SAGE DATA TRANSMISSION SYSTEMS — PRIVATE SERVICE SYSTEMS
AIR-GROUND VOICE COMMUNICATION SYSTEM
43A1 CARRIER TELEGRAPH TERMINAL
TESTS

1. GENERAL

1.01 This section describes a method of testing 43A1 carrier telegraph terminals in dual facility (DF) trunks, common user group (CUG) trunks, automatic test circuits (ATC), and trunk operation test circuits at Direction Centers (DC) and Radio Sites (RS).

1.02 The tests covered are:

A. Filament Voltage — All Locations: This test checks the filament voltage of 43A1 carrier telegraph terminals in DF and CUG trunks and in the trunk test circuits.

B. Send Level and Receiver Sensitivity — DF at DC: This test checks the send level and receiver sensitivity of 43A1 carrier telegraph terminals in DF trunks and trunk operation test circuits (TOTC) at Direction Centers. It also checks for proper response of supervisory lamps and alarms resulting from operation and release of the supervisory relay associated with each 43A1.

C. Loop Current — DF at DC or RS: This test checks for the presence of proper receive leg loop current by measuring plate-to-cathode voltage of the receiver output tube in each 43A1 carrier telegraph terminal in DF trunks and TOTC.

D. Send Level and Receiver Sensitivity — DF at RS: This test checks the send level and receiver sensitivity of 43A1 carrier telegraph terminals in DF trunks and trunk operation test circuits (TOTC) at Radio Sites. It also checks for proper response of supervisory lamps resulting from operation and release of the supervisory relay associated with each 43A1.

E. Send Level — CUG at DC: This test checks the send level of 43A1 carrier telegraph terminals in CUG trunks and the ATC at Direction Centers.

F. Receiver Sensitivity — CUG at DC: This test checks the receiver sensitivity of 43A1 carrier telegraph terminals in CUG trunks and the ATC at Direction Centers. It also checks for proper response of supervisory lamps and alarms resulting from operation and release of the supervisory relay associated with each 43A1.

G. Loop Current — CUG at DC or RS: This test checks for the presence of proper receive leg loop current by measuring plate-to-cathode voltage of the receiver output tube in each 43A1 carrier telegraph terminal in CUG trunks and the ATC at Direction Centers or Radio Sites.

H. Send Level and Receiver Sensitivity — CUG at RS: This test checks the send level and receiver sensitivity of 43A1 carrier telegraph terminals in CUG trunks and the ATC at Radio Sites. It also checks for proper response of supervisory lamps resulting from operation and release of the supervisory relay associated with each 43A1.

1.03 The tests in this section should be done in the order listed for each type of facility and location.

FACILITY AND LOCATION	TESTS (in order)
DF at DC	A-B-C
DF at RS	A-D-C
CUG at DC	A-E-F-G
CUG at RS	A-H-G

The procedure for testing a 43A1 carrier terminal in its associated circuitry in many test steps makes use of another 43A1 carrier terminal and its associated circuitry as a piece of test equipment. The order of tests and steps within a test is arranged so that a 43A1 carrier terminal being used as test equipment has met its necessary requirements for that usage. Each test checks certain features of several 43A1 carriers in various circuits. If only a particular 43A1

carrier terminal is to be checked, certain steps of the test to be determined locally may be unnecessary. However, if another 43A1 carrier terminal is used as test equipment for the desired test steps, it must be one that meets the requirements of any prior test steps that apply to it.

1.04 Tests need not be coordinated between Radio Sites and Direction Centers; however, the Direction Center must be notified prior to testing at a Radio Site.

1.05 Tests in this section do not require any circuit releases. However, the Air Force should be notified prior to testing even though the test method is designed to prevent service interruptions. If traffic loads are heavy, or certain military operations are in progress or scheduled, the Air Force may request postponement of testing.

Caution: Some of the tests will result in operation of the office alarms. The craftsman must be alert to differentiate between regular service alarms and alarms caused by testing.

1.06 This section specifies the send level for 43A1 terminals in the automatic test circuits and trunk operation test circuits, as well as in the DF and CUG trunks. Some of these levels have not been specified in any current literature.

1.07 This section is designed to check and adjust receiver sensitivity and send level of the 43A1 terminals in their working circuits. This is required because the actual circuit impedance at 43A1 carrier frequencies is about 400 ohms in the working circuits; whereas, a 43A1 terminal is checked and adjusted in the 165C1 test set while working with 600-ohm impedances. The difference in impedances would require that the send level of a 43A1 terminal be adjusted in the 165C1 test set (test bench) to a value about 2 db higher than the level required in the working circuit.

1.08 Lettered Steps: A letter a, b, c, etc, added to a step number in Part 3 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 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 that letter should be omitted.

2. APPARATUS

2.01 The apparatus required for each test is shown in Table A. The details of each item are covered in the paragraphs indicated by the numbers in parentheses.

2.02 322A Plug. Used in PATCH jack in DF trunks to operate a patching relay when patching in a spare trunk. Also used in OS jack to make busy a CUG trunk at sites where CUG trunks were initially installed.

2.03 184B Plug. Used in OS jack to make busy a CUG trunk at sites where DF trunks have been replaced by CUG trunks.

2.04 Patching cord, P3E cord 8 feet long, equipped with two 310 plugs (3P6E cord).

2.05 Patching cord, P6E cord 10 feet long, equipped with two 338A plugs (6P8B cord).

2.06 Patching cord, P3N cord, 6 feet long, equipped with one 310 plug and one 241A plug (3P17B cord). This cord is used for connections to the 21A TMS.

TABLE A

APPARATUS	TESTS							
	A	B	C	D	E	F	G	H
Automatic Test Circuit, SD-1G113-01	–	–	–	–	1	1	1	1
Sensitivity Test Circuit, SD-1G144-01	–	1	–	1	–	1	–	1
Telephone Circuit, SD-1G032-01	–	1	–	1	–	–	–	–
Transmission Measuring Circuit, SD-1G073-01	–	1	–	–	1	1	–	–
Trunk Operation Test Circuit, SD-1G033-01	–	1	*	–	–	–	–	–
Trunk Operation Test Circuit, SD-1G034-01	–	–	*	1	–	–	–	–
21A Transmission Measuring Set, J94021A	–	–	–	1	–	–	–	1
Head Telephone Set	–	1	–	1	–	–	–	–
KS-14510, List 1 Volt-Ohm-Milliammeter or equivalent	1	–	1	–	–	–	1	–
322A Plug (2.02)	–	1	–	–	–	*	–	*
184B Plug (2.03)	–	–	–	–	–	*	–	–
Cord (2.04)	–	2	–	2	1	*	*	3
Cord (2.05)	–	3	–	3	–	–	–	–
Cord (2.06)	–	–	–	1	–	–	–	1

* As required.

3. METHOD

STEP	ACTION	VERIFICATION
	A. Filament Voltage — All Locations	
1	Set switch of volt-ohm-milliammeter to 60-volt dc scale.	
2	Connect positive lead to FA and negative lead to FB pin jacks of 43A1 channel unit.	Meter reads between 19.5 and 20.5 volts. See Step 3a.
3a	If requirement of Step 2 is not met — Adjust FIL ADJ rheostat for meter reading of 20.0 volts.	
4	Disconnect meter leads.	

