AUTOMATIC TELEPHONE ANSWERING AND RECORDING

KS-14580 TELEPHONE ANSWERING SET

(PEATROPHONE)

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1. GENERAL

1.01 The KS-14580 telephone answering set (Peatrophone) is a machine used to furnish automatic telephone answering and recording service on central office and PBX extension lines. It is designed to answer an incoming call with a susbscriber's prerecorded announcement and to record the caller's message if he cares to leave one.

1.02 The announcement or talk-out message is variable up to about 30 seconds, while the incoming recording cycle is fixed at about 26 seconds. Maximum circuit holding time for the total cycle is approximately 60 seconds. Total time available for the recording of incoming messages is approximately one hour.

1.03 The Peatrophone connects directly to the telephone line and can be used with individual, 2-party, and 4-party full selective lines and PBX extensions. In the case of party lines, it is necessary to use a modified 531C subscriber set as auxiliary

equipment to reduce the chance of false starts from cross rings and give full selective ringing for 4-party lines.

2. DESCRIPTION

2.01 The machine consists of recording and reproducing equipment enclosed in a metal cabinet about 10 by 14 by 8 inches in size and weighs about 40 pounds (Fig. 1).

2.02 Subscriber-operator controls include record, playback, automatic, off, and test talk-out buttons. In addition, there are record and pickup arms, and ready, warning, pointer, and volume indicator lights.

2.03 Recording is accomplished on vinylite records by the embossing process. The larger record (KS-14583, List 1), which is about 8 inches in diameter, is used for recording incoming messages and will accommodate a maximum of about 130, 26-second messages on each side. The smaller record (KS-14583, List 2), which is about 4 inches in diameter, is used for the announcement message and, as used, accommodates one message of about 30 seconds maximum duration on each side. The announcement message is recorded by the subscriber using the transmitter of the associated telephone set as a recording microphone.

2.04 A terminal strip provides for installation connections to the telephone line and the local station.

3. POWER REQUIREMENTS

3.01 The machine is intended for use on a 115-volt 60-cycle ac power supply. For operation in dc areas an inverter per KS-15662 is available.

3.02 The power consumption when the set is responding to a call is about 90 watts. In the standby condition (automatic button depressed and machine awaiting a call), the consumption is about 25 watts. No power is drawn when the OFF button is depressed.

3.03 The machine is protected by means of a 2-ampere fuse which is located at the left rear of the chassis next to the warning light. This is a #312002 Littelfuse, 2a, or equivalent.

4. OPERATION

A. Recording an Announcement Message

4.01 In order to record an announcement message, the user must place a 4-inch record (KS-14583, List 2) on the large turntable, lift the record arm, move it toward the center of the record up to the record arm stop, release it, and depress the record button. Warning light LP1 will be lighted. After several seconds, the large turntable will begin to turn, and the record stylus will be lowered onto the record which will turn through about one revolution to form a "lead-in" groove. The pointer light LP3 will light in approximately seven seconds to indicate that the machine is ready to record an announcement message.

4.02 The announcement message should begin as soon as the dictate light comes on and should be dictated into the transmitter of the telephone at a high enough level to keep the volume indicator light LP4 flashing. Immediately after the message has been completed, the OFF button should be depressed. This results in a record on which the groove stops at the end of the message and, when the machine is handling an incoming call, this will insure minimum time between completion of the announcement message and transmission of the beep tone which indicates that the caller should begin speaking. This beep tone is transmitted after the pickup stylus rides out of the groove at the end of the message and operates a switch which transfers the machine into its incoming recording cycle.

4.03 If the telephone is hung up before the OFF button is depressed, the sound of the hangup will be recorded unless the complete cycle has been used. This hangup sound will then be transmitted when the machine answers a call and may confuse the caller.

4.04 Unless the OFF button has been previously depressed, the large turntable will stop after about 30 seconds, thus preventing a longer message from being made. If the message is incomplete when the large turntable stops, it must be recorded again on an unused record side.

