SECRETARIAL ANSWERING CABINETS

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1. GENERAL

1.01 This section provides information on the Secretarial Answering Cabinets, hereafter referred to as the Secretarial Answering Units (SAU's).

1.02 The information presented within this section is intended to familiarize personnel with the various SAU's, their various operating controls, and the circuit operations. Installation of an attendant's telephone and modification procedures for telephones from current production lines, both dial and Touch Calling, are also described.

2. DESCRIPTION

2.01 The SAU provides a centralized answering service. It is available for 6-line (Figure 1a), 10-line (Figure 1b), or 20-line (Figure 1c) service. Each line terminates at a three-position lever key on the unit. The key enables the attendant to answer, hold, or release an incoming call. The attendant is notified of the call by both audible and visible signals. The SAU gives complete line privacy. The attendant may connect to only one line at a time; however, the attendant may hold several calls simultaneously. The SAU cannot be used on lines equipped with loop extenders or battery boosters.

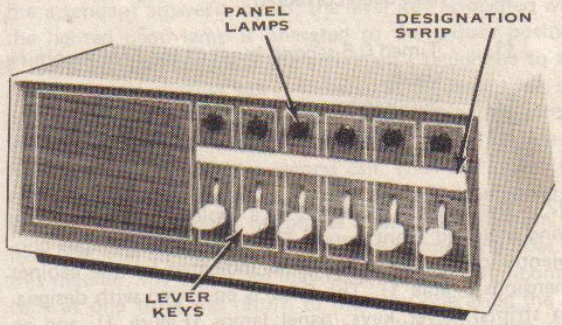


Figure 1a. Six-Line SAU.

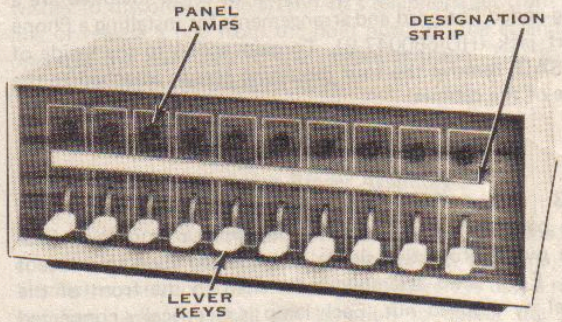


Figure 1b. Ten-Line SAU.

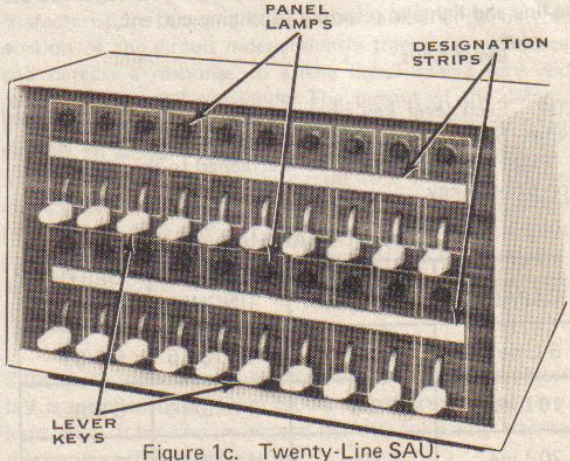


Figure 1c. Twenty-Line SAU.

Figure 1. Secretarial Answering Units.

2.02 The SAU's are furnished in three sizes:

(a) Twenty-line capacity and 10-line capacity, which is also used for the 6-line unit.
(b) The inductive holding bridge circuit utilizes a printed wiring card concept and inductor assembly.
(c) Arrangements for installing a Phone Mart jack have been incorporated into the design.
(d) Additional terminals have been incorporated within the cabinets to terminate the telephone associated with the cabinet.
(e) The decorative faceplate can be replaced with a color that will match the decor of the surroundings.
(f) The following electrical problems with previous SAU's have been corrected:

(1) Timed 0.5-second burst of tone for incoming signal.
(2) Suppression of dial pulses.
(3) Increased sensitivity to low-level ringing signals.

2.02 The SAU is enclosed in a molded plastic housing having a sloped front panel. The unit may be placed conveniently on a standard desk as indicated by the cabinet dimensions (Table 1). The SAU is equipped with designation strip(s), lever keys, panel lamps (Figure 1), and an electronic ringer assembly (Figure 2). Also included are a plug-ended line cord and arrangements for installing a Phone Mart jack (HD-660047-B). To gain access to the inside of an SAU, remove the four mounting screws attached to the base of the cabinet.

Panel Lamps

2.03 A neon panel lamp is located above each lever key. The panel lamps are encapsulated with a limiting resistor in a nylon protective sleeve and covered by a translucent lens. Each lamp assembly is fastened to the front of the panel by a speed nut. Each lamp is electrically connected in series with its associated resistor and is bridged across the line and lights in response to ringing current.

Lever Keys

2.04 Each lever key operates as a locking, cam-operated switch having three positions: answer, hold, and release. A finger-fitting, no-slip knob is attached to the metal extension of each key.

Table 1. SAU Measurements.

CAPACITY	HEIGHT (INCHES)	WIDTH (INCHES)	DEPTH (INCHES)
6-Line	4-5/8	11-13/16	6-5/8
10-Line	4-5/8	11-13/16	6-5/8
20-Line	7-1/4	11-13/16	6-5/8

Designation Strip

2.05 A 3/8-inch, white paper designation strip, covered by clear plastic, permits identification of each line. The 20-line cabinet is equipped with two of these strips. The designation strip is mounted to the mounting plate with two or three machine screws (Figure 3). To remove the strip, slip out the strip and clear plastic cover. The designation may be stamped, printed, or hand lettered.

Electronic Common Ringer Assembly

2.06 The ringer consists of a card that is used with a modified telephone receiver. For maximum efficiency and audibility, the receiver is firmly mounted inside the cabinet about 1/4 inch away from the back wall of the cabinet. Sound passes through holes in the flange of the base. A light cell assembly (Figure 4) activates the electronic common ringer assembly when a line is being called.

