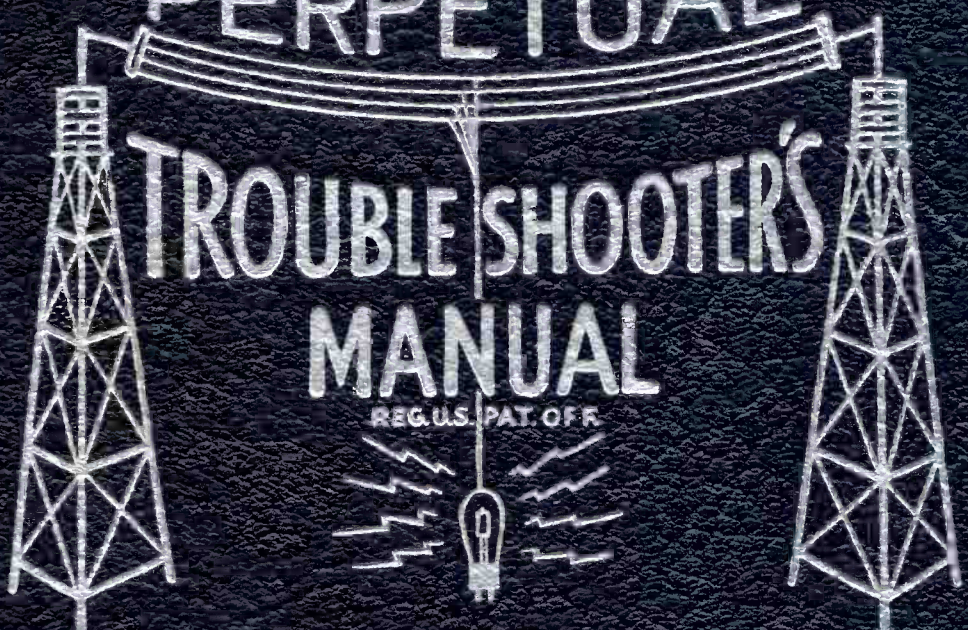
VOLUME XXI

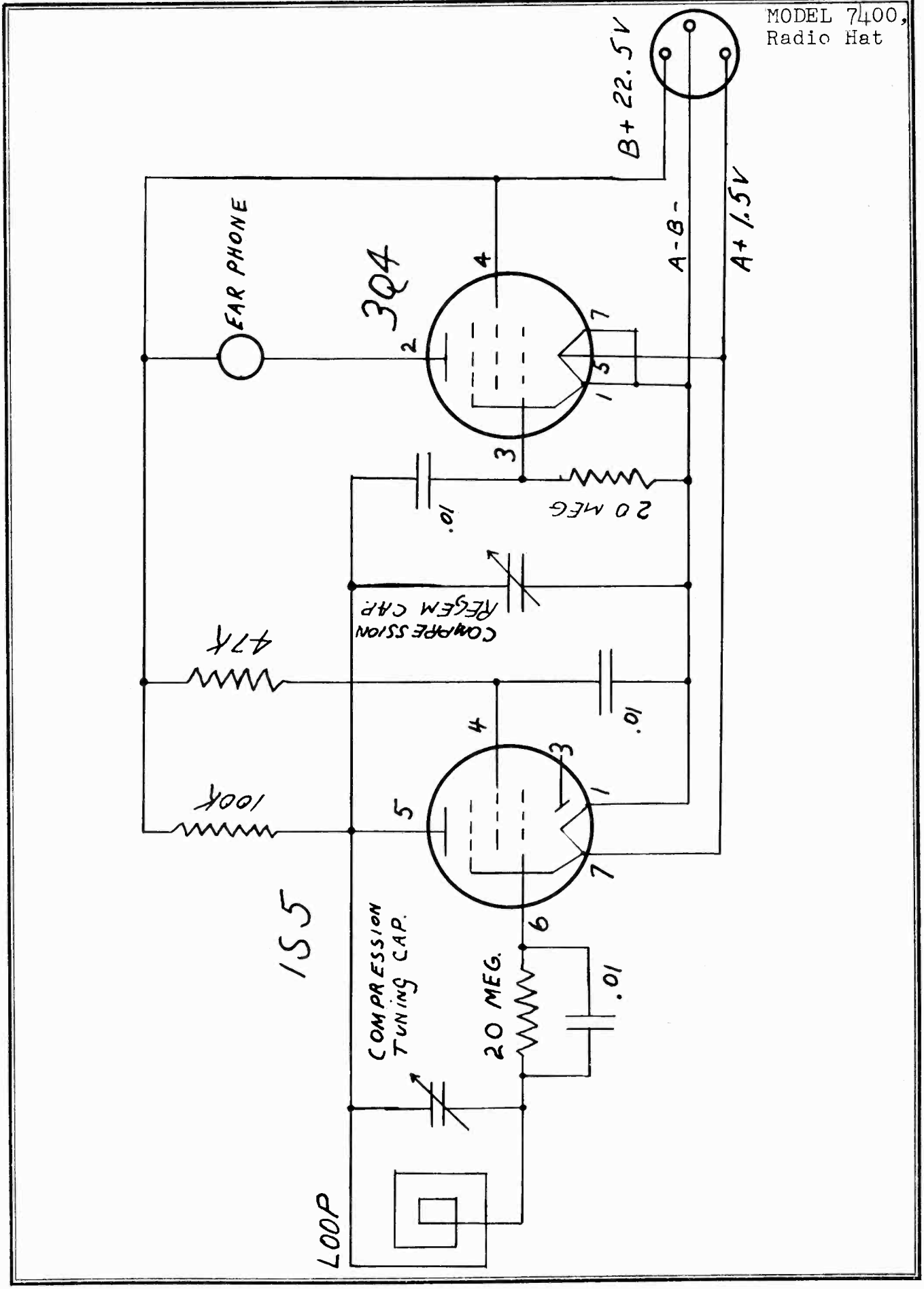
PERPETUAL TROUBLE SHOOTER'S MANUAL

REG. U.S. PAT. OFF.



JOHN F. RIDER

MODEL 7400,
Radio Hat



The Maguire Model 6L is a superheterodyne radio receiver having 5 tubes plus a rectifier tube, with provision for phonograph input, for operation on 105-125 volt AC or DC power supply. The tubes used are a 12SK7 as an R.F. amplifier, a 12SA7 as an oscillator-converter, a 12SK7 as an I.F. amplifier, a 12SQ7 as an AVC, detector, and 1st audio amplifier, a 35L6 as an output, and a 35Z5 as a power rectifier.

The broadcast band covers a frequency range from 535 to 1620 kilocycles. The dial is calibrated in kilocycles (KC) (less the final zero).

CONTROLS

TONE CONTROL: (Center knob).

Turn knob counter-clockwise for maximum bass and clockwise for maximum treble response.

VOLUME CONTROL: (Left-hand knob).

Turning knob clockwise turns the receiver on and turning further increases the volume.

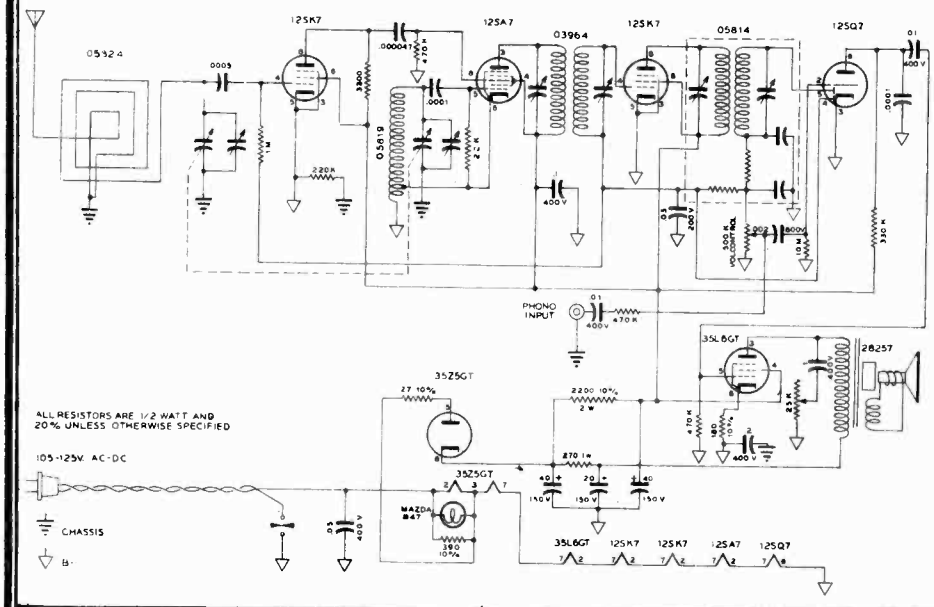
TUNING CONTROL: (Right-hand knob).

This knob is used to select stations. Tune station until it is at maximum clearness. Never attempt to reduce the volume by detuning the station—always use the volume control.

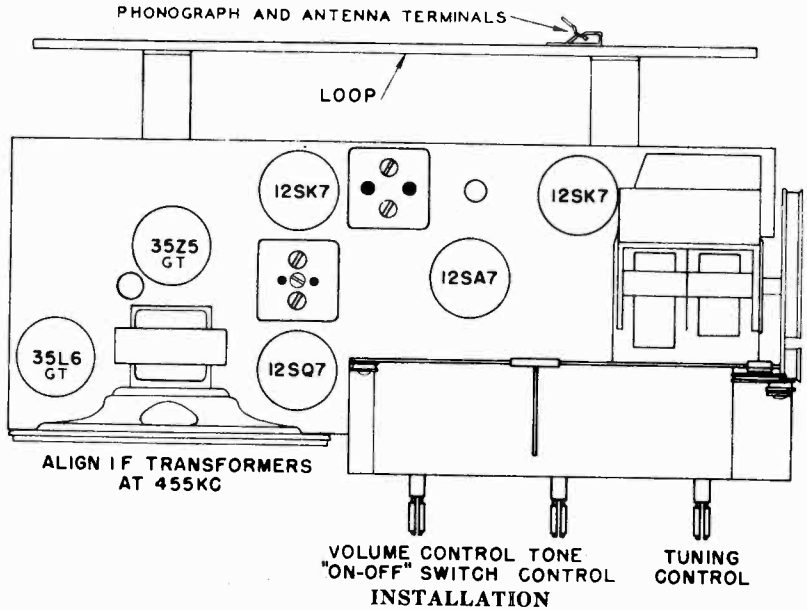
OPERATION

Turn the "On-Off" switch and volume control clockwise about half its range. This supplies power to the receiver. After allowing the tubes to warm up, tune in the desired station by rotating the tuning control. For best results, tune the desired station with the volume turned low. This enables you to get the exact point where the station comes in best. Then adjust the volume control.

To operate the receiver as a phonograph amplifier, connect phonograph lead to phonograph terminals at rear of loop, according to instructions printed at phonograph terminals. Turn "On-Off" switch and volume control clockwise about half its range and adjust tone control to desired position. Turn tuning control clockwise to the extreme right hand end of its range to silence radio.



TUBE LAYOUT



INSTALLATION

When using D.C. power supply, and after allowing sufficient time for tubes to warm up, if the receiver does not operate, remove the line cord plug from the socket and reverse. Replace the plug in the reverse position and allow tubes to warm up, at which time the receiver will operate.

When using A.C. power supply, it will be found that there will be less hum when the line cord is in the best position. Try both positions, leaving the plug in the position that produces the least hum.

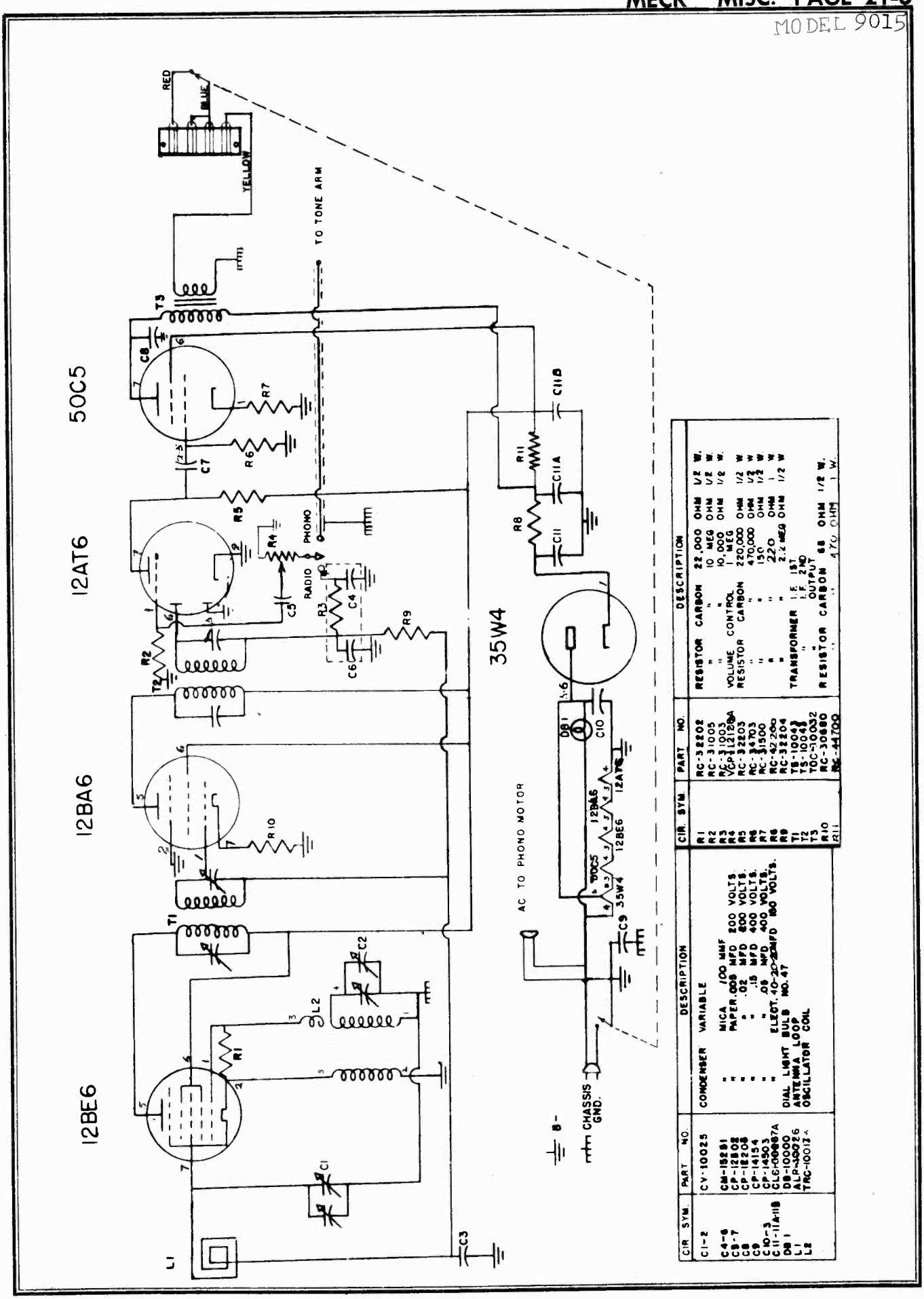
For reception of local stations no antenna is necessary, the built-in loop providing sufficient volume. If it is desired to listen to more distant stations, an antenna 50 to 100 feet long should be connected to the antenna terminal at the rear of the loop. **Do not use a ground with this receiver.**

If the receiver fails to operate, see that all tubes are pushed down in their respective sockets as illustrated in the tube layout diagram below. **Always disconnect line cord plug before making any adjustments inside cabinet.** It is necessary to remove the receiver from the cabinet to replace tubes.

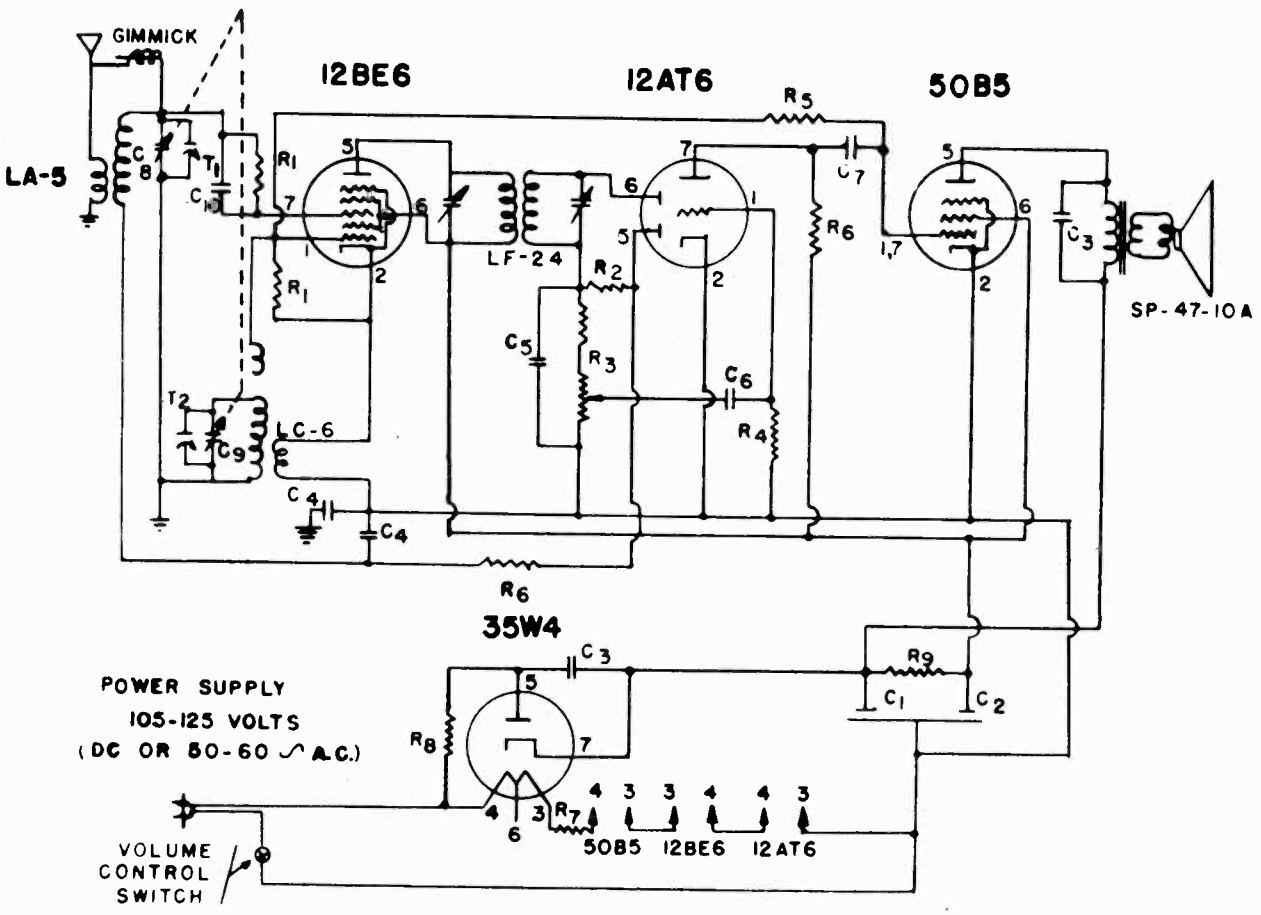
Sometimes, when operating this receiver in buildings having steel in their construction, it will be necessary to use an external antenna to provide sufficient volume for satisfactory operation.

Phonograph terminals are provided at the rear of the cabinet. Shielded cable should be used to connect a crystal type phonograph pickup to the radio. When the tuning control is turned clockwise to the end of its range the radio section of the receiver is silenced, permitting use of the receiver amplifier with phonograph input.

MODEL 9015



MODELS 153, 196,
197U, Ch. AR



ITEM	DESCRIPTIONS	PART NO.
C_1, C_2	2 X 40 MFD. 150 VOLT ELECT.	CE-15
C_3	.02 MFD. 400 V. PAPER COND.	CP-203-1
C_4	.05 MFD. 400 V. PAPER COND.	CP-503-1
C_5	100 MMFD. 500 V. MICA COND.	CM-101-1
C_6	.002 MFD. 400 V. PAPER COND.	CP-202-2
C_7	.005 MFD. 200 V. PAPER COND.	CP-502-3
C_8, C_9	VARIABLE CONDENSER	CV-14
C_{10}	500 MMFD. 500 V. MICA COND.	CM-501-1
LC-6	OSCILLATOR COIL	LC-6
LA-5	ANTENNA COIL	LA-5
LF-24	I.F TRANSFORMER	LF-24
R_1	18,000 OHMS 1/2 W. 10%	RC-183-2
R_2	4.7 MEGOHMS 1/2 W. RESISTOR	RC-475-1
R_3	2 MEG. VOL CONTROL, 100K STOP	VC-11
R_4	10 MEGOHMS 1/2 W. RESISTOR	RC-106-1
R_5	330,000 OHMS 1/2 WATT	RC-334-1
R_6	220,000 OHMS 1/2 WATT	RC-224-1
R_7	39 OHMS 1 WATT RESISTOR	RW-390-5
R_8	18 OHMS 1/2 W RESISTOR	RC-180-2
R_9	2200 OHMS 1 W. RESISTOR	RC-222-5
T_1, T_2	TRIMMERS	
SP-47-10A	SPEAKER - 4" P.M. WITH OUTPUT TRANSFORMER MTD.	SP-47-10A

CHASSIS SERIES "AR"

I.F. - 455 K.C.

FREQ. RANGE - 532.5 to 1620 K.C.
ALIGN T_2 at 1620 K.C.
T_1 at 1400 K.C.
TRACK at 600 K.C.

GANGING INSTRUCTIONS

MODEL OJ Series

An OUTPUT METER, connected to the speaker voice coil terminals, should be used for accuracy in making ganging adjustments.

The voice coil terminals, as well as the I.F. trimmers, may be made accessible by removing the screws by which the motor panel is mounted in the cabinet. Before lifting off the phono-recorder unit, MOVE THE PHONO. ARM TO THE CENTER OF THE TURNTABLE, and permit the arm to maintain this position until after the unit has been restored to the cabinet. In this way, the follower arm which engages the lateral feed screw will be protected against damage.

The R.F. trimmers and loop loading coil may be reached by raising front edge of panel.

Connect signal generator to control grid of 6BE6 tube.*

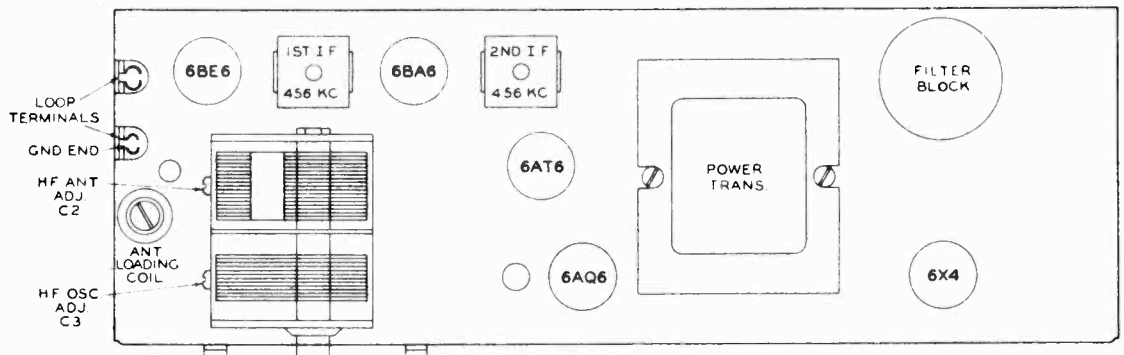
SIGNAL GENERATOR FREQUENCY	DIAL POSITION	TRIMMER
456 K.C.	1400 K.C.	T2-S** (Top Screw)
456 K.C.	1400 K.C.	T2-P** (Bottom Screw)
456 K.C.	1400 K.C.	T1-S** (Bottom Screw)
456 K.C.	1400 K.C.	T1-P** (Top Screw)

Place hot lead from signal generator near antenna loop.

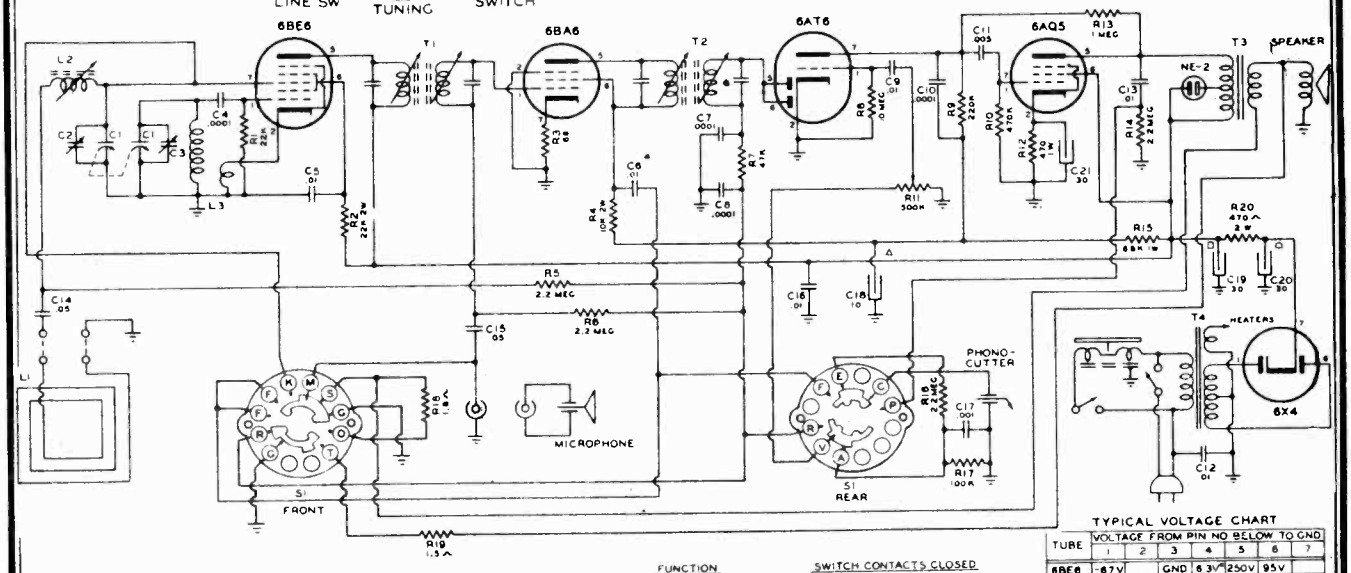
1400 K.C.	1400 K.C.	C-3 OSC.
1400 K.C.	1400 K.C.	C-2 ANT.
600 K.C.	600 K.C.	L-2 Loop Loading Coil

* Check the alignment of pointer with reference line below 550 K.C. on the scale. The pointer may be slipped on the shaft to correct for misalignment.

** In ganging the I.F. amplifier, use a low signal input.



TUBE SOCKET LAYOUT



FUNCTION	SWITCH CONTACTS CLOSED			
PHONOGRAPH	R-G	M-S-G	E-C	A-V
RADIO	G-F	M-S-G-O		V-R
RECORD RADIO	G-F	M-G-O-T	C-P	V-R
RECORD MICROPHONE	G-R-K	O-T	C-P	V-F

SWITCH IN PHONO POSITION-(COUNTERCLOCKWISE)-VIEWED FROM SHAFT END.

TYPICAL VOLTAGE CHART

TUBE	VOLTAGE FROM PIN NO BELOW TO GND						
	1	2	3	4	5	6	7
6BE6	-87V		GND	6.3V	250V	95V	
6BA6			GND	6.3V	78V	78V	7
6AT6	-3	'	GND	6.3V	-3V	-3	70V
6AQ5		14.5	GND	6.3V	235V	250V	
6X4	290V*		GND	6.3V		290V*	270V

MEASURED WITH 20,000Ω PER VOLT METER. SCALES USED 10-50-250-1000 *AC VOLTAGE

NOTE - ALL CAPACITIES MFD. ALL RESISTORS ½ WATT UNLESS OTHERWISE SPECIFIED

Admiral Record Changers RC220, RC221, RC222; RC320, RC321, RC322, early, late production

Record Changers RC221 and RC222 appear on *record changer pages RCD. CH. 20-9 through RCD. CH. 20-20 of Rider's Manual Volume XX*. RC220, RC320, RC321, and RC322 are similar to RC221 and RC222.

The only changes which were made in the late production RC220, RC221, and RC222 changers were the addition of the turntable retaining ring and the trip counterweight, reference number 138. Two types of turntable retaining devices have been used. The early type was a flat external retaining ring (part no. 401A286) which is no longer used. This has been replaced by the present retaining clip (part no. 414A36). When installing this clip, be sure that its "turned-up" ends are facing upward. The trip counterweight was added to eliminate erratic trip action because of a weak or stretched trip cocking spring (ref. no. 110). The trip cocking spring is no longer used. In order to mount the trip counterweight it was necessary to tap the trip lever (111) to accomodate the trip counterweight mounting screw (ref. no. 139).

In the parts list for RC221 and RC222, reference number 17, pickup arm, should have 403C35 as its part number.

The only difference between late production RC220, RC221, RC222 changers and RC320, RC321, RC322 changers is in the method of mounting the pawl and the trip serration plate. This change was made to simplify the adjustment for proper trip on 7-inch 33⅓-rpm records and 10-inch and 12-inch 33⅓-rpm or 78-rpm records. The oscillating trip is used for these types of records.

In the RC320, RC321, RC322 changers, the shape of the pawl (ref. no. 141A) has changed slightly from that shape given in *Volume XX*, and it is now mounted where the trip serrations plate (ref. no. 114) was mounted. The pawl and trip serrations have merely reversed their mounting positions. The accompanying figure shows the layout for this change.

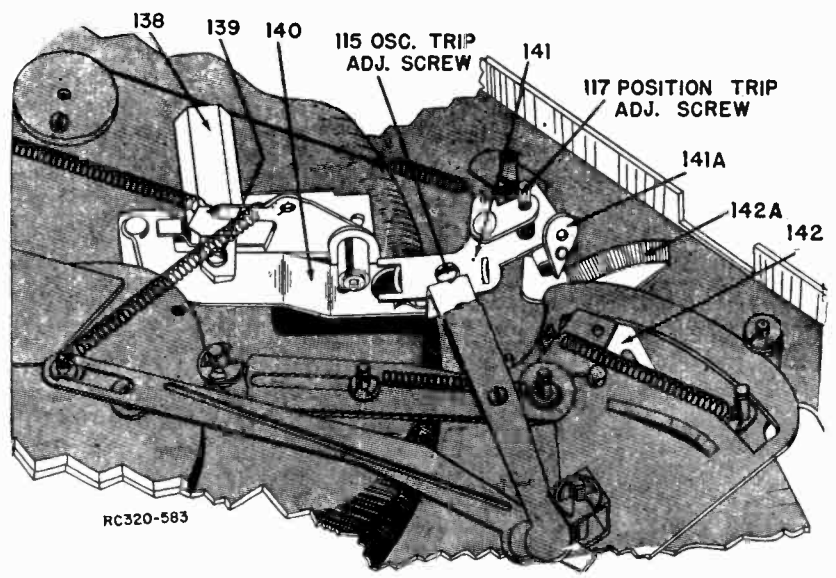
All adjustments on the RC320, RC321, and RC322 changers are the same as for the RC220, RC221, and RC222. The ideal adjustment of the oscillating trip adjusting screw is when the point of the pawl is horizontally even or level with the smooth side of the trip serrations.

In late production of RC320, RC321, and RC322, the 45-rpm centerpost cap (ref. no. 63) was changed to slightly decrease the over-all height of the cap and to include two extra ribs which help prevent the possibility of bending the slicers (65 and 66) if the 45-rpm centerpost adjustment is improperly made. The new centerpost cap is interchangeable with the old cap and should be used when replacing any centerpost cap. Two new cap mounting screws listed below should be used instead of the old type screws.

A felt washer is used between the changer pan and the motor mounting grommet at the mounting stud closest to the centerpost. This prevents the motor from tilting.

The parts listed below include corrections and additions to the parts list that appears for RC221 and RC222. It also contains all new parts for the RC320, RC321, and RC322 changers. For any parts not listed here see the parts list on *page RCD. CH. 20-20 in Volume XX*.

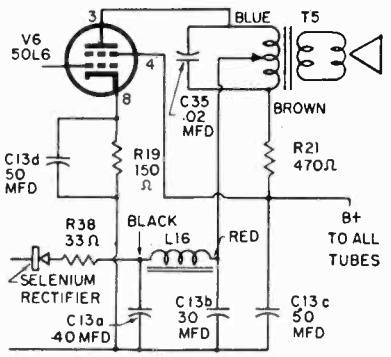
Ref. No.	*Part No.*	*Description*
	414A 36	Turntable retaining clip
	5A4-1	Felt washer (¼" ID x ¾" OD x 1/16")
17	403C 35	Pickup arm
63	403A 303	Centerpost cap (new, use on all models)
73	60-1125-C2-47	Screw (2 req.) 6-32 x 1⅛" BH MS
138	402A 203	Trip counterweight
139	85-187-C2-47	Screw, 8-32 x 3/16" BH MS
140	G400A 361	Trip lever and reject arm support
141	G400A 353	Trip engagement and adjusting plate (includes pawl)
141A		Pawl (part of 141)
142	G400A 357	Arm control lever (includes trip serrations)
142A		Trip serrations (part of 142)
	405A 112	50 cycle conversion spring for 33-1/3 rpm shaft
	405A 113	50 cycle conversion spring for 78 rpm shaft
	98A 15-15	50 cycle conversion pulley (45 rpm).



Bottom view of Admiral RC320, RC321, RC322 Record Changers.

Bendix 75B5, 75M5, 75M8, 75P6, 75W5

These models appear on *pages 20-16 through 20-23 of Rider's Manual Volume XX*. It has been found possible to reduce the hum level in these models by installing a choke in the output circuit to the speaker as shown in the accompanying diagram.



Changes for Bendix 75B5, 75M5, 75M8, 75P6, 75W5.

Remove capacitor C35, 0.02 μf, connected from pin 3 of the 50L6 (V6) tube socket and terminal board. Remove red lead from pin 4 of 50L6 tube socket and terminal of electrolytic, C13c. Remove resistor R55, 470 ohms, from pin 6 of 50L6 tube socket and terminal board.

Move the pickup point of brown lead of output transformer from the terminal board to pin 6 of 50L6 tube socket. Move the red lead from terminal C13a, 40 μf, to terminal C13b, 30 μf, of electrolytic capacitor C13.

Drill a hole through the chassis near the electrolytic capacitor for the leads of an added reactor, L16. This choke is available as Bendix stock number LFO1O2. Bend one ear of reactor L16 and mount on top of chassis by soldering both ears to the chassis, or holes may be punched in each ear and the reactor mounted with self-tapping screws. Insert the reactor leads through the hole.

Since leads of capacitor C35, 0.02 μf, are too short, install new capacitor C35 between pins 3 and 6 of 50L6, with tubing over the positive lead, and negative capacitor plate attached to pin 3.

Connect red lead of added reactor L16 to terminal C13b, 30 μf, of electrolytic capacitor C13. Connect black lead of added reactor to terminal C13a, 30μf, of electrolytic capacitor C13.

The connection of bypass capacitor C56 has been changed from chassis ground to common B— to eliminate a-c hum modulation. If hum is objectionable on a receiver not using an external antenna, this revised connection is recommended. Capacitor C63, 0.001 μf, is now connected to common B—, instead of to pin 11 of S1B.

To clarify the adjustments in step 4, FM Alignment-CW Meter Method on *page 20-18*, revise it to read as follows:

"Repeat steps 1, 2, and 3 until adjustment in step 1 does not require a readjustment to produce a zero reading on the VTVM in step 3."

The extended length of the spring in the dial cord of 75B5, 75W5, 75M5, and 75M8 has been designated as 1¼ inches minimum, to 1⅜ inches maximum. Revise Fig. 9 on *page 20-21* to show only 2 turns around the lower shaft in lieu of 4 turns originally indicated. The maximum dimensions of 1⅜ inches should also be indicated for spring attached at dial-cord drive wheel.

Ansley 709

Model 709 is the same as Model 53 which appears on *pages 17-1,2 through 17-5 of Rider's Manual Volume XVII.*

Automatic A.T.T.P.

The alignment and battery information that appears on *page 17-8 of Rider's Manual Volume XVII* under the heading of Models 660, 662, 666, Series C is labeled incorrectly. This page should be labeled Model A.T.T.P. The schematic for Model A.T.T.P. appears on *page 16-1 of Rider's Manual Volume XVI.*

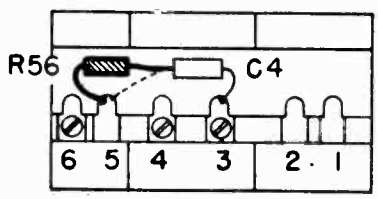
Automatic C-65

This model is the same as Model C-60X which appears on *page 16-1 of Rider's Manual Volume XVI.*

Bendix 95B3, 95M3, 95M9

The switch and its components for the long-playing record player have heretofore been mounted on the back cover. To avoid future difficulty in removing the back cover, this switch and its components are now mounted on a bracket attached to the rear of the cabinet. The bracket is mounted on the top rear cabinet rail and is placed so that the switch, in Models 95B3 and 95M3, extends through the ventilation louver in the upper left corner of the back cover. The strip between the louvers in Model 95M9 covers the switch and it is necessary to remove the strip between the louvers from the back cover.

The terminals of the gang capacitor are numbered from the front to the rear of the chassis as is indicated in the accompanying diagram. In the figure showing trimmer location, the capacitor designated in the r-f subchassis as C8, is C4. Resistor R56 has been added to the circuit to avoid any possibility of regeneration occurring, and this resistor is soldered from terminal 5 of the gang capacitor directly to capacitor C4. The other lead of capacitor C4 remains connected to terminal 3 of the gang capacitor as indicated in the diagram. On the schematic diagram, resistor R56 should be inserted in the a-m external lead between terminal board J6 and capacitor C4. Add R56, Comp., 1,000 ohms, ¼ w, Part No. RC22A102M to the replacement parts list.



Terminals of gang capacitor used in Bendix 95B3, 95M3, 95M9.

An additional filter capacitor C65 has been added to the avc circuit. The 470-$\mu\mu$f capacitor goes from terminal 10 of switch S1C to chassis ground. Add capacitor C65, Mica, 470 $\mu\mu$f, 500 v, Part No. CM5A38 to the replacement parts list.

The figure showing the f-m antenna should show 26" as the dimension for the lower half of the f-m antenna, instead of 6". The dipole should measure 26" on both sides of the center leads.

Farnsworth P-8

This a-m—f-m radio chassis used in Models 1002-F, 1003-M, and 1004-B, is identical to the P-7 chassis which appears on *pages 19-19 through 19-33 of Rider's Manual Volume XIX,* with the exception of the phono-input circuit. The differences are listed below:

1. The P-7 chassis employed a separate phono preamplifier stage; the P-8 does not.
2. Since the P-8 does not employ a preamp, the preamp power cable and plug and the 3.3-ohm resistor, ref. no. 14, are not included in this chassis.
3. The record changer, Capehart "333", used with the P-8 chassis employs a crystal pickup. Therefore, a 680,000-ohm, ½-watt resistor is connected from the phono-input lead to chassis ground.

Following is a list of parts which apply to the Models 1002-F, 1003-M, and 1004-B. These parts are different from those shown for the P-7 chassis.

Part No.	*Description*
650189A-G1	Loop antenna assembly
59534	On-off volume and tuning knobs
59535	Band switch knob
59537	Treble tone knob
31472	Glass escutcheon.

Farnsworth P-10

This a-m—f-m radio chassis used in Model 100-M, is identical to the P-10 chassis which appears on *pages 19-19 through 19-33 of Rider's Manual Volume XIX,* with the exception of the phono-input circuit.

In Model 1001-M, the P-10 chassis employs a 680,000-ohm resistor, from phono-input to chassis ground, instead of a 100,000-ohm resistor, ref. no. 15.

Following is a list of parts which apply to Model 1001-M. These parts are different from those shown in the Manual for the P-10 chassis.

Part No.	*Description*
650183A-G1	Speaker, 10" PM, output trans. assy.
750114B-1	Glass escutcheon
650189A-G1	Loop antenna assy.
650186A-4	On-off volume knob
650186A-2	Tuning knob
650186A-1	Band switch knob
650186A-3	Tone control knob.

Farnsworth P73

This model appears on *pages RCD. CH. 18-1 through 18-9 of Rider's Manual Volume XVIII.* The following part should be added to the parts list:

71245 Removal needle only, osmium tipped (P73).

Farnsworth Service Hints

The following service suggestions are offered in the event that the P70 series changers occasionally drop two or more records at one time. If this situation exists with new records, in which the center hole is not worn, the cause may be one of the following:

1. Misadjustment of the amount of tension on the compression spring (part no. 58789). This adjustment is on the underside of the compression lever assembly (part no. 15195) and consists of the adjustment nut (part no. 37344) and the lock-nut and washer (part nos. 2015-002 and 2121-003). Adjustment of this nut controls the amount of downward pressure exerted on the upper spindle assembly (part no. 13674) by the compression lever, which in turn controls the degree of expansion of the rubber sleeve (part no. 62152). Reference is made to paragraph "D", *page RCD. CH. 19-8 of Rider's Manual Volume XIX,* of the P71 record changer material for proper adjustment of the compression lever. If the rubber sleeve does not expand sufficiently to hold the remaining records on the spindle, one or more of these records will drop along with the record that is to be played. If this sleeve does not expand to the required value, the adjustment nut (37344) should be adjusted while the rubber is compressed to provide the correct expansion. After the adjustment is set, the lock nut should be tightened, and a small amount of Glyptol applied to secure the adjustment.
2. Incorrect position of the outer spindle (part no. 55334). The outer spindle is fastened to the main frame by a special hex-head bolt (part no. 37334) located on the underside of the main frame. The proper position of the outer spindle is given in relation to the inner spindle (part no. 11379) when the changer is in playing position and with no records on the spindle. Under these conditions the top of the outer spindle should be 1/16" below the point of bend of the metal springs on the inner spindle which form the spindle shelf. If the outer spindle is too high, the spindle shelf will recede into the outer spindle before the rubber sleeve is fully compressed, leaving the records without support.
3. If neither of the two previously mentioned suggestions corrects the situation, it is further suggested that the compression lever assembly (part no. 15195) be inspected to determine if the metal roller on this assembly has a diameter of 1/4" or 5/16". If it is the smaller diameter, replace it with one employing the 5/16" roller. The replacement of this compression lever will require a readjustment of the compression spring (part no. 58789) tension.

General Electric 64, 65, 66, 67, 123, 124, 125, 135, 136, 226

These models are found in *Rider's Manual Volume XX.* Models 64 and 65 appear on *pages 20-3 through 20-8;* 66 and 67 appear on *pages 20-9 through 20-12;* 123, 124 and 125 appear on *pages 20-13 through 20-15;* 135 and 136 appear on *pages 20-16 through 20-18;* and Model 226 appears on *pages 20-27 through 20-29.*

Power-supply filter resistor URF-053, 1,500 ohms, 2 watt, carbon in earlier receivers has been changed in later production to URF-049, 1,000 ohms, 2 watt, carbon. Some of the early Model 135 and 136 receivers will be found to have a 2,200-ohm resistor. URF-049, 1,000 ohms, 2 watts, is recommended for service replacement of the filter resistor and will result in improved tube performance.

Late production receivers incorporate an i-f tube change from the 12SK7 tube of early receivers to a miniature type 12BA6. The tube-pin connections are not the same as those for the 12SK7 tube. This should be considered when reading the diagrams of early production receivers. A tube socket for the 12BA6 tube has been added to the Replacement Parts List and catalogued RJS-141.

For Models 64, 65, 66, 67, 123, 124, and 125, a 47-ohm, ½-watt, carbon resistor, part number URD-017, is used in series with the 12BA6 tube cathode to B— to improve circuit stability.

General Electric 50

This model appears on *pages 15-1 through 15-4 of Rider's Manual Volume XV*. The following items should be added to the parts list:

Symbol	*Part No.*	*Description*
R4	RRC-013	1.0-megohm volume control
	RJS-060	Tube socket, miniature tube socket for 35W4 rectifier
	RJX-010	Assembly, tube socket and mounting plate assembly for 35W4 rectifier.
	RHH-004	Snapfastener, for mounting cabinet-back.

General Electric 106

This model appears on *pages 15-9 through 15-10 of Rider's Manual Volume XV*. Part no. RJX-005 should be changed to read RJX-007. Delete part no. ROP-006. Add part no. UOX-001, cone, replacement speaker cone.

General Electric 115, 115W

These models appear on *page 18-13 of Rider's Manual Volume XVIII*. The following changes have been made in the parts list.

Delete catalogue numbers and parts RDK-121 and RDK-122.

Add the following:

RAG-019	Grille, for Model 115 and 115W
RDK-150	Knob and bezel, brown, for Model 115
RDK-151	Knob and bezel, white, for Model 115W.

General Electric 118, 119

These models appear on *pages 19-8 through 19-10 of Rider's Manual Volume XIX*. The following changes should be made in the parts list. RLC-001 should be changed to RLC-061, T4, coil, oscillator coil. RAY-054 should be RAV-054.

Add:

RAV-056	Cabinet, Model 119 (oak)
RDK-037	Knob, plain, fawn colored
RDK-040	Knob, with arrow, fawn colored
RHH-004	Snapfastener, holds cabinet back to cabinet on Model 118

General Electric 123, 124

These models appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX*. The following changes should be noted in the replacement parts list. Item RDS-083 is a metal dial scale, tan color, with red and white figures. Later production receivers use the same type scale except for color. The later scale, cat. no. RDS-091, is gold in color, with brown and white figures.

The following catalogue numbers have been changed: URD-127 should read URD-137, R5, Resistor, 4.7 megohms, ½ w, carbon; RAU-037 should read RAU-307, Cabinet, Model 124 plastic cabinet (ivory).

General Electric 303

This model appears on *pages 15-37 through 15-39 of Rider's Manual Volume XV*. The symbol for RSW-019, switch, tone control switch, should read S4. Stock no. RMX-013 should be changed to read stock no. RMX-079.

General Electric 125

This model is identical mechanically and electrically to the late production Model 123 and 124 receivers, which appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX*. Model 125 is identified by its maroon color plastic cabinet. The cabinet replacement is listed as: RAU-321, Cabinet, plastic, for Model 125.

General Electric 123, 124, 125, 135, 136, 226

Models 123, 124, and 125 appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX*. Models 135 and 136 appear on *pages 20-16 through 20-18 of the same Volume*. Model 226 appears on *pages 20-27 through 20-29 of the same Volume*.

The grid resistor, URD-113, 470,000 ohms, ½ watt, carbon, has been changed in later production receivers to URD-121, 1 megohm. This change improved the audio gain.

General Electric 135, 136, 226

Models 135 and 136 appear on *pages 20-16 through 20-18 of Rider's Manual Volume XX*. Model 226 appears on *pages 20-27 through 20-29 of the same Volume*.

Late production receivers use a new type output transformer having a tapped primary. The tapped section to the B+ lead is connected in series with the power-supply filter resistor at the input filter capacitor. B+ ripple current through this winding is out of phase with ripple current to the receiver tubes, thus producing bucking voltage and reducing hum. The transformer leads are connected as follows: yellow to input filter capacitor, red to filter resistor, blue to plate of input tube, and secondary leads to speaker voice coil.

The new transformer, catalogue number RTO-078, will be carried in replacement stock in place of the original early production items RTO-063 and RTO-075 for the Models 135, 136, and 226, respectively.

General Electric 141, 143

Instability on the high end of the broadcast band might be caused by an oscillator coil whose coupling winding has changed its coupling capacitance. This defect can be corrected by replacing the coupling winding with a capacitor C15 of the value 56 $\mu\mu$f, catalogue number UCG-022. This capacitor connects the "high" side of the tuning capacitor C2 with the oscillator grid, pin 4, of the tube V1, 1R5.

Late production receivers always use capacitor C15 in conjunction with a new type of oscillator coil, RLC-101. This item replaces coil formerly catalogued RLC-089.

The hinge used in these receivers can easily be removed and replaced in the plastic cabinet or cover by the application of heat. To remove the hinge from the back cover or cabinet proper, heat the hinge at the half to be removed from the cabinet with a soldering iron. The hinge may then be pulled out of the groove of the plastic hinge recess. Since the cabinet plastic softens at a relatively low temperature, it will be unnecessary to apply the heat very long. To replace the hinge into the new unit, first start the hinge into the slotted recess in the plastic, then heat the hinge with the soldering iron and gently push the hinge into place.

General Electric 124, 135, 136

Model 124 appears on *pages 20-13 through 20-15 of Rider's Manual Volume XX*; Models 135 and 136 appear on *pages 20-16 through 20-18 of the same Volume*.

Where speakers have broken loose from cabinet mountings, or damage occurs when servicing receiver, the speaker can be remounted using screws in place of the original clips where the mounting bosses are broken. It is suggested that all four bosses be reworked to use screws for mounting, since the operation of removing the speaker may result in the breaking of additional bosses. The repair procedure is outlined as follows:

1. Cut off speaker mounting bosses and file flat to the level of the speaker baffle ring.
2. Drill hole 5/16-inch deep in each boss with #42 or 3/32-inch diameter drill.
3. Mount speaker with self-tapping screws #4 x ¼ inch long, Shakeproof Type 25, catalogue number RHS-044.

General Electric 233 Kaiser-Frazer

This model appears on *pages 18-29 through 18-36 of Rider's Manual Volume XVIII*. Noise in the form of rattle can be attributed to mechanical insecurity of parts, loose fittings, and screw fastenings, etc. Some of these are:

1. Loose tone control knobs and loose tone and volume control shafts may rattle against the cast grille. The keyway in the tone control shaft may be spread slightly to provide a tighter fit to the control knob.
2. If the shaft assembly seems loose or tends to rattle within the grille mounting hole, a ¾-inch length of #1 spaghetti (fabric or cambric tubing) may be slipped over the shaft assembly and into the bushing. This will displace the loose fitting and cushion against rattle.
3. Vibration of the screen which is set behind the case instrument panel grille causes a buzz sound when loose. The screen may be shimmed at its four corners to stabilize its mounting.

Suggestions for improving circuit and pick-up noise are as follows:

1. The former condition can be improved by antenna selection and careful peaking of the antenna trimmer to increase sensitivity and reduce noise. For metropolitan areas, a 62-inch antenna is quite adequate, while in outlying country areas the antenna length of 93 inches is recommended. Adjustment of the antenna trimmer is important and should not be overlooked. Every receiver installation should be adjusted for normal operation after the receiver has been operating approximately 15 minutes to reach normal operating temperatures, and with antenna fully extended. Tune in one of the weakest stations at approximately 1,200 kc, or near the higher-frequency end of the dial scale. Adjust trimmer for minimum noise level and maximum clarity on station used for test.
2. Noise pick-up may come from various sources, chiefly from ignition circuits of the car. The recommended noise suppressor and noise filter capacitor units should be checked. To eliminate wheel static insert about ½ ounce of powdered graphite through the valve of all four tire tubes. This will provide a ground leakage path to dampen static radiation.

General Electric 143

The connection between terminal number 4 of the 2nd i-f transformer to the 8,200-ohm resistor R2 is connected at the intersection with the B+ line. Late production receivers incorporate the following changes in order to improve the i-f stability. A 0.05-μf, 200-volt paper capacitor has been added in parallel with resistor R9. This capacitor has a reference number of C16 and stock number UCC-045. Capacitor C5 has been changed to a 0.1-μf, 200-volt capacitor, stock number UCC-050.

General Electric 145

The following parts have been added to provide replacement of the battery cover plate and assembly parts:

Ref. No.	*Description*
RAC-078	Cover, cover plate only
RHR-009	River, "A" battery spring rivet
RHR-010	River, "A" battery clip rivet
RHW-014	Washer, "A" battery spring washer
RII-027	Insulator, insulator strip
RMC-037	Clip, battery clip
RMS-189	Spring, "A" battery spring.

The following miscellaneous parts have been added. Most of these parts are required because of the addition of brown and white cabinets.

Ref. No.	*Description*
RAB-093	Cover, back cover (white)
RAB-094	Cover, back cover (brown)
RAC-063	Cover, loop cover (maroon) substitute for RAC-057
RAC-069	Cabinet, main body (brown) includes hinge
RAC-070	Cabinet, main body (white) includes hinge
RAC-071	Cover, front cover (white) includes hinge
RAC-072	Cover, front cover (brown) includes hinge
RAC-075	Cover, loop cover (white)
RAC-076	Cover, loop cover (brown)
RAI-007	Stop, cover stop
RDK-173	Knob, brown control knob
RHR-004	Rivet, tube socket rivet
RHY-009	Handle, cabinet handle
RSW-070	Switch, power, operates in conjunction with lid.

General Electric 226

This model appears on *pages 20-27 through 20-29 of Rider's Manual Volume XX*. Resistor R1, tube V1 cathode resistor, was removed from the circuit of late production receivers. This change results in an increase of gain in the r-f amplifier.

Solid dots indicating circuit wiring connections should be added and placed in the cathode lead of tube V4, one at the point where the lead intersects the lower end of R7, the other at the junction of R6 (low end of volume control) and C10. The circuit will then show the cathode properly terminated to B—.

Replacement item RTO-075 should read RTO-083, Audio output transformer.

General Electric 250

This model appears on *pages 15-32 through 15-36 of Rider's Manual Volume XV*. With particularly rough handling, the battery may be cracked while in place in the battery compartment. To forestall this failure, an additional strip of sponge rubber may be installed at the bottom of the battery cover to give added padding. If the battery does not charge and the fuse checks o.k. and the rectifier disks are not defective, check continuity of the power cord. A few isolated cases have been found in which the power cord has opened up where the cord fastens to the prong in the molded plug. An appreciable increase in duration of operation from a fully charged battery can be effected in the following manner, realizing, however, that some degree of performance is sacrificed in regard to sensitivity and power output. Replace power-supply filter resistor R17 (1,500 ohms) with a 4,700-ohm, 1-watt, carbon resistor. This change should be made only when there is a demand for longer duration of operation to one battery charge.

General Electric 200 Series

These models appear on *pages 18-19 through 18-20 of Rider's Manual Volume XVIII*. The following changes should be added to the parts list:

RHM-002	Clip, for mounting speaker board
RHM-004	Clip, dial scale mounting clip for plastic cabinet models
RHM-005	Clip, dial scale mounting clip for wood cabinet models.

General Electric 250, 260

Model 250 appears on *pages 15-32 through 15-36 of Rider's Manual Volume XV*. Model 260 appears on *pages 16-6 through 16-12 of Rider's Manual Volume XVI*. Add REC-003, Antenna loop connector strip to the parts lists for these models.

General Electric 356

This model appears on *pages 18-40 through 18-44 of Rider's Manual Volume XVIII*. Resistor R12 has been changed from 220 ohms, ½ w, to 330 ohms, ½ w, ±10%, Cat. No. URD-037.

B. F. Goodrich 92-527, 92-528

These models are the same as Models 92-523, 92-524, 92-525, 92-526.

B. F. Goodrich 93-109, 93-110, 93-111

These models are the same as Models 93-104, 93-105, 93-106.

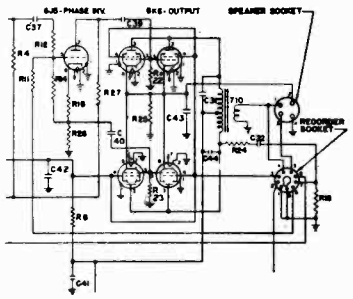
B. F. Goodrich 93-112, 93-113

These models are the same as Models 93-107 and 93-108.

Hoffman C503 and C513, Ch. 115

These models are identical with Models B503 and B513, which appear on *pages 17-8 through 17-13 of Rider's Manual Volume XVII*, except for the following changes:

1. Push-pull parallel 6K6's are used in the output stage instead of push-pull 6V6's. This is shown in the accompanying diagram.



Circuit changes for Hoffman C503 and C513.

2. On the recorder amplifier the screen dropping resistor R11 has been changed from 0.1 megohm to 2.2 megohms. The cathode resistor, R1, for this stage has been changed from 2,200 ohms to 4,700 ohms. This allows the screen current of the 6SJ7 tube to be self-regulating and to eliminate variations in gain between various 6SJ7's.
3. R31 and C49 have been added in parallel to the S1-sec 2, rear, wafer lead that goes to the phonograph receptacle.
4. Capacitor C30 is now connected to the variable resistor, R20, instead of to ground.

Magnavox AMP-101B

This model is the same as Model AMP-101A which appears on *pages 17-1 and 17-2 of Rider's Manual Volume XVII*, except for the following change in parts values.

Ref. No.	*Part No.*	*Description*
5	250129G4	Capacitor, paper, 0.03 μf, 400 v.

Montgomery Ward 04WG-672 Series

Model 04WG-672 appears on *pages 12-31 and 12-32 of Rider's Manual Volume XII*. Models A and B are the same as that model which appears in Volume XII. Models C, D, and E are similar to Model 04WG-672 with the following exceptions. Model C employs a plug-in resistor, R13 and R12. The values remain the same as in the earlier models. Model D employs the plug-in resistor and, in addition, a new oscillator coil and 2 section dry electrolytic capacitor. In Model E the loop antenna assembly has been redesigned.

Montgomery Ward 05WG-2745A

This model is the same as Model 94WG-2745A. To reduce regeneration in later production receivers, the following changes were made:

Ref. No.	*Part No.*	*Description*
		Removed
L-1	35A5	Insulated choke
C-6	47X496	500 $\mu\mu$f ceramic capacitor
		Added
R-37	B84562	5,600-ohm, 0.5-w carbon resistor. This resistor replaces the insulated choke L-5 in the circuit diagram.

Montgomery Ward 14WG-518A, 14WG-519A, 14WG-518B, 14WG-519B

These models are similar to Model 14WG-518 and 14WG-519 which appear on *page 13-46 of Rider's Manual Volume XIII*.

Montgomery Ward 64WG-2007B, 74WG-2007B and C

These models are similar to 54WG-2007A shown on *pages 15-28 to 15-30 of Rider's Volume XV*, except for the following changes. The drive-cord length has been increased and the following drive-cord replacement instructions are to be used.

Turn the gang condenser to the fully closed position. Use a new drive cord 18 inches in length and tie one end to the tension spring. Fasten the other end of the tension spring to the hook on the drive pulley. Pass the cord through the slot in the drive pulley rim and continue around pulley ½ turn, counterclockwise. Wind 3½ turns counterclockwise (from front of chassis) around tuning shaft. Turns should progress toward rear of chassis. Wind cord counterclockwise around drive pulley in back of previous ½ turn. Pass cord through the slot in the pulley rim. Stretch tension spring and tie free end of cord to the spring. Cut off any excess string.

The component parts are the same as those listed on *page 15-29 of Rider's Volume XV*, except for those listed below.

Ref. No.	*Part No.*	*Description*
C-15	B67204	0.20 μf, 200 v, tubular
C-16	D67104	0.10 μf, 400 v, tubular
C-18	D67102	0.001 μf, 400 v, tubular
C-19	17A123	1.0—12 $\mu\mu$f, trimmer.

Montgomery Ward 74WG-2700C

This model is the same as Model 54WG-2700A that appears on *pages 15-31 through 15-35 of Rider's Manual Volume XV*. The parts lists are the same except for the following changes:

Ref. No.	*Part No.*	*Description*
C2	17A149	1.8-12 $\mu\mu$f, loop antenna trimmer
C6	17A234	300-450 $\mu\mu$f, 600 kc, padder
C7	D67501	0.0005 μf, 400 v, tubular
C16	14A150	Gang condenser assembly
C32	47X182	7 $\mu\mu$f, ceramic
T6	53X235	117 v, 60 cycle, standard power transformer
T7	9A1395	"B" band loop antenna
	12A455	10" electrodynamic speaker, cone and voice assembly
	19X432	Flat washer
	26A382	Pulley mtg. plate assem. complete with idler pulleys, idler studs, brace brackets, string guide and dial background
	10X59	Drive cord
	28X113	Drive cord tension spring
Type V-28A139 Record Changer Parts		
	V-961B	Motor assembly 60 cycle, 115-120 v
Shure	P30-1	Crystal cartridge and semi-permanent needle assembly.

Montgomery Ward 93WG-801A, 93WG-801B, 93WG-801C, 93WG-801D, 93WG-801E, 93WG-802A, 93WG-802B, 93WG-802C

Models 93WG-801A, 93WG-801B, 93WG-801C, 93WG-802A, 93WG-802B, and 93WG-802C are without the built-in loop and their schematics are the same as those for Models 93WG-801 and 93WG-802 that appear on *page 11-47 of Rider's Manual Volume XI*. Models 93WG-801D and 93WG-801E are with built-in antennas and their schematics are the same as that for Model 93WG-801 which appears on *page 11-46 of Rider's Manual Volume XI*.

Montgomery Ward 94WG-2748C

Model 94WG-2748C receivers differ from the Model 94WG-2748B receivers by the replacement of a V-28A166 record changer with a G.I.-28A168 record changer. The following are the parts applicable to the G.I.-28A168 record changer:

G.I. - 56-76507	Motor, 3-speed, 60 cycles 105-125 volts, a.c.
Astatic - LT3D	Crystal cartridge
	Needle, regular (78 rpm)
	Needle, microgroove (red).

Motorola KR9, OE9, PC9, SR9

These models are schematically identical to Ch. 8A. Model KR9 is designed for installation in the 1949 Kaiser-Frazer. Model OE9 is designed for installation in all 1949 Oldsmobiles and in the 1948 Futuramic Oldsmobile. Model PC9 is designed for installation in the 1949 Pontiac. Model SR9 is designed for installation in the 1949 Studebaker.

National Service Hints

The NC-57 appears on *pages 18-1 through 18-16 of Rider's Manual Volume XVIII*. Following is a list of troubles common to the NC-57 and suggestions for correcting them:

1. Audio oscillation with automatic noise limiter (ANL) on and a-f gain on full.
   a. Dress the primary leads to the output transformer under the ANL switch. Pull the excess length of leads through the hole to the top of the chassis.
2. Hum with ANL on and a-f gain on full.
   a. Change the 6H6.
3. Oscillation on B and C bands.
   Check C19 h-f osc. grid coupling capacitor. This should be 100 $\mu\mu$f. A higher value than this will produce oscillation. Also change the oscillator grid resistor from 47,000 to 22,000 ohms.
4. Parasitic oscillation on A band above 50 Mc.
   a. Check the ground lead of the r-f amp. screen bypass capacitor. This should be as short as possible and soldered to the lug on the socket mounting ring adjacent to pin 4. The r-f amp cathode bias resistor should be 220 ohms.
5. Noisy band switch.
   a. Poor contacts in the switch, and poor contact between the switch shaft and the ground brushes on ER 210 coils.
   b. Ground brushes on switch shaft rubbing on the coil partition of the ER 210 coils.
   c. Coil partition mounting screws not tightened down.
6. Noisy trimmer control.
   a. Shorted plates.
   b. Poor rotor brush contact or rotor brush not grounded to the mounting bracket.
   c. Rotor shaft grounding spring on front end of chassis is loose or missing.
7. Oscillation on E band at twice the i.f.
   a. Check to see that there is a metal shield mounted on the trimmer control bracket.

National Service Hints

The NC-183 appears on *pages 19-11 through 19-35 of Rider's Manual Volume XIX*. Following is a list of troubles and suggestions for correcting them:

1. Oscillation in the E band at twice and three times the i.f.
   a. Look for loose screws on sides of coil compartment.
   b. Be sure second i-f and avc amp. plate leads are down near the chassis.
   c. Be sure the diode leads of the 6H6 are down near the chassis.
   d. Check ground leads on side of coil compartment.
   e. Be sure that the first r-f grid lead is down near the chassis.
   f. Check ground at the end of the shield on the bfo lead near the 6H6 det. tube.
2. Oscillation at low end of the B band.
   a. Check ground on main tuning capacitor and the ground brushes on band-change switch shaft.
   b. Be sure first i-f plate lead is down near the chassis.
3. Pulling of signal with antenna trimmer on the A band.
   a. Check ground on band-change switch shaft.
   b. Check ground from tie rod on tuning capacitor to chassis.
4. Motorboating with both r-f and audio gains at zero.
   a. Check value of inverse feedback resistor R47. This resistor should be 4,700 ohms. A lower value than this will cause the motorboating.
5. Audio oscillation.
   a. Output transformer may be wired wrong.
   b. Connecting leads to the transformer may be reversed.
6. Hum with limiter on.
   a. Change limiter tube.
7. Back lash in main tuning or bandspread dials.
   a. Check end bearings of main tuning and bandspread capacitors.
   b. Check tension of spring on antiback-lash gears.

Noblitt-Sparks Models 358T, 359T

Arvin Models 358T and 359T have the same chassis assembly as Models 152T and 153T which appear on *pages 18-1 through 18-3 of Rider's Manual Volume XVIII*. The only difference in these models is the color of the cabinet, rear cover, and knobs. The parts that differ from those listed in the 152T-153T parts list are as follows:

AA22993-1	Cabinet, sandal wood, for Model 358T
AA22993-2	Cabinet, willow green, for Model 359T
AC21696-3	Cabinet rear cover assy., willow green, for Model 358T
AC2169-4	Cabinet rear cover assy., willow green, for Model 359T
AC20501-3	Knob, gold for Model 358T and Model 359T.

Philco 50-1421 and 50-1422

These models are similar to Model 50-1420 which appears on *pages 20-183 through 20-188 of Rider's Manual Volume XX*, with the exceptions given below.

Model 50-1421 uses an M-9C record changer, which appears on *pages RCD. CH. 19-35 through RCD. CH. 19-54 of Rider's Manual Volume XIX;* while Model 50-1422 uses an M-20 record changer, which appears on *pages RCD. CH. 20-1 through RCD. CH. 20-16 of Rider's Manual Volume XX*.

The connection from pin 6 of the 12BE6 goes to tap 2 of the oscillator transformer, T400, instead of to tap 4 of Z300. Resistor R401, 47,000 ohms, is connected from pin 2 of the 12BE6 to pin 1, and the lead from pin 2 now goes directly to B—, instead of to tap 2 of T400. The lead from C400B goes to the avc.

The inside loop lead must be wired to the aerial section of C400, and the outside lead to the gang frame.

To prevent audio regeneration, the green lead from pin 1 of the 6AQ5 tube to the wiring panel must have excess wire dressed toward the 6AQ5 socket, and away from C203 and the blue lead of T200.

The replacement parts list for Model 50-1420 applies to Models 50-1421 and 50-1422, except for the differences indicated below:

Ref. No.	*Part No.*	*Description*
C100	45-3500	Capacitor, 0.04 μf
C204	61-0179	Capacitor, 0.004 μf
R200	33-5564-3	Volume control (with power on-off switch), 2 meg-ohms
R205	66-3568340	Resistor, 56,000 ohms
LS200	36-1629	Loudspeaker, p.m.
R306	66-0828340	Resistor, 82 ohms
C400	31-2751-3	Capacitor, tuning gang
R401	66-3478340	Resistor, 47,000 ohms
LA400	32-4375-1	Loop aerial, 50-1421 only
	40-7679-1	Baffle-and-cloth ass'y
	54-7745-3	Bottom cover
	10734-B	Cabinet
	56-7059FA9	Changer mtg. spring, 50-1422 only (3 required)
	56-7059-1FA9	Changer mtg. spring, 50-1422 only (3 required)
	76-4477-1	Drive shaft
	56-7001-1FCP	Pointer
	42-1847-2	Radio-phone switch.

Philco Model 50-1423

This model is electrically similar to Model 50-1420, which appears on *pages 20-183 through 20-188 of Rider's Manual Volume XX*, except for the differences which are described below. Model 50-1423 is housed in a wood, table-model cabinet, with an M-20 record changer, which appears on *pages RCD. CH. 20-1 through RCD. CH. 20-16 of Rider's Manual Volume XX*.

The connection from pin 6 of the 12BE6 goes to tap 2 of the oscillator transformer T400, instead of to tap 4 of Z300. Resistor R302 now goes from pin 6 of the 12BE6 to pin 6 of the 12BA6. Resistor R401, 47,000 ohms, is connected from pin 2 of the 12BE6 to pin 1, and the lead from pin 2 now goes directly to B—, instead of to tap 2 of T400. The lead from C400B goes to the avc.

The green lead from the aerial section of C400 must be wired to the same loop panel lug as the inside loop lead (side away from cabinet), and the black lead must be wired to the same lug as the outside loop lead (adjacent to cabinet).

The white lead from the oscillator section of C400 must be dressed upward from the chassis, and away from the trimmer screw.

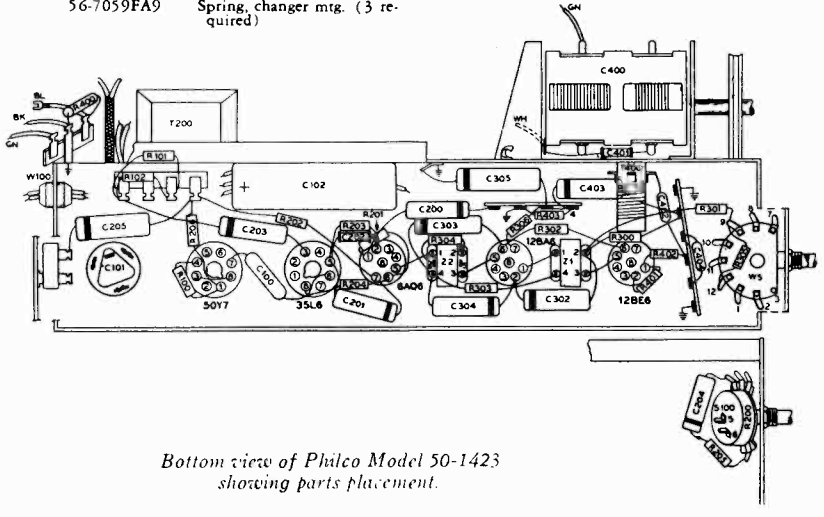
The yellow lead from Z301 to lug 12 of the wafer switch must be wired along the top side of the chassis, and dressed downward to the chassis.

The orange and brown leads wired to lugs 1 and 2 of the wafer switch must be wired along the removable side, and dressed downward to the chassis.

All wiring and components must be kept clear of R100, R101, and R102.

The under-chassis layout of Model 50-1423 differs from that of Model 50-1420. The parts layout of Model 50-1423 is shown in the accompanying figure.

Ref. No.	*Part No.*	*Description*
LS200	36-1629	Loudspeaker, p.m.
R200	33-5564-2	Volume control (with power on-off switch), 2 megohms, tapped at 1 megohm
T200	32-8242	Transformer, output
C400	31-2751-2	Capacitor, tuning gang
LA400	76-2127-9	Loop aerial
	10727	Cabinet
	56-5955	Apron
	40-7550	Baffle-and-cloth ass'y
	56-5931	Bezel
	54-7678-1	Bottom, celotex
	54-4579	Foot, rubber (4 required)
	54-4527-9	Knob, (3 required)
	45-6454	Lid
	56-6434	Butt hinge
	56-5992	Support
	56-7059FA9	Spring, changer mtg. (3 required)
	56-7059-1FJ47	Spring, changer mtg. (3 required)
	54-4630	Window, acetate
	54-5022	Dial scale, metal
	76-3731-1	Drive shaft
	56-6310	Heat shield, aluminum
	27-6233-6	Pilot-lamp-socket ass'y
	56-7001	Pointer
	27-4771-1	Rubber mount, tuning gang (4 required)



Bottom view of Philco Model 50-1423 showing parts placement.

Philco 50-526

Model 50-526 is similar to Models 50-522 and 50-524 which appear on *pages 20-153 through 20-157 of Rider's Manual Volume XX*, except for the following changes. Model 50-526 is housed in a new phenolic-plastic cabinet. The 1-megohm resistor, from the avc circuit, pin 5 of the 14B6 detector to B—, pin 4 of the same tube, that was listed under Modifications on *page 20-155* as R304, is designated now as R305. A 68-ohm resistor, R304, is added in the cathode line of the 12BA6 i-f amplifier. This resistor is connected from pin 7 of the 12BA6 to pin 7 of the 14B6. R301, the grid-return resistor, has been changed in value to 1 megohm.

In Run #2 the tuning gang, C400, has been changed to improve performance, and the new part number is 31-2751.

In Run #3, R301 has been removed to increase sensitivity.

The replacement parts list for Model 50-522 and 50-524 applies to Model 50-526 except for the differences indicated below:

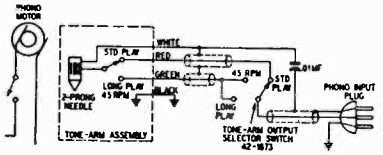
Ref. No.	*Part No.*	*Description*
I100	34-2068	Pilot lamp, 6-8 volt, brown bead
R301	66-5108340	Resistor, grid return, 1 megohm
R304	66-0688340	Resistor, cathode bias, 68 ohms
R305	66-5108340	Resistor, avc load, 1 megohm
Z300	32-4160-6A	Transformer, 1st i-f
Z301	32-4240-2A	Transformer, 2nd i-f
LA400	32-4052-38	Loop aerial
	10769	Cabinet
	54-7911	Back
	40-7778	Baffle-and-cloth ass'y
	54-7761	Baffle, speaker
	76-5157	Dial backplate
	54-5069	Dial scale, glass
	54-4728-1	Grille, plastic
	54-5718-2	Knob (2 required)
	56-5630-14	Pointer
	57-1468FA1	Hairpin fastener, drive shaft
	27-6233-6	Pilot-lamp-socket ass'y
	56-3545-6FA3	Clip, pilot-lamp mtg.
	54-7953	Cover, pilot lamp
	56-7373FA3	Scale strap, l.h.
	56-73731FA3	Scale strap, r.h.

Philco 50-1720

This model is electrically similar to Model 50-1725. It is housed in a different style of cabinet and employs an M-20 record changer.

The following schematic changes have been made. The connection from C421 now goes to R409, which goes to the junction of R410 and C422, instead of to R306. L410 has been inserted from the junction of C306 and C422 to the junction of C330 and C309. The value of R403 has been changed from 10,000 ohms to 22,000 ohms. Capacitor C320 has been added from ground to the junction of C306, R300, and tap 4 of Z300. Capacitor C329 is now located from ground to the junction of tap 2 of Z303 and pin 7 of the 6BJ6 2nd i-f amplifier, instead of from B— to ground. Capacitor C331 is now connected from the junction of C332 and C327 to ground, instead of across C333. Capacitor C320 has been deleted. It was connected from ground to the junction of C321 and R312. Capacitor C210 has been inserted from the junction of pin 7 of the 1st audio amplifier, ½ 19T8, to ground. The value of R201 has been changed from 47,000 ohms to 33,000 ohms. Capacitor C105 has been inserted from ground to the junction of L100 and pin 5 of the 19T8. Coils L402, L403, L405, and L408 are ¼ μh.

The accompanying diagram shows the hookup for the record changer, Model M-20.



Hookup for Record Changer, Philco Model M-20, in Philco Model 50-1720.

In Run #2, Capacitor C330 has been removed to improve f-m discriminator performance.

The replacement parts list for Model 50-1725 applies to Model 50-1720, except for the differences indicated below:

Ref. No.	*Part No.*	*Description*
C105	62-110009001	Capacitor, filament bypass, 100 μμf
CR100	34-8003-2	Rectifier, selenium, dry-disk, 150 ma
CR101	34-8003-2	Rectifier, selenium, dry-disk, 150 ma
R100	33-1335-84	Resistor, current limiting, 50 ohms
R101	33-3435-23	Resistor, 2-section filter
C210	62-122001001	Capacitor, cathode bypass, 220 μμf
LS200	36-1610-4	Loudspeaker
R201	66-3338340	Resistor, bass compensation, 33,000 ohms
T200	32-8367-1	Transformer, audio output
C320	62-110009001	Capacitor, plate decoupling bypass (f-m) 100 μμf (rewired)
C329	62-110009001	Capacitor, r-f bypass, 100 μμf (rewired)
C333	62-110009001	Capacitor, r-f bypass, 100 μμf
Z300	32-4257A	Transformer, f-m 1st i-f
Z301	32-4258A	Transformer, a-m 1st i-f
Z302	32-4372-1A	Transformer, f-m 2nd i-f
Z303	32-4160-3A	Transformer, a-m 2nd i-f
Z305	32-4240-2A	Transformer, a-m 3rd i-f
C400	31-2724-7	Capacitor, tuning gang (f-m, 3-section; a-m, 2-section)
L410	32-4143-4	Coil, B— r-f isolating choke, 100 μh
LA400	76-3583-13	Loop aerial
	10762	Cabinet
	54-7846	Back
	1W25345FE11	Screw, back mtg. (12 required)
	219-179	Baffle, wood, speaker
	40-7715	Baffle-and-cloth ass'y
	56-5855	Bezel
	54-5021	Dial scale
	56-2234-3	Scale strap (2 required)
	45-6564	Drop door
	27-4610	Grommet, control shaft, light shield (4 required)
	45-6565	Instrument panel
	27-6233-39	Socket ass'y, pilot lamp

Philco M-12C

This model appears on *pages RCD. CH. 19-55 through RCD. CH. 19-74 of Rider's Manual Volume XIX*. The three parts referred to below were listed twice in the parts list, and should be deleted as indicated.

Part No.	*Description*	
56-4647	Retainer spring	Delete
56-5753	Push-off saddle	Delete
76-4008	Base plate assembly	Delete.

RCA QU-62, Ch. RC-602B

This model appears on *pages 17-12 through 17-20 of Rider's Manual Volume XVII*. Capacitor C12 has been changed from 39 $\mu\mu$f to 33 $\mu\mu$f. Delete 70934, Capacitor, ceramic, 39 $\mu\mu$f, and add 73247, Capacitor, ceramic, 33 $\mu\mu$f (C12) to the replacement parts list.

RCA RP-168 Series

The RP-168 Record Changer Series is used in the following instrument models:

Record Player Attachments 9JY, CP-5203, 45J, QJY

Record Players (without radio) 9EY3, 9EY31, 9EY32, 9EY35, 9EY36, 45EY, QEY3

Radio-Phonograph Combinations 9QV5, 9W51, 9W78, 9W101, 9W102, 9W103, 9W105, 9W106, 9Y7, 9Y51, A55, A78, A106.

Radio-Phonograph-Television Combinations 9TW309, 9TW333, 9TW390, TA128, TA129, TR126, S1000

Detailed drawings (see Fig. 1) and descriptions for the pickup arm assemblies are given below:

SUB-BASE ASSEMBLIES

Type I—Sub-base Stock No. 74070. Has staked studs for spring anchors and one-piece reject lever. Stamped or labelled RP168-1 or RP168-3.

Type II—Same as Type I, except it uses a two-piece reject lever. Use Stock No. 74743 Sub-base (Type III) for replacement.

Type III—Sub-base Stock No. 74743. Same as Type II, except that it has pickup-arm rest on sub-base (when motor-board rest is used, the sub-base rest is to be deformed).

Type IV—Sub-base Stock No. 74468. It uses an a-c input connector and audio output jack mounted on a separate bracket. Labelled RP168-2 and used only with Model CP-5203.

Type V—Sub-base Stock No. 74856. Has turned up lances for spring anchors. Idler wheel mounting plate (45B, Stock No. 74814) is removable. It is labelled RP168-1, RP168B-1, etc. It has pickup-arm rest on sub-base (when motorboard rest is used, the sub-base rest is to be deformed).

NOTE:—Two different main levers (director lever) are used, depending upon which turntable assembly is used. Lever (41), Stock No. 74076 has a long end (41C) and is used with Turntables Types I and II. Lever (41), Stock No. 74857 has a short end and is used with Turntable Type III.

Type VI—Stock No. 74803. Similar to Type V, but it does not bear any "RP168" identification. It has pickup-arm rest on sub-base. Idler wheel mounting plate (45B) is secured to the sub-base with a shoulder rivet.

Type VII—Same as Type VI, except it does not have pickup-arm rest on sub-base. Use Stock No. 74803 (Type VI) for replacement (the pickup-arm rest is to be deformed).

NOTE: Type VI and VII—Late production of these types have the idler wheel mounting stud (22) staked to its mounting plate. The idler wheel retainer (horeshoe washer) is Stock No. 75081.

PICKUP-ARM ASSEMBLIES (LESS PICKUP)

Type I—Arm Stock No. 74041. Stamped 970488. Pickup-arm stud (9A) is full diameter for entire length (do not use where pickup-arm rest is on sub-base). Lead counterbalance is riveted to arm. Arm Stock No. 74443. For Model CP-5203 only. Black finish, otherwise similar to No. 74041.

Type II—Arm Stock No. 74824. Same as No. 74041 except that stud (9A) has a flat on one side at bottom end. Can be used with either type of pickup rest. Arm Stock No. 75058. For Model 45EY only. Two-tone finish, otherwise same as No. 74824.

Type III—Arm Stock No. 75073. Stamped 3R1. Similar to No. 74824 except that a different pivot (9B) is used and the lead counter-balance is fastened to the arm with a screw. Stud (9A) is of smaller diameter at bottom end. Can be used with either type of pickup rest. Use only with No. 74059 pivot arm.

Type IV—Same as Type III except that stud (9A) is of full diameter for entire length. Use No. 75073 for replacement.

Type V—Arm Stock No. 74796. Stamped 3R1. Similar to Type III except that a different pivot (9B) is used and the lead counter-balance is not used. A 5/8" o.d. counterbalance spring is used. Can be used with either type of pickup rest. Use only with No. 74799 pivot arm.

Type VI—Same as Type V except that stud (9A) is of full diameter for entire length.

Use No. 74796 for replacement.

When replacing a stylus, never bend the stylus support wire with crystal pickups (Stock Nos. 74067 and 74625) remove the two screws holding sapphire guard in place and remove the guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and gently push the shaft through the hole in the armature shaft until the sapphire holder assembly comes free. Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal. Take hold of the lower end of the shaft with a pair of pliers while loosening or tightening the nut, being very careful so as not to strip the threads or break the crystal. Insert threaded shaft of replacement sapphire holder through armature shaft and replace the washer and nut. Make sure that the sapphire is in the correct position. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough beyond the guard so that the guard will not touch the record. If necessary, bend the guard a little.

When using a variable reluctance pickup (Stock No. 74466) to remove the stylus assembly, insert a bent paper clip or equivalent tool into the stylus stud pin socket (see Fig. 2). Press the assembly out from the cartridge with the tool as shown by the arrow in the illustration. To replace the stylus assembly, insert the stud pin into the recess, with the locating tab positioned above the locating slot between the two pole pieces. Press assembly in firmly by applying pressure upon the stud pin with a blunt tool. Care must be taken to press assembly only at this point so as not to damage or distort the stylus arm.

When using a ceramic pickup (Stock No. 74984) to remove the stylus insert the point of a knife blade between the stylus wire and the case. The stylus may be pried out of its rubber mounting with a twisting motion of the knife blade. To replace stylus, push end of stylus wire down into its rubber mounting. Be certain that the stylus is centered in the groove of the pickup case.

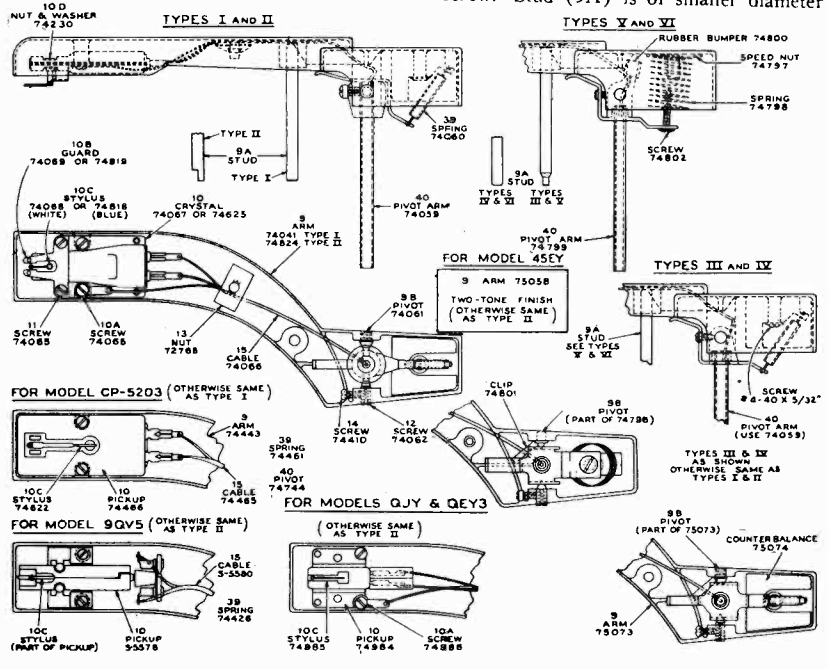


Fig. 1 PICKUP ARM ASSEMBLIES

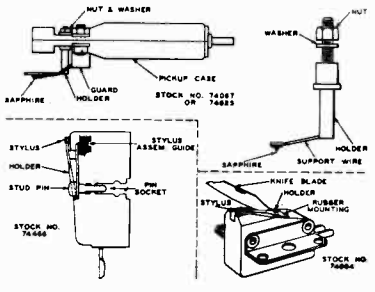


Fig. 2 STYLUS REPLACEMENT

RCA RP168 Series

The RP168 Series record changer appears on *pages RCD. CH. 19-1 through 19-8 of Rider's Manual Volume XIX*. The RP168-2 differs from the RP168-1 essentially in that it uses a capacitor-type motor. It also has a power input receptacle and audio output jack mounted on the base sub-assembly. The RP168-3 is identical to the RP168-1 except for the use of a motor which will operate satisfactorily on a 50-cycle power supply. For conversion to 50-cycle operation, a spring sleeve is added to the motor spindle shaft.

The changes in the replacement parts list for the RP168 Series are as follows:

Stock No.	Ill. No.	
		RP168-1
74620	1	Nose—spindle nose (late type—thick wall)
74427	46	Spring—reject lever spring (0.203" O.D. x 0.531"—13 turns) (late type, 2 required)
74426	59	Spring—trip lever spring (0.171" O.D. x 0.595"—30 turns)
74453	....	Washer—bearing washer between trip pawl (Ill. No. 37) and trip pawl lever (Ill. No. 66)
		RP168-2
74472	1	Nose—spindle nose
74445	8	Turntable—turntable and mat—less spindle nose and separator assemblies
74471	8A	Mat—turntable mat
74470	24	Wheel—idler wheel
74468	45	Base—sub-base assembly complete with all staked and riveted parts including idler lever and reject lever
74469	73	Motor—105/125 volts, 60-cycle capacitor type motor complete with connector and 5-μf capacitor
74621	....	Capacitor—motor capacitor—5μf
74473	....	Bracket-metal bracket with power input connector and audio output jack
		RP168-3
74624	73	Motor—105/125 volts, 60-cycle motor (stamped 941072-1) complete with connector and RCA 73158 spring sleeve (for 50-cycle conversion)
73158	....	Spring—spring sleeve to convert 941072-1 motor to 50-cycle operation
		RP168A-1
74209	75	Cover—mounting screw cover (threaded type) (3 required) use with 74424 screw
74581	75	Cover—mounting screw cover (plug-in type) (3 required) use with 74582 screw
74424	76	Screw—No. 8-32 x 1 ¾" special screw (with tapped hole) for mounting record changer (3 required) use with 74209 cover
74582	76	Screw—No. 8-32 x 1 ¾" special screw (non-tapped hole) for mounting record changer (3 required) use 74581 cover
74422	78	Spring—conical spring for mounting record changer—upper—L.H. side (2 required)
74423	79	Spring—conical spring for mounting record changer—bottom (3 required)
74208	80	Nut—tee nut for mounting record changer (3 required)
74184	81	Motorboard—motorboard complete with welded brackets and stud—less rest and operating parts
74421	84	Spring—conical spring for mounting record changer—upper—R.H. side (1 required)

The replacement parts listed above are for the specific models mentioned, other parts not listed are identical with those listed for RP168-1 in *Rider's Manual Volume XIX*.

RP168-2

This changer uses RP168-2 mechanism and RMP130-1 pickup and arm assembly

74467	83	Knob—reject control knob
74444	81	Motorboard—motorboard complete with welded brackets and stud—less rest and operating parts
74446	82	Rest—pickup arm rest
74474	....	Switch—ON-OFF switch.

RCA 8BX5, 8BX54, 8BX55, Ch. RC-1059, RC-1059A

These models appear on *pages 19-5 through 19-9 of Rider's Manual Volume XIX*. It has been found that the values of the resistor (10,000 ohms) and the capacitor (0.01 μf), specified to be used for i-f alignment, result in misalignment (1 to 1.5 kc) of the 1st i-f primary. For more accurate alignment, it is suggested that a 1,000-ohm resistor and a 39-$\mu\mu$f capacitor be used during i-f alignment.

RCA 8V91

This model appears on *pages 19-16 through 19-26 of Rider's Manual Volume XIX*. The following changes in parts list have been made:

Change:

73753 Pull—

to read:

73753 Pull—Door pull (2 required) for mahogany instruments.

Add:

74626 Pull—Door pull (2 required) for blonde instruments.

RCA 8X541, 8X542, 8X545, 8X546, 8X547, Ch. RC-1065C, RC-1065D, RC-1065F, RC-1065H, RC-1065J, RC-1065K

Chassis RC-1065C and RC-1065D are the same as Chassis RC-1065 and RC-1065A except that they have oscillator coils (stock no. 74448) and tuning capacitor (stock no. 74447) stamped 941274-2.

Chassis RC-1065F and RC-1065H are the same as Chassis RC-1065C and RC-1065D except that they use a 50B5 output tube.

Chassis RC-1065J and RC-1065K are similar to Chassis RC-1065C and RC-1065D except that they use stock number 75846 1st i-f transformer (stamped 970441-11), number 75847 2nd i-f transformer (stamped 970441-12) and number 71168 1-megohm volume control (stamped 970776-4).

When excessive hum is encountered in these chassis, the value of R15 should be checked. The correct value of this resistor is 1,200 ohms. In same chassis, two 1½-watt resistors (one each of 2,200 ohms and 2,700 ohms) are connected in parallel and used as a substitute for the 1,200-ohm, 1-watt resistor R15.

RCA 8X71, 8X72, Ch. RC-1070

These models appear on *pages 19-30 through 19-34 of Rider's Manual Volume XIX*. The driver tube (12AU6) cathode resistor, R11, has been changed from 180 ohms to 330 ohms.

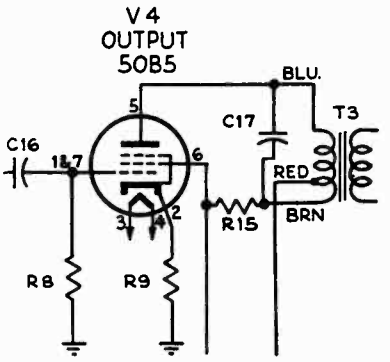
RCA 8X541, Ch. RC-1065F, 8X542, 8X547, Ch. RC-1065H

These instruments are similar to Models 8X541, 8X542, 8X547 which appear on *pages 18-45 through 18-46 of Rider's Manual Volume XVIII*, except that an RCA 50B5 tube is used in the output stage. The tuning capacitor and oscillator coil used are those described for the second production of the above models.

Chassis RC-1065 is used in Models 8X541, 8X544, and 8X545. Chassis RC-1065A in used in Models 8X542, 8X546, and 8X547. Chassis RC-1065B is used in Models 8X541, 8X544, 8X545 2nd production. Chassis RC-1065C is used in Models 8X542, 8X546, 8X547 2nd production.

The addition to parts list and the output tube circuit appear below:

74822 Socket—tube socket, miniature for 50B5 tube.



Output tube circuit for RCA chassis RC-1065F and RC-1065H.

RCA 9W101, 9W103, 9W105

These models appear on *pages 19-35 through 19-44 of Rider's Manual Volume XIX*. The original mounting screws used a cover which screwed into the top of the mounting screw. The screws now being used have a plug-in type of cover. This applies to the RCA 9Y7 also. The change in parts list is as follows:

74209 Cover—mounting screw cover (threaded type) for RP168A-1 record changer (3 required) (used with RCA 74424 screw)

74424 Screw—8-32 x 1 ¾" special screw (tapped hole) for RP168A-1 record changer (3 required) (used with RCA 74209 cover)

74581 Cover—mounting screw cover (plug-in type) for RP168A-1 record changer (3 required) (used with RCA 74582 screw)

74582 Screw—8-32 x 1 ¾" special screw (nontapped hole) for RP168A-1 record changer (3 required) (used with RCA 74581 cover).

RCA 9W101, 9W103, Ch. RC-618B

These models appear on *pages 19-35 through 19-44 of Rider's Manual Volume XIX*. In some chassis i-f transformers stamped 970435-2 have been used as a substitute for 2nd i-f transformers stamped 970435-5.

The 455-kc windings of 970435-2 transformers use resonating capacitors of 235 $\mu\mu$f each; the d-c resistance of each winding is 8.2 ohms. The transformer indicated in the schematic diagram is stamped 970435-5.

The addition to parts list is as follows:

74579 Bumper, rubber bumper (black) for front panel of record changer drawer, walnut or mahogany instruments, Models 9W101 and 9W103 (2 required)

74580 Bumper, rubber bumper (white) for front panel of record changer drawer, blonde or limed-oak instruments, Models 9W101 and 9W103 (2 required).

RCA 9Y7, Ch. RC-1057B

This model appears on *pages 20-21 through 20-23 of Rider's Manual Volume XX*. A 100-ohm, ½-watt resistor, R24, has been added in series with the oscillator coupling capacitor C23, between the capacitor C23 and the oscillator coil L3. This reduces noise caused by parasitics in the oscillator. Add to the replacement parts list: Resistor, fixed composition, 100 ohms, ± 20%, ½ watt, R24.

RCA 54B6, Ch. RC-589UE

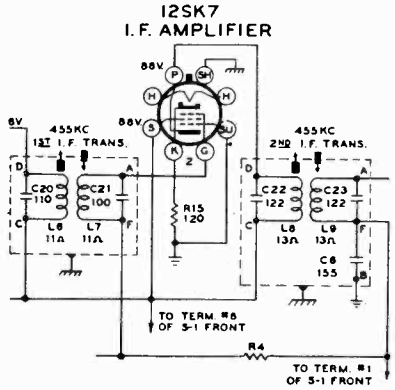
This model is similar to Model 54B1, 2nd Production, which appears on *changes pages C18-8 and C18-9 of Rider's Manual Volume XVIII*, and on *pages 15-22 through 15-24 of Rider's Manual Volume XV*, with the exception of the parts listed below:

Part No.	*Description*
73284	Fastener, push fastener to hold loop, chrome (2 required)
73281	Hinge, lid hinge, ivory
73276	Lid, case lid complete with loop support less loop, ivory
73282	Loop, antenna loop complete with connectors less lid, ivory
73280	Plate, backing plate for mounting hinge on lid, chrome
73279	Screw, case cover mounting screw, 1 set, ivory
73286	Bottom, case bottom, ivory
73277	Center, case center, gold
73287	Handle, carrying handle, tan
73288	Link, handle link.

RCA 75ZU 2nd Prod., Ch. RC-1063B

This model is the same as 75ZU, Ch. RC-1063A, which appears on *pages 19-45 and 19-46 of Rider's Manual Volume XIX*, except for the following changes:

Different i-f transformers are used, as shown in the accompanying diagram. Resistor R15 has been added to the cathode circuit of the 12SK7 i-f amplifier, and R14, in the diode circuit of the 12SQ7 2nd detector, has been deleted. Changes that apply to both the RC-1063A and RC-1063B chassis are given in the change notice for 75ZU, RC-1063A, that appears on *changes page C20-10 of Rider's Manual Volume XX*.



Changes for RCA 75ZU, RC-1063B.

The replacement parts list is the same as that for RC-1063A except for the differences listed below:

Part No.	*Description*
70128	Transformer, first i-f transformer, stamped 922246-11 (L6, L7, C20, C21)
70129	Transformer, second i-f transformer stamped 922246-12 (L8, L9, C6, C22, C23)
	Resistor, fixed composition, 120 ohms, ± 10% (R15).

RCA 77V2, Ch. RC-606C

This model appears on *pages 19-29 through 19-53 of Rider's Manual Volume XIX*. The top-view diagram of the chassis layout that appears on *page 19-52* illustrates tube V5 as 6K6GT. Tube V5 should be a 6V6GT.

Radio Wire JS-168

Model JS-168 is the same as Model JS-174 which appears on *page 19-17 of Rider's Manual Volume XIX*.

Radio Wire JS-175

Model JS-175 is the same as Models JS-173, JS-184, and JS-185 which appear on *page 19-16 of Rider's Manual Volume XIX*.

Regal 1107, 7254

Models 7254 and the revised 1107 are the same as Model 1107 which appears on *page 19-8 of Rider's Manual Volume XIX* with the following changes:

Antenna loop, 30-128, has been changed to an antenna coil, 30-145.

Ganged variable capacitors 40-101 have been changed to 40-101G.

The value of the 13,000-ohm resistor connected to the B lead of 30-127 has been changed to 15,000 ohms and is designated as 65-155.

The 200,000-ohm resistor, 65-142 has been changed to 220,000 ohms and is designated as 65-108.

The 0.01-μf capacitor connected to the A lead of 30-127 has been changed to 0.006 μf and is designated as 50-101.

Resistor 20-101 is now 20-103, the value remains the same.

Capacitor 53-103 is now 55-103, the value remains the same.

The 25-ohm, ½-watt resistor, 65-101 has been changed to 22 ohms, ½ watt, and is designated as 65-160.

The two 50-μf capacitors, 60-106, have been changed to 40 μf and are designated as 60-108.

The 2,400-ohm resistor, 65-132, has been changed to 2,200 ohms and is designated as 65-162.

Sears 101.206-1, 101.206-2, and 101.206-3

These automatic record changers are similar to Chassis 101.206 which appears on *pages RCD. CH. 18-6 through RCD. CH. 18-9 of Rider's Manual Volume XVIII*, with the following exceptions. Chassis 101.206-1 has a revised pickup-arm hub which permits manual movement of the pickup arm while the changer is in automatic cycle. The cam seat for the pickup arm permits return of the arm to the correct position after manual dislocation, without readjustment of the 10" or 12" drop points. This chassis incorporates a "Manual-Automatic" switch.

Chassis 101.206-2 is the same as the 101.206-1 except that it does not have the "Manual-Automatic" switch. Chassis 101.206-3 is the same as the 101.206-2 except that the phono-pickup lead has cotton overbraid for insulation from the chassis.

Sears 6686A, Ch. 139.151-1

This chassis is similar to Chassis 139.151 which appears on *page 17-1 of Rider's Manual Volume XVII*, except that an "ON-OFF" switch is used in the line cord. The parts list for this chassis is the same as that for the 139.151 except for the following change:

Ref. No.	*Part No.*	*Description*
H	J20667	Line cord, switch and plug.

Sears 101.211-4

This model appears in the *Record Changer Section of Rider's Manual Volume XIX on pages RCD. CH. 19-1 through 19-14*. Chassis 101.211-4 is basically the same as the 101.211-1; however, the 101.211-4 incorporates a revised spindle assembly, turntable and hinge body assembly. The change in parts list is as follows:

Location Number	*Part Number*	*Description*
5	R57943	Turntable assembly
12	R49953	Hinge pin
14	R57945	Hinge body assembly
15	R57710	Adjusting screw
20	R65101	Cartridge-syntronic pickup (grounded)
21	R66691	Arm-pickup (less cartridge)
68	R62360	Motor assembly, 110-volt, 50-cycle (Alliance)
70	R57902	Spindle assembly
70	R57934	Spindle shaft and base assembly
71	R57940	Record pusher
73	R57903	Pusher spring
76	R57051	Turntable bearing
81	R57768	Spring-pusher shaft
105	R49958	Spring-counterbalance

Location number 83 through 88 and number 103 have been deleted.

The 456.211-5 Record Changer is basically the same as the 101.211-1, except that the 456.211-5 incorporates a bottom pan assembly, R66692, and a revised spindle assembly, turntable and hinge body assembly. The syntronic pickup arm and grounded syntronic cartridge replace the old style plastic arm.

Sears 8005, Ch. 132.839-1

This chassis is similar to Chassis 132.839 which appears on *pages 17-8 through 17-10 of Rider's Manual Volume XVII*, except for the following changes. The filament connections have been reversed on the 50L6 tube socket to prevent burning of resistor R11 and damage to the tube. R12, a 1,200-ohm, 1-watt resistor has been added to the B+ circuit between T3 and C10B. The filter choke L3 has been deleted. The parts list for this chassis is the same as that for the 132.839 except for the following changes:

Ref. No.	*Part No.*	*Description*
R12		Resistor, 1,200 ohms, 1 w
T3	N21921	Transformer, output
Spk	N21922	Speaker, 4", p-m.

Sears 8210, Ch. 101.820-1A

This chassis is similar to Chassis 101.820 which appears on *pages 17-4, 17-5, and 17-15 of Rider's Manual Volume XVII*, except for the changes in the parts list. The parts list for this chassis is the same as that for the 101.820 except for the following changes:

Ref. No.	*Part No.*	*Description*
R10	R62705	Control, On-Off & volume
R15		Resistor, 680 ohms, ½ w
R14		Resistor, 820 ohms, ½ w
T3	R62721	Transformer, output
	R62717	Speaker, 5¼" p-m
	R63190	Cone, voice coil
	R57272	Plug, 1 prong.

Sears 9073A, Ch. 135.244; 9073B, Ch. 135.244-1

These models are similar to Model 9073, Ch. 135.244, which appears on *pages 20-70 through 20-72 of Rider's Manual Volume XX*. Models 9073A and 9073B use a three-speed manual record player, part no. F-7625 and the number F-296 cabinet.

Chassis 135.244-1 is the same as 135.244 except that a protective resistor, R12, has been added to the rectifier circuit, from pin 8 to the junction of C18 and C16.

The change in parts lists is as follows:

Ref. No.	*Part No.*	*Description*
R12	F-4022	Resisror, 33 ohms, ½ w, 20% (in 132.244-1 only)
	F-7625	Motor, phono, 60-cycle (less turntable) (speed indicator arm is in center of rear plate of motor)
	F-7626	Idler wheel
	F-7627	Turntable, 8"
	F-296	Cabinet, radio, molded.

Sears 101.666-1B

This chassis appears on *page 19-15 of Rider's Manual Volume XIX*. The d-c resistances of the r-f coils (L1 and L3), are 9.6 ohms.

Sears 9073C, Ch. 135.244-1

Model 9073C uses chassis 135.244-1 and is the same as Model 9073B except for the following differences. Capacitor C20 has been deleted from the circuit. The value of resistor R6 has been changed to 1.5 megohms. The value of volume control resistor R6 has been changed to 500,000 ohms. The values of capacitors C12 and C14 have been changed to 0.0001μf and 0.0005μf, respectively. Resistor R13, 2.2 megohms, has been added across the pickup socket. The change in the parts list is as follows:

Ref. No.	*Part No.*	*Description*
	F-7881	Arm, pickup (less crystal)
	F-7882	Cartridge, crystal, Shure Bros. P37C
	F-7883	Needle, phono, unipoint, sapphire
	F-7563	Capacitor, variable assembly
C12	F-6015	Capacitor, ceramic, 0.0001 μf 500 V
C14	F-4890	Capacitor, 0.0005 μf 600 V
R6	F-6239	Control, On-Off and Volume
R5	F-3450	Resistor, 1.5 megohm, ½ w, 20%
R13	F-4277	Resistor, 1,000 ohm, 1.0 w, 10%.

Sears 9005, 9006, Ch. 132.858

These models appear on *pages 20-65 and 20-66 of Rider's Manual Volume XX*. The following changes have been made in the replacement parts list:

Ref. No.	*Part No.*	*Description*
	N22166	Scale, dial, clear plastic
R4		Resistor, 2.2 megohms, ¼ w
R5	N22192	Resistor, volume control & on-off switch, 1 megohm
R6		Resistor, 15 megohms, ¼ w
R7		Resistor, 22 ohms, ¼ w
R8, R9		Resistor, 470,000 ohms, ¼ w
R10		Resistor, 150 ohms, ¼ w
R11		Resistor, 1,200 ohms, 1 w.

Sears 9270, Ch. 547.245

This model appears on *pages 20-73 through 20-75 of Rider's Manual Volume XX*. The parts number of "Bearing, tuning shaft," should be changed from V3449 to V9160. A 50-μf capacitor, C28, has been added to the filament network from the junction of pin 7 of the 1U5 and pin 1 of the 1U4, i.f., to the B— line. The following part should be added to the replacement parts list: C28, V4636, Capacitor, electrolytic, 50 μf, 25 v.

Stewart-Warner A92CR3S, Code 9028-CS, A92CR6S, Code 9028-FS

These models are similar to Models A92CR3, Code 9028-C, and A92CR6, Code 9028-F, which appear on *pages 17-11,12 through 17-21 of Rider's Manual Volume XVII*, except for the following differences. The "S" chassis is designed to provide greater sensitivity so as to accommodate the requirements of satisfactory performance in low signal strength areas. Due to certain design differences in these models it is desirable to set the band switch to the FM position whenever the record changer is used.

The high side of loop antenna no. 2 is connected to terminal R of antenna coil no. 18 as shown in Fig. 1. This loop is used only for a-m push-button operation. Band-switch section 3A is not used in the "S" chassis. One side of loop antenna no. 134 is connected to terminal L of antenna coil no. 15 through the 0.01-μf capacitor, no. 136. The other side of the antenna is grounded. This loop is used only for a-m operation. The brown lead from the external antenna is routed to terminal L of

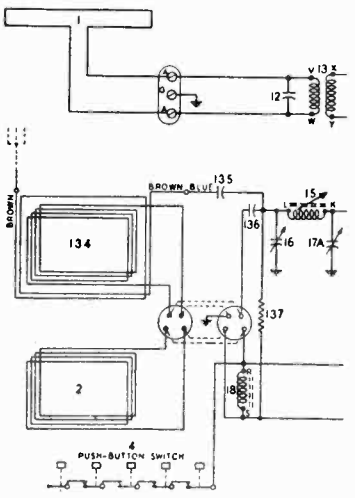


Fig. 1. Circuit changes for Stewart-Warner A92CR3S and A92CR6S.

antenna coil no. 15 through the 100-$\mu\mu$f capacitor no. 135. Terminal L of antenna coil no. 15 is connected to ave through the 680,000-ohm resistor no. 137. The high side of the wave trap consisting of coil no. 39 and capacitor no. 38 is connected to terminal S10 of band-switch section 3C. Resistor no. 69 is deleted and the cathode of the 6BA6 1st i-f tube is grounded. The cathode of the 6SJ7 tube is connected to ground through the 1,000-ohm resistor no. 139, instead of through the 1,500-ohm resistor no. 103. One side of the voice coil of the speaker is connected to the screen of the 6SJ7 tube through a 470-ohm resistor no. 140 and a 0.25-μf capacitor no. 108. The junction point between capacitor no. 108 and resistor no. 140 is connected to terminal S29 of band-switch section 3B. Terminals S30 and S31 are connected to the junction of resistor nos. 128 and 129. The change in section 3 band switch, front view, is shown in Fig. 2.

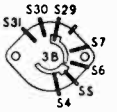


Fig. 2. Section 3, front view, band switch for Stewart-Warner A92CR3S and A92CR6S.

The additional parts used in the "S" type chassis are given below. Other parts are the same as those for the A92CR3 and A92CR6.

Ref. No.	*Part No.*	*Description*
91	502261	Capacitor, 0.01 μf, 600 v
	504725	Capacitor, 0.02 μf, 200 v (used only on chassis with "H" designation)
134	505668	Loop antenna for a.m. (29" x 30 ⅜")
135	502931	Capacitor, mica 100 $\mu\mu$f, 500 v
136	502261	Capacitor, 0.01 μf, 600 v
137	502267	Resistor, carbon, 680,000 ohms, ¼ w
138	502406	Resistor, carbon, 1,500 ohms, ¼ w
139	502478	Resistor, carbon, 1,000 ohms, ¼ w
140	502126	Resistor, carbon, 470 ohms, ¼ w.

Stewart-Warner B92CR Series

These models are similar to Models B92CR1,2,3,4,8,9, and 10 which appear on *pages 19-8 through 19-14 of Rider's Manual Volume XIX*. The following revisions apply to the B92CR Series. Capacitor no. 103 has been changed from 0.01 μf to 0.001 μf. The high side of the capacitor was formerly connected to the grid, pin 5, of the 6V6GT output tube. It is now connected to the grid of the 6SQ7, 1st a-f tube. These changes were made to eliminate low-frequency distortion, and are incorporated in chassis stamped with the letter "S" or "H".

The list of models in the B92CR Series and their code numbers is as follows:

Radio Model No.	*Radio Code No.*	*Radio Model No.*	*Radio Code No.*
B92CR1	9043-A	B92CR8	9043-K
B92CR1LP	9043-ALPW	B92CR9	9043-L
B92CR2	9043-B	B92CR10	9043-M
B92CR2LP	9043-BLP	B92CR12	9043-GR
B92CR2LPX	9043-BLPX	B92CR12LP	9043-GRLP
B92CR2X	9043-BX	B92CR13	9043-GL
B92CR3	9043-C	B92CR13LP	9043-GLLP
B92CR3LP	9043-CLP	B92CR14	9043-GM
B92CR3LPX	9043-CLPX	B92CR14LP	9043-GMLP
B92CR3X	9043-CX	B92CR15	9043-GT
B92CR4	9043-D	B92CR15LP	9043-GTLP
B92CR4LP	9043-DLP	B92CR18	9043-GH
B92CR4LPX	9043-DLPX	B92CR18LP	9043-GHLP
B92CR4X	9043-DX	B92CR19	9043-HM
B92CR5	9043-E	B92CR19LP	9043-HMLP.

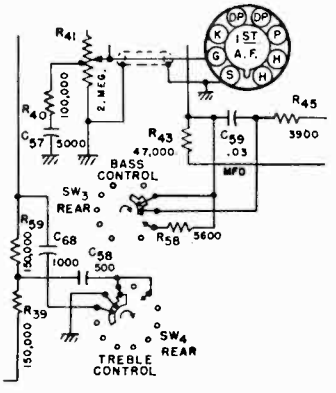
Change in parts list is as follows:

Ref. No.	*Part No.*	*Description*
118	505342	Speaker, p-m dynamic (8 inch) used on all models
119	506328	Speaker, p-m, dynamic (8 inch) used on all models except B92CR19 and B92CR19LP
119	506657	Speaker, p-m dynamic (6 inch) used only on models B92CR19 and B92CR19LP.

United Motors R-1253, R-1254, R-1255

Models R-1253 and R-1254 are found on *pages 18-11 through 18-19 of Rider's Manual Volume XVIII*. Model R-1255 is similar to these. The circuit changes for these models are shown in the accompanying diagram. The changes in the parts list are as follows:

Illus. No.	*Production Part No.*	*Service Part No.*	*Description*
C67	CM20A470M	G470	47 $\mu\mu$f, 500 v, ceramic
C68	CM20A102M	G102	1,000 $\mu\mu$f, 500 v, mica
R43	RC40AE473K	C473	47,000 ohms, 2 w, carbon
R45, 47	RC20AE392K	A392	3,900 ohms, ½ w, carbon
R57	RC30AE068K	B068	6.8 ohms, 1 w, carbon
R58	RC20AE562K	A562	5,600 ohms, ½ w, carbon
R59	RC20AE154M	A154	150,000 ohms, ½ w, carbon
SW3	60B265	1218695	Switch, power and tone (bass)
SW4	60B325	1218697	Switch, tone control (treble).



Circuit changes for United Motors R-1253, R-1254, and R-1255.

Templetone G418, G4108

Model G418 appears on *page 17-1 of Rider's Manual Volume XVII*. The value of resistor R5 has been changed to 10 megohms. Model G4108 is the same as G418.

Templetone H-727

Model H-727 is similar to model G-725 which appears on *pages 17-3 through 17-6 of Rider's Manual Volume XVII*.

United Motors R-705

This model appears on *pages 17-1 through 17-6 of Rider's Manual Volume XVII*. This receiver may be installed in the 1949 Chevrolet by using speaker and control mounting parts in adapter package No. 4415. Speaker installation instructions noted under "Pontiac" are used for mounting the speaker to the instrument panel.

United Motors 7258155

This model appears on *pages 19-76 through 19-80 of Rider's Manual Volume XIX*. The following changes have been made in the parts list after serial 5596000:

Illus. No.	*Production Part No.*	*Service Part No.*	*Description*
6	1219508	1219508	1st i-f assy. (miniature)
7	1219509	1219509	2nd i-f assy (miniature)
26	7240724	M908	Electrolytic
26A			20 μf, 25 v
26B			20 μf, 400 v
26C			20 μf, 400 v

United Motors 984249

Model 984249, Pontiac, appears on *pages 19-65 through 19-70 of Rider's Manual Volume XIX*. The 330-ohm, ½-watt, i-f cathode resistor, No. 54, has been replaced by a 390-ohm, ½-watt resistor on the late production sets. It has been found that the tendency to motor boat is caused by a 6SK7 tube with a much higher than average contact potential. A slightly higher bias on the i-f tube corrects this tendency, and the slightly higher value of cathode resistor accomplishes this.

United Motors 984296

Model 984296, Pontiac, appears on *pages 19-60 through 19-64 of Rider's Manual Volume XIX*. The following change has been made in all sets above serial number 691137 and B39-54401:

Illus. No.	*Production Part No.*	*Service Part No.*	*Description*
43	1213220	A 151	150 ohms, ½ w, insulated.

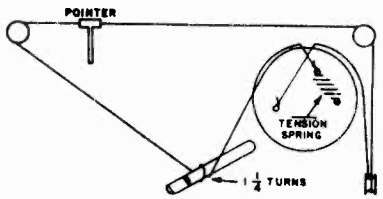
United Motors 986240, Chevrolet

This model appears on *pages 20-48 through 20-58 of Rider's Manual Volume XX*. The following changes are effective on only those sets above serial no. C49-0401050. The voltage at the grid of the r-f amplifier, 6BA6, is now 0 v, and that at the grid of the i-f amplifier, 6BA6, is now 0.3 v. The voltage at the first diode plate of the 6AV6 is —0.3 v. Capacitor 30, choke 8, and transformer 51A have been added, replacing section 51. Capacitor 23 has been deleted. The following changes should be made to the replacement parts list:

Ref. No.	*Prod. Part No.*	*Service Part No.*	*Description*
		Delete:	
23	1217848	1217848	Capacitor, chassis plate
51	7255881	7255881	Transformer, power (potted)
		Add:	
8	7258743	7258743	Choke
30	7257879	E-504	Capacitor, 0.5 μf, 100 v. tubular
51A	7258747	7258747	Transformer, power (unpotted)

Westinghouse H-190, H-191, H-191A H-220, Ch. V-2134

Model H-220 is similar to Models H-190, H-191, H-191A, Ch. V-2134 which appear on *pages 19-20 through 19-23 of Rider's Manual Volume XIX*. Model H-220 and late production of Model H-190 are identical, except that different record changers are used. In later production of Models H-190 and H-191 several changes were made. These changes, which are incorporated in all Model H-220 receivers, consist of a different dial-drive system, deletion of the 6BA6 1st i-f cathode resistor R3, and the addition of bypass capacitor C61 in the cathode circuit of the 6BA6 2nd i-f stage. The dial-drive drawing is shown in the accompanying figure.



Dial-drive connections for Westinghouse H-190, H-191, H-191A, and H-220.

All parts listed for Model H-190 in the replacement parts list in the manual, except the crystal cartridge and the phono needle, apply also to Model H-220. Additional parts for Model H-220 are listed below.

Part No.	*Description*
RCM30B222M	Capacitor, 2,200 μμf, mica, C61
V-8038	Crystal cartridge (for V-6313 changer)
V-8037	Needle, phono (for V-6313 changer)
V-1164-1	Cabinet (mahogany)
V-4898-1	Catch, bullet
V-3353-3	Slide mechanism (l. h.)
V-3353-4	Slide mechanism (r. h.)
V-4900-1	Strike, bullet catch
V-4965-3	Cable, phono input.

Westinghouse H-161, H-168, H-168A, H-168B

These models appear on *pages 18-6 through 19-32 of Rider's Manual Volume XVIII*. In production of some chassis, V-5596 "HI-KAP" capacitors are substituted for the following capacitors:

V-5040-15 (C7, C8, C9, C61, C62)
V-5040-11 (C19, C20, C63).

Westinghouse H-198, Ch. V-2137-2; H-199, Ch. V-2137-1; H-203, Ch. V-2137

Model H-198 appears on *pages 20-1 through 20-4 of Rider's Manual Volume XX*. Model H-199 appears on *pages 20-5 through 20-8 of the same Volume*, and Model H-203 appears on *pages 19-29 through 19-32 of Rider's Manual Volume XIX*.

In later production, a resistor was added and a capacitor deleted in order to minimize effects caused by production variances in the 6AV6 tubes. The resistor, 470,000 ohms, ¼ watt, was inserted in the lead between terminal #2 of the 1st 455-kc i-f transformer and the selector switch. The capacitor that was deleted had been connected between the avc line and ground. This capacitor is shown as C38 on the Model H-198 schematic and as C37 on the Models H-199 and H-203 schematics.

In case of oscillation and poor sensitivity on the f-m band, a check should be made to determine that the capacitor is not present in any chassis in which the resistor has been inserted. If both the resistor and capacitor are present, the capacitor should be removed and the receiver realigned.

Westinghouse H-203

This model appears on *pages 19-29 through 19-32 of Rider's Manual Volume XIX*. If bass response is objectionable, it can be decreased by changing C29 from 0.05 μf to 0.005 μf.

Westinghouse H-214, H214A, Ch. V-2103-3

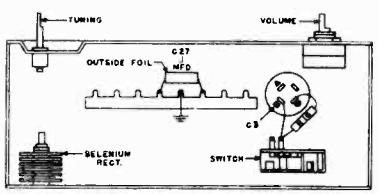
These models appear on *pages 20-9 through 20-11 of Rider's Manual Volume XX*. In order to prevent i-f oscillation, the green lead from the 1st i-f transformer to the 6SF7 grid should be dressed close to the chassis. The blue and green leads from the 2nd i-f transformer should be separated so far as possible.

As a heat precaution, all leads must be dressed well away from the ballast resistor R4.

Westinghouse H-303P4, H-304P4, Ch. V-2153

The chassis used in later production contains modifications that eliminate the possibility of burning out the filament of the 3V4 tube by inserting the a-c plug in position for battery operation with the on-off switch in off position. Sets that contain the modified chassis are identified by a warning label pasted on the inside of the back cover. The warning, which reads, "Always remove plug from wall socket before operating battery change-over switch," serves as a further precaution against damage. Sets that do not contain the revisions can be modified in the following manner:

1. Remove the chassis from the cabinet.
2. Refer to the accompanying figure, and remove enough components from their positions over C3 to permit ease in performing steps 3, 4, and 5.
3. Remove the 3 red B+ wires from the C3 section lug of the filter capacitor.
4. Solder the 3 wires together and apply tape to the joint until they are well insulated.
5. Connect a single red wire between C3 lug and the battery switch terminal to which R16 is connected. The wire should be the same type as the wires that were removed.
6. Connect a 0.1-μf, 200-v. capacitor (C27, RCP10W2104M) to the terminal board as shown in the figure.
7. Replace the components that were removed in step 2.



BOTTOM VIEW SHOWING WIRE REVISIONS

Westinghouse H-203, H-212

These models appear on *pages 19-29 through 19-32 of Rider's Manual Volume XIX*. The volume control is tapped at 50,000 ohms from ground rather than 450,000 ohms as shown on the schematic diagram.

In later production, a 33-ohm, ¼-watt resistor (RC10AE330K) was inserted in the lead from pin 7 of the 6BE6 oscillator-converter tube. The purpose of this resistor is to suppress parasitic oscillations that may develop when certain 6BE6 tubes are used.

In early sets, R35 in the cathode circuit of the 12AT7 FM r-f amplifier and mixer tube served as a form around which was wound the reactor, L21. For convenience in later production, the resistor was deleted from the circuit and the reactor was wound on other material. The part number, V-4886-10, shown in the parts list for this item applies to the later version which does not include the resistor, and R35 should be disregarded.

On some chassis, V-5596 "HI-KAP" capacitors are substituted for V-5040-13, C36 and C37, capacitors. These capacitors were substituted for convenience in production, and the operation of the receiver is not affected by the substitution.

Zenith 8H832, Ch. 8E20

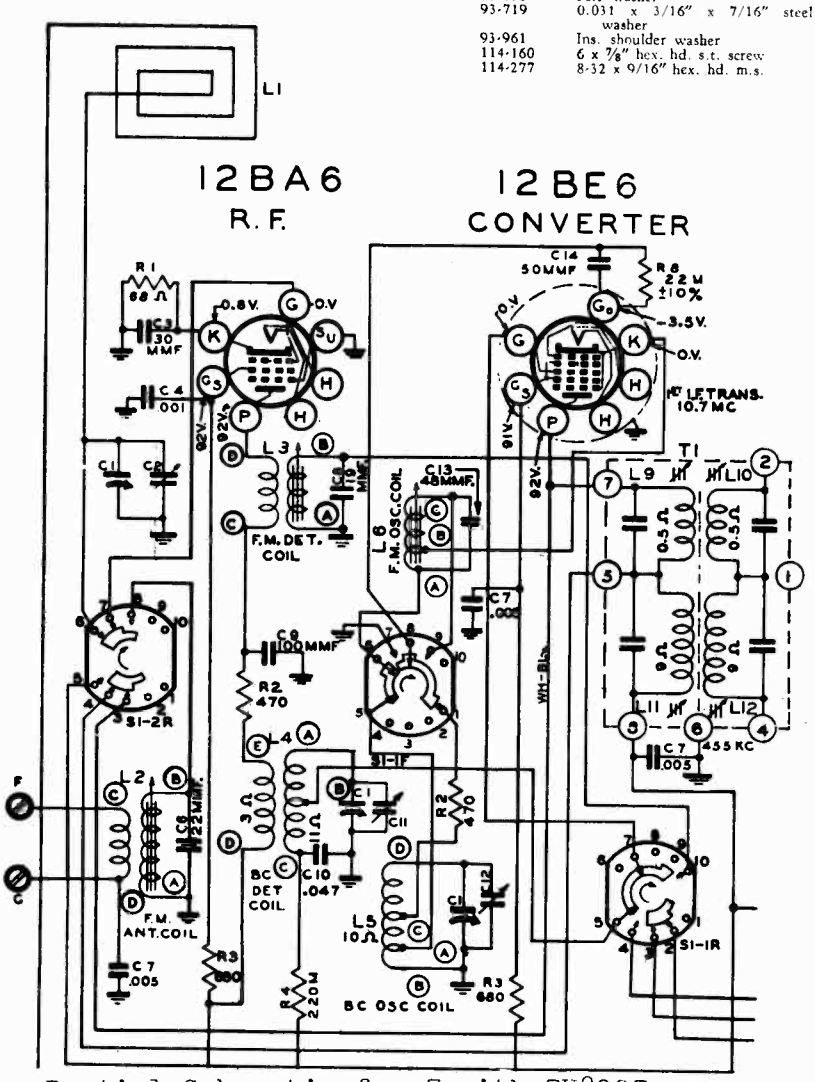
This chassis appears on *pages 19-16 through 19-21 of Rider's Manual Volume XIX*. If replacement of one of the speakers is required, care should be taken when connecting the new speaker in the circuit so that the speakers are properly phased. If the speakers are out of phase, all bass notes will be absent and distortion will be dominant. This condition can be corrected by reversing the voice coil wires on the newly replaced speaker.

Zenith 7H820Z, Ch. 7E01Z

Chassis 7E01Z is similar to Chassis 7E01 except that the 45-megacycle f-m band has been removed. The receiver now has the broadcast band and the 100-megacycle f-m band only. The new section is shown in the accompanying diagram. Balancing procedure is the same as for the 7E01.

The change in Parts List is given below:

Ref. No.	*Part No.*	*Description*
C30	22-1775	0.047 μf, 400 v
C10	22-1778	0.047 μf, 200 v
C19	22-1809	0.01 μf, 200 v
C25	22-1810	0.1 μf, 200 v
C24	22-1811	0.0047 μf, 400 v
C22	22-1813	0.22 μf, 600 v
C15	22-1814	0.0022 μf, 600 v
	58-128	Two-prong plug
	74-52	Plastic speaker screen
	83-1545	Insulating strip
	85-443	Bandswitch
	93-690	Felt washer
	93-719	0.031 x 3/16" x 7/16" steel washer
	93-961	Ins. shoulder washer
	114-160	6 x 7/8" hex. hd. s.t. screw
	114-277	8-32 x 9/16" hex. hd. m.s.



Partial Schematic for Zenith 7H820Z, showing elimination of 45Mc FM Band.

Zenith 5D811, Ch. 5E01

Model 5D811, Ch. 5E01, was erroneously listed in the Volume XX Index as 5D811, Ch. 5F01.

Zenith 5G003Z, Ch. 5C40Z

This model appears on *page 16-4 of Rider's Manual Volume XVI*, R2 is listed as 2,200 ohms. It should be listed as 220 ohms.

Zenith 7H820, Ch. 7E01

On some of the later run 7E01 chassis, the wax bypass capacitors were replaced with molded capacitors. Their part numbers are as follows:

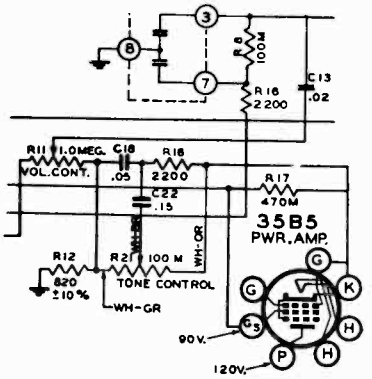
Ref. No.	*Part No.*	*Description*
C10	22-1778	Capacitor, 0.047 μf, 200 v, molded
C22	22-1750	Capacitor, 0.022 μf, 600 v, molded
C15	22-1754	Capacitor, 0.0022 μf, 600 v, molded
C19	22-1809	Capacitor, 0.01 μf, 200 v, molded
C24	22-1811	Capacitor, 0.0047 μf, 400 v, molded
C25	22-1810	Capacitor, 0.1μf, 200 v, molded.

Zenith 7H822Z, Ch. 7E02Z

Chassis 7E02Z is similar to the 7E02 which appears on *pages 18-21,22 through 18-25 of Rider's Manual Volume XVIII*. On the 7E02Z receiver a tone control has been added and a neon bulb on-off indicator. The accompanying figure shows the tone-control circuit. The following parts list shows the new components included in this receiver:

Part No.	*Description*
12-1546	Indicator socket brkt.
14-857	Model 822Z plastic cab.
22-1025	0.15 μf, 200 v, capacitor
22-1511	50 μμf, ceramic 500 v, capacitor
26-419	Dial scale
46-769	Tuning & vol. con. knob
46-770	Band-switch knob
46-780	Tone-control knob
46-781	Tone-control knob
63-1744	100 ohms, ins. resistor, 20%, ½ w
63-1884	220,000 ohms, ins. resistor, 20%, ½ w
63-2008	Tone control
78-585	Indicator socket
80-402	Dial cord tension spring
83-1593	Felt strip (2 used)
83-1595	Spacer strip
93-961	Ins. shoulder washer
100-105	Neon indicator bulb
199-35	Dial scale
202-687	Instruction book
S-15325	Cab. back & plug cover assy.

The 220,000-ohm resistor, R22, and the neon bulb on-off indicator have been inserted from pin 4 of the 35B5 power amplifier to ground.



Circuit changes for the Zenith 7H822Z, Chassis 7E02Z.

(Changer model number appears at top rear of changer pan and also on model label on underside of pan.)

NOTE

When servicing this Record changer, note that the Push-off, Velocity Trip, and Set-Down mechanisms function independently. One of these units may become inoperative without affecting the rest of the changer.

At time of publication, changer model label was being stamped with "RUN 4". See page 5.

OPERATING INSTRUCTIONS

This Admiral record changer will automatically play—

twelve of the 10-inch, 78 or 33 RPM records, or
ten of the 12-inch, 78 RPM records, or
twelve of the 12-inch, 33 RPM records, or
fourteen of the 7-inch, 45 RPM records, or
ten of the 7-inch, 33 RPM records.

Do not inter-mix these records.

SETTING RECORD SIZE SELECTOR KNOB: Turn this knob until it points to the size of record to be played.

SETTING SPEED CHANGE KNOB: Turn this knob until it points to the speed of the record to be played. "STD" indicates standard 78 RPM records.

SETTING PUSH-OFF ASSEMBLY: Pivot the Push-off assembly toward the centerpost to play 10-inch records and away from the centerpost to play 12-inch records. For 7-inch records, place the Push-off assembly in the 10-inch position and move the extension arm toward the centerpost.

LOADING AND STARTING: Place a stack of records over the centerpost so that they rest on the record support (64) and the centerpost offset. Records must be the same size and speed. If 10 or 12-inch records are being played, place the record clip on the stack.

The record changer is turned on by placing the function switch **on the radio,** in the "Phono" position.

REJECTING A RECORD: If the record changer will not trip into change cycle at the end of a record, or if you wish to stop playing a record and start playing the next one, merely move the reject knob to the "Rej" position.

STOPPING AND UNLOADING: Do not turn the record changer off during change cycle. Turn the phono motor off by turning the function switch (Radio-Phono) to the center position.

45 RPM ADAPTER: An adapter must be inserted into the center hole of the 45 RPM records in order to play them with this phonograph. A supply of these adapters is included with the set.

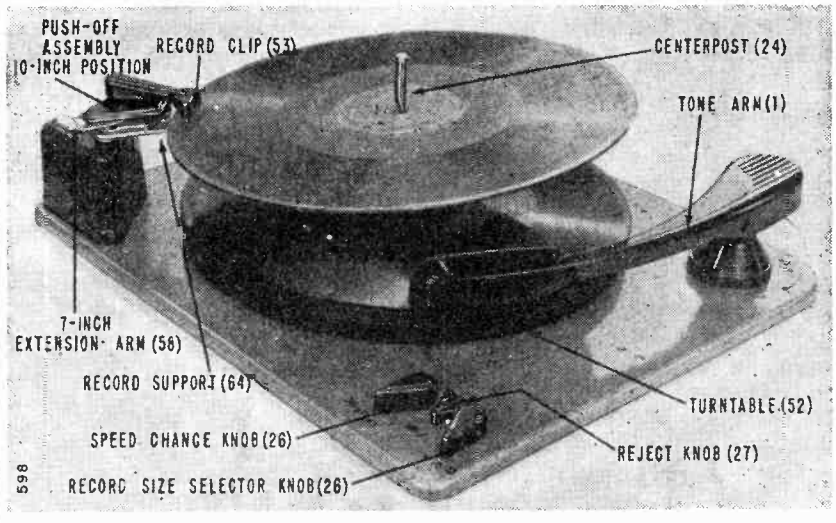
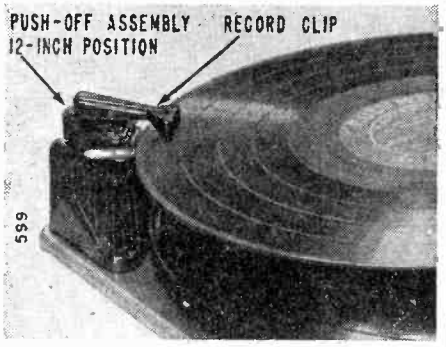
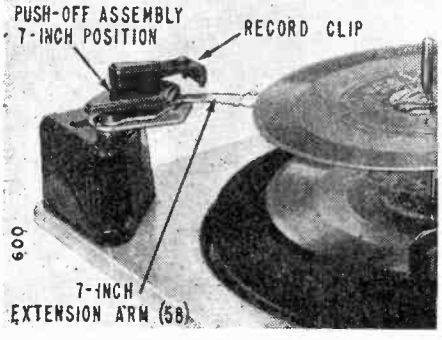


Figure 1. RC500 Record Changer, Top View.





MODEL RC500

CHANGE CYCLE

When following this change cycle, keep in mind that a velocity type trip is used, which depends upon a rapid movement of the tone arm toward the centerpost. Also, note that the Push-off, Trip, and Set-Down mechanisms function independently. Therefore, one of these units may become inoperative without affecting the rest of the changer.

If at all possible, we recommend that you carefully observe the change cycle of a record changer which is operating properly. It is a good idea to rotate the turntable by hand and repeat the change cycle until the function of each part is understood.

The changer operates as follows: The turntable is driven by the motor idler wheel (48), riding against its inside rim. The speed of the turntable is determined by the diameter of the drive shaft (either 78 RPM, 45 RPM, or 33 RPM) which rides against the idler wheel rubber tire (48).

The 78 RPM drive shaft is part of the motor armature. The 33 RPM drive shaft (44) and the 45 RPM drive shaft (45) are moved in and out of position mechanically by the speed change knob. See figure 3.

The changer mechanism is driven during its change cycle by the drive gear (30), which in turn is driven by the geared hub of the turntable. During normal record play, the "dead spot" on the drive gear is held next to the turntable hub by the gear indexing arm (41) and spring (39).

This changer employs a velocity trip, which consists primarily of two parts: the trip motion arm (32), and the gear engagement pawl (33). These parts are mounted near the "dead spot" on the drive gear. See Figure 2A.

During normal record play, the trip slider (36) is moved slowly by the stud on the arm control lever (23) which moves with the tone arm. The stud on the trip slider (36) rides against the trip motion arm (32), moving it very slightly. Since the gear engagement pawl (33) is held against the trip motion arm (32) by the trip friction washer (34), the gear engagement pawl (33) is also moved slightly toward the turntable hub. Since this movement is only slight, the vertical catch on the gear engagement pawl (33) is just touched and "kicked away" by the lug on the turntable hub. This occurs with each revolution of the turntable until the gear engagement pawl is moved in rapidly enough to be positioned in front of the lug before the next turntable cycle.

This rapid movement only occurs when the trip slider (36) is moved rapidly, by the tone arm, as the needle enters the trip grooves of the record. The gear engagement pawl (33) then moves in front of and engages the lug on the turntable hub. This causes the drive gear (30) to be rotated far enough so that the teeth on the drive gear will engage the teeth on the turntable hub, starting the change cycle. See figure 2B.

The changer can also be tripped by moving the reject knob to the "Rej" position. The stud on the end of the reject lever (88) moves the gear engagement pawl (33) into position to engage the lug on turntable hub.

As the drive gear begins to rotate, the control cam (90) also rotates, since both parts are mounted on the same shaft. See fig. 4. As the control cam rotates clockwise, roller (109) riding against the cam moves the drive link (107), which in turn rotates the control plate (102). As the control plate rotates, the incline tab (102A) rides across the tone arm lift rod (12), lifting the tone arm from the record. The stud on the arm control lever (23) then is engaged by the safety arm (105) (which rotates with the control plate), moving the tone arm away from the centerpost.

When the tone arm is almost clear of the record, the stud on the push-off link (84) (which is pivoted by the control cam), pivots the push-off arm (79) counter-clockwise. Since the push-off arm is held to the push-off plate and shaft (64) by two Allen screws, the push-off plate is also

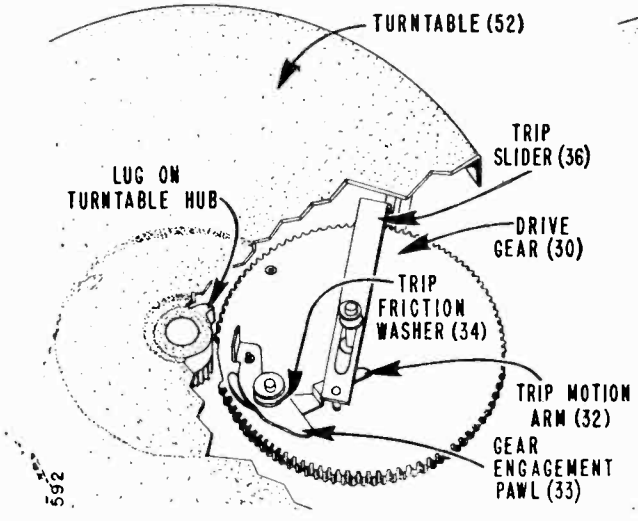


Figure 2A. Drive Gear Position Out of Change Cycle.

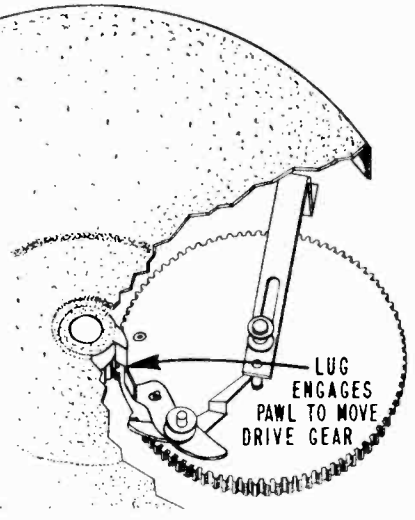


Figure 2B. Drive Gear Position During Change Cycle.

pivoted. Just before the control cam reaches half rotation, the tone arm will be positioned as far as possible from the centerpost, and the push-off plate (60) will "push-off" the record to the turntable.

As the control cam (90) rotates through the second half of the change cycle, the push-off plate is returned by the push-off arm return spring (78) and the remainder of the stack of records drops to the record support (64).

At the same time, the tone arm is returned by the set-down spring (98) which causes the set-down indexing stud on the size change plate (99) to ride against the indexing portion of the arm control lever (23).

The tone arm will move toward the record until the set-down indexing stud on the size change plate has reached the indexing point (end of cut-away section) on the arm control lever. After the arm stops moving inward, the lift rod will ride down the control plate incline (102A), and the tone arm will move toward the record.

Just before the tone arm touches the record, the safety arm engages the stud on the size change plate (99) and pivots it away from the arm control lever (23); releasing the tone arm.

The set-down point is determined by the position of the size change plate (99), which can be set for either 7-inch, 10-inch, or 12-inch set-down by the record size selector knob.

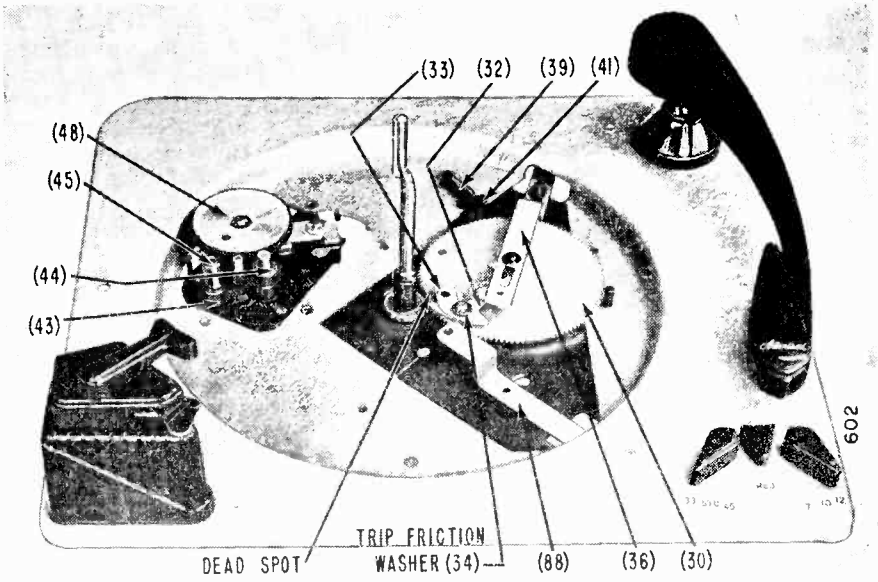


Fig. 3. RC500 Record Changer with Turntable Removed.

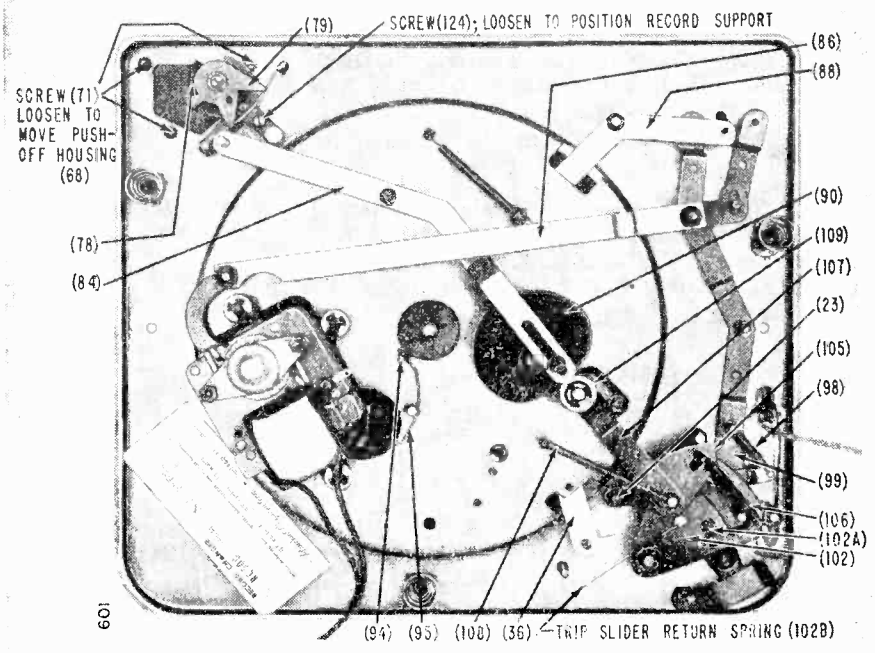


Fig. 4. RC500 Record Changer, Bottom View, Changer Out of Cycle.

MODEL RC500

ADJUSTMENTS

When making the following adjustments, keep in mind that the Push-off, Trip, and Set-Down mechanisms function independently. Therefore, one of these units may become inoperative without affecting the rest of the changer.

VELOCITY TRIP MECHANISM

This record changer uses a velocity type trip, which depends upon a rapid movement of the tone arm toward the centerpost in any area between 2 7/8" to 7/8" from the center of the record. **This trip requires no adjustment.** However, in order for the changer to trip properly, there must be sufficient friction between the trip motion arm (32) and the gear engagement pawl (33). If the friction is lost, a small amount of lubricant (such as lubriplate #110) should be placed between these parts. If this does not help, it may be necessary to replace the trip friction washer (34). See Figure 2A.

SET-DOWN ADJUSTMENT

Adjustment of the set-down point, is made by adjusting the set-down adjusting screw (6). See Figure 5. **The tone arm will automatically set-down properly on 7-inch or 12-inch records if the set-down adjustment is made properly on a 10-inch record.** The set-down adjusting screw is accessible through the hole in the right side of the tone arm. Turning this screw in moves the set-down point of the tone arm closer to the centerpost, and turning this screw out moves it away from the centerpost. Make this adjustment as follows:

1. Place the record size selector knob in the "10" position.
2. Push the reject knob to the reject position. Then start to rotate the turntable clockwise by hand.
3. As the change cycle is almost completed, and the tone arm just starts to move down towards the turntable, place a ruler against the centerpost and check the distance between the near side of the centerpost and the needle. This distance should be between 4 10/16" and 4 11/16".
4. If the 10-inch adjustment is correct, the needle should set down between 5 19/32" and 5 22/32" from the near side of the centerpost on 12-inch records, and between 3 1/4" to 3 5/32" on 7-inch records.

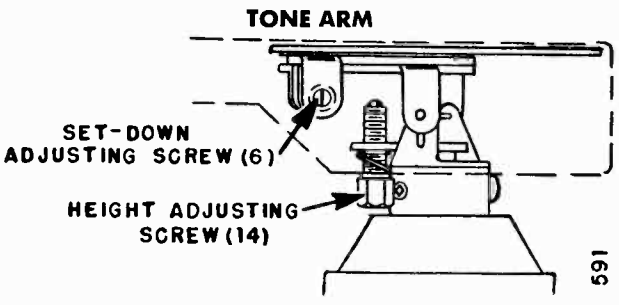


Figure 5. Set-Down and Height Adjustments.

ADJUSTING THE TONE ARM HEIGHT

This record changer is so designed that the tone arm will clear the bottom record of a stack to be played if the needle is 1/4" above the changer pan when the changer is not in change cycle and 1 3/8" above the turntable during change cycle. See Figure 6. With proper tone arm height setting, the tone arm will lift high enough during change cycle to clear a complete stack of records of any type on the turntable. This stack may consist of as many records as specified on page 1. Make this adjustment by placing the size selector knob in the "10" or "12" inch position, check the distance between the needle and the changer pan with the changer out of change cycle. If the needle is more than 1/4" above the pan, turn the lift adjusting screw (14, Figure 5) counterclockwise; if less, turn clockwise.

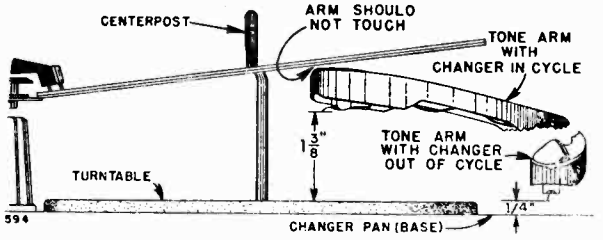


Figure 6. Checking Tone Arm Height.

POSITIONING RECORD SUPPORT (64)

If the record support is not positioned evenly under the bottom record of a stack to be played, one side of the record may drop to the turntable before the other. With the push-off assembly in the 10-inch position, place a 10-inch record over the upper portion of the centerpost so that the edge of the record fits against the edge of the record support (64). See figures 4 and 7. The contour of the record SHOULD follow the contour of the record support. If these contours do not match, position the push-off assembly as follows:

CAUTION: Be sure that the "testing" record has an even edge. For best results, try more than one record.

1. Loosen the screw (124) that holds the push-off positioning arm assembly (75) stationary.
2. Grip the push-off assembly and pivot it to the point where the edge of the record support "lines up" with the edge of the record.
3. Remove the record and tighten the screw (124).
4. Load the changer with a stack of 10-inch records, and "reject" the entire stack to the turntable. Check to see that all records drop to the turntable evenly.

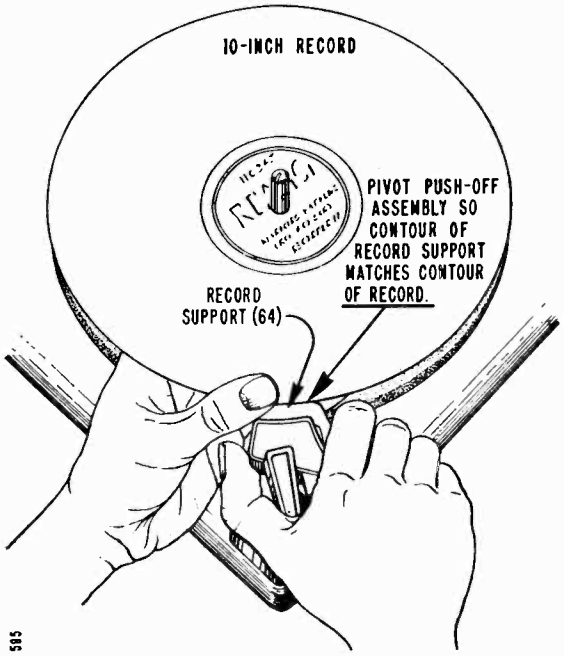


Figure 7. Positioning Record Support with 10-inch Record.

