

MANUAL FOR

Electronic Secretary®

Model DCR-1



ISSUE E

JULY 1957

DESCRIPTION

INSTALLATION, CONNECTION

AND MAINTENANCE INFORMATION

ELECTRONIC SECRETARY *Model DCR-1*

ENGINEERING SERVICE MANUAL

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DESCRIPTION, INSTALLATION AND CONNECTIONS

1. DESCRIPTION

The model DCR-1 Electronic Secretary is a machine used to furnish automatic telephone answering and recording service on central office and PBX lines. It can be used on individual lines and 2 and 4-party selective lines, and is the equivalent of 1 ringing bridge.

The machine is arranged to respond to an incoming call with an announcement message, followed by a tone signal, a period for recording a message and then a "Thank You" or sign-off message. The maximum total time for each call is approximately 3 minutes, which can be divided into any length of announcement plus recorded message plus sign-off message.

The machine consists, basically, of a modified record player, a wire recorder and an amplifier and loud speaker. A vinylite record, containing a standard message, is normally supplied. Records containing a specific announcement, recording period and sign-off messages may be obtained. This record is the timer for the entire operation. The wire recorder, which starts immediately following the tone signal, will accept messages up to a total of about 60 minutes, after which the machine will not respond to incoming calls. The automatic restoral of the record player arm, after completion of the sign-off message, electrically resets the machine, releasing the line for the next incoming call.

2. TRANSPORTING

The machine should be handled carefully at all times to avoid damage.

Before transporting the machine always:

- (a) Secure the record player tone arm by tying it to its bracket with lacing cord.
- (b) Remove the vinylite record.
- (c) After rewinding the wire to the small spool, which may require operating the "Automatic Stop Reset" button, remove the large and small wire spools.

3. POWER SUPPLY

The machine is designed to operate on 115-volt, 60-cycle, a-c power supply. In no case should the machine be directly connected to direct current. If only d-c current is available, refer the matter through regular organization channels to the Engineering Department for advice before proceeding with the installation.

The machine is protected by a 312-3AG - 3amp Littel fuse which is located adjacent to the power cord on the back of the case.

4. LOCATING

Locate the machine in accordance with the considerations outlined below. If the customer's wishes cannot be followed, explain the reason therefor.

- (a) The machine may be located within easy reach of the subscriber's telephone set, but this is not essential.
- (b) A desk or table sufficiently strong and stable (approximate weight of machine is 55 lbs.) and where ventilation is not restricted is a satisfactory location.
- (c) The machine is arranged for desk or table installation and need not be fastened.
- (d) Avoid locations that subject the apparatus to excessive moisture, heat or vibration.
- (e) The machine is equipped with a 8' power cord and plug for connection to a standard power supply outlet.

5. INSTALLATION

Do not connect the machine to the power supply until all of the installation work described below is completed. Use suitable protection to avoid marring desk, tables, etc.

Prepare a suitable cable with 3 insulated wires, preferably of red, green and yellow colored insulation. Fasten the cable to the terminal block of the Electronic Secretary, connecting the red wire to L-1, the green wire to L-2 and the yellow wire to ground.

Connect the opposite end of the cable to the telephone block as indicated under "6. Connections" for the type of service desired.

Release the record player tone arm and remove the cardboard cylinder, or in some cases the metal guard, from the outside of the cartridge. Do not place the tone arm on the tone arm rest.

Place the outgoing message record on the record player turntable.

Plug power cord into 115-v., 60-cycle a-c power supply.

6. CONNECTIONS

Type of Service	Connecting Cord to Line		
	Red	Green	Yellow
*Individual, PBX and other Bridged-Ringer Service	Ring	Tip	Tip
2 Party Selective			
Ring Party	Tip	Ring	Gnd
Tip Party	Ring	Tip	Gnd

} **

* On PBX trunks or Key equipment connect the machine ahead of any control equipment.

** Remove strap between terminals L and G at answering set.

The telephone set connections are not affected by the Electronic Secretary which is bridged on the line.

7. FINAL TESTS

Upon completion of the installation, make certain that all features of the machine function properly by making the following tests:

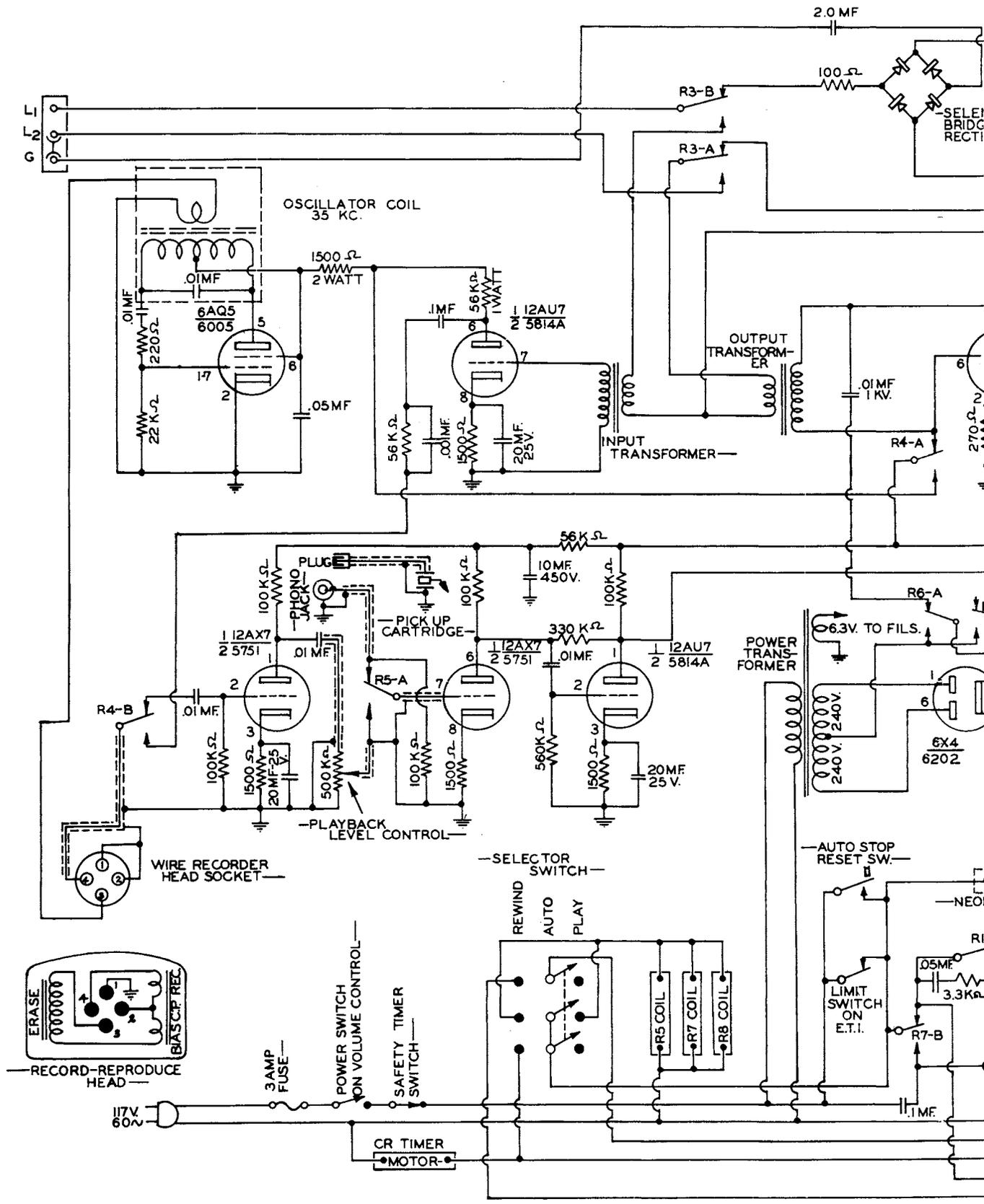
- (a) Recheck the associated telephone set to assure its normal operation.
- (b) On the front of the machine,
 1. Center the "Recorded Time Indicator" at left side of screen to O-O by turning the smaller center "Seconds" knob counter clockwise.
 2. Place the toggle switch on the control panel to the center, or "Automatic" position.
 3. Turn the "ON-OFF" volume control switch in a clockwise direction until the neon indicator glows.
 4. Should the neon indicator fail to glow, check:
 - a - The fuse on the back of the case.
 - b - The "Recorded Time-Indicator" is at O. O.
 - c - At the right rear of the machine is the Safety Timer switch under a 1/2 inch round blank button. If necessary, remove this button with a screw driver and depress the Reset button with a small insulated rod or wood stick. This Safety Timer switch will operate in the event that some malfunction of the machine permits a message cycle to exceed 3 minutes.

- (c) Place a spool of recording wire on the small spindle of the wire recorder. Pull out the plastic leader, lead it past the recording head and wrap it around the channeled groove in the large take-up drum. Make certain that the wire is in the groove of the recording head and that the reset button on the top of the wire recorder is depressed. Move the toggle switch to "Play" position and run wire onto take-up reel until the "Elapsed Time Indicator" shows about one and one half minute. Reposition "Elapsed Time Indicator" manually to "O-O". This will insure against the plastic leader being pulled out and the small reset switch being unnecessarily operated each time the wire is rewound, as the automatic stop switch will open the electrical circuit when the indicator returns beyond O-O to approximately 59 minutes.
 1. To re-establish normal operation after this switch has been operated, move toggle switch to "Play" and press the "Automatic Stop Reset" button, at the lower left side of the time indicator dial, until the elapsed time indicator shows O-O.
 2. When the recorder receives messages beyond 59 minutes the same limiting switches operate. To permit rewinding, move toggle switch to "Rewind"

- and press the automatic stop reset button until the elapsed time indicator shows 58 minutes.
- (d) Call the test desk and request the deskman to make a test call to check the announcement and leave a message.
 - (e) Move the toggle switch to the left, or "Rewind" position. The indicator will start forward and then, within a second or two, reverse. Leave the switch in the "Rewind" position until the indicator returns to "O-O".
 - (f) Move the toggle switch to the extreme right or "Playback" position, operate Automatic Stop Reset button, and advance the "Volume" control to check for recording of received message and for sufficient playback volume.
 - (g) Erase the test message by rewinding the wire with the erase button depressed until the elapsed time indicator shows O-O.
 - (h) The machine is now in the correct position for the subscriber's use. When the service is not desired turn the "Volume" control to "Off" and neon lamp will cease to glow.

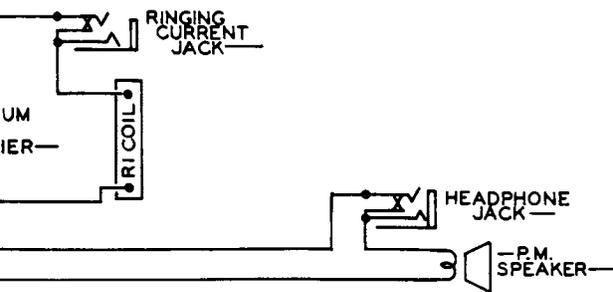
GENERAL OPERATING PRINCIPLES

- What It Is**
- The Electronic Secretary is an automatic telephone answering machine, consisting of several electronic amplifiers whose operating periods are governed by simple electrical-mechanical sequence switching. The harmonious co-functioning of these basically different systems provide a simple, yet completely satisfactory method of telephone answering, requiring a minimum amount of adjustment from one operating condition to another.
- Basic Timing**
- Basically the timing device used in Electronic Secretaries to control the activity sequence of the various amplifiers is the outgoing message disc or record; and the record player associated with it provides the mechanical power for the basic switching actions.
- Start and Stop MU Switches On Record Player**
- The record player has attached to its repeated mechanism a pair of very low operating pressure switches, which close as the tone arm lowers itself to the record to begin a cycle and opens as the tone arm travels through the throw-out grooves and resets itself, to end a cycle. We see therefore that the basic time-switching operation of starting and stopping the machine is performed by two simple switches attached to the record player; the duration of the operating cycle is determined by the length of time to which the record is cut.
- What Is Required To Start A Cycle Of Automatic Operation**
- From the above observation we learn that all that is required to place the machine into operation would be to apply current, when the telephone rings, to the record player motor, for a period long enough for it to close its own switches, which as we learned in the preceding paragraph, close when the tone arm sets down upon the record. This current of course will be cut off when the tone arm resets to end the operating cycle.
- How The Telephone Ring Starts The Record Player Motor - Trigger Action**
- To comprehend fully how the telephone ring automatically starts the record player, we can refer to schematic diagrams S_1 and S_2 . You will note that diagram S_2 is merely a part of diagram S_1 , which has been literally lifted out of the complete schematic to show and isolate the triggering action. Looking at S_2 closely, we see that one side of the telephone terminal block is connected through a 2 microfarad condenser to a selenium bridge rectifier, and the other side of the telephone line is connected through the normally closed contacts 3b, through a 100 ohm fusing resistor to the other input point of the selenium bridge. The output of the bridge rectifier feeds a 2500 ohm D.C. relay thru a metering jack. It is this relay, R_1 whose contacts apply current to the record player motor whenever the relay is energized by the rectified ringing current of the telephone.
- See Dia. S_1 and S_2**
- Relay Contacts Involved: 3b**



NOTE:

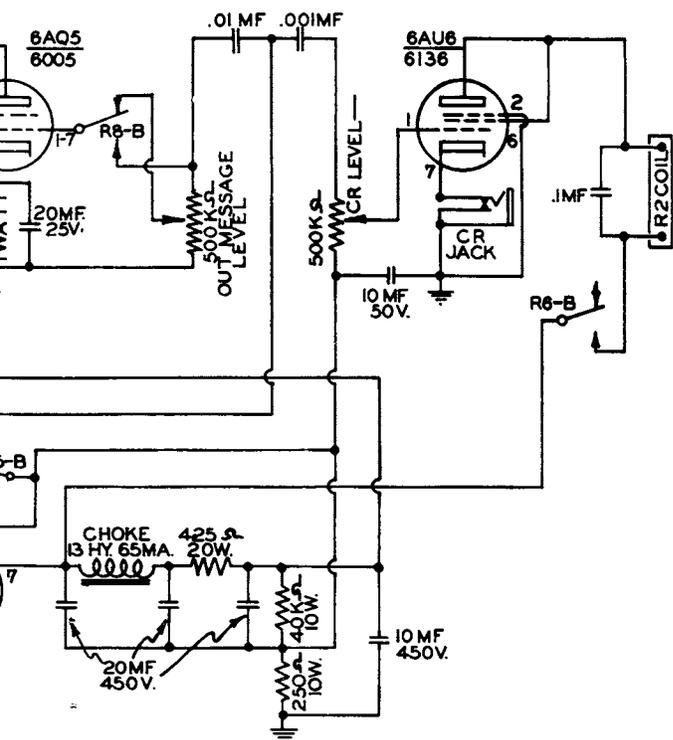
Relay contacts are read from left to right facing terminal board of relay. "A" contacts to the left and "B" contacts to the right.



