KS-21564 BUSINESS PHONE TRAINER

DESCRIPTION AND MAINTENANCE

1. GENERAL

1.01 This section covers the description and maintenance of the KS-21564 Business Phone Trainer.

1.02 When this section is reissued, the reasons for reissue will be listed in this paragraph.

1.03 The KS-21564 Business Phone Trainer was developed to simulate a standard Key Telephone System and is to be used in training people in the proper use of key telephones.

1.04 This issue of the section is based on the following drawing:

SD-69925-01, Issue 1

If this section is to be used with equipment or apparatus reflecting later issue(s) of the drawing, reference should be made to the SDs and CDs to determine the extent of the changes and manner in which the section may be affected.

1.05 The KS-21564 Business Phone Trainer provides the following:

- Communication between rotary and TOUCH-TONE® dial key telephone sets
- Individual ringing at all key telephone sets
- Dial tone, busy tone, and ringback tone
- Visual supervisory lamp signals, steady lamp signals for talking and dialing, wink signals for hold, and flashing signals for incoming ringing
- Intercommunication with signal buttons and buzzers for interoffice use
- Two jacks, one 1/4-inch jack for public address systems or recording devices and one mini jack for cassette attachment.

1.06 The Business Phone Trainer is packaged in three carrying cases. One case contains the controls, logic circuits and loudspeaker. The other two cases contain the key telephone sets, two per carrying case.

1.07 Business Phone Trainer instructions are shipped with each KS-21564,L5 unit.

2. DESCRIPTION

2.01 The complete Business Phone Trainer is made available in four options, two for sale to Bell System companies and two with W coded telephone sets for sale to organizations outside the Bell System. Each option consists of one KS-21564, L5 control unit and one of the KS-21564,L1 through L4 telephone groupings.

2.02 The telephone sets supplied with the Business Phone Trainer are equipped with 13-foot mounting cords and are available in List 1 through List 4 as shown in Table A.

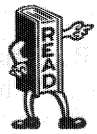
2.03 The KS-21564,L5 (Fig. 1) control unit is housed in a metal carrying case approximately 10 inches high, 16 inches wide, 6 inches deep, and weighs about 15.5 pounds with the Bell System Emblem on the control panel faceplate and consisting of:

- Monitor loudspeaker
- 3-Conductor power cord
- Two recorder jacks (1/4-inch jack for public address (P.A.) system or recorders; mini jack for cassettes)
- Four KS-16672,L3 connectors
- Four self-illuminating buttons to operate monitor features
- Volume control knob for loudspeaker
- Self-illuminating ON-OFF power switch

- 1/4 Amp power fuse
- LOCAL/DDD Selection key

3. OPERATION

3.01 The Business Phone Trainer is designed to simulate key telephone service in its method of operation. Four telephone sets, each simulating an individual station, share two common lines. Telephone set 1 can be used to represent an employer, with telephone set 2 being an employee. Telephone set 3, student 3, represents an outside station which can call or be called by sets 1 and 2. Telephone set 4, student 4, is also representative of another station at the same location as station 3. Each telephone set is individually designated by a telephone number located in the number plate holder of the dial. The telephone set mounting cord should be plugged into the jack on the control unit corresponding to the set number on the connector.



The KS-21564,L5 (Fig. 1) is equipped with plastic posts mounted at the top end of each KS-16672,L3 connector to prevent the station telephone set connector from being forced in backwards.

3.02 The loudspeaker is used to monitor the audible signals and telephone techniques of the students. Monitoring of one or more telephone talking circuits is selected by the loudspeaker selection switches.

3.03 The KS-21564 Business Phone Trainer assembled for operation is shown in Fig. 2.

3.04 Five of the six keys on telephone sets 1 and 2 are used, while three of the six keys on telephone sets 3 and 4 are used. The red key on the left is the HOLD key. The pickup keys are numbered 1 through 5 to the right of the HOLD key. The first pickup key is the line 1 key; the telephone number assigned is printed on the designation strip above the key. The second pickup key is the line 2 key; the telephone number assigned is printed on the designation strip above the key. The third pickup key is the intercom line, designated ICM, and appears on sets 1 and 2 only. The fourth pickup key is converted to a nonlocking signal key, designated SIG, and operates at telephone sets 1 and 2 only. The fifth pickup key is not used.

3.05 The key modifications of the four telephone sets are identical. The wiring at each of the four telephone set connectors, J1 through J4 in the List 5 control unit, determines the function of the four telephone sets.

