

CENTRAL OFFICE AUTOMATIC MESSAGE ACCOUNTING EQUIPMENT PRECAUTIONS TO LIMIT STOPPAGES IN NO. 1 ACCOUNTING CENTER NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section covers the procedures to be followed when answering alarms and when working on equipment, in central offices arranged for LAMA or CAMA, in order to avoid irregularities on the central office AMA tapes. These irregularities will, in turn, cause stoppages at the accounting center. The section supplements but does not replace the information in other BSP sections, circuit and schematic descriptions covering alarm routines, taking equipment out of service and working on apparatus.

1.02 This section is reissued to bring it in conformity with other material in the Plant Series. In this process marginal arrows have been omitted.

1.03 While it is desirable to prevent individual stoppages at the accounting center, caused by central office tape irregularities, those causing multiple stoppages are of greater concern in those accounting centers still using assemblers and computers. Most of these irregularities can be rectified by prompt recognition by the central office maintenance force, proper markings of the tapes involved, forwarding of complete information with the tapes and full cooperation between the central office maintenance force and the accounting center personnel.

1.04 The irregularities that are spread to all output tapes of the accounting center assembler, both first and second stage, are the cause of multiple stoppages. Since there are ten output tapes from the assembler in both stages, one spread-entry (an entry which is perforated on all output tapes) will appear one hundred times on the combined output tapes of the assembler second stage. Therefore, if the same irregularity appeared on each recorder tape, the total stoppages would be one hundred times the number of recorders in the recorder group.

1.05 The central office AMA tape entries which are spread to all output tapes of the accounting center assembler are indicated with an asterisk in Table 1.

1.06 The month, day tens, day units and recorder group information of the end-of-tape pattern is checked against the corresponding assembler switch settings to insure that the proper tapes are being processed.

1.07 The recorder number is checked to insure that the recorder tapes are processed in the proper numerical order starting with the lowest numbered recorder. If the recorder number checks, the assembler or assembler-computer starts processing the central office AMA tapes.

1.08 The irregularities in central office AMA tapes which are not spread will cause a single stoppage in the assembler, computer or assembler-computer. However, each stoppage incurs lost time and may hold up processing for an entire recorder group.

1.09 Straddle calls (part of a call entry on a regular recorder tape and the remainder of the entry on the other recorder tape as described in Paragraph 3.03) require manual association and computation at the accounting center. To keep straddle calls at a minimum, the recorder transfer feature should be used for routine maintenance or for testing only when little or no traffic is being served by the associated district junctors or trunks. If it is necessary to transfer to the emergency recorder during the busy hours because of a trouble condition, the trouble should be completely cleared before the regular recorder is restored to service. This will minimize the likelihood that two transfers to the emergency recorder from the same regular recorder will occur within the same hour. Where practicable, the associated district junctors or trunks should be made busy and allowed to restore to normal before using the recorder transfer feature.

TABLE 1

TAPE PATTERNS					DIGITS						
3 A.M.	MAKE BUSY	RECORDER TRANSFER		WINDOW SPLICE	NAME OF ENTRY	A	B	C	D	E	F
		FROM	TO								
X	X	X	X	X	Splice	0	8	1	0	1	0
X	X	X	X	X	Calendar Day	2	8	2	1	T	Day U
X	X	X	X	X	End-of-Tape Hour	2	8	1	1	T	Hour U
		X	X		Transfer Synchron.	2	8	5	5	0	0
		(or) X	X		Transfer Nonsynchron.	2	8	5	7	0	0
	X			X	Make-Busy Nonsynchron.	2	8	5	6	0	0
X	X	X	X	X	Recorder Number	2	8	0	5 or 6	T	Recorder U
X	X	X	X	X	Day Units and Month	2	8	3	Day Units	T	Month U
X	X	X	X	X	Day Tens and Recorder Group	2	8	4	Day Tens	T	Recorder Group U
					Hour	2	8	1	0	T	Hour U
					Irregular Hour	2	8	1	8	9	9
					Cancel Hour	2	8	1	9	9	9
					Charge Guard	2	8	5	4	0	0
					Cancel	2	8	7	0, 1 or 2	0	0

*See Paragraph 1.05.

