CAMA OPERATOR POSITION EXERCISE (COPE) PROCEDURES 2-WIRE NO. 1 ELECTRONIC SWITCHING SYSTEM

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1. GENERAL

1.01 This section provides maintenance procedures for testing, analyzing, and locating troubles associated with a ***centralized automatic message accounting (CAMA)*** operator position in the 2-Wire No. 1 ***Electronic Switching System (ESS).***

1.02 ***This section is organized as follows:***

(a) The term ***CAMA Operator Position Exercise (COPE) Procedures*** implies all the actions that must be performed by personnel at the central office and at the CAMA operator location to test, analyze, and locate troubles associated with the CAMA operator position. The COPE procedures include the operator trunk circuit diagnostic and the operator position exercise routine TNCOPE.

(b) The phrase ***CAMA operator position*** refers to a CAMA position, 3C position, or 3CL position.

(c) The procedure for initiating the COPE procedures from the maintenance TTY, ***trunk and line test panel (TLTP),*** and ***supplementary trunk test panel (STTP)*** is provided in Part 2.

(d) The procedure for initiating the COPE procedures from a CAMA operator position is provided in Part 2.

(e) A description of the COPE tests is provided in Part 3.

(f) Detailed flowcharts of the entire COPE procedure, as performed by personnel at the central office and at the CAMA operator position, are provided. These flowcharts identify the ESS TTY responses and operator console (lamp and tone) responses to each key operation or time-out occurring. The detailed COPE procedures are divided into individual tests only to simplify the presentation in this section. In reality, these tests [the diagnostic test, continuity check, ***reset (RS)*** key test, ***multifrequency (MF)*** digits test, and ***position disconnect (PD) key test***] must be performed sequentially with each test immediately following the previous one.

(g) A procedure for analyzing COPE failure results is provided in Part 4.

1.03 The COPE procedures provide a fast and easy method of verifying that a CAMA operator position is good or bad; and if bad, gives an indication of what is faulty. The COPE procedures verify the following:

(a) CAMA operator trunk circuit

(b) MF Keyset

(c) RS key

(d) PD key

(e) PO Jack

(f) Talking and keying paths of the CAMA operator position.

1.04 COPE procedures may be requested as follows:

(a) by personnel at the central office maintenance TTY, TLTP, or STTP (with cooperation from personnel at the CAMA operator position)

(b) by personnel at the CAMA operator position.

1.05 The CAMA operator trunk circuit diagnostic is always performed automatically before the position exercise portion when COPE procedures are started. ***If the diagnostic does not pass, the results are printed out on the maintenance TTY and the position exercise is not started.***

1.06 When the CAMA operator trunk diagnostic has successfully been completed, the personnel at the CAMA operator position must perform a

series of key operations that test the functions of the RS key, PD key, and MF keyset. The ESS processes and analyzes this fixed set of tests and provides passing or failing results via maintenance TTY output message in the central office and audio and visual indications at the CAMA operator position.

1.07 If any of the MF key operations fail, a single reset (RS key) option can be used to repeat operation of only the failure key, or a double reset (RS key) option can be used to repeat the entire MF digits test.

2. INITIATING CAMA OPERATOR POSITION EXERCISE PROCEDURES

INITIATING COPE PROCEDURES FROM CAMA OPERATOR POSITION

A. Description

2.01 COPE procedures may be initiated by personnel at the CAMA operator position without assistance from central office personnel providing that the CAMA operator trunk has not been made maintenance busy (out-of-service).

2.02 Under normal operation, the system waits for 1 to 2 seconds after detection of a PO (position occupied) signal before making that CAMA operator position available for handling CAMA traffic calls. Within this 1- to 2-second interval, an MF digit (or digits) must be keyed in at the CAMA operator position [in case of CAMA position; in the case of a 3C or 3CL position, a KP digit must precede the MF digit(s)]. If no MF digit is received by the No. 1 ESS during this 1- to 2-second interval, normal CAMA traffic will be routed to this CAMA operator position. If a digit is received, the CAMA operator trunk is placed in the trunk out-of-service state and control is turned over to the CAMA diagnostic program. The CAMA diagnostic program enters a diagnostic request into the routine request table and returns control to the system. The trunk out-of-service state returns steady high tone to the CAMA operator position which may last up to several minutes before the exercise request can be processed in the case of a busy office. Steady high tone will remain the entire time the CAMA operator trunk is waiting for the request to be processed.

2.03 If the CAMA operator position is put into the unoccupied state while the trunk is waiting for the request to be processed, the COPE request (and, therefore, the diagnostic request) is cancelled.

2.04 When the exercise request is processed by the ESS and, therefore, the CAMA operator trunk diagnostic started, the trunk out-of-service tone terminates. The system then performs a continuity check on the CAMA operator trunk ports.

B. Procedure

2.05 Refer to Fig. 1 for detailed procedures for initiating COPE procedures from the CAMA operator position.

REQUESTING COPE PROCEDURES FROM CENTRAL OFFICE MAINTENANCE TTY, TRUNK AND LINE TEST PANEL, OR SUPPLEMENTARY TRUNK TEST PANEL

A. Description

2.06 COPE procedures may be initiated by personnel at the central office with the cooperation of the personnel at the CAMA operator position.

2.07 When COPE procedures are requested from the central office, a communication link is established between the central office and the CAMA operator location (other than the trunk and associated CAMA operator position being tested). Once the separate communications channel has been established, it is necessary to inform personnel at the CAMA operator position to go into the unoccupied state (remove headset from PO jack) so that the operator trunk can be made maintenance busy. After the trunk has been busied, personnel at the CAMA operator position should be informed to return to the occupied state. A request for a diagnostic on either one of the two CAMA operator trunk ports can now be initiated. The diagnostic may be requested by keying a ***trunk network number (TNN)*** and a test code on the TLTP or STTP or by typing in an input message containing a TNN and test code on the maintenance TTY.

