

MULTIFREQUENCY OUTGOING SENDERS

TESTS USING OFFICE TEST FRAME TEST CIRCUIT SD-27633-01 (H-595-950)

NO. 5 CROSSBAR OFFICES

1. GENERAL	PAGE
1.01 This section describes a method of testing multifrequency outgoing senders in No. 5 crossbar offices using the office test frame test circuit (OTF) SD-27633-01, Issue 1, and the trouble indicator and connector circuit (TIC) SD-27634-01, Issue 1.	
1.02 This section is reissued for the following reasons:	
(a) To revise the title of the section to include the SD- and H- numbers of the office test frame test circuit.	
(b) To revise Test J to test that sender progress is stopped at the trouble point when option YC is provided.	
(c) To modify the verification of Test A to replace E lamp with the IE, AE, and DE lamps for an AMA class of service.	
(d) To add 1.10 to this section to indicate an operated condition of the TIC MB key in unattended offices.	
(e) To make minor changes as required.	
1.03 The tests covered are:	
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A. <i>Regular Call</i> : This test checks that the sender records information from a marker and that it outpulses inter-office calls on an AMA or non-AMA basis. The transmitting of information to the transverter is checked on AMA class calls	6
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E. <i>AMA Transverter Trouble Release</i> : This test checks that the sender operates its RA relay, sets the trunk to overflow, and releases when the transverter fails on both first and second trial on a detail-billed call	10
F. <i>Delay Pulsing of Last Digit on AMA Call</i> : This test checks that the sender delays sending the last digit until AMA functions are completed	10
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H. <i>Reversed Trunk</i> : This test checks that the sender sets the trunk to overflow and that the sender releases when supervision is reversed to off-hook after the start pulse signal	12
I. <i>Timing Features</i> : This test checks that the sender releases and sets the trunk to overflow in 14 to 22 seconds if it cannot complete its functions. It also checks, when the sender is arranged for reduced timing for transverter opera-	

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tions, the sender sets the trunk to return overflow and that the sender releases if the transverter has not completed its functions within 7 to 11 seconds	12	oscillator of the same frequency as a beat frequency oscillator	17
J. Cancel Timed Release and Alarm: This test checks that, with the associated CTR- key operated, the sender will not release when it times out and will operate the stuck sender alarm. It also checks that if the call is abandoned at this time the sender will not release. If the alarm sending circuit is provided, this test also checks that when the alarms are transferred the sender cancel-timed-release feature is disabled.		P. Oscillator Output Voltage: This test checks that each oscillator output voltage is within prescribed limits ..	18
↳ Option YC features to stop sender progress at trouble point are tested when provided	13	Q. Frequency Test Using the 72A Frequency Meter: This test checks, by using a 72A frequency meter, that the output frequency of each oscillator is within prescribed limits	19
K. Marker Reorder: This test checks that the sender sets the trunk to overflow and that the sender releases when the marker calls for reorder	14	R. Automatically Identified Call: This test checks that when the calling number has been received from the ANI transverter, the sender transmits a KP signal, information digit 0 for nonobserved calls, and digit 3 for observed calls, calling number, and ST signal ..	20
L. Intersender Timing: This test checks that the sender sets the trunk to overflow and that the sender releases if start pulsing polarity is not returned within 4 to 8 seconds after trunk test and the marker finds all senders in the sender group busy	15	S. Operator Identified Call: This test checks that, when the sender handles a call from a multiparty customer in which automatic identification of the calling number is not possible, the sender transmits a KP signal, information digit 1 for nonobserved calls, and digit 4 for observed calls	21
M. Sender Busy: This test checks that the sender appears busy when used on a service call or when made busy at the associated SMB- jack	16	T. Automatically Identified Call Failure: This test checks that, when the ANI transverter fails on both first and second trial, the sender transmits a KP signal, information digit 2 for nonobserved calls, and digit 5 for observed calls	22
FOR SENDERS USING MULTIFREQUENCY CURRENT SUPPLY			
N. Multifrequency Current Supply Trouble Release: This test checks that the sender sets the trunk to overflow and that the sender then releases when the multifrequency current supply is transferred during pulsing	16	1.04 It is expected that Test 0 will normally be used to make a comparative frequency test of an oscillator output. When the results of this test are not within the limits specified, or when a precise measurement of a frequency is required, Test Q should be performed.	
FOR SENDERS EQUIPPED WITH MULTIFREQUENCY GENERATOR			
O. Comparative Frequency: This test makes an appraisal of an oscillator output frequency by using a nearby		1.05 If it is found that the oscillator output voltage or frequency is not within the limits specified in the test, the requisite corrective measures will be found in the circuit notes which are part of SD-26051-01.	

