6A KEY TELEPHONE SYSTEM
2-TALKING LINK ARRANGEMENT
MAINTENANCE

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1. INTRODUCTION

1.01 This section covers the maintenance of the 2-talking link arrangement of the 6A Key Telephone System, the use of sequence charts and operational sketches, and a description of the symbols used.

2. GENERAL

2.01 This section is reissued to update sequence charts and operational sketches.

2.02 This issue of the section is based on CD- and SD-69286-01, Issue 8D. If this section is to be used with equipment or apparatus reflecting a later issue of the drawing(s) reference should be made to the later CD(s) and SD(s) to determine the extent of the changes and the manner in which the section may be affected.

2.03 The circuits used in the 6A Key Telephone System have been reduced to simplified sequence charts and operational sketches.

- 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

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

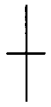
- Watch relay operation of equipment and compare it to that of the sequence charts as shown on the various figures.

- 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.

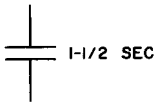
2.05 The following are samples of some of the symbols used in the preparation of the sequence charts and operational sketches contained in this practice.

SEQUENCE CHART SYMBOLS

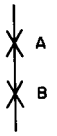
Relay or other apparatus in a fully operated position.



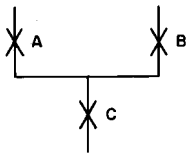
Relay or other apparatus in an unoperated or normal position.



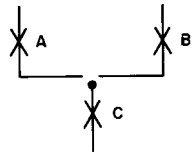
Time delay circuit (time will be designated).



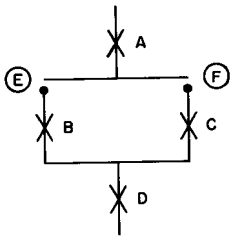
Operation of relay *A* causes the operation of relay *B*.



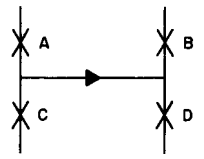
Both relays *A* and *B* have to be operated before relay *C* can operate.



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

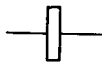


Option: Relay *A* in operating, operates relay *B* or *C* depending on the wiring option provided. Relay *B* or *C* in operating would in turn operate relay *D*.

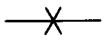


Both relays *A* and *B* must operate before relay *D* can operate. The arrow is used to indicate one-way action. In this illustration, relay *C* operates from relay *A* only.

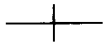
OPERATIONAL SKETCH SYMBOLS



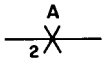
Relay core and winding.



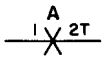
Apparatus operated (keys, telephone sets, etc).



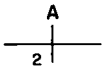
Apparatus normal (keys, telephone sets, etc).



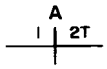
Make contact of an operated wire-spring-type relay. Relay will be designated above and contact number below. The position of the number indicates the location of the fixed contact in the circuit.



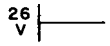
Make contact of an operated relay having a top and bottom pile-up. Relay will be designated above and a contact number on each side. Letter T or B would indicate that the contacts are in the top or bottom pile-up, respectively.



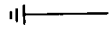
Normally closed contact of an unoperated wire-spring-type relay. Relay will be designated above and contact number below.



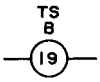
Normally closed contact of an unoperated relay having a top and bottom pile-up. Relay will be designated above and a contact number on each side.



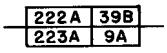
Battery symbol.



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.

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

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

2.08 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 sections pertaining to these specific items.

2.09 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	
A	Single or 2-Talking Link Arrangements	
T	2-Talking Link Arrangement With Camp-On	
AR	With Conference Time-Out Circuit	

OPTIONS ASSOCIATED WITH STATIONS

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

2.10 The following manufacture discontinued (MD) KTUs and suggested replacement KTUs are applicable to this section.

KTU (MD)	SUGGESTED REPLACEMENT
207B	207C
209A, 212A, 232A	232B
217A	217B
224A	224B
226A	226B
227A	227B

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

- 227A- or B-1 Ringing and Tone Control Circuit
- 227A- or B-2 Single Add-On Transfer Circuit
- 227A- or B-3 Auxiliary Relay Busy Lamp Circuit
- 227A- or B-4 Auxiliary Relay Lamp Flash Circuit
- 227A- or B-5 Auxiliary Relay Station Circuit

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

3. 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 Part 11), (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 ringing and tone control circuit.

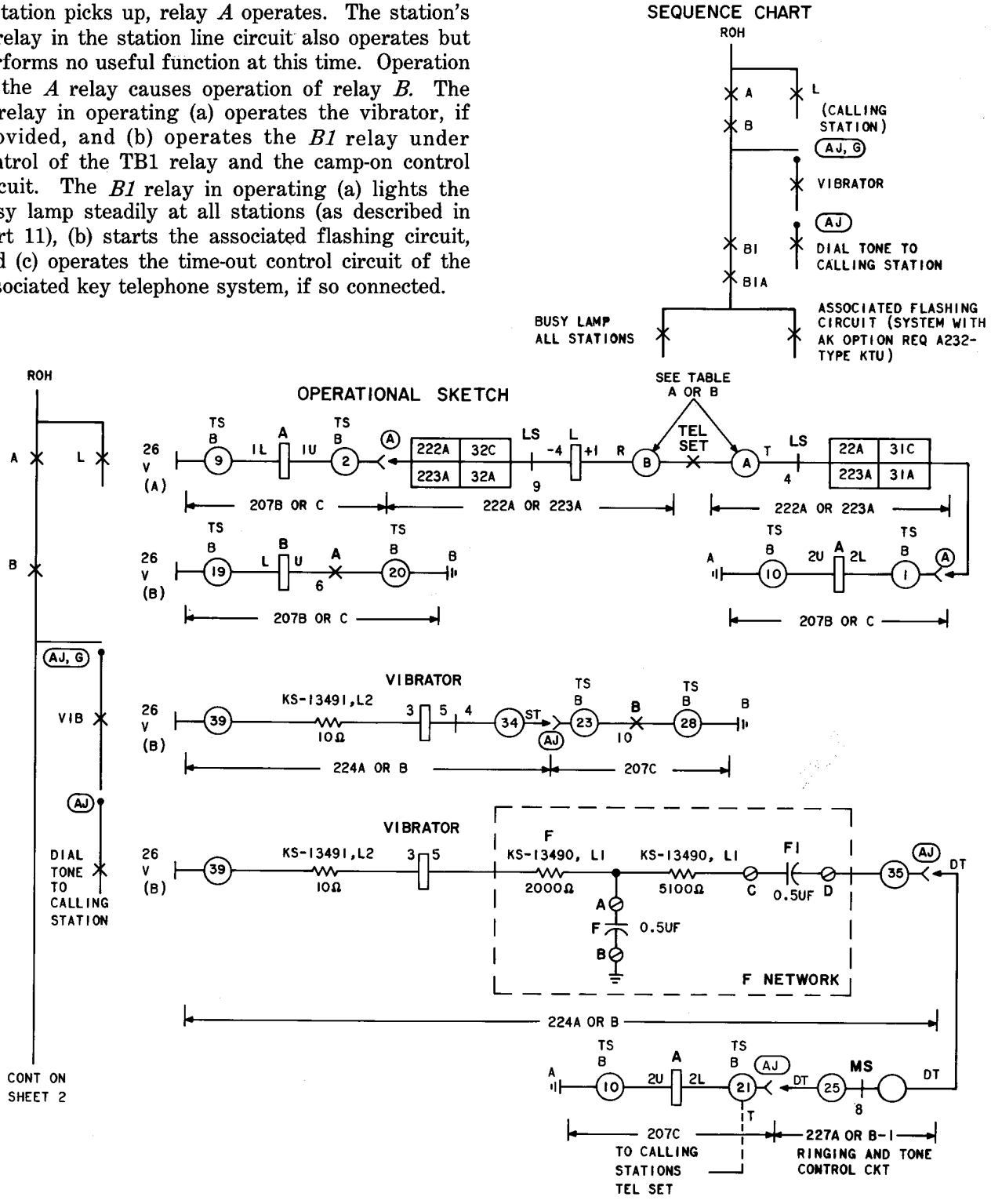


Fig. 1—Line Seizure (Sheet 1 of 2)

