MASTER TIMING CIRCUIT SD-25633-01

TESTS

NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section describes a method of testing the master timing circuit SD-25633-01 in No. 1 crossbar offices.

1.02 This section is reissued for the following reasons:

(a) To revise Test A

(b) To amplify verification statements in Tests A, B, E, I, and M

(c) To revise taking an out-of-synchronism trouble record in Test B

(d) To revise resynchronizing steps in Test E

(e) To add caution note to Tests F, I, J, and M regarding performing these tests near the hour

(f) To add steps to Test F to test preference chain with odd master timing circuit made busy

(g) To make minor corrections in Tests B, E, G, H, I, J, and M

(h) To revise Test L to synchronize TE and TO motor timers.

The Equipment Test List is not affected.

1.03 The tests covered are:

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A. Time Indication Check: This test checks that the selectors of the master timing circuits are in the correct positions with reference to the month, day, hour, and minute. 4

B. End-of-Tape Features: The following features are checked. (1) The master timing circuit provides the correct information in the proper sequence when perforating the recorder tapes for recorder transfer, make-busy, or window patterns. (2) Perforation lead information and progress indications are transmitted to the transverter trouble indicator when the master timing circuit is blocked because of a trouble condition. (3) Recorder transfer, make-busy, or window patterns cannot be made during the last 12 seconds of any hour when ZD wiring option is provided in the master timing circuit. (4) The length of splice pattern is increased when a tape window is encountered while perforating the splice pattern of a recorder transfer or make-busy pattern. (5) An additional splice pattern and tape identity group is perforated when a tape window is encountered during the perforation of the second tape identity group of a recorder transfer or make-busy pattern. (6) The master timing circuit furnishes the end-of-tape information under local control after a time-out has occurred due to the inability of the master timing and recorder circuits to complete the perforation of an end-of-tape pattern in the regular manner. 6

C. Routine End-of-Tape Record: This test checks the ability of the master timing circuit to control the perforation of the 3:00 AM. end-of-tape entries and also checks the recorder start sequence for all recorders with which it is normally associated. 17

D. Grouping Features: This test checks the grouping features in which the functions of providing perforating

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information for recorders under conditions of transfer, make busy, splice, and end of tape are taken over by one master timing circuit when the other master timing circuit is busy. 17

E. Selector Position and Check Lamp Features: The following features are checked. (1) Correct information is provided to the recorders for every position of every selector with respect to month, day, and hour. (2) The check lamps provide the correct indication for each position of the selectors. (3) Unsynchronized selectors in the master timing circuit may be synchronized. 18

F. Preference and Lockout Features: This test checks the preference and lockout features of the start relays. Also, a check is made of the start chain circuit for continuity and freedom from crosses. 26

G. Selector Exercise Features: This test checks the operation of the master timing circuit selectors by using the exercise keys. 28

H. Pulse Failure Alarm: This test checks that an alarm will operate when the TE or TO timer fails to provide a pulse every 6 seconds to step the selectors of the master timing circuits and recorders. A check is made that the audible part of the alarm may be silenced when desired. 29

I. Transfer Control Features and Timer Synchronism Failure Alarm: This test checks that an alarm will be brought in if the TE and TO timers are out of synchronism. A check is made that the audible part of the alarm may be silenced when desired. A check is also made of the feature that drops a pulse when a transfer from one master timing circuit to the other is made at a time when the TE and TO timers are out of synchronism. 29

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J. Selector Synchronism Check and Selector Synchronism Check Failure Alarms: This test checks that the selectors are checked for synchronism each minute and that an alarm will be brought in if one or more selectors associated with a master timing circuit or recorder are out of synchronism with the corresponding selector of the controlling master timing circuit. Checks are made that the hour entry will not be perforated when a selector synchronism failure alarm occurs and that the audible part of the alarm may be silenced when desired. . 32

K. Both Master Timing Circuits Make-Busy Alarm: This test checks that an alarm will be brought in if the CMBE and CMBO keys are both operated at the same time. 33

L. Synchronizing TE and TO Motor Timers: This test checks that the TE and TO motor timers are synchronized. 33

M. Time-out Alarm Features: The following features are checked. (1) An alarm is indicated at the transverter trouble indicator frame upon failure to complete the recording of a make-busy, transfer, window-splice, or a 3:00 AM. end-of-tape pattern. (2) The long time-out feature as applied to make-busy, transfer, and window-splice patterns brings in the major alarm in 18 to 30 seconds. (3) The splice pattern of 3:00 AM. end-of-tape patterns is timed for a 66- to 78-second period. (4) The long time-out feature as applied to the 3:00 AM. end-of-tape pattern brings in the transverter trouble indicator within 78 to 90 seconds in case of failure of the short time-out feature. (5) The auxiliary long time-out feature will provide a trouble indication in 2 to 5 minutes when a failure occurs in the long time-out as applied to a 3:00 AM. end-of-tape pattern. 35

N. Perforator Lead Cross-Detection Features: The following features are checked. (1) Detection of false battery

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or ground on the perforator leads to the recorders. (2) Detection of false ground on the perforator leads within the master timing circuit. (3) Calling in the transverter trouble indicator to register trouble conditions detected by the standing test. (4) Making itself busy under control of the AR key when trouble has been detected on one or more of the perforator leads. 38

O. End-of-Tape Failure Alarm Test: This test checks that a major alarm sounds in case the master timing circuit fails to start the 3:00 AM. end-of-tape record. 40

P. Fuse Alarm (FA) Relays and Make-Busy Features: This test checks that the master timing circuit is made busy when one of its 48-volt supply fuses or its +130 volt supply fuse operates. 41

Q. LT1 Through LT9 Relays (Long Timer) Test: This test checks the LT1 through LT9 chain circuit of the master timer. 42

R. Paper Take-up Alarm Test: This test checks that the major alarm sounds and a visual indication is given when the punched paper tape fails to be taken up on the associated storage reel in the perforator cabinet. 43

1.04 Tests covered in this section should not be made during the time any recorders are perforating the 3:00 AM. end-of-tape entry.

1.05 The performance of Tests B, E, and M can result in the loss of charge records for service calls.

1.06 Tests B, D, E, M, and N require actions and verifications at the transverter trouble indicator and the master timing frame at the same time.

1.07 A different recorder should be used each time that Test B is performed so that eventually all recorders will have been tested.

1.08 If Test B or M indicates trouble in the timing network of the SP or TM2 cold cathode tube, check the timing interval as covered in the circuit requirements table.

1.09 The term trouble record used in this section means a trouble lamp display when a transverter trouble indicator is provided.

1.10 While performing Test B, E, M, or N and during the time that the trouble indicator is engaged with a trouble record as a result of one of these tests, a recorder or transverter attempting to seize the transverter trouble indicator will cause a DL (display lost) lamp to light and the major alarm to sound. In this case, take a record of the circuit whose display was lost and then momentarily operate the RL (release) key at the transverter trouble indicator frame to retire the alarm and clear the trouble indicator. However, if another circuit seizes the trouble indicator first and the DL lamp is associated with the circuit under test, take a record of the trouble display before retiring the alarm and clearing the trouble display. Then repeat the test operations required to bring in the trouble display that was lost.

1.11 Reference should be made to Section 216-800-302 which covers precautions to be observed for limiting stoppages at the Accounting Center caused by central office tape irregularities.

1.12 A regular recorder should not be transferred to the emergency recorder during the interval from 5 minutes before to 5 minutes after any hour or more than once during the same hour.

1.13 Before starting any test which will cause the perforation of transfer, make-busy, and window splice patterns or trouble entries on the associated tape, use a red china marking pencil and draw a line across the unperforated tape at the point where it enters the chute. On completion of testing, proceed as follows at the associated perforator.

(1) Raise the slack alarm and hook it over the catch provided.

(2) Pull back some slack in the tape and disengage the tape from the tape guides.

(3) Using a red china marking pencil, place two large crosses on the smooth side of the

tape over the lower of the the two diamond patterns; that is, the diamond pattern farthest from the perforator drum.

(4) Find the red mark placed on the tape at the start of testing. Then mark two large crosses on the smooth side of the tape so that the center of the crosses is 4-1/2 inches from the red mark in a direction away from the perforator drum.

(5) Replace the tape in the tape guides and remove the slack tape arm from the catch.

(6) Record on the Accounting Center notification form the recorder group, recorder number, date, time, and a note that the tape was marked with red crosses to indicate that all entries between these crosses should be skipped.

1.14 In Part 3 of this section, only those trouble verifications, lamps, and alarms requiring verification as part of the test are listed.

1.15 ***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 paragraph indicated by the number in parentheses.

2.02 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 tool, and one 509A tool (for use in establishing test connections to relay windings).

2.03 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 tool, and one 419A tool (for use in establishing test connections to relay springs).

2.04 Testing cord, 893 cord, 3 feet long, equipped with two 360A tools (1W13A cord) and two 419A tools (for use when interconnecting relay springs).

2.05 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 tool, and one 411A tool (for use in establishing momentary test connections to relay springs and selector brushes).

2.06 716C receiver, attached to a W2AB cord, equipped with two 360A tools (2W21A cord), one KS-6278 tool, and one 411A tool (for use in checking the presence or absence of battery or ground).