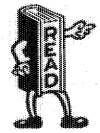
3.06 The intercommunications (INTERCOM) circuit, along with lamp signals and buzzers, operate only between students 1 and 2 (telephone sets 1 and 2).

3.07 All standard basic audible and visual key telephone signals are provided for both lines 1 and 2 which simulate two central office lines.

Note: The ringer for telephone set 2 is connected directly to line 2, and bridged to line 1 by a diode. The ringers for telephone sets 1 and 3 ring on line 1, and telephone set 4 rings on line 2.

Example 1: Telephone sets 1 and 2 can dial on line 1 and cause set 3 to ring. Dialing on line 2 will cause set 4 to ring. A talking path will be established when the called telephone answers.

Example 2: Both telephone set 3 (student 3) and telephone set 4 (student 4) can dial telephone set 2 (employee) on line 2 and cause set 2 to ring. When either telephone set 3 or 4 dials telephone set 1 (employer) on line 1, both sets 1 and 2 will ring.



To avoid the possibility of the Business Phone Trainer user receiving a shock caused by ringing current, no ringing current will be applied to any of the KS-16672,L3 connectors whenever any telephone set is unplugged from the control unit.

Note: Telephone sets 1 and 2 cannot dial each other nor can telephone sets 3 or 4 dial each other. However, telephone sets 1 and 2 can signal each other by operating the signal keys which operate a buzzer in the telephone set, and can talk on the INTERCOM line.

3.08 Ringing is accompanied by flashing lamp indications. Both lines may ring independently

or simultaneously, and ringing is initiated as soon as dialing has been completed.

3.09 Both lines can be placed on hold by any one of the four telephone sets. The line key will release, and the steady lamp signal will change to a wink signal at location which placed the line on hold. For example, when station 3 places a line on hold, the line lamp in stations 3 and 4 will wink while stations 1 and 2 line lamps remain steady.

3.10 The switch designated LOCAL/DDD located on the faceplate of the control unit is used to simulate local or long distance dialing. When the switch is in the LOCAL position, seven digits (any seven digits) must be dialed to make the telephone sets ring. When the switch is in the DDD position, ten-digit dialing (any ten digits) is required to start the ringing cycle.

4. INSTALLATION AND MAINTENANCE

4.01 In order to simplify the design of the control and logic circuits, standard telephone transmission practices were not followed, and the telephone set circuits are modified accordingly. For example, the tip side of the line, generally considered as a part of the transmission path, is used for dialing only.

4.02 The wiring of the key telephone sets used with the Business Phone Trainer are illustrated in Fig. 3 for the 565HKA and 565HKAW and Fig. 4 for the 2565HKA and 2565HKAW telephone sets. In an emergency, 565HK and 2565HK telephone sets can be modified for use in the Business Phone Trainer per Table B. Modified telephone sets should be appropriately marked.

4.03 The power fuse is the only replaceable component in the KS-21564,L5 control unit. Replacement fuses may be purchased locally as:

Fuse, MDL, 1/4 amp.

4.04 Spare lamps are provided under the HOLD button and under the unused line buttons of the telephone sets. The line lamps may be replaced with:

Western Electric Co.—LAMP, 51A
or
Sylvania (purchase locally)—10ESB

4.05 When the control unit will not operate, check for the following:

- Unit plugged into working 115V wall receptacle
- Wall receptacle under control of a switch
- Control unit power switch in ON position
- Telephone sets properly connected to KS-16672,L3 connectors
- MDL fuse blown.

The KS-21564,L5 Business Phone Trainer, control unit is not repairable in the field. If the control unit cannot be restored to service after checking the items shown in 4.05, proceed as follows:

For Bell System-owned units, return entire control unit to:

WESTERN ELECTRIC SERVICE CENTER
ATT: SERVICE DEPARTMENT
1850 W. 21 SOUTH STREET
SALT LAKE CITY, UTAH 84119

Organizations outside the Bell System owning units should contact the following for instructions:

WESTERN ELECTRIC CO.
COMMERCIAL RELATIONS—SALES
P.O. BOX 1579
NEWARK, NEW JERSEY 07102
or TELEPHONE 201-468-5816

5. CIRCUIT DESCRIPTION

5.01 The frequency generator for ringing the bells is supplied directly from the AC power source through the line fuse and the OFF and ON switch. It supplies:

- A 30-Hz ringing signal
- Ringback tone.

