

1B AND 1BA TELEPHONE ANSWERING SETS MAINTENANCE AND SUPPLIES

1. GENERAL

1.01 This section covers maintenance procedures for the 1B and 1BA telephone answering sets. It includes supply information on items required for their maintenance. It is reissued to include data on the KS-16328, List 1 cleaner used for cleaning the record heads and magnetic bands and to add information pertaining to radio station interference.

1.02 Work actually done on the customer's premises should be limited to verification and analysis of the trouble, readily made adjustments as described in this practice, and replacement of easily accessible parts which are normally available through the supply channels.

1.03 When tests are being made on customer's answering set, care should be taken not to erase any existing messages without first consulting with the customer.

1.04 Disassembly of the 1B and 1BA telephone answering sets should be undertaken only with supervisory approval.

1.05 The associated telephone set should be maintained in the standard manner as covered in the related Bell System Practices.

1.06 Cover removal procedure is contained in Section C55.614, 1B and 1BA Telephone Answering Sets, Installation and Connections.

Caution: Care must be used when working on the 1B and 1BA telephone answering sets with the cover removed because the ac power supply voltage (115 volts, 60 cycles ac) is on contacts of the K5 and K6 relays, terminals of the K9, associated resistors, S4, S42, and S43 switches, 4B thermistor, and F1 fuse holder. Only one side of the ac power supply is opened when the OFF-ON knob is turned OFF.

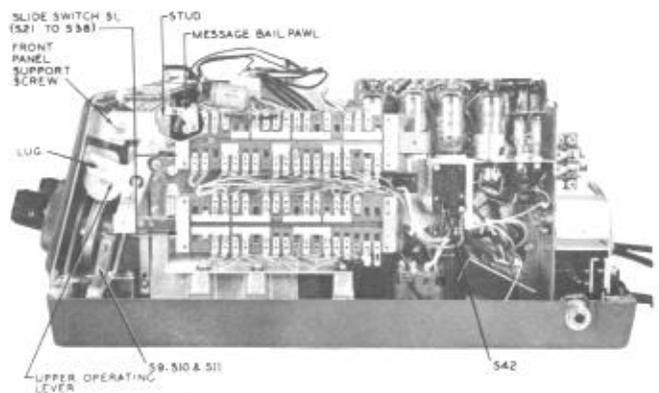


Fig. 1—1B Telephone Answering Set—Right Side

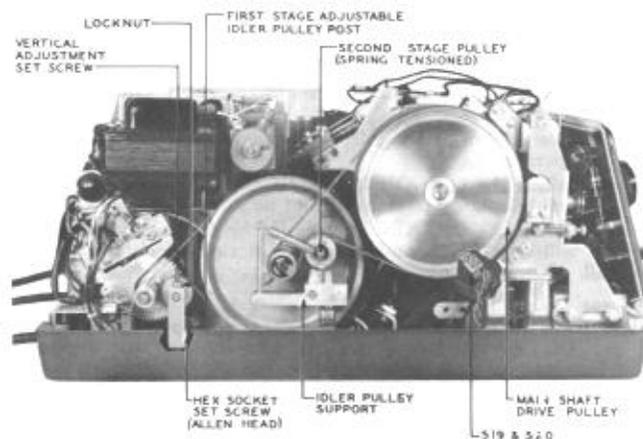


Fig. 2—1B Telephone Answering Set—Left Side

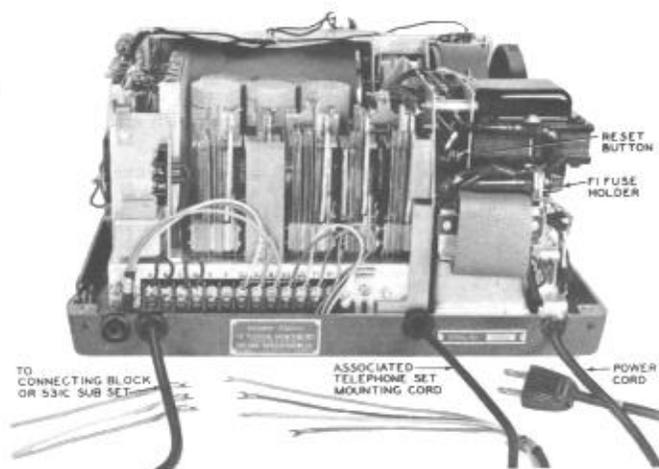


Fig. 3—1B Telephone Answering Set—Rear

1.07 The complete operating sequence of the 1B or IBA telephone answering set should have a final check made on every maintenance visit. The test procedure is covered in Final Tests of Section C55.614, 1B and IBA Telephone Answering Sets, Installation and Connections. If the set fails to perform satisfactorily after maintenance procedures included in this section have been completed and checked, the set should be replaced.

2. COMPONENTS AND PROCEDURES

2.01 **Caution:** Avoid touching the magnetic recording bands on the announcement or incoming message drums or allowing dirt or other foreign material to fall on the bands. If loose matter is observed on the bands, wipe off lightly with a clean, dry, KS-2423 twill jean cloth or other approved lint-free cloth.

Power Supply

2.02 The effect of a customer's power supply failure is as follows:

- The 1B or IBA telephone answering set will not operate.
- When the OFF-ON knob is in the OFF position, normal telephone service will not be affected.
- When the OFF-ON knob is in the ON position, there will only be an audible signal in case of an incoming call.

Fuses

2.03 The 1B telephone answering set is equipped with a fuse (F1) mounted in an HKP fuse holder. For fuse inspection turn top of fuse holder counterclockwise and withdraw (see Fig. 3).

Reset Button

2.04 The 1B telephone answering set is equipped with a thermal time delay relay (K9) to protect the erase coils from damage in the event of a mechanical or electrical failure. Depress the reset button to restore the power supply (see Fig. 3).

Circuit Protection—IBA Telephone Answering Set

2.05 To protect the set from damage in the event of mechanical or electrical failure, some IBA sets will be equipped with a circuit breaker (CB1) and some with a thermal time delay relay (K9) and a fuse (F1).

2.06 If the IBA set is equipped with a thermal time delay relay and fuse, the power supply and erase coil circuit is the same as for the 1B set (see Fig. 11).

Inverter

2.07 In areas where only dc power supply is available, a KS-15662 inverter is used to furnish power. See Section C55.620, DC-AC Inverter for Use with Telephone Answering Sets, for maintenance information.

2.08 If the inverter introduces noise in the circuit, a local ground should be connected to the F terminal on terminal strip TS1 in the answering set as follows:

Individual line bridged ringing	without 531C subset with 531C subset	Strap G and F on TS1 Connect F on TS1 to GRD in 531C*
2-party and 4-party selective	(-) parties on ring and tip (+) parties on ring and tip	Connect F on TS1 to GRD in 531C** Strap R and F on TS1
2-party selective	(-) and (+) tip parties in AMA, zone or multiple registration, and automatic ticketing	Strap G1 and F on TS1

* Use D5AA mounting cord or equivalent.

** Use D4AN mounting cord or equivalent.

Heater Base

2.09 In locations where the temperature may go below 20 degrees Fahrenheit a KS-14782 base should be installed and maintained according to Section C55.619, Heater Base for Use with 1AA and 1B Telephone Answering Sets.

Amplifier

2.10 **Caution:** When testing for trouble in connection with the amplifier circuit, direct current must not be permitted to pass through the record heads.

2.11 The amplifier circuit uses two CK512AX and four 3V4 electron tubes. If tests indicate the trouble is in the amplifier, substitute individual tubes until the defective tube is located, since the condition of the tubes cannot be determined by visual examination. If replacing the tubes does not clear the trouble in the amplifier, the answering set should be replaced.

Caution: The power must be turned off when tubes are being changed.

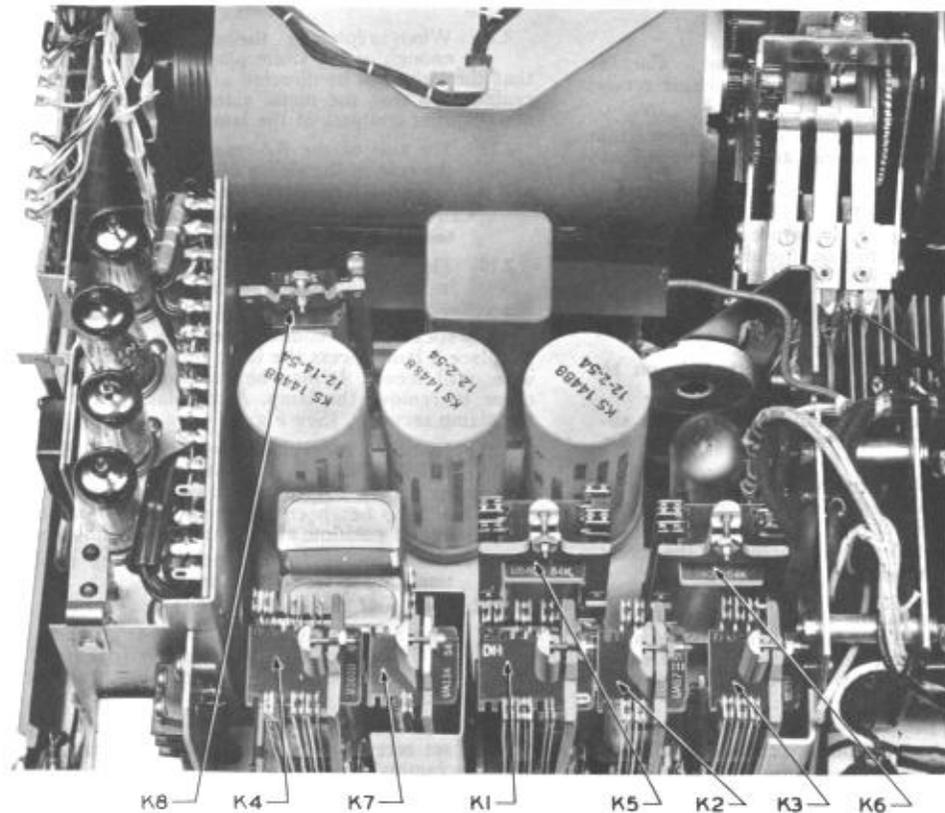


Fig. 4—1BA Telephone Answering Set—Rear

2.12 When removing a CK-512AX electron tube, the following steps should be followed:

- (1) Lift the end of the spring (tube retainer) until it clears the tips of the CK-512AX tubes, then rotate until it will not touch the tubes when it is released (see Fig. 5).
- (2) Gently withdraw the CK-512AX tube to be removed from its socket.

Caution: Be certain that the CK-512AX tubes are reinserted in their sockets so that the red mark on the tube base coincides with the molded dot on the socket and the red dot on the chassis (see Fig. 5).

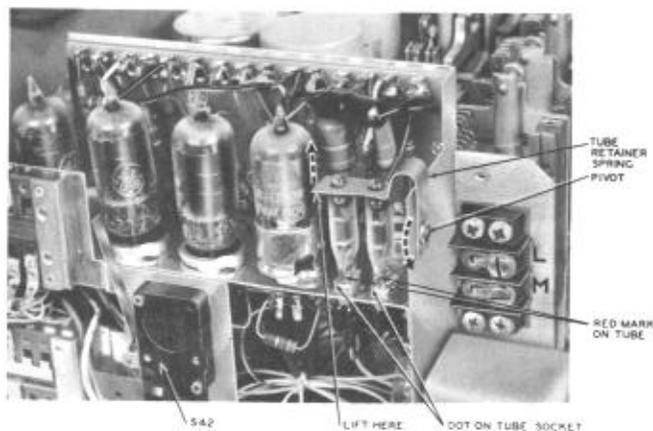


Fig. 5—1B Telephone Answering Set—Showing Electron Tubes and Tube Retainer Spring

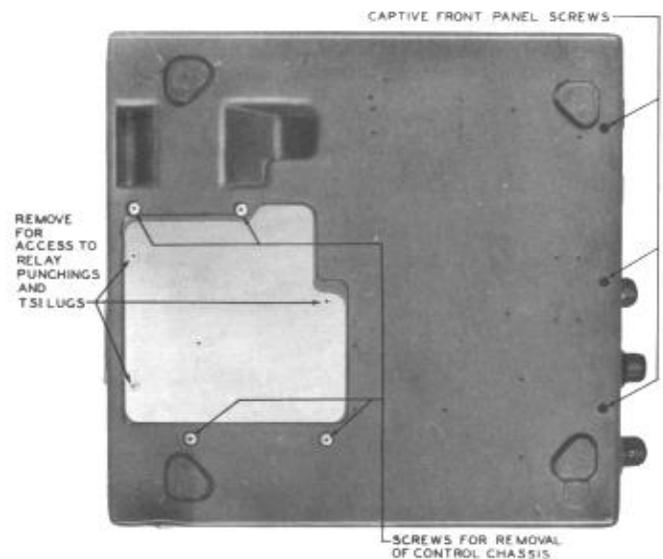


Fig. 6—1B Telephone Answering Set—Bottom

Front Panel Removal

2.13 The front panel is secured with three captive machine screws (see Fig. 6) and two removable machine screws (see Figs. 1 and 9).

