

A.E.CO. TYPE 101 DIRECTOR SYSTEM
FUNCTIONAL SCHEMATICS

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1. GENERAL

1.01 This section replaces Section 948-401-040, Issue 1, which should be removed from file and destroyed. This section is being reissued to cover the current information available on the equipment comprising the A.E.Co. Type 101 Director system. Because of the extensive changes and additions incorporated in this section, marginal arrowed brackets have been eliminated.

1.02 This section consists of the system block diagrams, sequence charts, and partial functional circuit diagrams applicable to the A.E.Co. Type 101 Director system equipment shown in Figure 1. The various illustrations will be of assistance when instructing personnel on the operation of the Type 101 Director system, since they serve as a quick and simple reference to system operation.

1.03 Information used to prepare this section was taken from the circuit drawings listed in Table 1.

1.04 The Type 101 Director system is comprised of the following major components (Figure 2):

- (a) Access Equipment - Enables the line desiring service to use the director for call processing. For information relative to the access equipment for the Type 101 Director system, refer to the related section in the 240-202 and 240-205 series of General System Practices.
- (b) Register-Sender - Performs all the operations necessary to process the call for service. For information relative to the register-sender in the Type

101 Director system, refer to the related section in the 240-205 series of General System Practices.

- (c) Translator - Controls the operation of the register-sender. For information relative to the translator in the Type 101 Director system, refer to the related section in the 240-202 and 240-205 series of General System Practices.

- (d) Translator Monitor - Verifies the proper operation of the translator. For information relative to the translator monitor in the Type 101 Director system, refer to the related section in the 240-202 and 240-205 series of General System Practices.

Block Diagrams

1.05 Figures 2 through 6 present an overall view of the Type 101 Director system equipment configuration.

1.06 Figure 2 shows the relationship of the Type 101 Director system and the switching equipment of a typical local step-by-step central office. Figure 3 is a block diagram of the register-sender access equipment, showing the path from the linefinder through the access equipment to the local first selector. The functional components comprising the register-sender and translator portions of the director system are shown in Figures 4 and 5, respectively. Figure 6 is a block diagram of a register-sender equipped for Touch Calling service.

Sequence Charts

1.07 The sequence charts presented in this section show the functional relationship of the individual units during the period when a call is first initiated until the call is completed. These charts may serve as a training guide by showing when the various units in the system are called upon for service and by indicating their function at that time. For continuity in tracing through the circuit drawings, the trainee or maintenance man is referred to applicable partial circuit drawings from the sequence charts.

Partial Circuit Drawings

1.08 The remaining illustrations are partial circuit diagrams. These diagrams have been extracted from the system schematics diagrams, and more readily identify the major circuit functions such as seizure, signaling, release, etc., of the various units in the system. Diagrams of this type can aid the trainee in tracing a call through the system, because he can follow the operation of the various units as they are called upon for service.

1.09 Each partial circuit diagram shows circuit paths containing relay contacts, relay and

rotary switch coils, rotary switch bank contacts, etc. These circuit paths illustrate the significant circuits involved in the operation indicated by the figure title.

Symbols

1.10 The symbols shown in Table 2 are used throughout this section to denote spring combinations and relay operations. Refer to Table 3 for an explanation of these symbols.

Table 1. Type 101 Director System Circuits.

DESCRIPTION	CIRCUIT NO.	ISSUE
Access Equipment		
Register-Sender Access	H-850348-A	11
Link Finder (Crosspoint Switch)	H-850349-A	2
Register-Sender	H-850215-A	32
Register-Sender Associated Circuits		
Correed Counting Chain	H-850616-B	1
Codelreed Storage	H-850232-B	1
Touch Calling Receiver	H-850325-A	5
Party Identity	H-850393-A	9
Translator	H-850216-A	14
Translator Monitor	H-850217-A	16

Table 2. Spring Combinations and Relay Operation.

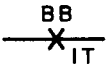
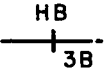
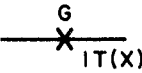
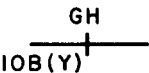
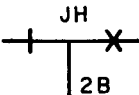
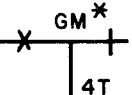
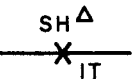
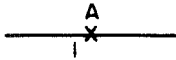
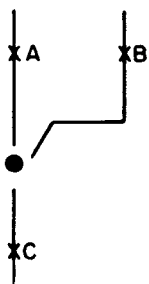
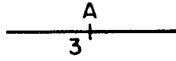
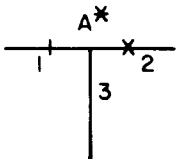
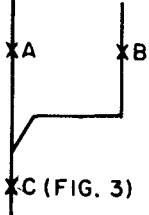
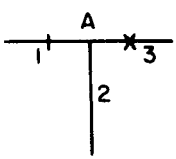
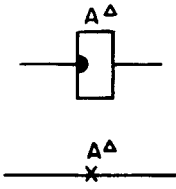
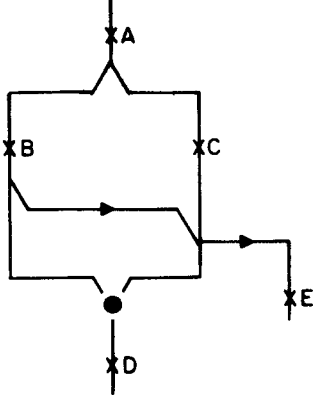
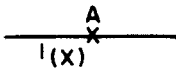

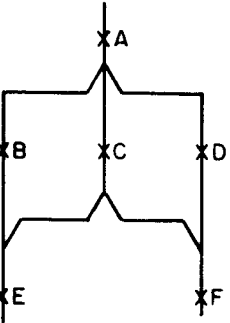
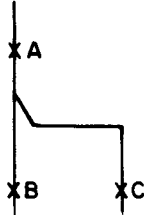
SPRING COMBINATIONS	
Function	Symbol
Make:	 Relay Designation Spring Contacts
Break:	
Make: (X=Operate First)	
Break: (Y=Operate Last)	
Transfer:	
Make-Before-Break:	
Make: Normally Operated (Shown unoperated)	
RELAY OPERATION	
Function	Symbol
Operate	+
Pulsing	*
Release	-

Table 3. Explanation of Symbols Used.

Symbol	Explanation	Symbol	Explanation
	Make contacts of relay A spring No. 1.		Operation of either relay A or B will cause relay C to operate.
	Break contacts of relay A spring No. 3.		
	A* = Make-before-break contacts of relay A.		Both relays A and B must be operated to operate relay C. The operate circuit for relay C is shown in (Figure 3) of this Section.
	Transfer contact combination of relay A.		
	Δ = Normally operated (Shown un-operated.)		Relay A operates, causing relays B and C to operate. Operation of either relay B or relay C will cause relay D to operate. Operation of relays B and C causes relay E to operate.
	Make (X contacts) of relay A.		
	Relay A operates, causing relay B to restore.		Relay A operates, causing relays B, C, and D to operate. Operation of relays B and C will cause relay E to operate. Operation of relays C and D will cause relay F to operate.
	Relay A operates, causing relays B and C to operate.		

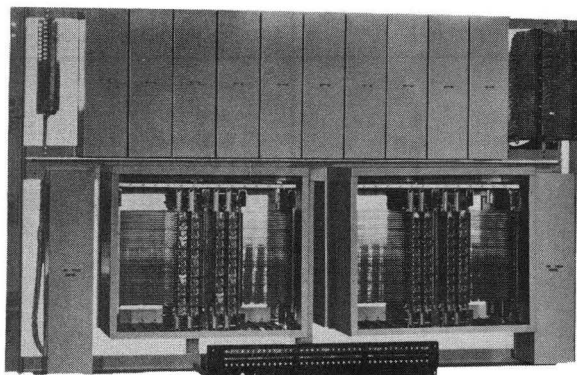


Figure 1a. Register-Sender Access Equipment.

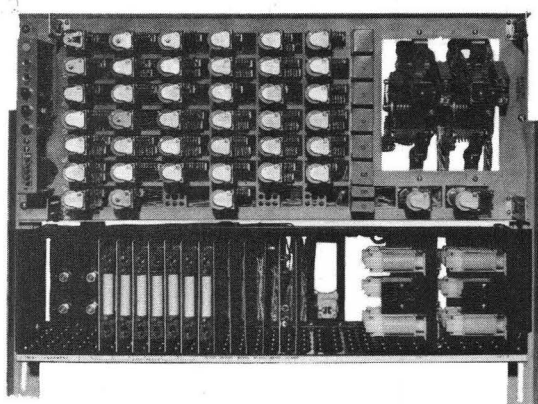


Figure 1b. Register-Sender.

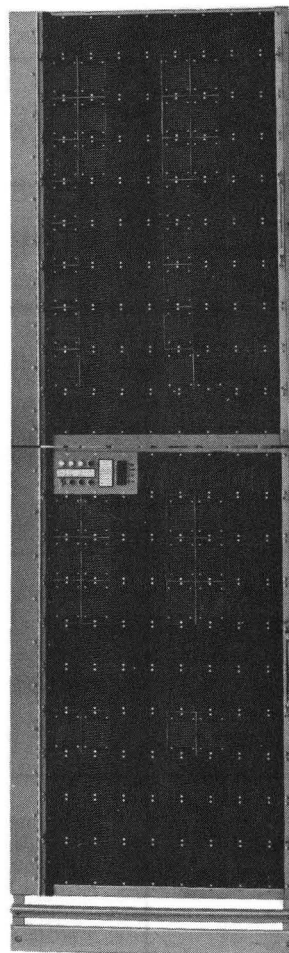


Figure 1c. Translator.

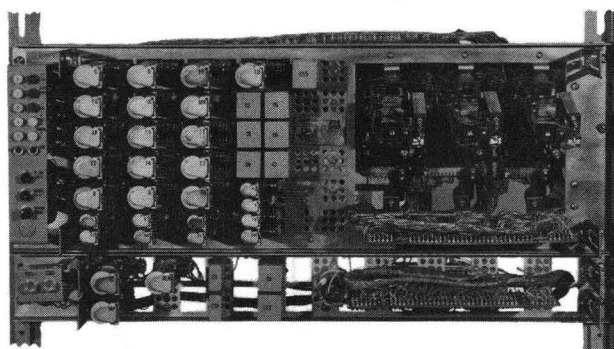


Figure 1d. Translator Monitor.

Figure 1. Type 101 Local Director Equipment.

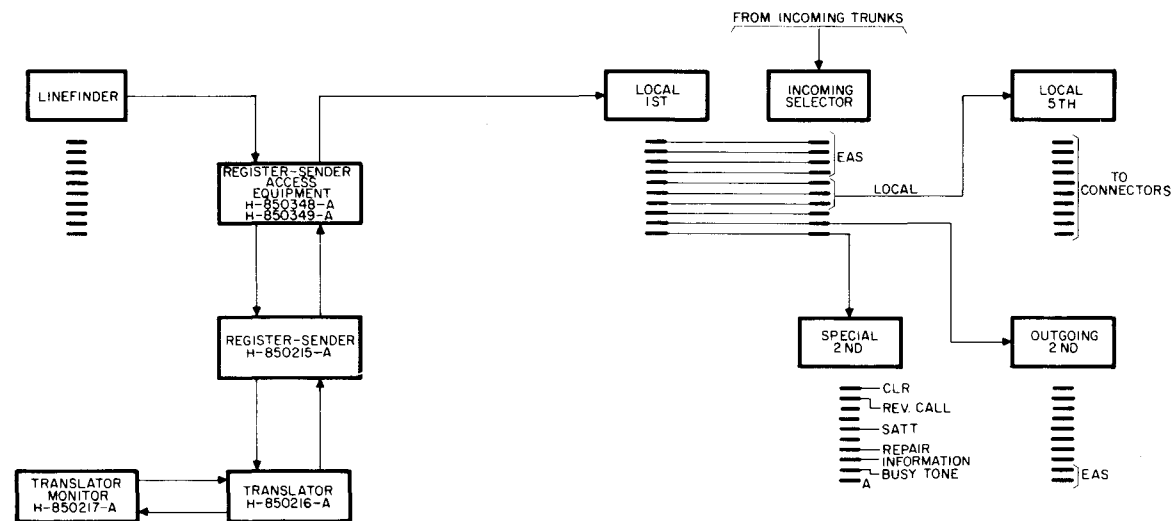


FIGURE 2. BLOCK DIAGRAM, TYPICAL TYPE IOI DIRECTOR EQUIPMENT ARRANGEMENT.

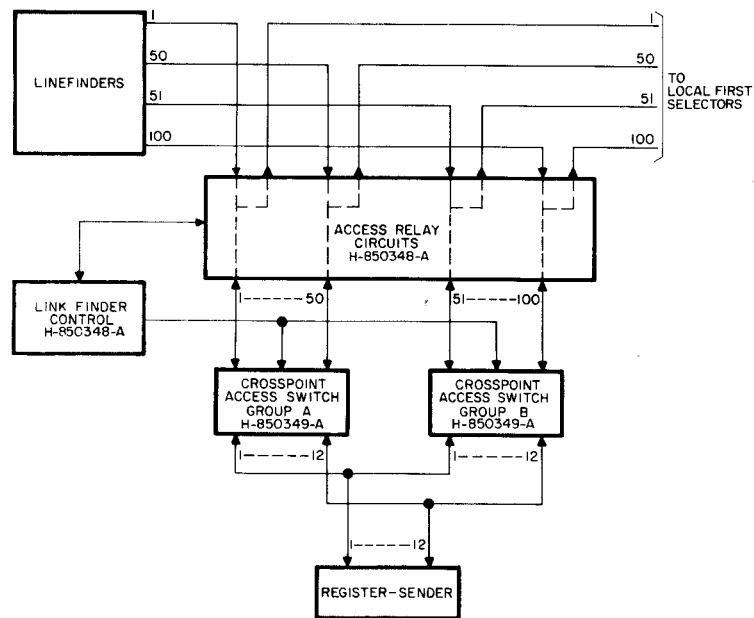


FIGURE 3. BLOCK DIAGRAM, REGISTER-SENDER ACCESS EQUIPMENT.

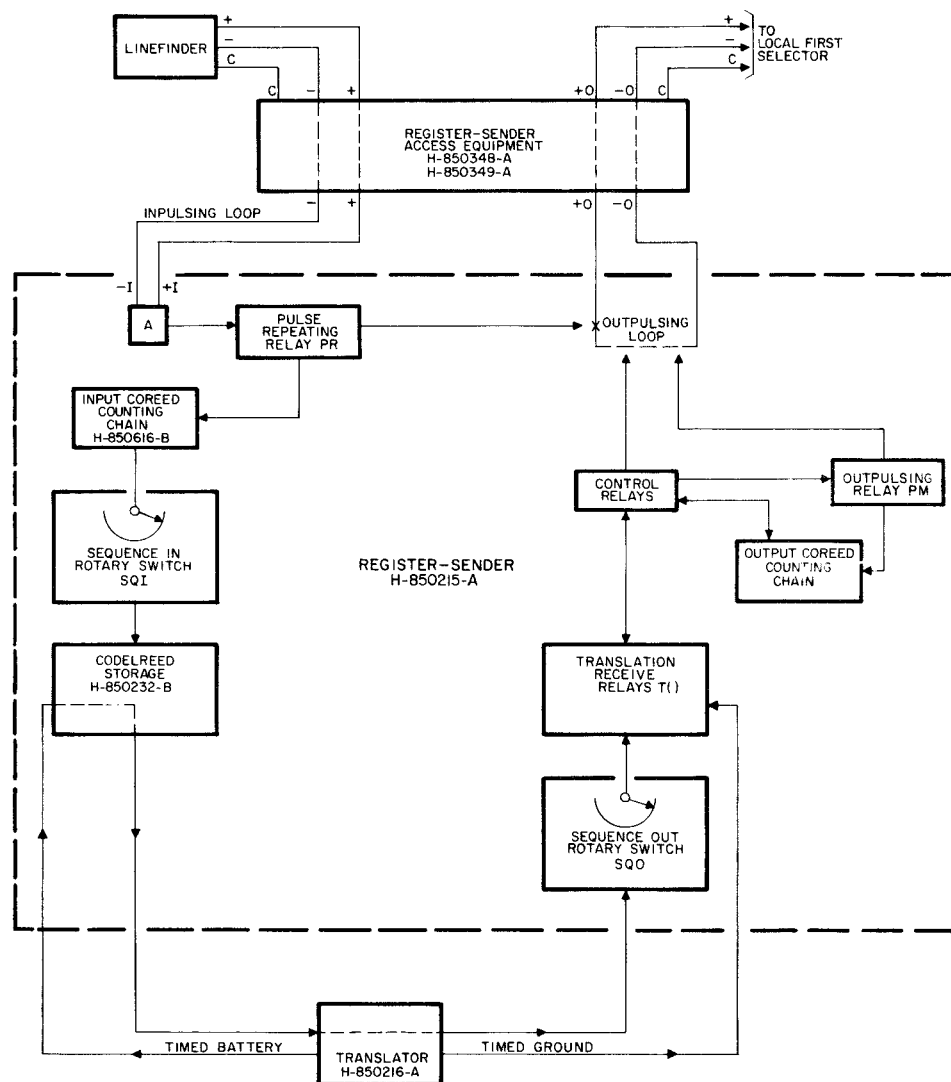


FIGURE 4. BLOCK DIAGRAM, REGISTER-SENDER.

