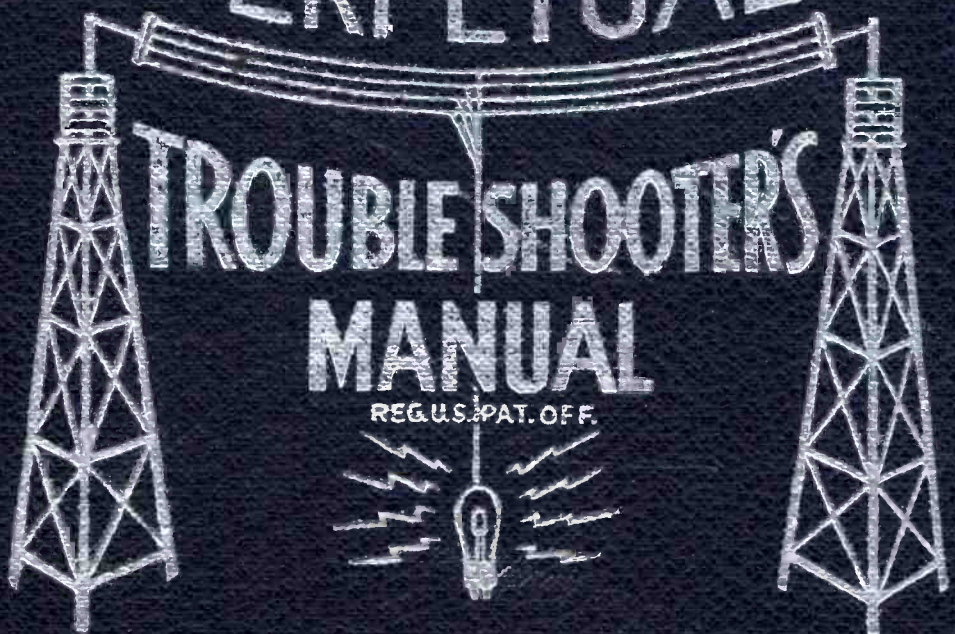
VOLUME XVII

PERPETUAL TROUBLE SHOOTER'S MANUAL



REG. U.S. PAT. OFF.

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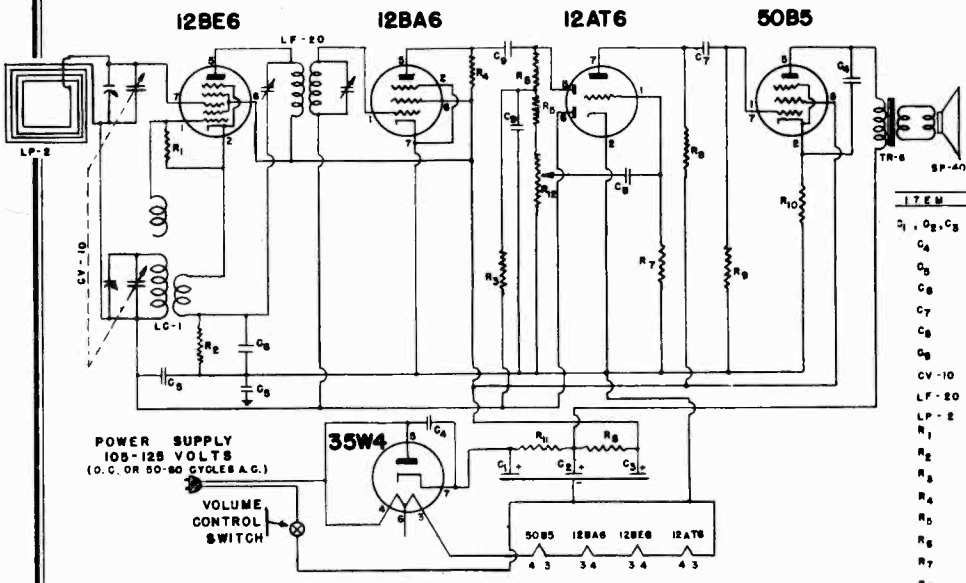
AMBASSADOR DISTRIBUTING CORP.

MODEL 141

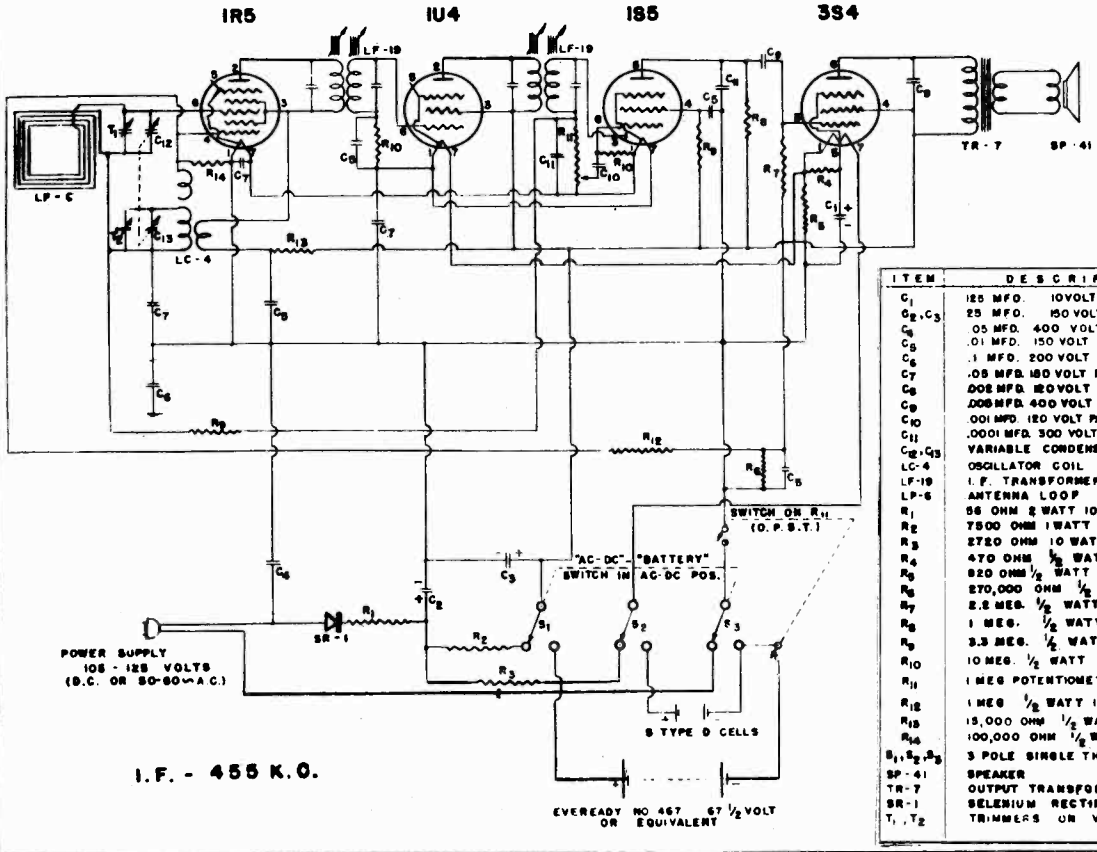


I. F. - 455 K.C.

ITEM	DESCRIPTION	PART NO.
C_1, C_2, C_3	3 X 20 MFD - 150 VOLT ELECTROLYTIC	CE - 11
C_4	.02 MFD - 400 VOLT PAPER CONDENSER	CP-203-1
C_5	.05 MFD - 200 VOLT PAPER CONDENSER	CP-503-4
C_6	.01 MFD - 400 VOLT PAPER CONDENSER	CP-103-1
C_7	.01 MFD - 150 VOLT PAPER CONDENSER	CP-103-2
C_8	.002 MFD - 400 VOLT PAPER CONDENSER	CP-202-2
C_9	.00015 MFD - 500 VOLT MICA CONDENSER	CM-151-1
CV-10	VARIABLE CONDENSER	CV-10
LF-20	I. F. TRANSFORMER	LF-20
LP-2	LOOP	LP-2
R_1	22,000 OHMS 1/2 WATT RESISTOR	RC-223-1
R_2	82 OHMS 1/2 WATT 10% RESISTOR	RC-820-2
R_3	2.2 MEG. 1/2 WATT RESISTOR	RC-228-1
R_4	5600 OHMS 1/2 WATT RESISTOR	RC-562-1
R_5	100,000 OHMS 1/2 WATT RESISTOR	RC-104-1
R_6	1500 OHMS 1 WATT RESISTOR	RC-152-4
R_7	10 MEG. 1/2 WATT RESISTOR	RC-106-1
R_8	220,000 OHMS 1/2 WATT RESISTOR	RC-224-1
R_9	470,000 OHMS 1/2 WATT RESISTOR	RC-474-1
R_{10}	150 OHMS 1/2 WATT RESISTOR	RC-151-1
R_{11}	150 OHMS 1 WATT RESISTOR	RC-151-4
R_{12}	VOLUME CONTROL 1 MEG. WITH S.P.S.T. SW.	VC-8
SP-40	SPEAKER	SP-40
LC-1	OSCILLATOR COIL	LC-1
TR-6	OUTPUT TRANSFORMER	TR-6

FREQ. RANGE - 530-1700 KC.
ALIGN AT - 1500 KC
TRACK AT - 600 KC.

MODEL 144

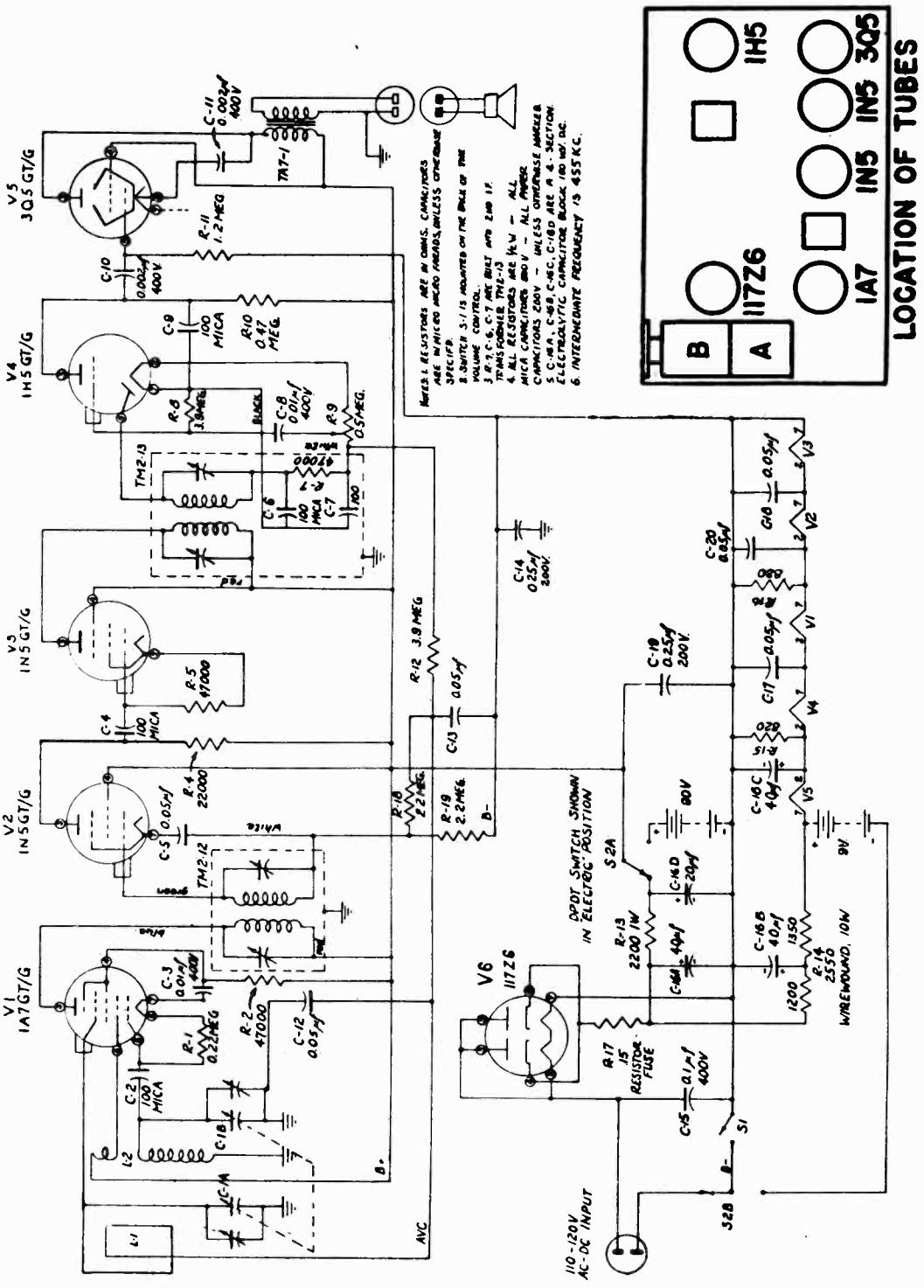


I. F. - 455 K.C.

ITEM	DESCRIPTION	PART NUMBER
C_1	125 MFD. 10VOLT } ELECTROLYTIC	CE-12
C_2, C_3	25 MFD. 150 VOLT } CONDENSER	
C_4	.05 MFD. 400 VOLT PAPER CONDENSER	CP 503-1
C_5	.01 MFD. 150 VOLT PAPER CONDENSER	CP 103-2
C_6	.1 MFD. 200 VOLT PAPER CONDENSER	CP 104-2
C_7	.05 MFD. 150 VOLT PAPER CONDENSER	CP 503-2
C_8	.002 MFD. 120 VOLT PAPER CONDENSER	CP 202-1
C_9	.008 MFD. 400 VOLT PAPER CONDENSER	CP 502-2
C_{10}	.001 MFD. 120 VOLT PAPER CONDENSER	CP 102-1
C_{11}	.0001 MFD. 300 VOLT MICA CONDENSER	CM 101-1
C_{12}, C_{13}	VARIABLE CONDENSER	CV 10
LC-4	OSCILLATOR COIL	LC - 4
LF-19	I. F. TRANSFORMER	LF -19
LP-6	ANTENNA LOOP	LP-6
R_1	56 OHM 2 WATT 10% W.W. RESISTOR	RW 560-6
R_2	7500 OHM 1 WATT 10% RESISTOR	RC 752-6
R_3	2720 OHM 10 WATT 5% RESISTOR	RP - 1
R_4	470 OHM 1/2 WATT RESISTOR	RC 471-1
R_5	820 OHM 1/2 WATT 10 % RESISTOR	RC 821-2
R_6	270,000 OHM 1/2 WATT 10% RESISTOR	RC 274-2
R_7	2.2 MEG. 1/2 WATT RESISTOR	RC 225-1
R_8	1 MEG. 1/2 WATT RESISTOR	RC 105-1
R_9	3.3 MEG. 1/2 WATT RESISTOR	RC 335-1
R_{10}	10 MEG. 1/2 WATT RESISTOR	RC 106-1
R_{11}	1 MEG POTENTIOMETER WITH SWITCH	VC - 6
R_{12}	1 MEG 1/2 WATT 10% RESISTOR	RC 105-2
R_{13}	15,000 OHM 1/2 WATT RESISTOR	RC 153-1
R_{14}	100,000 OHM 1/2 WATT 10% RESISTOR	RC 104-2
S_1, S_2, S_3	3 POLE SINGLE THROW SWITCH	SW - 3
SP-41	SPEAKER	SP-41
TR-7	OUTPUT TRANSFORMER	TR-7
SR-1	SELENIUM RECTIFIER	SR-1
T_1, T_2	TRIMMERS OR VARIABLE	

MODELS NUP, NU6

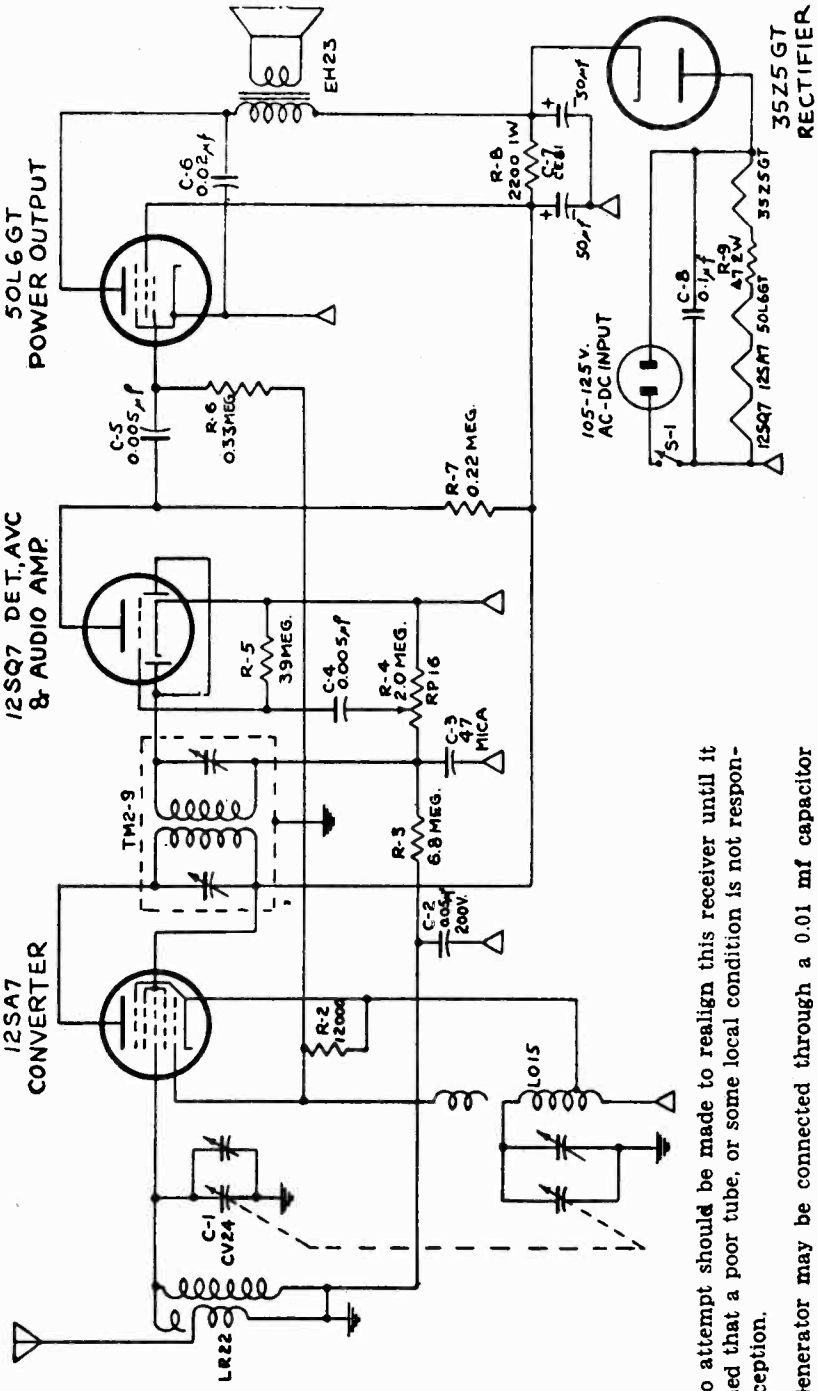
ATLAS SUPPLY CO.



NOTES: 1. RESISTORS ARE IN OHMS. CAPACITORS ARE IN MICRO MICRO FARADS, UNLESS OTHERWISE SPECIFIED.
2. SWITCH S-1 IS MOUNTED ON THE BACK OF THE VOLUME CONTROL.
3. R-7, C-6, C-7 ARE BUILT INTO 2ND I.F. TRANSFORMER TM2-13
4. ALL RESISTORS ARE ½ W — ALL MICA CAPACITORS 600 V — UNLESS OTHERWISE NOTED. CAPACITORS 200V — UNLESS OTHERWISE NOTED
5. C-16A, C-16B, C-16C, C-16D ARE A 4-SECTION ELECTROLYTIC CAPACITOR BLOCK 150 VOLTS D.C.
6. INTERMEDIATE FREQUENCY IS 455 K.C.

COAST TO COAST STORES

MODELS MD28, MD29



LOCATION OF TUBES

NOTES:
1. RESISTORS ARE IN OHMS AND ARE ½ WATT; CAPACITORS ARE 400V AND IN mf UNLESS OTHERWISE SPECIFIED.
2. SWITCH S-1 IS MOUNTED ON REAR OF VOLUME CONTROL.
3. SYMBOL Δ DENOTES B- AND SYMBOL ⏚ DENOTES CHASSIS.
4. I.F. FREQUENCY IS 455Kc.
5. TUNING RANGE IS 532Kc. TO 1700Kc.

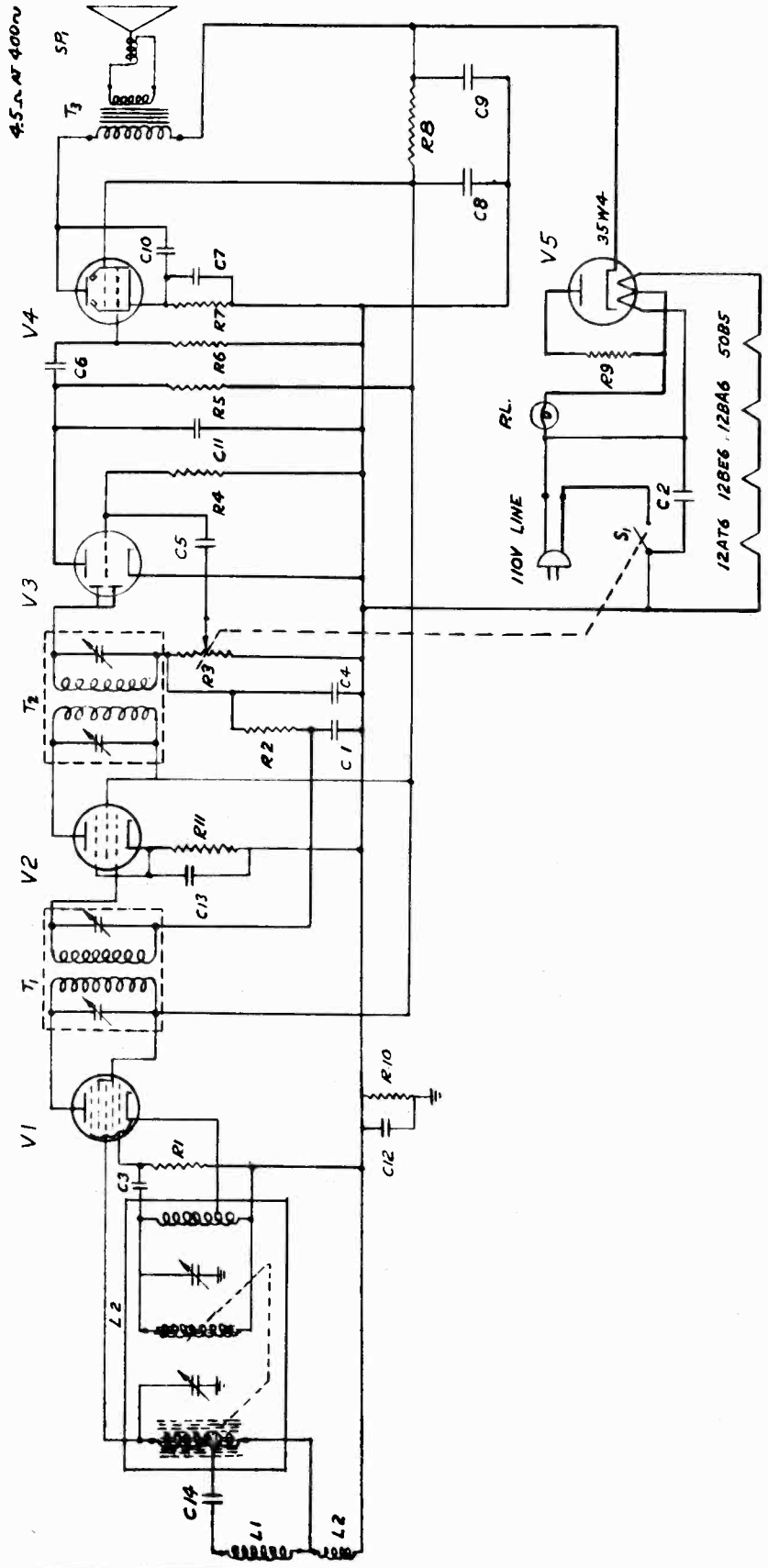
Alignment: No attempt should be made to realign this receiver until it has been determined that a poor tube, or some local condition is not responsible for faulty reception.

The Signal Generator may be connected through a 0.01 mf capacitor (used as dummy antenna) to the lug of RF section of tuning capacitor. Connect ground clip of generator to a convenient B-minus point such as one of the switch terminals on the back of the volume control. An output meter may be clipped directly across the voice coil lugs. Align the IF trimmers to 455 kc using least possible input from signal generator to avoid developing A. V. C. voltage which would make the tuning adjustments very broad.

To align RF trimmer, remove the 0.01 mf capacitor and connect the signal generator hot lead to a 68 mmf mica condenser. Connect the dummy antenna thus formed to the antenna lug on the antenna coil (lug to which the antenna hank is soldered). Again, use the least possible input from the signal generator. With the tuning capacitor plates completely out of mesh, and pointed at extreme clockwise position, adjust the oscilator trimmer on front section of tuning capacitor to 1700 kc. Readjust both signal generator and tuning capacitor to 1550 kc and adjust the RF trimmer on rear section for maximum response.

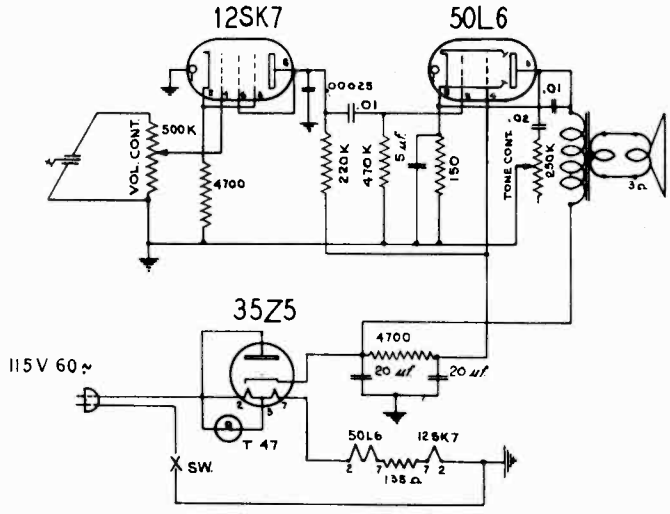
MODEL A6-C5389

DUAL ENGINEERING CORP.

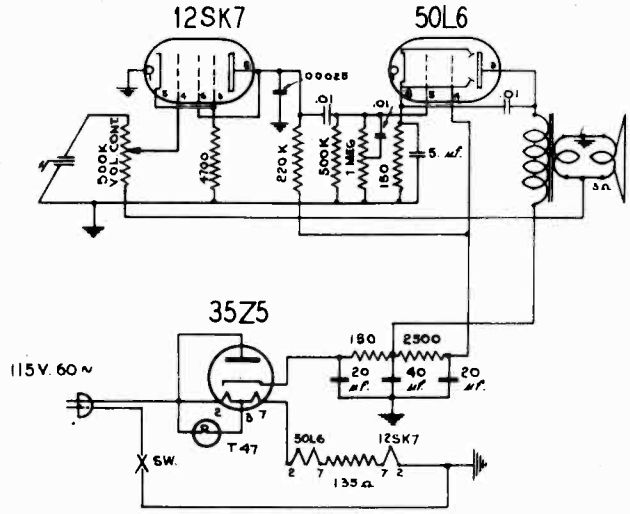


ELECTROMATIC MFG. CORP.

MODEL A.P.H. 301-A
MODEL A.P.H. 301-B
MODEL A.P.H. 301-C

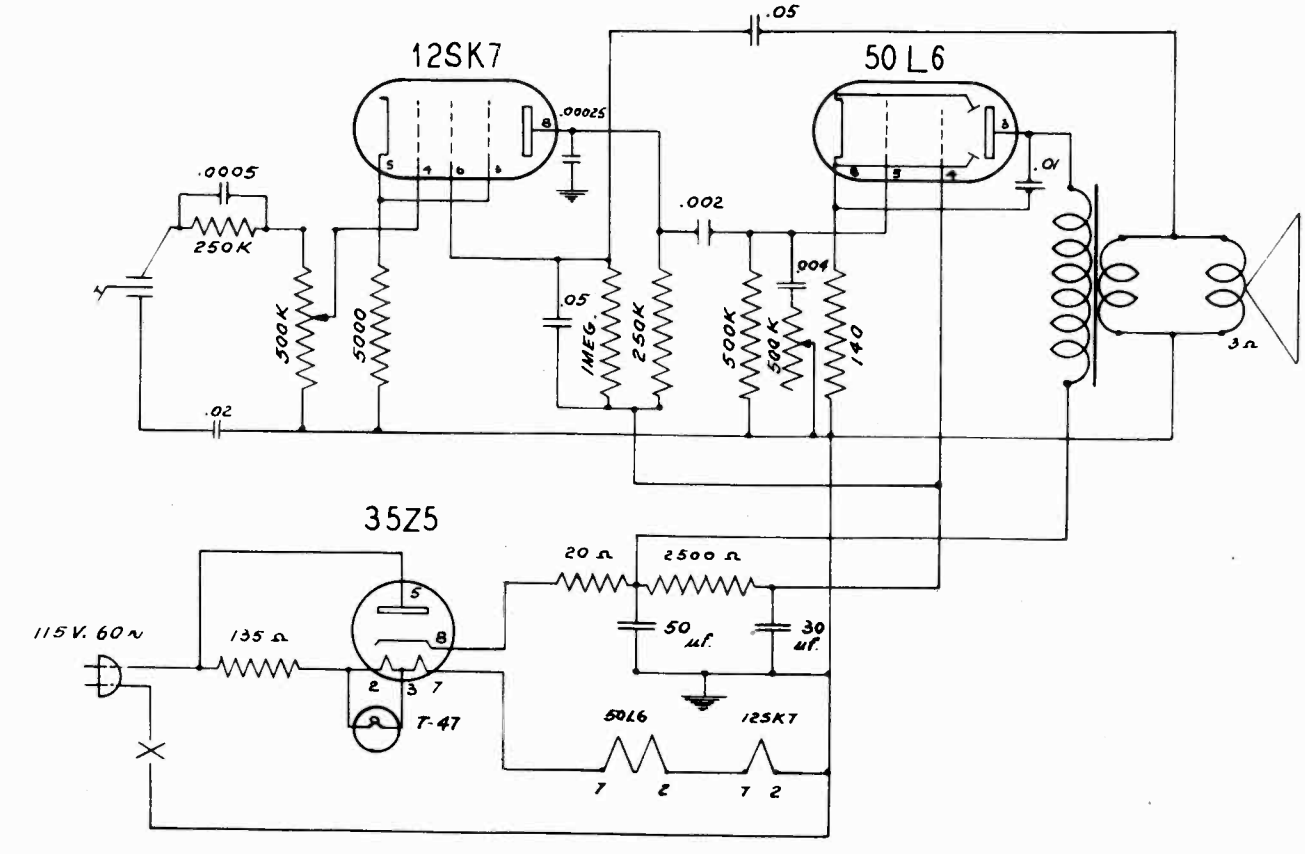


MODEL A.P.H. 301-A



5-8-46

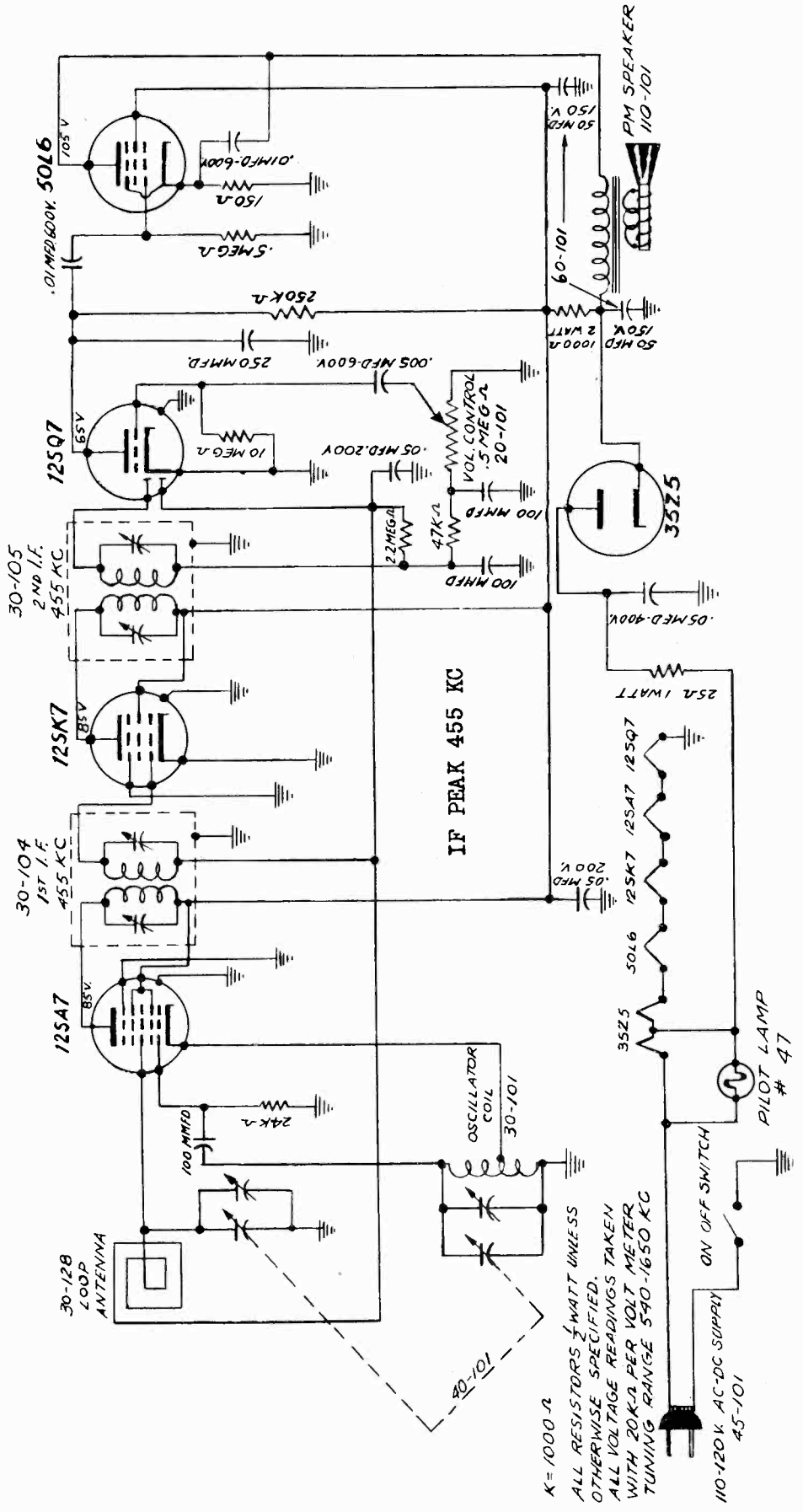
MODEL A.P.H. 301-B



MODEL A.P.H. 301-C

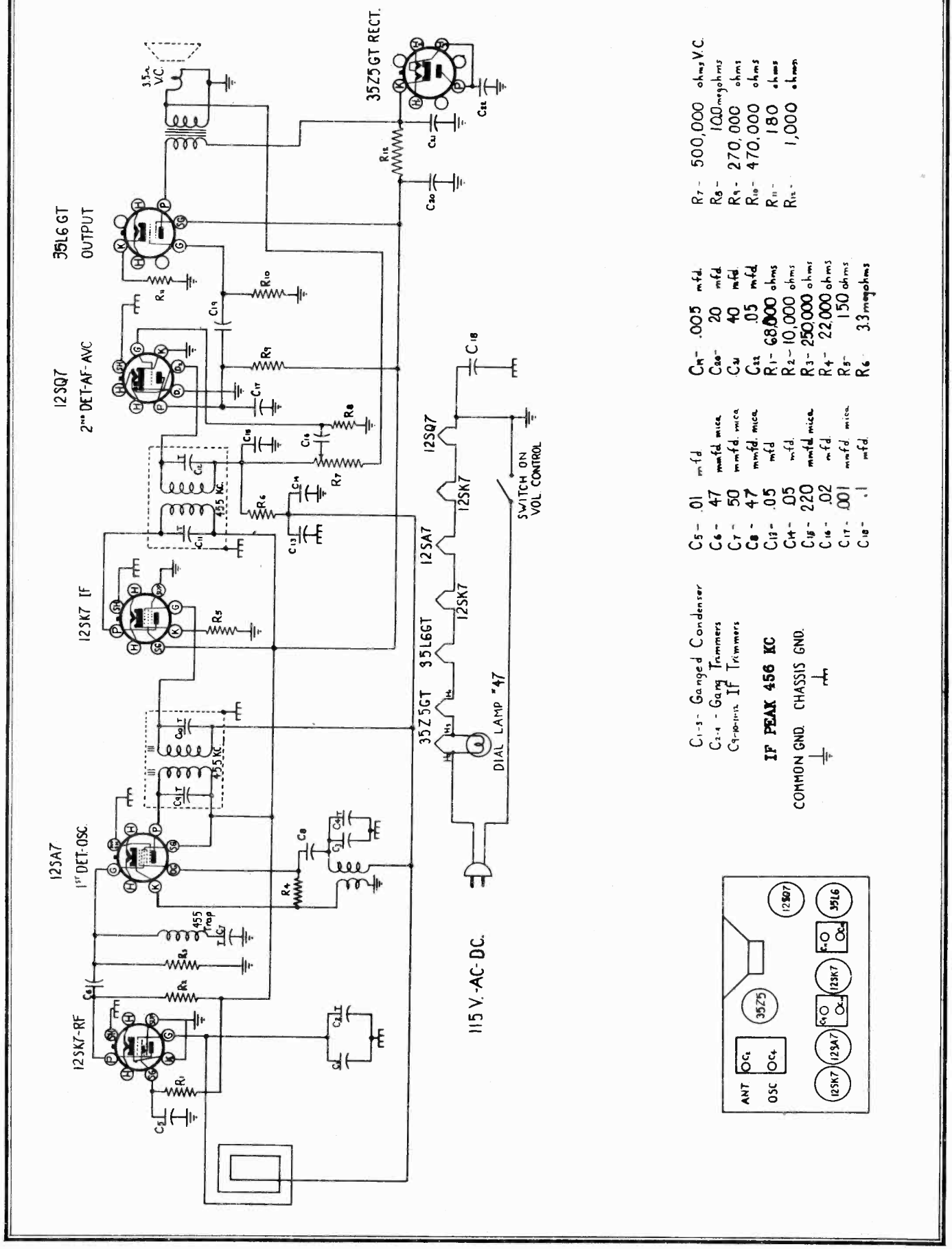
MODEL 205

W. T. KNOTT CO.



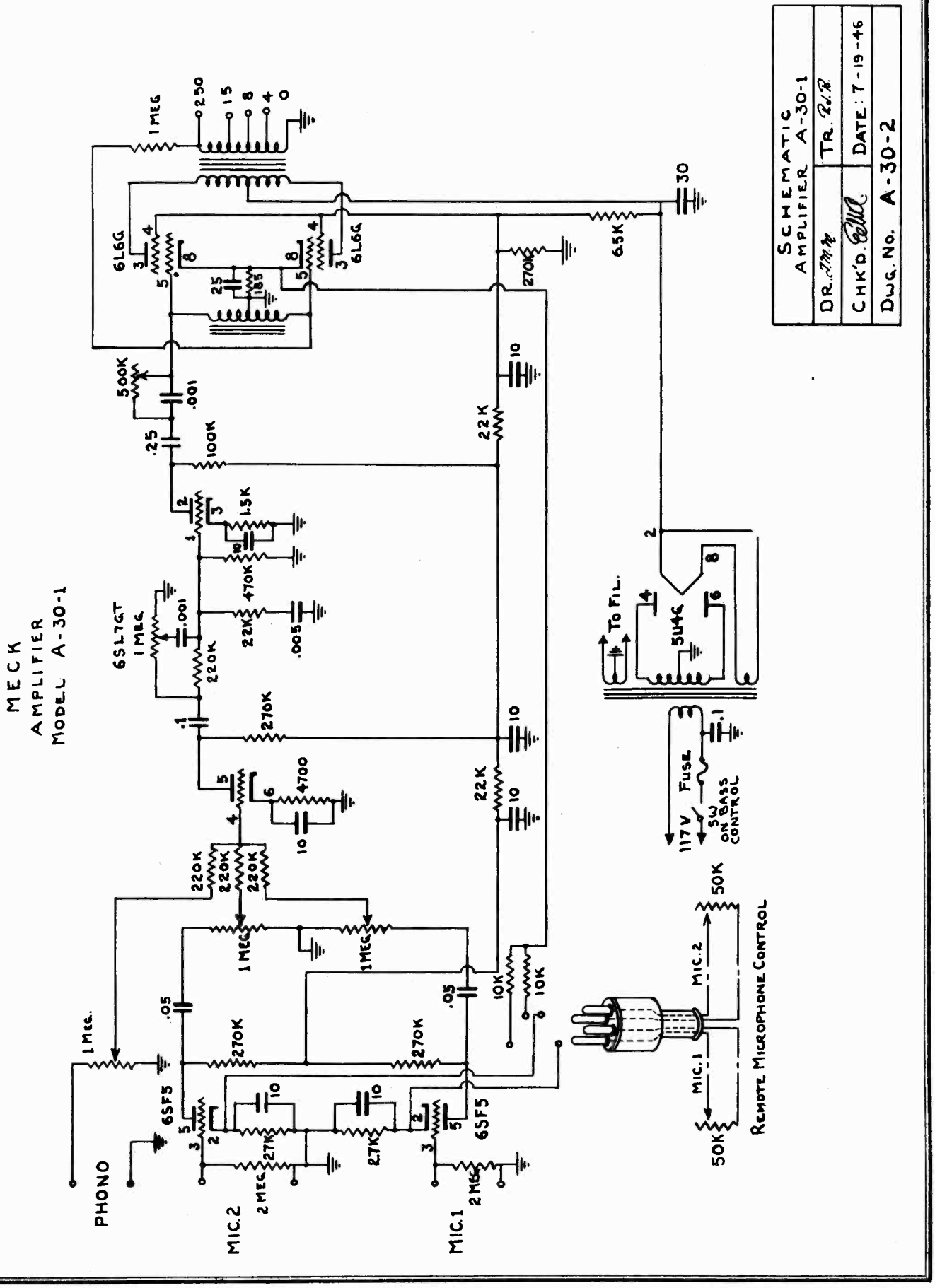
MAGNA ELECTRONIC CORP.

MODELS M300-6, M400-6



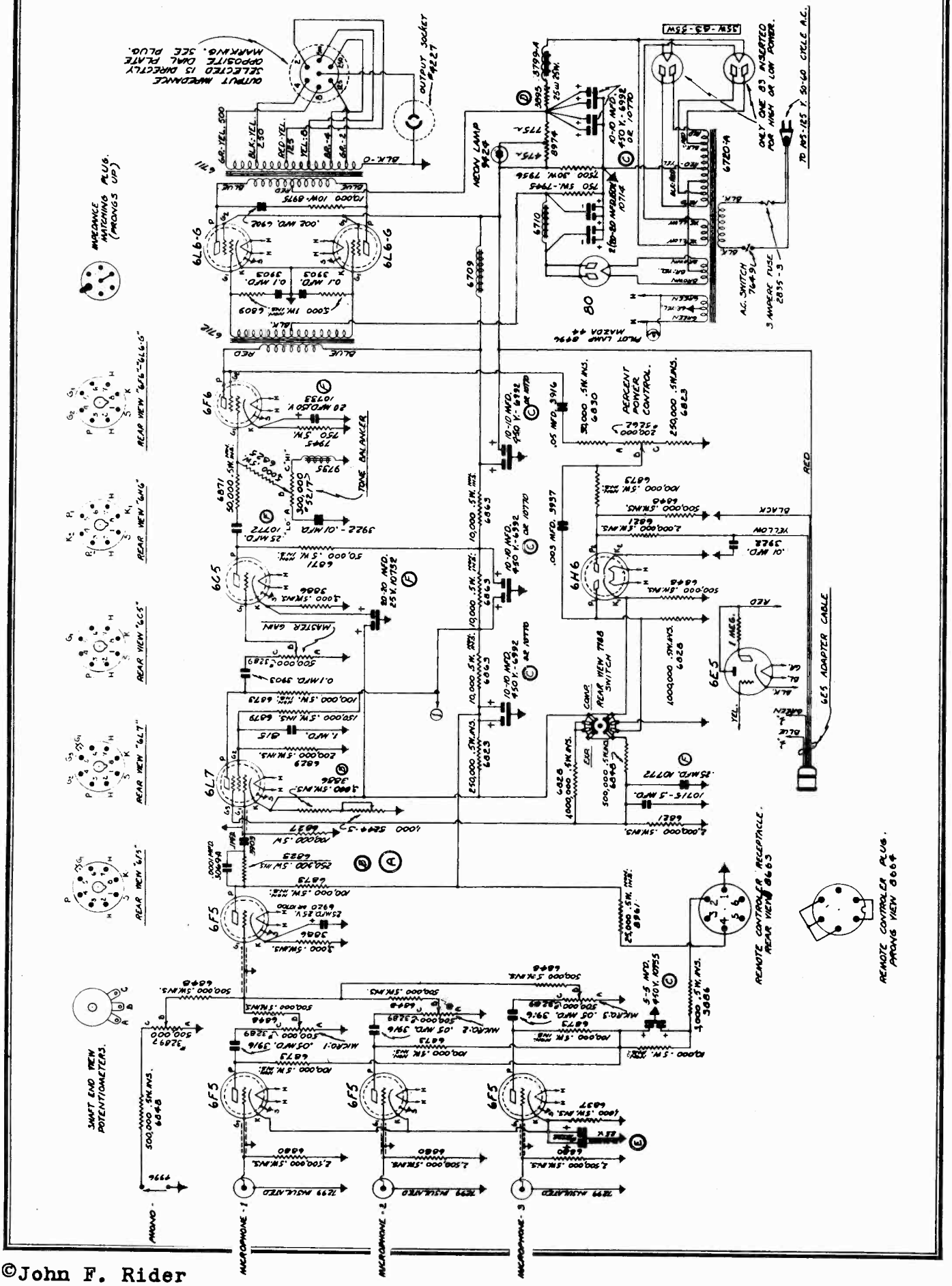
MODEL A-30-1

JOHN MECK IND., INC.

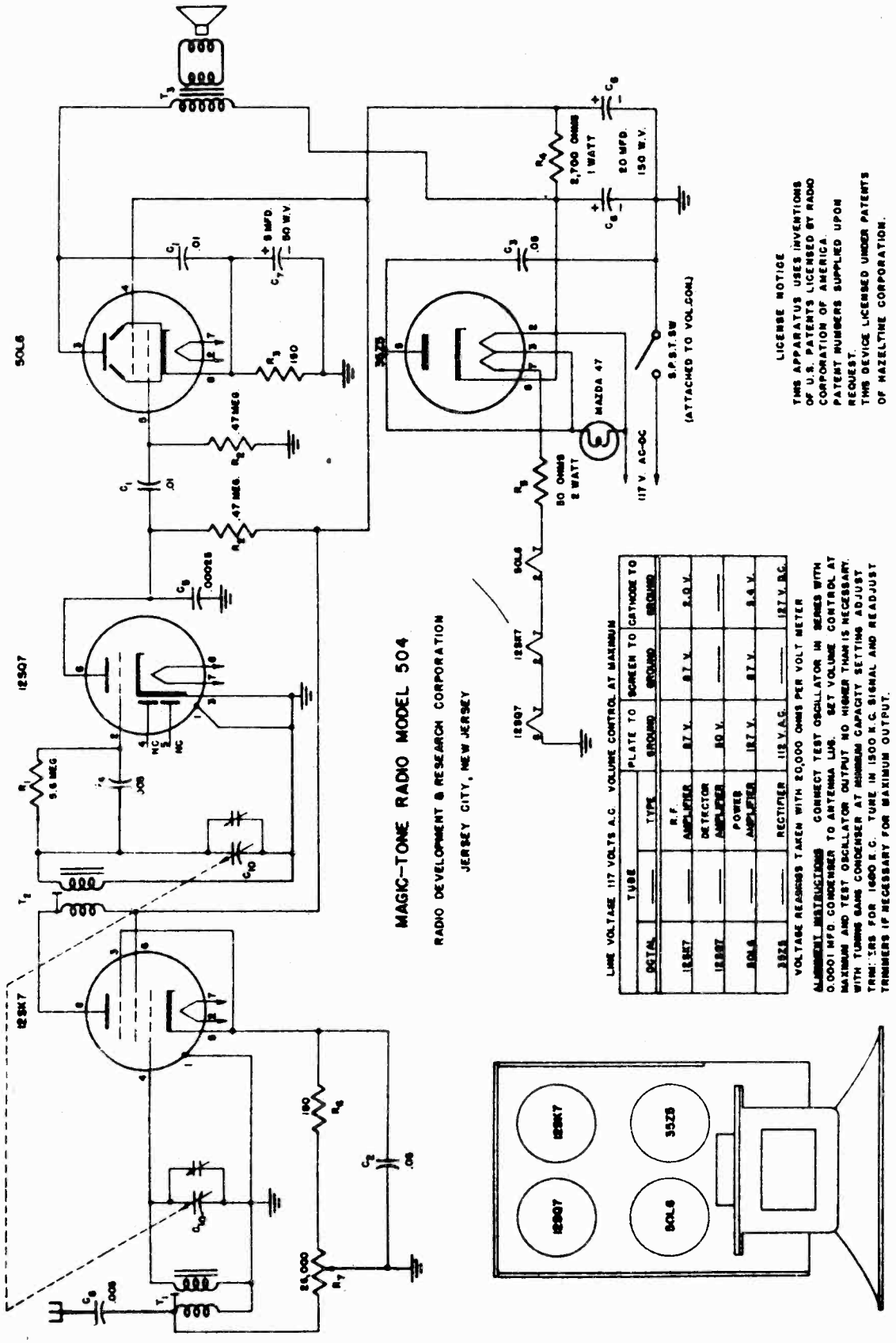


OPERADIO MFG. CO.

MODEL 855-AR

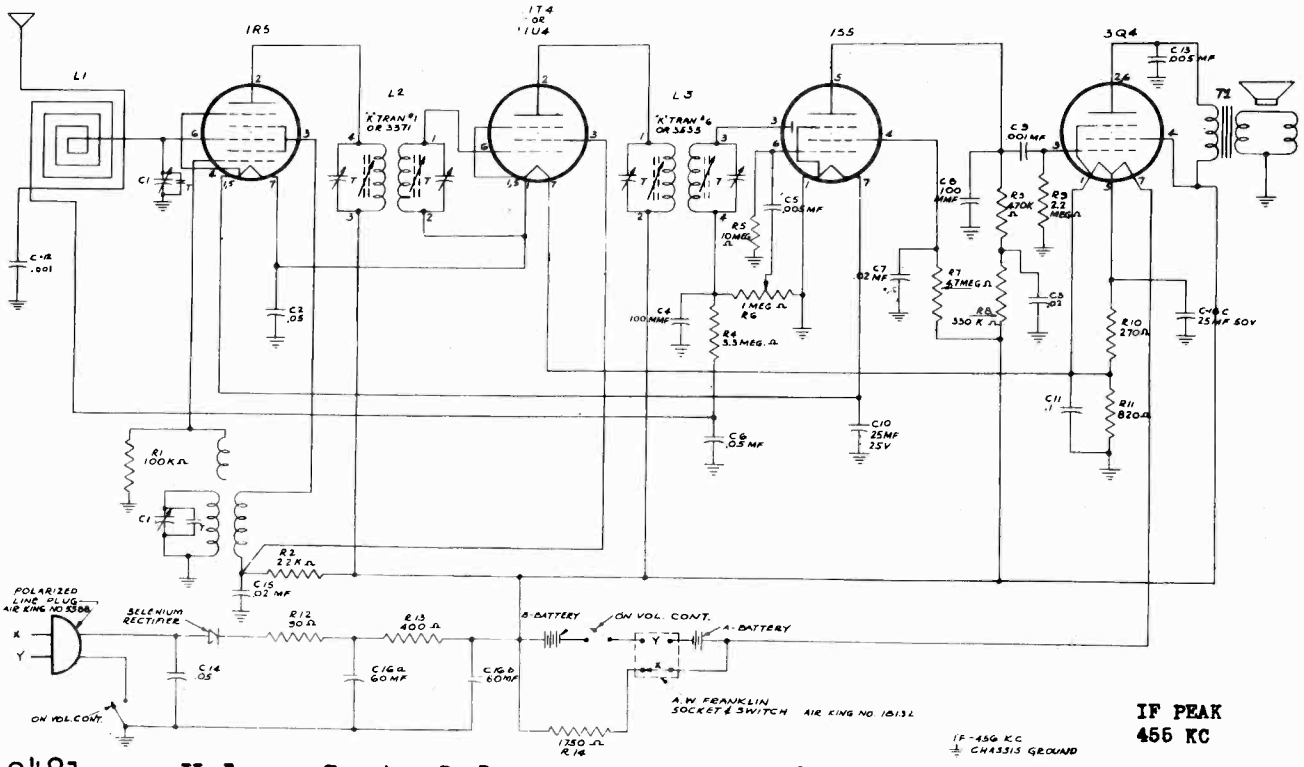


MODEL 504 RADIO DEVELOPMENT & RESEARCH CORP.



RADIONIC EQUIPMENT CO.