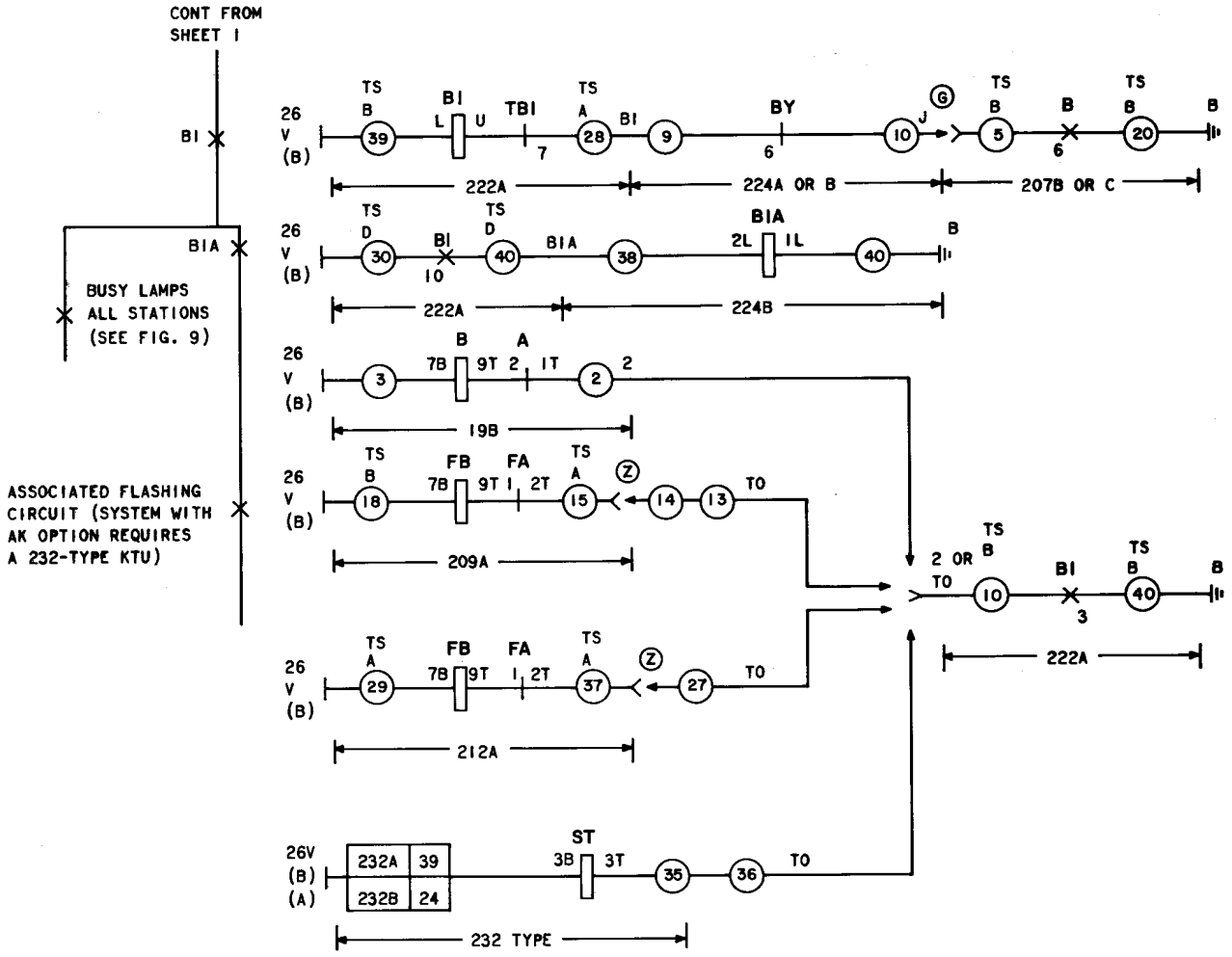


TABLE A

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

B-197122

Fig. 1—Line Seizure (Sheet 2 of 2)

4. BASIC OPERATION OF SELECTOR CIRCUIT (ROTARY DIAL)

4.01 Relays *A* and *B* have previously been operated as described in 3. 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*.

> ***Note:*** Selector operation is different when a TOUCH-TONE® adapter is in the system and a TOUCH-TONE dial station originates a call.

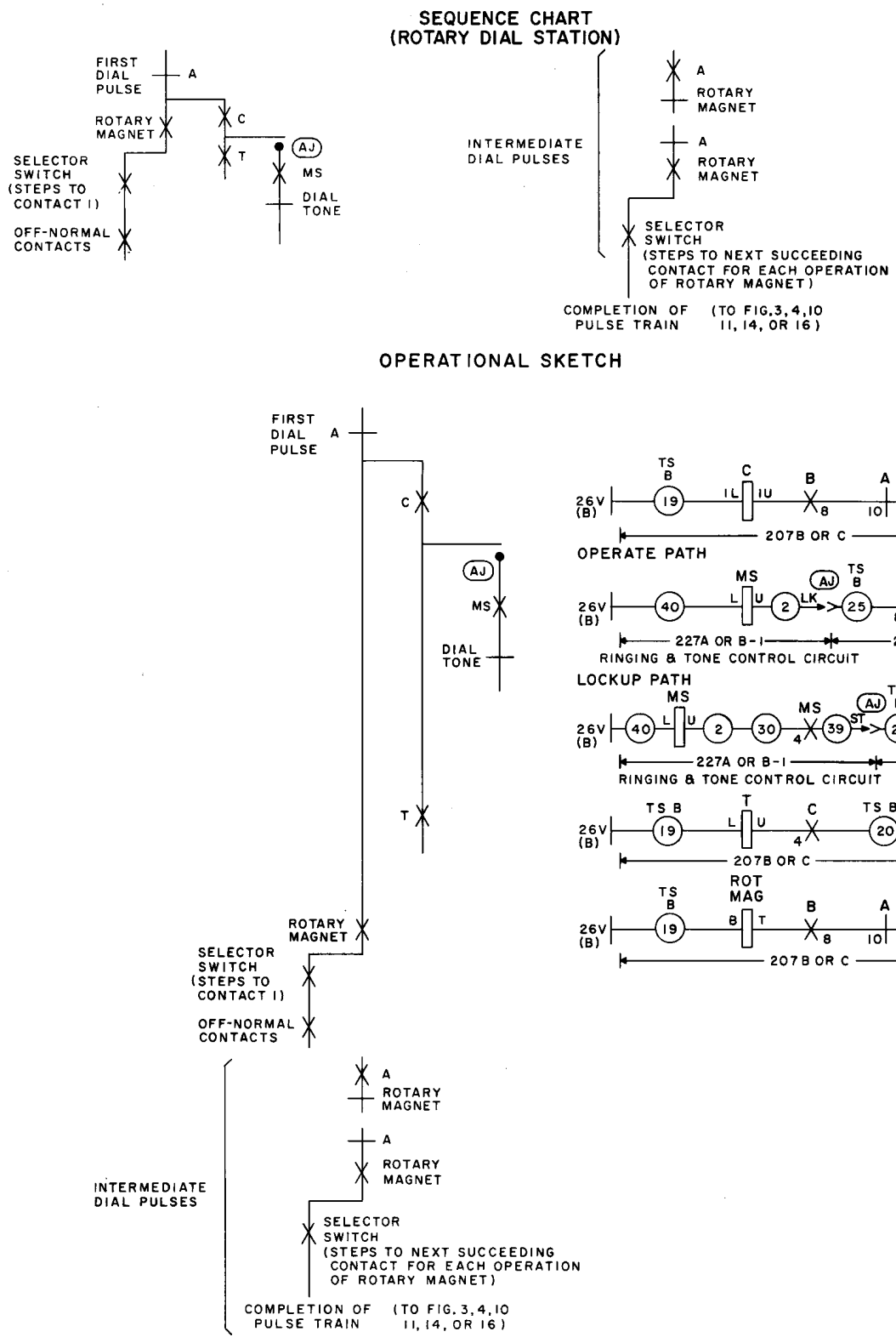


Fig. 2—Basic Operation of Selector Circuit Using Rotary Dial

5. STATION SELECTION, DIALING SINGLE-DIGIT CODE OR SECOND DIGIT OF 2-DIGIT CODE (Dialing first digit of a 2-digit code, see Part 6.)

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.

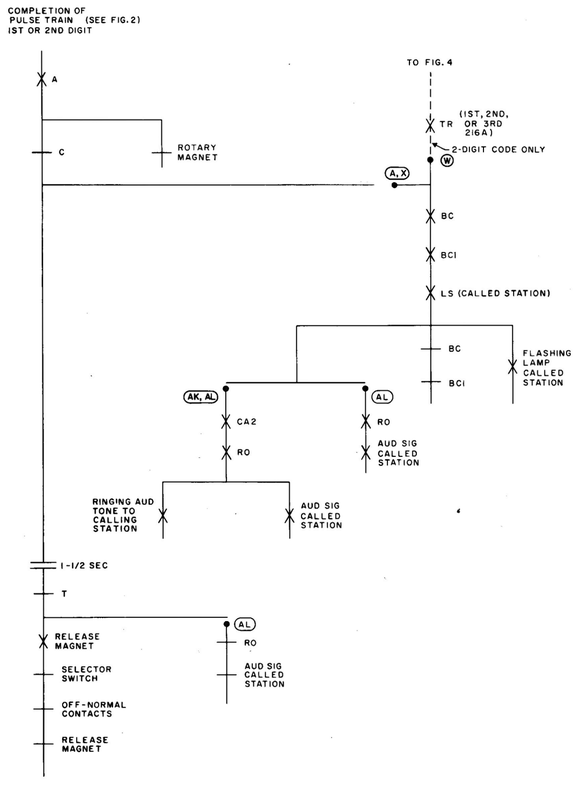
5.02 This ground operates relay *BC* which in turn operates relay *BC1*. Operation of the *BC1* relay shunts the winding of the *BC* relay, thus allowing the called station's *LS* relay to operate. Relays *BC* and *BC1* return to normal. The *LS* relay in operating (a) locks up and (b) connects the called station's lamp to the associated flashing circuit as described in 11.

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 Part 10.

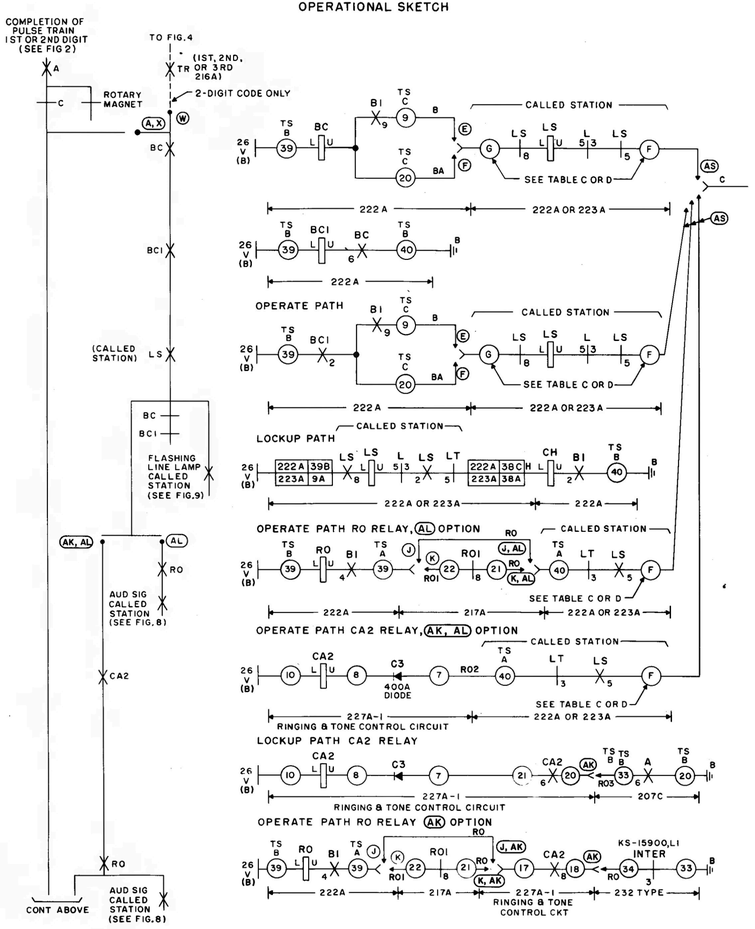
5.04 When *AK* and *AL* options are provided, the operation of the *LS* relay connects the ground from the second bank of the selector switch to the ringing and tone control circuit to operate the *CA2* relay. The *CA2* relay in operating (a) locks up and (b) connects the R*O* relay to the interrupter 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 R*O* relay in operating operates the audible signal at the called station as described in Part 10 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 R*O* 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.