5.02 The lamp current is unfiltered direct current (dc) obtained from the full wave rectifier used in the B battery supply.

LINE SEIZURE

5.03 The line logic controls the application of lamp signals, audible tones, ringing, and talk battery to the telephone sets. Busy tone and dial tone are supplied by an electronic tone generator. A condensed functional schematic of the line seizure by telephone set 1 with simulated visual and audible signals is shown in Fig. 5.

5.05 When either student 1 or 2 goes off-hook on line 1, the line 1 logic:

- Lights the line 1 busy lamp on telephone sets 1 and 2
- Enables the line 1 counter circuit
- Connects the talk battery to line 1
- Enables the line 1 hold circuit for telephone sets 1 and 2
- Prevents telephone sets 3 and 4 from seizing line 1
- Provides dial tone.

If telephone set 3 or 4 attempts to initiate a call while the line is seized by either telephone set 1 or 2, they will receive a busy tone.

5.06 When either student 3 or 4 goes off-hook on line 1, the line logic performs a similar function to those described in 5.05.

5.07 When line 1 is seized at telephone set 1 or 2 and the HOLD key is operated:

- The associated line pickup key releases
- The line 1 logic changes the steady line lamp to wink.

DIALING

5.08 The dialing circuit includes a binary counter which provides an output to the line logic after seven digits are dialed when the LOCAL/DDD switch is in the LOCAL position, and after ten digits are dialed when the switch is in the DDD position. The binary counter causes dial tone to be removed after one digit is dialed and is automatically reset when either the calling or called party goes on-hook.

5.09 The binary counter circuit counts only digits, not pulses. The dials of the key telephone sets are arranged to close a path from the input of the binary counter circuit, through the talk battery circuit to ground when the dial is off-normal.

RINGING

5.10 The path to ground from the frequency generator is interrupted by a triac to provide interrupted ringing current to the telephone circuits.

5.11 The control for the interrupted ringing is looped through the four telephone sets to prevent ringing voltage from being applied to the KS-16647,L3 connectors of the control unit if any of the telephone sets are unplugged from the control unit.

5.12 When dialing on line 1 is completed at telephone set 1 or 2, the line 1 logic causes the ringing current path from the frequency generator to the ringer in telephone set 3 to complete and ring the station bell.

5.13 Ringback tone, as heard by the calling party, is developed from the interrupted ringing voltage and is superimposed on the talking current under control of the line 1 logic circuit.

INTERCOM

5.14 Telephone sets 1 and 2 are interconnected for the INTERCOM circuit. Telephone sets 1 and 2 can signal each other through nonlocking signal keys and buzzers via the A-H-S(4) and T and R leads.

5.15 The INTERCOM line lamps at telephone sets 1 and 2 are controlled by the pickup keys and the A-H-S(3) lead.

MONITORING

5.16 The audible signals and voice transmission can be monitored by the loudspeaker in the List 5 control unit and/or a tape recorder or P.A. There are four self-illuminating monitor buttons

located on the control unit (one for each telephone set) which connect the input of the loudspeaker or recorder to the talking circuit (ring) of each telephone set via the P3 or IT leads. The loudspeaker level is controlled by the volume control located in the control unit panel. It is possible to monitor all four telephone sets by depressing all four monitor buttons. The monitor circuit is illustrated on Fig. 6.