ADJUSTING DISTANCE BETWEEN RECORD SUPPORT (64) AND CENTERPOST (24)

If records do not push-off satisfactorily, or more than one record drops to the turntable during change cycle, it may be necessary to adjust the distance between the centerpost and the record support. See Figures 4 and 8. Make this adjustment as follows:

1. Place the push-off assembly in the 10-inch position.
2. Hold the centerpost as far away from the push-off assembly as possible.
3. Measure the distance from the edge of the record support (64) to the inside edge of the offset shelf on the centerpost. This distance should be between 4 29/32″ and 4 31/32″.
4. If it is necessary to adjust for this distance, loosen the three screws (71) holding the plastic push-off housing (68) to the changer pan. Then move the assembly until the specified distance is obtained.
5. Tighten the three screws, and recheck the distance. Place a stack of records (any size) on the changer, and "reject" each record in the stack to the turntable. Check to see that each record is pushed off satisfactorily. If one side of the record drops to the turntable before the other, it may be necessary to make the "Positioning Record Support (64)" adjustment.

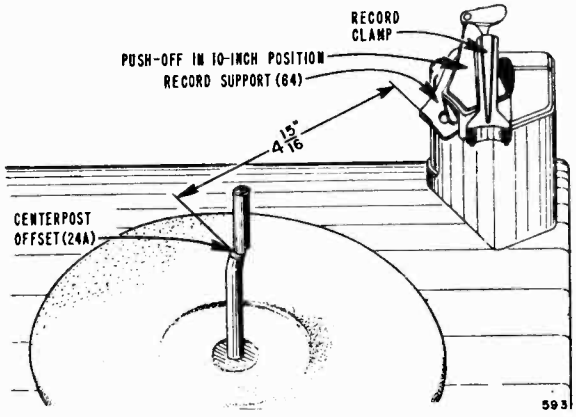


Figure 8. Checking Distance from Centerpost to Record Support.

SERVICE AND REPAIR

PRODUCTION CHANGES

Changer model label (on underside of changer pan) is stamped with run number corresponding to production changes.

RUN 1: Start of production.

RUN 2: Knob escutcheon (121) was added to changer. Speed change arm (89) and set-down change arm (96) were also changed so that knobs would line up with numbers on escutcheon. If wrong part for (89) or (96) is used, knob pointer will not correctly indicate changer set-down or speed. RUN 3: See (32), (36) in parts list. RUN 4: See (24).

LUBRICATION

DO NOT apply grease or oil to the trip slider (36). Also, under normal operating conditions, the motor should never require oiling.

Friction can sometimes be increased between the gear engagement pawl (33) and the trip motion arm (32), by placing a small amount of lubriplate #110 between these two parts. If a substitute lubricant is used, be sure that it is of equal viscosity (weight). See "Velocity Trip Mechanism" on page 4.

The rest of the changer should be lubricated with grease (such as lubriplate #107) whenever it comes into the shop for repair or adjustment. A good automobile chassis grease can be used for this purpose. All pivot and friction points should be greased.

The powdered iron roller (109) and oilite bearings (used in the turntable hub and tone arm base) may be lubricated with SAE No. 20 oil.

Care should be taken to prevent any of the lubricant from coming into contact with the idler wheel tire, the rubber drive belts, or any of the rubber grommets. Also be careful, when using oil, that an excess does not seep into the felt of the turntable.

REMOVING AND REPLACING TURNTABLE

To remove the turntable, first remove the turntable retaining clip (51). Be sure that the changer is not in change cycle, and then, grasp the turntable by its edges and lift up. Before replacing the turntable, make sure that the changer is not in change cycle. The pickup arm should be positioned away from the turntable. In replacing the turntable, force is not needed to seat it. Make certain, however, that the idler wheel of the motor has been pushed in towards the centerpost and that the idler wheel is making contact with the

inner side of the turntable flange. The idler wheel should be pushed in with a screwdriver or similar flat tool. Do NOT push toward the rear of the changer.

REPLACING CONTROL KNOBS (26 AND 27)

To remove the control knobs, place the blade of a screw driver between the knob and the retaining ring, directly under the knob, and pry up.

If it is difficult to remove the knobs without scratching the changer pan or the escutcheon (121), it may be necessary to use a flat ruler as a protector. Place the ruler next to the knob. Then insert a screw driver under the knob and pry up.

When re-installing the speed change knob, or the record size selector knob, place the blade of a screw driver between two halves of the knurled shaft and position the control in the center position. Be sure that the knobs lock into position. Line up the pointed end of the speed change knob with "STD", and the record size selector knob with "10", and then push the knobs straight down.

RECORD CHANGER TROUBLE SHOOTING

Changer Will Not Trip.
1. Check to see that the trip slider (36) moves freely.
2. Apply small amount of grease between the trip motion arm (32) and the gear engagement pawl (33). See "Trip Mechanism" on page 4.
3. Check tension on trip friction washer (34). If necessary, replace with new washer.
4. Check for grease or oil on trip slider.
5. Check for broken, loose, or misplaced trip slider return spring (102B, Figure 4). It may have slipped over the stud on the slider.

Changer Repeatedly Trips into Change Cycle.
1. Check tension of gear indexing spring (39).
2. Check for bent trip slider return spring (102B, Figure 4).
3. Check for bent trip slider (36).

Tone Arm Does Not Set-Down Properly.
1. Check set-down adjustment. See "Set-Down Adjustment" on page 4.
2. Check to see that the record size selector knob has locked into position.
3. Check for broken, weak, or missing control plate return spring (108).

***Tone Arm Skips Across Records.**
1. Check to see that the cabinet is level.
2. Check for worn needle.
3. Check height adjustment. See page 4.

Changer Causes Rumble or Noise.
1. BE SURE that the shipping screws (72) on each side of changer pan have been removed.
2. Check for any mechanical rub near the 3-speed motor.
3. Check for broken or missing float spring (74).

Records Do Not Push Off or More Than One Record Drops to the Turntable.
1. See "Adjusting Distance Between Record Support and Centerpost" on page 5.
2. Check for broken, missing, or weak push-off return spring (78). The push-off plate (60) may not be returning correctly.
3. Check to see that the push-off assembly is properly locked into position.
4. Check to see that no foreign material is between record support (64) and push-off plate (60).

Changer Trips Into Change Cycle Before Finishing Record.
1. Check for foreign material between trip motion arm (32) and gear engagement pawl (33).
2. Check for bent trip slider return spring (102B, Figure 4).
3. Check for bent trip slider (36).

Records Fall to Turntable Unevenly.
See "Positioning Record Support" on page 5.

Changer Stalls in Change Cycle.
1. Idler wheel (48) rubber tire may have foreign material on it. Try cleaning it with carbon tetrachloride solution.
2. Motor drive belts (43) may be slipping. If necessary, replace with a new belt.
3. Be sure push-off assembly is locked in position.

CAUTIONS

1. See that the rubber tire on the idler wheel (48), and both drive belts are kept clean from oil, grease, dirt or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts. When handling these parts, keep fingers and hands away from the driving surface. Natural body oils may cause slippage.
2. To avoid scratching changer pan or escutcheon, see discussion at top of page when replacing control knobs (26, 27).
3. Always move each control until it makes a definite stop and locks into position. Erratic action will result if this is not done.
4. Be sure that the shipping screws (72) on each side of the changer pan are removed. Noise will result from any mechanical vibration, and can be heard as a rumble in the speaker.

*IMPORTANT: If needle is type not held by knurled nut and does not follow 33 or 45 RPM grooves, bend needle tip at right angles to record, or replace. If trouble persists with either type cartridge, install parts (32) and (36). See parts list.

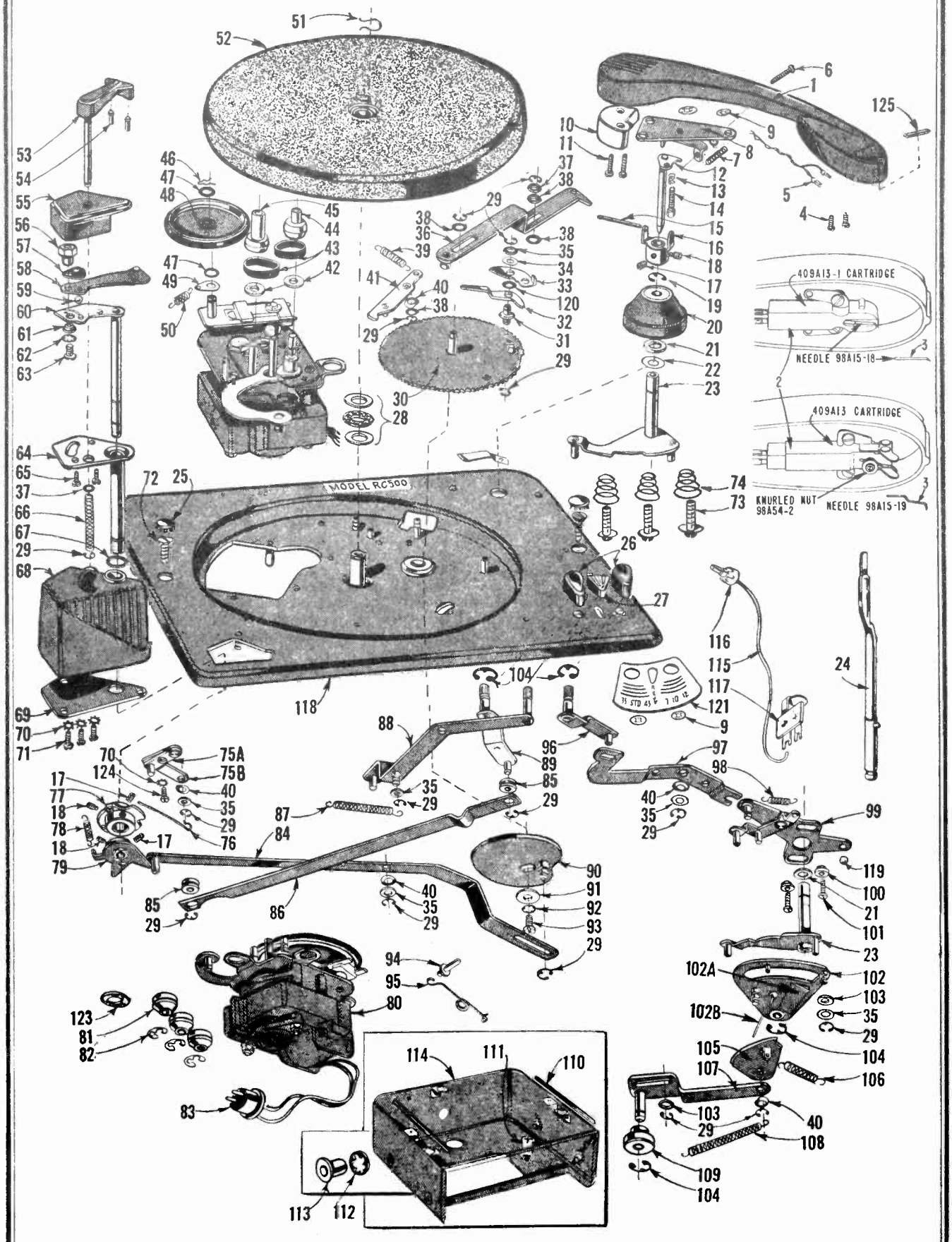


Figure 9. RC500 Record Changer, Exploded View.

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MODEL RC500

RC500 PARTS LIST

Ref. No.	Part No.	Description
1	∫403C51	Tone Arm (Maroon)
	⌊403C51 G	Tone Arm (Gold)
2	∫409A13-1	Pickup Cartridge with needle (push-in type)
	⌊409A13	Pickup Cartridge with needle and knurled nut
		Cartridges (with needle) are interchangeable
	98A54-2	Knurled Nut (for 409A13 Cartridge)
3	∫98A15-18	Needle for 409A13-1 Cartridge
	⌊98A15-19	Needle for 409A13 Cartridge
4	1A72-1-20	Cartridge Mtg. Screw Shakeproof type 25 (2 req.)
5	G400A529	Tone Arm Lead and Pin Jack Assembly
6	45-750-C2-47	Set-Down Adjusting Screw, #4-40x¾ BH MS
7	405A137	Set-Down Adjusting Lock Spring
8	G400A526	Tone Arm Mtg. and Pivot Plate Assembly
9	2B10-5-59	Speed Nut (4 req.)
10	404A31	Tone Arm Counterweight
11	1A70-6-20	Counterweight Retaining Screws, #4 x ⅜" (2 req.)
12	G400A520	Lift Rod and Plate Assembly
13	405A138	Lift Adjusting Spring
14	402A245	Lift Adjusting Screw
15	414A43	Pivot Shaft
16	G400A525	Tone Arm Support and Hub (includes set screws)
17	1A43-14	Allen Set Screw, #8-32x3/16" (3 req.)
18	402A247	Allen Set Screw, #8-32x¼" (3 req.)
19	401A355-3	Retaining Ring
20	∫403A52	Tone Arm Plastic Base (Maroon)
	⌊403A52 G	Tone Arm Plastic Base (Gold)
21	401A358	Spacer Washer
22	401A284	Bronze Washer (.316 x 15/32 x .005)
23	G400A542	Arm Control Lever and Shaft Assembly
‡24	∫G400B505	Centerpost (Run 3 or earlier; uses pin 94 and spring 95)
	⌊G400B505-1	Centerpost (Run 4 or later; uses retaining ring 401A355-3)
	401A355-3	Retaining ring, for G400B505-1 centerpost
25	13A2-8-57	Snap-in Buttons
26	∫403A54	Speed Change or Record Size Selector Knob (Maroon)
	⌊403A54 G	Speed Change or Record Size Selector Knob (Gold)
27	∫403A55	Reject Knob (Maroon)
	⌊403A55 G	Reject Knob (Gold)
28	415A11	Thrust Bearing
29	401A355-1	Retaining Ring
30	G400A532	Drive Gear and Stud Assembly
31	402A229	Trip Pivot Stud
32	98A15-22	Trip Motion Arm (Supplied with Trip Slider (36). Replace both parts.)
33	401A352	Gear Engagement Pawl
34	401A353	Trip Friction Washer
35	4B1-68-47	Washer
36	98A15-22	Trip Slider (Supplied with Trip Motion Arm (32). Replace both parts.)
37	4B1-67-47	Washer (.196 x 5/16 x 1/32)
38	4B2-178-0	Washer (.196 x ⅜ x 1/64)
39	405A134	Gear Indexing Spring
40	405A22	Spring Washer
41	G400A549	Gear Indexing Arm and Stud Assembly
42	98A15-9	Oil Retaining Felt Washer (2 req.)
43	406A20	Drive Belt (2 req.)
44	98A15-11	45 RPM Drive Shaft (60 cycles)
45	98A15-10	33 RPM Drive Shaft (60 cycles)
46	405A15	Idler Wheel Retaining Clip
47	412A30	Fibre Washer (2 req.)
48	G400A279	Idler Wheel Assembly
49	98A15-21	Idler Wheel Tie Lug
50	98A15-20	Idler Wheel Spring
51	414A36	Turntable Retaining Clip
52	G400B507	Turntable
53	∫G400A511	Record Clamp and Shaft and Rubber Tips (Maroon)
	⌊G400A511 G	Record Clamp and Shaft and Rubber Tips (Gold)
54	406A25	Record Clamp Rubber Tip (2 req.)
55	∫403B53	Push-off Plastic Cap (Maroon)
	⌊403B53 G	Push-off Plastic Cap (Gold)
56	402A249	Push-off Plate Nut
57	401A326	7" Record Support Detent Spring
58	G400A510	7" Record Support
59	415A28-1	Ball Bearing (⅛" diameter)
60	G400A509	Push-off Plate and Shaft Assembly
61	402A250	Spacer Washer
62	3B1-23-47	Lockwasher #4 I.T.
63	45-312-C2-47	Screw, #4x5/16 BH MS
64	G400A508	Record Support and Tube Assembly
65	1A72-2-20	Screw, Shakeproof type 25 (# 4 x 5/16")
66	405A136	Record Clamp Spring
67	4B1-158-47	Washer (.390 x 9/10 x 1/32)
68	403C50	Plastic Push-off Housing
69	401A346	Housing Bottom Plate
70	3B1-3-47	Lockwasher, # 6 E. T.
71	1A68-13-20	Plastiscrew, # 6 x 5/8 R.H.
72	103-1250-F2-57	"Hold Down" Screw, #10-32 x 1¼" (for shipping only)
73	AA210	Mounting Screw and Washer (table models only)
74	405A139	Float Spring (3 req.)
75	G400A565	Push-off Positioning Arm Assembly
76	414A40	Push-off Indexing Spring
77	G400A514	Push-off Index Plate and Hub Assembly
78	405A133	Push-off Return Spring
79	G400A517	Push-off Arm and Hub Assembly
80	*407B19	*3-Speed Motor Complete, 60 cycle, 117 volts
81	406A19	Motor Mounting Grommet (3 req.)
82	401A355-4	Motor Mtg. Retaining Ring (3 req.)
83	88A8-1	Phono Motor Plug
84	G400A562	Push-off Link and Stud Assembly
85	406A24	Speed Change Link Grommets (2 req.)
86	401A322	Speed Change Link
87	405A135	Reject Return Spring
88	G400A551	Reject Arm and Stud Assembly
†89	∫G400A567	Speed Change Arm (Run 2 or later)
	⌊G400A553	Speed Change Arm (Run 1)
90	G400A548	Control Cam and Stud Assembly
91	401A145	Control Cam Washer
92	3B1-26-47	Lockwasher, # 8 I.T.
93	85-375-C2-47	Screw, # 8/32 x ⅜" BH MS
94	402A228	Centerpost Retaining Pin ⌊Use only with early
95	414A42	Centerpost Lock Spring ∫centerpost (24)
†96	∫G400A568	Set-Down Change Arm (Run 2 or later)
	⌊G400A545	Set-Down Change Arm (Run 1)
97	401A332	Set-Down Change Link
98	405A130	Set-Down Spring
99	G400A546	Set-Down Change Plate and Arm Assembly
100	402A238	Spacer
101	1A70-11-20	Plastiscrew, # 6 x 7/16"
102	G400A537	Control Plate Assembly
103	401A173	Washer
104	401A355-2	Retaining Ring
105	401A345	Safety Arm
106	405A131	Safety Spring
107	G400A538	Drive Link and Stud Assembly
108	405A132	Control Plate Return Spring
109	415A27	Drive Link Roller
110	403A38-1	Plastic Trim (2 req.)
111	32A88	Antenna Lead Suppart
112	2B10-10-59	Speed Nut (4 req.)
113	27A24	Bottom Cover Bushing (4 req.)
114		Bottom cover
115	413A11-1	Shielded Cable (includes plug, 5")
116	R8A2-3	Plug (for lead-in cable)
117	10B1-18	Terminal Board
118		Changer Pan
119	415A28-2	Ball Bearing (5/32 diameter)
120	412A36	Fibre Washer (.196 x ⅜" x .005)
‡121	∫403B57	Escutcheon (Maroon) ⌊ Not on early sets.
	⌊403B57 G	Escutcheon (Gold) ∫ See Run 2 on page 5
122	4B1-19-47	Washer (.125 x ¼ x 1/32 Steel)
123	412A38	Motor Mounting Washer
124	65-187-C2-47	Screw, #6-32 x 3/16"
125	414A45	Tone Arm Weight

PARTS FOR CONVERTING 407B19 MOTOR TO 50 CYCLE

45 RPM Drive Shaft (50 cycles)	98A15-15
78 RPM Drive Shaft Spring (50 cycles)	405A113
33 RPM Drive Shaft (50 cycles)	405A112

*407B19 motor is not used on "Canadian Admiral" changers. For Canadian Admiral replacement motors order: ∫60 cycle, 105 to 125 volts 407X19-60; ⌊25 cycle, 105 to 125 volts 407X19-25

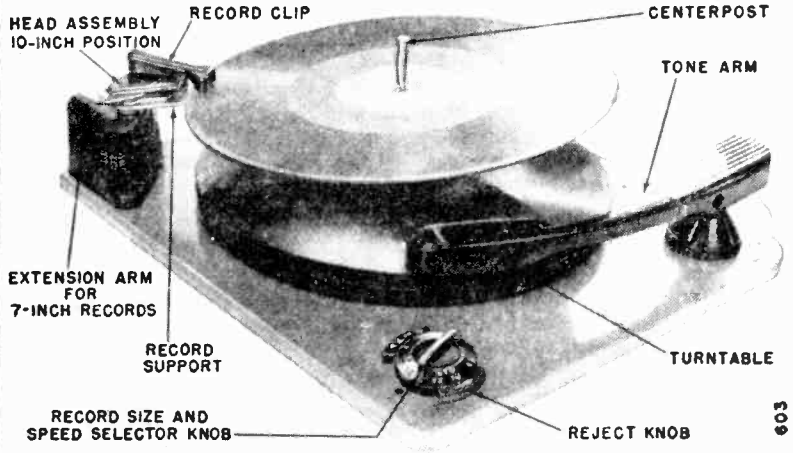
‡Run number is stamped on changer model label (on underside of changer).

†If wrong part is used, knob pointer will not correctly indicate changer set-down or speed. See "RUN 2" on page 5, and ‡ footnote above.

Changer model number appears at top rear of changer pan and also on model label on underside of pan. Except for a few early changers, the changer model labels are stamped with run numbers (RUN 1, RUN 2, etc.) corresponding to production changes.

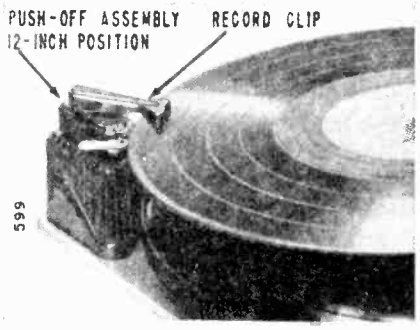
RC500 Record Changers (covered in Service Manual No. S298) and RC550 Record Changers are identical except for the control knobs, associated arms and links, and a few minor parts (such as washers, screws, etc.). Note that the position of the selector cam (89) determines both speed and set-down in RC550 changers.

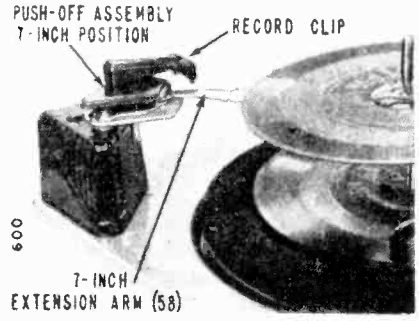
When servicing this Record Changer, note that the Push-off, Velocity Trip, and Set-Down mechanisms function independently. One of these units may become inoperative without affecting the other two.



Head Assembly Set for Playing 10-inch Records.

Figure 1. RC550 Record Changer, Top View.





OPERATING INSTRUCTIONS

This Admiral record changer will automatically play—

twelve of the 10-inch, 78 or 33 RPM records, or
ten of the 12-inch, 78 RPM records, or
twelve of the 12-inch, 33 RPM records, or
fourteen of the 7-inch, 45 RPM records, or
ten of the 7-inch, 33 RPM records.

Do not inter-mix these records.

SETTING THE SIZE AND SPEED SELECTOR KNOB: The available record sizes (7, 10, 12) are engraved under the three different speeds (33, STD, 45) on this knob. Rotate the knob until the size of record to be played (under the proper speed), lines up with the indicating dot on the changer pan. (Note that no size number is engraved under "45" since only 7-inch 45 RPM records are available.)

SETTING PUSH-OFF ASSEMBLY: Pivot the Push-off assembly toward the centerpost to play 10-inch records and away from the centerpost to play 12-inch records. For 7-inch records, place the Push-off assembly in the 10-inch position and move the extension arm toward the centerpost.

LOADING AND STARTING: Place a stack of records over the centerpost so that they rest on the record support (64) and the centerpost offset. Records must be the same size and speed. If 10 or 12-inch records are being played, place the record clip on the stack.

The record changer is turned on by placing the function switch **on the radio,** in the "Phone" position.

REJECTING A RECORD: If the record changer will not trip into change cycle at the end of a record, or if you wish to stop playing a record and start playing the next one, merely rotate the reject knob to the left momentarily.

STOPPING AND UNLOADING: Do not turn the record changer off during change cycle. Turn the phono motor off by turning the function switch **on the radio** to the center position.

45 RPM ADAPTER: An adapter must be inserted into the center hole of the 45 RPM records in order to play them with this changer. A supply of these adapters is included with the set.

MODEL RC550

CHANGE CYCLE

When following this change cycle, keep in mind that a velocity type trip is used, which depends upon a rapid movement of the tone arm toward the centerpost. Also, note that the Push-off, Trip, and Set-Down mechanisms function independently. One of these units may become inoperative without affecting the other two.

If at all possible, we recommend that you carefully observe the change cycle of a record changer which is operating properly. It is a good idea to rotate the turntable by hand and repeat the change cycle until the function of each part is understood.

The changer operates as follows: The turntable is driven by the motor idler wheel (48), riding against its inside rim. The speed of the turntable is determined by the diameter of the drive shaft (either 78 RPM, 45 RPM, or 33 RPM) which rides against the idler wheel rubber tire (48).

The 78 RPM drive shaft is part of the motor armature. The 33 RPM drive shaft (44) and the 45 RPM drive shaft (45) are moved in and out of position mechanically by the motor shift link (84), which is controlled by the selector cam (89). See figure 4.

The changer mechanism is driven during its change cycle by the drive gear (30), which in turn is driven by the geared hub of the turntable. During normal record play, the "dead spot" on the drive gear is held next to the turntable hub by the gear indexing arm (41) and spring (39).

This changer employs a velocity trip, which consists primarily of two parts: the trip motion arm (32), and the gear engagement pawl (33). These parts are mounted near the "dead spot" on the drive gear. See Figure 2A.

During normal record play, the trip slider (36) is moved slowly by the stud on the arm control lever (23) which moves with the tone arm. The stud on the trip slider (36) rides against the trip motion arm (32), moving it very slightly. Since the gear engagement pawl (33) is held against the trip motion arm (32) by the trip friction washer (34), the gear engagement pawl (33) is also moved slightly toward the turntable hub. Since this movement is only slight, the vertical catch on the gear engagement pawl (33) is just touched and "kicked away" by the lug on the turntable hub. This occurs with each revolution of the turntable until the gear engagement pawl is moved in rapidly enough to be positioned in front of the lug before the next turntable cycle.

This rapid movement only occurs when the trip slider (36) is moved rapidly, by the tone arm, as the needle enters the trip grooves of the record. The gear engagement pawl (33) then moves in front of and engages the lug on the turntable hub. This causes the drive gear (30) to be rotated far enough so that the teeth on the drive gear will engage the teeth on the turntable hub, starting the change cycle. See figure 2B.

The changer can also be tripped by rotating the reject knob to the left momentarily. The stud on the end of the reject arm (88) moves the gear engagement pawl (33) into position to engage the lug on turntable hub.

As the drive gear begins to rotate, the control cam (90) also rotates, since both parts are mounted on the same shaft. See fig. 4. As the control cam rotates clockwise, drive link roller (109) riding against the cam moves the drive link (107), which in turn rotates the control plate (102). As the control plate rotates, the incline tab (102A) rides across the tone arm lift rod (12), lifting the tone arm from the record. The stud on the arm control lever (23) then is engaged by the safety arm (105) (which rotates with the control plate), moving the tone arm away from the centerpost.

When the tone arm is almost clear of the record, the stud on the push-off link (86) (which is pivoted by the control cam), pivots the push-off arm (79) counterclockwise. Since the push-off arm is held to the push-off plate and shaft (60) by two Allen screws, the push-off plate is also

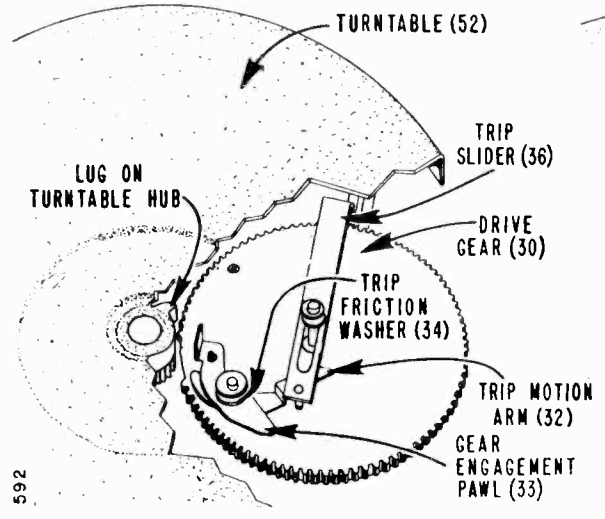


Figure 2A. Drive Gear Position Out of Change Cycle.

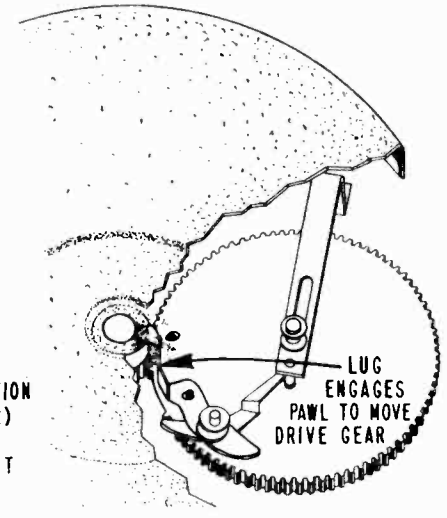


Figure 2B. Drive Gear Position During Change Cycle.

pivoted. Just before the control cam reaches half rotation, the tone arm will be positioned as far as possible from the centerpost, and the push-off plate (60) will "push-off" the record to the turntable.

As the control cam (90) rotates through the second half of the change cycle, the push-off plate is returned by the push-off arm return spring (78) and the remainder of the stack of records drops to the record support (64). See figure 1.

At the same time, the tone arm is returned by the set-down spring (98) which causes the set-down indexing stud on the size change plate (99) to ride against the indexing portion of the arm control lever (23).

The tone arm will move toward the record until the set-down indexing stud on the size change plate has reached the indexing point (end of cut-away section) on the arm control lever. After the arm stops moving inward, the lift rod will ride down the control plate incline (102A), and the tone arm will move toward the record.

Just before the tone arm touches the record, the safety arm engages the stud on the set-down change plate (99) and pivots it away from the arm control lever (23); releasing the tone arm.

The set-down point is determined by the position of the set-down change plate (99), which can be set for either 7-inch, 10-inch, or 12-inch set-down by the set-down change lever (97) which is controlled by the selector cam (89).

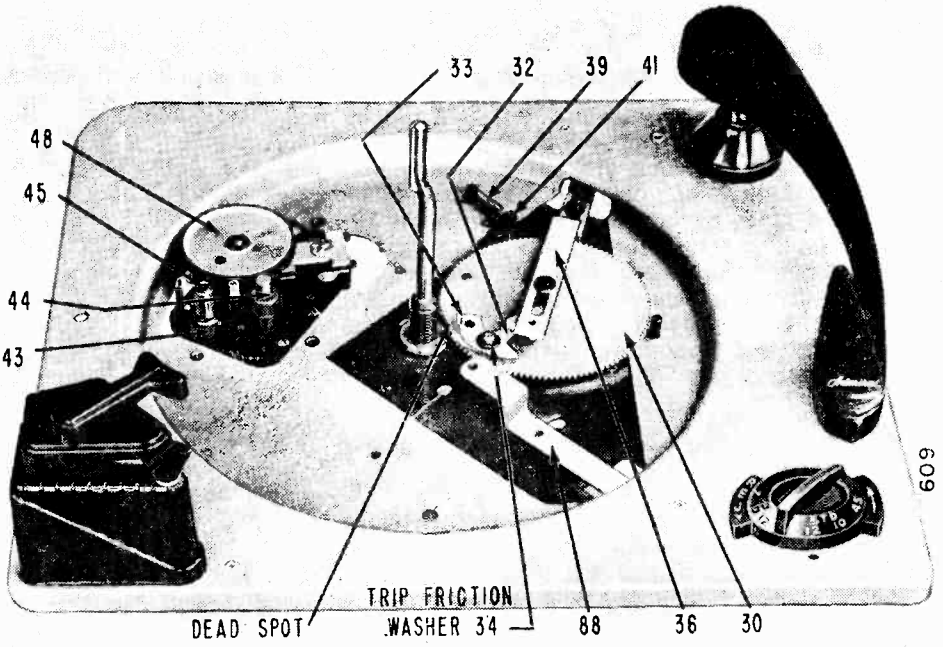


Fig. 3. RC550 Record Changer with Turntable Removed.

For Individual parts detail, see Figure 9, "RC550 Record Changer, Exploded View."

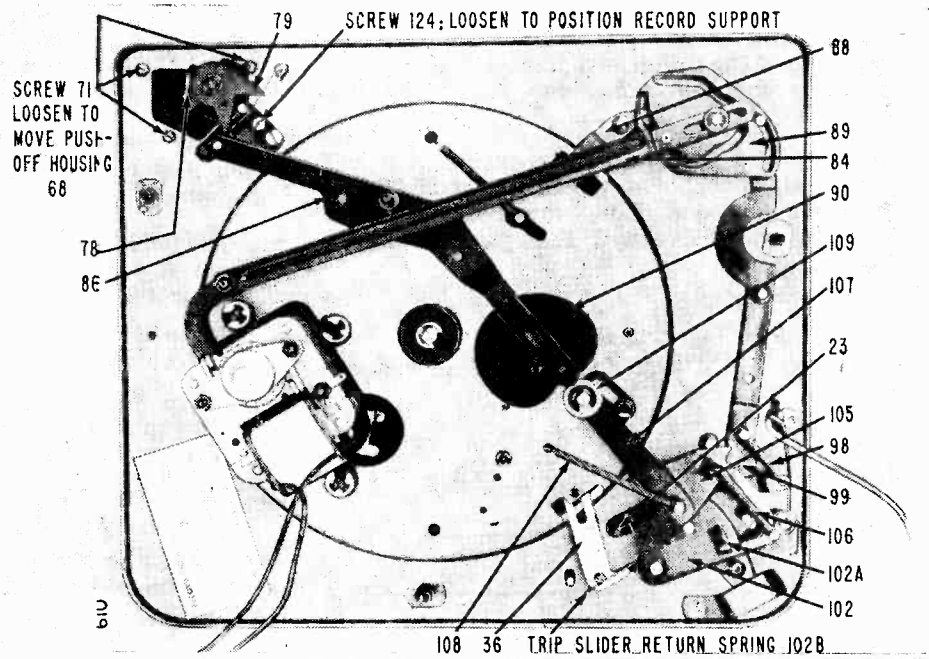


Fig. 4. RC550 Record Changer, Bottom View, Changer Out of Cycle.

MODEL RC550

ADJUSTMENTS

When making the following adjustments, keep in mind that the Push-off, Trip, and Set-Down mechanisms function independently. One of these units may become inoperative without affecting the other two.

VELOCITY TRIP MECHANISM

This record changer uses a velocity type trip, which depends upon a rapid movement of the tone arm toward the centerpost in any area between 2 7/8" to 7/8" from the center of the record. **This trip requires no adjustment.** However, in order for the changer to trip properly, there must be sufficient friction between the trip motion arm (32) and the gear engagement pawl (33). If the friction is lost, a small amount of lubricant (such as lubriplate #110) should be placed between these parts. If this does not help, it may be necessary to replace the trip friction washer (34). See Figure 2A.

SET-DOWN ADJUSTMENT

Adjustment of the set-down point, is made by adjusting the set-down adjusting screw (6). See Figure 5. **The tone arm will automatically set-down properly on 7-inch or 12-inch records if the set-down adjustment is made properly on a 10-inch record.** The set-down adjusting screw is accessible through the hole in the right side of the tone arm. Turning this screw in moves the set-down point of the tone arm closer to the centerpost, and turning this screw out moves it away from the centerpost. Make this adjustment as follows:

1. Place the size and speed selector knob (26) in the "78-10" position.
2. Rotate the reject knob to the left momentarily. Then start to rotate the turntable clockwise by hand.
3. As the change cycle is almost completed, and the tone arm just starts to move down towards the turntable, place a ruler against the centerpost and check the distance between the near side of the centerpost and the needle. This distance should be between 4 10/16" and 4 11/16".
4. If the 10-inch adjustment is correct, the needle should set-down between 5 19/32" and 5 22/32" from the near side of the centerpost on 12-inch records, and between 3 1/4" to 3 5/32" on 7-inch records.

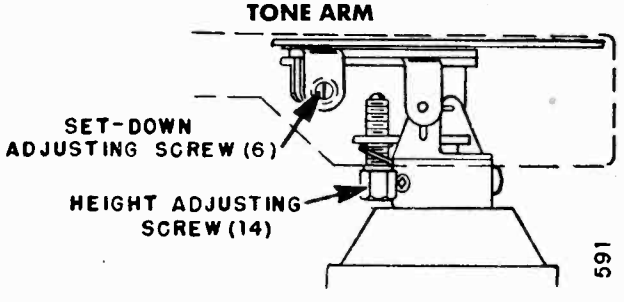


Figure 5. Set-Down and Height Adjustments.

ADJUSTING THE TONE ARM HEIGHT

This record changer is so designed that the tone arm will clear the bottom record of a stack to be played if the needle is 1/4" above the changer pan when the changer is not in change cycle and 1 3/8" above the turntable during change cycle. See Figure 6. With proper tone arm height setting, the tone arm will lift high enough during change cycle to clear a complete stack of records of any type on the turntable. This stack may consist of as many records as specified on page 1. Make this adjustment by placing the size and speed selector knob (26) in the "78-10" position, check the distance between the needle and the changer pan with the changer out of change cycle. If the needle is more than 1/4" above the pan, turn the lift adjustment screw (14, Figure 5) counterclockwise; if less, turn clockwise.

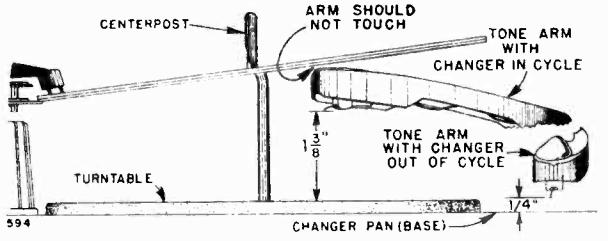


Figure 6. Checking Tone Arm Height.

POSITIONING RECORD SUPPORT (64)

If the record support is not positioned evenly under the bottom record of a stack to be played, one side of the record may drop to the turntable before the other. With the push-off assembly in the 10-inch position, place a 10-inch record over the upper portion of the centerpost so that the edge of the record fits against the edge of the record support (64). See figures 4 and 7. The contour of the record SHOULD follow the contour of the record support. If these contours do not match, position the push-off assembly as follows:

CAUTION: Be sure that the "testing" record has an even edge. For best results, try more than one record.

1. Loosen the screw (124) that holds the push-off positioning arm assembly (75) stationary.
2. Grip the push-off assembly and pivot it to the point where the edge of the record support "lines up" with the edge of the record.
3. Remove the record and tighten the screw (124).
4. Load the changer with a stack of 10-inch records, and "reject" the entire stack to the turntable. Check to see that all records drop to the turntable evenly.

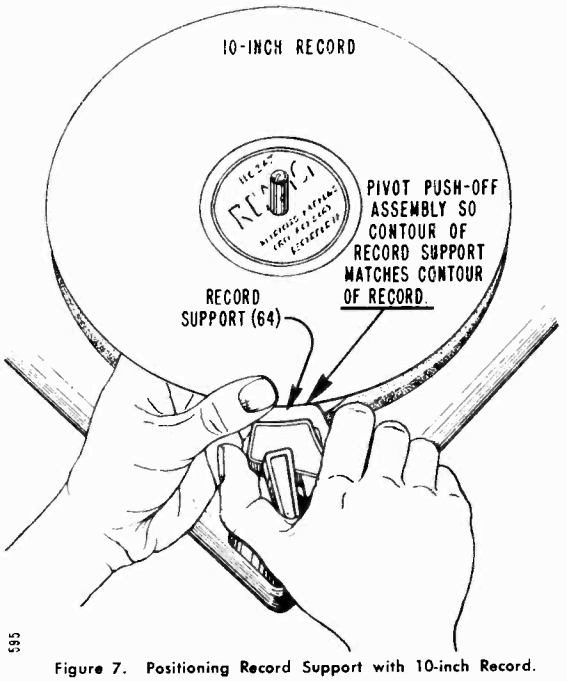


Figure 7. Positioning Record Support with 10-inch Record.

ADJUSTING DISTANCE BETWEEN RECORD SUPPORT (64) AND CENTERPOST (24)

If records do not push-off satisfactorily, or more than one record drops to the turntable during change cycle, it may be necessary to adjust the distance between the centerpost and the record support. See Figures 4 and 8. Make this adjustment as follows:

1. Place the push-off assembly in the 10-inch position.
2. Hold the centerpost as far away from the push-off assembly as possible.
3. Measure the distance from the edge of the record support (64) to the inside edge of the offset shelf on the centerpost. This distance should be between 4 29/32" and 4 31/32".
4. If it is necessary to adjust for this distance, loosen the three screws (71) holding the plastic push-off housing (68) to the changer pan. Then move the assembly until the specified distance is obtained.
5. Tighten the three screws, and recheck the distance. Place a stack of records (any size) on the changer, and "reject" each record in the stack to the turntable. Check to see that each record is pushed off satisfactorily. If one side of the record drops to the turntable before the other, it may be necessary to make the "Positioning Record Support (64)" adjustment.

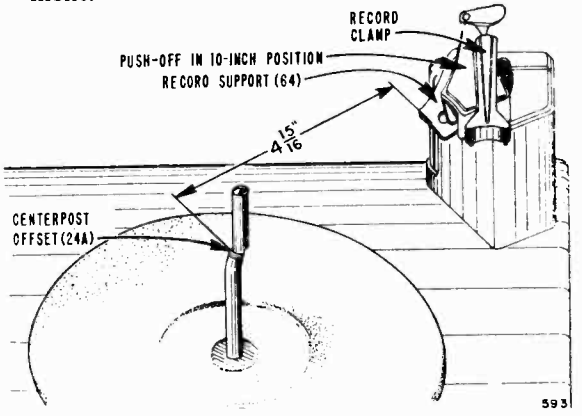


Figure 8. Checking Distance from Centerpost to Record Support.

SERVICE AND REPAIR

When reshipping Changer, be sure to place the Size and Speed Selector Knob in the "78-10" position.

LUBRICATION

DO NOT apply grease or oil to the trip slider (36). Also, under normal operating conditions, the motor should never require oiling.

Friction can sometimes be increased between the gear engagement pawl (33) and the trip motion arm (32), by placing a small amount of Lubriplate #110 between these two parts. Ordinary Vaseline can generally be used as a substitute for Lubriplate #110.

The rest of the changer should be lubricated with grease (such as Lubriplate #107) whenever it comes into the shop for repair or adjustment. A good automobile chassis grease can be used for this purpose. All pivot and friction points should be greased.

The powdered iron roller (109) and oilite bearings (used in the turntable hub and tone arm base) may be lubricated with SAE No. 20 oil.

Care should be taken to prevent any of the lubricant from coming into contact with the idler wheel tire, the rubber drive belts, or any of the rubber grommets. Also be careful, when using oil, that an excess does not seep into the felt of the turntable.

REMOVING AND REPLACING TURNTABLE

To remove the turntable, first remove the turntable retaining clip (51). Be sure that the changer is not in change cycle, and then, grasp the turntable by its edges and lift up. Before replacing the turntable, make sure that the changer is not in change cycle. The pickup arm should be positioned away from the turntable. In replacing the turntable, force is not needed to seat it. Make certain, however, that the idler wheel of the motor has been pushed in towards the centerpost and that the idler wheel is making contact with the inner side of the turntable flange. The idler wheel should be pushed in with a screwdriver or similar flat tool. Do NOT push toward the rear of the changer.

REPLACING SELECTOR CAM (89)

When replacing the selector cam (89), place the size and speed selector knob (26) so "STD-10" lines up with the indicating dot, hold the selector cam in the position shown in Figure 4, and install.

REPLACING CONTROL CAM (90)

Before replacing the control cam (90), be sure that the changer is out of change cycle. Place the control cam in the position shown in Figure 4, and install.

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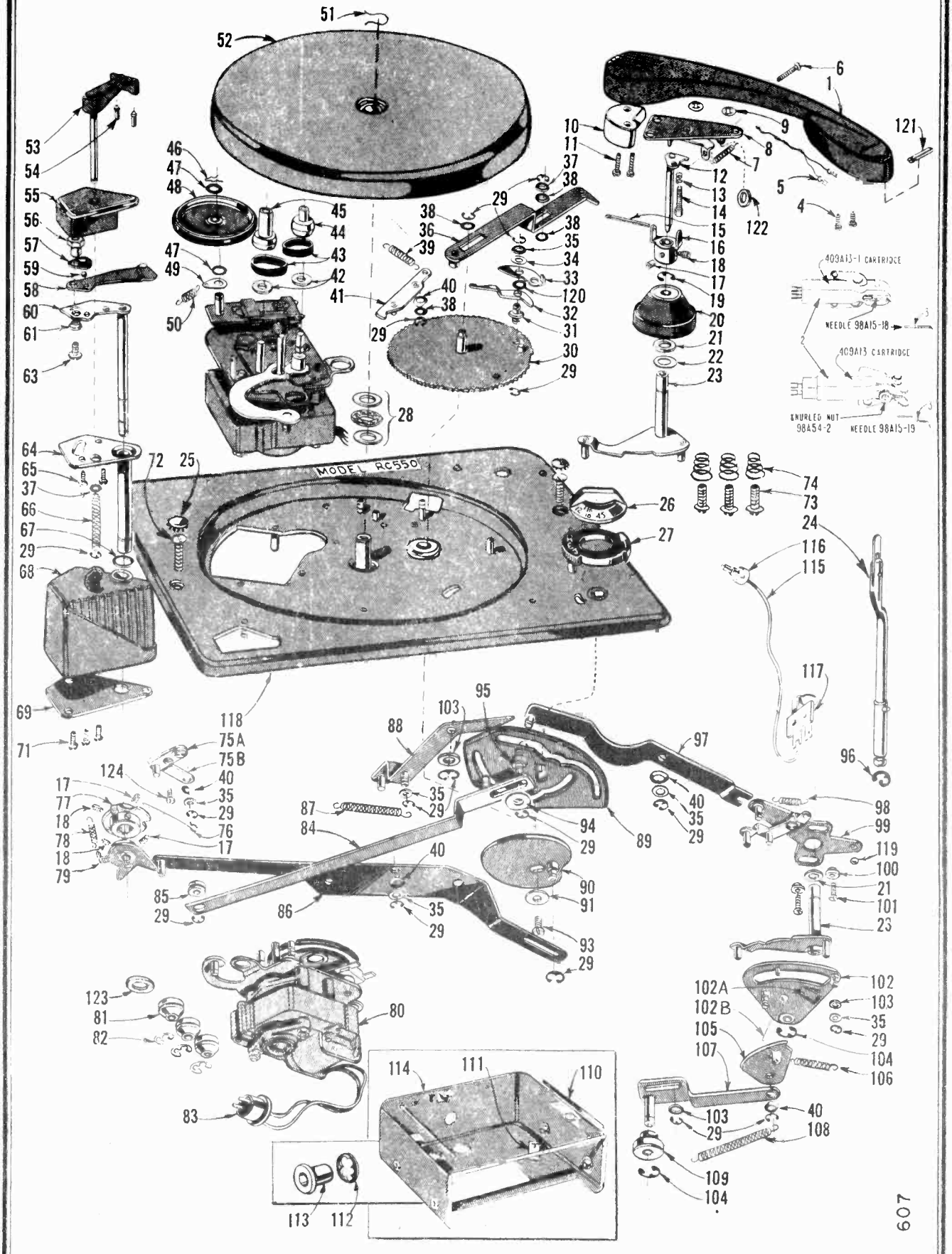

Figure 9. RC550 Record Changer, Exploded View.

REPLACING THE PUSH-OFF INDEX PLATE (77)

Position the push-off index plate (77) as shown in figure 10. Be sure that the Allen screw which is called out "falls into" the milled slot.

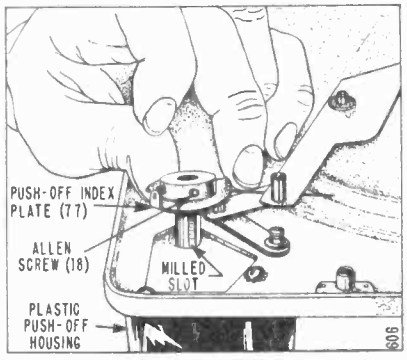

Figure 10. Installing Push-Off Index Plate.

REPLACING THE PUSH-OFF ARM (79)

Place push-off arm (79) over the push-off shaft so that the Allen screw which is called out below fits against the "flat section" of shaft.

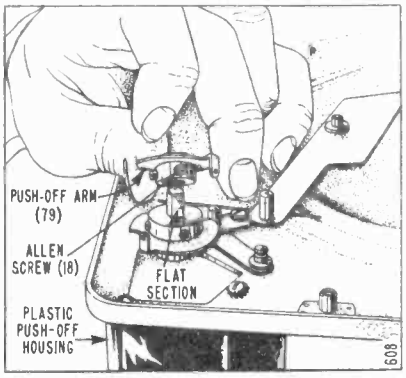

Figure 11. Installing Push-Off Arm.

RECORD CHANGER TROUBLE SHOOTING

Changer Will Not Trip.

1. Check to see that the trip slider (36) moves freely.
2. Apply small amount of grease between the trip motion arm (32) and the gear engagement pawl (33). See "Velocity Trip Mechanism" on page 4.
3. Check tension on trip friction washer (34). If necessary, replace with new washer.
4. Check for grease or oil on trip slider.
5. Check for broken, loose, or misplaced trip slider return spring (102B, Figure 4). It may have slipped over the stud on the slider.

Changer Repeatedly Trips into Change Cycle.

1. Check tension of gear indexing spring (39).
2. Check for bent trip slider return spring (102B, Figure 4).
3. Check for bent trip slider (36).

Tone Arm Does Not Set-Down Properly.

1. Check set-down adjustment. See "Set-Down Adjustment" on page 4.
2. Check to see that size and speed selector knob (26) has locked into position.
3. Check for broken, weak, or missing control plate return spring (108).

Tone Arm Skips Across Records.

1. Check to see that the cabinet is level.
2. Check for worn needle.
3. Check height adjustment. See page 4.

Changer Causes Rumble or Noise.

1. BE SURE that the shipping screws (72) on each side of changer pan have been removed.
2. Check for any mechanical rub near the 3-speed motor.
3. Check for broken float spring (74).

Records Do Not Push Off or More Than One Record Drops to the Turntable.

1. See "Adjusting Distance Between Record Support and Centerpost" on page 5.
2. Check for broken, missing, or weak push-off return spring (78). The push-off plate (60) may not be returning correctly.
3. Check to see that the push-off assembly is properly locked into position.
4. Check to see that no foreign material is between record support (64) and push-off plate (60).

Changer Trips Into Change Cycle Before Finishing Record.

1. Check for foreign material between trip motion arm (32) and engagement pawl (33).
2. Check for bent trip slider return spring (102B, Figure 4).
3. Check for bent trip slider (36).

Records Fall to Turntable Unevenly.

See "Positioning Record Support" on page 4.

Changer Stalls in Change Cycle.

1. Idler wheel (48) rubber tire may have foreign material on it. Try cleaning it with carbon tetrachloride solution.
2. Motor drive belts (43) may be slipping. If necessary, replace with new belts.
3. Be sure push-off assembly locks in position.

CAUTIONS

1. See that the rubber tire on the idler wheel (48), and both drive belts are kept clean from oil, grease, dirt or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts. When handling these parts, keep fingers and hands away from the driving surface. Natural body oils may cause slippage.
2. Always move the size and speed selector knob (26) control until it makes a definite stop and locks into position. Erratic action will result if this is not done.
3. Be sure that the shipping screws (72) on each side of the changer pan are removed. Noise will result from any mechanical vibration, resulting in a rumble in the speaker.

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RC550 PARTS LIST

Ref. No.	Part No.	Description
1	403C51	Tone Arm (Maroon)
	403C51 G	Tone Arm (Gold)
2	409A13-1	Pickup Cartridge with needle (push-in type)
	409A13	Pickup Cartridge with needle and knurled nut
		Cartridges (with needle) are interchangeable
	98A54-2	Knurled Nut (for 409A13 Cartridge)
3	98A15-18	Needle for 409A13-1 Cartridge
	98A15-19	Needle for 409A13 Cartridge
4	1A72-1-20	Cartridge Mtg. Screw Shakeproof type 25 (2 req.)
5	G400A529	Tone Arm Lead and Pin Jack Assembly
6	45-750-C2-47	Set-Down Adjusting Screw, #4-40x¾ BH MS
7	405A137	Set-Down Adjusting Lock Spring
8	G400A526	Tone Arm Mtg. and Pivot Plate Assembly
9	2B10-5-59	Speed Nut (2 req.)
10	404A31	Tone Arm Counterweight
11	1A70-6-20	Counterweight Retaining Screws, #4 x ⅜" (2 req.)
12	G400A520	Lift Rod and Plate Assembly
13	405A120	Lift Adjusting Spring
14	402A245	Lift Adjusting Screw
15	414A43	Pivot Shaft
16	G400A525	Tone Arm Support and Hub (includes set screws)
17	1A43-14	Allen Set Screw, #8-32x3/16" (3 req.)
18	402A247	Allen Set Screw, #8-32x¼" (3 req.)
19	401A355-3	Retaining Ring
20	403A52	Tone Arm Plastic Base (Maroon)
	403A52 G	Tone Arm Plastic Base (Gold)
21	401A358	Spacer Washer
22	401A284	Bronze Washer (.316 x 15/32 x .005)
23	G400A542	Arm Control Lever and Shaft Assembly
24	G400B505-1	Centerpast
25	13A2-8-57	Snap-in Buttons
26	403A59	Size and Speed Selector Knob (Maroon)
	403A59G	Size and Speed Selector Knob (Gold)
27	G400A582	Reject Knob (Maroon)
	G400A582G	Reject Knob (God)
28	415A11	Thrust Bearing
29	401A355-1	Retaining Ring
30	G400A532	Drive Gear and Stud Assembly
31	402A229	Trip Pivot Stud
32	401A351-1	Trip Motion Arm
33	401A352	Gear Engagement Pawl
34	401A353	Trip Friction Washer
35	4B1-68-47	Washer (5 req.)
36	G400A575	Trip Slider
37	4B1-67-47	Washer (.196 x 5/16 x 1/32)
38	4B2-178-0	Washer (.196 x ⅜ x 1/64)
39	405A134	Gear Indexing Spring
40	405A22	Spring Washer
41	G400A549	Gear Indexing Arm and Stud Assembly
42	98A15-9	Oil Retaining Felt Washer (2 req.)
43	406A20	Drive Belt (2 req.)
44	98A15-11	45 RPM Drive Shaft (60 cycles)
45	98A15-10	33 RPM Drive Shaft (60 cycles)
46	405A15	Idler Wheel Retaining Clip
47	412A30	Fibre Washer (2 req.)
48	G400A279	Idler Wheel Assembly
49	98A15-21	Idler Wheel Tie Lug
50	98A15-20	Idler Wheel Spring
51	414A36	Turntable Retaining Clip
52	G400B507	Turntable
53	G400A511	Record Clamp and Shaft and Rubber Tips (Maroon)
	G400A511 G	Record Clamp and Shaft and Rubber Tips (Gold)
54	406A25	Record Clamp Rubber Tip (2 req.)
55	403B53	Push-off Plastic Cap (Maroon)
	403B53 G	Push-off Plastic Cap (Gold)
56	402A249	Push-off Plate Nut
57	401A326	7" Record Support Detent Spring
58	G400A510	7" Record Support
59	415A28-1	Ball Bearing (⅛" diameter)
60	G400A509	Push-off Plate and Shaft Assembly

Ref. No.	Part No.	Description
61	402A250	Spacer Washer
63	402A262	Screw, #4-40x5/16 BH MS (includes lockwasher)
64	G400A508	Record Support and Tube Assembly
65	1A72-2-20	Screw, Shakeproof type 25 (# 4 x 5/16")
66	405A136	Record Clamp Spring
67	4B1-158-47	Washer (.390 x 9/10 x 1/32)
68	403C50	Push-off Housing (Maroon)
	403C50G	Push-off Housing (Gold)
69	401A346	Housing Bottom Plate
71	402A263	Plastiscrew, #6x5/8 R.H. (includes lock washer)
72	402A258	"Hold Down" Screw, #10-32 x 1¼" (for shipping only)
73	AA210	Mounting Screw and Washer (table models only)
74	405A139	Float Spring (3 req.)
75	G400A565	Push-off Positioning Arm Assembly
76	414A40	Push-off Indexing Spring
77	G400A514	Push-off Index Plate and Hub Assembly
		See "Replacing The Push-Off Index Plote (77)" on page 8.
78	405A133	Push-off Return Spring
79	G400A517	Push-off Arm and Hub Assembly (includes Allen screw)
		See "Replacing The Push-Off Arm (79)" on page 8.
80	*407B19	*3-Speed Motor Complete, 60 cycle, 117 volts
81	406A19	Motor Mounting Grammet (3 req.)
82	401A355-4	Motor Mtg. Retaining Ring (3 req.)
83	88A8-1	Phono Motor Plug
84	G400A580	Motor Shift Link (includes rubber grommet)
85	406A24	Speed Change Link Grommet
86	G400A562	Push-off Link and Stud Assembly
87	405A140	Reject Return Spring
88	G400A581	Reject Arm and Stud Assembly
89	401B365	Selector Cam (When replacing, see "Replacing Selector Cam (89)" on page 5.)
90	G400A548	Control Cam and Stud Assembly
		See "Replacing Control Cam (90)" on page 5.
91	401A145	Control Cam Washer
93	402A265	Screw, #8/32x⅜" BH (includes lock washer)
94	4B1-78-47	Washer (.196x½x1/6)
95	402A254	Selector Cam Stud
96	401A355-3	Centerpost Retaining Ring
97	G400A579	Set-Down Change Lever
98	405A130	Set-Down Spring
99	G400A546	Set-Down Change Plate and Arm Assembly
100	402A238	Spacer
101	1A70-11-20	Plastiscrew, # 6 x 7/16"
102	G400A537	Control Plate Assembly
103	401A173	Washer
104	401A355-2	Retaining Ring
105	401A345	Sofety Arm
106	405A131	Safety Spring
107	G400A538	Drive Link and Stud Assembly
108	405A132	Control Plate Return Spring
109	415A27	Drive Link Roller
110	403A38-1	Plastic Trim (2 req.)
111	32A88	Antenna Lead Support
112	2B10-10-59	Speed Nut (4 req.)
113	27A24	Bottom Cover Bushing (4 req.)
114		Bottom cover
115	413A11-1	Shielded Cable (includes plug, 15")
116	88A2-3	Plug (for lead-in cable)
117	10B1-18	Terminal Board
118		Changer Pan
119	415A28-2	Ball Bearing (5/32 diometer)
120	412A36	Fibre Washer (.196 x ⅜" x .005)
121	414A45	Tone Arm Weight
122	4B1-19-47	Washer (.125 x ¼ x 1/32 Steel)
123	412A38	Motor Mounting Washer
124	402A264	Screw, #6-32 x 3/16" BH

PARTS FOR CONVERTING 407B19 MOTOR TO 50 CYCLE

45 RPM Drive Shaft (50 cycles)	98A15-15
78 RPM Drive Shaft Spring (50 cycles)	405A113
33 RPM Drive Shaft Spring (50 cycles)	405A112

*407B19 motor is nat used on "Canadian Admiral" changers. For Canadian Admiral replacement motors order:

60 cycle, 105 ta 125 volts	407X19-60
25 cycle, 105 to 125 volts	407X19-25

GENERAL

This single post and single tone arm record changer is designed for dual speed operation (33⅓ or 78 revolutions per minute) from a power source of 110 volts at 60 cycles. It will play the Standard Groove or Microgroove type records for these speeds, a single record at a time or a series of twelve 10-inch or ten 12-inch records. *Note: Never stack together the Standard and Microgroove records intermixed for automatic operation* as playing of each type record requires special attention to the pickup discussed below.

The tone arm is designed to use either of two pickup heads which are interchanged by a plug arrangement at the end of the tone arm. The pickup heads are finished in color for identification. The TAN head is used to play Standard Groove records while the RED colored head is for Microgroove reproduction. *Always use the TAN head with Standard Groove records and the RED head with Microgroove records.* Use of the wrong head is certain to result in damage to records and pickup stylus.

RECORD PLAYER OPERATION

TO PLAY STANDARD RECORDS (78 RPM) 10-INCH OR 12-INCH—Rotate speed change switch to Std Play and plug the standard pickup cartridge (tan) into the pickup arm. The record player may then be operated manually or automatically, as outlined below, for either 10-inch or 12-inch records.

TO PLAY LONG PLAYING (MICROGROOVE 33⅓ RPM) RECORDS 10-INCH OR 12-INCH—Rotate the speed change switch to Long Play and plug the microgroove pickup (red) into the pickup arm. The record player may then be operated manually or automatically as outlined below for either 10-inch or 12-inch records.

TO PLAY 33⅓ RPM STANDARD GROOVE RECORDS—Rotate the speed change switch to Long Play and plug the standard pickup cartridge (tan) into the pickup arm. The record player may then be operated manually or automatically as outlined below for either 10-inch or 12-inch records.

CAUTION—To avoid damage to the pickup stylus and to the record surfaces, do not allow the standard pickup cartridge to be used on the microgroove records. Do not drop the pickup arm onto the record.

To prevent depressions, which cause "WOW" and poor reproduction, from forming in the rubber drive wheel always return the speed change knob to the neutral or center position.

MANUAL OPERATION

Raise the *hinged shelf* for 10-inch records and the *hold-down arm* into a vertical position. Slip the record down over the *spindle* onto the turntable. Turn the record mechanism *control knob* to the MANUAL position. This will start the turntable rotating. Gently lower the tone arm on the first groove of the record. When the record is through playing, return the tone arm by hand to its rest position. Stop turntable rotation by turning *control knob* to OFF position. When through playing phonograph, turn the Phono-Radio control to its OFF position.

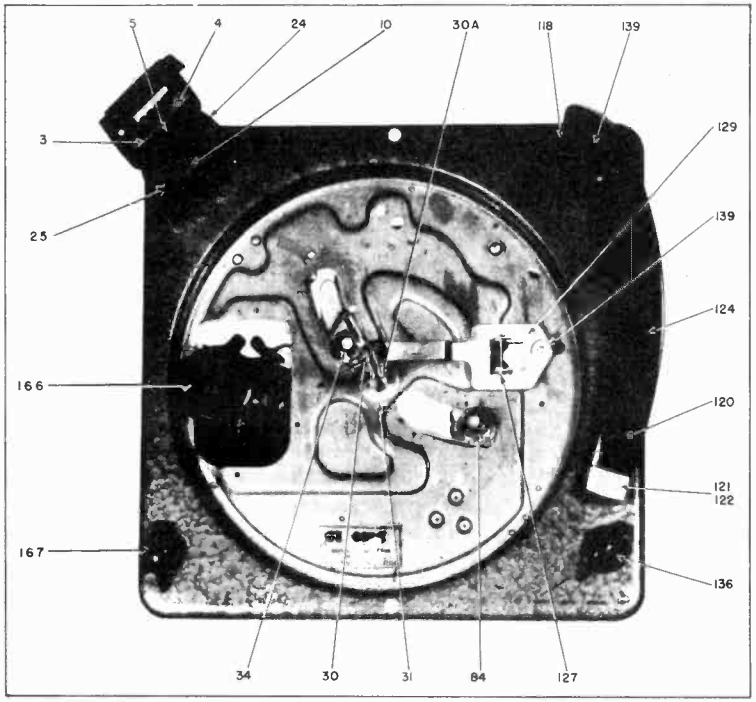


Fig. 1. Top View of Record Changer

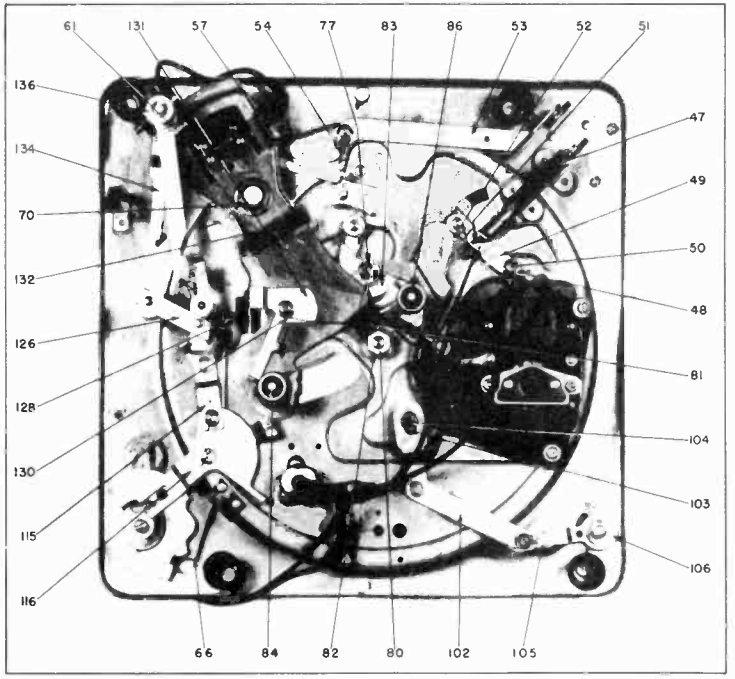


Fig. 2. Bottom View

AUTOMATIC OPERATION

Before placing records on the changer make sure the tone arm is placed on its rest. The *hold-down arm* should be in a vertical position to permit stacking of records. If 10-inch records are to be played, lower *hinged shelf* for 10-inch records to horizontal position. For 12-inch records raise the *hinged shelf* for 10-inch records into a vertical position, and rest the records on the *shelf* for 12-inch records. Place stack not to exceed twelve 10-inch or ten 12-inch records over *spindle* supported in the center on the record shelf of spindle, and at one side by the shelf for 10-inch or 12-inch records as the case may be. Place the *hold-down arm* to rest on the top record of the stack to be played. This steadies the records and assures correct dropping of records. Do not intermix 10-inch and 12-inch records.

Turn the phono *control knob* to REJECT position and release it. The changer will now play the entire stack and repeat the last record. To shut off phonograph before or after all records are played, turn *control knob* to OFF and lift tone arm and move it out to the rest position.

If you wish to reject a record before it has finished playing, turn the *control knob* to REJECT and release it. The changer will reject the record and then continue to play the remainder of the stack.

Before removing records, it is advisable to drop all unplayed records onto turntable by repeatedly turning *control knob* to REJECT position. After last record has dropped down on turntable, lift the tone arm and place it on its rest while the turntable and records are rotating. Turn *control knob* to OFF position. Raise *hold-down arm* and *shelf* for 10-inch records into vertical position. Lift records from turntable. If through operating the phonograph, turn the Phono-Radio control to OFF position.

PICKUP CARTRIDGE

The Model P13 record changer is equipped with two pickup arm cartridge heads, each containing a General Electric Variable Reluctance Cartridge incorporating a replaceable stylus assembly. The "TAN" colored head is plugged into the end of the pickup arm to play wide groove records known as the Standard type. The "RED" colored head is similarly inserted into the arm when using the Long Playing Microgroove records.

SERVICE—The stylus assemblies may be removed readily from the cartridge for replacement. Instructions for replacement are supplied with each new Replaceable Stylus Assembly catalogued in the replacement parts lists on the last page of this publication.

To insure optimum performance from the cartridge, its stylus, magnetic pole pieces, and gaps should be cleaned periodically of foreign particles accumulated from the record surfaces. A soft bristle brush similar to Cat. No. RQB-001 should be used to clean these parts. The gap clearance between stylus and each of its pole pieces has been adjusted to be not less than .011 inch. Care should be taken not to disturb this adjustment during service adjustment or cleaning.

OPERATING PRECAUTIONS

1. Do not, under any circumstances, connect the motor to a source of direct current or to alternating current other than that specified by the label.

2. Do not allow oil or grease to come in contact with the rubber tired friction drive wheels (166) or the Velocity Trip Arm friction washers, part of item (134).

3. Never use force to start or stop the motor, or any part of the record changer mechanism.

4. Do not intermix Microgroove records with the Standard Groove type.

5. Make certain the correct pickup head is used to play the desired records. The TAN head (121) is for Standard Groove recordings, while the RED head (122) is used to reproduce Microgroove recordings.

6. Always make certain that the Speed Control is set to the proper speed position as required for the type of record.

7. Use only records in good condition for automatic operation. For warped, odd size, or home recorded records, play as for manual operation.

8. Do not store the records upon the record post and spindle or on the turntable as they may warp, especially if the temperature is high.

9. When through operating the record changer, make certain the Speed Control (167) is returned to the "OFF" position. This prevents a damaging flat surface upon the rubber tired drive wheels otherwise developed as the motor drive shaft bears pressure upon them when the record changer remains idle for long periods engaged in either of the speed positions.

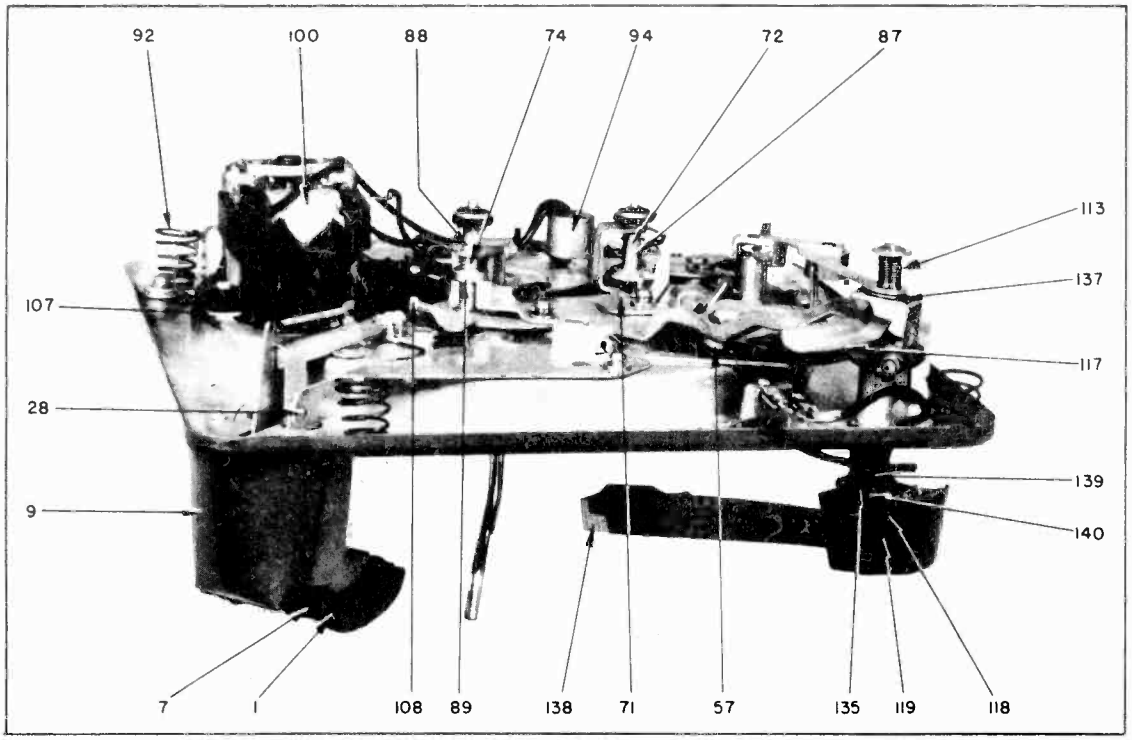


Fig. 3. Bottom View

CYCLE OF AUTOMATIC OPERATION

The following titled paragraphs describe in sequence each action of the record changer mechanism through the automatic cycle of operation.

INITIATING THE CHANGE CYCLE—Rotate the control knob (136) to auto position. This action closes switch and starts motor which turns the turntable. Rotating the control button to reject causes reject control link lever (115) to strike velocity trip lever (126) whose trip dog trips lead pin drop lever (131) from under swing plate lead pin (34). The lead pin (34) is pushed upward by compression spring (87) and engages the spiral on bottom side of turntable. As the turntable rotates, the spiral moves the lead roller (34) towards the center spindle, causing the swing arm (132) to rotate on its pivot.

PICKUP ARM MOVEMENT—The swing plate assembly (132) operates the pickup arm lift pin, thus raising and lowering the pickup arm. The swing plate assembly (132) also engages the velocity trip arm (134) through the swing plate friction spring (61), causing the pickup arm to move into its proper position in the change of cycle. The brake spring (81) assures a gentle lowering of the pickup arm onto the record. The swing arm then moves free of the velocity trip arm (34), allowing free action of the pickup arm.

RECORD FEED—As swing arm (132) approaches the end of the first half of its cycle, it comes in contact with and pushes the lever bearing washer and ejector idler lever (49). This lever, in turn, pushes the ejector push pin which moves the ejector lever (28) to operate either 10-inch or 12-inch record push-off plate, pushing off 10-inch or 12-inch records respectively.

PICKUP ARM INDEXING—The index of the pickup arm is set for 10-inch or 12-inch records by the position of the 10-inch record support (3) which controls the index change lever (53). The change lever (53) operates the pickup arm swing index lever (57).

COMPLETING CHANGE CYCLE—At the end of the first half of cycle, the dropping lever (83) contacts the lever trip bracket and allows the return cam and pin (89) to rise into the outer turn of the spiral on the under side of the turntable. At the same time, the lead cam and pin (71) is pushed out of the spiral by the cam at the center of the turntable and is locked out of the spiral by the lead roller drop lever (131). The turntable continues to rotate and the swing arm returns, and the return pin is pushed out of the turntable spiral and locked into that position by the return pin lock lever (83) completing the change of cycle.

AUTOMATIC TRIP—After the record has been played, the pickup stylus (121) follows the eccentric record grooves toward the spindle. The change in velocity of the pickup arm (124) at this point also causes a change in velocity of the velocity trip lever (126) which is coupled to it through a spring friction drive. At this velocity, enough striking pressure is brought to bear upon the velocity trip lever (126) by the trip lever, causing the upper velocity trip lever assembly (129) to be brought closer to the center of turntable. The revolving cam on the underside and center of the turntable carries the upper assembly of the velocity trip lever (129) to a position where the trip lever trip dog on item (129) triggers the lead pin drop lever (131) from under lead pin cam. The lead pin then drops into position, engaging spiral cam of turntable to start a new change cycle.

SERVICE ADJUSTMENTS

1. PICKUP ARM DROP POINT ADJUSTMENT:

(*A*) With the control knob in the off position, rotate turntable until swing arm (132) allows index swing arm lever (57) to move into position to contact index arm. Loosen index arm screw and move tone arm so that needle lands approximately $\frac{1}{8}$ inch from edge of record. Tighten screw on index lever. Note 10-inch record support (3) should be horizontal for 10-inch indexing adjustment.
(*B*) Index arm lever spring (54) should actuate index arm lever (57) as swing arm moves through its cycle.

2. RECORD SUPPORT POST ADJUSTMENT:

Trip changer and rotate turntable by hand until the swing arm has completed the first half of its cycle.
(*A*) Adjust screw (52) so that 12-inch push-off slide plate (10) extends $\frac{3}{8}$" past the ears of the record support post.
(*B*) If 10-inch records fail to drop, check to see if the 10-inch record support (3) rests on the edge of the record support post and not on the 12-inch push-off slide plate.
(*C*) Either 10- or 12-inch records fail to drop. Check to see that ejector arm spring (47) returns. Lower push pin and ejector lever (28) to the neutral position.

3. AUTOMATIC TRIP:

(*A*) Friction parts of the automatic trip arm (part of item 134) should be kept free of grease or oil. Clean if necessary with carbon-tetrachloride, or equivalent solvent.
(*B*) If mechanism fails to trip, it may be necessary to stretch spring (113) to increase friction of automatic trip arm.
(*C*) Make certain the automatic trip arm is aligned to strike the arm of the automatic trip lever assembly (126). Bend arm slightly if necessary.

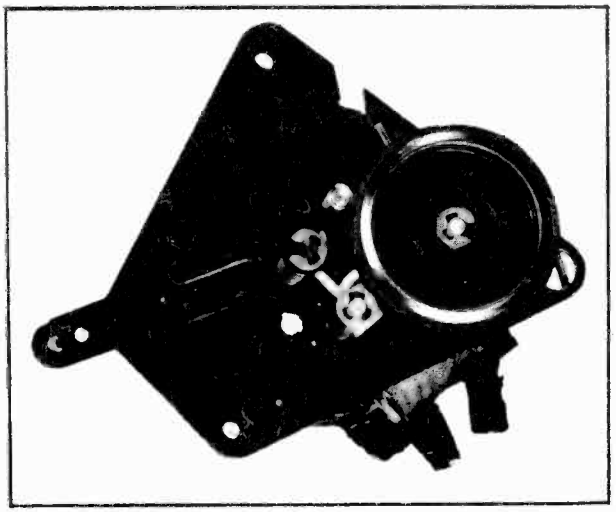


Fig. 4. RBH-011

Two-speed phono motor with idler wheel switching cam

LUBRICATION

Use Lubriplate, or equivalent, on the following:

1. Ten-inch record push-off plate (4) and 12-inch record push-off plate (10).
2. Cam swing plate lead and return pin at bottom of items 72-88.
3. On slide bolt operated by item (49).

Use Millicott 70K, or equivalent, on the following:

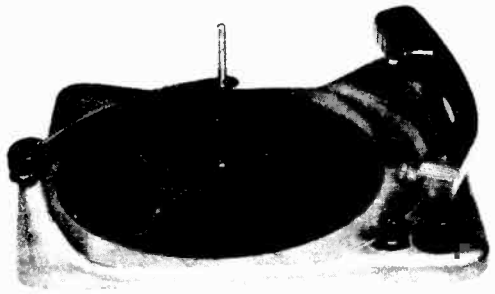
1. On edges of slots where swing arm clamps, slide on mounting plate.
2. Sloping edge of cammed dropping lever assembly (83).
3. Between friction washer at bottom of item (132).
4. Lever bearing washer (48). Part of item (49).
5. Ejector idler lever pivot pin on item (49).
6. Cammed dropping lever roller and pivot pin (83).
7. Index arm lever pivot pin (57).
8. Change lever fulcrum pin and slide washer (53).
9. Guides at bottom turntable (125).

TROUBLE SHOOTING CHART

SYMPTOMS	REMEDIES OR CAUSES
RECORD SELECTION:	
1. Records fail to drop.	1. Check adjustments 2A, 2B, 2C, 3A, 3B and 3C.
2. More than one record drops.	2. Check slider at top of spindle.
TONE ARM MOVEMENT:	
1. Tone Arm lands incorrectly.	1. Check adjustment 1A and 1B.
2. Tone Arm descends onto record too fast.	2. Check friction brake spring (81) (spring may be too weak to slow swing arm at end of cycle).
3. Does not lower onto record.	3. Check adjustment of acorn nut top of tone arm lift pin. Check end of swing plate, see that it is not bent.
TRIPPING AND CYCLING:	
1. Changer fails to trip.	1. Check adjustment 3A, 3B, 3C.
2. Changer changes too soon.	2. Check adjustment 3A.
3. Changer trips continuously.	3. Check selector lever spring (66).
4. Changer fails to cycle after tripping.	4. Adjustment (3B).
5. Changer jams at start of the change cycle.	5. Check to see that return roller (34) is held out of turntable spiral by cammed dropping lever (83) and cammed dropping lever spring (77).
6. Changer jams in the last half of change cycle.	6. Check to see that dropping lever torsion spring (77) is strong enough to actuate dropping lever (83) to prevent lead roller from re-entering the spiral on second-half of changer cycle.
7. Changer action is sluggish or fails to trip.	7. Check lubrication.
MOTOR:	
1. Changer is sluggish or motor overheats.	1. (a) Check lubrication, oil old or gummy. (b) Incorrect line voltage. (c) Defective motor.
2. Motor rumble heard in record reproduction.	2. (a) Shipping bolts not removed from motor board. (b) Flat spot on idler wheel (166).

Cat. No.	Item	Description
RAP-015	120	COVER PLATE—Aluminum retainer cover for pickup head receptacle
RBH-011	100	MOTOR—Two-speed phono motor assembly
RDK-128	36,167	CONTROL KNOB—"Off-Manual-Auto-Reject" or motor speed control knob
RHG-023	103	GROMMET—For motor speed lever
RHJ-008	82	SPACER—Spacing collar for record spindle
RHM-044	84	ROLLER BEARING SPEED NUT—Holds item 34
RHM-045	86	WASHER—Rubber cushion for item 34
RHN-007	80	NUT—Record spindle mounting nut
RHW-020	136	WASHER—Square center steel washer in velocity trip arm assembly
RHW-021	137	WASHER—Velocity trip arm friction washer (round hole)
RJP-003		PLUG—110 volt, two prong male plug
RMA-003	1	RECORD STABILIZER WEIGHT
RMA-007	116	LEVER PLATE—"Off-Manual-Auto-Reject" lever plate
RMB-014	34	PIN AND ROLLER—Swing plate lead or return pin
RMB-016	140	BUSHING—Centers pickup arm spring with pickup arm lift pin
RMB-017	139	BALL BEARINGS—3 32-inch diameter, set of 15 used in tone arm pivot, one used in assembling item
RME-001	9	EJECTOR MECHANISM HOUSING—Cast metal case
RML-027	115	LINK LEVER—Reject control lever (linked to item RMA-007)
RML-028	126	VELOCITY TRIP LEVER—Lower assembly consists of: lever flat spring stop, balanced fulcrum, and pivot pin
RML-029	129	VELOCITY TRIP LEVER—Upper assembly consists of: lever, trip dog, and trip dog pin
RML-030	131	DROP LEVER—Operates lead pin and roller, item 134
RMM-062	3	SUPPORT—10-inch record support
RMM-063	31	WASHER—Re-inforcement washer beneath spindle
RMM-064	48	BRASS WASHER—Lever bearing washer for item 49
RMM-065	71	CAM—Swing plate lead pin locking cam
RMM-066	72,88	SPACER—For item 34
RMM-067	89	CAM—Swing plate return pin locking cam
RMM-069	4	10-INCH RECORD—Push-off plate
RMM-070	8	HINGE BRACKET—For items 1 and 3
RMM-071	10	12-INCH RECORD—Push-off plate
RMM-072	53	INDEX LEVER—Index change control lever
RMM-073	57	LEVER—Indexes pickup arm swing lever (134)
RMM-076		WASHER—Slide washer (beneath item RMM-077)
RMM-077		PIN—Lever fulcrum pin fastens item 53
RMM-080		PIN—Record changer deck lever fulcrum pin (part of item 57)
RMM-108	102	LEVER—Motor speed lever
RMM-109	104	"C" WASHER—"ON" motor speed lever, velocity trip, idler wheel, and idler wheel linkage
RMM-110	105	LEVER—Motor speed change lever
RMM-111	106	WASHER—Friction washer
RMM-112	107	SPACER—Thin motor spacer
RMM-113	108	SPACER—Thick motor spacer
RMM-122	128	TRIP DOG—Part of item RML-029 (trips item 131, RML-030)
RMP-012	7	PIN—Hinge pin for item 8
RMP-016	50	PIN LEVER—Lever fulcrum pin for item 49
RMP-019	117	PICKUP ARM LIFT PIN
RMP-020	118	PICKUP ARM HINGE PIN
RMP-022	127	PIN—Hinge pin for trip dog (part of item RML-029)
RMS-131	5	SPRING—Ejector compression spring for 10-inch record push-off plate
RMS-133	24	SPRING—Balance arm spring for record stabilizer weight
RMS-134	25	SPRING—For 10-inch record support
RMS-135	30A	WASHER—Friction washer for record spindle
RMS-136	47	SPRING—Ejector arm extension spring
RMS-137	54	SPRING—Lever spring for item 53
RMS-138	61	SPRING—Friction spring on swing plate
RMS-139	70	RING—Engages item 13A for swing plate assembly
RMS-140	74,87	SPRING—Compression spring on item 34
RMS-142	79	SPRING—Cammed dropping lever tension spring on item 83
RMS-143	81	SPRING—Friction brake spring
RMS-144	92	SPRING—Mounting springs on main plate
RMS-146	66	SPRING—Selector lever index spring
RMS-185	119	SPRING—Pickup arm spring
RMS-187	130	SPRING—Used with drop lever, item 131, RML-030
RMS-188	133	SPRING—Velocity trip arm spring
RMT-016	125	TURNTABLE
RMU-040	30	RECORD SPINDLE ASSEMBLY
RMW-057	166	IDLER WHEEL
RMX-111	28	EJECTOR PIVOT CHANNEL SUB-ASSEMBLY
RMX-112	49	LEVER ASSEMBLY—Ejector idler lever assembly, including items 51 and 52
RMX-114	83	LEVER—Drop lever assembly for swing plate return pin
RMX-142	132	SWING PLATE ASSEMBLY—Operates pickup arm swing lever, item 34, and ejector idler lever, item 49 (assembly includes all attached parts)
RMX-143	134	LEVER AND VELOCITY TRIP ARM—Pickup arm swing lever and velocity trip arm assembly
RMX-144	135	PIVOT POST—Pickup arm pivot post with hinge bracket
RPA-011	124	PICKUP ARM—Pickup arm shell with leads and pickup receptacle
RPH-009	121	STANDARD PICKUP HEAD ASSEMBLY—Tan colored die cast head, complete with male connector
RPH-010	122	LONG-PLAY PICKUP HEAD ASSEMBLY—Red colored die cast head, complete with male connector
RPX-040	15	PICKUP CARTRIDGE—Includes 3 mil sapphire replaceable stylus, RPJ-001
RPX-041	114	PICKUP CARTRIDGE—Includes 1 mil sapphire replaceable stylus, RPJ-005
RSW-052	94	SWITCH—Phono motor switch
RWP-004	138	BALLAST WEIGHT—Used in tan pickup head only

MODEL P14



GENERAL.

The Model P14 is a three-speed record changer for playing records of 33⅓ rpm, 45 rpm or 78 rpm with either standard grooves, wide grooves or narrow grooves (microgrooves). The changer has two plug-in heads to change from 1 mil pickup for playing narrow groove records to a 3 mil pickup for playing standard or wide groove records. The 1 mil head has a red color, while the 3 mil head has a brown color. The record changer will play automatically 10- and 12-inch, 33⅓ rpm or 78 rpm records intermixed and automatically 7-inch 45 rpm or 33⅓ rpm records.

INSTALLATION—The record player is designed to operate from a 110–120 volt, 60 cycle per second power supply.

Mounting screws are supplied with the record changer to hold it secure during shipment. These screws are located on the plate under the turntable. The mounting screws should be turned clockwise to allow the record changer to float freely on its grommets. Before the turntable can be fully seated, the drive wheel (124) must be gently pushed back out of the way to prevent damage to the rubber tire. In case of reshipment of the receiver, these screws should be turned counterclockwise to draw the changer base plate down firmly against the mounting board. Do not remove these mounting screws.

LEVELING RECORD CHANGER—It is important to check that the record changer is absolutely level. Use a torpedo or similar type level on the record changer baseplate. Use adequate shims to level the record changer pan or radio combination cabinet to obtain perfect level. If changer is used for a new installation consult Fig. 7 for motorboard cutout, etc.

OPERATION.

TO PLAY A SINGLE RECORD—(See Fig. 1.) To play single records or home recordings, lift up the record support (1) and move it counterclockwise out of the way. Place the record on the spindle and lower to the spindle shelf. Tilt the record down towards the rear of the tone arm and lower the record to the turntable. Place the proper pickup head into the pickup arm (brown for standard groove records, or red for microgroove records). Turn the Control Knob (34) to proper speed position. Turn the Control Knob (42) to "ON" position, and trip the Index Trigger (14) on the rear inside of the Pickup Arm. Place Pickup Arm on the record with the stylus in the leading groove of the record. Then replace record support (1) over spindle.

TO PLAY 10-INCH AND 12-INCH RECORDS (78 RPM AND 33⅓ RPM) AUTOMATICALLY—Lift the record support and rotate until pin drops into locating groove. Place ten 12-inch or twelve 10-inch records, or ten 10-inch and 12-inch records intermixed over the spindle and lower to the offset shelf.

(*Note:* Standard and long-play or microgroove (78 rpm) and fine-groove (45 rpm) records cannot be intermixed for automatic operation, as a different type of stylus has to be used for each type of record.)

Hold records level and place record support over spindle. Plug in the proper head into the pickup arm (brown for standard

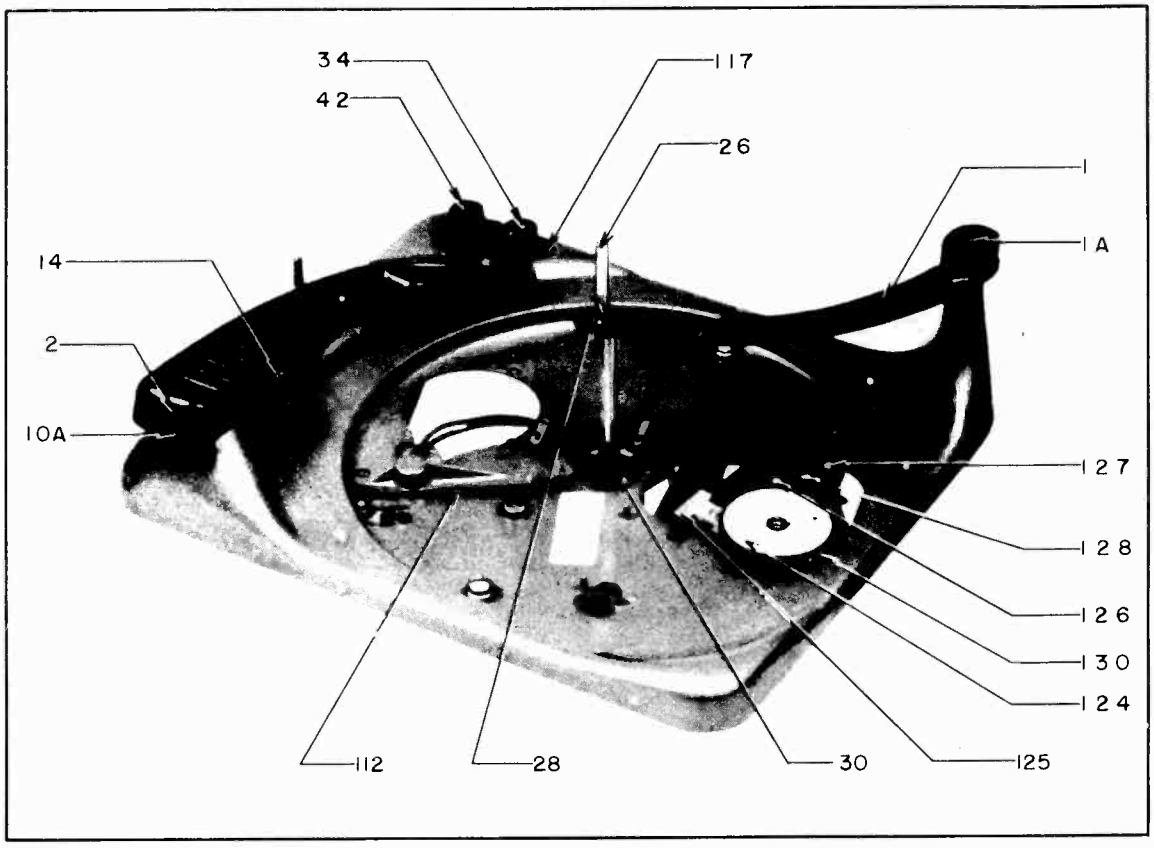


Fig. 1. Top View

MODEL P14

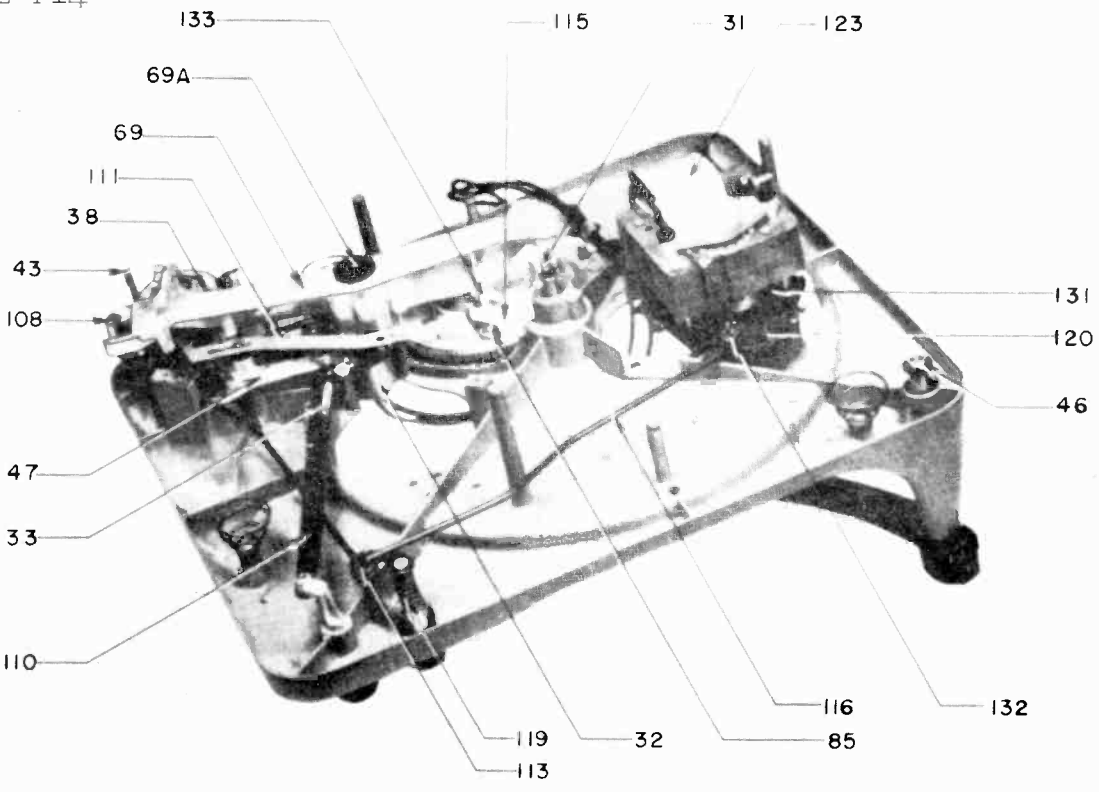


Fig. 2. Bottom View

groove, and red for microgroove (33⅓ rpm) and fine-groove (45 rpm) records. Rotate the motor speed control knob (34) to the 78 rpm position or 33—10"–12" position for 10- or 12-inch long-play 33⅓ rpm records.

To start the changer operating, turn the changer control knob to "Rej." and release. The changer will operate automatically until the last record has played. The pickup arm will return to the rest and the changer will automatically stop.

TO PLAY FINE-GROOVE (45 RPM) RECORDS—Turn motor speed knob to the 45 position for the 7-in. fine-groove 45 rpm records. Insert the record adapter which will hold the records with its 1½-in. spindle. Be sure that the pickup arm carries the red pickup head.

REJECTING A RECORD—To reject a record at any time while changer is operating, turn changer control knob to "Rej." and release.

STOPPING THE RECORD CHANGER—To turn off the record changer before the automatic shut-off, turn the changer control knob to the "Off" position and lift pickup arm and place it on its rest position.

UNLOADING RECORDS—Lift the record changer support and rotate it counterclockwise until pin on the shaft drops into the locating groove. Lift the stack of records straight up off the spindle.

REPEATING OF 7-, 10- OR 12-INCH RECORDS—To repeat records, place record on the turntable, the record support off the spindle and start changer. Records repeat until control is turned to "OFF" position.

OPERATING SUGGESTIONS.

Do not use warped records for automatic operation. Play these records singly.

Use care when loading or unloading records to prevent bending of the spindle.

Do not attempt to play microgroove or fine-groove with the standard pickup head (brown) or standard records with the red pickup head.

Keep stylus free from dust and lint to insure best reproduction.

When the record changer is not in use, the speed control knob should be left in the "78" position.

Store records flat in folders or in albums and do not lay record on record.

OPERATING PRECAUTIONS.

DO NOT use force to start or stop motor or any part of the record mechanism.

store records on the shelf of the record changer spindle, as the record may warp, especially if the temperature is high.

allow oil or grease to come in contact with the rubber idler wheel.

LUBRICATION—Additional lubrication should not be required for the life of the changer, but in cases of unusually high operating temperatures where lubrication is necessary, lubricate as follows:

Apply Lubriplate to:

1. Hinge bearing inside hinge assembly (13, Fig. 3).
2. Locator housing (75, Fig. 3) and set-down locator plate (43, Fig. 2).
3. Cam faces on lift arm (69, Fig. 2), lift arm bearing and lift arm cut-off rod bearings.
4. Between lever spring (38, Fig. 3) and cut-off rod.
5. Heart-shaped cam track on cam and cam bearing (133, Fig. 2).
6. Spindle between roller plunger and roller spring housing and between the roller spring housing and the spindle body (31, Fig. 2).
7. Turntable ball bearing (30, Fig. 1).

Apply a small quantity of mineral oil to:

1. Pickup arm locator assembly bearing and ball bearing pickup arm post (75, Fig. 3).
2. Control lever bearing (47, Fig. 2).
3. Turntable and spindle bearing (30, Fig. 1).

CYCLE OF AUTOMATIC OPERATION—At the end of the record when the stylus is in the eccentric groove at the center of the record, the rate of the forward movement increases and the end of the trip link nearest the spindle contacts the trip lever and turns it as the pickup arm advances. The trip lever, through spring washer tension, turns the trip pawl. The trip pawl is moved far enough for the sharp point at the end to definitely engage the projection on the turntable hub, thereby turning the cam to start the change cycle.

As the main cam gear is turned by the turntable gear, the lift arm roller (133, Fig. 2) moves around the heart-shaped cam at the center of the cam gear. The outside end of the lift

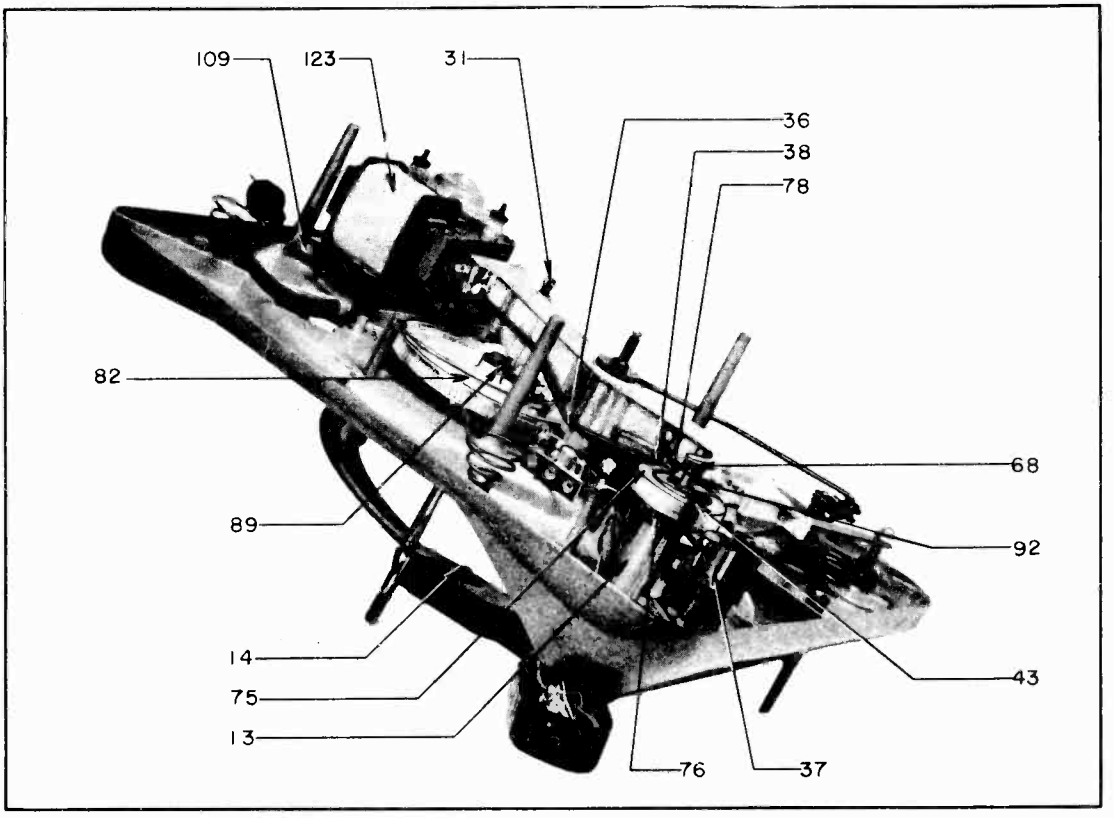


Fig. 3. Bottom View

arm raises or lowers the pickup arm by one cam action and swings the pickup arm in or out by another cam action. The pickup arm is first lifted by the cam pushing on the pickup arm lift rod (92, Fig. 3), then the pickup arm is swung out away from the records by the end of the lift arm which hits the stud of the ratchet arm (75, Fig. 4) assembly and rotates the pickup arm. After the pickup arm has swung out of the way, the inside end of the lift arm pushes up roller plunger (31, Fig. 3) which actuates the record pusher and causes it to move the bottom record into position to fall to the turntable.

Indexing is accomplished by the locator plate (43, Fig. 2) and the ratchet arm (75, Fig. 3). During the change cycle, the ratchet arm (75, Fig. 3) is pressed up against the locator plate (43, Fig. 3). The notches in these two parts should come together. During the last half of the cycle, the locator spring (38, Fig. 3) rotates the locator (43, Fig. 3) and the ratchet arm against the seven-inch index cam (37, Fig. 3).

During each cycle the adjusting ring (9, Fig. 4), rotates out and allows cam (11) to return to 10-inch index position if it had previously been tripped by a 12-inch record. Automatic shut-off after last record is accomplished by the cut-off rod (36, Fig. 3). When the record support arm falls onto the shelf of the spindle, the record pusher (28, Fig. 1) is stopped by the record support arm (1, Fig. 1). This limits the vertical travel of the Record Pusher Shaft Assembly (31, Fig. 3) so that the inside end of the cut-off rod (36, Fig. 3) hits the collar on the shaft assembly, causing cut-off rod (36) to rotate so that the outside end of rod (36) hits the control lever (47, Fig. 2) and rotates the lever to the "OFF" position.

ADJUSTMENTS

PICKUP ARM INDEXING—Screws (18, Fig. 4) and (19, Fig. 4) are used to adjust the point at which the stylus lands on the record. If the stylus lands too far out on the edge of the record, loosen screw (18) slightly and tighten screw (19).

If stylus is too far in on the record, loosen screw (19) slightly and tighten screw (18).

If it is necessary to make adjustment of screw (20, Fig. 4), loosen screw (20) and match locator plate (43, Fig. 2) and ratchet arm (75, Fig. 3) and with locator plate rotated against index stop in the base plate, rotate pickup arm to index approximately for a 10-inch record. Make a fine adjustment of indexing with screws (18, Fig. 4) and (19, Fig. 4), as above. When the correct set-down is obtained for the 10-in. position, the 12- and 7-inch needle set-down will be also correct.

PICKUP ARM HEIGHT—The pickup arm height is adjusted by the screw (92, Fig. 4) located on top of the pickup arm lift rod. Turn the screw out or in until the underneath side of the pickup arm clears the rest by $\frac{1}{8}$ in. or $\frac{3}{16}$ in.

TROUBLE SHOOTING CHART

SYMPTOM	CAUSE	REMEDY
1. Control Knob (42, Fig. 1) cannot be turned to "ON" position.	Machine shut off during cycle.	Rotate the turntable clockwise, by hand, until the control knob (42, Fig. 1) is free.
2. Turntable does not turn when control knob (42, Fig. 1) is moved to "ON" position.	1. Changer stalled in cycle. 2. No voltage at motor (123, Fig. 2). 3. Motor defective. 4. Idler wheel (124, Fig. 1) not engaging turntable rim.	1. Revolve the turntable clockwise, by hand, until it starts turning under its own power. 2. (a) Check wiring and joints. (b) Check the switch (32, Fig. 2) for proper operation. 3. Remove turntable and check whether motor operates without load. If a voltage is present at the motor and the pulley does not revolve, the motor is defective. 4. In case turntable is not moving with no load rotation of motor pulley: (a) Check motor idler assembly for free contact between motor pulley and turntable. (b) Clean turntable rim and rubber tire of the idler wheel.

MODEL P14

TROUBLE SHOOTING CHART (Cont'd)

SYMPTOM	CAUSE	REMEDY
3. Changer fails to cycle when the control knob is turned to "Rej."	The manual reject not actuating the trip.	Check for contact between reject link (112, Fig. 1) on the control lever (47, Fig. 2) and the trip pawl (84, Fig. 6) on the main cam (82, Fig. 3) when knob is in the "Rej" position. Contacting the trip should actuate the trip pawl (84, Fig. 6) to engage with pinion gear on the turntable hub. When the trip rod is turned and the cam pawl (84, Fig. 6) does not move forward, engaging the teeth on the turntable hub, check for binding between cam pawl and the cam. Clean and check for free movement, but do not lubricate.
4. Record fails to drop when changer cycles.	1. Spindle pusher shaft broken. 2. Pusher in spindle does not move far enough forward to eject record. 3. Lift screw loose. 4. Pusher raises outside spindle body.	1. Loosen the spindle holding setscrews and replace the spindle assembly (26, Fig. 1) with a new unit. 2. If the roller (31, Fig. 2) is compressed and the pusher (28, Fig. 1) does not move far enough forward to eject record, the spindle should be replaced. 3. Check screw (69A, Fig. 2) and tighten. 4. The pusher (28, Fig. 1) should first rise inside the spindle body, then move forward inside the center hole in the record. If faulty operation, replace complete spindle assembly.
5. More than one record drops.	1. Record hole too large. 2. Spindle slide not fully down. 3. Record support binding on spindle, or bent out of square with the shaft. 4. Record pusher (28, Fig. 1) defective.	1. Check diameter of hole. 2. Check to determine if the spindle slide is all the way down. (a) Check for free movement of the slide. (b) After records are placed, be sure the slide is in proper position. When a record is dropped, it will raise slightly returning immediately to its original position. 3. Check straightness of spindle. Straighten the record support (1, Fig. 1) if it is not square with the record support shaft. 4. Record pusher may be deformed, etc. Replace with a new spindle assembly or pusher.
6. Record hits pickup arm.	1. Pusher (28, Fig. 1) in spindle not moving far enough to eject record. 2. Lift arm screw loose. 3. Pusher extending beyond outside diameter of spindle.	1. See No. 4. 2. Tighten lift arm screw (69-A, Fig. 2). 3. Cycle the changer by hand, until roller assembly (31, Fig. 2) is at the top of its travel. Use new record as gage and see if it binds at any point. File off high points on pusher (28, Fig. 1) until record passes freely over spindle.

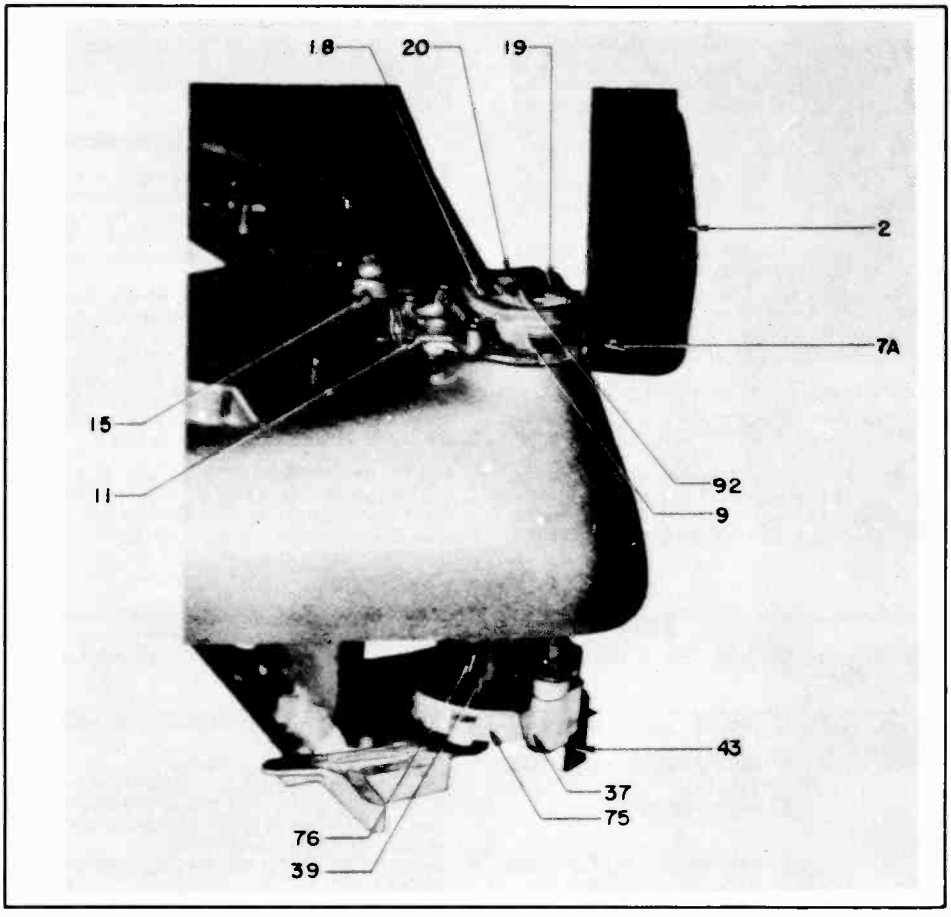


Fig. 4. Pickup Arm Mounting and Adjustment

MODEL P14

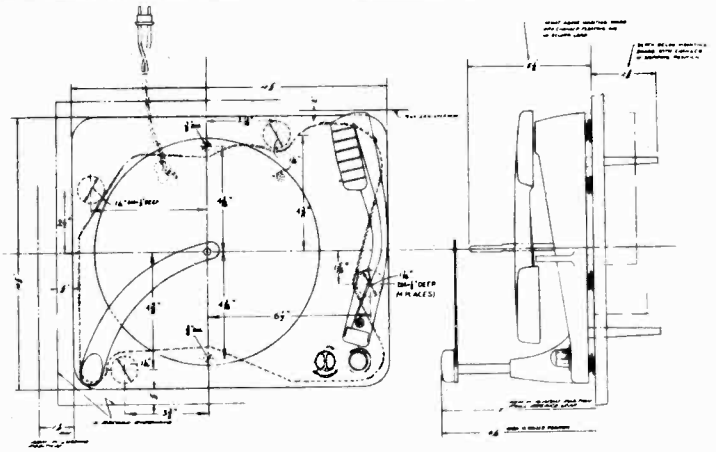


Fig. 5. Over-all Dimensions and Motorboard Cutout

TROUBLE SHOOTING CHART (Cont'd)

SYMPTOM	CAUSE	REMEDY
6. Record hits pickup arm.	4. Pickup arm not adjusted properly.	4. If the hinge bearing (13, Fig. 3) has been removed or the hinge bearing setscrew (20, Fig. 4) has been loosened, the realign position between hinge bearing and the pickup arm locator assembly must be reset. Follow the following procedure: (a) Loosen the setscrew (20, Fig. 4) sufficiently to allow the hinge bearing to slide on the pickup arm locator assembly shaft. The setscrew may be adjusted with an Allen wrench through the hole in the adjusting ring (9, Fig. 4) located between the two adjusting screws. (b) Place a $\frac{1}{32}$" shim between the set-down locator (43, Fig. 4) and the locator housing (75, Fig. 4). (c) Turn the control knob to the "OFF" position. (d) Raise the pickup arm and rotate the hinge assembly counterclockwise as far as it will go. In this position the arm extending from the setdown locator should be engaged by the turned-down leg on the control lever (47, Fig. 2). (e) Take up all the play between the parts by pressing up on the bottom of the locator housing and down on the top of the hinge bearing. (f) Then tighten the hinge body setscrew (20, Fig. 4) and remove shim.
7. Pickup arm does not set down on 10" record in proper position.	1. Pickup arm not adjusted properly. 2. Hinge catch (11, Fig. 4) does not return to 10" record position when changer cycles. 3. Binding between safety spring (38, Fig. 2) and locator housing.	1. See No. 6. 2. When the lift arm (69, Fig. 2) has moved as far out as it will go and is about to move back to its starting position, stop the change cycle. Lift the pickup arm and check the gap between the end of the leg on the catch (11, Fig. 4) and outside step on the adjusting ring (9, Fig. 4) to be at least $\frac{1}{64}$". If the gap is too small, check the setting of the hinge body and the pickup arm locator. The cam face on the lift arm (69, Fig. 2) which contacts the round stud on the bottom of the locator housing (75, Fig. 4), may be bent. Lubricate the hinge bearing with Lubriplate. 3. (a) Check binding of safety spring (38, Fig. 2) against the locator housing. Disassemble the pickup arm locator assembly by removing the lift arm (69, Fig. 2) loosening the hinge bearing setscrew (20, Fig. 4) and pulling the locator housing and pickup arm locator assemblies down from the bottom of the changer. Hold the pickup arm locator shaft and turn the locator housing assembly to slightly compress the safety spring release and check that safety spring returns the pickup locator casting firmly against the stop surface in the locating housing assembly. If binding is present, remove the safety spring to see if the pickup arm locator casting turns freely in the locator housing casting. Remove burrs or sharp edge on end of safety spring, stretch it to increase tension or replace. (b) Check to see if the locator plate (43, Fig. 2) is meshing with the locator housing when the lift rod (92, Fig. 3) is positioned at the beginning of the sloping cam surface of the lift arm (69, Fig. 2) in the final stage of the cycle. Swing the pickup arm halfway in towards the spindle. If the locator plate and locator housing disengage in this position, it is necessary to reset the clearance between the locator plate and the locator housing. It may be necessary to file off any burrs which may be present on the mating surfaces of the locator plate and the locator housing. When the index lever (15, Fig. 4) has been depressed, it is held in the position until the catch (11, Fig. 4) is disengaged. See No. 8.

MODEL P14

TROUBLE SHOOTING CHART (Cont'd)

SYMPTOM	CAUSE	REMEDY
7. Pickup arm does not set down on 10″ record in proper position (Cont'd).	4. Hinge catch does not disengage from the hinge cam.	4. (a) Check to see if the leg on the catch (11, Fig. 4) is sliding down the incline on the leg of the adjusting ring. (b) If the catch (11, Fig. 4) and the hinge cam are not disengaging when the catch leg is resting on the inside step on the adjusting ring, file the edge of the catch which contacts the hinge cam until the two parts have a clearance between them of about $\frac{1}{64}$″ when the leg on the catch is on the inside step on the adjusting ring.
8. Pickup arm does not set down on 12″ record in proper position.	1. Diameter of 12″ record under-size.	1. The set-down position for 12″ records is determined by the edge of the record striking the index lever (15, Fig. 4). If a 12″ record has a diameter of less than standard size of $11\frac{7}{8}$″ plus or minus $\frac{1}{32}$″, it may fail to depress the trip lever far enough.
	2. Enlarged center hole in record.	
	3. Pickup arm not adjusted properly.	3. See No. 6.
	4. Binding between safety spring and locator housing.	4. See No. 7.
	5. Index lever does not lock when 12″ record drops.	5. Stop the changer just after a 12″ record has dropped to the turntable and before the pickup arm has a chance to move in over the record. The index lever should be forced down until the step on the hinge cam passes the edge of the catch (11, Fig. 4), preventing the hinge cam and the index lever from returning to their original position. If the trip lever does not stay down in a depressed position, check: (a) To see if the catch (11, Fig. 4) is free to move forward and engage the hinge cam. (b) If the stop on the hinge body is defective, it might allow the pickup arm to move too far out, thus moving the index finger away from the spindle.
	6. Hinge catch (11, Fig. 4) does not go inside step on adjusting ring when index lever is depressed.	When a 12″ record falls towards the turntable, the index lever (15, Fig. 4) is tripped and the leg on the catch (11, Fig. 4) should be moved out over the incline between the inside and outside steps on the adjusting ring leg and held in that position by the shoulder on the hinge cam until the pickup arm starts to move in over the record. The leg on the catch should contact the incline and be moved out as it slides down the incline until the catch is disengaged and the index lever can snap back to a horizontal position. If this does not occur, file about a $\frac{1}{64}$″ diameter on the edge of the catch leg which contacts the incline. Check for binding between hinge body and hinge bearing (13, Fig. 3). Burrs on the bearing surfaces or lack of lubrication may prevent the hinge bearing from turning freely.
9. Needle does not track across record properly.	1. Needle may be clogged by accummulation of lint, dirt, etc.	1. Clean foreign material from around the needle.
	2. Locator housing does not disengage from the set-down locator when a cycle is completed.	2. When the changer is not in cycle, a $\frac{1}{32}$″ gap should exist between the locator housing and the set-down locator (43, Fig. 2). If the gap is small enough to allow the parts to touch and bind as the needle moves across the record, the hinge bearing must be reset. See No. 6.
	3. Hinge bearing binds.	3. (a) Check the locator housing and set-down locator for binding. (b) Check the bearing in the pickup arm post for binding. The bearing is located below the hinge bearing (13, Fig. 3). In order to inspect it, loosen the setscrew (20, Fig. 4) in the hinge bearing. Unsolder the pickup leads and pull them out. Pull up on the hinge and pickup assemblies. Clean foreign matter or corrosion from the bearings and lubricate with light mineral oil.
	4. Changer not level.	
	5. Excessive vibration during long play operation.	5. Check mounting of changer.
10. Changer trips before arm reaches end of record.	1. Record hole too large.	1. The groove may turn eccentric with the spindle and therefore cause premature tripping.
	2. Binding of trip link.	2. With the trip link released, check the trip link for freedom of motion.
11. Changer does not cycle when record has been played.	1. No eccentric trip groove on record.	1. Turn control knob to "REJ." at end of the record.
	2. Needle jumps out of groove in record.	2. (a) Check trip pressure. (b) Check for shallow groove on record. (c) Check for clean needle. (d) Check for binding in the pickup bearing or locator housing.
	3. Trip pawl binding on cam face.	3. The trip pawl (84, Fig. 6) must be free to move forward and engage the teeth of the turntable hub when the link releases it. Check for burrs or foreign matter lodged between the cam and the pawl. Do not oil as this might collect dirt and gum up the pawl.
12. Turntable speed too slow.	1. Binding in turntable bearing.	1. Check turntable bearing for freedom of movement. Hold the idler wheel (124, Fig. 1) out of engagement with the turntable and spin the turntable by hand to see if it turns readily. If binding occurs, clean and lubricate with light oil.
	2. Motor pulley too small in diameter.	2. Replace pulley.
	3. Line voltage too low.	3. Minimum line voltage should be 105 volts.
	4. Operating temperature too low.	4. Operating temperature should not be less than 60° F.

MODEL P14

TROUBLE SHOOTING CHART (Cont'd)

SYMPTOM	CAUSE	REMEDY
13. Turntable speed too fast.	1. Line voltage high. 2. Motor pulley too large in diameter.	1. Check line voltage. 2. Replace pulley.
14. Turntable stalls during cycle.	1. Motor idler (124, Fig. 1) not engaging turntable. 2. Turntable bearing tight. 3. Operating temperature too low. 4. Line voltage too low. 5. Binding in drive mechanism. 6. Binding between pickup arm lift rod and lift arm cam face. 7. Spindle roller spring compressed too far.	1. See No. 2. 2. See No. 2. 3. See No. 12. 4. Minimum voltage should not be less than 105 volts. 5. (a) Check for binding in gear teeth, check for bent cam bearing or bent spindle pushing. (b) Check lift arm bearing for freedom and the lift arm roller to be sure it is not bent, causing binding in the cam track. 6. Cycle the changer, stopping it half way through the cycle as the left arm is about to return. Lift pickup arm and raise lift rod (92, Fig. 3) by pulling up on the adjusting screw (92, Fig. 4) as high as it will go. Feel the lift arm (69, Fig. 2) for play. The lift rod may still touch the lift arm cam face, but it should not bind. If binding occurs, check for bent lift arm bearing or remove fiber washer under the lift arm to lower it. 7. Cycle the changer and check that before the top of the lift cam arm is reached, the pusher housing should stop its upward motion and the roller should continue up .005" to .047" more, slightly compressing the roller spring. If the spring compresses too much, the changer may stall on the shut-off cycle. (a) Check the lift arm to see it is square with the base plate. (b) If spring is too much compressed, remove fiber washer between lift arm and steel washer.
15. Changer continues to cycle.	1. Reject spring (33, Fig. 2) loose. 2. Locator spring (83, Fig. 6) loose. 3. Trip link (112, Fig. 1) frozen. 4. Trip pawl (84, Fig. 6) binding.	1. Check that reject spring (33, Fig. 2) is secured in position at both ends. 2. Check cam locator spring (83, Fig. 6) to see it has not fallen off or is not secured at an end. 3. Check trip link (112, Fig. 1) in the reject position. 4. Check trip pawl (84, Fig. 6) for binding, clean and do not oil.
16. Noise during playing of record.	1. Rumble from motor. 2. Defective turntable bearings. 3. Defective motor idler wheel (124, Fig. 1) 4. Defective records. 5. Turntable scrapes. 6. Squeaks.	1. Check the motor grommets for free suspension of motor. 2. Check for foreign matter in bearing, defective belts, binding between balls and ball retainer, rough surfaces on washers. Clean and lubricate with Lubriplate or light mineral oil. 3. A rapid thumping sound may indicate a flat spot on the motor idler wheel (124, Fig. 1). Check the rubber tire on the idler and the bearing of the idler. 4. Check for defective or warped record. 5. (a) Check for warped record. (b) Check for bent motor idler. 6. Check for good lubrication of changer parts as indicated under "Lubrication."
17. Changer does not shut off after last record has been played.	1. Record support binding on spindle. 2. Cut-off rod (36, Fig. 3) not engaging shoulder pusher housing.	1. The record support (1, Fig. 1) must rest on the offset shoulder of the spindle. See also No. 5. 2. On the shut-off cycle, the end of the cut-off rod (36, Fig. 3) should contact the shoulder on the bottom of the spindle pusher housing, part of pusher and roller assembly (31, Fig. 3), and turn the cut-off rod over 90°. If the end of the cut-off rod passes under the pusher housing as the changer cycles on the shut-off cycle: (a) Check that record support rests on spindle. (b) Check spindle to see it is being held in place by the spindle setscrews. (c) Check lift arm screw (69A, Fig. 2) for tightness. (d) Check for cut-off rod (36, Fig. 3) being too short.
18. Changers shut off prematurely.	1. Spindle roller spring compressed too far. 2. Roller spring in spindle too weak. 3. Record too thick. 4. Cut-off rod (36, Fig. 3) not being reset.	1. See No. 14. 2. If the roller spring is compressed under the load of a full stack of records, it may cause premature shut off; replace spindle assembly (26, Fig. 1). 3. Old style ⅛" thick records will shut-off the changer. 4. The flat spring (38, Fig. 3) acting against the cut-off rod should throw the rod against its top on the lift arm (69, Fig. 2) and hold it there. If the cut-off rod is not fully turned, the bent-up end next to the spindle may stick up high enough to prematurely contact the shoulder on the pusher housing, part of pusher and roller assembly (31, Fig. 3). Check: (a) Lever spring (38, Fig. 3) for tension. (b) Lubrication of cut-off rod bearings. (c) Clearance between the end of the cut-off rod (36, Fig. 3) which passes under the control lever (47, Fig. 2) and the bottom of the round stud on the control lever.
19. Turntable continues to revolve when control knob is turned to "OFF" position.	Switch (32, Fig. 2) defective.	Check switch for intermittent contact.
20. Needle does not set down on 7" record in proper position.	Tail on set-down locator plate (43, Fig. 2) damaged or bent out of position.	Straighten locator plate or replace it.

MODEL P14

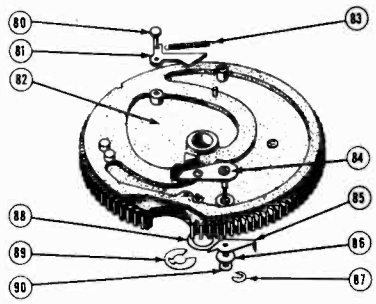


Fig. 6. Triple Speed Main Cam Gear

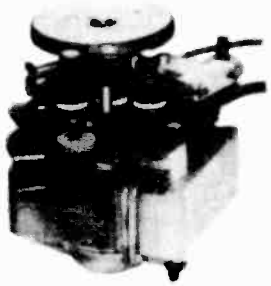


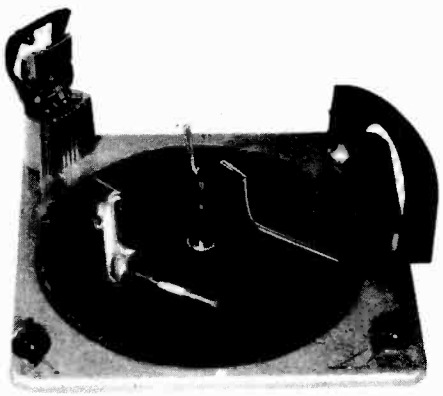
Fig. 7. Motor RBH-014

REPLACEMENT PARTS LIST
MODEL P14

Ref. No.	Description	Cat. No.
1	RECORD SUPPORT ARM ASSEMBLY—Includes knob, support arm, shaft with cross pin	RMX-160
1A	KNOB—For record support arm assembly	RDK-185
2	PICKUP ARM	RPA-012
2A	LONG-PLAY PICKUP HOUSING—Red, housing less pickup	RPH-008
2B	STANDARD PICKUP HOUSING—Brown, pickup housing less pickup	RPH-007
2C	WEIGHT—For pickup housing RPH-007	RWP-005
3	SPRING—Counterbalance spring for pickup arm	RMS-192
7A	PIN—Hinge pin on pickup arm	RMP-025
	BRACKET—Hinge pin bracket, fits around item 7A	RAD-046
10	ADJUSTING RING ASSEMBLY—Includes spring adjusting ring and two adjusting screws; used for adjusting pickup arm set-down	RMX-151
13	HINGE ASSEMBLY—One which pickup arm rotates across record; does not include item 10, adjusting ring assembly	RMX-152
14	PICKUP—Long play variable reluctance pickup with 1 mil stylus	RPX-041
17	PICKUP—Standard play variable reluctance pickup with 3 mil stylus	RPX-040
22	PICKUP ARM HINGE BEARING ASSEMBLY—Fits inside item 13 and rotates on ball bearings	RMX-153
24	BEARINGS—Ball bearings for pickup arm to rotate on	RMB-019
25	SPACER—For ball bearing, item 24	RHJ-011
26	SPINDLE—Includes spindle, guide at top of spindle, spindle base, and guide spring	RMX-154
28	RECORD PUSHER—In spindle for pushing record off spindle shelf	RML-037
30	BEARING—Ball bearing and race for turntable to rotate on	RMB-020
31	RECORD PUSHER SHAFT ASSEMBLY—Includes spindle roller pin, record pusher shaft, roller spring housing, roller spring, groove pin and roller plunger	RMX-155
32	SWITCH—A-c switch and plate assembly for 110 volts, 60 cycles	RSW-077
33	SPRING—For returning control lever from "Rej." to "ON" position	RMS-195
34	KNOB—Speed control knob	RDK-186
37	CAM—For 7-inch records, is moved into position when motor speed knob is rotated to 7-inch slow position	RMC-047
38	SPRING—Locator spring for rotating locator plate back against index cam at end of change cycle	RMS-196
38A	WASHER—Two required, one below turntable bearing and the other between bearing and turntable	RHW-016
39	WASHER—Compression washer for holding locator plate against ratchet arm assembly	RHW-019
42	KNOB—For changer control "ON," "OFF," "REJ." knob	RDK-187
43	LOCATOR PLATE—For indexing pickup arm, is rotated against index cam by spring (38)	RAP-016
46	SPRING—Safety coil spring inside locator assembly	RMS-197
47	LEVER—ON-OFF-REJ., control lever and cam	RML-033
80	DRIVE PIN—For mounting cam locator lever (114) to base plate	RMP-026
83	SPRING—To hold cam locator (114) against main cam gear	RMS-193

Ref. No.	Description	Cat. No.
60A	"C" WASHER—Prevents record support shaft from being pulled out of base plate	RHC-028
	RIVET—For attaching item 47 to the arm of the control knob crank	RHR-011
69	LIFT ARM ASSEMBLY—Die cast arm which is moved by the heart-shaped cam of the main cam gear (115); includes roller drive pin, roller, lift arm spring lever, automatic shut-off rod, spring and pin	RMX-168
75	LOCATOR ASSEMBLY—Pickup arm locator assembly, includes pickup shaft and pickup locator	RMU-056
	PIN—Drive pin for holding (122) onto locator assembly (75)	RMP-027
76	SPRING—Ratchet pawl spring for holding ratchet pawl (122) against serrated edge of trip rod	RMS-198
78	SPRING—Conical spring for holding pickup lift rod against cam end of lift arm (69)	RMS-199
86	WASHER—Spring washer on cam locator pawl assembly	RHW-022
92	LIFT ROD AND ADJUSTING SCREW—For raising pickup arm as lift arm end moves through its cycle	RMU-057
89	"C" WASHER—For mounting main cam gear (82) onto stud of base plate	RMC-046
	ROD—Connects between 7-inch index cam and motor speed control linkage	RMU-059
87	"C" WASHER—For index cam	RHC-033
109	MOTOR FASTENER—For mounting 3-speed motor, 3 required	RHH-011
110	INDEX ROD—Operates index arm	RML-042
84	LEVER—Trip lever engaging pawl on main cam gear	RML-043
116	ROD—Speed control rod	RML-046
117	ESCUTCHEON—Speed control escutcheon	RDE-072
119	SPRING—Motor speed control shaft spring	RMS-210
120	ARM—Motor speed control shaft and arm	RMX-165
121	LINK—Trip link	RML-047
85	PAWL—Trip pawl on main cam gear (115)	RMM-139
123	MOTOR ASSEMBLY—Includes idler wheel, two springs, idler wheel shift cam, speed control arm and 3 pulleys	RBH-014
124	IDLER WHEEL—Rubber tired wheel	RMW-060
125	ARM—Idler wheel arm	RMA-008
126	PULLEY—Low speed pulley (33 1/3 rpm)	RMW-061
127	PULLEY—Medium speed pulley (45 rpm)	RMW-062
128	PULLEY—High speed pulley (78 rpm)	RMW-063
129	ARM—Pulley mounting arm	RMA-009
130	SPRING—Idler wheel tension spring to pull wheel against inside of turntable rim	RMS-205
131	SPRING—Pulley arm tension spring	RMS-211
132	ARM—Motor speed arm on motor assembly	RMA-010
112	ROD—Reject rod	RML-044
113	GROMMET—For motor speed control shaft	RHG-027
81	LOCATOR—Cam locator lever fastens to base plate under main cam gear	RML-045
82	MAIN CAM GEAR ASSEMBLY—Main cam gear with heart-shaped cam channel. Includes main cam pawl, pawl tension spring and spring wire	RMX-164
123A	MOTOR—3-speed motor with belts*	RBH-016
124	WHEEL—Idler wheel	RMW-060
133	BELT—Drive belt	RMD-005
130	SPRING—Idler wheel tension spring	RMS-205
134	PULLEY—Pulley for 45 rpm	RMW-064
135	PULLEY—Pulley for 33 1/3 rpm	RMW-065
136	GROMMET—Motor mounting grommet	RHG-028

* Some changers use this type of motor.



GENERAL

This single pickup arm record changer is designed for triple speed operation (33⅓, 45 or 78 revolutions per minute) from a power source of 110 volts at 60 cycles. It will play the Standard Groove or Microgroove type records for these speeds, a single record at a time or a series of twelve 7-inch, twelve 10-inch or ten 12-inch records automatically.

Note: Never stack the Standard and Microgroove records intermixed for automatic operation as playing of each type record requires special attention to the pickup and record speed required.

The pickup arm is designed to use a two position knob control dual stylus assembly. The control knob is indexed to the figures on the *pickup arm* corresponding to the speed of the record being played. The speed control knob is set to the position corresponding to the rotation speed required by the record being played. Three record spindles are used. The slender spindle with the least offset is used for 10-inch and 12-inch records. The slender spindle with larger offset is used for 7-inch records. A third spindle is required to accommodate the large center hole of the 7-inch 45 rpm records.

RECORD PLAYER OPERATION

STANDARD-GROOVE RECORDS (78 RPM, 10- OR 12-INCH).

Use 10-inch/12-inch spindle, the spindle with the slightest bend. The bend should face ejector table. Turn cartridge selector lever to 78 rpm. Turn motor speed control knob to 78 rpm. If 10-inch records, lower 7-inch/10-inch record support to horizontal position. Place records over spindle onto record support. Lower balance arm to horizontal position resting on top of record stack. If 12-inch records are to be played, raise 7-inch/10-inch support arm to a vertical position. Place records on spindle, supporting edge of records on 12-inch record support. Lower balance arm to horizontal position, resting on top of record stack.

STANDARD-GROOVE RECORDS (33⅓ RPM, 10- OR 12-INCH).

If 10-inch or 12-inch (33⅓ rpm) records are to be played, use the same spindle as for 78 rpm. Follow directions for playing 78 rpm, except set cartridge selector lever at 78 position and set motor speed control knob at 33 position.

MICROGROOVE RECORDS (33⅓ RPM, 7-, 10- OR 12-INCH).

If 7-inch (33⅓ rpm) records are to be played, use ¼-inch plain spindle, with largest offset, insert it in center of turntable firmly, the bend facing the record support. Seven-inch records should

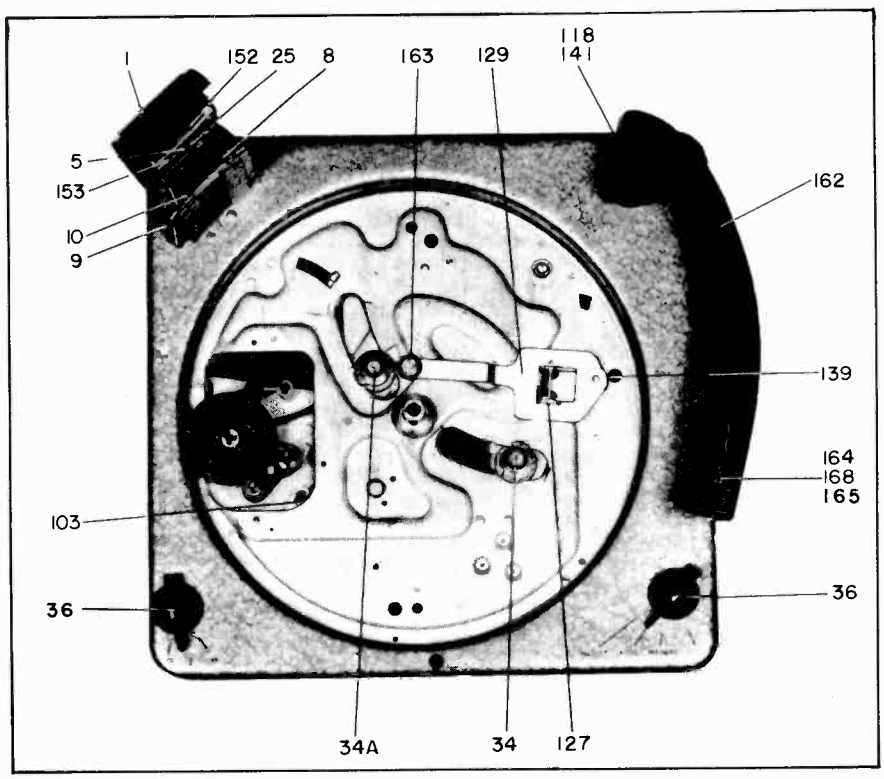


Fig. 1. Top of Record Changer

MODEL P15

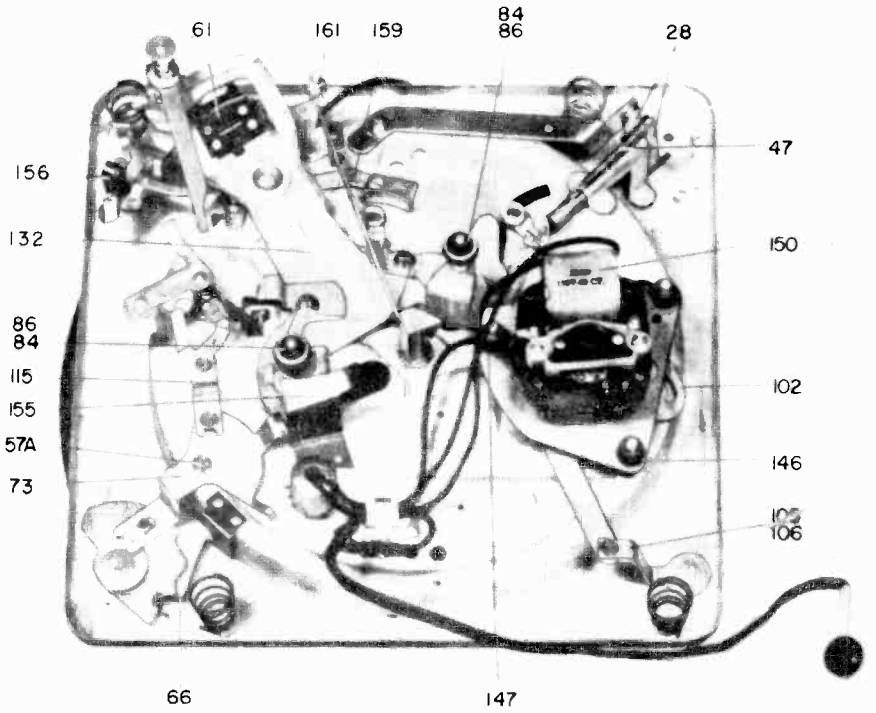


Fig. 2. Bottom View

be placed on the spindle and supported at the edge by the lower step of the 7-inch/10-inch support. The record stabilizer should then be lowered to the horizontal position resting on top of record stack. Turn cartridge selector lever to 33/45 rpm. Set motor speed control lever to 33 rpm.

MICROGROOVE RECORDS (45 RPM, 7-INCH).

Use 1½-inch spindle (with plastic ends). Insert spindle in turntable center hole; with spindle top facing record support, make sure the spindle sets in slot firmly. Set dual pickup cartridge to 33 45 position, and set speed control knob to the 45 position.

Seven-inch (45 rpm) records should be placed on the spindle and supported at the edge by the upper step of the 7-inch 10-inch record support. When playing 45 rpm records, the balance arm must remain in vertical position.

CAUTION—To avoid damage to the pickup stylus and to the record surfaces, do not allow the standard pickup stylus to be used on the microgroove records. Do not drop the pickup arm onto the record.

MANUAL OPERATION

Raise the *hinged shelf* for 10-inch records and the *hold-down arm* into a vertical position. Slip the record down over the proper *spindle* onto the turntable. Turn the record mechanism *control knob* to the MANUAL position. This will start the turntable rotating. Gently lower the pickup arm on the first groove of the record. When the record is through playing, return the tone arm by hand to its rest position. Stop turntable rotation by turning *control knob* to OFF position. When through playing phonograph, turn the Phono-Radio control to its OFF position.

AUTOMATIC OPERATION

Be sure the pickup is on the pickup arm rest. Point arrow on the pickup arm to select the stylus for records to be played, 78 or 33/45. Place the proper spindle in center hole. Place a stack of records, not to exceed twelve 10-inch or 7-inch records, or ten 12-inch records, not intermixed, over center post. All records must be of the same speed. The records will now rest on center post and on record support post. Set speed control to proper speed, turn control knob to reject position and release it. This turns changer on and starts change of cycle, dropping the first record on the turntable. To reject record, turn the control knob to "reject" and release it.

To discontinue operation, all records should be dropped to the turntable by repeatedly turning the control knob to reject position until all unplayed records have been dropped to the turntable. Place the pickup arm on the pickup arm rest and turn the control knob to the OFF position.

PICKUP CARTRIDGE

The Model P15 record changer is equipped with a dual stylus pickup for playing microgroove and standard groove records. A selector knob control permits instant setting of the dual assembly, to bring the required stylus into operating position of a corresponding type of record. The knob index (arrow) indicates the operating position of the stylii and is pointed to the 1 mil microgroove stylus with respect to the stylus assembly. To operate the knob control, the knob is first depressed and then turned to the desired position with its arrow index pointed to the end of the tone arm for microgroove records, or pointing to the tone arm rear for standard groove types.

SERVICE—To remove stylii assembly from cartridge, pull off the knob and compress spring slightly to release tension upon retaining washer. Retaining washer, spring and flat washer may then be picked off shaft and stylus assembly removed from cartridge. To insure optimum performance from the RPX-050 cartridge, its stylii, magnetic pole pieces and gaps should be cleaned periodically of foreign particles accumulated from the record surfaces. A soft bristle brush, Cat. No. RQB-001, or equivalent, should be used to clean these parts. These parts are more readily accessible for cleaning if the stylus assembly control knob is depressed and rotated to expose the stylii, poles, gaps, and the stylus guide and its recess. The gap clearance between stylus and each of its pole pieces has been adjusted to be not less than .010 inch. To obtain optimum performance from your cartridge, be careful not to distort parts of the assembly which would disturb this adjustment.

OPERATING PRECAUTIONS

1. Do not, under any circumstances, connect the motor to a source of direct current or to alternating current other than that specified.

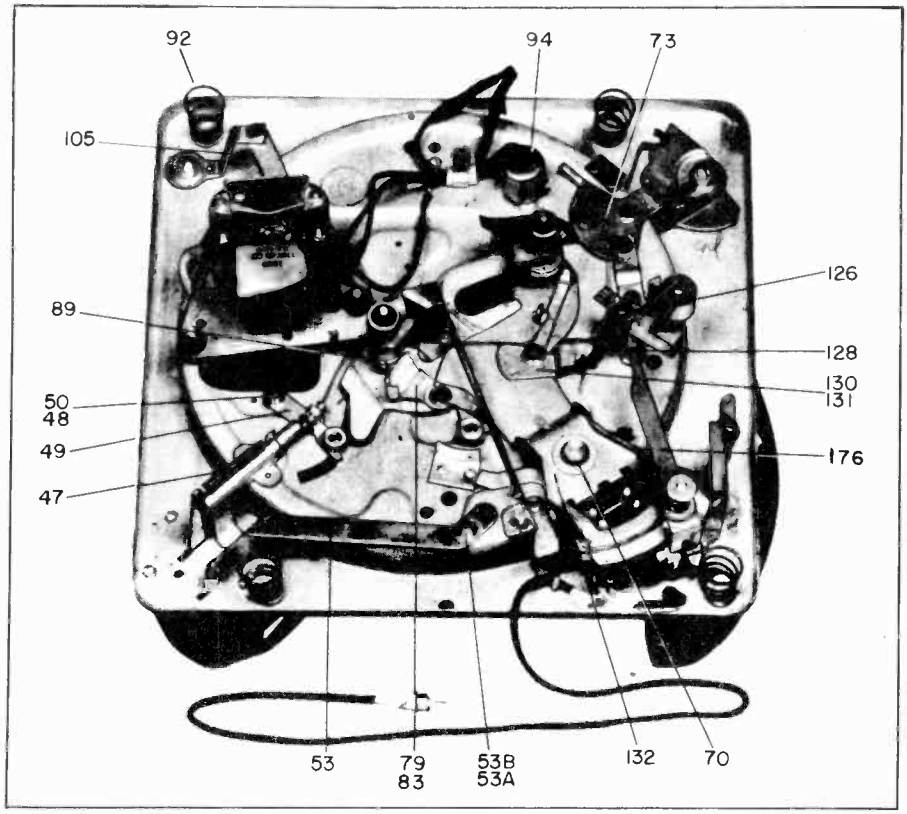


Fig. 3. Bottom View

2. Do not allow oil or grease to come in contact with the rubber tired friction drive wheels (or belts) or the Velocity Trip Arm friction washers, part of item (134).

3. Never use force to start or stop the motor, or any part of the record changer mechanism.

4. Do not intermix Microgroove records with the Standard Groove type.

5. Always make certain that the Speed Control is set to the proper speed position as required for the type of record.

6. Use only records in good condition for automatic operation. For warped, odd size, or home recorded records, play as for manual operation.

7. Do not store the records upon the record post and spindle as they may warp, especially if the temperature is high.

CYCLE OF OPERATION

INITIATING THE CHANGE CYCLE—Rotating the control knob or movement of the pickup arm which controls the velocity trip arm (176) moves the velocity trip lever (126) so that the idler wheel (163) moves toward the center of the turntable and strikes the cam at the center of the turntable. Meanwhile the trip dog (128) falls in back of the lead pin drop lever (131). The cam at the center of the turntable kicks the idler wheel (163) moving it away from the center post and causing the lead pin dropping lever (131) to move out from under the lead pin (34). The lead pin (34) is pushed upward into the large spiral on the bottom of the turntable by the spring (87). As the turntable rotates, the spiral moves the lead roller (34) towards the spindle causing the swing arm (132) to rotate on its pivot.

PICKUP ARM MOVEMENT—The cam end of the swing arm (132) raises and lowers the pickup arm lift pin (117) as the swing arm (132) is rotated on its pivot. The brake spring (155) slows the swing arm (132) at the end of its cycle to allow gentle lowering of the pickup arm to the record surface.

The pickup arm is rotated on its pivot by the friction spring (61) on the end of the swing arm (132) grasping the pickup arm bracket (135) as the swing arm is rotated on its pivot. At the end of the cycle, the friction spring (61) is moved free of the pickup arm, allowing the pickup arm to rotate freely.

RECORD FEED—As the swing arm (132) approaches the end of the first half of its cycle, it pushes the ejector lever (49) which in turn pushes the ejector push pin which moves the ejector lever (28) to operate the 7-10 inch and the 12-inch push plate (152) and (10) respectively.