2.07 Red china marking pencil.

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

2.09 Test cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 411A tool (test pick used for applying battery and ground to terminal strip punchings).

2.10 KS-16751 L1 dry reed reader (used to check synchronism of TE and TO motor timers).

3. METHOD

STEP	ACTION	VERIFICATION
A. Time Indication Check		
1	▶At building master clock— Referring to building master clock which has been checked against precise time source (030-125-501), start stopwatch precisely at the beginning of any minute and record the time.	

STEP **ACTION** **VERIFICATION**

TABLE A

APPARATUS	TESTS															
	A	B	C	D	E	F	H	I	J	L	M	N	O	P	Q	R
322A (Make-Busy) Plug	√	√	√	√	√	√	—	√	—	—	√	—	—	—	—	√
KS-3008 Stopwatch or Equivalent	1	1	—	—	—	—	1	1	1	—	1	—	—	—	—	1
32A (Remote Control) Test Set	—	1	—	—	1	—	—	—	—	—	1	—	—	—	—	—
Cord (2.02)	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—
Cord (2.03)	—	1	—	—	—	—	1	—	1	2	—	—	—	—	—	—
Cord (2.04)	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—
Cord (2.05)	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—
Test Receiver (2.06)	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Red Pencil (2.07)	—	1	—	—	1	—	—	—	—	—	1	—	—	—	—	—
Tools (2.08)	—	√	—	—	√	√	√	√	—	—	√	√	—	√	√	—
Cord (2.09)	—	—	—	—	—	—	—	—	—	—	—	√	—	√	—	—
KS-16751 L1 Dry Reed Reader (2.10)	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—

√ As required.

2	At master timing frame— Operate CKL key.	M_, DT_, DU_, HT_, HU_ check lamps lighted. These check lamps indicate correct month, day tens, day units, hour tens, hour units, respectively. H_, T_, U_ check lamps lighted. These check lamps indicate time in tenths of minutes to 599 and are read as a unit (600 = 1 hour).
3	When U_ check lamp has just extinguished— Stop timing and record time indicated by H_, T_, U_ check lamps.	Check that the sum of the elapsed time on the stopwatch and the time noted at the building master clock agrees within ±6 seconds of the time displayed on H_, T_, U_ check lamps at the instant the watch was stopped.
4a	If time indication is incorrect by more than ±6 seconds— Reset master timing circuits to correct time as described in Section 216-813-301 under "Pulse Failure Alarm."	

STEP	ACTION	VERIFICATION
5	Depress CLT key.	Lighted check lamps indicate time provided by master timer not in control.
6	Restore and depress CLT key several times.	Comparison of lighted check lamps indicates both timers are in synchronism.
7	Restore CLT, CKL keys.	Check lamps extinguished.◀

B. End-of-Tape Features

Caution 1: The charge records on recorder tapes for service calls made during the time this test is in progress cannot be properly processed by the Accounting Center. The tapes are marked for the Accounting Center to disregard the tape area covering both service call entries as well as improper test entries.

Caution 2: ▶If the test is in progress at 5 minutes before any hour, do not block or insulate contacts on any relay or cause make-busy or transfer pattern to be placed on any recorder until 5 minutes after the hour or until the hour entry has been placed on all recorders.◀

1	Select an AMA recorder associated with master timing circuit to be tested; mark tape and proceed as indicated in 1.13.	
2	At master timing circuit under test— Block nonoperated P3A relay.	
3	At transverter trouble indicator— Insert make-busy plug into RMB jack associated with AMA recorder being used for testing.	Trouble record taken. Indications as listed in Table B for P3A relay.
4	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	▶Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◀
5	At transverter trouble indicator— Momentarily operate RL key.	
6	At master timing circuit under test— Block nonoperated P4A relay.	

STEP	ACTION	VERIFICATION
7	At transverter trouble indicator— Remove make-busy plug from MB jack.	Trouble record taken. Indications as listed in Table B for P4A relay.
8	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P4A relay.	▶Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◀
9	At transverter trouble indicator— Momentarily operate RL key.	
10	At master timing frame under test— Block nonoperated P5A relay.	
11	At transverter trouble indicator— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for testing.	▶No trouble record taken.◀
12	Remove make-busy plug from MB jack.	At master timing circuit under test— MO relay operates, releases twice, ▶indicating master timing circuit caused recorder to perforate month information at beginning and end of make-busy pattern.◀
13	At AMA recorder being used for testing— Block nonoperated U relay.	▶Within one minute SSF lamp lighted. Major alarm sounds.◀
14	Momentarily operate the ACO key at the master timing frame to retire the audible alarm.	
15	Repeat Steps 2 through 5, substituting P5A relay for P3A relay.	Trouble record taken. Indications as listed in Table B for P5A relay.
16	At AMA recorder being used for testing— Remove blocking tool from U relay.	
17a	▶If testing odd master timing circuit with TT key in E position— Operate CKL key.	OS_ lamp for recorder under test and check lamps lighted.
18a	Momentarily operate S key.	SE lamp lighted while recorder selectors are stepping to synchronized position with even master timing circuit. OS_ lamp extinguished when selectors are synchronized.
19a	Momentarily operate AR key.	SSF lamp extinguished.

STEP **ACTION** **VERIFICATION**

TABLE B -- FOR TRANSVERTER TROUBLE INDICATOR

RELAY BLOCKED NONOPERATED		TROUBLE RECORD	
MASTER TIMING CIRCUIT	AMA RECORDER CIRCUIT	PERFORATOR MAGNET INDICATIONS A- THROUGH F-	PROGRESS INDICATIONS
P3A	—	2821XX (XX corresponding to day tens and day units)	TV, PT, PAK, P1, RD, D, RT, BSP, DA, and SY
P4A	—	2811XX (XX corresponding to hours tens and hours units)	TV, PT, PAK, P1, RD, E, RT, BSP, DA, HR, and SY; also P (if XA wiring is provided)
P5A	U	285600	TV, PT, PAK, P1, RD, D, RT, BSP, DA, HR, SC, and NS; also P (if XA wiring is provided)
P6A	—	2805XX (XX corresponding to recorder number in recorder group)	TV, PT, PT1, PAK, P1, RD, E, RT, BSP, DA, HR, SY, and RN; also P (if XA wiring is provided)
P7A	—	283 (DU) XX (DU) represents day units. XX represents month tens and month units.	TV, PT, PAK, P1, RD, D, RT, BSP, DA, HR, SY, RN, and MO; also P (ir XA wiring is provided)
P8A	—	284 (DT) XX (DT) represents day tens. XX represents marker group or recorder group number.	TV, PT, PAK, P1, RD, E, RT, BSP, CA, HR, SY, RN, MO, and MG, or RG; also P (if XA wiring is provided)
COP	—	081010	TV, P1, RD, D, RT, ASP, SY, and SPA; also P (if XA wiring is provided)
P1A	—	081010	TV, PT, PAK, P1, RD, D, RT, ASP, SY, and SPA; also P (if XA wiring is provided)
P2A (if provided)	—	286000	TV, PT, PAK, P1, RD, E, RT, ASP, SY, SPA, and SKP; also P (if XA wiring is provided)

20a	Restore CKL key.	Check lamps extinguished.
21b	If testing even master timing circuit with TT key in 0 position— Operate CKL key.	OS_ lamp for recorder under test and check lamps lighted.

STEP	ACTION	VERIFICATION
22b	Momentarily operate S key.	SO lamp lighted while recorder selectors are stepping to synchronized position with odd master timing circuit. OS_ lamp extinguished when selectors are synchronized.
23b	Momentarily operate AR key.	SSF lamp extinguished.
24b	Restore CKL key.	Check lamps extinguished.
25	Repeat Steps 6 through 9, substituting P6A for P4A relay.	Trouble record taken. Indications as listed in Table B for P6A relay.
26	Repeat Steps 2 through 9, substituting P7A for P3A relay and P8A for P4A relay.	Trouble record taken. Indications as listed in Table B for P7A and P8A relays.
27	Repeat Steps 2 through 5, substituting COP for P3A relay.	Trouble record taken. Indications as listed in Table B for COP relay.
28	At master timing circuit under test— Block nonoperated SS relay.	
29	At transverter trouble indicator— Remove make-busy plug from RMB jack.	
30	At master timing circuit under test— Remove blocking tool from SS relay; ***start timing.***	
31	When TSP relay operates— ***Stop timing.***	Elapsed time within 2.5 to 4.5 seconds.
32	At transverter trouble indicator— Momentarily operate RL key.	
33	Repeat Steps 2 through 5, substituting P1A for P3A relay.	Trouble record taken. Indications as listed in Table B for P1A relay.
34c	If P2A relay is provided— Repeat Steps 5 through 9, substituting P2A for P4A relay.	Trouble record taken. Indications as listed in Table B for P2A relay.
35d	If P2A relay is not provided— Remove make-busy plug from RMB jack.	
36	At perforator associated with emergency recorder— Mark tape and proceed as indicated in 1.13.	
37	At transverter trouble indicator— Insert make-busy plug into recorder TN jack	At master timing circuit under test— MO relay operated and released four times,