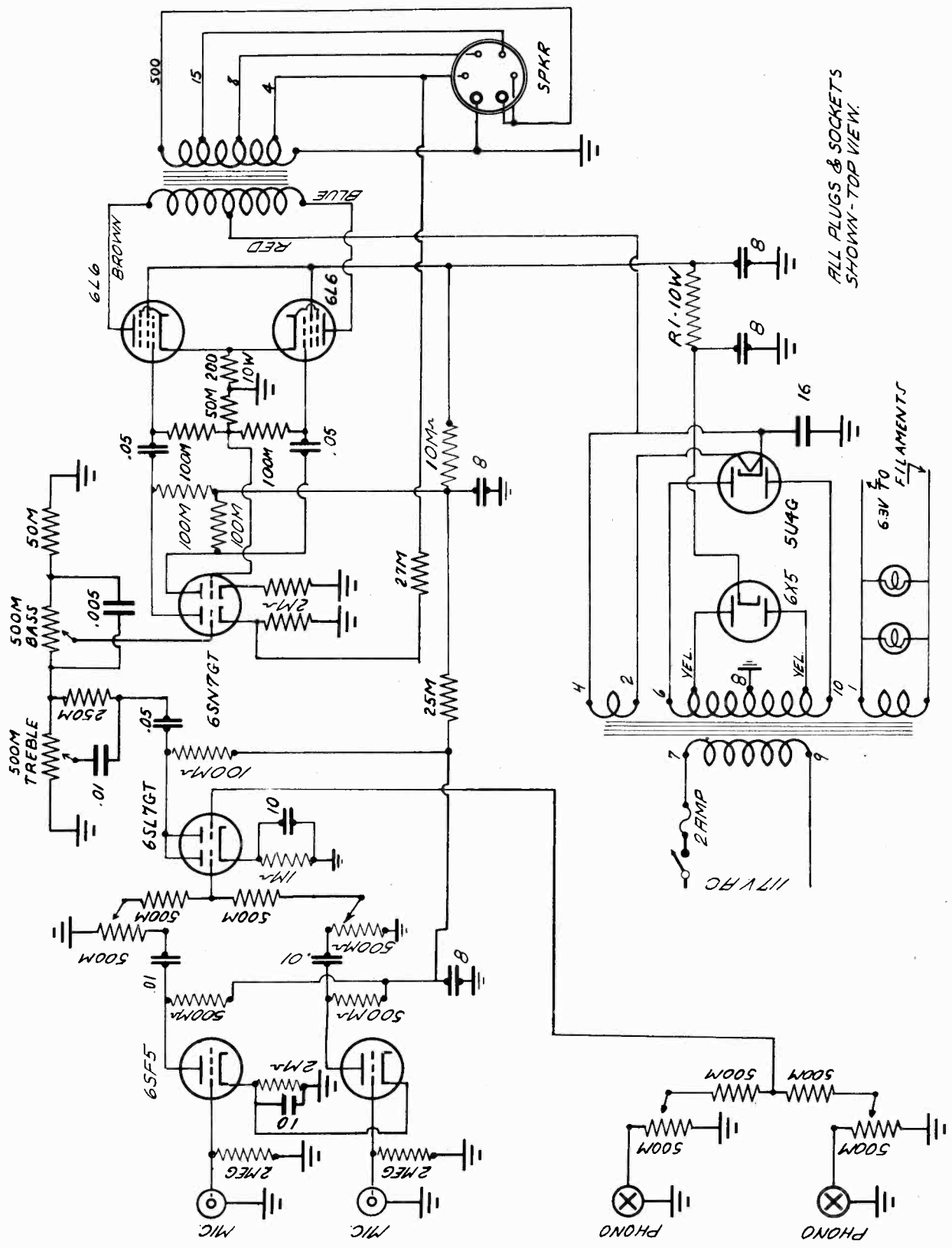
MODEL 35P



IF PEAK 455 KC

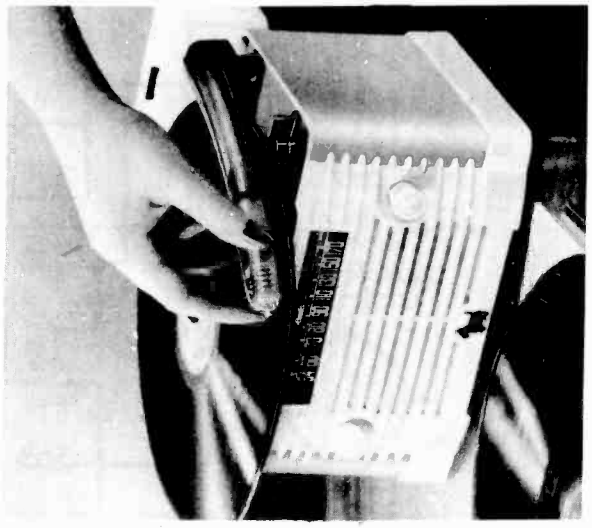
2481	Volume Control 1 meg w. switch (DPST)
	Resistors 270, 820, 8200, 100K, 330K, 470K, 2.2 meg
	3.3 meg, 4.7 meg, 10 meg, ¼ watt each
	" 33 ohms 1 watt
2177	Filter & filament dropping resistor
6011	Cabinet complete with carton and fittings
5899	Loud speaker 4" without transformer
5340	Backcover (without loop)
6246	Grille
4098	Dial crystal (mounted on grill)
39164	Knobs (brown)
	Instruction leaflet
1694	Variable condenser
2075	Electrolytic condenser unit (60, 60, 25)
20105	" " single 25mf 25 v.
28197	Oscillator coil
3371	I. F. transformer (input)
3535	I. F. transformer (output)
1337	Output transformer
28199	Loop
54309	Dial pan
54308	Tuning control bracket
4679	Drive shaft dial
5588	Line cord (polarized)
54325	Flag on-off
41106	Pointer
18131	Miniature tube socket
18130	" " "
18129	Battery cable plug
18132	Wafer switch

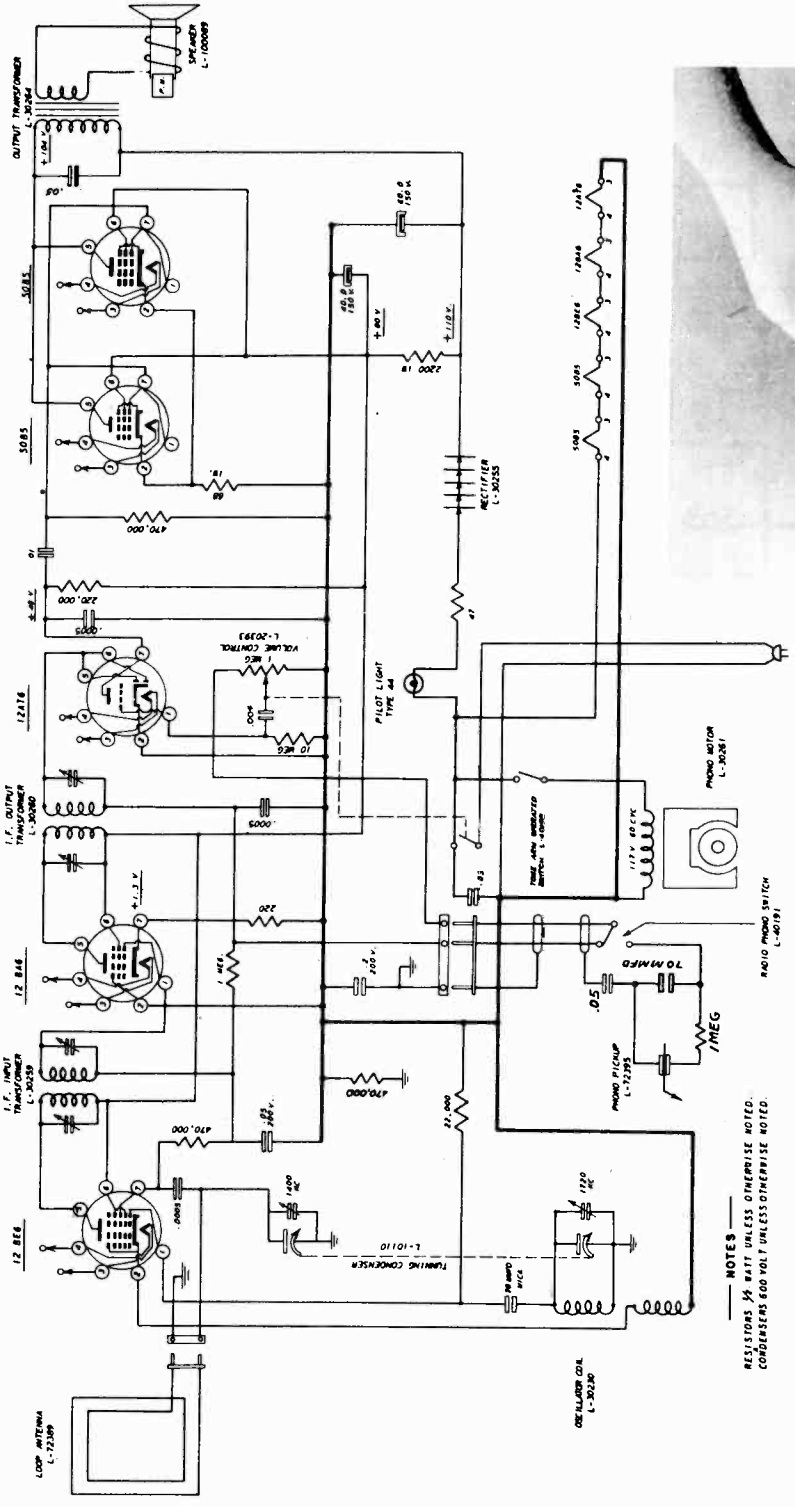
MODEL 35 RADOLEK CO.



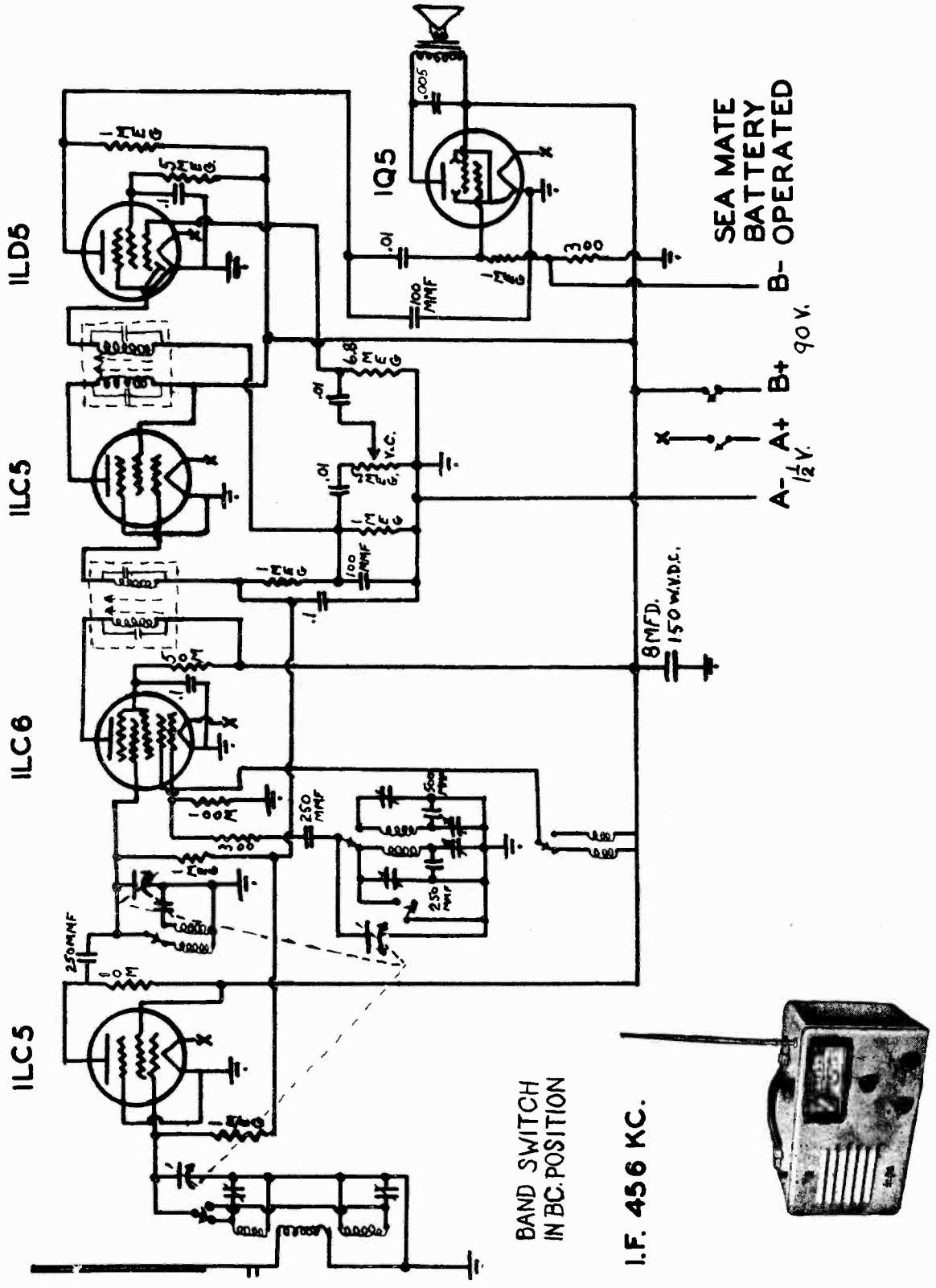
REMLER COMPANY LTD.

MODELS 5300B,
5300BI, 5300I

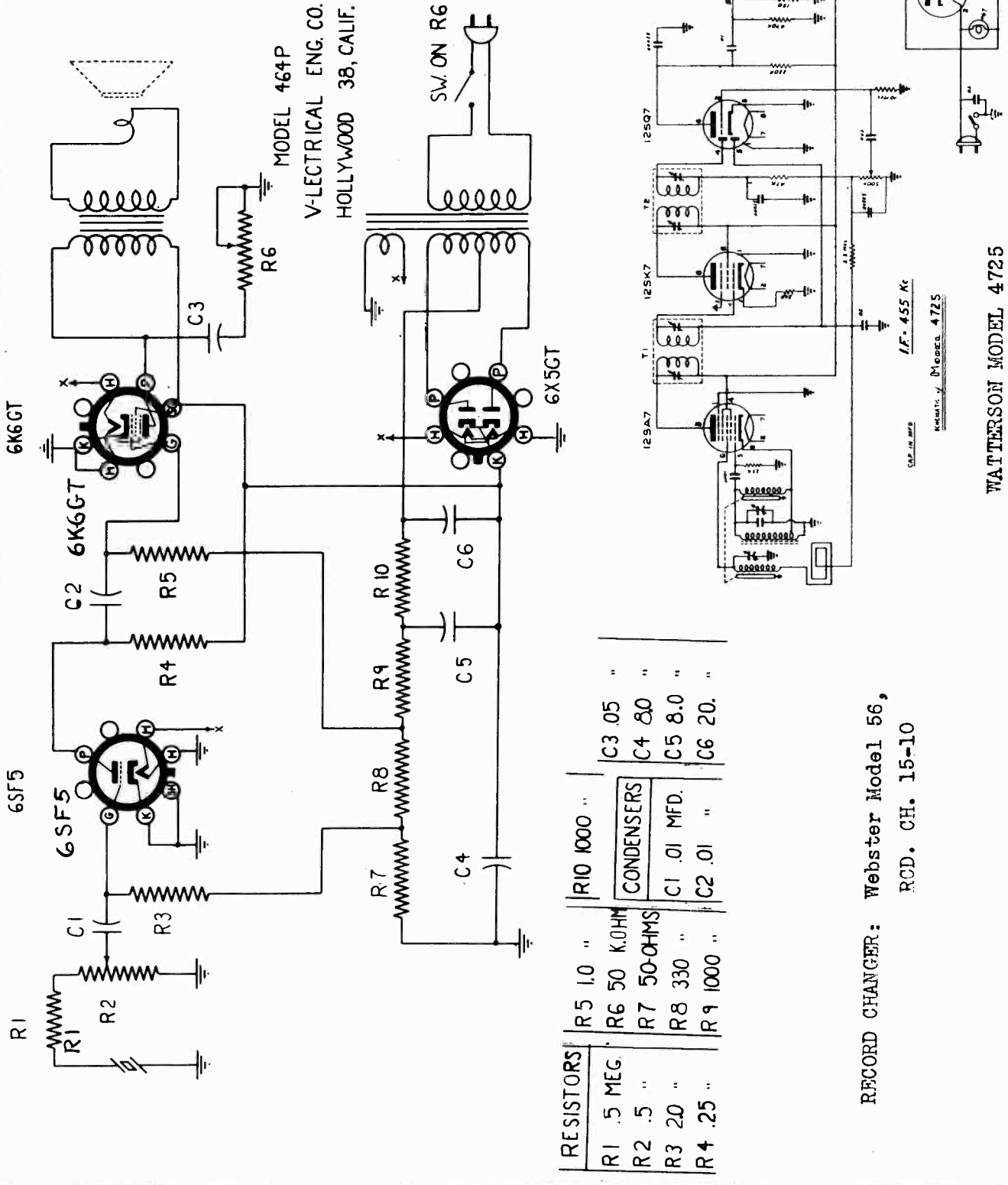




MODEL Sea Mate SOUNDVIEW MARINE CO.



V-LECTRICAL ENGINEERING CO. MODELS Z463, Z464P
WATTERSON RADIO MFG. CORP. Model 4725



RESISTORS			
R1 .5 MEG.	R5 1.0 "	R10 1000 "	C3 .05 "
R2 .5 "	R6 50 K.OHM	CONDENSERS	C4 .80 "
R3 .20 "	R7 50-OHMS	C1 .01 MFD.	C5 8.0 "
R4 .25 "	R8 330 "	C2 .01 "	C6 20. "
	R9 1000 "		

RECORD CHANGER: Webster Model 56,
RCD. CH. 15-10

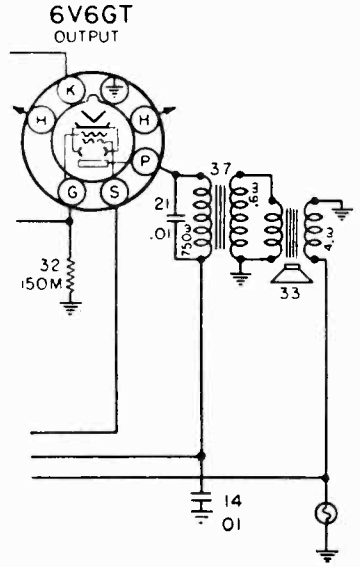
Ansley 32A

The model 32A is the same as the model 32, shown on *page 15-1, 2 of Rider's Volume XV,* with the following exceptions: the 240-ohm resistor connected to prong 5 of the plug is deleted as is also the 12-ohm resistor connected to the one just mentioned. The 10,000-ohm resistor that was in series with the deleted 12-ohm resistor is now connected to ground.

A permanent-magnet loudspeaker has replaced the dynamic speaker and the following changes have been made in this circuit: as there is now no field or bucking coils, the leads to these coils from terminals 1, 5, and 8 have been removed. Instead of the bucking coil (B.C. in the schematic), the voice coil is connected directly across the secondary of the output transformer.

Chevrolet 985792

In the production of this model between serial numbers B46-130000 and B46-136522 the following changes have been made: the 22,000-ohm resistor, 24, has been changed to 33,000 ohms; and the 0.01 μf capacitor, 14, has been moved



Partial schematic of Chevrolet 985792 showing changes.

from between the 33,000-ohm resistor, 25, and ground to the primary of the output transformer, 37, which is connected through the capacitor to ground, as shown in the accompanying illustration.

In the production of this model starting upward with serial number B46-136523, the 6SA7GT oscillator-translator tube has been changed to a type 7Q7. The voltages shown in the bottom view of the sockets on *page 13-2 of Rider's Volume XIII* are the same for the 7Q7 as for the 6SA7GT, except that the socket prong designations have been shifted.

Starting upward with serial number B47-1001, the tube complement is changed with the exception of the 7Q7 and the 0Z4G tubes. The i-f tube is changed from a 6SK7GT to a 7A7; the 6SQ7GT detector is changed to a 7B6, and the output tube is changed from a 6V6GT to a 7C5. The voltage readings on these tubes are the same as those noted above with the exception of the reading on the cathode of 7C5 which is 4.5 instead of 9.5 volts.

The early production schematic appears on *page 13-1 of Rider's Volume XIII.*

Crosley 56PA, 56PB

Recently it has been discovered that some of the models 56PA and 56PB radios, shown on *page 15-29 of Rider's Volume XV,* are more efficient on power line operation than they are on battery operation. This condition may exist in certain areas, even though the batteries are in good condition.

If a condition of this nature is encountered in your area, it is suggested that one lead wire of the 0.05-μf capacitor, which is item 13 in the schematic, should be disconnected from the terminal strip. This lead wire should be extended, covered with sleeving, and attached to the red wire in the interlock switch, as shown in Fig. 1.

In a later production of these models, a 1U5 tube has been substituted for the 1S5 Det.-AVC, 1st A.F. Amp. tube. All components connecting to the tube remain the same; the only difference occurs in the wiring to the tube socket.

Capacitor (15) which was formerly connected across the output transformer (5), is now connected from the plate pin 2 to F+ pin 7 of the 3S4 output tube.

A 12-$\mu\mu$f capacitor (46) part No. C-137727-13 has been added across the oscillator tank circuit as shown in Fig. 2. The ground from this tank circuit was inadvertently omitted from the schematic diagram shown in Volume XV.

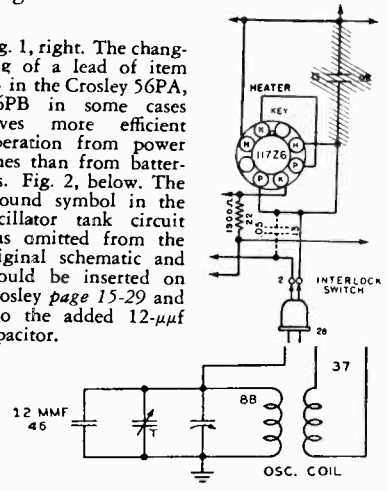


Fig. 1, right. The changing of a lead of item 13 in the Crosley 56PA, 56PB in some cases gives more efficient operation from power lines than from batteries. Fig. 2, below. The ground symbol in the oscillator tank circuit was omitted from the original schematic and should be inserted on Crosley *page 15-29* and also the added 12-$\mu\mu$f capacitor.

Emersion 512, 515, 516, 550, Chassis 120006, 120056

These models incorporating the 120006 chassis are the same as model 512 shown on *page 15-11 of Rider's Volume XV.* These models using the 120056 chassis are the same as those mentioned above, except for the replacing of the octal tubes with the following loctal tubes:—7B7, 14B6, 14Q7, 50A5, and a 35Y4. The circuit diagram and the voltage readings remain the same, except for the base pin numbers.

Emerson 550, Chassis 120,006

This model is the same as models 512, 515, and 516, chassis 120,006, shown on *pages 15-11 and 15-12 of Rider's Volume XV.*

Electronic Laboratories 2701, ISSUE B

This model from serial number 211,-001 and up, is similar to the 2701 receiver shown on *pages 15-1 and 15-2 of Rider's Volume XV,* except for the following changes:

A 27-ohm 10-watt wire-wound resistor, part W-284C has been added to the filament line, between pin 7 of the 35Z5GT/G rectifier and pin 2 of the 50L6GT/G output tubes.

In the alignment procedure for a frequency setting of 700 kc, the following note has been added in the last column: If more than one turn is required, the trimming 1400 kc should be repeated and the 700 kc padding of the tuning core also repeated until correct alignment has been reached.

Farnsworth ET-061

The following information is of use to those who have experienced finding turned-up edges in the cabinet of the Farnsworth model ET-061:

The Dynox or simulated wood wrap-around has a tendency to curl at the edge on early shipments of some table models. This can usually be firmly recemented by applying a heated dull knife blade between the Dynox and the cabinet. The heated blade should then be applied to the outside surface of the Dynox pressing it firmly against the cabinet. It will help to stroke the blade toward the edge of the Dynox while applying firm pressure. Care must be used to see that the knife blade is not hot enough to burn or discolor the finish of the Dynox.

FARNSWORTH ET-069

The Farnsworth Model ET-069 is the same as the Farnsworth Model ET-066 except that Model ET-069 uses cabinet No. H-247 and knob No. 59423. The schematic for the ET-066 is found on *page 15-5* of *Rider's Volume XV.*

Farnsworth P-51 Record Changer

The following procedure is required if it is desired to convert a 60-cycle-operated record player to 50-cycle operation:

50-cycle wire drive pulley #64401 replaces the 60-cycle metal pulley #55274 on the General Industries motor.

50-cycle wire drive pulley #64402 replaces 60-cycle wire pulley #64415 on General Industries motor.

50-cycle wire pulley #64399 is placed over 60-cycle nonremovable metal pulley on the Alliance motor.

50-cycle wire pulley #64410 replaces 60-wire pulley 64414 on Russell motor.

There have been many questions asked in reference to some suggestions pertaining to the satisfactory operation of this record changer. Below is a compiled list of service hints that may help you to understand and to correct certain faults in the operation of this changer:

Oversize Record Problems

An oversize record may bind between record plunger and spindle during changer cycle. To correct this condition to enable playing oversize records, loosen the three screws which hold the record support post to base plate and insert a 0.042 shim, #37269 underneath the front edge of the record support post (the edge toward turntable). The mounting screws may then be tightened.

If, after making sure the 10- and 12-inch needle landing adjustments are set correctly, the needle when moving in strikes the edge of the stack (especially when there are 6 or 8 records on the turntable), the tone arm lift rod adjustment is set too low to clear the record stack. Setting this adjustment to clear 12 records will eliminate this trouble.

On the early production run of P-51 changers, the plastic record support post was molded with a decorative ridge running vertical with the record support post. It was found that an oversize 12-inch record would rub this ridge. Two methods are suggested to correct this condition.

1. A small portion of the ridge may be removed with a file.

2. A part #36118 washer may be placed under the turntable. This positions the turntable slightly higher, thus clearing the ridge. The later production changer has a portion of this ridge removed.

Some complaints have been received of more than one record dropping at a time. Two causes can be attributed to this condition.

1. Failure of customer to lift the record stack clear of spindle, thus not allowing latch to drop down before setting records back over spindle.

2. When the record stack is removed, the spindle latch may remain in the up position due to a burr on the latch, insufficient lubrication of latch, latch pin fitting too snug, or latch itself being bent. To function correctly the latch must always point down when records are placed over the spindle.

"Wows" may be caused by (1) worn idler pulley, (2) C-washer under turntable slipped to one side, (3) insufficient lubrication between turntable spindle and turntable drive shaft, (4) bent spindle or bent turntable drive shaft.

The correct spacing for the friction trip assembly is 0.012 inch. The spacing between #50204 and the underside of the base plate should be 0.008 inch. Although in actual operation this spacing is between the under side of the base plate and the upper cork washer, it is important that the adjustment be made by inserting an 0.008 feeler gauge on top of the tone arm support post and under the tone arm support bracket.

Excessive click may usually be stopped by using an extra part #60438 spacer on the starting lever assembly. This should be installed on the under side of the starting lever assembly making a total of two washers on the under side and one on the upper side of the starting lever assembly. A part #62086 starting lever bumper that is worn down to the metal, will also cause click. This may be corrected by replacing with #07329 starting lever assembly.

If changer fails to trip or reject a record, when record selector switch is placed in reject position, the following parts should be checked:

1. Check trip lever for position in relation to trip finger spring. The trip lever should be on the left side of the spring as viewed from underneath changer and with record support post nearest you.

2. If insufficient tension is applied to friction trip assembly, the trip finger may assume a position low enough to strike the ejector pin. This pin is located on the edge of main cam and is the pin with the largest diameter. Adjustment of tension on friction trip assembly should correct this condition. If, however, the trip finger has become bent, it will require reforming before satisfactory operation is obtained. When set correctly, the trip finger will clear the ejector pin but will strike the starting lever bumper.

All necessary notes and pictures pertaining to this Farnsworth record changer are found in *Rider's Volume XV*, beginning with *RCD. CH. page 15-1.*

FARNSWORTH P-51 RECORD CHANGER

In the Farnsworth P-51 record changer a number of changes have been made in the parts numbers which are listed below:

561321	Shelf Post part number changed to 04050.
59166	Escutcheon part number changed to 04051.
37067	Flat Washer is obsolete in later production changer.
36845	#10 Flat Washer is obsolete.
561312	Spring is obsolete.
2017-005	Flat Washer is obsolete.

The following is a list of parts that were not originally identified:

36347	Drive screw fastens escutcheon to baseplate.
36847	Drive-lock pin is used in record shelf crank assembly.
36849	Hairpin cotter is used at bottom of stationary spindle.
36934	H. P. Cotter is used on A-C switch shaft.
561348	Spacer is used under stud mounting tone arm return lever No. 561355 and mounting nut.
561349	Spacer used with rejector lever.
64324	Small tension coil spring used to keep the tone arm from moving back over the record after last record has finished playing.

The original parts list for this record changer is found on *RCD. CH. page 15-12* of *Rider's Volume XV.*

Farnsworth P-52,P-57 Record Changers

Model P-52 is the same as P-51 except that the tone arm and P.C. escutcheon are different and that the Astatic L71 crystal pickup is used. The P-57 is the same as the P-52 except for the positive trip.

Firestone 7423-6

This model is the same as model S7398-1 shown on *page 13-14 of Rider's Volume XIII.*

Fada 602

This model, shown on *page 15-1 of Rider's Volume XV,* also uses the Milwaukee-Erwood 10700 Series Record Changer, which is shown on *page RCD.CH. 15-1 of Rider's Volume XV.*

GE 417A

This model appears on *pages 16-17 to 16-20 of Rider's Volume XVI.* The i-f transformers T-8 and T-9 are indicated as having terminals. They actually have leads coming out. For T-8: blue goes to the plate of V4, red goes to B+, green goes to grid of V5, and black goes to ground. For T-9: blue goes to plate of V4, red goes to B+, green goes to grid of V6, orange goes to junction of R16 and R27, and black goes to ground.

Farnsworth Models

The parts shortage has resulted in the substitution of various types of tuning capacitors without change in part numbers stamped on them. In ordering replacement tuning capacitors for ET-060, 061, 063, 064, 065, 066, 069; EK-263, 264, and 265 the following suggestions should be observed:

Gang Capacitor with 21 plate oscillator section requires the removal of trimmer from r-f section of gang if the loop antenna has a r-f trimmer located on it. This capacitor used B.C. oscillator coil #38483 and, if an S.W. oscillator coil is used requires S.W. oscillator coil #38549. Both of these coils have a white dot to indicate finish lug.

A #26239 gang capacitor with 19 plate oscillator section (identified by red dot on rear) may require the removal of r-f trimmer as explained above. This capacitor requires B.C. oscillator coil #38706 and S.W. oscillator coil (if used) #38709. These oscillator coils are marked with a yellow dot at the finish lug.

The following is an alignment hint for the Farnsworth models with respect to the use of the antenna:

The antenna should be held in a vertical position, ⅝ inch from the back side of the radio chassis in order to maintain the maximum output of the antenna after being installed in the cabinet. Therefore, we suggest some type of a jig to be made out of scrap material found around the service department to hold said antenna in the proper position while the serviceman is realigning the radio out of the cabinet. This suggestion is very helpful in getting the best operation out of the radio and, in addition, saving expense and time.

GALVIN DIAL CORD SLIPPAGE

Dial slippage encountered in 1946 home sets using slide rule type dials can easily be remedied by restringing using two dial cords.

Formerly, a single cord and tension spring was used for both driving the tuning capacitor and moving the pointer. It is recommended that two cords and tension springs be used; one for driving the tuning capacitor and one for moving the pointer.

Before removing the old cord, make a sketch showing the old cord layout. This will assist greatly in restringing.

First install the drive cord between the tuning shaft and tuning capacitor pulley. It is to be routed in exactly the same manner as the old cord was, except run it only between the tuning shaft and tuning capacitor pulley. Be sure to wind 3 turns around the tuning shaft. The old tension spring is used to provide tension on the cord by hooking in exactly as before. Use the cord originally on the set for this purpose, except cut it down to the required length.

Install the pointer cord supplied by routing it in the same fashion as before except that it does not go to the tuning shaft. Simply run it to the tuning capacitor pulley and apply light tension to it with the attached tension coil spring. There are several holes in the tuning capacitor pulley through which the tension spring may be hooked and/or adjusted.

To calibrate pointer, simply turn the tuning capacitor to the fully meshed position and set pointer to "V" notch or calibration mark provided.

Use a drop of household cement to fix pointer to cord. A drop of cement on all knots will secure them.

Gamble-Skogmo 43-7601, 43-7601A, 43-7601B

These models, shown on *pages 16-1 to 16-5 of Rider's Volume XVI,* use the General Instrument Record Changer model 205, which can be found on *pages RCD.CH. 15-5 to 15-8 of Rider's Volume XV.*

General Electric 250

To reduce the hum in this model, which is found on *pages 15-32 to 15-36 of Rider's Volume XV,* it is suggested that the following change be made.

Resistor R16 (2200 ohms) should be removed from the negative battery terminal lug, lengthen pigtail, insulate with a spaghetti covering, and solder to the ground lug of the terminal board located at socket saddle of the 1LH4 tube.

An appreciable increase in duration of operation from a fully charged battery in this model 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 (1500 ohms) with one of 4700 ohms, 1 watt, carbon. This change should be made only when the customer demands a longer duration of operation to one battery charge.

Hallicrafters S-38

In the event that an a-c hum develops in this receiver, the schematic of which appears on *page 15-59 of Rider's Volume XV,* it has been found that the 35Z5GT is the cause of the trouble, even though the tube passes a normal test. Also, other tubes in this set have been known to cause hum. Try replacement tubes.

Another cause is a high resistance ground between the chassis and the case. This usually develops through the rubber mounting grommets or through the switch mounting rivets. Occasionally it may be a defective 25-μf capacitor (C36), which should be replaced if defective. It is possible that C36 is not of the correct value. Check this point.

If this set loses sensitivity after being in use for approximately a half hour, replace the 12SA7GT/G tube, as an investigation has revealed that this condition is due to a certain percentage of Hytron tubes of this type, of a particular production run marked 1/6, 2/6, 1A6, or 2A6. The replacement should have any other marking than those listed previously.

Hallicrafters S-40

In the event that band 4 (15.7 to 43 mc) fails to operate at all times, but reception on other bands is normal, trouble is indicated in the oscillator circuit of this band, which in most cases can be traced to a weak 6SA7 oscillator tube or low line voltage. In those few cases where trouble persists, even though all voltages are normal and the tube has been replaced, this trouble can be remedied by replacement of the oscillator coil T9 and capacitor C18, as follows:

Replace T9 oscillator coil, part #51B791 containing 7 primary turns, with part #51B791B, having 10 primary turns. Change capacitor C8 (100 μμf) to part #CC25UK680K, 68 μμf. Connect the cathode lead from terminal 6 of the 6SA7 (V2) to T9 direct to the secondary winding where it leaves the coil form rather than to terminal lug "A" on the top of the coil form. (See sketch of coil form on *page 15-67, 68 in Rider's Volume XV.*) Replacement coils are furnished without the iron cores, as they are interchangeable. If new cores are needed, due to loss or breakage, they can be ordered under part #77A068.

If the receiver cannot be placed in "break-in" operation, apply the following remedy: Notice on the schematic of the receiver on *page 15-67, 68 in Rider's Volume XV* that the grid of V6 the output 6F6G tube is connected to the power switch S7, so that when the switch is in the "send" position the grid of this tube is grounded. Many operators wish to leave this switch in the "send" position and connect from terminal 5 on the plug PL2, through the transmitter relay to ground. In order to do this, the lead between S7 and V6 should be removed. On later production runs, this lead has been eliminated. See notes on "Power Requirements" and "Preparation for Use" on *page 15-71 of Rider's Volume XV.*

HOWARD 901-A

The following is a list of changes made in Howard Model 901-A above serial number 40575:

1. The 0.05-μf capacitor in the avc filter network, instead of going to ground, goes to B minus.
2. The 300-$\mu\mu$f capacitor that has one end connected to the variable arm of the volume control, has the other end connected to B minus instead of ground.
3. The 0.01-μf capacitor that has one end connected to the plate of the 50L6GT tube has the other end connected to the cathode of the same tube instead of to the low side of the output transformer.
4. There is inserted in series with the cathode of the 35Z5GT rectifier tube a 50-ohm 1-watt wire-wound resistor.

The schematic diagram for the original production runs is found on *page 15-2* of *Rider's Volume XV*.

MAGNAVOX CR 190

Points of information relative to the differences between the CR 190 chassis carrying various suffix letters are as follows:

The CR 190 A and B, which are found in *Rider's Volume XV on pages 15-43 to 15-50*, and CR 190 D are alike electrically.

The CR 190 C and CR 190 E differ from the models previously mentioned, in that item 22, 0.01-μf 600-volt paper capacitor, and item 47, 15,000-ohm 1-watt resistor, which are connected in series from the plate to ground on the first audio, are omitted.

The CR 190 F is the same as CR 190 A, B, and D except that a 220,000-ohm resistor is connected from grid to ground on the first audio tube.

The CR 190 A, B, and D were used in the Magnavox Georgian, Model 151 series, the Contemporary 148 series, and the Magnavox Provincial Model 152 series.

The CR 190 C and E were used in the Magnavox Duette Model 138 series.

The CR 190 F is used in only the Magnavox Duette Model 138 series.

This information should be added to *pages 15-43 to 15-50* in *Rider's Volume XV*.

Majestic 8S473

In the late production of this chassis 4810, above serial number A235000, the two capacitors, C30 and C32 (each 0.001 μf), have been removed from the cathode circuits of the two 6K6GT output tubes. The schematic for the early production of this set is on *page 15-28 of Rider's Volume XV*.

Meissner 6D

This model number is Meissner's new designation for models 9-1084 and 9-1086 which are shown on *pages 15-1 and 15-2 of Rider's Volume XV*.

MONTGOMERY WARD 64BR-1051A

The trimmer diagram in this model on *page 15-62 of Rider's Volume XV* has an error. The capacitor numbers on the input and output i-f transformers are wrong. The input i-f capacitors should be C8 and C9 and the output i-f capacitors should be C12 and C13.

Montgomery Ward 64BR-1051B

This model is similar to 64BR-1051A shown on *pages 15-61 to 15-63 of Rider's Volume XV*, except for the following changes:

Ref. No.	*Part No.*	*Description*
R1	BEC-9B1-27	220,000 ohms, 20%, ½ watt
R2	BEC-9B1-16	3,300 ohms, 20%, ½ watt
R3	BEC-9B1-84	68,000 ohms, 10%, ½ watt
R4, R7	BEC-9B1-37	10 megohms, 20%, ½ watt
R5, R9	BEC-9B1-34	3.3 megohms, 20%, ½ watt
R8	BEC-9B1-31	1 megohm, 20%, ½ watt
R10	BEC-9B1-60	680 ohms, 10%, ½ watt
R11, R14	BEC-9B1-42	22 ohms, 10%, ½ watt
R12	BEC-9B1-66	2,200 ohms, 10%, ½ watt
	BE 120-145	Coiled tension spring for dial string

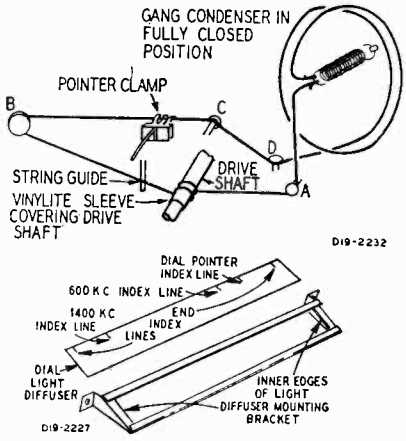
MONTGOMERY WARD 64WG-1804C, 74WG-1804C

These two models are similar to the 64WG-1804A receiver, shown on *pages 15-88 to 15-90 of Rider's Volume XV*, except for the following changes:

The frequency range has been slightly contracted to 540-1600 kc. A 470-ohm dropping resistor (R-20) has been inserted in the circuit between B+ and the following points: primary winding of the first i-f transformer (T-3), the screen-grids of the 12SA7 mixer, the screen-grid of the 12SK7 r-f amplifier, and resistor R-1. A 0.05-μf bypass capacitor (C-28) is connected from the junction of these points to the point marked "X" in the filament line of the schematic on *page 15-88 of Rider's Volume XV*.

The drive cord length has been increased for these models and the following drive cord replacement instructions should be followed.

Turn the gang condenser to the fully closed position. Use a new drive cord 42 inches long and tie one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley, pass the cord through the slot on the drive pulley rim, under stud A and wind two turns clockwise (from front of chassis) around the tuning shaft as shown in the accompanying illustration. Turns must progress away from chassis. Pass cord over pulley B and stud C and under stud D. Pass cord under drive pulley and wind 1¾ turns counterclockwise around drive pulley. Stretch tension spring and tie free end of cord to spring. Cut off any excess cord.



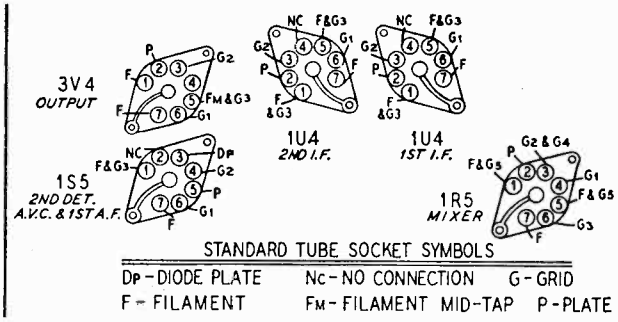
Revised dial stringing diagram and diffuser strip for Montgomery-Ward Models 64WG-1804C, 74WG-1804C.

Attach the dial pointer to the cord and position as instructed on *page 15-89 of Rider's Volume XV*.

The low end of the dial on these models is opposite to that used on the 64WG-1804A model so that the diffuser strip appears as shown in the accompanying illustration.

The components used in the 64WG-1804C and 74WG-1804C models are the same as those used in 64WG-1804A enumerated on *page 15-90 of Rider's Volume XV* except for the following:

Ref. No.	*Part No.*	*Description*
C-1	D67102	.001 mf 400 V Tubular
C-3A, C-3B	26A402	Gang condenser and pulley assembly
C-14	B67403	.04 mf 200 V Tubular
C-15	B67602	.006 mf 200 V Tubular
C-22	B67204	0.2 mf 200 V Tubular
C-23	D67104	.1 mf 400 V Tubular
C-24	17A123	1.5-12 mmf Trimmer
C-28	B67503	.05 mf 200 V Tubular
R-20	B85471	470 ohms 0.5 watts Carbon
T-1	26A445	"B" Range loop antenna assembly
	58X667	Dial
	26A446	Pointer bracket assembly 42" drive cord
	28X95	Drive cord tension spring
	41X81	Dial light diffuser



Revised tube layout for the Montgomery Ward Model 74WG-1054A in which a 3V4 output tube has been substituted for a type 3Q4 tube.

MONTGOMERY WARD 74WG-1054A

This receiver is the same as the 64WG-1054A, shown on *pages 15-82 to 15-84 of Rider's Volume XV* except for the following changes: A 3V4 is used for the output tube so that in the final step of the receiver stage sensitivity measurements the signal generator should be connected through the 0.05-μf coupling capacitor to pin 6 of this tube. A 2.2-volt input will be required for a 50-milliwatt output for this stage. The schematic shown on page 15-82 holds true for this model without any changes since the 3V4 tube has the same wiring as the 3Q4. The changed socket layout is shown in the accompanying sketch. The C-1 trimmer capacitor in this model has a value of 1.5-12 $\mu\mu$f, and its part number is 17T123.

MONTGOMERY WARD 54WG-2700A 64WG-2700A,—B, 74WG-2700A,—

These models are similar to the 54WG-2500A, shown on *pages 15-31 to 15-35 of to 15-96 of Rider's Volume XV* except for the following changes:

Ref. No.	*Part No.*	*Description*
C-7	D67501	.0005 mf 400 V Tubular
	12A455	10" Electro dynamic speaker
	28X113	Drive cord tension spring

The frequency range has been very slightly compressed to 540 kc-1600 kc. The issue "B" receivers incorporate a 10-inch electrodynamic speaker, part number 12A455.

MONTGOMERY WARD 64WG-2009B, 74WG-2009B

These models are similar to the 64WG-2009A, shown on *pages 15-95 and 15-96 of Rider's Volume XV* except for the following changes:

A 470-ohm dropping resistor (R-20) has been inserted in the circuit between B+ and the following points: the primary winding of the first i-f transformer (T-3), the screen grids of the 12SA7 mixer tube, and resistor R-2. A .05-mf bypass capacitor (C-28) is connected between the junction of these points and the point marked "X" in the filament line of the schematic on page 15-95.

The components used in these models are the same as those used in 64WG-2009A enumerated on *page 15-94 of Rider's Volume XV* except for the following changes and additions:

Ref. No.	*Part No.*	*Description*
C-1	D67102	.001 mf 400 V Tubular
C-3, C-4, C-5	B67102	.001 mf 200 V Tubular
C-14	B67403	.04 mf 200 V Tubular
C-15	B67602	.006 mf 200 V Tubular
C-19	B67253	.025 mf 200 V Tubular
C-23	D67104	0.1 mf 400 V Tubular
C-28	B67503	.05 mf 200 V Tubular
R-20	B85471	470 ohms 0.5 watts Carbon
	26A426	Tube socket and shield assembly

Montgomery Ward 74WG-2705B

This model is similar to the 74-WG2705A, shown on *pages 16-16 and 16-22 to 16-26 of Rider's Volume XVI* except for the following changes:

R-3 in the screen-grid circuit of the 6BA6 f-m r-f tube has been changed from 15,000 ohms to 27,000 ohms. The part

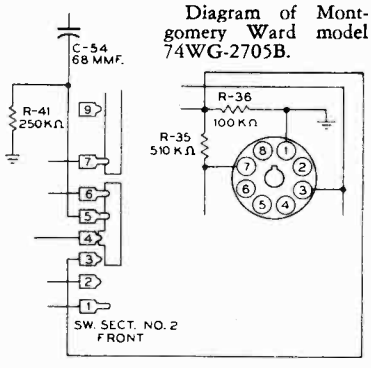


Diagram of Montgomery Ward model 74WG-2705B.

number is B85273, and it is a 0.5-watt carbon resistor.

R-41, a 250,000-ohm, 0.5-watt carbon resistor, part B83254 has been added to the oscillator grid circuit of the 6BE6 a-m r-f converter, and wiring has been added from contact 3 of switch section 2 front to the junction of *R-35* and *R-36* as shown in the accompanying diagram.

Arvin 544R, 544AR

These models are the same as models 544 and 544A appearing on *pages 15-3 to 15-5 of Rider's Volume XV*, except for the changes following.

The variable capacitor has been changed. The antenna section of this variable capacitor now has a capacitance of 420-$\mu\mu$f. The loop inductance has been made less to match this larger capacity.

The parts list for the Arvin 544R and 544AR is the same as that enumerated on *page 15-5 of Rider's Volume XV* except for the following changes:

Part No.	*Description*
A18640-2	Dial scale
A19473	Dial pointer
AC19867-1	Antenna loop assembly
AC19866	Var. capacitor and pulley assy.

PHILCO 80

In the Philco Model 80 the correct voltage on the screen grid of the 36 oscillator-detector tube is about 80 volts and not 165 volts as shown on *page 3-25* of *Rider's Volume III* and *page 113* of *Rider's Abridged Volumes I—V.*

RCA Receiver Drive Cords

A small amount of beeswax rubbed lightly over a *rayon* drive cord will prolong the life of the cord. Nylon cord does not require this treatment.

RCA Record Changers

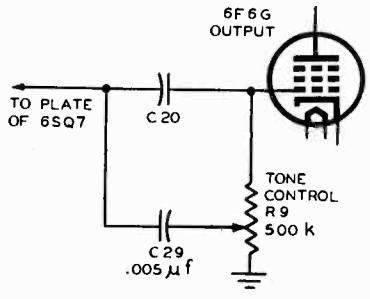
The motors of the RCA record changers Nos. 960001-1, 960001-2, 960001-3, and 960015 will not operate properly from a 50-cycle source. Information about these record changers will be found in the record changer section of *Rider's Volume XV.*

RCA QB12

This is the same chassis as used in model QB11, which will be found on *page 15-8 of Rider's Volume XV.*

RCA 5Q5, Q18

In the second production of the RCA Models 5Q5 and Q18 a tone control was



Tone control in second production of RCA 5Q5, Q18.

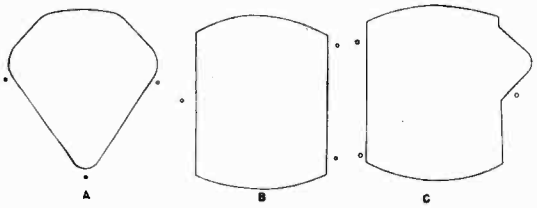
inserted in the control-grid circuit of the 6F6G output tube. The revision for this change is shown in the accompanying diagram; the original schematic is shown on *page 11-15* of *Rider's Volume XI.*

Noblitt-Sparks 558, Chassis RE-204

This model, which is on *pages 15-7 to 15-9 of Rider's Volume XV,* uses two different cutouts in the motor board of the cabinets; it is therefore necessary to use the correct part numbers when ordering replacement cabinet, motor, and turntable assembly or any part thereof.

Part E21004 Ballentine phono-motor and turntable assembly is used with part 19573-1 cabinet which has a cutout A, the outline being shown in the accompanying sketch. Part E19475 Alliance phono-motor and turntable assembly is used with part R19573 cabinet with cutout B or C.

C motor cutout is the result of reworking R19573-1 cabinets to be used as R19573 cabinets with E19475 motor and turntable assembly.

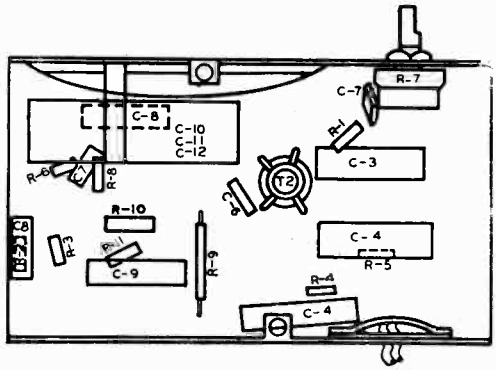


Sketch of different cutouts used in the motor board of the cabinet of model 558, chassis RE-204.

Noblitt-Sparks 444M, 444AM, Chassis RE-200M

The schematic for this model is the same as the 444,444A, chassis RE-200 shown on *page 15-1 of Rider's Volume XV* except for the substitution of miniature tubes for the regular metal and GT tubes. This set uses the 12BE6, 12AT6, 50B5, and 35W4 in place of the 12SA7, 12SQ7, 50L6GT, and 35Z5GT.

The location of parts under chassis has been reoriented as shown in the accompanying sketch.



Location of reoriented parts under chassis for Noblitt-Sparks model 444M, 444AM, chassis RE-200.

RCA 55F, 66-1

Service Hint: Failure of the 1A7GT converter to operate may be due to a short circuit in C21, the grid coupling capacitor. This will make itself evident as a high positive voltage on the signal grid of the 1A7GT tube.

RCA 5Q12

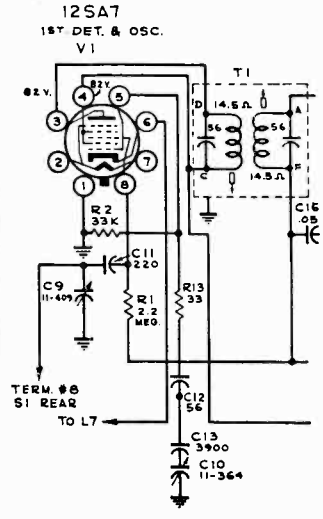
The RCA Model 5Q12 is the same as the Model 6Q8 except that in the 5Q12 the 6U5/6G5 tuning indicator tube and its associated resistance R11 are omitted. The schematic for Model 6Q8 is found on *page 11-33* of *Rider's Volume XI.*

RCA QU51C, QU51M, QU55

The value for capacitor C15 shown as 2-8 $\mu\mu$f, in the schematic found on *page 14-37* of *Rider's Volume XIV,* should be 2-12 $\mu\mu$f.

RCA Q103 Series, Chassis Nos. RC-1044, RC-1044 B

The following changes pertain to the Q103 series, chassis Nos. RC-1044 and RC-1044B appearing on *pages 16-8 to 16-13 of Rider's Volume XVI.* The capacitors in the 2d i-f transformer (T2) connected from A to F and D to C have been changed to 150 $\mu\mu$f. The capacitors connected from F-B and B to E have been changed to 105 $\mu\mu$f. A 33-ohm resistor (*R-13*) has been added to the oscillator circuit between the first grid of the 12SA7 pentagrid converter and *C12.* This is illustrated in the accompanying partial schematic.



Changes in the 1st Detector-Oscillator circuit of the RCA Q103 Series.

A felt pad is cemented to the side of the 1st i-f transformer next to the 12SA7 1st Det-Osc. tube. A rubber band around the tube and transformer holds the tube against the felt and reduces the tendency to howl on high volume.

Additional precautionary lead dress for these models is as follows:

5. Maintain flexible loop in ground straps of tuning capacitor. Allow slack in leads to tuning capacitor stators.
6. All leads to 12SA7 socket must be dressed to insure flexibility of the socket.
7. Oscillator grid coupling capacitor *C12* should be cemented to chassis with wax or glyptal cement.
8. Dress tracking capacitor *C13* outside of the range switch assembly and cement it to the range switch spacer bar with wax or glyptal cement.

RCA 56 SERIES, 61 — SERIES

On some models of these series, which appear in *Rider's Volume XV,* the 500,000-ohm volume control is not furnished with a stop 50,000 ohms from the high end of the control. Volume controls having no stop can be identified by a dot of red lacquer on the left side of the control, viewing the shaft end with terminals up. In models using this control, a 56,000-ohm ½-watt resistor, completely covered with spaghetti tubing, is connected between the high end of the control and the yellow lead on the second i-f transformer.

Replacement controls equipped with a stop do not need this external 56,000-ohm resistor, so when replacing a volume control, check the resistance between the arm and the high end of the replacement control with the arm turned fully clockwise. A reading of 50,000 ohms will indicate that the control is equipped with a stop, and that the 56,000-ohm resistor in the set should be removed before installing the new control.

RCA 56X5, 56X10, 61-5, 61-10

Changes in the schematic should be made on RCA Model 56X5, *page 15-32;* Models 56X10, *page 15-35;* and Models 61-5 and 61-10, *page 15-51, all in Rider's Volume XV.*

Change the location of C9 from the grid of the 12SQ7 to ground, so that it is connected from the plate of the 12SQ7 to ground.

Earlier models may still have C9 connected from grid to ground; in these sets an increase in sensitivity will be obtained by reconnecting C9 in accordance with the above change in the schematic.

R6 has been changed from 3.3 to 2.2 megohms.

RCA 55U

This change refers to RCA Model 55U, which appears on *page 15-16 of Rider's Volume XV*. Models having serial numbers B62201 will use transformer part number 922246-7 (Stock No. 70386). In this transformer, C21 is 100 $\mu\mu$f, rather than 110 $\mu\mu$f, as in previous transformers.

RCA 55U, 56X, 56X5, 65X

On these models, the data for which appear in *Rider's Volume XV*, the lead coloring on the output transformer may not correspond with the coloring given on the schematic in the service notes. It is therefore necessary to rely on resistance measurements to determine lead connections, rather than the color coding given in the schematic.

RCA 56X5, 56X10

In some of these models the 15-megohm resistor R5 has been omitted. This does not affect the basic operation of the set, the primary effect being to make the set more sensitive. The schematics for the RCA Models 56X5 and 56X10 appear on *pages 15-32* and *15-34* respectively of *Rider's Volume XV*. Resistor R5 appears in both of these schematics.

RCA 59VI

A speaker substitution has been made in some of the RCA Models 59VI, the circuit diagram of which appears on *page 15-54* of *Rider's Volume XV*. Speaker 92567-1 has been substituted for speaker 92513-1K. For replacement of speakers stamped 92567-1, order Stock No. 36330.

RCA 59V1

In RCA Model 59V1, found on *page 15-44 of Rider's Volume XV*, field coils stamped 94136-501A will have a minimum resistance of 1300 ohms at 25° C.

RCA 61-6, 61-7

A change has been made in the dial drive cord of these models, the dial drive mechanism of which appears on *page 15-53* of *Rider's Volume XV*. Stock No. 32634 cord-drive cord (about 37 inches long) should be approximately 34¾ inches long.

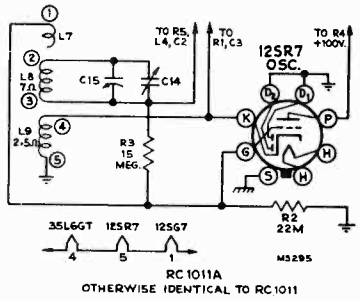
RCA 66BX

The following changes pertain to RCA Model 66BX which appears on *page 15-87 of Rider's Volume XV:*

1. Change Stock No. 71229—Transformer—First i-f transformer (L6, L7, C13, C14), to Stock No. 71399.
2. Add Stock No. 72541 — Socket — Tube socket — miniature — bottom mounted.

RCA 61-1, 61-2, 61-3

The schematic shown on *page 15-49 of Rider's Volume XV* shows a 12J5GT oscillator tube in chassis RC-1011. In the second production the 12J5GT tube was replaced with a 12SR7 tube (as shown in Fig. 1) and the chassis changed to RC-1011A. In the third production, the 12SR7 tube was replaced with a 12-



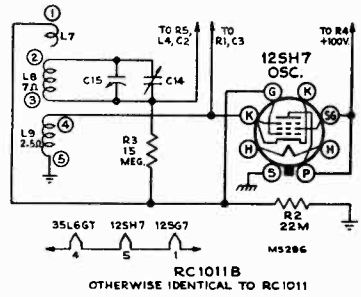
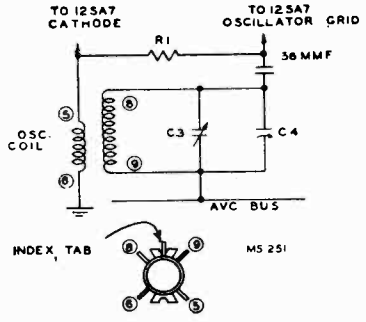


Fig. 1, above. Revised circuit with 12SR7 oscillator. Fig. 2, below, Second revision with 12SH7 oscillator.

SH7 tube (as shown in Fig. 2) and the chassis number is now RC-1011B.

RCA 65X Series

Some models may use a No. 71406 oscillator coil in place of the one shown in the schematic which appears on page *15-62* of *Rider's Volume XV*. When No. 71406 oscillator coil is used, there will be a No. 39622 mica capacitor (56 $\mu\mu$f) used in place of the "gimmick" capacitance winding shown in the schematic. The accompanying drawing illustrates the necessary circuit changes.



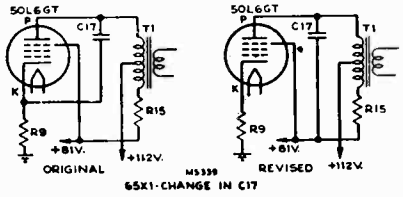
Alternate oscillator coil in RCA 65X.

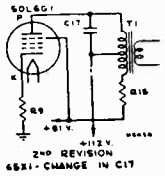
RCA 65X1, 65X2, 65X8 and 65X9, Chassis RC-1034

Models 65X8 and 65X9 are the same, except for the cabinets, as models 65X1 and 65X2, chassis RC-1034, shown on *pages 15-61 and 15-62 of Rider's Volume XV*. The following changes are applicable to all models. Capacitor C17, which was originally connected between plate and cathode of the 50L6GT output tube and later connected between plate and screen grid of the 50L6GT output tube, is now connected between plate of the 50L6GT output tube and center tap of the output transformer. These changes are shown in the accompanying schematic.

Some chassis use a part No. 71406 oscillator coil instead of the one indicated on the schematic. When this oscillator coil is used, a part No. 39622 mica capacitor (56 $\mu\mu$f) is used in place of the capacitance winding L4 (gimmick) shown in the schematic. This capacitor is connected between 7 and 8 of the oscillator coil.

The lead coloring of the output transformer may not correspond with the coloring given on the schematic. It is, therefore, necessary to rely on resistance measurements rather than the color coding given on the schematic to determine lead connections.

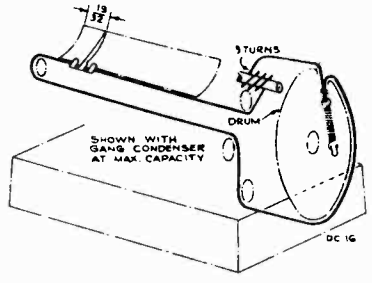




Partial schematics of the original, and first and second revisions in the output circuit of the RCA Chassis RC-1034.

RCA 66BX

The dial cord drawing for this model is shown on *page 15-87* of *Rider's Volume XV;* this is slightly in error and the correct drawing is shown in the accompanying figure.



The dial cord drawing for RCA 66BX.

RCA 85T2

The RCA Model 85T2 is the same as the Model 85T except that in the former model either of two loudspeakers may be employed with the numbers stamped as follows: 84128-1 or 84128-2.

RCA 112A

The RCA Model 112A is the same as the Model 112 except that resistor R15 in Model 112A is rated at 205 ohms. This resistor is located in the filament circuit of the RCA-12Z3 rectifier tube. The circuit diagram for Model 112 is found on *page 4-58* of *Rider's Volume IV.*

REMLER MP5-5-3

In the schematic of this model, which appears on *page 15-1 of Rider's Volume XV*, the cathode of the 6V6GT output tube, pin 8, should be connected to ground.

SCOTT 800-B

The instructions below are for installing an antenna coupling transformer for this receiver, data for which are shown on *pages 15-30 to 15-90 in Rider's Volume XV.*

For better reception of weak signals on the standard broadcast band in remotely located areas or in locations where the noise level is extremely high, an antenna coupling transformer is furnished which provides maximum signal input to the receiver for reception of stations on the standard broadcast band.

