CIRCUIT EXPLANATION

REGISTER-SENDER CKT.
FOR USE WITH
ELECTRONIC TRANSLATOR
H-850215-A

(Written specifically for circuit issue 38, * but may also apply to later issues. Refer to H print for appropriate E issue number.)

GENERAL

This circuit is designed as part of the Type 101 Director system, the main components of which are the Register-Sender, Register Sender Access Equipment, and the Electronic Translator. The 101 Director system provides common control and translation features to step-by-step offices resulting in greater economy through increased flexibility in numbering schemes and trunking arrangements for multi-office networks. This system is capable of fulfilling the needs of the local switching network without modification of existing switches or shelves.

The electromechanical Register-Sender basically converts dial pulses or Touch Call tones into codes, presents these codes to the Translator, and under control of the Translator translates codes into loop pulses or Multi-Frequency signals for outpulsing.

The Register-Sender accesses a common Translator on a time division basis, using two separate common highways. As many as 100 Register-Senders may use the same Translator depending on office requirements. One common highway (Translator Commons) is used to send the stored dialed digit information of the Register-Sender to the Translator, and the other common highway (Route Commons) carries instructions from the Translator back to the Register-Senders. A Register-Sender accesses the common highway during a period of time called a time slot. The Translator provides each Register-Sender with a 100 microsecond time slot. The period between time slots is determined by the number of Register-Senders in the group. The Translator can provide access to a maximum of 100 Register-

* SEE ADDENDUM SECTIONS, BEGINNING ON SHEET 85, FOR DETAILS OF HOW SUBSEQUENT CIRCUIT ISSUES AFFECT THE CIRCUIT OPERATION DESCRIBED HEREIN.

SIZE A | E-850215-A | SHEET 1 | TOTAL 8 | 7

AUTOMATIC ELECTRIC CO. NORTHLAKE, ILLINOIS U.S.A.

Rewritten 5/67:ar Issue 6

Changed Sections 3.02,3.03 3.04,3.05 3.07,4.01 4.02,5.01 6.01,6.02 and 7.02 9/67:msj Issue 7

Changed Section 18.00 Added Sections 1.03, 3.03.1, 7.03, and 3.04.1 7/71:iw J.C. Hall JCH

Issue 8

Added Addendum Section 1 To Cover H Issues 39 thru 47 J. Kujawa 4/75 pm ISSUE 9

12/75

WRITTEN BY	APPROVED	ISSUE	DRAWING NO.
J. F. Zurawski		10	E-850215-A

FM 281 (12/66)

Added Addendum Section #2 To Cover H Issues 48-53 6/78 J. Eggleston Issue 10

Senders. The Translator continuously connects each Register-Sender in its turn to the common highway. This means that the Register-Sender does not need to determine when a dialed code requires translation since the Translator is continuously scanning the entire system. The translated information will be returned as soon as the dialed code has been registered, whether that code consists of one or more digits.

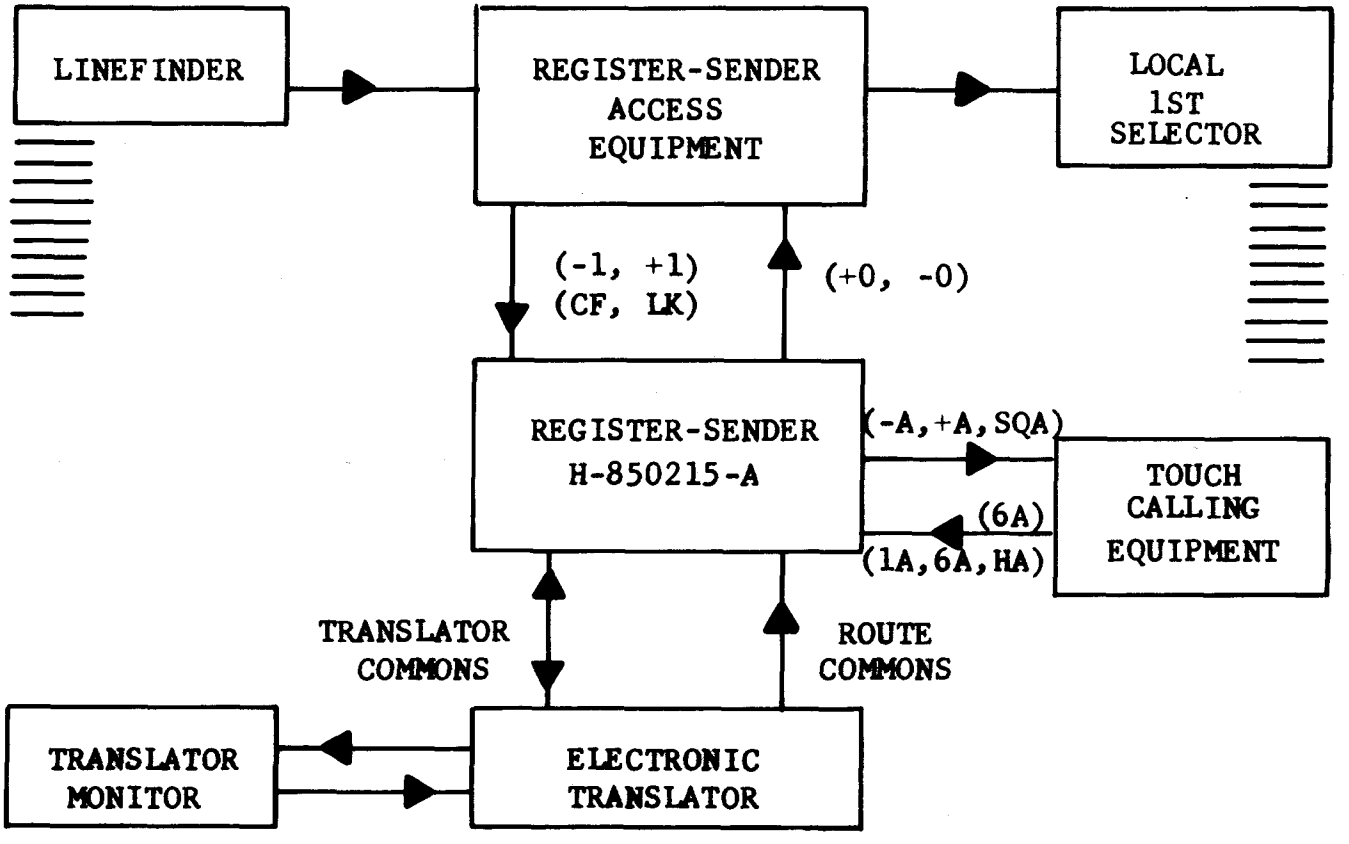
The Register-Sender registers the incoming dialed digits by counting the dial pulses by means of a correed counting chain and converts the digit into a 2 out of 5 code (see TABLE A, H-850215-A). During the interdigital pause, the Register-Sender stores the inpulsed digit on the codelreed cards by operating 2 out of the 5 codelreeds corresponding to the dialed digit and sends the 2 out of 5 code information to the Translator. If the Translator recognizes a routing code that permits early release, the Translator sends a special 3 out of 5 code instruction via the route commons to release the Register-Sender. The Register-Sender releases during the interdigital pause and causes the Access equipment to switch the transmission path directly to the succeeding switchtrain. The calling party continues dialing the remaining digits, and the succeeding switch train follows these dial pulses in a normal manner because the Register-Sender has now been disconnected from the call.

When an early release is not possible, the Register-Sender continues storing the remaining digits and sending the 2 out of 5 code information to the Translator. When the Translator receives enough information, it translates this information into instructions for the Register-Sender.

Certain calls may require additional or different routing digits than those used in the dialed number. In these cases, the Translator has these routing digits programmed into its translation for these calls. The routing digits are sent to the Register-Sender as a 2 out of 5 code via the route commons, and they are outpulsed in the same manner as a normal stored digit.

Certain calls may also require that one or more stored digits be deleted because they are not needed to route the call. The "delete digit" is programmed in the Trans-

FIG BD



A TYPICAL ARRANGEMENT OF EQUIPMENT

lator and is sent when the Register-Sender steps to the proper route commons lead. The "delete digit" causes the Register-Sender to step past the stored digits to be deleted and begin outpulsing the next stored digit. The Register-Sender will begin outpulsing the stored digits even if the calling party has not completed dialing the entire number and continue outpulsing until all of the stored digits are sent. Upon completion of outpulsing, the Register-Sender releases and resets the codelreeds to prepare for receiving the next call.

FEATURES

(a) Register-Sender may be released interdigitally by a signal from the Translator

(b) Register-Sender may cause the first or any succeeding dialed digit to be repeated to the route Selector when there is a possibility of early release

(c) First digit repetition to Selector is accomplished by a strapping option while succeeding digit repetition is controlled by the Translator

(d) Register-Sender may absorb repeated digits by opening the loop to the succeeding Selector when an early release code is not received

(e) A variable number of digits may be translated to facilitate foreign area and Centrex translations

(f) Translated routing information is not stored in the Register-Sender, but it is "read" and sent directly from the Translator Commons

(g) An alternate route can be obtained even if sending is in progress on the primary route when the ATB occurs, thus minimizing pocketed calls

(h) Subscriber dial pulses are registered on a corred counting chain

(i) Digits are stored on magnetic latching correeds mounted on printed circuit cards with each card storing two digits

(j) After sending routing digits, the Translator marks a control digit to cause the Register-Sender to delete dialed digits if required

(k) A stable, easily adjusted electronic impulse generator controls mercury wetted relay contacts for outpulsing

(l) "0" calls may be arranged for timing to distinguish from "0-plus" calls

(m) Adjustable permanent and inter-digital timing may be set for two different intervals depending on traffic conditions

(n) Provides monitor circuitry for alarm and locking circuit out of service if parity check fails or time division pulses from the Translator become permanent

(o) 2 out of 5 code system provides error detection (parity check)

(p) Circuit may be arranged to operate as a Register-Resender if a translation is not required

(q) Provides optional Touch Call facilities and two party identification

(r) Provides optional multifrequency outpulsing

(s) Test jacks arranged for use with portable Routiner H-61799-A or equivalent

(t) Provides access receptacle for use with portable test set H-850699-A and centralized test set H-850693-A or equivalent

CIRCUIT OPERATION

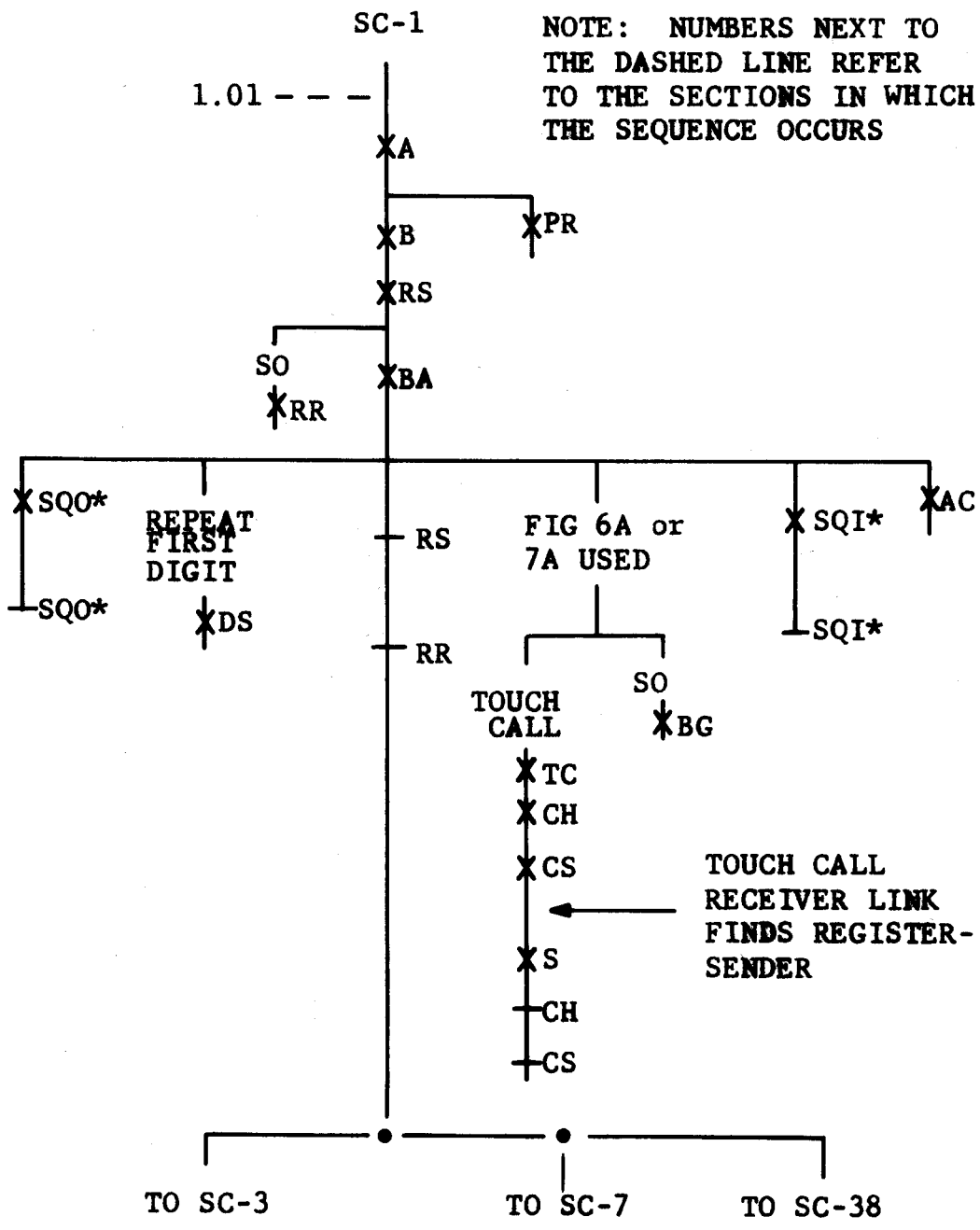
1.00 Seizure

1.01 Access Via FIG 1A or 10A

1.01.1 Touch Calling Adapter Not Used

When this circuit is seized, a loop is closed to the #1 and #2 windings of relay A (in series with resistors R39 and R40, respectively) via leads -1 and +1. Relay A operates and closes relays B and PR. Relay PR operates and connects resistance (#2 winding of correed CD1) battery (FIG 2A, 2B, 8A, 8B, 16A, or 17A) via resistor R1 to lead PG or connects terminal 3 (CARD CONNECTOR 14) to lead PG (FIG 43A, 44A, 46A, or 47A). Relay B operates, removes ground from lead RL, closes the #1 winding of relay RS by ground via lead RS, and grounds leads TONE ST (thereby connecting dial tone to lead "+" via the #2 winding of relay A and resistor R40 in series), TCL, CM, and BB. Relay RS operates, short-circuits the #2 winding of relay CL, grounds TERMS 33 & 35 of CARD CONNECTORS 1-7, and closes relay RR and the #2 winding of relay BA. Relay BA operates, locks, transfers lead G from resistance (resistor R7) battery to ground, removes ground from lead ATB, connects resistance (resistor R13) ground to lead TMC, grounds lead TCG (if used), closes correed AC and relay DS (see NOTE 58, H-850215-A), closes magnets SQI and SQO via their INT and ON springs, closes winding B of shunt field relay SD, grounds the LEV A wipers of rotary switch SQI, grounds leads TA, DSA, SPY ("CJ"wiring), H, ML ("S" wiring), BG, and DSM, charges capacitor C12 via resistor R23, connects lead TG to the #1 windings of relays T0, T1, T2, T4, and T7 in series with resistor R42 ("DD" wiring omitted), removes ground from leads BAG and ATB, opens the #1 winding of relay RS, connects resistance (resistor R13) ground to lead TMC, grounds lead TMB, connects resistance (#1 winding of relay TM1) ground to lead TMR, connects resistance (potentiometers R44 and R45 in series) ground to lead TM2, connects lead TG to lead TGA, connects resistance (SUPY lamp) ground to lead SBA, and connects resistance (potentiometers R44, R55, and R46 in series) ground to lead TMN. After its slow-to-operate interval, relay RR operates and removes ground from TERMS 33 & 35 of CARD CONNECTORS 1-7. Correed AC operates and either connects winding A of shunt field relay SD and

SEQUENCE CHARTS



* ROTARY SWITCH MAGNET

\# SILICON CONTROLLED RECTIFIER

resistor R6 in series ("R" wiring) or connects winding A of shunt field relay SD, resistor R6, and windings 7-8 and 3-4 of repeat coil RC in series ("S" wiring) (and also in series with the multiple combination of #2 winding of BT and diode CR148 - FIG 49A used) across leads +0 and -0 thereby seizing the succeeding Selector. Relay SD does not operate because its windings are energized in magnetic opposition. Magnet SQI operates and operates its INT springs, opening magnet SQI. Magnet SQI restores, and rotary switch SQI steps its wipers to the first bank contacts, grounds lead CSD via its LEV A wipers, and restores its ON and INT springs. Magnet SQO operates and operates its INT springs, opening magnet SQO. Magnet SQO restores, and rotary switch SQO steps its wipers to the first bank contacts and restores its ON and INT springs. Relay RS restores, removes the short circuit from the #2 winding of relay CL, and opens relay RR. Relay DS operates, locks, and disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, and T7. Relay RR restores.

1.01.2 Touch Calling Adapter Used (FIG 6A or 7A)

The following operation is similar to that described in Section 1.01.1 except that when relay BA operates and connects ground to lead DSA, relay BG is closed, and, if the calling party is using a Touch Call phone, the #1 winding of relay TC is closed by "time battery" via lead TCA and "time ground" via lead TGA when lead TG is connected to lead TGA.

Relay TC operates (Touch Calling) to its "X" contacts, locks via its #2 winding, operates fully, opens the #1 winding of relay TC, short-circuits resistors R39 and R40, transfers lead TB from lead DPM to lead TCM, connects resistance ground to lead HA, and closes relay CH by resistance battery via lead GM (Touch-Calling Receiver Adapter idle). Relay CH operates, locks via resistance battery on lead F1, removes resistance battery from lead F0, removes ground from lead GA, and closes relay CS. After its slow-to-operate interval, relay BG operates, connects dial tone to the calling party's line, and closes the #3 winding of relay PA ("J" wiring) in series with resistors R29 and R30. Relay CS operates and connects leads -1, +1, 1, 2, 3, 4, 5, 6, and SQ to leads -C, +C, 1C, 2C, 3C, 4C, 5C, 6C, and SQC, respectively. When the Touch Calling Receiver Link finds this Register-Sender, resis-

tance battery is returned via lead HA, closing relay S. Relay S operates, connects leads -1 and +1 to leads -A and +A, respectively, opens relay CH, and removes resistance (relay CH) ground from lead F1. Relay CH restores, grounds lead ST, connects lead F1 to lead FO, opens relay CS, and grounds lead GA. Relay CS restores and disconnects leads -1, +1, 1, 2, 3, 4, 5, 6, and SQ from leads -C, +C, 1C, 2C, 3C, 4C, 5C, 6C, and SQC, respectively.

1.02 Access Via FIG 41A or 42A

1.02.1 Touch Calling Adapter Not Used

When power is applied for the first time, ground is returned via lead RST, closing the #2 winding of relay R by resistance (resistor R7) battery via lead G. Relay R operates, locks, transfers leads FIA and FIB from leads FOA and FOB to leads ARA and ARB, respectively, and grounds lead RSA to mark the circuit idle to the preceding Link Finder.

When this circuit is seized, ground is returned via lead SCA, closing the #1 winding of relay H in series with the #1 winding of relay R. Relay H operates, locks via ground on lead BAG, grounds lead EC2, opens the #2 winding of relay R, grounds lead SR ("ST" wiring omitted) and TBN (if used), grounds leads RS and CF ("ST" wiring), closing the #1 winding of relay RS, and connects resistor R69 across leads -1 and +1 ("ST" wiring), closing the #1 and #2 windings of relay A in series with resistors R69, R66, and R67. When the Link Finder switches through, a loop is closed to the #1 and #2 windings of relay A in series with resistors R66 and R67, respectively, via leads -1 and +1 ("ST" wiring not used), and ground is removed from lead SCA, opening the #1 winding of relays R and H. Relay A operates, closes relay B, and grounds lead PR, closing relay PR. Relay R restores, removes ground from lead RSA, and transfers leads FIA and FIB from leads ARA and ARB to leads FOA and FOB, respectively. Relay RS operates, short-circuits the #2 winding of relay CL, grounds TERMS 33 & 35 of CARD CONNECTORS 1-7, and closes relay RR and the #2 winding of relay BA. Relay B operates, grounds lead TONE ST thereby returning dial tone to the calling party, removes ground from lead RL, and grounds leads BB, TCL, CM, CD, and BM. Relay PR operates and connects resistance (#2 winding of correed CD1) battery (FIG 2A, 2B, 8A, 8B, 16A, or 17A) via resistor R1 to lead PG or

connects terminal 3 (CARD CONNECTOR 14) to lead PG (FIG 43A, 44A, 46A, or 47A). Relay BA operates, and the following operation is similar to that described in Section 1.01.1 except that when ground is removed from lead BAG, the #2 winding of relay H is opened. Relay H restores, removes ground from leads SR ("ST" wiring omitted) and TBN (if used), and connects resistance (#2R) ground to lead RST.

1.02.2 Touch Calling Adapter Used (FIG 6A or 7A)

Seizure is similar to that described in Section 1.02.1 except that when relay BA operates and connects ground to lead DSA, relay BG is closed, and, if the calling party is using a Touch Call phone, the #1 winding of relay TC is closed by "time battery" via lead TCA and "time ground" via lead TGA when lead TG is connected to lead TGA.

Relay TC operates (Touch Calling) to its "X" contacts, locks via its #2 winding, operates fully, opens the #1 winding of relay TC, short-circuits resistors R66 and R67, and the following operation is similar to that described in Section 1.01.2 except that when relay BG operates dial tone is not connected to the calling party's line.

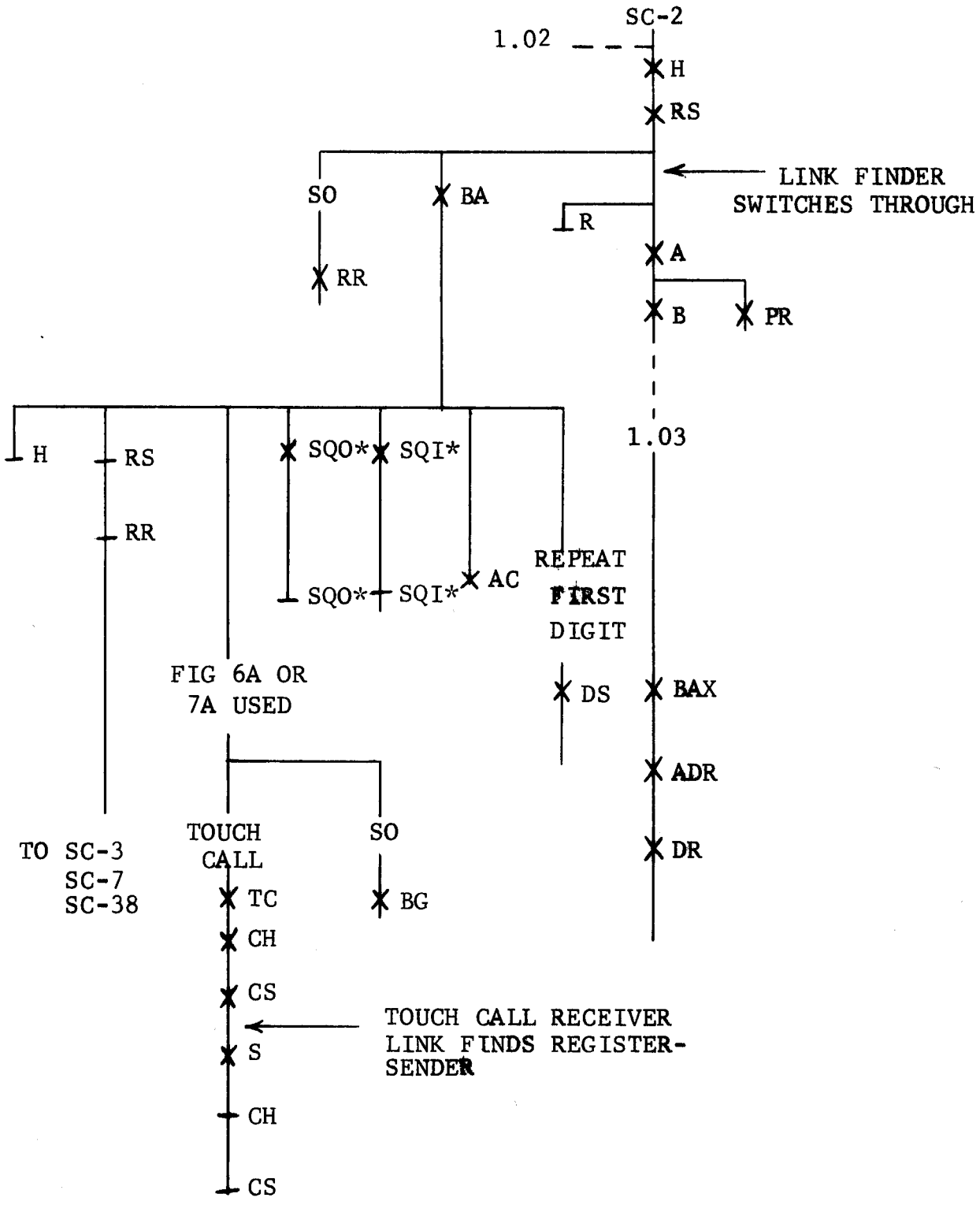
1.03 "CT" Wiring Provided

Operation is similar to that described in Section 1.00, except relay B operates and closes relay BAX. Relay BAX operates, grounds terminal TST and closes relay ADR. Relay ADR operates, and closes relay DR. Relay DR operates, grounds lead CF, connects resistance (R71) ground to lead LK and grounds leads TRC, GM, and terminal G (FIG 43A, 44A, 46A), or terminals G and TMG (FIGS 2B and 8B).

2.00 Registering Digits

2.01 Dial Pulsing (Operated: Relays A, B, BA, and PR, correed AC and possibly relays DS, TC, BG and S)

Relay A follows the dial pulses via leads -1 and +1 and, when at normal, opens relays B and PR, connects resistance [resistor R38 - (FIG 1A or 10A) or resistor R68 - (FIG 41A or 42A0] ground to the #1 winding of relay A, and closes relay C. Relay PR restores on the first pulse, opens the loop via leads -0 and +0 (relay DS operated), and disconnects resistance (#2 winding of correed CD1) battery or terminal 3 (CARD CONNECTOR 14 - FIG 43A, 44A, 46A, or 47A) via resistor R1 from lead PG. Relay C operates, grounds lead CB, closing relay CB, closes relay DR ("G" wiring), transfers lead DSL from ground via lead DSM to direct ground, grounds leads PG, grounding terminal 4 (CARD CONNECTOR 14-FIG 43A, 44A, 46A, or 47A), SQ, and lead CC (FIG 41A or 42A), removes ground from leads CD (FIG 41A or 42A), CM, and TCL, opening the #2 winding of TC(if operated), and removes dial tone from the calling party's line (FIG 41A or 42A). Relay CB operates, closes relays BB and BC (FIG 6A or 7A), opens


SC-2
1.02
H
RS
LINK FINDER SWITCHES THROUGH
SO
BA
R
A
RR
B
PR
1.03
H
RS
SQO*
SQI*
RR
SQO*
SQI*
AC
REPEAT FIRST DIGIT
DS
BAX
ADR
DR
FIG 6A OR 7A USED
TO SC-3
SC-7
SC-38
TOUCH CALL
SO
TC
BG
CH
CS
TOUCH CALL RECEIVER LINK FINDS REGISTER-SENDER
S
CH
CS

relay BG (if operated), transfers lead TMN from resistance (potentiometers R44, R46, and R55 in series) ground to resistance (resistor R19) battery, closes magnet SQI, and short-circuits winding A of shunt field relay SD (relay DS operated). Relay TC restores, opens relay S, transfers lead TB from lead TCM to lead DPM, and removes the short circuit from resistors R39 and R40 (FIG 1A or 10A) or resistors R66 and R67 (FIG 41A or 42A). Relay BC operates. Relay DR operates ("G" wiring) and removes resistance (resistor R38 - FIG 10A or R68 - FIG 42A) ground from the #1 winding of relay A. Relay BG restores, opens the #3 winding of relay PA ("J" wiring), and removes dial tone from the calling party's line (FIG 1A or 10A). Magnet SQI operates and operates its INT springs. Relay BB operates, locks, short-circuits potentiometer R55, grounds the LEV A wipers of rotary switch SQO, connects lead RL to the #2 winding of relay RL, and closes relay DT (FIG 41A or 42A). Relay DT operates. Relay S restores and disconnects leads -1 and +1 from leads -A and +A, respectively. Relay B remains operated during pulsing due to its slow-to-release characteristics. Relay C remains operated during pulsing due to the slow-to-release interval provided by resistor R57 and diode CR10 (FIG 1A or 10A) or resistor R70 and diode CR125 (FIG 41A or 42A). Relay A re-operates at the end of the first pulse, closes relays B and PR, and opens relay C. Relay PR operates, closes the #2 winding of correed CD1 or connects resistance (resistor R1) ground to terminal 3 (CARD CONNECTOR 14 - FIG 43A, 44A, 46A, or 47A), and opens the loop via leads +0 and -0 (relay DS operated). Correed CD1 operates.

