

MANUAL SUPPLEMENTARY TEST OF KEY PULSING SENDERS

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1. GENERAL INFORMATION

1.1 Description of Test: This section describes a method for making the supplementary tests on key pulsing senders SD-25015-01 before routine.

1.2 Test Procedure: Perform these tests before making supplementary tests with the sender test frame outlined in Section 163.1. Refer to Section 161 for general information.

2. RECORDS AND REQUIREMENTS

2.1 Records: Forms ID-1313 and ID-2210 are required for recording the results of these tests. For further information see Section 3 of Handbook 50.

2.2 Requirements: For requirements see Section 0.4 of this handbook.

3. TEST EQUIPMENT

Amt.	Code	Description
1	ITE-8253	Contact Protection Test Set
1	ITE-4034	Volt-Ohmmeter
1	ITE-4029	Pulse Checking Set
1	KS-3008	Stop Watch
As Req.	322A	Make Busy Plugs
1	ITE-9546	Single Conductor Cord
1	ITE-9598	2 Conductor Cord
1	ITE-9726	2 Conductor Cord
1	ITE-8507	Alligator Clip
1	R-2736	Connector
1	419A	Spring Clip

† Furnished with the D-C adjusting set, ITE-4040.

4. FUSING

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

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

FUSE	EQUIPMENT
48V A	Winding, 6B(RT1) relay
" B	" , 6B(RO) "
" C	" , 4B(MB) "
" D	" , 9B(DRL) "
" E	Contact, 4B(DST) "
" F	Winding, 7B(FO-F9) "
" G	" , 4B(TL) "
" H	" , 6B(FP) "
" J	S resistance
" K	Contact, 6B(DST) relay
" L	Winding, 6B(H) "
" WL	BA resistance
24V A	Contact, 3B(DS1) relay-code U123 or 4T(DS1) relay-code U148
" B	Contact, 5B(DS1) relay-code U123 or 6T(DS1) relay-code U148
" C	A resistance

5. CONTACT PROTECTION

5.1 Check the contact protection circuits of one key pulsing sender circuit, listed in Table A, with the corresponding circuits of another key pulsing sender circuit, as described in Section 2 of Handbook 50.

NOTE 1: Since Table A lists the circuits for all options, it is advised that this column be checked against the associated wiring list in order that only the specified circuits may be tested.

NOTE 2: At the completion of test of each contact protection circuit, remove the blocks and insulators from relays used for test purposes.

6. CHECK OF RESISTANCES

6.1 Using the cords furnished with the volt-ohmmeter, ITE-4034, connect the X terminal of the ohmmeter to 1T of the FS1 relay. Connect the R x 10 terminal to 2T of the CR-1 relay. Operate the DC and RES keys. Operate relays as indicated and check the resistance. The values may vary $\pm 5\%$.

<u>Relays Operated</u>	<u>Resistance</u>
None	0
CR-3	300
CR-3, CR-4	900
CR-4	600

6.2 Shift the ohmmeter lead from 2T of the CR-1 relay to 5B of the S5' relay. Operate relays as indicated and check the resistance.

<u>Relays Operated</u>	<u>Resistance</u>
None	900
CR-1	600
CR-1, CR-2	0
CR-2	300

6.3 Insulate 3 and 4B of AV relay. Connect the ohmmeter to contact 3B of relay FO3 and 1T of relay FS1, operate relays as indicated and check the resistance.

<u>Relays Operated</u>	<u>Resistance</u>
S-3	Open
S-3, CR-5	25,500
CR-5	Open

6.4 Remove the insulation from AV relay. Block CO relay operated. Connect the ohmmeter to punchings 70 and 80 Link and Test terminal strip. Manually operate relay OF3 and TCR if provided, note that a reading of 390 ohms $\pm 5\%$ is obtained (500 ohms $\pm 5\%$ for FIG N). Release the OF3 relay, operate relay AV1 and note that the 390 ohm reading is again obtained. Release relays AV1, CO and TCR.