SEQUENCE CHART



OPERATIONAL SKETCH



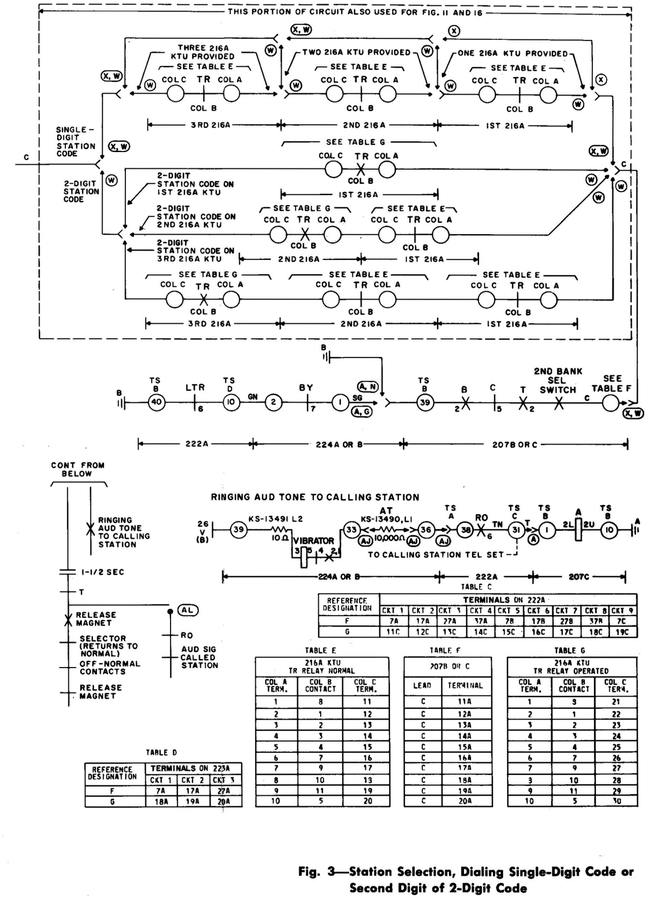


TABLE C

REFERENCE DESIGNATION	TERMINALS ON 222A								
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9
F	7A	17A	27A	17A	7B	17B	27B	17A	7C
G	11C	12C	13C	14C	15C	16C	17C	18C	19C

TABLE D

REFERENCE DESIGNATION	TERMINALS ON 225A		
	CKT 1	CKT 2	CKT 3
F	7A	17A	27A
G	18A	19A	20A

TABLE E — 216A KTU TR RELAY NORMAL

COL A TERM.	COL B CONTACT	COL C TERM.
1	8	11
2	1	12
3	2	13
4	3	14
5	4	15
6	7	16
7	9	17
8	10	13
9	11	19
10	5	20

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 G — 216A KTU TR RELAY OPERATED

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

Fig. 3—Station Selection, Dialing Single-Digit Code or Second Digit of 2-Digit Code

6. STATION SELECTION, DIALING FIRST DIGIT OF 2-DIGIT CODE (Dialing second digit, see Part 5.)

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.

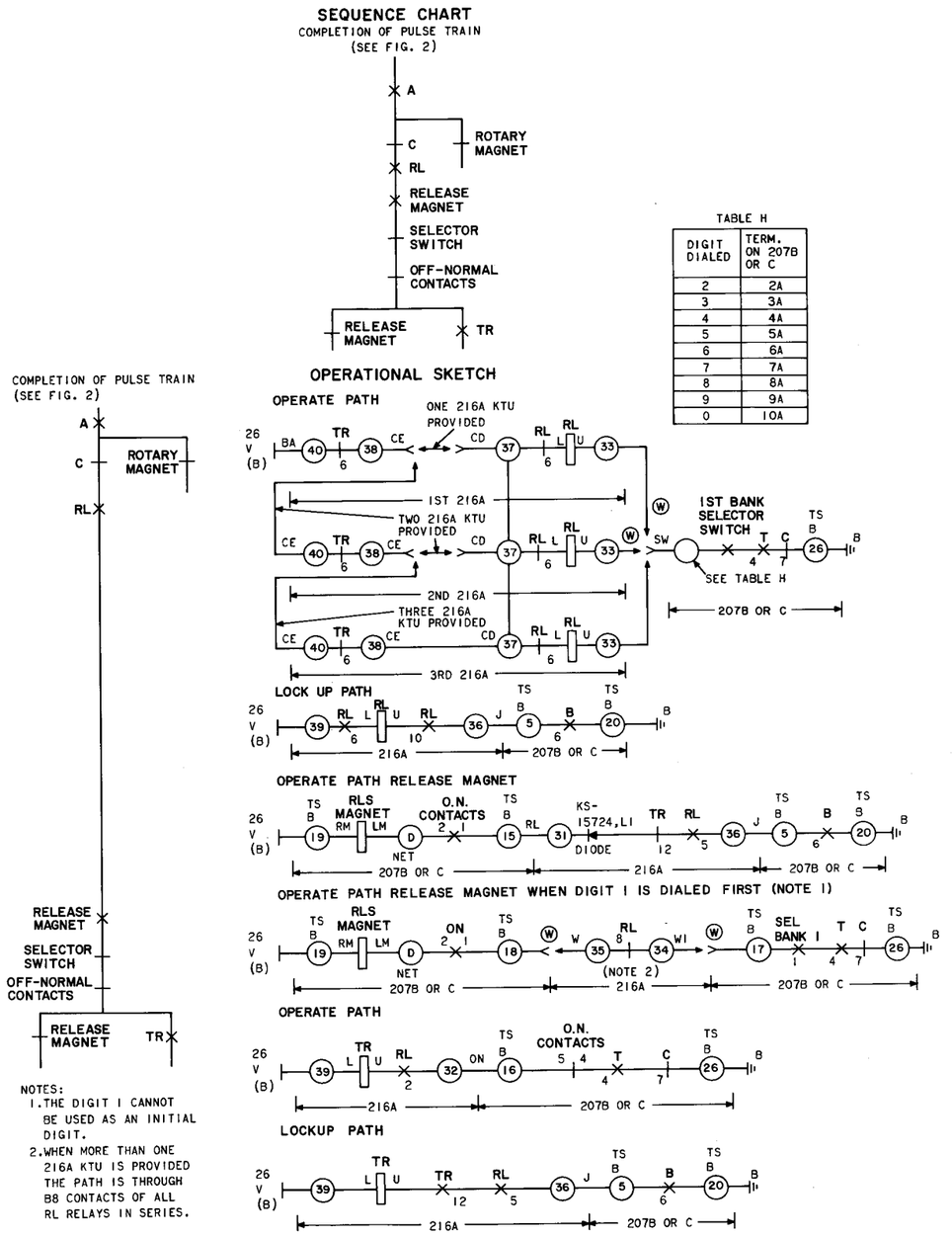


Fig. 4—Station Selection, Dialing First Digit of 2-Digit Code

7. STATION SELECTION, USING SIGNAL KEY

7.01 After line seizure has been accomplished as described in Part 3, 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 Part 11.

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 Part 10. The audible signal at the called station will operate as long as the signal key is depressed.

7.03 When *AK* and *AL* 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 Part 10 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.

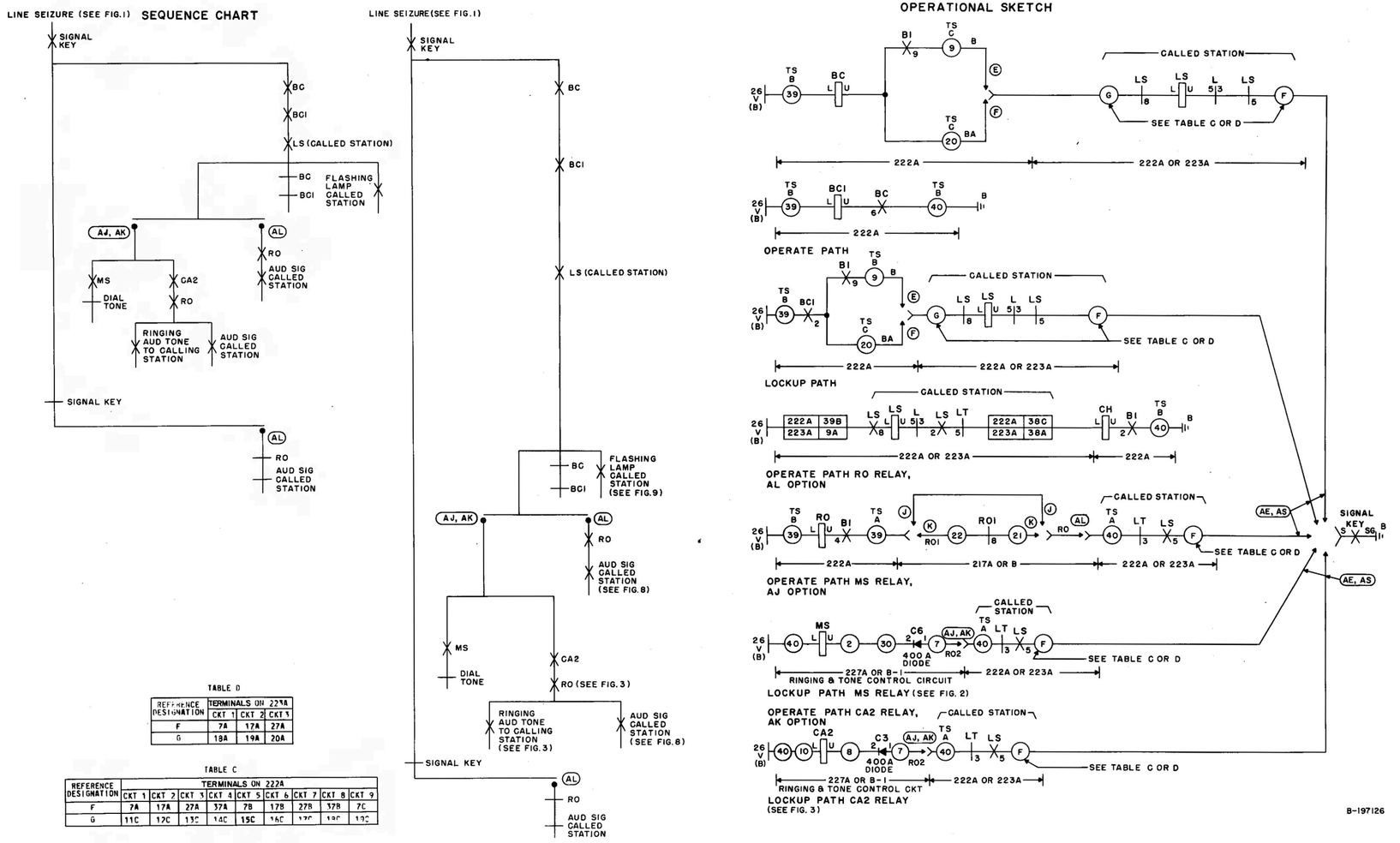


TABLE D

REFERENCE DESIGNATION	TERMINALS ON 227A		
	CKT 1	CKT 2	CKT 3
F	7A	17A	27A
G	18A	19A	20A

TABLE C

REFERENCE DESIGNATION	TERMINALS 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	18C	19C

Fig. 5—Station Selection, Using Signal Key

8. 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, (b) operates TB1A relay in the Dial Tone, Busy Signal, and Camp-on Control Circuit, and (c) 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.