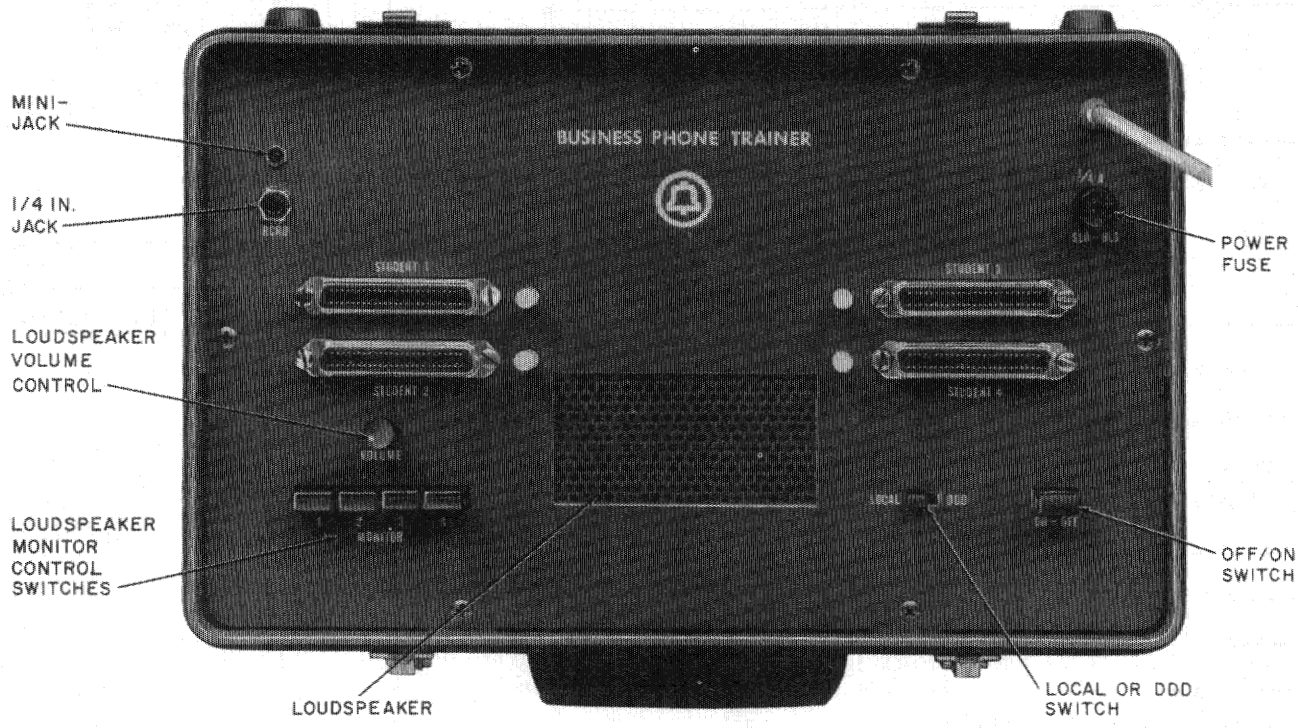


Fig. 1—KS-21564, List 5 Control Unit