7. PER CENT BREAK TEST OF PG RELAYS

7.1 Connect 48V battery and ground to the A jack of the ITE-4029, pulse checking set, using cord ITE-9598. With an ITE-9726 cord plugged into the P jack of the set, connect the ring of the cord, using a 419A spring clip, to the 1T(FP) relay.

7.2 Block (CI1) (CL2) and (FP) relays operated and (SP) relay non-operated. Insulate 2T (PG3) and 1T(OF1) relays.

7.3 Perform calibration tests as outlined in Handbook 50, Section 5, Paragraph 4, under test procedure.

7.4 Remove block from (SP) relay to start pulsing. The (PG) relay cover must be in place while making pulsing tests.

7.5 Check that the (PG) relays meet the requirements specified on the (PG) relay pulse check graph shown in circuit requirement table, as follows:

(a) Plot the readings of ITE-4029 on the scales of the (PG) relay pulse check graph. Then extend a horizontal line from the "per cent break" value and a vertical line from the "pulses per second" value through the diamond shaped area on the graph.

(b) If the intersection of these two lines falls within the area bounded by the solid lines on the graph the (PG) interrupter meets requirements.

8. LR RELAY OPERATING PATH

8.1 The purpose of this test is to check that the operating path for the LR relay is placed under control of the DC relay. This feature is used on calls abandoned while a marker is engaged.

8.2 Check that relay LR operates when ground is applied to contact 7B of relay ON and that the operating path is broken when relay DC is manually operated.

9. OF RELAY MAKE BUSY FEATURE

9.1 Manually operate relay OF. Manually operate relays CT and ON1 and note that they lock. Check that contact 5B of relay SC is grounded. Release relay OF and note that relays CT and ON1 release.

10. AA STRAP ON BO' RELAY AND SOAK PATH STP RELAY

10.1 Block relays ON1 and OF3 operated and note that the STP relay operates. Test that the front contact of the BO' relay is grounded. Release relays ON1 and OF3.

11. OPERATING PATH FOR CT RELAY

11.1 Pull outward the CTR key at the sender make busy frame associated with the key pulsing sender to be tested. Block relay TM7 operated. Check that relay CT operates and releases when ground is applied and removed from contact 11B of relay LR.

11.2 Push in the CTR key and observe that relay CT operates. Release the TM7 relay and note that the CT relay releases.

12. MAKE BUSY FEATURES

12.1 Check that relay MB of the sender operates when the sender is made busy at the sender make busy frame and that ground is applied to contact 1T of relay ON and 3B of relay ON1 and that battery is applied to contact 5B of relay SC.

12.2 Check that the sender MB relay operates when a make busy plug is inserted into the (GB)- jack associated with the marker connector on which the sender under test appears.

13. TEST OF COMPENSATING RESISTANCE - CR - TRANSMITTING LEADS AND UNUSED TRANSMITTING LEADS

13.1 This test checks continuity and absence of crosses in the CR transmitting leads to the marker, verifies that the proper CR relay is connected to each lead, and verifies the unused leads in the other groups of transmitting leads. The test is made by connecting ground to the lead under test and momentarily operating the DST relay in the sender. The marker calls in the trouble indicator and a record of the grounded lead is taken by the indicator.

13.2 In the sender block normal the relay corresponding to the lead to be tested. For example, if the CR1 lead is to be tested block normal the CR1 relay. Using cord ITE-9546 equipped with an R-2736 connector and an ITE-8507 alligator clip, connect ground to the top winding terminal.

13.3 An assistant at the trouble indicator should make busy all except one marker.

13.4 Manually operate the sender DST relay and release in about one second. The XT lamp and the lamp corresponding to the grounded lead light.

13.5 Restore the trouble indicator and make the test to each marker.

13.6 Perform the tests per Paragraphs 13.2 to 13.5 testing each CR lead and each lead in the other groups (OB, OG, etc) that is not used in the regular assignments.