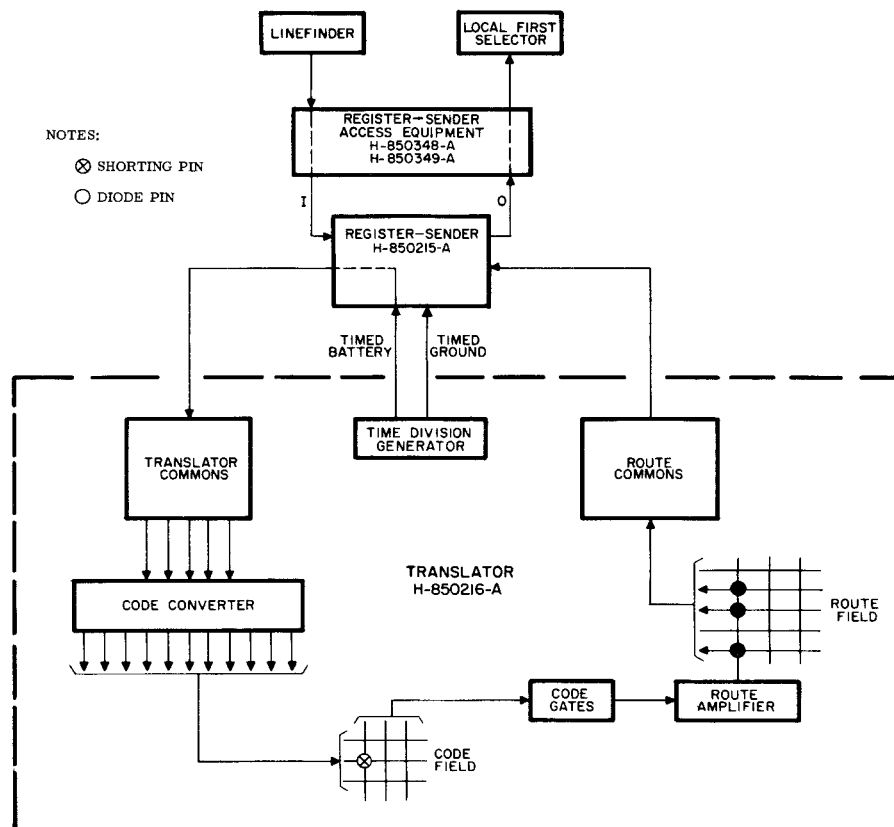


FIGURE 5. BLOCK DIAGRAM, TRANSLATOR.

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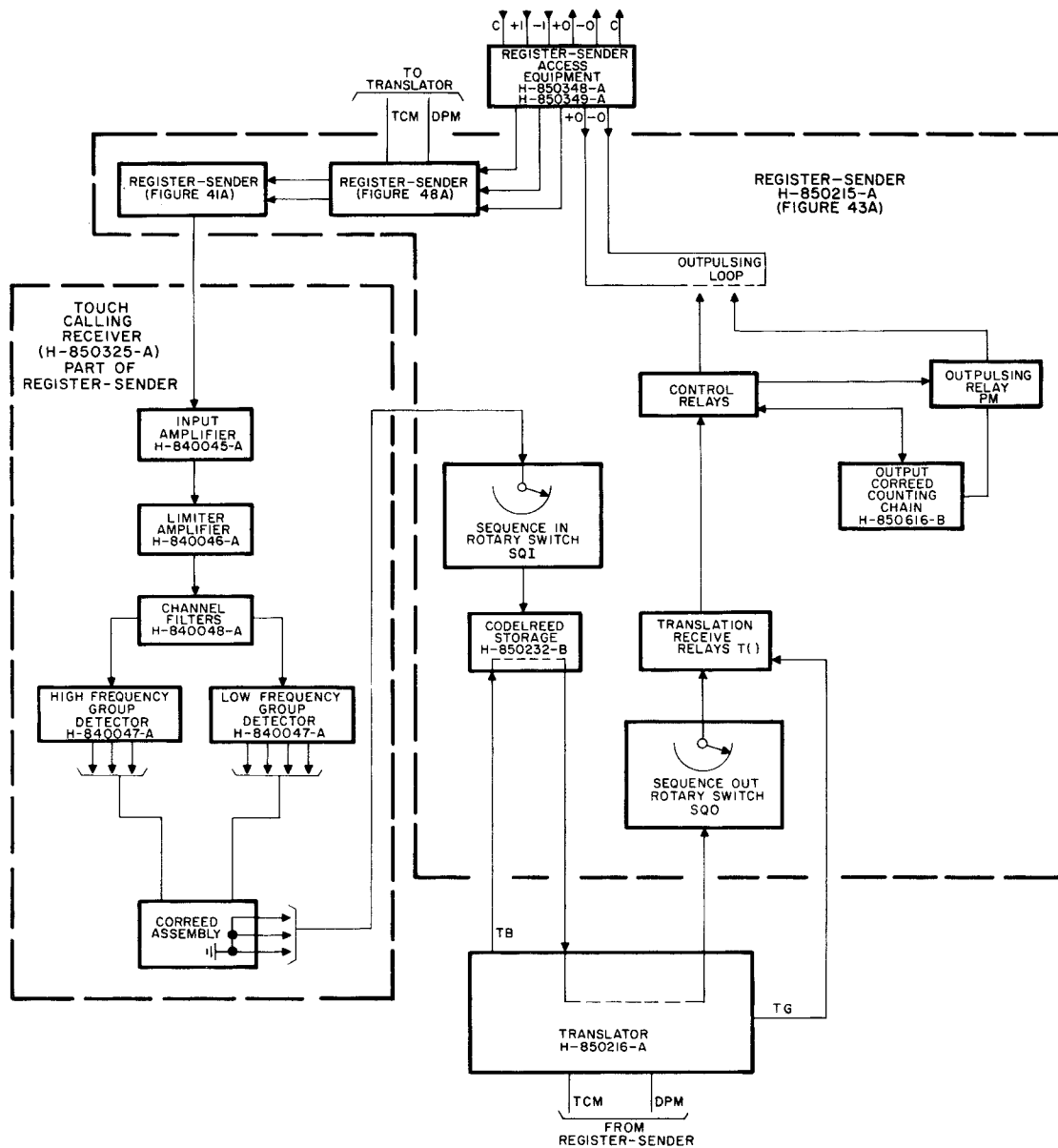


FIGURE 6. BLOCK DIAGRAM, REGISTER-SENDER WITH TOUCH CALLING SERVICE.

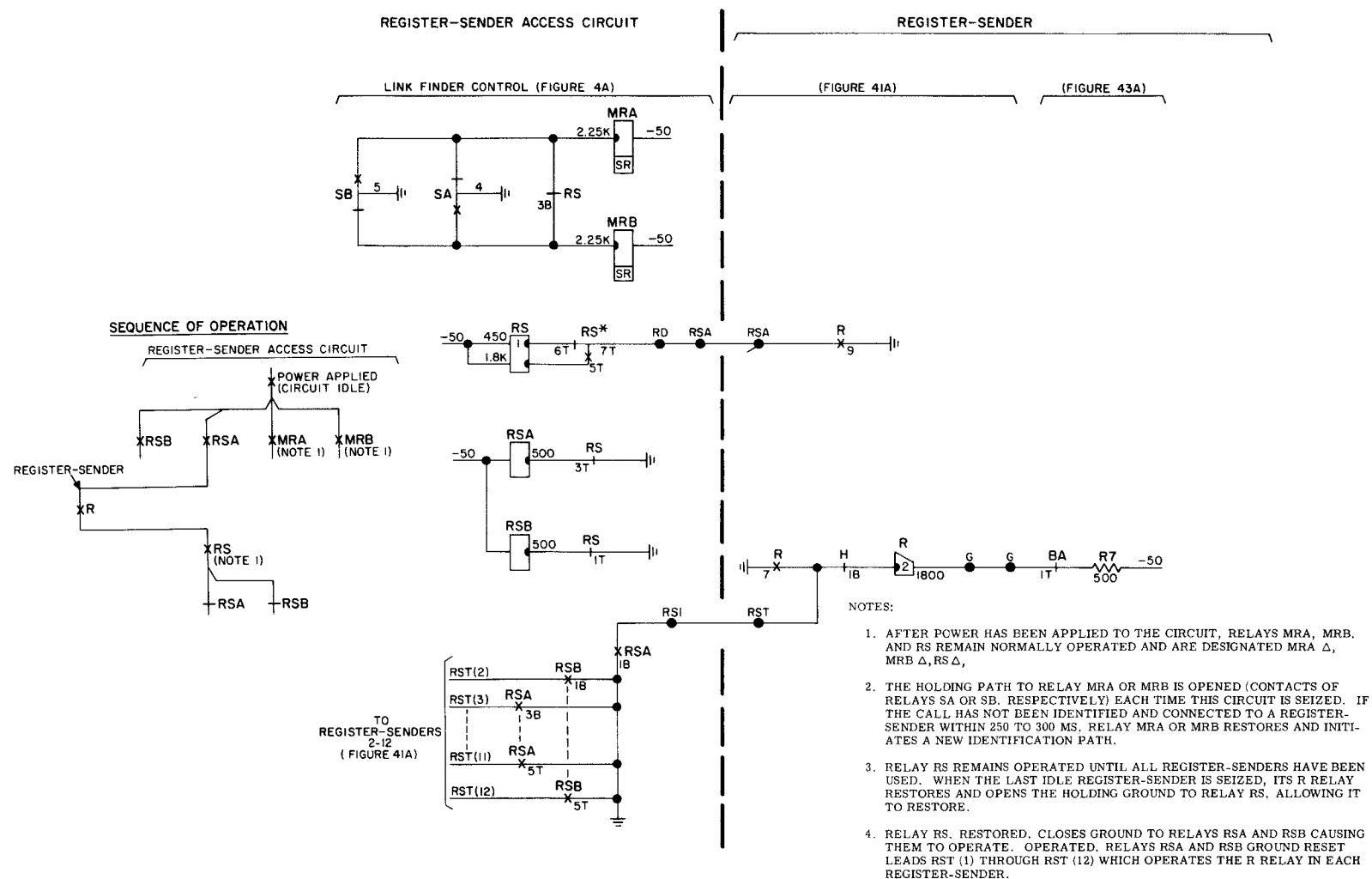


FIGURE 7. REGISTER-SENDER RESET AND ALLOTING CIRCUIT.

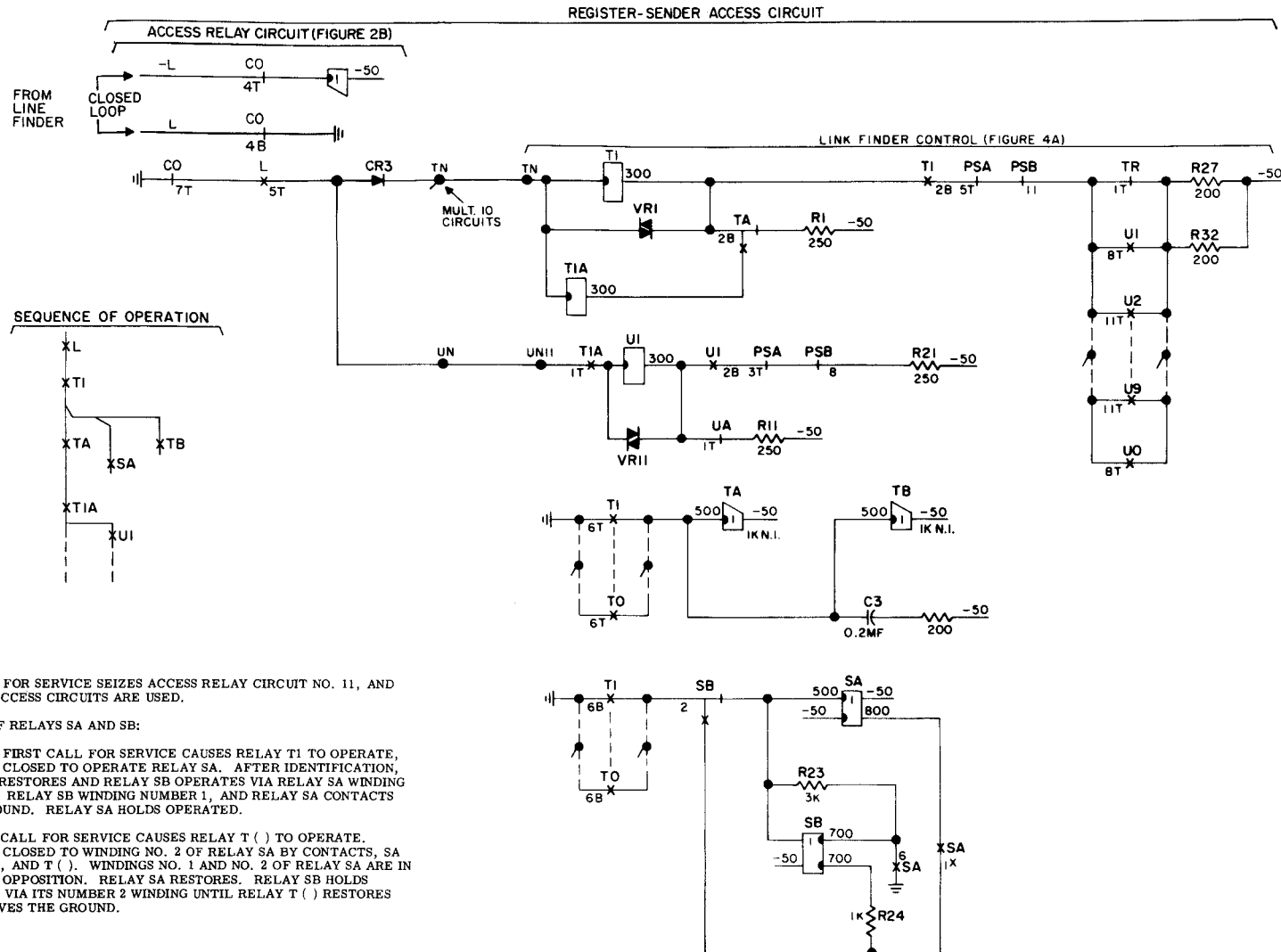


FIGURE 8. CALL FOR SERVICE.

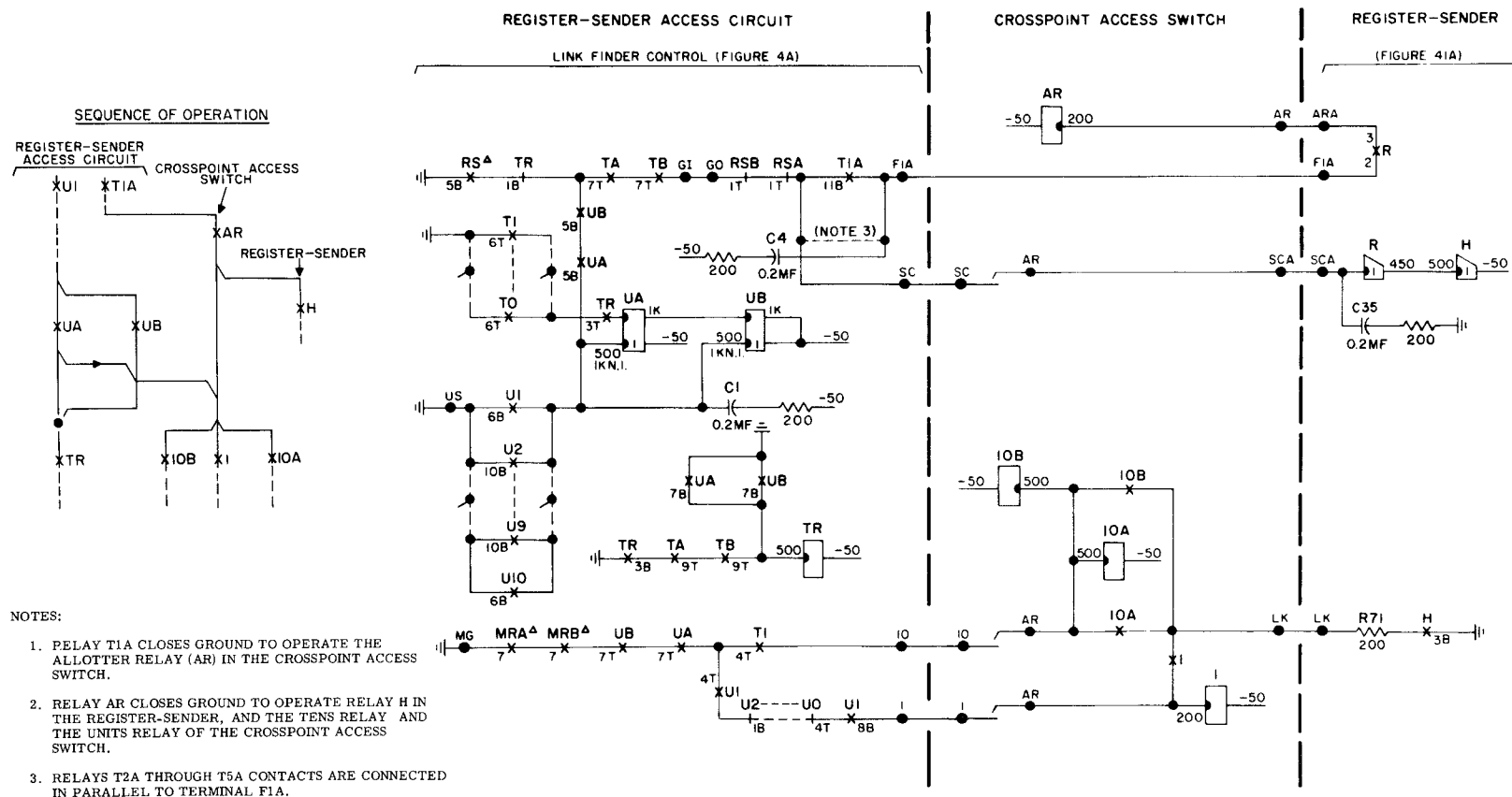


FIGURE 9. IDENTIFICATION OF ACCESS RELAY CIRCUIT CALLING FOR SERVICE.