2.08 When the CAMA operator trunk diagnostic has successfully been completed, the personnel at the CAMA operator position must perform a series of key operations that test the functions of the RS key, PD key, and MF keyset. The ESS processes and analyzes this fixed set of tests and provides passing or failing results via maintenance

TTY output message in the central office and audio and visual indications at the CAMA operator position. If the diagnostic failed, personnel at the central office have the option to either (1) leave the CAMA operator position maintenance busy so that additional testing can be done or (2) return the position to service. If the CAMA operator position is to be put into service, the personnel at the CAMA operator position must be informed to go position unoccupied (remove headset from PO jack). The central office personnel can then idle the busied CAMA operator trunk. After the trunk has been idled, the CAMA operator position may go into service, handling CAMA traffic, by going position occupied and waiting a minimum of 5 seconds before operating any position key.

Warning: If the CAMA operator trunk failed its diagnostic, it is probable that mishandling of CAMA traffic will occur if the CAMA operator position is put into service.

B. Procedure

2.09 Refer to Fig. 2 for detailed procedures for initiating COPE procedures from the central office maintenance TTY, TLTP, and STTP.

3. CAMA OPERATOR POSITION EXERCISE TESTS

CONTINUITY CHECK

A. Description

3.01 The ESS performs a continuity check on Port 0 and Port 1 of the CAMA operator trunk before the COPE tests are started. If the continuity check fails, the COPE tests are not started and a TN01 maintenance TTY output message is printed. Steady high tone is returned to the operator position for 10 seconds or until the CAMA position is put in the unoccupied state. The position should normally be put in the unoccupied state so that the problem can be analyzed and corrected. If the position is not unoccupied during this 10-second high tone interval, one of the following occurs: (1) if the COPE procedures were requested from the CAMA position, the TN01 output message is printed and normal CAMA traffic will be routed to the position; or (2) if the COPE procedures were requested from the central office (trunk is still busy), only the TN01 output message is printed (no CAMA traffic). If the continuity check passes, the CS lamp lights steady and three 500 ms high tone beeps separated by 500 ms of no-tone sent to the CAMA operator position by the No. 1 ESS. This signifies the start of the COPE tests. These tests consists of the following:

(1) RS key test

(2) MF Digit test

(3) PD key test.

B. Procedure

3.02 Refer to Fig. 3 for the system continuity check portion of the COPE procedures.

RS KEY TEST

A. Description

3.03 After the three 500 ms high tone beeps which are received at the CAMA operator position and the lighting of the CS lamp, the system begins 6-second timing. During this 6-second interval, the RS key must be operated, thereby sending a reset digit to the ESS. (For a 3C or 3CL position, a KP digit must precede the RS digit.) If the reset digit is invalid, the CS lamp is lighted at 120 ipm for 1.5 seconds, then is returned to steady. If no reset digit is received within six seconds, a time-out occurs, a TN01 maintenance TTY output message is printed, and the COPE tests are terminated. If the reset digit is valid, a 75 ms low tone beep is received at the CAMA operator position.

3.04 Following the 75 ms low tone beep, which indicates a valid reset digit, or following the 120 ipm/steady CS lamp, which indicates an invalid reset digit, the system begins 6-second timing on MF digit 1. Reference should be made to the description of the MF digit test as covered in 3.07 through 3.10.

3.05 If a time-out occurs during the RS key test, the COPE procedures are terminated with a TN01 TTY failure message and steady high tone is returned to the CAMA operator position for 10 seconds. During this interval the operator position must be put in the unoccupied state.

Warning: If the position is not unoccupied within this 10-second interval, a TN01

output message is printed and CAMA traffic may be routed to the position (if CAMA operator trunk is not in busied state).

B. Procedure

3.06 Refer to Fig. 4 for the RS key test portion of the COPE procedures.

MF DIGITS TEST

A. Description

3.07 Following the 75 ms low tone beep, which indicates a valid RS key operation, or following the 120 ipm/steady CS lamp, which indicates an invalid RS key operation, the MF digits portion of the COPE procedures is started. MF digits 1 through 9 and 0 must be keyed into the system in the sequence where 0 follows 9. After each MF key is operated, three possible responses can occur. If the MF digit is invalid, the CS lamp is lighted at 120 ipm for 1.5 seconds, then is returned to steady. If no MF digit is received within six seconds, a time-out occurs, a TN01 maintenance TTY output message is printed, and the COPE tests are terminated. If the MF digit is valid, a 75 ms low tone beep is received at the CAMA operator position.

3.08 Following the 120 ipm/steady CS lamp, the system begins 6-second timing on either the next MF digit in sequence or an RS digit. The RS key operation may represent a single reset operation used to repeat only the failing digit or a double reset operation used to repeat all the MF digits as explained in 3.16.

3.09 Following the 75 ms low tone beep, which indicates a valid MF digit, the system begins 6-second timing on the next MF key operation in the sequence 1 through 0 (where 0 follows 9). If the last MF digit was 0, the system begins 6-second timing on a PD key operation or an RS key operation. The PD key operation is the normal procedure to follow.

3.10 If a time-out occurs during the MF key test, the COPE procedures are terminated with a TN01 TTY failure message and steady high tone is returned to the CAMA operator position for 10 seconds. During this interval the operator position must be put in the unoccupied state.

Warning: If the position is not unoccupied within this 10-second interval, a TN01 output message is printed and CAMA traffic may be routed to the position (if CAMA operator trunk is not in busied state).

B. Procedure

3.11 Refer to Fig. 5 for the MF digits test portion of the COPE procedures.

PD KEY TEST

A. Description

3.12 Following the 75 ms low tone beep, which indicates a valid MF 0 key operation, the PD key test portion of the COPE procedures is started. The PD key must be operated within the 6-second timing interval after the 75 ms low tone. If the PD key fails, the system times out, causing the CS lamp to extinguish and steady high tone to occur. If the PD digit received by the system is valid, the CS lamp is immediately extinguished and steady high tone is returned to the CAMA operator position.