When FIG 43A, 44A, 46A, or 47A is used, relay PR follows the remaining pulses from relay A and, when at normal, removes resistance (resistor R1) ground from terminal 3, (CARD CONNECTOR 14), grounds terminal 4, and opens the loop via leads +0 and -0 (relay DS operated). When FIG 2A, 2B, 8B, 16A, or 17A is used, the circuit operates as described in the following paragraphs depending on the digit dialed. The outpulsing loop via leads -0 and +0 is only opened by relay PR if relay DS is operated.

On the second pulse, relay A restores, opens relays B and PR, and closes relay C. Relay PR restores, opens the loop via leads +0 and -0, and closes the #1 winding of correed CD2 in series with the #2 winding of correed CD1. Correed CD2 operates. Relay A re-operates, closes relays B and PR,

and opens relay C. Relay PR operates, opens the #2 winding of correed CD1 and the #1 winding of correed CD2, closes the #2 winding of correed CD2 in series with resistor R1, and closes the loop via leads +0 and -0. Correed CD1 restores.

On the third pulse, relay A restores, opens relays B and PR, and closes relay C. Relay PR restores, opens the loop via leads +0 and -0, and closes the #1 winding of correed CD3 in series with the #2 winding of correed CD2. Correed CD3 operates. Relay A re-operates, closes relays B and PR, and opens relay C. Relay PR operates, opens the #1 winding of correed CD3 and the #2 winding of correed CD2, and closes the #2 winding of correed CD3 in series with resistor R1, and closes the loop via leads +0 and -0. Correed CD2 restores.

On the fourth pulse, relay A restores, opens relays B and PR, and closes relay C. Relay PR restores, opens the loop via leads +0 and -0, and closes the #1 winding of correed CD4 in series with the #2 winding of correed CD3. Correed CD4 operates. Relay A re-operates, closes relays B and PR, and opens relay C. Relay PR operates, closes the loop via leads +0 and -0, opens the #1 winding of correed CD4 and the #2 winding of correed CD3, and closes the #2 winding of correed CD4 in series with resistor R1. Correed CD3 restores.

On the fifth pulse, relay A restores, opens relays B and PR, and closes relay C. Relay PR restores, opens the loop via leads +0 and -0, and closes the #1 winding of correed CD5 in series with the #2 winding of correed CD4. Correed CD5 operates. Relay A re-operates, closes relays B and PR, and opens relay C. Relay PR operates, closes the loop via leads +0 and -0, opens the #1 winding of correed CD5 and the #2 winding of correed CD4, and closes the #2 winding of correed CD5 in series with resistor R1. Correed CD4 restores.

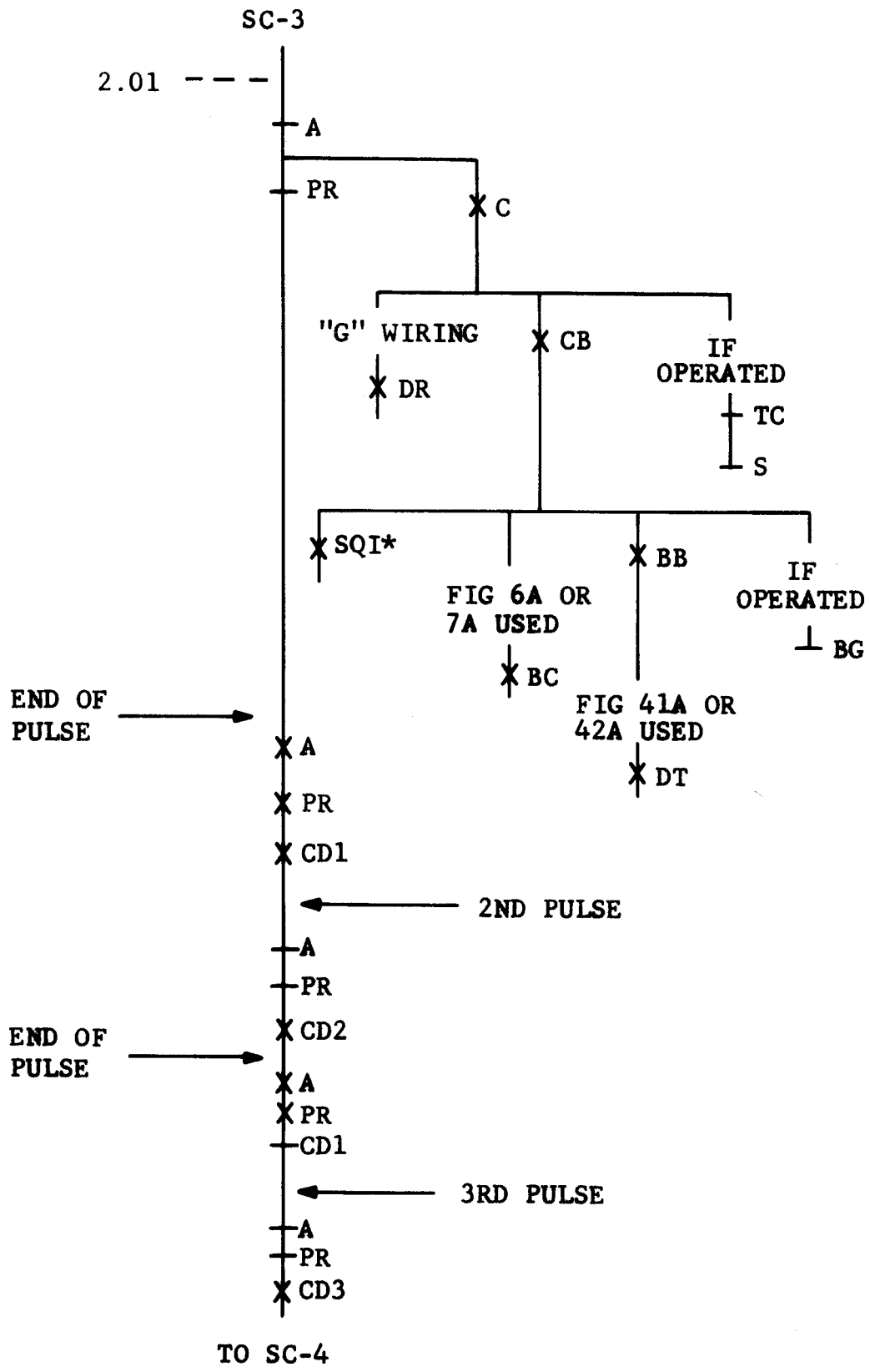
On the sixth pulse, relay A restores, opens relays B and PR, and closes relay C. Relay PR restores, opens the loop via leads +0 and -0, closes the #2 winding of relay CD6, closes the #1 winding of relay CD1 in series with the #2 winding of correed CD5, short-circuits relay SC, and grounds the LEV H wipers of rotary switch SQI, closing the #1 winding of relay CL in series with the #2 winding of relay CL. Correed CD1 operates. Relay CL operates to its

"X" contacts and locks. Relay CD6 operates and locks. Relay A re-operates, closes relays B and PR, and opens relay C. Relay PR operates, closes the loop via leads +0 and -0, opens the #1 winding of correed CD1 and the #2 winding of correed CD5, and closes the #2 winding of correed CD1. Correed CD5 restores.

If a seventh, eighth, ninth, or tenth pulse is sent, the following operation is the same as that described for the second, third, fourth, or fifth pulse, respectively.

After the last pulse of the dialed digit, relay C restores. After the slow-to-release interval provided by diode CR 110 and resistor R57 (FIG 1A or 10A) or diode CR125 and resistor R70 (FIG 41A or 42A), grounds lead CM thereby grounding the LEV C, D, E, F, or G wipers of rotary switch SQI (depending on the combination of CD( ) correeds operated), grounds leads TCL, RL (relay DR operated), and CD (FIG 41A or 42A), removes ground from leads PG (opening the #2 winding of relay CD6 and/or any CD correed, if operated) and CC (FIG 41A or 42A), opens relays CB, DR ("G" wiring), and the #2 winding of relay DS (if operated), and connects capacitors C32 and C31 in series with resistor R64 across leads -1 and +1 (FIG 41A or 42A). Relay CD6 restores. Correeds CD1-CD5 restore (if operated). Relay CB restores, transfers lead TMN from resistance (resistor R19) battery to resistance (potentiometers R44 and R46 in series - relay CL not operated) ground, grounds lead DSM, removes the short circuit from winding A of shunt field relay SD, and opens magnet SQI. Relay DS restores and connects lead TG to the #1 windings of relays T0, T1, T2, T4, and T7. After its slow-to-release interval, relay DR restores. Magnet SQI restores, and rotary switch SQI restores its INT springs and steps its wipers to the next bank contacts.

The succeeding digits are pulsed into the Register-Sender, and the following operation is similar to that described in this Section except that the outpulsing loop via leads +0 and -0 is not opened when relay PR restores (relay DS not operated) and relay CL is opened (if operated) when rotary switch SQI steps to the third bank contacts. Relay CL restores.



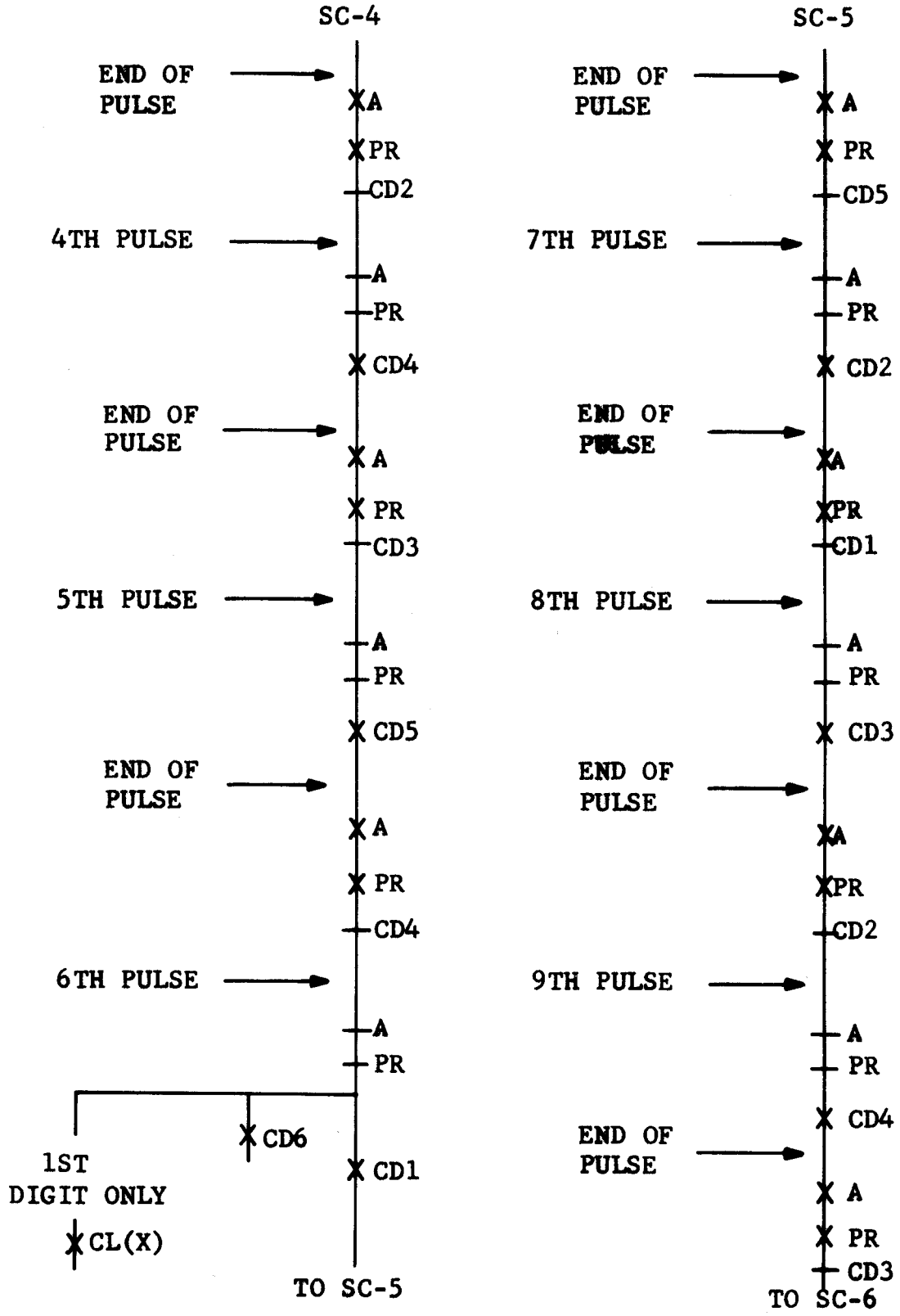
ISSUE	DRAWING NO.
10	E- 850215-A

2.02 Touch Calling (Operated: Relays A, B, BA, PR, S, BG, and TC, correed AC, and possibly relay DS)

When the calling party uses a Touch Call phone, digit identification is accomplished by the use of tones instead of dial pulses. Each digit is composed of a pair of tone frequencies unique for that particular digit. As the calling party keys the digits of another party's number, these tones are transmitted to the Register-Sender via leads -1 and +1 (FIG 6A or 7A) and connected to a Touch Calling Receiver via leads -A and +A. The Touch Calling Receiver converts these tones into a 2 out of 5 DC code which is returned to the Register-Sender codelreed storage and to the Translator.

When the first digit is keyed, the Touch Call Receiver returns ground via lead SQA, closing relay CB, and 2 of leads 1A-5A corresponding to the dialed digit. For this explanation, assume that the digit 3 has been keyed. The Touch Call Receiver would then return ground via leads 2A and 3A. Ground on leads 2A and 3A is connected to the LEV D and E wipers of rotary switch SQI. Relay CB operates, transfers lead TMN from resistance (potentiometers R44, R46, and R55 in series) ground to resistance (resistor R19) battery, opens the #2 winding of relay DS (if operated) and relay BG, and closes relays BB and BC and magnet SQI. Relay DS restores and connects lead TG to the #1 windings of relays T0, T1, T2, T4, and T7. Relay BG restores, opens the #3 winding of relay PA ("J" wiring), and removes dial tone from the calling party's line (FIG 1A or 10A). Relay BC operates. Magnet SQI operates and operates its INT springs. Relay BB operates, locks, short-circuits potentiometer R55, grounds the LEV A wipers of rotary switch SQO, connects lead RL to the #2 winding of relay RL, and closes relay DT (FIG 41A or 42A). Relay DT operates and removes dial tone from the calling party's line.

At the end of the digit, the Touch Call Receiver removes ground from lead SQA, opening relay CB, and removes ground from the 1A-5A leads corresponding to the keyed digit. Relay CB restores, transfers lead TMN from resistance (resistor R19) battery to resistance (potentiometers R44 and R46 in series) ground, and opens magnet SQI. Magnet SQI restores, and rotary switch SQI steps its wipers to the next bank contacts.



ISSUE	DRAWING NO.
10	E-850215-A

When the next digit is keyed, the Touch Call Receiver grounds lead SQA, closing relay CB, and 2 out of leads 1A-5A. Relay CB operates, transfers lead TMN from resistance (potentiometers R44 and R46 in series) ground to resistance (resistor R19) battery, and closes magnet SQI. Magnet SQI operates, and operates its INT springs. At the end of the digit, the Touch Call Receiver removes ground from lead SQA, opening relay CB, and removes ground from the 1A-5A leads corresponding to the keyed digit. Relay CB restores, transfers lead TMN from resistance (resistor RI9) battery to resistance (potentiometers R44 and R46 in series) ground, and opens magnet SQI. Magnet SQI restores, and rotary switch SQI steps its wipers to the next bank contacts.

The registering of the remaining digits is similar to that described in the preceding paragraph.

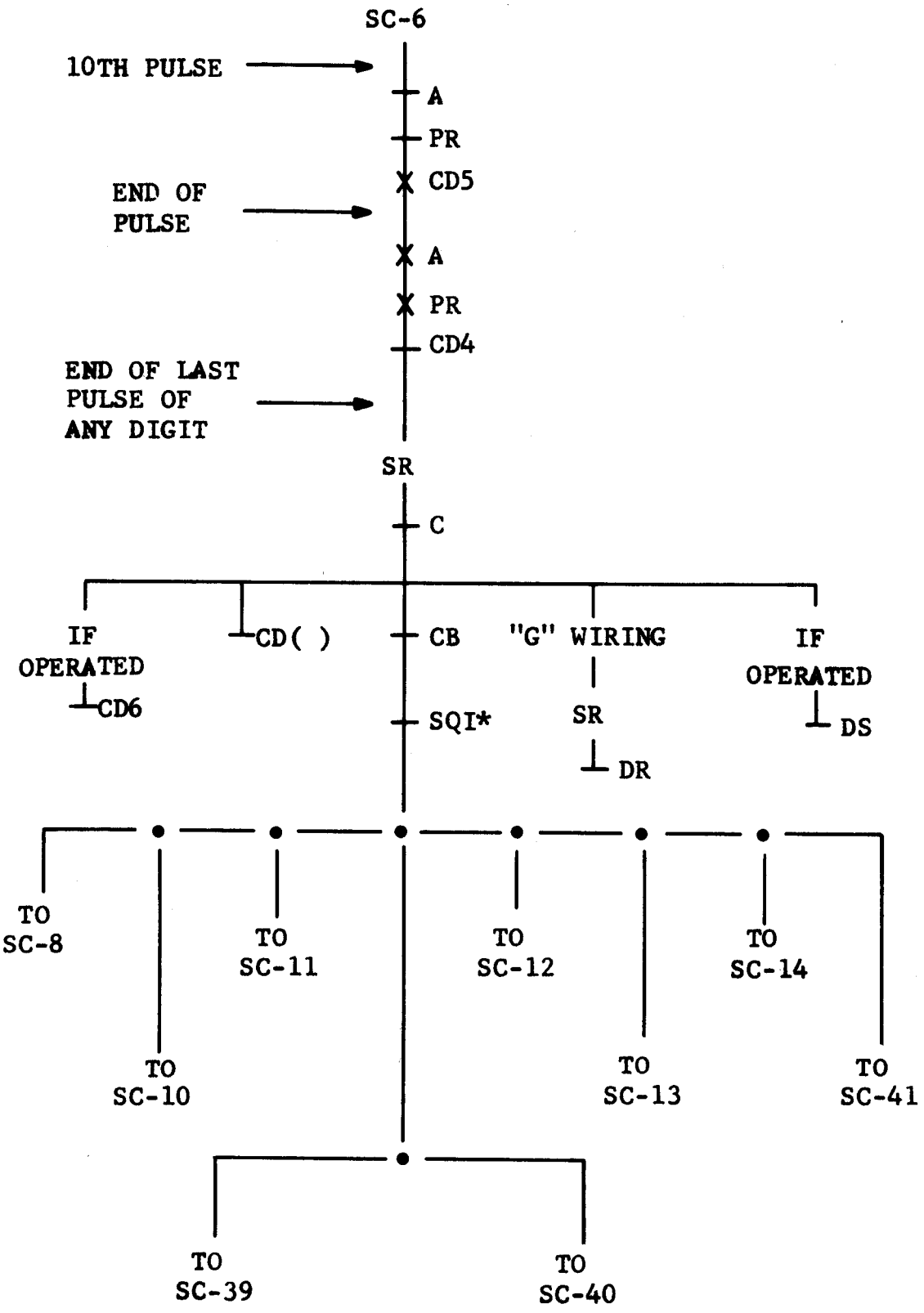
When a Touch Call phone is used, the operation of the Register Sender for special codes from the Translator is similar to that described in Sections 3.00, 4.00, 5.00, 6.00, and 7.00 except that relays S and TC are also operated. Relay TC is opened when relay B restores and removes ground from lead TCL. Relay TC restores, connects the #1 winding of relay TC to lead TCA, opens relay S, disconnects leads TS1 and TS2 from leads -1 and +1, respectively, and transfers lead TB from lead TCM to lead DPM. Relay S restores and disconnects leads -A and +A from leads -1 and +1, respectively.

3.00 Translation

3.01 "0" Code - Operator Recall [Operated: Relays A, B, BA, PR, BB, and CL ("X" contacts only), correed AC and possibly BC, and DT]

3.01.1 No Translation Required

"0" code calls are arranged for a 5 second timing interval to distinguish from "0-plus" codes. After the "time out", a routing (see NOTE 57, H-850215-A) may be sent in accordance with the strapping in the Register-Sender. The provision for translation of "0" code calls within the Register-Sender is for maximum protection against service

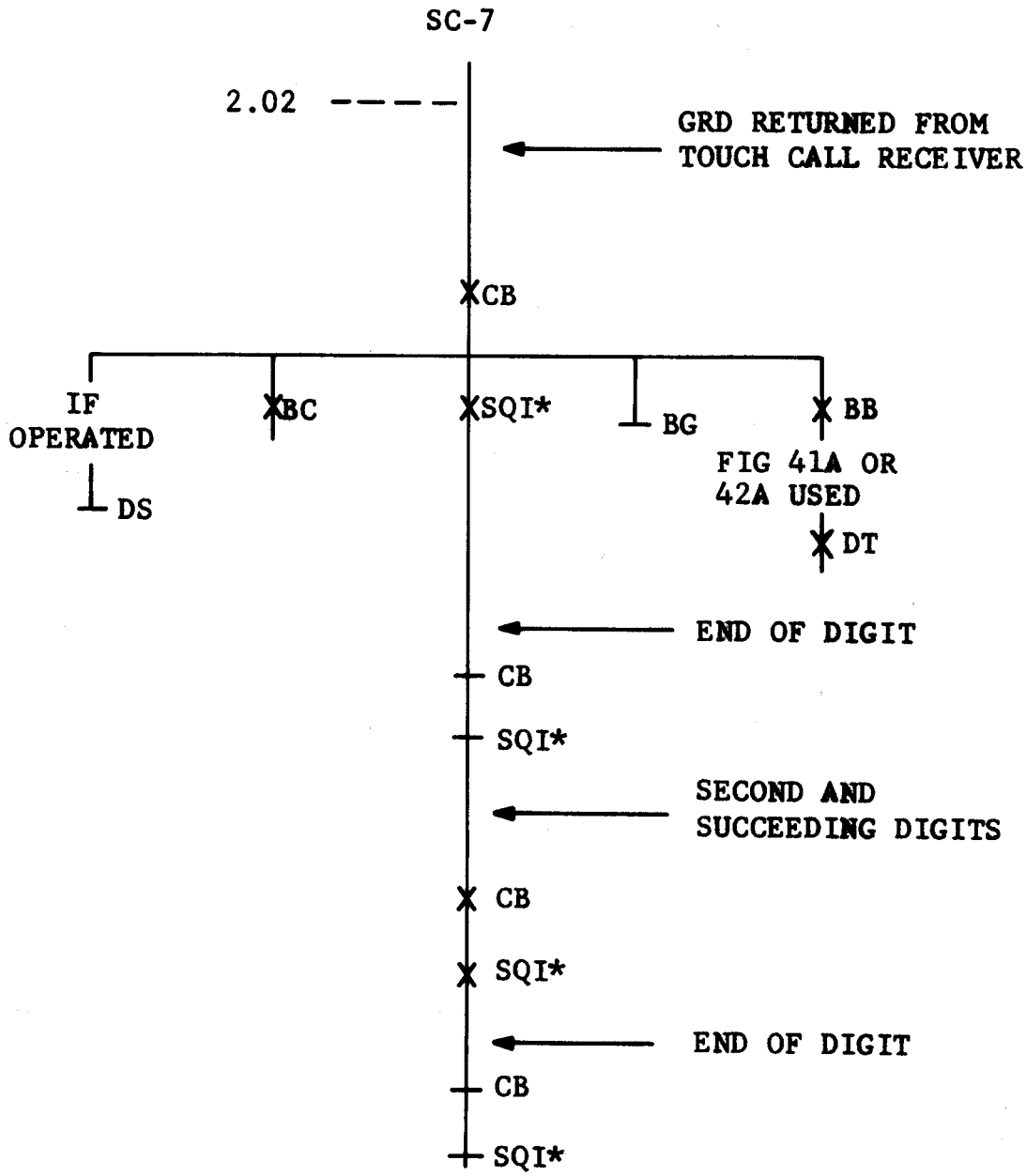

SC-6
10TH PULSE
A
PR
CD5
END OF PULSE
A
PR
CD4
END OF LAST PULSE OF ANY DIGIT
SR
C
IF OPERATED
CD6
CD( )
CB
SQI*
"G" WIRING
SR
DR
IF OPERATED
DS
TO SC-8
TO SC-10
TO SC-11
TO SC-12
TO SC-13
TO SC-14
TO SC-41
TO SC-39
TO SC-40

failure on calls to the Operator.

3.01.1.1 "L" Wiring Used

Upon completion of keying or dialing the digit "0" as described in Section 2.00, resistance (potentiometer R46) ground is connected to lead TMN. When capacitor C27 (FIG 14A) is charged sufficiently by resistance (potentiometer R46 and resistor R51 in series) ground via lead TMN, silicon controlled rectifier Q2 is triggered. Silicon controlled rectifier Q2 turns on and closes the #1 winding of relay TM1. Relay TM1 operates to its "X" contacts, locks via its #2 winding, operates fully, grounds the LEV B wipers of rotary switch SQI, closing the #1 and #2 windings of relay RL in series with resistance (resistor R52) battery, and closes the #2 winding of relay RS. Relay RS operates, short-circuits the #2 winding of relay CL, closes relay RR, and grounds TERMS 33 & 35 of CARD CONNECTORS 1-7. Relay RL operates to its "X" contacts, operates fully, locks, removes ground from lead H thereby releasing the access circuit, disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, and T7, transfers lead SPY ("CJ" wiring) and lamp SUPY from ground to lead 60 IPM, and grounds leads GA, PC, and ALM(1). Relay CL operates fully, locks, opens the #2 winding of relay TM1, turns off silicon controlled rectifier Q2, grounds lead CLG (FIG 2B, 8B, 43A, 44A, 46A, or 47A), grounds bank contact #12 of rotary switch SQO (LEV C), connects bank contact #13 of rotary switch SQO (LEV A) to leads CL1-CL6, and closes magnet SQO by ground via the LEV C wipers and INT springs of rotary switch SQO. After its slow-to-operate interval, relay RR operates and removes ground from TERMS 33 & 35 of CARD CONNECTORS 1-7. Relay TM1 restores and removes ground from the LEV B wipers of rotary switch SQI. Magnet SQO operates, and rotary switch SQO steps self-interruptedly to bank contact #13.