The coupling transformer should be installed as follows:

1. Loosen the large screw in the lower left hand corner of the pushbutton tuning backplate at the rear of the receiver. This screw is located on the square backplate just above and to the left of the antenna terminals.
2. Slide the coupling transformer mounting bracket under the screw head and tighten down. The transformer should face toward the center of the backplate and will cover up the license plate.
3. Fasten the white wire from the transformer to the outside AM antenna terminal on the receiver.
4. Connect a short piece of wire between the center AM antenna terminal and the GND terminal and connect the black wire from the coupling transformer to the GND terminal of this strip.
5. Connect the antenna lead-in to the two terminals provided on the coupling transformer, clamping the wires between the two flat washers provided.

Stewart-Warner 9017-A, B

These models are a later production of the 9017-A shown on *pages 15-49 to 15-52 of Rider's Volume XV.*

A 0.05-μf capacitor (61) part No. 502806, has been added from the avc bus (low side of secondary of 1st i-f transformer 33) to B— (cathode of the 12J5GT Osc. tube).

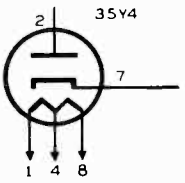
In some chassis of this model the short-wave oscillator trimmer 28 was ommitted in order to permit the use of gang capacitors with higher than normal capacity in the oscillator section. In these instances exact calibration is obtained without the use of the trimmer—merely tune receiver to 20-mc generator signal and adjust antenna trimmer 11.

Sonora RDU-209

The service data appearing on *page 15-2 of Rider's Volume XV* also applies to this model.

TELETONE 117, 117A, 118, 119

In the Teletone Models 117, 117A, 118, 119 (chassis series D) found on *page 15-4* of *Rider's Volume XV*, the pin numbers for the 35Y4 rectifier are shown incorrectly. The correct pin numbers for this tube are illustrated in the accompanying figure.



Correct pin numbers for the 35Y4 tube in the Teletone Model 117 schematic.

Truetone D1645, Issue C

The following changes appear in receivers of this issue, the original issue being on *page 15-1 of Rider's Volume XV*:

The 68-$\mu\mu$f capacitor C22 is now connected from the junction of R7 and R8 to ground and a 100-$\mu\mu$f capacitor, C34, is connected from the other end of R8 to ground. The value of C32 is now 470 $\mu\mu$f instead of 330 $\mu\mu$f. C31, 0.004 μf is now connected from the plate of the 6V6GT output tube to terminal 8, the cathode of this same tube, instead of between the plate and terminal 3 of the speaker socket. A 0.2-μf tubular capacitor, C35, part #D67204 has been added from the screen-grid of the 6V6GT output tube to ground.

The following parts are used in some receivers only. Check part number on old part before ordering and order part originally used in the set. 40X281 tone control (substitute for 40X276); 25X1539 radio-phono switch lever, when 40X281 is issued; 2A161 d.p.d.t. switch when 40X281 is used.

TRUETONE D1180 B

This model is similar to model D1180A, shown on *pages 13-69 and 13-79 of Rider's Volume XV* except for the following changes: The antenna trimmer (C2), part number 17A123, mounted on the loop aerial assembly in the Issue "A" model, has been replaced by a "Gimmick" fixed capacitance, consisting of two wires, one wrapped around the other. The 1400-kc adjustment as given in the alignment procedure is omitted; this adjustment is made at the factory and need not be made in the field.

Watterson 4582

The alignment instructions for this receiver, the schematic of which appears on *page 15-2 of Rider's Volume XV*, were unavailable when the Manual went to press. They are as follows:

I-F Alignment: Set signal generator to 455 kc; connect its high side with a 0.1 μf capacitor in series to the grid of the 1A7 tube and the grounded side to the chassis. Tune the iron cores of the perm tuner so they are completely out of the coils. Use a small generator output. First, adjust the second i-f transformer for maximum output and then the first i-f transformer. Check to see that both transformers are adjusted for maximum output.

R-F Alignment: Connect the high side of the signal generator (with the capacitor removed) to the antenna lead (blue) and the ground lead of the generator to the chassis (black) lead. Set volume control to maximum and see that the iron cores on perm tuner are all the way out of the coils. Set generator to 1650 kc and peak oscillator trimmer. *See page 15-2* for trimmer locations. Then peak antenna trimmer for maximum output.

Turn dial drive shaft until iron cores are completely inside coils; set generator to 540 kc and adjust tracking core for maximum output.

Recheck alignment at 1650 kc, making sure of maximum output.

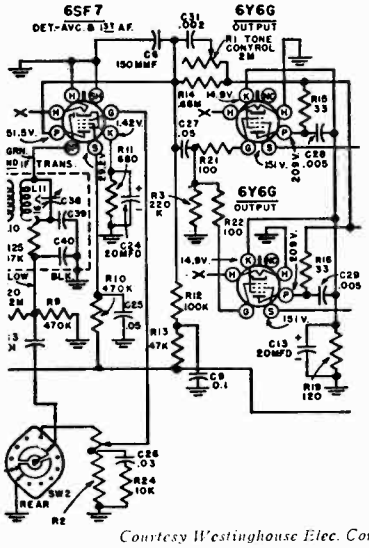
Zenith Chassis 6C40

The On-Off switch of this set must be in the "Off" position whenever the line plug is inserted into the changeover switch on the rear of the chassis. Failure to do this may cause flashing and possible burnout of the output tubes. In the event the set cuts out, the loop snap connectors may be sprung causing a poor contact; also there may be poor contact through the cabinet hinge. The letter "X" after the model number (6G001YX) indicates that an aluminum cabinet is used. The schematic diagram of this receiver will be found on *page 15-30 of Rider's Volume XV.*

WESTINGHOUSE H-104, H-105, H-107, H-108

In later productions of Westinghouse Models H-104, H-105, H-107, H-108 the tone-control circuit was modified to provide greater tonal range. In chassis incorporating this change, the chassis number was changed from V-2102 to V-2102-1. This change is shown in the accompanying diagram. The same two components that comprised the tone-control circuit in the early production models, C31 (0.002-μf) and tone control R1 (2 megohms), are also used in the later revised models. The former tone-control circuit was removed from the connection it had to the volume control, R2, and wired to the plate circuit of the 6SF7 first audio tube as follows:

One end of capacitor C31 is connected to the plate of the 6SF7 tube and the other end to the variable arm of the tone control, R1. One end of the tone control is connected between resistors R14 and R15, or between resistors R14 and R16, (since R14 is tied to one end of either of the other resistors), and the other end of the tone control left open. The schematic with the original tone control circuit is found on *page 15-1* of *Rider's Volume XV*.



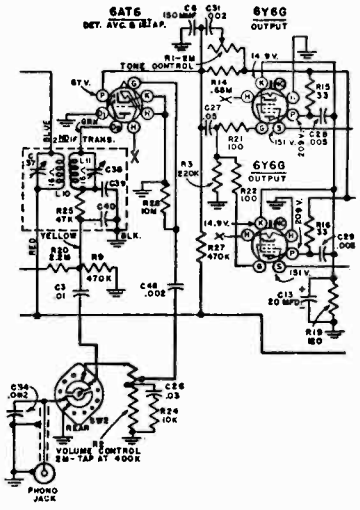
Courtesy Westinghouse Elec. Corp.

Tone-control circuit in Westinghouse chassis V-2102-1 showing changes.

Westinghouse H-104A, H-105A, H-107A, H-108A

These models are modified versions of the same model numbers without the suffix A, the service data for which appears on *page 15-1 of Rider's Volume XV* and changes in the June, 1947 issue of SUCCESSFUL SERVICING. The chassis number of the models carrying the suffix A is V-2102-2.

The major difference in this latest chassis is the substitution of a 6AT6 tube for the 6SF7 detector, avc, and first a-f amplifier. This necessitates the introduction of C48, (0.002 μf, 600 volts) between the control-grid of the 6AT6 and the movable arm of the volume control. The cathode and one end of the heater are connected to ground and to a 10,000-ohm resistor, R28, the other side of which goes to C48. R27, a 470,000-ohm, 0.25-watt resistor has been substituted for R12 and R13, thus eliminating C9 (0.1 μf). These changes are shown in the accompanying partial schematic, in which it should also be noted that now there is 67 volts on the plate of the 6AT6 instead of 51.5 as in the case of the 6SF7.

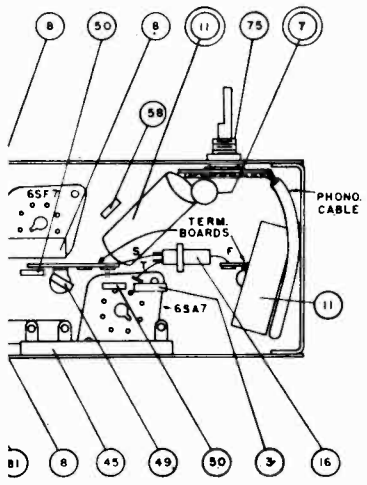


Modified Westinghouse chassis V-2102-2, showing changes due to use of 6AT6.

WESTINGHOUSE H-122, H-130

The following changes have been made in Westinghouse Models H-122 and H-130 that bear serial numbers higher than 1500:

1. The capacitor, item No. 7, was changed in value from 0.002-μf to 0.01-μf and its item number was also changed from 7 to 10. This capacitor connects across the phono-input cable at the radio-phono switch.
2. The 0.1-μf capacitor, item No. 11, which was previously connected between the shield of the phono-input cable and ground, now connects between the phono-input cable and the common negative line. Its physical location, looking at the bottom view of the chassis, was moved from the right side of the radio-phono switch to the left side. The diagram for this physical change is shown in the accompanying diagram.



Courtesy Westinghouse Elec. Corp.

Bottom view of the chassis of Westinghouse Models H-122 and H-130 showing new location of capacitor No. 11.

The original schematic for these models is illustrated on *page 15-5* of *Rider's Volume XV* and the chassis layout is shown on *page 15-7*.

Automatic 640, Series B

The schematic of this model is the same as the 640 shown on *page 15-7 of Rider's Volume XV* except for the change from octal type to loctal type tubes.

This model uses the 14Q7, 14A7, 14B6, 50A5, and 35Y4 in place of the 12SA7GT, 12SK7GT, 12SQ7GT, 50L-6GT, and 35Z5GT tubes.

Automatic 650

This model is similar to the 650 shown on *pages 15-4 and 15-7 of Rider's Volume XV* except for the following change: The 20,000 resistor in the oscillator grid circuit of the 12SA7GT now is connected directly to ground instead of to the cathode of that tube.

Belmont 8A510

This model is the same as the 8A59 shown on *pages 15-8 to 15-12 of Rider's Volume XV*, except for the addition of four parts.

The two miscellaneous parts of the removable tuner assembly are:

1. Part No. A-2J-7176—cam locking spring.
2. Part No. A-2J-7627-1—retainer spring.

The miscellaneous part added to the main chassis is part A-19A-11539 which is a plug on the speaker leads.

The final addition is an alternate record changer which can be used with this model. Part C-201-12545-1 is a Detrola Changer model 550, which is shown on *pages RCD.CH.15-1 to 15-10 of Rider's Volume XV.*

Zenith 6D0 Series

Variations in the tube line-up of this chassis 6C05 will be found; a single chassis may contain octal, lock-in, and miniature button tubes. If an original tube is replaced with an alternate, the socket must also be replaced. Alternates that may be found are as follows:

Original	*Alternate*
12SA7GT	12BE6 or 14Q7
12SQ7GT	12AT6
35Z5GT	35W4

In case the oscillator shifts, replace the 220-ohm resistor (R3) with a 1000-ohm resistor, and if the oscillator drops out at the low end of the band, disconnect R1 (10,000 ohms) from the negative return and connect it to the cathode of the converter. See the schematic on *page 15-28 of Rider's Volume XV.*

If audio oscillation occurs, disconnect the 0.0005-μf capacitor (C14) from the negative return and connect it to the cathode of the 35L6GT output tube. Take out C21 from the plate to the cathode of the 35L6GT. If oscillation occurs at 910 kc, change the capacitor C5 in the negative return to the chassis from 0.05 μf to 0.1 μf. In the event that there is hum, oscillation, or poor sensitivity, check for grounded tuning capacitor frame. This can be corrected by inserting cork or rubber pad between rear capacitor frame and chassis; this pad should be cemented in place.

The letter "V" (6C05V) indicates that an aluminum chassis is used.

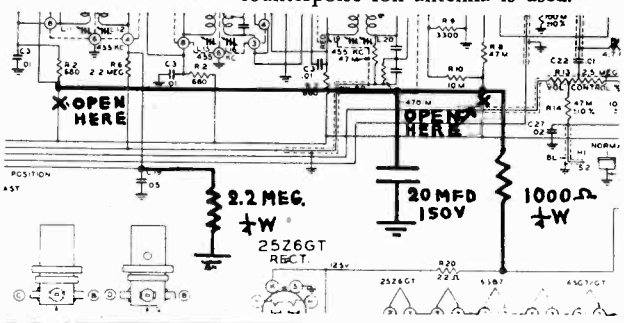
If hum and microphonics are found in this chassis, check for a grounded tuning capacitor frame to the cabinet ventilator plate. Distortion and poor sensitivity are usually caused by a short circiut between turns on the loop. Sometimes poor sensitivity and failure to operate on the low-frequency end of the dial is due to the oscillator coil, which should be replaced. If uncontrolled oscillations occur, solder a 470,000-ohm resistor across the secondary of the first i-f transformer.

Zenith Chassis 8C01

If flutter is experienced when the set is on f.m., it can be eliminated by installing a 20-μf 150-volt capacitor (Part No. 22-1635) and two 0.25-watt resistors, one 2.2 megohms (Part No. 63-600) and the other 1000 ohms (Part No. 63-583), as shown in the accompanying partial schematic. The complete schematic of this receiver will be found on *page 15-71, 72 of Rider's Volume XV.*

A rushing noise when the volume control is turned to minimum is caused by a poor connection from the grid element to the grid cap of the 6S8GT discriminator tube. A hot iron and a little flux on the grid cap will remove the high-resistance solder joint.

If the f-m oscillator drifts, check for a red dot on the oscillator tuning slug wire. If the wire is unmarked, replace with one which has a red dot.



F.m. flutter may be eliminated in the Zenith Chassis 8C01 if the indicated changes are made.

Zenith Chassis 5C01

A single chassis may contain octal, lock-in, and miniature button tubes. The following alternates may be found:

Original	*Alternate*
12SA7GT	12BE6 or 14Q7
35Z5GT	35W4
12SK7	12BA6
12SQ7	12AT6
50L6GT	50B5

In the event that the oscillator shifts, replace the 220-ohm resistor, R8, with one of 1000 ohms. If the oscillator drops out at the low end of the band, remove resistor R1 (10,000 ohms) from common return and connect it to the cathode of the converter. The schematic of this chassis will be found on *page 15-8 of Rider's Volume XV.*

Montgomery Ward 64WG-1807B, 74WG-1807B

These models are the same as model 64WG-1807A, shown on *pages 15-91 to 15-94 in Rider's Volume XV,* except for the following changes. A 0.2-μf bypass capacitor (C-35) has been connected between ground and the screen grid of the 6V6GT output tube, resistor R-14, resistor R-12, the red lead of the 2d i-f transformer (T-3), resistor R-5, resistor R-4, the red lead of the 1st i-f transformer (T-2), and resistor R-2. The 0.004-μf capacitor (C-31) is now connected from the plate lead of the 6V6GT output tube to the cathode of this tube. No counterpoise foil antenna is used.

Arvin 544 and 544R (Noblitt-Sparks)

The following changes have been made in the circuit appearing on *pages 15-3 to 15-5 of Rider's Volume XV* to reduce low level hum and hum modulation.

1. The capacity of the electrolytic capacitor A19136 (C7) is changed from 40-20$\mu\mu$f, 150v, 20$\mu\mu$f, 25v, to 50-20$\mu\mu$f, 150C, 20$\mu\mu$f, 25c.
2. The rotor of the variable capacitor is now connected to AVC instead of to chassis. (This is the same circuit that was used in sets built previous to March 1946.)
3. C11 0.1μf, 400v, capacitor from AVC to chassis is deleted.
4. The bypass capacitor from B+ to chassis is changed from C9, 0.05μf, 400v, to C11, 0.1μf, 400v, to prevent oscillation.
5. A fiber washer part 20198 ¼ inch ID, ½ inch OD, ⅛ inch thick, is added under the pointer to prevent the pointer from touching the dial and shorting AVC to the chassis.
6. The floating ground wiring is changed; the jumper from the oscillator coil to the #3 lug on the 12SK7 socket is removed and replaced by a jumper from the ground side of the volume control to the a-c switch lug.
7. The top of the dial scale backing plate has been cut off even with the top of the dial, to allow the dial to set in a more vertical position. The part number remains the same, and the old and new plates are interchangeable.

The parts list for these models remains the same as that enumerated on *page 15-5 of Rider's Volume XV* except for the changes noted.

Part No.	*Description*
A19136	Capacitor, electrolytic 50-30$\mu\mu$f, 150v. 20$\mu\mu$f, 25v.
A20198	Washer, fiber

General Electric 202

This receiver is the same electrically as the model 200 as shown on *pages 15-54 to 15-56 in Rider's Volume XV,* except that it has a different cabinet.

General Electric 219, 220, 221

A few cases of hum which cannot be reduced in the normal manner from these models shown on *pages 15-28 to 15-31 of Rider's Volume XV,* may be corrected by cathode degeneration in the output tube, 35L6GT/G, cathode circuit. Remove R17 and C29-C from the circuit. This can be done by disconnecting one end of R17.

General Electric A51, A56

These models are the same as model A54 shown on *pages 7-4 to 7-6 of Rider's Volume VII.*

RC161 RECORD CHANGER

IMPORTANT

The RC161 Record Changer is similar in appearance to other model changers. To be certain which model changer you are servicing, look for the changer model number which appears on the small label attached to the underside of the changer mechanism. The changer can be further identified by comparing Figures 3 and 5 with the actual changer.

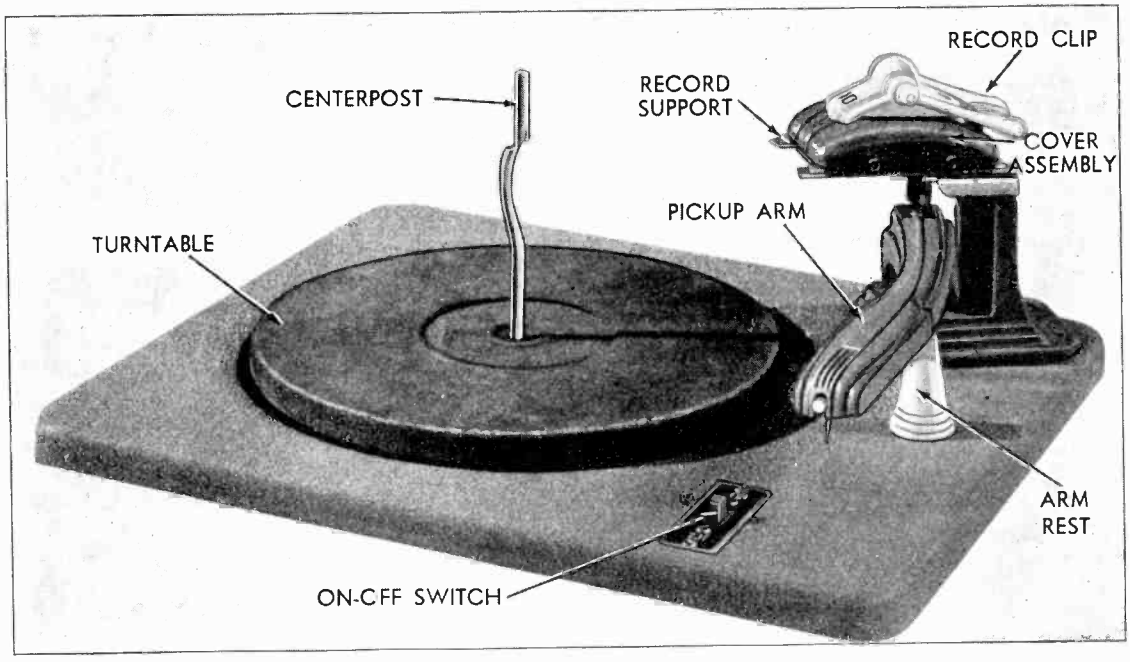


FIGURE 1. RECORD PLAYER, TOP VIEW

OPERATING INSTRUCTIONS

1. SETTING FOR SIZE OF RECORD.

The size of record for which the record changer is set to play is indicated by the number (on the top of the cover assembly) nearest the turntable. See Figure 1.

To change the setting, grasp the record support and cover assembly and rotate it a half turn until it snaps into place with the correct record size toward the turntable. **In changing the setting from 10-inch to 12-inch, rotate the assembly counterclockwise only; in changing from the 12-inch to the 10-inch setting, rotate the assembly clockwise only.**

2. STARTING THE RECORD CHANGER.

Load the record changer and set the record clip so that it rests on the top record. Before turning on the ON-OFF switch, firmly grasp the pickup arm, move it slightly to the right of the arm rest and then return the pickup arm to a point near the edge of the turntable before releasing it. While moving the arm, it should be held firmly enough to prevent it from snapping back and causing possible damage to the needle.

Now turn on the ON-OFF switch. The entire stack of records will then be played automatically.

3. REJECTING A RECORD.

To reject a record at any time and start playing the next one, firmly grasp the pickup arm, move it above and slightly to the right of the arm rest and return the pickup arm to a point near the edge of the record before releasing it. While moving the arm, it should be held firmly enough to prevent it from snapping back.

4. UNLOADING RECORDS.

To remove the records, it is advisable to have the changer mechanism out of cycle. However, it is possible to unload the changer while it is in cycle so long as the pickup arm is clear of the records.

When removing records, hold them lightly and lift straight up.

CAUTIONS

When turning the record support, be sure to grip the entire record support and cover assembly and not just the plastic record clip.

Never use force to stop the motor or turntable.

THE CHANGE CYCLE

5. DESCRIPTION OF CHANGE CYCLE. (See Figures 2, 5, and 6.)

While a record is playing and as the pickup arm moves toward the center of the record, the arm control pin (31A) on the arm control assembly (31) moves along the portion of the arm control track (36B) as indicated at "P", figure 2. As the record reaches the pickup or trip point, the pin reaches point "T" on the track. As it moves into the recessed position in which it it shown in the illustration, it permits the trip spring (35) to pull the arm control plate (36) forward towards the centerpost (27). As the arm control plate is drawn forward, the stop tab (36A) on the arm control plate (36) is withdrawn from behind the stop bracket (43A) on the eccentric cam (43). The cam, which no longer is held in place by the stop tab (36A), is pulled over by the eccentric cam spring (44) until the rubber tire makes contact with the knurled roller (53) on the turntable shaft (28A). This knurled roller, which rotates with the turntable shaft, rotates the eccentric cam. In turn, this forces the riser plate assembly (37) back along its guide rods (51A) away from the centerpost (27). As soon as the riser plate begins to move, the push-off cam and shaft assembly (42) rides along the inclined track (37C) of the riser plate (37). This action causes the push-off cam and shaft assembly (42) to be drawn downward; as a result the pickup arm lift (19) presses down on the arm lift bearing pin (14) causing the pickup arm to be raised clear of the record. Then the riser plate tab (37B) contacts and moves the arm control assembly (31) which, since it is coupled to the pickup arm support assembly (22), carries the pickup arm away from the centerpost and clear of the edge of the turntable. As the riser plate (37) continues to travel further along the guide rods (51A), the riser plate motion bracket (37A) contacts and rotates the push-off cam and shaft assembly (42); as a result, the push-off arm (5), [which is coupled to the push-off cam and shaft assembly (42)] causes the push plate (7C) to drop a record to the turntable.

During the second half of the change cycle, the pressure of the push plate spring starts to return the push plate (7C) and push-off arm (5) back to their normal position. At the same time, the motion of the eccentric cam (43) and the guide rod recoil spring (38) propel the riser plate (37) toward the centerpost. The arm control assembly (31), and hence the pickup arm, are drawn back by the tension in the set-down spring (30). After the arm reaches this point directly above the set-down point, the riser plate (37) has moved far enough back towards the centerpost (27) to allow the push-off cam and shaft assembly (42) to ride down the inclined track (37C) of the riser plate (37). This lowers the pickup arm onto the record. (The following paragraph describes how the set-down point is determined for the 10-inch and 12-inch settings.) As the eccentric cam (43), aided by the eccentric cam spring (44) completes its revolution, the rubber tire of the cam moves away from the knurled roller (53) on the turntable shaft and the stop bracket (43A) comes to rest against the stop tab (36A) of the arm control plate (36). The change cycle is completed.

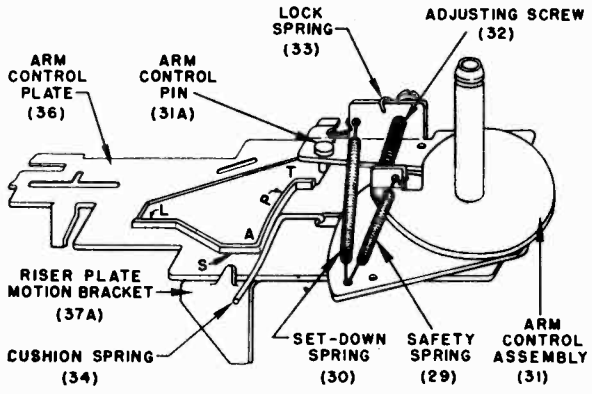


FIGURE 2.

6. DESCRIPTION OF DETERMINATION OF 10-INCH AND 12-INCH SET-DOWN POINTS.

During the early part of the change cycle, the arm control plate (36) has traveled (in a direction away from the centerpost) until the size change stop (36C) reaches the cam (42B) of the push-off cam and shaft assembly. The distance traveled by the arm control plate (36) will depend on the size of the record being played; the distance is less for a 12-inch setting than for a 10-inch setting. (This is true because the push-off cam (42B) presents its short radius to the size change stop (36C) for the 10-inch setting and presents its long radius to the size change stop for a 12-inch setting.) This variation in distance traveled means that the arm control track (36B) will be in a position closer to the centerpost for the 12-inch setting than for the 10-inch setting. This in turn means that during the change cycle the arm control pin (31A) [whose path is determined by the motion of the arm control assembly (31)] will leave its recessed position, and will ride along the "S" portion of the arm control track for the 12-inch setting and along the "L" portion for the 10-inch setting. (See Figure 2.)

As the pickup arm moves back towards the record during the second half of the change cycle, it will be stopped when the bracket (31C) reaches the adjusting screw (32). How far the arm returns before being stopped depends on whether the arm control pin (31A) has been riding in the "S" or "L" portion of the arm control track. If the pin has been riding in the "S" or 12-inch portion of the track, the arm will be stopped at a point directly above the 12-inch set-down point; if the pin has been riding in the "L" or 10-inch portion, the arm will be stopped at a point directly above the 10-inch set-down point.

7. REJECTING A RECORD.

When rejecting a record, the motion of the pickup arm moves the arm control assembly (31) so that the trip spring (35) tension is now permitted to move the arm control plate (36) slightly forward. This movement releases the stop bracket (43A) on the eccentric cam which was engaged by the stop tab (36A) on the arm control plate. The eccentric cam (43) then falls against the knurled roller (53) and the change cycle begins as if a record had just finished playing.

ADJUSTMENTS

CAUTIONS

See that the drive pulley (60A), and the rubber tires on both the idler wheel (57) and the eccentric cam (43) are kept clean and free from oil, grease, dirt, or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts.

If replacement of any parts requires the removal of the lift adjusting collar (10), pickup arm support assembly (22) or the push-off arm (5), be sure to re-position or replace these parts as directed in paragraphs 9, 10, and 11 respectively.

TOOLS REQUIRED

#6 Bristol Set Screw Wrench. (Part No. P-5805. List Price $0.05.)
#8 Bristol Set Screw Wrench. (Part No. P-5806. List Price $0.05.)

8. SET-DOWN POINTS AND PICKUP OR TRIP POINT.

(If the pickup arm support assembly (22) has been removed or if its set screws are loose, it must be re-positioned as described in paragraph 10 before adjusting the set-down points and pickup or trip point.)

This changer is designed so that the 10-inch set-down point, the 12-inch set-down point, and the pickup or trip point are simultaneously adjusted in a single operation. It is recommended that you make the adjustment at either of the set-down points. This adjustment is made by means of the adjusting screw (32) shown in figure 3. Turning this screw counter-clockwise will cause the arm to set down closer to the centerpost; turning it clockwise will cause the arm to set down further away from the centerpost. One complete turn on the screw will move the arm about ¼ inch.

If the adjusting screw (32) will not change the setting sufficiently, the pickup arm support assembly (22) may be out of position. (See paragraph 10.)

The set-down points when using a straight-shank needle will differ slightly than when using an offset-shank needle. Unless you know the type to be used by the customer, we suggest the following settings *when tested with a straight needle:* measuring from the side of the centerpost, 4⅝" for the 10-inch set-down point, 5⅝" for the 12-inch set-down point, and 1-19/32" for the pickup or trip point.

If you know which type of needle will be used by the customer, and test with that type of needle, the following settings are recommended: measuring from the side of the centerpost, 4-21/32" for the 10-inch set-down point, 5-21/32" for the 12-inch set-down point, and 1⅝" for the pickup or trip point.

When using an offset-shank needle, slight variations in set-down point can often be corrected by loosening the needle screw and rotating the needle slightly.

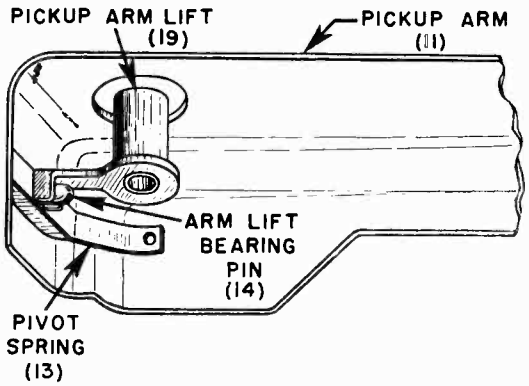


FIGURE 4.

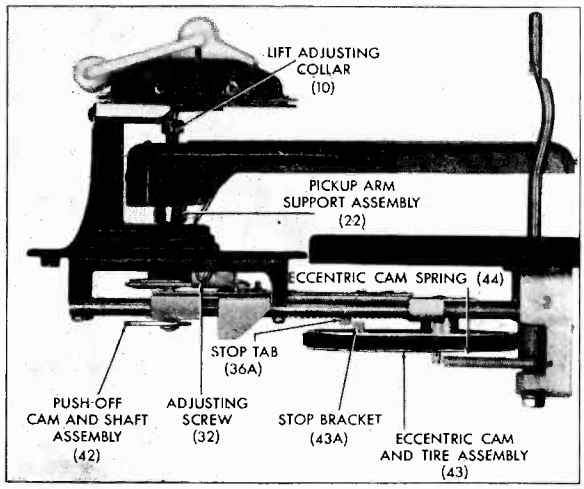


FIGURE 3.

9. PICKUP ARM HEIGHT.

When properly adjusted, the pickup arm height should be such that, without a needle and with a single record on the turntable, the arm should be about 1/32" above the record. The arm height depends on the location of the lift adjusting collar (10). As the collar is moved down, the arm is raised, and vice versa. When necessary, the pickup arm height may be adjusted by re-positioning the lift adjusting collar (10) as follows:

(a) The changer should be out of cycle.

(b) Lift the pickup arm and check to see that the pickup arm lift (19) is positioned properly over arm lift bearing pin (14). (See Fig. 4.)

(c) Remove needle and place pickup arm on turntable close to its edge.

(d) Loosen set screw in lift adjusting collar (10).

(e) Remove slack by pushing up on push-off cam and shaft assembly (42). Do not compress the arm lift shaft spring (41).

(f) Using a #6-32 Bristol wrench, place it in the set screw and slide the lift adjusting collar (10) down until it is snug against the pickup arm lift (19).

(g) Tighten set screw in the lift adjusting collar.

(h) Check height.

If height is still incorrect, it may be necessary to repeat the adjustment. Before doing so, it may be advisable to examine the shaft (42A) of the push-off cam and shaft assembly for nicks and burrs caused by the set-screws. Smooth shaft with file if necessary. The upper portion of the shaft is accessible if the push-off arm (5), head assembly (7) and lift adjusting collar (10) are removed. To prevent shaft from falling out through bottom, keep in place with masking tape. When replacing the lift adjusting collar (10) and push-off arm (5), see paragraphs 9 and 11 respectively.

ADMIRAL CORPORATION

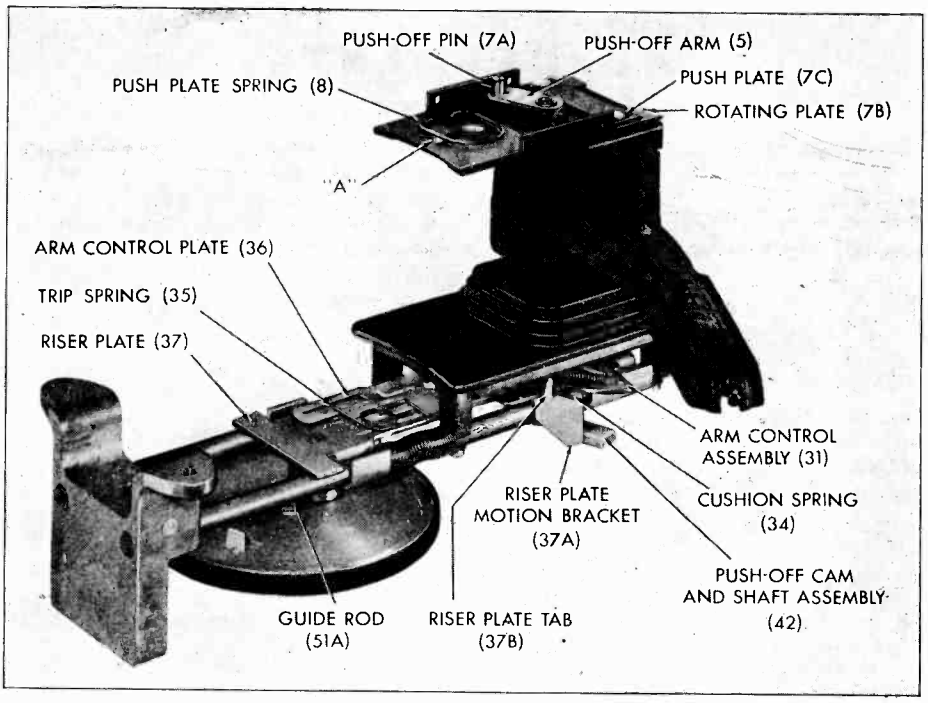


FIGURE 5.

10. RE-POSITIONING PICKUP ARM SUPPORT ASSEMBLY (22).

To assure proper set-down adjustment, this must be done carefully as follows if set screws are loose or if pickup arm support assembly (22) has been removed.

(a) Turn adjusting screw (32) (see paragraph 8) clockwise as far as it will go, then turn back counter-clockwise for 2 full turns.

(b) Place a 12" record on the turntable.

(c) With the changer out of cycle, manually move the arm control assembly (31) outwards as far as it moves freely. In this position, the arm control pin (31A) will be located as indicated at "A" in figure 2.

(d) Place pickup arm so that needle rests in first playing groove on the 12" record.

(e) Tighten the two set screws in pickup arm support assembly (22).

(f) Make the final set-down adjustment as described in paragraph 8.

11. RE-POSITIONING PUSH-OFF ARM (5).

This must be carefully done if set screws are loose or push-off arm (5) has been removed.

(a) Rotate the record support to the 10-inch position. Remove push-off arm (5).

(b) Manually slide the push plate (7C) over the rotating plate (7B) until a piece of metal 3/32 inch in diameter or a #8-32 Bristol wrench can be inserted into the opening at the front of the center slot in the push plate (see "A", figure 5). If the 12-inch push-off is faulty with this setting, try using a 1/16" piece of metal or a #6-32 Bristol wrench.

(c) Put the changer into cycle and manually rotate the turntable until the riser plate (37) has traveled along the guide rods (51A) to a position furthest away from the turntable.

(d) Now position push-off cam and shaft assembly (42) so that it is held tightly against riser plate motion bracket (37A).

(e) Put push-off arm in position, leaving about 1/16" clearance between the top of the push plate and the push-off arm.

(f) Tighten set screws in push-off arm.

12. CHANGER REPEATEDLY GOES THROUGH CHANGE CYCLE WITHOUT PLAYING RECORD.

(a) Mounting screw on eccentric cam (43) may be loose. Tighten.

(b) Cushion spring (34) has slipped out of position and is on wrong side of riser plate tab (37B). Re-position spring. (See figure 5.)

(c) In normal operation, the trip spring (35) holds the arm control plate (36) against the riser plate (37). If the trip spring is faulty, it permits the arm control plate to rise too high above the riser plate. This causes the stop bracket (43A) to pass underneath the stop tab (36A). To correct, bend the legs of the trip spring closer together. If necessary, replace trip spring.

(d) Eccentric cam (43) is bent so that stop bracket (43A) passes underneath stop tab (36A) on the arm control plate (36). To correct, straighten cam by putting changer out of cycle and pressing upward on cam near stop bracket.

(e) The stop bracket (43A) on the eccentric cam (43) is not properly bent and is failing to engage stop tap (36A) on arm control plate (36). To correct, bend stop bracket (43A) until it is at right angles to disc of eccentric cam.

13. NEEDLE SLIDES ACROSS PORTION OF RECORD AFTER SET-DOWN ON 12-INCH RECORD.

Cushion spring (34) has slipped out of position and is on wrong side of riser plate tab (37B). Re-position spring. (See figure 5.)

ADMIRAL CORPORATION MODEL RC-161

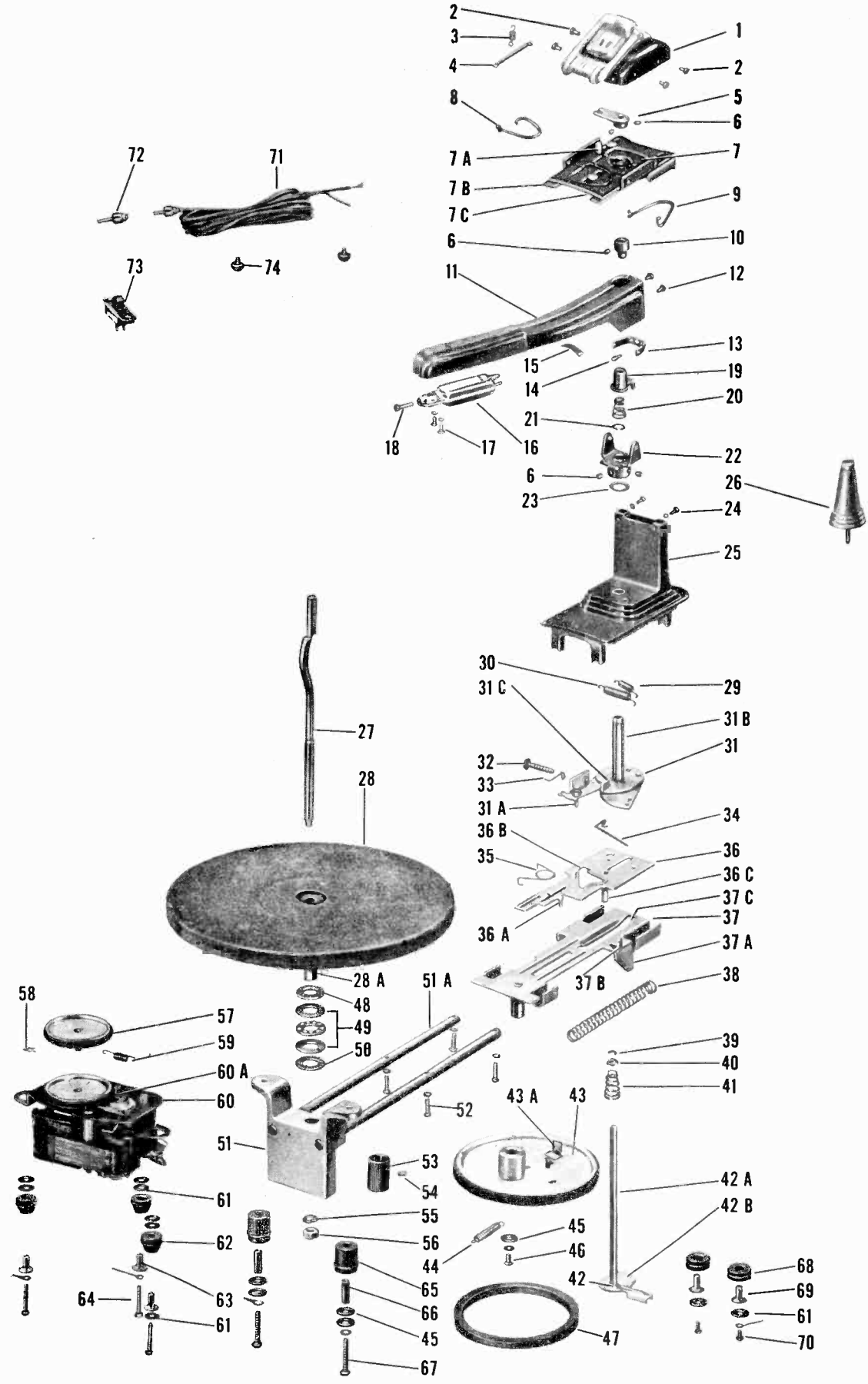


FIGURE 6. RECORD CHANGER, EXPLODED VIEW

MODEL RC-161

ADMIRAL CORPORATION

SERVICE PARTS LIST

RC161 RECORD CHANGER

See Exploded View, Figure 6, for Identification of Parts.

Ref. No.	Part Number	Description
1	G400A110	Cover assembly (Includes 3 and 4)
2	13A1-3-57	Snap buttons (cover)
3	405A4	Spring, record clip
4	414A4	Spring rod (record clip)
5	G400A66	Push-off arm assembly (When replacing, refer to paragraph 11)
6	1A44-38	Set screw (Bristol Head #6-32x3/16")
7	G400B68	Head assembly (Includes 7A, 7B, 7C, 7D, 8 and 9)
7A		Push plate pin (Part of 7)
7B		Rotating plate (Part of 7)
7C		Push plate (Part of 7)
7D		Head mounting plate (Part of 7)
8	405A38	Spring, push plate (Located on top of push plate)
9	405B18	Spring, head mounting plate (Located on bottom of head mounting plate assembly)
10	402A57	Lift adjusting collar (When replacing, refer to paragraph 9)
11	G400A92	Pickup arm, pivot spring and arm lift bearing pin assembly (Does not include 15 or 16)
12		Rivet (pickup arm pivot spring) } Supplied as a group only; order part number 98A1-P
13		Pivot spring (pickup arm) } Supplied as a group only; order part number 98A1-P
14		Arm lift bearing pin } Supplied as a group only; order part number 98A1-P
15	405A13	Spring clip (pickup arm)
16	409A3	Pickup cartridge } Interchangeable
	409A2	Pickup cartridge } Interchangeable
	409A1	Pickup cartridge } Interchangeable
17	42-250-C2-47	Screw (Fil.H.M.S. #4-40x1/4"; for mtg. cartridge)
18	402A43	Needle screw for cartridge
19	G400A86	Pickup arm lift assembly
20	405A46	Brake spring (5 turns)
21	405A37	Retaining ring (Used on arm support tube 31B)
22	G400A73	Pickup arm support assembly (When replacing, refer to paragraph 10)
23	405A27	Washer, spring
24	65-312-C2-47	Screw (B.H.M.S. #6-32x5/16"; for mtg. assembly 7)
25	G400B80	Base (die cast)
26	G400A46-3	Arm rest
27	G400A12	Centerpost
28	G400B49	Turntable
28A		Turntable shaft (Part of 28)
29	405A41	Safety spring
30	405A42	Set-down spring
31	G400A84	Arm control assembly
31A		Arm control pin (Part of 31)
31B		Arm support tube (Part of 31)
31C		Bracket (Part of 31)
32	402A60	Adjusting screw
33	405A44	Lock spring (set-down adjustment)
34	405A45	Cushion spring
35	405A43	Trip spring
36	G400A112	Arm control plate
36A		Stop tab (Part of 36)
36B		Track (Part of 36)
36C		Size change stop (Part of 36)
37	G400A88	Riser plate assembly
37A		Riser plate motion bracket (Part of 37)
37B		Riser plate tab (Part of 37)
37C		Inclined track (Part of 37)
38	405A9	Spring, recoil
39		Retaining ring (arm lift shaft) } Furnished as an assembly only; order part number G400A98
40		Safety collar (arm lift shaft) } Furnished as an assembly only; order part number G400A98
41		Spring (arm lift shaft) } Furnished as an assembly only; order part number G400A98
42		Push-off cam and shaft assembly } Furnished as an assembly only; order part number G400A98

Ref. No.	Part Number	Description
42A		Arm lift shaft (Part of 42)
42B		Push-off cam (Part of 42)
43	G400A78	Eccentric cam and tire assembly
43A		Stop bracket (Part of 43)
44	405A47	Spring, eccentric cam
45	4B1-57-47	Flat washer (eccentric cam)
46	84-250-C2-21	Screw (R.H.M. #8-32x1/4"; for mtg. eccentric cam)
47	406A1	Rubber tire, eccentric cam
48	412A1	Cork washer (3/32" thick)
49	415A2	Thrust bearing assembly (Replace as a unit)
50	412A9	Cork washer (3/64" thick)
51	G400B56	Turntable mounting and guide rod assembly
51A		Guide rods (Part of 51)
52	62-500-C2-21	Screw (Fil.H.M.S. #6-32x1/4"; for mtg. guide rod)
53	402A5	Knurled roller, turntable shaft
54	1A44-13	Set screw (Bristol #8-32x1/8"; for knurled roller)
55	3A2-9-47	Lockwasher, split (1/4" diameter)
56	402A41	Hex nut (1/4"-20; used on centerpost)
57	G400A23	Idler wheel assembly (Used with motor 407B3 only)
	G400A57	Idler wheel assembly (Used with motor 407B1 only)
	G400A59	Idler wheel assembly (Used with motor 407B2 only)
58	405A15	Spring, hairpin
59	405A14	Spring, idler wheel (Used with motor 407B3 only)
	405A35	Spring, idler wheel (Used with motor 407B1 only)
	405A36	Spring, idler wheel (Used with motor 407B2 only)
60	407B3	Motor, complete with idler wheel; 105-125 volts, 60 cycle (Motors 407B1 and 407B2 are interchangeable with 407B3)
60A	401A48	Drive pulley (Part of 60. For motor 407B3 only.)
61	4B1-36-47	Flat washer
62	406A4	Rubber grommet (motor mounting; for motor 407B3)
	406A9	Rubber grommet (motor mounting; for motor 407B1)
	406A10	Rubber grommet (motor mounting; for motor 407B2)
63	401A53	Spacer, grommet (Used with motor 407B3)
	402A44	Spacer, grommet (Used with motor 407B1)
	402A45	Spacer, grommet (Used with motor 407B2)
64	60-875-C2-2	Screw (R.H.M.S. #6-32x7/8"; used for mounting motor on metal base)
	60-1125-C2-21	Screw (R.H.M.S. #6-32x1 1/8"; used for mounting motor on wood or plastic base)
65	406A5	Rubber grommet (Large; used with metal base)
	406A2	Rubber grommet (Used with wood or plastic base)
66	402A36	Spacer, mounting (Used with metal base)
	29A2-4-21	Spacer, mounting (Used with wood or plastic base)
67	80-1000-C2-47	Screw (R.H.M.S. #8-32x1"; used for mounting record changer on metal base)
	280-875-C2-2	Screw (R.M.H.S. Sems #8-32x7/8"; used for mounting record changer on wood or plastic base)
68	406A6	Rubber grommet (Small; used with metal base)
	406A2	Rubber grommet (Used with wood or plastic base)
69	29A2-6-21	Spacer, mounting (Used with wood or plastic base)
70	60-250-C2-47	Screw (R.H.M.S. #6-32x1/4"; used for mounting record changer on metal base)
	260-687-C2-2	Screw (R.H.M.S. Sems #6-32x11/16"; used for mounting record changer on wood or plastic base)
71	89A5-9	Shielded output cable and plug
72	88A2-1	Plug (output)
73	77A1-15	Switch, On-Off
74	12A3-4	Rubber bumper
	405A30	50 cycle conversion spring (For motor 407B1)
	405A31	50 cycle conversion spring (For motor 407B2)
	405A32	50 cycle conversion spring (For motor 407B3)

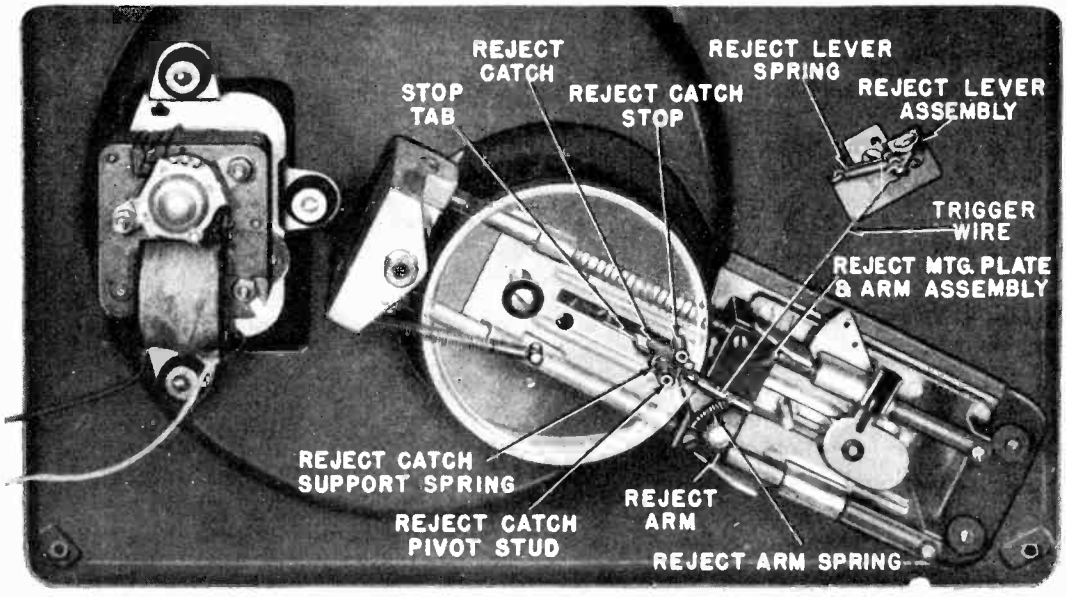
ADMIRAL CORPORATION MODEL RC-161A

RC161A RECORD CHANGER

When servicing the RC161A, use this supplement with the RC161 Service Manual

IMPORTANT

The RC161A Record Changer is similar in appearance to other model changers. To be certain which model changer you are servicing, look for the changer model number which appears on the small label attached to the underside of the changer mechanism.



ECCENTRIC CAM IN PHANTOM TO SHOW REJECT CATCH

The RC161A is a modification of the RC161 Record Changer. Hence, the Service Manual for the RC161 Record Changer may be used for servicing the RC161A if the following changes are noted:

THE REJECT MECHANISM

A push-button reject mechanism has been provided in the RC161A Record Changer.

The reject button is located on the top of the arm rest. The additional parts used to provide push-button rejection are shown in the illustration above; part numbers are listed below under "Service Parts List".

The illustration above shows the changer out of cycle, that is, when a record is playing. Note that the reject catch engages both the stop tab on the arm control plate, and the reject arm. If the changer is allowed to finish playing the record, the stop tab on the arm control plate is withdrawn from behind the reject catch; the eccentric cam is then pulled against the knurled roller and the change cycle begins. However, when the reject button is pressed, the reject trigger wire pulls the reject arm from behind the catch; the eccentric cam is pulled against the knurled roller and the change cycle begins.

TURNTABLE MOUNTING

The RC161A also features an important turntable shaft bearing arrangement. Self-lubricating porous bronze bearings are now pressed into the turntable mount casting. This feature was also added to the later RC161 changers.

OPERATING INSTRUCTIONS

To start the RC161A Record Changer, load the record changer, set the record clip, and turn on the On-Off switch. Now press down on the reject button directly or push down on the pickup arm momentarily if it is setting on the arm rest. The entire stack of records will be played automatically.

To reject a record, merely press down on the reject button.

SERVICE PARTS LIST

(All parts not listed below are the same as in the RC161 and should be ordered from RC161 Service Manual)

Part Number	Description
G400A115	Reject lever assembly
405A25	Spring, reject lever
414A12	Reject trigger wire
G400A116	Reject mounting plate and arm assembly
	Reject arm (part of reject mtg. plate and arm assembly)
405A25	Reject arm spring
401A97	Reject catch
405A15	Hairpin spring (reject catch)
405A50	Reject catch support spring

Part Number	Description
G400A117	*Eccentric cam and tire assembly (Does not include reject catch support spring or hairpin spring)
	Reject catch pivot stud (part of cam)
	Reject catch stop (part of cam)
G400A111	*Turntable mounting and guide rod assembly
402A62	*Knurled roller
G400A46-3	Arm rest assembly (Mounted on metal only)
G400A46-4	*Arm rest assembly (Mounted on wood or plastic)

*These parts are not interchangeable with RC161 parts having same description but different part numbers.

ADMIRAL CORPORATION

RC200 RECORD CHANGER

IMPORTANT

To be certain which model changer you are servicing, look for the changer model number which appears on the small label attached to the underside of the changer mechanism.

OPERATING INSTRUCTIONS

1. SETTING FOR SIZE OF RECORD.

The size of record for which the record changer is set to play is indicated by the number (on the top of the cover assembly) nearest the turntable. See Figure 1.

To change the setting, grasp the record support and cover assembly and rotate it a half turn until it snaps into place with the correct record size toward the turntable. **In changing the setting from 10-inch to 12-inch, rotate the assembly counterclockwise only; in changing from the 12-inch to the 10-inch setting, rotate the assembly clockwise only.**

2. STARTING THE RECORD CHANGER.

Load the record changer and set the record clip so that it rests on the top record.

Turn the Phono-Motor switch to the "ON" position. Press the reject button directly or push down on the pickup arm momentarily if it is setting on the arm rest. The bottom record will drop to the turntable and the Record Changer will play the entire stack of records automatically.

Care should be exercised when moving the pickup arm while the changer is out of cycle. If the arm is accidentally dropped while it is being moved from the edge of the turntable to the arm rest, the pickup arm may snap back and cause possible damage to the needle and record.

3. REJECTING A RECORD.

To reject a record at any time and start playing the next one, merely press the reject button on top of the arm rest.

4. UNLOADING RECORDS.

To remove the records, it is advisable to have the changer mechanism out of cycle. However, it is possible to unload the changer while it is in cycle so long as the pickup arm is clear of the records.

When removing records, hold them lightly and lift straight up.

CAUTIONS

When turning the record support, be sure to grip the entire record support and cover assembly and not just the plastic record clip.

Never use force to stop the motor or turntable.

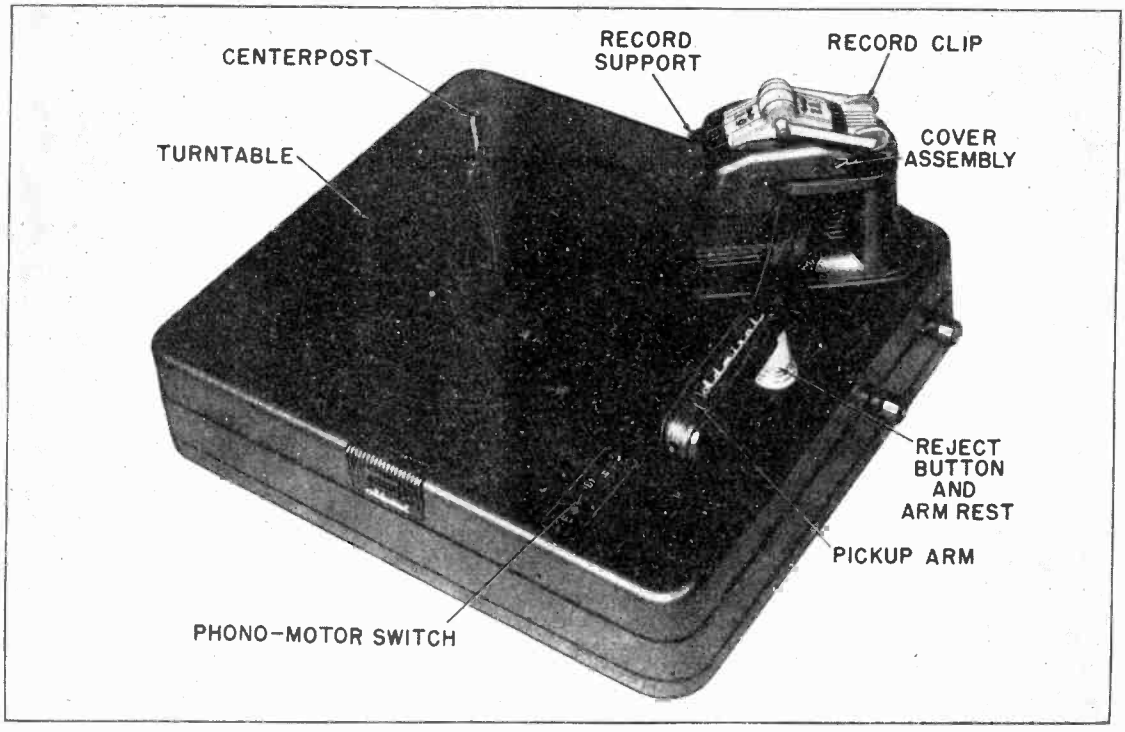


FIGURE 1. RECORD PLAYER, TOP VIEW

THE CHANGE CYCLE

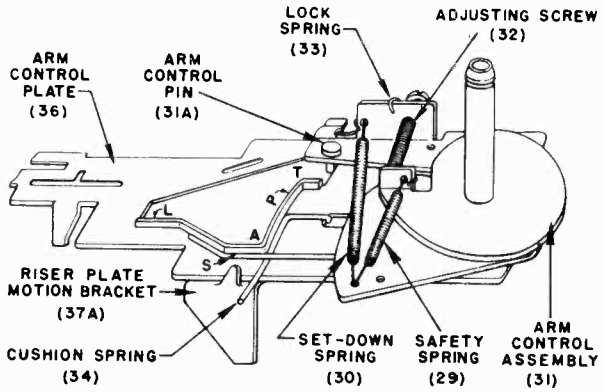


FIGURE 2.