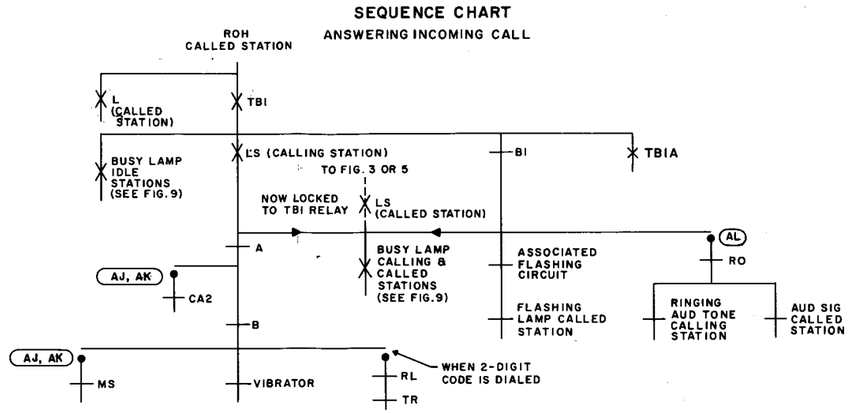


TABLE J

REFERENCE DESIGNATION	TERMINALS 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
G	11C	12C	13C	14C	15C	16C	17C	18C	19C

TABLE K

REFERENCE DESIGNATION	TERMINALS ON 223A		
	CKT 1	CKT 2	CKT 3
A	1A	11A	21A
B	2A	12A	22A
G	19A	19A	2UA

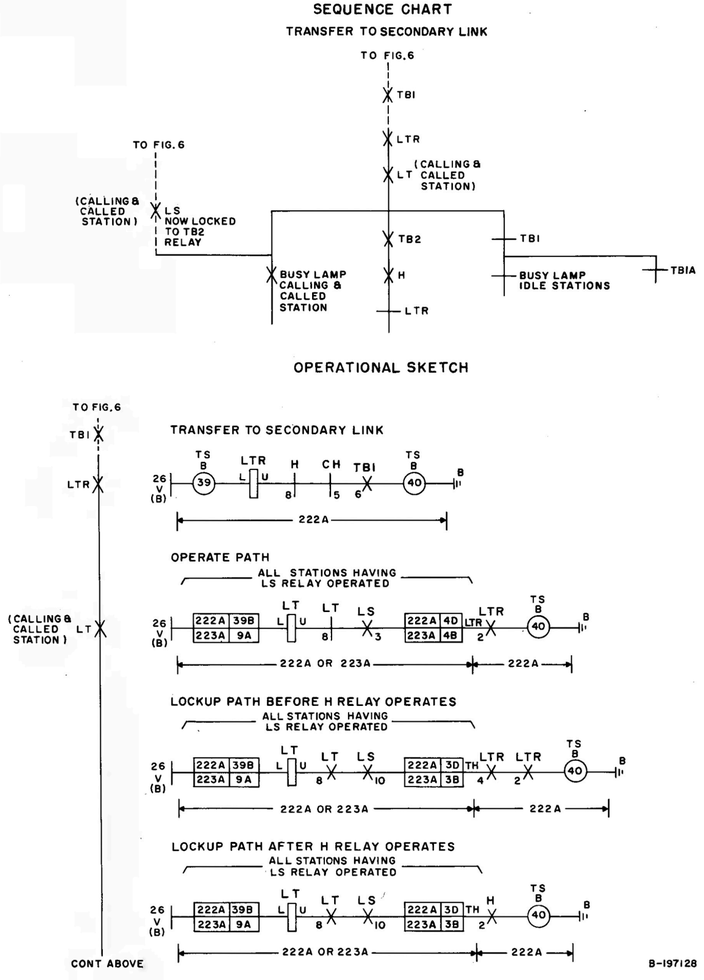
Fig. 6—Answering Incoming Call: Talking Path, Primary Link

9. 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* lead 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.



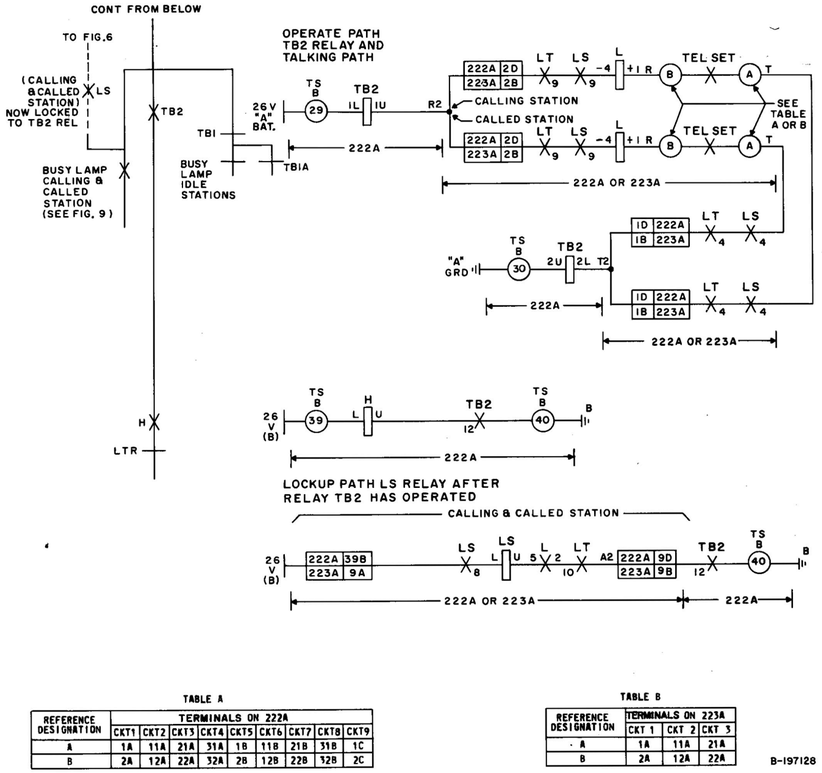


TABLE A

REFERENCE DESIGNATION	TERMINALS ON 222A								
	CKT1	CKT2	CKT3	CKT4	CKT5	CKT6	CKT7	CKT8	CKT9
A	1A	11A	21A	31A	1B	11B	21B	31B	1C
B	2A	12A	22A	32A	2B	12B	22B	32B	2C

TABLE B

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

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

10. 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 options (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.

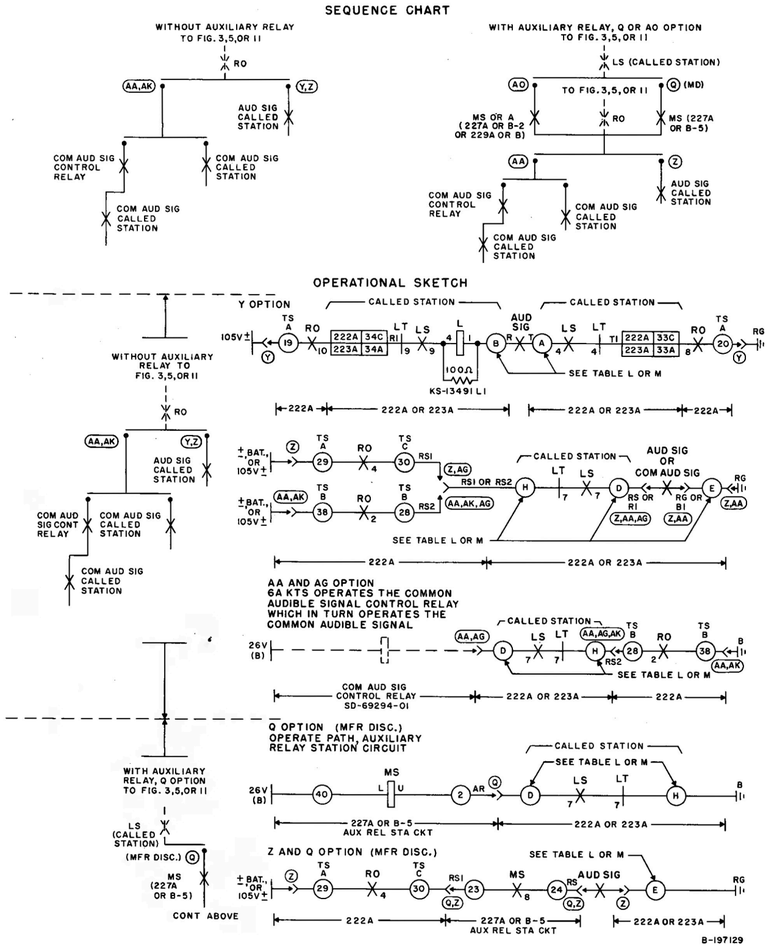
(b) and (c) ***Z and Q or Z and AO options (with auxiliary relay):*** The called station's *LS* relay in operating operates an auxiliary relay. Operation of the *RO* relay then connects audible signal voltage to a separate signal pair under control of the auxiliary relay to operate the audible signal. *Z* and *Q* options are MD.