2.14 Use care removing or replacing the panel to insure that the two front panel support screws are not dropped into the interior of the answering set.

2.15 Remount front panel as follows:

- (1) Check the message bail pawl to insure that it has not become disengaged from stud on the right rear of incoming message head carriage bail (see Fig. 1).
- (2) Place one of the machine screws with the flat and lock-washers in the hole in center front panel support (see Fig. 9).
- (3) Position the front panel so that the threads on the screw are engaged, but do not tighten securely.
- (4) Place the lug on the selector switch lever actuator assembly in the slot of the upper operating lever on the S1 slide switch (see Fig. 1).
- (5) Place the second machine screw with the flat and lock-washers through hole of the front panel support on the right of the answering set panel (see Fig. 1).
- (6) Position the front panel so that the threads of the screw are engaged but do not tighten.
- (7) Position the bottom of the front panel so that the three captive machine screws can be threaded into the panel supports. Do not permit the three bottom front panel supports to pinch or prevent the free movement of the cable between the message selector knob and the H2 head carriage (see Fig. 9).
- (8) Tighten all the front panel support screws.
- (9) Check the function selector knob for proper operation of S1 slide switch.
- (10) Check the message selector knob for proper operation of the incoming message recording head carriage.

Lamps

2.16 The K2-type switchboard lamps are used for lamps designated E1 (ON-OFF), E2 (ANSWER AND RECORD), E3 (DICTATE), and E4 (ANSWER ONLY). They are removed by grasping the wooden base of the lamp with long-nose pliers and carefully withdrawing from the lamp socket (see Fig. 8).

2.17 When replacing these K2-type switchboard lamps, enough of the white plastic band should be removed so that the light will be directed at the panel. The lamps must be replaced so that the metal sides of the lamp are against the metal spring contacts of the lamp sockets.

2.18 The tips of the K2-type lamps should be inserted into the hole in the sleeve of the ANSWER AND RECORD and ANSWER ONLY indicators (see Fig. 8).

Caution: Remove front panel according to 2.13 before attempting to replace lamps.

2.19 The 1847 Bayonet-type socket lamp is used in all lights in the IBA telephone answering set.

2.20 To remove lamps from socket, press the lamp into the socket, turn counterclockwise until free, and withdraw. To place a lamp, press the lamp into the socket and turn clockwise until secure. It may be necessary to loosen the clamp in order to remove the lamp. After placing a new lamp, tighten the clamp securely. (See Fig. 7.)

2.21 In order to replace the ANSWER & RECORD and ANSWER ONLY lamps, it will be necessary to loosen the clamp sufficiently to withdraw the lamp socket assembly. After the lamp has been replaced, restore the socket assembly to its original position and tighten the clamp securely.

Note: Remove front panel according to 2.13 before attempting to replace lamps.

Dial, Knob, and Button Placement

2.22 The START and STOP buttons are held in place by a B-17725 start, stop lever spring (open coil spring). The front panel must be removed if these buttons or the springs need replacing.

2.23 The knobs and dials are held in place by two hex socket set screws. If realignment is necessary use a 5/64-inch Allen hexagonal key wrench to loosen them.

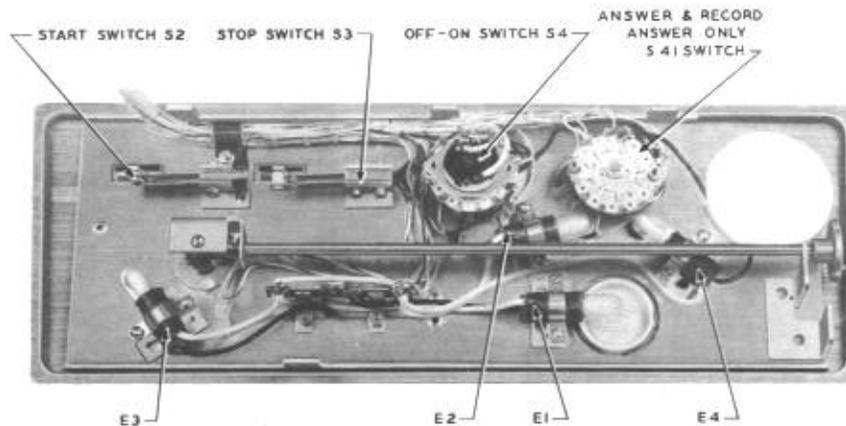


Fig. 7—IBA Telephone Answering Set—Back of Front Panel Showing Lamps and Switches

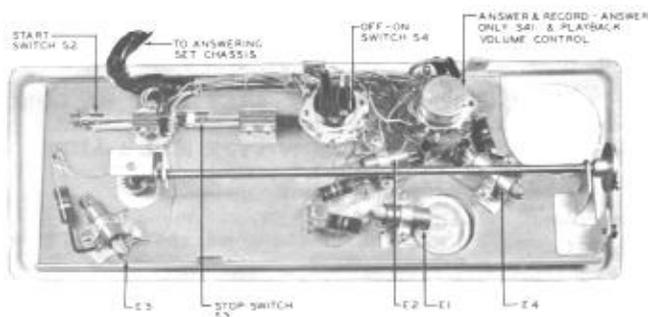


Fig. 8—IB Telephone Answering Set—Back of Front Panel Showing Lamps and Switches

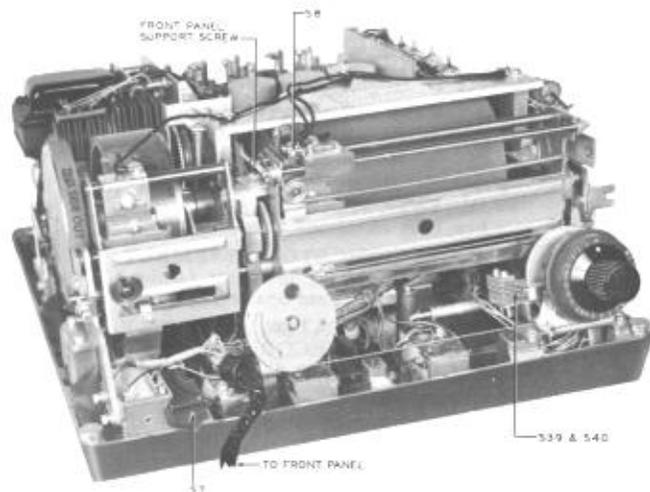


Fig. 9—IB Telephone Answering Set—Front View with Panel Removed

- 2.24 The marks on the knobs should be aligned as follows:
- Function Selector Knob: Dot on knob skirt should be adjacent to the designation on the front panel for each of its four positions.
 - OFF-ON Knob: Dot on knob skirt should be adjacent to OFF in counterclockwise position and adjacent to ON in clockwise position.
 - Playback Volume Knob: Dot on knob end should be at twelve o'clock when knob is in extreme counterclockwise position, as required for minimum volume. This does not apply to the IBA telephone answering set.
 - ANSWER AND RECORD/ANSWER ONLY Dial: Notch in dial edge should be adjacent to indicator for ANSWER AND RECORD in extreme counterclockwise position, and adjacent to indicator for ANSWER ONLY in extreme clockwise position.
 - Message Selector Knob: Dot on knob skirt should be directly under the dot under MESSAGES on the front panel when the incoming message recording head is in its extreme left position.
 - Message Indicator Dial: The answering set should be replaced if it becomes necessary to change this dial.

Drive Belts

- 2.25 The drive belts from motor to drum should be tensioned to drive the drums without slipping.
- 2.26 Proper tension of the belts can be checked as follows:
- Operate the answering set in ANNOUNCEMENT CHECK position.
 - The motor should drive the announcement drum at an even speed.

- Grasp the edges of the announcement drum and stop it from rotating. DO NOT TOUCH THE RECORDING BAND.
 - The motor should not stall, the drive belts should not slip, and the drum shaft should continue to turn.
- 2.27 The drive belt in the first stage is adjusted as follows (see Fig. 2):
- Loosen the hex socket set screw in the side of the first stage idler pulley post with the 1/16-inch hexagonal key (Allen) wrench.
 - Loosen the locknut on the vertical adjustment set screw with a 474A tool.
 - Increase the belt tension by turning the vertical set screw clockwise with a 0.050-inch hexagonal key (Allen) wrench. Add just enough tension to eliminate the slipping of the belt.
 - Exert downward pressure on idler pulley post to insure seating of the post on its support pin when the vertical adjustment set screw is rotated counterclockwise to lower the idler post.
 - Tighten the locknut with the 474A tool while the vertical set screw is held in place with the hexagonal key wrench.
 - Rotate the first stage idler pulley post in the direction that will cause the drive belt to run on the approximate middle of the intermediate pulley. Neither edge of the belt should rub continuously against any adjacent part of the set.
 - Tighten the hex socket set screw in the first stage idler pulley post.
 - The belt tension should be tested several times on completion of the belt adjustment or replacement.
- 2.28 The belt in the second stage is adjusted as follows:
- Loosen the hex socket set screw in the spring tension idler pulley support with the 3/32-inch hexagonal key (Allen) wrench (see Fig. 2).
 - Increase the belt tension by raising the idler pulley support just enough to eliminate the slipping of the belt.
 - Rotate the idler pulley support in the direction that will cause the drive belt to run on the approximate middle of the main shaft drive pulley. The belt should not ride beyond either edge of the pulley more than 0.020 inch as gauged by eye.
 - Tighten the hex socket set screw.
 - When replacing a belt, the spring tension idler pulley support should be lowered as far as possible on its support post and then adjusted to meet requirements covered above.
- 2.29 If the belts do not meet the requirements in the preceding paragraphs, the answering set should be replaced.

Magnetic Recording Bands

- 2.30 The bands should be tight enough on the drums to provide a smooth surface over the entire face of the bands. Make visual inspection only. If either band is loose or shows signs of irregularities, the answering set should be replaced.

Cleaning Magnetic Recording Heads and Bands

- 2.31 If volume level is low or if distortion is experienced, the record heads and magnetic bands should be cleaned with KS-16328, List 1 cleaner.
- 2.32 This cleaner is flammable to a small degree (about the same as rubbing alcohol) and is susceptible to freezing. All precautions should be taken to prevent exposure to sparks, flame, and freezing temperatures.
- 2.33 Remove loose dirt from the bands by wiping lightly with a clean, dry, KS-2423 cloth. Remove loose dirt from the record heads with a toothpick or orange stick and then wipe lightly with a clean, dry, KS-2423 cloth.
- 2.34 Shake the container of KS-16328, List 1 cleaner thoroughly before use as the components have a tendency to separate. Apply a small quantity to a clean, dry, KS-2423 cloth and wipe on to the recording bands while they are rotating. Wipe the cleaner and the emulsified dirt from the drums with a clean, dry, KS-2423 cloth. The cleaned drum should be dry and have a polished appearance. Repeat the process if necessary. The cleaner contains adequate lubricant. Therefore it is not necessary to perform a separate lubrication.

operation. Also, use solution on cloth to clean heads. Dry the recording heads thoroughly. Avoid letting the cleaner come in contact with metal parts.

Note: The above paragraphs apply to both the 1B and the 1BA telephone answering sets.

Handling and Transportation

2.35 When handling and transporting an answering set, the instructions in Section C55.614, 1B and 1BA Telephone Answering Set, Installation and Connections, should be followed.

Suppression of Radio Station Interference

2.36 If customer hears radio programs on either announcement or recorded messages, the trouble might be eliminated by the installation of a 1542A inductor in accordance with Section C55.804, Radio Signal Suppression in Telephone Sets. If this does not remedy the trouble, consult your supervisor.

3. TOOLS AND SPARE PARTS

3.01 The following special tools are required for maintenance of the 1B and 1BA telephone answering set:

<u>INDEX</u>	<u>ORDERING INFORMATION AND USE</u>
Cloth	CLOTH, TWILL JEAN, KS-2423.
Tools	TOOL, 373D. Burnishing blade holder.
	TOOL, 374A. Burnishing blade.
	TOOL, 374B. Burnishing blade.
	TOOL, 374C. Burnishing blade.
	TOOL, 474A. Box-end wrench used for locknut on idler pulley post.
Wrenches	WRENCH, HEXAGONAL, KEY (ALLEN), 0.050 IN. 0.050-in. Allen wrench.
	WRENCH, HEXAGONAL, KEY (ALLEN), 1/16 IN. 1/16-in. Allen wrench.
	WRENCH, HEXAGONAL, KEY (ALLEN), 5/64 IN. 5/64-in. Allen wrench.
	WRENCH, HEXAGONAL, KEY (ALLEN), 3/32 IN. 3/32-in. Allen wrench

3.02 The following list contains the spare parts required for field substitution.

<u>INDEX</u>	<u>ORDERING INFORMATION AND USE</u>
Buttons	B-178353-1, LEVER. START button.
	B-178353-2, LEVER. STOP button.
Cleaner	CLEANER KS-16328, L1. Cleaner and lubricant for magnetic bands available in 2 oz. and 1 qt. screw-cap glass bottles.
Cords	CORD, R2DB, EQUIPPED WITH 347B PLUG. Used for headset playback.
	CORD, D3AY.
	CORD, D4AN.
	CORD, D4AS.
	CORD, D5AA. Used to connect telephone answering set and telephone set to connector block or 531C subset as required.
Cover	B-179086-2, COVER. Cover for 1B and 1BA telephone answering set.
Dials	B-179824, KNOB. For MESSAGE INDICATOR dial.
	B-179835, KNOB. ANSWER AND RECORD/ANSWER ONLY dial.