5. DESCRIPTION OF CHANGE CYCLE. (See Figures 2, 5, and 7.)

While a record is playing and as the pickup arm moves toward the center of the record, the arm control pin (31A) on the arm control assembly (31) moves along the portion of the arm control track (36B) as indicated at "P", figure 2. As the record reaches the pickup or trip point, the pin reaches point "T" on the track. As it moves into the recessed position in which it is shown in the illustration, it permits the trip spring (35) to pull the arm control plate (36) forward towards the centerpost (27). As the arm control plate is drawn forward, the stop tab (36A) on the arm control plate (36) is withdrawn from behind the reject catch (85). This allows the eccentric cam (43) to be pulled over by the eccentric cam spring (44) until the rubber tire makes contact with the knurled roller (53) on the turntable shaft (28A). This knurled roller, which rotates with the turntable shaft, rotates the eccentric cam. In turn, this forces the riser plate assembly (37) back along the guide rods (51A) away from the centerpost (27).

As soon as the riser plate begins to move, the push-off cam and shaft assembly (42) rides along the inclined track (37C) of the riser plate (37). This action causes the push-off cam and shaft assembly (42) to be drawn downward; as a result the pickup arm lift (19) presses down on the arm lift bearing pin (14) causing the pickup arm to be raised clear of the record. Then the riser plate tab (37B) contacts and moves the arm control assembly (31) which, since it is coupled to the pickup arm support assembly (22), carries the pickup arm away from the centerpost and clear of the edge of the turntable. As the riser plate (37) continues to travel further along the guide rods (51A), the riser plate motion bracket (37A) contacts and rotates the push-off cam and shaft assembly (42); as a result, the push-off arm (5) [which is coupled to the push-off cam and shaft assembly (42)] causes the push plate (7C) to drop a record to the turntable.

During the second half of the change cycle, the pressure of the push plate spring starts to return the push plate (7C) and push-off arm (5) back to their normal position. At the same time, the motion of the eccentric cam (43) and the guide rod recoil spring (38) propel the riser plate (37) toward the centerpost. The arm control assembly (31), and hence the pickup arm, are drawn back by the tension in the set-down spring (30). After the arm reaches a point directly above the set-down point, the riser plate (37) has moved far enough back towards the centerpost (27) to allow the push-off cam and shaft assembly (42) to ride down the inclined track (37C) of the riser plate (37). This lowers the pickup arm onto the record. (The following paragraph describes how the set-down point is determined for the 10-inch and 12-inch settings.) As the eccentric cam (43) [aided by the eccentric cam spring (44)] completes its revolution, the rubber tire of the cam moves away from the knurled roller (53) on the turntable shaft. The reject catch (85) then comes to rest against both the stop tab (36A) and the reject arm (87A). The change cycle is completed.

6. DESCRIPTION OF DETERMINATION OF 10-INCH AND 12-INCH SET-DOWN POINTS.

During the early part of the change cycle, the arm control plate (36) has traveled (in a direction away from the centerpost) until the size change stop (36C) reaches the push-off cam (42B) of the push-off cam and shaft assembly. The distance traveled by the arm control plate (36) will depend on the size of the record being played; the distance is less for a 12-inch setting than for a 10-inch setting. (This is true because the push-off cam (42B) presents its short radius to the size change stop (36C) for the 10-inch setting and presents its long radius to the size change stop for a 12-inch setting.) This variation in distance traveled means that the arm control track (36B) will be in a position closer to the centerpost for the 12-inch setting than for the 10-inch setting. This, in turn, means that during the change cycle the arm control pin (31A) [whose path is determined by the motion of the arm control assembly (31)] will leave its recessed position, and will ride along the "S" portion of the arm control track for the 12-inch setting and along the "L" portion for the 10-inch setting. (See Figure 2.)

As the pickup arm moves back towards the record during the second half of the change cycle, it will be stopped when the bracket (31C) reaches the adjusting screw (32). How far the arm returns before being stopped depends on whether the arm control pin (31A) has been riding in the "S" or "L" portion of the arm control track. If the pin has been riding in the "S" or 12-inch portion of the track, the arm will be stopped at a point directly above the 12-inch set-down point; if the pin has been riding in the "L" or 10-inch portion, the arm will be stopped at a point directly above the 10-inch set-down point.

7. REJECTING A RECORD. (See Figure 6.)

When the reject button (26) is pressed, the reject trigger wire (83) pulls the reject arm (87A) from behind the reject catch (85). The eccentric cam (43) then falls against the knurled roller (53) and the change cycle begins as if a record had just finished playing.

ADJUSTMENTS

CAUTIONS

See that the drive pulley (60A), and the rubber tires on both the idler wheel (57) and the eccentric cam (43) are kept clean and free from oil, grease, dirt, or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts.

If replacement of any parts requires the removal of the lift adjusting collar (10), pickup arm support assembly (22) or the push-off arm (5), be sure to reposition or replace these parts as directed in paragraphs 9, 10, and 11 respectively.

TOOLS REQUIRED

#6 Bristol Set Screw Wrench. (Admiral Part No. P-5805. List Price $0.05.)
#8 Bristol Set Screw Wrench. (Admiral Part No. P-5806. List Price $0.05.)

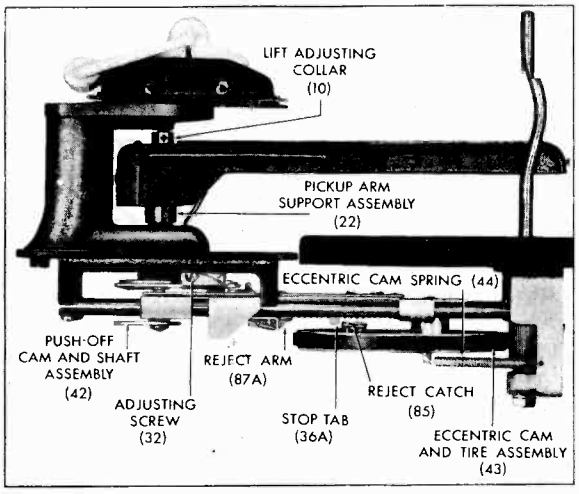


FIGURE 3.

8. SET-DOWN POINTS AND TRIP POINT.

If the pickup arm support assembly (22) has been removed or if its set screws are loose, it must be repositioned as described in paragraph 10 before adjusting the set-down points and pickup or trip point.

This changer is designed so that the 10-inch set-down point, the 12-inch set-down point, and the pickup or trip point are simultaneously adjusted in a single operation. It is recommended that you make the adjustment at either of the set-down points. This adjustment is made by means of the adjusting screw (32) shown in figure 3. Turning this screw counter-clockwise will cause the arm to set down closer to the centerpost; turning it clockwise will cause the arm to set down further away from the centerpost. One complete turn on the screw will move the arm about ¼ inch.

If the adjusting screw (32) will not change the setting sufficiently, the pickup arm support assembly (22) may be out of position. (See paragraph 10.)

The set-down points when using a straight-shank needle will differ slightly than when using an offset-shank needle such as the Admiral Lifetime Needle. If you do not know which type of needle is to be used by the customer, we suggest the following settings *when tested with a straight needle:* measuring from the side of the centerpost, 4⅝" for the 10-inch set-down point, 5⅝" for the 12-inch set-down point, and 1-19/32" for the pickup or trip point.

If you know which type of needle will be used by the customer, and test with that type of needle, the following settings are recommended: measuring from the side of the centerpost, 4-21/32" for the 10-inch set-down point, 5-21/32" for the 12-inch set-down point, and 1⅝" for the pickup or trip point.

When using an offset-shank needle, slight variations in set-down point can often be corrected by loosening the needle screw and rotating the needle slightly.

9. PICKUP ARM HEIGHT.

When properly adjusted, the pickup arm height should be such that, without a needle and with a single record on the turntable, the arm should be about 1/32" above the record. The arm height depends on the location of the lift adjusting collar (10). As the collar is moved down, the arm is raised, and vice versa. When necessary, the pickup arm height may be adjusted by repositioning the lift adjusting collar (10) as follows:

(a) Be sure the changer is out of cycle.
(b) Lift the pickup arm and check to see that the pickup arm lift (19) is positioned properly over the arm lift bearing pin (14). (See Fig. 4.)
(c) Remove needle and place pickup arm on turntable close to its edge.
(d) Loosen set screw in lift adjusting collar (10).
(e) Remove slack by pushing up on push-off cam and shaft assembly (42). Do not compress the arm lift shaft spring (42C).
(f) Using a #6-32 Bristol wrench, place it in the set screw and slide the lift adjusting collar (10) down until it is snug against the pickup arm lift (19).
(g) Tighten set screw in the lift adjusting collar.
(h) Check height.

If height is still incorrect, it may be necessary to repeat the adjustment. Before doing so, it may be advisable to examine the shaft (42A) of the push-off cam and shaft assembly for nicks and burrs caused by the set screws. Smooth the shaft with a file if necessary. The upper portion of the shaft is accessible if the push-off arm (5), head assembly (7), head mounting plate (75), base head (76), and lift adjusting collar (10) are removed. To prevent shaft from falling out through bottom, keep in place with masking tape. When replacing the lift adjusting collar (10) and push-off arm (5), see paragraphs 9 and 11 respectively.

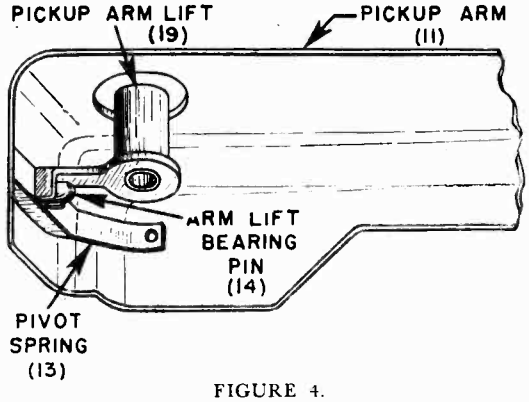


FIGURE 4.

SERVICE AND REPAIR

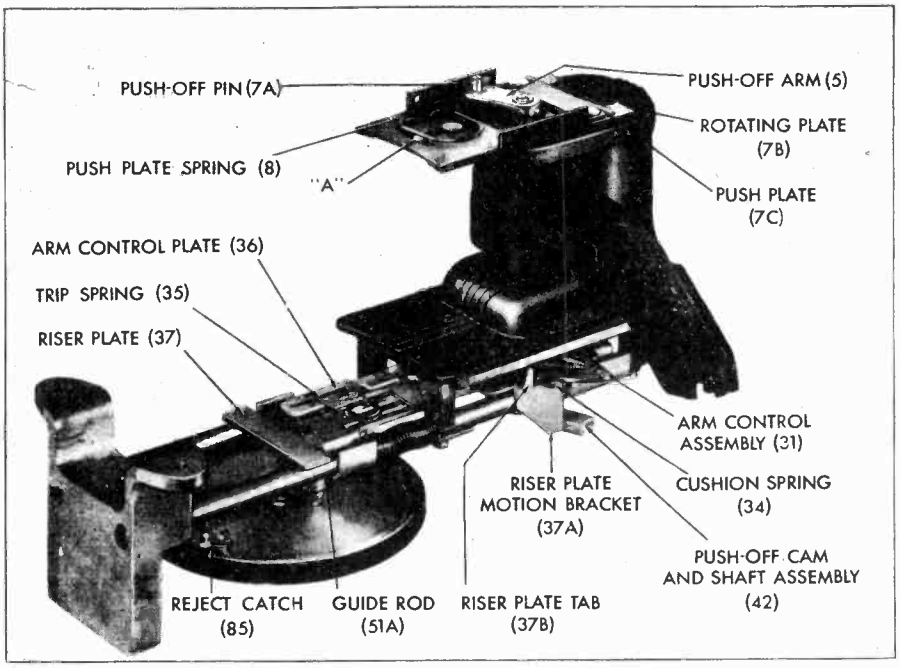


FIGURE 5.

10. RE-POSITIONING PICKUP ARM SUPPORT ASSEMBLY (22).

If the pickup arm support assembly (22) has been removed or if its set screws are loose, re-position as follows to assure proper set-down adjustment:

(a) Turn adjusting screw (32) (see paragraph 8) clockwise as far as it will go, then turn back counter-clockwise for 2 full turns.

(b) Place a 12" record on the turntable.

(c) With the changer out of cycle, manually move the arm control assembly (31) outward as far as it moves freely. In this position, the arm control pin (31A) will be located as indicated at "A" in figure 2.

(d) Place pickup arm so that needle rests in first playing groove on the 12" record.

(e) Tighten the two set screws in pickup arm support assembly (22).

(f) Make the final set-down adjustment as described in paragraph 8.

11. RE-POSITIONING PUSH-OFF ARM (5). (See Figure 5.)

If push-off arm (5) has been removed or if its set screws are loose, carefully re-position as follows:

(a) Rotate the record support to the 10-inch position. Remove push-off arm (5).

(b) Manually slide the push plate (7C) over the rotating place (7B) until a piece of metal 3/32 inch in diameter or a #8-32 Bristol wrench can be inserted into the opening at the front of the center slot in the push plate (see "A", figure 5).

If, after completing the re-positioning of the push-off arm, it is seen that this setting does not give proper push-off for both 10-inch and 12-inch records, vary the spacing at "A" slightly and repeat the procedure.

(c) Put the changer into cycle and manually rotate the turntable until the riser plate (37) has traveled along the guide rods (51A) to a position furthest away from the turntable.

(d) Now position push-off cam and shaft assembly (42) so that it is held tightly against riser plate motion bracket (37A).

(e) Put push-off arm in position, leaving about 1/16" clearance between the top of the push plate and the push-off arm.

(f) Tighten set screws in push-off arm.

12. CHANGER REPEATEDLY GOES THROUGH CHANGE CYCLE WITHOUT PLAYING RECORD.

(a) Mounting screw on eccentric cam (43) may be loose. Tighten it.

(b) Eccentric cam (43) is bent so that the reject catch (85) passes underneath the stop tab (36A) or reject arm (87A). To correct, straighten the cam by putting changer out of cycle and pressing upward on the cam near the reject catch.

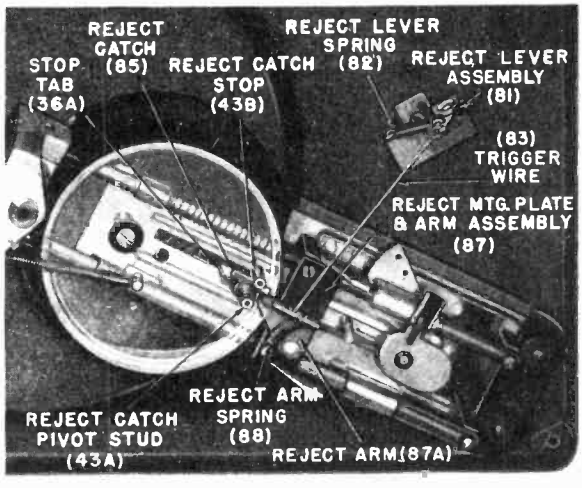


FIGURE 6. ECCENTRIC CAM IN PHANTOM TO SHOW REJECT CATCH

MODEL RC-200

ADMIRAL CORPORATION

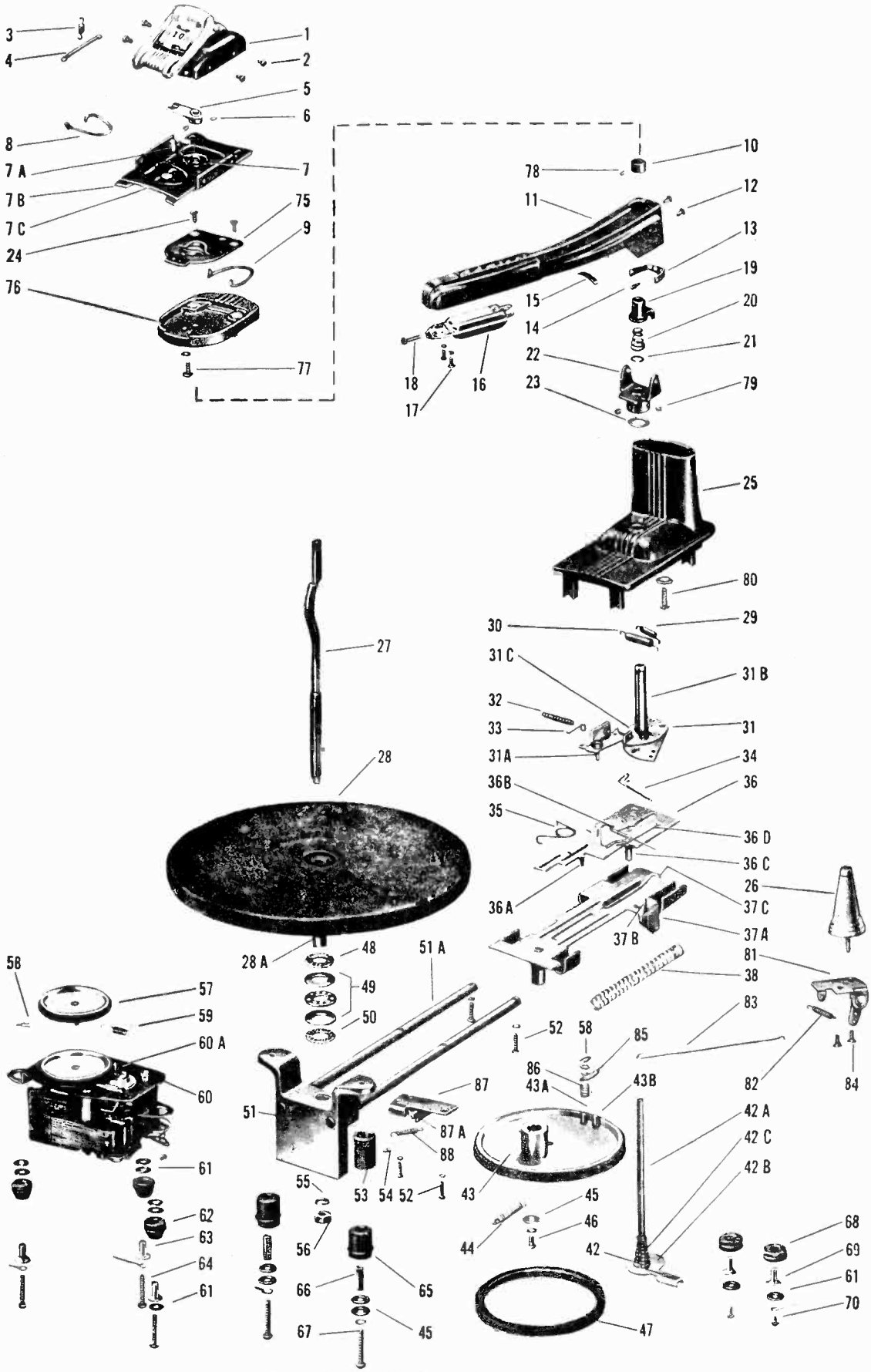


FIGURE 7. RECORD CHANGER, EXPLODED VIEW

SERVICE PARTS LIST

RC200 RECORD CHANGER

See Exploded View, Figure 7, for Identification of Parts.

Ref. No.	Part Number	Description
1	G400A128	Cover assembly (Includes 3 and 4)
2	13A1-3-57	Snap buttons (cover)
3	405A4	Spring, record clip
4	414A4	Spring rod (record clip)
5	G400A66	Push-off arm assembly (When replacing, refer to paragraph 11)
6	1A44-38	Set screw (Bristol Head =6-32x3/16"; cone tip)
7	G400B70	Head assembly (Includes 8)
7A		Push plate pin (Part of 7)
7B		Rotating plate (Part of 7)
7C		Push plate (Part of 7)
8	405A38	Spring, push plate (Located on top of push plate)
9	405B18	Spring, head mounting plate
10	402A66	Lift adjusting collar (When replacing, refer to paragraph 9)
11	G400A130	Pickup arm, pivot spring and arm lift bearing pin assembly (Does not include 15 or 16)
12		Rivet (pickup arm pivot spring) — Supplied as a group only; order part number 98A1
13		Pivot spring (pickup arm) — Supplied as a group only; order part number 98A1
14		Arm lift bearing pin — Supplied as a group only; order part number 98A1
15	405A13	Spring clip (pickup arm)
16	409A3	Pickup cartridge — Interchangeable
	409A2	Pickup cartridge — Interchangeable
	409A1	Pickup cartridge — Interchangeable
17	42-250-C2-47	Screw (Fil.H.M.S. =4-40x1/4"; for mtg. cartridge)
18	402A43	Needle screw for cartridge
19	G400A86	Pickup arm lift assembly
20	405A46	Broke spring (5 turns)
21	405A37	Retaining ring (Used on arm support tube 31B)
22	G400A73	Pickup arm support assembly (When replacing, refer to paragraph 10)
23	405A27	Washer, spring
24	61-312-C2-47	Screw (F.H.M.S. =6-32x5/16")
25	404C8	Base (die cast)
26	G400A46-1	Reject button and arm rest (For metal base)
	G400A46-2	Reject button and arm rest (For wood or plastic base)
27	G400A12-2	Centerpost
28	G400B49	Turntable
28A		Turntable shaft (Part of 28)
29	405A41	Safety spring
30	405A49	Set-down spring
31	G400A84	Arm control assembly
31A		Arm control pin (Part of 31)
31B		Arm support tube (Part of 31)
31C		Bracket (Part of 31)
32	402A60	Adjusting screw
33	405A44	Lock spring (set-down adjustment)
34	405A45	Cushion spring (Part of 36)
35	405A43	Trip spring
36	G400A125	Arm control plate (Includes 34)
36A		Stop tab (Part of 36)
36B		Track (Part of 36)
36C		Size change stop (Part of 36)
36D		Clamp spring (Part of 36)
37	G400A88	Riser plate assembly
37A		Riser plate motion bracket (Part of 37)
37B		Riser plate tab (Part of 37)
37C		Inclined track (Part of 37)
38	405A9	Spring, recoil
42	G400A98	Push-off cam and shaft assembly (Includes retaining ring, safety collar and spring)
42A		Arm lift shaft (Part of 42)
42B		Push-off cam (Part of 42)
42C		Arm lift shaft spring (Part of 42)
43	G400A117	Eccentric cam and tire assembly
43A		Reject catch pivot stud (Part of 43)
43B		Reject catch stop (Part of 43)
44	405A47	Spring, eccentric cam
45	4B1-57-47	Flat washer (ecentric cam)
46	84-250-C2-21	Screw (R.H.M.S. =8-32x1/4"; for mtg. eccentric cam)
47	406A1	Rubber tire, eccentric cam
48	412A1	Cork washer (3/32" thick)
49	415A2	Thrust bearing assembly (Replace as a unit)
50	412A9	Cork washer (3/64" thick)
51	G400A111	Turntable mounting and guide rod assembly
51A		Guide rods (Part of 51)
52	62-500-C2-21	Screw (Fil.H.M.S. =6-32x1/4"; for mtg. guide rod)
53	402A62	Knurled roller, turntable shaft
54	1A44-13	Set screw (Bristol =8-32x1/8"; for knurled roller)
55	3A2-9-47	Lockwasher, split (1/4" diameter)
56	402A41	Hex nut (1/4"-20; used on centerpost)
57	G400A23	Idler wheel assembly (For motor 407B3 or 407B4)
	G400A57	Idler wheel assembly (Used with motor 407B1 only)
	G400A59	Idler wheel assembly (Used with motor 407B2 only)
58	405A15	Spring, hairpin
59	405A14	Spring, idler wheel (For motor 407B3 or 407B4)
	405A35	Spring, idler wheel (Used with motor 407B1 only)
	405A36	Spring, idler wheel (Used with motor 407B2 only)
60	407B3	Motor, complete with idler wheel; 105-125 volts, 60 cycle (Motors 407B1 and 407B2 are interchangeable with 407B3)
	407B4	Motor, complete with idler wheel; 105-125 volts, 50 cycles
60A	401A48	Drive pulley (Part of 60. For motors 407B3, 407B4 only. In addition, motor 407B4 includes a coil spring, part number 405A32)
61	4B1-36-47	Flat washer
62	406A4	Rubber grommet (Used with motor 407B3 or 407B4)
	406A9	Rubber grommet (motor mounting; for motor 407B1)
	406A10	Rubber grommet (motor mounting; for motor 407B2)
63	401A53	Spacer, grommet (Used with motor 407B3 or 407B4)
	402A44	Spacer, grommet (Used with motor 407B1)
	402A45	Spacer, grommet (Used with motor 407B2)
64	60-312-C2-2	Screw (R.H.M.S. =6-32x5/16"; used for mounting motor on metal base)
	60-1125-C2-21	Screw (R.H.M.S. =6-32x1 1/8"; used for mounting motor on wood or plastic base)
65	406A5	Rubber grommet (Large; used with metal base)
	406A2	Rubber grommet (Used with wood or plastic base)
66	402A36	Spacer, mounting (Used with metal base)
	29A2-4-21	Spacer, mounting (Used with wood or plastic base)
67	80-875-C2-47	Screw (R.H.M.S. =8-32x7/8"; used for mounting record changer on metal base)
	280-875-C2-2	Screw R.M.H.S. Sems =8-32x7/8"; used for mounting record changer on wood or plastic base)
68	406A6	Rubber grommet (Small; used with metal base)
	406A2	Rubber grommet (Used with wood or plastic base)
69	29A2-6-21	Spacer, mounting (Used with wood or plastic base)
70	60-250-C2-47	Screw (R.H.M.S. =6-32x1/4"; used for mounting record changer on metal base)
	260-687-C2-2	Screw (R.H.M.S. Sems =6-32x11/16"; used for mounting record changer on wood or plastic base)
75	401A64	Head mounting plate
76	404B9	Base head
77	65-375-C2-47	Screw (B.H.M.S. =6-32x3/8")
78	1A44-7	Set Screw (Bristol Head =6-32x1/8"; cup tip)
79	1A44-8	Set Screw (Bristol Head =6-32x3/16"; cup tip)
80	100-437-C2-47	Screw (R.H.M.S. =10-24x7/16")
81	G400A115	Reject lever assembly
82	405A25	Spring, reject lever
83	414A12	Reject trigger wire
84	1A20-14-21	Screw (=6-3/8" drive screw; used for reject lever mounting on metal base)
	1A20-18-21	Screw (=6-7/8" drive screw; used for reject lever mounting on wood or plastic base
85	401A97	Reject catch
86	405A50	Reject catch support spring
87	G400A116	Reject mounting plate and arm assembly
87A		Reject arm (Part of 87)
88	405A25	Reject arm spring
	405A30	50 cycle conversion spring (For motor 407B1)
	405A31	50 cycle conversion spring (For motor 407B2)
	405A32	50 cycle conversion spring (For Motor 407B3)

CRESCENT INDUSTRIES, INC. MODEL C200

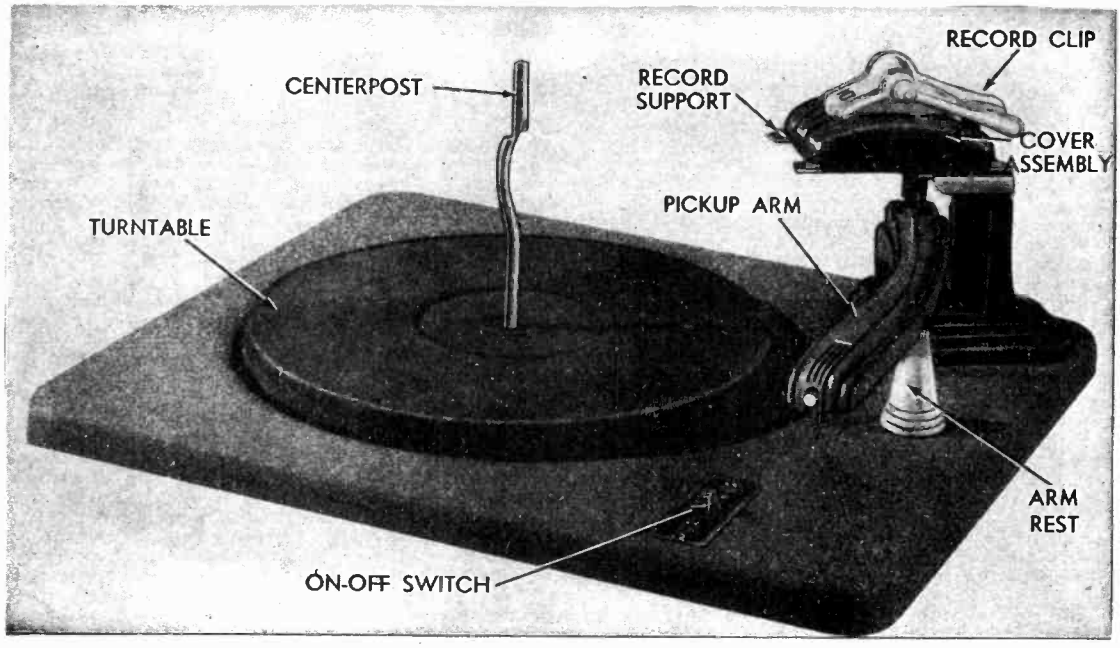


FIGURE 1. RECORD PLAYER, TOP VIEW

OPERATING INSTRUCTIONS

1. SETTING FOR SIZE OF RECORD.

The size of record for which the record changer is set to play is indicated by the number (on the top of the cover assembly) nearest the turntable. See Figure 1.

To change the setting, grasp the record support and cover assembly and rotate it a half turn until it snaps into place with the correct record size toward the turntable. **In changing the setting from 10-inch to 12-inch, rotate the assembly counterclockwise only; in changing from the 12-inch to the 10-inch setting, rotate the assembly clockwise only.**

2. STARTING THE RECORD CHANGER.

Load the record changer and set the record clip so that it rests on the top record. Now start the turntable rotating and press down on the reject button or push down on the pickup arm momentarily if it is setting on the arm rest. The entire stack of records will be played automatically.

On-Off switch is standard on some models.

3. REJECTING A RECORD.

To reject a record at any time and start playing the next one, merely press down on the reject button.

4. UNLOADING RECORDS.

To remove the records, it is advisable to have the changer mechanism out of cycle. However, it is possible to unload the changer while it is in cycle so long as the pickup arm is clear of the records.

Stop the turntable from rotating before lifting pickup arm to arm rest and remove records.

When removing records, hold them lightly and lift straight up.

CAUTIONS

1. **Never use force to stop the motor or turntable.**
2. **When turning the record support, be sure to grip the entire record support and cover assembly and not just the plastic record clip.**

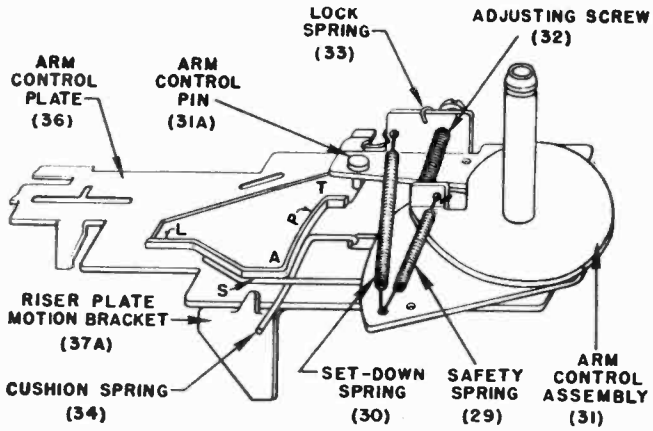


FIGURE 2.

THE CHANGE CYCLE

5. DESCRIPTION OF CHANGE CYCLE.

(See Figures 2, 6, and 7.)

While a record is playing and as the pickup arm moves toward the center of the record, the arm control pin (31A on the arm control assembly (31) moves along the portion of the arm control track (36B) as indicated at "P", figure 2. As the record reaches the pickup or trip point, the pin reaches point "T" on the track. As it moves into the recessed position in which it is shown in the illustration, it permits the trip spring (35) to pull the arm control plate (36) forward towards the centerpost (27). As the arm control plate is drawn forward, the stop tab (36A) on the arm control plate (36) is withdrawn from behind the reject catch (62) on the eccentric cam (61). The cam, which no longer is held in place by the stop tab (36A), is pulled over by the eccentric cam spring (44) until the rubber tire makes contact with the knurled roller (53) on the turntable shaft (28A). This knurled roller, which rotates with the turntable shaft, rotates the eccentric cam. In turn, this forces the riser plate assembly (37) back along its guide rods (51A) away from the centerpost (27). As soon as the riser plate begins to move, the push-off cam and shaft assembly (42) rides along the inclined track (37C) of the riser plate (37). This action causes the push-off cam and shaft assembly (42) to be drawn downward; as a result the pickup arm lift (19) presses down on the arm lift bearing pin (14) causing the pickup arm to be raised clear of the record. Then the riser plate tab (37B) contacts and moves the arm control assembly (31) which, since it is coupled to the pickup arm support assembly (22), carries the pickup arm away from the centerpost and clear of the edge of the turntable. As the riser plate (37) continues to travel further along the guide rods (51A), the riser plate motion bracket (37A) contacts and rotates the push-off cam and shaft assembly (42); as a result, the push-off arm (5), [which is coupled to the push-off cam and shaft assembly (42)] causes the push plate (7C) to drop a record to the turntable.

During the second half of the change cycle, the pressure of the push plate spring starts to return the push plate (7C) and push-off arm (5) back to their normal position. At the same time, the motion of the eccentric cam (61) and the guide rod recoil spring (38) propel the riser plate (37) toward the centerpost. The arm control assembly (31), and hence the pickup arm, are drawn back by the tension in the set-down spring (30). After the arm reaches this point directly above the set-down point, the riser plate (37) has moved far enough back towards the centerpost (27) to allow the push-off cam and shaft assembly (42) to ride down the inclined track (37C) of the riser plate (37). This lowers the pickup arm onto the record. (The following paragraph describes how the set-down point is determined for the 10-inch and 12-inch settings). As the eccentric cam (61), aided by the eccentric cam spring (44) completes its revolution, the rubber tire of the cam moves away from the knurled roller (53) on the turntable shaft and the reject catch (62) to rest against the stop tab (36A) of the arm control plate (36). The change cycle is completed

6. DESCRIPTION OF DETERMINATION OF 10-INCH AND 12-INCH SET-DOWN POINTS.

During the early part of the change cycle, the arm control plate (36) has traveled (in a direction away from the centerpost) until the size change stop (36C) reaches the cam (42B) Figure 2).

As the pickup arm moves back towards the record during the second half of the change cycle, it will be stopped when the bracket (31C) reaches the adjusting screw (32). How far the arm returns before being stopped depends on whether the arm control pin (31A) has been riding in the "S" or "L" portion of the arm control track. If the pin has been riding in the "S" or 12-inch portion of the track, the arm will be stopped at a point directly above the 12-inch set-down point; if the pin has been riding in the "L" or 10-inch portion, the arm will be stopped at a point directly above the 10-inch set-down point.

7. REJECTING A RECORD. (See Figure 3.)

The reject button (26A) is located on the top of the arm of the push-off cam and shaft assembly. The distance traveled by the arm control plate (36) will depend on the size of the record being played; the distance is less for a 12-inch setting than for a 10-inch setting. (This is true because the push-off cam (42B) presents its short radius to the size change stop (36C) for the 10-inch setting and presents its long radius to the size change stop for a 12-inch setting). This variation in distance traveled means that the arm control track (36B) will be in a position closer to the centerpost for the 12-inch setting than for the 10-inch setting. This in turn means that during the change cycle the arm control pin (31A) [whose path is determinted by the motion of the arm control assembly (31)] will leave its recessed position, and will ride along the "S" portion of the arm control track for the 12-inch setting and along the "L" portion for the 10-inch setting (See rest (26). The parts used to provide push button rejection are shown in Figure 3.

Figure 3 shows the changer out of cycle, that is, when a record is playing. Note that the reject catch (62) engages both the stop tab on the arm control plate, and the reject arm (70). If the changer is allowed to finish playing the record, the stop tab on the arm control plate is withdrawn from behind the reject catch (62); the eccentric cam (61) is then pulled against the knurled roller (53) and the change cycle begins. However, when the reject button (26A) is pressed the reject trigger wire (86) pulls the reject arm (70) from behind the reject catch (62); the eccentric cam (61) is pulled against the knurled roller (53) and the change cycle begins

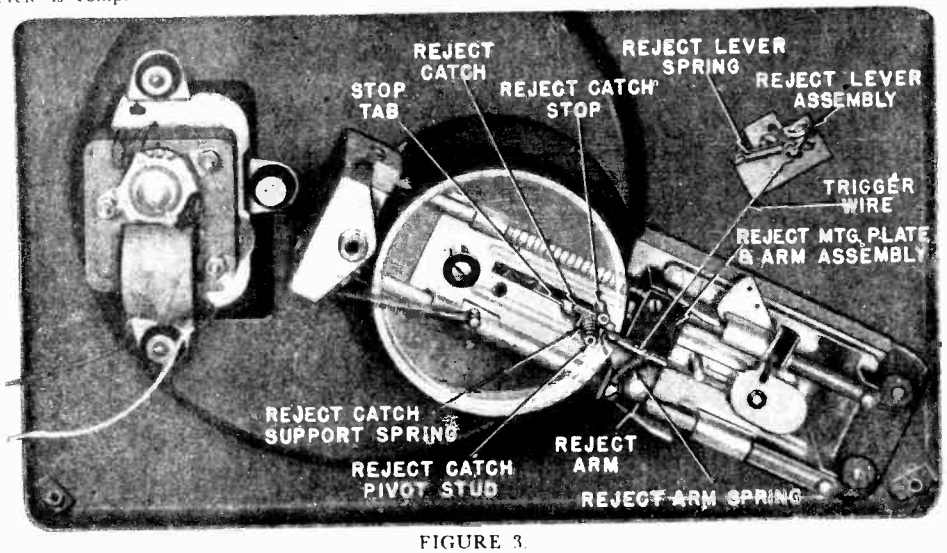


FIGURE 3.

ADJUSTMENTS

CAUTIONS

1. See that the drive pulley and the rubber tire on the motor (60) and the rubber tire on the eccentric cam (61) are kept clean and free from oil, grease, dirt, or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts.

2. If replacement of any parts requires the removal of the lift adjusting collar (10), pickup arm support assembly (22), or the push-off arm (5), be sure to re-position or replace these parts as directed in paragraph 9, 10, and 11 respectively.

TOOLS REQUIRED

#6 Bristol Set Screw Wrench.
#8 Bristol Set Screw Wrench.

8. SET-DOWN POINTS AND PICKUP OR TRIP POINT.

(If the pickup arm support assembly (22) has been removed or if its set screws are loose, it must be repositioned as described in paragraph 10 before adjusting the set-down points and pickup or trip point).

This changer is designed so that the 10-inch set-down point, the 12-inch set-down point, and the pickup or trip point are simultaneously adjusted in a single operation. It is recommended that you make the adjustment at either of the set-down points. This adjustment is made by means of the adjusting screw (32) shown in Fig. 4. Turning this screw counter-clockwise will cause the arm to set down closer to the centerpost; turning it clockwise will cause the arm to set down further away from the centerpost. One turn on the screw will move the arm about ¼ inch.

If the adjusting screw (32) will not change the setting sufficiently, the pickup arm support assembly (22) may be out of position. (See paragraph 10).

The set-down point when using a straight-shank needle will differ slightly than when using an offset shank needle.

If you do not know which type of needle is to be used by the customer, we suggest the following settings *when tested with a straight needle*: measuring from the side of the centerpost, 4⅝" for the 10-inch set-down point, 5⅝" for the 12-inch set-down point, and 1-19/32" for the pickup or trip point.

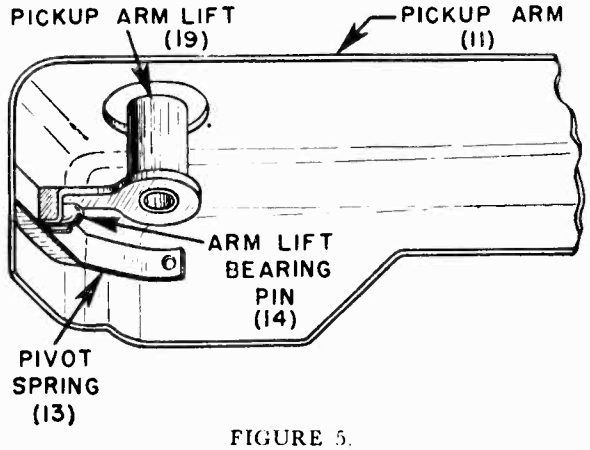


FIGURE 5.

If you know which type of needle will be used by the customer, and test with that type of needle, the following settings are recommended: measuring from the side of the centerpost, 4-21/32" for the 10-inch set-down point, 5-21/32" for the 12-inch set-down point, and 1⅝ for the pickup or trip point.

When using an offset-shank needle, slight variations in set-down point can often be corrected by loosening the needle screw and rotating the needle slightly.

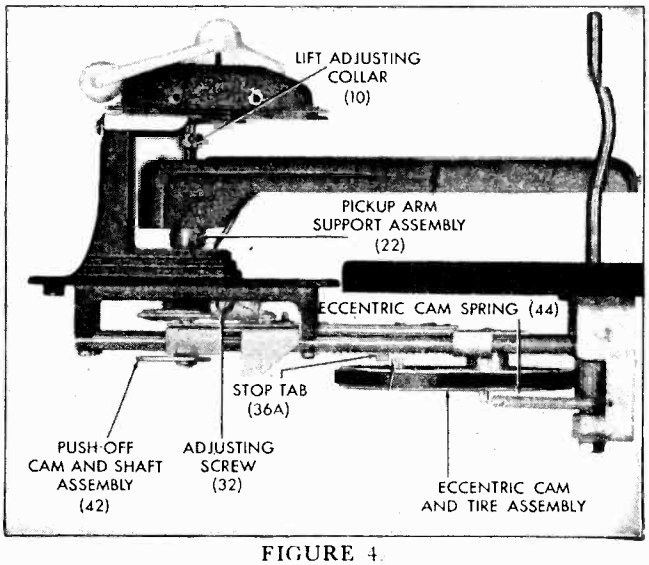


FIGURE 4.

9. PICKUP ARM HEIGHT.

When properly adjusted, the pickup arm height should be such that, without a needle and with a single record on the turntable, the arm should be about 1/32" above the record. The arm height depends on the location of the lift adjusting collar (10). As the collar is moved down, the arm is raised, and vice versa. When necessary, the pickup arm height may be adjusted by re-positioning the lift adjusting collar (10) as follows:

(a) The changer should be out of cycle.

(b) Lift the pickup arm and check to see that the pick-up arm lift (19) is positioned properly over arm lift bearing pin (14). (See Fig. 5).

(c) Remove needle and place pickup arm on turntable close to its edge.

(d) Loosen set screw in lift adjusting collar (10).

(e) Remove slack by pushing up on push-off cam and shaft assembly (42). Do not compress the arm lift shaft spring (41).

(f) Using a #6-32 Bristol wrench, place it in the set screw and slide the lift adjusting collar (10) down until it is snug against the pickup arm lift (19).

(g) Tighten set screw in the lift adjusting collar.

(h) Check height.

If height is still incorrect, it may be necessary to repeat the adjustment. Before doing so, it may be advisable to examine the shaft (42A) of the push-off cam and shaft assembly for nicks and burrs caused by the set-screws. Smooth shaft with file if necessary. The upper portion of the shaft is accessible if the push-off arm (5), head assembly (7) and lift adjusting collar (10) are removed. To prevent shaft from falling out through bottom, keep in place with masking tape. When replacing the lift adjusting collar (10) and push-off arm (5), see paragraphs 9 and 11 respectively.

SERVICING AND REPAIR

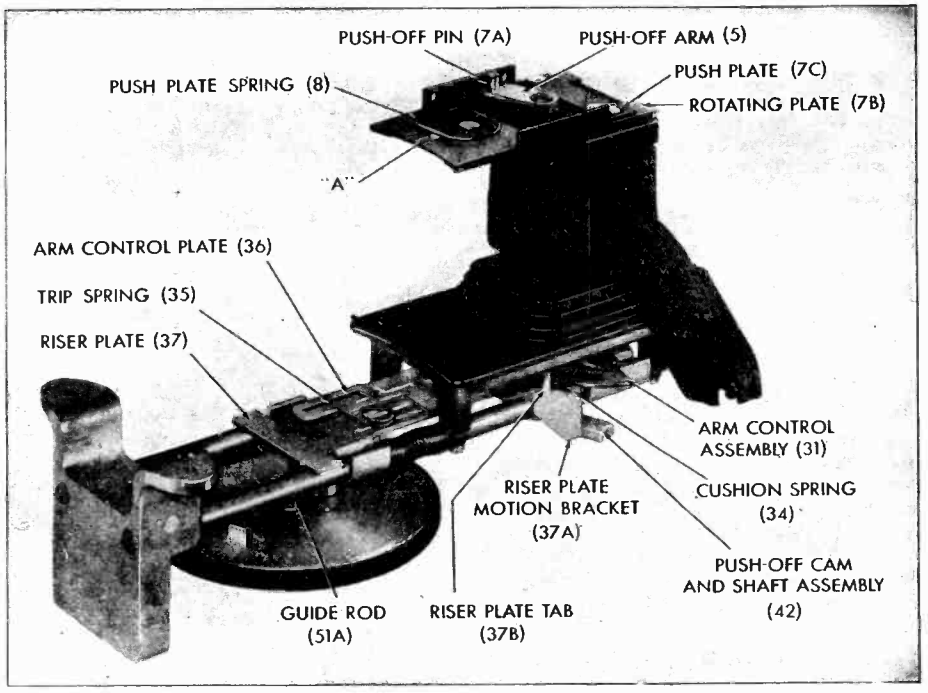


FIGURE 6.

10. RE-POSITIONING PICKUP ARM SUPPORT ASSEMBLY (22).

To assure proper set-down adjustment, this must be done carefully as follows if set screws are loose or if pickup arm support assembly (22) has been removed.

(a) Turn adjusting screw (32) (see paragraph 1) clockwise as far as it will go, then turn back counterclockwise for 2 full turns.

(b) Place a 12" record on the turntable.

(c) With the changer out of cycle, manually move the arm control assembly (31) outwards as far as it moves freely. In this position, the arm control pin (31A) will be located as indicated at "A" in figure 2.

(d) Place pickup arm so that needle rests in first playing groove on the 12" record.

(e) Tighten the two set screws in pickup arm support assembly (22).

(f) Make the final set-down adjustment as described in paragraph 1.

11. RE-POSITIONING PUSH-OFF ARM (5).

This must be carefully done if set screws are loose or push-off arm (5) has been removed.

(a) Rotate the record support to the 10-inch position. Remove push-off arm (5).

(b) Manually slide the push plate (7C) over the rotating plate (7B) until a piece of metal 3/32 inch in diameter or a #8-32 Bristol wrench can be inserted into the opening at the front of the center slot in the push plate (see "A", Figure 6). If the 12-inch push-off is faulty with this setting, try using a 1/16" piece of metal or a #6-32 Bristol wrench.

(c) Put the changer into cycle and manually rotate the turntable until the riser plate (37) has traveled along the guide rods (51A) to a position furthest away from the turntable.

(d) Now position push-off cam and shaft assembly (42) so that it is held tightly against riser plate motion bracket (37A).

(e) Put push-off arm in position, leaving about 1/16" clearance between the top of the push plate and the push-off arm.

(f) Tighten set screws in push-off arm.

12. CHANGER REPEATEDLY GOES THROUGH CHANGE CYCLE WITHOUT PLAYING RECORD.

(a) Mounting screws on eccentric cam (61) may be loose. Tighten.

(b) Cushion spring (34) has slipped out of position and is on wrong side of riser plate tab (37B). Re-position spring. (See Figure 6).

(c) In normal operation, the trip spring (35) holds the arm control plate (36) against the riser plate (37). If the trip spring is faulty, it permits the arm control plate to rise too high above the riser plate. This causes the reject catch (62) to pass underneath the stop tab (36A). To correct, bend the legs of the trip spring closer together. If necessary replace trip spring.

(d) Eccentric cam (61) is bent so that reject catch (62) passes underneath stop tab (36A) on the arm control plate (36). To correct, straighten cam by putting changer out of cycle and pressing upward on cam near reject catch.

13. NEEDLE SLIDES ACROSS PORTION OF RECORD AFTER SET-DOWN ON 12-INCH RECORD.

Cushion spring (34) has slipped out of position and is on wrong side of riser plate tab (37B). Re-position spring. (See Figure 6).

CRESCENT INDUSTRIES, INC. MODEL C200

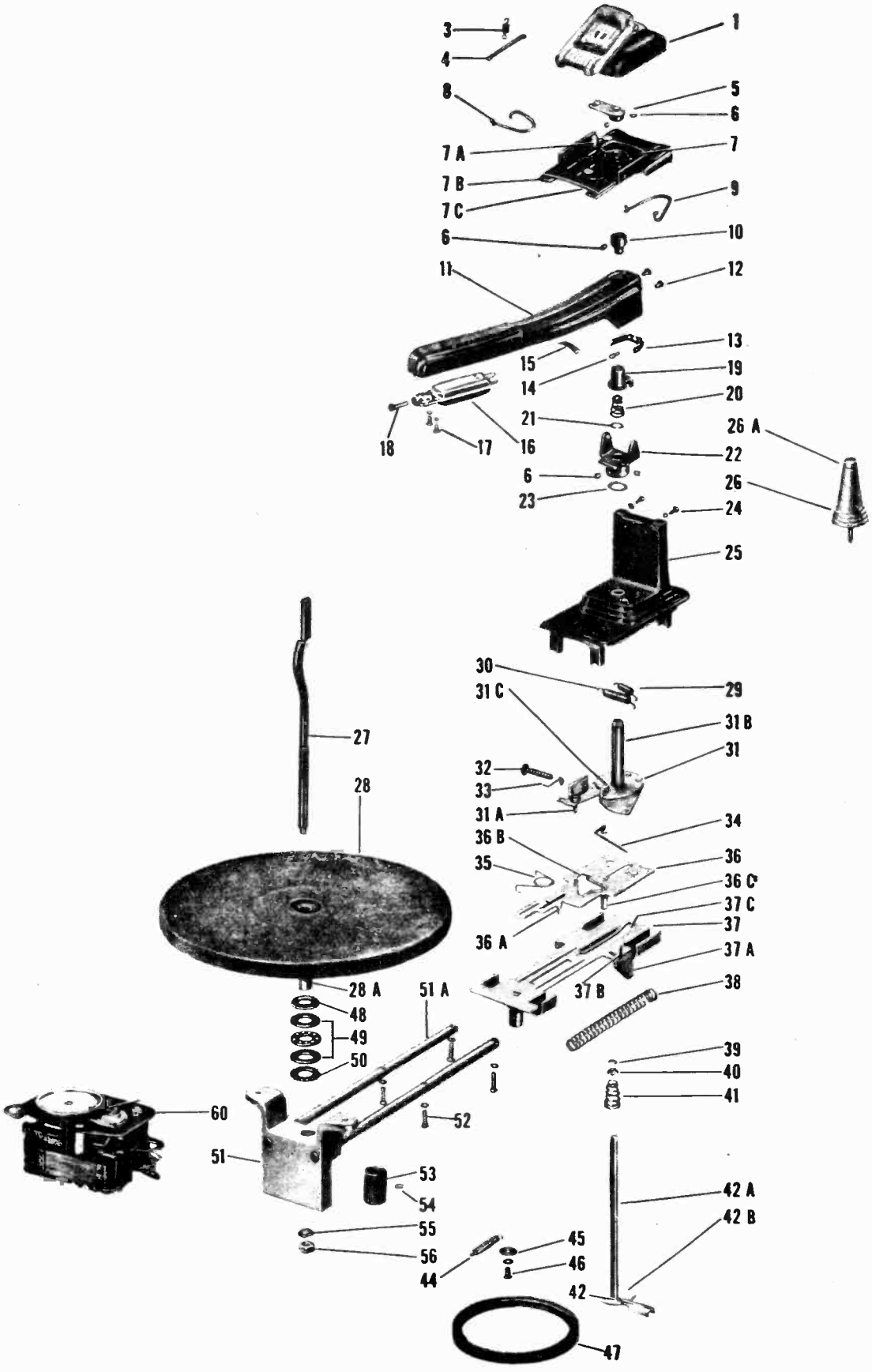


FIGURE 7. RECORD CHANGER, EXPLODED VIEW

MODEL C200

CRESCENT INDUSTRIES, INC.

SERVICE PARTS LIST

C 200 RECORD CHANGER

See Exploded View Figure 7 for Identification of Parts.

Ref. No	Part Number	Description
1	G400A13	Cover assembly (Includes 3 and 4)
3	405A4	Spring, record clip
4	414A4	Spring rod (record clip)
5	G400A66	Push-off arm assembly (When replacing, refer to paragraph 11)
6	1A44-38	Set screw (Bristol ☰6-32x3 16")
7	G400B68	Head assembly (Includes 7A, 7B, 7C, 7D, 8 and 9)
7A		Push plate pin (Part of 7)
7B		Rotating plate (Part of 7)
7C		Push plate (Part of 7)
7D		Head mounting plate (Part of 7)
8	405A38	Spring, push plate (Located on top of push plate)
9	405B18	Spring, head mounting plate (Located on bottom of head mounting plate assembly)
10	402A57	Lift adjusting collar (When replacing, refer to paragraph 9)
11	G400B93	Pickup arm, pivot spring and arm lift bearing pin assembly (Does not include 15 or 16)
12		Rivet (pickup arm pivot spring)
13		Pivot spring (pickup arm) — Supplied as a group only; order part number 98A1
14		Arm lift bearing pin
15	405A13	Spring clip (pickup arm)
16	409A3 409A2 409A1	Pickup cartridge Pickup cartridge — Interchangeable Pickup cartridge
17	42-250-C2-47	Screw (Fil.H.M.S. ☰4-40x1/4", for mtg. cartridge)
18	402A43	Needle screw for cartridge
19	G400A86	Pickup arm lift assembly
20	405A46	Brake spring (5 turns)
21	405A37	Retaining ring (Used on arm support tube 31B)
22	G400A73	Pickup arm support assembly (When replacing, refer to paragraph 10)
23	405A27	Washer, spring
24	65-312-C2-47	Screw (B.H.M.S. ☰6-32x5 16"; for mtg. assembly 7)
25	G400C11	Base (die cast)
26	G400A8	Arm rest assembly
26A	403-B8-4	Reject button
27	G400B21	Centerpost
28	A400B7	Turntable
28A		Turntable shaft (Part of 30)
29	405A41	Safety spring
30	405-A49	Set-down spring
31	G400A84	Arm control assembly
31A		Arm control pin (Part of 31)
31B		Arm support tube (Part of 31)
31C		Bracket (Part of 31)
32	402-A60	Adjusting screw
33	405A44	Lock spring (set-down adjustment)
34	405A45	Cushion spring
35	405A43	Trip spring
36	G400A112	Arm control plate
36A		Stop tab (Part of 36)
36B		Track (Part of 36)
36C		Size change stop (Part of 36)
37	G400A88	Riser plate assembly
37A		Riser plate motion bracket (Part of 37)
37B		Riser plate tab (Part of 37)
37C		Inclined track (Part of 37)
38	405A9	Spring, recoil

Ref. No	Part Number	Description
39		Retaining ring (arm lift shaft)
40		Safety collar (arm lift shaft) — Furnished as an assembly only; order part number G400A98
41		Spring (arm lift shaft)
42		Push-off cam and shaft assembly
42A		Arm lift shaft (Part of 42)
42B		Push-off cam (Part of 42)
44	405A47	Spring, eccentric cam
45	4B1-57-47	Flat washer (eccentric cam)
46	84-250-C2-21	Screw (R.H.M. ☰8-32x1/4"; for mtg. eccentric cam)
47	406A1	Rubber tire, eccentric cam
48	412A1	Cork washer (3 32" thick)
49	415A2	Thrust bearing assembly (Replace as a unit)
50	412A9	Cork washer (3 64" thick)
51	G40087	Turntable mounting and guide rod assembly
51A		Guide rods (Part of 51)
52	62-500-C2-21	Screw (Fil.H.M.S. ☰6-32x1/4"; for mtg. guide rod)
53	402A5	Knurled roller, turntable shaft
54	1A44-13	Set screw (Bristol ☰8-32x1/16"; for knurled roller)
55	3B1-29	Lockwasher, split (1/4" diameter)
56	402A41	Hex nut (1/4"-20; used on centerpost)
60	407-B1	Motor, complete, 105-125 volt 60 cycle (Motors 407-B2, 407-B3 and 407-B4 are interchangeable with 407-B1)

The following parts are not identified in exploded view, figure 7.

61	G400A117	Eccentric cam and tire assembly
62	401-A97	Reject catch (Part of 61)
63	402-A64	Reject catch stop (Part of 61)
64	402-A65	Reject catch stud (Part of 61)
65	405-A50	Reject catch support spring (Part of 61)
66	405-A15	Hairpin spring
67	G400A115	Reject lever assembly
68	405-A25	Reject lever spring
69	G400A116	Reject mounting plate and arm assembly
70		Reject arm (Part of 69)
71		Reject mounting plate (Part of 69)
72	405-A25	Reject arm spring
73	401-A200	Flat washer
74	401-A75-2	Flat washer
75	60-875-C2-2	Screw (R.H.M.S. ☰6-32x7/8"; used for mounting motor to metal base)
76	3B1-25-47	Lockwasher ☰6
77	406-A2	Rubber grommet
78	62-500-C2-21	Screw (F.H.M.S. ☰6-32x1/2"; used for mounting record changer to metal base)
79	29A2-4-21	Spacer, mounting
80	406-A3	Rubber washer
81	3B1-26-47	Lockwasher ☰8
82	80-875-C2-21	Screw (R.H.M.S. ☰8-32x7/8"; used for mounting record changer to metal base)
83	96A1-12	Spaghetti (.101 I.D.x1" long)
84	96A1-15	Spaghetti (.250 I.D.x3 1/2" long)
85	413-A3-2	Shielded output cable
86	414-A12	Reject trigger wire
87	77B1-44	Switch, on-off (standard on some models)
88	401-A103	Switch escutcheon plate
89	401-A80-C	Mounting strap, used for mounting record changer to metal base

EMERSON RADIO & PHONO. CORP.

