

6A KEY TELEPHONE SYSTEM

TWO-TALKING LINK ARRANGEMENT

MAINTENANCE

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8.00 ANSWERING INCOMING CALL: TALKING PATH, PRIMARY LINK, Fig. 6	14	1.01 This section covers the maintenance of the two-talking link arrangement of the 6A key telephone system, the use of sequence charts and operational sketches, and a description of the symbols used.	
9.00 TRANSFER TO SECONDARY LINK: TALKING PATH, SECONDARY LINK, Fig. 7	16	1.02 Due to extensive changes marginal arrows have been omitted.	
10.00 AUDIBLE SIGNALS, Fig. 8	18	2.00 GENERAL	
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12.00 BUSY SIGNAL, Fig. 10	22		
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14.00 ADD-ON CONFERENCING, PRIMARY OR SECONDARY LINK, Fig. 12	26	• Sequence charts cover the operation and release of relays, keys, and other apparatus	

in their relative time order. They are shown from the top downward and are connected by appropriate lines to show the interdependence of the successive operations.

- Operational sketches show complete circuits from battery to ground in simplified form, completely disregarding boundaries of conventional SD drawings. Key telephone unit numbers beneath the complete circuit identify key telephone units in which the individual relays, relay contacts, or other apparatus are located.

USE OF SEQUENCE CHARTS AND OPERATIONAL SKETCHES

2.02 After it has been determined that the trouble is in the 6A equipment, proceed as follows:

- Watch relay operation of equipment and compare it to that of the sequence charts as shown on the various figures.
- Where circuit failure occurs, the operational sketch either will show the complete path for the circuit that failed or it will refer to the figure where the complete path may be found.

2.03 The following are samples of some of the symbols used in the preparation of the sequence charts and operational sketches contained in this practice.

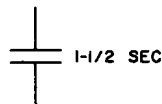
SEQUENCE CHART SYMBOLS



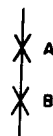
Relay or other apparatus in a fully operated position.



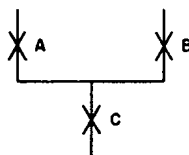
Relay or other apparatus in an unoperated or normal position.



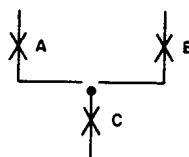
Time delay circuit (time will be designated).



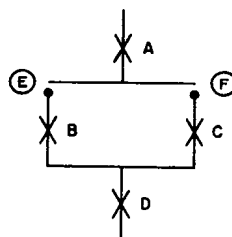
Operation of relay A causes the operation of relay B.



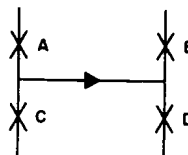
Both relays A and B have to be operated before relay C can operate.



Operation of either the A or B relay will cause the operation of relay C.

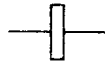


Option: Relay A in operating, operates relay B or C depending on the wiring option provided. Relay B or C in operating would in turn operate relay D.

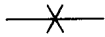


Both relays A and B must operate before relay D can operate. The arrow is used to indicate one-way action. In this illustration, relay C operates from relay A only.

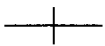
OPERATIONAL SKETCH SYMBOLS



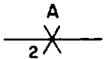
Relay core and winding.



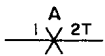
Apparatus operated (keys, telephone sets, etc.).



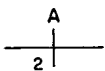
Apparatus normal (keys, telephone sets, etc.).



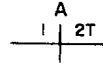
Make contact of an operated wire-spring-type relay. Relay will be designated above and contact number below. The position of the number indicates the location of the fixed contact in the circuit.



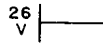
Make contact of an operated relay having a top and bottom pile-up. Relay will be designated above and a contact number on each side. Letter T or B would indicate that the contacts are in the top or bottom pile-up, respectively.



Normally closed contact of an unoperated wire-spring-type relay. Relay will be designated above and contact number below.



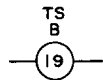
Normally closed contact of an unoperated relay having a top and bottom pile-up. Relay will be designated above and a contact number on each side.



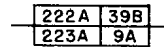
Battery symbol (B battery unless designated otherwise).



Ground symbol.



Point of termination, terminal strip B, terminal 19.



Point of termination, terminal strip B, terminal 39 if the 222A KTU is used or terminal strip A, terminal 9 if the 223A KTU is used.

2.04 A description of the operation, supplementing the sequence charts, is provided to specify the functions of the equipment.

2.05 The sequence charts and operational sketches in this section supplement, but do not replace, CD and SD-69286-01.

2.06 General maintenance of telephone sets, dials, keys, relays, power plants, etc, used with the 6A key telephone system is not covered in this section. References should be made to the C Sections pertaining to these specific items.

2.07 The following wiring options are applicable to this section.

**OPTIONS ASSOCIATED WITH
SYSTEM**

Wiring	Option	
X	Without (max nine codes)	Transfer Ckt
W	With (over nine codes)	
K	With	Preset Conference
J	Without	
G	With	Camp-On
N	Without	
H	Without	Aux Rel Busy Lamp Ckt
M	With	
S	Without	Aux Rel Lamp Flash Ckt
V	With	
AK	Interrupted	Audible Signal
AL	Single Spurt	
AJ	Dial, busy, and aud tone	
AQ	Busy signal & camp-on control ckt when used with a 207B KTU	

**OPTIONS ASSOCIATED WITH
STATIONS**

Wiring	Option	
E	With	Automatic Cutoff
F	Without	
Y	Over <i>T</i> & <i>R</i> leads	Sta Aud Signal
Z	Over sep sig pair	
AA	Sta assoc with com aud arr	Aux Rel Sta Ckt (Mfr Disc.)
Q	With	
AG	Without	Add-On Transfer Ckt
AG	Without	
AO	With	Sig Key Selection of Station
AE	Local sta or off- premise sta when <i>AK</i> opt is provided	
AF	Off-prem sta when <i>AL</i> opt is provided	Sta to originate add-on con- ference (Mfr Disc.)
AB	Sta to originate add-on con- ference (Mfr Disc.)	

2.08 The 227A key telephone units used in this system have been identified for clarity as follows:

- 227A-1 Ringing and Tone Control Circuit
- 227A-2 Single Add-On Transfer Circuit
- 227A-3 Auxiliary Relay Busy Lamp Circuit
- 227A-4 Auxiliary Relay Lamp Flash Circuit
- 227A-5 Auxiliary Relay Station Circuit (Mfr Disc.)

Each of the above circuits utilizes the *MS* relay of the 227A KTU.

3.00 LINE SEIZURE

3.01 The *T* and *R* leads of a 6A key telephone system station are connected to battery and ground through the windings of the *A* relay. As a station picks up, relay *A* operates. The station's *L* relay in the station line circuit also operates but performs no useful function at this time. Operation of the *A* relay causes operation of relay *B*. The *B* relay in operating (a) operates the vibrator if provided, and (b) operates the *B1* relay under control of the *TB1* relay and the camp-on control circuit. The *B1* relay in operating (a) lights the busy lamp steadily at all stations (as described in 11.00), (b) starts the associated flashing circuit, and (c) operates the time-out control circuit of the associated key telephone system if so connected.

3.02 When dial tone is provided, the output of the network in the vibrator circuit is returned to the tip side of the *A* relay under control of the *MS* relay in the ringing and tone control circuit.

Reference: SD-69286-01

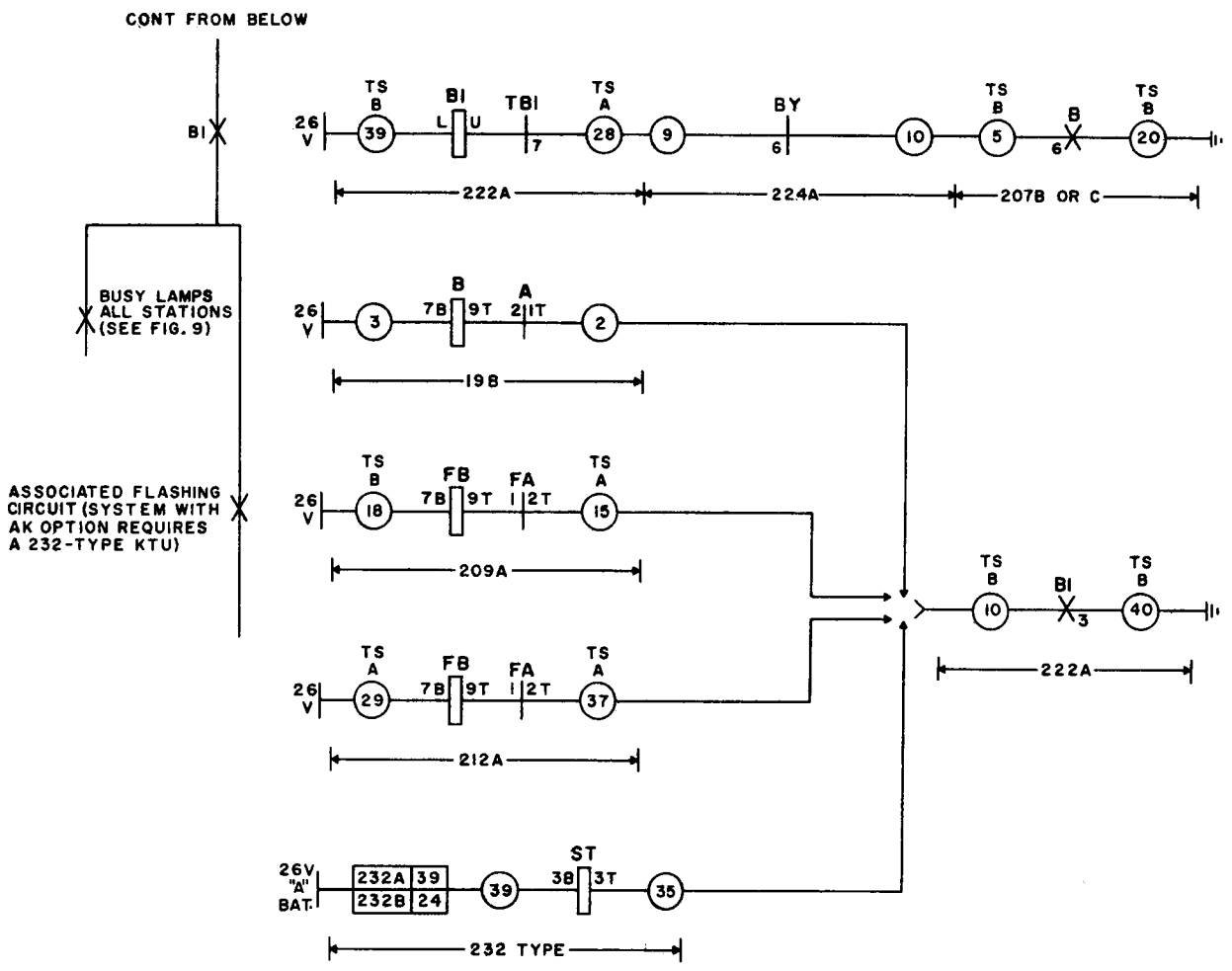
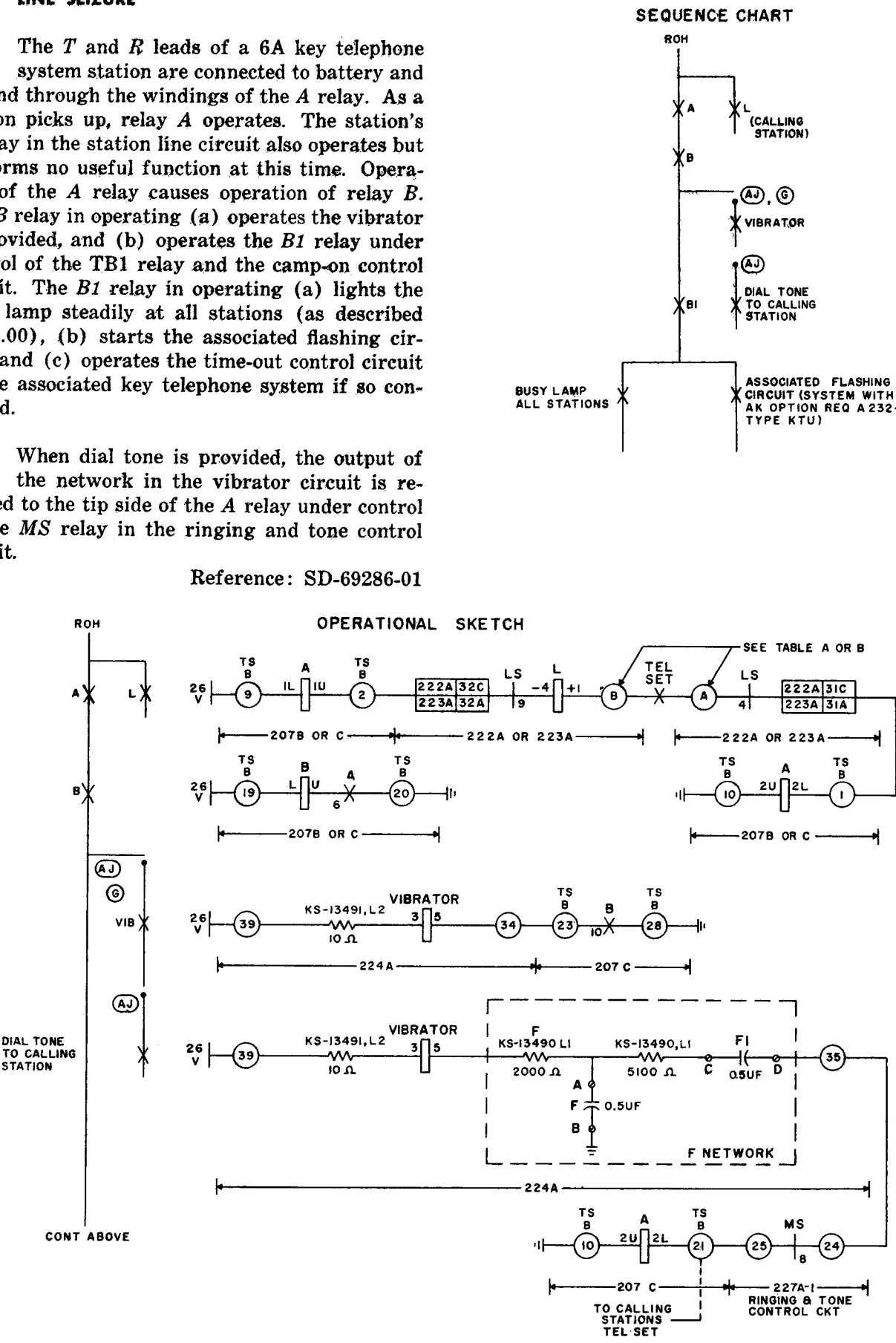


TABLE A

REFERENCE DESIGNATION	PUNCHING ON 222A								
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9
A	1A	11A	21A	31A	1B	11B	21B	31B	1C
B	2A	12A	22A	32A	2B	12B	22B	32B	2C

TABLE B

REFERENCE DESIGNATION	PUNCHING ON 223A		
	CKT 1	CKT 2	CKT 3
A	1A	11A	21A
B	2A	12A	22A

Fig. 1 — Line Seizure

4.00 BASIC OPERATION OF SELECTOR CIRCUIT

4.01 Relays *A* and *B* have previously been operated as described in 3.00.

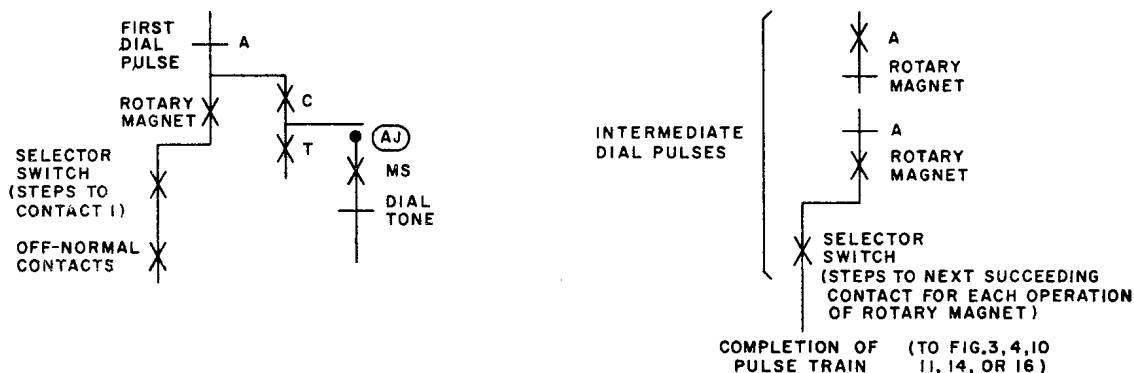
As each digit is dialed, relay *A* releases and reoperates in unison with the dial pulses. Slow release relay *B* remains operated during dialing. As relay *A* pulses, a ground is connected to the rotary magnet causing the selector switch to step in unison with the dial pulses.

4.02 A slow releasing relay *C* operates on the first release of relay *A* and remains operated during the pulse train. This relay causes operation of relay *T* which in turn connects a resistor and capacitor across its winding. The capacitor is charged during pulsing, and its discharge after the release of relay *C* holds relay *T* operated for approximately 1-1/2 seconds.

4.03 When dial tone is provided, relay *C* in operating, operates the *MS* relay in the ringing and tone control circuit. The *MS* relay in operating (a) locks up under control of relay *B* and (b) opens the path supplying dial tone to the tip side of the line through the winding of relay *A*.

