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LAMA RECORDER AND RECORDER CONNECTOR CIRCUITS
TESTS USING OFFICE TEST FRAME TEST CIRCUIT SD-27633-01 (J23260)
NO. 5 CROSSBAR OFFICES

1. GENERAL

1.01 This section describes a method of testing regular and emergency recorders and recorder connector circuits in No. 5 crossbar offices arranged for local automatic message accounting (LAMA), using the office test frame test circuit (OTF) SD-27633-01, Issue 2D and subsequent issues, the trouble indicator and connector circuit (TIC) SD-27634-01, Issue 2D and subsequent issues, and the recorder test position of the master timing circuit SD-25633-01.

1.02 The reasons for reissuing this section are listed below. Since this reissue is a general revision, no revision arrows have been used to denote significant charges. Equipment Test Lists are affected.

- (a) To add, 6-second timing to the title in Tests E and Q, and revise both tests.
- (b) To add, 1-second timing to the title in Tests E.1 and Q.1, and revise both tests.
- (c) To add, paper jam features to the title in Tests F and R, and rewrite both tests.
- (d) To revise Tests K and W.
- (e) To revise Table A.
- (f) To correct Fig. 1.
- (g) To make minor changes as required.

1.03 The tests covered are:

REGULAR RECORDER

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A. Transfer Features: This test checks the following: (1) In offices equipped with an emergency recorder, the call identity indexer associated with the regular recorder can be transferred to the emergency recorder. While the transfer is in effect, no other call identity indexer can be transferred and a charge guard entry is perforated. (2) In offices not equipped with an emergency recorder, the trunks associated with the recorder made busy can be transferred to the other recorder if the other recorder is not made busy and a charge guard entry is perforated.

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B. Make-Busy Features: This test checks the following: (1) When the regular recorder is made busy, the associated call identity indexer cannot be transferred to the emergency recorder. (2) When the regular recorder is made busy, the call identity indexer associated with any other regular recorder not made busy can be transferred to the emergency recorder. (3) In all offices the service busy, trouble busy, and extended timing leads from the regular recorder to each transverter and the master timing alarm release feature in the regular recorder make-busy circuit.

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C. Operation Test: This test checks the following: (1) The operation of

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the perforator magnets of the regular recorder by perforating the tape in a distinctive diamond-shaped pattern. (2) The normal operation of the recorder on an initial entry and on answer and disconnect entries. (3) The operation of the 2-out-of-5 check relays. (4) The operation of the OTO and RCK relays. (5) False battery on the OT lead. (6) False ground on the XTC lead. (7) Trouble grounds on the OT and TCO leads. (8) The recorder group number perforation. 14

D. Synchronizing Features: The following features are checked: (1) The feature for detecting when the timing selectors in the regular recorder are out of synchronism with the master timing circuit. (2) The feature for synchronizing the recorder selectors with the master timing circuit. 18

E. Recorder Number, Minutes Timing, and Hour Alarm Features (6-Second Timing): This test checks the following: (1) Perforator magnet leads from the timing selectors of the regular recorder. (2) Perforator magnet leads from the RN (recorder number), HRT (hour trouble), ADT (answer-disconnect trouble), TCT (talking charge trouble), and AT (advance tape) relays. (3) Selector timing switch positions that bring in the hour entry, the hour trouble entry, and the hour alarm. 20

E.1 Recorder Number Minutes Timing, Seconds Timing, and Hour Alarm Features (1-Second Timing): The following features are checked: (1) Perforator magnet leads from the timing selectors and relay counters of the regular recorder. (2) Perforator magnet leads from the RN, HRT, ADT, TCT, and AT relays. (3) Selector timing switch and relay counter positions that bring in the hour entry, hour trouble entry, and hour alarms. 30

F. Splice, Break-In Tape, and Paper Jam Feature: This test

checks the following: (1) That the regular recorder will perforate window pattern entries upon encountering a splice in the tape, a break in the tape, or the end of the tape supply. (2) That the no-paper alarm feature functions when a break in the tape, end of the tape supply or paper jam is encountered. (3) That the recorder busy features function when a break in the tape, or end of tape is encountered. 40

G. Trouble Timing Feature: This test checks that the recorder will time out and bring in an alarm in approximately 2 seconds upon the failure of entries originated by the recorder and an associated call identity indexer. 41

H. AG Lead Alarm and Locking Features: This test checks that the operation of a TA_ or TB_ relay in the call identity indexer will start the timing feature in its associated regular recorder. It also checks the locking paths for the RD and IPA relays. 44

I. Transient Operation of Perforator Magnets and Series Relay Locking Features: This test checks that the operation of a perforator magnet, while the regular recorder is idle, will cause a trouble entry to be perforated. It also checks the locking circuit for all perforator magnet series relays. 45

J. Trouble Cross-Detecting Features: This test checks the operation of the alarm feature if a failure occurs in the preference relay chain circuit of the regular recorder or in the tens or units relay chain circuit in the associated call identity indexer. It also checks the operation of the alarm feature due to falsely grounded TC, RB, and EXT leads. 47

K. Test for False Continuity and Crosses of TC_ Relays: This test checks for false continuity and crosses

	PAGE		PAGE
on the contacts of the transverter-connector relays in the regular recorder.	52	on the OT and TCO leads. (9) The recorder group number perforation.	62
L. Deleted:		P. Synchronizing Features: The following features are checked: (1) The feature for detecting when the timing selectors in the emergency recorder are out of synchronism with the master timing circuit. (2) The feature for synchronizing the emergency recorder selectors with the master timing circuit.	64
M. Preference Relays—Operating and Lockout Features: This test checks the order of preference and locking features of the IP, HP, TP, and MTP relays.	55	Q. Recorder Number, Minutes Timing, and Hour Alarm Features (6-Second Timing): This test checks the following: (1) Perforator magnet leads from the timing selectors of the emergency recorder. (2) Perforator magnet leads from the RN (recorder number), HRT (hour trouble), ADT (answer-disconnect trouble), TCT (talking charge trouble), and AT (advance tape) relays. (3) Selector timing switch positions that bring in the hour entry, the hour trouble entry, and the hour alarm.	66
M.1 Dynamic Test of Preference Relays: This test checks that the preference relays operate in the proper sequence.	57	Q.1 Recorder Number, Minutes Timing, Seconds Timing, and Hour Alarm Features (1-Second Timing): The following features are checked: (1) Perforator magnet leads from the timing selectors and relay counters of the emergency records. (2) Perforator magnet leads from the RN, HRT, ADT, TCT, and AT relays. (3) Selector timing switch and relay counter positions that bring in the hour entry, hour trouble entry, and hour alarm.	67
M.2 Detection of Falsely Grounded DJ₁ Lead: This test checks that a falsely grounded DJ ₁ lead in the call identity indexer on a timing entry will cause a trouble condition at the associated recorder, if option T is provided in the call identity indexer and option WN in the recorder.	58	R. Splice, Break-In Tape, and Paper Jam Feature: This test checks the following: (1) That the emergency recorder will perforate window pattern entries upon encountering a splice in the tape, a break in the tape, or the end of the tape supply. (2) That the no-paper alarm feature functions when a break in the tape, end of the tape supply, or paper jam is encountered. (3) That the emergency recorder busy features	
EMERGENCY RECORDER			
N. Make-Busy Feature: This test checks that when the emergency recorder is made busy no call identity indexer can be transferred from its associated regular recorder to the emergency recorder. It also checks the service busy feature and that, while the call identity indexer is connected to the emergency recorder, the emergency recorder can be made busy.	60		
O. Operation Test: This test checks the following: (1) End of tape is correctly perforated on tape. (2) The operation of the perforator magnets of the emergency recorder by perforating the tape in a distinctive diamond-shaped pattern. (3) The normal operation of the emergency recorder on an initial entry and on answer and disconnect entries. (4) The operation of the 2-out-of-5 check relays. (5) The operation of the OTO and RCK relays. (6) The false battery on the OT lead. (7) The false ground on the XTC lead. (8) The trouble grounds			

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function when a break in the tape, or end of tape is encountered.	69	MTP relays. The test also checks the operation of the RIP and RTL relays.	78
S. Trouble Timing Feature: This test checks that the emergency recorder will time out and bring in an alarm in approximately 2 seconds upon the failure of entries originated by the recorder and an associated call identity indexer.	70	Z. Exercising Routine: This test checks the operation of the emergency recorder with each call identity indexer.	78
T. AG Lead Alarm and Locking Features: This test checks that the operation of a TA_ or TB_ relay in the call identity indexer will start the timing feature in the emergency recorder. It also checks the locking paths for the RD and IPA relays.	72	AA. Dynamic Test of Preference Relays: This test checks that the preference relays operate in the proper sequence. When applicable, Fig. 27 is provided.	80
U. Transient Operation of Perforator Magnets and Series Relay Locking Features: This test checks that the operation of a perforator magnet while the emergency recorder is idle will cause a trouble entry to be perforated. It also checks the locking circuit for all perforator magnet series relays.	74	AB. Detection of Falsely Grounded DJ_ Lead: This test checks that a falsely grounded DJ_ lead in the call identity indexer on a timing entry will cause a trouble condition at the emergency recorder, if option T is provided in the call identity indexer and option WN in the emergency recorder.	81
V. Trouble Cross-Detecting Features: This test checks the operation of the alarm feature if a failure occurs in the preference relay chain circuit of the emergency recorder or in the tens or units relay chain circuit in the associated call identity indexer. Also checked is the operation of the alarm feature due to falsely grounded TC, RB, and EXT leads.	75	1.04 Since end-of-tape entries are perforated at 3 a.m., no tests shall be performed during the interval of 2:55 a.m. to 3:30 a.m.	
W. Test for False Continuity and Crosses of TC_ Relays: This test checks for false continuity and crosses on the contacts of the transverter-connector relays in the emergency recorder.	77	1.05 All tests require that either a regular or emergency recorder be made busy.	
X. Deleted:		1.06 All tests except Z require actions and verifications at different locations at the same time.	
Y. Preference Relays—Operating and Lockout Features: This test checks the order of preference and locking features of the IP, HP, TP, and		1.07 A test of the hour indication feature with each recorder is included in the section covering tests of the master timing circuit.	
		1.08 If Test C, G, O, or S indicates trouble in a timing network, check the timing interval as covered in the circuit requirements table.	
		1.09 When two regular recorders are provided and an emergency recorder is not provided, avoid transferring one recorder to the second recorder if the second recorder is made busy by a make-busy plug in the associated MB jack. This action will result in both recorders being taken out of service at the same time.	

1.10 In offices equipped with regular and emergency recorders or offices equipped with a trunk transfer circuit, where 6-second timing is used, transfers should not be made more than once during the same hour entry. Where 1-second timing is used, transfers should not be made more than once during the same ten minute entry. More than one transfer during a period may make it impossible to associate the entries for two or more calls on a trunk which has the initial entry on one tape and the answer and disconnect entries on the other tape. Information concerning precautions to limit stoppages at the accounting center caused by central office tape irregularities is included in Section 218-702-302.

1.11 In offices equipped for 1-second timing, it is suggested that each test be read by the employee before actually performing the test. This is intended to familiarize the employee with test steps that must be done in rapid succession.

1.12 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 a series of 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.

1.13 While performing Tests A through K, N through W, and Z, plant register REC PCT or REC PC and the traffic register associated with the recorder TPC lead will score. While performing Tests I, J, U, and V, plant register RTR_ will score. The reporting of these register operations should be in accordance with local instructions.

1.14 When lamp display control feature (option YR) is provided at the trouble indicator and connector circuit (TIC), a stored trouble condition is indicated by a lighted red DR lamp. Momentary operation of the LD key will cause the trouble indicating lamps to light. These lamps will be extinguished with the momentary operation of the RLS key. Application of this feature will prevent trouble lamp displays from occurring in unattended offices.

1.15 Where the office is equipped with the paper jam detector feature and the PJD (paper

jam detector) counter is provided, the following caution must be complied with.

Caution: When performing maintenance on the perforator and the slack take-up arm is stored in its holder, after 200 counts of the paper jam counter:

- (1) **A major alarm will sound**
- (2) **The NP lamp at recorder frame associated with the perforator lights**

In order to prevent the above, monitor the PJD counter. When the counter nears 200 release the take-up arm from its holder which allows the paper take-up motor to operate, in turn resetting the PJD counter to 0.

2. APPARATUS

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

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

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.

2.04 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord) and two 419A (test connector) tools or one KS-6278 connecting clip and one 509A tool.

2.05 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord) and two KS-6278 connecting clips or one KS-6278 connecting clip and one 411A (test pick) tool.

2.06 Red china crayon (for marking AMA perforator tape).

2.07 KS-14343 tape reader (checks arrangement of perforations).

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

2.09 Recorder, Brush Esterline Angus 20-pen event or equivalent.

2.10 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one 364

tool, and one 419A (test connector) tool or one 624A (terminal connector) tool.

2.11 Register (350 ohms) 18AN, or equivalent.

2.12 Patching cord, P3U cord, 7 feet long, equipped with one 310 plug and one 351A plug (3P27B cord) for regular crossbar switches, or P3BE cord, 7 feet long, equipped with one 310 plug and one 459A plug for small crossbar switches.