PART 819003

The various models of Emerson phonoradios are equipped with several types of automatic record changers, each similar in appearance and function, but with different identifying characteristics. Before attempting to service or adjust a record changer, examine the exterior-view photograph in these notes and compare it with the record changer you are about to service to make sure you are using the proper service instructions.

OPERATING PROCEDURE

AUTOMATIC OPERATION

Loading

1. Turn the set on and the volume up and set the selector knob in the position for phonograph operation.
2. Turn the Spindle Cap (2) until is is as completely OUT OF LINE with the Spindle (3) as possible.
3. If ten-inch records are to be played, rotate the Record Support (4) to the left, and for twelve-inch record operation rotate the Record Support to the extreme right.
4. Insert a maximum of 12 ten-inch records or 10 twelve-inch records on the Spindle shoulder and Record Support.
5. Swing the Hold-Down Finger (5) so that it rests on the top record.

Starting

To start operation, push the Starting Switch (6) to the ON position, then depress the switch button as indicated for reject.

Reject Records

To reject a record, depress the Starting Switch button as indicated on the switch housing.

Shut Off

1. Remove any records remaining on the Record Support.
2. Depress the Starting Switch as indicated for reject and allow the Pickup Arm (1) to reset on the record.
3. Gently lift the Pickup Arm and return it to the Rest Post (8).
4. Push the Starting Switch to the OFF position.

Unloading

1. Rotate the Spindle Cap until it is aligned with the Spindle.
2. Turn the Hold-Down Finger aside.
3. Lift the records, tilting them slightly to clear the Record Support.

MANUAL OPERATION

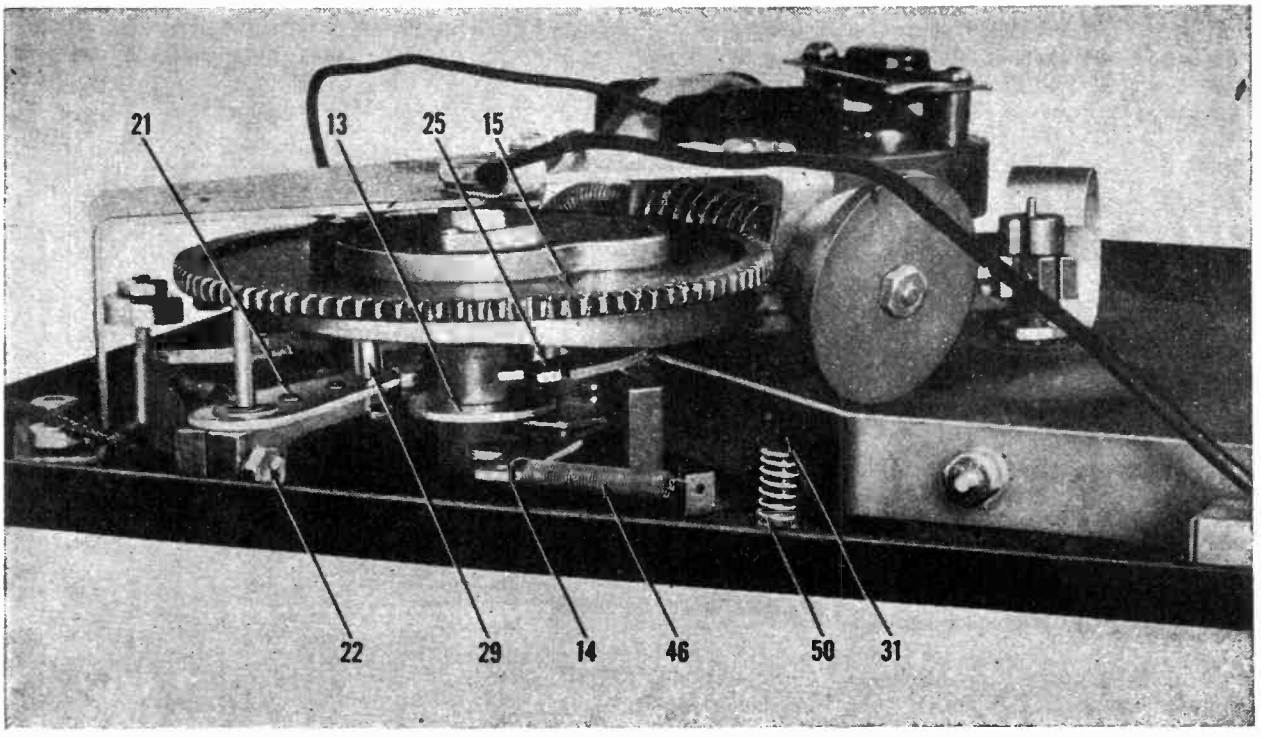
Starting

1. Turn the set on and the volume up and set the selector knob in the position for phonograph operation.
2. Make sure the Spindle Cap is aligned with the Spindle and place the record over the Spindle and on the Turntable.
3. Push the switch to the ON position.
4. Place the Pickup Arm on the outer edge of the record to start operation.

Shut Off

1. Allow Pickup Arm to complete its cycle and reset on the record. Gently lift the Pickup Arm and return it to the Rest Post.
2. Push the Starting Switch to the OFF position.

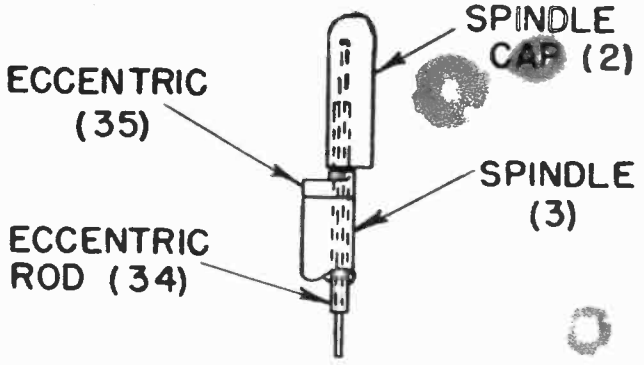
PART 819003 EMERSON RADIO & PHONO. CORP.



OPERATING CAUTIONS

This record changer has been sturdily constructed to give a maximum of service throughout a long life. In order to receive this service the following precautions should be observed:

1. Do not handle the Pickup Arm or mechanism while in cycle. Never use force.
2. Do not bend or strain the Spindle Cap when loading or unloading records.
3. Do not overload the changer. The maximum load is either 12 ten-inch or 10 twelve-inch records. Use modern records in good condition.
4. Keep the Pickup Arm on its rest and remove records when set is not in use.
5. During operation close the cover to reduce mechanical noise If a hum is noticeable, reverse the line plug.



SPINDLE ASSEMBLY

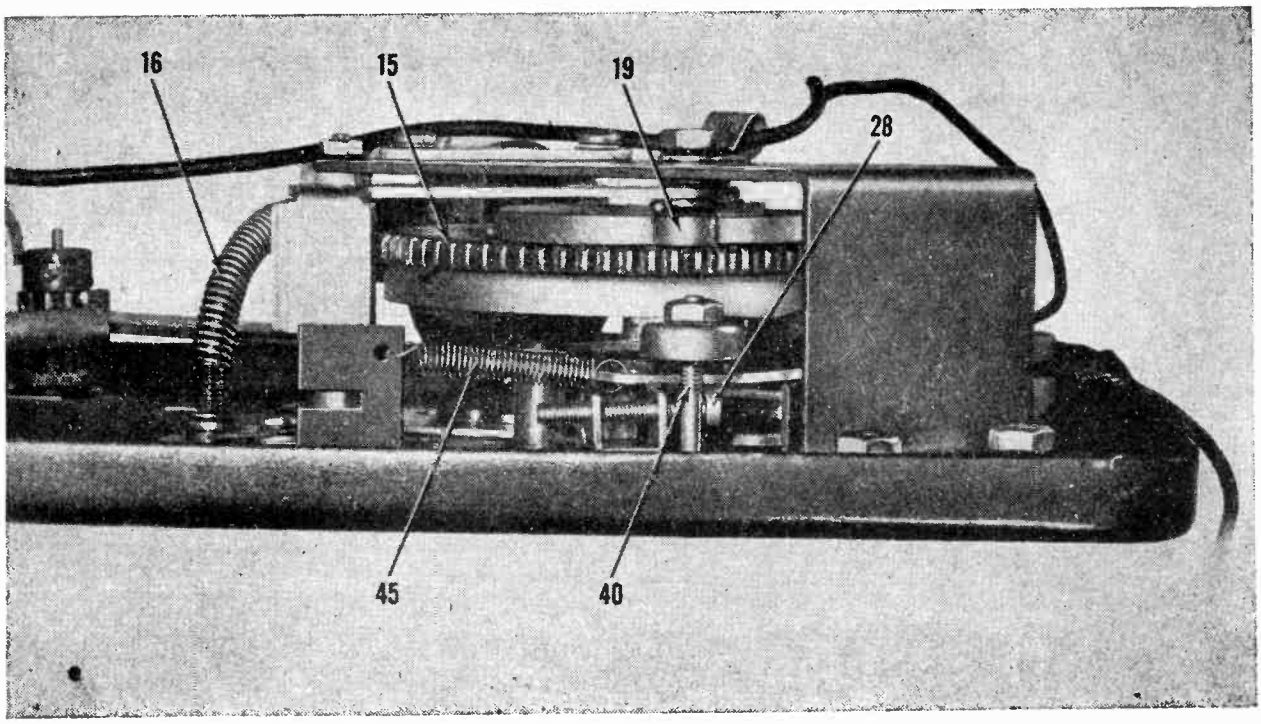
6. The phonoradio is not off when the phonograph is inoperative unless the volume control is in the extreme counterclockwise position.

OPERATING DESCRIPTION

This record changer is an automatic cam-type changer, featuring single-button control and eccentric-spindle record selection.

Starting

After the Single Control Button (6) has been turned ON, thus supplying power to rotate the turntable, automatic cycling may be started by depressing the button. This movement pushes the Trip Bar (31) forward, causing engagement with the Carrier Lever (14) and its attached cycling Drive Wheel (10). The latter thus contacts the rim of the turntable and rotates with it. This motion is transmitted through the Flexible Coupling (16) to the Worm Drive (17), which in turn drives the Main Cam (15).



Cycling

A single revolution of the Main Cam results in complete automatic cycling of the changer. This includes selection of a record from the stack, lifting the Pickup Arm from its rest, and setting the needle on the edge of the record. Upon completion of the revolution, the Automatic Trip Cam (13) engages with the block on the Trip Lever and pulls the Carrier Lever (14) back to its original position so that the cycling Drive Wheel (10) is no longer engaged with the turntable rim.

Record Feed

The lower side of the Main Cam (15) controls record selection. Motion of the Feed Cam Roller (19) about the cam results in a backward and forward movement of the Feed Sector Lever (18), thus engaging the Record Feed Pinion (20). This in turn causes the Eccentric (35) to first rotate to the proper position for record selection and to then return, allowing the record to drop over the Spindle.

Pick-Up Arm Movement

The upper side of the Main Cam (15) controls Pick-Up Arm (1) movement. LIFT is imparted by motion of the Lift Pin along the vertical edge of the cam as the latter rotates. DIRECTION is controlled by engagement of the Main Cam with the Sweep Lever Pinion (29). The Sweep Lever (21) is attached to the Pick-Up Arm by means of a clamp (22) around the Pick-Up Arm Pivot Sleeve (23). A boss projecting from the upper side of the Main Cam displaces the Stop Lever (25) at the end of the change cycle, thus permitting the Pick-Up Arm to proceed across the record.

Positive Trip Action

As the Pick-Up Arm approaches the Spindle, the Sweep Lever (21) hits the Positive Trip Screw (28) mounted on the Trip Lever. This action reengages the drive wheel with the turntable rim and starts a new cycle.

Ten-Inch or Twelve-Inch Operation

Adjusting the Record Support (4) to the ten-inch or twelve-inch position lowers the Selector Rod (40) a definite degree. The length of the extension of this rod determines the positioning of the Stop Lever (25). The latter is the means of regulating the distance the Sweep Lever (21) and its attached Pick-Up Arm travel before the arm is lowered to the edge of the record.

ADJUSTMENTS

Positive Trip

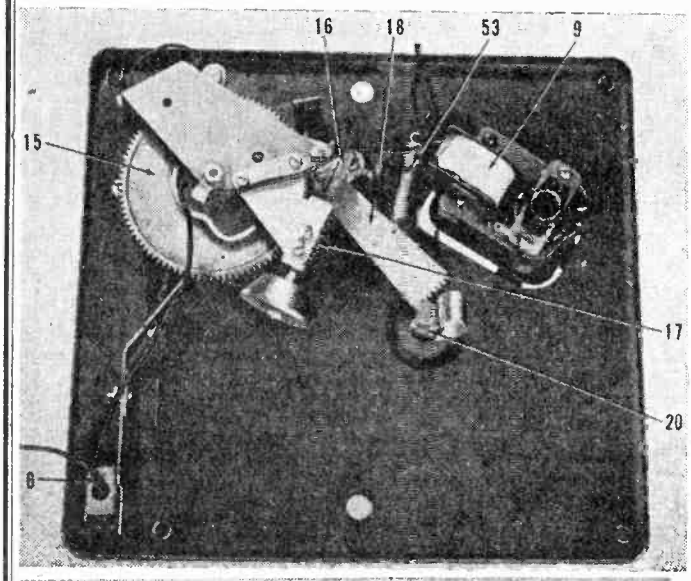
The tripping point of the changer may be readjusted by positioning of the Positive Trip Screw (28). Turn the screw clockwise to delay tripping and counter-clockwise to trip earlier in the playing cycle.

Pick-Up Arm Drop Point

An external strain exerted on the Pick-Up Arm may alter the drop point. To adjust, loosen the screw on the Sweep Lever Clamp (22) slightly and reposition the Pick-Up Arm with respect to the Sweep Lever (21).

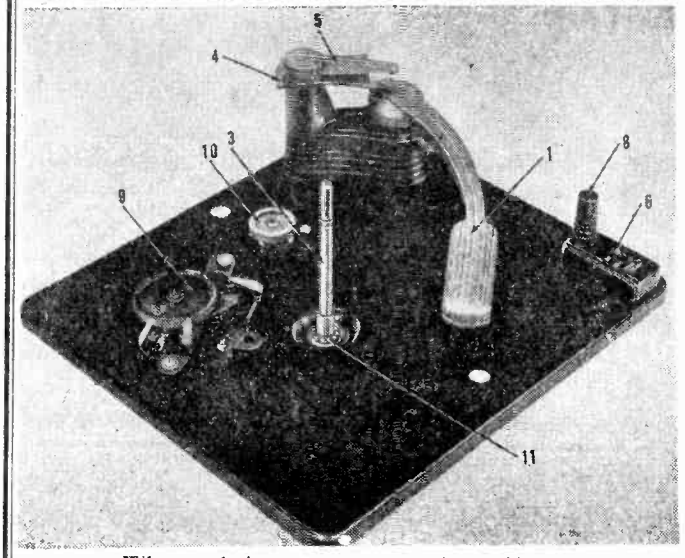
PART 819003

EMERSON RADIO & PHONO. CORP.



Needle Replacement

A special long-life needle is provided with the record changer. On most models the needle can be replaced by inserting a small screwdriver through the opening at the front of the Pick-Up Arm and loosening the set screw on the crystal cartridge. On some pickup arms, however, no opening is provided and needle replacement can be accomplished by removing the crystal cartridge. Simply unscrew the two round-head screws to unfasten the cartridge.



Slipping and Stalling

If the turntable slips [due to slipping of the Motor Wheel (9)] or stalling in cycle is encountered [due to slipping of the Cycling Drive Wheel (10)], align the Spindle Cap and lift off the turntable. With a clean cloth soaked in carbon tetrachloride or other suitable solvent, remove all traces of grease from the inside rim of the turntable, from the small motor shaft, and from the two rubber-rimmed wheels.

REPLACEMENT PARTS

When ordering, state part numbers. List price each as of January 1, 1946, subject to change without notice.

Reference Symbol	Part Number	
11	280450	Bearing
3	280460	Spindle
5	400090	Record Stabilizer Finger
6	510380	Single-Button Control Switch
10	400080	Cycling Drive Wheel
16	587180	Flexible-Coupling Spring Assembly
19	280480	Feed Cam Roller
—	280490	Lift Pin
—	587190	Counter-Balance Spring
—	587200	Finger Spring
—	587210	Mounting Spring
45	587220	Stop-Lever Spring
46	587230	Trip-Lever Spring
—	587240	Pull-In Spring
50	587250	Trip-Bar Spring
53	587260	Record-Feed Spring
—	587270	Carrier-Lever Spring
—	587280	Index Spring
—	413460	Turntable
9	400100	Motor Wheel
—	820034	Pickup Cartridge, less needle
9	819013	Motor, 110 V., 60 cycles
9	819014	Motor, 110 V., 25 cycles
9	819015	Motor, 220 V., 50 cycles
9	819016	Motor, 220 V., 25 cycles

FARNSWORTH TELEV. & RADIO CORP. MODEL P51
P56, P56MP

DESCRIPTION OF P-56, P-56MP and P-51 RECORD CHANGERS

TRIP ASSEMBLIES— P-56, P-56MP and P-51 Record Changers are identical with the exception of the trip mechanism. The P-56 and P-56MP trip finger follows the movement of the tone arm inward until the changer is tripped. The tripping of the P-51 changer depends upon the velocity of the tone arm moving the trip finger through spring tension.

THE LATEST CHANGER—Model P-56MP, has a top tone arm adjustment, magnetic pickup, and tone clarifier for optimum tonal reproduction from old, new and high fidelity records. Response to every tone value is achieved by the sensitive magnetic pickup and light weight tubular non-resonant tone arm. Critical needle set-down adjustment is facilitated through the provision of the top tone arm adjustment screw. Gray flock covered turntable and burnished record support shelves enhance the appearance of the changer. Other features of the P-56 MP are the same as the P-56 changer.

RECORD LOADING—These changers are to be loaded with a maximum of 12 ten-inch or 10 twelve-inch records (not intermixed). The record support shelf assembly (Part No. 13413 fig. 2) is turned to present the shortest distance to the spindle for playing 10-inch records. For 12-inch records, the shelf is rotated one half turn. The tone arm set down is automatically adjusted for the size of record by the position of the record shelf.

In the 10-inch position, the tone arm return lever is free to move inward against the main cam. The tone arm return lever through the correct adjustment of the tone arm crank 54108 (fig. 9) and tone arm bracket and support tube 15123 (fig. 6) imparts movement to the tone arm for the set-down on 10-inch records.

When the record support shelf and cover assembly is turned to the 12-inch position, the angular face of lower part of record support shelf post 57158 (fig. 5) forces the interceptor shaft 561317 down to intercept the movement of the tone arm return lever toward the main cam. The tone arm following the movement of the tone arm return lever is stopped in correct position to set-down on a 12-inch record.

RECORD CHANGING—After the changer is loaded with records, the control lever is moved to reject position to start the record change cycle. Rotation of the main cam will actuate the record lift lever which lifts the spindle and the stack of records so that the shelf lever can move the record supports under the records. The bottom record is moved to the record shelf which moves backward in synchronism with the outward movement of the record support, allowing the record to settle to the turntable. Then the tone arm return lever moves the tone arm into position to be lowered to the record by the tone arm lift rocker. The tone arm moves across the record until the selection is finished and the trip mechanism functions. Finally the tone arm is lifted and carried over the record until clear of the record stack and the next record is released completing one change cycle. In this manner all records in the stack are played.

AUTOMATIC STOP—The weight of the records on the spindle forces the record lift lever to follow the contour of the main cam. When the last selection is played, a spring lifts the record lift lever into position to move the automatic stop pawl outward. The main cam carries the stop pawl into engagement with the switch lever, thus, stopping the changer.

SPRING MOUNTING—The entire changer is floated on spring mountings to eliminate rumble or feedback. These springs insulate the changer from any cabinet vibration occasioned by the sound waves emanating from the speaker. This vibration, if transmitted through the tone arm to the pickup, would be amplified in the audio system of the radio and passed into the speaker again.

The spring mountings also cushion the changer from sudden jars or shocks.

After removing the four palnuts, the record changer may be easily removed from the cabinet by lifting the baseplate upward. Stress should not be placed on the record supports ("flags").

CYCLE OF OPERATION

STUDYING THE CYCLE—The record change cycle consists of the sequence of motions required to move the pickup into position on a record, play the record, remove the pickup and place a record into position. Since movements of various parts are being performed simultaneously, it is impossible to follow all of the actions at one time. A suggested method is to select one certain cycle of operation. For example, the raising of the tone arm, moving it over the record and the replacement on the record may be studied while running the changer slowly by hand. After the motions associated with the tone arm are understood, another portion of the changer may be observed.

The change cycle of the P-56, P-56MP and P-51 changers are identical. The construction of the tripping mechanisms differ as explained in the following paragraphs. It should be noted that the adjustments of each type of trip mechanism requires a different method of approach.

TRIP FINGER—The trip finger used on the P-56 and P-56MP is secured to the tone arm support tube and follows the movement of the tone arm. When the tone arm reaches a predetermined point, the trip finger spring touches the starting lever, moving it to contact the starting pawl on the spindle gear.

The trip finger on the P-51 is separated from the collar secured to the tone arm support tube by a spring wave washer. The tension of this spring forces the trip finger against a cork washer. Motion of the tone arm is transmitted through the tone arm crank and cork washer to the trip finger. When the needle enters the trip grooves of a record, the increased velocity of movement impels the trip finger against the starting lever. The starting lever then engages the starting pawl on the spindle.

THE CHANGE CYCLE—The turntable is driven through an idler pulley by the electric motor, the turntable being screwed on the spindle. A gear on the spindle meshes with the main cam gear. Several teeth are left off the main cam to stop it in playing position. After a selection has been played, the trip mechanism moves the starting lever far enough to engage the starting pawl on the turntable spindle. Since the starting lever is part of the main cam assembly, the main cam is moved forward at the right speed and correct distance to permit the gears to mesh properly.

As the main cam rotates, the tone arm lift rocker (561329 fig. 9) lifts the tone arm upward and the tone arm return lever 561354 moves the tone arm over the record. The record lift lever 561328 lifts the spindle and records to permit the shelf lever 561355 to position the record support shelves under the stack of records. Immediately after the support shelves are under the records, the record lift lever lowers the records to the shelves. Record ejector lever 561335 imparts motion to the record plunger arm (56975 fig. 5) which moves plunger 17115 forward to push the bottom record from the spindle offset. The remainder of the stack of records is raised by the record lift lever. The shelf lever snaps the record support shelves from under the bottom record at the same time the record ejector lever withdraws the plunger and shelf assembly, releasing the record which decends to the turntable. At the same time, the tone arm return lever has been returning the tone arm to the record. As the tone arm passes the outer edge of the record, the tone arm lift rocker lowers the pickup needle to the starting groove in the record. The main cam is now in playing position and stops. One change cycle has been completed.

PICTORIAL REPRESENTATION—The following series of photographs, with a corresponding brief explanation of each phase, are inserted to illustrate the movements of pertinent parts of the changer during a change of record cycle.

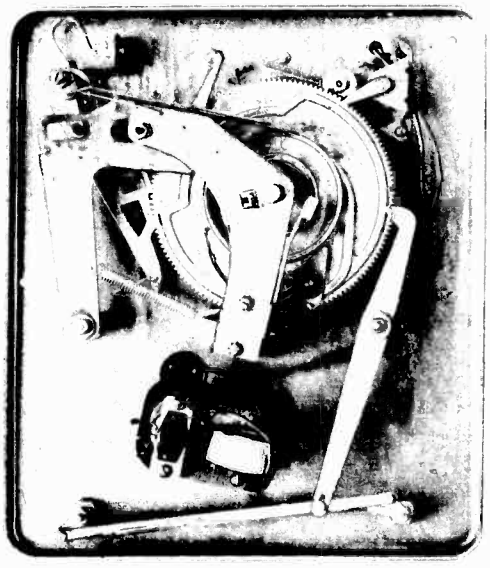


FIGURE A

FIGURE A—The main cam is driven through the spindle gear. When a change cycle is completed, the main cam disengages from the spindle gear because several teeth are left off the main cam gear. The tone arm is in position on the record and free to follow the playing groove. This phase of cycle is called the playing position.

FARNSWORTH TELEV. & RADIO CORP. MODEL P51
P56, P56MP

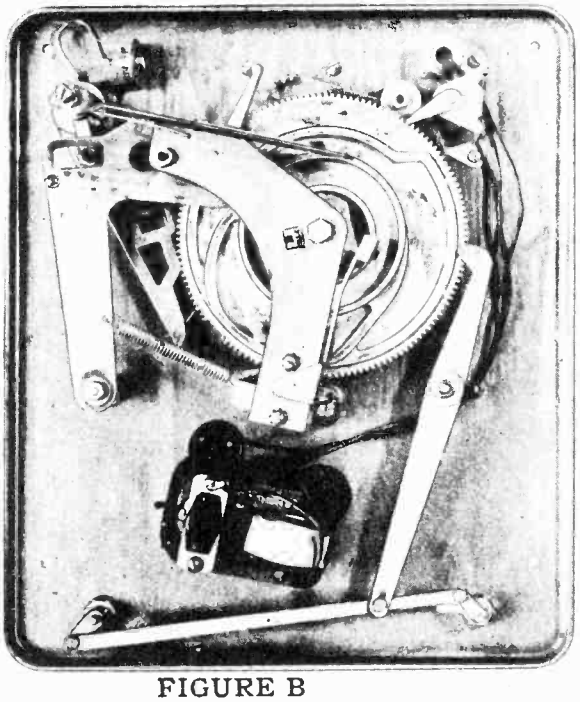


FIGURE B

FIGURE B—The change cycle has just begun. The tone arm lift lever has raised the tone arm from the record and the tone arm return lever has started to move the tone arm away from the turntable. The record lift lever assembly has started to raise the spindle and stack of records resting on it.

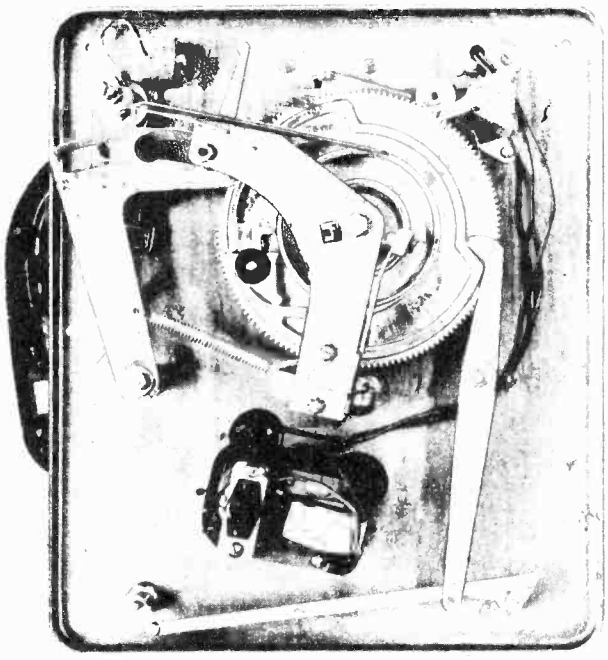


FIGURE C

FIGURE C--The shelf lever has moved in toward the center of the main cam which moves the support shelves in under the record stack. At the same time, the record lift lever has started to lower the spindle and stack of records.

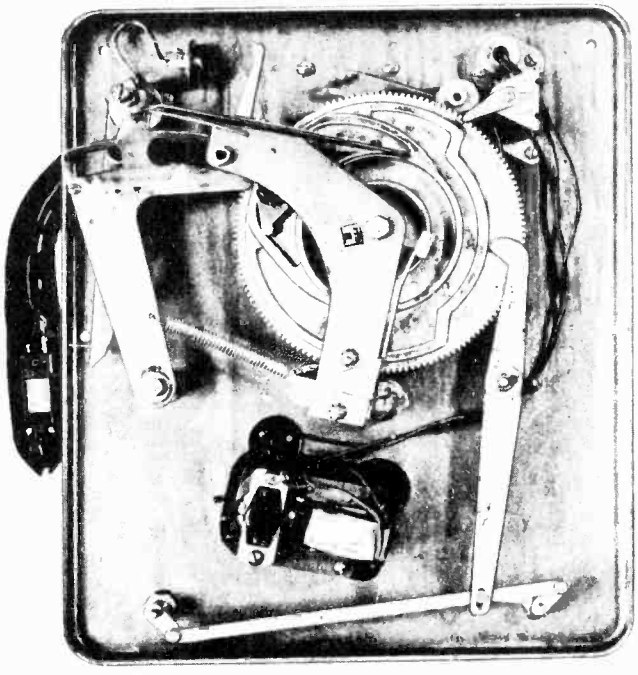


FIGURE D

FIGURE D—The record stack has been lowered to the record support shelves. Simultaneously the bottom record has been pushed off the stationary shelf and rests on the record ejector plunger.

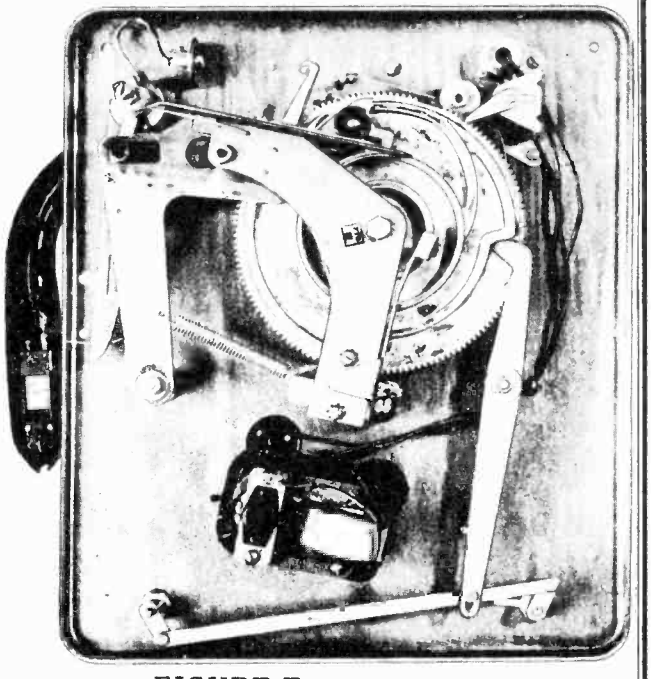


FIGURE E

FIGURE E—The record ejector plunger retracts and at the same time both of the record support shelves move out from under the bottom record which drops to the turntable.

CHANGER LUBRICATION

The record changer should be lubricated and cleaned periodically or when a major part or assembly is replaced. Dirt, old oil or grease may be removed with carbon tetrachloride or other similar cleaning fluid.

Use only a good grade of machine oil with a viscosity of SAE 10.

Care should be exercised to prevent an excess of oil being used on any part and that no oil gets on the velocity trip cork, motor pulley, idler pulley or turntable rim.

Once a year a thin coat of light grease of the vaseline type may be applied to all surfaces of the main cam that contact lift levers and record lift lever roller.

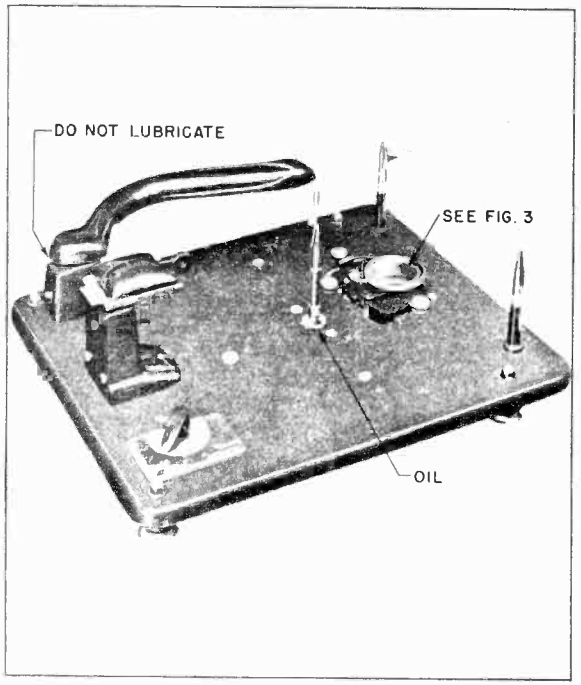


FIGURE G

DO NOT LUBRICATE THE FOLLOWING PARTS:

Tone arm support tube No. 15123.
Tone arm hinge pin No. 561337.
Starting lever assembly No. 58779 or 07329.
Velocity trip assembly.

USE LIGHT MACHINE OIL ON FOLLOWING PARTS:

One drop of oil between turntable drive shaft 13540 and the stationary spindle 15120. (Prevents record latch chatter.)
Idler pulley (see figure 3).
Phono motor (one drop on felt at each end of shaft).
Turntable drive shaft felts No. 92189.
Spindle thrust bearing 56959.
Record lift lever rivet and roller pin.
Tone arm lift lever rivet.
Crank link lever at pivot point.
12" Interceptor shaft at bearing in baseplate.

USE LIGHT GREASE OF VASELINE TYPE AT FOLLOWING POINTS:

Very light film on spindle at turntable drive shaft tube bearing surface.
Main cam tube or stud.
Main cam at gear teeth and cam tracks.
Tone arm return lever No. 561354 at the spacer No. 561350.
At record lift lever and spindle ball.
Indexing spring at point of bearing against pawl on automatic switch shaft.

PRECAUTIONS

Probably the greater part of Record Changer servicing is performed by radio technicians. As a result of his training, little difficulty is presented by invisible electrical troubles. With mechanical devices, much information pertinent to lubrication may be obtained by observation. Obviously, it will be seen that certain parts of rotating or sliding machinery must be lubricated, but it should be realized that other parts depend upon contact surfaces being dry and free from foreign substances, such as grease, so that proper friction exists.

Where lubrication is indicated, it should be applied judiciously, avoiding any excess lubricant that may be transferred or thrown to some part designed for dry operation.

Be sure to use the type of oil or grease recommended for lubricating specified items. Inspect parts not requiring lubrication to make certain they are clean. Cork washers 50204 and 60297 (fig. 16) should be replaced if oil or grease has come in contact with them.

Most owners, as a rule, forget all about lubrication during the time he has the equipment. He thinks of it after something has gone wrong. Consequently, the serviceman should stress the importance of periodic inspections and lubrications.

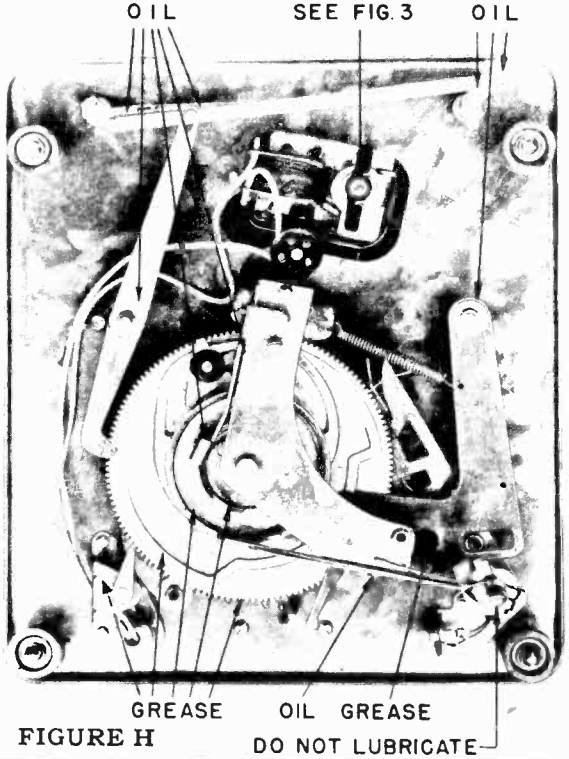


FIGURE H

FARNSWORTH TELEV. & RADIO CORP. MODEL P51
P56, P56MP

PARTS IDENTIFICATION (P-56)

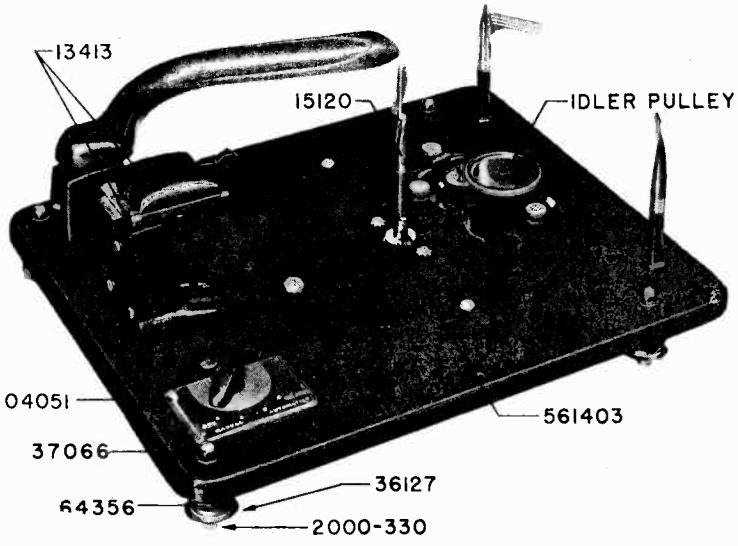


FIGURE 1 Top View

Part No.	Description
04050	Shelf Post
04051	Escutcheon
13435	Turntable
13510	Control Knob Assembly
13540	Turntable Drive Shaft and Gear Assy.
13544	Shelf Cover and Record Hold-Down Rubber Assembly
15120	Spindle Assembly
15127	Record Support and Crank Assembly (R.H.)
15128	Record Support and Crank Assembly (L.H.)
17115	Plunger and Shelf Assembly
59164	Record Support Post
59165	Tone Arm Support
59176	Shelf Cover
2041-135	#6—32x3/8" Allen cup pt. set screw

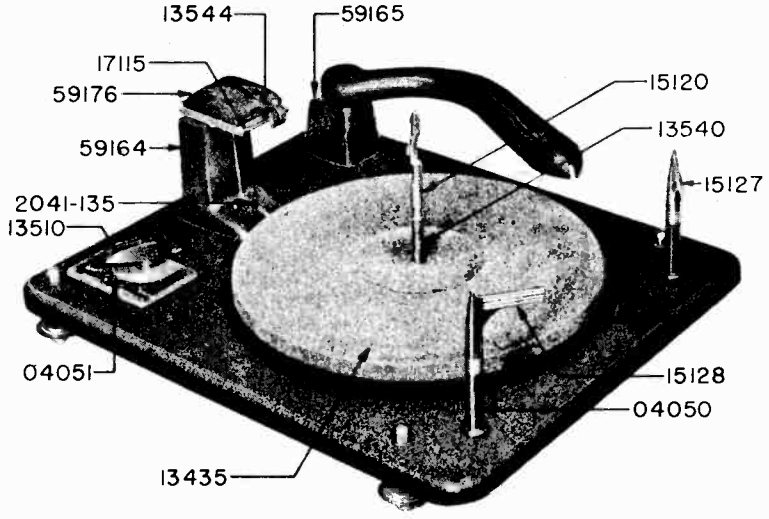


FIGURE 2 Top View with Turntable Removed

Part No.	Description
09217	Mounting Spring Assembly
36127	Cup
36137	Retainer Nut
64014	Upper Spring
64356	Lower Spring
2000-332	#10—32x2 1/8" Rd. Hd. M. S.
04051	Escutcheon
13413	Record Support Shelf and Cover Assembly
15120	Spindle Assembly
37066	Acorn Palnut
561403	Turntable "C" Stop Washer
2041-135	#6—32x3/8" Allen cup pt. set screw

MODEL P51, P56, P56MP FARNSWORTH TELEV. & RADIO CORP.

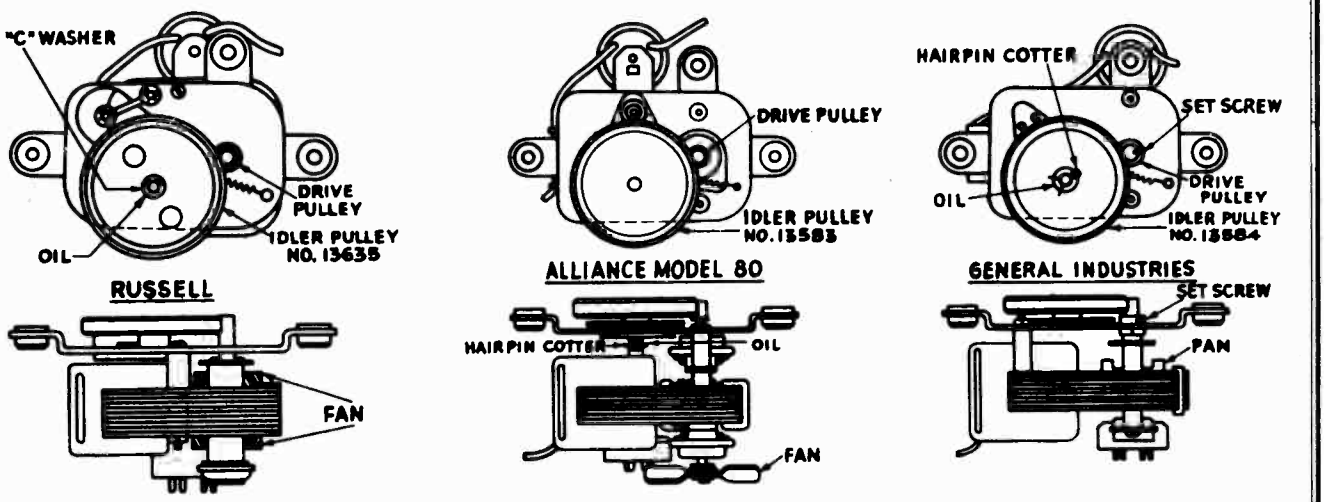


FIGURE 3. P-56 and P-51 Motors

The three makes of motors used on the P-56 and P-51 Record Changers are the Alliance motor the General Industries Motor and the Russell Motor. The complete motors are interchangeable, but it it necessary to identify the make of motor when ordering an idler Pulley or 50 cycle drive pulley Each make may readily be distinguished by noting the location of the fan on the motor and the location of the hair pin cotter or "C" washer holding the Idler pulley as shown in above figure 3.

PARTS LIST FOR FIGURE 4

Part No.	Description
07343	P. U. Socket Assembly
13412	Auto. Stop Switch and Bracket Assembly
15204	Trip Finger and Spring
15127	Record Shelf and Crank Assembly (R.H.)
15128	Record Shelf and Crank Assembly (L.H.)
36849	Hair Pin Cotter
44038	Phono Motor
54108	Tone Arm Crank
57160	Bracket
57247**	Main Cam
64325	Tone Arm Return Lever Spring
64330	Shelf Link Spring
90145	A. C. Switch
561323**	Automatic Stop Pawl
561325*	Shelf Crank Link
561328*	Record Lift Lever
561329*	Tone Arm Lift Rocker
561330*	Tone Arm Stop Lever
561335	Record Ejector Lever
561342	Shelf Crank Rivet
561355*	Shelf Lever
561356*	Tie Plate

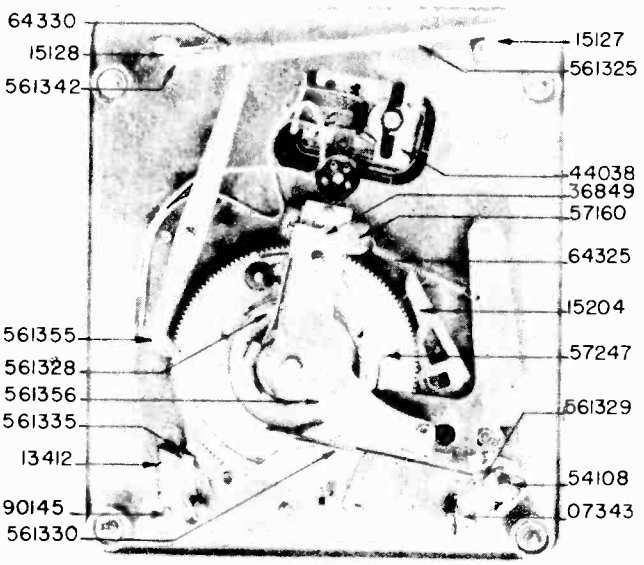


FIGURE 4

BOTTOM VIEW

*Not sold separately. Part numbers 561325, 561355 with R.H. and L.H. cranks sold as assembly #07330. Part numbers 561328, 561329, 561330, 561344 and 561356 sold as assembly #13414.

**Order by assembly No. 07618 which includes 57247, 561323 and 561326.

FARNSWORTH TELEV. & RADIO CORP. MODEL P51
P56, P56MP

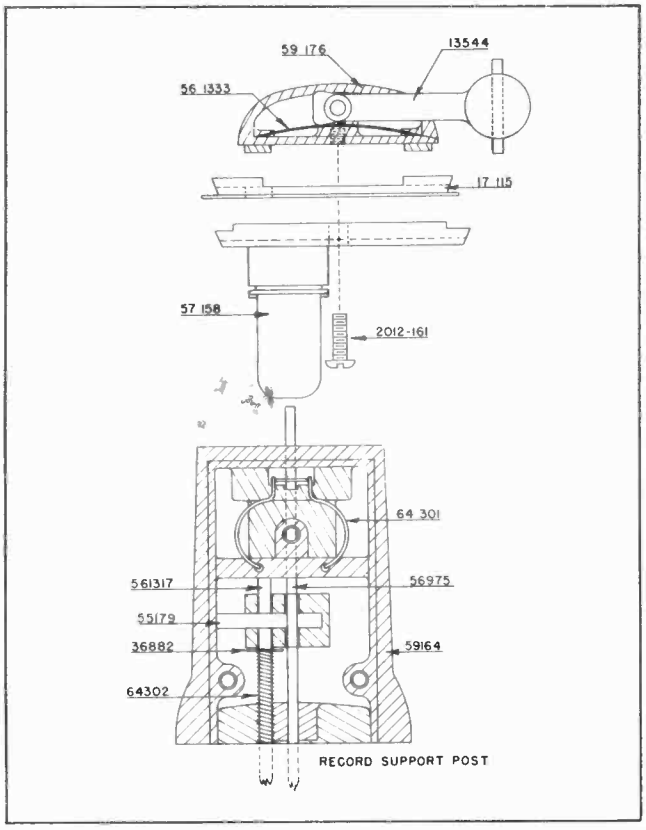


FIGURE 5

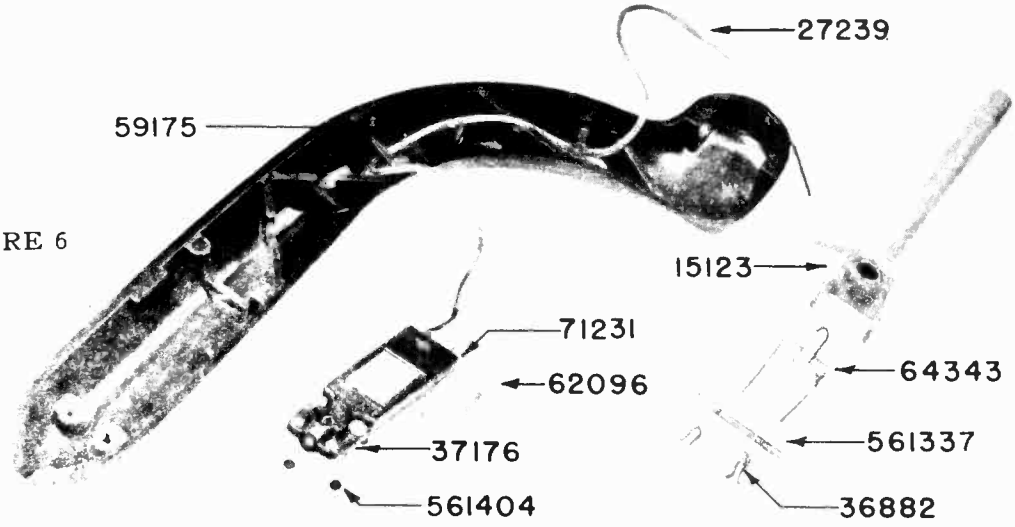
FIGURE 5

RECORD SUPPORT POST AND SHELF

Part No.	Description
13544	Shelf Cover Arm & Record Hold Down Rubber Assembly
17115	Plunger and Shelf Assembly
36882	Hairpin Cotter
55179	Pin
56975	Record Plunger Rocker Arm
57158	Record Support Shelf
59164	Record Support Post
59176	Shelf Cover
64301	Record Support Post Hold Down Spring
64302	Interceptor Shaft Spring
561317	Interceptor Shaft
561333	Shelf Cover Spring
2012-161	#6-32 x 7/16" Bdg. HMS

NOTE:—Record Plunger Rocker Arm 56975 is inserted in the elongated hole in Ejector Plunger No. 17115.

FIGURE 6



TONE ARM ASSEMBLY

Part No.	Description
15123	Tone Arm Bracket and Support Tube Assembly
27239	Shielded P. U. Conductor
36882	Hairpin Cotter Hubbard #111 x .026"
37176	#4-36 x 13/32 RHMS
59175	Tone Arm Housing
62096	P. U. Damping Shim
64343	Tone Arm Spring
71231	Crystal Cartridge
561337	Hinge Pin, Tone Arm
561404	P. U. Spacer

MODEL P51
P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

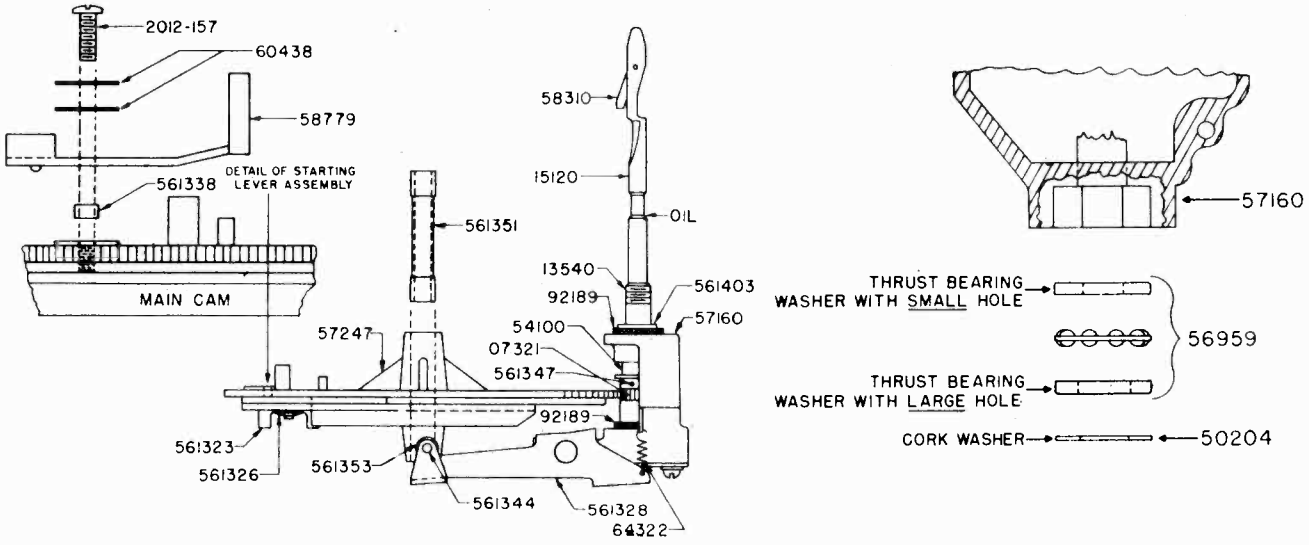


FIGURE 7

MAIN CAM AND SPINDLE SUPPORT BRACKET ASSEMBLY

Part No.	Description
07321	Spindle Gear Assembly
13540	Drive Shaft and Gear Assembly
15120	Turntable Spindle Assembly
50204	Cork Washer 3/8" O.D.
54100	Spacer
56959	Thrust Bearing
57160	Bracket
57247**	Main Cam
58310*	Automatic Record Latch
58779	Starting Lever
60438	Paper Washer
64322	Record Lift Lever Spring
92189	Felt Washer
561323*	Automatic Stop Pawl
561326*	Spring Washer
561328*	Record Lift Lever
561338	Spacer
561344*	Pin
561347	Pin
561351	Main Cam Tube
561353*	Record Lift Lever Roller
561403	Turntable Stop Washer
2012-157	#6—32x5/16" Bdg. HMS

*Not Sold Separately. See page 9.
**Order Main Cam by Assembly No. 07618.

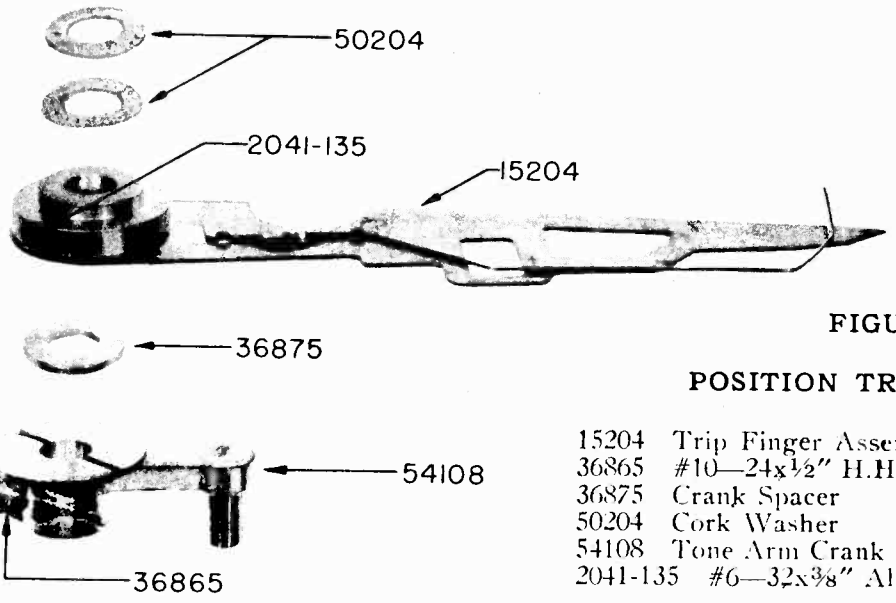


FIGURE 8

POSITION TRIP ASSEMBLY

15204	Trip Finger Assembly
36865	#10—24x1/2" H.H.M.S.
36875	Crank Spacer
50204	Cork Washer
54108	Tone Arm Crank
2041-135	#6—32x3/8" Allen cup. pt. set screw

FARNSWORTH TELEV. & RADIO CORP.

MODEL P51
P56, P56MP

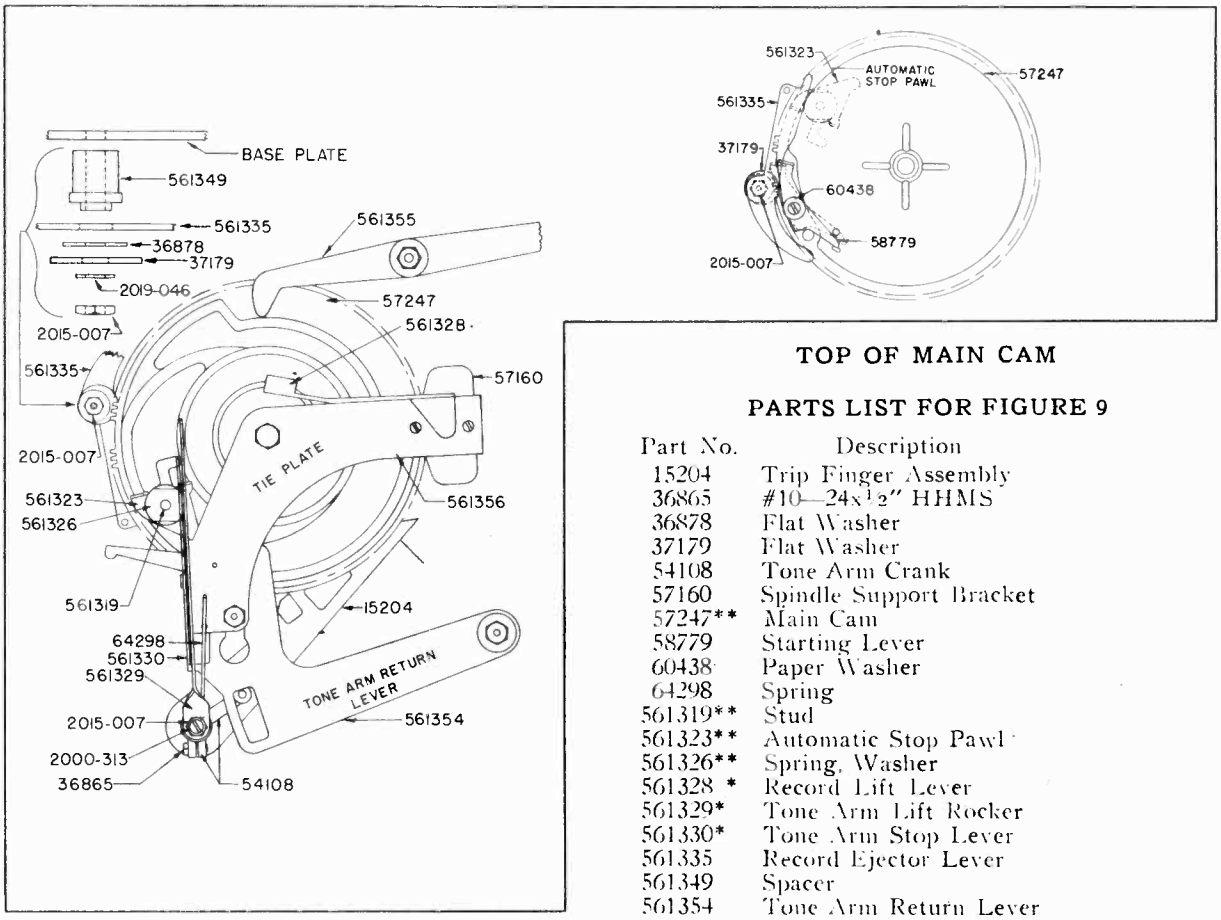


FIGURE 9

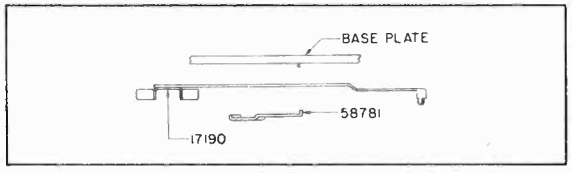
MAIN CAM AND ASSOCIATED ASSEMBLIES

TOP OF MAIN CAM

PARTS LIST FOR FIGURE 9

Part No.	Description
15204	Trip Finger Assembly
36865	#10—24x1/2" HHMS
36878	Flat Washer
37179	Flat Washer
54108	Tone Arm Crank
57160	Spindle Support Bracket
57247**	Main Cam
58779	Starting Lever
60438	Paper Washer
64298	Spring
561319**	Stud
561323**	Automatic Stop Pawl
561326**	Spring, Washer
561328 *	Record Lift Lever
561329*	Tone Arm Lift Rocker
561330*	Tone Arm Stop Lever
561335	Record Ejector Lever
561349	Spacer
561354	Tone Arm Return Lever
561355*	Shelf Lever
561356*	Tie Plate
2000-313	#10—32x1/2" RHMS
2015-007	#10—32 Std. Hex. Nut
2019-046	#10 SP Ext. Lockwasher

*Not sold separately, see note page 9.
**Order by Assembly No. 07618.