Over a Common Audible Circuit (AA Option)

10.04 This can be accomplished three ways.

(a) ***AA and AG options (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 options (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* options are MD.



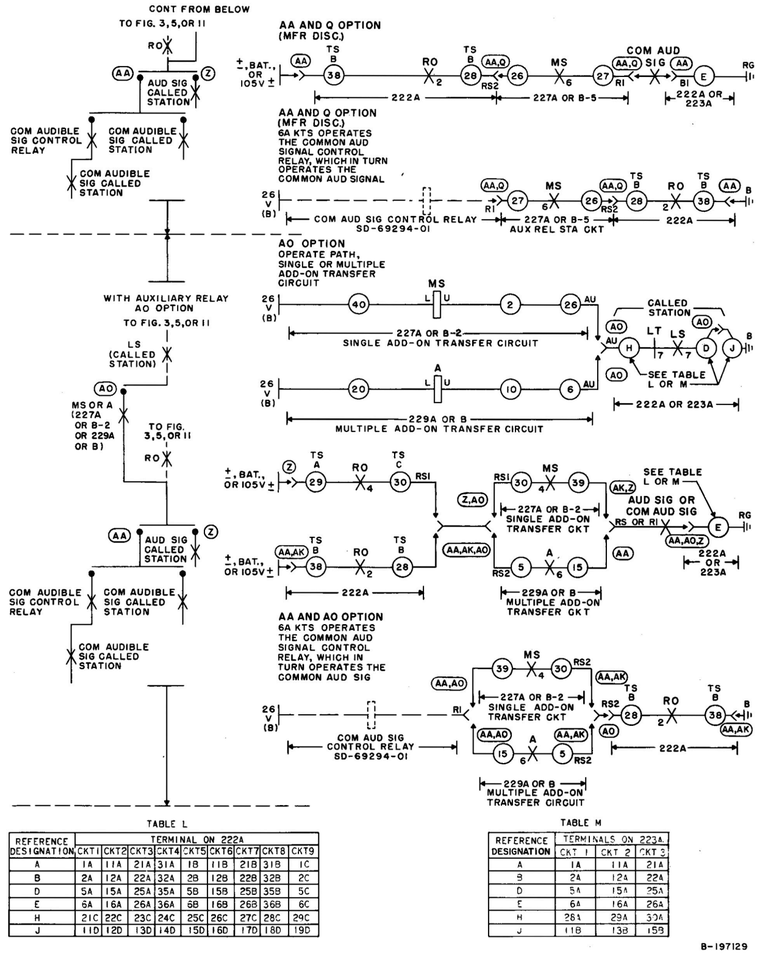


TABLE L

REFERENCE DESIGNATION	TERMINAL ON 222A								
	CKT1	CKT2	CKT3	CKT4	CKT5	CKT6	CKT7	CKT8	CKT9
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
E	6A	16A	26A	36A	6B	16B	26B	36B	6C
H	21C	22C	23C	24C	25C	26C	27C	28C	29C
J	11D	12D	13D	14D	15D	16D	17D	18D	19D

TABLE M

REFERENCE DESIGNATION	TERMINALS ON 223A		
	CKT 1	CKT 2	CKT 3
A	1A	11A	21A
B	2A	12A	22A
D	5A	15A	25A
E	6A	16A	26A
H	28A	29A	30A
J	11B	13B	15B

Fig. 8—Audible Signals

11. 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

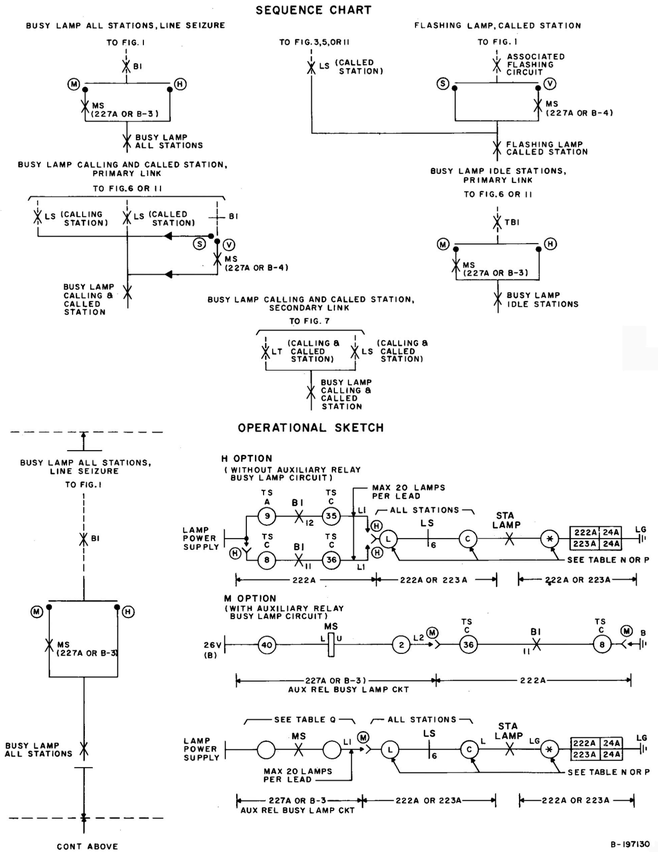
11.03 The called station in answering operates relay *TB1*. The *TB1* relay in operating (a) operates the *LS* relay of the calling station, (b) releases the *B1* relay, and (c) operates the auxiliary relay lamp flash circuit steadily, if provided (*V* option). The operated *LS* relays of the calling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



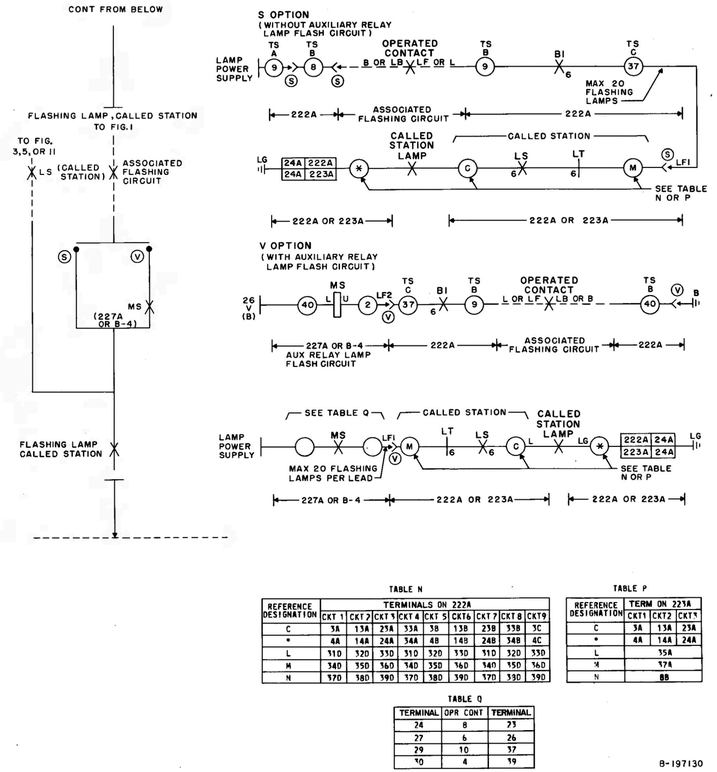


TABLE N

REFERENCE DESIGNATION	TERMINALS ON 222A								
	CKT 1	CKT 2	CKT 3	CKT 4	CKT 5	CKT 6	CKT 7	CKT 8	CKT 9
C	5A	13A	25A	33A	5B	13B	25B	33B	3C
*	4A	14A	24A	34A	4B	14B	24B	34B	4C
L	11D	32D	35D	11D	32D	11D	11D	32D	35D
M	34D	35D	16D	14D	35D	16D	14D	15D	16D
N	17D	18D	19D	17D	38D	39D	17D	33D	39D