Reference: SD-69286-01

SEQUENCE CHART



OPERATIONAL SKETCH

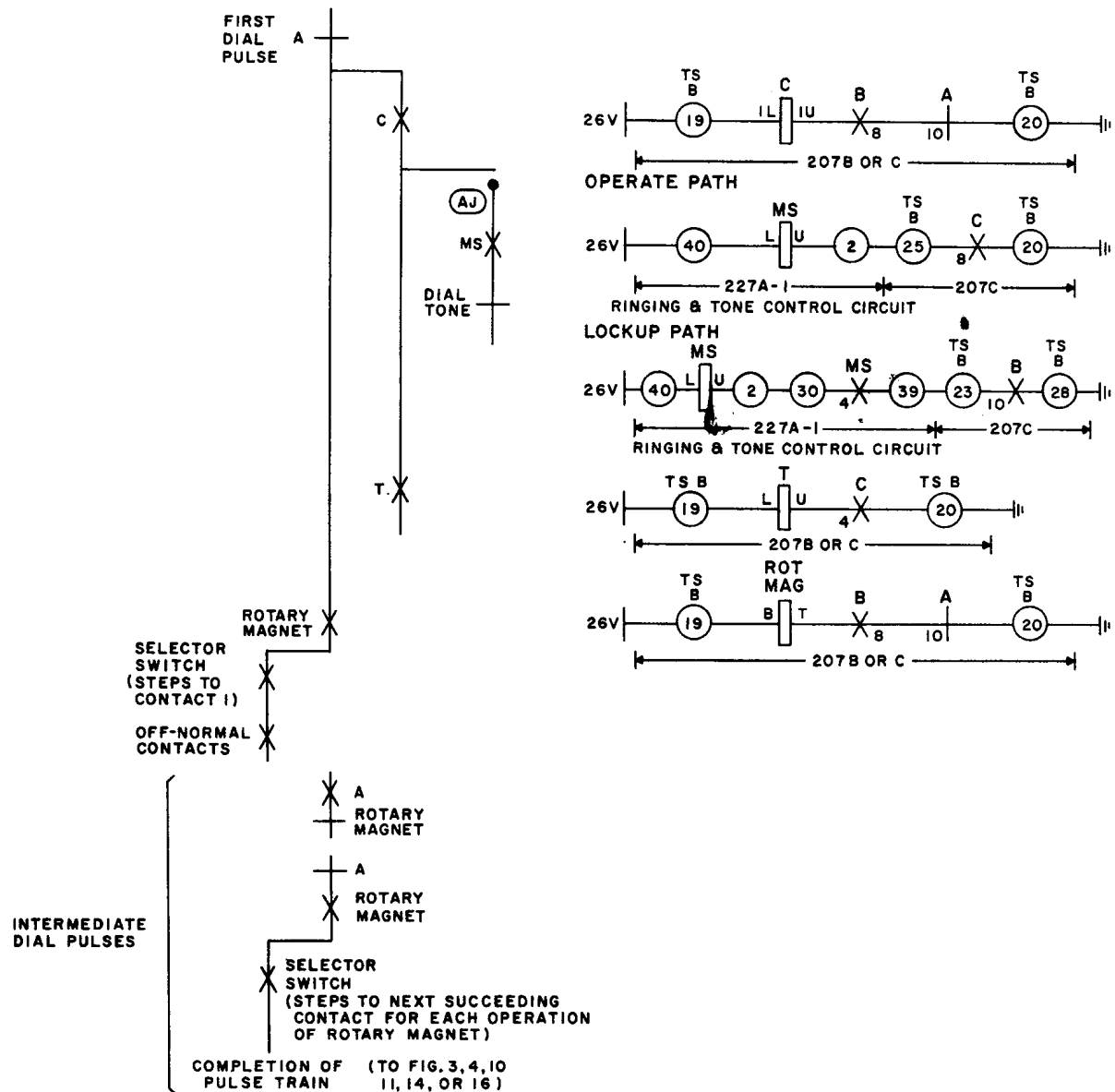


Fig. 2 — Basic Operation of Selector Circuit

5.00 STATION SELECTION, DIALING SINGLE-DIGIT CODE OR SECOND DIGIT OF 2-DIGIT CODE
(Dialing first digit of a 2-digit code, see 6.00.)

5.01 At the completion of the pulse train, relay *A* reoperates and relay *C* releases. The release of relay *C* (a) opens the operate path for relay *T* and (b) connects a ground to the station signaling circuit under control of the second bank of the selector switch and the *TR* relays if provided.

5.02 This ground operates relay *BC* which in turn operates relay *BC1*. Operation of the *BC1* relay shunts the winding of the *BC* relay, thus allowing the called station's *LS* relay to operate. Relays *BC* and *BC1* return to normal. The *LS* relay in operating (a) locks up and (b) connects the called station's lamp to the associated flashing circuit, as described in 11.00.

5.03 When *AL* option is provided, the operation of the *LS* relay connects the ground from the second bank of the selector switch to the *RO* relay. The *RO* relay in operating, operates the

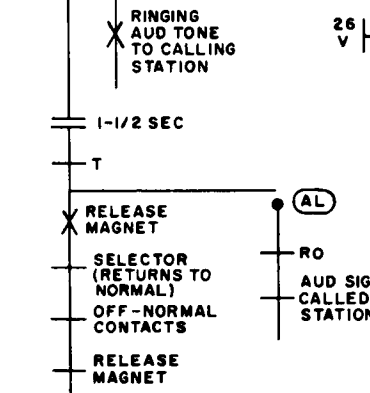
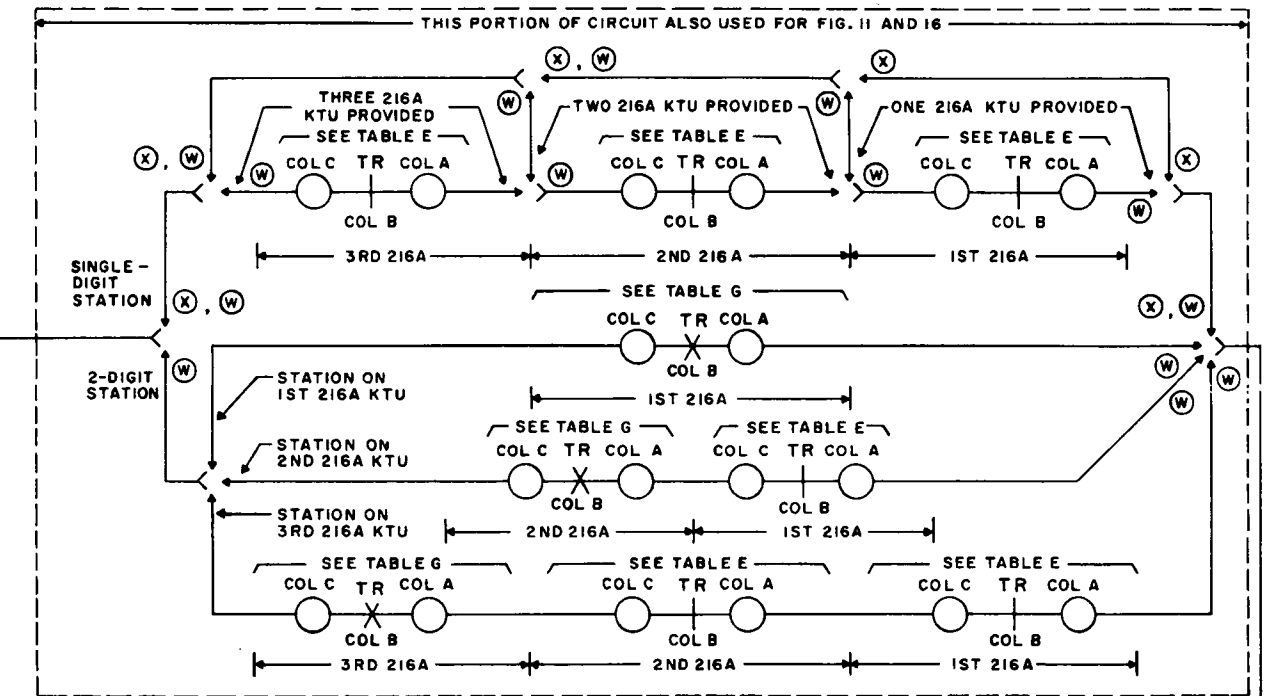
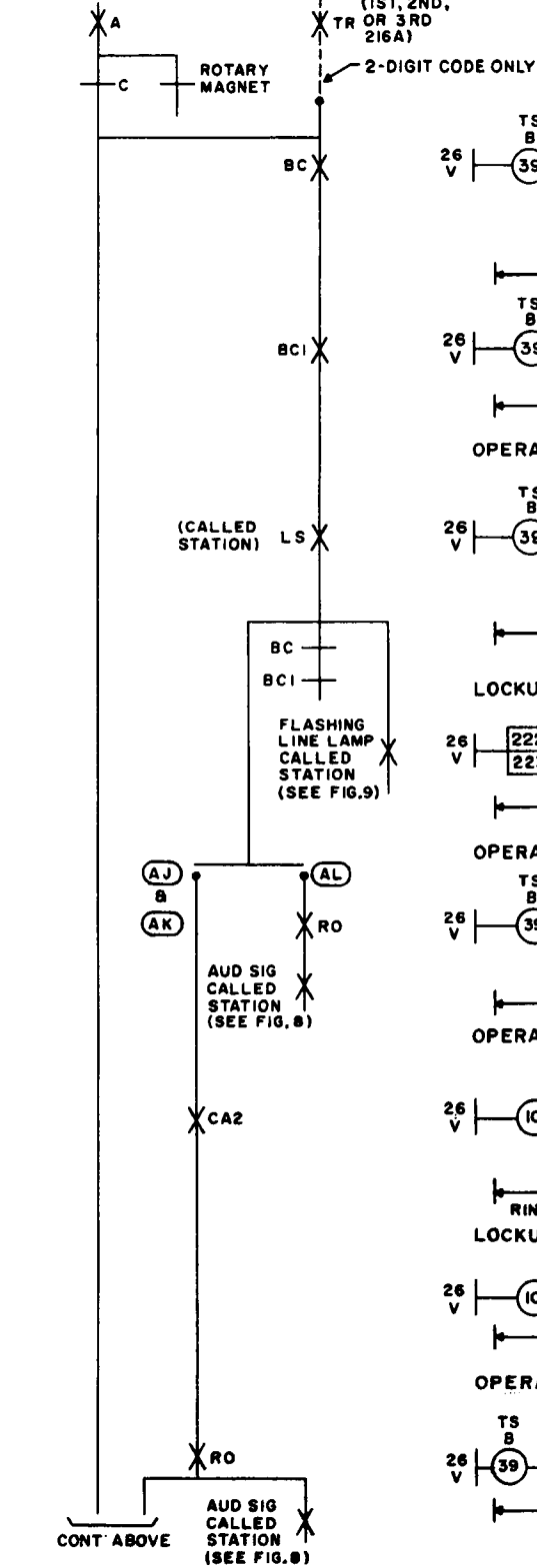
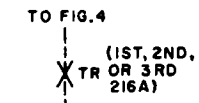
audible signal at the called station, as described in 10.00.

5.04 When *AJ* and *AK* options are provided, the operation of the *LS* relay connects the ground from the second bank of the selector switch to the ringing and tone control circuit to operate the *CA2* relay. The *CA2* relay in operating (a) locks up and (b) connects the *RO* relay to the interrupter in the associated flashing circuit. The interrupter operates and releases the *RO* relay with a 1-second operate and a 3-second release timing cycle. The *RO* relay in operating operates the audible signal at the called station as described in 10.00 and completes a path to send ringing audible tone to the calling party.

5.05 After a nominal 1-1/2 second time delay, relay *T* releases. The release of relay *T* (a) opens the operate path of the *RO* relay when *AL* option is provided and (b) provides an operate path for the release magnet. The release magnet in operating returns the selector switch to normal which in turn restores the off-normal contacts to their original position. This in turn opens the operate path of the release magnet.

Reference: SD-69286-01

OPERATIONAL SKETCH



COL A TERM.	COL B CONTACT	COL C TERM.
1	8	21
2	1	22
3	2	23
4	3	24
5	4	25
6	7	26
7	9	27
8	10	28
9	11	29
10	5	30

REFERENCE DESIGNATION	PUNCHING ON 223A		
	CKT 1	CKT 2	CKT 3
F	7A	17A	27A
G	10A	19A	20A

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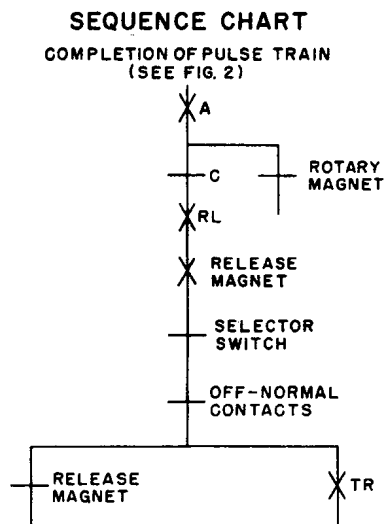
6.00 STATION SELECTION DIALING FIRST DIGIT OF 2-DIGIT CODE (Dialing second digit, see 5.00.)

6.01 The first digit of a 2-digit code is used as a transfer code. After completion of the pulse train, relay *A* reoperates and relay *C* releases. The release of relay *C* operates the *RL* relay under control of all normal *TR* relays and the selected *SW* lead on the first bank of the selector switch.

6.02 The *RL* relay locks to the operated *B* relay and connects an operate path for the release magnet of the selector circuit under control of the off-normal contacts and the *TR* relay.

6.03 The release of the selector switch causes the operation of the *TR* relay under control of the *RL* relay, the off-normal contacts, and relays *T* and *C*. The *TR* relay locks to the operated *B* relay and (a) transfers the *C* leads (connected to the second bank of the selector switch) from the single-digit code stations to the selected group of 2-digit code stations, (b) opens the operate path of the selector-release magnet, and (c) opens the operate path of any other *RL* relay which may be provided.

Reference: SD-69286-01



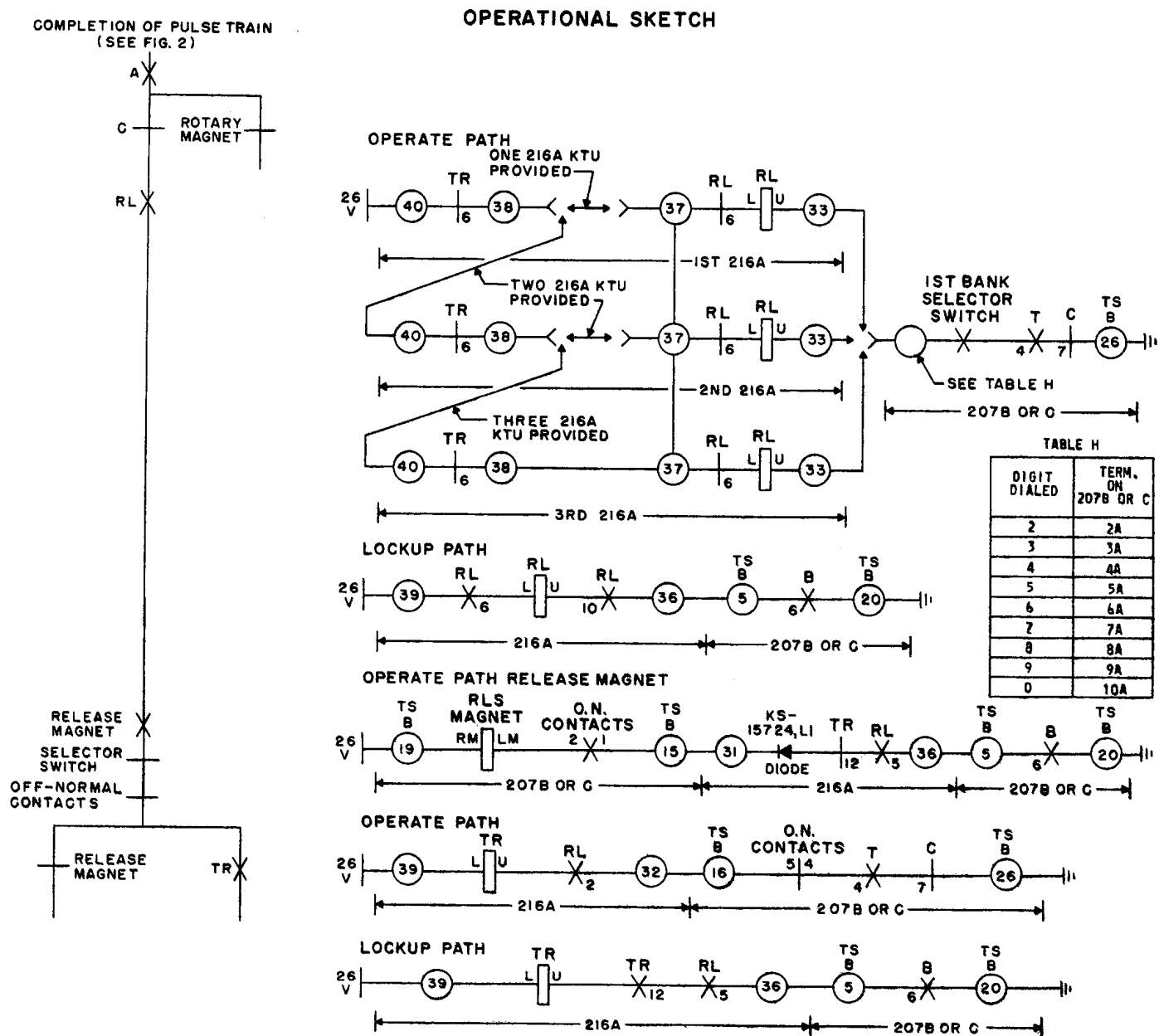


Fig. 4 — Station Selection, Dialing First Digit of 2-Digit Code

7.00 STATION SELECTION, USING SIGNAL KEY

7.01 After line seizure has been accomplished as described in 3.00, the signal key, furnished on a one-per-called-station basis, is operated. Operation of the signal key operates relay *BC* which in turn operates relay *BC1*. The *BC1* relay shunts the winding of the *BC* relay, thus allowing the called station's *LS* relay to operate. Relays *BC* and *BC1* return to normal. The *LS* relay in operating (a) locks up and (b) connects the called station's lamp to the associated flashing circuit, as described in 11.00.

7.02 When *AL* option is provided, the operation of the *LS* relay connects the ground from the signal key to the *RO* relay. The *RO* relay in operating operates the audible signal at the called station, as described in 10.00. The audible signal at the called station will operate as long as the signal key is depressed.

7.03 When *AJ* and *AK* options are provided, the operation of the *LS* relay connects the ground from the signal key to the ringing and

tone control circuit to operate relays *MS* and *CA2*. The *MS* relay in operating (a) locks up and (b) opens the path supplying dial tone to the calling station. The *CA2* relay in operating (a) locks up and (b) connects the *RO* relay to the interrupter in the associated flashing circuit. The interrupter operates and releases the *RO* relay with a 1-second operate and a 3-second release timing cycle. The *RO* relay in operating operates the audible signal at the called station as described in 10.00 and completes a path to send ringing audible tone to the calling party. The signal key can be released at any time, as the *RO* relay is now under control of the interrupter.

