

48

# MASTER TIMING CIRCUIT SD-94811-01

## TESTS

### NO. 5 CROSSBAR OFFICES

### ARRANGED FOR AMA MAGNETIC TAPE RECORDING

#### 1. GENERAL

PAGE

1.01 This section describes a method of testing master timing circuit SD-94811-01, in No. 5 crossbar offices arranged for AMA magnetic tape recording.

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes. Equipment Test Lists are affected.

- (a) To include reference to the KS-20268-01 list -2 electronic timer.
- (b) To change the title of and revise test D.
- (c) To change the title of test J.
- (d) To add test Q.

1.03 The tests covered are:

PAGE

**A. Time Indication Check:** This test checks the output data of both the even and odd timers for month, day, hour, minutes, and seconds time values, by observing lamps. . . . . 3

**B. Manual Transfer:** This test checks the manual transfer of either timer from the on-line condition to the off-line condition. . . . . 4

**C. Fuse Alarm Transfer:** This test checks the lamps, alarms, and transfer features of either timer from an on-line to off-line condition in case of an operated fuse. . . . . 5

**D. Motor or Electronic Timer Failure—Timing and Alarm:** This test checks timing, lamps, and alarm indications in case of a TM motor or electronic timer failure. . . . . 7

**E. Data Check Failure in Recorder—Transfer Feature:** This test checks the timer action in case of a data check failure in the recorder. . . . . 8

**F. Seconds, Minutes, and Hours Synchronization Failure Alarm:** This test checks the timing, lamps, and alarm indications in case the synchronization checks between odd and even timers for seconds, minutes, and hours fails. . . . . 9

**G. Day and Month Synchronization Failure Alarm:** This test checks the alarm, lamp, and alarm cut-off indication in case the synchronization check between odd and even timers for day and month fails. . . . . 10

**H. Seconds Synchronization Failure:** This test checks the alarm and lamp indications in case the seconds units within a timer fail to advance. . . . . 11

**I. Self Synchronization Check Failure:** This test checks the lamp and alarm indications in case a self check within a timer of month, day, hour, minutes, or seconds fails. . . . . 12

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PAGE

**J. Cam Synchronization Check Alarm** *(Electronic or Electro-mechanical Timers Provided)* : This test checks the lamp and alarm indications when the TM motor controlled cams are out of step. . . . . 13

**K. Transfer Timer Alarm:** This test checks the lamp and alarm indications in case a transfer is not completed in 135 to 330 milliseconds. . . . . 13

**L. Trouble Recording Check Alarm:** This test checks the lamp and alarm indications in case a trouble recording is not completed in 650 to 765 milliseconds. . . . . 14

**M. 3AM Entry Failure Alarms:** This test checks the alarm and lamp indications in case a 3AM entry is missed. . . . . 14

**N. Entry Timer Failure Alarm:** This test checks the alarm and lamp indications in case of too long a delay in preparing for a minute, 3AM, or day charge entry. . . . . 16

**O. Overall Timer Alarm and Transfer:** This test checks the lamp and alarm indications in case of delay in the preference chain operation. . . . . 18

**P. Preference Relays—Operations and Lockout Features:** This test checks that only one preference relay at a time will be handled by a timer, in high to low order. Other attempts for preference will be locked out. . . . . 21

**Q. Advance Check Failure Timing and Alarm:** This test checks timing, lamps, and alarm indications in case of a failure to receive an advance pulse. . . . . 23

entries will be placed on the magnetic tape for each AMA entry request, which will cause minimum charge entries.

**1.05 Lettered Step:** 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 a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

**1.06** The statement between the asterisks (\*\_\*) after action or verification statements is added to clarify the function being simulated in the test procedures of Part 3.

**1.07** The on-line timer cannot be transferred to the off-line timer during the period from **55 seconds** to **0 seconds**. This prevents interference with the minute entry.

**1.08** The minute entry test or day change test cannot be done during the period from **50 seconds** to **0 seconds**. This prevents interference with the minute entry.

**1.09** The location statement, At MTF—, is used to refer to all apparatus located on the four basic bays of the MTF.

**2. APPARATUS**

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.