STEP	ACTION	VERIFICATION
	B. Send Level and Receiver Sensitivity — DF at DC	
1	Patch from A DROP REC jack of spare trunk to REC B jack of TMS, using 3P6E cord.	TMS reads between −18.8 and −19.2 db. See Step 2a.
2a	If requirement in Step 1 is not met — In trunk equipment bays — Adjust SEND LEV potentiometer in REG 43A1 until TMS reads −19.0 db.	
3	Move patch cord from A DROP REC jack to B DROP REC jack in spare trunk.	TMS reads between −18.8 and −19.2 db. See Step 4b.
4b	If requirement in Step 3 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer in ALT 43A1 until TMS reads −19.0 db.	
5	Remove patch cord from TMS and B DROP REC jacks.	
6	Patch from A DROP REC jack of a spare DF trunk to DF jack in STC (patch ***a*** in Fig. 1) using a 3P6E patch cord.	
	Note: Use a spare trunk that has been tested by Steps 1 through 5.	
7	Insert R test cord of TOTC into ADJ jacks in STC with knurled side of plug down (patch ***b*** in Fig. 1).	
8	Operate ON key in TOTC.	In TOTC — FA lamp lights and FR lamp flashes regularly about once a second. See Step 9c.
9c	If FR lamp does not flash regularly in Step 8 — Adjust REC GAIN potentiometer in REG 43A1 in TOTC until FR lamp does flash regularly.	
10	Operate LT key in STC.	
11	Patch from TOTC B jack in STC to REC B jack in TMS (patch ***c*** in Fig. 1), using 3P6E patch cord.	TMS reads between −34.8 and −35.2 db. See Step 12d.
12d	If requirement in Step 11 is not met — Adjust SEND LEV potentiometer in REG 43A1 in TOTC until TMS reads −35.0 db.	
13	Restore LT key in STC.	
14	Remove cord from TOTC B jack of STC and REC B jack of TMS.	
15	Remove R test cord from ADJ jacks of STC.	

STEP	ACTION	VERIFICATION
	B. Send Level and Receiver Sensitivity — DF at DC (Cont)	
16	Insert A test cord of TOTC in ADJ jacks of STC with knurled side of plug down.	In TOTC — FR lamp is lighted and FA lamp flashes regularly about once a second. See Step 17e.
17e	If FA lamp does not flash regularly in Step 16 — Adjust REC GAIN potentiometer of ALT 43A1 in TOTC until FA lamp flashes regularly.	
18	Operate LT key in STC.	
19	Patch from TOTC B jack of STC to REC B jack of TMS (patch *c* in Fig. 1), using 3P6E patch cord.	TMS reads between −34.8 and −35.2 db. See Step 20f.
20f	If requirement in Step 19 is not met — Adjust SEND LEV potentiometer of ALT 43A1 in TOTC until TMS reads −35.0 db.	
21	Remove cord from TOTC B jack of STC and REC B jack of TMS.	
22	Remove cord from A DROP REC jack of spare trunk and DF jack of STC.	
23	Restore LT key in STC.	
24	Restore ON key in TOTC.	
25	Remove TOTC A test cord from ADJ jacks of STC.	
26	Patch from A DROP jacks of spare DF trunk to TEST jacks of STC, using 6P8B cord. ***Note:*** Spare trunk must have been tested per Steps 1 through 5.	
27	Plug R test cord of TOTC into TOTC jacks of STC. ***Note:*** TOTC must have been tested per Steps 6 through 20f.	In spare trunk — SWA, STB, and GUARD B lamps are lighted. STA lamp, accompanied by audible alarm, flashes regularly about once a second. See Step 28g.
28g	If STA lamp does not flash regularly in Step 27 — Move cord from TEST to ADJ jacks in STC.	
29g	In trunk equipment bay — Adjust REC GAIN potentiometer of REG 43A1 in spare trunk until STA lamp flashes regularly. ***Note:*** If STA lamp is not visible during adjustment, watch for regular pulsing of associated RSR relay.	

STEP	ACTION	VERIFICATION
	B. Send Level and Receiver Sensitivity — DF at DC (Cont)	
30	Remove cord from ADJ or TEST jacks of STC and A DROP jacks of spare trunk.	
31	Momentarily push ACO A key in spare trunk.	
32	Patch from TEST jacks of STC to B DROP jacks of spare trunk using 6P8B cord.	In spare trunk — SWB, STA, and GUARD A lamps are lighted. STB lamp, accompanied by audible alarm, flashes regularly about once a second. See Step 33h.
33h	If STB lamp does not flash regularly in Step 32 — Move cord from TEST to ADJ jacks in STC.	
34h	In trunk equipment bay — Adjust REC GAIN potentiometer until STB lamp flashes regularly. ***Note:*** If STB lamp is not visible during adjustment, watch for regular pulsing of associated RSA relay.	
35	Remove cord from B DROP jacks of spare trunk and TEST or ADJ jacks of STC.	
36	Momentarily push ACO B key in spare trunk.	
37	Remove TOTC R test cord from TOTC jacks of STC.	

Note: Steps 38i through 47j cover a procedure for replacing a working trunk with a spare. The procedure differs from that described in other literature but must be followed to insure the channel will be working on the same line facilities after the patch as before. Perform Steps 39i through 42i or 44j through 47j in rapid sequence. Patches are shown in Fig. 2.

38i	If SWA lamp in working DF trunk to be tested is lighted — Using head telephone set and position telephone circuit, monitor 4 wire at A MON L jacks to determine when channel is idle (patch ***a*** in Fig. 2).	
39i	When channel is idle — Using 6P8B cord, patch from A DROP jacks of a tested spare trunk to A LINE jacks of trunk under test, putting cord in DROP jacks first (patch ***b*** in Fig. 2).	
40i	Insert 322A plug in PATCH jack of trunk under test (***c*** in Fig. 2).	

STEP	ACTION	VERIFICATION
	B. Send Level and Receiver Sensitivity — DF at DC (Cont)	
41i	Using 6P8B cord, patch from B DROP jacks of spare trunk to B LINE jacks of trunk under test, putting cord in DROP jacks first (patch *d* in Fig. 2).	
42i	Momentarily push ACO keys in trunk under test.	In spare trunk — SWA lamp is lighted, other lamps are extinguished. In trunk under test — SWB, STA, STB, GUARD A, and GUARD B lamps are lighted and SWA lamp is extinguished.
43j	If SWB lamp in working DF trunk to be tested is lighted — Using head telephone set and position telephone circuit, monitor 4 wire at B MON L jacks to determine when channel is idle (patch *a* in Fig. 2).	
44j	When channel is idle — Using 6P8B cord, patch from B DROP jacks of a tested spare trunk to B LINE jacks of trunk under test, putting cord in DROP jacks first (patch *d* in Fig. 2).	
45j	Insert 322A plug-in PATCH jack of trunk under test (*c* in Fig. 2).	
46j	Using 6P8B cord, patch from A DROP jacks of spare trunk to A LINE jacks of trunk under test, putting cord in DROP jacks first (patch *b* in Fig. 2).	
47j	Momentarily push ACO keys in trunk under test.	In spare trunk — SWB lamp is lighted; other lamps are extinguished. In trunk under test — SWA, STA, STB, GUARD A, and GUARD B lamps are lighted. SWB lamp is extinguished.
48	Using 3P6E cord, patch from A DROP REC jack of trunk to REC B jack of TMS (patch *e* in Fig. 2).	TMS reads between −18 and −20 db. See Step 49k.
49k	If requirement in Step 48 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer in REG 43A1 of trunk under test until TMS reads −19.0 db.	
50	Move cord from A DROP REC jack to B DROP REC jack.	TMS reads between −18 and −20 db. See Step 51*l*.