4.05 A library of announcement messages can be retained by the user.

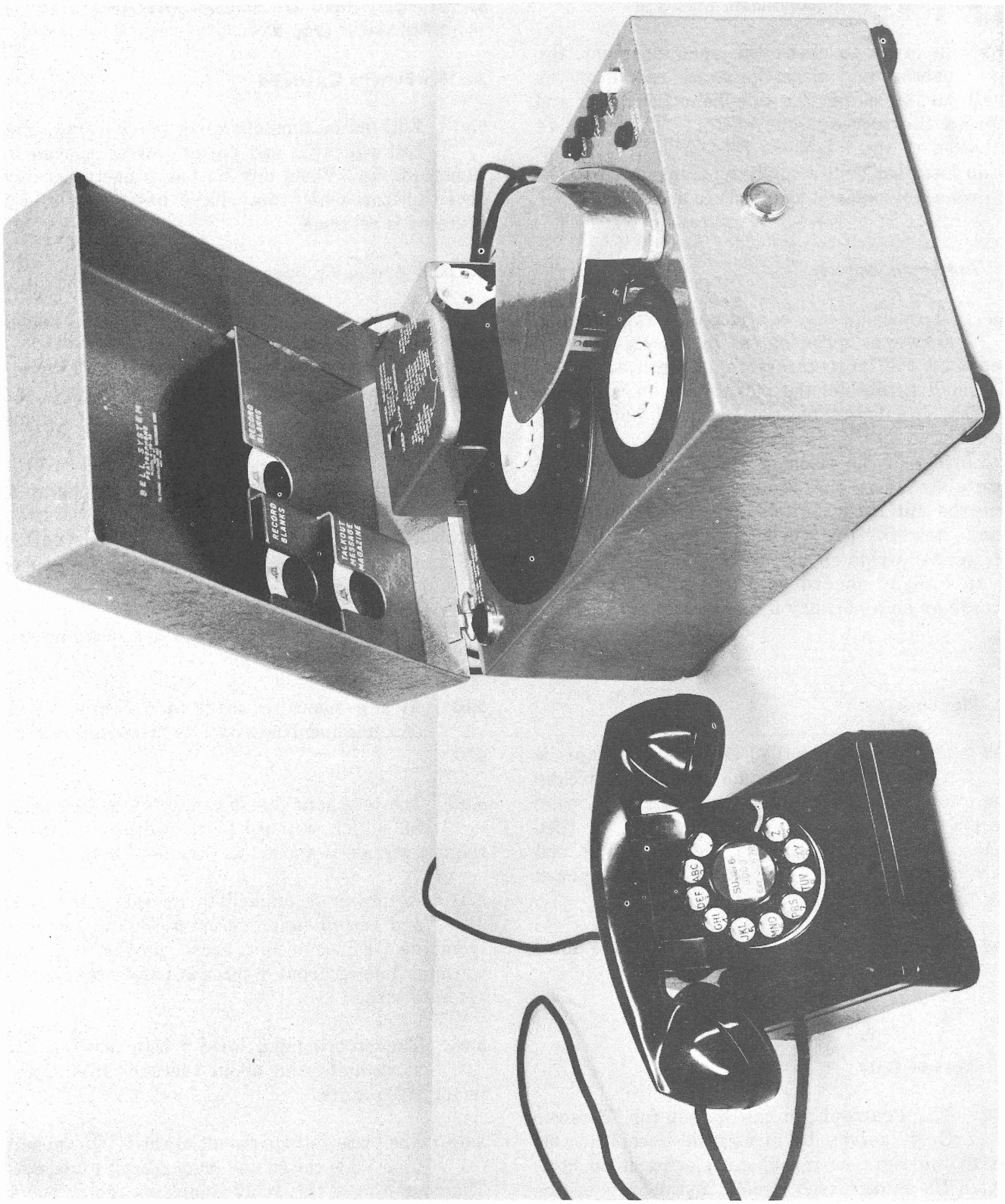


Fig. 1—KS-14580 Telephone Answering Set (Peatrophone)

B. Checking the Announcement Message

4.06 In order to check the announcement, the user should place the 4-inch record on the small turntable, lift the telephone hand set, and depress the test talk-out button. The message delivered to the telephone receiver will be about 10 db less than will actually be transmitted to the line when the machine responds to a call.