**2.01** KS-3008 stopwatch or equivalent.

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

**2.03** Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), KS-6278 connecting clip, and 624A tool.

**2.04** Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), KS-6278 connecting clip, and 639A tool.

**1.04** Tests C, E, F, O should be done in periods of extremely light traffic conditions. When the TRL\_ lamp for the on-line timer is lighted, 99

TABLE A

APPARATUS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Stopwatch (2.01)				✓		✓									✓		✓
Tools (2.02)			✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Cord (2.03)								✓									
Cord (2.04)													✓			✓	
Tools (2.05)								✓					✓	✓	✓	✓	
Cord (2.06)					✓								✓				
Cord (2.07)													✓	✓	✓		

✓ As required

**2.05** 651D (relay contact connector holder) tool.

**2.06** Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), KS-6278 connecting clip, and 624B tool.

**2.07** Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), 624A tool, and 639A tool.

### 3. METHOD

#### STEP

#### ACTION

#### VERIFICATION

##### A. Time Indication Check

**Caution:** *If time indicated is not correct when compared with a known correct source, reset master timer to correct time as described in Section 218-773-301.*

1 At master timing frame—  
Operate SEC key.

SEC lamp lighted.  
One each of ODD and EVEN T<sub>0</sub> through 5 and U<sub>0</sub> through 9 lamps lighted to indicate seconds output data of odd and even timers.  
\*Lamp data advances each second through 59, then repeats 00 through 59 each minute.\*

2 Release SEC key.

SEC, ODD and EVEN T<sub>1</sub> and U<sub>1</sub> lamps extinguished.

3 Operate MIN key.

MIN lamp lighted.  
One each of ODD and EVEN T<sub>0</sub> through 5 and U<sub>0</sub> through 9 lamps lighted to indicate minutes output data of odd and even timers.  
\*Lamp data advances each minute through 59, then repeats 00 through 59 each hour.\*

4 Release MIN key.

MIN, ODD and EVEN T<sub>1</sub> and U<sub>1</sub> lamps extinguished.

STEP	ACTION	VERIFICATION
5	Operate HR key.	HR lamp lighted. One each of ODD and EVEN T <sub>0</sub> through 2 and U <sub>0</sub> through 9 lamps lighted to indicate hours output data of odd and even timers. *Lamp data advances each hour through 23, then repeats 00 through 23 each day.*
6	Release HR key.	HR, ODD and EVEN T <sub>0</sub> and U <sub>0</sub> lamps extinguished.
7	Operate DAY key.	DAY lamp lighted. One each of ODD and EVEN T <sub>0</sub> through 3 and U <sub>0</sub> through 9 lamps lighted to indicate correct day of month output data of odd and even timers. *Lamp data advances each day through 28, 29, 30, or 31, then repeats 1 through 28, 29, 30, or 31 each month.*
8	Release DAY key.	DAY, ODD and EVEN T <sub>0</sub> and U <sub>0</sub> lamps extinguished.
9	Operate MTH key.	MTH lamp lighted. One each of ODD and EVEN T <sub>0,1</sub> and U <sub>0</sub> through 9 lamps lighted to indicate months output data of odd and even timers. *Lamp data advances each month through 12, then repeats 1 through 12 each year.*
10	Release MTH key.	MTH, ODD and EVEN T <sub>0</sub> and U <sub>0</sub> lamps extinguished.
11	Observe ODD and EVEN SUN through SAT lamps.	One each of ODD and EVEN SUN, MON, TUE, WED, THU, FRI, or SAT lamps lighted to indicate day of week. *Lamp data advances each day through SAT, then repeats SUN through SAT each week.*

## B. Manual Transfer

### Odd Timer to Even Timer Transfer

**Note:** ODD OL lamp lighted.

1	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T <sub>0</sub> through 5 and U <sub>0</sub> through 9 lamps lighted to indicate seconds output data of odd and even timers.
	<b>Note:</b> See paragraph 1.07.	
2	Momentarily operate TRE key.	ODD OL lamp extinguished. EVEN OL, TRS, ALM lamps lighted. Major alarm sounds.

STEP	ACTION	VERIFICATION
3	Momentarily operate ACO key.	Major alarm silenced.
4	Momentarily operate ARC key.	TRS, ALM lamps extinguished. EVEN OL lamp remains lighted.
5	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.

#### Even Timer to Odd Timer Transfer

**Note:** EVEN OL lamp lighted.

6	Operate SEC key.  <b>Note:</b> See paragraph 1.07.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
7	Momentarily operate TRE key.	EVEN OL lamp extinguished. ODD OL, TRS, ALM lamps lighted. Major alarm sounds.
8	Momentarily operate ACO key.	Major alarm silenced.
9	Momentarily operate ARC key.	TRS, ALM lamps extinguished. ODD OL lamp remains lighted.
10	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.

#### C. Fuse Alarm Transfer

**Caution:** Perform Steps 2 and 10 in the period of time from 1 second to 55 seconds, as close to 55 seconds time as needed, perform Steps 2, 10 before 55 seconds time, to minimize 99 entries on magnetic tape. (See paragraph 1.07.)

#### Odd Timer

**Note:** ODD OL lamp lighted.

1	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
2	At spare fuse position for odd timer— Place operated fuse.	FA lamp lighted. Major alarm sounds. ODD OL lamp extinguished.