STEP	ACTION	VERIFICATION
	associated with AMA recorder being used for testing.	▶indicating the master timing circuit caused end-of-tape entries to be perforated on the regular and emergency recorder tapes.◀ At emergency recorder frame— EW lamp lighted.
38	Remove make-busy plug from TN jack.	At master timing circuit under test— MO relay operated and released four times, ▶indicating the master timing circuit caused end-of-tape entries to be perforated on the regular and emergency recorder tapes.◀ At emergency recorder frame— EW lamp extinguished.
39	At master timing circuit under test— Block nonoperated P5A relay.	
40	At transverter trouble indicator— Insert make-busy plug into recorder TN jack associated with AMA recorder being used in testing.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 285500, TV, PT, PAK, P1, RD, A, RT, BSP, DA, HR, SC, and SY; also P (if XA wiring is provided).
41	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P5A relay.	▶Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◀
42	At transverter trouble indicator— Momentarily operate RL key.	
43	At transverter trouble indicator— Remove make-busy plug from TN jack.	
44	At master timing circuit under test— Block nonoperated P5A relay.	
45	At AMA recorder used for testing— Block nonoperated U relay.	▶Within one minute SSF lamp lighted. Major alarm sounds.◀
46	Momentarily operate the ACO key at the master timing frame to retire the audible alarm.	
47	At transverter trouble indicator— Insert make-busy plug into recorder TN jack associated with AMA recorder being used for testing.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 285700, TV, PT, PAK, P1, RD, A,

STEP	ACTION	VERIFICATION
		RT, BSP, DA, HR, SC, and NS; also P (if XA wiring is provided).
48	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P5A relay.	▶Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◀
49	At AMA recorder being used for testing— Remove blocking tool from U relay.	
50	At transverter trouble indicator— Momentarily operate RL key.	
51a	▶If testing odd master timing circuit with TT key in E position— Operate CKL key.	OS_ lamp for recorder under test and check lamps lighted.
52a	Momentarily operate S key.	SE lamp lighted while recorder selectors are stepping to synchronized position with even master timing circuit. OS_ lamp extinguished when selectors are synchronized.
53a	Momentarily operate AR key.	SSF lamp extinguished.
54a	Restore CKL key.	Check lamps extinguished.
55b	If testing even master timing circuit with TT key in 0 position— Operate CKL key.	OS_ lamp for recorder under test and check lamps lighted.
56b	Momentarily operate S key.	SO lamp lighted while recorder selectors are stepping to synchronized position with odd master timing circuit. OS_ lamp extinguished when selectors are synchronized.
57b	Momentarily operate AR key.	SSF lamp extinguished.
58b	Restore CKL key.	Check lamps extinguished.◀
59	At master timing circuit under test— Block nonoperated P6A relay.	
60	At transverter trouble indicator— Remove 322A plug from recorder TN jack associated with AMA recorder being used for testing.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 2805XX with XX representing the recorder number; also the TV, PT, PT1, PAK,

STEP	ACTION	VERIFICATION
		P1, RD, A, RT, BSP, DA, HR, SY, SC, and RN; also P (if XA wiring is provided).
61	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P6A relay.	◗Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◖
62	At transverter trouble indicator— Momentarily operate RL key.	
63	At transverter trouble indicator— Insert make-busy plugs into RMB and recorder TST or T jacks associated with the emergency recorder.	
64	Insert plug of 32A test set into R jack.	
65	Momentarily depress white button of 32A test set.	RUT lamp lighted while test entries are perforated— ◗At end of first revolution of selector— TT, DL, 2R lamps lighted. Minor alarm sounds. Minor alarm changed to major at end of second revolution of selector.◖
66	◗When RUT, 2R lamps are extinguished— Momentarily operate AR key.	TT, DL lamps extinguished. Major alarm silenced.◖
67	Momentarily depress white button of 32A test set.	RUT lamp lighted while test entries are perforated. ◗At end of first revolution of selector— TT, DL, 2R lamps lighted. Minor alarm sounds. Minor alarm changed to major at end of second revolution of selector.◖
68	◗When RUT, 2R lamps are extinguished— Momentarily operate AR key.	TT, DL lamps extinguished. Major alarm silenced.◖
69	Remove make-busy plugs from MB and TST or T jacks.	
70	Remove plug of 32A test set from R jack.	
71	At transverter trouble indicator— Momentarily operate RL key.	
72	At perforator associated with emergency AMA recorder or the other regular recorder where	

STEP	ACTION	VERIFICATION
	trunk transfer is used— Mark tape and proceed as indicated in 1.13.	
73	At master timing frame— Operate TT key to O.	
74	Operate CMBE key.	CMBE lamp lighted.
75	Insulate 9-10B of PE relay.	
76	▶At even master timing circuit—◀ Block nonoperated HRT relay.	
77	Operate, release UH relay successively until U selector reaches position ▶10.◀	
78	Operate, release TH relay successively until T selector reaches position 10.	
79	Operate, release HH relay successively until H selector reaches position 6.	SR, PRE relays operated.
80	Operate, release HH relay successively until H selector reaches position 13.	SR, PRE relays operated.
81	Operate, release HH relay successively until H selector reaches position 20.	SR, PRE relays operated.
82	Operate, release TH relay successively until T selector reaches position 20.	SR, PRE relays operated.
83	Block nonoperated TH relay.	
84	Operate, release UH relay successively until U selector reaches position ▶20.◀	SR, PRE relays operated.
85e	▶If ZD option is provided—◀ Operate, release UH relay successively until U selector reaches position ▶9.◀	SR, PRE relays operated.
86e	Operate, release UH relay to step U selector to position ▶10.◀	SR, PRE relays operated.
87	Remove blocking tool from HRT relay.	HRT relay operated.
88	Remove blocking tool from TH relay and insulator from PE relay.	
89	▶At master timing frame—◀ Operate CKL key.	▶Check lamps lighted.◀

STEP	ACTION	VERIFICATION
90	Momentarily operate S key.	SO lamp lighted ▸while even master timing circuit selectors are stepping to synchronized position with odd master timing circuit.◂
91	When SO lamp is extinguished— Restore CMBE, CKL keys.	CMBE, ▸check◂ lamps extinguished.
92	Operate TT key to E.	
93	Operate CMBO key.	CMBO lamp lighted.
94	Insulate 9-10B of PO relay.	
95	At odd master timing circuit— Block nonoperated HRT relay.	
96	Repeat Steps 76 through 85e for odd master timing circuit.	SR, PRO relays operated.
97	Remove blocking tool from HRT, ▸TH◂ relays and insulator from PO relay.	
98	Operate CKL key.	▸Check lamps lighted.◂
99	Momentarily operate S key.	SE lamp lighted ▸while odd master timing circuit selectors are stepping to synchronized position with odd master timing circuit.◂
100	When SE lamp is extinguished— Restore CMBO, CKL keys.	CMBO, ▸check◂ lamps extinguished.
101	▸At master timing circuit—◂ Block nonoperated P3A relay.	
102	At AMA recorder used for testing— Momentarily operate SP relay.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 2821XX with XX representing the day tens and the day units corresponding to the day of the month; also the TV, PT, PAK, P1, RD, SP, RT, BSP, DA, and SY.
103	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	▸Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◂
104	At transverter trouble indicator— Momentarily operate RL key.	

STEP	ACTION	VERIFICATION
105	At AMA recorder used for testing— Block operated SP relay.	At AMA recorder frame— NP lamp lighted. Aisle pilot lamp lighted. Major alarm sounded.
106	Remove blocking tool from SP relay.	
107	Momentarily operate AR key. ***Note:*** Steps 108 and 109 should be performed in rapid succession.	NP lamp extinguished. Aisle pilot lamp extinguished. Major alarm silenced.
108	At transverter trouble indicator— Insert 322A plug into RMB jack associated with AMA recorder used for testing.	At master timing circuit under test— SS relay operated. In 2.5 to 4.5 seconds— TSP relay operated. RLS relay momentarily operated. SS, TSP relays released.
109	At transverter trouble indicator— Remove make-busy plug from RMB jack; ***start timing.***	At master timing circuit under test— SS relay operated.
110	After 1.5 seconds— Operate SP relay.	In 4 to 6 seconds after SS relay operated— TSP relay operated. RLS relay momentarily operated. SS, TSP relays released.
111	Block operated ESP relay.	
112	Connect ground to 10B of RLS relay.	
113	Momentarily operate RCT relay.	ROS, SP relays operated, then released.
114	Remove test connection from RLS relay.	
115	Remove blocking tool from ESP relay. ***Note:*** Steps 116 and 117 should be performed in rapid succession.	
116	At transverter trouble indicator— Insert make-busy plug into RMB jack associated with AMA recorder used for testing.	At master timing frame— ▶Master timing circuit causes perforator to perforate make-busy pattern on AMA tape of recorder under test.◀ ESP relay operated.
117	At master timing circuit under test— When ESP relay operates— Momentarily operate ROS relay.	ESP relay released; ▶additional make-busy pattern perforated in AMA tape; ESP relay reoperated.◀
118	Insulate 8B of LC1 relay.	