3.13 To silence the steady high tone at the end of the COPE procedures, the CAMA operator position must be put into the unoccupied state, (whether the PD key function has passed or failed). If the CAMA operator procedures were originally initiated from the CAMA operator position, (1) the position may handle CAMA traffic by being returned to the occupied state and waiting five seconds, or (2) the position may remain in the unoccupied state. If the CAMA procedures were initiated from the central office maintenance TTY, STTP, or TLTP, the CAMA operator position must be released from the maintenance busy state before the position is capable of handling CAMA traffic.

3.14 If a time-out occurs during the RS key test, the COPE procedures are terminated with a TN01 TTY failure message and steady high tone is returned to the CAMA operator position for 10 seconds. During this interval the operator position must be put in the unoccupied state.

Warning: If the position is not unoccupied within this 10-second interval, a TN01 output message is printed and CAMA traffic may be routed to the position (if CAMA operator trunk is not in busied state).

B. Procedure

3.15 Refer to Fig. 6 for the PD key test portion of the COPE procedures.

RESET (RS) KEY OPTIONS

A. Description

3.16 The RS key may be used throughout the MF digit providing it functioned correctly in its own test. The following options are available using the RS key.

(1) ***Single Reset Option:*** Operation of the RS key once cancels the results of the last MF key operation, enabling that key to be retried without incurring a failure. This action may be done more than once on any one digit.

(2) ***Double Reset Option:*** Operation of the RS key twice cancels the results of all MF digits that have been keyed in. (A 75 ms low tone must occur after the first RS key operation before the RS key can be operated for the second time.) The double reset option enables the MF digit test to be restarted beginning with MF digit 1.

The following operations of the RS key causes the system to terminate the COPE procedures:

(1) Detection of three RS key operations in a row

(2) Detection of two double reset options at any time during the MF digits test

(3) Detection of a total of 30 digits including reset digits.

3.17 If one of the above reset options occur, the COPE procedures are terminated with a TN01 TTY failure message and steady high tone is returned to the CAMA operator position for 10 seconds. During this interval the operator position must be put in the unoccupied state.

Warning: If the position is not unoccupied within this 10-second interval, a TN01 output message is printed and CAMA traffic may be routed to the position (if CAMA operator trunk is not in busied state).

B. Procedure

3.18 Refer to Fig. 5A for the single reset key option procedure and to Fig. 5B for the double reset key option procedure.