1.10 Consideration should be given to the possible effect on the central office AMA tapes before any tests are made on the central office AMA equipment.

1.11 Repeated routine end-of-tape, make-busy, transfer and window splice patterns as a result of testing cause unnecessary accounting machine operation. This type of entry should be clearly marked on the central office AMA tapes at the position of the test entries and all information relative to the AMA equipment activity should be included on Form E-4104, described in Section 216-800-304, and sent to the accounting center with the central office AMA tapes. The nonessential entries can then be passed over during processing at the accounting center.

Caution: *As a general note of caution, it is recommended that a visual inspection of the tape or tapes be made after performing any manually controlled master timer entry or entries.*

1.12 The AMA circuits covered are:

- (A) Recorder and Recorder Connector
- (B) Perforator
- (C) Master Timing
- (D) Transverter
- (E) Transverter Connector
- (F) Translator
- (G) Call Identity Indexer
- (H) District Junctor or Trunk Arranged for AMA
- (I) Billing Indexer

2. APPARATUS

- 2.01** No. 322A (make-busy) Plugs, as required.
- 2.02** Red China Marking Pencil (obtain locally).
- 2.03** No. 32A Test Set.
- 2.04** Master Timing Circuit SD-25633-01 (recorder test portion).

3. METHOD

A. Recorder and Recorder Connector

3.01 When it is necessary to remove a recorder from service, one of the following methods can be used:

- (a) When practicable, make busy the associated district junctors or trunks and allow them to restore to normal. Under this condition, all completed calls will be charged and no straddle calls will result.
- (b) Transfer the regular recorder to the emergency recorder, or to the other recorder where trunk transfer is used. Under this condition, all completed calls will be charged but straddle calls may result.
- (c) Where trunk transfer is provided, if it is impracticable to make busy the associated district junctors or trunks and the emergency recorder is not available, make busy the recorder. Under this condition, all message unit calls using the associated district junctors or trunks will be free calls and all toll calls using these district junctors or trunks will be routed to overflow. For this reason, recorders should be made busy only when there are no other means of removing them from service.

3.02 When the emergency recorder is in use and it is desired to take it out of service, the associated district junctors or trunks should be transferred back to the regular recorder or made busy whenever possible.

3.03 To prevent lost straddle calls, avoid transferring the same recorder to the emergency recorder, or to the other recorder where trunk transfer is used *more than once during the same hour* (from 1 to 2, 2 to 3, etc) since it may not be possible to associate the entries for two or more calls on a district junctor or trunk having the initial entries on one tape and the answer and disconnect entries on the other tape.

3.04 Working on any apparatus in the regular and emergency recorders and preference circuits should be avoided between the hours of 2:55 A.M. and 3:30 A.M. to prevent interference with the 3:00 A.M. end-of-tape entries.

3.05 Before working on individual pieces of apparatus (except the TTIB relay), in the regular and emergency recorder and preference circuits, make busy the transverter trouble indi-

cator, trouble recorder, or trouble ticketer to the recorder, to avoid calling in the transverter trouble indicator, trouble recorder or trouble ticketer to record a trouble condition caused by working on the apparatus. The transverter trouble indicator, trouble recorder, or trouble ticketer will then be available to record service failures on other equipment units.

3.06 In the course of testing or clearing trouble on a recorder, it may be necessary to apply transfer, make-busy, window splice or routine end-of-tape patterns or trouble entries on the central office AMA tape. Any of the foregoing entries should be followed by a recorder test pattern. After the recorder has been made busy or transferred and before starting any tests, the recorder tape should be marked with a red china marking pencil at the point where the unperforated tape enters the tape chute. Apply the recorder test pattern following any entries perforated during the course of testing and mark the central office AMA tape as follows:

(a) At the transverter trouble indicator, trouble recorder, trouble ticketer, or the master test frame:

(1) Insert a make-busy plug into the RCDR-TST, R-TST, or R-T jack of the recorder under test.

