MULTIFREQUENCY (MF) SIGNALING-RECEIVING CIRCUIT SD-95536-01

ADJUSTING PROCEDURE

USING ADJUSTING CIRCUIT SD-95664-01

1. GENERAL

1.01 This section describes the method of adjusting the limiter, variable bias, and signal-present circuits of the signaling-receiving circuit SD-95536-01 when using the adjusting circuit SD-95664-01 which is normally provided for adjusting these circuits. Tests are also made to verify the output level of the adjusting circuit and that the pulse corrector circuit is functioning properly.

1.02 This section is reissued to add a test that will check the output level of the adjusting circuit SD-95664-01. This reissue affects the Equipment Test List.

1.03 The tests and adjustments covered are:

1.04 When the MF receiver is initially converted from electron tube to HIN operation, follow the procedure outlined in the modification kit.

Caution: If the MF receiver is equipped with HIN devices, the +130 Vdc and -48 Vdc fuses (in that order) must be removed before replacing HIN devices. After replacing the HIN devices, reverse the order of replacing the fuses (-48 Vdc fuse first).

1.05 If SD-95664-01, Issue 11B (Option X, Fig. 1) was installed, then Issues 13AC and 15A must be installed before making this test.

1.06 Adjustment of the volume limiter can only be made when there is no shunt path on the input. Examine the drawing of the associated circuit (such as a sender register or test circuit) to determine if there is a shunt path on or across the T and R leads. Remove the shunt by blocking apparatus, insulating contacts, or by operating appropriate test circuit keys.

1.07 If the MF receiver is equipped with HIN devices, the P potentiometer is no longer used and should be in the fully clockwise position. At the time of conversion to HIN operation it is

recommended that an application of glyptol or orange stamping ink, such as WECo R-2883, be applied to keep the P potentiometer in this position.

1.08 ***Lettered Steps:*** A letter (a, b, c, etc) added to a step number in Parts 3 and 4 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 that letter should be omitted.

2. APPARATUS

Test A and Adjustments and Tests B and C

2.01 Part of adjusting circuit SD-95664-01, normally associated with the signaling-receiving circuit, is located at the MF current supply frame when the office has the MF current supply circuit SD-95086-01 or SD-95391-01.

2.02 One 32A test set, for signaling-receiver bay equipped with SP RLS jack.

Test A

2.03 One 21A Transmission Measuring Set (Section 103-221-100) (TMS) or equivalent.

2.04 One 3P17B cord assembly (P3N cord, 6 feet long, equipped with a 241A plug at one end and a 310 plug at the other end).

2.05 Two 3P13A cord assemblies (P2J cord, 3 feet long, equipped with 241A plug on each end).

Adjustments and Tests B Through D

2.06 KS-14510, L( ) VOM with the red VOM lead connected to +VOM input and the black VOM lead connected to -VOM input.

2.07 Two 3P13A cord assemblies (P3J cords, 3 feet long, equipped with two 241A plugs).

2.08 Blocking and insulating tools as required. Use tools and apply as covered in Section 069-020-801.

Adjustments and Tests B and C

2.09 One 3P6E cord assembly (P3E cord, 8 feet long, equipped with two 310 plugs).

Test D

2.10 One 3W4A cord assembly (W3M cord, 6 feet long, equipped with one 310 plug and three 360 tools).

2.11 Two KS-6378 connecting clips.

3. PREPARATION

STEP	ACTION	VERIFICATION
All Adjustments and Tests		
1	At sender frame— Make busy the circuit associated with the MF receiver requiring adjustments.	
2	At MF receiver— Verify that no patching or testing cords are connected to the receiving circuit.	
3a	If power supply has been disconnected or if the L1, L2, or BR tube has been replaced with another tube (ZP Option)— Allow receiver to warm up for at least 10 minutes.	

