

## CIRCUIT EXPLANATION

DIAL SPEED AND/OR TCMF  
SUBSET AND PARTY IDENTITY CKT.  
SELECTOR LEVEL & TEST DESK  
ACCESS  
H-850678-A

(Written specifically for circuit issue 18-25.  
but may also apply to later issues. Refer  
to H print for appropriate E issue number.)

SIZE	A	SHEET 1	TOTAL 6	6
E- 850678-A ADDEND.				
AUTOMATIC ELECTRIC CO. NORTHLAKE, ILLINOIS U.S.A.				

Added  
Addendum  
1 to  
Cover H  
Issues 18  
thru 25  
1/75 pm  
ISSUE 4

ISSUE 18

Advanced "AH" drawing to issue 10.

ISSUE 19

To facilitate remote office testing of TCMF subsets by automatically providing remote battery feed rather than local battery feed. Added "GMS" wiring superseding "GM" wiring. Straps "RBF" normally provided. omitted when TCMF test applique H-851074-A is provided.

ISSUE 20

To provide balanced busy tone and balanced dial tone option for access by No. 1 EAX offices, The following changes are made.

1. Added new Fig. 12A similar to Fig. 2A, except arranged for balanced busy tone.
2. Added new Fig. 13A similar to Fig. 4A, except arranged for balanced busy tones.
3. In Fig. 3A, moved 450 ohm resistors R2 and R3 from being a part of "B" apparatus to a location in the main Fig. 3A. Also designated some existing wiring as "M" wiring and added superseding "N" wiring and apparatus for new manufacture of Fig. 3A.

Added installer's "P" wiring option, for balanced dial tone when used with a No. 1 EAX exchange.

4. In Fig. 11A, removed single busy tone wiring and apparatus (capacitor C2, OIMF,) and added balanced busy tone wiring and apparatus (resistor R2 and R3 and 2MF capacitors C2 and C3). This is an outright change. Figure 11A is used only with No. 1 EAX access.

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E- 850678-A-ADDEND.

5. Revised reference figures "AC" and "AA" to reflect new figures 12A and 13A.
6. Revised terminal blocks and stubbings in Figures 2A, 4A, 5A, 7A, 8A and 10A to reflect new Figures 12A and 13A.
7. Revised notes 53, 55, 56, 57, 58, 68 and 69 to reflect new Fig's. 12A and 13A.
8. In Note 10 corrected reference to "U" wiring, changing reference to "J" wiring and apparatus. Notes 13, 72, 73 and 74 added.
9. "AH" drawing change (issues 12 and 13) combined with ckt. issue 20 change, which was pending.

#### ISSUE 21

Advanced "AH" drawing to issue 14.

#### ISSUE 22

Added terminal block (5 X 6) for figure 6A.

#### ISSUE 23

Added table A to supplement Notes 7 and 90.

Figure 1A, changed relays BSD and DC to be same as equivalent relays of Figure 11A. Added resistors R2 & R3 (2.7K $\Omega$ ) and R4 (900 $\Omega$ ) and capacitors C3A and C3B. This provides a tone source circuit that is not part of the impedance matching termination as used in the CXP-5 system.

Figure 3A, added resistors R4 and R5 (2.7K $\Omega$ ) and R6 (900 $\Omega$ ) which in part provides a tone source circuit same as that provided in Figure 1A for use in CXP-5 system.

Figure 4A, rewire springs 8 and 9 of relay GT to be in series with coil of relay CP and spring 6 of relay PC, thereby allowing rotary switch PS to step properly and prevent relay CP from operating falsely on a ground fault detection.

Figure 12A, added resistors R14 - R17 (2.7K $\Omega$ ) and resistor R18 (900 $\Omega$ ) which provides a tone source circuit same as provided in figure 1A for use with CXP-5 system.

Figure 13A, rewire spring 5 and 6 of relay GT to be in series with coil of relay CP and spring 6 of relay PC thereby allowing rotary switch PS to step properly and prevent relay CP from

operating falsely on a ground fault detection. Added resistors R10 - R13 (2.7K.) which in part provides a tone source circuit same as provided in Figure 1A for use in the CXP-5 system.

Impedance matching terminations provided per approved circuit design practice T-65, guidelines for precise tones.

#### ISSUE 23 Addendum 1

The original ground fault test feature of the party identity test circuits, Figure 4A and 13A, is for use with the system standard inductive ground party identity tip mark and normally be provided. When only the dial off, normal tip mark is employed, an additional installers strap is required.

In figures 4A and 13A - removed old "R" and "S" wiring.

Figure 4A, added new "R" wiring to terminal punching DT1 and junction of spring 5 of relay H and spring 8 of relay GT also added "R" wiring to terminal punching DT2 and junction of spring 9 of relay GT and spring 3 of relay DN.

Added "S" strap option between terminal punchings DT1 and DT2. (Installer's option per Note 76).

Figure 13A - Added new "R" wiring to terminal punching DT1 and junction of spring 1B of relay H and spring 5 of relay GT also added "R" wiring to terminal punching DT2 and junction of spring 6 of relay GT and spring 3 of relay DN.

Added "S" strap option between terminal punchings DT1 and DT2. (installers option per note 76).

#### ISSUE 24

Corrected drafting error in figure 12A ("W" wrg. & app.), connection between resistor "R15", "R12" and capacitor "C6" to 11T of relay "BMF".

#### ISSUE 25

Provided balanced dial tone option in Fig. 12A when accessed by No. 1 EAX offices.

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E-850678-A-ADDEND. 1

# CIRCUIT EXPLANATION

M

DIAL SPEED AND/OR TCMF  
SUBSET AND PART IDENT CKT  
SELECTOR LEVEL & TEST DESK  
ACCESS  
H-850678-A

(Written specifically for circuit issue 17,  
but may also apply to later issues. Refer  
to H print for appropriate E issue number.)

## GENERAL

This circuit provides facilities for testing either dial  
type or TCMF type subsets for dial speed, tone quality, and  
party identity.

After seizing the circuit, a digit is dialed to access the  
dial pulse test call portions of the circuit. The Testman  
then dials the digits "0" in order to test the dial speed.  
Fither one, two, or three splashes of dial tone are sent  
by this circuit depending on whether the dial speed is  
slow, correct, or fast, respectively. The dial speed is  
compared to a built-in pulse generator.

The "identity access" digit is dialed to seize the party  
identity test portion of the circuit, i.e., the digit "0" followed  
by the dialed party digit is dialed into the circuit in order  
to test the party identity. If the proper identification  
is made, the circuit returns steady dial tone. If the  
proper identification is not made, busy tone is returned.

When the circuit is used to test a TCMF type subset, an  
access digit is keyed after the circuit has been seized  
to access the TCMF test call portion of the circuit.

Party identity is automatically made of the TCMF subset  
under test. Party identity verification is made by keying  
in the party digit into the test circuit. If the proper  
party identification is received, the circuit returns dial  
tone to the subset. If the party identification fails, the  
circuit returns momentary (3 to 4 seconds) busy tone followed  
by dial tone. After party identity verification has been  
made, the pushbuttons are sequentially depressed (1-2-3 etc).  
If the proper registration of digits occurs (TCMF tones cor-  
rect), a double order "zip" tone is returned to the subset.

Re-  
written  
12/71; mb  
Cronenwe  
S.D.C. ST  
CHaney  
Issue 3

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SHEET 4 TOTAL  
AUTOMATIC ELECTRIC CO.  
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If the digit registration fails, no tones are returned. An option is available for digit registration whereby confirmation can be made as each push button is depressed. If the digit is properly registered, dial tone is momentarily interrupted, if not, steady dial tone exists. When the circuit is seized, the following supervisory indications are returned at the test desk: (a) Bright Busy lamp - indicates the dial test selector access portion of the circuit is being used (b) 120 IPM Bright Flashing BL lamp - indicates the TCMF test selector access portion of the circuit is being used (c) 60 IPM Bright Flashing BL lamp - indicates test desk has accessed TCMF portion of the circuit.

#### FEATURES

- (a) Can be accessed by Test Desk, SXS Selector level (via FIG 1A), or #1 EAX Selector Group matrix outlet (via FIG 11A)
- (b) Provides for TCMF testing of Tributary offices from a non-senderized office via a Test Desk without going through a selector or access circuit (FIG 1A or 11A not used) - SEE FIG TRIB-1 FOR TYPICAL INTERCONNECTION OF CIRCUITS
- (c) Accepts TCMF and Dial type test calls
- (d) Checks subset party identity
- (e) Checks digit registration
- (f) Provides visual display of digit sequence and value
- (g) Provides tone signals to indicate test failures
- (h) Provides a TCMF Allotter Circuit to permit a test desk to select an idle TCMF TEST RECEIVER ACCESS AND PARTY IDENTITY CIRCUIT (FIG 2A) from a group of ten (maximum)
- (i) Provides a TCMF TEST DESK ACCESS CIRCUIT to switch the test desk position into the TCMF circuitry
- (j) Provides a BSY LAMP DIST CKT to indicate "all circuits" (FIG 1A & 2A or FIG 11A & 2A) "busy" (ATB) to the test desk positions

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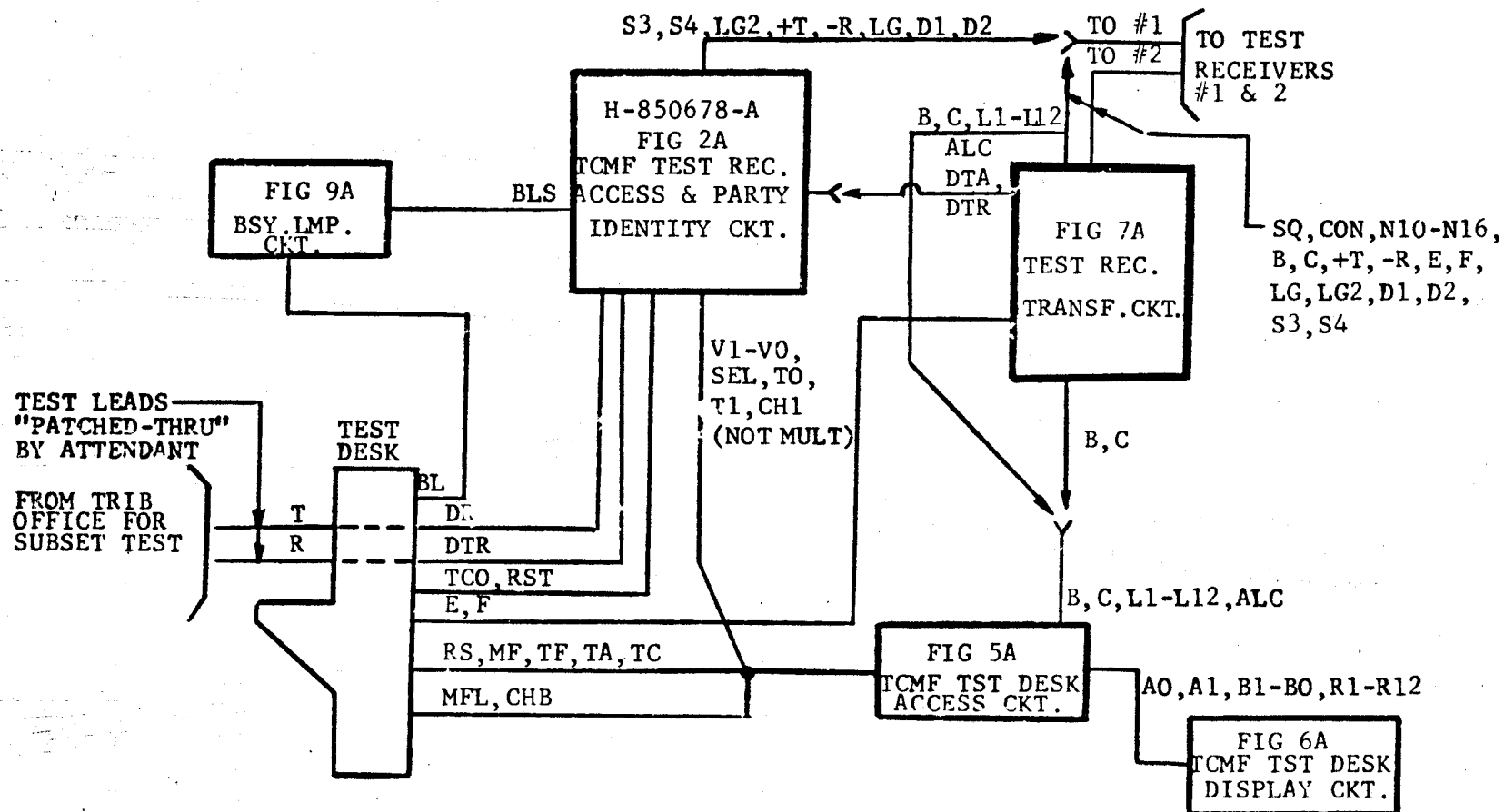


FIG TRIB-1

TYPICAL INTERCONNECTION DIAGRAM FOR  
SUBSET TESTING AT TRIBUTARY OFFICES VIA TEST  
DESK (WHEN ONE FIG 2A, PROVIDED - FOR REF. ONLY)

CIRCUIT OPERATION

NOTE: In this explanation numbers in parentheses after relay or rotary switch designations indicate the circuit figure in which they are located; i.e. relay B (1A or 11A) means relay "B" of figure 1A or 11A.

1.00 Access by SXS Selector Level (FIG 1A USED)

1.01 Seizure (Normally operated: ON springs of rotary switch RS)

This circuit is accessed via the Selector level assigned to this particular test circuit. Resistance (#2C) battery on lead C marks this circuit idle to the associated Selector.

When seized, the loop via leads "+" and "-" is closed, closing #1 and #2A (1A) in series, and resistance ground via lead C closes #2C (1A). Relay A (1A) operates and closes B (1A). Relay B (1A) operates, grounds lead C to mark this circuit busy, connects leads SQ1 and CO (TO FIG 2A WHEN PROVIDED) to leads SQ and CON (TO TEST REC H-850679-A OR EQUIV, OR FIG 7A WHEN PROVIDED), respectively, grounds lead CH3, and grounds lead BY (See Note 67, H-850678-A). Relay C (1A) operates.

1.01.1 Dial Pulse Test Call (Operated: Relays A, B and C)

The type of Subset test that is required is determined by a dialed digit (see NOTE 52; H-850678-A).

On the first dial pulse, the loop via leads "+" and "-" is opened, opening #1 and #2A (1A). Relay A (1A) restores, opens B (1A) and closes #1C (1A) and magnet RS (1A) in series. Relay B (1A) remains operated during dialing due to its slow-to-release characteristics. Switch RS operates and operates its INT springs. At the end of the first pulse, the loop via leads "+" and "-" is closed, closing #1 and #2A (1A). Relay A (1A) operates, closes B (1A) and opens #1C (1A) and magnet RS (1A). Switch RS restores, steps its wipers one step (to their first bank contacts), restores its ON springs opening #2C (1A), and restores its INT springs. The next dial pulse (if any) opens the loop via leads "+" and "-", and A (1A) and switch RS (1A) follow the dialed pulses as described above.

At the end of the digit, the loop via leads "+" and "-" is closed, closing #1 and #2A (1A). Relay A (1A) operates,

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closes B (1A) and opens #1C (1A) and magnet RS. Switch RS restores and steps its wipers to the dialed bank contacts. After its slow-to-release interval, C (1A) restores and closes DC (1A) via LEV G wiper of switch RS (see NOTE 52; H-850678-A). Relay DC (1A) operates, transfers leads "+" and "-" (TO SEL BK) from resistance (#2A) ground and resistance (#1A) battery to leads "+" and "-" (TO FIG 3A, OR H-85175 OR EQUIV), respectively, opening A (1A) and seizing FIG 3A (see Section 3.00), and transfers lead C (TO FIG 3A, OR H-85175 OR EQUIV) from resistance (#1BSD) battery to ground. Relay A (1A) restores and opens B (1A). After its slow-to-release interval, B (1A) restores, removes ground from lead CH3, disconnects leads SQ1 and CO (TO FIG 2A, WHEN PROVIDED) from leads SQ and CON (TO TEST REC. H-850679-A OR EQUIV OR FIG 7A when provided), respectively, and removes ground from LEV G wiper of rotary switch RS(1A). Relay DC (1A) is held operated via ground on lead C (TO FIG 3A, OR H-85175 OR EQUIV).

#### 1.01.2 TCMF Test Call (Operated: Relays A, B and C)

When the test digit (to choose the TCMF Test) is received from the preceding circuits via leads "+" and "-", A and switch RS follow the pulses as described in Section 1.01.1.

After its slow-to-release interval, C (1A) restores and closes TC (1A), via LEV G wiper of switch RS (see NOTE 52; H-850678-A). Relay TC (1A) operates, connects leads T and R to leads "+" and "-" (TO SEL BK), respectively, disconnects lead TD from lead TD1, transfers ground from lead CH1 to lead LG1, closing TCS (1A) via lead TCS and thermistor TR1 (and FIG 2A), connects leads DR1 and DA1 to leads DR and DA, respectively, (to provide dial tone), connects leads R1 through R6 to terminals N10 through N16, via the LEV A through F wipers of switch RS, respectively (see NOTE 51; H-850678-A), and transfers lead BY from ground to lead IP. After its slow-to-operate interval provided by thermistor TR1, TCS (1A) operates to its "X" contacts, operates fully, and grounds lead TC1, to seize FIG 2A (the TCMF Test Receiver Access and Party Identity Circuit).

#### 2.00 TCMF Test Receiver Access and Party Identity Circuit [(FIG 2A) Operated: Relays A, B, TC and TCS]

Ground via lead TC1 (from FIG 1A; see Section 1.01.2, from FIG 11A; see Section 1.01.2) closes TC1 (2A). Relay TC1 (2A) operates, disconnects lead T and lead DT from lead +T (via capacitor C1 and resistors R1 and R2), closes #3PA in series with resistor R7, closes T2 (2A), and transfers lead R and lead DR from lead -R (via capacitor C2 and



resistors R4 and R5) to resistance (#1A1, #1PA, and #2PA in series) battery. The parity check is made at this time (before T2 operates). Party one has no mark and party two has a resistance ground mark on lead R.

### 2.01 Party One

Party one has no mark on lead R, so that polar relay PA does not operate at this time. After its slow-to-operate interval, T2 (2A) operates and closes #1PC. Relay PC (2A) operates to its "X" contacts, short-circuits #2PC, operates fully, removes the short circuit from #2PC, closing #1 and #2PC in series, disconnects leads DTR (and lead HTR; NOTE 61, H-850678-A) and DTA (and lead HTA; NOTE 61, H-850678-A) from leads +T (via leads DR & DR1 and FIG 1A or 11A) and -R (via leads DA & DA1 and FIG 1A or 11A), respectively, connects lead +T to lead -R via resistor R10, opens relay TCS (1A or 11A) via lead TCS, transfers lead D1 from lead D2 and #2PNG to #2POK, and connects lead S3 to lead S4.

Relay TCS (1A or 11A) restores and opens TC1 (2A) via lead TC1. After its slow-to-release interval, TC1 (2A) restores, connects leads +T and -R to leads T and R (via resistors R1 and R2, and capacitor C1; and resistors R4 and R5, and capacitor C2), respectively, opens T2 (2A) and #3PA, and disconnects resistance (#1A1, #1PA, and #2PA in series) battery from lead R. Relay T2 (2A) restores. The party parity check is now made (Section 2.03).

### 2.02 Party Two

Party two has a resistance ground mark on lead R, closing #1 and #2PA in series, magnetically aiding #3PA. Polar relay PA (2A) operates. After its slow-to-operate interval, T2 (2A) operates and closes #1PB. Relay PB (2A) operates, similar to that described for PC (2A) in Section 2.01, except that it transfers lead D2 from lead D1 and #2PNG to #2POK. The subsequent operations are identical except that when relay TC1 restores due to operation of relay PB (2A), #1 & #2 PA will be short-circuited opening relay PA. Relay PA (2A) restores.

### 2.03 Party Parity Check

In order to check the parity of the party mark, the testman keys the digit corresponding to the party identity. The Test Receiver receives the tones corresponding to the digit keyed, and grounds the corresponding class lead (lead D1 or D2).

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## SEIZURE

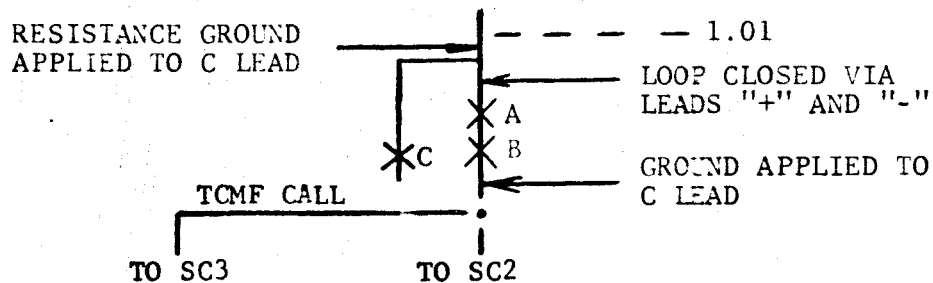
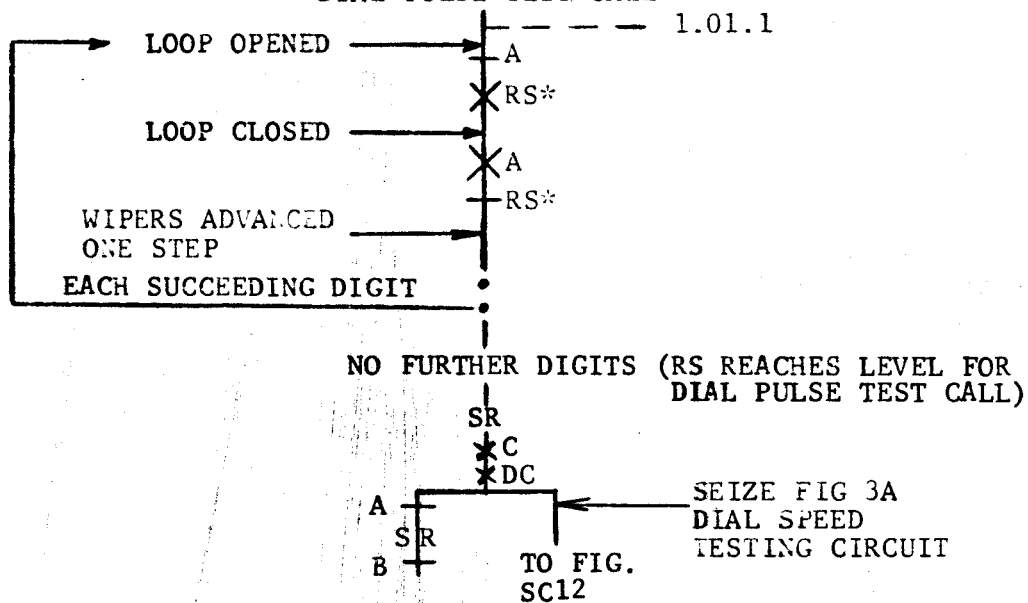


FIG SC2 (ACCESS CIRCUIT FIG 1A)  
DIAL PULSE TEST CALL



NOTE: NUMBERS NEXT TO DASHES INDICATE SECTION  
IN WHICH OPERATION IS DESCRIBED

\* INDICATES ROTARY SWITCH

### 2.03.1 Parity

If the party identity keyed corresponds to the party identity detected, #2POK is closed via lead D1 or D2 (PC or PB operated, respectively). Relay POK (2A) operates to its "X" contacts, only and short-circuits #1POK. At the end of the digit, the Test Receiver removes the ground from lead D1 (or D2), removing the short circuit from #1POK (closing #1 or #2POK in series). Relay POK (2A) operates fully, grounds lead ALC closing #1ALT1 (FIG 7A), opens relay PC (2A) (or PB), grounds leads TO (via LEV C of switch SEQ), U1 (via LEV F of switch SEQ), and LG, and disconnects #2PNG from lead D2 (or D1). Relay PC (2A) (or PB) restores, connects leads DTR (and lead HTR, "Y" WRG) and DTA (and lead HTA, "Y" WRG) to leads T and R, respectively (to supply dial tone to the subset indicating that TCMF digit verification may be attempted), connects lead D1 to lead D2, and disconnects lead S3 from lead S4. Relay ALT1 (FIG 7A) operates and short-circuits #1ALT2 (7A).