Volume and Tone Controls

2.07 Volume and tone controls are provided on all SAU's. One control of each is located on the bottom of each cabinet (Figure 5). The volume control is used to increase or decrease the volume of the output signal to any desired level within the range of it's control. The tone control is a three-position switch that is used to change the frequency of the output signal. This is most desirable when more than one SAU is used in the same office. The differences in output frequencies can be used to indicate which SAU has a call requiring answering.

Plug-Ended Line Cord

2.08 All three versions of the SAU are equipped with a silver satin line cord terminated to a 50-pin plug. The plug-ended line cord facilitates installation and replacement of the SAU. Table 2 shows terminal designations for the SAU and various connecting devices.

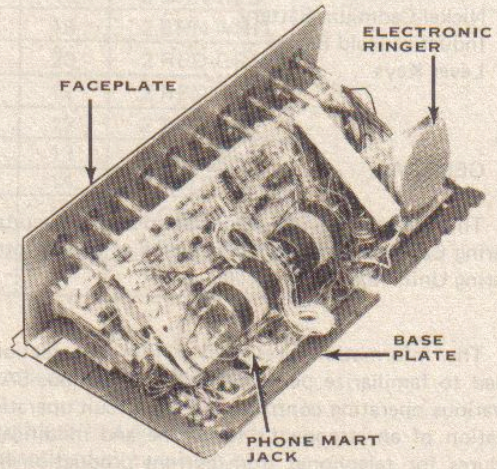


Figure 2. Side View of 6-Line and 10-Line SAU.

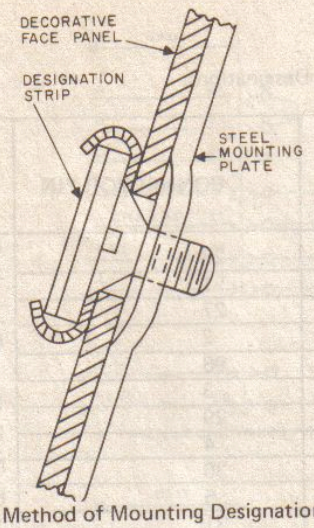


Figure 3. Method of Mounting Designation Strip.

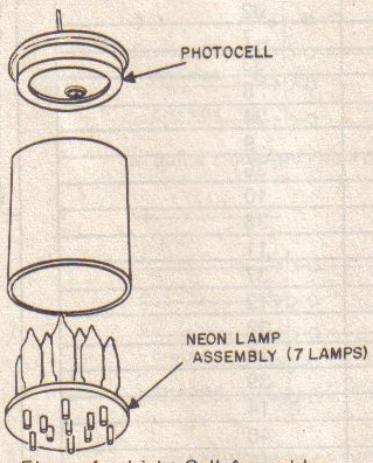


Figure 4. Light Cell Assembly.

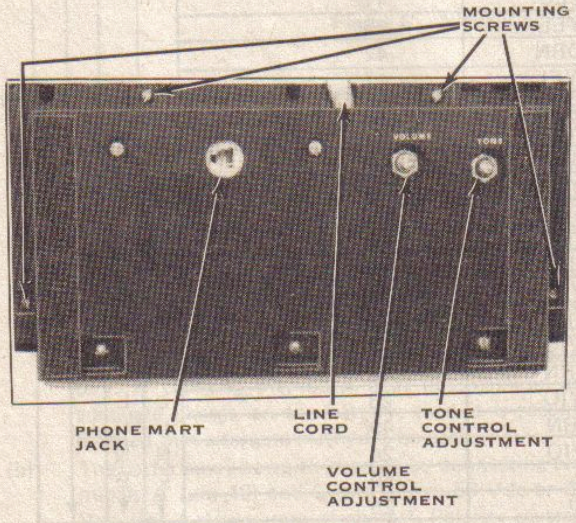


Figure 5. Bottom of SAU.

2.09 The 50- pin plug-ended line cord mates with a 66E3-type connecting block, a plug-connector-panel Type P-C-PAN (Type 149A) bridging adapter. The connecting block and bridging adapters are provided by the telephone companies. The bridging adapters enable the SAU to be used with running cable and still provide screw terminals for various wiring options.

3. OPERATION

Keys and Panel Lamps Cabinet

3.01 A call may be answered by either the individual called party or by the answering cabinet attendant. Should the attendant answer the call, the lever key associated with the lighted neon lamp is operated to the answer position (Figure 2). This connects the attendant's telephone to the calling line. If another call is received at the same time, the lamp associated with that line lights and the electronic common ringer sounds. The attendant may put the first line on hold and then answer the second call. With the key in the hold position, an inductive holding bridge is placed across the line, the attendant's telephone is disconnected from the first line, and the circuit is open to the remaining lines. In this manner, the attendant may hold a number of incoming calls at one time and return to them by operating the appropriate key to the answer position. When the attendant wishes to disconnect the attendant's telephone set from the line or release a line from the hold position, the attendant operates the lever key to the release position. This is the normal position for the lever keys.

Electronic Common Ringer Assembly

3.02 When ringing signals are received from any line and coupled through the suppression network of that line, the electronic common ringer assembly (Figure 11) uses a neon isolation lamp/photocell combination to detect the presence of the ring signal. Because of the various operating characteristics of the photocell, the remainder of the detector portion of the circuit independently tracks each photocell and detects a response to a ring signal over a very wide range of photocell resistance. The output of the detector triggers a timing circuit. Activation of the timing circuit permits an Audio Frequency (AF) oscillator to operate for the duration of the timing circuit (0.5 second). The frequency determining structure of the AF oscillator is altered by use of the tone control switch, thereby providing a choice of AF frequencies. The output signal of the AF oscillator is applied to a power amplifier stage whose output is connected to a receiver.

3.03 The power for the electronic common ringer assembly is supplied by a nickel-cadmium battery. The battery is kept in a fully charged state by the following alternate methods, as shown in Figure 6:

Table 2. SAU Terminal Designations.