7.04 A selected conference call can be originated by the simultaneous operation of a number of signal keys (max 6). The operation of the signal keys operates the associated station circuits (see 7.01) which in turn controls the audible signals at the called stations (see 7.02 or 7.03). For answering the conference call see PRESET CONFERENCE, 13.08 through 13.10.

Reference: SD-69286-01

SEQUENCE CHART

LINE SEIZURE (SEE FIG. 1)

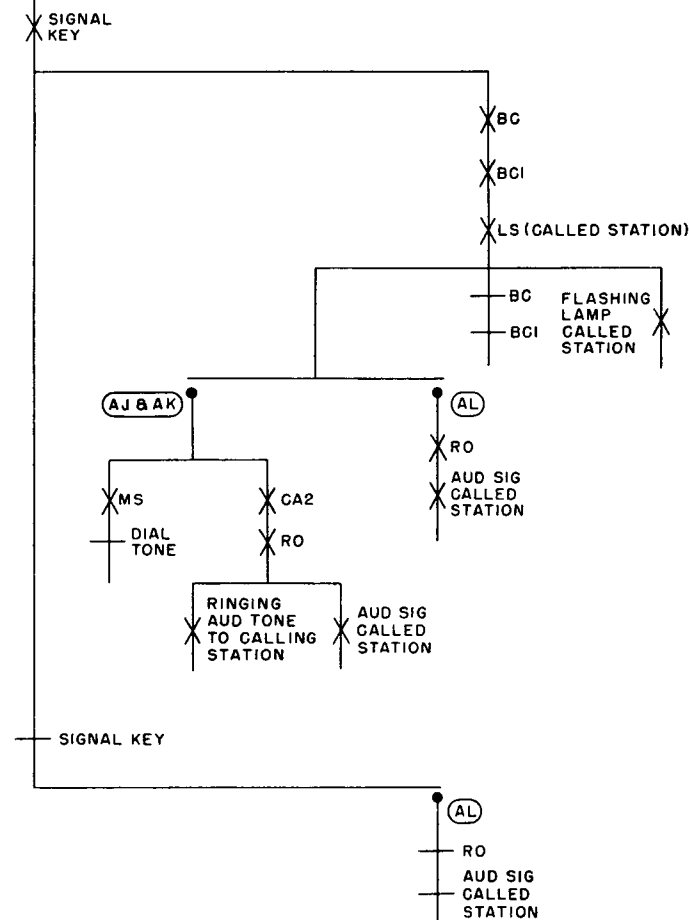


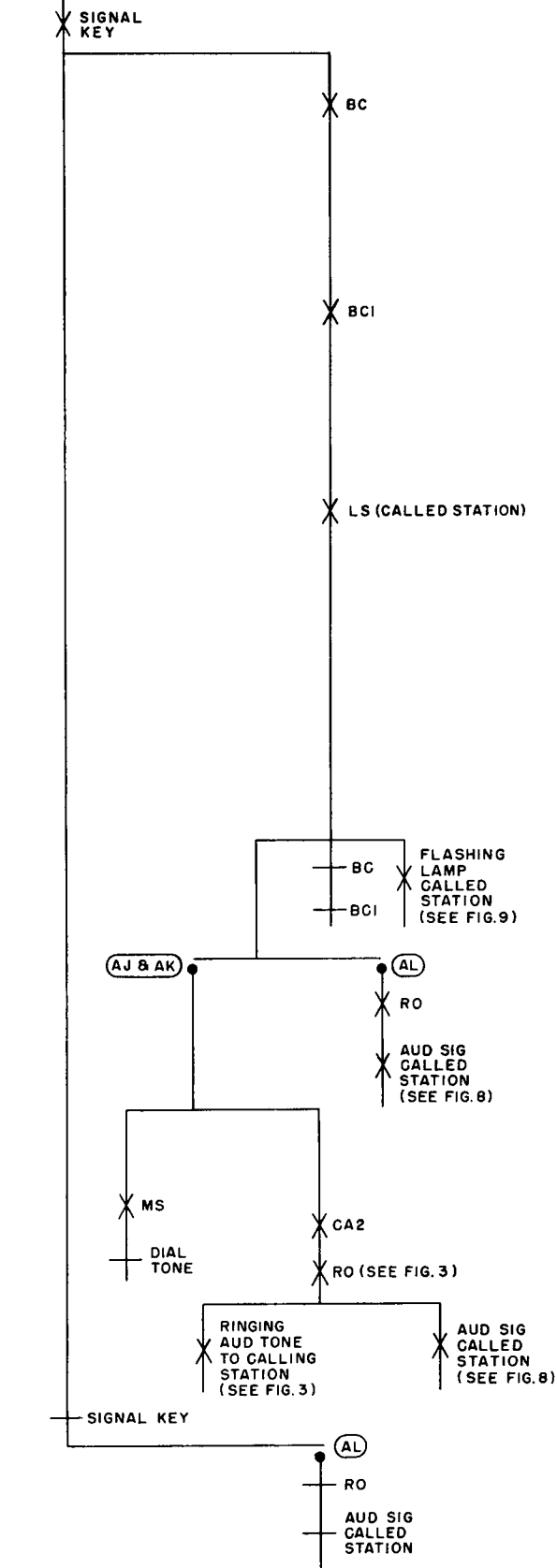
TABLE D

REFERENCE DESIGNATION	PUNCHING ON 221A
	CKT 1 CKT 2 CKT 3
F	7A 17A 27A
G	18A 19A 20A

TABLE C

REFERENCE DESIGNATION	PUNCHING ON 222A
	CKT 1 CKT 2 CKT 3 CKT 4 CKT 5 CKT 6 CKT 7 CKT 8 CKT 9
F	7A 17A 27A 37A 7B 17B 27B 37B 7C
G	11C 12C 13C 14C 15C 16C 17C 19C 19C

LINE SEIZURE (SEE FIG. 1)



OPERATIONAL SKETCH

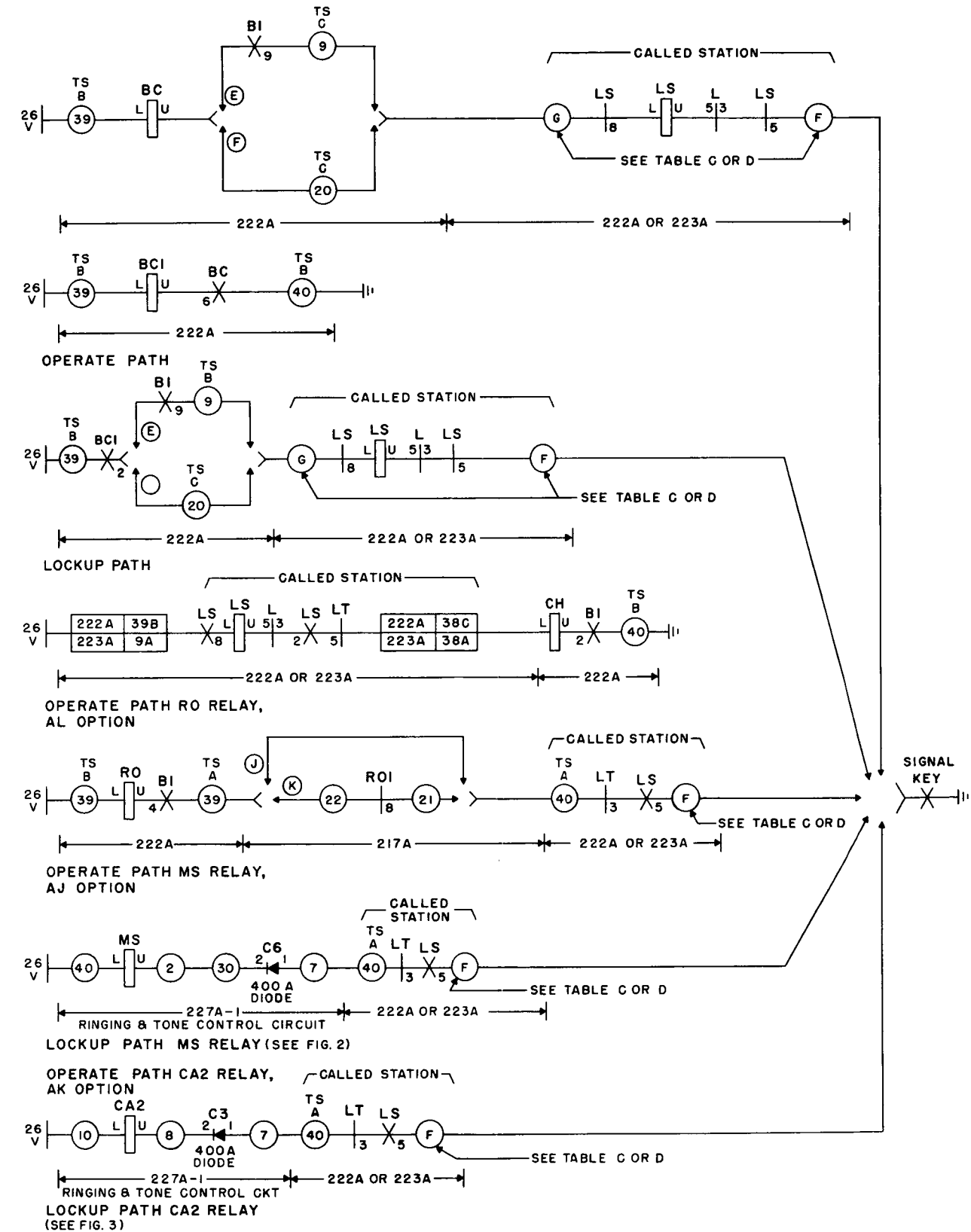


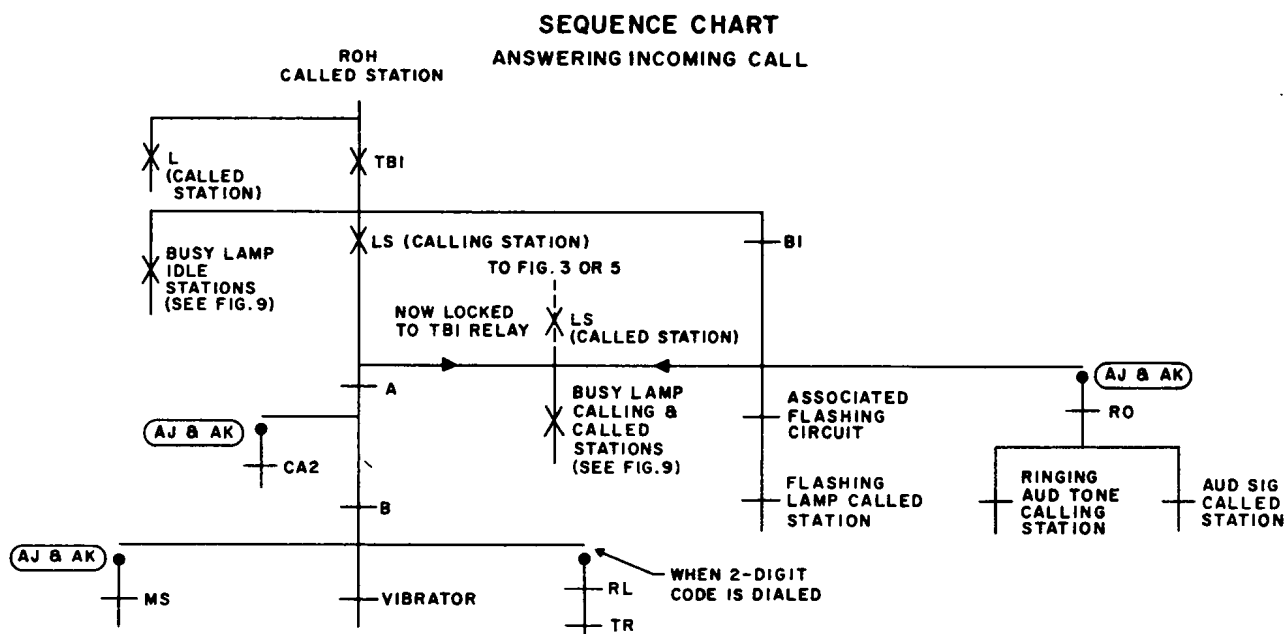
Fig. 5 — Station Selection, Using Signal Key

8.00 ANSWERING INCOMING CALL: TALKING PATH, PRIMARY LINK

8.01 The called party responds to the audible signal and connects its telephone circuit to the *T* and *R* leads, operating the *TB1* relay. (Connection can only be made during the silent interval.) Operation of the *TB1* relay (a) operates the calling station's *LS* relay and (b) opens the operate path for the *B1* relay. The calling station's *LS* relay in operating (a) locks up to the *TB1* relay, (b) transfers the *T* and *R* leads of the calling station from the *A* relay to the *TB1* relay, and (c) releases the *A* relay. The release of relays *A* and *B1* causes the release of associated relays used in the process of making a call.

8.02 The calling and called stations are now connected to a common T and R path with talking battery being supplied through the windings of the *TB1* relay.

Reference: SD-69286-01



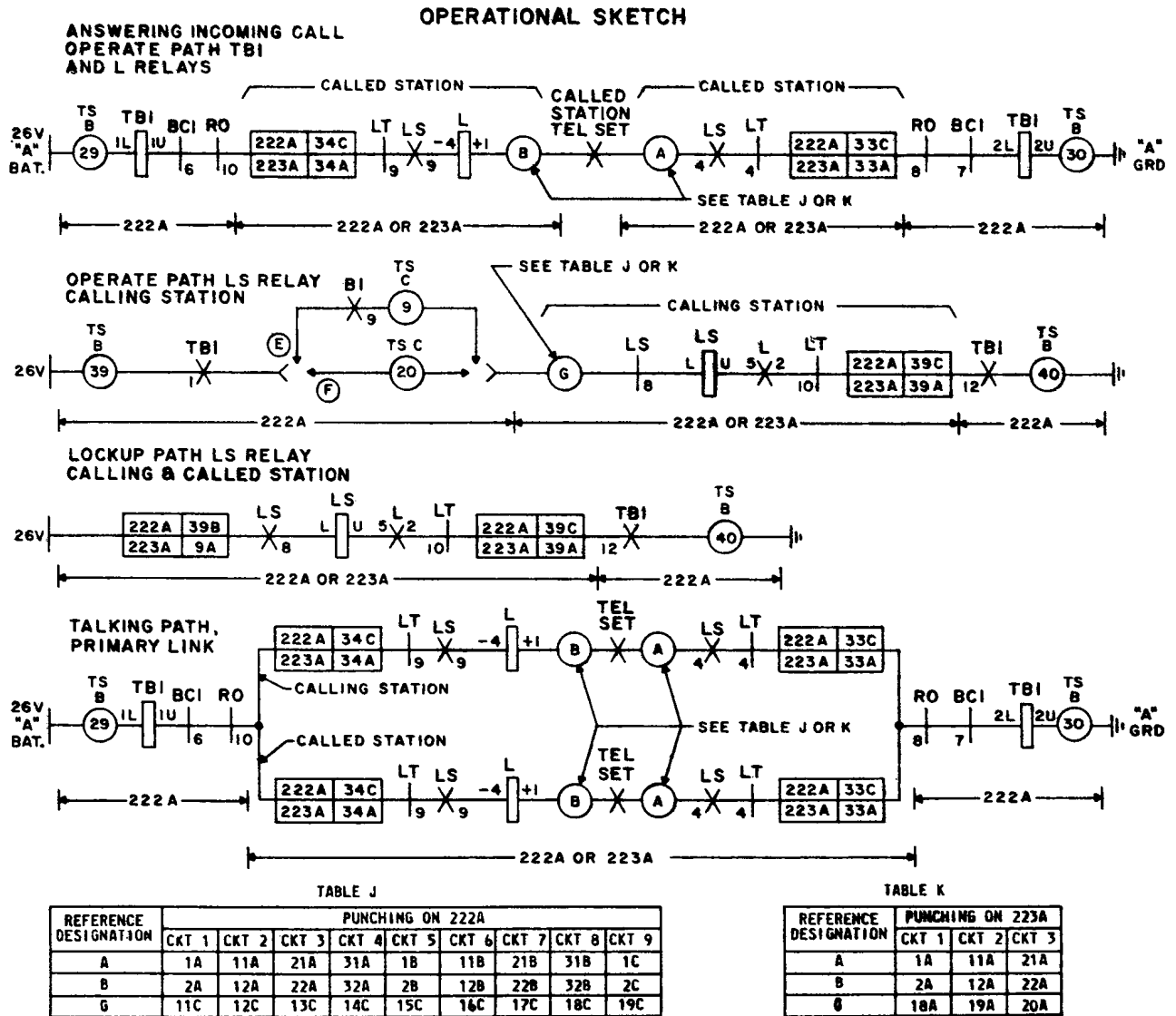


Fig. 6 — Answering Incoming Call: Talking Path, Primary Link

9.00 TRANSFER TO SECONDARY LINK: TALKING PATH, SECONDARY LINK

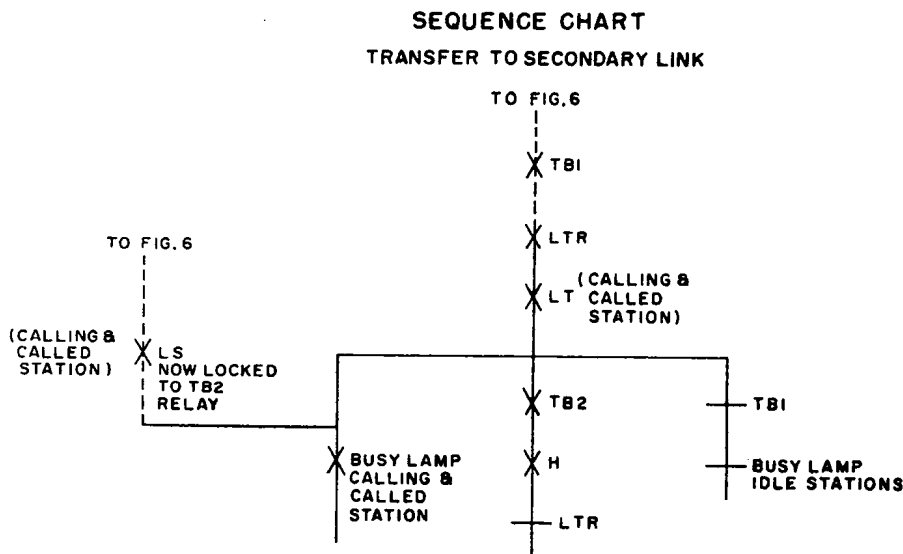
9.01 After a talking path has been established on the primary talking link, and the secondary talking link is free, the *LTR* relay operates. In operating, the *LTR* relay operates all *LT* relays in the station line circuits that have their *LS* relays operated. The *LT* relays in operating (a) lock up, (b) transfer control of the visual signal, and (c) transfer the *T* and *R* leads from the *TB1* relay to the *TB2* relay, causing it to operate. The *TB1* relay then releases. The operation of the *TB2* relay (a) provides a lockup path for the *LS* relays and (b) operates the *H* relay. The *H* relay in operating (a) locks up the *LT* relay, (b) releases the *LTR* relay, and (c) keeps the operating path of the *LTR* relay open, thus preventing a transfer until the secondary talking link is vacated.