	R	S	T	U	V	W	Y	Z	AA	AB
322A (ma Plug	√	2	√	2	√	2	—	√		√
32A Test	—	1	1	1	1	1	—	—	—	1
Test Rece	—	1	—	—	—	1	—	—	—	—
Cord (2.0	—	—	—	—	1	1	2	—	—	—
Cord (2.0	—	—	—	1	—	1	—	—	—	—
Cord (2.0	—	—	—	—	1	—	1	—	—	—
Red China (for marki	1	1	1	1	1	1	1	1	—	1
Tape Reac	—	—	—	—	—	—	—	1	—	—
Tools (2.0	√	√	√	√	√	√	√	√	—	√
Pen Recor	—	—	—	—	—	—	—	—	1	—
Cord (2.1	—	—	—	—	—	—	—	—	4	—
Resistor (—	—	—	—	—	—	—	—	—	1
Cord (2.1	—	—	—	—	—	—	—	1	—	—

√ As requ

3. METHOD

STEP	ACTION	VERIFICATION
REGULAR RECORDER		
A. Transfer Features		
With Emergency Recorder		
1	At jack, lamp, and key circuit— Check that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with recorders. EW lamp not lighted.
2	At perforator cabinet associated with emergency recorder— Mark tape (refer to paragraph 1.10).	
3	At jack, lamp, and key circuit— Insert make-busy plug into TN jack associated with recorder under test.	At recorder frame— EW lamp lighted. At recorder being tested— RNT, NS, all TN_ relays operated. RT, RT1 relays released. Ground absent on 2B of MB relay.
4a	If options G and P are provided— Check for ground on 8B of TNS relay.	Ground present.
5b	If options G and R are provided— Check for ground on 12T of TNS relay.	Ground present.
6	At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
7	At perforator cabinet line-up— Insert plug of 32A test set into R jack.	
8	Momentarily operate white (ST) button of 32A test set. Note: If a trouble is encountered while applying the test pattern, as indicated by RIT lamp lighted, clear the trouble and apply a good test pattern before restoring the recorder to service.	Perforator associated with emergency recorder operated. RW lamp not lighted. RIT lamp not lighted. RUT lamp lighted. When test is completed— RUT lamp extinguished. Note: If RW lamp is lighted, wait until RW lamp extinguished and then momentarily reoperate the white (ST) button of the 32A test set. Wait several seconds and again momentarily operate white (ST) button.

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STEP	ACTION	VERIFICATION
9	At perforator cabinet line-up— Remove plug of 32A test set from R jack.	
10	Mark tape (refer to paragraph 1.08).	
11	At jack, lamp, and key circuit— Remove plug from TST jack.	
12	Insert make-busy plug into TN jack of any other recorder.	At associated recorder— TNS relay <i>not</i> operated.
13	At jack, lamp, and key circuit— Remove make-busy plug from TN jack used in Step 12.	
14	Remove make-busy plug from TN jack of recorder under test.	At recorder frame— EW lamp extinguished. At recorder under test— RNT, NS, all TN_ relays released.
With Trunk Transfer Circuit		
15	At jack, lamp, and key circuit— Observe that recorder under test is in service.	R_ lamp associated with recorder under test extinguished.
16	At perforator cabinet associated with recorder being transferred to— Mark tape (refer to paragraph 1.10).	
17	Insert make-busy plug into TN jack associated with recorder under test.	R_ lamp lighted for recorder under test. If recorder 0 is under test— At transfer circuit— TR0_ relays operated. If recorder 1 is being tested— At transfer circuit— TR1_ relays operated.
Note: A trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR_AR key at the trouble indicator panel.		
18	At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
19	At perforator cabinet line-up— Insert plug of 32A test set into R jack.	
20	Momentarily operate white (ST) button of 32A test set.	Perforator associated with recorder under test operated.

STEP	ACTION	VERIFICATION
	<p>Note: If a trouble is encountered while applying the test pattern, as indicated by RIT lamp lighted, clear the trouble and apply a good test pattern before restoring the recorder to service.</p>	<p>RW lamp not lighted. RIT lamp not lighted.</p> <p>RUT lamp lighted. When test is completed— RUT lamp extinguished.</p> <p>Note: If the RW lamp is lighted, wait until the RW lamp is extinguished and then momentarily reoperate the white (ST) button of the 32A test set. Wait several seconds and again momentarily operate white (ST) button.</p>
21	<p>When perforator stops operating— Repeat Step 20 to advance tape for reading.</p>	<p>If recorder 0 was transferred to 1— Read charge guard entry 285440 for trunks 00-49. If recorder 1 was transferred to 0— Read charge guard entry 285450 for trunks 50-99.</p> <p>Note: Use KS-14343 tape reader to examine tape.</p> <p>Caution: Exercise care not to mutilate tape in any manner, and under no circumstances cut the tape.</p>
22	<p>At perforator cabinet line-up— Remove plug of 32A test set from R jack.</p>	
23	<p>At jack, lamp, and key circuit— Remove plug from TST jack.</p>	
24	<p>Remove plug from TN jack associated with recorder under test.</p>	<p>R_ lamp extinguished. If recorder 0 is being tested— At transfer circuit— TR0_ relays released. If recorder 1 is being tested— At transfer circuit— TR1_ relays released.</p> <p>Note: A trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR_AR key at the trouble indicator panel.</p>
25	<p>At perforator cabinet— Mark tape (refer to paragraph 1.10).</p>	
26	<p>Repeat Steps 15 through 25 for other recorder.</p>	

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STEP	ACTION	VERIFICATION
B. Make-Busy Features		
1	Remove from service all trunks associated with recorder under test.	
2	At recorder under test— Block nonoperated XT relay.	
3	Insulate 3B of RD relay.	
4	At jack, lamp, and key circuit— Insert make-busy plug into MB jack associated with recorder being tested.	R_ lamp associated with recorder being tested lighted. At recorder under test— NS relay operated. RT, RT1 relays <i>not</i> operated. At each LAMA transverter— Ground present on 1B of associated RST_ relay. Ground absent on 6T of associated RST_ relay.
5	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
6	At recorder under test— Block nonoperated TA relay.	
7	Block operated ON relay.	At each LAMA transverter— Ground present on 6T of associated RST_ relay.
8	At recorder under test— Remove blocking tool from ON relay.	
9	Remove blocking tool from TA relay.	
10a	If emergency recorder is provided— At jack, lamp, and key circuit— Check that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with recorders.
11a	Insert make-busy plug into TN jack associated with recorder being tested.	At recorder frame— EW lamp <i>not</i> lighted.
12	At recorder under test— Insulate 2T of RT relay.	
13	Connect ground to 2T of RT relay.	At each LAMA transverter— Ground present on 4B of associated RST_ relay.
14	At recorder under test— Remove ground from 2T of RT relay.	At each LAMA transverter— Ground absent on 4B of associated RST_ relay.

STEP	ACTION	VERIFICATION
15	At recorder under test— Remove insulator from 2T of RT relay.	
16a	If emergency recorder is provided— At jack, lamp, and key circuit— Remove plug from TN jack associated with recorder under test.	
17a	Insert make-busy plug into TN jack associated with any other recorder not made busy.	At recorder frame— EW lamp lighted.
18a	At jack, lamp, and key circuit— Remove plug from TN jack associated with transferred recorder.	At recorder frame— EW lamp extinguished.
19	At jack, lamp, and key circuit— Remove plug from MB jack associated with recorder being tested.	At recorder under test— NS relay released. Ground absent on 8B of TN1 relay, 2B of TN6 relay.
20	Block nonoperated MBR relay.	
21	At jack, lamp, and key circuit— Insert make-busy plug into MB jack associated with recorder under test.	At recorder under test— MTR lamp lighted. RT, RT1 relays released. Major alarm sounds.
22	Remove blocking tool from MBR relay.	
23	Operate MBR relay.	MBR relay locked operated.
24	At recorder frame— Momentarily operate AR key.	MTR lamp extinguished. Major alarm silenced.
25	At recorder under test— Remove insulator from 3B of RD relay.	
26	Remove blocking tool from XT relay.	
27b	If either Test H or J is to be made at this time— Omit Steps 28c through 32c.	
28c	If neither Test H nor J is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder being tested.	
29c	Insert plug of 32A test set into R jack.	

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STEP	ACTION	VERIFICATION
30c	Momentarily operate white key button of 32A test set.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed— RUT lamp extinguished.
	<i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	
31c	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder being tested.	
32c	Remove plug of 32A test set from R jack.	
33	Remove plug from MB jack associated with recorder under test.	At perforator cabinet— Make-busy pattern perforated. At jack, lamp, and key circuit— R_ lamp associated with recorder being tested extinguished.
34	Restore to service all trunks associated with recorder being tested.	
35	At perforator cabinet— Mark tape (refer to paragraph 1.10).	

C. Operation Test

1a	If emergency recorder is provided— At jack, lamp, and key circuit— Check that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with recorders.
2b	If emergency recorder is not provided— At jack, lamp, and key circuit— Observe that recorder under test is in service.	R_ lamp extinguished for recorder under test.
3	Insert make-busy plug into TN jack associated with recorder under test.	If emergency recorder is provided— At recorder frame— EW lamp of emergency recorder lighted. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp lighted for recorder under test.

Note: If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm

STEP	ACTION	VERIFICATION
		can be released by operating the TIR-AR key at the trouble indicator panel.
4	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
5	At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
6	From office records, determine recorder group number.	
7	At perforator cabinet line-up— Insert plug of 32A test set into R jack.	
8	Momentarily operate white key button of 32A test set. Note: If the RW lamp is lighted, wait until the RW lamp is extinguished and then momentarily reoperate the white key button of the 32A test set. Wait several seconds and again momentarily operate white key button.	Perforator associated with recorder under test operated. RW lamp not lighted. RIT lamp not lighted.
9	When perforator stops operating— Repeat Step 8 several times to advance tape for reading.	
10	Read transfer entry.	Entries perforated as follows:

STEP

ACTION

VERIFICATION

DIGIT						
TIMING	A	B	C	D	E	F
	2	8	2	1	DAY X X T U	
6 sec. 1 sec.	2 2	8 8	1 1	1 2	HOUR X X X X T U	
	2	8	5	X 5 or 7	O	O
	2	8	0	5	RECORDER X X T U	
6 sec. 1 sec.	2 2	8 8	3 3	DAY X UNIT MINUTE TENS	X X	X X
	2	8	4	X *	X †T	X †U

*Round, Day Tens, Recorder Group Hundreds

†Marker or Recorder Group

Note: Digits marked X will vary depending on office options, time of day, day of month, etc. A check of office records will be necessary to determine certain information that should be perforated in the end of tape entry.

Note: Use KS-14343 tape reader to read tape.

Caution: Exercise care not to mutilate tape in any manner, and under no circumstances cut the tape.

11 Read test pattern.

Note: Disregard all perforations following

Perforations on tape arranged exactly the same as pattern shown in Fig. 1.

No light or irregular perforations.

STEP

ACTION

VERIFICATION

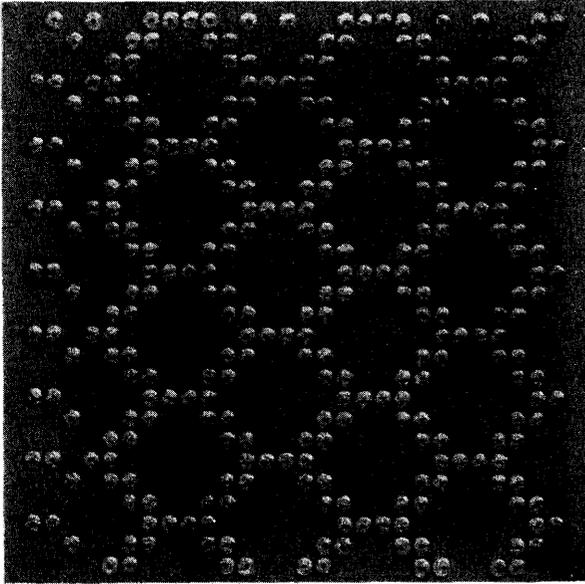


Fig. 1—Recorder Test Pattern

the diamond pattern.

- 12 Mark tape (refer to paragraph 1.10).
- 13 Remove plug of 32A test set from R jack.
- 14 At jack, lamp, and key circuit—
Remove plug from TST jack.
- 15 Remove plug from TN jack associated with
recorder being tested.

If emergency recorder is provided—
At recorder frame—
EW lamp extinguished.
If emergency recorder is not provided—
At jack, lamp, and key circuit—
R₁ lamp extinguished.

Note: If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key at the trouble indicator panel.

- 16a If emergency recorder is provided—
At emergency perforator—
Repeat Step 10.

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STEP	ACTION	VERIFICATION
17b	If emergency recorder is not provided— At perforator associated with recorder not under test— Repeat Step 10.	
D. Synchronizing Features		
1	Remove from service all trunks associated with recorder under test.	
2	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
3	At recorded under test— Block nonoperated XT relay.	
4	Insulate 3B of RD relay.	
5	Operate and release UH relay.	Within 1 minute— Major alarm sounds. At master timing frame— SSF lamp lighted.
6	Operate CKL key.	OS_ lamp associated with recorder being tested lighted.
7	At jack, lamp, and key circuit— Insert make-busy plug into MB jack associated with recorder under test.	R_ lamp lighted for recorder under test.
8	At master timing frame— Momentarily operate AR key.	Major alarm silenced. At recorder being tested— If option YE is provided— Ground present on operating spring 15 of TIB relay when CA relay released. Ground absent on operating spring 15 of TIB relay when CA relay operated. If option YF is provided— Ground present on fixed contact 15 of TIB relay when CA relay is released. Ground absent on fixed contact 15 of TIB relay when CA relay is operated. At master timing frame— SSF lamp extinguished.
9	Momentarily operate S key.	OS_ lamp associated with recorder being tested extinguished.
10	Restore CKL key.	At recorder being tested— If option YE is provided— Ground absent on operating spring 15 of TIB relay.