6-AND 10-LINE COLOR CODE	DESCRIPTION	20-LINE COLOR CODE	CONNECTOR PIN	CABINET USED
GRN	+L1	WHT-BLU	26	6 LINE, 10 LINE, 20 LINE
RED	−L1	BLU-WHT	1	
BLK	+L2	WHT-ORN	27	
YEL	−L2	ORN-WHT	2	
WHT	+L3	WHT-GRN	28	
BLU	−L3	GRN-WHT	3	
BRN-GRN	+L4	WHT-BRN	29	
BRN-RED	−L4	BRN-WHT	4	
BRN-BLK	+L5	WHT-SL	30	
BRN-YEL	−L5	SL-WHT	5	
BRN-WHT	+L6	RED-BLU	31	
BRN-BLU	−L6	BLU-RED	6	
RED-YEL	+L7	RED-ORN	32	10 LINE, 20 LINE
RED-GRN	−L7	ORN-RED	7	
RED-BLU	+L8	RED-GRN	33	
RED-BLK	−L8	GRN-RED	8	
GRN-YEL	+L9	RED-BRN	34	
RED-WHT	−L9	BRN-RED	9	
GRN-BLU	+L10	RED-SL	35	
GRN-BLK	−L10	SL-RED	10	
	+L11	BLK-BLU	36	20 LINE
	−L11	BLU-BLK	11	
	+L12	BLK-ORN	37	
	−L12	ORN-BLK	12	
	+L13	BLK-GRN	38	
	−L13	GRN-BLK	13	
	+L14	BLK-BRN	39	
	−L14	BRN-BLK	14	
	+L15	BLK-SL	40	
	−L15	SL-BLK	15	
	+L16	YEL-BLU	41	
	−L16	BLU-YEL	16	
	+L17	YEL-ORN	42	
	−L17	ORN-YEL	17	
	+L18	YEL-GRN	43	
	−L18	GRN-YEL	18	
	+19	YEL-BRN	44	
	−L19	BRN-YEL	19	
	+L20	YEL-SL	45	
	−L20	SL-YEL	20	
YEL-BLK	+ CHARGE	VIO-BLU	46	6 LINE, 10 LINE, 20 LINE
GRN-WHT	− CHARGE	BLU-VIO	21	
YEL-WHT	C	VIO-ORN	47	
YEL-BLU	GRD	ORN-VIO	22	
BLK-WHT	RING 5	VIO-GRN	48	
BLK-BLU	RING G	GRN-VIO	23	
SL	A	VIO-BRN	49	
BLU-WHT	B	BRN-VIO	24	
SL-BLK	+SECY ANS	VIO-SL	50	
SL-YEL	−SECY ANS	SL-VIO	25	

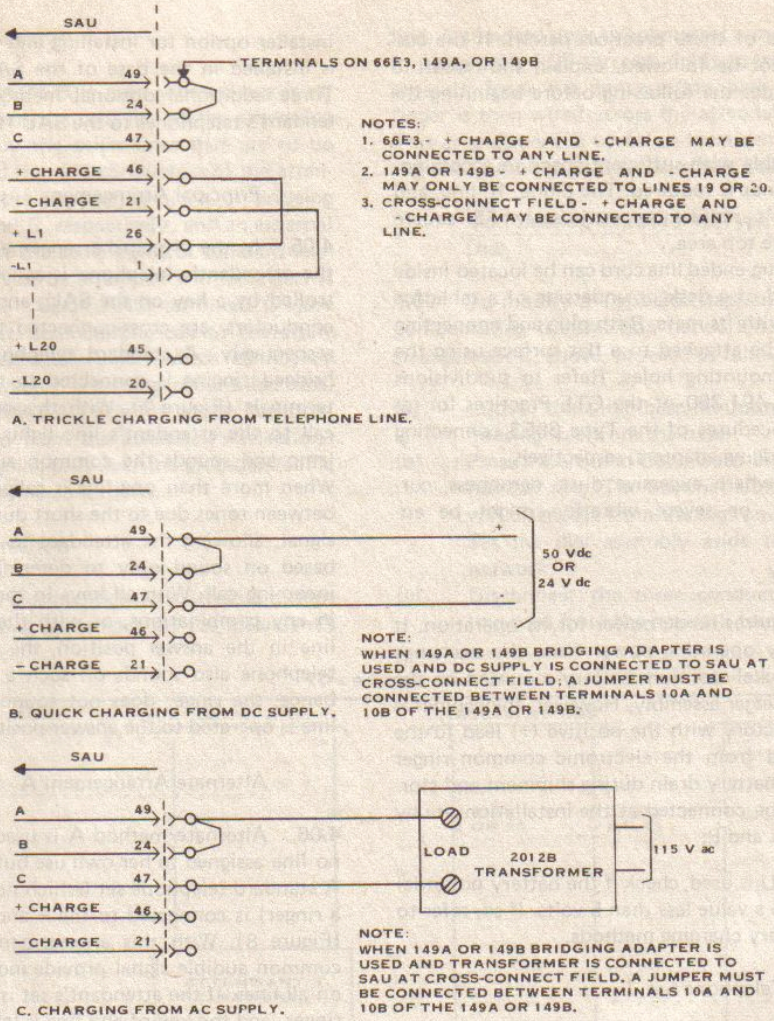


Figure 6. Nickel-Cadmium Battery Charging Methods.

(a) The battery may be trickle-charged from a telephone line (preferably a line that receives the most calls) terminated at the SAU. An incoming ringing signal on the appointed line momentarily provides a greater charging current. Use of the Type 66E3 connecting block or the cross-connect field permits the charging circuit to be connected to any line appearing at the SAU. Connect a jumper from connector pin 46 (+ CHARGE) to pin +L of the most busy line, and connect another jumper from pin 21 (-CHARGE) to pin -L of the same line to trickle-charge the battery. If charging method A does not maintain an adequate charge on the battery, then it is recommended that alternate method C be used.

(b) The battery may be quick-charged by connecting terminals A (pin 49) and C (pin 47) to 50 Vdc or 24 Vdc (for a slower rate of charge). Polarity reversal protection is provided.

(c) The battery may be charged from 110 Vac by using a Type 2012B isolation transformer and connecting its LOAD terminals to terminals A (pin 49) and C (pin 47) and leaving terminals +CHARGE (pin 46) and –CHARGE (pin 21) unconnected.

(d) Two terminals are located in the base of the cabinet to permit charging the internal battery from an external source.