STEP	ACTION	VERIFICATION
		EVEN OL, TRS, ALM, EVEN TRL, and ODD TRL lamps lighted.
3	Observe when T_ and U_ lamps reach 00.	EVEN TRL lamp extinguished.
4	At spare fuse position for odd timer— Remove operated fuse.	FA lamp extinguished. At jack, lamp, and key circuit— MTFG lamp lighted. At miscellaneous circuit for master timer— FG lamp lighted.
5	At master timing frame— Momentarily operate ARO key.	ODD TRL lamp extinguished. At jack, lamp, and key circuit— MTFG lamp extinguished. At miscellaneous circuit for master timer— FG lamp extinguished.
6	At master timing frame— Momentarily operate ARC key.	TRS, ALM lamps extinguished.
7	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.
8	At MTF— Momentarily operate TRRAR key.	Major alarm silenced.
<b>Even Timer</b>		
<i>Note:</i> EVEN OL lamp lighted.		
9	Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
10	At spare fuse position for even timer— Place operated fuse.	FA lamp lighted. Major alarm sounds. EVEN OL lamp extinguished. ODD OL, TRS, ALM, EVEN TRL, and ODD TRL lamps lighted.
11	Observe when T_ and U_ lamps reach 00.	ODD TRL lamp extinguished.
12	At spare fuse position for even timer— Remove operated fuse.	FA lamp extinguished At jack, lamp, and key circuit— MTFG lamp lighted. At miscellaneous circuit for master timer— FG lamp lighted.
13	At master timing frame— Momentarily operate ARE key.	EVEN TRL lamp extinguished. At jack, lamp, and key circuit— MTFG lamp extinguished.

STEP	ACTION	VERIFICATION
		At miscellaneous circuit for master timer— FG lamp extinguished.
14	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
15	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.
16	At MTF— Momentarily operate TRRAR key.	Major alarm silenced.
<b>D. Motor or Electronic Timer Failure-Timing and Alarm</b>		
	<i>Note:</i> See paragraph 1.07.	
1a	If ODD OL lamp lighted— At master timing frame— Momentarily operate TRE key.	ODD OL lamp extinguished. EVEN OL, TRS, ALM lamps lighted. Major alarm sounds.
2a	Momentarily operate ACO key.	Major alarm silenced.
3a	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
4	Operate MBO key.	MBO lamp lighted.
5	Block operated AR relay in odd timer.	
6	Insulate 7B of MSF relay in odd timer.	
7	Remove blocking tool from AR relay; <i>start timing.</i>	In 6 seconds— ODD MSF, ODD TRL lamps lighted.
8	Remove insulator from MSF relay.	
9	Momentarily operate ARO key.	ODD TRL, ODD MSF lamps extinguished.
10	Release MBO key.	
11	Momentarily operate TRE key.	EVEN OL lamp extinguished. ODD OL, TRS, ALM lamps lighted. Major alarm sounds.
12	Momentarily operate ACO key.	Major alarm silenced.
13	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
14	Operate MBE key.	MBE lamp lighted.
15	Block operated AR relay in even timer.	
16	Insulate 7B of MSF relay in even timer.	

STEP	ACTION	VERIFICATION
17	Remove blocking tool from AR relay; <i>start timing.</i>	In 6 seconds— EVEN MSF, EVEN TRL lamps lighted.
18	Remove insulator from MSF relay.	
19	Momentarily operate ARE key.	EVEN TRL, EVEN MSF lamps extinguished.
20	Release MBE key.	MBE lamp extinguished.

#### E. Data Check Failure in Recorder—Transfer Features

**Caution:** Perform Steps 2 and 9 in the period of time from 1 second to 55 seconds, as close to 55 seconds time as needed, perform Steps 2 and 9 before 55 seconds time, to minimize 99 entries on magnetic tape. (See paragraph 1.07.)

#### Odd Timer to Even Timer Transfer

**Note:** ODD OL lamp lighted.

1	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
2	Momentarily apply ground to terminal strip AA-E, terminal 08. *This represents a data check failure from the recorder.*	ODD OL lamp extinguished. EVEN OL, TRS, ALM, EVEN TRL, ODD TRL lamps lighted. Major alarm sounds.
3	Momentarily operate ACO key.	Major alarm silenced.
4	Observe when T_ and U_ lamps reach 00.	EVEN TRL lamp extinguished.
5	Momentarily operate ARO key.	ODD TRL lamp extinguished.
6	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
7	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.

#### Even Timer to Odd Timer Transfer

**Note:** EVEN OL lamp lighted.

8	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
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STEP	ACTION	VERIFICATION
9	Momentarily apply ground to terminal strip AA-E, terminal 08.	EVEN OL lamp extinguished. ODD OL, TRS, ALM, EVEN TRL, ODD TRL lamps lighted. Major alarm sounds.
10	Momentarily operate ACO key.	Major alarm silenced.
11	Observe when T_ and U_ lamps reach 00.	ODD TRL lamp extinguished.
12	Momentarily operate ARE key.	EVEN TRL lamp extinguished.
13	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
14	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.