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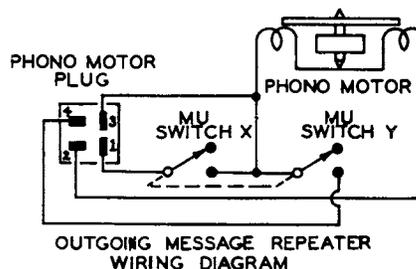
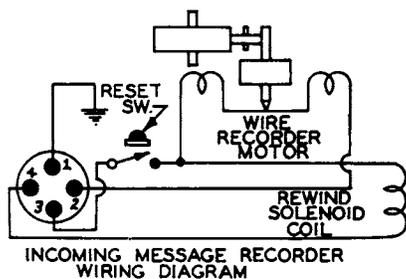
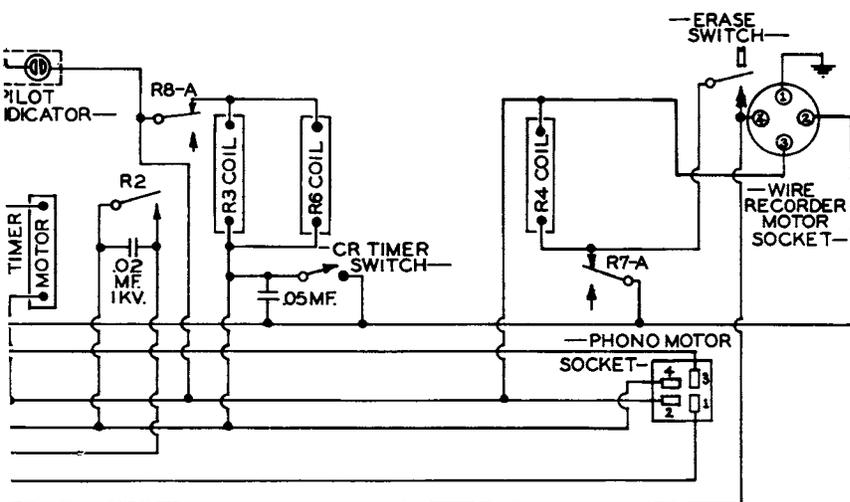
Model DCR-1

Complete Schematic Drawing S1



IMPORTANT

Relay 9 has been removed from this model. See Page 48 for schematic drawing with Relay 9 and description.



Relay Contact
of Relay 1
Switches
115 V.A.C.
To Record
Player Motor

If we now refer momentarily to diagram S7 we can see how current from the hot side of the power line travels through the 3 ampere fuse, power switch connected to the volume control shaft, safety timer switch, normally closed contact of relay contact 7b, normally closed contacts of limit switch on elapsed time indicator through the contacts of relay 1 when closed to pin 3 of the 4 pin Jones phono motor socket. Pin 3 through the plug that fits this socket leads to the hot side of the record player motor. This action of contact of relay 1 closing is called "triggering" and relay 1 is called the triggering relay.

Electrical
Action of the
MU-Switches
on the Record
Player

We have now seen the electrical effect of relay 1 in starting the record player and the action of the low pressure MU-switches in closing, thus starting a cycle. The effect of closing these two switches is to short pins 1 to 3 and 3 to 4 on the 4 pin phono motor socket (refer to diagram S7). This action in effect advances current from the hot side of the line across the contacts of relay 1 to hold the record player motor in continuously; and the shorting of pins 3 to 4 of the second record player MU switch advances current to the coils of relay 3 and relay 6. You will note from diagram S7 that the coils of these two relays get their neutral feed through the normally closed contacts of relay 8a. In the play-back or rewind position of the selector control switch current will of course be brought to the coil of relay 8 and the neutral path to relays 3 and 6 will be broken.

How The
Machine
Answers The
Phone

We see however that in the automatic position closing of the contacts of relays 3 and 6 will in effect answer the phone in the following manner: Referring to diagram S, we see that in the stand-by automatic position, contact 3b of relay 3 is connecting one side of the telephone line to the selenium rectifier bridge, through 100Ω fusing resistor while relay contact 3a is connecting the output of the audio output transformer to the loud-speaker voice coil. When relay 3 is energized however, these normally open contacts close and the effect of contact 3b is to lead from one side of the input line transformer to one side of the telephone line, while at the same time contact 3a will switch one side of the audio output transformer, and the line input transformer with their secondaries in series will be thrown across the telephone line. The effect of this loading will be the same as answering the phone in the conventional manner.

Function of
Relay 3

Function of
Relay 6

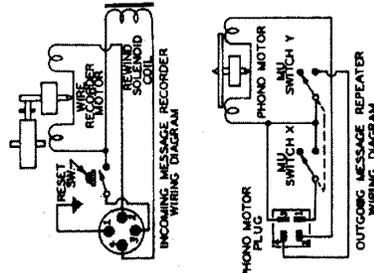
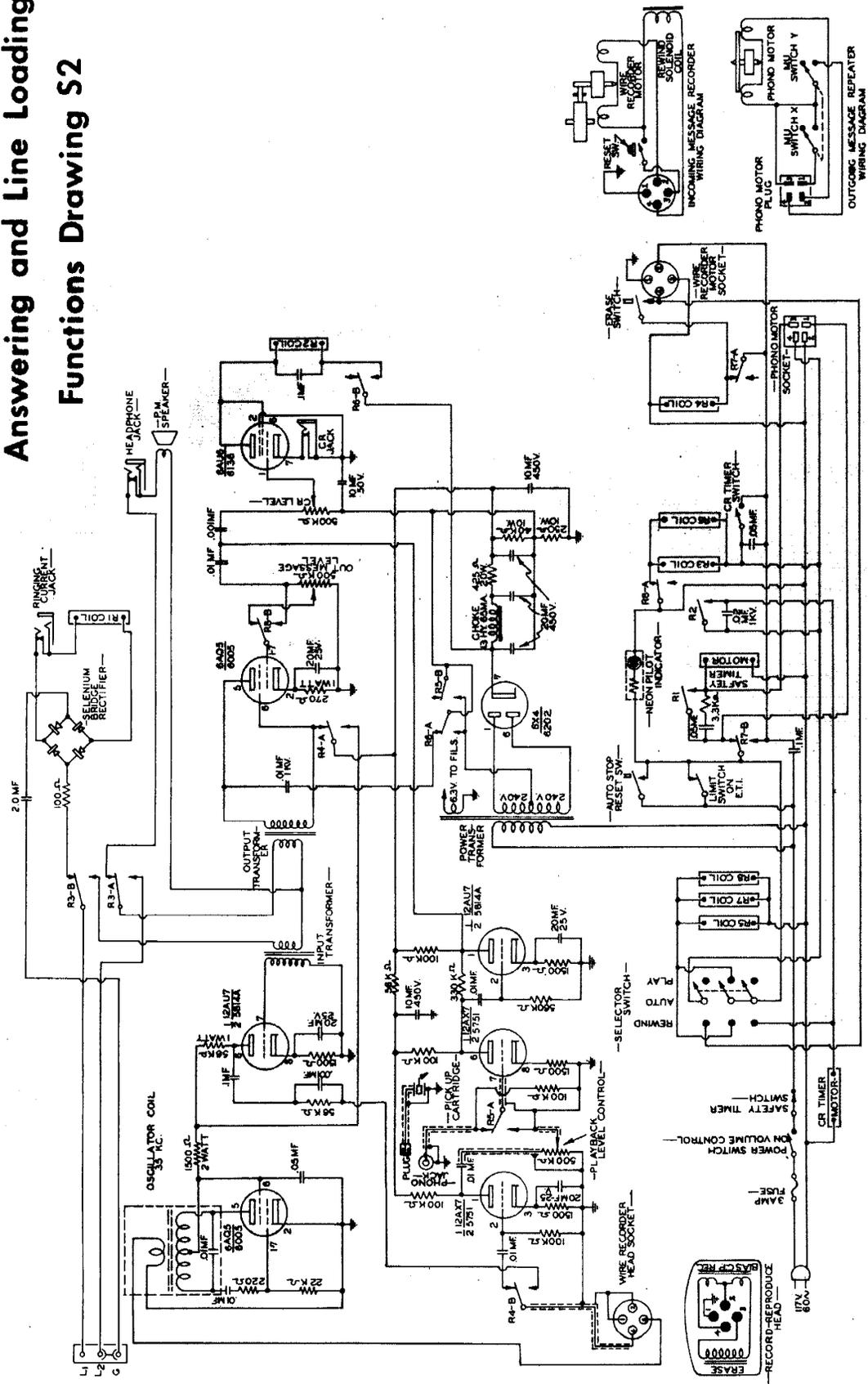
The function of relay 6 in this operation is twofold. Contact 6a opens at this time to remove an .01 by-pass condenser from the plate of the 6AQ5 tube, as this condenser while desirable in the playback operation of the amplifier tends to muffle the speech during the outgoing message phase of automatic operation. Relay contact 6b closes also at this time to supply d.c. voltage to relay 2 and the 6AU6 tube associated with its operation.

At this point we are now in cycle and transmitting an outgoing message. The outgoing message path can be seen clearly in diagram S3, outgoing message and CR action. To fully under-

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Answering and Line Loading Functions Drawing S2



How The Record Player Transmits The Outgoing Message Over The Telephone

stand this action we can take a pencil and follow a signal from the phonograph record as it enters the amplifier at a point marked phono tip Jack on diagram S₃. The signal is carried thru the normally closed contact of relay 5a to the grid of the 12AX7 (second section) through one section of the 12AU7 from where it travels through the outgoing message volume control potentiometer and the normally closed section of relay contact 8b to the output tube 6AQ5. From the output of this tube it travels through the two secondaries of the output and input transformer in series and is impressed on the telephone line through the contacts of relay 3 now closed.

The CR Action
How It Works

We are now sending out an outgoing message in which the answering machine first identifies itself to the calling party, eventually directing him to leave his message in some such manner as, "at the end of the tone signal, please begin speaking." Now let us refer to diagram S₃ to study what happens as this directive is given, both electronically and electrically. First of all, retracing the audio path through the normally closed contacts of relay 5a to the grid of the second section of voltage amplifier tube 12AX7 to and through the second voltage amplifier tube 12AU7. The output plate of the 12AU7 feeds up to a junction point, where it goes in one direction through an .01 condensor to the audio output stage 6AQ5 and through an .001 condensor to the relay tube 6AU6. It is the function of this latter tube in which we are now interested, in order to obtain "CR action" which in ordinary English means:

What It Does

- A. Starting and stopping the wire recorder mechanism at the proper time.
- B. Muting the outgoing message at the proper time so that there will be no background noise from the outgoing message amplifier in the recordings.
- C. Switching plate voltage to the record pre - amplifier tube (12AU7) and the oscillator tube (6AQ5). Refer to diagram S₃.

Electronic and Electrical Operation of CR

Now these functions of the CR action are accomplished as follows. All audio impulses leaving the record disc will show up at both the input of the 6AQ5 audio output stage and at the input of the 6AU6 relay tube stage. However the effect on the relay tube stage will be to energize the relay R₂ for relatively short intervals. This action will allow the contacts of R₂ to close momentarily and place 115 V.A.C. on the CR motor shown in diagram S₇. We see from this diagram that this power is obtained from pin 4 of the phono motor socket, which now has power, since the machine is in cycle. However since the small motor shaft is spring loaded, it cannot advance far before the power is again removed. However, when the steady tone is emitted from the record, the relay R₂ will hold in steadily for the duration of the tone, which is the allotted recording period. This advances the motor and cam until it stalls against the MU switch which is attached to the motor and cam assembly. The MU switch brings

Electrical Operation of CR

115 V.A.C. to the wire recorder motor and also to the coil of relay 4 through the closed contacts of relay 7a. The energizing of relay 4 does the following. Referring back to diagram S₃ and the general schematic diagram S, we can follow the specific action of these two relays, and their resultant completion of the CR action.

Relay 4
and 9

Their Function
In The CR
Action

How Machine
Resets To
End A Cycle
Of Automatic
Operation

The Machine
Drops Out Of
The Automatic
Cycle

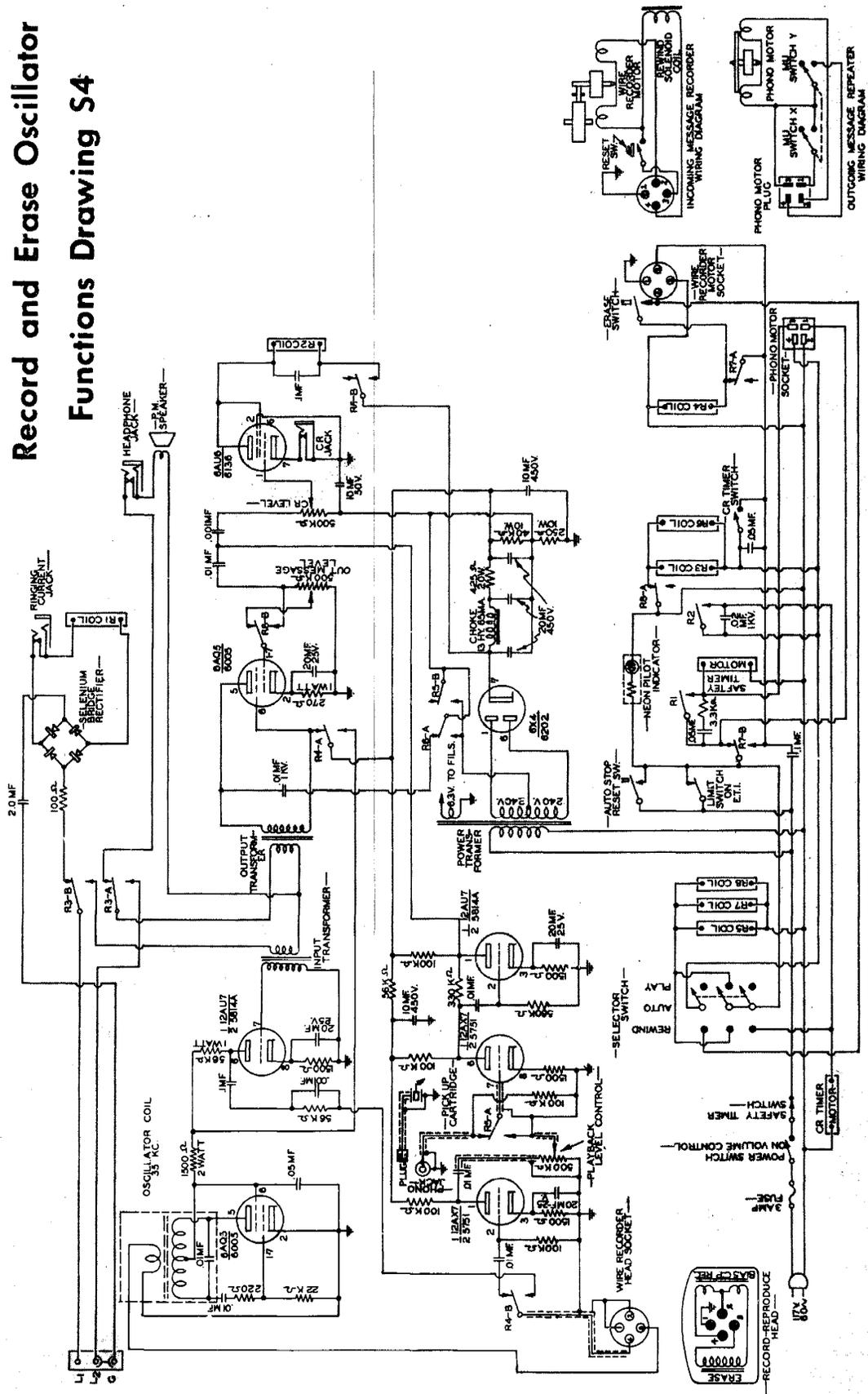
As relay 4b is energized its contacts, switch the wire recorder head lead (pin 4 on amphenol connector) from the grid of the playback amplifier 12AX7 to the output of the recording pre-amplifier 12AU7. This circuit is made through an equalizing network, which consists of a 56,000 ohm resistor shunted by a .001 condenser, the equalizing network in series with a .1 coupling condenser completes the path between the head and the plate of the 12AU7, at the same time relay contact 4a is completing AB plus circuit to the plate return of the 12AU7 recording preamp tube and the 6AQ5 oscillator tube to supply plate current to both of them. The oscillator coil secondary is connected to the oscillator section of the record head (pin 3 of recording head connector). The stage is now set for recording incoming messages and this phase of the automatic cycle will be terminated, when the tone signal ceases on the record. When this occurs, relay 2 drops out allowing the CR motor and cam to return; plus opening the CR MU switch. (See diagram S₇). This stops the wire recorder motor, de-energizes relays 4 and 9, thus restoring the activity of the outgoing message amplifier and terminating the record and erase conditions. The closing message now comes off the record disc and the tone arm finally traverses the throw-out grooves of the record and the record player resets itself. This reset action of course, drops out the two MU switches attached to the record player (see S₇) and the continuity of power flow from pin 1 to 3 to 4 on the phono motor socket is broken. This, of course, de-energizes relays 3 and 6. Relay contacts 3b and 3a of course, remove the load of the input and output line transformer from the line and restore the trigger circuit to the condition of standby. Relay contact 6a which when energized, completes a negative return to the plate power supply. Now upon de-energization, will reconnect a plate by-pass condenser to ground through a 250 OHM dropping bias resistor. This bypass for all practical purposes is satisfactorily close to ground. We have removed the source of plate current by breaking the negative return to the power supply for standby conditions. Relay contact 6b closed during the automatic operation cycle, opens again to remove the source of direct current from CR relay R₂ and the CR tube 6AU6. We have now completed an automatic cycle and are awaiting another call.