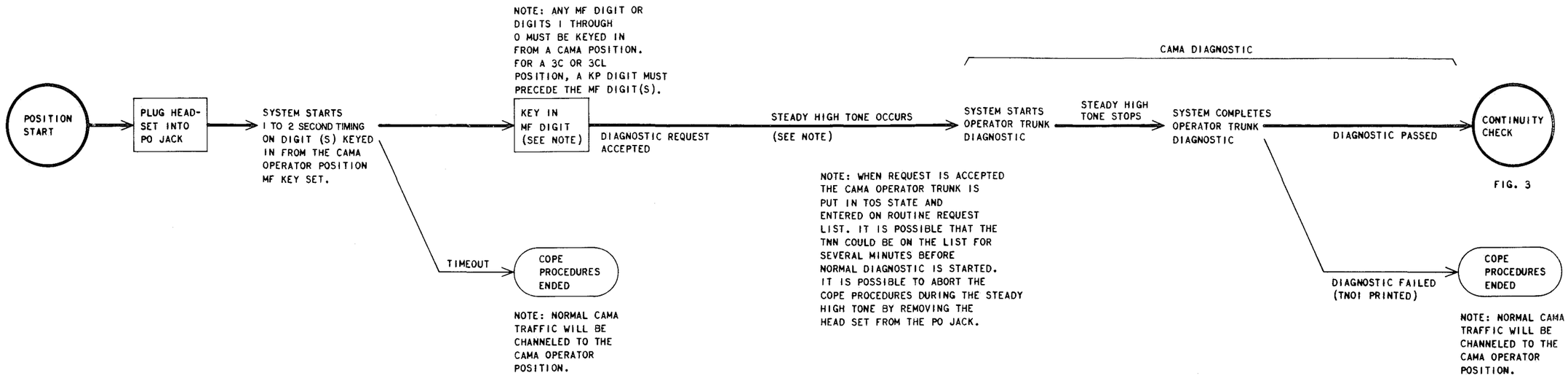


FIG. 3

Fig. 1—COPE Procedures—Request from CAMA Operator Position

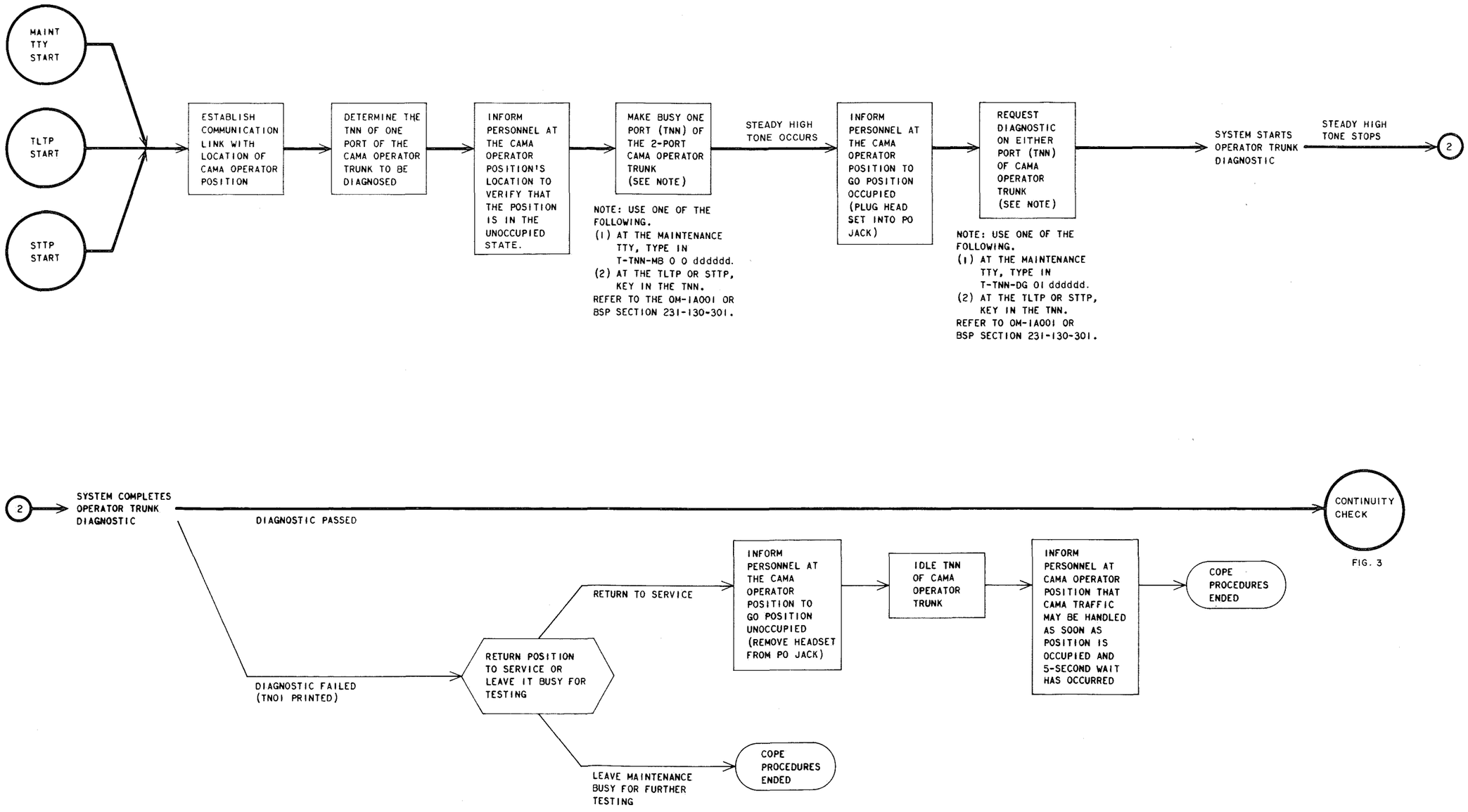


Fig. 2—COPE Procedures—Request from Maintenance TTY, STTP, and TLTP

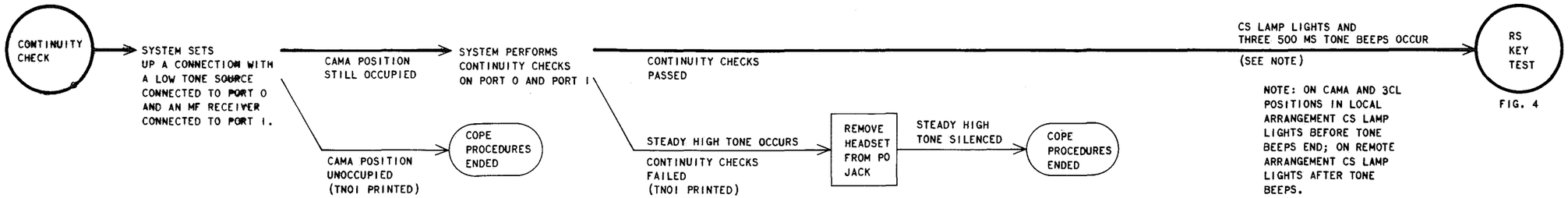