PICKUP ARM INDEXING—When the 10-inch or 12-inch spindle is inserted in the center of the turntable, the discriminator lever (160) is moved out of the way so that lever (159) may be pulled against the 10-inch or 12-inch indexing lever (53). The 10-inch or 12-inch indexing lever (53) is controlled by the 7-10 inch record support. If the 7-10 inch record support is in a vertical position, index lever (159) is positioned for 12-inch record index. If the 7-10 inch record support is lowered, the index lever 159 is positioned for 10-inch record index. If either 7-inch spindle is inserted in the center of the turntable, the index lever (159) is stopped by the leg of the discriminator lever (160) which is not moved out of the way by the shorter 7-inch spindles. As the pickup arm is swung towards the spindle by the return action of the swing arm, the pickup arm is stopped by the arm (145) contacting the stepped end of index lever (159). At the end of the change cycle index lever (159) is moved out of the way by the swing arm which allows the pickup arm to be free on its pivot. Lever 170 is a braking lever for the pickup arm during the change cycle.

COMPLETING THE CHANGE CYCLE—At the end of the first half of the cycle, the dropping lever (83) contacts the lever trip bracket and allows the return roller (34A) to raise into the spiral on the underside of the turntable. At the same time, the cam at the inside of the spiral pushes the lead roller (34) down. The lead roller dropping lever (131) is moved into position by its spring and holds the lead roller (34) out of the spiral during the last half of the change cycle. As the turntable rotates, the swing arm (132) is swung back to its starting position. At the end of the last half of the cycle, the return roller (34A) is pushed out of the spiral by the cam at the center of the spiral. The return roller (34A) is held out of the spiral by lever (83).

MODEL P15

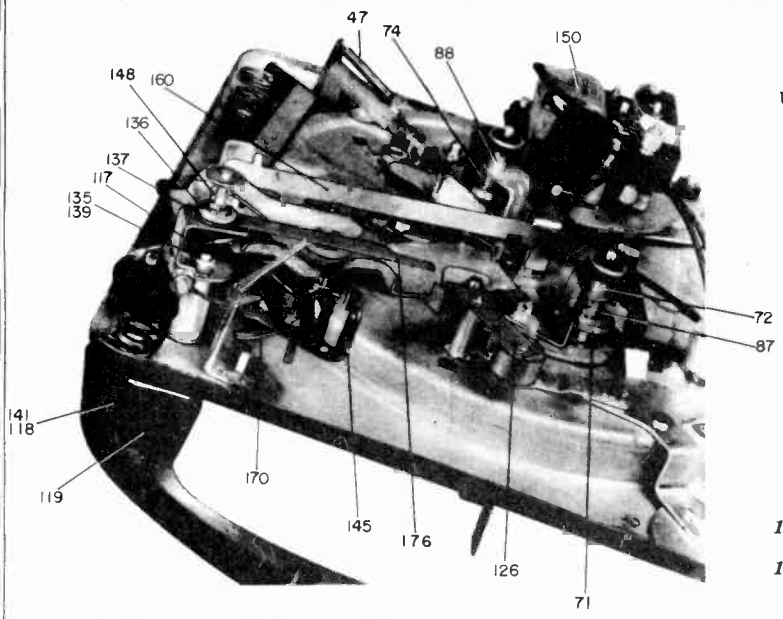


Fig. 4. Bottom View

LUBRICATION

Use Millicott 70K, or equivalent, on the following:

1. On edges of slots where swing arm clamps slide on base plate.
2. Sloping edge of cam dropping lever (83).
3. Between washer which holds swing arm (132).
4. Lever bearing washer on item (49).
5. Pivot pin on item 49.
6. Roller and pivot of lever (83).
7. Index arm lever pivot pin (159).
8. Index lever fulcrum pin and slide washer (53).
9. Spiral channel on bottom of turntable.
10. Slide bolt which pushes lever 28.
11. 7–10 inch record pushoff plate and 12-inch record pushoff plate.

SERVICE ADJUSTMENTS

1. PICKUP ARM DROP POINT ADJUSTMENT.

(A) With the control knob in OFF position, trip dropping lever (131) to trip changer and manually rotate the turntable until index lever (159) is free. Rotate pickup arm lever (145) so that it hits the middle or 10-inch index step of lever (159). (Place 10- or 12-inch spindle in center of turntable and lower 7- and 10-inch record support to a horizontal position.) Loosen the screw which clamps pickup arm pivot post (135) and rotate the pickup arm so that the stylus lands about ⅛-inch in from the outer edge of a ten-inch record. Check for proper indexing on 7-inch and 12-inch records.

(B) Spring on index lever (159) should have enough tension to rotate index lever (159) into position.

2. RECORD SUPPORT POST ADJUSTMENT.

Trip changer and rotate turntable manually until the swing arm has completed the first half of its cycle.

(A) Adjust the screw on lever (49) so that the 12-inch record pushoff plate (10) moves out flush with the ejector housing (9).

3. AUTOMATIC TRIP.

(A) Adjust nut on top of spring to increase or decrease pressure on velocity trip lever (134).

(B) Bend velocity trip lever (134) to contact end of lever (126).

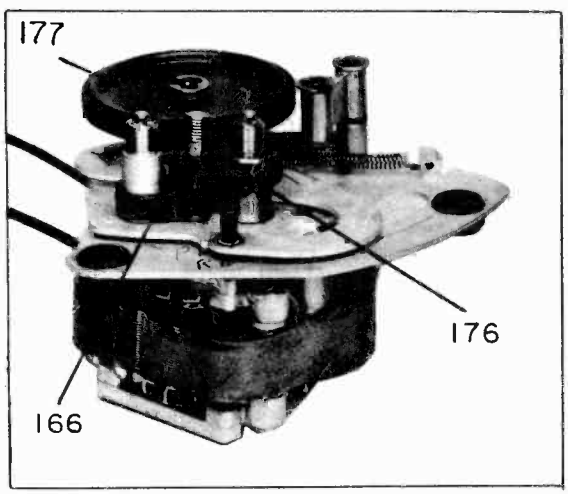


Fig. 5. Three Speed Phono Motor RBH-013

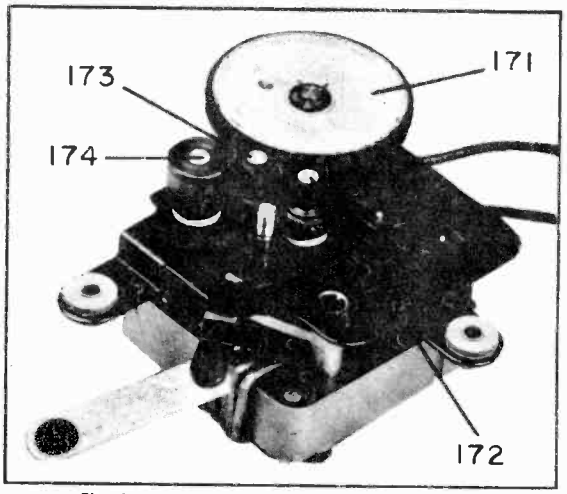


Fig. 6. Three Speed Phono Motor RBH-015

REPLACEMENT PARTS LIST

Cat. No.	Item	Description
RBH-013	150	MOTOR—Three-speed, belt-driven motor, uses two small belts to turn 33⅓ and 45 rpm pulleys. See Fig. 5.
RBH-015	150	MOTOR—Three-speed motor uses bushings for low speeds (used in late production). See Fig. 6.
*RDK-128	36	KNOB—Control knob
*RHC-032	141	HAIRPIN COTTER—Pickup arm hinge pin
*RHG-023	103	GROMMET—For motor speed lever
*RHM-044	84	NUT—Roller bearing speed nut, top of items 72 and 88.
*RHM-045	86	WASHER—Rubber cushion washer, on top of items 72 and 88.
*RHW-020	136	WASHER—Round adjustable steel washer, on top of item 134.
*RHW-021	137	WASHER—Velocity trip arm friction washer, part of item 134
*RJP-003		PLUG—110 volt, two prong male plug.
RKP-009	168	STYLUS SERVICE KIT
*RMA-003	1	ARM—Balance arm assembly rest on top of record stack
*RMA-007	116	LEVER PLATE—"Off-Manual-Auto-Reject" lever plate.
*RMB-014	34, 34A	PIN AND ROLLER—Swingplate lead and return pin.
*RMB-017	139	BALL BEARINGS—⅛-inch diameter, set of 15 used in tone arm pivot, one used in assembling items 126, RML-028 and 129, RML-029
RMD-003	166	BELT—Small pulley belt
RMD-004	167	BELT—Large pulley belt.
*RME-001	9	EJECTOR MECHANISM HOUSING—Cast metal case, top side of record changer
*RML-027	115	LINK LEVER—Reject control lever linked to item 116

Cat. No.	Item	Description
*RML-028	126	VELOCITY TRIP LEVER—Lower assembly consists of: lever, flat spring stop, balanced fulcrum, and pivot pin.
*RML-029	129	VELOCITY TRIP LEVER—Upper assembly consists of: lever, trip dog, and trip dog pin.
*RML-030	131	DROP LEVER—Operates lead pin and roller, item 34.
*RML-038	151	MOTOR SPEED LEVER ASSEMBLY—For motor RBH-013.
*RML-039	158	RBH-015 MOTOR SPEED LINK.
*RML-040	159	LEVER—Index ratchet arm lever.
*RML-041	160	INDEX—7-inch record discriminator lever.
RML-050	170	BRAKE LEVER.
*RMM-064	48	WASHER—Lever spacer washer on item 49.
*RMM-065	71	WASHER—Shoulder washer on item 34.
*RMM-066	72, 88	SPACER—For item 34 or item 34A.
*RMM-067	89	CAM—Swing plate return pin locking washer.
*RMM-070	8	HINGE BRACKET—For items 1 and 153.
*RMM-071	10	PLATE—12-inch record push-off plate.
*RMM-072	53	INDEX LEVER—10-inch record index control.
*RMM-076	53A	WASHER—Slide washer beneath item RMM-077.
*RMM-077	53B	PIN—Index lever fulcrum pin fastens item 53 to record changer deck.
*RMM-080	57A	PIN—Change lever fulcrum pin, part of item 57.
*RMM-108	102	LEVER—Motor-speed lever, part of control changing from 33⅓, 45 and 78 rpm for RBH-013.
*RMM-111	106	WASHER—Friction washer, part of item 105.
*RMM-122	128	TRIP DOG—Part of item 129, RML-029 (trips item 131, RML-030).
*RMM-135	146	SPACER—Short motor spacer at base of motor for RBH-013 motor.
*RMM-136	147	SPACER—Long motor spacer at base of motor for RBY-013 motor.
*RMM-137	152	7-INCH AND 10-INCH RECORD SLIDE BOLT.
*RMM-138	153	7-INCH AND 10-INCH RECORD SUPPORT.
*RMM-110	105	LEVER—Motor speed change lever, part of item 102 for Motor RBH-013.
*RMP-012	7	PIN—Hinge pin for item 8.
*RMP-016	50	PIN—Lever fulcrum pin, for item 49.
*RMP-019	117	PICKUP ARM LIFT PIN—Part of item 162.
*RMP-020	118	PICKUP ARM HINGE PIN—Part of item 162.
*RMP-022	127	PIN—Hinge pin, for trip dog on item 129.
RMP-024	176	LEVER—Velocity trip lever.
RPX-050	164	G-E DUAL PICKUP.
*RMS-131	5	SPRING—Ejector compression spring for 10-inch push-off plate.
*RMS-134	25	SPRING—For 10-inch record support.
*RMS-136	47	SPRING—Ejector arm tension spring.
*RMS-138	61	SPRING—Two friction springs on 132.
*RMS-139	70	RING—Retaining ring engages item 132 swingplate assembly.
*RMS-140	74, 87	SPRING—Compression spring on item 34.
*RMS-142	79	SPRING—Cammed dropping lever tension spring on item 83.
*RMS-144	92	SPRING—Mounting spring on record chassis.
*RMS-146	66	SPRING—Selector lever index spring.
*RMS-185	119	SPRING—Pickup arm spring, part of item 162.
*RMS-187	130	SPRING—Used with drop lever, item 131.
RMS-205	175	SPRING—Tension spring for idler wheel for RBH-015.
*RMS-206	148	SPRING—Velocity trip lever clutch spring.
*RMS-207	155	SPRING—Large brake spring stops swing arm at end of cycle.
*RMS-208	156	SPRING—Brake spring (wide black spring).
*RMS-209	161	SPRING—Index discriminator lever spring, part of item 160 assembly.
*RMT-016	125	TURNTABLE.
*RMU-060	154	SPINDLE—Off-set spindle for 10- and 12-inch records.
*RMW-059	163	IDLER WHEEL—On velocity trip lever assembly.
RMW-060	171	IDLER WHEEL—For RBH-015 motor.
RMW-061	172	BUSHING—Low speed, 33⅓ rpm.
RMW-062	173	BUSHING—Medium speed, 45 rpm.
RMW-063	174	BUSHING—High speed, 78 rpm.
RMW-066	177	IDLER WHEEL—For RBH-013.
RMX-111	28	EJECTOR PIVOT CHANNEL SUB-ASSEMBLY.
RMX-112	49	LEVER ASSEMBLY—Ejector idler lever assembly.
*RMX-114	83	LEVER ASSEMBLY—Dropping lever assembly for swingplate return pin.
*RMX-142	132	SWINGPLATE ASSEMBLY—Operates pickup arm lever and ejector idler lever, item 49 (assembly includes all attached parts).
*RMX-144	135	PIVOT POST—Pickup arm pivot post.
RMX-161	145	ARM—Index arm assembly.
RMX-162	149	SPINDLE—10- and 12-inch spindle post assembly.
RMX-163	157	SPINDLE—1½ inch spindle post assembly.
RPA-013	162	ARM—Pickup arm assembly.
RPJ-010	165	REPLACEABLE STYLUS ASSEMBLY.
RSW-052	94	SWITCH—Phono motor switch.

*Used on previous record changers.

TROUBLE SHOOTING CHART

SYMPTOMS	REMEDIES OR CAUSES
RECORD SELECTION	
1. Records fail to drop.	1. Check adjustment 2A. Check to see that 7–10 inch record support rests on the edge of the selector housing (9) and not on the 12-inch record pushoff plate. Check to see that ejector spring (47) returns levers (49) and (28) to the neutral position at the end of each cycle.
2. More than one record drops.	2. Check slider at top of 10- and 12-inch spindle to see that it is free to slide up and down.
PICKUP ARM MOVEMENT	
1. Pickup arm lands incorrectly.	1. Check adjustments 1A, 1B. Check operation of levers 159, 160 and 53.
2. Pickup arm descends onto record too fast.	2. Check friction brake spring (155). This spring may be too weak to slow swing arm (132) at the end of cycle.
3. Pickup arm does not lower onto record.	3. Check to see that cam end of swing arm (132) is not bent.
TRIPPING AND CYCLING	
1. Changer fails to trip.	1. Check adjustment 3A and 3B. Clean friction surfaces between velocity trip lever (134) and the friction washers. Clean with carbon tetrachloride or equivalent solvent. Check to see that idler wheel (163) is moved against cam at center of turntable by the velocity trip lever (134) pressing against lever (126) as the pickup arm is moved towards the center of the turntable. Levers 129 and 126 should not bind on their pivot.
2. Changer trips too soon.	2. Check adjustment 3A. Pressure on velocity trip lever may be too great.
3. Changer trips continuously.	3. Check selector lever spring (66). It should return selector lever to auto position from reject.
4. Changer fails to cycle after being tripped.	4. Check to see that lead roller (34) is being pushed upward into spiral on bottom of the turntable by the spring 87.
5. Changer jams at start of change cycle.	5. Check to see that return roller 34A is held out of the spiral by the cam dropping lever (83). During second half of cycle, spring should rotate lever (83) under return roller (34A) collar as it is pushed out of the spiral.
6. Changer action is sluggish.	6. Check lubrication. Check to make sure that slow speed bushings on the motor are not binding in their bearings due to dirt or gummy oil or grease.
MOTOR	
1. Changer is sluggish or motor overheats.	1. (a) Check lubrication (oil may be old or gummy). (b) Low line voltage. (c) Defective motor.
2. Motor rumble heard in record reproduction.	2. (a) Shipping bolts not removed from motor board. (b) Flat spot on idler wheel.

SUBJECT: SUPPLEMENT TO P15

Substitution of RBH-015 motor for RBH-017 and RBH-013 motors in the P15 three-speed record changer. Stock RBH-013 and RBH-017 motors will not be carried as a replacement unit. Parts for RBH-013 and RBH-017 will be stocked and are listed below and in ER-S-P15 parts list. Stock RBH-015 motor as listed in service notes for the P15 will be stocked. Parts for RBH-015 are listed below. RBH-015 motor is shown in Figure 1. RBH-017 motor is shown in Figure 2.

SUBSTITUTION OF RBH-015 MOTOR FOR RBH-017 MOTOR

RBH-017 motor, Figure 2, was used in late production of the P15 record changer. Stock RBH-015 motor may be substituted directly for RBH-017 motor without any change in the mechanism.

SUBSTITUTION OF RBH-015 MOTOR FOR RBH-013 MOTOR

Stock RBH-015 motor may be substituted for RBH-013 motor by changing to a new speed control linkage. All parts for this new linkage are contained in kit RKP-010. Kit RKP-010 contains the following:

1. Link Lever, Cat. No. RML-039
2. Rocker Lever, Cat. No. RMA-011
3. Knob Lever, Cat. No. RMM-110
4. Shoulder Rivet, Cat. No. RMM-080
5. Decal to identify RPM position of knob
6. Small rubber sleeve RMB-022

PROCEDURE.

1. Remove old RBH-013 motor and replace with RBH-015 motor as shown in Figure 3. Motor mounting studs are the same for RBH-015 and RBH-013.
2. Remove connecting lever and linkage between old RBH-013 motor and speed control knob. Save the knob, the flat washer, lockwasher and machine screw which secures lever to the speed control knob.
3. Rivet lever RMA-011 in place as shown in Figure 3 with shoulder rivet RMM-080. A hole is already stamped in the base plate to mount the shoulder rivet as shown in Figure 3.
4. Connect link lever RML-039, as shown in Figure 3, using grommet and rubber sleeve on motor speed change lever pin.
5. Mount lever RMM-110 as shown in Figure 3, using flat washer lockwasher and machine screw and knob. Figures 3 and 4 show the levers in the 45 rpm position.
6. Remove old decal by scraping the numbers off lightly with a razor blade. Replace with the decal as shown in Figure 4.
7. Make switch and plug connections. Connect ground lead between motor and base plate.

CAT. NO.	DESCRIPTION
RKP-010	KIT - Speed change lever kit for converting from RBH-013 motor to RBH-015 motor.
RMA-011	LEVER - Rocker lever for speed control linkage for RBH-015 or RBH-017 motors.
RML-039	LINK - Link lever for RBH-015 or RBH-017 motor with grommet.
RMM-080	RIVET - Shoulder rivet for mounting lever RMA-011.
RMM-110	LEVER - Knob lever for use with RBH-015 or RBH-017 motor.
RMS-205	SPRING - Idler wheel tension spring for RBH-015 motor.
RMS-211	SPRING - Pulley arm index spring for RBH-015 and RBH-017 motors.
RMS-212	SPRING - Idler wheel spring for RBH-017 motor.
RMS-218	LOCK RING - Small lock ring for holding 33 1/3, 45 and 78 rpm speed change pulleys onto spindle.
RMW-060	WHEEL - Idler wheel for RBH-015 motor.
RMW-061	PULLEY - 33 RPM speed change pulley for RBH-015 or RBH-017 motors.
RMW-062	PULLEY - 45 RPM speed change pulley for RBH-015 or RBH-017 motors.
RMW-063	PULLEY - 78 RPM speed change pulley for RBH-015 or RBH-017 motors.
RMW-066	WHEEL - Idler wheel for RBH-017 motor.

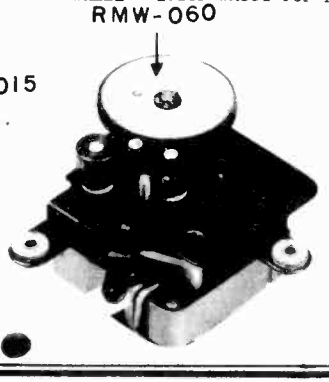


FIGURE 1.

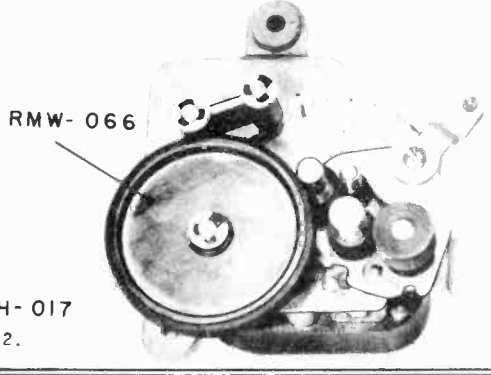


FIGURE 2.

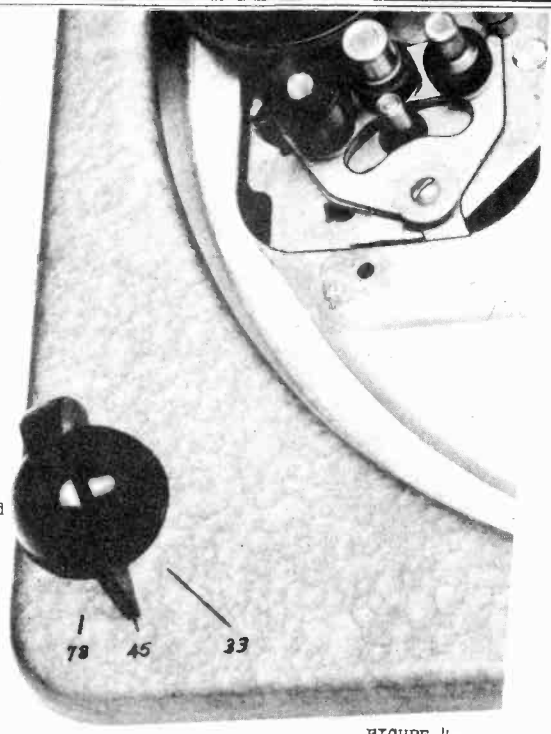


FIGURE 4.

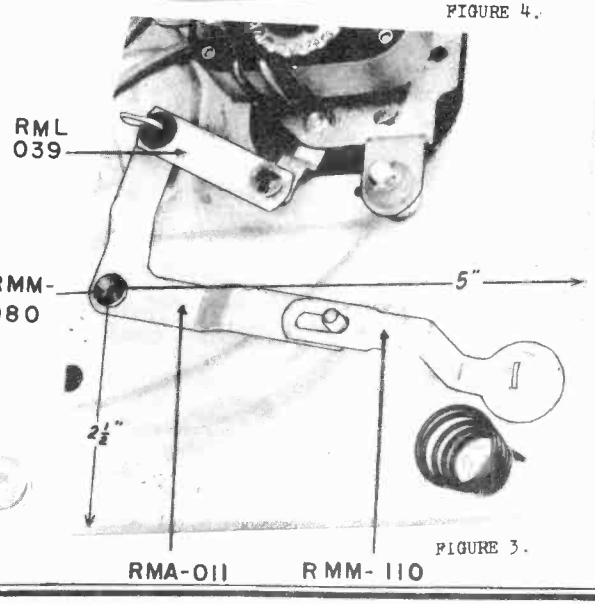


FIGURE 3.

DESCRIPTION

Motorola Model RC-36 Record Changer is a three-speed, single-post changer, designed to play the following records not intermixed:

a. ten 12-inch 33 or 78 RPM records, or -
b. twelve 10-inch 33 or 78 RPM records, or -
c. twelve 7-inch 45 RPM records, or -
d. twelve 7-inch 33 RPM records

A specially designed single-point needle is used for playing both standard and fine-groove records. Two interchangeable record spindles are used - a large diameter spindle for 45 RPM records and a small diameter spindle for all other type records.

The last record to drop to the turntable will be repeated until the changer speed control is turned off. This stops the turntable but the phono motor will continue to run until the "power" or "phono" control on the radio panel is turned off. No power switch is incorporated in the changer. The motor is designed to operate on 105 to 120 volts, 60 cycles AC only.

This changer features a limit stop mechanism which assures correct dropping of the pick-up arm on the lead-in grooves of the records and proper timing of the change cycle after the record has played, regardless of the record size - 7-inch, 10-inch or 12-inch.

OPERATION

PHONOGRAPH CONTROLS

SPEED. The SPEED control determines the speed at which the turntable revolves. You must set this control to the position corresponding to the playing speed of the records you wish to play, viz., record speed 33 RPM, SPEED control to 33; record speed 45 RPM (large center-hole records), SPEED control to 45; or record speed 78 RPM, SPEED control to 78.

CAUTION: The SPEED control can only be moved clockwise from a playing speed position, but may be moved counterclockwise or clockwise, one position, from an OFF position. To stop turntable - rotate SPEED control clockwise.

REJECT. The REJECT control is momentarily turned clockwise and released to start playing action or to reject a record before it has completely played.

OPERATING PROCEDURE

1. Turn the radio power switch "on" and the phono-radio control to the "phono" position.
2. Select the appropriate center post for the records you desire to play.
   a. Two spindles are provided; one spindle for small-hole records and one for large-hole records.
   b. To play small center-hole records, insert the small diameter spindle into the hole in the center of the turntable and rotate the spindle until the pin of the spindle drops into the slot in the turntable bushing.
   c. To play large center-hole records, insert the large diameter spindle into the turntable hole and turn the spindle counterclockwise until the spindle reaches a stop. NOTE: If the two metal separator discs of the large spindle are seen protruding from the spindle, turn the spindle shaft until they disappear inside the spindle, then insert the spindle into the turntable.
   d. To remove a spindle from the turntable, merely lift the spindle straight up from the turntable.

3. Adjust the RECORD SUPPORT to the correct position according to the size record you desire to play.

   a. Three positions of the record support are provided, i.e., a separate position for playing 7-inch, 10-inch, and 12-inch records (see Figure 2).

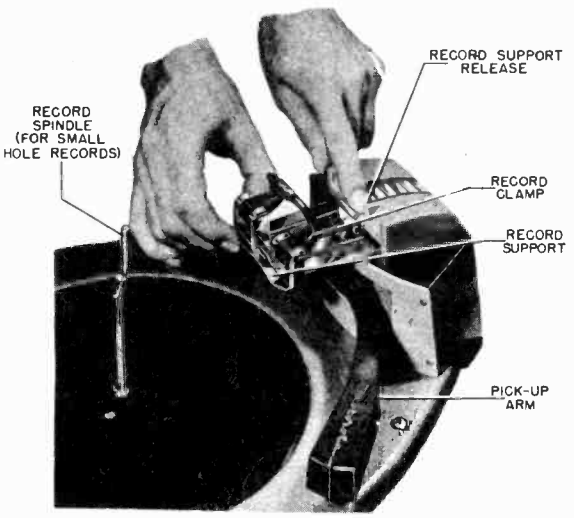
   b. To adjust the RECORD SUPPORT press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the correct position according to the size records being played. The RECORD SUPPORT will lock in position (see Figure 1). NOTE: Although the ledge of the RECORD SUPPORT is not used when playing 7-inch 45 RPM records, the RECORD SUPPORT must be in the 7-inch playing position.

4. Load the records.

   a. Raise the RECORD CLAMP to a vertical position.

   b. Place a stack of records over the center post in the desired sequence, with the last record to be played on top.

   c. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the spindle when playing small-hole records. If you are playing large-hole records, place the records over the spindle and rest them on the off-sets of the large spindle.



To adjust the RECORD SUPPORT, press down on the RECORD SUPPORT RELEASE and move the record support to the desired position.

FIGURE 1. RECORD SUPPORT ADJUSTMENT

   d. Gently lower the RECORD CLAMP on the records. NOTE: DO NOT LOWER THE RECORD CLAMP WHEN PLAYING 7-INCH 45 RPM RECORDS.

5. Adjust the SPEED control to the position corresponding to the record speed of the records you are playing.

6. Momentarily turn the REJECT control clockwise.

   a. The bottom record will now drop to the turntable, the pick-up arm will lift, swing in, and drop to the turntable; record playing will now begin.

   b. The REJECT control may be turned momentarily clockwise to reject a record before it has completely played. NOTE: Never touch the pick-up arm while the record changer is in a changing cycle.

7. At the conclusion of playing and as the last record is being repeated, lift the pick-up arm and move it to the right.

8. Turn the SPEED control clockwise to the OFF position. NOTE: This stops the turntable, but the motor will continue to run until turned off either with the "phono" control or "power" switch on the radio panel.

9. Turn the power switch on the radio panel "off".

TO UNLOAD RECORDS

1. Raise the RECORD CLAMP.

2. Lift the records straight up from the turntable. Do not apply pressure to the top record. Keep your thumbs free. NOTE: When removing 45 RPM records, if the two metal separator discs of the large spindle are seen protruding from the spindle, lift the spindle, with the records, from the turntable and turn the spindle shaft until the discs disappear inside the holder before removing records.

A. To play 7-inch small-hole records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme outward position. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.

B. To play 10-inch records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the middle position (1-1/2 inches in from the extreme outward position). Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.

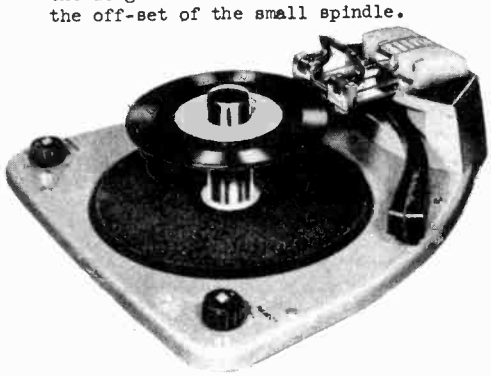


FIGURE 2. RECORD SUPPORT IN RECORD PLAYING POSITIONS

C. To play 12-inch records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme inward position. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.

D. To play 7-inch large-hole records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme outward position. Rest the records on the off-set of the large spindle.

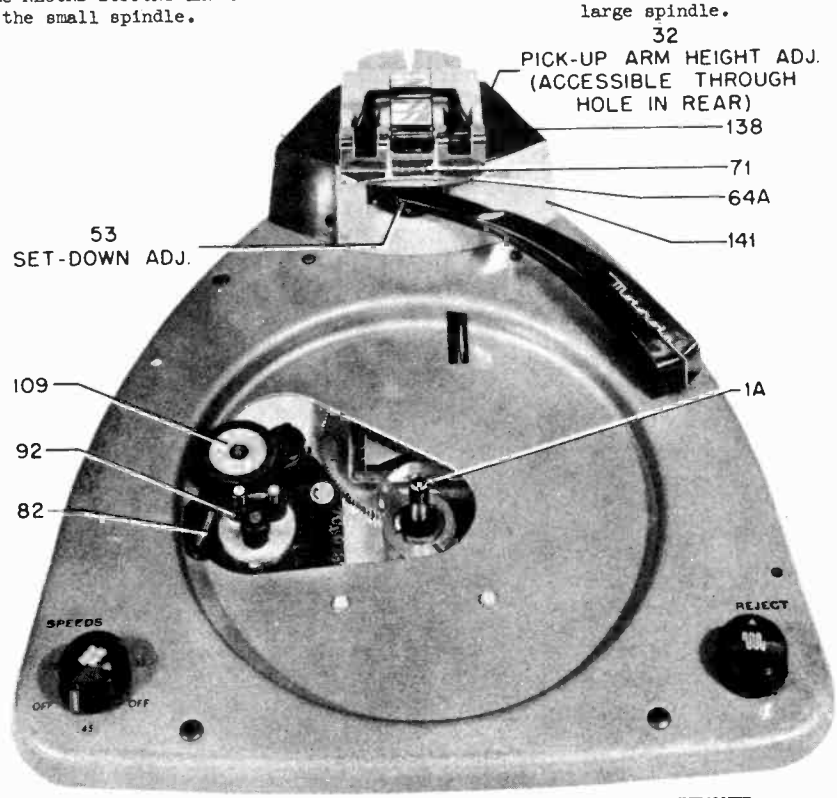


FIGURE 3. TOP VIEW OF RECORD CHANGER WITH TURNTABLE REMOVED

MODEL RC-36

THEORY OF OPERATION

Refer to Figures 3, 4, 5, 6, 7 & 8 for location of the various parts described in this section. This will enable you to readily follow the operation of this unit.

The turntable is rim-driven. Power is transmitted to the turntable through an idler wheel (109) and a speed control turret (92). The speed control turret is operated by means of a 3-gear train, linking the turret to the speed change shaft assembly (87) which is manually operated by the speed control knob on the record changer base. This control has six positions - 78, 45 & 33-1/3 RPM and three "off" positions - controlled by an ingenious six-point cam (87A). This cam permits easy selection of turntable speeds, yet prevents the speed control turret (92) from jamming idler wheel (109) against turntable and causing flat-spots. The speed control can only be moved clockwise from a playing speed position, but may be moved counterclockwise or clockwise, one position, from an OFF position.

During a playing of a record, only the motor assembly (82) and turntable (119) are in operation. Balance of the mechanism is inoperative until the change cycle starts.

THE CHANGE CYCLE

The change cycle may be initiated in two ways - by means of the pick-up arm entering the cut-off grooves in the record or by manual operation of the reject knob. Power for the change cycle is obtained from the turntable.

Prior to a change cycle and while the turntable revolves, the weighted end of the drive clutch lever (118) is resting on the trip lever (21A). When the pick-up arm needle finishes playing a record and enters the cut-off groove, the trip arm (36A), attached to pick-up arm shaft (33), pushes the trip flag bracket (21B) - or when the changer's "reject" control is turned, the reject arm (4), acting through the reject rod (134), pushes the trip flag bracket (21B). This action releases trip lever arm (21C) allowing the trip lever spring (22) to pull the trip lever (21A) away from the drive clutch lever (118), causing the weighted end (118A) of the drive clutch lever (118) to lower and, consequently, the drive dog (118B) of the drive clutch lever contacts the drive screw (120) on the turntable and the change cycle begins.

When the drive clutch lever (118) engages the drive screw (120) and as the turntable continues to revolve, this revolving action causes the cycle gear (9) to turn through the drive gear (117). As the cycle gear revolves, its roller (9A) moves the slide channel (21) back and in doing so, the pick-up arm shaft (33) rides up on the incline (21D) of the slide channel, raising the pick-up arm. As the slide channel (21) continues its backward motion, the clutch fingers (21F) will engage the set-down arm assembly (36) to swing the pick-up arm in a direction away from the spindle. At the extreme backward travel of the slide channel (21) the push-off lever (60C), which rides in the slot (21E) of the slide channel, is actuated and this in turn, through the push-off link (72) moves the record push-off lever (71) pushing the lower record off the record support

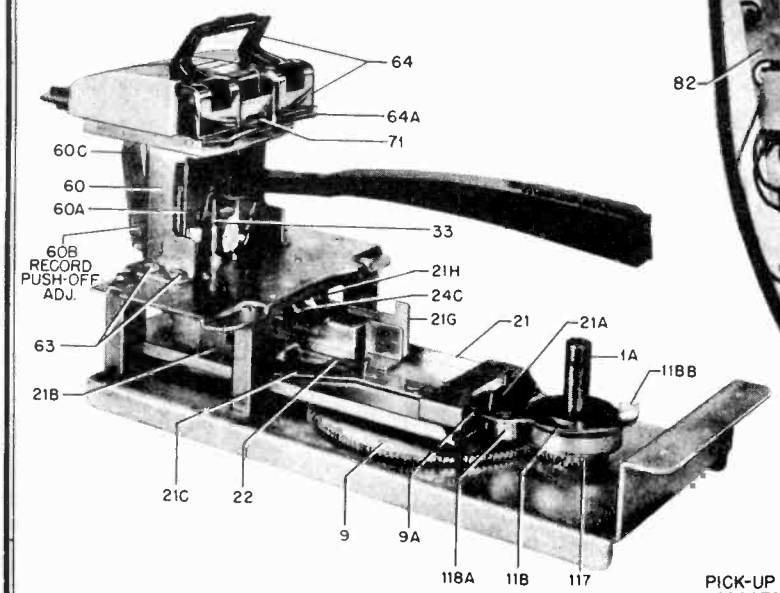


FIGURE 5. VIEW OF RECORD CHANGER WITH BASE & MOTOR ASSEMBLY REMOVED

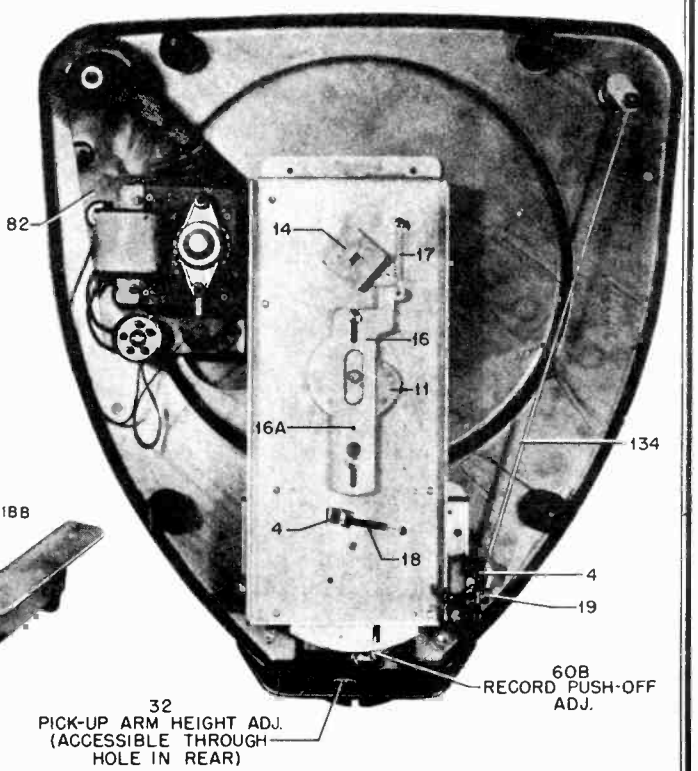


FIGURE 4. BOTTOM VIEW OF RECORD CHANGER

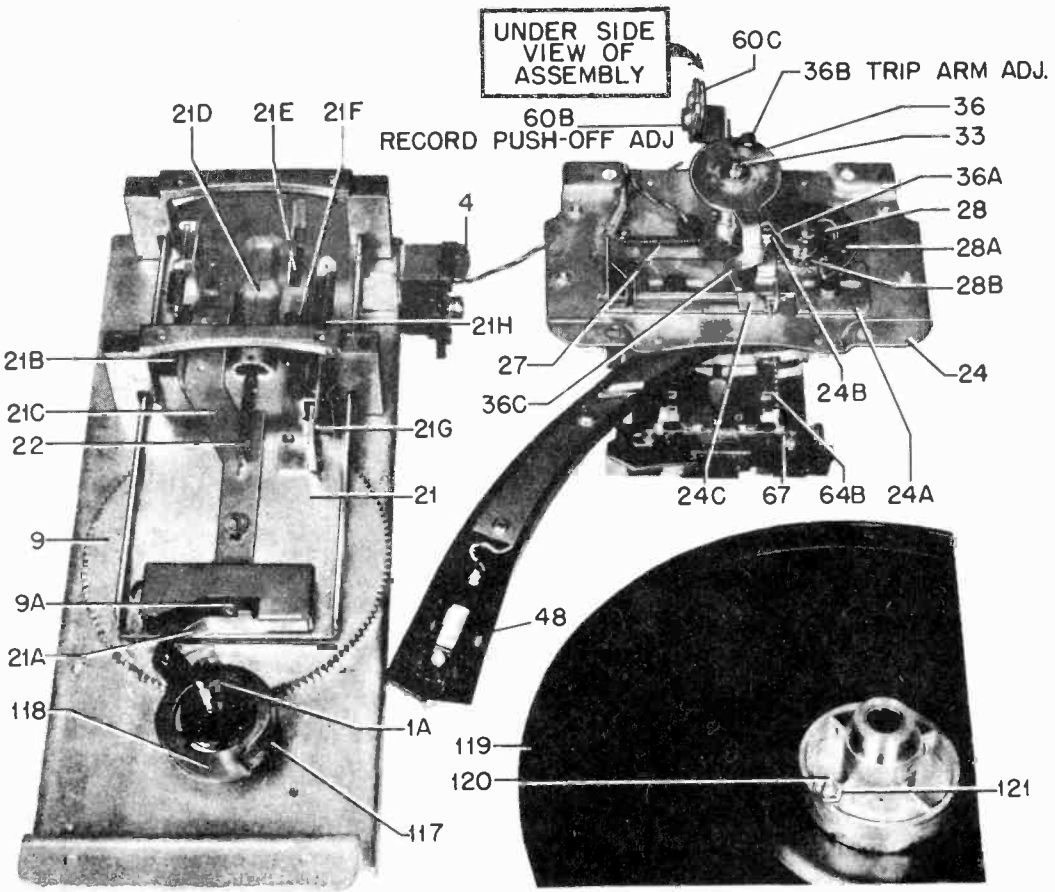


FIGURE 6. DISASSEMBLED VIEW OF RECORD CHANGER MECHANISM

(64A) thus permitting it to drop to the turntable. At this same time, the restoring lever (21G) lowers the set-down flag (24C) (which will index the pick-up arm when the slide channel makes its forward motion) also the trip slide cocking stud (6) engages the trip arm (21C) with the trip flag (21B) to set it for the next cycle and to prevent re-cycling when the slide channel completes its cycle. At this point one-half of the change cycle is completed.

The cycle gear (9) will continue to rotate until it completes one revolution. As it continues to revolve, the slide channel (21) will move forward and the clutch fingers (21F) that are still engaging the set-down arm assembly (36) will now swing the pick-up arm back toward the record spindle until the set-down arm (36C) contacts the set-down flag (24C); this controls the pick-up arm set-down point. While the arm is being held over the set-down point by (24C), continued rotation of the cycle gear (9) makes the pick-up arm shaft (33) ride down the incline (21D), lowering the pick-up arm onto the record.

As the slide channel (21) approaches the end of the cycle (fully forward position) the set-down flag (24C) is moved out of the way by the restoring lever (21H) to give the pick-up arm complete freedom of movement during playing of the records.

When the slide channel moves fully forward, the drive clutch lever (118) rides up the trip lever incline (21A) and disengages the drive clutch lever dog (118B) from the drive dog screw (120) in the turntable, thus ending the cycle.

PICK-UP ARM SET-DOWN POINT

The point at which the pick-up arm drops to the turntable for either 7-inch, 10-inch or 12-inch records is determined by the position of the set-down flag (24C).

When the record support assembly (64) is adjusted for a specific size record, the movement of the record support causes rotation of the gear and pinion shaft assembly (60A) through the rack gear (64B) on the record support. Since the gear and pinion shaft assembly (60A) engages the set-down gear (28B) and the set-down cam (28A) is attached to the set-down gear, any movement of the record support will cause the set-down cam to turn. The set-down cam stud (24B), on the slide plate and spring assembly (24A), rides with the set-down cam due to the tension of the slide plate spring (27); therefore, any action of the set-down cam will affect the position of the set-down flag (24C).

45 RPM RECORD DROP

The 45 RPM spindle shaft, when dropped in the turntable center hole, fits into the slot in the timing stop (14).

When the change cycle begins and the slide channel (21) is making its backward movement, the reject plate (16)

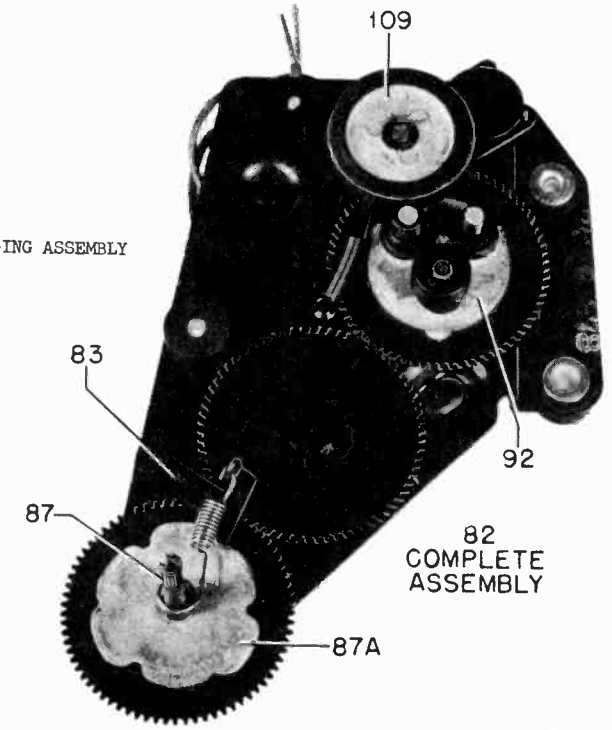


FIGURE 7. MOTOR & SPEED CHANGING ASSEMBLY

moves forward due to the eccentric form of the drop cam (11) riding on roller (16A) and the tension of the spring (17), pulls the reject plate (16) forward until it contacts timing stop (14), preventing it from rotating. Since the turntable with the 45 RPM spindle continues to rotate and the timing stop (14) and spindle shaft (153) remain stationary, the two pinion gears (155) in the upper section of the spindle rotate around the spindle shaft (153) gear. The eccentric extending from the upper end of the two pinion gears (155) runs in a slot in the molded record supports to produce the necessary action which causes the supports to move in against the tension of spring (156). As the plastic record supports recede, the separator discs mounted above each record support separate the lower record of the stack and support the remaining stack while the lower record drops to the turntable. With continued rotation of the spindle the record supports, due to the action of spring (156), will move out to support the record stack, while the separator discs recede into the spindle.

When the slide channel (21) is making its forward movement, the reject plate (16) moves back releasing the timing stop (14) allowing the timing stop and the spindle shaft to revolve for the playing of the record.

LUBRICATION

Factory lubrication should be sufficient for a long period of service.

When lubrication is required use only the following lubricants in the places specified:

Part	Lubricant
Turntable Bearing	- "All-State" Front Wheel Bearing Grease (car lubricant)
Slide Channel (21), Slide Plate & Spring Assembly (24A)	- Moly-Kote (Alpha Corp type M) (Motorola Part No. 11M490126)
All other moving parts	- Silicone High Temperature Lubricant (Dow Corning Corp #DC-44) (Motorola Part No. 11M476079)

DO NOT LUBRICATE THE FOLLOWING PARTS:

Trip flag bracket (21B)

Trip lever assembly (21C)

If any oil or grease should come in contact with the idler wheel tire, inside rim of turntable, or any of the motor drive surfaces, clean with carbon-tetrachloride.

MAINTENANCE

It is advised that the service man thoroughly study and familiarize himself with the operation of the integral parts of the record changer and to carefully analyze the trouble before attempting to make any adjustments or to do any repair work on the record changer. The changer, after it leaves the factory, will not require any periodic adjustments, except to adjust the needle set-down point, if the needle or cartridge is replaced.

Should it become necessary to remove the changer from the cabinet, or the changer mechanism from the base plate, the service man is further advised not to unnecessarily remove parts or sections of the changer, since the changer then will require adjustment.

In order for the changer to operate properly, it is important that the changer remain level, either mounted in the cabinet or, while repairing the changer, on the bench. If the changer is working satisfactorily, leave it alone.

ADJUSTMENTS

NEEDLE SET-DOWN ADJUSTMENT

A template, (Motorola Part No. 54B792330) furnished with the record changer, is required to index the needle to the correct set-down point after a needle or cartridge has been replaced. If a template is not available, you may improvise one as follows:

1. Set a compass to 3-5/16 inches and draw a circle on a piece of cardboard.
2. Punch out a 17/64 inch diameter hole at the exact center of the circle.

To index the needle to the correct set-down point:

1. Place the small diameter spindle in the turntable and the template over the spindle.
2. Move the record support to the 7-inch record playing position. NOTE: When the needle is set correctly for this position, the index will be automatically set for 10-inch and 12-inch records.
3. Rotate the turntable by hand and turn the reject control to start the change cycle. Watch the needle carefully. It must land on the curved line of the template.
4. If the needle does not land on the line, adjust the set-down setscrew (53) located on the pick-up arm (see Figure 11). Turn the setscrew clockwise to move the pick-up arm in a direction towards the spindle, or turn the setscrew counterclockwise to move the pick-up arm in a direction away from the spindle. IMPORTANT: Turn the screw very slightly and repeat step 3. Repeat this procedure until the needle lands exactly on the curved line.

PICK-UP ARM HEIGHT ADJUSTMENT

If the pick-up arm strikes the bottom record of a stack of records resting on the 45 RPM spindle or the pick-up arm does not rise sufficiently to clear a 1-inch stack of records after they have dropped to the turntable, proceed as follows:

1. Remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
2. The height adjustment screw (32) is accessible through a hole in the rear of the record support housing (138) (see Figure 3).
3. If insufficient clearance is noted, turn the height adjustment screw (32) clockwise to raise the arm, or counterclockwise to lower the arm, as required.

PUSH-OFF LEVER ADJUSTMENT

If a record fails to drop to the turntable, check the position of the record push-off lever (71) on the record support during a change cycle; it should protrude a minimum of 1/32 inch from the record support during the record dropping portion of change cycle. If adjustment is required, proceed as follows:

1. Remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
2. Turn the reject knob to place changer in cycle and rotate turntable by hand until record push-off lever (71) is at its point of maximum forward travel.
3. Turn the push-off adjustment screw (60B) until push-off lever (71) protrudes 1/32 inch beyond lip (64A) of record support.

TURNTABLE DRIVE PIN ADJUSTMENT

If a "clicking" noise is heard while a record is playing, the drive dog adjusting screw (120) on the bottom of the turntable is touching the drive dog (118B). To remedy:

1. Remove the turntable. NOTE: Do not remove the drive clutch lever (118); also do not lose the bearing washer (115).
2. Loosen the hex nut (121) and turn the drive dog adjusting screw (120) counterclockwise to bring the screw further away from the drive dog. CAUTION: Do not turn the screw too much, since the screw will not engage the drive dog and, as a consequence, the changer will fail to cycle.
3. Tighten the hex nut (121).
4. Replace the turntable.

MODEL RC-36

TRIP ARM ADJUSTMENT

If the mechanism does not trip after playing a record or trips before a record has completed its play, the set-down arm (36) requires adjustment.

1. Readjust the needle set-down setscrew (53) (see paragraph on NEEDLE SET-DOWN ADJUSTMENT).
2. If adjusting the setscrew in step 1 does not correct the fault, remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
3. Turn the set-down adjustment screw (53) until the end of the setscrew is even with the pick-up arm.
4. Adjust the trip arm adjustment stud (36B) (this is an eccentric stud) sufficiently so that mechanism trips correctly.
5. Readjust the needle set-down setscrew (53) (see paragraph on NEEDLE SET-DOWN ADJUSTMENT).

PARTS REMOVAL AND REPLACEMENT

TO REMOVE THE RECORD CHANGER FROM THE CABINET

1. Disconnect the power and phono input leads from the record changer.
2. Loosen and remove the four Phillips head screws (123) on the top of the record changer and pull the record changer straight up from the cabinet.

NEEDLE REPLACEMENT

Use only a Motorola needle; do not use any other needle, as damage to the records or crystal cartridge will result. IMPORTANT: After needle is replaced, check the set-down point as outlined in NEEDLE SET-DOWN ADJUSTMENT.

Two types of needles and crystal cartridges are being used. Look at your needle and cartridge!

IMPORTANT: The needle should be held in the cartridge perpendicular to the surface of the turntable.

1. If the needle is secured to the cartridge with a small, round knurled nut (see Figure 9), loosen the nut and remove the needle from the cartridge. Replace with Motorola needle, Part No. 59K691908. Insert the replacement needle in the cartridge needle receptacle and tighten the knurled nut.
2. If the needle is not held in place with a knurled nut, merely pull the needle from the cartridge using your fingers or pliers (see Figure 10). Replace with Motorola needle, Part No. 59K691909. The replacement needle is partly encased in a small guard to protect the needle point; push the needle into the cartridge needle receptacle and remove the guard. Friction will hold the needle in position.

FIGURE 9.

FIGURE 10.

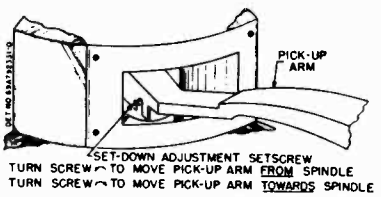


FIGURE 11.

CARTRIDGE REPLACEMENT

Two types of cartridges are being used, they are interchangeable. To remove the cartridge, merely remove the cartridge retainer clip (48) and disconnect the pick-up leads. IMPORTANT: After cartridge is replaced, check the needle set-down point as outlined in NEEDLE SET-DOWN ADJUSTMENT paragraph.

TO REMOVE THE TURNTABLE

1. Remove the turntable retaining clip.
2. Lift the turntable straight up from the base plate. Be sure the bearing (116) and bearing washer (115) do not get lost or dirty.
3. When replacing the turntable, it will be necessary to center the drive clutch lever (118) and bearing washer (115) to allow proper seating of the turntable over the spindle post.
4. Replace the turntable retaining clip.

TO REPLACE THE DRIVE CLUTCH LEVER

1. Place the changer mechanism in the rest position (slide channel (21) in full forward position) with the trip flag bracket (21B) engaged in the trip lever arm (21C).

2. Place the drive clutch lever (118) in position with the weighted end (118A) of the drive dog resting on the trip lever (21A).

TO REMOVE THE DRIVE GEAR

1. Remove the turntable and drive clutch lever (118).

2. Lift the drive gear (117) straight up from the spindle post.

3. When replacing the drive gear (117) it is important that the changer be timed correctly. To time, position cycle gear so that cycle gear roller (9A) is directly in line with the spindle post (1A) and pull the trip lever (21A) forward so that trip flag (21B) falls in and locks it in position. Now place the drive clutch lever (118) in position on drive gear (117) and mesh the gears so that weighted end of clutch lever (118) rests on the lowest edge of the trip lever (21A) incline. Check the timing by playing a stack of 45 RPM records. If a record of the stack fails to drop during a cycle, move the drive gear (117) one "tooth" and play another stack of records to again check the timing.

TO REMOVE THE RECORD SUPPORT HOUSING COVER AND RECORD SUPPORT HOUSING

1. Remove the four Phillips head screws (142) that secure the housing cover (141) to the housing (138).

2. Remove the four hex head screws (140) and four washers (139), accessible from the bottom of the changer, that secure the housing to the base plate.

TO REMOVE THE COMPLETE CHANGER MECHANISM AND MOTOR ASSEMBLY

1. Disconnect the power and phono leads.

2. Remove the speed control knob.

3. Disconnect the reject rod (134).

4. Remove the turntable and drive clutch lever (118) from the changer.

5. Remove the record support housing cover (141) and housing (138).

6. From the bottom of the changer, remove one machine screw (131) securing the motor assembly (82) to the base plate (122).

7. Remove the four Phillips head lockscrews (130).

8. Remove the two hex head screws (129).

TO REMOVE THE MOTOR ASSEMBLY

1. Disconnect the power lead.

2. Remove one machine screw (131) from the bottom of the record changer securing the motor assembly to the base plate.

3. Remove the turntable from the record changer.

4. Remove the two machine screws (114) securing the motor assembly to the changer mechanism.

5. Remove the speed control knob.

PICK-UP ARM MOUNTING PLATE ASSEMBLY REPLACEMENT

Should it ever become necessary to remove the pick-up arm mounting plate assembly (24), the following precautions should be observed when replacing the assembly.

1. Be sure that the hole in the set-down cam (28A) lines up with the hole in the mounting plate and that the set-down cam stud (24B) on the set-down flag (24C) is on the outside of the cam.

2. Be sure that the set-down flag (24C) is in a position so that it can be actuated by the restoring lever (21G).

3. The record support must be in the 12-inch playing position when replaced.

TO REMOVE THE SLIDE HINGE AND SLIDE BRACKET

1. Slide hinge (145) is secured with a spring clip (149). To unlatch the slide hinge: Place a folded piece of paper on both sides of the slide hinge, between the slide hinge and the slide cover (143) and pull the paper forward, simultaneously pulling the slide hinge upwards. See Figure 12.

2. Four machine screws secure the slide bracket (146) to the record support and slide cover (143).

MODEL RC-36

REPLACEMENT PARTS LIST

Ref. No.	Part Number	Description
1	1X691802	Mounting Plate Riveted Assembly (includes items 1 through 8)..
2	7A470234	Bracket, receptacle mtg .....
3	5S7701	Rivet: .122 x 3/16; stl .....
4	45B691361	Arm, manual reject .....
5	5K691478	Rivet, shoulder .....
6	46A691227	Stud, trip slide cocking .....
7	5K26998	Rivet, shoulder .....
8	46A691273	Stud, reject plate slide .....
9	1X691803	Cycle Gear, Shaft & Roller Assembly
10	4A691767	Washer, spring .....
11	45A691256	Cam, record drop (45 RPM) .....
12	4S7569	Washer, flat: 5/16 x .145 x .027; cad pl .....
13	3S7247	Lockscrew: 6-32 x 3/16; slotted hex head machine screw; cad pl ....
14	46A691309	Stop, timing .....
15	42A691462	Clip .....
16	1X691843	Reject Plate & Roller Assembly..
17	41A76925	Spring, coil tension .....
18	41A691489	Spring, manual reject .....
19	9A470260	Receptacle, 1-prong .....
20	3S7506	Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl.....
21	1X691804	Slide Channel Assembly: complete.
22	41A691469	Spring, trip lever arm actuating.
23	41A14244	Spring, tension coil .....
24	1X691962	Set-Down Flag & Pick-Arm Mounting Assembly: complete; includes items 24 through 30 .....
25	41A691258	Spring, set-down flag detent .
26	5S7769	Rivet: .088 x 3/32 stl;.....
27	41A691282	Spring, slide plate .....
28	1X691813	Set-Down Cam & Gear Assembly .
29	4K73809	Washer, "C" .....
30	5A790684	Grommet, rubber .....
31	1X691815	Pick-up Arm Brkt. & Stud Assembly..
32	3A691288	Screw, pick-up arm adj .....
33	47A691221	Shaft, pick-up arm .....
34	46A691268	Pin, pick-up carriage .....
35	3S3858	Setscrew: 4-40 x 1/4 allen head ...
36	1X691816	Set-Down Arm Assembly .....
37	3S9700	Setscrew: 6-32 x 3/16 allen head...
38	46C691431	Counterbalance, pick-up arm.....
39	3S1452	Screw, machine: 4-40 x 1/2 slotted binderhead; cad pl .....
40	1X691817	Pick-up Arm Assembly: includes items 40 through 53 .....
41	45D691428	Arm, pick-up: arm only .....
42	1X691818	Pick-up Cartridge Leads Assembly...
43	9A72670	Contact, pin terminal .....
44	59B691430	Cartridge, crystal: with needle (Shure) .....
45	or 59K691907	Cartridge, crystal: with needle (Electro Voice) .....
46	59K691908	Needle (for 59B691430 cartridge)...
47	59K691909	Needle (for 59K691907 cartridge)...
48	42A691429	Clip, cartridge retainer .....
49	1X691819	Pick-up Arm Plate & Bushing Assem..
50	3S490739	Screw: #4 x 1/4 PKZ Phillips binderhead; cad pl .....
51	3S490535	Screw, machine: 4-40 x 5/16 Phillips flat head; cad pl .....
52	41A691329	Spring, torsion .....
53	3S9710	Setscrew: 4-40 x 5/16 slotted headless .....
54	4K580282	Washer, spring: phosphor bronze.
55	4A16556	Washer, spring .....
56	3S2286	Lockscrew: 4-40 x 3/16 slotted hex head machine screw; cad pl ...
57	46C691368	Block, guide slide .....
58	4S7651	Lockwasher: #8 int; cad pl ...
59	3S2963	Screw, machine: 8-32 x 1-3/4" plain hex head; cad pl .....
60	1X691820	Record Support Housing Assembly: complete with push-off lever & gears .....
61	1X691963	Bracket Lock Assembly .....
62	5S8497	Rivet: .088 x 1/8; stl; nkl pl.....
63	3S7350	Lockscrew: 6-32 x 1/4; slotted hex head machine screw .....
64	1X691824	Record Support & Clamp Assembly: complete; includes items 64 through 70 .....
65	1X691964	Clamp Assembly, record hold-down
66	41A691279	Spring, extension .....
67	41A691795	Spring, push off restoring .....
68	5S691794	Rivet, shoulder .....
69	46A691485	Stud, drive .....
70	46A691243	Pin, spring retainer .....
71	47K691953	Lever, record push-off .....
72	1X691826	Push-Off Link & Bushing Assembly
73	46A691235	Stud, slide locking .....
74	41A691466	Spring, coil .....
75	4S8279	Washer, flat: 5/16 x .125 x .027; cad pl .....
76	4K73809	Washer, "C" .....
77	64B691342	Plate, record rest cover .....
78	3S6932	Screw, machine: 4-40 x 3/16 slotted locking type binderhead .....
79	43K471634	Ball, steel .....
80	42A691405	Clip, ball bearing .....
81	41A691467	Spring, extension .....
82	59D691876	Motor Drive Assembly: complete; includes items 82 through 113..
83	45A691223	Pawl, speed detent .....
84	5K691481	Rivet, shoulder .....
85	37K15125	Grommet, rubber .....
86	5A12105	Eyelet, mounting .....
87	1X691965	Speed Change Shaft Assembly ....
88	44A691219	Gear, speed change .....
89	43A17431	Bushing, collar: brass .....
90	3S7113	Setscrew: 8-32 x 1/4 slab head .
91	41A691280	Spring, pawl extension .....
92	1X691966	Speed Control Turret Assembly: includes items 92 through 97 .....
93	4A691407	Washer, pulley: felt .....
94	42A691438	Clip, pulley retainer .....
95	49A691333	Pulley, speed control (78 RPM)..
96	49K691337	Pulley, speed control (45 RPM)...
97	49A691335	Pulley, speed control (33 RPM)....
98	44A691219	Gear, speed change .....
99	4A691214	Washer, turret spring: phosphor bronze .....
100	3S490530	Screw, machine: 3-48 x 3/16 slotted round head; cad pl .....
101	59C691379	Motor, phono .....
102	28A470534	Plug, cable connector .....
103	29A481785	Lug, ground connector .....
104	4S7657	Lockwasher: #8 ext; cad pl ...
105	3S2957	Screw, machine: 8-32 x 1/2 plain hex head; cad pl .....
106	3A691237	Screw, motor mounting .....
107	41A691284	Spring, motor extension .....
108	1X691967	Idler Wheel Bracket Assembly .
109	49A691277	Wheel, idler .....
110	4A691891	Washer, insulating: rubber ...
111	42A691893	Clip, hair pin .....
112	46A691420	Pin, groove .....
113	41A691281	Spring, idler extension .....
114	3S7279	Screw, machine: 8-32 x 5/8 slotted binderhead; cad pl .....
115	4A691286	Washer, bearing .....
116	43A691278	Bearing, turntable .....
117	44B691354	Gear, drive .....
118	1X691827	Drive Clutch Lever & Weight Assembly
119	1X691978	Turntable Assembly .....
120	3A691225	Screw, drive dog adjusting ..
121	2S7003	Nut, hex: 8-32 x 5/16 .....
122	1X691829	Record Changer Base Assembly: includes items 122 through 128 ...
123	3S488108	Screw, machine: 10-32 x 1-3/8 Phillips flat head; antique copper finish .....
124	4S8214	Washer, flat: 7/8 x .203 x .067

Ref. No.	Part Number	Description
125	35A481870	Mounts, shock:rubber .....
126	43A484295	Sleeve, shock mount:rolled .....
127	2A484296	Nut, shock mount: tapered tee ..
128	37A17361	Grommet, rubber .....
129	3S7205	Lockscrew: 8-32 x 1/4 slotted hex head machine; cad pl .....
130	3S490533	Lockscrew: 6-32 x 1/4 Phillips binderhead machine screw; antique copper finish .....
131	3S7279	Screw, machine: 8-32 x 5/8 slotted binderhead; cad pl .....
132	1X691830	Reject Lever & Shaft Assembly
133	4A11722	Washer, "C" .....
134	47A691464	Rod, reject .....
135	43A691917	Sleeve, rubber .....
136	2A691432	Nut, speed .....
137	36B691483	Knob, control .....
138	15D691488	Housing, record support .....
139	4S8279	Washer, flat: 5/16 x .125 x .027; cad pl .....
140	3S490531	Screw: #4 x 3/8 PKF plain hex head; cad pl .....
141	15C691393	Cover, housing .....
142	3S490532	Screw: #2 x 3/8 PKF Phillips oval head; nkl pl .....
143	15C691395	Cover, slide .....
144	42A691415	Fastener, slide cover .....
145	55B691391	Hinge, slide release: chrome pl....
146	7B691418	Bracket, slide release hinge .....
147	47A691424	Shaft, slide release hinge .....
148	3S490352	Screw, machine: 2-56 x 5/32 slotted binderhead; cad pl .....
149	41A691463	Spring, retainer .....
150	4S8406	Lockwasher: #2 int; cad pl ...
151	47C691499	Spindle, record: 33 & 78 RPM.....
152	1X691832	Spindle, record: 45 RPM: complete.
153	1X691834	Drive Gear & Shaft Assembly .....
154	42A691283	Clip, shaft .....
155	1X691835	Record Support & Separator Assembly
156	41A691406	Spring, compression .....
157	1X691836	Center Post Cap & Spring Assembly .
158	41A691253	Spring, spindle cap .....
159	3S7164	Screw, machine: 6-32 x 1/4 slotted binderhead; cad pl .....
160	4S7666	Lockwasher: #6 ext; cad pl ...
161	3S488082	Screw, machine: 6-32 x 1-3/4" slotted round head; cad pl ..

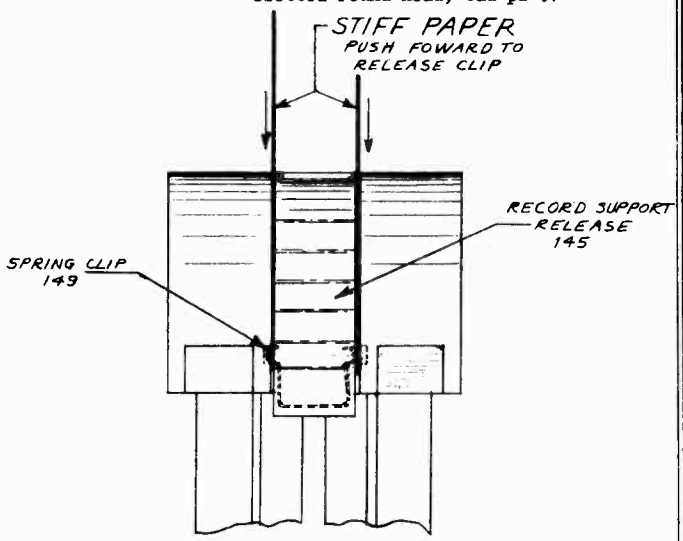


FIGURE 12. METHOD OF RELEASING CLIP ON RECORD SUPPORT RELEASE

SERVICE HINTS

STANDARD OR 33 RPM RECORDS FAIL TO DROP

1. Adjust the push-off lever (71), or -
2. Record center-hole binding on spindle. Ream out with pencil.

45 RPM RECORDS FAIL TO DROP

1. Drive gear (117) does not mesh with cycle gear (9) correctly.

PICK-UP ARM DOES NOT SET DOWN IN CORRECT POSITION

1. Adjust the set-down setscrew (53).

MECHANISM TRIPS BEFORE RECORD IS COMPLETED, OR DOES NOT TRIP AFTER RECORD IS COMPLETED

1. Adjust set-down setscrew (53) and the trip arm stud (36B).

CONTINUOUS CYCLING

1. Drive clutch lever (118) 180° out of phase; merely reverse the drive clutch lever's position on the drive gear (117), or -
2. Grease or dirt on trip flag bracket (21B), or -
3. Set-down flag (24C) not being actuated by restoring lever (21G), or -
4. Turntable bearing (116) or bearing washers (115) missing.

MECHANISM FAILS TO TRIP WHEN REJECT BUTTON IS TURNED

1. Reject rod (134) not connected, or -
2. Trip lever spring (22) weak or not connected.

MECHANISM SLOW IN STARTING

1. Bad motor, or -
2. Grease on idler wheel (109) or on speed control pulleys (95, 96 or 97), or -
3. Parts binding.

TURNTABLE DOES NOT REVOLVE

1. Check the power to the motor, or -
2. Remove the turntable and check to see if the motor shaft revolves, or -
3. Bad motor, or -
4. Grease on the idler wheel (109) or on speed control pulleys (95, 96 or 97), or -
5. Turntable not seated properly.

NEEDLE JUMPS GROOVES

1. Record changer not level, or -
2. Records dirty - clean with soap and water, or -
3. Needle not set correctly in the cartridge - it should be perpendicular to surface of the record.

RECORD SUPPORT CANNOT BE ADJUSTED TO THE THREE RECORD PLAYING POSITIONS

1. Set-down cam (28A) not set properly with relation to the set-down cam stud (24B). See Pick-up Arm Mounting Plate Assembly Replacement.

MODELS RC-36,
RC-36A

DESCRIPTION

The Model RC-36A record changer differs from the Model RC-36 only in the type of record reject mechanism used. The RC-36 employs a limit trip, whereas the RC-36A uses a velocity trip, the operation of which depends upon the speed at which the tone arm approaches the center of the record, not upon any predetermined dimension from the center spindle.

The operating procedure for the RC-36A changer is as described in the RC-36 manual.

THEORY OF OPERATION

The change cycle of the RC-36A changer is similar to the RC-36, except where the new trip flag assembly (164) the set-down arm and trip assembly (167), and the set-down flag (165C) are involved. Refer to Figures 1 and 2 for the locations of the new parts.

The theory of operation of the velocity trip mechanism is as follows:

As the pick-up arm (40) approaches the center of a record, the trip arm (167A) tends to release the trip flag (164A) from the trip lever arm (163B); but, with every revolution of the turntable, the wiper (184) strikes the trip rod (164) and resets the trip flag (164A). This action continues until the pick-up arm enters the cut-off grooves, when the movement of the trip arm (167A) is so rapid that the trip flag (164A) cannot be reset by the wiper (184). The change cycle thus is initiated.

The trip arm spring (168) has been designed to allow the proper amount of slippage between the trip arm (167A) and the set-down arm (167B) so that the changer will not cycle during the normal playing of a record, and yet the friction is great enough to trigger the trip flag (164A) when the cut-off groove is reached.

As the pick-up arm moves outward, off the record, the rear projection on the trip arm (167A) encounters a stud (173) in the rear slide guide block (172), and the trip arm (167A) is reset to its proper position for the next cycle.

The set-down flag (165C) on the RC-36A has been revised to include a formed, flat spring (165D) which holds the set-down arm (167B) firmly until the pick-up arm has been lowered to the record, thus preventing "skating" if the changer is jarred or is setting at a slight angle.

ADJUSTMENTS AND SERVICE HINTS

All adjustments and service hints for the RC-36 changer apply equally to the RC-36A changer except the trip arm adjustment.

If the mechanism does not trip after playing a record, or trips before a record has completed its play, proceed as follows:

1. Remove the turntable (182).
2. Measure the distance between the outer edge of the hub on the turntable and the point of contact of the trip rod on the wiper (184). The dimension should be approximately 7/8". Bend the wiper bracket (183) if necessary.
3. Check the operation by playing a 78 RPM record and a 33 RPM record. If the changer trips too soon at 78 RPM, bend the wiper bracket (183) downward slightly (toward the trip rod). If the changer does not reject at 33 RPM, bend the wiper bracket (183) upward slightly (away from the trip rod).
4. If the above adjustment does not correct the trouble, remove the changer from the cabinet and proceed as in steps 5 & 6.
5. Check the reject operation visually. Move the trip flag (164A) outward until it is flush with the projection on the trip lever arm (163B). As the turntable is rotated, the wiper (184) should contact the trip rod (164) very lightly. Bend the wiper bracket (183) if necessary.
6. If the adjustment in step 5 is correct, and the changer still does not reject properly, check for any looseness or binding of the trip arm (167A) on the set-down arm assembly. The pressure required to move the trip arm (167A), measured from the tip of the trip arm, should be 10 to 18 grams. Replace the trip arm spring (168) if necessary.

REPLACEMENT PARTS LIST

LATE MODEL RC-36 REPLACEMENT PARTS SUPPLEMENT

The following parts are replacements for, or additions to, the original items listed in the RC-36 Service Manual. They are also used in the RC-36A.

Ref. No.	Part Number	Description
5	5A691472	Rivet, shoulder (replaces 5K691478 rivet) .....
35	3S3863	Setscrew: 4-40 x 1/4 Bristo head; cad pl (replaces 3S9700 setscrew)
85	37K692036	Grommet, rubber (replaces 37K15125 grommet) .....
123	3S400110	Screw, machine: 10-32 x 1-3/4" Phillips flat head; antique copper finish (replaces 3S488108 screw) .....
140	3S400038	Screw, thread cutting: #4 x 5/16; type 25; plain hex head; cad pl (replaces 3S490531 screw).
162	42A600415	Clip (replaces item 15, when used with 46A691309-A timing stop (14) .....
170	4S7683	Lockwasher, internal: #4; cad pl (under screw, item 39).
171	4S7683	Lockwasher, internal: #4 cad pl (under screw, item 50).
174	35A600113	Bumper, rubber (inserted in front edge of record hold-down clamp, item 65) .....
180	2S7981	Speednut: for 1/8" stud (fits over ends of screws, item 106) .....
181	29R5301	Lug, soldering (on motor grounding lead) .....
186	42K692053	Clip, speed (turntable retainer)

MODELS RC-36, RC-36A

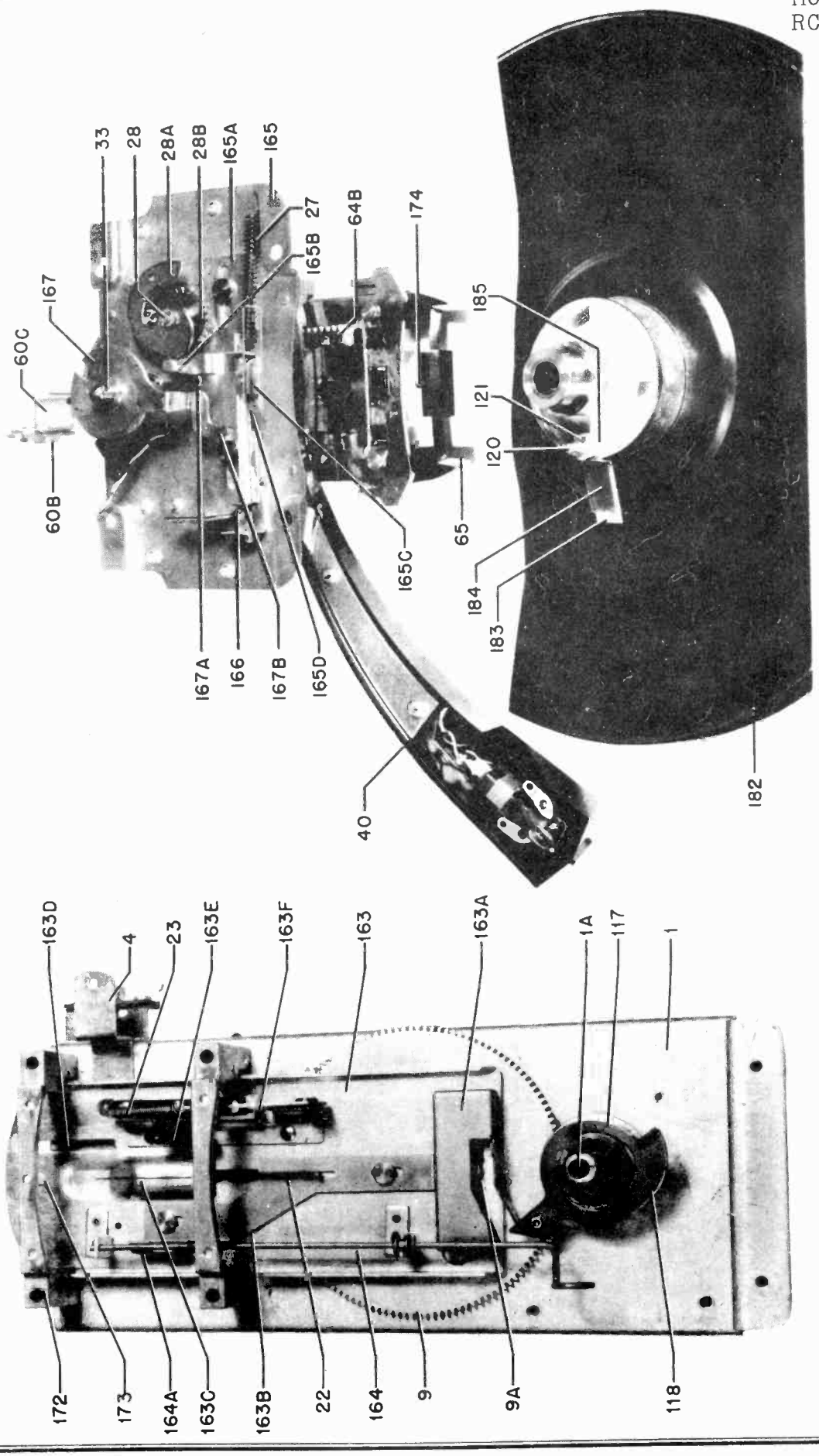


FIGURE 1. DISASSEMBLED VIEW OF RC-36A RECORD CHANGER MECHANISM
(BALANCE OF PARTS SAME AS RC-36)

DET. NO. 69C600272-0

MODEL RC-36A REPLACEMENT PARTS LIST
Same as RC-36 except:

163	1X600757	Slide Channel Assembly: complete; includes items 22, 23 and 164 .....
164	1B600748	Trip Flag and Trip Rod Assembly
165	1X600761	Set-Down Flag and Pick-up Arm Mounting Assembly: complete; includes items 26, 27, 28, 29, 30 and 166 .....
166	41A600766	Spring, set-down flag detent..
167	1B600752	Set-Down Arm and Trip Arm Assembly .....
168	41A600856	Spring, clutch .....
169	3S3866	Setscrew: 6-32 x 3/16 Bristo head; cad pl .....
172	1X600895	Block, slide guide: includes item 173 .....
173	46A600738	Stud, reset .....
175	28A16313	Plug, phono motor: 3-prong; with shell (replaces plug, item 102, on some changers)
176	15A690616	Shell, phono motor plug (used with item 175) .....
177	42A600114	Clamp, phono motor plug (used with item 175) .....
178	4A9751	Lockwasher, internal-external: #8; cad pl (mounts item 175)
179	3S7205	Screw, machine: 8-32 x 1/4 slotted locking hex head; cad pl (mounts item 175).....
182	1X600773	Turntable Assembly: complete; includes items 120, 121, 183, 184 and 185 .....
183	7A600745	Bracket, wiper .....
184	37K600771	Wiper, plastic .....
185	4S7651	Lockwasher, internal: #8; cad pl.....
187	3S400218	Screw, machine: 6-32 x 1/4 Phillips binder head lockscrew; nkl pl .....

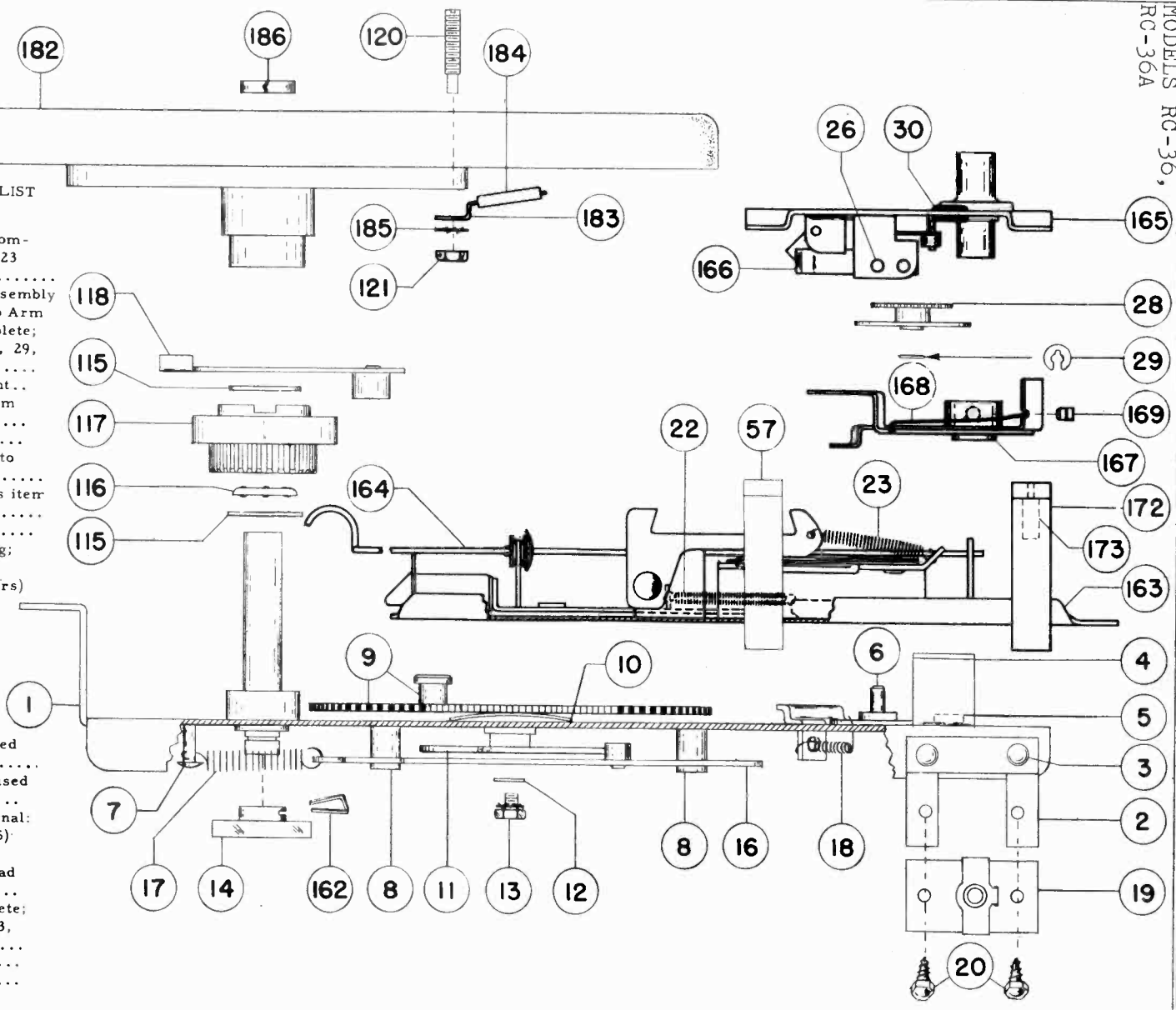


FIGURE 2. RC-36A RECORD CHANGER REPLACEABLE PARTS

(BALANCE OF PARTS SAME AS RC-36)

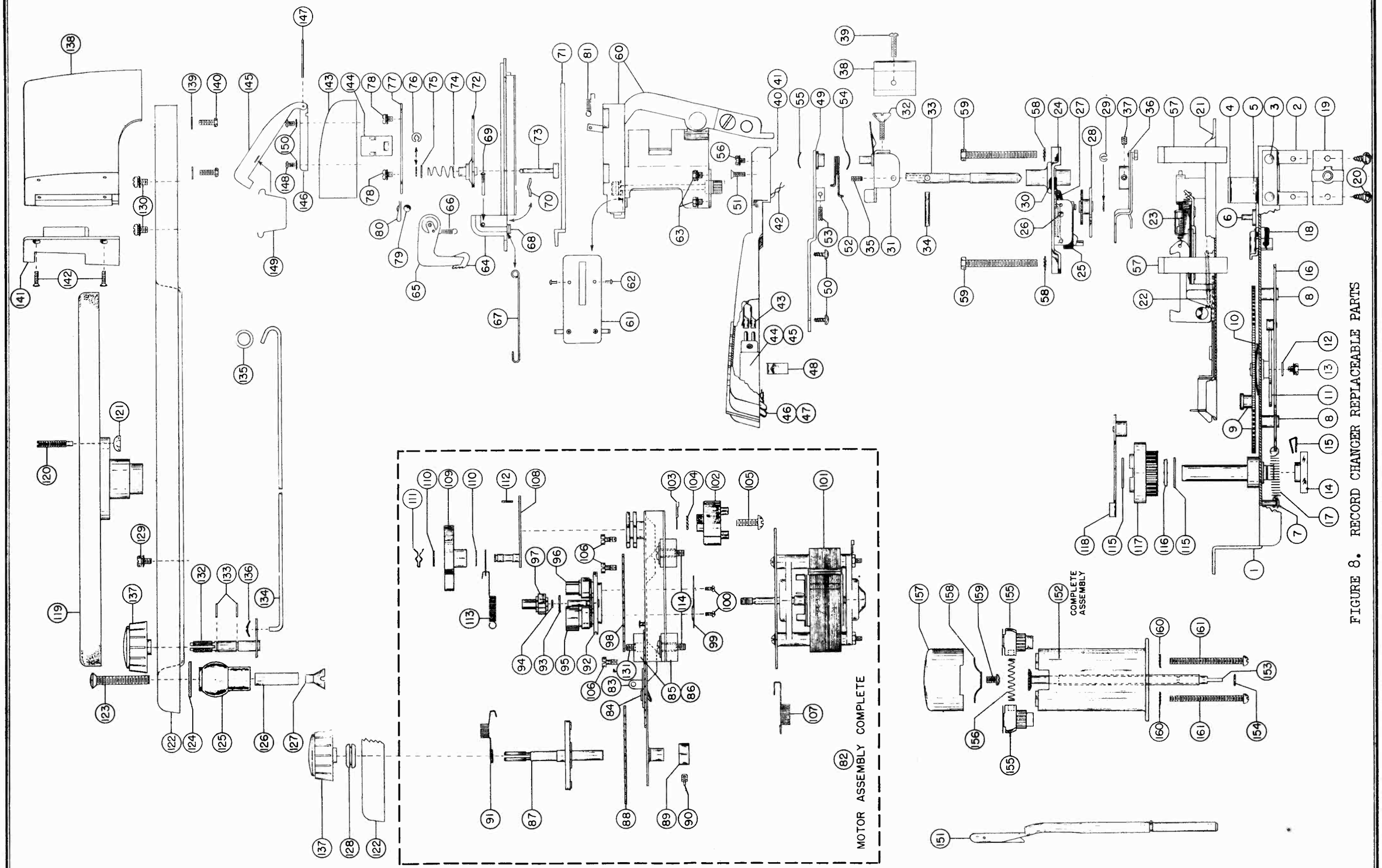


FIGURE 8. RECORD CHANGER REPLACEABLE PARTS

MODEL RC-37

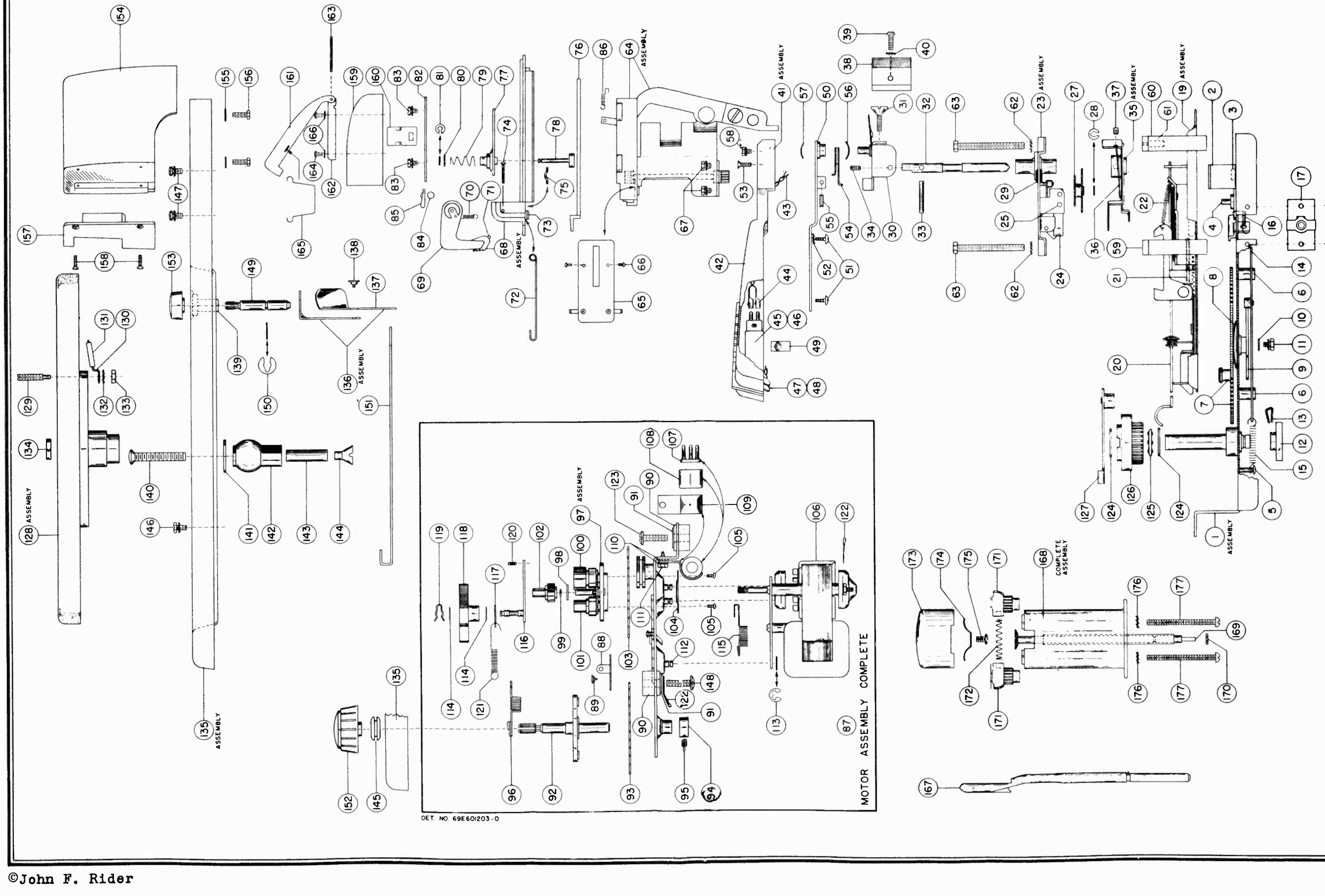


FIGURE 9. RECORD CHANGER REPLACEABLE PARTS

DESCRIPTION

Motorola Model RC-37 Record Changer is a three-speed, single-post changer, designed to play the following records, not intermixed:

a. ten 12-inch 33 or 78 RPM records, or -

b. twelve 10-inch 33 or 78 RPM records, or -

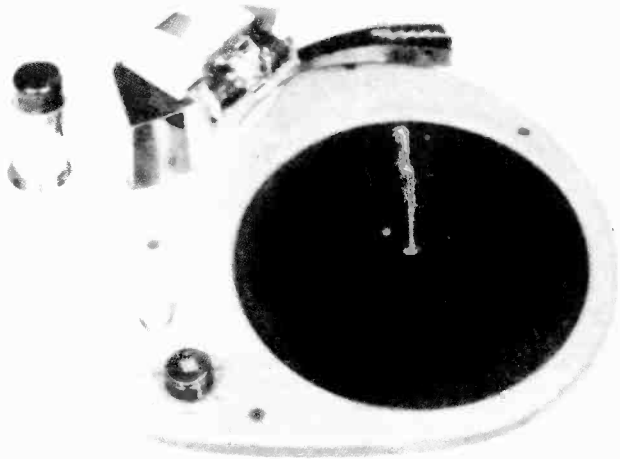
c. twelve 7-inch 45 RPM records, or -

d. twelve 7-inch 33 RPM records

Both standard and fine-groove records may be played with a specially designed single-point needle. Two interchangeable record spindles are used - a large diameter spindle for 45 RPM records and a small diameter spindle for all other type records.

The last record to drop to the turntable will be repeated until the changer is turned off. The speed control on the changer will stop the turntable; but, since no power switch is incorporated in the changer, the phono motor will continue to run until the "power" or "phono" control on the radio panel is turned off.

The RC-37 changer employs a velocity trip, the operation of which depends upon the speed at which the tone arm approaches the center of the record, not upon any predetermined dimension from the center spindle.



The motor is designed to operate on 105 to 120 volts, 60 cycles AC only.

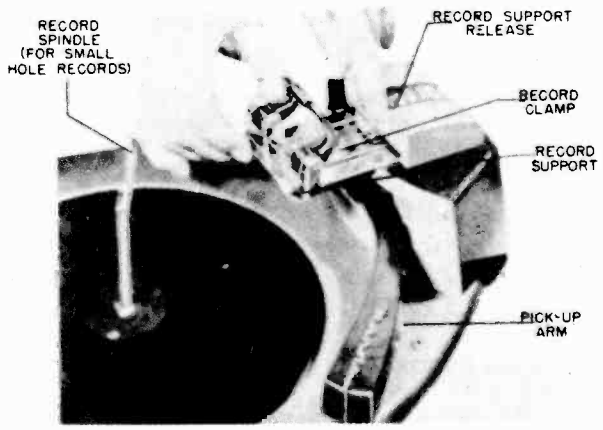
OPERATION

PHONOGRAPH CONTROLS

SPEED. The SPEED control determines the speed at which the turntable revolves. Set this control to the position corresponding to the playing speed of the records, viz., record speed 33 RPM, SPEED control to 33; record speed 45 RPM (large center-hole records), SPEED control to 45; or record speed 78 RPM, SPEED control to 78.

CAUTION: The SPEED control can be rotated clockwise only from a playing speed position, but it may be rotated in either direction, one position, from OFF.

REJECT. The REJECT knob is pushed momentarily and then is released to start playing action or to reject a record before it has completely played.



To adjust the RECORD SUPPORT, press down on the RECORD SUPPORT RELEASE and move the record support to the desired position.

FIGURE 1. RECORD SUPPORT ADJUSTMENT

OPERATING PROCEDURE

1. Turn the radio power switch "on" and the phono-radio control to the "phono" position.

2. Select the appropriate center post for the records to be played.

   a. Two spindles are provided: one for small-hole records and one for large-hole records.

   b. To play small center-hole records, insert the small diameter spindle into the hole in the center of the turntable, and rotate the spindle until the pin drops into the slot in the turntable bushing.

   c. To play large center-hole records, insert the large diameter spindle into the turntable hole and rotate it counterclockwise until it reaches a stop. If the two metal separator discs of the spindle are protruding, remove the spindle, turn the spindle shaft until they disappear, and re-insert it into the turntable.

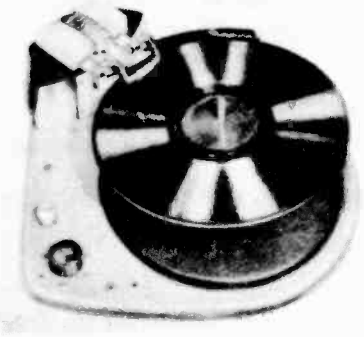
   d. To remove a spindle from the turntable, lift it straight up.

3. Adjust the RECORD SUPPORT to the correct position, according to the size record to be played.

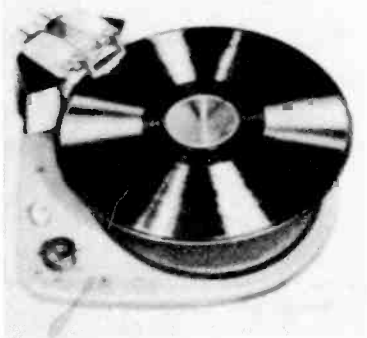
   a. Three positions of the record support are provided: for 7-inch, 10-inch or 12-inch records (see Figure 2).

   b. To adjust the RECORD SUPPORT, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the correct position, according to the size records being played. The RECORD SUPPORT will lock in position (see Figure 1). NOTE: When playing 7-inch 45 RPM records, the RECORD SUPPORT must be in the 7-inch playing position, although the ledge is not used.

A. To play 7-inch small-hole records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme outward position. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.



B. To play 10-inch records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the middle position (1½ inches in from the extreme outward position). Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.



C. To play 12-inch records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme inward position. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.

D. To play 7-inch large-hole records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme outward position. Rest the records on the off-set of the large spindle. Do not lower the RECORD CLAMP.

FIGURE 2. RECORD SUPPORT IN RECORD PLAYING POSITION

4. Load the records.

   a. Raise the RECORD CLAMP to a vertical position.

   b. Place a stack of records on the center post in the desired sequence, with the last record to be played on top.

   c. When playing small-hole records, rest them on the ledge of the RECORD SUPPORT and on the off-set of the spindle. Rest large-hole records on the supports on the large spindle.

   d. Gently lower the RECORD CLAMP on the records. NOTE: DO NOT LOWER THE RECORD CLAMP WHEN PLAYING 7-INCH 45 RPM RECORDS.

5. Adjust the SPEED control to the position corresponding to the playing speed of the records to be played.

6. Momentarily push the REJECT knob.

   a. The bottom record will drop to the turntable, the pick-up arm will lift, swing in, and lower to the record. Playing will now begin.

   b. The REJECT knob may be pushed to reject a record before it has completely played. NOTE: Never touch the pick-up arm while the phonograph is in a changing cycle.

7. At the conclusion of playing, and as the last record is being repeated, lift the pick-up arm and move it to the right.

8. Turn the SPEED control clockwise to the OFF position. NOTE: The turntable will stop but the motor will continue to run until turned off, either with the "phono" control or the "power" switch on the radio panel.

9. Turn the power switch on the radio panel "off".

TO UNLOAD RECORDS

1. Raise the RECORD CLAMP.

2. Lift the records straight up from the turntable. Do not apply pressure to the top records. Keep the thumbs free. NOTE: If, when removing 45 RPM records from the large spindle, the two metal separator discs are protruding from the spindle, lift both the spindle and the records from the turntable. Rotate the shaft on the bottom of the spindle to retract the discs, and then remove the records.

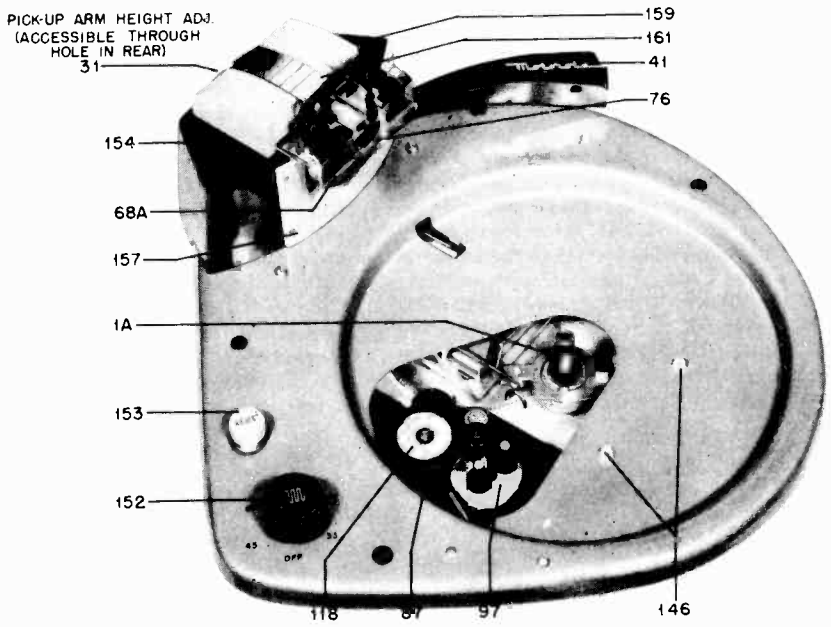


FIGURE 3. TOP VIEW OF RECORD CHANGER WITH TURNTABLE REMOVED

THEORY OF OPERATION

Refer to Figures 3, 4, 5, 6, 7 and 9 for the location of the various parts described in this section.

The turntable is rim-driven through an idler wheel (118) and a speed control turret (97). The speed control turret is operated by means of a 3-gear train, linking the turret to the speed change shaft assembly (92), which is manually operated by the speed control knob on the record changer base. This control has six positions - 78, 45 & 33 RPM and three "off" positions - controlled by a six-point cam (92A). This cam permits easy selection of turntable speeds, yet it prevents the speed control turret (97) from jamming the idler wheel (118) against the turntable and causing flat spots. The speed control can be rotated clockwise only from a playing speed position, but it may be rotated in either direction, one position, from OFF.

During the playing of a record, only the motor assembly (87) and the turntable (128) are in operation. The balance of the mechanism is inoperative until the change cycle starts.

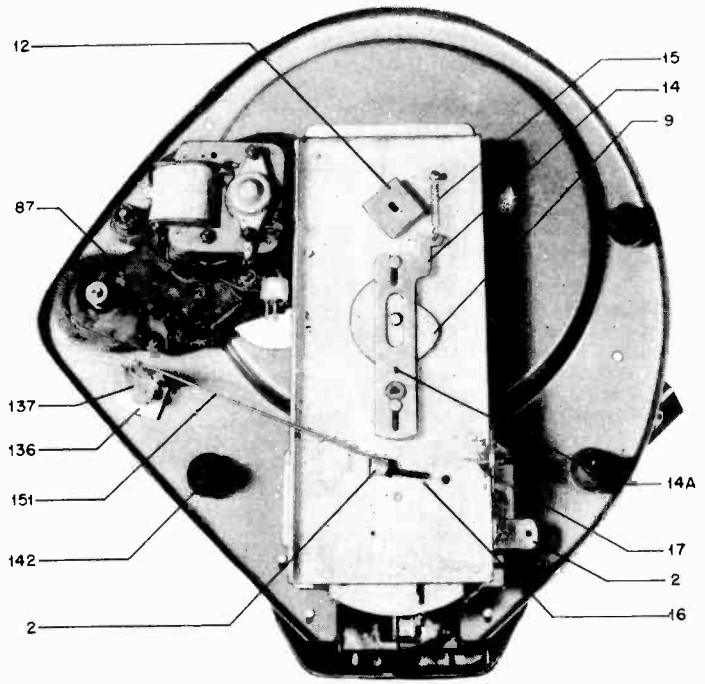


FIGURE 4. BOTTOM VIEW OF RECORD CHANGER

THE CHANGE CYCLE

The change cycle may be initiated in two ways - by means of the pick-up arm entering the cut-off grooves in the record or by manual operation of the reject knob. Power for the change cycle is obtained from the turntable. As the pick-up arm (41) approaches the center of a record during playing, the trip arm (35A) tends to release the trip flag (20A) from the trip lever arm (19B); but, with every revolution of the turntable, the wiper (131) strikes the trip rod (20) and resets the trip flag (20A). This action continues until the pick-up arm enters the cut-off grooves, when the movement of the trip arm (35A) is so rapid that the trip flag (20A) cannot be reset by the wiper (131). The change cycle thus is initiated. The trip arm spring (36) has been designed to allow the proper amount of slippage between the trip arm (35A) and the set-down arm (35B) so that the changer will not cycle during the normal playing of a record and yet the friction is great enough to trigger the trip flag (20A) when the cut-off groove is reached.

If the reject knob is pushed manually, the reject arm (2) acting through the reject rod (151), releases the trip flag (20A) from the trip lever arm (19B), thereby starting the change cycle.

Prior to a change cycle, and while the turntable revolves the weighted end of the drive clutch lever (127) is resting on the trip lever (19A). The releasing of the trip flag (20A) from the trip lever arm (19B) allows the trip lever spring (21) to

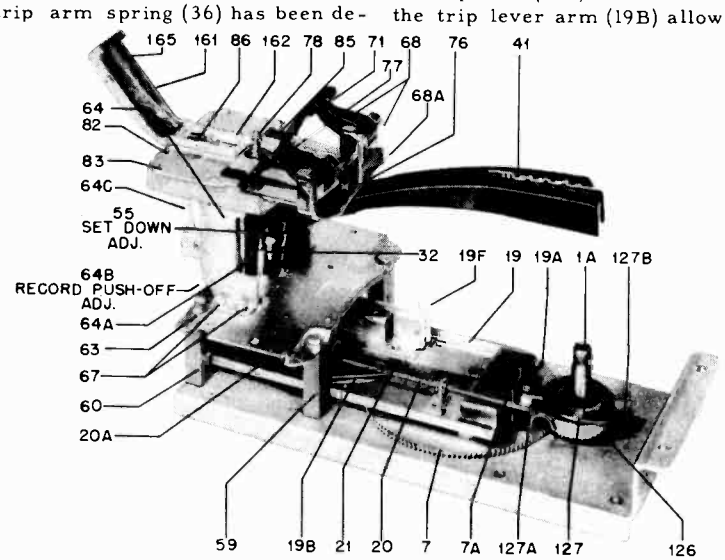


FIGURE 5. VIEW OF RECORD CHANGER WITH BASE & MOTOR ASSEMBLY REMOVED

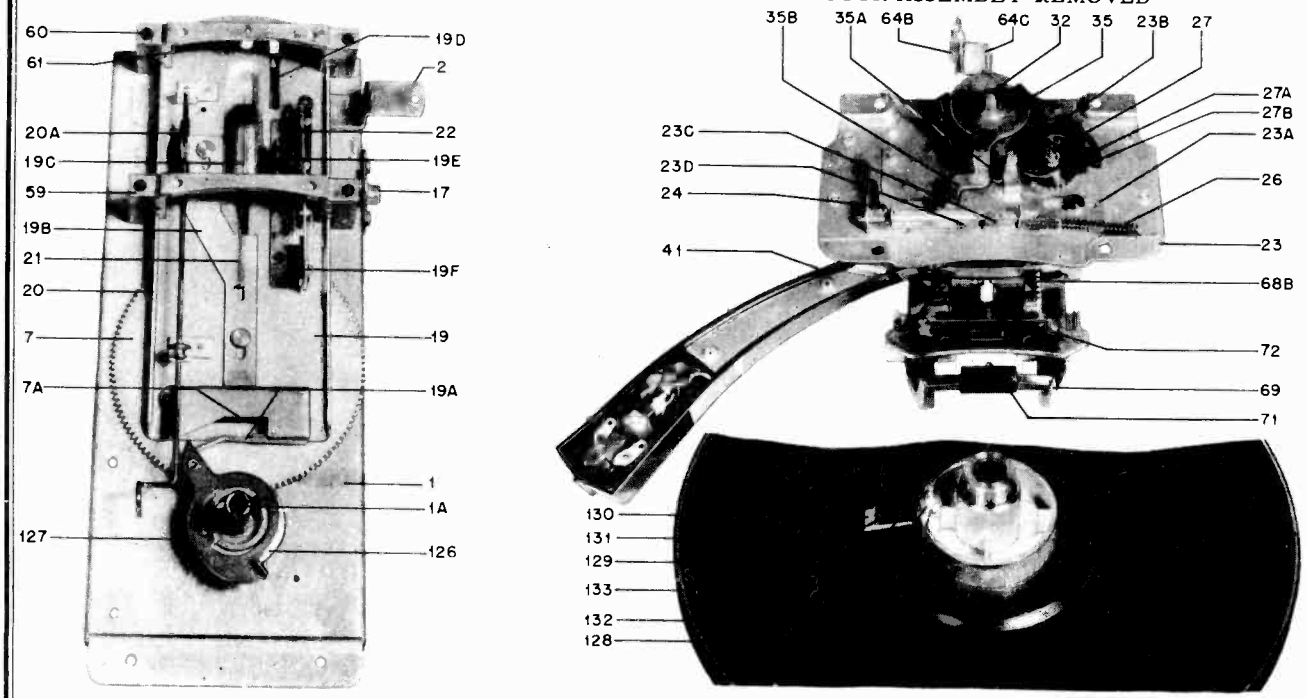


FIGURE 6. DISASSEMBLED VIEW OF RECORD CHANGER MECHANISM

pull the trip lever (19A) away from the drive clutch lever (127), causing the weighted end (127A) of the drive clutch lever (127) to lower. Consequently, the drive dog (127B) of the drive clutch lever contacts the drive screw (129) on the turntable.

Since the turntable continues to revolve when the drive clutch lever (127) engages the drive screw (129), the drive gear (126) causes the cycle gear (7) to turn. As the cycle gear revolves, its roller (7A) moves the slide channel (19) back and, in so doing, the pick-up arm shaft (32) rides up on the incline (19C) of the slide channel, raising the pick-up arm. As the slide channel (19) continues its backward motion, the clutch fingers (19E) will engage the set-down arm assembly (35) to swing the pick-up arm in a direction away from the spindle. At the extreme backward travel of the slide channel (19) the push-off lever (64C), which rides in the slot (19D) of the slide channel, is actuated. This lever, in turn, through the push-off link (77), moves the record push-off lever (76), ejecting the lower record from the record support (68A) and permitting it to drop to the turntable.

While the slide channel (19) is in its extreme backward position, the rear projection on the trip arm (35A) encounters a stud (61) in the rear slide guide block (60), and the trip arm (35A) is reset to its proper position for the next cycle; the restoring lever (19F) lowers the set-down flag (23C) (which will index the pick-up arm when the slide channel makes its forward motion); and the trip slide cocking stud (4) engages the trip arm (19B) with the trip flag (20A) to set it for the next cycle. At this point one-half of the change cycle is completed.

While the cycle gear (7) is in its second half-revolution, the slide channel (19) will move forward, and the clutch fingers (19E) that are still engaging the set-down arm assembly (35) will swing the pick-up arm back toward the record spindle until the set-down arm (35B) contacts the set-down flag (23C), which controls the pick-up arm set-down point. The set-down flag (23C) includes a formed, flat spring (23D) which holds the set-down arm (35B) firmly until the pick-up arm has been lowered to the record, thus preventing "skating" if the changer is jarred or is setting at a slight angle.

While the arm is being held over the set-down point by the set-down flag (23C), continued rotation of the cycle gear (7) makes the pick-up arm shaft (32) ride down the incline (19C), lowering the pick-up arm onto the record.

As the slide channel (19) approaches the end of the cycle (fully forward position) the set-down flag (23C) is moved out of the way by the restoring lever (19F) to give the pick-up arm complete freedom of movement during playing of the records. Also, the drive clutch lever (127) rides up the trip lever incline (19A) and disengages the drive clutch lever dog (127B) from the drive dog screw (129) in the turntable. The cycle thus is ended.

PICK-UP ARM SET-DOWN POINT

The point at which the pick-up arm drops to the turntable for either 7-inch, 10-inch or 12-inch records is determined by the position of the set-down flag (23C).

The movement of the record support assembly (68), when it is adjusted for a specific size record, causes rotation of the gear and pinion shaft assembly (64A), through the rack gear (68B) on the record support. Since the gear and pinion shaft assembly (64A) engages the set-down gear (27B), and the set-down cam (27A) is attached to the set-down gear, any movement of the record support will cause the set-down cam to turn. The set-down cam stud (23B) on the slide plate and spring assembly (23A), rides with the set-down cam, due to the tension of the slide plate spring (26). Therefore, any action of the set-down cam will affect the position of the set-down flag (23C).

45 RPM RECORD DROP

The 45 RPM spindle shaft, when placed into the turntable center hole, fits into the slot in the timing stop (12).

When the change cycle begins, and as the slide channel (19) is making its backward movement, the reject plate (14) moves forward, due to the eccentric form of the drop cam (9) riding on the roller (14A); and the tension of the spring (15) pulls the reject plate (14) forward until it contacts the timing stop (12), preventing it from rotating. Since the turntable and spindle continue to rotate, while the timing stop (12) and spindle shaft (169) remain stationary, the two pinion gears (171) in the upper section of the spindle rotate around the gear on the spindle shaft. The eccentric extending from the upper end of the two pinion gears (171) runs in a slot in the molded record supports to produce an action which causes the supports to move in against the tension of the spring (172). As the plastic record supports recede, the separator discs mounted above each record support separate the lower record from the stack and support the remainder of the stack, while the lower record drops to the turntable. With continued rotation of the spindle, the record supports, due to the action of the spring (172), will move out to support the record stack, while the separator discs recede into the spindle.

When the slide channel (19) is making its forward movement, the reject plate (14) moves back, releasing the timing stop (12) and allowing the timing stop and the spindle shaft to revolve for the playing of the record.

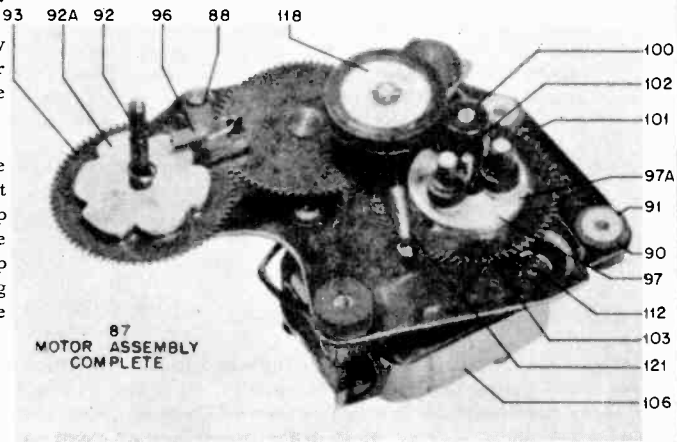


FIGURE 7. MOTOR & SPEED CHANGING ASSEMBLY

MAINTENANCE

It is recommended that the service man thoroughly study and familiarize himself with the operation of the integral parts of the record changer and analyze the trouble carefully before attempting to make any adjustments or to do any repair work on the record changer.

Should it become necessary to remove the changer from the cabinet, or the changer mechanism from the base plate, the service man is advised not to remove parts or sections of the changer unnecessarily, since the changer then may require readjustment.

The changer will not operate properly, either in the cabinet or on the repair bench, unless it is level. If the changer is working satisfactorily, leave it alone.

ADJUSTMENT

NEEDLE SET-DOWN ADJUSTMENT

A template (Motorola Part No. 54B792330), furnished with the record changer, is required to index the needle to the correct set-down point after a needle or cartridge has been replaced. If a template is not available, one may be improvised as follows:

1. Draw a circle of 3-5/16 inches radius on a piece of cardboard.
2. Punch out a 17/64 inch diameter hole at the exact center of the circle.

To index the needle to the correct set-down point:

1. Place the small diameter spindle in the turntable and the template over the spindle.
2. Move the record support to the 7-inch record playing position.
3. Rotate the turntable by hand and push the reject knob to start the change cycle. Watch the needle carefully. It must land on the curved line of the template.
4. If the needle does not land on the line, adjust the set-down setscrew (55) located on the pick-up arm (see Figure 12). Turn the setscrew clockwise to move the pick-up arm towards the spindle, or turn it counterclockwise to move the pick-up arm away from the spindle. IMPORTANT: Turn the screw very slightly, and repeat steps 3 & 4 until the needle lands exactly on the curved line.
5. When the needle is set correctly for the 7-inch position, the index will be set automatically for 10-inch and 12-inch records.

PICK-UP ARM HEIGHT ADJUSTMENT

If the pick-up arm strikes the bottom record of a stack of records resting on the 45 RPM spindle, or if the pick-up arm does not rise sufficiently to clear a 1-inch stack of records after they have dropped to the turntable, proceed as follows:

1. Remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
2. The height adjustment screw (31) is accessible thru a hole in the rear of the record support housing (154) (see Figure 3).
3. Turn the height adjustment screw (31) clockwise to raise the arm, or counterclockwise to lower the arm, as required.

PUSH-OFF LEVER ADJUSTMENT

If a record fails to drop to the turntable, check the position of the record push-off lever (76) on the record support during a change cycle. It should protrude a minimum of 1/32 inch from the record support during the record dropping portion of the change cycle. If adjustment is required, proceed as follows:

1. Remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
2. Push the reject knob to place the changer in cycle and rotate the turntable by hand until the record push-off lever (76) is at its point of maximum forward travel.
3. Turn the push-off adjustment screw (64B) until the push-off lever (76) protrudes at least 1/32 inch beyond the lip (68A) of the record support.

TURNTABLE DRIVE PIN ADJUSTMENT

If a "clicking" noise is heard while a record is playing, the drive dog adjusting screw (129) on the bottom of the turntable is touching the drive dog (127B). To remedy:

1. Remove the turntable. NOTE: Do not remove the drive clutch lever (127); also, do not lose the bearing washer (124).
2. Loosen the hex nut (133) and turn the drive dog adjusting screw (129) counterclockwise to bring the screw farther from the drive dog. CAUTION: Do not turn the screw too much, since the screw will not engage the drive dog and, as a consequence, the changer will fail to cycle.
3. Tighten the hex nut (133).
4. Replace the turntable.

TRIP ADJUSTMENT

If the mechanism does not trip after playing a record, or trips before a record has completed its play, proceed as follows:

1. Remove the turntable (128).
2. Measure the distance between the outer edges of the hub on the turntable and the point of contact of the trip rod on the wiper (131). The dimension should be approximately 7/8 inch. Bend the wiper bracket (130), if necessary.
3. Check the operation by playing a 78 RPM record and a 33 RPM record. If the changer trips too soon at 78 RPM, bend the wiper bracket (130) downward slightly (toward the trip rod). If the changer does not reject at 33 RPM, bend the wiper bracket (130) upward slightly (away from the trip rod).
4. If the above adjustment does not correct the trouble, remove the changer from the cabinet and proceed as in steps 5 & 6.
5. Check the reject operation visually. Move the trip flag (20A) outward until it is flush with the projection on the trip lever arm (19B). As the turntable is rotated, the wiper (131) should contact the trip rod (20A) very lightly. Bend the wiper bracket (130), if necessary.
6. If the adjustment in step 5 is correct, and the changer still does not reject properly, check for any looseness or binding of the trip arm (35A) on the set-down arm assembly. The pressure required to move the trip arm (35A), measured from the tip of the trip arm, should be 10 to 18 grams. Replace the trip arm spring (36), if necessary.

PARTS REMOVAL & REPLACEMENT

TO REMOVE RECORD CHANGER FROM CABINET

1. Disconnect the power and phono input leads from the record changer.
2. Remove the changer from the cabinet, as shown in Figure 8.

NEEDLE REPLACEMENT

Replace the needle with a Motorola needle of the proper type only; otherwise, damage to the records or crystal cartridge will result. Two types of cartridges and needles, as described below, are used in the Model RC-37 changer. The needles are not interchangeable between the two cartridges.

1. Motorola needle, Part No. 59K691908, is used in the Shure cartridge. It is held in the cartridge with a small, round, knurled nut (see Figure 10). To replace the needle, loosen the nut and remove the needle.
2. Motorola needle, Part No. 59K691909, is used in the Electro-Voice cartridge. It is not held with a nut, but is pushed into the cartridge (see Figure 11). To remove the needle, pull it from the cartridge with fingers or pliers.

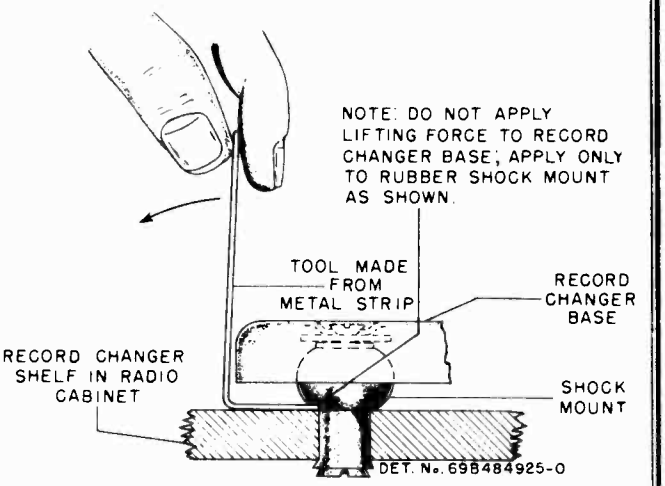


FIGURE 8. REMOVAL OF CHANGER FROM CABINET

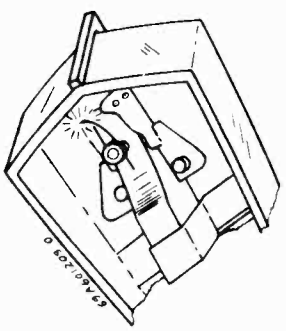


FIGURE 10.
SHURE NEEDLE REPLACEMENT

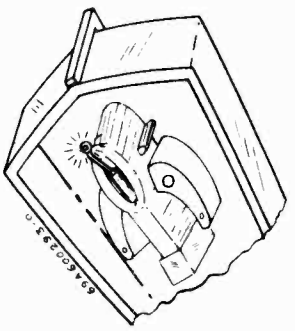


FIGURE 11. ELECTRO-VOICE NEEDLE REPLACEMENT

IMPORTANT: The needles should be held in the cartridges perpendicular to the surface of the record. After the needle has been replaced, check the set-down point as outlined in NEEDLE SET-DOWN ADJUSTMENT.

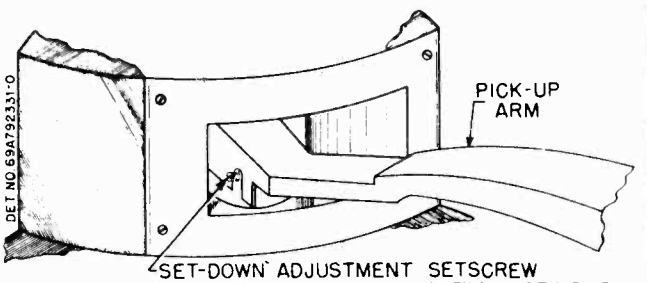


FIGURE 12. NEEDLE SET-DOWN ADJUSTMENT

CARTRIDGE REPLACEMENT

Two types of cartridges, Shure and Electro-Voice, are used. The two cartridges are interchangeable. To remove the cartridge, merely remove the retainer clip (49) and disconnect the pick-up leads. IMPORTANT: After the cartridge has been replaced, check the needle set-down point as outlined in NEEDLE SET-DOWN ADJUSTMENT.

TO REMOVE THE TURNTABLE

1. Remove the turntable retaining clip (134).
2. Lift the turntable straight up from the base plate. Be sure the bearing (125) and the bearing washers (124) do not get lost or dirty.
3. When replacing the turntable, it will be necessary to center the drive clutch lever (127) and the bearing washer (124) to allow proper seating of the turntable over the spindle post.

TO REPLACE THE DRIVE CLUTCH LEVER

1. Place the changer mechanism in the rest position [slide channel (19) in full forward position], with the trip flag bracket (20A) engaged in the trip lever arm (19B).
2. Place the drive clutch lever (127) in position with the weighted end (127A) resting at the bottom of the trip lever incline (19A).

TO REMOVE THE DRIVE GEAR

1. Remove the turntable and drive clutch lever (127).
2. Lift the drive gear (126) straight up from the spindle post.
3. When replacing the drive gear (126) it is important that the changer be timed correctly. To time the changer, rotate the cycle gear (7) until the cycle gear roller (7A) is directly in line with the spindle post (1A), and pull the slide channel (19) forward until it is locked by the trip flag (20A). Then place the drive clutch lever (127) in position on the drive gear (126), and mesh the gears so that the weighted end of the clutch lever (127A) rests on the lowest edge of the trip lever incline (19A). Check the timing by playing a stack of 45 RPM records. If a record of the stack fails to drop during a cycle, move the drive gear (126) one "tooth" and play another stack of records to again check the timing.

TO REMOVE THE RECORD SUPPORT HOUSING COVER AND RECORD SUPPORT HOUSING

1. Remove the four Phillips head screws (158) that secure the housing cover (157) to the housing (154).
2. Remove the four hex head screws (156) and four washers (155), accessible from the bottom of the changer, that secure the housing to the base plate.

TO REMOVE THE SLIDE RELEASE HINGE AND HINGE BRACKET

1. The record support slide release hinge (161) is held in place with a spring clip (165). To release the clip, place a piece of stiff paper on both sides of the release hinge, between the release hinge and the slide cover (159). See Figure 13. Pull the paper forward, simultaneously lifting upward on the release hinge.
2. Remove the four machine screws (164) holding the slide release hinge bracket (162).

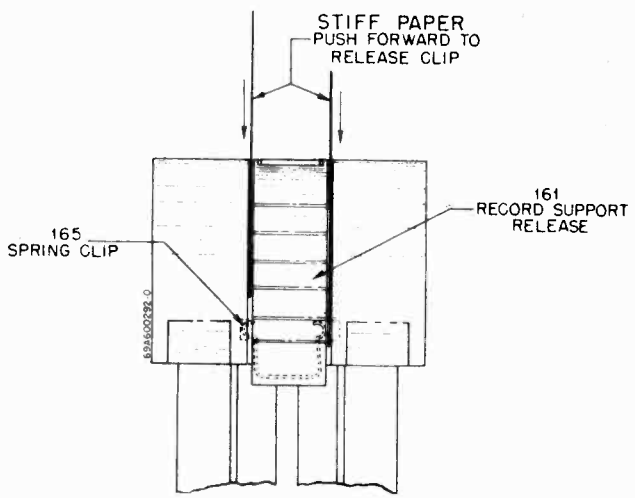


FIGURE 13. REMOVAL OF RECORD SUPPORT RELEASE

TO REMOVE THE COMPLETE CHANGER MECHANISM AND MOTOR ASSEMBLY

1. Remove the record support housing cover (157) and housing (154).
2. Remove the speed control knob (152).
3. Disconnect the reject rod (151).
4. Remove the turntable and drive clutch lever (127).
5. From the bottom of the changer, remove one machine screw (148) securing the motor assembly (87) to the base plate (135).
6. Remove the four Phillips head lockscrews (147).
7. Remove the two hex head screws (146).
8. Carefully lift the base plate from the motor and changer mechanism.

MOTOR SPEED CONTROL TURRET ASSEMBLY REPLACEMENT

CAUTION: Do not disassemble the speed changing mechanism without first marking the positions of turret assembly, the speed change gears, and the speed change cam, as shown in Figure 14. But, if the turret has been removed accidentally, or if the above precaution has not been taken, the assembly procedure is as follows (refer to Figures 9 & 14).

1. Assemble the speed control pulleys (100), (101), (102) to the turret plate (97A). They are snapped over the pulley shafts, and they can be pried off with a screwdriver. Note that the 45 RPM pulley is adjacent to the part number on the turret plate, as shown in Figure 14.
2. Attach the turret plate (97) and the speed change gear (103) to the speed control bracket with the turret spring washer (104) and the two machine screws (105).
3. Place the speed change shaft assembly (92) and the speed change gear (93) on the speed control bracket. Do not tighten the collar bushing (94) to the shaft.
4. Rotate the turret assembly until the correct angle is obtained between the center of the turret plate and the speed change shaft and 33 RPM speed control pulley, as in Figure 14. Use a combination square with a protractor, or other accurate protractor, for measuring the angle.
5. Lift the speed change gear (93) from the idler gear and rotate it until the slot in the shaft is in the direction shown in Figure 14 and the speed detent pawl (88) falls into the detent in the speed change cam (92A). There are two detents, on opposite sides of the cam, into which the pawl may fall. The correct detent is the one which will permit clockwise rotation only of the speed change shaft.
6. Tighten the setscrew (95) in the collar bushing (94).
7. Attach the motor (106) to the studs on the speed control bracket with the "C" washers (113).
8. Attach the tension springs (121), (96), (115). Note that the idler wheel spring (121) hooks into a soldering lug (117) under the idler wheel.
9. Check the complete assembly for the correct speeds and the sequence of speeds.

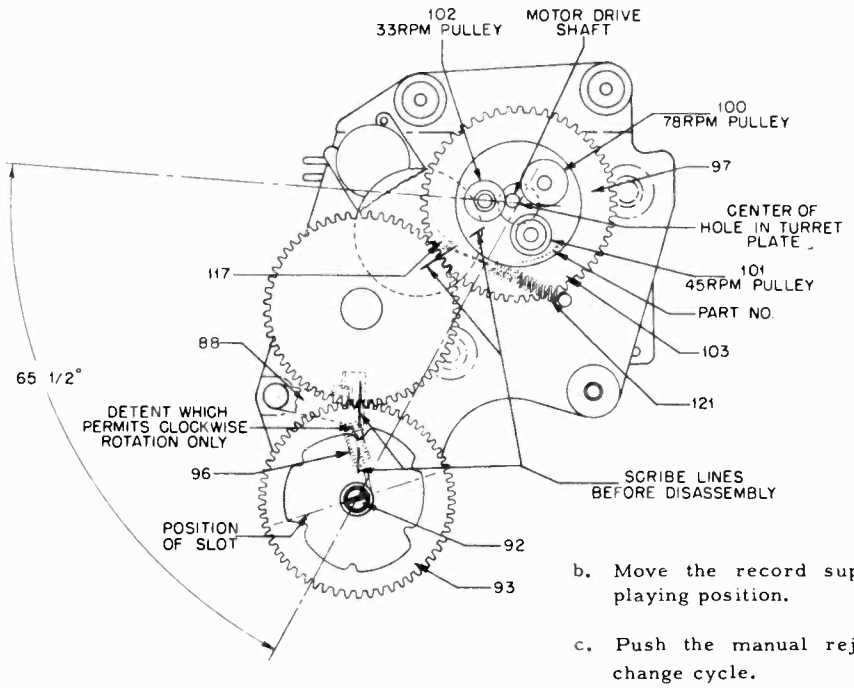


FIGURE 14. MOTOR GEAR TRAIN ASSEMBLY

PICK-UP ARM MOUNTING PLATE ASSEMBLY REPLACEMENT

If it is necessary to remove the pick-up arm mounting plate assembly (23), the following precautions should be observed when replacing the assembly.

1. Move the record support to the 12-inch playing position.
2. Align the hole in the set-down cam (27A) with the hole in the mounting plate. The stud (23B) on the set-down flag (23C) should be on the outside of the cam.
3. Move the set-down flag (23C) to the "up" position.
4. Carefully place the pick-up arm mounting plate (23) on the slide guide blocks (59) and (60), making sure the trip assembly (35) does not rest or bind on any portion of the slide channel assembly (19).
5. If the set-down arm and trip assembly (35) has been loosened or removed from the pick-up arm shaft (32) readjust as follows:
   a. Place the turntable, small spindle, and template (see section on NEEDLE SET-DOWN ADJUSTMENT) on the spindle post.
   b. Move the record support to the 7-inch record playing position.
   c. Push the manual reject arm (2), to start the change cycle.
   d. Slowly rotate the turntable until the slide channel assembly (19) starts to move backward. NOTE: The SPEED control should be in an "off" position for ease of operation.
   e. As the pick-up arm shaft (32) rides up on the incline (19C) of the slide channel (19), raise or lower the set-down arm and trip assembly (35) until it is in a position to be grasped by the clutch fingers (19E).
   f. Continue rotating the turntable until the slide channel moves forward to a point where the set-down arm (35B) touches the set-down flag (23C).
   g. With the fingers, move the set-down arm (35B) against the guiding edge of the set-down flag (23C).
   h. Rotate the turntable until the set-down arm (35B) is just about to lose contact with the set-down flag (23C), and place the pick-up needle directly over the line on the template.
   i. Tighten the setscrew (37) in the set-down arm and trip assembly (35).
   j. Cycle the changer several times to check the needle set-down point. Small corrections of the set-down point may be made with the set-down adjustment screw (55).

LUBRICATION

Factory lubrication should be sufficient for a long period of service. When lubrication is required, use only the following lubricants in the places specified.

Part	Lubricant
Turntable Bearing (125) & Slide Channel (19)	-E. F. Houghton "Stay-Put" #512 Grease (Motorola Part Number 11M476047)
Motor Speed Change Gears (93 & 103)	-Silicone High Temperature Lubricant (Dow Corning Corp. #DC-33 - Motorola Part Number 11M488020)

DO NOT LUBRICATE THE FOLLOWING PARTS:

Trip flag (20A)
Slide Plate & Spring Assembly (23A)
Trip Lever Arm (19B)
Set-Down Arm Assembly (35)
Drive Clutch Lever (127)

If any oil or grease should come in contact with the idler wheel tire, inside rim of the turntable, or any of the motor drive surfaces, clean with carbon-tetrachloride.

MODEL RC-37

SERVICE HINTS

78 RPM or 33 RPM RECORDS FAIL TO DROP

1. Adjust the push-off lever (76).

2. Record center hole binding on spindle.

MECHANISM SLOW IN STARTING

1. Bad motor.

2. Grease on idler wheel (118) or on speed control pulleys (100, 101, 102).

3. Parts binding.

MECHANISM TRIPS BEFORE RECORD IS COMPLETED, OR DOES NOT TRIP AFTER RECORD IS COMPLETED

1. Adjust the wiper bracket (130) on the turntable (see section on Trip Adjustment).

CONTINUOUS CYCLING

1. Drive clutch lever (127) 180° out of phase. Reverse the position of the drive clutch lever on the drive gear (126).

2. Grease or dirt on trip flag (20A).

3. Set-down flag (23C) not being actuated by restoring lever (19F).

RECORD SUPPORT CANNOT BE ADJUSTED TO THE THREE RECORD PLAYING POSITIONS

1. Set-down cam (27A) not set properly with relation to the set-down cam stud (23B). See PICK-UP ARM MOUNTING PLATE ASSEMBLY REPLACEMENT.

PICK-UP ARM DOES NOT SET DOWN IN CORRECT POSITION

1. Adjust the set-down setscrew (55).

NEEDLE JUMPS GROOVES

1. Record changer not level.

2. Records dirty - clean with soap and water.

3. Needle not set correctly in the cartridge - it should be perpendicular to the surface of the record.

MECHANISM FAILS TO TRIP WHEN REJECT KNOB IS IS PUSHED

1. Reject rod (151) not connected.

2. Trip lever spring (21) weak or not connected.

TURNTABLE DOES NOT REVOLVE

1. No power to motor.

2. Bad motor.

3. Grease on the idler wheel (118) or on speed control pulleys (100, 101, 102).

4. Turntable not seated properly.

45 RPM RECORDS FAIL TO DROP

1. Drive gear (126) does not mesh correctly with the cycle gear.

2. Record center hole binding on spindle.

REPLACEMENT PARTS LIST

NOTE: When ordering parts specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description
1	1X691802	Mounting Plate Riveted Assembly (includes items 1 through 6) .
2	45B691361	Arm, manual reject .....
3	5A691472	Rivet, shoulder .....
4	46A691227	Stud, trip slide cocking .....
5	5K600898	Rivet, shoulder .....
6	46A691273	Stud, reject plate slide .....
7	1X691803	Cycle Gear, Shaft & Roller Assembly
8	4A691767	Washer, spring .....
9	45A691256	Cam, record drop (45 RPM) .....
10	4S7569	Washer, flat: 5/16 x .145 x .027; cad pl .....
11	3S7247	Screw, machine: 6-32 x 3/16; slotted hex head lockscrew; cad pl .....
12	46A691309	Stop, timing .....
13	42A600415	Clip .....
14	1X691843	Reject Plate & Roller Assembly .
15	41A76925	Spring, coil tension .....
16	41A600699	Spring, manual reject .....
17	9A470260	Receptacle, 1-prong .....
18	3S7506	Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl.....
19	1X600757	Slide Channel Assembly: complete, includes items 20, 21 and 22....
20	1B600748	Trip Flag and Trip Rod Assembly .
21	41A691469	Spring, trip lever arm actuating
22	41A14244	Spring, tension coil .....
23	1X600761	Set-Down Flag and Pick-up Arm Mounting Assembly: complete; includes items 24 through 29.....
24	41A600766	Spring, set-down flag detent...
25	5S7769	Rivet: .088 x 3/32 stl; .....
26	41A691282	Spring, slide plate .....
27	1X691813	Set-Down Cam & Gear Assembly .
28	4K692188	Washer, "C" .....
29	5A790684	Grommet, rubber .....
30	1X691815	Pick-up Arm Brkt. & Stud Assembly..
31	3A691288	Screw, pick-up arm adj .....
32	47A691221	Shaft, pick-up arm .....
33	46A691268	Pin, pick-up carriage .....
34	3S3863	Setscrew: 4-40 x 1/4 Bristo head; cad pl .....
35	1B600752	Set-Down Arm and Trip Arm Assembly.
36	41A600856	Spring, clutch .....
37	3S3866	Setscrew: 6-32 x 3/16 Bristo head; cad pl .....
38	46C691431	Counterbalance, pick-up arm .....
39	3S1452	Screw, machine: 4-40 x 1/2 slotted binderhead; cad pl .....
40	4S7683	Lockwasher, int: #4; cad pl...
41	1X691817	Pick-up Arm Assembly: includes items 42 through 55 .....
42	45D691428	Arm, pick-up: arm only .....
43	1X691818	Pick-up Cartridge Leads Assembly
44	9A72670	Contact, pin terminal .....
45	59B691430	Cartridge, crystal: with needle (Shure) .....
46 or	59K691907	Cartridge, crystal: with needle (Electro Voice) .....
47	59K691908	Needle (for 59B691430 cartridge)...
48	59K691909	Needle (for 59K691907 cartridge)...
49	42A691429	Clip, cartridge retainer .....
50	1X691819	Pick-up Arm Plate & Bushing Assem..
51	3S490739	Screw, sheet metal: #4 x 1/4 PKZ Phillips binderhead; cad pl .
52	4S7683	Lockwasher, int: #4 cad pl...
53	3S490535	Screw, machine: 4-40 x 5/16 Phillips flat head; cad pl .....
54	41A691329	Spring, torsion .....
55	3S9710	Setscrew: 4-40 x 5/16 slotted headless .....
56	4K580282	Washer, spring: phosphor bronze.
57	4A16556	Washer, spring .....
58	3S2286	Screw, machine: 4-40 x 3/16 slotted hex head lockscrew; cad pl...

Ref. No.	Part No.	Description
59	46C691368	Block, slide guide .....
60	1X600895	Block, slide guide: includes item 61 .....
61	46A600738	Stud, reset .....
62	4S7651	Lockwasher, int: #8 cad pl..
63	3S2963	Screw, machine: 8-32 x 1-3/4" plain hex head; cad pl .....
64	1X691820	Record Support Housing Assembly: complete with push-off lever & gears .....
65	1X691963	Bracket Lock Assembly .....
66	5S8497	Rivet: .088 x 1/8; stl; nkl pl
67	3S7350	Screw, machine: 6-32 x 1/4; slotted hex head lockscrew; cad pl.....
68	1X691824	Record Support & Clamp Assembly: complete; includes items 69 through 74 .....
69	1X691964	Clamp Assembly, record hold-down
70	41A691279	Spring, extension .....
71	35A600113	Bumper, rubber .....
72	41A691795	Spring, push off restoring .....
73	5S691794	Rivet, shoulder .....
74	46A600523	Stud, drive .....
75	46A691243	Pin, spring retainer .....
76	47K691953	Lever, record push-off .....
77	1X691826	Push-Off Link & Bushing Assembly.
78	46A691235	Stud, slide locking .....
79	41A691466	Spring, coil .....
80	4S8279	Washer, flat: 5/16 x .125 x .027; cad pl .....
81	4K692188	Washer, "C" .....
82	64B691342	Plate, record rest cover .....
83	3S2950	Screw, machine: 4-40 x 1/4 slotted locking binderhead; cad pl ....
84	43K471634	Ball, steel .....
85	42A691405	Clip, ball bearing .....
86	41A691467	Spring, extension .....
87	59D600612	Motor Drive Assembly: complete; includes items 88 through 122 .....
88	45A691223	Pawl, speed detent .....
89	5K691481	Rivet, shoulder .....
90	37K15125	Grommet, rubber .....
91	5A12105	Eyelet, mounting .....
92	1X691965	Speed Change Shaft Assembly ....
93	44A691219	Gear, speed change .....
94	43A17431	Bushing, collar: brass .....
95	3S7113	Setscrew: 8-32 x 1/4 slab head..
96	41A691280	Spring, pawl extension .....
97	1X691966	Speed Control Turret Assembly: includes items 98 through 102 ....
98	4A691407	Washer, felt .....
99	42A691438	Clip, pulley retainer .....
100	49A691333	Pulley, speed control (78 RPM)..
101	49K691337	Pulley, speed control (45 RPM)...
102	49A691335	Pulley, speed control (33 RPM)....
103	44A691219	Gear, speed change .....
104	4A691214	Washer, turret spring: phosphor bronze .....
105	3S490530	Screw, machine: 3-48 x 3/16 slotted round head; cad pl .....
106	59C600611	Motor, phono .....
107	28A16313	Plug, phono motor: 3-prong; with shell .....
108	15A690616	Shell, phono motor plug (used with item 107) .....
109	42A600114	Clamp, phono motor plug (used with item 107) .....
110	4S7657	Lockwasher, ext: #8; cad pl...
111	3S3397	Screw, sheet metal: #8 x 5/16 PKZ plain hex head; cad pl .....
112	46A600613	Stud, motor mtg .....
113	4K600617	Washer, "C" .....
114	4K691439	Washer, insulating .....
115	41A691284	Spring, motor extension .....
116	1X691967	Idler Wheel Bracket Assembly .
117	29R3042	Lug, soldering .....
118	49A691277	Wheel, idler .....
119	42A691893	Clip, hair pin .....
120	46A691420	Pin, groove .....
121	41A691281	Spring, idler extension .....
122	29R5301	Lug, soldering .....
123	3S7279	Screw, machine: 8-32 x 5/8 slotted binderhead; cad pl .....
124	4A691286	Washer, bearing .....
125	43A691278	Bearing, turntable .....
126	44B691354	Gear, drive .....
127	1X691827	Drive Clutch Lever & Stud Assembly.
128	1X600773	Turntable Assembly: complete; includes items 129 through 134.....
129	3A691225	Screw, drive dog adjusting .....
130	7A600745	Bracket, wiper .....
131	37A600771	Wiper, plastic .....
132	4S7651	Lockwasher, int: #8; cad pl ..
133	2S7003	Nut, hex: 8-32 x 5/16; cad pl.
134	42K692053	Clip, speed .....
135	1X600775	Record Changer Base Assembly: includes items 136 through 139.....
136	1X600776	Bracket Assembly, manual reject: includes items 137 & 138 .....
137	7A600723	Bracket, manual reject actuating...
138	5K691481	Rivet, shoulder .....
139	43A600718	Bushing, manual reject shaft .....
140	3S400110	Screw, machine: 10-32 x 1-3/4" Phillips flat head; antique copper finish .....
141	4S8214	Washer, flat: 7/8 x .203 x .067
142	35A481870	Mounts, shock: rubber .....
143	43A484295	Sleeve, shock mount.....
144	2A484296	Nut, shock mount: tapered tee..
145	37A17361	Grommet, rubber .....
146	3S7205	Screw, machine: 8-32 x 1/4 slotted hex head lockscrew; cad pl ....
147	3S400218	Screw, machine: 6-32 x 1/4 Phillips binder head lockscrew; nkl pl.
148	3S7279	Screw, machine: 8-32 x 5/8 slotted binderhead; cad pl .....
149	47A600721	Shaft, manual reject .....
150	4K600617	Washer, "C" .....
151	47A600719	Rod, manual reject .....
152	36B691483	Knob, speed control .....
153	36A600725	Knob, reject control .....
154	15D691488	Housing, record support .....
155	4S8279	Washer, flat: 5/16 x .125 x .027; cad pl .....
156	3S400038	Screw, thread cutting: #4 x 5/16; type 25; plain hex head cad pl .....
157	15C691393	Cover, housing .....
158	3S490532	Screw, thread cutting: #2 x 3/8 PKF Phillips oval head; nkl pl ....
159	15C691395	Cover, slide .....
160	42A691415	Fastener, slide cover .....
161	55B691391	Release Hinge, record support slide; chrome pl .....
162	7B691418	Bracket, slide release hinge.....
163	47A691424	Shaft, slide release hinge .....
164	3S490352	Screw, machine: 2-56 x 5/32 slotted binderhead; cad pl .....
165	41A691463	Spring, retainer .....
166	4S8406	Lockwasher, int: #2; cad pl..
167	47C691499	Spindle, record: 33 & 78 RPM.....
168	1X691832	Spindle, record: 45 RPM; complete
169	1X691834	Drive Gear & Shaft Assembly .....
170	42A691283	Clip, shaft .....
171	1X691835	Record Support & Separator Assembly
172	41A691406	Spring, compression .....
173	1X691836	Center Post Cap & Spring Assembly..
174	41A691253	Spring, spindle cap .....
175	3S7164	Screw, machine: 6-32 x 1/4 slotted binderhead; cad pl .....
176	4S7666	Lockwasher, ext: #6; cad pl..
177	3S488082	Screw, machine: 6-32 x 1-3/4" slotted round head; cad pl .

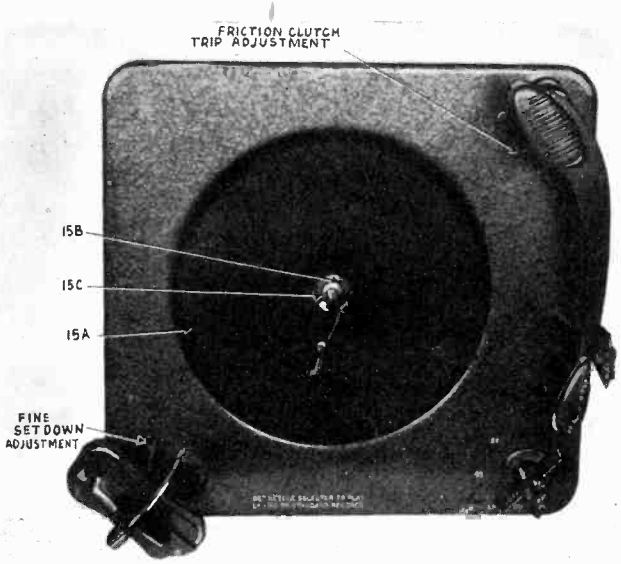


Figure 1. Top View of Record Changer

ADJUSTMENT PROCEDURES

Spindle Adjustment

The spindle should be checked for perpendicularity when changer is out of cycle. To adjust, bend the ear on the push-off lever assembly; bending toward spindle spring will throw top of spindle away from record shelf.

Record Shelf

Place gauge on the 10" record shelf with changer in manual position. Loosen the two screws holding the shelf to the base plate. Adjust pushoff saddle location so that without flexing spindle away from saddle, but with all clearances taken up, the edge of the gauge fits snugly against the edge of the raised portion of the shelf. Tighten screw. CAUTION: This adjustment must be made immediately after completing a change cycle.

Tone-Arm Height and Lift

With the changer out of cycle, and the tone-arm free, set the arm over the base plate. The needle point should be 1/8" ±1/16" above the base plate. To adjust the clearance, bend the protruding ear of the swivel post (at the rear of the tone-arm heel). Bending the ear upward decreases the clearance, downward increases the clearance. Raise the tone-arm to its maximum height, and place it against the rest post. There should be approximately 3/32" clearance between the lower edge of the tone-arm and the top of the rest-post hook. Adjust the ear on the swivel until a mean is reached between the correct rest-post clearance and base-plate clearance.

Vertical Timing

Adjust by bending, the end of the lifting lever, which attaches to the lift cord, so that there is 1/32" to 1/16" slack in lift cord for all tone-arm positions between the tone-arm rest-post and spindle when changer is out of cycle. Check by cycling changer and noting if lifter lever and pull cord will raise tone-arm to its maximum heights.