C. Automatic Answer

4.07 The machine may be arranged to automatically answer an incoming call by placing an 8-inch record on the large turntable, a 4-inch record on the small turntable, the pickup arm in is normal position, and depressing the automatic button. The ready light will light, and the red warning light at the rear of the machine will go out. The large turntable will make about one revolution each time the automatic button is depressed so that a blank "lead-in" groove will always be provided. The record stylus should be located near the edge of an unused record or just inside the latest recordings on a partially used record.

D. Playback

4.08 Playback of recorded incoming messages is accomplished by manually moving the pickup arm into position on the large turntable, depressing the playback button, and listening to the recorded messages in the telephone receiver. The red warning light will be lighted while the playback button is depressed.

4.09 Recorded incoming messages can be retained by the user.

E. Answer Only

4.10 The Peatrophone can be set for "Answer Only" service by moving the record arm as far to the right as it will go, placing it on hook switch D9 as discussed in 5.37, and depressing the automatic button. The ready light will not be lighted in this condition but the machine will respond to an incoming ring, transmit the announcement message to the caller, and then disconnect.

5. FUNCTIONING OF EQUIPMENT AND CIRCUIT OPERATION (Fig. 2)

A. No Buttons Operated

5.01 With no buttons operated, the warning light LP1 will light and power will be applied to transform T3. When any button is operated, any other button which may have been previously operated is released.

B. OFF Button K1 Operated

5.02 The warning light LP1 goes out and power is disconnected from T3.

5.03 The telephone line is connected through the OFF button K1 directly to the local telephone set, and the Peatrophone draws no power.

5.04 After the OFF button K1 has been operated, subsequent operation of any other button requires a warmup time of 4 to 5 seconds before the amplifier will pass current causing plate relay S1 to operate which starts the machine.

C. Record Button K4 Operated, Recording an Announcement Message

5.05 Arrangements are made for recording of an announcement message as discussed in Part 4A.

5.06 The telephone line is connected to ring relay S2 which will give an audible signal if ringing voltage is applied as discussed in 5.33.

5.07 Ac power is applied to record motor MO2 and record timer motor MO4. If switched from the OFF condition, there may be a circuit warmup time of about 4 seconds before the motors begin to turn.

5.08 The record head lowers into postion and starts embossing about 3 seconds after record motor MO2 starts.

5.09 The plate voltage circuit of the 6AQ5 vacuum tube V3 is closed and plate relay S1 operates. The operation of this relay completes the ac power circuit to start recording.

5.10 The timing of the talk-out recording is controlled by the cam of record timer motor

MO4 and is as follows. The cam operates switch D5 seven seconds after operation of the record button to allow for a "lead-in" groove and warmup. Operation of D5 closes the circuit causing pointer lamp LP3 to light, indicating that the machine is in a recording condition. The control side of ac power is open at K4 through the contacts of 26-second record switch D6 and a contact of S8 so the contacts of 30-second record switch D8 will control the recording time. After 30 seconds of recording, the cam will operate switch D8 releasing the control side of ac power and operating solenoid S7 (through made contact of D8) which mechanically releases record button K4. If less than a 30-second recording is made, the circuits are released by operating OFF button K1.

5.11 The local telephone set is used to record the talk-out message. The transmitter current for this condition is obtained from the 12-volt rectifier RF5, and the speech circuit for recording the talk-out message is from the local telephone set through isolation transformer T1 to contacts of S9 to the amplifier input, through the amplifier to output transformer T2 and to the recording head.

D. Test Talk-Out Button K5 Operated

5.12 In order to test a talk-out record, it is placed on the small turntable and the test talk-out button K5 is operated.

5.13 The telephone line is connected to ring relay S2 which will buzz if an incoming ringing signal is received. The machine will not start in response to a ringing signal with K5 operated, however, since the control side of ac power is open at automatic button K2.

5.14 Operation of K5 also removes the short from the 3000-ohm resistor R38; this places approximately a 10-db loss in the speech path of the talk-out message.

5.15 One contact of K5 opens the ac power control path to midcycle relay S6 and another closes the ac power control side to operate start relay S4.

5.16 The operation of the start relay S4 starts the talk-out motor MO1 and talk-out timer motor MO3 to control the turning of the turntable and the timing of the talk-out message, as discussed in 5.25.

5.17 The recorded talk-out message is picked up and amplified and then transmitted through isolation transformer T1 to the local telephone set.