Fig. 3—COPE Procedures—Continuity Check

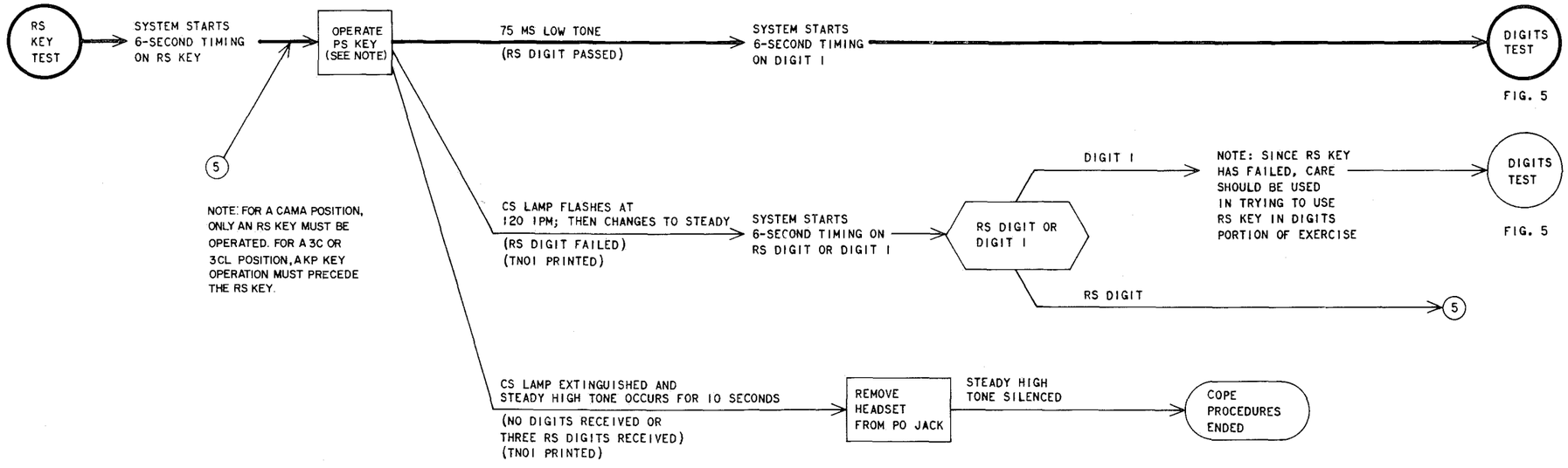


Fig. 4—COPE Procedures—RS Key Test

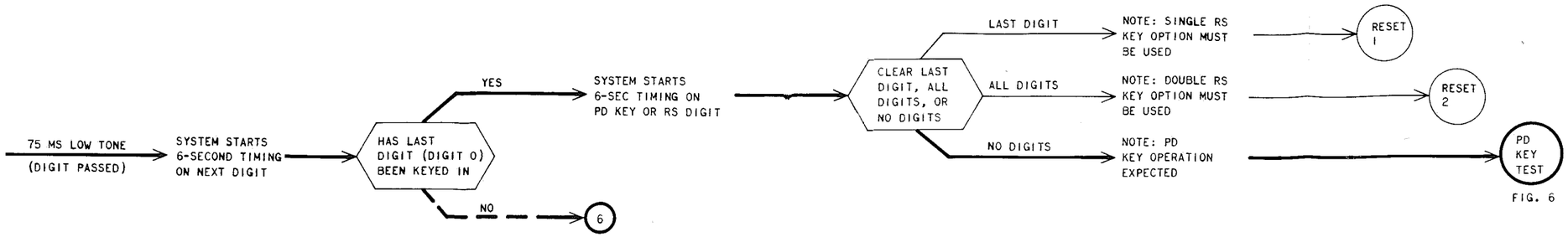
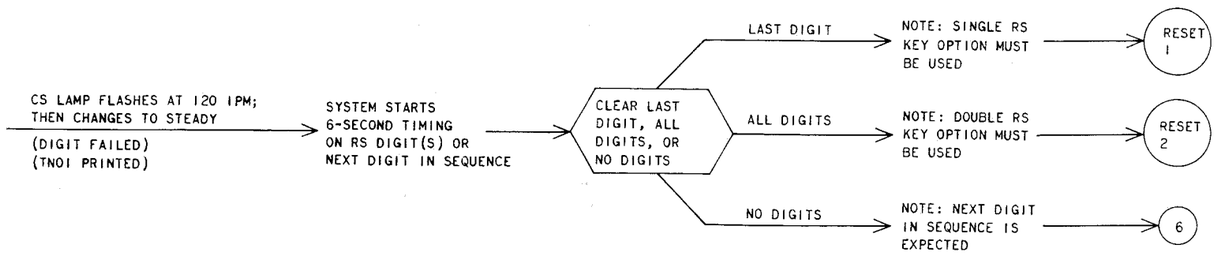
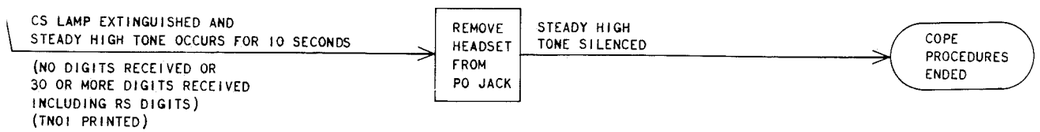
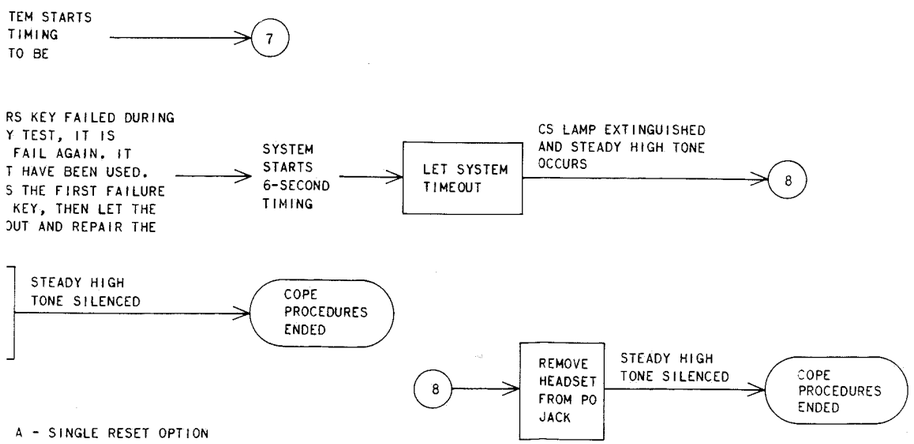