3.04 The nickel-cadmium battery is placed into the circuit by connecting a jumper from terminal A (pin 49) to terminal B (pin 24) of line cord connector.

4. INSTALLATION

Location

4.01 In locating the SAU, the installer shall be guided by the customer's wishes insofar as installation requirements

and other provisions of these practices permit. If the customer's wishes cannot be followed, explain the reason to the customer. Consider the following before beginning the installation:

(a) A desk or table with sufficient space to accommodate the cabinet is required. The 6-line, 10-line, and 20-line SAU's require approximately 78 square inches of table top area.

(b) The 6-foot plug-ended line cord can be located inside the knee well of a desk or underside of a table for attachment with its mate. Both plug and connecting units should be attached to a flat surface using the appropriate mounting holes. Refer to subdivisions 491-501 and 491-360 of the GTE Practices for installation procedures of the Type 66E3 connecting block and bridging adapters, respectively.

(c) Avoid areas where excessive dust, dampness, corrosive fumes, or severe vibration might be encountered.

Power Supply

4.02 The SAU requires no ac power for its operation. It obtains its necessary operating power from the exchange lines and a 6-volt nickel-cadmium battery mounted on the electronic common ringer assembly. However, the cabinet is shipped from the factory with the positive (+) lead to the battery disconnected from the electronic common ringer assembly to prevent battery drain during shipment and storage. This lead must be connected at the installation site by strapping terminals A and B.

4.03 Before an SAU is used, check if the battery potential may have dropped to a value less than 5 volts. If so, refer to Figure 6 for the battery charging methods.

Attendant's Telephone Set

4.04 In addition to a principal method that makes full use of the connections and wiring provided in the SAU, an installer option for installing and wiring a Phone Mart jack is installed in the base of the SAU as shown in Figure 5. Three additional optional methods of connecting an attendant's telephones to the SAU follow.

Principal Arrangement

4.05 In the principal arrangement method of connection, the attendant's telephone is assigned one of the lines controlled by a key on the SAU, and the tip (+) and ring (–) conductors are cross-connected to the G and 5 terminals, respectively. A standard telephone instrument wired for bridged ringing is connected to the + and – SECY.ANS. terminals (Figure 7). With this arrangement, an incoming call to the attendant's line lights the associated line panel lamp and sounds the common audible signal at all times. When more than one line is called, there is a silent period between tones due to the short duration (0.5 second) of the signal, allowing the attendant to count the incoming rings based on sound only to determine when to answer the incoming call. With all keys in the hold or release positions in any combinations, or with the key for the attendant's line in the answer position, the ringer in the attendant's telephone also sounds on such a call. To minimize disturbance, the ringer does not sound if the key of any other line is operated to the answer position.

Alternate Arrangement A

4.06 Alternate method A is used when the attendant has no line assigned to her own use but answers calls for others. A standard telephone set (which need not be equipped with a ringer) is connected to the + and) SECY.ANS. terminals (Figure 8). With this arrangement, the panel lamps and common audible signal provide indication of incoming calls on all lines. If the attendant's set is equipped with a bridged ringer, and the key of any line is left in the answer position, the ringer sounds on incoming calls to that line, if no higher-numbered answer key is operated.

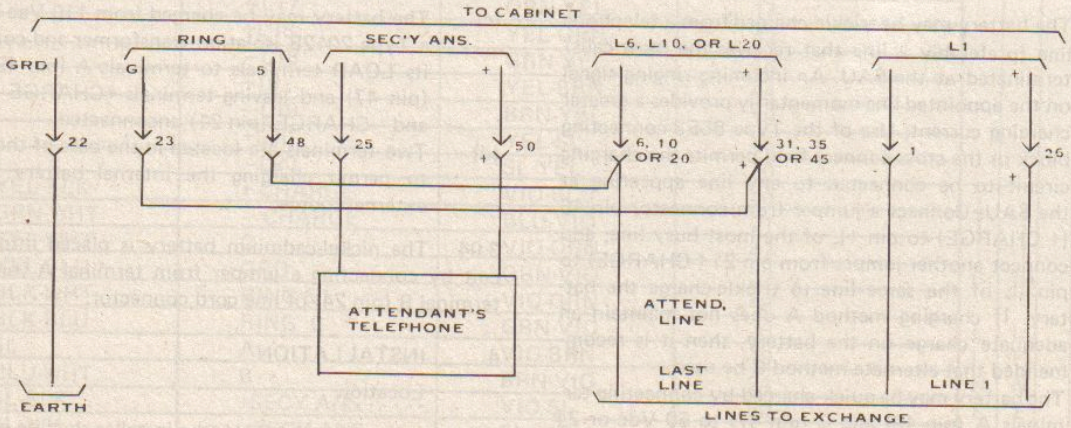


Figure 7. Connections for Attendant's Telephone Set, Principal Arrangement.

Alternate Arrangement B

4.07 Alternate arrangement B is used when a line is assigned to the attendant, but the capacity of the answering cabinet is fully utilized by the other lines that are to be answered. The tip (+) and ring (–) conductors of the attendant's line are wired at the connecting block or bridging adapter to terminals G and 5, respectively, and an external ringer box is connected at the same point. A standard telephone set (which should not be equipped with a ringer) is connected to the + and – SECY.ANS. terminals (Figure 9). With this arrangement, an incoming call to the attendant's line sounds the external ringer, which cannot be silenced even if the attendant is talking on another line. Provided that no key on the SAU is in the answer position, the call may be answered from the attendant's telephone but cannot be held. Outgoing calls over the attendant's line may be placed under the same conditions.

Alternate Arrangement C

4.08 Alternate method C is identical to method B except for the means of furnishing the ringer on the attendant's line. A standard desk telephone set is modified (as explained in paragraphs 4.09 through 4.14) to provide a ringer bridge separate from the conversation path. The self-contained ringer is then wired across the attendant's line (Figure 10). This arrangement is useful at locations where it is not convenient to mount an external ringer box.