9.02 The stations are now connected to a common *T* and *R* path with talking battery being supplied through the windings of the *TB2* relay.



*A slight click will be heard during the transfer operation as the battery supply changes from the *TB1* relay to the *TB2* relay.*

Reference: SD-69286-01



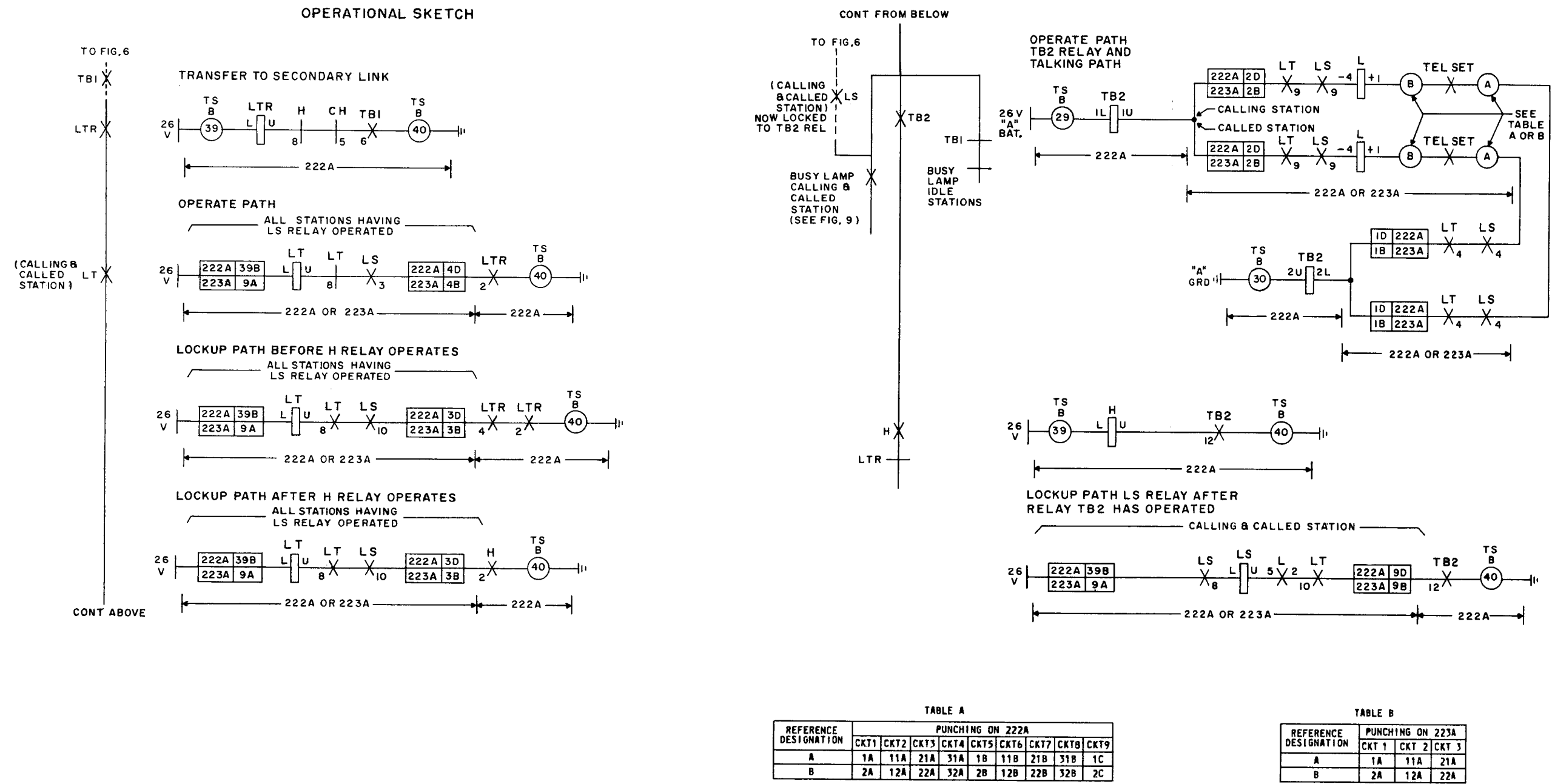


Fig. 7 – Transfer to Secondary Link: Talking Path, Secondary Link

10.00 AUDIBLE SIGNALS

10.01 Three methods for operating audible signals are provided:

- Over *T* and *R* leads (*Y* option).
- Over a separate pair (*Z* option).
- Over a common audible circuit (*AA* option).

Over *T* and *R* leads (*Y* Option)

10.02 The operation of the *RO* relay connects ringing voltage to the *T* and *R* leads to operate a bridged ringer at the called station.

Over a Separate Pair (*Z* Option)

10.03 This can be accomplished three ways.

(a) *Z* and *AG* option (without auxiliary relay): The operation of the *RO* relay connects audible signal voltage to a separate signal pair under control of the called station's line circuit to operate the audible signal.

(b) and (c) *Z* and *Q* or *Z* and *AO* option (with auxiliary relay): The called station's *LS*

relay in operating operates an auxiliary relay. Operation of the *RO* relay then connects audible signal voltage to a separate signal pair under control of the auxiliary relay to operate the audible signal. *Z* and *Q* option is Mfr Disc.

Over a Common Audible Circuit (*AA* Option)

10.04 This can be accomplished three ways.

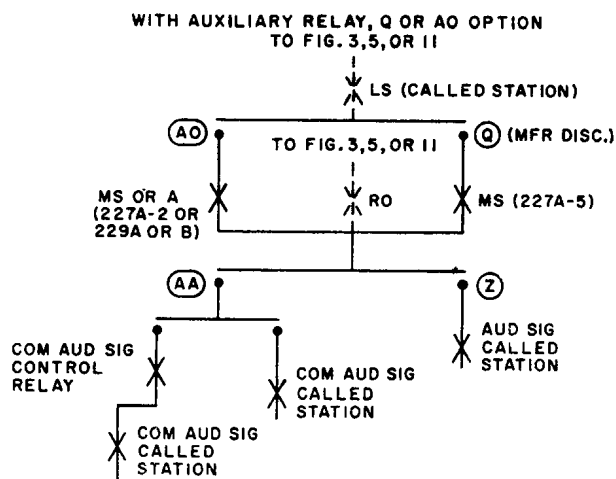
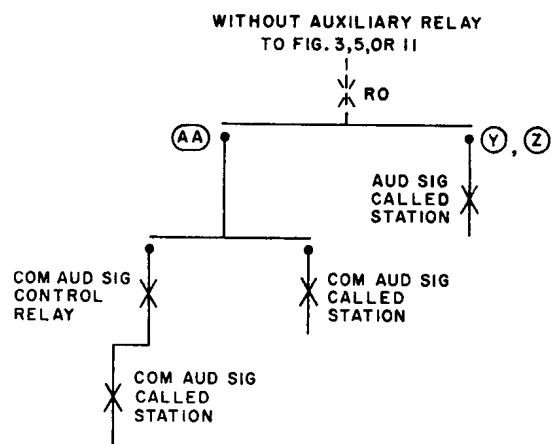
(a) *AA* and *AG* option (without auxiliary relay):

The operation of the *RO* relay, connects audible signal voltage to a common audible signal or connects ground to a common audible signal control relay under control of the called station's line circuit.

(b) and (c) *AA* and *Q* or *AA* and *AG* option (with auxiliary relay): The called station's *LS* relay in operating, operates an auxiliary relay. Operation of the *RO* relay connects audible signal voltage to a common audible signal or connects ground to a common audible signal control relay under control of the auxiliary relay. *AA* and *Q* option is Mfr Disc.

Reference: SD-69286-01

SEQUENCE CHART





11.00 VISUAL SIGNALS

Busy Lamps All Stations, Line Seizure

11.01 The *B1* relay operates on pickup. Relay *B1* in operating lights the busy lamp at all stations (*H* option) or operates an auxiliary relay busy lamp circuit (*M* option). The auxiliary relay in operating lights the busy lamp at all stations.

Flashing Lamp, Called Station

11.02 When a station is called, its *LS* relay operates. The *LS* relay in operating connects the called station lamp to the flashing circuit (*S* option) or connects the called station lamp to an auxiliary relay lamp flash circuit (*V* option) which in turn is under control of the flashing circuit.

Busy Lamp Calling and Called Station, Primary Link

11.03 The called station in answering operates relay *TB1*. The *TB1* relay in operating (a) operates the *LS* relay of the calling station, (b) releases the *B1* relay, and (c) operates the auxiliary relay lamp flash circuit steadily if provided (*V* option). The operated *LS* relays of the

calling and called station connect the station lamp to the lamp power supply through a normal contact of the *B1* relay (*S* option) or through operated contacts of the auxiliary relay lamp flash circuit (*V* option).

Busy Lamp Idle Stations, Primary Link

11.04 The called station in answering operates relay *TB1*. The *TB1* relay in operating takes over control of the busy lamp at the idle stations directly (*H* option) or takes over control of the operated auxiliary relay busy lamp circuit (*M* option). The auxiliary relay then controls the busy lamp at all idle stations.

Busy Lamp Calling and Called Stations, Secondary Link

11.05 Upon transfer to the secondary link, the busy lamp at the calling and called stations are now under control of their respective station line circuits. The transfer operation causes the release of the *TB1* relay, which extinguishes the busy lamps at all idle stations.

Reference: SD-69286-01

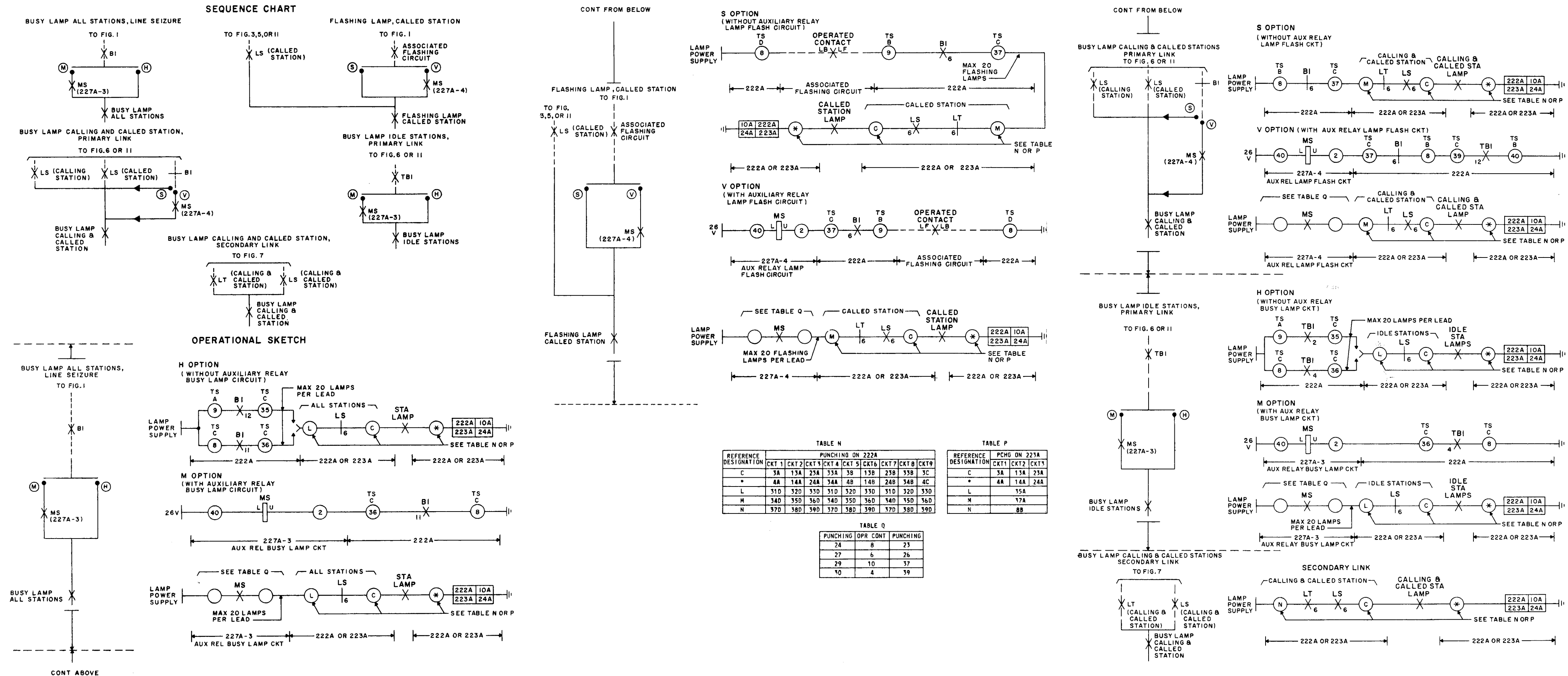


Fig. 9 – Visual Signals

12.00 BUSY SIGNAL

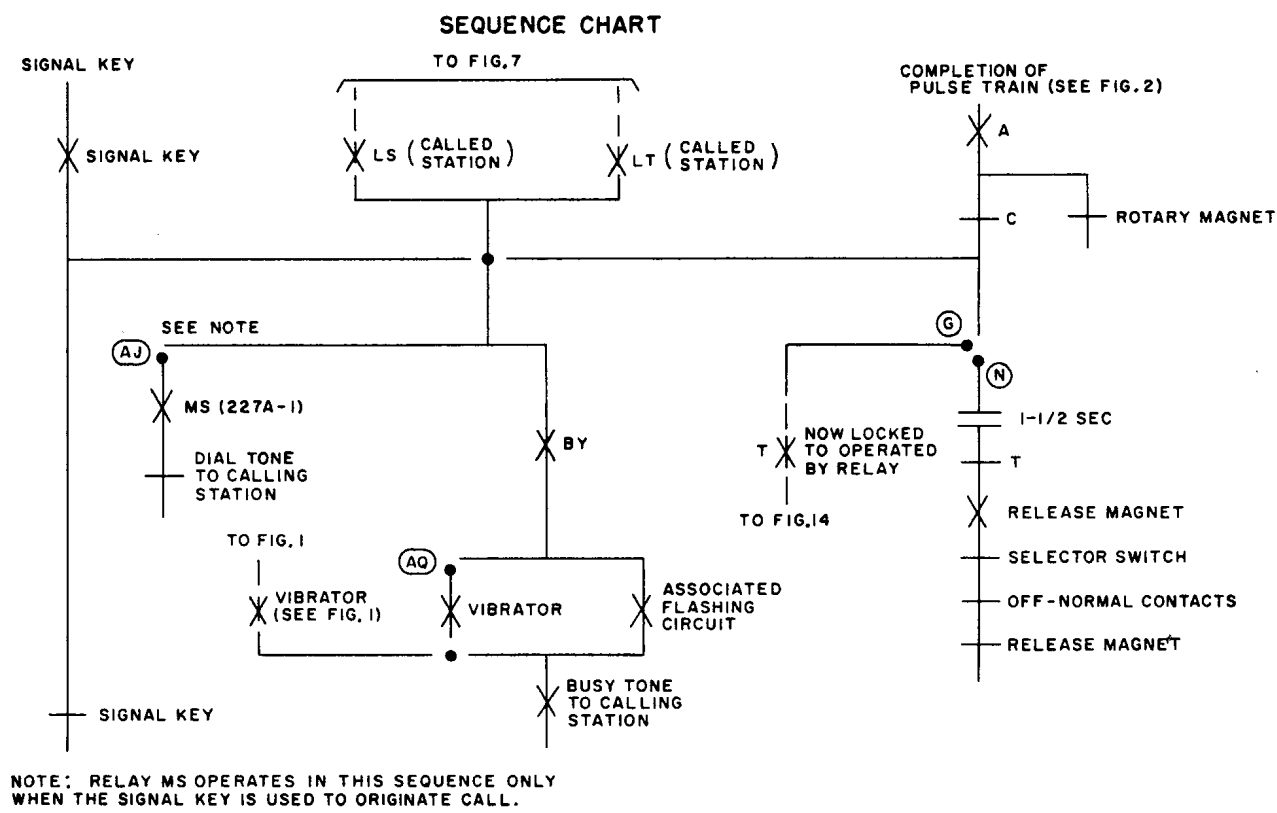
12.01 A station is busy on the secondary link.
When a call is originated to this station, ground from the selector circuit or from an operated signal key would operate relay *BY* under control of the called station's operated line circuit. If *AJ* option is provided, ground from the signal key would also operate the *MS* relay in the ringing and tone control circuit, opening the dial tone lead to the calling station.