When the access circuit restores the loop to the #1 and #2 windings of relay A via leads -1 and +1 and the loop via leads +0 and -0 are opened. Relay A restores, opens relays B and PR, and closes relay C. Relay PR restores. Relay C operates, grounds leads CB, SQ, PG, and CC (FIG 41A or 42A), removes ground from leads CD (FIG 41A or 42A), CM, and TCL, transfers lead DSL from lead DSM to ground, disconnects capacitors C32 and C31 in series with resistor R64 from across leads +1 and -1 (FIG 41A or 42A), and closes relay CB. Relay CB operates, transfers lead TMN from re-

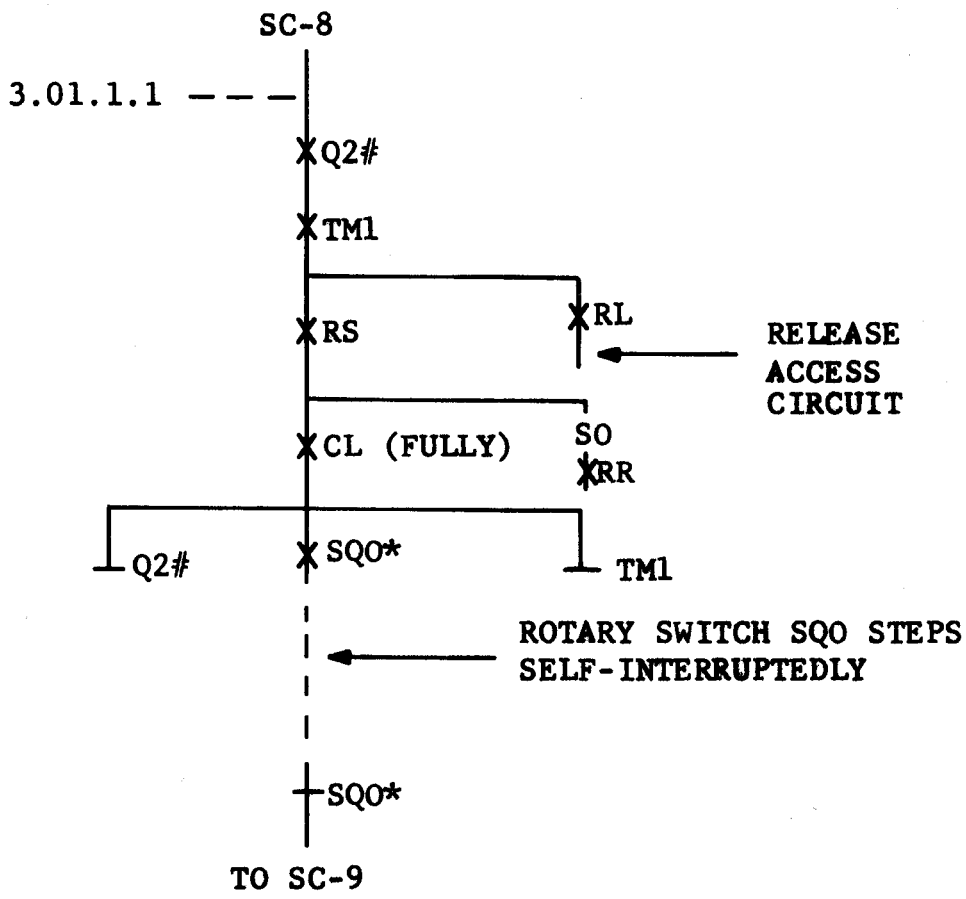


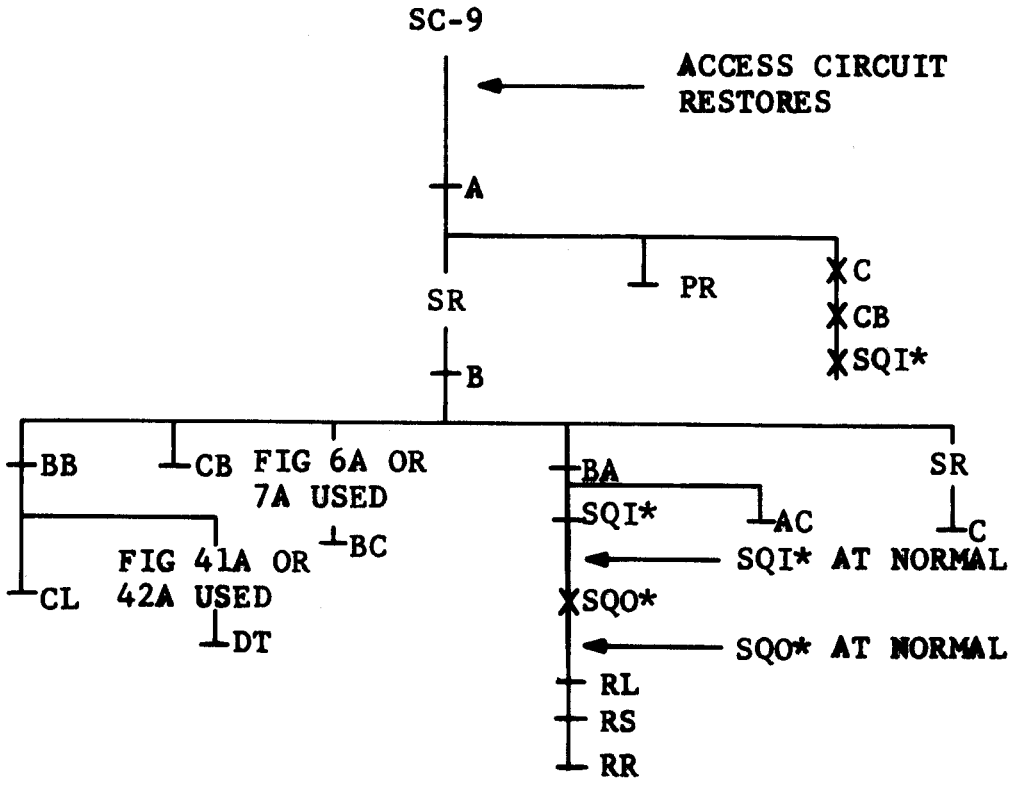
ISSUE	DRAWING NO.
10	E- 850215-A

sistance (potentiometer R46) ground to resistance (resistor R19) battery, and closes magnet SQI. Magnet SQI operates and operates its INT springs. After its slow-to-release interval, relay B restores, removes ground from leads BB, CB, PG, RS, TONE ST, and (FIG 41A or 42A used) CC and BM, removes resistance (resistor R71) ground from lead LK (FIG 41A or 42A), grounds lead RL, and opens relays BB, CB, C, and BC (FIG 6A or 7A), and the #2 winding of relay BA. Relay BA restores, grounds lead BAG, removes ground from the LEV A wipers of rotary switch SQI, opens winding A of shunt field relay SD, removes ground from lead ML ("S" wiring) and opens magnet SQI and correed AC. Relay BB restores, transfers lead T from ground to lead DT, and opens relay DT (FIG 41A or 42A) and the #1 winding of relay CL. Relay CB restores and transfers lead TMN from resistance (resistor R19) battery to resistance (potentiometer R46 and R55 in series) ground. Relay BC restores. Correed AC restores. Relay CL restores, removes ground from lead CLG (FIG 2B, 8B, 43A, 44A, 46A, or 47A), and disconnects leads CL1-CL6 from bank contact #13 of rotary switch SQO LEV A. Relay DT restores. After the slow-to-release interval provided by resistor R57 and diode CR110 (FIG 1A or 10A) or by resistor R70 and diode CR 125 (FIG 41A or 42A), relay C restores and transfers lead DSL from ground to lead DSM. Magnet SQI restores, and rotary switch SQI steps self-interruptedly to its "home" position where its ON springs operate, open the "homing" circuit, and close magnet SQO via its INT springs. Magnet SQO operates, and rotary switch SQO steps self-interruptedly to its "home" position where its ON spring operate, open its "homing" circuit, and short-circuit the #1 and #2 windings of relay RL. Relay RL restores, disconnects lead 60 IPM from lead SPY ("CJ" wiring) and lamp SUPY, transfers lead G from ground to resistance (resistor R7) battery, transfers lead TMC from resistance (resistor R13) ground to resistance (resistors R7 and R13 in series) battery, grounds lead ATB, opens the #2 winding of relay RS, and removes ground from leads MR ("S" wiring), PC, ALM(1), and GA. Relay RS restores and opens relay RR. Relay RR restores. The circuit is now at normal.

3.01.1.2 "P" Wiring Used

The following operation is similar to that described in Section 3.01.1.1 except that relay RL is not closed, and, when rotary switch SQO steps to bank contact #13, termi-





ISSUE	DRAWING NO.
10	E-850215-A

nals CL1-CL6 (FIG 2A, 2B, 8B, 16A, or 17A) or terminals CL1-CL10 (FIG 43A, 44A, 46A, or 47A) are grounded. The "CL" terminals are strapped to the CARD CONNECTOR terminals as required by the routing digits (see NOTE 57, H-850215-A). Grounding the "CL" terminals closes the codelreeds corresponding to the routing digits. When the codelreeds corresponding to the first routing digit operate, 2 out of 5 "T" relays are closed. Assume that the digit 3 is the first routing digit. Then relays T1 and T2 are closed. Relays T1 and T2 operate, and the following operation is the same as that described in Sections 4.01 and 4.02.

3.01.2 Translation Required

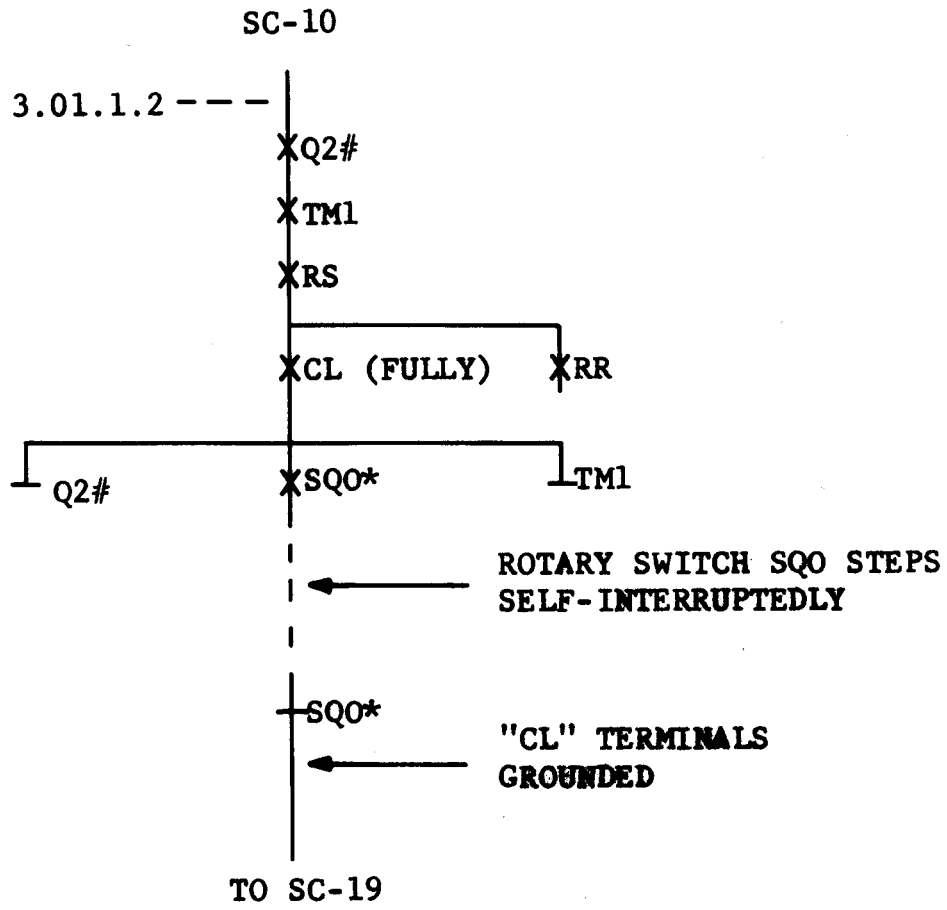
When the Register-Sender is not wired to repeat the first dialed digit to the succeeding Selector to provide a delayed routing, it is necessary for the Translator to provide a translation to route the call to an Operator.

Once the digit "0" has been registered, the Translator sends a routing code via the route commons thereby closing 2 out of 5 of the "T" relays via "timed battery" on the corresponding levels of rotary switch SQO. For example: if the routing digit is 3, "timed battery" is connected to LEVS E and F of rotary switch SQO, closing the #1 windings of relays T1 and T2. Relays T1 and T2 operate, and the following operation is the same as that described in Sections 4.01 and 4.02. If more than one routing digit is required, the Translator sends the appropriate code via the route commons, and the following operation is the same as that previously described in this Section.

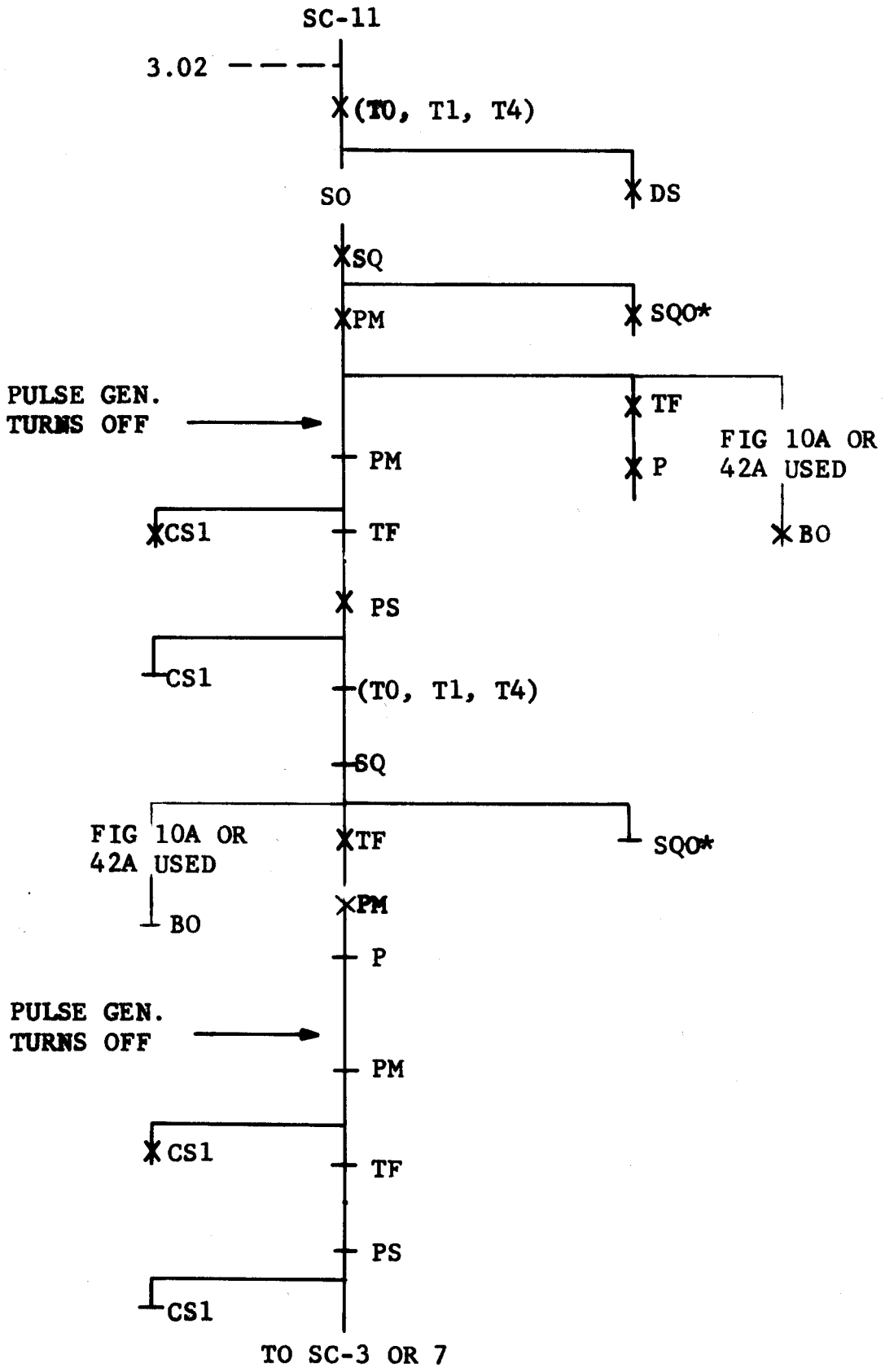
When all of the routing digits have been sent, the Translator releases the Register-Sender as described in Section 3.03.

3.02 Repeat Next Digit to Selector (Operated: Relays A, B, BA, BB, and PR, correed AC, and possibly relays BC and DT.

When the Register-Sender is required to repeat the next digit to the Selector, "timed battery" is returned via the route commons to LEVS D, E, and G of rotary switch SQO,


SC-10
3.01.1.2
Q2#
TM1
RS
CL (FULLY)
RR
Q2#
SQO*
TM1
ROTARY SWITCH SQO STEPS
SELF-INTERRUPTEDLY
SQO*
"CL" TERMINALS
GROUNDED
TO SC-19

closing the #1 windings of relays TO, T1, and T4. Relays TO, T1, and T4 operate to their "X" contacts, lock via their #2 windings, operate fully, close relay SQ and the #2 winding of relay DS, and open the #1 windings of relays TO, T1, and T4. Relay DS operates to its "X" contacts, operates fully, locks, and disconnects lead TG from the #1 windings of relays TO, T1, T2, T4, and T7. After its slow-to-operate interval, relay SQ operates, closes relay BO (FIG 10A or 42A), magnet SQO, and relay PM, and turns on the pulse generator. Magnet SQO operates and operates its INT springs. Relay PM operates, closes the #1 winding of relay TF, and grounds terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Relay BO operates and disconnects leads -1 and +1 from leads -0 and +0 via capacitors N and P, respectively. Relay TF operates, grounds terminal PP, and closes the #1 winding of relay P. Relay P operates to its "X" contacts, operates fully, and short-circuits winding A of relay SD and the #1 winding of relay PS. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, and closes the #2 winding of correed CS1 in series with resistor R3 or connects resistance (resistor R3) ground to terminal 3 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Relay TF restores, turns off the pulse generator, removes ground from terminal PP, and closes the #1 winding of relay PS in series with the #1 winding of relay P. Correed CS1 operates. Relay PS operates to its "X" contacts, operates fully, and opens the #2 winding of correed CS1 and the #2 windings of relay TO, T1, and T4. Correed CS1 restores. Relays TO, T1, and T4 restore and open relay SQ. Relay SQ restores, closes the #2 winding of relay TF, and opens relay BO (FIG 10A or 42A), and magnet SQO. Relay BO restores and connects leads -1 and +1 to leads -0 and +0 via capacitors N and P, respectively. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts. Relay TF operates, closes relay PM, and the #2 winding of relay PS, closes the #2 winding of relay P in magnetic opposition to its #1 winding, and turns on the pulse generator. Relay PM operates and closes the #1 winding of relay TF, and connects ground to terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Relay P restores and opens the #1 and #2 windings of relay P and the #1 windings of relays PS and TF. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, closes the #2 winding of



ISSUE	DRAWING NO.
10	E-850215-A

correed CS1, and removes ground from terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Correed CS1 operates. Relay TF restores, turns off the pulse generator, and opens the #2 winding of relay PS. Relay PS restores and opens the #2 winding of correed CS1 or removes resistance (resistor R3) ground from terminal 3 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Correed CS1 restores.

When the calling party dials or keys the next digit, the following operation is similar to that described in Section 2.01 or 2.02 (relay DS operated) except that upon completion of the repeated digit the Register-Sender is prepared to receive a special 3 out of 5 code from the Translator when lead TG is connected to the #1 windings of relays T0, T1, T2, T4, and T7.

3.03 Release Register-Sender Interdigitally (Operated: Relays A, B, BA, BB, and PR, correed AC, and possibly relays BC, and DT)

When the Register-Sender is to be released interdigitally, "timed battery" is returned via the route commons to LEVS D, E, and F of rotary switch SQ0, closing the #1 windings of relays T0, T1, and T2. Relays T0, T1, and T2 operate to their "X" contacts, lock via their #2 windings, operate fully, open their #1 windings, close relay SQ, and close the #1 and #2 windings of relay RL in series with resistor R52. Relay RL operates to its "X" contacts, operates fully, locks, transfers lead SPY ("CJ" wiring) and lamp SUPY from ground to lead 60 IPM, disconnects lead TG from the #1 windings of relays T0-T7, grounds leads GA, PC, and ALM(1), closes the #2 winding of relay RS, and removes ground from lead H thereby releasing the access circuit. After its slow-to-operate interval, relay SQ operates, closes magnet SQ0, relay BO (FIG 10A or 42A), and relay PM, and turns on the pulse generator. Relay RS operates, closes relay RR, short-circuits the #2 winding of relay CL, and grounds TERMS 33 & 35 of CARD CONNECTORS 1-7. Magnet SQ0 operates and operates its INT springs. Relay PM operates and closes the #1 winding of relay TF. Relay BO Operates and disconnects leads -1 and +1 from leads -0 and +0 via capacitors N and P, respectively. Relay TF operates and closes the #1 winding of relay P.

After its slow-to-operate interval, relay RR operates and removes ground from TERMS 33 & 35 of CARD CONNECTORS 1-7.

If FIG 15A is used, grounding lead ALM(1) short-circuits the #1 winding of normally operated relay AL. Relay AL restores, grounds lead AP, and grounds lead AS ("GX" wiring) or connects resistance (lamp ALM) battery to lead AS ("HH" wiring).

When the access circuit restores, the loop to the #1 and #2 windings of relay A via leads -1 and +1 and the loop via leads +0 and -0 are opened. Relay A restores, and the following operation is similar to that described in Section 3.01.1.1 except that when relay BA restores, relays SQ, PM, the #2 windings of relays TO, T1, and T2, the #1 windings of relays P and TF, and correed AC are also opened, and the pulse generator is turned off. Relays TO, T1, T2, P, TF, and PM restore. Correed AC restores. Relay SQ restores and opens relay BO (FIG 10A or 42A). Relay BO restores and connects leads -1 and +1 to leads -0 and +0 via capacitors N and P, respectively.

When FIG 15A is used, the short circuit is removed from the #1 winding of relay AL when ground is removed from lead ALM(1) closing the #1 winding of relay AL in series with its #2 winding. Relay AL operates, removes ground from lead AP, and removes ground from lead AS ("GX" wiring) or removes resistance (lamp ALM) battery from lead AS ("HH" wiring).

3.03.1 "CT" Wiring Provided

When relay RL operates it closes relay RLA. Relay RLA operates, opens relay DR and disconnects lead SA from SB. Relay DR restores, removes ground from lead CF and grounds terminal DPPC or TCPC. When relay B restores it opens relay BAX. Relay BAX restores, removes ground from term TST and opens the outgoing loop. Further operation is similar to that described in Section 3.03.

3.04 Absorb Digit [Operated: Relays A, PR, B, BA, and BB correed AC, and possibly relays BC (FIG 6A or 7A) and DT (FIG 41A or 42A)]

When the Register-Sender is required to release the succeeding switch train and absorb the digit, "timed battery" is returned via the route commons to LEVS D, F, and G of rotary switch SQO, closing the #1 windings of relays TO, T2, and T4. Relays TO, T2, and T4 operate to their #2 windings, operate fully, open their #1 windings, close relay SQ and the #2 winding of relay AB, and open correed AC. Correed AC restores and opens the loop via leads +0 and -0 to release the succeeding equipment. Relay AB operates to its "X" contacts and operates fully. After its slow-to-operate interval, relay BO (FIG 10A or 42A), magnet SQO, and relay PM, and turns on the pulse generator. Magnet SQO operates and operates its INT springs. Relay PM operates, closes the #1 winding of relay TF, and grounds terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Relay BO operates and disconnects leads -1 and +1 from leads -0 and +0 via capacitors N and P, respectively. Relay TF operates, grounds terminal PP, and closes the #1 winding of

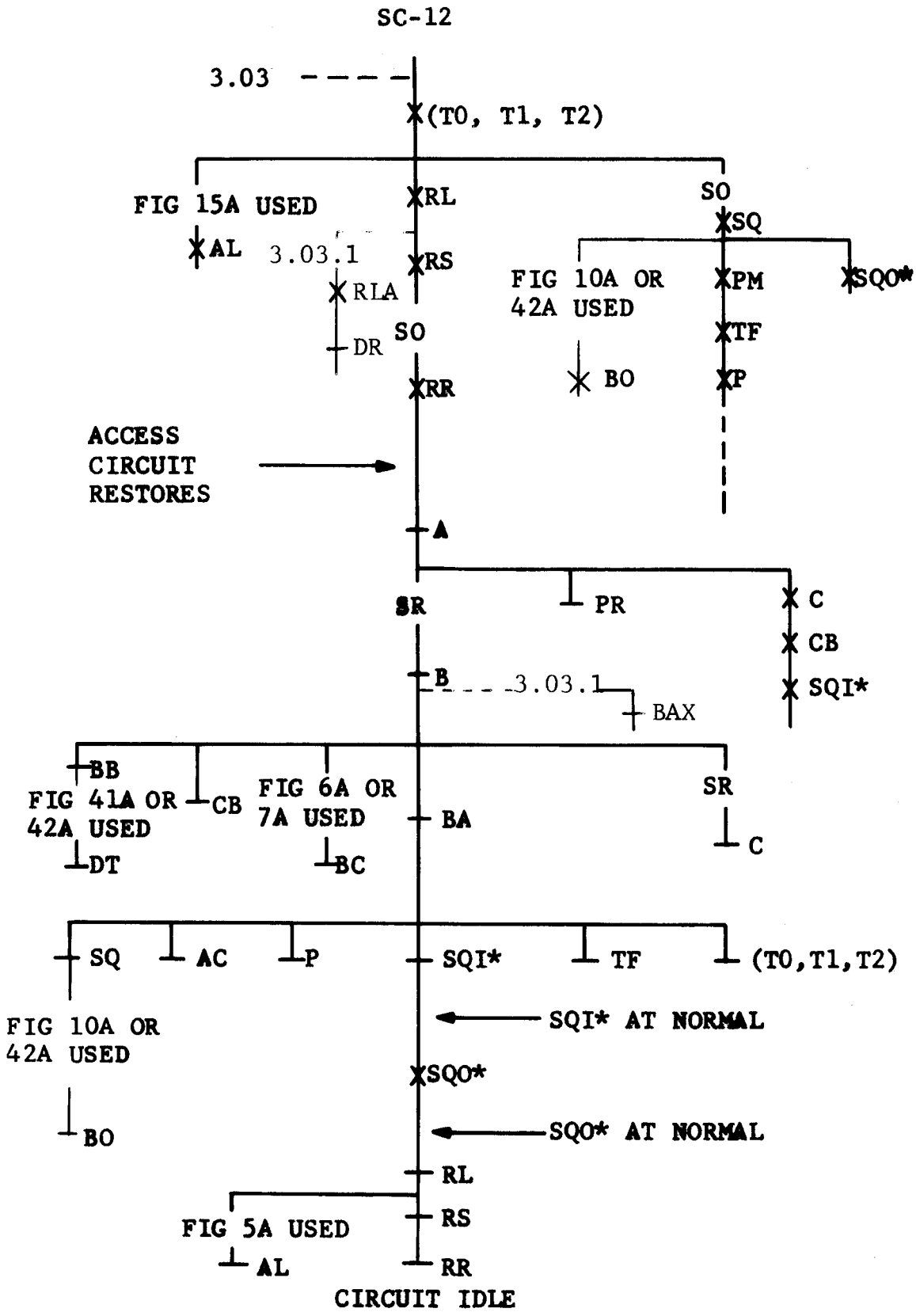
relay P. Relay P operates to its "X" contacts, operates fully, and short-circuits winding A of shunt field relay SD and the #1 winding of relay PS. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, and closes the #2 winding of correed CS1 in series with resistor R3 or connects resistance (resistor R3) ground to terminal 3 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Correed CS1 operates. Relay TF restores, turns off the pulse generator, removes ground from terminal PP, and closes the #1 winding of relay PS in series with the #1 winding of relay P. Relay PS operates to its "X" contacts, connects lead TG to the #2 winding of relay L, operates fully, closes the #1 winding of relay AB, opens the #2 winding of correed CS1 and the #2 windings of relays TO, T2, and T4, and disconnects lead TG from the #1 windings of relays TO, T1, T2, T4, and T7. Correed CS1 restores. Relays TO, T2, and T4 restore, open relay SQ and the #2 winding of relay AB, and close correed AC. Correed AC operates. Relay SQ restores, disconnects lead TG from the #2 winding of relay L, closes the #2 winding of relay TF, and opens relay BO (FIG 10A or 42A) and magnet SQO. Relay BO restores and connects leads -1 and +1 to leads -O and +O via capacitors N and P, respectively. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and opens its INT springs. Relay TF operates, turns on the pulse generator, closes relay PM and the #2 winding of relay PS, and closes the #2 winding of relay P in magnetic opposition to its #1 winding. Relay PM operates, and the following operation is similar to that described in Section 4.02 except that, when relay PS restores, the #1 winding of relay AB is opened. Relay AB restores and closes the outpulsing loop via leads -O and +O. The Register-Sender is now prepared to receive routing information from the Translator.

3.04.1 Accelerated Absorb Cycle

When it is desirable to absorb specific digits, the diode associated with the digit to be absorbed is inserted in the counting chain circuit (H-850616-B).

For the purpose of this explanation it will be assumed that the digit 2 will be absorbed.

On seizure (Section 1.00) rotary switch SQI steps to the first rotary position grounding resistor R53 via lead AB4



ISSUE	DRAWING NO.
10	E- 850215-A

thereby removing resistance battery bias from the timer preparing it for operation. First pulse operation is described in Section 2.01.

On the second pulse relay A restores, opens relays B and PR, and closes relay C. Relay PR restores, closes counting chain correed C2, grounds the timer circuit (FIG 57A) via diode CR11 (part of Circuit H-850616-B), and opens the outgoing loop across leads +0 and -0 (relay DS operated) correed C2 operates.

Upon completion of the second pulse, relay A re-operates, opens relay C, closes relays B and PR, removes resistance (relay ABS & resistor R55) ground from the timer (FIG 57A) via diode CR216 to start the timing interval by resistance (relay ABS coil and resistor R54 in series with resistor R55) connected battery. Relay PR operates, opens counting chain correed C1, and closes the outgoing loop across leads +0 and -0 via resistor R19. Correed C1 restores.