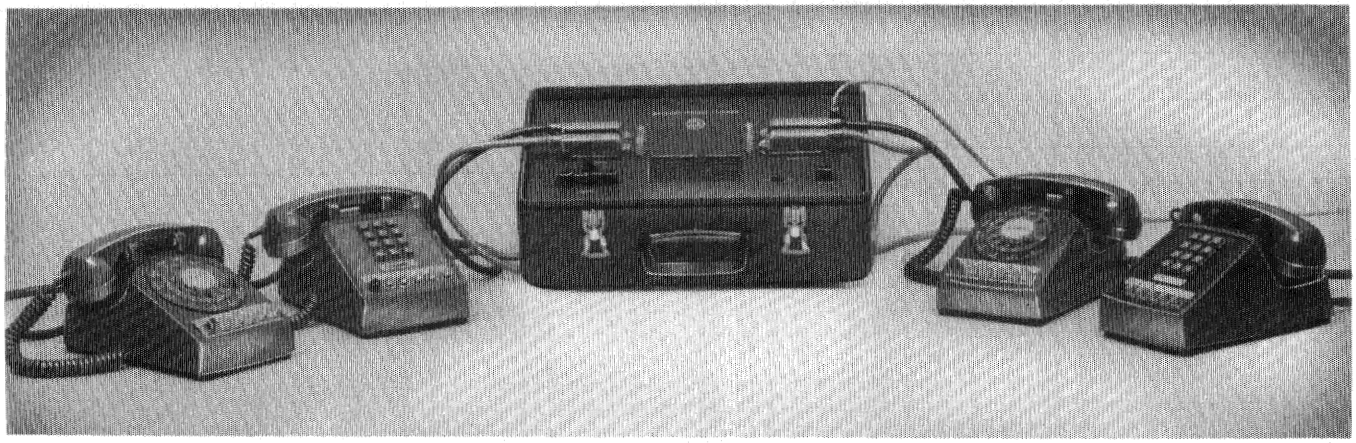
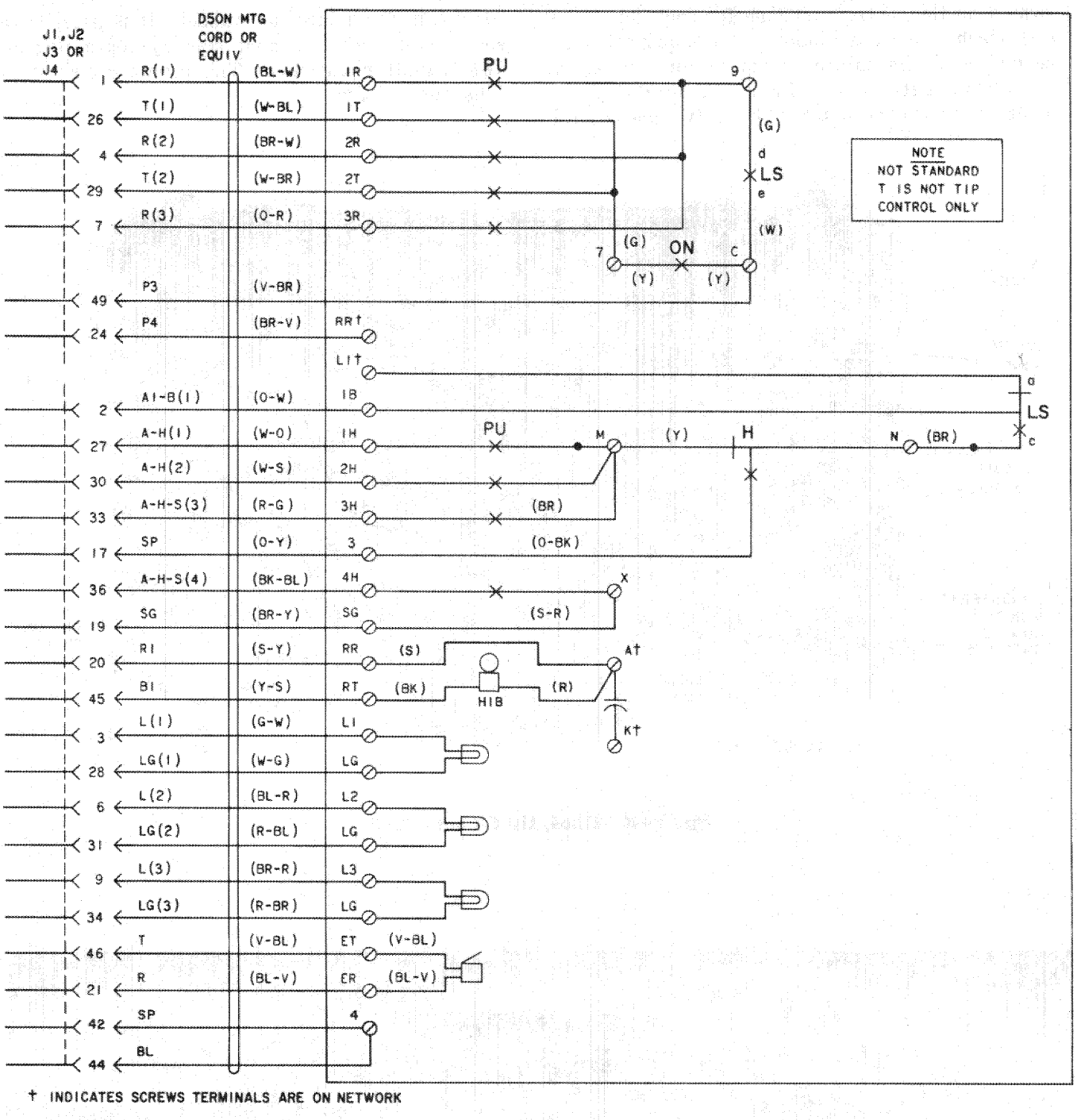