To comprehend fully the conditions of playback, we can refer advantageously to diagrams S₅ and S₇. Electronically, we see that small voltages generated by passing magnetically treated

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Record and Erase Oscillator Functions Drawing S4



The Playback Action

wire thru the slot in the recording head, will be fed through an .01 condensor into the first playback pre-amplifier which is a section of a 12AX7 tube. Leaving the output of this voltage amplifier tube, the signal reaches the high side of a 500,000 ohm volume control, whose movable arm is now switched into the grid circuit of the succeeding tube by the action of relay contact 5a, which is one of the relay contacts affected by placing the main control switch into either the rewind or playback positions. The action of 5a has now made the volume control available as a playback volume control and it is located for convenience on the front panel of the machine. The signal continues on through the second section of the 12AX7 and the 12AU7 and on to the junction point, where the 6AQ5 and 6AU6 are fed. We note, however, that under conditions of playback (see S5) Relay contact 6b will be open, so the CR relay and tube will be inoperative. Normally closed relay contact 4a will, however, be closed. Thus supplying plate voltage for output tube 6AQ5. The playback signal will then proceed through the now closed contact 8b, whose switching action takes the full voltage from the top connection of the volume control potentiometer rather than the partial drop from the arm of the control. The signal will then go on through the 6AQ5 where it will attain a very high level of voltage and power and will transfer this energy through its output transformer, whose secondary will now be connected to the voice coil of the speaker through the normally closed contact relay 3a.

Action of Relay Contact 5a

Relay Contact 6b

Relay Contact 4a

Relay Contact 8b

Relay Contact 3a

Electrical Operation During Playback

To get the complete picture electrically of playback action, we can refer to diagrams S5 and S7). We have thus far accounted for the action of relay contact 5a and 8b in the playback cycle. We see from the electrical portion of the schematic, S7), that relays 5, 7, and 8 are involved in the playback action. This leaves contacts 5b, 7b, and 8a unexplained.

Function of Relays 7, 5, And 8

Studying a diagram of the power supply S6, we see that contact 5a provides a closing of the negative return of the power supply on playback, just as 6a does during the automatic cycle. Contact 7b in its normally closed position, provides a path to the trigger relay contact R₁ and the automatic portion of the circuit when in the automatic position, but when relay 7 is energized in playback it breaks this path and forms one to pin 2 of the recorder motor socket, which is the wire recorder motor "hot side". Relay contact 7a breaks the path to relay coil 4 when relay 7 is energized thus allowing the wire recorder motor to run without relay 4 being energized. Relay contact 8a breaks the neutral to relays 3 and 6 when relay 8 is energized.

Delayed Action of Wire Recorder Rewind

To complete our electrical study we must learn how the CR motor device is used in the rewind cycle to introduce a delay before the wire recorder reverses itself. The purpose of this delay is to allow the high speed reversal to be initiated under motor conditions of full torque and speed. To fully comprehend this, we must be cognizant of the fundamental operating principles

of the wire recorder mechanism. The wire recorder motor operates in only one speed and in one direction, but its shaft is connected frictionally to a system of idlers to give a uniform speed in what we would call the forward direction of the wire recorder mechanism. However for the purpose of rewinding the wire to the original spool, the system of idlers is mechanically disengaged and another system of higher speed reversing idlers is engaged through the simple lateral or pulling motion of an electrical solenoid. We see however that with the higher resultant speed of the reversing action, a greater power transfer from the motor is necessary. Therefore in order to obtain the greater starting power required before engaging the reversing idlers the motor is allowed to develop its approximate full speed before the reversing solenoid is energized. The electrical procedure of this is as follows from diagram 6:

When the main control switch is thrown to the left or rewind position, the CR motor shown at the left of the diagram will be energized by direct action from the power line through the main control switch. This action will after a second of delay, close the CR MU switch shown at the right hand side of the drawing. The CR MU switch will take current from pin 2 of the recorder motor socket, now made live by the action of 7b and feed it to the arm on the deck of the master control switch.

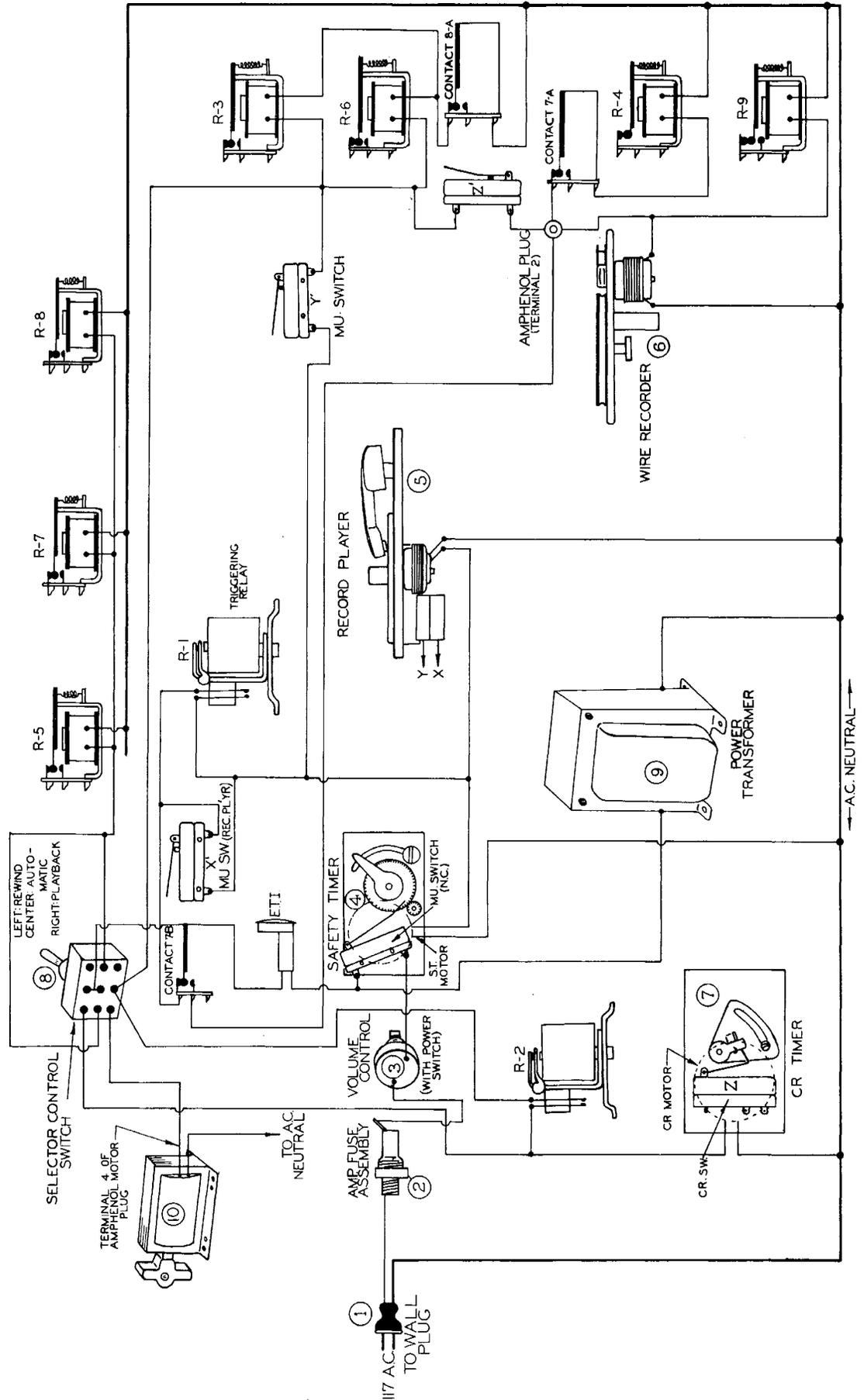
Delayed Action
On Wire
Recorder
Rewind

But since this switch is now turned toward the left or rewind position the current will be carried back to pin 4 of the recorder motor socket; which leads to the reversal solenoid. Thus in approximately one second after the rewind position is engaged, the wire recorder mechanism will rewind.

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Pictorial Electrical Drawing S8



DESCRIPTION OF BASIC COMPONENTS

Basic Component 1. The Record Player or Primary Timer.

The record player on the Electronic Secretary is the basic timer and its timing functions are regulated by the manner in which the record is cut. This arrangement affords an infinite amount of flexibility and is entirely self synchronizing, therefore no adjustment need be made for different outgoing or different timing cycles. This is accomplished in the following manner:

The record disc starts out with the conventional lead-in spiral and then goes into the answering or opening portion of the outgoing message. Before this part of the message is completed, the voice directs the calling party in this manner. "At the end of the tone signal, please begin your message." A 1400 cycle tone signal's then recorded onto the disc for the duration of time desired for recording of the incoming message. At the end of this interval the tone signal stops and the farewell or closing message is recorded on the disc. A lead-out spiral is then cut onto the disc to complete one timing cycle. The record player, therefore by a series of simple electrical-mechanical operations, timed through the guidance of individual record discs, controls the overall automatic operation of the machine in the following manner:

When the telephone rings the rectified ringing voltage of the telephone energizes relay 1, which places current on the record player motor and the safety timer motor. If the duration of ring is sufficiently long, the record player turntable will spin until the tone arm positions itself onto the lead-in groove of the record. About this time two small mu switches are mechanically closed starting an operating cycle. The first of these two switches (x) form a holding circuit around the contacts of relay 1, which have reopened again when the phone stops ringing. The second mu switch (y) forms a path to relays 3 and 6, one of whose functions is to throw the transmitting and recording transformers across the telephone line, thus in effect answering the telephone. The other functions of these relays will be explained in detail under relays 3 and 6.

The tone arm now starts to traverse the sound grooves of the record and the outgoing message is amplified and impressed onto the telephone line. At the end of the outgoing message a tone operated switch, called the CR switch, starts the wire recorder motor and places current on relay 4, through the normally closed contacts of relay 7 (a). This action mutes the tone as far as the telephone line is concerned and switches the wire recorder amplifier to the record position. The action of the CR system will be explained in detail under CR-mechanism. At the end of the tone signal of course, this action is reversed and the balance of the outgoing message is transmitted. At this point the tone arm moves into the throw-out groove and mechanically resets the record player. This causes the two mu switches to open

up and re-establish the electrical conditions of stand-by.

We have now gone through a complete normal cycle of automatic operation and have seen how the record player has performed its function of basic timing of the automatic cycle.

Basic Component 2. The CR mechanism or Auxiliary Timer.

The CR mechanism is a combination of electrical, mechanical and electronic components co-functioning to form a relay system that will discriminate between a series of short pulse-like sounds and steady tones of unvarying amplitude.

The output of the sound cartridge is fed into the CR-voltage amplifier just as it is into the audio output amplifier, and the voice peaks on the record tend to pull in a sensitive type relay marked relay 2. Whenever this relay pulls in it places A.C. line voltage on a small synchronous motor to whose shaft is attached a spring loaded cam. Whenever the relay pulls in the cam tends to advance, but since the application of voltage is sporadic the spring loading returns it to the starting point. However, when a steady tone comes through the amplifier, the cam advances far enough to close a mu switch, whose switching action makes possible the auxiliary timing or CR action, required to start the recorder motor. In addition to this the amplifiers are switched from the transmit to the record phase and the tone signal and outgoing amplifier is muted thru auxiliary relay action.

Basic Component 3. The Safety Timer.

The safety timer is a secondary timing device built into the electronic secretary to insure the continuity of telephone service in the event of mechanical or electrical failure on the part of the electronic secretary. This device like the CR mechanism consists of a spring loaded cam actuated by a synchronous motor. After a period of travel exceeding the regular time interval of a cycle of operation by about 50% the cam will operate a reset type of mu switch, which opens up the main power circuit, just ahead of the power switch; thus disabling the electronic secretary, but opening all relays so that the telephone circuit will be opened, and a regular telephone service will not be interrupted.

Basic Component 4. The Selector Switch.

The selector switch is actually only in circuit during the playback and rewind phases of operation. In the playback position it serves to by-pass the automatic switching in order to get current to the wire recorder motor. In both the playback and rewind positions, it closes circuits to relays 5, 7 and 8 whose particular switching duties will be detailed in the section on relays. In rewind position alone, the wire recorder reversing solenoid is energized, thus mechanically rewinding the wire recorder. The center or automatic position leaves all relays de-energized until the telephone rings.

Basic Component 5. Relays

Relay 1

This is a direct current relay of the sensitive type with a resistance of 2500 ohms. Its normal pull-in point is between 6 and 8 milliamperes and this point can be varied by increasing or decreasing the spring tension adjustment. It is energized by the rectified ringing current of the telephone. The 2mfd. paper condenser shown in series with one side of the telephone line is used to block the direct current present in the telephone circuit from the electronic secretary.

Relay 2

This relay is physically the same as 1. Functionally it is used in the plate circuit of the CR amplifier to start and stop the synchronous CR motor in response to audio pulses.

Relay 3

This is a double pole double throw relay with an A.C. coil. This relay is energized by the action of the mu switch at the beginning of a cycle and serves to switch the telephone circuits to an answering position. The switching is done as follows:

In the standby position of the machine relay contact 3 (b) connects one side of the telephone line to a selenium bridge. While contact 3 (a) connects the voice coil winding of the outgoing message amplifier to the voice coil of the loudspeaker. However, when the mu switch on the record player closes the relay is energized and contact 3 (b) switches the telephone line across the secondary of a 10: 1 recording transformer; which is in series with the voice coil winding of the out-going message loud-speaker transformers and, contact 3 (a) throws the other end of this voice coil winding across the telephone line.

Thus in effect the two contacts have placed the two transformer with their secondaries in series across the telephone line.

Relay 4

This is an alternating current relay. Its 4(b) contacts connect the voice coil of the recording head to the input of the playback amplifier in the normal position and in the energized position they connect the voice coil of the head to the output of the record amplifier tube. Contacts 4 (a) connect the plate voltage supply to the output tube, 6AQ5 in the normal position and in the energized position connect the plate voltage supply to the oscillator, and to the record amplifier. This relay is energized by CR mechanism which allows it to operate only during the record portion of the answering cycle.

Relay 5

This is an alternating current relay. Its functions are as

follows: Contact 5 (b) closes a circuit in the negative return and operates only on playback to establish a source of plate voltage during the playback period of operation. This contact is necessary because a similarly operating relay contact 6 (a) provides this plate voltage only during the automatic portion of operation. The contact 5 (b) therefore is necessary in order to shunt 6 (a) so that plate current will flow during manual or playback operations of the set. Contact 5 (a) switches in the playback volume control during the playback period of operation and also in so doing links up the first section of the 12AX7 pre-amplifier tube which is not used during the outgoing message portion of the automatic cycle. Relay 5 is energized by the action of the selector switch going into the playback or rewind position.

Relay 6

This is an alternating current relay. Relay 6 is operated by the mu switch on the record player and becomes energized at the beginning of an automatic cycle. Contacts 6 (a) close the negative return and provide plate voltage at the beginning of an automatic cycle. Contacts 6 (b) provide plate voltage for the CR relay on automatic operation when the machine goes into cycle.