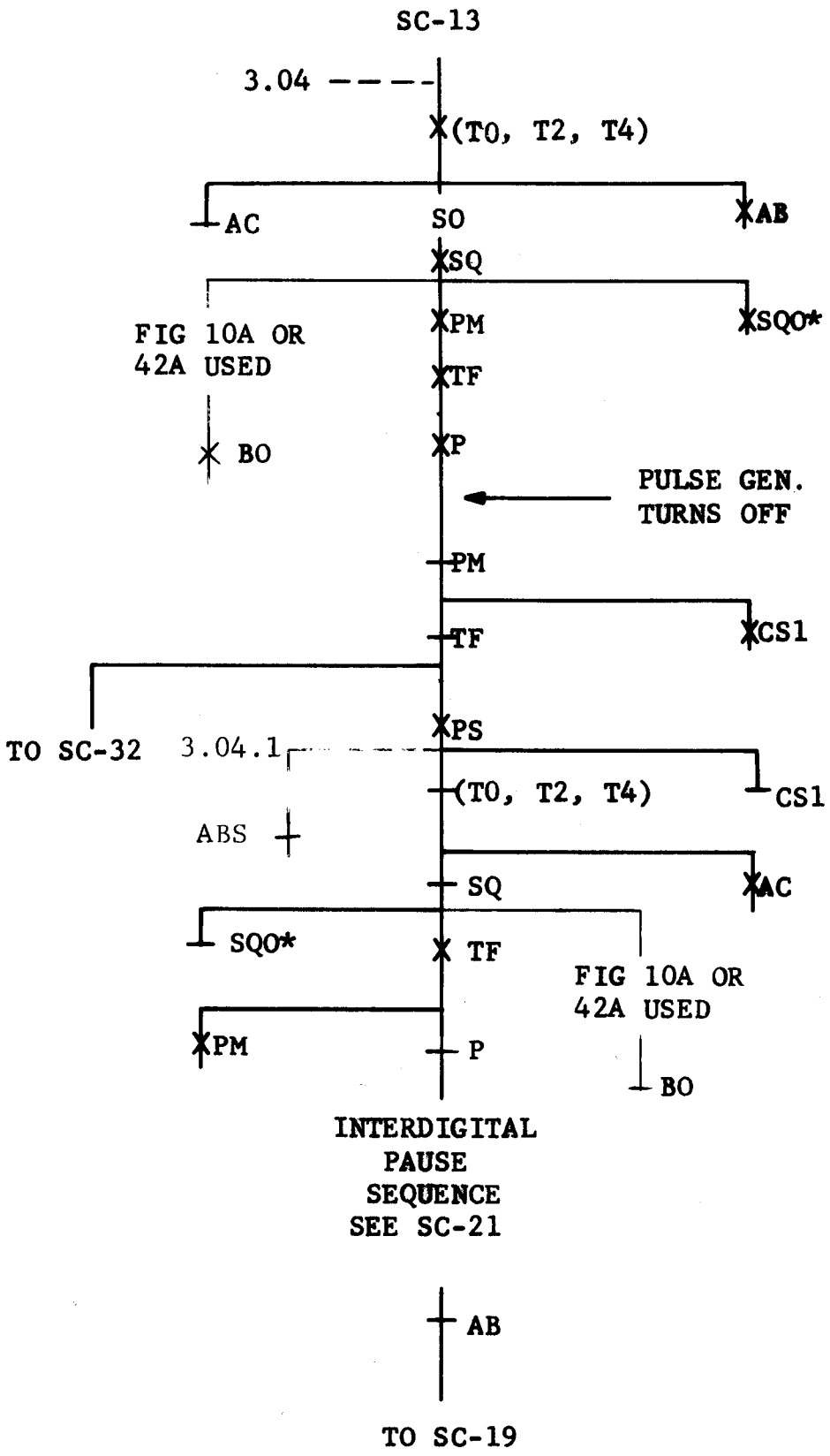
After a (FIG 57A) timing interval of approximately 70ms the timer grounds its output lead, closing relay ABS. Relay ABS operates, locks via diodes CR213 and CR214 and lead ABH to ground, opens the operate path from the timer, and opens the outgoing loop across lead +0 and -0.

During the Absorb cycle (see Section 3.04) when relays AB and PS operate ground is forwarded via diode CR216 shunting relay ABS. Relay ABS restores.

At the end of the interdigital pause rotary switch SQI steps its wipers to the 2nd rotary position removing ground from the timer biasing network (Resistor R53 and CR212). The timer, now resistance (R53 and CR212) battery biased, cannot operate again until this bias is removed.

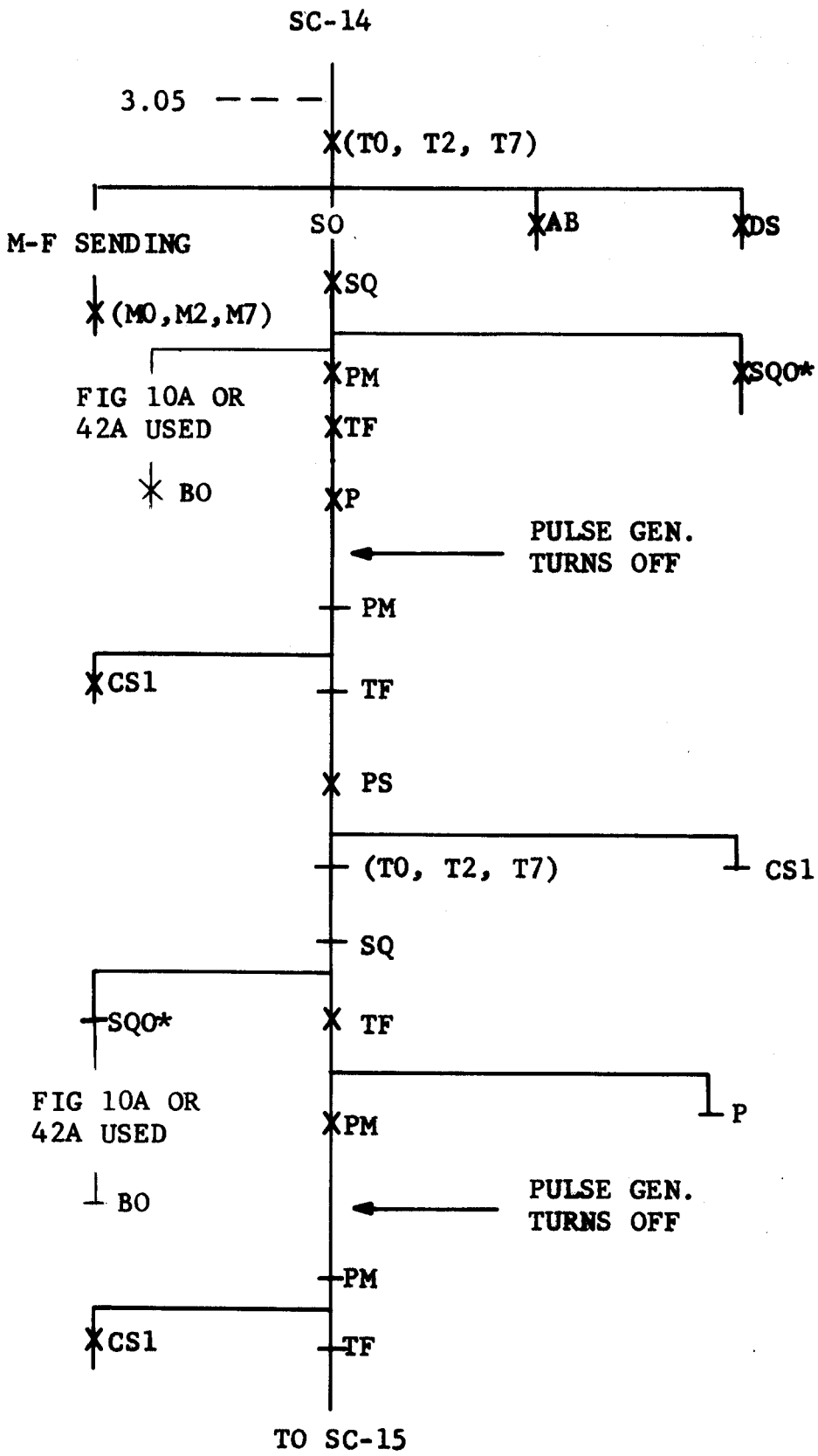
3.05 Hold Sending [Operated: Relays A, B, BA, BB, PR, correed AC, and possibly relays BC (FIG 6A or 7A) and DT (FIG 41A or 42A)

When the Register-Sender is required to hold sending until the 7th digit (or 10th digit - See NOTE 61; H-850215-A) has been registered, "timed battery" is returned via the route commons to LEVS D, F, and H of rotary switch SQO, closing the #1 windings of relays T0, T2, and T7. Relays T0, T2, and T7 operate to their "X" contacts, lock via their #2 windings, ground leads MM0, MM2, and MM7 ("S" wiring, operate fully, opens their #1 windings, close relay SQ ("R" wiring), and close the #1 winding of relay DS



ISSUE	DRAWING NO.
10	E-850215-A

operates to its "X" contacts, operates fully, and disconnects lead TG from the #1 windings of relays TO, T1, T2, T4, and T7. Relay AB operates to its "X" contacts, short-circuits the pulsing contacts of relay PM by connecting lead -O to lead +O, operates fully, and locks in series with the #1 winding of relay DS. After its slow-to-operate interval, relay SQ operates, closes relay BO (FIG 10A or 42A), magnet SQO, and relay PM, and turns on the pulse generator. Magnet SQO operates and operates its INT springs. Relay BO operates and disconnects leads -1 and =1 from leads -O and +O via capacitors N and P, respectively. Relay PM operates, closes the #1 winding of relay TF, and grounds terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Relay TF operates, grounds terminal PP, and closes the #1 winding of relay P. Relay P operates to its "X" contacts, operates fully, and short-circuits winding A of shunt field relay SD and the #1 winding of relay PS. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, and closes the #2 winding of correed CS1 in series with resistor R3 or connects resistance (resistor R3) ground to terminal 3 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Correed CS1 operates. Relay TF restores, turns off the pulse generator, removes ground from terminal PP, and closes the #1 winding of relay PS in series with the #1 winding of relay P. Relay PS operates to its "X" contacts, operates fully, and opens the #2 windings of correed CS1 and relays TO, T2, and T7. Correed CS1 restores. Relays TO, T2, and T7 restore, and open relay SQ. Relay SQ restores, closes the #2 winding of relay TF, and opens relay BO (FIG 10A or 42A) and magnet SQO. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs. Relay TF operates, turns on the pulse generator, closes relay PM and the #2 winding of relay PS, and closes the #2 winding of relay P in magnetic opposition to its #1 winding. Relay PM operates and closes the #1 winding of relay TF, and connects ground to terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Relay P restores



ISSUE	DRAWING NO.
10	E- 850215-A

and opens the #1 and #2 windings of relay P and the #1 winding of relay PS. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, closes the #2 winding of correed CS1, and removes ground from terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A or 47A). Correed CS1 operates. Relay TF restores, turns off the pulse generator, and opens the #2 winding of relay PS. Relay PS restores and opens the #2 winding of correed CS1 or removes resistance (resistor R3) ground from terminal 3 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Correed CS1 restores.

The calling party continues dialing or keying in the remaining digits as described in Section 2.00 except that the outpulsing loop is not opened when PR restores (relays AB and DS operated). When the last digit has been stored in the codelreed storage, rotary switch SQI steps to the next bank contacts where its LEV A wipers remove ground from its bank contact multiple, opening the #1 windings or relays DS and AB. Relay DS restores, connects lead TG to the #1 windings of relays T0, T1, T2, T4, and T7, and removes the short circuit from the pulsing contacts of relay PR. Relay AB restores and removes the short circuit from the pulsing contacts of relay PM. The Register-Sender is now prepared to receive routing instructions from the Translator via the route commons.

3.06 Routing Complete [Operated: Relays A, B, BA, BB, and PR, correed AC, and possibly relays BC (FIG 6A or 7A) and DT (FIG 41A or 42A)]

When all the necessary routing digits have been registered, "timed battery" is returned via the route commons to LEVS D, E, and H of rotary switch SQ0, closing the #1 windings of relays T0, T1, and T7. Relays T0, T1, and T7 operate to their "X" contacts, lock via their #2 windings, operate fully, open their #1 windings, and close relay SQ and the #2 windings of relays AS and PS. Relay AS operates to its "X" contacts, operates fully, short-circuits the #1 winding of relay AT, closes magnet SQ0 by ground via the LEV C wipers and INT springs of rotary switch SQ0, disconnects lead TG from the #1 windings of relays T0, T1, T2,

SC-15

PS

CS1

SUBSCRIBER
CONTINUES DIALING
UNTIL ALL DIGITS
ARE REGISTERED

SQO*

DS

AB

TO SC-19

SC-16

3.06 - - - -

(T0, T1, T7)

PS

AS

(T0,T1,
T7)

CS1

SQO*

MP

ROTARY SWITCH SQO
STEPS TO CONTACT #12

AT

PS

CS1

TO SC-17

T4, and T7, and closes relay MP. Relay PS operates to its "X" contacts, operates fully, opens the #2 windings of relays T0, T1, and T7, and closes the #2 winding of correed CS1. Relays T0, T1, and T7 restore and open relay SQ before it operates. Correed CS1 operates. Relay MP operates and locks. Magnet SQO operates, and rotary switch SQO steps self-interruptedly to its bank contacts #12 where its LEV C wipers encounter absence of ground. When the LEV C wipers of rotary switch SQO encounter absence of ground, the #2 winding of relay PS is opened and the short circuit is removed from the #1 winding of relay AT thereby closing the #1 winding of relay AT (in multiple with resistor R5) in series with the #2 winding of relay AS. Relay PS restores and opens the #2 winding of correed CS1. Correed CS1 restores. Relay AT operates to its "X" contacts, operates fully, connects lead TG to the #1 windings of relays T0, T1, T2, T4, and T7. The Register-Sender is now ready to receive the delete digit code from the Translator.

3.07 Delete Digit [Operated: Relays A, B, BA, BB, PR, AT, MP, and AS, correed AC, and possibly relays BC (FIG 6A or 7A) and DT (FIG 41A or 42A)]

The delete digit marks out the codelreed storage chain so that after routing is completed, sending of the stored digits will start with the stored digit indicated by the delete digit. Upon translation of the delete digit, "timed battery" is returned via the route commons to 2 out of 5 of rotary switch SQO levels (LEVS D, E, F, G, and H) corresponding to the delete digit.

For purposes of this explanation, assume that sending is to start with the 3rd stored digit. "Timed battery" is returned via the route commons to LEVS E and F of rotary switch SQO, closing the #1 windings of relays T1 and T2. Relays T1 and T2 operate to their "X" contacts, lock via their #2 windings, operate fully, open their #1 windings, close the #1 and #2 windings of relay PC in magnetic opposition (for a parity check), ground terminals 18 and 19 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A used), and close relay SQ. Relay SQ operates, turns on the pulse generator, and closes relay PM, relay BO (FIG 10A or 42), the #2 winding of relay AT, and the #1 winding of relay AS in magnetic opposition to its #2 winding. Relay AS restores, opens the #1 winding of relay AT, opens the #1 and #2 windings of relay AS, and disconnects lead TG from the #1 windings of relays T0, T1,

T2, T4, and T7. Relay BO operates and disconnects leads -1 and +1 from leads -0 and +0 via capacitors N and P, respectively. Relay PM operates, closes magnet SQO and the #1 winding of relay TF, and grounds terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Magnet SQO operates and operates its INT springs. Relay TF operates, grounds terminal PP, and closes the #1 winding of relay P. Relay P operates to its "X" contacts, operates fully, and short-circuits winding A of shunt field relay SD and the #1 winding of relay PS.

When FIG 43A, 44A, 46A, or 47A is used, relay PM follows the pulses of the pulse generator and, when at normal, opens the #1 winding of relay TF, and removes ground from and connects resistance (resistor R3) ground to terminals 4 and 3 (CARD CONNECTOR 15), respectively. The #2 winding of relay TF is opened during the same pulse as it is opened when FIG 2A, 2B, 8B, 16A, or 17A is used as described in the following paragraphs.

The pulse generator opens relay PM. Relay PM restores, opens magnet SQO and the #1 winding of relay TF, and closes the #2 winding of correed CS1. Correed CS1 operates and closes the #2 winding of relay TF before it restores. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs.

The pulse generator closes relay PM. Relay PM operates, closes magnet SQO and the #1 winding of relay TF, and closes the #1 winding of correed CS2 in series with the #2 winding of correed CS1. Correed CS2 operates. Magnet SQO operates and operates its INT springs. The pulse generator opens relay PM. Relay PM restores, opens magnet SQO, the #1 winding of relay TF, the #1 winding of correed CS2, and the #2 winding of correed CS1, and closes the #2 winding of correed CS2. Correed CS1 restores. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs.

The pulse generator closes relay PM. Relay PM operates, closes magnet SQO and the #1 winding of relay TF, and closes the #1 winding of correed CS3 in series with the #2 winding of correed CS2. Correed CS3 operates. Magnet SQO operates and operates its INT springs. The pulse gen-

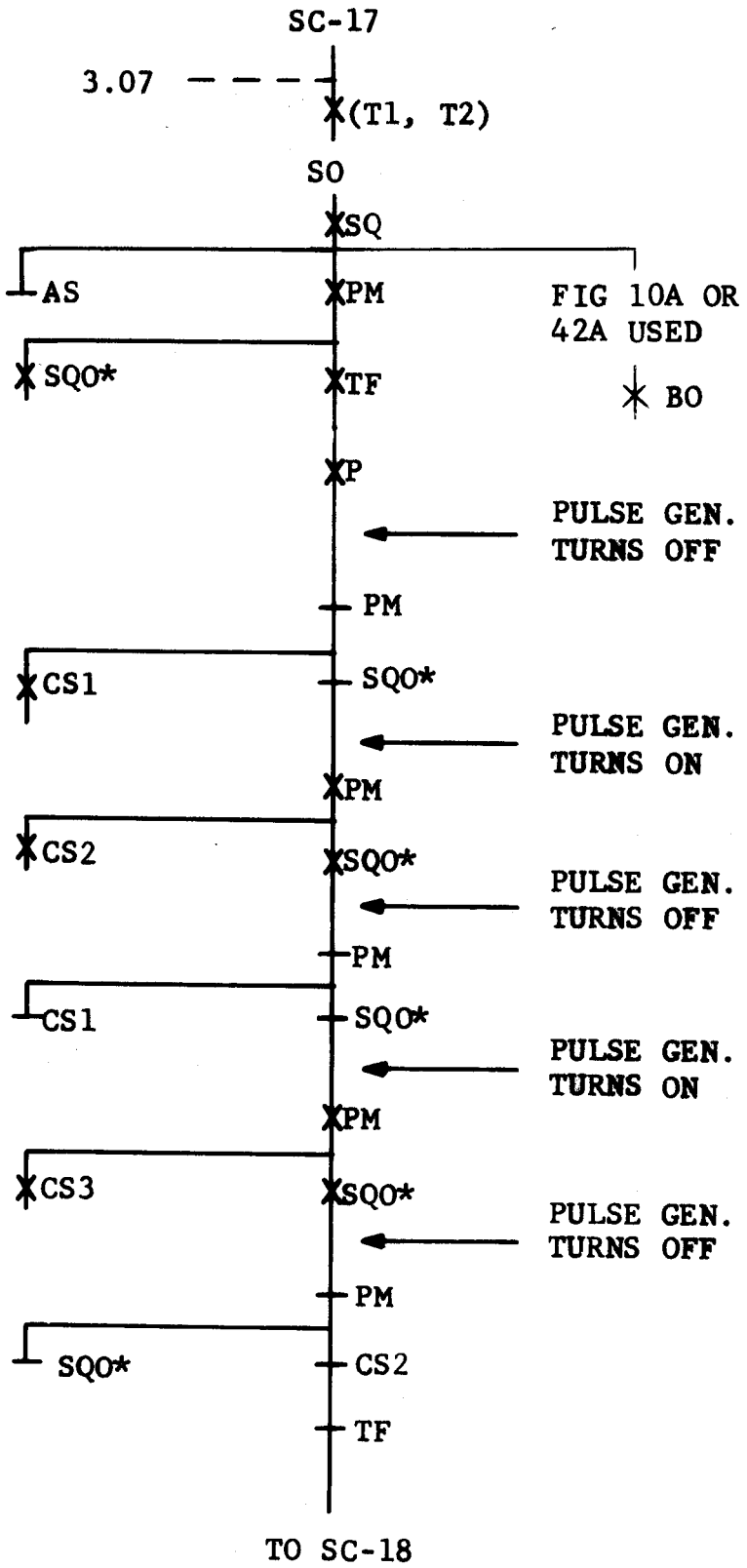
erator opens relay PM. Relay PM restores, opens magnet SQO, the #1 winding of relay TF, the #1 winding of correed CS3, and the #2 winding of correed CS2, and closes the #2 winding of correed CS3. Correed CS2 restores and opens the #2 winding of relay TF. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs. Relay TF restores, removes ground from terminal PP, turns off the pulse generator, and removes the short circuit from the #1 winding of relay PS, closing the #1 winding of relay PS (in multiple with resistor R9) in series with the #1 winding of relay P. Relay PS operates to its "X" contacts, operates fully, and opens the #2 winding of correed CS3 and the #2 windings of the operated "T" relays (relays T1 and T2 for this example). Correed CS3 restores. Relays T1 and T2 restore, connect the #1 windings of relays T1 and T2 to LEVS E and F, respectively, of rotary switch SQO, opens relay SQ, and opens the #1 and #2 windings of relay PC. Relay SQ restores, closes the #2 winding of relay TF, and opens relay BO (FIG 10A or 42A), and the #2 winding of relay AT. Relay AT restores. Relay BO restores and connects leads -1 and +1 to leads -O and +O via capacitors N and P, respectively. Relay TF operates, closes the #2 winding of relay PS, closes the #1 winding of relay P in magnetic opposition to its #2 winding, turns on the pulse generator, closes relay PM, and closes relay BO (FIG 42A or 10A). Relay PM operates, and the following operation is similar to that described in Section 4.02. The Register-Sender is now prepared to outpulse the digits stored in the codel-reed storage.

4.00 Outpulsing [Operated: Relays A, B, BA, BB, PR, and MP, correed AC, and possibly relays DT (FIG 41A or 42A) and BC (FIG 6A or 7A)]

4.01 Sending a Digit

When the Register-Sender is prepared to send the stored digits, "timed battery" is connected to two out of five of LEVS D, E, F, G, and H of rotary switch SQO via the codel-reed cards as determined by the digit stored in the codel-reed storage. For purposes of this explanation, assume that the digit 3 is to be sent.

"Timed battery" is connected to LEVS E and F of rotary switch SQO, closing the #1 windings of relays T1 and T2. Relays T1 and T2 operate to their "X" contacts, lock via



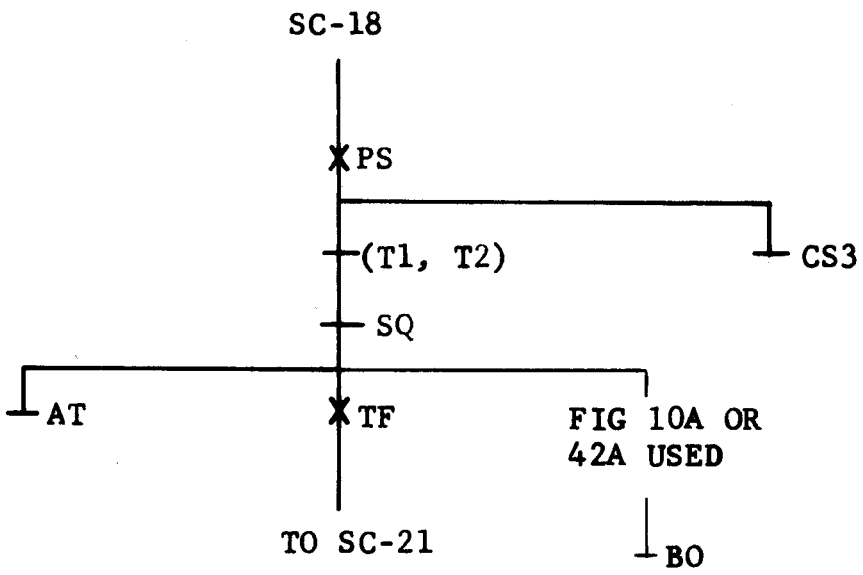
ISSUE	DRAWING NO.
10	E-850215-A

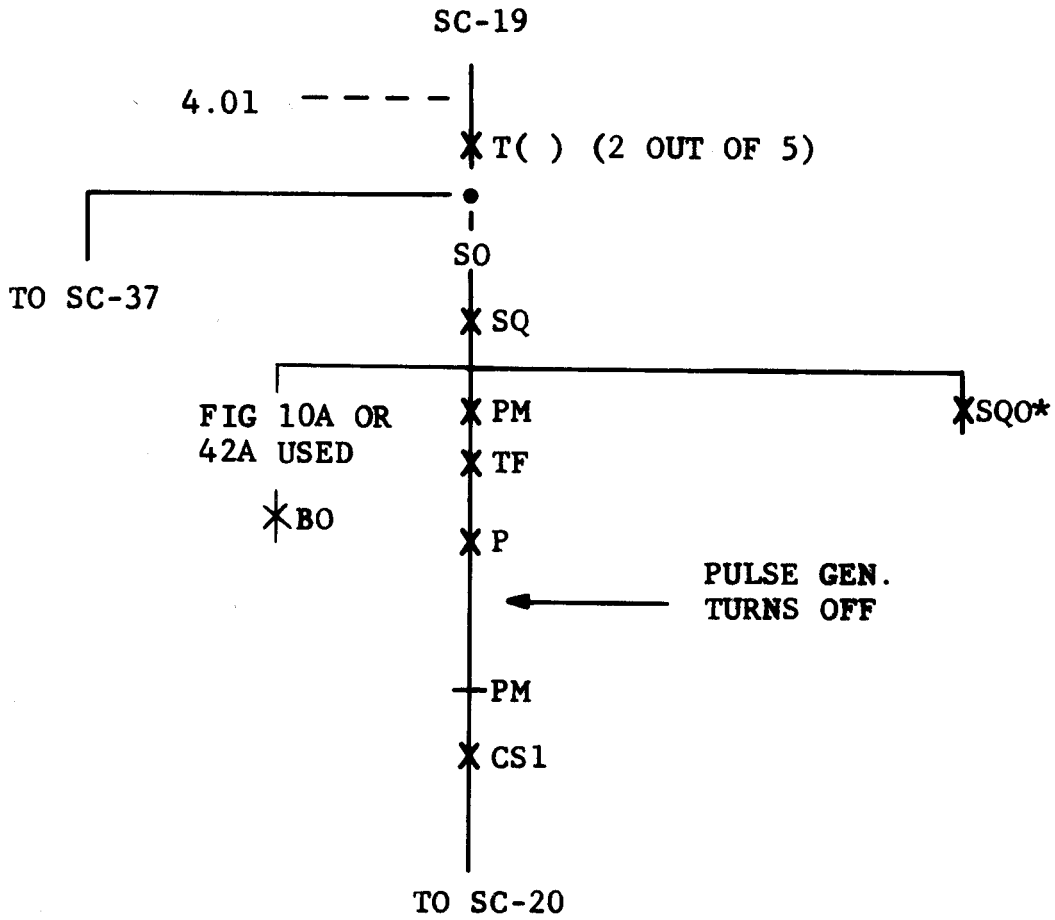
their #2 windings, operate fully, open their #1 windings, close the #1 and #2 windings of relay PC in magnetic opposition (for a parity check), ground terminals 18 and 19 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A used), and close relay SQ. After its slow-to-operate interval, relay SQ operates, closes relay BO (FIG 10A or 42A), magnet SQO and relay PM, and turns on the pulse generator. Magnet SQO operates and operates its INT springs. Relay BO operates and disconnects leads -1 and +1 from leads -0 and +0 via capacitors N and P, respectively. Relay PM operates, closes the #1 winding of relay TF, grounds terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A), and opens the outpulsing loop via leads -0 and +0. Relay TF operates, grounds terminal PP, and closes the #1 winding of relay P. Relay P operates to its "X" contacts, operates fully, and short-circuits winding A of shunt field relay SD and the #1 winding of relay PS.

When FIG 43A, 44A, 46A, or 47A is used, relay PM follows the pulses of the pulse generator and, when at normal, opens the #1 winding of relay TF, and removes ground from and connects resistance (resistor R3) ground to terminals 4 and 3 (CARD CONNECTOR 15), respectively. The #2 winding of relay TF is held operated by ground via a path provided by the operated "T" relays and CS( ) correeds during outpulsing of the stored digit. The #2 winding of relay TF is opened during the same pulse that it is opened when FIG 2A, 2B, 8B, 16A, or 17A is used as described in the following paragraphs.

The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, closes the #2 winding of correed CS1, and closes the outpulsing loop via leads +0 and -0. Correed CS1 operates and closes the #2 winding of relay TF before it restores.

The pulse generator closes relay PM. Relay PM operates, closes the #1 winding of relay TF, closes the #1 winding of correed CS2 in series with the #2 winding of correed CS1, and opens the outpulsing loop via leads +0 and -0 for the second pulse. Correed CS2 operates. The pulse generator opens relay PM. Relay PM operates, opens the #1 winding of relay TF, the #1 winding of correed CS2, and the #2 winding of correed CS1, closes the #2 winding of correed CS2, and closes the outpulsing loop via leads +0 and -0. Correed CS1 restores.