(2) After inserting the plug of a No. 32A test set into the R jack, momentarily operate the white button of the test set to cause a test call group to be perforated on the recorder tape. The RUT lamp will be lighted while the test call group is being perforated.

(3) When the RUT lamp is extinguished, again momentarily operate the white button of the test set to cause a second test call group to be perforated and relight the RUT lamp.

(4) When the RUT lamp is again extinguished, remove the plugs from the RCDR-TST, R-TST, or R-T jack and the RCDR-MB or R-MB jack.

Note: Test patterns must be complete as indicated by no blocking of the test.

(b) At the perforator associated with the recorder under test:

(1) Raise the slack tape arm and hook it over the catch.

(2) Pull back some slack in the tape and if necessary to obtain access disengage the tape from the tape guides.

(3) Using a red china marking pencil, place two large crosses on the smooth side of the tape over the lower of the two diamond patterns, that is, the diamond pattern farthest from the perforator drum.

(4) Find the red mark placed on the tape at the start of testing. Then mark two large crosses on the smooth side of the tape in the splice portion of the make-busy pattern which will be in a direction away from the red mark and the perforator drum.

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

3.07 Record on the accounting center notification form (E-4104), under "Report of Trouble or Activity," the recorder number, date, time, and a note that the tape was marked with red crosses to indicate that all entries between these crosses are test entries.

3.08 Each recorder has an HR, MTR, NP, and XRB lamp appearing on the recorder frame. If, in response to an alarm, one of these lamps is lighted, make busy or transfer the recorder indicated by the alarm. Then proceed to the associated perforator cabinet and using a red china marking pencil, draw a single line across the top of the unperforated tape where it enters the tape chute. After the trouble has been cleared, proceed as outlined in Paragraphs 3.06 and 3.07.

3.09 To prevent a false HR alarm, do not restore a recorder to service during the interval from one full minute before the hour to one full minute after the hour.

3.10 Before restoring a recorder to service, verify that the HR3 relay is operated except during the interval from 59.8 minutes to the perforation of the hour entry. If the HR3 relay is observed to be normal during the interval from 00.0 to 59.7 minutes, operate it manually and observe that it locks.

3.11 Before restoring a recorder to service, verify that the timing selector switches are synchronized with the master timing circuit

and apply test patterns as outlined in Paragraphs 3.06 and 3.07.

3.12 Whenever practicable, a recorder that has been transferred should be restored to service in the period of lightest traffic in order to keep the number of straddle calls at a minimum.

B. Perforator

3.13 Since a perforator is permanently associated with a recorder, the same conditions governing the removal from service of a recorder apply to a perforator.

3.14 When a perforator tape is torn or mutilated due to a failure to advance the tape after a line of perforation, an alarm will be received to indicate the trouble. Remove the perforator from service as covered in Paragraph 3.01 and proceed as follows:

(a) If the paper is torn, feed the end of the unperforated tape into the perforator and advance the tape over the drum by repeatedly operating and releasing the AT key approximately ten times until proper traction is obtained between the paper and the drum.

(b) Check the operation of the recorder and perforator by applying a test pattern with the master timing circuit. This operation will also serve to advance the paper through the perforator sufficiently to obtain proper side-wise positioning on the drum.

(c) Apply additional test patterns so that the diamond patterns can be examined.

(d) If the paper fails to advance but is not torn, make busy or transfer the associated recorder and, using a red china marking pencil, mark the tape at the point where the unperforated tape enters the tape chute.

(e) Clear the obstruction or trouble and proceed as outlined in Paragraphs 3.06 and 3.07.

3.15 Before splicing new tape to the trailing end of the tape in a perforator, examine the new tape for folds, creases, tears, and any other irregularities which might cause mutilated entries or difficulty in tape feeding.