STEP	ACTION	VERIFICATION
		Ground present on operating spring 9 of TIB relay when CA relay released. Ground absent on operating spring 9 of TIB relay when CA relay operated. If option YF is provided— Ground absent on fixed contact 15 of TIB relay. Ground present on fixed contact 9 of TIB relay when CA relay is released. Ground absent on fixed contact 9 of TIB relay when CA relay is operated.
11	At jack, lamp, and key circuit— Remove plug from MB jack associated with recorder under test.	
12	At recorder under test— Operate and release TH relay.	Within 1 minute— Major alarm sounds. At master timing frame— SSF lamp lighted.
13	Repeat Steps 6 through 11.	
14	At recorder under test— Momentarily operate HH relay.	Within 1 minute— Major alarm sounds. At master timing frame— SSF lamp lighted.
15	Repeat Steps 6 through 10.	
16	At recorder under test— Remove insulator from 3B of RD relay.	
17	Remove blocking tool from XT relay.	
18a	If either Test H or J is to be made at this time— Omit Steps 19b through 23b.	
19b	If neither Test H nor J is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder being tested.	
20b	Insert plug of 32A test set into R jack.	
21b	Momentarily operate white key button of 32A test set.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed—
	Note: If a trouble is encountered while applying the test pattern, as indicated by	

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STEP	ACTION	VERIFICATION
	lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	RUT lamp extinguished.
22b	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder being tested.	
23b	Remove plug of 32A test set from R jack.	
24	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
25	At jack, lamp, and key circuit— Remove plug from MB jack associated with recorder being tested.	R_ lamp extinguished for recorder under test.
26	Restore to service all trunks associated with recorder under test.	

E. Recorder Number, Minutes Timing, and Hour Alarm Features (6-Second Timing)

Caution: *Do not start test 5 minutes before or after hour entry.*

1a	If emergency recorder is provided— At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with recorders. EW lamp <i>not</i> lighted.
2b	If emergency recorder is not provided— At jack, lamp, and key circuit— Observe that recorder under test is in service.	R_ lamp extinguished for recorder under test.
3	Insert make-busy plug into TN jack of recorder being tested.	If emergency recorder is provided— At recorder frame— EW lamp lighted. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp lighted for recorder under test.
4	At perforator cabinet for recorder under test— Disconnect perforator plug from jack by raising front of perforator to clear stop screws, then	Note: If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key at the trouble indicator panel.

STEP	ACTION	VERIFICATION
	pulling perforator forward approximately 1 inch.	
5	At recorder under test— Block nonoperated HS, HRA, C, PTC relays.	
6	Insulate 7T of RN relay.	
7	Operate and release HH, TH, UH relays as required to advance H, T, U selectors to position 1.	
8	Operate and hold M, RN relays for several seconds.	<p>Minor alarm sounds. At TIC— Display registered. REC, DR_ lamps lighted corresponding to recorder number. B', C', D' lamps lighted as indicated in Table B on line corresponding to H, T, U selector positions.</p> <p>E', F' lamps lighted indicating recorder tens and units digits, respectively.</p>
9	Momentarily operate TIR-AR, RLS keys.	<p>Minor alarm silenced. Display released.</p>
10	At recorder under test— Operate and release HH, TH, UH relays as required to advance H, T, U selections to next position.	
11	Operate and hold M relay for several seconds.	<p>Minor alarm sounds. At TIC— B', C', D' lamps lighted as indicated in Table B.</p>
12	Momentarily operate TIR-AR, RLS keys.	<p>Minor alarm silenced. Display released.</p>
13	At recorder under test— Repeat Steps 10 through 12 for each position of the H, T, U selectors.	

STEP

ACTION

VERIFICATION

TABLE B

SELECTOR POSITIONS			NUMBERS INDICATED BY TROUBLE INDICATOR LAMPS LIGHTED		
H	T	U	B'	C'	D'
1	1	1	0	0	0
2	2	2	1	1	1
3	3	3	2	2	2
4	4	4	3	3	3
5	5	5	4	4	4
6	6	6	5	5	5
*8	7	7	0	6	6
8	8	8	0	7	7
9	9	9	1	8	8
10	10	10	2	9	9
11	11	11	3	0	0
12	12	12	4	1	1
13	13	13	5	2	2
*15	14	14	0	3	3
15	15	15	0	4	4
16	16	16	1	5	5
17	17	17	2	6	6
18	18	18	3	7	7
19	19	19	4	8	8
20	20	20	5	9	9
1	1	1	0	0	0

* *Note:* The H selector does not stop at position 7 or 14, but automatically advances to position 8 or 15, respectively.

STEP	ACTION	VERIFICATION
	Note: The H selector does not stop at position 7 or 14 but automatically advances to position 8 or 15, respectively.	
14	Check that H, T, U selectors are on position 1.	
15	Block nonoperated TA, HRT, UH relays.	
16	Block operated IPA, CA relays.	
17	Remove insulator from 7T of RN relay.	
18	Remove blocking tool from C relay.	Within 7 seconds— C relay locked operated.
19	Remove blocking tool from IPA relay.	C relay released.
20	Block nonoperated C, TC1 relays.	
21	Remove blocking tools from CA, UH relays.	
22	Block operated HPA relay.	HR1, HR2 relays operated.
23	Release HR3 relay (if operated) by opening 1B.	
24	Operate and release UH relay once.	U selector advances to position 2.
25	Remove blocking tool from HRA relay.	
26	Apply ground to 3T of NS relay.	At recorder frame— HR lamp lighted. Major alarm sounds.
27	At recorder under test— Operate and release UH relay.	U selector advances to position 3.
28	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
29	At recorder under test— Momentarily operate CK relay.	HR3 relay operated.
30	Operate and release HH, TH, UH relays as required to advance the H, T, U selectors to positions 6, 10, 8, respectively.	
31	Connect ground to 4T of C relay.	HR3 relay released.
32	Operate and release UH relay to advance U selector to position 9.	

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STEP	ACTION	VERIFICATION
33	Operate HR3 relay.	HR3 relay locked operated. At recorder frame— HR lamp lighted. Major alarm sounds.
34	At recorder under test— Insulate 10T of PTS relay.	
35	Remove blocking tools from HPA, HS relays.	HR1, HR2 relays released.
36	Insulate 1T of HS relay.	
37	Block nonoperated HPA relay.	
38	Remove blocking tool from PTC relay.	
39	Operate and release UH relay to advance U selector to position 10.	HS relay operated.
40	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
41	At recorder under test— Operate and release HH, TH, UH relays as required to advance H, T, U selectors to positions 8, 11, 12, respectively.	HS relay released.
42	Momentarily apply ground to 4B of HR3 relay.	HR3 relay released. At recorder frame— HR lamp lighted. Major alarm sounds.
43	At recorder under test— Operate and release UH relay as required to advance U selector to position 13.	
44	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
45	At recorder under test— Operate and release HH, TH, UH relays as required to advance H, T, U selectors to positions 13, 20, 19, respectively.	
46	Operate HR3 relay.	HR3 relay locked operated. At recorder frame— HR lamp lighted. Major alarm sounds.

STEP	ACTION	VERIFICATION
47	At recorder under test— Operate and release UH relay as required to advance U selector to position 20.	HS relay operated.
48	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
49	At recorder under test— Operate and release HH, TH, UH relays as required to advance the selectors to positions 15, 1, 12, respectively.	HS relay released.
50	Momentarily apply ground to 4B of HR3 relay.	HR3 relay released. At recorder frame— HR lamp lighted. Major alarm sounds.
51	At recorder under test— Operate and release UH relay as required to advance U selector to position 13.	
52	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
53	At recorder under test— Operate HR3 relay.	HR3 relay locked operated.
54	Operate and release HH, TH, UH relays as required to advance selectors to positions 20, 10, 18, respectively.	HR3 relay released.
55	Operate and release UH relay as required to advance U selector to position 19.	
56	Operate HR3 relay.	HR3 relay locked operated. At recorder frame— HR lamp lighted. Major alarm sounds.
57	At recorder under test— Operate and release UH relay as required to advance U selector to position 20.	HS relay operated.
58	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
59	At recorder under test— Operate and release TH relay as required to advance T selector to position 11.	HS relay released.
60	Operate and release TH relay as required to advance T selector to position 20.	HS relay operated.

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STEP	ACTION	VERIFICATION
61	Momentarily operate HH relay.	H, T, U selectors advanced to position 1. HS relay released.
62	Momentarily apply ground to 4B of HR3 relay.	HR3 relay released.
63	Remove ground from 4T of C relay, 3T of NS relay.	
64	Remove insulators from 10T of PTS relay, 1T of HS relay.	
65	Remove blocking tools from C, HRT, TA relays.	
66	Block nonoperated PTC relay.	
67	Momentarily operate HRT, HTA relays if provided.	ON relay operated. Minor alarm sounds. At TIC— Display registered.
68c	At recorder under test— If HTA relay is not provided— Remove blocking tool from TC1 relay and examine trouble display taken in Step 67.	At TIC— Lamps lighted, corresponding to A' to F' digit designations, indicating numbers 2, 8, 1, 8, 9, and 9, respectively.
69d	At recorder under test— If HTA relay is provided— Examine trouble display taken in Step 67.	Lamps lighted, corresponding to A' to F' digit designations, indicating numbers 2, 8, 1, 9, 9, and 9, respectively. At recorder under test— H selector is on position 1.
70d	At TIC— Momentarily operate TIR-AR, RLS keys.	Display released. Minor alarm silenced.
71d	At recorder under test— Momentarily operate PR1 relay.	
72d	Block nonoperated C, ON relays.	
73d	Block operated HS relay.	
74d	Momentarily apply ground to 4T of C relay.	At recorder frame— HR lamp lighted. Major alarm sounds.
75d	Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
76d	At recorder under test— Operate and release HH relay as required to advance H selector to position 8.	

STEP	ACTION	VERIFICATION
77d	Momentarily apply ground to 4T of C relay.	At recorder frame— HR lamp lighted. Major alarm sounds.
78d	Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
79d	At recorder under test— Operate and release HH relay as required to advance H selector to position 15.	
80d	Release HR3 relay, if operated, by opening 1B.	
81d	Momentarily apply ground to 4T of C relay.	At recorder frame— HR lamp lighted. Major alarm sounds.
82d	At recorder under test— Block operated HRT, HTA relays.	
83d	Remove blocking tool from TC1 relay.	
84d	Remove blocking tool from ON relay.	ON relay operated. Minor alarm sounds. At TIC— Display registered. Lamps lighted, corresponding to A' to F' digit designations, indicating numbers 2, 8, 1, 8, 9, and 9, respectively.
85	At recorder under test— Block nonoperated ON relay.	
86	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
87	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
88	At recorder under test— Remove blocking tools from HS, C, and HRT, HTA relays.	
89	Connect ground to 9B of ON relay.	
90	Block operated ADT relay.	
91	Remove blocking tool from ON relay.	ON operated for several seconds then releases. At TIC— Disregard display registered.

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STEP	ACTION	VERIFICATION
92	Momentarily operate TIR-AR, RLS keys.	Display released.
93	At recorder under test— Operate and hold ON relay for several seconds.	Minor alarm sounds. At TIC— Display registered. Lamps lighted, corresponding to A' to F' digit designations, indicating numbers 2, 8, 7, 1, 0, and 0, respectively.
94	At recorder under test— Block nonoperated ON relay.	
95	Remove blocking tool from ADT relay.	
96	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
97	At recorder under test— Remove blocking tool from HPA relay.	
98	Block operated TCT relay.	
99	Remove blocking tool from ON relay.	
100	Operate and hold ON relay for several seconds.	Minor alarm sounds. At TIC— Display registered. Lamps lighted, corresponding to A' to F' digit designations, indicating numbers 2, 8, 5, 4, 0, and 0, respectively.
101	At recorder under test— Remove blocking tool from TCT relay.	
102	Remove ground from 9B of ON relay.	
103	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
104	At recorder under test— Block operated AT relay.	
105	Operate and hold ON relay for several seconds.	Minor alarm sounds. At TIC— Display registered. Lamps lighted, corresponding to A' to F' digit designations, indicating numbers 0, 1, 0, 1, 0, and 1, respectively.
106	At recorder under test— Remove blocking tools from AT, PTC relays.	

STEP	ACTION	VERIFICATION
107	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
108	At perforator cabinet— Restore perforator plug to associated jack.	
109	At master timing frame— Momentarily operate S key.	
110e	If either Test F, G, I, or K is to be made at this time— Omit Steps 111g through 115g.	
111g	If neither Test F, G, I, nor K is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder being tested.	
112g	Insert plug of 32A test set into R jack.	
113g	Momentarily operate white key button of 32A test set. <i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by a lighted RIT lamp, clear the trouble and apply a good test pattern before restoring recorder to service.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp not lighted. When test is completed— RUT lamp extinguished.
114g	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder being tested.	
115g	Remove plug of 32A test set from R jack.	
116	Remove plug from TN jack associated with recorder being tested.	If emergency recorder is provided— At recorder frame— EW lamp extinguished. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp extinguished.

Note: If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key

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STEP	ACTION	VERIFICATION
E.1 Recorder Number, Minutes Timing, Seconds Timing, and Hour Alarm Features (1-Second Timing)		
<i>Caution: Do not start test 1 minute before or after any 10 minute period.</i>		
1a	If emergency recorder is provided— At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with recorders. EW lamp not lighted.
2b	If emergency recorder is not provided— At jack, lamp, and key circuit— Observe that recorder under test is in service.	R_ lamp extinguished for recorder under test.
3	Insert make-busy plug into TN jack of recorder under test.	If emergency recorder is provided— At recorder frame— EW lamp lighted. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp lighted for recorder under test.
<i>Note: If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR_AR key at the trouble indicator panel.</i>		
4	At perforator cabinet for recorder under test— Disconnect perforator plug from jack by raising front of perforator to clear stop screws, then pulling perforator forward approximately 1 inch.	
5	At recorder under test— Block nonoperated HS, HRA, C, PTC relays.	
6	Insulate 7T of RN relay.	
7	Operate and release HH, TH, relays as required to advance H and T selectors to position 1.	
8	Operate and release UH relay as required to advance the UA-D counters to indicate 0 seconds (UD relay operated)	
9	Operate and hold M, RN relays for several seconds.	Minor alarm sounds. At TIC— REC, DR_ lamps lighted corresponding to recorder numbers. B', C', D' lamps lighted as indicated in Table C on line corresponding to H, T selector positions

STEP

ACTION

VERIFICATION

and UA-D counter relays operated.
E', F' lamps lighted indicating recorder tens
and units digits respectively.