STEP	ACTION	VERIFICATION
119	At transverter trouble indicator— Remove make-busy plug from RMB jack.	Trouble record taken— Indications as follows: Perforator magnets A_ through F_ representing numerals 2821XX with XX representing the day tens and day units; also the TV, PT, PAK, P1, RD, E, RT, BSP, DA, and SY.
120	At transverter trouble indicator— Momentarily operate RL key.	
121	At master timing circuit under test— Remove insulator from LC1 relay.	
122	At transverter trouble indicator— Insert make-busy plugs into RMB and recorder TST or T jacks associated with AMA recorder being used for test.	
123	Insert plug of 32A test set into R jack.	
124	Momentarily depress white button of 32A test set.	RUT lamp lighted while test entries are perforated. ▶At end of first revolution of selector— TT, DL, 2R lamps lighted. Minor alarm sounds. Minor alarm changed to major at end of second revolution of selector.
125	When RUT, 2R lamps are extinguished— Momentarily operate AR key.	TT, DL lamps extinguished. Major alarm silenced.◀
126	Momentarily depress white button of 32A test set.	RUT lamp lighted while test entries are perforated. ▶At end of first revolution of selector— TT, DL, 2R lamps lighted. Minor alarm sounds. Minor alarm changed to major at end of second revolution of selector.
127	When RUT, 2R lamps are extinguished— Momentarily operate AR key.	TT, DL lamps extinguished. Major alarm silenced.◀
128	Remove make-busy plugs from RMB and recorder TST or T jacks.	
129	Remove plug of 32A test set from R jack.	
130	At transverter trouble indicator— Momentarily operate RL key.	

STEP	ACTION	VERIFICATION
131	At perforator associated with AMA recorder being used for testing— Mark tape and proceed as indicated in 1.13.	

C. Routine End-of-Tape Record

Caution: Do not make this test during the 5 minutes before or after any hour.

1a	If testing even master timing circuit— At master timing frame— Insert make-busy plug into RETE jack.	At transverter trouble indicator— RCDR_ or R_ lamp for highest even-numbered recorder lighted for approximately 5 seconds, followed by similar action for each of lower even-numbered recorders. MTE lamp lighted during entire period of test. ***Note:*** If any initial, answer, or disconnect entries for service calls occur during this test, they may be distinguished from the end-of-tape entries by the lighting of the RCDR_ or R_ lamp for a period of less than 1 second and should be disregarded.
2a	At master timing circuit— Remove make-busy plug from RETE jack.	
3b	If testing odd master timing circuit— At master timing frame— Insert make-busy plug into RETO jack.	At transverter trouble indicator— RCDR_ or R_ lamp for highest odd-numbered recorder lighted for approximately 5 seconds followed by similar action for each of lower odd-numbered recorders and the EMG RCDR or EMG R lamp. MTO lamp lighted during entire period of this test. ***Note:*** If any initial answer or disconnect entries for service calls occur during this test, they may be distinguished from the end-of-tape entries by the lighting of the RCDR_ or R_ lamp for a period of less than 1 second and should be disregarded.
4b	At master timing circuit— Remove make-busy plug from RETO jack.	

D. Grouping Features

Caution: Do not make this test during the 5 minutes before or after any hour.

1	At master timing frame— Operate CMBE key.	At master timing frame— CMBE lamp lighted.

STEP	ACTION	VERIFICATION
		At transverter trouble indicator— CMBE lamp lighted.
	Caution: This test requires the use of both master timing circuits; therefore, do not make this test if the CMBE or CMBO key is found operated. Determine if satisfactory to restore operated key or clear the trouble; then restore the operated key before proceeding with the test.	
2	Momentarily insert make-busy plug into RETO jack.	At transverter trouble indicator— RCDR_, EMG RCDR, R_, or EMG R lamp lighted for approximately 5 seconds for each recorder in following sequence: highest odd-numbered recorder to lowest odd-numbered recorder, emergency recorder, highest even-numbered recorder to lowest even-numbered recorder.
3	At transverter trouble indicator— Insert make-busy plug into RMB jack for an even-numbered recorder.	At master timing frame— MO relay in odd master timing circuit operated, released twice.
4	At transverter trouble indicator— Remove make-busy plug from RMB jack.	
5	At master timing frame— Restore CMBE key.	CMBE lamp extinguished.
6	Operate CMBO key.	At master timing frame— CMBO lamp lighted. At transverter trouble indicator— CMBO lamp lighted.
7	At master timing frame— Momentarily insert make-busy plug into RETE jack.	At transverter trouble indicator— RCDR_, EMG RCDR, R_, or EMG R lamp lighted in same sequence as for Step 2.
8	At transverter trouble indicator— Insert plug into RMB jack for an odd-numbered recorder.	At master timing frame— MO relay in even master timing circuit operated, released twice.
9	Remove make-busy plug from RMB jack.	
10	At master timing frame— Restore CMBO key.	CMBO lamp extinguished.

E. Selector Position and Check Lamp Features

Caution: The charge records on recorder tapes for service calls made during the time this test is in progress cannot be properly processed by the Accounting

STEP	ACTION	VERIFICATION
	Center, and the tapes are marked for the Accounting Center to disregard the tape area covering both service call entries as well as improper test entries.	
1	▶Operate CKL key.	Check lamps lighted.◀
2a	If testing even master timing circuit— Operate TT key to E position.	▶Within one minute— ET lamp lighted.◀
3b	If testing odd master timing circuit— Operate TT key to O position.	▶Within one minute— OT lamp lighted.◀
	Caution: Do not perform the following steps during the 5 minutes before or after any hour to prevent interference with the placing of the hour record on the recorders. If the test is in progress at 55 minutes after the hour, or it becomes necessary to apply a make-busy or transfer pattern to any of the recorders served by the master timing circuit not under test, operate the TT key to the opposite position to that established for the test. The test may be resumed 5 minutes after the hour, or when the transfer or make-busy operation is completed by again operating the TT key to the position established for the test.	
4a	If testing even master timing circuit— Examine unperforated tape of each odd-numbered AMA recorder, and of the emergency recorder if it is serving in place of an odd recorder, for a distance of approximately 3 feet from input chute.	No splices in unperforated tapes.
5b	If testing odd master timing circuit— Examine unperforated tape of each even-numbered AMA recorder and of the emergency recorder if it is serving in place of an even recorder, for a distance of approximately 3 feet from input chute.	No splices in unperforated tapes.
6c	If splice in unperforated tape is found— At transverter trouble indicator— Momentarily insert make-busy plug into RMB jack associated with AMA recorder, as required, to advance splice beyond perforator drum.	
7	Select AMA recorder associated with master timing circuit to be tested; mark associated tape and proceed as indicated in 1.13.	

STEP	ACTION	VERIFICATION
8	At master timing frame— Operate CKL key. ***Note:*** While performing the following steps, the selectors of all recorders and the master timing circuit not in control will be out of synchronism with the master timing circuit under test; thereby bringing in the SSF alarm and lighting the OS_ lamps for all recorders and the OSE or OSO lamp. When the major alarm sounds and the SSF lamp lights, operate the ACO key at the master timing frame momentarily to silence the alarm.	
9	At master timing circuit under test— Block nonoperated P7A relay.	
10	Operate, release MOH relay sucessively until M selector reaches position 1.	M1 check lamp lighted.
11	At transverter trouble indicator— Insert make-busy plug into RMB jack associated with AMA recorder being used for testing.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 283X01. (X representing day units may be disregarded for this test.)
12	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P7A relay.	◗Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◖
13	At transverter trouble indicator— Momentarily operate RL key.	
14	Repeat Steps 9 through 13 for each of M selector positions 2 through 12, ◗removing or inserting make-busy plug at RMB jack, causing master timer to energize P7A relay.◖	Same as Steps 10, 11, with M_ check lamp and E, F indications corresponding to position of M selector.
15	At master timing circuit under test— Block nonoperated P3A relay.	
16	Operate, release DTH relay successively until DT selector reaches position 1.	DT0 check lamp lighted.
17	Operate, release DH relay successively until DU selector reaches position 1.	DU1 check lamp lighted.
18	At transverter trouble indicator— Insert make-busy plug into RMB jack associated	Trouble record taken. Indications as follows:

STEP	ACTION	VERIFICATION
	with AMA recorder being used for testing.	Perforator magnets A_ through F_ representing numerals 282101.
19	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	◗Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◖
20	At transverter trouble indicator— Momentarily operate RL key.	
21	At master timing circuit under test— Block nonoperated P7A relay.	
22	At transverter trouble indicator— Remove make-busy plug from RMB jack associated with AMA recorder being used for test.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 2831XX. (Digits represented by XX may be disregarded.)
23	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P7A relay.	◗Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◖
24	At transverter trouble indicator— Momentarily operate RL key.	
25	At master timing circuit under test— Block nonoperated P8A relay.	
26	At transverter trouble indicator— Insert make-busy plug into RMB jack associated with AMA recorder being used for test.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 284 0XX. (Digits represented by XX may be disregarded.
27	◗At master timing circuit under test—◖ Remove blocking tool from P8A relay.	
28	At transverter trouble indicator— Momentarily operate RL key. ***Note:*** In the following steps, inserting or removing the make-busy plug at the RMB jack of the trouble ticketer or trouble recorder will cause the blocked P_A relay in the master	

STEP	ACTION	VERIFICATION
	timing circuit to be energized, resulting in a trouble record.	
29	Repeat Steps 15 through 20 but set the DU selector in position 2 as indicated in Table C.	DT_, DU_ check lamps lighted and perforator magnet indications A_ through F_ as listed in Table C.
30	Repeat Steps 15 through 24 but set the DU selector in position 3 as indicated in Table C.	DT_, DU_ check lamps and A_ through F_ indications as listed in Table C.
31	Repeat Steps 15 through 20 for each of DU selector positions 4 and 5 as indicated in Table C.	DT_, DU_ check lamps and A_ through F_ indications as listed in Table C.