1.06 In performing the following tests, action and verification are required in the locations indicated.

Test B	Action at marker frame.
Tests C, D, F, G, I, M, O, P, and Q	Action and verification at sender frame.
Test E	Action at translator frame.
Test J	At sender frame and also requires alarms transferred for short interval during test.
Test L	At sender and multifrequency supply circuit.

1.07 Tests L and M require that all senders in a sender group be made busy.

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

1.09 Local instructions should be followed for recording and reporting plant register operations for registers associated with sender SS leads.

1.10 The TIC MB key should be operated in unattended offices to prevent lamps from being lighted and generating heat sufficient to discolor or warp designation strips. A large number of lamps lighted will also result in lamp fuses operating and causing a major alarm.

2. APPARATUS

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

TABLE A

APPARATUS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Office test frame	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	1	1	1
322A (make-busy) plugs	-	-	-	-	-	-	-	-	√	-	-	√	√	√	√	√	√	√	√	√
Cord (2.02)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Receiver (2.03)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
KS-3008 stopwatch or equivalent	-	1	-	-	-	-	-	-	1	-	-	1	-	1	-	-	-	-	-	-
Receiver (2.04)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Electron tube voltmeter (2.05)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Cord (2.06)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-
Load resistor (2.07)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Load resistor (2.08)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Frequency meter (2.09)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Cord (2.10)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Cord (2.11)	√	√	√	√	√	√	√	√	√	√	√	√	-	√	-	-	-	√	√	√
Cord (2.12)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cord (2.13)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

√ As required.

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- 2.02** Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord) and two KS-6278 connecting clips (to connect ground).
- 2.03** Test receiver, 716C receiver attached to a W2AB cord, equipped with two 360A tools (2W21A cord), one KS-6278 connecting clip, and one 411A (test pick) tool (to check for the presence or absence of battery or ground).
- 2.04** Test receiver, 716C receiver attached to a W2AB cord, equipped with two 360A tools (2W21A cord), and two 624B (test connector) tools (to make test connections to terminals arranged for solderless-wrapped connections).
- 2.05** Electron tube voltmeter, Voltohmyst, RCA WV-98A Senior, or equivalent (for measuring oscillator output voltages).
- 2.06** Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one 624B (test connector) tool, and one KS-6278 connecting clip.
- 2.07** Load resistor, 19LM or equivalent, 275 ohms ± 1 percent.
- 2.08** Load resistor, 19SE or equivalent, 1100 ohms ± 1 percent.
- 2.09** 72A frequency meter, J64072A (SD-59373-01).
- 2.10** Testing cord, P2AA cord, 3 feet long, equipped with one 241A plug (2W3A cord), two 360A tools, and two KS-6278 connecting clips.
- 2.11** Patching cord, P3D cord, 6 feet long equipped with two 309 plugs (3P3A cord) as required.
- 2.12** Patching cord, P3E cord, 6 feet long equipped with two 310 plugs (3P7A cord).
- 2.13** Testing cord, W2W cord, 10 feet long equipped with one 310 plug (2W17C cord), one 360B tool, one 360C tool, one 624A (terminal connector) tool, and one 624B (terminal connector) tool.
- 2.14** Blocking and insulating tools as required. Use tools and apply, as covered in Section 069-020-801.