17190 Reject Lever Assembly
58781 Reject Lever Clip

PARTS LIST FOR FIGURE 10

Part No.	Description
04111	Record Support Post Cover
15204	Trip Finger Assembly
37179	Flat Washer
54108	Tone Arm Crank
56975	Record Plunger Rocker Arm
64326	Tone Arm Brake Spring
561317	Interceptor Shaft
561320	Tone Arm Lift Rod
561329*	Tone Arm Lift Rocker
561330*	Tone Arm Stop Lever
561335	Record Ejector Lever

*Sold only as part of assembly 13414.

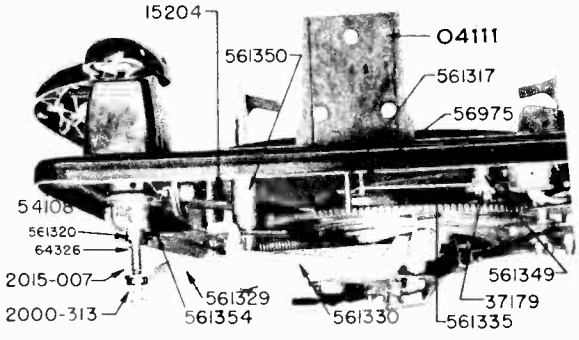


FIGURE 10. Edge View

561349 Spacer
561350 Tie Plate Mounting Spacer
561354 Tone Arm Return Lever
2000-313 #10—32x1/2" RHMS
2015-007 #10—32 Std. Hex Nut

MODEL P51
P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

PARTS IDENTIFICATION (P-56MP)

Five features are to be considered in differentiating the P-56MP changer from the P-56 Model. They are: the top tone arm adjustment; the magnetic pickup and tone arm; the tone clarifier; the motor; and the finish of "flags", turntable and operating controls.

In addition to accessibility, the top tone arm adjustment screw, which is located at the hinged end of the tone arm housing, provides for fine adjusting of needle landing, after the coarse adjustment has been made as described for the P-56.

A variable reluctance magnetic pickup, such as used with this changer will not respond to vertical movement, and, as a result, is not affected by common record surface imperfections. This sensitive magnetic pickup, in combination with the light weight tubular non-resonant tone arm, achieve unsurpassing fidelity of musical response.

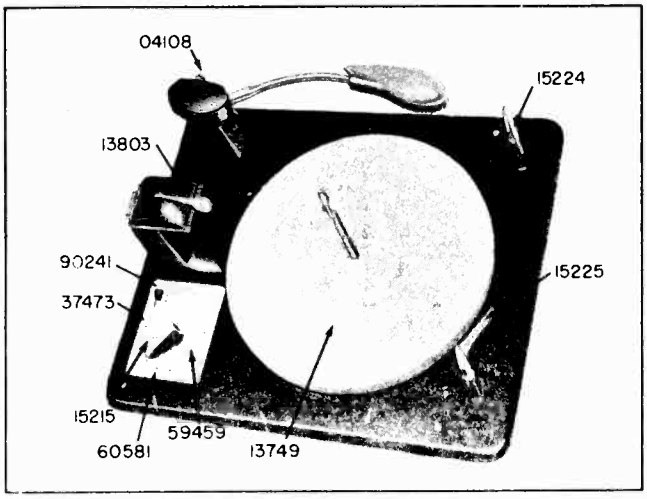
The tone clarifier consists of a resistance capacity network regulated by a three position switch. Set at the corresponding position for the type of record being played, reproduction at high noise-free tonal definition is effected.

A two pole induction motor specifically designed for use with the magnetic pickup drives this changer at constant speed.

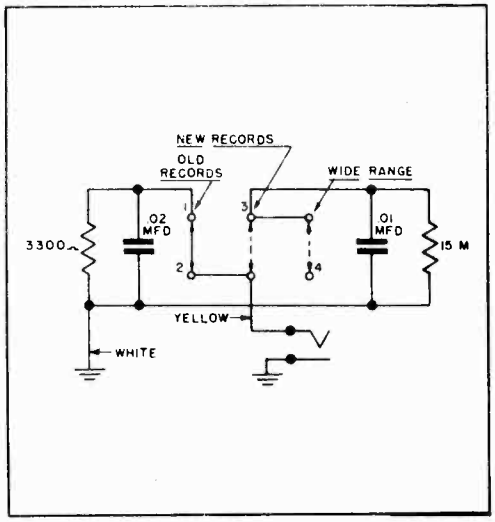
All parts of the P-56MP Record Changer, with the exception of those listed on this page, interchange with the P-56. Servicing data pertinent to the P-56 is applicable to the magnetic pickup equipped model.

P-56MP PARTS LIST

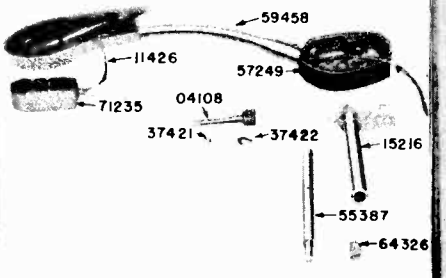
Part No.	Description
04108	Tone Arm Adjustment Screw
11426	Pickup terminal and lead assembly
13749	Turntable
13758	Auto stop switch and Bracket assembly
13759	Record support shelf and cover assembly
13803	Shelf cover arm and record hold down rubber assy.
15215	Control knob and spring
15216	Tone arm support tube and bracket assy.
15224	Record support and crank (R.H.)
15225	Record support and crank (L.H.)
25112	Tubular capacitor .01 mfd. 200V
25276	Tubular capacitor .02 mfd. 200V
37421	"E" Washer (for the tone arm adj. screw)
37422	Spring washer (for the tone arm adj. screw)
37473	#4—36 x 3/16" Phillips oval H.M.S.
44061	Phono motor (less plug)
55386	Tone arm spacer
55387	Tone arm lift rod
57249	Tone arm end
59458	Tone arm tube and plastic head
59459	Escutcheon
60581	Escutcheon background
71235	Magnetic pickup
77210	3300 ohm carbon resistor
77265	15000 ohm carbon resistor
80458	Terminal strip
80468	Phono motor plug
90241	3 position slide switch



TOP VIEW—FIGURE 11



CLARIFIER SCHEMATIC



TONE ARM ASSY.—FIGURE 12

BOTTOM VIEW—FIGURE 12

FARNSWORTH TELEV. & RADIO CORP. MODEL P51
P56, P56MP

PARTS IDENTIFICATION (P-51)

Parts used exclusively in the P-51 record changer are listed below. Their position in the changer is indicated in the illustrations appearing in this section. Other parts are interchangeable with model P-56 and may be identified by reference to section 6. Procedure to be followed in adjusting trip mechanism will be found on page 18, division E of operational adjustments section.

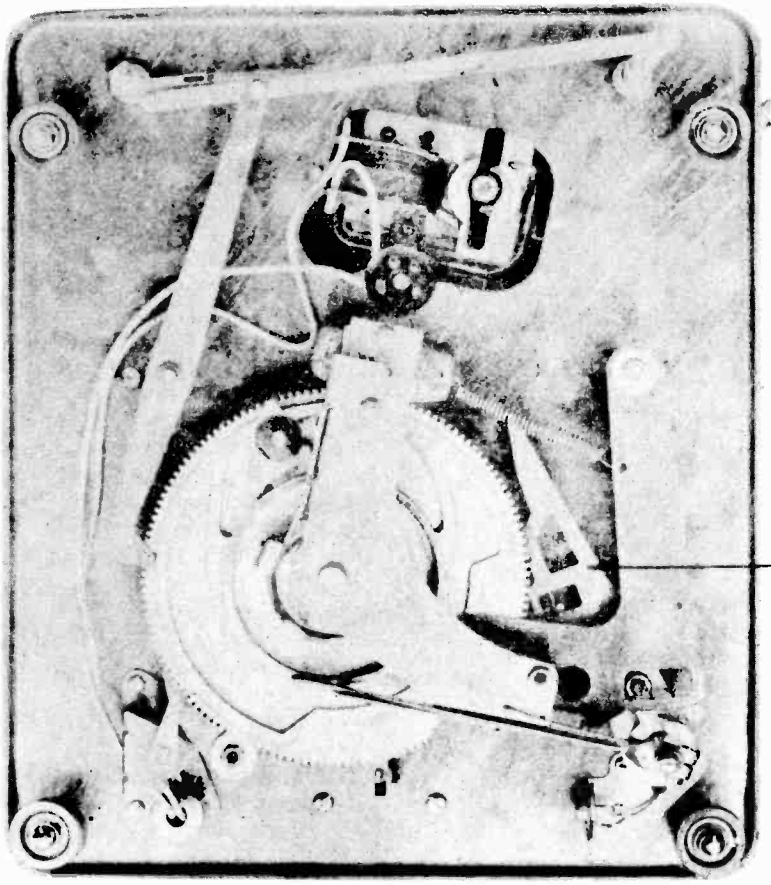


FIGURE 14 Bottom View

P-51 PARTS LIST

Part No.	Description
07329	Starting Lever Assembly
07332	Main Cam Rivet Assembly
15117	Trip Finger and Spring
37157	Tubular Rivet .085 x ¼"
57161*	Main Cam
60297	Cork Washer
62086	Starting Lever Bumper
62094	Starting Lever Sleeve
64327	Reject Rod
561327	Trip Finger Spacer
561340	Wave Washer

*Order by assembly No.07332 which includes cam 57161, stop pawl 561323, spring washer 561326 and stud 561319.

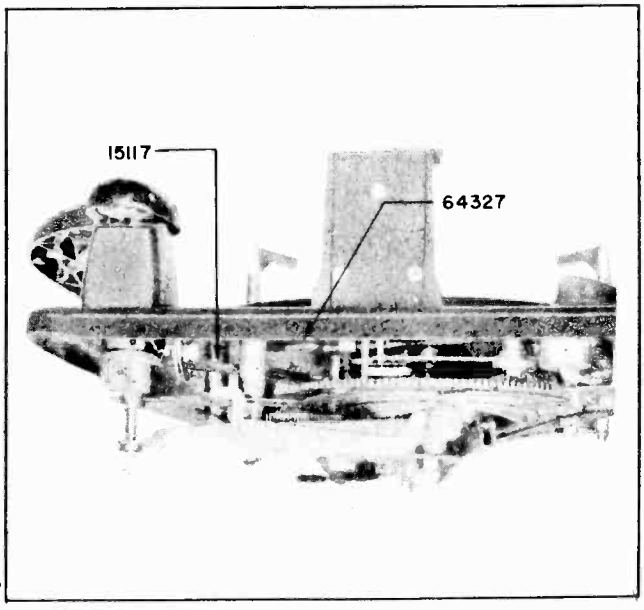


FIGURE 15 Edge View

MODEL P51
P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

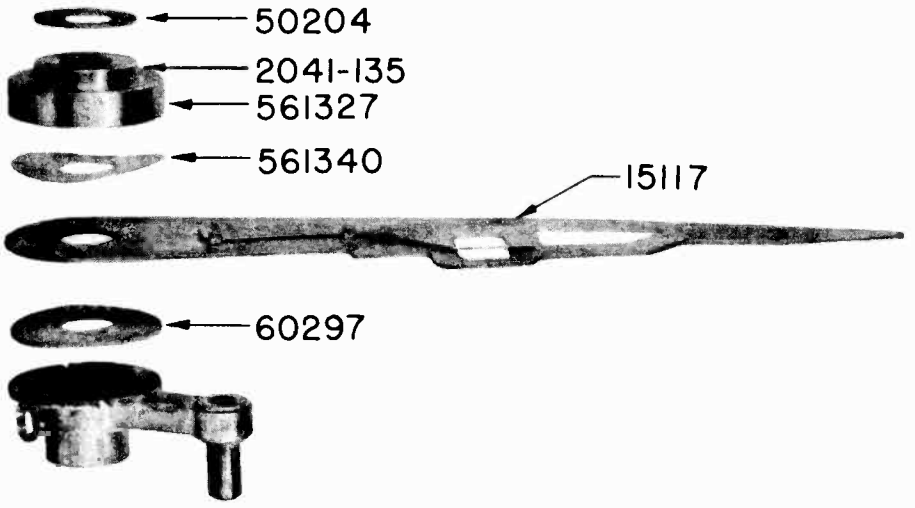


FIGURE 16 Velocity Trip Assembly

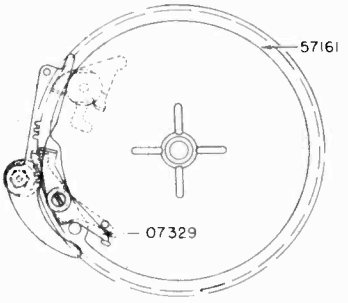


FIGURE 17 Main Cam—Top View

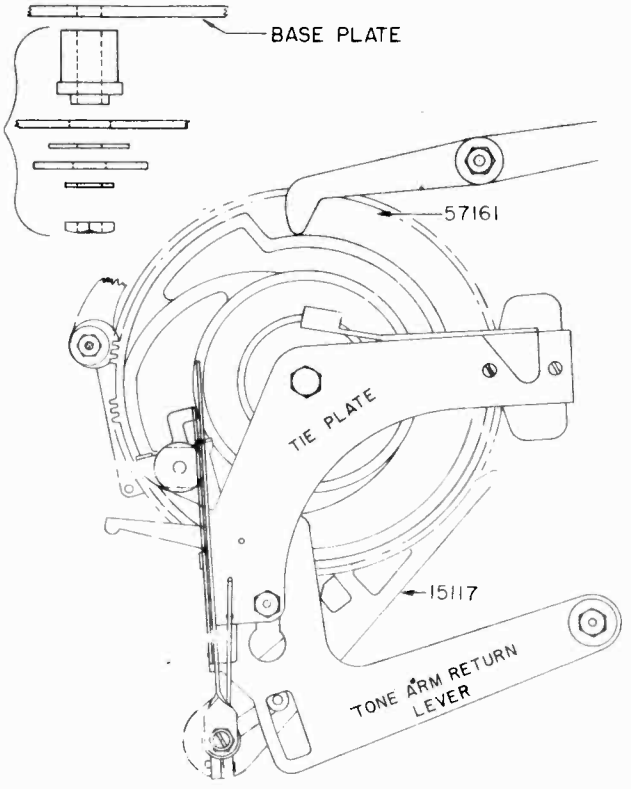


FIGURE 17
Main Cam and Associated Assemblies

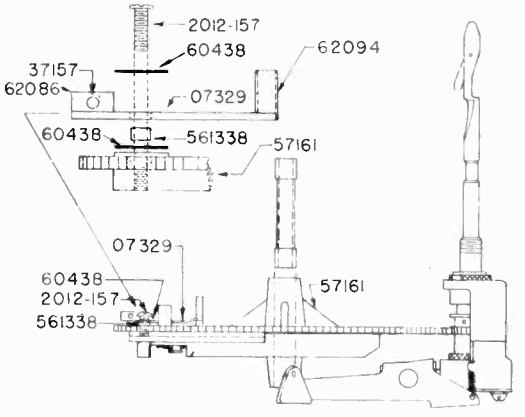


FIGURE 18
Main Cam and Spindle Support Bracket Assembly

REASSEMBLING PARTS

When repairs are being made, a careful check should be made of all moving parts in order to make sure that no binding occurs. Check all moving parts for binding before springs are connected.

All levers which operate on shoulder studs should be assembled with the burred side of the retaining washer away from the lever. This method is necessary to prevent the washer from binding on the lever.

TO REPLACE HOLD DOWN RUBBER ASSEMBLY AND SHELF COVER SPRING

Insert hold-down assembly 13544 into cover as shown in figure 5. Place spring 561333 into position and push other part of shelf cover over spring. Place on shelf and insert screws 2012-161. NOTE: The elongated hole in plunger and shelf assembly 17115 is placed over the round hole in support shelf 57158.

TO REPLACE RECORD SUPPORT POST HOLD DOWN SPRING 64301 (fig. 5)

Insert record shelf 57158 into record support post 59164. Place the open ends of the spring in the holes in support post. With a very small screw driver, lift the spring into the slot in record support post 57158. Hold spring in place with finger, and slip backplate over post WITHOUT RELEASING SPRING from slot.

TO REMOVE AND REPLACE TURNTABLE

The spindle gear may be wedged by a wooden block or a wrapped screw driver between it and the main cam, to prevent it from turning while the turntable is being unscrewed from the spindle (by rotating counter-clockwise). When replacing turntable, see that the "C" washer (No. 561403) remains fully inserted in the turntable shaft and make sure the turntable does not bind on the idler pulley. The turntable may then be properly tightened. The record latch must be entirely in the recess in the spindle to permit the turntable to be replaced. NEVER USE PLIERS TO HOLD SPINDLE.

TO REMOVE IDLER PULLEY (See Figure 3).

After the turntable has been removed, the idler pulley can be removed by slipping off the small hairpin cotter on the end of the idler pulley shaft.

When replacing the pulley a single drop of oil should be used on the pulley shaft.

CAUTION: Do not allow oil to get on either the idler pulley or the turntable rim.

TO REMOVE SPINDLE 15120

Slip out hairpin cotter No. 36849 at the bottom of the spindle.

REPLACING THRUST BEARING

When replacing thrust bearing 56959, the thrust bearing washer having the smaller hole must be placed in the turntable drive shaft bracket 57160 first, so that the shoulder on the turntable drive shaft may rest on the washer. See figure 7.

REPLACING INDEXING SPRING

Move control knob to automatic position and pull off knob. Remove the two screws holding switch assembly to baseplate. Push the reject rod from hole and remove switch assembly. Remove the hairpin cotter from shaft and pull shaft forward so that pawl will not interfere with spring. Replace spring, and booster spring, if used, through slot in the bracket. (The curved part of the spring bears against the pawl.) Hold the spring against bracket away from pawl and push shaft into place. Be sure the lip on the pawl enters the slot in the switch. Replace hairpin cotter and the assembly is ready to be replaced.

SHIPPING CHANGER

A hold down bolt should always be used on each side of the changer to bolt the changer securely to the cabinet while it is in transit. A cardboard spacer ⅛" thick should be placed between the baseplate and cabinet approximately one inch from each shipping bolt. These spacers prevent excessive compression of the mounting springs. The tone arm should also be fastened securely for shipping. Always remove the hold down bolts before putting the changer in operation. After this is done, see that the changer is centered properly in the cabinet, and floats freely on the spring mounts; otherwise, the changer will not properly feed records, and the tone arm will not position properly on the record.

INSERTING PHONO PLUG

The phono input plug must be inserted into the phono socket as far as possible to avoid "grid hum". If hum persists, check ground connection of socket.

MODEL P51
P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

OPERATIONAL ADJUSTMENTS

A. TONE ARM HEIGHT ADJUSTMENT

1. Disconnect power.
2. Load two 10" records on spindle. With mechanism in cycle, rotate turntable by hand until tone arm is at highest point.
3. Loosen locknut 2015-007 and raise or lower screw 2000-313 Figure 10 until distance from top of tone arm to bottom record on stack is 3/16 inch. Tighten locknut.

NOTE: Unless the standard needle furnished is used, the tone arm may not raise sufficiently to clear full stack of 10" records on turntable.

B. RECORD SUPPORT SHELF ADJUSTMENT

1. Loosen the three screws under baseplate which secure the record support post. Turn main cam until space left by missing teeth is over inner screw.)
2. With #6 Allen wrench, adjust set screw (2041-135 fig. 1 at base of shelf post) until spacing between spindle center to edge of record shelf to 4.97 inches, using gauge 58803. If this gauge is not vailable, one may be fashioned from a metal strip with a spindle hole in one end 4.97 inches from hole-center to opposite end. If the changer does not incorporate an Allen screw adjustment, shim the support post under front or rear according to direction desired.
3. Tighten the three below-chassis screws.

C. STARTING LEVER ADJUSTMENT

If washer 37179 Fig. 9 does not move starting lever far enough, the changer will trip as soon as the change cycle is completed. To correct this condition,

1. Loosen locknut 2015-007.
2. Move washer 37179 in toward main cam.
3. Tighten locknut securely after proper adjustment has been made.

Clicking noise from starting lever on P-51 may be stopped by adding another paper washer 60438 to bottom of assembly. Check to see that washers can be turned freely and that the starting lever does not bind.

D. FIXED POSITION TRIP ADJUSTMENT AND NEEDLE LANDING ADJUSTMENT (P-56 and P-56MP)

The trip adjustment and tone arm clearance setting are made concurrently.

1. TONE ARM CLEARANCE
   a. Loosen Allen set screw 2041-135 Figure 8, in trip finger collar.
   b. Run turntable by hand through cycle to play position.
   c. Turn record shelf to 10-inch position.
   d. Insert narrow width .008 feeler gauge (Part No. 88316) between tone arm support post and tone arm support bracket.
2. POSITION TRIP ADJUSTMENT
   a. Hold tone arm so that needle is 13/4 inchs away from spindle. (Changer baseplate in horizontal position.)
   b. Move starting lever against low side of cam on spindle gear.
   c. Move the trip finger in until it starts to move the starting lever.
   d. Tighten the Allen set screw in the collar with the collar tight against the cork washer and remove .008" feeler gauge.
   e. Run the changer through cycle by hand to see that no parts have been displaced which might cause it to jam.
3. NEEDLE LANDING ADJUSTMENT

Before proceeding with adjustment of P-56 MP needle landing, it may be necessary to adjust the top tone arm adjustment screw until the support bracket is centered in the tone arm.

   a. Place 10-inch record on turntable and control lever in automatic position.
   b. Lift up tone arm stop lever 561330 Figure 10, allowing tone arm return lever to go all the way toward main cam.
   c. Place needle in starting groove or 3/32" from outside edge of record.
   d. Loosen hex screw in tone arm crank and move crank against the outer edge of cutout in tone arm return lever.
   e. Tighten hex screw in tone arm crank while holding crank up against trip finger and collar.
4. 12" NEEDLE LANDING will usually not require adjustment. If required, it should be made only after 10" adjustment is correct.
   a. Turn record shelf to 12" position and place 12" record on turntable, Changer in playing position.
   b. Place needle in starting groove or 3/32" from outside edge.
   c. Slightly form tone arm return lever until it touches interceptor shaft.
5. ERRATIC NEEDLE LANDING
   a. Smooth surface of tone arm stop lever where it contacts tone arm return lever.
   b. Check wire leads to see they do not interfere with changer mechanism.

E. VELOCITY TRIP ADJUSTMENT (P-51)

Tone arm clearance must be set before adjusting trip.

FARNSWORTH TELEV. & RADIO CORP. MODEL P51, P56, P56MP

GENERAL PARTS

Part No.	DESCRIPTION
04050	Shelf Post
04051	Escutcheon
04108	Tone arm adjustment screw P-56MP
04111	Record support post cover
05087	Shipping shim assembly
07321	Spindle gear assembly
07329	Starting lever assembly, P-51
07330	Shelf crank and link assembly
07332	Main cam rivet assembly, P-51
07618	Main cam rivet assembly, P-56 and P-56MP
07343	P.U. socket assembly
09217	Mounting spring assembly
09340	Mounting spring assembly P-56MP
11426	Pickup terminal and lead assy., P-56MP
13410	Turntable drive shaft & bracket assy.
13412	Auto stop switch & bracket assy., P-56, P-51
13414	Tie plate assy.
13435	Turntable, P-56, P-51
13510	Control knob assy.
13540	Drive shaft and gear assy.
13544	Shelf cover arm & record hold-down rubber assy.
13583	Idler pulley used with Alliance motor
13584	Idler pulley used with General Ind. motor
13819	Idler pulley for P-56MP motor
13749	Turntable P-56MP
13758	Auto stop switch & bracket assy., P-56MP
13803	Shelf cover arm & record hold down rubber assy., P-56MP
15117	Trip finger and spring, P-51
15120	Spindle assy.
15123	Tone arm support tube & bracket assy. P-56, P-51
15127	Record support and crank (R.H.) P-56, P-51
15128	Record support and crank (L.H.) P-56, P-51
15204	Trip finger assy., P-56, P-56MP
15215	Control knob & spring P-56MP
15216	Tone arm support tube & bracket assy., P-56MP
15224	Record support and crank (R.H.) P-56MP
15225	Record support and crank (L.H.) P-56MP
17115	Plunger and shelf assy.
17190	Reject lever assy., P-56, P-56MP
25112	Tubular capacitor .01 mfd. 200 V
25276	Tubular capacitor .02 mfd. 200 V
27239	Shielded P.U. Lead Wire
36127	Mounting spring cup
36137	Mounting spring retainer nut
36347	#0 x ¼" Drive Screw (used to fasten Escutcheon)
36843	¼—28 x 2⅝ HHM bolt
36844	¼"—28 Hex Half Nut
36847	Driv-Lok pin type B 5/64" Dia x 7/16" Lg. (for shelf crank)
36849	H.P. Cotter (used at bottom of stationary spindle)
36865	#10—24 x ½" HHMS
36867	#10 Flat washer ⅝ O.D. x .062
36875	Crank spacer
36878	Flat washer
36882	H.P. Cotter Hubbard #111 x .026"
36888	#10—32 x 1" Bolt
36914	#10—32 x 2¼ Carriage Bolt
36934	H.P. Cotter (used on A.C. Switch Shaft)
36949	⅜—24 Std. Hex Nut
37066	10-32 Acorn Palnut
37067	Flat Washer
37157	Tubular rivet .085 x ¼"
37176	#4—32 x 13/32 RHMS
37179	Flat washer ⅞ OD x 1 16 thick
37421	"F" washer for tone arm adj. screw P-56MP
37422	Spring washer (for tone arm adj. screw) P-56MP
37473	#4—36 x 3/16" Phillips oval H.M.S. (for escutcheon) P-56MP
41107	Record changer mounting & shipping kit
41117	Kit of 12 paper washers #60438
44038	Phono motor for 60 cycles P-56, P-51
44061	Phono motor (less plug) for P-56MP
50204	Cork washer ¾" OD
54100	Spacer
54108	Tone arm crank
55179	Pin
55258	Tone arm lever positioner
55386	Tone arm spacer P-56MP
55387	Tone arm lift rod P-56MP
55398	Tone arm spacer (used between 15123 and 59165) P-56
56959	Thrust bearing
56975	Record plunger rocker arm
57158	Record support shelf
57160	Spindle bracket
57249	Tone arm end P-56MP
58779	Starting lever P-56, P-56MP
58781	Reject lever clip P-56, P-56MP
58796	Booster spring (used with 561331)
58803	Shelf adjusting gauge

Part No.	DESCRIPTION
59164	Record support post
59165	Tone arm support
59175	Tone arm housing
59176	Shelf cover
59458	Tone arm tube and plastic head P-56MP
59459	Escutcheon P-56MP
60297	Cork washer, P-51
60438	Order by kit (see #41117)
60611	Escutcheon background P-56MP
62086	Starting lever bumper, P-51
62094	Starting lever sleeve, P-51
62096	P.U. damping shim, P-56, P-51
64014	Upper mounting spring
64298	Tone arm lift lever spring
64301	Hold-down spring, record support post
64302	Interceptor shaft spring
64322	Record lift lever spring
64324	Spring, Tone arm stop lever
64325	Tone arm return lever spring
64326	Tone arm brake spring
64327	Reject rod, P-51
64329	Plunger rocker spring
64330	Shelf link spring
64343	Tone arm spring
64356	Lower mounting spring
64471	Tension spring for P-56MP motor
71231	Crystal cartridge
71235	Magnetic pickup P-56MP
77210	3300 ohm carbon resistor P-56MP
77265	15000 ohm carbon resistor P-56MP
80458	Terminal strip P-56MP
80468	Phono motor plug P-56MP
88316	.008 feeler gauge
88317	.013 feeler gauge
90145	Switch A.C.
90241	3 position slide switch P-56MP
92189	Felt washer
561317	Interceptor shaft
561320	Tone arm lift rod, P-56, P-51
561327	Trip finger spacer P-51
561331	Indexing spring
561332	Long spacer (used with 561355 and 561354)
561333	Shelf cover spring
561335	Record ejector lever
561337	Tone arm hinge pin, P-56, P-51
561338	Spacer, starting lever
561340	Wave washer, P-51
561342	Shelf crank rivet
561347	Pin, spindle gear
561348	Washer spacer (used with 561355 and 561354)
561349	Spacer (used with ejector lever)
561350	Tie plate mtg. spacer
561351	Main cam tube
561354	Tone arm return lever
561402	Auto stop switch cover
561403	Turntable stop washer
561404	P.U. Spacer, P-56, P-51
2000-209	#8—32 x ⅜" RHMS
2000-313	#10—32 x ½" RHMS
2000-327	#10—32 x 1½" RHMS
2000-329	#10—32 x 1¾" RHMS
2000-332	#10—32 x 2⅛" RHMS
2003-321	#10—32 x 1" F.H.M.S. (for record ejector lever) P-56MP
2007-053	#3—48 x 3/16" Fil H.M.S. (for tone arm) P-56MP
2012-151	#6—32 x ⅛" Bdg. HMS
2012-157	#6—32 x 5/16" Bdg. HMS
2012-161	#6—32 x 7/16" Bdg. HMS
2012-209	#8—32 x ⅜" Bdg. HMS
2013-107	#4—40 x 5/16" Bdg. HMS (used with #55358) P-56MP
2015-007	#10—32 Std. Hex Nut
2017-005	#10—Sdt. Flat Washer
2019-003	#4 S.P. Int. Lockwasher
2019-045	#8 S.P. Ext. Lockwasher
2019-007	¼" S.P. Int. Lockwasher
2019-046	#10 S.P. Ext. Lockwasher
2041-135	#6—32 x ⅜" Allen cup pt. set screw
2085-219	#6—32 x ⅞" oven H.M.S. (motor and plug mtg.) P-56MP
2091-022	⅛" x 3/16" Tubular rivet (slide switch mtg.) P-56MP

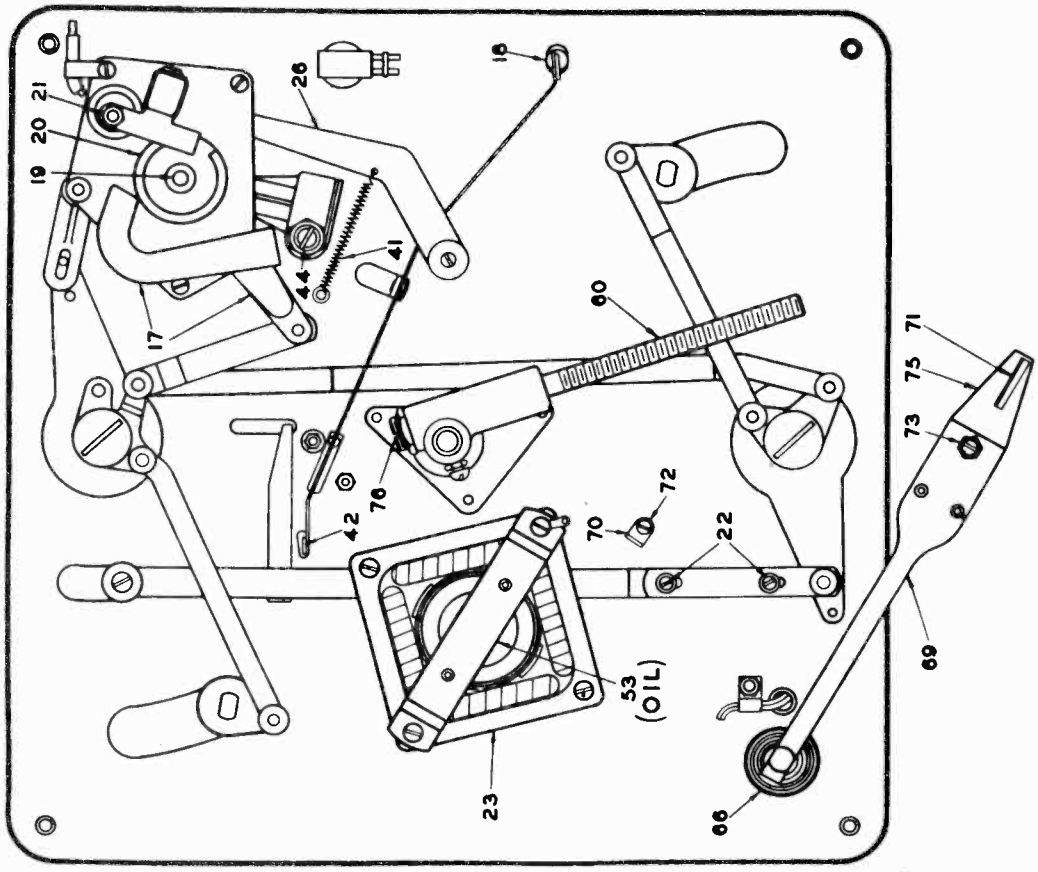
50 Cycle Drive Pulleys (see fig. 3)

64401	50 cycle wire drive pulley for Gen. Ind. motor with metal pulley
64402	50 cycle wire drive pulley for Gen. Ind. motor with wire pulley
64399	50 cycle wire drive pulley for Alliance motor

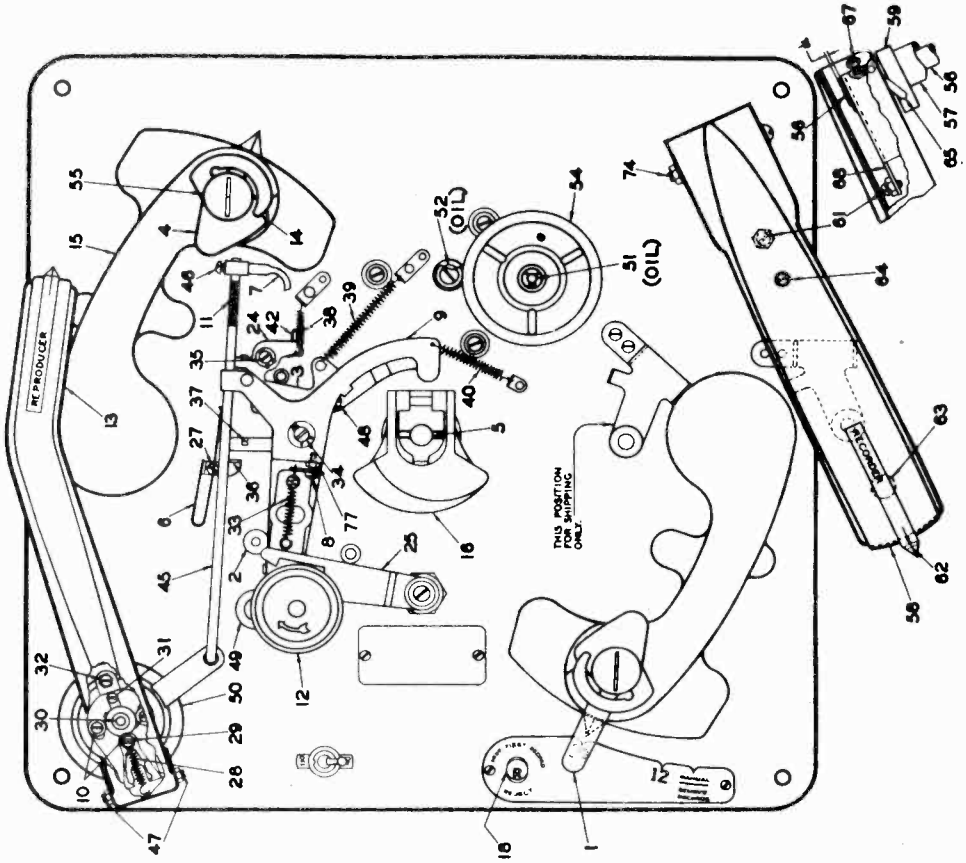
MODELS P51,P56, P56MP

FARNSWORTH TELEV. & RADIO CORP.

Bottom View
MODELS GI-RC130 and RC130L



Top View
MODELS GI-RC130 and RC130L



GENERAL

This record changer is designed to operate from a power source of 105–125 volts at 60 cycles. It will automatically play ten 12-inch records or twelve 10-inch records at a single loading. When the last record is played, the tone arm returns to its starting position, shutting off the motor. The turntable speed is 78 rpm.

MANUAL OPERATION

1. Move the record support plate (4) counterclockwise as far as it will go.

2. Place the hold-down finger (5) over the number "10" on the record support plate (4).

3. Twist the top of the turntable-spindle (2) so that it aligns into a smooth spindle with the lower part (3) of this assembly.

4. Place a record over the spindle (3) onto the turntable. Push down on switch button (6). This operation starts the motor. The pickup arm will move over onto the record. After the record has been played, the tone arm will then return to the starting position, shutting off the motor.

AUTOMATIC OPERATION

1. Twist the top of spindle (2) so that the top part is "off center" and a little step appears.

2. For 10-inch records, turn the record support (4) so that its short side is towards the spindle. For 12-inch records, the long, curved side should face the spindle. Keep the hold-down finger (5) turned slantwise across the corner.

3. Place the records to be played on the spindle (3). They will rest on the record support (4) and the step (35) of the spindle. Swing the hold-down finger so that it rests on the top record.

4. Start operation by pressing down on the switch button. The records will play through and after the last record has been played, the arm (1) will return to the starting position, shutting off the motor. If you wish to reject a record before it has finished playing, push down on the switch button.

5. To stop the phonograph before all records are played, remove any records remaining on the record support. Press down on switch button (6) and the tone arm will return to the starting position, shutting off the motor.

OPERATION PRECAUTIONS

1. Use only unwarped records for automatic operation. For warped, odd size, or home recorded records, play as for manual operation.

2. Never use force to start or stop the motor or any part of the record changing mechanism.

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

4. Do not allow oil or grease to come into contact with the drive wheels or any rubber part of the record changer.

LUBRICATION

Use light grease (Lubriplate or equivalent) on the following:

1. Worm gear and main cam gear.
2. All cams.
3. Spindle bearing.

Use light machine oil on the following:

1. All shafts before insertion in bearing (replacements). Keep oil or grease away from disc pulleys or other rubber parts.

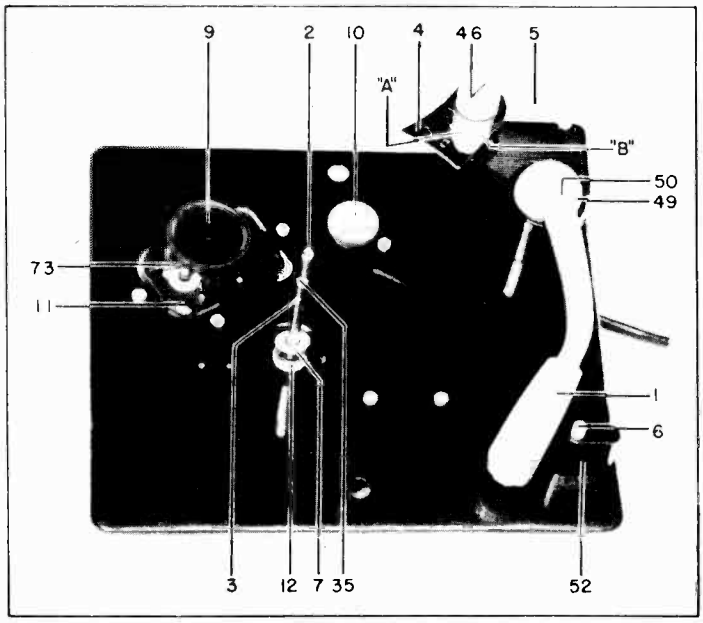
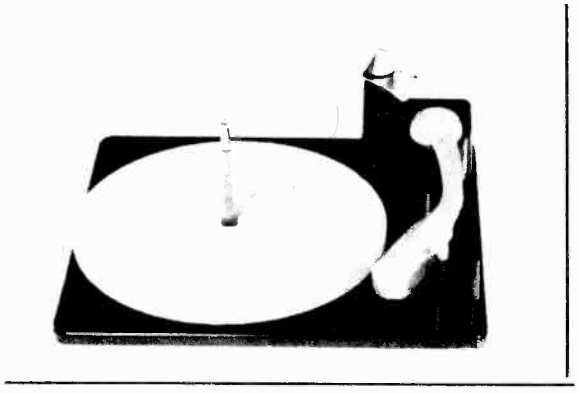


Fig. 1. Top View of Record Changer



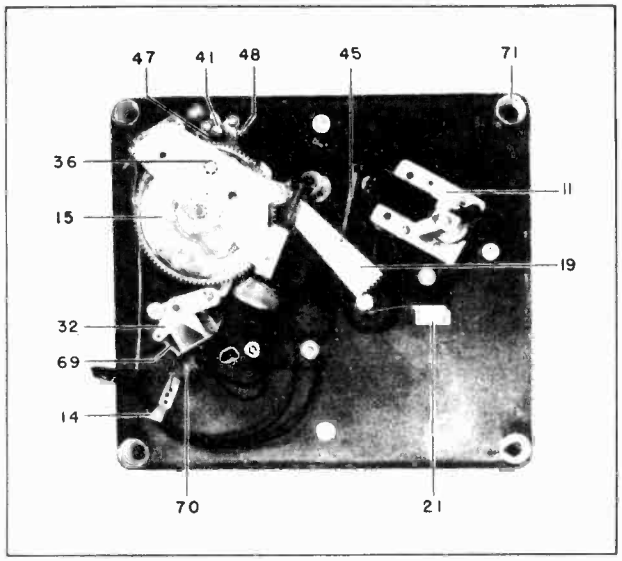


Fig. 2. Bottom View

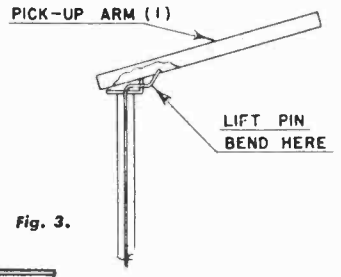


Fig. 3.

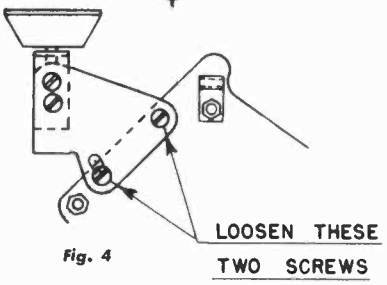


Fig. 4

PICK-UP

A special General Electric pick-up is used in this changer which will give superior results from the standpoint of high fidelity, low surface noise, and negligible record wear. The pick-up is not interchangeable with a crystal pick-up as the ratio of output voltage levels of the two types is at least 70 to 1, the pick-up supplied having an extremely low output.

The pick-up is supplied with a semi-permanent type stylus. Dust and foreign matter should be removed from the stylus assembly at regular intervals with a soft brush. Make sure the stylus arm is centered between the stops. This clearance should be 9 to 11 mils on each side.

When making service adjustments, it is advisable to replace the cover over the stylus which was originally shipped on it. This will prevent possible injury and misalignment.

50-CYCLE OPERATION

This changer may be used on a 50-cycle power supply provided it is equipped with a Type A or Type G motor and a 50-cycle conversion spring and is operated at reduced voltage. This reduced voltage operation is obtainable either from a tap on the primary of the power transformer or by use of a series resistor.

The conversion spring number is Stock No. RMS-036 (Type G motor) or RMS-037 (Type A motor) and is placed over the motor drive bushing that operates the idler wheel (9).

PHONO MOTOR PARTS REPLACEMENT

Two types of phono motors are used during production. These are identified as Type A and Type G motors and can be distinguished by the following: Type A has an external cooling fan blade, Type G has internal cooling fan blade. When ordering idler wheel springs or 50-cycle conversion springs, specify the type of motor used, as motor parts are not interchangeable.

CYCLE OF OPERATION

INITIATING THE CHANGE CYCLE—Pushing down on the control button (6) turns the power ON and starts the turntable rotating. Automatic cycling may be started by depressing the button (6). This movement slides the trip bar (14), causing engagement with the carrier lever (31) and its attached drive wheel (10). This motion of the carrier lever causes the drive wheel (10) to contact the rim of the turntable and rotate with it. The rotation of the drive wheel (10) is transmitted through the flexible coupling (16) to the worm drive (17), which in turn drives the main cam (15).

CYCLING—A single revolution of the main cam (15) results in a complete automatic cycling of the changer. This includes selection of a record from the stack, lifting of the tone arm (1) from its rest position and setting of the needle in the first groove of the record.

Upon the completion of the revolution the automatic trip cam at the bottom of the cam (15) which has the block on the trip lever (57) riding on its outer surface, drops into a depression on the trip cam, on the underside of cam (15), which causes the carrier lever (31) to return to its original position so that the drive wheel (10) will disengage with the turntable rim.

RECORD FEED—The outer and lower surface of the main cam (15) controls the record selection. Motion of the feed cam roller (36) about the cam groove causes the feed sector lever (19) which is engaged with the record feed pinion (20), to turn the eccentric (44) to the proper position for a record selection and to then return, allowing the record to drop over the spindle (3). The feed sector lever and record feed cam should enmesh as shown in Fig. 7.

PICK-UP ARM MOVEMENT—The upper surface of the main cam (15) controls the pick-up arm movement. The tone arm is lifted by the motion of the lift pin (25) as it contacts the outer vertical edge of the cam (15) as the latter rotates. The direction of swing of the tone arm is controlled by the engagement of the main cam (15) with the sweep lever pinion. The sweep lever (62) connects directly to the tone arm (1) by means of a clamp (25) around the pick-up arm pivot sleeve. A boss projecting from the upper side of the main cam (15) displaces the stop lever (59) at the end of the change cycle, thus permitting the tone arm to proceed across the record.

POSITIVE TRIP ACTION—As the tone arm runs-in on the inner groove of the record after the playing of that record, the sweep lever (62) hits the positive trip screw (54) mounted on the trip lever (57). This action re-engages the drive wheel (10) with the rim of the turntable and starts a new cycle.

PAWL TRIP ACTION—Any reversal of the direction of the sweep lever (62) travel before positive trip action takes place at the end of the playing of a record causes the sweep lever (62) to push forward the pawl (56) mounted on the auxiliary trip lever (57). This movement also has the effect of re-engaging the drive wheel (10) to start a new cycle. Pawl trip action is effective only after the pick-up arm (1) reaches a distance of not more than four inches from spindle (3).

10- OR 12-INCH OPERATION—Setting the record support shelf (4) to the 10-inch or 12-inch position lowers the stop selector rod (39) a definite amount. The raising and lowering of this rod determines whether the stop lever (59) positions against the rod (39) or the cap at the top of the rod. This regulation of the distance that the sweep lever (62) will travel determines whether the tone arm which is attached to the sweep lever (62) will lower on the first groove of the 10-inch or 12-inch record.

AUTOMATIC SHUT-OFF—Release of the record stabilizer finger (5) lowers the shut off rod (41) and forces the stop selector lever (40) completely clear of the stop lever (42). The latter is then able to move into a position which completely blocks any forward motion of the sweep lever (62). Consequently, the sweep lever (62) cannot perform its usual function of actu-

ating the switch lever (32). Thus the switch lever roller remains in the path of the stop lever (42). On completion of the cycle, the stop lever (42), in returning to home position, hits the switch lever roller and forces the mercury switch (13) to the OFF position.

SERVICE ADJUSTMENTS

The turntable is driven by means of a friction *idler wheel* (9). The driving power is transferred from the motor *bushing* to the *drive wheel* (9) and then to the rim of the turntable. It is important, therefore, that the *motor bushing* and the *idler wheel* (9) be kept clean of grease, oil, dirt, or any foreign matter. Any quick drying solvent like naphtha is satisfactory for cleaning these parts.

A. TONE ARM DROP-POINT

The point at which the stylus of the tone arm drops on the record is adjusted by loosening slightly the *sweep lever clamp* (75) and repositioning the *tone arm* (1) with respect to the *sweep lever* (62) sufficiently so that the proper landing point is obtained. The stylus should land approximately $\frac{1}{8}$-inch in from the edge of the record when properly adjusted. When the landing adjustment has been made for 10-inch records, the landing will be correct for the 12-inch records.

B. POSITION OF RECORD SUPPORT (4)

The angle through which the *record support* (4) rotates when changing from its 10-inch to its 12-inch position, and the position of its edge with respect to the records it supports when in either of its two positions may be adjusted by means of the two *positioning screws* "A" and "B," see Figure 1. *Screw* "A" adjusts the 12-inch position; *screw* "B" adjusts the 10-inch position.

The position of the *record support* for either 10-inch or 12-inch records is correct when the support is symmetrical with respect to the records being supported (so that the record will drop from both corners of the support simultaneously).

C. POSITIVE TRIP

The time at which the changer starts to cycle is adjustable by turning the *positive trip screw* (74). Turn the screw clockwise to delay tripping or cycling of the mechanism and counterclockwise to trip earlier in the playing cycle. The *screw* should be adjusted so that the changer trips when the needle is $3\frac{1}{8}$ inches in from the edge of a 10-inch record. This adjustment is rather critical and should be made accurately.

D. ALIGNMENT OF ECCENTRIC (35)

The alignment of the *eccentric* (35) is accomplished by

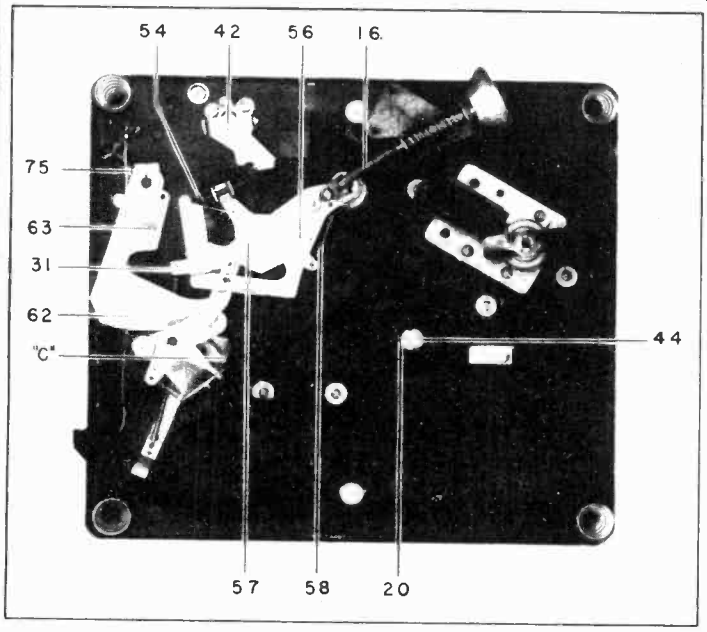


Fig. 5. Bottom View, cam removed

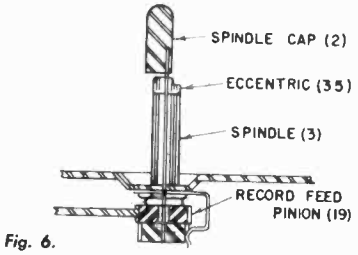


Fig. 6.

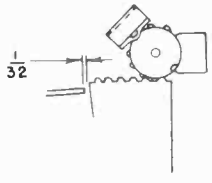


Fig. 7.

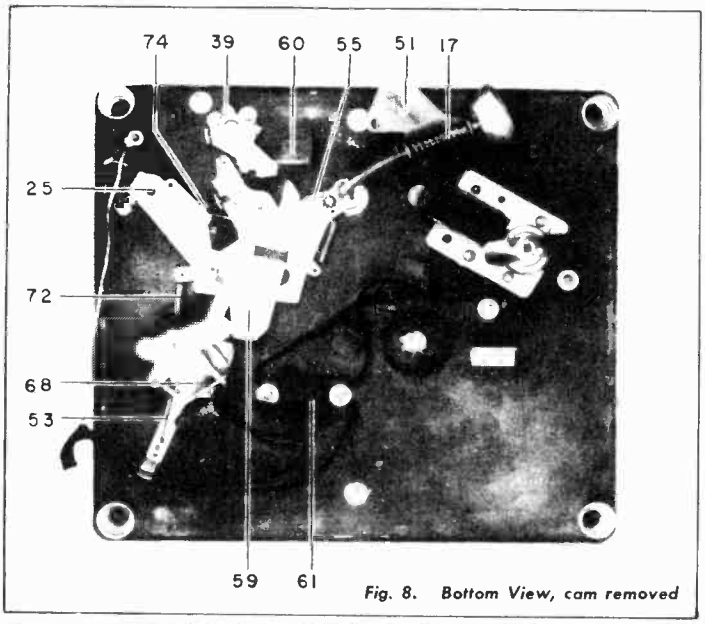


Fig. 8. Bottom View, cam removed

loosening the clamping screw on the *feed pinion* (20), shifting the position of the *eccentric* so that it is aligned with the *spindle* (3) and retightening the clamping screw. See Fig. 6.

The position of the *eccentric* is correct if it is aligned with the *spindle* when the mechanism is not in a change cycle.

E. ALIGNMENT OF SPINDLE CAP (2)

The alignment of the *spindle cap* (2) is accomplished by loosening the two set screws holding the *cap index cam* (44) in place, rotating the *cap index cam* until the *spindle cap* (2) is aligned with the *spindle* (3). Tighten the two setscrews.

F. POSITIONING OF DRIVE WHEEL (10)

Under normal conditions when the changer is not cycling, the *drive wheel* must not contact the *rim* of the turntable. If it does, adjust the *eccentric bushing* (hex-shaped) so that it just clears. This adjustment should be slight as a large adjustment away from the rim of the turntable will prevent cycling when the changer is supposed to. If it contacts the rim when it is not supposed to, the changer will be in continuous cycling. On some of the later models the hex-shaped bushing is replaced by a smooth bushing. To make this adjustment, it may be necessary to bend the bushing slightly with a tool.

G. ADJUSTMENT OF WORM GEAR (17)

The enmeshing of the *worm gear* (17) with the *cam* (15) is regulated by the two set screws, see Figure 4. If the *worm gear* enmeshes with the *cam* too tightly, it causes binding with the resultant defective cycling.

H. LIFT PIN (25) ADJUSTMENT

Bend *lift pin* (25) so that needle will play the first record. See Figure 3 for correct bending point. When the tone arm is at its starting position, it should clear the *starter button* about $\frac{1}{8}$ of an inch. If *lift pin* (25) is bent too far, it will not clear the records located on the shelf plate.

I. AUTOMATIC SHUT-OFF SCREW (42) ADJUSTMENT

Make certain that automatic *shut-off adjusting screw* (42) mounted on *stop selector lever* makes contact with the *shut-off adjusting rod* (41) when the *stabilizer finger* (5) is released. Adjust as required.

TROUBLE-SHOOTING CHART

SYMPTOMS	REMEDIES OR CAUSES
RECORD SELECTION	
1. Records drop unevenly from record support.	1. (a) Check adjustment B.
2. Records do not slip on or off the spindle smoothly.	2. (a) Check adjustment D. (b) Check adjustment E.
3. Records fail to drop.	3. (a) Check adjustment D. (b) Check adjustment B.
4. Records drop more than one at a time.	4. (a) Check adjustment E. (b) Check center hole in records—probably too large.
5. Records fail to stay on spindle cap when loading.	5. (a) Check adjustment E.
TONE ARM MOVEMENT	
1. Needle lands incorrectly.	1. (a) Check adjustment A.
2. Needle fails to feed in after landing.	2. (a) Check *pull-in spring* (58)—probably too weak.
3. Needle lands properly on record but slides in on record.	3. (a) Check for broken stylus in pick-up. (b) Pull-in spring (58) too strong.
TRIPPING—CYCLING	
1. Changer fails to trip.	1. (a) Check adjustment C.
2. Changer trips too soon.	2. (a) Check adjustment C. (b) Check record—may be eccentric.
3. Changer trips continuously.	3. (a) *Trip lever spring* (46) too weak. (b) *Trip block* (65) on trip lever turned out of line or catching edge worn. (c) Disengaging *cam* (13) worn. (d) *Carrier lever spring* (62) too strong.
4. Changer trips but fails to change—turntable continues to turn.	4. (a) *Carrier lever spring* (62) too weak. (b) Grease on drive wheel or turntable rim.
5. Changer continues to cycle after last record has been played.	5. (a) Check adjustment F.
MOTOR	
1. Changer is sluggish or motor overheats.	1. (a) Check lubrication—oil old or gummy. (b) Incorrect line voltage. (c) Defective motor winding. (d) Check binding of worm on main cam.
2. Motor rumble heard in record reproduction.	2. (a) Shipping bolts not removed from motor board.
3. Motor fails to start.	3. (a) Defective switch. (b) Check adjustment F. (c) Check a-c input plug to motor.
4. Motor fails to shut off after last record has been played.	4. (a) Check adjustment I.