Fig. 2—KS-21564 Business Phone Trainer Assembled For Operation



† INDICATES SCREWS TERMINALS ARE ON NETWORK

Fig. 3—Wiring Diagram for 565HKA and 565HKAW Telephone Sets

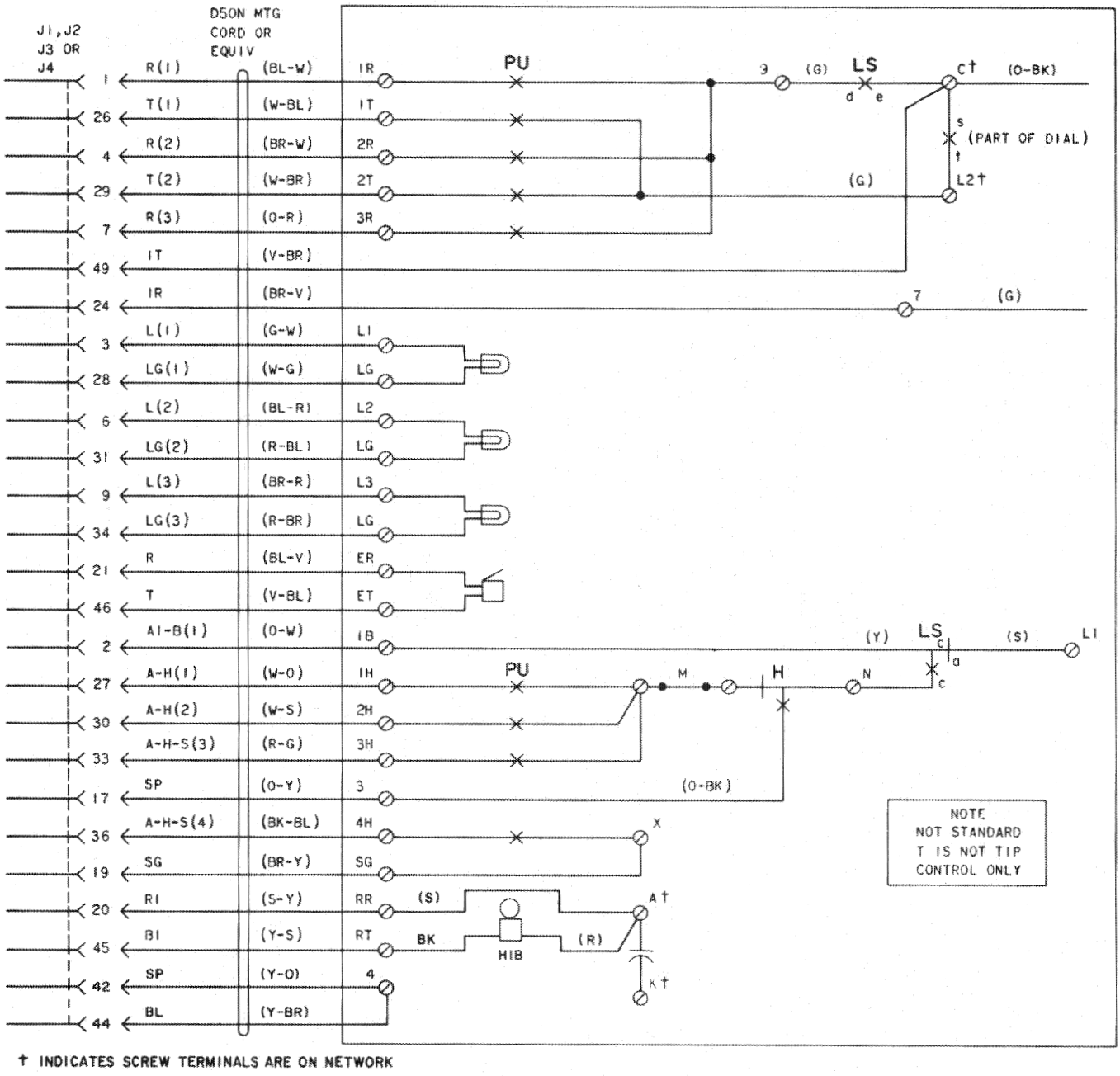
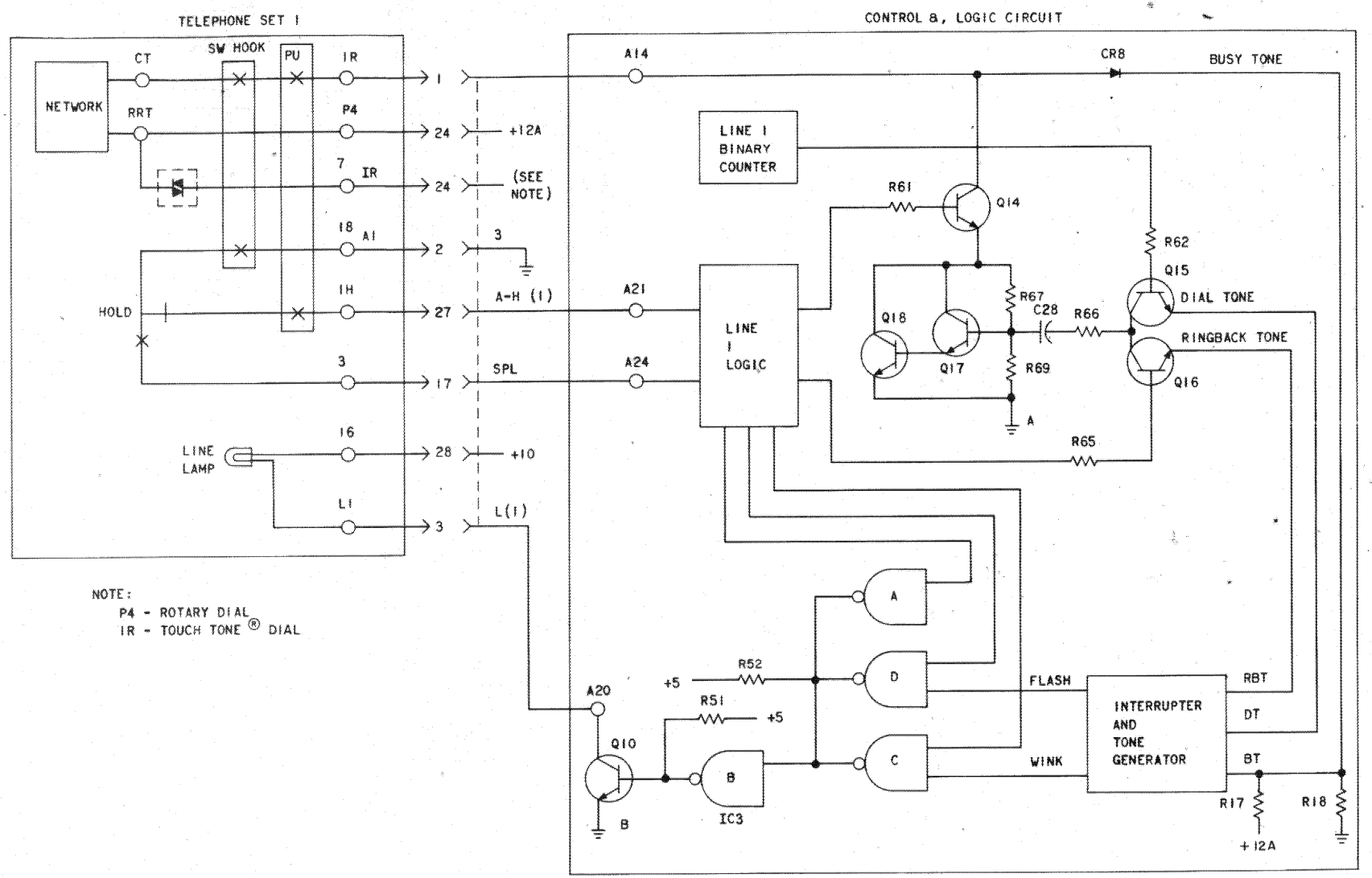


