MASTER TIMING CIRCUIT SD-25633-01

SIX SECOND TIMING FEATURES

TESTS

NO. 5 CROSSBAR OFFICES

1. GENERAL

1.01 This section describes the procedures to be followed to test the Master Timing Circuit, SD-25633-01 and its features using six-second timing.

1.02 This section is reissued to remove the one-second timing features. This reissue affects the Equipment Test Lists.

PAGE

1.04 Tests covered in this section should not be made during the time any recorders are perforating the 3:00 A.M. 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 trouble recorder frame 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 perforated trouble card when a trouble recorder is provided.

1.10 Reference should be made to the section which covers precautions to be observed for limiting stoppages at the accounting center caused by central office tape irregularities.

1.11 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. (See Fig. 1 for non-transfer times.)

1.12 Before starting any test which will cause the perforation of transfer, make-busy, 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 arm 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 two diamond patterns, that is, the diamond pattern farthest from the perforator drum.

ENTRIES						
	HOUR	TEN MINUTE				
	*0500	0510	0520	0530	0540	0550
Do Not Transfer During This Interval	0458 To 0501	0508 To 0511	0518 To 0521	0528 To 0531	0538 To 0541	0548 To 0551

*Example only—could be any hour and appropriate ten minute entries.

Fig. 1—

(4) Find the red mark placed on the tape at the start of testing. 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.

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

1.14 In offices provided with a master test frame (MTF) trouble recorder, while performing Tests B, E, and M, a DL (display lost) lamp will be lighted at the MTF and a major alarm sounded. To extinguish the lamp and to silence the alarm, operate the TRR-AR key at the MTF. The alarm release may also be handled by remote control by patching the MTF AR jack to the SP jack. To silence the alarm, momentarily insert a 349A plug into the SP jack associated with the frame at which the test is being made.

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 listed in Table A. The details of each item are covered in the paragraph indicated by the number in parentheses.

2.02 Testing cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 509A (relay winding connector) 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 connecting clip, and one 419A (test connector) tool (for use in estblishing test connections to relay springs).

2.04 Testing cord, 893 cord, 3 feet long, equipped with two 360A tools (1W13A cord) and two 419A (test connector) 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 connecting clip, and one 411A (test pick) tool (for use in establishing momentary test connections to relay springs and selector brushes).

2.06 67C test set or equivalent, equipped with one KS-6278 connecting clip (to check for presence of battery or ground).

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

3. METHOD

STEP	ACTION	VERIFICATION
A. Time Indication Check		
1	⧫Check precise time source per local procedures and start the stopwatch precisely at the beginning of any minute and record the time.⧫	
2	At master timing frame— Operate CKL key.	M_, DT_, DU_, HT_, HU_ lamps lighted. These check lamps indicate correct month, day tens, day units, hour tens, hours units,

STEP	ACTION	VERIFICATION

TABLE A

APPARATUS	TESTS													
	A	B	C	D	E	F	H	I	J	M	N	O	Q	R
322A (make-busy) Plug		✓	✓	✓	✓			✓		✓				
KS-3008 Stopwatch or equivalent	1	1					1	1	1	1			1	1
32A Test Set		1			1					1				
Cord (2.02)						2								
Cord (2.03)		1					1		1					
Cord (2.04)										1			1	
Cord (2.05)											1	1		
Test Set (2.06)		1				1								
Red China Marking Pencil		1			1					1				
Tools (2.07)		✓			✓	✓	✓	✓		✓	✓		✓	

✓ As required.

		respectively. H_, T_, U_ check lamps lighted. These check lamps indicate time in tenths of minutes up to 59.9 and are read as a unit.
3	When U_ check lamp has just extinguished— Stop timing and record time as indicated by H_, T_, U_ check lamps.	Check that sum of the elapsed time on the stopwatch agrees within 12 seconds (±0.2 minute) of the time displayed on the H_,T_, U_ check lamps, at the instant the watch was stopped.
4a	If time indication is incorrect by more than 12 seconds— Reset master timing circuits to correct time as described in section titled "MASTER TIMING	

STEP	ACTION	VERIFICATION
	CIRCUIT—METHOD OF HANDLING ALARMS" under "Pulse Failure Alarm".	
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 and CKL keys.	Check lamps extinguished.

B. End-of-Tape Feature

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 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.

1	Select an AMA recorder associated with master timing circuit to be tested; mark tape as indicated in paragraph 1.12.	
2	At master timing circuit under test— Block nonoperated P3A relay.	
3	At trouble recorder frame— Insert make-busy plug into recorder MB 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.	
5	Block nonoperated P4A relay.	
6	At trouble recorder frame— Remove make-busy plug.	Trouble record taken. Indications as listed in Table B for P4A relay.
7	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P4A relay.	
8	At master timing circuit under test— Block nonoperated P5A relay.	

STEP	ACTION	VERIFICATION
9	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for testing.	
10	Remove make-busy plug from MB jack.	At master timing circuit under test— MO relay operated, release twice.
11	At AMA recorder being used for testing— Block nonoperated U relay. ***Note:*** This may cause a selector synchronism failure alarm (at master timing frame, SSF lamp lighted). If this occurs, momentarily operate the ACO key at the master timing frame to silence the audible alarm. If option VM is provided, the alarm will reinstate at 10 minute intervals. Reoperate the ACO key to silence the audible alarm.	
12	Repeat Step 3, substituting P5A relay for P3A relay.	Trouble record taken. Indications as listed in Table B for P5A relay.
13	At AMA recorder being used for testing— Remove blocking tool from U relay.	
14a	If SSF lamp is lighted at master timing frame— Momentarily operate AR key.	SSF lamp extinguished.
15	Repeat Steps 4, 5, 6, 7 substituting P6A for P4A relay and substituting P5A for P3A relay.	Trouble record taken. Indications as listed in Table B for P6A relay.
16	Repeat Steps 2 through 7, substituting P7A for P3A relay, P8A for P4A relay.	Trouble record taken. Indications as listed in Table B for P7A, P8A relays.
17	Repeat Steps 2, 3, 4 substituting COP relay for P3A relay.	Trouble record taken. Indications as listed in Table B for COP relay.
18	At master timing circuit under test— Block nonoperated SS relay.	
19	At trouble recorder frame— Remove make-busy plug from MB jack.	
20	At master timing circuit under test— Remove blocking tool from SS relay; ***start timing.***	
21	When TSP relay operates, ***stop timing.***	Elapsed time within 2.5 to 4.5 seconds.