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Drive Belts

ORDERING INFORMATION AND USE

B-177478-1, DRIVE BELT 15 IN. LONG.

First stage drive belt.

B-177478-2, DRIVE BELT 17-1/8 IN. LONG.

Second-stage drive belt.

FUSE, SLO-BLOW-TYPE MDL 1 AMP (LITTLEFUSE).

Power supply fuse.

Grommet

B-179099, GROMMET.

Used with telephone set and answering set mounting cords.

Headband

HEADBAND, 15A.

Used for headset playback.

Holder

HOLDER, FUSE, HKP (BUSSMAN MFG CO.).

Power supply fuse holder.

Indicators

KB-179830, INDICATOR ASSEMBLY.

DICTATE indicator (red).

For 1B telephone answering set.

KB-179862-1, INDICATOR ASSEMBLY.

ANSWER & RECORD indicator (green).

For 1B telephone answering set.

KB-179862-2, INDICATOR ASSEMBLY.

ANSWER ONLY indicator (amber).

For 1B telephone answering set.

P-18A704, INDICATOR ASSEMBLY.

DICTATE indicator (red).

For 1BA telephone answering set.

P-18A705, INDICATOR ASSEMBLY.

ANSWER ONLY indicator (amber).

For 1BA telephone answering set.

P-18A706, INDICATOR ASSEMBLY.

ANSWER & RECORD indicator (green).

For 1BA telephone answering set.

Knobs

B-177612, KNOB.

OFF-ON switch control knob.

B-179825, KNOB.

Message selector knob.

B-179832, KNOB.

Function switch control knob.

KB-179834, KNOB.

Playback volume knob. For 1B telephone answering set.

KNOB, KS-14945.

ANSWER & RECORD, ANSWER ONLY knob. For 1BA telephone answering set.

Lamps

LAMP, K2.

Used in all lights of 1B telephone answering set.

LAMP, 1847.

Used in all lights of 1BA telephone answering set.

Nut

NUT, 4-40 HEX STD.

Locknut on vertical adjustment set screw.

Plate

B-177738, COVER, PLATE.

Access plate to relay punchings and TSI lugs.

Receiver

RECEIVER, 723A.

Used in headset playback.

Screws

B-177700, SCREW.

Captive front panel support screw.

B-177861, SCREW.

Telephone answering set cover set screw.

SCREW, HEX SOCKET HEAD STEEL SET 4.40 x 1 IN. FLAT POINT

Vertical adjustment hex socket set screw.

SCREW, HEX SOCKET HEADSET 6-32 x 1/8 IN. FLAT POINT.

Hex socket set screw in first stage idler pulley post.

SCREW, HEX SOCKET STEEL SET 0.164-32 x 1/4 IN.

Used to secure knobs and dials on their respective shafts.

INDEX

Screws
Cont'd

ORDERING INFORMATION AND USE

SCREW, BD HD 5-40 x 3/16 IN.

Terminal screws on TS1 and TS6.

SCREW, BD HD 6-32 x 1/4 IN.

Front panel support screw.

SCREW, BD HD CAD PL 6-32 x 3/8 IN.

Used for telephone cord retainer bracket and to fasten mounting cord stay hook on left side of TS1 terminal strip.

SCREW, BD HD 6-32 x 5/16 IN.

Plate screws for access to relay punchings and TS1 lugs.

SCREW, BD HD 8-32 x 1/2 IN.

Control chassis mounting screw.

Sleeve

B-179866, SLEEVE.

Use with ANSWER AND RECORD and ANSWER ONLY indicator assembly.

Spring

B-177725, SPRING.

Tension spring for start and stop buttons.

Tubes

TUBE, ELECTRON, CK-512AX.**TUBE, ELECTRON, 3V4.**

Used in amplifier circuit.

Washers

B-170011, WASHER.

No. 6 lockwasher used with telephone cord retainer bracket screw, front panel support screw, mounting cord stay-hook screw, and plate screw for access to relay punchings and TS1 lugs.

WASHER, PLAIN NO. 4 (0.028 IN. THICK x 5/16 IN.).

Used with locknut on vertical adjustment set screw.

WASHER, PLAIN NO. 6.

Used with front panel support screw, telephone cord retainer bracket screw, and mounting cord stay-hook screw.

WASHER, LOCK NO. 8 SHAKEPROOF NO. 1208-00.

Used with control chassis screws.

3.03 The following circuit drawings pertain to the 1B and 1BA telephone answering sets. These drawings may be obtained on order from the Western Electric Company.

KB-179802-1B Telephone Answering Set—Control Schematic

KB-177301-1B Telephone Answering Set—Amplifier and Power Supply Schematic

A-212475-1BA Telephone Answering Set—Amplifier and Power Supply Schematic

A-212477-1BA Telephone Answering Set—Control Schematic

4. CIRCUIT DESCRIPTION FOR 1B TELEPHONE ANSWERING SET

4.01 The following information applies only to the 1B telephone answering set. The circuit diagrams for this set are shown in Figs. 11 and 12.

4.02 (a) The output of rectifier X1 is 48 volts positive dc (P+ and P1+).

(b) The output of rectifier X2 is 75 volts positive dc (Amp B+).

Answering Set Turned Off

4.03 With the OFF-ON knob (S4 switch) in the OFF position the associated telephone set is connected to the CO or PBX line as follows: from line to TS1 terminal R, through S4A 9 to 8, to TS1 terminal R1, through associated telephone set to TS1 terminal T1, through S4A 11 to 12, to TS1 terminal T, to the other side of line. For associated telephone set ringing circuit, see Section C55.614, 1B and 1BA Telephone Answering Sets, Installation and Connections, Fig. 6 through Fig. 13.

Answering Set Turned On

4.04 With the OFF-ON knob (S4 switch) in the ON position:

(a) The associated telephone set is disconnected from the CO or PBX line.

(b) The ON-OFF lamp (E1) lights: P+, through R208, through E1, S4A 14 to 13, to ground.

(c) The X1 rectifier is energized: 145 volts ac from power plug PG1, S4B 16 to 17, K9 relay contacts, fuse F1, through T4, to other side of power plug PG1.

Announcement Dictate

4.05 With the set turned on, and the function selector knob (S1 switch) in ANNOUNCEMENT DICTATE position:

(a) With service selector dial (S41) in ANSWER AND RECORD position, the green ANSWER AND RECORD lamp (E2) lights: ground, through normal K5 relay 1T to 3T, E2 lamp, R207, S29 3 to 4, S41 2 to 3, to P+.

(b) With service selector dial (S41) in ANSWER ONLY position, the green ANSWER AND RECORD lamp (E2) lights: ground, through normal K5 relay 1T to 3T, E2 lamp, R207, S29 3 to 4, S41 2 to 1, S11 2 to 1, S7 1 to 2, to P1+.

4.06 Depress START button (S2 switch) momentarily. The K3 relay operates: ground, through K3 winding, S28 1 to 3, S2 1 to 2, to P+.

4.07 K3 relay locks up: ground, through K3 winding, operated K3 6T to 5T, normal S3 2 to 1, S27 1 to 3, S11 2 to 1, S7 1 to 2, to P1+.

4.08 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.

4.09 The green ANSWER AND RECORD lamp (E2) is extinguished by the operation of the K5 relay, which opens the E2 lamp circuit through its 1T and 3T contacts.

4.10 Motor starts: 115 volts ac from power plug P1, S4B 16 to 17, thermal relay (K9) contacts, fuse F1, operated K5 1B to 2B, motor winding, to other side of power plug P1.

4.11 The X2 rectifier circuit is closed through the K5 relay 5T to 4T to supply 75 volts dc (Amp B+) to the amplifier.

4.12 K6 relay operates: ground, through K6 winding, S44 1 to 2, S38 1 to 3, K3 2B to 1B, to P+.

4.13 K1 relay operates: ground, through K1 winding, S37 3 to 1, operated K3 2T to 1T, to P+.

4.14 Adjustable limit switch solenoid (L2) operates: ground, through L2, S36 3 to 1, S24 2 to 3, K6 4T to 5T, to P1+, releasing adjustable limit switch S7. To insure positive operation a parallel path is provided: ground, through L2, S36 3 to 1, S24 2 to 3, operated K1 1T to 2T, operated K3 4B to 3B, to P+.

4.15 Announcement drum clutch solenoid (L1) operates through the same paths as the L2 solenoid with exception of the S36 switch.

4.16 (a) Operation of L1 pulls drum pawl from slot in drum rim, allowing drum clutch to rotate drum.

(b) L1 operates linkage engaging cam clutch starting announcement cam rotation.

(c) Linkage between L1 and announcement bail causes announcement head carriage to move toward drum, causing record head (H1) to come into contact with magnetic recording band surface.

(d) As drum pawl disengages from slot in drum rim it operates S19.

4.17 K5 relay locks up: ground, through K5 winding, S19 2 to 1, to P1+.

4.18 The announcement drum erase cycle is started by operation of the K6 relay: 115 volts ac from power plug P1, S4B 16 to 17, thermal relay (K9) contacts, fuse F1, operated K5 2B to 1B, operated K6 1B to 2B, S43 1 to 2, S42 2 to 1, through announcement drum erase coil, to other side of power plug P1.

4.19 After approximately one revolution of announcement drum (3 seconds minimum), announcement cam 1-3 operates S43, inserting R219 (11A resistance lamp) in series with ac supply to erase coil, and placing R220 (4B thermistor) across announcement drum erase coil.

4.20 As K6 relay operates, the manual reset thermal time delay relay (K9) is placed across the 115-volt ac line, through R218 (11A thermistor) and R212 (536 ω resistance), to protect the erase coil from damage in the event of mechanical or electrical failure.

- 4.21 Announcement cam 1-1 operates S44, approximately 1/2 second after S43 operates, releasing K6 relay, which disconnects the erase circuit.
- 4.22 K4 relay operates: ground, through K4 winding, operated K1 4T to 5T, normal K6 3T to 1T, to P1+.
- 4.23 Bias oscillator and amplifier output circuit is established: amplifier output, operated K4 2B to 1B, S21 3 to 1, through announcement record-playback head (H1), to ground.
- 4.24 Amplifier input circuit is established: amplifier input, through operated K4 6T to 5T, operated K4 6B to 7B, R119, output transformer (T2) 3 to 4, to ground.
- 4.25 Amplifier input is connected to associated telephone set: through 1 and 2 of output transformer (T2), S31 3 to 2, S4A 7 to 8, to R1 of TS1 terminal strip, through associated telephone set, to T1 of TS1, S4A 11 to 10, S30 2 to 3, C203, S25 1 to 5, to 1 of output transformer (T2).
- 4.26 ANNOUNCEMENT DICTATE lamp (E3) lights: ground, through E3, R206, S13 2 to 1, S37 3 to 1, operated K3 2T to 1T, to P+.
- 4.27 The customer can now dictate an announcement.
- 4.28 During the recording of the announcement the head carriage pushes the adjustable limit switch (S7) toward its maximum position.
- 4.29 Announcement cam 1-3 operated S13 at the end of the erase cycle, to light DICTATE lamp E3. S13 stays operated during the announcement. About 5 seconds before the end of announcement dictate time cam 1-3 causes S13 to open momentarily resulting in the ANNOUNCEMENT DICTATE lamp (E3) flashing.
- 4.30 When customer completes his announcement, he operates the STOP button momentarily.
- 4.31 (a) K3 relay releases.
(b) K1 relay releases.
(c) K4 relay releases.
- 4.32 Adjustable limit switch solenoid (L2) releases, clamping the adjustable limit switch (S7) mechanism in a position corresponding to the end of recorded announcement.
- 4.33 Announcement drum clutch solenoid (L1) releases, allowing head carriage and cams to restore to start position.
- 4.34 The K5 relay is held up by the announcement drum pawl switch (S19) until the announcement drum pawl enters the slot in the drum rim.
- 4.35 (a) K5 relay releases.
(b) Motor stops.
(c) Green ANSWER AND RECORD lamp lights.
(d) Set is restored to normal.
- 4.36 If the STOP button is not depressed by the customer, the adjustable limit switch (S7) is operated by an extension of the head carriage at the physical limit of its travel. This releases all relays and solenoids and the machine is restored to ANNOUNCEMENT DICTATE ready condition.
- Announcement Check**
- 4.37 With the set turned on, and the function selector knob (S1 switch) in ANNOUNCEMENT CHECK position, no ready light is provided.
- 4.38 Depress START button (S2 switch) momentarily. The K3 relay operates: ground, through K3 winding, S28 1 to 3, S2 1 to 2, to P+.
- 4.39 K3 relay locks up: ground, through K3 winding, operated K3 6T to 5T, normal S3 2 to 1, S27 1 to 3, S11 2 to 1, S7 1 to 2, to P1+.
- 4.40 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.
- 4.41 Motor starts: 115 volts ac from power plug P1, S4B 16 to 17, thermal relay (K9) contacts, fuse F1, operated K5 1B to 2B, motor winding, to other side of power plug P1.
- 4.42 The X2 rectifier circuit is closed through K5 relay 5T to 4T to supply 75 volts dc (Amp B+) to amplifier.
- 4.43 Announcement drum solenoid (L1) operates: ground, through L1, S23 1 to 3, normal K1 3T to 2T, operated K3 4B to 3B, to P+.