3. PREPARATION

STEP	ACTION	VERIFICATION
Tests A through L, N, R, S, and T		
1	At OTF — Restore all keys and switches.	
2	At jack, lamp, and key circuit — Restore (push in) CTR- key associated with sender under test.	
3	Patch SDR jack in MB2 jack field to SMB-jack for sender to be tested.	
4	Patch 0-9 jacks in MB1 jack field to SMB-jacks of all other senders in same sender group.	
5a	If particular trunk is required — Operate NT, FS- keys to select trunk link frame on which trunk appears.	

STEP	ACTION	VERIFICATION
6a	Insert make-busy plug into TS- jack corresponding to trunk switch appearance of selected trunk.	
7a	Insert make-busy plug into MB- jack associated with trunk used for sender tests.	
8	At OTF — Operate MKR- key to select completing marker.	
9	Operate OTL, MFS, MCB keys.	
10b	If digit for access code is required — Operate Prel Digit switch.	
11	Operate 7D key for 7-digit call. <i>Note:</i> If 10-digit call is desired, do not operate any —D key.	
12	Set DIAL switches A through K as required for MF route and any numerals to be tested.	
13	Set SDR switches A through K as required corresponding to digits that sender will output.	
14	Operate 4SD, 5SD, or 7SD keys, depending on the number of digits the sender will output. <i>Note:</i> If ten digits are to be outputted, do not operate any of these keys.	
15c	If ANI features are provided — Set SDR switches B through K for calling line identification. Set SDR switch A for X digit, "Identifying Digit." Refer to Table B.	

TABLE B

DIGIT	SERVICE CONDITION	TYPE OF CALL
0	Nonobserved	Automatic Identification
1	Nonobserved	Operator Identification
2	Nonobserved	Identification Failure
3	Observed	Automatic Identification
4	Observed	Operator Identification
5	Observed	Identification Failure

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STEP	ACTION	VERIFICATION
16c	Operate 9SD, ANI keys.	
17d	If trunk requires wink start — Operate WK key.	

4. METHOD

STEP	ACTION	VERIFICATION
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A. Regular Call

18	At OTF — Operate OGT key; CL- key for class of service required for test.	
19	Operate FS-, NT keys; insert make-busy plug into TS- jack associated with trunk.	
20	At jack, lamp, and key circuit — Insert make-busy plug into OGT-MB jack associated with trunk.	
21e	If route selected is flat rate — At OTF — Operate NCH key.	
→ 22	Operate ST key.	OS lamp lighted. At completion of dialing — ED lamp lighted. At completion of outpulsing — EP lamp lighted. If class of service is AMA — IE, AE, DE lamps lighted in sequence. CS lamp lighted. High tone heard.
23	When CS lamp lights — Restore ST key.	OS, ED, EP, IE, AE, DE, CS lamps extinguished.
	<i>Note:</i> If ST key is not restored when CS lamp lights, the OTF will test the trunk used for test call and advance until TOK lamp lights.	
24	Repeat Steps 11, 23 substituting office codes and numerals as required to test all digits.	
25f	If AMA class of service is used and trans- verter transmitting leads are to be tested — Operate T1, TV-, TVR- keys.	

STEP	ACTION	VERIFICATION
26f	Operate ST key.	OS lamp lighted. At TIC — At completion of dialing — Display registered. FU 2/5, VG 2/6, HG 2/5, VF 1/5, TH-, HN-, T-, U-, OFF-, DR-, TP or RP, MB 2/5, RN 2/5, A- through K-, T 2/5 and U 2/5 lamps lighted, identifying originating test line, trunk used and message billing index. <i>Note:</i> Disregard XP1 lamp.
27f	Restore ST key.	OS lamp extinguished. <i>Note:</i> Disregard XP1 lamp if lighted.
28g	If equipped with 2TR key — Operate 2TR key.	
29g	Operate ST key.	OS lamp lights. At TIC — After completion of dialing — Display registered. FU 2/5, VG 2/6, HG 2/5, VF 1/5, TH-, HN-, T-, U-, OFF-, TV-, TPT or RPT, MB 2/5, RN 2/5, A- through K-, T 2/5 and U 2/5 lamps lighted, identifying originating test line, transverter, trunk used, and message billing index.
30g	Restore ST key.	OS lamp extinguished.
31	At TIC — Restore RLS key.	Display released.
32	At OTF — Restore all keys and switches not required for next test.	
33	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	

B. Trunk Test — Open Trunk

18	At marker used for test — Block nonoperated HTR relay.	
19	At OTF — Operate RTL, NCH keys; CL- key for non-AMA class of service.	