STEP	ACTION	VERIFICATION
22	Repeat Steps 2, 3, substituting P1A relay for P3A relay.	Trouble record taken. Indications as listed in Table B for P1A relay.
23b	If P2A relay is provided— Repeat Steps 4, 5, 6, 7 substituting P2A relay for P4A relay and substituting P1A for P3A relay.	Trouble record taken. Indications as listed in Table B for P2A relay.
24c	If P2A relay is ***not*** provided— Remove blocking tool from P1A relay. At trouble recorder frame— Remove make-busy plug from MB jack.	
25	At perforator associated with emergency recorder or at other regular recorder where trunk transfer is used— Mark tape and proceed as indicated in paragraph 1.12.	
26	At trouble recorder frame— Insert make-busy plug into recorder TN or RTN jack associated with AMA recorder being used for testing.	At master timing circuit under test MO relay operated, released four times. At emergency recorder frame— EW lamp lighted.
27	At trouble recorder frame— Remove make-busy plug from TN or RTN jack.	At master timing circuit under test MO relay operated, released four times. At emergency recorder frame— EW lamp extinguished.
28	At master timing circuit under test— Block nonoperated P5A relay.	
29	At trouble recorder frame— Insert make-busy plug into recorder TN or RTN jack associated with AMA recorder being used for 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, SY. P indication if XA wiring is provided.
30	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P5A relay.	
31	At trouble recorder frame— Remove make-busy plug from TN or RTN jack.	
32	At master timing circuit under test— Block nonoperated P5A relay.	
33	At AMA recorder used for testing— Block nonoperated U relay.	

STEP	ACTION	VERIFICATION
	Note: This may cause a selector sychronism failure alarm (at master timing frame, SSF lamp lighted). If this occurs momentarily operate the ACO key at the master timing frame to silence the audible alarm. If option VM is provided, the alarm will reinstate at 10 minute intervals. Reoperate the ACO key to silence the alarm.	
34	At trouble recorder frame— Insert make-busy plug into recorder TN or RTN 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, RT, BSP, DA, HR, SC, NS. P indication if XA wiring is provided.
35	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P5A relay.	
36	At AMA recorder being used for testing— Remove blocking tool from U relay.	
37a	If SSF lamp is lighted at master timing frame— Momentarily operate AR key.	SSF lamp extinguished.
38	At trouble recorder frame— Remove make-busy plug from TN or RTN jack.	
39	At master timing circuit under test— Block nonoperated P6A relay.	
40	At trouble recorder frame— Insert make-busy plug into recorder TN or RTN 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), TV, PT, PT1, PAK, P1, RD, A, RT, BSP, DA, HR, SY, SC, RN. P indications if XA wiring is provided.
41	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P6A relay.	
42	At master timing circuit under test— Block nonoperated P6A relay.	
43	At trouble recorder frame— Remove make-busy plug from TN or RTN jack.	Trouble record taken. Indications as follows: Perforator magnets A- through F- representing numerals 2806XX

STEP	ACTION	VERIFICATION
		(with XX representing the recorder number), TV, PT, PT1, PAK, P1, RD, B, RT, BSP, DA, HR, SY, SC, RN. P indication if XA wiring is provided.
44	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P6A relay.	
45	At trouble recorder frame— Insert make-busy plug into recorder MB and TST or T jacks associated with emergency recorder or other regular recorder where trunk transfer is used.	
46	Insert plug of 32A test set into R jack.	
47	Momentarily operate white (ST) button of 32A test set.	RUT lamp lighted while test entries are perforated.
48	When RUT lamp is extinguished— Momentarily operate white (ST) button of 32A test set.	RUT lamp lighted while test entries are perforated.
49	When RUT lamp is extinguished— Remove make-busy plugs from MB and TST or T jacks.	
50	Remove plug of 32A test set from R jack.	
51	At perforator associated with emergency AMA recorder or other regular recorder where trunk transfer is used— Mark tape and proceed as indicated in paragraph 1.12.	
52	If ZD option is provided— At master timing frame— Operate TT key to O.	
53	Operate CMBE, CKL keys.	CMBE lamp lighted.
54	Insulate 9-10B of PE relay.	
55	Block nonoperated HRT relay.	
56	Operate, release UH relay successively until U selector reaches position 9.	
57	Operate, release TH relay successively until T selector reaches position 10, and operate,	

STEP	ACTION	VERIFICATION
	release UH relay successively until U selector reaches position 10.	
58	Operate, release HH relay successively until H selector reaches position 6.	SR, PRE relays operated.
59	Operate, relase HH relay successively until H selector reaches position 13.	SR, PRE relays operated.
60	Operate, release HH relay successively until H selector reaches position 20.	SR, PRE relays operated.
61	Operate, release TH relay successively until T selector reaches position 20.	SR, PRE relays operated.
62	Block nonoperated TH relay.	
63	Operate, release UH relay successively until U selector reaches position 10.	SR, PRE relays operated.
64	Operate, release UH relay successively until U selector reaches position 19.	SR, PRE relays operated.
65	Operate, release UH relay to step U selector to position 20.	SR, PRE relays operated.
66	Remove blocking tool from HRT relay.	HRT relay operated.
67	Remove blocking tool from TH relay.	
68	Remove insulator from PE relay.	
69	Operate CKL key.	
70	Momentarily operate S key.	SO lamp lighted.
71	When SO lamp is extinguished— Restore CMBE, CKL keys.	CMBE lamp extinguished.
72	Operate TT key to E.	ET lamp lighted within 6 seconds.
73	Operate CMBO key.	CMBO lamp lighted.
74	Insulate 9-10B of PO relay.	OSO lamp lighted.
75	Block nonoperated HRT relay.	
76	Repeat Steps 54 through 71 for odd master timing circuit.	SR, PRO relays operated.
77	Remove blocking tool from TH relay.	