REPLACEMENT PARTS LIST

CAT. NO.	REFERENCE	DESCRIPTION
RAD-022	68	BRACKET—Switch bracket subassembly
RAX-015	51	BRACKET—Drive support bracket assembly
RBX-006	11	MOTOR—Phono motor assembly (Type A), 115 v., 60 cycle
RBX-007	11	MOTOR—Phono motor assembly (Type G), 115 v., 60 cycle
RHW-008	7	WASHER—Turntable bearing washer (2 per package)
RJB-015	61	BOARD—Motor terminal board
RMA-002	1	ARM—Tone arm (less pickup cartridge)
RMC-016	44	COLLAR—Indexing collar assembly
RML-012	31	LEVER—Carrier lever assembly
RMM-013	14	LEVER—Trip bar assembly
RMM-030	4	SUPPORT—Record support plate
RMM-031	56	PAWL—Pawl assembly (includes spring)
RMM-034	55	STUD—Carrier lever pivot stud
RMP-003	25	PIN—Tone arm lift pin
RMP-010	49	PIN—Tone arm hinge pin
RMR-001	36	ROLLER—Feed cam roller
RMS-010	47	SPRING—Stop selector lever spring
RMS-011	71	SPRING—Mounting spring (pkg. 4)
RMS-012	60	SPRING—Stop lever spring
RMS-013	58	SPRING—Trip lever spring
RMS-016	52	SPRING—Control button spring
RMS-017	53	SPRING—Trip bar spring
RMS-022	45	SPRING—Feed sector lever spring
RMS-023	72	SPRING—Carrier lever spring
RMS-030	50	SPRING—Tone arm counterbalance spring
RMS-036		SPRING—Conversion for 50 cycle Type G motor
RMS-037		SPRING—Conversion for 50 cycle Type A motor
RMS-050	54	SPRING—Auxiliary trip lever spring
RMS-052	63	SPRING—Pull-in spring
RMS-100	46	SPRING—Stabilizer finger tension spring
RMS-101	69	SPRING—Switch bracket spring
RMS-102	73	SPRING—Drive wheel tension spring for Type A motor
RMS-103	73	SPRING—Drive wheel tension spring for Type G
RMT-005	64	TURNTABLE—Turntable assembly
RMU-027	41	ROD—Shut-off rod
RMU-028	39	ROD—Stop selector rod
RMW-030	9	WHEEL—Drive wheel for Type A motor
RMW-031	9	WHEEL—Drive wheel for Type G motor
RMX-002	16	SPRING—Drive spring assembly
RMX-004	21	SPRING—Indexing spring assembly
RMX-024	35	ECCENTRIC—Spindle eccentric assembly
RMX-025	2	CAP—Spindle cap and rod assembly
RMX-026	12	BEARING—Turntable bearing assembly
RMX-027	20	GEAR—Pinion gear assembly
RMX-031	17	GEAR—Worm gear
RMX-032	10	WHEEL—Drive wheel assembly
RMX-034	70	SWITCH—Motor switch assembly
RMX-035	19	LEVER—Feed section lever assembly
RMX-036	32	LEVER—Switch lever assembly (includes roller)
RMX-037	59	LEVER—Stop lever assembly
RMX-038	40 and 42	LEVER—Stop selector lever assembly
RMX-040	57	LEVER—Auxiliary trip lever assembly
RMX-043	15	GEAR—Main cam and gear assembly
RMX-045	62	LEVER—Sweep lever assembly
RMX-088	3	SPINDLE—Stationary spindle assembly
RMX-089	48	PIN—Pin and C washer kit

GENERAL

This single-post record changer is designed to operate from a power source of 110 volts, 60 cycles. It will play a single record at a time or a series of 10-inch or 12-inch records intermixed. When the series of records have been played through, the arm will return to its rest position, shutting off the record changer power.

The turntable speed is 78 rpm.

MANUAL OPERATION

1. Turn the Selector Switch (23) to the "M" position.

2. With the Record Stabilizer Weight (1) turned back and the spindle in position, place a record on the spindle as in Automatic Operation. The record may then be moved forward slightly to slip over the spindle step and then lowered to the turntable in playing position.

3. Press the "ON" button (24).

4. Place the Stylus gently on the edge of the record. Do not lift the pickup arm too high as this may cause it to catch in the automatic stop lock position.

5. At the end of the recording, or to stop the record at any time, either push down on the "OFF" button (25) (pickup arm rest) or replace the pickup arm on the rest.

AUTOMATIC OPERATION

1. Turn the Selector Switch (23) to "A" position.

2. Turn back the Record Stabilizer Weight (1). Place not more than twelve 10-inch records or ten 12-inch records, or ten records of the two sizes mixed, on the spindle. The bottom record will rest on the step of the spindle and the record selector shelf (62). Now turn the Stabilizer Weight (1) forward so that it rests on the edge of the top record.

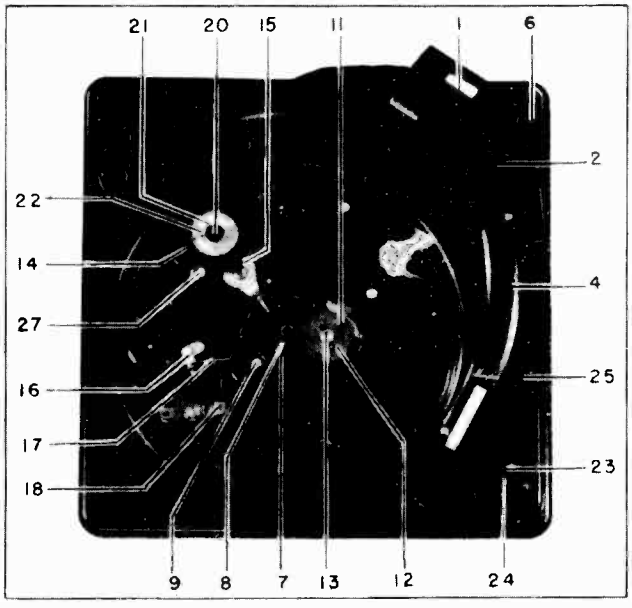


Fig. 1. Top View of Record Changer

3. Depress the "ON" button (24) in the front right-hand corner of the record player. The record player does the rest without further attention. When the last record has been played, the pickup arm automatically returns to its rest position and shuts off the motor.

4. If you wish to reject the record being played, push down the "ON" button. The changer immediately will shift to the next record.

5. If you want to stop the phonograph before all the records have been played, depress the "OFF" button (25). You can move the pickup arm by hand at any time without damage to the mechanism. However, after the last record has been played, the pickup arm automatically is locked in position until it has come to rest on the "OFF" button.

6. To remove a stack of records from the turntable, pull out the center spindle, lift off the entire stack of records, and replace the spindle.

OPERATION PRECAUTIONS

1. Use only unwarped records for automatic operation. For warped, odd-size, or home-recorded records, play as for manual operation.

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

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

4. Do not allow oil or grease to come in contact with the drive wheel or any rubber part of the changer.

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

LUBRICATION

Use a light machine oil on the following:

1. Motor bearings, saturate top and bottom felts.

2. Pick-up arm shaft (5), see Fig. 3. Apply one drop each to bottom bearing point, bracket hole, and hole through main base plate.

3. Ball bearing assembly (8), see Fig. 1.

4. Idler wheel felt (21), see Fig. 1.

Apply lubriplate No. 110 with a small brush to:

1. Idler wheel linkage.

2. Turntable shaft stud.

3. Pickup arm hinge pins.

4. Knife edge of raising lever (38), see Fig. 3.

5. Main cam bearing. It is necessary to remove the sub-plate assembly to lubriplate this bearing.

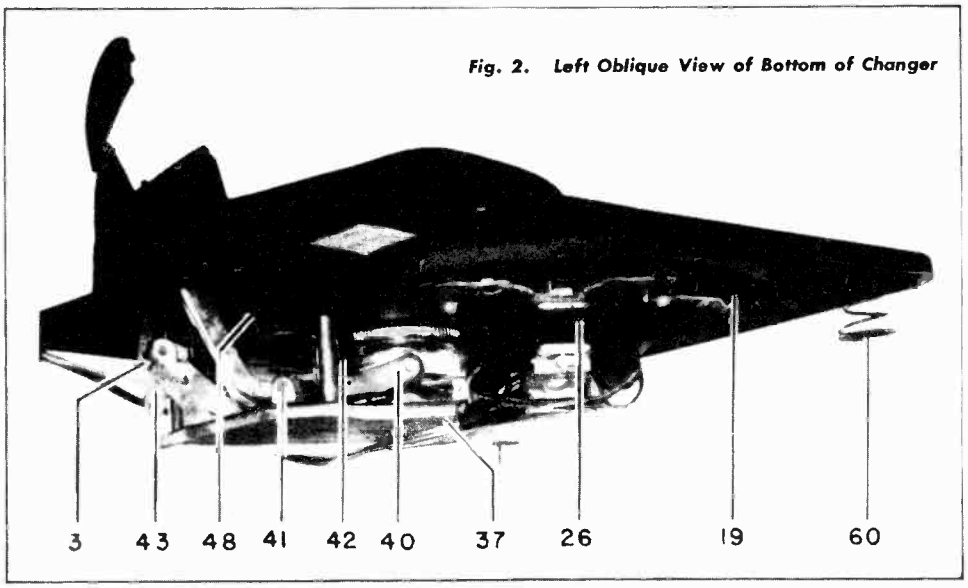


Fig. 2. Left Oblique View of Bottom of Changer

Apply Sta-Put with a small brush to:

1. Teeth of Main Cam Actuating Gear (45), see Fig. 4.
2. Track of Main Cam Gear (46), see Fig. 4.
3. Teeth of large and small Idler Gears (11) (12), see Fig. 1.
4. Raising Lever Bracket bearing surfaces (38), see Fig. 4.

PICKUP

A special General Electric pickup is used in this changer which will give superior results from the standpoint of high fidelity, low surface noise, and negligible record wear. The pickup is not interchangeable with a crystal pickup as the ratio of output voltage levels of the two types is at least 70 to 1, the pickup supplied having an extremely low output.

The pickup is supplied with a semi-permanent type stylus. Dust and foreign matter should be removed from the stylus assembly at regular intervals with a soft brush. Make sure the stylus arm is centered between the pole pieces. This clearance should be 9 to 11 mils on each side.

When making service adjustments, it is advisable to replace the cover over the stylus which was originally shipped on it. This will prevent possible injury and misalignment.

50- OR 60-CYCLE OPERATION

When operating on 60 cycles, use pulley, Stock No. RMW-025, on idler wheel and a-c motor voltage of 105–125 v. a-c.

When operating on 50 cycles, use pulley, Stock No. RMW-034, on idler wheel and a-c motor voltage of 90–109 v. a-c.

When the 50-cycle drive pulley is used, the idler wheel will not be completely retracted from the turntable but will still have some pressure applied to it when the motor is off. This is due to the larger diameter of the 50-cycle pulley.

CYCLE OF OPERATION

INITIATING THE CHANGE OF CYCLE—Depressing the *ON button* (24) turns the power switch ON, also trips the *idler release rod* causing the *idler wheel* (14) to make contact with turntable, starting it to rotate. This causes *gears* (11) and (12) to mesh with *main cam gear* (45), causing the start of cycling.

CYCLING—A single revolution of the *main cam* (45) results in a complete automatic cycling of the changer. This includes selection of a record from the stack, lifting of the *pickup arm* (4) from its rest position, and setting of the stylus in the first groove of the record. Upon the completion of the revolution, the *automatic trip cam* (46) which has the *trip lever* (47) riding on its outer edge, trips and causes *pickup lever* (38) to trip on the edge of *disc hub* (31). This causes the *arm* (4) to depress the *off button* (25), which trips the *idler release rod* (19) causing *idler wheel* (14) to disengage from edge of turntable, thus completing the cycle.

RECORD FEED—The outer and lower surface of the *main cam* (46) controls the record selection. Motion of the *rocker arm lever* (40) controls the *record selector lever* (3), causing *selector arm* (61) on the record shelf to push forward and drop a record.

PICKUP ARM MOVEMENT—The lower surface of the *main cam* (46) controls the pickup arm movement. The tone arm is lifted by the motion of the *lever* (38) and *disc hub* (31) by motion of the *cam* (46). Direction of swing of the pickup arm is controlled by the *lever* (38) that lifts and turns the *disc hub* (31). After the pickup arm travels across the record, the *automatic trip* (30) controls the point at which the mechanism trips and the *arm* (4) returns to the starting position, completing the cycle.

POSITIVE TRIP ACTION—As the pickup arm runs in on inner groove of the record after record has been played the *automatic trip lever* (30) trips the *actuating pawl* on main cam assembly, allowing it to engage the main cam *actuating gear* (45) driving the mechanism through the change of cycle.

PAWL TRIP ACTION—Pressing down on the ON button starts motor and also trips the *velocity trip lever* (47). This, in turn, trips the *actuating pawl* on main cam actuating gear, driving the mechanism through the change cycle.

10- OR 12-INCH OPERATION—The selector arm (61) attached to the record's selector lever (3) initiates the selection of either 10- or 12-inch records. When a 10-inch record is resting on the record selector shelf (62) the selector arm (61) is not depressed, resulting that the selector lever assembly is thus in its normal engaged position with the indexing lever (43). This causes the drop mechanism of the pickup arm (4) to be indexed for the 10-inch drop-point during its change cycle. When a 12-inch record is on the record selector shelf, the selector arm (61) is depressed which, in turn, disengages the record selector lever (3) from the indexing lever (43). This results in the pickup arm dropping in the 12-inch drop-point position during the change cycle. In addition to this indexing, the motion of the record arm towards the turntable at the proper instant causes the record which is then resting on the platform to be pushed forward sufficiently past the notch on the turntable spindle to cause it to drop on the turntable.

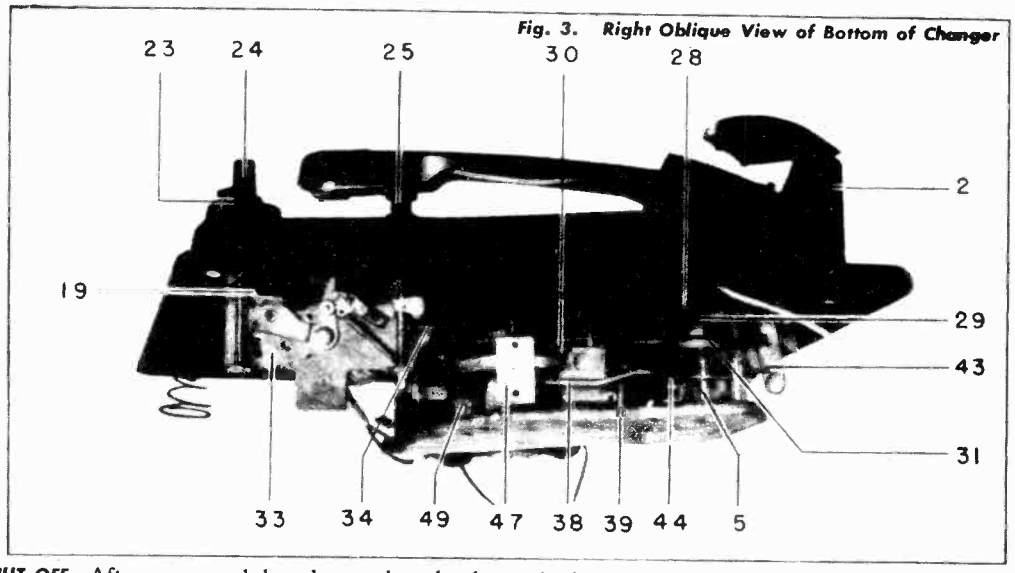


Fig. 3. Right Oblique View of Bottom of Changer

AUTOMATIC SHUT-OFF—After a record has been played, the *pickup arm* (4) moves over to the "OFF" *button* (25) dropping on same. This trips the *switch* (24) and *idler release rod* (19), automatically shutting off changer.

SERVICE ADJUSTMENTS

The turntable is driven by means of a friction *idler wheel* (14). The driving power is transferred from the *motor bushing* (27) to the *drive wheel* (14) and then to the *rim* of the turntable.

It is important, therefore, that the *motor bushing* (27) and *idler wheel* (14) be kept clean of grease, oil, and dirt or any foreign matter. Any quick drying solvent, like naphtha, is satisfactory for cleaning these parts.

A. AUTOMATIC TRIP—When the movement of the *pickup arm* (4) toward the spindle is greater than $\frac{1}{8}$ inch in $\frac{1}{2}$ revolution of the turntable, the *automatic trip arm* (30) trips the *velocity trip and roller assembly* (47). This releases the *actuating pawl* on the *main cam assembly* (46), allowing it to engage the main cam *actuating gear* (45) and driving the mechanism through the change cycle.

The *automatic trip arm* follows the movement of the pickup arm through a *spring compression clutch* (29). This clutch must be kept free of oil or grease.

Should it become necessary to clean the clutch, loosen the *lock* (A), see Fig. 6, to relieve the spring tension, and clean the clutch parts with carbon tetrachloride. Reset the clutch spring tension by setting the lock at least $\frac{1}{4}$ inch below the main plate. This tension should be sufficient to operate the trip mechanism without placing undue drag on the movement of the pickup arm.

B. AUTOMATIC LOCK LEVER—This *lever* (48) should move up and down freely with no record on spindle. Hook end of the automatic shut-off lock lever (point B, Fig. 6) should catch *pickup arm raising disc* (31) at the beginning of cycle, to prevent travel of the arm and to cause it to drop on the "OFF" button. With no records on the spindle, this hook should clear the *pickup arm raising disc* by $\frac{1}{32}$ inch with the mechanism at rest. Bend lip (point F, Fig. 6) if necessary to make clearance correct.

C. VELOCITY TRIP—At the completion of the change of cycle, the actuating pawl is engaged by the hook end of the *velocity trip and roller assembly* (47) which has been returned to its normal position by the reset points on the *main cam drive gear* (45). This hook should be adjusted for about .005–.015 inch clearance from the bottom of the *main cam drive gear* (45). Greater clearance may permit the pawl to bounce past the hook and re-engage, causing it to go into another cycle.

D. INDEXING—The eccentric screw, accessible through the top of the *pickup arm* (4) should take care of any normal adjustment. Turn the screw clockwise to index the stylus in toward the spindle and counterclockwise to index the stylus out away from the spindle.

Should further adjustment be necessary, proceed as follows: Operate the mechanism by revolving the turntable manually until the stylus drops to within $\frac{1}{8}$ inch of a 10-inch record on the turntable. With a No. 8 Bristol wrench in each of the set screws (points D and E, Fig. 6), alternately loosen one and tighten the other until the stylus rests above the records lead-in groove at the desired point.

Be sure both setscrews are tight when this adjustment is completed. The 12-inch position is indexed automatically by the pressure of a 12-inch record on the front of the selector arm (61).

E. PICKUP ARM LIFT—The stylus should approach the top record of a full stack on the turntable with approximately $\frac{1}{8}$-inch clearance. Adjust by bending the *pickup arm raising lever* (38) at point C, see Fig. 6. Do not attempt to move *pickup arm raising disc* up or down.

F. RECORD DROP ADJUSTMENT—The distance between the *selector arm* (61) and the *spindle* is critical and should be adjusted as accurately as possible. If this distance is too great, records of minimum diameter will not be pushed off the spindle step during the change of cycle. If it is too short, records of maximum diameter will either lie over the tips of the *selector lever* (61) (resulting in no record drop and improper index) or be pushed against the spindle with undue force, causing center hole damage.

CAUTION: *Be certain that a standard size record is used in making this adjustment: A standard 10-inch record measures $9\frac{7}{8}$ inches $\pm\frac{1}{32}$ inch diameter. A standard 12-inch record measures $11\frac{7}{8}$ inches $\pm\frac{1}{32}$ inch diameter.*

With a standard 10-inch record on the *spindle*, check the distance between the edge of the record and the front of the *selector arm fingers* (61). This distance should be approximately $\frac{5}{32}$ inch and should be the same for each side of *selector arm* (61). With a full stack of records on the spindle, the weight of the records will reduce this distance to about $\frac{1}{8}$ inch. Do not attempt to bend the spindle to adjust this distance. Bending the spindle will destroy the relationship between the heel of the spindle off-set and the horizontal plain of the record. This spacing is set to permit only one record at a time to slide between the heel of the off-set and the step of the spindle. Standard records are 0.70 inch to 0.100 inch in thickness and any change in the angle of the spindle will either close the angle of the off-set, which will result in torn

Fig. 4. Main Cam Gear Assembly

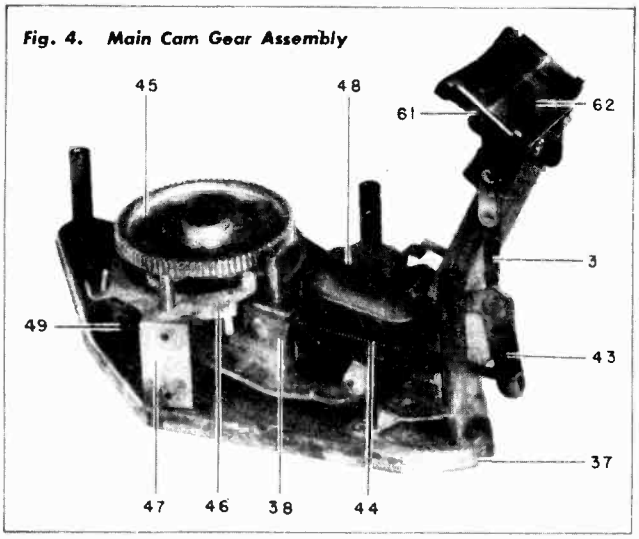
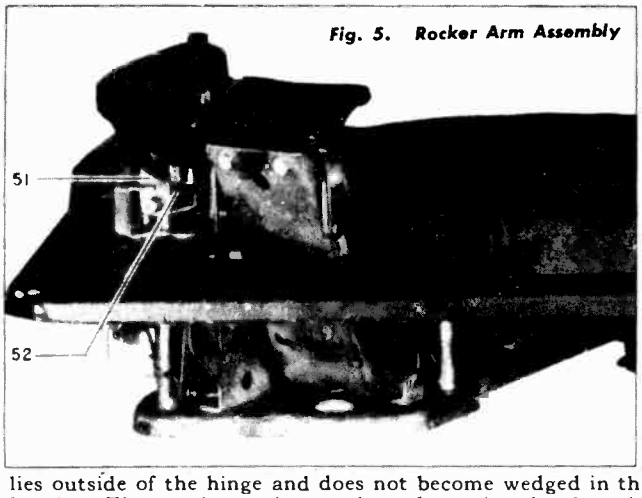


Fig. 5. Rocker Arm Assembly



center labels on thick records, or open the angle, permitting two thin records to drop at one time.

To adjust push-off distance:

1. Remove the four screws under the main plate which hold the center trim section.

2. Remove the center trim section by lifting straight up.

3. For forward adjustments of the *selector arm* (61), wedge a screwdriver between the *rocker arm* and the sub-plate in front of the rocker arm pivot. With the heel of the hand, bend the record selector post toward the spindle.

4. For backward adjustment, wedge the screwdriver between the rocker arm and the sub-plate in back of the rocker arm pivot. Pull back on the selector post.

5. After making adjustment, make sure that both selector arm fingers are equi-distant from the edge of the record.

G. TO REMOVE THE PICKUP ARM OR REPLACE A PICKUP CARTRIDGE.

A pickup cartridge can be easily replaced by first removing the pickup arm.

A spring is inserted between the pins of the hinge bracket to prevent its coming apart in shipment. This spring must be removed before the hinge can be taken apart. Proceed as follows:

1. Hold the pickup arm firmly.

2. Remove the spacing spring by pressing down on its center until it snaps off the hinge pins.

3. With a screwdriver or long-nose pliers, bend in one end of the blue steel pickup arm hinge brackets while lifting up on the arm. This will release the pickup arm hinge pin.

4. Repeat on the other pickup arm bracket.

5. The pickup arm, when released from the hinge brackets, may then be turned over and laid on the turntable for easy access to the cartridge.

6. Unsolder the leads and remove two setscrews that fasten the pickup.

TO REPLACE THE PICKUP ARM.

1. Hook the roller (on the rear of the hinge assembly) under the pickup lift bracket.

2. Use a pair of long-nosed pliers to place the pickup arm hinge brackets over the pins in the shaft bracket.
In performing this operation be sure that the pickup cord lies outside of the hinge and does not become wedged in the bracket. The spacing spring need not be replaced unless the unit is to be reshipped.

H. TO REMOVE THE SUB-PLATE ASSEMBLY.

In the event that it becomes necessary to replace any of the major parts in the sub-plate assembly (Fig. 4), the entire assembly should first be removed from the main plate. Proceed as follows:

1. Remove the turntable spindle and turntable.

2. Remove the pickup arm.

3. Remove the center trim section (2).

4. Unhook the rocker arm return spring (42).

5. Remove the rocker arm pivot pin (41).

6. Remove the four No. 8–32 screws holding the sub-plate studs and holding the center post to the main plate.

To replace the sub-plate assembly reverse the above procedure, making certain that all parts fall into their proper positions.

I. TO REMOVE THE RECORD SELECTOR AND ROCKER ARM ASSEMBLY.

1. Unhook the rocker arm return spring (42), Fig. 2.

2. Remove the rocker arm pivot pin (41), Fig. 2.

3. Lift out the selector and rocker arm assembly as a unit.

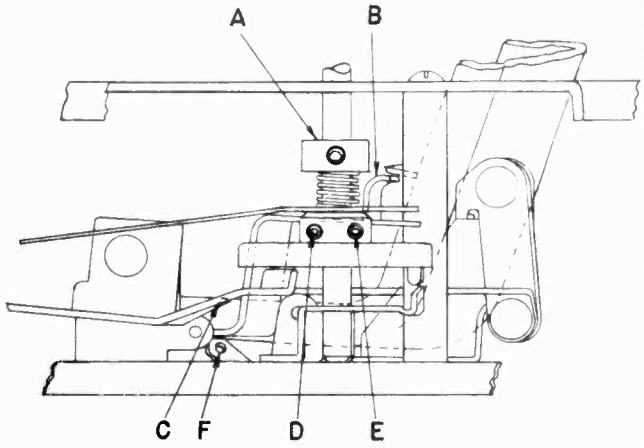


Fig. 6. Adjustment Points

GENERAL ELECTRIC CO.

TROUBLE SHOOTING CHART

SYMPTOMS	REMEDIES OR CAUSES
TRIPPING	
1. Automatic Trip Fails.	1. (a) Check adjustment A. (b) Binding of velocity trip. (c) Actuating pawl stuck; part of main cam assembly. (d) Automatic trip arm bent and not hitting velocity trip and roller (30). (e) Insufficient compression on clutch spring (29). (f) Manual trip lever binding (34). (g) No velocity lead-in groove or eccentric in center of record. (h) Foreign matter in record groove. (i) Bent stylus.
2. Manual Trip Fails.	2. (a) Manual trip lever (34) hair spring bent or broken. (b) Velocity trip and roller assembly (47) binding. (c) Actuating pawl stuck.
3. Velocity Trip Fails.	3. (a) Check adjustment C. (b) Velocity trip and roller assembly (47) rubbing on main cam actuating gear (45)
4. Automatic Lock Lever Fails.	4. Check adjustment B.
INDEXING	
1. Indexing of Arm.	1. Check adjustment D.
PICKUP ARM MOVEMENT	
1. Pickup arm lift too high or too low.	1. Check adjustment E.
RECORD DROP	
1. Adjustment of Record Drop.	1. Check adjustment F.
MOTOR	
1. Motor Does Not Shut Off.	1. (a) OFF button stuck. (b) Defective switch. (c) Defective switch mechanism.

REPLACEMENT PARTS LIST

CAT. NO.	REF.	DESCRIPTION	CAT. NO.	REF.	DESCRIPTION
RAA-008	30	ARM—Automatic trip arm	RMP-009	49	PIN—"Shut-off" pivot pin
RAD-024	51	BRACKET—Pickup arm mounting bracket	RMS-071	39	SPRING—Pickup arm raising lever tension spring
RAD-025	17	BRACKET—Connecting link bracket	RMS-074	44	SPRING—Index compression spring
RBX-011	26	MOTOR—50-60 cycle with mounting grommet	RMS-075	42	SPRING—Rocker arm return spring
RDB-013	24	BUTTON—"ON" button	RMS-104	52	SPRING—Hinge spacing spring
RDB-014	25	BUTTON—"OFF" button	RMS-105	29	SPRING—Clutch tension spring
RDF-007	21	WASHER—Idler wheel (felt)	RMS-106	58	SPRING—Manual trip spring
RDK-091	23	KNOB—Manual control knob and spring washer	RMS-108	60	BUSHING—Spring bushing
RHC-011	22	CLIP—Idler wheel retaining clip	RMU-032	19	ROD—Idler release rod
RHS-009	13	SCREW—Idler gear mounting screw	RMW-025	27	PULLEY—Motor drive, 60-cycle pulley
RHW-003	7	WASHER—Bearing race washer	RMW-033	14	WHEEL—Idler wheel assembly
RHW-004	20	WASHER—Idler wheel (fiber)	RMW-034	27	PULLEY—Motor drive, 50-cycle pulley
RMB-008	59	BUSHING—Rubber bushing	RMX-071	8	BEARING—Ball bearing and retainer assembly
RMG-005	45	GEAR—Main cam gear	RMX-072	9	STUD—Turntable shaft assembly
RMG-007	11	GEAR—Small idler gear (fiber)	RMX-075	31	DISC—Disc and hub assembly, PU raising arm
RMG-008	12	GEAR—Large idler gear (fiber)	RMX-077	46	CAM—Main cam assembly
RMK-003	12	COUPLING—Idler gear coupling	RMX-078	47	TRIP—Velocity trip and roller assembly
RML-006	34	LEVER—Lever and wire assembly manual trip	RMX-080	28	COLLAR—Clutch spring tension collar
RML-010	48	LEVER—Automatic "shut-off" lock lever	RMX-095	5	SHAFT—Shaft assembly, PU arm pivot
RML-013	15	LEVER—Idler lever and mounting assembly	RMX-096	3	SELECTOR—Selector and shelf assembly
RML-014	16	LINK—Connecting link and spring assembly	RMX-097	53	SHAFT—Shaft assembly record spindle
RML-015	18	LEVER—Idler release lever	RMX-098	54	SHAFT—Needle pad shaft assembly
RML-016	38	LEVER—Lever assembly, arm raising lever and bracket assembly	RMX-099	55	SHAFT—Shaft assembly T.T. assembly
			RPA-004	4	ARM—Pickup arm (less reproducer)
RML-017	40	LEVER—Rocker arm and lever assembly.	RPX-010		PICKUP—Magnetic reproducer
RML-018	43	LEVER—Index selector lever	RSS-004	56	SWITCH—A-c power switch
RMM-038	57	SWITCH—Switch cover	RSX-014	33	SWITCH—Switch assembly complete, less buttons
RMP-008	41	PIN—Rocker arm pivot pin			

1. TONE ARM CLEARANCE ADJUSTMENT
   a. Loosen Allen set screw in trip finger spacer 561327 (fig. 16)
   b. Move record shelf to 10" position and run changer through cycle to play position.
   c. Insert narrow width .008" feeler gauge (Part Number 88316) between tone arm support post and tone arm support bracket.
   d. Hold spacer tight against small cork washer, and tighten set screw.
   e. Remove .008 feeler gauge.
2. TRIP AND NEEDLE LANDING ADJUSTMENTS
   a. Place 10-inch record on turntable.
   b. Lift up tone arm stop lever (561330 fig. 10) so that tone arm return lever will go all the way in toward main cam.
   c. Place needle in starting groove on record or 3/32" in from outside edge of record.
   d. Loosen hex screw in tone arm crank.
   e. Insert .013" feeler gauge (part number 88317) between large cork washer (60297 Figure 16) and trip finger.
   f. Set tone arm crank against outer edge of cutout in tone arm return lever (No. 561354 Figure 9). Hold tone arm crank in position pressed tightly against large cork washer and retighten hex set screw.
   g. Remove .013 feeler gauge.
   h. Run changer through cycle to see that no parts have been displaced that might cause changer to jam.
3. 12 INCH NEEDLE LANDING—See paragraph 4, Division D.
4. ERRATIC NEEDLE LANDING—See paragraph 5, Division D.
5. REJECTS CONTINUOUSLY
   a. Trip finger passes over stud on main cam and fails to return to normal position due to improper clearance between trip finger and tone arm crank. Set clearance with .013" feeler gauge.
6. DOES NOT REJECT
   a. See that reject rod is on side of trip finger spring farthest from main cam. See Figure 14.
7. FAILS TO TRIP AT END OF RECORD
   a. Check clearance between trip finger and tone arm crank. Should be .013". If correct, see that starting lever #07329 Figure 18 is not binding.
   b. See that trip finger is not bent so as to strike stud on cam. thus preventing actuation of starting lever.

F. RECORD FEED

1. FAILURE TO PUSH RECORDS FROM FLAT PORTION OF SPINDLE
   a. Records undersize or holes too large or eccentric (not centered).
   b. Incorrect distance from spindle center to the edge of record shelf. See Division B.
   c. Stroke is insufficient.
      (1) Plunger arm (part number 56975) does not make contact with the record support post cover plate. Indent plate slightly. Be sure the inside of plate is lubricated with lubriplate.
      (2) Pivot for record plunger rocker arm (part number 55179 may be moved slightly inward to obtain greater stroke.
2. DOES NOT DROP RECORDS
   a. Failure to push records from flat portion of spindle. See paragraph 1. Division F.
   b. Shelf lever #561355 may be off cam track.
3. DROPS MORE THAN ONE RECORD
   a. Check spacing from spindle center to edge of record shelf. See Division B.
   b. Record latch not dropping down.
      (1) Failure to lift record stack clear of spindle.
      (2) Sticking latch due to insufficient lubrication, pin fitting too snug, burr on latch or bent latch.
4. SHUTS OFF BEFORE LAST RECORD IS PLAYED
   a. Tension of spring 64322 (fig. 7) too great.
5. DOES NOT SHUT OFF
   a. Automatic stop pawl 561323 (fig. 9) too tight. Release pressure between wave washer and pawl using a screwdriver.
   b. Tone arm stop lever 561330 not flat against tone arm lift rocker.

G. REPRODUCTION

1. No response.
   a. Audio system. Check with radio reception.
   b. Pickup leads shorted.
   c. Pickup cartridge dead. Try new cartridge.
2. Distorted tone.
   a. Worn needle.
   b. "WOWS" or variance in speed.
      (1) Oil on idler pulley and turntable rim.
      (2) "C" washer 561403 (under turntable) dragging on baseplate.
   c. Warped records.
   d. Defective pickup cartridge.
      (1) Use of badly chipped records or records with breaks.
      (2) Dropping tone arm on record.
3. Thumping noise.
   a. Groove in idler pulley worn by motor drive pulley. Result of idler pulley being held stationary with motor running.
      (1) Sand idler pulley smooth or replace pulley.
4. "Grid Hum".
   a. Insert phono input plug into phono socket as far as possible.
   b. Check electrical ground connection of phono socket.
5. Mechanical Hum
   Check alignment of turntable motor armature.

OPERATING INSTRUCTIONS AND DESCRIPTION

(1) Lever for setting to play 10-inch or 12-inch records Manual playing or Remove records. Mechanism as shown is set for playing 10-inch records.

(3) Trip mechanism designed to handle automatically records with either spiral run-in or oscillating grooves.

(4) Record Support Fingers.

(5) Turntable Shaft.

(6) Trip Rod Tension Spring.

(7) Adjustment for run-in or spiral grooved records.

(8) Adjusting lock screw for controlling position of power take-off wheel **(12)**.

(10) Adjusting screws for locking tone arm in position so that needle will rest properly on edge of record.

(12) Rubber-tired power take-off wheel. It is through the trip mechanism this wheel contacts the inside flange of the turntable during the change cycle from one record to the next, but does not operate during the playing of a record.

(13) Pickup Arm.

(14) Record Divide Fingers.

(15) Record Support Arm.

(16) Master Trip Cam.

(18) Reject Button. By pressing this button, changing mechanism operates immediately regardless of needle position on the record. Also by pressing this button, the first record will drop on turntable.

(21) Adjusting screw for setting vertical movement for pickup arm. If properly set, no further adjustment will be necessary.

(22) Adjusting Tie Bar used for positioning record support arms. The adjustment of this bar properly made should require no further attention.

(23) Rim Drive Electric Motor. Be sure Voltage and Cycles are correct for your Power Line.

(45) Trip Rod.

(54) Rubber-tired Drive Wheel. By means of a spring this wheel contacts the steel pulley on the motor and the inside flange of the turntable; driving the table in clockwise rotation.

(58) Cutter Arm. At all times except when actually recording, cutter arm is placed on cutter arm support rest.

(60) Lead Screw.

(61) Adjusting Screw and Lock Nut for proper spacing between cutter arm and record.

(62) Cutting Stylus clamp screw.

(64) Adjusting Screw by which the tension on the cutter head equalizing spring may be varied for different types of records.

(69) Follower Arm and Spring Cam. This arm and cam mesh with lead screw **(60)** to provide lateral motion of cutter arm during recording.

Note: The Cutter Arm Support Rest holds cutter arm out of the way when automatic record changer is in use and also removes all strain on cutter-head equalizing spring. Mounted in inside position for shipping purposes. Before attempting to use mechanism it is necessary to move rest to the outside position shown.

How To Load Records

The record support posts must be set for either 10-inch or 12-inch records. This is accomplished by simply lifting Lever **(1)** then shift to the desired position. Select any number up to ten 12-inch or twelve 10-inch records, line them up with center holes, slip them onto center post of the turntable.

How To Start And Stop

All that is necessary to start the automatic Record Changer, after loading with records and properly securing needle in pickup, is to turn on the current by throwing switch. After turntable is in motion, press button **(18)**. To stop changer merely throw switch to off position.

How To Reject A Record

Press Reject Button **(18)**.

How To Remove Records

Before removing records move Lever **(1)** away from turntable to extreme position.

For Manual Playing Of A Record

Move Lever **(1)** away from turntable to extreme position same as for removing records. This will free the tripping mechanism so that the pickup arm can be moved by hand to and from the record.

NOTE: During recording Lever **(1)** must be in manual position at all times.

How To Place Record On Turntable

Place blank record disc on turntable in such a manner that the retractable pin protrudes through one of three holes near center of record. This is absolutely necessary to prevent the record from slipping and ruining the recording. When it is desired to play an ordinary record, place record on turntable; weight of record will cause pin to depress into turntable and friction between record and table is sufficient to prevent slippage.

How To Cut Records

Start motor, raise cutter arm from rest position to an angle of approximately 45 degrees and move inward until white mark on front of cutter arm is just inside record periphery. Lower arm gently as far as it will go; if stylus does not contact record, arm must be raised to relocate. The record is now being cut; inside limit of travel of recording arm will be indicated by a "clicking" sound, when this is heard, raise cutter arm immediately and place on rest. During time of cutting fine threads will accumulate about ½ inch inside stylus. These threads are carried to the center spindle by means of the thread collector attached to the cutter stylus clamp screw.

Phonograph Play-Back

With phonograph reproducing needle in pickup arm **(13)** start motor and place arm on record.

Caution:

Do not use changer mechanism with home recording discs.

GENERAL INFORMATION

LEVELING OF INSTRUMENT

For this mechanism to operate to the best advantage it should be mounted in a cabinet which is solidly supported and has no tendency to rock on its feet. If the floor under the cabinet is not level, shims should be placed under the feet of the cabinet until the base plate of this instrument is level.

Failure to level the instrument may result in improper feed-in of the pickup arm when the automatic record changer is in use and during recording the proper balance of the cutter head would be disturbed.

PLAYBACK NEEDLES

This mechanism will play 10 twelve inch or 12 ten inch commercial records automatically and an ordinary needle would become badly worn and cause serious record wear before the completion of this number of records. Special long playing needles made especially for automatic record changers should always be used. These needles are not as a rule recommended for playback of home recorded discs, however. For home recordings, 100% shadowgraphed needles will give the least surface noise and prolong the life of the recording. These needles in turn are not suitable for use in an automatic record changer for playing a series of commercial records. No needle which has been used to play a commercial record should ever be used to play home recordings except in the case of the so called "permanent point type". Unless needles have a locating flat on the shank for engagement with the needle clamping screw they should never be used after they have once been removed from the needle chuck. Even if needles have a flat on the shank it is not always easy to locate them exactly as they were the previous time and serious damage to

records may follow the re-use of such needles. The pickup needles used in this unit should be 5/8 inches long.

LUBRICATION

Frequent lubrication of the record changer is not required, however, certain points should receive attention at least two or three times a year. Lubricate with SAE 20 automobile engine oil (every six months or every 500 hours of operation whichever comes first) the following points: motor bearings (52) and (53), turntable shaft bearing under cam (16) and idler bearing (51). Caution: Make sure that no oil, grease, or solvent of any description gets on the rubber tread of idler (54). Oil other parts of the mechanism whenever advisable. Keep the working surfaces of cam (16) and the various cams on cam shaft (19) covered with a thin film of petroleum jelly (Vaseline).

Whenever the follower arm post (56) shows any tendency to stick or bind in the pivot post bushing (57), apply petroleum jelly to the follower arm post above and below the pivot post bushing and work the lubricant in by alternately raising and lowering the recording arm (58). Never oil the follower arm post. Work petroleum jelly into the bearing surfaces between the straddle plate (59) and the pivot post bushing (57). This can best be done by raising the recording arm (58) until it is free of the feed screw after which it can be swung from side to side until the lubricant is well worked into place.

Because the threads or shavings resulting from the recording process may work into the various parts of the mechanism, care should be exercised to remove this debris from the mechanism at regular intervals. At such times also thoroughly clean the threads of the feed screw (60), removing any dirt particles which may have accumulated. The use of a brush is recommended for cleaning the feed screw. Never use a sharp instrument to remove particles from the feed screw threads as scratches on the threads would be detrimental.

AUTOMATIC RECORD CHANGER MECHANISM

DESCRIPTION OF TRIP MECHANISM

(1) In order to automatically change records, the record changer mechanism must first be put in motion. The trigger which accomplishes this purpose is the trip mechanism. The trip mechanism is actuated by the trip grooves at the nd of the music grooves in all standard records.

.) All commercial records manufactured in recent years have either an eccentric (oscillating), or spiral (run-in) type of trip groove.

(3) This record changer will trip on any standard eccentric trip groove. It will also trip on any spiral trip groove provided that the spiral does not terminate at a larger diameter than that for which the trip mechanism is adjusted.

(4) To observe the operation of the trip mechanism, it is necessary to first remove the turntable and then move lever (1) to either the 10 or 12 inch position.

(5) To follow the action of the trip mechanism on eccentric trip groove records, it will be seen that as the pickup arm (13) swings inwardly, the trip rod (45) moves toward the pickup base until the serrations on the trip rod seen at (11) are in contact with the knife edge of the trip latch (24). If the pickup arm (13) is now moved outwardly, the serrations at (11) will engage with the trip latch (24) permitting the trip cam lever (3) to be released so that it will drop in and engage the trip cam (16).

(6) To observe the action of the trip mechanism on spiral trip groove records, swing the pickup arm (13) inwardly until the trip dog (7) comes in contact with the trip latch (24) and releases trip cam lift lever (3).

(7) The reject button (18) it will be noted also operates to trip the mechanism by imparting motion to latch (24).

(8) After trip cam lift lever (3) has been released so that it will engage trip cam (16), the forces required to operate the balance of the trip mechanism are derived from the motor (23) which drives cam (16) through the turntable.

(9) As trip cam (16) engages trip cam lift lever (3), cam (16) is hinged upwards so that it engages the pulley control lever (9) and forces pulley (12) into positive frictional engagement with the inside of the turntable rim.

(10) To keep pulley (12) in engagement with the turntable rim after lever (9) walks off of cam (16), lever (9) is engaged by latch (25) and the tripping operation is complete.

DESCRIPTION OF SPEED REDUCER AND CAM SHAFT

(11) Driven by the pulley (12) through a double worm and gear reduction, the cam shaft (19) carries cams which control the pickup arm movements, the dropping of records and at the conclusion of the change cycle, the release of latch (25).

(12) Cam (20) which is mounted on lower end of shaft (19) raises and lowers the pickup arm (13) through a rocker arm and push rod. On the upper side of cam (20) is a dog which engages lever (17) and actuates the record handling fingers (4) (See paragraph 18).

(13) The positioning of the pick up arm (13) for 10 or 12 inch records is controlled by two cams just above the lower cam shaft bearing. The lower of these cams (with short throw) positions the pickup for 12 inch records and the upper cam (with long throw) positions the pickup for 10 inch records.

(14) An examination of the pickup positioning cams will reveal spring fingers at the termination of the cam rise. These spring fingers are provided to urge the pickup needle into the starting groove on records which do not have lead in grooves.

(15) When lever (1) is set in the 10 or 12 inch position the pickup positioning cam follower is shifted up or down so as to engage the proper cam. The pickup positioning cam follower can easily be distinguished by the coil spring mounted thereon and linking the cam follower to its extension. This coil spring will extend, preventing damage, if for any reason the pickup arm (13) becomes obstructed while the pickup positioning cam is forcing the pickup arm (13) inwardly.

(16) Just above the pickup positioning cams is the pickup return cam which has the function of swinging the pickup arm (13) outwardly when the mechanism has been tripped.

(17) The last and uppermost cam operates through cam follower (26) to release the pulley latch (25) thus disengaging pulley (12) from the turntable rim at the completion of the cycle.

(18) On the upper side of the latch control cam is mounted a roller which engages the upper extension of lever (17) and through a linkage rotates the record support fingers (4) so as to drop a record to the turntable. After the record is dropped, the lower extension of lever (17) engages with the dog on the upper side of cam (20), rotating support fingers (4) in the opposite direction and back to their original position.

ADJUSTMENT OF SPIRAL TRIP MECHANISM

(19) To adjust the spiral trip to operate farther from the center of the record, loosen the set screw (46) holding dog (7) and move the dog (7) away from the end of the trip rod (45). (Read paragraph 20 before making adjustment).

(20) Dog (7) is set at the factory to trip when the pickup needle is 1-3/4" from the edge of the hole in the record center. This standard setting is correct for all late recordings and all but a very few of the older ones. To facilitate the location of dog (7) it is best to hold a scale with the end touching the turntable pin (5) and in such a manner that the pickup needle will swing directly above the scale graduations. As noted above, the trip should release when the pickup needle reaches the 1-3/4" graduation. Note: If for any reason the position of the pickup arm (13) with relation to the pickup base becomes changed, the trip dog (7) may require resetting. For this reason always check to see that the pickup is being lowered correctly onto the edge of the record before adjusting dog (7). (This pickup adjustment is covered in paragraph 34).

MECHANISM FAILS TO TRIP

(21) If the mechanism fails to trip always examine the trip grooves on the record first before attempting to make any adjustments. The record grooves may be badly worn or scratched in such a manner as to cause the pickup needle to jump the grooves. Also try a new pickup needle as the needle may have been damaged.

(22) The trip rod (45) is held in contact with trip latch (24) by the trip rod tension spring (6). If the eccentric trip fails to operate, it may be necessary to increase the pressure of spring (6) against trip rod (45) but before changing the adjustment, first, make sure that the trip rod does not bind in the bearing where it is linked to the pick-up base, second, be sure that the trip rod floats freely, third, examine the serrations at (11) to be certain that the sharp edges have not been damaged, fourth, remove any dirt which may be embedded in the serrations and which would prevent the trip latch (24) from being engaged, fifth, examine the knife edge of trip latch (24) to see if it has become damaged, sixth, inspect the spring (6) to see that its long leg clears that part of supporting bracket (36) on which rests trip rod (45), seventh, make sure that the pick-up needle is not jumping out of the trip grooves in the record, eighth, hold pickup base (50) with one hand, then press gently sideways on head of pickup arm (13) to detect any unusual amount of lost motion or play which might be caused by lock screws (10) not holding firmly or pivot screws (47) not being correctly adjusted, ninth, sight along the length of the trip rod (45) to make sure that it has not become bent as this would seriously interfere with adjustment of spring (6). If trip rod (45) is found to be bent, always disassemble it before trying to straighten it. Note: Do not increase the pressure of spring (6) against trip rod (45) any more than is necessary to insure operation of the eccentric trip as excessive spring pressure will cause the pickup needle to jump the record grooves. To increase the tension of spring (6) against trip rod (45) loosen screw (27) and turn spring bracket (36) in a clockwise direction.

(23) If the pickup needle shows a tendency to jump grooves on all records and fails to trip, make sure that the pickup arm (13) swings freely. Next check the pressure of the pickup needle against the record to make sure that counter balance spring (28) is properly adjusted. (Model GI-RC130 should have a needle pressure of : 2-1/2 oz.: Model GI-RC130L: 1-1/4 oz. minimum). To correct insufficient needle pressure, loosen lock nut on adjusting screw (29) and turn adjusting screw (29) in a clockwise direction until needle pressure is correct. Caution: Before changing adjusting screw (29) make certain that push rod (30) moves up and down freely and is not supporting the pickup arm (13) while the needle apparently is resting on the record. Also make sure that pickup arm (13) is not resting on the head of screw (32). If the pickup needle only jumps grooves when but one record is on the turntable, pickup arm (13) is almost certainly resting on either push rod (30) or screw (32) in which case read paragraph 33. As a final pre-caution see that pivot screws (47) are not so tight as to interfere with the free vertical motion of pickup arm (13).

(24) If the trip mechanism still works in a faulty manner after the foregoing precautions have been taken, next check the trip latch (24) and the trip cam lift lever (3) to make sure that they work freely and do not bind on studs (35) and (48) respectively. If either of these levers are scraping on the base plate, make sure that the studs have not worked loose.

(25) If the lever (3) moves freely when it clears the trip latch (24) but does not swing into path of the trip cam (16) then spring (39) which connects to lever (3) is either stretched or missing. If lever (3) makes a loud click when it drops in, the rubber bumper, against which it should strike, has worked up and should be pressed back into place. Note: Never attempt to make the trip mechanism operate from home recorded discs.

CHANGE MECHANISM DRIVE PULLEY FAILS TO ENGAGE

(26) If the trip mechanism functions in a satisfactory manner and pulley (12) is latched in position to engage the turntable rim but does not contact the turntable rim with sufficient pressure to insure operation, loosen lock nut (77) and turn adjusting screw (8) counter clockwise so as to move the pulley control lever extension (49) outwardly a distance which will bring pulley (12) into positive frictional engagement with the turntable rim then tighten lock nut (77). Caution: This adjustment is very critical and should be carefully made.. If pulley (12) is forced too tightly against the turntable rim the latch (25) will stick at the completion of the change cycle and prevent the pulley from becoming disengaged from the turntable rim. Before making any adjustment it is also advisable to check the set screw in pulley (12) to make sure that pulley (12) is tight and not turning on the shaft which carries it.

(27) If latch (25) fails to hold pulley (12) in position, check the latch to make sure that the latch fingers have not been bent. Next check spring (41) on lever (26) to make sure that the spring is not defective or missing. If pulley (12) is riding off the lower edge of the turntable rim or so high as to cause it to scrape against the underside of the turntable, the height of pulley (12) may be adjusted by means of thrust screw (44). Before trying to turn screw (44) always loosen the lock nut provided.

MECHANISM REPEATS

(28) If the mechanism repeats (continues to change records without playing them), the pulley (12) may not be disengaging from the turntable rim. This failure to disengage may be due to the following: Faulty action of the latch (25). (See "Caution" in paragraph 26). A defective or missing return spring (40) on pulley control lever (9). A defective or missing spring (41) on lever (26). Lever (26) may be bent so that it is not contacting the pulley release cam. (See paragraph 17).

(29) If pulley (12) disengages at the completion of the change cycle and immediately re-engages, the trip mechanism is at fault and it is suggested that the following be checked: Reject lever (42) may be bearing against trip latch (24) or it might be caught under trip latch (24). Pulley control lever (9) may be bent down so that it engages cam (16) even when cam (16) is not elevated by lift lever (3). Cam (16) may be sticking in the raised position. The reset spring (38) on trip latch (24) may be defective or missing. The stud (34) on which pulley control lever (9) is mounted may have worked loose and should be tightened.

MECHANISM TRIPS DURING PLAYING CYCLE

(30) If the mechanism trips during the playing of a record and before the pickup arm has swung inwardly to the point where the trip is adjusted to operate on spiral trip groove records, the following conditions should be checked: Weak or missing reset spring (38) on latch (24). Defective shoulder on trip latch (24) or rounded corner on cam lift lever (3), permitting lever (3) to slip off of the shoulder on trip latch (24). If the mechanism trips when the pickup arm is moved by hand from the outside edge of the turntable outwardly the trip rod (45) may be bent.

MECHANISM TRIPS OR PICKUP ARM BINDS IN MANUAL POSITION

(31) When lever (1) is moved to the manual position the pickup arm (13) should be capable of free motion between the normal limits of its travel without tripping the mechanism. If the pickup arm binds or trips the mechanism under these conditions check the following: Trip rod (45) may be bent or disengagement finger (37) bent or broken. If rubber bumper (2) becomes pushed up away from the base plate, this will permit lever (9) to overtravel and may jam trip rod (45).

RECORDS FAIL TO DROP PROPERLY FROM RECORD SUPPORTS

(32) If two or more records are dropped at the same time or one edge of a record drops and the other edge does not then the rear record support (15) may not be correctly adjusted or record separating fingers (14) may be bent. Also check the records to make sure that they are of standard diameter and thickness. Should record separating fingers (14) be bent refer to paragraph 35 for corrective measures. An examination of the unit will disclose that the front record support has fixed positions determined by dedents which are located by lever (1). The rear record support (15) however is adjustable. If the record supports are not the correct distance apart, loosen screws (22) and move the rear record support (15) to the proper position.

Caution: Before making this adjustment always make sure the lever (1) is firmly located in the proper dedent.

Note: As home recording discs differ from standard records in thickness and diameter, they cannot be handled by the record supports.

PICKUP ARM LIFT AND REST ADJUSTMENTS

(33) The height to which pickup arm (13) is lifted during the change cycle may be adjusted by the screw (21). In making this adjustment make sure that the pickup arm will not lift high enough to strike the bottom record on the record supports. Also make sure that the pickup needle drops low enough to rest properly on one record on the turntable. (Recommended needle length 5/8"). If the pickup arm (13) is in contact with the push rod (30) or the pickup rest (32) when the pickup needle is resting on one record on the turntable, the needle will not exert sufficient pressure against the record for proper operation. Before adjusting the pickup lift, therefore, the pickup rest (32) should be checked to be sure that it is correctly adjusted. Pickup rest (32) is correctly adjusted when the pickup needle just touches the top of the turntable. As a final check be sure that the pickup will track properly when reproducing the thinnest home recorded disc likely to be used.

ADJUSTMENT OF PICKUP LOWERING POINT

(34) To adjust the pickup arm (13) so that it will be lowered to the correct point on the outside of the record, first shift the lever (1) to the 10" position and then stop the mechanism with the pickup positioning cam follower at the point of maximum rise of the pickup positioning cam. (See paragraphs 13, 14 and 15). Now raise the pickup arm to the vertical position and loosen two screws (10) so that the arm (13) can be moved with relation to the pickup base (50) but not too freely. Next holding the pickup base (50) so that it will not turn, force the pickup arm (13) toward the record centering pin (5). Now place a scale under the pickup needle with the end of the scale touching the record centering pin (5). Next, carefully pull the pickup arm (13) outwardly until the pickup needle is 4-45/64" from the pin (5). Raise the pickup arm (13) and tighten the two locking screws (10) being careful not to move arm (13) outwardly past the correct setting before tightening the screws. This adjustment will automatically take care of 12" records as well as 10" as will be seen by moving lever (1) to the 12" position and running the unit through its cycle. If the pickup arm (13) always lowers in the 12" position, regardless of the position of lever (1), the pickup positioning cam follower is sticking in the down position. Some pickups are equipped with an eccentric (31) for rotating the pickup arm (13) with relation to the pickup base (50). On such units the two locking screws (10) are loosened and eccentric (31) turned a small amount at a time until the pickup needle is lowered to the correct point on the record.

CHIPPING OF RECORDS

(35) The record supports (4) and the record separating fingers (14) are so designed that no chipping of standard records will take place unless through rough handling the fingers (14) become bent. For proper operation the fingers (14) must be perfectly flat. To straighten the fingers (14) it is necessary to remove the large headed screws (55) which hold the fingers in place after which the fingers (14) can be disassembled. Ordinarily straightening can be accomplished by holding the main part of finger (14) through which the clamping screw passes with one hand and then taking hold of the sickle shaped part of (14) with the fingers of the other hand, bending the sickle shaped part until it is lined up with the main body. After bending lay the finger (14) on a flat surface to make sure the straightening has been properly done.

RECORDER MECHANISM

MAGNETIC CUTTER

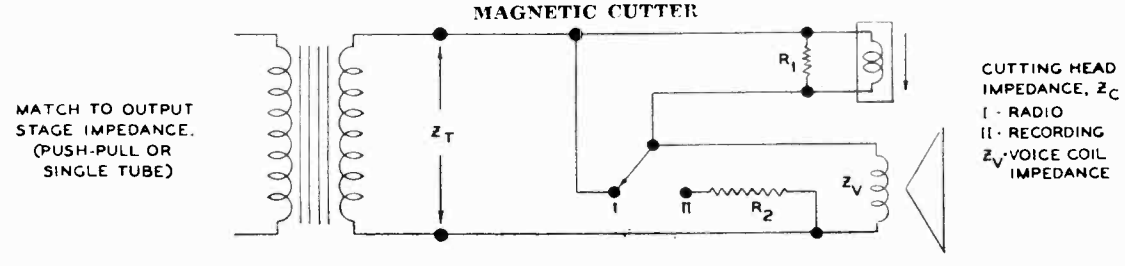


FIG. A

TYPICAL VALUES OF COMPONENTS

Z_C OHMS	R_1 OHMS	Z_V OHMS	R_2 OHMS	Z_T OHMS	MONITORING SPEAKER LEVEL BELOW RECORDING LEVEL
10	10	3.2*	0.4	3.2	17.0
10	10	4.0	0.5	4.0	16.5
10	10	6.0	1.0	6.0	13.0
10	16	8.0	2.25	8.0	10.0
10	18	10.0	5.50	10.0	5.0

* RMA STANDARD VOICE COIL IMPEDANCE OF SMALL SPEAKERS

MAGNETIC CUTTER (Cont'd)

(36) A suggested circuit for inclusion of the magnetic cutter in the voice coil circuit is shown in Figure A.