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STEP	ACTION	VERIFICATION
20	Operate ST key; <i>start timing</i> after TGT lamp lights.	OS lamp lighted. At completion of dialing — ED lamp lighted. TGT lamp lighted. In 2 to 5 seconds — Overflow tone heard. At TIC — Display registered. Trouble indication of trunk guard test failure.
21	At OTF — Restore ST key.	OS, ED, TGT lamps extinguished. Tone removed.
22	At TIC — Momentarily operate RLS key.	Display released.
23	At marker used for test — Block operated HTR relay in marker used for test.	
24	At jack, lamp and key circuit — Operate (pull out) CTR- key.	
25	At OTF — Operate ST key, <i>start timing</i> after TGT lamp lights.	OS lamp lighted. At completion of dialing — ED, TGT lamps lighted. In 14 to 22 seconds — Overflow tone heard. At jack, lamp, and key circuit — TO lamp, associated with sender under test, lighted.
26	At OTF — Restore ST key.	OS, ED, TGT lamps extinguished.
27	At jack, lamp, and key circuit — Restore (push in) CTR- key.	TO lamp extinguished.
28	At marker used for test — Remove blocking tool from HTR relay.	
29	At OTF — Restore all keys and switches not required for next test.	
30	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	

C. Abandoned Call — AMA

18	At OTF — Operate CL- key for AMA class of service.
19	Operate DO key.

STEP	ACTION	VERIFICATION
20	At outgoing sender frame — Insert plug of 32A test set into RC jack.	
21	At sender under test — Insulate 1M, 10M of STT relay.	
22	Operate white button on 32A test set.	ON1 relay operated
23	Immediately after ON1 relay operates — Operate red button on 32A test set, <i>start timing</i> .	ON1 relay remains operated. In 6 to 11 seconds — ON1 relay released.
24	Remove insulators from STT relay.	
25	Remove plug of 32A test set from RC jack.	
26	At OTF — Restore all keys and switches not required for next test.	
27	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	

D. Abandoned Call — Non-AMA

18	At OTF — Operate DO key.	
19	Operate CL- key for non-AMA class of service.	
20	At outgoing sender frame — Insert plug of 32A test set into RC jack.	
21	Operate white button on 32A test set.	At sender under test — ON1 relay operated.
22	Immediately after sender SP relay operates — Operate red button on 32A test set.	ON1 relay released. EP relay not operated.
23	Remove plug of 32A test set from RC jack.	
24	At OTF — Restore all keys and switches not required for next test.	
25	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	

STEP	ACTION	VERIFICATION
E. AMA Transverter Trouble Release		
18	At OTF — Set DIAL switches A through K as required to select multifrequency route with MB-9 charge.	
19	Operate TV-, TVR- keys.	
20	Operate CL- key for AMA class of service.	
21	At AMA translator — Remove jumper of originating test line.	
22	At OTF — Operate OGT key.	
23	Operate ST key.	At TIC — At completion of dialing — Display registered. Transverter failure, no DNK lamp on first trial. Second dial display lost. DL- lamp lighted. At OTF — Overflow tone heard.
24	Restore ST key.	Overflow tone removed.
25	At TIC — Momentarily operate RLS key.	Display released.
26	At AMA translator — Replace jumper for OTL.	
27	At OTF — Restore all keys and switches not required for next test.	
28	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	

F. Delay Pulsing of Last Digit on AMA Call

18	At OTF — Operate OGT key.
19	Operate CL- key for AMA class of service.
20	At sender under test — Insulate 1M, 10M of STT relay.
21	Insert plug of 32A test set into RC jack.