STEP	ACTION	VERIFICATION
78	Remove insulator from PO relay.	
79	Operate CKL key.	
80	Momentarily operate S key.	SE lamp lighted.
81	When SE lamp is extinguished— Restore CMBO, CKL keys.	CMBO lamp extinguished.
82	Block nonoperated P3A relay.	
83	At AMA recorder used for testing— Momentarily oprate SP relay.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 2821XX (with XX representing the day tens and day units corresponding to the day of the month), TV, PT, PAK, P1, RD, SP, RT, BSP, DA, SY.
84	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	
85	At AMA recorder used for testing— Block operated SP relay.	At AMA recorder frame— NP lamp lighted. Aisle pilot lamp lighted. Major alarm sounds.
86	At AMA recorder used for testing— Remove blocking tool from SP relay.	If recorder has XO option— At AMA recorder frame— NP lamp extinguished. Aisle pilot lamp extinguished. Major alarm silenced.
87	If recorder has XN option— Momentarily operate AR key.	NP lamp extinguished. Aisle pilot lamp extinguished. Major alarm silenced.
88	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder used for testing; ***start timing.*** ***Note:*** Steps 90, 91 must be performed in rapid succession.	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.
89	At trouble recorder frame— Remove make-busy plug from MB jack; ***start timing.***	At master timing circuit under test— SS relay operated.
90	After 1.5 seconds— Operate SP relay.	In 4 to 6 seconds after SS relay operated— TSP relay operated.

STEP	ACTION	VERIFICATION
		RLS relay momentarily operated. SS, TSP relays released.
91	Block operated ESP relay.	
92	Connect ground to 10B of RLS relay.	
93	Momentarily operate RCT relay.	ROS, SP relays operated, released.
94	Remove test connection from RLS relay.	
95	Remove blocking tool from ESP relay.	
	Note: Steps 97 and 98 must be performed in rapid succession.	
96	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AM recorder used for testing.	At master timing frame— ESP relay operated momentarily.
97	At master timing circuit under test— When ESP relay operates— Momentarily operate ROS relay.	At master timing frame— ESP relay released, operated, and released again.
98	At master timing circuit under test— Insulate 8B of LC1 relay.	
99	At trouble recorder frame— Remove make-busy plug from MB jack.	Trouble record taken. Indications as follows: Perforator magnets A_ through F_ representing numerals 2821XX (with XX representing day tens, day units), TV, PT, PAK, P1, RD, E, RT, BSP, DA, SY.
100	At master timing circuit under test— Remove insulator from LC1 relay.	
101	At trouble recorder frame— Insert make-busy plugs into recorder MB and TST or T jacks associated with AMA recorder being used for test.	
102	Insert plug of 32A test set into R jack.	
103	Momentarily operate white (ST) button of 32A test set.	RUT lamp lighted while test entries are perforated.
104	When RUT lamp is extinguished— Momentarily operate white (ST) button of 32A test set.	RUT lamp lighted while test entries are perforated.

STEP	ACTION	VERIFICATION
105	When RUT lamp is extinguished— Remove make-busy plugs from MB and TST or T jacks.	
106	Remove plug of 32A test set from R jack.	
107	At perforator associated with AMA recorder being used for testing— Mark tape and proceed as indicated in paragraph 1.12.	

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 trouble recorder frame— RCDR_ or R_ lamp for highest even-numbered recorded 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 RCDR_ or R_ lamp for a period of less than 1 second and should be disregarded.
2a	At master timing frame— 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 trouble recorder frame— 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 EMG RCDR R or EMG R lamps. 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 RCDR_ or R_ lamp for a period of less than 1 second and should be disregarded.
4b	At master timing frame— Remove make-busy plug from RETO jack.	

TABLE B

RELAY BLOCKED NONOPERATED		TROUBLE RECORD	
MASTER TIMING CIRCUIT	AMA RECORDER CRCUIT	PERFORATOR MAGNET INDICATIONS A-THROUGH F-	PROGRESS INDICATIONS
P3A	—	2821XX (XX corresponding to day tens, day units).	TV, PT, PAK, P1, RD, D, RT, BSP, DA, SY.
P4A	—	2811XX for 6-second timing (XX corresponding to hours tens, hours units).	TV, PT, PAK, P1, RD, E, RT, BSP, DA, HR, SY, also P (if XA wiring is provided).
P5A	U	285600	TV, PT, PAK, P1, RD, D, RT, BSP, DA, HR, SC, 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, RN, also P (if XA wiring is provided).
P7A	—	283 (DU) XX for 6-second timing (DU) represents day units XX represents months tens, months units.	TV, PT, PAK, P1, RD, D, RT, BSP, DA, HR, SY, RN, MO also P (if XA wiring is provided).
P8A	—	284 (DT) XX (ZY option) (DT) represents day tens or recorder group hundreds. XX represents marker group	TV, PT, PAK, P1, RD, E, RT, BSP, DA, HR, SY, RN, MO, RG, MG, also P (if XA wiring is provided).
P8A	—	289 (DT) XX (ZZ option) (DT) represents day tens or recorder group hundreds. XX represents recorder group.	TV, PT, PAK, P1, RD, E, RT, BSP, DA, HR, SY, RN, MO, RG, also P (if XA wiring is provided).
COP	—	81010	TV, P1, RD, D, RT, ASP, SY, SPA, also P (if XA wiring is provided).
P1A	—	081010	TV, PT, PAK, P1, RD, D, RT, ASP, SY, SPA, also P (if XA wiring is provided).
P2A (if provided)	—	286000	TV, PT, PAK, P1, RD, E, RT, ASP, SY, SPA, SKP, also P (if XA wiring is provided).

STEP	ACTION	VERIFICATION
D. Grouping Feature		
	Caution: Do not make this test during the 5 minutes before or after any hour.	
1	At master timing frame— Operate CMBE key. ***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 the operated key, or clear the trouble, then restore the operated key before proceeding with the test.***	CMBE lamp lighted. At trouble recorder frame— CMBE lamp lighted.
2	At master timing frame— Momentarily insert make-busy plug into RETO jack.	At trouble recorder frame— RCDR_, EMG RCDR R, 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-number recorder.
3	Insert make-busy plug into recorder MB jack for an even-numbered recorder.	At master timing frame— MO relay in odd master timing circuit operated, released twice.
4	At trouble recorder frame— Remove make-busy plug from MB jack.	
5	At master timing frame— Restore CMBE key.	CMBE lamp extinguished.
6	Operate CMBO key.	CMBO lamp lighted. At trouble recorder frame— CMBO lamp lighted.
7	At master timing frame— Momentarily insert make-busy plug into RETE jack.	At trouble recorder frame— RCDR_, EMG RCDR R, R_, or EMG R lamp lighted in same sequence as for Step 2.
8	Insert make-busy plug into recorder MB jack for an odd-numbered recorder.	At master timing frame— MO relay in even master timing circuit operated, released twice.
9	At trouble recorder frame— Remove make-busy plug from MB jack.	