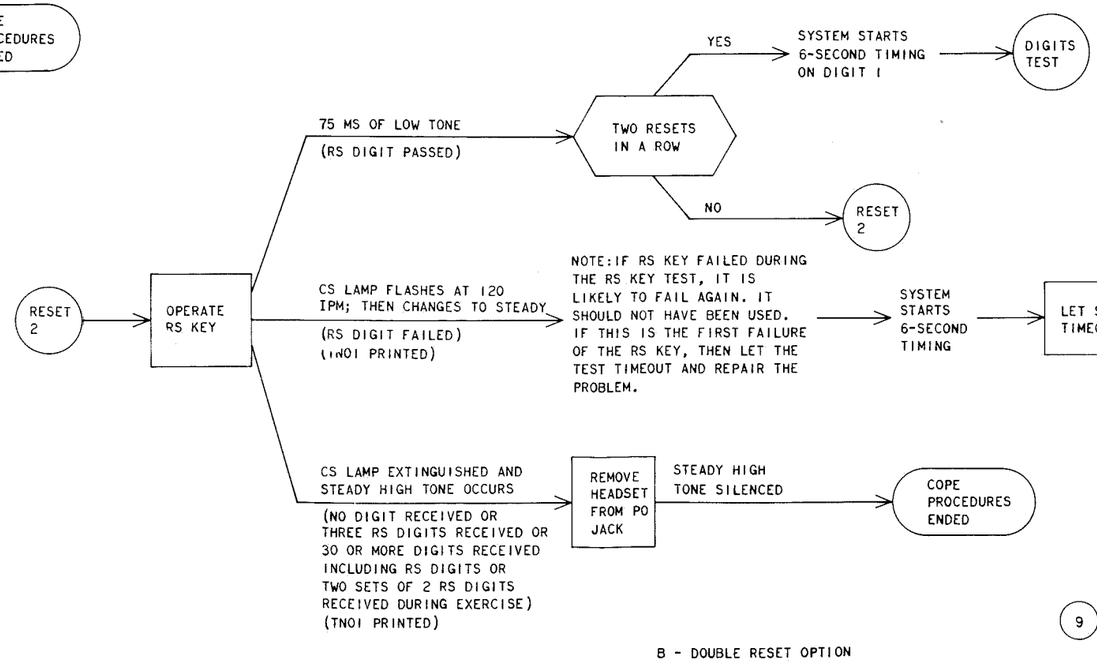
FIG. 6







A - SINGLE RESET OPTION



B - DOUBLE RESET OPTION

Fig. 5—COPE Procedures—MF Digits Test and Reset Options

DIGITS TEST

6

OPERATE DIGIT n WHERE n = DIGITS 1 THROUGH 0 IN THE SEQUENCE 0 > 9

REENTER FAILING DIGIT

7

75 MS LOW TONE
(DIGIT PASSED)

SYSTEM STARTS 6-SECOND TIMING ON NEXT DIGIT

HAS LAST DIGIT (DIGIT 0) BEEN KEYED IN

YES

SYSTEM STARTS 6-SEC TIMING ON PD KEY OR RS DIGIT

CLEAR LAST DIGIT, ALL DIGITS, OR NO DIGITS

LAST DIGIT

NOTE: SINGLE RS KEY OPTION MUST BE USED

RESET 1

ALL DIGITS

NOTE: DOUBLE RS KEY OPTION MUST BE USED

RESET 2

NO DIGITS

NOTE: PD KEY OPERATION EXPECTED

PD KEY TEST

NO

6

CS LAMP FLASHES AT 120 IPM; THEN CHANGES TO STEADY
(DIGIT FAILED)
(TNOI PRINTED)

SYSTEM STARTS 6-SECOND TIMING ON RS DIGIT(S) OR NEXT DIGIT IN SEQUENCE

CLEAR LAST DIGIT, ALL DIGITS, OR NO DIGITS

LAST DIGIT

NOTE: SINGLE RS KEY OPTION MUST BE USED

RESET 1

ALL DIGITS

NOTE: DOUBLE RS KEY OPTION MUST BE USED

RESET 2

NO DIGITS

NOTE: NEXT DIGIT IN SEQUENCE IS EXPECTED

6

CS LAMP EXTINGUISHED AND STEADY HIGH TONE OCCURS FOR 10 SECONDS
(NO DIGITS RECEIVED OR 30 OR MORE DIGITS RECEIVED INCLUDING RS DIGITS)
(TNOI PRINTED)

REMOVE HEADSET FROM PO JACK

STEADY HIGH TONE SILENCED

COPE PROCEDURES ENDED

FIG. 6

RESET 1

OPERATE RS KEY

75 MS OF LOW TONE
(RS DIGIT PASSED)

NOTE: SYSTEM STARTS 6-SECOND TIMING ON DIGIT TO BE ENTERED

7

CS LAMP FLASHES AT 120 IPM; THEN CHANGES TO STEADY
(RS DIGIT FAILED)
(TNOI PRINTED)

NOTE: IF RS KEY FAILED DURING THE RS KEY TEST, IT IS LIKELY TO FAIL AGAIN. IT SHOULD NOT HAVE BEEN USED. IF THIS IS THE FIRST FAILURE OF THE RS KEY, THEN LET THE TEST TIMEOUT AND REPAIR THE PROBLEM.

SYSTEM STARTS 6-SECOND TIMING

LET SYSTEM TIMEOUT

CS LAMP EXTINGUISHED AND STEADY HIGH TONE OCCURS

8

CS LAMP EXTINGUISHED AND STEADY HIGH TONE OCCURS
(NO DIGITS RECEIVED, OR THREE RS DIGITS RECEIVED, OR 30 OR MORE DIGITS RECEIVED INCLUDING RS DIGITS)
(TNOI PRINTED)

REMOVE HEADSET FROM PO JACK

STEADY HIGH TONE SILENCED

COPE PROCEDURES ENDED

8

REMOVE HEADSET FROM PO JACK

STEADY HIGH TONE SILENCED

COPE PROCEDURES ENDED

A - SINGLE RESET OPTION

RESET 2

OPERATE RS KEY

75 MS OF LOW TONE
(RS DIGIT PASSED)

TWO RESETS IN A ROW

YES

SYSTEM START: 6-SECOND TIM ON DIGIT 1

NO

RESET 2

CS LAMP FLASHES AT 120 IPM; THEN CHANGES TO STEADY
(RS DIGIT FAILED)
(TNOI PRINTED)

NOTE: IF RS KEY FAILED DURING THE RS KEY TEST, IT IS LIKELY TO FAIL AGAIN. IT SHOULD NOT HAVE BEEN USED. IF THIS IS THE FIRST FAILURE OF THE RS KEY, THEN LET THE TEST TIMEOUT AND REPAIR THE PROBLEM.