**F. Seconds, Minutes, and Hours Synchronization Failure Alarm**

**Caution:** Perform Step 8 in the period of time from 1 second to 55 seconds, as close to 55 seconds time as needed, perform Step 8 before 55 seconds time, to minimize 99 entries on magnetic tape. (See paragraph 1.07.)

1a	If ODD OL lamp lighted— At master timing frame— Momentarily operate TRE key.	ODD OL lamp extinguished. EVEN OL, TRS, ALM lamps lighted. Major alarm sounds.
2a	Momentarily operate ACO key.	Major alarm silenced.
3a	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
4	Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
5	Operate MBO key.	MBO lamp lighted.
6b	If HK relay in odd timer is operated— Insulate 12M of HK relay in odd timer.	
7c	If HK relay in odd timer is released— Insulate 12B of HK relay in odd timer.	
8	Release MBO key.	MBO lamp extinguished. In 3 to 5 seconds— SMHS, ALM, EVEN TRL, ODD TRL lamps lighted. Major alarm sounds.

**SECTION 218-773-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
9	Remove insulator from HK relay.	
10	Momentarily operate ACO key.	Major alarm silenced.
11	Momentarily operate ARC key.	ALM SMHS lamps extinguished.
12	Observe when T_ and U_ lamps reach 00.	EVEN TRL lamp extinguished.
13	Momentarily operate ARO key.	ODD TRL lamp extinguished.
14	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.

**G. Day and Month Synchronization Failure Alarm**

1a	If ODD OL lamp lighted— At master timing frame— Operate MBE key.	MBE lamp lighted.
2b	If EVEN OL lamp lighted— Operate MBO key.	MBO lamp lighted.
3c	If MOY relay is operated in even timer— Insulate 10M of MOY relay in even timer.	
4d	If MOY relay is released in even timer— Insulate 10B of MOY relay in even timer.	
5e	If MBO lamp lighted— Release MBO key.	MBO lamp extinguished. DMSF, ALM lamps lighted. Major alarm sounds. At MTF— MTT lamp lighted.
6f	At master timing frame— If MBE lamp lighted— Release MBE key.	MBE lamp extinguished. DMSF, ALM lamps lighted. Major alarm sounds. At MTF— MTT lamp lighted.
7	At master timing frame— Remove insulator from MOY relay.	
8	Momentarily operate ACO key.	Major alarm silenced. MTT-ACG lamp lighted.
9	Momentarily operate ARC key.	DMSF, ALM lamps extinguished. At MTF— MTT-ACG, MTT lamps extinguished.

STEP	ACTION	VERIFICATION
<b>H. Seconds Synchronization Failure</b>		
<i>Note:</i> See paragraph 1.07.		
1	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
2a	If ODD OL lamp is lighted— Momentarily operate TRE key.	ODD OL lamp extinguished. EVEN OL, TRS, ALM lamps lighted. Major alarm sounds.
3a	Momentarily operate ACO key.	Major alarm silenced.
4a	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
5	Operate MBO key.	MBO lamp lighted.
6	Momentarily apply ground to 10F of SP2 relay in odd timer.	ODD SOS, ODD TRL lamps lighted.
7	Momentarily operate ARO key.	ODD SOS, ODD TRL lamps extinguished.
8	Momentarily apply ground to 9F of TSP2 relay in odd timer.	ODD SOS, ODD TRL lamps lighted.
9	Momentarily operate ARO key.	ODD SOS, ODD TRL lamps extinguished.
10	Release MBO key.	MBO lamp extinguished.
11	Momentarily operate TRE key.	EVEN OL lamp extinguished. ODD OL, TRS, ALM lamps lighted. Major alarm sounds.
12	Momentarily operate ACO key.	Major alarm silenced.
13	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
14	Operate MBE key.	MBE lamp lighted.
15	Momentarily apply ground to 10F of SP2 relay in even timer.	EVEN SOS, EVEN TRL lamps lighted.
16	Momentarily operate ARE key.	EVEN SOS, EVEN TRL lamps extinguished.
17	Momentarily apply ground to 9F of TSP2 relay in even timer.	EVEN SOS, EVEN TRL lamps lighted.
18	Momentarily operate ARE key.	EVEN SOS, EVEN TRL lamps extinguished.
19	Release MBE key.	MBE lamp extinguished.