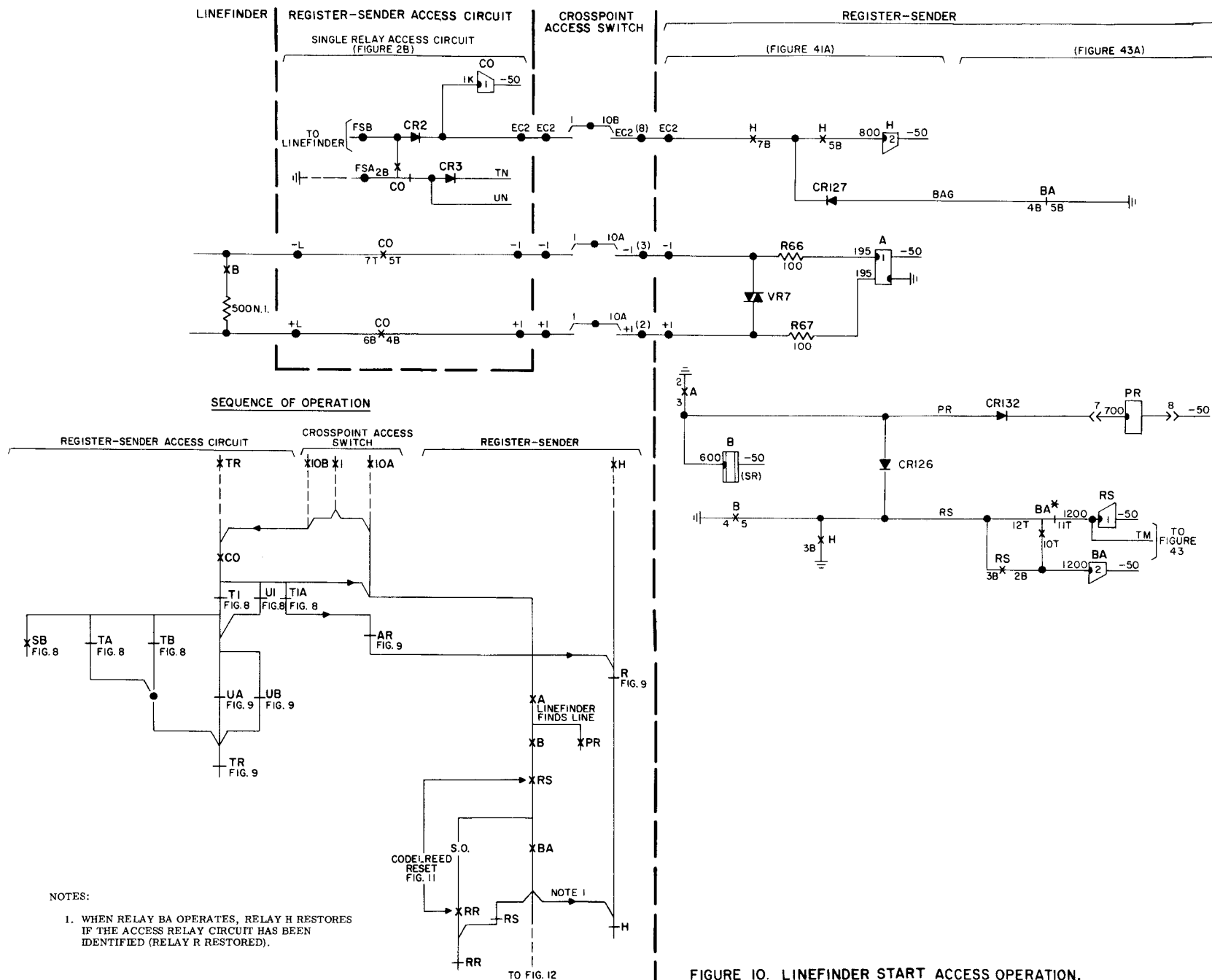


FIGURE 10. LINEFINDER START ACCESS OPERATION.

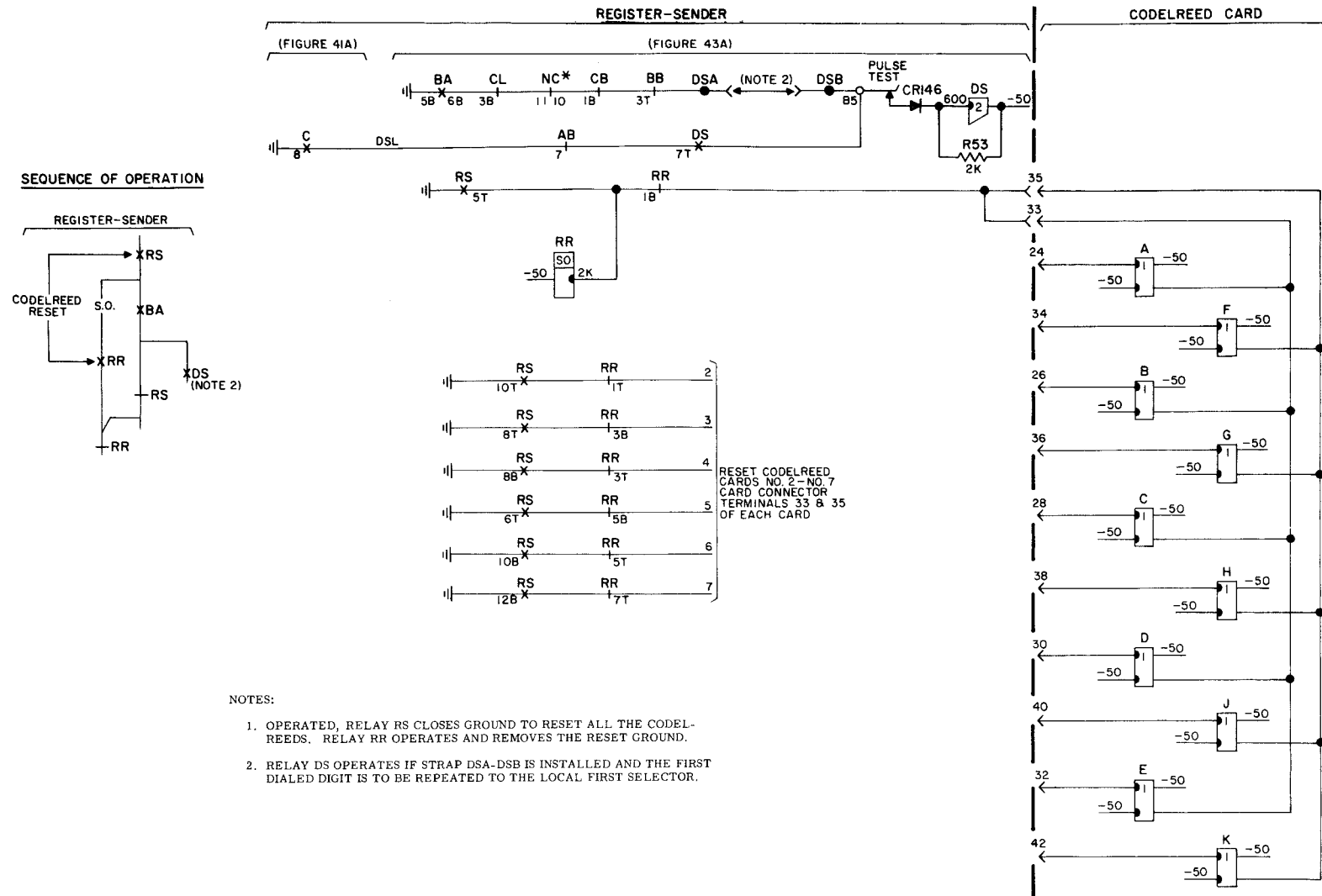


FIGURE 11. CODELREED STORAGE RESET.

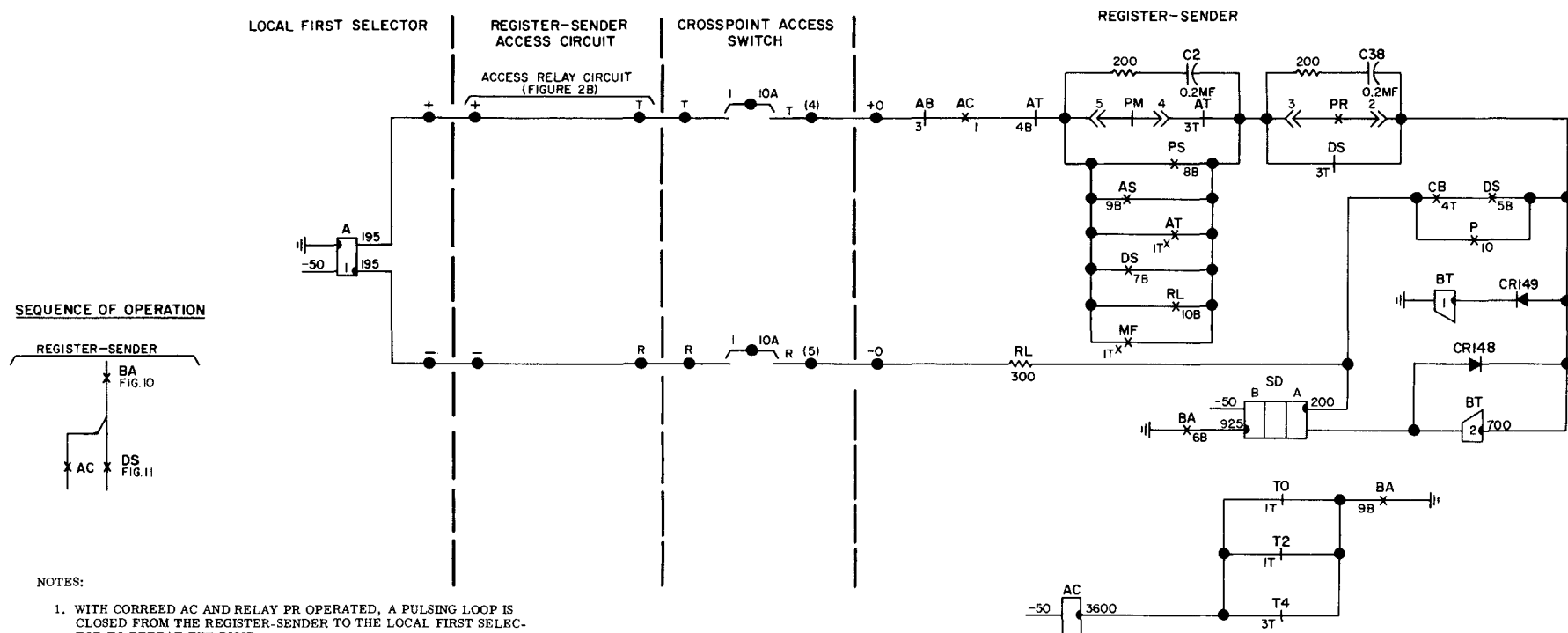
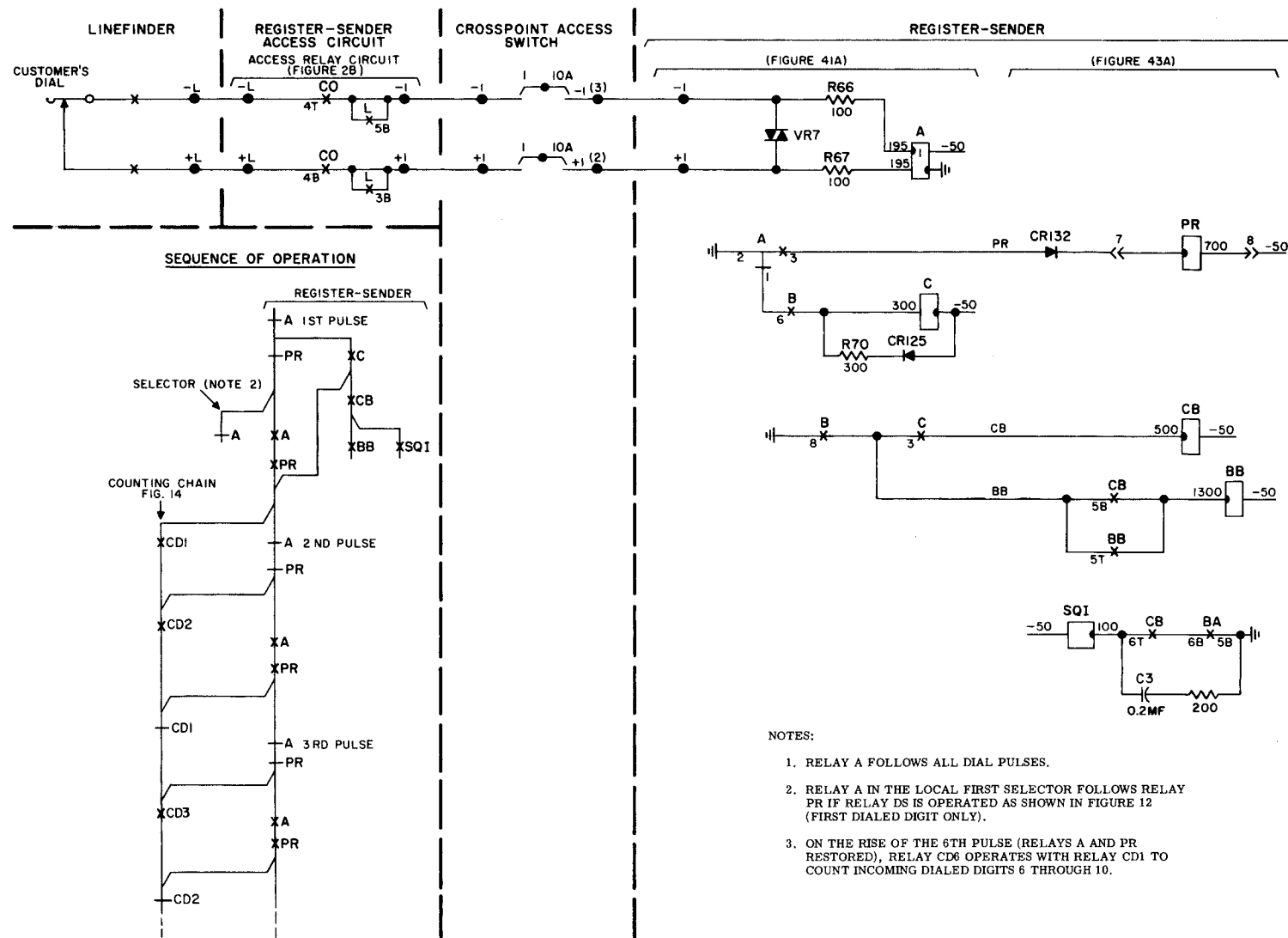


FIGURE 12. PULSING LOOP CLOSED TO LOCAL FIRST SELECTOR.

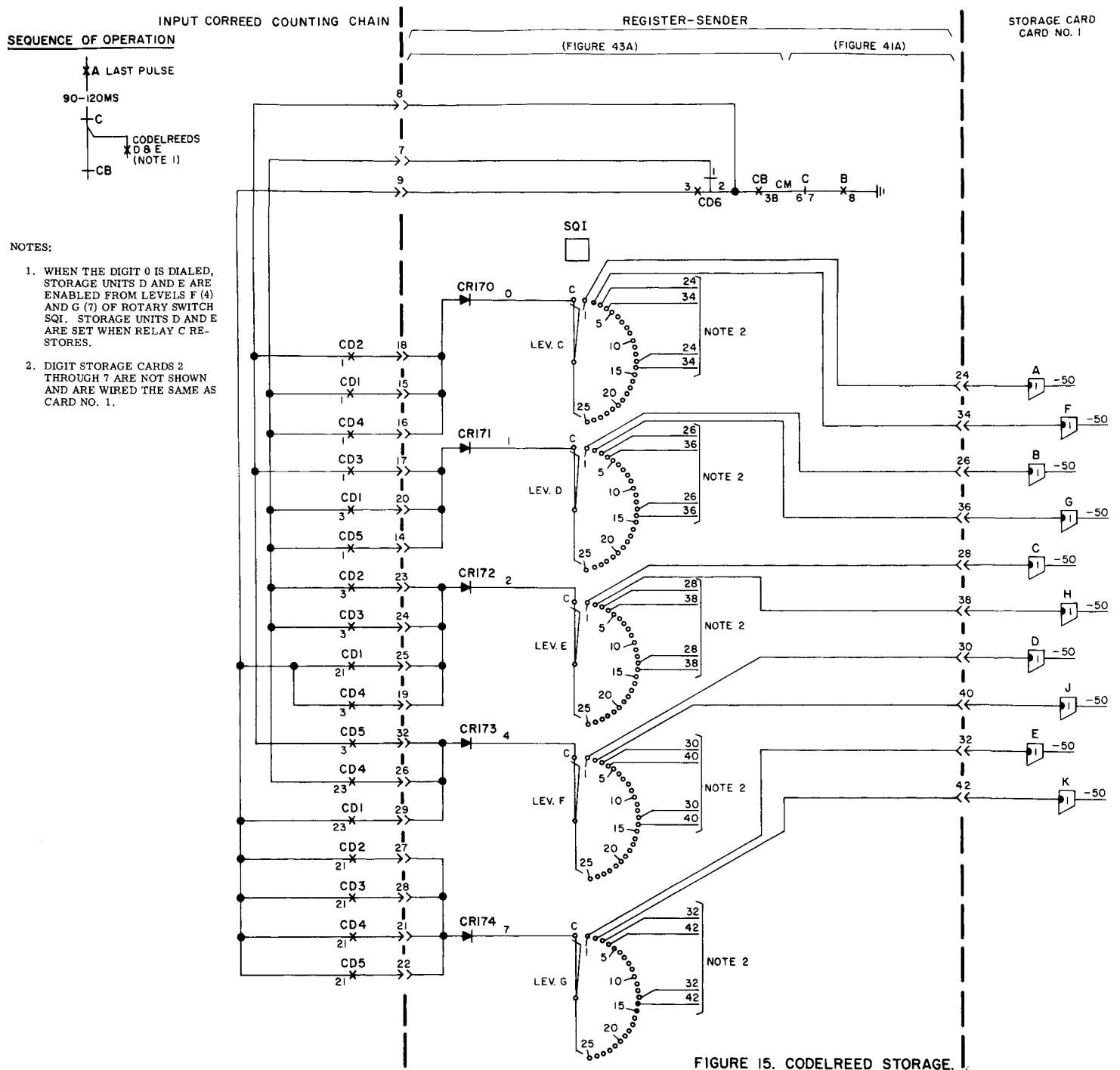


NOTES:

1. RELAY A FOLLOWS ALL DIAL PULSES.
2. RELAY A IN THE LOCAL FIRST SELECTOR FOLLOWS RELAY PR IF RELAY DS IS OPERATED AS SHOWN IN FIGURE 12 (FIRST DIALED DIGIT ONLY).
3. ON THE RISE OF THE 6TH PULSE (RELAYS A AND PR RESTORED), RELAY CD6 OPERATES WITH RELAY CD1 TO COUNT INCOMING DIALED DIGITS 6 THROUGH 10.