TABLE C

SELECTOR POSITIONS		TROUBLE INDICATOR LAMPS LIGHTED ACCORDING TO POSITIONS OF T AND H SELECTORS		UA THROUGH UD RELAY COUNTER OPERATIONS	TROUBLE INDICATOR LAMPS LIGHTED ACCORDING TO POSITIONS OF UA THROUGH UD RELAYS
T	H	B'	C'	RELAYS OPERATED	D'
1	1	0	0	UD	0
2	2	1	1	UB, UD	1
3	3	2	2	UB	2
4	4	3	3	UA, UB	3
5	5	4	4	UA, UB, UD	4
6	6	5	5	UA, UB, UC, UD	5
7	+	6	+	UA, UB, UC	6
8	8	7	0	UB, UC	7
9	9	8	1	UB, UC, UD	8
10	10	9	2	UC, UD	9
11	11	0	3	UA through UD relays repeat above sequence every ten seconds.	0
12	12	1	4		1
13	13	2	5		2
14	+	3	+		3
15	15	4	0		4
16	16	5	1		5
17	17	6	2		6
18	18	7	3		7
19	19	8	4		8
20	20	9	5		9

+ Indicates the H selector does not stop on terminals 7 or 14 but automatically advances to position 8 or 15, respectively.

- 10 At TIC—
Momentarily operate TIR-AR, RLS keys. Minor alarm silenced.
All lamps extinguished.
- 11 At recorder under test—
Operate and release HH, TH, UH relays as

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STEP	ACTION	VERIFICATION
	required to advance H and T selectors to next positions and UA-D counters to their next positions, respectively.	
12	Operate and hold M relay for several seconds.	Minor alarm sounds. At TIC— B', C', D' lamps lighted as indicated in Table C.
13	Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. All lamps extinguished.
14	Repeat Steps 11 through 13 for each position of the H, T selectors and UA-D counter relays. <i>Note:</i> The H selector does not stop at position 7 or 14, but automatically advances to position 8 or 15, respectively.	
15	At recorder under test— Check that H, T selectors are in position 1 and UA-D counters are at zero seconds (UD relay operated).	
16	Block nonoperated TA, HRT, UH relays.	
17	Block operated IPA, CA relays.	
18	Remove insulator from 7T of RN relay.	
19	Remove blocking tool from C relay.	Within 2 seconds— C relay locked operated.
20	Remove blocking tool from IPA relay.	C relay released.
21	Block nonoperated C, TC1 relays.	
22	Remove blocking tools from CA, UH relays.	
23	Block operated HPA relay.	HR1, HR2 relays operated.
24	Release HR3, if operated, by opening 1B.	
25	Operate and release UH relay 6 times.	UA-D counters indicate 6 seconds, (UA, UB, UC operated).
26	Remove blocking tool from HRA relay.	
27	Connect ground to 3T of NS relay.	At recorder frame— HR lamp lighted. Major alarm sounds.

STEP	ACTION	VERIFICATION
28	At recorder under test— Operate and release UH relay.	UA-D counters indicate 7 seconds, (UB, UC operated).
29	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
30	At recorder under test— Momentarily operate CK relay.	HR3 relay operated.
31	Operate, release HH, TH relays as required to advance H, T selectors to positions 6, 10, respectively.	
32	Operate, release UH relay as required to advance UA-D counters to indicate 6 seconds. (UA, UB, UC relays operated.)	
33	Connect ground to 4T of C relay.	HR3 relay released.
34	Operate release UH relay to advance UA-D counters to indicate 8 seconds. (UB, UC, UD relays operated.)	
35	Operate HR3 relay.	HR3 relay locked operated. At recorder frame— HR lamp lighted. Major alarm sounds.
36	At recorder under test— Insulate 10T of PTS relay.	
37	Remove blocking tools from HPA, HS relays.	HR1, HR2 relays released.
38	Insulate 1T of HS relay.	
39	Block nonoperated HPA relay.	
40	Remove blocking tool from PTC relay.	
41	Operate, release UH relay to advance UA-D counters to indicate 9 seconds. (UC, UD relays operated.)	HS relay operated.
42	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
43	At recorder under test— Operate, release HH, TH relays as required to advance H, T selectors to positions 8, 11, respectively.	

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STEP	ACTION	VERIFICATION
44	Operate, release UH relay to advance UA-D counters to indicate 6 seconds (UA, UB, UC relays operated.)	HS relay released.
45	Momentarily apply ground to 4B winding terminal of HR3 relay.	HR3 relay released. At recorder frame— HR lamp lighted. Major alarm sounds.
46	At recorder under test— Operate, release UH relay to advance UA-D counters to indicate 7 seconds. (UB, UC relays operated.)	
47	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
48	At recorder under test— Operate, release HH, TH relays to advance H, T selectors to positions 13, 20, respectively.	
49	Operate, release UH relay to advance UA-D counters to indicate 6 seconds. (UA, UB, UC relays operated.)	HS relay released.
50	Operate, release UH relay two times to advance UA-D counters to indicate 8 seconds. (UB, UC, UD relays operated.)	HS relay released.
51	Momentarily operate HR3 relay.	HR3 relay locked operated. At recorder frame— HR lamp lighted. Major alarm sounds.
52	At recorder under test— Operate, release UH relay to advance UA-D counters to indicate 9 seconds. (UC, UD relays operated.)	HS relay operated.
53	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
54	At recorder under test— Operate, release HH, TH relays to advance H, T, selectors to positions 15, 1, respectively.	
55	Operate, release UH relay to advance UA-D counters to indicate 6 seconds. (UA, UB, UC relays operated.)	HS relay released.
56	Momentarily apply ground to 4B winding terminal of HR3 relay.	HR3 relay released. At recorder frame—

STEP	ACTION	VERIFICATION
		HR lamp lighted. Major alarm sounds.
57	At recorder under test— Operate release UH relay to advance UA-D counters to indicate 7 seconds. (UB, UC relays operated).	
58	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
59	At recorder under test— Momentarily operate HR3 relay.	HR3 relay locked operated.
60	Operate, release HH, TH relays to advance H, T, selectors to positions 20, 10, respectively.	
61	Operate, release UH relay to advance UA-D counters to indicate 6 seconds. (UA UB UC relays operated).	HR3 relay released.
62	Operate, release UH relay to advance UA-D counters to indicate 8 seconds. (UB, UC, UD operated.)	
63	Momentarily operate HR3 relay.	HR3 relay locked operated. At recorder frame— HR lamp lighted. Major alarm sounds.
64	At recorder under test— Operate, release UN relay to advance UA-D counters to indicate 9 seconds. (UC, UD operated.)	HS relay operated.
65	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
66	At recorder under test— Operate, release TH relay to advance T selector to position 11.	HS released.
67	Operate, release TH relay to advance T selector to position 20.	HS relay operated.
68	Momentarily apply ground to 5B of the C relay.	H, T selectors advanced to position 1. UA-D counters advanced to indicate 0 seconds. (UD only operated.) HS relay released.
69	Momentarily apply ground to 4B winding terminal of HR3 relay.	HR3 relay released.

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STEP	ACTION	VERIFICATION
70	Remove ground from 4T of C relay, 3T of NS relay.	
71	Remove insulators from 10T of PTS relay, IT of HS relay.	
72	Remove blocking tools from C, HRT, TA relays.	
73	Block nonoperated PTC relay.	
74	Momentarily operate HRT, HTA relays, if provided.	ON relay operated. Minor alarm sounds. At TIC— Display registered.
75	Momentarily operate TIR-AR key.	Minor alarm silenced.
76c	If HTA relay is not provided— At recorder under test— Remove blocking tool from TC1 relay and examine trouble displayed in Step 74.	At TIC— Display registered. A' through F' digit designating lamps lighted indicating numbers 2, 8, 1, 5, 9, 9, respectively.
77d	If HTA relay is provided— Examine trouble display taken in Step 74.	At TIC— Display registered. A' through F' digit designating lamps lighted indicating numbers 2, 8, 1, 6, 9, 9, respectively.
78	At TIC— Momentarily operate RLS key.	Display released.
79	At recorder under test— Block TC1 relay nonoperated.	
80	Block HR relay operated.	
81	Repeat Steps 74 and 75.	
82c	If HTA relay is <i>not</i> provided— At recorder under test— Remove blocking tool from TC1 relay and examine trouble displayed in Step 74.	At TIC— Display registered. A' through F' digit designations perforated indicating 2,8,1,8,9,9, respectively.
83d	If HTA relay is provided— Examine trouble displayed in Step 74.	At TIC— Display registered. A' through F' digit designations perforated indicating 2, 8, 1, 9, 9, 9, respectively.
84d	At recorder under test— Remove blocking tool from HR relay.	
85d	Momentarily operate PR1 relay.	

STEP	ACTION	VERIFICATION
86d	Block nonoperated C, ON relays.	
87d	Block operated HS relay.	
88d	Operate and release relay HH to advance the H selector to position 2.	
89d	Momentarily apply ground to 4T of C relay.	At recorder frame— HR lamp lighted. Major alarm sounds.
90d	Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
91d	At recorder under test— Operate and release HH relay as required to advance H selector to position 9.	
92d	Momentarily apply ground to 4T of C relay.	At recorder frame— HR lamp lighted. Major alarm sounds.
93d	Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
94d	At recorder under test— Operate and release HH relay as required to advance H selector to position 16.	
95d	Release HR3 relay, if operated, by opening 1B.	
96d	Momentarily apply ground to 4T of C relay.	At recorder frame— HR lamp lighted. Major alarm sounds.
97d	At recorder under test— Block operated HRT, HTA relays.	
98d	Remove blocking tool from TC1 relay.	
99d	Remove blocking tool from ON relay.	ON relay operated. At recorder frame— Minor alarm sounds. At TIC— Display registered. A' through F' digit designating lamps lighted indicating numbers 2, 8, 1, 5, 9, 9, respectively.
100d	At recorder under test— Block nonoperated ON relay.	

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STEP	ACTION	VERIFICATION
101d	At recorder frame— Momentarily operate AR key.	HR lamp extinguished. Major alarm silenced.
102d	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
103d	At recorder under test— Remove blocking tools from HS, HRT, HTA, C relays.	
104	Connect ground to 9B of ON relay.	
105	Block operated ADT relay.	
106	Remove blocking tool from ON relay.	ON relay operated for several seconds, then released. At TIC— Disregard display.
107	Momentarily operate TIR-AR, RLS key.	Minor alarm silenced. Display released.
108	At recorder under test— Operate and hold ON relay for several seconds.	At recorder frame— Minor alarm sounds. At TIC— A' through F' digit designating lamps lighted indicating numbers 2, 8, 7, 1, 0, 0, respectively.
109	At recorder under test— Block nonoperated ON relay.	
110	Remove blocking tool from ADT relay.	
111	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
112	At recorder under test— Remove blocking tool from HPA relay.	
113	Block operated TCT relay.	
114	Remove blocking tool from ON relay.	
115	Operate and hold ON relay for several seconds.	At recorder frame— Minor alarm sounds. At TIC— A' through F' digit designating lamps lighted indicating numbers 2, 8, 5, 4, 0, 0, respectively.
116	At recorder under test— Remove blocking tool from TCT relay.	

STEP	ACTION	VERIFICATION
117	Remove ground from 9B of ON relay.	
118	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
119	At recorder under test— Block operated AT relay.	
120	Operate and hold ON relay for several seconds.	At recorder frame— Minor alarm sounds. At TIC— A' through F' digit designating lamps lighted indicating numbers 0, 1, 0, 1, 0, 1, respectively.
121	At recorder under test— Remove blocking tools from AT, PTC relays.	
122	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
123	At perforator cabinet— Restore perforator plug to its associated jack.	
124	At master timing frame— Momentarily operate S key.	
125	At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
126	Insert plug of 32A test set into R jack.	
127	Momentarily operate white (ST) button of 32A test set. <i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply a good test pattern before restoring recorder to service.	RUT lamp lighted. When test is completed— RUT lamp extinguished.
128	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder under test.	
129	Remove plug of 32A test set from R jack.	
130	Remove plug from TN jack associated with recorder under test.	If emergency recorder is provided— At recorder frame— EW lamp extinguished. If emergency recorder is not provided— At jack, lamp, and key circuit—

STEP	ACTION	VERIFICATION
		R_ lamp associated with recorder under test extinguished.
		<i>Note:</i> If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key at the trouble indicator panel.
F. Splice, Break-in-Tape, and Paper Jam Features		
Splice and Break-In-Tape		
1	Remove from service all trunks associated with recorder under test.	
2	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
3	Cut a window splice in the paper tape at a point just before the tape enters the tape chute.	
	Caution Exercise care not to mutilate the tape in any manner.	
4	At jack, lamp, and key circuit— Insert make-busy plug into MB jack of recorder under test to advance window splice through perforator.	At perforator cabinet— Make-busy pattern perforated on tape. At recorder under test— SP relay operated when window splice is encountered.
	Note: More than one make-busy pattern may be needed to advance the window splice through the perforator. This may be accomplished by removing and then reinserting the make-busy plug into the MB jack associated with the recorder under test.	
5	At recorder under test— Block operated SP relay.	In approximately two minutes— NP lamp lighted. Major alarm sounds. At perforator cabinet— Splice pattern perforated.
6	At recorder under test— Remove blocking tool from SP relay.	At perforator cabinet— Make-busy pattern perforated.
7	At recorder frame— Momentarily operate AR key.	Major alarm silenced. NP lamp extinguished.