### 2.03.2 No Parity

If the party identity keyed does not correspond to the party identity detected, the Test Receiver Circuit grounds lead D1 (party 1) or D2 (party 2), closing #2PNG (2A). Relay PNG operates to its "X" contacts and short-circuits #1PNG (2A). At the end of the digit, the Test Receiver disconnects ground from lead D1 or D2, removing the short circuit from #1PNG (2A). Relay PNG (2A) operates (#1 and #2PNG closed in series) completely, connects lead T to lead R via resistor R8, transfers leads R & DR from lead -R to lead BT (to supply busy tone), and closes BTO (2A) via thermistor TR1 and resistor R9 in multiple. After its slow-to-operate interval, provided by thermistor TR1, BTO (2A) operates, locks, grounds lead ALC, closing #1ALT1 (FIG 7A), opens relay PB(2A) or relay PC (2A), and relay PNG (2A), grounds leads TO (via LEV C wiper of switch SEQ), LG, and U1 (via LEV F wiper of switch SEQ). Relay ALT1 (FIG 7A) operates and short-circuits #1ALT2 (7A). Relay PNG (2A) restores, removes resistor R8 from across leads T and R, and transfers lead R from lead BT (to remove busy tone) to lead -R. Relay PB (2A) or PC (2A) restores, connects leads DTR (and lead HTR "Y" WRG) and DTA (and lead HTA, "Y" WRG) to leads T and R, respectively, (to supply dial tone to the subset, indicating the TCMF digit verification may be attempted), connects lead D1 to lead D2, and disconnects lead S3 from lead S4.

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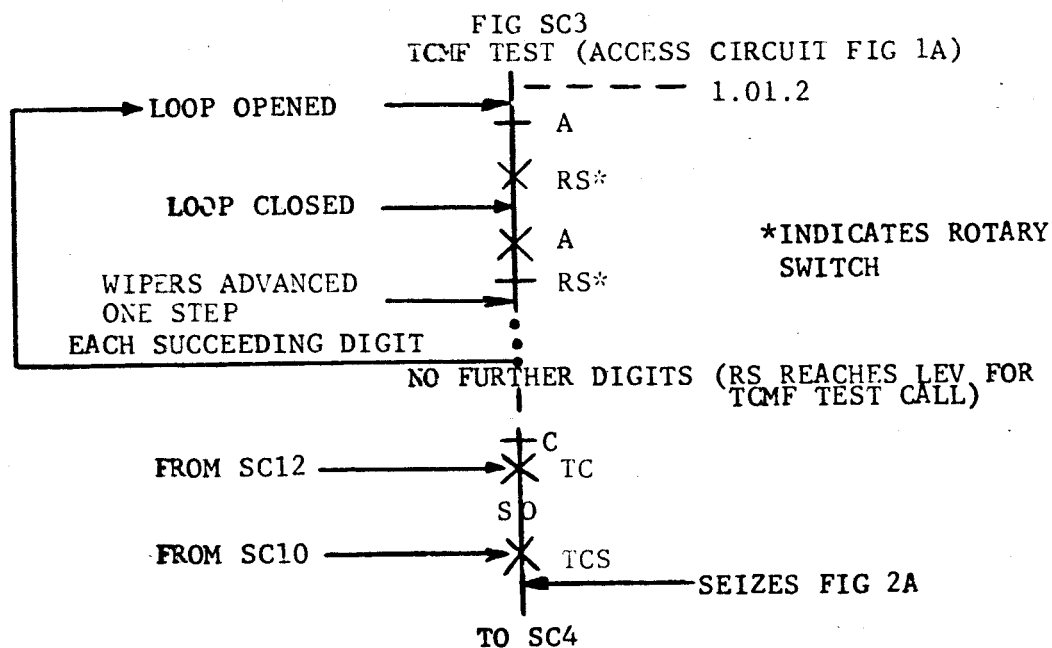


FIG SC4-SEIZURE  
TCMF TEST RECEIVER ACCESS AND PARTY IDENTITY CIRCUIT (FIG 2A)

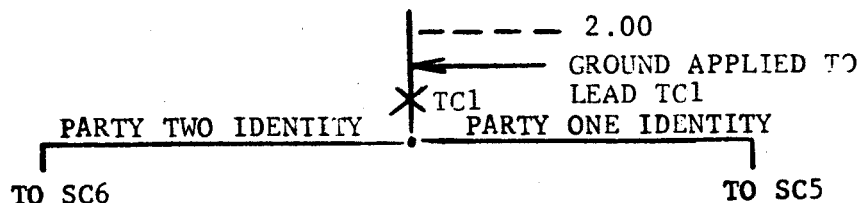
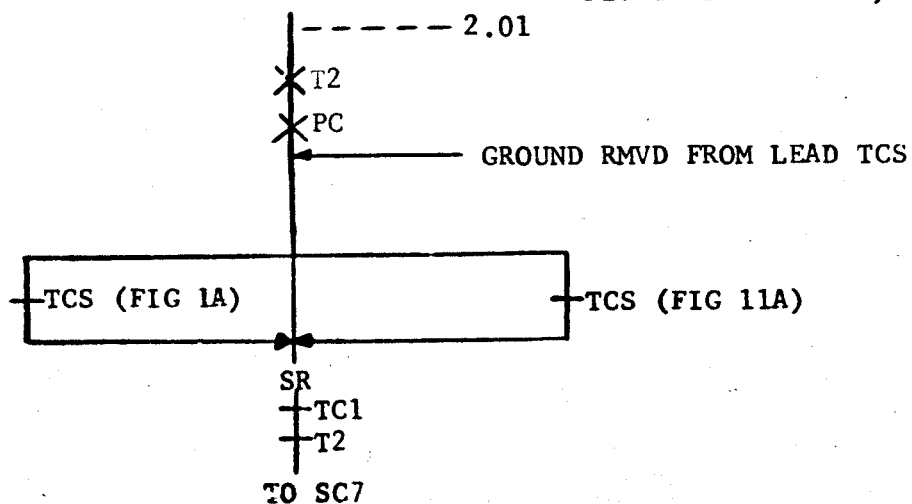


FIG SC5  
PARTY ONE IDENTITY  
TCMF TEST RECEIVER ACCESS AND PARTY IDENTITY CIRCUIT (FIG 2A AND  
FIG 1A OR FIG 11A)



## 2.04 TCMF Digit Verification [Operated: Relays A, B, TC, ROT SW, RS (FIG 1A or 11A); Relays POC or BTO (FIG 2A) and Relay ALTI (FIG 7A)]

Following a party check testman may check the subset's oscillator output combinations by operating the push buttons of the subset. The Test Receiver (FIG 2A) receives the tones (via leads +T and -R) and processes them. Figure 2A may be arranged to provide two methods of verification via FIG 1A (or 11A) and the Test Receiver.

Without "X" wiring the Test Receiver is conditioned so that all digits must be checked in sequential order and a "good" or "faulty" indication is given after all the digits have been received. The circuit operation for the full sequential check is as described in Section 2.04.2.

With "X" wiring (FIG 2A) provided each digit received in sequence will individually be checked after it is received. An indication is given to the testman that one (or both) the oscillators associated with each digit is (or are) faulty. The circuit operation for checking of each TCMF Digit after it has been received is as described in Section 2.04.1.

### 2.04.1 Digit Verification After Receipt of Each Individual TCMF Digit ("X" Wiring Used)

With "X" wiring provided (SEE NOTE 54, H-850678-A) each digit is verified immediately after it is received by the Test Receiver. If the digit is correct, the Test Receiver grounds lead SQ (FIG 1A or 11A) closing relay SQ (FIG 2A) via lead SQL. Relay SQ(2A) operates, disconnects leads DTR (and lead HTR, "Y" WRG) and DTA (and lead HTA, "Y" WRG) from leads T & R, respectively (to remove dial tone from the subset), and closes relay SQS(2A). Relay SQS(2A) operates and locks. When the Test Receiver removes ground from lead SQ (FIG 1A or 11A), relay SQ(2A) is opened. Relay SQ(2A) restores, connects leads DTR (and lead HTR, "Y" WRG) and DTA (and lead HTA, "Y" WRG) to leads T & R, respectively (to connect dial tone to the subset), and closes relay SQT(2A). After its slow-to-operate interval, relay SQT(2A) operates, disconnects leads DTR (and lead HTR, "Y" WRG) and DTA (and lead HTA, "Y" WRG) from leads T & R, respectively (to remove dial tone from the subset), and opens relay SQS(2A). After its slow-to-release interval, relay SQS(2A) restores and opens relay SQT(2A). Relay SQT(2A) restores and connects leads DTR (and lead HTR, "Y" WRG) and DTA (and lead HTA, "Y" WRG) to leads T & R, respectively (to connect

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FIG SC6  
PARTY TWO IDENTITY  
TCMF TEST RECEIVER ACCESS AND PARTY IDENTITY CIRCUIT  
(FIG 2A, AND FIG 1A & 11A)

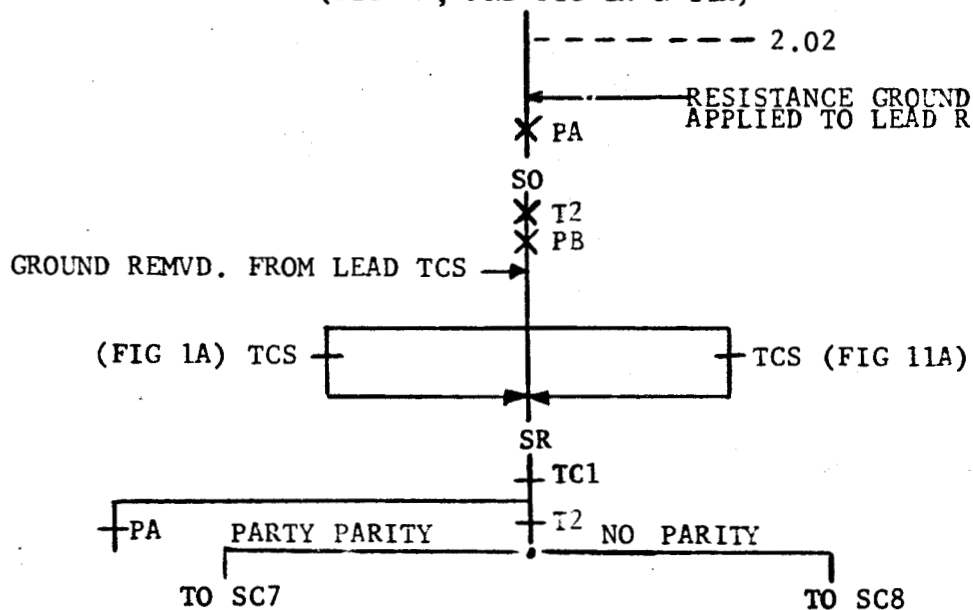
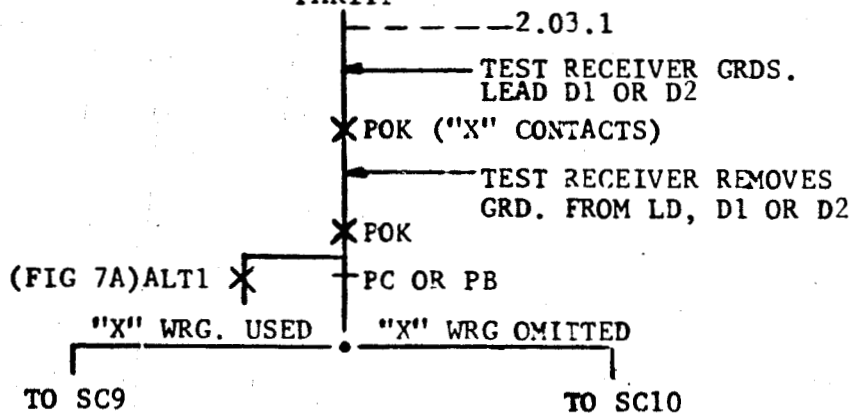


FIG SC7 (FIG 2A)  
PARTY PARITY CHECK  
TCMF TEST RECEIVER ACCESS AND PARTY IDENTITY CIRCUIT  
PARITY



dial tone to the subset). This operation is repeated after each correctly verified digit. When the last digit is correctly verified, the circuit operation continues as described in Section 2.05.1 or repeated testing may be done as described in Section 2.05.2. If any of the digits are not properly verified by the Test Receiver lead SQ is not grounded, relay SQ(2A) does not operate, and there is no interruption of dial tone. The test can be repeated by the momentary operation of the subset's hookswitch, and the circuit operation continues as described in Section 2.05.2.

#### 2.04.2 Digit Verification Following Receipt of All Digits in Sequential Order ("X" wiring omitted)

After receipt of the last digit if all the digits are properly registered, the Test Receiver grounds lead CON (FIG 1A or 11A) to close #2CON (via lead CO). Relay CON(2A) operates to its "X" contacts, locks (#1 and #2CON in series), operates completely, disconnects leads DTR (and lead HTR, "Y" WRG) and DTA (and lead HTA, "Y" WRG) from leads T (via leads DR & DR1 & FIG 1A or 11A) and R (via leads DA & DA1 & FIG 1A or 11A), respectively (to remove dial tone from the subset), disconnects ground from lead LG, and closes relay T1(2A). After its slow-to-operate interval, relay T1(2A) operates and closes relay T2(2A). After its slow-to-operate interval, relay T2(2A) operates and closes relay T3(2A). After its slow-to-operate interval, relay T3(2A) operates, connects leads HTR (and lead DTR, "Y" WRG) and HTA (and lead DTA, "Y" WRG) to leads T and R, respectively (to connect dial tone to the subset), and closes relay T4(2A). After its slow-to-operate interval, relay T4(2A) operates, locks, disconnects leads HTR (and lead DTR, "Y" WRG) and HTA (and lead DTA, "Y" WRG) from lead T and R, respectively (to remove dial tone from the subset), and opens relay T2(2A). Relay T2(2A) restores, connects leads HTR (and lead DTR, "Y" WRG) and HTA (and lead DTA, "Y" WRG) to leads T & R, respectively (to connect dial tone to the subset), and opens relays T1(2A) and T3(2A). Relay T3(2A) restores and disconnects leads HTR (and lead DTR, "Y" WRG), and HTA (and lead DTA, "Y" WRG) from leads T & R, respectively (to remove dial tone from the subset). Relay T1(2A) restores and closes relay EOT (2A). Relay EOT(2A) operates and opens relay CON(2A) and either relay POK (party identification verification correct) or relay BTO (party identification verification failure).

Relay CON(2A) restores, connects leads DTR (and lead HTR, "Y" WRG) and DTA (and lead HTA, "Y" WRG) to leads T & R, respectively (connecting dial tone to the subset), opens relay T4(2A), connects ground to lead LG, and connects

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FIG SC8 (FIG 2A)

NO PARITY

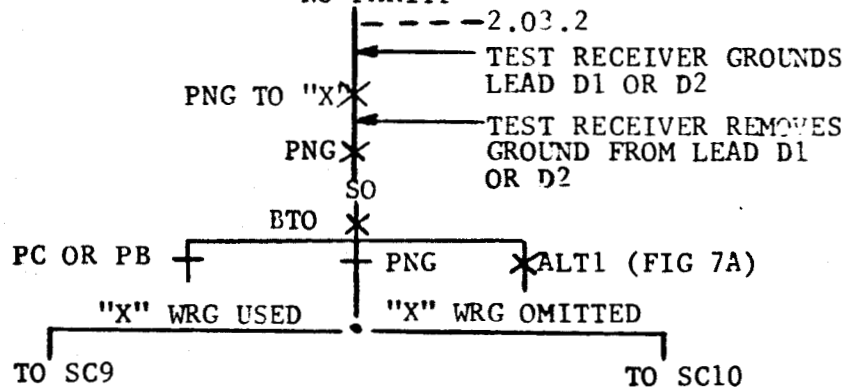
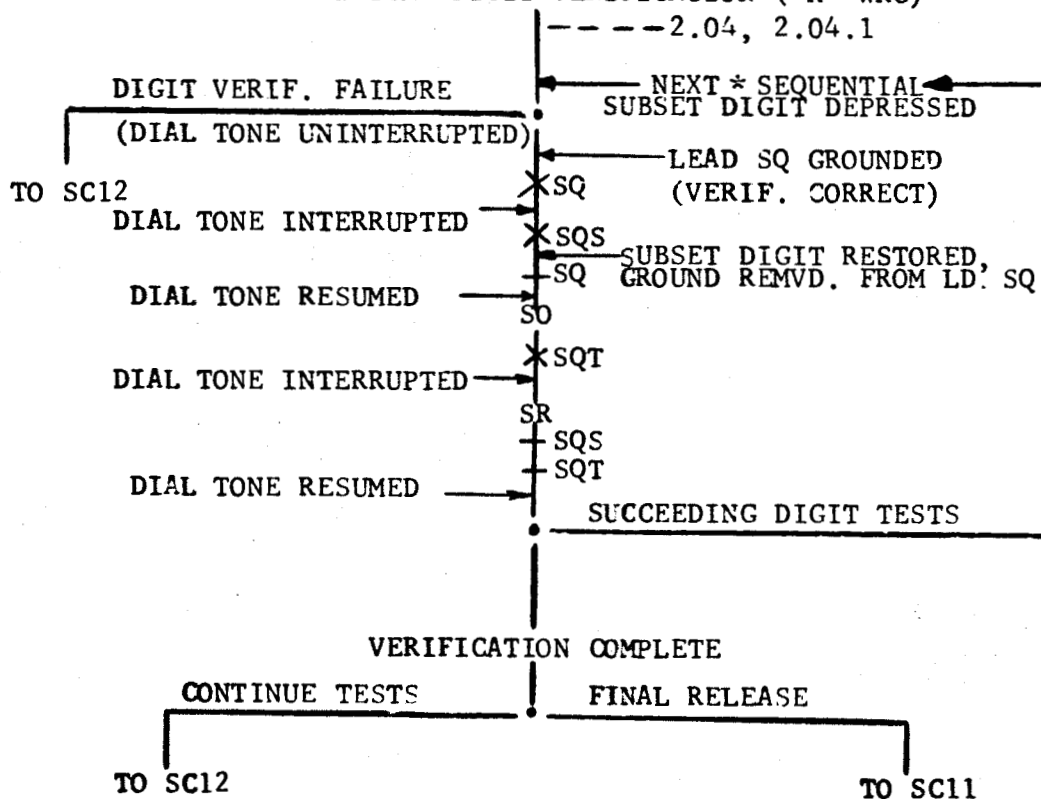


FIG SC9 (FIG 2A)

INDIVIDUAL TCMF DIGIT VERIFICATION ("X" WRG)



\*NOTE: Although each digit is checked individually, each must be received in its proper sequential order.

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resistance (#2CON) battery to lead CO. Relay POK(2A) restores (if operated), disconnects ground from lead ALC removing the short circuit from #1ALT2 (FIG 7A), (See Section 7.00 for subsequent transfer operation) grounds lead TCS to close relay TCS (FIG 1A or 11A), disconnects ground from lead LG, and connects resistance (#2PNG) battery to leads D1 & D2. Relay BTO(2A) restores (if operated), disconnects ground from lead ALC removing the short circuit from #1ALT2 (FIG 7A) (See Section 7.00 for subsequent transfer operation), connects ground to lead TCS to close relay TCS (FIG 1A or 11A), disconnects ground from lead LG, and connects resistance (#2PNG) battery to leads D1 & D2. Relay T4(2A) restores and opens relay EOT(2A). After its slow-to-release interval, relay FOT (2A) restores. After its slow-to-operate interval, due to thermistor TR1, relay TCS(2A) operates and the circuit operations continue as described in Sections 1.01.2 or 11.01.2 after which another test may be conducted as described in Section 2.00.

If all digits were verified correctly with dial tone interrupted 3 times ("ZIP-ZIP-ZIP" tone) following receipt of the last digit, and all tests are complete, the circuit operation continues as described in Section 2.05.1.

If, after the last digit, dial tone remains on the line (uninterrupted), a failure of one of the subset oscillators has occurred. The test can be repeated by the momentary operation of the subset's hookswitch and the circuit operation continues as described in Section 2.05.2.

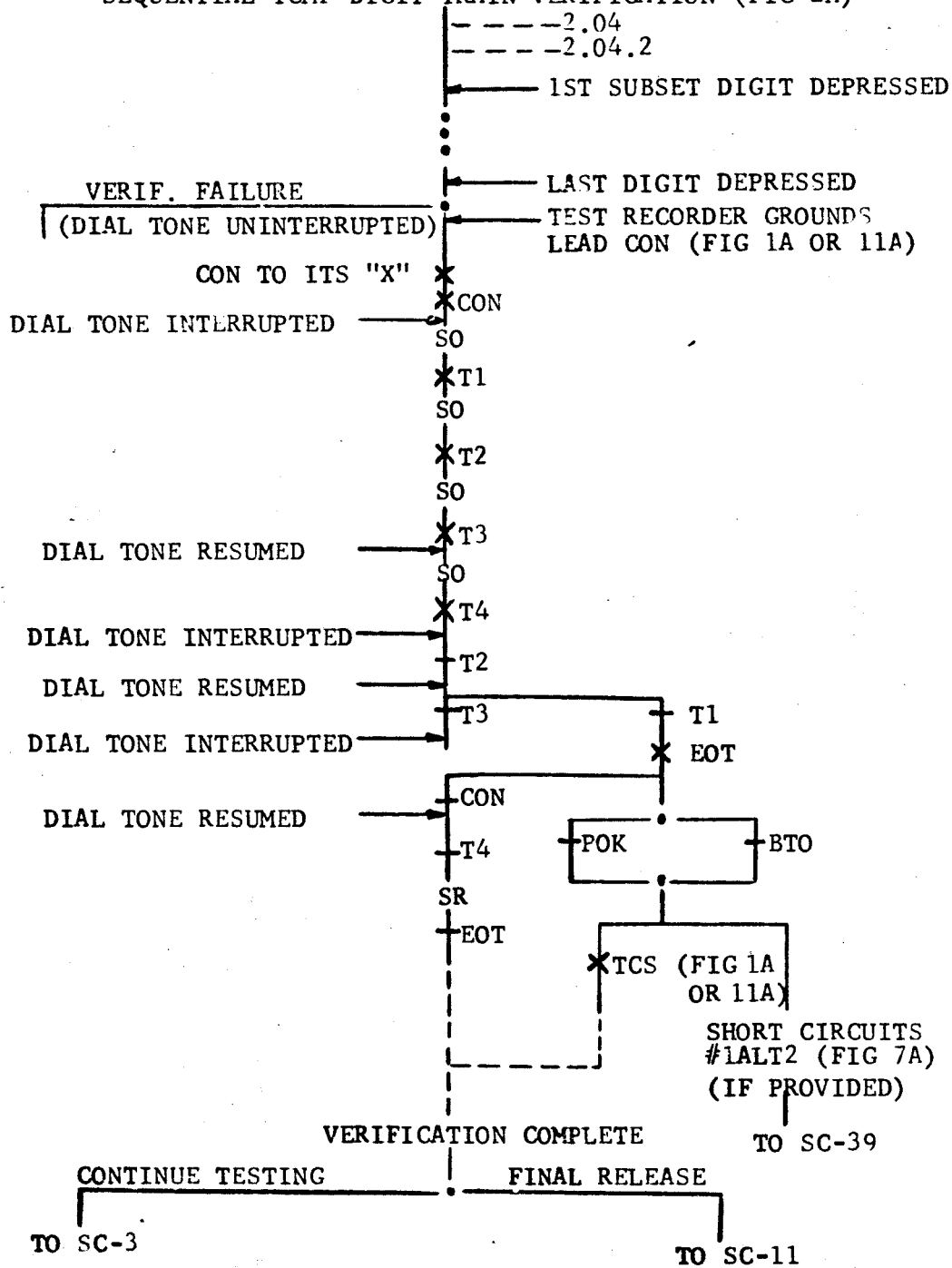
## 2.05 Release from TCMF Subset Digit Verification (FIGS 1A (or 11A) and 2A)

### 2.05.1 Release Following Completed Verification [Operated: Rotary SW. RS; Relays A, B, TC, and ALT1 (FIG 7A) and possibly relays TCS, POK, or BTO]

#### 2.05.1.1 Access by FIG 1A Used

After all the TCMF digits have been found correct, either checked after all the digits have been received (See Section 2.04.2) or checked after each individual digit has been received (See Section 2.04.1) the testman will restore the handset of the subset under test opening the loop via leads "+" and "-" which in turn opens relay A (FIG 1A). Relay A (1A) restores, opens relay B (1A) and closes relay CS (1A). Relay CS(1A) operates, opens relay TC(1A) and removes ground from lead LG1. Removal of ground from lead LG1 either, opens relay BTO(2A) (party identity failure) or relay POK(2A) (party identity correct) (if operated, "X" WRG Used), or

FIG SC10  
SEQUENTIAL TCMF DIGIT TRAIN VERIFICATION (FIG 2A)



opens relay TCS(1A) ("X" WRG omitted) and removes ground from lead LG. Relay BTO(2A) [or POK(2A)] restores (if operated), removes ground from lead LG, removes ground from lead ALC removing the short circuit from #1ALT2(7A) (see Section 7.00 for transfer operation) and connects lead TCS to lead LG1. Relay TCS(1A) restores, (if operated). Relay TC(2A) restores, transfers lead BY from lead IP to ground, disconnects leads R1 thru R6 from terminals N10 through N16 (via the LEV A through LEV F wipers of rotary switch RS (1A) and FIG 2A), respectively (See NOTE 51, H-850678-A), opens relay CS(1A), disconnects leads DR1 and DA1 from leads DR and DA, respectively (to remove dial tone), disconnects leads "+" and "-" (to SEL BK) from leads T and R, respectively, and connects line termination (resistor R1) across leads T and R. After its slow-to-release interval, relay B(1A) restores, and removes ground from lead BY (See NOTE 67, H-850678-A). After its slow-to-release interval, relay CS(1A) restores, grounds lead CH1, connects lead TD to lead TD1, and closes rotary switch RS(1A) via its O.N. and INT SPRINGS. Rotary switch RS(1A) operates and steps self-interruptedly to its "home" position. When rotary switch RS reaches its "home" position, the INT springs restore, the O.N. springs operate opening the "homing" circuit to magnet RS and transfers leads C and CH3 from ground to resistance (#2C) battery to indicate the circuit is idle to the associated equipment. The circuit is now at normal.