FIGURE 13. RECEIVING DIALED DIGIT "0".

FIGURE 14. "IN SEQUENCE" COUNTING CHAIN.



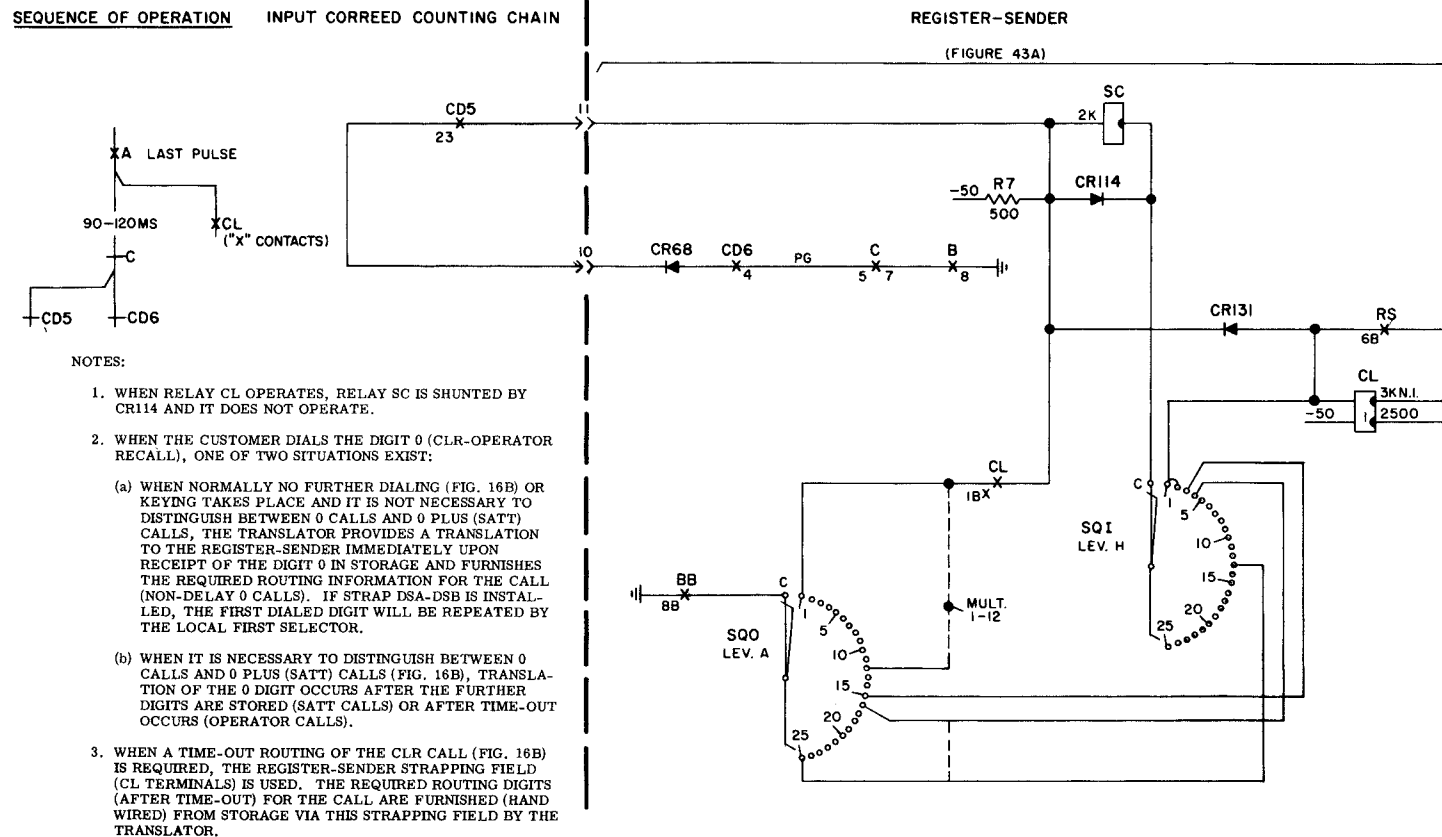


FIGURE 16A. "0" (CLR) CALL REGISTRATION.

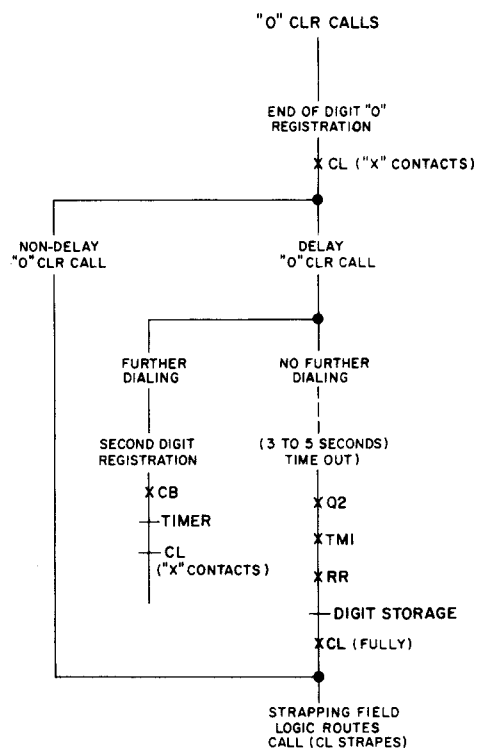


FIGURE 16B. "O" (CLR) CALL ROUTING



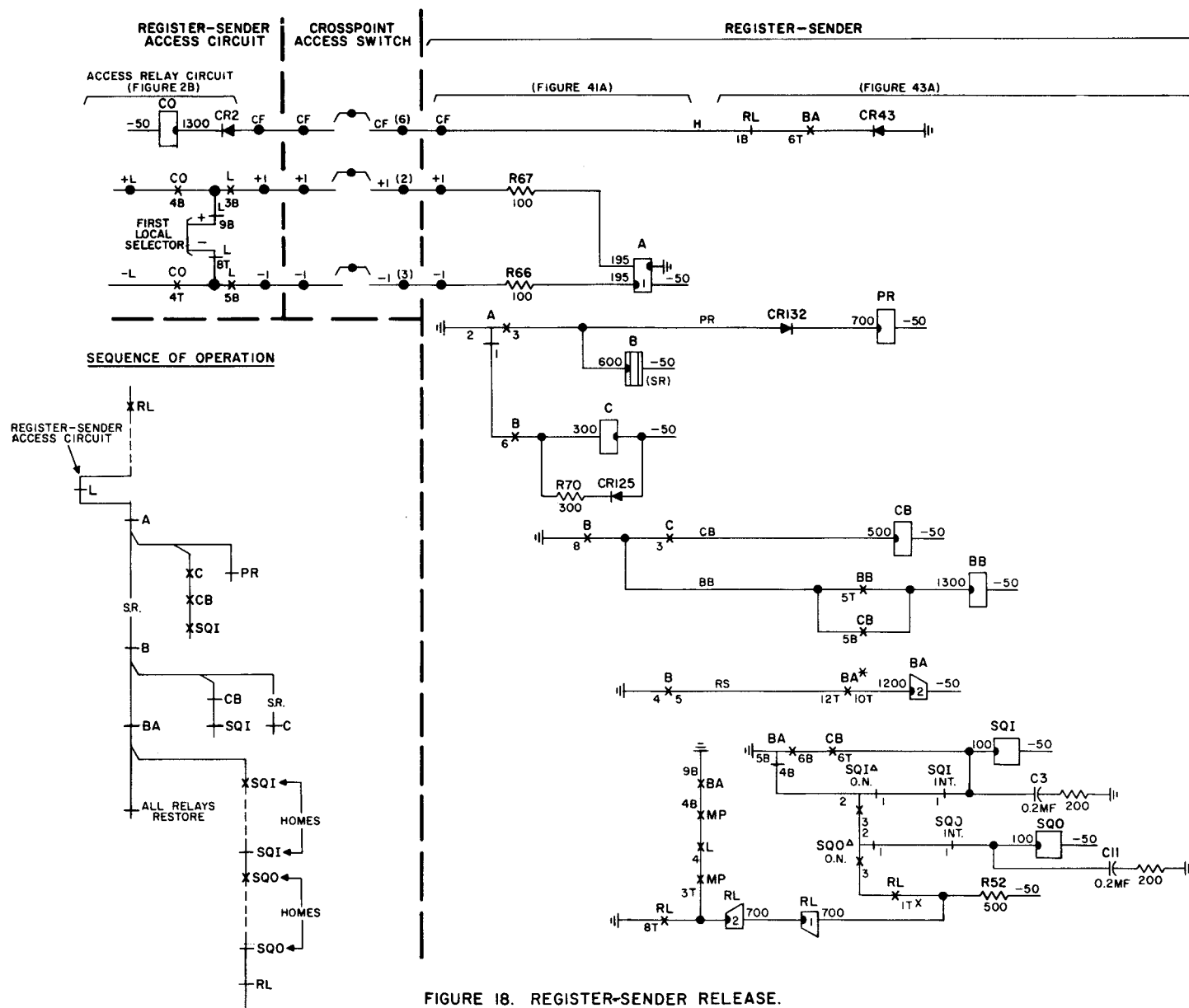


FIGURE 18. REGISTER-SENDER RELEASE.

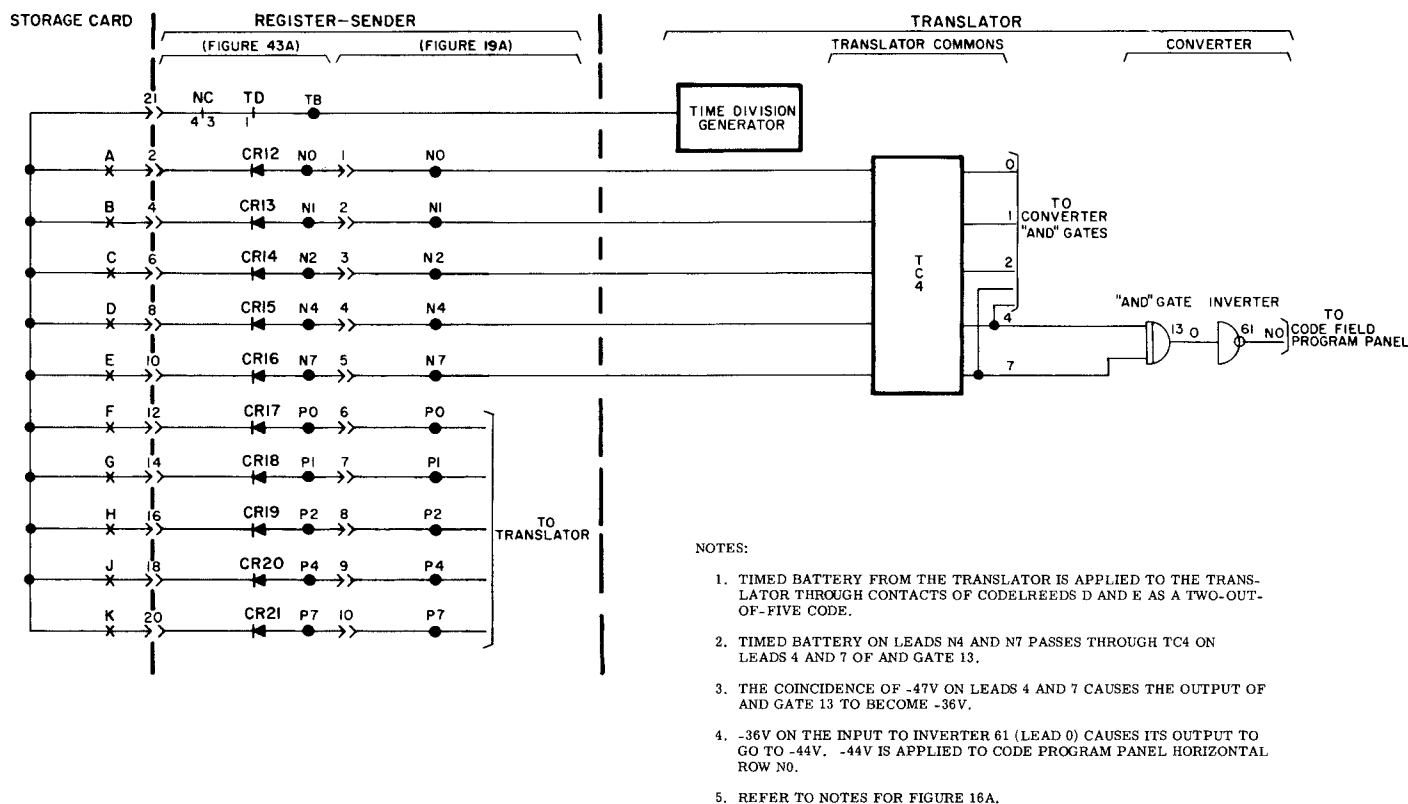


FIGURE 19. "0" CLR CALL, TRANSLATION REQUIRED.

NOTES:

1. ● DIODE PIN
- ① JUMPER PIN
2. THE CODE FIELD IS PROGRAMMED TO SUPPLY AN INPUT TO ALL LEADS OF CODE AND GATE 101 WHEN A SIGNAL IS PRESENT ON LEAD N0. WITH -44V (OUTPUT OF INVERTER 61) ON ALL THREE INPUTS, CODE AND GATE 101 APPLIES -36V TO ROUTE AMPLIFIER 111. ROUTE AMPLIFIER 111 WILL TURN ON, EXHIBITING A -47V OUTPUT.

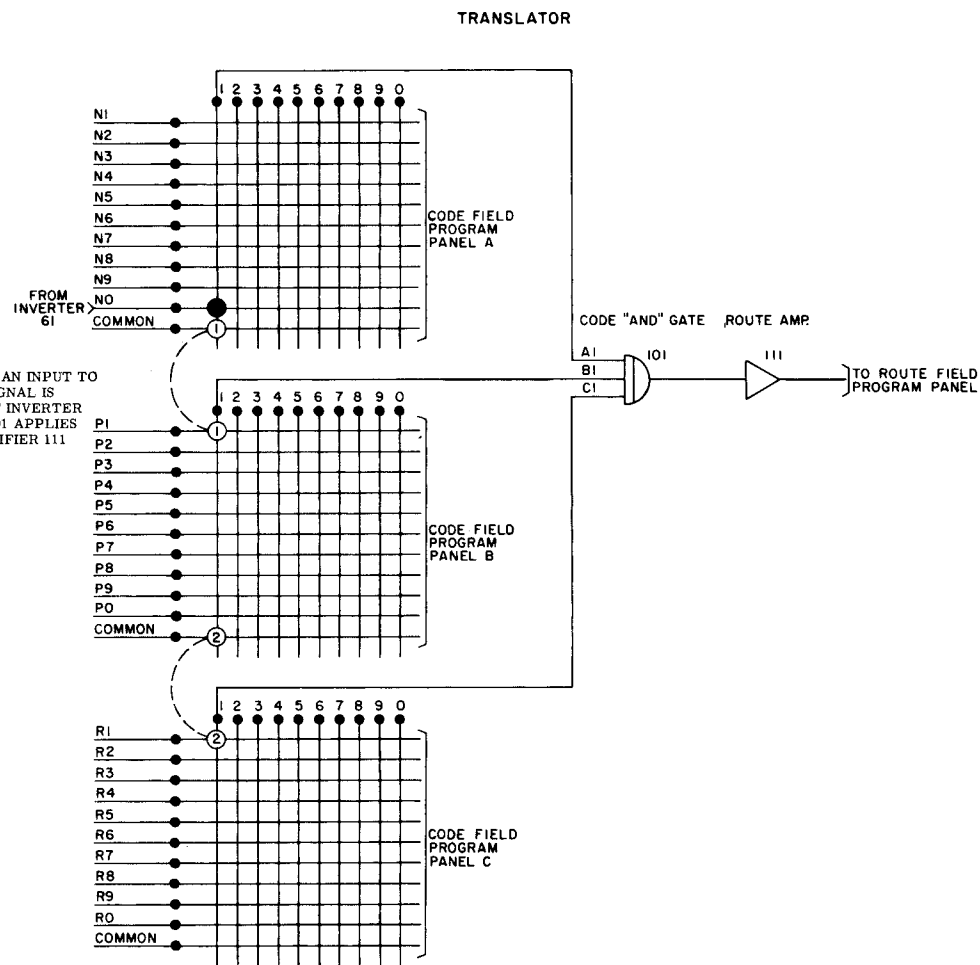


FIGURE. 20. "0" CLR CALL, CODE FIELD PROGRAMING.