STEP	ACTION	VERIFICATION
4	At MF current supply frame— Insert one end of 3P13A cord into LEV jack.	
5	Insert other end of 3P13A cord into LEV aisle jack of aisle where signaling receiver is located.	
6	Insert one end of other 3P13A cord into SP jack.	
7	Insert other end of 3P13A cord into SP aisle jack of aisle where signaling receiver is located.	
Test A		
8	At TMS— Connect 115-volt, 60-Hz power cord to 115-volt, 60-Hz power source.	
9	Operate ON OFF switch to ON position. ***Note:*** Allow approximately 10 minutes for tubes in TMS to warm up and stabilize.	
10	Connect 241A plug of 3P17B cord into DET IN 600Ω jack.	
Adjustments and Tests B and C		
	Note: See 1.07.	
11	At MF receiver— Remove cover and block nonoperate the KP1, KP2, and LK relays.	
12	At MF receiver frame— Insert one end of 3P6E cord into LEV CAL jack.	
13	At MF receiver— Insert other end of 3P6E cord into IN jack.	

4. METHOD

A. Test of Output Level of Adjusting Circuit

11	At TMS— Operate DET INPUT switch to -10 position.	
12	At MF receiver frame— Connect 310 plug of 3P17B cord to LEV CAL jack.	At TMS— Meter should indicate -9.6 ±0.8 dBm.

STEP	ACTION	VERIFICATION
13	Disconnect 310 plug of 3P17B cord from LEV CAL jack.	
14	At TMS— Operate DET INPUT switch to -30 position.	
15	At MF receiver frame— Connect 310 plug of 3P17B cord to SP CAL jack.	At TMS— Meter should indicate -27.0 ±0.8 dBm.
16b	If MF receiver frame is equipped with SP CAL key— Operate SP CAL key clockwise (white mark vertical).	At TMS— Meter should indicate -28.0 ±0.8 dBm.
17b	Operate SP CAL key counterclockwise (white mark horizontal).	At TMS— Meter indicates -27.0 ±0.8 dBm. At MF receiver frame— SP relay released.
18c	If MF receiver frame is equipped with SP RLS jack— Connect plug of 32A test set into SP RLS jack.	
19c	At 32A test set— Depress and lock white button.	At TMS— Meter should indicate -28.0 ±0.8 dBm.
20c	Release white button.	At TMS— Meter should indicate -27.0 ±0.8 dBm.
21c	At MF receiver frame— Disconnect plug from SP RLS jack.	
22	Disconnect 310 plug from SP CAL jack.	
23	At TMS— Operate ON OFF switch to OFF position.	
24	Disconnect power cord from power source.	

B. Adjustment of MF Receiver Equipped With Electron Tubes (ZP Option)

14	At VOM— Set selector switch to AC VOLTS position 12.	
15	At MF receiver— Connect red and black VOM leads to T and R, respectively, of LEV test points.	

STEP	ACTION	VERIFICATION
16	Adjust P potentiometer of VOL LIM for a VOM indication of 11.0 Vac.	
17	Disconnect VOM leads.	
18	Remove blocking tools from KP1, KP2, and LK relays.	
19	At VOM— Set selector switch to DC VOLTS position 60.	
20	At MF receiver— Connect the black and red VOM leads to the T and GRD jacks, respectively, of the LEV test points.	
21	Adjust BIAS potentiometer of SP BIAS CONT for a VOM indication of 31 volts.	
22	Disconnect VOM leads.	
23	At MF receiver frame— Remove 3P6E cord from LEV CAL jack.	
24	With same end of 3P6E cord, insert plug into SP CAL jack.	
25	At MF receiver— Block operate the KP1 and KP2 relays and block nonoperate the LK relay.	
26b	If MF receiver is associated with No. 4A or 4M overseas sender circuit SD-68551-01 or 4A MF sender SD-68575-01— At No. 4A or 4M sender— Block operate LS and MS relays.	
27	Remove cover from SP relay.	***Note:*** SP relay should be operated.
28c	If SP relay is not operated— At MF receiver— Adjust SP potentiometer so that SP relay is operated.	
29d	If SP CAL key is provided— At MF receiver frame— Operate SP CAL key.	SP relay released.
30d	Restore SP CAL key.	SP relay operates.
31e	If verification of Steps 28c and/or 29d are not met—	