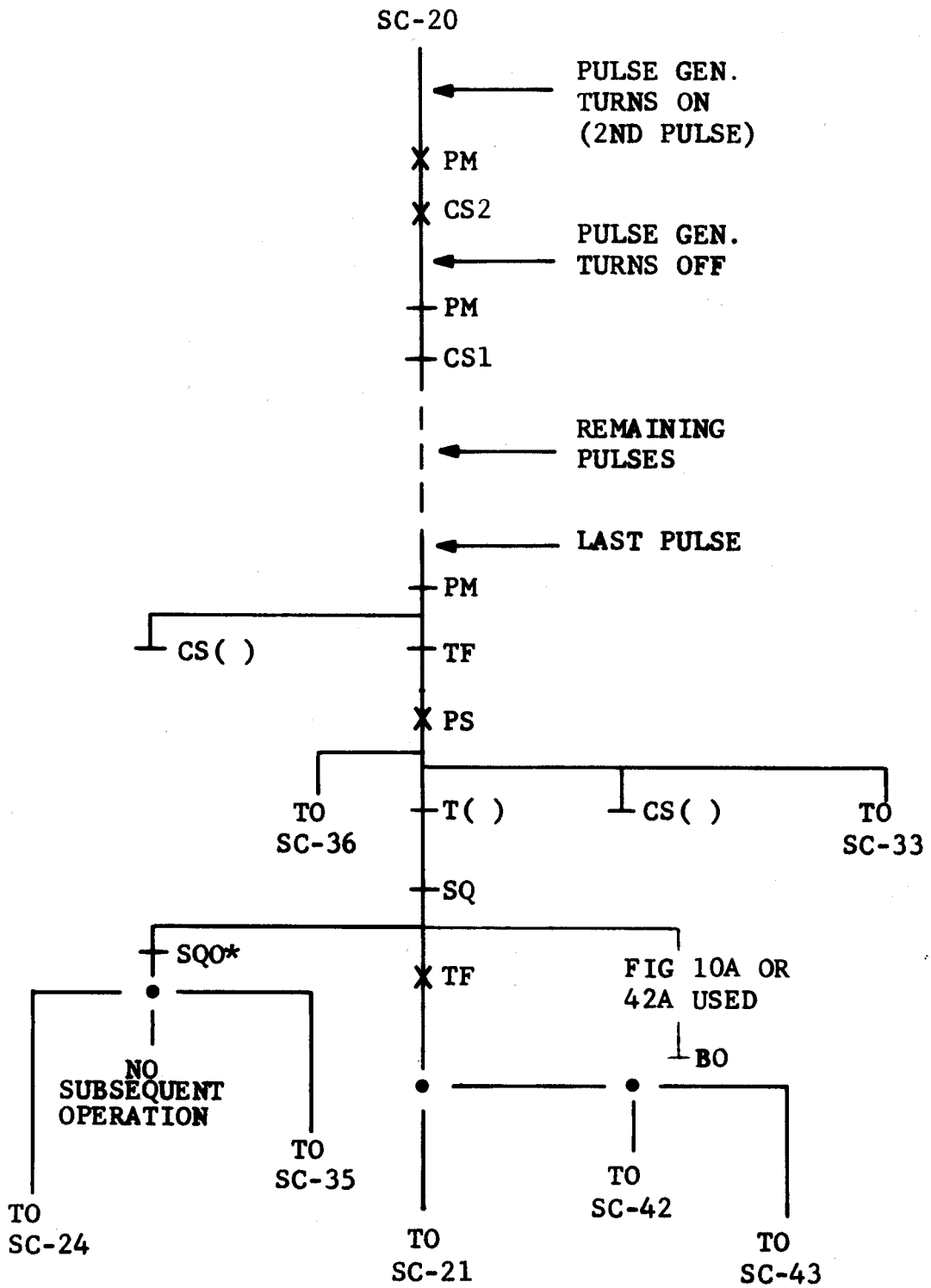

SC-18
PS
(T1, T2)
CS3
SQ
AT
TF
FIG 10A OR
42A USED
TO SC-21
BO


SC-19
4.01
T( ) (2 OUT OF 5)
SO
TO SC-37
SQ
FIG 10A OR
42A USED
PM
SQO*
TF
BO
P
PULSE GEN.
TURNS OFF
PM
CS1
TO SC-20

The pulse generator closes relay PM. Relay PM operates, closes the #1 winding of relay TF, closes the #1 winding of correed CS3 in series with the #2 winding of correed CS2, and opens the outpulsing loop via leads +O and -O for the third pulse. Correed CS3 operates. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, the #1 winding of correed CS3, and the #2 winding of correed CS2, closes the #2 winding of correed CS3, and closes the outpulsing loop via leads +O and -O. Correed CS2 restores and opens the #2 winding of relay TF. Relay TF restores, turns off the pulse generator, removes ground from terminal PP, and removes the short circuit from the #1 winding of relay PS thereby closing the #1 winding of relay PS (in multiple with resistor R9) in series with the #1 winding of relay P. Relay PS operates to its "X" contacts, connects lead TG to the #2 winding of relay L, operates fully, disconnects lead TG from the #1 windings of relays TO, T1, T2, T4, and T7, opens the #2 winding of correed CS3, the #1 and #2 windings of relay PC, and the #2 windings of relays T1 and T2, and short-circuits the pulsing contacts of relay PM. Correed CS3 restores. Relays T1 and T2 restore, connect the #1 windings of relays T1 and T2 to LEVS E and F, respectively, of rotary switch SQO, and opens relay SQ. Relay SQ restores, disconnects lead TG from the #2 winding of relay L, closes the #2 winding of relay TF, and opens relay BO (FIG 10A or 42A) and magnet SQO. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs. Relay TF operates, grounds terminal PP, turns on the pulse generator, closes relay PM, and the #2 winding of relay PS, and closes the #2 winding of relay P in magnetic opposition to the #1 winding of relay P. The Register-Sender now begins a counting sequence to provide an interdigital pause.

4.02 Interdigital Pause

Relay PM operates and closes the #1 winding of relay TF. Relay P restores, opens the #1 and #2 windings of relay P and the #1 winding of relay PS, and removes the short circuit from winding A of shunt field relay SD. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, and closes the #2 winding of correed



ISSUE	DRAWING NO.
10	E-850215-A

CS1. Correed CS1 operates.

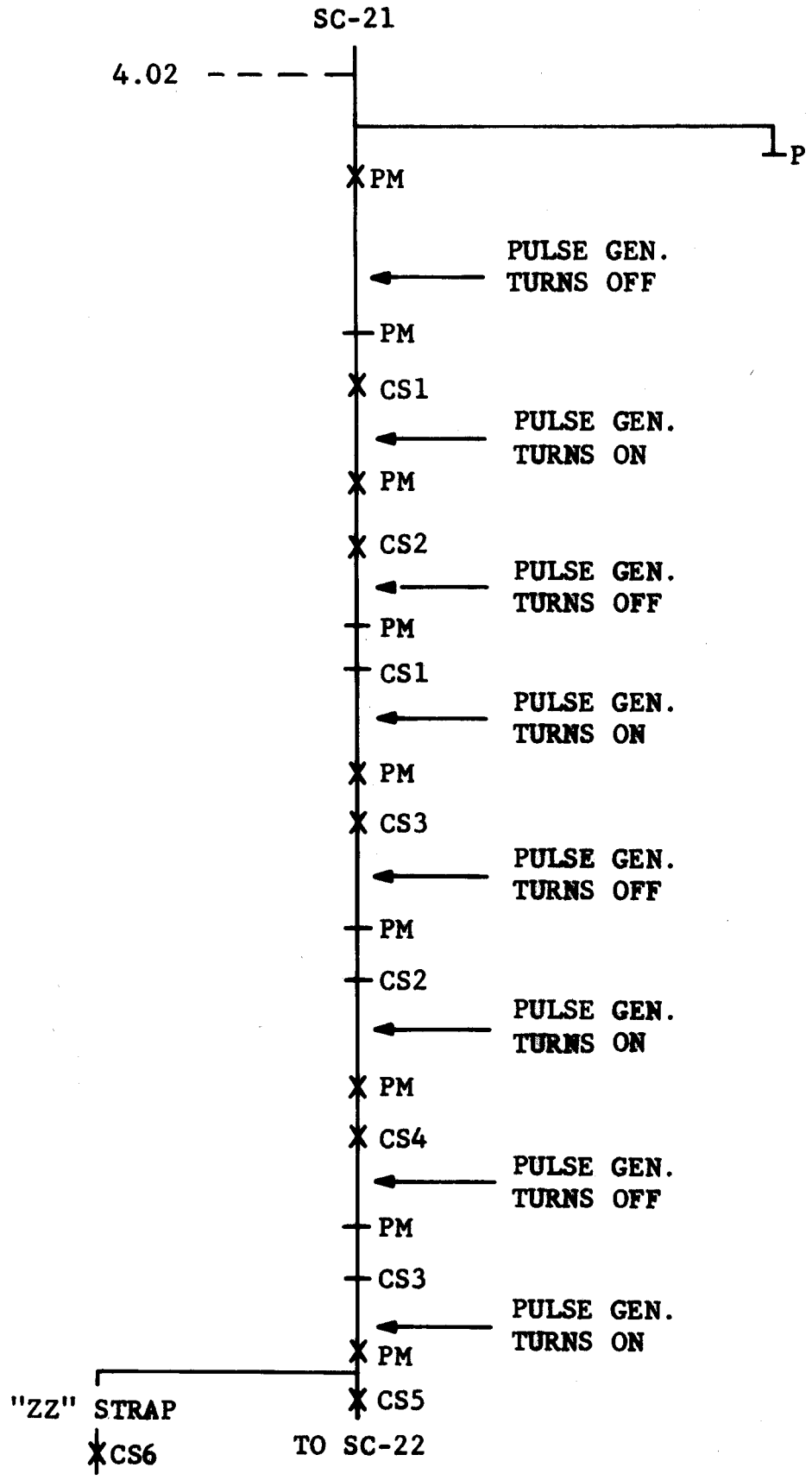
The pulse generator closes relay PM. Relay PM operates, closes the #1 winding of relay TF, and closes the #1 winding of correed CS2 in series with the #2 winding of correed CS1. Correed CS2 operates. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, the #2 winding of correed CS1, and the #1 winding of correed CS2, and closes the #2 winding of correed CS2. Correed CS1 restores.

The pulse generator closes relay PM. Relay PM operates, closes the #1 winding of relay TF, and closes the #1 winding of correed CS3 in series with the #2 winding of correed CS2. Correed CS3 operates. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, the #2 winding of correed CS2, and the #1 winding of correed CS3, and closes the #2 winding of correed CS3. Correed CS2 restores.

The pulse generator closes relay PM. Relay PM operates, closes the #1 winding of relay TF, and closes the #1 winding of correed CS4 in series with the #2 winding of correed CS3. Correed CS4 operates. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, the #1 winding of correed CS4, and the #2 winding of correed CS3, and closes the #2 winding of correed CS4. Correed CS3 restores.

The pulse generator closes relay PM. Relay PM operates, closes the #1 winding of relay TF, and closes the #1 winding of correed CS5 in series with the #2 winding of correed CS4. Correed CS5 operates, and closes the #2 winding of relay CS6. Relay CS6 operates, locks, and opens the #2 winding of relay TF. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, the #1 winding of correed CS5, and the #2 winding of correed CS4, and closes the #2 winding of correed CS5. Correed CS4 restores.

When strap "ZZ" is omitted (see NOTE 113, H-850215-A) the pulse generator closes relay PM again. Relay PM operates, closes the #1 winding of relay TF and the #2 winding of relay CS6, and closes the #1 winding of correed CS1 in series with the #2 winding of correed CS5. Correed CS1 operates. Relay CS6 operates, locks, and opens the #2


SC-21
4.02
P
PM
PULSE GEN. TURNS OFF
PM
CS1
PULSE GEN. TURNS ON
PM
CS2
PULSE GEN. TURNS OFF
PM
CS1
PULSE GEN. TURNS ON
PM
CS3
PULSE GEN. TURNS OFF
PM
CS2
PULSE GEN. TURNS ON
PM
CS4
PULSE GEN. TURNS OFF
PM
CS3
PULSE GEN. TURNS ON
PM
CS5
TO SC-22
"ZZ" STRAP
CS6

winding of relay TF ("Z" strap omitted). The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, the #2 winding of correed CS5, and the #1 winding of correed CS1, and closes the #2 winding of correed CS1. Correed CS5 restores.

When the "Z" strap is used and the "ZZ" strap is omitted (see NOTE 56, H-850215-A), the pulse generator closes relay PM again. Relay PM operates, closes the #1 winding of relay TF, and closes the #1 winding of correed CS2 in series with the #2 winding of correed CS1. Correed CS2 operates. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, the #1 winding of correed CS2, and the #2 winding of correed CS1, and closes the #2 winding of correed CS2. Correed CS1 restores and opens the #2 winding of relay TF.

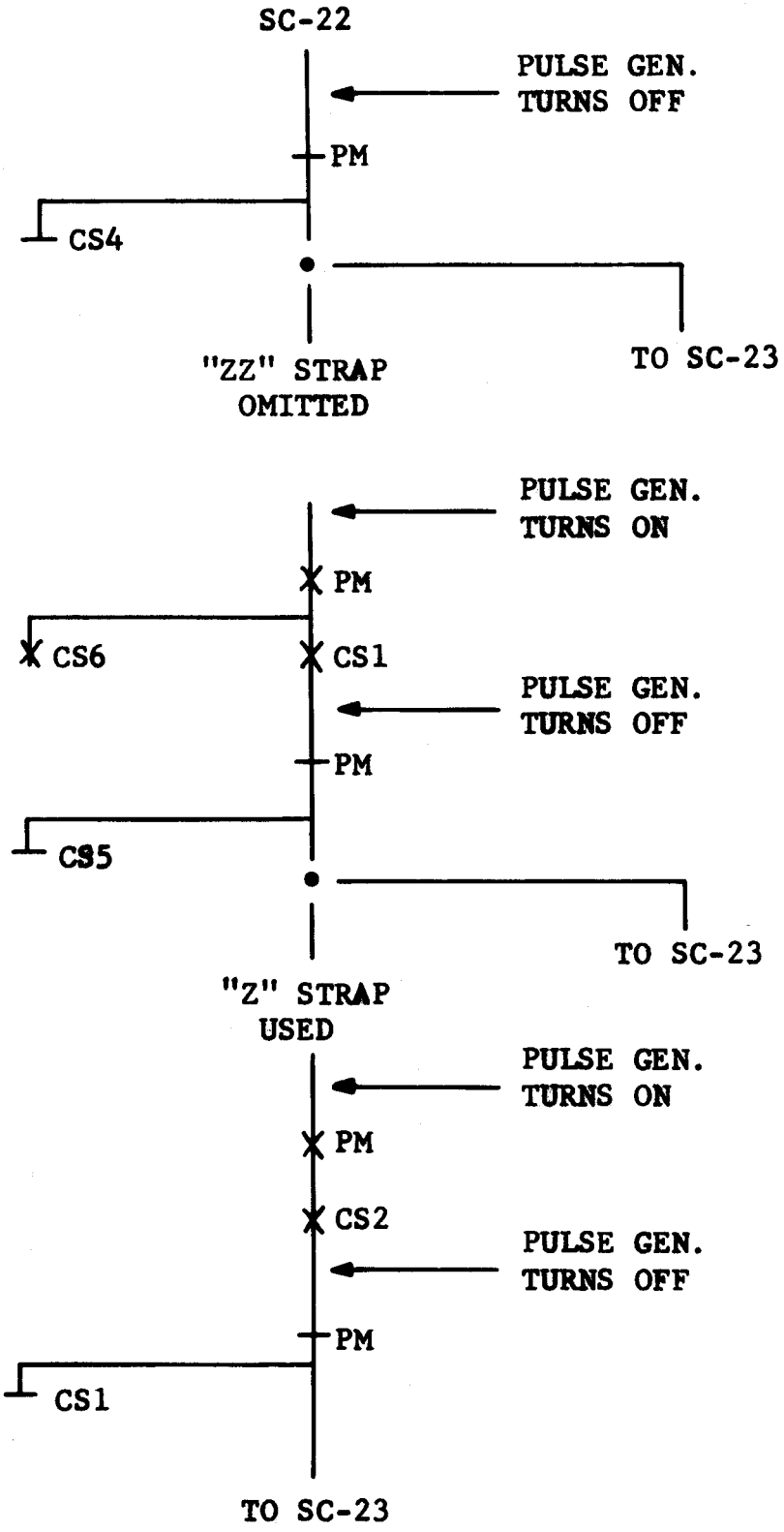
When relay TF restores, the pulse generator is turned off, relay BO (FIG 10A or 42A) and the #2 winding of relay PS are opened, and the #2 winding of relay CS6 is opened. Relay CS6 restores. Relay PS restores, connects lead TG to the #1 windings of relays TO, T1, T2, T4, and T7, opens the #2 winding of correed CS5 ("Z" strap), and removes the short circuit from the pulsing contacts of relay PM. Correed CS1 or CS2 or CS5 restores (if operated).

The Register-Sender is now prepared to send the remaining stored digits as described in Section 4.01 or to release as described in Section 7.00.

4.03 Outpulsing Overtakes Inpulsing

If the calling party is a slow dialer, it is possible for the Register-Sender to outpulse all of the digits the calling party has dialed up to this time. The Register-Sender would then have to wait until the calling party dials the next digit before it could outpulse the next digit.

When outpulsing overtakes inpulsing, rotary switch SQO steps its LEV A wipers to the bank contact corresponding to the next digit to be dialed. For purposes of this explanation, assume that the calling party has dialed 5 digits, and rotary switch SQI has stepped its LEV H wipers



ISSUE	DRAWING NO.
10	E- 850215-A

to bank contact #6 to await the dialing of digit #6. After the Register-Sender outpulses the 5th stored digit, rotary switch SQO steps its LEV A wipers to bank contact #18 thereby connecting ground to bank contact #6 of rotary switch SQI to close relay SC in series with resistor R7. Relay SC operates and disconnects lead TG from the #1 windings of relays TO, T1, T2, T4, and T7.

When the calling party dials the 6th digit, the following operation is similar to that described in Section 2.00 except that when rotary switch SQI steps to the 7th bank contact, upon completion of the 6th digit, relay SC is opened. Relay SC restores and connects lead TG to the #1 windings of relays TO, T1, T2, T4, and T7, closing 2 of these relays (depending on the 6th dialed digit). If, for example, the digit 3 was the 6th digit dialed, relays T1 and T2 operate, and the following operation is the same as that described in Sections 4.01 and 4.02.

5.00 Multi-Frequency Sending [Operated: Relays A, B, BA, BB, and PR, correed AC, and possibly BC (FIG 6A or 7A) and DT (FIG 41A or 42A)] ("S" wiring used)

When Multi-Frequency (MF) sending is required, the Register-Sender is equipped with a MF CONTROL CIRCUIT (FIG 9A) and all the dialed digits must be registered before sending may take place.

5.01 Hold Sending and Dial Pulse Routing

When the hold sending code is returned to the Register-Sender from the Translator, the following operation is similar to that described in Section 3.05 except that when relays TO, T2, and T7 operate to their "X" contacts, relays MO, M2, and M7 are closed by ground via leads MMO, MM2, and MM7, respectively. Relays MO, M2, and M7 operate, connect resistance (relays DO, D2, and D7 in multiple) battery to lead AT, connect resistance (relay GA) battery to lead MS, and grounds lead DK, closing SQ. After all the digits have been received, the Translator sends a routing code via the route commons. The Register-Sender pulses the routing digit(s) (as described in Sections 4.01 and 4.02) needed to route the call to a MF trunk. After the call has been routed, the Translator sends a "special" three out of five code (1, 4, 7) via the route commons.

5.02 Multi-Frequency Send Signal

When "timed battery" is returned via the route commons to LEVS E, G, and H of rotary switch SQO, the #1 windings of relays T1, T4, and T7 are closed. Relays T1, T4, and T7 operate to their "X" contacts, lock via their #2 windings, close relays M1, M4, and M7 via ground on leads MM1, MM4, and MM7, respectively, operate fully, and open their #1 windings. Relays M1, M4, and M7 operate, close relay MFA, ground lead DK, closing relay SQ, connects resistance (relay GA) battery to lead MS, and connect resistance (relays D1, D4, and D7 in multiple) battery to lead AT. Relay MFA operates and grounds lead MF, closing the #2 winding of relay MF. Relay MF operates to its "X" contacts and short-circuits its #1 winding and the pulsing contacts of relay PM. After its slow-to-operate interval, relay SQ operates, and the following operation is similar to that described in Section 4.01 except that the #2 winding of relay TF is closed when relay P operates fully (relay T7 operated) and the outpulsing loop is not opened when relay PM operates (relay MF operated).

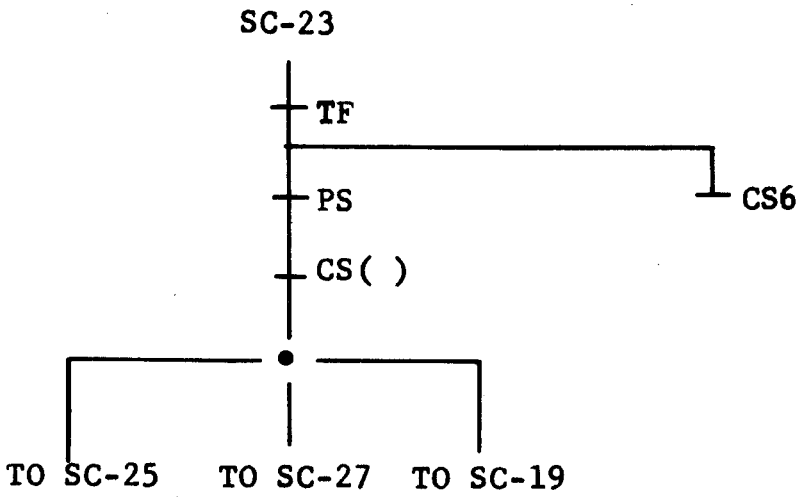
Relay PM continues counting pulses in a manner similar to that described in Section 4.01 until the 10th pulse. Relay CS6 operates and locks on the 6th pulse. When relay PM operates on the 10th pulse, the #1 winding of relay TF is closed, and the #1 winding of correed CS5 is closed in series with the #2 winding of correed CS4. Correed CS5 operates. The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, the #1 winding of correed CS5, and the #2 winding of correed CS4. Correed CS4 restores and opens the #2 winding of relay TF. Relay TF restores, turns off the pulse generator, removes ground from terminal PP, opens the #2 winding of relay CS6, and removes the short circuit from the #1 winding of relay PS thereby closing the #1 winding of relay PS in series with the #1 winding of relay P. Relay CS6 restores. Relay PS operates to its "X" contacts, connects lead TG to the #2 winding of relay L, operates fully, disconnects lead TG from the #1 windings of relays TO, T1, T2, T4, and T7, and opens relays M1, M4, and M7 and the#2 windings of relays T1, T4, and T7 and correed CS5. Relays T1, T4, and T7 restore, and connect the #1 windings of relays T1, T4, and T7 to LEVS E, G, and H, respectively, of

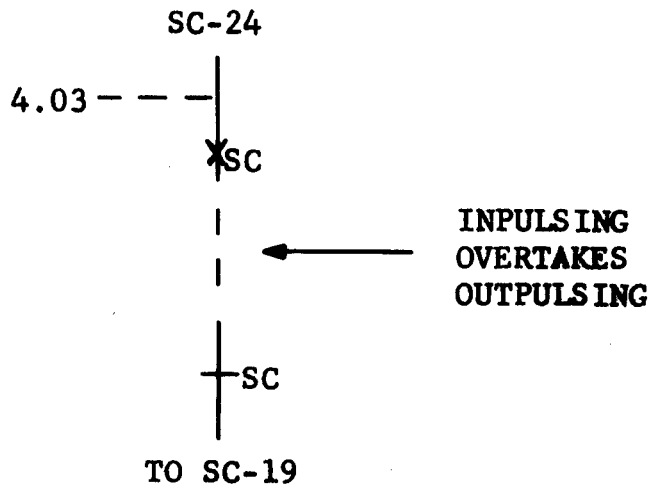
rotary switch SQO. Relays M1, M4, and M7 restore and open relays MFA and SQ. Correed CS5 restores. Relay SQ restores, opens magnet SQO, closes the #2 winding of relay TF, and disconnects lead TG from the #2 winding of relay L. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs. After its slow-to-release interval, relay MFA restores and removes ground from lead MF thereby closing the #1 winding of relay MF in series with the #2 winding of relay MF. Relay MF operates fully, grounds leads MS and DL, and grounds bank contact #12 of rotary switch SQO LEV C. Relay TF operates, and the following operation is similar to that described in Section 4.02 except that upon completion of the interdigital pause the Register-Sender is prepared to receive a delete digit from the Translator.

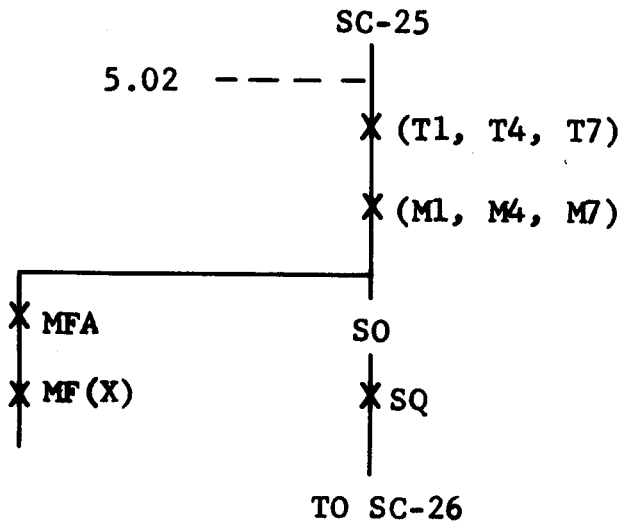
5.03 Delete Digit Registration

The Translator now sends a delete digit signal to the Register-Sender so that, after routing is complete, the sending of the stored digits will start with the digit indicated by the delete digit. Upon translation of the delete digit, "timed ground" is extended via lead TG to the #1 windings of relays T0, T1, T2, T4, and T7. The Translator extends "timed battery" to 2 out of 5 of rotary switch SQO levels (LEVS D, E, F, G, and H), corresponding to the digit at which sending of the stored digits is to start.

For purposes of this explanation, assume that MF sending is to start with the 4th digit in storage. "Timed battery" is returned via the route commons to LEVS D and G of rotary switch SQO, closing the #1 windings of relays T0 and T4. Relays T0 and T4 operate to their "X" contacts, lock via their #2 windings, ground leads MM0 and MM4, closing relays M0 and M4, respectively, operate fully, and open their #1 windings. Relays M0 and M4 operate, close relay GA by ground via lead MS, connect resistance (the #1 windings of relays D0 and D4 in multiple) battery to lead AT, and ground lead DK, closing relay SQ. Relay GA operates, removes ground from lead DK, opening relay SQ before it operates, closes the #1 windings of relays D0 and D4, and grounds leads PS and SQO, closing the #2 winding of relay PS and magnet SQO, respectively. Relays D0 and D4 operate, lock, and ground leads DA, DB, DD, DE, DH, and DJ. Magnet SQO operates and operates its INT springs. Relay


SC-23
TF
PS
CS6
CS( )
TO SC-25
TO SC-27
TO SC-19

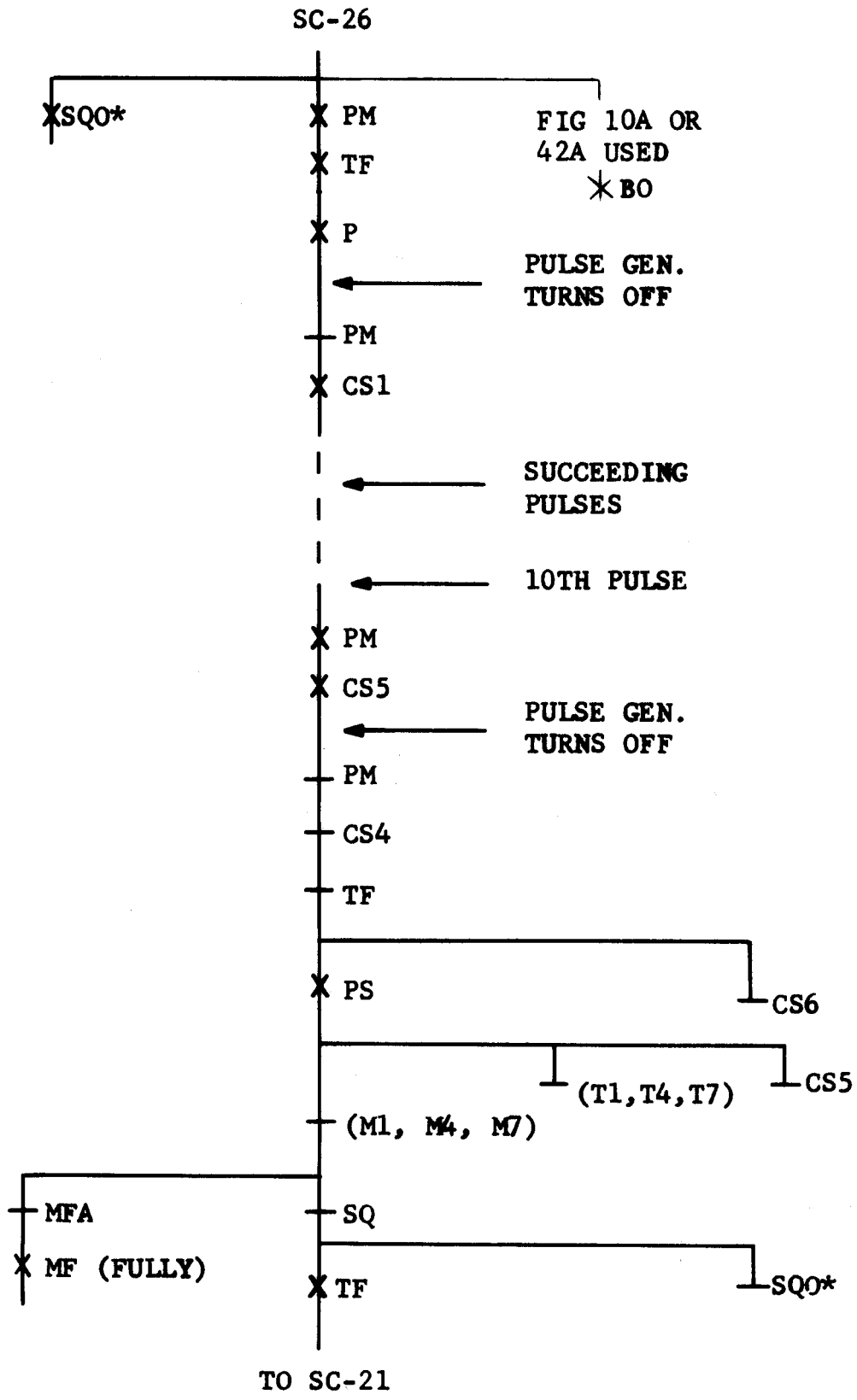

SC-24
4.03
SC
INPULSING
OVERTAKES
OUTPULSING
SC
TO SC-19


SC-25
5.02
(T1, T4, T7)
(M1, M4, M7)
MFA
MF(X)
SO
SQ
TO SC-26

PS operates to its "X" contacts, connects lead TG to the #2 winding of relay L, operates fully, opens the #2 windings of relays T0 and T4, removes ground from leads MM0 and MM4, opening relays M0 and M4, respectively, and disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, and T7. Relays T0 and T4 restore. Relays M0 and M4 restore and open relay GA. Relay GA restores, removes the short circuit from relay DD in series with the multiple combination of the #1 windings of relays D0 and D4, removes ground from leads SQ0 and PS, opening magnet SQ0 and the #2 winding of relay PS, respectively. Relay DD operates. Magnet SQ0 restores, and rotary switch SQ0 steps its wipers to the next bank contacts, and restores its INT springs. Relay PS restores, connects lead TG to the #1 windings of relays T0, T1, T2, T4, and T7, and disconnects lead TG from the #2 winding of relay L.