- 4.44 (a) Operation of L1 pulls drum pawl from slot in drum rim, allowing drum clutch to rotate drum.
(b) L1 operates linkage engaging cam clutch starting announcement cam rotation.
(c) Linkage between L1 and announcement bail causes announcement head carriage to move toward drum, causing record head (H1) to come into contact with magnetic recording band surface.
(d) As drum pawl disengages from slot in drum rim it operates S19.
- 4.45 Amplifier input circuit is established: amplifier input, through normal K4 relay 6T to 7T, S22 3 to 2, through announcement record-playback head (H1), to ground.
- 4.46 Amplifier output is established: output transformer (T1) 1 to 2, through output transformer (T2) 4 to 3, normal K4 relay 2T to 1T, to 1 of output transformer (T1).
- 4.47 Amplifier output is connected to associated telephone set: output transformer (T2) 1 to 2, S31 3 to 2, S4A 7 to 8, to R1 of TS1 terminal strip, through associated telephone set, to T1 of TS1, S4A 11 to 10, S30 2 to 3, C203, R201, S25 2 to 5, to 1 of output transformer (T2).
- 4.48 Announcement is reproduced in associated telephone set (and headset if plugged in headset jack J1).
- 4.49 At end of announcement, adjustable limit switch operates:
(a) K3 relay releases.
(b) L1 solenoid releases.
(c) Head carriage and cams restore to start position.
- 4.50 The K5 relay is held up by announcement drum pawl switch (S19) until the announcement drum pawl enters the slot in the drum rim.
- 4.51 (a) S19 releases.
(b) K5 relay releases.
(c) Motor stops.
(d) Set is restored to normal.
- 4.52 The STOP button (S3) will also release K3 and restore the set to normal (ANNOUNCEMENT CHECK ready) condition. The STOP button may be depressed at any time during the operation of the set in this function.

Message Playback

- 4.53 With the set turned on, and the function selector knob (S1 switch) in MESSAGE PLAYBACK position, no ready light is provided.
- 4.54 Depress START button (S2 switch) momentarily. The K3 relay operates: ground, through K3 winding, S28 1 to 3, S2 1 to 2, to P+.
- 4.55 K3 relay locks up: ground, through K3 winding, operated K3 6T to 5T, normal S3 2 to 1, S27 1 to 3, S11 2 to 1, S7 1 to 2, to P1+.
- 4.56 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.
- 4.57 Motor starts: 115 volts ac through power plug P1, S4B 16 to 17, thermal relay (K9) contacts, fuse F1, operated K5 1B to 2B, motor winding, to other side of power plug P1.
- 4.58 Rectifier X2 is energized through operated K5 4T to 5T, to supply 75 volts dc (Amp B+) to amplifier.
- 4.59 Amplifier input circuit is established: amplifier input, through normal K4 relay 6T to 7T, S22 3 to 1, message record-playback head (H2), to ground.
- 4.60 Amplifier output circuit is established: output transformer (T1) 1 to 2, through output transformer (T2) 4 to 3, normal K4 relay 2 to 1, to 1 of output transformer (T1).
- 4.61 Amplifier output circuit is connected to associated telephone set: output transformer (T2) 1 to 2, S31 3 to 2, S4A 7 to 8, to R1 of TS1 terminal strip, through associated telephone set, to T1 of TS1, S4A 11 to 10, S30 2 to 3, C203, through playback volume control R202, C209, S25 3 to 5, to 1 of output transformer (T2).
- 4.62 Incoming message drum clutch solenoid (L3) operates: ground, through S23 2 to 3, normal K1 3T to 2T, operated K3 4B to 3B, to P+.

4.63 Incoming message drum rotates and message is heard in associated telephone set (and headset if plugged into headset jack J1).

Note: Message cams rotate for one revolution and stop. Their rotation has no operational significance in MESSAGE PLAYBACK.

4.64 Incoming message drum is stopped by STOP switch (S3) operated by customer, or by S11 switch if allowed to run until head carriage reaches end of the incoming message drum.

- 4.65 (a) K3 relay releases.
- (b) K5 relay releases.
- (c) Motor stops.
- (d) The answering set must be reset before any further operation.

Automatic Answer—Answer Only

4.66 With the set turned on, the function selector knob (S1 switch) turned to AUTOMATIC ANSWER, and service selector dial (S41 switch) turned to ANSWER ONLY, the amber ANSWER ONLY lamp (E4) lights: ground, through normal K5 relay 1T to 3T, through E4, R221, S41 4 to 5, S9 2 to 1, S8 2 to 1, S29 1 to 4, S41 2 to 1, S11 2 to 1, S7 1 to 2, to P1+.

Note: The zero on the message indicator dial and the white dot on the message selector knob must be adjacent, or the S8 switch will be open, the E4 lamp will not light, and the set will not operate.

4.67 An incoming call operates the K2 relay: ringing current from CO or PBX line to TS1 terminal R, S4A 1 to 2, C202, R215 (8C thermistor), TS1 terminal A, strap to TS1 terminal B, 2 of X4 (400 E varistor), through K2 relay winding 6T to 6B, 1 of X4, S20 2 to 1, S35 3 to 1, S10 1 to 2, TS1 terminal G to telephone ground.

4.68 K2 relay locks up: ground, through K2 winding 5B to 5T, 4 of C208, R203, operated K2 1B to 2B, normal K1 3B to 2B, S14A 2 to 1, S16 2 to 1, S8 2 to 1, S29 1 to 4, S41 2 to 1, S11 2 to 1, S7 1 to 2, to P1+.

4.69 K3 relay operates: ground, through K3 winding, operated K2 1T to 2T, to P+.

4.70 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.

4.71 The amber ANSWER ONLY lamp is extinguished by the operation of the K5 relay, which opens the E4 lamp circuit through its 1T and 3T contacts.

4.72 Motor starts: 115 volts ac from power plug P1, S4B 16 to 17, thermal relay (K9) contacts, fuse F1, operated K5 1B to 2B, motor winding, to other side of power plug P1.

4.73 The X2 rectifier circuit is closed through the K5 relay 5T to 4T, to supply 75 volts dc (Amp B+) to the amplifier.

4.74 Announcement drum clutch solenoid (L1) operates: ground, through L1, S23 1 to 3, normal K1 3T to 2T, operated K3 4B to 3B, to P+.

4.75 (a) Operation of L1 pulls drum pawl from slot in drum rim, allowing drum clutch to rotate drum.

(b) L1 operates linkage engaging cam clutch starting announcement cam rotation.

(c) Linkage between L1 and announcement bail causes announcement head carriage to move toward drum, causing record head (H1) to come into contact with magnetic recording band surface.

(d) As drum pawl disengages from slot in drum rim it operates S19.

4.76 Approximately 3-1/2 seconds after first ring, cam 1-1 operates S15 enabling K7 relay winding to seize the telephone line.

4.77 K7 relay operates 0.48 volts dc from CO or PBX line, to TS1 terminal R, S4A 1 to 2, S15 2 to 1, S31 1 to 3, K7 winding, S14B 2 to 1, normal K1 5B to 6B, S30 3 to 1, S4A 5 to 4, TS1 terminal T, to ground on CO or PBX line.

4.78 K7 relay locks up through its own 1T and 2T contacts.

4.79 K2 relay lockup circuit is transferred from S14A to 2B and 1B of the K7 relay. The operation of announcement cam 1-2 opens S14A placing K2 relay under control of K7.

4.80 Amplifier input circuit is established: amplifier input through normal K4 relay 6T to 7T, S22 3 to 2, through announcement record-playback head (H1), to ground.

4.81 Amplifier output is established: output transformer (T1) 1 to 2, through output transformer (T2) 4 to 3, normal K4 relay 2T to 1T, to 1 of output transformer (T1).

4.82 Amplifier output is connected to CO or PBX line: output transformer (T2) 1 to 2, S31 3 to 1, S15 1 to 2, S4A 2 to 1, TS1 terminal R, through CO or PBX line, TS1 terminal T, S4A 4 to 5, S30 1 to 3, C203, S25 4 to 5, to 1 of output transformer (T2).

4.83 Announcement goes out on line to calling party.

4.84 If calling party disconnects during announcement K7 releases, releasing K2. The open contacts of S20, associated with announcement drum pawl mechanism, prevent a new call from being received until drum and cams are restored to normal.

4.85 At end of announcement, adjustable limit switch (S7) operates.

4.86 (a) K2 relay releases.

(b) K3 relay releases.

(c) L1 solenoid releases.

4.87 Release of L1 solenoid allows announcement head carriage to restore to start position.

4.88 (a) Announcement cam 1-1 opens S15.

(b) K7 releases.

(c) Telephone line is dropped.

4.89 The K5 relay is held up by the announcement drum pawl switch (S19) until the announcement drum pawl enters the slot in the drum rim.

4.90 (a) K5 relay releases.

(b) Motor stops.

(c) Amber ANSWER ONLY lamp lights.

(d) Set is ready to receive another call.

4.91 With the set turned on, the function selector knob (S1 switch) turned to AUTOMATIC ANSWER, and the service selector dial (S41 switch) turned to ANSWER AND RECORD, there is a choice of two other settings to be made.

4.92 If previously recorded messages are to be erased:

(a) Turn message selector knob counterclockwise until it is against its stop and the white dot on the knob is below the white dot on the panel.

(b) Turn message indicator dial counterclockwise until it is against its stop and the zero is also below the white dot on the panel.

4.93 The green ANSWER AND RECORD lamp (E2) lights: ground, through normal K5 relay 1T to 3T, E2 lamp, R207, S41 6 to 5, S9 2 to 1, S40 2 to 1, S29 1 to 4, S41 2 to 3, to P+.

4.94 If previously recorded messages are to be retained, the zero on the message indicator dial, and the white dot on the message selector knob must be adjacent to each other.

4.95 The green ANSWER AND RECORD lamp (E2) lights: ground, through normal K5 relay 1T to 3T, E2 lamp, R207, S41 6 to 5, S9 2 to 1, S8 2 to 1, S29 1 to 4, S41 2 to 3, to P+.

Note: If the markings, as described in 4.94 above are not adjacent, the S8 switch will be open, the E4 lamp will not light, and the set will not operate.

4.96 An incoming call operates the K2 relay: ringing current from CO or PBX line to TS1 terminal R, S4A 1 to 2, C202, R215 (8C thermistor), TS1 terminal A, strap to TS1 terminal B, 2 of X4 (400 E varistor), through K2 relay winding 6T to 6B, 1 of X4, S20 2 to 1, S35 3 to 1, S10 1 to 2, TS1 terminal G to telephone ground.

4.97 K2 relay locks up: ground, through K2 winding 5B to 5T, 4 of C208, R203, operated K2 1B to 2B, normal K1 3B to 2B, S14A 2 to 1, S16 2 to 1, S40 2 to 1, S29 1 to 4, S41 2 to 3, to P+.