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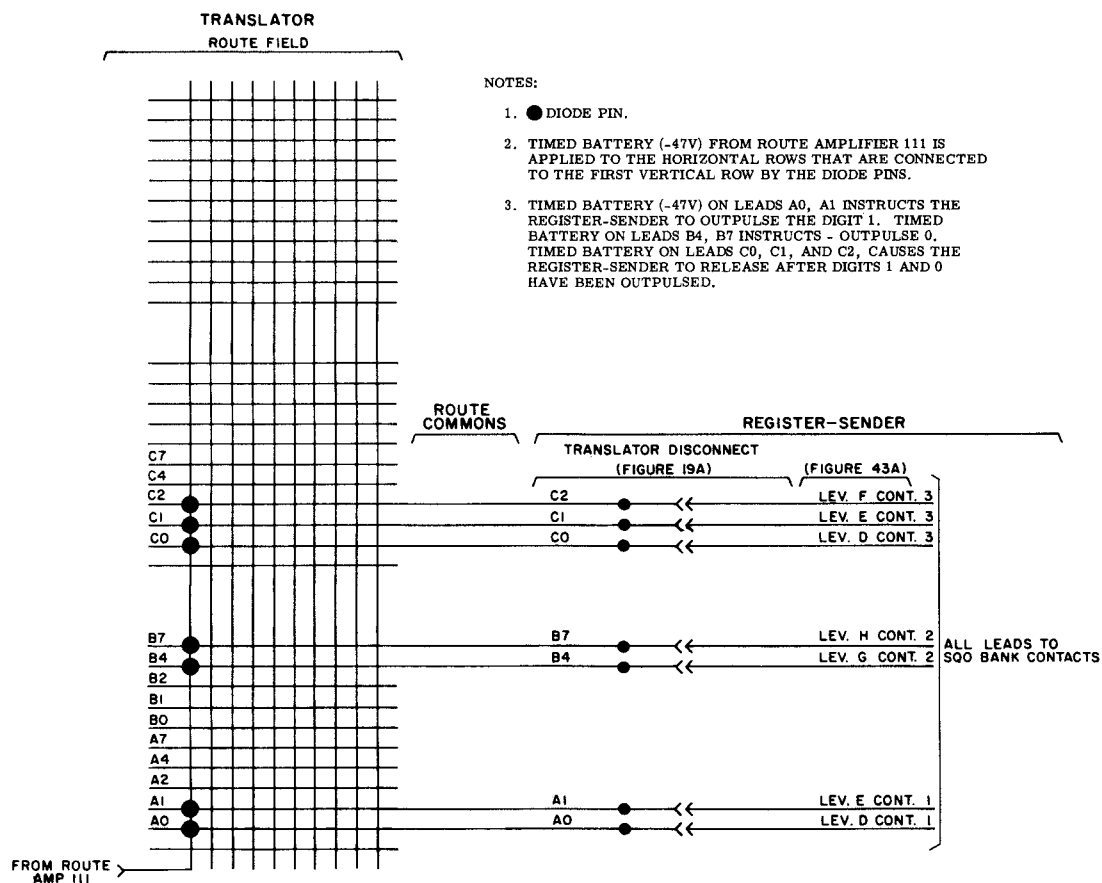


FIGURE 21. "O" CLR CALL, ROUTE FIELD PROGRAMING.

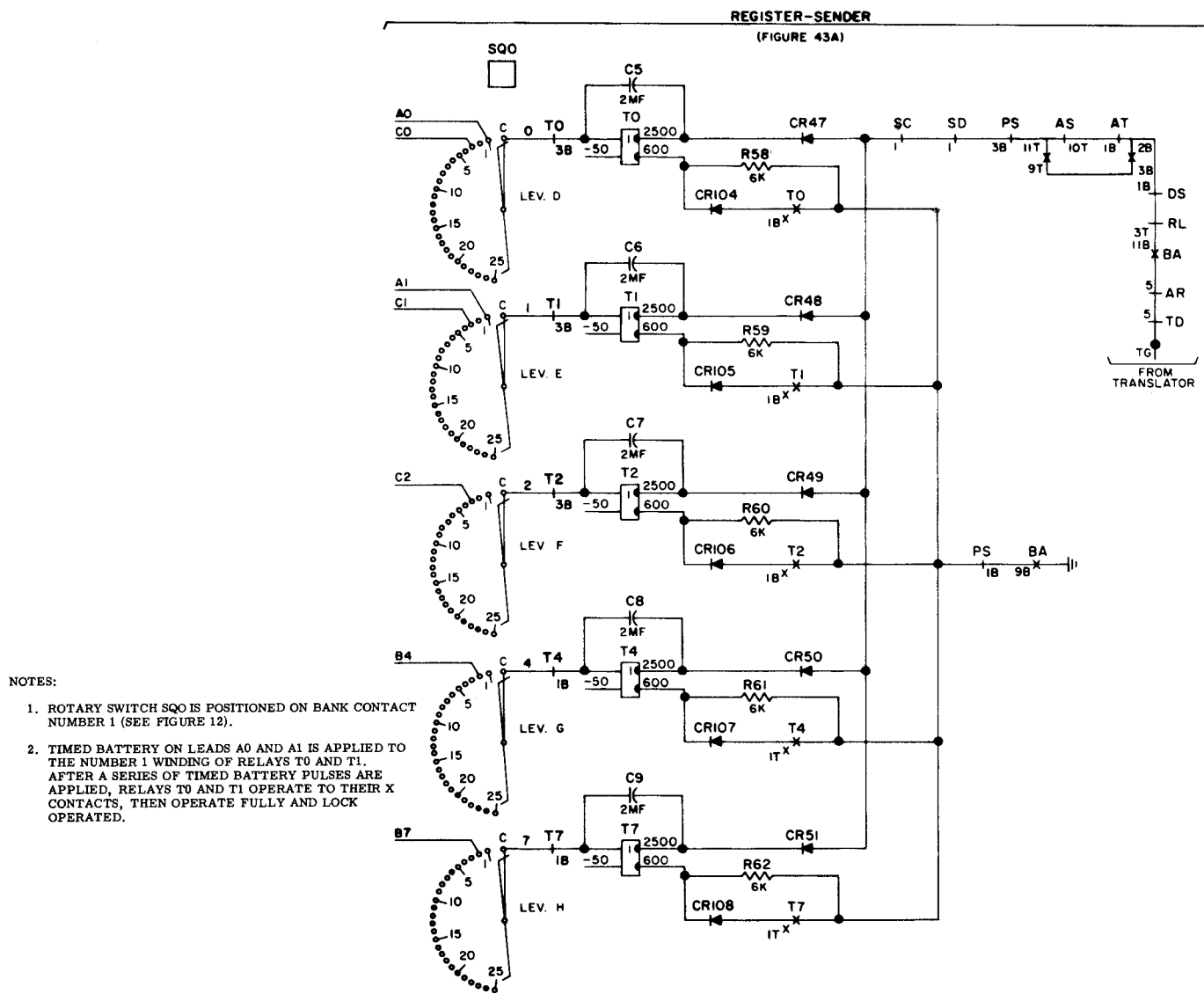


FIGURE 22. "O" CLR CALL, TRANSLATION RETURNED TO REGISTER-SENDER.

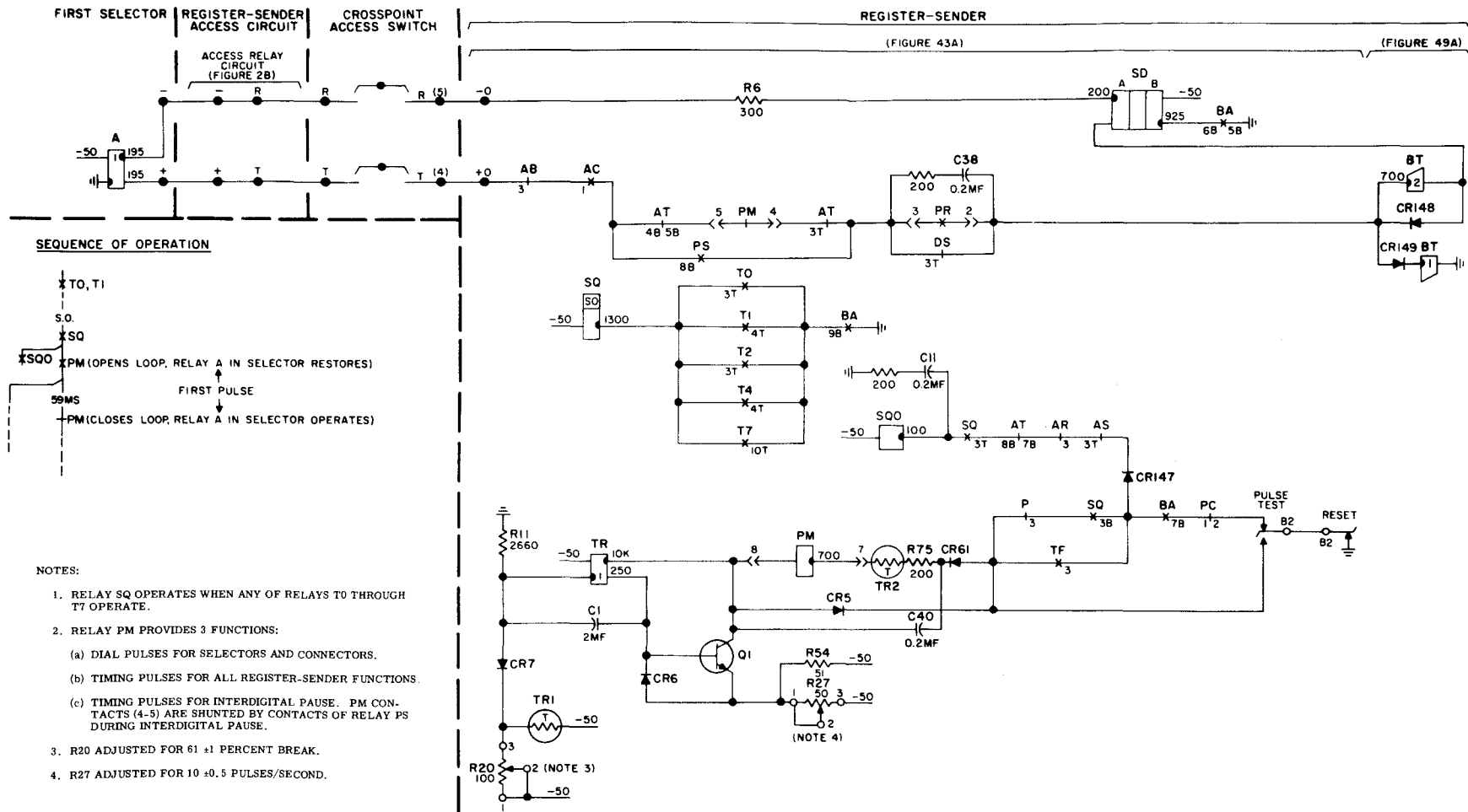


FIGURE 23. PULSE GENERATOR.

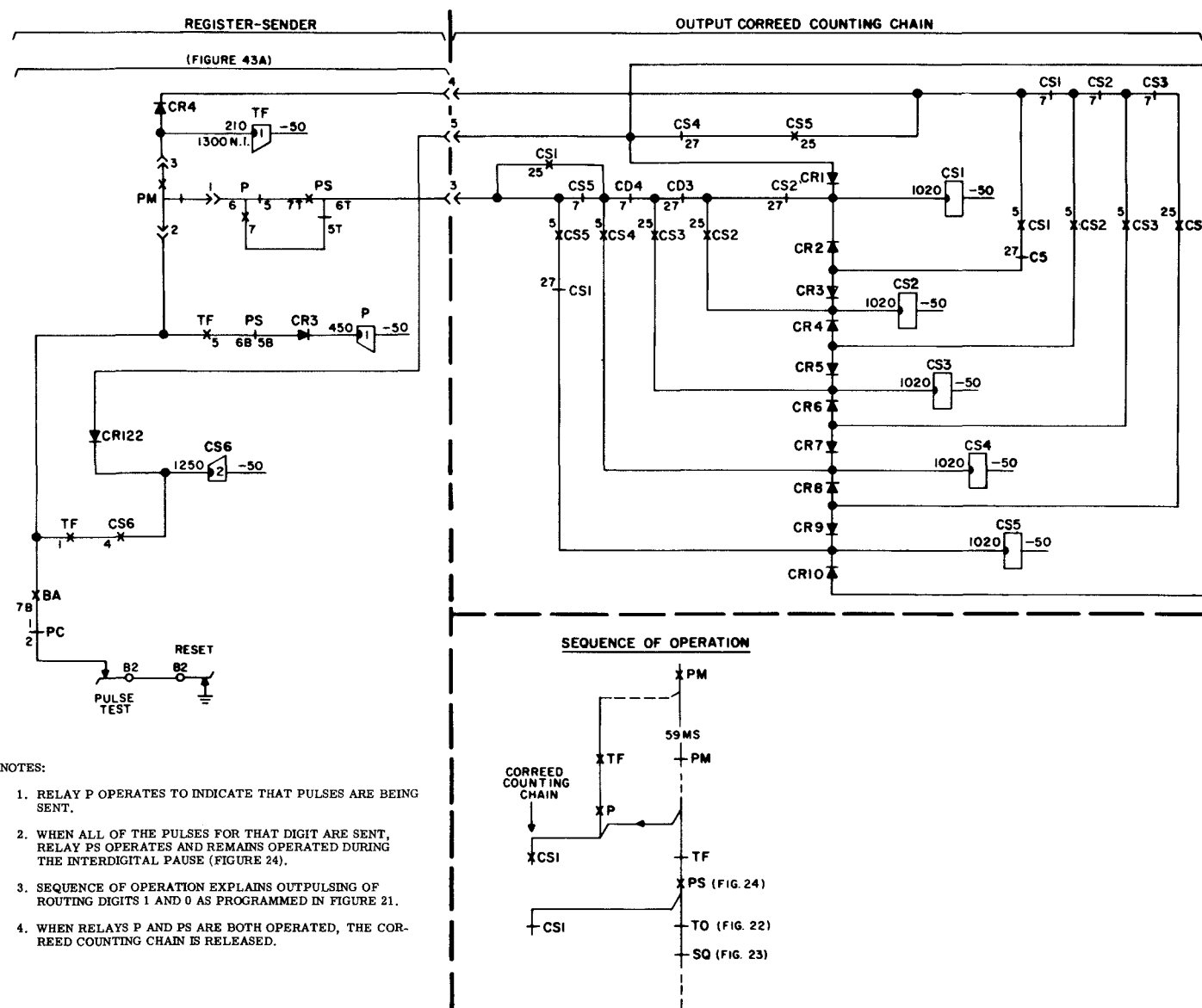
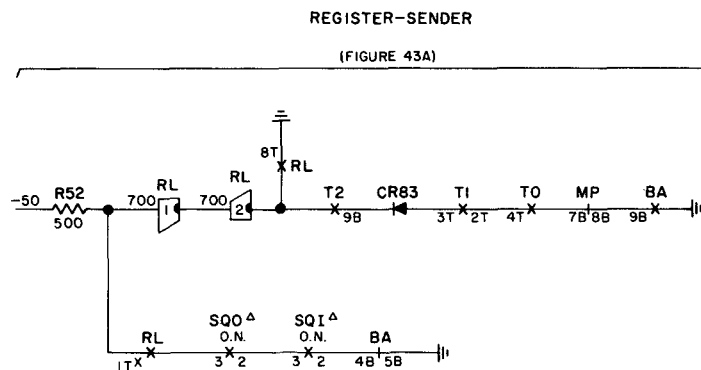
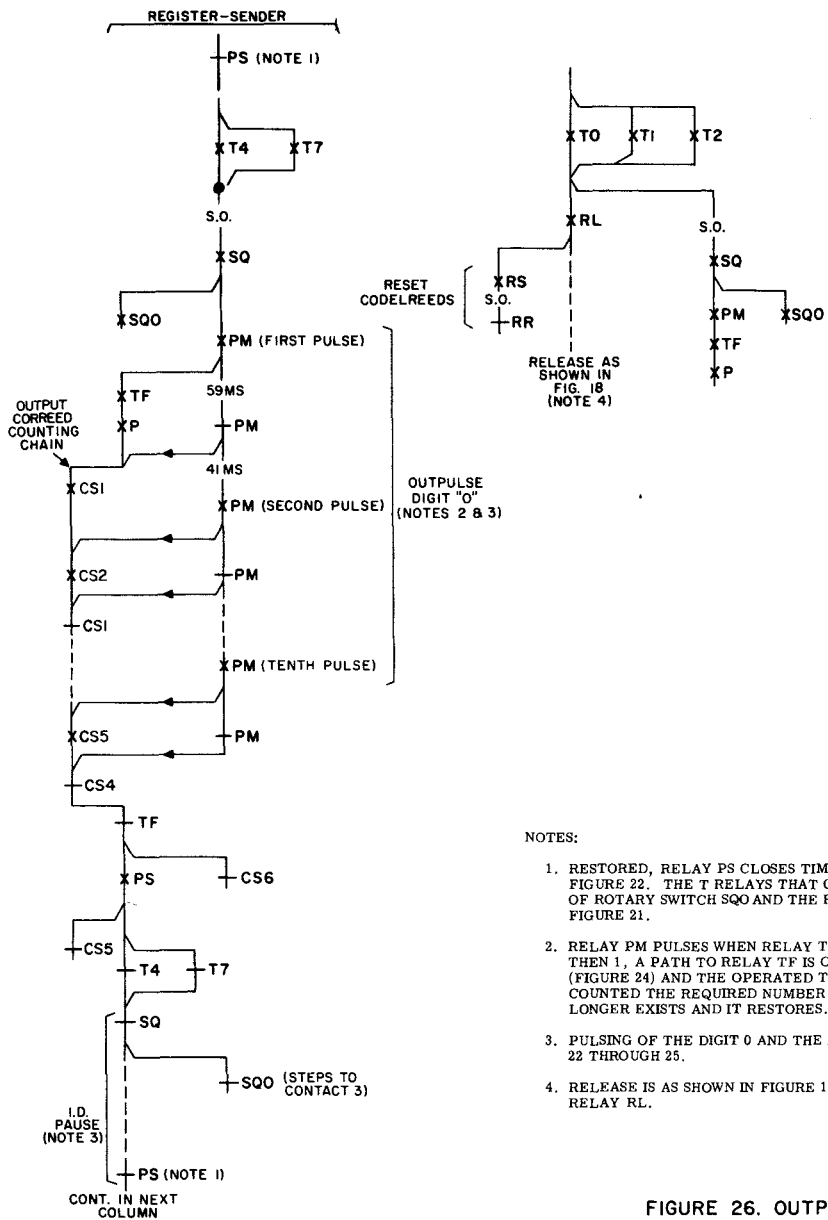


FIGURE 25. "OUT SEQUENCE" COUNTING CHAIN.