STEP	ACTION	VERIFICATION
22	Operate white button on 32A test set.	Sender outpulsed all but last digit and did not release.
23	Remove insulator from 1M of STT relay.	Sender outpulsed last digit and released.
24	Operate red button on 32A test set.	
25	Remove insulator from 10M of STT relay.	
26	Remove plug of 32A test set from RC jack.	
27	At OTF — Restore all keys and switches not required for next test.	
28	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	

G. No-Pulse AMA Call

18	At OTF — Operate A through G DIAL switches as required for intraoffice AMA route and any test line number.	
19	Operate CL- key for AMA class of service, IAO key.	
20	At sender under test — Insert plug of 32A test set into RC jack.	
21	Operate white button on 32A test set.	At sender under test — ON1, STT relays operated. RLT relay operated and sender released without pulsing.
22	Operate red button on 32A test set.	
23	Insulate 1M, 10M of STT relay.	
24	Block nonoperated TM relay.	
25	Operate white button on 32A test set.	After sender ON1 relay operates — Manually operate RO relay.
26	Operate red button on 32A test set.	ON1, RO relays remain operated.
27	Remove blocking tool from TM relay.	
28	Remove insulators from STT relay.	ON1, RO relays released. Sender released.
29	At OTF — Restore all keys and switches not required for next test.	

STEP	ACTION	VERIFICATION
30	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	
H. Reversed Trunk		
18	At OTF — Operate CL- key for non-AMA class of service.	
19	Operate RVT key.	
20	Operate ST key.	At completion of dialing — Overflow tone heard.
21	Operate DL key.	Overflow tone removed.
22	Restore ST key.	
23	Restore all keys and switches not required for next test.	
24	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	
I. Timing Features		
18	At OTF — Operate OGT key; operate CL- key for non-AMA class of service.	
19	At outgoing sender frame — Insert plug of 32A test set into RC jack.	
20	At sender under test — Block nonoperated EP relay.	
21	Operate white button on 32A test set; when ON1 relay operates, <i>start timing</i> .	At sender under test — ON1 relay operated. In 14 to 22 seconds — TM relay operated. Sender released.
22	Operate red button on 32A test set.	
23	At OTF — Change CL- key to AMA class of service.	
24	At sender under test — Insulate 1M, 10M of STT relay.	
25	Operate white button on 32A test set; when ON1 relay operates, <i>start timing</i> .	ON1 relay operated. In 14 to 22 seconds — TM relay operated. Sender released.

STEP	ACTION	VERIFICATION
26	Operate red button on 32A test set.	
27	Remove insulators from STT relay.	
28	Remove blocking tool from EP relay.	
29	Remove plug of 32A test set from RC jack.	
30	At OTF — Restore all keys and switches not required for next test.	
31	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	
J. Cancel Timed Release and Alarm		
18	At jack, lamp, and key circuit — Operate (pull out) CTR- key of sender being tested.	
19	At OTF — Operate CL- key for non-AMA class of service.	
Γ 20e	If stop sender progress feature (YC option) is provided — At sender under test — Block nonoperated second steering relay that would normally operate dependent on code used in test.	
21e	At OTF — Operate ST key; <i>start timing</i> after TGT lamp lights.	TGT lamp lighted. In 14 to 22 seconds — At jack, lamp, and key circuit — TO lamp lighted. At sender under test — TRL, PG1 relays operated. At TIC — 2/5 lamp lighted for first digit outpulsed.
22e	At sender under test — Remove blocking tool from steering relay.	TRL, PG1 relays remain operated.
23e	At OTF — Restore ST key.	TGT lamp extinguished.
24e	At jack, lamp, and key circuit — Restore (push in) CTR- key.	TO lamp extinguished. At sender under test — TRL, PG1 relays released.
↳ 25e	At TIC — Momentarily operate RLS key.	Display released.