5.18 At the end of the talk-out message, the pickup arm moves toward the center of the record and operates midcycle switch D3 releasing start relay S4. This closes the control circuit of solenoid S7 which, in operating, mechanically releases the test talk-out button K5. Motor MO1 continues to run until the cam on the turret opens contact D11, at which time the pickup is in its normal position and the talk-out motor and talk-out timer motor stop. If D3 does not operate, the circuit will release when limit switch D4 opens the circuit to S4.

E. Automatic Button K2 Operated, Standby Condition

5.19 At the time the automatic button K2 is operated, warning lamp LP1 goes out. Ac power is available to operate motors and rectifiers for relay operation and is also connected to transformer T3 to energize the power rectifier and amplifier and amplifier vacuum tube filaments. At this time plate voltage is supplied to V1 and V2. Twelve volts dc is also applied to energize delay relay S3.

5.20 The ready light LP2 lights.

5.21 The telephone line is connected to the ring relay S2 through key K1 in its non-operate position in series with condenser C23.

F. Overthrow Automatic Button K6

5.22 The overtravel of the K2 button momentarily operates K6, energizing the auto relay S8 which locks under control of 7-second delay contact D5 and one contact of S8 starting record motor MO2. Another contact of S8 closes a circuit which starts the record timer motor MO4. This causes the record head to be lowered onto the record and to emboss a blank "lead-in" groove. After about 7 seconds, the cam of record timer motor MO4 operates switch D5 releasing auto relay S8 and stopping record motor MO2 and record timer motor MO4.

G. Automatic Button K2 Operated, Answering a Call

5.23 The ringing signal received over the telephone line operates ring relay S2 which emits a buzzing sound audible at some distance. If the ring persists for more than about 0.5 second, the 12-volt operate circuit is removed from delay relay S3 long enough to release it. Release of S3, with S2 operated, closes the circuit to rectifier RF1, energizing start relay S4 which is operated and is held operated through one of its own contacts.

5.24 Ready light LP2 is extinguished.

5.25 When the start relay S4 operates,

(a) It completes the plate path to the 6AQ5 vacuum tube V3, operating the plate relay S1 and completing activation of the amplifier. The operation of the plate relay S1 connects 220-ohm resistor R36 across the 12-volt rectifier RF5 and connects the control side of the ac line to talk-out motor MO1. Start relay S4 locks and holds through its own contact until it is released by operation of 26-second timer switch D6, midcycle switch D3, or limit switch D4.

(b) It completes the telephone line circuit to isolation transformer T1 terminating the telephone line and releasing the ringing voltage at the central office. Ring relay S2 and delay relay S3 are thereby restored to their original conditions.

(c) It connects the control side of ac power to talk-out timer motor MO3. This starts MO3 which in turn rotates the talk-out timer cam.

(d) It connects the control side of ac power to talk-out motor MO1 starting the talk-out turntable.

(e) It also connects the control side of ac power to trip magnet S5. When S5 operates, it causes gears to mesh and this enables the pickup turret drive through a drive belt arrangement. The turret is designed to lower the pickup stylus onto the talk-out record and, after rotating approximately 90°, it is stopped by the opening of contact D10 operated by a cam on the turret. The pickup stylus then follows the groove of the talk-out record.

H. Automatic Button K2 Operated, Delivering an Announcement Message

5.26 The speech path for the talk-out message is from the pickup to the amplifier input, through the amplifier to output transformer T2, and then to isolation transformer T1 to the telephone line.

5.27 At the end of the talk-out message, the pickup stylus, having no groove to hold it, slides toward the center of the record, and a cam associated with the pickup arm assembly trips the midcycle switch D3. This operates the midcycle relay S6 which then transfers the circuits to record an incoming message as described in Part I. Amplifier relay S9 operates simultaneously with midcycle relay S6. The trip magnet S5 is energized by a contact of midcycle relay S6, causing the gears to mesh and the turret to rotate and the pickup to return to its original position. Contacts D10 and D11 are then opened by turret cam operation, and power to S5 and S6 is interrupted.

I. Automatic Button K2 Operated, Recording an Incoming Message

5.28 With the operation of midcycle relay S6 and amplifier relay S9, the Peatrophone is now ready to record an incoming message. The contacts of midcycle relay S6:

(a) Open the control side of ac power to talk-out timer motor MO3.