5.04 Multi-Frequency Routing Digits

In order to route the call to its destination, a MF routing digit(s) may now have to be sent. For purposes of this explanation, assume that the digit 3 is the first MF routing digit sent. "Timed battery" is returned via the route commons to LEVS E and F of rotary switch SQ0, closing the #1 winding of relays T1 and T2. Relays T1 and T2 operate to their "X" contacts, lock via their #2 windings, ground leads MM1 and MM2, closing relays M1 and M2, operate fully, and open their #1 windings. Relays M1 and M2 operate, close relay GA, and ground lead SQ0, closing magnet SQ0. Magnet SQ0 operates and operates its INT springs. Relay GA operates, closes relay GB, and connects "KP" tone (1700 & 1100 Hz) to the out-pulsing loop via repeat coil RC. After its slow-to-operate interval, relay GB operates to its "X" contacts, locks, operates fully, and opens relay GA. Relay GA restores, closes relay KP, and disconnects "KP" tone from the out-pulsing loop. After its slow-to-operate interval, relay KP operates, locks, and closes relay GA. Relay GA operates, grounds lead PS, closing the #2 winding of relay PS, and connects a tone to the out-pulsing loop corresponding to the digit to be sent (see TABLE D; H-850215-A). Relay PS operates to its "X" contacts, connects lead TG to the #2 winding of relay L, operates fully, opens the #2 windings of relays T1 and T2, removes ground from leads MM1 and MM2, opening relays M1 and M2, respectively, and disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, and T7. Relays T1 and



ISSUE	DRAWING NO.
10	E-850215-A

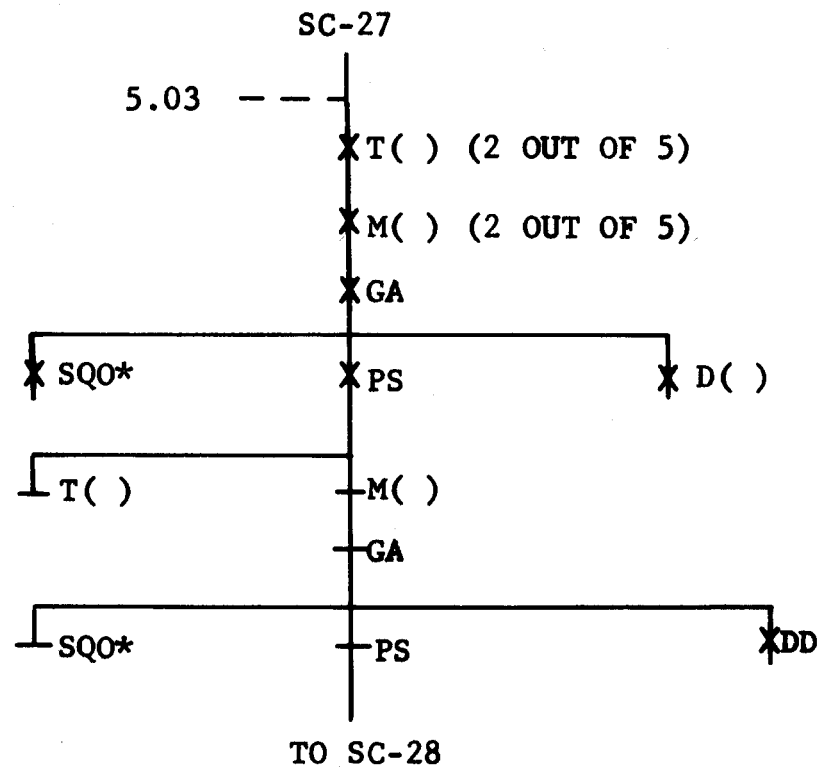
T2 restore. Relays M1 and M2 restore, open relay GA, and disconnect the MF tone from the outpulsing loop. Relay GA restores and removes ground from leads SQO and PS, opening magnet SQO and the #2 winding of relay PS, respectively. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs. Relay PS restores, connects lead TG to the #1 windings of relays TO, T1, T2, T4, and T7, and disconnects lead TG from the #2 winding of relay L.

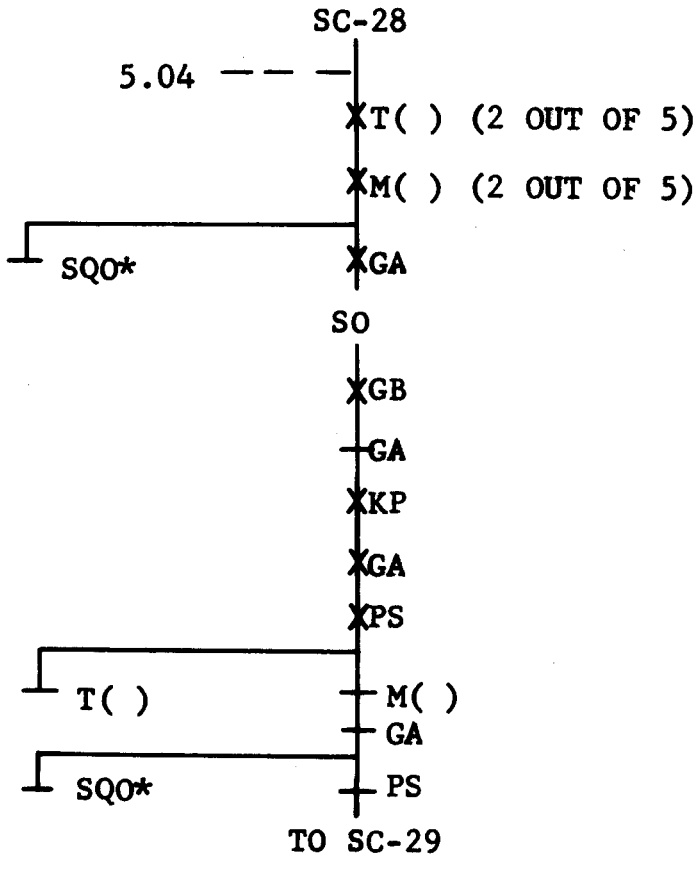
If any additional MF routing digits are required, the following operation is similar to that described in the previous paragraph except that relays KP and GB are already operated.

5.05 Advance to Codelreed Storage

When all the MF routing digits have been sent, the Translator extends "timed battery" via the route commons to LEVS D, E, and H of rotary switch SQO, closing the #1 windings of relays TO, T1, and T7. Relays TO, T1, and T7 operate to their "X" contacts, lock via their #2 windings, ground leads MMO, MM1, and MM7, closing relays MO, M1, and M7, respectively, operate fully, open their #1 windings, and close the #2 windings of relays AS and PS. Relays MO, M1, and M7 operate and ground lead SQO, closing magnet SQO. Magnet SQO operates and operates its INT springs. Relay PS operates to its "X" contacts, connects lead TG to the #2 winding of relay L, operates fully, opens the #2 windings of relays TO, T1, and T7, removes ground from leads MMO, MM1, and MM7, opening relays MO, M1, and M7, respectively, and disconnects lead TG from the #1 windings of relays TO, T1, T2, T4, and T7. Relay AS operates to its "X" contacts, operates fully, removes ground from leads MS and SQO, opening magnet SQO, and closes relay MP. Relay MP operates and locks. Magnet SQO restores, and rotary switch SQO steps to the next bank contacts and restores its INT springs, closing magnet SQO by ground via the LEV C wipers of rotary switch SQO. Magnet SQO operates, and rotary switch SQO steps self-interruptedly to bank contacts #13 of rotary switch SQO.

Rotary switch SQO will continue to step self-interruptedly to the bank contact of rotary switch SQO determined by the delete digit sent by the Translator. Since the digit "4" is being used as the delete digit in this explanation,



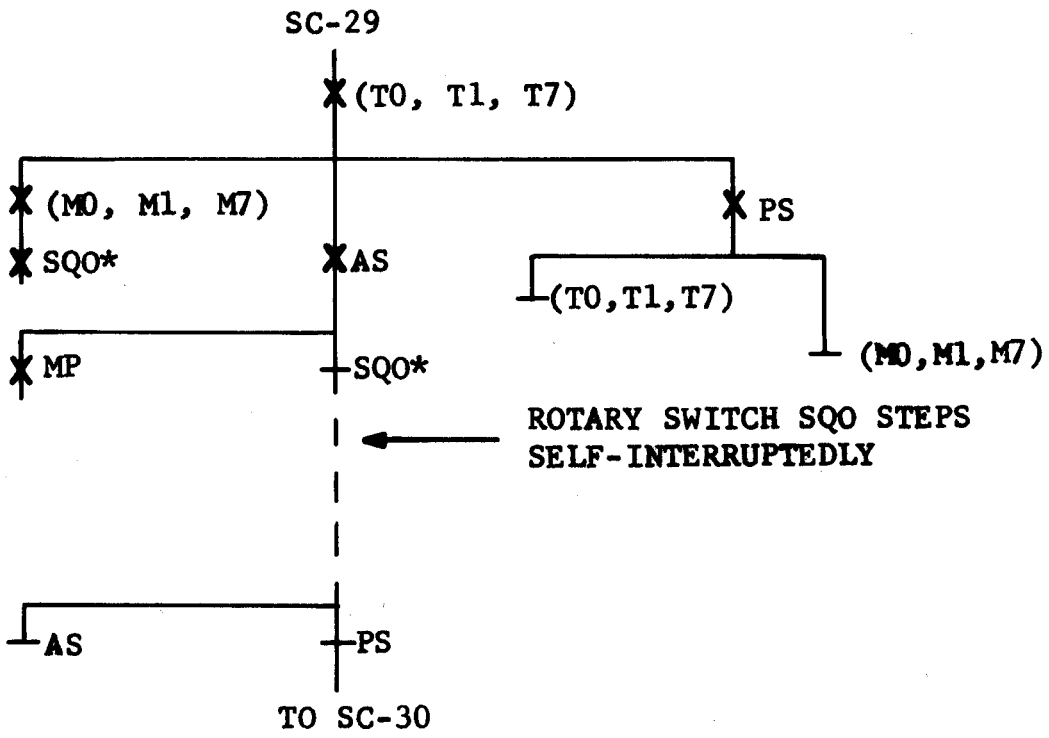


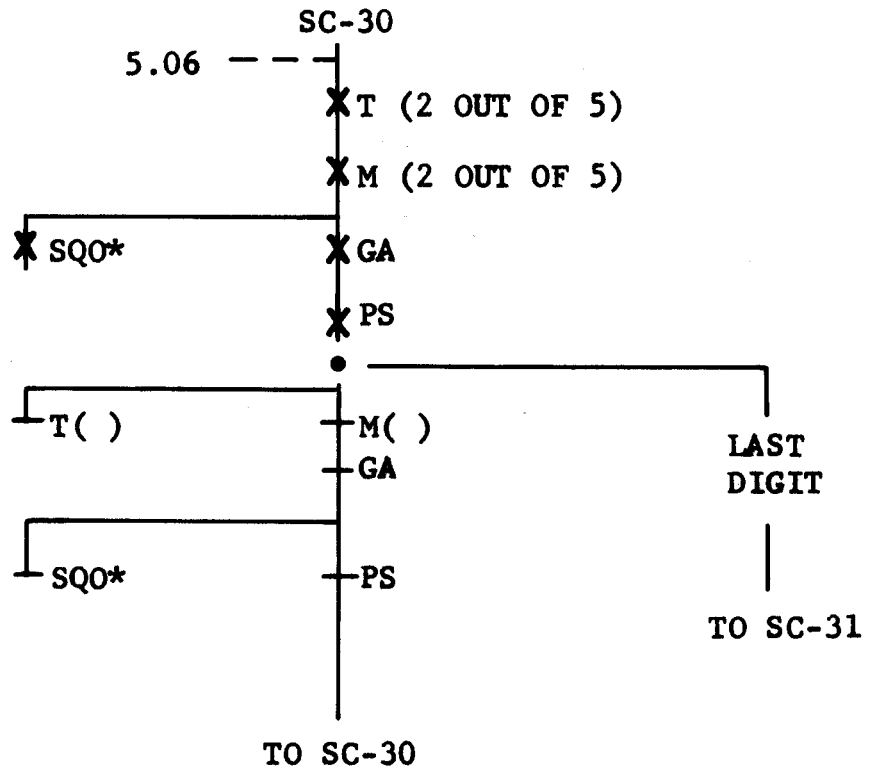
ISSUE	DRAWING NO.
10	E- 850215-A

ground is present on lead DE. Therefore, rotary switch SQO continues to step self-interruptedly to bank contacts #16 of rotary switch SQO where its LEV B and C wipers encounter absence of ground, opening the #2 windings of relays PS and AS. Relay AS restores and grounds lead MS. Relay PS restores, connects lead TG to the #1 windings of relays TO, T1, T2, T4, and T7, and disconnects lead TG from the #2 winding of relay L. The Register-Sender is now prepared to send the registered digits beginning with the 4th digit stored on the codelreeds.

5.06 Sending Stored Digits

"Timed battery" is connected to 2 out of 5 of LEVS D, E, F, G and H of rotary switch SQO depending on the stored digit to be sent. For example, assume that the digit 4 is the first stored digit to be sent. Then "timed battery" is connected to LEVS D and G of rotary switch SQO via the codelreed store, closing the #1 windings of relays TO and T4. Relays TO and T4 operate to their "X" contacts, lock via their #2 windings, ground leads MMO and MM4, closing relays MO and M4, respectively, operate fully, close the #1 and #2 windings of relay PC in magnetic opposition (for parity check), and open their #1 windings. Relays MO and M4 operate and close relay GA by ground via lead MS and ground lead SQO, closing magnet SQO. Magnet SQO operates and operates its INT springs. Relay GA operates, grounds lead PS, closing the #2 winding of relay PS, and connects the MF tone corresponding to the stored digit (see TABLE D, H-850215-A). Relay PS operates to its "X" contacts, connects lead TG to the #2 winding of relay L, operates fully, opens the #2 windings of the operated "T" relays (relays TO and T4 in this example), removes ground from the "MM" leads corresponding to the operated "T" relays (leads MMO and MM4 in this example), opening the operated "M" relays (MO and M4 in this example). Relays TO and T4 restore and open the #1 and #2 windings of relay PC. Relays MO and M4 restore, open relay GA, and disconnect the MF tone from the outpulsing loop. Relay GA restores and removes ground from leads PS and SQO, opening the #2 winding of relay PS and magnet SQO, respectively. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs. Relay PS restores, connects lead TG to the #1 windings of relays TO, T1, T2, T4, and T7, and disconnects lead TG from the #2 winding of relay L.





ISSUE	DRAWING NO.
10	E-850215-A

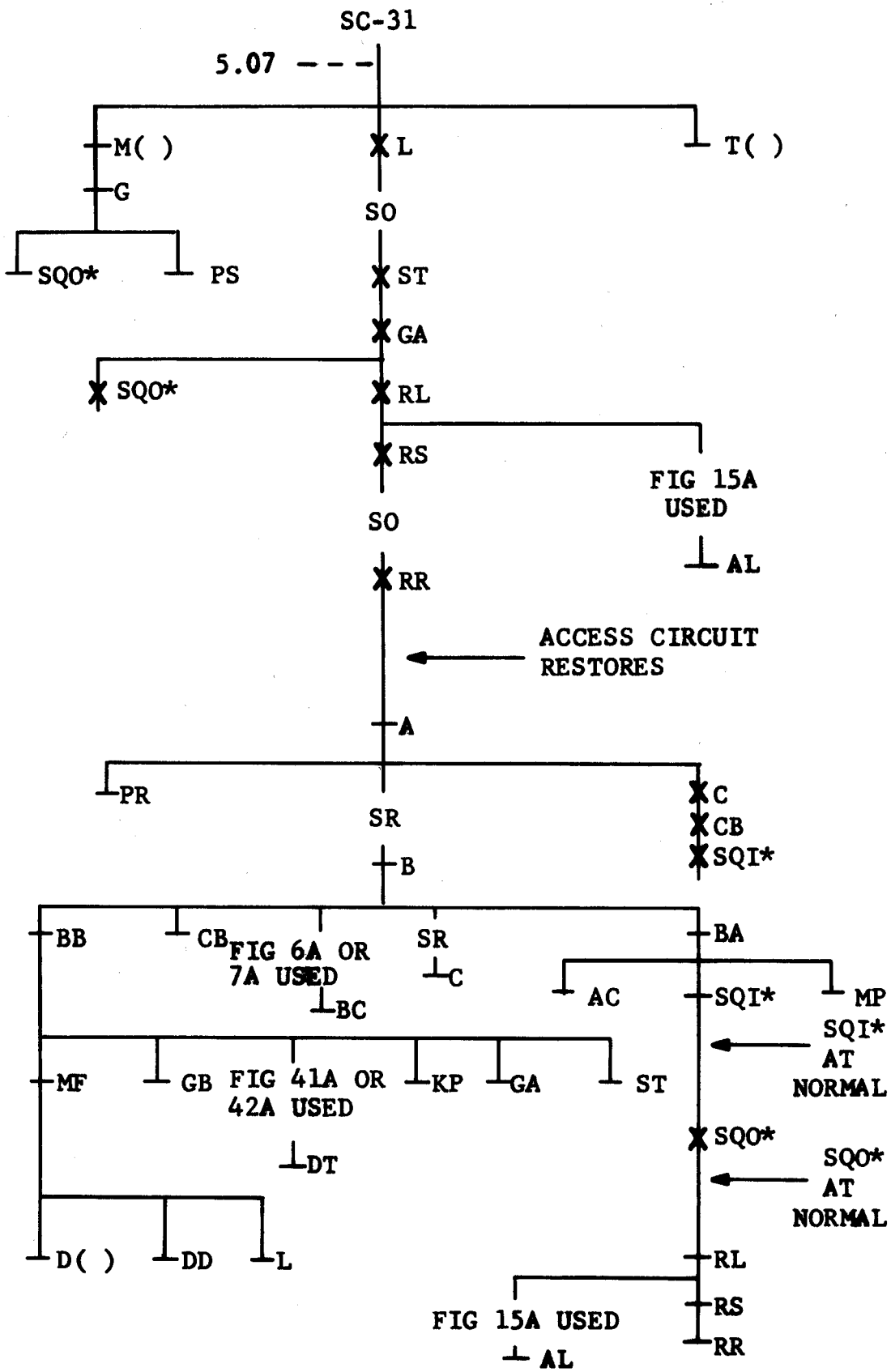
The remaining stored digits are sent via the multifrequency mode as described in the previous paragraph.

5.07 MF Release

When rotary switch SQO steps to the bank contacts corresponding to the last stored digit, the following operation is similar to that described in Section 5.06 except that the Translator extends "timed battery" via the route commons to LEV J of rotary switch SQO and, when relay PS operates to its "X" contacts, the #2 winding of relay L is closed by "timed ground" via lead TG. Relay L operates, locks via its #1 winding, and grounds lead ST, closing the #1 winding of relay ST. After its slow-to-operate interval, relay ST operates, locks via its #2 winding, and closes relay GA. Relay GA operates, grounds leads SQO and MR, closing magnet SQO and the #1 and #2 windings of relay RL in series with resistor R52, and connects "ST" tone (1700 & 1500 Hz) to the outpulsing loop. Magnet SQO operates and operates its INT springs. Relay RL operates to its "X" contacts, operates fully, locks, transfers lead SPY ("CJ" wiring) and lamp SUPY from ground to lead 60 IPM, disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, and T7, grounds leads GA, PC, and ALM(1), closes the #2 winding of relay RS, and removes ground from lead H thereby releasing the access circuit. Relay RS operates, closes relay RR, short-circuits the #2 winding of relay CL, and grounds TERMS 33 & 35 of CARD CONNECTORS 1-7. After its slow-to-operate interval, relay RR operates and removes ground from TERMS 33 & 35 of CARD CONNECTORS 1-7.

If FIG 15A is used, the following operation is the same as that described in Section 3.03.

When the access circuit restores, the loop to the #1 and #2 windings of relay A via leads -1 and +1 and the loop via leads +0 and -0 are opened. Relay A restores, opens relays B and PR, and closes relay C. Relay PR restores. Relay C operates, grounds leads CB, SQ, PG, and CC (FIG 41A or 42A), removes ground from leads CD (FIG 41A or 42A), CM, and TCL, transfers lead DSL from lead DSM to ground, disconnects capacitors C32 and C31 in series with resistor R64 from across leads +1 and -1 (FIG 41A or 42A), and closes relay CB. Relay CB operates, connects resistance (resistor R19) battery to lead TMN, and closes magnet SQI. Magnet SQI operates and operates its INT springs. After its slow-to-



ISSUE	DRAWING NO.
10	E-850215-A

release interval, relay B restores, removes ground from leads BB, CB, PG, RS, TONE ST, and (FIG 41A or 42A used) CC and BM, removes resistance (resistor R71) ground from lead LK (FIG 41A or 42A), grounds lead RL, opens relays BB, CB, C and BC (FIG 6A or 7A), and opens the #2 winding of relay BA. Relay BA restores, grounds lead BAG, removes ground from the LEV A wipers of rotary switch SQI, and opens magnet SQI, correed AC, and relay MP. Relay BB restores, transfers lead T from ground to lead DT, removes ground from leads ST, MS, and ML, and opens relays DT (FIG 41A or 42A), GA, GB, and KP and the #1 and #2 windings of relays MF and ST. Relay CB restores and removes resistance (resistor R19) battery from lead TMN. Relay BC restores. Correed AC restores. Relay DT restores. Relay MF restores, removes ground from lead DL, opening relay DD and the operated "D" relays (relays D0 and D4 in this example), and opens the #1 winding of relay L. Relay GA restores, removes "ST" tone (1700 & 1500 Hz) via repeat coil RC from the outpulsing loop, and removes ground from lead SQO, opening magnet SQO. Relays GB, KP, ST, DD, and L restore. Relays D0 and D4 restore and remove ground from leads DA, DD, DE, DH, and DJ. After the slow-to-release interval provided by resistor R57 and diode CR110 (FIG 1A or 10A) or by resistor R70 and diode CR125 (FIG 41A or 42A), relay C restores and transfers lead DSL from ground to lead DSM. Magnet SQI restores and the following operation is the same as that described in Section 3.01.1.1.

6.00 Alternate Routing [Operated: Relays A, B, BA, BB, and PR, correed AC, and possibly relays BC (FIG 6A or 7A) and DT (FIG 41A or 42A)]

6.01 All Trunks Busy

When all trunks of the primary route are busy, the Translator returns "timed battery" via the route commons to LEV J of rotary switch SQO, and the following operation is similar to that described in Section 3.04 except that when relay PS operates to its "X" contacts the #2 winding of relay L is closed. Relay L operates, locks via its #1 winding, and closes the #2 winding of relay AR. Relay AR operates to its "X" contacts, operates fully, closes relay SQ before it restores, and opens magnet SQO and the #2 winding of relay L. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs, closing magnet SQO by ground via the LEV B

relay PS operates to its "X" contacts, the #2 winding of relay L is closed. Relay L operates and locks via its #1 winding. During the interdigital pause following the outpulsing of the routing digit, the succeeding Selector steps to its 11th rotary position where positive booster battery is connected to lead +0, closing the #1 and #2 windings of relay BT (FIG 49A). Relay BT operates and connects lead BTD to lead BTC.

The operation for the interdigital pause is similar to that described in Section 4.02, except that, when relay PS restores, the #2 winding of relay AR is also closed and the #1 and #2 windings of relay L are opened. Relay AR operates to its "X" contacts, locks, recloses the #1 winding of relay L, and closes relay SQ, operates fully, disconnects lead TG from the #1 windings of relays TO, T1, T2, T4, and T7, and closes the #1 winding of relay AB. Relay AB operates to its "X" contacts, operates fully, locks, opens the outpulsing loop via leads +0 and -0, and opens the #1 and #2 windings of relay BT. Relay BT restores and disconnects lead BTC from lead BTD. After its slow-to-operate interval, relay SQ operates, closes relay BO (FIG 10A or 42A) and PM, turns on the pulse generator, and closes magnet SQO by ground via the LEV B wipers and INT springs of rotary switch SQO. Relay BO operates and disconnects leads -1 and +1 from leads -0 and +0 via capacitors N and P, respectively. Relay PM operates, closes the #1 winding of relay TF, and grounds terminal 4 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A or 47A). Relay TF operates, grounds terminal PP, and closes the #1 winding of relay P. Relay P operates to its "X" contacts, operates fully, and short-circuits winding A of shunt field relay SD and the #1 winding of relay PS. Magnet SQO operates, and steps self-interruptedly until the LEV B wipers of rotary switch SQO encounter absence of ground.

The pulse generator opens relay PM. Relay PM restores, opens the #1 winding of relay TF, and closes the #2 winding of correed CS1 in series with resistor R3 or connects resistance (resistor R3) ground to terminal 3 (CARD CONNECTOR 15 - FIG 43A, 44A, 46A, or 47A). Correed CS1 operates. Relay TF restores, turns off the pulse generator, removes ground from terminal PP, and removes the short circuit from the #1 winding of relay PS, closing the #1 winding of relay PS in series with the #1 winding of relay P.