STEP	ACTION	VERIFICATION
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 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.

1a If testing even master timing circuit—
At master timing frame—
Operate TT key to E.

2b If testing odd master timing circuit—
At master timing frame—
Operate TT key to O.

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.

3a If testing even master timing circuit—
At even-numbered AMA recorder—
Examine unperforated tape of each even-numbered AMA recorder and of the emergency recorder, or the other regular recorders where trunk transfer is used (if emergency recorder is serving in place of an even recorder) for a distance of approximately 3 feet from input chute.

No splices in unperforated tapes.

STEP	ACTION	VERIFICATION
4b	If testing odd master timing circuit— At odd-numbered AMA recorder— Examine unperforated tape of each odd-numbered AMA recorder and of the emergency recorder, or the other regular recorders where trunk transfer is used (if emergency recorder is serving in place of an odd recorder) for a distance of approximately 3 feet from input chute.	No splices in unperforated tapes.
5c	If splice in unperforated tape is found— At trouble recorder frame— Momentarily insert make-busy plug into recorder MB jack associated with AMA recoder, as required, to advance splice beyond perforator drum.	
6	Select AMA recorder associated with master timing circuit to be tested; mark associated tape as indicated in paragraph 1.12.	
7	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 SSF lamp lights, momentarily operate the ACO key at the master timing frame to silence the alarm. If option VM is provided, the alarm will reinstate at 10 minute intervals. Reoperate the ACO key to silence the audible alarm.	
8	At master timing circuit under test— Block nonoperated P7A relay.	
9	Operate, release MOH relay successively until M selector reaches position 1.	M1 check lamp lighted.
10	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for testing.	Trouble record taken. Perforator magnet indications A_ through F_ representing numerals 283X01. (X represents day units. The X may be disregarded for this test).

STEP	ACTION	VERIFICATION
11	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P7A relay.	
12	At trouble recorder frame— Remove make-busy plug from MB jack.	
13	Repeat Steps 8 through 12 for each of M selector positions 2 through 12.	Same as Steps 9, 10 with M_ check lamp, E, F indications corresponding to position of M selector.
14	At master timing circuit under test— Block nonoperated P3A relay.	
15	Operate, release DTH relay successively until DT selector reaches position 1.	DT0 check lamp lighted.
16	Operate, release DH relay successively until DU selector reaches position 1.	DU1 check lamp lighted.
17	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for testing.	Trouble record taken. Perforator magnets A_ through F_ indications representing numerals 282101. If trouble recorder is provided— Perforations representing day tens 0, day units 1.
18	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	
19	At MTF— Momentarily operate RL key.	
20	At trouble recorder frame— Remove make-busy plug from MB jack.	
21	At master timing circuit under test— Block nonoperated P7A relay.	
22	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for test.	Trouble record taken. Perforator magnet indications 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.	
24	At MTF— Momentarily operate RL key.	

STEP	ACTION	VERIFICATION
25	At trouble recorder frame— Remove make-busy plug from MB jack.	
26	At master timing circuit under test— Block nonoperated P8A relay.	
27	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for test.	Trouble record taken. Perforator magnet indications A_ through F_ representing numerals 2840XX (digits represented by XX may be disregarded and digit 0 may represent day tens or recorder group hundreds, depending on office wiring).
28	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P8A relay.	
29	At MTF— Momentarily operate RL key.	
30	At trouble recorder frame— Remove make-busy plug from MB jack.	
31	Repeat Steps 14 through 20, except set DU selector in position 2 as indicated in Table C.	At master timing circuit under test— DT_, DU_ check lamps lighted and perforator magnet indications A_ through F_ as listed in Table C. At trouble recorder frame— DT_, DU_ indications as listed in Table C.
32	Repeat Steps 14 through 25, except set DU selector to position 3 as indicated in Table C.	At master timing circuit under test— DT_, DU_ check lamps lighted and A_ through F_ indications as listed in Table C. At trouble recorder frame— DT_, DU_ indications as listed in Table C.
33	Repeat Steps 14 through 20 for each of DU selector positions 4, 5, 6 as applicable to Table C.	At master timing circuit under test— DT_, DU_ check lamps lighted and A_ through F_ indications as listed in Table C. At trouble recorder frame— DT_, DU_ indications as listed in Table C.
34	Repeat Steps 14 through 20 for each of DU selector positions 7, 8, 9 as applicable to Table C.	At master timing circuit under test— DT_, DU_ check lamps lighted and A_ through F_ indications as listed in Table C. At trouble recorder frame— DT_, DU_ indications as listed in Table C.
35	Repeat Steps 14 through 30 except set DU selector in position 10 as indicated in Table C.	At master timing circuit under test— DT_, DU_ check lamps lighted and A_ through F_ indications as listed in Table C.