TABLE C

RELAY BLOCKED NONOPERATED	POSITION OF SELECTORS		CHECK LAMPS LIGHTED		PERFORATOR MAGNET INDICATIONS	DAY INDICATIONS	
	DT	DU	DT	DU	A- THROUGH F-	DT-	DU-
P3A	1	1	0	1	282101	0	1
P7A	1	1	0	1	2831XX		
P8A	1	1	0	1	2840XX		
P3A	1	2	0	2	282102	0	2
P3A	1	3	0	3	282103	0	3
P7A	1	3	0	3	2833XX		
P3A	1	4	0	4	282104	0	4
P3A	1	5	0	5	282105	0	5
P3A	1	6	0	6	282106	0	6
P7A	1	6	0	6	2836XX		
P3A	1	7	0	7	282107	0	7
P3A	1	8	0	8	282108	0	8
P3A	1	9	0	9	282109	0	9
P3A	2	10	1	0	282110	1	0
P7A	2	10	1	0	2830XX		
P8A	2	10	1	0	2841XX		
P3A	2	11	1	1	282111	1	1
P3A	2	12	1	2	282112	1	2
P3A	2	13	1	3	282113	1	3
P3A	2	14	1	4	282114	1	4
P3A	2	15	1	5	282115	1	5
P3A	2	16	1	6	282116	1	6
P3A	2	17	1	7	282117	1	7
P3A	2	18	1	8	282118	1	8
P3A	2	19	1	9	282119	1	9
P3A	3	20	2	0	282120	2	0
P8A	3	20	2	0	2842XX		
P3A	4	11	3	1	282131	3	1
P8A	4	11	3	1	2843XX		

Note: Digits represented by XX may be disregarded.

STEP	ACTION	VERIFICATION
32	Repeat Steps 15 through 24 but set the DU selector in position 6 as indicated in Table C.	DT_, DU_ check lamps and A_ through F_ indications as listed in Table C.
33	Repeat Steps 15 through 20 for each of DU selector positions 7, 8, 9 as indicated in Table C.	DT_, DU_ check lamps and A_ through F_ indications as listed in Table C.
34	Repeat Steps 15 through 28 but set the DU selector in position 10 as indicated in Table C.	DT_, DU_ check lamps and A_ through F_ indications as listed in Table C.
35	Repeat Steps 15 through 20 for each of DU selector positions 11 through 19 and the DT selector in position 2 as indicated in Table C.	DT_, DU_ check lamps and A_ through F_ indications as listed in Table C.
36	Repeat Steps 15 through 20, 25 through 28, but set DT selector in position 3 and DU selector in position 20 as indicated in Table C.	DT_, DU_ check lamps and A_ through F_ indications as listed in Table C.
37	Repeat Steps 15 through 20, 25 through 28, but set the DT selector in position 4 and DU selector in position 11 as indicated in Table C.	DT_, DU_ check lamps and A_ through F_ indications as listed in Table C.
38	At master timing circuit under test— Block nonoperated P4A relay.	
39	Operate, release HTH relay successively until HT selector reaches position 1.	HT0 check lamp lighted.
40	Operate, release HUH relay successively until HU selector reaches position 1.	HU0 check lamp lighted.
41	At transverter trouble indicator— Insert plug into, ◗or remove make-busy plug from◖ RMB jack associated with AMA recorder being used for test.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 281100.
42	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P4A relay.	◗Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◖
43	At transverter trouble indicator— Momentarily operate RL key.	
44	Repeat Steps 38 through 43 but set HT selector in positions 1, 2, 3 successively and HU selector in positions 2 through 10 successively as indicated in Table D.	HT_, HU_ check lamps lighted and perforator magnet indications A_ through F_ listed in Table D.

STEP	ACTION	VERIFICATION

TABLE D

POSITION OF SELECTORS		CHECK LAMPS LIGHTED		TROUBLE RECORD		
				PERFORATOR MAGNET INDICATIONS	HOUR INDICATIONS	
HT	HU	HT	HU	A- THROUGH F-	HT-	HU-
1	1	0	0	281100	0	0
2	2	1	1	281111	1	1
3	3	2	2	281122	2	2
1	4	0	3	281103	0	3
1	5	0	4	281104	0	4
1	6	0	5	281105	0	5
1	7	0	6	281106	0	6
1	8	0	7	281107	0	7
1	9	0	8	281108	0	8
1	10	0	9	281109	0	9

45a	▶If testing even master timing circuit— Insulate contacts 9-10B of PE relay.◀	
46b	▶If testing odd master timing circuit— Insulate contacts 9-10B of PO relay.◀	
47	Operate, release successively HH, TH, UH relays until H, T, U selectors reach position 1.	H0, T0, U0 check lamps lighted.
48	Repeat Step 47 for each of the H, T, U selector positions as indicated in Table E.	H_, T_, U_ check lamps lighted as indicated in Table E.
49a	▶If testing even master timing circuit— Remove insulator from contacts of PE relay.	
50b	If testing odd master timing circuit— Remove insulator from contacts of PO relay.◀	
51b	If testing odd master timing circuit— At master timing frame— Operate CMBO key.	▶CMBO lamp lighted.◀
52b	Momentarily operate S key.	SE, OSO lamps lighted ▶while odd master timing circuit synchronizes with even master timing circuit.◀
53b	When SE and OSO lamps are extinguished— Restore CKL, CMBO keys.	▶CMBO lamp extinguished.◀

STEP	ACTION	VERIFICATION

TABLE E

H, T, OR U SELECTOR POSITIONS	CHECK LAMPS LIGHTED		
	H-	T-	U-
1	0	0	0
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	+	6	6
8	0	7	7
9	1	8	8
10	2	9	9
11	3	0	0
12	4	1	1
13	5	2	2
14	+	3	3
15	0	4	4
16	1	5	5
17	2	6	6
18	3	7	7
19	4	8	8
20	5	9	9
21	+	+	+
22	+	+	+

+ Indicates positions from which the selector steps automatically.

54a	▶If testing even master timing circuit—◀ Operate CMBE key.	▶CMBE lamp lighted.◀
55a	Momentarily operate S key.	SO, OSE lamps lighted ▶while even master timing circuit synchronizes with odd master timing circuit.◀
56a	When SO, OSE lamps are extinguished— Restore CKL, CMBE keys.	▶CMBE lamp extinguished.◀
57	Momentarily operate AR key.	SSF lamp extinguished.
58	At transverter trouble indicator— Insert make-busy plugs into RMB and recorder TST or T jacks associated with AMA recorder being used for testing.	

STEP	ACTION	VERIFICATION
59	Insert plug of 32A test set into R jack.	
60	Momentarily depress white button of 32A test set.	RUT lamp lighted while test entries are perforated. ▶At end of first revolution of selector— TT, DL, 2R lamps lighted. Minor alarm sounds. Minor alarm changed to major at end of second revolution of selector.
61	When RUT, 2R lamps are extinguished— Momentarily operate AR key.	TT, DL lamps extinguished. Major alarm silenced.◀
62	Momentarily depress white button of 32A test set.	RUT lamp lighted while test entries are perforated. ▶At end of first revolution of selector— TT, DL, 2R lamps lighted. Minor alarm sounds. Minor alarm changed to major at end of second revolution of selector.
63	When RUT, 2R lamps are extinguished— Momentarily operate AR key.	TT, DL lamps extinguished. Major alarm silenced.◀
64	Remove make-busy plugs from MB and TST or T jacks.	
65	Remove plug of 32A test set from R jack.	
66	At perforator associated with AMA recorder being used for testing— Mark tape and proceed as indicated in 1.13.	

F. Preference and Lockout Features

Caution 1: Do not make busy or transfer any recorders while this test is in progress.

Caution 2: ▶Do not perform the following steps during the 5 minutes before or after any hour.◀

1	At master timing frame— Block nonoperated SCO relay.	
2	Connect battery to BF of EST relay.	EST relay operated. No battery on 9T, 3B, 6B of EST relay.
3	Connect battery to BF of ST1 relay.	ST1 relay operated. EST relay remains operated.