Setdown

Set record shelf to 12" position. Set the eccentric stud to its center position. Place a 7" record on the turntable, set the record shelf to 7" position, and cycle changer by hand until tone-arm is ½" above record. Loosen hex-head clamp screw on friction clutch and rotate turntable until needle is over a point 1/8" in from record edge. Tighten clamp screw and check by putting changer through another cycle. Remove 7" record. Set record shelf to 10" position and place a 10" record on turntable. Rotate turntable until needle is just above record. If needle is not 1/8" in from record edge an adjustment may be made by bending the ear of the setdown cam that is in contact with the eccentric stud. Bending the ear outward will move the setdown position away from the spindle, bending the ear in toward the shelf spindle will move the setdown point toward the spindle. Recheck. Using a 12" record and shelf set to 12" position repeat as for 10" record, bending the corresponding ear for adjustment.

When the setdown is equal for the three record sizes (7", 10", and 12") a fine adjustment is provided in the form of an eccentric stud available through a hole in the base plate by the record shelf stanchion. This adjustment will vary the setdown position of ALL size records a total of 3/16". Do not use this adjustment unless it is desired to vary all three setdown positions on equal amount.

Trip

The trip plate assembly should be so adjusted that when the ear of the reset arm is contacting the peak point of the reset cam, the finger of the trip plate supporting the dog latch will

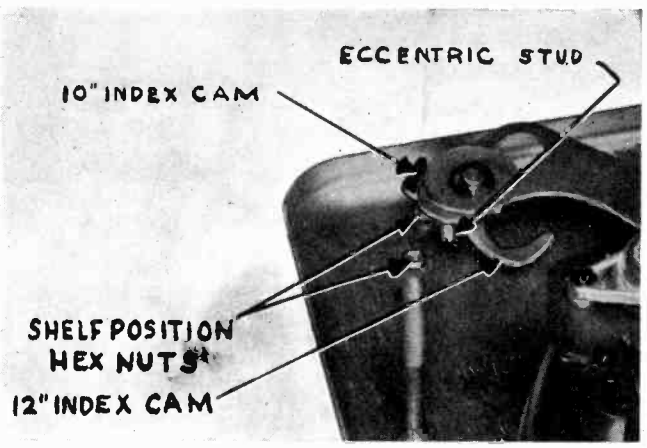


Figure 2. Cam Adjustment

engage the latch by 1/16"; or twice the thickness of latch metal. The amount of engagement between the finger and the latch is adjustable by bending the ear of the trip plate. Bending the ear inward decreases the amount of engagement, bending the ear outward increases the amount of engagement. This adjustable ear is accessible through the large hole in the bridge and should be bent by using long nose pliers. CAUTION: Too much engagement will prevent tripping.

After the trip-latch engagement is set, the friction clutch should be adjusted. This is a screw adjustment accessible when the tone arm is on the rest-post, through a hole in the base plate by the tone-arm stanchion. Turn the screw, counterclockwise, until just tight, then loosen one turn. Check by playing several records. If changer pre-trips, loosen screw (turn clockwise) slightly.

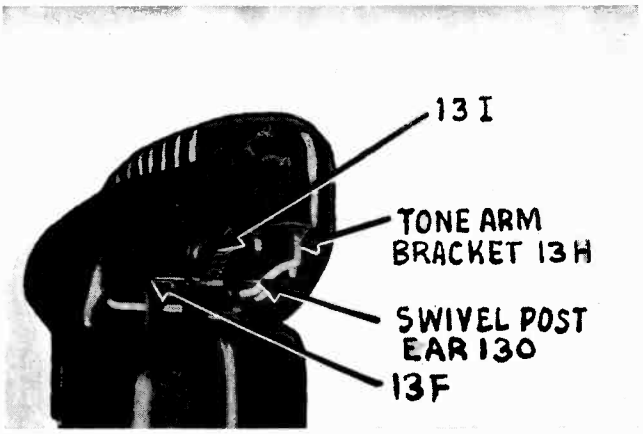


Figure 3.

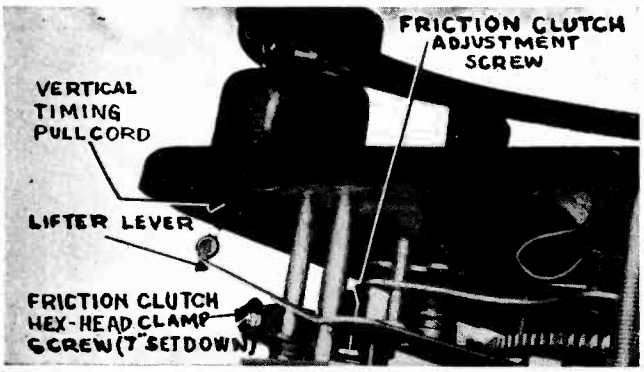


Figure 4.

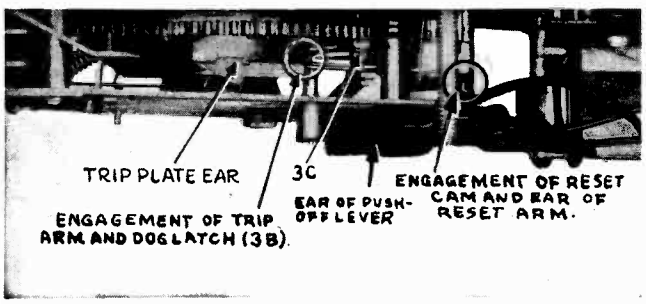


Figure 5.

LUBRICATION INSTRUCTIONS

Lubricants

Oil S.A.E. 20
Grease Texaco Motor Cup Grease (unless otherwise specified)

Parts Not To Be Lubricated

Drive Shaft
Motor Pulley
Drive Belt
Idler Tire
Dog Latch (on cam gear)
Lifting Lever (where dog rides)
Trip Plate Assembly
Friction Washer
Friction Finger
Spindle Latch (may be lubricated with powdered graphite)

Parts To Be Greased

1. Switch lever where it slides on motor board.
2. Slot where switch lever rides.
3. Slots where control link slides.
4. Control link slot.
5. Hole where record shelf shaft rides.
6. Detents for record shelf.
7. Hold-down assembly.
8. Hold-down shaft.
9. Setdown cam where eccentric stud rides.
10. Cam gear; all cam surfaces and gear teeth, except dog latch.
11. Ball bearing; if disassembled, as they are replaced in race.
12. Lifting lever; where lever contacts cam gear.
13. Pushoff lever; where end slides on bridge, where stud rides in slot of bridge, and at pivot pin.
14. Stud of friction clutch; grease ends of return lever and tone arm actuator where they engage stud of friction clutch assembly also stud where these two levers make contact.
15. Cam surface of of idler-wheel lifter.
16. Detent surfaces.
17. Guide slots of shelter plate.
18. Extension of idler shaft in contact with lower shifter plate.

Parts To Be Oiled

1. Cam Gear Spindle.
2. Trip plate assembly pivot; in bushing only.
3. Return lever roller.
4. Cam gear index lever roller.
5. Control knob shafts.
6. Tone arm shaft where it rotates in bridge.
7. Tone arm pivot pin where it goes through holes in bracket.
8. Turntable bearings; top and bottom.
9. Reject lever pivot.
10. Actuator spindle; oil spindle, assemble return lever after oil dimples where it rides on base plate, assemble washer, setdown lever, cam gear index lever, washer, and tone arm actuator; being sure oil is applied between bearing surfaces.
11. Idler support shaft.
12. Idler Shaft.
13. Slider bar; four points.
14. Two shift roller pins.
15. Pulley shaft.
16. Under pivot bushing of shifter plate.

Caution

When lubricating the motor, remove the rubber belt and idler wheel. When lubrication is completed, be sure the motor shaft and pulley are free from oil and grease. Failure to observe this precaution may result in slippage.

Dow Corning "DC-4"

Apply to the contacts of the cartridge contact plate, and to the dimple of the cartridge returning spring.

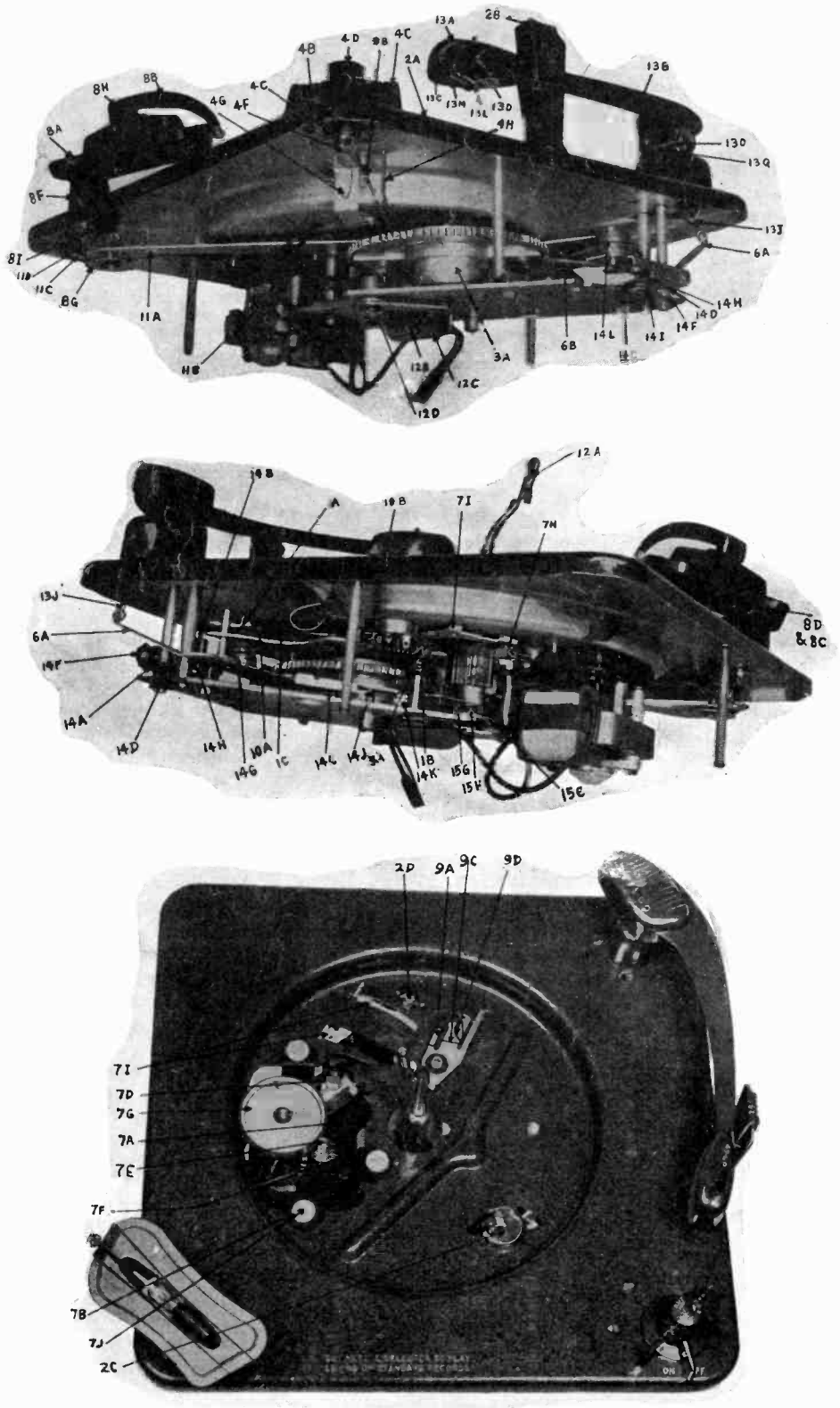


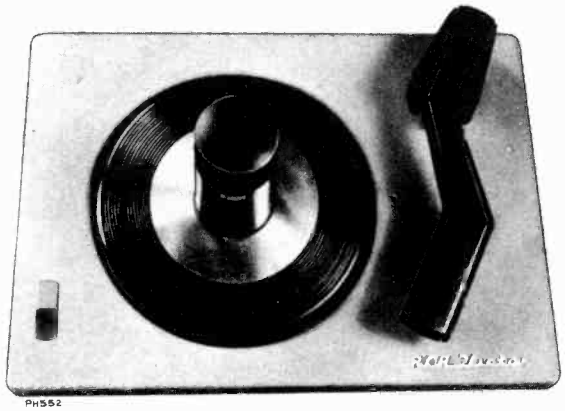
Figure 6. Parts Locations

M-22 PARTS LIST

	Description	Part No.
1. (a)	Actuator, tone-arm	76-6502
(b)	Spring, compression, actuator spindle	56-8087
(c)	Spring, actuator	56-8095
2. (a)	Base plate, tone-arm rest, and tone-arm stanchion	76-5892
(b)	Bumper, tone-arm, rubber	54-8136
(c)	Switch, motor power	42-1867
(d)	Switch, pick-up	42-1873
3. (a)	Cam Gear	76-5905
(b)	Dog latch	56-8138
(c)	Pin	56-8139
4. (a)	Control Assembly	
(b)	Knob, on-off	54-4786
(c)	Knob, speed control	54-4767
(d)	Knob assembly, Man., Aut., Rej.	76-5901
(e)	Shaft and bar assembly, speed change	76-5899
(f)	Shaft and crank assembly, Man., Aut., Rej.	76-5900
(g)	Lever, on-off switch	56-8090
(h)	Link, speed change control	56-8091
(i)	Ring, retaining, reject shaft	1W42295FE7
(j)	Ring, retaining, switch lever	1W42253FE7
5. (a)	Index Lever, cam gear	76-5895
(b)	Spring, index lever	56-8094
6. (a)	Lifter Lever	56-8132
(b)	Spring, lifter lever	56-8133
7. (a)	Motor, 117v, 60c	35-1451
(b)	Shock mount (3)	54-4501
(c)	Spacer, mounting (3)	56-4926-1FA3
(d)	Spring, compression	56-8252
(e)	Pulley assembly	45-6499
(f)	Drive belt	54-7939
(g)	Idler wheel	76-5267
(h)	Grommet, rubber, speed selector lever	27-4707
(i)	Plate, motor speed shift	56-8083
(j)	Screw, motor mounting (3)	1W21561FA3
	*Motor, 117v, 60c	35-1452
	Idler Wheel	45-6559
	Pulley	45-6558
	Shockmounts (3)	54-4501
	*Motor, 117v, 60c	35-1455
	Idler Wheel	45-6614
	Pulley	45-6615
	Shockmounts (3)	54-4826
8. (a)	Record Shelf and Shaft Assembly	76-5914
(b)	Hold-down assembly	76-5897
(c)	Pin, record hold-down	56-8300
(d)	Shaft, record hold-down	56-8299
(e)	Spring, hold-down	56-8164
(f)	Push-off saddle	56-8078
(g)	Washer, cupped	56-8089
(h)	Fulcrum arm, hold-down	56-8301
(i)	Spring, record shelf	56-8088
9. (a)	Reject Lever	56-8079
(b)	Link, reject	56-8084
(c)	Spring, reject	56-8080
(d)	Spring, detent	56-8081
10. (a)	Return Lever	76-5893
(b)	Spring, return lever	56-8092
11. (a)	Setdown Lever	76-5894
(b)	Spring, setdown (lever to bridge)	56-8093
(c)	Cam, setdown	56-8149
(d)	Nut	56-7042
12. (a)	Spindle	76-5909
(b)	Spring, spindle	56-8131
(c)	Push off lever assembly	76-5908
(d)	Lever, spindle	56-8130
13. (a)	Tone-arm Assembly (complete)	35-2710
(b)	Tone-arm shell	35-2707
(c)	Retainer plate, front	56-6795
(d)	Retainer plate, rear	56-8415
(e)	Spring, cartridge retaining	56-6796
(f)	Pin, shaft and swivel	56-7011
(g)	Screw, shoulder, swivel mounting (3)	56-7408-1
(h)	Bracket, mounting for shaft and swivel	56-8123
(i)	Spring, needle pressure	56-8124
(j)	Pull-cord, vertical timing	76-2982-4
(k)	Contact plate	76-4647
(l)	Cartridge (includes needle)	76-4649
(m)	Needle	45-9588
(n)	Needle, sapphire tips	45-9589
(o)	Swivel assembly	76-5911
(p)	Shock-mount, swivel mounting (3)	54-4729
(q)	Washer, friction (plastic)	54-8103
(r)	Spring, tone arm shaft	56-8773
14. (a)	Trip Arm Assembly	76-5910
(b)	Screw, friction trip adjustment	56-8109
(c)	Trip finger, friction	56-8112
(d)	Washer, friction clutch, (plastic) (2)	54-8142
(e)	Spring, friction trip adjustment	56-8111
(f)	Nut, clamp screw	56-7042
(g)	Spring, friction screw lock	56-8108
(h)	Plunger	56-8110
(i)	Washer	56-8113
(j)	Trip plate assembly	76-5907
(k)	Spring, trip plate	56-8117
(l)	Washer, lead (4)	8W52297
15. (a)	Turntable	35-2711
(b)	Retainer, turntable	56-8097
(c)	Washer, bearing (2)	56-8127
(d)	Retainer, ball, brass	56-8128
(e)	Cover, ball	56-8129
(f)	Ball, 1/8" diam. (3)	5W2017
(g)	Reset cam, trip	54-8139
(h)	Washer, neoprene	54-8140
(i)	Ring, retaining	1W42311FE7
	Changer Mounting	
	Spring, heavy (3)	56-7059FA9
	Spring, light (3)	56-7059-1FCP
	Sleeve (3)	54-7798
	Speed nut (3)	W-2554FCP

* This motor not carried, order motor 35-1451. If motor 35-1455 is replaced by motor 35-1451 order (3) shockmounts, part number 54-4501.

MODELS RP-190,
RP-190-1, RP-190-2



Primarily RP190-1 and RP190-2 are the same excepting the pickup cartridge, pickup cable, power cable and plugs.

This mechanism will be used in the following instruments:

Group	Instruments
RP190-1	9Y510
RP190-1	45J2
RP190-2	A82
RP190-2	A91
RP190-2	A108
RP190-2	45W9

SPECIFICATIONS

Turntable speed	45 r.p.m.
Records used	RCA seven-inch fine groove
Record capacity	Up to 12 records
Pickup force	Approx. 5 grams
Stylus tip radius	.001 inch
Power supply	105-125 volts, 60 cycle, a.c.

CAUTION

1. Avoid handling the pickup arm when the mechanism is in cycle.
2. Do not use force to release a jam.
3. Do not try to remove the records on the turntable if the turntable is stopped in cycle.
4. If the separator knives protrude from the center post when the mechanism is out of cycle, push the "start-reject" knob to reject and the condition should be corrected automatically.

AUTOMATIC OPERATION

1. Place a stack of records over the center post, with the desired selections upward, the last record to be played on top.
2. Push the "start-reject" knob to "start" and let go. The mechanism will automatically play in sequence one side of each record stacked on the separator shelves.
3. To reject a record being played, push the "start-reject" knob.
4. At conclusion of playing and as the last record is being repeated, lift the pickup arm and place on its rest. Turn off the power to the drive motor by pulling forward on control knob.
5. Remove the stack of records by lifting them straight up.

LUBRICATION

A light machine oil (SAE No. 10) should be used to oil the bearings of the drive motor.

On all bearing surfaces, excepting the motor bearings, Houghton STA-PUT No. 320, or equivalent, should be used. On all other sliding surfaces, STA-PUT No. 512, or equivalent, is recommended. STA-PUT can be purchased from E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia, Pa.

(Do not oil or grease record separator shelves.)

It is important that the drive motor spindle and the rubber tire on the idler wheel be kept clean and free from oil or grease. dirt, or any foreign material at all times. Carbon tetrachloride or naphtha is satisfactory for cleaning these parts.

Function of Principal Parts

Trip Lever (77)

The trip lever is mounted on the bottom end of the pickup arm vertical pivot shaft. The function is to transfer the movement of the pickup arm to parts of the operating mechanism below the motor board. The end of the trip lever contacts stud on cycling cam thereby starts tripping action.

Pickup Arm Return Lever (70)

The function of the pickup arm return lever is to provide a force necessary to push the pickup into landing position. The end of the pickup arm return lever is curved so as to provide a stop for trip lever. This stop determines landing position of the pickup.

Reject Lever (22)

The function of the reject lever is to transfer the action of the control knob to the cycling cam thereby starting a change cycle.

Muting Switch (68)

The function of the muting switch is to short the pickup leads to prevent amplifying of mechanical noise, of the merchanism during change cycle.

Cycling Cam (85)

The cycling cam is mounted on the cycling slide. The function of the cam is to transfer the rotary motion of the turntable shaft into sliding motion of the cycling slide.

Stop Dog (82A)

The stop dog is mounted on the end of cycling slide. The function of the stop dog is to engage the ratchet wheel on the separator shaft and prevent it from rotating, at the exact moment during change cycle.

Ratchet Wheel (53)

The function of the ratchet wheel located on the end of the separator shaft is to keep the separator shaft stationary at the proper time, so as to actuate the separator mechanism inside the centerpost.

Cycling Slide (82)

The cycling slide is the main connecting medium between the various moving parts.

MODELS RP-190,
RP-190-1, RP-190-2

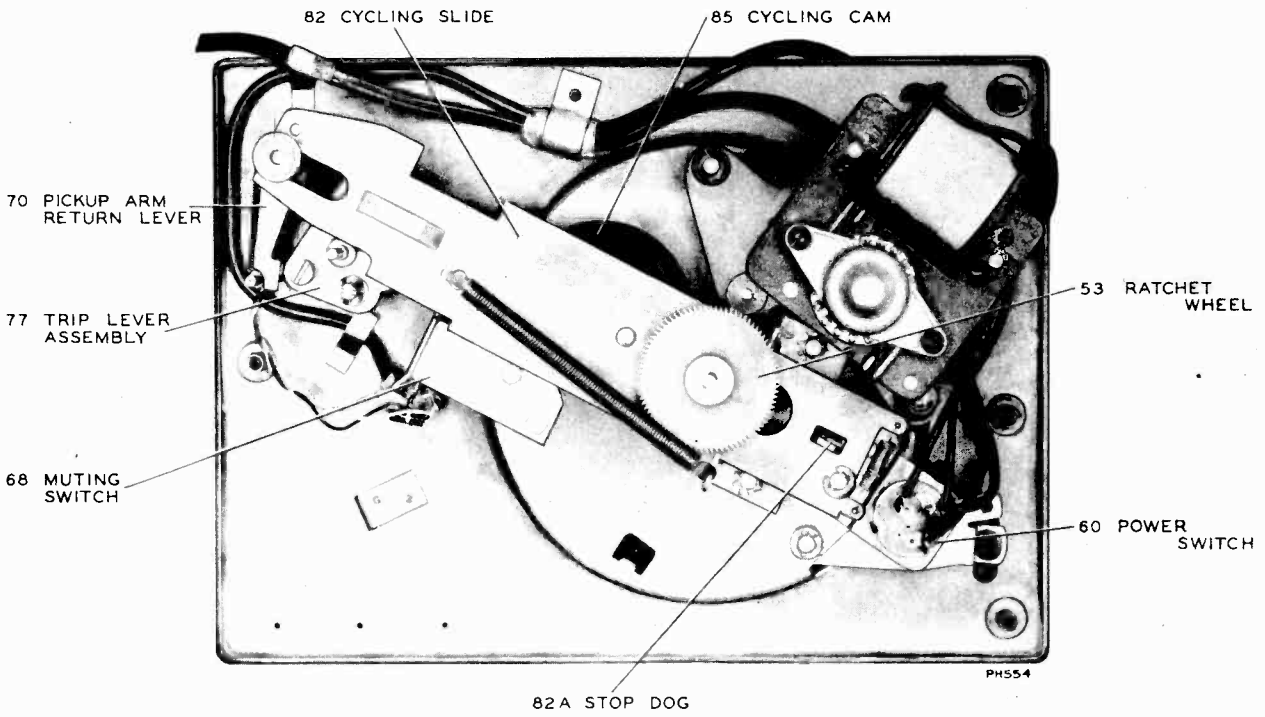


Fig. 1

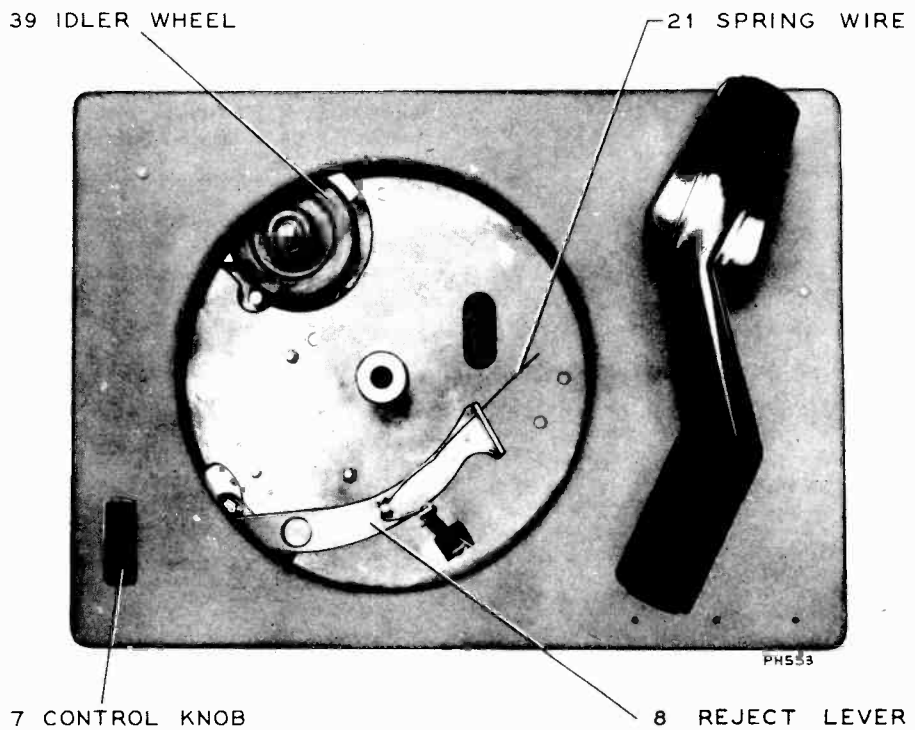


Fig. 2

Cycle of Operation

FUNCTION	EXPLANATION
Place a stack of records over centerpost.	1. Records rest on separator shelves protruding from either side of the centerpost.
Push control knob to reject.	1. The control first actuates the power switch applying power to the drive motor. This starts the turntable rotating. 2. Further movement of the control knob actuates the reject lever assembly (8) which contacts the stud mounted on the eccentric cycling cam and moves it slightly.
Cycling starts.	1. The slight movement of the eccentric cycling cam (85) is sufficient for engagement with the rotating knurled roller (62) mounted on turntable shaft. 2. The eccentric cycling cam which is mounted on the cycling slide (82) pushes the slide in the direction of the pickup arm pivot. In so doing tension is increased on the slide return spring (89). 3. The tab on the cycling slide moves back permitting muting switch to close.
Pickup raises from the rest.	1. As the cycling slide continues to move in the direction of the pickup arm pivot the small incline pressed in the slide causes the elevating rod (74) to lift the pickup arm from the rest. 2. The raised pickup arm moves inward slightly from the inward force of the pickup arm return lever (70), until the stud on the trip lever (77) assembly comes against edge of the cycling slide. 3. The cycling slide continues to move further, which pushes the trip lever back. The eccentric landing adjustment stud (79) contacts and pushes the pickup arm return lever (70) against the tension of the return spring (69).

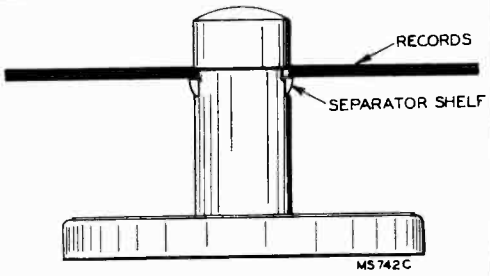


Fig. 3

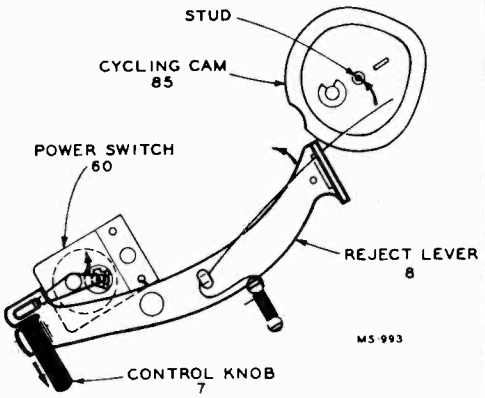


Fig. 4

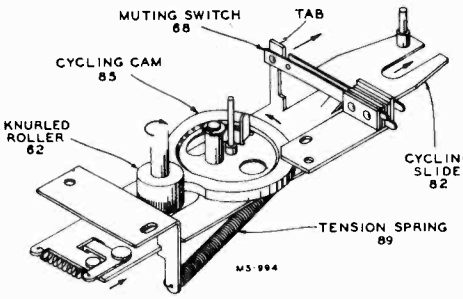


Fig. 5

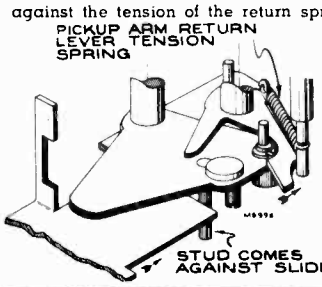


Fig. 6

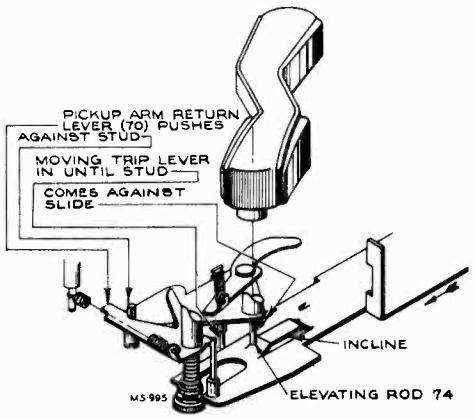


Fig. 7

MODELS RP-190,
RP-190-1, RP-190-2

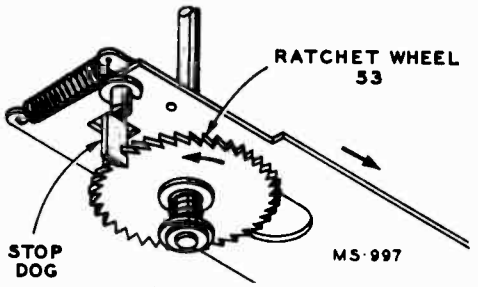


Fig. 8

Separator knives separate the lower record from the stack and the lower record drops to the turntable.

1. As the cycling slide reaches the limit in its movement in the direction of the pickup arm pivot, the stop dog mounted on the slide engages the rotating ratchet wheel (53).
2. The ratchet wheel and separator shaft (6) then remains stationary and the turntable continues to rotate.
3. The separator shelves and knives are coupled together in such a manner that the flattened end of the separator shaft pushes the knives out, which in turn pulls the opposite shelves in.
4. As the shelves recede, the separator knives mounted above the shelves move out and separate the lower record of the stack and support the remaining records while the lower record drops to the turntable.

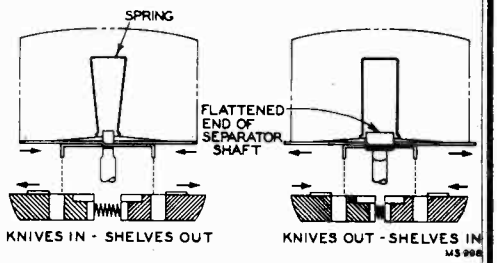


Fig. 9

Pickup moves in for landing.

1. The cycling slide moves away from the pickup arm pivot, due to the force produced by the tension spring (89) keeping the eccentric cycling cam against the rotating knurled roller (62). The knurled roller at this time is returning to the smaller diameter of the cam.
2. The stud on trip lever assembly follows the slide due to the force produced by the action of the pickup arm return lever.
3. After the slide has moved back a short distance the stud on the trip lever assembly no longer follows the slide since the landing adjustment stud comes against the curved stop on the end of the pickup arm return lever. At this moment the pickup is directly above the point of landing.
4. As the cycling slide completes the return movement the elevating rod slides down the incline which lowers the stylus on the record.

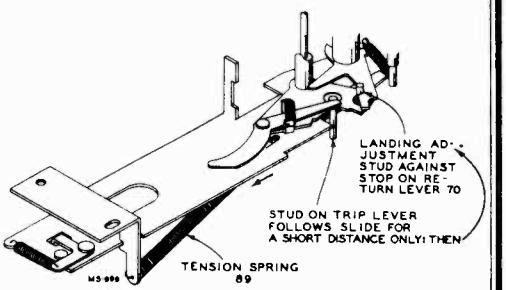


Fig. 10

Cycle completed and the record plays.

1. The tab on the cycling slide contacts and opens the muting switch.
2. The stud on the cycling slide pushes pickup arm return lever back to permit free motion of the pickup arm.
3. The change cycle is completed as the cycling slide comes against the stop bracket, at which time the knurled roller rotates in the cut away section of the cam.
4. As the record plays and the pickup arm moves inward.
5. When the stylus reaches the end of the selection the end of the trip lever contacts the stud on the cycling cam, and pushes it slightly.
6. The slight movement of the cycling cam causes engagement with the rotating knurled roller, thereby starting a change cycle.
7. The mechanism repeats the preceding sequence of operations until the last record of the stack has dropped and has been played. This selection will be repeated until the pickup is lifted and placed on the rest.

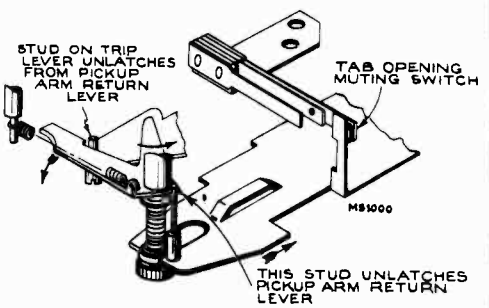


Fig. 11

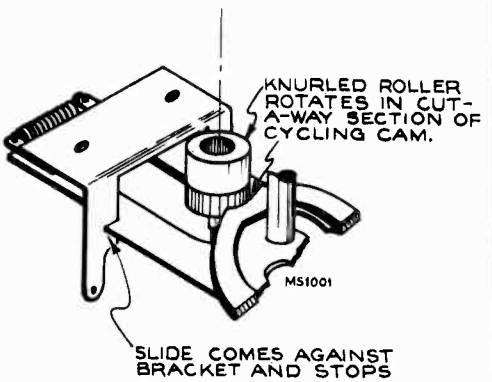


Fig. 12

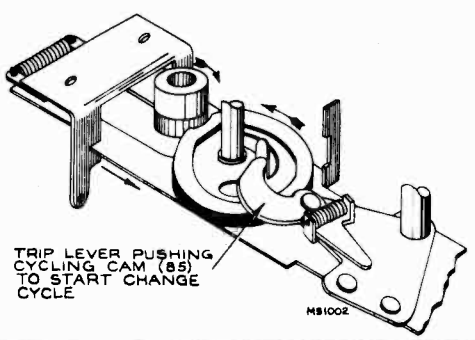


Fig. 13

MODELS RP-190,
RP-190-1, RP-190-2

DO YOU KNOW?

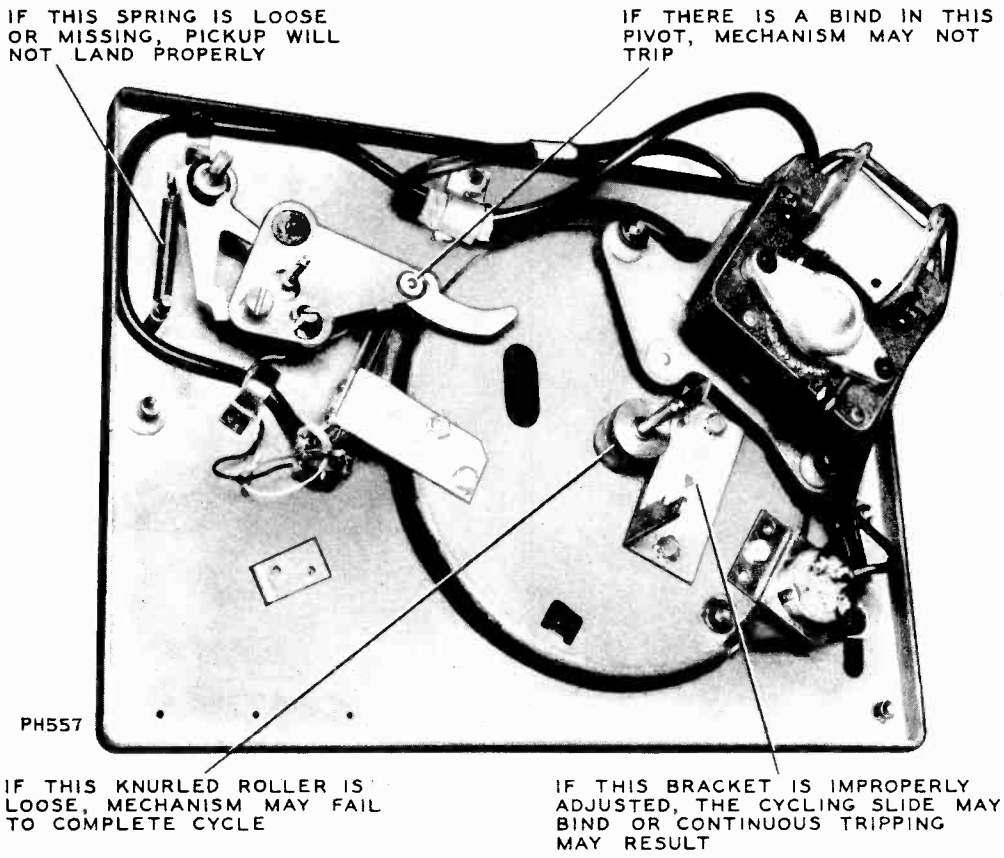


Fig. 14

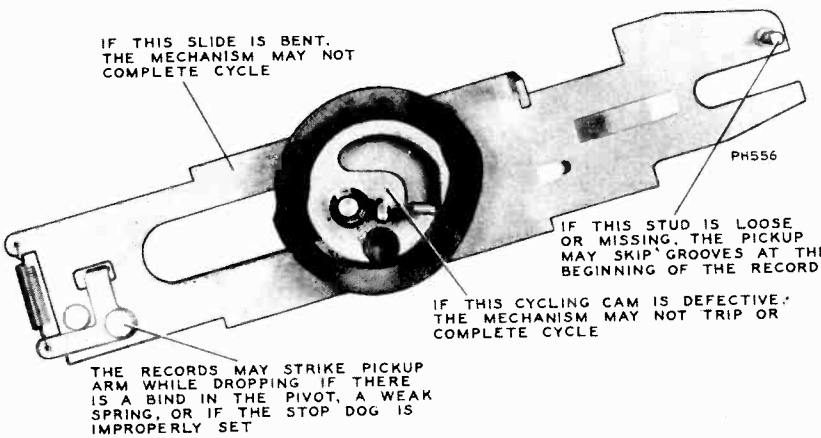


Fig. 15

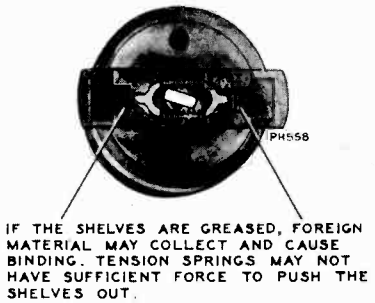


Fig. 16

MODELS RP-190,
RP-190-1, RP-190-2

SERVICE HINTS

REJECT CONTROL FAILS TO OPERATE

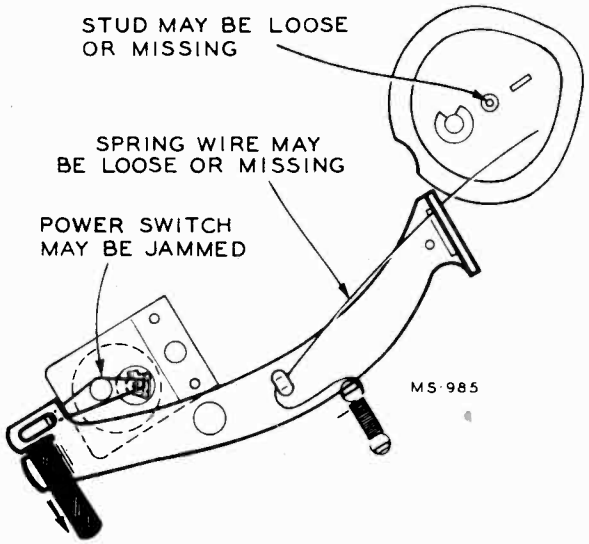
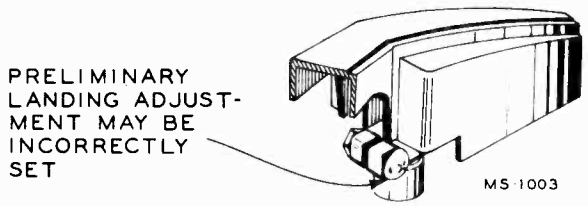


Fig. 17

RECORD STRIKES PICKUP ARM WHEN DROPPING



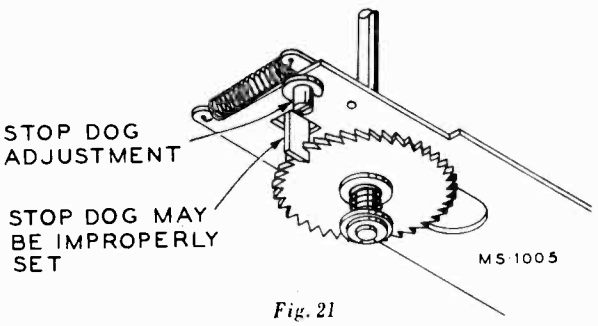


Fig. 21

MECHANISM FAILS TO SEPARATE RECORDS PROPERLY

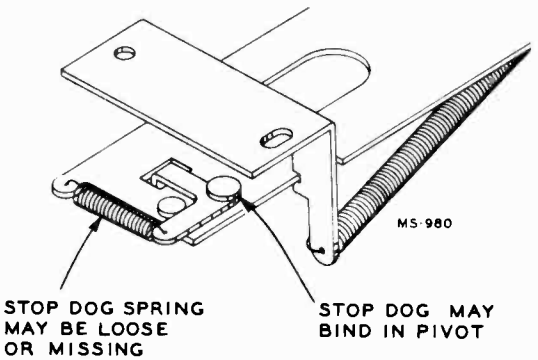


Fig. 18

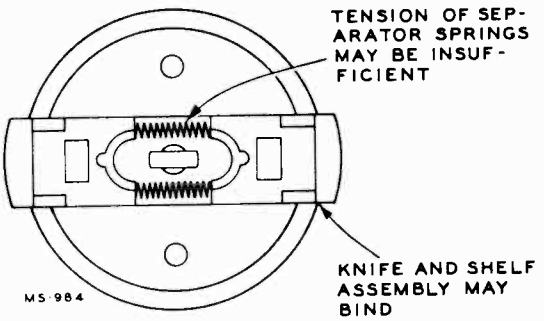


Fig. 19

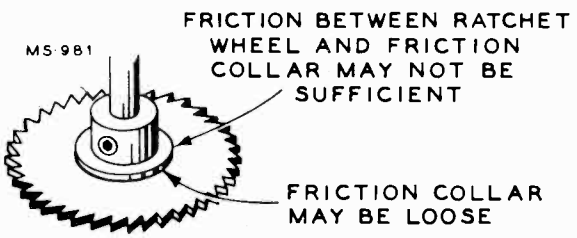


Fig. 20

MODELS RP-190,
RP-190-1, RP-190-2

PICKUP FAILS TO LAND PROPERLY

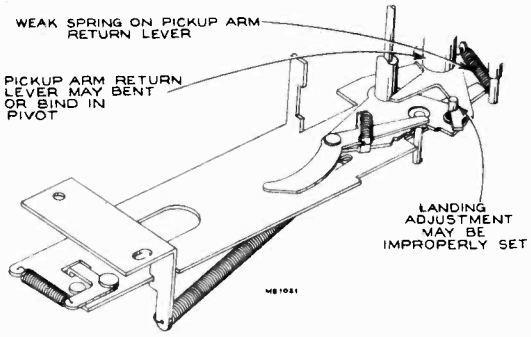


Fig. 22

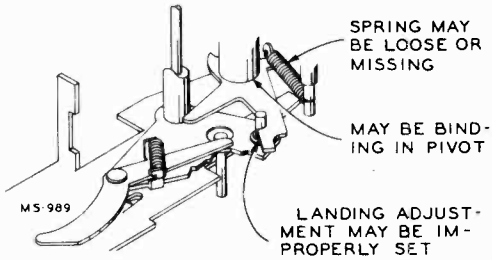


Fig. 23

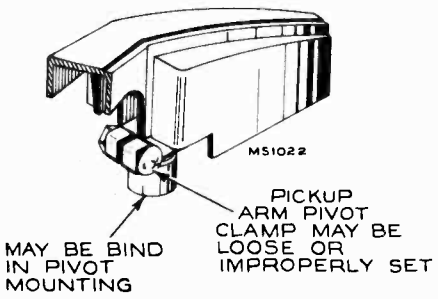


Fig. 24

DISTORTED OR NO OUTPUT

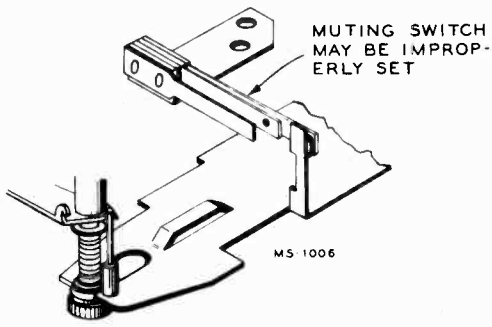


Fig. 28

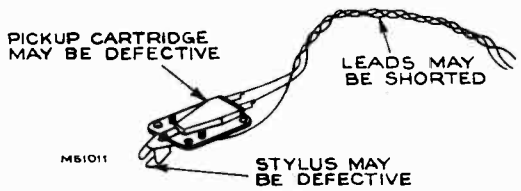


Fig. 29

PICKUP SKIPS GROOVES

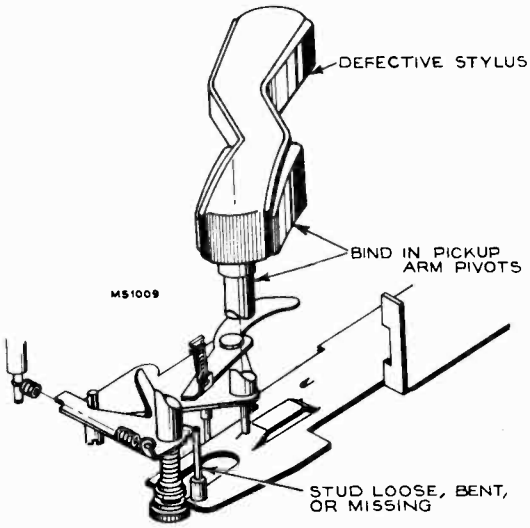


Fig. 25

MECHANISM FAILS TO TRIP

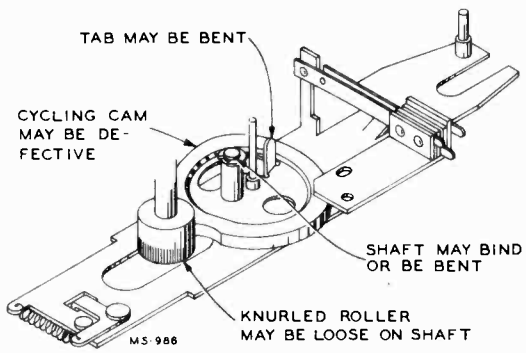


Fig. 26

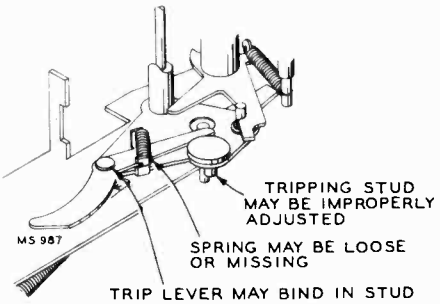


Fig. 27

PREMATURE TRIPPING

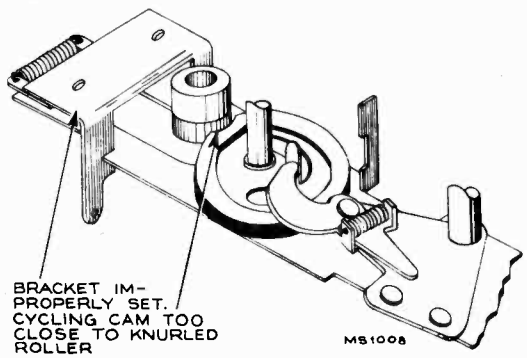


Fig. 30

MODELS RP-190,
RP-190-1, RP-190-2

"WOW" OR SPEED VARIATION

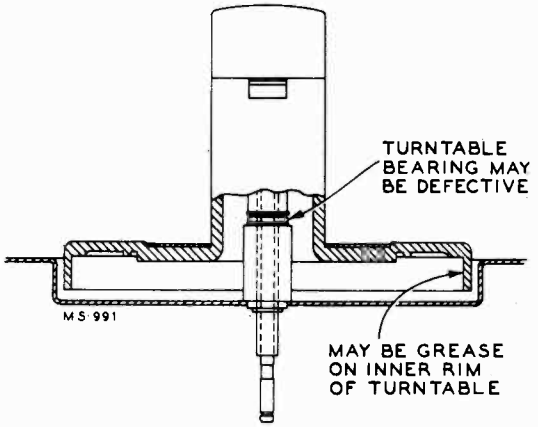


Fig. 31

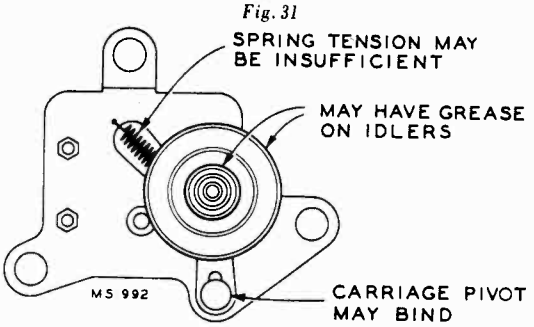


Fig. 32

CONTINUOUS TRIPPING

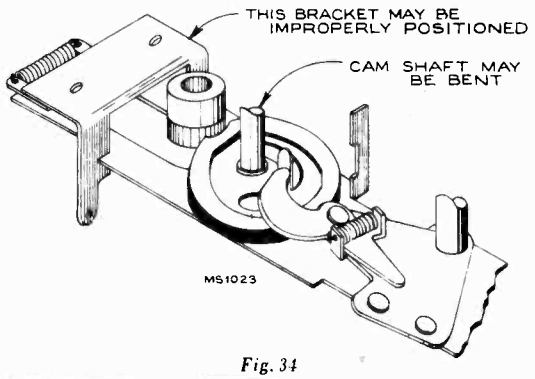


Fig. 34

RUMBLE

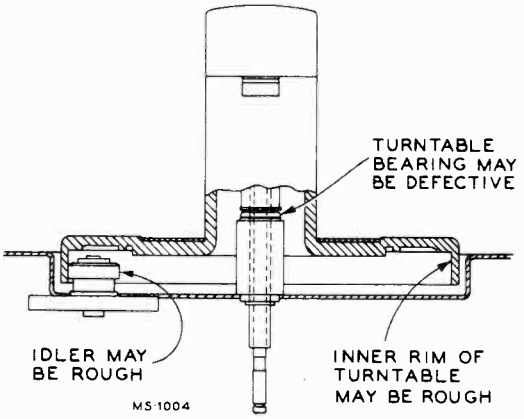


Fig. 33

MECHANISM FAILS TO COMPLETE CYCLE

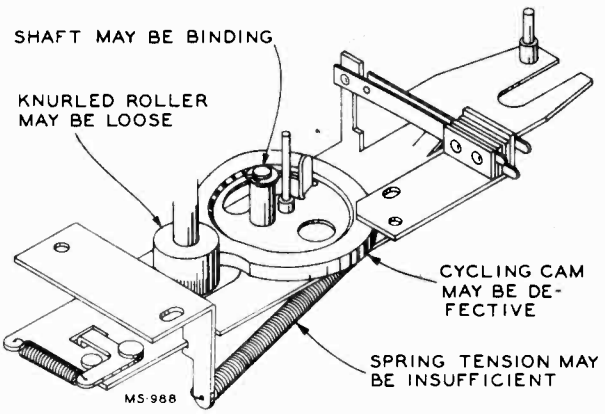


Fig. 35

ADJUSTMENTS

LANDING

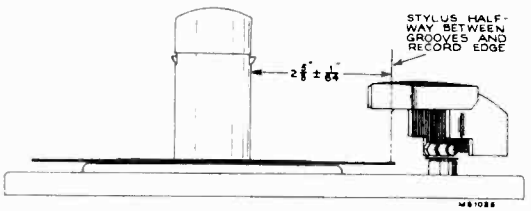


Fig. 36

TRIPPING

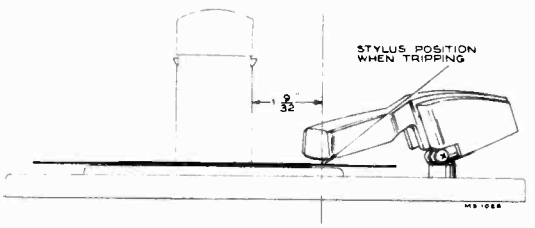


Fig. 37

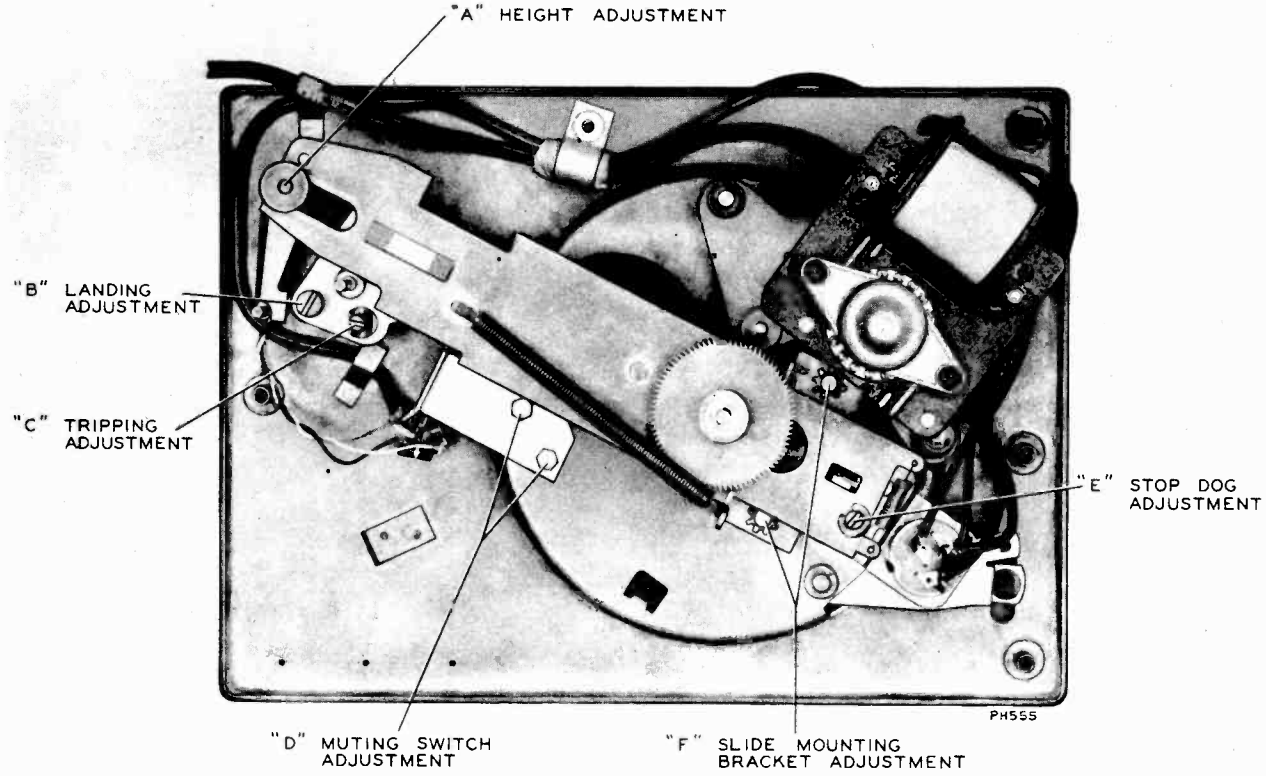


Fig. 38

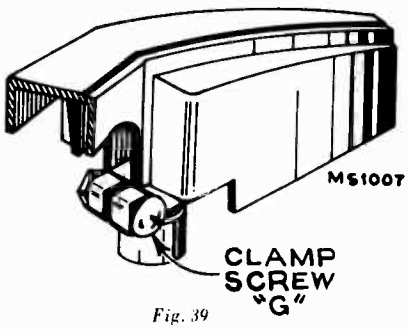


Fig. 39

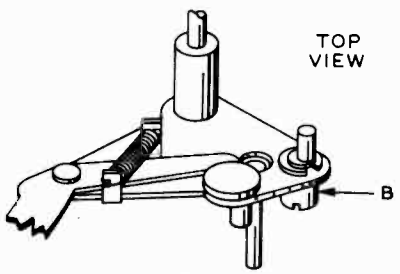


Fig. 40

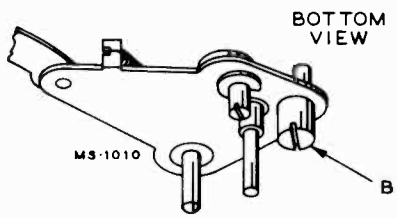


Fig. 41

Adjustments

Pickup Landing Adjustment:

Under ordinary conditions the landing adjustment is a screwdriver adjustment as shown. The adjustment of eccentric landing adjustment stud (B) gives approximately a ¼" movement. (See Figs. 38, 40, 41.)

If, however, the pickup arm has been removed it is first necessary to make an approximate landing adjustment as follows:

1. With the mechanism out of cycle and the clamp screw (G) loose, place pickup arm on the rest and tighten clamp screw enough to prevent the clamp from slipping on the shaft.
2. Set the landing adjustment stud (B) as shown (mid-adjustment). (See Figs. 40, 41.)
3. With the power removed, push reject control to reject. Rotate turntable by hand in the correct direction until the pickup is about ready to land. See sketch.
4. Loosen clamp screw (G) and move pickup arm so the stylus is approximately 2⅝" from side of centerpost. Tighten clamp screw. (See Figs. 36, 39.)
5. Exact landing adjustment can now be made by a screwdriver on stud (B). (See Fig. 38.)

Pickup Height Adjustment (See Fig. 38):

Adjust knurled nut (A) until the distance (during change cycle) between the top of the turntable and the stylus point is approximately 1⅛".

NOTE: If unable to adjust for sufficient height, it may be necessary to cut a few turns from the compression spring to allow more space on the shaft.

Tripping Adjustment (See Figs. 37, 38):

Adjust the eccentric tripping stud (C) until the mechanism trips when the stylus is 1 9/32" from the side of the centerpost.

Mounting Bracket Adjustment (See Fig. 38):

Loosen the two screws (F) and move the bracket so it is as near perpendicular to the slide as possible. Move back or forward until the cut away section of the cycling cam clears the knurled roller approximately 1/16". Tighten screws.

Muting Switch Adjustment (See Fig. 38):

Loosen the two screws (D) and adjust the position of the switch so the contacts are approximately 1/32 to 1/16 inches apart when the mechanism is out of cycle. If the mounting screws do not give sufficient adjustment, bend tab on slide slightly.

Stop Dog Adjustment (See Fig. 38):

Turn the eccentric screw (E) until the record drops to the turntable without striking the pickup arm.

MODELS RP-190,
RP-190-1, RP-190-2

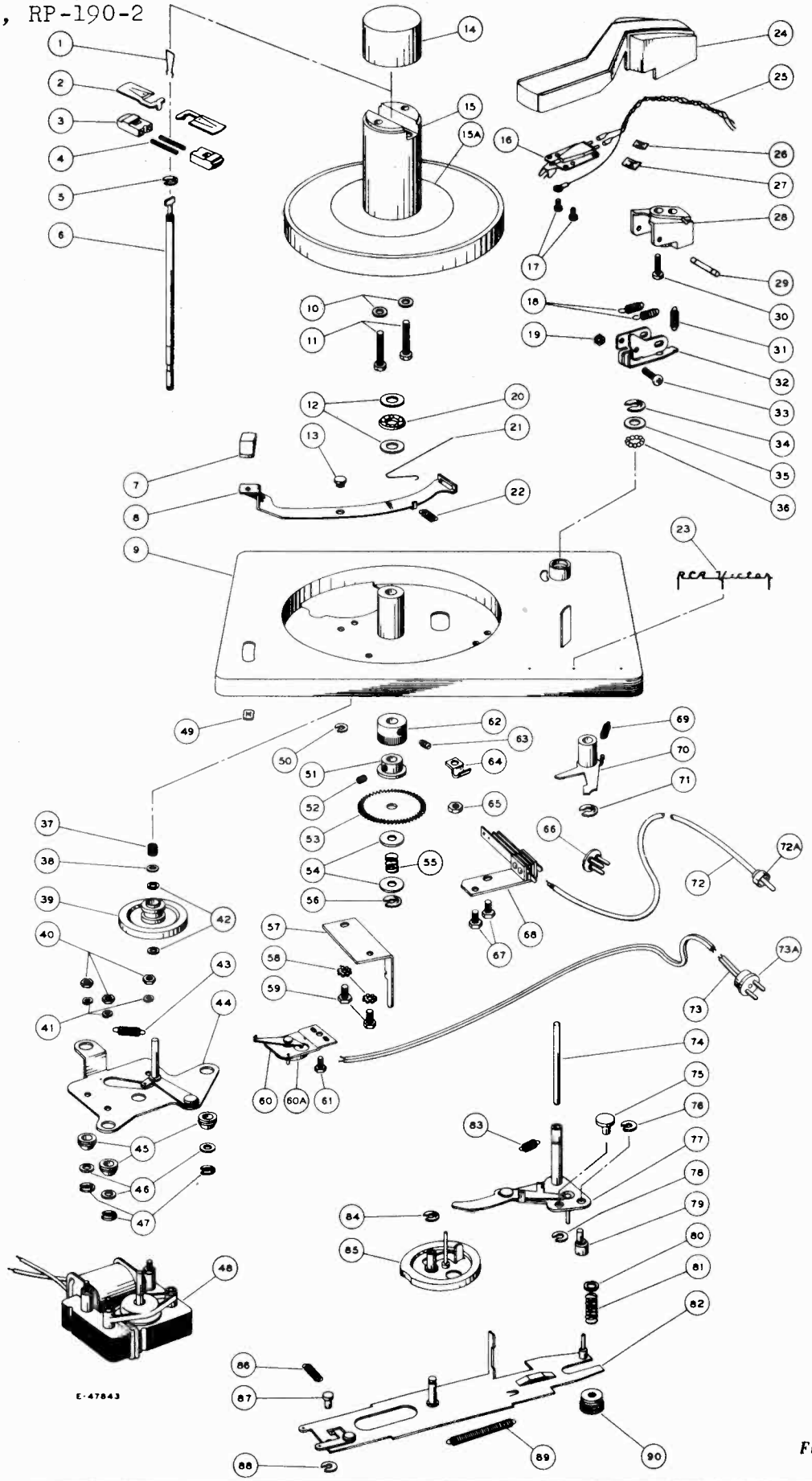
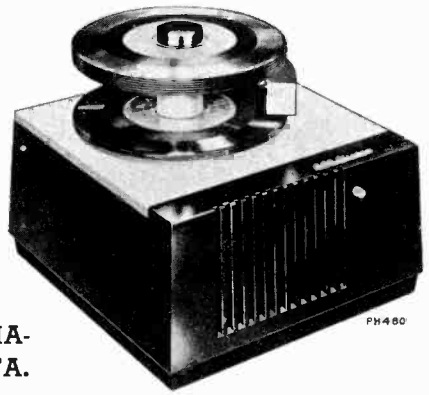


Fig. 42

STOCK No.	ILL. No.	DESCRIPTION RP190-1, RP190-2
74862	1	Spring—Spindle nose spring—formed
74864	2	Separator—Separator knife
74865	3	Shelf—Separator shelf
75756	4	Spring—Separator shelf return spring (.118" O.D. x 3/4" — 16 turns)
33726	5	Washer—"C" washer to hold separator shaft and cam
75757	6	Shaft—Separator shaft with cam
75741	7	Knob—Control knob
75739	8	Lever—Reject lever complete with formed spring
75729	9	Board—Motorboard sub-assembly complete with welded and/or staked studs and rest
74869	10	Washer—No. 6 flat washer for under head of screws No. 75758
75758	11	Screw—No. 6-32 x 1" fillister head machine screw (holds nose to spindle)
74080	12	Washer—Thrust bearing washer
75748	13	Stud—Reject lever mounting stud
75755	14	Cap—Spindle nose cap—red
75753	15	Turntable—Turntable and shaft assembly complete with finished disc
75754	15A	Disc—Finished disc for turntable part of No. 75753
75476	16	Crystal—Crystal cartridge complete with stylus (RP190-1)
75575	16	Crystal—Crystal cartridge complete with stylus (RP190-2)
74819	16A	Guard—Stylus guard for (RMP 128-4) (RP190-2)
74065	16B	Screw—No. 2-56 x 3/16" fillister head screw to mount guard (RMP 128-4) (RP190-2)
75770	16C	Stylus—Replacement stylus and holder assembly (yellow) for crystal (RMP 128-4) (RP-190-2)
74230	16D	Washer—Washer and nut to mount replacement stylus (RMP 128-4) (RP190-2)
75722	17	Screw—No. 4 x 1/4" fillister head screw to mount crystal
75727	18	Spring—Shock absorbing spring (.187" O.D. x 3/4")
75725	19	Nut—No. 8-32 hex nut to mount pickup arm
72349	20	Bearing—Thrust bearing
75740	21	Spring—Reject lever spring (formed), part of reject lever
75742	22	Spring—Reject lever return spring (.180" O.D. x .535" — 21 1/2 turns)
74782	23	Emblem—"RCA Victor" emblem.
75719	24	Arm—Pickup arm shell only
75728	25	Cable—3 wire twisted pickup arm cable complete with connectors
71095	26	Nut—Speed nut for cable in rear of arm
72765	27	Nut—Speed nut for cable in center of arm
75721	28	Weight—Counterbalance weight die cast
75724	29	Pin—Pin for anchoring shock absorbing springs
75723	30	Screw—No. 6 x 11/16 fillister head screw to fasten counterbalance
75886	31	Spring—Counterbalance spring (.180" O.D. x .600" — 30 turns)
75720	32	Swivel—Pickup arm swivel
75726	33	Screw—No. 8-32 x 3/8" cross recessed pan head machine screw to mount pickup arm
35969	34	Washer—"C" washer to mount trip lever
75752	35	Washer—Steel balls thrust washer
3658	36	Ball—Steel ball (3/32 dia.)
74870	37	Retainer—Idler wheel retainer (spring sleeve type)
75887	38	Washer—Spring washer for idler wheel
74077	39	Wheel—Idler wheel
—	40	Nut—No. 6-32 hex nut for mounting motor to idler lever plate assembly
—	41	Lockwasher—No. 6 split lockwasher for No. 6-32 hex nut
74078	42	Washer—Dampening washer for idler wheel
75762	43	Spring—Idler wheel tension spring (.195" O.D. x 29/32" — 37 1/2 turns)
75759	44	Plate—Motor mounting plate complete with idler lever
75761	45	Grommet—Rubber grommet for motor mounting plate
75749	46	Washer—Flat washer—metal (.0299" x .190" I.D. x 3/8" O.D.)—for mounting motor
33726	47	Washer—"C" washer to mount motor assembly
75760	48	Motor—117 volt, 60 cycle motor
74212	49	Nut—Control knob speed nut
74431	50	Washer—Spring washer to mount reject lever mounting stud
75736	51	Collar—Friction collar
14974	52	Screw—No. 8-32 x 3/16" hex socket head cup point—for friction collar
75738	53	Wheel—Ratchet wheel
75750	54	Washer—Flat washer—metal (.0299" x .180" I.D. x 9/16" O.D.)—for ratchet wheel, thrust spring
75743	55	Spring—Ratchet wheel thrust spring (5/16" O.D. x 7/16" — 5 1/2 turns)
33726	56	Washer—"C" washer to mount ratchet wheel
75735	57	Bracket—Mounting bracket for slide assembly
	58	Lockwasher—No. 8 external teeth lockwasher for cycling slide mounting bracket
74670	59	Screw—No. 8 x 3/8" self-tapping hex head screw to mount slide assembly bracket
75732	60	Housing—"On-Off" switch housing and lever less switch
75733	60A	Switch—"On-Off" switch
—	61	Screw—No. 8 x 1/4" self-tapping hex head screw to mount "On-Off" switch
75737	62	Roller—Knurled roller
75751	63	Screw—No. 10-32 x 17/64" headless set screw—dog point—for knurled roller
—	64	Clamp—Cable clamp for audio cable
—	65	Nut—No. 8-32 hex nut to fasten cable clamp ILL. 64
74192	66	Connector—3 contact male connector for audio cable
—	67	Same as 61
75730	68	Switch—Muting switch
75745	69	Spring—Pickup arm return lever spring (.195" O.D. x 1 1/4" — 66 turns)
75734	70	Lever—Return lever
35969	71	Washer—"C" washer to mount return lever
—	72	Cable—Shielded audio cable (see Service Data for various instruments)
31048	72A	Plug—Pin plug for audio cable
—	73	Power cord (see Service Data for various instruments)
30870	73A	Connector—2 contact male connector for power cable
75731	74	Rod—Elevating rod
75768	75	Stud—Tripping adjustment stud
74431	76	Washer—Spring washer for adjusting studs
75767	77	Lever—Trip lever assembly less spring and tripping and landing adjustment studs
74431	78	Washer—Spring washer for adjusting studs
75769	79	Stud—Landing adjustment stud
75749	80	Washer—Flat washer—metal (.0299" x .190" I.D. x 3/8" O.D.)—to mount sub-motorboard
75746	81	Spring—Height adjustment spring (.262" O.D. x 13/16" — 8 turns)
75763	82	Slide—Cycling slide assembly complete with stop dog less cam wheel and stop dog adjusting stud
75742	83	Spring—Trip lever spring (.180" O.D. x 535" — 21 1/2 turns)
33726	84	Washer—"C" washer for cam wheel
75764	85	Wheel—Cam wheel and tire
75765	86	Spring—Stop dog tension spring (.195" O.D. x 11/16 — 24 1/2 turns)
75766	87	Stud—Adjusting stud for stop dog
74431	88	Washer—Spring washer for stop dog adjusting stud
75744	89	Spring—Slide assembly return spring (1/4" O.D. x 2 23/32" — 90 turns)
75747	90	Nut—Knurled nut for height adjustment

MODEL 45-EY



FOR RECORD CHANGER SERVICE INFORMATION—REFER TO RP-168 SERIES SERVICE DATA.
ON PAGES RCD.CH.19-1 THROUGH RCD.CH.19-8.

Specifications

Tube Complement

1. RCA 12AV6 ..... Amplifier
2. RCA 50C5 (in RS-132 or RS-132-A) ..... Output
   RCA 50B5 (in RS-132-F) ..... Output
3. RCA 35W4 ..... Rectifier

Loudspeaker (92577-6W)

Size and type ..... 4 in. P.M.
Voice coil impedance ..... 3.2 ohms at 400 cycles

Dimensions (overall)

Height, 7⅝" Width, 9 1/16" Depth, 9⅝"

Power Supply Rating

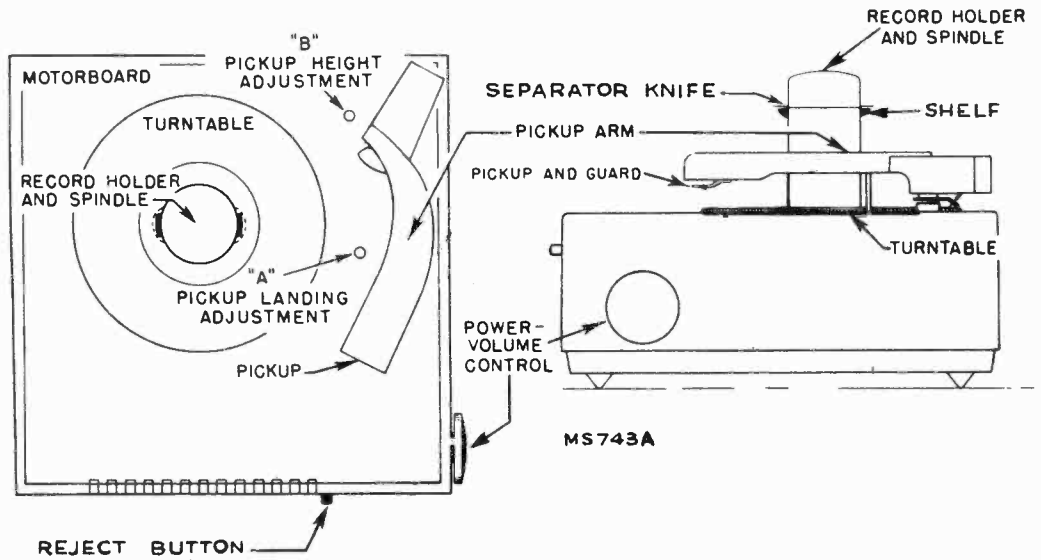
115 volts, 60 cycles A.C. ..... 40 watts

Power Output

Undistorted ..... 1.0 watt Maximum ..... 1.25 watts

Record Changer

Turntable speed ..... 45 r.p.m.
Records used ..... RCA 7 in. fine groove
Record capacity ..... up to 10 records
Pickup ..... Crystal (medium output)
Pickup Stock No. 74067 used with RS-132 or RS-132-F
Pickup Stock No. 74625 used with RS-132-A



Pickup Landing Adjustment "A"

The pickup point should land half-way between the outer edge of the record and the first music groove.

If the pickup lands inside the starting grooves—turn screw "A" slightly clockwise. If pickup lands outside the starting grooves—turn screw "A" slightly counterclockwise.

Pickup Height Adjustment "B"

During cycle the pickup arm must rise high enough to clear a stack of ten records on the turntable, but not high enough to cause the top of the arm to touch records resting on the record supports.

If pickup does not clear a stack of ten records—turn screw "B" slightly clockwise. If pickup arm touches records on record supports—turn screw "B" slightly counterclockwise.

Record Separators

During service, the position of the star wheel on the underside of the record changer may be accidentally shifted; this may cause the separator knives to be extended when they should be concealed.

If the separator knives are thus extended—turn the power on so that the turntable is revolving, push the "start-reject" knob and allow the mechanism to complete a change cycle. If the knives remain extended—while the turntable is still revolving, gently press fingers against the extended knives until they disappear inside the center post—DO THIS ONLY WHILE MECHANISM IS OUT OF CYCLE.

MODEL 45-EY

To Remove Chassis

Remove the four screws at the corners of the bottom cover, separate the motor power plug and socket and remove the pickup cable from its socket on the amplifier chassis.

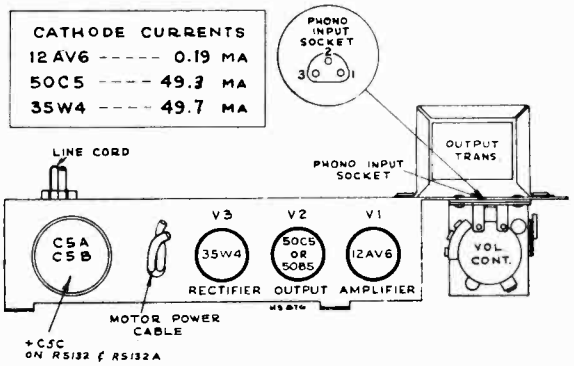
Elongated holes permit the speaker position to be adjusted. If the speaker should be replaced or its mounting bracket loosened, the speaker mounting bracket screws should not be tightened until after the bottom cover is assembled to the cabinet.

Amplifier Chassis

Three different amplifier chassis have been used in Model 45-EY.

Chassis No. RS-132 and RS-132-A use a 50C5 output tube. Chassis No. RS-132-F uses a 50B5 output tube.

Crystal pickup Stock No. 74067 is used in instruments having chassis RS-132 or RS-132-F. Crystal pickup Stock No. 74625 is used in instruments having chassis RS-132-A.

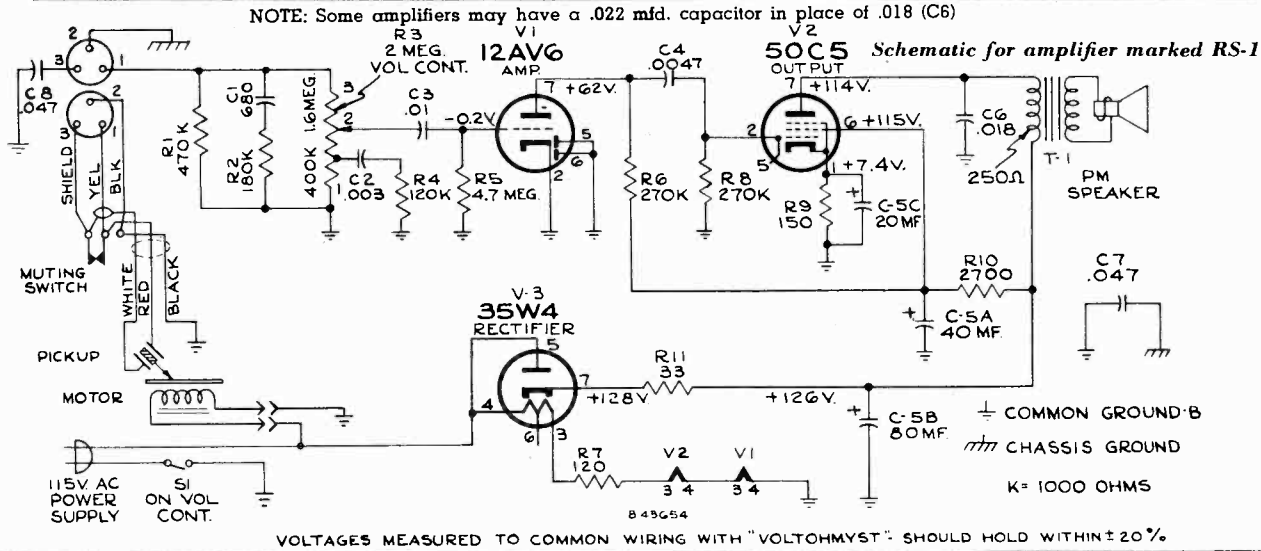


REPLACEMENT PARTS (For instruments having amp. chassis marked RS-132)

STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLIES RS-132
39648	Capacitor—Mica, 680 mmf. (C1)
73920	Capacitor—Moulded paper, .0047 mfd., 400 volts (C4)
73961	Capacitor—Tubular, .003 mfd., 200 volts (C2)
71923	Capacitor—Tubular, .01 mfd., 200 volts (C3)
58476	Capacitor—Moulded paper, .018 mfd., 400 volts (C6)
73553	Capacitor—Moulded paper, .047 mfd., 400 volts (C7, C8)
72281	Capacitor—Electrolytic, comprising 1 section of 80 mfd., 150 volts; 1 section of 40 mfd., 150 volts; and 1 section of 20 mfd., 25 volts (C5A, C5B, C5C)
74133	Control—Volume control and power switch (R3, S1)
28451	Cover—Insulating cover for electrolytic capacitor
73693	Grommet—Strain relief grommet (1 set) for power cord
70391	Insulator—Phono input socket insulator
30868	Plug—2 contact female plug for motor cable
73237	Resistor—Wire wound, 33 ohms, 150 ma. (R11)
72314	Resistor—Wire wound, 120 ohms, 5 watts (R7)
	Resistor—Fixed, composition, 150 ohms ±10%, ½ watt (R9)
	Resistor—Fixed, composition, 2700 ohms ± 10%, ½ watt (R10)
	Resistor—Fixed, composition, 120,000 ohms ±10%, ½ watt (R4)
	Resistor—Fixed, composition, 180,000 ohms ±10%, ½ watt (R2)
	Resistor—Fixed, composition, 270,000 ohms ±10%, ½ watt (R6, R8)
	Resistor—Fixed, composition, 470,000 ohms ±10%, ½ watt (R1)
	Resistor—Fixed, composition, 4.7 megohms ±20%, ½ watt (R5)

STOCK No.	DESCRIPTION
73117	Socket—Tube socket
36422	Socket—3 contact socket for phono input cable
72535	Transformer—Output transformer (T1)
	SPEAKER ASSEMBLIES 92577-6W—RL 108B4
74165	Speaker—4" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
74135	Baffle—Speaker baffle
74793	Bottom—Cabinet bottom cover
74137	Bracket—Mounting bracket for reject button and shaft
74136	Bracket—Speaker mounting bracket
74138	Button—Reject button and shaft
Y2226	Cabinet—Plastic cabinet less bottom cover
74190	Cable—Shielded pickup cable complete with 3 prong male plug
74193	Clamp—Spring clamp for reject button and shaft
74782	Emblem—"RCA Victor" emblem
74623	Hardware—Set of mounting parts consisting of 3 flat washers, 3 spacers and 3 rubber grommets to mount record changer
74666	Knob—Power switch knob
74192	Plug—3 prong male plug for pickup cable
74734	Spring—Retaining spring for knob
74139	Spring—Reject button and shaft return spring (.203" dia. x 1½"—21" turns)
2917	Washer—"C" washer for reject button and shaft

NOTE: Some amplifiers may have a .022 mfd. capacitor in place of .018 (C6)



Schematic for amplifier marked RS-132

VOLTAGES MEASURED TO COMMON WIRING WITH "VOLTOHMYST" SHOULD HOLD WITHIN ± 20%

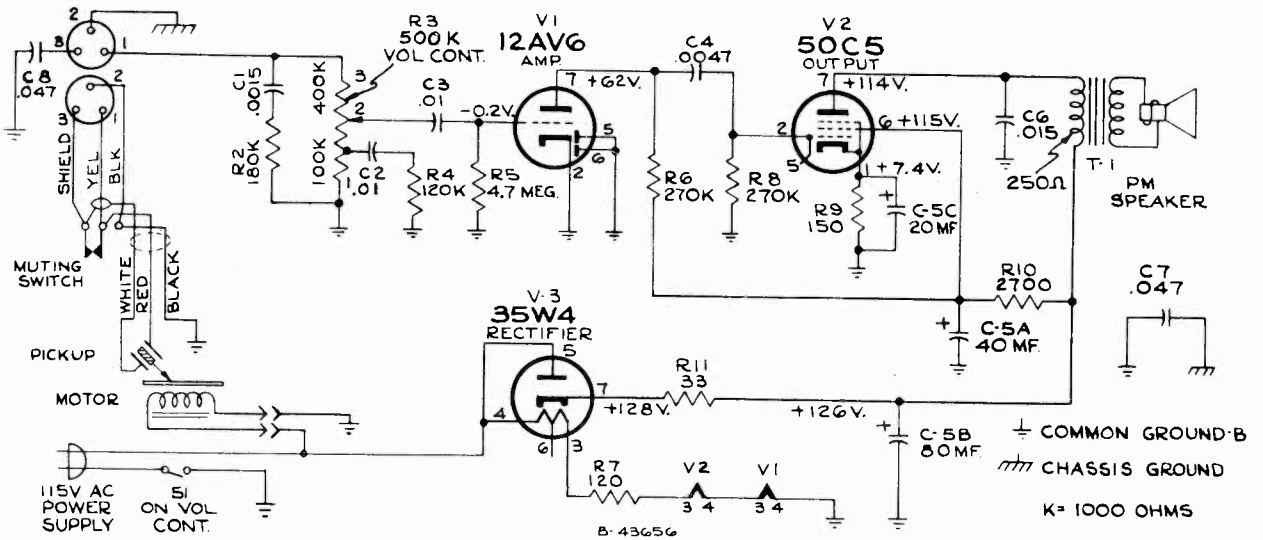
MODEL 45-EY

REPLACEMENT PARTS (For instruments having amp. chassis marked RS-132-A)

STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLIES RS-132-A
72281	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts; 1 section of 40 mfd., 150 volts; and 1 section of 20 mfd., 25 volts
71934	Capacitor—Tubular, paper, .0015 mfd., 600 volts (C1)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C4)
71923	Capacitor—Tubular, paper, .01 mfd., 200 volts (C2, C3)
73797	Capacitor—Tubular, paper, .015 mfd., 600 volts (C6)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C7, C8)
30868	Connector—2 contact female connector for motor cable
36422	Connector—3 contact female connector for phono cable
38411	Control—Volume control and power switch
28451	Cover—Insulating cover for electrolytic
73693	Grommet—Power cord strain relief grommet
28452	Plate—Mounting plate for electrolytic
73237	Resistor—Fuse type, 33 ohms (R11)
72314	Resistor—Wire wound, 120 ohms, 5 watts (R7)
	Resistor—Fixed, composition:—
	150 ohms, ±10%, ½ watt (R9)
	2700 ohms, ±10%, ½ watt (R10)
	27,000 ohms, ±10%, ½ watt (R4)
	180,000 ohms, ±10%, ½ watt (R2)
	270,000 ohms, ±10%, ½ watt (R6, R8)
	4.7 megohm, ±20%, ½ watt (R5)
73117	Socket—Tube socket
72535	Transformer—Output transformer

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES 92577-6W
74165	Speaker—4" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
74135	Baffle—Speaker baffle
74793	Bottom—Cabinet bottom cover
74136	Bracket—Speaker mounting bracket
74137	Bracket—Mounting bracket for reject button and shaft
74138	Button—Reject button and shaft
Y2226	Cabinet—Plastic cabinet less bottom cover
74190	Cable—Shielded pickup cable complete with 3 contact male plug
74193	Clamp—Spring clamp for reject button and shaft
74192	Connector—3 contact male connector for pickup cable
74782	Emblem—"RCA Victor" emblem
74623	Hardware—Set of mounting parts consisting of 3 flat washers, 3 eyelets and 3 rubber grommets to mount changer
74666	Knob—Power switch knob
74734	Spring—Retaining spring for knob
74139	Spring—Reject button and shaft return spring
2917	Washer—"C" washer for reject button and shaft

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



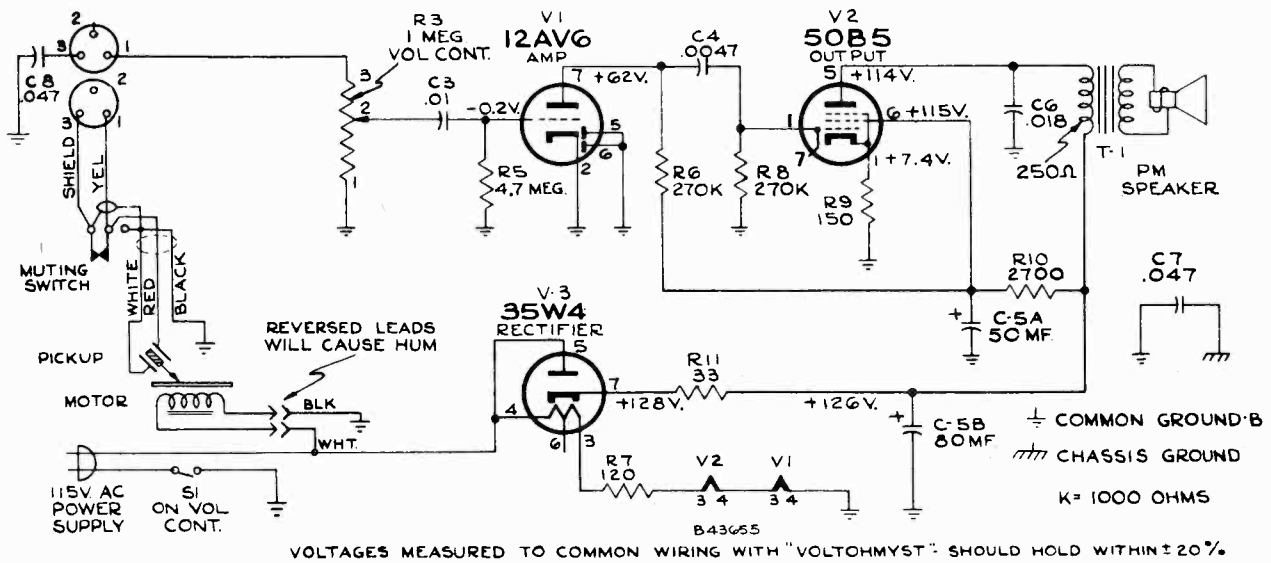
VOLTAGES MEASURED TO COMMON WIRING WITH "VOLTOHMYST" SHOULD HOLD WITHIN ± 20%

Schematic for amplifier marked RS-132A

REPLACEMENT PARTS (For instruments having amp. chassis marked RS-132-F)

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLIES RS-132-F		**SPEAKER ASSEMBLIES** 92577-6W
73520	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C5A, C5B)	74165	Speaker—4" P.M. speaker complete with cone and voice coil
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C4)		**MISCELLANEOUS**
71923	Capacitor—Tubular, paper, .01 mfd., 200 volts (C3)	74135	Baffle—Speaker baffle
58476	Capacitor—Tubular, paper, oil impregnated, .018 mfd., 400 volts (C6)	74793	Bottom—Cabinet bottom cover
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C7)	74136	Bracket—Speaker mounting bracket
36422	Connector—3 contact female connector for phono cable (J1)	74137	Bracket—Mounting bracket for reject button and shaft
30868	Connector—2 contact female connector for motor cable (J2)	74138	Button—Reject button and shaft
74101	Control—Volume control and power switch (R3, S1)	Y2226	Cabinet—Plastic cabinet less bottom cover
73127	Cover—Insulating cover for electrolytic	74193	Clamp—Spring clamp for reject button and shaft
73693	Grommet—Power cord strain relief grommet (1 set)	74192	Connector—3 contact male connector for pickup cable
28451	Plate—Mounting plate for electrolytic	74782	Emblem—"RCA Victor" emblem
73237	Resistor—Fuse type, 33 ohms (R11)	74623	Hardware—Set of mounting parts consisting of 3 flat washers, 3 eyelets and 3 rubber grommets to mount changer
72314	Resistor—Wire wound, 120 ohms, 5 watts (R7)		
	Resistor—Fixed, composition:—		
	150 ohms, ±10%, ½ watt (R9)	74666	Knob—Volume control and power switch knob
	2700 ohms, ±10%, ½ watt (R10)	74734	Spring—Retaining spring for knob
	270,000 ohms, ±10%, ½ watt (R6, R8)	74139	Spring—Reject button and shaft return spring
	4.7 megohm, ±20%, ½ watt (R5)	2917	Washer—"C" washer for reject button and shaft
73117	Socket—Tube socket		
72535	Transformer—Output transformer (T1)		

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



VOLTAGES MEASURED TO COMMON WIRING WITH "VOLTOHMYST" SHOULD HOLD WITHIN ± 20%.

Schematic for amplifier marked RS-132F

MODEL 45J

Specifications

Record Changer (RP-168)

Turntable speed ..... 45 r.p.m.
Records used ..... RCA fine groove—7 in.
Record capacity ..... Up to 10 records
Pickup RMP-128-1—Stock No. 74067.. Crystal (medium output)

Power Supply Rating

115 volts, 60 cycles A.C. ..... 15 watts

Dimensions (overall)

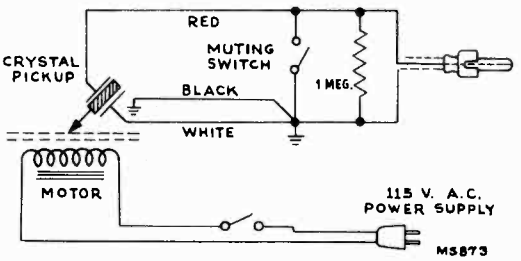
Height 6⅝" Width 9⅛" Depth 6⅞"

Record Separator

In the out of cycle position the record separator knives or discs are normally concealed inside the center post. During service, the position of the star wheel on the underside of the record changer may be accidentally shifted; this may cause the separator knives to be extended when they should be concealed.

If the separator knives are thus extended—turn the power on so that the turntable is revolving, gently press fingers against the extended knives until they disappear inside the center post—**DO THIS ONLY WHILE MECHANISM IS OUT OF CYCLE.**

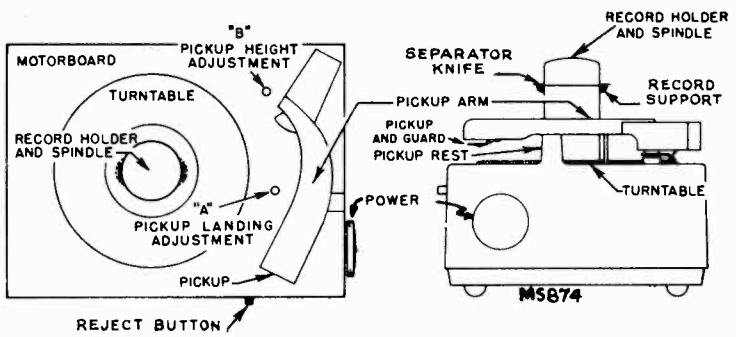
Note: This holds true only to mechanisms having the circular, rotating knives.



Schematic Diagram

Record Changer Mounting

The cabinet is used as the motorboard of the record changer. The record changer is attached with three screws and bushings. THE PICKUP ARM MUST BE REMOVED BEFORE THE RECORD CHANGER CAN BE REMOVED—REFER TO RP-168 SERIES SERVICE DATA.



Top and Side Views

FOR RECORD CHANGER SERVICE INFORMATION—REFER TO RP-168 SERIES SERVICE DATA. ON PAGES RCD.CH.19-1 THROUGH RCD.CH.19-8.

Pickup Landing Adjustment "A"

The pickup point should land half-way between the outer edge of the record and the first music groove.

If the pickup lands inside the starting grooves—turn screw "A" slightly clockwise. If pickup lands outside the starting grooves—turn screw "A" slightly counterclockwise.

Pickup Height Adjustment "B"

During cycle the pickup arm must rise high enough to clear a stack of eight records on the turntable, but not high enough to cause the top of the arm to touch records resting on the record supports.

If pickup does not clear a stack of eight records—turn screw "B" slightly clockwise. If pickup arm touches records on record supports—turn screw "B" slightly counterclockwise.

REPLACEMENT PARTS

STOCK No.	DESCRIPTION
	MISCELLANEOUS
74097	Bottom—Cabinet bottom cover
74189	Bushing—Shoulder bushing to mount mechanism in cabinet (3 required)
74098	Button—Reject button
Y2151	Cabinet—Plastic cabinet less bottom cover
74296	Cable—Shielded pickup cable complete with pin plug
74674	Emblem—"RCA Victor" emblem
31051	Foot—Rubber foot (4 required)
73490	Knob—Power switch knob
——	Resistor—Fixed, composition: 1 megohm, ±10%, ½ watt
14270	Spring—Retaining spring for knob
74871	Switch—Power switch

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.

MODEL 45J

Connecting Record Changer Attachment to Radio Receivers

RCA Radios with Phono Jack

Plug male connector on the end of the "Phono" lead into the female connector on the receiver chassis. If set is provided with a phono switch, push or turn the "Phono" switch to "Phono" position, and operate the Record Changer Attachment according to instructions. If no switch is provided, use maximum setting of volume control on attachment, and minimum setting of radio volume control which will give acceptable volume, and tune receiver off frequency from any very strong station. In some instances the radio volume control will have the effect of a tone control.

RCA Type No. 202W1 Record Player Selector

This selector switch may be used for combined operation of two record players through one phono input jack. A choice of two types of input jacks and output cable plugs are provided.

Radio-Phonograph Combinations

Most radio-phonograph combinations use resistors and/or capacitors for tone compensation in the phono input circuit.

Where unsatisfactory reproduction is obtained with Model 45J connected into the phono jack of such instruments, we suggest that Model 45J be connected as indicated for radios which do not have a phono jack.

Radios Without Phono Jack

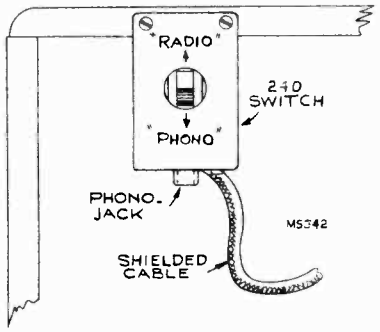
Methods of connecting the Record Changer Attachment to various types of audio systems are given in the accompanying text and illustrations. The data given requires that an RCA Type No. 240X1 (Formerly Stock No. 240) Radio-Phono switch be used for switching from radio to phonograph, as desired. For ease in connecting the "phono" lead to the switch, the male plug on the end of the lead matches the phono jack on the switch.

In general, the Record Changer Attachment must be used with radio receivers having at least two stages of high-gain audio amplification. The output of the Record Changer Attachment should be connected to the input of the first audio tube, and at the same time the output of the radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the Record Changer Attachment is in operation.

Installation of Switch

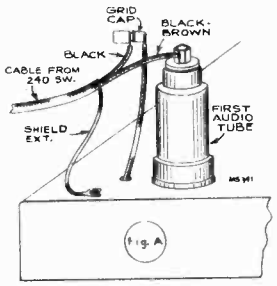
Fasten the bracket to the cabinet in such a position that the switch may be easily reached. For wooden cabinets, a suggested place is the upper rear edge of the cabinet. If the radio has a plastic cabinet, the bracket may be fastened to the chassis by self-tapping screws or soldering. **In the case of a.c.-d.c sets, the bracket should not be fastened to the chassis.** In such cases, a wooden block may be fastened to the chassis and the bracket screwed to the wooden block, care being exercised that there is no metallic path from the bracket to the chassis.

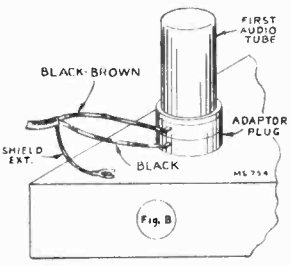
Connect the braided shield extension to the radio chassis by either soldering or placing the spade lug under a mounting screw.



On a.c.-d.c. sets it is necessary to isolate the cable shield from the chassis. This is best done by connecting the shield to the chassis through a .25 mfd. 300-volt condenser. Care should be taken that the shield braiding and switch bracket do not come in contact with the chassis.

If the common-negative wiring in the a.c.-d.c. set is isolated from the set chassis, connect the cable shield, through a .25 mfd. capacitor, to the common-negative wiring, and not to the chassis.





Note:

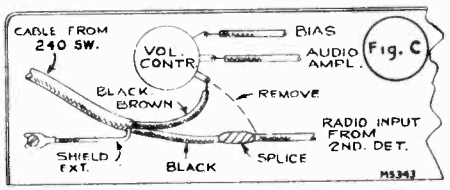
If late production models are connected to a radio set as shown in Fig. A & B, it will probably be necessary to substitute a volume control in place of the 1 meg. fixed resistor, since majority of sets do not have a volume control following the first audio tube.

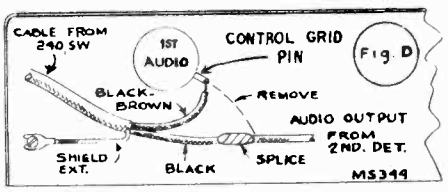
For radio receivers in which the 1st-audio tube has a top grid cap—see Fig. A:

1. Disconnect the grid lead from the first audio tube.
2. Connect the cap on the black lead to the clip on the grid lead, as shown above.
3. Connect the clip on the black-brown lead to the grid cap at the top of the 1st-audio tube, bending the terminal if necessary to proper size for a metal tube cap.
4. Insert the plug on the end of the record player lead into the jack on the bracket.
5. Secure or position the connection cable assembly so that the cap and clip terminals are well separated from each other and other metal parts.

For radio receivers in which the 1st-audio tube is type 6SQ7, 6SR7, 12SQ7 or 12SR7—see Fig. B:

1. Use adaptor plug RCA Stock No. 37798.
2. Remove the 1st-audio tube.
3. Solder the switch leads to the adaptor plug terminals—black to bottom lug—black-brown to top lug.
4. Tape terminals to prevent short circuits when installed in set.
5. Insert the adaptor into the 1st-audio tube socket.
6. Insert the 1st-audio tube into the adaptor.
7. Insert the plug on the end of the record player lead into the jack on the bracket.





For other radio receivers in which the 1st-audio tube does not have a grid cap; connection to volume control input—see Fig. C, connection to 1st-audio tube control grid—see Fig. D:

1. Unsolder the lead from the volume control lug indicated in Fig. C or from the control grid pin indicated in Fig. D. It is usually necessary to remove the chassis from the cabinet to do this.
2. Solder the black-brown lead (remove clip) to the lug or pin disconnected in Step 1.
3. Solder the black lead (remove plug) to the lead disconnected in Step 1. Tape the joint to prevent short circuits.
4. Insert the plug on the end of the record player lead into the jack on the bracket.

MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

PH482

IDENTIFICATION OF MODELS

Each record changer bears a label on the underside of the motorboard in accordance with the following:

960282-1

60 cycle version used in domestic instruments. Has Stock No. 75044 crystal pickup. Used in Models A55, A78, TA128 and TA129.

960282-2

50/60 cycle version used in instruments designed for export sale. Has Stock No. S-5652 ceramic pickup. Used in Models 9QV5 and 4QV8C.

960282-3

50/60 cycle version used in instruments designed for export sale. Has Stock No. 75044 crystal pickup. Used in early production of Model 9QV5.

960282-4

60 cycle version used in domestic instruments. Has Stock No. 75475 crystal pickup. Used in Models A82, 2T81 and 6T84 (mahogany and walnut).

960282-5

Identical to 960282-4 except for tan finish, Used in Models A82, 2T81 and 6T84 (blonde and limed oak).

Compensation:

Some of the above record changers have a resistor/capacitor combination on the pickup lead terminal board. This is to compensate for the differing frequency response of various instruments. Correct values of these resistors and capacitors are indicated in the Service Data for the instruments which use the record changer.

AUTOMATIC OPERATION

1. Lift the record stabilizing clamp.
2. Place a stack of records, ten inch if desired; over the center post leaving the edge of the stack resting on the ten-inch support.
   When playing a stack of twelve-inch records, raise both the stabilizing clamp and the ten-inch record support before placing the stack over the center post. The twelve inch records will rest on the main support.
3. Lower the stabilizing clamp on the stack of records.
4. Turn the speed selector control for the proper speed.
5. Select the proper stylus by turning the knob at the front end of the pickup arm.

NOTE: The speed selector and the stylus selector controls must indicate the same when selecting for a certain type of record.

6. Turn the control knob in the right hand end of the motorboard to "reject" and release.
   The mechanism will play one side of each record in the stack automatically. It will continue to repeat the last record of the stack until the pickup is raised from the record and placed on the rest.
7. To reject a record being played, turn the control knob to reject and release.
8. To remove records, place pickup arm on the rest, turn control knob to "off," raise stabilizing clamp and lift the entire stack.

NOTE: The pickup arm should only be handled when the control is in the manual position or before the pickup has played approximately ⅓ the distance in, if playing automatically. The pickup arm can also be handled when the mechanism is stopped if it feels free to move.

FEATURES

1. This record changer is a center support, drop type, two speed (78-33⅓ rpm) mechanism, designed to play automatically a series of twelve ten-inch, or ten twelve inch records of the standard 78 rpm type or of the long playing 33⅓ rpm type.
2. The mechanism is equipped with a light weight, dual stylus pickup cartridge.
3. The automatic tripping device is of the acceleration type.
4. The two speeds of 78 or 33⅓ rpm are controlled by a single knob.
5. The stylus selection is accomplished by a single knob.

MANUAL OPERATION

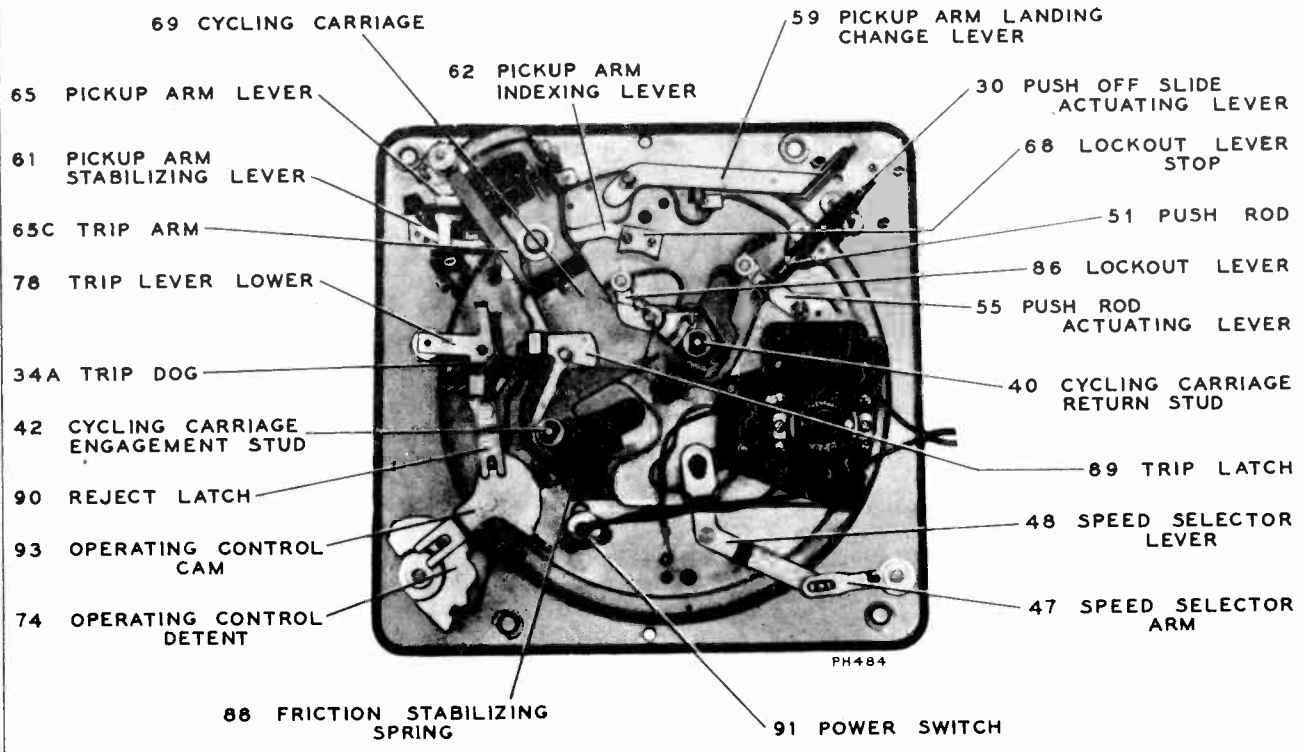
1. Raise both the stabilizing clamps and the ten-inch support shelf.
2. Place either a ten or twelve inch record on turntable.
3. Select the proper speed and stylus.
4. Turn control knob to manual.
5. Place pickup on start of the record.
6. When selection is completed, lift pickup arm and place it on the rest.
7. Turn control knob to "off".
8. Lift record straight up to remove.

HELPFUL SUGGESTIONS

Before servicing the mechanism, inspect the assembly to determine whether all levers, springs and parts are in place and not jammed or bent.

1. Never use force to start or stop the turntable or any part of the mechanism.
2. (a) If for any reason the mechanism becomes jammed, it may be released by pulling both the spiral engagement stud and the cycling carriage return stud downward. Then move the cycling carriage in a clockwise direction (viewed from the bottom).
   (b) If the two studs cannot be pulled down, try to remove the turntable by lifting straight up.
3. Cracked or badly chipped records may damage the stylus.
4. Do not leave records on the mechanism for an extended period of time as a guard against warpage.

MODELS 960282-1, 960282-2, 960282-3, 960282-4, 960282-5



FUNCTIONS OF PRINCIPAL LEVERS

Push-off slide actuating lever 30

The actuating lever located inside the support post extends through the motorboard. The function is to transfer the movement of the push rod 51 to the 10 and 12 inch push-off slides.

Push-off slides 5, 10

The function of the slide is to push the records off the step in the center post.

Cycling Carriage 69

The cycling carriage forms the main tie link between the various levers. When the mechanism is tripped the cycling carriage engagement stud 42 raises and engages the cycling spiral channel located on the underside of the turntable. This engagement causes the cycling carriage to rotate about its pivot in a counterclockwise direction (Viewed from the bottom). The movement of the carriage continues in the same direction until the inclined portion of the spiral channel pushes the stud down to engage the latch (89). The next instant the cycling carriage return stud (40) becomes unlatched after which it raises and engages the spiral channel which returns the cycling carriage to the normal out of cycle position.

Cycling Carriage engagement Stud 42

The engagement stud forms a link between the cycling carriage and the cycling spiral on the under side of the turntable. This stud causes the cycling carriage to rotate in a counterclockwise direction (viewed from the bottom of the motorboard).

Cycling Carriage Return Stud 40

The return stud forms a link between the cycling carriage and the cycling spiral. This causes the cycling carriage to return to the normal out of cycle position.

Push Rod 51

The push rod forms a link between the push rod actuating lever (55) and the push off slide actuating lever (30).

Elevating Rod 19

The elevating rod functions as a lift for the pickup arm.

Push rod actuating lever 55

Push rod actuating lever is a tie link between the push rod (51) and the cycling carriage (69). It also is provided with an adjustment to govern the travel of the push-off slides 5 and 10.

Friction stabilizing spring 88

This spring forms a wedge which holds the cycling carriage (69) from drifting when the mechanism is in the playing position. In its braking action it provides a means of slowing the movement of the pickup to provide a gentle landing.

Trip lever (upper) 34

As the pickup arm travels towards the center of the record, the trip lever is carried along by the inter-connecting levers. A small offset located on the turntable shaft rotating with the turntable contacts the end of the trip lever once with each revolution. On each contact the trip lever is pushed back slightly. This slight backward movement continues as long as the pickup is moving at a constant rate of speed. When the pickup enters the eccentric groove of the record, the movement is accelerated and thus allows the trip dog (34A) to drop off the edge of the trip latch (89) before the turntable has made a revolution, therefore, the small offset on the turntable strikes the trip lever and in so doing, moves trip latch (89) and starts change cycle.

Trip Lever (lower) 78

The lower trip lever mechanically linked to the upper trip lever (34) transfers the action from the underside of the motorboard to the top of the motorboard.

Pickup Arm Landing Change Lever 59

The pickup arm landing change lever functions as a stop for the pickup indexing lever (62). The change lever position is altered depending upon the position of the 10 inch record support 4.

Pickup Arm Indexing Lever 62

The pickup arm lever engages one of the notches in the indexing lever and in so doing determines the landing position of the pickup.

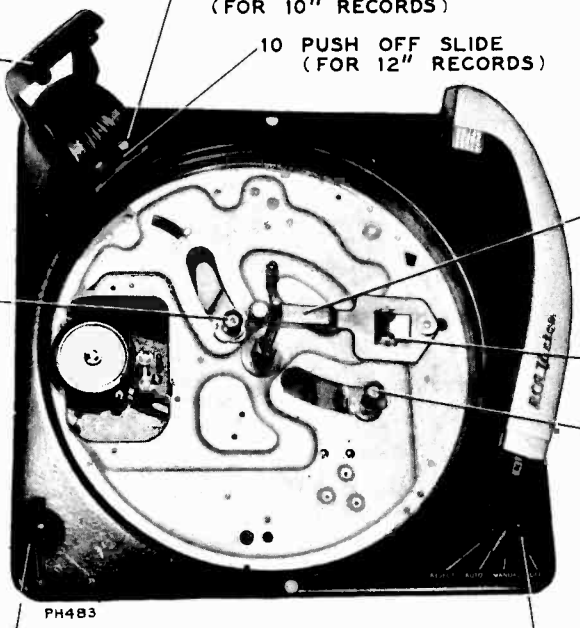
Pickup arm lever 65

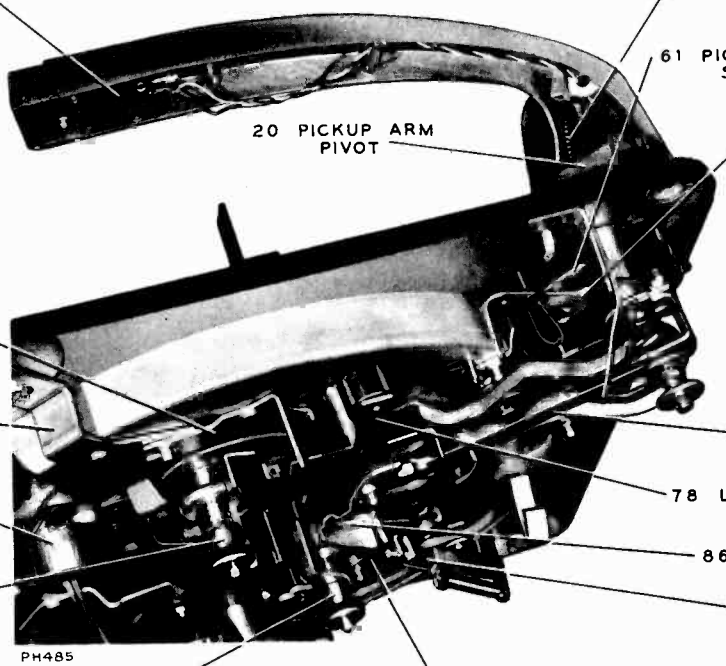
The pickup arm lever is connected to the pickup arm through the pickup arm pivot (20). The inward motion of the pickup arm causes the tripping action as a result of the contact between the pickup arm lever and the lower trip lever.

Pickup Arm Stabilizing Lever 61

The pickup arm stabilizing lever is actuated by a small tab on the cycling carriage during the change cycle. The forward movement of this stabilizing lever permits contact with the stud (65A) on the pickup arm lever, thereby stabilizing the pickup arm during the change cycle of the mechanism.

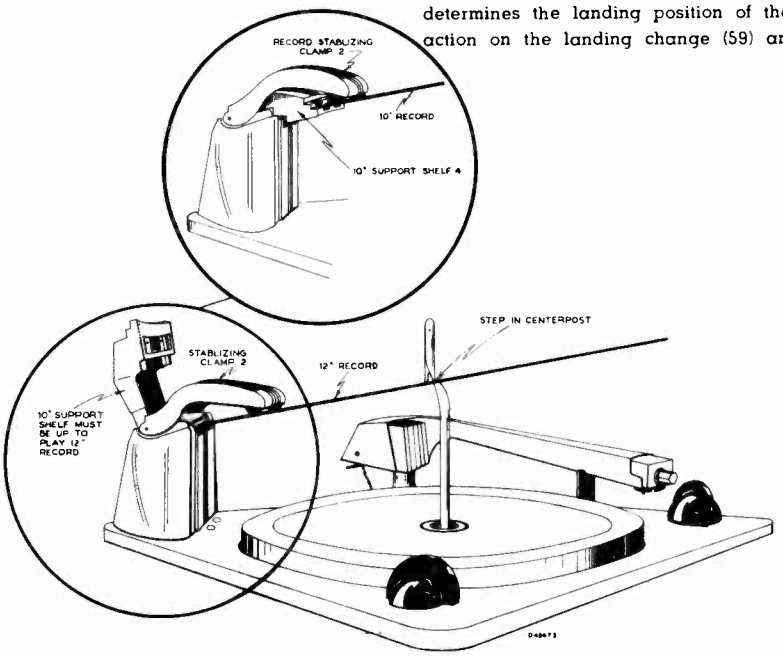
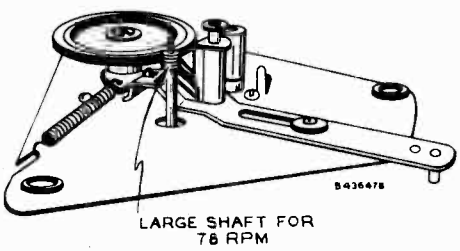
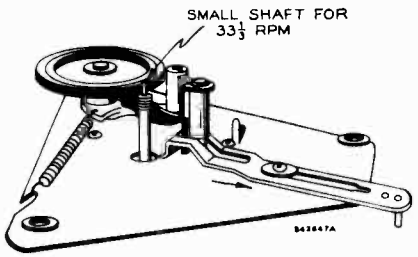
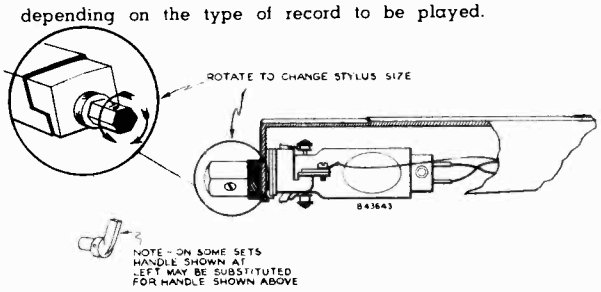
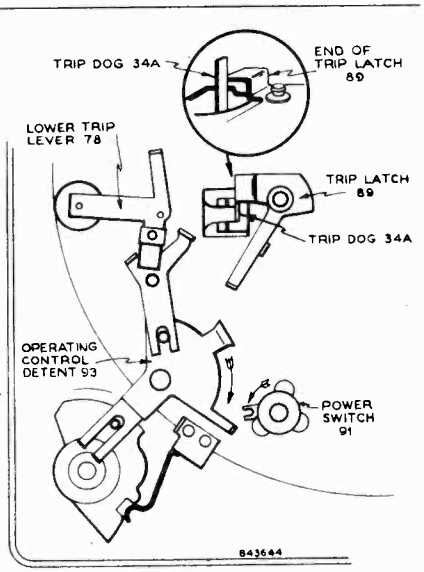
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5





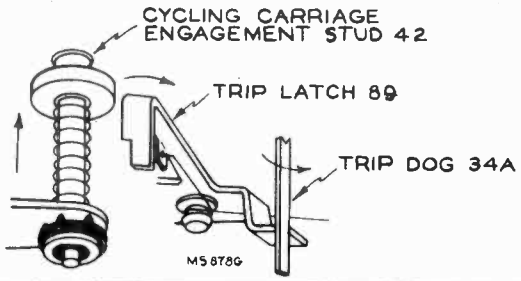
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

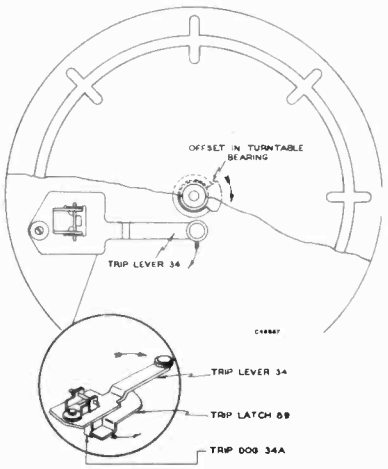
CYCLE OF OPERATION

Function	Description
Place a stack of 10 or 12 inch records over the center post. Lower the record stabilizing clamp.	1. The records are supported by notch or step in center post. 2. The edge of the records rest on the separator shelf. 10 inch records on the 10 inch shelf (4) 12 inch records on the 12 inch shelf (9) 3. The position of the 10 inch support shelf (4) (up or down) determines the landing position of the pickup due to the action on the landing change (59) and index (62) levers. 
Turn speed selector knob to 78 or 33⅓ rpm position (depending on type of record).	1. The motor has a turned down shaft providing a means of changing speed by raising or lowering the idler on the dual diameter shaft.  
Rotate stylus knob.	1. The rotation of the stylus knob selects the proper stylus depending on the type of record to be played. 
Push Control knob to reject position and release.	1. The Operating Control detent (74) mechanically connected to control knob engages and actuates the power switch (91) starting the turntable rotating. 2. Further rotation of the control knob moves the lower trip lever (78) sufficiently to allow the trip dog (34A) to slide off the end of the trip latch (89). 

MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

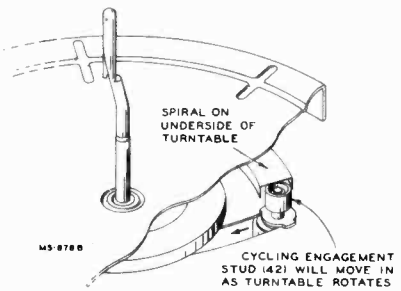
3. As the trip dog slides off the trip latch, the trip lever (34) has moved in sufficiently for the offset on the turntable shaft to contact the end of the trip lever and push it back.
4. The backward movement of the trip lever (34) unlatches cycling engagement stud (42) allowing it to raise and engage the cycling spiral.



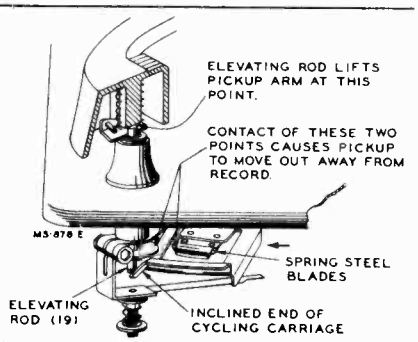


Cycling starts.

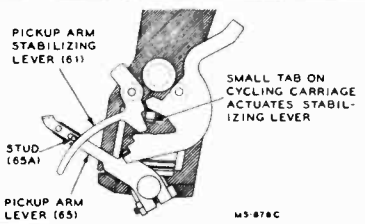
1. As the cycling carriage engagement stud (42) engages the spiral on the under side of the turntable, the carriage begins to move counterclockwise (viewed from the bottom of the motorboard) about its pivot.



2. The inclined end of the carriage located beneath the pick-up arm pivot raises the elevating rod (19) lifting the pick-up arm.
3. The same end of the cycling carriage has two spring steel blades forming a frictional connection between the cycling carriage and the pickup arm lever (65) by wedging the disc portion of the pickup arm lever between the two blades. This moves the pickup arm outward.



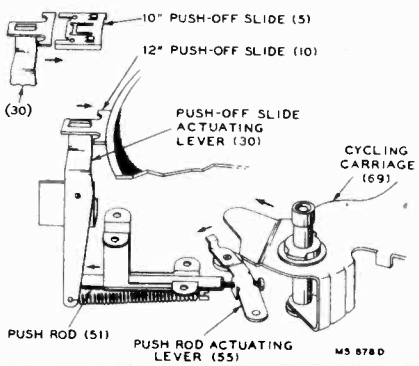
4. A small tab on the cycling carriage contacts and moves the pickup arm stabilizing lever (61) against the stud (65A) mounted on the tension spring incorporated in the pickup arm lever (65). This contact stabilizes the pickup arm in its movement during change cycle.



Record drops to the turntable.

1. As the cycling carriage continues to rotate, the end nearest the support post contacts push rod actuating lever (55), starting the action necessary to push the record off the center post.
2. The movement of the push rod actuating lever (55) through the linkage of push rod (51) push-off slide actuating lever (30) and push-off slide (5 or 10) pushes the record off the center post.
3. Record drops to turntable.

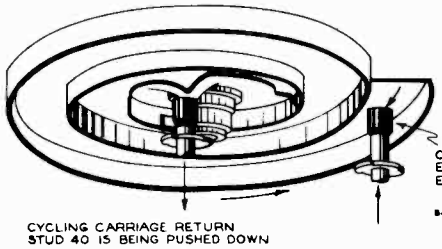
Note: The mechanism incorporates two push-off slides; one for ten inch (5) and one for twelve inch records (10).

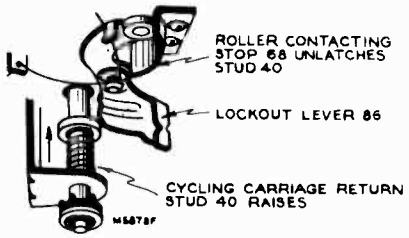


MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

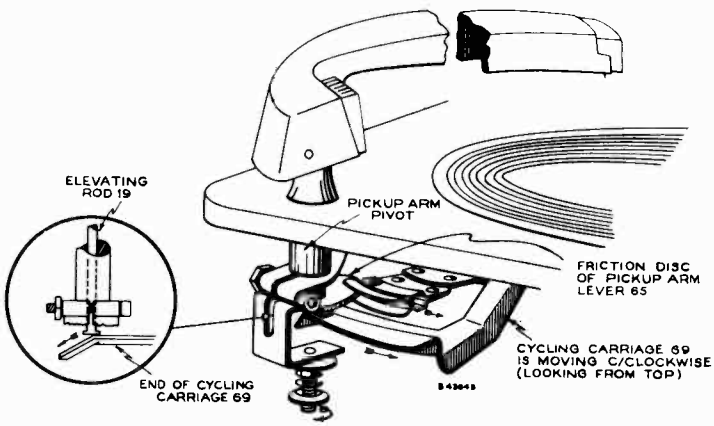
Pickup moves in for landing.

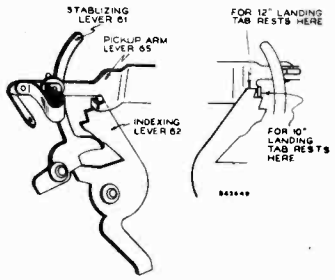
1. Up to this time the cycling carriage (69) is moving in a counterclockwise direction (viewed from the bottom). After the record is pushed off the center post the lock out lever (86) mounted on cycling carriage contacts the stop and in so doing unlatches the cycling carriage return stud (40).
2. As the cycling carriage return stud (40) raises to engage the spiral on the underside of the turntable, the cycling engagement stud (42) is pushed down and latched by the action of the incline in the spiral tract, thereby disengaging from the spiral.
3. The cycling carriage is now moving clockwise (viewed from the bottom of the motorboard).





4. The end of the cycling carriage beneath the pickup arm pivot again makes the frictional contact with the disc on the pickup arm lever (65). This contact moves the pickup arm in for landing.
5. The pickup arm on its inward movement continues to be stabilized by the pickup arm stabilizing lever (61). This stabilizing continues until the tab on the pickup arm lever is against the ten or twelve inch landing notch in the indexing lever. At this point the pickup should be directly over the point of landing on the record.
6. An instant later the small tab on the cycling carriage contacts the side of the pickup arm stabilizing lever, unlatching the indexing lever (62) and permitting free motion of the pickup arm.
7. The elevating rod sliding down the small incline on the cycling carriage permits the pickup to land on the start of the record.

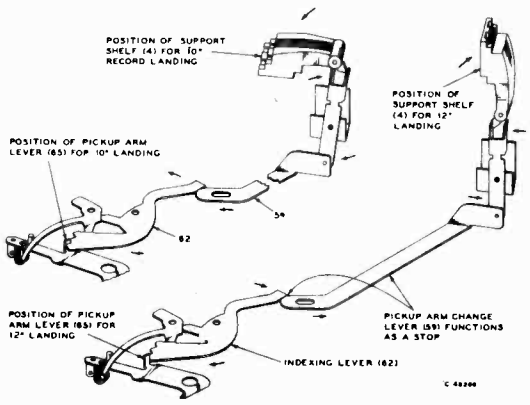




Note: It should be understood that the function of the indexing lever (62) is to determine the landing position of the pickup, both on ten and twelve inch records.

This is done by the pickup arm change lever (59) functioning as a stop for the indexing lever (62). The position of the pickup arm change lever in turn is governed by the position of the ten inch support shelf (4) (up or down).

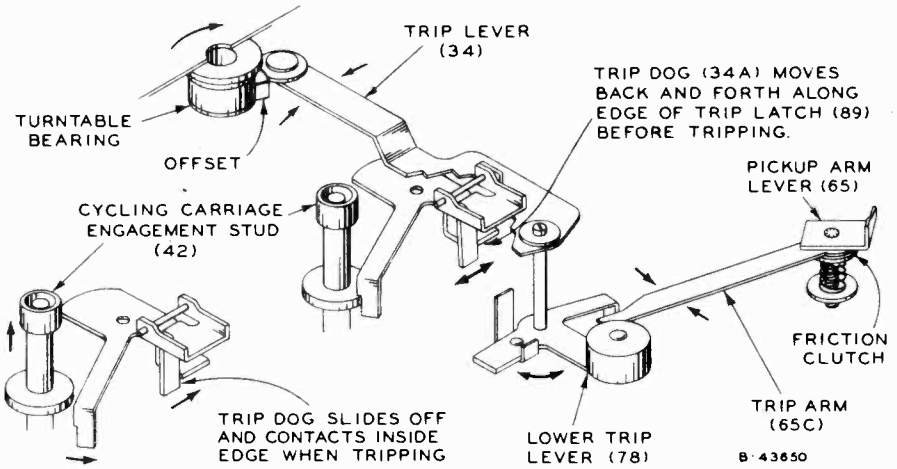
8. As the pickup is landing the cycling carriage has reached its starting position and the cycling carriage return stud (40) is pushed down by the incline in the cycling spiral and locked in position.



MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

Cycling is completed and record plays.

1. While the record plays, the end of the trip lever (34) is slowly moving toward the center post due to the force produced by the pickup arm down through the linkage of the pickup arm lever (65) trip arm (65C) and the lower trip lever (78).
2. As the trip lever slowly (34) approaches the offset on the inner shaft of the turntable it is pushed back slightly with each revolution of the turntable.
3. The trip lever continues to be pushed back against the friction clutch of the trip arm (65C) as long as the pickup arm moves in at a constant rate of speed.
4. When the pickup reaches the end of the selection the pickup moves into the eccentric groove quite rapidly. This rapid movement permits the trip dog (34A) to slide off the edge of the trip latch (89) before the offset on the turntable shaft has made one revolution. As the offset contacts the trip lever (34), it unlatches the trip latch (89) permitting the cycling carriage engagement stud (42) to raise and engage the cycling spiral starting a new cycle.



Pickup raises and moves out.

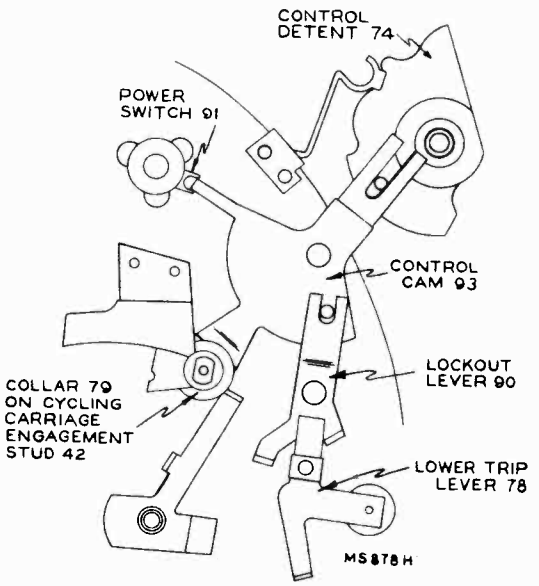
1. After the mechanism has been tripped the pickup arm moves out and rises by action of the cycling carriage (69) on the pickup arm lever (65) and the elevating rod (19).
2. The mechanism again follows the preceding sequence of dropping and playing records until the last record of this stack has been played. The mechanism is not provided with an automatic stop so the last selection is repeated until the pickup arm is placed on the rest and the power removed from the drive motor.

Note: The pickup arm can be raised and moved to the rest position any time after the mechanism has completed the change cycle, providing the pickup has not played more than approximately 1/3 of the selection. If the pickup arm is moved after this time, the mechanism will go into change cycle and the pickup arm should not be retarded in its movement.

The pickup arm can also be handled when the mechanism is not in operation, providing the pickup arm has freedom of motion.

Turn function control knob to manual.

1. The control detent (74) which is mechanically connected to the control knob, actuates the power switch through the control cam (93). This action starts the turntable rotating.
2. One end of the control cam also slides under the collar (79) on the cycling carriage engagement stud (42). This prevents the stud from raising if the trip lever is disturbed.
3. The control cam also holds the manual lock out lever (90) in such a position that it locks the lower trip lever (78) to prevent tripping. In this position, the trip lever (34) is held away preventing contact with off-set on turntable shaft.



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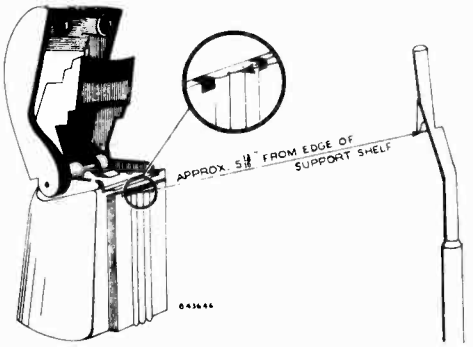
ADJUSTMENTS

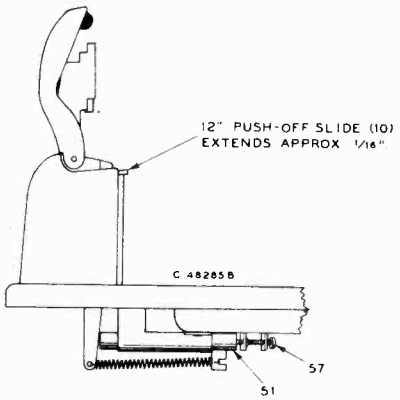
POSITION OF SUPPORT POST

1. Loosen three mounting screws at the base of the support post.
2. Slide support post to a position as indicated in accompanying drawing. The curvature of the shelf should conform with a 12" record.
3. After push-off slides have been adjusted, try a stack of both 10 and 12 inch records to determine the ease of separation. A compromise from the setting may be necessary due to differences in length of the 10 inch support shelf (4).



Adjustment of Push-Off Slides

1. Trip the mechanism and turn the turntable by hand until the cycling carriage has rotated counterclockwise, (Viewed from the bottom) to its limit.
2. Adjust screw 57 on push rod actuating lever until the 12 inch push-off slide is extending approximately 1/16" over the edge of the shelf.
3. Turn lock nut to hold screw and try a stack of 10 and 12 inch records for ease in separation.

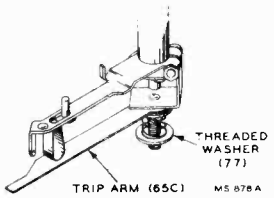


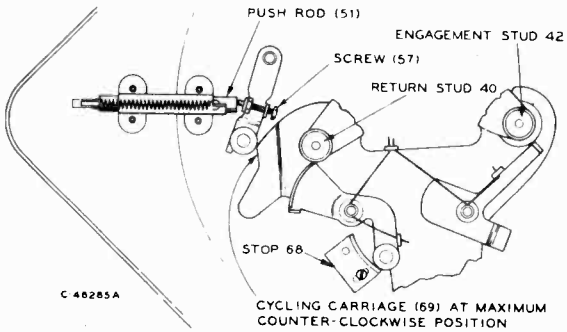
Adjust lock out lever stop (68)

The lock out lever stop (68) should be so adjusted that the cycling carriage return stud (40) raises an instant before the spiral engagement stud (42) is pushed down. If this timing is not properly made the mechanism will jam.

Adjustment of friction clutch on trip arm

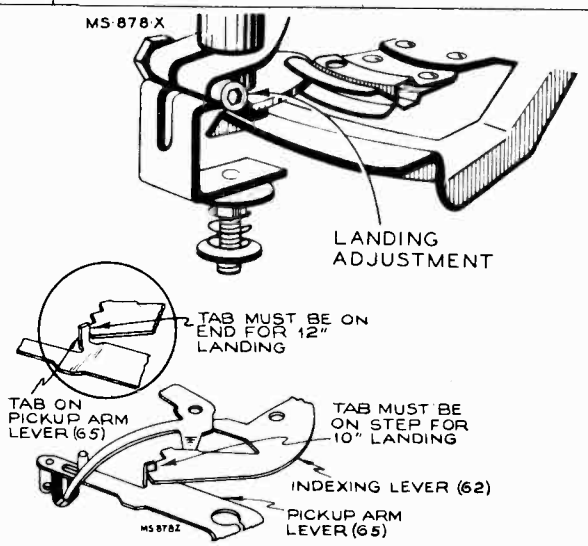
1. Turn the threaded washer on the pickup arm lever to produce sufficient friction for trip arm so the mechanism will have positive tripping. Care must be exercised against excessive friction as it would cause premature wear on the side walls of the record or in many cases, actually jump the grooves.





Pickup Landing Adjustment

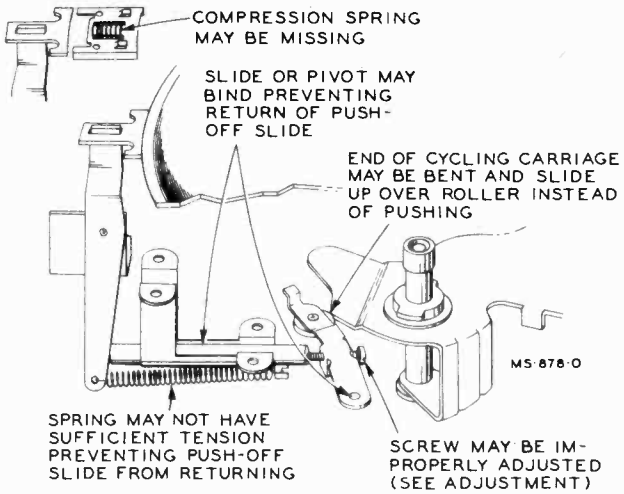
1. Disconnect power from mechanism.
2. Place a 10" record on turntable.
3. Turn the operating control to reject and release.
4. Rotate the turntable by hand until the tab on the pickup arm lever (65) is about ready to move away from the indexing lever. (The pickup will be a few inches above the record at this moment).
5. Loosen adjustment screw and hold the pickup arm lever in this position while moving the pickup arm directly above the point of landing. (Landing should be about half way between the edge of the record and the start of the recorded section. Approximately 4-11/16" from the side of the center post for a 10" record).
6. Tighten adjustment screw, apply power and check the pickup landing on both 10 and 12 inch records.
   If mechanism fails to land properly on 12" records the tab may be bent. In that case bend slightly.

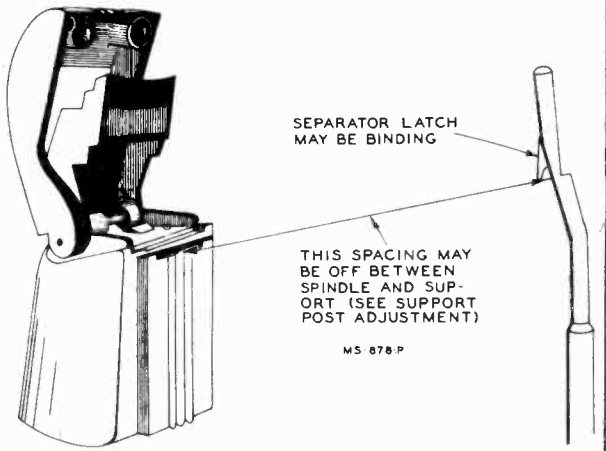


MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

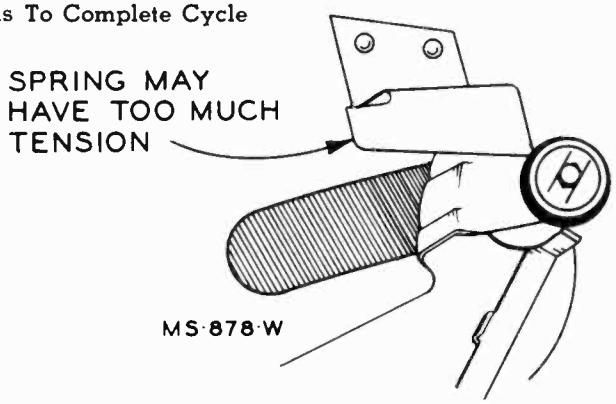
SERVICE HINTS

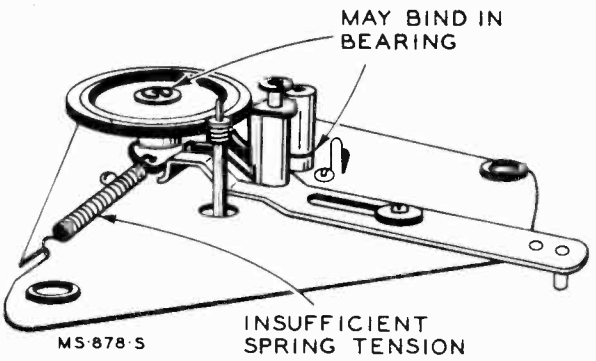
Fails To Separate Records Properly

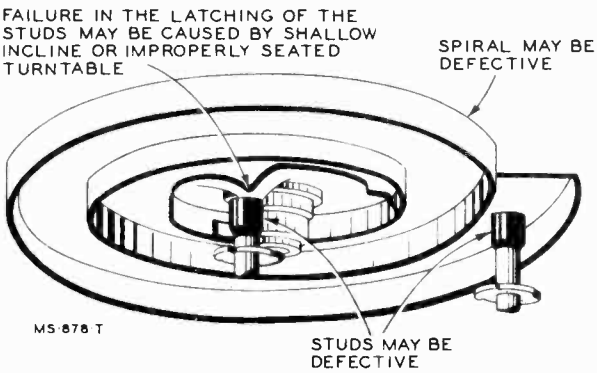


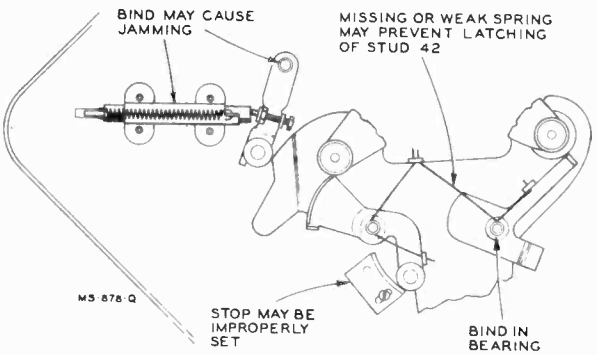


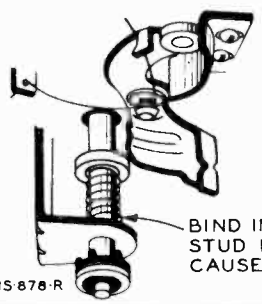
Fails To Complete Cycle



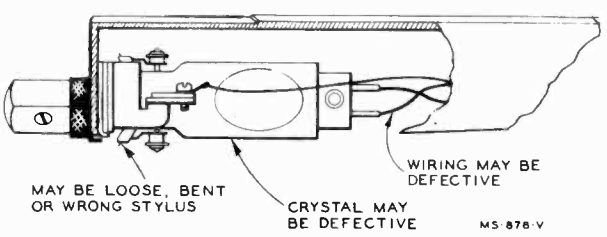








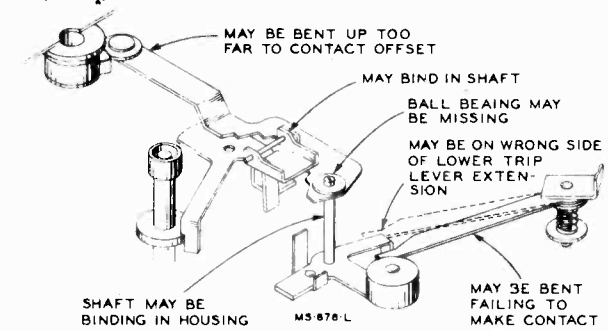
Weak—Distorted or No Output

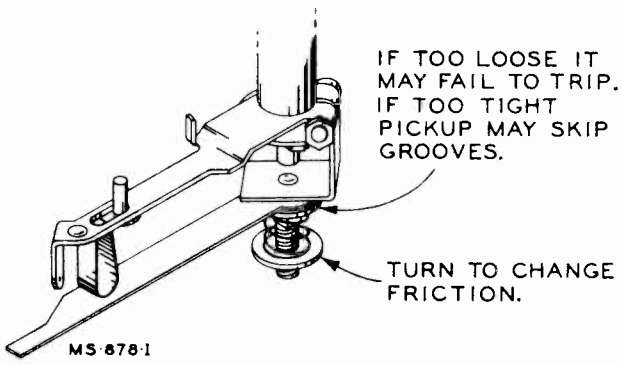


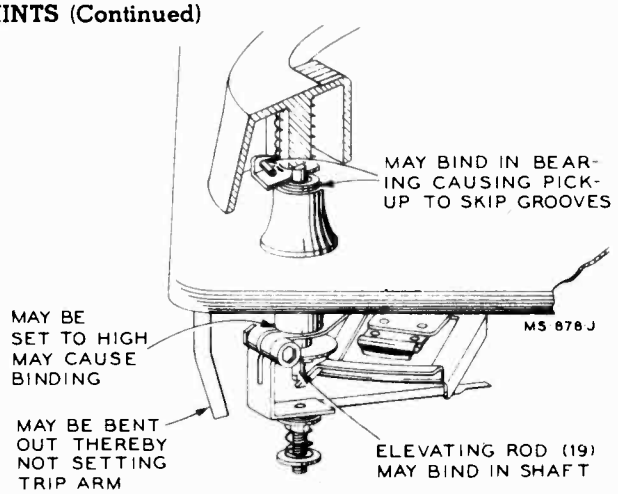
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

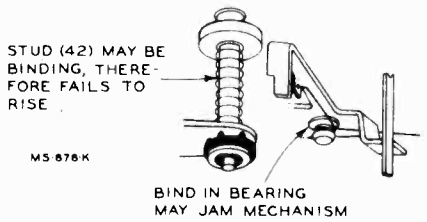
SERVICE HINTS (Continued)

Fails to Trip

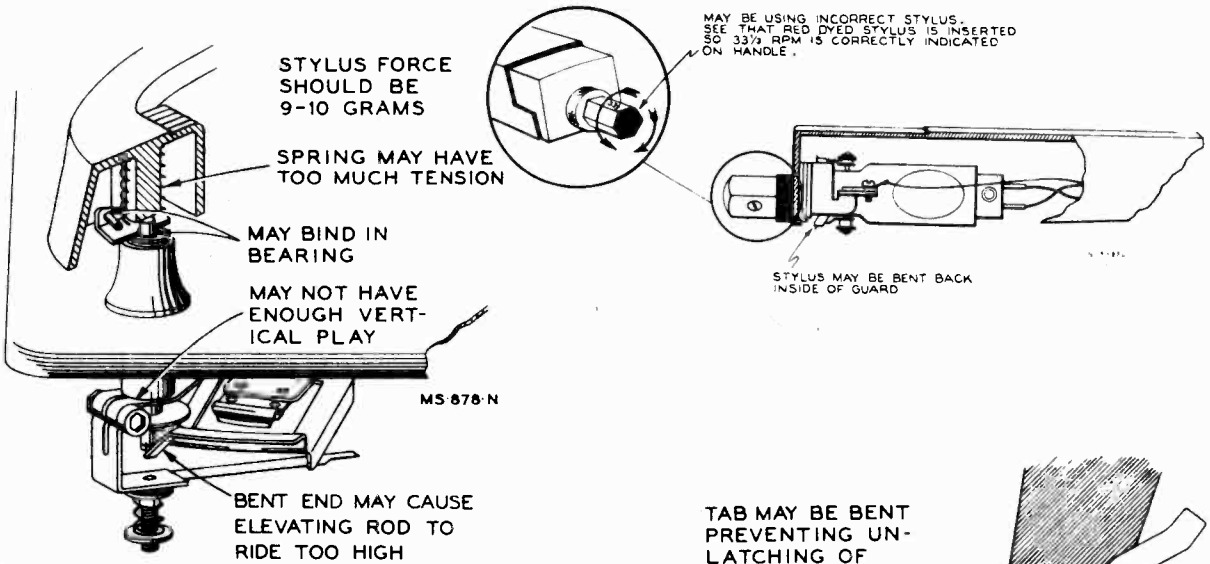




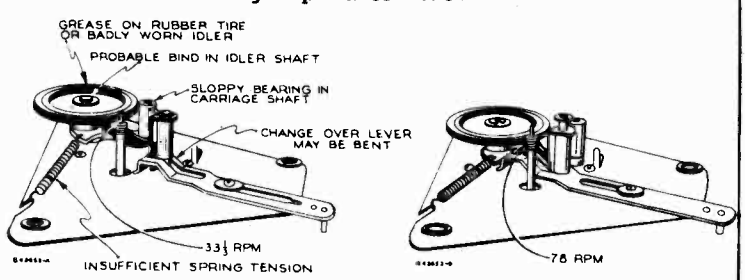


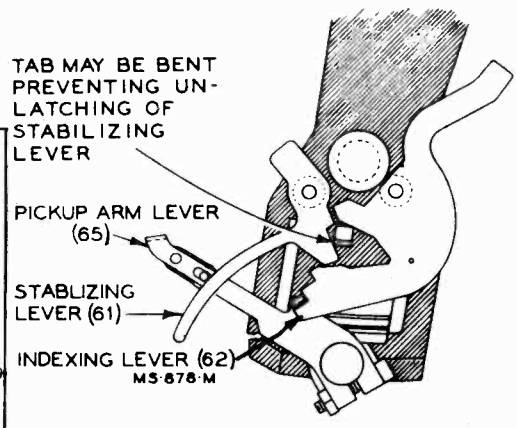


Pickup Skips Grooves



Turntable Fails To Change Speed or "Wow"

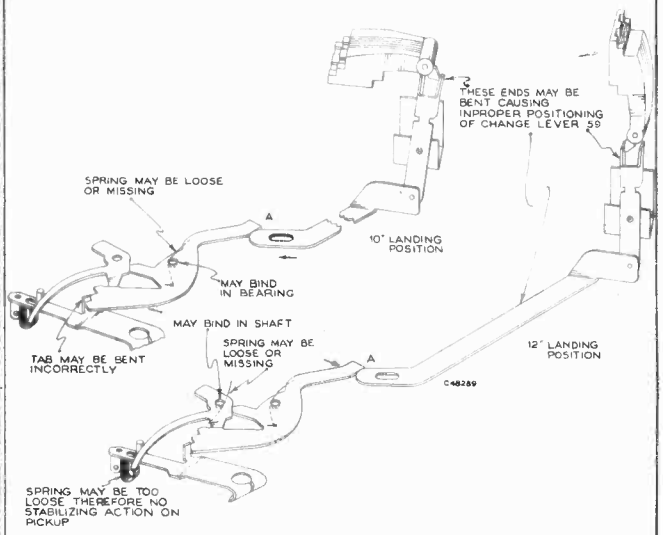


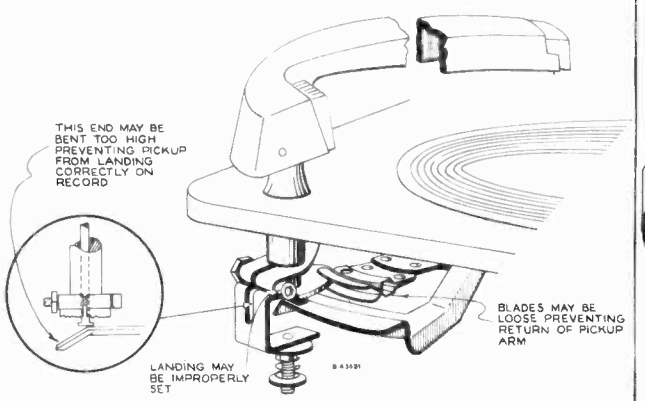


MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

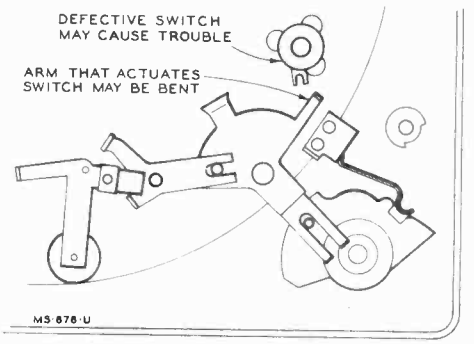
SERVICE HINTS (Continued)

Fails To Land Properly

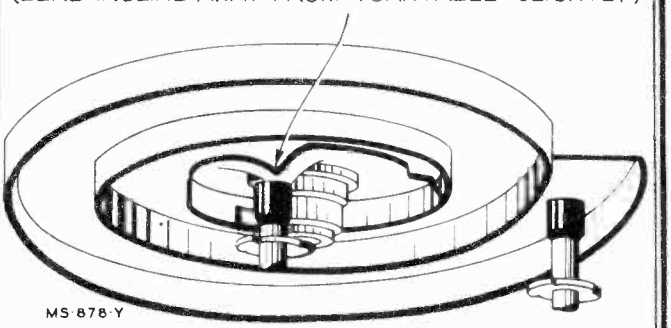




Turntable Fails To Rotate

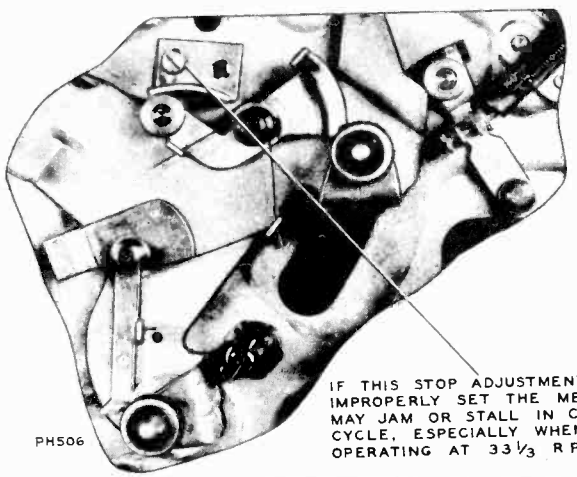


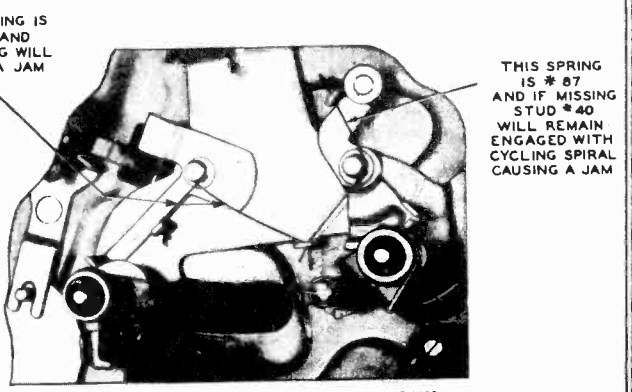
INCLINE IN SPIRAL MAY BE TOO SHALLOW THEREBY FAILING TO PUSH STUDS DOWN FAR ENOUGH CAUSING A JAM.
(BEND INCLINE AWAY FROM TURNTABLE SLIGHTLY)



DO YOU KNOW?