STEP	ACTION	VERIFICATION
	B. Send Level and Receiver Sensitivity — DF at DC (Cont)	
51*l*	If requirement in Step 50 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer in ALT 43A1 of trunk under test until TMS reads −19.0 db.	
52	Remove cord from TMS REC B jacks of TMS and B DROP REC jack of trunk.	
53	Plug TOTC R test cord into TOTC jacks of STC (patch *f* in Fig. 2).	
54	Using 6P8B cord, patch from TEST jacks of STC to A DROP jacks of trunk under test (patch *g* in Fig. 2).	In trunk under test — STA lamp, accompanied by audible alarm, flashes regularly about once a second. See Step 55m.
55m	If STA lamp does not flash regularly in Step 54 — Move patch cord from TEST jacks to ADJ jacks in STC.	
56m	In trunk equipment bay — Adjust REC GAIN potentiometer until STA lamp flashes regularly. ***Note:*** If lamp is not visible during adjustment, watch for regular pulsing of associated RSR relay.	
57	Move cord from A DROP REC jacks to B DROP REC jacks and plug other end into TEST jacks in STC.	In trunk under test — STB lamp, accompanied by audible alarm, flashes regularly about once a second. See Step 58n.
58n	If STB lamp does not flash regularly in Step 57 — Move cord from TEST jacks to ADJ jacks in STC.	
59n	In trunk equipment bay — Adjust REC GAIN potentiometer in ALT 43A1 of trunk under test until STB lamp flashes regularly. ***Note:*** If lamp is not visible during adjustment, watch for regular pulsing of associated RSA relay.	
60	Remove TOTC R test cord from TOTC jacks of STC.	
61	Remove cord from B DROP REC jacks of trunk and TEST or ADJ jacks of STC.	

STEP	ACTION	VERIFICATION
	B. Send Level and Receiver Sensitivity — DF at DC (Cont)	
	Note: Steps 62o through 71p cover restoration of tested trunk to its assigned channel. Perform Steps 63o through 66o or 68p through 71p in rapid sequence.	
62o	If SWA lamp in spare trunk is lighted — Using head telephone set and position telephone circuit, monitor 4 wire at A MON L jacks of trunk just tested to determine when channel is idle (patch ***a*** in Fig. 2).	
63o	When channel is idle — Remove cord from A LINE jacks and A DROP jacks, removing it from A LINE jacks first (patch ***b*** in Fig. 2).	
64o	Remove 322A plug from PATCH jack (***c*** in Fig. 2).	
65o	Remove cord from B LINE jacks and B DROP jacks, removing it from B LINE jacks first (patch ***d*** in Fig. 2).	
66o	Momentarily push ACO keys in spare trunk.	In tested trunk — SWA lamp is lighted; other lamps are extinguished.
67p	If SWB lamp in spare trunk is lighted — Using head telephone set and position telephone circuit, monitor 4 wire at B LINE jacks of trunk just tested to determine when channel is idle (patch ***a*** in Fig. 2).	
68p	When channel is idle — Remove cord from B LINE jacks and B DROP jacks, removing it from B LINE jacks first (patch ***d*** in Fig. 2).	
69p	Remove 322A plug from PATCH jack (***c*** in Fig. 2).	
70p	Remove cord from A LINE jacks and A DROP jacks, removing it from A LINE jacks first (patch ***b*** in Fig. 2).	
71p	Momentarily push ACO keys in spare trunk.	In tested trunk — SWB lamp is lighted; other lamps are extinguished.
72	Disconnect position telephone circuit from A or B MON L jacks.	

STEP	ACTION	VERIFICATION
	C. Loop Current — DF at DC or RS	
1	Set volt-ohm-milliammeter for 300-volt dc scale.	
2	Connect positive lead to LP and negative lead to C pin jacks of 43A1 channel unit in working DF trunk. ***Note:*** Do not do this test on any trunk in which supervisory relay RSA or RSR is released.	Meter reads between 78 and 82 volts. See Step 3a. ***Note:*** If channel is not idle, meter will read 130 volts. Continue test after channel becomes idle.
3a	If requirement in Step 2 is not met — Adjust LP CUR potentiometer until meter reads 80.0 volts.	
4	Remove meter leads from LP and C pin jacks.	
5	At testboard — Plug R test cord of TOTC into A DROP jacks and A test cord of TOTC into B DROP jacks of spare DF trunk.	In spare trunk — STA and STB lamps are extinguished.
6	Operate ON key in TOTC.	In TOTC — FA and FR lamps are extinguished.
7	Connect positive lead of volt-ohm-milliammeter to LP pin jack and negative lead to C pin jack of REG 43A1 in TOTC.	Meter reads between 78 and 82 volts. See Step 8b.
8b	If requirement in Step 7 is not met — Adjust LP CUR potentiometer in REG 43A1 until meter reads 80.0 volts.	
9	Move meter leads to LP and C pin jacks of ALT 43A1 in TOTC.	Meter reads between 78 and 82 volts. See Step 10c.
10c	If requirement in Step 9 is not met — Adjust LP CUR potentiometer in ALT 43A1 until meter reads 80.0 volts.	
11	Remove meter leads from LP and C pin jacks of ALT 43A1 in TOTC.	
12	In trunk equipment bay — Connect volt-ohm-milliammeter positive lead to LP pin jack and negative lead to C pin jack of REG 43A1 in spare trunk.	Meter reads between 78 and 82 volts. See Step 13d.
13d	If requirement in Step 12 is not met — Adjust LP CUR potentiometer in REG 43A1 until meter reads 80.0 volts.	
14	Move meter leads to LP and C pin jacks of ALT 43A1 in spare trunk.	Meter reads between 78 and 80 volts. See Step 15e.

STEP	ACTION	VERIFICATION
	C. Loop Current — DF at DC or RS (Cont)	
15e	If requirement in Step 14 is not met — Adjust LP CUR potentiometer in ALT 43A1 until meter reads 80.0 volts.	
16.	Remove meter leads from ALT 43A1.	
17	Remove TOTC test cords from spare trunk A and B DROP jacks.	
	D. Send Level and Receiver Sensitivity — DF at RS	
1	Plug R test cord of TOTC into TEST jacks of STC, with knurled side of plug down.	
2	Patch from TOTC B jack of STC to DET IN 600 jacks of 21A TMS, using 3P17B cord.	TMS reads between −28.8 and −29.2 db. See Step 3a.
3a	If requirement in Step 2 is not met — Adjust SEND LEV potentiometer of REG 43A1 in TOTC until TMS reads −29.0 db.	
4	Remove R test cord from TEST jacks of STC.	
5	Plug A test cord of TOTC into TEST jacks of STC, with knurled side of plug down.	21A TMS reads between −28.8 and −29.2 db. See Step 6b.
6b	If requirement in Step 5 is not met — Adjust SEND LEV potentiometer of ALT 43A1 in TOTC until TMS reads −29.0 db.	
7	Remove A test cord from TEST jacks of STC.	
8	Remove cord from TOTC B jack of STC and DET IN 600 jacks of 21A TMS.	
9	Plug R test cord of TOTC into TOTC jacks of STC.	
10	Patch from TEST A jack of STC to A DROP TRANS jack of spare DF trunk, using 3P6E cord.	In spare trunk — STB and SWA lamps are lighted. STA lamp flashes regularly about once a second. See Step 11c.
11c	If STA lamp does not flash regularly in Step 10 — Move cord from TEST A jack to ADJ A jack in STC.	
12c	In trunk equipment bay — Adjust REC GAIN potentiometer in REG 43A1 of spare trunk until STA lamp flashes regularly. ***Note:*** If lamp is not visible during adjustment, watch for regular pulsing of associated RSR relay.	