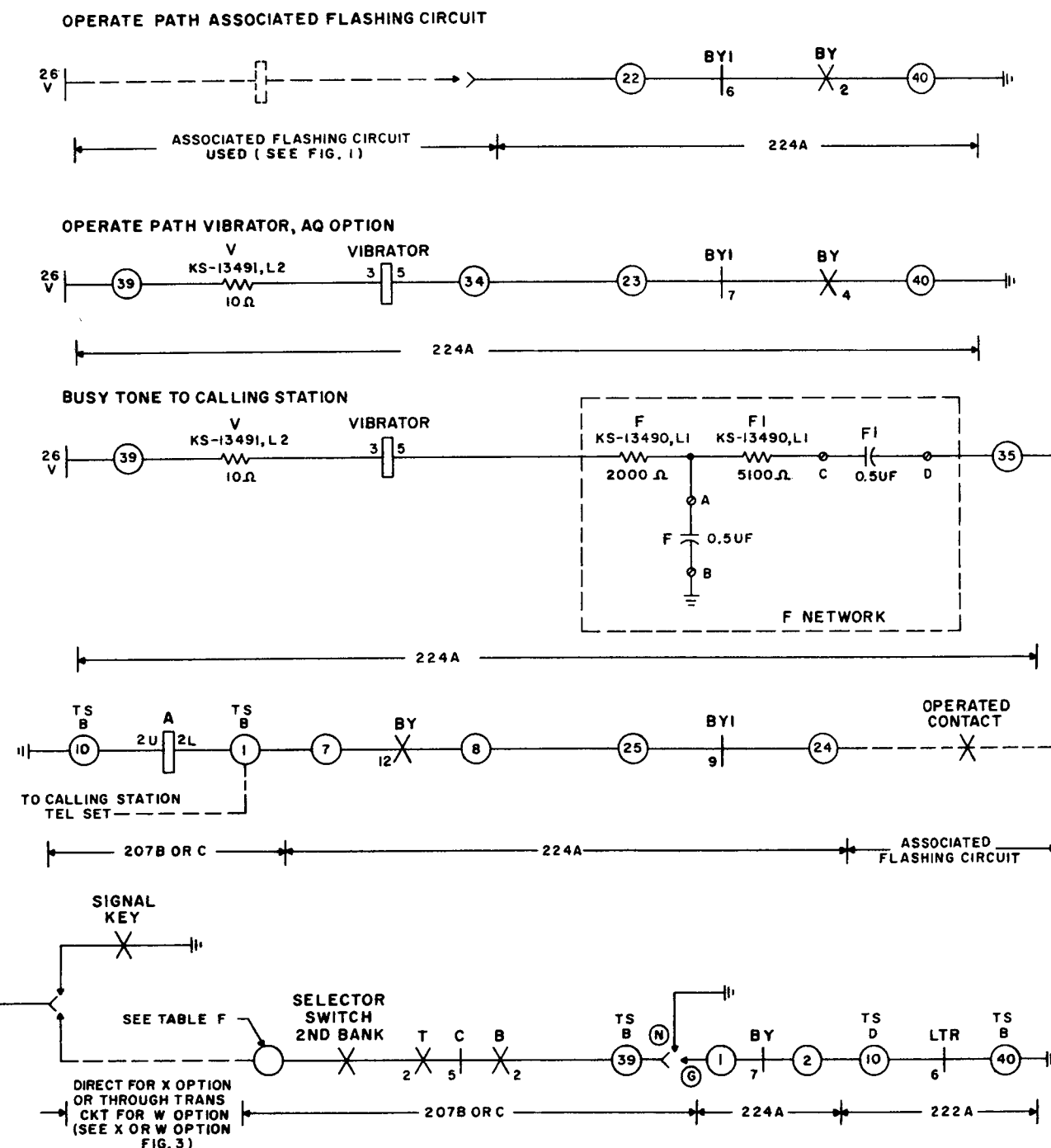
12.02 The *BY* relay in operating (a) locks up, (b) operates the associated flashing circuit, and (c) operates the vibrator if *AQ* option is provided.

12.03 The output of the network in the vibrator circuit is returned to the tip side of the *A* relay under control of the associated flashing circuit and the operated *BY* relay. Busy tone is now heard by the calling station, indicating the called station is busy on the secondary link.

12.04 If camp-on (*G* option) is provided, the operation of the *BY* relay will lock the *T* relay in the selector circuit operated. The calling station then has the option of hanging up or camping on the system as described in 16.00. The camp-on feature cannot be used on a call originated by a signal key.

Reference: SD-69286-01





REFERENCE DESIGNATION	PUNCHING ON 223A		
	CKT 1	CKT 2	CKT
F	7A	17A	27A

LEAD	TERMINAL
C	11A
C	12A
C	13A
C	14A
C	15A
C	16A
C	17A
C	18A
C	19A
C	20A

Fig. 10 – Busy Signals

13.00 PRESET CONFERENCE

13.01 A preset conference can be established by dialing an assigned code or by the use of a signal key.

13.02 After line seizure has been accomplished, as described in 3.00, a ground is connected to the preset conference circuit under control of the selector circuit if the dial was used or under control of an operated signal key. This ground will cause the operation of relay *RO1*, under control of either the *PC1* or *PC2* relay. In operating, the *RO1* relay (a) connects battery to the *PC1* and *PC2* relays, (b) locks up under control of the *PC1* and *PC2* relay, and (c) opens the operate path of the *RO* relay to prevent operation of the audible signals until all *LS* relays have operated.

13.03 The *PC1* or *PC2* relay will now operate. The operation of the *PC1* or *PC2* relay will (a) lock up, (b) release the *RO1* relay, and (c) connect ground through a maximum of six station line circuits to operate the *BC* relay. The *BC* relay operates the *BC1* relay, which in turn connects battery ahead of the *BC* relay to operate all called station *LS* relays (maximum six) associated on the conference.

13.04 The *LS* relays in operating (a) lock up to the operated *B1* relay through the winding of the *CH* relay, causing it to operate and (b) connect all the called station lamps to the associated flashing circuit.

13.05 When *AL* option is provided, the operation of the *LS* relays connects the ground from the *PC1* or *PC2* relay to the *RO* relay. The *RO* relay in operating operates the audible signals as described in 10.00.

13.06 When *AJ* and *AK* options are provided, the operation of the *LS* relays connects the ground from the *PC1* or *PC2* relay to the ringing and tone control circuit to operate the *CA2* relay. If a signal key was used to establish a conference, this ground would also operate the *MS* relay of the ringing and tone control circuit. The *MS* relay in operating opens the dial tone path to the calling station. The *CA2* relay in operating (a) locks up and (b) connects the *RO* relay to the interrupter in the associated flashing circuit. The *RO* relay in operating operates the audible signals

as described in 10.00 and completes a path to send ringing audible tone to the calling party.

13.07 The release of the selector switch after a nominal 1-1/2 seconds, or the release of the signal key, will release the *PC1* or *PC2* relay. The release of the *PC1* or *PC2* relay will open the operate path of the *RO* relay if *AL* option is provided. The release of the *RO* relay opens the audible signal path to all called stations.

13.08 When the first called station answers, the *TB1* relay will operate. The *TB1* relay in operating (a) provides a holding path for relay *B1* under control of the operated *CH* relay and (b) operates and locks operated the calling station's *LS* relay, thus allowing the calling station to receive a flashing lamp signal. The lamp will continue to flash until the last called station answers. The operation of the calling station's *LS* relay releases the selector circuit. When *AJ* and *AK* options are provided, the release of the selector circuit releases the *MS* and *CA2* relays in the ringing and tone control circuit. The release of the *CA2* relay opens the operate path of the *RO* relay. The release of the *RO* relay opens the audible signal path to all called stations and the ringing audible tone to the calling station.

13.09 As each called station answers, the lock-up path for the associated *LS* relays is transferred from the *B1* relay to the *TB1* relay.

13.10 When the last called station answers, the operate path for the *CH* relay is opened and the relay releases. The release of relay *CH* releases the *B1* relay, thereby allowing the lamps to light steadily at all stations. When the lamp at the calling station lights steadily, it is an indication that all stations on the conference call have answered. The transfer operation to the secondary link may now take place if that link is vacant.

13.11 A station that is part of the conference being called may be busy on the secondary link. This condition will cause the *BY* relay to operate under control of the busy station's operated line circuit and the operated conference circuit. The *BY* relay in operating will (a) lock up under control of the selector circuit, (b) operate various control circuits as described in 12.00, and (c) return busy tone to calling station. The calling station will receive the busy tone until the first called station answers.

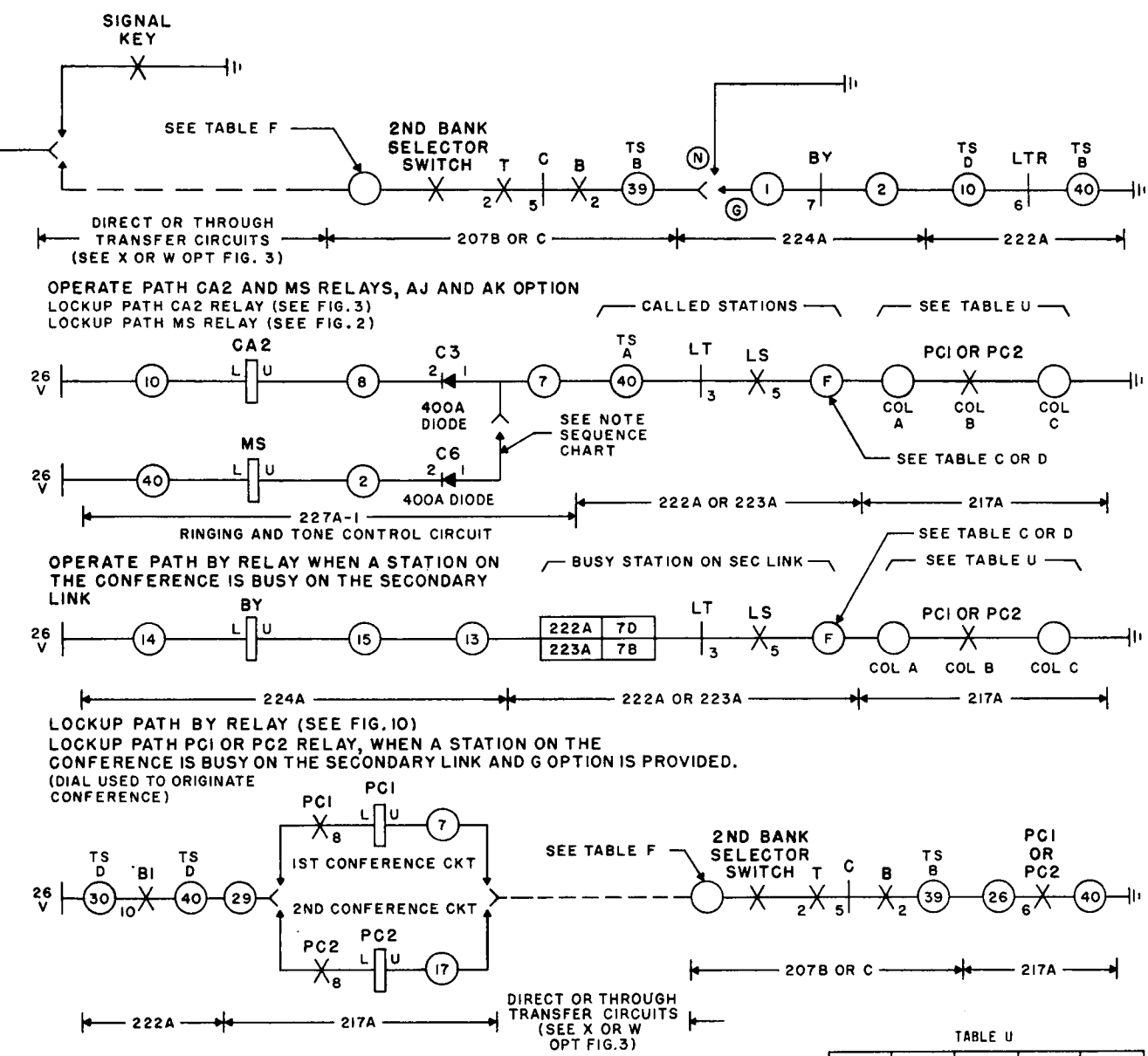
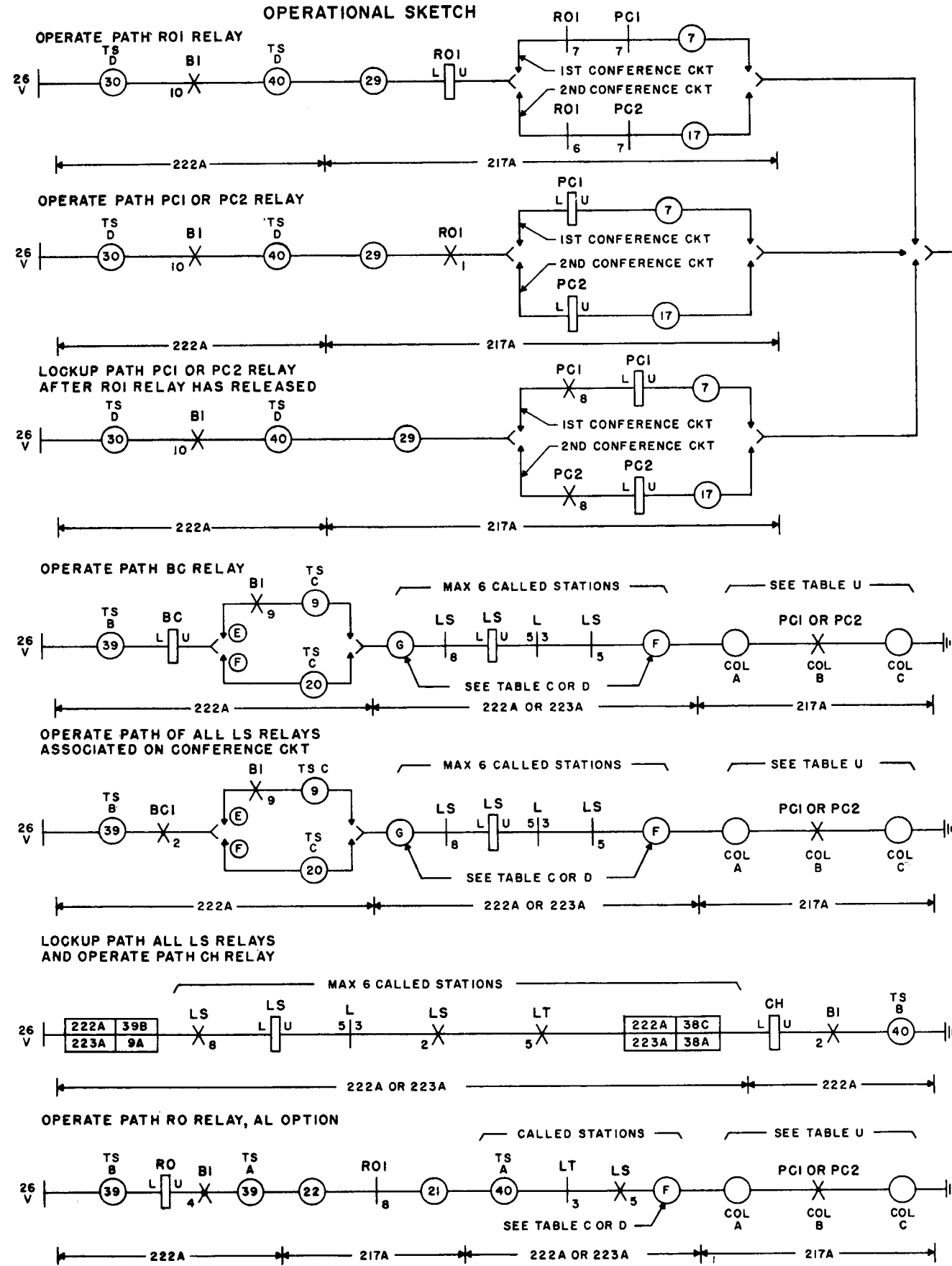
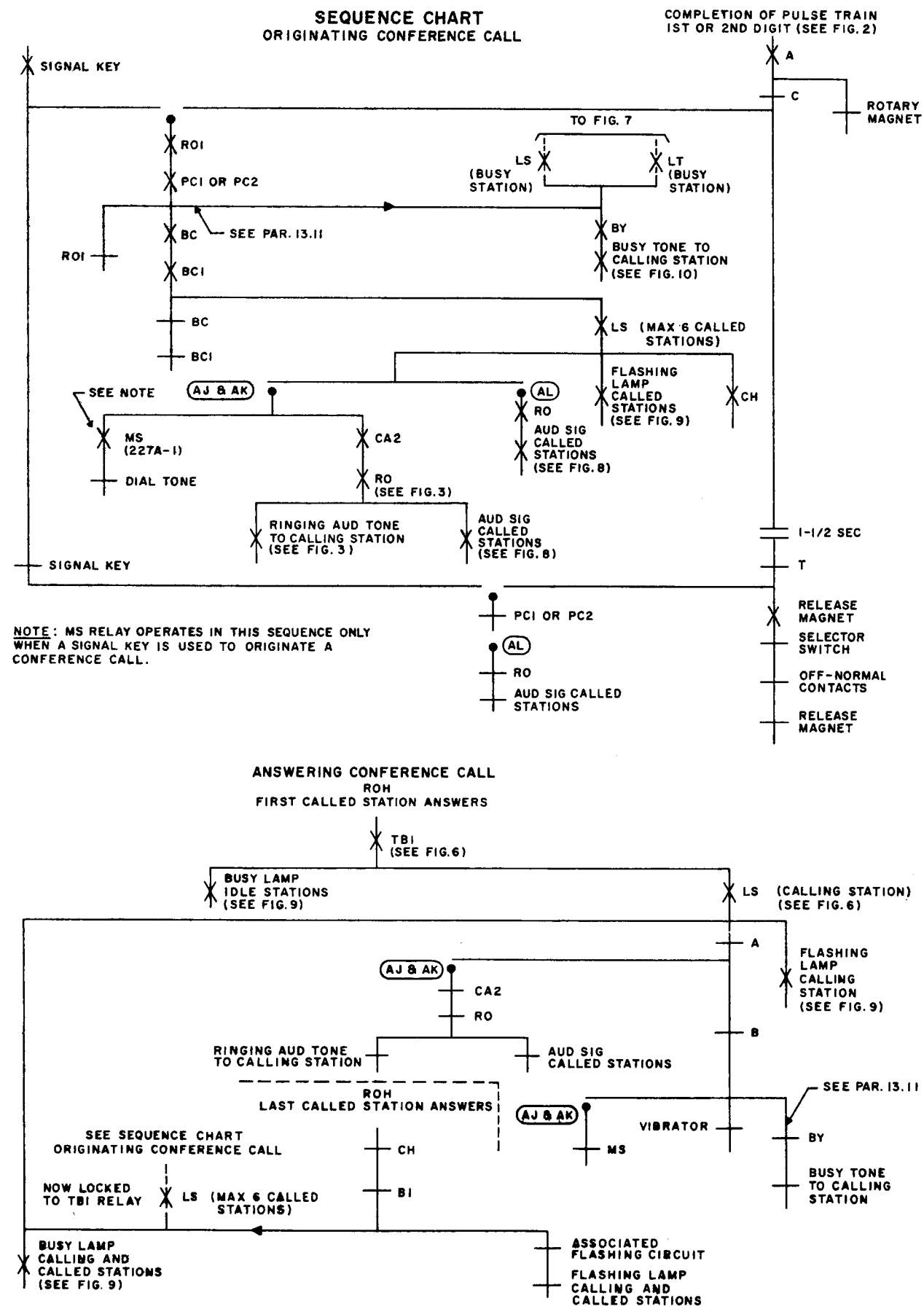


TABLE C

PUNCHING ON 222A

LEAD DESIG	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9
F	7A	17A	27A	37A	7B	17B	27B	37B	7C
G	11C	12C	13C	14C	15C	16C	17C	18C	19C

TABLE D

PUNCHING ON 223A

LEAD DESIG	CKT 1	CKT 2	CKT 3
F	7A	17A	27A
G	18A	19A	20A

TABLE F

207B OR C

LEAD	TERMINAL
C	11A
C	12A
C	13A
C	14A
C	15A
C	16A
C	17A
C	18A
C	19A
C	20A

TABLE U

RELAY	CKT	COL A TS PCHG	COL B CONTACT NO.	COL C TS PCHG
PC1	1	1	1	15
	2	2	2	16
	3	3	3	17
	4	4	4	18
	5	5	5	19
PC2	6	6	6	20
	7	7	7	21
	8	8	8	22
	9	9	9	23
	10	10	10	24

Fig. 11 — Reset Conference

14.00 ADD-ON CONFERENCING, PRIMARY OR SECONDARY LINK

14.01 The incoming central office or PBX line is picked up under control of an associated key telephone system or key equipment line circuit. When it is ascertained that one of the 6A stations is to be conferenced with this call, a hold is placed on the central office or PBX line.