#### 2.05.1.2 Access by FIG 11A Used

The release cycle using FIG 11A for access is similar to that described for FIG 1A in Section 2.05.1.1 except that when the Testman restores the handset of the subset under test, relay A (FIG 11A) is opened via the loop and EAX Selector Group matrix to SXS Trunk Interface Circuit, H-840227-A (or EQUIV.). Relay A(11A) restores, opens relay B(11A), and closes relay CS(11A). Relay CS(11A) operates, removes ground from lead LG1 and opens relay TC(11A) (via LEV G wiper of rotary switch RS). Relay TC(11A) restores, transfers lead BY from lead IP to ground, disconnects leads R1 thru R6 from terminals N10 through N16 (via the LEV A thru LEV F wipers of rotary switch RS and FIG 2A), respectively (See NOTE 51, H-850678-A), opens relay CS(11A), disconnects leads DR1 and DA1 from leads DR and DA, respectively (to remove dial tone), disconnects leads T(+) and R(-) from leads T(T) and R(R) (via interface H-840227-A or EQUIV), respectively, and connects line termination resistance (resistor R1) across leads T(T) and R(R). After its slow-to-release interval, relay B(11A)

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restores, and removes ground from lead BY via strap "C", if used (See NOTE 67, H-850678-A). After its slow-to-release interval, relay CS(11A) restores, grounds lead CH1, connects lead TD to lead TD1, and closes rotary switch RS(11A) via its O.N. and INT springs. Rotary switch RS(11A) operates and steps self-interruptedly to its "home" position. When rotary switch reaches its "home" position the INT springs restore, the O.N. springs operate opening the "homing" circuit of rotary switch RS and transfers lead CH3 from ground to resistance (#2C) battery and removes ground from lead A. When ground is removed from lead A circuit H-840227-A (or EQUIV) connects resistance battery to lead IT(C), and removes resistance ground from lead H(H) marking the interface and its associated (H-850678-A or EQUIV) trunk, idle to the preceding EAX circuits. The circuits are now at normal.

2.05.2 Release Following Incomplete TCMF Digit Verification or To Repeat Testing Operated: Relays A, B, TC (FIG 1A or 11A), ALT1 (FIG 7A); Rotary SW RS (FIG 1A or 11A); and possibly relays TCS (FIG 1A or 11A), POK or BTO (FIG 2A)

Following a completed verification or after a digit verification failure, either using a check of all the digits (See Section 2.04.2) or a check of each digit individually (See Section 2.04.1), the testman may repeat either type test by momentarily flashing the hookswitch of the subset under test.

When the hookswitch is restored, (On-Hook) relay A (FIG 1A or 11A) is opened. Relay A (1A or 11A) restores, opens relay B (1A or 11A) and closes relay CS (1A or 11A). Relay B (1A or 11A) remains operated due to its slow-to-release characteristics. Relay CS (1A or 11A) operates, opens relay TC (1A or 11A), removes ground from lead LG1 to: open, if operated ("X" WRG used) relay BTO(2A) (party identity failure) or POK (2A) (party identity correct) and possibly remove ground from lead LG to release the Test Receiver, and open relay TCS (1A or 11A), if operated ("X" WRG Omitted). Relay TC (1A or 11A) restores, disconnects leads "+" and "-" (FIG 1A) or T(+) and R(-) (FIG 11A) from leads T and R, respectively, connects line termination resistance (resistor R1) across leads T and R, disconnects leads DR and DA from leads DR1 and DA1, respectively, disconnects leads R1 through R6 from terminals N10 thru N16, respectively, transfers lead BY

from lead IP to ground, and opens relay CS (1A or 11A). Relay BTO(2A) restores (if operated), disconnects ground from lead ALC removing the short circuit from #1ALT2 - FIG 7A (See Section 7.00 for the subsequent transfer operation), and connects resistance (#2PNG) battery to leads D1 and D2. Relay POK(2A) restores (if operated) and performs the same operations as relay BTO(2A) during restoration. Relay TCS (1A or 11A) restores, if operated, and removes ground from lead TC1.

When the hookswitch is operated (Off-Hook) the loop is closed closing relay A (1A or 11A). Relay A (1A or 11A) operates and closes relay B (1A or 11A). After its slow-to-release interval, relay CS (1A or 11A) restores, connects lead TD to lead TD1, grounds lead CH1 and closes relay TC (1A or 11A) via LEV G wiper of rotary switch RS. Relay TC (1A or 11A) operates and the circuit operation continues as described in Section 1.01.2 (FIG 1A) or 11.01.2 (FIG 11A) except that rotary switch RS remains operated. All tests will then be repeated as described in Section 2.00.

### 3.00 Dial Speed Testing Circuit (FIG 3A)

Access to this circuit may be gained directly from the SXS Selector level assigned for these particular testing purposes or via Figure 1A in the case of combined dial pulse and TCMF Subset test units from SXS equipment or via Figure 11A in the case of combined test units from #1EAX Selector Group matrix Outlet. In any case the operation of FIG 3A is basically identical.

#### 3.01 Seizure

Resistance (#2CA) battery on lead C marks this circuit idle to the preceding circuit.

When seized, the loop via leads "+" and "-" is closed, closing #1 and #2A(3A) in series, and resistance ground via lead C closes #2CA(3A) via the O.N. springs of rotary switch RS (FIG 3A). Relay A(3A) operates and closes relay B(3A). Relay B(3A) operates and grounds lead C. Relay CA(3A) operates.

#### 3.02 Pulsing by the Subset Dial (Operated: Relays A, B and CA)

The testman dials the digit "0". Relay A(3A) follows the pulses of the dialed digit via leads "+" and "-" as the loop is opened and closed for each pulse. On the first pulse,

FIG SC11  
FINAL RELEASE  
(FIGS 1A (OR 11A) & 2A USED)

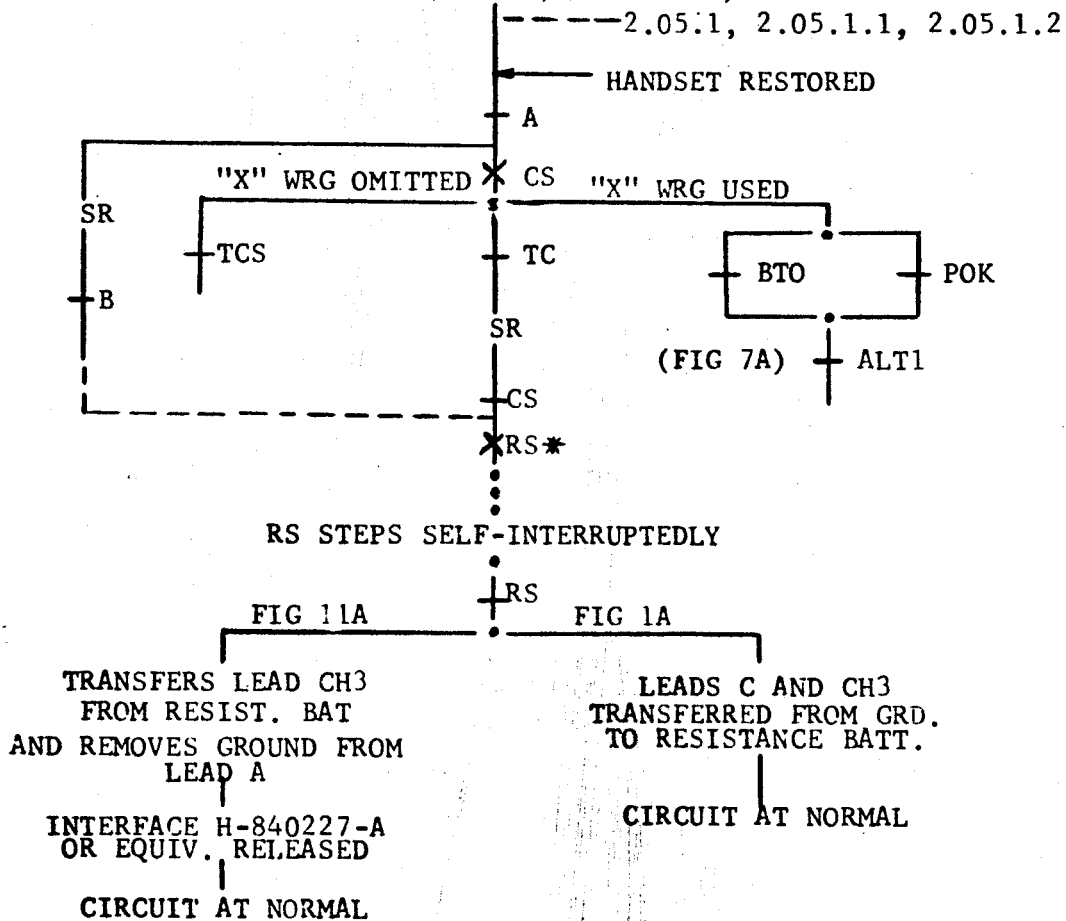
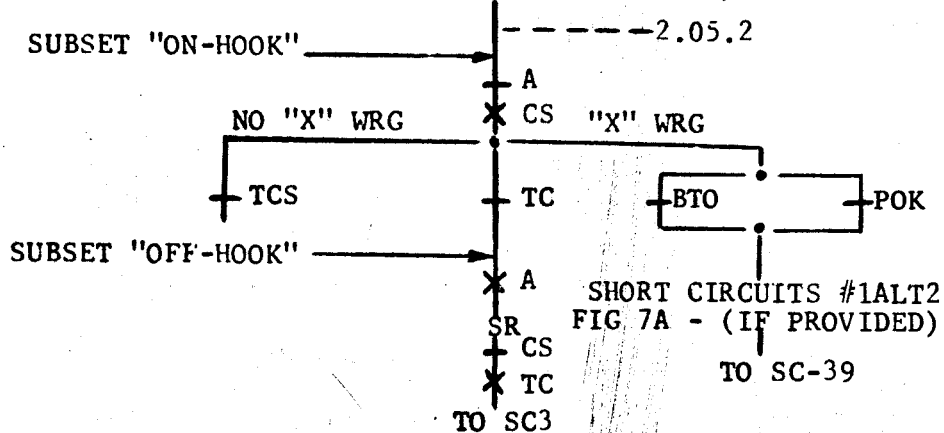


FIG SC12  
REPEATED TESTING  
(FIGS 1A (OR 11A) & 2A USED)



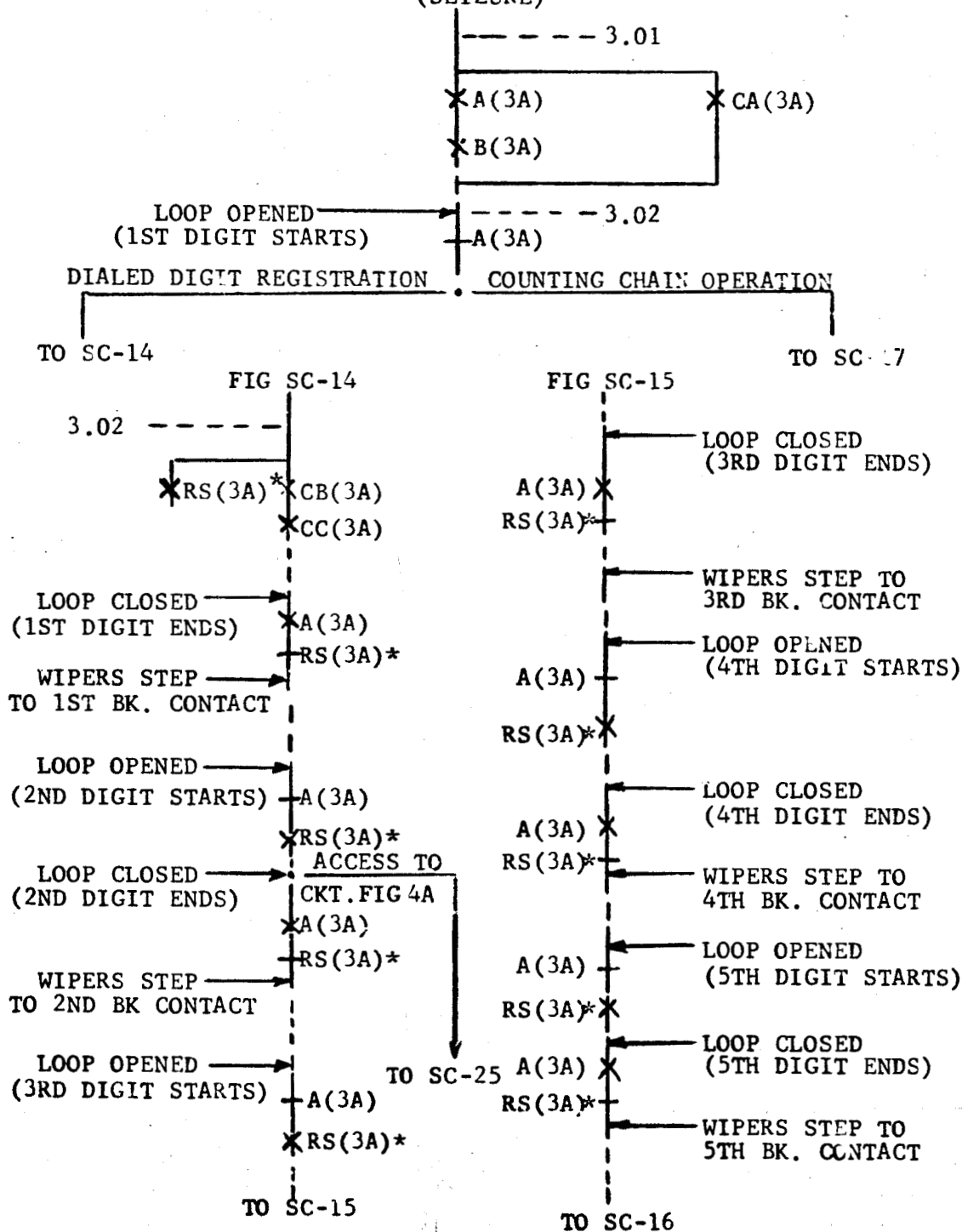
\* INDICATES ROTARY SWITCH

the loop is opened, opening #1 and #2A. Relay A(3A) restores, closes #1CA, #1CB, relay PM1(3A) and magnet RS(3A), and opens relay B(3A). Relay B(3A) remains operated during dialing due to its slow-to-release characteristics. Relay CB(3A) operates, closes relay CC(3A) and transfers control of relay PM1(3A) from relay A(3A) to relay B(3A). Magnet RS(3A) operates and operates its INT springs. Relay PM1(3A) operates and starts the "prime mover" relays (See Section 3.03 for a complete description of the operation of the "prime mover" relays). Relay CC(3A) operates, closes #2CB and disconnects leads DTR and DTA ("A" WRG; See NOTE 62, H-850678-A) or induction coil IND ("B" WRG; See NOTE 62, H-850678-A) from leads "+" and "-" to remove dial tone from the line.

At the end of the first pulse, the loop is again closed across leads "+" and "-" closing #1 and #2A in series with the loop. Relay A(3A) operates, closes relay B(3A), and opens magnet RS, #1CA, and #1CB. Magnet RS(3A) restores, restores its INT springs, steps its wipers to the first bank contact, and restores its ON springs, opening #2CA. Relay CA(3A) remains operated during dialing due to its slow-to-release characteristics.

Thus, relay A(3A) follows the remaining pulses of the digit "0" and when restored closes #1CA, #1CB and magnet RS, and opens relay B(3A). When operated, relay A(3A) closes relay B(3A), opens #1CA, #1CB and magnet RS. In this way rotary switch RS(3A) steps its wipers one step after each dialed pulse.

FIG SC-13  
DIAL SPEED TESTING CIRCUIT (FIG 3A)  
(SEIZURE)



\*INDICATES  
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### 3.03 Machine Pulsing by the Prime Mover Relays (Operated: Relays A, B, CA, CB and CC)

Initial operation of relay PM1(3A) caused by relay A(3A) operating, starts a pulse generator consisting of relays PM1, PM2 and PM3 which will sequentially operate and restore to provide an input for the counting chain consisting of relays CHA thru CHD and CH1 thru CH0. The operation will be explained through Section 3.03.1 thru 3.03.11 and will show the receipt of each control pulse from the prime movers and the subsequent reaction of the counting chain.

**NOTE:** During the circuit operation of H-850678-A (FIG 3A) the counting chain portion is used in two operation cycles. Initially, it is triggered by the first incoming pulse of relay A and machine pulses at 10 P.P.S. to form a standard from which the incoming dialed pulses may be compared and found fast, correct or slow. Following determination of pulse speed, the counting chain is utilized in a second cycle to signal the result of the speed test to the testing subset operator by producing various "zip-zip-zip" or interrupted dial tones. The sequence charts accompanying this explanation show the cyclic use of the machine pulser with the solid lines representing the primary circuit operation and dotted lines to denote the auxiliary signalling operations.

#### 3.03.1 First Control Pulse

Relay PM1(3A) operates on a pulse of relay A (3A), connects spring #1 to spring #2 of LT TST JK, (for pulse measurement), and closes relays PM2(3A, and CH1(3A). Relay PM2 operates and closes relay PM3. Relay CH1 operates and short-circuits relay CHC. Relay PM3(3A) operates and

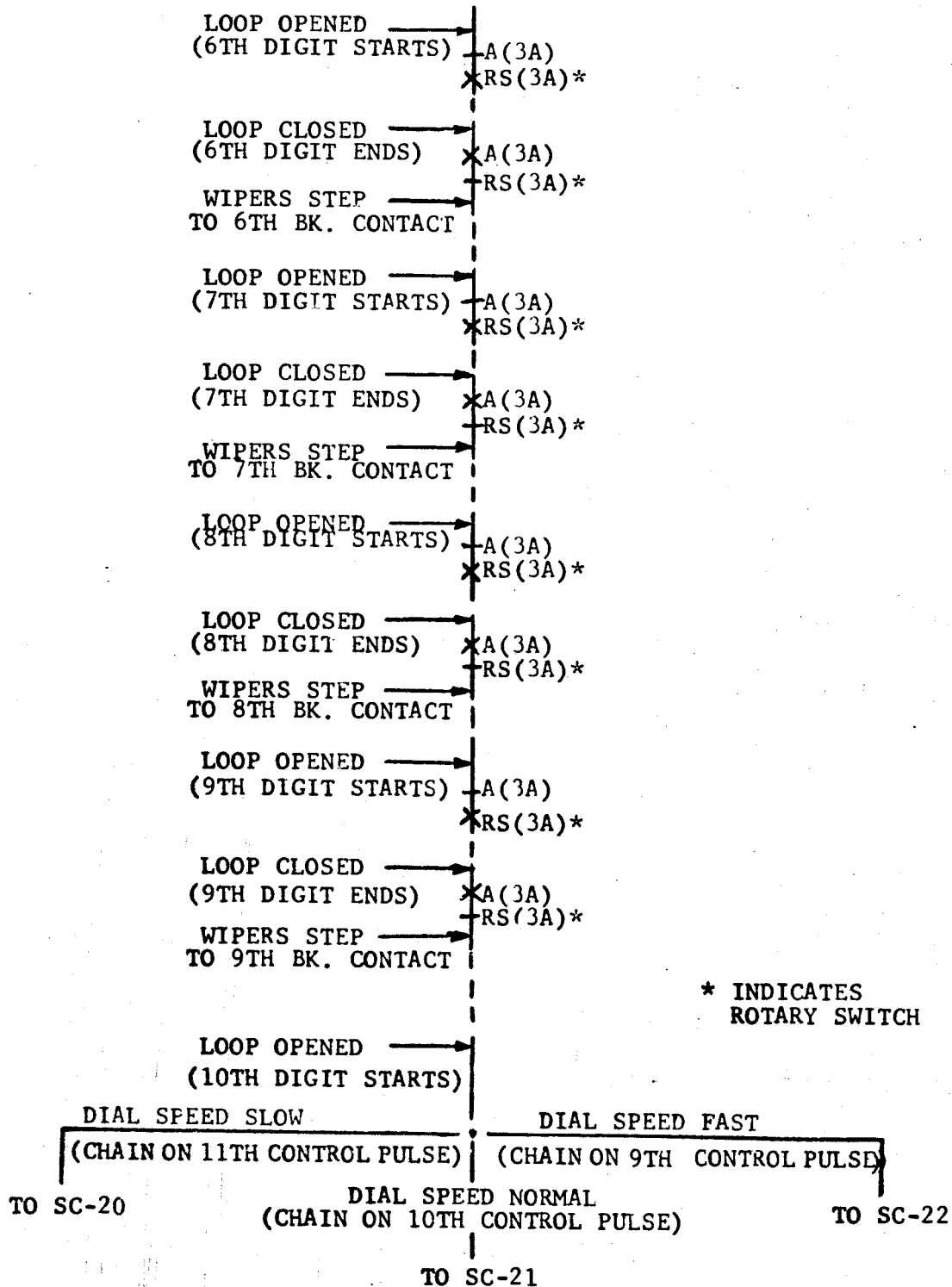
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FIG SC-16



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opens relay PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK (for pulse measurement), and removes the short circuit from relay CHC, closing relay CHC in series with relay CH1. Relay CHC(3A) operates. Relay PM2(3A) restores and opens relay PM3. Relay PM3(3A) restores and closes relay PM1 to start the second control pulse.