NOTES:

1. RESTORED, RELAY PS CLOSING TIMED GROUND TO THE T RELAYS AS SHOWN IN FIGURE 22. THE T RELAYS THAT OPERATE ARE DETERMINED BY THE POSITION OF ROTARY SWITCH SQO AND THE ROUTE FIELD PROGRAMMING SHOWN IN FIGURE 21.
2. RELAY PM PULSES WHEN RELAY TF IS OPERATED. TO PULSE DIGITS, OTHER THAN 1, A PATH TO RELAY TF IS CLOSED THROUGH THE COUNTING CHAIN (FIGURE 24) AND THE OPERATED T RELAYS. WHEN THE COUNTING CHAIN HAS COUNTED THE REQUIRED NUMBER OF PULSES, A PATH TO RELAY TF NO LONGER EXISTS AND IT RESTORES.
3. PULSING OF THE DIGIT 0 AND THE INTERDIGITAL PAUSE IS AS SHOWN IN FIGURES 22 THROUGH 25.
4. RELEASE IS AS SHOWN IN FIGURE 18, EXCEPT FOR THE OPERATING PATH AT RELAY RL.

FIGURE 26. OUTPUTS FOLLOWED BY 0,1,2 CODE (RELEASE).

NOTES:

1. CODE FIELD IS PROGRAMMED TO TRANSLATE DIALED DIGITS 224, 225, OR 226. DIGITS ARE RECEIVED AND EXTENDED TO THE TRANSLATOR SIMILAR TO THE DIGIT 0, PREVIOUSLY DESCRIBED. ASSUME THE FIRST DIGIT HAS BEEN REPEATED TO THE SELECTOR.

2. THE TRANSLATION DESCRIBED IN FIGURES 27 THROUGH 32 IS AS FOLLOWS:

- ABSORB FIRST DIALED DIGIT.
- ADVANCE ROTARY SWITCH SQO TO POSITION M.
- DELETE FIRST TWO DIALED DIGITS STORED ON CODELREEDS.
- OUTPULSE DIALED DIGITS 3 TO 7 FROM CODELREED STORAGE.
- RELEASE VIA MARK ON LEAD VAR.

⊗ INDICATES SHORTING PIN.

● INDICATES DIODE PIN.

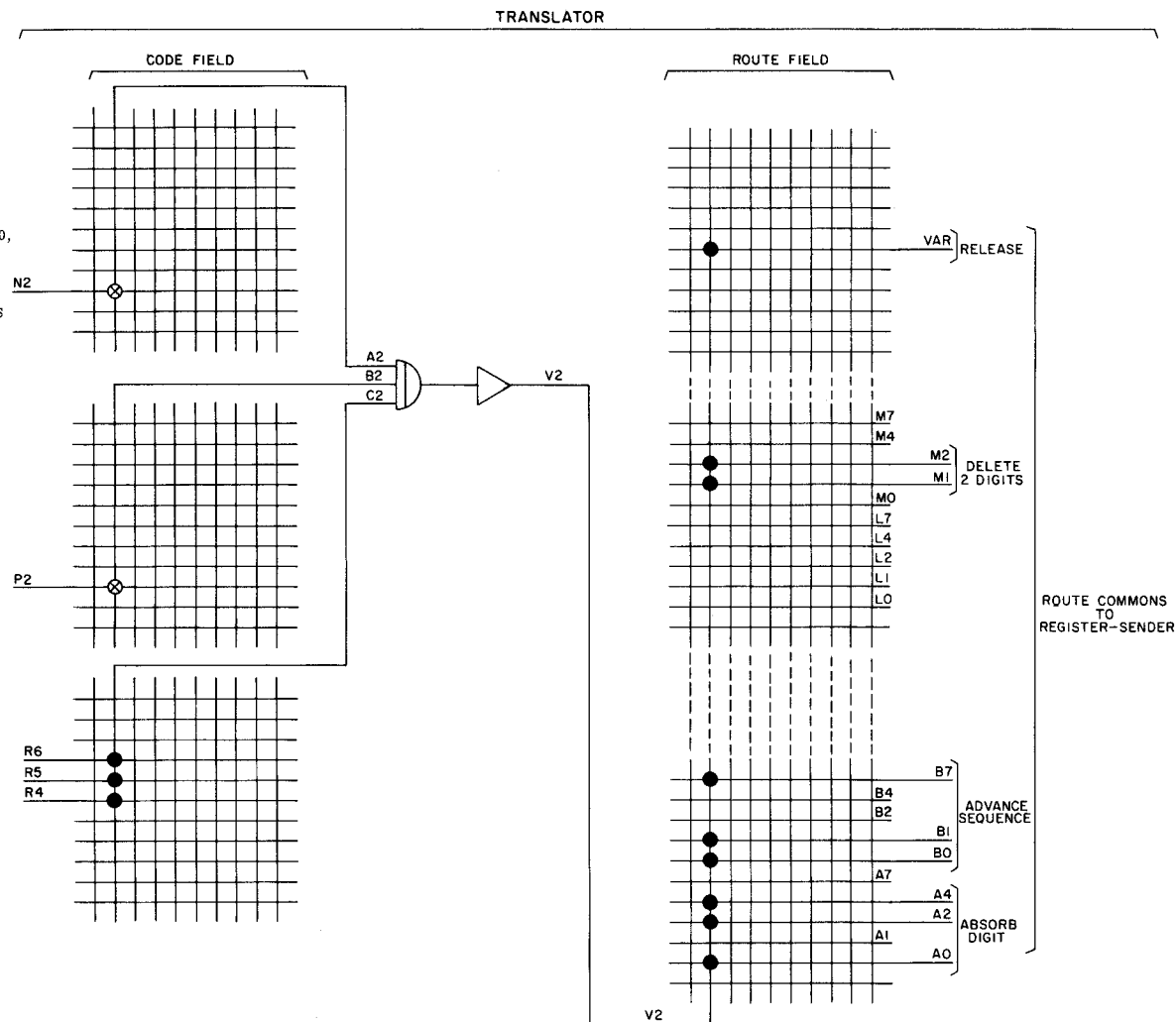


FIGURE 27. CODE AND ROUTE FIELD PROGRAMING, THREE-DIGIT TRANSLATION.

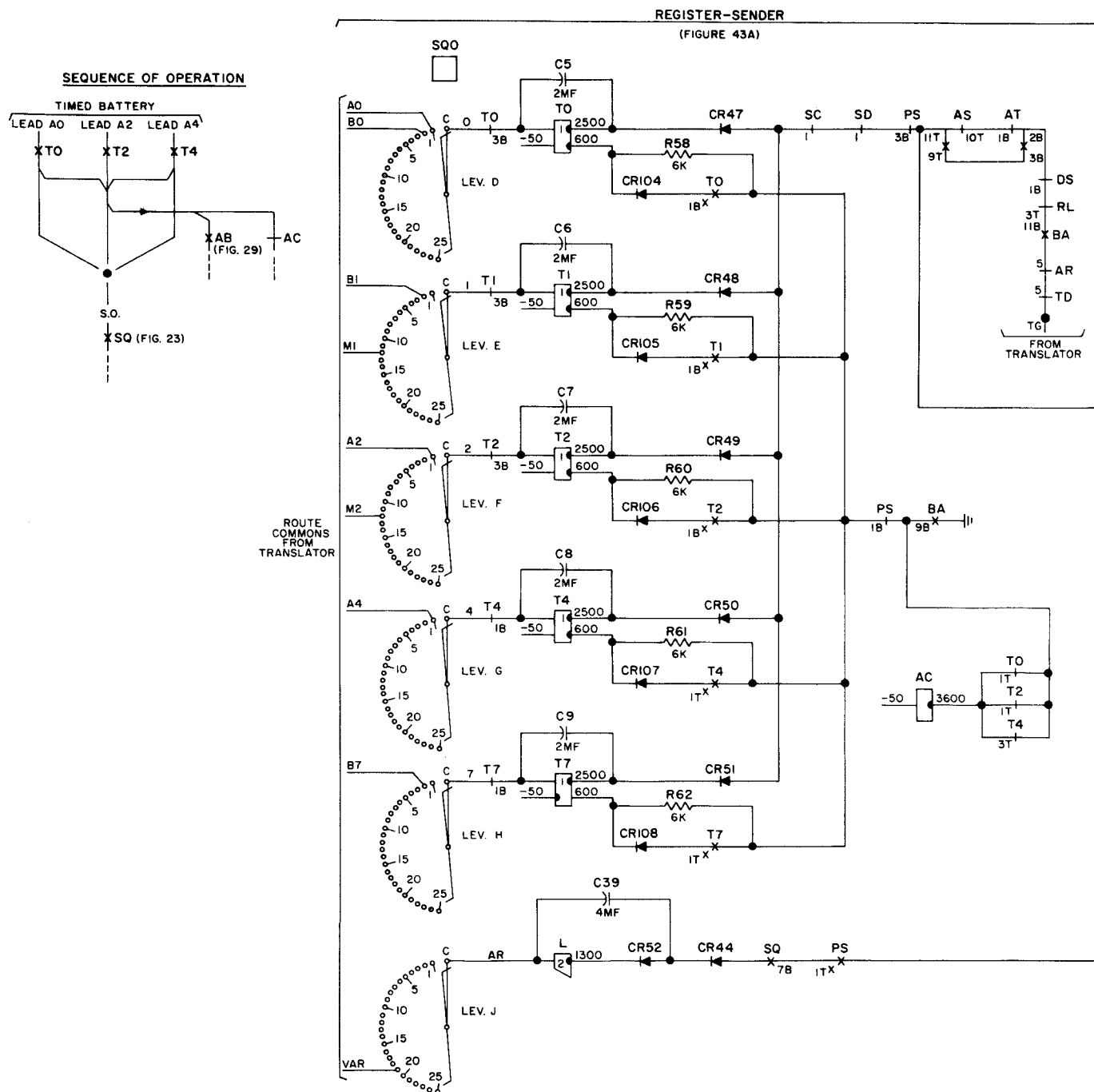


FIGURE 28. ABSORB TRANSLATION RETURNED TO REGISTER-SENDER.

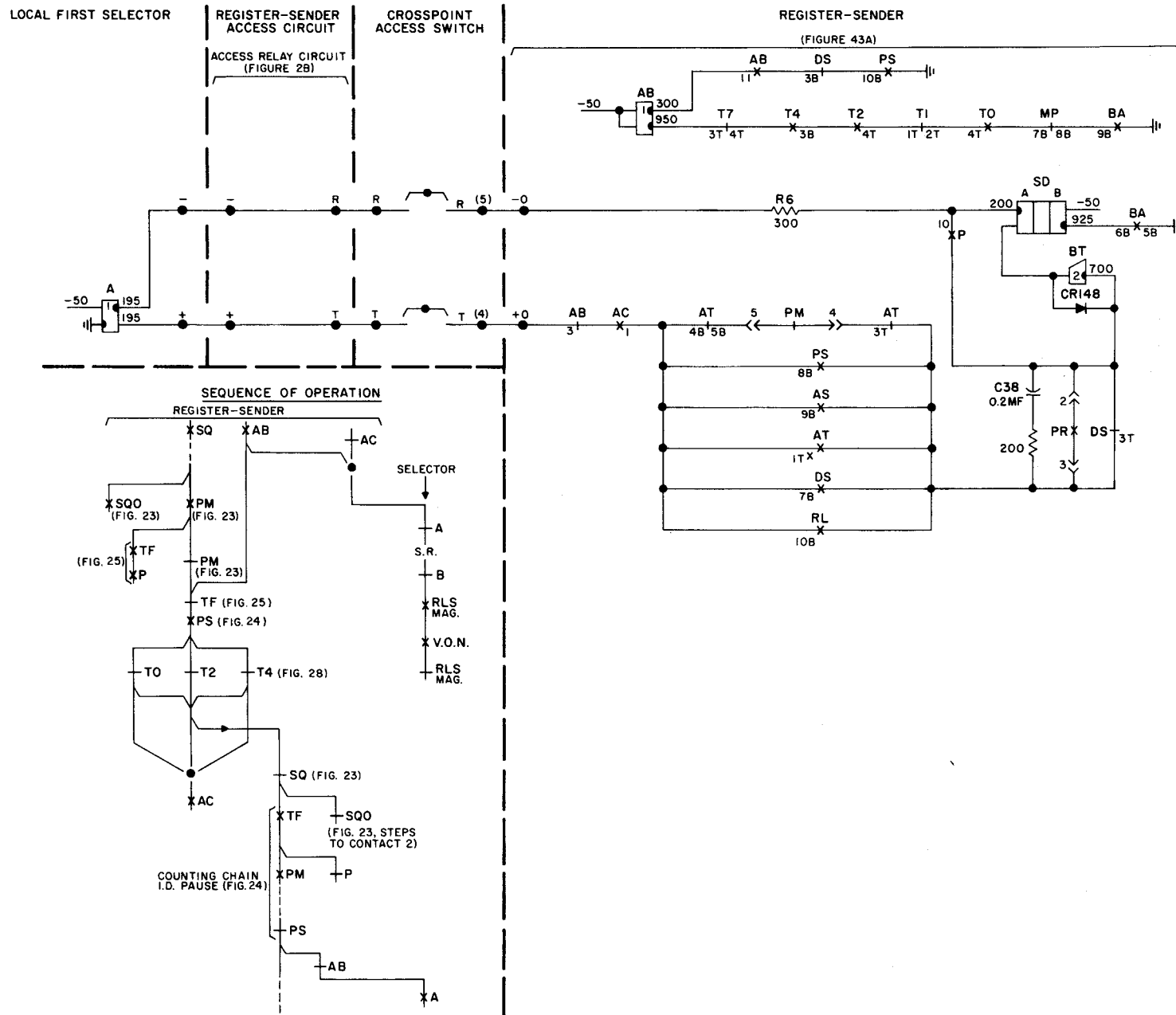
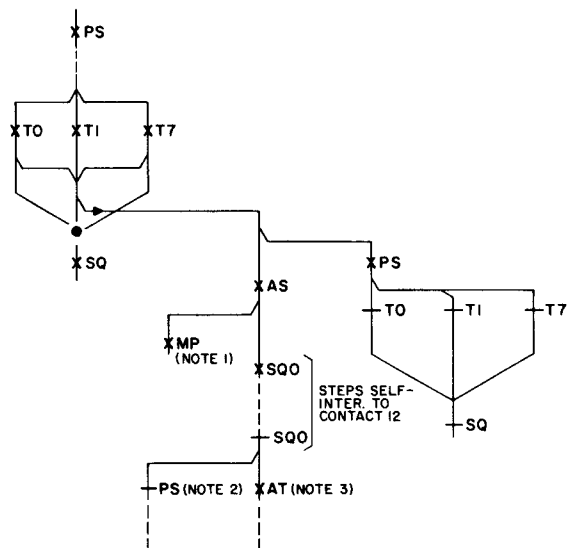


FIGURE 29. ABSORB REPEATED DIGIT (CODE 0,2,4).

SEQUENCE OF OPERATION



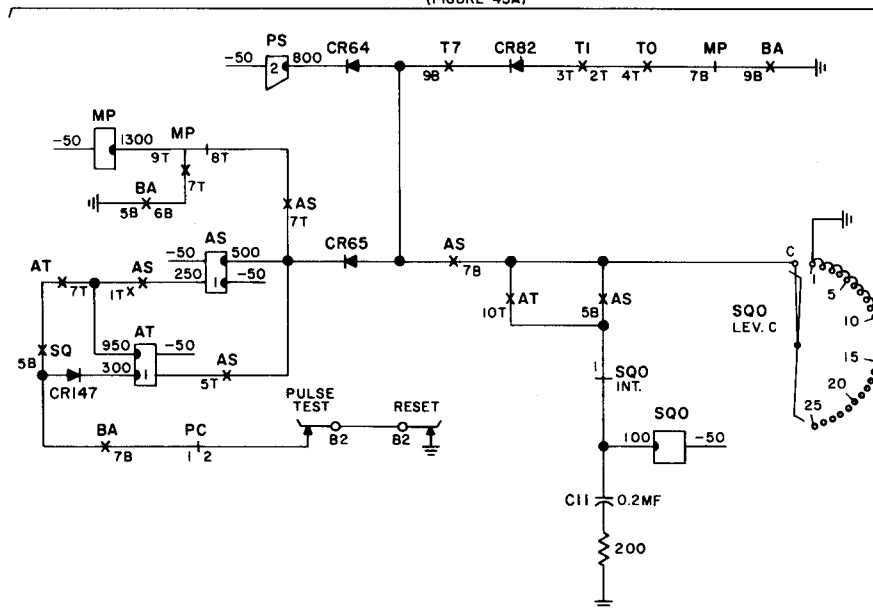
NOTES:

1. OPERATED, RELAY MP PREPARES A CIRCUIT FOR PARITY CHECK AS SHOWN IN FIGURE 31.
2. RELAY PS RESTORES WHEN ROTARY SWITCH SQO REACHES CONTACT 12.
3. AT CONTACT 12, THE GROUND SHUNT IS REMOVED FROM RELAY AT (WINDING NUMBER 1) AND IT OPERATES.

FIGURE 30. ADVANCE SEQUENCE (CODE 0,1,7)..