STEP	ACTION	VERIFICATION
	D. Send Level and Receiver Sensitivity — DF at RS (Cont)	
13c	Move cord from ADJ A jack to TEST A jack in STC.	
14	Operate LT key in STC.	
15	Patch from A DROP REC jack of spare trunk to DET IN 600 jacks of 21A TMS, using 3P17B cord.	TMS reads between −24.8 and −25.2 db. See Step 16d.
16d	If requirement in Step 15 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer in REG 43A1 of spare trunk until TMS reads −25.0 db.	
17	Remove cord from A DROP REC jack of spare trunk and DET IN 600 jacks of TMS.	
18	Restore LT key in STC.	
19	Move cord from A DROP TRANS jack to B DROP TRANS jack in spare trunk.	In spare trunk — STA and SWB lamps are lighted. STB lamp flashes regularly about once a second. See Step 20e.
20e	If STB lamp does not flash regularly in Step 19 — Move cord from TEST A jack to ADJ A jack in STC.	
21e	In trunk equipment bay — Adjust REC GAIN potentiometer in ALT 43A1 of spare trunk until STB lamp flashes regularly. ***Note:*** If lamp is not visible during adjustment, watch for regular pulsing of associated RSA relay.	
22	Operate LT key in STC.	
23	Patch from B DROP REC jack of spare trunk to DET IN 600 jacks of 21A TMS, using 3P17B cord.	TMS reads between −24.8 and −25.2 db. See Step 24f.
24f	If requirement in Step 23 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer in ALT 43A1 of spare trunk until TMS reads −25.0 db.	
25	Remove cord from B DROP REC jack of spare trunk and DET IN 600 jacks of TMS.	
26	Remove cord from B DROP TRANS jack of spare trunk and ADJ A or TEST A jack of STC.	

STEP	ACTION	VERIFICATION
	D. Send Level and Receiver Sensitivity — DF at RS (Cont)	
27	Remove R test cord of TOTC from TOTC jacks of STC.	
28	Restore LT key in STC.	
29	Patch from A DROP REC jack of spare trunk to DF jack of STC, using 3P6E cord.	
30	Patch from TOTC B jack of STC to A DROP TRANS jack of spare trunk.	
31	Plug R test cord of TOTC into TEST jacks of STC, with knurled side of plug down.	
32	Operate ON key in TOTC.	In TOTC — FA lamp lights. FR lamp flashes regularly about once a second. See Step 33g.
33g	If FR lamp does not flash regularly in Step 32 — Move R test cord from TEST to ADJ jacks in STC, keeping knurled side of plug down.	
34g	Adjust REC GAIN potentiometer in REG 43A1 in TOTC until FR lamp flashes regularly.	
35	Remove R test cord of TOTC from TEST or ADJ jacks of STC.	
36	Plug A test cord of TOTC into TEST jacks of STC, with knurled side of plug down.	In TOTC — FR lamp is lighted. FA lamp flashes regularly about once a second. See Step 37h.
37h	If FA lamp does not flash regularly in Step 36 — Move A test cord of TOTC from TEST to ADJ jacks of STC, keeping knurled side of plug down.	
38h	Adjust REC GAIN potentiometer in ALT 43A1 of TOTC until FA lamp flashes regularly.	
39	Restore ON key to normal in TOTC.	
40	Remove A test cord of TOTC from TEST or ADJ jacks of STC.	
41	Remove cord from A DROP REC jack of spare trunk and DF jack of STC.	
42	Remove cord from A DROP TRANS jack of spare trunk and TOTC B jack of STC.	

STEP	ACTION	VERIFICATION
	D. Send Level and Receiver Sensitivity — DF at RS (Cont)	
	Note: Steps 43 through 51j cover a procedure for replacing a working DF trunk with a spare. The procedure differs from that given in other literature, but must be followed in order that channel will be on same line facilities after patch as before. Patching steps should be done in rapid sequence. Patches are shown in Fig. 3.	
43	Using position telephone circuit and head telephone set, monitor 4 wire at MON TRANS and MON REC jacks in DF trunk to be tested to determine when channel is idle.	
44i	If SWA lamp in trunk to be tested is lighted — When circuit is idle, patch from A DROP jacks of spare trunk to A LINE jacks of trunk to be tested, using 6P8B cord. Put cord in A DROP jacks first (patch ***a*** in Fig. 3).	
45i	Patch from TRK IN and TRK OUT jacks of spare trunk to R EQ OUT and R EQ IN jacks of trunk to be tested, using 6P8B cord (patch ***b*** in Fig. 3).	
46i	Patch from PT-COD TRK jack of spare trunk to PT-COD R EQ jack of trunk to be tested, using 3P6E cord (patch ***c*** in Fig. 3).	
47i	Patch from B DROP jacks of spare trunk to B LINE jacks of trunk to be tested, using 6P8B cord (patch ***d*** in Fig. 3). Put cord in B DROP jacks first.	In trunk under test — SWB, STA, and STB lamps are lighted. SWA lamp is extinguished. In spare trunk — SWA lamp is lighted. SWB, STA, and STB lamps are extinguished.
48j	If SWB lamp in trunk to be tested is lighted — When circuit is idle, patch from B DROP jacks of spare trunk to B LINE jacks of trunk to be tested, using 6P8B cord. Put cord in B DROP jacks first (patch ***d*** in Fig. 3).	
49j	Patch from TRK IN and TRK OUT jacks of spare trunk to R EQ OUT and R EQ IN jacks of trunk to be tested, using 6P8B cord (patch ***b*** in Fig. 3).	
50j	Patch from PT-COD TRK jack of spare trunk to PT-COD R EQ jack of trunk to be tested, using 3P6E cord (patch ***c*** in Fig. 3).	
51j	Patch from A DROP jacks of spare trunk to A LINE jacks of trunk to be tested, using 6P8B cord. Put cord in A DROP jacks first (patch ***a*** in Fig. 3).	

STEP	ACTION	VERIFICATION
	D. Send Level and Receiver Sensitivity — DF at RS (Cont)	
52	Plug R test cord of TOTC into TOTC jacks of STC (patch *e* in Fig. 3).	
53	Patch from TEST A jack of STC to A DROP TRANS of trunk under test (patch *f* in Fig. 3).	In trunk — SWA and STB lamps are lighted. STA lamp flashes regularly about once a second. See Step 54K.
54k	If STA lamp does not flash regularly in Step 53 — Move patch cord from TEST A jack to ADJ A jack in STC.	
55K	In trunk equipment bay — Adjust REC GAIN potentiometer in REG 43A1 in trunk under test until STA lamp flashes regularly. *Note:* If STA lamp is not visible during adjustment, watch for regular pulsing of associated RSR relay.	
56k	Move cord from ADJ A to TEST A jack in STC.	
57	Operate LT key in STC.	
58	Patch from A DROP REC jack of trunk under test to DET IN 600 jacks in 21A TMS, using 3P17B cord (patch *g* in Fig. 3).	TMS reads between −24 and −26 db. See Step 59*l*.
59*l*	If requirement in Step 57 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer in REG 43A1 in trunk under test until TMS reads −25.0 db.	
60	Remove cord from a DROP REC jack and DET IN 600 jacks.	
61	Restore LT key in STC.	
62	Move cord from A DROP TRANS jack to B DROP TRANS jack in trunk under test.	In trunk — SWB and STA lamps are lighted. STB lamp flashes regularly about once a second. See Step 63m.
63m	If STB lamp does not flash regularly in Step 62 — Move cord from TEST A jack to ADJ A jack in STC.	
64m	In trunk equipment bay — Adjust REC GAIN potentiometer of ALT 43A1 in trunk under test until STB lamp flashes regularly. *Note:* If STB lamp is not visible during adjustment, watch for regular pulsing of associated RSA relay.	