(b) Transfer the control side of the ac power circuit of talk-out motor MO1 from the midcycle relay to switch D11 which releases this motor when the pickup has returned to its original position.

(c) Apply power to record motor MO2 and record timer motor MO4 by closing the control side of the ac power circuit.

(d) Place a hold on midcycle relay S6 which is then under the control of 26-second record switch D6.

The operation of amplifier relay S9 transfers amplifier input from the pickup to the telephone line through isolation transformer T1, and it transfers amplifier output from the telephone line to the

recorder head. The Peatrophone is now in a recording condition.

5.29 During the recording interval, the beep tone generator MG will be connected to give beep tone at approximately one second (switch D7) and 24 seconds (switch D12) after the start of recording. The beep tone generator magnetizing coil is energized by dc voltage from rectifier RF1, controlled by contacts on the cam of recording timer motor MO4 making contact through the outside springs of switches D7 and D12. The beep tone generator output voltage is applied to isolation transformer T1 through a contact of start relay S4 and is connected to ground through the inside contacts of switches D7 and D12. To prevent beep tone from being recorded on the record with the incoming message, the suppressor grid of V2 is grounded by the center contacts of D7 and D12.

5.30 At the end of the recording interval of 26 seconds, the record timer cam opens the ac power circuit (opens D6) to start relay S4 releasing this relay. This releases all other circuits and restores the Peatrophone to a standby condition.

J. Playback Button K3 Operated

5.31 The operation of playback button K3 mechanically lifts the recording head off the record.

5.32 Warning lamp LP1 is lighted.

5.33 The telephone line is connected to ring relay S2. This relay will respond to ringing voltage to give an audible signal, but the start relay S4 will not operate since the control side of ac power is open at automatic button K2 which is in the nonoperate position. If an incoming call is received, it can be answered manually by operation of the OFF button K1 or by enabling the machine to answer it by operating the automatic button K2.

5.34 The pickup arm must be moved manually over to the recording turntable in order to play back the recorded messages. The signal is picked up, fed through the amplifier, and then transmitted through isolation transformer T1 to the local telephone set. Record motor MO2 operates until the playback button K3 is released, at which time the pickup arm must be returned manually to its original position on the pickup bridge. On later production, the ready light will not light until the pickup arm has been returned to its original position.

K. Special Switches Not Covered in Other Circuit Operations

5.35 Switch D1 in the fused side of ac power is operated by the cover when it is on the machine. When D1 is open, however, power is not removed from the ac terminals.

5.36 Switch D2 is operated when all recording space for incoming messages has been used. It opens the control side of ac power to prevent the Peatrophone from receiving calls for which no recording space is available.

5.37 Hook switch D9 is provided so that the Peatrophone may be used for "Answer Only" service. In this condition, with the automatic button operated, the machine will answer calls and disconnect immediately after transmitting the talk-out message rather than switching to a record condition for the recording of incoming calls. At the end of the announcement, the pickup arm operates D3 which releases relay S4. If D3 is not operated after 90 seconds (30 seconds or 43 seconds on early production), a cam associated with timer motor MO3 operates contact D4 and thereby releases S4. The circuit is then restored to its standby condition.

6. AMPLIFIER

6.01 A single speech amplifier is used for recording and reproducing both incoming and outgoing messages.

6.02 The amplifier consists of four stages of amplification using three tubes: a 12AX7 (double triode), a 6AU6, and a 6AQ5 (designated V1, V2, and V3). Automatic volume control is provided by means of a 6AL5 tube (designated V4) and associated circuitry.

6.03 Power is supplied to the amplifer from the main 115-volt ac source through power transformer T3.A, 6.3-volt winding of the secondary of T3 provides filament current to all tubes, and a second winding supplies voltage to rectifier RF5 which furnishes 12 volts dc for operation of relays, for transmitter current for the local telephone set and for rectifier RF7. A third winding of the secondary of T3 provides 450-volt C-bias voltage

through rectifier RF6 for the AVC of the V4 tube. It also provides plate current to the tubes through rectifier RF4 and a filter system.