STEP	ACTION	VERIFICATION
8a	If no further tests are to be performed— At perforator cabinet— Mark tape (refer to paragraph 1.10).	
9a	At jack, lamp, and key circuit— Restore to service all trunks associated with recorder under test.	
Paper Jam Feature		
10	Remove from service all trunks associated with recorder under test.	
11	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
12	Remove tape from slack tape arm and place arm on holder.	
13	At jack, lamp, and key circuit— Insert make-busy plug into MB jack associated with recorder under test. <i>Note:</i> More than one make-busy pattern will be needed in order to advance the paper jam detector counter past two hundred registrations.	At recorder frame— NP lamp lighted. Major alarm sounds. At perforator cabinet— Paper jam detector counter indicates more than two hundred registrations.
14	At recorder frame— Momentarily operate AR key.	NP lamp <i>not</i> extinguished. Major alarm <i>not</i> silenced.
15	At perforator cabinet— Remove slack tape arm from holder and verify that tape winds onto take-up reel. <i>Caution: Take care not to mutilate tape in any manner.</i>	Take-up reel stops when slack tape arm activates microswitch on take-up motor. Paper jam detector counter reset. Major alarm silenced. At recorder frame— NP lamp extinguished.
16	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
17	At jack, lamp, and key circuit— Remove make-busy plug from MB jack associated with recorder under test.	
18	Restore to service all trunks associated with recorder under test.	

G. Trouble Timing Feature

1a	If emergency recorder is provided— At jack, lamp, and key circuit—	No make-busy plug in any TN jacks associated with recorder.
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STEP	ACTION	VERIFICATION
	Check that emergency recorder is not in service.	EW lamp <i>not</i> lighted.
2b	If emergency recorder is not provided— At jack, lamp, and key circuit— Observe that recorder under test is in service.	R_ lamp extinguished for recorder under test.
3	Insert make-busy plug into TN jack associated with recorder under test.	If emergency recorder is provided— At recorder frame— EW lamp of emergency recorder lighted. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp lighted for recorder under test.
4	At perforator cabinet— Mark tape (refer to paragraph 1.10).	Note: If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key at the trouble indicator panel.
5	At recorder under test— Insulate 3T of TTIB relay.	TA, TF relays operated. In approximately 0.5 second— TB relay operated. Minor alarm sounds. In approximately 2 seconds— TC, TD, TE, RD relays operated. TA, TF relays released At TIC— DL_ lamp lighted.
6	Block operated ON relay.	TB, TC, TD, TE, RD relays released.
7	At recorder under test— Remove blocking tool from ON relay.	DL_ lamp extinguished. Minor alarm silenced.
8	Remove insulator from 3T of TTIB relay.	TA, TF, TM relays momentarily operated. In approximately 0.5 second— TB, TE relays operated. Minor alarm sounds.
9	At TIC— Momentarily operate TIR-AR, RLS keys.	
10	At recorder under test— Block operated TTIB relay.	
11	Block operated ON relay.	

STEP	ACTION	VERIFICATION
		Ground on 5T of TBL relay. Ground on 8B of IPA relay.
12	Remove blocking tool from ON relay.	TB, TE relays released. At TIC— DL_ lamp lighted.
13	At recorder under test— Remove blocking tool from TTIB relay.	
14	Momentarily operate T1R-AR, RLS keys.	DL_ lamp extinguished. Minor alarm silenced.
15c	If either Test E, I, or K is to be made at this time— Omit Steps 16d through 20d.	
16d	If neither Test E, I, nor K is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
17d	Insert plug of 32A test set into R jack.	
18d	Momentarily operate white key button of 32A test set. Note: If a trouble is encountered while applying the test pattern, as indicated by the lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp not lighted. When test is completed— RUT lamp extinguished.
19d	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder under test.	
20d	Remove plug of 32A test set from R jack.	
21	At perforator cabinet Mark tape (refer to paragraph 1.10).	
22	At jack, lamp, and key circuit— Remove plug from TN jack associated with recorder under test.	If emergency recorder is provided— At recorder frame— EW lamp associated with emergency recorder extinguished. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp extinguished.

STEP	ACTION	VERIFICATION
		<i>Note:</i> If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key at the trouble indicator panel.
H. AG Lead Alarm and Locking Features		
1	Remove from service all trunks associated with recorder under test.	
2	At jack, lamp, and key circuit— Insert make-busy plug into MB jack associated with recorder under test.	R_ lamp lighted for recorder under test.
3	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
4	At TIC— Insert make-busy plug into MB jack associated with recorder.	
5	At recorder under test— Block nonoperated IP, TE relays.	
6	At call identity indexer associated with recorder being tested— Block operated any TA_ or TB_ relay.	Minor alarm sounds. At TIC— DL_ lamp lighted.
7	At recorder under test— Operate RD, IPA relays.	RD, IPA relays locked operated.
8	At call identity indexer associated with recorder under test— Remove blocking tool from TA_ or TB_ relay.	At recorder under test— RD, IPA relays released.
9	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. DL_ lamp extinguished.
10	At call identity indexer associated with recorder under test— Block operated any U_ relay.	
11	At recorder under test— Operate RD relay.	RD relay locked operated.
12	At call identity indexer associated with recorder under test— Remove blocking tool from U_ relay.	At recorder under test— RD relay released.
13	Remove blocking tools from TE, IP relays.	

STEP	ACTION	VERIFICATION
14	At TIC— Remove plug from MB jack associated with recorder being tested.	
15a	If Test J is to be made at this time— Omit Steps 16b through 20b.	
16b	If Test J is not to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
17b	Insert plug of 32A test set into R jack.	
18b	Momentarily operate white key button of 32A test set. <i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by the lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp not lighted. When test is completed— RUT lamp extinguished.
19b	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder under test.	
20b	Remove plug of 32A test set from R jack.	
21	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
22	At jack, lamp, and key circuit— Remove plug from MB jack associated with recorder under test.	R-lamp extinguished.
23	Restore to service all trunks associated with recorder under test.	
I. Transient Operation of Perforator Magnets and Series Relay Locking Features		
1a	If emergency recorder is provided— At jack, lamp, and key circuit— Check that emergency recorder is not in service.	No make-busy plug in any TN jack associated with recorders.
2b	If emergency recorder is not provided— At jack, lamp, and key circuit— Observe that recorder under test is in service.	R_ lamp extinguished for recorder under test.

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STEP	ACTION	VERIFICATION
3	Insert make-busy plug into TN jack associated with recorder under test.	If emergency recorder is provided— At recorder frame— EW lamp of emergency recorder lighted. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp lighted for recorder under test.
		Note: If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key at the trouble indicator panel.
4	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
5	At recorder under test— Connect ground to T winding terminal of A0 relay for several seconds.	A0 relay operated. Minor alarm sounds. At TIC— Display registered. A'0, RN_ lamps associated with recorder being tested lighted. A0 relay released.
6	Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
7	At recorder under test— Insulate 3B of TE relay, 8T of PTS relay, 9B of TEC relay.	
8	Block nonoperated IP relay.	
9	Momentarily connect ground to T winding terminal of A0 relay.	A0 relay locked operated. PTS relay operated.
10	Momentarily connect ground to B winding terminal of A0 relay.	A0, PTS relays released.
11	Repeat Steps 9, 10 for each of A1, A2, B0 to B7, C0 to C7, D0 to D7, E0 to E7, F0 to F7 relays.	
12	Remove insulators from 3B of TE relay, 8T of PTS relay, 9B of TEC relay.	
13	Remove blocking tool from IP relay.	
14c	If either Test E, G, or K is to be made at this time— Omit Steps 15d through 19d.	

STEP	ACTION	VERIFICATION
15d	If neither Test E, G, nor K is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
16d	Insert plug of 32A test set into R jack.	
17d	Momentarily operate white key button of 32A test set. <i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by the lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	At recorder portion of master timing circuit— RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed— RUT lamp extinguished.
18d	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder under test.	
19d	Remove plug of 32A test set from R jack.	
20	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
21	At jack, lamp, and key circuit— Remove plug from TN jack associated with recorder being tested.	If emergency recorder is provided— At recorder frame— EW lamp associated with emergency recorder extinguished. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp extinguished. <i>Note:</i> If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key at the trouble indicator panel.
J. Trouble Cross-Detecting Features		
1	Remove from service all trunks associated with recorder under test.	
2	At jack, lamp, and key circuit— Check that recorder under test is not transferred.	No make-busy plug in any TN jack associated with recorders.
3	At jack, lamp, and key circuit— Insert make-busy plug into MB jack associated with recorder under test.	At recorder under test— MBR relay operated. At jack, lamp, and key circuit— R_ lamp lighted for recorder under test.

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STEP	ACTION	VERIFICATION
4	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
5	At recorder under test— Insulate 3T, 4B of XPA relay.	
XP Relay		
6	Insulate 3B of IP relay.	Minor alarm sounds. At TIC— Display registered. XP1, RN_ lamps associated with recorder under test lighted. At recorder under test— XPA relay operated.
7	Remove insulator from 3B of IP relay.	
8	Momentarily open 6T of XPA relay.	XPA relay released.
9	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
10	At recorder under test— Block nonoperated XP1 relay.	
11	Insulate 3T of MTP relay.	XP relay not operated.
12	Insulate 6T of MTP relay.	XP relay operated.
13	Remove insulator from 3T of MTP relay.	XP relay released.
14	Remove insulator from 6T of MTP relay.	
15	Remove blocking tool from XP1 relay.	
XU Relay		
16	At call identity indexer associated with recorder under test— Insulate 3T of any U_ relay.	Minor alarm sounds. At TIC— Display registered. XU1, RN_ lamps associated with recorder under test lighted. At recorder being tested— XPA relay operated.
17	At call identity indexer associated with recorder under test— Remove insulator from 3T of U_ relay.	
18	At recorder under test— Momentarily open 6T of XPA relay.	XPA relay released.

STEP	ACTION	VERIFICATION
19	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
20	At recorder under test— Block nonoperated XP1 relay.	
21	At call identity indexer associated with recorder under test— Insulate 3B of any U_ relay.	At recorder under test— XU relay operated.
22	At call identity indexer associated with recorder under test— Remove insulator from 3B of U_ relay.	At recorder under test— XU relay released.
23	Remove blocking tool from XP1 relay.	
XTC, XCO Relays		
24	At call identity indexer associated with recorder under test— Connect ground to 3T of any UA_ relay.	Minor alarm sounds. At TIC— Display registered. XTL, XTC, RN_ lamps associated with recorder under test lighted.
25	Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
26	At call identity indexer associated with recorder under test— Remove ground from 3T of UA_ relay.	
27	Block operated A1 relay.	Minor alarm sounds. At TIC— Display registered. XTC, RN_ lamps associated with recorder under test lighted. At recorder under test— XTC, XCO relays operated.
28	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
29	At call identity indexer associated with recorder under test— Remove blocking tool from A1 relay.	At recorder under test— XTC, XCO relays released.
XT Relay		
30	Connect ground to 2B of MB relay.	
31	At call identity indexer associated with recorder under test—	Minor alarm sounds. At TIC—

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STEP	ACTION	VERIFICATION
	Insulate 1T of any T_ relay.	Display registered. XT1, RN_ lamps associated with recorder under test lighted. At recorder under test— XT relay operated.
32	At call identity indexer associated with recorder under test— Remove insulator from 1T of T_ relay.	At recorder under test— XT relay released.
33	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
34	At recorder under test— Remove insulators from 3T, 4B of XPA relay.	Major alarm sounds. At recorder frame— XRB lamp associated with recorder under test lighted.
35	Momentarily operate AR key.	Major alarm silenced. XRB lamp extinguished.
36	At recorder under test— Block nonoperated XP1 relay.	
37	Insulate 3B of RD relay.	XT relay operated.
38	Remove insulator from 3B of RD relay.	XT relay released.
39	Remove blocking tool from XP1 relay.	
40	Remove ground from 2B of MB relay.	
XRB Relay		
41	Insulate 6B of MBR relay.	
42	Release MBR relay.	
43	Block nonoperated MBJ relay.	
44	Momentarily apply ground to 8B of TN1 relay.	Major alarm sounds. At recorder frame— XRB lamp associated with recorder under test lighted.
45	Momentarily operate AR key.	Major alarm silenced. XRB lamp extinguished.
46	At recorder under test— Momentarily connect ground to 2T of RT relay.	Major alarm sounds. At recorder frame— XRB lamp associated with recorder under test lighted.

STEP	ACTION	VERIFICATION
47	Momentarily operate AR key.	Major alarm silenced. XRB lamp extinguished.
48	At recorder under test— Remove blocking tool from MBJ relay.	
49	Operate MBR relay.	MBR relay locked operated.
50	Remove insulator from 6B of MBR relay.	
TL Relay Release		
51	At CII— Insulate contact 5B of TO relays.	At recorder under test— TL relay released.
52	At CII— Remove insulators from all T-relays.	At recorder under test— TL relay operated.
53	Repeat Steps 51, 52 for T1 through T9 relays, as provided.	
54a	If Test H is to be made at this time— Omit Steps 55b through 59b.	
55b	If Test H is not to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
56b	Insert plug of 32A test set into R jack.	
57b	Momentarily operate white key button of 32A test set. Note: If a trouble is encountered while applying the test pattern, as indicated by the lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed— RUT lamp extinguished.
58b	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder under test.	
59b	Remove plug of 32A test set from R jack.	
60	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
61	At jack, lamp, and key circuit— Remove plug from MB jack associated with recorder being tested.	MBR relay released. R_ lamp extinguished.