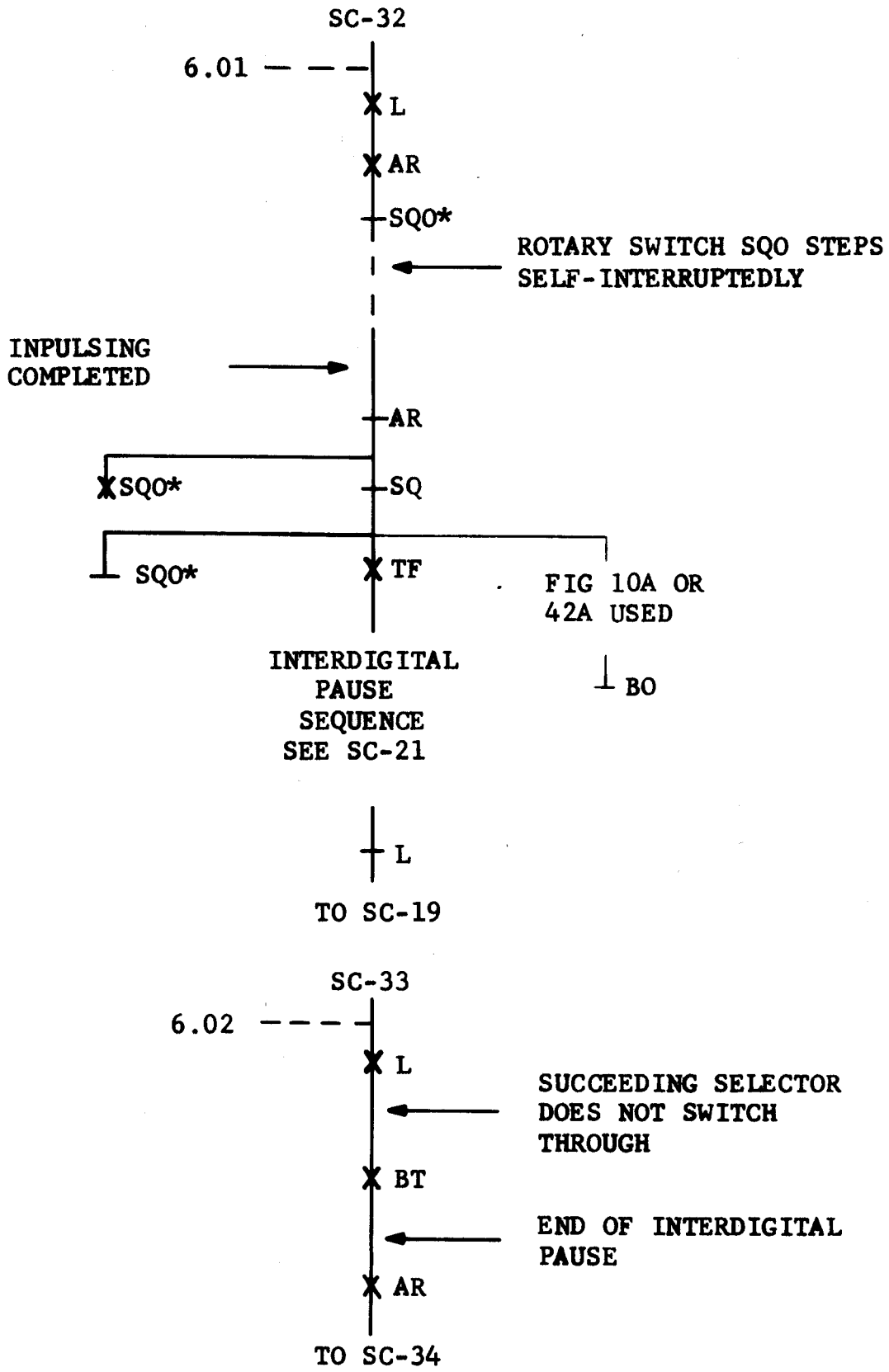
wipers of rotary switch SQO. Magnet SQO operates, and rotary switch SQO steps self-interruptedly to bank contacts of rotary switch SQO as determined by strapping (see NOTE 53, H-850215-A).

During the absorb digit cycle the calling party has continued dialing. Rotary switch SQI steps to the next bank contacts after each digit is sent. When the last digit has been registered, rotary switch SQI steps to its next bank contacts where its LEV A wipers encounter absence of ground, opening the #2 winding of relay AR. Relay AR restores, connects lead TG to the #2 winding of relay L, opens relay SQ, and closes magnet SQO. Magnet SQO operates and operates its INT springs. Relay SQ restores, disconnects lead TG from the #2 winding of relay L, opens relay BO (FIG 10A or 42A) and magnet SQO, and closes the #2 winding of relay TF. Magnet SQO restores, and rotary switch SQO steps its wipers to the next bank contacts and restores its INT springs. Relay BO restores and connects leads -1 and +1 to leads -O and +O via capacitors N and P, respectively. Relay TF operates, turns on the pulse generator, closes relay PM and the #2 winding of relay PS, and closes the #2 winding of relay P in magnetic opposition to the #1 winding of relay P. Relay PM operates, and the following operation is similar to that described in Section 4.02 except that, when relay PS restores, the #1 windings of relays AB and L are opened. Relay AB restores and closes the outpulsing loop via leads -O and +O. Relay L restores. The Register-Sender is now prepared to receive routing instruction from the Translator via the route commons.

6.02 No Selector Switch Through

When the Translator sends routing digits to the Register-Sender via the route commons, the Register-Sender outpulses the digits to step the succeeding Selector to the level corresponding to the routing digit if there is an idle trunk available (no "AR" on LEV J banks of rotary switch SQO). When the Selector finds an idle trunk and switches through, the routing is completed, and the Register-Sender can outpulse the stored digits.

If all the trunks of the succeeding Selector level become busy after outpulsing of the routing digit has begun, the Translator connects "timed battery" to the LEV J bank contact 5 of rotary switch SQO (1st alternate route) via the route commons. The outpulsing of the routing digit is similar to that described in Section 4.01 except that, when


SC-32
6.01
L
AR
SQO*
ROTARY SWITCH SQO STEPS SELF-INTERRUPTEDLY
INPULSING COMPLETED
AR
SQO*
SQ
SQO*
TF
FIG 10A OR 42A USED
BO
INTERDIGITAL PAUSE SEQUENCE SEE SC-21
L
TO SC-19
SC-33
6.02
L
SUCCEEDING SELECTOR DOES NOT SWITCH THROUGH
BT
END OF INTERDIGITAL PAUSE
AR
TO SC-34

Relay PS operates to its "X" contacts, operates fully, and opens the #2 windings of correed CS1 and relay AR. Correed CS1 restores. Relay AR restores, and the following operation is the same as that described in Section 6.01.

6.03 Special Delete Digit Instructions Needed for Alternate Routing (FIG 46A, 47A, 16A or 17A)

When the primary route is busy, alternate routes may have to be used which require different routing instructions than those provided for the primary route. In this case the Register-Sender must receive its alternate routing instructions before rotary switch SQO steps to the primary routing instruction position.

The following operation is similar to that described in Section 6.01 except that, when relay L operates, relay SL is also operated. Relay SL operates, locks, and removes ground from contact #11 of level C of rotary switch SQO.

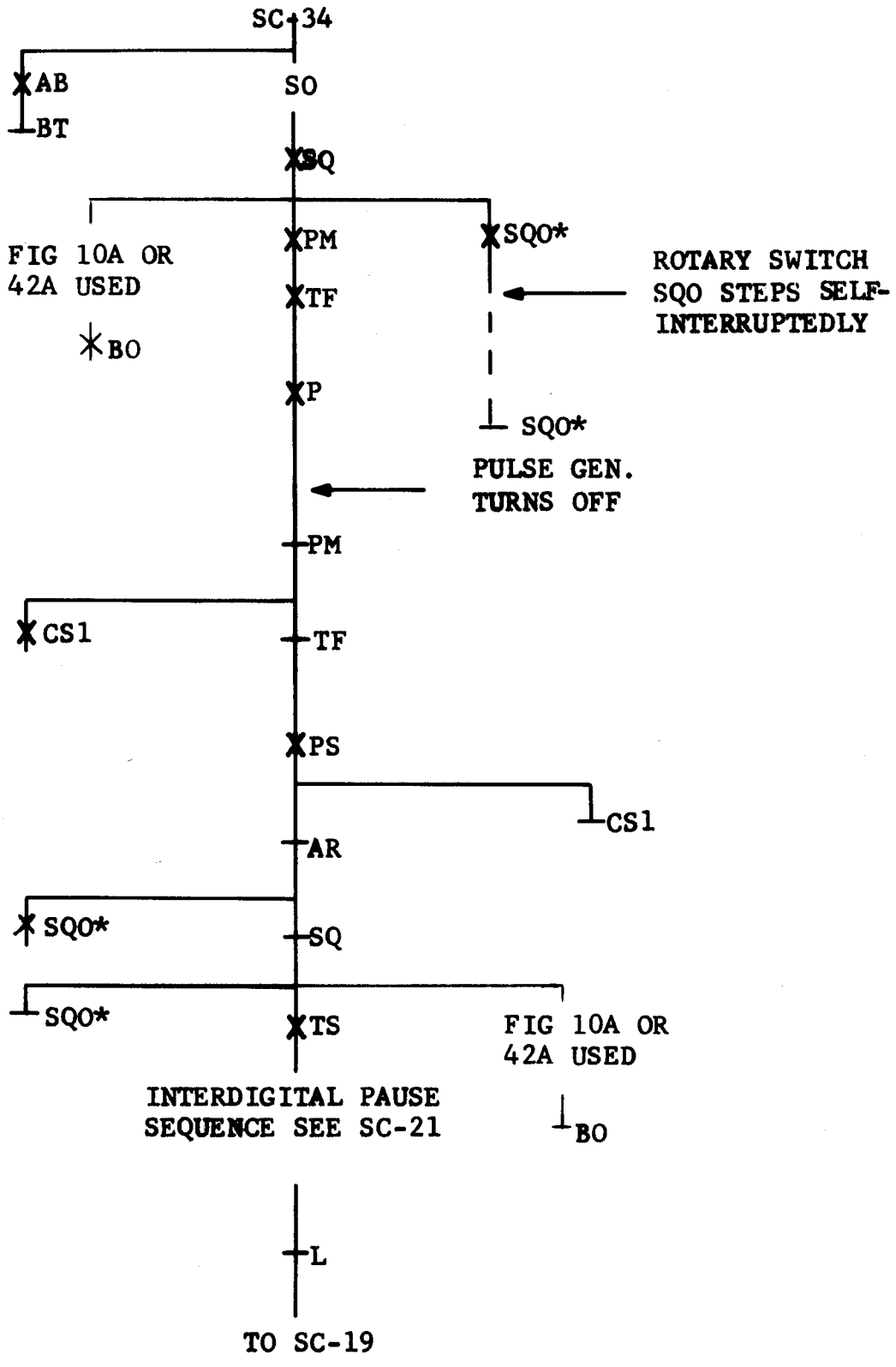
Once the Register-Sender receives its routing instructions, the following operation is similar to that described in Section 3.06 except that rotary switch SQO steps to its bank contacts #11 instead of #12. The delete digit operation is similar to that described in Section 3.07 except that outpulsing will start with the stored digit preceding the delete digit. For example: the digit 2 indicates that sending starts with the 1st stored digit, the digit 3 indicates that sending starts with the 2nd stored digit, etc.

7.00 Release [Operated: Relays A, B, BA, BB, PR, and MP, correed AC, and possibly relays DT (FIG 41A or 42A) and BC (FIG 6A or 7A)]

7.01 Via Strapping

The LEV A bank of rotary switch SQO is wired to release the Register-Sender after the last stored digit is sent (see NOTE 54, H-850215-A). When rotary switch SQO steps to the bank contact of LEV A of rotary switch SQO wired to strap A, relay RL is closed.

Relay RL operates to its "X" contacts, operates fully, locks, removes ground from lead H thereby releasing the



ISSUE	DRAWING NO.
10	E-850215-A

access circuit, disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, and T7, transfers lead SPY ("CJ" wiring) and lamp SUPY from ground to lead 60 IPM, closes the #2 winding of relay RS, and grounds leads GA, PC, and ALM(1). Relay RS operates, closes relay RR, and grounds TERMS 33 & 35 of CARD CONNECTORS 1-7. After its slow-to-operate interval, relay RR operates and removes ground from TERMS 33 & 35 of CARD CONNECTORS 1-7.

When the access circuit restores, the following operation is similar to that described in Section 3.01.1.1 except that relay CL is not operated and relay MP is opened when relay BA restores. Relay MP restores.

7.02 Via "AR Mark

When rotary switch SQO steps to the contacts corresponding to the last stored digit, the following operation is similar to that described in Section 4.01 except that the Translator extends "timed battery" via the route commons to LEV J of rotary switch SQO and, when relay PS operates to its "X" contacts, the #2 winding of relay L is closed by "timed ground" via lead TG. Relay L operates, locks via its #1 winding ("T" relays restored), and closes the #1 and #2 windings of relay RL in series with resistor R52. Relay RL operates, and the following operation is similar to that described in Section 7.01 except that, when relay BA restores, relays PS and TF are opened, and (if operated) opens relay PM and any CS( ) correeed. Relay PS restores and opens the #1 winding of relay L. Relays L, TF, and PM and correeed CS( ) restore.

7.03 "CT" Wiring Provided

Operation is similar to that described in Section 7.01 except when relay RL operates operation then proceeds as described in Section 3.03.1.

8.00 Parity Check

During outpulsing, this circuit performs a parity check on the digit stored in the codel reeds to determine if a valid 2 out of 5 code is being received. When a valid code is being sent, 2 out of the 5 "T" relays are operated. Relay PC is adjusted to operate when 1, 3, 4, or 5 of resistors R14-R18 are in parallel with each other and in series with the #1 winding of relay PC. Relay PC does not operate when any 2 of resistors R14-R18 are in parallel with each other and in series with the #1 winding of relay PC.

When a valid 2 out of 5 code is received, the following operation is the same as that described in Section 4.01.

When an invalid code is received, 1, 3, 4, or 5 of the "T" relays operate to their "X" contacts, lock, operate fully, open their #1 windings, close relays SQ and PC, and close or open various relays depending upon the combination of "T" relays operated. Relay PC operates and connects resistance (potentiometer R46) ground to lead TMN thereby charging capacitor C27 (FIG 14A) via resistor R51. After its slow-to-operate interval, relay SQ operates. When capacitor C27 has charged sufficiently, silicon controlled rectifier Q2 is triggered. Silicon controlled rectifier Q2 turns on and closes the #1 winding of relay TM1. Relay TM1 operates to its "X" contacts, locks via its #2 winding, operates fully, grounds the LEV B wipers of rotary switch SQI, grounds leads ALM(2) and GA, closes the #1 winding of relay DS in series with the #1 winding of relay AB, closes the #1 winding of relay BA, and closes relay SC in series with resistor R7. Relay SC operates and disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, and T7. Relay AB operates to its "X" contacts and operates fully. Relay DS operates to its "X" contacts, connects lead +0 to lead -0, and operates fully. The Register-Sender is now locked and is prevented from outpulsing any additional digits.

When the calling party disconnects, the loop to the #1 and #2 windings of relay A via leads -1 and +1 is opened. Relay A restores, opens relays B and PR, and closes relay C. Relay PR restores. Relay C operates, grounds leads CB, SQ, PG, and CC (FIG 41A or 42A), removes ground from leads CD (FIG 41A or 42A), CM, and TCL, transfers lead DSL from lead DSM to ground, disconnects capacitors C31 and C32 in series with resistor R64 from across leads -1 and +1 (FIG 41A or 42A), and closes relay CB. Relay CB operates and closes magnet SQI. Magnet SQI operates and operates its INT springs. After its slow-to-release interval, relay B restores, removes ground from leads BB, CB, PG, RS, TONE ST, and (FIG 41A or 42A used) CC and BM, removes resistance (resistor R71) ground from lead LK (FIG 41A or 42A), grounds lead RL, closes relay RL, and opens relays BB, CB, C, and BC (FIG 6A or 7A) and the #2 winding of relay BA. Relay RL operates to its "X" contacts, operates fully, locks, removes ground from lead H thereby releasing the access circuit, transfers lead SPY ("CJ" wiring) and lamp SUPY from ground to lead 60 IPM, and grounds leads PC and

ALM(1). Relay CB restores and opens magnet SQI. Relay BC restores. Relay BB restores, removes ground from the LEV A wipers of rotary switch SQI, transfers lead T from ground to lead DT, and opens relay DT (FIG 41A or 42A). Magnet SQI restores, and rotary switch SQI steps its wipers to the next bank contact and opens its INT springs. Relay DT restores. After the slow-to-release interval provided by resistor R57 and diode CR110 (FIG 1A or 10A) or by resistor R70 and diode CR125 (FIG 41A or 42A), relay C restores and transfers lead DSL from ground to lead DSM. The Register-Sender remains locked out of service until the RESET key is operated.

When the RESET key is operated, silicon controlled rectifier Q2 is turned off, ground is removed from lead ALM(2), relays SC and PC are opened, and the #1 windings of relays BA, DS, and AB are opened. Relay BA restores, grounds lead BAG, closes magnet SQI, and opens relays SQ, PC, and MP, the #2 winding of relay TM1, all of the operated "T" relays, winding A of shunt field relay SD, and correed AC (if operated). Relays AB and DS restore and disconnect lead +0 from lead -0. Relays SC, TM1, MP, SQ, and "T" restore. Correed AC restores. Magnet SQI operates, and rotary switch SQI steps self-interruptedly to its "home" position where its ON springs operate, open the "homing" circuit, and close magnet SQO via its INT springs. Magnet SQO operates, and rotary switch SQO steps self-interruptedly to its "home" position where its ON springs operate, open its "homing" circuit, and short-circuit the #1 and #2 windings of relay RL. Relay RL restores, disconnects lead 60 IPM from lead SPY ("CJ" wiring) and lamp SUPY, transfers lead G from ground to resistance (resistor R7) battery, transfers lead TMC from resistance (resistor R13) ground to resistance (resistor R7) battery, and grounds lead ATB. The circuit is now at normal.

9.00 Dialing Errors (Operated: Relays A, B, BA, and PR, correed AC, and possibly relays TC, S, DS, and BG)

9.01 Failure to Dial Any Digits

9.01.1 "L" Wiring Used

If a subscriber seizes the Register-Sender as described in Section 1.00 but fails to dial within a predetermined time interval (see NOTE 9, H-850215-A), capacitor C27 (FIG 14A)

charges sufficiently to trigger silicon controlled rectifier Q2. Silicon controlled rectifier Q2 turns on and closes the #1 winding of relay TM1. Relay TM1 operates to its "X" contacts, locks via its #2 winding, operates fully, closes the #2 winding of relay RS, and closes the #1 and #2 windings of relay RL in series with resistor R52. Relay RL operates to its "X" contacts, operates fully, locks, removes ground from lead H thereby releasing the access circuit, disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, or T7 (relay DS operated), transfers lead SPY ("CJ" wiring) and lamp SUPY from ground to lead 60 IPM, and grounds leads PC, GA, and ALM(1). Relay RS operates, closes relay RR, and grounds TERMS 33 & 35 of CARD CONNECTORS 1-7. After its slow-to-operate interval, relay RR operates and removes ground from TERMS 33 & 35 of CARD CONNECTORS 1-7.

When the access circuit restores, the following operation is similar to that described in Section 3.01.1.1 except that relays CL, BB, DT, and BC are not operated, relay BG is opened (if operated) when relay B restores, and relays DS, TM1, and TC are opened (if operated) and silicon controlled rectifier Q2 is turned off when relay BA restores. Relay BG restores and opens the #3 winding of polar relay PA ("J" wiring). Relays DS and TM1 restore. Relay TC restores, disconnects leads TS1 and TS2 from leads -1 and +1, respectively, connects lead TCA to the #1 winding of relay TC, transfers lead TB from lead TCM to lead DPM, and opens relay S. Relay S restores.

9.01.2 "P" Wiring Used

The following operation is similar to that described in Section 9.01.1 except that the #1 and #2 windings of relay RL are not closed when relay TM1 operates. Relay RS operates, closes relays RR and NC, and grounds TERMS 33 & 35 of CARD CONNECTORS 1-7. After its slow-to-operate interval, relay NC operates, locks, connects lead TG to the #2 winding of relay L, transfers lead TB from terminal 21 of CARD CONNECTOR 1 to lead PL, opens (if operated) relay BG and the #2 winding of relay DS, opens the #1 and #2 windings of relay TM1, and turns off silicon controlled rectifier Q2. After its slow-to-operate interval, relay RR operates and removes ground from TERMS 33 & 35 of CARD CONNECTORS 1-7. Relay DS restores. Relay BG restores and opens the #3 winding of relay PA ("J" wiring). Relay TM1 restores, removes ground from the LEV B wipers of rotary switch SQI,

and opens the #2 winding of relay RS. Relay RS restores and opens relay RR. Relay RR restores. The Register-Sender is now prepared to receive routing instructions from the Translator. The call may now be routed to an intercept trunk, to an information Operator, or to a vacant level to receive busy tone depending upon the operating procedures of the telephone company.

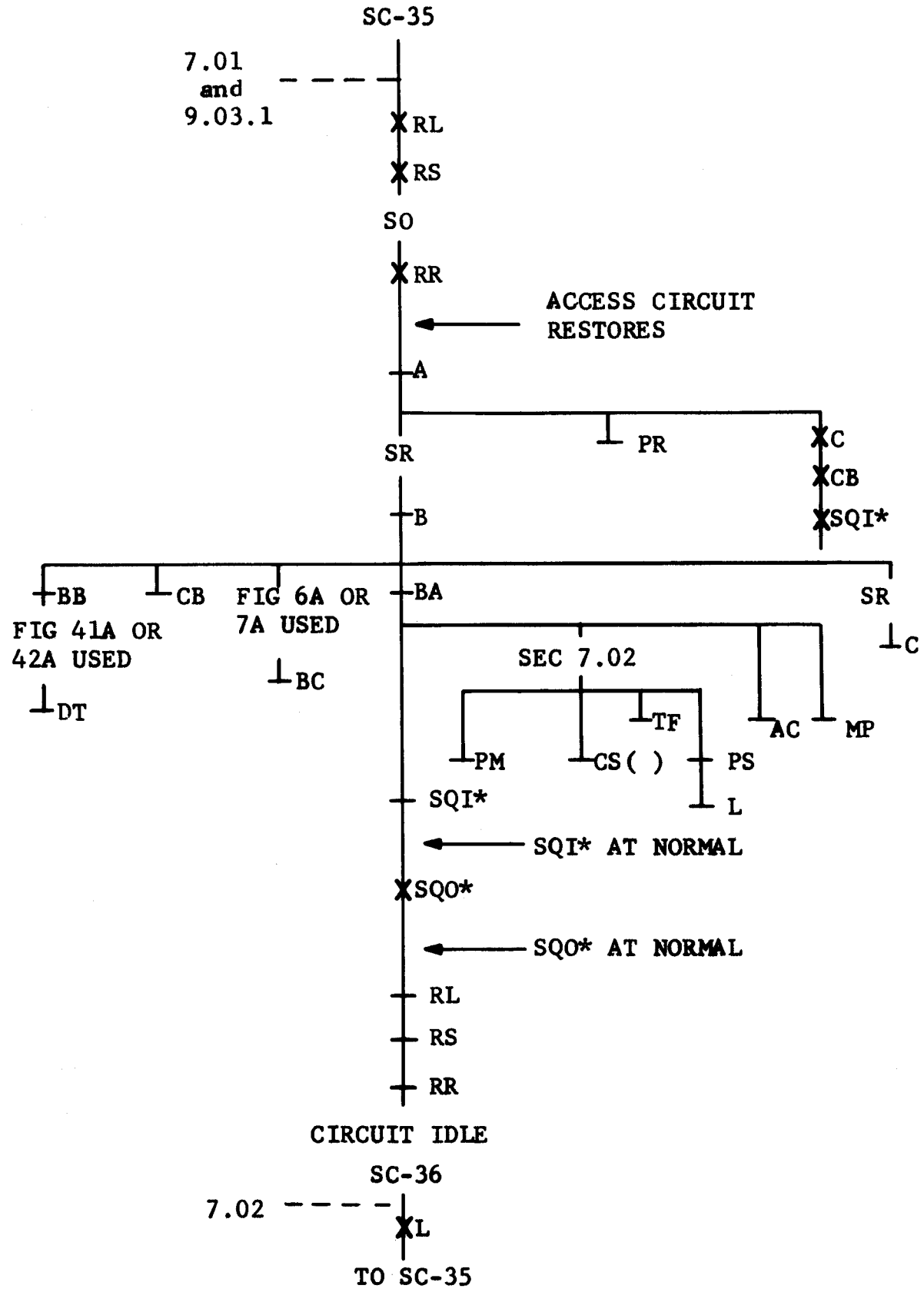
9.02 Partial Dialing (Operated: Relays A, B, BA, BB, and PR, correed AC, and possibly relays BC and DT)

9.02.1 "U1" Wiring Used; "T" Wiring Omitted

During the interdigital pause while the calling party is dialing the digits of a desired number, resistance (potentiometers R44 and R46 in series) ground is connected to lead TMN as described in Section 2.00. If the calling party waits longer than a predetermined interval (see NOTE 9, H-850215-A) to dial the next digit, capacitor C27 (FIG 14A) charges sufficiently to trigger silicon controlled rectifier Q2. Silicon controlled rectifier Q2 turns on and closes the #1 winding of relay TM1. Relay TM1 operates to its "X" contacts, locks via its #2 winding, operates fully, and closes the #2 winding of relay RS. Relay RS operates, and the following operation is similar to that described in Section 9.01.2 except that lead TB is connected to lead NC when relay NC operates.

9.02.2 "T" Wiring Used; "U1" Wiring Omitted

The following operation is similar to that described in Section 9.02.1 except that relays RR and NC are closed and TERMS 33 & 35 of CARD CONNECTORS 1-7 are grounded when relay RS operates. After its slow-to-operate interval, relay NC operates, locks, transfers lead TB from terminal 21 of CARD CONNECTOR 1 to lead NC, opens the #1 and #2 windings of relay TM1, turns off silicon controlled rectifier Q2, and closes the #1 and #2 windings of relay RL in series with resistor R52. After its slow-to-operate interval, relay RR operates and removes ground from TERMS 33 & 35 of CARD CONNECTORS 1-7. Relay TM1 restores, removes ground from the LEV B wipers of rotary switch SQI, and momentarily opens the #2 winding of relay RS. Relay RL operates to its "X" contacts, operates fully, locks, removes ground from lead H thereby releasing the access circuit, disconnects lead TG from the #1 windings of relays T0, T1, T2, T4, and



ISSUE	DRAWING NO.
10	E-850215-A

T7, transfers lead SPY ("CJ" wiring) and lamp SUPY from ground to lead 60 IPM, and grounds lead PC, ALM(1), and GA.

When the access circuit restores the following operation is similar to that described in Section 3.01.1.1 except that relay CL is not operated and relay NC is opened when relay BA restores.

9.03 Dialing Excess Digits (Operated: Relays A, B, BA, BB, and PR, correed AC, and possibly relays BC and DT)

9.03.1 "LL" Wiring Used

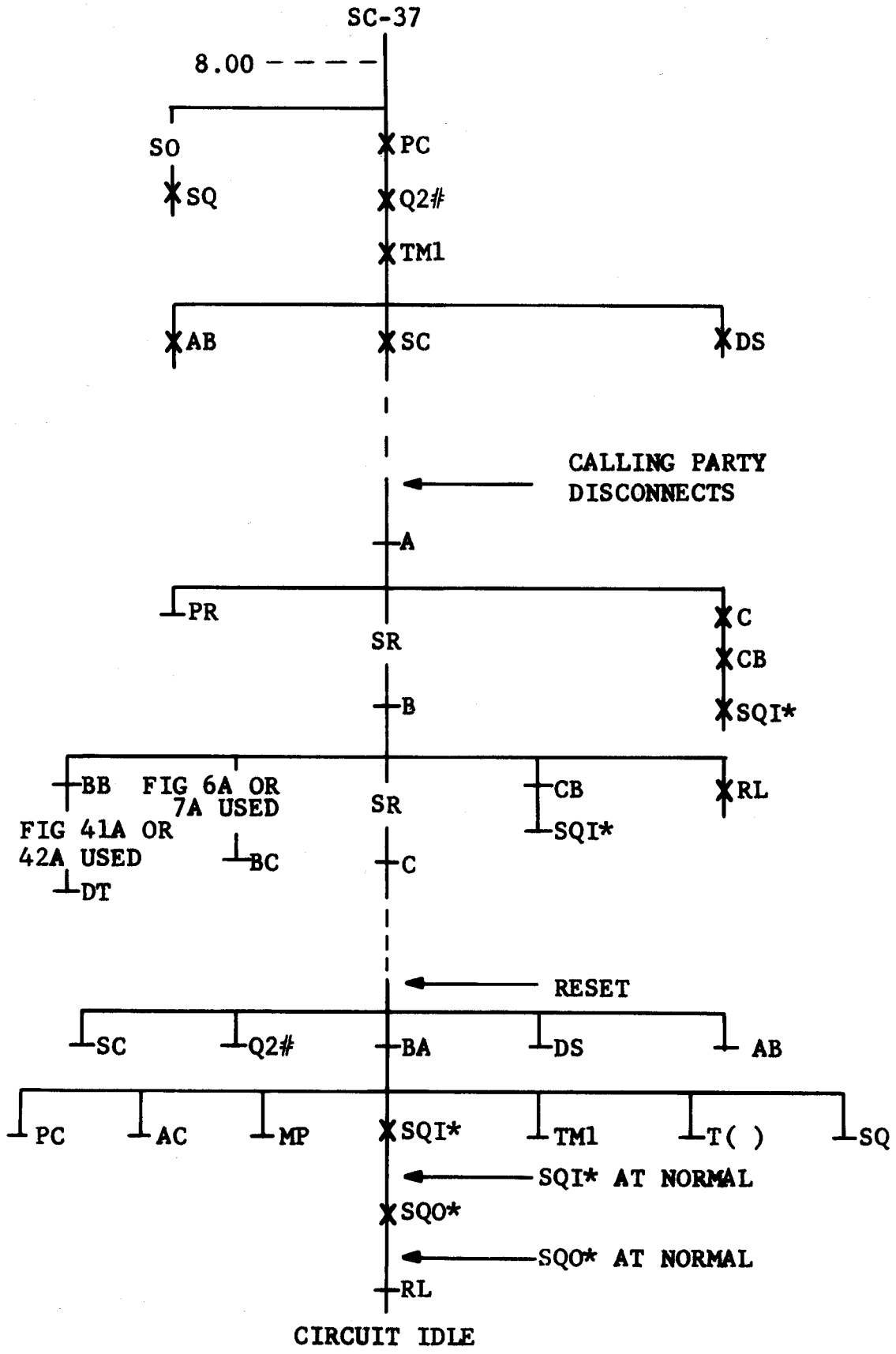
Rotary switch SQI takes one step after registering each digit the calling party dials. If the calling party dials an excess number of digits and rotary switch SQI steps to its bank contact #15, the #1 and #2 windings of relay RL are closed in series with resistor R52. Relay RL operates, and the following operation is the same as that described in Section 7.01.