Relay 7

This is an alternating current relay. Relay 7 is operated by the selector switch in the playback and rewind positions and serves through contact 7 (b) to cut off the automatic switching section during manual operation and also to break the path to relay 4 and 9 which otherwise would be energized in playback or rewind.

Relay 8

This is an alternating current relay. It is operated in playback and rewind positions by the selector switch. Contacts 8a break the neutral from relays 3 and 6 on playback. Contacts 8b serve to remove the arm of the volume control from the circuit on playback.

Relay Summary

- D.C. Relays 1 and 2 - Used in answering and CR circuits.
- A.C. Relays 3 and 6 - Operated by mu switch on record player.
- A.C. Relays 5, 7, and 8 - Operated by selector switch.
- A.C. Relay 4 - Operated by CR mechanism.

GENERAL MAINTENANCE PROCEDURE

To perform any service operation on an Electronic Secretary other than what would normally be connected with the top side of the wire recorder or record player, it will be necessary to remove the cover and lid assembly as shown in Figures A, B, and C (see next page).

We first remove the latching screw from both ends of the chassis as indicated by the arrow in Figure A. Now, grasping the side of the cover lid assembly as shown in Figure B we lift it through a 90° arc. When we have reached this position we can remove the cover completely by disengaging the loose pin hinges which hold the two assemblies together. The separate pieces are shown in Figure C.

We note from this last illustration that all the tubes, the recorder head, and the various plugs are readily accessible. To work on the under side of the chassis, we need only remove the record player and the wire and drum from the wire recorder mechanism, and we turn the entire chassis upside down. In this position we can take out the three machine screws and remove the base panel. Standard electrical and electronic procedure is then followed as indicated other places in this manual.

Items to be carried in stock for possible replacement are suggested as follows:

1. One, or more, complete sets of tubes
2. One phono cartridge replacement
3. One record head for wire recorder

Basic tools and instruments suggested for servicing:

1. Normal stock of electrical tools, diagonal pliers, screw drivers, etc.
2. Small Allen wrench set
3. Burnishing tools for relays
4. A multi-meter, including voltage, milli-ampere and ohms scales
5. A set of small spin-tight wrenches
6. Soldering iron and/or gun
7. Small bottle of denatured alcohol for cleaning drive pulleys

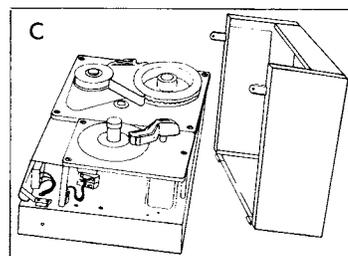
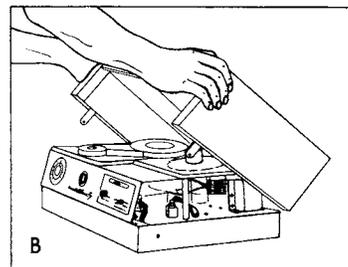
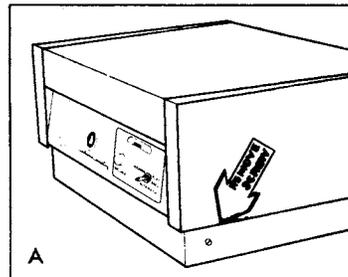




Photo shows chassis with wire recorder mechanism and record player mechanism removed and with test extension connector leads used to duplicate normal operating conditions.

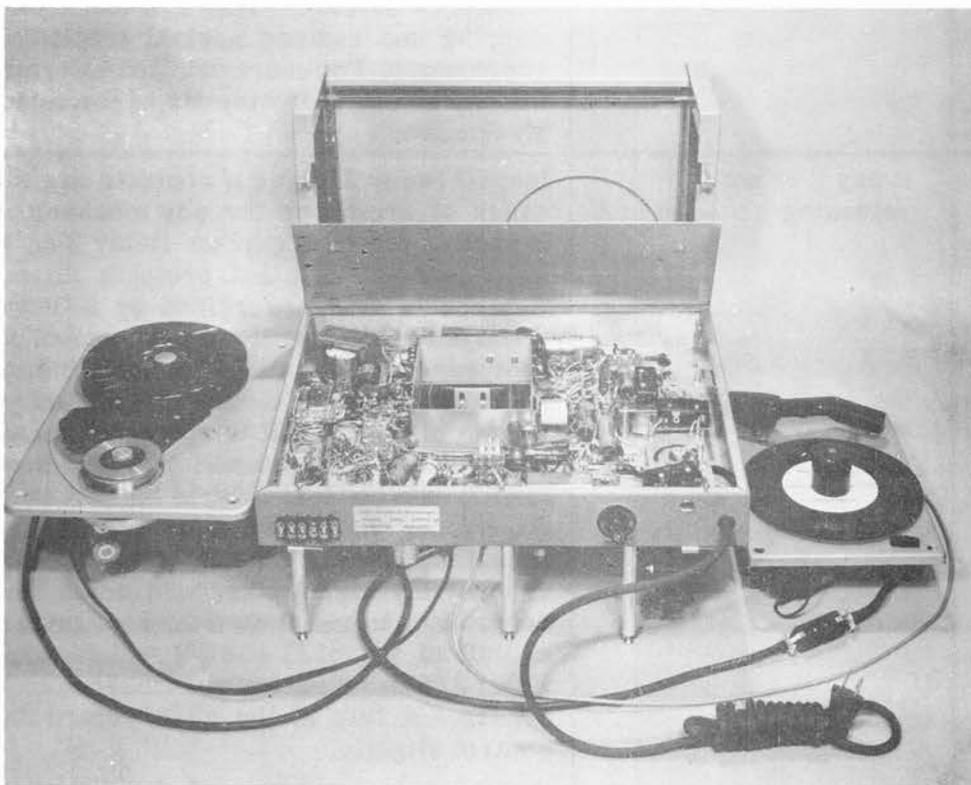


Photo shows the same arrangement but with the chassis inverted so that all under chassis components can be observed under operating conditions.

5

SUMMARY of MAINTENANCE CALLS and Suggested Measures for Handling:

SERVICE REPORT INDICATES:	PROBABLE CAUSE:	CORRECTIVE MEASURE:
Machine does not answer or is slow to answer	<p>Poor connection at telephone terminal block or at power supply from wall socket</p> <p>Lack of continuity to Relay 1</p> <p>Phono motor or mechanism stalling or slipping</p>	<p>Check thoroughly to see that adequate connections are made between telephone line terminal block and terminal block on Electronic Secretary. Also check to see that machine has good power connection to wall receptacle, and that pilot light is glowing. Be sure that safety timer and auto stop switch are re-set.</p> <p>Check to see that Relay 1 is receiving current and is operating when the ringing voltage is applied to the terminal block of the machine. A break in continuity such as a poor contact on Relay 3 might be the cause of the relay coil not receiving current.</p> <p>If the record player is slipping or sticking clean the inside tractional edges of the record player turntable and also the rubber drive pulleys with Denatured Alcohol. This will usually remedy the slipping and restore normal traction to these components. For more detailed information refer to Chapter VII "Adjustments of the Record Player Mechanism".</p>
Wire recorder does not stop at end of record period	<p>Relay 2 is not releasing</p> <p>CR timer jams in closed position</p>	<p>Inspect Relay 2 to see if contacts are sticking because of arcing or for any mechanical reasons. If such is the case replace Relay 2 as well as the suppressor circuit that protects its contacts. If Relay 2 is being energized by a flow of current through its winding, the measurement of this current can be determined by inserting the leads of the milliammeter into the CR metering jack with the aid of a 2-circuit telephone plug. A considerable flow of current will indicate that the 6136 (6AU6) tube has lost its grid bias. A table showing the proper voltage readings for this tube is contained in Chapter VI. It is also possible for an excessively high background noise level on the record disc to maintain a current level in the plate circuit of the 6136 (6AU6) which would prevent Relay 2 from releasing when the tone on the record ceases. If this is the case, retard the CR level control slightly.</p> <p>If this is determined as the cause of the trouble, replace the CR timer.</p>

SERVICE REPORT INDICATES:	PROBABLE CAUSE:	CORRECTIVE MEASURE:
Weak recording	Defective tube in record pre-amplifier stage 5814-A (12AU7) Accumulation of dirt on head	Replace the 5814-A (12AU7) if found weak. Clean the recording head with Denatured Alcohol.
Set does not terminate cycle or re-cycles	Contact on Relay 1 is not releasing Mu switches on record player do not release	If relay is not releasing it may either be that the spring tension to release the armature is inadequate or that the gap between the armature and the pole face is too small to allow the armature to release. If this adjustment cannot be made in the field the relay should be replaced. This is caused by too small an allowance for over-travel in setting the switches. The adjustments can be made by bending the actuating levers of the switches so that they will readily release.
Outgoing message weak	Weak tube Weak cartridge	Check and replace if necessary 5751 (12AX7), 5814-A (12AU7), 6005 (6AQ5) tubes. Replace phono cartridge if output is found to be too low.
Outgoing message distorted	Defective stylus in cartridge, or out of saddle	Check and replace cartridge, needle, or both.
Tone signal is continuous over telephone line and wire recorder does not start.	Caused by insufficient gain in CR circuit, resulting in failure of CR relay to pull in Defective CR timer	Replace either weak cartridge or defective 5751 (12AX7), 5814-A (12AU7), or 6136 (6AU6) tubes. Replace defective CR timer.
Recording is distorted	Inadequate magnetic bias and erase oscillator not working Defective recording head	Check 6005 (6AQ5) oscillator tube and replace if necessary Replace head
Low playback volume	Weak tube, usually 5751 (12AX7) if set has normal output on outgoing message	Check 5751 (12AX7) and replace if necessary. Refer to Chapter VI under "A.C. Signal Measurement, Playback Operation" for normal gain of amplifier.
Distorted or noisy playback operation	Relay Contacts 4B normally closed contact supplying input grid of playback amplifier require cleaning Defective playback volume control	Clean and burnish contact 4B; also Contacts 5A and 8B. Replace defective playback volume control.

VOLTAGE MEASUREMENTS ON DCR-I

ALL D. C. READINGS MEASURED WITH
SIMPSON #260 METER. ALL VOLTAGES WITH
RESPECT TO CHASSIS EXCEPT WHERE INDICATED

D. C. MEASUREMENTS

SET IN AUTOMATIC OPERATION	TRIGGERED RECORDING	
Power Supply		
6 X 4 Cathode (Pin 7)	260	260
Second Filter	235	235
Third Filter	215	215
Negative Return	- 10	- 11
CR Amplifier		
6AU6 Triode Plate & Screen (Pins 5 & 6)	260	235
Grid (Pin 1)	- 6.5	- 6.8
1/2 12AU7 (Driver) Plate (Pin 1)	62	62
Cathode (Pin 3)	2.2	2.2
1/2 12AX7 (2nd Pre-Amp) Plate (Pin 1)	80	80
Cathode - Pin 3	.75	.75
1/2 12AU7 (Record Amp.) Plate (Pin 6) (In Record Position)	105	85
Cathode (Pin 8)	3.8	4.5
6AQ5 Oscillator Screen (Pin 6)		160
Plate (Pin 5)		160
Grid (Pin 1, 7)		- 23
SET IN PLAYBACK OPERATION		VOLTAGES
Playback Amplifier		
1/2 12AX7 First Amp. Plate (Pin 1)		80
Cathode (Pin 3)		.75
1/2 12AX7 (Second Amp.) Plate (Pin 6)		85
Cathode (Pin 8)		.65
1/2 12AU7 (Driver) Plate Pin 1		60
Cathode (Pin 3)		2.3
6AQ5 (Output Plate Pin 5)		210
Screen Grid (Pin 6)		215
Cathode (Pin 2)		11

AC SIGNAL MEASUREMENTS

Record Amplifier (Record Gain Control Full - 400 Cycle Signal From 600 OHM Generator. Output Loaded With Head.)

Input To Terminal Block (Do Not Ground One Side) (Oscillator Tube Out)	.034
1/2 12AU7 Record Amplifier Grid (Pin 7)	.42
1/2 12AU7 " " Plate (Pin 6)	5.8
Through Coupling Capacitor At Record Head	5.6 .094

Record AMP Has Overall Gain Of 2.6 to 3.
Reading At Head May Be .08 to .1 Volt.

Play Back Amplifier

(Playback Gain Control -- Full -- 1000 Cycle Signal
Input Loaded With Head)

INPUT AT HEAD TERMINALS		.001 V.A.C.
1/2 12AX7 First Amplifier Plate (Pin 1)		.045 V.A.C.
1/2 12AX7 Second Amplifier Grid (Pin 7)		.044 V.A.C.
1/2 12AX7 Second Amplifier Plate (Pin 6)		.32 V.A.C.
1/2 12AU7 Driver Amplifier Grid (Pin 2)		.32 V.A.C.
1/2 12AU7 Driver Amplifier Plate (Pin 1)		4.8 V.A.C.
6AQ5 Power Output Grid (Pin 1, 7)		4.6 V.A.C.
6AQ5 Power Output Plate To B+ (Pin 5)		82.0 V.A.C.

Overall Voltage Gain of Playback Amplifier May Vary From
60,000 To 100,000, Therefore A Reading At 6AQ5 Plate Can
Be Between 60 And 100 Volts.

ADJUSTMENTS OF RECORD PLAYER MECHANISM

SECTION A

Brief Description of Operating Principles

The device used is essentially the repeater portion of a standard, highly developed, record changer mechanism. To adapt this mechanism to the requirements of telephone answering, several modifications were made to fully utilize the torque of the prime mover and to increase the indexing latitude of the repeater mechanism.

Current applied to the winding of the driver motor will transfer power to its shaft and then on to a drive pulley. Co-axially affixed to this first drive is a smaller driving surface which engages the inside rim of the turntable itself and in so doing effects a speed reduction, resulting in an output drive of 45 RPM.

Attached to the underside of the turntable shaft is a knurled coupling whose frictional surface engages an eccentric drive wheel, whose hub is attached to the movable slide plate. Movement of the eccentric causes the plate to travel in a lateral course between guide bars.