**SECTION 218-773-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
20	Release SEC key.	SEC, ODD and EVEN T <sub>-</sub> and U <sub>-</sub> lamps extinguished.
<b>I. Self Synchronization Check Failure</b>		
<i>Note:</i> See paragraph 1.07.		
1	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T <sub>0</sub> through 5 and U <sub>0</sub> through 9 lamps lighted to indicate seconds output data of odd and even timers.
2a	If ODD OL lamp lighted— Momentarily operate TRE key.	ODD OL lamp extinguished. EVEN OL, TRS, ALM lamps lighted. Major alarm sounds.
3a	Momentarily operate ACO key.	Major alarm silenced.
4a	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
5	Operate MBO key.	MBO lamp lighted.
6b	If ATD relay in odd timer is operated— Insulate 6M of ATD relay in odd timer.	
7c	If ATD relay in odd timer is released— Insulate 6B of ATD relay in odd timer.	
8	Release MBO key.	MBO lamp extinguished. ODD SSF, ODD TRL, ALM lamps lighted. Major alarm sounds.
9	Remove insulator from ATD relay.	
10	Momentarily operate ACO key.	Major alarm silenced.
11	Momentarily operate ARO key.	ODD SSF, ODD TRL lamps extinguished.
12	Momentarily operate ARC key.	ALM lamp extinguished.
13	Momentarily operate TRE key.	EVEN OL lamp extinguished. ODD OL, TRS, ALM lamps lighted. Major alarm sounds.
14	Momentarily operate ACO key.	Major alarm silenced.
15	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
16	Operate MBE key.	MBE lamp lighted.
17d	If ATD relay in even timer is operated— Insulate 6M of ATD relay in even timer.	

STEP	ACTION	VERIFICATION
18e	If ATD relay in even timer is released— Insulate 6B of ATD relay in even timer.	
19	Release MBE key.	MBE lamp extinguished. EVEN SSF, EVEN TRL, ALM lamps lighted. Major alarm sounds.
20	Remove insulator from ATD relay.	
21	Momentarily operate ACO key.	Major alarm silenced.
22	Momentarily operate ARE key.	EVEN SSF, EVEN TRL lamps extinguished.
23	Momentarily operate ARC key.	ALM lamp extinguished.
24	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.
<b>J. Cam Synchronization Check Alarm</b> ♦(Electronic or Electromechanical Timers Provided)♦		
1	At master timing frame— Operate MBE/O key in off line timer.	MBE/O lamp for off-line timer lighted.
2	Insulate 2B of 1P relay in off-line timer.	
3	Release MBE/O key operated in Step 1.	MBE/O lamp extinguished. Within 1 second— CSK, ALM lamps lighted. Major alarm sounds.
4	Remove insulator from 1P relay.	
5	Momentarily operate ACO key.	Major alarm silenced.
6	Momentarily operate ARC key.	CSK, ALM lamps extinguished.
<b>K. Transfer Timer Alarm</b>		
1a	If ODD OL lamp is lighted— At master timing frame— Insulate 12M of WL relay.	TTM, ALM lamps lighted. Major alarm sounds.
2b	If EVEN OL lamp is lighted— Insulate 12B of WL relay.	TTM, ALM lamps lighted. Major alarm sounds.
3	Remove insulator from WL relay.	
4	Momentarily operate ACO key.	Major alarm silenced.
5	Momentarily operate ARC key.	TTM, ALM lamps extinguished.

**SECTION 218-773-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
<b>L. Trouble Recording Check Alarm</b>		
1	At master timing frame— Block operated ARC relay.	
2	Insulate 9B of RLT relay in even timer.	
3	Remove blocking tool from ARC relay.	Within one second— TRK, ALM lamps lighted. Major alarm sounds.
4	Remove insulator from RLT relay.	
5	Momentarily operate ACO key.	Major alarm silenced.
6	Momentarily operate ARC key.	TRK, ALM lamps extinguished

**M. 3AM Entry Failure Alarms**

**Note:** See paragraph 1.07.

**Caution: Do not start this test between 0200 and 0300 hours.**

1	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
2a	If ODD OL lamp is lighted— Momentarily operate TRE key.	ODD OL lamp extinguished. EVEN OL, TRS, ALM lamps lighted. Major alarm sounds.
3a	Momentarily operate ACO key.	Major alarm silenced.
4a	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
5	Operate MBO key.	MBO lamp lighted.
6	Connect 2F of MBB1 relay in odd timer to 1L winding terminal of ALM relay.	
7	Block operated C3A relay in odd timer.	
8	Momentarily apply ground to 12F of C3A relay in odd timer.	ODD 3AR, ALM lamps lighted. Major alarm sounds.
9	Momentarily operate ACO key.	Major alarm silenced.
10	Momentarily operate ARO key.	ODD 3AR lamp extinguished.
11	Momentarily operate ARC key.	ALM lamp extinguished.