(Jamming or Stalling)

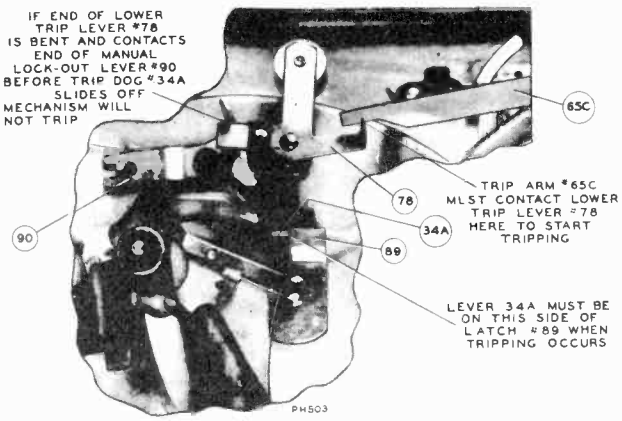


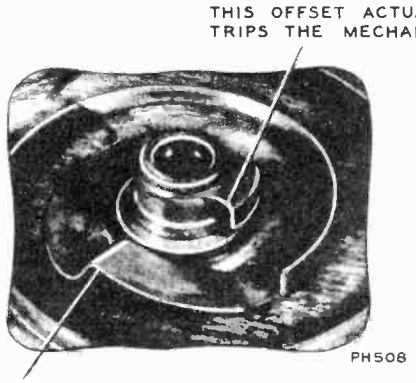


MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

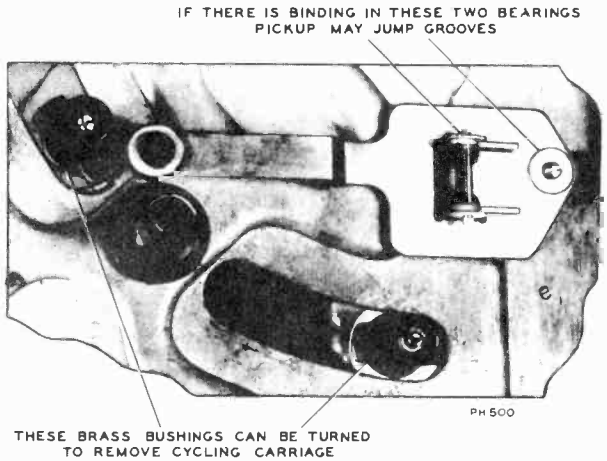
DO YOU KNOW?

(Tripping)

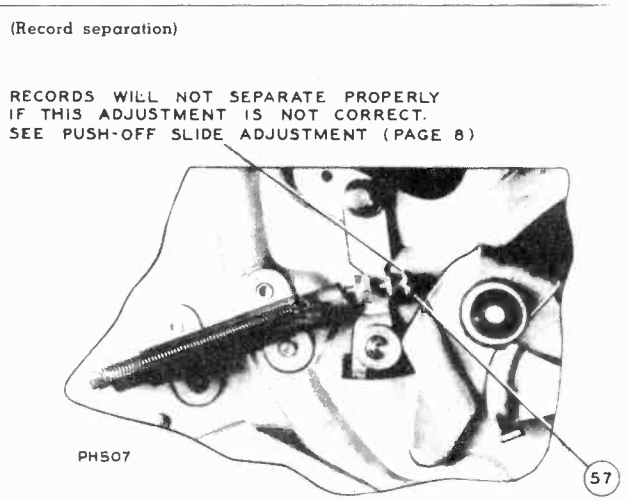




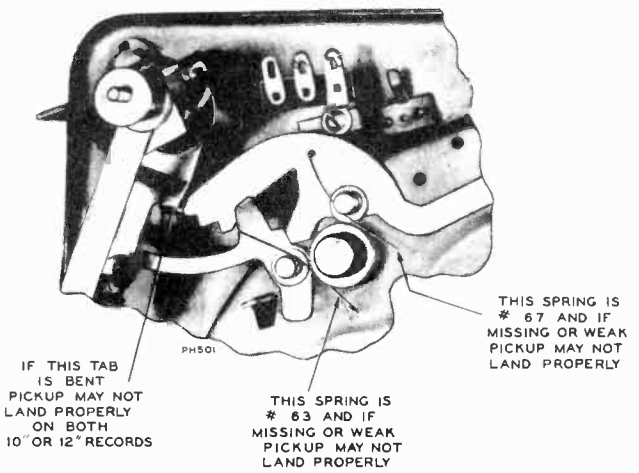
(Jumping grooves)

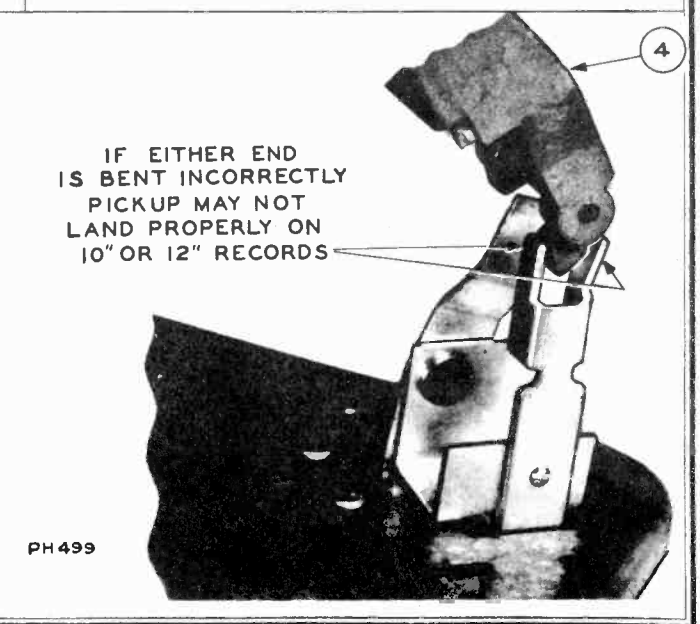


(Record separation)



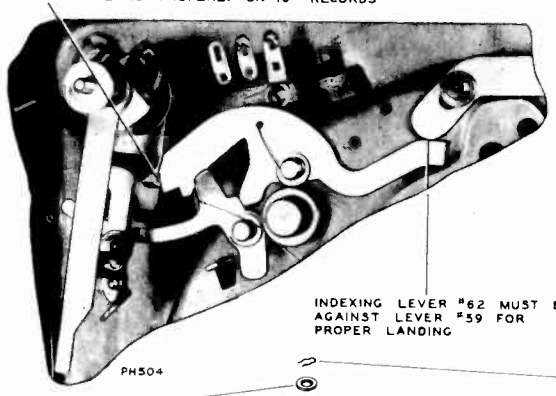
(Pickup landing)

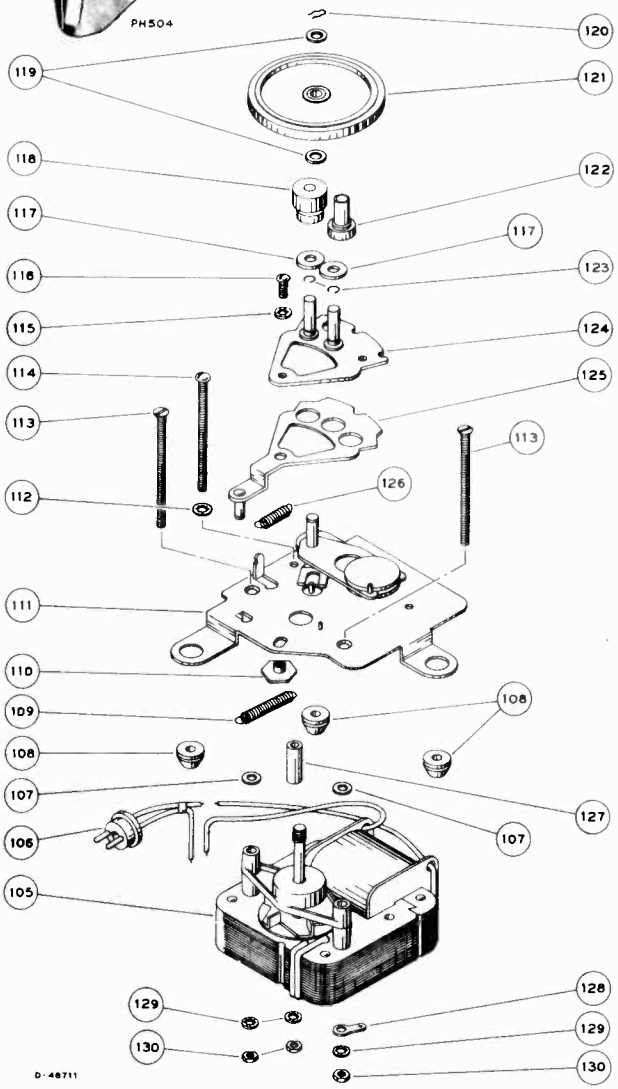




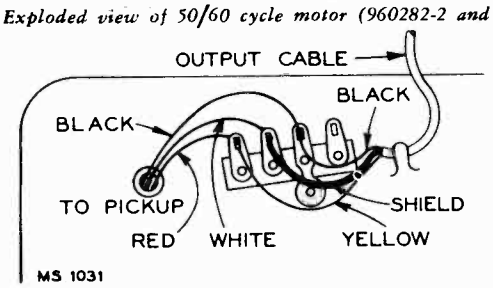
MODELS 960282-1, 960282-2, 960282-3, 960282-4, 960282-5

DO YOU KNOW?

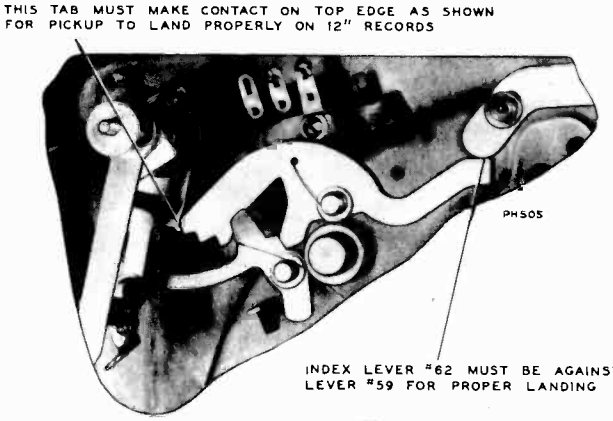


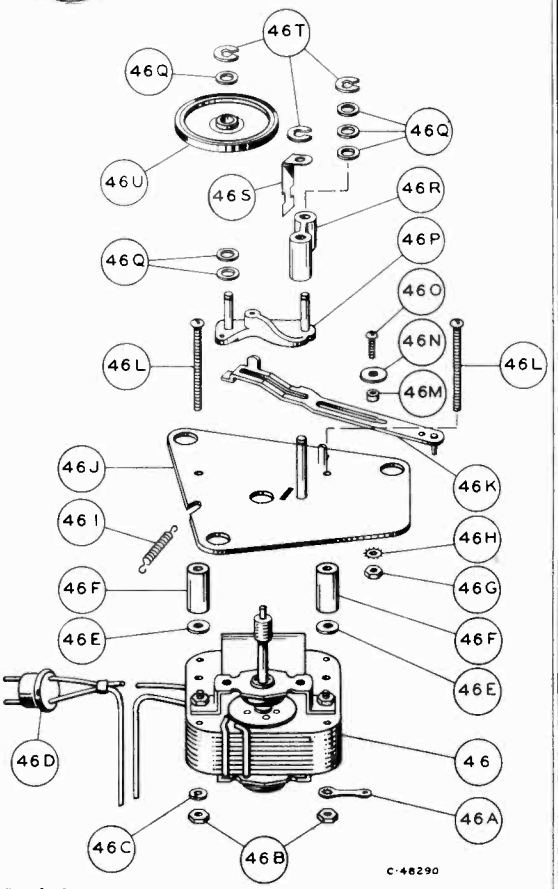


Exploded view of 50/60 cycle motor (960282-2 and -3)

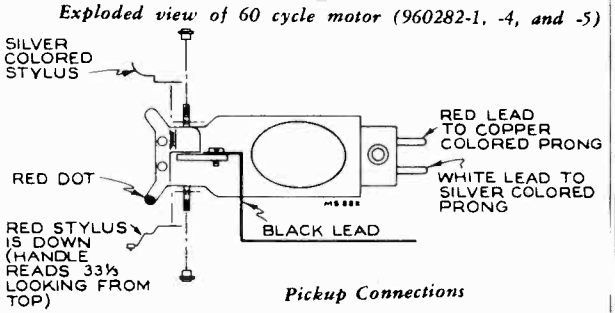


Pickup Lead Connections to Terminal Board (Model A55 only)





Exploded view of 60 cycle motor (960282-1, -4, and -5)

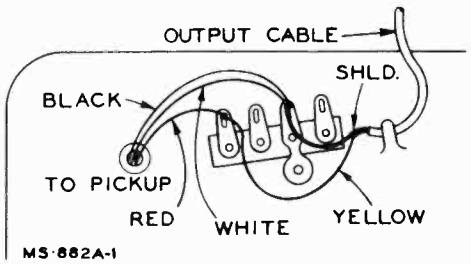


Pickup Connections

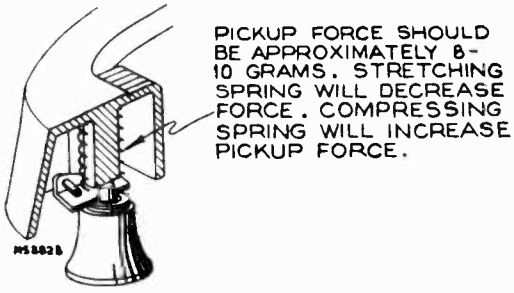
Some record changers have a resistor/capacitor combination on the pickup lead terminal board. This is to compensate for the differing frequency response of various instruments. Correct values of these resistors and capacitors are indicated in the Service Data for the instruments which use the record changer.

PICKUP INFORMATION

MODELS 960282-1, 960282-2, 960282-3, 960282-4, 960282-5



Pickup Lead Connections to Terminal Board (all instruments except Model A55)



Counterbalance Spring

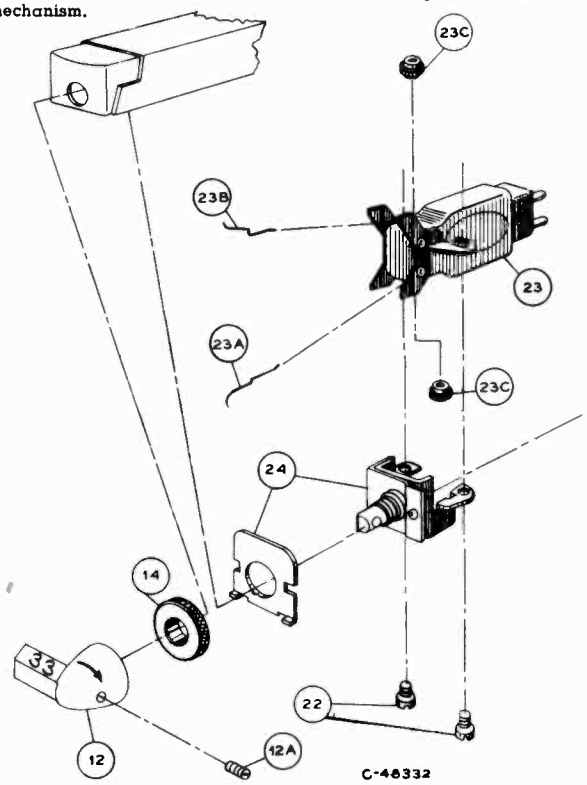
LUBRICATION

The motor bearings and all pivot bearings, excepting the pickup arm pivot, should be lubricated with S.A.E. 10 machine oil.

The pickup arm and the trip lever bearings are riding on ball bearings which should be packed sparingly with light grease, preferably STA-PUT #512. Use STA-PUT #512 or equivalent grease on the edges of all cams and pivots or sliding contacts including the spiral track and engagement stud.

NOTE: Do not oil friction clutch or trip arm 65C, spring steel wedge on end of cycling carriage 69 or friction brake 88.

NOTE: Keep oil and grease from all rubber parts of the mechanism.



Note: The stylus are not replaceable in Stock No. S-5652 ceramic pickup used in 960282-2.

Pickup Assembly—Models 960282-1, -2 and -3

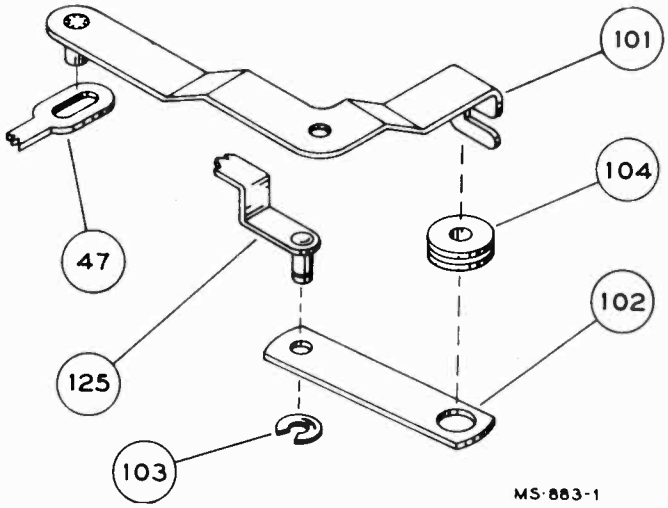
These record changers are used in instruments manufactured for RCA International Division.

They are identical to 960282-1 except for the following:

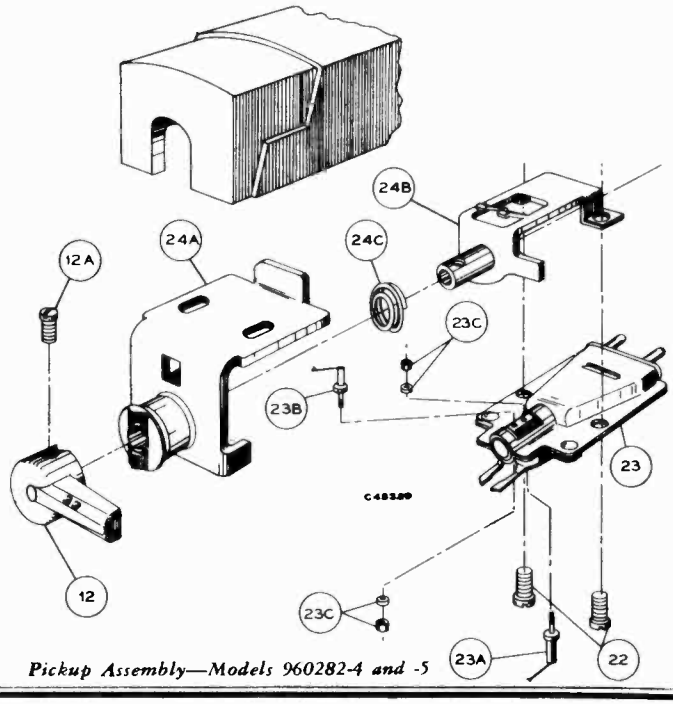
1. A motor is used which may be converted for operation on a 50 cycle power supply. Stock No. S-5637 motor includes mounting plate, grommets, idler wheel and change-over mechanism. A 50 cycle conversion spring is also included.
2. Two levers (Items #101 and #102) are different. (Order replacements by description and item number.)
3. A ceramic pickup cartridge is used only with 960282-2. Stock No. S-5652 ceramic cartridge complete, including styluses.
4. Stock No. 75044 crystal pickup is used with 960282-3.

NOTE: For operation on a 50 cycle power supply. Remove original spring sleeve from motor shaft and replace with the 50 cycle conversion spring.

Replacements for items used only on 960282-2 and 960282-3 are stocked by RCA International Distributors but are not stocked in the U. S. A. Order parts giving full description.

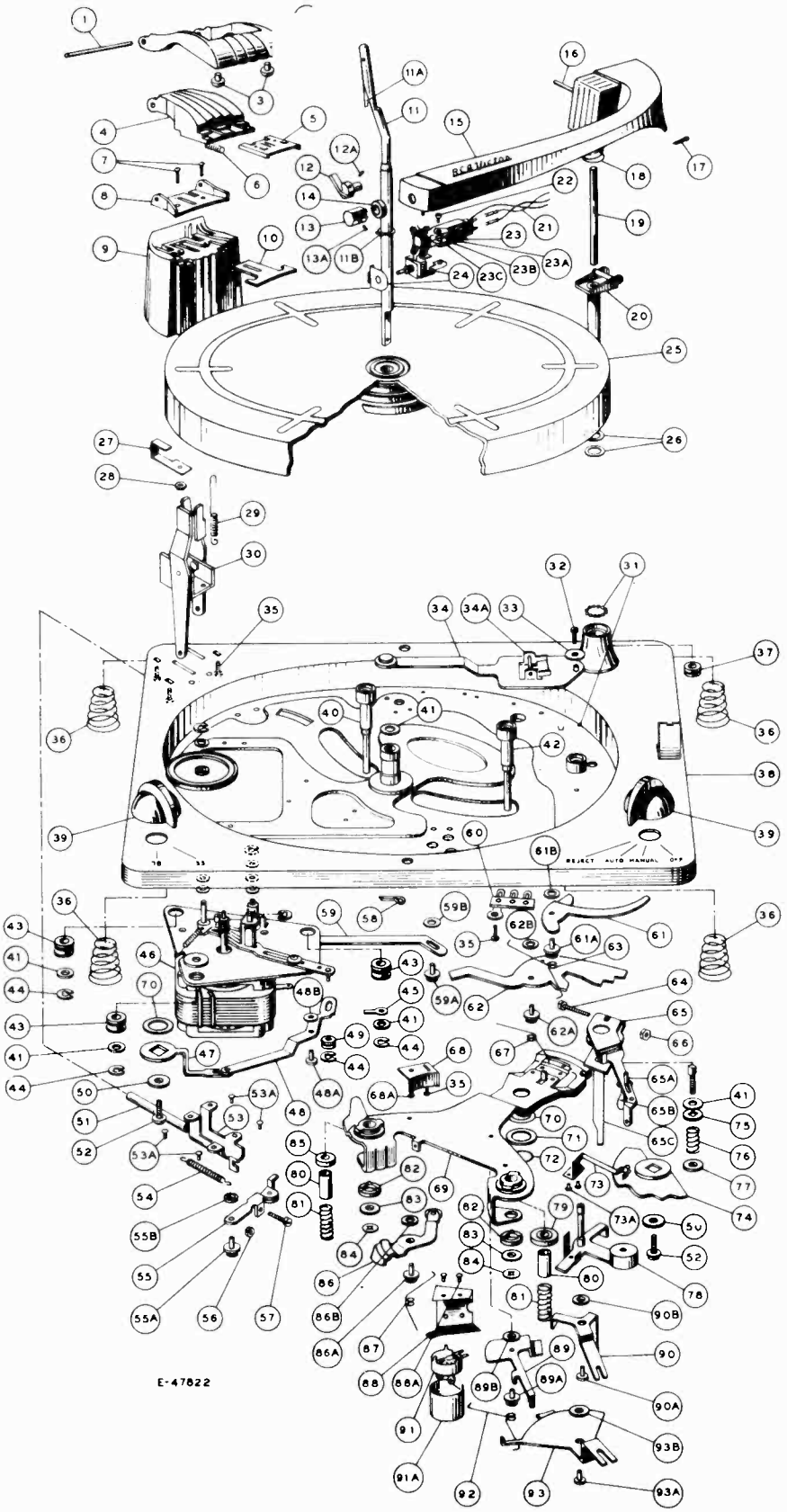


Speed control levers used in 960282-2 and 960282-3 (order by item No. from RCA International Distributors only)



Pickup Assembly—Models 960282-4 and -5

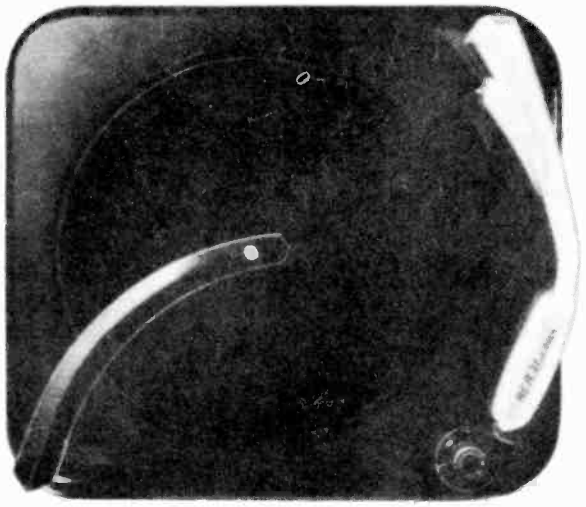
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5



Exploded view of 960282-1

1	75254	Pin—Push-off box hinge pin
2	75255	Clamp—Stabilizing clamp assembly including rubber bumpers—maroon—for 960282-1, -2, -3 and -4
2	75921	Clamp—Stabilizing clamp assembly including rubber bumpers—light brown—for 960282-5
3	75256	Bumper—Rubber bumper for stabilizing clamp (2 req'd) (2 included)
4	75257	Support — 10" record support — maroon — for 960282-1, -2, -3 and -4
4	75922	Support—10" record support—light brown—for 960282-5
5	75258	Slide—10" record push-off slide
6	75259	Spring—Return spring for 10" push-off slide (.250" O.D. x 9/16"—5 turns)
7	——	Screw—#4-40 x 3/8" round head steel machine screw
8	75260	Cover—12" record push-off slide cover
9	75261	Support — Main support casting for push-off mechanism—maroon—for 960282-1, -2, -3 and -4
9	75923	Support—Main support casting for push-off mechanism—light brown—for 960282-5
10	75262	Slide—12" record push-off slide
11	75263	Spindle—Turntable spindle or centerpost (includes ILL.11A)
11B	75303	Ring—Turntable retainer ring
12	75264	Knob—Stylus selector knob complete with set screw—lever type—for 960282-1, -2 and -3
12	75924	Knob—Stylus selector knob complete with set screw—lever type—for 960282-4 and -5
12A	——	Screw—Screw for handle type control knob (included with Stock Nos. 75264 and 75924)
13	——	Knob—Stylus selector knob—hexagon—not used in actual production
13A	——	Screw—Screw for hexagon control knob
14	75265	Collar—Threaded collar for pickup mounting assembly—for 960282-1, -2 and -3
15	75266	Arm—Pickup arm shell complete with fibre guide—for 960282-1, -2, and -3
15	75925	Arm—Pickup arm shell for 960282-4 and -5
16	75267	Pin—Pivot arm pin
17	75268	Spring—Retaining spring (hair-pin) for pivot arm pin
18	75269	Spring—Counterbalance spring for 960282-1, -2 and -3
18	75929	Spring—Counterbalance spring for 960282-4 and -5
19	75270	Rod—Elevating rod
20	75271	Arm—Pivot arm and shaft
21	75272	Cable—Three wire pickup cable (12") complete with connectors
22	——	Screw—Mounting screw for pickup cartridge (4-40 x 1/8" fillister head) two required—for 960282-1, -2 and -3
22	75933	Screw—Mounting screw for pickup cartridge (2-56 x 1/8" fillister head) two required for 960282-4 and -5
23	75044	Pickup—Crystal pickup complete with two stylus—for 960282-1 and -3
23	S-5652	Pickup—Ceramic pickup complete with two stylus—for 960282-2
23	75475	Pickup—Crystal pickup complete with two stylus—for 960282-4 and -5
23A	75045	Stylus—33 1/3 r.p.m. stylus—RED—for #75044 pickup cartridge
23A	75496	Stylus—33 1/3 r.p.m. stylus—RED—for #75475 pickup cartridge
23B	75046	Stylus—78 r.p.m. stylus — PLAIN — for #75044 pickup cartridge
23B	75497	Stylus—78 r.p.m. stylus — PLAIN — for #75475 pickup cartridge
23C	74274	Nut—Stylus retaining nut—knurled—for #75044 pickup
23C	74230	Nut — Stylus retaining nut and washer — for #75475 pickup cartridge
24	75273	Mount—Pickup cartridge mount assembly (2-piece assembly)—for 960282-1, -2 and -3
24A	75931	Bracket—Bracket and bearing assembly (to mount #75932 rotor in #75925 arm) — for 960282-4 and -5
24B	75932	Rotor — Rotor bracket and shaft assembly (to mount #75475 pickup in #75931 bracket)—for 960282-4 and -5
24C	75930	Spring—Detent spring for rotor bracket assembly #75932—for 960282-4 and -5
24D	75975	Screw—3-48 x 1/8" truss head screw to mount #75931 bracket to #75925 pickup arm shell —for 960282-4 and -5
25	75275	Turntable—10" dia.
26	75276	Washer—Spacing washer (2 req'd) (.008 x 13/32" I.D. x 9/16" I.D.—Phosphor Bronze)
27	75277	Spring—Pressure spring for 10" record support
28	——	Nut—4-40 hex nut
29	75278	Spring—Tension spring for stabilizing clamp (.216" O.D. x 1 7/8"—20 turns)
30	75279	Lever—Push-off slide actuating lever assembly
31	3658	Ball—Steel ball (3/32" dia.)
32	——	Screw—#4-40 x 1/4" fillister head screw
33	75280	Washer—Steel washer (.031" x .125" x 1/2")
34	75281	Lever—Trip lever assembly including trip dog, ILL. 34A
35	28360	Screw—Screw to mount main support (3 req'd) (#6-32 x 3/8" thread cutting)
36	75040	Spring—Conical spring to mount record changer —4 required—for 960282-1, -2 and -3
36	75927	Spring—Conical spring to mount record changer —3 required—for 960282-4 and -5
37	75282	Grommet—Rubber grommet for pickup cable exit
38	——	Board—Motorboard complete with all riveted, staked and welded parts
39	75283	Knob—Speed selector or function control knob —maroon—for 960282-1, -2, -3 and -4
39	75928	Knob—Speed selector or function control knob—light brown—for 960282-5
40	75284	Stud—Cycling carriage return stud including shaft, washer and cambric roller
41	75285	Washer—Friction spring washer for turntable and motor mounting. (.250" x .281" I.D. x .450" O.D.)
42	75284	Stud—Cycling carriage engagement stud including shaft, washer and cambric roller
43	75286	Grommet—Rubber grommet to mount motor (3 req'd)
44	75287	Washer—"C" washer to mount motor (3 req'd)
45	——	Lug—Terminal lug
46	75288	Motor—117 volt, 60 cycle motor complete with mounting plate, idler wheel and change-over mechanism—for 960282-1, -4 and -5. See illustration on page 13
46	S-5637	Motor—117 volt, 50/60 cycle motor complete with mounting plate, idler wheel and change-over mechanism — for 960282-2 and -3. See illustration on page 13
		The following motor parts (46A to 46U) are for #75288 motor only
46A	——	Lug—Terminal lug
46B	——	Nut—#6-32 hex nut to mount top plate (2 req'd)
46C	——	Lockwasher—#6 lockwasher (split) to mount top plate
46D	30870	Connector—2 contact male connector for motor leads
46E	——	Washer—Flat washer for under metal spacer (2 req'd)
46F	75290	Spacer—Metal spacer for motor mounting (2 req'd)
46G	——	Nut—#4 hex nut to mount idler riser slide
46H	——	Lockwasher—#4 (external) lockwasher to mount idler riser slide
46I	75291	Spring—Tension spring for idler carriage
46J	75292	Plate—Motor top plate including stud for idler pivot link
46K	75293	Slide—Idler riser slide
46L	——	Screw—#6-32 x 1 3/4" round head brass machine screw to mount top plate (2 req'd)
46M	75294	Spacer—Metal spacer to mount idler riser slide
46N	——	Washer—Flat washer to mount idler riser slide
46O	——	Screw—Screw to mount idler riser slide (#4-40 x 3/8" round head steel machine screw)
46P	75295	Carriage—Idler carriage
46Q	75296 / 75436	Washer—Fibre dampening washer .010 thick / Washer—Fibre dampening washer .020 thick
46R	75297	Link—Idler pivot link
46S	75298	Guide—Idler riser slide guide
46T	75287	Washer—"C" washer to mount idler carriage and idler wheel
46U	75300	Wheel—Idler wheel
47	75301	Arm—Speed selector arm
48	75302	Lever — Speed selector lever complete with mounting pivot stud and washer—for 960282-1, -4 and -5. See page 18 for description of 960282-2 and -3
49	75282	Grommet—Rubber grommet used in speed change assembly
50	75304	Washer—Spacer washer (small) for speed selector arm (.059" x .190" I.D. x 5/8" O.D.)
51	75305	Rod—Push rod
52	75306	Screw—Mounting screw complete with lock-washer for control knobs (10-32 x 3/8" fillister head-special)
53	75307	Housing—Push rod housing complete with four (4) rivets
54	75308	Spring—Tension spring for push rod
55	75309	Lever—Push rod actuating lever complete with mounting pivot stud and washer (includes Ill. 56 and 57)
56	——	Nut—#6 hex nut for push rod travel adjusting screw (includes 75309, Ill. 55)
57	——	Screw—Adjusting screw for push rod travel (#6-32 x 5/8" fillister head screw) (included in 75309, Ill. 55)
58	75310	Pin—Cotter pin for turntable spindle or centerpost
59	75311	Lever—Pickup arm landing change lever complete with mounting pivot stud and washer
60	——	Board—Terminal board (3 contact)
61	75312	Lever—Pickup arm stabilizing lever complete with mounting pivot stud and washer
62	75313	Lever—Pickup arm indexing lever complete with mounting pivot stud and washer
63	75314	Spring—Tension spring for stabilizing lever
64	75315	Screw—Screw to mount pickup arm lever (10-32" x 1" socket head cap screw)
65	75316	Lever—Pickup arm lever including trip arm, engagement stud and tension spring
66	——	Nut—#10 hex nut for pickup arm lever mounting screw
67	75317	Spring—Tension spring for indexing lever (2 turns)
68	75318	Stop—Lockout lever stop complete with mounting rivet
69	75319	Carriage—Cycling carriage
70	75320	Washer—Mounting washer (thin) for cycling carriage
71	75321	Washer—Mounting washer (thick) for cycling carriage
72	75322	Washer—Mounting washer (split) for cycling carriage
73	75323	Spring—Lock spring for detent complete with (2) rivets
74	75324	Detent—Operating control detent
75	75325	Washer—Friction washer (square-hole) for trip arm (.060" x .189" square I.D. x 5/8" O.D.)
76	75326	Spring—Friction adjustment spring for trip arm (.360" O.D. x 33/64"—5 1/2 turns)
77	75327	Washer—Threaded washer for adjusting trip arm friction (.0673 x .159" I.D. x 5/8" O.D.—.159" I.D. hole tapped #10-32)
78	75328	Lever—Lower trip lever
79	75329	Washer—Shouldered washer for cycling carriage engagement stud for Ill. 42
80	75330	Spacer—Metal spacer for cycling carriage studs
81	75331	Spring—Tension spring for cam roller (.379" O.D. x 1-1/32"—7 turns)
82	75332	Grommet—Rubber grommet for cycling carriage studs
83	75304	Washer—Stop washer for cam studs (.059" x .190" I.D. x 5/8" I.D.)
84	75334	Nut—Speed nut for cycling carriage studs
85	75335	Washer—Engagement washer for cycling carriage return stud
86	75336	Lever—Lockout lever complete with mounting pivot stud and washer
87	75337	Spring—Tension spring for lockout lever (2 turns)
88	75338	Spring—Friction stabilizing spring for cycling carriage complete with two (2) rivets
89	75339	Latch—Trip latch complete with mounting pivot stud and washer
90	75340	Lever—Manual lockout lever complete with mounting pivot stud and washer
91	75341	Switch—Power switch complete with cover
92	75342	Spring—Trip latch tension spring—2 turns
93	75343	Cam—Operating control cam complete with mounting pivot stud and washer

MODELS 960284-1,
960284-2



PH536

Mechanism may be used in the following instruments:

Radio Combinations—A108	960284-1, -2
—A91	960284-1, -2
Television Combinations—9T89	960284-1, -2
—6T87	960284-1, -2

The difference between 960284-1 and 960284-2 is in color. (See parts list.)

SPECIFICATIONS

Turntable speed	78-33⅓ rpm
Record used	10" or 12" (intermixed)
Record capacity	Ten twelve-inch
	Twelve ten-inch
	Ten intermixed
Pickup force	Eight to 10 grams
Stylus radius	.001 inch for 33⅓ rpm
	.003 inch for 78 rpm
Type pickup	Crystal
Power supply	105-125 volts, 60 cycles A-C

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FEATURES

1. This record changer is a center support intermix mechanism designed to play automatically a series of records up to ten 12-inch, twelve 10-inch, or ten intermixed records of the standard 78 RPM type. It will also play a series of the long playing 33-1/3 RPM type of similar diameter.
2. The mechanism is equipped with a light weight dual stylus pickup cartridge. The proper stylus can be selected by turning a knob in the end of the pickup arm.

   After the last selection of the stack has been played, the pickup arm will go to the rest position and the mechanism will stop automatically.
4. The automatic tripping device is of the acceleration type.
5. The speed change is accomplished by a single control mounted on the motorboard.

AUTOMATIC OPERATION

1. Lift and rotate the record support to one side.
2. Place a stack of records over the center post.
3. Rotate the record support to a position so the center post will extend through the hole in the end of the support.
4. Turn the speed control to select the proper speed.
5. Rotate the knob in the end of the pickup arm to the proper numeral corresponding to the turntable speed.
6. Turn the function control knob to reject and release. The mechanism will play one side of each record of the stack until the last selection has been played at which time it will stop automatically.
7. To reject a record being played, turn the function control knob to reject and release.
8. To remove records, lift and turn the record support to one side.
9. Lift the stack of records straight up.

MANUAL OPERATION

1. Lift and rotate the record support to one side.
2. Place the record to be played on the turntable (tilt slightly to slide over the step in the centerpost).
3. Set the speed and pickup cartridge controls properly.
4. Turn function control to reject and release.
5. After the pickup sits on the record, place the record support over the centerpost, permitting it to rest on the step in the centerpost.
6. The mechanism will play the record after which it will stop automatically.

FUNCTION OF PRINCIPAL LEVERS

See Fig. 1

Reject rod (56)

The function of the reject rod is to transfer the action from the control knob to the reject lever.

Trip slide (98)

The function of the trip slide is to transfer the movement of the pickup arm lever to the lower trip pawl. This action starts the change cycle.

Cycling gear (96)

The function of the cycling gears is to transfer the rotating motion of the turntable to the cycling mechanism.

MODELS 960284-1, 960284-2

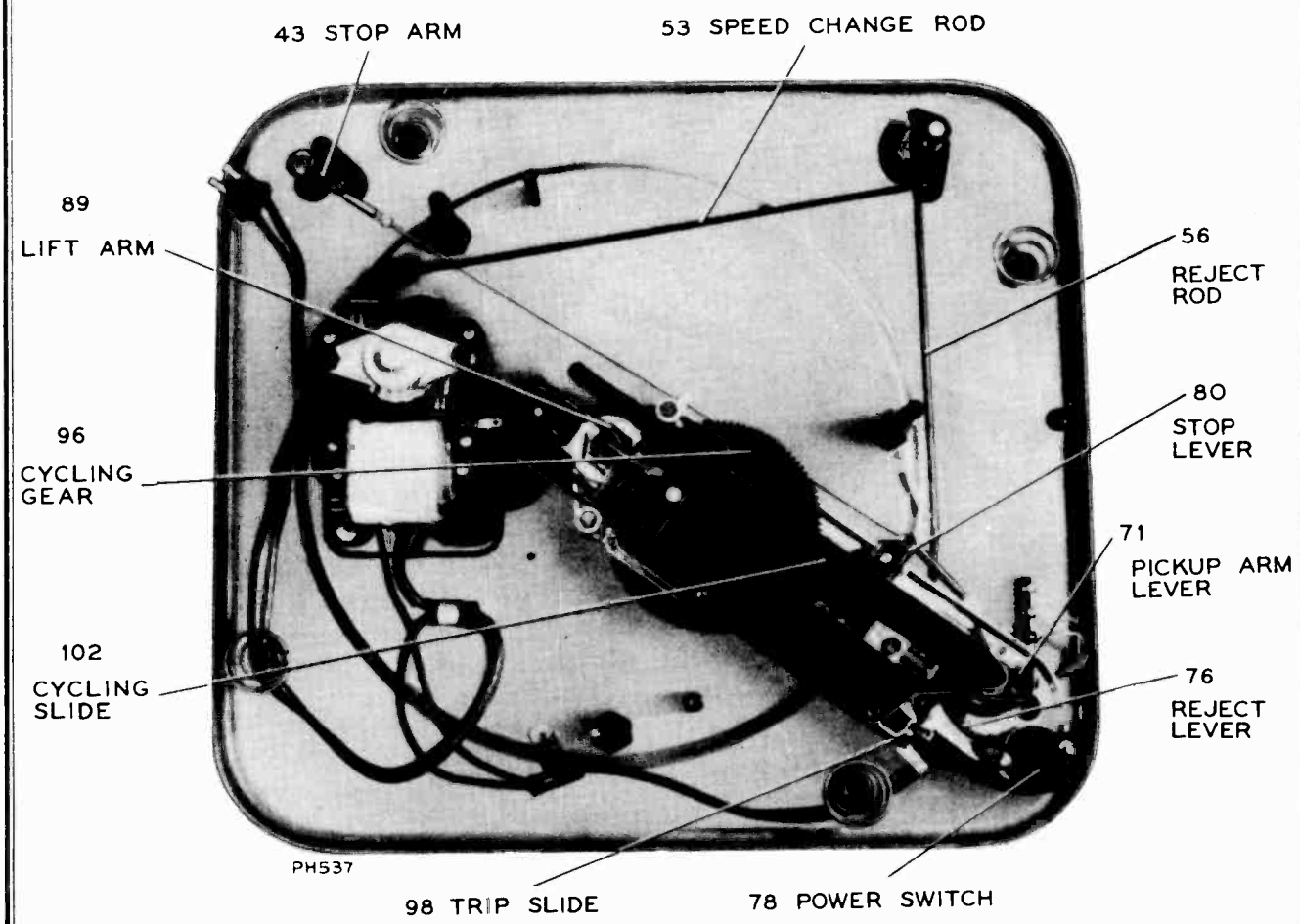

Fig. 1

Stop arm (43)

When the last record of the stack drops to the turntable, the record support arm drops. The lower end of the record support arm pivot actuates the stop lever thereby transferring the action for automatic stopping.

Lift arm (89)

The function of the lift arm is to transfer the movement of the cycling slide to the separator mechanism inside the centerpost.

Stop lever (80)

The function of the stop lever is to raise the trip slide and form a stop for pickup arm return lever. This results in the mechanism stopping automatically.

Cycling slide (102)

The function of the cycling slide is to transfer the action from the cycling gear to the other levers.

See Figs. 1 and 4

Pickup arm lever (71)

The function of the pickup arm lever is to transfer movement of the pickup arm to levers located beneath the motorboard. Other levers beneath the motorboard also counter react through the pickup arm lever thereby directing the movement of the pickup arm.

Reject lever (76)

The function of the reject lever is to actuate the power switch and trip slide.

See Fig. 2

Twelve-inch indexing lever (61)

After the completion of each change cycle of the mechanism, the pickup arm automatically is indexed for ten-inch records unless a twelve-inch record has dropped to the turntable. As a twelve-inch record drops to the turntable, it moves the twelve-inch indexing lever thereby directing the position of the selector lever.

See Fig. 3

Trip pawl (upper) (94)

The upper trip pawl functions as an actuating device for the cycling engagement pawl.

Cycling engagement pawl (96A)

The function of the cycling engagement pawl is to engage the off-set in the turntable shaft thereby starting change cycle.

See Fig. 4

Pickup arm return lever (68)

The function of the pickup arm return lever is to provide the force necessary to move the pickup into landing position.

Selector lever (83)

The function of the selector lever is to form a stop for the pickup arm return lever. The position of selector lever (up or down) determines whether the pickup lands on ten- or twelve-inch records.

Trip pawl (lower) (97)

The lower trip pawl transfers the action of the trip slide from the lower to the upper side of the cycling gear.

(See Exploded View—Fig. 6)

Record support (overarm) (1)

The function of the record support is to stabilize and hold the records in a horizontal plane which is parallel to the motorboard. After the last record of the stack drops to the turntable, the pivot of the record support drops down and actuates the automatic stopping device.

Center post (34)

The function of the center post is to support the stack of records. It also houses the separating mechanism.

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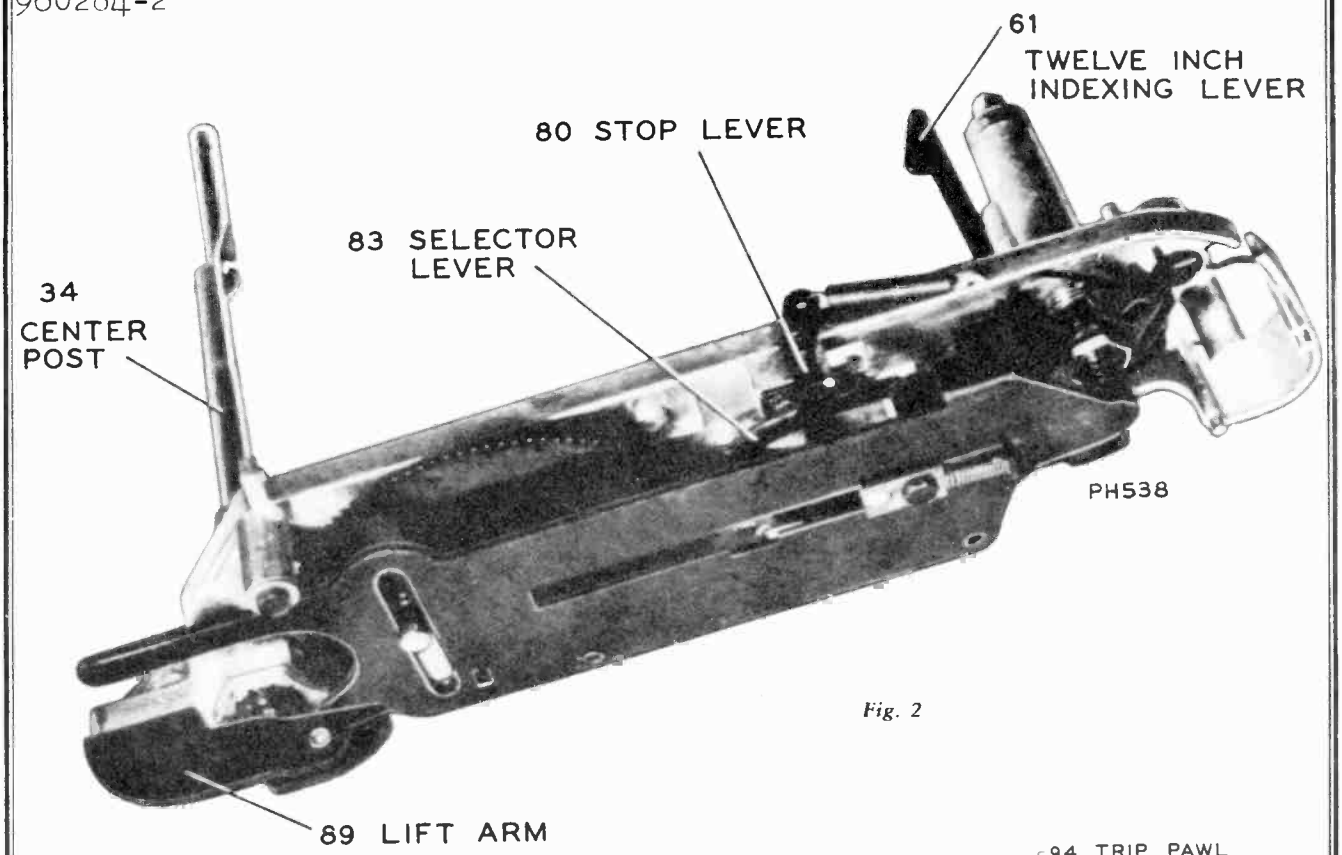


Fig. 2

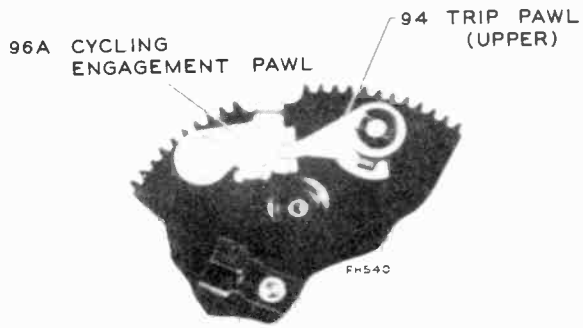


Fig. 3

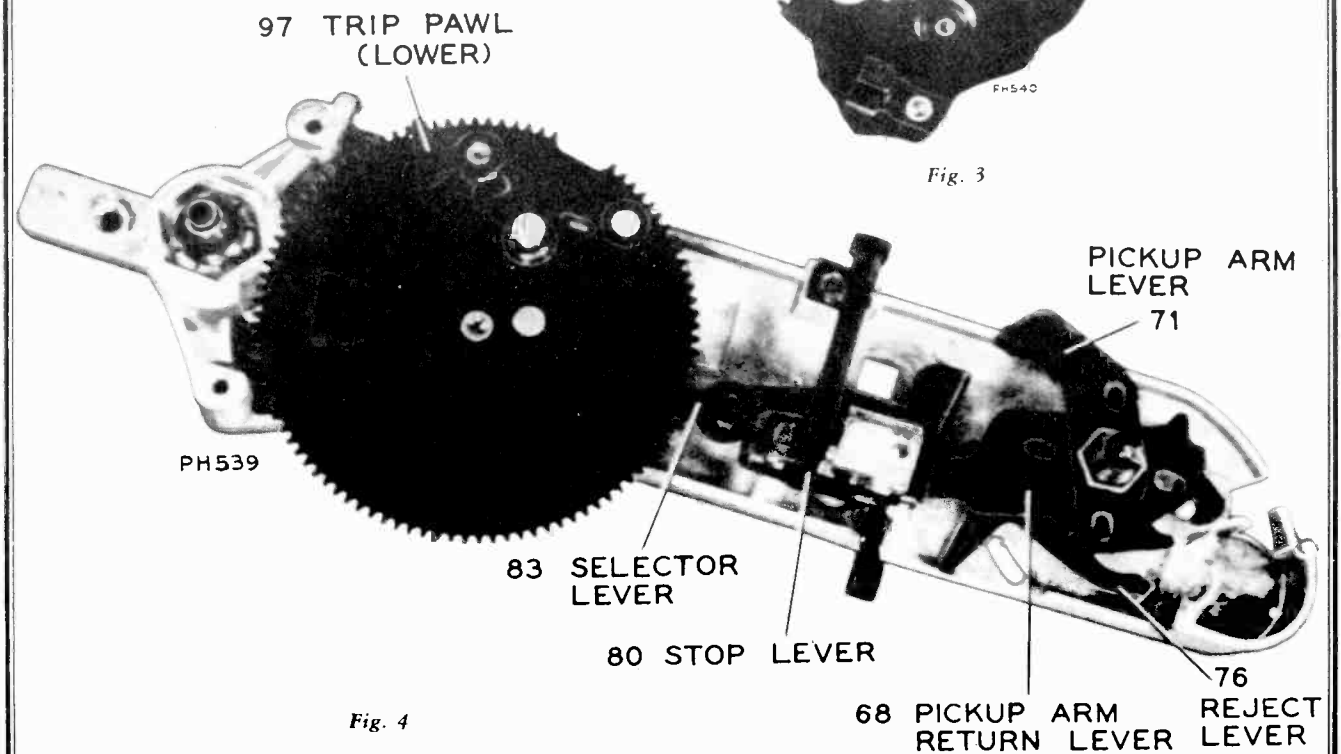


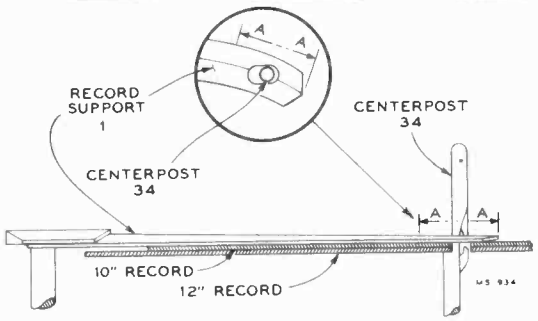
Fig. 4

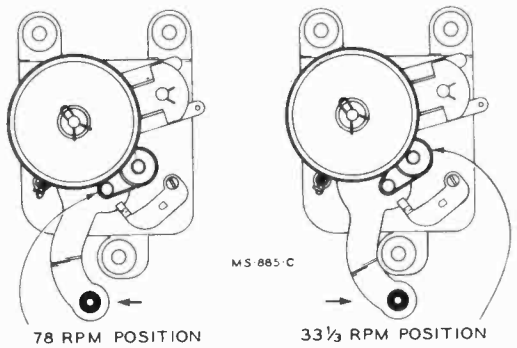
MODELS 960284-1, 960284-2

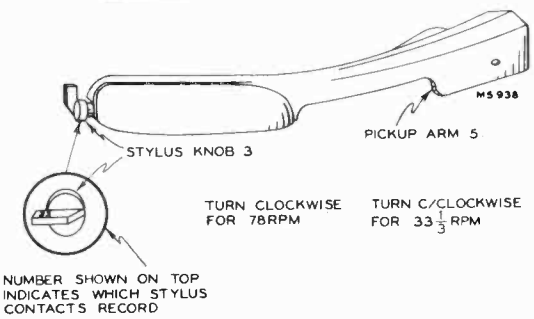
CYCLE OF OPERATION

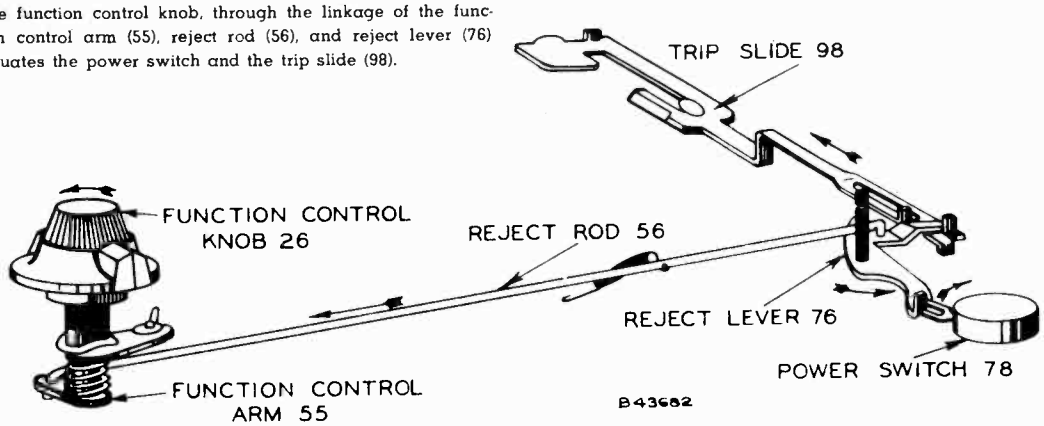
NOTE: In the cycle of operation it is assumed the mechanism has stopped automatically (out of cycle) with the pickup arm on the rest.

Function	Description
Place a stack of records over the center post (intermixed if so desired). Place the record support over the center post.	1. The stack of records rests on the step in the centerpost (34). 2. The hole in the end of the record support (1) permits the end of the support to slide over the center post and rest on the stack of records.
Turn the speed selector knob to 78 or 33-1/3 rpm position.	1. The speed change is accomplished by shifting to either of two shafts on the motor assembly which are rotating at different speeds. The additional shaft is connected by a small rubber belt.
Rotate the knobs to select the proper stylus.	1. The rotation of the stylus knob (3) selects the proper stylus depending on the type of record to be played.
Rotate function control knob to reject position and release.	1. The function control knob, through the linkage of the function control arm (55), reject rod (56), and reject lever (76) actuates the power switch and the trip slide (98).





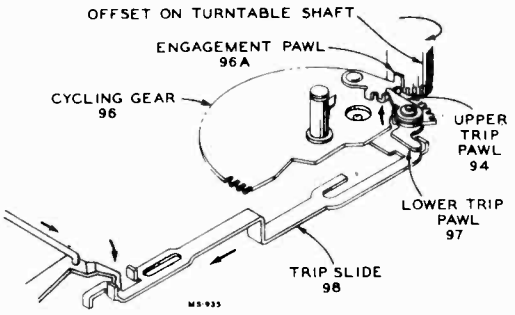




MODELS 960284-1, 960284-2

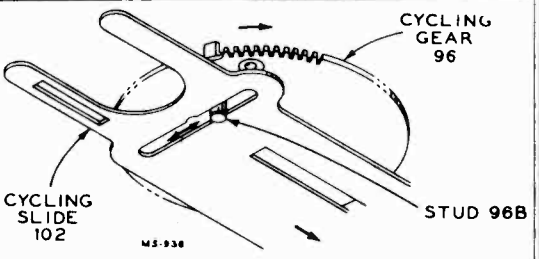
Cycling starts.

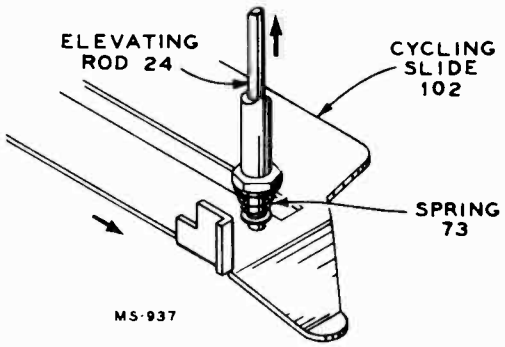
1. The closing of the power switch starts the turntable rotating.
2. The trip slide (98) in its movement contacts the lower trip pawl (97) and moves both the lower and the upper trip pawls which are tied together. The movement of the upper trip pawl (94) actuates the cycling engagement pawl (96A) sufficiently to cause engagement with the off-set on the rotating turntable shaft.
3. The contact between the cycling engagement pawl (96A) and the off-set on the turntable shaft gives the necessary push for the teeth in the cycling gear (96) to engage the teeth in the shaft of the turntable thereby starting change cycle.

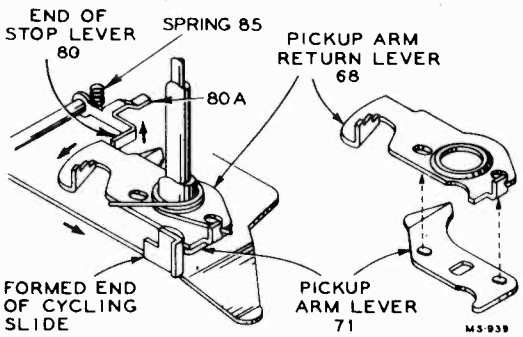


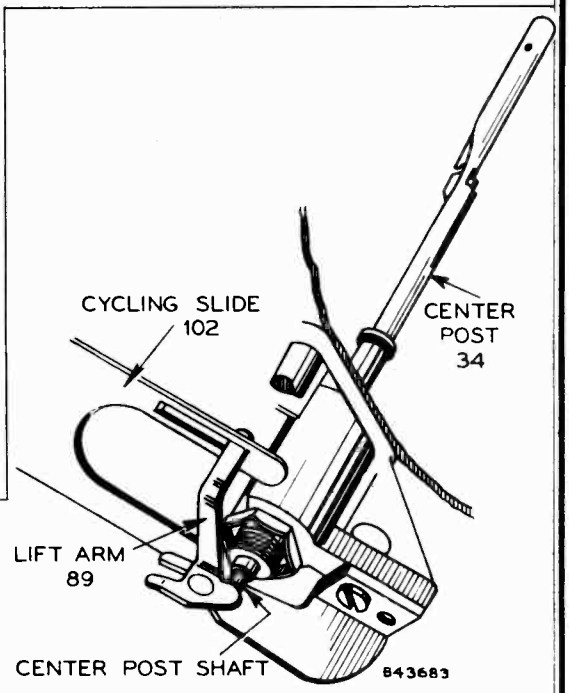
Pickup rises and remains outside turntable area.

1. As the cycling gear rotates, the stud (96B) mounted on the underside of the gear, rides inside a slot cut in the cycling slide (102).
2. The rotation of the cycling gear pushes the cycling slide back and forth.
3. As the slide moves away from the center post, an incline formed on the end of the slide causes the elevating rod (24) to raise and lift the pickup arm.
4. At the same time the elevating rod is pushed upward, the pickup arm lever (71) is also carried along from the force transferred through the spring (73). The raising of the pickup arm lever causes the two dimples formed in the pickup arm lever to engage the two holes in the pickup arm return lever (68) and couple them together. This stabilizes and directs the movement of the pickup arm during change cycle.
5. The cycling slide continues to move away from the center post until the formed end of the slide pushes against the pickup arm return lever. This relieves the force of pickup arm return lever against stop lever (80). This permits the stop lever return spring (85) to expand and return the stop lever to normal position.
6. The end (80A) of stop lever (80) pushes trip slide back ready for the next change cycle.









Record drops to turntable.

1. Further movement of the cycling slide causes the slot in the end of the cycling slide to actuate the lift arm (89).
2. The lift arm pushes up on the shaft extending from the bottom end of the center post. This shaft actuates the push off mechanism inside the center post, and the record drops to the turntable.

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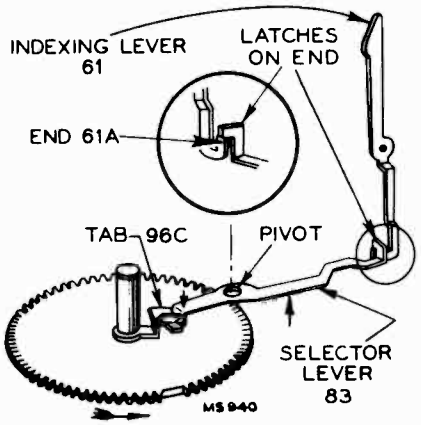
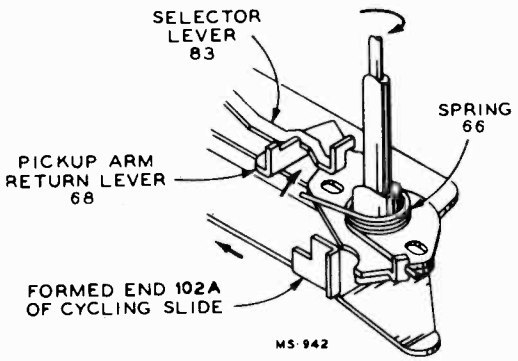
3. At this time the tab (96C) on cycling gear pushes down on one end of the selector lever (83) (which is pivoted in the center) thereby raising the other end causing it to latch on the edge (61A) of the twelve-inch indexing lever (61).



The pickup moves in for landing.

1. As the cycling slide returns, the formed edge (102A) on the slide moves back permitting the pickup arm return lever spring (66) to expand. This causes the pickup arm return lever (68) to move the pickup inward until the pickup arm return lever comes against the selector lever (83). The pickup is now directly above the point of landing.

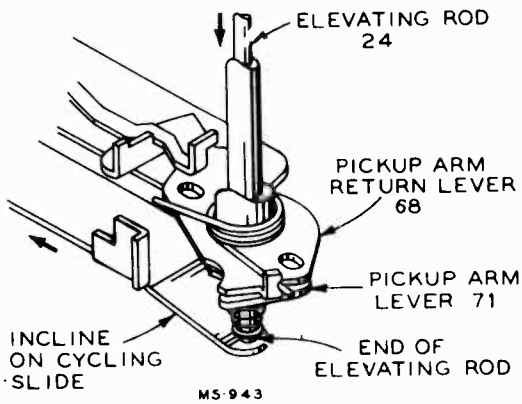


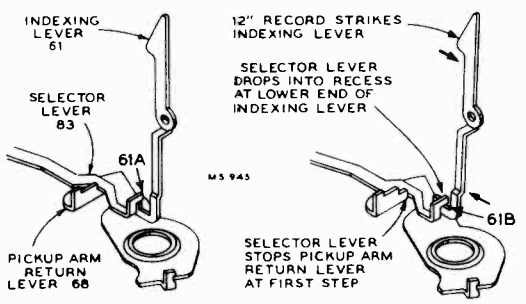
Pickup sits on record.

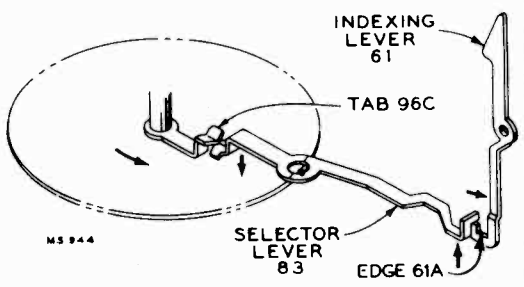
1. The elevating rod (24) slides down the incline on the slide permitting the pickup to sit on the start of the record.

NOTE:—12" indexing.

The mechanism automatically is indexed for the pickup to land on a ten-inch record, each time the mechanism goes through change cycle, unless a twelve-inch record contacts indexing lever (61) as its drops to the turntable. On each revolution of the cycling gear (complete change cycle) the tab (96C) pushes down on the selector lever (83) and the other end of the selector lever latches on the top edge (61A) of the twelve-inch indexing lever. Under these conditions the pickup will land correctly on a ten-inch record. On the other hand if a twelve-inch record drops to the turntable, it strikes the indexing lever on the way down. This permits the end of the selector lever (83) to drop down further into the recess (61B). The lower step of the pickup arm return lever makes contact with the selector lever and the pickup will land correctly on a twelve-inch record.







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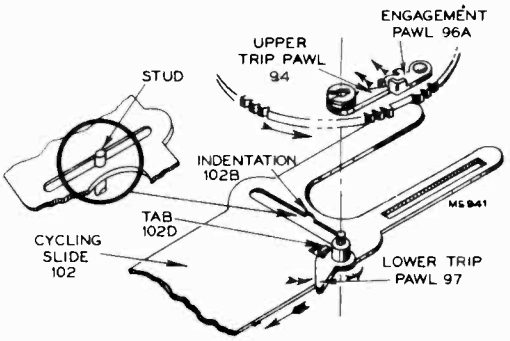
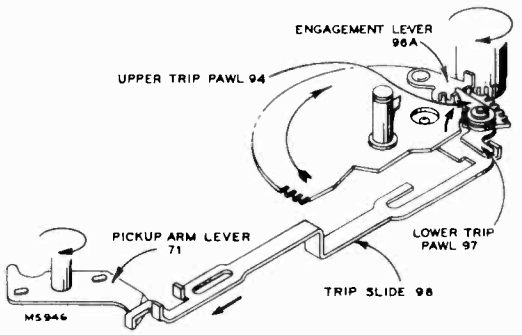
Mechanism completes cycle.

1. Just before the cycling gear completes cycle, a small tab (102D) on cycling slide makes contact with lower trip pawl (97) thereby moving upper trip pawl (94) and cycling engagement pawl (96A) back. This prevents the re-engagement with the off-set on the turntable shaft which would start a new change cycle.
2. The cycling gear comes to rest as the stud sliding in the cycling slide drops into a small indentation (102B) in the slide. The cut away section of the gear is in position so the gear on the turntable shaft is free to rotate.



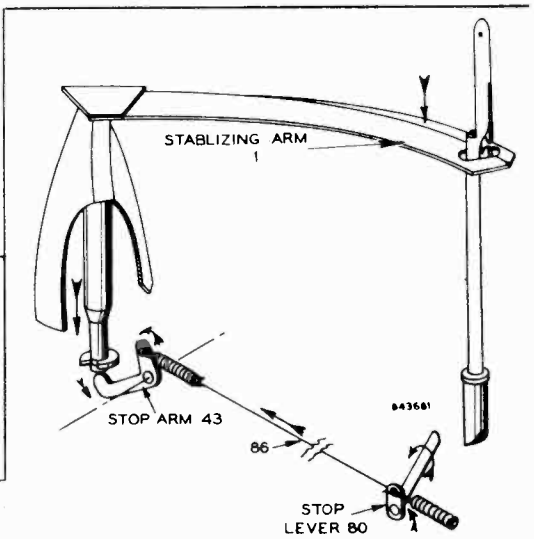
Record plays.

1. As the record plays, the pickup moves in toward the center of the record carrying the trip slide along. This is due to the contact made with the pickup arm lever which is rotating with the pickup arm pivot.
2. The trip slide contacts the lower trip pawl and both the lower and upper trip pawls and the cycling engagement pawls move slightly with each revolution of the record. This slight movement of the pawls is reversed each time the off-set on the turntable shaft comes in contact with the cycling engagement pawl. The back movement is taken up in the friction connection between the upper and lower trip pawls.
3. This action continues as long as the pickup moves in at a constant rate of speed. When the stylus leaves the recorded section of the record, the rapid acceleration results in the rapid movement of the cycling engagement pawl. The cycling engagement pawl assumes such a position that the off-set on the turntable shaft makes a positive contact and the cycling cam is pushed sufficiently for engagement between the teeth of the cycling gear and the teeth in the turntable shaft. This starts change cycle.



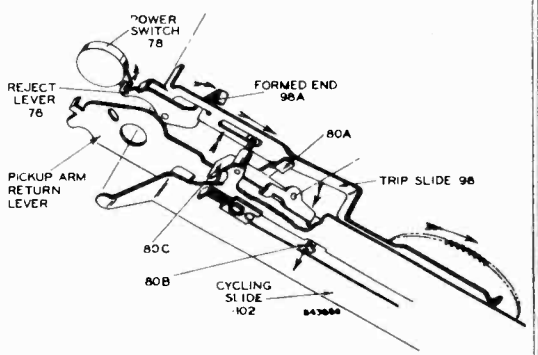
Pickup raises and moves out.

1. After the mechanism has been tripped the pickup arm moves out from action of the cycling slide (102) on the pickup arm lever (71).
2. The mechanism again follows the preceding sequence of dropping and playing the records until the last record of the stack has been played.



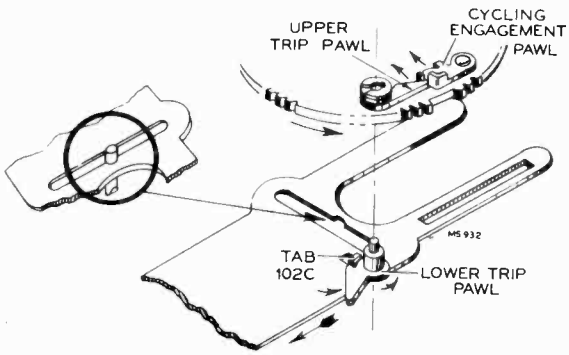
Mechanism stops automatically.

1. After the last selection has been played and the mechanism again goes into change cycle, the record support drops and actuates stop arm (43).
2. The stop arm movement is transferred through a connecting wire (86) to stop lever (80) causing it to raise.
3. As the stop lever raises the end (80A) lifts one end of trip slide. The other end (80C) of stop lever rises and forms a stop for pickup arm return lever preventing the pickup from moving in for landing.
4. The cycling slide has moved away from the center post permitting the lower end (80B) of stop lever to drop down through a small square cut in the cycling slide. After the end of the stop lever drops through the square opening, it slides along a channel cut in the slide which prevents it from raising until the slide returns.



MODELS 960284-1, 960284-2

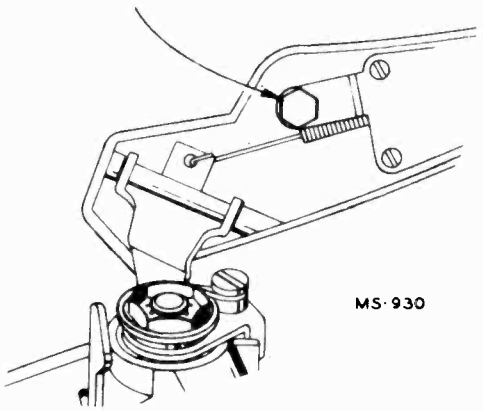
5. As the cycling slide moves back, it carries the raised trip slide along until finally the formed end (98A) of the trip slide (98) pushes reject lever which in turn actuates the power switch (78). This removes the power from the drive motor and mechanism stops.
6. The elevating rod (24) lowers the pickup arm to the rest.
7. As the cycling gear comes to rest, a small tab (102C) on cycling slide contacts and moves lower and upper trip pawls and cycling engagement pawl back to prevent engagement with off-set on turntable shaft. This prevents starting a change cycle if power would be applied to drive motor.



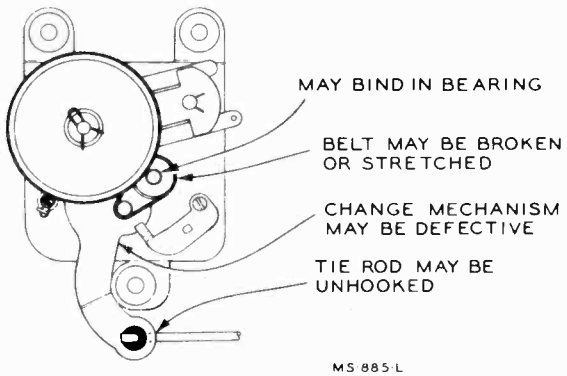
SERVICE HINTS

Pickup Arm Strikes Record on Center Post

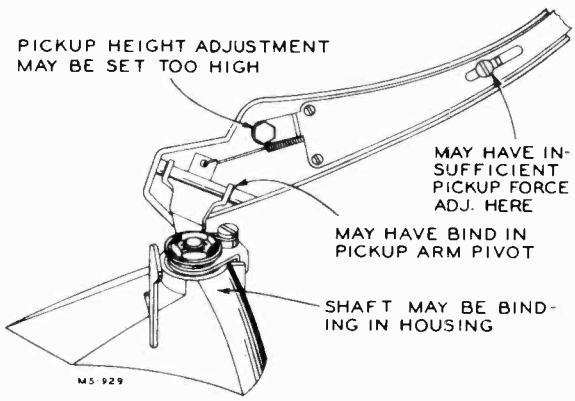
PICKUP HEIGHT ADJUSTMENT SET TOO HIGH

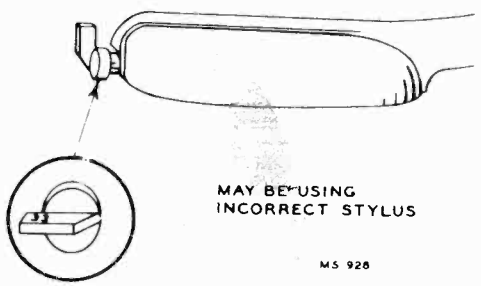


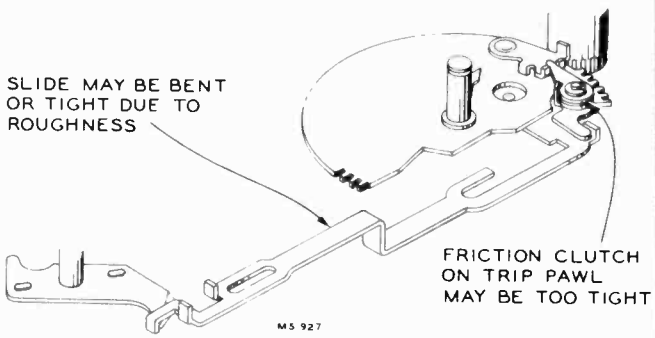
Speed Change Control Fails to Function



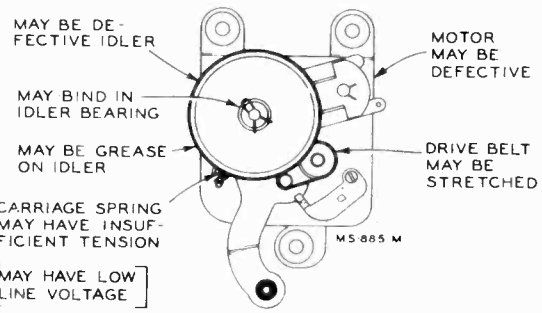
Pickup Skips Grooves







"Wow" or Speed Variation



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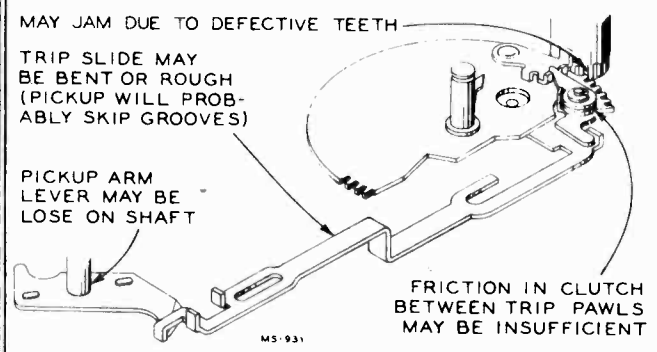
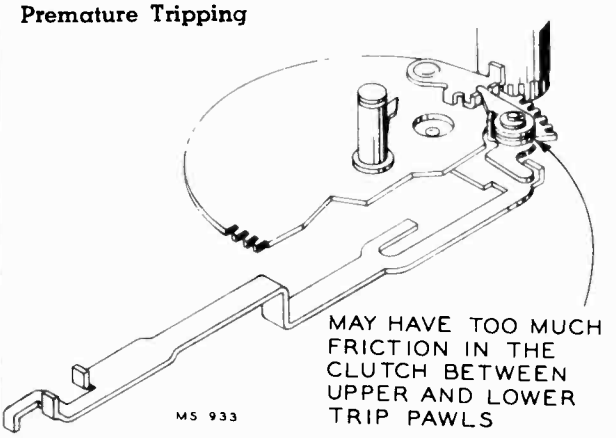
960284-2

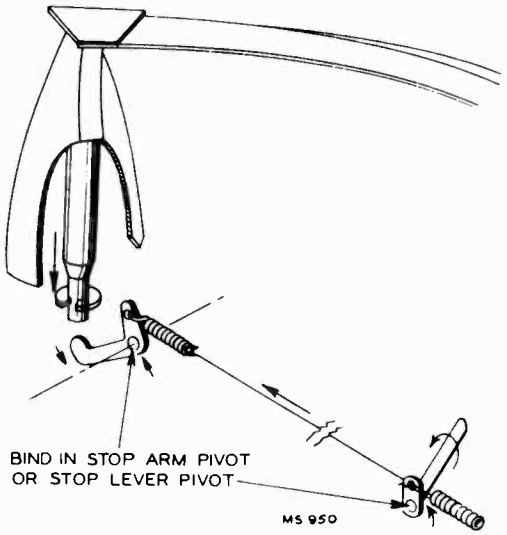
Mechanism Fails to Trip



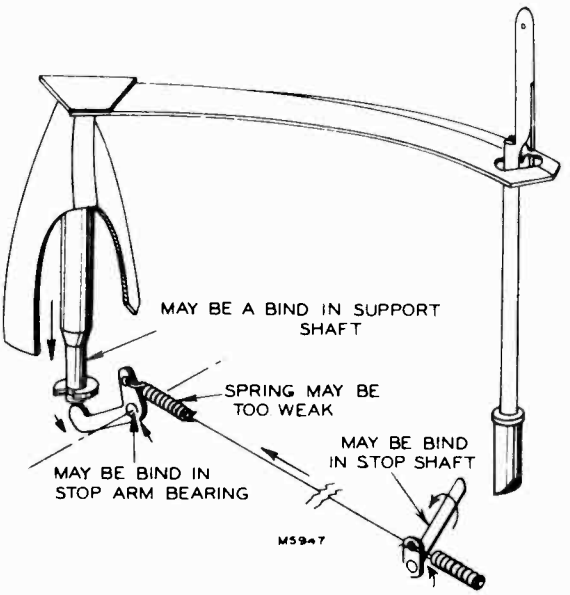
Premature Tripping



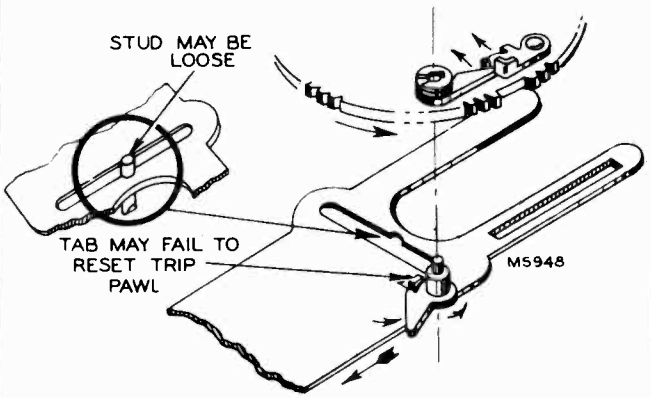
Pickup Sets Down on Rest Instead of Record



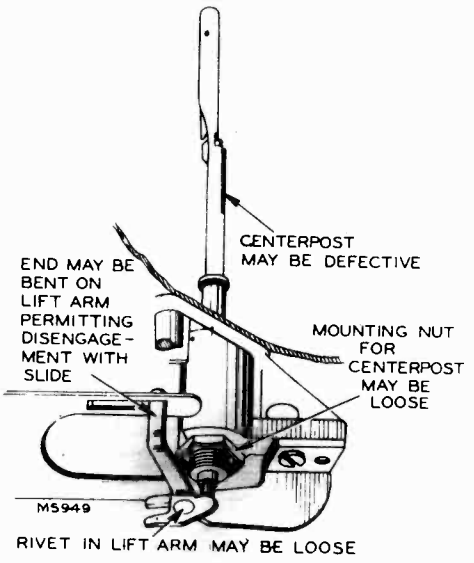
Mechanism Fails to Stop Automatically



Mechanism Trips Continuously

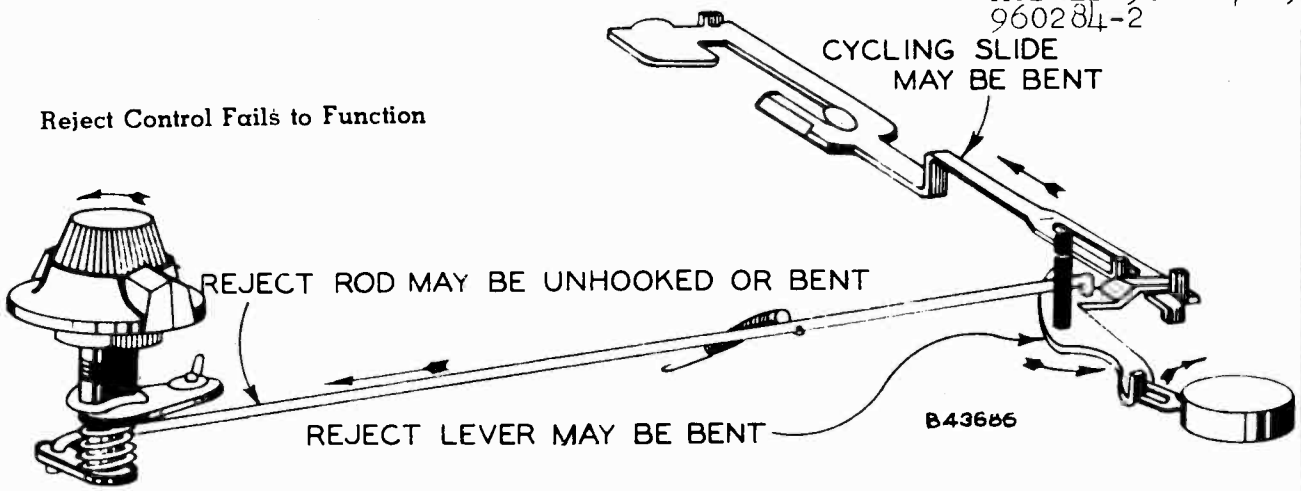


Failure to Separate Records Properly

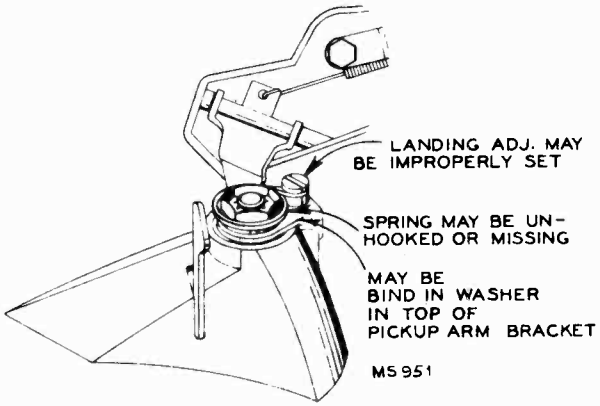


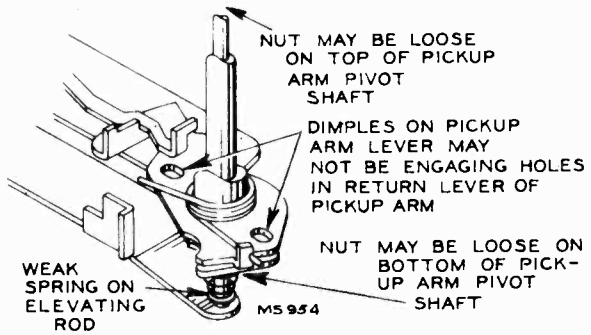
MODELS 960284-1, 960284-2

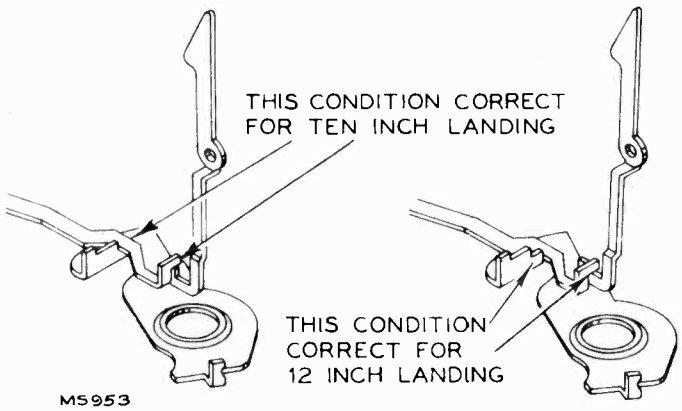
Reject Control Fails to Function

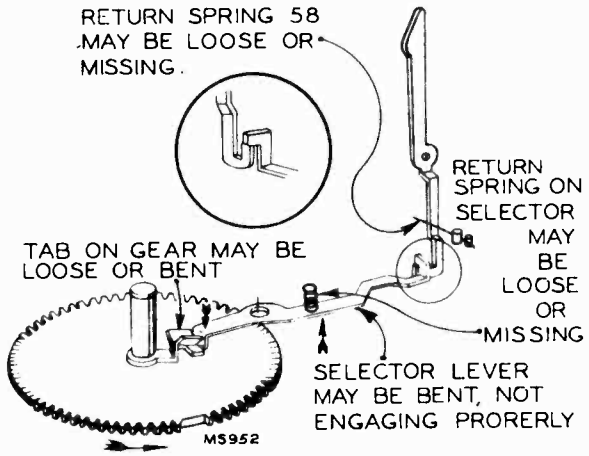


Pickup Fails to Land Properly

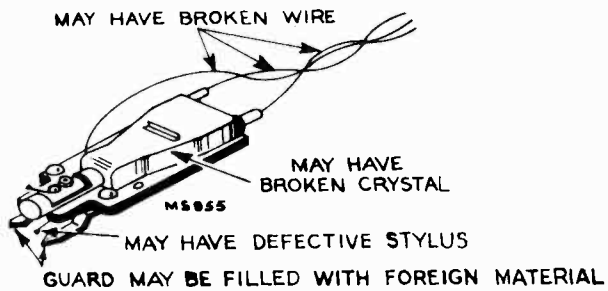




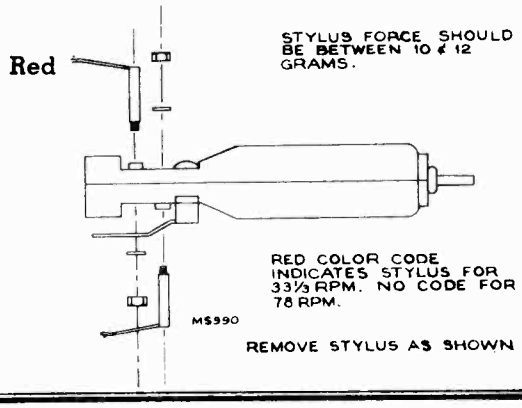




Distorted or No Output

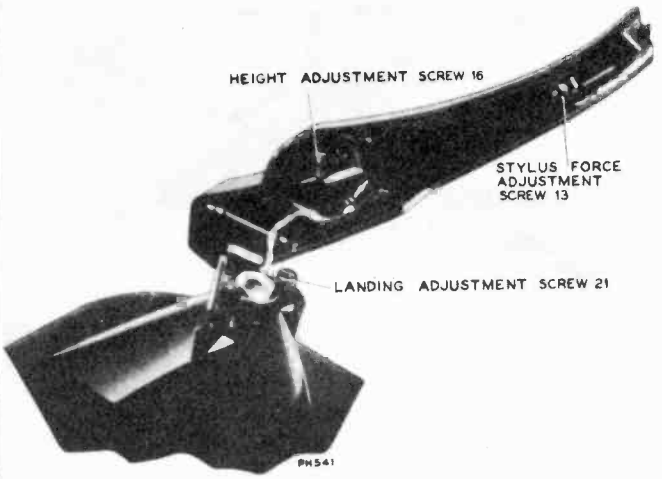


Removing Stylus



MODELS 960284-1,
960284-2

ADJUSTMENTS

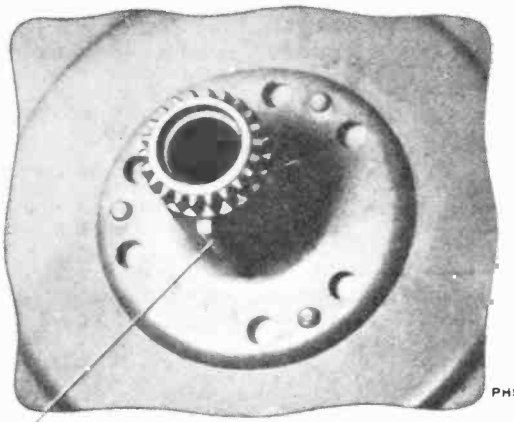


Landing Position—The landing position of the stylus is adjusted by means of the landing adjustment screw (21) mounted on the pickup arm support bracket assembly. Turn the screw for correct landing on 10" records and the 12" adjustment should automatically be correct.

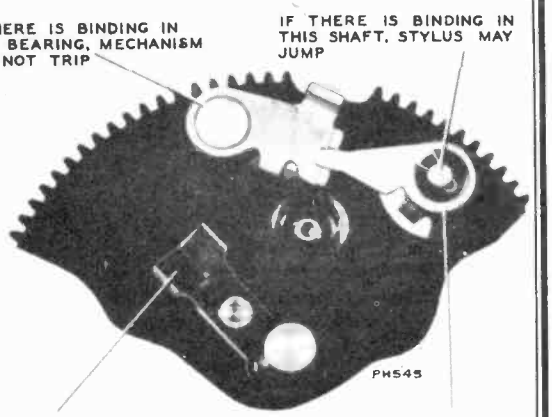
Pickup Arm Height—The pickup arm height is adjusted by screw (16) located inside the pickup arm. To raise pickup arm turn screw counterclockwise to lower arm turn screw clockwise. The pickup arm height should be adjusted so that with a 1⅛" stack of records the pickup arm lifts ¼" straight up as the change cycle starts.

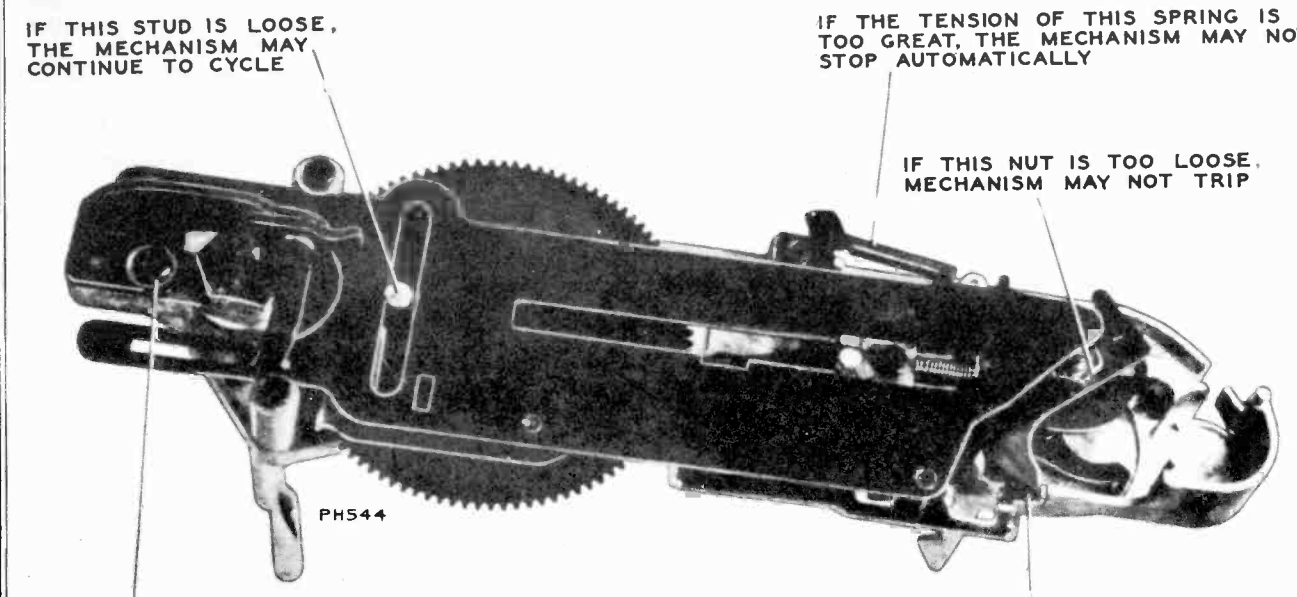
Stylus Force—Stylus force should be ten to twelve grams. Loosen screw (13) and move slide back and forth until the correct stylus force is obtained.

DO YOU KNOW?



THE "OFFSET" CONTACTS ENGAGEMENT PAWL #96A CAUSING THE GEARS OF THE TURNTABLE SHAFT AND CYCLING CAM TO ENGAGE AND CARRY THE MECHANISM THROUGH CYCLE





MODELS 960284-1, 960284-2

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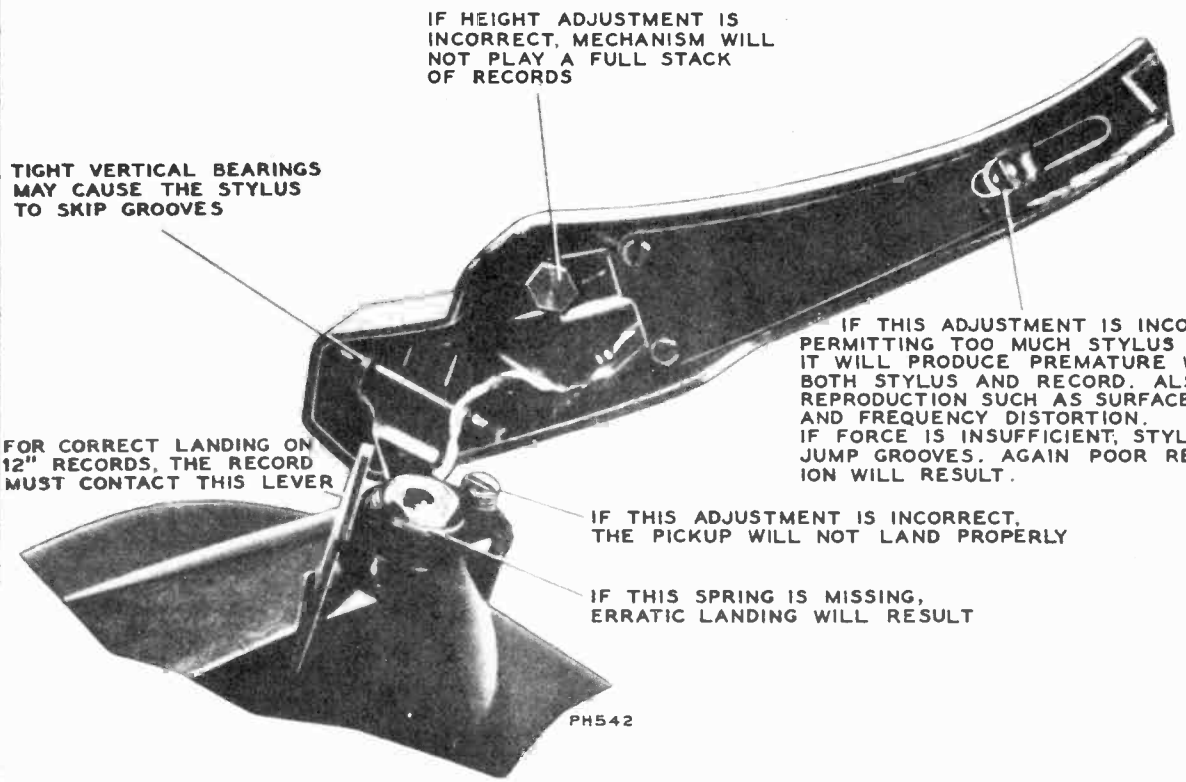
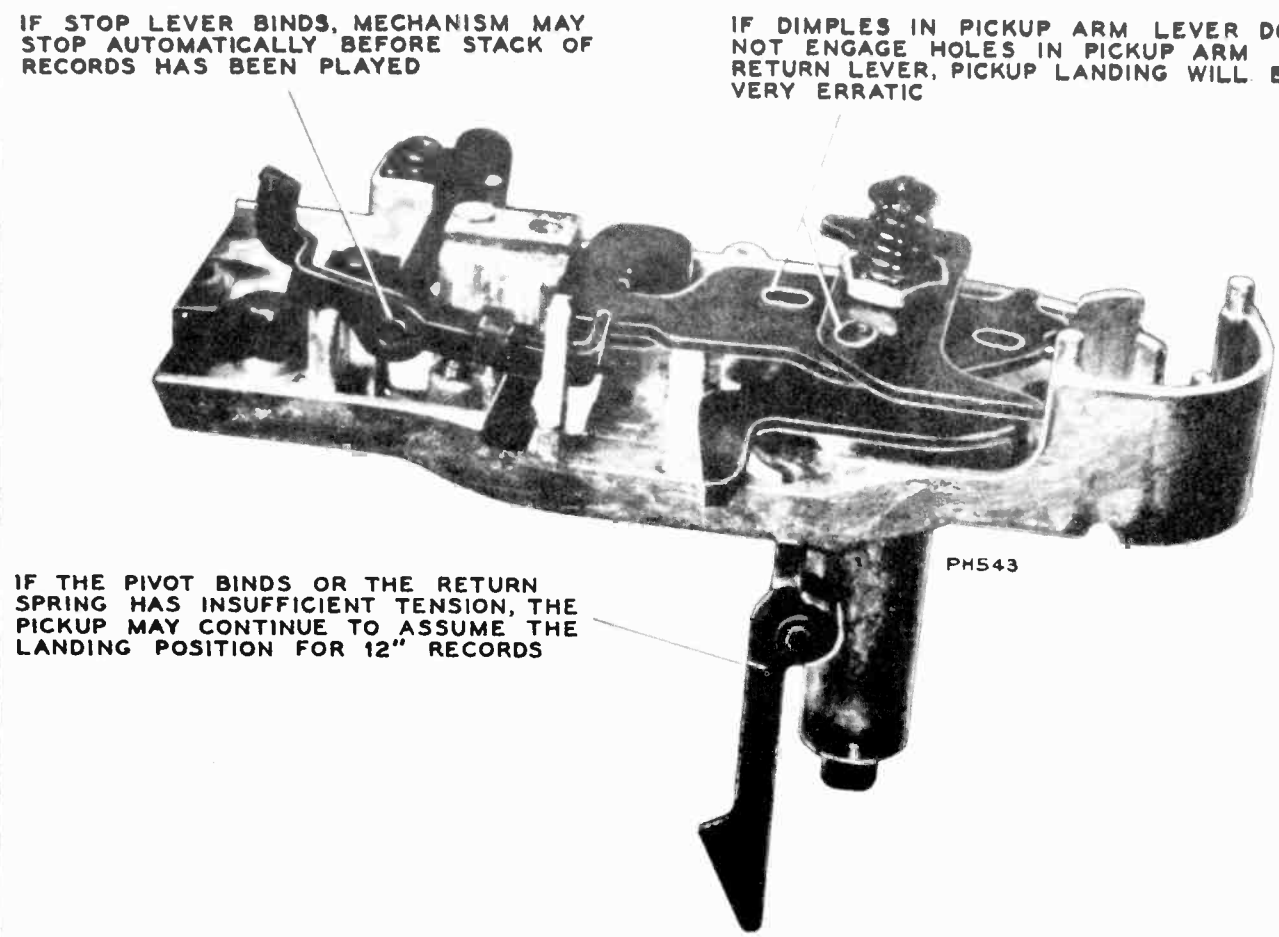
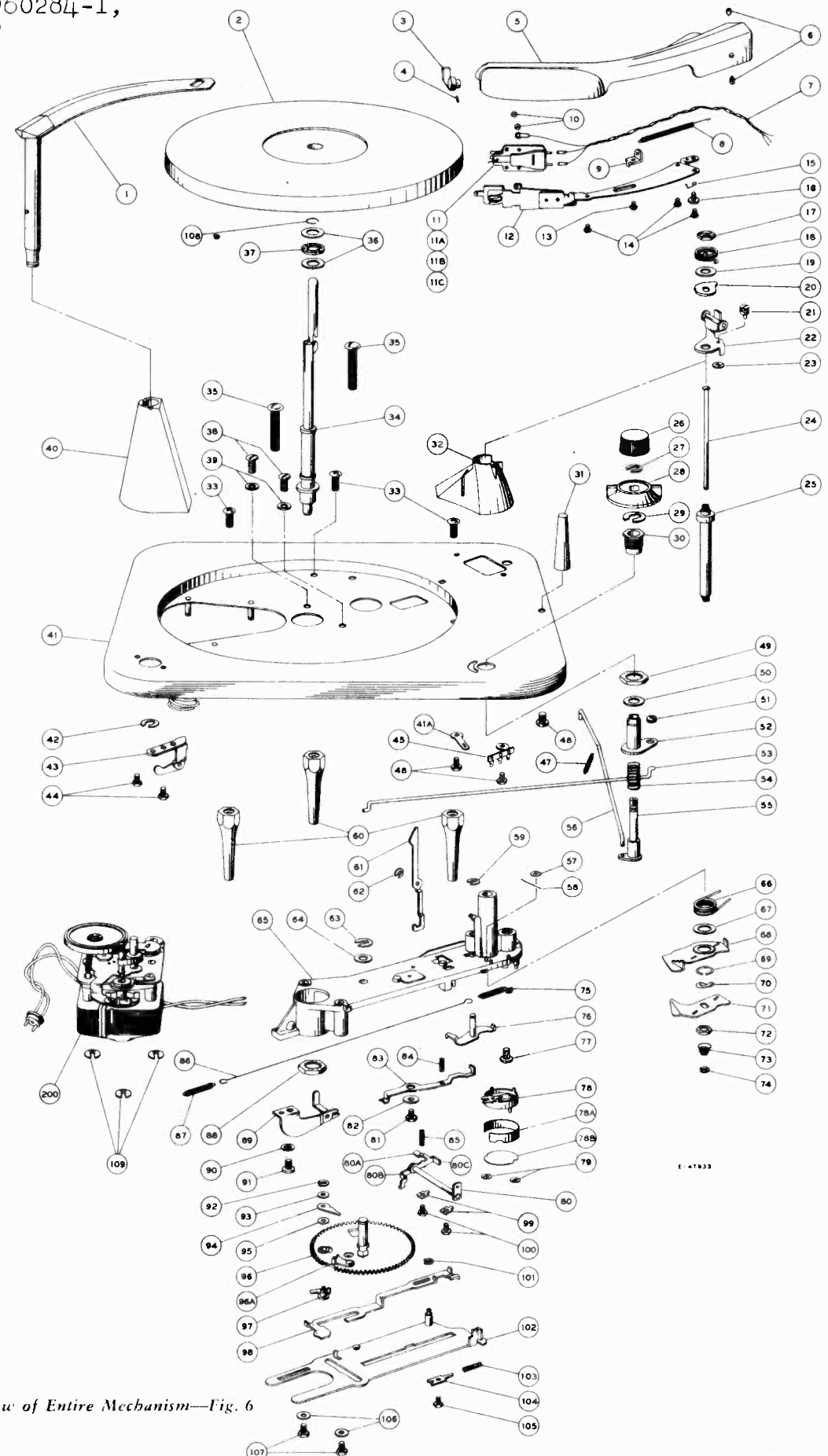


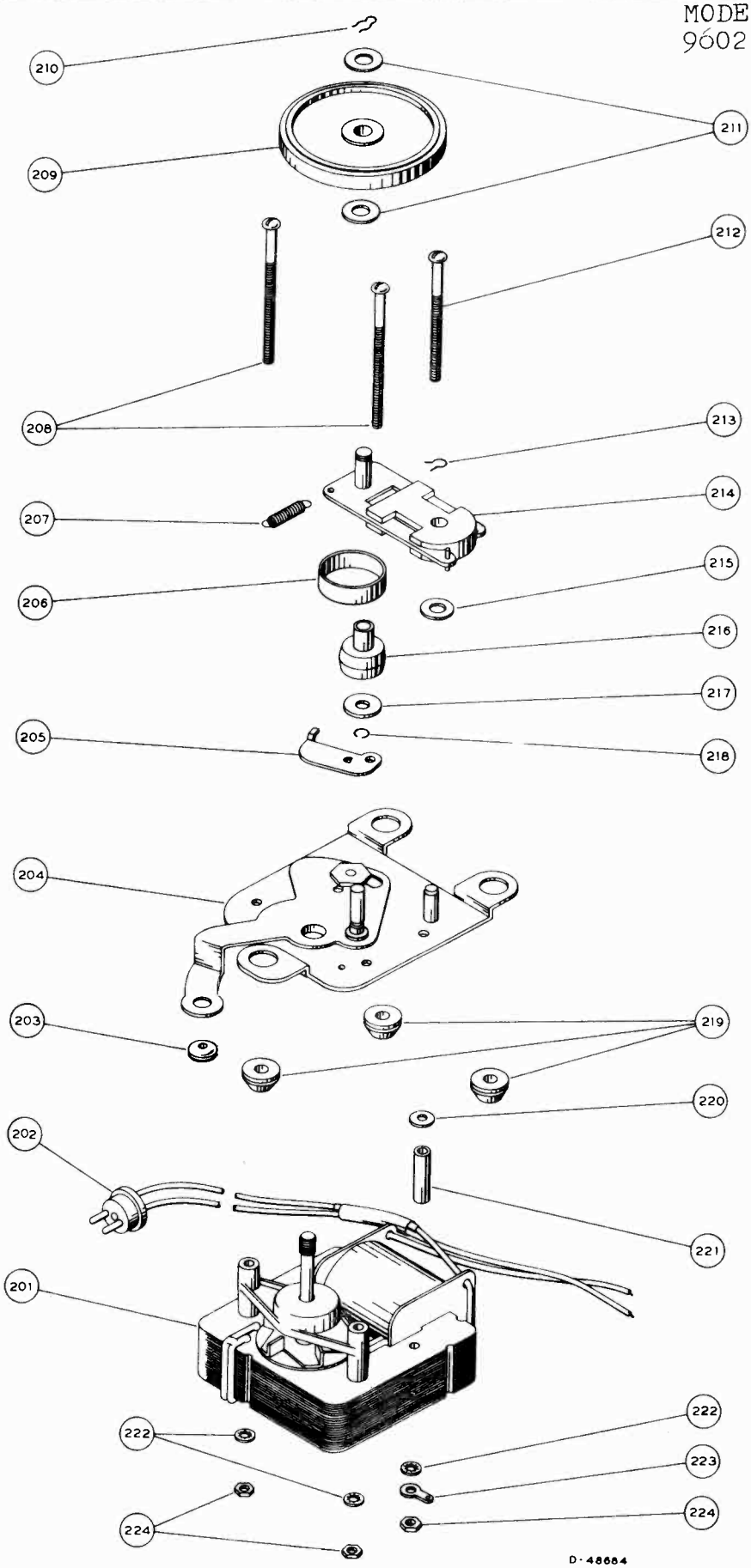


MODELS 960284-1,
960284-2



Exploded View of Entire Mechanism—Fig. 6

MODELS 960284-1, 960284-2



Exploded View of Motor (60 cycles)—Fig. 5

MODELS 960284-1, 960284-2

REPLACEMENT PARTS

ILL. NO.	STOCK NO.	DESCRIPTION
1	75802	Support—Record support complete with plastic cap (maroon) and pin for 960284-1
1	75803	Support—Record support complete with plastic cap (tan) and pin for 960284-2
1A	75804	Cap—Plastic cap (maroon) for record support assembly for 960284-1
1A	75805	Cap—Plastic cap (tan) for record support assembly for 960284-2
2	75806	Turntable—Turntable and hub assembly
3	75264	Knob—Stylus selector knob complete with screw Ill. #4
4	——	Screw—Screw for stylus selector knob (included in 75264, Ill. #3)
5	75807	Arm—Pickup arm shell only complete with "RCA Victor" emblem
6	75357	Pivot—Pickup arm pivot (2 required)
7	75808	Cable—Three (3) wire pickup cable complete with connectors
8	75809	Spring—Pickup arm counterbalance spring (coil type)
9	75810	Bracket—Adjustment bracket for counterbalance spring
10	——	Screw—Mounting screw for crystal
11	75475	Crystal—Two-way (33⅓/78 RPM crystal complete with styluses
11A	75497	Stylus—Osmium tip stylus for 78 RPM section (not coded)
11B	75496	Stylus—Osmium tip stylus for 33⅓ RPM section (coded "red")
11C	74230	Nut—#00-112 nut and washer to mount stylus
12	75811	Mount—Crystal mount and swivel assembly
13	——	Screw—#6-32 x ⅛" round head machine screw to mount counterbalance spring adjustment bracket
14	71097	Screw—#4 x ¼" self tapping screw for crystal mount and swivel assembly
15	75812	Spring—Lock spring (coil type) for height adjustment screw
16	75813	Screw—Height adjustment screw (hex head)
17	——	Nut—Pal nut for mounting pickup arm bracket
18	75814	Spring—Tension spring (coil type) for landing adjustment stud
19	——	Washer—Metal (steel) washer for pickup arm pivot shaft (1/16" x ¼" I.D. x ½" O.D.)
20	75815	Cam—Landing adjustment cam
21	75816	Stud—Landing adjustment stud (eccentric)
22	75817	Bracket—Pickup arm mounting bracket complete with pin
23	75818	Nut—Speed nut for landing adjustment stud
24	75819	Rod—Elevating rod
25	75820	Shaft—Pickup arm pivot shaft and sleeve
26	75821	Knob—Function control knob (maroon) for 960284-1
26	75822	Knob—Function control knob (tan) for 960284-2
27	75399	Washer—"C" washer to mount function control arm and shaft assembly
28	75823	Knob—Motor speed control knob (maroon) for 960284-1
28	75824	Knob—Motor speed control knob (tan) for 960284-2
29	75825	Washer—"C" washer to mount motor control arm and shaft assembly
30	75826	Bushing—Threaded bushing for control shaft
31	75827	Rest—Pickup arm rest (maroon) for 960284-1
31	75828	Rest—Pickup arm rest (tan) for 960284-2
32	75829	Housing—Pickup arm pivot shaft housing (plum hammertone) (die-cast) for 960284-1
32	75873	Housing—Pickup arm pivot shaft housing (light brown) (die-cast) for 960284-2
33	75830	Screw—#10 x ½ self-tapping cross-recessed head screw to mount plastic legs
34	75831	Spindle—Turntable spindle assembly
35	75377	Screw—Motorboard mounting screw (¼-20 x 1⅜" round head—special)
36	75354	Washer—Thrust washer for turntable bearing (2 required)
37	75355	Bearing—Thrust bearing
38	——	Screw—#10-24 x 5/16" pan head machine screw to mount die-cast sub-assembly
39	——	Lockwasher—#10 internal tooth lockwasher to mount die-cast sub-assembly
40	75832	Housing—Record support housing (plum hammertone) (die-cast) for 960284-1
40	75874	Housing—Record support housing (light brown) (die-cast) for 960284-2
41	——	Board—Motorboard (plum hammertone) complete with mounting springs, cable clamps and motor mounting studs for 960284-1
41	——	Board—Motorboard (light brown) complete with mounting springs, cable clamps and motor mounting studs for 960284-2
41A	——	Lug—Terminal lug
42	75385	Washer—"C" washer for record support shaft
43	75834	Arm—Stop arm assembly
44	——	Screw—#6 x 5/16" hex head self-tapping screw to mount record support housing and stop arm
45	——	Board—Terminal board (3 contact)
46	——	Screw—#6-32 x ¼" hex head self-tapping screw to mount terminal board and pickup arm pivot housing
47	75401	Spring—Reject rod return spring (coil type)
48	75830	Screw—#10 x ½" self-tapping cross-recessed head screw to mount arm rest
49	——	Nut—Pal nut to mount threaded bushing Ill. #30
50	75835	Washer—Bronze washer for control shaft
51	75403	Grommet—Rubber grommet for motor speed control rod
52	75836	Arm—Motor speed control arm and shaft assembly
53	75837	Rod—Motor speed control rod
54	75838	Spring—Compression spring for control lever shaft (coil type)
55	75839	Arm—Function control arm and shaft assembly
56	75840	Rod—Reject rod
57	75841	Nut—Speed nut for 12" indexing lever return spring
58	75842	Spring—12" indexing lever return spring (formed)
59	75392	Washer—"C" washer for mounting reject lever
60	75843	Leg—Plastic leg
61	75844	Lever—12" indexing lever
62	75397	Washer—"C" washer for mounting 12" indexing lever
63	75373	Washer—"C" washer for mounting cycling gear
64	75845	Washer—Fibre washer for mounting cycling gear
65	75846	Casting—Main casting
66	75847	Spring—Pickup arm return lever spring (coil type)
67	75848	Washer—Fiber washer for pickup arm pivot shaft
68	75849	Lever—Pickup arm return lever
69	75850	Retainer—Retainer ring for pickup arm return lever
70	75851	Washer—Spring washer for pickup arm pivot shaft
71	75852	Lever—Pickup arm lever
72	——	Nut—Pal nut to fasten pickup arm lever
73	75854	Spring—Thrust spring (coil type) for elevating rod
74	75397	Washer—"C" washer for elevating rod
75	75855	Spring—Return spring (coil type) for stop lever
76	75856	Lever—Reject lever
77	——	Screw—#10-24 x 5/16" round head machine screw and lockwasher
78	75857	Switch—"On-Off" switch complete with insulating strip and cover
79	75841	Nut—Speed nut for fastening switch cover

MODELS 960284-1, 960284-2

REPLACEMENT PARTS

ILL. NO.	STOCK NO.	DESCRIPTION
80	75858	Lever—Stop lever assembly (including 80A, B, C)
81	——	Screw—#6-32 x ¼" hex head screw for selector lever
82	——	Washer—Flat washer (steel) for mounting selector lever
83	75859	Lever—Selector lever
84	75860	Spring—Return spring (coil type) for selector lever
85	75861	Spring—Return spring (coil type) for stop lever
86	75862	Link—Control link
87	75863	Spring—Return spring (coil type) for stop arm
88	——	Nut—Pal nut for spindle
89	75864	Arm—Lift arm
90	——	Lockwasher—Internal teeth lockwasher (#10) for lift arm mounting screw
91	——	Screw—#10-24 x 5/16" round head machine screw for lift arm
92	75397	Washer—"C" washer for mounting trip pawl
93	75396	Washer—Fibre washer for trip pawl shaft
94	75865	Pawl—Trip pawl—upper
95	75395	Washer—Spring washer for trip pawl shaft
96	75866	Gear—Cycling gear complete with shaft and engagement lever
96A	——	Lever—Engagement lever—part of Ill. 96
97	75867	Pawl—Trip pawl—lower
98	75868	Slide—Trip slide
99	75869	Strip—Bearing strip for stop lever shaft
100	——	Screw—#4-40 x ¼" hex head screw for mounting stop lever shaft bearing strips
101	75397	Washer—"C" washer for mounting trip slide
102	75870	Slide—Cycling slide and cam assembly
103	75871	Spring—Stabilizing spring (coil type) for cycling slide
104	75872	Plate—Bearing plate for cycling slide
105	——	Screw—#6-32 x ½" hex head machine screw for mounting cycling slide bearing plate
106	——	Washer—Brass washer for cycling slide
107	——	Screw—#6-32 x ½" hex head machine screw for mounting cycling slide
108	75353	Retainer—Turntable spindle thrust bearing assembly retainer
109	75876	Washer—"C" washer for mounting motor
200	75333	Motor—117 volt, 60 cycle, complete with top plate, idler wheel and drive belt
202	30870	Connector—2 contact male connector for motor leads
203	75403	Grommet—Rubber grommet for motor speed change tie rod (2 req'd)
204	75426	Plate—Motor top plate including speed change carriage, 3 mounting grommets and 1 speed change lever grommet
205	75431	Plate—Friction guide plate
206	75376	Belt—Rubber belt for motor drive shaft
207	75383	Spring—Tension spring for idler wheel
208	——	Screw—#6-32 x 2" round head machine screw to mount top plate to motor
209	75382	Wheel—Idler wheel
210	75380	Spring—Hairpin spring for idler wheel
211	75433	Washer—Dampening washer for idler wheel (2 req'd)
212	——	Screw—#6-32 x 2⅛" round head machine screw to mount top plate to motor
213	75432	Spring—Hairpin spring to mount idler carriage
214	75430	Carriage—Idler carriage
215	75433	Washer—Fibre washer
216	75429	Pulley—Drive pulley and shaft assembly for 33⅓ RPM
217	75428	Washer—Felt washer
218	75427	Retainer—Retainer ring for drive pulley and shaft
219	75386	Grommet—Rubber grommet to mount motor (3 req'd)
220	——	Washer—Flat metal washer
221	——	Spacer—Metal spacer to mount top plate to motor
222	——	Lockwasher—#6 internal teeth
223	——	Lug—Terminal lug
224	——	Nut—#6 hex nut

LUBRICATION

The mechanism is properly lubricated when it leaves the factory, so no lubrication should be necessary for a long period of time. If, however, the mechanism has unusual use or high operating temperatures, it may be necessary to add additional lubrication.

It is suggested to use Lubriplate or STA-PUT No. 512 to:

1. Pickup arm pivot.
2. Points of sliding contact with cycling slide, including:
   a. elevating rod
   b. lift arm
   c. roller on cycling cam
   d. pickup arm return lever
   e. pickup arm lever
3. End of selector lever contacting tab on cycling gear.
4. Turntable thrust bearing.
5. Sparingly on a trip slide.
6. All points of sliding contact.

Apply a small quantity of light machine oil #10 or Singer Sewing machine oil to:

1. Trip pawl pivot.
2. Cycling engagement pawl pivot.
3. Bearing of record support.
4. Elevating rod.
5. Bearing of lift arm.
6. Bearing of reject lever.
7. Bearing of stop lever.
8. Bearing of cycling gear.
9. Motor bearings.

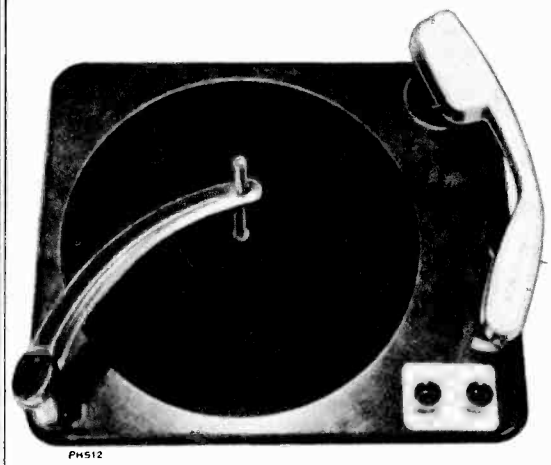
NOTE: Keep oil or grease away from all rubber parts.

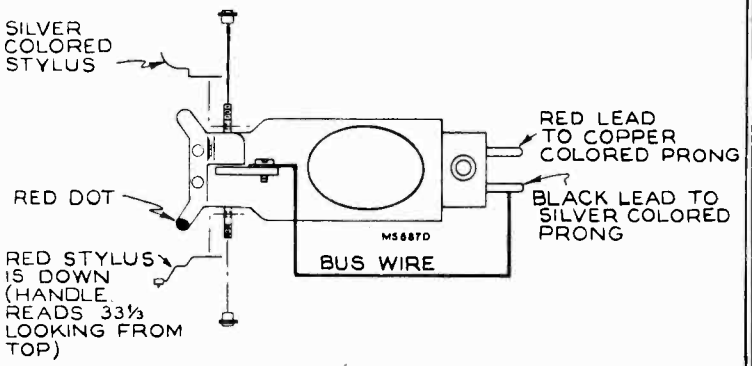
MODEL 960285-1

PICKUP INFORMATION

Pickup force should be approximately 8 to 10 grams. This force is determined by the design of the pickup and arm assembly.

However, a tight vertical bearing in the pickup arm will tend to have the same effect as insufficient pickup force.





Features

1. This record changer is a center support intermix mechanism designed to play automatically a series of records up to ten 12-inch, twelve 10-inch, or ten intermixed records of the standard 78 RPM type. It will also play a series of the long playing 33-1/3 RPM type of similar diameter.
2. The mechanism is equipped with a light weight dual stylus pickup cartridge which can be selected by turning a knob in the end of the pickup arm.
3. The mechanism will automatically stop and the pickup arm return to the rest position after the mechanism has played the last selection of the stack.
4. The automatic tripping device is of the acceleration type.
5. The speed change is accomplished by a single control mounted on the motorboard.

Automatic Operation

1. Lift and rotate the record support to one side.
2. Place a stack of records over the center post.
3. Rotate the record support so the center post will extend through the hole in the end of the support.
4. Turn the speed control to select the proper speed.
5. Rotate the knob in the end of the pickup arm to the proper numeral corresponding to the turntable speed.
6. Turn the function control knob to reject and release. The mechanism will play one side of each record of the stack until the last selection has been played at which time it will stop automatically.
7. To reject a record being played, turn the function control knob to reject and release.
8. To remove records, lift and turn the record support to one side.
9. Lift the stack of records straight up.

Manual Operation

1. Lift and rotate the record support to one side.
2. Place the record to be played on the turntable (tilt slightly) to slide over the stop in the center post.
3. Set the speed and pickup cartridge controls properly.
4. Turn function control to reject and release. (Allow mechanism to complete cycle.)
5. Place the record support (2) over the spindle, permitting it to rest on the step of the spindle.
6. The mechanism will play the record after which it will stop automatically.

Lubrication

The mechanism is properly lubricated when it leaves the factory, so lubrication should not be necessary for a long period of time. If, however, the mechanism has unusual use or high operating temperatures, it may be necessary to add additional lubrication.

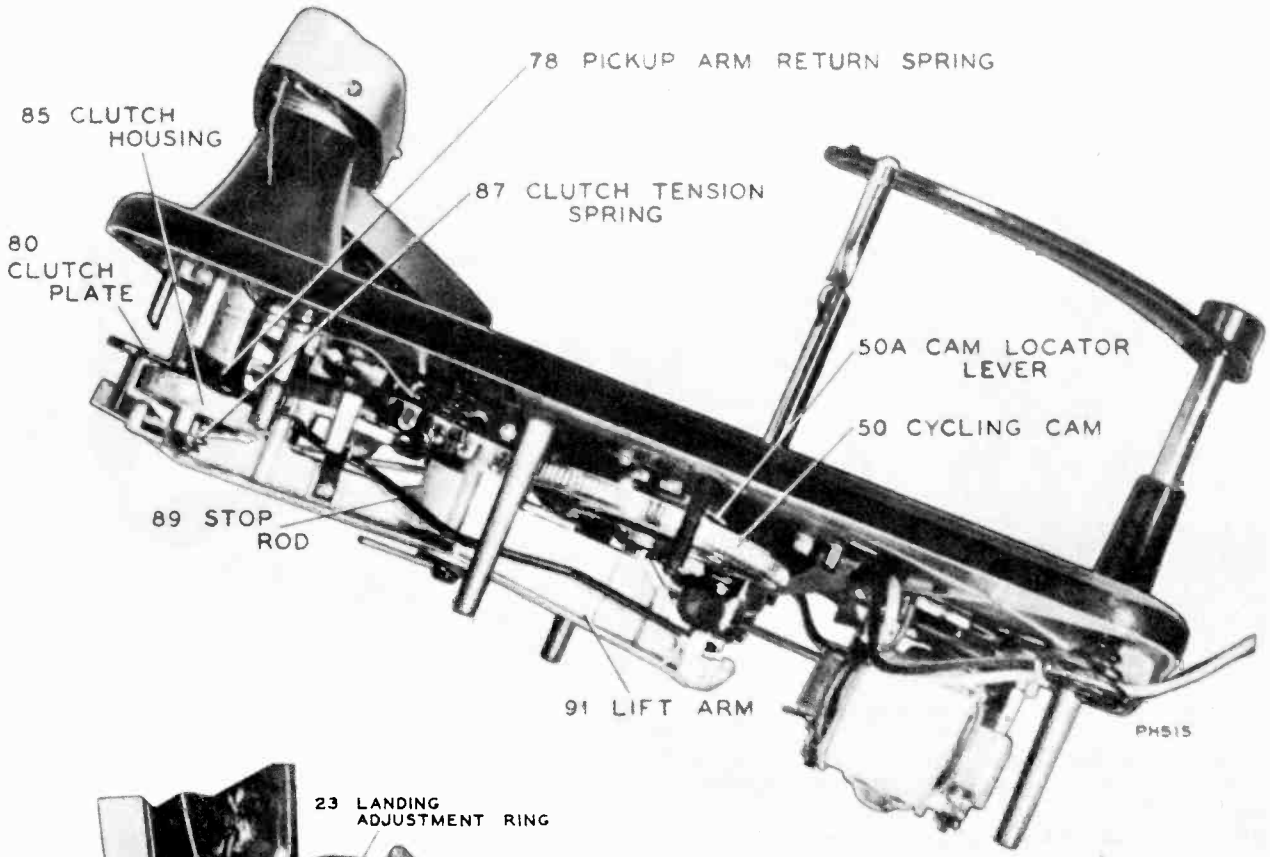
It is suggested to use Lubriplate or STA-PUT No. 512 to:

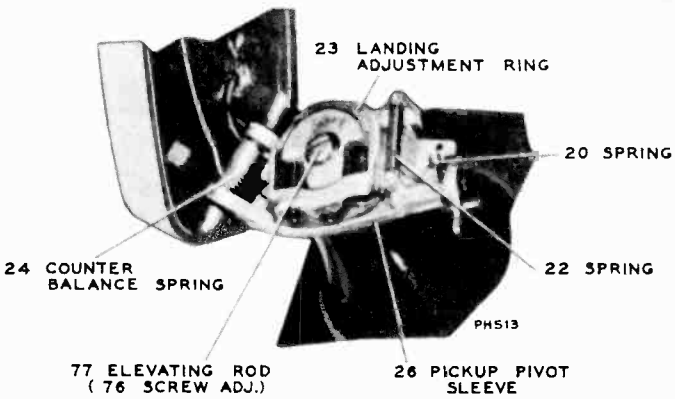
1. Pickup pivot bushing (27).
2. Frictional contact on the clutch assembly.
3. Lift arm bearing and cam faces.
4. Spring contact on stop rod (89).
5. Channel on cycling cam (50).
6. Roller on end of center post (39), ball bearing races 5-6-7.
7. Trip slide (71).
8. All frictional contacts and gears in general.

Apply a small quantity of light oil No. 10 or Singer Sewing machine oil to:

1. Trip dog (52).
2. Motor bearings.
3. Control levering bearing (59).
4. Record support bearing (2).

NOTE: Keep oil or grease away from all rubber parts.





Functions of Principal Levers

Control lever (59A)

The function of the control lever is to actuate both the reject rod (40) and the power switch (66). It is also engaged by the stop rod (89) causing the mechanism to stop automatically after the last selection has been played.

Trip slide (71)

The trip slide consists of a long thin piece of brass which actuates the lower trip dog to start automatic tripping.

Stop rod (89)

The stop rod consists of a long rod running lengthwise along the side of the lift arm (91). The function of the stop rod is to engage the control lever and stop the mechanism after the last selection has been played.

Lift arm (91)

Lift arm functions as a main tie between the cycling cam (50) and the other parts of the mechanism. It also directs the separation of the records and the movement of the pickup arm.

Centerpost (39)

The center post functions as a support for the stack of records and also provides a means of record separation by the mechanism inside the center post.

Record support (2)

The record support performs the function of stabilizing the stack of records. It also clamps the push off mechanism built inside the center post which in turn controls the stopping of the mechanism after the last selection has been played.

Landing adjustment ring (23)

The landing adjustment ring forms a clamp which is used for landing adjustment and a latch controlling the indexing of 10- and 12-inch records.

Reject rod (40)

The reject rod forms a tie between trip dog and control lever (59A).

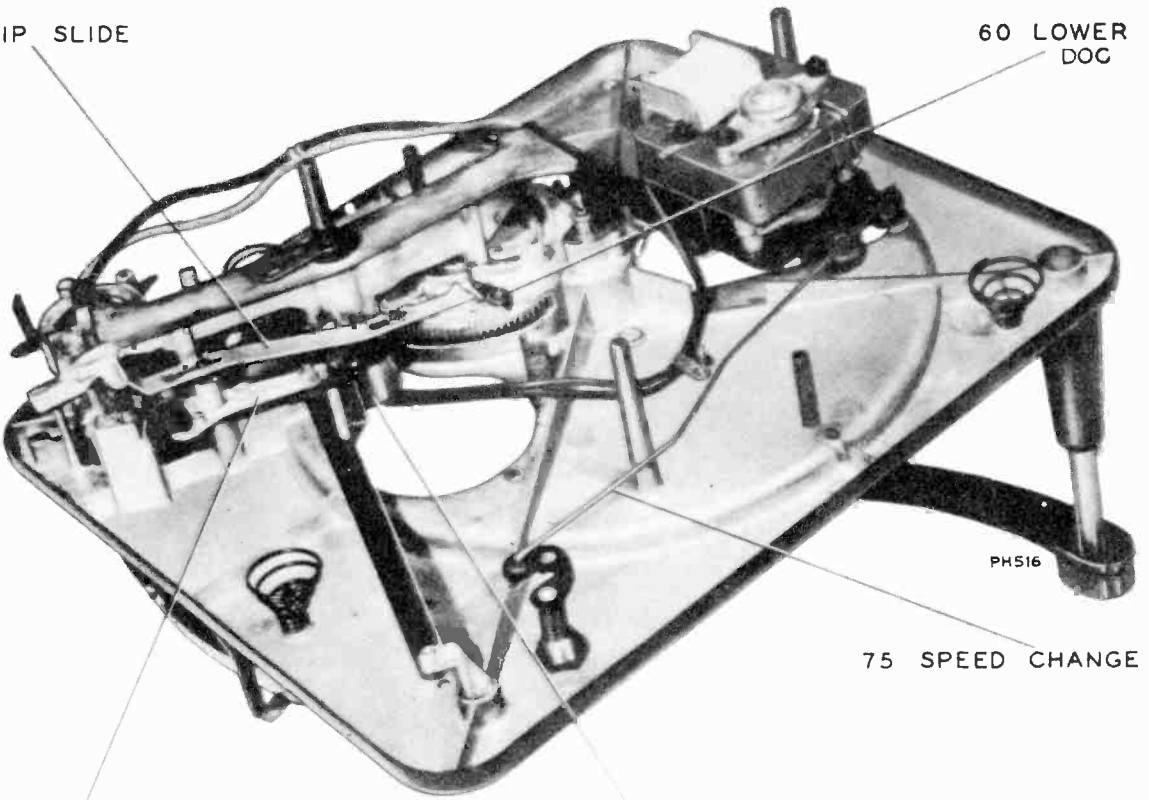
Upper trip dog (52)

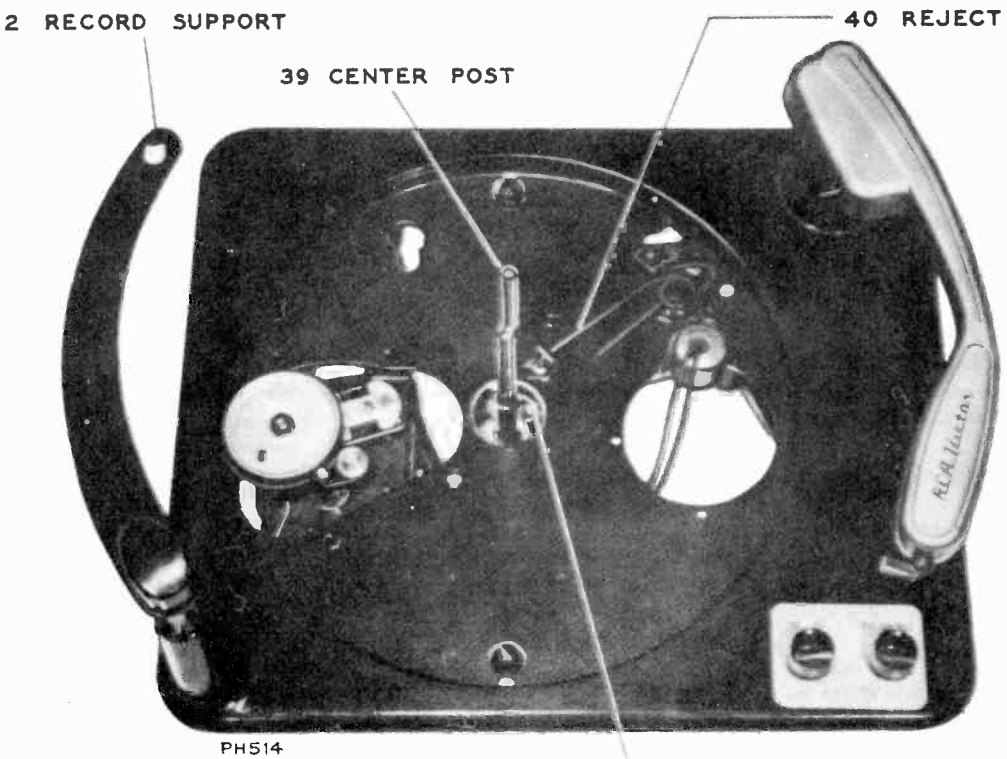
The trip dog consists of a small piece of hardened steel mounted on the main cycling cam. The contact between the off-set on the turntable shaft and the trip dog cause the teeth of the cam and the teeth of the turntable shaft to engage thereby starting change cycle.

Lower trip dog (60)

The lower trip dog is in contact with trip slide (71) when tripping. It is connected by friction to the shaft of upper trip dog thereby providing the necessary take up to prevent the pickup from skipping grooves when tripping starts.

MODEL 960285-1

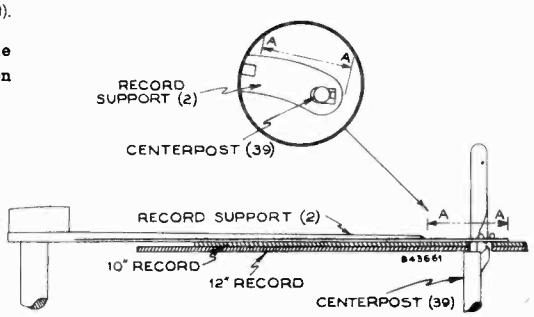


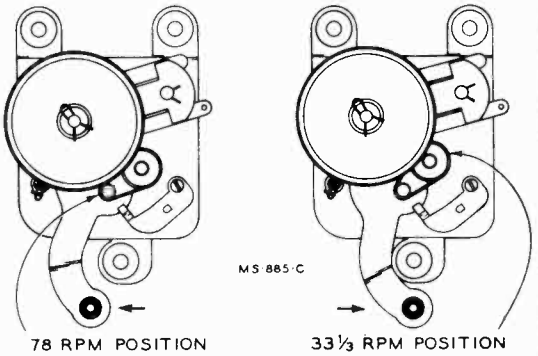


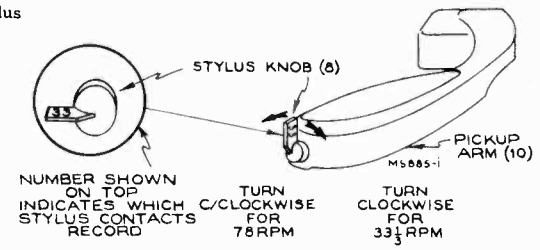
Cycle of Operation

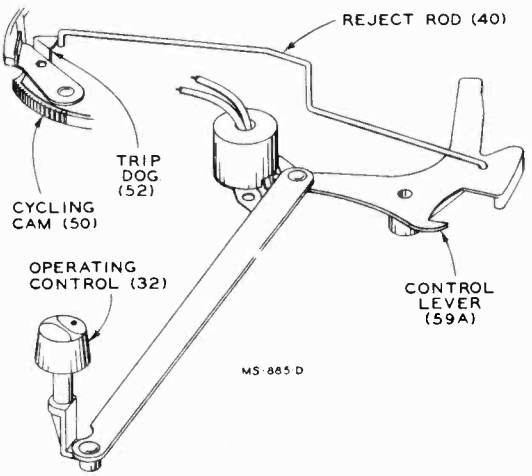
NOTE: In the cycle of operation it is assumed the mechanism has stopped automatically with the pickup arm on the rest.

FUNCTION	DESCRIPTION
Place a stack of records over the center post (intermixed if so desired). Place the record support over the center post.	1. The stack of records rest on the step in the center post (39). 2. The hole in the end of the record support (2) permits the end of the support to slide over the center post and rest on the stack of records. This stabilizes the records.
Turn the speed selector knob to 78 or 33-1/3 rpm position.	1. The speed change is accomplished by shifting to either of two shafts on the motor which are rotating at different speeds. The additional shaft is connected by a small rubber belt (36).
Rotate the knob to select the proper stylus.	1. The rotation of the stylus knob (8) selects the proper stylus depending on the type of record to be played.
Rotate control knob to reject position and release.	1. The operating control actuates control lever (59A) which in turn actuates the power switch. This starts the turntable rotating. 2. Further rotation of the control knob moves the reject rod (40) sufficiently to actuate the trip dog (52) which starts change cycle.





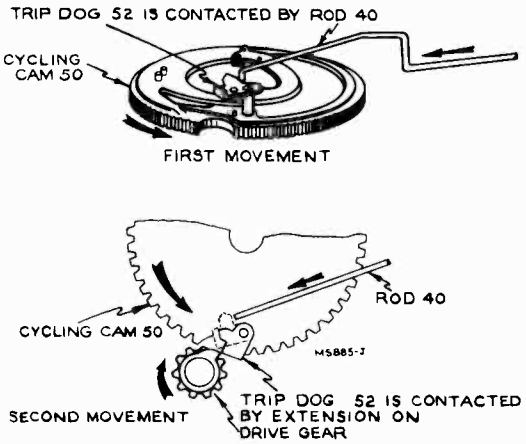


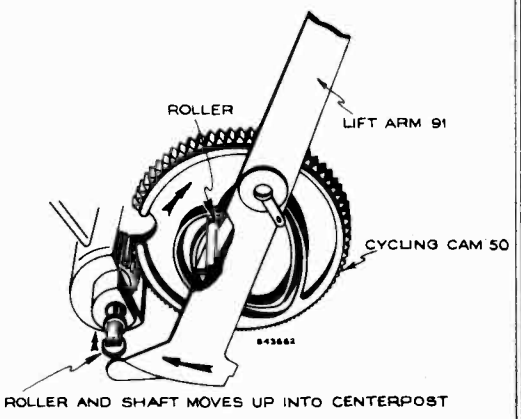


MODEL 960285-1

Cycling starts.