9.03.2 "MM" Wiring Used

If the calling party dials an excess number of digits and rotary switch SQI steps to its bank contact #15, relay NC is closed. After its slow-to-operate interval, relay NC operates, locks, connects lead TG to the #2 winding of relay L, and transfers lead TB from terminal 21 of CARD CONNECTOR 1 to lead NC. The Register-Sender is now prepared to receive routing instructions from the Translator. The call may now be routed to an intercept trunk, to an information Operator, or to a vacant level to receive busy tone depending on the operating procedures of the telephone company.

10.00 Stop Dial

When a succeeding circuit is not prepared to accept the digits being outpulsed by the Register-Sender, battery polarity is reversed via leads -O and +O closing winding A of shunt field relay SD magnetically aiding winding B during the interdigital pause as described in Section 4.02. Shunt field relay SD operates. When relay PS restores as described in Section 4.02, lead TG is not connected to the #1 windings of relays TO, T1, T2, T4, and T7 thereby pre-



ISSUE	DRAWING NO.
10	E-850215-A

venting the "T" relays from operating and outpulsing the next stored digit.

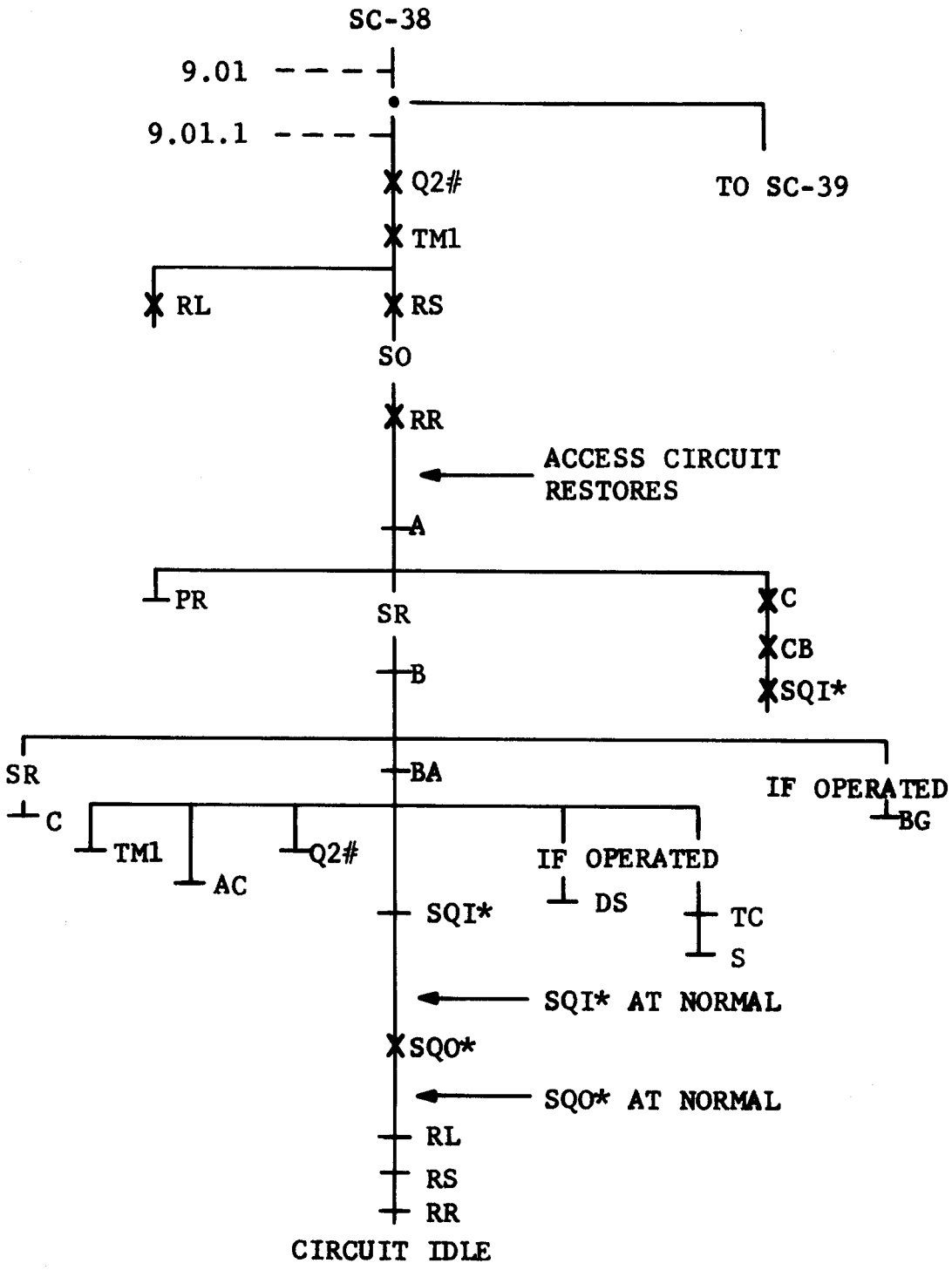
When the stop dial condition is removed, the succeeding circuit returns normal polarity via leads -0 and +0 thereby closing winding A of shunt field relay SD in magnetic opposition to its B winding. Shunt field relay SD restores and connects lead TG to the #1 windings of relays T0, T1, T2, T4, and T7. The Register-Sdnder is now able to continue outpulsing the stored digits as described in Sections 4.01 and 4.02.

11.00 Time Division Failure

If time division ground via lead TG becomes permanent ground, the #2 winding of relay TD is closed and lamp L1 is lighted brightly. If time division battery via lead TB becomes permanent battery, the #1 winding of relay TD is closed and lamp L2 is lighted brightly. In either case, relay TD operates, disconnects lead TB from lead TBB and terminal 21 of CARD CONNECTOR 1, disconnects lead TG from lead TGA and the #1 windings of relays T0, T1, T2, T4, and T7, (relay BA operated), transfers lead SPY ("CJ" wiring) and lamp SUPY from ground (relay BA operated) to lead 60 IPM, closes the #1 winding of relay BA, grounds the LEV H wipers of rotary switch SQI, closes relay SC, grounds leads ALM(2) and GA, and closes the #1 winding of relay DS in series with the #1 winding of relay AB. Relay SC operates. Relay DS operates to its "X" contacts, and operates fully. Relay AB operates to its "X" contacts, short-circuits the pulsing contacts of relays PR and PM by connecting lead -0 to lead +0, and operates fully.

If FIG 15A is used, grounding lead ALM(2) short-circuits the #1 winding of normally operated relay AL. Relay AL restores, grounds lead AP, and grounds lead AS ("GX" wiring) or connects resistance (lamp ALM) battery to lead AS ("HH" wiring).

When the fault is corrected, permanent ground is removed from lead TG, opening the #2 winding of relay TD and extinguishing lamp L1 or permanent battery is removed from lead TB, opening the #1 winding of relay TD and extinguishing lamp L2. In either case, relay TD restores, connects lead TB to lead TBB and terminal 21 of CARD CONNECTOR 1, connects lead TG to lead TGA, transfers lead SPY ("CJ" wiring)



ISSUE	DRAWING NO.
10	E-850215-A

and lamp SUPY from lead 60 IPM to ground, removes ground from the LEV H wipers of rotary switch SQI, removes ground from leads ALM(2) and GA, opens relay SC and the #1 windings of relays DS, BA and AB. Relay AB restores and disconnects lead -0 from lead +0. Relays DS and SC restore and connect lead TG to the #1 windings of relays T0, T1, T2, T4, and T7 (relay BA operated).

If FIG 15A is used, the short circuit is removed from the #1 winding of relay AL when ground is removed from lead ALM(2), closing the #1 winding of relay AL in series with its #2 winding. Relay AL operates, removes ground from lead AP, and removes ground from lead AS ("GX" wiring) or removes resistance (lamp ALM) battery from lead AS ("HH" wiring).

12.00 Class of Service (FIG 4A)

Seizure is the same as that described in Section 1.00 except that the EC or EC1 lead encounters the following conditions:

Class #1 = No Connection

Class #2 = Direct Ground

Class #3 = 2000 Ohm Ground

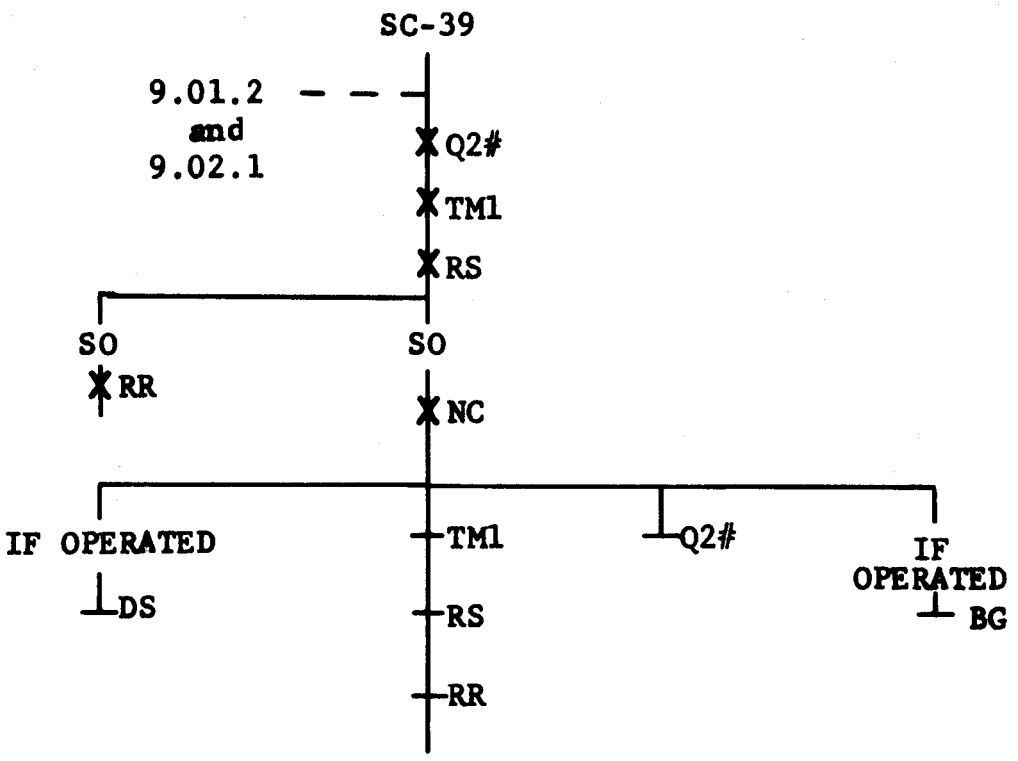
When class of service is #1, there is no operation in this circuit.

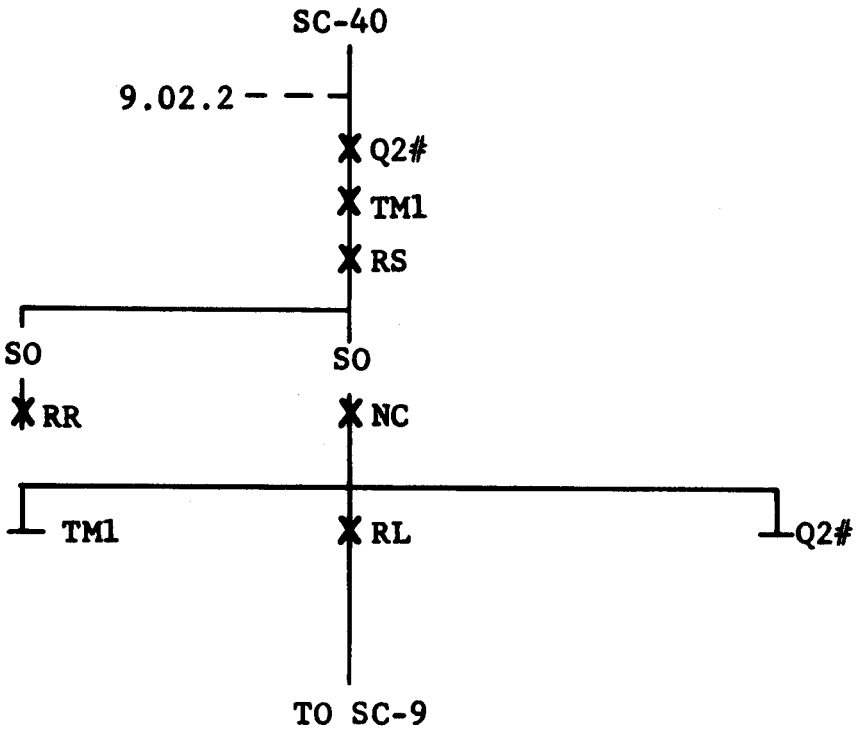
When the class of service is #2, ground is connected to lead EC or EC1, closing relay SA in series with relay SB. Relays SA and SB operate and connect leads TBA and CSD to leads CSC and CSE, respectively.

When the class of service is #3, resistance ground is connected to lead EC or EC1, closing relay SA in series with relay SB. Relay SA operates and transfers lead TBA from lead CSA to lead CSB. Relay SB does not operate in series with relay SA and resistance ground.

13.00 Two Party Identification (FIG 7A)

When 2 party identification is required, the Register-Sender is normally released upon recognition of a SATT access code to permit party identification to be detected





ISSUE	DRAWING NO.
10	E-850215-A

in the Ticketer. When a translated routing is required for SATT access, the Register-Sender identifies and repeats the party identification to the succeeding Ticketer. Party #2 has a resistance ground mark on the tip side of the line.

If party #1 makes a call, operation is the same as that described in Section 2.01.

If party #2 makes a call, the following operation is similar to that described in Section 2.01 except that when the calling party dials, the current flow is reversed via leads -1 and +1, closing the #1 and #2 windings of polar relay PA magnetically aiding its #3 winding. Relay PA operates and closes relay PB. Relay PB operates, locks, and connects resistance (resistor R31) ground to lead +0.

14.00 Register-Resender (FIG 10A or 42A used)

If this circuit is to operate as a Register-Resender without translations, for applications for Touch Calling where no EAS translation is required, leads TB and TG are strapped to battery and ground, respectively; ground is connected to bank contact #12 of rotary switch SQO; the #1 and #2 windings of relay TD are disconnected from leads TB and TG, respectively; and "TT" wiring is used.

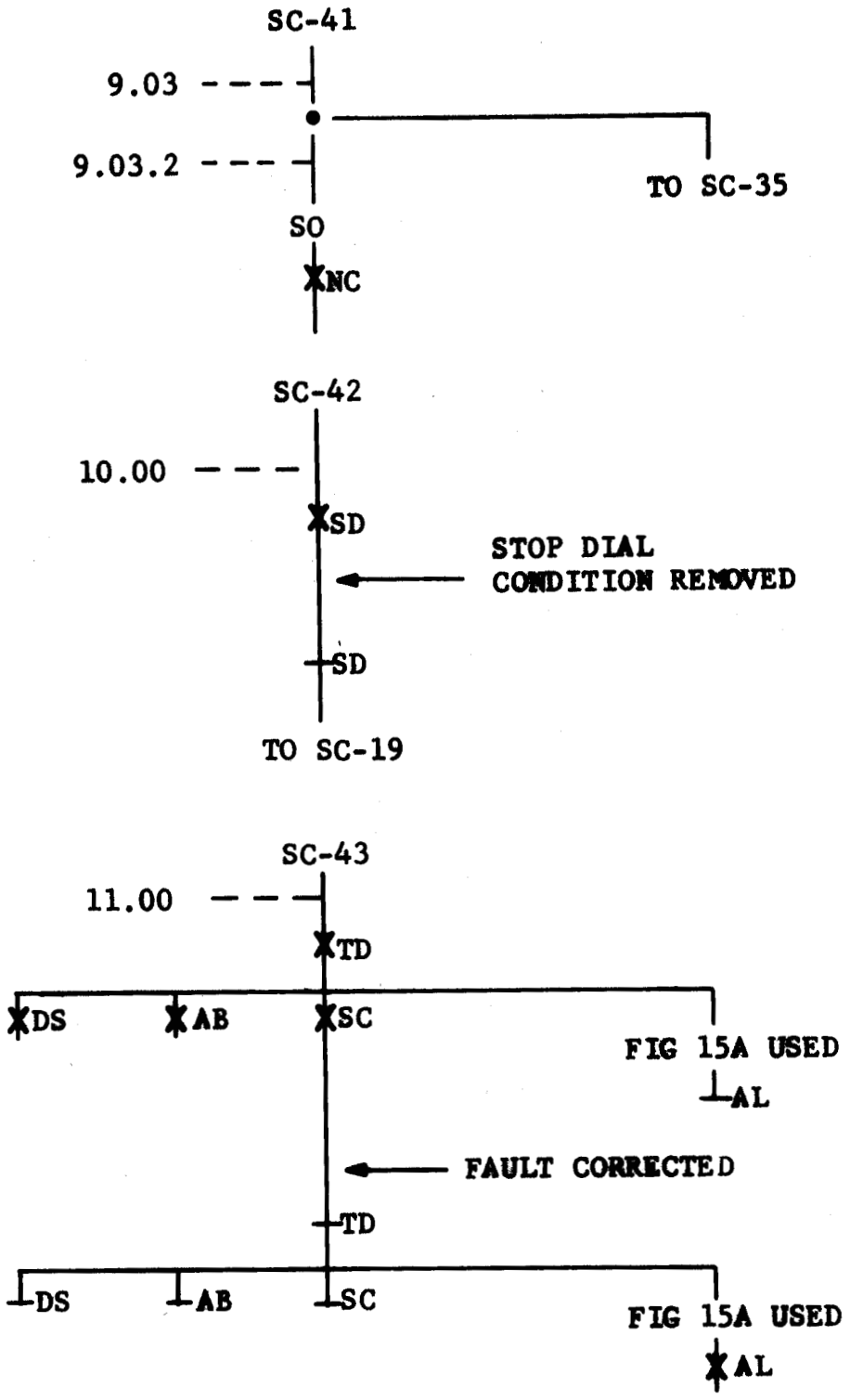
Seizure is similar to that described in Section 1.00 except that when rotary switch SQO operates, it steps self-interruptedly to its bank contact #13.

14.01 Dial Phone Used

When the calling party uses a dial phone, the operation is similar to that described in Section 2.01 ("G" wiring used) except that when relay C restores, lead RL is grounded, closing the #1 and #2 winding of relay RL in series with resistor R52. Relay RL operates, and the following operation is similar to that described in Section 7.01 except that relay MP is not operated and relay CL may be operated.

14.02 Touch Call Phone Used

When the calling party uses a Touch Call phone, the operation is similar to that described in Section 2.02 except that, when the first digit is keyed, the Touch Call Receiver returns ground via 2 out of leads 1A-5A to 2 out of LEV C,


SC-41
9.03
9.03.2
TO SC-35
SO
NC
SC-42
10.00
SD
STOP DIAL
CONDITION REMOVED
SD
TO SC-19
SC-43
11.00
TD
DS
AB
SC
FIG 15A USED
AL
FAULT CORRECTED
TD
DS
AB
SC
FIG 15A USED
AL

D, E, F, and G wipers of rotary switch SQI. Assume, for purposes of this explanation, that the digit 3 is keyed. Therefore, the Touch Call Receiver returns ground to LEVS D and E of rotary switch SQI, closing 2 codelreeds on the codelreed storage card. The 2 codelreeds operate and connect battery to the LEV E and F bank contact #13, closing the #1 windings of relays T1 and T2 (corresponding to the digit 3) by ground via lead TG (relay DS not operated). The "T" relays corresponding to the digit dialed (relays T1 and T2 in this example) operate, and the following operation is similar to that described in Sections 4.01 and 4.02 except that, when relay PS restores at the end of the interdigital pause, 2 "T" relays are closed which correspond to the second digit that was keyed.

The calling party may continue keying digits while the Register-Sender is outpulsing digits. After all the digits have been keyed, the Register-Sender continues outpulsing the remaining digits stored in the codelreeds.

When all the stored digits are outpulsed, the Register-Sender releases as described in Section 7.01 if the LEV A wipers of rotary switch SQO are resting on a back contact connected to strap "A" (see NOTE 54, H-850215-A). If the wipers of rotary switch SQO are not resting on bank contact connected to strap "A", the Register-Sender times out to release this circuit.

15.00 Load Control Circuit

15.01 Figure 11A Used

This circuit is provided when an accelerated time-out of all Register-Senders is required. When the total office traffic exceeds a predetermined value (see NOTE 64, H-850215-A), polarized relay PL operates to the position where the #2 winding of relay FT is closed. Relay FT operates, locks, and grounds leads TS(1), TS(2), TS(3), and TS(4), closing relay R (FIG 15A). Relay R operates and connects leads TA(1)-TA(7) to leads TM2(1)-TM2(7) respectively.

When the number of busy Register-Senders in the office falls below a predetermined level, polar relay PL operates to the position where the #1 winding of relay PL is closed in magnetic opposition to its #2 winding. Relay

PL restores, opens its #1 and #2 windings, and removes ground from leads TS(1)-TS(4), opening relay R. Relay R restores and disconnects leads TA(1)-TA(7) from leads TM2(1)-TM2(7), respectively.

When relay R operates, potentiometer R45 is connected in parallel with potentiometer R44 thereby reducing the value of the resistance ground placed on lead TMN during a time-out function. Silicon controlled switch Q2 is triggered faster with less resistance ground on lead TMN thereby providing an accelerated time-out interval.

15.02 Figure 12B Used

This circuit provides for accelerated time-out of Register-Senders within a Link-Finder group if all Register-Senders within that group are busy. All Register-Senders within a Link-Finder group have their ATB leads connected together. When an all-trunks busy condition occurs, ground is removed from lead ATB, opening normally operated relay ATB. Relay ATB restores and grounds lead TS, closing relay R (FIG 15A). Relay R operates and the following operation is the same as that described in Section 15.01.

When one of the Register-Senders restores, ground is connected to lead ATB, closing relay ATB. Relay ATB operates and removes ground from lead TS, opening relay R. Relay R restores, and the following operation is the same as that described in Section 15.01.

16.00 Touch Call Class Control (FIG 48A)

When ground is connected to lead TM or SR, relay TC is closed. Relay TC operates, locks via ground on lead CD, connects leads TS1 and TS2 to leads -1 and +1, respectively, and transfers lead TBB from lead DPM to lead TCM.

17.00 Reset (FIG 41A or 42A Used)

Upon release, the Register-Sender connects resistance (resistor R7) battery to lead RST via the #2 winding of relay R. The Register-Sender is now marked idle to the access circuit (H-850348-A or equivalent).

When all the Register-Senders in a particular group have been used, the access circuit grounds lead RST, closing

the #2 winding of relay R. Relay R operates, locks, transfers leads FIA and FIB from leads FOA and FOB to leads ARA and ARB, respectively, and grounds lead RSA to mark this circuit idle to the preceding Link Finder.

18.00 Busy Key and Pulse Test

This circuit can be manually marked busy by operating the BUSY key. Operating the BUSY key transfers lead G from resistance (resistor R7) battery to ground, removes ground from lead ATB, and grounds lead GA.

To perform a pulse test, the PULSE TEST key is operated to the PULSE TEST position, closing relays PLT and turning on the pulse generator. Relay PLT operates and closes relay PM. Relay PM operates and follows the pulses from the pulse generator.

19.00 Centralized Testing Access (FIG 51A)

When it is desired to test this Register-Sender from a centralized testing position, ground is received via lead D(n) closing relay DA. Relay DA operates and connects the necessary Register-Sender test leads to the centralized test equipment commons.

When ground is removed from lead D(n), relay DA is opened. Relay DA restores and disconnects the Register-Sender test leads from the centralized test equipment commons.

ADDENDUM SECTIONS TO EXPLANATION

Addendum Section 1

ISSUE 39

Added strap between 33 & 35, to provide reset for last half of codel card #7. Added Note 137 to remove CSA, CSB & CSC leads from translator commons, to prevent feedback of timed battery from idle register when CSA, CSB or CSC straps are required. Added varistor to 600 ohm #2 winding of "T" relays ("DE" wiring) to prevent erosion of contacts of "PS" relay when "T" relays release.

Added stubbing and terminals ("DF" wiring) to auto monitor circuit H-850720-A.

ISSUE 40

Added PC1 relay ("DG" wiring & apparatus) to provide "reorder" tone on parity check failure.

ISSUE 41

In Figure 46A, changed part of "CV" wiring to "DK" and changed part of "CW" wiring to "DL" and added new figure 60A to provide orderable figure (when 2 delete control spaces are required) to work with Figures 41A or 42A. "DK" wiring will apply to Figure 46A only.

Made part of "AY" wiring and apparatus "DM" wiring and apparatus (R74-500, 5W) and added superseding wiring and apparatus "DN" (R74-1000, 5W) and "DO" (VR-18) to relay coil SQ, to reduce contact metal transfer on SQ, TC and/or M( ) relay contacts.

Advanced "AH" Drawing to issue 29.

ISSUE 42

Added relay "TCG" and two (2) additional make contacts to existing "TC" relay as "DT" wiring and apparatus, to lock the register sender in the TCMF mode if the first digit is TCMF, or disable the TCMF receiver if the first digit is dial pulse or hook switch flash, to eliminate customers' ability to complete fraudulent toll calls by keying in local digit and then hook-switch flashing to release the register and step the selector to select an outgoing EAS trunk to the toll officeand, by using an "MF BOX", send MF tones to the toll office to complete the call.

Designated wiring between relay "TO" 7T & "AR" relay coil ad "DU" wiring and Note 141 regarding removal of "DU" wiring, to eliminate a partial lockup of the register which can occur if rotary switch SQO is on bank contacts 15, 17, 18 or 20 when the reset key is operated on MF parity check failure.

Added RTG(N) timed ground lead as "DR" wiring required to prevent false turn off pulses of "T( )" relays.

ISSUE 43

In order to implement the proper wiring and apparatus with Figure 57A for quick release feature and CC drawing CC-850215-A50 and eliminate cause of false pulse to first selector on seizure of Register Sender, "DV" wiring and apparatus were added to "CT" wiring and apparatus for Figures 41A & 42A with additional information added to Note 124 and new note 142.

ISSUE 44

Rearranged the springs of relay "B" to obtain a set of make contacts (9 & 10) superseding "DZ" wiring, to the path of varistor VR7, to remove low current through the varistor when register is idle.

Removed multiple flags on leads from terminals 17, 7, 9, 11, 13 & 15 in Figure 9A going to MF distribution circuit.

Changed resistors R66 and R67 to 5 watt & superseding "DX" wiring and apparatus.

Added varistor VR18 to "DD" relay coil as "EA" wiring and apparatus to eliminate a malfunction in MF sending due to the 1500 ohm N.I. winding of relay "DD" becoming shorted.

ISSUE 45

To lengthen the duration of the "tone on" time the 500 ohm parallel resistance of relays MO to M7 was changed to 700 ohms, this extends the "tone on" time to approximately 70MS (up from 50-60 MS). Added relay PS1 to Figure 9A to control the release of rotary switch SQO and utilized springs 9 & 10 of relay GA to control the path to relay "L" for the "AR" mark. The above change reduced the interdigital time to approximately 100 MS (down from 110 - 120 MS). Designated existing wiring and apparatus as "EB" superseded by "EC".

ISSUE 46

To make register sender compatible with issue 6 of on-line monitor circuit H-850720-A, designated part of existing wiring and apparatus as "ED" & "EF" superseded by "EE" & "EG" respectively.

ISSUE 47

Added diode CR-201, superseding wiring and apparatus "EH", to prevent backfeed from "TMC" lead which would cause false traffic counts when trafficoders are used.

Rated entire drawing NAFM.

Addendum Section #2

ISSUE 48

Explanation not affected.

ISSUE 49

Explanation not affected

ISSUE 50

Explanation not affected

ISSUE 51

Explanation not affected

ISSUE 52

Explanation not affected

ISSUE 53

Issue 53 covers a change in the method of operating relay PC (see sect. 8.00). Transistorized relay driver H-840406-A40A, added at issue 53, turns on when 1/5, 3/5, 4/5 or 5/5 T( ) relays operate, to operate relay PC, but will not turn on when 2/5 T( ) relays operate. All other functions listed under 8.00 remain the same.