3.03.2 Second Control Pulse (Operated: Relays CH1 and CHC)

Relay PM1(3A) operates, closes relays PM2 and CH2 and connects spring 1 to spring 2 of LT TST JK. Relay CH2(3A) operates and short-circuits relay CHB. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK and removes the short circuit of relay CHB, closing CHB in series with relay CH2. Relay CHB(3A) operates and opens relays CH1 and CHC. Relay PM2(3A) restores and opens relay PM3. Relays CH1(3A) and CHC(3A) restore. Relay PM3(3A) restores and closes relay PM1 to start the third control pulse.

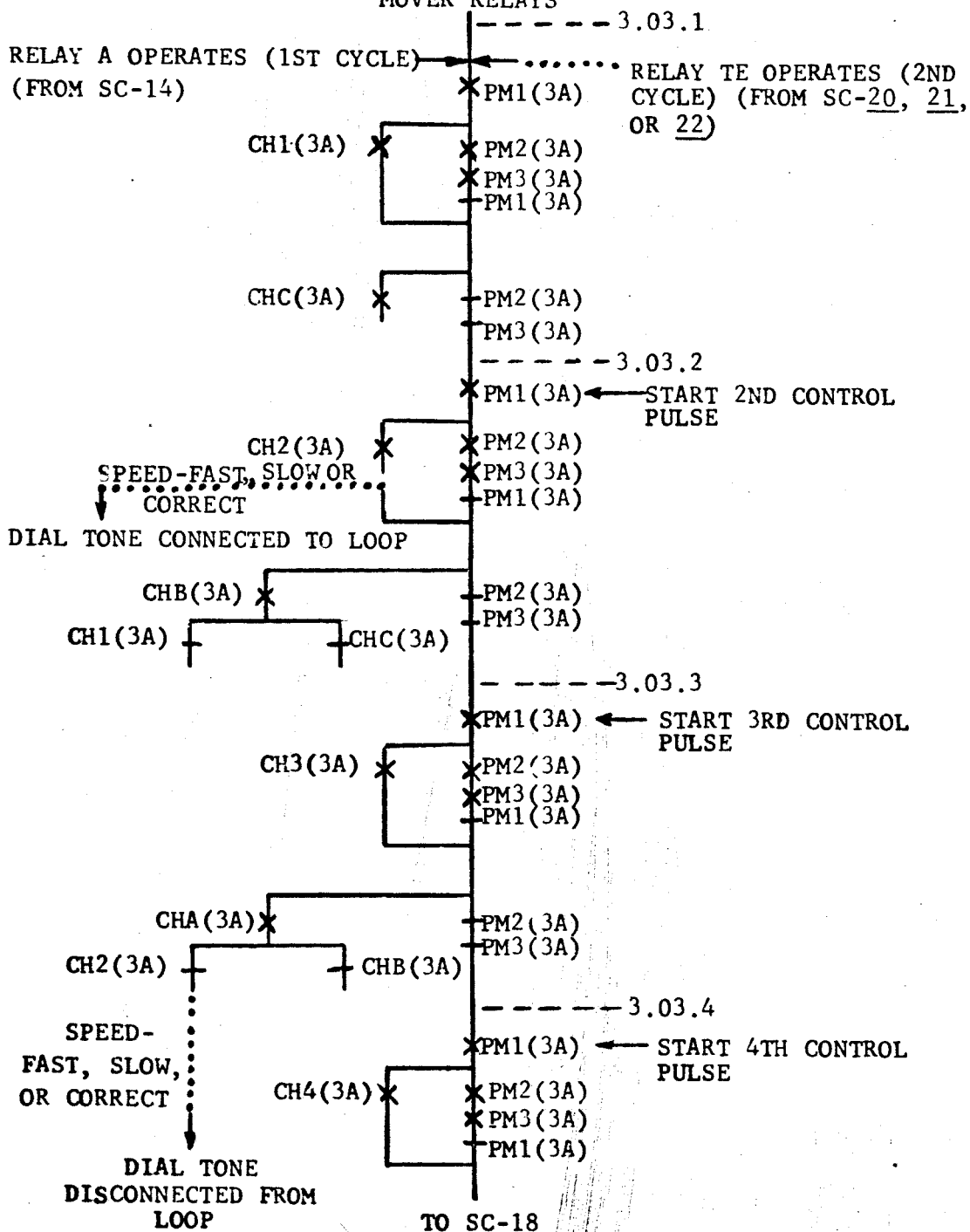
3.03.3 Third Control Pulse (Operated: Relays CH2 and CHB)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT. TST JK, and closes relays PM2 and CH3. Relay CH3(3A) operates and short-circuits relay CHA. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK, and removes the short circuit of relay CHA closing CHA in series with relay CH3. Relay CHA(3A) operates and opens relays CHB and CH2. Relay PM2(3A) restores and opens relay PM3. Relays CH2(3A) and CHB(3A) restore. Relay PM3(3A) restores and opens relay PM1 to start the fourth control pulse.

3.03.4 Fourth Control Pulse (Operated: Relays CHA and CH3)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT TST JK and closes relays PM2 and CH4. Relay CH4(3A) operates and short-circuits relay CHC. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT TST JK, and removes the short circuit from relay CHC closing CHC in series with relay CH4. Relay CHC(3A) operates and opens relays CHA and CH3. Relay PM2(3A) restores and opens relay PM3. Relays CHA(3A) and CH3(3A) restore. Relay PM3(3A) restores and closes relay PM1 to start the fifth control pulse.

FIG SC-17



### 3.03.5 Fifth Control Pulse (Operated: Relays CHC and CH4)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT. TST JK and closes relays PM2 and CH5. Relay CH5(3A) operates and short-circuits relay CHB. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay PM1. Relay PM1 (3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK, and removes the short circuit of relay CHB closing CHB in series with relay CH5. Relay CHB(3A) operates and opens relays CHC and CH4. Relay PM2(3A) restores and opens relay PM3. Relays CHC(3A) and CH4(3A) restore. Relay PM3(3A) restores and closes relay PM1 to start the sixth control pulse.

### 3.03.6 Sixth Control Pulse Operated (Relays CHB and CH5)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT. TST JK and closes relays PM2 and CH6. Relay CH6(3A) operates and short-circuits relay CHA. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK, and removes the short circuit of relay CHA, closing CHA in series with relay CH6. Relay PM2(3A) restores and opens relay PM3. Relay CHA(3A) operates and opens relays CHB(3A) and CH5(3A). Relay PM2(3A) restores and opens relay PM3. Relay CHB(3A) and CH5(3A) restore. Relay PM3(3A) restores and closes relay PM1 to start the seventh control pulse.

### 3.03.7 Seventh Control Pulse (Operated: Relay CHA & CH6)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT. TST JK and closes relays PM2 and CH7. Relay CH7(3A) operates and short-circuits relay CHC. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK, and removes the short circuit from relay CHC closing CHC in series with relay CH7. Relay CHC(3A) operates and opens relays CHA and CH6. Relay PM2(3A) restores and opens relay PM3. Relays CHA(3A) and CH6(3A) restore. Relay PM3(3A) restores and opens relay PM1 to start the eighth control pulse.

### 3.03.8 Eighth Control Pulse (Operated: Relays CHC & CH7)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT. TST JK and closes relays PM2 and CH8. Relay CH8(3A) operates and short-circuits relay CHB. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay

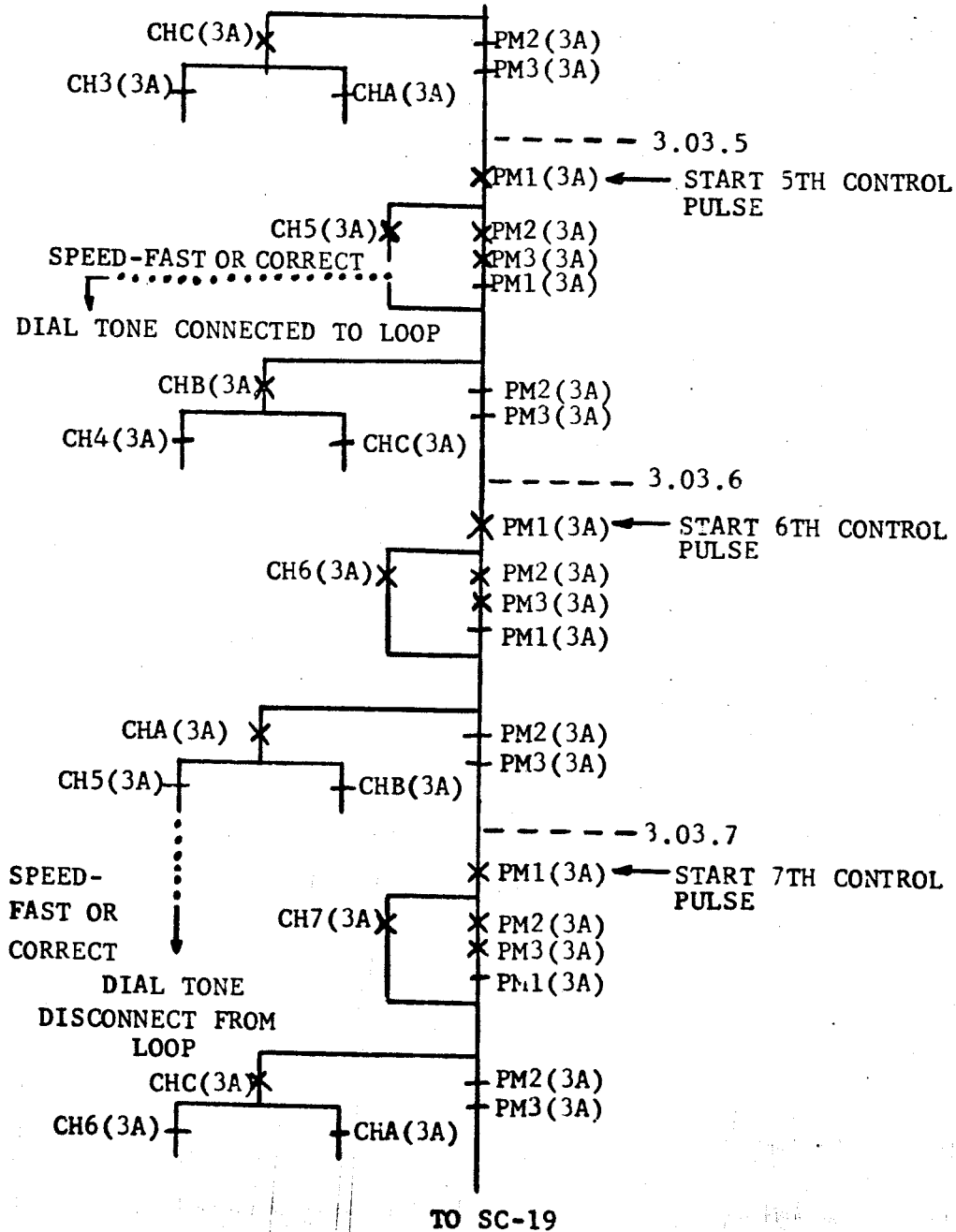
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PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK, and removes the short circuit from relay CHB closing CHB in series with relay CH8. Relay CHB(3A) operates and opens relays CHC and CH7. Relay PM2(3A) restores and opens relay PM3. Relays CHC(3A) and CH7(3A) restore. Relay PM3(3A) restores and closes relay PM1 to start the ninth control pulse.

### 3.03.9 Ninth Control Pulse (Operated: Relays CHB and CH8)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT. TST JK and closes relays PM2 and CH9. Relay CH9(3A) operates and short-circuits relay CHA. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK and removes the short circuit from relay CHA closing CHA in series with relay CH9. Relay CHA(3A) operates and opens relays CHB and CH8. Relay PM2(3A) restores and opens relay PM3. Relays CHB(3A) and CH8(3A) restore. Relay PM3(3A) restores and closes relay PM1 to start the tenth control pulse.

### 3.03.10 Tenth Control Pulse (Operated: Relays CHA and CH9)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT. TST JK and closes relays PM2 and CHO. Relay CHO(3A) operates, short-circuits relay CHD, and closes #1 and #2 TC. Relay TC(3A) does not operate as its windings are closed in magnetic opposition. Relay PM2(3A) operates and closes relay PM3. Relay PM3(3A) operates and opens relay PM1. Relay PM1(3A) restores, opens relay PM2, disconnects spring 1 from spring 2 of LT. TST JK, and removes the short circuit from relay CHD closing CHD in series with relay CHO. Relay CHD(3A) operates and opens relays CHA and CH9. Relay PM2(3A) restores and opens relay PM3. Relays CHA(3A) and CH9(3A) restore. Relay PM3(3A) restores and closes relay PM1 to start the eleventh control pulse.

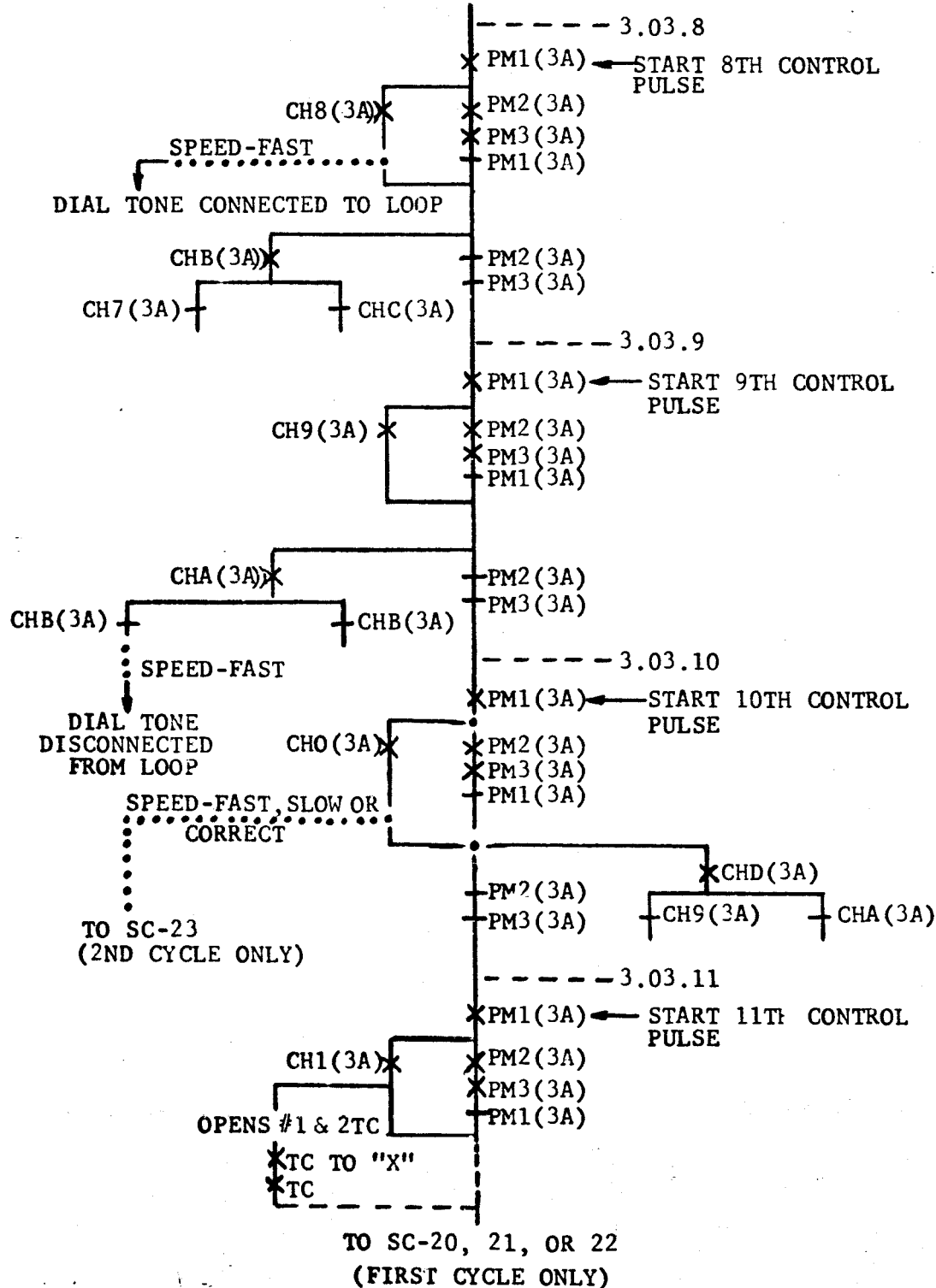
### 3.03.11 Eleventh Control Pulse (Operated: Relays CHD and CHO)

Relay PM1(3A) operates, connects spring 1 to spring 2 of LT. TST JK and closes relays PM2 and CH1. Relay CH1(3A) operates, short-circuits relay CHC, and opens #1 and #2 TC. Opening #1 and #2 TC produces and "inductive kick" in TC. Relay TC(3A) operates to its "X" contacts, locks closing its #1 and #2 windings in series aiding, and operates fully.

### 3.04 Speed Test

The speed at which dial pulses are registered on Rotary Switch RS(3A) is compared with the speed of pulses generated by

FIG SC-19





PM1, which are registered in the counting chain relays (CH1 thru CHO) at 10 pulses per second.

If the dial speed is slower than the generator, switch RS(3A) will not reach bank contact number nine by the time the eleventh control pulse is sent to the counting chain relays (see Section 3.04.1).

If the dial speed compares favorably with the generator, switch RS(3A) will reach bank contact number nine when the counting chain has counted to nine or ten (see Section 3.04.2).

If the dial speed is faster than the generator, switch RS(3A) will reach bank contact number nine before the counting chain reaches the count of nine, (see Section 3.04.3).

#### 3.04.1 Slow Dial Speed (Operated: Relays A, B, CA, CB, CC, CH1, CHD, CHO, and TC)

At start of the last (tenth) pulse of the dialed digit, relay A(3A) restores, opens relay B(3A), and closes #1CA, #1CB and magnet RS. Magnet RS(3A) operates and operates its INT springs, closing relay PF(3A) via the ninth bank contact of the LEV B wiper of RS. Relay PF(3A) operates, locks and removes the short circuit from relay CHC, closing CHC in series with relay CH1. Relay CHC(3A) operates and opens relays CHD and CHO. At the end of the pulse, relay A(3A) operates, closes relay B(3A) and opens #1CA, #1CB and magnet RS. Magnet RS(3A) restores, restores its INT springs and steps the wipers one step. Relays CHO(3A) and CHD(3A) restore. After its slow-to-release interval relay CA(3A) restores and opens relay CC. After its slow-to-release interval, relay CC(3A) restores, opens #2CB, and closes magnet RS via its INT and ON springs. Magnet RS(3A) operates and operates the INT springs opening magnet RS(3A). The INT springs restore and close magnet RS. This self-interrupted stepping continues until rotary switch RS steps to its "home" position. When the wipers are in the "home" position, the ON springs operate, opening the homing circuit to magnet RS and closing #2CA. Relay CB(3A) restores, opens relays CHC and CH1, closes relay TE, and stops the prime mover relays from pulsing by opening relay PM1. Relays PM1(3A), PM2(3A) and PM3(3A) restore in sequence if any are operated at this time. Relays CHC(3A) and CH1(3A) restore. Relays CA(3A) operates. After its slow-to-operate interval, relay TE(3A) operates, locks and closes #1TD and relay PM1. Relay TD(3A) operates, locks and opens relay PF. Relay PF(3A) restores.

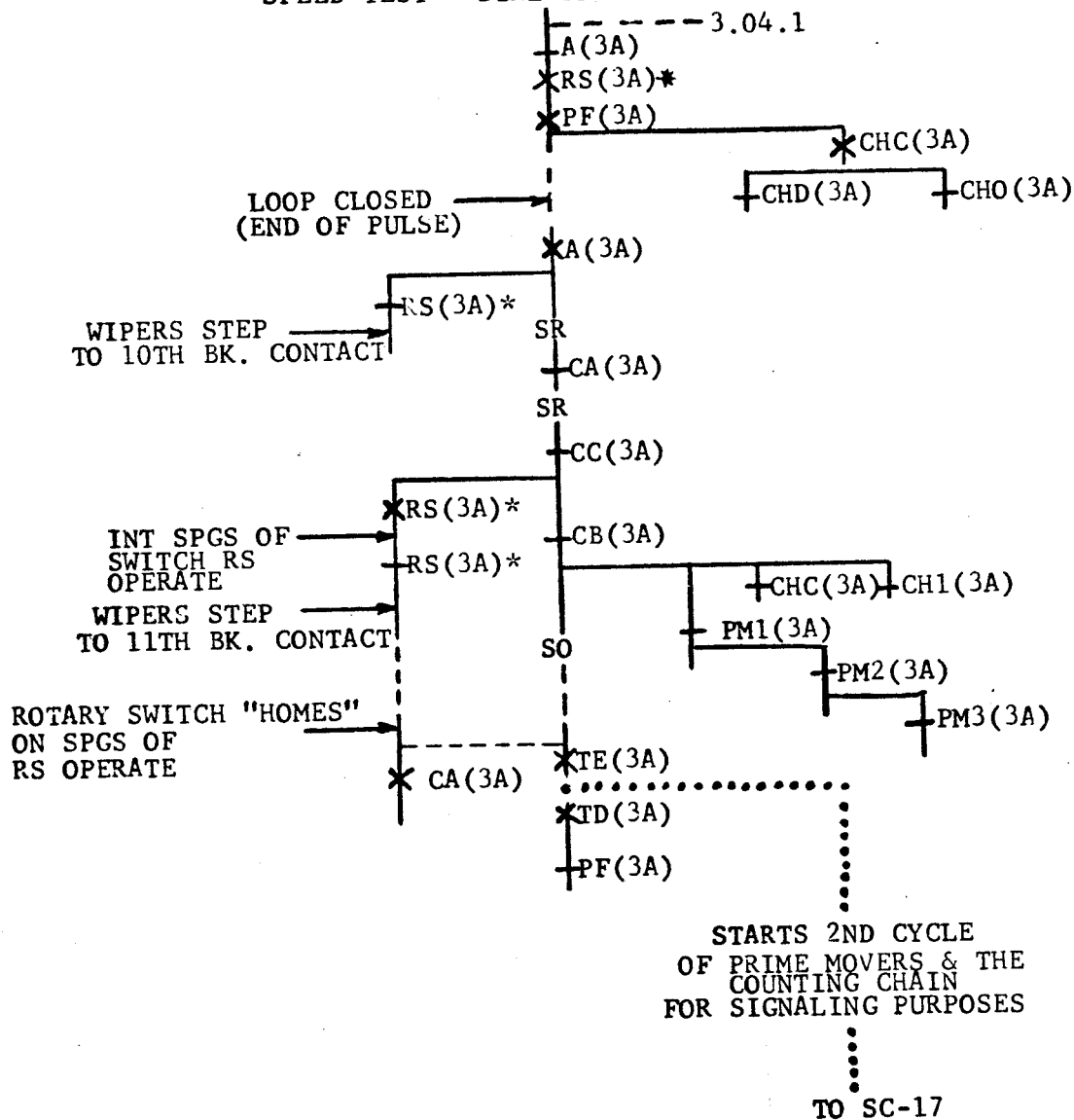
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FIG SC-20  
SPEED TEST - DIAL SPEED FOUND SLOW



\* INDICATES ROTARY SWITCH

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Relay PM1(3A) operates and the following operation is similar to that described in Sections 3.03.1 thru 3.03.10 except that when relay CH2(3A) operates (2nd control pulse) it connects leads DTA and DTR ("A" WRG., SEE NOTE 62, H-850678-A) or induction coil IND ("B" WRG, SEE NOTE 62, H-850678-A) to leads "+" and "-" to return one splash of dial tone (when CH2 operates) to the subset to indicate the dial speed is slow. Relay TE(3A) will be opened when relay CHO operates. Relay TE(3A) restores opens #1 and #2TC, opens relays CHO and CHD, and stops the prime mover relays from pulsing. Relays CHO(3A), CHD(3A) and TC(3A) restore.