STEP	ACTION	VERIFICATION
	D. Send Level and Receiver Sensitivity — DF at RS (Cont)	
65	Operate LT key in STC.	
66	Patch from B DROP REC jack of trunk under test to DET IN 600 jacks of 21 TMS, using 3P17B cord.	TMS reads between −24 and −26 db. See Step 67n.
67n	If requirement in Step 66 is not met — Adjust SEND LEV potentiometer of ALT 43A1 in trunk under test until TMS reads −25.0 db.	
68	Remove card from B DROP REC jack and DET IN 600 jacks.	
69	Restore LT key in STC.	
70	Remove cord from B DROP TRANS jack and TEST A or ADJ A jack.	
71	Remove R test cord of TOTC from TOTC jack in STC.	
72	Using position telephone circuit and head telephone set, monitor 4 wire at MON TRANS and MON REC jacks in trunk under test to determine when it is idle.	
73o	If SWA lamp in spare trunk is lighted — When channel is idle, remove cord from A LINE jacks of tested trunk and A DROP jacks of spare trunk. Remove cord from A LINE jacks first.	
74o	Remove cord from TRK IN and TRK OUT jacks and R EQ OUT and R EQ IN jacks.	
75o	Remove cord from PT-COD TRK jack and PT-COD R EQ jack.	
76o	Remove cord from B LINE jacks and B DROP jacks. Remove cord from B LINE jacks first.	
77p	If SWB lamp in spare trunk is lighted — When channel is idle, remove cord from B LINE jacks of tested trunk and B DROP jacks of spare trunk. Remove cord from B LINE jacks first.	
78p	Remove cord from TRK IN and TRK OUT jacks and R EQ OUT and R EQ IN jacks.	
79p	Remove cord from PT-COD TRK jack and PT-COD R EQ jack.	
80p	Remove cord from A LINE jacks and A DROP jacks. Remove cord from A LINE jacks first.	

STEP	ACTION	VERIFICATION
	E. Send Level — CUG at DC	
1	Patch from ST jack of ATC to REC B jack of TMS.	TMS reads between −35.8 and 36.2 db. See Step 2a.
2a	If requirement in Step 1 is not met — Adjust SEND LEV potentiometer in T 43A1 of ATC until TMS reads −36.0 db.	
3	Remove cord from ST jack and REC B jack.	
4	In ATC — Operate CHANNELS-TENS and CHANNELS-UNITS switches to 0 position.	
5	Using GROUPS, TRUNKS-TENS, and TRUNKS-UNITS switches, select trunk to be tested.	
6	Operate ON key; then momentarily operate ST key.	
7	After timers have operated and alarm is sounding (about 5 seconds after ST key is operated), momentarily operate ACO key in ATC. ***Note:*** ATC will not complete the test connections if selected trunk is busy. Do not put make-busy plug in OS jack of trunk to be tested.	
8b	If trunk under test is a spare trunk — Remove make-busy plug from OS jack of spare trunk.	
9	Patch from DROP REC jack of trunk under test to REC B jack of TMS, using 3P6E cord.	TMS reads between −15 and −17 db. See Step 10c. ***Note:*** Disregard any momentary change in level that may occur every two seconds.
10c	If requirement in Step 9 is not met — In ATC — Adjust SEND LEV potentiometer of L 43A1 until TMS reads −16.0 db.	
11	Remove cord from DROP REC and REC B jacks.	
12	Patch from AMP jack of ATC to REC B jack of TMS.	If trunk is spare — TMS reads between −15.8 and −16.2 db. See Step 13d. If trunk is not spare — TMS reads between −15 and −17 db. See Step 13d.

STEP	ACTION	VERIFICATION
	E. Send Level — CUG at DC (Cont)	
13d	If requirement in Step 12 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer of 43A1 in trunk under test until TMS reads −16.0 db.	
14b	If trunk just tested is a spare trunk — Insert make-busy plug in OS jack of spare trunk.	
15e	If another trunk is to be tested — Momentarily operate RL key in ATC.	
16e	Using GROUPS, TRUNKS-TENS, and TRUNKS-UNITS switches, select next trunk to be tested.	
17e	Momentarily operate ST key.	
18e	After timers have operated and alarm is sounding (about 5 seconds after ST key is operated), momentarily operate ACO key in ATC.	If trunk is not spare — TMS reads between −15 and −17 db. See Step 20f. If trunk is spare — See Step 19b.
19b	If trunk under test is a spare trunk — Remove make-busy plug from OS jack of spare trunk.	TMS reads between −15.8 and −16.2 db. See Step 20f.
20f	If requirement in Step 18e or 19b is not met — In trunk equipment bay — Adjust SEND LEV potentiometer of 43A1 in trunk under test until TMS reads −16.0 db.	
21b	If trunk just tested is a spare trunk — Insert make-busy plug in OS jack of spare trunk.	
22g	If additional trunks are to be tested — Repeat Steps 15e through 21b, as required for each.	
23	Restore ON key in ATC.	
24	Remove cord from AMP jack of ATC and REC B jack of TMS.	

STEP	ACTION	VERIFICATION
	F. Receiver Sensitivity — CUG at DC	
	Note: Depending upon bay arrangements, patching for this test may require use of inter-bay trunks and two cords in place of single cords specified.	
1	In ATC, operate CHANNELS-TENS and CHANNELS-UNITS switches to 0 position.	
2	Using GROUPS, TRUNKS-TENS, and TRUNKS-UNITS switches, select any idle trunk.	
3	Operate ON key and momentarily operate ST key.	
4	After timers have operated and alarm is sounding (about 5 seconds after ST key is operated), momentarily operate ACO key in ATC.	
5	Patch from ST jack of ATC to ATC jack of STC, using 3P6E cord.	
6	Patch from TEST A jack of STC to DROP TRANS jack of trunk selected in Step 2.	In ATC — TOD lamp flashes regularly about once a second. See Step 7a.
7a	If TOD lamp does not flash regularly in Step 6 — Move cord from TEST A jack to ADJ A jack of STC.	
8a	In ATC — Adjust REC GAIN potentiometer of L 43A1 until TOD lamp flashes regularly.	
9	Restore ON key in ATC.	
10	Remove cord from TEST A or ADJ A jack of STC and DROP TRANS jack of trunk.	
11	Remove cord from ST jack of ATC and ATC jack of STC.	
12	Remove make-busy plug from OS jack of a spare CUG trunk.	
13	Momentarily operate associated ACO key in testboard appearance of spare trunk.	
14	In trunk and channel alarm and control panel — Operate ACO key associated with spare trunk.	
15	Patch from DROP REC jack of spare trunk to CUG jack of STC.	