STEP	ACTION	VERIFICATION
62	Restore to service all trunks associated with recorder under test.	
K. Test for False Continuity and Crosses of TC Relays		
1a	If emergency recorder is provided— At jack, lamp, and key circuit— Observe that emergency recorder is not in use.	No make-busy plug in any TN jacks associated with recorders. EW lamp not lighted.
2b	If emergency recorder is not provided— At jack, lamp, and key circuit— Observe that recorder under test is in service.	R_ lamp extinguished for recorder under test.
3	Insert make-busy plug into TN jack associated with recorder under test.	If emergency recorder is provided— At recorder frame— EW lamp of emergency recorder lighted. If emergency recorder is not provided— At jack, lamp, and key circuit— R_ lamp lighted for recorder under test. Note: If emergency recorder is not provided, a trouble indication is received showing an XTC failure and a minor alarm sounds. Alarm can be released by operating the TIR-AR key at the trouble indicator panel.
4	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
5	At jack, lamp, and key circuit— Insert make-busy plug into associated MB jack of lowest numbered transverter.	At transverter made busy— RK relay released. At recorder unit TC terminal strip— Battery absent on terminals 7, 18, 19, 29, 36, 39, 47, 56. Ground absent on terminals 5, 7, 9 through 15, 25, 27, 35, 36, 49, 56. TVM, CH relays released.
6	At recorder under test— Connect ground to 9B of CH relay.	If CHLK relay is provided— CHLK relay not operated.
7	Remove ground from 9B of CH relay.	
8	Insulate 6T of TVM relay.	At recorder unit TC terminal strip— Battery absent on terminal 45.
9	At recorder under test— Remove insulator from 6T of TVM relay.	

STEP	ACTION	VERIFICATION
10	Insulate 6T of TVM1 relay.	At recorder unit TC terminal strip— Ground absent on terminal 48.
11	At recorder under test— Remove insulator from 6T of TVM1 relay.	
12	Connect ground to top winding terminal of TC_ relay associated with transverter made busy.	
13	Block operated ON1 relay.	At recorder unit TC terminal strip— Ground absent on terminal 0.
14	At recorder under test— Remove ground from top winding terminal of TC_ relay.	
15	Remove blocking tool from ON1 relay.	
16	Connect 7B of HS relay to terminal 27 of frame TC terminal strip associated with transverter made busy.	At transverter made busy— IR relay operated.
17	At recorder under test— Remove connection between 7B of HS relay and terminal 27.	At recorder unit TC terminal strip— Both battery and ground absent on terminal 18.
18	At recorder under test— Connect ground to 6B of TBL relay.	At frame TC terminal strip associated with transverter made busy— Ground absent on terminal 29.
19	At recorder under test— Remove ground from 6B of TBL relay.	
20	At transverter made busy— Insulate 7T, 3B, 9B of COD relay.	At frame TC terminal strip associated with transverter made busy— Both battery and ground absent on terminals 26, 36, 46, 56.
21	At transverter made busy— Remove insulator from 9B of COD relay.	At frame TC terminal strip associated with transverter made busy— Both battery and ground absent on terminals 36, 56.
22	At transverter made busy— Remove insulators from 3B, 7T of COD relay.	
23	Insulate 3T, 7B of COD relay.	At frame TC terminal strip associated with transverter made busy— Both battery and ground absent on terminals 16, 55.

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STEP	ACTION	VERIFICATION
24	At transverter made busy— Remove insulators from 3T, 7B of COD relay.	
25	Insulate 1T of TOK relay.	At frame TC terminal strip associated with transverter made busy— Battery absent on terminal 47.
26	At transverter made busy— Insulate 5B of COD relay.	At frame TC terminal strip associated with transverter made busy— Battery absent on terminal 57.
27	At transverter made busy— Remove insulators from 1T of TOK relay, 5B of COD relay.	
28	Insulate 9B of COB relay.	At frame TC terminal strip associated with transverter made busy— Both battery and ground absent on terminal 38.
29	At transverter made busy— Insulate 5T of COD relay.	At frame TC terminal strip associated with transverter made busy— Both battery and ground absent on terminal 58.
30	At transverter made busy— Remove insulators 5T of COD relay, 9B of COB relay.	
31	Insulate 3B of LP relay.	At frame TC terminal strip associated with transverter made busy— Both battery and ground absent on terminal 39.
32	At transverter made busy— Insulate 5T of TOK relay.	At frame TC terminal strip associated with transverter made busy— Battery absent on terminal 49.
33	At transverter made busy— Remove insulator from 3B of LP relay.	
34	Remove insulator from 5T of TOK relay.	
35	At recorder frame TC terminal strip associated with transverter made busy— Check for presence of battery on terminals 29, 37, 47.	
36	At jack, lamp, key circuit— Remove plug from MB jack associated with transverter made busy.	

STEP	ACTION	VERIFICATION
37	Repeat Steps 5 through 36, using next higher numbered transverter until all TC_ relays of recorder being tested have been tested.	
38c	If either Test E, G, or I is to be made at this time— Omit Steps 40d through 44d.	
39d	If neither Test E, G, nor I is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with recorder under test.	
40d	Insert plug of 32A test set into R jack.	
41d	Momentarily operate white key button of 32A test set. <i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by the lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp not lighted. When test is completed— RUT lamp extinguished.
42d	At jack, lamp, and key circuit— Remove plug from TST jack associated with recorder under test.	
43d	Remove plug of 32A test set from R jack.	
44	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
45	At jack, lamp, and key circuit— Remove plug from TN jack associated with recorder under test.	If emergency recorder is not provided— At recorder frame— EW lamp extinguished.

L. Deleted**M. Preference Relays—Operating and Lockout Features**

- 1 Remove from service all trunks served by recorder being tested.
- 2 At perforator cabinet—
Mark tape (refer to paragraph 1.10).
- 3 At recorder under test—
Block nonoperated XP relay.
- 4 Insulate 5T of MTP relay.

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STEP	ACTION	VERIFICATION
5	Connect battery to B winding terminal of IP relay.	IP relay operated.
6	Connect battery to B winding terminal of HP relay.	IP relay remains operated. HP relay not operated.
7	Remove battery from IP relay.	IP relay released. HP relay operated.
8	Reconnect battery to B winding terminal of IP relay.	IP relay operated. HP relay remains operated.
9	Remove battery from IP relay.	IP relay released.
10	Connect battery to B winding terminal of highest numbered TP_ relay.	TP_ relay not operated.
11	Remove battery from HP relay.	HP relay released. TP_ relay operated.
12	Reconnect battery to B winding terminal of HP relay.	HP relay operated. TP_ relay remains operated.
13	Remove battery from TP_ relay.	TP_ relay released.
14	Connect battery to B winding terminal of next highest numbered TP_ relay.	TP_ relay not operated.
15	Remove battery from B winding terminal of HP relay.	HP relay released. TP_ relay operated.
16	Reconnect battery to B winding terminal of HP relay.	HP relay operated. TP_ relay remains operated.
17	Remove battery from B winding terminal of TP_ relay.	TP_ relay released.
18	Repeat Steps 14 through 17, using remaining TP_ relays.	
19	Connect battery to B winding terminal of MTP relay.	MTP relay not operated.
20	Remove battery from B winding terminal of HP relay.	HP relay released. MTP relay operated.
21	Reconnect battery to B winding terminal of HP relay.	HP relay operated. MTP relay remains operated.
22	Remove battery from B winding terminals of HP, MTP relays.	HP relay released. MTP relay released.

STEP	ACTION	VERIFICATION
23	Remove insulator from 5T of MTP relay.	
24	Remove blocking tool from XP relay.	
25a	If recorder preference improvement to reduce single time lines (Apparatus Fig. 27) is provided— At recorder unit SDR terminal strip— Momentarily apply ground to terminal 1.	At recorder under test— RIP relay operated.
26a	Repeat Step 25a using terminals 2 through 10.	RIP relay operated.
27a	At recorder under test— Insulate 8B of RTL relay.	
28a	Repeat Steps 25a and 26a.	At recorder under test— RIP relay <i>not</i> operated.
29a	Remove insulator from 8B of RTL relay.	
30a	Momentarily apply ground to the U winding terminal of RTL relay.	T1A, HS relays not operated.
31a	Momentarily apply ground to the U winding terminal of RIP relay.	At CII— T relays not operated.
32a	At recorder under test— Block nonoperated ON1, ON2 relays as provided.	
33a	Block operated TP_ relay.	RTL relay operated.
34a	Insulate contact 6B of RIP relay.	RTL relay released.
35a	Remove insulator from 6B of RIP relay.	RTL relay operated.
36a	Block operated ON1 relay.	RTL relay released.
37a	Remove blocking tools from ON1 ON2, and TP relays blocked in Steps 32a, 33a.	
38	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
39	Restore to service all trunks removed from service at start of test.	

M.1 Dynamic Test of Preference Relays

Note 1: Apparatus Fig. 27 provided.

Note 2: Refer to Section 100-133-120 before using Esterline Angus 20-pen event recorder.

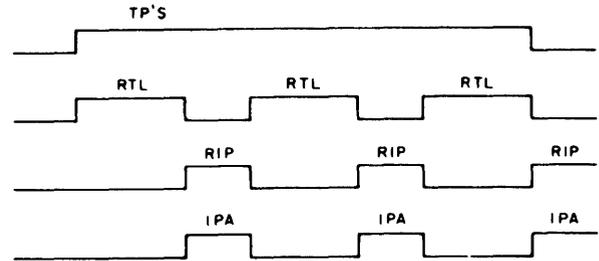
STEP	ACTION	VERIFICATION
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Note 3: This test does not affect service and should be made during busy hours so that the recording will reflect conditions when two or more transverters have preference relays operated in order that a timing entry can be shown taking place between initial entries.

Note 4: Connect battery first to prevent tying the leads together through the pen windings of the event recorder; disconnect battery last.

- | | | |
|---|---|--|
| 1 | At recorder under test—
Connect recording device to upper windings | |
|---|---|--|

Satisfactory operation of preference relays will be indicated by a recording as follows:



of RTL and RIP relays, 13T of IPA relay, 6B of CHLK relay.

- | | | |
|---|---|--|
| 2 | Remove connections from RTL, RIP, IPA, CHLK relays. | |
|---|---|--|

M.2 Detection of Falsely Grounded DJ_ Lead

Note: This test is made only when T option is provided in the call identity indexer and option WN in the recorder.

- | | | |
|---|---|--|
| 1 | Remove from service all trunks associated with recorder under test. | |
| 2 | At perforator cabinet—
Mark tape (refer to paragraph 1.10). | |
| 3 | At jack, lamp, and key circuit—
Insert make-busy plug into MB jack for recorder under test. | |
| 4 | At recorder under test—
Insulate DS relay 1 and 2T, TBL relay 4 and 5B, and DTKA relay 6 and 7B. | |

STEP	ACTION	VERIFICATION
5	Block ON relay nonoperated.	
6	At CII associated with recorder under test— Connect ground through 18AN resistor (350 ohms) or equivalent, to 5T winding terminal of DJK relay.	
7	At recorder under test— Insulate LC relay 5 and 6T.	
8	Block operated IPA, UL, and DTKA relays.	
9	Block nonoperated M relay.	
10	Strap together 11, 12T of M relay.	DTN relay operated.
11	At CII associated with recorder under test— Remove ground from DJK relay.	DJK relay released. At recorder under test— DTN relay released.
12	Remove blocking tools from IPA, UL, DTKA, M, and ON relays.	
13	Remove strap from 11, 12T of M relay.	
14	Remove insulators from LC, DS, TBL, and DTKA relays.	
15	At jack, lamp, and key circuit— Insert make-busy plug into TST jack of recorder under test.	
16	Insert plug of 32A test set into R jack.	
17	Momentarily operate white (ST) button of 32A test set.	RUT lamp lighted. When test is completed— RUT lamp extinguished.
	Note: If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	
18	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
19	At jack, lamp, and key circuit— Remove plug from TST jack.	
20	Remove plug of 32A test set.	

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STEP	ACTION	VERIFICATION
21	Remove plug from MB jack.	R_lamp extinguished.
22	Restore to service all trunks associated with recorder under test.	

EMERGENCY RECORDER

N. Make-Busy Feature

1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp not lighted.
2	Remove from service all trunks associated with one regular recorder.	
3	At jack, lamp, and key circuit— Insert make-busy plug into MB jack associated with emergency recorder.	EMR lamp lighted. At emergency recorder— NS relay operated. RT relay nonoperated.
4	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
5	At jack, lamp, and key circuit— Insert make-busy plug into TN jack of recorder associated with trunks removed from service.	EW lamp not lighted.
6	Remove plug from TN jack of regular recorder.	
7	Remove plug from MB jack.	EMR lamp extinguished. At emergency recorder— NS, RT relays released.
8	Block nonoperated XT relay.	
9	Insulate 3B of RD relay.	
10	At jack, lamp, and key circuit— Insert make-busy plug into TN jack of recorder associated with trunks removed from service.	EW lamp lighted.
11	Insert make-busy plug into MB jack of emergency recorder.	At emergency recorder— NS relay operated. RT relay nonoperated. At regular recorder— Ground present on 8B of TN1. Ground absent on 2B of TN6.
12	At emergency recorder— Block nonoperated TA relay.	

STEP	ACTION	VERIFICATION
13	Block operated ON relay.	At regular recorder— Ground present on 2B of TN6.
14	At emergency recorder— Remove blocking tool from ON relay.	
15	Remove blocking tool from TA relay.	
16	At jack, lamp, and key circuit— Remove plug from MB jack.	At emergency recorder— NS relay released. RT relay nonoperated.
17	Insulate 4B, 10B of MBR relay.	
18	Block operated MBR relay.	At regular recorder— Ground present on 8B of TN1.
19	At emergency recorder— Remove blocking tool from MBR relay.	
20	Remove insulator from 4B, 10B of MBR relay.	
21	Remove insulator from 3B of RD relay.	
22	Remove blocking tool from XT relay.	
23	At jack, lamp, and key circuit— Remove plug from TN jack of regular recorder.	EW lamp extinguished.
24	Restore to service all trunks removed from service at start of test.	
25a	If any of Tests O through W are to be made at this time— Omit Steps 26b through 32b.	
26b	If none of Tests O through W are to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into MB jack of emergency recorder.	
27b	Insert make-busy plug into TST jack of emergency recorder.	
28b	Insert plug of 32A test set into R jack of emergency recorder.	
29b	Momentarily operate white key button of 32A test set.	At recorder test portion of master timing circuit— RUT lamp lighted.