STEP	ACTION	VERIFICATION
12	Remove blocking tool from C3A relay in odd timer.	
13	Remove test connection from MBB1 relay in odd timer and ALM relay.  <i>Note:</i> If 3AK relay is operated, manually restore 3AK relay.	
14	Operate 3ANT relay in odd timer.	3ANT relay in odd timer locks operated.
15	Momentarily apply ground to U winding terminal of odd TRL relay. *This indicates a trouble release.*	3ANT relay released. ODD TRL lamp lighted.
16	Momentarily operate ARO key.	ODD TRL lamp extinguished.
17	Manually restore 3AK relay.	
18	Operate 3AM relay in odd timer.	3AM relay in odd timer locks operated.
19	Momentarily apply ground to U winding terminal of odd TRL relay.	3AM relay released. ODD TRL lamp lighted.
20	Momentarily operate ARO key.	ODD TRL lamp extinguished.
21	Manually restore 3AK relay.	
22	Release MBO key.	MBO lamp extinguished.
23	Momentarily operate TRE key.	EVEN OL lamp extinguished. ODD OL, TRS, ALM lamps lighted. Major alarm sounds.
24	Momentarily operate ACO key.	Major alarm silenced.
25	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
26	Operate MBE key.	MBE lamp lighted.
27	Connect 2F of MBB1 relay in even timer to 1L winding terminal of ALM relay.	
28	Block operated C3A relay in even timer.	
29	Momentarily apply ground to 12F of C3A relay in even timer.	EVEN 3AR, ALM lamps lighted. Major alarm sounds.
30	Momentarily operate ARE key.	EVEN 3AR lamp extinguished.
31	Momentarily operate ACO key.	Major alarm silenced.

**SECTION 218-773-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
32	Momentarily operate ARC key.	ALM lamp extinguished.
33	Remove blocking tool from C3A relay in even timer.	
34	Remove test connection from MBB1 relay in even timer and ALM relay.	
35	Operate 3ANT relay in even timer.	3ANT relay in even timer locks operated.
36	Momentarily apply ground to U winding terminal of even TRL relay. *This indicates a trouble release.*	3ANT relay in even timer released. EVEN TRL lamp lighted.
37	Momentarily operate ARE key.	EVEN TRL lamp extinguished.
38	Manually restore 3AK relay.	
39	Operate 3AM relay in even timer.	3AM relay in even timer locks operated.
40	Momentarily apply ground to U winding terminal of even TRL relay.	3AM relay released. EVEN TRL lamp lighted.
41	Momentarily operate ARE key.	EVEN TRL lamp extinguished.
42	Manually restore 3AK relay.	
43	Release MBE key.	MBE lamp extinguished.
44	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.

**N. Entry Timer Failure Alarm**

**Note:** See paragraph 1.08.

1	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
2a	If ODD OL lamp is lighted— Momentarily operate TRE key.	ODD OL lamp extinguished. EVEN OL, TRS, ALM lamps lighted. Major alarm sounds.
3a	Momentarily operate ACO key.	Major alarm silenced.
4a	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
5	Operate MBO key.	MBO lamp lighted.

STEP	ACTION	VERIFICATION
6	Release SEC key.	SEC, ODD and EVEN T <sub>1</sub> and U <sub>1</sub> lamps extinguished.
7	Operate MIN key.	MIN lamp lighted. T <sub>0</sub> through 5, U <sub>0</sub> through 9 lamps lighted to indicate minutes data of odd and even timers.
8	Block operated ET relay in odd timer (normally operated).	
9	Connect 2F of MBB1 relay in odd timer and 1L winding terminal of ALM relay.	
10	Just after one of U <sub>0</sub> through 9 lamps are updated— Insulate 4B of AV relay in odd timer	
11	Remove blocking tool from ET relay in odd timer.	In approximately 1/2 second— ODD ET, ODD TRL, ALM lamps lighted. Major alarm sounds.
12	Momentarily operate ACO key.	Major alarm silenced.
13	Remove insulator from AV relay.	
14	Momentarily operate ARO key.	ODD ET, ODD TRL lamps extinguished.
15	Momentarily operate ARC key.	ALM lamp extinguished.
16	Remove test connection from MBB1 relay in odd timer and ALM relay.	
17	Release MBO key.	MBO lamp extinguished.
18	Momentarily operate TRE key.	EVEN OL lamp extinguished ODD OL, TRS, ALM lamps lighted. Major alarm sounds.
19	Momentarily operate ACO key.	Major alarm silenced.
20	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
21	Operate MBE key.	MBE lamp lighted.
22	Block operated ET relay in even timer (normally operated).	
23	Connect 2F of MBB1 relay in even timer and 1L winding terminal of ALM relay.	