STEP	ACTION	VERIFICATION
	F. Receiver Sensitivity — CUG at DC (Cont)	
16	Patch from TEST A jack of STC to RT jack of ATC, using 3P6E cord.	In ATC — FT lamp flashes regularly about once a second. See Step 17c.
17c	If FT lamp does not flash regularly in Step 16 — Move cord from TEST A jack to ADJ A jack of STC.	
18c	In ATC — Adjust REC GAIN potentiometer of T 43A1 until FT lamp flashes regularly.	
19	Remove cord from TEST A or ADJ A jack of STC and RT jack of ATC.	
20	Remove cord from CUG jack of STC and DROP REC jack of spare trunk.	
21	Insert make-busy plug in OS jack of spare trunk.	
22	In trunk and channel alarm and control panel — Restore ACO key associated with spare trunk.	
23	Insert make-busy plug in OS jack of trunk to be tested. ***Note 1:*** Trunk must be idle before attempting test. ***Note 2:*** If trunk is spare, the make-busy plug will already be in OS jack.	
24	Patch from ST jack of ATC to ATC jack of STC, using 3P6E cord.	
25	Patch from TEST A jack of STC to DROP TRANS jack of trunk under test.	In trunk — ST lamp flashes regularly about once a second. See Step 26d.
26d	If ST lamp does not flash regularly in Step 25 — Move cord from TEST A to ADJ A jack of STC.	
27d	In trunk equipment bay — Adjust REC GAIN potentiometer until ST lamp flashes regularly. ***Note:*** If ST lamp is not visible during adjustment, watch for regular pulsing of associated RS relay.	

STEP	ACTION	VERIFICATION
	F. Receiver Sensitivity — CUG at DC (Cont)	
28	Remove cord from ADJ A or TEST A jack of STC and DROP TRANS jack of trunk.	
29e	If trunk just tested is a working trunk — Remove make-busy plug from OS jack.	
30	Remove cord from ST jack of ATC and ATC jack of STC.	
	G. Loop Current — CUG at DC or RS	
	Note: Depending upon bay arrangements, it may be necessary to use two cords and an interbay trunk instead of the single cord specified.	
1	Patch from ST jack of ATC to DROP TRANS jack of spare trunk, using 3P6E cord.	ATC - 102.4
2	Patch from RT jack of ATC to DROP REC jack of spare trunk, using 3P6E cord.	
3	Set volt-ohm-milliammeter to 300-volt dc scale.	
4	In trunk equipment bay — Connect positive meter lead to LP pin jack and negative lead to C pin jack of 43A1 in spare trunk.	Meter reads between 78 and 82 volts. See Step 5a.
5a	If requirement in Step 4 is not met — Adjust LP CUR potentiometer in 43A1 until meter reads 80.0 volts.	
6	Remove meter leads from 43A1.	
7	In ATC — Operate CHANNELS-TENS and CHANNELS-UNITS switches to 0 position.	
8	Using GROUPS, TRUNKS-TENS, and TRUNKS-UNITS switches, select spare trunk.	
9	Operate ON key and momentarily operate ST key.	
10	After timers have operated and alarm is sounding (about 5 seconds after ST key is operated), momentarily operate ACO key in ATC.	
11	In ATC — Connect positive meter lead to LP pin jack and negative lead to C pin jack in T 43A1.	Meter reads between 78 and 82 volts. See Step 12b.

STEP	ACTION	VERIFICATION
	G. Loop Current — CUG at DC or RS (Cont)	
12b	If requirement in Step 11 is not met — Adjust LP CUR potentiometer in T 43A1 until meter reads 80.0 volts.	
13	Move meter leads to LP and C pin jacks in L 43A1.	Meter reads between 78 and 82 volts. See Step 14c.
14c	If requirement in Step 13 is not met — Adjust LP CUR potentiometer in L 43A1 until meter reads 80.0 volts.	
15	Remove meter leads from L 43A1.	
16	Restore ON key in ATC.	
17	Remove cords from RT and ST jacks of ATC and DROP TRANS and DROP REC jacks of spare trunk.	
18	In trunk equipment bay — Connect positive meter lead to LP pin jack and negative lead to C pin jack of 43A1 in working trunk. ***Note:*** Do not test a trunk that does not have its RS relay operated.	Meter reads between 78 and 82 volts. See Step 19d. ***Note:*** If trunk is not idle, meter will read 130 volts. Continue test after trunk becomes idle.
19d	If requirement in Step 18 is not met — Adjust LP CUR potentiometer in 43A1 until meter reads 80.0 volts.	
20	Remove meter leads from 43A1.	
	H. Send Level and Receiver Sensitivity — CUG at RS	
1	Patch from ST jack of ATC to DET IN 600 jacks of 21A TMS, using 3P17B cord.	TMS reads between −25.8 and −26.2 db. See Step 2a.
2a	If requirement in Step 1 is not met — Adjust SEND LEV potentiometer of T 43A1 in ATC until TMS reads −26.0 db.	
3	Remove cord from ST jack and DET IN 600 jack.	
4	At ATC — Operate CHANNELS-TENS and CHANNELS-UNITS switches to 0 position.	
5	Using TRUNKS-TENS and TRUNKS-UNITS switches, select spare trunk.	
6	Operate ON key and momentarily operate ST key.	

STEP	ACTION	VERIFICATION
	H. Send Level and Receiver Sensitivity — CUG at RS (Cont)	
7	After timers have operated and alarm sounds (about 5 seconds after ST key is operated), momentarily operate ACO key in ATC.	
8	Patch from ST jack of ATC to CUG jack of STC, using 3P6E cord.	
9	Patch from TEST A jack of STC to DROP TRANS jack of spare trunk.	In ATC — TOD lamp flashes regularly about once a second. See Step 10b.
10b	If TOD lamp does not flash regularly in Step 9 — Move cord from TEST A jack to ADJ A jack.	
11b	Adjust REC GAIN potentiometer of L 43A1 in ATC until TOD lamp flashes regularly.	
12b	Move cord from ADJ A jack to TEST A jack in STC.	
13	Patch from DROP REC jack of spare trunk to DET IN 600 jacks of 21A TMS, using 3P17B cord.	TMS reads between −25 and −27 db. See Step 14c. ***Note:*** Disregard any momentary level changes that may occur every two seconds.
14c	If requirement in Step 13 is not met — Adjust SEND LEV potentiometer of L 43A1 in ATC until TMS reads −26.0 db.	
15	Remove cord from DROP REC jack of spare trunk.	
16	Restore ON key in ATC.	In spare trunk — ST lamp flashes regularly about once a second. See Step 17d.
17d	If ST lamp does not flash regularly in Step 16 — Move cord from TEST A jack to ADJ A jack of STC.	
18d	In trunk equipment bay — Adjust REC GAIN potentiometer of 43A1 in spare trunk until ST lamp flashes regularly. ***Note:*** If ST lamp is not visible during adjustment, watch for regular pulsing of associated RS relay.	
19	Operate LT key in STC.	