For purposes of mechanical analysis the positions of the slide bar can be subdivided:

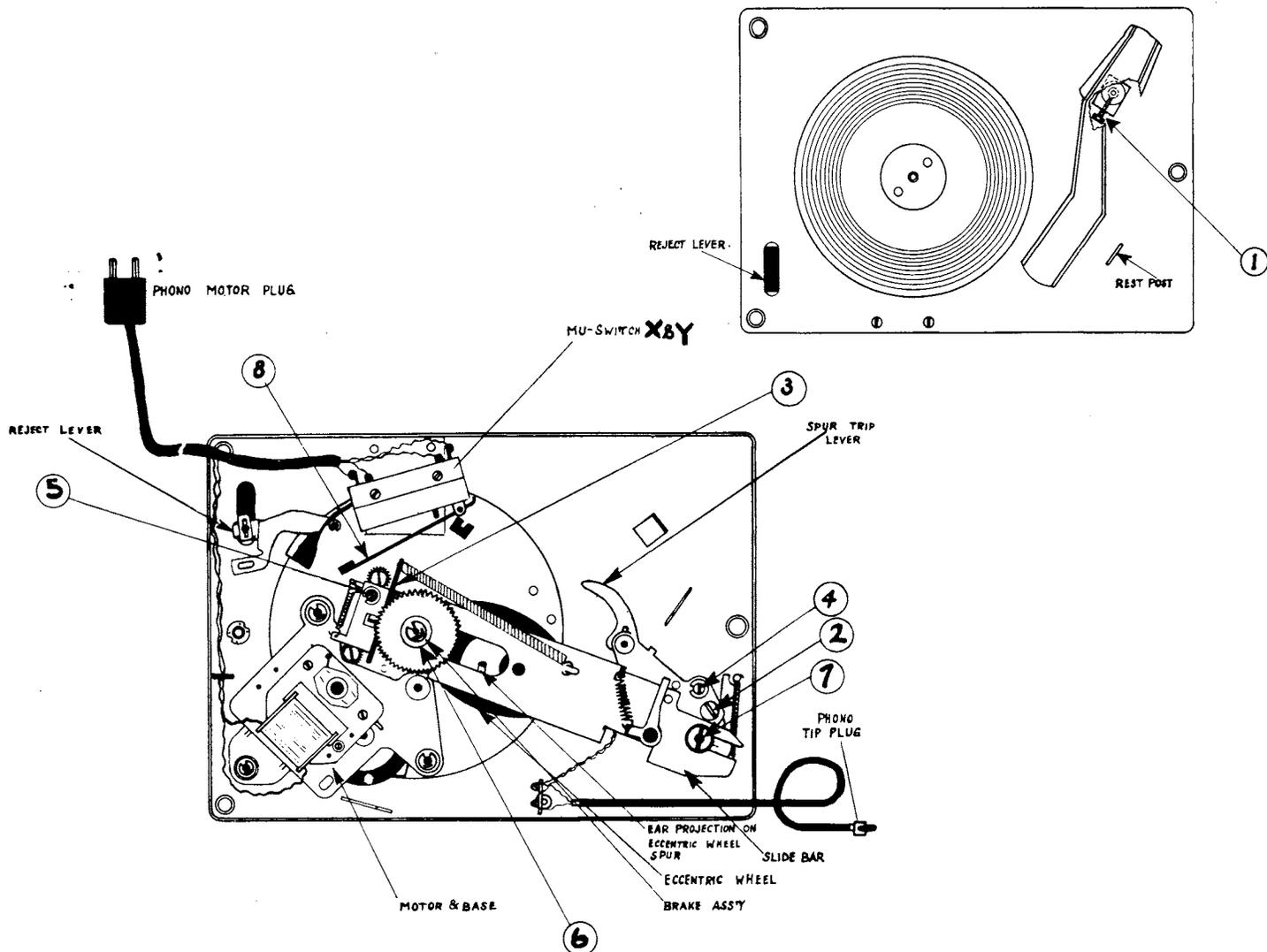
- A. The forward or stationary position, that is when the slide bar has moved to its furthestmost position toward the turntable shaft. In this position the tone arm has been lowered and is free to follow the grooving of the record.
- B. The backward and in-between positions where the eccentric wheel and its associated slide plate are in motion, the tone arm is not free but is being guided through a path determined by the mechanical camming and levering actions of the slide bar assembly.

Considering first of all the conditions of Section A, we see that when the slide bar is way forward, the eccentric drive has positioned itself so that its "round" or "bay" is harboring the knurled coupling of the turntable shaft. In this position, a definite clearance exists between the knurled surface of the coupling and the hollowed section on the periphery of the eccentric drive wheel. This condition of no friction will remain until some positive force is applied to the eccentric to nudge it into engagement with the revolving knurled coupling.

This force is applied as follows: as the tone arm traverses the grooving of the record, a follower mechanism below it and on the underside of the record moves in a parallel path. At the tip of this follower is a spur trip lever which eventually, as it moves in a tangential path across the eccentric wheel, pushes the small

ELECTRONIC SECRETARY Model DCR-1

Adjustments of Record Player Mechanism



1. **COARSE TONE ARM INDEXING ADJUSTMENT** - Loosen screw slightly holding tone arm (1) and rotate turntable by hand until backward and forward travel is descending on record. Now move tone arm by hand until the setdown point of stylus will be midway between edge of record and the beginning of concentric record grooves. Then tighten screw.

2. **FINE INDEXING ADJUSTMENT** - If when tightening coarse adjustment screw (1) setdown point is still off slightly, turn fine adjustment screw (2) to position setdown point exactly.

3. **SLIDE BAR STOP ADJUSTMENT** - Rotate turntable by hand until slide bar is in its forward position (in this position Mu switches X and Y will be closed). Check to see that bay in eccentric drive wheel is opposite knurled coupling. Loosen slightly the two screws holding slide bar stop in place, moving it either forward or backward until approximately 1/16" clearance between inside of bay and knurled coupling is obtained.

4. **SPUR LEVER TRIP ADJUSTMENT** - This adjustment controls the point on record that tone arm will reject after the closing message on record. It is set for maximum at factory so that tone arm will reject as soon as possible after closing message and should not have to be re-set. The only instance where adjustment might be needed is when a record is used that has a 2-minute time cycle or more, in which case tone arm may reject before closing message is completed. Backing off of this adjustment will make the tone arm reject later.

5. **BRAKE INTERVAL ADJUSTMENT** - This adjustment controls the length of time that the brake will be engaged on turntable and is set for maximum engagement of brake knife. The purpose of having a brake on the record player is to eliminate re-cycling, that is, to keep tone arm from drifting due to momentum of motor, and setting down on beginning of record again after machine has answered a call and has rejected.

6. **BRAKE SPRING ADJUSTMENT** - This adjustment will determine the amount of brake pressure that will be applied to the turntable. Below ratchet wheel mounted on turntable spindle there is a friction collar held in place by one Allen head screw. To increase brake, loosen Allen screw and raise collar, compressing brake spring, and then tighten screw. To decrease brake, lower collar.

7. **TONE ARM ADJUSTMENT** - Adjust until tone arm is parallel to motorboard.

8. **MU SWITCHES X AND Y LEVER ARM ADJUSTMENT** - Adjust X and Y Mu switches so that they close just before tone arm sets down on record. Mu switch X should close just before Y. This adjustment is made by bending lever arm of Mu switch by hand until correct setting is reached.

ear projecting from the top side of the eccentric and causes the outer surface to re-engage the knurled coupling. This causes the slide bar to move away from the center of the turntable.

We are now entering the phase of mechanical operation designated under "B". The motion of the slide bar effects a 3-way mechanical action of lifting the tone arm, returning it to a starting position and operating a latch to make possible a steady indexing position. The lifting of the tone arm is accomplished by a raised portion of the slide, bearing upward on a pin, to lift the tone arm up at a point ahead of its swivel position. The return of the arm is effected by the action of a lever in the slide mechanism striking a projecting pin from a lever affixed to the underside of the tone arm swivel. On the forward stroke of the slide, again the tone arm will swing back toward its indexing position, the raising step on the slide bar will slip out from under the tone arm elevating pin, allowing it to drop to the record. The latch will release, thus freeing the arm to follow the record grooving.

SUMMARY OF MAINTENANCE CALLS and Suggested Measures for Handling;

Service Report Indicates:	Probable Cause:	Corrective Measures:
Record player does not go into cycle (tone arm remains on resting post).	Too much brake tension on turntable	Refer to "Brake Spring Adjustment (6)" and adjust to lessen spring pressure
Record changer re-cycles, that is, tone arm sets down on beginning of record again after tone arm has rejected at end of cycle with no ringing voltage being applied	Not enough brake tension on turntable. Momentum of motor causing tone arm to drift too far	Refer to "Brake Spring Adjustment (6)" and adjust to increase spring pressure
Tone arm rejects as soon as it sets down on record	Gap between bay in eccentric drive wheel and knurled coupling too small	Refer to "Slide Bar Stop Adjustment (3)" and adjust for proper gap
Tone arm does not reject at end of record	Gap between bay in eccentric drive wheel and knurled coupling too great	Refer to "Slide Bar Stop Adjustment (3)" and adjust for proper gap
Tone arm does not tract properly (skips grooves in record)	Insufficient needle pressure	Take off the counter-balance spring located at base of tone arm
	Worn or chipped needle	Replace needle
	Needle out of cartridge saddle (this happens occasionally when needle guard is removed)	Position needle in saddle
Erratic indexing (tone arm sometimes does not set down on edge of record, but off the record)	Bind in tone arm follow assembly (trip lever assembly); that is, the shaft the tone arm is fastened to is binding as it passed through the motorboard bushing	Remove tone arm, "C" washer and other washers and put a few drops of light oil along shaft. If bind is slight, the shortening of pickup arm return lever spring (No. 69-Section 9) should remedy this condition

Note: If the telephone is ringing and the tone arm does not set down on the record, or if it fails to reject at end of record, the safety timer Mu switch will open (after 4 minutes) and open the power to machine, disconnecting it from the line. Mu switch will have to be reset via access plug in rear of chassis.

ADJUSTMENTS OF THE WIRE RECORDER MECHANISM

SECTION A

Forward Adjustments: This category of adjustments has reference to corrective measure taken to remedy faulty operation in the run or forward operation of the wire recorder mechanism. We shall list the troubles resulting from these maladjustments, the cause, the remedy or correct adjustment:

Apparent Trouble: Slipping in the Run Position

Cause 1. Oil on motor shaft, intermediate drive pulley, or takeup drum turntable. (See Figure 3)

Adjustment: Clean with Denatured Alcohol only.

Cause 2. Motor shaft not centered in access well on top-side of motor board.

Adjustment: Remove plug from topside of motor board as shown in Figure 5. This permits visible access to top end of motor shaft. Now loosen machine screws holding motor frame assembly to bracket attached to motor board. Position motor so that shaft is centered in well and tighten screws.

Cause 3. Sticking of the rocker arm assembly caused by friction developed between stabilizing bar (refer to Figure 4) and aluminum idler wheel or its supporting arm.

Remedy: Spring bar up or down to get uniform clearance on both sides of stabilizing bar. This will permit rocker assembly to move without undue friction.