STEP	ACTION	VERIFICATION
		At trouble recorder frame— DT_, DU_ indication as listed in Table C.
36	Repeat Steps 14 through 20 for each of DU selector positions 11 through 20, DT selector in position 2 as applicable in Table C.	At master timing circuit under test— DT_, DU_ check lamps lighted and A_ through F_ indications as listed in Table C. At trouble recorder frame— DT_, DU_ indications as listed in Table C.
37	Repeat Steps 14 through 20, 26 through 30, except set DT selector in position 3, DU selector in position 20 as applicable in Table C.	At master timing circuit under test— DT_, DU_ check lamps lighted an A_ through F_ indications as listed in Table C. At trouble recorder frame— DT_, DU_ indications as listed in Table C.
38	Repeat Steps 14 through 20, 26 through 30, except set DT selector in position 4, DU selector in position 11 as applicable in Table C.	At master timing circuit under test— DT_, DU_ check lamps lighted and A_ through F_ indications as listed in Table C. At trouble recorder frame— DT_, DU_ indications as listed in Table C.
39	At master timing circuit under test— Block nonoperated P4A relay.	
40	Operate, release HTH relay successively until HT selector reaches position 1.	HT0 check lamp lighted.
41	Operate, release HUH relay successively until HU selector reaches position 1.	HU0 check lamp lighted.
42	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for test.	Trouble record taken. Perforator magnet indications A_ through F_ representing numerals 281100. At trouble recorder frame— Indications representing hours tens 0, hours units 0.
43	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P4A relay.	
44	At MTF— Momentarily operate RL key.	
45	At trouble recorder frame— Remove make-busy plug from MB jack.	
46	Repeat Steps 40 through 45, except set HT selector in positions 1, 2, 3 successively, HU selector in positions 2 through 10 successively as indicated in Table D.	At master timing circuit under test— HT_, HU_ check lamps lighted and perforator magnet indications A_ through F_ as listed in Table D.

STEP	ACTION	VERIFICATION
		At trouble recorder frame— HT_, HU_ indications as listed in Table D.
47	Insulate 10B of PE/PO relay.	
48	If testing even master timing— Operate TT key to position O or if testing odd master timer operate TT key to position E.	
49	At master timing circuit under test— Operate, release HH, TH, UH relays successively until H, T, U selectors reach position 1.	With CLT key held operated— H0, T0, U0 check lamps lighted.
50	Repeat Step 49 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.
51	At master timing circuit under test— Block nonoperated P3A relay.	
52	Operate, release HH, TH relays successively until H, T selectors reach position 1.	
53	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for test.	Trouble record taken. MT0, MU0 indications as listed in Table F
54	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	
55	At trouble recorder frame— Remove make-busy plug from MB jack.	
56	Repeat Steps 49 through 55 for each of H, T selector positions.	Trouble record taken. MT-, MU- indications as listed in Table F.
57	Remove insulator from PE/PO relay.	
58b	If testing odd master timing circuit— At master timing circuit under test— Operate TT key to E.	
59	Operate CMBO key.	CMBO lamp lighted.
60	Momentarily operate S key.	SE, OSO lamps lighted.
61	When SE, OSO lamps are extinguished— Restore CKL, CMBO keys.	CMBO lamp extinguished.
62a	If testing even master timer— Operate TT key to O.	

STEP ACTION VERIFICATION

TABLE C

RELAY BLOCKED NONOPERATED	POSITION OF SELECTORS		CHECK LAMPS LIGHTED		PERFORATOR MAGNET INDICATIONS A- THROUGH F-	DAY INDICATIONS	
	DT	DU	DT	DU		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.

* Digit preceding XX represents day tens or recorder group hundreds.

63	Operate CMBE key.	CMBE lamp lighted.
64	Momentarily operate S key.	SO, OSE lamps lighted.
65	When SO, OSE lamps are extinguished— Restore CKL, CMBE keys.	CMBE lamp extinguished.
66	Momentarily operate AR key.	SSF lamp extinguished.

STEP ACTION VERIFICATION

TABLE D

POSITION OF SELECTORS		CHECK LAMPS LIGHTED		TROUBLE RECORD		
				PERFORATOR MAGNET INDICATIONS A- THROUGH F-	HOUR INDICATIONS	
HT	HU	HT	HU		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

67 At trouble recorder frame—
Insert make-busy plugs into recorder MB and TST or T jacks associated with AMA recorder being used for testing .

68 Insert plug of 32A test set into R jack.

69 Momentarily operate white (ST) button of 32A test set.

RUT lamp lighted while test entries are perforated.

70 When RUT lamp is extinguished—
Momentarily operate white (ST) button of 32A test set.

RUT lamp lighted while test entries are perforated.

71 When RUT lamp is extinguished—
Remove make-busy plug from MB and TST or T jack.

72 Remove plug of 32A test set from R jack.

73 At MTF—
Momentarily operate RL key.

74 At perforator associated with AMA recorder being used for testing—
Mark tape and proceed as indicated in paragraph 1.12.

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.

F. Preference and Lockout Features

Caution: Do not make busy or transfer any recorders while this test is in progress. Also do not perform this test if window splice in the paper tape is near enough to being perforated since a splice pattern will not be performed during this test.

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

STEP	ACTION	VERIFICATION

TABLE F

H, T SELECTOR POSITIONS	TROUBLE RECORD MINUTE INDICATIONS	
	MT-	MU-
1	0	0
2	1	1
3	2	2
4	3	3
5	4	4
6	5	5
7	+	+
8	0	7
9	1	8
10	2	9
11	3	0
12	4	1
13	5	2
14	+	3
15	0	4
16	1	5
17	2	6
18	3	7
19	4	8
20	5	9
21	+	+
22	+	+

+Indicates positions from which the selector steps automatically.

3	Connect battery to 9BF of ST1 relay.	ST1 relay operated. EST relay remains operated.
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 9BF 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.	

STEP	ACTION	VERIFICATION
9	Repeat Steps 6 through 8 on all higher odd-numbered ST_ relays in succession.	Higher odd-numbered ST_ relays operated. 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 9BF of ST0 relay.	ST0 relay operated. No battery on 9T, 3B, 6B of ST0 relay.
13	Connect battery to 9BF 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 operated. 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 ST_ relay.	
18	Operate CMBE key.	CMBE lamp lighted.
19	Connect battery to 9BF of highest even-numbered ST_ relay.	Highest even-numbered ST_ relay operated. No battery on 9T, 3B, 6B of highest even-numbered ST_ relay.
20	Connect battery to 9BF 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 released. 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	Remove blocking tools from SCE, SCO relays.	

STEP	ACTION	VERIFICATION
G. Selector Exercise Features		
1a	If testing odd master timing circuit— Operate TT key to E.	
2a	Operate CMBO, CKL keys.	CMBO lamp 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 selector 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.
10a	When SE lamp is extinguished— Restore CMBO, CKL keys.	CMBO lamp extinguished.
11b	If testing even master timing circuit— Operate TT key to O.	
12b	Operate CMBE, CKL keys.	CMBE lamp lighted.
13b	Repeat Steps 3a through 8a, except for even master timing circuit.	Selectors step in even master timing circuits.
14b	Momentarily operate S key.	SO lamp lighted while selectors resynchronize.
15b	When SO lamp is extinguished— Restore CMBE, CKL keys.	CMBE lamp extinguished.
H. Pulse Failure Alarm		
1	At master timing frame— Block nonoperated PF relay; ***start timing.***	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.