14.02 The 6A station to be conferenced is selected, signaled, and a talking path established on the primary or secondary link.

14.03 Originating the conference when the 6A stations are on the primary link (*AB* and *AG*, *AB* and *Q*, or *AO* option) :

- *AB* and *AG* options: The operation of the add-on signal key at the control station causes the operation of relay *M* through contacts of the control station's operated *LS* and normal *LT* relays.
- *AB* and *Q* or *AO* option: The operation of the control station's *LS* relay operates an auxiliary relay. The operation of the add-on signal key at the control station causes the operation of relay *M* through a contact of the operated auxiliary relay.
- *AB* and *AG*, and *AB* and *Q* options are Mfr Disc.

14.04 The *M* relay in operating (a) locks operated under control of the *TB1* relay, (b) opens the operate path of any other *M* relay, thus preventing the interconnection of two or more outside lines (see Inset I on the operational sketch),

and (c) bridges the incoming central office or PBX line and the 6A station through the *120F* repeat coil.

14.05 Originating the conference when the 6A stations are on the secondary link (*AB* and *AG*, *AB* and *Q*, or *AO* option) :

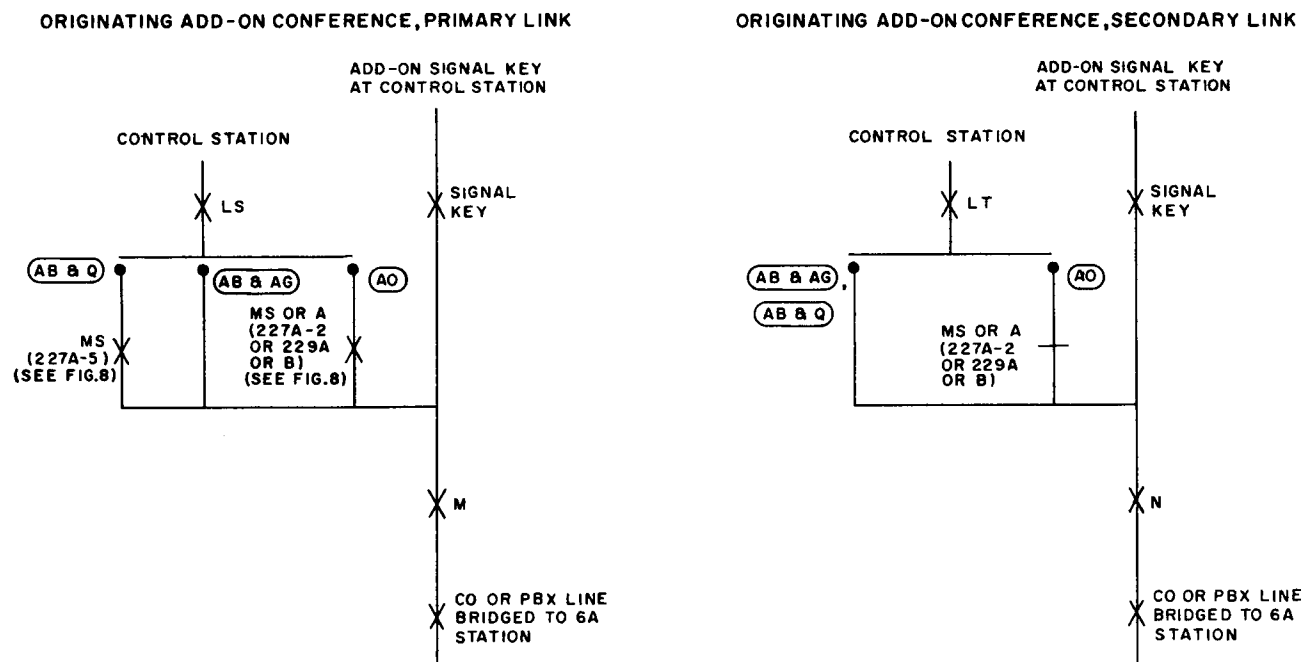
- *AB* and *AG* or *AB* and *Q* options: The operation of the add-on signal key at the control station causes the operation of relay *N* through a contact of the control station's operated *LT* relay.
- *AO* option: The operation of the control station's *LT* relay releases the auxiliary relay, associated with the control station. The operation of the add-on signal key at the control station causes the operation of relay *N* through a contact of the released auxiliary relay and the operated *LT* relay of the control station.
- *AB* and *AG*, and *AB* and *Q* options are Mfr Disc.

14.06 The *N* relay in operating (a) locks operated under control of the *H* relay, (b) opens the operate path of any other *N* relay thus preventing the interconnection of two or more outside lines (see Inset II on the operational sketch), and (c) bridges the incoming central office or PBX line and the 6A station through the *120F* repeat coil.

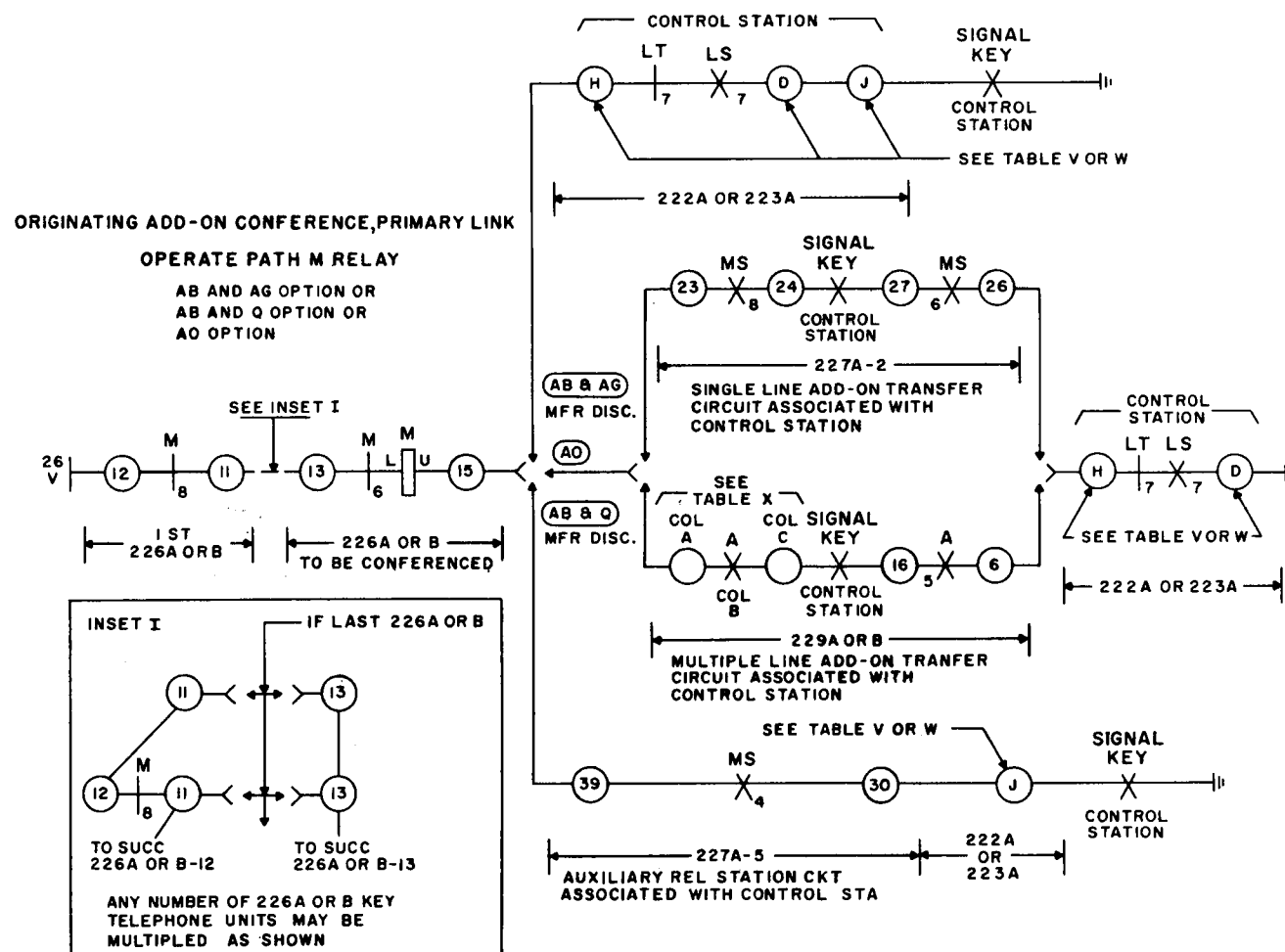
14.07 The add-on conference circuit is equipped with *A* lead control.

Reference: SD-69286-01

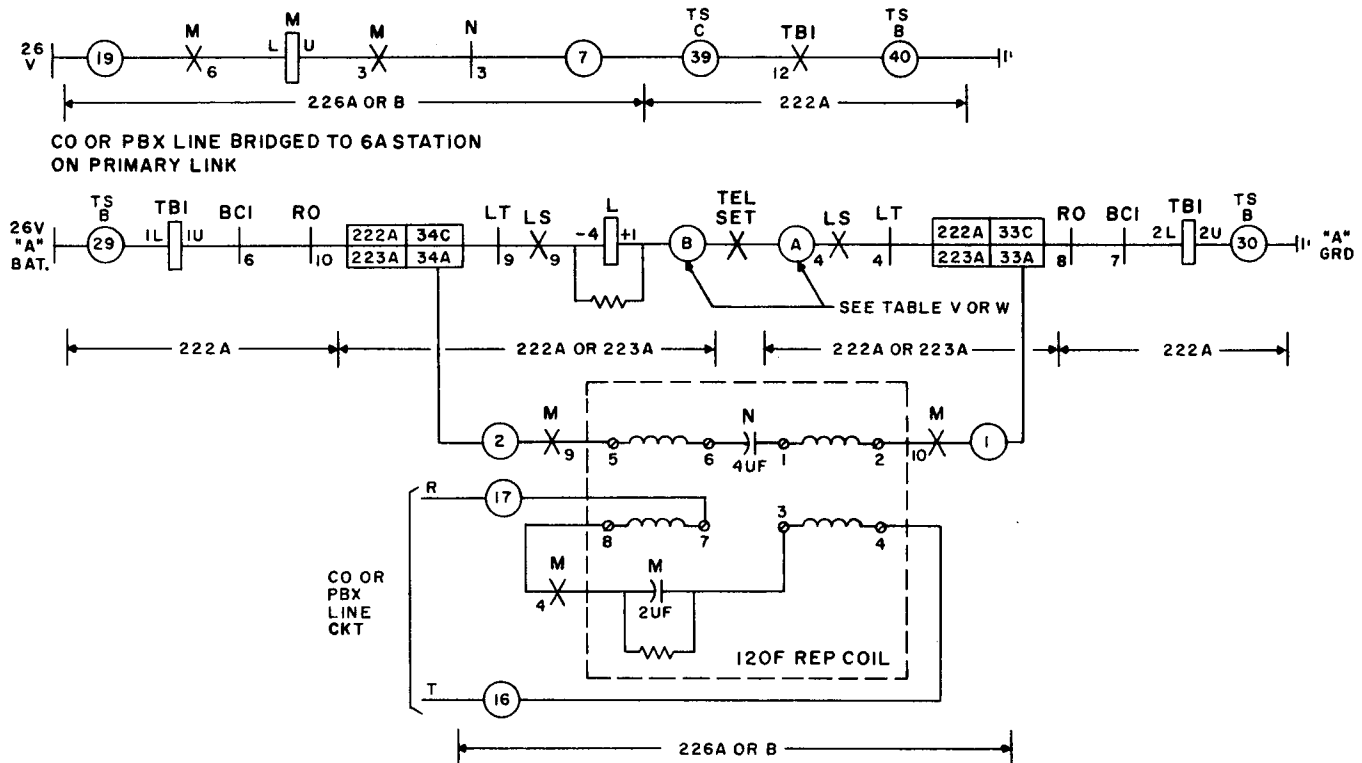
SEQUENCE CHART



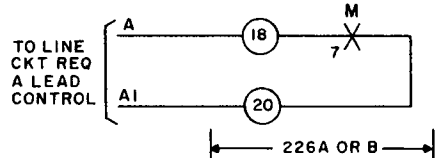
OPERATIONAL SKETCH



LOCKUP PATH M RELAY

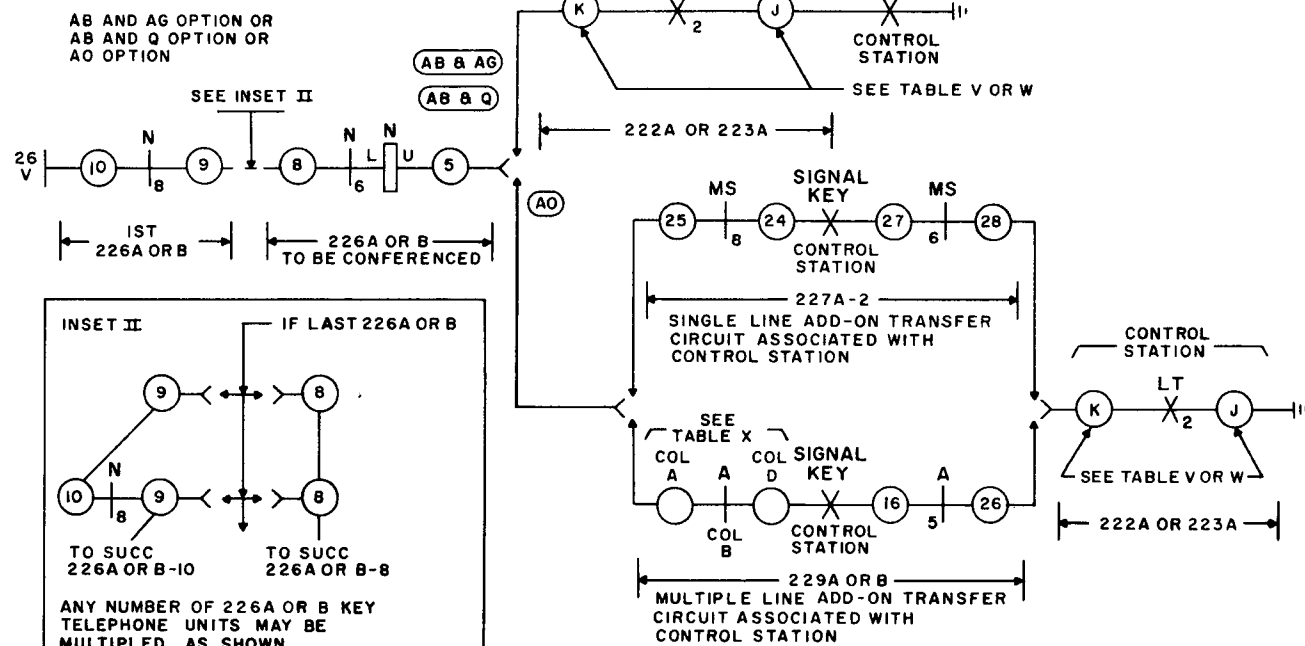


A LEAD CONTROL, PRIMARY LINK

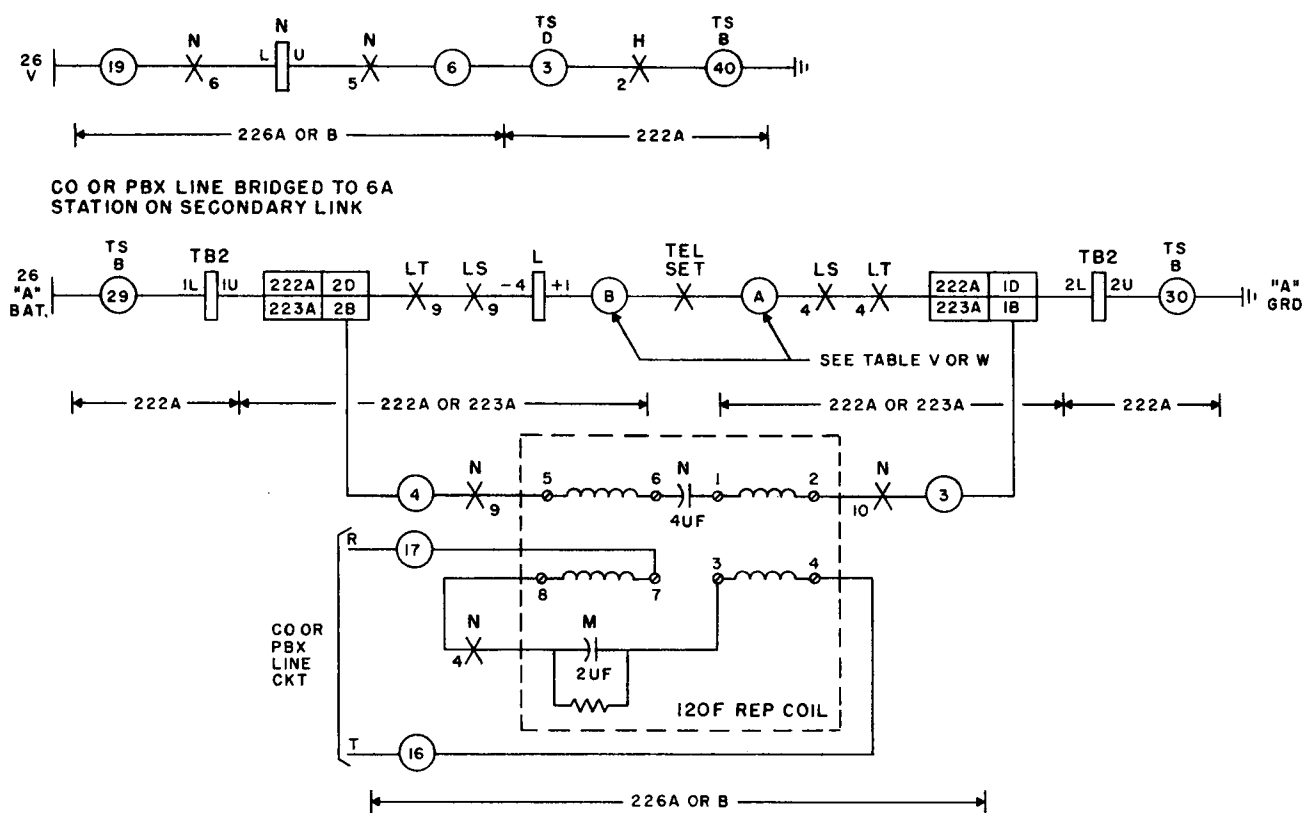


ORIGINATING ADD-ON CONFERENCE,
SECONDARY LINK

OPERATE PATH N RELAY



LOCKUP PATH N RELAY



A LEAD CONTROL, SECONDARY LINK

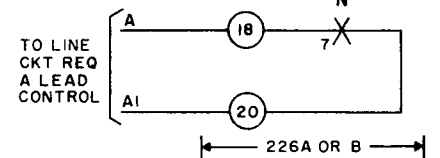


TABLE V

REFERENCE DESIGNATION	PUNCHING ON 2224								
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9
A	1A	11A	21A	31A	1B	11B	21B	31B	1C
B	2A	12A	22A	32A	2B	12B	22B	32B	2C
D	5A	15A	25A	35A	5B	15B	25B	35B	5C
H	21C	22C	23C	24C	25C	26C	27C	28C	29C
J	11D	12D	13D	14D	15D	16D	17D	18D	19D
K	21D	22D	23D	24D	25D	26D	27D	28D	29D