3.16 Eliminate any defective new tape by removing the affected layers before splicing to the trailing end of the tape already in the bin.

3.17 No attempt should be made to splice torn perforated tape.

3.18 Troubles due to paper irregularities shall be described on trouble tickets and Form E-4104 so as to provide sufficient information for effective trouble analysis. This is required so that excessive machine stops and perforator failures due to paper defects may be eliminated. The following is an example of how several more common paper troubles may be recorded:

(a) Paper jam — Caused by torn tape.

(b) Paper jam — Caused by fold.

(c) Paper jam — Caused by paper stuck together, 2 or more thicknesses going through perforator.

(d) Mutilations — Fold caused paper to fail to advance.

C. Master Timing

3.19 Two master timing circuits (even and odd) furnish timing information in the form of 6 second pulses, control the perforation of recorder tape identity records and provide means for testing the recorder circuits.

3.20 One master timing circuit normally supplies the time pulses to all recorders in the group. Transfer under manual control (TT key) provides for one or the other of the master timing circuits to supply the time pulses to all recorders.

3.21 A synchronization feature in the master timing circuit provides for checking once a minute that the selectors of both the even and odd master timing circuits and all recorders are resting on corresponding terminals. Should the selector switches get out of step, the switch synchronization failure (SSF) lamp is lighted and the audible alarm sounded.

3.22 The master timing circuit should not be worked on or used for applying routine end-of-tape patterns during the interval from 5 minutes before the hour to 5 minutes after the hour.

3.23 When tests of a master timing circuit require that a recorder be attached, use the emergency recorder unless otherwise specified.

3.24 After clearing trouble in the master timing circuit, the circuit should be restored to service, but may be left out of control until needed.

3.25 Immediately after restoring a master timing circuit to service, or when testing a master timing circuit, it may be necessary to apply the routine end-of-tape pattern to all recorders. Before doing this, verify that the master timing circuits and the recorders are synchronized and that the selector switches are in the correct positions. Then check the ability of each master timing circuit to apply an end-of-tape pattern by inserting and then removing a plug from the MB- jack associated with an even and an odd recorder. As an additional check, insert and remove a plug from the RETE and the RETO jacks to check all even and odd recorders, respectively.

3.26 A synchronization failure alarm will occur as a result of the selector switches of the two master timing circuits and the recorder circuits being out of synchronism. Under this condition, multiple stoppages at the accounting center will result if all of the following conditions exist:

- (a) The controlling master timing circuit is at fault (losing time).
- (b) The controlling master timing circuit and all the recorders are synchronized.
- (c) The TT key is operated or restored after the alarm has sounded at a time when the recorder selectors have not reached 59.9 minutes.
- (d) The true hour has been reached and passed in the controlling (transferred to) master timing circuit but the hour entry has been skipped because the recorders have been synchronized with the controlling (transferred to) master timing circuit.

To prevent such multiple stoppages at the accounting center, proceed as outlined in the following paragraphs.

3.27 If, in response to a master timing circuit alarm, it is found that the controlling master timing circuit is slow, but in synchronism with the recorders and showing an hour different than the other master timing circuit, allow the hour entry to be attempted provided the selectors are stepping properly and the time is near the turn of the hour. Both master timing circuits will then place the proper end-of-tape hour entry when the recorders are transferred or made busy in preparation for synchronization. This procedure will prevent accounting center stoppages since the computer or the assembler-computer checks the end-of-tape hour entry against the preceding hour entry to verify that no hour entry is skipped or duplicated.

3.28 Alarms occurring shortly after 3 A.M. may be due to a failure to complete the 3 A.M. end-of-tape perforations. If the trouble is not cleared and the 3 A.M. end-of-tape entries are not completed before the next hour entry (4 A.M.) accounting center stoppages will result since the hour entries will not be in proper sequence. This type of trouble should be cleared promptly. To advance the associated recorder tapes sufficiently for cutting, place several make-busy patterns on the affected tapes.