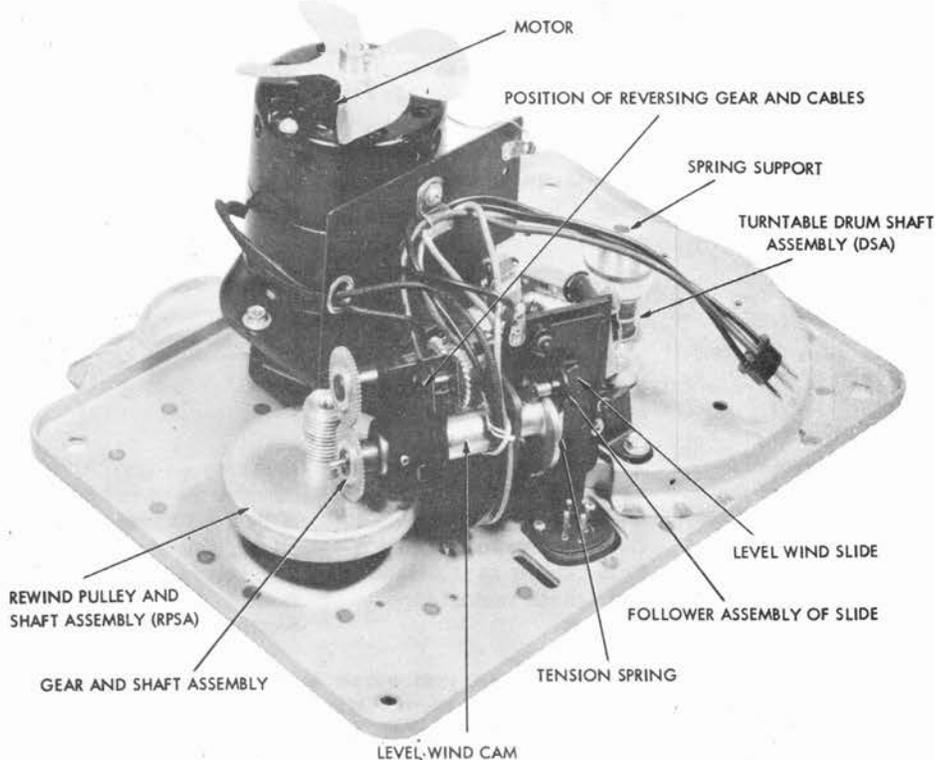


FIGURE NO. 1 - UNDERSIDE WIRE RECORDER ASSEMBLY

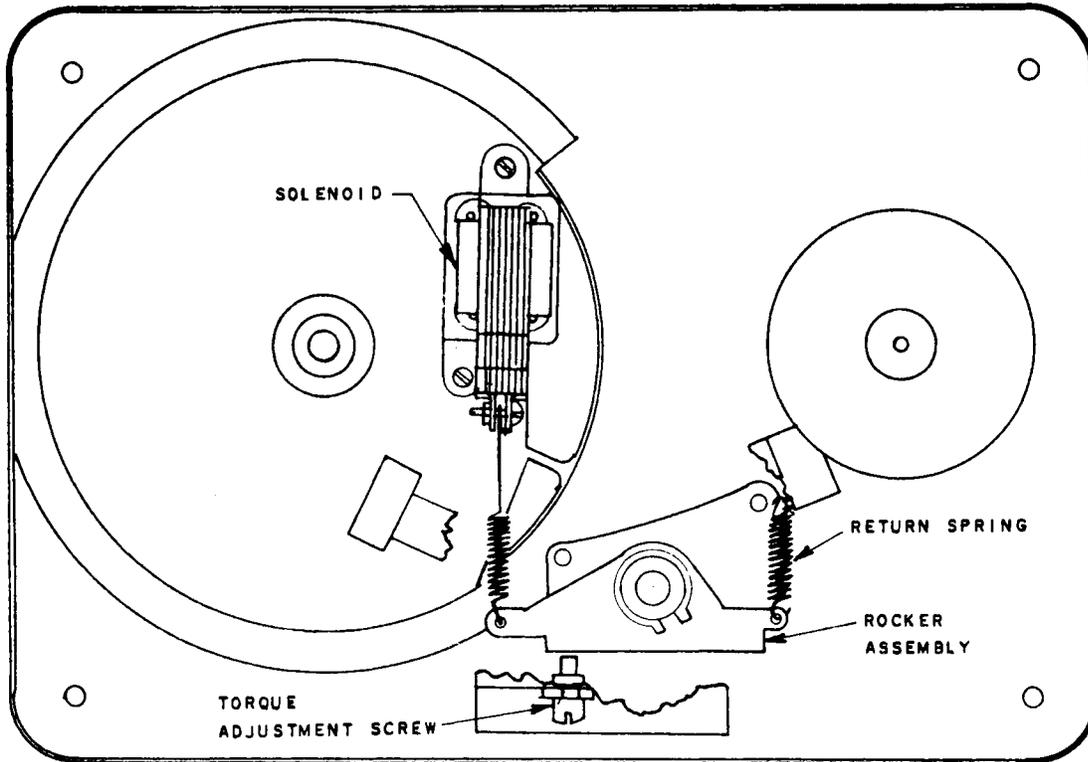


FIGURE #2. ACTION OF ROCKER ASSEMBLY

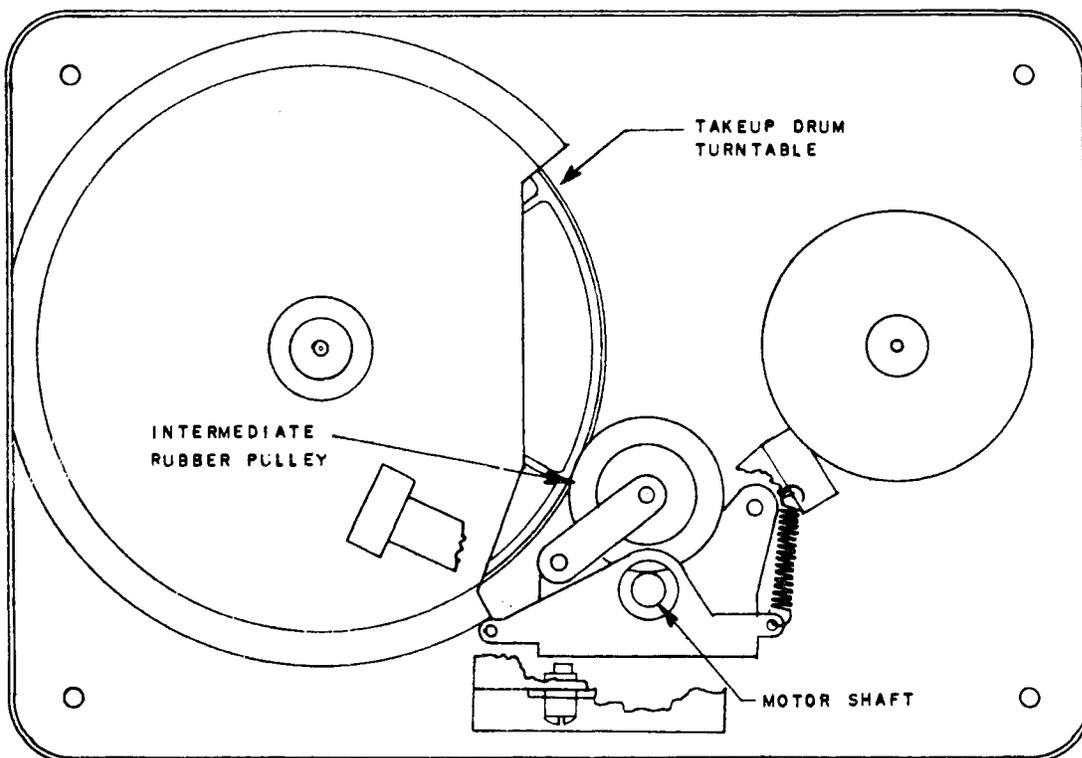


FIGURE #3. OPERATION OF RUN

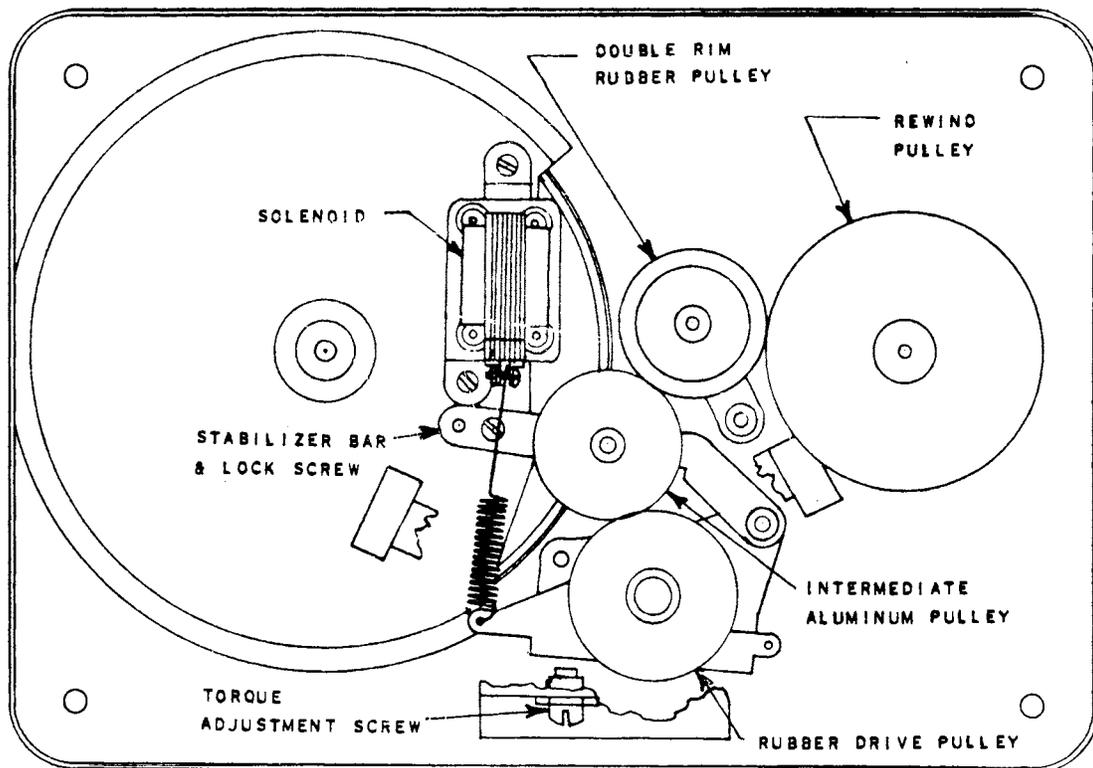


FIGURE #4. OPERATION OF REWIND

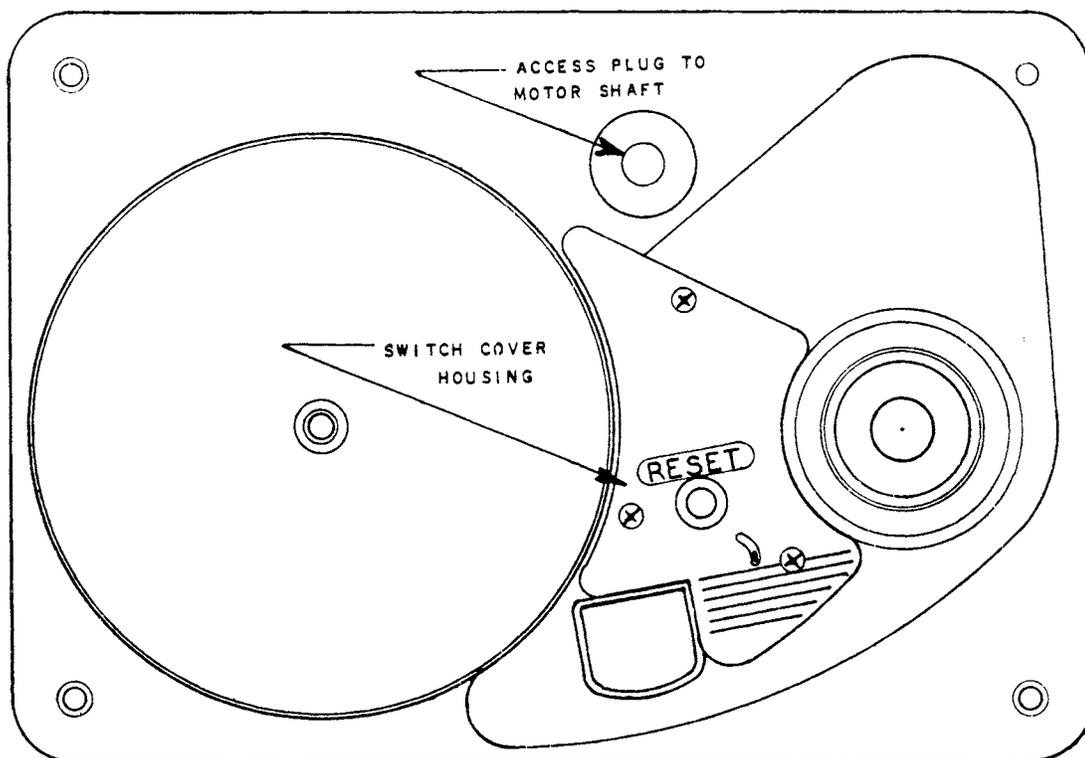


FIGURE #5. TOP VIEW WIRE RECORDER

Cause 4. Improper adjustment of turntable torque. Proper adjustment of the turntable torque is very important. Insufficient torque will result in inconsistent turntable speed, causing "wow". Too much torque will result in wire breakage when switching from "Rewind" to "Play".

1. With the power connected, place the unit in "Play" position.

2. Loosen the locknut on the adjustment screw in the motor mounting bracket.

3. If the turntable does not rotate, turn the adjustment screw counter-clockwise until the idler drive pulley barely makes contact with the turntable, but enough to allow the turntable to rotate.

4. If the turntable is rotating, turn the screw clockwise until the turntable stops rotating, then back the screw out until the idler drive pulley barely makes contact with the turntable, but enough to allow the turntable to rotate.

5. After this adjustment is made, turn the adjustment screw counter-clockwise 3/4 turn.

6. Tighten the locknut, being careful not to turn the adjustment screw.

Apparent Trouble: Stalling in the run position.

Cause 1. Insufficient end play in turntable drum shaft assembly. See Figure 1 as DSA.

Adjustment: Loosen Allen set screws on spring support hub and set for clearance of .006".

Cause 2. Insufficient end play in rewind pulley shaft assembly shown in Figure 1 as RPSA.

Adjustment: Loosen Allen set screw on worm gear coupling and set for .006" play.

Cause 3. Too much friction or too deep mesh between the worm gear and fibre gear train.

Adjustment: Remove bakelite switch cover housing on top of motor board by taking out three Phillips head screws. This makes available three hex head screws which hold the entire level wind assembly with the fibre gear train to the underside of the motor board. Slight loosening of these screws permits the assembly to be shifted so that a shallower or deeper mesh can be secured as required. Set the mesh for 3/4 tooth depth and secure by tightening the hex screws.

Cause 4. Not enough end play in the horizontal shaft extending from the take-off fibre gear to the heart-shaped level wind cam on the rewind assembly.

Adjustment: Loosen Allen set screws on cam and reset for 10/1000 clearance.

Cause 5. Insufficient end play in shaft extending from secondary fibre gear to flexible shaft coupling on rewind assembly.

Adjustment: Loosen Allen set screws on coupling and adjust for .003".

SECTION B

Rewind Adjustments: This section deals principally with adjustments that effect the rewind operation of the mechanism. These manifestations would in most cases be a slow rewind, and less

frequently, no rewind.

Cause 1. Oil on idler wheel train. See Figure 3 for wheels that would be affected.

Adjustment: Clean with Denatured Alcohol only.

Cause 2. Misalignment of idler wheels, especially 2 rim rubber drive pulley.

Adjustment: Spring supporting arm up or down until pulley is in proper plane with respect to other pulleys.

Cause 3. Maladjustment of stabilizing bar.

Adjustment: With the machine in "Off" position, loosen set screw on stabilizing bar and adjust to obtain 1/16" clearance between aluminum drive pulley and rubber drive pulley, attached to motor shaft.

Cause 4. Insufficient exertion of force on rocker assembly by solenoid.

Adjustment: Loosen mounting screws on solenoid bracket and move solenoid assembly as necessary to obtain increased pressure.

Cause 5. Solenoid jamming in out position, thus not permitting rewind action.

Adjustment: Loosen screws on bumper bracket which limits travel of solenoid, and reset so that solenoid is 1/32" from extended position.

Cause 6. Refer to Section A under slow run. Some of these causes could affect rewind action also.

SECTION C

Level Wind Adjustment:

1. Rotate the rewind hub until the recording head is in its extreme downward position. In this position, the wire slot in the recording head should be approximately .020" above the motor board. If the wire is too high or too low, with respect to the motor board, it may be adjusted by slight bending of the level wind slide.

2. The reset switch arm, which is fastened to the top of the switch housing should be 15/32" from raised section on the motor board under switch lever finger. This may be adjusted by bending the arm.

3. Thread on a spool of wire and let it wind on the turntable for 15 or 20 minutes. Observe how the wire lies in the channel of the turntable. With the proper adjustment, the wire should be even all the way across the channel. If the wire piles up in the top of the channel of the turntable remove the turntable and add washers until the condition is corrected. If the wire piles up in the bottom of the channel, washers should be removed.

4. Rewind the wire on the storage spool and observe how the wire lies on the spool. If the wire piles up on the top of the spool, remove the hub assembly and add washers until this condition is corrected. If the wire piles up on the bottom of the spool, washers should be removed.

SECTION D

Lubrication: Factory lubrication should be sufficient for a long period of service, however, should it become necessary to lubricate the recorder, do so as follows:

Use Sta-Put No. 122-2 Grease on the following:

1. Pins of the bracket and post assembly

2. Washers
3. The worm gear of the rewind pulley assembly
4. The shaft of the level wind shaft and gear assembly, also bearing faces
5. Level wind guides of the frame and housing assembly
6. Follower assembly

Use Sta-Put No 1245 Oil on the following:

1. Reversing gear assembly
2. The cam surface of the level wind cam

Caution: All pressed oilite bearings do not require oil.

Do not, under any circumstances, permit oil or grease to come in contact with the rubber tires of the idler pulleys and drive pulley, the turntable rim, pulley, and the rewind pulley. If grease and oil are on the rubber tires, clean these and other surfaces with Dentured Alcohol.

Avoid over-lubrication.

SECTION E

Cleaning of the recording head: Weak reproduction when not accompanied by high distortion is probably due to dirt or foreign matter in the recording gap. Clean the gap with a stiff-bristle brush, using Denatured Alcohol.

Caution: Do not use any metallic object for this purpose.

SECTION F

Automatic Switch Assembly:

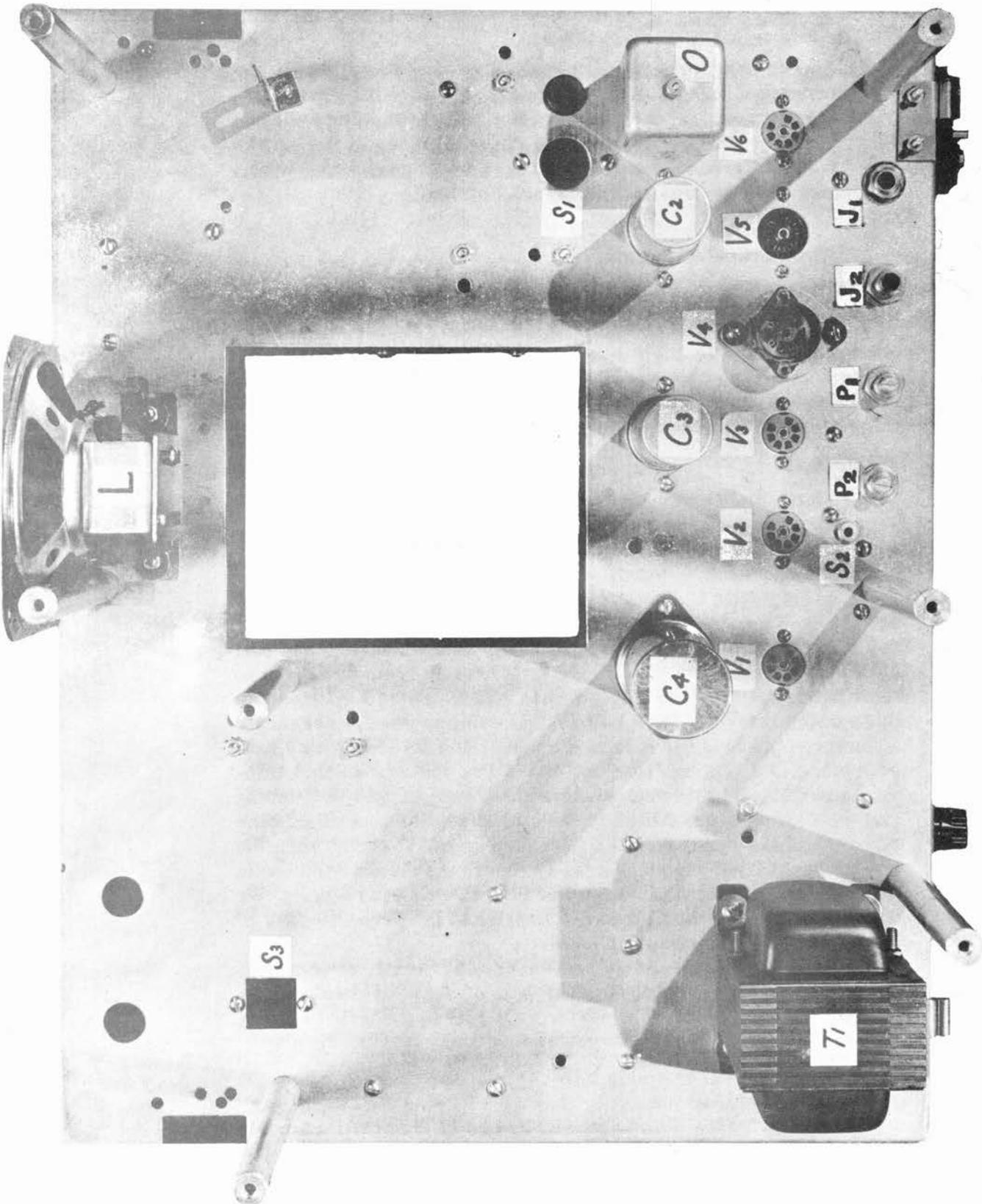
This assembly is located on the top side of the motor board under the bakelite switch housing, and its actuating device for re-setting purposes is a small pushbutton. The device normally is made to trip when the plastic leader at either end of the spool of wire passes by it. The actuating device for opening or triggering the switch is a small metallic peg which extends across and just above the normal path of the wire as it travels from one spool to the other. Attached to this tripping peg is a small rectangular plate which is free to travel around a mounting post, but assumes a centered position because of the equalizing force of a tiny hair pin spring. Projecting from one end of this plate is a short tripping pawl which in its centered position tends to hold the moving leaf of a snap-action switch in the closed position. A slight disturbance of the small metallic peg, such as might occur when the plastic leader rubs against it will produce a swiveling motion in the plate and a lateral movement of the tripping pawl from under the switch leaf, allowing it to snap open and interrupt the flow of current to the wire recorder motor.