STEP	ACTION	VERIFICATION
	H. Send Level and Receiver Sensitivity — CUG at RS (Cont)	
20	Patch from DROP REC jack of spare trunk to DET IN 600 jacks of 21A TMS, using 3P17B cord.	TMS reads between −25.8 and −26.2 db. See Step 21e.
21e	If requirement in Step 20 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer of 43A1 in spare trunk until TMS reads −26.0 db.	
22	Remove cord from DROP REC jack and DET IN 600 jacks.	
23	Restore LT key in STC.	
24	Remove cord from TEST A or ADJ A jack of STC and DROP TRANS jack of spare trunk.	
25	Patch from ST jack of ATC to DROP TRANS jack of spare trunk, using 3P6E cord.	
26	Patch from DROP REC jack of spare trunk to CUG jack of STC, using 3P6E cord.	
27	Patch from TEST A jack of STC to RT jack of ATC.	In ATC — FT lamp flashes regularly about once a second. See Step 28f.
28f	If FT lamp does not flash regularly in Step 27 — Move cord from TEST A jack to ADJ A jack in STC.	
29f	Adjust REC GAIN potentiometer in T 43A1 of ATC until FT lamp flashes regularly.	
30	Remove cord from ST jack of ATC and DROP TRANS jack of spare trunk.	
31	Remove cord from DROP REC jack of spare trunk and CUG jack of STC.	
32	Remove cord from TEST A or ADJ A jack of STC and RT jack of ATC.	
33	Insert make-busy plug in OS jack of working trunk to be tested. ***Note:*** Trunk must be idle before testing is attempted.	

STEP	ACTION	VERIFICATION
	H. Send Level and Receiver Sensitivity — CUG at RS (Cont)	
34	Patch from LINE TRANS jack of trunk under test to 600-ohm jack, using 3P6E cord.	
35	Patch from ST jack of ATC to CUG jack of STC, using 3P6E cord.	
36	Patch from TEST A jack of STC to DROP TRANS jack of trunk under test, using 3P6E cord.	In trunk under test — ST lamp flashes regularly about once a second. See Step 37g.
37g	If ST lamp does not flash regularly in Step 36 — Move cord from TEST A jack to ADJ A jack in STC.	
38g	In trunk equipment bay — Adjust REC GAIN potentiometer until ST lamp flashes regularly. ***Note:*** If lamp is not visible during adjustment, watch for regular pulsing of associated RS relay.	
39	Operate LT key in STC.	
40	Patch from DROP REC jack of trunk under test to DET IN 600 jacks of 21A TMS, using 3P17B cord.	TMS reads between −25 and −27 db. See Step 41h.
41h	If requirement in Step 40 is not met — In trunk equipment bay — Adjust SEND LEV potentiometer until TMS reads −26.0 db.	
42	Remove cord from DROP REC jack of trunk and DET IN 600 jacks of TMS.	
43	Remove cord from DROP TRANS jack of trunk and TEST A or ADJ A jack of STC.	
44	Remove cord from ST jack of ATC and CUG jack of STC.	
45	Remove cord from LINE TRANS jack of trunk and 600-ohm jack.	
46	Remove make-busy plug from OS jack of trunk.	
47	Restore LT key in STC.	