Modification Procedure, Type 80 Telephone with Dial

4.09 To modify a Type 80 telephone equipped with self-compensating transmission network for use with alternate arrangement C, above, proceed as follows:

(a) Loosen the three base mounting screws and lift the housing free from the base.
(b) Press inward and downward on the edge of the dial number ring. The bayonet slots on the dial bracket will disengage from the lugs on the mounting tripod. Set the dial assembly aside to gain access to the network.
(c) Disconnect the three conductors of the standard line cord from the network terminals.

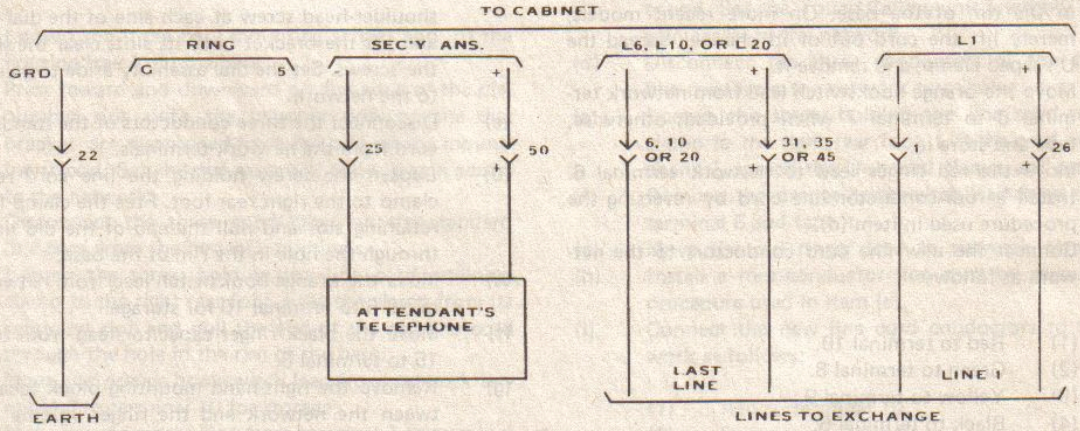


Figure 8. Connections for Attendant's Telephone Set, Alternate Arrangement A.

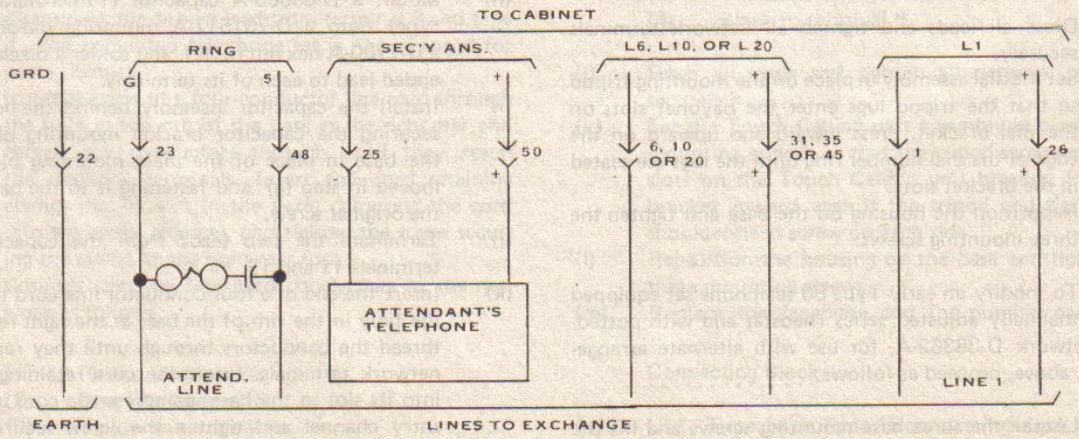


Figure 9. Connections for Attendant's Telephone Set, Alternate Arrangement B.

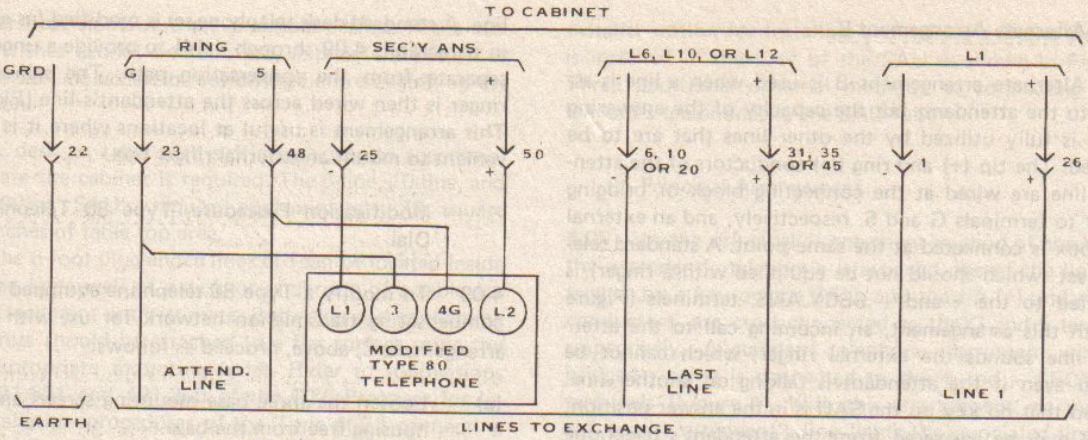


Figure 10. Connections for Attendant's Telephone Set, Alternate Arrangement C.

(d) Loosen the screw holding the line cord retaining clamp to the right rear foot. On sets of earlier manufacture, free the clamp from its retaining slot and pull the end of the odd line cord through the hole in the rim of the base. On more recent models, merely lift the cord out of its channel, spread the U-shaped clamp, and remove it.

(e) Move the orange hookswitch lead from network terminal 6 to terminal 7 when provided; otherwise, tape and store it.

(f) Move the red ringer lead to network terminal 6.

(g) Install a four-conductor line cord by reversing the procedure used in item (d).

(h) Connect the new line cord conductors to the network as follows:

(1) Red to terminal 10.
(2) Green to terminal 8.
(3) Yellow to terminal 9.
(4) Black to terminal 6.

(i) Dress all leads and tighten all network terminals securely.

(j) Set the dial assembly in place on the mounting tripod so that the tripod lugs enter the bayonet slots on the dial bracket. Press inward and upward on the edge of the dial number ring until the lugs are seated in the bracket slots.