TABLE P

REFERENCE DESIGNATION	TERM ON 227A		
	CKT1	CKT2	CKT3
C	5A	13A	25A
*	4A	14A	24A
L		15A	
M		17A	
N		8B	

TABLE Q

TERMINAL	OPR CONT	TERMINAL
24	8	23
27	6	26
29	10	37
20	4	19

B-197130

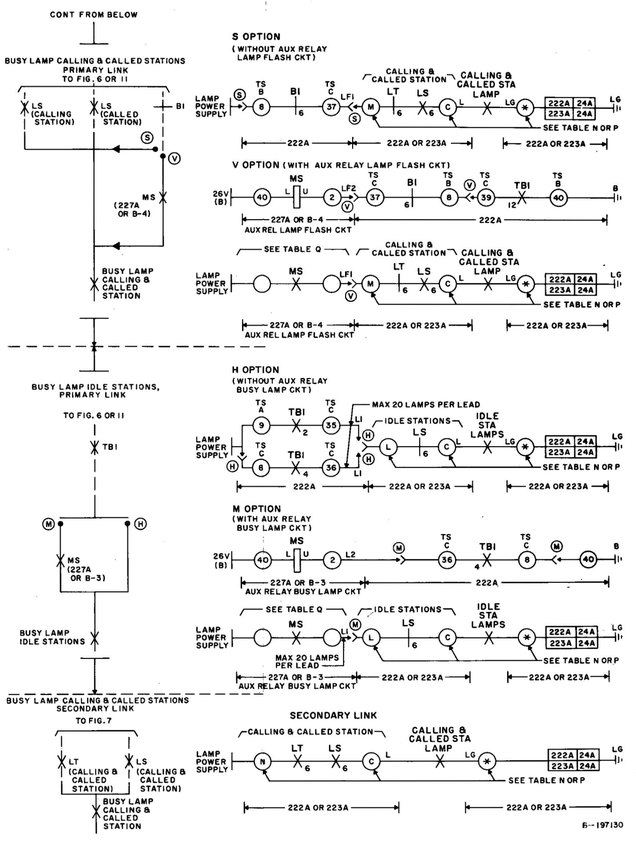


Fig. 9—Visual Signals

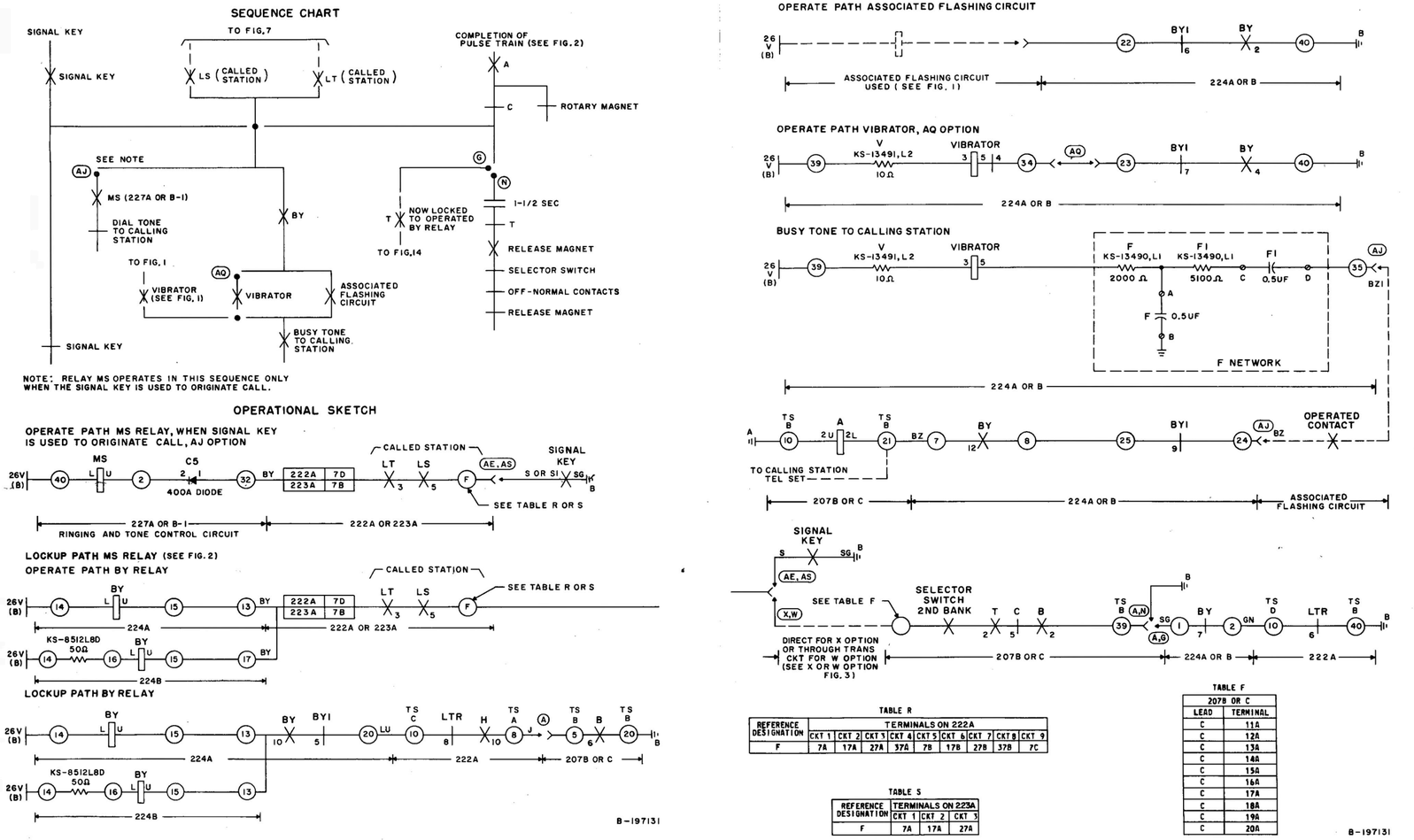
12. BUSY SIGNAL

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 Part 16. The camp-on feature cannot be used on a call originated by a signal key.



REFERENCE DESIGNATION	TERMINALS 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

REFERENCE DESIGNATION	TERMINALS ON 223A		
	CKT 1	CKT 2	CKT 3
F	7A	17A	27A

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. 10—Busy Signals

13. 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 Part 3, 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* or *PC2* relays, (b) locks up under control of the *PC1* and *PC2* relays, 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 Part 10.

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 Part 10 and completes a path to send ringing audible tone to the calling party.

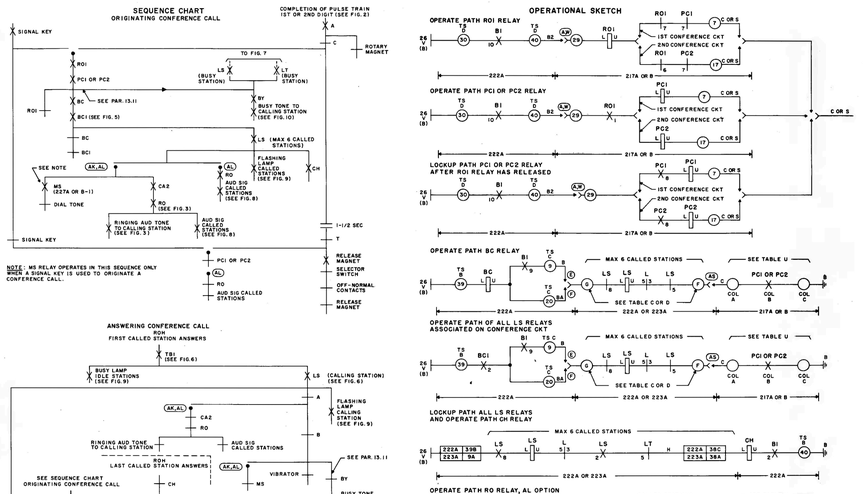
13.07 The release of the selector switch after a nominal 1-1/2 seconds, or the release of the signal key, will release the *PC1* or *PC2* relay. The release of the *PC1* or *PC2* relay will open the operate path of the *RO* relay if *AL* option is provided. The release of the *RO* relay opens the audible 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, or 30 seconds have elapsed since the origination of the preset conference call, whichever occurs first, 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 Part 12 and (c) return busy tone to calling station. The calling station will receive the busy tone until the first called station answers.



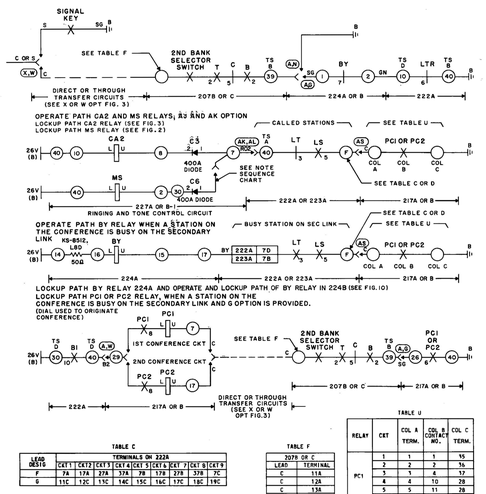


TABLE C

LEAD DESIG	TERMINALS 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	18C	19C

TABLE D

LEAD DESIG	TERMINALS ON 227A		
	CKT 1	CKT 2	CKT 3
F	7A	17A	27A
G	18A	19A	20A

TABLE F

2079 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 TERM.	COL B CONTACT NO.	COL C TERM.
PC1	1	1	1	15
	2	2	2	16
	3	3	4	17
	4	4	10	26
	5	5	11	26
	6	6	12	26
PC2	1	11	1	26
	2	12	2	26
	3	13	4	26
	4	14	10	26
	5	15	11	26
	6	16	12	26

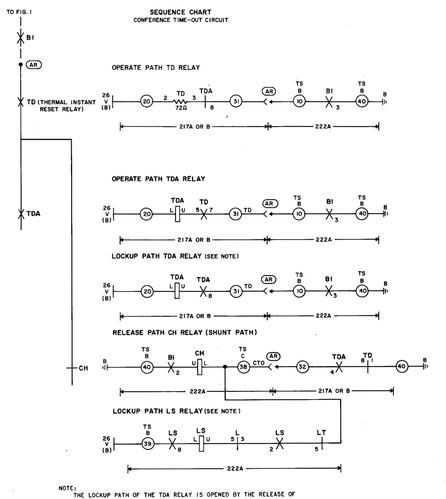


Fig. 11—Preset Conference

14. 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 MD.

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 MD.

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.

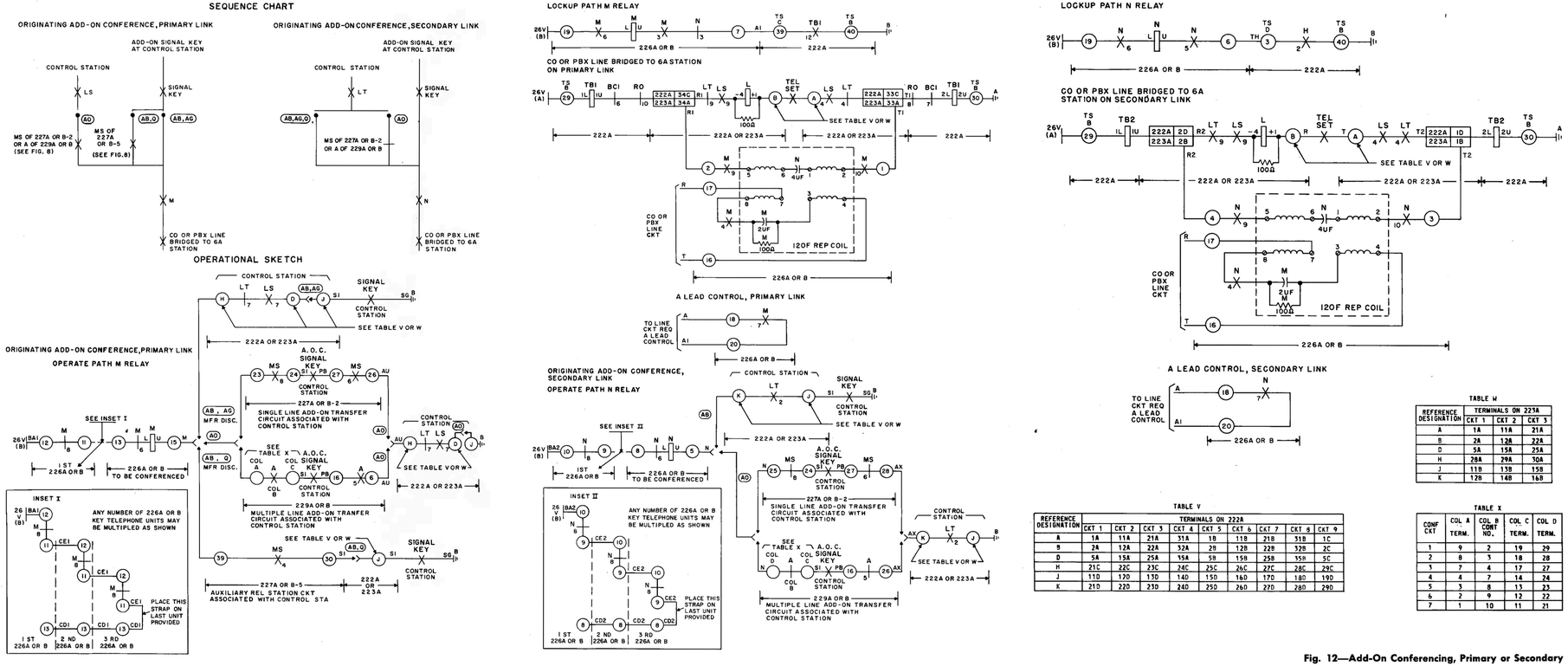


TABLE W

REFERENCE DESIGNATION	TERMINALS 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

TABLE V

REFERENCE DESIGNATION	TERMINALS 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
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 TERM.	COL B CONT NO.	COL C TERM.	COL D TERM.
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

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

15. 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 Part 9. 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 conrol 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.