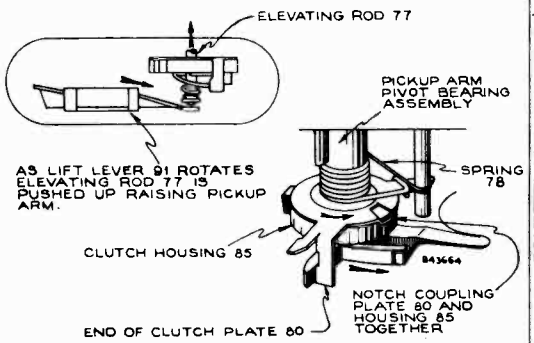
1. The reject rod (40) has moved the trip dog (52) sufficiently for the off-set in the rotating turntable shaft to engage and tend to push it away.
2. Since the trip dog (52) is mounted on the edge of the cycling cam (50) the movement rotates the cam and in so doing, causes engagement between the teeth in the turntable shaft and the cycling cam. This engagement starts change cycle.
3. As the cycling cam rotates, a small roller mounted on the lift arm (91) follows the track formed in the cycling cam (50). This engagement causes the lift arm (91) to start rotating in a clockwise direction (viewed from the bottom).
4. The rotation of the lift arm (91) also causes contact with the small roller connecting the push-off mechanism inside the center post. This contact pushes the small roller and shaft upward.





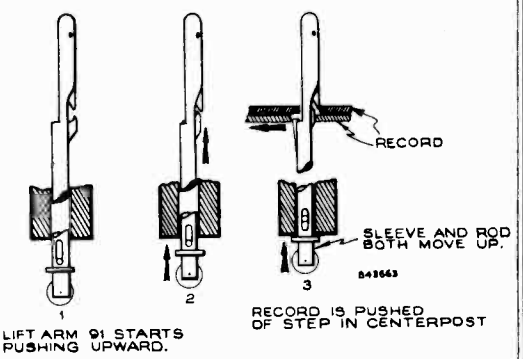
The pickup rises and remains outside turntable area.

1. While the lift arm (91) is rotating the end directly under the pickup arm pivot engages the elevating rod (77) and raises the pickup.
2. The pickup has been setting on the rest so it moves out very little when the lift arm (91) is rotating in a clockwise direction (viewed from bottom).
3. At this same time the extended end of the lift arm (91) contacts end of clutch plate (80) rotating it in a clockwise direction (viewed from bottom) against the tension of spring (78).
4. Since both the clutch plate (80) and housing (85) are rotated to the extreme clockwise direction, the clutch plate is engaged in a notch in the clutch housing which couples the two together.



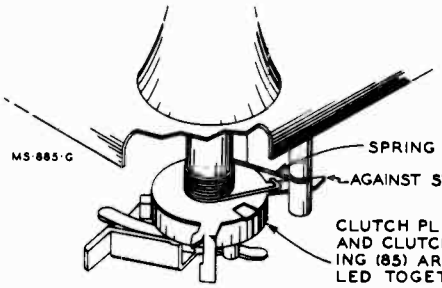
Record drops to turntable.

1. The upward movement of the push-off mechanism actuates the small lever embedded in the center post to engage the center hole of the record and push the record off the step permitting it to drop to the turntable.

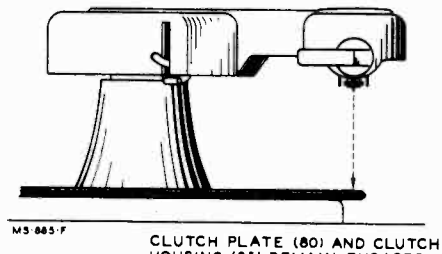


The pickup moves in for landing.

1. The next instant the lift arm (91) starts rotating in a counter-clockwise direction (viewed from bottom) returning to normal out of cycle position. The separator mechanism returns to normal, and the pickup arm is pushed in by the force produced by the expanding spring (78).



2. The pickup arm continues to be pushed in until the end of the clutch plate (80) comes against the stop. At this instant the pickup is directly over the landing point on the record.



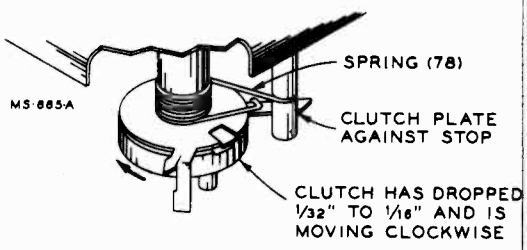
The pickup lands.

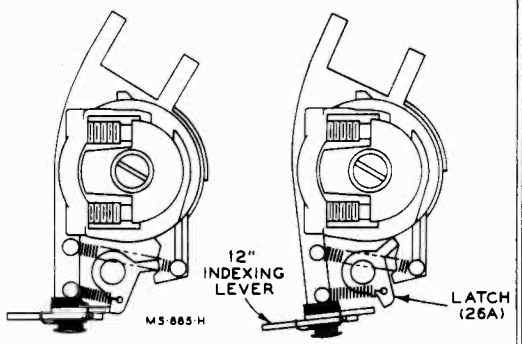
1. The clutch housing (85) is lowered slightly unlatching the clutch plate (80). This unlatching permits free movement of the pickup arm.

2. The pickup is at this moment landing on the record.

   NOTE: It should be made clear at this time that the pickup arm, landing adjustment ring (23), pivot sleeve (26), bushing (27), pivot (82) and clutch assemblies (78 to 88) move horizontally as one unit inside the pivot housing on the motorboard. In addition the pickup pivot sleeve (26) rotates in respect to the bushing (27) in approximately a 5 or 10 degree arc. This movement determines the difference in the landing position on ten- or twelve-inch records.

   As the pickup arm is moved out with each change cycle, the landing adjustment ring (23) it latched to the pickup pivot sleeve (26) through the latch (26A). If a ten-inch record drops to the turntable, the latch remains engaged and the pickup lands on the ten-inch record. On the other hand, if a twelve-inch record drops to the turntable, the edge of the record contacts the small lever at the side of the pickup arm and unlatches the pickup adjustment ring (23). This unlatching allows the pickup to position for landing on twelve-inch records.





LANDING ADJUSTMENT RING (23) REMAINS LATCHED FOR 10" RECORD LANDING

LANDING ADJUSTMENT RING (23) IS UNLATCHED FOR 12" RECORD LANDING

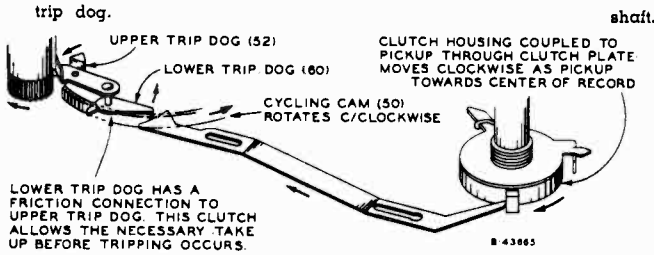
Change cycle is completed and record plays.

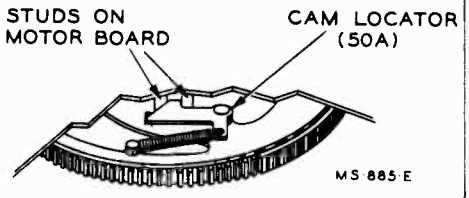
1. The change cycle is completed as the cam locator lever (50A) engages the two studs extending from the bottom of the motor board. This permits the drive gear on the turntable shaft to rotate in the cut away section of the cycling cam.

2. As the record plays, the pickup moves in toward the center of the record carrying the trip slide (71) along because of the contact made with the projection on the clutch housing which is rotating with the pickup arm pivot.

3. The trip slide (71) moves the trip dog (52) slightly with each revolution of the record, but this movement is reversed each time the off-set on the turntable shaft comes in contact with the trip dog (52). The back movement is taken up in the friction connection between the upper and lower trip dog.

4. The trip dog (52) is mounted on the edge of the cycling cam (50) at such an angle that as long as the pickup moves in at a constant rate of speed the projection contacts the trip dog (52) along the side and pushes it back. When the pickup leaves the recorded section of the record, the rapid acceleration results in the rapid movement of the trip dog (52). The dog assumes such an angle that the off-set on the turntable shaft contacts the end and rotates the cycling cam sufficiently to cause engagement between the teeth of the cycling cam and teeth in the turntable shaft. This starts change cycle.

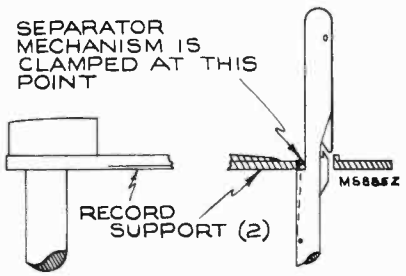


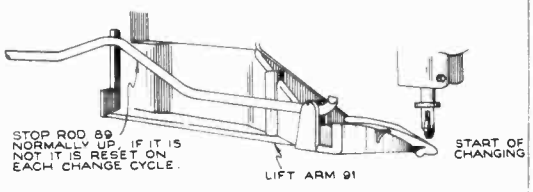


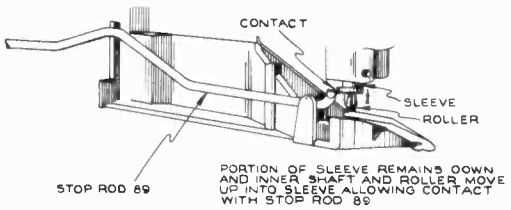
MODEL 960285-1

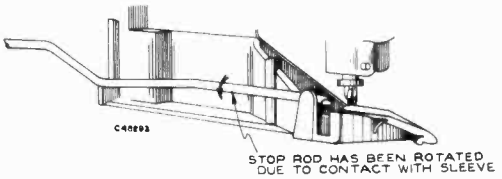
Pickup raises and moves out.

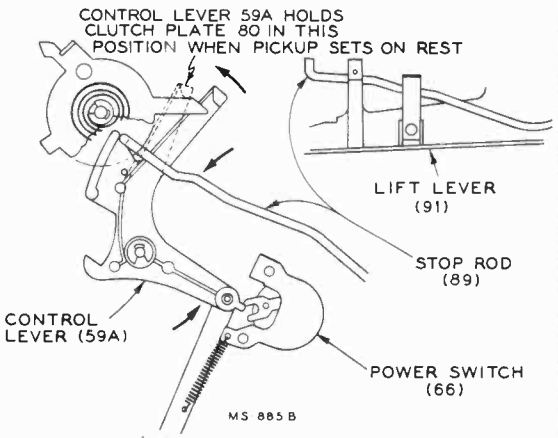
1. After the mechanism has been tripped, the pickup moves out from action of the lift arm on the clutch assembly which is linked to pickup arm.
2. The mechanism again follows the preceding sequence of dropping and playing records until the last record of the stack has been played.
3. After the last selection has been played and the mechanism again goes into change cycle, the support post (2) has dropped sufficiently for the hole in the end to clamp and stop the push-off action built in the center post.
4. Since the push-off action is blocked and the lift arm (91) tends to push up on the separator mechanism, the shaft mounting the small roller moves up into the brass sleeve instead of the entire assembly moving up.
5. The brass sleeve remaining down forming a stop for the end of the stop rod (89) which is mounted on the side of the lift arm (91). This contact causes it to rotate when the lift arm moves by.
6. The bent-up end of the stop rod (89) nearest the pickup arm pivot engages the control lever (59A).
7. The engagement between the stop rod (89) and the control lever (59A) turns the power switch off and also holds one end of the clutch plate causing the pickup to set down on the rest instead of the record.
8. The cycle is completed when the cycling cam becomes disengaged from the gear on the turntable shaft. This is accomplished by a cut-away section of the cam.











ADJUSTMENTS

Approximate Landing Adjustment (if pickup arm assembly has been removed).

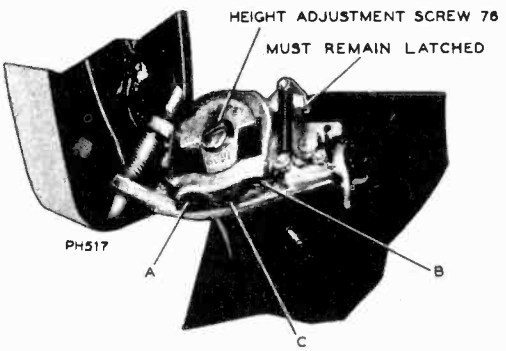
1. Remove power from mechanism.
2. Place a ten inch record on turntable.
3. Rotate turntable by hand until the pickup is just ready to land. Make sure the notch in the clutch plate remains engaged with clutch housing. The end of the clutch plate must be against stop also.
4. Hold the clutch and plate assembly. Loosen the set screw "C" and move the pickup into the approximate landing position.
5. Allow approximately 1/32" to 1/16" vertical play in pickup pivot shaft. (This vertical play is critical.)
6. Tighten set screw "C."

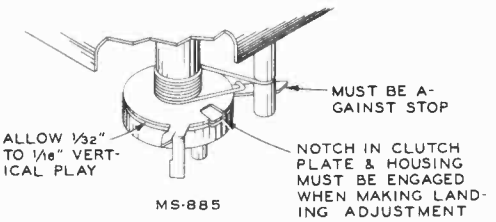
Exact Landing Adjustment.

1. Remove power from mechanism.
2. Place a ten inch record on turntable.
3. Rotate turntable by hand until pickup is about ready to land.
4. To move pickup in, loosen set screw "A" a few turns and tighten "B."
5. To move the pickup out, loosen set screw "B" a few turns and tighten "A."

Pickup Arm Height.

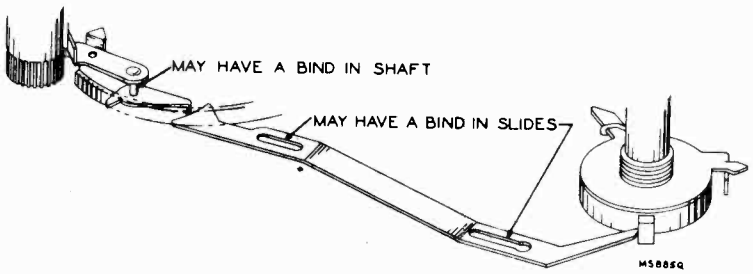
Adjust screw (76) in the end of the elevating rod so the under side of pickup arm clears the rest by 1/8" to 3/16" during change cycle.

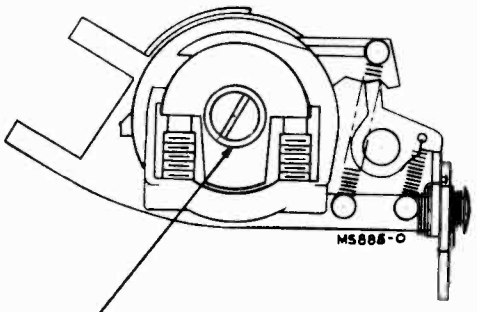




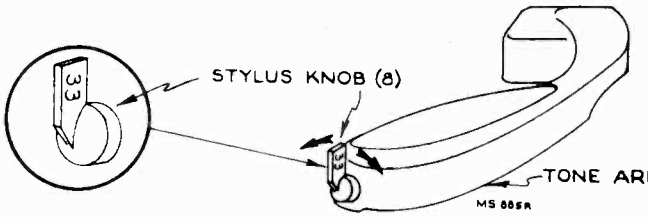
MODEL 960285-1

PICKUP SKIPS GROOVES





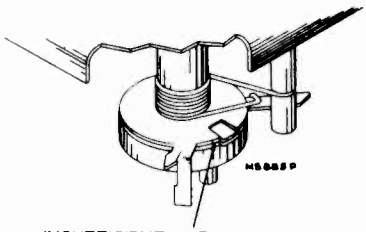
ELEVATING ADJUSTMENT MAY BE SET TOO HIGH



MAY BE USING INCORRECT STYLUS

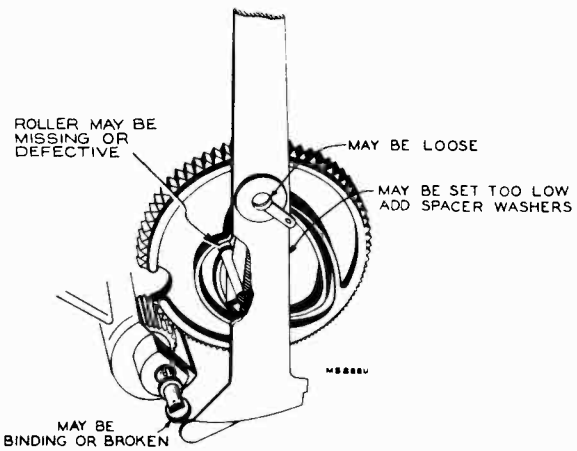
TURN C/CLOCKWISE FOR 78RPM

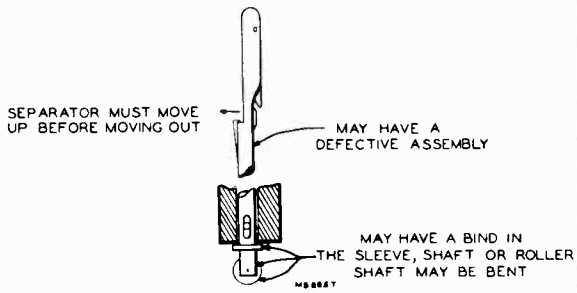
TURN CLOCKWISE FOR 33⅓ RPM

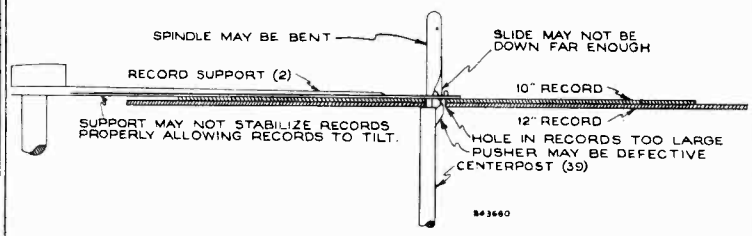


INSUFFICIENT VERTICAL PLAY IN PICKUP PIVOT SHAFT MAY PREVENT UNLATCHING OF CLUTCH, SKIPPING OF GROOVES MAY RESULT

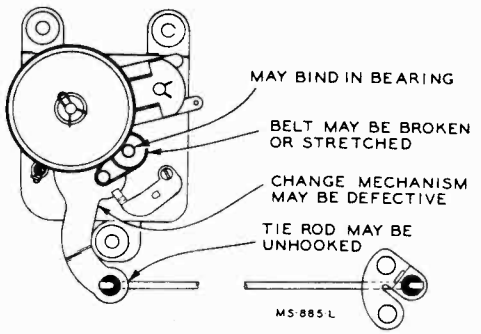
FAILURE TO SEPARATE RECORDS PROPERLY





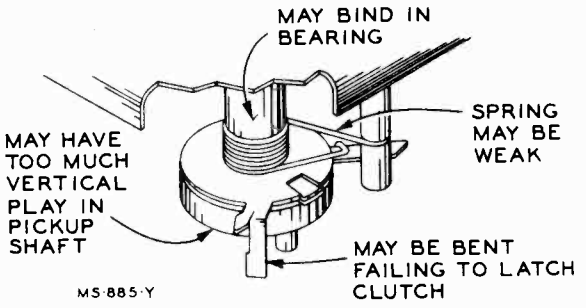


FAILS TO CHANGE SPEED

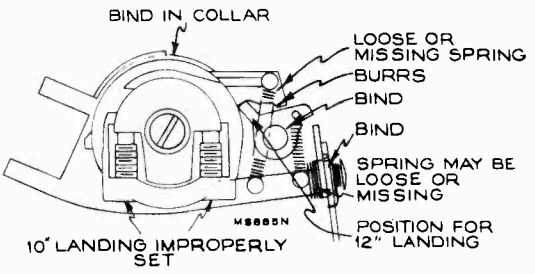


MODEL 960285-1

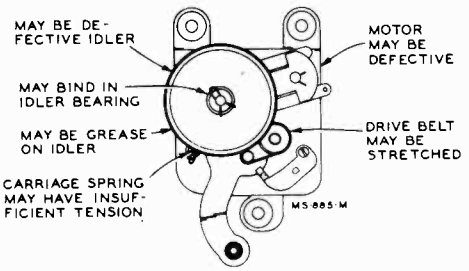
PICKUP FAILS TO LAND PROPERLY



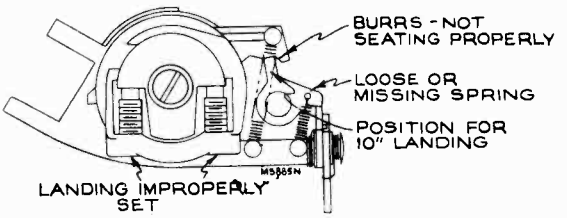
PICKUP FAILS TO LAND CORRECTLY ON 12" RECORDS



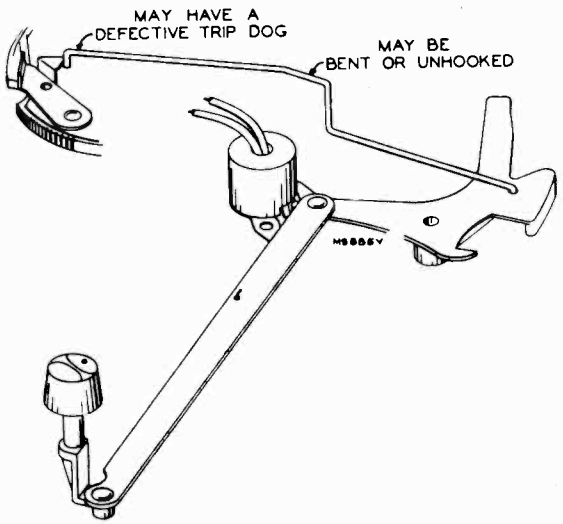
"WOW" OR SPEED VARIATION



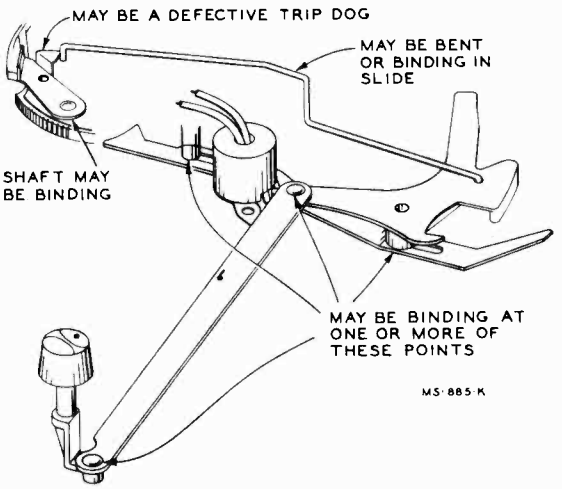
PICKUP FAILS TO LAND CORRECTLY ON 10" RECORDS



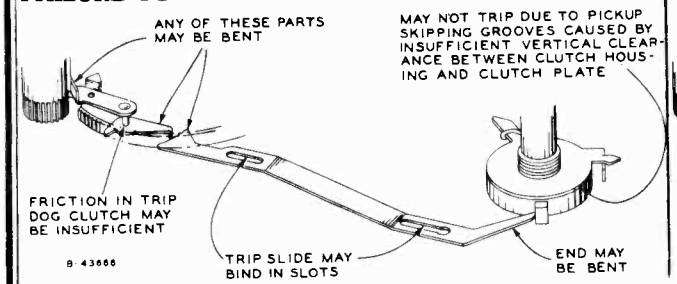
REJECT CONTROL DOES NOT FUNCTION



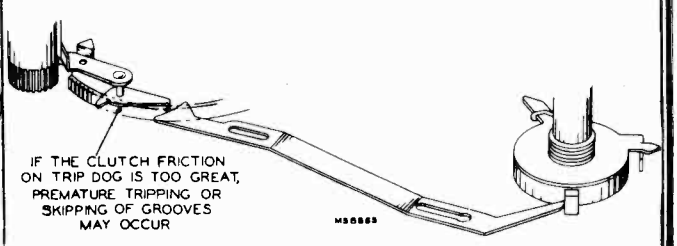
CONTINUOUS TRIPPING



FAILURE TO TRIP

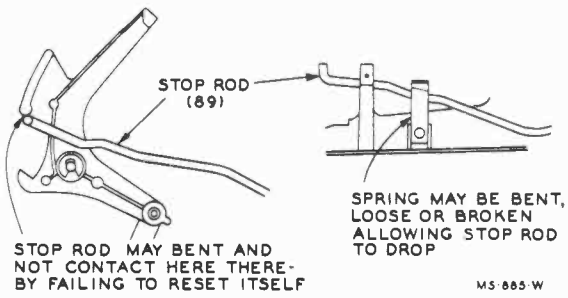


PREMATURE TRIPPING

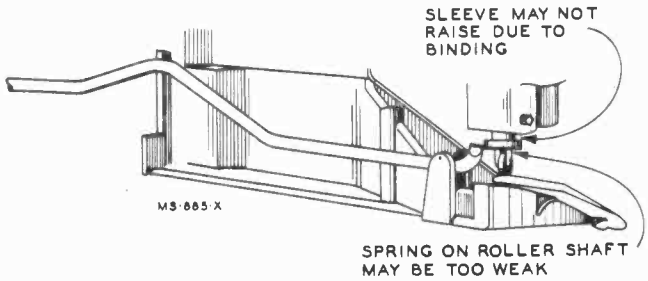


MODEL 960285-1

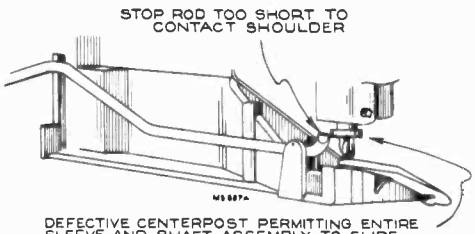
PICKUP SETS DOWN ON REST INSTEAD OF RECORD

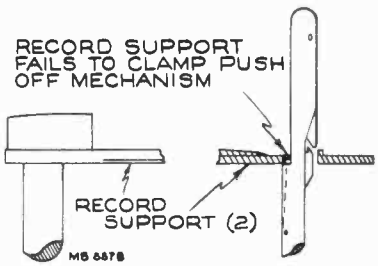


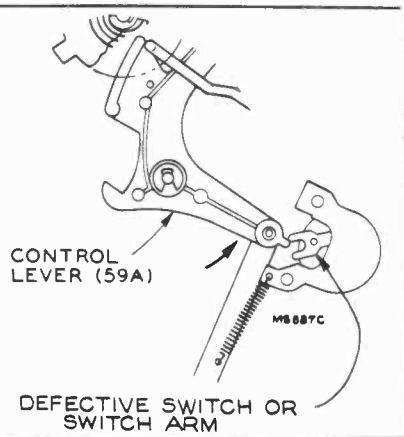
MECHANISM SHUTS OFF PREMATURELY



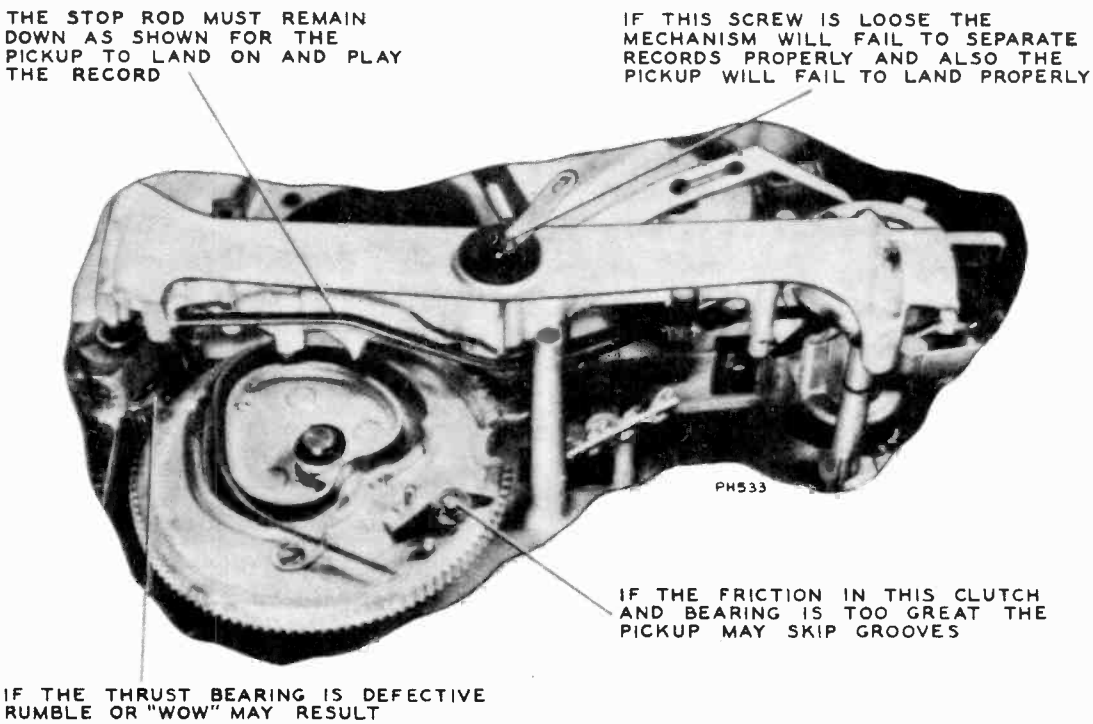
MECHANISM FAILS TO STOP AUTOMATICALLY







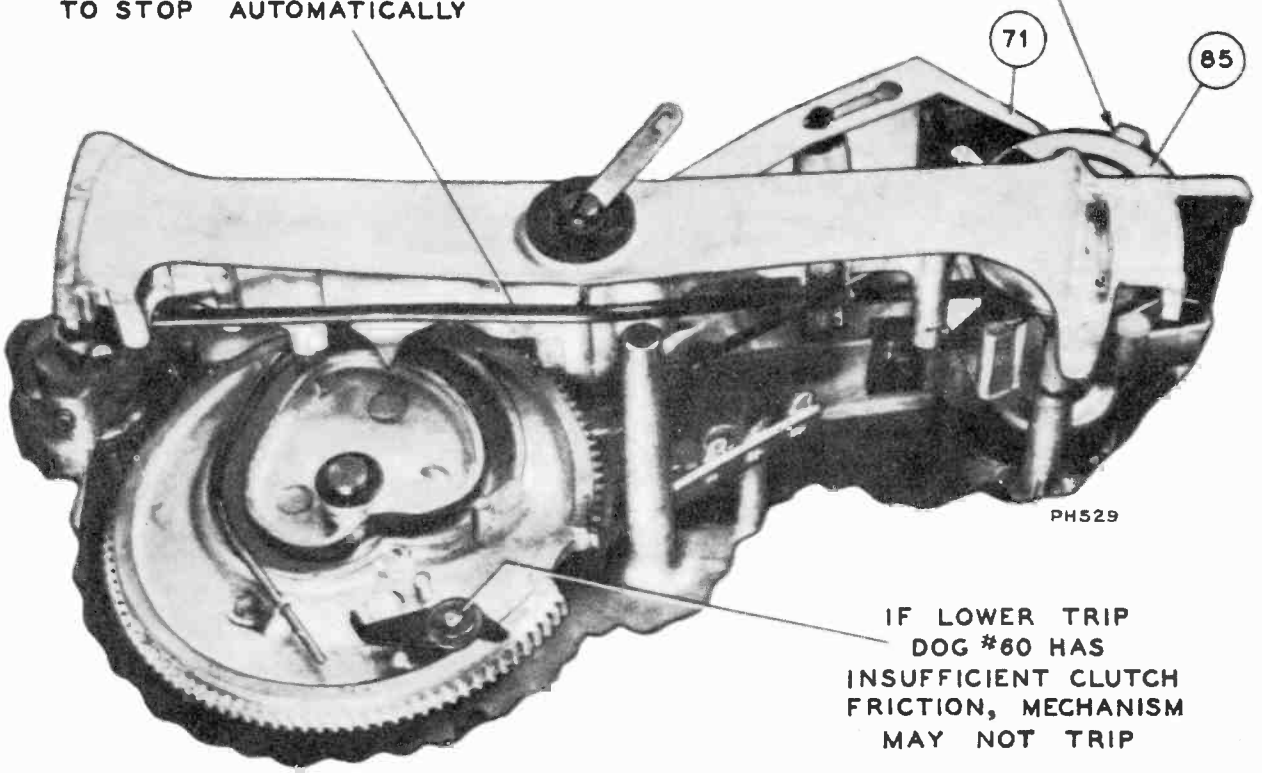
DO YOU KNOW?



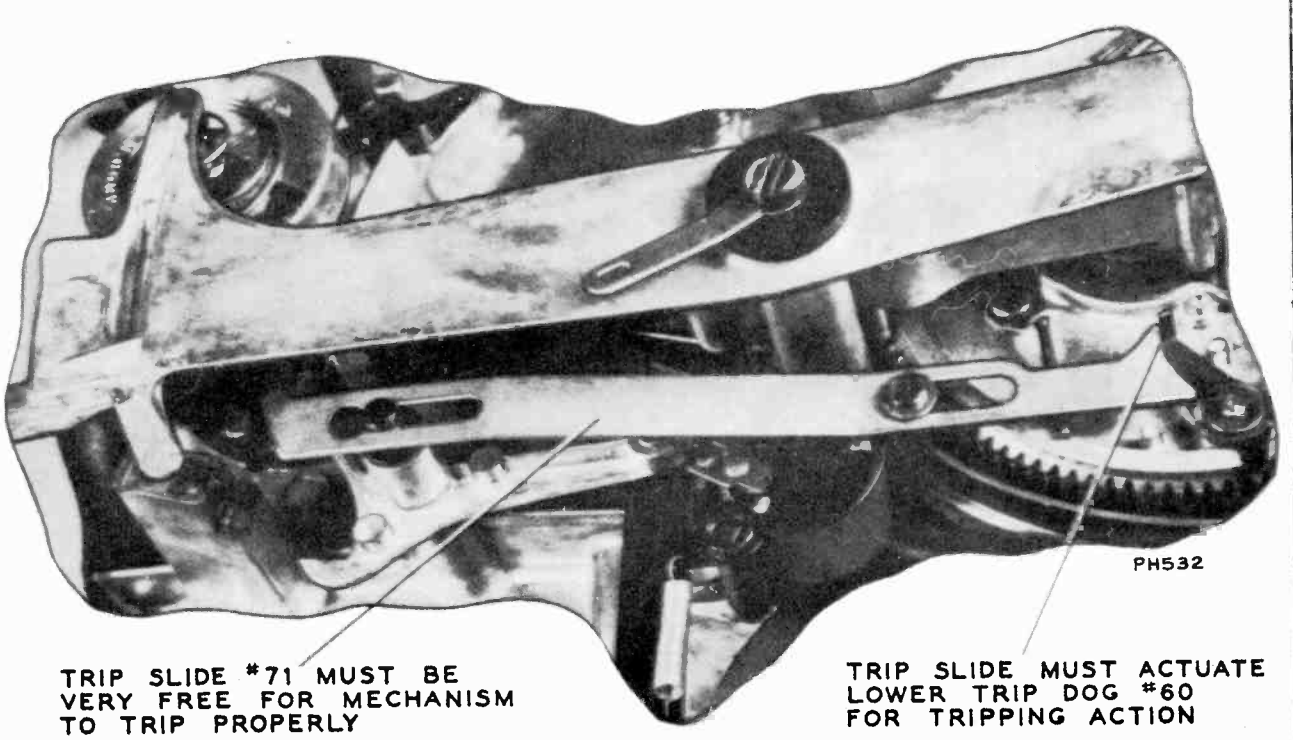
MODEL 960285-1

IF END OF TRIP SLIDE #71 IS BENT IT MAY NOT CONTACT HERE THEREFORE MECHANISM WILL NOT TRIP

THIS STOP ROD #89 MUST BE UP AS SHOWN, FOR MECHANISM TO STOP AUTOMATICALLY



IF LOWER TRIP DOG #60 HAS INSUFFICIENT CLUTCH FRICTION, MECHANISM MAY NOT TRIP

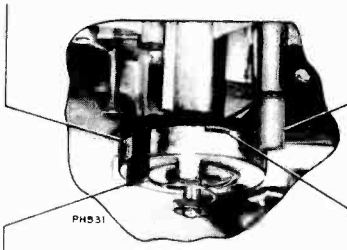


TRIP SLIDE #71 MUST BE VERY FREE FOR MECHANISM TO TRIP PROPERLY

TRIP SLIDE MUST ACTUATE LOWER TRIP DOG #60 FOR TRIPPING ACTION

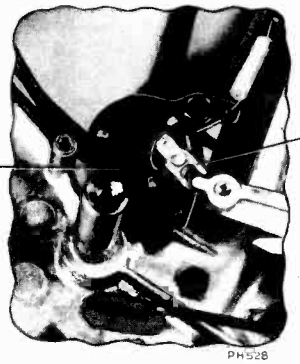
IF THERE IS INSUFFICIENT VERTICAL PLAY BETWEEN CLUTCH PLATE AND CLUTCH HOUSING THE PICKUP MAY SKIP GROOVES

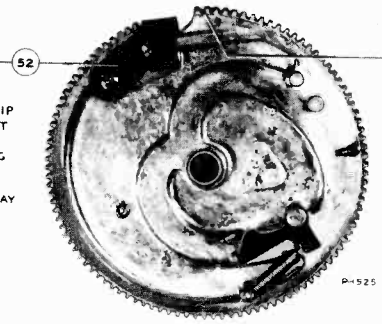
THIS END OF CLUTCH PLATE MUST BE AGAINST STUD WHEN THE PICKUP IS DIRECTLY ABOVE THE POINT OF LANDING

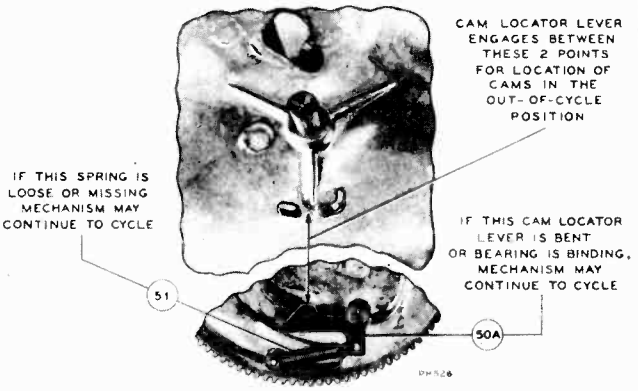


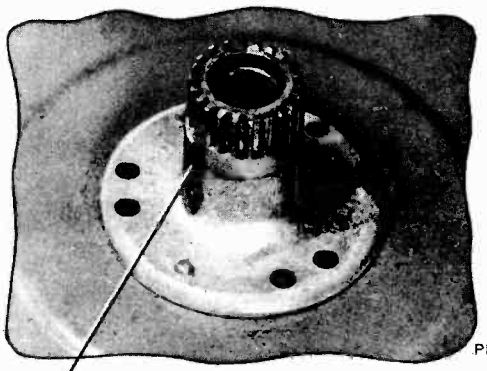
IF THIS END OF CLUTCH PLATE IS BENT CLUTCH HOUSING AND PLATE MAY NOT LATCH CAUSING ERRATIC LANDING

THE NOTCH IN CLUTCH PLATE #80 MUST ENGAGE CLUTCH HOUSING #85 DURING CHANGE CYCLE AND REMAIN ENGAGED UNTIL THE PICK-UP SETS ON THE RECORD



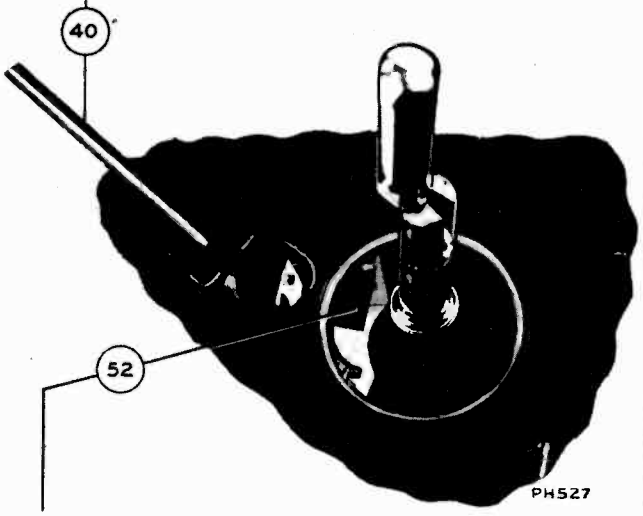






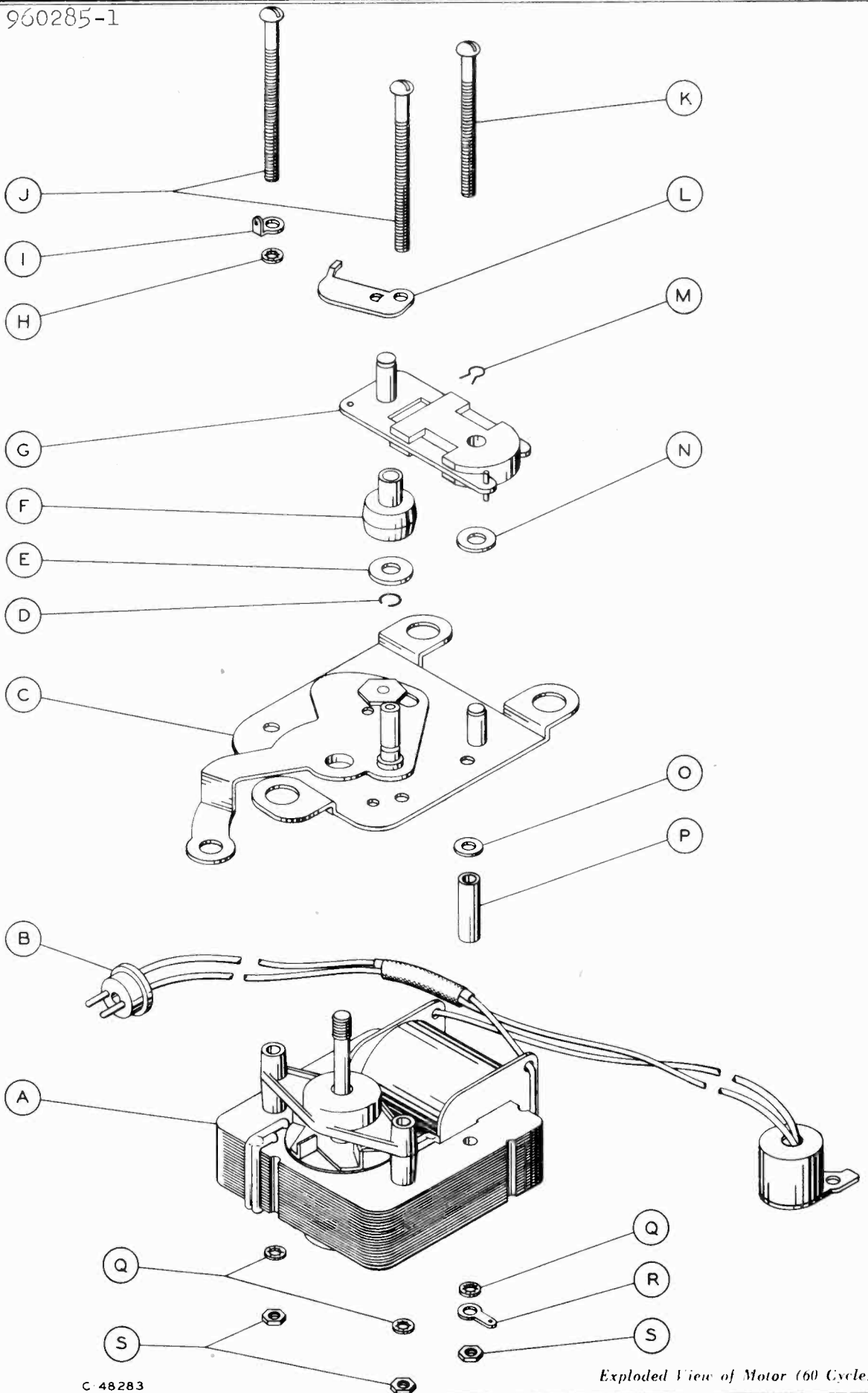
THE "OFFSET" ACTUATES TRIP DOG #52 CAUSING THE GEARS OF THE TURNTABLE SHAFT AND CYCLING CAM TO ENGAGE AND CARRY THE MECHANISM THROUGH CYCLE

IF THIS REJECT ROD BINDS IT MAY CAUSE DIFFICULTY IN REJECTING RECORDS



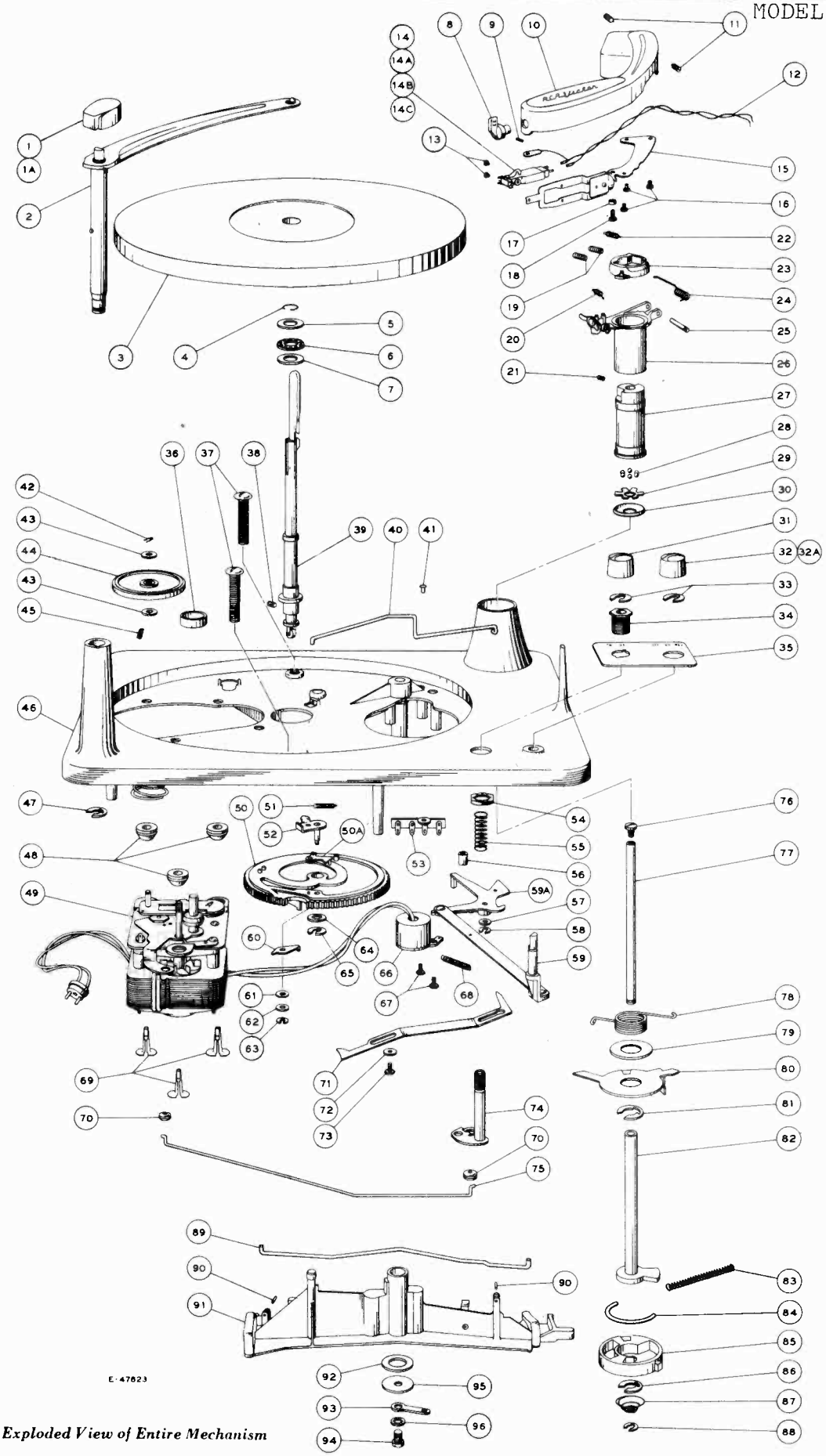
IF THIS TRIP DOG IS BENT, LOOSE OR BINDING IN THE BEARING MECHANISM MAY NOT TRIP

MODEL 960285-1



Exploded View of Motor (60 Cycle)

MODEL 960285-1



Exploded View of Entire Mechanism

MODEL 960285-1

REPLACEMENT PARTS

ILL. No.	STOCK No.	DESCRIPTION
1	75350	Knob—Record support knob
1A	——	Spring—Retaining spring for record support knob
2	75351	Support—Record support
3	75352	Turntable
4	75353	Retainer—Turntable spindle thrust bearing assembly retainer
5	75354	Washer—Thrust washer for turntable bearing
6	75355	Bearing—Thrust bearing
7	75354	Washer—Thrust washer for turntable bearing
8	75264	Knob—Stylus selector knob (handle type) complete with screw
9	——	Screw—Screw for stylus selector knob (included in 75264, ILL. 8)
10	75356	Arm—Pickup arm shell only (plastic)
11	75357	Pivot—Pickup arm pivot (2 required)
12	75358	Cable—Three wire pickup cable complete with connectors
13	——	Screw—Mounting screw for crystal (2 required) (No. 4-40 x 1/8" round head screw)
14	75044	Crystal—Replacement crystal complete with styluses
14A	75045	Stylus—Stylus only (red) for 33 RPM section
14B	75046	Stylus—Stylus only (plain) for 78 RPM section
14C	75274	Nut—Mounting nut (knurled) for stylus
15	75359	Mount—Crystal cartridge mount and swivel assembly
16	71097	Screw—Mounting screw for crystal mount (3 required) (No. 4 x 1/4" self-tapping)
17	75360	Spacer—Metal spacer for crystal mount screw, ILL. 18
18	75002	Screw—Mounting screw for crystal mount (No. 4 x 3/8" self-tapping)
19	75361	Screw—Landing adjustment screw (2 required) (No. 10 x 1/2" headless—special)
20	75362	Spring—Tension spring for indexing latch
21	31085	Screw—Pickup pivot bushing screw (No. 8 x 1/8" Allen head set screw)
22	75363	Spring—Tension spring for landing adjustment ring
23	75364	Ring—Landing adjustment ring
24	75365	Spring—Counterbalance spring for pickup arm
25	75366	Pin—Pivot pin for counterbalance spring
26	75367	Sleeve—Pickup arm pivot sleeve, including latch and two springs
27	75368	Bushing—Pickup arm pivot sleeve bushing
28	10941	Ball—Steel ball (1/8" diameter)
29	75369	Retainer—Ball bearing retainer
30	75370	Cup—Ball race cup
31	75371	Knob—Speed control knob
32	75372	Knob—Function control knob complete with spring
32A	——	Spring—Retaining spring for function control knob (included in 75372, ILL. 32)
33	75373	Washer—"C" washer for control knob (2 required)
34	75374	Bushing—Threaded bushing for speed control crank
35	75375	Escutcheon—Index escutcheon
36	75376	Belt—Rubber belt for motor drive shaft
37	75377	Screw—Motorboard mounting screws (2 required) (No. 1/4-20 x 1 3/8" round head—special)
38	30006	Screw—Set screw for turntable centerpost (No. 8 x 3/8" Allen head set screw)
39	75378	Spindle—Turntable spindle or centerpost
40	75379	Rod—Reject rod
41	——	Rivet—Mounting rivet for terminal board, ILL. 53
42	75380	Spring—Hairpin spring for idler wheel
43	75433	Washer—Dampening washer for idler wheel (2 required)
44	75382	Wheel—Idler wheel
45	75383	Spring—Tension spring for idler wheel
46	75384	Board—Motorboard complete with four mounting springs, pivot arm housing, record support housing, terminal board (ILL. 53) and mounting studs
47	75385	Washer—"C" washer for record support pivot shaft
48	75386	Grommet—Rubber grommet to mount motor (3 required)
49A	75333	Motor—117 volt, 60 cycle, complete with top plate, idler wheel and drive belt
49B	30870	Connector—2 contact male connector for motor leads
49C	75426	Plate—Motor top plate including speed change carriage, 3 mounting grommets and 1 speed change lever grommet
49D	75427	Retainer—Retainer ring for drive pulley and shaft
49E	75428	Washer—Felt washer
49F	75429	Pulley—Drive pulley and shaft assembly for 33-1/3 RPM
49G	75430	Carriage—Idler carriage
49H	——	Lockwasher—No. 6 internal teeth
49I	——	Terminal lug
49J	——	Screw—No. 6-32 x 2" round head machine screw to mount top plate to motor
49K	——	Screw—No. 6-32 x 2 1/8" round head machine screw to mount top plate to motor
49L	75431	Plate—Friction guide plate
49M	75432	Spring—Hairpin spring to mount idler carriage
49N	75433	Washer—Fibre washer
49P	——	Spacer—Metal spacer to mount top plate to motor
49Q	——	Lockwasher—No. 6 internal teeth
49R	——	Terminal lug
49S	——	Nut—No. 6 hex nut
50	75387	Cam—Main cam (including wire spring)
51	75388	Spring—Cam locater lever spring
52	75389	Pawl—Trip pawl
53	——	Board—Terminal board
54	——	Nut—Locknut for speed control crank threaded bushing
55	75390	Spring—Spacer spring for speed control crank
56	——	Bumper—Rubber bumper not stocked
57	75391	Washer—Fibre washer for control lever shaft
58	75392	Washer—"C" washer for mounting control lever
59	75393	Lever—Function control crank, link and lever assembly
60	75394	Pawl—Lower trip pawl
61	75395	Washer—Bronze washer (3/8" O.D.) for trip pawl shaft
62	75396	Washer—Steel washer (1/4" O.D.) for trip pawl shaft
63	75397	Washer—"C" washer for trip pawl
64	75398	Washer—Fibre washer (1/2" O.D.) for mounting main cam
65	75399	Washer—"C" washer for mounting main cam
66	75400	Switch—Power switch (includes cover)
67	——	Screw—Power switch mounting screw (No. 6-32 x 1/2" hex head)
68	75401	Spring—Return spring for control lever link
69	75402	Fastener—Push fastener to mount motor (3 required)
70	75403	Grommet—Rubber grommet for motor speed change tie rod (2 required)
71	75404	Lever—Trip slide lever
72	75405	Washer—Metal washer to mount trip slide
73	——	Screw—Mounting screw to mount trip slide lever (No. 4 x 1/4" hex head self-tapping)
74	75406	Crank—Speed control crank
75	75407	Rod—Motor speed change tie rod
76	75408	Screw—Pickup height adjusting screw (No. 6-32 x 1/4" pan head brass)
77	75409	Rod—Elevating rod
78	75410	Spring—Return spring for pickup arm
79	75411	Washer—Spring washer for clutch plate
80	75412	Plate—Clutch plate
81	75413	Washer—"C" washer for pickup arm pivot
82	75414	Shaft—Pickup arm pivot shaft
83	75415	Spring—Clutch safety spring
84	75416	Guide—Clutch safety spring guide
85	75417	Housing—Clutch housing
86	75392	Washer—"C" washer for clutch housing
87	75418	Spring—Conical spring for elevating rod
88	75419	Washer—"C" washer for elevating rod
89	75423	Rod—Lift arm stop rod complete with pins, ILL. 90
90	——	Pin—Mounting pin for stop rod (included in 75423—ILL. 89)
91	75420	Arm—Lift arm assembly complete with stop rod and stop rod mounting pins (includes ILL. 89 and ILL. 90)
92	75421	Washer—Fibre washer for lift arm shaft
93	——	Lug—Terminal lug
94	——	Screw—Mounting screw for lift arm assembly (No. 8-32 x 3/8" pan head screw)
95	75422	Washer—Retainer washer for lift arm shaft
96	——	Lockwasher—No. 8 lockwasher (internal teeth)

MODEL VM-508222

OPERATING INSTRUCTIONS

PLACING RECORDS ON THE CHANGER: Raise the Record Support Arm straight up until it clears the Center Post. Then, turn this arm to the position shown in Fig. 1 so that it will not interfere with record loading.

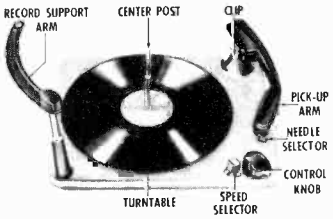


FIG. 1

Place records on the Center Post so that center of record rests on the "shoulder" or off-set in the post and hold them level in that position. While holding the records in this manner, turn Record Support Arm back over the records until the hole in the tip of the arm is over the Center Post. Then, lower the Support Arm and push it down gently until records are held parallel with Turntable (see Fig. 2). This completes the loading procedure and changer is now ready for automatic operation.

SETTING NEEDLE SELECTOR AND SPEED SELECTOR: Complete instructions for the proper setting of these controls are given in the chart at the bottom of this page.

STARTING THE CHANGER: Turn on the receiver before attempting to start the changer and be sure that controls on receiver control panel are properly set for phonograph operation.

To start the changer, turn the Control Knob (on changer) clockwise to the "ON" position. This will turn motor on and Turntable will start rotating. Continuing to turn Control Knob clockwise to "REJ." position starts the changing mechanism (do not attempt to hold the knob in this position; a momentary turn is all that is required). All records which are loaded on the changer will then be played in sequence. **After last record has been played the Pick-up Arm returns to its rest position and the changer will turn off automatically.**

CONTROLLING THE VOLUME: Use the volume control on the receiver control panel to adjust the volume of the phonograph.

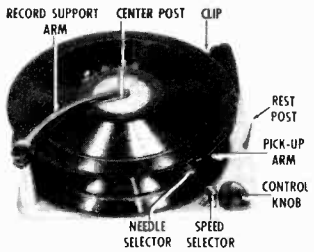


FIG. 2

CONTROLLING THE TONE: Use the tone control on the receiver control panel to select most pleasing tone.

REJECTING A RECORD: If you wish to stop playing a record and start playing the next one, merely turn Control Knob to "REJ." position.

STOPPING THE CHANGER: This record changer will stop automatically after last record is played. If you desire to stop the changer at any other time, merely turn Control Knob to "OFF" position. Then lift Pick-up Arm from record and place it on the Rest Post.

UNLOADING RECORDS: If some records remain above the off-set shoulder on the Center Post, it will be necessary to hold them steady before disturbing the Record Support Arm. Then raise the Support Arm straight up until it clears the Center Post and turn it to the position shown in Fig. 1. Records can now be removed by lifting them off the Turntable.

SETTING THE NEEDLE SELECTOR AND SPEED SELECTOR CONTROLS FOR VARIOUS TYPES OF RECORDS

TYPE OF RECORD TO BE PLAYED	NEEDLE SELECTOR Raise Pick-up Arm slightly and turn Needle Selector all the way (in the direction indicated by the arrow on Needle Selector Knob) to the position shown below:	SPEED SELECTOR Turn Speed Selector so that dot is opposite position shown below:	**RECORD CAPACITY Maximum number of records to be played at one loading.
10" or 12" 78 R.P.M. STANDARD	"78" should face up	White dot opposite "78"	Ten when intermixed; or ten 12"; or twelve 10"
10" or 12" 33⅓ R.P.M. "MICROGROOVE — LONG PLAYING"	"33-45" should face up	White dot opposite "33 / 10"-12""	Ten when intermixed; or ten 12"; or twelve 10"
7" *45 R.P.M. "FINE GROOVE"	"33-45" should face up	White dot opposite "45"	Twelve 7"
7" 33⅓ R.P.M. "MICROGROOVE — LONG PLAYING"	"33-45" should face up	White dot opposite "33 / 7""	Twelve 7"

* Insert adapter disc in center hole of this record. See envelope containing discs for instructions.

** Do not intermix "Standard" — 78 R.P.M. with "Long Playing" (Microgroove) 33⅓ R.P.M. records.
Do not intermix "Standard" — 78 R.P.M. with "Fine Groove" — 45 R.P.M. records.
Do not intermix "Long Playing" (Microgroove) 33⅓ R.P.M. with "Fine Groove" — 45 R.P.M. records.
Do not intermix 7" records with 10" or 12" records.

MODEL VM-508222

DESCRIPTION OF CYCLE

In order to observe the operation of the changer mechanism, it is advisable to remove the Record Changer from the cabinet. This may be done by first disconnecting the Phono Motor Cable and Phono Pick-up Cable from the radio chassis. Then lift turntable off and note two hold down screws (See Fig. 16). Remove these screws by turning counter-clockwise. Unit is now free and may be lifted out from record changer compartment.

To observe the action of the changer mechanism as it progresses through a complete cycle of operation, turn the Control Knob to the "REJ." position and release it. As the turntable is rotated clockwise by hand, the motion of all parts of the changer can now be examined.

Numbers which appear after parts mentioned in text refer to parts shown in illustrations on pages 123, 124 and 125 unless otherwise indicated.

FUNCTION	EXPLANATION
SETTING FOR DESIRED NEEDLE AND NEEDLE PRESSURE	1. When the Needle Selector Knob (2) is turned so that the number "78" appears at the top, the Crystal Cartridge (6) is rotated, allowing the point of the correct Needle (4) to face down and contact the record. 2. Rotating the Needle Selector Knob (2) counter-clockwise 180° so that the numbers "33-45" appear at the top, turns the Crystal Cartridge (6) over, allowing the tip of the "Microgroove" Needle (5) to face down and contact the record. Rotating the Needle Selector Knob (2) in the counter-clockwise direction also draws up on Chain (9) which exerts a pull on Counter-Balance Pressure Spring (10). This spring is connected to Hinge Bracket (13) at rear of Pick-up Arm (1). The pulling action on Hinge Bracket (13) causes a pushing action against Hinge Assembly (16). This pushing action develops a counter-balance, allowing on $6\frac{1}{2}$ to $9\frac{1}{2}$ grams pressure of the needle on the record.
SETTING FOR DESIRED SPEED "Turret" Type Motors (See Page 123 for Illustration of Motors.)	1. When the Speed Knob (88) is in either "33-7" or "33-10"-12"" position, the motor shaft contacts small diameter Idler Pulley (64) which in turn contacts Idler Wheel (63). The wheel in this position drives Turntable (48) at 33⅓ R.P.M. 2. Turning Speed Selector Knob (88) counter-clockwise to the "78" position causes attached Speed Selector Rod (90) to actuate idler pulley mounting bracket. This bracket moves the large diameter Idler Pulley (65) so that it contacts motor shaft and Idler Wheel (63). The wheel in this position drives Turntable (48) at 78 R.P.M. 3. A further rotation of Speed Selector Knob (88) counter-clockwise to the "45" position causes attached Speed Selector Rod (90) to actuate and idler pulley mounting bracket so that the intermediate size Idler Pulley (66) contacts motor shaft and Idler Wheel (63). The wheel in this position drives Turntable (48) at 45 R.P.M.
SETTING FOR DESIRED SPEED "Belt" type motor (See Page 123 for Illustrations of Motor.)	1. When the Speed Selector Knob (88) is in the "78" position, motor shaft makes direct contact with Idler Wheel (63). The wheel in this position drives Turntable (48) at 78 R.P.M. 2. Turning Speed Selector Knob (88) clockwise to the either "33-7" or "33-10"-12" "position causes attached Speed Selector Rod (90) to actuate idler pulley mounting bracket. This bracket moves the large Idler Pulley (64) so that it pushes Idler Wheel (63) away from motor shaft. The lower Drive Belt (68) transfers power from the motor shaft to Idler Pulley (64). With Idler Wheel in this position, it drives Turntable (48) at 33⅓ R.P.M. 3. Turning Speed Selector Knob (88) counter-clockwise all the way to the "45" position causes attached Speed Selector Rod (90) to actuate idler pulley mounting bracket. This bracket moves large Idler Pulley (64) out of engagement with Idler Wheel (63). As the bracket completes its movement, it brings small Idler Pulley (66) into contact with Idler Wheel (63). The upper Drive Belt (68) transfers power from the motor shaft to Idler Pulley (66). With Idler Wheel (63) in this position, it drives Turntable (48) at 45 R.P.M.
STARTING Turn Control Knob (52) to the "ON" position.	1. Actuates Control Link Assembly (54). 2. Power Switch (61) is turned on. 3. Motor (62) operates Idler Wheel (63), to rotate Turntable (48) and attached gear at hub.
CYCLING Turn Control Knob (52) to "REJ." position.	1. Actuates Control Link Assembly (54). 2. Control Lever (57) and attached Manual Trip Rod (33) pushes Clutch Pawl (79). 3. Clutch Pawl (79) engages a projection on hub of Turntable (48). 4. Main Cam Assembly (81) is rotated so that its teeth engage gear on hub of Turntable (48).
FUNCTION OF MAIN CAM ASSEMBLY (81)	1. The heart-shaped groove in the Main Cam Assembly (81) directs and coordinates the motion of the Lift Arm Assembly (83). While the Main Cam Assembly (81) makes one half of a revolution, it swings Lift Arm Assembly (83) in one direction. During the remaining half of the revolution it swings the Lift Arm Assembly (83) in the opposite direction until the arm returns to its starting position. 2. During the revolution of Main Cam Assembly (81), the Clutch Pawl (79) is reset due to wiping action of Trip Pawl (76) against the hub of the Lift Arm Assembly (83). 3. At the completion of the revolution of Main Cam Assembly (81), the Stop Pawl (75) fits between two locating pins on under side of Base Plate (25). This holds cam in a position so that its open periphery is adjacent to the gear on the hub of the Turntable (48).
DISPLACEMENT OF A RECORD	1. As the Lift Arm (83) goes through its swing, an inclined plane on the arm, pushes up Center Post Roller (44) and attached push-up rod inside Center Post (43). 2. Ejector Lever (45) moves up and then out, pushing bottom record off shoulder of the Center Post (43) and allowing it to drop to the Turntable (48). 3. As the Lift Arm Assembly (83) makes its return swing, the incline plane lowers Center Post Roller (44) and attached push-up rod. 4. Ejector Lever (45) moves down, while still in the ejected position, thus gently lowering the remainder of stack of records.

DESCRIPTION OF CYCLE (Continued)

FUNCTION	EXPLANATION
PICK-UP ARM MOVEMENT	1. As the Lift Arm Assembly (83) goes through its swing, an inclined plane on the opposite end of the arm from the Center Post (43) pushes up on Lift Rod (37), causing the Pick-up Arm (1) to rise. 2. Height of Pick-up Arm (1) may be changed by shifting the Height Adjustment Screw (36) — for complete adjustment details, see section of "Trouble Shooting Chart" entitled "Pick-up Arm Lift is too high or too low." 3. Lift Arm (83) also controls lateral motion of Pick-up Arm (1) by engaging a stud on lower part of Locator Housing (35).
Function of Safety Spring (32).	1. Pick-up Arm (1) is attached to Hinge Assembly (16). Hinge Locking Ring (11) holds Hinge Assembly (16) and Hinge Bearing (22) in their proper positions by a pair of Adjustment Screws. Hinge Bearing (22) and Pick-up Arm Locator Assembly (30) are held by Set Screw (21). The lower end of Pick-up Arm Locator (30) fits into the Locator Housing (35) and is held against a stop by Safety Spring (32). 2. If Pick-up Arm (1) is held during a change cycle, the Safety Spring (32) will allow Locator Housing (35) to move without damage to the changer mechanism.
Set Down Point; 7" or 10" Record.	1. Setting of Speed Selector Knob (88) actuates Index Rod (96) which positions Locator Cam (97). 2. As Lift Arm (83) reaches its maximum forward excursion, it contacts and pushes on the bent down projection of Set Down Locator (28). This moves locator around so that a dimple on its face fits into a detent on Locator Housing (35). 3. Half way through the return sweep, the Lift Arm (83) disengages from stud on lower part of Locator Housing (35). The Return Spring (26) forces over the Set Down Locator (28) and Locator Housing (35) until a projection on Set Down Locator (28) contacts Locator Cam (97), as shown in Figs. 13 and 17. Fig. 13 shows Set Down Locator (28) contacting Locator Cam (97) for 10" operation while Fig. 17 shows these parts in proper position for 7" operation. As movement of Pick-up Arm (1) is coordinated with Locator Housing (35), the arm is swung over the record to the correct set down point. 4. The completion of the return swing of Lift Arm (83) lowers Lift Rod (37), thus allowing needle to set down on the record. 5. Locator Housing (35) and Set Down Locator (28) are separated. The clearance between these two parts permits Pick-up Arm (1) to track across the record. 6. Set down point of Pick-up Arm (1) may be changed by shifting the position of Hinge Assembly (16) with respect to Hinge Bearing (22). This position may be changed by turning Adjustment Screws in Hinge Locking Ring (11) — for complete adjustment details see section of "Trouble Shooting Chart" entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Set Down Point; 12" Record.	For 12" operation, Speed Selector Knob (88) must be in either "33-10"-12"" or "78" position, depending upon the type of record to be played. 1. As a 12 inch record drops to the turntable it passes and hits Trip Lever (17) at rear of Pick-up Arm (1). 2. Index Cam (18) is actuated. This in turn changes the position of Index Lever (20) and holds the lever in this new position. 3. Leg of Index Lever (20) slides into "12 inch Stop" (see Fig. 8) as Ratchet Arm (35) turns Hinge Locking Ring (11) counter-clockwise until position of Fig. 6 is assumed. 4. This provides the correct position of Pick-up Arm (1) with respect to Set Down Locator (28) for proper 12" operation.
CHANGING A RECORD **Action of Trip mechanism during playing portion and at end of record.**	1. During the playing portion of the record, Pick-up Arm (1) proceeds laterally across the record. A projection on side of Locator Housing (35) contacts and exerts a constant pressure on Automatic Trip Link (34). This pressure is transferred to the Trip Pawl (76) (see Fig. 17) which in turn controls the Clutch Pawl (79) thru the "friction grip" action of Spring Washer (77). 2. As the needle proceeds across the record, the lateral movement per revolution is only equal to the space between two playing grooves. This amount of movement is insufficient to bring the Clutch Pawl (79) into engagement with the projection on hub of Turntable (48). Instead, the projection has a wiping action to push the Clutch Pawl (79) away from the hub. 3. When the needle enters the spiral groove, at the end of a record, the rate of advance of Pick-up Arm (1) toward the Center Post (43) is greatly accelerated. This increase in rate of lateral movement is sufficient to bring Clutch Pawl (79) into engagement with projection on hub of Turntable (48), thus causing "CYCLING." 4. Any movement of the Pick-up Arm (1), that causes a lateral movement greater than the space between two playing grooves, such as raising the arm and moving toward the Center Post (43), will cause tripping action.
REJECTING A RECORD **Turn Control Knob (52) to "REJ." position.**	1. This starts the change cycle as described in preceding section entitled "CYCLING" and permits next record to be played.
AUTOMATIC SHUT-OFF	1. Dropping of the last record onto the turntable lowers the Record Support Arm (40) so that it rests on the off-set shoulder of the Center Post (43). The hole in tip of Support Arm (40) is small enough to prevent Ejector Lever (45) from pushing all the way out on the next change cycle. 2. The brass bushing just above Center Post Roller (44) does not go all the way up as in a normal change cycle but is in the path of one end of the Automatic Shut-Off Rod (86). This rod is attached to Lift Arm Assembly (83) and therefore as arm swings in, the tip of the rod contacts the brass bushing and is turned 90°. See Fig. 14. 3. The other end of the rod is also turned 90° and is in a position so that it will engage and push Control Lever (57) when Lift Arm Assembly (83) makes its return sweep. 4. Control Lever (57) actuates Switch (61), shutting off the record changer. 5. Control Lever (57) also engages Set Down Locator (28) and holds it as shown in Fig. 5. This causes the Pick-up Arm (1) to set down on the rest post.
STOPPING **Turn Control Button (52) to "OFF" position.**	1. Turns Switch (61) to off position and Motor (62) stops.

MODEL VM-508222

TROUBLE SHOOTING CHART

Numbers which appear after parts mentioned in text refer to parts shown in illustrations on pages 123, 124 and 125 unless otherwise indicated.

SYMPTOM	CAUSE	REMEDY
Control Knob (52) cannot be turned to "ON" position.	1. Changer was shut off while changing a record.	Rotate Turntable (48) one turn clockwise by hand and turn Control Knob (52) on again.
Turntable fails to start after turning Control Knob (52) to the "ON" position.	1. Changer was shut off while changing a record.	Rotate Turntable (48) one turn clockwise by hand.
	2. No power.	Check to determine if there is power at the wall outlet by disconnecting receiver power cord and connecting a lamp to same outlet.
	3. Speed Selector Knob (88) set midway between any of its four "indexed" positions. The above does not apply to changer equipped with the belt type motor.	While changing from one speed to another, there is a position where the motor shaft momentarily does not contact any of the Idler Pulleys (64), (65), or (66), and if the Speed Selector Knob (88) is left in this position, Turntable (48) will not rotate. Be sure that knob is correctly "indexed" to the desired setting.
	4. Idler Wheel (63) not engaging Turntable (48).	Check for any binding action of lever on which Idler Wheel (63) is mounted. Also be sure that Spring (72) which pulls Idler Wheel (63) against Turntable (48) is hooked to motor frame and has sufficient tension.
	5. Defective On-Off Switch (61).	Check continuity across switch contacts. Replace switch if necesary.
	6. Defective Motor.	Remove Turntable (48) so that there will be no load on Motor and check to see if Idler Wheel (63) rotates. Replace Motor (62) if found defective.
	7. Grease on Idler Wheel (63), Idler Pulleys (64), (65) or (66), (or Drive Belts (68)) or rim of Turntable (48).	Clean with carbon tetrachloride.
	8. Binding in changer mechanism.	For analysis of fault see symptom entitled "Changer stops while changing a record."
Changer refuses to cycle when Control Knob (52) is turned to "REJ." position.	1. Manual Trip Rod (33) not contacting Clutch Pawl (79).	Check to see that Manual Trip Rod (33) is hooked into hole in Control Lever (57) and that it is contacting Clutch Pawl (79) on Main Cam Assembly (81).
	2. Clutch Pawl (79) binding on face of Main Cam Assembly (81).	Check for burrs or foreign matter lodged between Clutch Pawl (79) and cam. **Do not oil.**
	3. Lift Arm (83) not turning during cycle.	Check for broken roller on Lift Arm Assembly (83); roller is located on end of Lift Arm which engages Cam assembly (81). If this is the case, replace Lift Arm Assembly (83).
Changer stops while changing a record.	1. Idler Wheel (63) not engaging Turntable (48) properly.	Be sure that Spring (72) which pulls Idler Wheel (63) against Turntable (48) has sufficient tension.
	2. Grease on Idler Wheel (63), Idler Pulleys (64), (65) or (66), (or Drive Belts (68)) or rim of Turntable (48).	Clean with carbon tetrachloride.
	3. Turntable (48) and Bearing Race (50) binding.	Remove Turntable (48). Check to see if Turntable Washer (49) and Bearing Race (50) are free to rotate. If binding does occur remove Center Post (43) by loosening Set Screw (47) and withdrawing Center Post (43) from the top. Binding of Bearing Race (50) may now be released. Before replacing Turntable (48) clean bearing surfaces.
	4. Operating temperature too low.	If changer has been stored in a cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.
	5. Low line voltage.	Line voltage should not be less than 105 volts.
	6. Binding in drive mechanism.	To check for binding proceed as follows: a. Remove Lift Arm Assembly (83) by taking out Screw (85). b. Remove Idler Wheel (63). c. Turn Control Knob (52) to "REJ." position and rotate Turntable very slowly by hand through one change cycle, checking for any binding action. If binding occurs check for: foreign matter in the gear teeth of Main Cam Assembly (81); bent main cam bearing; bent center post bushing. Also check for clearance between Main Cam (81) and Automatic Trip Link (34). A projection on the hub of Main Cam Assembly (81) should contact and push Automatic Trip Link (34). Thus the link is reset for the next playing cycle. There should be no binding during this action. Bending of Automatic Trip Link (34) may be required. If no binding occurs proceed as follows: d. Remove "C" Washer (39) and Spring (38). e. Raise Pick-up Arm (1) and withdraw Lift Rod (37). f. Replace Lift Arm Assembly (83). g. Loosen Set Screw (47) so that inclined plane of Lift Arm Assembly (83) will push up the complete Center Post (43). h. Turn Control Knob (52) to "REJ." position and rotate Turntable very slowly by hand through one change cycle, checking for binding action. If binding does occur check lift arm bearing for freedom of movement and lift arm roller to be sure it is not bent, causing binding in the heart-shaped groove in the Main Cam Assembly (81).

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	7. Binding between Lift Rod (37) and inclined plane of Lift Arm Assembly (83).	To check for this action proceed as follows: a. Replace Lift Rod (37) and Spring (38) taken off in steps 6d and 6e. b. Leave Center Post (43) in same position as in step 6g. c. Turn Control Knob (52) to "REJ." position and rotate Turntable (48) by hand until Lift Arm Assembly (83) has moved in one direction as far as it will go and is about to return. d. Raise Lift Rod (37) by pulling up. It may still be contacting the inclined plane of Lift Arm Assembly (83) but it should not bind. If binding does occur, check for bent lift arm bearing shaft. It may be necessary to remove Fibre Washer (84), which may be under Lift Arm Assembly (83), to lower the arm.
	8. Center Post Roller (44) being compressed too far.	To check for this action proceed as follows: 1. Replace Center Post (43) released for steps 6g and 7b. 2. Turn Control Knob (52) to "REJ." position and rotate Turntable very slowly by hand until Center Post Roller (44) reaches position on inclined plane of Lift Arm Assembly (83) illustrated in Fig. 3. It will be noted that "Brass Bushing" has also risen but at this point stops. A further movement of Lift Arm Assembly (83) causes roller shaft to move up into "Brass Bushing" a distance not to exceed 1/16". Should the latter movement exceed this, it may cause the Lift Arm Assembly (83) to bind due to excessive pressure. In that event check the following: a. Bearing for Lift Arm Assembly must be square with the changer Base Plate (25). b. Remove any fibre washer between metal washer and bottom of Lift Arm Assembly (83). c. Center Post may be too long. The critical 1⅛" dimension shown in Fig. 9 should not be exceeded.
	9. Weak Motor (62).	After checking the preceding eight items and relieving any binding action, replace Idler Wheel (63). Should the changer then continue to stop during a change cycle, it may be assumed that the motor is weak (has low torque) and should therefore be replaced.
Changer cycles continuously.	1. Control Link Assembly (54) in reject position.	Check for loose, unhooked or missing Reject Spring (58).
	2. Stop Pawl (75) not engaging projections in Base Plate (25).	Check for loose, unhooked Stop Pawl Spring (74).
	3. Trip Pawl (76) binding.	Check for burrs or foreign matter lodged between Trip Pawl (76) and face of Main Cam (81). **Do not oil.**
	4. Insufficient "friction grip" between Clutch Pawl (79) and Trip Pawl (76).	The "friction grip" between Clutch Pawl (79) and Trip Pawl (76) should be sufficient so that the slightest movement of the Trip Pawl (76) causes a corresponding movement in the Clutch Pawl (79). This is especially true during the change cycle where the Trip Pawl (76) is being reset to the playing position. See Item 2 in section entitled "Function of Main Cam Assembly (81)" on page 115. It may be necessary to add a thin washer between "C" Washer (78) and Spring Washer (77) to increase this "friction grip".
Changer cycles before record is finished playing.	1. Hole in record too large.	Record with badly worn center hole may cause playing grooves to rotate with an eccentric motion thus effecting an oscillating movement of the Pick-up Arm (1).
	2. Binding between Clutch Pawl (79) and Trip Pawl (76).	The "friction grip" between Clutch Pawl (79) and Trip Pawl (76) should be sufficient so that the slightest movement of either one would cause a corresponding movement in the other. Yet, this "friction grip" or binding between these two parts must not be so great as to prevent a "slipping" or clutch action. As the constant tripping pressure is applied to the Trip Pawl (79) by the Trip Lever (76) there should be enough clutch action to permit the projection of the hub of the Turntable (48) to move Clutch Pawl (79) away from hub. For a complete description of this action refer to "CHANGING A RECORD" in section entitled "DESCRIPTION OF CYCLE" on page 116.
	3. External lateral movement of Pick-up Arm (1).	Anything that might cause the Pick-up Arm (1) to move laterally more than the distance between two playing grooves of a record, such as a sudden jar, could start the change cycle.
Changer fails to cycle after playing a record.	1. Record has no eccentric groove.	Old style records which do not have this spiral tripping groove cannot be played automatically.
	2. Needle (6) jumping out of eccentric groove.	Eccentric groove too shallow. Check with a record which is known to have a good groove. Needle badly worn or bent. Replace.
	3. Movement of Locator Housing (35) not following lateral movement of Pick-up Arm (1).	Check for loose Hinge Bearing Set Screw (21). Retighten this screw after repositioning Hinge Bearing (22) as outlined in Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
	4. Automatic Trip Link (34) not making contact.	Check to see that, as Pick-up Arm (1) approaches spiral tripping groove of record, one end Automatic Trip Link (34) is making contact with projection on side of Locator Housing (35) and other end is contacting Trip Pawl (76) as illustrated in Fig. 17. Bend Automatic Trip Link (34) to proper shape or replace with new link.

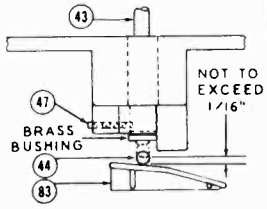


FIG. 3

MODEL VM-508222

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	5. Clutch Pawl (79) binding on face of Main Cam Assembly (81).	Check for burrs or foreign matter lodged between the Clutch Pawl (79) and cam. **Do not oil.**
Pick-up Arm lift is too high or too low; OR **Needle fails to contact first record;** OR **Top of Pick-up Arm strikes stack of records while changer is cycling;** OR **Pick-up Arm strikes Rest Post.**	1. Height Adjustment Screw (36) is incorrectly set.	To adjust height proceed as follows: a. Turn Control Knob (52) to the "REJ." position and rotate Turntable (48) clockwise by hand until Pick-up Arm (1) swings over the Rest Post. b. Raise Pick-up Arm (1) and note Height Adjustment Screw (36). (See Fig. 4.) c. Hold Lift Rod (37) steady and turn adjustment screw clockwise to lower Pick-up Arm and counter-clockwise to raise the arm. d. Raise or lower Pick-up Arm (1) as required until lower edge of Pick-up Arm (1) is ¼" above the top of the Rest Post.
Pick-up Arm (1) sets down at wrong starting point when playing 10" records. **NOTE: If set down point is erratic or differs occasionally, then see symptom and analysis entitled "Pick-up Arm does not set down at same position consistently."**	1. Improper setting of Pick-up Arm.	Before checking for proper set down point of Pick-up Arm (1), be sure Speed Selector Knob (88) is set to either "33-10"-12"" or "78" position and that Locator Cam (97) is in the position shown in Fig. 13. If cam is improperly set, refer to Item 1 in section entitled "Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records." Place a 10" record on Turntable. Turn Control Knob (52) to "REJ." position. Rotate Turntable by hand until tip of Needle (4) is within ¼" of top of record. Raise Pick-up Arm (1) and be sure that leg of Index Lever (20) is in the first step of the Hinge Locking Ring (11) as shown in Fig. 4. If this is not set correctly, see Item 2 in section entitled "Pick-up Arm (1) sets down in 12" position when playing 10" records."
	2. Improper Adjustment of Pick-up Arm (1).	If Index Lever (20) is properly positioned in the first step of Hinge Locking Ring (11) then proceed as follows: a. If needle is setting too far out on edge or off record, loosen the **back** "Adjustment Screw" about ¼ turn and tighten front screw to lock adjustment in place. b. If needle is setting too far in on the record, loosen the front "Adjustment Screw" about ¼ turn and tighten back screw.
	3. Hinge Bearing (22) not in proper position with respect to Locator Housing (35).	To reset Hinge Bearing (22) to proper position, proceed as follows: a. With power disconnected, swing point of Set Down Locator (28) and engage it with arm of Control Lever (57) as shown in Fig. 5. b. Lift Pick-up Arm (1) and loosen Set Screw (21) (see Fig. 4). Note: It may be necessary to line up hole in Hinge Locking Ring (11), by moving "Adjustment Screws" to gain access to Set Screw (21). c. Turn Locator Housing (35) until dimple on face of Set Down Locator (28) is opposite detent in Locator Housing (35). d. Place a 1/32" shim between Locator Housing (35) and Set Down Locator (28). Take up all the play between the parts by pressing up on the bottom of Locator Housing (35) and down on the top of Hinge Bearing (22). Be sure that Hinge Bearing (22) is turned **counter-clockwise as far as it will go.** Now tighten Set Screw (21). e. Recheck set down point of Pick-up Arm (1) by referring to adjustments described in Items 2a and b above.
	4. Broken or loose Return Spring (26).	Check for broken or unhooked Return Spring (26). Replace or rehook into position as shown in Fig. 5, with one end of spring hooked around Set Down Locator (28) and other end of spring hooked around leg of Base Plate (25).
Pick-up Arm (1) sets down at wrong point when playing 12" records.	1. Record too small.	Before checking for proper set down point of Pick-up Arm (1), be sure Speed Selector Knob (88) is set to either "33-10"-12"" or "78" position and that Locator Cam (97) is in the position shown in Fig. 13. If cam is improperly set, refer to Item 1 in section entitled "Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records." As a 12" record drops off the off-set in the Center Post (43) it should hit Trip Lever (17) as it passes the Pick-up Arm. Standard 12" records should be used. They should have a diameter of 11⅞" plus or minus 1/32".
	2. Record wobbles and fails to hit Trip Lever (17) when dropping.	Check Items 1, 2 and 3 in section entitled "12" record drops and wobbles, failing to hit Trip Lever (17)."
	3. Trip Lever (17) above its normal horizontal position and record does not hit lever.	Check to see if spring on Trip Lever (17) is loose or broken and rehook or replace in position as shown in Fig. 4.

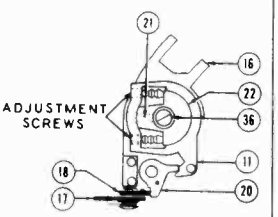


FIG. 4

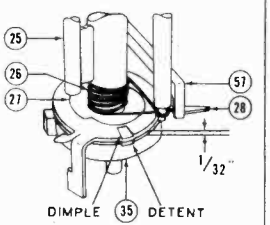
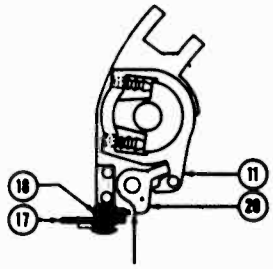


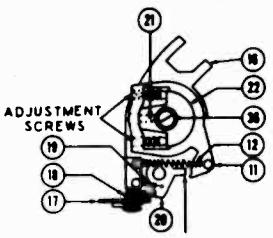
FIG. 5

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	4. Trip Lever (17) below its normal horizontal position and record does not hit lever.	To check this condition proceed as follows: a. Turn Control Knob (52) to "REJ." position and rotate Turntable (48) by hand until Pick-up Arm is about to start return toward the record. b. Depress Trip Lever (17) momentarily. There should be a slight shift in the position of Pick-up Arm (1). c. Raise Pick-up Arm (1) and check to see if there is a clearance of about 1/64" between Index Lever (20) and Index Cam (18) as shown in Fig. 6. Should the clearance be insufficient, file the edge of Index Lever (20) closest to the Index Cam (18). d. Should the space be adequate, check for loose or broken spring on Index Cam (18) and replace or rehook as shown in Fig. 6.
	5. Record with too large a center hole.	This will produce the same effect as an undersize record, described in Item 1 above.
	6. Loose or missing Index Spring (19).	Check for loose or missing Index Spring (19) and replace or rehook in position as shown in Fig. 7.
	7. Pick-up Arm not properly adjusted.	If 12" record hits Trip Lever (17) properly and Pick-up Arm lands at wrong starting point, Pick-up Arm may not be properly positioned. This adjustment must be made while changer is set for 10" operation. Refer to Items 2a and b in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Pick-up Arm (1) sets down at wrong point when playing 7" records.	1. Locator Cam (97) improperly set.	Before checking for proper set down point of Pick-up Arm (1) be sure Speed Selector Knob (88) is set to either "33-7" " or "45" position and that Locator Cam (97) is in the position shown in Fig. 17. If cam is improperly set, refer to Item 1 in section entitled "Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records."
	2. Pick-up Arm (1) not properly adjusted.	If Locator Cam (97) is correctly set and Pick-up Arm (1) lands at wrong starting point, Pick-up Arm may not be properly positioned. This adjustment must be made while changer is set for 10" operation. Refer to Items 2a and 2b in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Pick-up Arm (1) sets down in 10" position when playing 12" records.	1. Index Lever does not slide down incline and assume the position shown in Fig. 6.	Be sure that record has hit Trip Lever (17) as it dropped past Pick-up Arm. Also check Items 2, 3 and 5 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 12" records." Should the above fail to correct the condition, file about 1/64" bevel on corner of Index Lever (20) (see Fig. 7 for location). Be careful not to round off end.
Pick-up Arm (1) sets down in 12" position when playing 10" records.	1. Index Spring (19) broken or missing.	Check for broken or missing Index Spring (19) and replace or rehook in position as shown in Fig. 7.
	2. No clearance between Hinge Locking Ring (11) and Index Lever (20). This may be due to one of the following: a. Hinge Bearing (22) not in proper position with respect to Locator Housing (35). b. Projection on Hinge Assembly (16) defective.	In order to check for proper clearance, first turn Control Knob (52) to "REJ." position and rotate Turntable (48) by hand until Lift Arm Assembly (83) has moved in one direction as far as it will go and is about to return. Now raise Pick-up Arm (1) and check to see if there is a clearance of about 1/64" between Index Lever (20) and Hinge Locking Ring (11). (See Fig. 7 for location.) a. If this gap is not present, it will be necessary to check the setting of the Hinge Bearing (22) by referring to Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records." b. Should the above remedy fail to provide the required gap it will be necessary to check the projection at base of Hinge Assembly (16). Also check for binding between Hinge Bearing (22) and body of Hinge Assembly (16). This may be accomplished by disassembling Pick-up Arm mechanism as described under heading "Top Assembly" in section entitled "Procedure for Removal and Replacement of Major Parts."
Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records. **OR** **Pick-up Arm (1) sets down in 10" position when playing 7" records.**	1. Locator Cam (97) not in proper position with respect to Speed Selector Knob (88).	When Speed Selector Knob (88) is set to either the "78" or "33-10"-12" " position, the Locator Cam should be so placed that the projection on Set Down Locator (28) contacts cam as shown in Fig. 13. With Speed Selector Knob (88) set to either "45" or "33-7" " position, the Locator Cam (97) should be so placed that the projection on Set Down Locator (28) contacts the shaft of the cam as shown in Fig. 17. If this is not the case check the following: a. Index Rod (96) not properly connected to Locator Cam (97). b. Index Rod (96) not properly shaped. See Fig. 17 for shape. c. Arm at base of Speed Selector Shaft (89) not properly staked.



FILE THIS EDGE FOR 1/64" CLEARANCE
Refer to Step 4c in this section.
FIG. 6



FILE THIS CORNER
Refer to Item 1 in section entitled "Pick-up Arm (1) sets down in 10" position when playing 12" records."
FIG. 7

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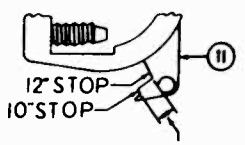
TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
Pick-up Arm (1) sets down correctly for 7" and 10" records but incorrectly for 12" records. **OR** **Pick-up Arm (1) sets down correctly for 12" records but incorrectly for 7" and 10" records.**	1. Distance, that controls 10" and 12" indexing, is incorrect.	Be sure that Pick-up Arm (1) has been properly adjusted as described under Items 2a and b in section entitled "Pick-up Arm sets down at wrong starting point when playing 10" records." Now, with a 12" record in place, operate changer as described in Instruction Section. If the Pick-up Arm (1) approaches the record, but lands too far on the record, it will be necessary to file the "12" stop" deeper. (See Fig. 8.) If the Pick-up Arm (1) approaches the record, but lands to the right of it, it will be necessary to file the "10" stop" deeper. (See Fig. 8.) After each filing operation, carefully readjust set down point as described in Items 2a and b in section entitled "Pick-up Arm sets down at wrong starting point when playing 10" records."  **THIS DISTANCE CONTROLS INDEXING OF 10" AND 12" RECORDS.** **FIG. 8**
Pick-up Arm (1) does not set down at same position consistently.	1. Ring Spring (12) broken or missing. 2. Binding between Safety Spring (32) and Locator Housing (35). 3. Broken or loose Return Spring (26). 4. Locator Cam (97) not in proper position with respect to Speed Selector Knob (88).	Check for broken or missing Ring Spring (12) and replace or rehook in position as shown in Fig. 7. To check for binding between these parts it will first be necessary to disassemble Pick-up Arm mechanism as described under heading "Bottom Assembly" in section entitled "Procedure for Removal and Replacement of Major Parts." Binding may now be checked by holding shaft of Pick-up Arm Locator (30) in one hand and turning Locator Housing (35) with other. Check to see that locator is returned all the way to the stop in Locator Housing (35). A further check may be made by removing Safety Spring (32) and by rotating Pick-up Arm Locator (30) and again checking for any binding action. Remove all burrs and sharp edges on both locator and spring. After reassembling be sure to properly set position of Locator Housing (35) in manner described in Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records." Check for broken or unhooked Return Spring (26). Replace or rehook into position as shown in Fig. 5 with one end of spring hooked around Set Down Locator (28) and other end of spring hooked around leg of Base Plate (25). Check Item 1 in section entitled "Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records."
Pick-up Arm remains on Rest Post after changing a record.	1. Hinge Bearing (22) not in proper position with respect to Locator Housing (35). 2. Bent down projection of Set Down Locator (28) not properly shaped.	Check Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records." Check to be sure that bent down projection of Set Down Locator (28) is pointing straight down as shown in Figs. 5 and 14. To determine the correct action of Set Down Locator, refer to "Description of Cycle," Item 2 in section entitled "Set down point; 7" or 10" records." If necessary, reshape the bent down projection or replace with new Set Down Locator (28).
Improper "tracking" of needle on record—needle slips out of grooves and skips portions of record.	1. Incorrect setting of Needle Selector Knob (2). 2. Foreign matter in record grooves. 3. Needle (4) or (5) not contacting record grooves. 4. Badly worn records due to one of the following: a. Deep Scratches on the record. b. Needle Selector Knob (2) improperly set. c. Broken or unhooked Chain (9) and/or Counter Balance Pressure Spring (10).	Setting of Needle Selector Knob (2) to the correct position to correspond with type of record being played is vitally important — the knob should be turned so that the numbers "78" appear at the top when playing standard (78 R.P.M.) type records; it should be turned so that numbers "33-45" appear at the top when playing "Long Playing" (microgroove — 33⅓ R.P.M.) or "Fine groove" (45 R.P.M.) records. Clean record with record brush or camel's hair brush. Be sure that front part of Pick-up Arm (1) is not contacting record. Should this be the case, it will be necesary to slightly bend needle so that its tip protrudes beyond Crystal Cartridge (6). Do not bend needle while mounted in Crystal Cartridge (6). Remove Needle (4) or (5) as outlined in section entitled "Procedure for Removal and Replacement of Major Parts" on Page 128. To check for these conditions proceed as follows: a. Examine record for scratches that may have destroyed continuity of grooves. b. If records had been played with Needle Selector Knob (2) set improperly (for correct setting see Item 1 in this section), the needle may have destroyed the continuity of the grooves to such an extent that they can no longer be used. c. The action of parts may be observed by raising Pick-up Arm (1) and turning Needle Selector Knob (2). As knob is turned counter-clockwise toward the "33-45" position, Chain (9) is pulled up around hub on Pivot Assembly (8). This pull should be transmitted to the Counter Balance Pressure Spring (10) which is attached to Hinge Bracket (13). Should it become necessary to replace or rehook the Chain (9) or Spring (10) it may be accomplished by first taking out the four screws that retain the Pivot Assembly (8). In reassembling Pivot Assembly (8), care should be exercised to properly route Chain (9) to insure smooth operation of Needle Selector Knob (2). With the Needle Selector Knob (2) set so that the numbers "33-45" appear at the top, Chain (9), which is attached to hook on hub of Pivot Assembly (8), should go around hub in a clockwise direction, around projection in Pick-up Arm (1) and along side of the arm.

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	5. Needle pressure too light when playing "Long Playing" (microgroove) records.	If needle skips grooves while playing "Long Playing" (microgroove) or "Fine groove" records, it may be due to Pick-up Arm (1) not having enough pressure — less than 6½ grams. Should this pressure be found to be too light after checking it with a sensitive gram scale, the leg of Hinge Bracket (13) on which the Counter Balance Pressure Spring (10) is hooked, should be bent backward. **CAUTION:** Bend slowly and carefully as only a slight change is required. Too much pressure can cause excessive record wear.
	6. Badly worn or bent Needle (4) or (5).	Examine needle for worn or bent tip and replace if necessary. To replace needle refer to section entitled "Procedure for Removal and Replacement of Major Parts."
	7. Locator Housing (35) not disengaging from the Set Down Locator (28) when a change cycle is complete.	There should be a space of approximately 1/32" between these parts at the end of a change cycle. If this space is lacking, see Fig. 5 as well as Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
	8. Binding between Hinge Bearing (22) and Hinge Assembly (16).	Check for binding between Hinge Bearing (22) and body of Hinge Assembly (16) by disassembling Pick-up Arm mechanism as described under heading "Top Assembly" in section entitled "Procedure for Removal and Replacement of Major Parts."
	9. Shallow eccentric groove.	Try a record which is known to have a good groove.
Pick-up Arm does not return to Rest Post after last record has been played.	1. Control Lever (57) not engaging Set Down Locator (28).	On return sweep of Lift Arm (83) the upturned end of Automatic Shut-off Rod (86) should contact and actuate Control Lever (57) so that leg on lever engages Set Down Locator (28) as shown in Fig. 5. If Automatic Shut-off Rod (86) does not contact Control Lever (57) try bending rod or replacing it if necessary. If leg on Control Lever (57) is defective, replace entire Control Link Assembly (54).
	2. Hinge Bearing (22) not in proper position with respect to Locator Housing (35).	To check for correct position refer to Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Record fails to drop off the off-set on the Center Post.	1. Pusher shaft inside of Center Post (43) is broken.	Should pusher shaft be broken, the Center Post Roller (44) and "Brass Bushing" will drop out of Center Post (43). If this is the case replacement of the entire Center Post (43) will be required and may be accomplished as follows: a. Locate Set Screw (47) by referring to Fig. 14. Loosen screw, and Center Post (43) may be withdrawn from top of changer. b. Replace with new Center Post (43) making sure Set Screw (47) engages "Locating Hole" at bottom of Center Post (43) (see Fig. 9.)
	2. Ejector Lever (45) does not move out far enough.	Check to see if Screw (85) is loose. (See Fig. 13 for location.) Retighten screw.
	3. Ejector Lever (45) pushes up entire stack of records.	This lever should first rise inside the slot in the Center Post (43) then move forward pushing one record off the shoulder of Center Post (43). This action may be observed by proceeding as follows: a. Place a record on the off-set of the Center Post (43) and then lower Record Support Arm (40) into place. b. Turn Control Knob (52) to "REJ." and rotate Turntable (48) by hand. c. While Turntable is being revolved observe the action of the Ejector Lever (45). d. Should it push forward prematurely, the Center Post (43) is defective and will have to be replaced.
	4. Lift Arm (83) not turning during cycle.	Check for broken roller on Lift Arm Assembly (83). Replace Lift Arm Assembly (83).
More than one record drops at a time.	1. Center Hole in record too large or badly worn.	Records with badly worn center holes will not rest properly on off-set Center Post (43) and these should not be used when using the changer for automatic operation.
	2. Record changer not level.	Record changer must be set in a level position in order for record to rest properly and securely on its supports.
	3. Improper setting of Record Support Arm (40).	See paragraph entitled "Placing Records on Changer" in Operating Instruction section. The Record Support Arm (40) must be able to slide down under its own weight. If this support does not follow the records down as they are being lowered to the Turntable (48) multiple dropping of records will result. While this occurs, it is

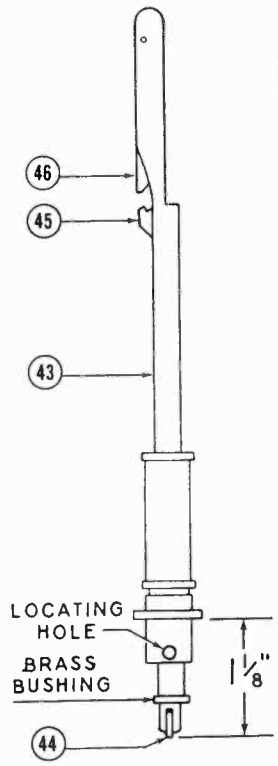


FIG. 9

MODEL VM-508222

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
		generally due to binding between the Record Support Arm (40) and Center Post (43) and may be checked as follows: a. See if Center Post (43) is straight. Carefully straighten. b. Tip of Record Support Arm (40) is slightly bent up. Straighten so that tip of arm rests on offset shoulder of Center Post (43) when shaft of Support Arm is properly seated. c. If after checking the above steps, hole in tip of Record Support Arm (40) is not centered over Center Post (43), raise support arm up as far as it will go and with heel of your hand, bend shaft slightly until hole is centered over Center Post (43). Now lower Record Support Arm (40) until locating pin in shaft enters base plate. There should be an equal amount of play on each side of the hole in tip of the arm. Bend to correct position. d. If Record Support Arm (43) is loose on its shaft, replace.
	4. Slide (46) in upper part of Center Post (43) not all the way down.	Relieve any binding so that Slide (46) will not stick at any point. CAUTION: When records are placed on the Center Post (43) be sure the Slide (46) is all the way down.
Record drops and lands on Pick-up Arm (1); OR 12" records drops and wobbles, failing to hit Trip Lever (17).	1. Ejector Lever (45) does not move out far enough. 2. Ejector Lever (45) extending out too far.	Check to see if Screw (85) is loose. (See Fig. 13 for location.) Retighten screw. To check this condition proceed as follows: a. Turn Control Knob (52) to "REJ." position and rotate turntable by hand until Ejector Lever (45) has reached its maximum outward position. b. With a **new** record as a gauge, check to see if any binding occurs. c. Should there be any binding action, it may be removed by using a fine file to remove the high or binding spots.
	3. Hinge Bearing not in proper position with respect to Locator Housing (35).	To check for this condition see Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Record changer fails to shut off automatically after last record has been played.	1. Improper setting of Record Support Arm (40). 2. Changer stalls during change cycle. 3. Automatic Shut-off Rod (86) not being properly set for automatic shut-off operation. This may be due to one of the following: a. Improperly set Record Support Arm (40). b. Set Screw (47) not fitting properly in locating hole of Center Post (43). c. Screw (85), that holds Lift Arm (83) in place, is loose. d. Bent up end of Automatic Shut-off Rod (86) too short.	See Item 3 in section entitled "More than one record drops at a time." See section entitled "Changer stops while changing a record." On the change cycle following the playing of the last record, and as Lift Arm Assembly (83) swing in, tip of Automatic Shut-off Rod (86) should contact "Brass Bushing" at base of Center Post (43). (See Fig. 14.) If tip of Automatic Shut-off Rod (86) is not contacting "Brass Bushing" check the following: a. After last record has been dropped, tip of Record Support Arm (40) should be resting on off-set of Center Post (43). If this is not the case see Item 3 in section entitled "More than one record drops at a time." b. Be sure that Set Screw (47) is properly positioned in "Locating Hole" at base of Center Post (43). (See Figs. 9 and 14 for location of hole and screw.) c. Tighten Screw (85). (See Fig. 13 for location.) d. If bent-up end of Automatic Shut-off Rod (86) is still not contacting "Brass Bushing," try placing either a 1/64" or 3/64" Fibre Washer (84) between bottom of Lift Arm Assembly (83) and metal washer. Should the rod still not contact bushing properly it will be necessary to replace entire Automatic Shut-off Rod (86). CAUTION: When inserting Fibre Washer (84) care should be exercised that other end of rod does not bind against Control Lever (57).
	4. Automatic Shut-off Rod (86) not actuating Control Lever (57).	After Automatic Shut-off Rod (86) has contacted "Brass Bushing" and has been turned 90°, the Lift Arm Assembly (83) makes its return sweep and the other end of the rod should contact and actuate Control Lever (57), thus shutting off Switch (61). Bending or replacing of Automatic Shut-off Rod (86) may be required.
Record changer shuts off before last record has been played.	1. Center Post Roller (44) moves up too far. 2. Record too thick. 3. Automatic Shut-off Rod (86) not being reset.	To check this condition refer to Item 8 in section entitled "Changer stops while changing a record." Old style records which are 1/8" thick will shut off the changer instead of being dropped. Do not use this type of record for automatic operation. On the change cycle following a cycle in which the changer was automatically shut off, the Automatic Shut-off Rod (86) should return to its original position. On the in-sweep, the bent-up part of the rod engages the Control Lever (57) which turns the rod 90°. It is held against a stop on the Lift Arm Assembly (83) by a flat Spring (87). If Automatic Rod is not reset, check the following: a. Check tension of Spring (87). Should it be insufficient it would allow the Automatic Shut-off Rod (86) to be out of position, thus turning off changer prematurely.

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
		b. Lubricate the bearing of the Automatic Shut-off Rod (86) and Spring (87) with Lubriplate. c. In normal operation there should be a clearance between Control Lever (57) and Automatic Shut-off Rod (86) when the latter is turned fully down. Bending of rod may be necessary.
	4. Hinge Bearing not in proper position with respect to Locator Housing (35).	If Locator Housing (35) is so positioned that projection on base of housing rides on incline plane of Lift Arm Assembly (83) while the latter is swinging thru its cycle, it would cause other end of Lift Arm Assembly (83) to rise and allow Automatic Shut-off Rod (86) to contact "Brass Bushing." This in turn would cause changer to shut off automatically as previously described. Should this be the case Locator Housing will have to be repositioned as described in Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Slow Turntable Speed.	1. Idler Wheel (63) not engaging Turntable properly.	Be sure Speed Selector Knob (88) is **indexed properly** to either of the four positions. Check to be sure that Spring (72) which pulls Idler Wheel (63) against Turntable (48) has sufficient tension.
	2. Grease on Idler Wheel (63) on Idler Pulley (64), (65), (66) (or Drive Belt (68)) or rim of Turntable (48).	Clean with carbon tetrachloride.
	3. Turntable and Bearing Race (50) binding.	Remove Turntable (48). Check to see if Turntable Washer (49) and Bearing Race (50) are free to rotate. If binding does occur, remove Center Post (43) by loosening Set Screw (47) and withdraw Center Post (43) from the top. Binding of Bearing Race (50) may now be released. Before replacing Turntable (48) clean bearing surface.
	4. Operating temperature too low.	If changer has been stored in cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.
	5. Low line voltage.	Line voltage should not be less than 105 volts.
	6. Defective Motor (62).	If, after checking the above 5 items, the turntable speed is still slow, it may be assumed that the motor is weak (has low torque) and should be replaced.
Noisy operation during playing cycle such as; **1. Rumble or "wow."**	a. Changer does not float freely on its mounting springs	Be sure the two hold down screws (see Fig. 16) have been loosened sufficiently to allow the entire unit to float freely.
	b. Improper motor mounting.	Be sure that Motor (62) is mounted on rubber bushings and that frame of Motor (62) is not contacting Base Plate (25).
	c. Worn tire on Idler Wheel (63).	Examine Idler Wheel (63) for flat spots on tire and replace entire wheel if required.
	d. Worn or missing Grommet (73).	Be sure that rubber Grommet (73) at end of Speed Selector Rod (90) is not worn or missing. There should be no metal contact at end of Speed Selector Rod (90) and bracket that controls position of Idler Pulleys (64), (65) and (66).
2. Rapid thumping sound.	Flat spot on Idler Wheel (63), or rubber tire of Idler Pulley (64), (65) or (66).	Examine Idler Wheel (63) as well as Idler Pulleys (64), (65) and (66) for flat spots on rubber tire and replace entire wheel or pulley where required. See section entitled "Procedure for Removal and Replacement of Major Parts" for instructions on replacement of Pulleys (64), (65), or (66).
3. Scraping sound while Turntable (48) revolves.	a. Turntable warped.	This may be checked by noting a serious rise and fall in Turntable as it revolves. Check for warped Turntable or bent bearing. Replace Turntable (48).
	b. Idler Wheel (63) bent.	Replace with new Idler Wheel (63) or new Motor (62) if support shaft is bent.
	c. Wires beneath turntable rubbing.	Dress wires away from Turntable (48).
4. Squeaking sounds.	Lack of lubrication.	See section entitled "Lubrication."
5. A "ticking" sound once every revolution of turntable (48).	a. Bent Clutch Pawl (79).	If this is the case, projection on hub of Turntable (48) will catch edge of Clutch Pawl (79) instead of wiping smoothly along curved surface of pawl during playing cycle. A complete description of this action is outlined in Item 2 in section entitled "Changing a Record" on page 116. Reshape pawl or replace with a new one.
	b. "Block type" Clutch Pawl (79).	Some Clutch Pawls (79) were made with a block of metal at the point of contact. This type is more critical to adjust. If loud "ticking" still persists after bending adjustment, try replacing with a new one.
Noisy operation during change cycle such as: **1. Clicking noise.**	Changing mechanism.	There is a certain amount of clicking noise as the mechanism goes through its cycle. If there are any extra loud sounds check for binding and insufficient clearance of parts.
2. Grinding sounds.	Worn or defective parts, or lack of lubricant.	Check for worn or defective parts or a lack of lubricant.
Excessive Record wear when playing "Long Playing" (microgroove) records.	1. Improper pressure of Pick-up Arm (1).	This pressure should not exceed 12 grams. Should the pressure be found to be too heavy after checking it with a sensitive gram scale, the leg of the Hinge Bracket (13), on which the Counter Balance Pressure Spring (10) is hooked, should be bent forward. CAUTION: Bend slowly and carefully as only a slight change is required. Too little pressure can cause "mistracking."

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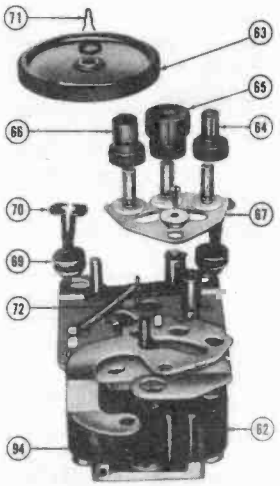
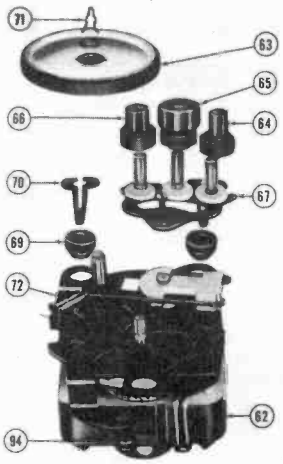
ALTERNATE TYPES OF MOTORS



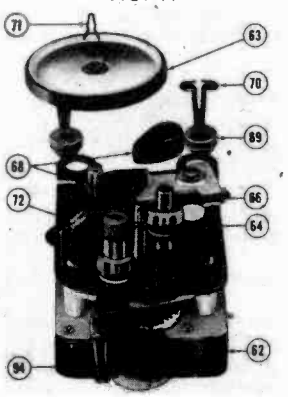
This "turret type" motor is identified by a letter "R" or "3211" stamped on motor.

FIG. 10



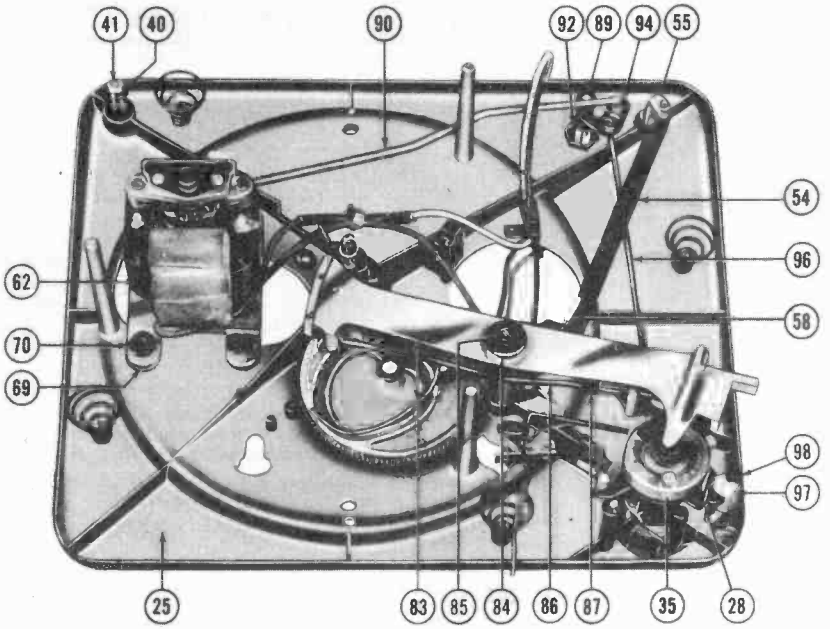
This "turret type" motor is identified by a "GI" on bearing or "3129" stamped on motor.

FIG. 11



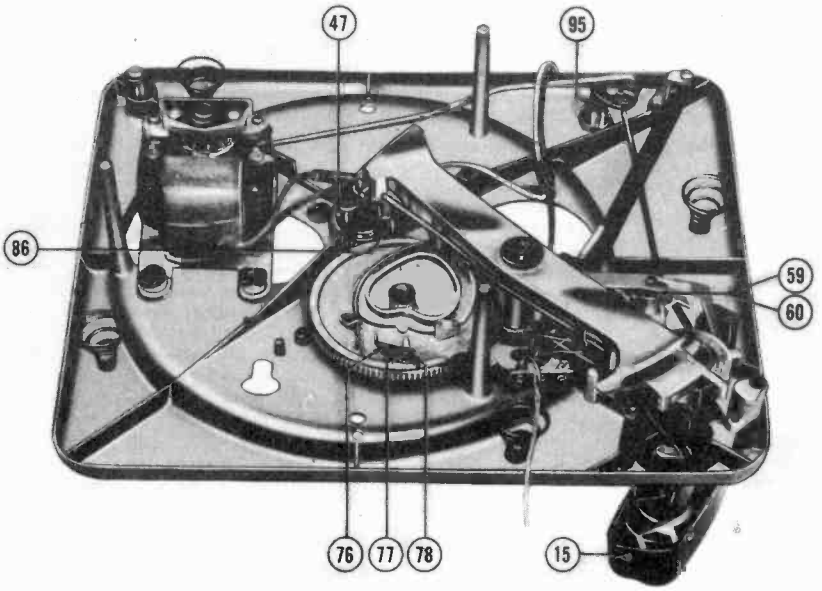
This "belt type" motor is identified by a "GI" on bearing or "2727" stamped on motor.

FIG. 12



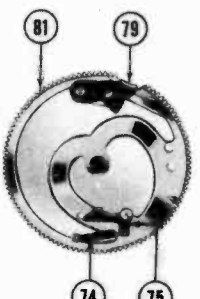
Bottom view of Changer.

FIG. 13



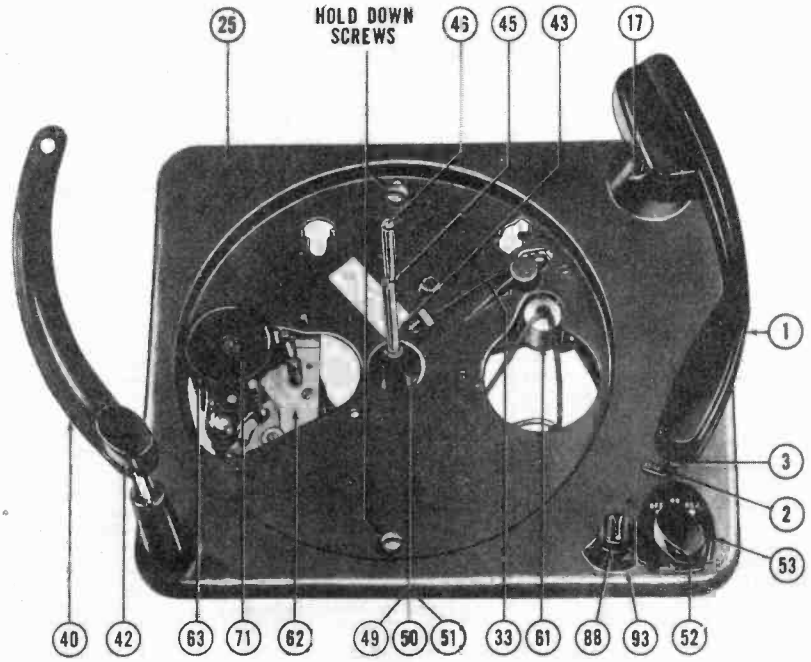
Bottom view of Changer with Automatic Shut-off Rod (86) contacting "Brass Bushing" on Center Post (43) for Automatic Shut-off operation.

FIG. 14

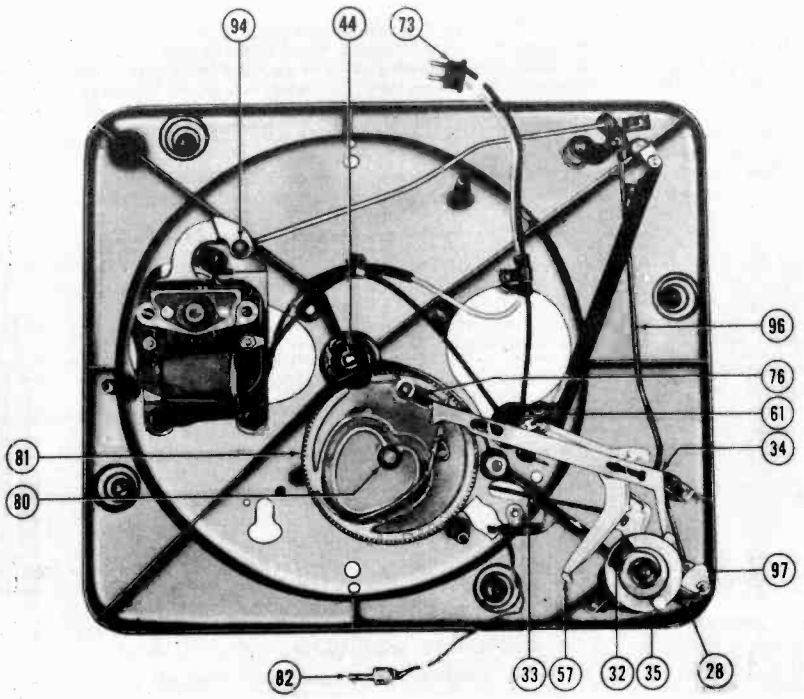


Top view of Main Cam Assembly (81).

FIG. 15



Top view of Changer.
FIG. 16



Bottom view of Changer with Lift Arm Assembly (83) removed.
FIG. 17

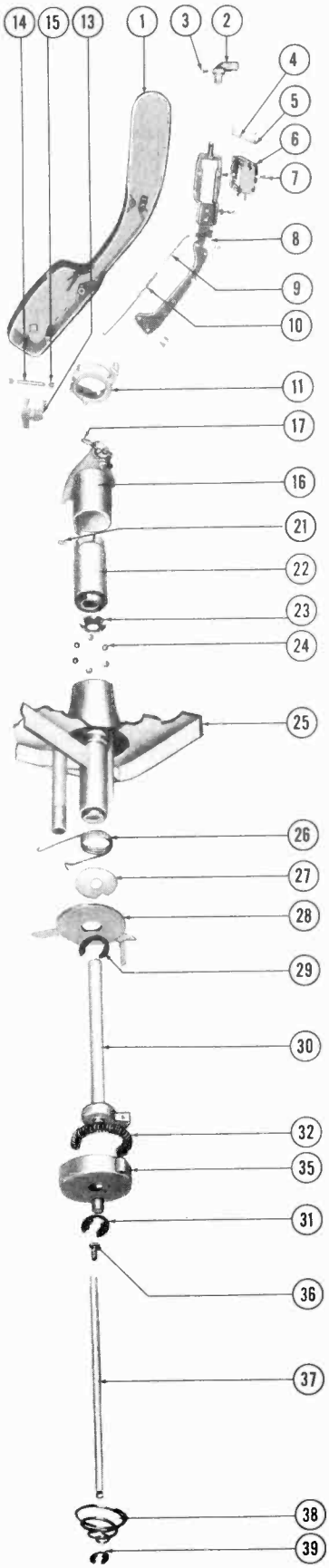


FIG. 18

MODEL VM-508222

PROCEDURE FOR REMOVAL AND REPLACEMENT OF MAJOR PARTS

NAME OF ITEM	METHOD OF REMOVING OR REPLACING
Needle (4) or (5).	To remove Needle (4) or (5), turn Needle Selector Knob (2) so that needle to be replaced faces down. To withdraw needle, merely grasp it between thumb and forefinger and pull straight downward. When inserting a new Needle (4) or (5) place it so that tip faces forward and push shank of Needle all the way in. **CAUTION: When replacing both needles be sure that the fine (.001") tipped Needle (5) is placed in the correct side of the Cartridge (6). A distinct color identifies correct side of cartridge and corresponding Needle (5).**
Crystal Cartridge (6).	To remove this part, first turn Needle Selector Knob (2) until the numbers "33-45" appear at the top. Now raise Pick-up Arm (1) and take out Screws (7) and withdraw Cartridge (6) from arm. Do not attempt to unsolder lead connections — merely slip the "quick disconnect" electrical connectors off prongs at rear of Cartridge (6). To replace Cartridge (6), proceed in the reverse order outlined above. **CAUTION:** Care should be taken, when placing cartridge in Pick-up Arm (1), that side with identifying color faces down.
Center Post (43) and Bearing Race (50).	To remove Center Post (43) loosen Set Screw (47) and withdraw post from top of changer. Turntable Washers (49) and Bearing Race (50) are held in place by Retaining Ring (51). To replace Center Post (43) first be sure that Turntable Washers (49) and Bearing Race (50) are in place. Next, insert Center Post (43) from top of changer and tighten Set Screw (47) making sure screw enters "Locating Hole" at base of Center Post (43) (see Fig. 9 and 14.)
Disassembly of Pick-up Arm Mechanism. TOP ASSEMBLY. BOTTOM ASSEMBLY.	The support which holds and locates the Pick-up Arm (1) is made of an upper and lower major assembly. These assemblies are held together by Set Screw (21). (For location see Fig. 7.) It may be necessary to line up hole in Hinge Locking Ring (11) by moving Adjusting Screws. Before attempting to work on top assembly, it will be necessary to unsolder and disconnect the cartridge lead at the terminal strip on underside of Base Plate (25). Then withdraw lead from hole in Base Plate (25) and proceed as follows to disengage top assembly: 1. Loosen Set Screw (21). Top assembly may now be lifted straight out. 2. Pick-up Arm (1) may be taken off Hinge Assembly (16) by first unhooking Counter Balance Pressure Spring (10) from Hinge Bracket (13). Then loosen Pivot Screws (15) at rear of arm. 3. Disconnect one end of Ring Spring (12), being careful not to break the peened-over stud around which it is fastened. 4. Loosen adjustment screws on Hinge Locking Ring (11). The major assembly may now be separated into three assemblies: Hinge Locking Ring (11), Hinge Bearing (22) and Hinge Assembly (16). Care should be exercised not to lose the six Ball Bearings (24) and Ball Bearing Spacer (23) resting in ball cup on Base Plate (25). Before attempting to work on bottom assembly, it will be necessary to take off Lift Arm Assembly (83) by removing Screw (85). To remove and disassemble bottom assembly, proceed as follows: 1. Loosen Set Screw (21). Bottom assembly may now be withdrawn. 2. If a further breakdown is required, it may be done in the following manner: Take off "C" Washer (39) and withdraw Lift Rod (37). Take out Safety Spring (32). Remove "C" Washer (31). Locator Housing (35) and Pick-up Arm Locator (30) may now be separated.
Replacing Pick-up Arm Mechanism.	The Pick-up Arm mechanism should be reassembled by reversing the procedure given in the preceding paragraphs, exercising the following precaution: 1. When replacing cartridge lead in Pick-up Arm (1) care should be exercised so that lead coming out of hole in Base Plate (25) passes around Hinge Pin (14). It should then be laid in special recesses around inside edge of Pick-up Arm (1), routed under Pivot Assembly (8) and passed thru hole at point of pivot. For final setting of Set Screw (21) and adjustment of Pick-up Arm (1), reference should be made to items 3c, d and e on Page 119 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Replacing Lift Arm Assembly (83).	When replacing Lift Arm Assembly (83), observe the following precautions: a. Rotate Main Cam Assembly (81) until it comes to rest and is held by Stop Pawl (75). b. Replace Lift Arm Assembly on the bearing shaft and be sure that Automatic Shut-off Rod (86) fits under Automatic Trip Lift Link (34). c. Be sure roller on Lift Arm Assembly (83) fits into heart-shaped groove in Main Cam Assembly (81).
Idler Pulleys (64), (65), or (66). (Turret type motor.)	To remove an individual Idler Pulley (64), (65) or (66), first set Speed Selector Knob (88) to a position where the particular Idler Pulley to be removed does not make a contact with anything. While holding the Motor (62) steady in one hand, pull Idler Pulley straight up until it releases from its shaft. When replacing Idler Pulleys (64), (65) or (66), they must be slipped over their respective shafts and pressed down firmly until they "snap" into position. **It is important that these pulleys be properly seated.**
Idler Pulley (64) or (66). (Belt type motor.)	Before removal of Idler Pulley (64) can be accomplished it will be necessary to take off Drive Belt (68). In the case of Idler Pulley (66) it will be necessary to remove both Drive Belts (68). Removal of Idler Pulley (64) or (66) can then be accomplished as outlined in first paragraph of preceding section on turret type motor. When replacing Idler Pulley (64) or (66), exercise care to press the pulley down on its shaft until it snaps into position.

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high operating temperature, it may require lubrication.

The recommended lubricants and points of lubrication are as follows:

A. LUBRIPLATE (apply with small brush):

1. Hinge Bearing (22).
2. Locator Housing (35) and Set Down Locator (28).
3. Inclined Planes of Lift Arm Assembly (83), lift arm bearing, and bearings for Automatic Shut-off Rod (86).
4. Between Automatic Shut-off Rod (86) and Spring (87).
5. Heart-shaped groove in Main Cam Assembly (81) and main cam bearing.
6. At lower section of Center Post (43) where the "Brass Bushing" and support of Center Post Roller (44) enter body of Center Post (43).
7. Between Turntable Washer (49) and Bearing Race (50).
8. Bearing for Automatic Trip Link (34).

B. LIGHT MINERAL OIL (apply with small oil can or medicine dropper):

1. Pick-up Arm Locator (28) inside of Locator Housing (35) and their bearing surfaces.
2. Ball Bearings (24) inside pick-up arm housing in Base Plate (25).
3. Bearings for Control Link Assembly (54).

MODEL VM-508222

PARTS LIST

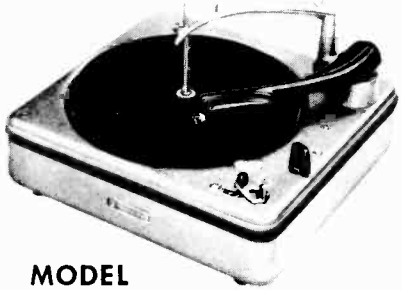
REF. No.	PART No.	DESCRIPTION
1	507600	Pick-up Arm (less pivot assy. and cartridge)
2	508579	Knob — Needle Selector
3	507602	Screw — Set; for Needle Selector
4	508433	Needle — Phonograph for Standard records
5	508434	Needle — Phonograph for "Fine Groove" and "Microgroove" records
6	508432	Crystal Cartridge (incl. both needles)
7	508577	Screw #4-40 x 1/8"; for mtg. cartridge
8	508578	Pivot assembly and cartridge mtg. brkt.
9	507605	Chain
10	507606	Spring — Counter Balance Pressure
11	505243	Hinge Locking Ring (incl. adjustment screws)
12	505244	Ring Spring
13	507607	Hinge Bracket
14	507608	Hinge Pin for Pick-up Arm
15	507609	Pivot Screw for Hinge Pin
16	507610	Hinge Assembly (incl. trip lever, index cam, index spring, index lever)
17	*	Trip Lever (part of Item 16)
18	*	Index Cam (part of Item 16)
19	*	Spring, Index (part of Item 16)
20	*	Index Lever (part of Item 16)
21	505246	Screw, Set #8-32 x 3/16"; for Hinge Bearing
22	505245	Hinge Bearing
23	508113	Ball Bearing Spacer
24	505252	Ball Bearing
25	508580	Base Plate
26	505256	Return Spring
27	507612	Washer — Set Down Locator Clutch
28	508115	Set Down Locator
29	506787	"C" Washer for Set-Down Locator
30	505247	Pick-up Arm Locator
31	505248	"C" Washer for Pick-up Arm Locator
32	505249	Spring, Safety
33	508138	Rod, Manual Reject
34	508130	Automatic Trip Link
35	508116	Locator Housing
36	505291	Height Adjusting Screw
37	505289	Lift Rod
38	505292	Spring, Lift Rod
39	505267	"C" Washer for Lift Rod
40	505832	Record Support Assembly
41	506788	"C" for Record Support Arm
42	506770	Knob for Record Support Arm
43	506772	Center Post
44	*	Center Post Roller (part of Item 43)
45	*	Ejector Lever (part of Item 43)
46	*	Slide (part of Item 43)
47	506782	Screw, set; for center post
48	508117	Turntable
49	508582	Turntable Washer
50	508581	Turntable Bearing
51	507616	Retaining Ring for Turntable Washers
52	506770	Control Knob
53	507617	Escutcheon — "OFF-ON-REJ."
54	508119	Control Link Assembly (incl. Control Crank and Control Lever)
55	*	Control Crank (part of Item 54)
56	505266	"C" Washer for Control Crank
57	*	Control Lever (part of Item 54)
58	505268	Spring, Reject
59	506786	Washer, Fiber; for Control Lever
60	505267	"C" Washer for Control Lever
61	505269	Switch — "ON-OFF"
62	508120	Motor — 115 volt, 60 cyc.
63	508901	Idler Wheel for Motor identified with "R" or "3211" stamped on Motor
	508121	Idler Wheel; used on Motor identified with "GI" on bearing surface or either "2727" or "3129" stamped on Motor
64	508902	Idler Pulley for 33 1/3 R.P.M.; used on Motor identified with "R" or "3211" stamped on Motor
	508903	Idler Pulley for 33 1/3 R.P.M.; used on Turret Type Motor identified with "GI" on bearing or "3129" stamped on Motor
	508904	Idler Pulley for 33 1/3 R.P.M.; used with Belt Type Motor identified with "GI" on bearing or "2727" stamped on Motor
65	508905	Idler Pulley for 78 R.P.M., used on Motor identified with "R" or "3211" stamped on Motor
	508906	Idler Pulley for 78 R.P.M.; used on Turret Type Motor identified with "GI" on bearing or "3129" stamped on Motor
66	508907	Idler Pulley for 45 R.P.M.; used on Motor identified with "R" or "3211" stamped on Motor
	508908	Idler Pulley for 45 R.P.M.; used with Turret Type Motor identified with "GI" on bearing or "3129" stamped on Motor
	508909	Idler Pulley for 45 R.P.M.; used with Belt Type Motor identified with "GI" on bearing or "2727" stamped on Motor
67	508910	Bracket, Idler Pulley Mounting; used on Motor identified with "R" or "3211" stamped on Motor
	508911	Bracket, Idler Pulley Mounting; used on Motor identified with "GI" on bearing surface or "3129" stamped on Motor
68*	508139	Drive Belt for Motor; used on Motor identified with "GI" on bearing surface or "2727" stamped on Motor
69	508912	Rubber Bushing for Mounting Motor; used on Motor identified with "R" or "3211" stamped on Motor
	508123	Rubber Bushing for Mounting Motor; used on Motor identified with "GI" on bearing surface or either "2727" or "3129" stamped on Motor
70	508122	Clip, Motor Mounting
71	505267	"C" Washer for Mounting Idler Wheel
72	508913	Spring, Idler Wheel Tension; used with Motor identified with "R" or "3211" stamped on Motor
	508914	Spring, Idler Wheel Tension; used on Motor identified with "GI" on bearing surface or either "2727" or "3129" stamped on Motor
73	501031	Plug for Phono. Motor Cable
74	508137	Spring for Stop Pawl
75	*	Pawl, Stop (part of Item 81)
76	508133	Pawl, Trip
77	508135	Spring Washer for Trip Pawl
78	508134	"C" Washer for Trip Pawl
79	508136	Pawl, Clutch
80	505284	"C" Washer for Main Cam
81	508132	Main Cam Assembly (incl. Clutch Pawl, Trip Pawl, Stop Pawl and Spring)
82	500966	Plug for Phono. Pick-up Cable
83	505285	Lift Arm Assembly (incl. Automatic Shut-off Rod and Spring)
84	506781	Washer, Fiber; 3/64" thick
	506780	Washer, Fiber; 1/64" thick
85	505288	Screw for Lift Arm
86	505286	Automatic Shut-off Rod
87	505287	Spring, Automatic Shut-off Rod
88	507622	Knob for Speed Selector
89	508124	Speed Selector Shaft and Arm
90	508126	Speed Selector Rod
91	505266	"C" Washer for Speed Selector Shaft
92	507624	Bushing for Speed Selector Shaft
93	508127	Escutcheon — Speed Selector
94	508125	Rubber Bushing for Speed Selector Rod
95	508131	Spring, Speed Selector Shaft
96	508128	Index Rod
97	508129	Locator Cam
98	505279	"C" Washer for Locator Cam
	508533	Inserts for 45 R.P.M. records (pkg. of 12)

*Not supplied as replacement part

MODELS 100, 100-55, 100-62, 100-64, 100-557

MODEL 100

MODEL 100-64



MODEL 100-55 100-557

MODEL 100-62

SERVICE INSTRUCTIONS

WEBSTER-CHICAGO MODEL 100 RECORD CHANGER

DESCRIPTION

Model 100 is a three speed Automatic record changer. Simple in design and operation, it provides automatic playing of up to a 1" stack of 7-inch, 10-inch or 12-inch records at speeds of 33⅓, 45 or 78 rpm.

Model 100 features Automatic adjustment for any diameter record stack, an Automatic "manual" position, a "flat" record drop, an improved spindle that carefully lowers the unplayed record stack to the spindle step, ready for the next record change cycle.

Model 100 returns the Pickup Arm to the Rest position after playing the last record; the motor continues to revolve until the Speed Selector Lever is moved to the nearest "OFF" position. The idler wheel is also pulled away from the motor shaft when the Speed Control Lever is in an "OFF" position, eliminating the possibility of a flat spot developing in the rubber wheel. Two "OFF" positions are available for ease of operation.

Model 100 features the Webster-Chicago Velocity-Trip Mechanism which gives an unusually fast record change. The Pickup Arm is not actuated by "lead-in" springs so there is almost no lateral pressure. The arm travels freely in either direction. This lack of lateral pressure adds immeasurably to the life of records and is considered to be as important as extra-light vertical pressure. The free floating arm permits "home recordings" or "inside out" records up to 12" size to be played manually.

Model 100 will change warped or rough-edged records, at the same time assuring maximum protection to the finest disc.

The basic Model 100 Mechanism is used in the following models:

Model 100-1 is the basic record changer chassis with a Crystal pickup cartridge and replaceable needle. The needle and cartridge have high compliance so they will play both standard groove and microgroove records at low needle pressure.

Model 100-27 is the same basic mechanism as above with special pickup arm and interchangeable plug-in heads designed for the G. E. Variable Reluctance Cartridges.

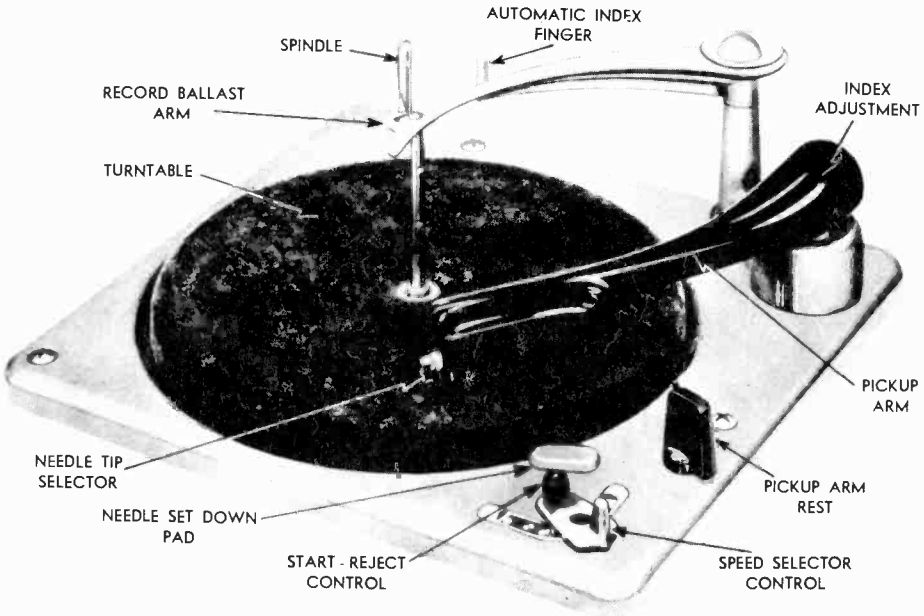
Model 100-55, Model 100-557 are models 100-1 and 100-27 respectively mounted on an attractive metal base to fully enclose and protect the mechanism.

Model 100-62 is a complete portable phonograph with the Model 100-1 record changer, an amplifier and speaker mounted in an attractive burgundy leatherette carrying case.

Model 100-64 is the basic Model 100 mechanism mounted in an attractive burgundy leatherette carrying case for portable use. An output receptacle is provided especially for the Model 66 and Model 166 portable amplifiers. A special cord and plug assembly is also provided to facilitate connecting Model 100-64 to a radio receiver or P.A. amplifier and speaker.

MODELS 100, 100-55,
100-62, 100-64, 100-557

OPERATION



A.C. POWER CONNECTIONS

Most models are designed for 105-120 volt operation. Special models may be designed for 210-240 volt operation.

Always check the production tag on the underside of the mainplate to determine the correct voltage and current required by your particular changer mechanism.

If it is desired to operate the changer on 50-cycle current, a special motor shaft sleeve must be used in order to drive the turntable at the required speed.

Do not under any circumstances connect the changer to a source of direct current (DC) or alternating current of any other frequencies.

The motor switch is part of the Speed Control Lever. The power is off when the lever is in an "OFF" position.

The following instructions regarding the changer controls apply to all models. Special instructions regarding the Model 100-62 amplifier controls are given in the printed operating instructions.

FOR "AUTOMATIC" RECORD CHANGE

1. Lift the Record Ballast Arm and swing it away from the spindle until it "latches" with a light snap. The Automatic Index Finger will follow.
2. Place up to a 1-inch stack of any one size of records on the Spindle and swing the Record Ballast Arm back to the spindle allowing it to drop in position with the spindle in the hole. The Automatic Index Finger will remain away from the record until the change cycle starts. It will then move in to feel the diameter of the record and automatically index the pickup needle to the proper playing position.
3. Then turn Needle Tip Selector to correct position for records being played. Move the Speed Selector Lever to the correct speed for the records being played and push the START-REJECT control.
4. To reject any record while playing in the Automatic Position, push the Reject control.

After the last record has been played, the entire stack may be removed from the turntable at one time. The simplest procedure is as follows:

a. Lift and turn the Record Ballast Arm weight out of position until it latches. Be sure the pickup arm is on the pickup arm rest.
b. Place the fingers of both hands under opposite edges of the bottom record. Do not apply pressure to the top record but keep your thumbs free, and lift the stack of records straight up, following the contours of the spindle. This permits the stack of records to follow the curve of the spindle without binding.

FOR "MANUAL" RECORD CHANGE

1. Lift the Record Ballast Arm and swing it and the Automatic Index Finger away from the spindle. The changer is then automatically in "manual" until the Record Ballast Arm is moved in and placed over the spindle. The pickup arm can be moved in or out without tripping the Velocity Trip automatic mechanism so long as the Record Ballast Arm and Automatic Index Finger are left in this position.
2. Turn Needle Tip Selector to correct position for record being played. Place a record on the turntable. Move the Speed Control Lever to the correct speed for the record being played and then place the needle gently on the record. To stop the mechanism at any time turn the Speed Selector Lever to an "OFF" position.

MODELS 100, 100-55,
100-62, 100-64, 100-557

SERVICE INFORMATION

All units are accurately adjusted, lubricated and tested at the factory. However, service repairs and adjustments sometimes become necessary. This bulletin should be studied carefully before making any adjustments or replacing parts.

Service parts are available from your Webster-Chicago distributor. All parts must be ordered by piece part number as given in the parts list on page 11 and by model and production number, stamped on the underside of the main plate.

The functions and most probable misadjustments of the main assemblies are as follows (reference numbers refer to the exploded views on page 10).

FAILS TO CHANGE RECORDS AUTOMATICALLY

The Main Cam Assembly (61) drives the mechanism associated with the action of the Pickup Arm (23) and the Record Selector assemblies. It, in turn is driven by the gear train (9) and the Turntable which is rim driven by the phonograph motor.

The Cam Drive Gear (56) is put in motion or "tripped" by means of the "Velocity Trip" (57) or by the manually operated "reject" trip (25). When the movement of the Pickup Arm toward the spindle is greater than 1/8" in 1/2 revolution of the turntable, the Velocity Trip Arm (76) trips the Velocity Trip (57). This releases the Actuating Pawl on the Main Cam Assembly (61), allowing it to engage the Cam Drive Gear (56) and driving it through the change cycle. The pressure from the Velocity Trip Arm required to actuate the trip mechanism is negligible.

The Velocity Trip Arm (76) follows the movement of the Pickup Arm through a weighted friction clutch (75). This clutch must be kept free of oil and grease. If the clutch does not cause the Velocity Trip Arm to trip the mechanism, clean the clutch parts with carbon tetrachloride. This clutch should operate the trip mechanism without placing undue drag on the movement of the pick-up arm.

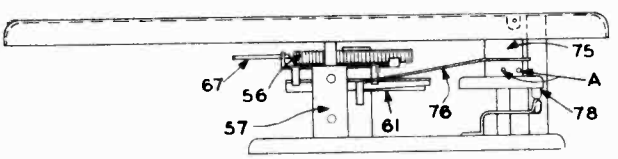


Fig. 1

Also check for:

1. Velocity Trip (57) binding on its mounting Pin (J of 69).
2. Slight burr on end of the Actuating Pawl or on the underside of the hook end of the Velocity Trip (57).
3. Actuating Pawl stuck (part of Main Cam Assembly (61) engaged by the hook end of the Velocity Trip (57)).
4. Velocity Trip Arm (76) bent and not hitting the Velocity Trip (57).
5. Velocity Trip Arm (76) fails to touch the Velocity Trip.
6. Velocity Trip (57) rubbing on the underside of the Cam Drive Gear (56).
7. No velocity lead-in groove or eccentric groove in the center of record.
8. Foreign matter in record groove.
9. Badly worn record.
10. Badly bent or worn needle.
11. Spindle out of adjustment. (See "Does not push off records, page 7).

CHANGES RECORDS PREMATURELY

At the completion of the change cycle, the Actuating Pawl (part of 61), is disengaged from the Cam Drive Gear (56) by the hook end of the Velocity Trip (57), which has been returned to its normal position by the reset points on the Cam Drive Gear (56).

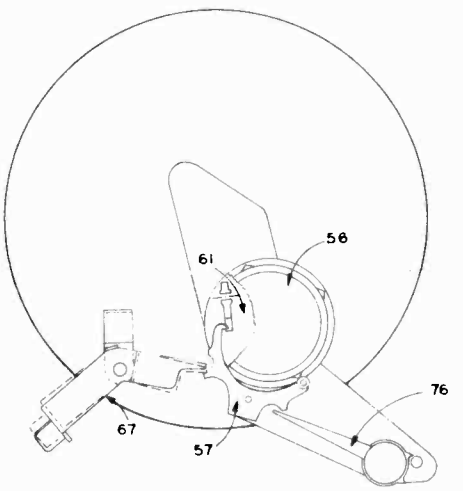


Fig. 2

MODELS 100, 100-55, 100-62, 100-64, 100-557

If the vertical clearance between the lip on the Velocity Trip Lever and the edge of the Main Cam is too small, it will prevent the hooked end of the Velocity Trip Lever from engaging the trigger. Adjust the clearance between the lip on the Velocity Trip Lever and the Main Cam to be within 1/32" and 1/64" when the roller is contacting the point of one of the reset points on the Cam Drive.

Also check for:

1. Velocity Trip (57) rubbing on Cam Drive Gear (56).
2. Manual Trip Lever (67) binding.
3. "Disengage Roller" broken on the Velocity Trip (57).

PICKUP ARM DOES NOT CLEAR 1" RECORD STACK

The vertical movement of the pickup arm is controlled by the angle of the pickup arm raising lever (62 and Fig. 3). The needle should approach the top record of a full 1" stack of records on the turntable with approximately 1/16" clearance.

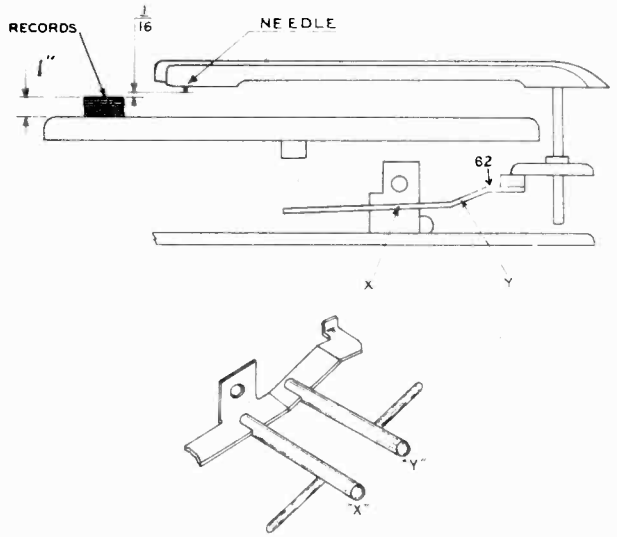


Fig. 3

To adjust:

1. Put a full 1" stack of records ON THE TURNTABLE.
2. Trip the "Reject" control and rotate the turntable clockwise until the pickup arm reaches its highest point.
3. Be sure the center or 10" notch in the pickup arm raising disc engages the pickup arm raising lever.
4. If the needle does not clear the top record or if it raises too high, adjust by holding the pickup arm raising lever (62) at point **X** and bending at **Y** as indicated in Fig. 3.