SECTION 218-773-501

STEP	ACTION	VERIFICATION
24	Just after one of U0 through 9 lamps are updated— Insulate 4B of AV relay in even timer.	
25	Remove blocking tool from ET relay.	In approximately 1/2 second— EVEN ET, EVEN TRL, ALM lamps lighted. Major alarm sounds.
26	Remove insulator from AV relay.	
27	Momentarily operate ACO key.	Major alarm silenced.
28	Momentarily operate ARE key.	EVEN ET, EVEN TRL lamps extinguished.
29	Momentarily operate ARC key.	ALM lamp extinguished.
30	Remove test connection from MBB1 relay in even timer and ALM relay.	
31	Release MBE key.	MBE lamp extinguished.
32	Release MIN key.	MIN, ODD and EVEN T_ and U_ lamps extinguished.

O. Overall Timer Alarm and Transfer

**Note:** See paragraph 1.08.

1	At master timing frame— Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
2a	If ODD OL lamp is lighted. Momentarily operate TRE key.	ODD OL lamp extinguished. EVEN OL, TRS, ALM lamps lighted. Major alarm sounds.
3a	Momentarily operate ACO key.	Major alarm silenced.
4a	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
5	Operate MBO key.	MBO lamp lighted.
6	Connect 2F of MBB1 relay in odd timer and 1L winding terminal of ALM relay.	
7	Block nonoperated P8A, PGT1 relay in odd timer.	
8	Block operated P8 relay in odd timer; <b>start timing.</b>	In 3 to 4 seconds— ODD TRL, ODD OAT, ALM lamps lighted. Major alarm sounds.

STEP	ACTION	VERIFICATION
9	Remove blocking tool from P8 relay.	ODD OAT lamp remains lighted.
10	Momentarily operate ACO key.	Major alarm silenced.
11	Momentarily operate ARO key.	ODD TRL, ODD OAT lamps extinguished.
12	Momentarily operate ARC key.	ALM lamp extinguished.
13	Remove blocking tools from P8A, PGT1 relays.	
14	Remove test connection from MBB1 relay in odd timer and ALM relay.	
15	Release MBO key.	MBO lamp extinguished.
16	Block nonoperated NTRS relay in even timer.	
17	Block nonoperated P3 relay in odd timer.	
	<b>Note:</b> Perform Steps 18 through 21 as rapidly as possible to prevent interference with next minute entry. Start Step 18 as close to 50 seconds time as needed to complete Step 21 before 50 seconds time. This will prevent excess 99 entries on magnetic tape.	
18	When T <sub>-</sub> and U <sub>-</sub> lamps are lighted to indicate time required— Block nonoperated P1A relay in even timer.	
19	Momentarily operate METE key.	In 3 to 4 seconds— Major alarm sounds. EVEN OAT, ALM, ODD OL, TRS, EVEN TRL, ODD TRL lamps lighted. EVEN OL lamp extinguished.
20	Remove blocking tools from NTRS, P1A relays in even timer.	
21	Remove blocking tool from P3 relay in odd timer.	
22	Observe when T <sub>0</sub> , U <sub>0</sub> lamps are lighted.	ODD TRL lamp extinguished.
23	Momentarily operate ARE key.	EVEN OAT, EVEN TRL lamps extinguished.
24	Momentarily operate ACO key.	Major alarm silenced.
25	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
26	Operate MBE key.	MBE lamp lighted.

SECTION 218-773-501

STEP	ACTION	VERIFICATION
27	Connect 2F of MBB1 relay in even timer and 1L winding terminal of ALM relay.	
28	Block nonoperated P8A, PGT1 relays in even timer.	
29	Block operated P8 relay in even timer; <i>start timing.</i>	In 3 to 4 seconds— EVEN TRL, EVEN OAT, ALM lamps lighted. Major alarm sounds.
30	Remove blocking tool from P8 relay.	EVEN OAT lamp remains lighted.
31	Momentarily operate ARE key.	EVEN OAT lamp extinguished.
32	Momentarily operate ACO key.	Major alarm silenced.
33	Momentarily operate ARC key.	ALM lamp extinguished.
34	Remove blocking tools from P8A, PGT1 relays.	
35	Remove test connection from MBB1 relay in even timer and ALM relay.	
36	Release MBE key.	MBE lamp extinguished.
37	Block nonoperated NTRS relay in odd timer.	
38	Block nonoperated P3 relay in even timer.	
	<b>Note:</b> Perform Steps 39 through 42 as rapidly as possible to prevent interference with next minute entry. Start Step 39 as close to 50 seconds time as needed to complete Step 42 before 50 seconds time. This will prevent 99 entries on magnetic tape.	
39	When T <sub>-</sub> and U <sub>-</sub> lamps are lighted to indicate time required— Block nonoperated P1A relay in odd timer.	
40	Momentarily operate METO key.	In 3 to 4 seconds— Major alarm sounds. ODD OAT, ALM, EVEN OL, TRS, EVEN TRL, ODD TRL lamps lighted. ODD OL lamp extinguished.
41	Remove blocking tools from NTRS, P1A relays in odd timer.	
42	Remove blocking tool from P3 relay in even timer.	