STEP	ACTION	VERIFICATION
4	Open 1-2T of EST relay.	EST relay released. No battery on 9T, 3B, 6B of ST1 relay.
5	Remove test connection from EST relay.	
6	Connect battery to BF of ST3 relay.	ST3 relay operated. ST1 relay remains operated.
7	Open 1-2T of ST1 relay.	ST1 relay released. No battery on 9T, 3B, 6B of ST3 relay.
8	Remove test connection from ST1 relay.	
9	Repeat Steps 6 through 8 on all higher odd-numbered ST_ relays in succession.	Higher odd-numbered ST_ relays operate. Lower odd-numbered ST_ relays remain operated. No battery on 9T, 3B, 6B of higher odd-numbered ST_ relays after lower numbered ST_ relays have released.
10	After testing highest odd-numbered ST_ relay— Remove test connection from ST relay.	
11	Block nonoperated SCE relay.	
12	Connect battery to BF of ST0 relay.	ST0 relay operated. No battery on 9T, 3B, 6B of ST0 relay.
13	Connect battery to BF of ST2 relay.	ST2 relay operated. ST0 relay remains operated.
14	Open 1-2T of ST0 relay.	ST0 relay released. No battery on 9T, 3B, 6B of ST2 relay.
15	Remove test connection from ST0 relay.	
16	Repeat Steps 13 through 15 on all higher even-numbered ST_ relays in succession.	Higher even-numbered ST_ relays operate. Lower even-numbered ST_ relays remain operated. No battery on 9T, 3B, 6B of higher even-numbered ST_ relays after lower-numbered ST_ relays have released.
17	After testing highest even-numbered ST_ relay— Remove test connection from this relay.	
18	Operate CMBE key.	CMBE lamp lighted.
19	Connect battery to BF of highest even-numbered ST_ relay.	Highest even-numbered ST_ relay operated. No battery on 9T, 3B, 6B of highest even-numbered ST_ relay.

STEP	ACTION	VERIFICATION
20	Connect battery to BF of EST relay.	EST relay operated. Highest even-numbered ST_ relay remains operated.
21	Open 1-2T of highest even-numbered ST_ relay.	Highest even-numbered ST_ relay releases. No battery on 9T, 3B, 6B of EST relay.
22	Remove test connection from ST_, EST relays.	
23	Restore CMBE key.	CMBE lamp extinguished.
24	▶Operate CMBO key.	CMBO lamp lighted.
25	Connect battery to BF of highest odd-numbered ST_ relay.	Highest odd-numbered ST_ relay operated. No battery on 9T, 3B, 6B of highest odd-numbered ST_ relay.
26	Disconnect battery from BF of highest odd-numbered ST_ relay.	Highest odd-numbered ST_ relay released.
27	Restore CMBO key.	CMBO lamp extinguished.◀
28	Remove blocking tools from SCE, SCO relays.	

G. Selector Exercise Features

1a	If testing odd master timing circuit— Operate TT key to E.	▶Within one minute— ET lamp lighted.◀
2a	Operate CMBO, CKL keys.	CMBO, ▶check lamps for even master timing circuit lighted.◀
3a	Operate, hold operated EXM key.	M selector steps steadily and uniformly throughout its arc.
4a	After approximately 10 seconds— Release EXM key.	
5a	Operate, hold operated EXD key.	DT, DU selectors step steadily and uniformly throughout their arcs.
6a	After approximately 10 seconds— Release EXD key.	
7a	Operate, hold operated EXH key.	HT, HU selectors step steadily and uniformly throughout their arcs.
8a	After approximately 10 seconds— Release EXH key.	
9a	Momentarily operate S key.	SE lamp lighted while selectors resynchronize.

STEP	ACTION	VERIFICATION
10a	When SE lamp is extinguished— Restore CMBO, CKL keys.	CMBO, ▶check◀ lamps extinguished.
11b	If testing even master timing circuit— Operate TT key to O.	
12b	Operate CMBE, CKL keys.	CMBE, ▶check lamps for odd master timing circuit lighted.◀
13b	Repeat Steps 3a throuh 8a for even master timing circuit.	▶Selectors of even master timing circuit step steadily and uniformly throughout their arcs.◀
14b	Momentarily operate S key.	SO lamp lighted while selectors resynchronize.
15b	When SO lamp is extinguished— Restore CMBE, CKL keys.	CMBE, ▶check◀ lamps extinguished.

H. Pulse Failure Alarm

1	At even master timing frame— Block nonoperated PF relay.	After 6 to 11 seconds— PF lamp lighted. Major alarm sounds. Aisle pilot lamp lighted.
2	Momentarily operate ACO key.	Major alarm silenced. Aisle pilot lamp extinguished.
3	Remove blocking tool from PF relay.	
4	Momentarily operate AR key.	PF lamp extinguished.
5	Block operated PF relay.	After 6 to 11 seconds— PF lamp lighted. Major alarm sounds. Aisle pilot lamp lighted.
6	Momentarily operate ACO key.	Major alarm silenced. Aisle pilot lamp extinguished.
7	Remove blocking tool from PF relay.	
8	Momentarily operate AR key.	PF lamp extinguished.

I. Transfer Control Features and Timer Synchronism Failure Alarm

Caution: ***▶Do not perform the following steps during the 5 minutes before or after any hour to prevent interference with the placing of the hour record on the recorders.◀***

STEP	ACTION	VERIFICATION
1	At master timing frame— Operate TT key to E.	▶Within one minute— ET lamp lighted.◀
2	Insulate 4T of PO relay.	CSY relay released. TSF lamp lighted. Major alarm sounds.
3	Momentarily operate ACO key.	Major alarm silenced.
4	Block nonoperated CSY relay.	
5	Remove insulator from PO relay.	
6	Operate CKL key.	▶Check lamps lighted.◀
7	Operate TT key to O.	Within 1 minute— OT, SSF lamps lighted. OS_ lamp for each recorder lighted.
8a	If emergency recorder is substituting for regular recorder— At the master timing frame— Momentarily operate S key.	SO lamp lighted while selectors of regular recorder are stepping ▶to synchronized position with odd master timing circuit.◀ OS_ lamp extinguished when selectors are synchronized.
9	At transverter trouble indicator— Insert make-busy plug into emergency recorder MB jack.	
10	At master timing frame— Momentarily operate S key.	SO lamp lighted while selectors of emergency recorder are stepping ▶to synchronized position with odd master timing circuit.◀ EM OS lamp extinguished when selectors are synchronized.
11	At transverter trouble indicator— Remove plug from emergency recorder MB jack. ***Note:*** ▶Steps 12 through 15 resynchronize the recorders without transferring using the RMB jacks. Steps 16 through 19 resynchronize the recorders and test the transfer feature.◀	
12	Insert make-busy plug into RMB jack for one of the recorders with lighted OS_ lamp.	
13	At master timing frame— Momentarily operate S key.	SO lamp lighted while selectors of regular recorder are stepping ▶to synchronized position with odd master timing circuit.◀ OS_ lamp extinguished when selectors are synchronized.

STEP	ACTION	VERIFICATION
14	At transverter trouble indicator— Remove plug from RMB jack.	
15	Repeat Steps 12, 13, 14 for each of the remaining regular recorders with lighted OS_ lamp.	
16b	If emergency recorder is not substituting for regular recorder— Insert make-busy plug into recorder TN jack for one of the recorders with lighted OS_ lamp. ***Caution: While making this test, do not make more than one transfer from the same recorder during the same hour period since it may not be possible for the Accounting Center to associate the entries for two or more calls on the same district junctor or trunk which has their initial entries on one tape and the answer and disconnect entries on the other tape.***	
17b	At master timing frame— Momentarily operate S key.	SO lamp lighted while selectors of regular recorder are stepping ▶to synchronized position with odd master timing circuit.◀ OS_ lamp extinguished when selectors are synchronized.
18b	At transverter trouble indicator— Remove plug from recorder TN jack.	
19b	Repeat Steps 16b, 17b, 18b for each of the remaining recorders with lighted OS_ lamp.	
20	At master timing frame after next hour entry has been perforated— Operate TT key to E.	Within 1 minute— ET, SSF lamps lighted. OS_ lamp for each recorder lighted.
21	Repeat Steps 8a through 19b.	
22	Remove blocking tool from CSY relay.	
23	Momentarily operate AR key.	TSF, SSF lamps extinguished. ▶Check lamp extinguished.◀
24	Restore CKL key.	

STEP	ACTION	VERIFICATION
J.	**Selector Synchronism Check and Selector Synchronism Check Failure Alarms**	
1	At master timing frame— Operate TT key to E. ***Caution 1: This test requires the use of both master timing circuits; therefore, do not make this test if the CMBE or CMBO key is found operated. Determine if satisfactory to restore operated key or clear the trouble; then restore the operated key before proceeding with the test.*** ***Caution 2: ▶Do not perform the following steps during the 5 minutes before or after any hour to prevent interference with the placing of the hour record on the recorders.◀***	
2	Restore CKL key if operated.	At master timing frame— M_, DT_, DU_, HT_, HU_, H_, T_, U_ check lamps momentarily lighted once each minute ▶under control of even master timing circuit.◀
3	At master timing frame— Momentarily operate UH relay of odd master timing circuit.	Within 1 minute— SSF lamp lighted. Major alarm sounds.
4	Operate CKL key.	▶Check lamps lighted.◀ OSO lamp lighted. OSE lamp remains extinguished.
5	Momentarily operate ACO key.	Major alarm silenced.
6	Operate CMBO key.	CMBO lamp lighted.
7	Momentarily operate S key.	SE lamp lighted while odd master timing circuit selectors are stepping to synchronized position. OSO lamp extinguished when selectors are synchronized.
8	Momentarily operate AR key.	SSF lamp extinguished.
9	Restore CMBO, CKL keys.	CMBO, ▶check◀ lamps extinguished.
10	Repeat Steps 3 through 9 for each of TH, HH, HUH, HTH, DTH, MOH relays in succession.	
11	Operate TT key to O.	M_, DT_, DU_, HT_, HU_, H_, T_, U_ check lamps momentarily lighted once each minute ▶under control of odd master timing circuit.◀