13.7 Perform the tests per Paragraphs 13.2 to 13.6 on each sender. Where more than one sender appears in a marker connector, it will not be necessary to test to all markers from each sender since all connector to marker leads were tested with the first sender. The test per Paragraph 13.5 may, therefore, be omitted except for the first sender tested in each connector.

14. MISCELLANEOUS CIRCUITS

14.1 Test miscellaneous circuits such as the following that are not covered in other tests: (1) frame test battery; (2) spare jack to MDF; (3) frame line circuit; (4) fuse alarms. Test that the fuse alarm is not stopped when the FA lamp is removed. Repeat the test with the 20A lamp removed.

TABLE A

Contact Protection Circuits

No.	Designation	Circuit Preparation			Type Ckt shown HB50 Sect 2	Loc. on SD-Dwg	Option
		Connect Lead to	Block or Insulate	Mtg Plt-Pos.			
1	C1 & C2	1T(RC)	(DST)O	A1;R5	2	H17	AN AX
2	FO3 rel	2B(RC)	(FO3)No:(DST)O	A1;P9;R5	2	G15	CA
3	C1	A(O)	(DST)O	A2;R5	2	H17	AN AX
4	C3 & C4	A(5')	A(5')	B7	2	H10	
5	C3	2(6')		B8	2	H10	
6	CD-CD	1(TM)	(PC)No	D1;H4	1	A35	
7	CD-CE	1(RM)		D3	2	A35	
8	FR rel	2B(CO)	2B(CO);(FR)No	G1,6	2	I43	CA
9	FT rel	9TF(FT)wdg	2T(CO);(FT)No	G2,1	2	I45	CA
10	FT1 rel	3B(FT)	(FT1)No	G2,5	2	I42	CA
11	FR1 rel	1B(FR)	(FR1)No	G6,7	2	I40	CA
12	ND rel	2B(FR1)	(ND)No	G7,8	2	I39	CA
13	ND1 rel	4T(ND)	(ND1)No	G8,9	2	J40	CA
14	ND2 rel	3T(ND1)	3T(ND1);(ND2)No	G9,10	2	J39	CA
15	CL3 rel	2T(WT)	(CL3)No	H1;S3	2	G6	CA
16	WT1 rel	2B(WT)	(WT1)No	H1,2	2	E33	CA
17	PC	2(PC1)	2(PC1);(PC)No	H5,4	1	C32	CA
18	ST rel	3(PC1)	3(PC1);(ST)No	H5;J1	2	B33	CA
19	KC rel	1B(KC)	3B(KC);(KC)No; (ON1)O	H7;S8	2	B36	CA
20	KR rel	3B(KR1)	(KR)No	H9,8	2	B37	CA
21	WT rel	2B(ST)	2B(ST);(WT)No	J1;H1	2	D34	CA
22	CH	12T(LR)	(PG1)No	J2;K6	2	H35	CL
23	PR	4B(LR)	(PR)No	J2;K3	1	J35	CA
24	PT	6B(LR)	(PT)No	J2;K4	1	J36	CA
25	GR rel	4T(PG1)	(GR)No	K6,5	2	I35	CA
26	TM1 & TM2 rels	1B(TM1)	1B(TM1);(TM1), (TM2)No	L1,2	2	F46	CA