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STEP	ACTION	VERIFICATION
	<i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply a good test pattern before restoring recorder to service.	RIT lamp <i>not</i> lighted. When test has been completed— RUT lamp extinguished.
30b	At jack, lamp, and key circuit— Remove plug from TST jack.	
31b	Remove plug of 32A test set from R jack.	
32b	Remove plug from MB jack.	
33	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
O. Operation Test		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders.
2	Insert make-busy plugs into MB, TST jacks associated with emergency recorder.	EMR lamp lighted. At emergency recorder— NS relay operated.
3	From office records, determine recorder group number.	
4	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
5	Insert plug of 32A test set into R jack.	Perforator associated with recorder under test operated.
6	Momentarily operate white key button of 32A test set. <i>Note:</i> If the RW lamp is lighted, wait until RW lamp is extinguished, then momentarily reoperate the white key button of 32A test set. Wait several seconds, then again momentarily operate white key button of 32A test set.	RW lamp <i>not</i> lighted. RIT lamp <i>not</i> lighted.
7	When perforator stops operating— Repeat Step 6 several times to advance tape for readings.	
8	Read make-busy entry.	Entries perforated as follows:

STEP

ACTION

VERIFICATION

DIGIT						
TIMING	A	B	C	D	E	F
	2	8	2	1	DAY X X T U	
6 sec.	2	8	1	1	X	X
1 sec.	2	8	1	2	T	U
	**2	**8	**5	**6	**O	**O
	2	8	0	5	RECORDER X X T U	
6 sec.	2	8	3	DAY X UNIT		MONTH X X
1 sec.	2	8	3	MINUTE TENS		X X
	2	8	4	X *	X †	X †U

*Round, Day Tens, Recorder Group Hundreds

†Marker or Recorder Group

**Digits indicated in this line will occur only when out of synchronism.

Note: Digits marked X will vary depending on office options, time of day, day of month, etc. A check of office records will be necessary to determine certain information that should be perforated in the end of tape entry.

Note: Use KS-14343 tape reader to read tape.

Caution: Exercise care not to mutilate in any manner, and under no circumstances cut the tape.

9 Read test pattern.

Note: Disregard all perforations following the diamond pattern.

Perforations on tape arranged exactly same as pattern shown in Fig. 1.

No light or irregular perforations.

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STEP	ACTION	VERIFICATION
10	Mark tape (refer to paragraph 1.10).	
11	Remove plug of 32A test set from R jack.	
12	At jack, lamp, and key circuit— Remove plugs from TST, MB jacks associated with emergency recorder.	EMR lamp extinguished. At emergency recorder— NS relay released.
P. Synchronizing Features		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp <i>not</i> lighted.
2	At emergency recorder— Operate and release UH relay.	Within 1 minute— Major alarm sounds. At master timing frame— SSF lamp lighted.
3	Operate CKL key.	OS_ lamp associated with emergency recorder lighted.
4	At jack, lamp, and key circuit— Insert make-busy plug into MB jack associated with emergency recorder.	R_ lamp associated with emergency recorder lighted.
5	At master timing frame— Momentarily operate AR key.	Major alarm silenced. SSF lamp extinguished. At emergency recorder being tested— If option YE is provided— Ground present on operating spring 15 of TIB relay when CA relay released. Ground absent on operating spring 15 of TIB relay when CA relay operated. If option YF is provided— Ground present on fixed contact 15 of TIB relay when CA relay is released. Ground absent on fixed contact 15 of TIB relay when CA relay is operated.
6	At master timing frame— Momentarily operate S key.	OS_ lamp associated with recorder being tested extinguished.
7	Restore CKL key.	At emergency recorder being tested— If option YE is provided— Ground absent on operating spring 15 of TIB relay. Ground present on operating spring 9 of TIB relay when CA relay released. Ground absent on operating spring 9 of TIB relay when CA relay operated. If option YF is provided—

STEP	ACTION	VERIFICATION
		Ground absent on fixed contact 15 of TIB relay. Ground present on fixed contact 9 of TIB relay when CA relay is released. Ground absent on fixed contact 9 of TIB relay when CA relay is operated.
8	At jack, lamp, and key circuit— Remove plug from MB jack associated with emergency recorder.	
9	At emergency recorder being tested— Operate and release TH relay.	Within 1 minute— Major alarm sounds. At master timing frame— SSF lamp lighted.
10	Repeat Steps 3 through 8.	
11	At emergency recorder— Momentarily operate HH relay.	Within 1 minute— Major alarm sounds. At master timing frame— SSF lamp lighted.
12	Repeat Steps 3 through 7.	
13a	If either Test Q, S, U, or W is to be made at this time— Omit Steps 14b through 18b.	
14b	If neither Test Q, S, U, nor W is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with emergency recorder.	
15b	Insert plug of 32A test set into R jack.	
16b	Momentarily operate white key button of 32A test set.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed— RUT lamp extinguished.
	<p>Note: If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.</p>	
17b	At jack, lamp, and key circuit— Remove plug from TST jack associated with emergency recorder.	
18b	Remove plug of 32A test set from R jack.	

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STEP	ACTION	VERIFICATION
19	Remove plug from MB jack associated with emergency recorder.	
Q. Recorder Number, Minutes Timing, and Hour Alarm Features (6-Second Timing)		
CAUTION: Do not start test 5 minutes before or after hour entry.		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp <i>not</i> lighted.
2	Insert make-busy plug into MB jack associated with emergency recorder.	EMR lamp lighted.
3	At perforator cabinet associated with emergency recorder— Disconnect perforator plug from jack by raising front of perforator to clear stop screws, then pulling perforator forward approximately 1 inch.	
4	At emergency recorder— Block nonoperated HS, HRA, C, PTC relays.	
5	Insulate 7T of RN relay.	
6	Operate and release HH, TH, UH relays as required to advance H, T, U selectors to position 1.	
7	Operate and hold M, RN relays for several seconds.	Minor alarm sounds. AT TIC— REC, DR_EMG lamps lighted corresponding to recorder number. B', C', D' lamps lighted as indicated on first line of Table B. E', F' lamps lighted indicating 4, 0, respectively.
8	Proceed as outlined in Steps 9 through 25 of Test E.	
9	At emergency recorder— Connect ground to 4T of RNT relay.	At recorder frame— HR lamp lighted. Major alarm sounds.
10	Proceed as outlined in Steps 27 through 109 of Test E.	

STEP	ACTION	VERIFICATION
11a	If either Test S or U is to be made at this time— Omit Steps 12b through 16b.	
12b	If neither Test S nor U is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with emergency recorder.	
13b	Insert plug of 32A test set into R jack.	
14b	Momentarily operate white key button of 32A test set. Note: If a trouble is encountered while applying the test pattern, clear the trouble and apply a good test pattern before restoring the recorder to service.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed— RUT lamp extinguished.
15b	At jack, lamp, and key circuit— Remove plug from TST jack associated with emergency recorder.	
16b	Remove plug of 32A test set from R jack.	
17	Remove plug from MB jack associated with emergency recorder.	EMR lamp extinguished.
Q.1 Recorder Number, Minutes Timing, Seconds Timing, and Hour Alarm Features (1-Second Timing)		
Caution: <i>Do not start test 1 minute before or after any 10 minute period.</i>		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp <i>not</i> lighted.
2	Insert make-busy plug into MB jack associated with emergency recorder.	EMR lamp lighted.
3	At perforator cabinet associated with emergency recorder— Disconnect perforator plug from jack by raising front of perforator to clear stop screws, then pulling perforator forward approximately 1 inch.	
4	At emergency recorder— Block nonoperated HS, HRA, C, PTC relays.	

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STEP	ACTION	VERIFICATION
5	Insulate 7T of RN relay.	
6	Operate and release HH, TH relays as required to advance H, T selectors to position 1.	
7	Operate and release UH relay as required to advance UA-D counters to indicate 0 seconds. (UD relay only operated.)	
8	Operate and hold M, RN relays for several seconds.	<p>Minor alarm sounds. At TIC— REC, DR_EMG lamps lighted corresponding to recorder number. B', C', D' lamps lighted as indicated on first line of Table C. E', F' lamps lighted indicating 4, 0, respectively.</p>
9	Perform Steps 10 through 26 of Test E.1.	
10	Connect ground to 4T of RNT relay.	<p>HR lamp lighted. Major alarm sounds.</p>
11	Perform Steps 28 through 122 of Test E.1.	
12	At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with emergency recorder.	
13	Insert plug of 32A test set into R jack.	
14	Momentarily operate white (ST) button of 32A test set. <i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	<p>RUT lamp lighted When test is completed— RUT lamp extinguished.</p>
15	At jack, lamp, and key circuit— Remove plug from TST jack associated with emergency recorder.	
16	Remove plug of 32A test set from R jack.	
17	Remove plug from MB jack associated with emergency recorder.	EMR lamp extinguished.

STEP	ACTION	VERIFICATION
R. Splice, Break-in-Tape, and Paper Jam Feature		
Splice and Break-in-Tape		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders.
2	At perforator cabinet of emergency recorder— Mark tape (refer to paragraph 1.10).	
3	Cut a window splice in the paper tape at a point just before the tape enters the tape chute.	
	Caution: Exercise care not to mutilate the tape in any manner.	
4	At jack, lamp, and key circuit— Insert make-busy plug into MB jack of emergency recorder.	At perforator cabinet— Make-busy pattern perforated on tape.
	Note: More than one make-busy pattern may be needed to advance the window splice through the perforator. This may be accomplished by removing and then reinserting the make-busy plug into the MB jack associated with the emergency recorder.	At emergency recorder— SP relay operated when window splice is encountered.
5	Block operated SP relay.	In approximately two minutes— NP lamp lighted. Major alarm sounds. At perforator cabinet— Splice pattern perforated.
6	At emergency recorder— Remove blocking tool from SP relay.	At perforator cabinet— Make-busy pattern perforated.
7	At recorder frame— Momentarily operate AR key.	Major alarm silenced. NP lamp extinguished.
8a	If no further tests are to be performed— At perforator cabinet— Mark tape (refer to paragraph 1.10).	
9	At jack, lamp, and key circuit— Remove make-busy plug from MB jack of emergency recorder.	

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STEP	ACTION	VERIFICATION
Paper Jam Feature		
10	At perforator cabinet of emergency recorder— Mark tape (refer to paragraph 1.10).	
11	Remove tape from slack tape arm and place arm on holder.	
12	At jack, lamp, and key circuit— Insert make-busy plug into MB jack of emergency recorder. <i>Note:</i> More than one make-busy pattern will be needed in order to advance the paper jam detector counter past two hundred registrations.	At recorder frame— NP lamp lighted. Major alarm sounds. At perforator cabinet— Paper jam detector counter indicates more than two hundred registrations.
13	At recorder frame— Momentarily operate AR key.	NP lamp <i>not</i> extinguished. Major alarm <i>not</i> silenced.
14	At perforator cabinet— Remove slack tape arm from holder and verify that tape winds onto take-up reel. <i>Caution: Take care not to mutilate tape in any manner.</i>	Take up reel steps when slack tape arm activates microswitch on take up motor. Paper jam detector counter reset. Major alarm silenced. At recorder frame— NP lamp extinguished.
15	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
16	At jack, lamp, and key circuit— Remove make-busy plug from MB jack of emergency recorder.	
S. Trouble Timing Feature		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp <i>not</i> lighted.
2	Insert make-busy plug into MB jack associated with emergency recorder.	EMR lamp lighted.
3	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
4	At emergency recorder— Insulate 3T of TTIB relay.	
5	Block operated ON relay.	TA, TF relays operated. In approximately 0.5 seconds— TB relay operated. Minor alarm sounds.

STEP	ACTION	VERIFICATION
		In approximately 2 seconds— TC, TD, TE, RD relays operated. TA, TF relays released. At TIC— DL lamp lighted.
6	At emergency recorder— Remove blocking tool from ON relay.	TB, TC, TD, TE, RD relays released.
7	Remove insulator from 3T of TTIB relay.	
8	At TIC— Momentarily operate TIR-AR, RLS keys.	DL lamp extinguished. Minor alarm silenced.
9	At emergency recorder being tested— Block operated TTIB relay.	
10	Block operated ON relay.	In approximately 0.5 second— TE relay operated. Minor alarm sounds. Ground on 5T of TBL relay. Ground on 8B of IPA relay.
11	Remove blocking tool from ON relay.	TE, relay released. At TIC— DL lamp lighted.
12	At emergency recorder— Remove blocking tool from TTIB relay.	
13	At TIC— Momentarily operate TIR-AR, RLS keys.	DL lamp extinguished. Minor alarm silenced.
14a	If either Test Q, U, or W is to be made at this time— Omit Steps 15b through 19b.	
15b	If neither Test Q, U, nor W is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with emergency recorder.	
16b	Insert plug of 32A test set into R jack.	
17b	Momentarily operate white key button of 32A test set. Note: If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp not lighted. When test is completed— RUT lamp extinguished.