False tripping due to vibration or other extraneous causes can be corrected by setting the bent ends of the hair pin spring so that the swiveling plate will assume a position of correct center. In this position the pawl will push up squarely against the center of the leaf spring.

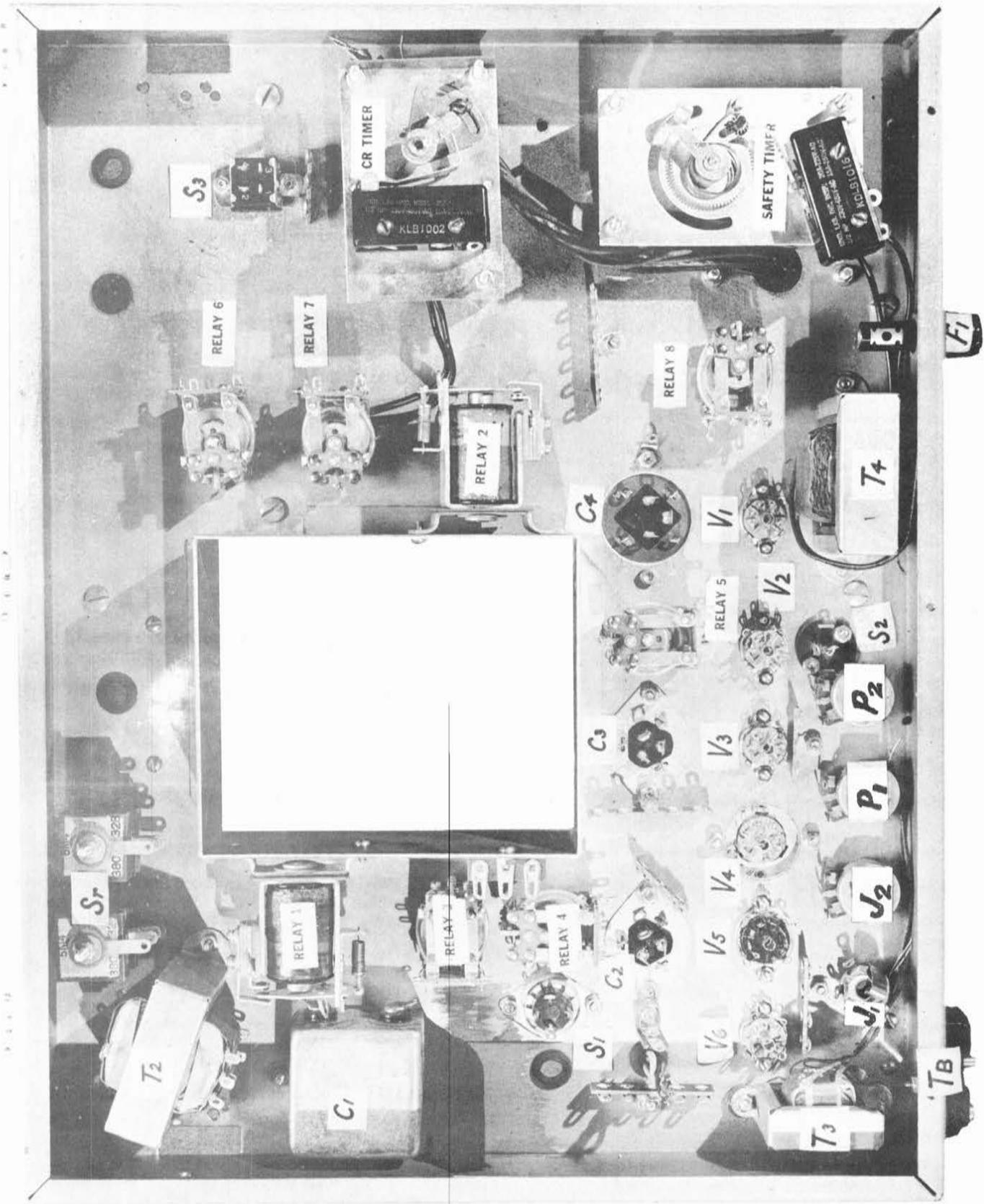
Counter Not Turning:

In most cases this is caused by one of the small Allen set screws holding the cable which links the rewind assembly to the counter assembly, being loose.

Adjustment: Tighten the loose set screw with a small Allen wrench.



ELECTRONIC SECRETARY Model DCR-1
TOPSIDE VIEW OF CHASSIS



ELECTRONIC SECRETARY MODEL DCR-1
 UNDERSIDE VIEW OF CHASSIS

PARTS LIST

DCR-1

WHEN ORDERING PARTS FOR REPAIR OR REPLACEMENT, PLEASE GIVE OUR PART NUMBER AND BRIEF DESCRIPTION. IF POSSIBLE, PLEASE INDICATE SERIAL NUMBER OF MACHINE WHERE THE PARTS WILL BE USED.

CHART REF.	PART NO.	DESCRIPTION	CHART REF.	PART NO.	DESCRIPTION
	75-B-100	Speaker bracket		50-K-100	Volume control knob for off-on switch
	75-B-101	Timer cable bracket		5-L-100	Pilot light, neon, with 2 speed nuts
	75-B-103	Mounting bracket for elapsed time indicator		1-P-100	Pillars, 4-1/16" x 1/2" round, steel, tapped 10/32 ends
	1-C-103	Flexible timer cable - 6-3/4"		1-P-101	Pillars, 4-1/8" x 1/2" round, steel, tapped 10/32 ends
	2-C-100	Cabinet - grey hammerloid finish with lid stop		1-P-102	Pillars - brass stand-off 3/8"x1/2"
	85-S-100	Lid stop only for cabinet		1-P-103	Pillars - brass stand-off 3/8"x1-1/4"
	40-C-101	Chassis, punched, plated, painted and lettered		10-P-100	Plate - for fuse "Use 3 amp. fuse"
T-4	42-C-100	Choke - 13 henry		10-P-101	Plate - red letter "Caution-Disconnect"
O	43-C-100	Oscillator coil - shielded		10-P-104	Bottom plate only - for chassis
C-2	47-C-100	Electrolytic condenser 10-10-20 Mfd. @ 450-450-20V.		10-P-105	Condenser mounting plate - metal
				10-P-106	Condenser mounting plate - fibre
C-3	47-C-101	Electrolytic condenser Triple 20 Mfd. @ 25V.		10-P-107	Trade-mark plate "Electronic Secretary" 6-1/2"
C-4	47-C-102	Electrolytic condenser Triple 20 Mfd. @ 450V.		10-P-112	Front control plate
	47-C-103	Electrolytic condenser Tubular, 10 Mfd. @ 50V.	A11-P-101		Record player complete (see separate list)
	47-C-200	Electrolytic condenser Bathtub 2 Mfd. @ 400V. D.C.	15-P-100		Plug, snap button for 3/8" hole
	47-C-250	Hicap condenser - .001 Mfd. @ 600V.	27-P-100		Selenium rectifier - 65 Ma.
	47-C-251	Hicap condenser - .01 Mfd. @ 600V.	30-R-100		Relay - AC - DPDT 115 V. 2 circuit
	47-C-252	Hicap condenser - .02 Mfd. @ 600V.	30-R-400		Relay - DC - 2500 Ohm coil N.O. SPST
	17-1550	Hicap Condenser - .01 Mfd @ IKV	35-R-100		Resistor, Carbon 100 Ohm 1/2 Watt #10%
	17-1549	Hicap Condenser - .02 Mfd. @ IKV	35-R-101		Resistor, Carbon 220 Ohm 1/2 Watt #10%
	47-C-300	Tubular, ceramic condenser - .1 Mfd. @ 600V.	35-R-103		Resistor, Carbon 1500 Ohm 1/2 Watt #10%
	47-C-301	Tubular, ceramic condenser - .05 Mfd. @ 600V.	35-R-104		Resistor, Carbon 3300 Ohm 1/2 Watt #10%
P1, P2	50-C-100	Potentiometer - control - 500,000 Ohm 1/2 watt	35-R-108		Resistor, Carbon 22000 Ohm 1/2 Watt #10%
	50-C-101	Potentiometer - control - 500,000 Ohm 1/2 watt with off-on switch	35-R-109		Resistor, Carbon 56000 Ohm 1/2 Watt #10%
TB	20-T-103	Telephone block - complete with cover	35-R-110		Resistor, Carbon 100000 Ohm 1/2 Watt #10%
	1-F-100	Fuse - cartridge type, 3 Amp.	35-R-113		Resistor, Carbon 330000 Ohm 1/2 Watt #10%
F1	50-H-100	Fuse holder, complete with hardware	35-R-116		Resistor, Carbon 560000 Ohm 1/2 Watt #10%
	75-G-100	Rubber grommet - for 1/2" drilled hole	35-R-200		Resistor, carbon 270 Ohm 1 Watt 10%
	75-G-101	Rubber grommet - for 1/4" drilled hole	35-R-201		Resistor, carbon 56000 Ohm 1 Watt 10%
	15-H-100	Wire recorder head	35-R-225		Resistor carbon 1500 Ohm 2 Watt 10%
A25-R-100		Complete wire recorder - less wire, head and takeup drum (see separate parts list)	36-R-100		Resistor, wirewound 250 Ohm 10 Watt 10%
	20-W-100	Wire - for recorder - one hour on spool	36-R-102		Resistor, wirewound 40000 Ohm 10 Watt 10%
A75-D-100		Takeup drum, plastic with snap button and spring	16-R-150		Resistor, wirewound 425 Ohm 20 Watt 10%
	25-H-100	Hinge - for chassis - 2 hole - female			
	25-H-101	Hinge - plain - welded on cabinet			
	50-I-100	Insulator - for selenium stack			
	50-I-101	Insulator - for AC tie point			
S2	1-J-100	Phono-jack, for record player			
J1, J2	1-J-101	Metering jack			
PH	1-J-102	Headphone jack			

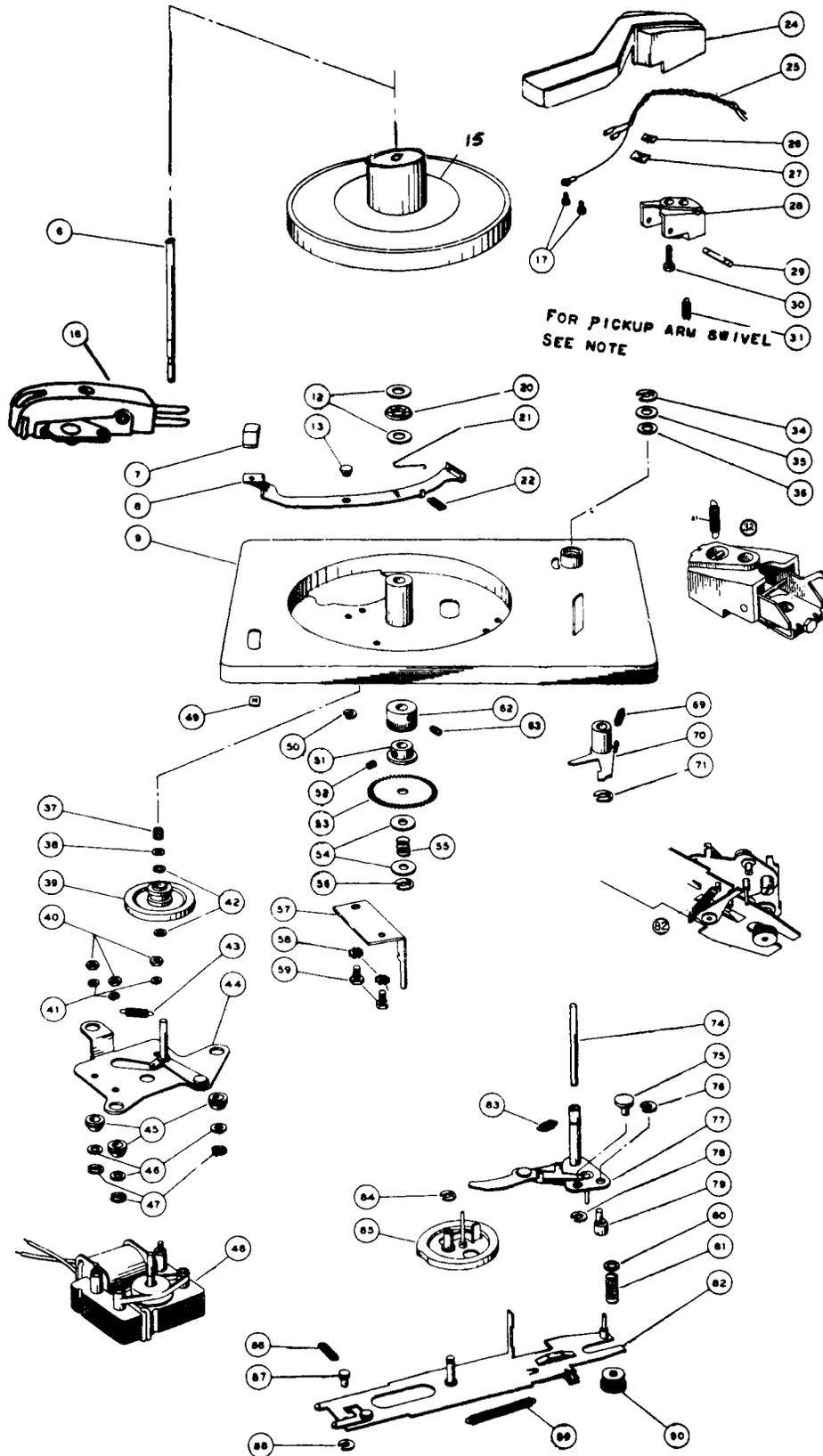
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CHART REF.	PART NO.	DESCRIPTION	CHART REF.	PART NO.	DESCRIPTION
	15-S-101	Front screen only		20-S-301	Screws - 6/32 x 1/4 round head machine Cad. plate
	21-S-100	Tube shield for 12AX7		20-S-302	Screws - 6/32 x 1/2 round head machine Cad. plate
S3	49-S-100	4 prong socket - chassis mount, Jones		20-S-303	Screws - 6/32 x 3/4 round head machine Cad. plate
S1	49-S-101	4 prong socket - chassis mount, amphenol		20-S-304	Screws - 6/32 x 1 round head machine Cad. plate
	49-S-102	4 prong socket - for wire recorder head		20-S-305	Screws - 6/32 x 1-1/2 round head machine Cad. plate
	A49-S-103	Head connector assembly - for recorder		20-S-306	Screws - 6/32 x 1-3/4 round head machine Cad. plate
V5	50-S-100	Tube socket - 9 pin		20-S-307	Screws - 6/32 x 2 round head machine Cad. plate
V1,2,3,6	50-S-101	Tube socket - 7 pin miniature		20-S-325	Screws - 6/32 x 1/2 flat head Cad. plate
V4	50-S-102	Tube socket - 9 pin shielded base, shock mounted		20-S-400	Screws - 4/36 x 3/8 round head
L	60-S-100	Speaker - 4 inch		20-S-500	Screws - 4 x 1/4 sheet metal self tapping
	95-S-100	Mu switch		20-T-100	Terminal tie strip - 1 lug 3/8" space
	95-S-101	Three pole toggle switch		20-T-101	Terminal tie strip - 2 lug 3/8" space
	25-T-100	Safety timer - complete		20-T-104	Terminal tie strip - 3 lug 3/8" space
	A25-T-101	CR timer - 1 switch		20-T-106	Terminal tie strip - 4 lug 3/8" space
	25-T-104	Elapsed time indicator - complete		20-T-107	Terminal tie strip - 5 lug 3/8" space
T1	70-T-100	Power transformer		20-T-109	Terminal solder lug - #6 hole
T3	70-T-200	Output transformer		1-W-100	Washer, insulating, fibre, flat, for phone jack
T2	70-T-300	Input transformer		1-W-101	Washer, insulating, fibre with shoulder for phone jack
	90-T-100	Receiving tube - #6005 G.E. Industrial type		1-W-102	Washer, metal, flat, nickel plated, 3/8" hole
	90-T-101	Receiving tube - #6136 G.E. Industrial type		1-W-103	Washer, #6 plated
	90-T-102	Receiving tube - #6202 G.E. Industrial type		1-W-104	Washer, #6 plated
	90-T-103	Receiving tube - #5751 G.E. Industrial type		1-W-105	Washer, #4 plated
	90-T-104	Receiving tube - #5814A G.E. Industrial type		1-W-106	Washer, #10 plated
	20-W-102	Power cord - 8 ft. - with #44 plug - open other end		2-W-100	Lockwasher, internal star 3/8" hole
	20-S-100	Screws - 10/32 x 1/2 Binding Head cadmium plate		2-W-101	Lockwasher, external strz #6 plated
	20-S-101	Screws - 10/32 x 1/2 Oval head nickel plate		2-W-102	Lockwasher, split type #4 plated
	20-S-102	Screws - 10/32 x 1/2 binding head nickel plate		2-W-103	Lockwasher, split type #6 plated
	20-S-200	Screws - 8/32 x 1/2 round head machine Cad. plate		2-W-104	Lockwasher, split type #6 plated
	20-S-201	Screws - 8/32 x 2-1/2 round head machine Cad. plate			