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STEP	ACTION	VERIFICATION
→ 26e	At jack, lamp, and key circuit — Operate (pull out) CTR- key.	
→ 27	At sender under test — Block nonoperated EP relay.	
28	At OTF — Operate ST key; <i>start timing</i> after TGT lamp lights.	TGT lamp lighted. In 14 to 22 seconds — At jack, lamp, and key circuit — TO lamp lighted. At OTF — Overflow tone heard.
29	Operate DL key.	Overflow tone removed.
30	At jack, lamp, and key circuit — Remove patch cord from SMB- jack of sender under test, <i>start timing</i> .	In 10 to 15 seconds — R-S-TOA lamp lighted. Major alarm sounds.
31	Replace patch cord into SMB- jack of sender under test.	R-S-TOA lamp extinguished. Major alarm silenced.
32f	If alarm sending circuit is provided — Operate alarm transfer key to DB position, if provided, or to TR position. <i>Note:</i> All alarms will be transferred while key is operated.	TO lamp extinguished.
33	Operate alarm transfer key to NTR position.	
34	Momentarily operate RS key.	
35	At sender frame — Remove blocking tool from EP relay.	
36	At OTF — Restore ST key.	TGT lamp extinguished.
37	Restore all keys and switches not required for next test.	
38	At jack, lamp, and key circuit — Restore (push in) CTR- key of sender being tested.	If alarm sending circuit is <i>not</i> provided — TO lamp extinguished.
39	Remove patch cords and plugs not required for next test.	

K. Marker Reorder

18	At marker used for test — Block nonoperated HTR relay.
19	At TIC — Insert make-busy plug into TIC-MB- jack for marker used for test.

STEP	ACTION	VERIFICATION
20	At OTF — Operate RTL key; CL- key for non-AMA class of service.	
21	Operate ST key.	At completion of dialing — Overflow tone heard.
22	Restore ST key.	
23	At marker used for test — Remove blocking tool from HTR relay.	
24	At TIC — Remove plug from TIC-MB- jack.	
25	At OTF — Restore all keys and switches not required for next test.	
26	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	

L. Intersender Timing

18	At relay rack frame — Block operated R- relay in sender group release circuit associated with sender under test.	
19	At sender under test — Block nonoperated SP relay.	
20	At marker used for test — Block operated HTR relay.	
21	At OTF — Operate CL- key for non-AMA class of service.	
22	Operate ST key; <i>start timing</i> after TGT lamp lights.	TGT lamp lighted. In 4 to 8 seconds — Overflow tone heard.
23	Restore ST key.	TGT lamp extinguished. Overflow tone removed.
24	At relay rack frame — Remove blocking tool from R- relay.	
25	At marker used for test — Remove blocking tool from HTR relay.	

STEP	ACTION	VERIFICATION
26	At sender under test — Remove blocking tool from SP relay.	
27	At OTF — Restore all keys and switches not required for next test.	
28	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	
M. Sender Busy		
<i>Caution: Perform the following steps as rapidly as possible to minimize service re-action.</i>		
1	At jack, lamp, and key circuit — Insert make-busy plugs into SMB- jacks of all other senders in subgroup associated with sender under test.	
2	At sender frame — When sender to be tested is idle — Block operated SB relay.	
3	Test for presence of ground on punchings A16, A26, and B17 on sender control unit terminal strip.	Ground <i>not</i> present on punchings A16, A26, B17.
4	At jack, lamp, and key circuit — Insert make-busy plug into SMB- jack of sender being tested.	
5	At sender frame — Remove blocking tool from SB relay.	SB relay remains operated.
6	Test for presence of ground on punchings A16, A26, and B17.	Ground <i>not</i> present on punchings A16, A26, B17.
7	At jack, lamp, and key circuit — Remove plug from SMB- jack of sender under test.	Ground present on punchings A16, A26, B17 when sender is idle.
8	Remove all plugs from SMB- jacks of senders used in test.	