CS LAMP EXTINGUISHED AND STEADY HIGH TONE OCCURS
(NO DIGIT RECEIVED OR THREE RS DIGITS RECEIVED OR 30 OR MORE DIGITS RECEIVED INCLUDING RS DIGITS OR TWO SETS OF 2 RS DIGITS RECEIVED DURING EXERCISE)
(TNOI PRINTED)

REMOVE HEADSET FROM PO JACK

STEADY HIGH TONE SILENCED

B - DOUBLE RESET OPTION

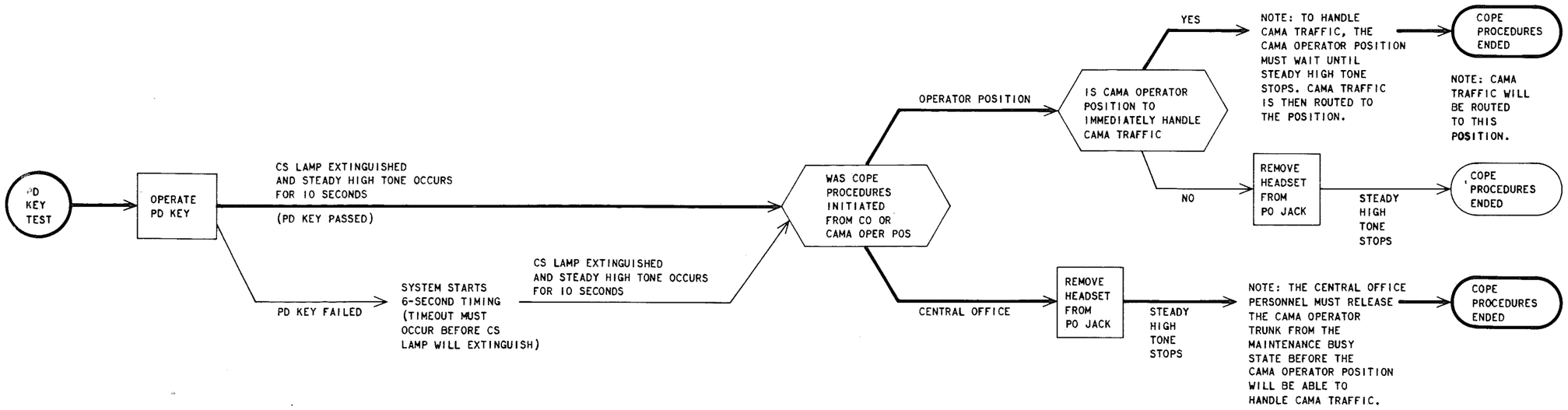


Fig. 6—COPE Procedures—PD Key Test

4. ANALYZING CAMA OPERATOR POSITION FAILURE RESULTS (TN01 AND TN04 OUTPUT MESSAGE)

TN01 OUTPUT MESSAGE

4.01 A TN01 output message is printed out on the maintenance TTY whenever a COPE test fails. The trouble number, which is printed in the TN01 failure message, is generated by routine TNCOPE. As shown in Fig. 7, each bit corresponding to an octal-to-binary breakdown of the TN01 trouble number represents the pass (0) or fail (1) results for a particular test. It is possible to have more than one failure bit set in any one exercise.

TN04 OUTPUT MESSAGE

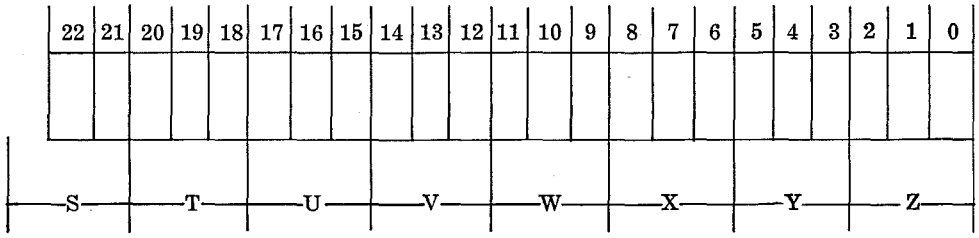
4.02 If a raw data diagnostic was requested on the CAMA operator trunk from the central office (first digit of the two-digit test code was 4), the ferrod results in the MF receiver for each digit that failed will be printed. These results are printed out in a TN04 output message. The failing digit ferrod results start with raw data word 100 for the reset digit and end with word 110 for digit 0. (For example, word 100 for reset digit; 101 for digit 2; 102 for digit 2; 103 for digit 3; etc.) These ferrods, which are represented by octal numbers printed in the TN04 message are shown in Fig. 8. The expected multifrequency two-out-of-six codes can be derived from Table A. By comparing the expected results to the TN04 output message results, the failing digit(s) and frequency can be found.

4.03 Refer to Fig. 9 for an example of TN04 and TN01 output messages.

TN01 a aa bb bb bb ccc ddd – stuv wxyz

ddd = CPI of Trunk

stuv wxyz = represents the faults as follows



Z	B (0) — POSITION NOT OCCUPIED (TERMINATES TEST) B (1) — CONTINUITY CHECK FAILURE — PORT 0 (TERMINATES TEST) B (2) — CONTINUITY CHECK FAILURE — PORT 1 (TERMINATES TEST)
Y	B (3) – (SD-1A315 AND SD-1A316 ONLY) POSITION NOT IDLE AND OCCUPIED AFTER PD TEST B (4) – SIX-SECOND TIME-OUT – NO RESET RECEIVED (TERMINATES TEST) B (5) – (SD-1A315 AND SD-1A316 ONLY) NO 1-0-1 CHANGE ON F(1) AT END OF TEST
X	B (6) — INVALID DIGITS RECEIVED B (7) — DIGITS OUT OF SEQUENCE B (8) — SIX-SECOND TIME-OUT — NO DIGIT RECEIVED (TERMINATES TEST)
W	B (9) — NO POSITION DISCONNECT SIGNAL B (10) — NO POSITION UNOCCUPIED SIGNAL AT END OF TEST B (11) — 3 RS IN A ROW, OR 2 SETS OF 2 RS, OR 30 DIGITS (TERMINATES TEST)
V	B (12) — RESET DIGIT FAILED B (13) — DIGIT 1 FAILED B (14) — DIGIT 2 FAILED
U	B (15) — DIGIT 3 FAILED B (16) — DIGIT 4 FAILED B (17) — DIGIT 5 FAILED
T	B (18) — DIGIT 6 FAILED B (19) — DIGIT 7 FAILED B (20) — DIGIT 8 FAILED
S	B (21) — DIGIT 9 FAILED B (22) — DIGIT 0 FAILED