PARTS LIST OF RECORD PLAYER PART NO. A11-P-101

REF. NO.	PART ORDER NO.	DESCRIPTION	REF. NO.	PART ORDER NO.	DESCRIPTION
6	22-S-100	Separator shaft with arm	55	65-S-105	Ratchet Wheel Thrust Spring
7	50-K-101	Control knob	56	1-W-105	"C" Washer to Mount Ratchet Wheel
8	3-L-100	Motorboard sub-assembly complete with studs	57	75-B-107	Mounting Bracket for Slide Assembly
12	1-W-107	Thrust bearing washer	58	2-W-105	No. 8 External Tooth Lockwasher
13	75-S-100	Reject lever mounting stud	59	20-S-203	No. 8 x 3/8" Self-Tapping Hex Screw
15	95-T-100	Turntable - only	62	65-R-100	Knurled Roller
16	17-C-100	Cartridge - Astatic - ceramic	63	20-S-103	No. 10-32 x 17/64 Screw - Headless Dog Point
16A	15-N-100	Needle for above	69	65-S-105	Pickup Arm Return Lever Spring
17	20-S-402	Screw to mount pickup - 4 x 1/4"	70	3-L-101	Return Lever
20	15-B-101	Thrust bearing	71	1-W-108	"C" Washer for Mount Return Lever
21	65-S-100	Reject lever spring			
22	65-S-101	Reject lever return spring			
24	80-A-101	Pickup arm shell only			
24A	A80-A-100	Pickup arm complete			
25	A1-C-106	3 Wire twisted cable for pickup	74	22-S-102	Elevating Rod
26	90-N-108	Speed nut for cable - rear of arm	75	75-S-103	Tripping Adjustment Stud
27	90-N-109	Speed nut for cable - center of arm	76, 78	1-W-116	Spring Washer for Adjusting Studs
			77	3-L-102	Trip Lever Assembly
			79	75-S-102	Landing Adjustment Stud
28	15-W-100	Counterbalance weight	81	65-S-106	Height Adjustment Spring
29	22-S-101	Counterbalance pivot shaft	82	25-S-100	Cycling Slide Complete with Stop Dog and Safety Lever
30	20-S-308	Screw to fasten counterbalance #6	82B	65-S-107	Safety Lever Actuating Spring
31	65-S-102	Spring for counterbalance	83	65-S-101	Trip Lever Spring
32	96-S-100	Swivel for pickup arm	84	1-W-109	"C" Washer for Cam Wheel
34	1-W-108	"C" washer to mount trip lever	85	16-W-102	Cam Wheel and Tire
35	1-W-110	Steel thrust washer			
36	1-W-111	Bearing washer for tone arm	86	65-S-108	Stop dog Tension Spring
37	65-S-103	Idler wheel retainer	88	1-W-116	Spring Washer for Stop Dog Adjusting Stud
38	1-W-112	Spring washer for idler wheel			
39	16-W-100	Idler wheel	89	65-S-109	Slide Spring for Assembly Return
40	90-N-104	Nut #6 32 Hex.	90	90-N-111	Knurled Nut for Height Adjustment Linkage 1/16 x 1/2"
41	2-W-103	#6 Split lockwasher		20-S-102	Screw 6/32 x 1/2"
42	1-W-113	Dampening washer for idler wheel		75-B-102	Mu Switch Mounting Bracket
43	65-S-104	Idler wheel tension spring	See Page 32 for Sketches Showing These Added Parts	95-S-100	Light Pressure Switch, Slide Actuated
44	10-P-114	Motor mounting plate complete with idler lever		20-S-306	Screw 6/32 x 1-3/4"
45	75-G-102	Rubber grommet for motor mounting hole		70-S-100	Brass Stripping for tying Mu switch
46, 80	1-W-114	Flat metal washer for mounting motor		A1-C-105	Cable Assembly for Switches and Motor Assembly
47	1-W-105	"C" washer for motor mount assembly		A1-C-104	Cable Assembly for Pickup Output
48	64-M-100	Motor, 117 Volt, 60 cycle G. I.		20-T-101	Tie Strip for Pickup Cable Terminal
49	90-N-110	Control knob speed nut			
50	1-W-116	Spring washer to mount stud			
51	46-C-100	Friction Collar			
52	20-S-202	Screw, No. 8/32 x 3/16" hex			
53	16-W-101	Ratchet Wheel			
54	1-W-115	Flat, Metal Washer for Ratchet Wheel			

RECORD PLAYER PARTS

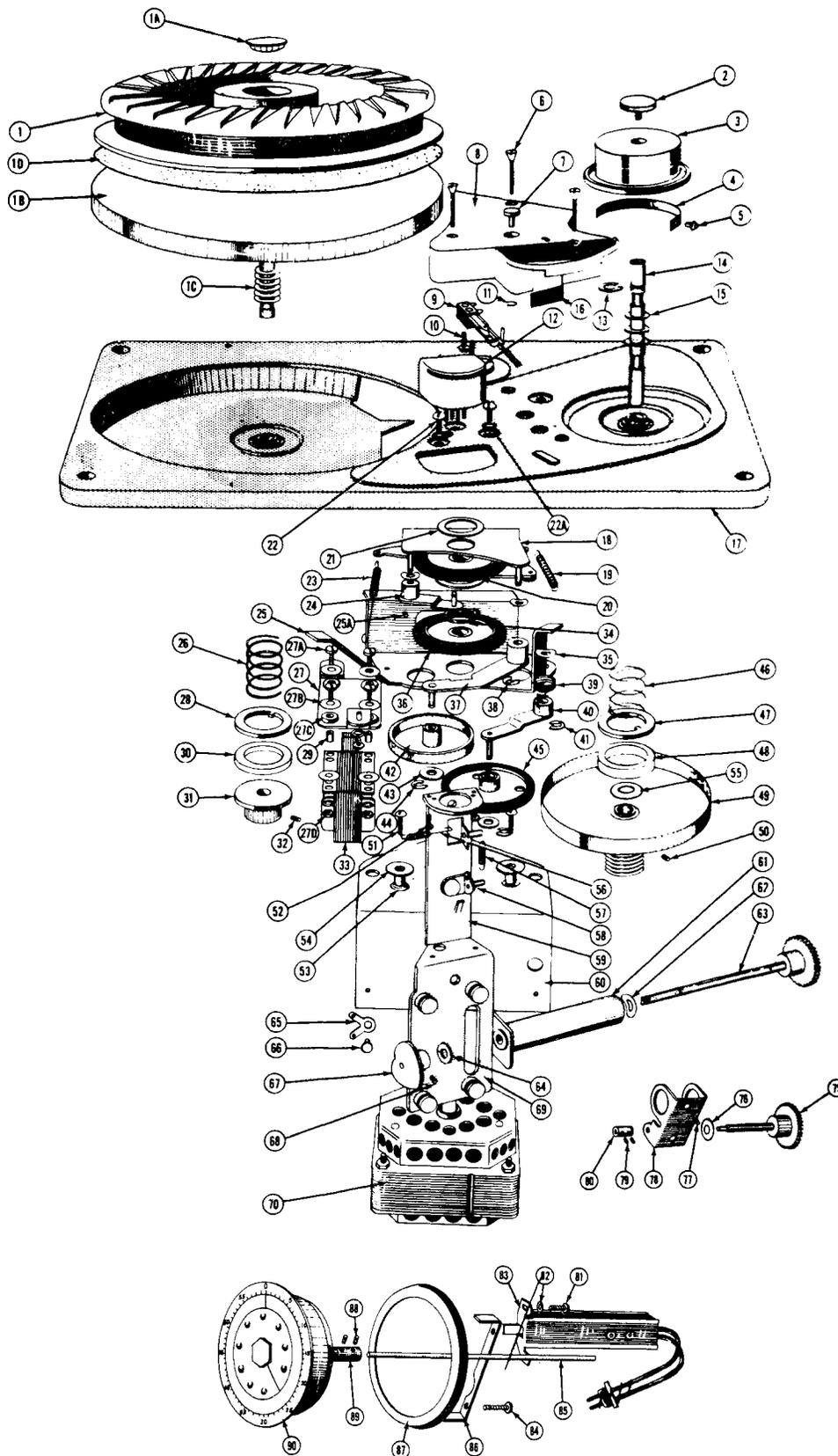


PARTS LIST OF WIRE RECORDER

PART NO. A25-R-100

REF. NO.	PART ORDER NO.	DESCRIPTION	REF. NO.	PART ORDER NO.	DESCRIPTION
	A75-D-100	Takeup Drum with snap button and spring	40	A6-L-105	Link Assembly
	15-H-100	Recording Head - four prong	41	1-W-123	"C" Washer
1A	15-P-101	Plug Button - snap, 3/4" hole	42	A90-P-102	Pulley and Bushing Assembly
1B	A95-T-101	Lower Turntable Section and Shaft Assembly	43	1-W-124	Cloth Washer
	1-W-117	Metal Shim Thrust Washer	46	65-S-116	Rewind Pulley Spring
1C	25-D-100	Clutch Disc	47	1-W-120	Keyed Washer
1D	20-S-104	Hub Lock	44	1-W-123	"C" Washer
2	A85-H-100	Rewind Hub Assembly	45	A90-P-103	Pulley Assembly
3	65-S-110	Spring	46	65-S-116	Rewind Pulley Spring
4	50-P-101	Index Pin	48	1-W-125	Felt Washer
5			49	A90-P-104	Rewind Pulley Assembly with Set Screw
6	20-S-309	6/32 x 1" O.H.M.S. Screw	51	20-S-205	Motor Mounting Screw
7	90-B-100	Reset Button	52	20-S-403	4/40 x 1/4" Screw
8	A95-S-105	Automatic Switch Assembly	53	2-W-106	#8 I. T. Lockwasher
9	A95-S-106	Switch Only	54	55-S-100	Spacer Sleeve
10	20-S-302	Screw	55	1-W-126	Fibre Washer
11	65-S-111	Retaining Spring	56	65-S-117	Level Wind Spring
13	1-W-118	Hub Thrust "C" Washer	57	65-S-118	Tension Spring
14	22-S-103	Rewind Hub Shaft	59	A25-S-101	Level Wind Frame
15	1-W-117	Shim Thrust Washer	60	10-P-115	Motor Mounting Plate
16	50-I-102	Insulator	62	1-W-122	Spring Washer
17	A65-M-101	Motorboard and Bearing Assembly	63	A20-G-100	Gear and Shaft Assembly
18	75-B-108	Bracket and Post Assembly	64	1-W-127	Flat Washer
19	65-S-112	Spring	67	5-C-100	Level Wind Cam with Set Screw
20	90-P-101	Pulley Assembly	69	75-F-100	Frame and Housing Assembly
21	1-W-119	Flat Washer	70	64-M-101	Motor (110V. 60 cycle)
22	20-S-200	8/32 x 3/8 R.H.M.S. Steel Cad.	70A	A10-P-116	Motor Mounting Plate Assembly Complete with Hardware
22A	2-W-106	Lockwasher	70B	20-S-205	8/32 x 5/8" R.H.M.S.
23	65-S-113	Spring	70C	2-W-106	#8 I. T. Lockwasher
24	A6-L-103	Drive Link Assembly	70D	55-S-100	Spacer Sleeve
25A	A20-S-105	Torque Adjust Assembly	75	A20-G-101	Gear Shaft Assembly
26	65-S-114	Turntable Spring	76	1-W-127	Washer
27	75-B-109	Bracket	77	20-S-326	Set Screw (6/32 x 3/16")
28	1-W-120	Keyed Washer	78	75-B-110	Bracket
30	1-W-121	Felt Washer	80	59-C-100	Coupling with Set Screw
31	85-H-101	Spring Support with Set Screw	81	20-S-301	Switch Mounting Screws
32	A52-S-101	Solenoid Assembly (110V. 60 Cycle)	82	2-W-101	Washer
33	52-S-102	Solenoid Only	83	A95-S-107	Switch Assembly
34	45-R-101	Retaining Ring	84	20-S-301	Timer Mounting Screw
35	1-W-122	Spring Washer	86	75-B-103	Bracket
36	90-P-100	60 Cycle Drive Pulley	87	45-R-100	Timer Spacer Ring
37	A6-L-104	Movable Link Assembly	89	59-C-100	Coupling with Set Screws
38	1-W-123	"C" Washer	90	A25-T-105	Timer
39	65-S-115	Spring	103	1-C-103	Timer Cable - Flexible 6-3/4"

WIRE RECORDER MECHANISM PARTS



IMPORTANT!

The Electronic Secretary DCR-1 differs from the one shown in previous manuals as follows:

1. Relay 9 has been removed.
The coil of this relay is designated R9 and was located near the lower right-hand corner of this Schematic Drawing. The relay is located in the center of the left-hand edge on the underside view of chassis on page 41 of Issue D Manual for previous DCR-1 models.
2. The lead from Pin 6 of the 6AQ5(6005) tube has been removed from the top (normally closed) "B"

- contact of Relay 4. In the drawing on this page the normally closed contact of Relay 9 is called R9(A) and is located at the lower left of the 6AQ5(6005). The normally closed contact of Relay 4 is called R4(B) and is located between the lower left of the one-half 12AU7(5814) tube and the lower right of the 6AQ5(6005) tube shown on the top half of the drawing.
3. The lead from the oscillator coil has been removed from the bottom (normally open) "8" contact of Relay 9 and returned directly to Pin 3 of the Record Head plug. The normally open contact of Relay 9 is called R9(B) and is located to the left of the oscillator coil near the upper left-hand corner.

ELECTRONIC SECRETARY

Model DCR-1

Complete Schematic Drawing S1

(Previous Models)