Fig. 4—Wiring Diagram for 2565HKA and 2565HKAW Telephone Sets



NOTE:
P4 - ROTARY DIAL
IR - TOUCH TONE ® DIAL

Fig. 5—Condensed Functional Schematic of Line Seizure With Simulated Visual and Audible Signals for Telephone Set 1

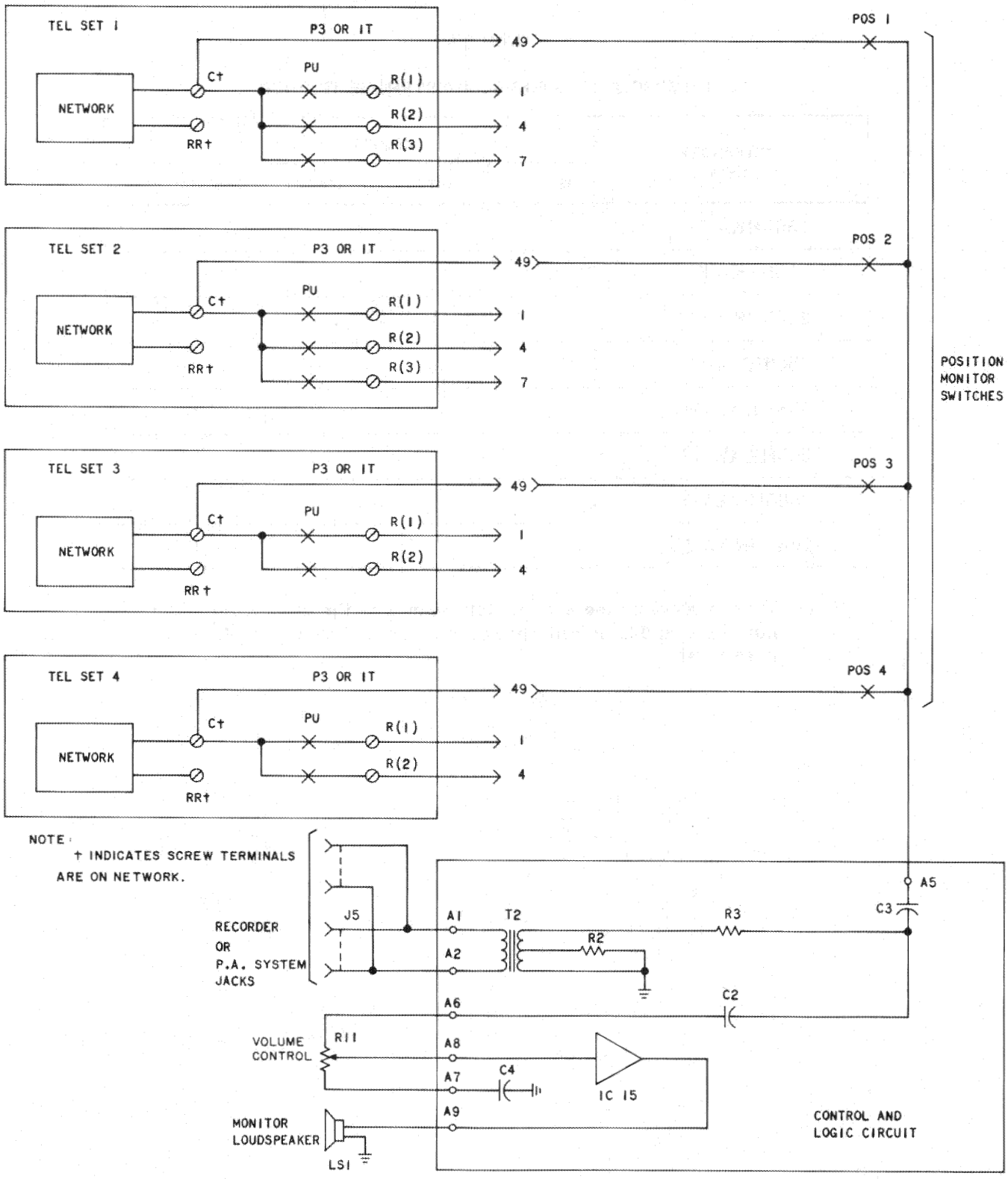


Fig. 6—Monitor Circuit-Telephone Sets 1, 2, 3 and 4

TABLE A

TELEPHONE SETS FOR BUSINESS PHONE TRAINER

TELEPHONE SETS	KS-21564			
	LIST 1	LIST 2	LIST 3	LIST 4
565HKA-51	2	1		
565HKA-53	2	1		
2565HKA-51		1		
2565HKA-53		1		
565HKAW-51			2	1
565HKAW-53			2	1
2565HKAW-51				1
2565HKAW-53				1

Note: W denotes telephone sets sold for use outside the Bell System. The numbers 1 and 2 indicate the number of each type of telephone set in each list.

TABLE B

TELEPHONE SET MODIFICATIONS

565HKA				2565HKA			
TERMINATION	COLOR	FROM	TO	TERMINATION	COLOR	FROM	TO
Pickup Key	G	F†	7	Dial	V	7	L2†
Cord	BR-V	7	RR†	Dial	G	L2†	7
Cord	V-BR	8	C†	Cord	V-BR	8	C†
Cord	Y-BR	L2†	4	Cord	Y-BR	1	4
Dial	Y	8	C†	Hold Key	O-BK	N	3
Hold Key	O-BK	N	3	Signal Key	S-R	M	SG
Signal Key	S-R	M	SG	Ringer Cap	R	K †	A†
Ringer Cap	R	K†	A†	Pickup Key 5	BR-BK	X	5H
Pickup Key 5	BR-BK	X	5H				
Buzzer Leads	GR-Y	BZ	ER	Buzzer Leads	GR-Y	BZ	ER
	Y-GR	BZ1	ET		Y-GR	BZ1	ET

Note: All convertible key positions are supplied as pickup keys. To convert from pickup (locking) to signaling (nonlocking), remove the P-12A892 screw detail from key position involved.

†Indicates screw terminals on network.