STEP	ACTION	VERIFICATION
3	Remove blocking tool from PF relay.	
4	Momentarily operate AR key.	PF lamp extinguished.
5	Block operated PF relay; ***start timing.***	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 this test during the 5 minutes before or after any hour.

1	At master timing frame— Operate TT key to E.	
2a	Insulate 4T of PO relay.	CSY relay released. TSF lamp lighted. Major alarm sounds.
3	When CSY relay releases— Block nonoperated CSY relay.	
4	Momentarily operate ACO key.	Major alarm silenced.
5	Remove insulator from PO relay.	
6	Operate CKL key.	
7	Operate TT key to O; ***start timing.***	Within 1 minute— SSF, OS_ lamps for each recorder lighted.
8a	If emergency recorder or the other regular recorder where trunk transfer is used is substituting for regular recoder— At master timing frame— Momentarily operate S key.	SO lamp lighted while selectors of regular recorder are stepping to synchronized position. OS_ lamp extinguished when selectors are synchronized.
9	At trouble recorder frame— Insert make-busy plug into emergency recorder MB jack.	

STEP	ACTION	VERIFICATION
10	At master timing frame— Momentarily operate S key.	SO lamp lighted while selectors of emergency recorder are stepping to synchronized position. EM OS lamp extinguished when selectors are synchronized.
11	At trouble recorder frame— Remove make-busy plug from MB jack.	
12a	If emergency recorder or the other regular recorder where trunk transfer is used is substituting for regular recorder— Insert make-busy plug into recoder MB 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 into synchronized position. OS_ lamp extinguished when selectors are synchronized.
14	At trouble recorder frame— Remove make-busy plug from MB jack.	
15	Repeat Steps 12, 13, 14 for each of the remaining regular recorders with lighted OS_ lamp.	
16b	If emergency recorder or the other regular recoder where trunk transfer is used is not substituting for regular recorder— Insert make-busy plug into recorder TN or RTN 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. If more than one transfer is made in one period it may not be possible for the accounting center to associate the entries for two or more calls on the same trunk which have their initial entries on one tape and the answer and disconnect entries on the other tape.***	
17	At master timing frame— Momentarily operate S key.	SO lamp lighted while selectors of regular recorder are stepping to synchronized position. OS_ lamp extinguished when selectors are synchronized.

STEP	ACTION	VERIFICATION
18	At trouble recorder frame— Remove make-busy plug from TN or RTN jack.	
19	Repeat Steps 16b, 17, 18 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 position E.	Within 1 minute— SSF, OS_ lamps for each recorder lighted.
21	Repeat Steps 8 through 19.	
22	Remove blocking tool from CSY relay.	
23	Momentarily operate AR key.	TSF, SSF lamps extinguished.
24	Restore CKL key.	

J. Selector Synchronism Check and Selector Synchronism Check Failure Alarms

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

1	At master timing frame— Operate TT key to E.	

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 the operated key, or clear the trouble, then restore the operated key before proceeding with the test.

1	Restore CKL key if operated.	At master timing frame— M_, DT_, DU_, HT_, HU_, H_, T_, U_ check lamps momentarily lighted once each minute.
3	At master timing frame— Momentarily operate UH relay of odd master timing circuit; ***start timing.***	Within 1 minute— SSF and check lamps lighted. Major alarm sounds.
4	Operate CKL key.	OSO lamp lighted. OSE lamp remains extinguished.
5	Momentarily operate ACO key.	Major alarm silenced.

STEP	ACTION	VERIFICATION
	Note: If option VM is provided, the alarm will reinstate at 10 minute intervals. Reoperate the ACO key to silence the audible alarm.	
6	If ZD wiring option is provided without apparatus Fig. 31— Connect ground to 3T of TCE relay.	HE relay not operated.
7	Remove test connection from TCE relay.	
8	Operate CMBO key.	CMBO lamp lighted.
9	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.
10	Momentarily operate AR key.	SSF lamp extinguished.
11	Restore CMBO, CKL keys.	CMBO lamp extinguished.
12	Repeat Steps 3 through 5, 8 through 11 successively for each of TH, HH, HUH, HTH, DTH, DH, MON relays, as applicable to office timing features.	
13	Operate TT key to 0.	M_, DT_, DU_, HT_, HU_, H_, T_, U_ check lamps momentarily lighted once each minute.
14	Momentarily operate UH relay of even master timing circuit; ***start timing.***	Within 1 minute— SSF and check lamps lighted. Major alarms sounds.
15	Operate CKL key.	OSE lamp lighted. OSO lamp remains extinguished.
16	Momentarily operate ACO key.	Major alarm silenced.
	Note: If option VM is provided, the alarm will reinstate at 10 minute interval. Reoperate the ACO key to silence the audible alarm.	
17a	If ZD wiring option is provided without apparatus Fig. 31— Connect ground to 3T of TCO relay.	HO relay ***not*** operated.
18	Remove test connection from TCO relay.	
19	Operate CMBE key.	CMBE lamp lighted.
20	Momentarily operate S key.	SO lamp lighted while even master timing circuit selectors are stepping to synchronized

STEP	ACTION	VERIFICATION
		position. OSE lamp extinguished when selectors are synchronized.
21	Momentarily operate AR key.	SSF lamp extinguished.
22	Restore CMBE, CKL keys.	CMBE lamp extinguished.
23	Repeat Steps 14 through 16, 19 through 22 successively for each of TH, HH, HUH, HTH, DTH, DH, MOH relays, as applicable to office timing features.	
K. Both Master Timing Circuits Make-Busy Alarm		
1	At master timing frame— Operate CMBO key.	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. Timer Start Control		
1	At master timing frame— Operate TT key to E.	
2	Operate MSO key to STP.	TSF lamp lighted. Major alarm sounds. TO timer stopped. Within 1 minute— SSF lamp lighted.
3	Momentarily operate ACO key.	Major alarm silenced.
4	Operate CMBO, CKL keys.	CMBO lamp lighted.
5	Grasp hub of TO timer; manually turn cam shaft very slowly in direction in which it normally rotates until the small cam passes	