TABLE A (Cont'd)
Contact Protection Circuits

No.	Designation	Circuit Preparation			Type Ckt shown HB50 Sect 2	Loc. on SD-Dwg	Option
		Connect Lead to	Block or Insulate	Mtg Plt-Pos.			
27	FS rel	8B(FS)	(FS)No	M12	2	E10	CA
28	FS & FS1 rels	8B(FS)	(FS),(FS1)No	M12;N7	2	E10	CE or CF
29	S1 & S1' rels	1B(S1)	(S1),(S1')No	N1;M1	2	A17	CA
30	S2 & S2' rels	3B(S2)	(S2),(S2')No	N2;M2	2	F69	Fig. G CA
31	S3 & S3' rels	1B(S3)	3T(S0);(S3),(S3') No	N3;M3;U9	2	A15	CA
32	FS1 rel	6T(S4)	(FS1)No	N4,7	2	E11	CA
33	S4 & S4' rels	4B(S4)	(S4),(S4')No	N4;M4	2	A14	CA
34	S5 & S5' rels	4B(S5)	(S5),(S5')No	N5;M5	2	A12	CA
35	S6 & S6' rels	4B(S6)	(S6),(S6')No	N6;M6	2	A11	CA
36	S6 & S6' rels R(net)	4B(S6)	(S6),(S6')No	N6;M6	1	A11	AW CA
37	FS2 rel	4T(FS2)	(FS2)No	N8	2	E12	CA
38	S	3T(TG1)	(TG2)No	N9,10	1	I31	CA
39	TG1 rel	6T(TG2)	(TG1)No	N10,9	2	J31	CA
40	IA	6B(OF1)	(IA)No	P1,6	1	E12	CA
41	OF	4B(OF1)	(OF1)No	P1	1	G12	CA
42	OF2 rel	10B(OF1)	10B(OF1);(OF2)No	P1,2	2	G11	CA
43	OF3 rel	9B(OF3)	(OF3)No	P3	2	G70	Fig. Q CA
44	OF4 rel	2B(OF3)	2B(OF3);(OF4)No	P3,4	2	F11	CA
45	AV rel	1T(IA)	(AV)No	P6;S5	2	D17	CA
46	C5	4T(FO2)	4T(FO2);A(5)	P8;A7	2	H10	AN AX
47	DST rel	4T(TR2)	(DST)No	R2,5	2	C3	CA
48	SC rel	1B(DC)	1B(DC);(SC)No	R6;S9	2	D47	CA
49	SC1 rel	2B(DC)	1B(DC);(SC1)No	R6;S10	2	C47	CA
50	DRL rel	3T(DRL)	(DRL)No	R7	2	C2	CA
51	D rel	1B(D)	(D)No	R8	2	E3	CA
52	DC	3B(D)	(D)No	R8	1	E3	CA
53	DS rel	5T(DS)	(DS)No	R9	2	D39	CA
54	DS1 rel	1T(DS1)	(DS1)No	R10	2	C65	Fig. D CA
55	DS1 rel	1B(DS1)	(DS1)No	R10	2	A54	Fig. E CA
56	CI	1T(CL1)	(FO2)No	S1;P8	1	F9	BK
57	CL1 rel	4T(CL1)wdg	(CL1)No	S1	2	G9	CA
58	CL2 rel	8T(CL2)wdg	(CL2)No	S2	2	G8	CA
59	CL4 rel	10T(CL4)wdg	(CL4)No	S4	2	G5	CA
60	F01 rel	5B(AV)	(F01)No	S5;P10	2	F17	CA
61	CT rel	3B(CT)	(CT)No	S7	2	F31	Fig. B CA
62	A	9T(ON1)		S8	1	C41	WA
63	CJ	5T(ON1)	1T(DS1)-Fig. E only	S8;R10	1	C39	CA
64	CK	7T(ON1)		S8	1	C42	CA
65	CO rel	3T(ON1)	(CO)No	S8;G1	2	I46	CA
66	CR1 rel	1B(CR1)	(CR1)No	T1	2	E9	CA
67	CR2 rel	1B(CR2)	(CR2)No	T2	2	E8	CA
68	CR3 rel	1B(CR3)	(CR3)No	T3	2	E7	CA
69	CR4 rel	1B(CR4)	(CR4)No	T4	2	E6	CA
70	CR5 rel	1B(CR5)	(CR5)No	T5	2	E5	CA
71	SD1 rel	4T(SD1)	(SD1)No	T6	2	G69	Fig. G CA
72	RT & RT1 rels	4T(RT)	(RT),(RT1)No	T8,9	2	C8	CA
73	IS rel	4B(RT1)	(IS)No	T9;U11	2	C6	CA
74	CC	2T(ON)		T10	1	C43	CB
75	CF	8T(ON)		T10	1	C42	BK
76	ON rel	4T(ON)	(ON)No	T10	2	D44	CA
77	ON1 rel	5B(ON)	(ON1)No	T10;S8	2	C40	CA
78	OB1 rel	4B(OB1)	(OB1)No	U1	2	B8	CA
79	OB2 rel	4T(OB2)	(OB2)No	U2	2	B7	CA
80	OB4 rel	4T(OB4)	(OB4)No	U3	2	B6	CA
81	OB5 rel	1B(OB5)	(OB5)No	U4	2	A9	Fig. M CA