Notes

A. In the message erase operation the S8 closes before S40 opens to take over the holding circuit of the K2 relay.

B. In the message retention operation the S40 is already open and holding circuit goes through S8.

4.98 K3 relay operates: ground, through K3 winding, operated K2 1T to 2T, to P+.

- 4.99 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P+.
- 4.100 The green ANSWER AND RECORD lamp is extinguished by the operation of the K5 relay, which opens the E2 lamp circuit through its 1T and 3T contacts.
- 4.101 Motor starts: 115 volts ac from power plug P1, S4B 16 to 17, thermal relay (K9) contacts, fuse F1, operated K5 1B to 2B, motor winding, to other side of power plug P1.
- 4.102 The X2 rectifier circuit is closed through the K5 relay 5T to 4T, to supply 75 volts dc (Amp B+) to the amplifier.
- 4.103 Announcement drum clutch solenoid (L1) operates: ground, through L1, S23 1 to 3, normal K1 3T to 2T, operated K3 4B to 3B, to P+.
- 4.104 (a) Operation of L1 pulls drum pawl from slot in drum rim, allowing drum clutch to rotate drum.
(b) L1 operates linkage engaging cam clutch starting announcement cam rotation.
(c) Linkage between L1 and announcement bail causes announcement head carriage to move toward drum, causing record head (H1) to come into contact with magnetic recording band surface.
(d) As drum pawl disengages from slot in drum rim it operates S19.
- 4.105 K6 relay operates: ground, through K6 winding, S44 2 to 1, operated K2 4T to 3T, S39 2 to 1, normal K1 3T to 2T, operated K3 4B to 3B, to P+.
- 4.106 K6 relay locks up: ground, through K6 winding, S44 1 to 2, operated K2 4T to 3T, operated K6 2T to 1T, to P1+.
- 4.107 Incoming message drum flyback switch solenoid (L4) operates: ground, through L4 winding, S34 3 to 1, S44 2 to 1, operated K2 4T to 3T, S39 2 to 1, normal K1 3T to 2T, operated K3 4B to 3B, to P+; releasing S8 index contact, which restores to incoming message head carriage and closes S8.
- 4.108 Incoming message drum solenoid (L3) operates: ground, through L3, S24 1 to 3, operated K6 4T to 5T, to P1+.
- 4.109 The incoming message drum erase coil cycle is started by operation of the K6 relay 0.115 volts ac from power plug P1, S4B 16 to 17, thermal relay (K9) contacts, fuse F1 operated K5 2B to 1B, operated K6 1B to 2B, S43 1 to 2, S42 2 to 3, through incoming message drum erase coil, to other side of power plug P1.
- 4.110 After a little more than one revolution of incoming message drum, announcement cam 1-3 operates S43; inserting R219 (11A resistance lamp) in series with ac supply to erase coil, and placing R220 (4B thermistor) across message drum erase coil.
- 4.111 As K6 relay operates, the manual reset thermal time delay relay (K9) is placed across the 115-volt ac line, through R218 (11A thermistor) and R212 (536 ω resistance), to protect the erase coil from damage in the event of mechanical or electrical failure.
- 4.112 Approximately 1/2 second after S43 opens, S44 of cam 1-1 opens, releasing K6 relay and L4 solenoid, disconnecting the erase circuit.
- 4.113 Incoming message drum solenoid (L3) releases. Incoming message drum stops and cams restore to normal.
- 4.114 If message selector knob and message indicator dial are off normal, i.e., not under white dot on panel, the incoming message erase cycle will not take place due to S39 being open.
- 4.115 Approximately 3-1/2 seconds after first ring, cam 1-1 operates S15 enabling K7 relay winding to seize the telephone line.
- 4.116 K7 relay operates: 48 volts dc from CO or PBX line, to TS1 terminal R, S4A 1 to 2, S15 2 to 1, S31 1 to 3, K7 winding, S14B 2 to 1, normal K1 5B to 6B, S30 3 to 1, S4A 5 to 4, TS1 terminal T, to ground on CO or PBX line.
- 4.117 K7 relay locks up through its own 1T and 2T contacts.
- 4.118 K2 relay lockup circuit is transferred from S14A, to 2B and 1B of the K7 relay. The operation of announcement cam 1-2 opens S14A, placing K2 relay under control of K7.
- 4.119 Amplifier input circuit is established: amplifier input, through normal K4 relay 6T to 7T, S22 3 to 2, through announcement record-playback head (H1), to ground.
- 4.120 Amplifier output is established: output transformer (T1) 1 to 2, through output transformer (T2) 4 to 3, normal K4 relay 2T to 1T, to 1 of output transformer (T1).
- 4.121 Amplifier output is connected to CO or PBX line: output transformer (T2) 1 to 2, S31 3 to 1, S15 1 to 2, S4A 2 to 1, TS1 terminal R, through CO or PBX line, TS1 terminal T, S4A 4 to 5, S30 1 to 3, C203, S25 4 to 5, to 1 of output transformer (T2).
- 4.122 Announcement goes out on line to calling party.
- 4.123 At the end of announcement, adjustable limit switch (S7) operates energizing K1 relay.
- 4.124 K1 relay operates: ground, through K1 winding, S33 1 to 3, S41 9 to 8, S7 3 to 2, to P1+.
- 4.125 K1 relay locks up: ground, through K1 winding, operated K1 8T to 9T, operated K3 6B to 5B, to P1+.
- 4.126 K1 relay contacts 7B and 8B take over the task of enabling K7 to hold the telephone line from S15 of announcement cam 1-1.
- 4.127 The announcement drum solenoid (L1) releases and announcement head and cams restore to start position.
- 4.128 Incoming message drum solenoid (L3) operates: ground, through L3, S24 1 to 3, operated K1 1T to 2T, operated K3 4B to 3B, to P+.
- 4.129 Incoming message drum and cams starting rotating.
- 4.130 K4 relay operates: ground, through K4 winding, operated K1 4T to 5T, normal K6 3T to 1T, to P1+.
- 4.131 Bias oscillator and amplifier output circuit is established: amplifier output, operated K4 2B to 1B, S21 3 to 2, through incoming message record-playback head (H2), to ground.
- 4.132 Amplifier input circuit is established: amplifier input, operated K4 6T to 5T, operated K4 6B to 7B, R119, output transformer (T2) 3 to 4, to ground.
- 4.133 Amplifier input is connected to incoming CO or PBX line: through 1 and 2 of output transformer (T2), S31 3 to 1, operated K1 8B to 7B, S4A 2 to 1, TS1 terminal R, through incoming CO or PBX line, TS1 terminal T, S4A 4 to 5, S30 1 to 3, C203, S25 4 to 5, to 1 of output transformer (T2).
- 4.134 Operation of incoming message cam 2-2 sends first beep tone out on line, followed immediately by second beep tone: 75 volts dc (Amp B+), S17 2 to 3, through beep amplifier and output transformer (T2), to S18 2 to 1, R204, tone generator (G1), to ground.
- 4.135 Incoming message can now be recorded on drum.
- 4.136 The automatic volume control (AVC) is disabled while beep tone is on the line. Operation of S17 opens AVC at contacts 1 and 2 while beep tone is sent out over contacts 2 and 3.
- 4.137 Approximately 26 seconds after second beep tone, continued operation of cam 2-2 sends third and fourth beep tones out on line.
- 4.138 Operation of cam 2-3 operates S18 which selects full output of tone generator, causing the fourth beep tone to be louder than the other three beep tones.
- 4.139 Operation of cam 2-1 opens S16 about 2 seconds after last beep tone, releasing K2 relay.
- 4.140 (a) All relays release.
(b) Motor stops.
(c) Incoming message drum stops.
(d) Incoming message cams restore to start positions.
(e) Telephone line is released.
(f) Set is ready to receive another call.
- 4.141 If the calling party disconnects before the 30-second incoming message recording time has elapsed, the K7 relay releases, restoring the set to normal, ready to receive another call. This applies only to calling party control offices where there is a momentary open of CO battery when the calling party releases.
- 4.142 When the incoming message head reaches the point on the drum where only 35 seconds of message recording time remains, the S9 contacts open and the ANSWER AND RECORD and ANSWER ONLY lamps will not light.

4.143 Approximately 5 seconds later, the cam attached to the message selector knob assembly opens the contacts of S10. S10 opens the telephone ground circuit and subsequent calls would encounter a "don't answer" condition.

4.144 The last call which the set is able to receive will have the full 30-second message recording time. When the incoming message recording material is exhausted the S11 opens and disables the set for all four operating functions.

4.145 Switch positions for Fig. 11, 1B Telephone Answering Set Control Circuit:

FUNCTION	S 21	S 22	S 23	S 24	S 25	S 26	S 27	S 28	S 29	S 30	S 31	S 32	S 33	S 34	S 35	S 36	S 37	S 38	S 42
ANNOUNCEMENT DICTATE	1	1	2	2	1	1	1	1	3	2	2	0	0	0	0	1	1	1	1
ANNOUNCEMENT CHECK	2	2	1	1	2	1	1	1	2	2	2	0	0	0	0	0	0	0	1
MESSAGE PLAYBACK	1	1	2	2	3	1	1	1	2	2	2	0	0	0	0	0	0	0	1
AUTOMATIC ANSWER	2	2	1	1	4	0	0	0	1	1	1	1	1	1	1	0	0	0	3

5. CIRCUIT DESCRIPTION FOR IBA TELEPHONE ANSWERING SET

5.01 The following information applies only to the IBA telephone answering set. See Fig. 4 for location of relays. The circuit diagrams for this set are shown in Figs. 13 and 14.

Note: If the IBA set is equipped with a thermal time delay relay and fuse, the power supply and erase coil circuit is the same as for the 1B set (see Fig. 11).

5.02 The output of rectifiers follows:

- Rectifier X1 is 48 volts positive dc (P+ and P1+).
- Rectifier X2 is 75 volts positive dc (AMP B+).

Answering Set Turned Off

5.03 With the ON-OFF knob (S4 switch) in the OFF position, the associated telephone set is connected to the CO or PBX line as follows: from line to TS1 terminal R, S4A 9 to 8, TS1 terminal R1, through associated telephone set to TS1 terminal T1, S4A 11 to 12, TS1 terminal T, to the other side of the line. For associated telephone set ringing circuit, see Section C55.614, 1B and IBA Telephone Answering Sets, Installations and Connections, Figs. 9 through 13.

Answering Set Turned On

5.04 With the ON-OFF knob (S4 switch) in the ON position:

- The associated telephone set is disconnected from the CO or PBX line.
- Transformer T4 is energized: 115 volts ac from power plug P1, CB1, S4B, through T4, to other side of power plug P1. Transformer T4 provides 4 volts ac for the lamp power supply and energizes rectifier X1.
- The ON-OFF lamp (E1) lights: 4 volts ac from transformer T4, through E1 lamp, to other side of transformer winding.
- If call comes in during ANNOUNCEMENT DICTATE operation, the local telephone set will ring, but ringup relay K2 will not operate because telephone ground continuity to K2-6B is broken by S20 and S35.

Announcement Dictate

5.05 With the set turned on and the function selector knob (S1 switch) in ANNOUNCEMENT DICTATE position, the green ANSWER & RECORD lamp (E2) (ready light for ANNOUNCEMENT DICTATE function) lights as follows: 4 volts ac from transformer T4, E2, S37, normal K5 1T to 3T, S9, to other side of transformer winding.

5.06 Depress START button (S2 switch) momentarily. The K3 relay operates: ground, through K3 winding, S28, S2, to P+.

5.07 K3 relay locks up: ground, through K3 winding, operated K3 6T to 5T, S3, S27 1 to 3A, S11, S7 1 to 2, to P1+.

5.08 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.

5.09 The green ANSWER & RECORD lamp is extinguished by the operation of the K5 relay which opens the E2 lamp circuit through its 1T and 3T contacts.

5.10 Motor starts: 115 volts from power plug P1, CB1, S4B, operated K5 1B to 2B, motor winding, to other side of power plug P1.

5.11 The X2 rectifier circuit is closed, through the K5 relay 5T to 4T, to supply 75 volts dc (AMP B+), to the amplifier.

5.12 K1 relay operates (with S41 switch in ANSWER & RECORD position): ground, through K1 winding, S38 1 to 3, operated K3 6B to 5B, to P1+.

5.13 K1 relay operates (with S41 switch in ANSWER ONLY position): ground, through K1 winding, S38 1 to 3, operated K3 6B to 5B, to P1+.

5.14 K1 relay locks up: ground, through K1 winding, operated S38 1 to 3, K3 6B to 5B, to P1+.

5.15 K6 relay operates (with S41 switch in ANSWER & RECORD position): ground, through K6 winding, S44, operated K3 2T to 1T, S29 3 to 4, S41 2 to 3, to P+.

5.16 K6 relay operates (with S41 switch in ANSWER ONLY position): ground, through K6 winding, S44, operated K3 2T to 1T, S29 3 to 4, S41 2 to 1, S11, S7, to P1+.

5.17 Announcement drum clutch solenoid (L1) operates: ground, through L1, S24 2A to 3, operated K1 3B to 4B, operated K3 4B to 3B, to P+. During the erase cycle, there is a parallel path from S24 3, to operated K6 4T to 5T, to P+.

5.18 (a) Operation of L1 pulls drum pawl from slot in drum rim, allowing drum clutch to rotate drum.

(b) L1 operates linkage, engaging cam clutch starting announcement cam rotation.

(c) Linkage between L1 and announcement bail causes announcement head carriage to move toward drum, causing record head (H1) to come into contact with magnetic recording band surface.

(d) As drum pawl disengages from slot in drum rim, it operates S19 and opens S20.

5.19 K5 relay locks up: ground, through K5 winding, operated K3 3T to 4T in parallel with S19, to P1+.

5.20 The announcement drum erase coil (L5) is energized by the operation of the K6 relay: 115 volts ac from power plug P1, CB1, S4B, operated K5 1B to 2B, operated K6 1B to 2B, S43, S42 2 to 1, through L5, to other side of power plug P1.

5.21 After approximately one revolution of announcement drum (3 seconds minimum), announcement cam 1-3 operates S43, inserting R219 (11A resistance lamp) in series with ac supply to erase coil.

5.22 Approximately 3-1/2 seconds after K6 operates, announcement cam 1-1 operates S44, releasing the K6 relay, which opens the erase circuit.

5.23 K4 relay operates: ground, through K4 winding, operated K1 8T to 9T, normal K6 3T to 1T, to P1+.

5.24 Adjustable limit switch solenoid (L2) operates: ground, through L2, operated K4 8T to 9T, S24 2A to 3, operated K1 3B to 4B, operated K3 4B to 3B, to P+, releasing adjustable limit switch S7.

5.25 Bias oscillator and AVC tubes are activated when contacts 3T and 4T of the K4 relay open (see Fig. 14, IBA Amplifier and Power Supply Schematic).

5.26 Bias oscillator and amplifier output are connected to announcement record head (H1): amplifier output, operated K4 2B to 1B, S21 3 to 1A, through H1, to ground.