STEP	ACTION	VERIFICATION
	Adjust SP potentiometer so that the SP relay is released when the SP CAL key is operated and SP relay is operated when the SP CAL key is released.	
32f	If adjusting circuit is equipped with SP RLS jack— At MF receiver frame— Connect 32A test set to SP RLS jack.	
33f	At 32A test set— Lock operate white button.	SP relay released.
34f	Release white button.	SP relay operates.
35g	If verification of Steps 32f and/or 33f are not met— At MF receiver— Adjust SP potentiometer so that the SP relay is released when white button of 32A test set is operated and SP relay is operated when white button of 32A test set is released.	
36	At MF receiver frame— Disconnect 3P6E cord from SP CAL jack.	SP relay releases.
37f	If MF receiver frame is equipped with a SP RLS jack— Disconnect plug of 32A test set from SP RLS jack.	
38	At MF receiver— Disconnect other end of 3P6E cord from IN jack.	
39	Remove blocking tools from KP1, KP2, and LK relays and replace cover.	
40	Replace cover on SP relay.	
41b	If MF receiver is associated with No. 4A or 4M overseas sender circuit SD-68575-01 or 4A MF sender SD-68575-01— At No. 4A or 4M sender— Remove blocking tools from LS and MS relays.	
42h	If no further tests are to be made— At MF carrier supply frame— Disconnect 3P13A cords from LEV PAD and SP PAD jacks.	

STEP	ACTION	VERIFICATION
43h	Remove other end of 3P13A cords from LEV and SP aisle jacks.	
	C. Test and Adjustment of MF Receiver Equipped With Hybrid Integrated Network (HIN) Devices (ZQ Option)	
14	At VOM— Set selector switch to AC VOLTS position 60.	
15	At MF receiver— Connect red and black VOM leads to T and R, respectively, of LEV test points.	
16	At VOM— Observe meter reading.	VOM should indicate 11.75 ±3.75 volts.
17b	If VOM indication in Step 16 is less than 8.0 or greater than 15.5 Vac— At fuse bay— Remove +130 Vdc and -48 Vdc fuses associated with MF receiver. See Caution after 1.04.	
18b	At MF receiver— Replace KS-21078 HIN in L1 socket.	
19b	At fuse bay— Replace -48 Vdc and +130 Vdc fuses removed in Step 17b. ***Note:*** Replace -48 Vdc fuse first.	
20b	At VOM— Observe meter reading.	VOM should indicate 11.75 ±3.75 volts.
21c	If VOM indication is still less than 8.0 or greater than 15.5 Vac— At fuse bay— Remove +130 Vdc and -48 Vdc fuses associated with MF receiver (see Caution after 1.04).	
22c	At MF receiver— Replace KS-21078 HIN in L2 socket.	
23c	At fuse bay— Replace -48 Vdc and +130 Vdc fuses removed in Step 21c.	

STEP	ACTION	VERIFICATION
	Note: Replace -48 Vdc fuse first.	
24	At VOM— Observe and record meter indication. (This is the VOLUME LIMITER READING which is used in Step 29 with Table A.)	
25	At MF receiver— Disconnect VOM leads.	
26	Remove blocking tools from KP1, KP2, and LK relays.	
27	At VOM— Set selector switch to DC VOLTS position 60.	
28	At MF receiver— Connect the black and red VOM leads to R and GRD jacks, respectively, of the LEV test points.	Meter indicates BIAS voltage.
29	Adjust BIAS potentiometer of SP BIAS CONT according to Table A and VOLUME LIMITER READING (Step 24 or 33).	Meter should indicate BIAS adjustment specified in Table A according to VOLUME LIMITER READING.
30	Disconnect VOM leads.	
31	At VOM— Set selector switch to AC VOLTS position 60.	
32	At MF receiver— Connect red and black VOM leads to T and R, respectively, of the LEV test points.	
33	At VOM— Observe meter reading.	VOM should indicate limiter voltage used in Step 29.
34d	If limiter voltage has changed— At MF receiver— Disconnect VOM leads and repeat Steps 27 through 29 and proceed to Step 35.	
35	At MF receiver— Disconnect VOM leads.	
36	At MF receiver frame— Remove 3P6E cord from LEV CAL jack.	
37	With same end of 3P6E cord, insert plug into SP CAL jack.	