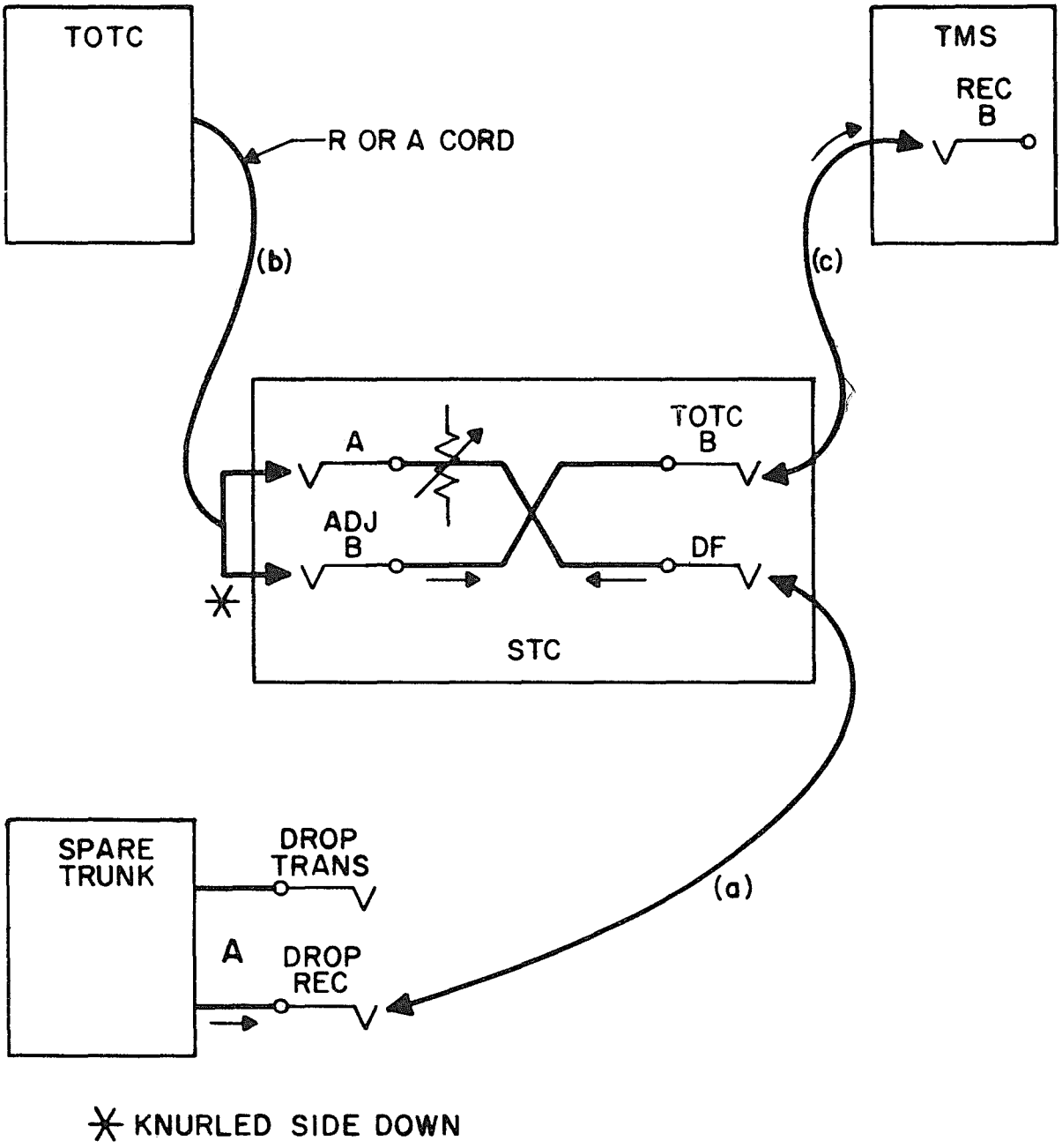

Fig. 1 – Send Level and Receiver Sensitivity for TOTC at DC

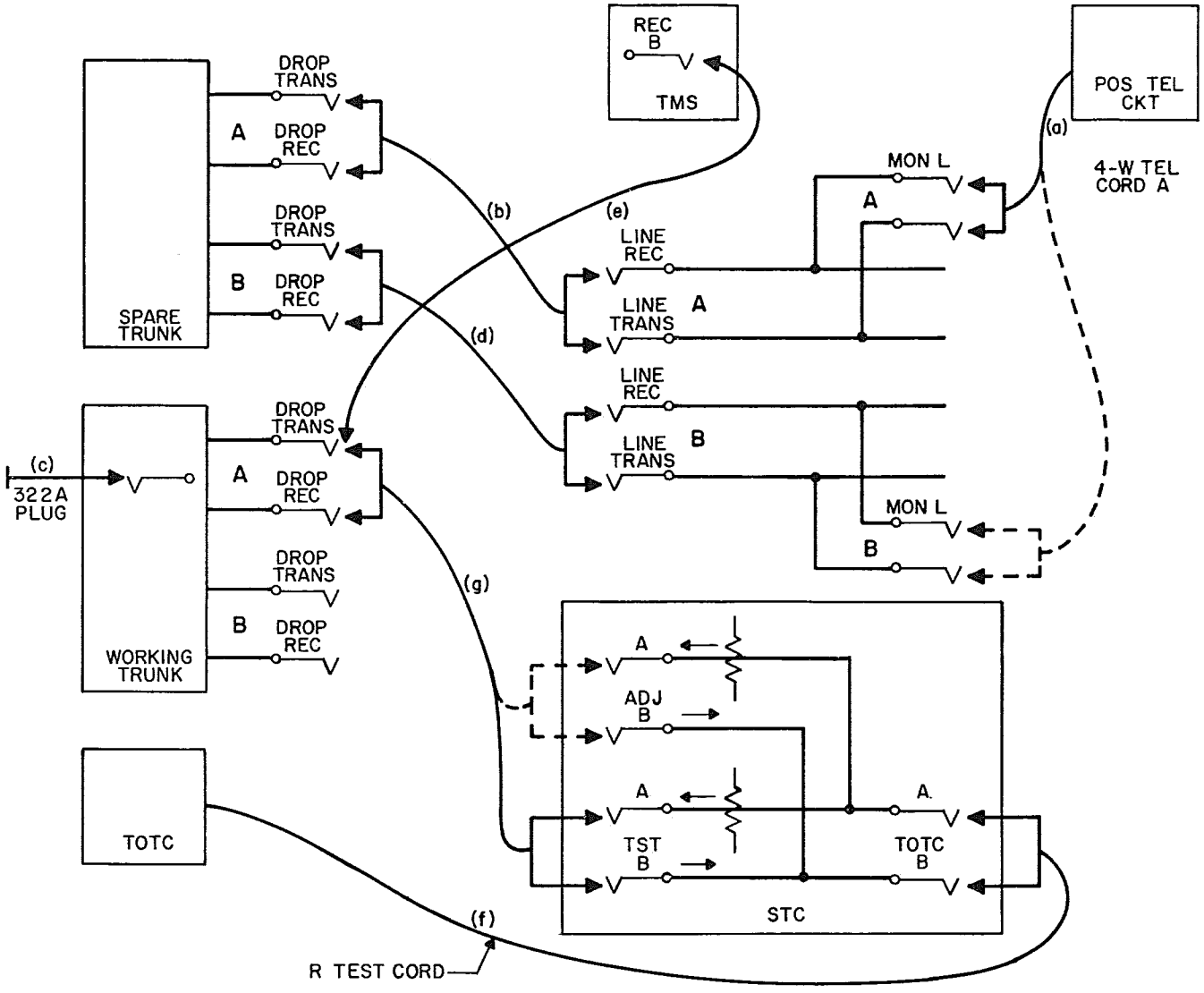

Fig. 2 – Send Level and Receiver Sensitivity Setup — DF at DC

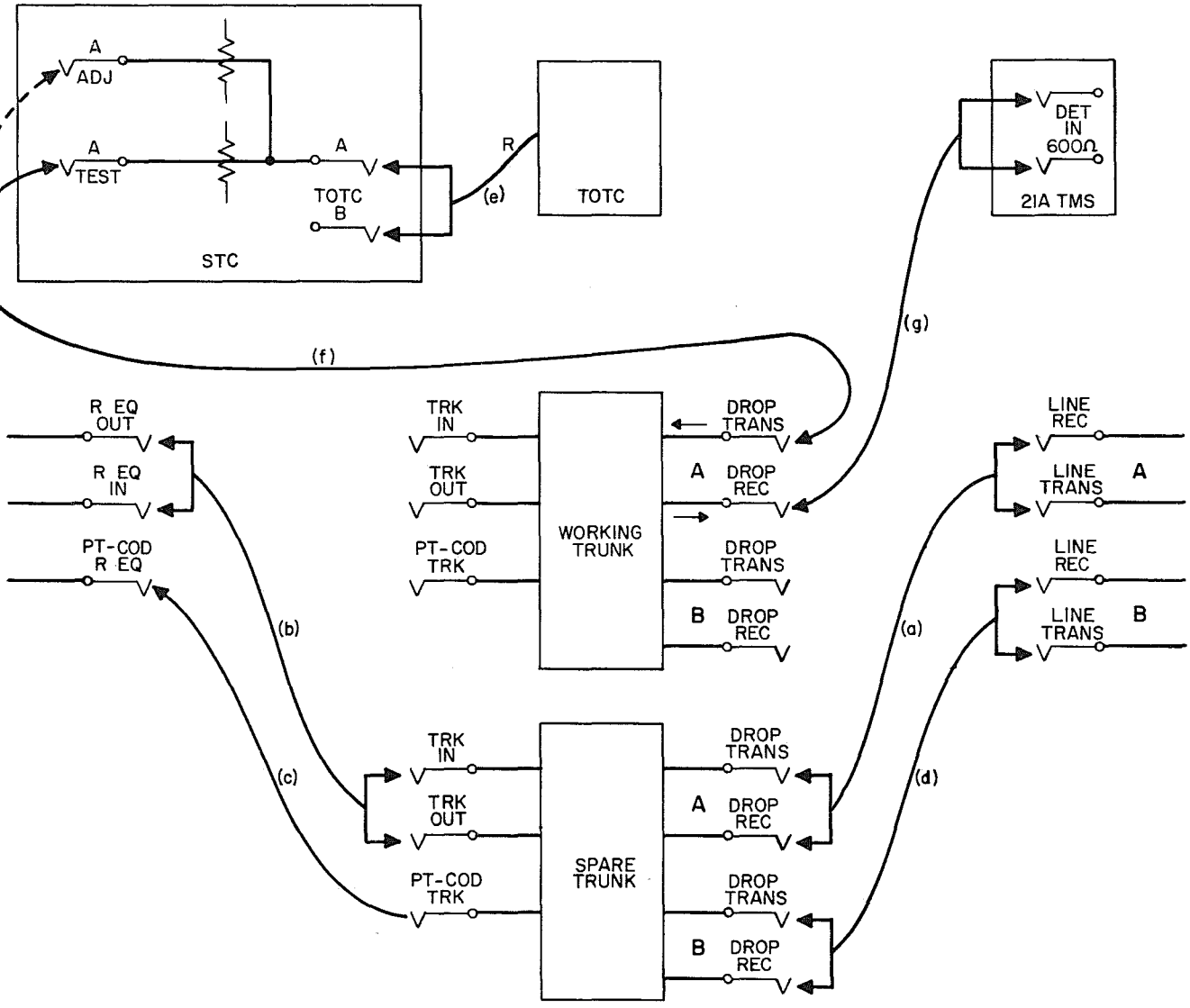

Fig. 3 – Send Level and Receiver Sensitivity Setup — DF at RS