TABLE X

CONF CKT	COL A TS PCHG	COL B CONF NO.	COL C TS PCHG	COL D TS PCHG
1	9	2	19	29
2	8	3	18	28
3	7	4	17	27
4	4	7	14	24
5	3	8	13	23
6	2	9	12	22
7	1	10	11	21

TABLE W

REFERENCE DESIGNATION	PUNCHING ON 223A		
	CKT 1	CKT 2	CKT 3
A	1A	11A	21A
B	2A	12A	22A
D	5A	15A	25A
H	28A	29A	30A
J	11B	13B	15B
K	12B	14B	16B

Fig. 12 — Add-On Conferencing, Primary or Secondary Link

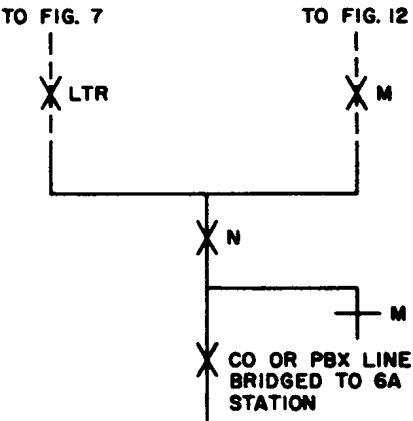
15.00 ADD-ON CONFERENCING, TRANSFER TO SECONDARY LINK

15.01 When the secondary link is free, stations on the primary link are automatically transferred to the secondary link, as described in 9.00. If the stations are connected to an add-on conference circuit, this circuit will also transfer to the secondary link in the following manner. The operation of the *LTR* relay during link transfer and the operated *M* relay cause the operation of relay *N*.

15.02 The *N* relay in operating (a) locks up under control of the *H* relay, (b) opens the lockup path of the *M* relay, and (c) transfers control of the central office or PBX line from the *M* relay to its own operated contacts.

Reference: SD-69286-01

SEQUENCE CHART



OPERATIONAL SKETCH

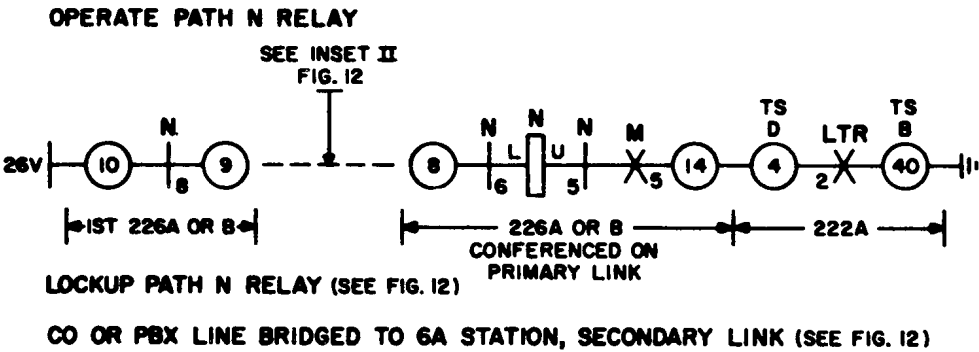


Fig. 13 – Add-On Conferencing, Transfer to Secondary Link

16.00 CAMP-ON

16.01 When the 6A key telephone system is equipped with camp-on, an idle station may go in over the busy lamp (indicating that both links are busy) and dial a code to select another station.

16.02 Line seizure is accomplished as described in 3.00 with the exception of the operation of the *B1* relay and its functions. At the completion of the pulse train at the end of the first digit, a ground from the selector circuit operates the *BY1* relay under control of the normal *B1* and *LTR* relays and the operated *TB2* relay.

16.03 The *BY1* relay in operating (a) opens the lockup path for the *BY* relay, and (c) opens the various control paths which are used in the process of camp-on. The *BY1* is a slow-release relay. Therefore, it will remain operated over the interval needed to operate the transfer circuit when a 2-digit code is dialed.

16.04 The *BY* relay in operating (a) opens the operate path of the *BY1* relay; (b) after the *BY1* relay releases, the *BY* relay locks up to the *B* relay under control of a parallel path in the common equipment of the 222A KTU; (c) opens its own operate path; (d) holds the *T* relay operated preventing the release of the selector switch thus registering the dialed code; (e) operates the associated flashing circuit; (f) operates the vi-

brator if *AQ* option is provided; and (g) connects busy tone to the winding of relay *A* to which the calling party is also connected. This indicates to the calling party, and any other idle station that may pick up, that the system is being camped on.

16.05 The release of the secondary link and the transfer operation of the call on the primary link will release the *BY* relay. The release of relay *BY* (a) allows relay *B1* to operate and (b) removes the holding circuit from the *T* relay, starting its timing cycle.

16.06 The *B1* relay in operating allows the called station's signaling circuit to operate as described in 5.02 through 5.05.



If the primary link releases before the secondary link, the camp-on circuit will still be activated until such time as the secondary link releases.

Stations which are connected so that they are not automatically cut off (F option), cannot camp on a system busy, since, on pickup, they are transferred onto the primary talking link.

Signal key selection cannot be used to operate the camp-on feature on a system busy.

Reference: SD-69286-01

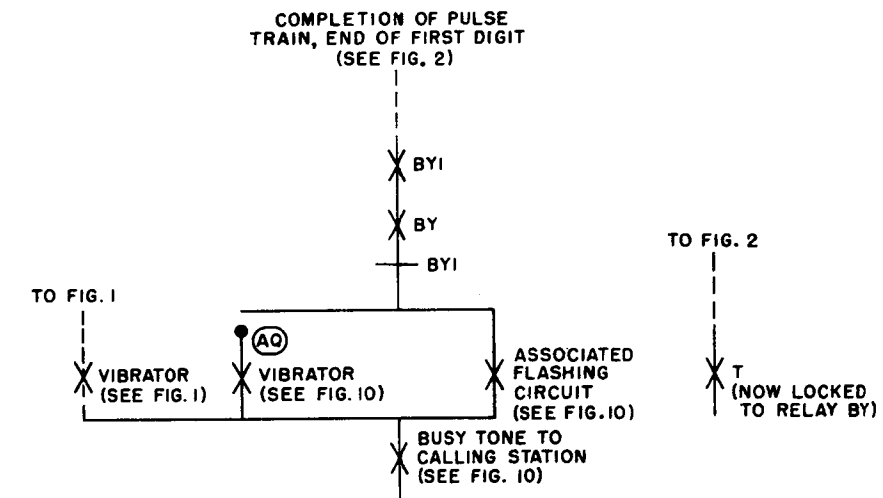
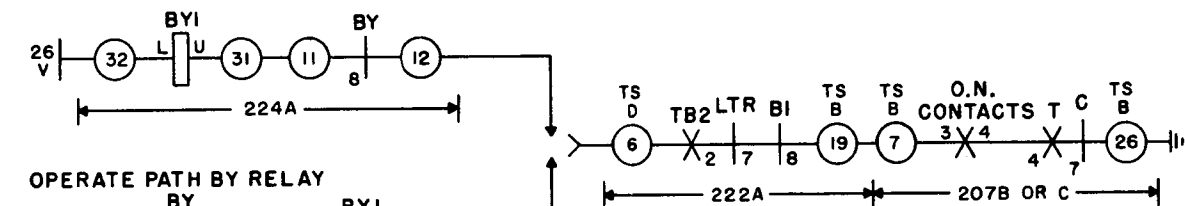
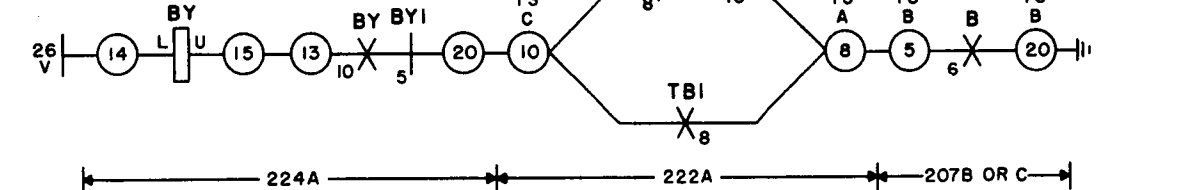
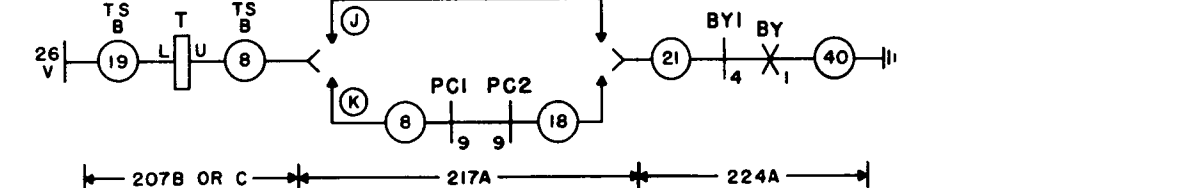
SEQUENCE CHART**OPERATIONAL SKETCH****OPERATE PATH BY1 RELAY****OPERATE PATH BY RELAY****LOCKUP PATH BY RELAY AFTER RELAY BY1 RELEASES****LOCKUP PATH FOR T RELAY IN SELECTOR CIRCUIT**

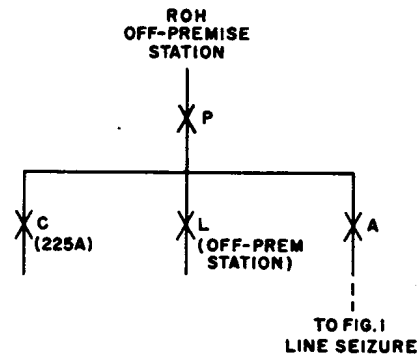
Fig. 14 — Camp-On

17.00 OFF-PREMISE STATION, LINE SEIZURE

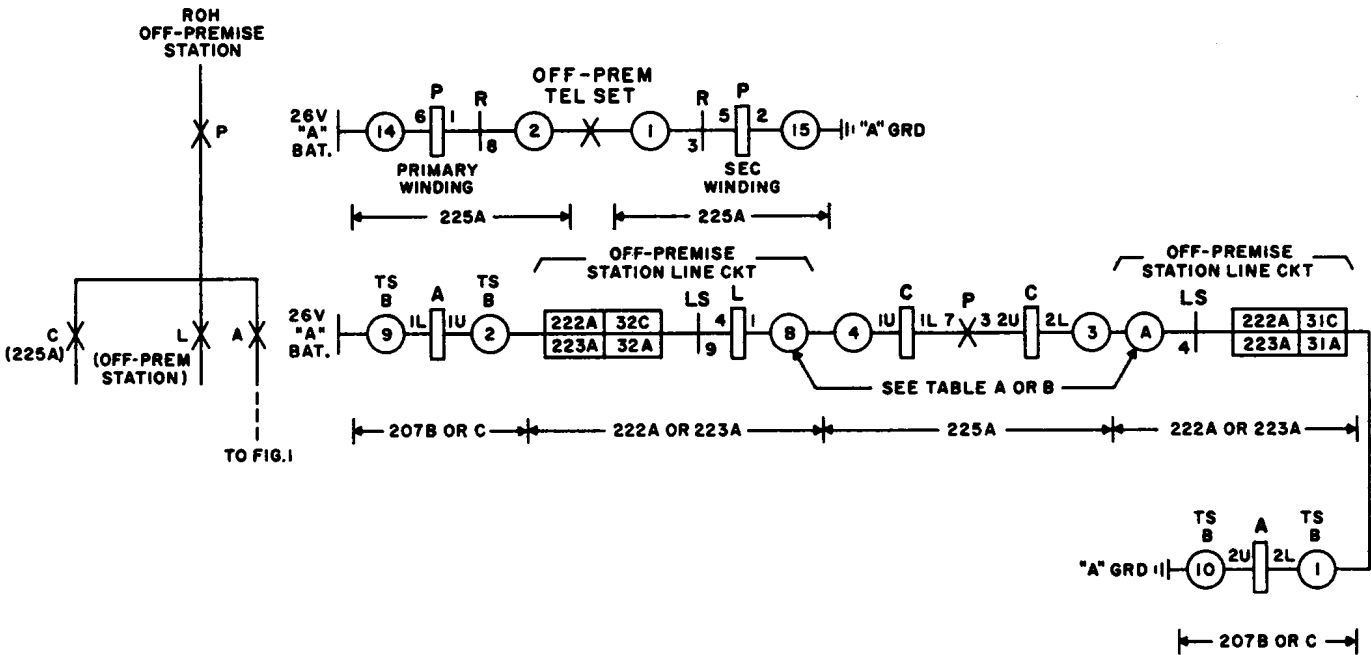
When the off-premise station initiates a call, it is connected to the selector circuit under control of relay *P* in the long line circuit and the *LS* relay in its associated line and signaling circuit. As the station picks up, relay *P* operates and closes a path through the windings of relay *C* in the long line circuit to operate relay *A* in the selector circuit. Upon dialing, relay *P* repeats dial pulses causing relay *A* to release and re-operate in unison with the dial pulses. This action causes the selector circuit to operate as described in 4.01, 4.02, and 4.03.

Reference: SD-69286-01

SEQUENCE CHART



OPERATIONAL SKETCH



REFERENCE DESIGNATION	PUNCHING ON 222A								
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9
A	1A	11A	21A	31A	1B	11B	21B	31B	1C
B	2A	12A	22A	32A	2B	12B	22B	32B	2C

REFERENCE DESIGNATION	PUNCHING ON 223A		
	CKT 1	CKT 2	CKT 3
A	1A	11A	21A
B	2A	12A	22A

Fig. 15 – Off-Premise Station, Line Seizure

18.00 OFF-PREMISE STATION, INCOMING CALL

18.01 An off-station is selected by dialing a station code or by the use of a signal key.

AL Option

18.02 Ground from the operated selector circuit or the operated signal key operates the *R* relay in the long line circuit. The *R* relay in operating (a) opens the transmission path between the off-premise station and local stations; (b) connects generator to the off-premise station's *T* and *R* leads, operating the audible signal; and (c) operates the *BC* relay. The functions of the *BC*, *BC1*, and *LS* relays are as described in 5.02 or 7.01.

AK and AJ Options

18.03 Same as described in 5.01, 5.02, and 5.04 when the dial is used or 7.01 and 7.03 when the signal key is used. The *RO* relay operates the *R* relay of the long line circuit. The *R* relay in turn operates the audible signal at the off-premise station.