Fig. 7 — Interpretation of TN01 Trouble Number

TABLE A

MULTIFREQUENCY TWO-OUT-OF-SIX CODE
SD-1A246-01

FREQ HZ	700	900	1100	1300	1500
900	1				
1100	2	3			
1300	4	5	6		
1500	7	8	9	0	
1700	NA	NA	KP	NA	NA

NA = NOT APPLICABLE

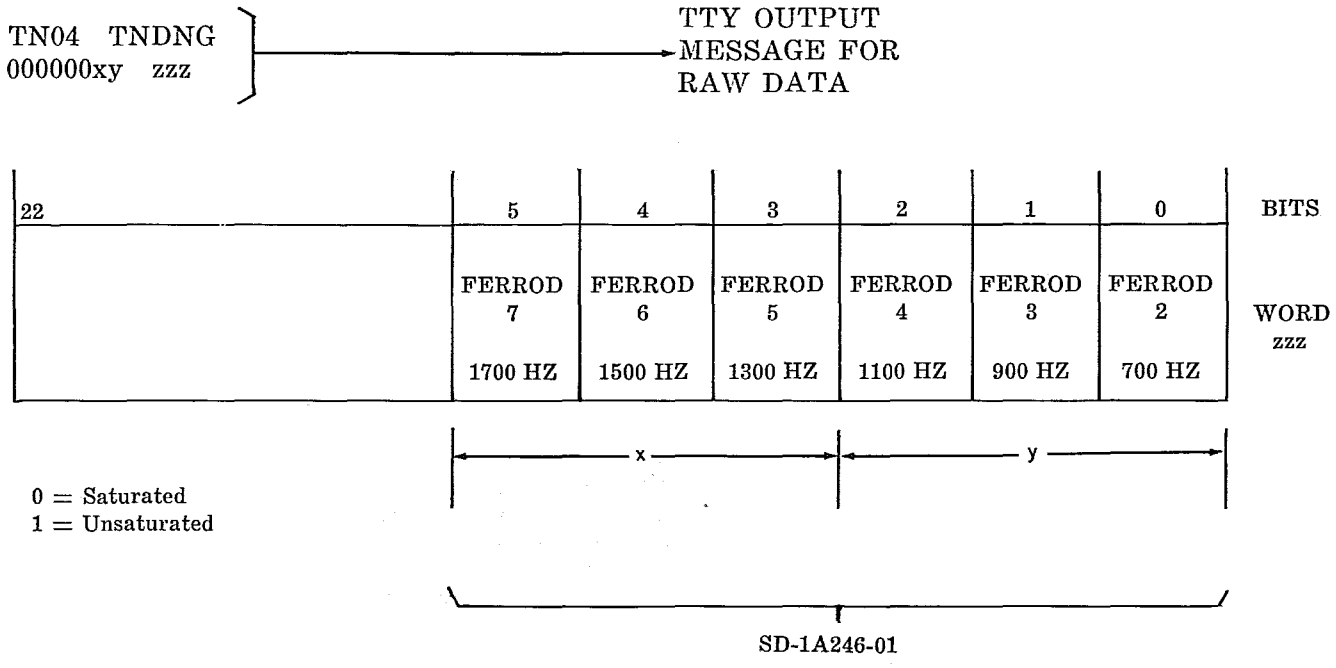
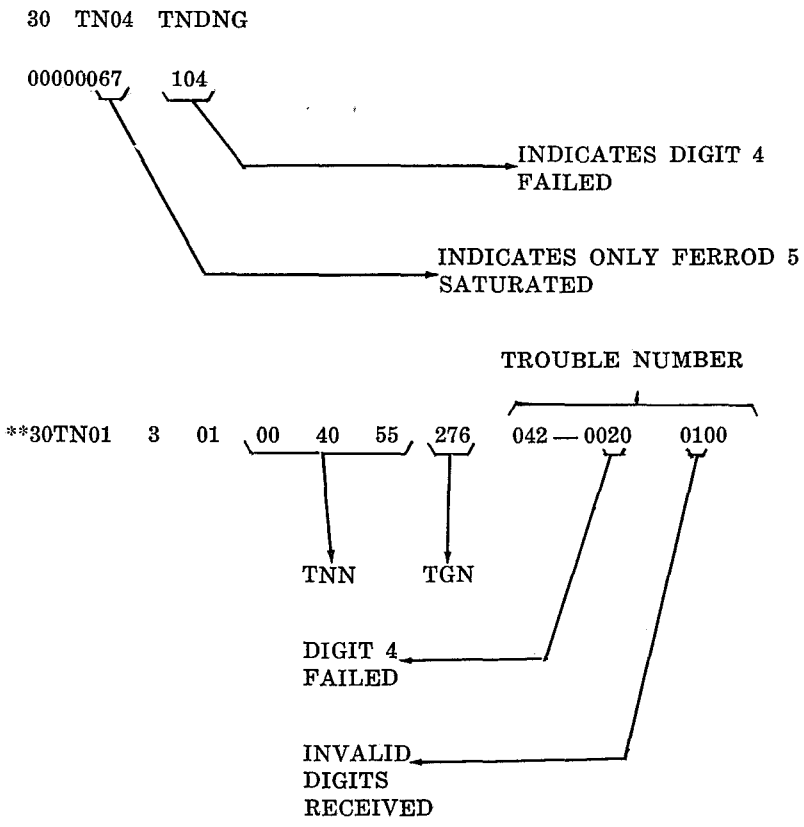


Fig. 8 — MF Digit Ferrod Results (Used for Analyzing TN04 Output Message)



Note: The expected results for digit 4, as determined from Table A, are 700 HZ and 1300 HZ. After comparing these results to the MF digit ferrod word layout shown in Fig. 8 and the TN04 results, it is apparent that ferrod 2 and ferrod 5 should have been saturated. As can be seen from the TN04 output in this example, ferrod 2 did not saturate.

Fig. 9 — Example of TN04 and TN01 Output Messages