REGISTER-SENDER

(FIGURE 43A)



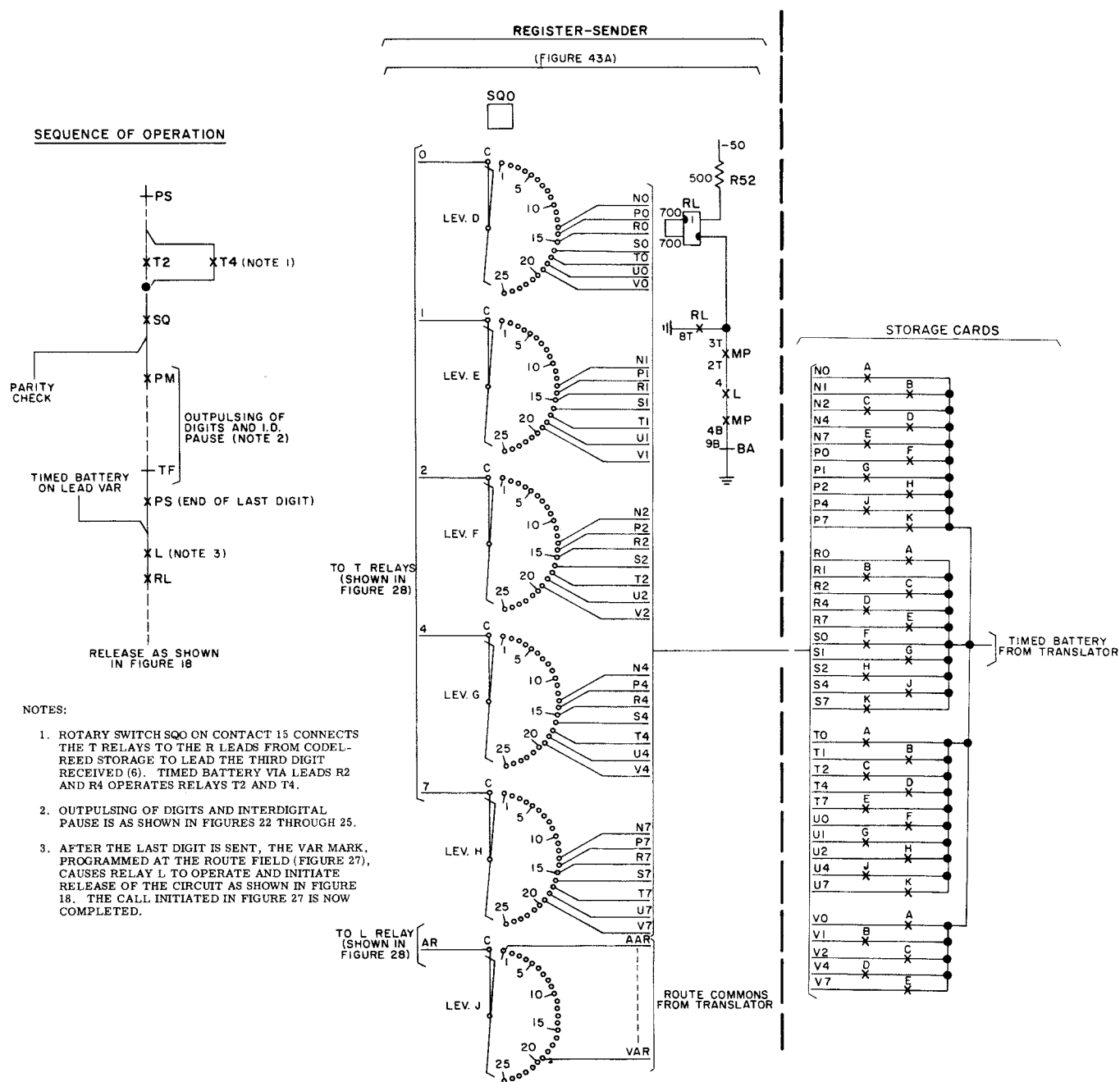


FIGURE 32. READOUT FROM STORAGE

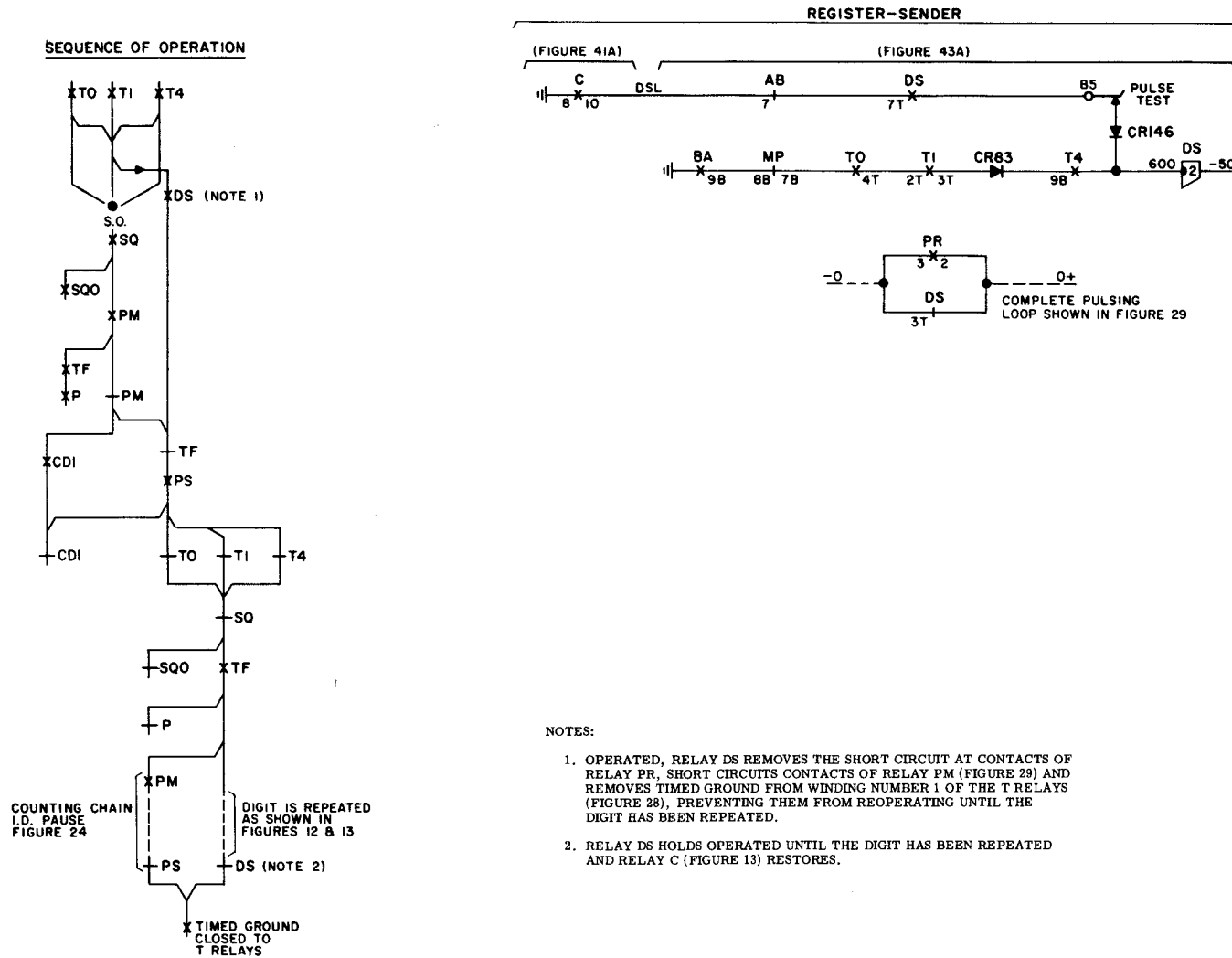


FIGURE 33. REPEAT NEXT DIALED. DIGIT TO SELECTOR (CODE 0,1,4).

NOTES:

1. ALTERNATE ROUTING CAN OCCUR UNDER TWO CONDITIONS:
 - (a) IF ALL TRUNKS ON A PARTICULAR SELECTOR LEVEL ARE BUSY (ATB). THIS CONDITION CAUSES THE AR RELAY ASSOCIATED WITH THAT LEVEL TO RESTORE AND CLOSE TIMED BATTERY TO THE APPROPRIATE AR LEAD, INITIATING ALTERNATE ROUTING.
 - (b) IF A SELECTOR FAILS TO SWITCHTHROUGH. AFTER ROUTING DIGITS ARE OUTPULSED, RELAY L IS OPERATED VIA LEVEL J OF ROTARY SWITCH SQO (FIGURE 28). IF SWITCHTHROUGH DOES NOT OCCUR, RELAY L REMAINS OPERATED, INITIATING ALTERNATE ROUTING. DURING THE INTERDIGITAL PAUSE FOLLOWING THE OUTPULSING OF THE ROUTING DIGIT, THE SUCCEEDING SELECTOR STEPS TO ITS ELEVENTH ROTARY POSITION AND CONNECTS A POSITIVE 24-VOLT BOOSTER BATTERY SIGNAL TO OPERATE RELAY BT IN THE REGISTER-SENDER.
2. IF AN ALTERNATE ROUTE COMMAND IS GENERATED AS A RESULT OF EITHER CONDITION, 1(a) OR (b), THE REGISTER-SENDER GOES THROUGH AN ABSORB CYCLE AND NEW ROUTING DIGITS ARE SENT.
3. ONLY PROGRAMMED INTERSECTIONS OF THE CODE FIELD AND ROUTE FIELD ARE SHOWN; ALL OTHERS HAVE BEEN OMITTED FOR SIMPLICITY.
4. \otimes INDICATES SHORTING PIN.
 ● INDICATES DIODE PIN.

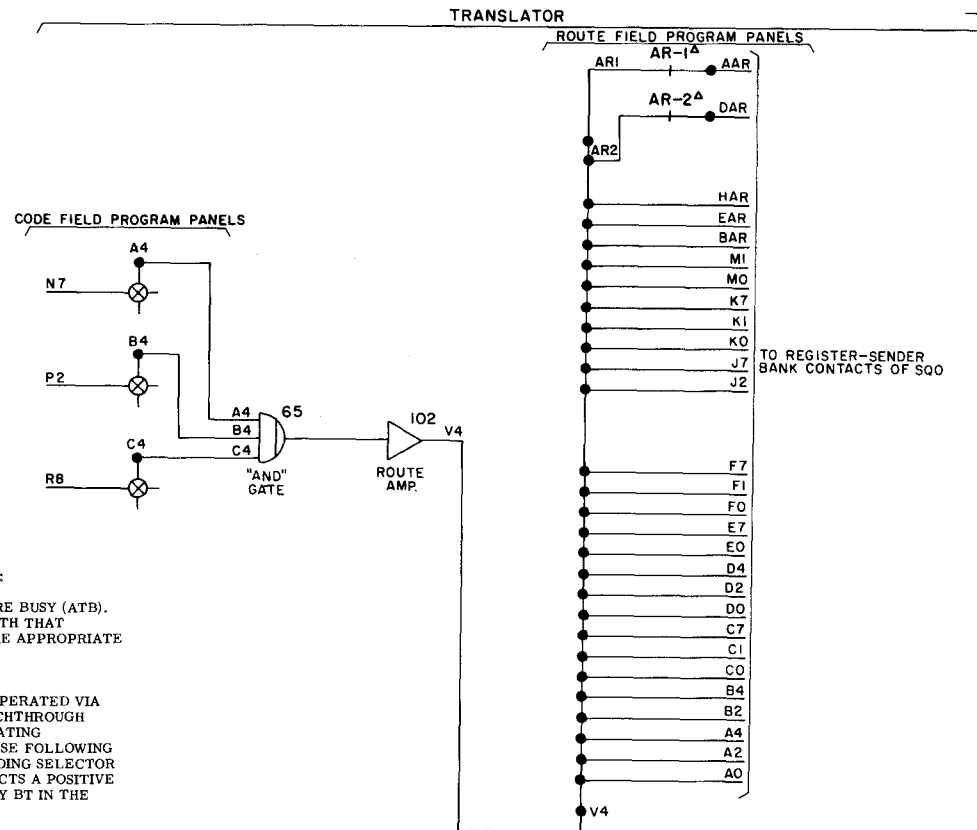
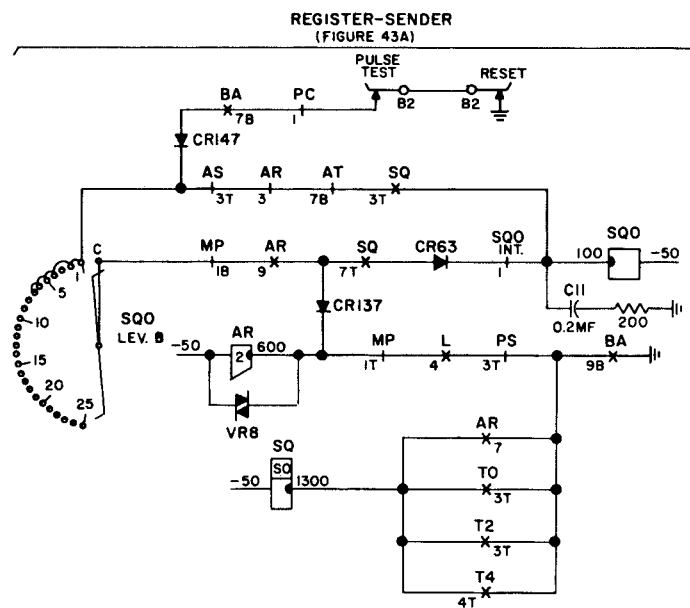
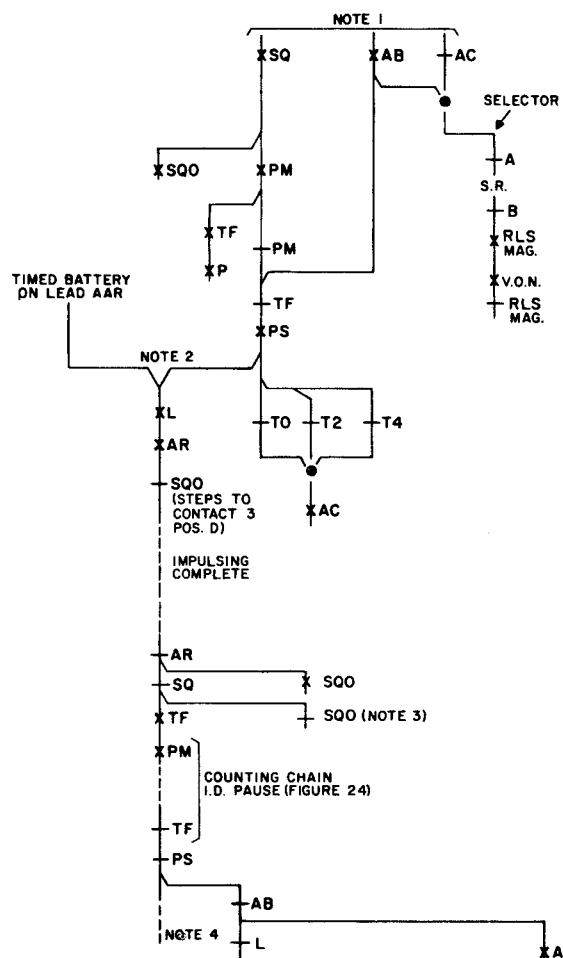


FIGURE 34. PROGRAMMED ALTERNATE ROUTING.

SEQUENCE OF OPERATION



NOTES:

1. THE 0, 2, 4, (ABSORB CYCLE) PROGRAMMED IN THE A SPACE IS RECEIVED AS SHOWN IN FIGURE 28. ABSORB CYCLE OPERATION IS AS SHOWN IN FIGURE 29.
2. IF AN ATB CONDITION EXISTS FOR THIS ROUTE (RELAY AR-1 RESTORED), TIMED BATTERY IS CLOSED TO LEAD AAR. WHEN RELAY PS OPERATES, RELAY L OPERATES, INITIATING ALTERNATE ROUTING.
3. ROTARY SWITCH SQO STEPS SELF-INTERRUPTED, VIA LEAD B, TO CONTACT 4 (POSITION D) TO RECEIVE THE FIRST ALTERNATE ROUTE.
4. CONTACT 4 (POSITION D) OF ROTARY SWITCH SQO HAS TIMED BATTERY ON LEADS D0, D2, AND D4, WHICH CAUSES AN ABSORB CYCLE. IF AN ATB CONDITION EXISTS, OPERATION IS AS PREVIOUSLY DESCRIBED. IF THERE ARE IDLE TRUNKS, A 7 IS OUTPULSED. IF ALL TRUNKS BECOME BUSY AFTER THE OUTPULSING HAS BEGUN "CRANK-BACK" ALTERNATE ROUTING (FIGURE 36) MAY BE INITIATED.

FIGURE 35. ATB ALTERNATE ROUTING.

FIGURE 36. CRANK-BACK ALTERNATE ROUTING.

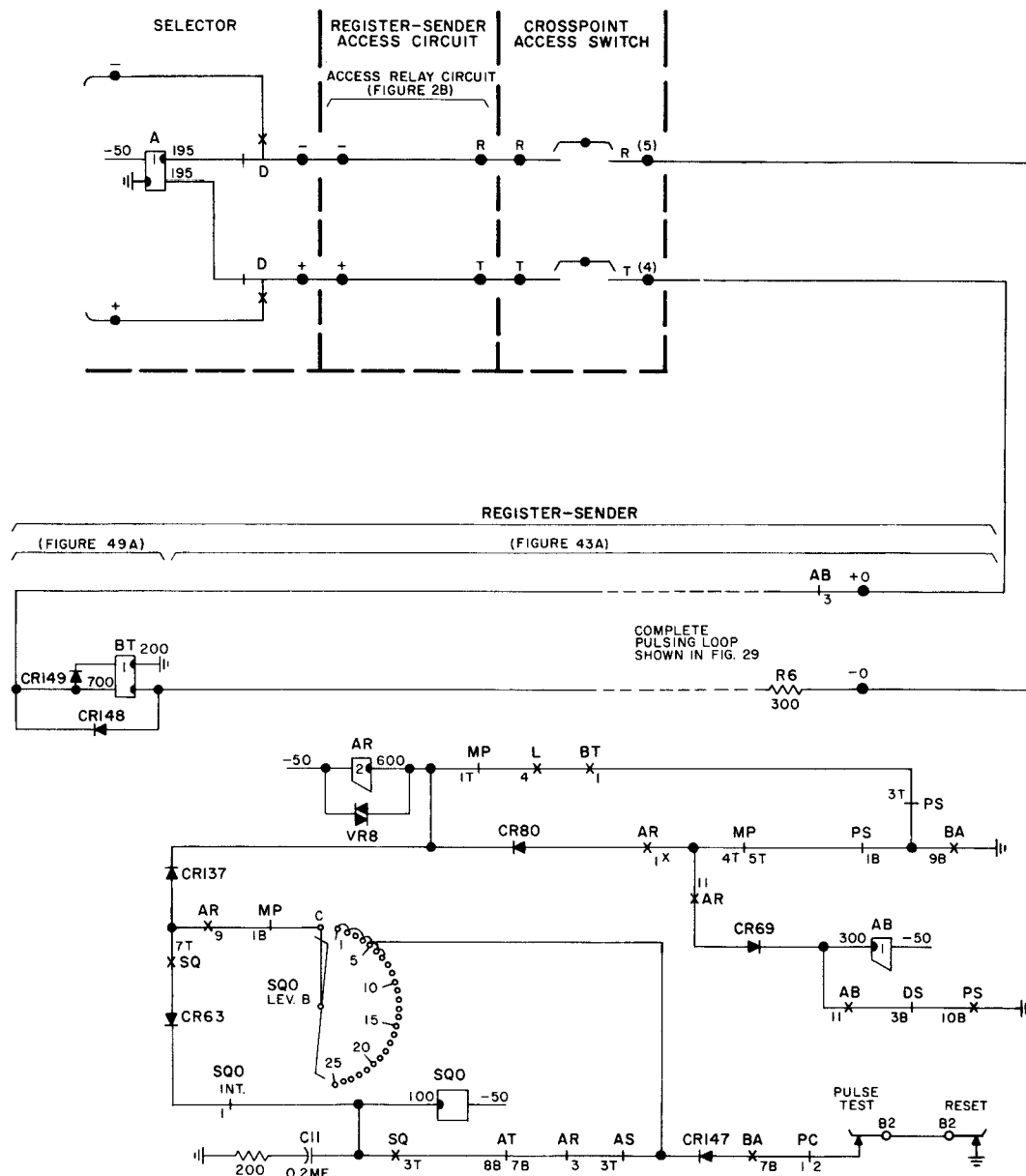


FIGURE 36. CRANK-BACK ALTERNATE ROUTING.