6.04 The output of V3 is fed through transformer T2, one side of the primary being connected to the winding of plate relay S1. The secondary output is transferred via contacts of S9 to the local telephone set, the telephone line, or recording or pickup heads as required.

6.05 AVC tube V4 is suppressed until the output voltage of V3 is high enough to cause V4 to pass current which then affects the bias voltage of V1. The master and gain control potentiometers are provided to control the point of operation and the rate of change of the AVC. The master potentiometer controls the ceiling of the AVC and the gain potentiometer controls the rate at which the amplifier approaches this ceiling. These controls are adjusted properly during production and should not be changed.

6.06 AVC operates on all conditions: record, test talk-out, announce, incoming recording, and playback.

7. TRANSMISSION CONSIDERATIONS

A. General

7.01 The Peatrophone is designed to operate at normal telephone speech levels, and the quality of the speech reproduced from both the talk-out and incoming message records is expected to be intelligible and comparable to good telephone transmission.

7.02 Talk-out announcements should be recorded, if possible, with room noise at a minimum. If room noise is high, background noise may be recorded.

7.03 When recording an announcement message, the user should begin to speak as soon as the pointer light LP3 lights so that, when the machine is handling a call, the interval between the time the machine responds to the incoming ring and the start of the announcement will be short.

7.04 The response characteristic is essentially flat in the 200- to 3000-cycle range but drops off sharply at about 200 cycles to reduce low-frequency noise.

B. Transmission Levels

7.05 The transmitting level of the talk-out announcement to the telephone line will normally be about −3 to −5 vu. If the user departs from normal speaking level to a degree not readily compensated for by AVC when dictating his announcement message, this value might vary from about 0 to −8 vu. The design is such that rectifier RF7 limits the maximum level that can be delivered to the telephone line to about +8 vu.

7.06 The minimum incoming signal which the set will pick up amd record for intelligible reproduction is about −60 vu. It is expected that this will enable messages to be recorded at a satisfactory level by a weak talker over limiting connection. If the gain were increased beyond what is provided to compensate for low incoming level, unsatisfactory noise and crosstalk conditions might result.

7.07 The message playback level to the telephone set is about −10 vu. This can be changed to the extent of about 10 db by adjustment of P1, the playback volume control which is not accessible to the subscriber.

7.08 The test talk-out transmission path introduces a loss of about 10 db by insertion of a 3000-ohm resistor, R38, into the circuit so that the recorded talk-out announcement will be heard at the set location at approximately the same level as would be experienced by a caller over an average telephone circuit.