Consecutive tests from the same subset can be made without disconnecting from this circuit by dialing the digit "0" consecutively. Operation during the repeated tests will occur as described previously.

After testing, release will occur as described in Section 3.06.

**3.04.2 Correct Dial Speed (Operated: Relays A, B, CA, CB, CC, CH9 or CHO and CHA or CHD)**

At the start of the last (tenth) pulse of the dialed digit, relay A(3A) restores, opens relay B(3A) and closes #1CA, #1CB and magnet RS(3A). Magnet RS operates the INT springs and closes relay PF. Relay PF(3A) operates and locks. At the end of the pulse, relay A(3A) operates, closes relay B(3A) and opens #1CA, #1CB and magnet RS. Magnet RS(3A) restores and steps the wipers one step. The INT springs restore. After its slow-to-release interval, relay CA(3A) restores, opens relay CC and closes relay TA. Relay TA(3A) operates and locks. After its slow-to-release interval, relay CC(3A) restores, opens #2CB and closes magnet RS via the INT and ON springs. Relay CB(3A) restores, closes relay TE, stops the prime mover pulsing and opens relays CHO and CHD. Magnet RS(3A) operates and steps the wipers self-interruptedly to the "home" position. When the wipers of rotary switch RS are in the home position, the ON springs operate opening the homing circuit to magnet RS and closing #2CA. Relay CHD(3A) restores. Relay CHO(3A) restores and opens #1 and #2TC. Opening #1 and #2TC produces an "inductive kick" in relay TC. Relay TC(3A) operates to its "X" contacts closing #1 and #2TC in series aiding, and operates fully.

Relay CA(3A) operates. After its slow-to-operate interval, relay TE(3A) operates, locks and closes #1TD and relay PM1. Relay TD(3A) operates, locks and opens relay PF. Relay PF(3A) restores.

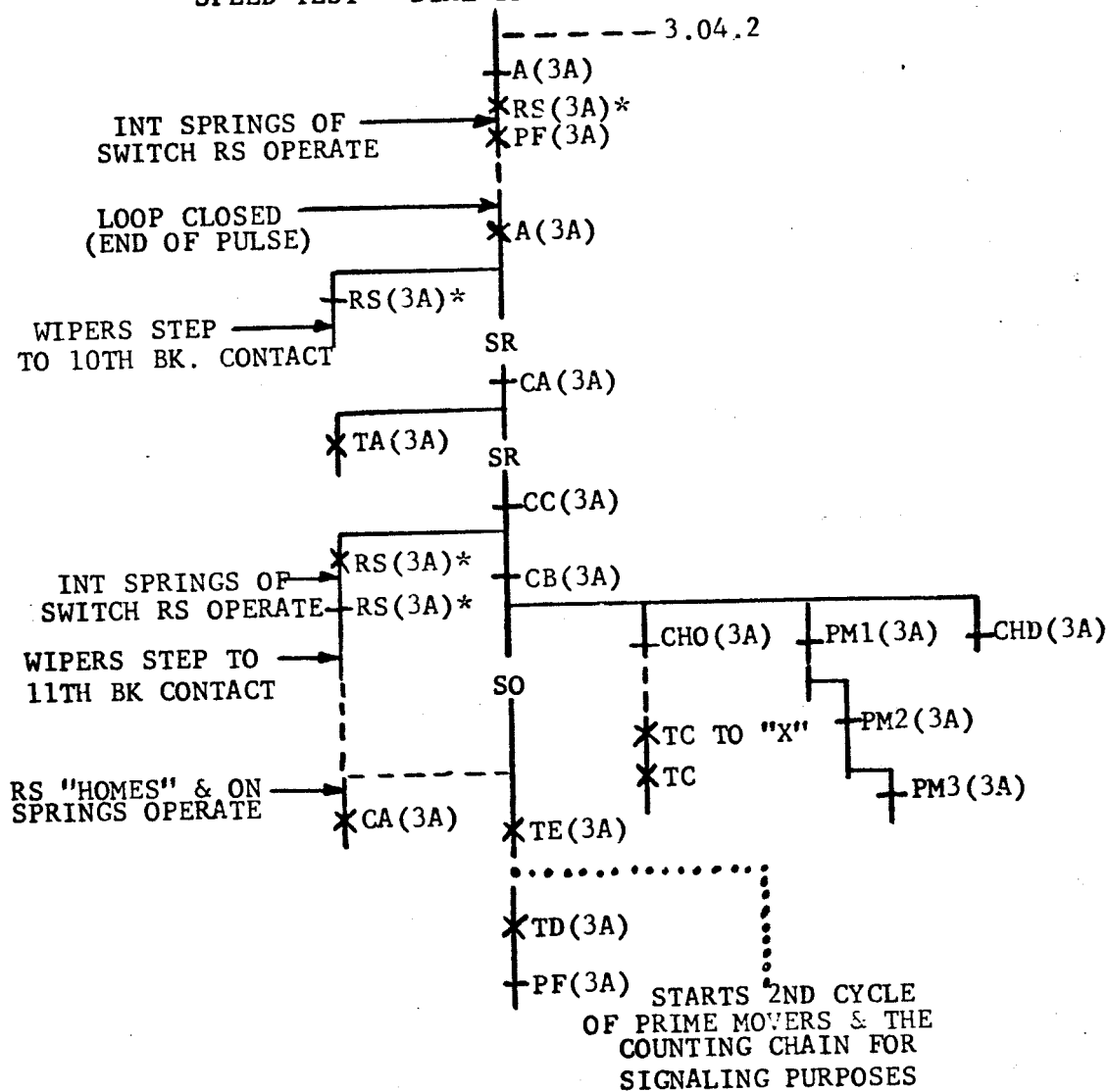
ISSUE

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DRAWING NO.

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FIG SC-21  
SPEED TEST - DIAL SPEED FOUND CORRECT



\* INDICATES ROTARY SWITCH

ISSUE

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DRAWING NO.

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Relay PM1(3A) operates and the following operation is similar to that described in Sections 3.03.1 thru 3.03.10 except that when relay CH2(3A) operates and restores and relay CH5(3A) operates and restores, leads DTA and DTR ("A" WRG, SEE NOTE 62, H-850678-A) or induction coil IND ("B" WRG, SEE NOTE 62, H-850678-A) will be connected and disconnected from leads "+" and "-", returning two splashes of dial tone to the subset to indicate the dial speed is correct. Relays TE and TA will also be opened when relay CHO operates. Relay TA(3A) restores. Relay TE(3A) restores, opens #1 and #2TC, and stops the prime mover relays from pulsing. Relay TC(3A) restores.

Consecutive tests from the same subset can be made without disconnecting from this circuit by dialing the digit "0" consecutively. Operation of the repeated tests will be as described in the previous sections.

After testing, release will occur as described in Section 3.06.

3.04.3 Fast Dial Speed (Operated: Relays A, B, CA, CB, CC, CH8 and CHB)

At the beginning of the last pulse of the dialed digit, relay A(3A) restores opens relay B(3A) and closes #1CA, #1CB, and magnet RS. Magnet RS(3A) operates and operates the INT springs, closing relay PF. Relay PF(3A) operates, locks and stops the counting chain. At the end of the pulse, relay A(3A) operates, closes relay B(3A) and opens #1CA, #1CB, and magnet RS. Magnet RS(3A) restores and steps the wipers one step. The INT springs restore. After its slow-to-release interval, relay CA(3A) restores, closes relay TB and opens relay CC. Relay TB(3A) operates, locks, and closes relay TA. Relay TA(3A) operates and locks. After its slow-to-release interval, relay CC(3A) restores, opens #2CB and closes magnet RS via its ON and INT springs. Magnet RS(3A) steps its wipers self-interruptedly to its home position. When the wipers of rotary switch RS are in the "home" position, the ON springs operate, opening the homing circuit to magnet RS and closing #2CA. Relay CB(3A) restores, closes relay TE, opens relays CHB and CH8 and stops the prime mover relays from pulsing. Relay CA(3A) operates. Relays CHB(3A) and CH8(3A) restore. After its slow-to-operate interval, relay TE operates, locks, closes #1TD, closes #1 and #2TC in series aiding and starts the prime mover relays pulsing (SEE BELOW). Relay TD(3A) operates, locks and opens relay PF. Relay TC(3A) operates its "X" contacts and operates fully. Relay PF(3A) restores.

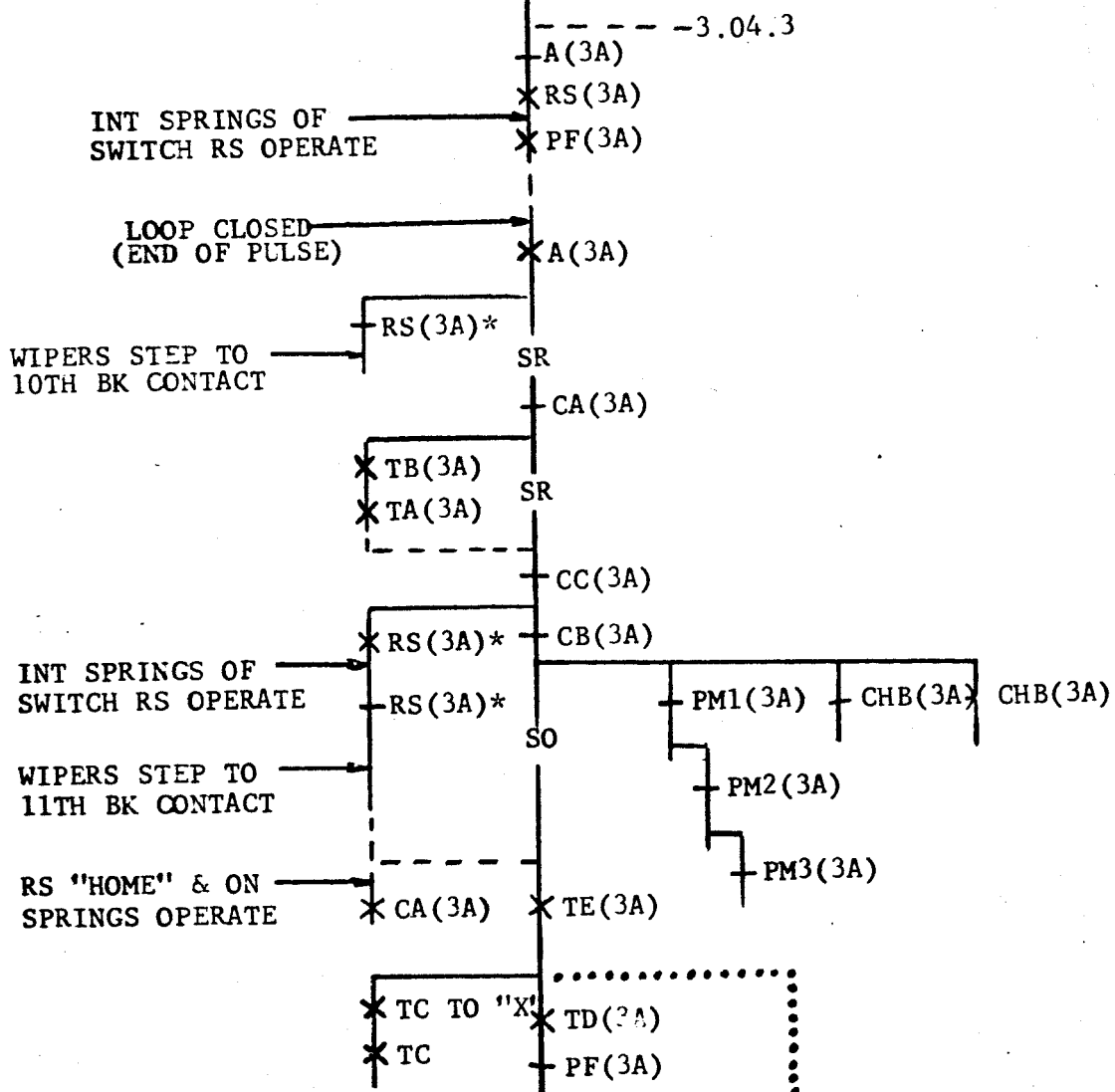
ISSUE

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DRAWING NO.

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FIG SC-22  
SPEED TEST - DIAL SPEED FOUND FAST



\* INDICATES ROTARY SWITCH

TO SC-17

Relay PM1(3A) operates and the following operation is similar to that described in Sections 3.03.1 to 3.03.10 except that when relay CH2(3A) operates and restores, relay CH5(3A) operates and restores, and relay CH8(3A) operates and restores leads DTA and DTR ("A" WRG, SEE NOTE 62, H-850678-A) or induction coil IND ("B" WRG, SEE NOTE 62, H-850678-A) is connected to leads "+" and "-", sending three splashes of dial tone to the subset to indicate that the dial speed is fast. Relays TE, TA and TB will also be opened when relay CHO operates. Relays TA(3A) and TB(3A) restore. Relay TE(3A) restores, opens #1 and #2TC and stops the prime mover relay pulsing. Relay TC(3A) restores.

Consecutive tests from the same subset can be made without disconnecting from this circuit by dialing the digit "0" consecutively. Operation of the repeated tests is the same as described previously.

When testing is complete release will occur as described in Section 3.06.

### 3.05 Access to Party Identity Test Circuit

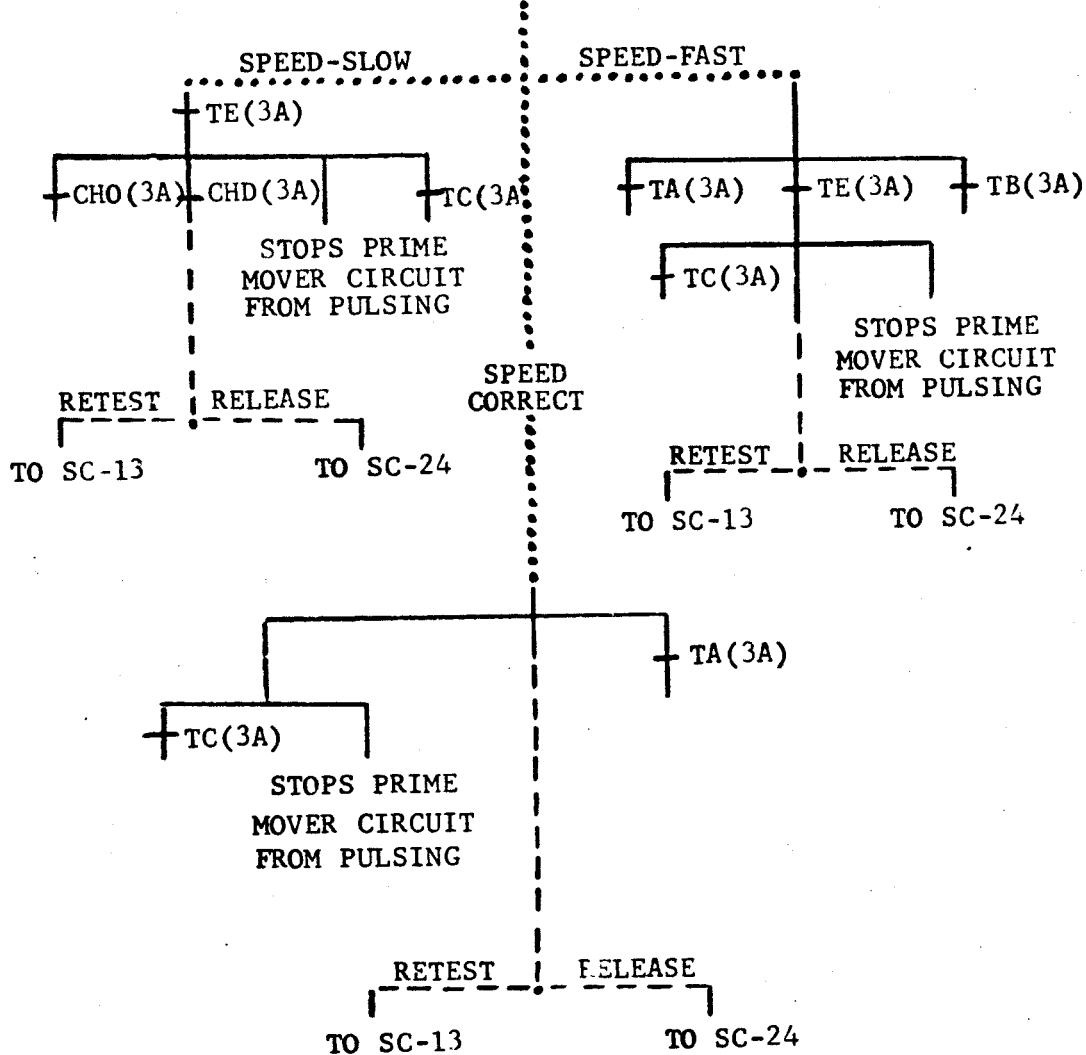
The Party Identity Test Circuit (FIG 4A) may be accessed via this circuit by dialing the digit "2".

The operations for registering the digit on switch RS(3A) are as described in Section 3.02. At the end of dialing the loop via leads "+" and "-" is closed, closing relay A(3A). Relay A operates, opens magnet RS, #1CA and #1CB, and closes relay B(3A). Switch RS restores, restores its INT springs, and steps its wipers one step. After its slow-to-release interval, CA restores, opens CC, and closes relay SS(3A) via LEV A of switch RS and lead OP (FIG 4A). Relay SS(3A) operates, locks via lead L and FIG 4A and transfers leads "+" and "-" from #2 and #1A to leads +1 and -1, opening A and seizing the Party Identity Test Circuit FIG 4A (See Section 4.00). Relay A(3A) restores and opens B. After its slow-to-release interval, CC(3A) restores, opens CB(3A), and closes magnet RS via its INT and ON springs. Switch RS "homes" as previously described. After its slow-to-release interval, B restores and opens any operated counting chain relays and pulse generating relays, which restore.

### 3.06 Release (Operated: Relays A, B, CA, TD and ON springs)

When the Testman restores the handset of the subset under test, the loop across leads "+" and "-" is opened, opening relay A. Relay A(3A) restores opens relay B(3A) and #1CA(3A), and closes relay PM1(3A) to start the prime mover relays

FIG SC-23  
RESET OF PRIME MOVERS & COUNTING CHAIN  
FOLLOWING SPEED SIGNAL AND OPER-  
ATION OF RELAY CHO(3A) - 2ND CYCLE



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pulsing. After its slow-to-release interval, relay B(3A) restores, stops the prime mover relays from pulsing, opens relay TD(3A) and #2CA(3A), and removes ground from leads C and C1. Relay TD(3A) restores. After its slow-to-release interval, relay CA(3A) restores. Resistance (#2CA) battery on leads C and C1 mark the circuit idle to the preceding equipment. The circuit is now at normal.

### 3.07 Testing Facilities

Operation of the BUSY KEY connects ground to lead C to mark this circuit busy. A speed check of the prime mover relays and the counting chain relays can be made by operating the LT SPEED CHECK key, closing TE. Relay TE(3A) operates, closes #1 and #2TC in series and relay TD and starts the prime mover relays pulsing. Relay TD(3A) operates and locks. Relay TC(3A) operates to its "X" contacts and operates fully. The prime mover relays operate as described in Section 3.03. Relay CHO(3A) operates once each second and lights the lamp once per second. The flashing may be timed with an appropriate timing device to determine whether the speed is correct. Restoration of the LT SPEED CHECK key opens relays TE and TD. Relay TE(3A) restores, opens #1 and #2TC and stops the prime mover relay pulsing. Relay TD(3A) restores. Relay TC(3A) restores. The BSY KEY is restored, transferring lead C from ground to resistance (#2CA) battery to mark the circuit idle. The circuit is now at normal.

### 4.00 Party Identity Test Circuit (FIG 4A)

#### 4.01 Seizure

This circuit is marked idle to preceding equipment by ground on lead OP, and is accessed from a Selector level by way of the Dial Speed Testing Circuit (FIG 3A). When it is desired to test the party identifying features of the subscriber's subset from the subscriber's station, the testman dials a digit "2" into the Dial Speed Testing Circuit. Ground on lead OP operates a switching relay (SS) in figure 3A which switches leads "+", "-", and C from the selector banks to leads +1, -1 and C. Relay A (FIG 3A) restores and the Dial Speed Test Circuit restores as described in Section 3.06. Relay SS (FIG 3A) remains under control of FIG 4A. The loop via leads +1 and -1, through #1 and #2PA closes AA(4A). Relay AA(4A) operates and closes relay BA(4A). Relay BA(4A) operates, grounds lead C to hold the preceding switch train, grounds lead L to hold the Dial Speed Testing Circuit, removes ground from lead OP, connects resistor R4 in series with #2AA, and closes #3PA (via resistor R3) and BS(4A). Relay BS(4A) operates.

ISSUE

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FIG SC-24  
RELEASE FOLLOWING DIAL SPEED TEST

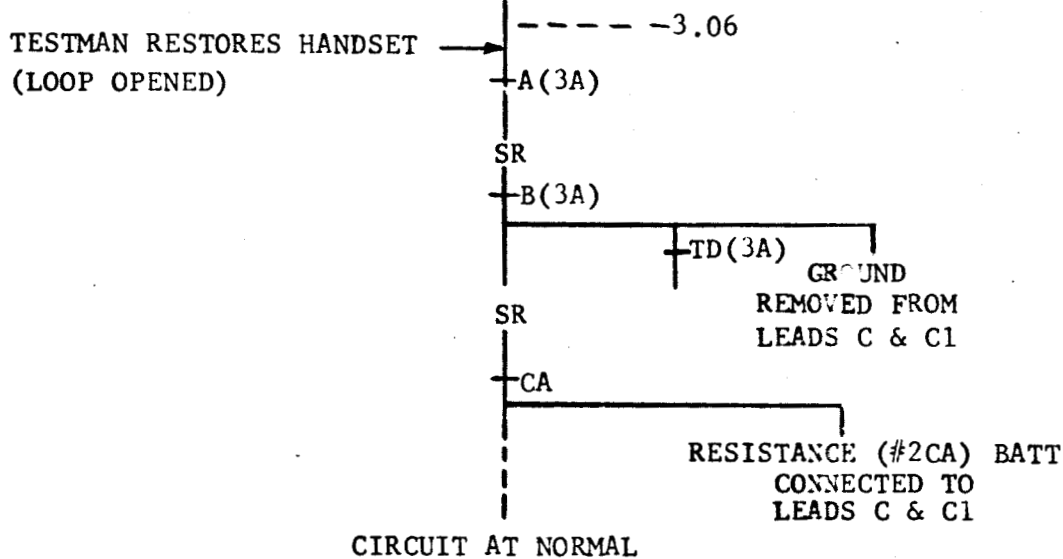
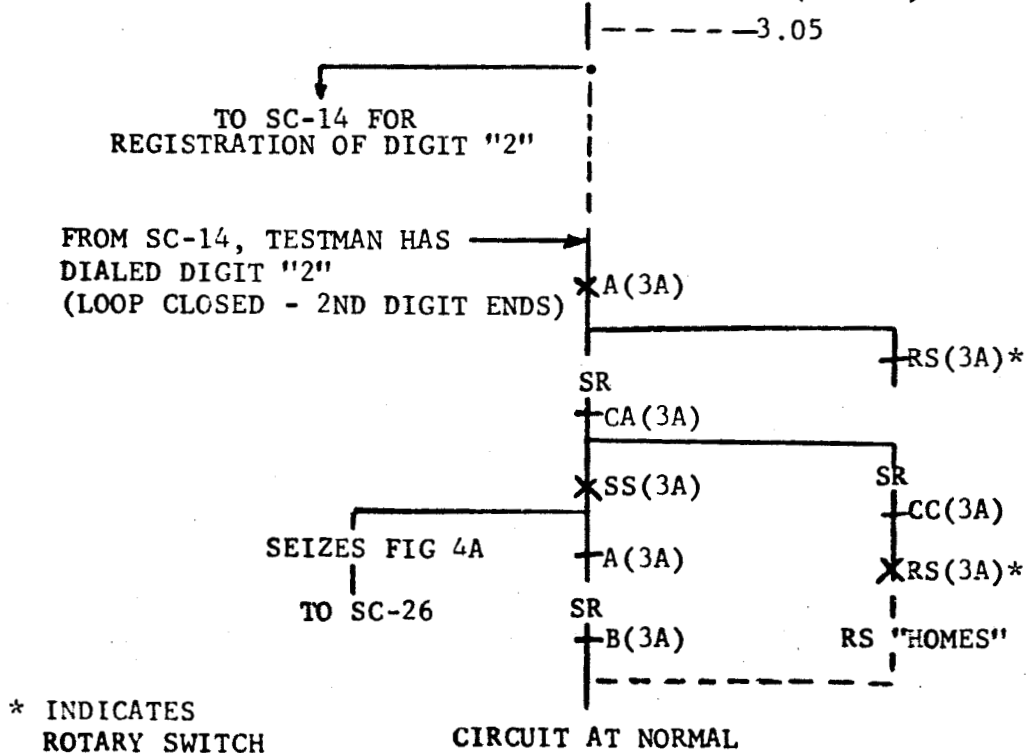


FIG SC-25  
ACCESS TO PARTY IDENTITY CIRCUIT (FIG 4A)



ISSUE

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#### 4.02 First Digit Dialed (Operated: Relays AA, BA and BS)

When the testman dials the first digit ("0"), this circuit checks the digit to insure that "0" is received correctly, and detects and registers the party identity.