STEP	ACTION	VERIFICATION
	under and beyond the contact operating finger and clears it by approximately 3/32 inch.	
6	At any time except when U8 or U9 lamp is lighted— Operate MSO key to ST.	Within 1 minute— TO timer starts to run.
7	Operate MSO key to R.	
8	Momentarily operate S key.	SE lamp lighted while odd master timing circuit selectors are stepping to synchronized position.
9	When SE lamp is extinguished— Momentarily operate AR key.	TSF, SSF lamps extinguished.
10	Restore CMBO key.	CMBO lamp extinuished.
11	Operate TT key to O.	
12	Proceed as in Steps 2 through 10 on TE timer, using MSE, CMBE keys instead of MSO, CMBO keys and CMBE lamp instead of CMBO lamp.	SO lamp lighted while even master timing circuit selectors are stepping to synchronized position.
13	Restore CKL key.	CMBE lamp extinguished instead of CMBO.

M. Time-Out Alarm 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 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.

1	Select an AMA recorder associated wth master timer to be tested and mark tape as indicated in 1.12.	
2	At master timing circuit under test— Block nonoperated P3A relay.	
3	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for testing, ***start timing.***	Within 4 to 7 seconds— Trouble record taken.

STEP	ACTION	VERIFICATION
4	At master timing circuit under test— When TIB relay operates— Remove blocking tool from P3A relay.	
5	At trouble recorder frame— Remove make-busy plug from MB jack.	
6	At master timing circuit under test— Block nonoperated P3A, TMR, TM5, TM6 relays.	
7	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for testing.	At master timing circuit under test— TM2 relay operated.
8	When TM2 relay releases, ***start timing.***	
9	When TM2 relay reoperates, ***stop timing.***	Elapsed time on stopwatch is 2 to 4 seconds. TM6 relay ***not*** energized.
10	Remove blocking tool from TM5 relay.	
11	When TM2 relay releases, ***start timing.***	
12	When TM2 relay reoperates, ***stop timing.***	Elapsed time on stopwatch is 2 to 4 seconds. TM5, TIB relays operated. TM6 relay energized.
13	Remove blocking tools from TMR, P3A relays.	
14	When TM1 relay releases— Remove blocking tool from TM6 relay.	
15	At trouble recorder frame— Remove make-busy plug from MB jack.	
16	At master timing circuit under test— Block nonoperated P3A relay.	
17	At trouble recorder frame— Insert make-busy plug into TRMB MB_ jack associated with master timing circuit under test.	TIB relay operated.
18	Insert make-busy plug into recorder MB jack associated with AMA recorder being used for testing.	After 16 to 20 seconds— At trouble recorder frame— CMB_, MT_ display lamps assciated with master timer under test lighted. At master timing frame— CMB_, TA_ lamps associated with master timer under test lighted.

STEP	ACTION	VERIFICATION
		Major alarm sounds. If option B provided— ETF_ lamp associated with master timer under test lighted. At AMA recorder frame— MTR lamp lighted.
19	At master timing circuit under test— Momentarily operate AR key.	CMB_, TA_ lamps associated with master timer under test extinguished. Major alarm silenced. If option B provided— ETF_ lamp extinguished.
20	At AMA recorder frame under test— Momentarily operate AR key.	MTR lamp extinguished.
21	Remove blocking tool from P3A relay.	
22	At trouble recorder frame— Remove make-busy plug from MB jack associated with AMA recorder frame being used for test.	
23	Momentarily operate alarm release key.	Display lost lamp extinguished.
24	Block nonoperated TM1, TM6 relays.	
25	Insulate 8-9T of ET1 relay, 1-2T of LTB relay.	
26	At trouble recorder frame— Insert make-busy plug into recorder MB jack associated with AMA recorder being used for testing, ***start timing.***	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.
27	Connect 10B to 11B of ET1 relay.	TM1 relay energized.
28	Insulate 7-8B of LT9 relay.	TM1 relay ***not*** energized.
29a	If E wiring option is used— Remove insulator from LTB relay.	In 2 to 5 minutes— TM1 relay energized.
30b	If B wiring option is used— Remove insulator from LTB relay.	In 2 to 5 minutes— TM6 relay energized.
31	Remove test connection from ET1 relay.	
32	Remove Insulators from LT9, ET1 relays.	
33	Remove blocking tool from TM1 relay.	TM1 relay momentarily operated.

STEP	ACTION	VERIFICATION
34	After TM1 relay releases— Remove blocking tool from TM6 relay.	
35	At trouble recorder frame— Remove make-busy plug from MB jack.	
36	At master timing circuit under test— Momentarily operate LT4 relay.	At master timing frame— CMB_, TA_ lamps associated with master timer under test lighted. Major alarm sounds. If option B provided— ETF lamp associated with master timer under test lighted. At trouble recorder frame— CMB_, MT_ lamps associated with master timer under test lighted.
37	At master timing frame— Momentarily operate AR key.	CMB_, TA lamps lighted. Major alarm silenced. If option B provided— ETF lamp extinguished. At trouble recorder frame— CMB_, MT_ lamps extinguished.
38	At trouble recorder frame— Remove make-busy plug from TRMB MB_ jack.	TIB relay released.
39	At master timing frame— Insert make-busy plugs into recorder MB and TST or T jacks associated with AMA recorder under test.	
40	Insert plug of 32A test set into R jack.	
41	Momentarily operate white (ST) button of 32A test set.	RUT lamp lighted while test entries are perforated.
42	When RUT lamp is extinguished— Momentarily operate white (ST) button of 32A test set.	RUT lamp lighted while test entries are perforated.
43	When RUT lamp is extinguished— Remove make-busy plugs from MB and TST or T jacks.	
44	Remove plug of 32A test set from R jack.	
45	At perforator associated with AMA recorder being used for testing— Mark tape and proceed as indicated in paagraph 1.12.	