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STEP	ACTION	VERIFICATION
	a good test pattern before restoring the recorder to service.	
18b	At jack, lamp, and key circuit— Remove plug from TST jack associated with emergency recorder.	
19b	Remove plug of 32A test set from R jack.	
20	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
21	At jack, lamp, and key circuit— Remove plug from MB jack associated with emergency recorder.	EMR lamp extinguished.
T. AG Lead Alarm and Locking Features		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp <i>not</i> lighted.
2	Remove from service all trunks associated with any one regular recorder.	
3	At jack, lamp, and key circuit— Insert make-busy plug into TN jack of recorder associated with trunks removed from service.	At recorder frame— EW lamp lighted.
4	Insert make-busy plug into MB, jack associated with emergency recorder.	EMR lamp lighted.
5	At TIC— Insert make-busy plug into TIC MB EMG RC jack.	
6	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
7	At emergency recorder being tested— Block nonoperated IP, TE relays.	
8	At call identity indexer associated with emergency recorder— Block operated any TA_ or TB_ relay.	Minor alarms sounds. At TIC— DL_ lamp lighted.
9	At emergency recorder— Operate RD, IPA relays.	RD, IPA relays locked operated.
10	At call identity indexer associated with emergency recorder— Remove blocking tool from TA_ or TB_ relay.	At emergency recorder— RD, IPA relays released.

STEP	ACTION	VERIFICATION
11	At TIC— Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. DL_ lamp extinguished.
12	At call identity indexer associated with emergency recorder— Block operated any U_ relay.	
13	At emergency recorder— Operate RD relay.	RD relay locked operated.
14	At call identity indexer associated with emergency recorder— Remove blocking tool from U_ relay.	At emergency recorder— RD relay released.
15	Remove blocking tools from TE, IP relays.	
16	At jack, lamp, and key circuits— Remove plug from MB jack associated with emergency recorder.	
17	At TIC— Remove plug from TIC MB EMG RC jack.	
18	At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with emergency recorder.	
19	Insert plug of 32A test set into R jack.	
20	Momentarily operate white key button of 32A test set. <i>Note:</i> If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed— RUT lamp extinguished.
21	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
22	At jack, lamp, and key circuit— Remove plug from TST jack associated with emergency recorder.	
23	Remove plug of 32A test set from R jack.	
24	Remove plug from MB jack associated with emergency recorder.	
25	Remove plug from TN jack.	EW lamp extinguished.

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STEP	ACTION	VERIFICATION
26	Restore to service all trunks removed from service at start of this test.	
U. Transient Operation of Perforator Magnets and Series Relay Locking Features		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp <i>not</i> lighted.
2	Insert make-busy plug into MB jack associated with emergency recorder.	EMR lamp lighted.
3	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
4	At emergency recorder— Connect ground to T winding terminal of A0 relay for several seconds.	A0 relay operated. Minor alarm sounds. At TIC— Display registered. A'0, RN_ lamps associated with recorder being tested lighted.
5	Momentarily operate TIR-AR, RLS keys.	Minor alarm silenced. Display released.
6	At emergency recorder— Insulate 3B of TE relay, 8T of PTS relay, 9B of TEC relay.	
7	Block nonoperated IP relay.	
8	Momentarily connect ground to T winding terminal of A0 relay.	A0 relay locked operated. PTS relay operated.
9	Momentarily connect ground to B winding terminal of A0 relay.	A0, PTS relays released.
10	Repeat Steps 8, 9 for each of A1, A2, B0 to B7, C0 to C7, D0 to D7, E0 to E7, F0 to F7 relays.	
11	Remove insulators from 3B of TE relay, AT of PTS relay, 9B of TEC relay.	
12	Remove blocking tool from IP relay.	
13a	If either Test Q, S, or W is to be made at this time— Omit Steps 14b through 18b.	

STEP	ACTION	VERIFICATION
14b	If neither Test Q, S, nor W is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with emergency recorder.	
15b	Insert plug of 32A test set into R jack.	
16b	Momentarily operate white key button of 32A test set. Note: If a trouble is encountered while applying the test pattern, as indicated by the lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	At recorder test portion of master timing circuit— RUT lamp lighted. RIT lamp not lighted. When test is completed— RUT lamp extinguished.
17b	At jack, lamp, and key circuit— Remove plug from TST jack associated with emergency recorder.	
18b	Remove plug of 32A test set from R jack.	
19	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
10	At jack, lamp, and key circuit— Remove plug from MB jack associated with emergency recorder.	EMR lamp extinguished.
V. Trouble Cross-Detecting Features		
1	At jack, lamp, and key circuit— Check that emergency recorder is not in service.	No make-busy plug in any TN jack associated with regular recorders. EW lamp not lighted.
XP Relay		
2	At emergency recorder— Insulate 3T, 4B of XPA relay.	
3	Proceed as outlined in Steps 6 through 15 of Test J.	
XU, XTC, XCO, XT Relays		
4	Remove from service all trunks associated with any one regular recorder.	
5	At jack, lamp, and key circuit— Insert make-busy plug into TN jack of recorder with trunks removed from service.	At recorder frame— EW lamp associated with emergency recorder lighted.

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STEP	ACTION	VERIFICATION
6	At jack, lamp, and key circuit— Insert make-busy plug into MB jack of emergency recorder.	EMR lamp lighted. At emergency recorder— MBR relay operated.
7	Proceed as outlined in Steps 16 through 40 of Test J.	
XRB Relay		
8	At emergency recorder— Insulate 6B of MBR relay.	
9	Release MBR relay.	
10	Block nonoperated MBJ relay.	
11	At transferred recorder— Momentarily connect ground to 8B of TN1 relay.	Major alarm sounds. XRB lamp associated with emergency recorder lighted.
12	At recorder frame— Momentarily operate AR key.	At transferred recorder— XRB lamp extinguished. Major alarm silenced.
13	At transferred regular recorder— Momentarily connect ground to 2T of RT relay.	At transferred recorder— Major alarm sounds. XRB lamp associated with emergency recorder lighted.
14	At recorder frame— Momentarily operate AR key.	At transferred recorder— Major alarm silenced. XRB lamp extinguished.
15	At emergency recorder— Remove blocking tool from MBJ relay.	
16	Operate MBR relay.	MBR relay locked operated.
17	Remove insulator from 6B of MBR relay.	
18a	If Test T is to be made at this time— Omit Steps 19b through 24b.	
19b	If Test T is not to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with emergency recorder.	
20b	Insert plug of 32A test set into R jack.	
21b	Momentarily operate white key button of 32A test set.	At recorder test portion of master timing circuit—

STEP	ACTION	VERIFICATION
	Note: If a trouble is encountered while applying the test pattern, as indicated by the lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed— RUT lamp extinguished.
22b	At jack, lamp, and key circuit— Remove plug from TST jack associated with emergency recorder.	
23b	Remove plug of 32A test set from R jack.	
24b	Remove plug from MB jack associated with emergency recorder.	
25	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
26	At jack, lamp and key circuit— Remove plug from TN jack associated with transferred regular recorder.	EW lamp extinguished. At emergency recorder— MBR relay released.
27	Restore to service all trunks removed from service at start of this test.	
W. Test for False Continuity and Crosses of TC Relays		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp <i>not</i> lighted.
2	Insert make-busy plug into MB jack associated with emergency recorder.	EMR lamp lighted.
3	Perform Steps 4 through 38 of Test K.	
4a	If either Test Q, S, or U is to be made at this time— Omit Steps 5b through 9b.	
5b	If neither Test Q, S, nor U is to be made at this time— At jack, lamp, and key circuit— Insert make-busy plug into TST jack associated with emergency recorder.	
6b	Insert plug of 32A test set into R jack.	
7b	Momentarily operate white key button of 32A test set.	At recorder test portion of master timing circuit—

STEP	ACTION	VERIFICATION
	Note: If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply a good test pattern before restoring the recorder to service.	RUT lamp lighted. RIT lamp <i>not</i> lighted. When test is completed— RUT lamp extinguished.
8b	At jack, lamp, and key circuit— Remove plug from TST jack associated with emergency recorder.	
9b	Remove plug of 32A test set from R jack.	
10	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
11	At jack, lamp, and key circuit— Remove plug from MB jack associated with emergency recorder.	EMR lamp extinguished.
X. Deleted		
Y. Preference Relays—Operating and Lockout Features		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. EW lamp <i>not</i> lighted.
2	At emergency recorder— Perform Steps 2 through 38 of Test M.	
Z. Exercising Routine		
1	At jack, lamp, and key circuit— Observe that emergency recorder is not in service.	No make-busy plug in any TN jacks associated with regular recorders. At recorder frame— EW lamp <i>not</i> lighted.
2	Determine which call identity indexer is next in order to be transferred to emergency recorder.	
3	Insert make-busy plug into TN jack of recorder connected to call identity indexer selected in Step 2.	At recorder frame— EW lamp lighted.
4	At perforator cabinet— Mark tape (refer to paragraph 1.10)	
5	At translator frame— Select four spare line equipments. Wire each line equipment to one of the following directory numbers: 0000, 1111, 3333, or 6666.	

STEP	ACTION	VERIFICATION
	The office coil (OFF_) should be varied, as equipped, so as to utilize all combinations of office indicators, with the above mentioned directory numbers.	
6	Select, for test purposes, trunks associated with following tens and units relays on call identity indexer associated with recorder number test: tens 0, units 0; tens 1, units 1; tens 3, units 3; and tens 6, units 6.	
	Note: If above trunks cannot be used for this test, select any other trunks with combinations of tens and units relays on call identity indexer, which will test for transposition, all T (0-7) and U (0-7) trunk identification leads to recorder.	
7	At line link frame— Patch line link vertical selected in Step 5 to SP jack.	
8	At OTF— Patch SP jack to OTL jack.	
9	Operate OTLP, MCB, MKR_ keys.	
10	Operate EVEN or ODD, FS_ keys and TS_ switch to select trunk chosen in Step 6.	
11	Set RSG, RSS switches to select sender used in test.	If provided— MBG lamp lighted.
12	Operate _D key as required to correspond to number of digits to be dialed.	
13	Operate DIAL switches A through K as required to select office code and permanently busy number into distant office reached by using trunk selected in Step 6.	
14	Set PS switch to 15/65.	
15	Set LL switch to 0.	
16	At jack, lamp, and key circuit— Insert make-busy plugs into TVMB_ jacks for all transverters except one used in test.	
17	At OTF— Operate ST key.	OS lamp lighted. After completion of dialing— Busy tone heard.

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STEP	ACTION	VERIFICATION
18	Restore ST key.	OS lamp extinguished.
19	At perforator cabinet containing recorder associated with trunk selected in Step 6— Mark tape at input chute with red china crayon. This will facilitate reading of tape with KS-14343 tape reader.	
20	When sufficient tape has been perforated at perforator cabinet— Read tape entries for test made.	A_ through F_ designations perforated showing entry index A0 office directory number of calling line on B_, C_, D_, E_, F_ positions. The next line will have entry index A2; call identify indexer trunk number associated with trunk used on test will be perforated on E_, F_ positions.
21	Repeat Steps 7, 10, 13, 17 through 20 using the next calling number as selected in Step 6; continue until all calling numbers and trunks have been used.	
22	Repeat Steps 5 through 21 using a different transverter, until all transverters have been used with recorder being tested.	
23	At line link frame— Remove patching cord from SP jack, line link vertical.	
24	At OTF— Restore all keys and switches; remove all patching cords.	
25	Repeat Steps 1 through 23 using different call identity indexer until the tests have been applied to all call identity indexers.	
26	At perforator cabinet— Mark tape (refer to paragraph 1.10).	
27	At jack, lamp, and key circuit— Remove make-busy plug from TN jack.	At recorder frame— EW lamp extinguished.

AA. Dynamic Test of Preference Relays

Note 1: Apparatus Fig. 27 provided.

Note 2: Refer to Section 100-133-120 before using Esterline Angus 20-pen event recorder.

Note 3: This test does not affect service and should be made during busy hours so

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STEP	ACTION	VERIFICATION
3	At jack, lamp, and key circuit— Insert make-busy plug into TN jack of recorder associated with trunks removed from service.	At recorder under test— EW lamp lighted.
4	At jack, lamp, and key circuit— Insert make-busy plug into MB jack, associated with emergency recorder.	
5	At emergency recorder— Insulate DS relay 1 and 2T, TBL relay 6 and 7B, and DTKA relay 6 and 7B.	
6	Block ON relay nonoperated.	
7	At CII associated with transferred recorder— Connect ground through 18AN resistor (350 ohms) or equivalent to 5T winding terminal of DJK relay.	DJK relay operated.
8	At emergency recorder— Insulate LC relay 5 and 6T.	
9	Block operated IPA, UL, and DTKA relays.	
10	Block nonoperated M relay.	
11	Strap together 11, 12 T of M relay.	DTN relay operated.
12	At CII associated with transferred recorder— Remove connection from ST winding terminal of DJK relay.	DJK relay released. At emergency recorder— DTN relay released.
13	Remove blocking tools from IPA, UL, DTKA, M, and ON relays.	
14	Remove strap from 11, 12 T of M relay.	
15	Remove insulators from LC, DS, TBL, and DTKA relays.	
16	At jack, lamp, and key circuit— Insert make-busy plug into TST jack of emergency recorder.	
17	Insert plug of 32A test set into R jack.	
18	Momentarily operate white (ST) button of 32A test set.	RUT lamp lighted. When test is completed— RUT lamp extinguished.
	Note: If a trouble is encountered while applying the test pattern, as indicated by lighted RIT lamp, clear the trouble and apply	

STEP	ACTION	VERIFICATION
	a good test pattern before restoring the recorder to service.	
19	At perforator cabinet of recorder under test— Mark tape (refer to paragraph 1.10).	
20	Remove plugs from TST, MB jacks.	
21	Remove plug from TN jack.	EW lamp extinguished.
22	Remove plug of 32A test set from R jack.	
23	Restore to service all trunks associated with recorder used in test.	