(k) Reposition the housing on the base and tighten the three mounting screws.

4.10 To modify an early Type 80 telephone set equipped with a manually adjusted series rheostat and with potted-shell network D-38362-A, for use with alternate arrangement C, above, proceed as follows:

(a) Loosen the three base mounting screws and lift the housing free from the base.

(b) Press inward and downward on the edge of the dial number ring until the bayonet slots on the dial bracket are disengaged from the pins of the mounting tripod. On sets of earlier manufacture, loosen the shoulder-head screw at each side of the dial bracket and lift the bracket until its slots clear the shank of the screws. Set the dial assembly aside to gain access to the network.

(c) Disconnect the three conductors of the standard line cord from the network terminals.

(d) Loosen the screw holding the line cord retaining clamp to the right rear foot. Free the clamp from its retaining slot and pull the end of the old line cord through the hole in the rim of the base.

(e) Move the orange hookswitch lead from network terminal 6 to terminal 10 for storage.

(f) Move the black ringer capacitor lead from terminal 15 to terminal 6.

(g) Remove the right-hand mounting block located between the network and the ringer volume control slot and held in place by a screw beneath the base.

(h) Mount a D-68563-A capacitor (1-microfarad, can-type) onto a D-731517-A mounting block, using a D-7700-A hex nut (6-32), and solder a black spade-ended lead to each of its terminals.

(i) Install the capacitor assembly behind the network, securing the capacitor bracket mounting block to the base in place of the plain mounting block removed in step (g) and fastening it to the base with the original screw.

(j) Terminate the two leads from the capacitor on terminals 11 and 13.

(k) Insert the end of a four-conductor line cord through the hole in the rim of the base at the right rear, and thread the conductors through until they reach the network terminals. Insert the cord retaining clamp into its slot in the base, compress the cord into the entry channel and tighten the screw securing the clamp to the right rear foot.

(l) Connect the new line cord conductors to the network as follows:

(1) Red to terminal 10.
(2) Green to terminal 8.
(3) Yellow to terminal 9.
(4) Black to terminal 16.

(m) Dress all leads and tighten all network terminals securely.

(n) Set the dial assembly in place on the mounting tripod so that the tripod pins enter the bayonet slots on the dial bracket. Press inward and upward on the edge of the dial number ring until the pins are seated in the bracket slots. On sets of earlier manufacture, press the bracket inward against the tripod and tighten the shoulder-head screw on each side.

(o) Reposition the housing on the base and tighten the three mounting screws.

4.11 To modify an early Type 80 telephone set equipped with a manually adjusted series rheostat and with potted-shell network D-38368-A, for use with alternate arrangement C, above, proceed as follows:

(a) Loosen the three base mounting screws and lift the housing free from the base.

(b) Press inward and downward on the edge of the dial number ring until the bayonet slots on the dial bracket are disengaged from the pins on the mounting tripod. Set the dial assembly aside to gain access to the network.

(c) Disconnect the three conductors on the standard line cord from the network terminals.

(d) Loosen the screw holding the line cord retaining clamp to the right rear foot. Free the clamp from its retaining slot and pull the end of the old line cord through the hole in the rim of the base.

(e) Move the orange hookswitch lead from network terminal 6 to terminal 10 for storage.

(f) Move the red ringer lead from terminal 7 to terminal 9. If the set is equipped with a SATT identity dial, disconnect the brown lead from terminal 9 and tape it. The converted telephone set is not arranged for party identity.

(g) Insert the end of a four-conductor line cord through the hole in the rim of the base at the right rear, and thread the conductors through until they reach the network terminals. Insert the cord retaining clamp into its slot in the base, compress the cord into the entry channel, and tighten the screw securing the clamp to the right rear foot.

(h) Connect the new line cord conductors to the network as follows:

(1) Red to terminal 10.
(2) Green to terminal 8.
(3) Yellow to terminal 9.
(4) Black to terminal 16.

(i) Dress all leads and tighten all network terminals securely.

(j) Set the dial assembly in place on the dial mounting tripod, so that the tripod pins enter the bayonet slots on the dial bracket. Press inward and upward on the edge of the dial number ring until the pins are seated in the bracket slots.

(k) Reposition the housing on the base and tighten the three mounting screws.

Modification Procedure, Type 80 Telephone with Touch Calling Unit

4.12 When an attendant's telephone for use with alternate arrangement C, above, is required at a station arranged for Touch Calling service, modify a Type 80 telephone set as follows:

(a) Remove the number card slide and the faceplate.

(b) Loosen the three base mounting screws and lift the housing free from the base.

(c) Loosen the shoulder-head screw at each side of the Touch Calling unit bracket, and lift the bracket until its slots clear the shank of the screws in the mounting tripod. Set the Touch Calling unit assembly aside to gain access to the network.

(d) Disconnect the three conductors of the standard line cord from the network terminals.

(e) Loosen the screw holding the line cord retaining clamp to the right rear foot. Lift the cord out of its channel, spread the U-shaped clamp, and remove it.

(f) Remove the orange hookswitch lead from network terminal 6 and tape it.

(g) Move the red ringer lead to network terminal 6.

(h) Install a four-conductor line cord by reversing the procedure used in item (e).

(i) Connect the new line cord conductors to the network as follows:

(1) Red to terminal 10.
(2) Green to terminal 8.
(3) Yellow to terminal 9.
(4) Black to terminal 6.

(j) Dress all leads and tighten all network terminals securely.

(k) Set the Touch Calling unit assembly in place on the mounting tripod, so that the tripod screws enter the slots on the Touch Calling unit bracket. Press the bracket inward against the tripod and tighten the shoulder-head screw on each side.

(l) Reposition the housing on the base and tighten the three mounting screws.

(m) Replace the faceplate and the number card slide.

Connecting Block

4.13 Use a Type 14 or Type 15 connecting block to terminate the line cord of a Type 80 telephone set modified for

use with alternate arrangement C. If modification of a Type 13 block already in place at the attendant's location is required, see the 491-500 subdivision of GTE Practices covering block installation.