TABLE A (Cont'd)

Contact Protection Circuits

No.	Designation	Circuit Preparation			Type Ckt shown HB50 Sect 2	Loc. on SD-Dwg	Option
		Connect Lead to	Block or Insulate	Mtg Plt-Pos.			
82	OG1 rel	4T(OG1)	(OG1)No	U5	2	B5	CA
83	OG2 rel	1B(OG2)	(OG2)No	U6	2	B4	CA
84	OG4 rel	1B(OG4)	(OG4)No	U7	2	B3	CA
85	OG5 rel	1B(OG5)	(OG5)No	U8	2	B2	CA
86	R	2T(SO)	2T(SO);(RT), (RT1)No	U9	2	D5	AY
87	SO rel	1B(SO)	(SO)No	U9	2	D5	CA
88	AV1 rel	3T(TW)	(AV1)No	U10;S6	2	F72	<u>Fig. C</u> CA
89	TW rel	3B(TW)	(TW)No	U10	2	G4	CA
90	ST2 rel	1T(STC)	(ST2)No	Z2,4	2	H24	CA
91	ST4 rel	3T(STC)	(ST4)No	Z2,5	2	H23	CA
92	UL rel & H net.	2B(STC)	(UL),(UC)No	Z2;AA1,2	1	G27	<u>WB</u> CA
93	FC & FL rels	4T(FL)	(FC),(FL)No	Z10,11	2	F21	CA
94	STL rel & I net.	2T(FC)	(STL),(STC)No	Z11,1,2	1	H27	<u>WB</u> CA
95	TL rel & G net	2B(UC)	(TL),(TC)No	AA2;AB1,2	1	F27	<u>WB</u> CA
96	U2 rel	1T(UC)	(U2)No	AA2,4	2	G24	CA
97	U4 rel	3T(UC)	(U4)No	AA2,5	2	G23	CA
98	HL rel & F net.	2B(TC)	(HL),(HC)	AB2;AC1,2	1	E27	<u>WB</u> CA
99	T2 rel	1T(TC)	(T2)No	AB2,4	2	F24	CA
100	T4 rel	3T(TC)	(T4)No	AB2,5	2	F23	CA
101	H2 rel	1T(HC)	(H2)No	AC2,4	2	H69	<u>Figs.</u> or H or J
102	H4 rel	3T(HC)	(H4)No	AC2,5	2	B66	CA
103	THL rel & E net.	2B(HC)	(THL),(THC)No	AC2;AD1,2	1	E23 C27	CA <u>WB</u> CA
104	TH2 rel	1T(THC)	(TH2)No	AD2,4	2	C24	CA
105	TH4 rel	3T(THC)	(TH4)No	AD2,5	2	C23	CA
106	T & T' rels	4B(T)	(T),(T')No	AD7,8	2	F29	CA
107	U & U' rels	4T(U)	(U),(U')No	AD9,10	2	G29	CA
108	STB & STB' rels	3B(STB)	(STB),(STB')No	AD11,12	2	H29	CA
109	STD rel	2T(STB)	(STD)No	AD11;Z7	2	H20	CA
110	STE rel	3B(STB')	(STE)No	AD12;Z8	2	H20	CA
111	CL rel & D net.	1T(CL)	(CL),(CC)No	AE1,2	1	F64	<u>Fig. D</u> CA
112	CL rel & D net.	1B(CL)-U6064 2B(CL)-U522	(CL),(CC)No	AE1,2	1	F54	<u>Fig. E</u> CA
113	BL rel & C net.	2T(CC)	(BL)No	AE2;AF1	1	E54	<u>Fig. E</u> CA
114	C2 rel	5B(CC)	(C2)No	AE2,4	2	G50	<u>Fig. E</u> CA
115	C4 rel	3T(CC)	(C4)No	AE2,5	2	G49	<u>Fig. E</u> CA
116	STA & STA' rels	4T(STA)	(STA),(STA')No	AE7,8	2	A29	CA
117	TH & TH' rels	4B(TH)	(TH),(TH')No	AE9,10	2	C29	CA
118	THD rel	3B(TH)	(THD)No	AE9;AC7	2	C20	CA
119	THE rel	2T(TH')	(THE)No	AE10;AC8	2	D20	CA
120	H & H' rels	4B(H)	(H),(H')No	AE11,12	2	D29	CA
121	BL rel & C net	1B(BL)	(BL),(BC)No	AF1,2	1	E64	<u>Fig. D, WB</u> CA
122	AL rel & B net.	2B(BC)	2B(BC):(AL), (AC)No	AF2;AG1,2	1	B64	<u>Fig. D</u> CA
123	AL rel & B net.	2B(BC)	2B(BC):(AL), (AC)No	AF2;AG1,2	1	B54	<u>Fig. E</u> CA
124	B2 rel	1T(BC)	(B2)No	AF2,4	2	E60	<u>Fig. D</u> CA
125	B2 rel	6T(BC)	(B2)No	AF2,4	2	E50	<u>Fig. E</u> CA
126	B4 rel	3T(BC)	(B4)No	AF2,5	2	E59	<u>Fig. D</u> CA
127	B4 rel	3B(BC)	(B4)No	AF2,5	2	E49	<u>Fig. E</u> CA