STEP	ACTION	VERIFICATION
12	Momentarily operate UH relay of even master timing circuit.	Within 1 minute— SSF lamp lighted. Major alarm sounded.
13	Operate CKL key.	▶Check lamps lighted.◀ OSE lamp lighted. OSO lamp remains extinguished.
14	Momentarily operate ACO key.	Major alarm silenced.
15	Operate CMBE key.	CMBE lamp lighted.
16	Momentarily operate S key.	SO lamp lighted while even master timing circuit selectors are stepping to synchronized position. OSE lamp extinguished when selectors are synchronized.
17	Momentarily operate AR key.	SSF lamp extinguished.
18	Restore CMBE, CKL keys.	CMBE, ▶check◀ lamps extinguished.
19	Repeat Steps 12 through 18 for each of TH, HH, HUH, HTH, DTH, MOH relays.	
K.	**Both Master Timing Circuits Make-Busy Alarm**	
1	At master timing frame— Operate CMBO key.	At master timing frame— CMBO lamp lighted.
2	Operate CMBE key.	CMBO lamp remains lighted. CMBE lamp lighted. MBE relay not operated. Major alarm sounds.
3	Restore CMBO key.	CMBO lamp extinguished. Major alarm silenced.
4	Operate CMBO key.	CMBO lamp lighted. Major alarm sounds. MBO relay not operated.
5	Restore CMBE, CMBO keys.	CMBE, CMBO lamps extinguished. Major alarm silenced.
L.	**▶Synchronizing TE and TO Motor Timers**	
1	At master timing frame— Using 893 cord— Connect contact 1 of TE timer to any lamp of KS-16751 L1 dry reed reader.	

STEP	ACTION	VERIFICATION
2	Connect contact 1 of TO timer to any other lamp of KS-16751 L1 dry reed reader.	
3	Connect cord of KS-16751 L1 dry reed reader to 48V battery.	KS-16751 L1 dry reed reader lamps lighted in unison at 6-second intervals.
4a	If KS-16751 L1 dry reed reader lamps do not light in unison— Operate TT key to O to synchronize TE timer or operate TT key to E to synchronize TO timer.	
5a	Operate MS_ key to STP.	TSF lamp lighted. Major alarm sounded. T_ timer stopped. Within 1 minute— SSF lamp lighted.
6a	Momentarily operate ACO key.	Major alarm silenced.
7a	Operate CMB_, CKL keys.	CMB_, check lamps lighted.
8a	Grasp hub of T_ timer; manually turn camshaft very slowly in direction in which it normally rotates until the small cam passes under and beyond the contact operating finger and clears it by approximately 3/32 inch.	
9a	At any time except when U8 or U9 lamp is lighted— Operate MS_ key to ST position.	Within 1 minute— T_ timer starts to run.
10a	Operate MS_ key to R position.	KS-16751 L1 dry reed reader lamps lighted in unison at 6-second intervals. ***Note:*** If KS-16751 L1 dry reed reader lamps do not light in unison, repeat steps 4a through 10a rotating camshaft of timer under test slightly more or slightly less than in Step 8a until KS-16751 L1 dry reed reader lamps are in unison.
11a	Momentarily operate S key.	S_ lamp lighted while selectors of master timing circuit under test step to synchronized position.
12a	When S_ lamp is extinguished— Momentarily operate AR key.	TSF, SSF lamps extinguished.
13a	Restore CMB_, CKL keys.	CMB_, check lamps extinguished.

STEP	ACTION	VERIFICATION
14	Remove cords connecting KS-16751 L1 indicator to TE and TO timers.	
15	Disconnect cord of KS-16751 L1 dry reed reader from −48V battery.	

M. Time-out Alarm Features

Caution 1: The charge records on recorder tapes for service calls made during the time this test is in progress cannot be properly processed by the Accounting Center. The tapes are marked for the Accounting Center to disregard the tape area covering both service call entries as well as improper test entries.

Caution 2: ▶Do not perform the following steps during the 5 minutes before or after any hour to prevent interference with the placing of the hour record on the recorders.◀

1	Select an AMA recorder associated with master timer to be tested; mark tape and proceed as indicated in 1.13.	
2	At master timing circuit under test— Block nonoperated P3A relay. ***Note:*** ▶In the following tests after a trouble record is taken, it will be necessary to operate the RL key at the transverter trouble indicator to clear the indicator lamp panel.◀	
3	At transverter trouble indicator— Insert 322A plug into RMB jack associated with AMA recorder being used for testing.	Within 4 to 7 seconds— Trouble record taken.
4	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	▶Master timing circuit resumes operation, causing recorder to resume perforation of tape entry. ***Note:*** If blocking tool is not removed, master timer will time out in 15 to 20 seconds.◀
5	At master timing circuit under test— Block nonoperated P3A, TMR, TM5, TM6 relays.	
6	At transverter trouble indicator— Remove make-busy plug from RMB jack	At master timing circuit under test— TM2 relay operated.

STEP	ACTION	VERIFICATION
	associated with AMA recorder being used for testing.	
7	When TM2 relay releases— ***Start timing.***	
8	When TM2 relay reoperates— ***Stop timing.***	Elapsed time on stopwatch is 2 to 4 seconds. TM6 relay not energized.
9	Remove blocking tool from TM5 relay.	
10	When TM2 relay releases— ***Start timing.***	
11	When TM2 relay reoperates— ***Stop timing.***	Elapsed time on stopwatch is 2 to 4 seconds. TM5, TIB relays operated. TM6 relay energized.
12	Remove blocking tool from TMR, P3A relays.	
13	When TM1 relay releases— Remove blocking tool from TM6 relay.	
14	At master timing circuit under test— Block nonoperated P3A relay.	
15	At transverter trouble indicator— Momentarily operate DRT_ relay associated with master timing circuit not under test at trouble indicator frame.	DRT_ relay remains operated. DRT_ lamp lighted. Minor alarm sounded.
16	Insert make-busy plug into RMB jack associated with AMA recorder being used for testing.	
17	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	After 16 to 20 seconds— At transverter trouble indicator— CMB_, MT_ display lamps associated with master timer under test lighted. At master timing frame— CMB_, TA_, ETF_ lamps associated with master timer under test lighted. Major alarm sounded.
18	At transverter trouble indicator— Momentarily operate RL key.	DRT_, DLT_ lamps extinguished.
19	At master timing circuit under test— Momentarily operate AR key.	CMB_, TA_, ETF_ lamps extinguished. Major alarm silenced.
20	Block nonoperated TM1, TM6, ◗RK, LTA◖ relays.	

STEP	ACTION	VERIFICATION
21	At transverter trouble indicator— Remove make-busy plug from RMB jack associated with AMA recorder being used for testing; at same time start stopwatch.	At master timing circuit under test— In 18 to 30 seconds— TM6 relay energized. In 66 to 78 seconds— TSP relay operated. In 78 to 90 seconds— LT9 relay operated.
22	At master timing circuit under test— Connect 10B to 11B of ET1 relay.	TM1 relay energized.
23	Insulate 7-8B of LT9 relay.	TM1 relay not energized.
24a	If E wiring option is used— Remove ◗blocking tool from LTA◖ relay.	In 2 to 5 minutes— TM1 relay energized.
25b	If B wiring option is used— Remove ◗blocking tool from LTA◖ relay.	In 2 to 5 minutes— TM6 relay energized.
26	Remove test connection from ET1 relay contacts.	
27	Remove insulator from LT9 relay.	
28	Remove blocking tool from RK, TM1 relays.	TM1 relay momentarily operated.
29	After TM1 relay releases— Remove blocking tool from TM6 relay.	
30	At master timing circuit under test— Momentarily operate LT4 relay.	At master timing frame— CMB_, TA_, ETF_ lamps associated with master timer under test lighted. Major alarm sounded. At transverter trouble indicator— CMB_, MT_ lamps associated with master timer under test lighted.
31	At master timing frame— Momentarily operate AR key.	At master timing frame— CMB_, TA_, ETF_ lamps extinguished. Major alarm silenced. At transverter trouble indicator— CMB_, MT_ lamps extinguished.
32	At transverter trouble indicator— Insert make-busy plugs into RMB and TST or T jacks associated with AMA recorder under test.	
33	Insert plug of 32A test set into R jack.	
34	Momentarily depress white button of 32A test set.	RUT lamp lighted while test entries are perforated. ◗At end of first revolution of selector—

STEP	ACTION	VERIFICATION
		TT, DL, 2R lamps lighted. Minor alarm sounds. Minor alarm changed to major at end of second revolution of selector.
35	When RUT, 2R lamps are extinguished— Momentarily operate AR key.	TT, DL lamps extinguished. Major alarm silenced.
36	Momentarily depress white button of 32A test set.	RUT lamp lighted while test entries are perforated. At end of first revolution of selector— TT, DL, 2R lamps lighted. Minor alarm sounds. Minor alarm changed to major at end of second revolution of selector.
37	When RUT, 2R lamps are extinguished— Momentarily operate AR key.	TT, DL lamps extinguished. Major alarm silenced.
38	Remove make-busy plugs from RMB and TST or T jacks.	
39	Remove plug of 32A test set from R jack.	
40	At transverter trouble indicator— Momentarily operate RL key.	
41	At perforator associated with AMA recorder being used for testing— Mark tape and proceed as indicated in 1.13.	