The loop via leads +1 and -1 is opened, opening AA(4A). Relay AA(4A) restores, opens relay BA(4A), and closes relay CA(4A) and magnet PS(4A). Party identification is initiated at this time (see Section 4.03). Switch PS(4A) operates and operates its INT springs. Relay CA(4A) operates and closes CB(4A) and HD(4A). At the end of the pulse, the loop via leads +1 and -1 is closed, closing relay AA(4A). Relay AA operates, opens CA(4A) and magnet PS(4A), and closes BA(4A). Relays CA(4A) and BA(4A) remain operated during pulsing due to their slow-to-release characteristics. Switch PS(4A) restores, restores its INT and ON springs, and steps its wipers one step. Relay HD(4A) operates to its "X" contacts, locks, operates fully, and shunts resistor R1 with resistor R3. Relay CB(4A) operates and closes #1 and #2G in magnetic opposition.

In this way, the digit "0" is dialed and registered on switch PS(4A).

##### 4.02.1 Digit Recorded Correctly

At the end of dialing the digit, the loop via leads +1 and -1 is closed, closing AA(4A). Relay AA(4A) operates, closes BA(4A) and opens CA(4A) and magnet PS(4A). Switch PS(4A) restores, restores its INT springs, and steps its wipers one step. After its slow-to-release interval, CA(4A) restores, opens CB(4A) and closes DO(4A) via LEV A of switch PS(4A). Relay DO(4A) operates and locks via the ON springs of switch PS. After its slow-to-release interval, CB(4A) restores and opens #1 and #2G. Relay G(4A) is an "inductive kick" relay. The magnetic fields of #1 and #2G collapse at different rates, providing a net field to operate G to its "X" contacts. Relay G(4A) operates to its "X" contacts, locks with #1 and #2G in series, magnetically aiding, operates fully, and closes magnet PS(4A) via its INT and ON springs. Switch PS(4A) steps, self-interruptedly, to its "normal" position. As switch PS steps into its "normal" position, it operates its ON springs, opening DO(4A). Relay DO(4A) restores. This circuit is now ready for the next digit.

ISSUE

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FIG SC26 (FIG 4A)  
PARTY IDENTITY TEST CIRCUIT  
SEIZURE

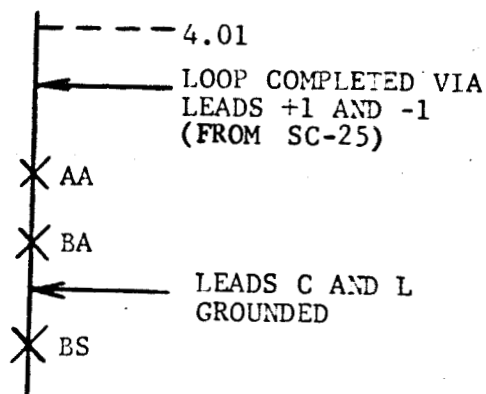
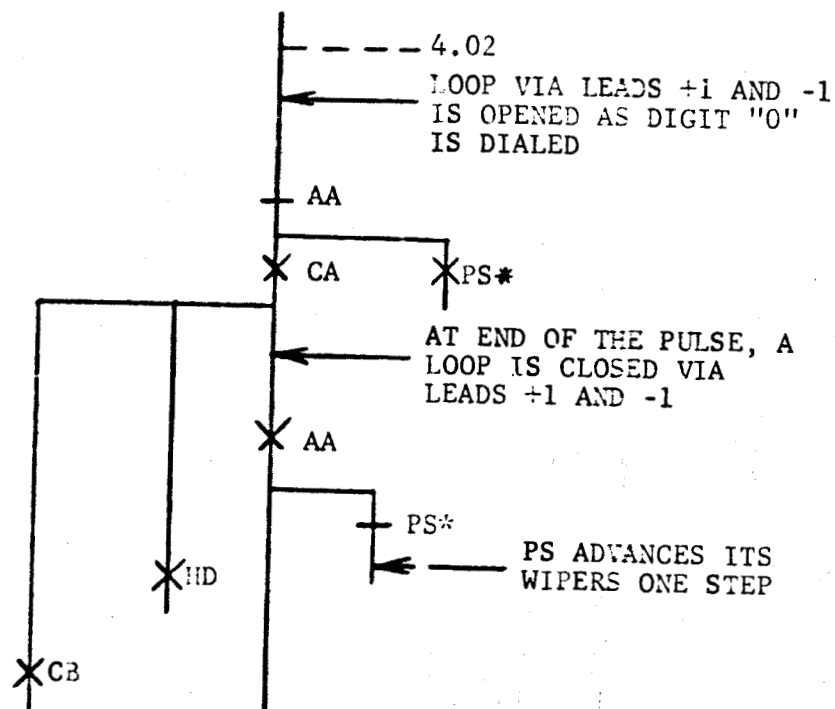


FIG SC27 (FIG 4A)  
FIRST DIGIT DIALED



\* INDICATES ROTARY SWITCH

#### 4.02.2 Digit Received Incorrectly

Operation is similar to that described in Section 4.02.1, except that the restoration of CA(4A) closes DN(4A) via LEV A of switch PS, instead of closing DO. Relay DN(4A) operates, locks, and connects lead IPM to lead -1, to give the testman the indication that the digit was not sent correctly. After its slow-to-release interval, CB(4A) restores and opens #1 and #2G. The remainder of the operation is as described in Section 4.02.1, except that the testman now has to disconnect.

#### 4.03 Party Identity Check

When four-party identification is provided, party #1 employs a standard subset while that of party #2 provides a tip mark through dial shunt springs during dialing. Party #3 and #4 subsets require special spotter dials.

When the party identification digit is dialed, AA follows the pulses, and on the first pulse, restores, connects lead +1 to lead -1 via #1PA and #2AA, and closes CA(4A). Relay CA(4A) operates, closes HD(4A) and removes the shunt (resistor R3) from resistor R1. If the "tip" mark is found, PA(4A) operates (#1 and #2 windings in series aiding) and closes PB(4A). Relay PB(4A) operates. Relay HD(4A) operates. If the tip mark is not found, PA does not operate.

When HD(4A) operates, it short-circuits resistor R4. When a "spot" is found, PA(4A) operates (AA operated) and closes #1PC. Relay PC(4A) operates to its "X" contacts, locks, operates fully and marks party #3 (if PB is operated, a ground test fault is registered). If another pulse occurs, #1PB is closed. Relay PB(4A) operates to its "X" contacts, locks and operates fully.

The party identification is thus made by the operated, or unoperated PB and PC.

TABLE 1 - PARTY MARKING

Party Mark	Relay PB	Relay PC
1	0	0
2	X	0
3	0	X
4	X	X
0 - Unoperated		
X - Operated		

FIG SC28 (FIG 4A)  
DIGIT "0" RECORDED CORRECTLY

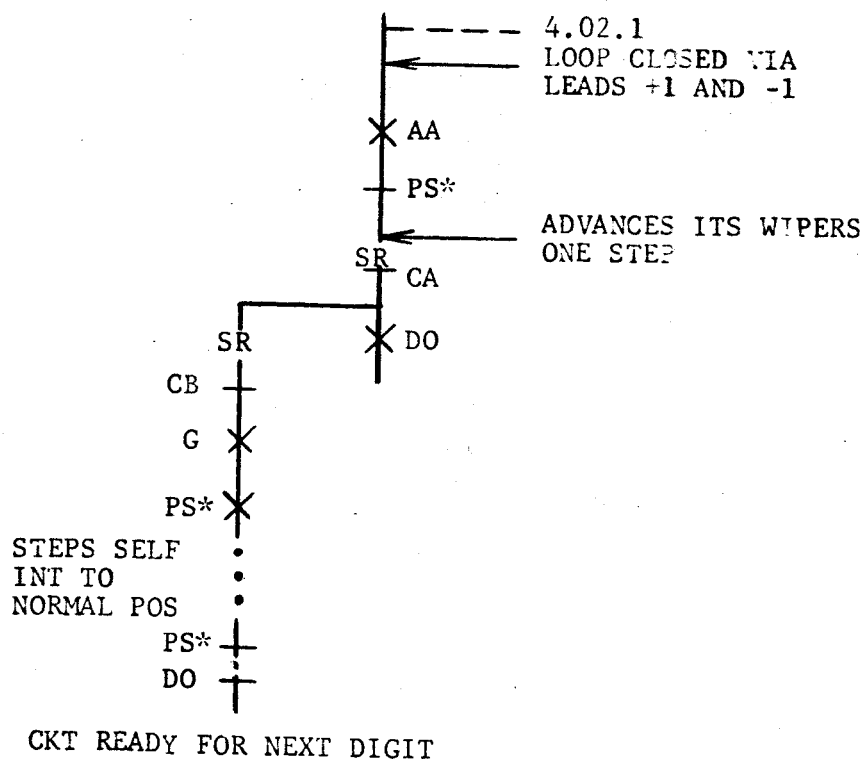
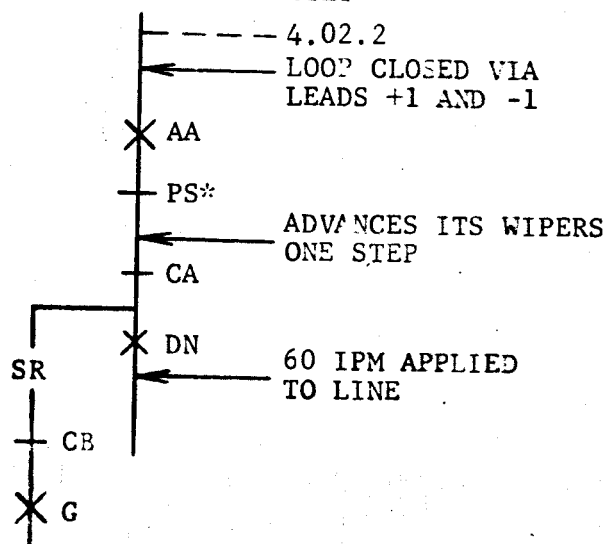


FIG SC29 (FIG 4A)  
DIGIT RECEIVED INCORRECTLY



\* INDICATES ROTARY SWITCH

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#### 4.03.1 Party Identity Dialed (Operated: Relays AA, BA, BS, G, HD, and possibly PB and/or PC)

Absence of IPM tone after the first digit is dialed is a signal to the testman that the first digit "0" was received correctly and that the circuit is prepared to receive the second digit. The testman dials the second digit which must correspond to the party identity number of the subset under test (either 1, 2, 3 or 4). Relay AA(4A) follows the dial pulses of the digit, and when at normal, opens BA(4A), closes CA(4A) and magnet PS(4A) via its ON springs. Relay CA(4A) operates and closes CB. Relay CB(4A) operates and closes #1 and #2H in magnetic opposition. Switch PS(4A) follows the pulses of AA(4A), advancing its wipers one step after each pulse.

After the last pulse AA(4A) re-operates and opens CA(4A) and switch PS. Switch PS(4A) restores and advances its wipers to the bank contact corresponding to the digit dialed.

##### 4.03.1.1 Party Identity Correct

After its slow-to-release interval, CA(4A) restores, opens CB(4A) and closes CP(4A) via LEV B of switch PS(4A). Relay CP(4A) operates, locks, and disconnects ground from lead L (to allow FIG 3A to release this circuit). After its slow-to-release interval, CB(4A) restores and opens #1 and #2H. Relay H(4A) operates to its "X" contacts on its "inductive kick" (as previously described for G), locks with #1 and #2H in series, magnetically aiding, operates fully, and disconnects lead +1 from lead -1 via resistor R2 and capacitor C1.

##### 4.03.1.2 Party Identity Incorrect

After its slow-to-release interval, CA(4A) restores and opens relay CB(4A). After its slow-to-release interval, CB(4A) restores and opens #1 and #2H. Relay H(4A) operates to its "X" contacts due to its "inductive kick" (as previously described), locks with #1 and #2H in series, magnetically aiding, operates fully, and connects lead BSY TONE to lead -1 for an "incorrect party mark" indication. The testman now has to disconnect.

##### 4.03.2 Ground Fault

When a ground fault occurs (PA remains operated during the party check), relay GT(4A) is closed when PB operates. Relay GT(4A) operates to its "X" contacts, locks, operates fully, and connects lead BSY TONE to lead -1 for ground fault indication. The testman has to disconnect.

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4

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FIG SC30 (FIG 4A)  
PARTY IDENTITY CHECK

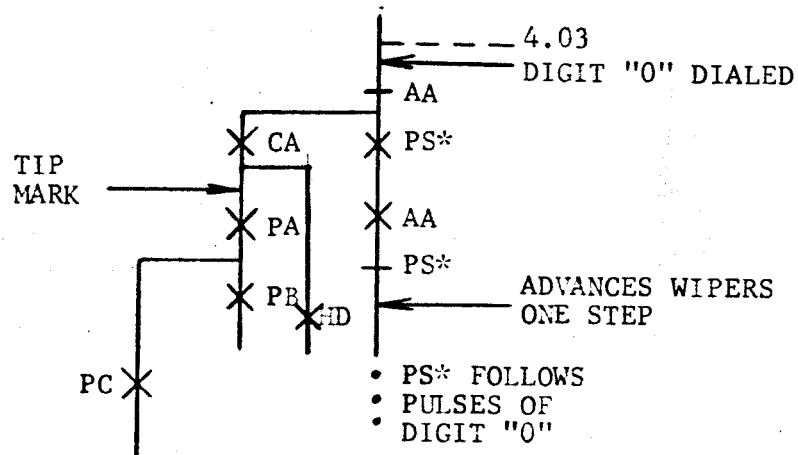
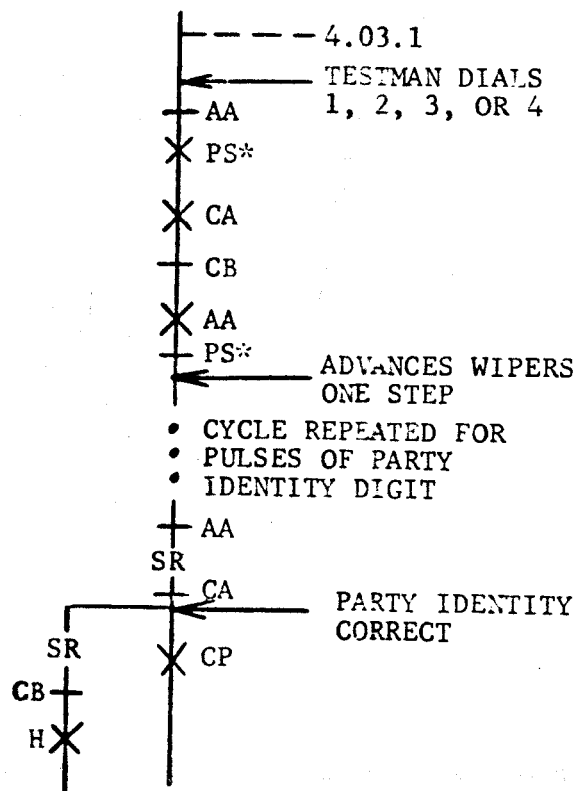


FIG SC31 (FIG 4A)  
PARTY IDENTITY DIALED



\* INDICATES ROTARY SWITCH



#### 4.04 Release

##### 4.04.1 After First Digit Received Correctly (Operated: Relays AA, BA, BS, HD, G, and possibly PB and/or PC - FIG 4A and relay SS - FIG 3A)

When the Testman restores, the loop via leads +1 and -1 is opened, opening AA(4A). Relay AA(4A) restores, opens BA(4A) and closes CA(4A) and magnet PS(4A). Relay CA operates and closes CB(4A). Switch PS(4A) operates. Relay CB(4A) operates. After its slow-to-release interval, BA(4A) restores, opens C(4A), BS(4A), CA(4A), HD(4A), and PB(4A) and/or PC(4A) (if operated) and removes ground from lead L opening relay SS(FIG 3A). Relay SS(3A) restores and switches leads "+", "-", and C (FIG 3A) from leads +1, -1 and C (FIG 4A) to #1A, #2A and C respectively. Relay BS(4A) restores and closes magnet PS(4A) via its INT and ON springs. Relays G(4A), HD(4A), PB(4A) and PC(4A) restore. After its slow-to-release interval, CA(4A) restores and opens CB(4A). After its slow-to-release interval, CB restores. Switch PS(4A) steps, self-interruptedly, to its "normal position. This circuit is now at normal.

##### 4.04.2 After First Digit Received Incorrectly (Operated: Relays AA, BA, BS, HD, G, DN, and possibly PB and/or PC)

Operation is similar to that described in Section 4.04.1, except that DN(4A) is opened, and restores, when BA(4A) restores.

##### 4.04.3 After Correct Party Identification (Operated: Relays AA, BA, BS, HD, G, H, CP, and possibly PB and/or PC - FIG 4A and relay SS - FIG 3A)

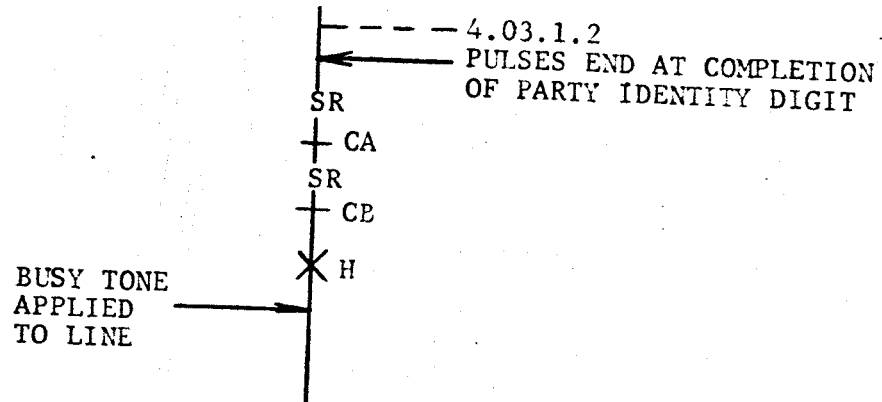
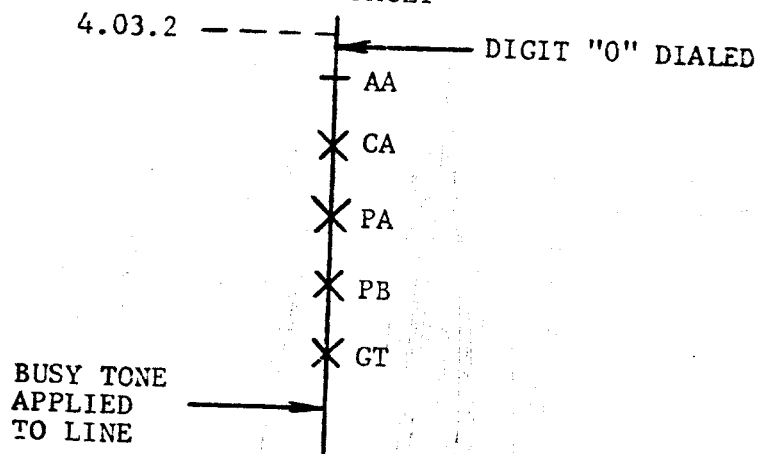
Operation is similar to that described in Section 4.04.1 with the following exceptions: The loop is opened by the preceding circuit (instead of the testman restoring); CP(4A) is opened by the restoration of BS(4A); and H(4A) is opened by the restoration of BA(4A). Relays CP(4A) and H(4A) restore.

##### 4.04.4 After Incorrect Party Identification (Operated: Relays AA, BA, BS, HD, G, H, and possibly PB and/or PC - FIG 4A and relay SS - FIG 3A)

Operation is similar to that described in Section 4.04.1, except that H(4A) is opened (and restores) when BA(4A) restores.

#### 4.05 Busying

This circuit can be marked busy by operating the BUSY KEY, which removes ground from lead OP.

FIG SC32 (FIG 4A)  
PARTY IDENTITY INCORRECTFIG SC33 (FIG 4A)  
GROUND FAULT

## 5.00 TCMF Test Desk Access (FIGS 2A, 5A, 6A and 1A or 11A)

### 5.01 Seizure and Operation

Access to FIG 2A can be made from the test board outgoing to a subscriber or incoming over an inspector's trunk. In either case, FIG 2A is accessed by operating a key (TCMF) located at each test desk position. A chain circuit, through figure 5A, is employed to prevent multiposition access. The key (TCMF), when operated, grounds lead MF closing MF(5A). Relay MF(5A) operates, connects lead B to lead TA, transfers lead TC from lead TB to lead C, closes MFS(5A) and MFD(5A) (in series), transfers lead CH1 from lead CHO to lead MFL, grounds leads RS and TF, disconnects lead CHA from lead CHB (and CHO), disconnects lead TDO from lead TDN, closes #1BMF (FIG 2A) via lead SEL, diode CR3, lead TD1, FIG 1A or 11A and lead TD. Relay BMF(2A) operates, disconnects lead T from lead DT, transfers lead R from lead DR to lead BT (to supply busy tone), disconnects leads DR and DA from leads DTR and DTA (via capacitors C3 and C4), disconnects resistance (relay SQ) battery from lead SQ1, disconnects lead CO from CON, disconnects relay TC1 from lead TC1, disconnects lead TCS from lead LG1, and closes #2BMF and TD via lead SEL. Relay MFS(5A) operates and connects leads TO-UO to leads AO-BO. Relay MFD(5A) operates and connects leads L1-L12 to leads 1-12. Relay TD(2A) operates, grounds lead MFL (via lead CH1), disconnects leads R6 and R4 from leads R5 and R3, respectively, grounds lead LG2, disconnects lead R1 from lead R2, connects #1ADT to lead TCO, connects SQ to lead SQ, and connects resistance (#1A1) battery and resistance (#2A1) ground to leads DR and DT, respectively. The test desk Operator informs the subset party of the test. The transmitter cut-off key is operated at the desk set, grounding lead TCO, closing #1ADT. Relay ADT(2A) operates, closes TC1(2A), and connects leads DTR and DTA to leads DT and DR (to supply dial tone). The party identity is now determined and compared as described in Section 2.00.