STEP	ACTION	VERIFICATION
38	At MF receiver— Remove cover and block operate the KP1 and KP2 relays and block nonoperate the LK relay.	
39e	If MF receiver is associated with No. 4A or 4M overseas sender circuit SD-68551-01 or 4A MF sender SD-68575-01— At No. 4A or 4M sender— Block operate the LS and MS relays.	
40	Remove cover of SP relay.	***Note:*** SP relay should be operated.
41f	If adjusting circuit is equipped with SP RLS jack— At MF receiver frame— Insert plug of 32A test set into SP RLS jack.	
42f	At 32A test set— Lock operate white button.	SP relay released.
43f	Release white button.	SP relay operates.
44g	If verifications in Steps 42f and/or 43f are not met— At MF receiver— Adjust SP potentiometer so that the SP relay is released when the white button on 32A test set is operated and SP relay is operated when white button on 32A test set is released.	
45h	If SP CAL key is provided— At MF receiver frame— Operate SP CAL key.	SP relay releases.
46h	Restore SP CAL key.	SP relay operates.
47i	If verification in Steps 45h and/or 46h are not met— At MF receiver— Adjust SP potentiometer so that the SP relay is released when the SP CAL key is operated and SP relay is operated when SP CAL key is released.	
48	Disconnect 3P6E cord from SP CAL jack.	SP relay released.
49f	If adjusting circuit is equipped with SP RLS jack— At MF receiver frame— Disconnect 32A test set from SP RLS jack.	

STEP	ACTION	VERIFICATION
50	At MF receiver— Disconnect other end of 3P6E cord from IN jack.	
51	Remove blocking tools from KP1, KP2, and LK relays and replace cover.	
52	Replace cover of SP relay.	
53e	If MF receiver is associated with No. 4A or 4M overseas sender circuit SD-68551-01 or 4A MF sender SD-68575-01— At No. 4A or 4M sender— Remove blocking tool from LS and MS relays.	
54j	If no further tests are to be made— At MF carrier supply frame— Disconnect 3P13A cords from LEV PAD and SP PAD jacks.	
55j	Remove other end of 3P13A cords from LEV and SP aisle jacks.	
	D. Test of Pulse Corrector Leads	
8b	If MF receiver is associated with No. 4A or 4M overseas sender circuit SD-68551-01 or 4A MF sender SD-68575-01— At 4A or 4M sender— Block operate the LS and MS relays.	
9	At VOM— Set selector switch to DC VOLTS position 60.	
10	Connect KS-6378 connecting clips to black and red VOM leads.	
11	At back of MF receiver— Connect red VOM lead to GRD.	
12	Connect black VOM lead to pin 4 of KP relay. ***Note:*** Contacts 4 and 7 of KP relay must be made.	
13	At VOM— Observe meter reading.	If VOM indicates over 1.1 volts— Clear trouble before proceeding.
14	Set selector switch to DC VOLTS position 3.	VOM indicates 0.7 ±.4 Vdc.
15	Set selector switch to DC VOLTS position 60.	

STEP	ACTION	VERIFICATION
16	At front of MF receiver— With 3W4A cord, insert 310 plug into SP jack.	
17	With other end of 3W4A cord, connect 360 tool of ring (black) conductor to GRD.	
18	Connect 360 tool of sleeve (red) conductor to pin 29 of terminal strip A.	
19	At VOM— Observe meter reading.	VOM indicates 45 ±5 Vdc.
20	At front of MF receiver— Disconnect 360 tool of sleeve (red) conductor of 3W4A cord from pin 29 of terminal strip A.	
21	Disconnect 360 tool of ring (black) conductor of 3W4A cord from GRD.	
22	Remove 310 plug of 3W4A cord from SP jack.	
23	At back of MF receiver— Remove VOM leads.	
24	At front of MF receiver— Remove cover and block operated the KP1 relay.	
25	Remove cover from SP relay.	
26	At VOM— Set selector switch to DC VOLTS position 12.	
27	At back of MF receiver— Connect red lead of VOM to GRD.	
28	Connect black lead of VOM to 4B (bottom) of KP2 relay.	
29	At VOM— Observe meter indication.	VOM indicates 8.45 ±1.45 volts.
30	At front of MF receiver— With 3W4A cord, connect 360 tool of tip (white) conductor to pin 29 of terminal strip A. ***Caution: Do not touch or ground tip of 310 plug of 3W4A cord.***	