18.04 No provision is made to supply the off-premise station with illumination from the 6A key telephone system.

Reference: SD-69286-01

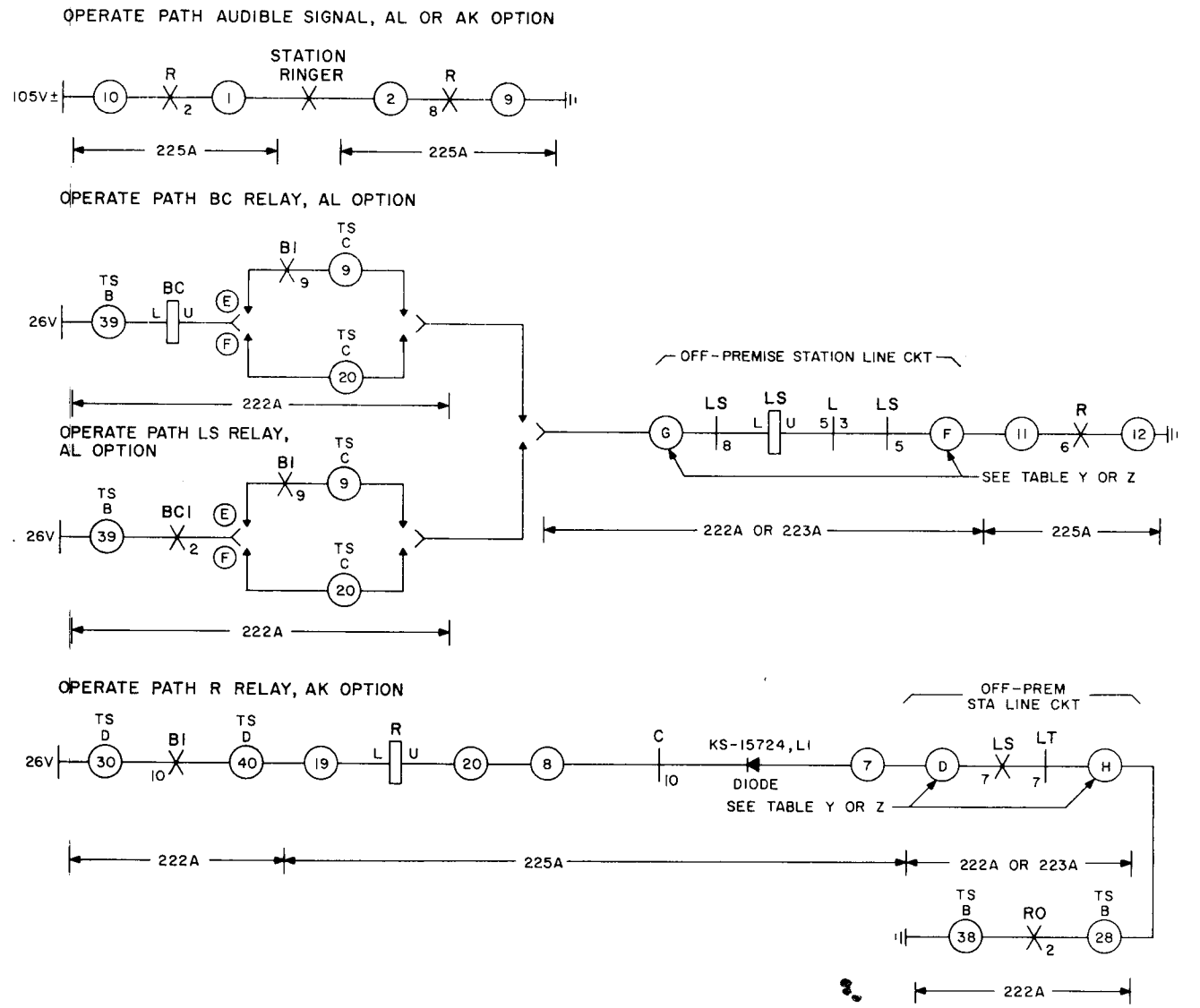
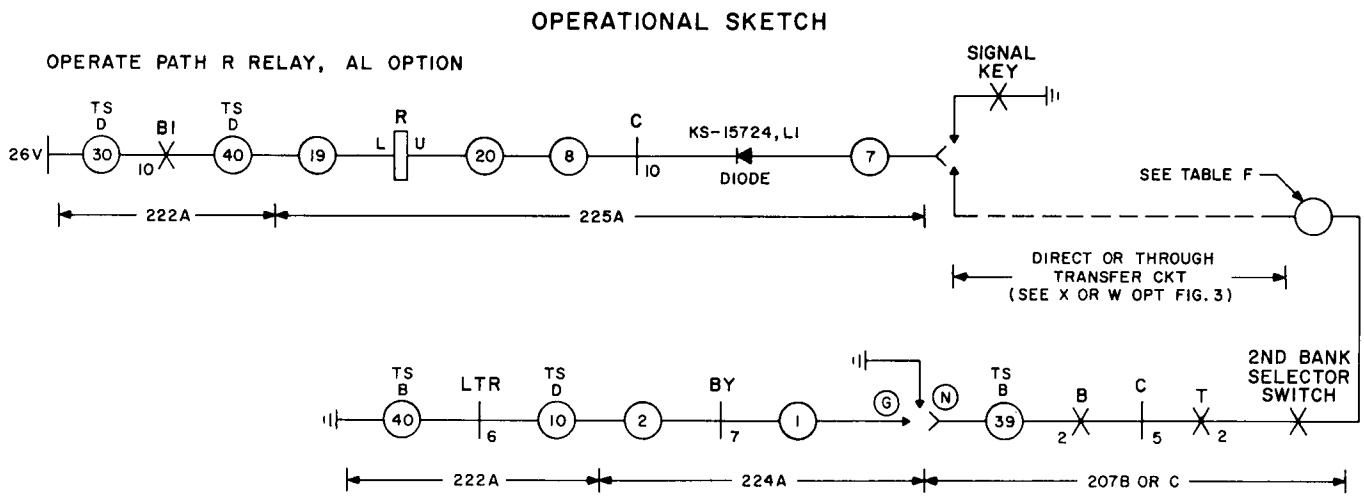
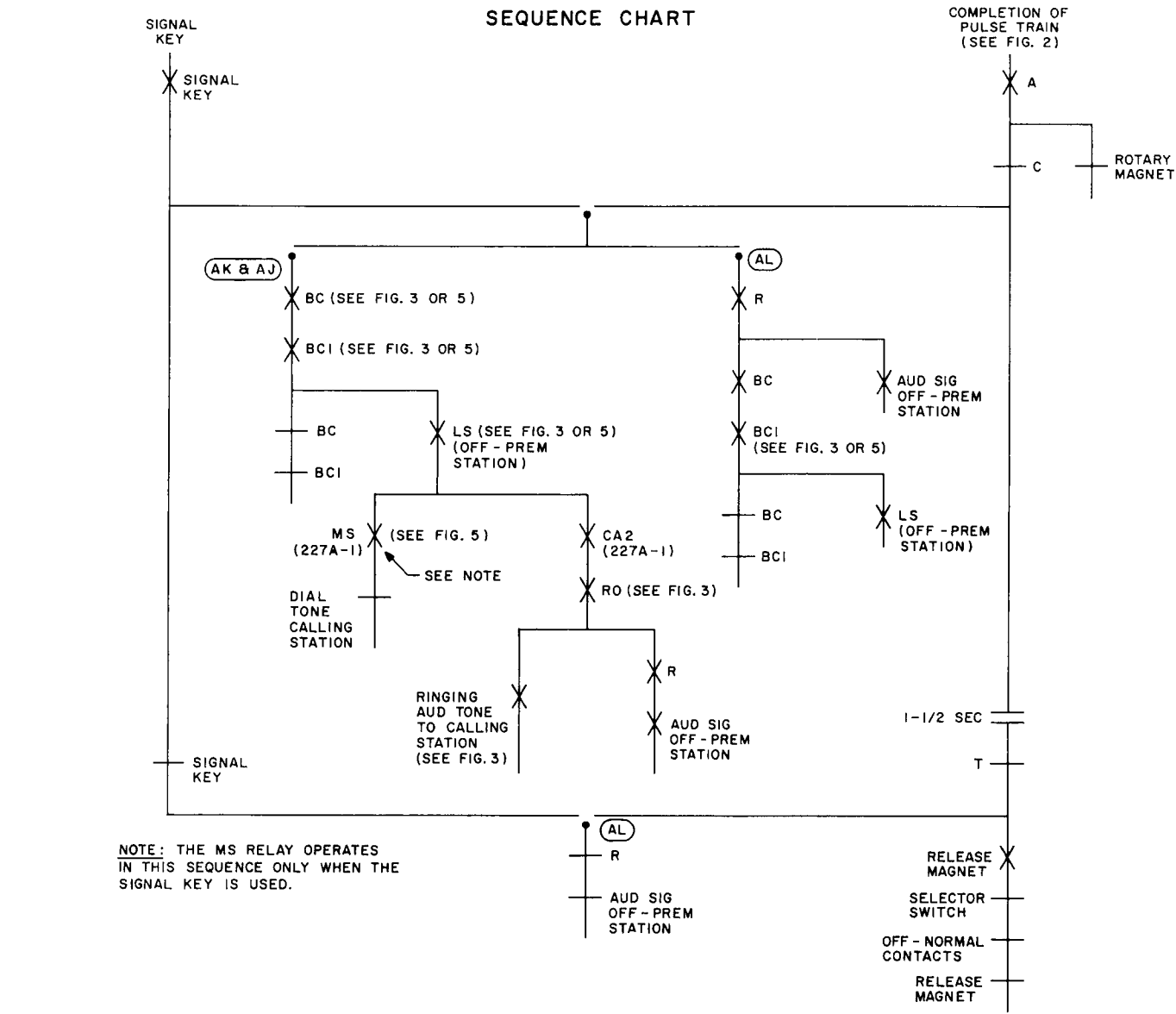


TABLE Y

REF DESIG	PUNCHING ON 222A								
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9
D	5A	15A	25A	35A	5B	15B	25B	35B	5C
F	7A	17A	27A	37A	7B	17B	27B	37B	7C
G	11C	12C	13C	14C	15C	16C	17C	18C	19C
H	21C	22C	23C	24C	25C	26C	27C	28C	29C

TABLE Z

REF DESIG	PUNCHING ON 223A		
	CKT 1	CKT 2	CKT 3
D	5A	15A	25A
F	7A	17A	27A
G	18A	19A	20A
H	28A	29A	30A

TABLE F

207B OR C	
LEAD	TERMINAL
C	11A
C	12A
C	13A
C	14A
C	15A
C	16A
C	17A
C	18A
C	19A
C	20A

Fig. 16 — Off-Premise Station, Incoming Call

19.00 OFF-PREMISE STATION, ANSWERING INCOMING CALL: TALKING PATHS**Answering Incoming Call:**

19.01 When an off-premise station picks up in response to the audible signal, the *P* relay will operate. The operation of the *P* relay operates relay *C* in the long line circuit, relay *L* in the station line circuit, and relay *TB1* in the battery supply and signaling circuit. The functions of *TB1* and related relays are as described in 8.01.

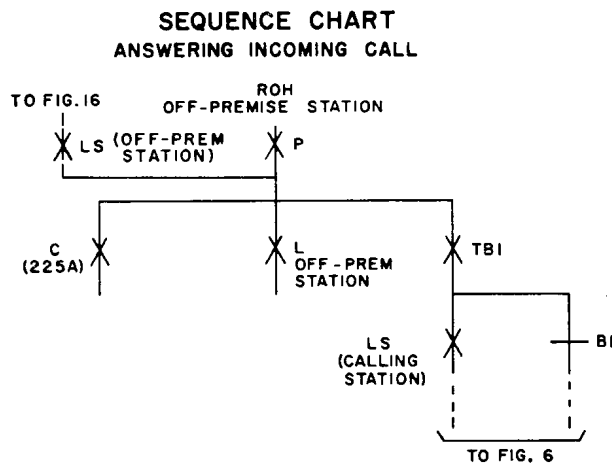
Talking Path, Primary Link:

19.02 Talking battery for the local station is supplied from the *TB1* relay, and for the off-premise station it is supplied from the *P* relay. The two telephone circuits are bridged together through the *P1* and *D* capacitors.

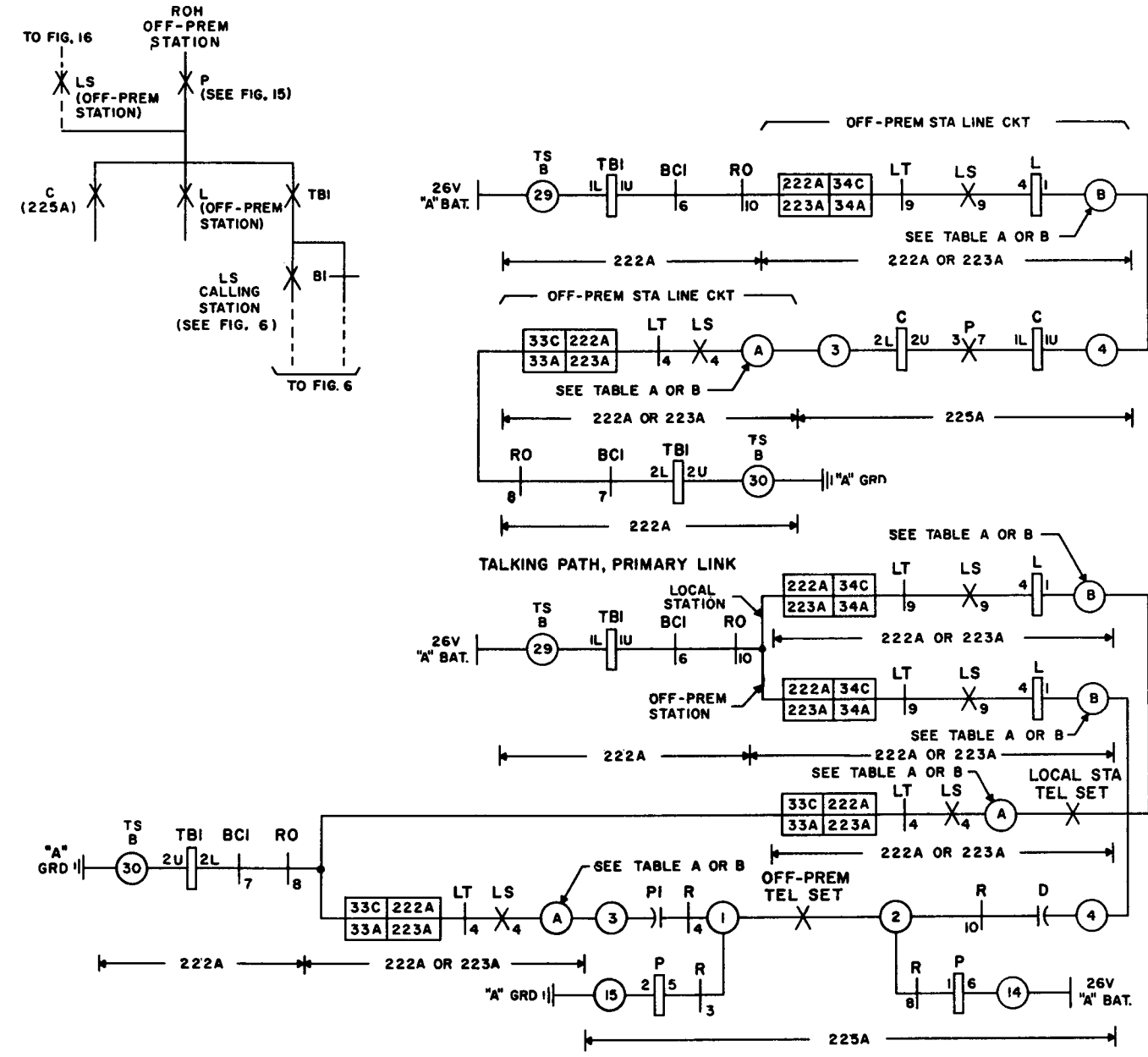
Talking Path, Secondary Link:

19.03 Talking battery for the local station is supplied from the *TB2* relay, and for the off-premise station it is supplied from the *P* relay. The two telephone circuits are bridged together through the *P1* and *D* capacitors.

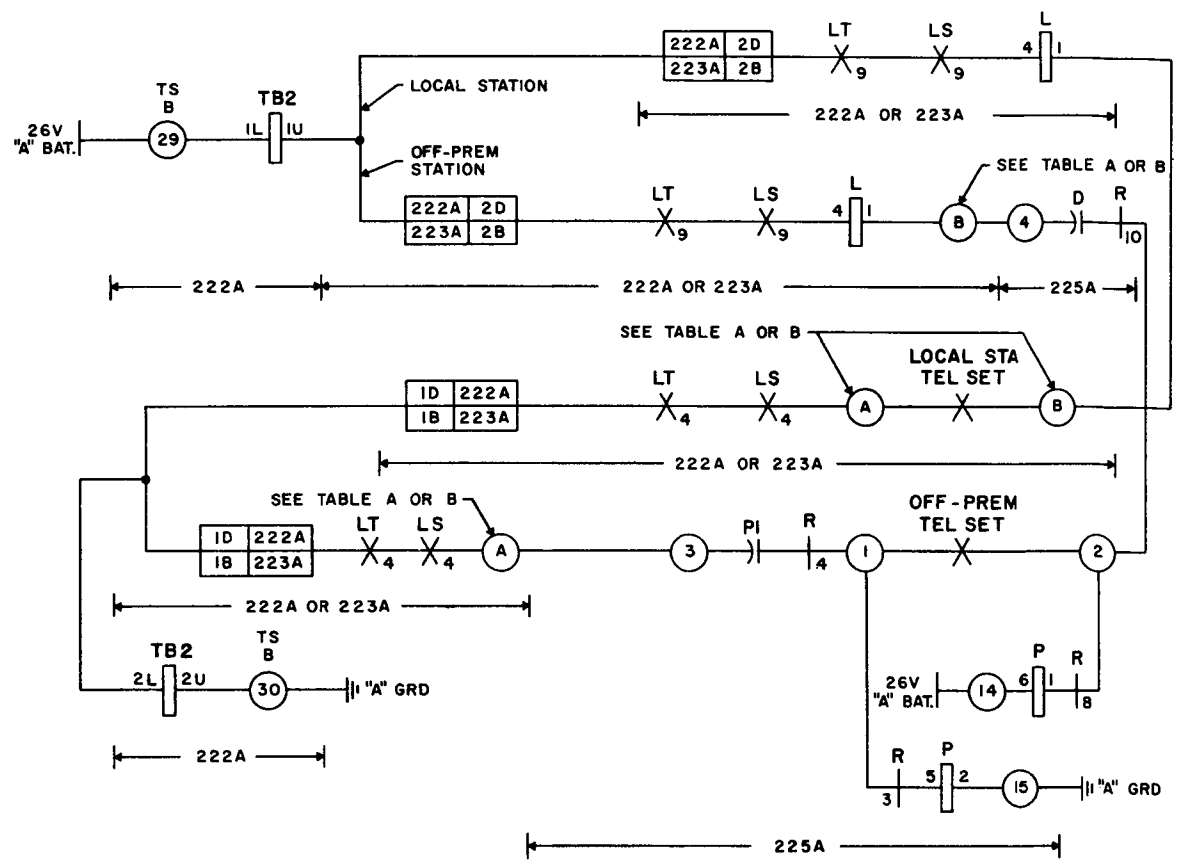
Reference: SD-69286-01



OPERATIONAL SKETCH



TALKING PATH, SECONDARY LINK



REFERENCE DESIGNATION	PUNCHING ON 222A								
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9
A	1A	11A	21A	31A	1B	11B	21B	31B	1C
B	2A	12A	22A	32A	2B	12B	22B	32B	2C

REFERENCE DESIGNATION	PUNCHING ON 223A		
	CKT 1	CKT 2	CKT 3
A	1A	11A	21A
B	2A	12A	22A

Fig. 17 — Off-Premise Station, Answering Incoming Call: Talking Paths