5. INSTALLATION TESTS

5.01 Check the performance of the secretarial answering unit and make final adjustments to the tone and volume controls after installation and electrical connections are completed. Perform the checks and adjustments described in the following paragraphs.

Incoming Calls

5.02 Evaluate the overall operation by checking the panel lamps, common ringer assembly, and lever keys as follows:

(a) Lift the handset at a station on one of the lines assigned to the answering cabinet and dial the number of another line so assigned.
(b) The panel lamp for the called line should light and the common ringer assembly should sound.
(c) Repeat steps (a) and (b) for each line having an appearance on the cabinet.

Outgoing Calls

5.03 Lift the handset at a station on one of the lines assigned to the SAU, and dial a series of 9's. This checks the suppression circuit of the common ringer assembly. If the circuit is properly absorbing the line surges from dial pulsing, the ringer assembly should not sound during dialing.

5.04 If the ringer assembly sounds during dialing of any line, refer to paragraph 6.06 for maintenance procedures.

Adjustments – Volume and Tone Controls

5.05 Lift the handset at a station on one of the lines assigned to the answering cabinet and dial the number of another line so assigned. During the ringing period, make adjustments to volume and tone controls, if necessary.

5.06 The volume control is located at the bottom rear of the cabinet (Figure 5). Adjust this control to the maximum desirable volume as determined by the customer. To increase the volume, turn the adjustment screw in a counterclockwise direction.

5.07 The tone control is located at the bottom rear of the cabinet (Figure 5). When more than one SAU is installed in the same office, adjust the tone controls to different frequency outputs on each cabinet. The different frequency outputs indicate which cabinet has a call to be answered.

5.08 When only one SAU is installed in an office, the frequency setting is not an important factor. Set the tone output to the frequency desired by the customer.

6. MAINTENANCE

6.01 The following paragraphs describe the maintenance procedures the telephone company personnel use to troubleshoot and repair an SAU at their repair facility. Maintenance of the SAU on the customer's premises is restricted, since the components are enclosed and inconvenience to the customer should be minimal. The simple method of unplugging and replacing the SAU with a new working unit provides the telephone company with a quick and efficient means of removing the problem from the customer's property. No preventive maintenance checks or services are required for the SAU.

6.02 No special tools other than a test lamp, soldering iron, screwdriver, wiring pliers, and spring-adjusting pliers are required to service the SAU. A Vacuum Tube Voltmeter (VTVM) and oscilloscope (if available) are also recommended for troubleshooting.

Panel Lamps

6.03 To determine if a neon panel lamp is faulty, a test lamp or VTVM is used to check for ringing voltage (75 through 150 volts) of the signaled line at the terminals of the connecting block or bridging adapter. If the ringing voltage is present at this point, check further through the line cord to the respective lever key.

6.04 To gain access to the lever key terminals, the housing is removed by removing the four mounting screws (Figure 5) that secure the housing to the base.

6.05 The circuit can now be checked up to the lever key, and if it is determined that the panel lamp is faulty, it must be removed. Unsolder the two lamp wires at the lever key, cut the cable tie, and push the lamp from the rear until it is free of the speed nut. Insert a new panel lamp, secure it with a speed nut, solder the wires, and tie the wires to the lamp. Initiate another call to the line and check the lamp.

Suppression Network

6.06 If an outgoing call is initiated, and as the digits are dialed, a tone is heard at the SAU, the suppression network is faulty and must be replaced.

6.07 Begin the replacement as described in paragraph 6.04 and proceed by unsoldering the red, green, and slate wires at the lever key. Cut the wires of the new suppression network to the approximate length of those of the old unit, then wire, solder, and dress the hybrid network. When soldering the hybrid networks, hold the respective leads with pliers for heat dissipation.

Electronic Common Ringer Assembly

6.08 Incoming ringing signals on a line cause the associated neon isolation lamp of the light cell assembly to light and illuminate the photocell. The photocell resistance drops,

causing the voltage at the base of transistor Q1 to rise. This rise in voltage (at least 0.6-volt change is needed to trigger the detector and timing circuit) can be measured by a VTVM or oscilloscope at terminals 9 and 11 (terminals 9 and 10 or 12 when more than one light cell assembly is used) of the card, If no rise in voltage is evident during the ringing period, battery voltage is normal, and connections to the card are secure, then the light cell assembly must be replaced.

6.09 To gain access to the light cell assembly, refer to paragraph 6.04. It is not necessary to describe the manner in which the light cell should be removed because it is evident just from looking at it. The light cell is wired per Table 3.

6.10 When no tone is heard as the line is signaled and the photocell is functioning normally, it is recommended that the receiver and volume control rheostat be checked. To verify that the receiver is functioning, place another similar receiver (known to be good) at terminals 6 and 7, and initiate a call to ring the line. If this does not correct the problem, proceed to check the volume control rheostat. With the VTVM, check the resistance of the unit (remove the back plate). The range of the rheostat is from 0 ohms to 1,000 ohms.

6.11 If the tone control switch is not functioning, the tone emitted from the receiver is of a low frequency. With the VTVM, check the resistance at terminals 5 and 8 (should indicate 1.5 megohms).

6.12 No maintenance procedures are suggested for the detector, OR gate, timer, oscillator, and power amplifier portions of the electronic common ringer assembly. If it is certain that any portion of the assembly is faulty, send the card to the repair facility. For access to the unit, refer to paragraph 6.04 and remove the unit from the mounting (secured by four screws).

Nickel-Cadmium Battery

6.13 The battery voltage can be measured after the base plate and back plate are removed. The normal voltage is 6 Vdc, which rises to 7 volts after prolonged trickle charging from the line. When it is found that the battery cannot hold the charge; the battery should be replaced. Refer to paragraph 6.04 for accessing the battery. Remove spade terminals from the battery and replace the battery.

Inductive Hold Bridge

6.14 When a call is being answered on one line and another call is received at the same time, place the first call on hold and answer the second call. If the first call is lost as it is placed on hold, the inductive hold bridge must be checked. With the lever key in the hold position, check the resistance (approximately 500 ohms) at the (+) and (—) line terminals of the connecting block or bridging adapters. If it is evident that the inductive hold bridge is open, shop repair of the inductive hold bridge assembly is recommended.