FOR SENDERS USING MULTIFREQUENCY CURRENT SUPPLY**N. Multifrequency Current Supply Trouble Release**

18	At jack, lamp, and key circuit — Remove patching cords and insert make-busy plugs into SMB- jacks of all other senders in subgroup associated with sender under test.	
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STEP	ACTION	VERIFICATION
19e	If 1-4, 2-5, 3-6 keys are provided — At multifrequency current supply — Operate 1-4, 2-5, or 3-6 keys associated with sender being tested.	
20	At sender under test — Connect ground to punching 15 on C terminal strip.	
21	At OTF — Operate CL- key.	
22	Operate ST key.	At completion of dialing — Overflow tone heard.
23	Restore ST key.	
24e	If 1-4, 2-5, 3-6 keys are provided — At multifrequency current supply — Restore 1-4, 2-5, or 3-6 keys.	
25	At sender under test — Remove test connection from terminal strip.	
27	At jack, lamp, and key circuit — Remove patch cords and plugs not required for next test.	
26	At OTF — Restore all keys and switches not required for next test.	

FOR SENDERS EQUIPPED WITH MULTIFREQUENCY GENERATOR

O. Comparative Frequency Test

- 1 At jack, lamp, and key circuit —
Insert make-busy plug into MB- jack of sender being tested.
- 2 Insert make-busy plug into MB- jack of sender (having oscillators known to be at proper frequencies) to be compared with sender being tested.
- 3 At each sender made busy —
Block operated ON relay.
- 4 Connect one of 624B tools of test receiver to terminal M12 of each sender.

Note: If senders are not within reach of the cords, locally available cords may be used to extend the reach of the cord provided with the test receiver.

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STEP	ACTION	VERIFICATION
5	Listen for beat frequency.	Oscillator frequency is satisfactory if beats can be counted (usually 5 or less per second).
6	Remove test receiver connections.	
7	Repeat Steps 4 through 6 to test each frequency, substituting, in turn, following terminals for terminal M12 in Step 4: M15, M21, M22, M25, M35.	
8	Remove all test cords.	
9	Remove blocking tools from ON relay.	
10	At jack, lamp, and key circuit — Remove plugs.	

P. Oscillator Output Voltage

- 1 At jack, lamp, and key circuit —
Insert make-busy plug into MB- jack of sender being tested.
- 2 At sender under test —
Connect 1100-ohm resistor to terminals M11 and M12, using 893 cords; 624B tools provide means for connecting to M- terminals, KS-6278 connecting clips provide means for connecting to resistor.
- 3 Set voltmeter to read ac volts in accordance with approved procedure for particular meter being used.
- 4 Block operated ON relay.
- 5 Connect voltmeter GND terminal to side of resistor connected to terminal M11.
- 6 Touch voltmeter probe to side of resistor connected to terminal M12.
- 7 Note output voltage indicated on meter.
- 8 Remove voltmeter connections.
- 9 Substitute 275-ohm resistor for 1100-ohm resistor.
- 10 Connect voltmeter GND terminal to side of resistor connected to terminal M11.
- 11 Touch voltmeter probe to side of resistor connected to terminal M12.

STEP	ACTION	VERIFICATION
12	Note output voltage indicated on meter.	
13a	If difference in readings noted in Steps 7, 12 is other than 0.25 ± 0.02 volt — Proceed as outlined in notes accompanying schematic drawing (refer to 1.05).	
14	Disconnect meter and 275-ohm resistor.	
15	Repeat Steps 2 through 14, as required, to check output voltage of each oscillator, substituting the following terminals, in turn, for terminal M12 in Steps 2, 6, 11: M15, M21, M22, M25, and M35.	
16b	If output voltage measured in Step 7 of any of six oscillators is not approximately 2.4 volts or varies more than 0.15 volt from other five oscillators — Proceed as outlined in notes accompanying schematic drawing (refer to 1.05).	
17	Remove blocking tool from ON relay.	
18	At jack, lamp, and key circuit — Remove plug from MB- jack.	

Q. Frequency Test Using the 72A Frequency Meter

- 1 At jack, lamp, and key circuit —
Insert make-busy plug into MB- jack of sender being tested.
- 2 At sender being tested —
Connect 1100-ohm resistor to terminal M11 and to first terminal in Table C, using 893 cords; 624B tool provides means for connecting to M- terminals, KS-6278 connecting clips provide means for connecting to resistor.