8. SUPERVISION

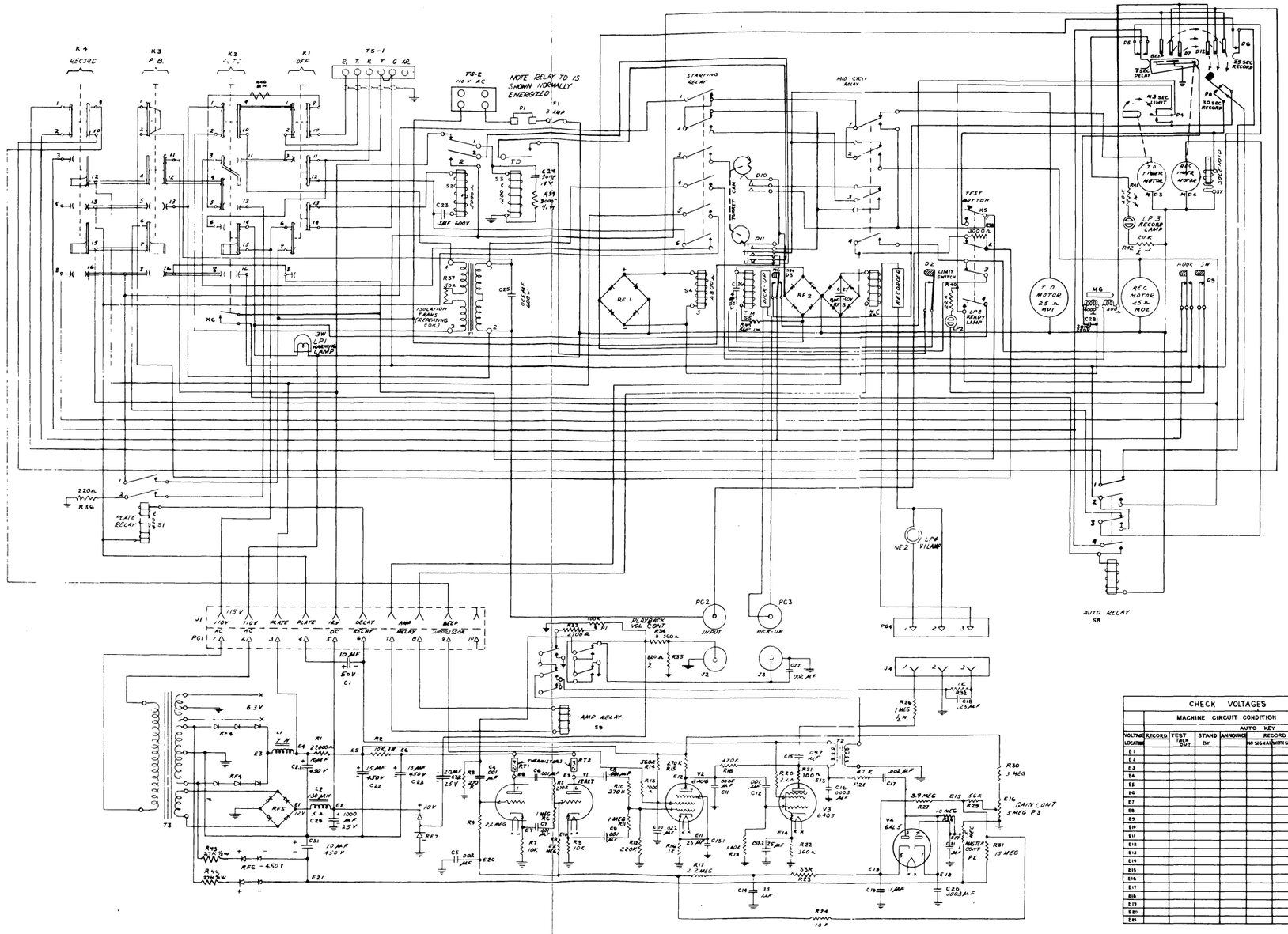
8.01 The impedance of the ringing circuit is approximately 13,000 ohms at ringing frequency and represents one high-impedance bridge. An audible signal is provided by relay S2 which is designed to buzz when ringing current is applied to it. If the telephone set ringer is also connected across the line to provide a ring in addition to the buzz of the Peatrophone, the combination represents two high-impedance bridges. Minimum ringing current required at 20 cps is about 2.5 to 5.0 milliamperes.

8.02 The circuit is designed so that it will not operate if ringing current is applied for less than 0.2 second but will operate if applied for 0.5 second or more.

8.03 The dc resistance of the holding circuit is about 100 ohms and remains constant during the period in which the line is normally held. If the calling party hangs up before the cycle of the machine has been completed, the Peatrophone will hold the line for the duration of the cycle.

8.04 The impedance presented to the telephone line while the machine is handling a call is approximately 600 to 700 ohms and remains essentially smooth between 200 and 3500 cps. The impedance of the ringing circuit to 1000 cycles is above 100,000 ohms.

8.05 As mentioned in 1.03, a modified 531C subscriber set is used for party-line installations. With proper connections, the Peatrophone does not tend to false start on dialing or other transients.



CHECK VOLTAGES							
	MACHINE CIRCUIT CONDITION						
				AUTO KEY			
VOLTAGE LOCATION	RECORD	TEST TALK OUT	STAND BY	ANNOUNCE	RECORD NO SIGNAL	RECORD WITH SIGNAL	PLAYBACK
E1							
E2							
E3							
E4							
E5							
E6							
E7							
E8							
E9							
E10							
E11							
E12							
E13							
E14							
E15							
E16							
E17							
E18							
E19							
E20							
E21							

NOTE -
A- INFORMATION ON THIS CIRCUIT SCHEMATIC APPLIES TO APPARATUS BEARING SERIAL NUMBERS 101 TO 501 INCLUSIVE. FOR CIRCUIT INFORMATION ON APPARATUS BEARING SERIAL NUMBER 502 AND HIGHER SEE BX-764627.

Fig. 2