direction. If T2 lamp is lighted, proceed to Step 22.	
19	Operate MTR key momentarily.	MTS, T1 lamps extinguished.
20	Repeat Steps 17, 18, and 19 until a change from T1 to T2 lamp occurs.	
21	Operate MTS key momentarily.	MTS, T2 lamps light.
22	Rotate M potentiometer very slightly in a clockwise direction.	
23	Operate MTR key momentarily.	MTS, T2 lamps extinguished.
24	Repeat Steps 21, 22, and 23 until a change from T2 to T1 lamp occurs.	
25	Operate CAL1000Ω switch to position CAL-640.	
26	Operate MTS key momentarily.	MTS and either T2 or OK lamps light.
27	If T2 lamp is lighted, rotate H potentiometer very slightly in a counterclockwise direction. If OK lamp is lighted, proceed to Step 31.	

STEP	ACTION	VERIFICATION
28	Operate MTR key momentarily.	MTS, T2 lamps extinguished.
29	Repeat Steps 26, 27, and 28 until a change from T2 to OK lamp occurs.	
30	Operate MTS key momentarily.	MTS, OK lamps light.
31	Rotate H potentiometer very slightly in a clockwise direction.	
32	Operate MTR key momentarily.	MTS, OK lamps extinguished.
33	Repeat Steps 30, 31, and 32 until a change from OK to T2 lamp occurs.	
34	Perform Test F, Calibration Check Test. Start at Step 7.	

H. Traffic Count Registration Test — No. 5 Crossbar No

1	Operate RN1 key momentarily.	
2	Operate RGT key momentarily.	RGT lamp lights.
3	Operate LL-TL key to position LL.	
4	Operate LB0, LB2, LB4, LB6, LB8 keys.	
5	Record reading of R register.	
6	Operate RTS key momentarily.	EG lamp lights. R register reads 5 higher than in Step 5.
7	Operate RTR key momentarily.	EG lamp extinguished.
8	Operate LB1, LB3, LB5, LB7, LB9 keys.	
9	Operate RTS key momentarily.	EG lamp lights. R register reads 10 higher than in Step 6.
10	Operate RTR key momentarily.	EG lamp extinguished.
11	Restore LB0, LB2, LB4, LB6, LB8 keys.	
12	Operate RTS key momentarily.	EG lamp lights. R register reads 5 higher than in Step 9.
13	Operate RTR key momentarily.	EG lamp extinguished.
14	Restore all LB- keys.	
15	Operate RTS key momentarily.	EG lamp lights. R register reads same as in Step 12.
16	Operate RTR key momentarily.	EG lamp extinguished.
17	Operate LB0, LB1 keys.	
18	Operate RTS key momentarily.	EG lamp lights. R register reads 2 higher than in Step 15.
19	Operate RTR key momentarily.	EG lamp extinguished.
20	Restore LB1 key.	

STEP	ACTION	VERIFICATION
21	Repeat Steps 17 through 20 using LB2 to LB9 key in succession instead of LB1 key.	For each repeat tests, R register reads 2 higher than previous reading.
22	Restore LB0, LB9 keys.	
23	Operate LL-TL key to position TL.	
24	Operate LB0, LB2, LB4, LB6, LB8 keys.	
25	Operate RTS key momentarily.	EG lamp lights. R register reads 5 higher than in Step 21.
26	Operate RTR key momentarily.	EG lamp extinguished.
27	Restore all LB- keys.	
28	Operate LB1, LB3, LB5, LB7, LB9 keys.	
29	Operate RTS key momentarily.	EG lamp lights. R register reads 5 higher than in Step 25.
30	Operate RTR key momentarily.	EG lamp extinguished.
31	Restore all LB- keys.	
32	Operate RN1 key momentarily.	RGT lamp extinguished.