TABLE C

M- TERMINAL	OSCILLATOR OUTPUT FREQUENCY	MAXIMUM PERMISSIBLE VARIATION IN CYCLES PER SECOND
M12	700	693 to 707
M15	900	891 to 909
M21	1100	1089 to 1111
M22	1300	1287 to 1313
M25	1500	1485 to 1515
M35	1700	1683 to 1717

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STEP	ACTION	VERIFICATION
3	Insert 241A plug of 2W3A cord into BRDG IN jack of 72A frequency meter.	
4	Connect one KS-6278 connecting clip of 2W3A cord to each side of 1100-ohm resistor.	
5	Block operated ON relay.	
6	Measure frequency.	Frequency is within limits indicated in Table C.
7a	If output frequency is not within limits specified in Table C — Proceed as outlined in notes accompanying schematic drawing (refer to 1.05).	
8	Move test connection from punching used in Table C to next punching indicated in same table.	
9	Repeat Steps 6 through 8 until all frequencies are tested.	
10	Remove all test connections.	
11	Remove blocking tool from ON relay.	
12	At jack, lamp, and key circuit — Remove plug from MB- jack.	
R. Automatically Identified Call		
18	At jack, lamp, and key circuit — Insert make-busy plug into TCMB jack of transverter to be used for test.	
19	At OTF — Operate OGT, CL-, TV-, TVR-, 2TR, OTLP keys.	
20	Patch OTL jack to SP jack.	
21	At line link frame — Patch SP jack to primary line switch vertical for individual class of service used for test.	
22	At OTF — Operate ST key.	OS lamp lighted. At completion of dialing — ED lamp lighted. At TIC — FU 2/5, VG 2/6, RG 2/5, VF 1/5, TV, TPT or RPT, DNK, A- through E- lamps lighted. A- lamp indicates automatically identified call and B- through E- lamps indicate calling line number.

STEP	ACTION	VERIFICATION
23	At OTF — Restore ST key.	OS, ED, lamps lighted.
24	At TIC — Operate RLS key.	Display released.
25	At OTF — Restore all keys and switches.	
26	At jack, lamp, and key circuit — Remove plug from TVMB jack.	
S. Operator Identified Call		
18	At jack, lamp, and key circuit — Insert make-busy plug into TVMB jack of transverter to be used for test.	
19	At OTF — Operate OGT, CL-, TV-, TVR-, 2TR, OI, OTLP keys.	
20	Patch OTL jack to SP jack.	
21	At line link frame — Patch SP jack to primary line switch ver- tical for individual class of service used for test.	
22	At OTF — Operate ST key.	OS lamp lighted. At completion of dialing — ED lamp lighted. At TIC — FU 2/5, VG 2/6, HG 2/5, VF 1/5, TV-, DNK, TPT or RPT, A- through E- lamps lighted. A- lamp indicates operator identified call and B- through E- lamps indicate calling line number.
23	At OTF — Restore ST key.	OS, ED lamps extinguished.
24	At TIC — Operate RLS key.	Display released.
25	At OTF — Restore all keys and switches.	
26	At jack, lamp, and key circuit — Remove plug from TVMB jack.	

STEP	ACTION	VERIFICATION
T. Automatically Identified Call Failure		
18	At jack, lamp and key circuit — Insert make-busy plug into TVMB jack of transverter to be used for test.	
19	At OTF — Operate OGT, CL-, TV-, TVR-, 2TR, OTLP keys.	
20	Patch OTL jack to SP jack.	
21	At line link frame — Patch SP jack to primary line switch vertical for individual class of service used for test.	
22	At transverter frame — Block nonoperated DNK relay.	
23	At OTF — Operate ST key.	OS lamp lighted. At completion of dialing — ED lamp lighted. At TIC — DNK lamp not lighted. A- through E- lamps lighted. A- lamp indicates automatically identified call, B- through E- lamps indicate calling line number.
24	At OTF — Restore ST key.	OS, ED lamps extinguished.
25	At TIC — Operate RLS key.	Display released.
26	At OTF — Restore all keys and switches.	
27	At jack, lamp, and key circuit — Remove plug from TVMB jack of transverter used for test.	
28	At OTF — Remove patch cord from OTL, SP jacks.	
29	At line link frame — Remove patching cord.	