STEP	ACTION	VERIFICATION
43	Observe when T0 and U0 lamps are lighted.	EVEN TRL lamp extinguished.
44	Momentarily operate ARO key.	ODD OAT, ODD TRL lamps extinguished.
45	Momentarily operate ACO key.	Major alarm silenced.
46	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
47	Release SEC key.	SEC, T_ and U_ lamps extinguished.

**P. Preference Relays—Operation and Lockout Features**

**Note:** See paragraph 1.07.

1	At master timing frame— Operate MBE/O key for timer with OL lamp extinguished.	MBE/O lamp lighted for off-line timer.
	<b>Note:</b> Actions and verifications in this test pertain to apparatus associated with the off-line timer.	
2	Block nonoperated PGT, OAT, ON, PGT1, OAT1, TRL1, and TSRL relays.	
3	Connect battery to 11F of PGT relay.	P8, P8A relays operated.
4	Block operated P8A relay.	
5	Momentarily operate in turn the 55, TLO, and WLO relays.	P8 relay momentarily released with each operation.
6	Remove blocking tool from P8A relay.	
7	Block operated OAT relay.	P8, P8A relays released. OAT lamp lighted.
8	Remove test connection from PGT relay.	
9	Block nonoperated OAT relay.	OAT lamp extinguished.
10	Block operated P8A relay.	
11	Connect battery to 10F of PGT relay.	P7 relay operated. P7A relay <b>not</b> operated.
12	Remove blocking tool from P8A relay.	P7A relay operated.
13	Block operated P7A relay.	
14	Remove test connection from PGT relay.	P7 relay released.

SECTION 218-773-501

STEP	ACTION	VERIFICATION
15	Connect battery to 9F of PGT relay.	P6 relay operated. P6A relay <i>not</i> operated.
16	Remove blocking tool from P7A relay.	P6A relay operated.
17	Block operated P6A relay.	
18	Remove test connection from PGT relay.	P6 relay released.
19	Repeat Steps 15 through 18, substituting P5 for P6, P6A for P7A, etc, until P1, P1A relays have been tested. Use Table B for contact numbers on PGT relay.	
20	Remove blocking tools from PGT, OAT, ON, OAT1, PGT1, TRL1 and TSRL relays.	
21	Release MBE/O key.	MBE/O lamp extinguished.
22	Operate SEC key.	SEC lamp lighted. One each of ODD and EVEN T0 through 5 and U0 through 9 lamps lighted to indicate seconds output data of odd and even timers.
23	Momentarily operate TRE key.	On-line OL lamp extinguished. Off-line OL, TRS, ALM lamps lighted. Major alarm sounds.
24	Momentarily operate ACO key.	Major alarm silenced.
25	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
26	Repeat Steps 1 through 25 for test of other timer.	
27	Release SEC key.	SEC, ODD and EVEN T_ and U_ lamps extinguished.

TABLE B

RELAY UNDER TEST	CONNECT BATTERY TO PGT RELAY
P5	7F
P4	6F
P3	5F
P2	4F
P1	2F

STEP	ACTION	VERIFICATION
<b>Q. Advance Check Failure Timing and Alarm</b>		
	<i>Note:</i> See paragraph 1.07.	
1a	If ODD OL lamp lighted— At master timing frame— Momentarily operate TRE key.	ODD OL lamp extinguished. Even OL, TRS, ALM lamps lighted. Major alarm sounds.
2a	Momentarily operate ACO key.	Major alarm silenced.
3a	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
4	Operate MBO key.	MBO lamp lighted.
5	Block operated AR relay in odd timer.	
6	Insulate 7B of ADVK relay in odd timer.	
7	Remove blocking tool from AR relay.	In approximately 1 second— ODD ADK, ODD TRL lamps lighted.
8	Remove insulator from ADVK relay.	
9	Momentarily operate ARO relay.	ODD ADK, ODD TRL lamps extinguished.
10	Release MBO key.	
11	Momentarily operate TRE key.	Even OL lamp extinguished. ODD OL, TRS, ALM lamps lighted. Major alarm sounds.
12	Momentarily operate ACO key.	Major alarm silenced.
13	Momentarily operate ARC key.	TRS, ALM lamps extinguished.
14	Operate MBE key.	MBE lamp lighted.
15	Block operated AR relay in even timer.	
16	Insulate 7B of ADVK relay in even timer.	
17	Remove blocking tool from AR relay.	In approximately 1 second— EVEN ADK, EVEN TRL lamps lighted.
18	Remove insulator from ADVK relay.	
19	Momentarily operate ARE key.	EVEN ADK, EVEN TRL lamps extinguished.
20	Release MBE key.	