Each time the test desk Operator wishes to converse with the subset party, the transmitter cut-off key is restored, opening ADT, which restores. The test desk Operator then instructs the subset Operator to sequentially depress the pushbuttons. In each operation of the pushbuttons, the numerical equivalent will be displayed (FIG 6A) and the sequence in which they appear will also be displayed. After the party test, and after each digit, the Test Receiver grounds lead SQ, closing SQ(2A). Relay SQ(2A) operates and closes magnet SEQ(2A). Switch SEQ(2A) operates and operates its INT springs. At the end of the digit,

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FIG SC34 (FIG 4A)  
RELEASE  
1ST DIGIT RECEIVED  
CORRECTLY

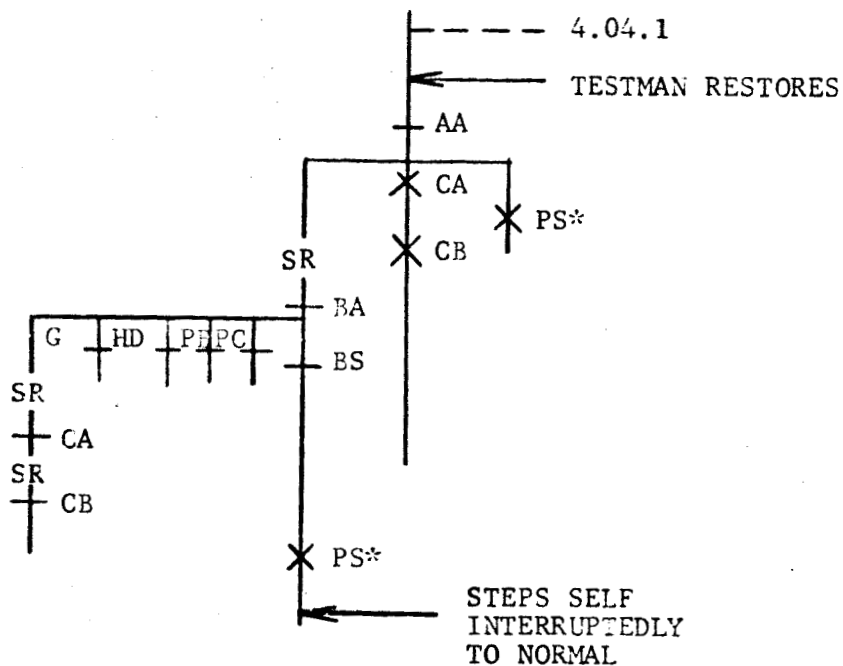
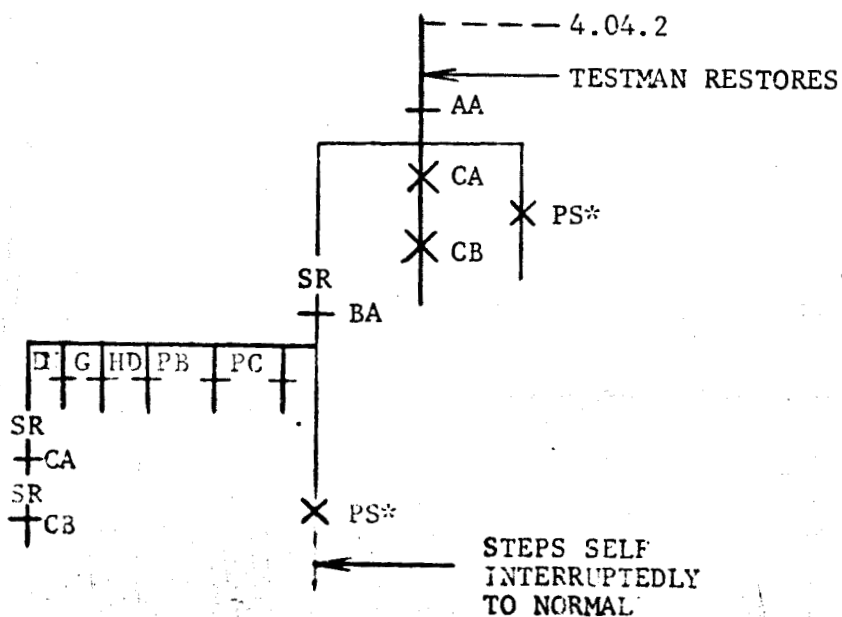


FIG SC35 (FIG 4A)  
RELEASE  
1ST DIGIT RECEIVED  
INCORRECTLY



\* INDICATES  
ROTARY SWITCH

ISSUE  
4

DRAWING NO.  
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the Test Receiver disconnects ground from lead SQ, opening SQ(2A). Relay SQ(2A) restores and opens magnet SEQ(2A). Switch SEQ(2A) restores and restores its INT and ON springs. In this way, the sequence of the digits is displayed on the display units in FIG 6A ((and hence the position in the sequence)).

5.02 Release (Operated: Relays TD and B.F - FIG 2A, relays MF, MFS and MFD - FIG 5A)

After all testing is complete, the test desk operator disconnects the subset operator from the test board and restores and key (TCMF) located at the test desk position. The key (TCMF) when restored, removes ground from lead MF opening relay MF (FIG 5A). Relay MF(5A) restores, disconnects lead B from lead TA, transfers lead TB from lead C to lead TC, opens relays MFS(5A) and MFD(5A) in series, transfers lead CH1 from lead MFL to lead CHO (and lead CHB, if used), disconnects ground from leads RS and TF, connects lead CHA to lead CHB (and lead CHO), connects lead TDO to lead TDN, and removes ground from lead SEL opening #1 and #2BMF(2A) (via lead TD1, FIG 1A or 11A and lead TD) and relay TD(2A). Relay BMF(2A) restores, disconnects lead T from lead DT, transfers lead R from lead BT to lead DR (to remove busy tone from the line), connects leads DR and DA to leads DTR and DTA (via capacitors C3 and C4), connects resistance (relay SQ) battery to lead SQ1 to FIG 1A or 11A ("X" WRG USED), connects resistance (#2CON) to lead CO, transfers lead BLS(BL1) ("D" WRG USED) or lead BLS(BL3) ("C" WRG USED) from busy tone or ground ("J" or "K" and "C" or "D" WRG USED - SEE NOTES 9, 10 and 63, H-850678-A) to lead BY, connects resistance (relay TCS) battery via FIG 1A or 11A and lead TCS to lead LG1, and connects resistance (relay TCI) battery to lead TC1. Relay TD(2A) restores, removes ground from lead CH1 ("C" WRG USED) or lead CH3 ("D" WRG USED - SEE NOTES 67 and 69, H-850678-A), connects leads R6 and R4 to leads P5 and R3, respectively, removes ground from lead LG2, connects lead R1 to lead R2, disconnects resistance (relay ADT, "J" or "K" WRG USED) battery from lead TCO, transfers resistance (relay TCS) battery from lead LG1 to lead RST, connects resistance (relay SQ) battery to lead SQ, and disconnects resistance (#1A1) battery and resistance (#2A1) ground from leads DR and DT, respectively.

Relay MFD(5A) restores and disconnects leads L1 thru L12 from leads 1 thru 12 respectively. Relay MFS(5A) restores and disconnects leads TO, T1 and U1 thru UO from leads AO, A1 and B1 thru BO, respectively.

FIG SC36 (FIG 4A)  
RELEASE  
AFTER CORRECT PARTY IDENTIFICATION

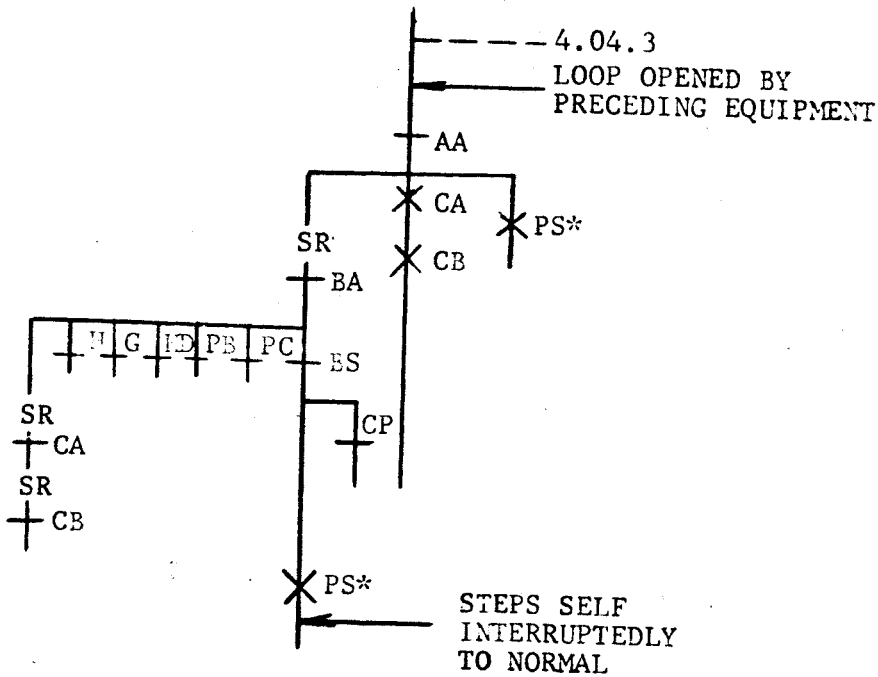
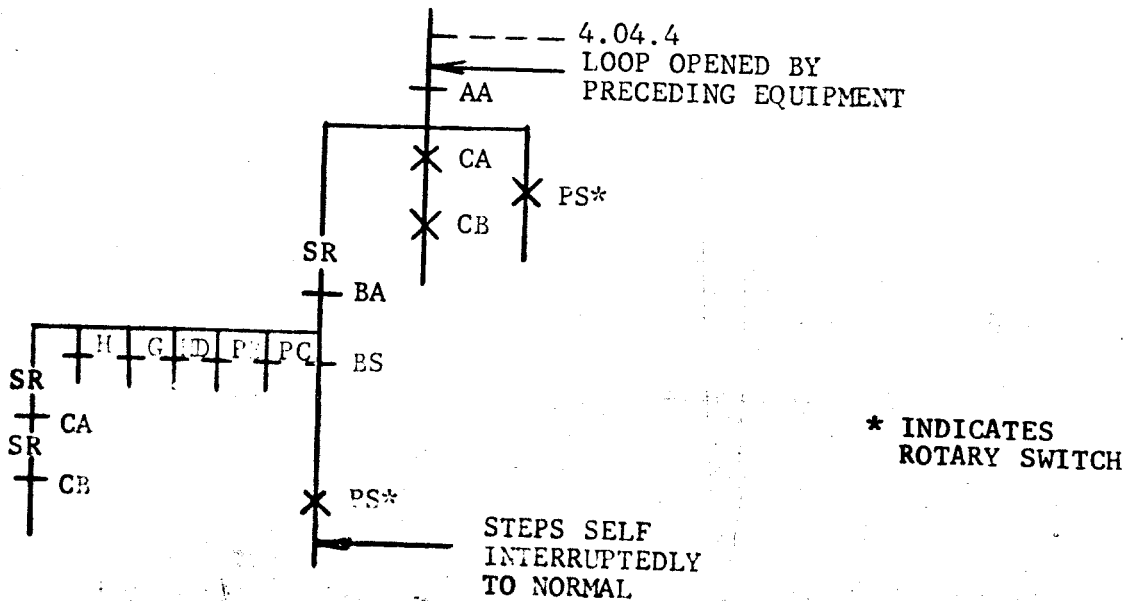


FIG SC37 (FIG 4A)  
RELEASE  
AFTER INCORRECT PARTY IDENTIFICATION



6.00 TCMF Testing of Tributary Offices Without Going Through Selectors and Access Circuits (FIGS 1A or 11A OMITTED) - "L" WRG USED

To permit subset testing in Tributary Offices via a Test Desk in the main office "L" WIRING is used (See NOTES 12 and 68, H-850678-A). The typical interconnection of circuits is shown in FIGURE TRIB - 1.

To test subsets in the tributary office the testman with the subset contacts the Test Desk and requests to use TCMF TEST RECEIVER ACCESS AND PARTY IDENTITY CIRCUIT (FIG 2A, H-850678-A). The test desk operator will then patch the call through the test position to the available H-850678-A, FIG 2A.

After the call has been patched through, the circuit operation continues as described in Section 5.00 except that all test inputs and results are transmitted to and from the Test Receiver (H-850679-A or equivalent) via FIG 2A directly and not via FIG 1A or 11A.

7.00 Test Receiver Alternator Circuit (FIG 7A)

This circuit is accessed via lead ALC. Ground via lead ALC (see Section 2.00) closes #1ALT1(7A). Relay ALT1(7A) operates and short-circuits #1ALT2(7A). When ground is removed from lead ALC, it removes the short circuit from #1ALT2, closing #1ALT2 in series with #1ALT1. Relay ALT2(7A) operates, transfers various leads (from FIG 2A) from Test Receiver 1 to Test Receiver 2, closes relay TT1 and TT2 in series, and connects resistance (relay DTI) battery to lead T2. Relays TT1(7A) and TT2(7A) operate and transfer various FIG 1A or 11A, FIG 2A, and FIG 5A leads from Test Receiver 1 to Test Receiver 2. Relay DTI(7A) is closed each time a ground pulse is connected to lead T2. Relay DTI(7A) operates (once each pulse) and disconnects lead DTR and DTA (terminals DT and DR) from leads DTR and DTA, respectively, to give interrupted dial tone to identify Test Receiver 2.

The next time ground is applied to lead ALC, it closes #2ALT2 and #2ALT1 (in magnetic opposition to #1ALT1). Relay ALT1(7A) restores and opens #1 and #2ALT1, and #1ALT2. At the end of the ground signal, #2ALT2 is opened. Relay ALT2(7A) restores, opens relays TT1(7A) and TT2(7A), disconnects resistance (relay DTI) battery from lead T2, and transfers various FIG 2 leads from Test Receiver 2 to Test Receiver 1. Relays TT1 and TT2 restore and transfer the various leads back to Test Receiver 1 (from Test Receiver 2).

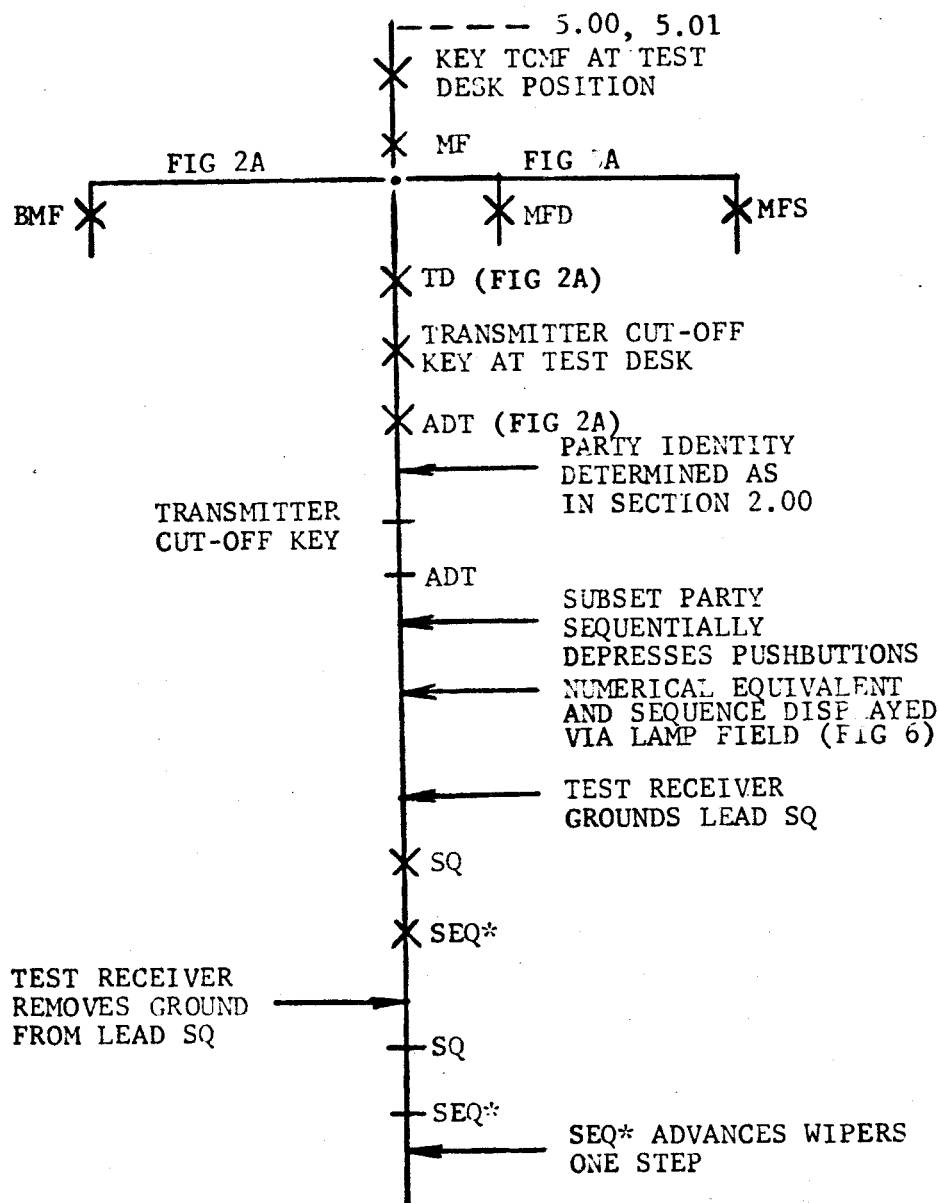
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FIG SC38  
(FIGS 2A, 5A, AND 6A)  
TCMF TEST DESK ACCESS



\* INDICATES ROTARY SWITCH

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The Test Receivers may be transferred manually by the operation of the respective keys.

#### 8.00 TCMF Allotter Circuit (FIG 8A)

The TCMF ALLOTTER CIRCUIT (FIG 8A) permits a test desk to access a maximum of ten TCMF TEST RECEIVER ACCESS AND PARTY IDENTITY CIRCUITS (FIGS 2A) see NOTE 65 and FIG AC for interconnection of circuits. To access the touch calling subset test circuitry a key (TCMF) is operated at a test desk position, applying ground to lead MF (FIG 8A). Ground via lead MF closes relay INP(8A). Relay INP(8A) operates and closes the motor magnet of rotary switch ACC(8A). Motor magnet ACC(8A) cocks a driving spring, and operates its INT springs, opening relay INP(8A). Relay INP(8A) restores and opens the motor magnet of rotary switch ACC(8A). Motor magnet ACC(8A) restores its INT springs. Rotary switch ACC(8A) steps its wipers to the first rotary position, closing relay INP(8A) via ground on lead TA1 if the first TCMF circuit is busy. On the first rotary step the ON springs restore, short-circuiting relay SW if the first TCMF circuit is busy. Relay INP(8A) operates, removes the short circuit from relay SW(8A), and closes the motor magnet of rotary switch ACC(8A). Motor magnet ACC(8A) operates its INT springs, opening relay INP(8A). Relay INP(8A) restores, short-circuiting relay SW(8A) and opening motor magnet ACC. Motor magnet ACC(8A) restores, restores its INT springs closing relay INP if the second TCMF circuit is busy, and rotary switch ACC(8A) steps its wipers to the third rotary position. If the third TCMF circuit is idle, ground is absent from lead TA3, and relay INP(8A) is not closed upon stepping to rotary position three. Relay SW(8A) is closed in series with relay INP(8A). The current flow is not sufficient to operate relay INP(8A). Relay SW(8A) operates, disconnects lead TB from lead TC, connects leads DT and DR to levels D and E of rotary switch ACC(8A), grounds lead RS, grounds lead MF3 (to 3rd FIG 10A), grounds lead TF, and disconnects lead TA3 from lead MFL and relay INP(8A). The Test Desk (H-85297; or EQUIV) position is now connected to an idle TCMF test circuit.

After the Operator at the Test Desk has completed TCMF subset tests, a key (TCMF) at the Test Desk is restored, closing relay INP(8A) by grounding lead CHA, and opening relay SW by disconnecting relay SW from relay INP(8A). Relay SW(8A) restores, connects lead TB to lead TC, disconnects leads DT and DR from levels D and E of ROT SW ACC, disconnects ground from leads RS and TF and connects the level A wiper of rotary switch ACC(8A) to relay INP(8A)

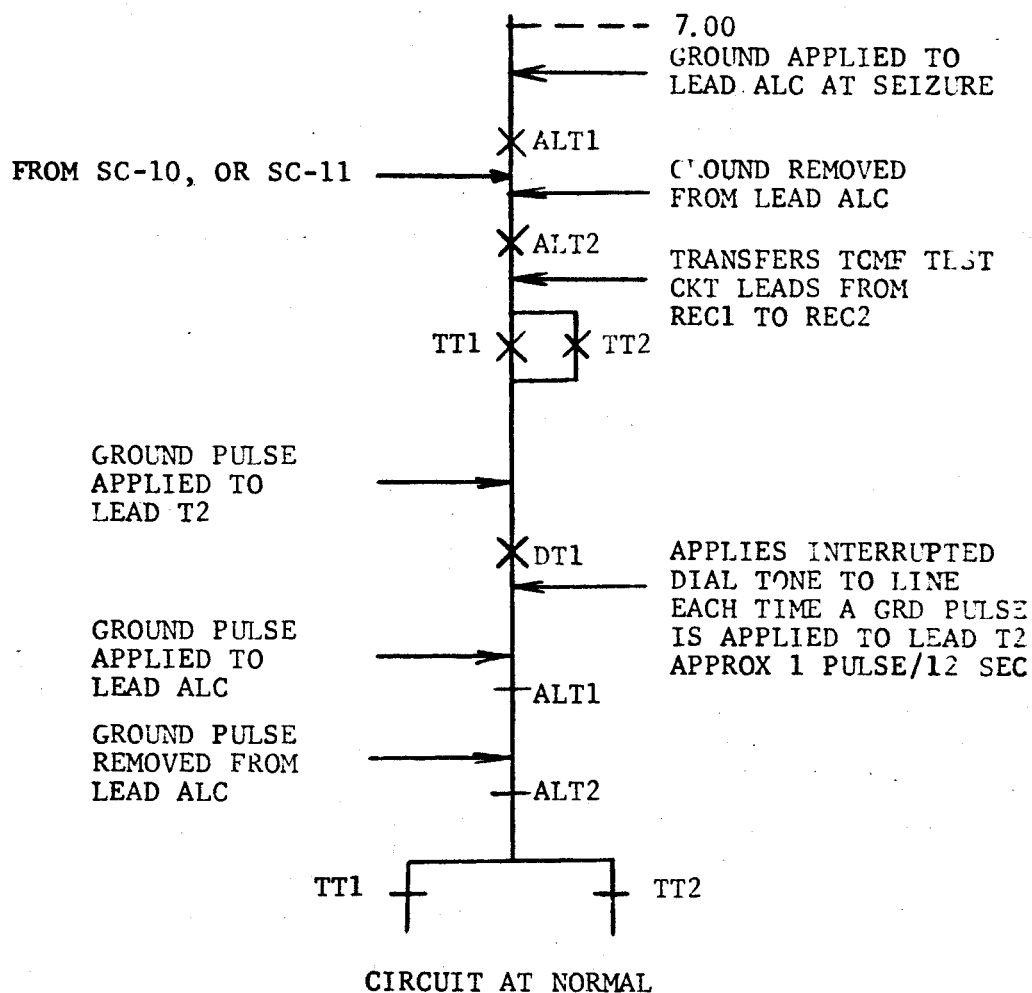
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FIG SC39 (FIG 7A)  
TEST RECEIVER ALTERNATOR CIRCUIT



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and lead MFL via diode CR1. Relay INP(8A) operates and closes the motor magnet of rotary switch ACC(8A). Motor Magnet ACC(8A) operates, cocks a driving spring, and operates its INT springs, opening relay INP(8A). Relay INP(8A) restores and opens motor magnet ACC(8A). Motor magnet ACC(8A) restores its INT spring, closing relay INP(8A). Rotary switch ACC(8A) advances its wipers one rotary position. Relay INP(8A) operates and closes motor magnet ACC(8A). Motor Magnet ACC(8A) operates its INT springs, opening relay INP(8A). Relay INP(8A) restores and opens motor magnet ACC(8A). Motor magnet ACC(8A) restores its INT springs, closing relay INP(8A). Rotary switch ACC(8A) advances its wipers one rotary position. This self-interrupted rotary stepping continues until the wipers of rotary switch ACC reach the home position and rotary switch ACC operates its ON springs preventing further rotary stepping by transferring resistance (relay INP) battery from lead CHA to lead MF. The TCMF ALLOTTER CIRCUIT is now at normal.