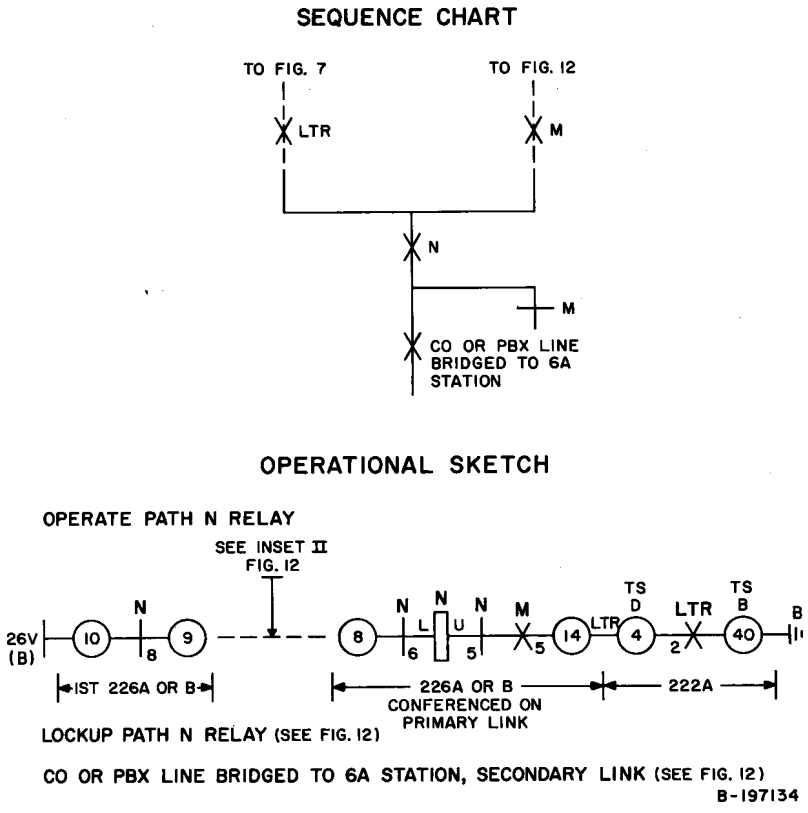


Fig. 13—Add-On Conferencing, Transfer to Secondary Link

16. 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 Part 3 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.

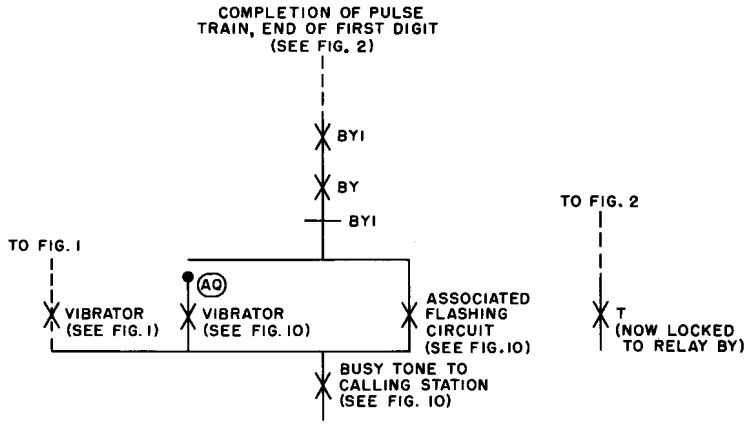
16.04 The *BY* relay in operating (a) opens the operate path of the *BY1* relay; (b) after the *BY1* releases, the *BY* relay locks up to the *B* relay under control of a parallel path in the common equipment of the 222A KTU; (c) opens its own operate path; (d) holds the *T* relay operated preventing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

SEQUENCE CHART



OPERATIONAL SKETCH

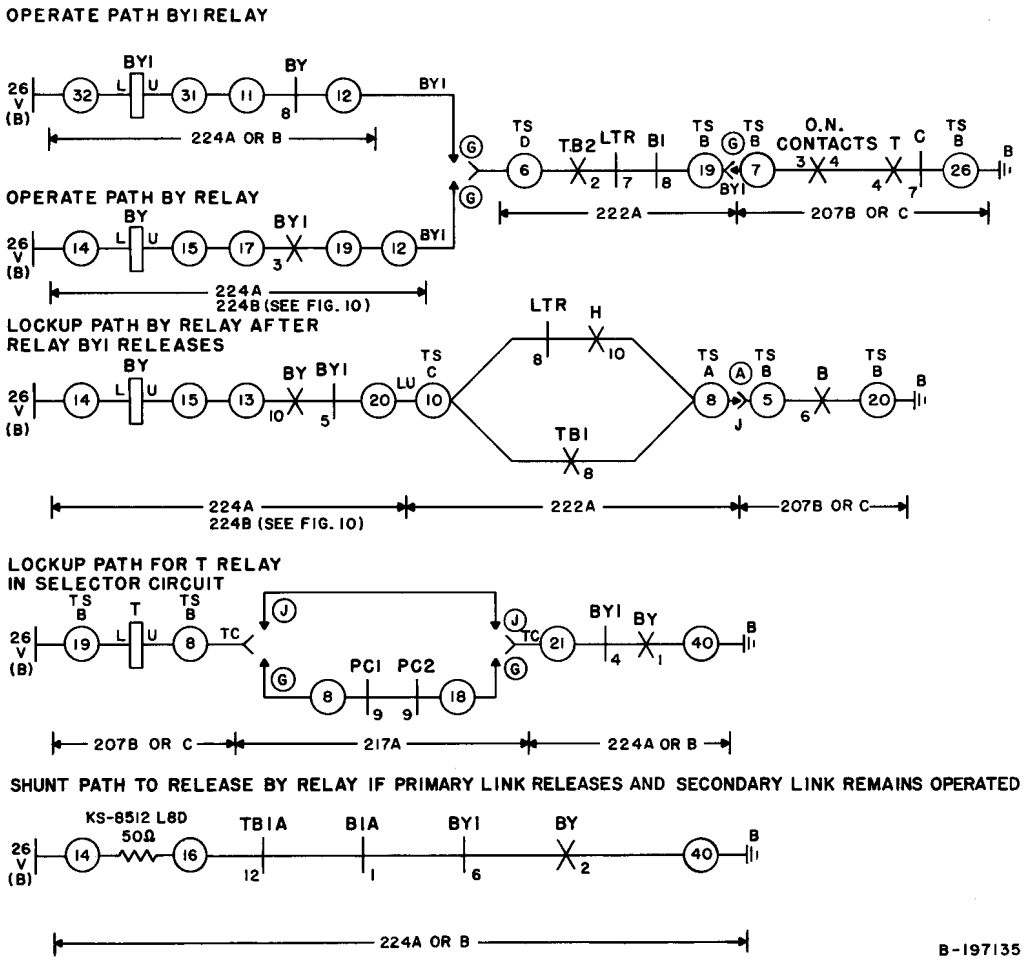
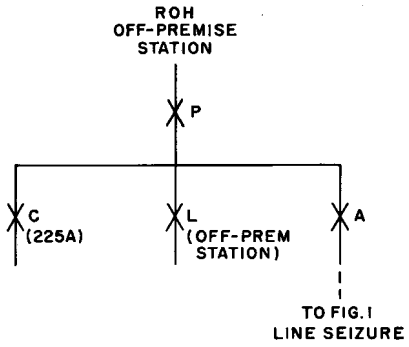


Fig. 14—Camp-On

17. OFF -PREMISE STATION, LINE SEIZURE

17.01 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 reoperate in unison with the dial pulses. This action causes the selector circuit to operate as described in 4.01, 4.02, and 4.03.

SEQUENCE CHART



OPERATIONAL SKETCH

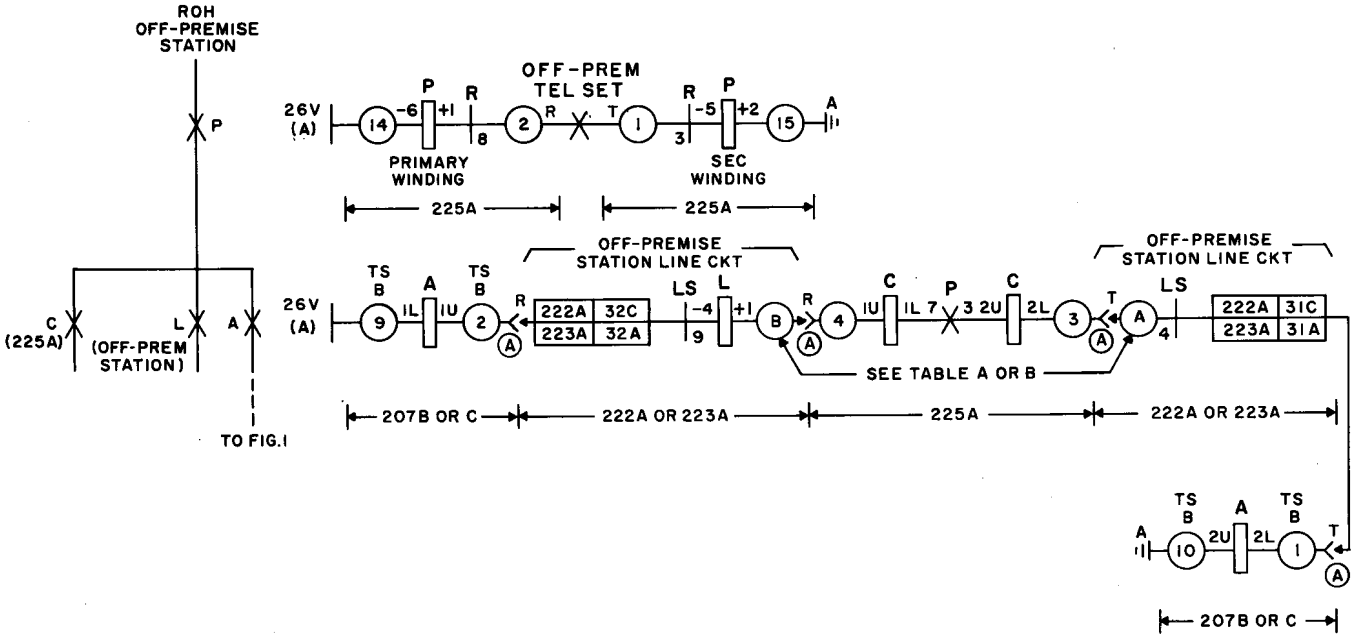


TABLE A

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

B-197136

Fig. 15—Off-Premise Station Line Seizure

18. 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.