5.27 Amplifier input circuit is established: amplifier input, operated K4 6T to 5T and 6B to 7B, R119, output transformer T2 3 to 4, to ground.

5.28 Amplifier input is connected to associated telephone set: through 1 and 2 of output transformer T2, S31 3 to 2, S4A 7 to 8, to R1 of TS1, through associated telephone set, to T1 of TS1, S4A 11 to 10, S30 2 to 3, C203, S25 1 to 5, to 1 of T2. Battery supply is AMP B+ through R123 and R210 to S31 2 and R1, ground through R209, to S30 2 and T1.

5.29 ANNOUNCEMENT DICTATE lamp (E3) lights: 4 volts ac from transformer T4, through E3, S13 (operated by cam 1-3), S36, S9, to T4.

5.30 The customer can now dictate an announcement.

5.31 During the recording of the announcement the head carriage pushes the adjustable limit switch (S7) toward its maximum position.

5.32 Announcement cam 1-3 operated S13 at the end of the erase cycle to light DICTATE lamp E3. S13 stays operated during the announcement. About 5 seconds before the end of the announcement, dictate time cam 1-3 causes S13 to open momentarily, resulting in the ANNOUNCEMENT DICTATE lamp (E3) flashing.

5.33 When the customer completes his announcement, he operates the STOP button (S3 switch) momentarily.

(a) K3 relay releases.

(b) K1 relay releases.

(c) K4 relay releases.

5.34 Adjustable limit switch solenoid (L2) releases, clamping the adjustable limit switch (S7) mechanism in a position corresponding to the end of the recorded announcement.

5.35 Announcement drum clutch solenoid (L1) releases, allowing head carriage and cams to restore to START position.

5.36 The K5 relay is held up by the announcement drum pawl switch (S19) until the announcement drum pawl enters the slot in the drum rim.

(a) K5 relay releases.

(b) Motor stops.

(c) Green ANSWER & RECORD lamp lights.

(d) Set is restored to ANNOUNCEMENT DICTATE ready condition.

5.37 If the STOP button is not depressed by the customer at the end of the recorded announcement, the adjustable limit switch (S7) is operated by an extension of the head carriage at the physical limit of its travel. This releases all relays and solenoids and the machine is restored to ANNOUNCEMENT DICTATE ready condition.

Announcement Check

5.38 With the set turned on and the function knob (S1 switch) in ANNOUNCEMENT CHECK position, depress the START button (S2 switch) momentarily.

5.39 K3 relay operates: ground, through K3 winding, S28, S2 to P+.

5.40 K3 relay locks up: ground, through K3 winding, operated K3 6T to 5T, S3, S27 1 to 3B, S11, S7 1 to 2, to P1+.

5.41 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.

5.42 Motor starts: 115 volts ac from power plug P1, CB1, S4B, operated K5 1B to 2B, motor winding, to other side of power plug P1.

5.43 The X2 rectifier circuit is closed through K5 relay 5T to 4T, to supply 75 volts dc (AMP B+), to amplifier.

5.44 Announcement drum clutch solenoid (L1) operates: ground, through L1, S23 1B to 3, normal K1 5B to 4B, operated K3 4B to 3B, to P+.

5.45 (a) Operation of L1 pulls drum pawl from slot in drum rim, allowing drum clutch to rotate drum.

(b) L1 operates linkage, engaging cam clutch starting announcement cam rotation. Cams perform no operating function in this sequence.

(c) Linkage between L1 and announcement bail causes announcement head carriage to move toward drum, causing record head (H1) to come into contact with magnetic recording band surface.

(d) As drum pawl disengages from slot in drum rim, it operates S19.

5.46 Amplifier input is connected to announcement record head (H1): amplifier input, normal K4 6T to 7T, S22 3 to 2, through H1, to ground.

5.47 Amplifier output is established: ground, through output transformer T1 2 to 1, normal K4 1T to 2T, transformer T2 3 to 4, to ground.

5.48 Amplifier output is connected to associated telephone set: through transformer T2 1 to 2, S31 3 to 2, S4A 7 to 8, TS1 terminal R1, through associated telephone set, TS1 terminal T1, S4A 11 to 10, S30 2 to 3, C203, R201, S25 2 to 5, to 1 of transformer T2.

5.49 The announcement is reproduced in the associated telephone set and also in a headset if plugged into jack J1. Headset should always be removed when dictating an announcement.

5.50 At end of the announcement, the adjustable limit switch (S7) operates:

(a) K3 relay releases.

(b) L1 solenoid releases.

(c) Head carriage and cams restore to START position.

5.51 The K5 relay is held up by the announcement drum pawl switch (S19) until the announcement drum pawl enters the slot in the drum rim.

(a) S19 releases.

(b) K5 relay releases.

(c) Motor stops.

(d) Set is restored to ANNOUNCEMENT CHECK ready condition.

5.52 The STOP button (S3) will also release K3 and restore the set to ANNOUNCEMENT CHECK ready condition. The STOP button may be depressed at any time during the operation of the set in this function.

Message Playback

5.53 With the set turned on, and the function knob (S1 switch) in MESSAGE PLAYBACK position, depress the START button (S2 switch) momentarily.

5.54 K3 relay operates: ground, through K3 winding, S28, S2, to P+.

5.55 K3 relay locks up: ground, through K3 winding, operated K3 6T to 5T, S3, S27 1 to 3B, S11, S7 1 to 2, to P1+.

5.56 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.

5.57 Motor starts: 115 volts ac from power plug P1, CB1, S4B, operated K5 1B to 2B, motor winding, to other side of power plug P1.

5.58 The X2 rectifier circuit is closed through K5 relay 5T to 4T, to supply 75 volts dc (AMP B+), to the amplifier.

5.59 Amplifier input is connected to message record head (H2): amplifier input, normal K4 relay 6T to 7T, S22 3 to 1B, message head H2, to ground.

5.60 Amplifier output circuit is established: ground, through transformer T1 2 to 1, normal K4 1T to 2T, transformer T2 3 to 4, to ground.

5.61 Amplifier output is connected to associated telephone set: through transformer T2 1 to 2, S32 3 to 2, S4A 7 to 8, TS1 terminal R1, through associated telephone set, TS1 terminal T1, S4A 11 to 10, S30 2 to 3, C203, C209, S25 3 to 5, to 1 of transformer T2.

5.62 Incoming message drum clutch solenoid (L3) operates: ground, through L3 winding, S23 2A to 3, normal K1 5B to 4B, operated K3 4B to 3B, to P+.

5.63 Incoming message drum rotates and message is heard in associated telephone set and also in a headset if plugged into jack J1.

Note: Message cams rotate for one revolution and stop. Their rotation has no operational significance in message playback.

5.64 Incoming message drum is stopped by STOP switch (S3), which is operated by subscriber or by S11 switch if allowed to run until head carriage reaches end of the incoming message drum.

(a) K3 relay releases.

- (b) K5 relay releases.
- (c) Motor stops.
- (d) Message selector knob must be depressed and turned counterclockwise to allow S11 to reclose before any further operation.

Automatic Answer—Answer Only

- 5.65 With the set turned on, the function selector knob (S1 switch) turned to AUTOMATIC ANSWER, and service selector knob (S41 switch) turned to ANSWER ONLY, the K8 relay operates: ground, through K8 winding, S8 (or S40 via S41 13 to 14), S29 1 to 4, S41 2 to 1, S11, S7 1 to 2, to P1+.
- 5.66 Amber ANSWER ONLY lamp (E4) lights: 4 volts ac from transformer T4, through E4, S41 4 to 5, operated K8 3T to 2T, normal K5 1T to 3T, S9, to transformer T4.
- Note:** The zero on the message indicator dial and the white dot on the message selector knob must be adjacent, or the S8 switch will be open and the E4 lamp will not light.
- 5.67 An incoming call operates the K2 relay: ringing current from central office or PBX line to TS1 terminal R, S4A 1 to 2, C202, R215, TS1 terminal A, strap to TS1 terminal B, normal K7 7T to 6T, K2 winding 6T to 6B, S20, S35, S10 TS1 terminal G, to telephone ground.
- 5.68 K2 relay locks up: ground, through K2 winding 5B to 5T, R203, operated K2 1B to 2B, normal K1 4T to 3T, S14A, S16, S41 11 to 10, S29 1 to 4, S41 2 to 1, S11, S7 1 to 2, to P1+.
- 5.69 K3 relay operates: ground, through K3 winding, operated K2 1T to 2T, normal K1 4T to 3T, S14A, S16, S41 11 to 10, S29 1 to 4, S41 2 to 1, S11, S7 1 to 2, to P1+.
- 5.70 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.
- 5.71 The amber ANSWER ONLY lamp is extinguished by the operation of the K5 relay which opens the E4 lamp circuit through its 1T and 3T contacts.
- 5.72 Motor starts: 115 volts ac from power plug P1, C81, K4B, operated K5 1B to 2B, motor winding, to other side of power plug P1.
- 5.73 The X2 rectifier circuit is closed through K5 relay 5T to 4T, to supply 75 volts dc (AMP B+) to amplifier.
- 5.74 Announcement drum clutch solenoid (L1) operates: ground, through L1 winding, S23 1A to 3, normal K1 5B to 4B, operated K3 4B to 3B, to P+.
- Note:** If the zero on the message indicator dial and the white line on the message selector knob are aligned with the dot on the set panel and the message indicator dial is detented (to preset message drum erasure), the K6 relay will operate and the messages on the incoming message drum will be erased.
- 5.75 (a) Operation of L1 pulls drum pawl from slot in drum rim, allowing drum clutch to rotate drum.
- (b) L1 operates linkage, engaging cam clutch starting announcement cam rotation.
- (c) Linkage between L1 and announcement bail causes announcement head carriage to move toward drum, causing record head (H1) to come into contact with magnetic recording band surface.
- (d) As drum pawl disengages from slot in drum rim, it operates S19 and opens S20.
- 5.76 K5 relay locks up: ground, through K5 winding, S19, to P1+.
- 5.77 Approximately 3-1/2 seconds after the start of the first ring, cam 1-1 operates S15, enabling K7 relay winding to seize the telephone line.
- 5.78 K7 relay operates: 48 volts dc from central office or PBX line, to TS1 terminal R, S4A 1 to 2, S15, S31 1 to 3, operated K3 2B to 1B, K7 winding, S14B, normal K1 1T to 2T, S30 3 to 1, S4A 5 to 4, TS1 terminal T, to ground on central office or PBX line.
- 5.79 About 1 second after the line is seized, announcement cam 1-2 opens S14A and S14B. Opening of S14A places the K2 relay under control of the K7. Opening of S14B enables K7 to respond when central office battery is interrupted at the instant of calling party disconnect.
- 5.80 K7 relay locks up through its own 1T and 2T contacts.

- 5.81 K2 relay lockup circuit is transferred from S14A to 1B and 2B of the K7 relay.
- 5.82 Amplifier input is connected to announcement record head (H1): amplifier input, normal K4 6T to 7T, S22 3 to 2, through H1, to ground.
- 5.83 Amplifier output circuit is established: ground, through transformer T1 2 to 1, normal K4 1T to 2T, transformer T2 3 to 4, to ground.
- 5.84 Amplifier output is connected to central office or PBX line: transformer T2 1 to 2, S31 3 to 1, S15, S4A 2 to 1, TS1 terminal R, over central office or PBX line, to TS1 terminal T, S4A 4 to 5, S30 1 to 3, C203, S24 4 to 5, to 1 of transformer T2.
- 5.85 Announcement goes out on line to calling party.
- 5.86 If calling party disconnects during announcement, K7 releases which releases K2. The open contacts of S20, associated with announcement drum pawl mechanism, prevent a new call from being received until drum indexes.
- 5.87 At end of announcement, adjustable limit switch (S7) operates.
- (a) K2 relay releases.
 - (b) K3 relay releases.
 - (c) K7 relay releases.
 - (d) Telephone line is dropped.
 - (e) L1 solenoid releases, allowing head carriage to restore to START position.
- 5.88 The K5 relay is held up by the announcement drum pawl switch (S19) until the announcement drum pawl enters the slot in drum rim.
- (a) S20 closes.
 - (b) K5 relay releases.
 - (c) Motor stops.
 - (d) Amber ANSWER ONLY lamp lights.
 - (e) Set is ready to receive another call.