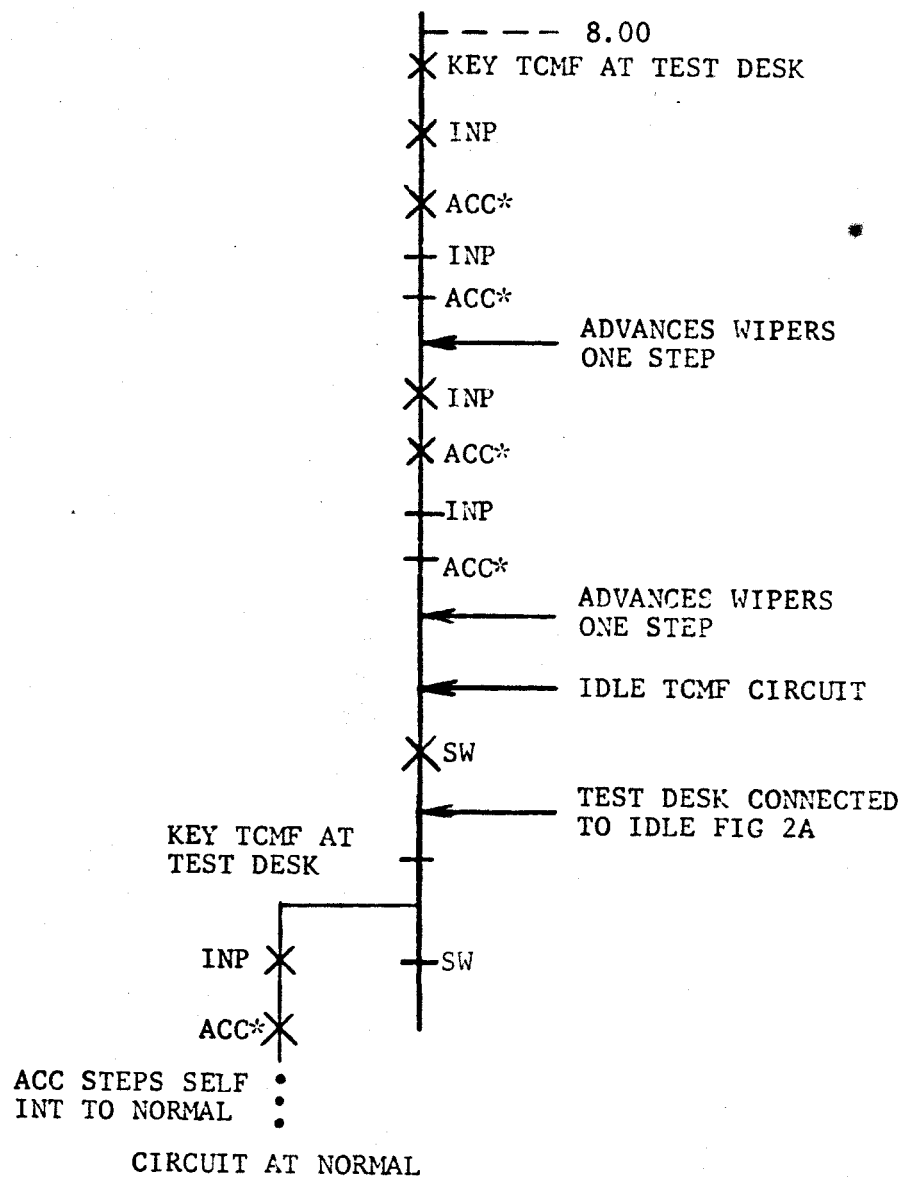
#### 9.00 BSY LAMP DIST CKT (FIG 9A)

When all TCMF TEST RECEIVER ACCESS AND PARTY IDENTITY CIRCUITS (FIG 2A) are busy, ground via lead BLS closes relay BL(9A). Relay BL(9A) operates and connects ground to terminals BL1-BL6, lighting a busy lamp at each test desk position. When one or more TCMF TEST RECEIVER ACCESS CKTS becomes idle, ground is removed from lead BLS, opening relay BL(9A). Relay BL(9A) restores and removes ground from terminals BL1-BL6, extinguishing the busy lamps at the test positions.

#### 10.00 TCMF TEST DESK ACCESS CIRCUIT (FIG 10A)

When a TCMF test desk attempts to access the TCMF test circuits, ground is applied to lead MF(), closing relay MF(10A), as a key (TCMF) is operated at the test desk position. Relay MF(10A) operates, closes relays MFD(10A) and MFS(10A) in series, grounds leads MFS and TA1, connects terminal TC1 to lead TCO, connects terminal RS to terminal RST, connects terminal ED to terminal E, connects terminal FD to terminal F, connects terminal TC to terminal TE, connects terminal TA to terminal TD, and disconnects terminal TDO from terminal TDN. Relay MFS(10A) operates, connects leads AO and A1 to leads TO and T1, respectively, and connects leads B1-BO, to leads U1-UO, respectively. Relay MFD(10A) operates and connects leads 1-12 to leads L1-L12, respectively. The TCMF Test Receiver Output is connected to the TCMF TEST DESK DISPLAY CKT (FIG 6A) and the Test Position, H-85297, or EQUIV, is connected to the TCMF Test Receiver Access and Party Identity Circuit (FIG 2A).

FIG SC40 (FIG 8A)  
TCMF ALLOTTER CIRCUIT



\* INDICATES ROTARY SWITCH

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When the Test Desk Operator has finished TCMF testing, a key (TCMF) at the test desk is restored, removing ground from terminal MF() opening relay MF(10A). Relay MF(10A) restores, removes ground from leads MFS and TAL, disconnects terminal TCl from terminal TCO, disconnects terminal RS from terminal RST, disconnects terminal ED from terminal E, disconnects terminal FD from terminal F, disconnects terminal TC from terminal TE, disconnects terminal TA from terminal TD, connects terminal TPO to terminal TDN, and opens relays MFS(10A) and MFD(10A). Relay MFS(10A) restores, disconnects leads AO and AI from leads TO and TI, respectively, and disconnects leads B1-B0 from leads U1-U0, respectively. Relay MFD(10A) restores and disconnects leads 1-12 from leads L1-L12, respectively.

#### 11.00 Access by #1EAX Selector Group Matrix Outlet (FIG 11A Used)

NOTE: In this section, parenthesis after a lead designation indicates the terminal for the lead [i.e. lead ST(ST) refers to lead ST (terminal ST)]

#### 11.01 Seizure (Normally Operated: ON springs of rotary Switch RS)

This circuit is arranged to operate in conjunction with a #1EAX Office and is accessed via a FAX Selector Group Matrix to SXS Trunk Interface Circuit H-840227-A (or EQUIV.). Resistance battery connected to lead IT(C) via Circuit H-840227-A marks this circuit idle to the EAX Selector Group Matrix. Upon seizure, ground is connected to lead S and a loop is closed between leads T(+) and R(-). Circuit H-840227-A removes resistance battery from lead IT(C), returns resistance ground to lead H(H), and extends the loop across leads T1 and R1 closing #1 and #2A(11A) in series via leads FB and FG. Relay A(11A) operates, closes relay B(11A), and grounds lead A(A) via diode CR4 to hold circuit H-840227-A operated and mark this circuit busy. Relay B(11A) operates, grounds lead CH3, closes #2C, connects leads SQ1 and CO (TO FIG 2A WHEN PROVIDED) to leads SQ and CON (TO TEST REC H-850679-A or EQUIV, or FIG 7A WHEN PROVIDED), respectively, and grounds lead BY (STRAP "C" PROVIDED, See NOTE 69; H-850678-A). Relay C(11A) operates. Depending on the type of test call (TCMF or Dial Pulse) the circuit operation continues as described in Sections 11.01.1 or 11.01.2.

#### 11.01.1 Dial Pulse Test Call (Operated: Relays A, B, C, and ON springs)

The type of subset test that is required is determined by a dialed digit (See NOTE 52; H-850678-A).

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FIG SC-41

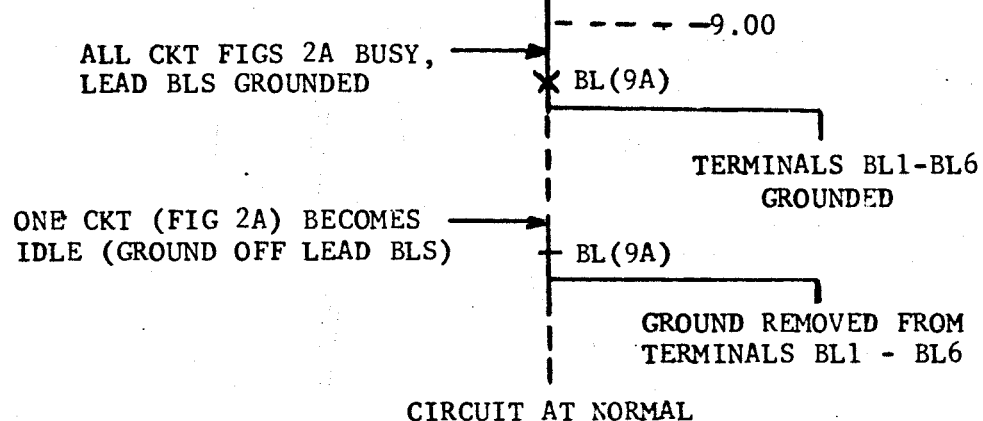
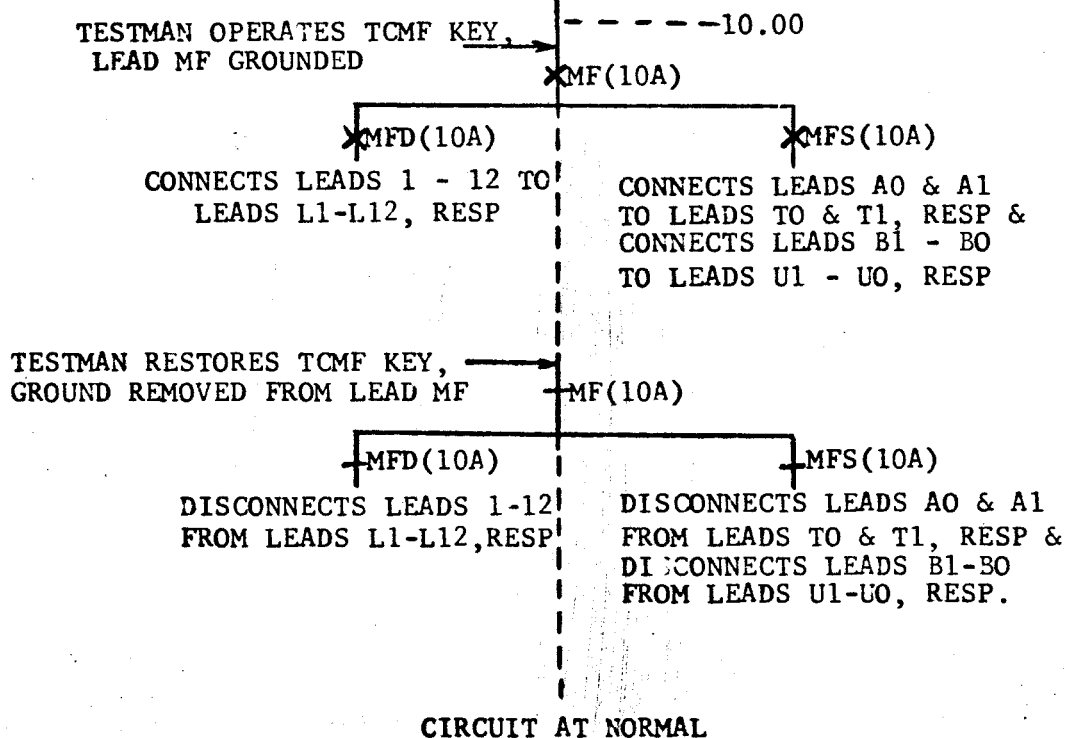


FIG SC-42

TCMF TEST DESK ACCESS (FIG 10A USED)



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On the first dial pulse, the loop via leads T(+) and R(-) is opened, opening #1 and #2A. Relay A(11A) restores, opens relay B(11A), and closes #1C and magnet RS in series. Relay B(11A) remains operated during dialing due to its slow-to-release characteristics. Rotary switch RS operates and operates its INT springs.

At the end of the first pulse, the loop via leads T(+) and R(-) is closed, closing #1 and #2A(11A) in series via leads FB and FG. Relay A(11A) operates, closes B(11A) and opens #1C and magnet RS(11A) in series. Rotary switch RS(11A) restores, steps its wipers one step to their first bank contacts, restores its ON springs, opening #2C and restores its INT springs. The next dial pulse (if any) opens the loop via leads T(+) and R(-) and relay A(11A) and magnet RS(11A) follow the pulses as just described.

At the end of the digit, the loop via leads T(+) and R(-) is closed, closing #1 and #2A(11A) in series via leads FB and FG. Relay A(11A) operates, closes B(11A) and opens #1C and magnet RS(11A) in series. Rotary switch RS(11A) restores and steps its wipers to the dialed bank contacts. After its slow-to-release interval, relay C(11A) restores and closes relay DC(11A) via LEV G wiper of rotary switch RS(11A) (See NOTE 52; H-850678-A) and terminal DC. Relay DC(11A) operates, transfers leads T(+) and R(-) from resistance (#2A) ground and resistance (#1A) battery to leads "(D+)" and "(D-)" (TO FIG 3A, or H-85175 or EQUIV), respectively, opening relay A(11A) and seizing FIG 3A (See Section 3.00), and transfers lead C(C1) from resistance (#1BSD) battery to ground. Relay A(11A) restores and opens relay B(11A). After its slow-to-release interval, relay B(11A) restores, removes ground from lead CH3, disconnects leads SQ1 and CO (to FIG 2A when provided) from leads SQ and CON (TO TEST REC H-850679-A or EQUIV or FIG 7A WHEN PROVIDED), respectively, and removes ground from the LEV G wiper of rotary switch RS(11A). Relay DC(11A) is held operated via ground on lead C(C1) (TO FIG 3A, or H-85175 or EQUIV)

#### 11.01.2 TCMF Test Call (Operated: Relays A, B and C)

As the correct test digit (to choose the TCMF Test) is received from the preceding circuits via leads T(+) and R(-), relay A(11A) and rotary switch RS(11A) follow the pulses as described in Section 11.01.1 and the operation continues until RS(11A) restores and steps its wipers to the correct level for a TCMF call. After its slow-to-release interval, relay C(11A) restores and closes relay TC(11A) via the LEV G wiper of rotary switch RS (see NOTE

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FIG SC-43  
(ACCESS BY CIRCUIT FIGURE 11A)  
SEIZURE

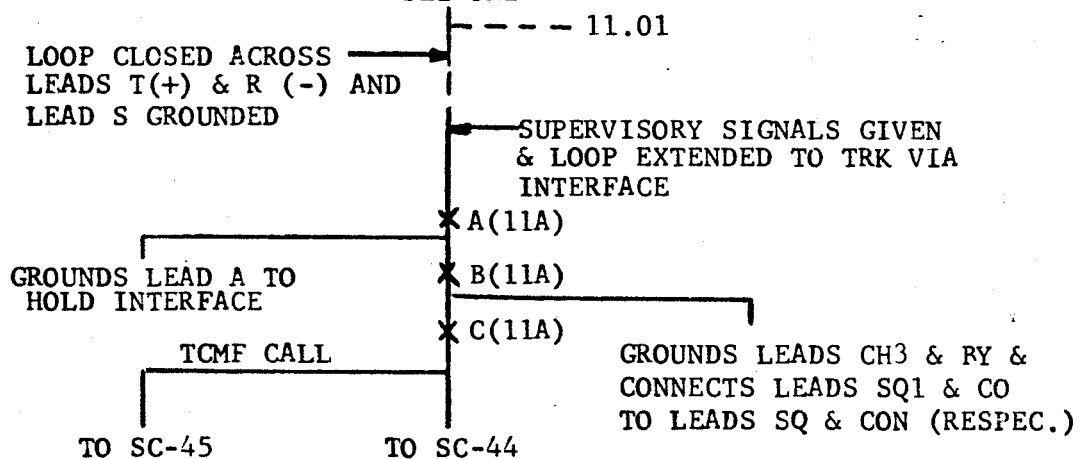
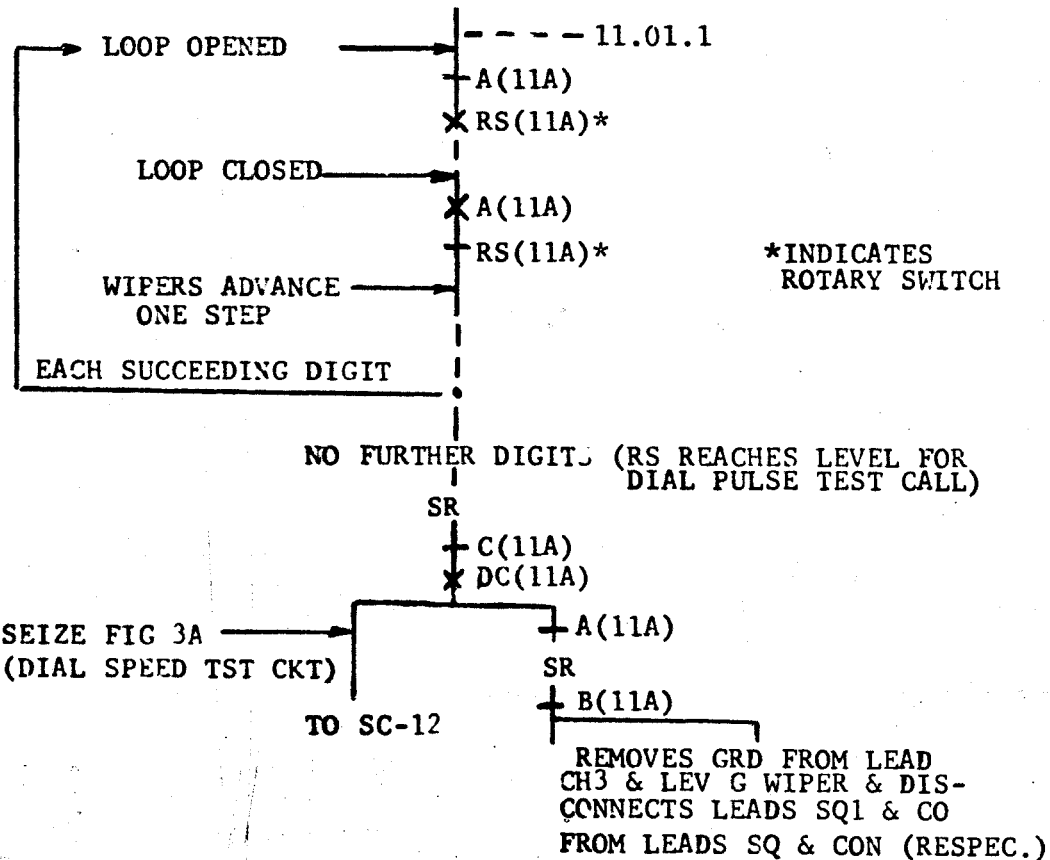


FIG SC-44  
DIAL PULSE TEST CALL



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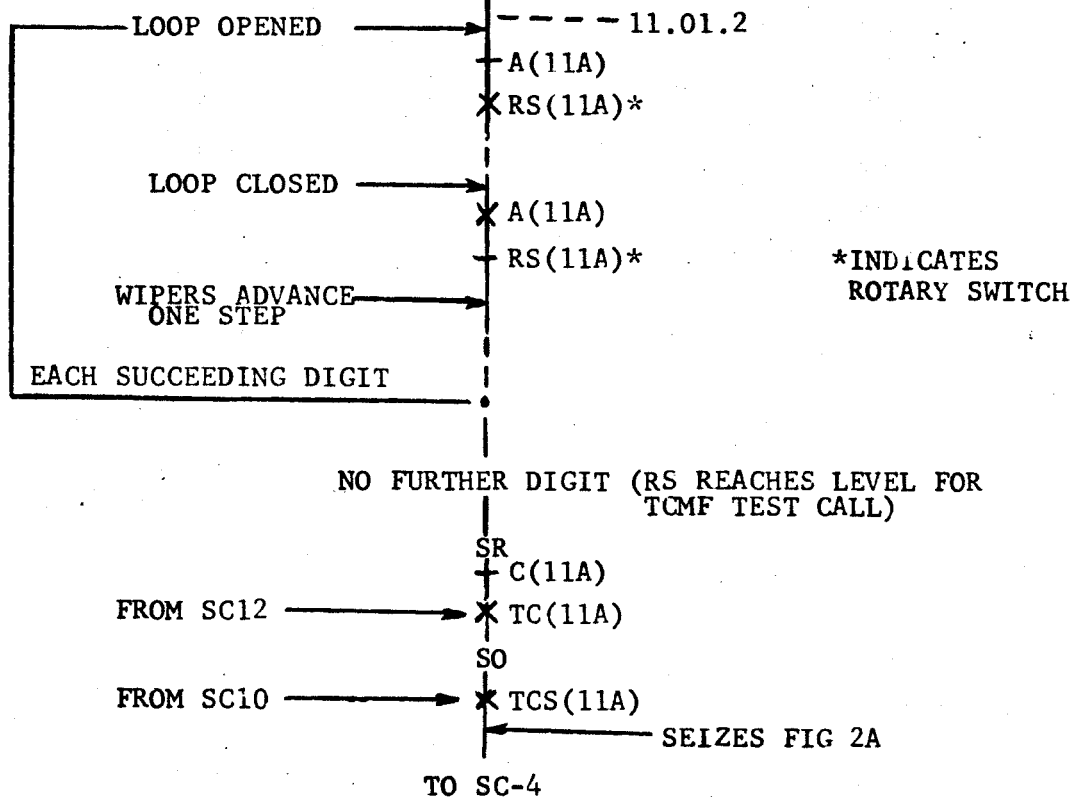
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E-850678-A



52; H-850678-A) and terminal TC. Relay TC(11A) operates, removes the line termination resistance (resistor R1) from across leads T(T) and R(R), connects leads T(+) and R(-) from the succeeding equipment (via circuit H-840227-A) to leads T(T) and R(R) (To FIG 2A), respectively, disconnects lead TD from lead TD1, transfers ground from lead CH1 to lead LG1 closing relay TCS(11A) via lead TCS and thermistor TR1 (and FIG 2A), connects leads DR1 and DA1 to leads DR and DA, respectively (to provide dial tone), connects leads R1 through R6 to terminals N10 through N16 (via the LEV A through LEV F wipers of rotary switch RS(11A) and FIG 2A), respectively (See NOTE 51; H-850678-A), and transfers lead BY from ground to lead IP.

After its slow-to-operate interval, provided by thermistor TR1, relay TCS(11A) operates to its "X" contacts, operates completely, and grounds lead TC1, to seize FIG 2A (the TCMF Test Receiver Access and Party Identity Circuit). The circuit operation continues as described in Section 2.00

FIG SC-45  
TCMF TEST CALLISSUE  
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