3.29 Before restoring a master timing circuit to normal, check that *all* selectors are in the correct position with reference to the month, day, hour, and minute.

3.30 When the selectors of a master timing circuit are to be synchronized, verify that the selectors of the master timing circuit in control are in their correct positions, otherwise both master timing circuits may be in synchronism but with improper selector settings.

3.31 To prevent interference with the placing of the hour record on the recorder tapes, avoid restoring a master timing circuit to control during the interval from 5 minutes before to 5 minutes after any hour.

3.32 Complete information on trouble in master timing circuits which affect central office AMA tapes should be forwarded to the accounting center on Form E-4104.

D. Transverter

- 3.33** Before working on any individual piece of apparatus of the transverter except the TIB relay, insert a make-busy plug into the TVTIB or TRMB jack.
- 3.34** When using the sender test frame to test transverters, do not operate the CA key before the transverter is released as the sender may be left off normal and unguarded.
- 3.35** Complete information on troubles in transverters which affect central office AMA tapes should be forwarded to the accounting center on Form E-4104.
- 3.36** Before restoring a transverter to service, test its ability to place the cancel entry on the central office AMA tape using the sender test frame.

E. Transverter Connector

- 3.37** When a transverter connector is removed from service by making the associated senders busy during periods of heavy traffic, subscriber reactions may result because of slow dial tone. A transverter connector should be restored to service immediately upon clearing trouble, especially during periods of heavy traffic.
- 3.38** Before restoring transverter connectors to service, apply tests which may be indicated by the nature of the trouble found.

F. Translator

- 3.39** Removing a translator from service will prevent identification of 1000 calling subscribers. For this reason, a translator should be made busy only as required to work on equipment and should be restored to service as quickly as possible.
- 3.40** If a translator is made busy, all bulk billed calls will be completed without a

charge record and toll calls will be routed to overflow. For this reason, avoid making a translator busy during the daytime or busy hour periods.

- 3.41** If a translator is removed from service, the traffic, accounting and repair service people should be advised by telephone of the action taken.
- 3.42** Spare windings are provided on the E-SW, O-SW, SW0, SW1, SW2, SW4, SW7, VF0 to VF4 relays and on the directory number coils for use if trouble develops on the primary windings. The relay or coil should be replaced as soon as possible.
- 3.43** Translators removed from service for maintenance reasons should be restored to service as quickly as possible.

G. Call Identity Indexer

- 3.44** Except where trunk transfer is used, when a call identity indexer is removed from service by making the associated recorder busy in place of the district junctions or trunks, all message unit calls using district junctions or trunks associated with the call identity indexer are free calls and toll calls are routed to overflow. For this reason, where possible, the district junctions or trunks should be removed from service.
- 3.45** Before working on individual pieces of apparatus in the call identity indexer, make busy the transverter trouble indicator.
- 3.46** Circuit failures in call identity indexers cause the time alarm features of the associated recorders to function. These failures call in the transverter trouble indicator, and the trouble location must be determined from the display, trouble card, or trouble ticket produced.

H. District Junctor or Trunk Arranged for AMA

- 3.47** To avoid starting the call identity indexer circuit and causing repeated timing entries on the central office AMA tape, insulate

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the DJ- lead of the district junctor or trunk involved before attempting to clear trouble or adjust apparatus.

3.48 If, as a result of trouble or testing, repeated timing entries are perforated on the central office AMA tape, complete information giving district junctor or trunk number, associated recorder number, time of day, and the nature of the trouble should be forwarded to the accounting center.

3.49 Before restoring district junctors or trunks to service, they should be tested for ability to place initial, answer, and discon-

nect entries on the central office AMA tape using the district junctor test frame.

I. Billing Indexer

3.50 Before working on any individual pieces of apparatus of the billing indexer, make busy the transverter trouble indicator to the billing indexer.

3.51 Billing indexers should be removed from service only when traffic conditions permit.