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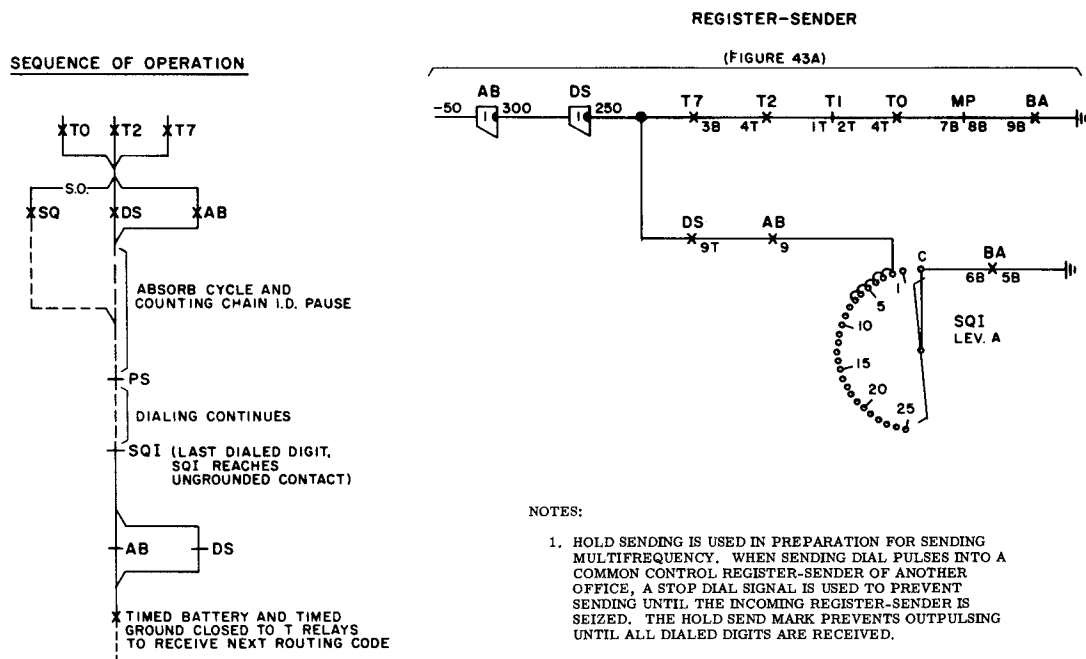
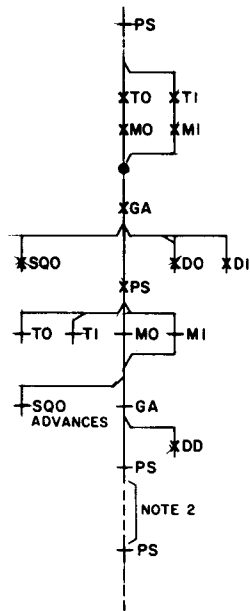


FIGURE 37. HOLD SENDING (CODE 0,2,7).



SEQUENCE OF OPERATION



RELAYS PREVIOUSLY OPERATED
BA, MF

NOTES:

1. THE MF DELETE DIGIT IS PROGRAMMED IN THE SPACE FOLLOWING THE 1, 4, 7 CODE (SEND MF).
2. AFTER REGISTERING THE DELETE DIGIT (D0 AND D1 LOCKED OPERATED) ROTARY SWITCH SGO STEPS TO THE NEXT POSITION TO RECEIVE A 0, 1, 7 (ADVANCE SEQUENCE, SEE FIGURE 30). RELAY AS OPERATES AND ROTARY SWITCH SGO STEPS SELF-INTERRUPTS. RELAY D1 CAUSES ROTARY SWITCH SGO TO STEP TO THE FIRST DIGIT LOCATION.

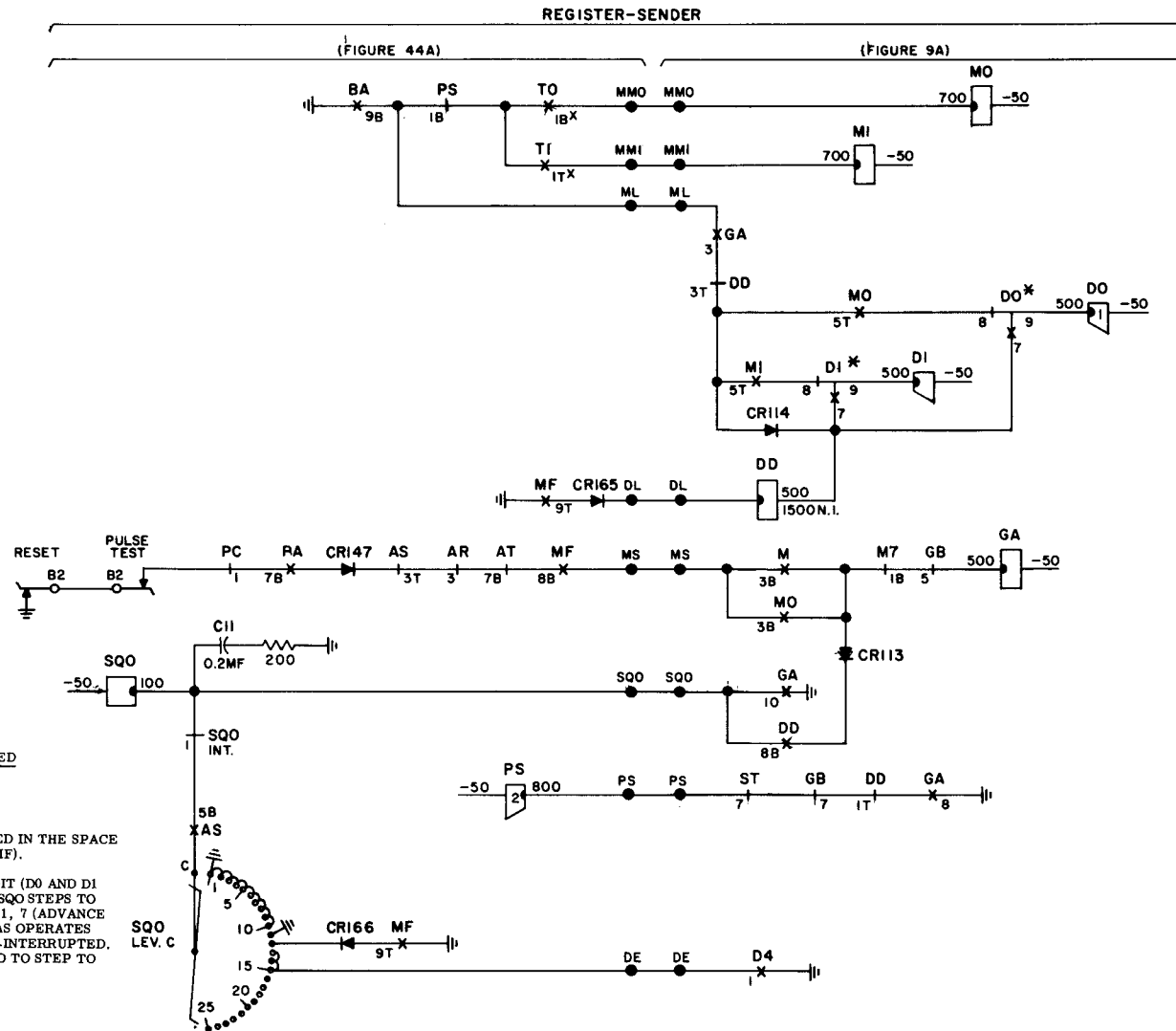
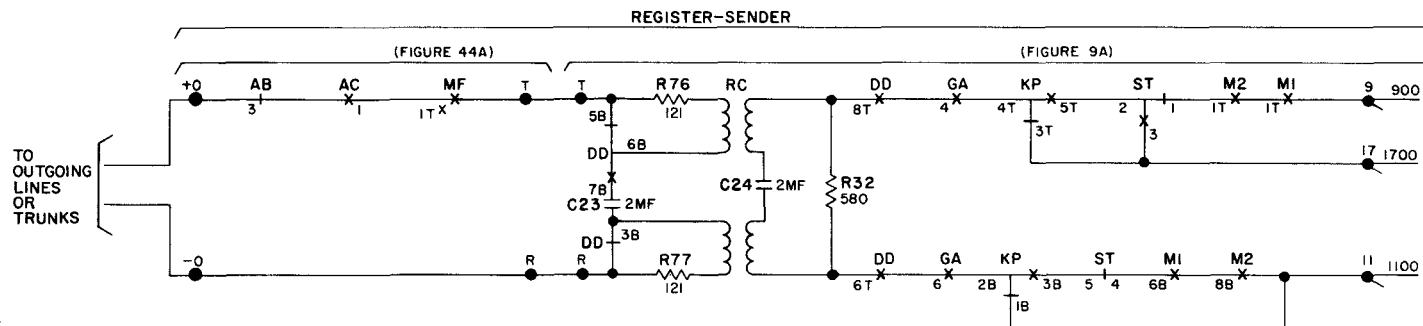
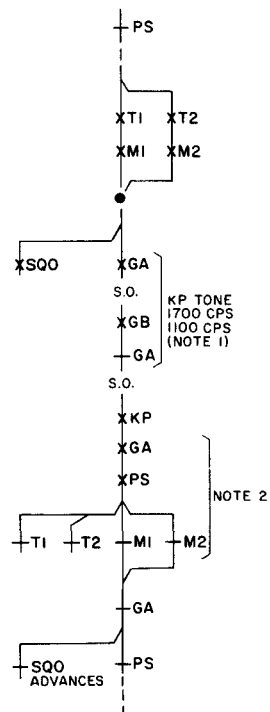


FIGURE 39. MF DELETE DIGIT.



SEQUENCE OF OPERATION



NOTES:

1. KP (KEY PULSE) TONE IS SENT PRIOR TO THE SENDING OF DIGITS TO CONDITION THE RECEIVING EQUIPMENT ON THE LINE.
2. RELAY GA CLOSES THE TONES REPRESENTING THE DIGIT (3) TO THE T & R LEADS UNTIL THE M RELAYS RESTORE.

RELAYS PREVIOUSLY OPERATED
AC, MF, BA, DD

FIGURE 40. MF SENDING.



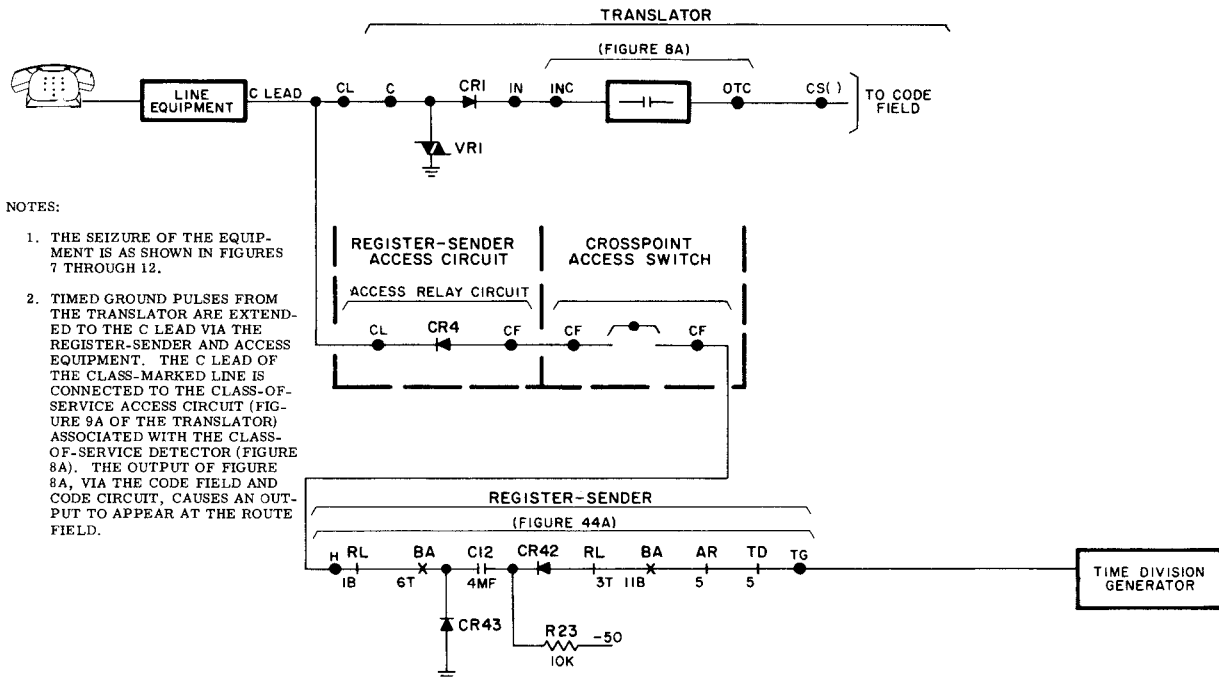


FIGURE 42. C LEAD CLASS-OF-SERVICE.

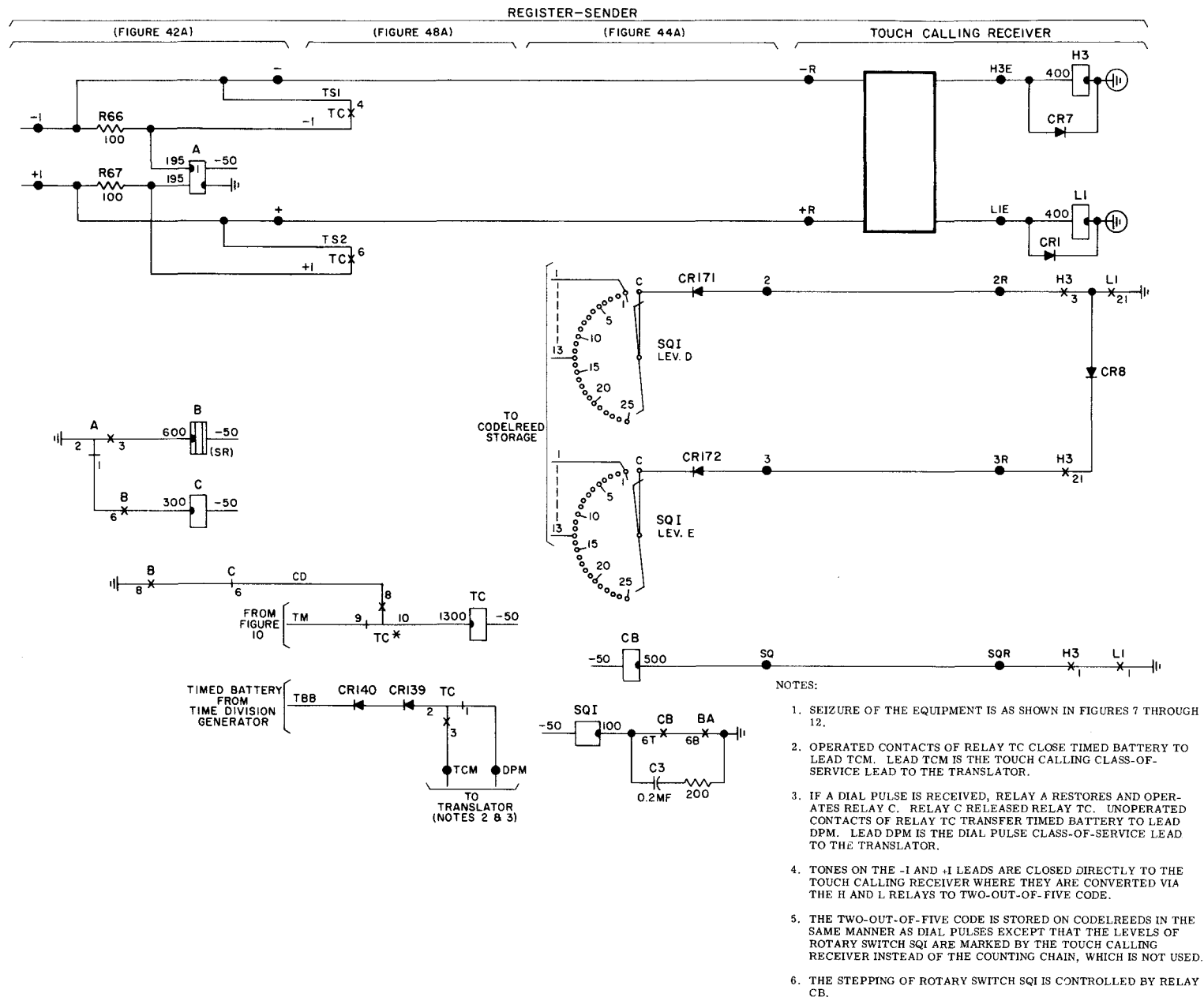


FIGURE 43. TOUCH CALLING ARRANGEMENT, ONE TOUCH CALLING RECEIVER PER REGISTER-SENDER.