Automatic Answer—Answer and Record

- 5.89 With the set turned on, the function knob (S1 switch) turned to AUTOMATIC ANSWER, and the service selector knob (S41 switch) turned to ANSWER & RECORD, there is a choice of two other settings to be made.
- 5.90 If previously recorded messages are to be erased:
- (a) Turn message selector knob counterclockwise until it is against its stop. The white line on the knob should be below the white dot on the panel.
 - (b) Turn message indicator dial counterclockwise until it detents. The zero should be below the white dot on the panel.
 - (c) K8 relay operates: ground, through K8 winding, S41 12 to 11, S16, S14A, normal K1 3T to 4T, S41 15 to 14, S40, S29 1 to 4, S41 2 to 3, to P+.
- 5.91 If previously recorded messages are to be retained:
- (a) The zero on the message indicator dial and the white line on the message selector knob must be adjacent to each other.
 - (b) K8 relay operates: ground, through K8 winding, S8, S29 1 to 4, S41 2 to 3, to P+.
- 5.92 Operation of the K8 relay causes the green ANSWER & RECORD lamp (E2) to light: 4 volts ac from transformer T4, through E2, S41 6 to 5, operated K8 3T to 2T, normal K5 1T to 3T, S9, to transformer T4.
- 5.93 An incoming call operates the K2 relay: ringing current from central office or PBX line to TS1 terminal R, S4A 1 to 2, C202, R215, TS1 terminal A, strap to TS1 terminal B, normal K7 7T to 6T, K2 winding 6T to 6B, S20, S35, S10, TS1 terminal G, to telephone ground.
- 5.94 K2 relay locks up:
- (a) If preset for message erasure, ground, through K2 winding 5B to 5T, R203, operated K2 1B to 2B, S41 15 to 14, S40, S29 1 to 4, S41 2 to 3, to P+.
 - (b) If set for message retention, ground, through K2 winding 5B to 5T, R203, operated K2 1B to 2B, normal K1 4T to 3T, S14A, S16, S41 11 to 12, S8, S29 1 to 4, S41 2 to 3, to P+.

- 5.95 K3 relay operates:
- If preset for message erasure; ground, through K3 winding, operated K2 1T to 2T, S41 15 to 14, S40, S29 1 to 4, S41 2 to 3, to P+.
 - If set for message retention; ground, through K3 winding, operated K2 1T to 2T, normal K1 4T to 3T, S14A, S16, S41 11 to 12, S8, S29 1 to 4, S41 2 to 3, to P+.
- 5.96 K5 relay operates: ground, through K5 winding, operated K3 3T to 4T, to P1+.
- 5.97 The green ANSWER & RECORD lamp (E2) is extinguished by operation of the K5 relay, which opens lamp circuit through its 1T and 3T contacts.
- 5.98 Motor starts: 115 volts ac from power plug P1, CB1, S4B, operated K5 1B to 2B, motor winding, to other side of power plug P1.
- 5.99 The X2 rectifier circuit is closed through the K5 relay 5T to 4T, to supply 75 volts dc (AMP B+), to the amplifier.
- 5.100 Announcement drum clutch solenoid (L1) operates: ground, through L1, S23 1A to 3, normal K1 5B to 4B, operated K3 4B to 3B, to P+.
- 5.101 (a) Operation of L1 pulls drum pawl from slot in drum rim, allowing drum clutch to rotate announcement drum.
- L1 operates linkage, engaging cam clutch starting announcement cam rotation.
 - Linkage between L1 and announcement bail causes announcement head carriage to move toward drum, causing announcement record head (H1) to come into contact with magnetic recording band surface.
 - As drum pawl disengages from slot in drum rim, it operates S19 and opens S20.
- 5.102 K5 relay locks up: ground, through K5 winding, S19, to P1+.
- 5.103 If preset for message erasure, the first incoming call causes the operations described in 5.105 to 5.113.
- 5.104 K6 relay operates: ground, through K6 winding, S44, operated K2 4T to 3T, S39, normal K1 5B to 4B, operated K3 4B to 3B, to P+.
- 5.105 Incoming message drum fly-back switch solenoid (L4) operates: ground, through L4 winding, S34, S44, operated K2 4T to 3T, S39, normal K1 5B to 4B, operated K3 4B to 3B, to P+.
- 5.106 K6 relay and L4 locks up: ground through K6 and L4 windings (S34 for L4), S44 operated K2 4T to 3T, operated K6 2T to 1T, to P1+.
- 5.107 The incoming message drum erase coil (L6) is energized by operation of the K6 relay: 115 volts ac from power plug P1, CB1, S4B, operated K5 1B to 2B, operated K6 1B to 2B, S43, S42 2 to 3, through L6, to other side of power plug P1.
- 5.108 Incoming message drum solenoid (L3) operates: ground, through L3 winding, S24 1 to 3, operated K6 4T to 5T, to P+, starting incoming message drum and cam rotation.
- 5.109 Operation of L4 releases the S8 index contact by spreading the parallel bars, which restores to incoming message head and closes S8. In the message erase operation, the S8 closes before S40 opens to take over the holding circuit of the K2 relay.
- 5.110 After a little more than one revolution of incoming message drum, announcement cam 1-3 operates S43 which inserts R219 (11A resistance lamp) in series with ac supply to erase coil.
- 5.111 Approximately 1/2 second after S43 operates, announcement cam 1-1 operates S44 which releases K6 relay and L4 solenoid, disconnecting the erase circuit.
- 5.112 Incoming message drum solenoid (L3) releases. Incoming message drum stops and cams restore to normal.
- 5.113 Approximately 3-1/2 seconds after the start of the first ring, cam 1-1 operates S15, enabling K7 relay winding to seize the telephone line.
- 5.114 K7 relay operates: 48 volts dc from central office or PBX line, to TS1 terminal R, S4A 1 to 2, S15, S31 1 to 3, operated K3 2B to 1B, K7 winding, S14B, normal K1 1T to 2T, S30 3 to 1, S4A 5 to 4, TS1 terminal T, to ground on central office or PBX line.
- 5.115 K7 relay locks up through its own 1T and 2T contacts.
- 5.116 K2 relay lockup circuit is transferred from S14A to 2B and 1B of the K7 relay. The operation of announcement cam 1-2 opens S14A, placing K2 relay under control of the K7 approximately 4-1/2 seconds after the start of the first ring.
- 5.117 Amplifier input is connected to announcement record head (H1): amplifier input, normal K4 6T to 7T, S22 3 to 2, through H1, to ground.
- 5.118 Amplifier output circuit is established: ground, through transformer T1 2 to 1, normal K4 1T to 2T, transformer T2 3 to 4, to ground.
- 5.119 Amplifier output is connected to central office or PBX line: transformer T2 1 to 2, S31 3 to 1, S15, S4A 2 to 1, TS1 terminal R, over central office or PBX line, to TS1 terminal T, S4A 4 to 5, S30 1 to 3, C203, S24 4 to 5, to 1 of transformer T2.
- 5.120 Announcement goes out on line to calling party.
- 5.121 At the end of announcement, adjustable limit switch (S7) operates energizing K1 relay: ground, through K1 winding, S33, S41 9 to 8, S7 3 to 2, to P1+.
- 5.122 K1 relay locks up: ground, through K1 winding, operated K1 6B to 7B, operated K3 6B to 5B, to P1+.
- 5.123 K1 relay contacts 1B and 2B take over the task of enabling K7 to hold the telephone line from S15 of announcement cam 1-1, which restores to START position at end of announcement.
- 5.124 K1 relay contacts 1T and 2T open, enabling K7 to maintain calling party control as S14B closes with the flyback of cam 1-2 at transfer from announcement reproduce to incoming message record.
- 5.125 The announcement drum solenoid (L1) releases, and announcement head and cams restore to normal positions.
- 5.126 Incoming message drum solenoid (L3) operates: ground, through L3 winding, S24 1 to 3, operated K1 3B to 4B, operated K3 4B to 3B, to P+. Incoming message drums and cams start rotating.
- 5.127 K4 relay operates: ground, through K4 winding, operated K1 8T to 9T, normal K6 3T to 1T, to P1+.
- 5.128 Bias oscillator and AVC tubes are activated when contacts 3T and 4T of the K4 relay open (see Fig. 14).
- 5.129 Bias oscillator and amplifier output are connected to message record head (H2): bias oscillator and amplifier output, operated K4 2B to 1B, S21 3 to 2, through H2, to ground.
- 5.130 Amplifier input circuit is established: amplifier input, operated K4 6T to 5T, operated K4 6B to 7B, R119, transformer T2 3 to 4, to ground.
- 5.131 Amplifier input is connected to central office or PBX line: from transformer T2 1 to 2, S31 3 to 1, operated K1 2B to 1B, S4A 2 to 1, TS1 terminal R, over incoming central office or PBX line, TS1 terminal T, S4A 4 to 5, S30 1 to 3, C203, S25 4 to 5, to 1 of transformer T2.
- 5.132 Operation of incoming message cam 2-2 sends first signal tone out on line, followed immediately by second signal tone: 75 volts dc (AMP B+), S17 2 to 3, S32, through signal tone amplifier and transformer T2. Signal tone sequence is: signal tone generator (G1), R204, S18 1 to 2, signal tone amplifier, to ground.
- 5.133 Incoming message can now be recorded on drum.
- 5.134 The automatic volume control (AVC) is disabled while signal tone is on line. Operation of S17 removes 75 volts dc (AMP B+) from AVC tubes at contacts 1 and 2 while signal tone is sent out over contacts 2 and 3.
- 5.135 Approximately 24 seconds after second signal tone, continued operation of cam 2-2 sends third and fourth signal tones out on line.

5.136 Cam 2-3 operates S18 which selects full output of tone generator, causing the fourth signal tone to be louder than the other three signal tones.

5.137 Operation of cam 2-1 opens S16 about 2 seconds after last beep tone, releasing K2 relay.

- All relays release.
- Telephone line is released.
- Motor stops.
- Incoming message drum stops.
- Incoming message cams restore to START position.
- Green ANSWER & RECORD lamp lights.
- Set is ready to receive another call.

5.138 If the calling party disconnects before the 30-second incoming message recording time has elapsed, the K7 relay releases, restoring the set to normal ready to receive another call. This applies only to calling party control central offices where there is a momentary open of central office battery when the calling party releases.

5.139 When the incoming message head reaches the point on the drum where only 35 seconds of message recording time remains, the S9 contacts are opened by the cam attached to the message selector knob assembly. The ANSWER & RECORD and ANSWER ONLY lamps will not light after this point has been reached.

5.140 Approximately 5 seconds later, the cam which opened S9 opens S10. S10 opens the telephone ground circuit and subsequent calls will encounter a "don't answer" condition.

5.141 The last call which the set is able to receive will have the full 30-second message recording time. When the incoming message recording material is exhausted, S9-S10 and S11 are open and the set is disabled for all four operating functions.

5.142 Fig. 10 applies to both the 1B and 1BA telephone answering sets.

5.143 Switch positions for Fig. 14 are as follows:

Switch	Position			
	AUTOMATIC ANSWER	MESSAGE PLAYBACK	ANNOUNCEMENT CHECK	ANNOUNCEMENT DICTATE
S21	2-3	1B-3	2-3	3-1A
S22	2-3	1B-3	2-3	3-1A
S23	1A-3	2A-2B-3	1B-3	2B-3
S24	1-3	2B-3	1-3	3-2A
S25	4-5	3-5	2-5	1-5
S26	0	3-1	3-1	3-1
S27	0	3B-1	3B-1-3A	1-3A
S28	0	1-3	1-3	1-3
S29	1-4	0	0	4-3
S30	1-3	3-2	3-2	3-2
S31	1-3	3-2	3-2	3-2
S32	1-3	0	0	0
S33	1-3	0	0	0
S34	1-3	0	0	0
S35	1-3	0	0	0
S36	0	0	0	1-3
S37	0	0	0	1-3
S38	0	0	0	1-3
S42	2-3	2-3	2-3	2-1