STEP	ACTION	VERIFICATION
31	While carefully observing the meter, touch tip of 310 plug to sleeve of SP jack.	VOM showed a momentary 0.7V deflection. ***Note:*** This step may be repeated to verify deflection.
32	Hold tip of 310 plug to sleeve of SP jack.	SP relay held operated.
33	Remove blocking tool from KP1 relay.	
34	While carefully observing the VOM, manually operate the KP1 relay.	VOM showed a 0.7V deflection. ***Note:*** This step may be repeated to verify deflection.
35	Remove tip of 310 plug of 3W4A cord from sleeve of SP jack. ***Caution: Do not touch or ground tip of 310 plug of 3W4A cord.***	SP relay released.
36	Disconnect 360 tool of tip (white) conductor of 3W4A cord from pin 29 of terminal strip A.	
37	At back of MF receiver— Disconnect VOM leads.	
38	At front of MF receiver— Block operate KP1 and KP2 relays.	
39	At VOM— Set selector switch to DC VOLTS position 12.	
40	At back of MF receiver— Connect red VOM lead to GRD.	
41	Connect black VOM lead to pin 6 of SP BIAS CONT socket.	
42	At VOM— Observe meter reading.	VOM indicates 8 ±1 Vdc.
43	At back of MF receiver— Disconnect VOM leads.	
44	At MF receiver frame— With 3P6E cord, insert one end into LEV CAL jack.	
45	At front of MF receiver— Insert other end of 3P6E cord into IN jack.	SP relay operates.

STEP	ACTION	VERIFICATION
46	At back of MF receiver— Connect black VOM lead to GRD.	
47	Connect red VOM lead to pin 6 of SP BIAS CONT socket.	
48	At VOM— Observe meter reading.	VOM indicates 3.75 ±0.75 volts.
49	At back of MF receiver— Disconnect red VOM lead from pin 6 of SP BIAS CONT socket.	
50	Disconnect black VOM lead from GRD.	
	Caution: Complete Step 50 before starting Step 51.	
51	At MF receiver frame— Disconnect 3P6E cord from LEV CAL jack.	SP relay releases.
52	At front of MF receiver— Disconnect other end of 3P6E cord from IN jack.	
53	Remove blocking tool from KP1 and KP2 relays and replace cover.	
54	Replace cover of SP relay.	
55b	If MF receiver is associated with No. 4A or 4M overseas sender circuit SD-68551-01 or 4A MF sender SD-68575-01— At No. 4A or 4M sender— Remove blocking tools from LS and MS relays.	
56c	If no further tests are to be made— At MF carrier supply frame— Disconnect 3P13A cords from LEV PAD and SP PAD jacks.	
57c	Disconnect other end of 3P13A cords from LEV and SP aisle jacks.	

TABLE A

WHEN VOLUME LIMITER READING IS	ADJUST BIAS POTENTIOMETER TO
8.0— 8.5 Vac	24.0 Vdc
8.5— 9.0 Vac	25.0 Vdc
9.0— 9.5 Vac	26.5 Vdc
9.5—10.0 Vac	27.5 Vdc
10.0—10.5 Vac	29.0 Vdc
10.5—11.0 Vac	30.5 Vdc
11.0—11.5 Vac	31.5 Vdc
11.5—12.0 Vac	32.5 Vdc
12.0—12.5 Vac	33.5 Vdc
12.5—13.0 Vac	34.5 Vdc
13.0—13.5 Vac	35.5 Vdc
13.5—14.0 Vac	36.5 Vdc
14.0—14.5 Vac	37.5 Vdc
14.5—15.5 Vac	38.8 Vdc