STEP	ACTION	VERIFICATION
N. Perforator Lead Cross-Detection Feature		
1	At master timing frame— Momentarily connect ground to 02 of terminal strip A (located at top of frame).	CMBE lamp lighted. At trouble recorder frame— CMBE lamp lighted. Trouble record taken. XPL indication.
2	At master timing frame— Momentarily operate AR key.	CMBE lamp extinguished. At trouble recorder frame— CMBE lamp extinguished.
3	At master timing frame— Block nonoperated PLXE relay.	
4	Momentarily connect ground, in turn, to terminals of terminal strip A as follows: 3, 4, 10, 11, 12, 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.
5	Momentarily connect battery to 02 of terminal strip A.	XPE relay operated while battery is applied.
6	Remove blocking tool from PLXE relay.	
7	Momentarily connect ground to 02 of terminal strip C (located at top of frame).	CMBO lamp lighted. At trouble recorder frame— CMBO lamp lighted. Trouble record taken. XPL indication.
8	At master timing frame— Momentarily operate AR key.	CMBO lamp extinguished. At trouble recorder frame— CMBO lamp extinguished.
9	At master timing frame— Block nonoperated PLXO relay.	
10	Momentarily connect ground, in turn, to terminals of terminal strip C as follows: 3, 4, 10, 11, 12, 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.
11	Momentarily connect battery to terminal 02 of terminal strip C.	XPO relay operated while battery is applied.
12	Remove blocking tool from PLXO relay.	
13	At RC terminal strip for even master timing circuit—	CMBE lamp lighted. At trouble recorder frame—

STEP	ACTION	VERIFICATION
	Momentarily connect ground to terminal 02 (located adjacent to RCO, RCE relays).	CMBE lamp lighted. Trouble record taken. XPL indication.
14	At master timing frame— Momentarily operate AR key.	CMBE lamp extinguished. At trouble recorder frame— CMBE lamp extinguished.
15	At master timing frame— Block nonoperated PLXE relay.	
16	Momentarily connect ground, in turn, to terminals of terminal strip RC for even master timing circuit as follows: 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.
17	Remove blocking tool from PLXE relay.	
18	At RC terminal strip for odd master timing circuit— Momentarily connect ground to terminal 02.	CMBO lamp lighted. At trouble recorder frame— CMBO lamp lighted. Trouble record taken. XPL indication.
19	At master timing frame— Momentarily operate AR key.	CMBO lamp extinguished. At trouble recorder frame— CMBO lamp extinguished.
20	At master timing frame— Block nonoperated PLXO relay.	
21	Momentarily connect ground, in turn, to terminals of terminal strip RC for odd master timing circuits as follows: 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.
22	Remove blocking tool from PLX0 relay.	

O. End-of-Tape Failure Alarm Test

1	At even master timing circuit— Momentarily connect ground to brush on arc 2 of U selector when selector reaches terminal 5 or 15.	At master timing frame— ETFO lamp lighted. Major alarm sounds.
2	Momentarily operate AR key.	ETFO lamp extinguished. Major alarm silenced.

STEP	ACTION	VERIFICATION
3	A 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 sounds.
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 sounds.
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.
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 sounds.
11	Momentarily operate AR key.	ETFO lamp extinguished. Major alarm silenced.
12	Restore CMBE key.	CMBE lamp extinguished.

P. FA, FA1 Fuse Alarm Relays and Make-Busy Feature

1	At even master timing circuit— Momentarily operate FA relay.	At master timing frame— FA1 relay operated. FGE, CMBE lamps lighted. At jack, lamp, and key circuit— MTFG lamp lighted.
2	At even master timing circuit— Momentarily operate AR key.	FGE, CMBE lamps extinguished. At jack, lamp, and key circuit— MTFG lamp extinguished.
3	At even master timing circuit— Block operated FA2 relay.	FA and FA1 relay operated. Major alarm sounds.
4	Release blocked FA2 relay.	FA relay released and same lamps lighted as in Step 1. Major alarm silenced.
5	Momentarily operate AR key.	FA1 relay released. Same lamps extinguished as Step 2.

STEP	ACTION	VERIFICATION
6	Repeat Steps 1 through 4 for odd master timing circuit.	Observe FGO, CMBO lamps instead of FGE, CMBE lamps.

Q. LT1 Through LT9 Relays (Long Timer)

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

1	Operate CKL key.	
2a	If testing even master timing circuit— At master timing frame— Operate TT key to O.	Within 1 minute— OT lamp lighted.
3a	Operate CMBE key.	CMBE lamp lighted.
4a	At even master timing circuit— Block nonoperated ST_ relays.	
5b	If testing odd master timing circuit— Operate TT key to E.	Within 1 minute— ET lamp lighted.
6b	Operated CMBO key.	CMBO lamp lighted.
7b	At odd master timing circuit— Block nonoperated ST_, EST relays.	
8	Block nonoperated ET1 relay.	
9	Using 893 cord, short 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 relay operated. LT3 relay operated 6 seconds after LT2 relay operated.Succeeding LT_ relays operated; preceding LT_ relays released at 6-second intervals. Approximately halfway through test— Major alarm sounds. TAO or TAE lamp lighted. ETFO or ETFE lamp lighted.
10	Remove connection from 4, 5B or ET1 relay.	
11	Momentarily operate AR key.	Major alarm silenced. TAO or TAE lamp extinguished. ETFO or ETFE lamp extinguished.

STEP	ACTION	VERIFICATION
12c	If necessary to repeat test— Repeat Steps 9 through 11.	
13	Remove blocking tools from ST_, ET1 relays.	
14b	If testing odd master timing circuit— Remove blocking tool from EST relay.	
15b	Restore CMBO key.	CMBO lamp extinguished.
16a	If testing even master timing circuit— Restore CMBE key.	CMBE lamp extinguished.
17	Restore TT key key to position E.	
18	Restore CKL key.	

R. Paper Take-Up and Jammed Paper Alarms

1	At perforator cabinet— Disconnect motor drive unit from power outlet.	
2	Remove take-up motor control arm from paper tape and let it drop to its lowest position; ***start timing.***	At master timing frame— PTU_ lamp lighted. Within 2 minutes— Major alarm sounds. Aisle pilot lamp lighted.
3	At perforator cabinet— Replace control arm on tape.	
4	Reconnect motor drive unit to power outlet.	After tape has been taken up on storage reel— At master timing frame— PTU_ lamp extinguished. Major alarm silenced. Aisle pilot lamp extinguished.