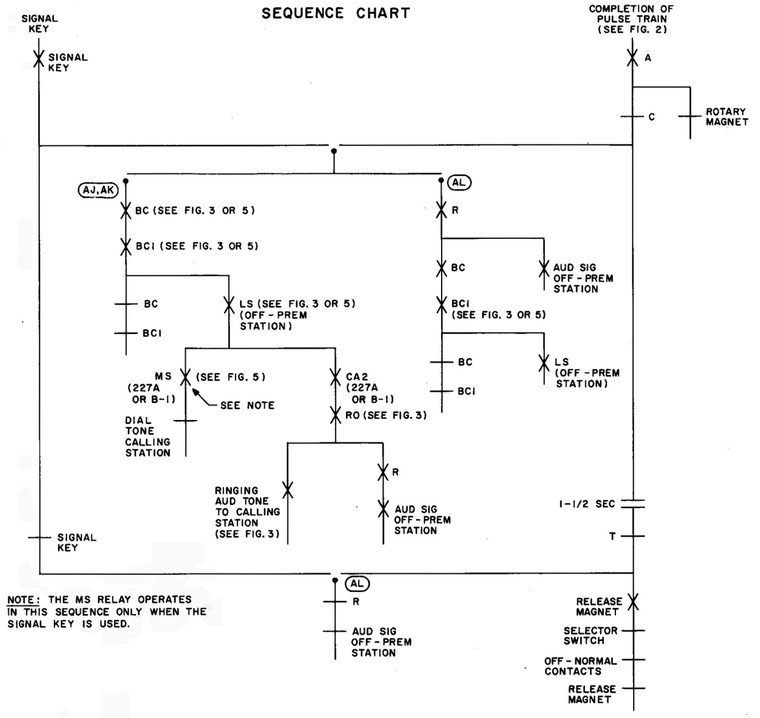
AL Option

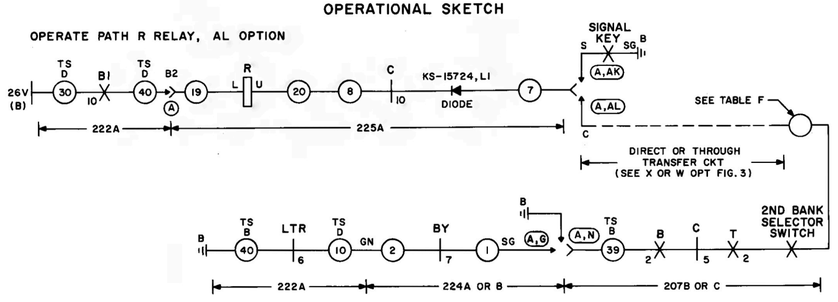
18.02 Ground from the operated selector circuit or the operated signal key operates the *R* relay in the long line circuit. The *R* relay in operating (a) opens the transmission path between the off-premise station and local stations; (b) connects generator to the off-premise station's *T* and *R* leads,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





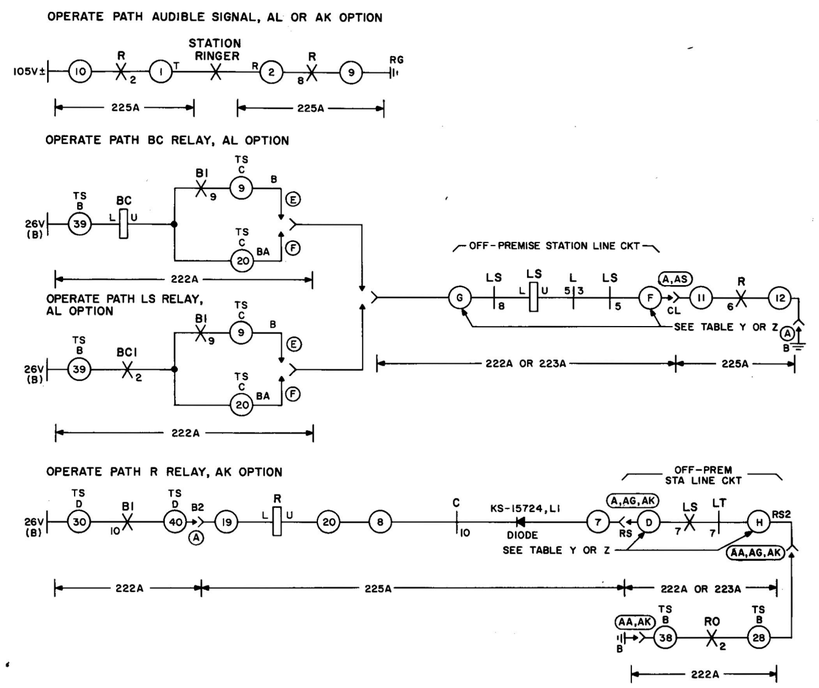


TABLE Y

REF DESIG	TERMINALS 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	TERMINALS 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. 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.

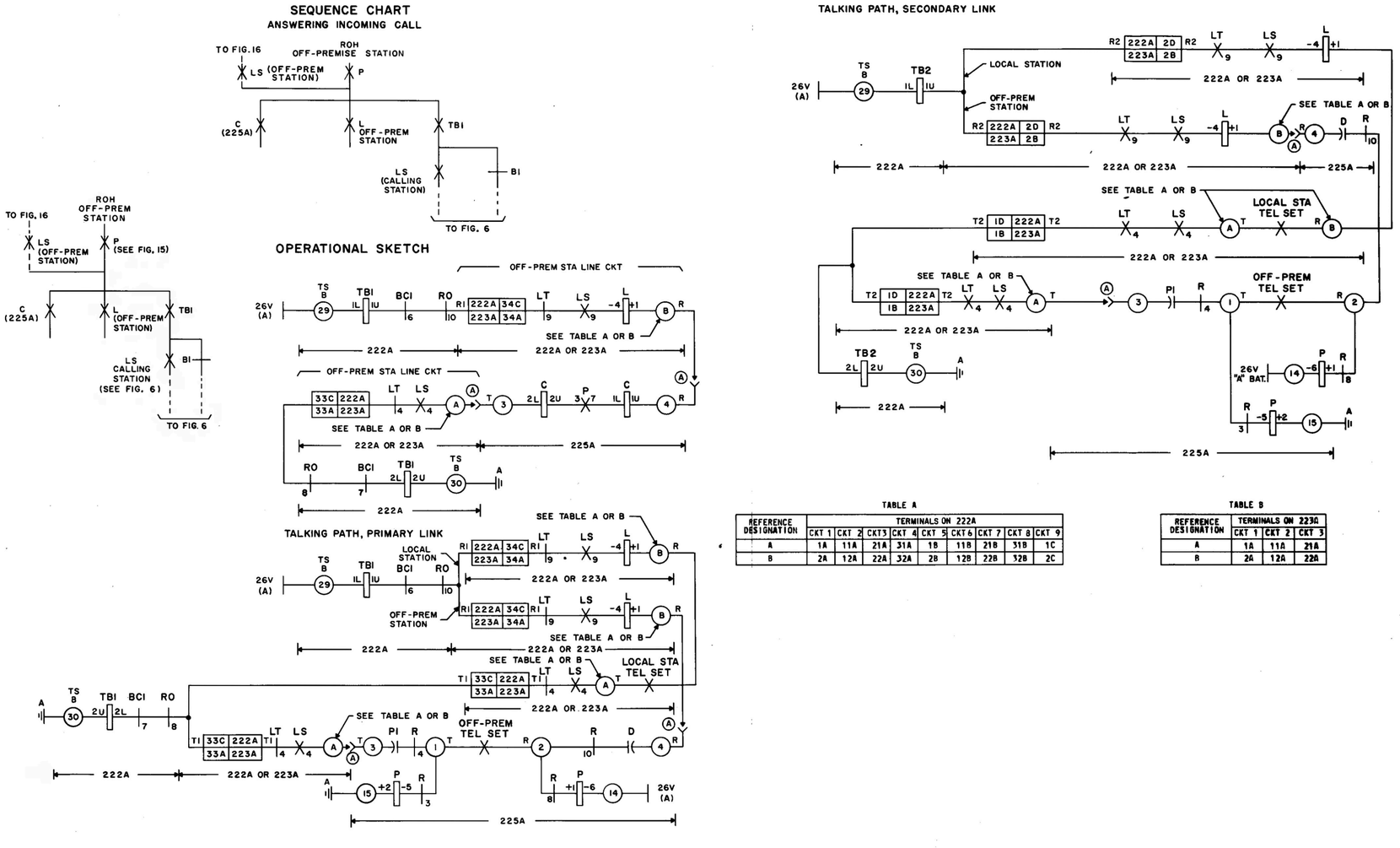


TABLE A

REFERENCE DESIGNATION	TERMINALS 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	TERMINALS 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 Path

S-9124
(3-27)

SOUTHWESTERN BELL TELEPHONE COMPANY

_____ 19____

MR._____

17 - 170 - W
18 - 175 BK
19 - 174 R
21 - 173 G
22 - 172 W
23 - 171 BL
50 - 199 R