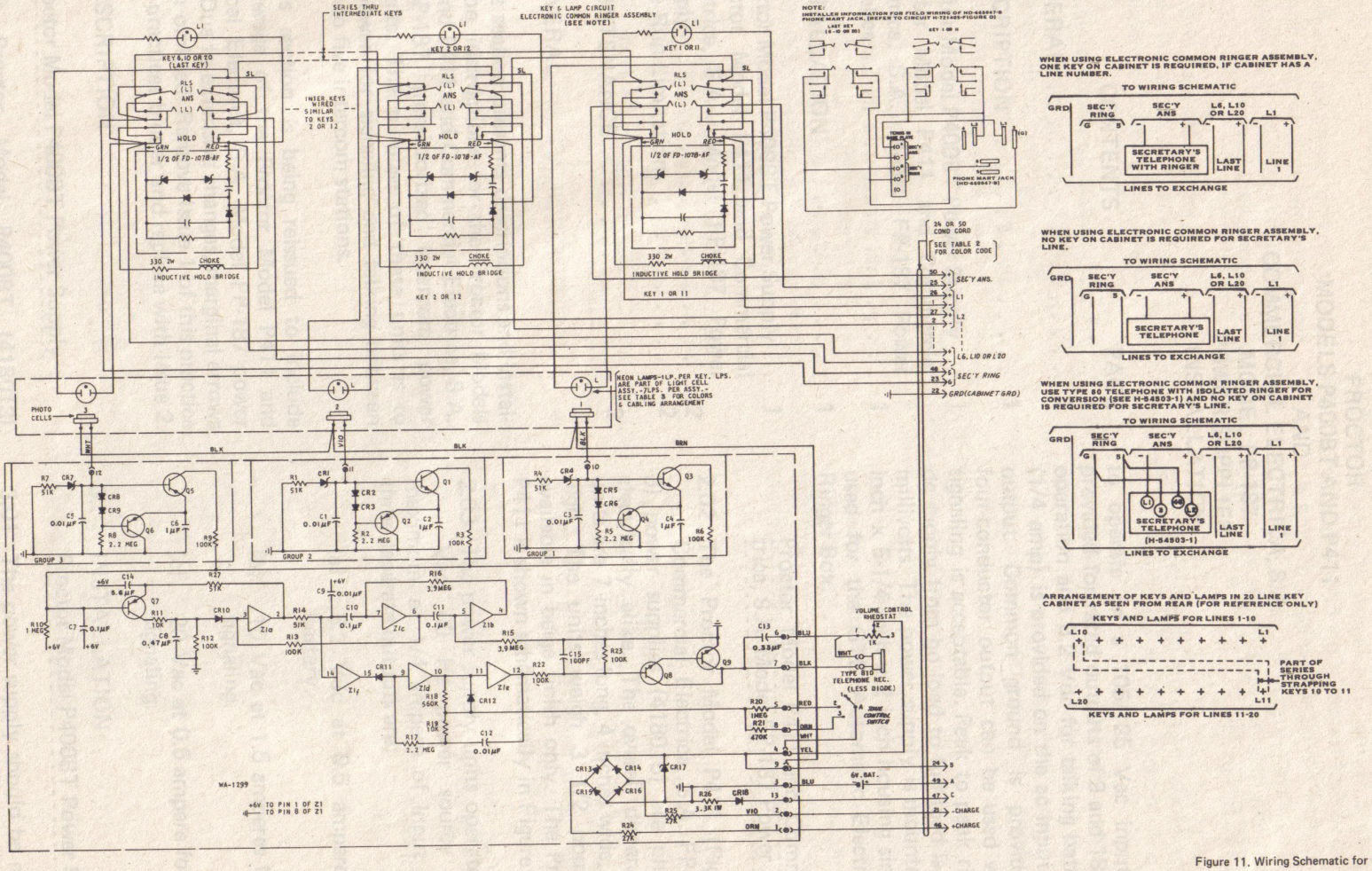
Lever Keys

6.15 If a lever key spring is found to be out of adjustment when troubleshooting a circuit malfunction, spring adjusting pliers (duckbill) should be used by an experienced person to correct the problem.

Table 3. Light Cell Assembly Wiring.

LIGHT CELL ASSEMBLY	NEON LAMP (TWO TERMINALS PER LAMP)	CABLE ASSEMBLY 3 / CABLE ASSEMBLY 2 / CABLE ASSEMBLY 1 — CONNECT TO KEYS			WIRES (W-6123)
1	1	1			2 BLU
	2	2			2 ORN
	3	3			2 GRN
	4	4			2 BRN
	5	5			2 SL
	6	6			2 RED
	7	*			2 BLK
2	1		7		2 WHT
	2		8		2 YEL
	3		9		2 VIO
	4		10		1 PINK
	5		*	18	2 BRN-RED
	6		*	19	2 BRN-WHT
	7		*	20	2 RED-GRN
3	1			11	2 RED-YEL
	2			12	2 RED-BLK
	3			13	2 RED-BLU
	4			14	2 RED-WHT
	5			15	2 GRN-WHT
	6			16	2 YEL-WHT
	7			17	2 BLK-WHT

* NOT CONNECTED – TAPE THE KEY ENDS ONLY AND LEAVE DEAD IN CABLE FORM.



WHEN USING ELECTRONIC COMMON RINGER ASSEMBLY, ONE KEY ON CABINET IS REQUIRED, IF CABINET HAS A LINE NUMBER.

WHEN USING ELECTRONIC COMMON RINGER ASSEMBLY, NO KEY ON CABINET IS REQUIRED FOR SECRETARY'S LINE.

WHEN USING ELECTRONIC COMMON RINGER ASSEMBLY, USE TYPE 80 TELEPHONE WITH ISOLATED RINGER FOR CONVERSION (SEE H-54803-1) AND NO KEY ON CABINET IS REQUIRED FOR SECRETARY'S LINE.

ARRANGEMENT OF KEYS AND LAMPS IN 20 LINE KEY CABINET AS SEEN FROM REAR (FOR REFERENCE ONLY)

Figure 11. Wiring Schematic for 6-, 10-, or 20-Line SAU.