CAUTION: All adjusting bends should be made slowly, using slight but firm, easy pressure. Be careful to bend only up and down, not across the lever.

Be sure the set screws in the Pickup Arm Raising Disc (78A) are not loose and are properly positioned in the alignment holes as explained in the paragraph on Needle Setdown position.

NEEDLE SET DOWN POINT INCORRECT

The pickup arm should set the needle down at or just outside the "lead-in" groove of the record, regardless of the size of the record. The group of parts illustrated in Fig. 4 are all inter-related so it is advisable to follow a set routine when checking for the proper needle set down positioning. At the factory the following routine is followed:

1. Adjust for pickup arm height. This should be done before the needle set down positioning is adjusted because the pickup arm raising lever (62) sometimes has to be bent in order to adjust the pickup arm higher and this bending may affect the position of the edge of the lever in the notches of the pickup arm raising disc (78) later. See the paragraph above for this adjustment.

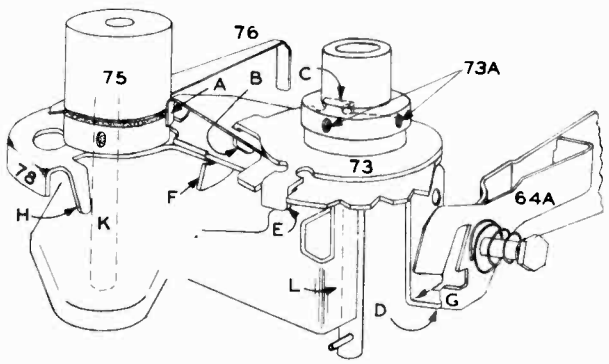


Fig. 4

2. Check the adjustment of the positioning ear (H of 78). To do this, place a 7" record on the spindle or hold the index finger out in the 7" position while you trip the change mechanism and revolve the turntable by hand until the

pickup arm goes out over the pickup arm rest as far as it will go. At the extreme limit of its movement the pickup arm raising lever (62) should engage the 7" notch of the pickup arm raising disc (78). If it does not engage the notch, bend the ear (H of 78) so that the ear just touches the mounting stud K and forces the lever to engage the notch properly. (NOTE: This ear was used on previous record changer models to adjust the pickup arm and assure its setting down on the pickup arm reset.)

Now that you are certain that the pickup arm raising lever (62) is properly engaging the notch of the pickup arm (78), check the actual Needle Setdown Point. Put a 10" record on the spindle, trip the mechanism and revolve the turntable by hand until the needle almost touches the record. If the needle is not about to touch the record at the proper position, use two No. 6 Bristol wrenches to adjust the screws 78A and properly position the pickup arm.

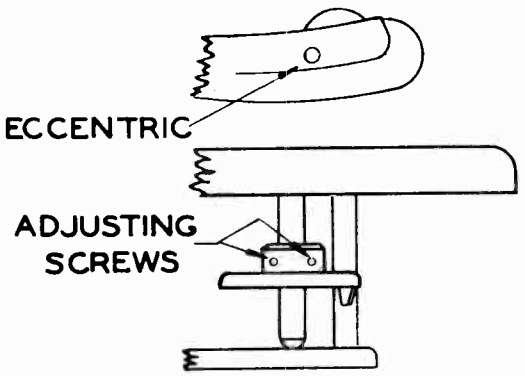


Fig. 5

These screws have pointed ends which fit into the "off center" holes in the shaft (21C). NOTE: The slot in the eccentric adjustment (21D), reached through the hole in the top of the pickup arm, should point along the pickup arm and not across it.

A vernier adjustment for the 12" set down point is provided by the screw (78B) which holds the ear on the pickup arm raising disc in position. With the mechanism "in cycle", the pickup arm out over the rest button (11) as far as it will go, and with the pickup arm raising lever (62) in the 12" notch of the raising disc (78), loosen the adjusting screw (78B) and move the adjusting ear so it just touches the 12" index adjusting ear (B of 73). See Fig. 4. Tighten the adjusting screw (78B) to hold the ear in this position.

3. Check the adjustment of the record ballast arm. It should drop over the spindle when it is swung into position. If necessary, bend the ear L of the stop bracket (69) so that the record ballast arm will drop over the spindle easily.

In most all cases you will find that most of these adjustments are perfect. With a little experience you will learn what to watch and can breeze through them rapidly only stopping when some misadjustment is evident. However it is important that this routine be followed for proper final results.

ERRATIC NEEDLE SETDOWN POSITIONING

If all adjustments to assure a correct needle set down seem all right and the needle still sets down at odd and wrong positions, check:

1. Lip (D of 73, Fig. 4) should engage G of 64A by only about $\frac{3}{32}$". If it is difficult for G to clear D, the movement of the pickup arm will not be properly controlled and erratic "Indexing" will result. Bend D, if necessary, to permit smooth, easy seperation of these two parts.

CANNOT "REJECT" RECORDS

Pushing the Reject button (25) causes the Trip Lever Arm (67) to contact the Velocity Trip mechanism (57), putting the change mechanism in cycle.

If you cannot "Reject" records, check the perpendicular ear of the Velocity Trip mechanism. It may be bent so the Trip Lever Arm cannot touch it.

CANNOT PLAY RECORDS "MANUALLY" OR ONE AT A TIME

The changer is automatically in "manual" whenever the Record Ballast Arm (1A) and the Index

Finger (1C) are turned out as far as they will go, as tho you were loading a stack of records. The finger D of (73) holds the finger G of (64A), causing finger A of (73) to hold the velocity trip arm away from the change mechanism as long as the Index Finger is "out" away from the spindle.

If the mechanism "trips" with the Index Finger in the Manual position check for:

1. No detent in end of finger D of (73). (See Fig. 4.)
2. Dirt in the detent.
3. Finger A of (73) bent so it does not stop and hold the velocity trip arm.

DOES NOT PUSH OFF RECORDS

The action of the vertical cam of (64) on the bent lever plate (71) forces the actuating rod (A) up into the spindle (3) to move the record push off finger forward, pushing off the bottom record of the unplayed stack.

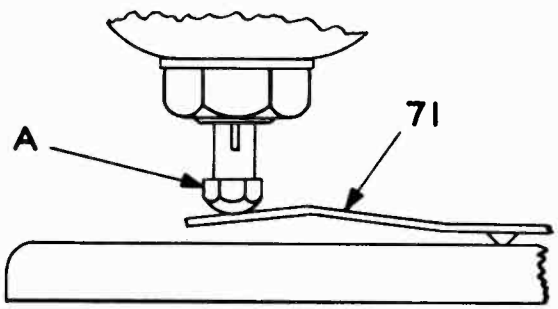


Fig. 6

If the push off finger fails to release the record:

1. Put a full 1" stack of 12" records on the spindle, turn on the A.C. power and trip the Reject button. If the bottom record is not pushed off:
2. Turn the Adjusting nut (A) ¼ turn counter-clockwise out of the spindle to make the actuating rod slightly longer.

   If the bottom record still does not drop, continue turning the adjusting nut counter-clockwise, ¼ turn at a time, until the record is pushed off.

   CAUTION: If the actuating rod is turned out too far, the cam of (64) will not be able to complete its motion and the changer will stall in cycle. When a change cycle has been completed there should be very slight play at both ends of the rocker lever (71).

STALLS DURING CHANGE CYCLE

1. See above.
2. Check for low line voltage.

MORE THAN ONE RECORD IS DROPPED DURING A CHANGE CYCLE

The floating latch at the top of the Record Spindle is so spaced that only one record at a time can slide between the heel of the latch and the step of the spindle. The hole in the latch is elongated so that the latch can slip into the spindle recess when records are being removed.

If more than one record is dropped at a time, it will be found to be due to:

1. Foreign matter in spindle recess causing the latch to stick.
2. Exceptionally thin records.
3. Bent spindle.

INCORRECT TURNTABLE SPEED

The three speed mechanism and the motor are one assembly. The Drive Wheels (31, 32 and 33) are mounted on a movable metal plate (35) in such a way that moving the Speed Selector Lever (27) moves the correct wheel into position between the motor shaft and the Turntable drive idler (79). The tongue of the detent spring (53) fits into an indentation in the edge of the metal plate to index the speed selector wheels and hold them firmly in the desired position.

"OFF" indentations between each speed position hold the drive wheels away from the motor shaft and the Turntable idler when the Speed Selector Lever is in an "off" position.

If the Turntable speed is incorrect, check for:

1. Turntable Idler (79) cocked at an angle. Bend the wheel and shaft to straighten wheel.

CAUTION: Do not bend idler (79) toward the drive wheels (31, 32, 33). Bend only sideways or away from the wheels.

2. The drive wheel mounting assembly (part of motor assembly (44)) must not bind. There should be at least 1/64" play at point "A". Bend the raised metal stop if more clearance is needed.
3. The entire motor assembly (44 plus 35, etc.) should be free floating. There should be slight play of the Speed Control Lever (27) between the "78" and "33" positions and the stops at the end of the speed selector dial.
4. Defective drive wheels (31, 32, 33).

ERRATIC SPEED (wow)

Remove any dirt or excess flocking from the inside rim of the turntable. Check the rubber part of the drive wheels for a flat spot or "out of round". If the rubber part of either Drive wheel becomes slick and shiny — Replace.

GLIDE-IN ON 12" RECORDS

The term "glide-in" is used to describe the action of the pickup arm and needle when the needle does not sit down smoothly in the first groove of the record, despite accurate indexing adjustments, but seems to glide over the first two or three grooves before seating itself properly. If glide-in occurs:

1. The pickup cord may be dressed too tight or in such a manner that it interferes with the free movement of the pickup arm. Make certain there is sufficient play in the pickup cord.

SLIDE-IN OR NEEDLE JUMPS GROOVES

Slide-in describes the condition where the needle will touch the first groove of the record properly but will jump the grooves forward or back as though the needle pressure was too light.

To correct slide-in, check for:

1. Incorrect needle tip. The standard ("78") tip will be especially likely to jump grooves of a microgroove record. Be certain the "micro" or "33-45" tip is used for either the 33⅓ or 45 rpm microgroove records.
2. Chipped or damaged needle.
3. Tight pickup cord.
4. Needle pressure too light. See page 9.

CHANGE CYCLE STARTS BEFORE END OF RECORD

If the Trip Assembly chatters while the changer is running or if the changer cycles before the entire record is played, there is probably insufficient clearance between the hook end of the Velocity Trip (57) and the actuating gear (56). This clearance should be adjusted to be within 1/32" to 1/64" by bending the lever.

REPLACEMENT OF PARTS

TO REPLACE THE PICKUP ARM

1. Unhook the pickup arm hinge clip (21A) and raise the arm to a vertical position.
2. Remove the two mounting screws. Remove the pickup arm.
3. Attach the new arm.

The weight of the arms is uniform so the needle pressure adjustments should be left alone.

REPLACE PICKUP ARM BRACKET AND SHAFT ASSEMBLY

1. Loosen Bristol screws in Pickup Arm Raising Disc (78A).
2. Remove the felt disc (77), Automatic Trip Arm (76) and Clutch (75) by sliding them off the bottom of the Pickup Arm Shaft (21C). Pull the shaft out of the changer.

To replace, reverse the procedure and adjust the

MODELS 100, 100-55,
100-62, 100-64, 100-557

Pickup Arm Raising Disc set screws for proper needle set down as explained on page 6.

TO REPLACE THE NEEDLE

1. Loosen the needle set screw, or thumb nut if used.
2. Remove the needle.
3. Insert the new needle and tighten the set screw or thumb nut.

Some needles are simply forced into a socket, no set screw or thumb nut being required. Just pull the old one out and force the new one in.

TO REPLACE THE CARTRIDGE

Special mounting brackets are required for the cartridges supplied by the different manufacturers. When replacing a cartridge it is advisable to leave the bracket attached to the pickup arm and remove the cartridge from the bracket. The mounting bracket is not included in the replacement cartridge package. Webster Electric's A7M-1 cartridge assembly is one exception.

Webster Electric, Astatic, Shure Bros. and Electro Voice "turnover" type cartridges are all approved for use in W/C changers. Replacements should be ordered from your radio service technician or your radio parts supplier. Order by the manufacturers part number but accept a substitute number at your dealers recommendation. Some cartridge manufacturers have two sets of part numbers for the same unit. For example Shure Bros. P-76, sold only to changer manufacturers, is identical with their W-22AB, sold only to radio parts stores.

TO REPLACE THE MOTOR

It is not necessary to replace the entire Three Speed mechanism when replacing the motor. However, it is necessary to remove the entire assembly from the main plate, and then remove the motor from the assembly.

1. Remove the entire assembly by removing mounting screws (52) and tension clip (40 part of 38).
2. Remove and save the Turntable Drive Wheel (79) the detent spring (53) and tension spring (54).
3. Remove and save the three Speed mechanism plate assembly (37) by removing clip and washer (34) and (35). Do not remove the small drive wheels (31, 32, 33) from the plate.
4. Reassemble new motor to the Three Speed Mechanism plate and the entire assembly to the main plate.
5. It may be necessary to adjust the play of the Three Speed Mechanism mounting plate "C" (part of the motor 44), so there is proper play between the sliding stop and the metal stop at point "A" (see page 10). The mounting plate should be free, approximately $\frac{1}{64}$" clearance between the sliding stop and point "A".

TO REPLACE THE TRIP MECHANISM

1. Remove screw (55) from the top of the Main Actuating Gear (56). Remove the three screws holding the main plate to the subplate mounting posts "K" of 69.
2. Lower the sub plate (69) and lift the Main Actuating Gear (56) and lift the Trip Mechanism (57) from the mounting post (J of 69).
3. Replace the new parts in reverse order.

TO REPLACE PICKUP ARM RAISING LEVER

1. Follow steps 1 and 2 above.
2. Remove "C" clip (59) and washers (58 and 60). Lift the Main Cam Assembly (61) and remove the pickup arm raising lever assembly (62).
3. Replace the new parts in reverse order.

TO ADJUST NEEDLE PRESSURE

1. Unsnap the pickup arm hinge (21A) and raise the arm to a vertical position.
2. Insert a small steel rod in the holes A of the spring mounting stud (21B). Turn the mounting stud downward to increase or upward to decrease the needle pressure.

   CAUTION: A slight movement of the stud is usually enough. An accurate gauge is necessary to insure correct needle pressure. Most cartridges require 7 to 10 grams for proper tracking and best reproduction.

MODELS 100, 100-55,
100-62, 100-64, 100-557

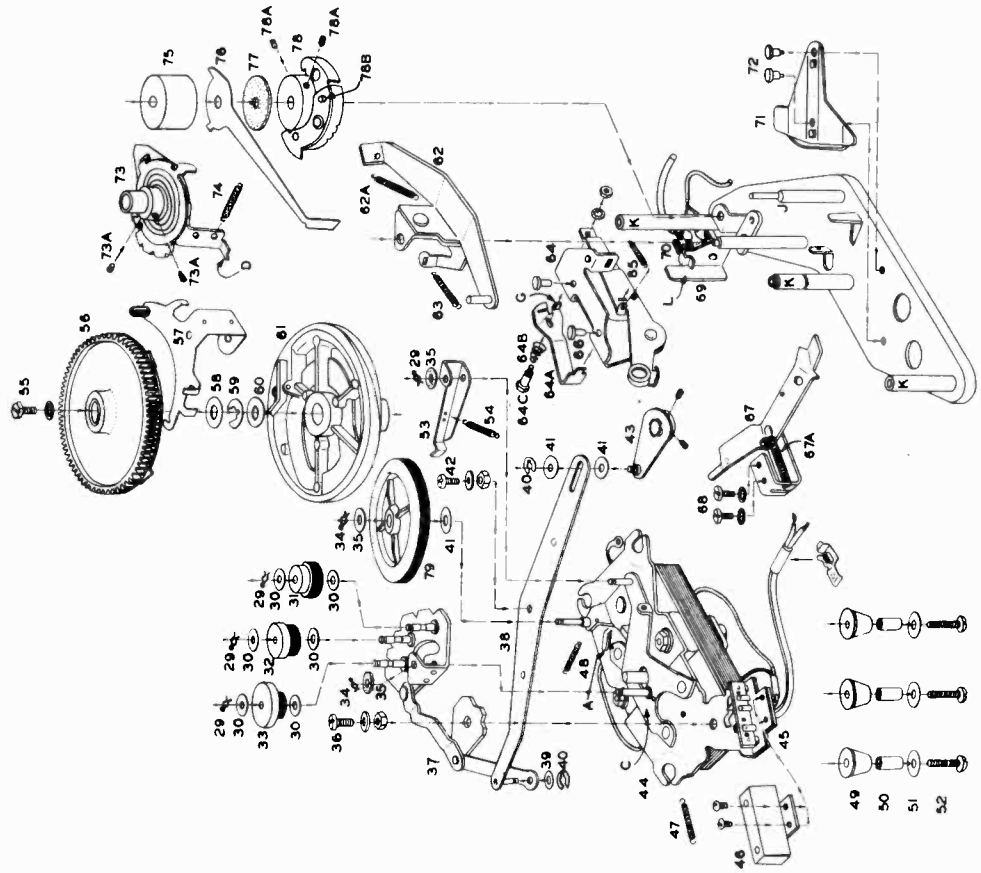


Fig. 8
Exploded View below Main Plate

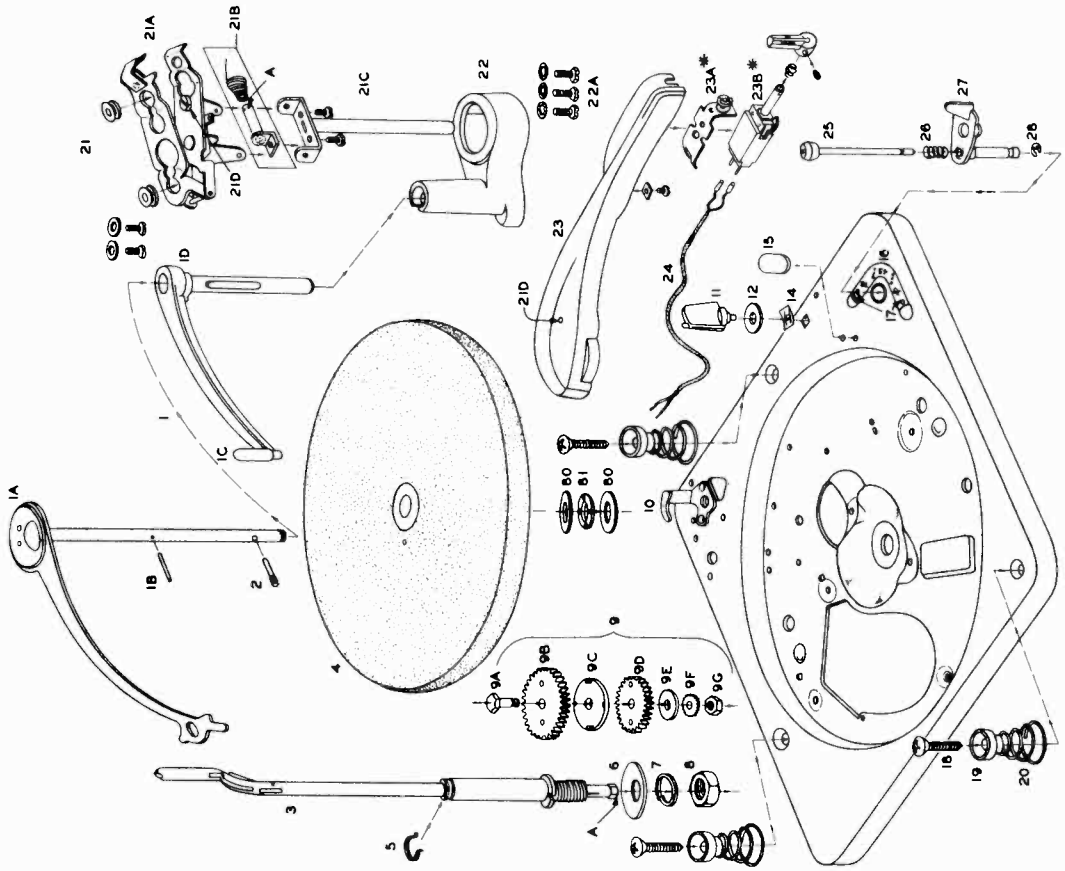


Fig. 7
Exploded View above Main Plate

MODELS 100, 100-55, 100-62, 100-64, 100-557

LUBRICATION

Model 100 Record Changers leave the factory completely oiled and lubricated. Under normal conditions this should be sufficient for approximately one year or 1,000 hours of operation. When operated under extreme conditions of dust or heat, they should be oiled more frequently, as required.

Do not permit oil or grease to get on the rubber Idler Drive Wheel or the Motor Sleeve, on Turntable Drive Rim or on the Automatic Trip Arm clutch. Any oil or grease on these points should be removed using Carbon Tetrachloride. The recommended lubricants and points of lubrication are as follows:

A — No. 10 OIL (Apply With Small Oil Can or Medicine Dropper)

1. Motor Bearings.
2. Pickup Arm Shaft.
3. Ball Bearing Assembly.
4. Idler Wheel Felt.

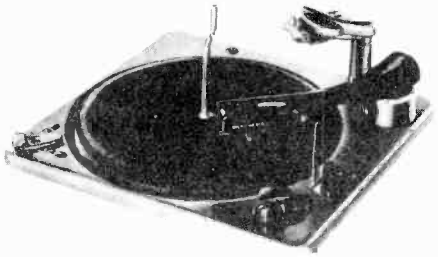
B — A NON FLUID LUBRICANT (Apply With Small Brush)

1. Idler Wheel Link.
2. Turntable Shaft Stud.
3. Pickup Arm Hinge Pins.
4. Knife edge of Pickup Arm Raising Lever.
5. Teeth of Main Cam Actuating Gear.
6. Track of Main Cam Gear.
7. Teeth of Large and Small idler gears.
8. Raising lever Bracket bearing surface.
9. Spindle adjusting nut at bottom.

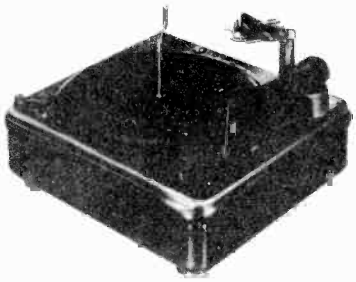
Figure Number	Part Number	Description
1	11X550	Record Ballast Arm and Index Finger Assembly —
1A	11X549	Record Ballast Arm
1B	41P731	Knurled Pin for 11X550
1C	24P048	Index Finger Cushion
1D	42X218	Index Finger Arm
2	41P743	Knurled Pin for 11X549
3	11X558	Spindle
4	11X138	Turntable
5	50P221	Retainer for Turntable
6	25P289	Cup Washer — Spindle Mounting
7	25P403	Lock Washer — Spindle Mounting
8	26P687	Nut — Spindle Mounting
9	11X132	Idler Gear Assembly
9A	41P333	Shoulder Screw
9B	47P024	Idler Gear — Large
9C	45P342	Coupler — for 11X132
9D	47P023	Idler Gear — Small
9E	25P284	Washer — for 11X132
9F	25P222	Lock Washer — for 11X132
9G	26P046	Nut — for 11X132
10	45P191	Stop Bracket for Pickup Arm
11	49P099	Pickup Arm Rest
12	25P388	Washer
14	26P554	Speed Nut
15	24P004	Needle Pad
16	78P508	Speed Indicator Dial
17	27P205	Rivet for Indicator Dial
18	26P740	Mounting Screw
19	24P007	Mounting Grommet
20	46P116	Mounting Spring
21	21X282	Pickup Arm Hinge and Shaft Assembly
21A	21X283	Pickup Arm Hinge
21B	11X386	Pickup Arm Counter Balance
21C	11X385	Pickup Arm Shaft
22	42P219	Housing
22A	26P747	Housing Mounting Screw
23	49X123-X	Pickup Arm
		The mounting bracket required will depend upon the cartridge used. Order exact replacement cartridges from your
23A		parts distributor by the cartridge manufacturer's part number,
23B		stamped on the cartridge. The mounting bracket need not be replaced when replacing the cartridge. Nor is the bracket usually included in the replacement cartridge package.
24	20X1363-1	Pickup Cord and Lug Assembly
25	49X135	Reject Button
26	46P226	Compression Spring — Reject Button
27	42X217	Speed Selector Lever
28	25P447	"C" Retainer for Reject Button
29	50P034	Reainer Clip
30	25P406	Fibre Washer
31	11X456	Drive Wheel — 33 R.P.M.
32	11X458	Drive Wheel — 45 R.P.M.
33	11X460	Drive Wheel — 78 R.P.M.

Figure Number	Part Number	Description
34	50P125	Retaining Clip
35	25P030	Felt Washer
36	41P673	Shoulder Screw — Switch Cam
37	17X481	Drive Wheel Mounting Plate and Cam
38	11X539	Speed Selector Arm
39	25P030	Felt Washer for 11X539
40	25P439	"C" Washer for 11X539
41	25P046	Fibre Washer
42	41P747	Shoulder Screw for 11X539
43	11X540	Speed Selector Link and Hub
44	17X467	Motor and Top Bridge Assembly
45	32P054	A.C. Switch
46	45P819	Switch Cover
47	46P139	Tension Spring — Index Plate
48	46P134	Tension Spring — Idler Link
49	25P363	Motor Mount Grommet
50	41P592	Motor Mount Sleeve
51	25P367	Motor Mount Washer
52	26P110	Motor Mount Screw
53	45P817	Speed Selector Lock Lever
54	46P187	Tension Spring — Lock Lever
55	26P748	Screw — Main Plate to Sub Plate Assembly.
56	11X032	Main Actuating Gear
57	11X320	Velocity Trip
58	25P343	Washer — for 11X545
59	25P342	"C" Washer — for 11X545
60	25P083	Washer — for 11X545
61	11X545	Main Cam Assembly
62	11X553	Pickup Arm Raising Lever
62A	46P022	Tension Spring — Raising Lever
63	46P221	Tension Spring — Raising Lever
64	11X546	Cam Lever and Bracket — Complete
64A	45P921	Cycle Stop Arm
64B	46P218	Compression Spring
64C	41P746	Shoulder Screw for 11X546
65	46P017	Tension Spring for 11X546
66	27P072	Rivet for Cam Lever Mounting
67	11X542	Reject Trip Lever
67A	46P219	Tension Spring — Trip Lever
68	26P747	Screw — Trip Lever Mounting
69	45P926	Positioning Plate
70	70P045	Standoff Lug Assembly
71	45P909	Spindle Actuating Lever
72	27P217	Rivet for Mounting 45P909
73	11X547	Set Down Disc Assembly
74	46P225	Tension Spring — Set Down Disc
75	41P576	Clutch Weight
76	45P935	Velocity Trip Arm
77	23P009	Felt Washer — Velocity Trip
78	11X552	Pickup Arm Raising Disc
79	11X366	Idler Wheel
80	25P269	Washer — Bearing Race
81	11X058	Turntable Bearing

MODELS 346, 355, 362, 364

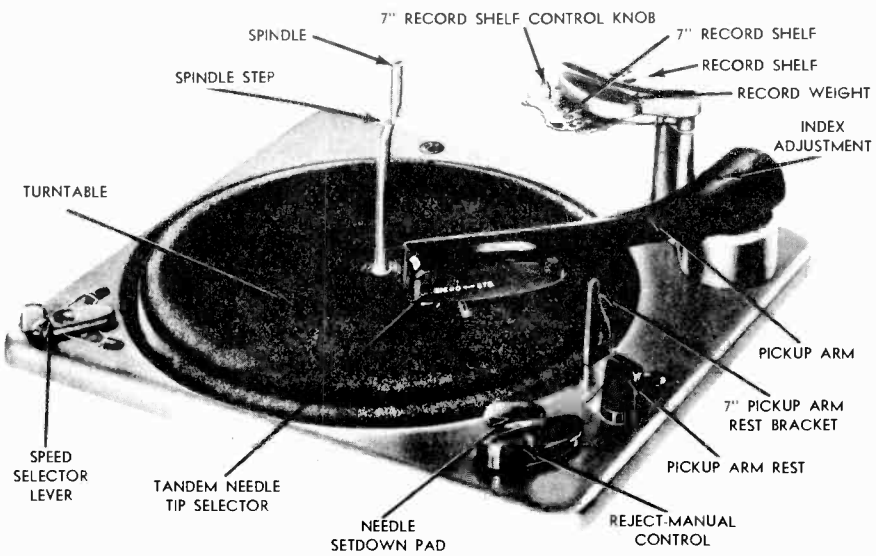


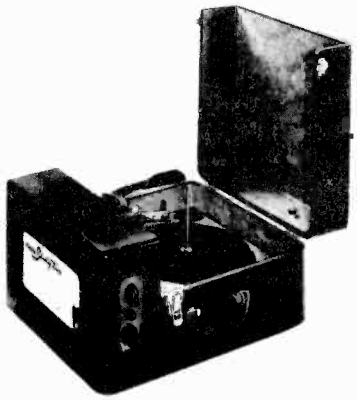
MODEL 346



MODEL 355

MODEL 364





MODEL 362

DESCRIPTION

The Webster-Chicago Model 346-1 basic mechanism is a three speed, single post, spring cushioned spindle, automatic record changer. Simple in design and operation it provides automatic playing of up to a 1" stack of 7", 10" or 12" records at speeds of 33⅓, 45 or 78 rpm.

Model 346 returns the pickup arm to the rest position after playing the last 10" or 12" record, although the motor continues to revolve until the Speed Selector Lever is moved to the nearest "OFF" position. Two "OFF" positions are available for ease of operation. The idler wheel is also pulled away from the motor shaft when the Speed Control Lever is in an "OFF" position, eliminating the possibility of a flat spot developing on the rubber wheel.

The last 7" record of a stack continues to play until the Speed Selector Lever is moved to one of the "OFF" positions and the Pickup Arm moved from the record to the Rest Position.

Automatic playing of 7" records is made possible by a simple, ingenious 7" record shelf which is easily placed on the Record Selector Post and by a movable 7" Pickup Arm Rest which can be swung into or out of position.

Model 346 also features the exclusive Webster-Chicago Velocity-Trip Mechanism. The pickup arm is not actuated by "lead-in" springs and there is a minimum of lateral pressure. The arm travels freely in either direction. This lack of lateral pressure or inertia adds immeasurably to the life of records and is considered to be as important as extra-light vertical pressure. The freefloating arm permits "home recordings" or "inside out" records up to 12" size to be played manually.

Model 346 will change warped or rough-edged records, at the same time assuring maximum protection to the finest discs.

Model 362 automatic phonograph is a Model 346 mechanism mounted in an attractive burgundy leatherette case, together with an amplifier and speaker. The circuit diagram of Model 362 is included in the operating instructions.

Model 364 is a Model 346 mounted in an attractive burgundy leatherette carrying case.

Model 355 is a Model 346 mounted on an attractive metal base.

These service instructions apply to all four models, 346-1, 355, 362 and 364.

PICKUP CARTRIDGE

The special pickup cartridge of Model 346 has a replaceable Tandem-Tip Needle. The lever on the cartridge is moved to "Std" or "Micro", as indicated on the pickup arm, to lower the proper point into playing position. All 78 rpm and some 33⅓ rpm records including "Books for the Blind", require the "Standard" point. The 33⅓ rpm Microgroove and 45 rpm records require the "Micro" point.

The special cartridge has been designed to play 78 rpm as well as 45 rpm and 33⅓ rpm records at very light needle pressures.

MODELS 346, 355, 362, 364

OPERATION

MOTOR

Connect the motor cord to a source of 105-115 volt 60 cycle current only. If it is desired to operate the changer on 50-cycle current, a special motor shaft sleeve must be used in order to drive the turntable at the required speed.

Do not under any circumstances connect the motor to a source of direct current (DC) or alternating current of any other frequencies.

The motor switch is part of the Speed Control Lever. The power is off when the lever is in an "OFF" position.

FOR AUTOMATIC RECORD CHANGE

1. Move the Tandem-Tip Selector Lever to "Std" or "Micro" as explained in the description of the pickup cartridge above.
2. Turn the Record Shelf forward or back for ten- or twelve-inch records. For 7-inch records, turn the Record Shelf forward to the 10-inch position. Place the 7-inch Record Shelf in position with the Record Selector Knob turned to "45" or "33" as required. Move the Pickup Arm to the Spindle, then raise the 7-inch Pickup Arm Rest straight up and return the Pickup Arm to the 7-inch Rest position.
3. With the record ballast weight lifted and turned forward out of position, place up to a 1" stack of records on the spindle so that the bottom record rests on the step of the spindle and on the Record Shelf.
4. Turn the record ballast weight and lower it until it rests on the top record or the 7" Record Shelf.
5. Move the Speed Control Lever to "33⅓", "45" or "78", as required by the record being played. This also turns the motor power on.
6. Move the "Manual-Reject" Control Knob to the "Reject" position, and release it. The control will then drop back into the automatic playing position and the mechanism will continue to operate automatically until the last record is completed. The Pickup Arm will then return to the "Rest" position and the motor will continue to revolve until the Speed Control Lever is turned to an "OFF" position. Seven-inch records will continue to play until the Speed Control Lever is moved to an "OFF" position and the Pickup Arm is lifted to the 7-inch Rest position.
7. To reject any record while playing in the automatic position, move the control knob momentarily to the REJECT position and release.

After the last record has been played, the entire stack may be removed from the turntable at one time. The simplest procedure is as follows:

a. Place the Pickup Arm on the Pickup Arm Rest.
b. Lift and turn the record ballast weight out of position.
c. Place the fingers of both hands under opposite edges of the bottom record.
d. Do not apply pressure to the top record (Keep your thumbs free.)
e. Lift the stack of records straight up, following the contours of the spindle. This permits the stack of records to follow the curve of the spindle without binding and greatly facilitates the removal of the stack.

FOR "MANUAL" RECORD CHANGE

1. Turn the Record Shelf to the "12" position. (This is not essential but permits more clearance in loading and unloading records.)
2. Move the Tandem-Tip Selector Lever to "Std" or "Micro" as required. See the paragraph "Pickup Cartridge".
3. Place a record on the turntable.
4. Move the "Manual-Reject" Control Knob toward the spindle to the "Manual" position, as indicated by the arrow on the Control Knob. No harm will result if the knob is accidentally moved to the "Reject" position. If a twelve-inch record is on the turntable, the arm will automatically index to the edge of the record. If a ten-inch record is on the turntable, the needle will be set down gently on the rubber pad and the arm may be moved to the edge of the record.
5. Move the Speed Control Lever to the proper position as required by the record being played.
6. Place the needle gently on the edge of the record.
7. To stop the mechanism at any time, turn the Speed Control Lever to an "OFF" position.

MODELS 346, 355, 362, 364

SERVICE INFORMATION

All units are accurately adjusted, lubricated and tested at the factory. However, service repairs and adjustments sometimes become necessary. This bulletin should be studied carefully before making any adjustments or replacing parts.

Service parts are available from your Webster-Chicago distributor. All parts must be ordered by piece part number and also record changer model and production number, stamped on the under side of the main plate.

The functions and most probable misadjustments of the main assemblies are as follows (reference numbers refer to the exploded views on pages 12 and 14):

THE AUTOMATIC TRIP FAILS TO FUNCTION

The Main Cam Assembly (32) and Actuating Gear (31) are the heart of the record changer. The Main Cam Assembly drives the mechanism associated with the action of the Pickup Arm (7) and the Record Selector assemblies. It, in turn, is driven by the gear train (28, 29, 30) and the Turntable which is rim driven by the phonograph motor.

The Main Cam Assembly and Actuating Gear is put in motion or "tripped" by means of the "automatic" trip or by the manually operated "reject" trip. When the movement of the Pickup Arm toward the spindle is greater than 1/8" in 1/2 revolution of the turntable, the Automatic Trip Arm (35) trips the Velocity Trip and Roller Assembly (33). This releases the Actuating Pawl on the Main Cam Assembly (32), allowing it to engage the Main Cam Actuating Gear (31) and driving it through the change cycle. The pressure from the Automatic Trip Arm required to actuate the trip mechanism is negligible.

The Automatic Trip Arm follows the movement of the Pickup Arm through a weighted friction clutch (34). This clutch must be kept free of oil and grease. If the clutch does not cause the Automatic Trip Arm to trip the mechanism, clean the clutch parts with carbon tetrachloride. This clutch should operate the trip mechanism without placing undue drag on the movement of the pickup arm.

Also check for:

1. Velocity Trip and Roller Assembly (32) binding.
2. Slight burr on end of the Actuating Pawl or on the underside of the hook end of the Velocity Trip and Roller Assembly.
3. Actuating Pawl stuck (part of Main Cam Assembly (32) engaged by the hook end of the Velocity Trip and Roller Assembly (33).
4. Automatic Trip Arm (35) bent and not hitting the Velocity Trip and Roller Assembly (33).
5. Automatic Trip Arm (35) fails to touch the Velocity Trip and Roller Assembly.
6. Velocity Trip and Roller Assembly (33) rubbing on the underside of the Main Cam Actuating Gear (31).
7. No velocity lead-in groove or eccentric groove in the center of record.

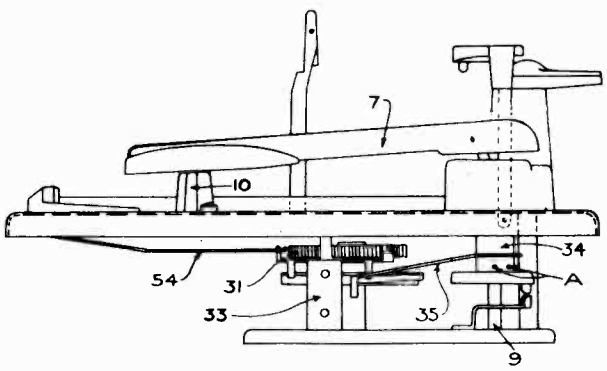
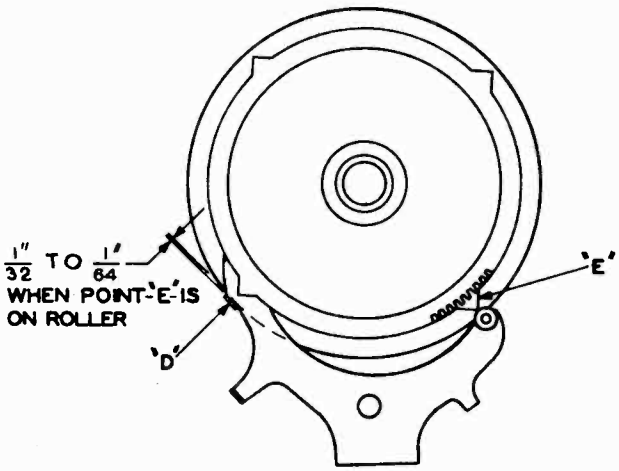


Fig. 1



ADJUST IF NECESSARY BY BENDING AT POINT "D"

Fig. 2

MODELS 346, 355, 362, 364

8. Foreign matter in record groove.
9. Badly worn record.
10. Badly bent or worn needle.

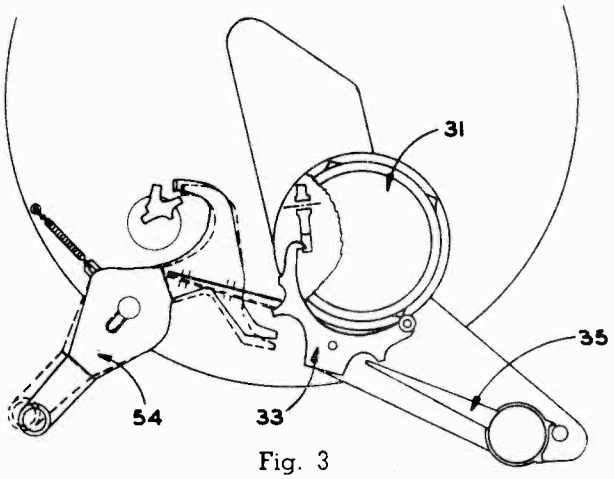


Fig. 3

IF THE "REJECT" TRIP FAILS TO FUNCTION

When the control knob is moved to the extreme REJECT position, the hair spring of the Reject Trip Lever Arm (54) actuates the Velocity Trip and Arm Assembly, putting the change mechanism in cycle. See Fig. 3.

Check for:

1. "Reject" trip hair spring of Lever 54 bent or broken.
2. Velocity Trip and Roller Assembly (33) binding.
3. Actuating Pawl (32) stuck (part of Main Cam Assembly).

IF THE MECHANISM CONTINUES TO CYCLE

At the completion of the change cycle, the Actuating Pawl is disengaged from the Main Cam Assembly Actuating Gear by the hook end of the Velocity Trip and Roller Assembly, which has been returned to its normal position by the reset points on the Main Cam Drive Gear, Fig. 2.

If the clearance between the lip on the Velocity Trip Lever and the edge of the Main Cam is too small, it will prevent the hooked end of the Velocity Trip Lever from engaging the trigger. Adjust the clearance between the lip ("D" of Fig. 2) on the Velocity Trip Lever and the Main Cam to be within $\frac{1}{32}$" and $\frac{1}{64}$" when the roller is contacting the point of one of the reset points on the Actuating Gear.

Also check for:

1. Velocity Trip and Roller Assembly (33) rubbing on Main Cam Actuating Gear (31).
2. Manual Trip Lever (54) binding.
3. "Disengage Roller" broken on Velocity Trip and Roller Assembly (33).

PICKUP ARM LIFT TOO HIGH OR TOO LOW

The vertical movement of the pickup arm is controlled by the angle of the pickup arm raising lever (37 and Fig. 4). The needle should approach the top record of a full 1" stack of records on the turntable with approximately $\frac{1}{16}$" clearance.

To adjust:

1. Put a full 1" stack of records ON THE TURNTABLE.
2. Trip the "Reject" control and rotate the turntable clockwise until the needle clears the top record of the stack by about $\frac{1}{16}$".
3. Be sure the front or 10" notch in the pickup arm raising disc engages the pickup arm raising lever.
4. If the needle does not clear the top record or if it raises too high, adjust by holding the pickup arm raising lever (37) at point X and bending at Y as indicated in Fig. 4.

CAUTION: All adjusting bends should be made slowly, using slight but firm, easy pressure.

Be sure the set screws in the Pickup Arm Raising Disc (36) are not loose and are properly positioned in the alignment holes as explained in the paragraph on Needle Setdown Indexing.

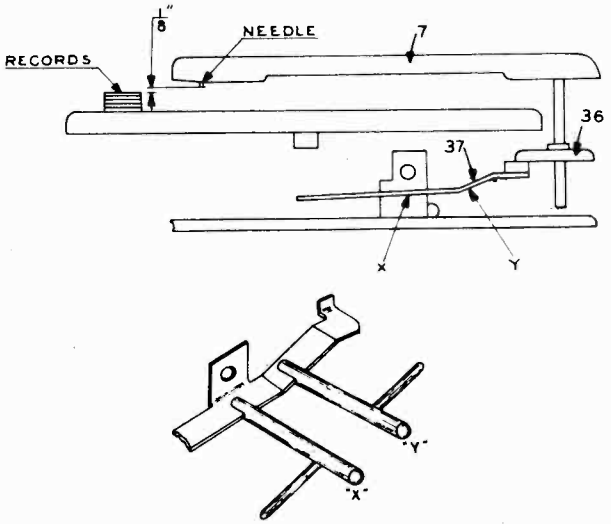


Fig. 4

MODELS 346, 355, 362, 364

NEEDLE SET DOWN POINT INCORRECT

The pickup arm should set the needle down just outside the "lead-in groove" of the record.

The horizontal movement of the pickup arm (7) is controlled by the eccentric excursion of the Pickup Arm Raising Lever (37) moving the Pickup Arm Raising Disc (36) when actuated by the Main Cam Assembly (32). The eccentric screw (part of 8) accessible through the top of the pickup arm (7), should take care of any normal position adjustment. Turn this screw clockwise to index the needle in toward the spindle and counter-clockwise to index the needle out away from the spindle.

Should further adjustment be necessary, proceed as follows:

1. Set the eccentric screw, just mentioned, to a middle position.
2. Set the Record Shelf (4) to the 10" position.
3. Operate the mechanism by revolving the turntable manually until the needle drops to within 1/8" of a ten-inch record on the turntable.
4. Be sure the notch in the Pickup Arm Raising Disc (36) engages the Pickup Arm Raising Lever (37).
5. The No. 8 Bristol set screws "A" of the Pickup Arm Raising Disc (36, Fig. 1) have pointed ends which fit into the off center holes in the Pickup Arm Shaft (9). Alternately loosen one screw and tighten the other until the needle rests above the record lead-in groove at the desired point. Be sure that both set screws are tight when this adjustment is completed.
6. Complete the change cycle of the mechanism and place the pickup arm on the Pickup Arm Rest (10). The tongue of the Pickup Arm Raising Disc (36) should now rest against the post which supports the sub plate assembly. If the pickup arm does not rest in the proper position on the pickup arm rest, bend the tongue closer to or away from this post until the pickup arm is correctly positioned.

   REMEMBER: Always slight but firm, easy bends!
7. Turn the Record Shelf to 12" and check the needle drop on a twelve-inch record. Make any additional adjustments with the eccentric screw mentioned previously.
8. Move the pickup arm to the center of the turntable, trip the mechanism and turn the turntable by hand. Move the pickup arm until the outside or 7" notch of the pickup arm raising disc (36) engages the pickup arm raising lever (37). Continue to revolve the turntable until the arm reaches the end of its outward movement. Raise the 7" pickup arm rest (77) and bend it in or out until it just touches the side of the arm. This adjusts the 7" needle set down point.

ERRATIC INDEXING

Whether the needle sets down in the 10" or the 12" position is controlled through the presence or absence of pressure from the Compression Spring (45), on the Pickup Arm Raising Lever bracket. Pressure forces the stud to travel the inside edge or the outside edge of the groove in the bottom of the Main Cam. The compression on this spring is changed as the Record Shelf is changed from the 10" to the 12" position. Improper adjustment of the spring tension will result in erratic indexing.

In the 12" position, the spring should be just free. In the 10" position the compression of the spring holds the stud of the Pickup Arm Raising Lever against the outside edge of the groove. If the compression tension needs adjustment:

Bend the Metal finger, through which the spring arm (45) fits, to give a "sloppy" fit of spring "45" when the Record Shelf is in the "back" or "12" position.

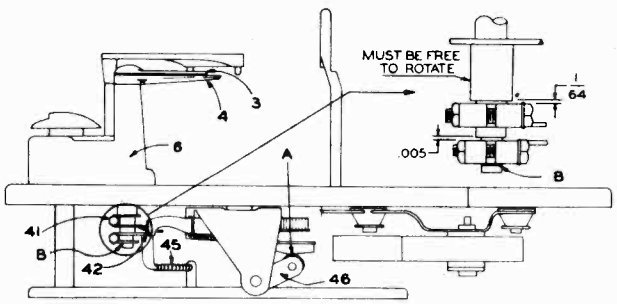


Fig. 5

MORE THAN ONE RECORD IS DROPPED DURING A CHANGE CYCLE

The floating latch at the top of the Record Spindle is so spaced that only one record at a time can slide between the heel of the latch and the step of the spindle. The hole in the latch is elongated so that the latch can slip into the spindle recess when records are being removed.

If more than one record is dropped at a time, it will be found to be due to:

1. Foreign matter in spindle recess causing the latch to stick.
2. Exceptionally thin records.

MODELS 346, 355, 362, 364

CHANGE CYCLE STARTS WHEN NEEDLE TOUCHES RECORD (10" or 7" Records)

1. The velocity trip arm (35) may be too close to lip "B" of velocity trip (33) at the instant of contact of the needle with the record. There should be at least 1/64" clearance between the velocity trip arm and the velocity trip. Carefully bend lip "B" in to provide proper clearance. However, do not in any way bend the velocity trip at any other point. Improper bending may cause binding and constant tripping of the mechanism.

TO ADJUST SPEED SELECTOR LEVER POSITION

1. Loosen set screw of coupling (69).
2. Move idler assembly (67) to 45 rpm position.
3. With the Speed Selector Lever opening over "45" tighten the set screw.

INCORRECT TURNTABLE SPEED

The three speed mechanism and the motor are one assembly. The speed selector idlers (64, 65 and 66) are mounted on a movable metal plate (67) in such a way that moving the Speed Selector Lever (74) moves the correct idler into position between the motor shaft and the Turntable drive idler (78). The tongue of the detent spring (68) fits into indentations in the edge of the metal plate to index the speed selector idlers and hold them firmly in the desired position.

"OFF" indentations between each speed position hold the idlers away from the motor shaft and the Turntable idler when the Speed Selector Lever is in an "off" position.

If the Turntable speed is incorrect, check for:

1. Turntable Idler (78) cocked at an angle. Bend the wheel and shaft to straighten wheel. CAUTION: Do not bend idler (78) toward the speed selector idlers (64, 65, 66). Bend only sideways or away from the small idlers.
2. The idler mounting assembly (part of motor assembly 49) must not bind. There should be at least 1/64" play at point "A". Bend the raised metal stop if more clearance is needed.
3. The entire motor assembly (49 plus 67, etc.) should be free floating. There should be slight play of the Speed Control Lever (70) between the "78" and "33" positions and the stops at the end of the speed selector dial. If there is any binding, loosen set screw of coupling (69) and retighten with the tongue of the detent spring (68) in the proper position.

ERRATIC SPEED (WOW)

Remove any dirt or excess flocking from the inside rim of the turntable. Check the rubber idler wheel for a flat spot or "out of round".

If the rubber part of either Drive wheel becomes slick and shiny — Replace.

STALLS DURING CHANGE CYCLE

See Above.

GLIDE-IN ON 12" RECORDS

The term "glide-in" is used to describe the action of the pickup arm and needle when the needle does not sit down smoothly in the first groove of the record, despite accurate indexing adjustments, but seems to glide over the first two or three grooves before seating itself properly. If glide-in occurs:

1. Check tension of compression spring (45). The spring should be free in 12" position at the moment the needle sets down on the record.
2. Remove any cause of friction in index lever (45) by bending the "eye" of (37).
3. On Model 355, pulling the metal base up snug to the main plate may put too much tension on the compression spring (45). Be certain spring (45) is very free.
4. The pickup cord may be dressed too tight or in such a manner that it interferes with the free movement of the pickup arm. Make certain there is sufficient play in the pickup cord.

SLIDE-IN OR NEEDLE JUMPS GROOVES

Slide-in describes the condition where the needle will touch the first groove of the record properly but will jump the grooves forward or back as though the needle pressure was too light.

To correct slide-in, check for:

1. Incorrect needle tip. The standard tip will be especially likely to jump grooves of a microgroove record. Be certain the "micro" tip is used for either the 33⅓ or 45 rpm microgroove records.
2. Chipped or damaged needle.
3. Tight pickup cord.

RECORD FAILS TO DROP

The record must leave the spindle step just prior to or at least by the time it leaves the record shelf. If the spindle is too far from the record shelf, the record will hang up on the spindle step and fail to drop.

To adjust.

With a rubber mallet, hit the part of the housing (6) which covers the push-off assembly (3 and 4) hard enough to jar it nearer or farther away from the spindle. With a record on the spindle and record shelf there should be about 1/16" clearance between the push-off blade (3) and the record.

MODELS 346, 355, 362, 364

CHANGE CYCLE STARTS BEFORE END OF RECORD

If the Trip Assembly chatters while the changer is running or if the changer cycles before the entire record is played, there is probably insufficient clearance between the hook end of the Velocity Trip and Roller Assembly and the actuating gear. This clearance should be adjusted to be within $\frac{1}{32}$" to $\frac{1}{64}$" by bending the lever at point "C" as shown in Fig. 6.

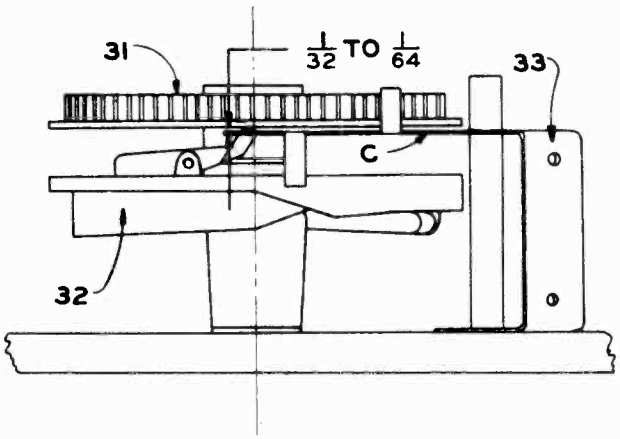


Fig. 6

LAST RECORD REPEATS

The weight of the records on the Spindle keeps the Automatic Shut Off Lock Lever (59) from dropping and engaging the Pickup Arm Raising Disc. The dropping of the last record releases the Automatic Shut Off Lock Lever, permitting it to engage the Pickup Arm Raising Disc and prevent the Pickup Arm from moving onto the record. The Pickup Arm then comes to rest on the Rest Button.

If the last record continues to play:

1. Check the Spindle to be sure that it moves up and down freely.
2. With no records on the Spindle, and with the mechanism at rest, the hook "D" of the Automatic Shut Off Lock Lever (59) should clear the top of the Pickup Arm Raising Disc by $\frac{1}{32}$". Adjust, if necessary, by bending the Automatic Shut Off Lock Lever slightly.

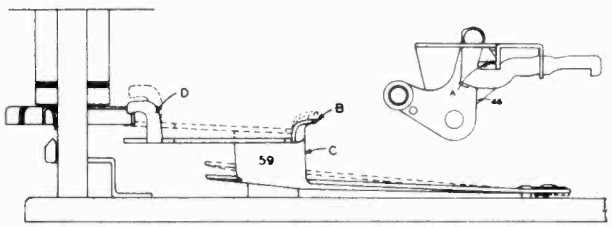


Fig. 7

LAST RECORD WILL NOT PLAY

As explained above, the weight of records on the spindle prevents the Automatic Lock Lever (59) from dropping. As the Cam Lever and Bracket assembly (46) moves forward to engage the Push-off Blade Actuating Lever (42), Fig. 5, point A of the Cam Lever (46), Fig. 7 should also move forward under point B of the Automatic Shut Off Lock Lever (59) to make certain it does not drop until the last record has dropped to the turntable and the Pickup Arm is in position to play. If point A does not engage point B, the Lock Lever (59) will drop to engage the Pickup Arm Raising Disc (36) and the Pickup Arm will return to the rest position without playing the last record.

To adjust, bend B so they engage properly. It may be necessary to bend (46) at point C, then readjust point D so it engages the Pickup Arm Raising Disc (36) correctly.

REPLACEMENT OF PARTS

TO REPLACE THE PICKUP ARM

1. Unhook the pickup arm hinge clip (8) and raise the arm to a vertical position.
2. Remove the two mounting screws. Remove the pickup arm.
3. Attach the new arm.

The weight of the arms is uniform so the needle pressure adjustments should be left alone.

REPLACE PICKUP ARM BRACKET AND SHAFT ASSEMBLY

1. Loosen Bristol screws in Pickup Arm Raising Disc (36).
2. Remove Disc washer (55), Automatic Trip Arm (35) and Clutch (34) by sliding them off the bottom of the Pickup Arm Shaft (9) and pull shaft out of changer from above.

To replace, reverse the procedure and adjust the Pickup Arm Raising Disc for proper indexing as explained on page 7.

TO REPLACE THE CARTRIDGE

1. Remove the two mounting screws, one on each side of the cartridge, and carefully remove pickup cord tips from cartridge pins.
2. Remove the old cartridge and replace with the new one.

Be certain the cartridge is parallel with the side of the pickup arm.

TO REPLACE THE NEEDLE

1. Loosen the needle set screw, using a small screw driver.
2. Remove the needle.
3. Insert the new needle with the flat side of the needle toward the set screw. Be sure the needle shank is all the way in to the bottom of the needle hole.
4. Tighten the set screw. The needle point should be parallel to the sides of the needle slot and evenly spaced between the walls of the slot.

TO REPLACE THE MOTOR

It is not necessary to replace the entire Three Speed mechanism when replacing the motor. However, it is necessary to remove the entire assembly from the main plate and then remove the motor from the assembly.

1. Remove the entire assembly by removing mounting screws (53) and retaining clip (23, part of 69).
2. Remove the Turntable Drive Wheel (78), the detent spring (68) and tension spring (74).
3. Remove the Three Speed mechanism plate assembly (67). Do not remove the small idler wheels (64, 65, 66) from the plate.
4. Reassemble new motor to the Three Speed Mechanism plate and the entire assembly to the main plate.
5. It may be necessary to adjust the play of the Three Speed Mechanism mounting plate "C" (part of the motor 49), so there is proper play between the sliding stop and the metal stop at point "A" (see page 13). The mounting plate should be free, approximately $\frac{1}{64}$" clearance between the sliding stop and point "A". The Speed Selector Lever (74) should be in the "78" position when making this adjustment. See paragraph 2 of "Incorrect Turntable Speed"

LUBRICATION

Model 346 Record Changers leave the factory completely oiled and lubricated. Under normal conditions this should be sufficient for approximately one year or 1,000 hours of operation. When operated under extreme conditions of dust or heat, this operation should be performed more frequently as required.

Do not permit any oil or grease to get on the rubber Idler Drive Wheel or the Motor Sleeve, on Turntable Drive Rim or on the Automatic Trip Arm clutch. Any oil or grease on these points should be removed using Carbon Tetrachloride. The recommended lubricants and points of lubrication are as follows:

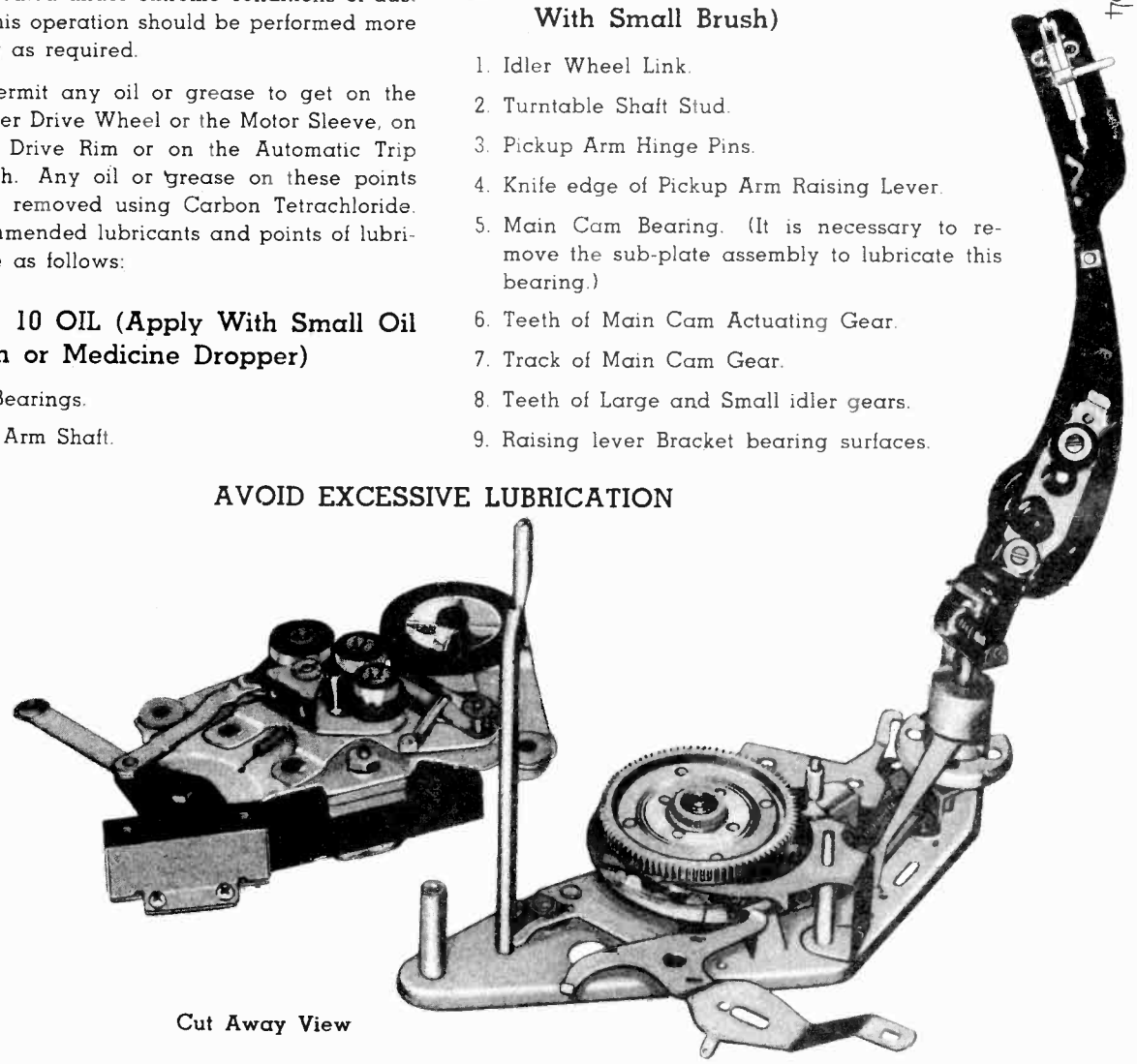
A — No. 10 OIL (Apply With Small Oil Can or Medicine Dropper)

1. Motor Bearings.
2. Pickup Arm Shaft.
3. Ball Bearing Assembly.
4. Idler Wheel Felt.

B — A NON FLUID LUBRICANT (Apply With Small Brush)

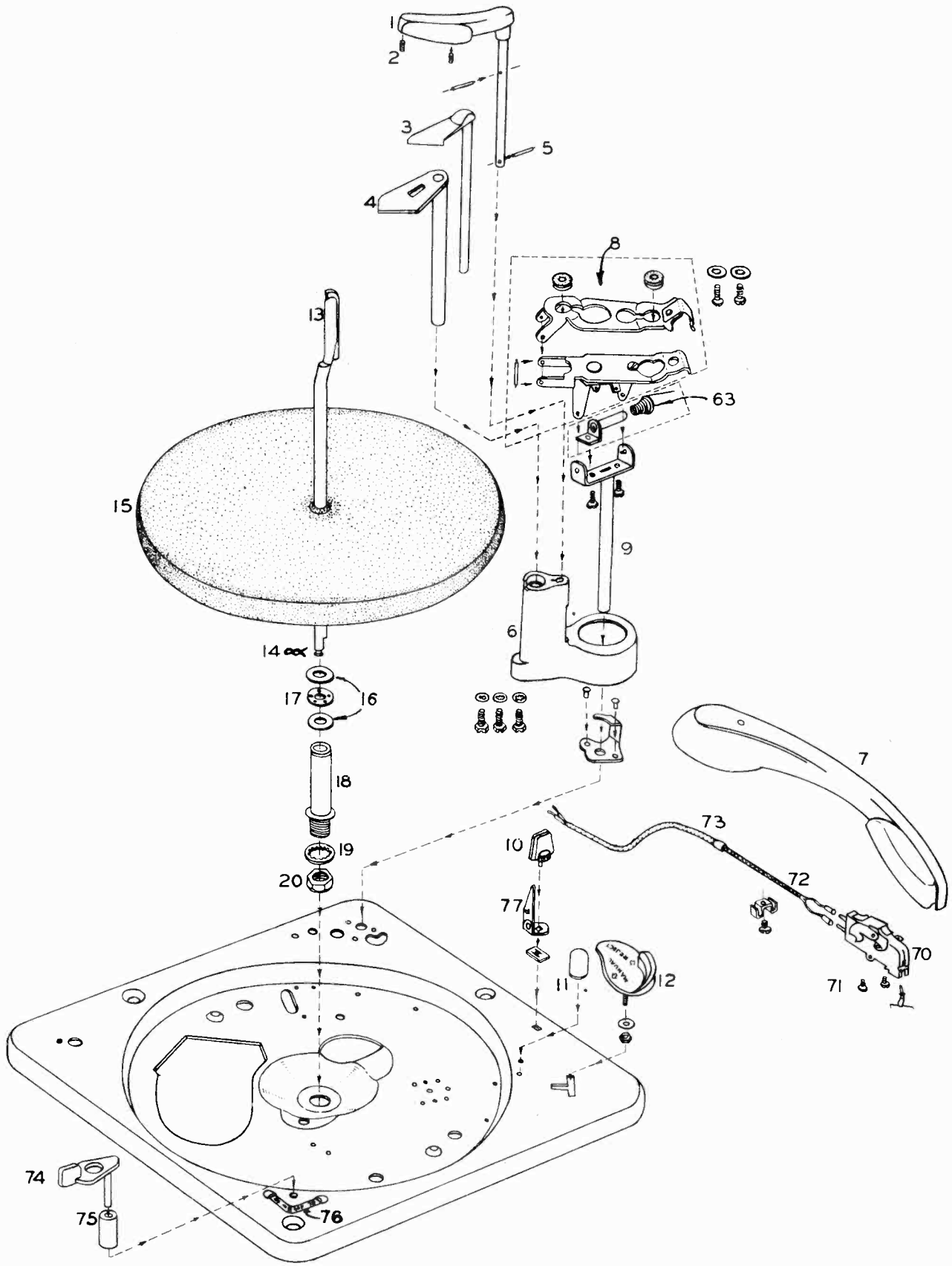
1. Idler Wheel Link.
2. Turntable Shaft Stud.
3. Pickup Arm Hinge Pins.
4. Knife edge of Pickup Arm Raising Lever.
5. Main Cam Bearing. (It is necessary to remove the sub-plate assembly to lubricate this bearing.)
6. Teeth of Main Cam Actuating Gear.
7. Track of Main Cam Gear.
8. Teeth of Large and Small idler gears.
9. Raising lever Bracket bearing surfaces.

AVOID EXCESSIVE LUBRICATION



Cut Away View

MODELS 346,
355, 362, 364



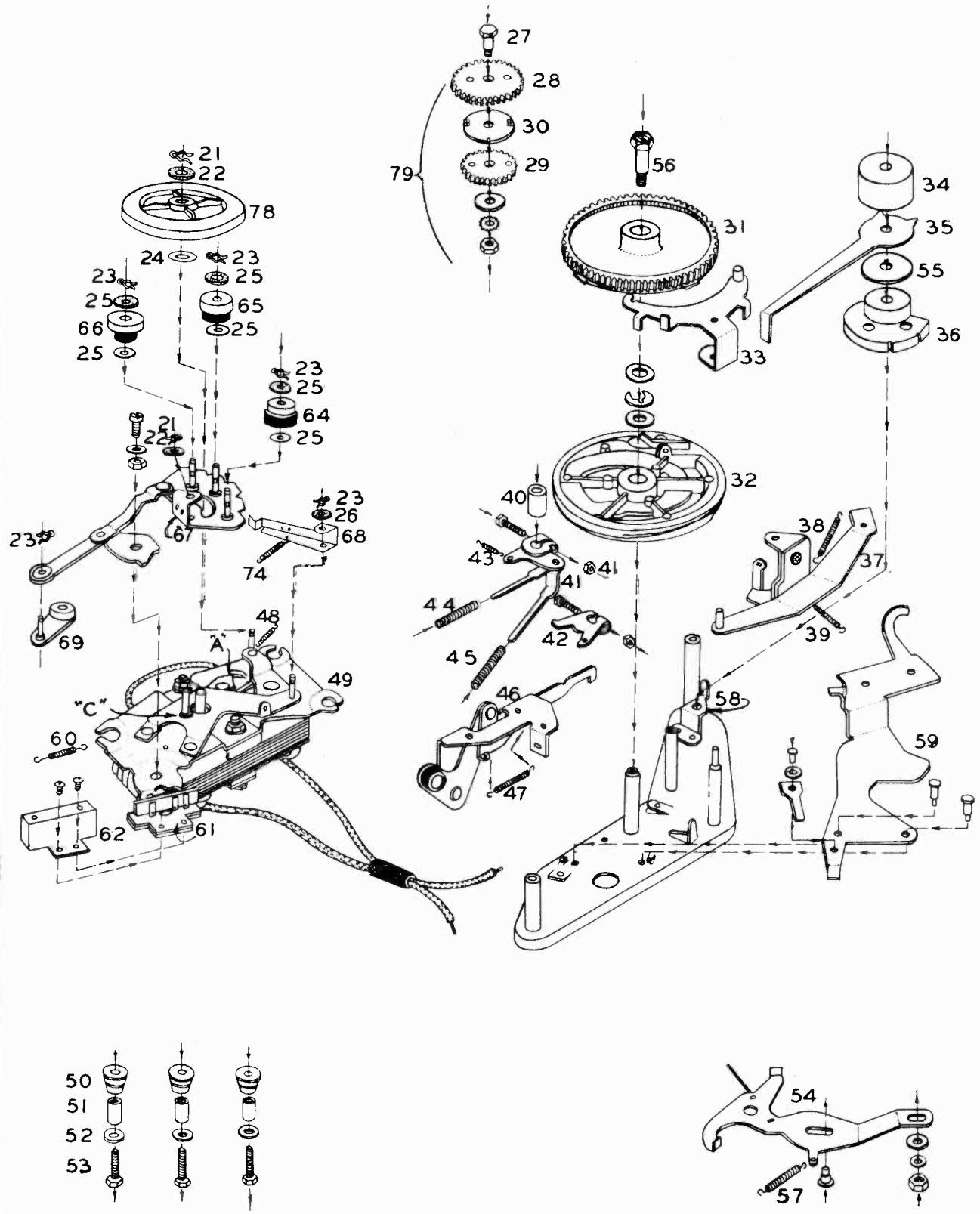
Exploded View above Main Plate

MODELS 346,
355, 362, 364

REPLACEMENT PARTS LIST

Illustration No.	*Part No.*	*Description*
1	42X196	Record Weight Assembly
2	24P013	Record Weight Cushion
3	42X183	Push Off Blade
4	42X184	Record Shelf
5	27P157	Record Weight Groove Pin
6	42P199	Housing
7	49X123	Pickup Arm
8	21X283	Pickup Arm Hinge Assembly
9	11X385	Pickup Arm Shaft
10	49P099-C	Pickup Arm Rest
11	24P004-C	Needle Pad
12	49X089-C	"Reject-Manual" Lever
13	11X358	Spindle
14	50P204	Spindle Retainer Clip
15	11X292-C	Turntable
16	25P269	Bearing Race Washer
17	11X058	Bearing Race
18	41P414	Turntable Bearing
19	25P333	Turntable Bearing Lock Washer
20	26P687	Turntable Bearing Nut
63	11X386	Pickup Arm Counterbalance Spring
70		Cartridge
71	26P474	Cartridge Mounting Screw
72	20X1264-4	Light Pickup Cord Assembly — Internal
73	20P811-60	Heavy Pickup Cord Assembly — External
74	42X205	Speed Selector
75	41P669	Bushing
76	78P454	Speed Indicator
77	11X481	7" Rest Assembly

MODELS 346, 355, 362, 364



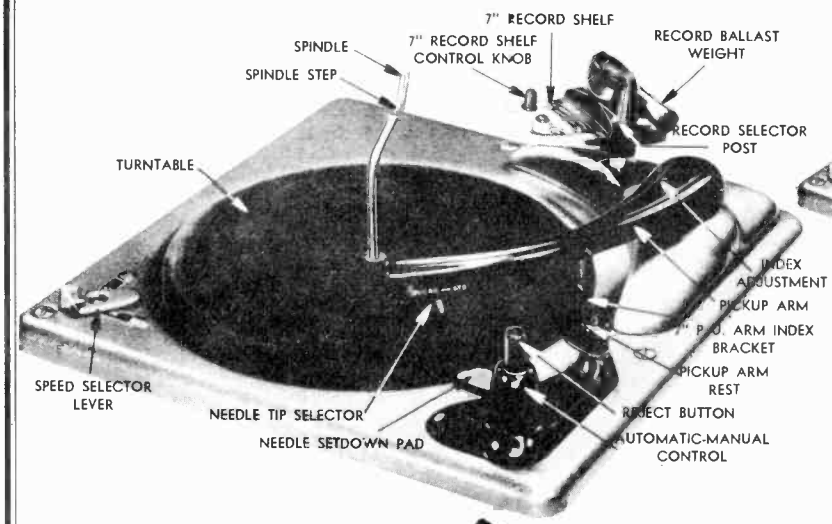
Exploded View below Main Plate

MODELS 346,
355, 362, 364

REPLACEMENT PARTS LIST

Illustration No.	*Part No.*	*Description*
21	50P125	Spring Clip
22	25P030	Felt Washer
23	50P034	Spring Clip
24	25P046	Fibre Washer
25	25P406	Fibre Washer
26	25P407	Felt Washer
27	41P333	Shoulder Screw
28	47P024	Large Idler Gear
29	47P023	Small Idler Gear
30	45P342	Idler Gear Coupler
31	11X032	Trip Resetting Gear Assembly
32	11X033	Cam and Trigger Assembly
33	11X320	Velocity Trip
34	41P576	Velocity Trip Clutch Weight
35	45P568	Automatic Trip Arm
36	11X227	Pickup Arm Raising Disc
37	11X046	Pickup Arm Raising Lever
38	46P044	Tension Spring
39	46P139	Tension Spring
40	41P607	Spacer
41	11X287	Lever and Toggle Assembly
42	11X312	Push-off Blade Actuating Lever
43	46P162	Tension Spring
44	46P151	Compression Spring
45	46P152	Compression Spring
46	11X319	Cam Lever and Bracket Assembly
47	46P158	Tension Spring
48	46P134	Idler Link Tension Spring
49	17X467	Motor and Top Bridge Assembly
50	25P363	Motor Shock Mounts
51	41P592	Motor Mount Sleeve
52	25P367	Motor Mount Washer
53	26P110	Motor Mount Bolt
54	11X291	Trip Lever and Wire Assembly
55	23P009	Friction Disc
56	41P333	Stud Mounting Screw
57	46P117	Tension Spring
58	45P347	Pickup Arm Pivot Bracket
59	11X316	Automatic Shut Off Lock Lever
60	46P139	Tension Spring
61	32P054	Switch and Bracket Assembly
62	45P819	Switch Cover
64	11X456	Drive Wheel — 33⅓ R.P.M.
65	11X458	Drive Wheel — 45 R.P.M.
66	11X460	Drive Wheel — 78 R.P.M.
67	17X464	Index Plate and Cam Assembly
68	45P817	Index Lock Lever
69	17X466	Hub and Lever Assembly
78	11X366	Idler Wheel
79	11X132	Complete Gear Assembly
80	50P221	Turntable Retaining Ring

MODELS 356-1, 356-27, 357-1



Model 356-1

Model 356-27

Model 357-1

DESCRIPTION

The Webster-Chicago Model 356-1 basic mechanism is a three speed, single post, spring cushioned spindle, automatic record changer. Simple in design and operation it provides automatic playing of up to a 1" stack of 7", 10" or 12" records at speeds of 33⅓, 45 or 78 rpm.

Model 356 returns the pickup arm to the rest position after playing the last 10" or 12" record, although the motor continues to revolve until the Speed Selector Lever is moved to the nearest "OFF" position. Two "OFF" positions are available for ease of operation. The idler wheel is also pulled away from the motor shaft when the Speed Control Lever is in an "OFF" position, eliminating the possibility of a flat spot developing on the rubber wheel.

The last 7" record of a stack continues to play until the Speed Selector Lever is moved to one of the "OFF" positions and the Pickup Arm moved from the record to the Rest Position.

Automatic playing of 7" records is made possible by a simple, ingenious 7" record shelf which is easily placed on the Record Selector Post and by a movable 7" Pickup Arm Rest which can be swung into or out of position.

Model 356 also features the exclusive Webster-Chicago Velocity-Trip Mechanism. The pickup arm is not actuated by "lead-in" springs and there is a minimum of lateral pressure. The arm travels freely in either direction. This lack of lateral pressure or inertia adds immeasurably to the life of records and is considered to be as important as extra-light vertical pressure. The free-floating arm permits "home recordings" or "inside out" records up to 12" size to be played manually. Model 356 will change warped or rough-edged records, at the same time assuring maximum protection to the finest discs.

Model 356-27 is the same as Model 356-1 except for the pickup arm. The special pickup arm on this model is provided with two interchangeable plug-in Heads in which the General Electric Variable Reluctance Cartridges can be mounted. The Brown head and the brass weight are for use with the RPX-040 General Electric Cartridge. The Red head is for use with the RPX-041 General Electric Cartridge. Use the RPX-041 for the 33⅓ rpm and 45 rpm records.

Model 357 is a Model 356 mounted on an attractive metal base.

These service instructions apply to all three models.

PICKUP CARTRIDGE

The special pickup cartridge of Model 356-1 and Model 357 has a replaceable Tandem-Tip Needle. The lever on the cartridge is moved to "Std" or "Micro", as indicated on the pickup arm, to lower the proper point into playing position. All 78 rpm and some 33⅓ rpm records including "Books for the Blind", require the "Standard" point. The 33⅓ rpm Microgroove and 45 rpm records require the "Micro" point.

The special cartridge has been designed to play 78 rpm as well as 45 rpm and 33⅓ rpm records at very light needle pressures.

Model 356-27 uses the General Electric cartridges as previously explained in the Description.

MODELS 356-1, 356-27, 357-1

OPERATION

MOTOR

Connect the motor cord to a source of 105-120 volt 60-cycle current only. If it is desired to operate the changer on 50-cycle current, a special motor shaft sleeve must be used in order to drive the turntable at the required speed.

Do not under any circumstances connect the motor to a source of direct current (DC) or alternating current of any other frequencies. The motor switch is part of the Speed Control Lever. The power is off when the lever is in an "OFF" position.

FOR AUTOMATIC RECORD CHANGE

1. Move the Tandem Tip Needle Selector to "Std" or "Micro" or plug-in the correct Head as explained in the description of the pickup cartridge above.
2. Turn the Record Selector Post to "10" or "12" for the ten- or twelve-inch records. The Record Selector Post is pivoted and turns in a counterclockwise direction to the 10" posittion as indicated by the arrows. Do not use the Ballast Weight (see Illustration, Page 1) as a handle to turn the post. Turn by grasping the head of Record Selector Post with the thumb and forefingers. For 7" records, turn the Record Selector Post to "10". Move the pickup arm toward the center of the record until it touches the spindle. Move the 7" pickup arm rest into position and return the pickup arm to the 7" rest position. Place the 7" record shelf on the record selector post, as illustrated, with the control knob of the record shelf turned to "45" or 33" as required.
3. Turn the Manual-Automatic Switch (sleeve of Reject button) to AUTOMATIC.
4. With the Record Ballast Weight turned back, place up to a 1" stack of records on the spindle so that the bottom record rests on the step of the spindle and the shelf of the Record Selector Post or 7" Record Shelf.
5. Turn the Record Ballast Weight forward to rest on the top record or the 7" adapter.
6. Move the Speed Selector Lever to "33⅓", "45" or "78", as required by the record being played. This also turns the power on.
7. Press the Reject buttom to start the changer.

   To reject any record while playing in the AUTOMATIC position, press the Reject button.

   NOTE: After the last record has been played, the Pickup Arm should not be touched until it has come to rest on the "Rest" button or has dropped to a normal playing position on the record.
8. After the last record has been played, the entire stack may be removed from the turntable at one time. The simplest procedure is as follows:
   a. Turn the Record Ballast Weight back out of position.
   b. Place the fingers of both hands under opposite edges of the bottom record.
   c. Do not apply pressure to the top record. (Keep your thumbs free.)
   d. Lift the stack of records straight up, following the contours of the spindle. This permits the stack of records to follow the curve of the spindle without binding and greatly facilitates the removal of the stack.

FOR "MANUAL" RECORD CHANGE

1. Turn the Record Selector Post to the "12" position. (This is not essential but permits more clearance in loading and unloading records.)
2. Turn the Selector Switch (sleeve of Reject Button) to MANUAL.
3. Place a record on the turntable. It may facilitate this operation if 10" and 12" records are placed over the spindle at an angle, with one edge of the records held below the level of the Record Selector Post Shelf. Records may be removed in the same manner.
4. Move the Speed Selector Lever to the proper position as required by the record being played.
5. Move the Tandem-Tip Selector to "Std" or "Micro" as explained in the description of the pickup cartridge.
6. Place the needle gently on the edge of the record. Do not lift the pickup arm too high as this will cause it to catch in the Automatic Stop Lock position.
7. To stop the mechanism at any time, turn the Speed Selector Lever to an "OFF" position.

MODELS 356-1, 356-27, 357-1

SERVICE INFORMATION AND ADJUSTMENTS

All units are accurately adjusted, lubricated and tested at the factory. However service repairs and adjustments sometimes become necessary. This bulletin should be studied carefully before making any adjustments or replacing parts.

Service parts are available from your Webster-Chicago distributor. All parts must be ordered by piece part number and also record changer model and production number, stamped on the under side of the main plate.

The functions and most probable misadjustments of the main assemblies are as follows (reference numbers refer to the exploded view on pages 12 and 14):

THE AUTOMATIC TRIP FAILS TO FUNCTION

The Main Cam Assembly (38) and Actuating Gear (36) are the heart of the record changer. The Main Cam Assembly drives the mechanisms associated with the action of the Pickup Arm (5) and the Record Selector assemblies. It, in turn, is driven by the gear train (29, 30, 31) and the Turntable which is rim driven by the phonograph motor.

The Main Cam Assembly and Actuating Gear is put in motion or "tripped" by means of the "automatic" trip or by the manually operated "reject" trip. When the movement of the Pickup Arm toward the spindle is greater than ⅛" in ½ revolution of the Turntable, the Automatic Trip Arm (33) trips the Velocity Trip and Roller Assembly (37). This releases the Actuating Pawl on the Main Cam Assembly (38), allowing it to engage the Main Cam Actuating Gear (36) and driving it through the change cycle. The pressure from the Automatic Trip Arm required to actuate the trip mechanism is negligible.

The Automatic Trip Arm (33) follows the movement of the Pickup Arm through a weighted friction clutch (32). This clutch must be kept free of oil and grease. Should it become necessary, clean the clutch parts with carbon tetrachloride. This clutch should operate the trip mechanism without placing undue drag on the movement of the pickup arm.

Also check for:

1. Velocity Trip and Roller Assembly binding.
2. Slight burr on end of the actuating pawl or on the underside of the Velocity Trip hook.
3. Actuating Pawl stuck (part of Main Cam Assembly (38) engaged by the hook end of the Velocity Trip and Roller Assembly (37).
4. Automatic Trip Arm (33) bent and not hitting the Velocity Trip and Roller Assembly (37).
5. Automatic Trip Arm (33) fails to touch the Velocity Trip and Roller Assembly.
6. Velocity Trip and Roller Assembly (37) rubbing on the underside of the Main Cam Actuating Gear (36).
7. No velocity lead-in groove or eccentric groove in the center of record.
8. Foreign matter in record groove.
9. Badly worn record.
10. Badly bent or worn needle.

IF THE "REJECT" TRIP FAILS TO FUNCTION

When the "On" button is pressed, the hair spring of the "reject" trip lever arm (65), actuates the Velocity Trip and Arm Assembly, putting the change mechanism in cycle.

Check for:

1. "Reject" trip hair spring of Lever (65) bent or broken.
2. Velocity Trip and Roller Assembly (37) binding.
3. Actuating Pawl (part of Main Cam Assembly 38) stuck.

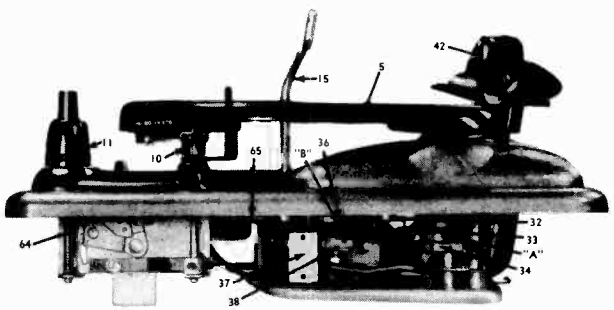


Fig. 1

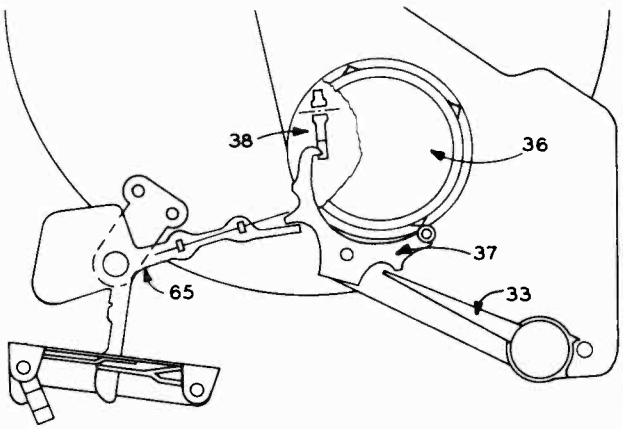


Fig. 2

MODELS 356-1,
356-27, 357-1

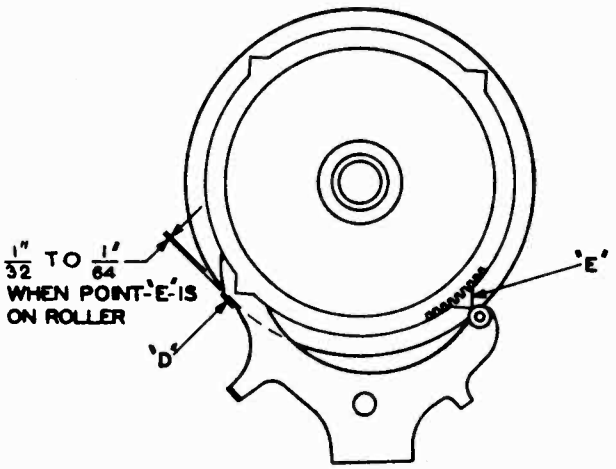
IF THE MECHANISM CONTINUES TO CYCLE

At the completion of the change cycle, the Actuating Pawl is disengaged from the Main Cam Assembly Actuating Gear (36) by the hook end of the Velocity Trip and Roller Assembly (37) which has been returned to its normal position by the reset points on the Main Cam Drive Gear (Fig. 3). This hook should be adjusted for about 1/64" clearance from the bottom of the Main Cam Drive Gear (36), Fig. 1. Greater clearance may permit the pawl to bounce past the hook and re-engage, causing the mechanism to continue to cycle.

If the clearance between the lip on the Velocity Trip Lever and the edge of the Main Cam is too small, it will prevent the hook end of the Velocity Trip Lever from engaging the trigger. Adjust the clearance between the lip (D, Figs. 3 and 5) on the Velocity Trip Lever of the Main Cam to be within 1/64" when the roller is contacting the point of one of the protrusions on the Actuating Gear.

Also check for:

1. Velocity Trip and Roller Assembly (37) rubbing on Main Cam Actuating Gear (36).
2. Manual Trip Lever (65) binding.
3. "Disengage Roller" broken on Velocity Trip and Roller Assembly (37).



ADJUST IF NECESSARY BY BENDING AT POINT "D".

Fig. 3

PICKUP ARM LIFT TOO HIGH OR TOO LOW

The vertical movement of the pickup arm is controlled by the angle of the Pickup Arm Raising Lever (40), Fig. 4. The needle should approach the top record of a full stack of 10" records on the turntable with approximately 1/16" clearance.

To adjust:

1. Put a full stack of 10" records ON THE TURNTABLE.
2. Press the "On" button and rotate the Turntable clockwise until the needle clears the top record of the stack by about 1/16".
3. Be sure the notch in the Pickup Arm raising disc (34) engages the pickup arm raising lever (40).
4. If the needle does not clear the top record or if it raises too high, adjust by bending the pickup arm raising lever at the point indicated in Fig. 4 Y.

CAUTION: All adjusting bends should be made slowly, using slight but firm, easy pressure.

Be sure the set screws (A of Fig. 1) of the pickup arm raising disc are not loose and are properly positioned in the alignment holes as explained in the paragraph on Needle Setdown Indexing.

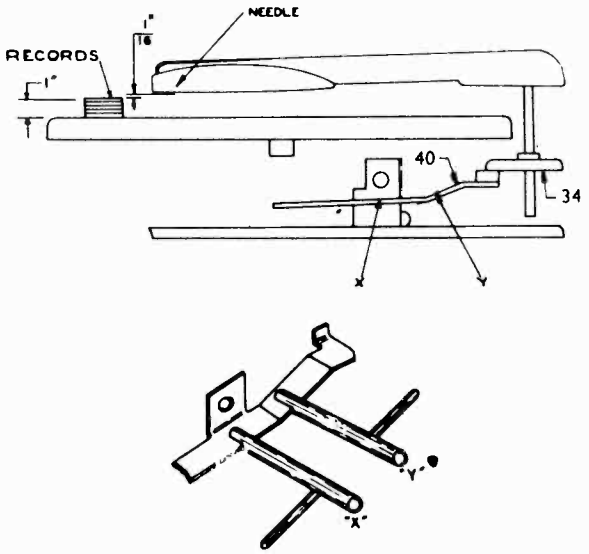


Fig. 4

NEEDLE SET DOWN INDEXING INCORRECT

The horizontal movement of the pickup arm (5) is controlled by the eccentric excursion of the Pickup Arm Raising Lever (40) moving the Pickup Arm Raising Disc (34) when actuated by the Main Cam Assembly (38). The eccentric screw (part of 6), accessible through the top of the pickup arm (5), should take care of any normal position adjustment. Turn this screw clockwise to index the needle in toward the spindle and counter-clockwise to index the needle out away from the spindle.

Should further adjustment be necessary, proceed as follows:

1. Set the eccentric screw, just mentioned, to a middle position.
2. Set the Record Selector Post (42) to the 10" position.
3. Operate the mechanism by revolving the Turntable manually until the needle drops to within 1/8" of a 10" record on the turntable.
4. Be sure the notch in the Pickup Arm Raising Disc (34) engages the Pickup Arm Raising Lever (40).

5. With a No. 8 Bristol wrench in each of the set screws of the Pickup Arm Raising Disc (35) as indicated in A, Fig. 1, alternately loosen one screw and tighten the other until the needle rests above the record lead-in groove at the desired point.
6. Complete the change cycle of the mechanism and position the Pickup Arm on the rest button (10). If necessary, bend the tongue of the Pickup Arm Raising Disc closer to or away from the Base Plate Post until the Pickup Arm is correctly seated on the rest button when the tongue is touching the Base Plate Post.

NOTE: All adjusting bends should be slight but firm, easy bends.

CHANGE CYCLE STARTS BEFORE END OF RECORD

If the trip assembly chatters while the changer is running, or if the changer cycles before the entire record is played, there is probably insufficient clearance between the hook end of the Velocity Trip and Roller Assembly (37) and the Actuating Gear (36). This clearance should be adjusted to be within $\frac{1}{32}$" to $\frac{1}{64}$" by bending the lever at point "C" shown in Fig. 5.

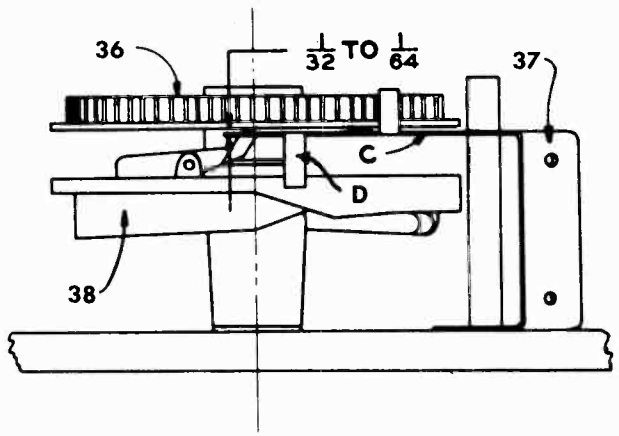


Fig. 5

MORE THAN ONE RECORD IS DROPPED DURING A CHANGE CYCLE

The floating latch at the top of the Record Spindle is so spaced that only one record at a time can slide between the heel of the latch and the step of the spindle. The hole in the latch is elongated so that the latch can slip into the spindle recess when records are being removed.

If more than one record is dropped at a time, it will be found to be due to:

1. Foreign matter in spindle recess causing the latch to stick.
2. Exceptionally thin records.

RECORD DROPS ON PICKUP ARM

As the change cycle is started, the first motion of the inclined outer bottom surface of the Main Cam (38) causes the Record Selector Post (42) to move toward the Spindle about $\frac{3}{32}$ inch. This position is maintained until the Pickup Arm has made its full outward lateral excursion at which time the Record Selector Post again moves toward the spindle, causing the bottom record to drop into playing position.

If the Record Selector Post (42) has been bent back, away from the Record Spindle, it is possible for a standard record to rest on the spindle step with its edge just over the edge of the Record Selector Post shelf. Then as the change cycle is started, the record is pushed off the spindle by the initial movement of the Record Selector Post, so that it drops on the Pickup Arm.

To correct this condition, the Rocker Arm Assembly must be adjusted so that the Record Selector Post is brought nearer to the spindle. This adjustment is made in the following manner:

1. With the mechanism at rest, remove the Turntable and replace the Record Spindle. Set the Record Selector Post to the position for playing 12-inch records and place a 12-inch record on the Record Spindle.
2. Insert a short screwdriver through the motorboard opening into the screw slot as shown at "A" in Fig. 6. Clockwise rotation of the screw will increase the distance between the Record Spindle and the Record Selector Post; counterclockwise rotation will decrease it.

It is recommended that the distance between the edge of the record and the step of the Record Selector Post be held to just over $\frac{1}{32}$ of an inch so that records with rough or sharply beveled edges will not catch on the outer edge of the Record Selector Post.

CAUTION: Be certain that a standard size record is used in making this adjustment. A standard 10" record measures $9\frac{7}{8}$" ± $\frac{1}{32}$" diameter. A standard 12" record measures $11\frac{7}{8}$" ± $\frac{1}{32}$" diameter.

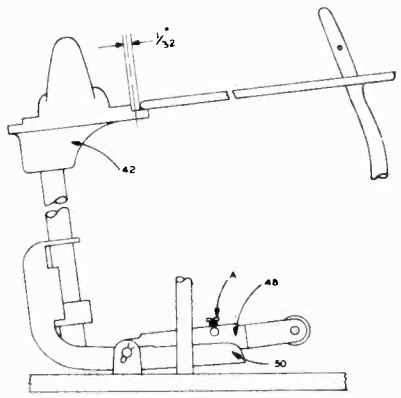


Fig. 6

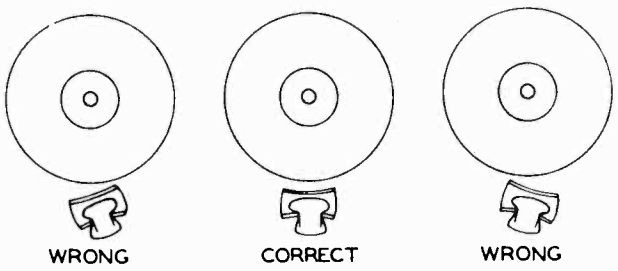
MODELS 356-1, 356-27, 357-1

PUSH OFF POST ANGLE INCORRECT

The Record Selector Post should be adjusted so that the curve of the shelf matches the curve of the record. See Fig. 7.

To adjust this angle:

1. Turn the Record Selector Post to the "10" position.
2. Place a ten-inch record on the Spindle in the normal position for automatic playing.
3. With a No. 8 Bristol wrench in each of the set screws (point A, Fig. 7), alternately loosen one and tighten the other until the Record Selector post angle is correct. Be sure that both set screws are tight at the completion of this adjustment.



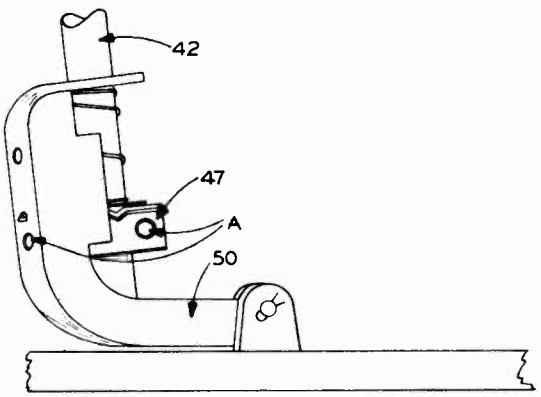


Fig. 7

ERRATIC INDEXING

Indexing in the 10" or the 12" position is controlled through the presence or absence of pressure from the Compression Spring (47A) on the Pickup Arm Raising Lever (40). The compression on this spring is changed as the Record Selector Post (42) is changed to the 10" or 12" position. Improper adjustment of the spring tension will result in erratic indexing. In the 12" position, the spring should be just free. In the 10" position, the compression of the spring holds the stud of the Pickup Arm Raising Lever (40) against the outside edge of the groove, forcing the stud to travel the inside edge or the outside edge of the groove in the bottom of the Main Cam (38).

To adjust:

Bend the slotted arm (part of 40) for proper tension and smooth clearance of the spring guide arm (47).

LAST RECORD DOES NOT PLAY

The weight of the records on the Spindle keeps the Automatic Shut Off Lock Lever (44) from dropping and engaging the Pickup Arm Raising Disc (38), thus permitting the mechanism to continue to cycle.

The Push Off Post (50) moves forward slightly at the beginning of each change cycle. The bracket "B" on this post is then underneath the elevated hook "A" on the Automatic Shut Off Lock Lever (44). This forward movement takes place before the last record drops so the change cycle should continue. However the dropping of the last record releases the Automatic Shut Off Lock Lever, permitting it to drop and shut off the mechanism when the change cycle starts after the last record.

If the last record does not play:

1. Bend the elevated hook "A", Fig. 8 forward so that it will overlap the Push Off Post bracket "H" about 1/32" with a record on the spindle.

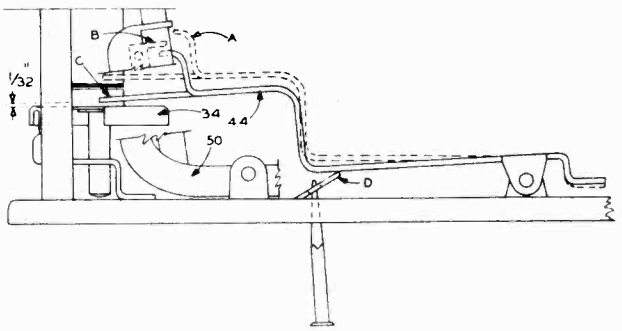


Fig. 8

LAST RECORD CONTINUES TO PLAY (10" or 12" Records)

1. Check the record spindle to be sure that it moves up and down freely.
2. With no records on the spindle, check the Automatic Shut Off Lock Lever (44). The lower hook end of this arm "C" should catch the Pickup Arm Raising Disc (34) at the beginning of the cycle to prevent travel of the Pickup Arm, causing it to drop on the OFF button. With no records on the Spindle and with the mechanism at rest, this hook should clear the top of the Pickup Arm Raising Disc by 1/32". Adjust if necessary, by inserting a screw driver in the hole in the bottom base plate and bending lip "D". Never attempt to move the Pickup Arm Raising Disc up or down.
3. The elevated hook "A" on the Automatic Shut Off Lock Lever will sometimes lock with the bracket "B" on the Record Selector Post (50) if the drop of the record is delayed. More clearance can be obtained by bending the elevated hook "A" away from the bracket.

GLIDE-IN ON 12" RECORDS

The term "glide-in" is used to describe the action of the pickup arm and needle when the needle does not sit down smoothly in the first groove of the record, despite accurate indexing adjustments, but seems to glide over the first two or three grooves before seating itself properly. If glide-in occurs:

1. Check tension of compression spring (47A). The spring should be free in 12" position at the moment the needle sets down on the record.
2. Remove any cause of friction in index lever (47) by bending the "eye" of 40.
3. On Model 357, pulling the metal base up snug to the main plate may put too much tension on the compression spring (47A). Be certain spring (47A) is very free.
4. The pickup cord may be dressed too tight or in such a manner that it interferes with the free movement of the pickup arm. Make certain there is sufficient play in the pickup cord.

SLIDE-IN OR NEEDLE JUMPS GROOVES

Slide-in describes the condition where the needle will touch the first groove of the record properly but will jump the grooves forward or back as though the needle pressure was too light.

To correct slide-in, check for:

1. Incorrect needle tip. The standard tip will be especially likely to jump grooves of a microgroove record. Be certain the "micro" tip is used for either the 33⅓ or 45 rpm microgroove records.
2. Chipped or damaged needle.
3. Tight pickup cord.

CHANGE CYCLE STARTS WHEN NEEDLE TOUCHES RECORD (10" or 7" Records)

1. The velocity trip arm (33) may be too close to lip "B" of velocity trip (37) at the instant of contact of the needle with the record. There should be at least 1/64" clearance between the velocity trip arm and the velocity trip. Carefully bend lip "B" in to provide proper clearance. However, do not in any way bend the velocity trip at any other point. Improper bending may cause binding and constant tripping of the mechanism.

TO ADJUST SPEED SELECTOR LEVER POSITION

1. Loosen set screw of coupling (62).
2. Move Idler assembly (67) to 45 rpm position.
3. With the Speed Selector Lever opening over "45", tighten the set screw.

INCORRECT TURNTABLE SPEED

The three speed mechanism and the motor are one assembly. The speed selector idlers (24, 26 and 27) are mounted on a moveable metal plate (67) in such a way that moving the Speed Selector Lever (70) moves the correct idler into position between the motor shaft and the Turntable drive idler (91). The tongue of the detent spring (73) fits into indentations in the edge of the metal plate to index the speed selector idlers and holds them firmly in the desired position.

"Off" indentations between each speed position hold the idlers away from the motor shaft and the Turntable idler when the Speed Selector Lever is in an "off" position.

If the Turntable speed is incorrect, check for:

1. Turntable Idler (91) cocked at an angle. Bend the wheel and shaft to straighten wheel.
   CAUTION: Do not bend idler (91) toward the speed selector idlers (24, 26, 27). Bend only sideways or away from the small idlers.
2. The idler mounting assembly (part of motor assembly 54) must not bind. There should be at least 1/64" play at point "A". Bend the raised metal stop if more clearance is needed.
3. The entire motor assembly (54 plus 67, etc.) should be free floating. There should be slight play of the Speed Control Lever (70) between the "78" and "33" positions and the stops at the end of the speed selector dial. If there is any binding, loosen set screw of coupling (62) and retighten with the tongue of the detent spring (73) in the proper position.

ERRATIC SPEED (WOW)

Remove any dirt or excess flocking from the inside rim of the turntable. Check the rubber idler wheel for a flat spot or "out of round".

If the rubber part of either Drive wheel becomes slick and shiny — Replace.

STALLS DURING CHANGE CYCLE

See Above.

REPLACEMENT OF PARTS

TO REPLACE THE PICKUP ARM

1. Unhook the pickup arm hinge clip (6) and raise the arm to a vertical position.
2. Remove the two mounting screws. Remove the pickup arm.
3. Attach the new arm.

The weight of the arms is uniform so the needle pressure adjustments should be left alone.

REPLACE PICKUP ARM BRACKET AND SHAFT ASSEMBLY

1. Loosen Bristol screws in Pickup Arm Raising Disc (34).
2. Remove Disc washer (43), Automatic Trip Arm (33) and Clutch (32) by sliding them off the bottom of the Pickup Arm Shaft (7) and pull shaft out of changer from above.

To replace, reverse the procedure and adjust the Pickup Arm Raising Disc for proper indexing as explained

TO REPLACE THE CARTRIDGE

1. Remove the two mounting screws, one on each side of the cartridge, and carefully remove pickup cord tips from cartridge pins.
2. Remove the old cartridge and replace with the new one.

Be certain the cartridge is parallel with the side of the pickup arm.

TO REPLACE THE NEEDLE

1. Loosen the needle set screw, using a small screw driver.
2. Remove the needle.
3. Insert the new needle with the flat side of the needle toward the set screw. Be sure the needle shank is all the way in to the bottom of the needle hole.
4. Tighten the set screw. The needle point should be parallel to the sides of the needle slot and evenly spaced between the walls of the slot.

REPLACE RECORD POST AND ROCKER ARM ASSEMBLY

1. Remove the Pickup Arm Assembly.
2. Remove the four nuts under the main plate which hold the Crescent Assembly.

3. Unhook the Rocker Arm Return Spring.
4. Remove the Rocker Arm Pivot Pin.
5. Lift out the Record Selector Post, Rocker Arm and Crescent Assembly as a unit.
6. In replacing the Rocker Arm Assembly, note paragraph "Replacing the Sub-Plate Assembly".

TO REPLACE THE MOTOR

It is not necessary to replace the entire Three Speed mechanism when replacing the motor. However, it is necessary to remove the entire assembly from the main plate and then remove the motor from the assembly.

1. Remove the entire assembly by removing mounting screws (58) and retaining clip (23).
2. Remove the Turntable Drive Wheel (91), the detent spring (73) and tension spring (74).
3. Remove the Three Speed mechanism plate assembly (67). Do not remove the small idler wheels (24, 26, 27) from the plate.
4. Reassemble new motor to the Three Speed Mechanism plate and the entire assembly to the main plate.
5. It may be necessary to adjust the play of the Three Speed Mechanism mounting plate "C" (part of the motor 54), so there is proper play between the sliding stop and the metal stop at point "A" The mounting plate should be free, approximately $\frac{1}{64}$" clearance between the sliding stop and point "A". The Speed Selector Lever (70) should be in the "78" position when making this adjustment. See paragraph 2 of "Incorrect Turntable Speed"

LUBRICATION

Webster-Chicago Record Changers leave the factory completely oiled and lubricated. Under normal conditions this should be sufficient for approximately one year or 1,000 hours of operation. When operated under extreme conditions of dust or heat, this operation should be performed more frequently as required.

Do not permit any oil or grease to get on the rubber Idler Drive Wheels or the Motor Sleeve, on Turntable Drive Rim or on the Automatic Trip Arm clutch. Any oil or grease on these points should be removed using Carbon Tetrachloride.

The recommended lubricants and points of lubrication are as follows:

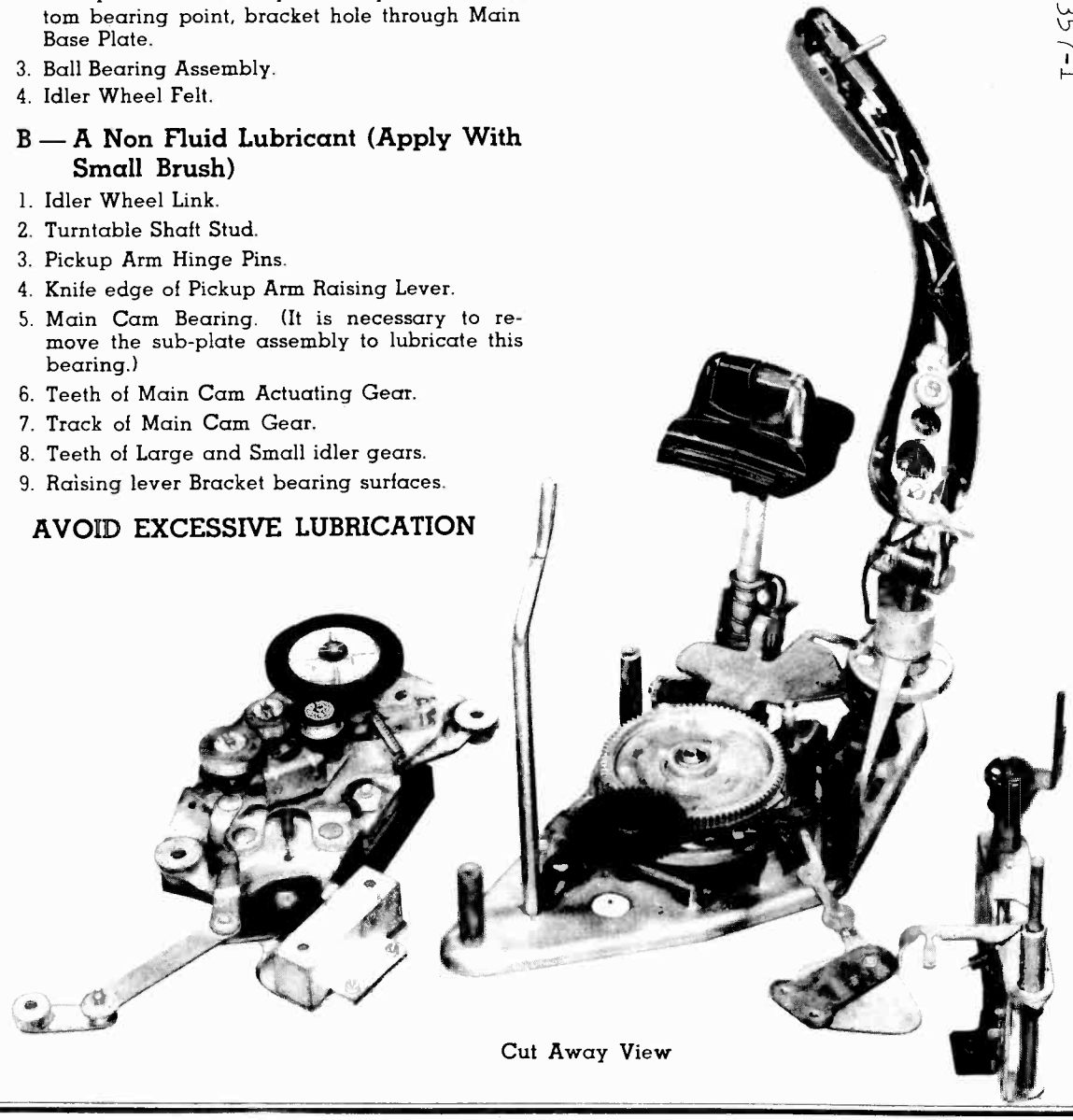
A — No. 10 OIL (Apply With Small Oil Can or Medicine Dropper)

1. Motor Bearings.
2. Pickup Arm Shaft. Drop one drop each to bottom bearing point, bracket hole through Main Base Plate.
3. Ball Bearing Assembly.
4. Idler Wheel Felt.

B — A Non Fluid Lubricant (Apply With Small Brush)

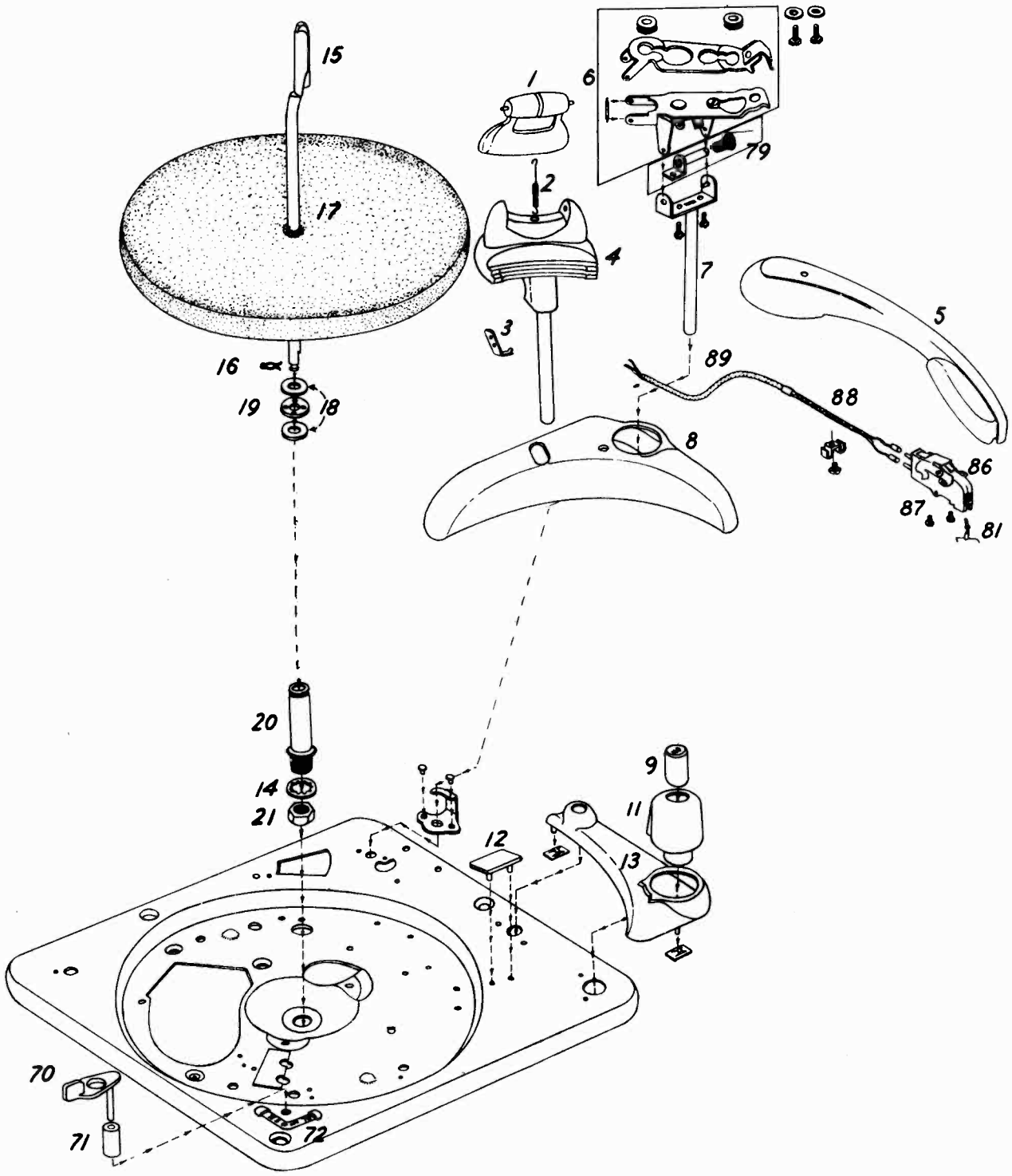
1. Idler Wheel Link.
2. Turntable Shaft Stud.
3. Pickup Arm Hinge Pins.
4. Knife edge of Pickup Arm Raising Lever.
5. Main Cam Bearing. (It is necessary to remove the sub-plate assembly to lubricate this bearing.)
6. Teeth of Main Cam Actuating Gear.
7. Track of Main Cam Gear.
8. Teeth of Large and Small idler gears.
9. Raising lever Bracket bearing surfaces.

AVOID EXCESSIVE LUBRICATION



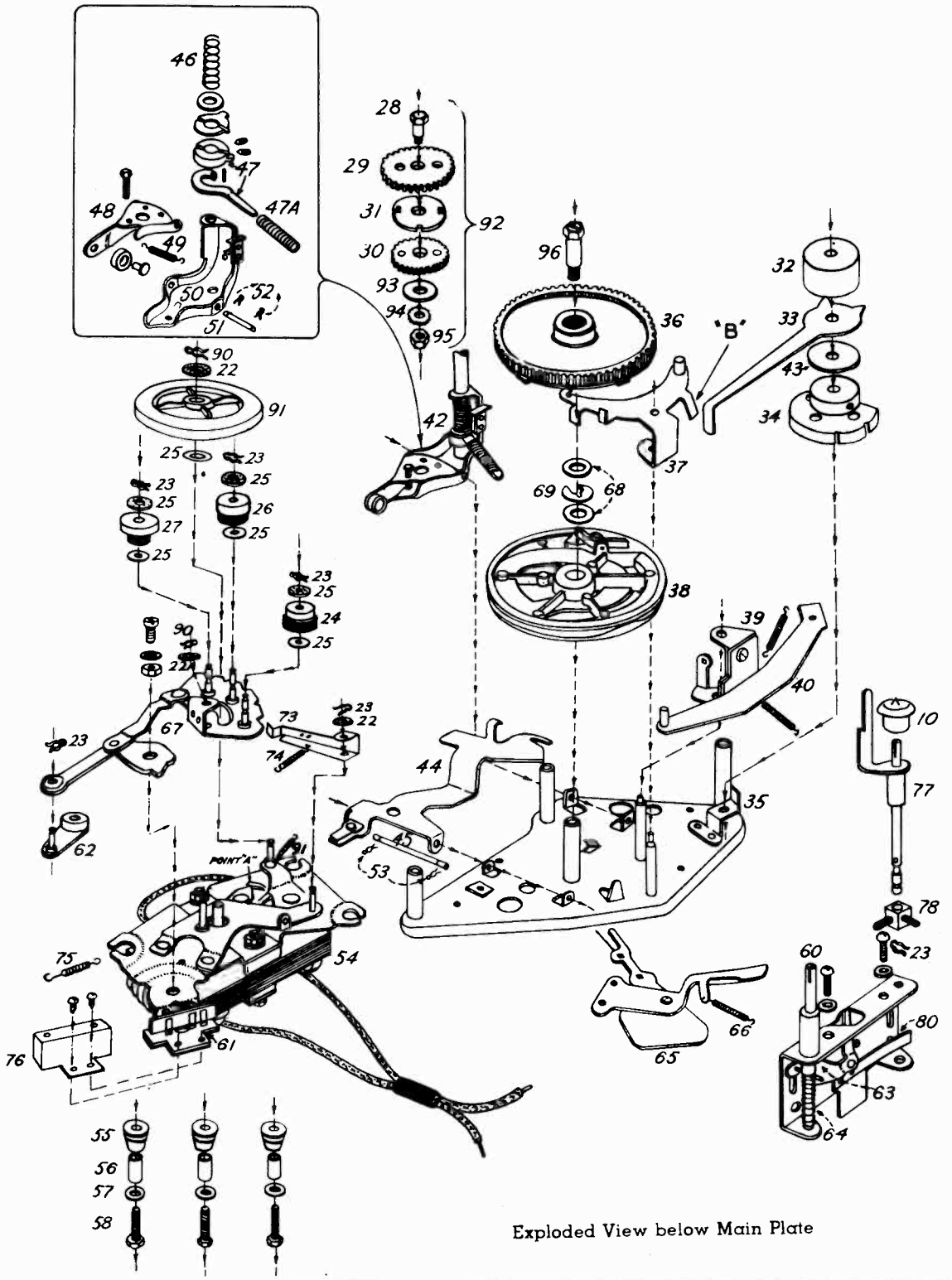
Cut Away View

MODELS 356-1, 356-27, 357-1



Exploded View above Main Plate

MODELS 356-1,
356-27, 357-1



Exploded View below Main Plate

PARTS LIST

Illustration No.	Part No.	Description
1	49X074	Record Stabilizer
2	46P126	Tension Spring
3	45P464	Spring Retainer

PARTS LIST

Illustration No.	Part No.	Description
4	49X029	Selector Post
5	49X124-1C	Pickup Arm
6	21X283	Pickup Arm Mounting Hinge
7	11X385	Pickup Shaft Assembly
8	45P350	Crescent Plate
9	49P111	Reject Button
10	49P125	Pickup Arm Rest
11	11X139	Control Knob and Set Screw
12	24P022	Needle Pad
13	49P027	Escutcheon
14	25P333	Lock Washer
15	11X133	Spindle
17	11X289	Turntable
18	25P269	Washer Bearing Race
19	11X058	Bearing Race Assembly
20	41P414	Turntable Bearing
21	26P687	Bearing Nut
70	42X205	Speed Selector
71	41P669	Bushing
72	78P454	Speed Indicator
87	26P474	Screw — Cartridge Mounting
16	50P204	Spindle Clip
22	25P407	Felt Washer
22A	25P030	Felt Washer
23	50P034	Clip
24	11X456	Drive Wheel — 33⅓
25	25P046	Fibre Disc
26	11X458	Drive Wheel — 45
27	11X460	Drive Wheel — 78
28	41P333	Shoulder Screw
29	47P024	Large Fibre Gear
30	47P023	Small Fibre Gear
31	45P342	Idler Gear Coupler
32	41P576	Weight
33	45P568	Auto Trip Arm
34	11X227	Tone Arm Raising Disc
36	11X032	Trip Reset Gear
37	11X320	Velocity Trip
38	11X033	Cam and Trigger Assembly
39	46P139	Tension Spring — Index Plate
40	11X046	Raising Arm Lever
41	46P022	Tension Spring
43	23P009	Friction Disc
44	11X079	No-Record Lever
45	41P443	Pin
46	46P012	Compression Spring
47	11X049	Selector Lever and Collar
47A	46P011	Compression Spring
48	11X141	Rocker and Roller Assembly
49	46P017	Compresion Spring
50	11X142	Rocker Arm Lever
51	41P421	Retaining Pin
52	50P125	Clip
53	50P125	Clip
54	17X467	Motor and Top Bridge Assembly
55	25P363	Rubber Shock Motor Mount
56	41P592	Motor Mount Sleeve
57	25P367	Motor Mount Washer
58	26P110	Motor Mount Bolt
59	11X470	Automatic Manual Control Assembly
60	41P444	Switch Shaft
61	32P054	Switch
62	17X466	Hub and Lever Assembly
63	45P361	Switch Lever
64	46P123	Compression Spring
65	11X158	Trip Lever and Wire
66	46P117	Tension Spring — Trip Lever
67	17X464	Index Plate and Cam Assembly
68	25P343	Washer
69	25P342	"C" Washer
73	45P817	Index Lock Lever
74	46P187	Tension Spring — Lock Lever
75	46P139	Tension Spring — Index Plate
76	45P819	Switch Cover
77	11X472	7" Adapter Rest
78	41P704	Positioning Cam
79	11X386	Pickup Counter Balance
80	45P872	Leaf Spring
88	20X1264-4	Pickup Cord — Internal
89	20P811-60	Pickup Cord — External
90	50P125	Clip
91	11X366	Idler Wheel
92	11X132	Idler Gear Assembly
93	25P284	Coupling Washer
94	25P222	Lock Washer
95	26P046	Nut
96	26P748	Shoulder Screw
97	46P134	Tension Spring — Idler Link

MODELS S14023, S14026

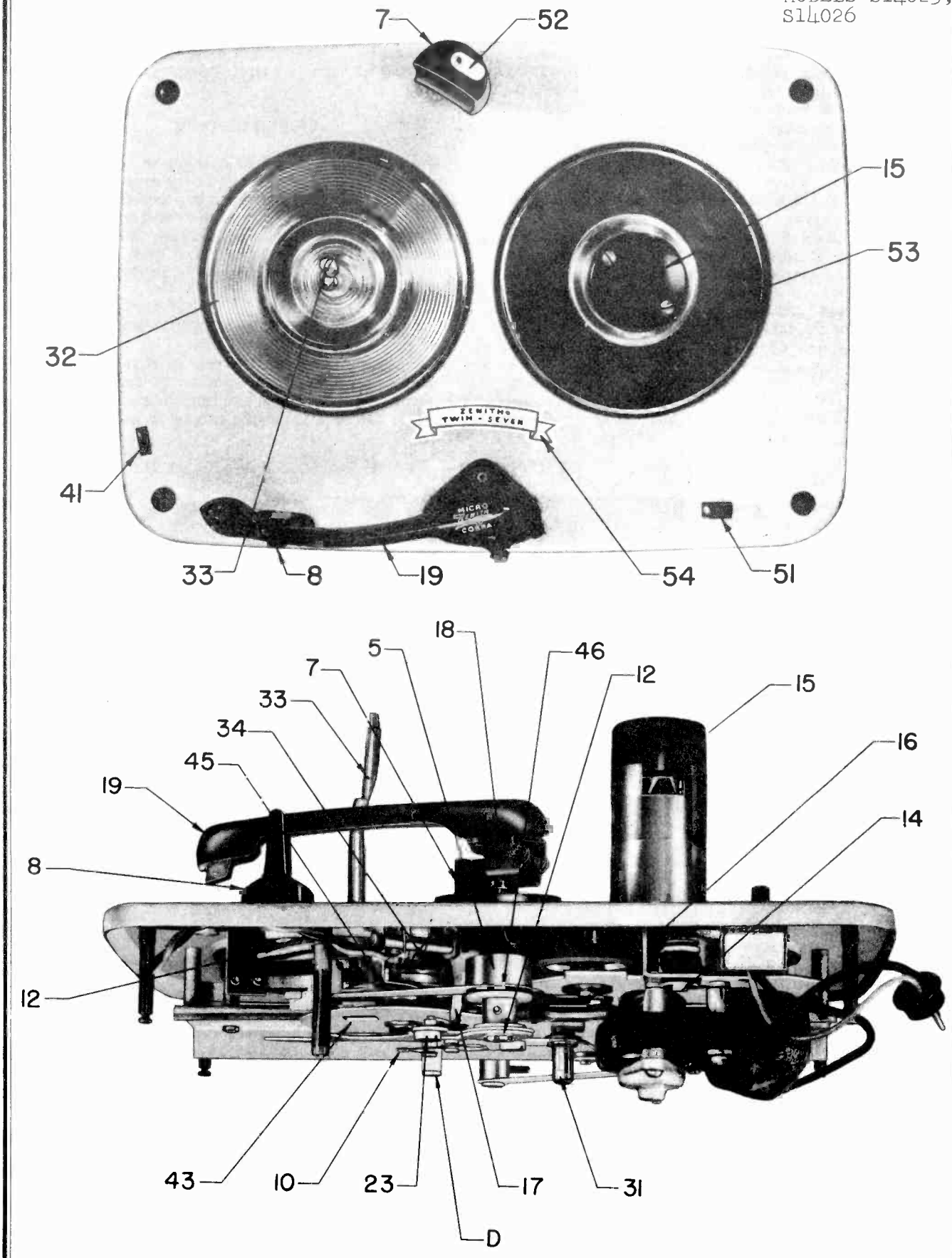


Fig. 2 Side View

MODELS S14023, S14026

GENERAL

The Zenith Model S14023 and S14026 Record Changers are designed to automatically play 7" 33 1/3 RPM and 7" 45 RPM Micro Groove records. With a few minor exceptions, these two changers are alike both electrically and mechanically. The only actual difference between the two changers is in the AC power cable to the record changer and the connecting cable from the Cobra Tone Arm to the phono pre-amp. These changers will play either a stack of twelve 7" 33 1/3 RPM records or twelve 7" 45 RPM records. However, these records cannot be played simultaneously and neither can they be intermixed. These changers employ two turntables, one rotating at 45 RPM and the other rotating at 33 1/3 RPM. There is but a single tone arm and this is to be used for either turntable. To move it from the 33 1/3 RPM playing position to the 45 RPM turntable playing position, all that is required is to grasp it and lift it high enough to clear the 33 1/3 RPM spindle then swing it to the right until it snaps into the 45 RPM playing position. Thus indexed, it is ready for 45 RPM operation. These changers do not turn off after the last record has been played. They will repeat the final record until the record player is turned off manually. Connect this changer only to an outlet supplying 117 volts 60 cycle. Power consumption is 25 watts.

SHIPPING BOLTS

Before placing the record changer in operation, the machine must be floated freely on the mounting springs. During shipping the mechanism is secured by means of four shipping bolts. To float the changer, use a wide blade screw driver and turn the four mounting bolts clockwise until the heads are flush with the mounting plate which allows the changer to float on its shock mounts. (See Fig. 1)

LEVELLING THE RECORD CHANGER

It is essential to have the changer absolutely level. Use a torpedo or similar type level on the record changer base plate, use adequate shims to level the record changer pan or combination cabinet to achieve perfect level.

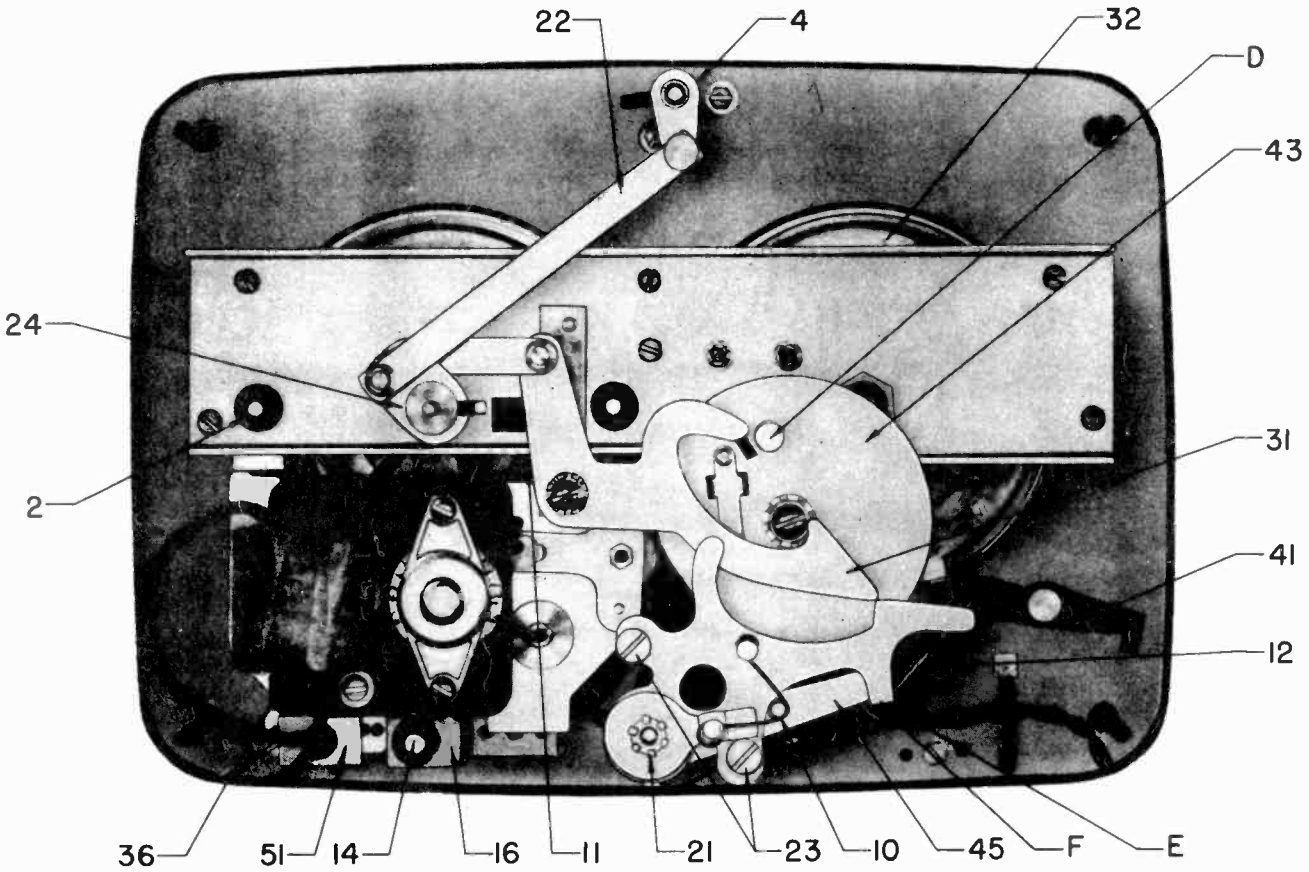


Fig. 3 Bottom View

CYCLING

The Motor shaft drives the turntable through the media of idler wheels. The motor shaft drives the fast idler wheel (48) which in turn drives the slow speed idler wheel (37) which then simultaneously rim-drives the 45 RPM and 33 1/3 RPM turntables. (See Fig. 9) The changer can be cycled either manually or automatically. The record changer cycles automatically in the following manner. As the tone arm moves towards the center of the record, the friction between the felt washer (46) and trip actuator stud assembly (45) created by the brass weight (5) carries the trip actuator and stud assembly (45) in towards trip lever (47) (See Fig. 2). When the nylon stud on (45) contacts surface (C) on trip lever (47), the entire trip lever is rotated (direction B) around axis (A). This swings trip actuator in (direction B) and allows pawl (44) to rise and engage the upper clutch plate assembly (35). (See Figs. 4 & 5) The upper clutch plate assembly (35) is continually rotating and this places the changer in cycle.

When the clutch pawl (44) mechanically connects the upper clutch assembly to the lower clutch assembly, the entire clutch assembly rotates. As the lower clutch plate assembly (43) rotates, the nylon bushing (D) contacts throwout cam and lever assembly (21) thus moving the tone arm from the record finish position to a position over the tone arm captivator. (See Figs. 2 & 3) As the lower clutch assembly continues to rotate, the nylon bushing (D) contacts the inside surface of throwout cam and lever assembly thus returning the tone arm to record start position. Simultaneously the bushing (D) on the lower clutch assembly (43) contacts the ejector cam assembly (31) and a new record is dropped on the turntable. This actuates the 33 1/3 RPM ejector cam and at the same time actuates the ejector mechanism on the 45 RPM spindle. The ejector shaft and plate assembly (26) in the 45 RPM spindle rotates (See Fig. 8) automatically inserting record separators (29) between the bottom record and the record stack and then retracts the record supports (28) from beneath the last record, dropping this record. The record ejector shaft (26) turns again placing the record supports (28) out under the record stack and the record separators (29) retract, thus lowering the record stack on the record support plates. At the same time the eccentric shaped lower clutch assembly (43) actuates the tone arm lift lever and pin assembly (17) thus raising and lowering the tone arm in the proper sequence.

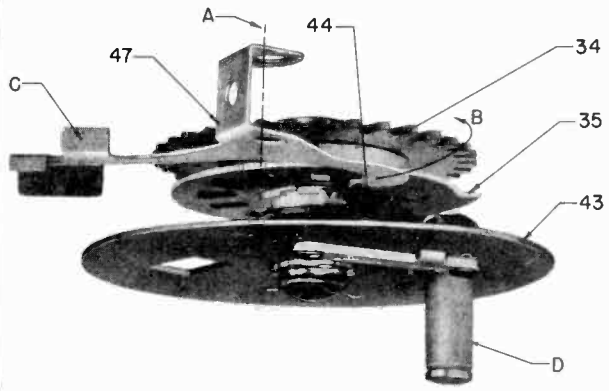


Fig. 4 Clutch Assembly with Pawl (44) Disengaged

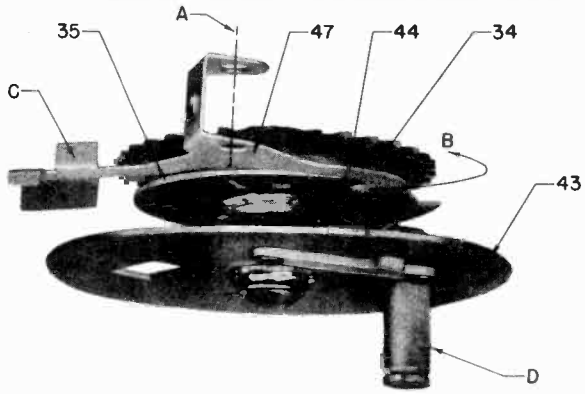


Fig. 5 Clutch Assembly with Pawl (44) Engaged

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use, or high operating temperature, the changer should be lubricated as follows

Lubricate the following places with #10 light machine oil:

1. 33 1/3 RPM ejector shaft (4) near base plate.
2. Rivet and shoulder stud on 33 1/3 ejector shaft (22).
3. Rivet and shoulder stud on 45 RPM ejector link (24).
4. 45 RPM ejector shaft spindle mounting plate (26).
5. Trip lever (47) in two places on its pivot shaft.
6. Reject lever (41) at the reject lever pivot.
7. Link lever (17) on the shaft pivot.

TONE ARM HEIGHT ADJUSTMENT

The tone arm height adjustment determines vertical rise of the tone arm. If the tone arm does not rise sufficiently it will not play a full stack of twelve records. (See Fig. 6) On the other hand, if the tone arm raises too high it may hit the records resting on the record shelf. Set the tone arm height adjustment screw (6) so that the needle clears twelve unwarped records on the turntable. The tone arm housing must not hit the under side of the records on the record shelf when the changer is cycled after adjustment.

TONE ARM SET-DOWN ADJUSTMENT

With the tone arm locked in the tone arm captivator, the gap between surface (E) on throwout cam and lever assembly (21) and aligning stud (F) should be adjusted so it is 1/4". (See Fig. 3) Adjusting stud (23) on the 33 1/3 RPM side should be in as far an outward position as possible during this operation. When the gap is 1/4", the slab head screws should be tightened on the tone arm shaft. Then the adjusting studs (23) can be rotated for final minor indexing of 33 1/3 and 45 RPM tone arm set-down positions.

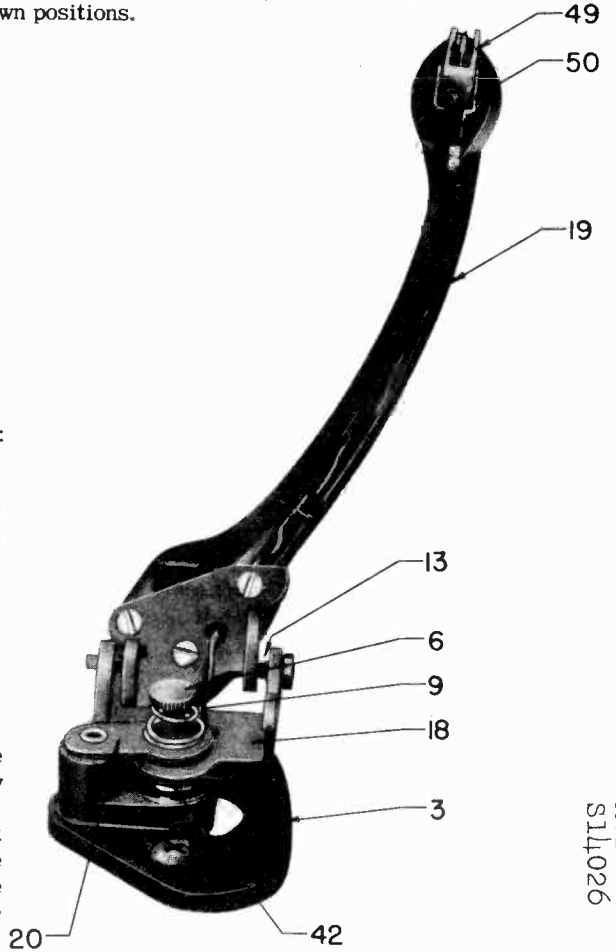


Fig. 6 Tone Arm & Hinge Assembly

MODELS S14023, S14026

TONE ARM HINGES

The tone arm hinge adjustment must be made in the following manner. (See Fig. 6) Insert an Allen wrench into special set screw (13) and hold it in this position. With a hex head wrench loosen the hex nut around this set screw. Then tighten set screw to a point where the tone arm moves freely in the vertical position but still does not have any lateral motion. Hold the set screw (13) firmly in this position with the Allen wrench, and then tighten the hex head nut.

SLAB HEAD SCREWS

For maximum rigidity the tone arm shaft and 45 RPM spindle shaft are locked into position with slab head screws. The slab head set screw wrench is available as part number 68-8.

MANUAL TRIP ADJUSTMENT

The manual trip with the brass spring should be adjusted so there will be 1/8" clearance between the spring and surface (C) on trip lever (47). (See Fig. 4) There should also be .020 to .040 clearance between trip lever (47) and the top surface of the lower plate of the lower clutch assembly (43).

THEORY OF THE COBRA RADIONIC PICKUP

The operation of the Cobra pickup is considerably different from Crystal and Dynamic pickups. These pick-ups generate audio power, while the Cobra controls power generated by a radio frequency oscillator, detector and audio amplifier. The oscillator operates at a frequency of 2.5 Mc. Modulation is accomplished by changing the energy losses in tuned circuit. These losses may be represented by an equivalent resistance in series with the reactance of the coil.l The ratio of the resistance to the reactance determines the efficiency of Q of the coil. The amplitude of the RF voltage developed across this coil by an oscillator will vary with changes in Q.

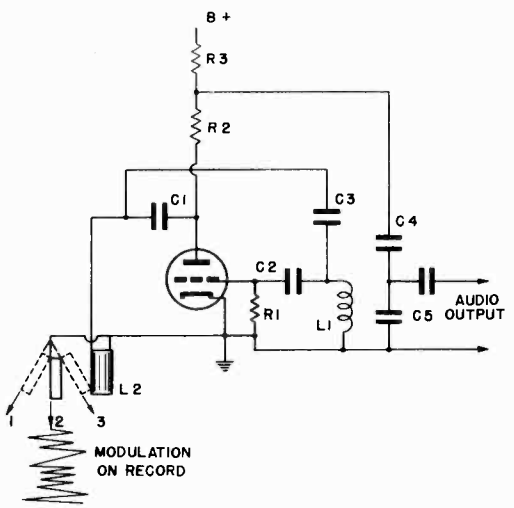


Fig. 7 Simplified Circuit of Oscillator

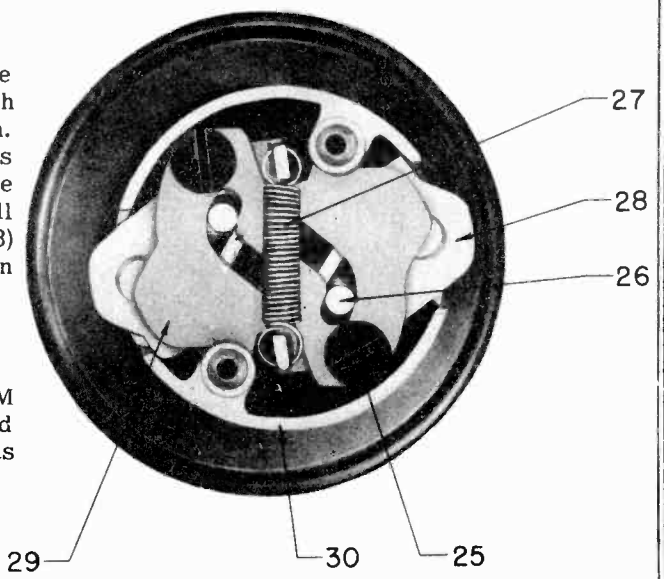


Fig. 8 45 RPM Spindle Assembly

The grid coil Ll and other components of the oscillator are mounted in the oscillator pre-amp chassis, while the plate coil L2 is in the needle cartridge with the vane and needle assembly. The coil is fixed and has 40 turns of No. 40 wire (approximate DC resistance 2 1/2 ohms). The stainless steel vane, which is in the field of the coil, is spot welded to the osmium-iridium tipped stylus.

Any movement of the stylus will cause a corresponding movement of the vane. As the stylus and vane follow the modulations in the record, changes in the mutual inductance between the vane and coil occur (See Fig. 7) In position 2 the vane is at rest, and a constant RF voltage appears across the plate coil. As the vane is set in motion and reaches position l, it is at its greatest outward swing from the coil, resulting in low mutual inductance, low relfected resistance, higher Q, and a higher RF voltage across the coil. In position 3 it is at its greatest inward swing; resulting in a high mutual inductance, high relfected resistance, lower Q and a lower RF voltage. It can be seen that the amplitude of the RF voltage which appears across the coil will vary with changes in Q, satisfying the condition for amplitude modulation. The position of the vane changes both the Q and L of the coil. Changes in L shift the frequency slightly, and a certain amount of frequency modulation is present, but since there is no frequency discrimination it remains undetected. Since the grid and plate coils are part of a single tuned circuit any variations of amplitude of the RF voltage brought about by the changes in Q across the plate coil will also appear across the grid coil Ll, causing a shift in the average plate current through the plate load resistor across which the audio output voltage is developed. Plate bend detection takes place since only the positive half of the grid swing causes an increase in the average plate current. These changes in the average plate current appear as audio voltage across the plate load resistor.

MODELS S14023, S14026

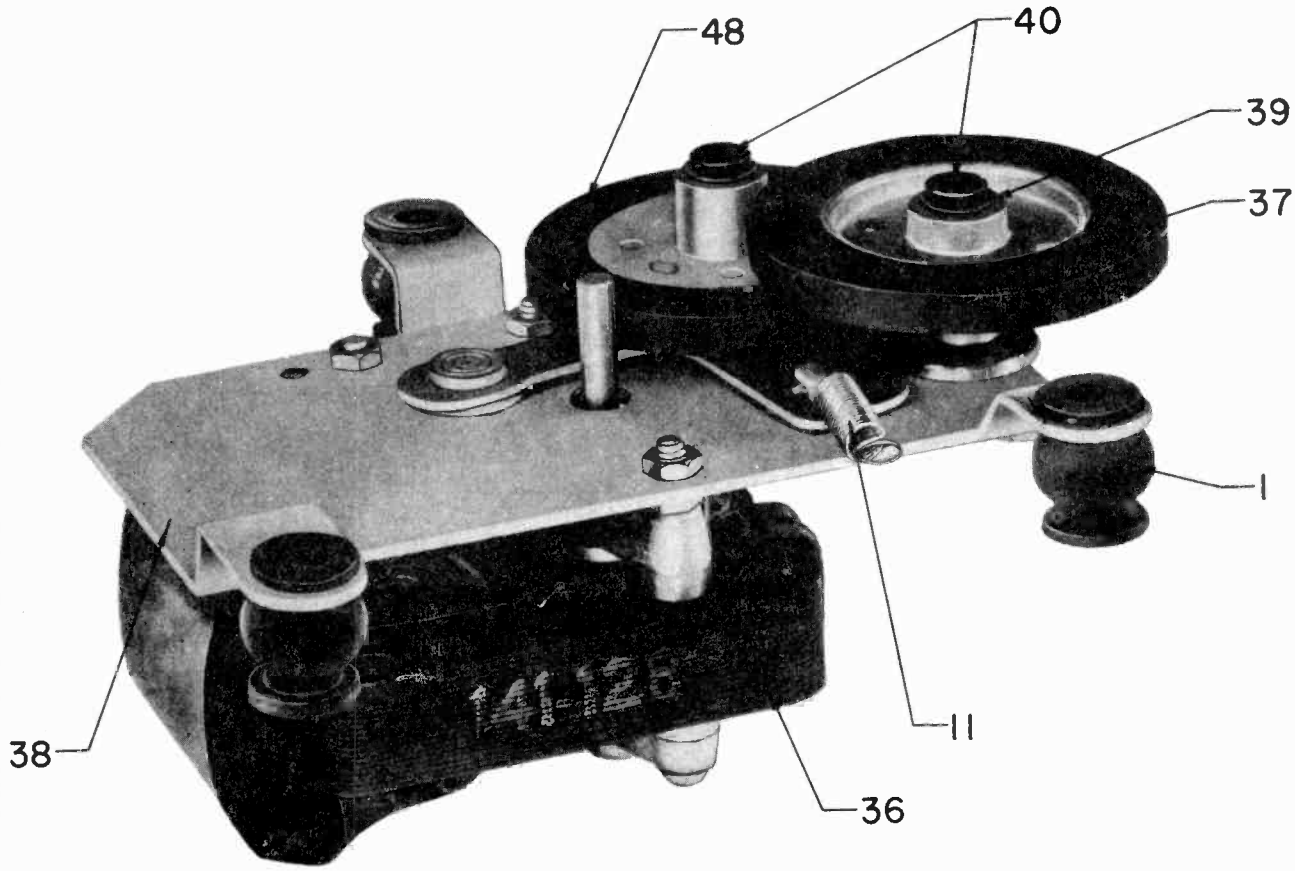


Fig. 9 Motor & Idler Wheel Assembly

The 2.5 Mc RF voltage and the audio voltage both appear at the plate (pin 6) of the oscillator triode. R2, C4 and C5 filter out the RF voltage allowing only the audio component to the grid (pin 4) of the amplifier triode where it is amplified, fed through a shielded lead to the audio amplifier of the receiver and reproduced by the loudspeaker.

NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY.

a. Clean foreign material from around needle.

b. Check needle to see if the tip is bent or broken. Replace needle.

c. Hinge bearing binds. Check lateral movement of tone arm. It must move freely without binding.

d. Excessive vibration while playing an LP record. Any vibration caused by (1) unsteady mounting, (2) floor vibration, or (3) passing of heavy vehicles may cause the pickup to glide across the record grooves.

MECHANISM STARTS SLOWLY AND MOTOR GETS HOT.

a. Check line voltage and frequency.

b. Check lubrication.

c. Motor windings damaged.

d. Room temperature abnormally low.

MOTOR FAILS TO RUN EVEN WHEN IT IS DISCONNECTED FROM CHANGER AND PROPER VOLTAGE AND FREQUENCY APPLIED DIRECTLY TO THE TWO INPUT LEADS OF THE WINDING.

a. Open windings.

b. Damaged or frozen bearings.

c. Lower Rear Support Bracket bent. Remove and straighten bracket--Re-center armature.

NEEDLE SETS DOWN PROPERLY ON RECORD BUT SLIDES OVER THE RECORD GROOVES.

a. Cabinet tilted.

b. Badly worn or broken needle cartridge.

MODELS S14023, S14026

TONE ARM FALLS OFF RECORD.

a. Check Tone Arm set-down adjustment.

b. Check Tone Arm Pivot Bracket.

c. Changer not level.

SQUEAKS OR NOISES DURING PLAYING OF RECORDS.

a. Friction between the records on the turntable and the spindle will occasionally cause squeaks. A thin coat of wax applied to the spindle will remedy this condition.

b. Check lubrication.

RECORD IS NOT HEARD ALTHOUGH CHANGER OPERATES.

a. See that the Band switch is on Phono.

b. Check receiver audio by listening to radio.

c. Check the phono oscillator tube.

d. Check Needle Cartridge.

e. Check Tone Arm Housing for broken leads.

RUMBLE AND MICROPHONICS DURING REPRODUCTION.

a. Changer not "floated" properly. Remove packing Strip. Loosen mounting bolts.

b. Motor leads pulled too tight preventing motor from "floating" freely.

c. Noisy phono oscillator tube.

d. Impression on Idler Wheel.

NEEDLE FAILS TO CLEAR MAXIMUM LOAD OF RECORDS ON THE TURNTABLE.

a. Check Tone Arm height adjustment.

TONE ARM SETS DOWN TOO FAR IN OR OUT ON RECORD.

a. Check Tone Arm set-down adjustment.

TONE ARM SET-DOWN VARIES.

a. Tone Arm pivots loose.

CHANGER CONTINUES TO CYCLE.

a. Check the trip switch adjustment.

b. Trip Pawl sticks.

CHANGER WILL NOT CYCLE UPON COMPLETION OF RECORD.

a. Be certain that the record has an eccentric center groove.

b. Check trip pawl.

RECORD BINDS ON OPPOSITE TURNTABLE.

a. If 33 1/3 RPM records rub on 45 RPM turntable, remove 33 1/3 turntable and raise it by placing washers between 33 1/3 RPM mounting and turntable. This will raise the level of the 33 1/3 records so they will clear the 45 RPM turntable.

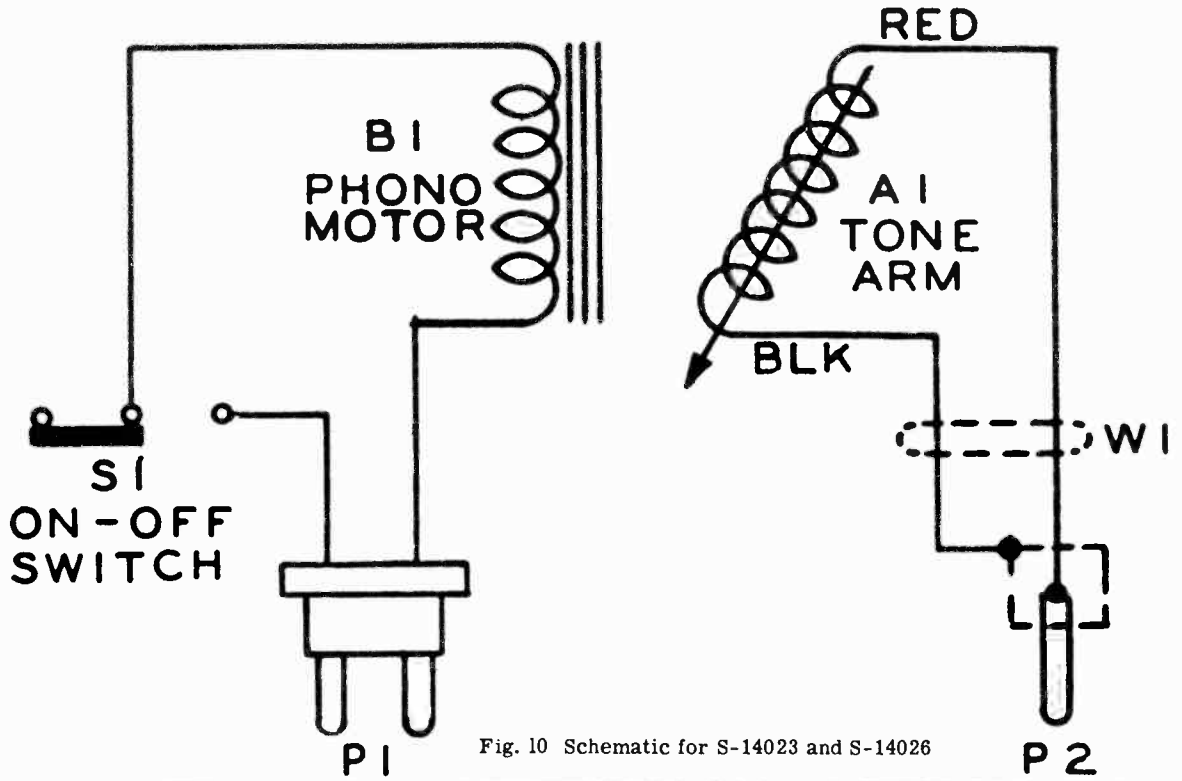


Fig. 10 Schematic for S-14023 and S-14026

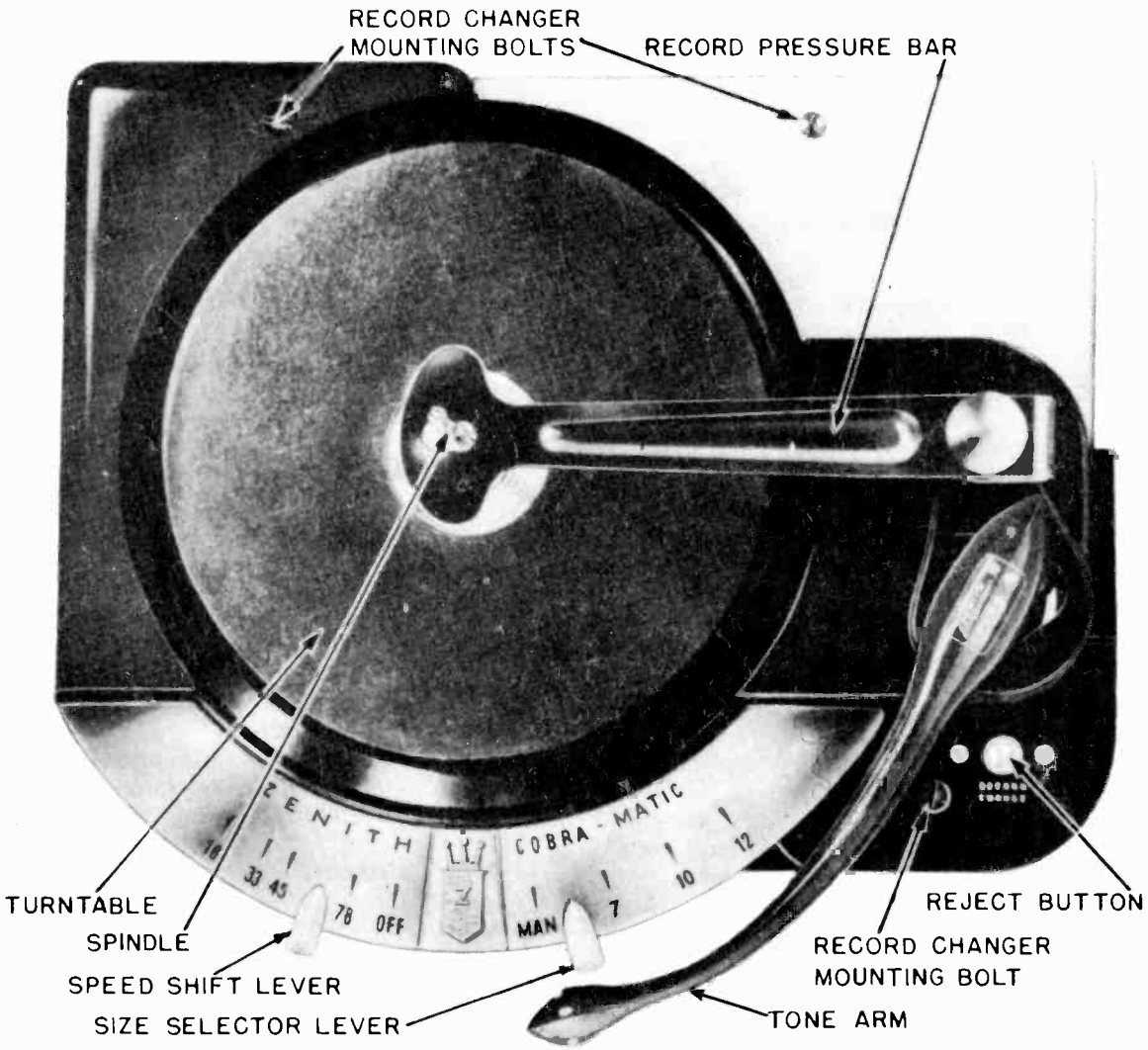
MODELS S14023, S14026

PARTS LIST

DIAG. NO.	PART NO.	DESCRIPTION
1-125-77		Motor Mtg. Grommet (3 used)
2- 93-1018		Motor Mtg. Washer (Bakelite) (6 used)
3-199-123		Tone Arm Sleeve
4-199-122		Ejector Shaft Sleeve
5-135-15		Weight
6-112-778		Adj. Screw (Lift Pin)
7- 84-72		Record Support
8- 84-73		Tone Arm Rest
9- 80-750		Adj. Spring (Lift Pin)
10-80-752		Tone Arm Positioning Spring
11-80-753		Idler Wheel Tension Spring
12-80-754		Reject Lever Return Spring
13-73-121		Special Set Screw
14-56-277		Grommet Retaining Pin
15-15-93		Spindle Cap (Red)
16-12-1661		Motor Mtg. Brkt.
17-S-16080		Lift Lever & Pin Assem.
18-S-16074		Swivel Brkt. & Shaft Assem.
19-S-16073		Tone Arm Assem. (Complete less Cart.)
20-S-16075		Lift Pin & Plate Assem.
21-S-16076		Throw-Out Cam & Lever Assem.
22-S-16071		Ejector Lever Link & Bushing Assy.
23-97-357		Adjusting Stud
24-S-16070		Ejector Lever & Bushing Assem.
25-112-776		Shoulder Screw (2 used on S-16067)
26-S-16066		Ejector Shaft & Plate Assem.
27-80-749		Record Support Spring
28-57-1555		Record Support (2 used on S-16067)
29-83-1666		Record Separator
30-76-557		Upper Spindle
31-S-16069		Ejector Cam & Bushing Assem.
32-S-16065		Turntable & Bearing Assem. (33 1/3 RPM)
33-S-16061		Spindle & Dog Assem. (33 1/3 RPM)
34-34-196		Clutch Gear
35-S-16063		Clutch Plate Assem. (Upper)
36-141-128		Motor 115V 60 Cycles
37-61-142		Idler Wheel - Slow
38-S-16058		Motor Mtg. Plate & Lever Assem.
39-93-678		Fish Paper Washer
40-76-561		Idler Wheel Shaft (2 Used)
41-S.16057		Reject Lever & Spring Assem.
42-93-1015		Thrust Washer (used on S-16074)
43-S.16064		Clutch Plate Assem. (Lower)
44-60-21		Pawl
45-S-16079		Trip Actuator & Stud Assem.
46-93-1017		**Felt Washer** (used on S-16079)
47-117-180		Trip Lever
48-61-143		Idler Wheel - Fast
49-S-15222		Cobra Tone Arm Cartridge
50-12-1658		Cartridge Retaining Brkt.
51-85-471		Switch
52-S-16072		Ejector Shaft & Plate Assem.
53-S-16104		Turntable & Ring Assem. (45 RPM)
54-102-626		Decal

PART. NO.	DESCRIPTION
12-1659	Tone Arm Brkt.
19-123	Record Changer Mtg. Clip
54-62	Hex Nut for 45 RPM Spindle Bushing
54-299	4-40x3/16 A.F. x 1/16" thk. Hex Nut Steel-Stat. Br.
54-300	Hex Nut for 33 1/3 RPM Spindle Sleeve
56-275	Lift Pin
58-75	Single Contact Plug
58-86	Two Prong Plug
69-108	#6-32x1/4 R.H.M.S. Brass-Plain (used on S-16069)
73-70	8-32x1/2" Allen Hd. Set Screw Cuppoint (used on S-16067)
73-112	8-32x1/2 Slab Hd. Set Screw Cuppoint (1 ea. used on S-16070, S-16071, 2 ea. on 76-560)
73-124	6-32x3/8" lg. Slab Hd. Set Screw Conept. (2 used on S-16076)
76-560	Spindle Shaft (45 RPM)
80-748	Reject Lever Spring
80-751	Lift Pin Return
93-143	Shakeproof Lock washer for 45 RPM Spindle Bushing
93-1011	Turntable Retaining Washer (used on S-16065)
93-1012	Shakeproof Lock washer for 33 1/3 Spindle Sleeve
93-1013	Thrust Washer (1 ea. used on S-10665 and S-16104)
93-1014	Lift Pin Washer
93-1035	Retaining Washer
94-682	45 RPM Spindle Bushing
94-684	33 1/3 RPM Spindle Sleeve
112-573	#2-32x1/4 R.H.S.T. Screw Shakeproof Cad.
112-777	#4-40x3/4 Oval Phill. H. M.S. Steel Stat. Br. (2 used on 15-93)
112-779	6-32x3/8 Phill. B. H. M. S. Stat. Br. (1 ea. used on 12-1661, 2 ea. used on 199-123)
113-21	Hex Head Screw for Mtg. Lower Clutch Assem.
114-253	6-20x3/8 Hex Hd. Sl. S. T. Screw (1 used on 84-73, 2 used on 84-72)
125-76	Rubber Grommet
148-119	Tone Arm Only
188-128	Retaining Ring (5 used)
188-129	Retaining Ring (3 used Motor Mtg.)
S-16060	Spindle Mtg. Plate Assem.
S-16067	Upper Spindle Assem. (45 RPM)
S-16091	Plug & Wire Assem.
S-16505	Cable Assembly (S-14026)

MODELS S14028, S14029,
S14030, S14031, S14036



GENERAL DESCRIPTION

The Zenith Models S-14028, S-14029, S-14030, S-14031 and S-14036 Record Changers are designed to play standard 78, 45 and 33 1/3 RPM records of standard commercial dimensions. With few minor exceptions these five changers are alike electrically. The basic changer for S-14029, S-14030 and S-14031 is the S-14028. The addition of cable assemblies for tone arm and AC connections are the determining factors between S-14029, S-14030 and S-14031. The only difference in these cables is lead length and plugs. S-14036 Record Changer is basically identical to S-14028 except it uses a 50-60 cycle motor and is used primarily for the export market. The other difference is the tone arm and AC connecting cables.

Features of these changers include playing and automatically changing as many as ten 12" or ten 10" records. Ten inch and twelve inch records of the same type cannot be intermixed.

A full stack of 7" 33 1/3 RPM, or a full stack of 7" 45 RPM records (with adapter inserted in the records) can also be played on this changer. This changer does not shut off after the last record, however, all that is required to turn the changer off is to move the speed change lever (18) to OFF position.

Connect this changer only to an outlet supplying 117 volt 60 cycle A.C. unless specified otherwise. Power consumption is 25 watts.

SHIPPING BOLTS

Before placing the changer in operation, the machine must be floated freely on the mounting springs. During shipment, the changer is secured to the changer base pan be means of three mounting bolts. To float the changer, take a wide-blade screw driver and turn down these bolts until they are flush with the record changer base plate. During shipment the motor and motor mounting plate (65) (66) is bolted to the changer base plate. Before the record changer can be operated, motor mounting screw (9) must be removed. As you can see, fastening the motor mounting plate (66) with motor mounting screw (9) to the record changer base plate prevents the motor drive shaft from contacting the rubber surface of drive wheel assembly (36) and prevents a possibility of damage to drive wheel assembly from rough handling during shipment.

LEVELING THE RECORD CHANGER

It is essential to have the record changer absolutely level. Use either a torpedo or similar type level on the record changer base plate. Use adequate shims to level the record changer pan or the combination cabinet to achieve perfect level.

LOADING THE RECORD CHANGER

1. Pull straight up on the record pressure arm knob (12) until the record pressure arm clears the spindle. Swing the record pressure arm to the right until pins in pressure arm shaft (14) drop into locating slot on record pressure arm housing (1).

2. Changer will automatically play ten 12" either standard or Long Play, ten 10" either standard or Long Play or ten 7" Long Play or Fine Groove records

NOTE: Standard, Fine Groove and Long Play records cannot be played in the same stack of records. Speed change lever (18) must be re-set for each type of recording.

3. Place records on spindle and lower them to offset shelf. Level records and replace record pressure arm (14) over spindle and lower this until it rests on the top of the record stack.

To play standard 78 RPM recordings:

1. Motor speed control lever (18) must be set to 78 position. This will set the record changer to proper speed position and cause the turntable to rotate.

2. Set-up lever (17) must be moved to the size records being played.

3. Place the changer in cycle by depressing reject switch knob (73). The changer will play the remaining records automatically. The changer will continue to play the last record until speed change lever (18) is moved to OFF position.

To play 33 1/3 RPM records:

1. Motor speed change lever (18) must be in 33 1/3 position.

2. Set-up lever (17) should then be moved to either 12", 10" or 7" position depending on the size record being played.

To play Fine Groove (45 RPM) records:

1. Speed change lever (18) should be moved to 45 position and set-up lever (17) should be in 7" position. It must be remembered that these records are manufactured with a 1 1/2" spindle hole so it is essential that a record adapter be inserted into each 45 RPM record to be played. This is necessary to reduce the spindle hole to conventional size.

REJECTING

To reject a record anytime, while the changer is operating, depress reject switch button (73) and release. This will automatically cause the record changer to go through cycle and begin playing the next record.

STOPPING

To turn off the record changer all that is required is to move the speed shift lever (18) to OFF position.

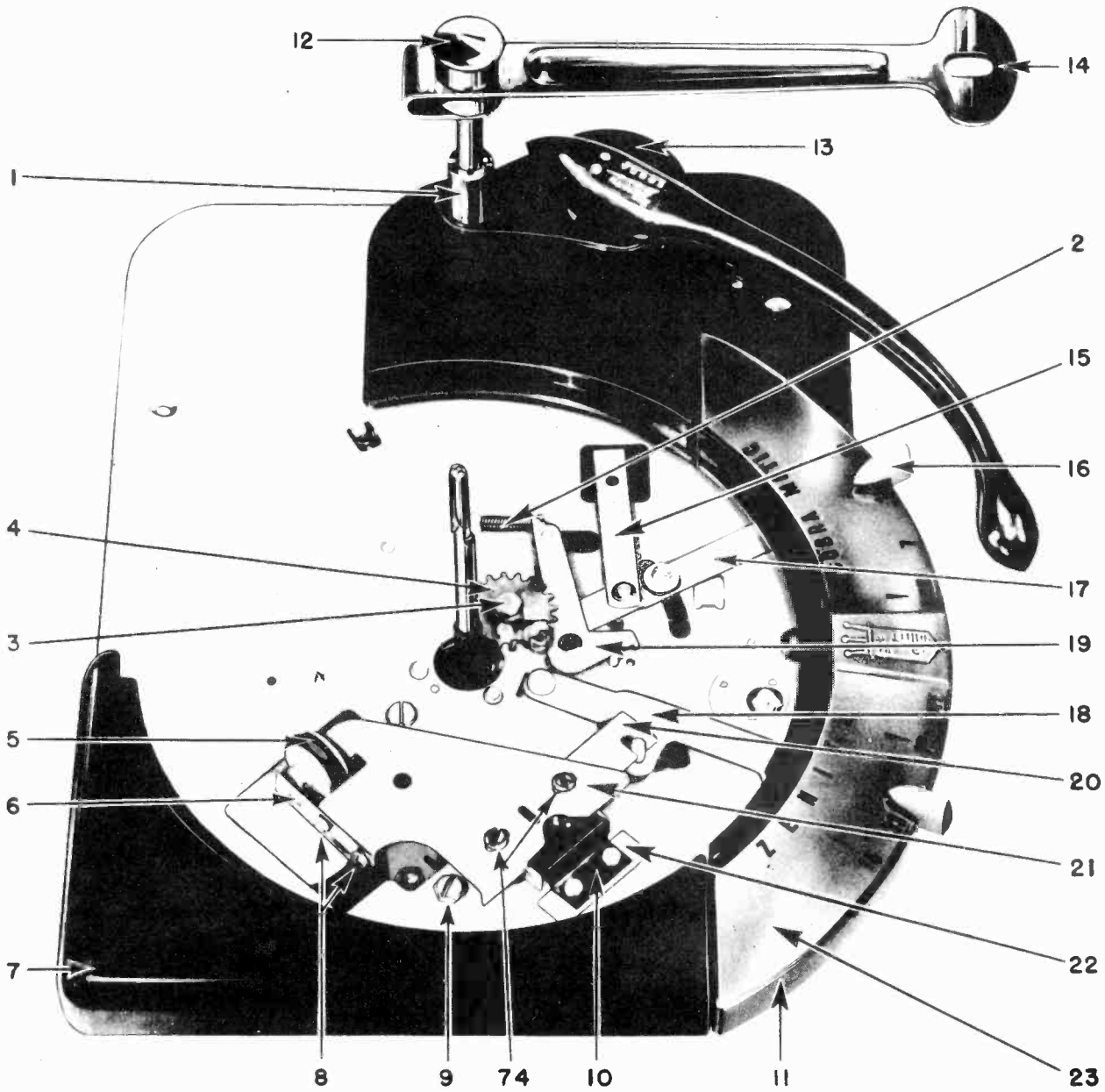
UNLOADING

Lift the record pressure arm (14) and swing it to the right until the pin on the shaft drops into the locating groove on record pressure arm shaft housing (1). Lift stack of records straight up on spindle.

MANUAL OPERATION

To play single records or home recordings, lift up the record pressure arm and turn it to the right. Place record on spindle and lower to the spindle shelf. Gently push record towards record pressure arm shaft and lower to turntable. Move speed change lever (18) to proper speed for type of record being played and move set-up lever (17) to manual position. Pick up tone arm and place the needle on the lead-in groove of the record.

MODELS S14028, S14029,
S14030, S14031, S14036



Record Changer Top View with Turntable Removed

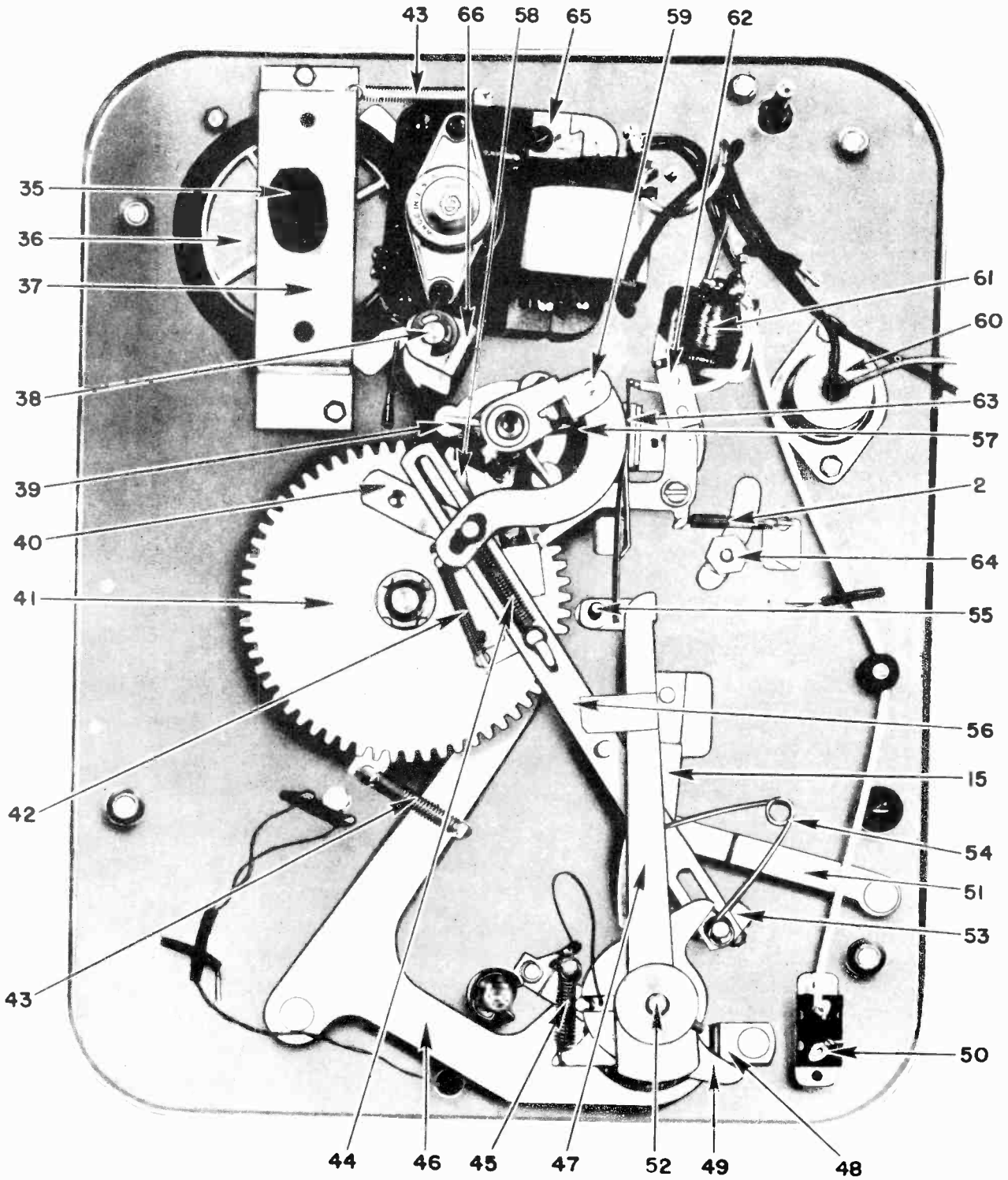
CAUTION

When changing needles be certain that only a Red-Green cartridge is used, S-15780. This will accommodate 78, 45 and 33 1/3 RPM records.

DESCRIPTION OF CYCLING

The motor shaft contacts drive wheel assembly (36) and causes it to rotate by friction contact with its rubber surface. Drive wheel assembly (36) drives idler wheel (5). The underside of the turntable is in contact with idler wheel (5) and is driven in this manner. Speed of the turntable is controlled by changing the position of the idler wheel (5) on drive wheel (36). When idler wheel is moved to the center of drive wheel (36) it will rotate more slowly than when moved to the outer edge of this drive wheel (36). In this manner the turntable can be driven at any speed from 10 to 85 RPM. Minor adjustments for proper tonal pitch can be made by simply moving speed change lever (18) back and forth to compensate for turntable speed which may vary due to line voltage changes. When reject button (73) is depressed it energizes solenoid (61) which then attracts trip pawl assembly (62). The same thing occurs when the forward movement of the tone arm causes friction lever and weight assembly (47) to contact the copper bronze contact on trip switch assembly (63). When gear segment (58) is released, gear pawl spring (42) causes the gear segment (58) to engage the rotating pinion gear (25) under the turntable thus causing clutch assembly (41) to rotate.

MODELS S14028, S14029, S14030, S14031, S14036



Record Changer Bottom View

As clutch assembly (41) rotates, tone arm lift lever (46) swings in such a manner that it contacts tone arm lift pin and raises the tone arm. Simultaneously, tone arm link and stud assembly (56) slides towards, and contacts one finger of tone arm lever assembly (49) forcing the tone arm towards the outer edge of the turntable and then on its return swing contacts the other finger of tone arm lever assembly (49) swinging the tone arm back over the records. The position to which it swings the tone arm over the records is determined by the position of record size discriminator (51). There are three steps on the record size discriminator (51) which determines set-down position for 7", 10" and 12" records. The tone arm lift lever

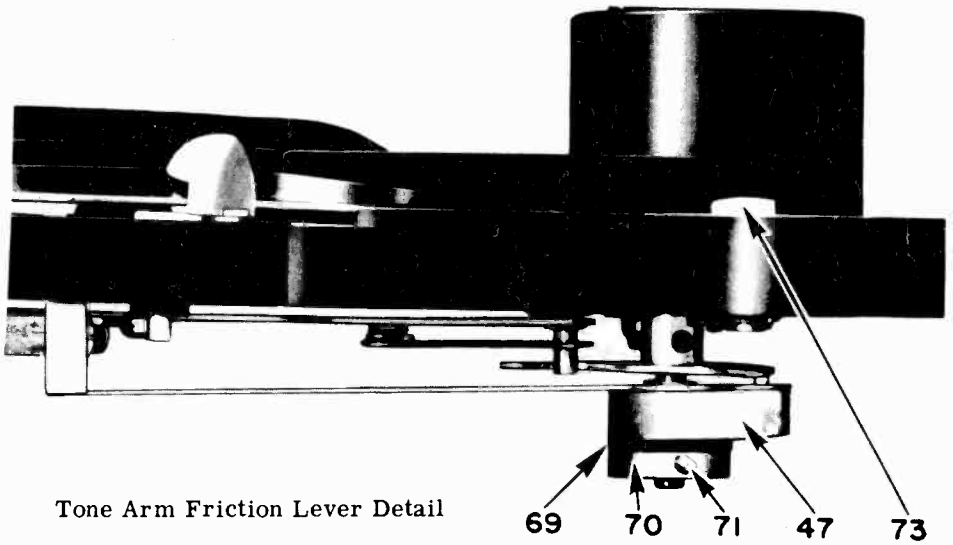
MODELS S14028, S14029,
S14030, S14031, S14036

(46) returns and releases brake lever assembly (48) which keeps the tone arm from moving erratically during cycle. Simultaneously, ejector lever and link assembly (59) rotates and this in turn causes spindle shaft (30) to rotate and ejector cam (29) to push the record off the spindle shelf. Operation of the tone arm set-down adjustment can be observed by raising the tone arm so the adjustment mechanism can be viewed.

VELOCITY TRIP

This changer is provided with what is commonly known as a velocity trip rather than a ratchet and positive trip mechanism. A velocity trip depends for the tripping action on the rate of forward motion of the pickup arm with respect to the turntable rotation. The changer will trip only when the tone arm advances more in one revolution of the turntable than the distance between normal grooves in a record. Only records having fast finishing grooves will operate the velocity trip. During the normal playing cycle, friction lever and weight assembly (47) continually moves forward toward the copper bronze contact on trip switch assembly (63).

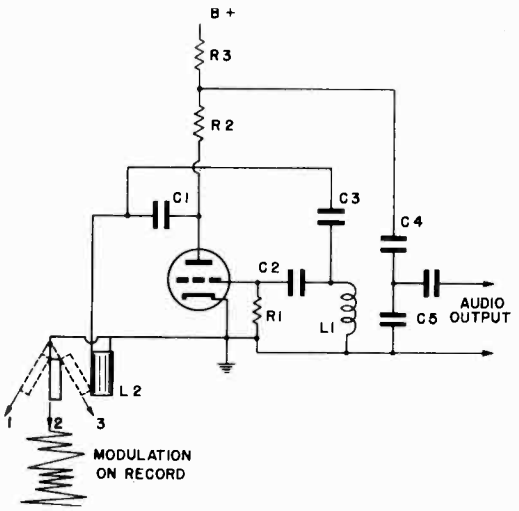
On normal forward advance, the friction lever and weight assembly (47) is kept from contacting the copper bronze contact by a wiping action from oscillating lever stud assembly (55). The oscillation of oscillating lever and stud assembly is produced by eccentric motion of oscillating gear (4) which is driven by the pinion gear (25) on the lower portion of the turntable. Oscillating gear (4) is mounted off-center so it will describe an eccentric action as it is being driven by the turntable gear. The tone arm moves in towards the center of the record and the repeated action of oscillating lever (55) keeps friction lever and weight assembly (47) from coming in contact with the copper bronze strip on trip switch assembly (63) as the pickup arm moves slowly towards the spindle and lead-in grooves. During the first revolution of the turntable, in the eccentric cycling grooves, the pickup arm advances rapidly and friction lever and weight assembly (47) is moved forward fast enough so that oscillating lever (55) does not halt its progress, therefore, friction lever and weight assembly (47) contacts the copper bronze trip contact on trip switch assembly (63) grounding it and making a complete circuit. This actuates solenoid (61) causing the changer to cycle.



Tone Arm Friction Lever Detail

THEORY OF THE COBRA RADIONIC PICKUP

The operation of the Cobra pickup is considerably different from Crystal and Dynamic pickups. These pickups generate audio power, while the Cobra controls power generated by a radio frequency oscillator, detector and audio amplifier. The oscillator operates at a frequency of 2.5 Mc. Modulation is accomplished by changing the energy losses in a tuned circuit. These losses may be represented by an equivalent resistance in series with the reactance of the coil. The ratio of the resistance to the reactance determines the efficiency or Q of the coil. The amplitude of the RF voltage developed across this coil by an oscillator will vary with changes in Q.

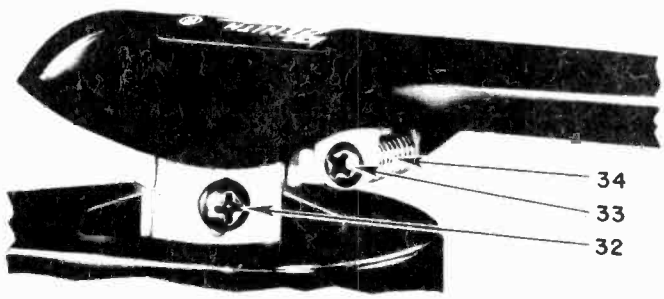


Simplified Circuit of Oscillator

The grid coil L1 and other components of the oscillator are mounted in the oscillator pre-amp chassis, while the plate coil L2 is in the needle cartridge with vane and needle assembly. The coil is fixed and has 40 turns of No. 40 wire (approximate DC resistance 2 1/2 ohms). The stainless steel vane, which is in the field of the coil, is spot welded to the osmium-iridium tipped stylus.

Any movement of the stylus will cause a corresponding movement of the vane. As the stylus and vane follow the modulations in the record, changes in the mutual inductance between the vane and coil occur. In position 2 the vane is at rest, and a constant RF voltage appears across the plate coil. As the vane is set in motion and reaches position 1, it is at its greatest outward swing from the coil, resulting in low mutual inductance, low reflected resistance, higher Q, and a higher RF voltage across the coil. In position 3 it is at its greatest inward swing, resulting in a high mutual inductance, high reflected resistance, lower Q and a lower RF voltage. It can be seen that the amplitude of the RF voltage which appears across the coil will vary with changes in Q, satisfying the condition for amplitude modulation. The position of the vane changes both the Q and L of the coil. Changes in L shift the frequency slightly, and a certain amount of frequency modulation is present, but since there is no frequency discrimination it remains undetected. Since the grid and plate coils are part of a single tuned circuit, any variations of amplitude of the RF voltage brought about by the changes in Q across the plate coil will also appear across the grid of coil L1, causing a shift in the average plate current through the plate load resistor across which the audio output voltage is developed. Plate bend detection takes place since only the positive half of the grid swing causes an increase in the average plate current. These changes in the average plate current appear as audio voltage across the plate load resistor.

The 2.5 Mc RF voltage and the audio voltage both appear at the plate (pin 6) of the oscillator triode. R2, C4 and C5 filter out the RF voltage allowing only the audio component to the grid (pin 4) of the amplifier triode where it is amplified, fed through a shielded lead to the audio amplifier of the receiver and reproduced by the loud speaker.



Tone Arm Set-Down & Height Adjustments

SET DOWN ADJUSTMENT

When adjusting the tone arm for proper set-down on the edge of the record, move set-up change lever to 7" position, place a 7" record on the turntable, turn the record changer through cycle by rotating the turntable by hand. Watch closely where the needle point of the Cobra cartridge lands on the record and adjust tone arm set-down adjustment screw (33) until proper landing position is obtained.

TONE ARM HEIGHT ADJUSTMENT

The tone arm height adjustment determines vertical rise of the tone arm. If the tone arm does not rise sufficiently it will not play a full stack of twelve records. On the other hand, if the tone arm raises too high it may hit the records resting on the record shelf. Set the tone arm height adjustment screw (32) so that the needle clears twelve unwarped records on the turntable. The tone arm housing must not hit the under side of the records on the record shelf when the changer is cycled after adjustment.

SLAB HEAD SCREWS

For maximum rigidity many components are locked into position with slab head screws. This type set screw provides a more positive grip. The slab head set screw wrench is available as part number 68-8.

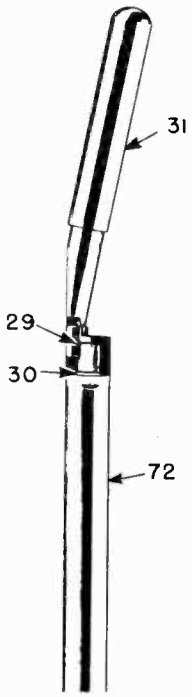
SPEED INDICATOR ADJUSTMENT

It is possible that the speed of the record changer may not conform to the speed stop on escutcheon (23). Proper adjustments can be made in the following manner. Put a stroboscopic dise on the turntable, adjust speed change lever (18) until the turntable is turning at exactly 78 RPM. Stop the record changer by pulling the AC plug, remove the turntable, loosen the two adjusting screws (74) and move speed change lever (18) so that the point on the control knob indexes exactly at the 78 mark on the escutcheon (23). Then re-tighten adjusting screws (74) and replace the turntable. The turntable should now rotate at exactly 78 RPM, however, as a precaution, again check with the stroboscopic disc.

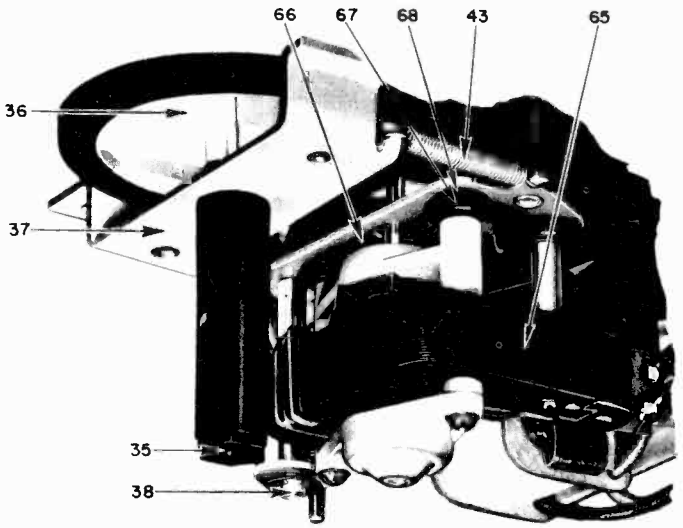
SPINDLE

The spindle on this record changer is composed of five separate parts. Spindle shaft (30) and ejector cam (29) are pressure-fit together and if either breaks, they cannot be replaced since the assembly operation is a machine operation. The spindle housing is composed of two separate portions which once again are pressure-fit together and require a machine operation for assembly. It is possible that spindle cap (31) may be pulled off spindle assembly (72) and if this does occur, it can easily be replaced by sliding a new spindle cap down over the spindle and then pressing in on the detent portion, which acts as a stop to keep the spindle cap from sliding off spindle (72). If breakage occurs other than loss of the spindle cap (31), the entire spindle assembly (72) must be replaced.

MODELS S14028, S14029, S14030, S14031, S14036

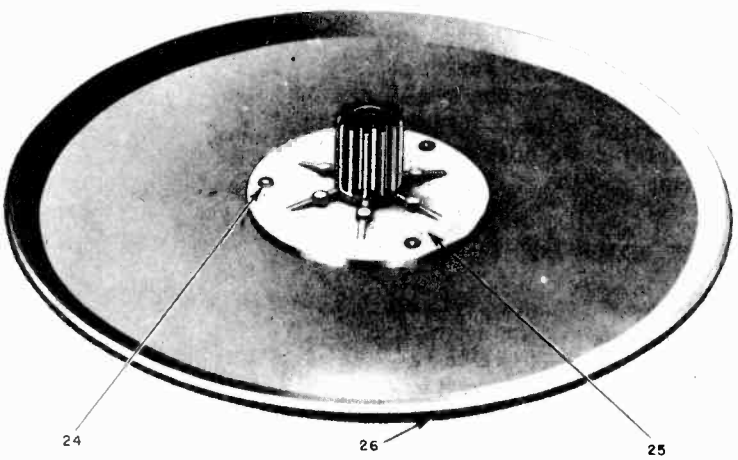


Spindle S-17424



MOTOR AND MOUNTING MECHANISM

The motor (65) is shock mounted by the means of rubber grommets (68) and fibre washers (67) to mounting plate and stud assembly (66). The entire motor (65) and motor mounting plate (66) revolve about motor mounting stud (38). The point at which motor mounting stud (38) passes through motor mounting plate should be well lubricated to allow free action of the motor. The motor drive shaft is kept in contact and in constant pressure with drive wheel assembly (36) by the means of motor tension spring (43). This insures the proper friction contact between the motor drive shaft and drive wheel (36). The drive wheel (36) is firmly mounted in drive wheel bracket and bearing assembly and is pivoted on bearings at two points eliminating possible lateral motion. This reduces the possibility of WOWS. When the record changer is in shipment, the entire motor and bracket assembly (66) (65) is fastened to a second point by motor mounting screw (9). This eliminates the possibility of indentations forming in drive wheel (36) as a result of constant pressure and pounding of the motor drive shaft during shipment.

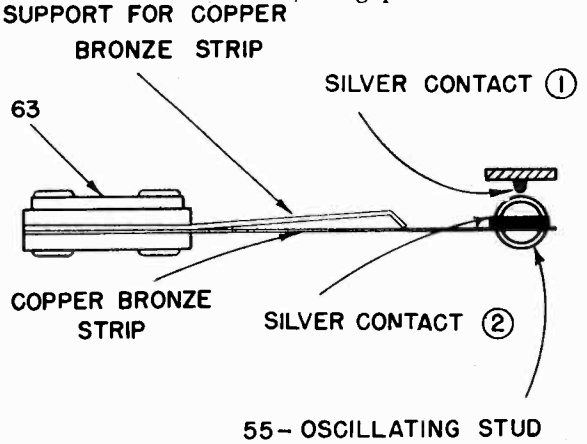


TURNTABLE

There is little possibility of any damage occurring to the turntable through normal usage. However, it is possible the turntable may be removed and dropped, thus damaging pinion and bearing assembly (25) so that it would have to be replaced. Replacement is quite simple. All that is required is to drill out the three rivets (24) on pinion bearing (25). When removing the rivets from the turntable plate or disc, be certain not to excessively disturb the flocking. Then obtain three new rivets (24) and re-rivet pinion bearing assembly (25). If the flocking is scraped or damaged or discolored it can be replaced by spraying the scraped portion with clear lacquer. Dip the entire turntable disc into a box of flocking, then brush off the excess.

TRIP CONTACT ASSEMBLY

For proper automatic rejecting, silver contact #2 on trip switch assembly (63) should be in proper relation to silver contact #1 on friction lever (47). The adjustment should be made with the record changer resting on the side nearest to the idler wheel and trip assembly (36). The turntable should be rotated sufficiently to move oscillating lever stud (55) to its maximum upward travel. The distance between the silver contact #1 on the friction lever (47) and silver contact #2 on trip switch (63) should be 1/16". If the distance is greater or less than 1/16", the support for the copper bronze strip on trip switch assembly (63) should be bent until this 1/16" gap is attained.



Trip Contact Adjustment

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high operating temperatures the changer should be lubricated as follows:

All shoulder rivets which hold moving parts, all stud shoulder mounting points on which moving parts operate and all C washers should be lubricated with a few drops of fine instrument oil.

The other moving surfaces should be coated either with Sta-Put Grease or Sta-Put Oil as indicated in the following two illustrations. The purpose of using the extremely fine instrument oil is its ability to penetrate into the moving metal parts. These saturated materials then act similarly to self-lubricated oillite bearings.

TROUBLE SHOOTING

NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY

a. Clean foreign material from around needle.

b. Check needle to see if the tip is bent or broken. Replace needle.

c. Hinge bearing binds. Check lateral movement of tone arm. It must move freely without binding.

d. Excessive vibration while playing an LP record. Any vibration cause by (1) unsteady mounting, (2) floor vibration, or (3) passing of heavy vehicles may cause the pickup to glide across the record grooves.

MECHANISM STARTS SLOWLY AND MOTOR GETS HOT

a. Check line voltage and frequency.

b. Check lubrication.

c. Motor windings damaged.

d. Room temperature abnormally low.

MOTOR FAILS TO RUN EVEN WHEN IT IS DISCONNECTED FROM CHANGER AND PROPER VOLTAGE AND FREQUENCY APPLIED DIRECTLY TO THE TWO INPUT LEADS OF THE WINDING

a. Open windings.

b. Damaged or frozen bearings.

c. Lower rear support bracket bent. Remove and straighten bracket--re-center armature.

NEEDLE SETS DOWN PROPERLY ON RECORD BUT SLIDES OVER THE RECORD GROOVES

a. Cabinet tilted.

b. Badly worn or broken needle cartridge.

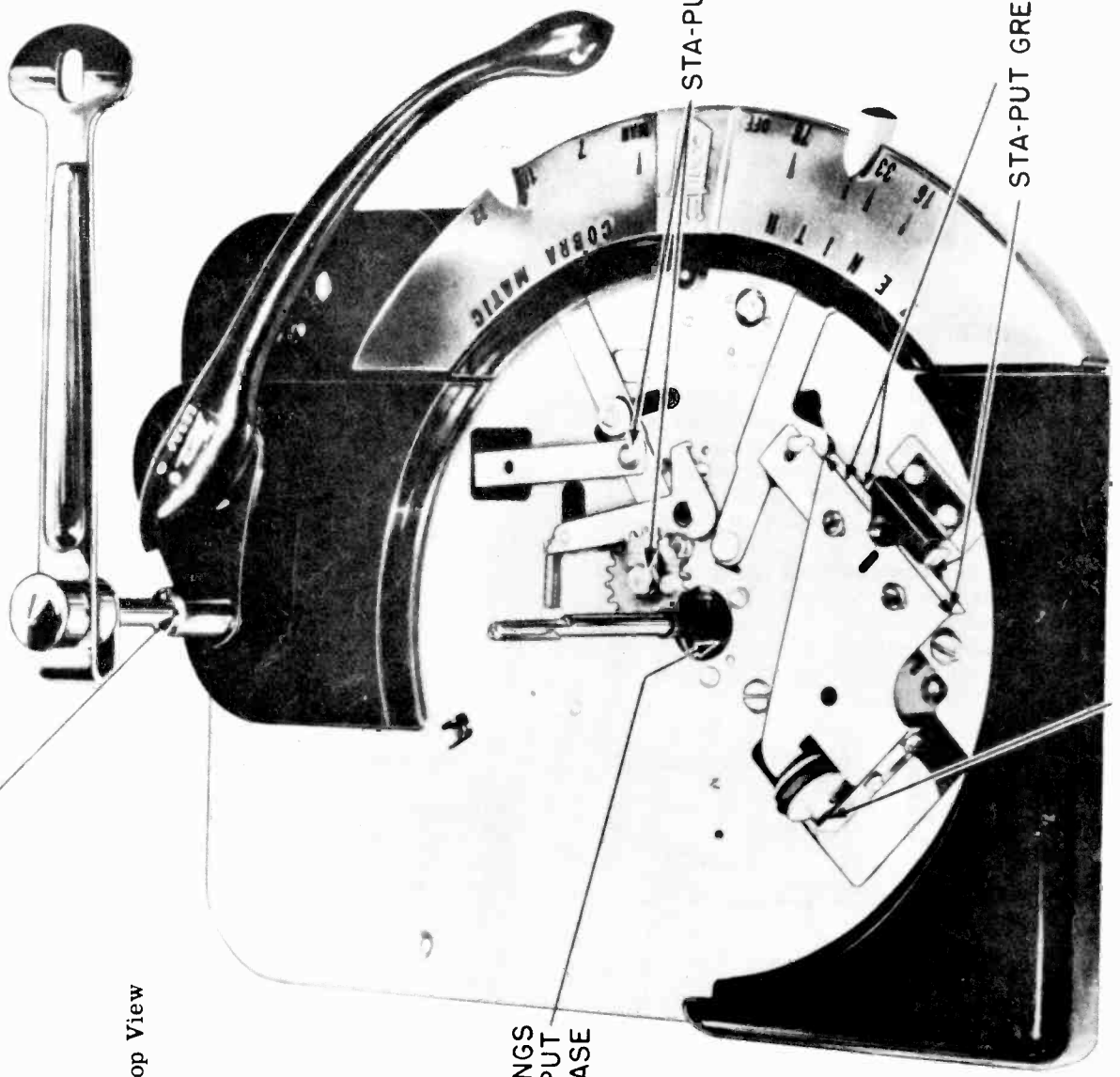
TONE ARM FALLS OFF RECORD

a. Check tone arm set-down adjustment.

b. Check tone arm pivot bracket.

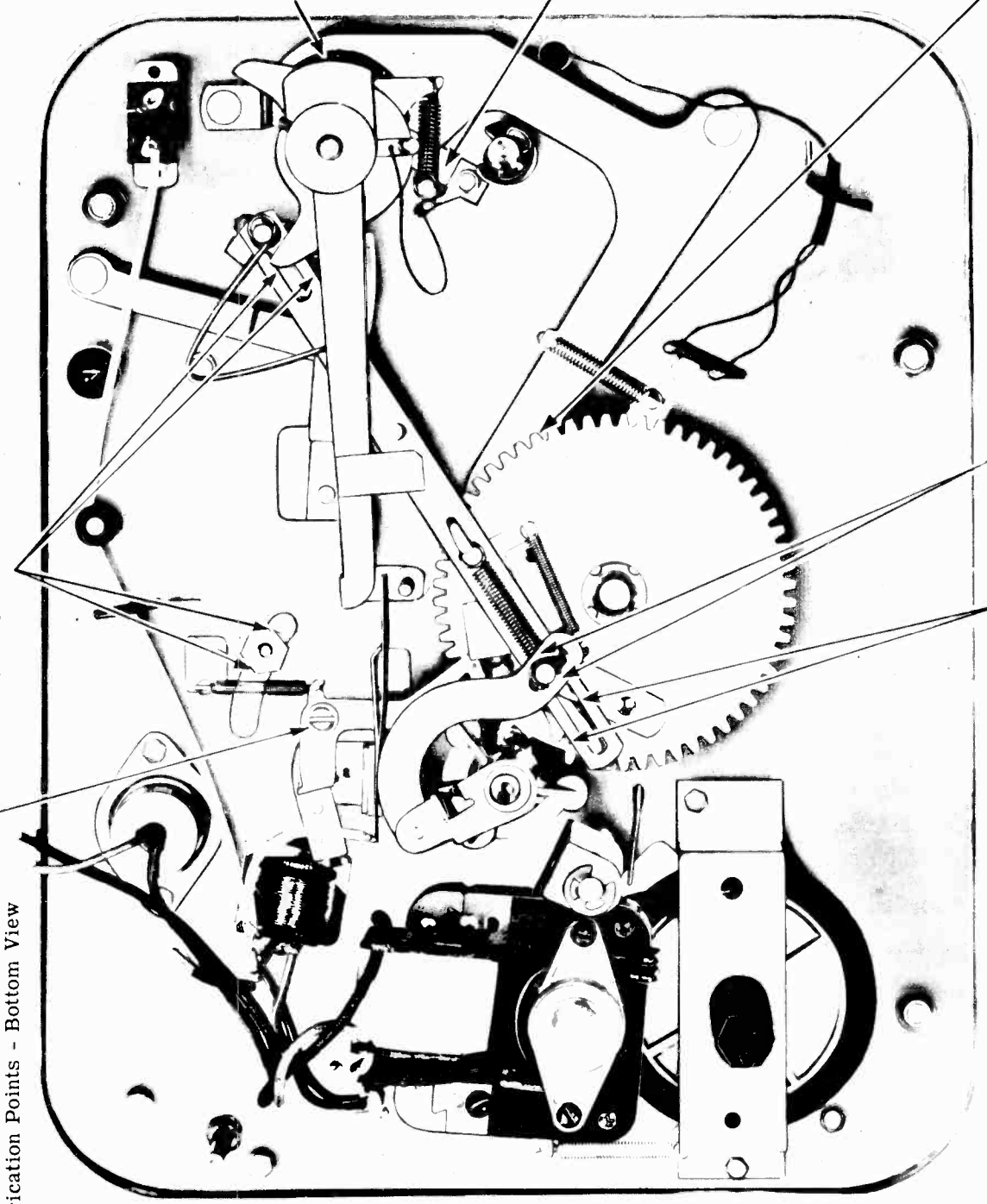
c. Changer not level.

MODELS S14028, S14029,
S14030, S14031, S14036



Lubrication Points - Top View

MODELS S14028, S14029,
S14030, S14031, S14036



Lubrication Points - Bottom View

MODELS S14028, S14029,
S14030, S14031, S14036

SQUEAKS OR NOISES DURING PLAYING OF RECORDS

a. Friction between the records on the turntable and the spindle will occasionally cause squeaks. A thin coat of wax applied to the spindle will remedy this condition.

b. Check lubrication.

RECORD IS NOT HEARD ALTHOUGH CHANGER OPERATES

a. See that the receiver is set for Phono.

b. Check receiver audio by listening to radio.

c. Check the phono oscillator tube.

d. Check needle cartridge.

e. Check tone arm housing for broken leads.

RUMBLE, WOW AND MICROPHONICS DURING REPRODUCTION

a. Changer not "floated" properly. Remove packing strip. Loosen mounting bolts.

b. Motor leads pulled too tight preventing motor from "floating" freely.

c. Noisy phono oscillator tube.

d. Impression on idler wheel.

e. Check rubber motor shock mounts.

f. Check the motor drive shaft and be certain the plane of the shaft's diameter is parallel to the rubber surface of drive wheel assembly (36).

NEEDLE FAILS TO CLEAR MAXIMUM LOAD OF RECORDS ON THE TURNTABLE

a. Check tone arm height adjustment.

TONE ARM SETS DOWN TOO FAR IN OR OUT ON RECORD

a. Check tone arm set-down adjustment.

TONE ARM SET DOWN VARIES

a. Tone arm pivots loose.

CHANGER CONTINUES TO CYCLE

a. Check the trip switch adjustment.

b. Trip pawl sticks.

CHANGER WILL NOT CYCLE UPON COMPLETION OF RECORD

a. Be certain that the record has an eccentric center groove.

b. Check velocity trip mechanism.

CHATTER OF TRIP PAWL ASSEMBLY

a. Remove mounting bolt which fastens trip pawl assembly (62) to shoulder stud. Then load shoulder stud with Sta-Put Grease and replace and fasten trip pawl assembly.

ELECTRICAL NOISE WHEN TONE ARM IS MOVED

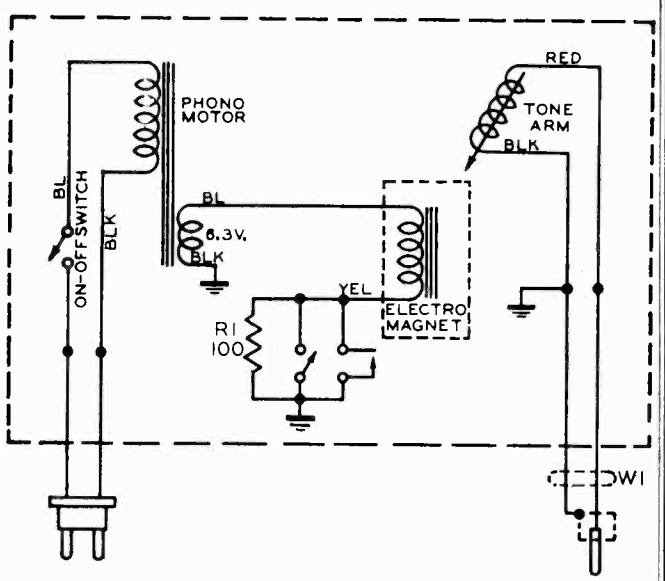
a. Check ground wire from metal tone arm stiffener to ground terminal used to terminate ground wire from the Cobra Cartridge.

b. Stud on oscillating lever and stud assembly (55) should be covered with vinylite tubing to prevent contact with friction lever and weight assembly (47).

c. Friction lever (47) at its most outward swing may contact wire guide stud on changer base plate. Cover this stud with vinylite tubing.

FRICTION LEVER (47) FAILS TO MOVE WITH TONE ARM

a. Check felt washer (69) for proper friction surface. If worn, replace.



Wiring Diagram

MODELS S14028, S14029, S14030, S14031, S14036

PARTS LIST for

S-14028, S-14029, S-14030, S-14031 and S-14036
Variable Speed Record Changers

Tone Arm Assembly

Diag. No.	Parts No.	Description
	12-1658	Cartridge Retaining Brkt.
33	69-261	Tone Arm Set-Down Adj. Screw
34	80-609	Landing Adj. Spring
	83-1636	Contact Support Strip
	91-1225	Red-Black Tone Arm Wire
	112-573	#2-32x1/4 R. H. S.T. (Cartridge Ret. Brkt. Mtg. Screw)
	112-619	#2-32x5/16 R.H.S.T. (3 used to Mt. Hinge Plate)
	127-68	Cartridge Contacts
	127-69	Cartridge Contacts
	148-125	Cobra Tone Arm Only
	S-15780	Red-Green Cobra Cartridge
	S-16905	Tone Arm Assem. (Complete) (Less Cartridge)
	S-16986	Hinge Plate & Brkt. Assem.

Miscellaneous

Diag. No.	Parts No.	Description
	6-59	Spindle Bearing
	6-61	Compression Spring Bearing
	6-64	Tone Arm Bearing
22	12-1742	Guide Brkt. (Idler Wheel)
31	15-81	Cap (Spindle)
	23-22	A.C. Connector (used on S-14028-30-31)
60	24-550	Switch Lead Cover
4	34-172	Osc. Gear (Part of S-16918)
13	43-187	Record Post Housing
11	43-188	Front Housing
7	43-189	Decorative Housing
12	46-865	Record Shaft Knob (Gold)
73	46-866	Reject Switch Knob
16	46-867	Speed & Record Size Control Knobs (2 Used)
	54-280	4-40x3/16x1 1/16" Hex Nut Steel N.P. (used on Lift Pin Assem.)
	54-282	Spring Nut (used on Lift Pin Assem.)
	56-284	Groove Pin 1/16" dia. (used on S-16913)(or 56-287)
	56-285	Groove Pin 3/32" dia.x3/8" lg. (used on S-16927)
	57-1613	Emblem Plate
20	57-1649	Speed Adj. Plate
	57-1650	Switch Mtg. Plate
23	57-1654	Escutcheon
58	60-16	Gear Segment Pawl
	63-1744	100 ohm 1/2W Ins. Res 20%
24	64-3	Rivet 1/8 dia.x9/32 lg Tubular (3 used on Turntable)
	64-6	Rivet 1/8 dia.x3/16 lg. Tubular (used on S-16912)
	64-430	Shoulder Rivet (8 used)
3	64-431	Shoulder Rivet (used on S-16918)
	69-43	8-32x3/8 R.H.M.S. Steel (Mts. S-13913)
32	69-262	8-32x1/2" Phill. R.H.M.S. Steel St. Br. (Tone Arm Height Adj.)
	73-99	8-32x1/4" Slab Hd. Set Screw (2 used on S-16908)
71	73-112	8-32x1/2" Slab Hd. Set Screw (used on 94-723)
	73-121	Special Set Screw (Tone Arm & Lift Pin)
	73-123	8-32x1/4" Allen Hd. Set Screw (used with 46-865)
	73-131	6-32x3/8" Slab Hd Set Screw (used on S-16917)
2	80-582	Trip Lever Spring (2 used)
43	80-613	Tone Arm Lift Lever & Motor Tension Spring (2 used)
	80-645	Tone Arm Height Adj. Spring
42	80-698	Gear Segment Pawl Spring
	80-807	Spindle Compression Spring (used on S-16913)
10	80-808	Idler Brkt. Retaining Spring
45	80-809	Brake Spring
6	80-810	Idler Wheel Spring
	80-811	Tone Arm Swivel Spring
44	80-812	Tone Arm Link Spring
54	80-813	Tone Arm Toggle Spring
57	80-814	Ejector Lever Spring
	80-816	Compression Spring (used with S-16922)
	83-1574	Two Lug Terminal Strip
	85-482	ON-OFF Switch
50	85-483	Reject Switch
	93-53	1/32x11/64x3/8 Steel Washer (used on S-15505)
	93-416	1/32 thk.x13/64 I.D. x 5/8O.D. (used on Motor Mtg.)
	93-781	#8 Split Lockwasher Steel N.P. (used on S-13913)

MODELS S14028, S14029, S14030, S14031, S14036

Diag. No.	Parts No.	Description
	93-784	Spring Washer (used on 94-722)
	93-876	Fibre Washer (used on S-13913)
67	93-900	Fibre Washer (3 used on Motor Mtg.)
	93-903	Steel Washer (3 used on motor Mtg.)
	93-968	.046 thk x .171 I.D. x 1/2" O.D. Steel Washer (used on 94-722)
69	93-1055	Felt Washer (used on S-16910)
	93-1056	Felt Washer (used on Idler Wheel)
	93-1070	Bearing Washer (2 used on 6-59)
	93-1071	Bearing Washer (2 used on 6-64)
64	94-722	Friction Bushing
70	94-723	Friction Lever Retaining Bushing (used on S-16910)
38	97-391	Motor Mtg. Stud
55	97-393	Osc. Lever Stud
	112-544	Record Changer Mtg. Screw
35	112-804	Compression Spring Retaining Screw (used on S-16922)
	112-805	4-40x1/2" Truss Hd. W. S. Steel Stat Br. (2 used to Mt. 85-483)
	112-806	#4x3/8" Binding Hd S.T. Screw (1 used on ea. 46-867)
	113-9	8-32x1/4 Hex Hd Sl. M.S. (1 ea. used on S-15505 & 94-722)
8	114-217	#8x1/4" Hex Hd. Sl. S.T. (7 used)
	114-248	6-20x5/16" Hex Hd. Sl. S. T. (2 used 43-187 & 189 - 3 Used 43-188)
	114-297	#6x1/4" Hex Hd. Sl. S. T. Screw (2 used 85-482 & 1 used on 83-1574)
9	114-345	10-32x3/8" Hex Hd. Sl. M.S. Steel (used on Motor Mtg.)
74	114-347	#8-32x3/8 Hex Hd. (2 used on S-16919)
	114-348	8-32x5/16 Hex Hd. S. T. (3 used on S-16913 & 2 used 199-134)
	114-357	#10-32x3/8 Hex Hd. Sl. M. S. Red Finish (used on Motor Mtg. in Shipping)
46	117-145	Tone Arm Lift Lever
15	118-58	Set Up Link
68	125-61	Rubber Grommet (3 used on Motor Mtg.)
	135-16	Tone Arm Lift Pin Weight
65	141-129	Motor
65	141-131	Motor 50-60 cycle export
	184-14	1/8" dia. Steel Ball
	188-128	Retaining Ring (9 used)
	188-131	Retaining Ring (used on Motor Mtg.)
	188-137	Retaining Ring (used on pressure arm & shaft Assy.)
	188-140	Retaining Ring (used on Clutch Gear Assem.)
1	199-134	Record Pressure Arm Shaft Sleeve
61	S-13913	Magnet Coil Assem.
62	S-15505	Trip Pawl Assem.
51	S-16900	Discriminator Lever & Stud Assem.
18	S-16901	Speed Change Lever & Stud Assem.
17	S-16902	Set-Up Change Lever & Stud Assem.
53	S-16903	Actuating Lever & Pin Assem.
	S-16904	Tone Arm Brkt. & Lift Pin Assem.
52	S-16907	Tone Arm Shaft Assem.
49	S-16908	Tone Arm Lever & Bushing Assem.
47	S-16910	Friction Lever & Weight Assem.
40	S-16911	Brkt. & Stud Assem. (used on S-16912)
41	S-16912	Clutch Gear Assem.
39	S-16913	Gear Housing & Sleeve Assy.
59	S-16917	Ejector Lever & Link Assy.
19	S-16918	Osc. Gear & Lever Assem.
21	S-16919	Idler Wheel Brkt. & Shaft Assy
5	S-16921	Idler Wheel Assem.
36	S-16922	Drive Wheel Assem.
37	S-16923	Drive Wheel Brkt. & Bearing Assem.
66	S-16924	Motor Mtg. Plate & Stud Assy.
14	S-16927	Pressure Arm & Shaft Assy.
25	S-16929	Turntable Pinion & Bearing Assem.
26	S-16930	Turntable Assem. (Complete)
63	S-16933	Trip Switch Assem.
48	S-17166	Brake Lever Assem.
56	S-17391	Tone Arm Link & Stud Assy.
72	S-17424	Spindle Assem. (Complete)
		S-14029
	S-17028	Plug & Shielded Lead Assy. (Plug 58-75)
	S-17029	Plug & Wire Assy. (Plug 58-192)
		S-14030
	S-17068	Cable & Plug Assy. (Plug 58-166),
		S-14031
	S-16940	Twisted Wire & Plug Assy. (Plug 58-75)
	S-16988	Plug & Wire Assy. (Plug 58-192)
		S-14036
	S-17028	Plug & Shielded Lead (Plug 58-75)
	S-17029	Plug & Wire Assem. (Plug 58-192)
	23-22	A-C Connector

MODEL C710,
Ch. 133

SPECIFICATIONS

The Hoffman Model C710 DraweRECORDER is a drawer-mounted disc recorder unit comprising a recording table and cutting arm for 78 rpm inside-out disc recording up to 10" diameter, and a self-contained amplifier and microphone preamplifier. The unit is normally used as a recorder only, and as such is installed in the record storage compartment of Hoffman radio-phonograph combinations. However, it may also be modified for use as a self-contained recorder and playback unit by the addition of a speaker and playback arm. (See Service Data No. 30, Chassis 133.)

APPLICATION

The Hoffman Model C710 DraweRECORDER may be installed in the following Hoffman receivers produced prior to the issuance of this data:

C506	C510	D522	900	912
C507	C515	D524	901	913
C509	C516	C530	902	C1006

In ordering Model C710, be sure to specify the model number of the set in which it is to be installed.

METHOD OF INSTALLATION

1. If the receiver cabinet has 13/16" side panels or 3/8" side panels with a cleat on the inside of the record compartment, locate and drill the mounting holes for the DraweRECORDER shelf per the instructions on the template furnished with the shelf.

2. If the receiver cabinet has 3/8" thick side panels with no cleat in the record compartment, it will be necessary to provide additional support for the outer end of the shelf. Glue a 1/2" thick by 3" wide by approximately 12" long wood cleat on the inside cabinet side panel of the record compartment, centering it at the hole location given on the template.

3. Locate and drill holes in the center partition of the receiver cabinet per the instructions on the template.

4. Mount the shelf using the wood screws at the outer end and the machine screws at the center through the partition.

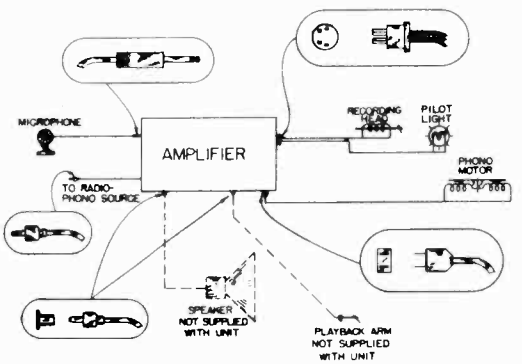
5. Install the DraweRECORDER and adjust the slides as necessary for free operation.

6. Plug the AC lead from the DraweRECORDER into the receptacle on the receiver, and the audio lead into the jack marked "television" or "recorder." The Model C710 may be used to record signals from any type of home receiver by the addition of a connection in the audio circuit, ahead of the volume control and by making provision for the AC to the recorder.

MAJOR COMPONENTS

Amplifier and Recorder Chassis	133 (See Service Data No. 30)
Microphone	Part No. 9014
Drawer	Part No. 6540
Shelf	(Specify receiver model No. when ordering)

BLOCK DIAGRAM



ELECTRICAL AND MECHANICAL DATA

AMPLIFIER

Average required input levels (0 db = 6 MW across 500 ohms):

Microphone jack	−49 db
Radio-phono cable	+ 3.2 db

Power Source—117 volts AC, 60 cycles, 70 watts

RECORDER

Motor—4 pole synchronous type

Recording head—Magnetic, impedance 3.2 ohms at 400 cycles

Recording direction: Center to Outside

Maximum time of recording (one side of disc):

10"—5.0 Min.
8"—3.5 Min.
6"—2.0 Min.

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TUBE COMPLEMENT

1	12SJ7	Mike Preamplifier	1	35L6GT	Power Output
1	12SQ7	First Audio Amplifier	1	50Y6GT	Rectifier
1	12SQ7	Second Audio Amplifier	1	6AB5/6N5	Volume Indicator

SOCKET VOLTAGES

Tube	Function	1	2	3	4	5	6	7	8
12SJ7	Preamp.	0	0*	10	0	10	25	11.8AC*	59
12SQ7	1st Audio	0	−.35	0	0	−.4	75	11.5AC*	11.5AC*
12SQ7	2nd Audio	0	0	1.2	0	0	105	11.5AC*	11.5AC*
35L6GT	Output	0	32AC*	200	130	0	NC	32AC	8
6AB5/6N5	Indicator	5.5AC*	20	−.2	110	0	5.5AC*	—	—
50Y6GT	Rectifier	NC	45AC*	0	125	125	NC	45AC*	235

*All AC heater voltages are measured between tube heater pins.
All voltages measured to chassis except as noted.
Line voltage 117 volts.
DC voltages measured with 20,000 ohm/volt meter.
AC voltages measured with 1000 ohm/volt meter.
All voltages DC except as noted.
Both volume controls in minimum position—no signal input.
Selector switch in "playback" position.

OPERATING INSTRUCTIONS

OPERATING THE RECORDER MECHANISM

Turn the ON-OFF switch on the radio to the ON position. This switch turns all of the equipment ON or OFF. Turn the RECORD RADIO-PHONO VOLUME switch on the recorder unit to the ON position. The recorder motor may now be started by turning the three-position switch on the recorder unit to either the RECORD or PLAYBACK position. To stop the recorder motor, place the switch in the STANDBY position.

DESCRIPTION OF OPERATING CONTROLS

A brief description of the various controls on the DraweRECORDER is given below. For location of these controls, see Figure 1.

1. VOL. INDICATOR. An eye type of indicator is used with this equipment. It enables the operator to maintain the proper volume level when recording either on radio or microphone.

   CAUTION: NEVER RECORD SO THAT THE LOUDEST SOUNDS OVERLAP THE PATTERN ON THE VOLUME INDICATOR. IF THE RECORDING LEVEL IS TOO HIGH THE RECORDING WILL BE RUINED. See paragraph on RECORDING LEVEL INDICATOR.

2. RECORD-MICRO. PORT. PLAYBACK VOLUME. The microphone intensity is regulated by this control when using a microphone with the recorder. The microphone should be plugged into the jack marked MICROPHONE. This control is also used as a volume control during playback when the unit is used as a portable instrument.

3. RECORD RADIO-PHONO VOLUME. This control is used for adjusting the intensity of the program material to be recorded from the radio or phonograph.

4. SWITCH. The knob to the left is a three-position switch with the following functions:

   a. STANDBY position—In standby position the amplifier tubes are heated and ready for immediate action, but the recorder is inoperative and the recorder motor is not running. This position is provided to enable the user to make an instantaneous recording of news flashes or other program material the user may wish to record at the spur of the moment.

   b. PLAYBACK position—The switch should be in this position when playing back a recording if the recorder mechanism is equipped with a playback arm. The auxiliary playback arm is not supplied as standard equipment. If it is desired to install a playback arm on the recorder unit, see the paragraph on PORTABLE USE.

   c. RECORD position—The switch should be placed in this position when making a recording.

MICROPHONE RECORDING

When recording with the microphone proceed as follows:

1. Plug the microphone into the MICROPHONE jack.
2. Place a recording blank on the turntable. Be sure the drive pin of the turntable is engaged in the drive pin hole of the recording blank.
3. Place the three-position switch in the RECORD position.
4. Adjust the RECORD-MICRO. PORT. PLAYBACK VOLUME control until the volume indicator almost closes when speaking into the microphone.
5. Move the recorder arm to the extreme left (toward the center of the recording blank) and lower the recording arm so that the needle starts cutting the blank. The recorder cuts from the inside to the outside, or opposite from a commercial record. This simplifies the problem of disposing of the thread.

6. After the recording has been started, make certain that the thread falls free of the cutting needle and toward the center of the record. It may be necessary to start the thread toward the center of the recording blank with the finger, but after a few revolutions of the turntable the thread will lie flat and no further attention will be required.
7. At the conclusion of the recording, cut a few blank grooves before lifting the recording head from the record.

RADIO RECORDING

When it is desired to record a radio program, follow the procedure given above for MICROPHONE RECORDING but use the RECORD RADIO-PHONO VOLUME control to regulate the intensity of the program material to be recorded instead of the microphone volume control. The program being recorded can be heard on the speaker during the recording process. This feature is provided so that the radio volume and recorder volume controls may be operated independently without any interaction. Similarly, the tone controls on the radio panel may be operated to obtain the most pleasing effects for the listener without affecting the quality of reproduction from the recorder.

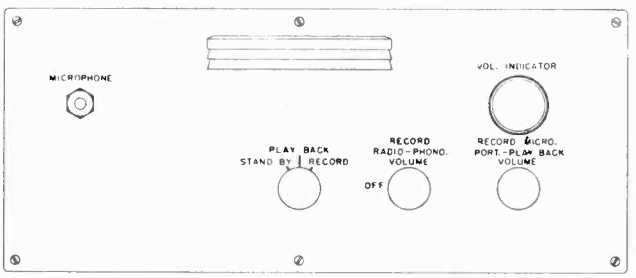

Fig. 1—HOFFMAN DRAWER RECORDER, PANEL VIEW

RECORDING MICROPHONE AND RADIO SIMULTANEOUSLY

If the RECORD RADIO-PHONO VOLUME control and the RECORD-MICRO PORT.-PLAYBACK VOLUME controls of the recorder are operated simultaneously, a combination recording of both radio and microphone may be obtained. When making this type of recording, the procedure described under RADIO RECORDING AND MICROPHONE RECORDING should be followed.

RECORDING PHONOGRAPH RECORDS

To make a copy of a phonograph record proceed as follows:

1. Place the switch on the radio panel in the PHONO position.
2. Turn the RECORD RADIO-PHONO VOLUME control to ON.
3. Start the record changer, which should be operated manually, and adjust the RECORD RADIO-PHONO VOLUME control on the DraweRECORDER until the volume indicating eye almost closes on the loudest sounds. The volume level is now properly adjusted to make the recording.
4. Place the recording blank on the recording turntable. Be sure the drive pin of the turntable is engaged in the drive pin hole of the recording blank.
5. With the record player motor running, place the record player arm on its rest.
6. Start the recorder motor by placing the three-position switch in the RECORD position.
7. Move the recorder arm to the extreme left (towards the center of the recording blank), and lower the recording arm so that the needle starts cutting the recording blank.
8. Place the record player arm on the first groove of the record to be recorded.
9. When the recording has played through, back off the RECORD RADIO-PHONO VOLUME control on the DraweRECORDER and remove the recording arm from the record.
10. Stop the record changer.

ADJUSTMENT OF THE CUTTING HEAD

The depth of cut which the cutting needle makes on the surface of the recording blank is adjusted by turning the thumb screw on the cutting arm. The thread left by the cutting needle should be about the size of a human hair. To determine if the depth of cut is correct proceed as follows.

1. Start the recorder and cut a few grooves in a recording blank.
2. Note the size of the thread.
3. Raise the recorder arm and remove the arm from the turntable.
4. If the thread is too large, turn the adjusting screw on the cutting arm towards the next lower number to decrease the pressure of the cutting head. Various makes of recording blanks may require different adjustments to produce the same size thread.

INSTALLATION OF THE CUTTING NEEDLE

Loosen the needle set screw at the front of the cutting head. Place the new needle in the hole in the bottom of the recording head, and make certain that the set screw is tightened against the flat side of the cutting needle. Lower the recording arm to the rest position.

PORTABLE USE

Chassis 133 recorder may be converted to independent portable operation as follows:

1. Select a standard single-hole-mount playback arm with a crystal cartridge capable of .5 to 1.0 volt output and mount the arm in the hole just behind and to the left of the turntable.

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2. Using a standard phono plug, attach the playback arm cable to the "playback" phono input receptacle. (See Figure 2.)

3. Using a second standard phono plug, attach a 3.2 ohm PM dynamic speaker to the "speaker" jack. (See Figure 2.)

RECORDING LEVEL INDICATOR

For proper recording level operation, the VOLUME indicator must be adjusted so that the eye just closes when approximately ½ watt of power is applied to the recording head. One-half watt of power produces good quality home recordings and allows a margin of safety to prevent overloading on high amplitude peaks. This recording level produces records with a playback level slightly lower than a commercial record, so that the volume control on a phonograph must be advanced farther than with a commercial record.

Use a constant 400 cycle source such as an audio oscillator for a reference signal. Connect the RADIO-PHONO INPUT wire to the signal source. Set the RECORD RADIO-PHONO VOLUME at about one-third of its clockwise rotation. Connect an AC voltmeter across the recording head. A convenient place to make this connection is from the ground to the white wire under the chassis at the recorder receptacle. Adjust the 400 cycle source output to produce 1.3 volts across the recording head. Approximately .5 volt signal input will be required. Set the VOLUME INDICATOR ADJUSTMENT, R26, located on the rear of the chassis, so that the tuning eye just begins to close with the 1.3 volt recording level. The VOLUME INDICATOR is now adjusted so that proper recording level will be obtained from microphone or radio.

RECORDER MECHANISM

1. MAINTENANCE REPAIRS

Following is a list of symptoms and remedies for mechanical difficulties in the recorder mechanism.

A. Mechanical rumble or "thump" (usually evidenced by a "moire" or "spoke" pattern in the recordings).
   1. Flat spots or dents in the drive wheel tire. Remove turntable and drive wheel and resurface the tire by clamping the wheel in a drill press and holding a sandpaper or emery block against the tire. If this treatment will not remedy the trouble, it may be necessary to replace the drive wheel. Even though a new wheel is installed, it still may be necessary to surface the tire as above.
   2. Dirt or foreign matter on the inner rim of the turntable. Remove table, and polish the inner rim with fine emery or crocus cloth.
   3. Faulty motor mount grommets. Replace.
   4. Bent motor shaft. Replace armature.

B. Uneven groove spacing on recordings ("gathering").
   1. Dirt or foreign matter in the lead screw thread grooves. Clean the lead screw thoroughly with carbon tetrachloride and coat lightly with a good quality light grease.

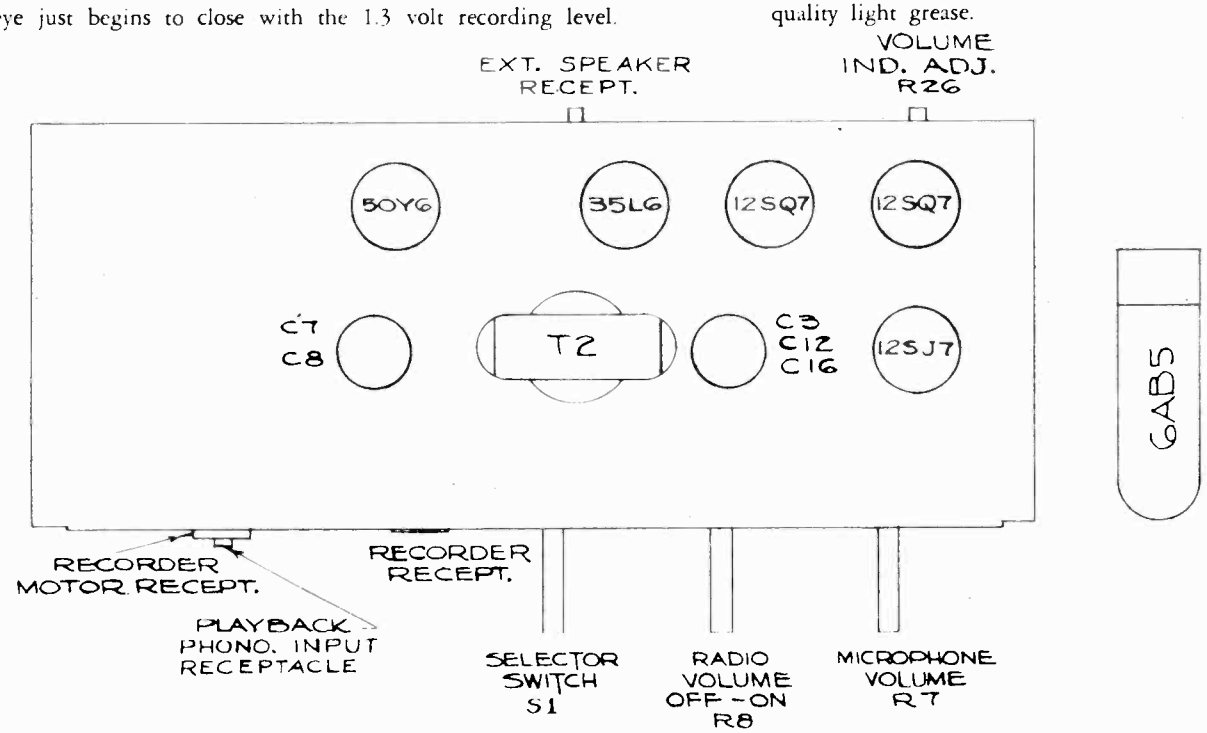

Fig. 2—TUBE LOCATION AND PARTS LAYOUT TOP VIEW CHASSIS 133

2. Lead screw follower "riding up" on the lead screw threads. See MAINTENANCE ADJUSTMENTS below for the remedy for this condition.
3. Bent lead screw or faulty spur gear on lead screw. Replace lead screw.

C. "Wow" or uneven speed in recording.

1. Oil or grease on rubber drive tire or on inner rim of turntable. Remove turntable and clean drive wheel and inner rim of table thoroughly with carbon tetrachloride.
2. Drive wheel engagement spring too weak. If adjustments will not correct, replace the spring. CAUTION: If this spring is too strong, it will cause flats or dents to be formed in the rubber drive tire.
3. Disc center drive pin missing. Replace.
4. Faulty motor field. Replace motor.

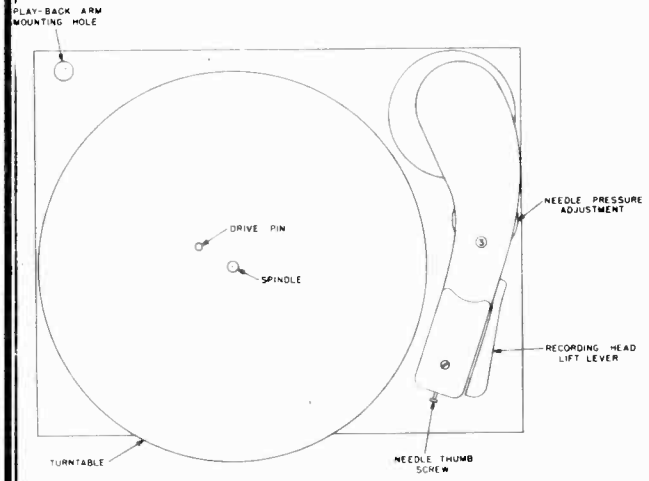

Fig. 3—RECORDER MECHANISM, TOP VIEW

2. MAINTENANCE ADJUSTMENT

A. Groove depth. This adjustment is a knurled wheel located at the bottom of the recording arm. (See Figure 3.) Rotating the wheel in a clockwise direction increases the depth of cut, while counterclockwise rotation decreases it.

The ideal setting for depth of cut is one that will give the 60-40 groove land ratio. However, for practical purposes it is satisfactory to gauge the depth of cut by the size of the chip thread, which should be approximately that of a human hair. In gauging depth of cut adjustments, always use a fresh disc and a sharp cutting needle.

B. Needle angle. This adjustment is a Phillips head screw located on the recording arm swivel post, just above the motor board. Clockwise rotation of this screw decreases the needle angle, while counterclockwise rotation increases it. The adjustment should be set so that the needle is at 90° to the recording disc surface. A convenient method of checking this is to set the needle on an uncut recording blank and set the adjustment so that the needle and its reflection form a straight line when viewed from the side. (See Figure 4.)

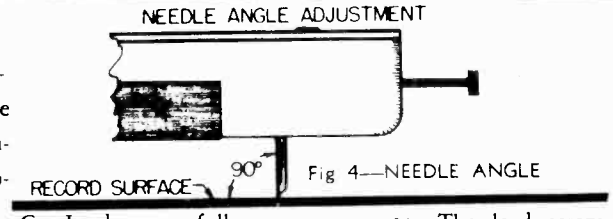

Fig 4—NEEDLE ANGLE

C. Lead screw follower engagement. The lead screw follower linkage is so designed that the follower should remain at 90° to the lead screw throughout the useful arc of travel of the recording arm. Adjustment of this angle is obtained by sliding the die-cast arm drive bar in or out in its socket at the base of the arm swivel. A set screw is provided to lock this adjustment in position. Maladjustment of the follower engagement will cause riding up of the follower and "gathering" in the recordings made on the machine.

D. Lead screw end play adjustment. This adjustment is a large set screw and lock nut at the spindle end of the lead screw. With the worm spindle drive assembly well lubricated, this adjustment should be set tight enough so that the end play in the lead screw is negligible, and yet not tight enough to cause binding. A practical way of accomplishing this is to tighten the large set screw until it seats against the end of the lead screw, then back it out about ¾ of a turn, and lock in position.

PARTS LIST

Symbol	*Description*			*Hoffman Part No.*
C1	25 Mf	25V	Electrolytic	4205
C2	.05 Mf	200V	Paper	4100
C3, C12, C16	20/20/20 Mf	450/450/25V	Electrolytic	4200
C4, C14	100 Mmf	20%	Mica	4000
C5, C11, C13	.02 Mf	400V	Paper	4106
C6	50 Mf	150V	Electrolytic	4210
C7, C8	50/50 Mf	150/300V	Electrolytic	4208
C9	.005 Mf	600V	Paper	4102
C10	.002 Mf	600V	Paper	4118
C15	.01 Mf	400V	Paper	4112
C17	.1 Mf	200V	Paper	4111
C18	. 05 Mf	400V	Paper	4101

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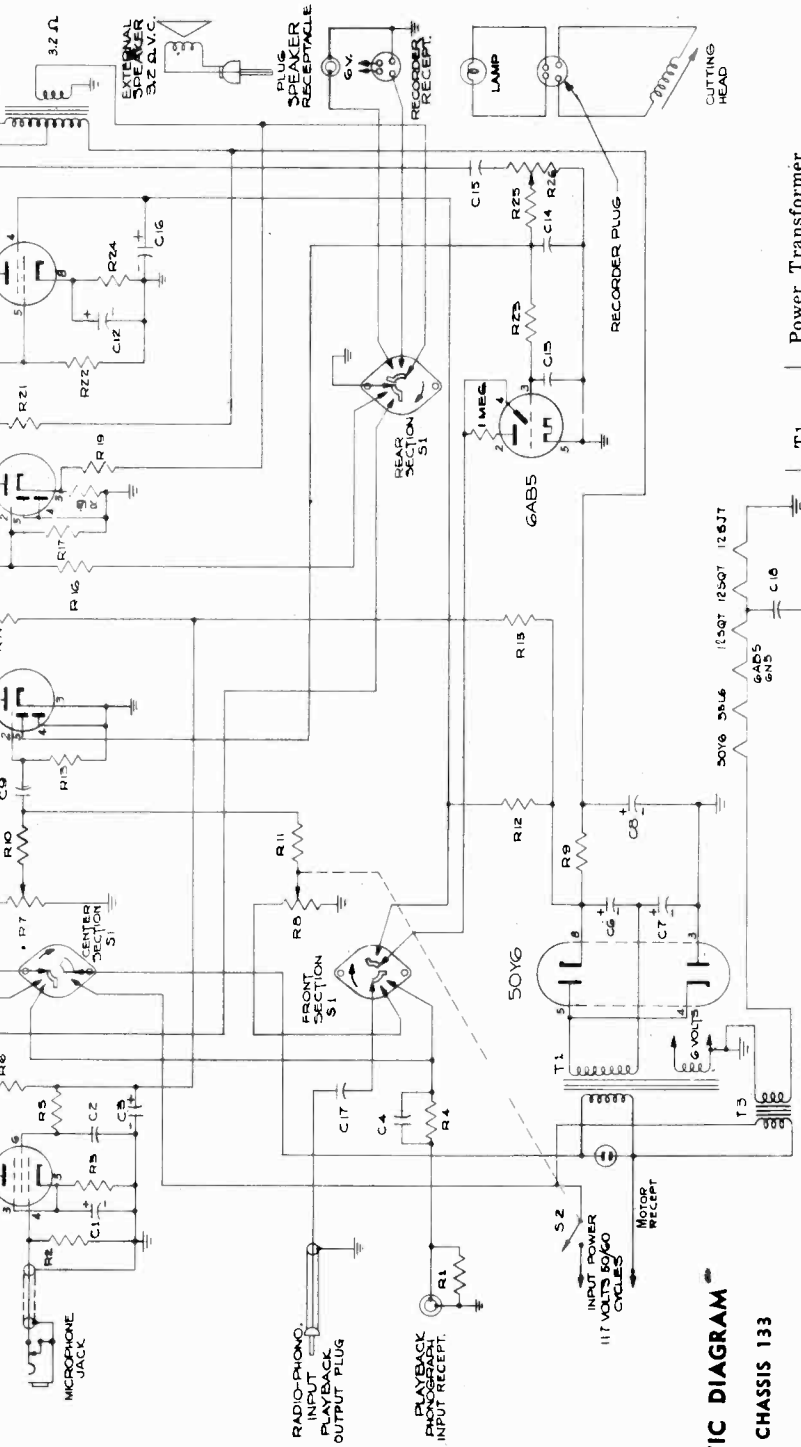


SCHEMATIC DIAGRAM

RECORDER CHASSIS 133

R1, R22	470,000 ohm	½ W Carbon	4506
R2, R6, R10, R11, R14, R16, R21	220,000 ohm	½ W Carbon	4500
R3	1200 ohm	½ W Carbon	4523
R4, R25	2.2 Meg.	½ W Carbon	4502
R5, R17, R23	1 Meg.	½ W Carbon	4513
R7	500,000 ohm potentiometer		4804
R8	500,000 ohm potentiometer with SPST Switch (S2)		4802
R9	470 ohm	1 W Carbon	4525
R12, R15	47,000 ohm	½ W Carbon	4504
R13	4.7 Meg.	½ W Carbon	4544
R18, R19	10,000 ohm	½ W Carbon	4515
R24	220 ohm	1 W Carbon	4594
R26	500,000 ohm potentiometer		4811
S1	Selector Switch		6006
S2	SPST Power Switch (Part of R8)		

T1	Power Transformer	5013
T2	Output Transformer	5111
T3	Isolation Transformer	5014
	Motor (General Industries No. 22700)	9512
	Motor Bushing	1026
	Motor Armature	9580
	Motor Grommets	3548
	Drive Wheel	9530
	Drive Wheel Spring	9522
	Lead Screw Assembly	9523
	Recording Arm Assembly	9526
	Recorder and Pilot Light Plug	6207
	Recording Disc Locating Pin	1056
	Microphone	9014
	Recording Head	9540
	Turntable Retaining Clip	9533
	Drive Wheel Retaining Clip	9531
	Turntable (General Industries No. 12761)	9527

MECHANICAL ASSEMBLY ADJUSTMENTS

These adjustments are listed in the order in which they would be performed on a machine which is completely out of adjustment. Changing one adjustment will often affect succeeding adjustments and units should be carefully checked for proper adjustment after repairs have been made. If caution is used in dismantling units for repair, it is possible to avoid a great deal of labor.

A: Motor mounting. To replace drive roller (A-181) remove four screws (S-115) from rubber mounting points, lift out motor without disconnecting leads from switch terminals. Remove screw (S-118), immerse drive roller in Acetone solvent until adhesive bond softens. Remove drive roller from shaft.

B: Control knob should be set on transfer shaft with setscrew against the flat and the detect lever (A-109) setscrews should be tightened so that knob is vertical when the lever is in trough of detent slide (M-107), i.e. in "Stop" setting.

C: Tighten setscrews of motor transfer lever (A-110) when drive lever (A-181) is midway between rewind drive pulley (R-348) and flywheel (A-101) when control is in "Stop" position, (i.e. the travel should be equal in either direction). To check, operate brake lever (M-110). Clearance of brake shoe should be the same on either Forward or Rewind.

D: The motor power switch (P-119) is set in "Stop" position so that contacts are opened by biasing action of switch blade against bakelite pin in motor swing plate. The Erase "Safety" Switch is mounted in the "Stop" position so that contacts are open and a gap of approx. 1/16" appears between motor mounting assembly (A-112) and insulating bushing on switch. Switch is adjusted to make firm contact when control lever is in "Forward" position.

E: Forward stop lug (M-109) should be set so motor mounting assembly (A-112) comes to rest against it as soon as drive roller (A-181) makes firm contact with flywheel (A-181). Excessive pressure against flywheel prevents motor from starting when control lever is "snapped" into "Forward" position. Insufficient pressure results in slippage and "Wow". Best is to adjust forward stop lug (M-109) 1/16" from edge of swing plate at point where drive roller begins to touch flywheel.

F: There is no rewind-stop adjustment, however, rewind drive pulley is located in a hanger adjustable by bending stop lug (M-111) against the swing plate bushing, allowing a clearance between drive roller and rewind pulley in "Stop" position which allows drive roller to engage drive pulley in "Rewind" position. In this position, the rewind drive pulley hanger (A-111) is away from the stop, pressing drive roller by means of the torsion spring which needs no adjustment.

G: Set the pressure lever (A-113) so that it is vertical when the control knob is in the PLAY-RECORD position. Set the arm adjusting plate (M-105) so that it clears the pressure arm (M-104) by 1/64" when in this position. Normally adjusted, the tape guide (A-105) will move slightly or not at all, when control is turned from Off to Rewind.

H: The brake spring (P-116) should be adjusted so that brake (A-114) clears take-up pulley (R-348) and allows it to turn freely in forward or rewind positions. The in Off or Stop positions should be sufficient to prevent "coasting" of the reel. If brake clearance is unequal in forward or rewind, adjustment "C" is incorrect.

I: The tape guide block (A-105) is self locating. Tape pressure pads (A-103) located in this block are pressed forward by phosphor bronze pressure springs. These springs exert 15 grams pressure when not against the tape, and a maximum of 30 grams when in operating position with tape against the springs in guide block.

J: Adjust head pressure with two screws in slotted holes in head bracked (M-116). Both record head (A-106) and erase head (A-107) are adjusted into the tape guide block until the pressure pads on the reverse side show a movement slightly less than 1/32". This will give the 30 grams head pressure against the shoe for each head. "Wow" will result if too much pressure is used at this point.

K: Lateral movement of the heads is effected by moving them in desired direction by means of the screws in slotted holes that hold heads to head bracket. They should be positioned so there is no hanging up of the tape pressure guide when control lever is turned to stop position. Final adjustment on record head is made by turning head so that air gap in lamination is at right angles to direction of tape travel. This is best accomplished with the aid of a pre-recorded, constant 3000 cycle note. Adjustment is made by rotating head for maximum response on an output meter.

L: Open record or erase heads must be replaced completely. Worn out or damaged head lamination can be replaced as follows: Remove head and (M-116) bracket assembly without disturbing the individual heads. On record head (A-106) remove lamination (P-127) by prying with screw driver. Press in new lamination with fingers until it bottoms on yoke. Erase head (A-107) lamination (P-128) is replaced in same way. It is important to replace laminations with steel section uppermost in tape guide.

SERVICE TIPS

1. RECORDER "WOWS"
   a. Felt pressure pad (A-103)worn.
   b. Dirt on drive roller (A-181) or pressure roller (A-183)
   c. Head pressure too great. Loosen screws holding head mounting bracket (M-116) and lower head slightly. Adjustment "L". Do not disturb head alignment adjustment "M".
   d. Insufficient pressure on pressure roller (A-183). Tighten spring (P-114) or replace roller.
   e. Drive or pressure roller eccentric.
   f. Motor shaft binding. Shaft should turn freely when rotated by hand with control at "Off". If necessary realign bearings by tapping motor lightly with wooden mallet.

2. MOTOR RUNS BUT MECHANISM WILL NOT OPERATE
   a. Motor stop improperly adjusted. See adjustment "G".
   b. Drive roller worn or defective. Replace

3. MECHANISM RUNS FORWARD BUT WILL NOT REWIND OR VICE-VERSA
   a. Rewind belt (P-112) or take-up belt (P-113) broken or off pulleys. Replace.
   b. Motor stop improperly adjusted. See adjustment "G".
   c. Pressure roller interferes with panel at Rewind. Remove roller and chamfer its bottom edge 1/16" x 45°.

4. TAKE-UP REEL DOES NOT TURN OR DRAGS
   a. Brake dragging. See adjustment "H"
   b. Take-up belt (P-113) broken, or off pulley. Replace belt.

5. MECHANISM DOESN'T OPERATE WHEN CONTROL IS "SNAPPING " INTO PLAY/RECORD OR REWIND
   a. Motor stop improperly adjusted. See adjustment "G".
   b. Housing screw hangs up lever arm on Rewind. Check screw length. Should be 15/16"

6. CONTROL KNOB TURNS BUT MOTOR ASSEMBLY DOES NOT SWING
   a. Motor transfer lever (A-110) set screws loose. Tighten screws. See adjustment "C".
   b. Lever loose at hub. Replace.

7. MOTOR ASSEMBLY SWINGS. MECHANISM OPERATES, BUT NO DETENT OPERATIONS

8. SLOW SPEED
   a. Pressure arm spring (P-114) weak. Replace.
   b. Head pressure too great. Raise head slightly. See adjustment "J".
   c. Flywheel shaft binding. Check tightness of screws holding front and rear plates. Check plates for warpage.
   d. Motor shaft binding. Realign bearings.

9. HIGH BACKGROUND NOISE (HISS)
   a. Check tape
   b. Defective Record-Playback head. Replace.
   c. Record head magnetized. Demagnetize with 60 cycle A.C. Air core coil.

10. INCOMPLETE ERASE
   a. Erase voltage too low.
   b. Erase head open.
   c. Poor contact on Play-Record switch.

11. POOR HIGH FREQUENCY RESPONSE
   a. Head gap not at right angles to tape. See adjustment "K".
   b. Defective head or worn lamination. See adjustment "L".
   c. Poor head contact due to worn felt pressure pad. See adjustment "J".

AMPLIFIER SERVICE NOTES

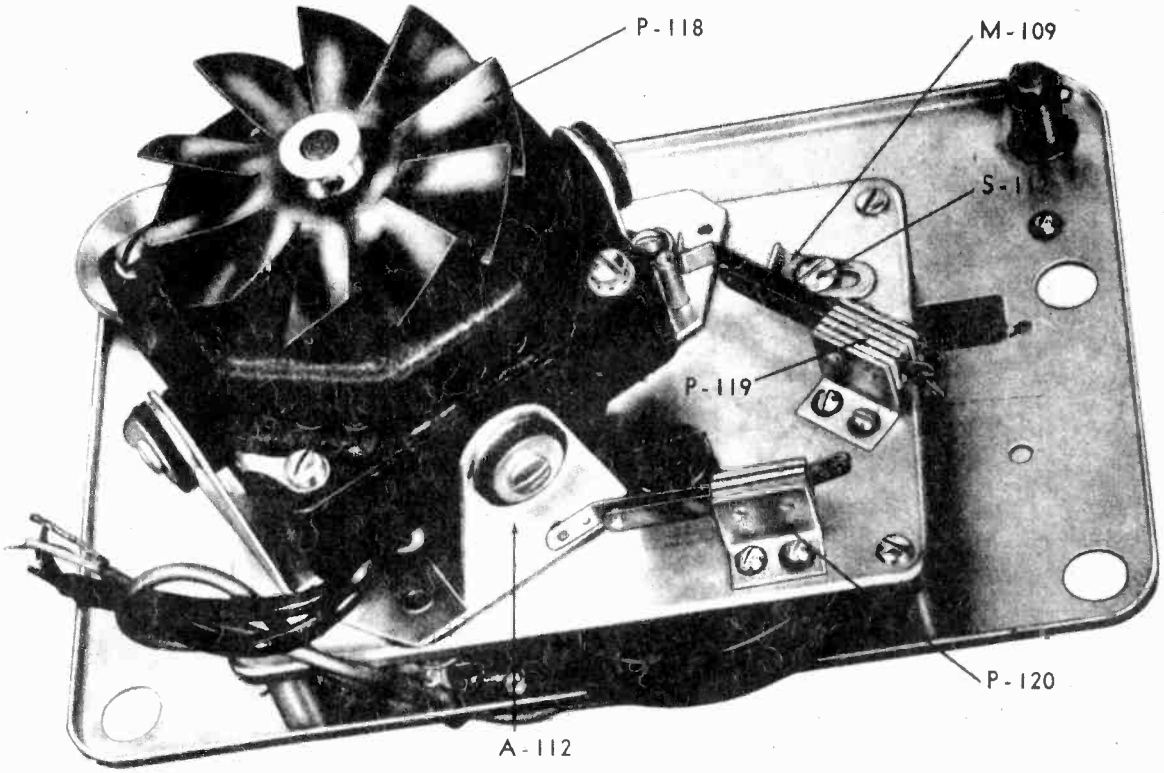
MICROPHONIC OR NOISY ON PLAYBACK: Check 6J7 tube for noise by tapping. Replace. Microphonic checks should be made with the instrument fully warmed up.

DISTORTION ON PLAYBACK
   a. Check all tubes.
   b. Be sure when recording that recording light is barely flashing. An overloaded signal will cause distortion on playback.
   c. Tone control should be at full treble when recording. Adjust only on playback.
   d. Check all record and erase voltages as indicated on circuit diagram.
   e. Be sure to check microphone plug for shorts, breakage or grounding.

MODELS C-2, T-3

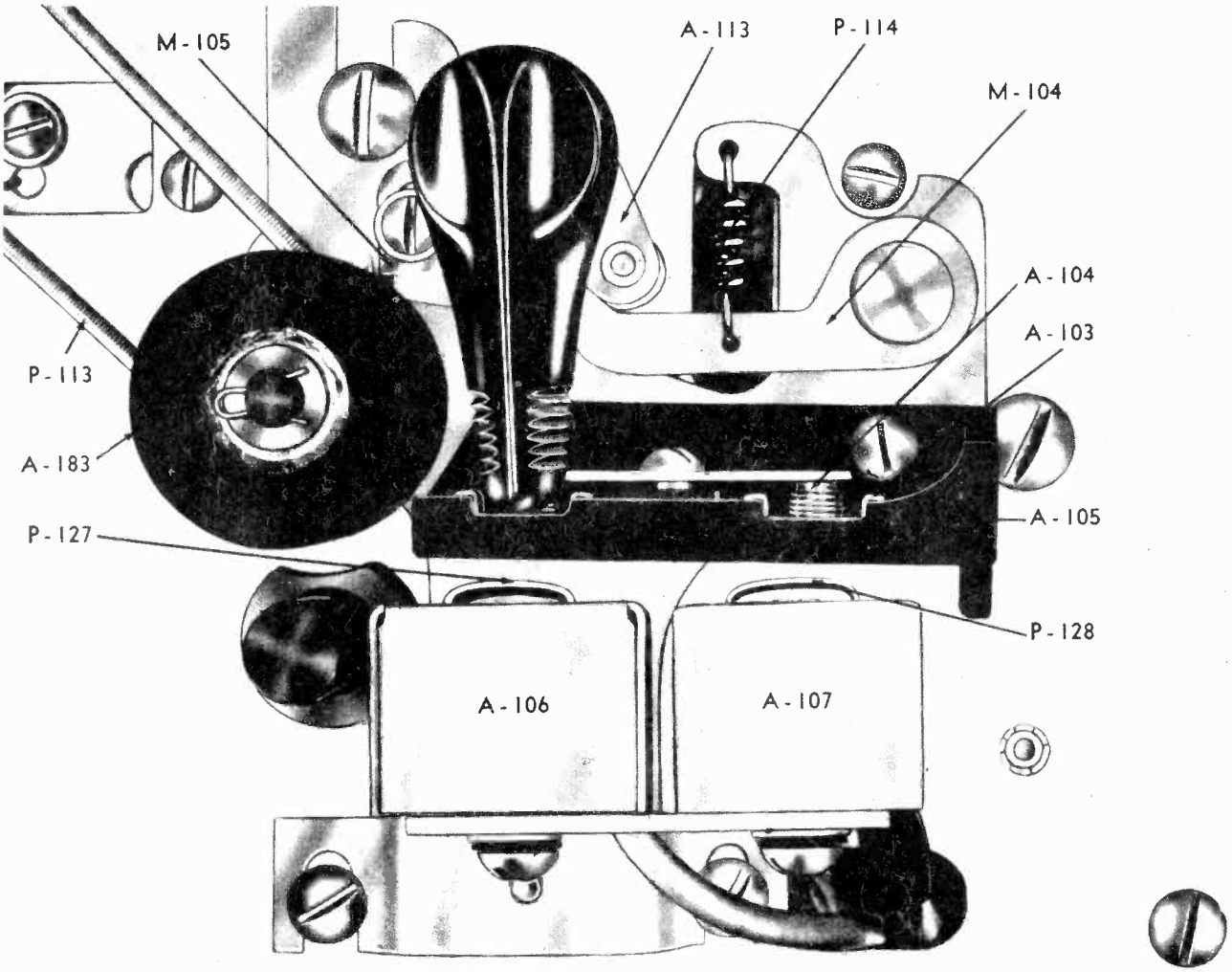
MECHANICAL ASSEMBLY PARTS LIST

PART NO.	DESCRIPTION
R 305	Pressure Arm Stud
R 306	Roller Stud
R 309	Lever Bushing
R 310	Lifter Stud
R 311	Roller
R 314	Transfer Shaft Bearing
R 319	Flywheel Shaft
R 320	Plate Spacer
R 324	Driver Hub
R 325	Pressure Roller Hub
R 329	Pressure Plate Spacer
R 331	Motor Transfer Shaft
R 344	Motor Transfer Stud
R 345	Motor Transfer Roller
R 348	Rewind Drive Pulley
R 356	Reel Drive Pin
R 360	Insulator Pin
R 367	Motor Pivot Bushing
R 419	Shouldered Nut
R 436	Take-Up Pulley
R 437	Rewind Pulley
R 500	Rewind Shaft
R 501	Pivot Stud
R 502	Rewind Stud
R 503	Rewind Spindle
R 504	Take-Up Spindle
R 505	Spindle Collar
R 506	Grommet Spacer
R 507	Motor Plate Spacer
M 101	Front Plate
M 102	Rear Plate
M 103	Roller Plate
M 104	Pressure Arm
M 105	Arm Adjusting Plate
M 106	Lever
M 107	Detent Slide
M 108	Bearing Cup
M 109	Motor Stop Lug
M 110	Brake Lever
M 111	Rewind Arm
M 112	Motor Mounting Bracket
M 113	Motor Mounting Bracket (Special Slot)
M 114	Motor Swing Plate
M 115	Switch Mounting Plate
M 116	Head Bracket
M 117	Spring Bracket
M 118	Pressure Pad
P 101	Insulator
P 102	Leather Brake Shoe
P 103	Fly Wheel Bearing
P 104	Reel Bearing
P 105	Plain Bearing
P 106	Steel Washer
P 107	Linen Washer
P 108	Varnished Cambric
P 109	Bakelite Washer
P 110	Felt Washer
P 111	Felt Washer
P 112	Rewind Drive Belt

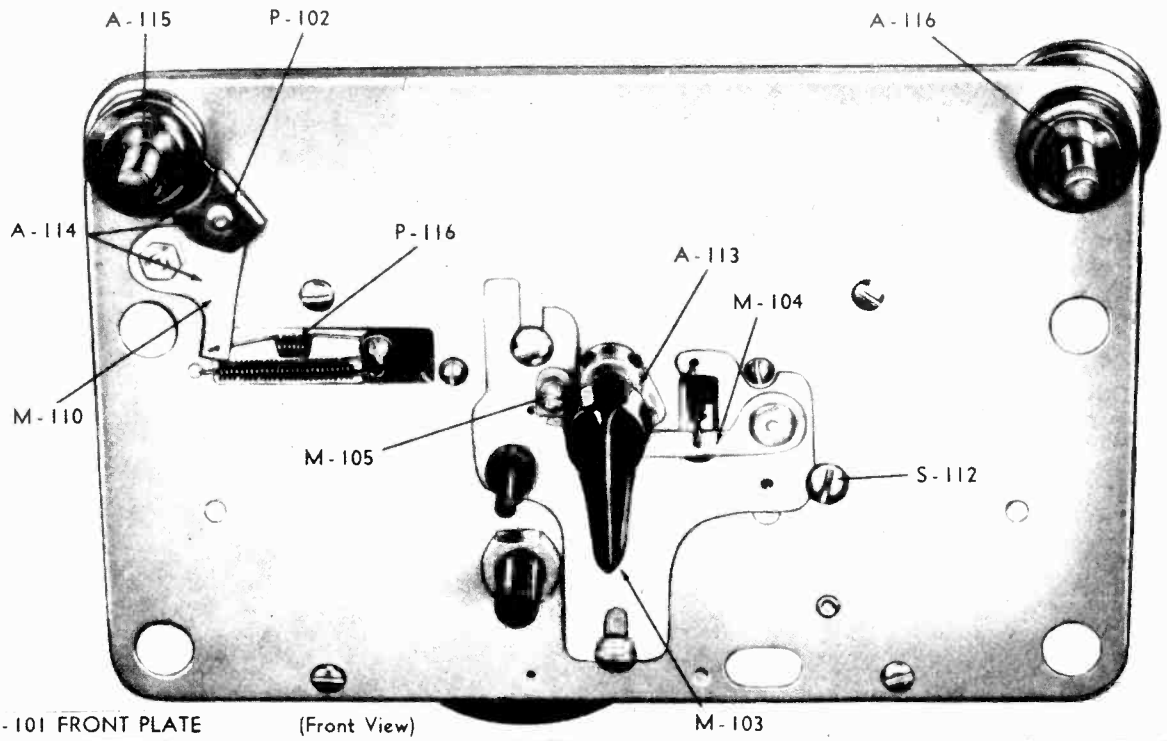


A-100 MECHANISM (Rear View)

PART NO.	DESCRIPTION
P 113	Take-Up Drive Belt
P 114	Pressure Arm Spring
P 115	Detent Spring
P 116	Brake Spring
P 117	Rewind Bracket Spring
P 118	Motor Fan
P 119	Stack Switch Motor
P 120	Stack Switch Erase
P 121	Ball Bearing
P 122	Control Knob
P 123	Rubber Grommets
P 124	Bakelite Guide
P 125	Motor
P 126	Pressure Coil Spring
P 127	Record Head Lamination
P 128	Erase Head Lamination
P 129	Inter-lock Switch
S 101	Cotter Pin
S 102	Hairpin Clip
S 103	Hairpin Clip
S 104	5-40 x ¼" Screws
S 105	6-32 x ⅛" Allen Head
S 106	8-32 x 3/16" Allen Head
S 107	5-40 x 5"16/ Screws
S 108	6-32 x ¼" F.H. Screws
S 109	6-32 x 3/16" Binder Head
S 110	⅜" Washer 3/16" Hole
S 111	#5 Shakeproof Lock
S 112	8-32 x 3/16" Truss Head
S 113	5-40 x ⅝" Screw
S 114	5-40 x ⅛" Screw
S 115	8-32 x ⅝ Binder
S 116	⅝" Washer #8 Hole
S 117	⅜" Washer #5 Hole
S 118	5-40 x ½" R.H.M.S.
S 119	9/32" Washer #8 Hole
S 120	½" Washer .315" Hole
S 121	.125 x 7/32 Brass Rivet
S 122	⅜" Washer 7/32" Hole
A 100	Mechanism
A 101	Fly Wheel Assembly
A 102	Motor Swing Plate Assembly
A 103	Pressure Pad and Felt Assembly
A 104	Spring Bracket and Pressure Coil Spring Assembly
A 105	Tape Guide Assembly
A 106	Record Head
A 107	Erase Head
A 108	Record & Erase Head Mounting Assembly
A 109	Detent Lever Assembly
A 110	Motor Transfer Lever
A 111	Re-wind Pulley Assembly
A 112	Motor Mounting Assembly
A 113	Pressure Lever Assembly
A 114	Brake Assembly
A 115	Take-up Shaft Assembly
A 116	Re-wind Shaft Assembly
A 181	Rubber Driver
A 183	Pressure Roller

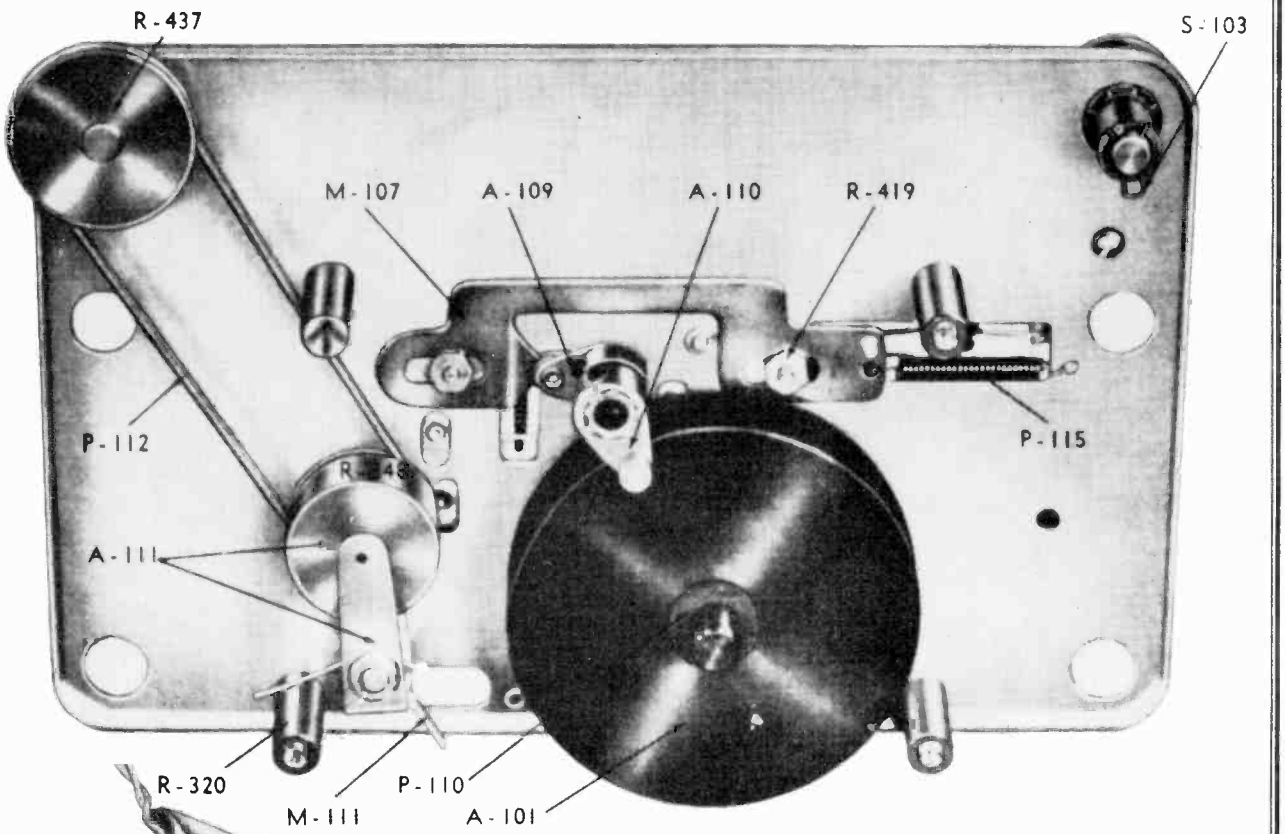


HEAD AND TAPE GUIDE DETAIL

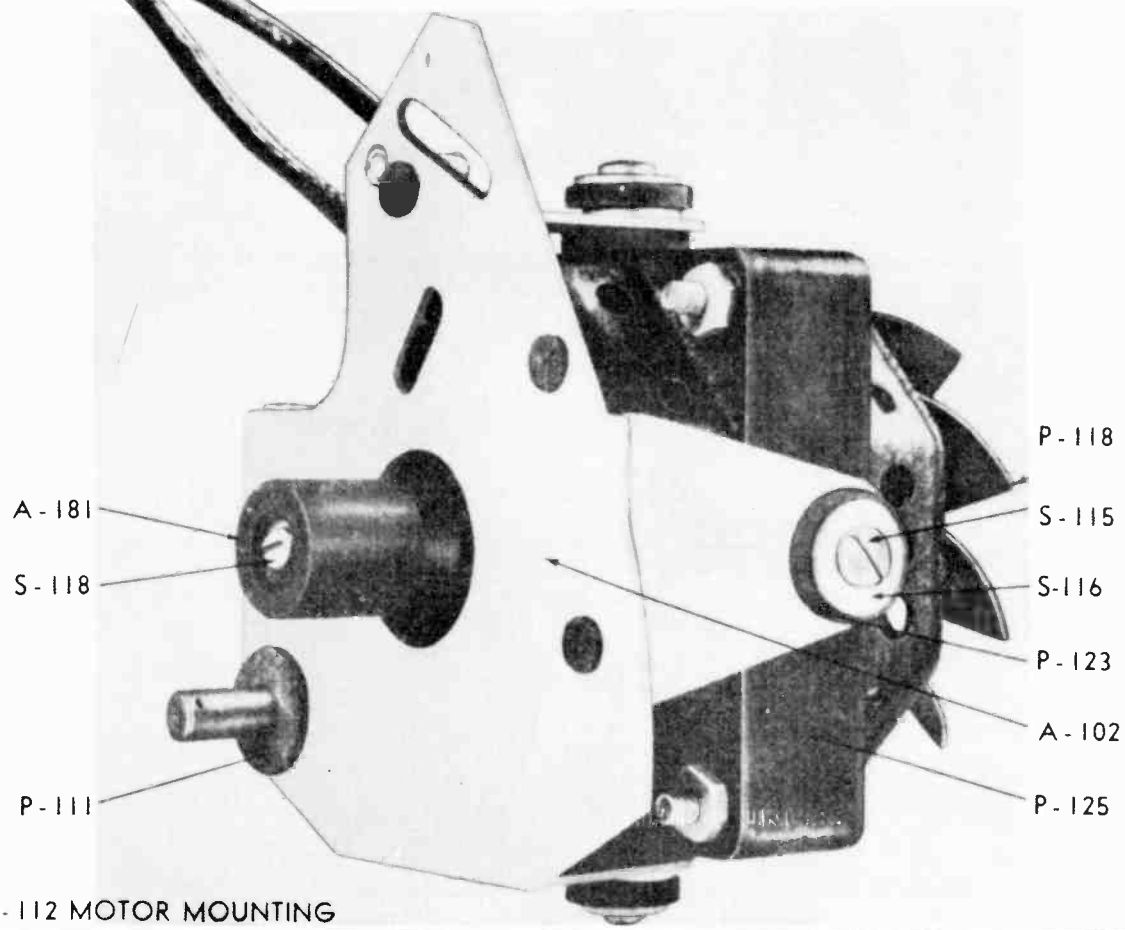


M-101 FRONT PLATE (Front View)

MODELS C-2, T-3

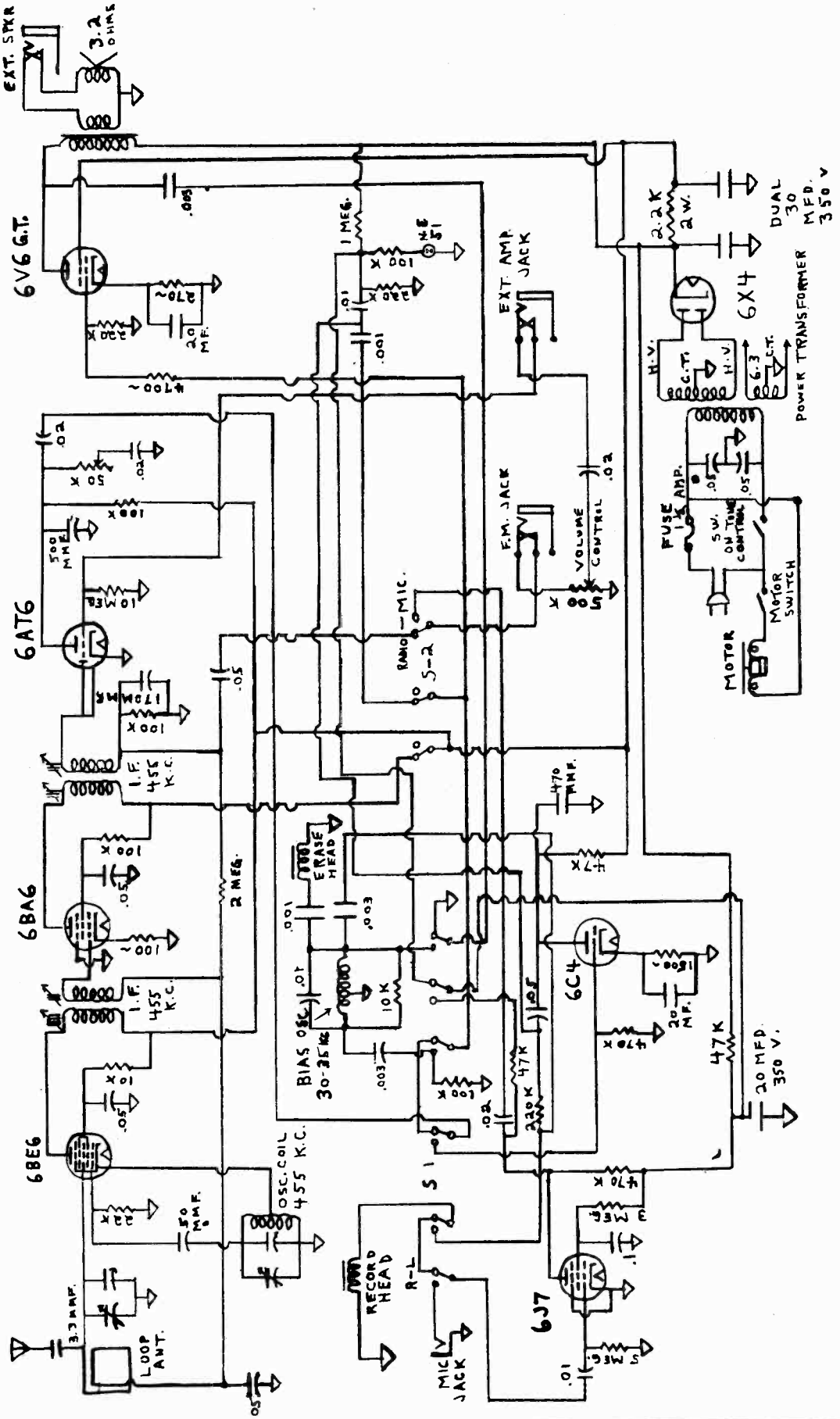


M-101 FRONT PLATE (Rear View)



A-112 MOTOR MOUNTING

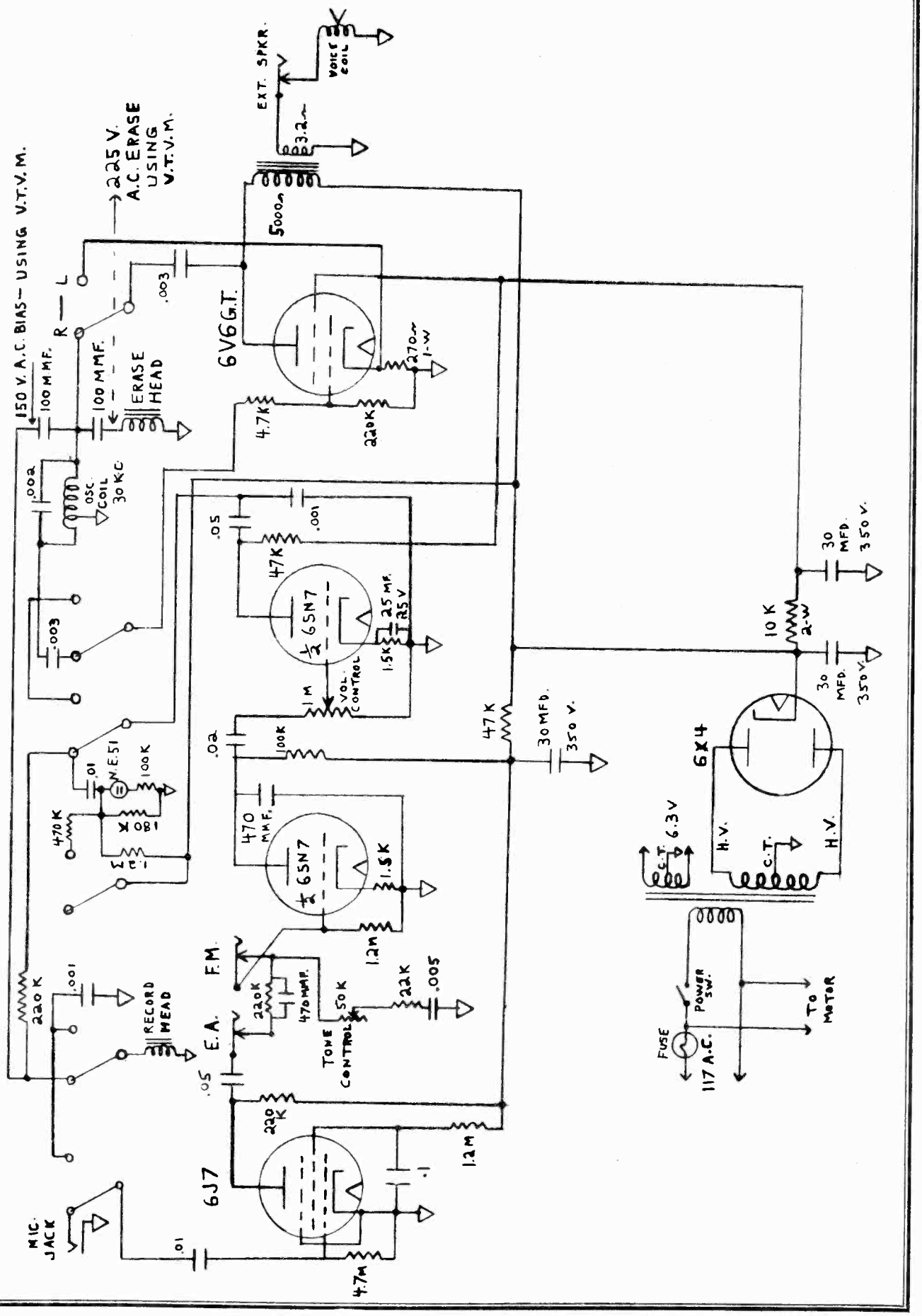
MODEL C-2



BIAS VOLTAGE AT RECORD HEAD 125 - 150 Volts A.C.
ERASE VOLTAGE AT ERASE HEAD 200 - 225 Volts A.C.
MEASURED WITH V.T.V.M. (IF SIMPSON 260 METER
IS USED VOLTAGES WILL BE 35% to 40% LOWER.)

TAPE REC. PAGE 21-6 PENTRON

MODEL T-3



OPERATING INSTRUCTIONS
FOR
SONAR TAPE RECORDER MODEL T-10

The Sonar Tape Recorder Model T-10 is high fidelity equipment composed of four basic units; namely the RPA-10 Amplifier, the PS-300 Power Supply, the Tape Mechanism and the Infinite Impedance Speaker System.

The T-10 Recorder is designed for 117 volt 60 cycle operation. Before applying power, be sure current is as outlined above.

CAUTION:

Toggle switch on the front panel marked "disc-tape" should be in "Disc" position until the operator is thoroughly familiar with the operation of the amplifier.

OPERATION:

Plug the two cables found in the rear of recorder case into the matching receptacles of power supply and speaker enclosure, respectively. Turn the control marked "speaker-gain" until a click is heard. This is the main power switch. When the power is on, the "Listen" indicator light will glow. If the "Record" indicator light is on, turn the "Listen-Record" switch to the "Listen" position. Permit the amplifier to warm up for one minute before using.

Remove the red wing screw on top of the tape unit before using. This wing screw should be re-inserted when carrying the recorder and removed when put in operation.

INPUTS:

There are four inputs on the front panel designated as LG1 (low gain 1), LG2 (low gain 2), "Mike 1" and "Mike 2". Control marked "Gain 1" controls LG1, counter-clockwise rotation from "0"; and "Mike 1", clockwise rotation. Control marked "Tape Gain" controls LG2, counter-clockwise rotation from "0"; playback of tape, clockwise rotation. When the "Listen-Record" switch is in the "Record" position, clockwise rotation of "Tape Gain" control then controls "Mike 2" input. Control marked "Speaker Gain" is completely independent of "Gain 1" control and "Tape Gain" control, and may be set to any desired level for playback or monitoring while recording.

When using LG1 and LG2, a wide range of impedances from 100 ohms to 500,000 ohms may be used without the need of a matching transformer. Microphone inputs are high impedance and will handle a microphone signal from -65DB. When using low impedance microphones, a cable transformer should be employed.

Any combination of inputs such as FM-AM radio, phonograph, etc., should be fed to LG1 or LG2. Microphones or Reluctance pickups should be fed to Mike 1 or Mike 2. Any combination of the above may be electronically mixed.

A fifth input located on top of the chassis, as noted in Figure 1, titled "Dubbing", is to connect two or more tape recorders together for simultaneous recording. Dubbing one tape to another, or playing two tape machines simultaneously, may be achieved. A low gain signal, such as a radio having its own volume control, may be fed to this fifth input without having to use any of the front panel mixing controls.

Frequency equalization for the recording amplifier is fixed. The "Bass" and "Treble" controls only affect the reproduced signal as heard through the speaker system. The bass control will boost 20DB and cut 20DB. The treble control will boost 15DB and cut 15DB.

For so-called flat frequency response, the bass control should be set to #2 and the treble control to #3. The operator, however, could set these equalizers to suit his particular desires.

MODEL T-10

OPERATION OF TAPE MECHANISM:

Place empty tape reel on left hand spindle, keyed side down, so that key fits in drive pin on spindle.

Place loaded tape reel on right hand spindle, keyed side down, so that key fits in drive pin on spindle. Tape must come off reel, clockwise, with coated surface out. (Black side of paper tape is the coating. - Dull side of plastic tape is the coating.) If coating is inside, put a half twist in the tape before threading. When loaded tape reel is wound up on the take-up reel, rethread the right hand reel with coating outside.

Place left control knob, which controls the threading of tape, toward rear of case. This leaves the tape slot in the escutcheon open for threading. (See Control Sketch, Figure 2.)

Slowly draw several feet of tape off the loaded reel, through the slot in the escutcheon, keeping it taut against the drag of clutch, and allowing enough tape to thread and wrap on the unloaded reel. - See that tape is not twisted.

Pull left control knob toward front of case. This threads the tape against the capstan and tape guides. It also holds the tape in place while the balance of the operation is completed, that is, winding a couple of wraps on the empty reel. Tape is inserted in slot in reel center and wrapped on clockwise by rotating the reel by hand. - Care must be taken to insure that the tape is not twisted.

RECORDING:

Plug in a microphone in either Mike 1 or Mike 2, or a low level signal, such as a radio, to LG1 or LG2. Set toggle switch from Disc to Tape and adjust the gain control corresponding to the input being used so the V.U. Meter will move with program material and will read a peak value of "0" once every few seconds to a minute, depending upon the nature of the program being recorded. Adjust "Speaker Gain" control to desired monitoring level. if a microphone is used, care should be taken to prevent a howl. Set the "Listen-Record" switch to the "Record" position.

Start tape in forward position by pushing right hand control forward (toward rear of case).

To record on the lower track, pull the right hand control toward the front of the case.

LISTENING:

Set the "Listen-Record" switch in the "Listen" position. Shut the V.U. Meter off. Adjust tape-gain control to #3, clockwise rotation. Start the tape machine as outlined under Recording, and adjust speaker-gain control and equalizer to desired volume and tone, respectively. The V.U. Meter may be used to read the playback level on the tape. Adjust tape gain control so that the V.U. Meter does not read above + 3 V.U.

ERASING TAPE:

When recording, the tape is automatically erased. However, to erase a certain section of tape on either track, set controls marked "Gain 1" and "Tape Gain" to "0", and put the "Listen-Record" switch in the "Record" position. Start tape in motion dependent on track to be erased. Forward direction erases top track. - Reverse direction erases bottom track.

REWINDING TAPE AT HIGH SPEED:

If it is desired to rewind the tape before completing one channel in playback or recording, all that is necessary is to first reverse the direction of tape, and then unthread the capstan and tape guides by moving the left hand control toward the rear of the case, or into the unload position. This releases the drag on the tape and the clutches pick up speed.

When tape is completely rewound, or rewound to the point desired, place the right hand control in neutral or *STOP* position.

NOTE: When rewinding in the reverse direction, it may be necessary to rotate the right hand take-up reel by hand when the reel is three quarters loaded. This is normal, since the clutches are set to give accurate timing at 7.5" per second, in record and playback of tape on both tracks.

CAUTION:

When tape mechanism is not in use, make sure the left hand control is towards the rear of case. This is to prevent the record playback head from resting on the capstan, causing "flats". Before engaging the left hand control, take up tape slack by rotating either reel by hand.

AUTOMATIC REWIND:

Wind the tape in the forward or clockwise direction onto the left hand reel where the program on the tape ends. Place a one inch piece of ¼" wide aluminum foil adhesive tape on the back (uncoated side) of tape.

Rewind tape in reverse direction back onto right hand reel. The machine is now ready for playing or recording two tracks automatically. The aluminum foil actuates a solenoid switch which is composite with the first tape guide at the right end of the forward escutcheon.

SINGLE TRACK OPERATION:

The Sonar T-10 Tape Recorder will play tapes made on single track machines when operated in the forward direction. Single track recordings made on the T-10 Recorder, forward direction, may be played on any other single track recorder.

MONITORING:

A jack mounted on the front panel titled "Monitor", is designed to feed a pair of earphones, high or low impedance. The monitor output can also feed a booster amplifier or a telephone line when fed to a matching transformer having impedances of 100,000 ohm Pri. and 600 ohm Sec. The speaker gain control has no effect on the monitor level. The monitor level is controlled by controls marked "Gain I" and "Tape Gain".

DISC RECORDING:

Since the RPA-10 Amplifier is a high fidelity unit, having a conservative rating of 10 watts output with exceptionally low harmonic distortion, it can be used for disc recording. The power output may be fed to a magnetic disc recording head. Simply determine the cutter impedance and connect to the power output having the corresponding impedance. The output transformer in the RPA-10 Amplifier is wired for 10 ohms and 500 ohms output, as noted in the schematic. However, any other impedance may be obtained since the secondary is of the multi-impedance type. The V.U. Meter may also be used as a cutting level indicator, by connecting the unused side of the toggle switch through a high resistance to the 500 ohm line. The exact value of resistance will be determined by finally obtaining the proper recording level on the disc and then setting the resistor so the meter reads "0" V.U. *Do not* disturb the V.U. Calibration control on top of the chassis.

AMPLIFIER DESCRIPTION:

As will be noted from the schematic diagram, the RPA-10 Amplifier has 11 tubes, five of which are dual purpose triodes. The pre-amplifier section uses two 12SJ7 tubes and one 12SC7 tube. These three tubes have D.C. voltage on their filaments, obtained from the cathodes of the 6L6 output tubes. The three tubes in the high gain pre-amplifier and low gain input circuits are purposely operated at reduced filament voltage to give a better signal-to-noise ratio.

The 6SJ7 tube is the tape recording amplifier having the necessary equalization in the grid circuit. This stage gets the signal from the plates of the 12SC7 tube. The 12SC7 tube also feeds the 6SN7 tube used as a volume indicator stage working the V.U. Meter. The 6SL7 stage also gets its signal from the 12SC7 tube. This 6SL7 stage is a voltage amplifier that feeds the high and low frequency equalizers. The other half of the tube feeds the monitor. The output of the equalizer feeds one half of the 6SN7 tube which is directly coupled to the second half of the tube, functioning as a plate cathode phase inverter, driving the 6L6's in push-pull. Inverse feedback is employed between the 500 ohm output winding and the 6SN7 driver tube. This feedback enables large power output with good regulation and low harmonic distortion.

The bias and erase circuits use a 6SN7 tube as the 70 K.C. oscillator and bias amplifier. Bias amplifier has an

MODEL T-10

adjustable control mounted on the rear skirt of the chassis. The erase amplifier circuit uses a 6V6 tube to insure better than 55DB erasure.

POWER SUPPLY:

The power supply uses a 5U4G rectifier tube feeding two separate filter sections, as noted in the schematic diagram.

There are two B+ outputs, one for the 6L6 plates, the other for the voltage amplifiers and bias oscillator and amplifier. The power supply delivers 200 mils at approximately 370 volts out of the single choke section filter, and approximately 360 volts out of the two section choke filter. A 6.3 volt filament supply at 5 Amps. and 5 volts at 3 Amps.

Power supply has an A.C. outlet mounted on the side of the chassis to feed a tuner, or where an A.C. outlet may be required that is controlled from the amplifier A.C. switch. A 5 amp. type 3AG fuse is included in the power supply for line protection.

MAINTENANCE:

B+ voltage fed to the primary center tap of the output transformer is 370 volts. B+ measured from the screens of the 6L6 tubes is 360 volts. These voltages are measured with the "Listen-Record" switch in the "Listen" position. With the "Listen-Record" switch in the "Record" position, the voltages will be 350 and 320, respectively.

The erase voltage, with the tape machine running and the "Listen-Record" switch in the "Record" position, is 250 volts.

The bias voltage is set for 125 volts.

With the 6SN7 oscillator tube removed, feed a 5000 cycle tone into the amplifier, adjust the gain control for .5 volts, measured at the record playback head. Then adjust the V.U. Meter Control for "0" V.U. deflection.

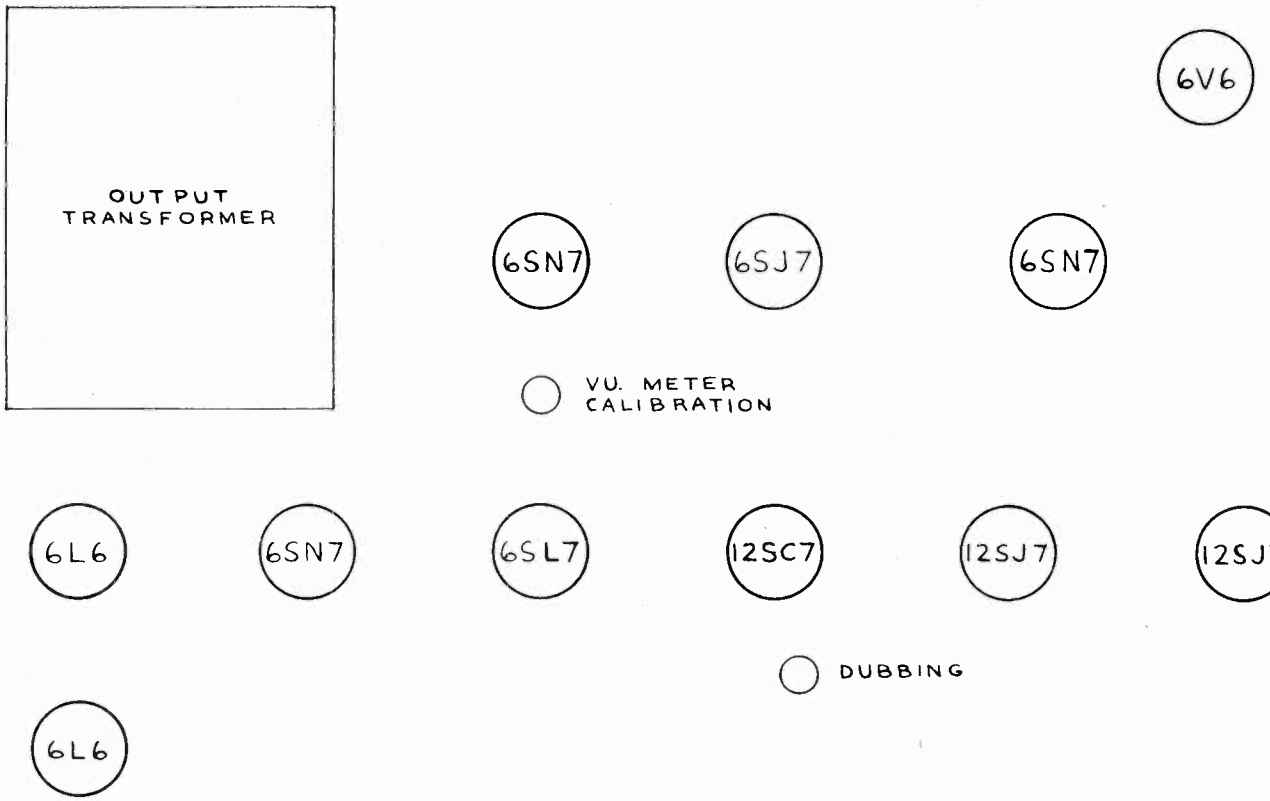
All voltages are measured with a V.T.V.M. The bias and erase voltages are measured with a probe feeding the V.T.V.M.

Sonar Tape Recorder, Model T-10, occasionally will require minor adjustments to the tape mechanism. Depending on the use of this machine, it is advisable that the capstan be cleaned once a month with 3/0 sand paper. This is to insure proper traction at all times. One method of checking the traction between the capstan and the tape is to load the machine as outlined under "Operation of Tape Mechanism". Running in the forward direction, gently grab the right-hand spool. This will cause the left-hand knob to move forward, indicating proper tension.

The slipping clutches employed in this mechanism should be set and maintained to produce 3 to 4 ounces tape tension. This tension is measured with a vest pocket type postal scale. Fasten the leader coming from the tape to the scale, keeping the mechanism in the "Off" position, and draw the scale until the reel starts to turn. This will show the amount of tension on the tape. To increase or decrease this tension, there is provided a locking nut mounted directly on the bottom of each slipping clutch. Turning the nut counter-clockwise increases tension, clockwise rotation decreases tension.

Approximately once every three months, the two erase heads and the record playback head should be cleaned by dipping a pipe cleaner into carbon tetrachloride and swabbing the gaps free of oxide that will normally accumulate. Permit the heads to dry for at least five minutes before using. Do not put carbon tet on the capstan.

It is also advisable, approximately once every month, to clean the flywheel with a rag soaked in carbon tet, and also the two rear discs representing the slipping clutches.



TUBE LAYOUT
FIGURE 1

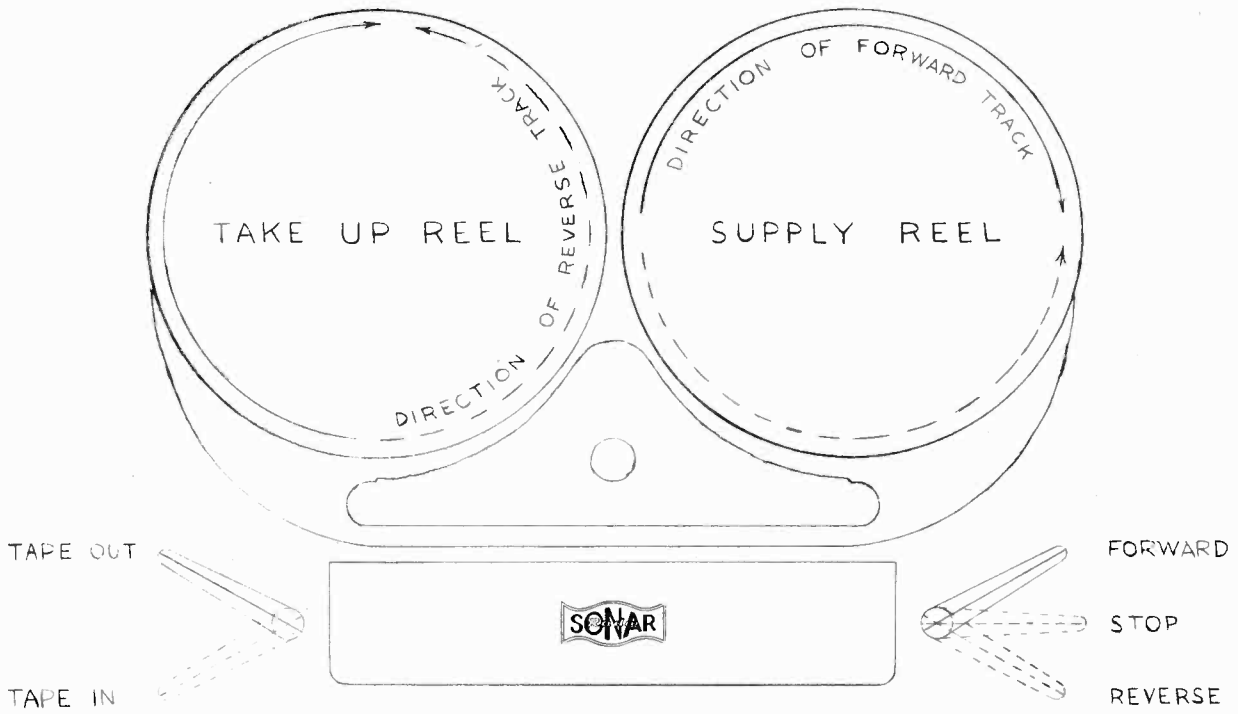


FIGURE 2

TAPE REC. PAGE 21-6 SONAR

MODEL T-10