N. Perforator Lead Cross-Detection Features

1	At master timing frame— Momentarily connect ground to 02 of A terminal strip (located at top of frame).	CMBE lamp lighted. At transverter trouble indicator— CMBE lamp lighted. Trouble record taken. XPL indication.
2	At transverter trouble indicator— Momentarily operate RL key.	
3	At master timing frame— Momentarily operate AR key.	CMBE lamp extinguished. At transverter trouble indicator— CMBE lamp extinguished.
4	Block nonoperated PLXE relay.	
5	Momentarily connect ground in turn to punchings of A terminal strip as follows: 2, 3, 4, 10, 11, 12, 13, 14, 20, 21, 22, 23, 24, 30, 31, 32, 33, 34, 40, 41, 42, 43, 44, 50, 51, 52, 53, 54.	XPE relay operated in each case while ground is applied.

STEP	ACTION	VERIFICATION
6	Momentarily connect battery to 02 of A terminal strip.	XPE relay operated while battery is applied.
7	Remove blocking tool from PLXE relay.	
8	Momentarily connect ground to 02 of C terminal strip (located at top of frame).	CMBO lamp lighted. At transverter trouble indicator— CMBO lamp lighted. Trouble record taken. XPL indication.
9	At transverter trouble indicator— Momentarily operate RL key.	
10	At master timing frame— Momentarily operate AR key.	CMBO lamp extinguished. At transverter trouble indicator— CMBO lamp extinguished.
11	Block nonoperated PLXO relay.	
12	Momentarily connect ground in turn to punchings of C terminal strips as follows: 2, 3, 4, 10, 11, 12, 13, 14, 20, 21, 22, 23, 24, 30, 31, 32, 33, 34, 40, 41, 42, 43, 44, 50, 51, 52, 53, 54.	XPO relay operated in each case while ground is applied.
13	Momentarily connect battery to 02 of C terminal strip.	XPO relay operated while battery is applied.
14	Remove blocking tool from PLXO relay.	
15	At RC terminal strip for even master timing circuit— Momentarily connect ground to terminal 02 (located adjacent to RCO, RCE relays).	CMBE lamp lighted. At transverter trouble indicator— CMBE lamp lighted. Trouble record taken. XPL indication.
16	At transverter trouble indicator— Momentarily operate RL key.	
17	At master timing frame— Momentarily operate AR key.	CMBE lamp extinguished. At transverter trouble indicator— CMBE lamp extinguished.
18	Block nonoperated PLXE relay.	
19	Momentarily connect ground in turn to punchings of RC terminal strip for even master timing circuit as follows: ◗2,◖ 3, 4, 10, 11, 12, 13, 14, 20, 21, 22, 23, 24, 30, 31, 32, 33, 34, 40, 41, 42, 43, 44, 50, 51, 52, 53, 54.	XPE1 relay operated while ground is applied.
20	Remove blocking tool from PLXE relay.	

STEP	ACTION	VERIFICATION
21	At RC terminal strip of odd master timing circuit— Momentarily connect ground to punching 02.	CMBO lamp lighted. At transverter trouble indicator— CMBO lamp lighted. Trouble record taken. XPL indication.
22	At transverter trouble indicator— Momentarily operate RL key.	
23	At master timing frame— Momentarily operate AR key.	CMBO lamp extinguished. At transverter trouble indicator— CMBO lamp extinguished.
24	Block nonoperated PLXO relay.	
25	Momentarily connect ground in turn to punchings of RC terminal strip for odd master timing circuits as follows: ▶2,◀ 3, 4, 10, 11, 12, 13, 14, 20, 21, 22, 23, 24, 30, 31, 32, 33, 34, 40, 41, 42, 43, 44, 50, 51, 52, 53, 54.	XPO1 relay operated while ground is applied.
26	Remove blocking tool from PLXO relay.	

O. End-of-Tape Failure Alarm Test

1	At master timing frame— At U selector of even master timing circuit— Momentarily connect ground to brush on arc 2 when selector reaches terminal 5 or 15.	At master timing frame— ETFO lamp lighted. Major alarm sounded.
2	Momentarily operate AR key.	ETFO lamp extinguished. Major alarm silenced.
3	At U selector of odd master timing circuit— Momentarily connect ground to brush on arc 2 when selector reaches terminal 5 or 15.	ETFE lamp lighted. Major alarm sounded.
4	Momentarily operate AR key.	ETFE lamp extinguished. Major alarm silenced.
5	Operate CMBO key.	CMBO lamp lighted.
6	At U selector of even master timing circuit— Momentarily connect ground to brush on arc 2 when selector reaches terminal 5 or 15.	ETFE lamp lighted. Major alarm sounded.
7	Momentarily operate AR key.	ETFE lamp extinguished. Major alarm silenced.
8	Restore CMBO key.	CMBO lamp extinguished.
9	Operate CMBE key.	CMBE lamp lighted.

STEP	ACTION	VERIFICATION
10	At U selector of odd master timing circuit— Momentarily connect ground to brush on arc 2 when selector reaches terminal 5 or 15.	ETFO lamp lighted. Major alarm sounded.
11	Momentarily operate AR key.	ETFO lamp extinguished. Major alarm silenced.
12	Restore CMBE key.	CMBE lamp extinguished.

P. Fuse Alarm (FA) Relays and Make-Busy Features

1	At master timing frame— Apply battery to terminal 120 on MISC terminal strip.	At miscellaneous relay rack— FA lamp lighte At master timin · frame— CMBE lamp lighted. At transverter trouble indicator— CMBE lamp lighted. Major alarm sounded.
2	Remove test connection from MISC terminal strip.	At miscellaneous relay rack— FA lamp extinguished At master timing frame— ALE lamp lighted. CMBE lamp remains lighted. Major alarm silenced.
3	Momentarily operate AR key.	CMBE, ALE lamps extinguished.
4	Repeat Steps 1 through 3 on odd master timing circuit. Apply battery to terminal 123 on MISC terminal strip.	Observe ALO, CMBO lamps instead of ALE, CMBE lamps.
5a	If R wiring option is provided— Block nonoperated MTO relay.	CMBO lamp lighted.
6a	Remove blocking tool from MTO relay.	CMBO lamp extinguished.
7a	Block nonoperated MTE relay.	CMBE lamp lighted.
8a	Remove blocking tool from MTE relay.	CMBE lamp extinguished.
9b	If S wiring option is provided— Momentarily release MTO relay.	CMBO, ALO lamps lighted.
10b	Momentarily operate AR key.	CMBO, ALO lamps extinguished.
11b	Momentarily release MTE key.	CMBE, ALE lamps lighted.
12b	Momentarily operate AR key.	CMBE, ALE lamps extinguished.

STEP	ACTION	VERIFICATION
Q. LT1 Through LT9 Relays (Long Timer) Test		
	Caution: Do not perform the following steps during the 5 minutes before or after any hour to prevent interference with the placing of the hour record on the recorders.	
1a	If even timer is to be tested— At master timing frame— Operate TT key to O.	Within 1 minute— OT lamp lighted.
2a	Operate CMBE key.	CMBE lamp lighted.
3a	At even master timing circuit— Block nonoperated ST_ relays.	
4b	If odd timer is to be tested— Operate TT key to E.	Within 1 minute— ET lamp lighted.
5b	Operate CMBO key.	CMBO lamp lighted.
6b	At odd master timing circuit— Block nonoperated ST_, EST relays.	
7	Block nonoperated ET1 relay.	
8	Using 893 cord, short contacts 4, 5B of ET1 relay; ***start timing.***	LT1 relay operated. LT2 relay operated in 0 to 6 seconds. LT1 relay released 6 seconds after LT2 is operated. LT3 relay operated 6 seconds after LT1 is released. Preceding LT_ relay released and succeeding LT_ relay operated at 6-second intervals. Approximately halfway through test— Major alarm sounded. TAO or TAE lamp lighted. ETFO or ETFE lamp lighted.
9	Remove connection from 4, 5B of ET1 relay.	
10	Momentarily operate AR key.	Major alarm silenced. TAO or TAE lamp extinguished. ETFO or ETFE lamp extinguished.
11c	If necessary to repeat test— Repeat Steps 8 through 10.	
12	Remove blocking tools from ST_, ET1 relays.	
13b	If testing odd timer— Remove blocking tool from EST relay.	

STEP	ACTION	VERIFICATION
14b	Restore CMBO key.	CMBO lamp extinguished.
15a	If testing even timer— Restore CMBE key.	CMBE lamp extinguished.

R. Paper Take-up Alarm Test

1	At perforator cabinet— Disconnect motor drive unit from power outlet.	
2	Remove take-up motor control arm from paper tape; move control arm to its lowermost position.	At master timing frame— PTU lamp lighted. Within 1 to 2 minutes— Major alarm sounds. Alarm pilot lamp lighted.
3	At perforator cabinet— Replace control arm on tape.	
4	Reconnect motor drive unit to power outlet.	At master timing frame— After tape has been taken up on storage reel— PTU lamp extinguished. Major alarm silenced. Aisle pilot lamp extinguished.
5	Repeat Steps 1 through 4 on remaining perforator cabinets.	