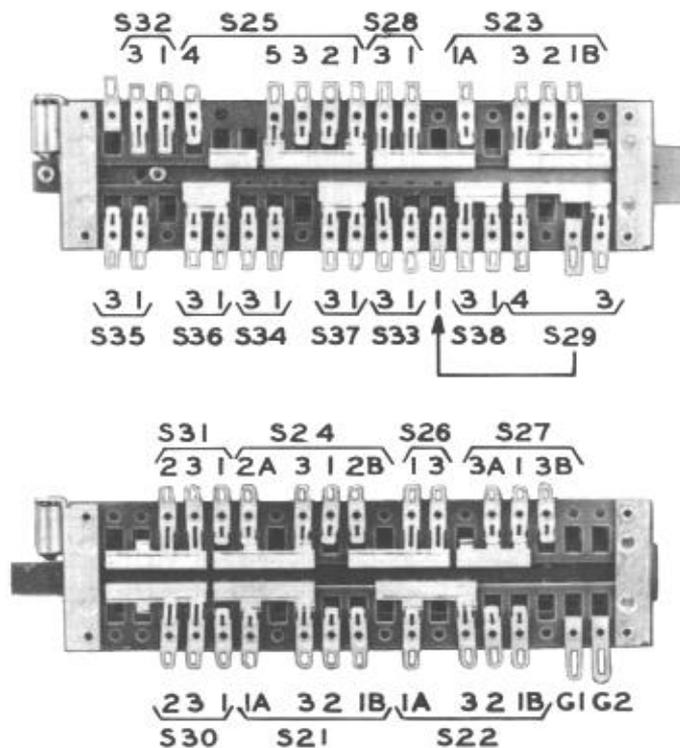
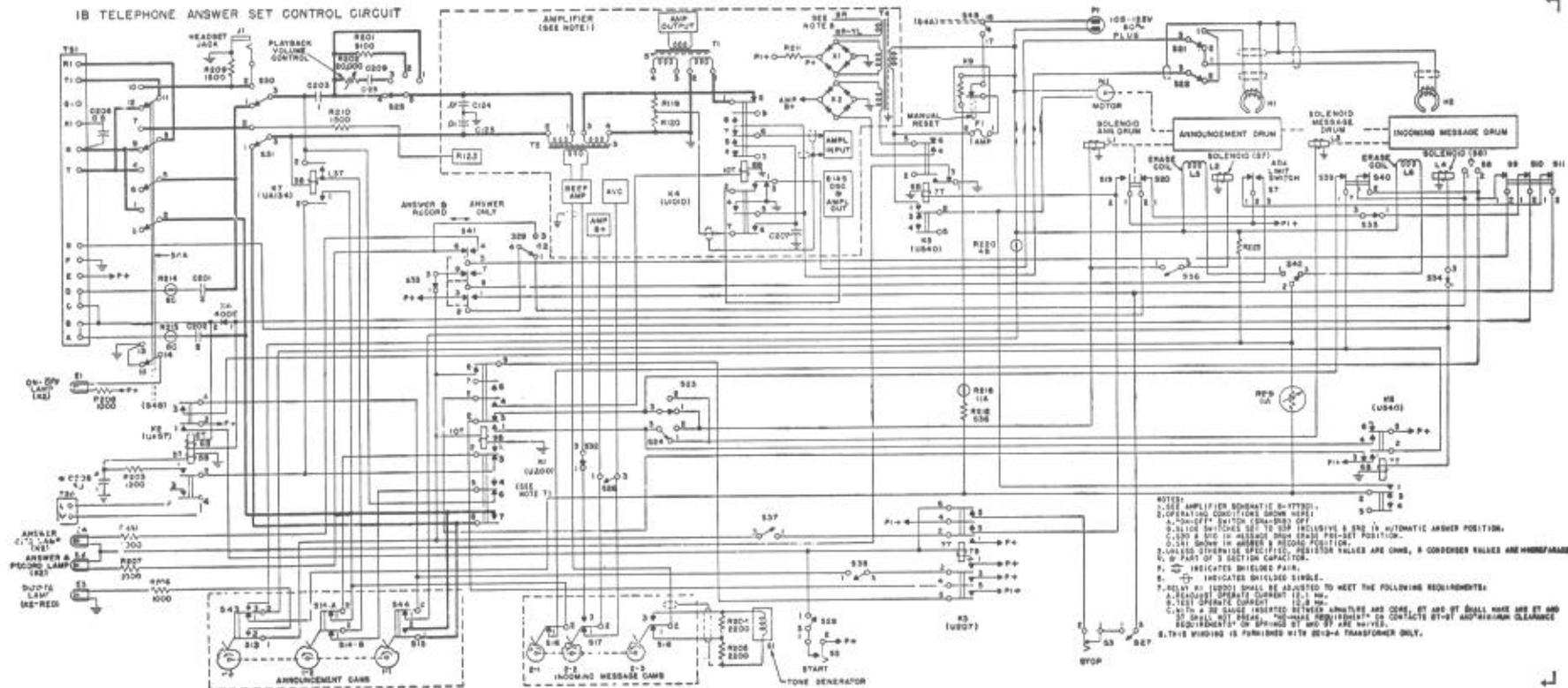


Fig. 10—S1 Slide Switch—Showing Position of Switches and Contacts—Shown in Announcement Dictate Position (Switch Shown in Two Parts for Clarity)



- NOTES:
1. SEE AMPLIFIER SCHEMATIC 0-117320.
 2. OPERATING CONDITIONS SHOW HERE.
 3. "ON-OFF" SWITCH (S14-S15) OFF.
 4. C-101 & C-102 IN MESSAGE DRUM SHALL PRE-SET POSITION.
 5. C-101 & C-102 IN ANSWER DRUM SHALL PRE-SET POSITION.
 6. VALVED DIVERTER SPECIFIED, POSITION VALVES ARE OHMS, & CONDENSED VALVES ARE WINDUP/PAUSE.
 7. PART OF 3 SECTION CAPACITOR.
 8. - indicates shielded pair.
 9. - indicates shielded single.
 10. RELAY R1 (1000) SHALL BE ADJUSTED TO MEET THE FOLLOWING REQUIREMENTS:
 1. REQUIRED OPERATING CURRENT 12.1 MA.
 2. TEST SPRING CURRENT 12.8 MA.
 3. CONTACT TO BE CLOSED (SEPARATE BETWEEN ARMATURE AND CORE, AT ARE OF SHALL HAVE 0.015 IN AND 0.015 IN) PRESSURE REQUIREMENT IN CONTACTS BT-WT AND BT-WT CLEARANCE REQUIREMENT IN CONTACTS BT-WT AND BT-WT SHALL HAVE 0.015 IN AND 0.015 IN.
 11. THIS WINDING IS FURNISHED WITH 8013-A TRANSFORMER ONLY.

Fig. 11-1B Telephone Answering Set Control Circuit

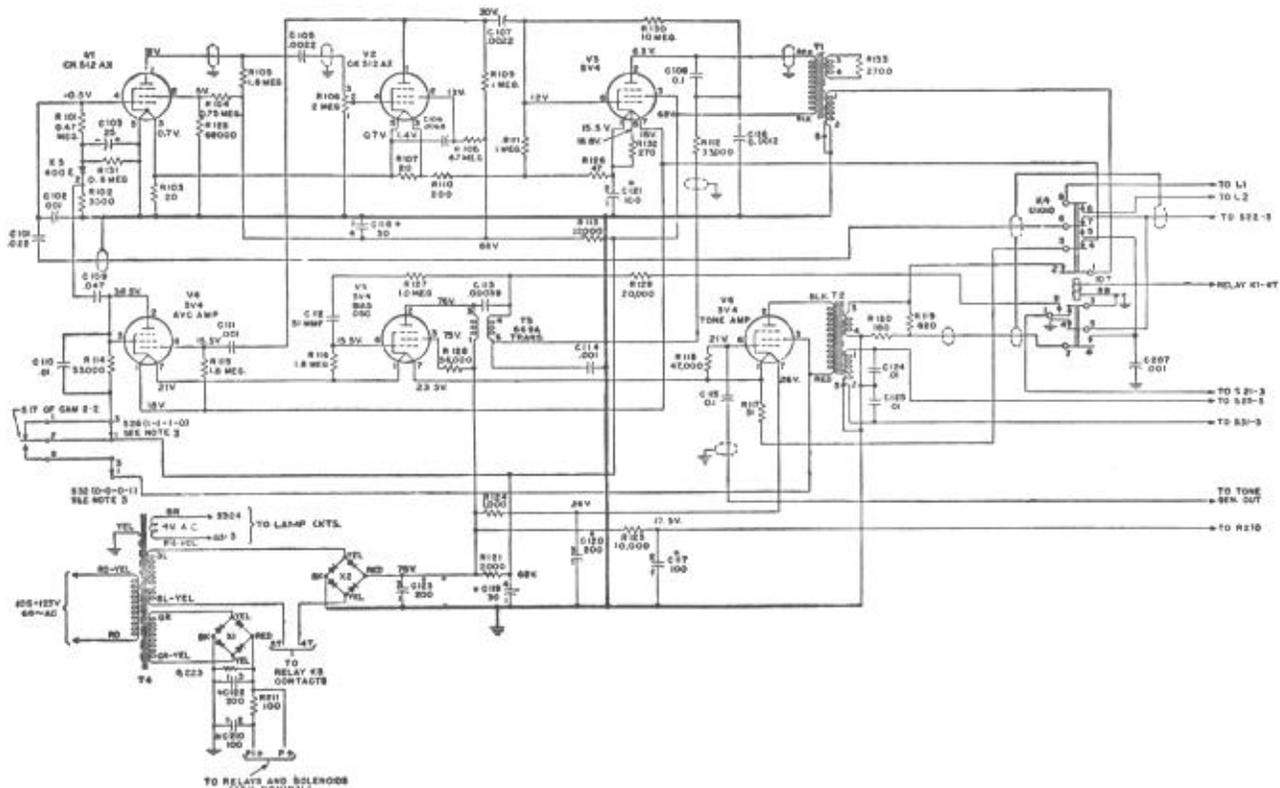


Fig. 13—1BA Amplifier and Power Supply Schematic

NOTES:

- 1- RESISTOR VALUES ARE OHMS UNLESS OTHERWISE SPECIFIED.
- 2- CAPACITOR VALUES ARE MICROFARADS UNLESS OTHERWISE SPECIFIED.
- 3- NOTATION ASSOCIATED WITH S22 AND S23 DESIGNATES POSITION OF SWITCHES IN THE FOUR FUNCTIONAL POSITIONS OF S1: S22 (I-I-DO) S23 (CLOSED-CLOSED-CLOSED-OPEN) IN ANNOUNCEMENT-DICTATE, ANNOUNCEMENT-CHECK, MESSAGE-PLAYBACK, AND AUTOMATIC ANSWER RESPECTIVELY.
- 4- VOLTAGES ARE NOMINAL VALUES MEASURED WITH VACUUM TUBE VOLTMETER BETWEEN INDICATED TERMINAL AND GROUND, WITH THE FUNCTION SWITCH AT ANNOUNCEMENT-DICTATE AND A LINE VOLTAGE OF 115 V. 60-HZ. AC.
- 5- FOR INTERCONNECTING INFORMATION SEE S-163502
- 6- S-2 INDICATES THAT THIS CAPACITOR IS PART OF A 3-SECTION CAPACITOR AS FOLLOWS:
C102 & C103 ARE IN ONE UNIT.
C107, C09, & C105 ARE IN ONE UNIT.
C108, C106, & C104 ARE IN ONE UNIT.

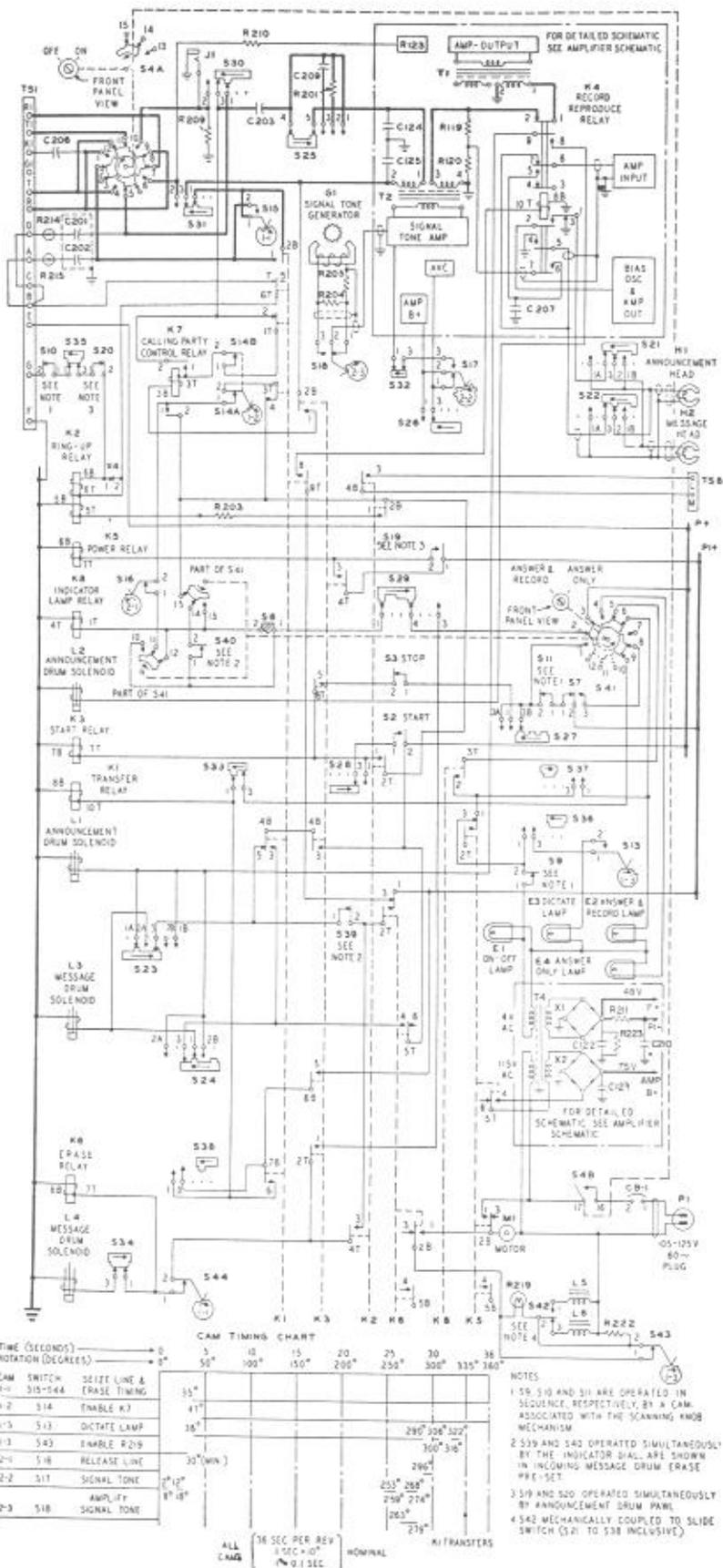


Fig. 14—IBA Telephone Answering Set—Control Schematic