TABLE A (Cont'd)
Contact Protection Circuits

No.	Designation	Circuit Preparation			Type Ckt Shown HB50 Sect	Loc. on SD-Dwg	Option
		Connect Lead to	Block or Insulate	Mtg Plt-Pos.			
128	C2 rel	1T(BC)	(C2)No; (TDA)O, when provided	AF2;AE4;AG7	2	G60	<u>Fig.D</u> CA
129	C4 rel	3T(BC)	(C4)No; (TDA)O, when provided	AF2;AE5;AG7	2	G59	<u>Fig.D</u> CA
130	A & A' rels	4B(A)	(A), (A')No	AF7, 8	2	A27	CA
131	B & B' rels	4B(B)	(B), (B')No	AF9,10	2	A25	CA
132	C & C' rels	4T(C)	(C), (C')No	AF11,12	2	A23	CA
133	CA	2T(AL)		AG1	2	A38	AO
134	A2 rel	1T(AC)	(A2), (TD2)No	AG2,4,9	1	B60	<u>Fig.D</u> CA
135	A2 rel	1T(AC)	(A2)No	AG2,4	2	B50	<u>Fig.E</u> CA
136	A4 rel	3T(AC)	(A4)No	AG2,5	2	B59	<u>Fig.D</u> CA
137	A4 rel	3T(AC)	(A4)No	AG2,5	2	B49	<u>Fig.E</u> CA
138	TD & TDA rels	6T(TD)wdg	(TD), (TDA)No	AG8,7	2	C63	<u>Fig.D</u> CA
139	CG	2B(F10)		AH11	1	C45	BK
140	F10 rel	1B(F10)	(F10)No	AH11	2	C45	CA
141	FOO rel	1B(FOO)	(FOO)No	AH12	2	C44	CA

➔ Arrowed lines indicate new or changed information.

R. E. RAHMES
Engineer of Installation

Reason for Reissue:
To make minor changes.

Replaces Section 163 dated 6-19-47.