In this circuit, the speaker is used as a monitor. Resistor R_2 shunts the speaker voice coil and resistor R_1 shunts the cutter. Resistor values are selected which will result in the total series resistance of the two groups approximately matching the output transformer's impedance. The ratio of R_1 in ohms in parallel with Z_c in ohms at 400 cycles to R_2 in ohms in parallel with Z_v in ohms at 400 cycles will represent the voltage ratio between cutting and monitoring levels. This can be converted to decibels when the resistance of each leg of the network is known. The high frequency response of the cutters is partially governed by the ratio of Z_c to R_1. Resistor R_1 should be of the same value as the impedance of Z_c or slightly higher, but R_1 should in no case exceed twice the value of Z_c in ohms. In all calculations, sufficient accuracy will normally be secured if the 400 cycle impedance of both cutter and speaker voice coil be considered as pure resistance. Generally speaking, the 400 cycle impedance in ohms of a magnetic cutter will be approximately 2½ times its D. C. resistance in ohms. The 400 cycle impedance in ohms of the speaker voice coil will be approximately 1¼ times its D. C. resistance. If the 400 cycle impedance in ohms is supplied by the manufacturer of the cutter or speaker, it should be used instead of calculations from the D. C. resistance.

(37) Typical values for R_1 and R_2 with various impedance voice coils are given in the above table when a 4 ohm D. C. - 10 ohm 400 cycle cutter is used. Value of R_1 and R_2 can be found with other impedance cutters by simply applying Ohms Law if, as mentioned before, the 400 cycle impedance in ohms is considered as pure resistance.

When connecting the cutter to an output where the monitor speaker isn't required, only R_1 in parallel with Z_c in ohms will be considered as the load. For example, a 10 ohm cutter at 400 cycles (Z_c) in parallel with a 16 ohm resistor (R_1) would represent a load of 6.15 ohms to the output transformer of the radio receiver or amplifier. It would be satisfactory to connect this to the 6 ohm tap of the output transformer.

(38) A volume level indicator is necessary to prevent cutting too heavily. For this purpose, a high resistance voltmeter (1000 ohms per volt or higher) can be connected across the cutting head in parallel with T_1. Where Z_c has a value of 10 ohms as shown in the table, the voltage peaks should be about 1 volt on speech and 1½ volts on music. A power level of approximately ¼ watt is required by the average magnetic cutter for satisfactory operation. This is a voltage of 1.58 across a 10 ohm impedance cutter.

Other methods of volume level indication such as neon bulbs in series with resistors, tuning eyes, oscillographs, etc., are also satisfactory. Any high impedance device which will indicate low values of A. C. voltage can be used.

In cases where it is necessary to extend the cutter lead wires, insulated #20 wire should be used. When the extension is over a few feet it is usually desirable to use a larger wire size.

CRYSTAL CUTTER

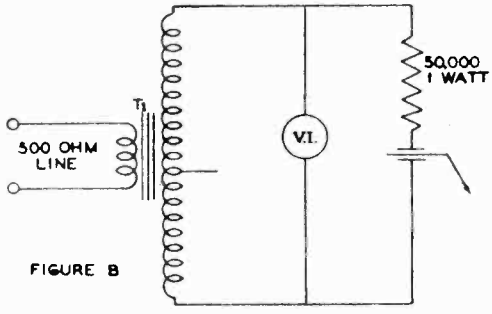


FIGURE B

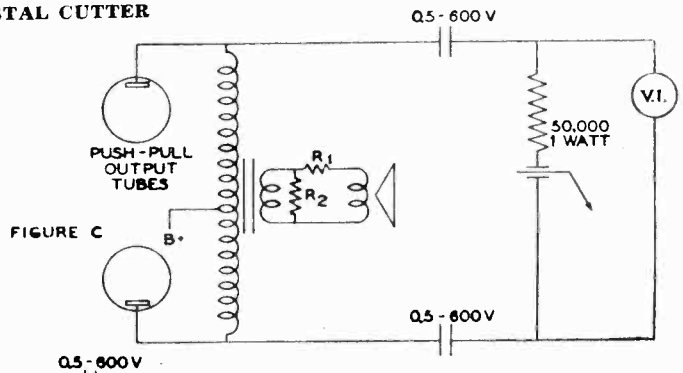


FIGURE C

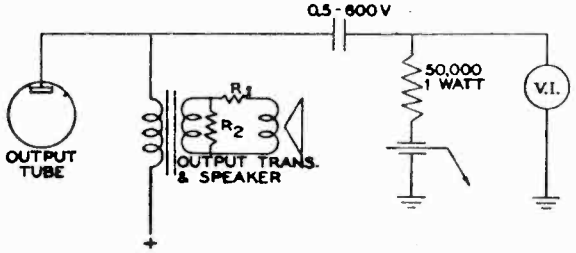


FIGURE D

(39) To record at characteristics similar to standard commercial recordings with a crystal cutter, a 50,000 ohms 1 watt resistor should be placed in series with the cutter. To emphasize high frequencies, this resistor should be shunted with a condenser between .001 to .01 mfd. To emphasize low frequencies, the series resistor should be varied up to 250,000 ohms.

(40) A volume level indicator is necessary to prevent cutting too heavily. The level indicator should be connected as V. I. in figures B, C and D. Any high impedance device which will indicate A. C. voltage can be used. A high resistance A. C. voltmeter (1000 ohms or more per volt) 0-150 volt scale may be used. For normal recordings, the voltage peaks should be about 100 volts. The actual voltage required can be determined after a few trial recordings are made (see section on Making A Trial Recording).

(41) A crystal cutter must be driven from a high impedance source, Figures C and D show means of capacity coupling the cutter to either a single or push-pull output circuit. The 0.5 mfd. 600 volt condenser blocks the direct current from reaching the cutter but will pass the voltages to be recorded. Resistors R_1 and R_2 represent legs of an "L" pad to be used in attenuating the speaker level to permit its being used for monitoring when recording a radio program. These two resistors may be fixed and of such values that the total load to the output transformer will be the same as the speaker impedance. The monitoring level will be a fixed number of decibels below the recording level. See Chart E for typical values of R_1 and R_2. Various degrees of monitoring attenuation can be found by simply applying Ohms Law if the 400 cycle impedance of the speaker voice coil is considered as pure resistance. A simple switching arrangement can be used to remove the resistors from the circuit as well as opening the cutter circuit when not recording.

Figure B indicates a means of inductively coupling the cutter to an amplifier's 500 ohm output. Transformer T_1 should have an impedance ratio of 500 to between 40,000 to 80,000. Several reputable tranformer manufacturers supply tranformers which can be used - some are designed primarily for crystal cutters and others are for driving push-pull grids from a 500 ohm line. If the latter transformer is used, the center tap of the secondary will be left open as shown in Fig. B.

The length of the wire from the radio or amplifier to the crystal cutter should be kept as short as possible and should be well insulated.

CHART E

TYPICAL VALUES OF "L" PAD RESISTORS R_1 AND R_2 FOR SPEAKER MONITORING

OUTPUT TRANSFORMER AND VOICE COIL IMPEDANCE IN OHMS	R_1 OHMS	R_2 OHMS	DECIBELS ATTENUATION BELOW RECORDING LEVEL
3.2	5.5	5.5	8.5
3.2	10	4.5	12.0
6.0	10	10	8.5
6.0	15	8	11.0
8.0	11	14	7.5
8.0	20	11	11.0

AMPLIFIER

(42) The amplifier should be capable of at least 5 watts output in order to keep harmonic distortion down to a reasonable level and preferably have triode output or beam tubes with inverse feedback. Frequency response should be reasonably flat within the audible range. Hum level should be low enough so that hum is not discernible at the loud speaker with the volume adjusted to recording level. The amplifier should be stable at full volume and "microphonic" tubes avoided. If the amplifier and recorder unit are to be installed in the same cabinet, all conditions of mechanical resonance and feed back must be avoided to preclude the possibility of recorded "rumble". The cabinet should be substantially built of comparatively heavy materials. If cabinet resonance is encountered, wooden braces glued to the inside surfaces of the cabinet will sometimes serve to correct this condition.

RECORDING FROM RADIO

(43) For radio recording, it is desirable to leave the speaker connected for monitoring purposes. In Fig. A the circuit components are arranged for reducing the speaker volume during recording as shown in the table.

(44) Referring to Fig C and D, an "L" pad is shown in the voice coil circuit for reducing speaker volume during recording. When the radio is being used without recording this "L" pad should of course be disconnected.

RECORDING FROM MICROPHONE

(45) When recording from microphone the speaker must be disconnected to prevent feed back and a resistor of the same value as the speaker voice coil impedance substituted for the voice coil, in order that the proper load impedance be reflected back to the output tubes.

PLAYBACK PICKUP

(46) The crystal pickup leads may be connected directly to the phonograph input terminals provided on most amplifiers and radio receivers, or may be connected between "grid" and "ground" of the radio receiver's second detector tube if no other connection is provided.

The volume control is usually in this circuit and the pickup lead can be connected to the two outside connections of potentiometer type volume controls. One of these connections is grounded, or at very low potential. The shield or outer conductor of the pickup wire should be connected to this terminal. The inner wire of the pickup lead should be connected to the opposite volume control connection. If desired, a single pole double throw switch can be used at this point to switch from radio to phonograph. If these connections are reversed, an A. C. hum will be heard in the loud speaker when the switch is in record playing position.

MICROPHONE

(47) For making microphone recordings through the audio amplifier of a radio receiver, quite satisfactory results will usually be forthcoming by use of a diaphram type crystal microphone of reputable manufacture, connected to the phonograph input terminals of the radio receiver. Correct polarity of connections to the microphone cable should be observed, the same as for connecting the pickup cable. The shield of the cable should connect to "ground." This arrangement will usually afford sufficent volume for microphone recording, although the microphone cannot be expected to produce the same loud speaker volume as is obtained in playing records with the pickup connected to the amplifier. The phonograph pickup delivers approximately from .5 to 2 volts to the input of the amplifier, while the microphone is capable of furnishing only approximately 1/100th of this voltage or from .01 to .02 volts.

PRE-AMPLIFIER FOR MICROPHONE

(48) If it is within the scope of the constructor's knowledge and ability, the assembly and installation of a microphone pre-amplifier will prove to be a material aid in microphone recording service. The purpose of the pre-amplifier is to amplify the impulses generated by the microphone, before being fed into the audio frequency amplifier, so that the amplifier will produce about the same amount of volume to the recording head, or cutter, whether recordings are made from microphone or from radio reception.

RECORDING STYLI

(49) This mechanism is designed to utilize short shank styli or cutting needles. Short shank styli have an overall length ranging from $\frac{9}{16}$" to $\frac{5}{8}$" whereas long shank styli are approximately $\frac{1}{8}$" longer. Any attempt to use long shank styli will result in failure as it will be found impossible to correctly adjust the stylus angle (see "Stylus Angle Adjustment"). It is also essential that the cutting face of the styli be parallel to the axis of the shank. Styli having a hooked cutting face are offered for sale but as in the case of the long shank type, these cannot be used in this mechanism.

(50) Short shank, straight face cutting styli are sold at widely varying prices depending on the material and care used in their manufacture. The most inexpensive type is made from hardened steel and the cutting point is ground to a sharp "V". In contrast the higher priced styli are tipped with special metal cutting edges such as stellite or precious stones such as sapphire and the cutting points on these are ground with a slight radius. The useful life of styli ranges from 30 minutes in the case of steel styli to as much as 10 hours in the case of natural sapphire styli, but it must be remembered that the abrasive character of the recording blanks used will finally determine the actual life of any given stylus. Care must also be exercised to prevent the sharp cutting edges from coming in contact with hard surfaces, such as the turntable, which would render the stylus unfit for further use.

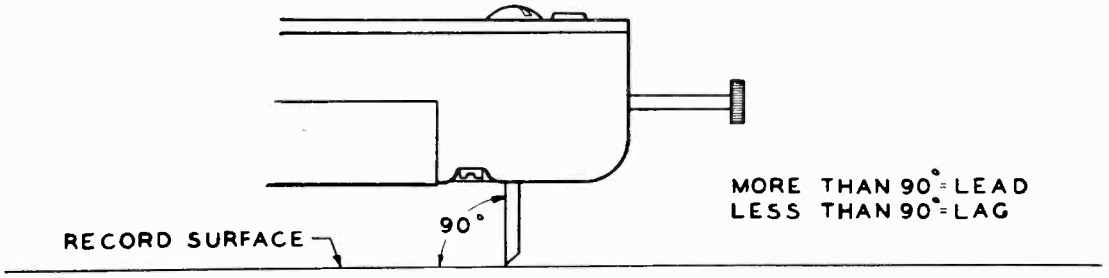
(51) Almost all recording styli, now on the market, have a flat cut on the shank. This flat is of great assistance in properly locating a stylus in the cutting head as the stylus screw bears against this flat and holds the stylus in proper position. When styli are used which do not have the locating flat, it is usually difficult to properly position them in the cutting head. Even where styli have the locating flat cut on the shank, they do not always position themselves in the stylus chuck so that the thread cut from the record disc will throw toward the record center. In case the thread tends to throw to the outside, loosen the stylus clamping screw slightly and reseat the stylus in the stylus chuck.

CUTTING HEAD ADJUSTMENTS

(52) Due to the wide range of physical properties found in various recording blanks and the varying cutting qualities of different styli, it is necessary to adjust the cutting head on this unit for the particular type of recording blank and stylus to be used if best results are to be realized. To compensate for these differences in recording materials, two adjustments must be made. First, the proper angle must be maintained between the cutting face of the stylus and the face of the record disc. Second, downward pressure of the stylus against the record must be correct. (See "Stylus Angle Adjustment" and "Depth of Cut Adjustment.")

(53) Owing to the fact that the shanks of cutting styli are of hardened steel, there is a tendency for styli to become loose in the stylus chuck during the recording process. To combat this tendency, the stylus clamping screw should be tightened with the fingers at the completion of each recording. Never tighten the stylus clamping screw with pliers, however, as breakage of the clamping screw is almost certain to occur.

STYLUS ANGLE ADJUSTMENT



(54) The angle between the cutting face of the stylus and the face of the recording blank is said to "lead" when the angle is greater than 90° and is said to "lag" when the angle is less than 90°. Approaching the vertical, a point will be found where the cut becomes cleaner and quieter, however, a point is always reached where the stylus tends to dive into the record face and when this happens, chatter and squealing occur. For this reason the useful limits of adjustment are from the vertical to 5° lagging. Because of the sharp "V" point found on hardened steel styli, this type usually operates best at about 5° lagging angle. Sapphire styli on the other hand can usually be adjusted between the vertical and 5° lagging angle. Stellite and other alloy styli will be found to fall somewhere between steel and sapphire and usually can be operated almost vertically. It should be noted that when a stylus becomes dull from normal wear, surface noise increases and eventually chattering or squealing occur. Chattering or squealing can also be caused by a recording blank which does not cut freely because it has become dried out or else did not have good cutting qualities initially. All of these factors must be considered when adjusting the stylus angle.

(55) The stylus angle is controlled by the length of the stylus and the distance from the top of the recording blank to the recording arm (58). As the stylus should always be inserted in the stylus chuck as far as it will go, it follows that to change the stylus angle the recording arm should be raised or lowered. Raising the recording arm decreases the lag and lowering the recording arm increases the lag. To change the height of the recording arm (58) above the record blank, first raise the recording arm to the vertical position and then adjust stop screw (61) until stylus angle is correct.

(56) To determine the angle between the cutting face of the stylus and the top of the record blank at any time, two methods of inspection are used. (a) With the turntable stationary and the stylus resting on the record blank, a sight taken across the cutting face of the stylus and one side of the spindle in the center of the turntable will show any departure from the vertical and how much. (b) Looking across the cutting face of the stylus, both the stylus and its reflection in the face of the record blank can be seen at one time. When the stylus is vertical with respect to the record blank, the plane of the cutting face of the stylus and its reflection will of course be in a straight line. When the mechanism is mounted down in a well in a cabinet it is not always possible to make these inspections directly and in this case a mirror must be employed.

(57) The most important thing to remember in making this adjustment is that the best stylus angle is that angle which gives the quietest cut and plays back with the least surface noise.

(58) Caution: Because of the wide variation in the thickness of record blanks (.020" to .100"), the variation in the length of styli ($\frac{9}{16}$" to $\frac{5}{8}$") and the possibility of warped or bent recording blanks, be sure that the stylus clamping screw (62) does not strike the bottom of the slot in the end of the recording arm as the stylus follows the surface of the record blank. Also, be sure that the cork bumper (63) on top of the cutting head is not striking in the top of the recording arm. If it is suspected that the cork bumper is striking, this can be easily checked by gently applying upward pressure on the stylus clamping screw (62). It will raise easily if the cork bumper is not striking but do not lift this screw roughly as it might become bent.

(59) Caution: Every care should be exercised to prevent the cork bumper from striking in the top of the recording arm during recording as this would drive the cutting stylus through the coating on the recording blank and ruin the cutting edges of the stylus. The stylus may also be damaged if it is lowered roughly on to the face of the recording blank. Never allow the stylus to rest on a stationary recording blank if energy is being fed to the cutting head, as the stylus will dig through the record coating and damage its cutting edges.

DEPTH OF CUT ADJUSTMENT

(60) The depth of cut is regulated by screw (64) located on top of the recording arm (58). Turning screw (64) clockwise increases the depth of cut. To check the depth of cut, make a trial cut of a few quiet grooves on a record blank of the same type on which recordings are to be made. This is important because of the varying hardness and cutting qualities of different blanks. For an accurate inspection of the grooves, a magnifying glass or low powered microscope should be used to compare the width of the grooves with the land or uncut space between grooves. If a magnifying glass is not available, the examination can be made with the unaided eye provided the light strikes the record at the correct angle. When a magnifying glass is not used, however, the grooves appear to be wider than they actually are and this should be borne in mind. For home recording practice, a groove exactly the same width as the land, is recommended. Too narrow a groove will cause difficulty with the playback needle climbing out of the groove, while at the other extreme a very wide groove will cut across into the adjacent grooves during recording. Too wide a groove may also produce sudden variations in the turntable speed.

(61) Hardened steel styli with a sharp "V" point cut deeper for a given pressure than the higher priced styli which have a very slight radius on the point. As styli become dulled with use more pressure is required to maintain the same depth of cut. Changing the cutting angle (angle between the cutting face of stylus and face of record) will have some effect on the depth of cut and for this reason the stylus angle adjustment should always be made before the depth of cut adjustment, where both adjustments are necessary.

IMPORTANCE OF RECORDING AT THE CORRECT VOLUME LEVEL

(62) If recordings are made at too low a volume level, it will be necessary to increase the gain during playback to where surface noises will be very objectionable. If on the other hand the volume level is too high, the wall of record material between grooves may be cut through, rendering the record useless. Where only a very thin wall is left between grooves, "echo" or "ghost" may be noticeable. "Echo" is the faint reproduction of recorded sound as the playback needle travels in the adjacent groove following the groove in which the sound originally was recorded, while "ghost" is heard in a groove preceding an adjacent groove where the sound actually was recorded.

MAKING A TRIAL RECORDING

(63) After it has been determined that all of the adjustments are in correct order, and the machine is cutting correctly, a trial cut should be made to determine the correct level of volume for recording.

(64) During recording, the tone control should be set to its treble or high pitch position to avoid the possibility of losing high frequencies in the recording.

(65) In making microphone recordings, place the microphone at a distance of about 10 to 18 inches for the speaking voice, and at correspondingly greater distances for recording vocal or instrumental musical renditions. When recording speech, the microphone should not be spoken into at close range, as lip sounds and sounds of breathing will be recorded, and because of shock to the microphone diaphram due to sudden bursts of sound impulses entering the microphone, the voice is caused to be recorded unnaturally.

ADJUSTMENT OF RECORDING ARM MOUNTING

(66) The recording arm assembly is automatically positioned for height at the pivot or back end by the "U" shaped link (65) and the follower arm post (56). If the recording arm assembly does not always come to the same height when the recording arm is lowered to the horizontal position, check spring (66) and also make sure the follower arm post (56) is not binding in the pivot post bushing (57). If link (65) is loose when the recording arm is lowered to the horizontal position, this is an indication that something is wrong. If the follower arm post (56) is binding in the pivot post bushing (57), trouble may also be experienced when trying to raise the recording arm from the horizontal position. To stop any binding between the follower arm post (56) and the pivot post bushing (57) apply grease as outlined in the section on lubrication.

(67) Two hex-head set screws (67) secure the recording arm assembly to follower arm post (56). If the hex-head screws (67) become loosened or the relationship between the recording arm platform (68) and the follower arm (69) become altered in any manner, make sure that both of the following conditions are complied with. (a) The end of the follower arm post (56) should extend through the recording arm platform (68) approximately 1/32". Note that this dimension is taken from the top surface of the platform (68) and not from the staked end of the bushing attached to the platform. (b) With the follower arm (69) swung in to where it is in contact with the stop (70), the recording stylus should be cutting a circle approximately 3 inches in diameter. If the spring blade on the end of the follower arm strikes the casting carrying the feed screw before the follower arm strikes stop (70) or the knife edge (71) can no longer engage the feed screw threads, loosen screw (72) and reset stop (70). When resetting stop (70) make sure that knife edge (71) will still engage with the threads of the feed screw (60) when recording at the outside of a 10 inch diameter record blank.

(68) Caution: Any time that the recording arm mounting is adjusted, it is always necessary to readjust the tension screw (73) (See "Proper Engagement of Feed Screw").

(69) If after hex-head set screws (67) are properly tightened there is any lost motion between the recording arm and the follower arm (69), check the adjustment of the pivot screw (74). When pivot screw (74) is properly adjusted there should be no lost motion between the recording arm (58) and the recording arm platform (68).

PROPER ENGAGEMENT OF FEED SCREW

(70) Engagement between the knife edge (71) and the feed screw (60) usually starts to take place when the nose of the recording arm is around 2 inches above the turntable. When the recording arm (58) is raised to a greater height than this, unhampered horizontal motion of the recording arm is possible between the normal limits of its travel. To permit disengagement of the recording arm from the feed screw at a minimum height above the turntable, stop screw (73) has been provided. Adjustment of screw (73) should be made with the recording arm in the lowered position and with the feed screw engaged. Adjust screw (73) so that it barely touches spring blade (75) when the knife edge (71) is engaged at any point in the length of feed screw (60).

(71) Normally the full pressure of knife edge (71) against feed screw (60) is desirable. If this pressure is sufficient to cause uneven turntable speed, however, the pressure of knife edge (71) against feed screw (60) can be reduced by turning screw (73) in a clockwise direction. Great care should be used however in reducing the blade pressure as uneven groove spacing may result.

UNEVEN SPACING OF RECORD GROOVES

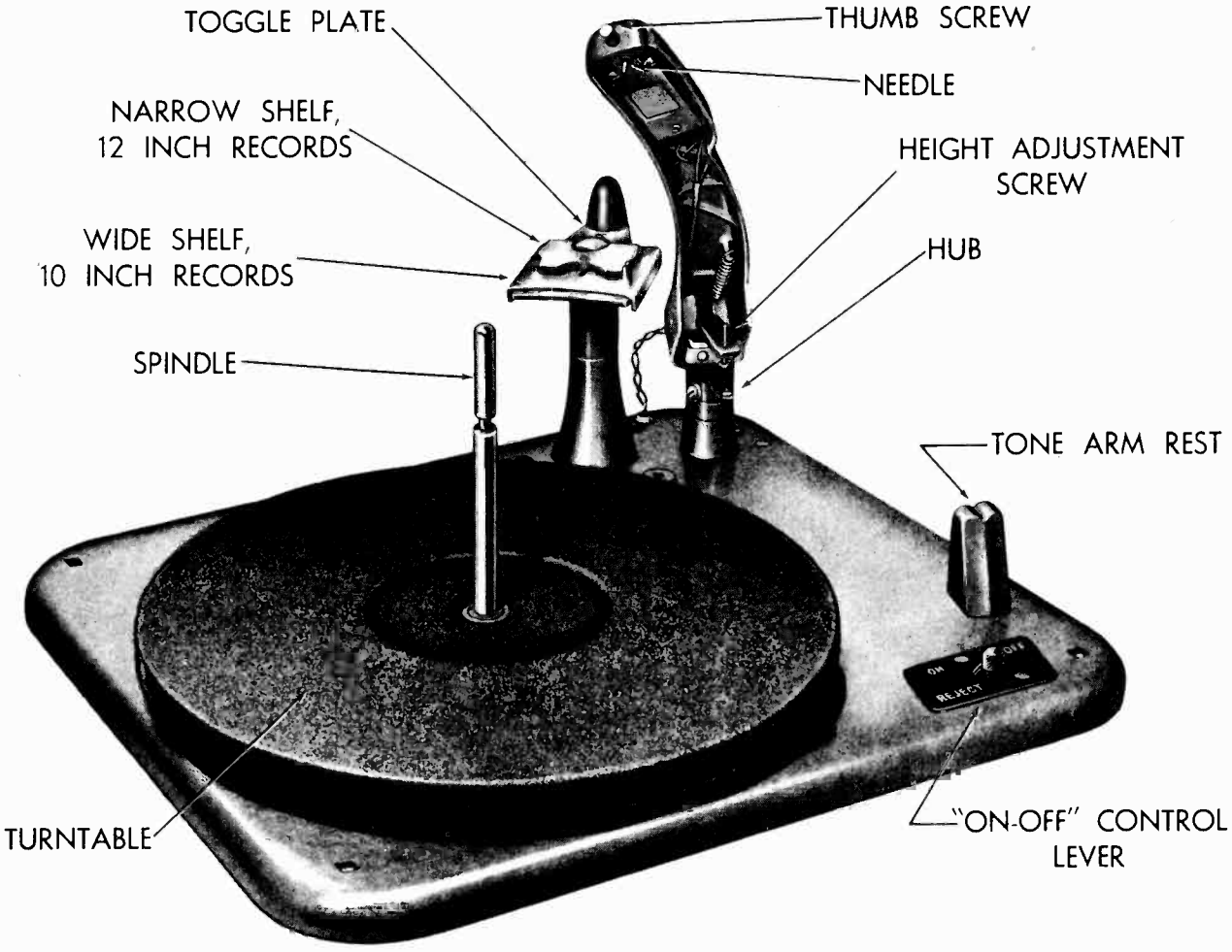
(72) If screw (73) is turned too far, in a clockwise direction, it will reduce the pressure of the knife blade (71) against feed screw (60), to where the knife blade (71) will climb the sides of the threads in the feed screw and cause uneven spacing of the recorded grooves in the record disc. Always be sure that the threads of feed screw (60) are free of dirt or other foreign matter, as these particles may cause uneven spacing of recorded grooves. Excessive end play in the feed screw will also cause uneven groove spacing.

(73) Thrust screw (76) is provided to keep the end play out of feed screw (60). Care must be used in adjusting screw (76) to prevent binding feed screw (60) between the end thrusts as this would put an excessive load on the motor and cause speed variations in the turntable.

(74) Lost motion or play between the follower arm (69) and recording arm (58) in the horizontal direction will prevent the recording arm from accurately following the follower arm, and this play should be eliminated (See "Adjustment of Recording Arm Mounting" paragraphs 67 and 69).

HOW TO REPLACE CUTTER HEAD

1. Remove the stylus screw (62).
2. With the arm (58) in the vertical position, press the balance spring against the top of the arm which will throw the cutter head out where it can be firmly grasped.
3. Pull the cutter head upwards until the knife edge at the back of the cutter clears its seat in the arm.
4. Unhook the balance spring from the cutter head.
5. It will now be noticed that a cork bumper (63) is glued to the top of the cutter head. This bumper is put there to prevent the stylus screw from being bent if the recorder arm is roughly handled. Remove this cork from the old head and glue it to the new head in precisely the same location as before.
6. Hook the balance spring to the new cutter head and extend the spring sufficiently so that the cutter head knife can be placed in its seat in the arm.
7. Replace stylus screw with shaving collector between cutter head and cutter arm with bottom of collector to left of center.
8. Thread the cutter leads through the arm, the arm platform, the base plate and the leads clamp on the underside of the base plate and arrange them exactly as before.



THE CHANGE CYCLE

An understanding of the methods used to accomplish the necessary mechanical motions will aid greatly in the diagnosis of any disorders of the mechanism. A careful study of the following outline should prove extremely valuable.

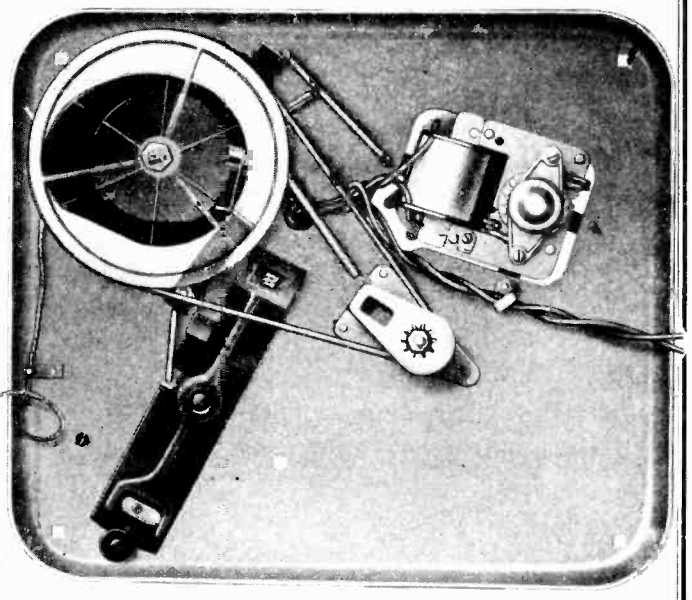
The mechanical functions of the change cycle, raising, moving and lowering the tone arm and the ejection of records are controlled by a cam. This cam is driven during the change cycle by a ratchet on the cam which engages one of the bosses on the revolving drive wheel. This wheel is driven from the turntable bearing by means of a spring belt. The turntable is rim driven from the motor.

THE CHANGE CYCLE

The change cycle sequence is as follows:

1. As the needle in the tone arm nears the end of a record, a lever with a serrated end moves with the tone arm and engages a trip dog pivoted on a release bracket.

2. The eccentric groove in the record causes the tone arm to oscillate. The backward motion of the tone arm and serrated lever causes the trip dog to push against its pivot point, thus moving the release bracket away from the cam.



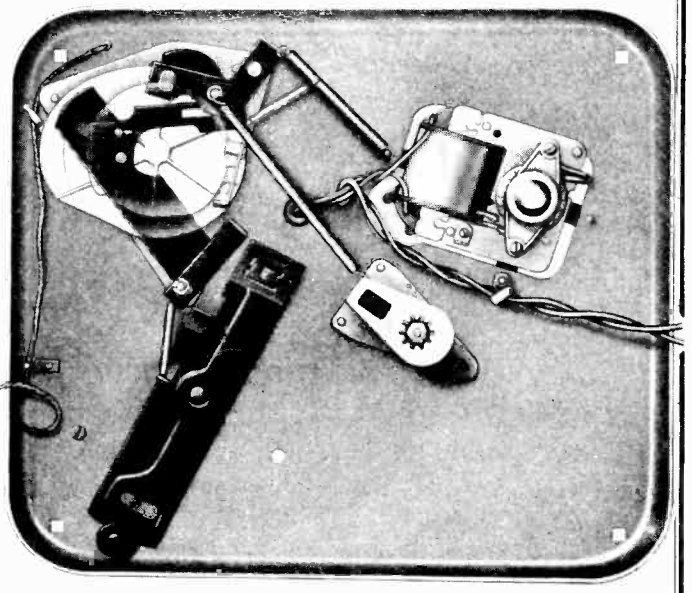
3. This allows the drive ratchet on the cam (which has been held by the release bracket) to drop down onto the drive wheel and engage one of the bosses; the cam then rotates with the drive wheel.

4. The function of the cam is threefold. It causes the:

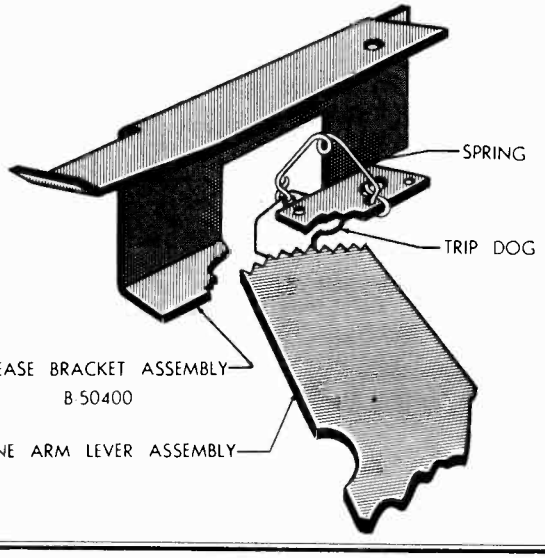
(a) Tone arm to be raised and lowered at the proper times.

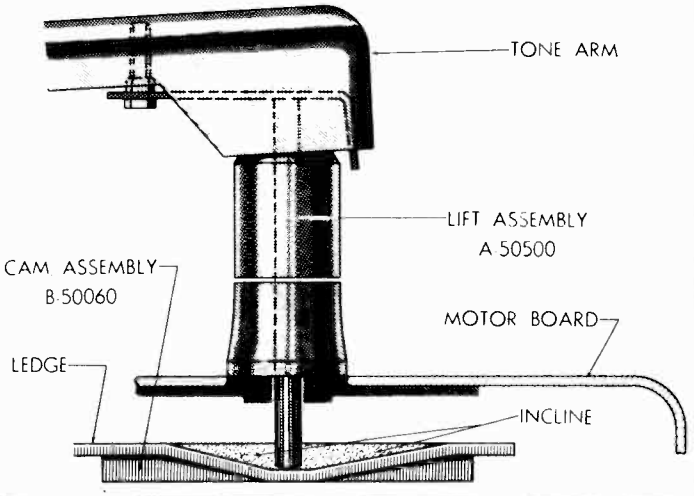
(b) Horizontal motion of the tone arm.

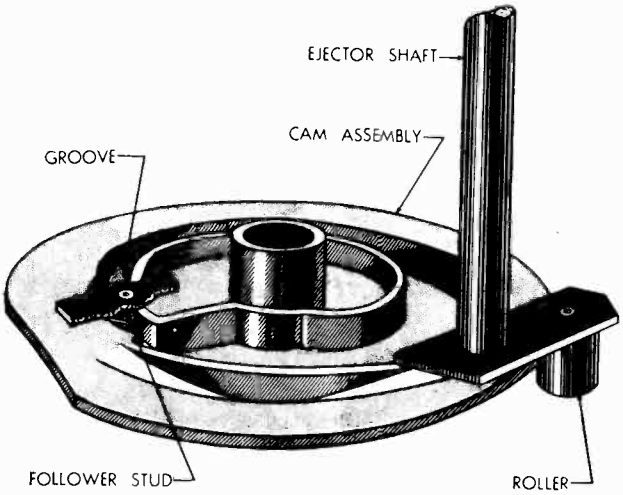
(c) Ejector plate to be moved.

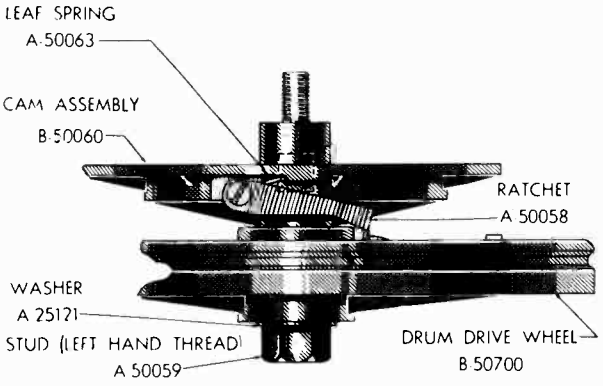


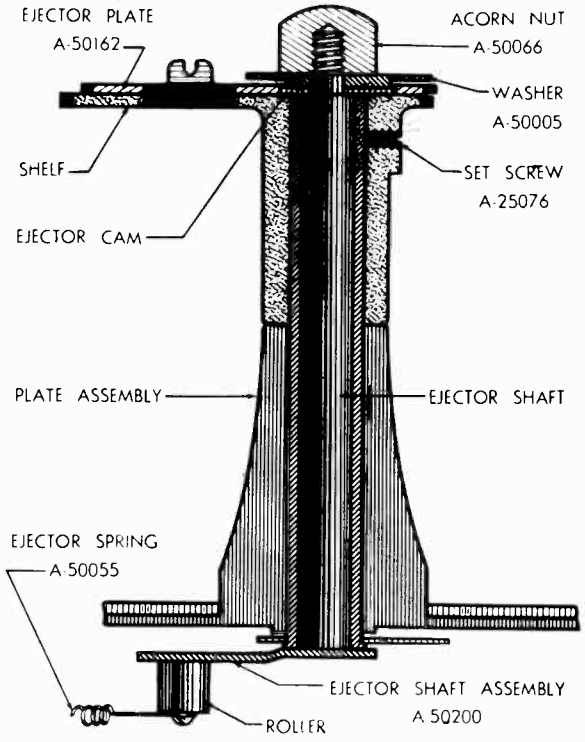
As the cam turns, the tone arm lift shaft rides up an incline to a ledge on the periphery of the cam and thus raises the tone arm off the record. During most of the remainder of the cycle, the lift shaft rides this ledge, keeping the tone arm elevated.











The change cycle sequence (Cont'd)

5. The follower stud on the adjustment lever assembly is pulled into a groove on the cam. As the cam rotates, this stud follows the groove and causes the tone arm to swing out beyond the edge of the record.

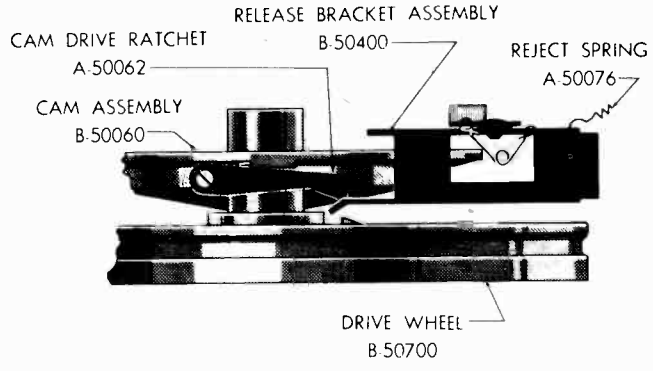
6. The shape of the cam is elliptical at one portion of the outer periphery. A roller attached to an ejector lever and shaft follows the outside periphery of the cam. As the cam rotates, the elliptical portion pushes against the roller causing the lever to move, thereby turning the ejector shaft.

7. This shaft extends up through the plate assembly to the record support shelf. A small ejector cam turned by this shaft moves the ejector plate, pushing a record off of the shelf.

8. The tone arm follower stud still riding in the groove on the cam causes the tone arm to return to a position over the outside edge of the record.

9. The tone arm lift shaft now rides down an incline from the ledge to a flat on the main cam, thus lowering the tone arm to the record.

10. At this point, the drive ratchet on the cam is lifted off the boss on the drive wheel by the release bracket. The cam ceases rotating and the change cycle is completed. The tone arm is now in position for reproduction of the record.

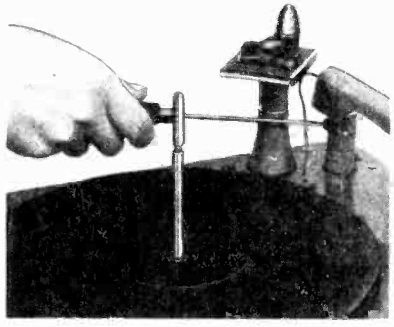


ADJUSTMENTS

A—PICKUP POSITION

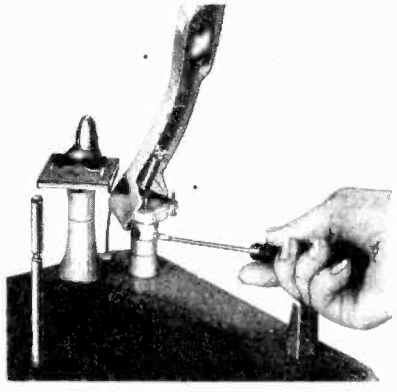
A simple adjustment to the changer may be made if the tone arm frequently falls off the edge of a standard record or starts playing a standard record too far in on the music grooves. Adjust as follows:

1. Make certain that the needle is straight in the tone arm and that the thumb screw is tight.



2. Put three to five records on the turntable.

3. Loosen the lock screw on the hub sleeve.



4. With a screwdriver turn the adjustment stud to the right or to the left until the needle in the tone arm is directly above the starting groove of the record on the turntable.

5. Carefully tighten the lock screw.

The following instructions are for use only when the tone arm and hub are being reassembled to the changer. This adjustment is for correct positioning of the tone arm needle in the first groove of a record. The needle should set down at approximately 4¾ inches from the center of the spindle on 10-inch records. (Adjustment for 12-inch records is automatic when the 10-inch adjustment is made.)

A—PICKUP POSITION (Cont'd)

6. Push upwards on the tone arm lever (near the bearing) from beneath the motor board and hold it against the plate.

7. On the top, insert a .005 shim between the tone arm hub and the boss on which it rests to obtain the necessary clearance. If there is less than .005 clearance, it will cause the tone arm to be stiff.

8. Place the tone arm in its correct position above the record. (Be sure to continue holding the lever firmly against the plate.) Tighten one set screw on the hub.

9. Run the changer through a few cycles, using several records to check the adjustment. Make a minor correction if necessary.

10. Tighten the other set screw on the hub and remove the shim.

B—RECORD SHELF POSITION

This shelf must be adjusted for the correct distance from the spindle as well as for correct alignment with the spindle.

1. To Adjust the Distance

(a) Remove the turntable by lifting upward. Loosen slightly the three Phillips head screws that hold the spindle assembly to the motor board. Remove the drive-spring belt from the turntable bearing and the drum drive wheel.

(b) With the record shelf in the 10-inch position (wide ledge toward spindle), carefully place a standard 10-inch record so that it rests on the shelf and on the ledge of the spindle.

ADJUSTMENTS

A—PICKUP POSITION (Cont'd)

6. Push upwards on the tone arm lever (near the bearing) from beneath the motor board and hold it against the plate.

7. On the top, insert a .005 shim between the tone arm hub and the boss on which it rests to obtain the necessary clearance. If there is less than .005 clearance, it will cause the tone arm to be stiff.

8. Place the tone arm in its correct position above the record. (Be sure to continue holding the lever firmly against the plate.) Tighten one set screw on the hub.

9. Run the changer through a few cycles, using several records to check the adjustment. Make a minor correction if necessary.

10. Tighten the other set screw on the hub and remove the shim.

B—RECORD SHELF POSITION

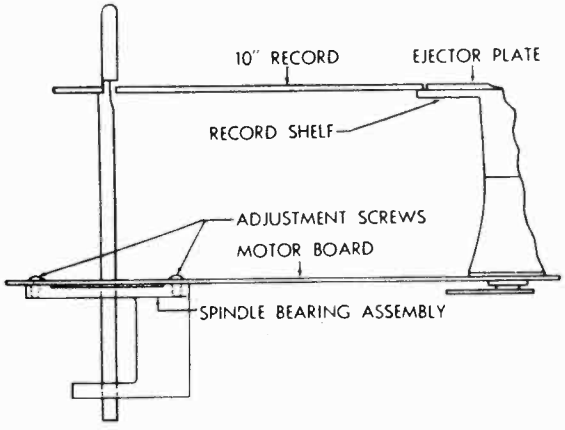
This shelf must be adjusted for the correct distance from the spindle as well as for correct alignment with the spindle.

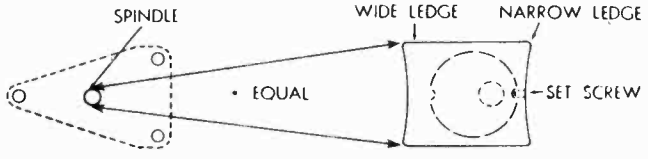
I. To Adjust the Distance

(a) Remove the turntable by lifting upward. Loosen slightly the three Phillips head screws that hold the spindle assembly to the motor board. Remove the drive-spring belt from the turntable bearing and the drum drive wheel.

(b) With the record shelf in the 10-inch position (wide ledge toward spindle), carefully place a standard 10-inch record so that it rests on the shelf and on the ledge of the spindle.

(c) Adjust the distance by sliding the spindle assembly toward or away from the shelf. The position should be such that the record will not fall off of either the spindle or the shelf, nor jam when the ejector plate pushes it, and when ejected, will fall clear of both shelf and spindle ledge. (See the Standards for record sizes listed under GENERAL INFORMATION on page 6.)





(d) Carefully tighten the screws and check the adjustment again, using several standard records. Replace the turntable, being careful to push the idler wheel of the motor under the edge of the turntable. Replace the belt.

ADJUSTMENTS

B—RECORD SHELF POSITION (Cont'd)

II. To Adjust Alignment

(a) Loosen the set screw beneath the 12-inch shelf (narrow ledge). Have the 10-inch shelf toward the spindle.

(b) Place a standard 10-inch record over the spindle, allowing it to rest on the spindle ledge and record shelf.

NOTE: Be sure the record shelf is in the correct position in relation to the adjustment cam which is under the motor board. When the 10-inch ledge is toward the spindle, the wider section of the adjustment cam should also be toward the spindle.

(c) Rotate the shelf slightly in either direction to line up the record edge and the shelf. Tighten the set screw.

C—HEIGHT OF TONE ARM

If the needle in the tone arm does not come down far enough to contact the first record on the turntable or if the tone arm does not rise high enough to clear the top of a complete stack of records on the turntable, adjust as follows:

1. Raise the tone arm and loosen the lock nut.

(NOTE: Some models do not have this lock nut, therefore adjust only as directed in paragraph 2 below.)

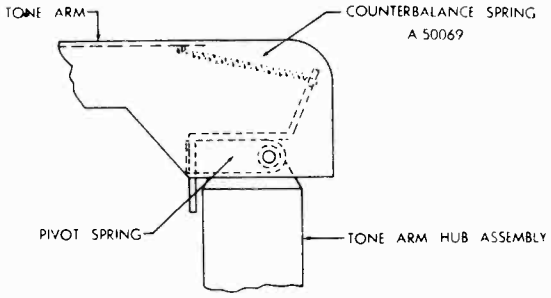
2. Turn the height adjustment screw in either direction until the desired adjustment is obtained.

3. Tighten the lock nut again when the tone arm height has been adjusted.

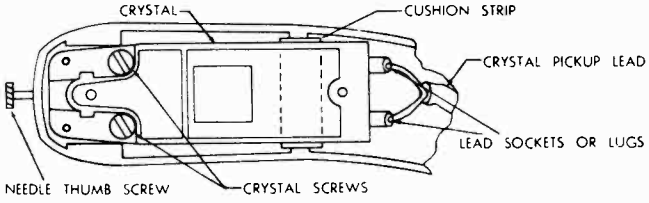
D—THE TONE ARM

The weight of the tone arm at the needle point should be 1¼ ounces. The counterbalance spring, which is fastened to the tone arm and to the hub, should be adjusted to the tension required to obtain this weight.

The tone arm may be removed from the changer to facilitate changing the crystal cartridge. Simply squeeze the pivot spring and lift off the tone arm. The counterbalance spring may be unhooked from the hub if the tone arm is to be completely



removed. To change the crystal, remove the needle thumb screw and the two screws which hold the crystal to the tone arm. Slip the lead sockets off the plugs on the crystal or unsolder the leads if there are lugs on the crystal. (*Caution:* Crystals become damaged by excessive heat.) Re-



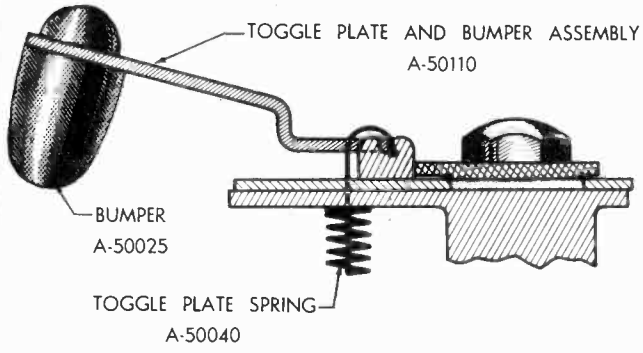
move the crystal and replace with a new one in the same manner. Be sure the rubber or plastic cushion strip is placed under the crystal.

The lead, which emerges from the tone arm at the back, should have some slack at all times or it will bind the tone arm and prevent its free movement across the record.

ADJUSTMENTS

E–TOGGLE PLATE

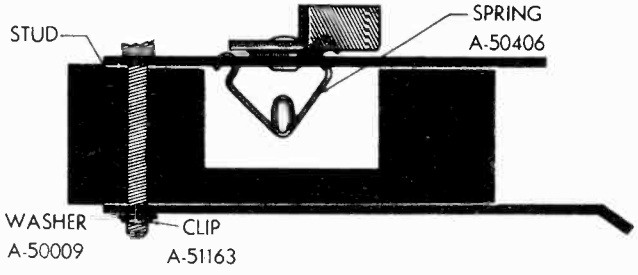
The toggle plate is held to the ejector shelf by a spring; this spring also exerts tension on the toggle plate to keep the records in place on the shelf. If too much tension is exerted, the spring should be distorted slightly.



Put the toggle assembly on the ejector shelf, locating the tabs on the plate in the bosses on the shelf. Push the end of the spring through the slot in the shelf, with the open end of the spring toward the nut. (The spring will have to compress.) Fasten the end of the spring in the small center hole on the plate. The large side of the bumper is to be placed over the 10-inch records.

The rubber bumper should be assembled to the plate with the large side of the bumper on the side of the plate marked with an "X" or an "O."

F–RELEASE BRACKET ASSEMBLY



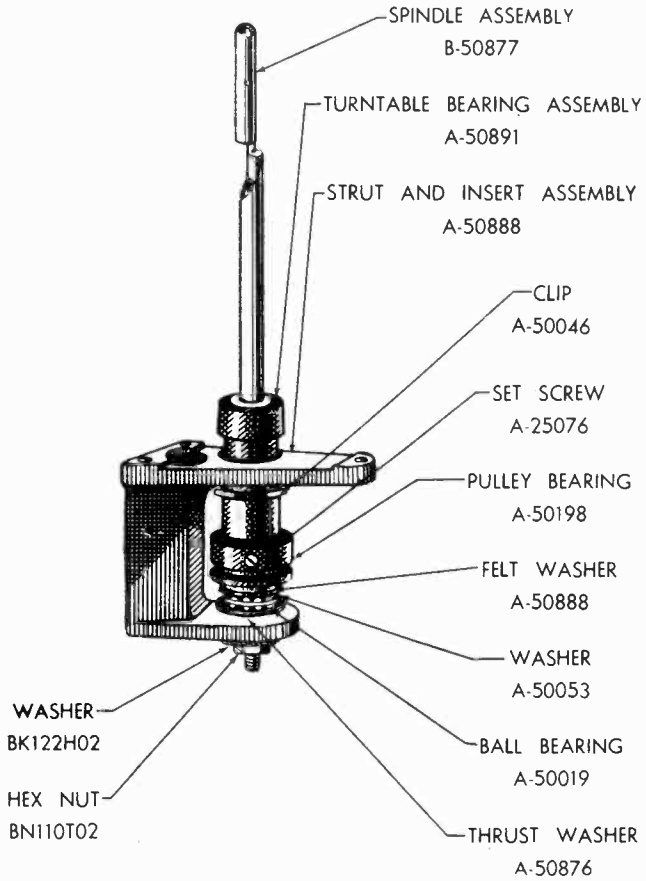
This bracket, with the dog and grasshopper spring assembled to it, is one of the critical items in the unit. It should pivot freely on the stud to which it is assembled. It may be easily removed by slipping the hairpin clip and washer off the stud and carefully turning the bracket so it will clear the main cam and drum drive wheel.

The dog should pivot very freely. If it does not, clean and relubricate with fine oil. If it is still sluggish, replace the entire assembly.

G–SPINDLE AND BEARING ASSEMBLY

To replace the spindle assembly, bearings or washers, proceed as follows:

1. Loosen set screw in pulley bearing.
2. Remove lock clip on turntable bearing.
3. Remove nut on bottom of spindle.
4. Replace defective part and reassemble. (See illustration below for correct sequence of parts.)



5. Tighten nut securely but do not use force. Make sure that the spindle is centered so that the turntable bearing will slide freely into the strut. To accomplish this in the event the spindle is not aligned correctly, raise the turntable bearing above the strut and exert a slight pressure against the spindle to align it.

6. When aligned, fasten pulley to turntable bearing and replace lock clip.

ADJUSTMENTS

H—MOTOR

The speed of the turntable should be within the limits of 76 to 81 R.P.M.

If the changer runs slow, and after careful examination there is no evidence of binding of any mechanical parts, the motor should be checked. (Low line voltage should also be considered.)

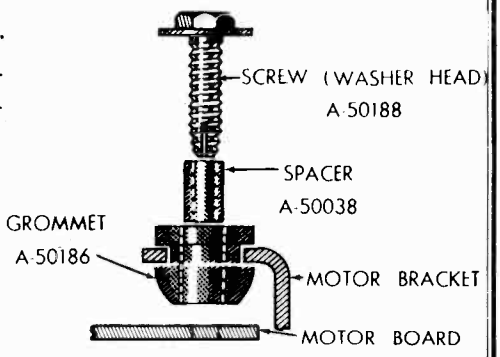
It is better to order a new motor if it should prove defective. Rewinding of coils is never satisfactory.

switch and line cord, be sure to fasten the index spring over one of the mounting screws. Attach the other end of the spring to the index lever.

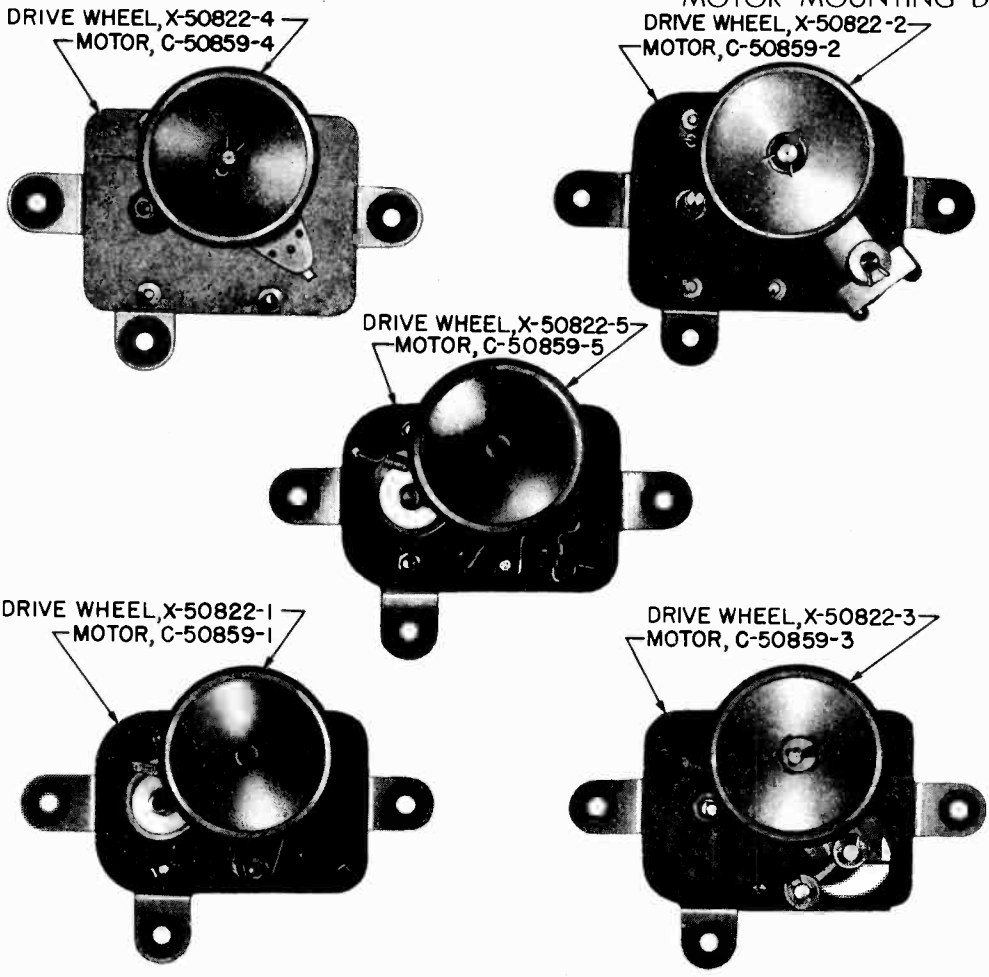
Check drive wheel for oil or flat spot on the rubber drive surface. Replace drive wheel if defective.

Caution: Check for the correct relationship of the adjustment cam and record shelf when fastening the spring. In the 10-inch position, the larger side of this cam should be toward the spindle.

After a new motor has been assembled to the motor board with its screws, washers, spacers and grommets, and wired to the



MOTOR MOUNTING DETAIL



When ordering replacement drive wheels, kindly use correct part number of drive wheel corresponding to the type of motor in your changer. The five types of motors used to date are illustrated above. They are for use on 105 to 125 volts, 60 cycle A. C. only.

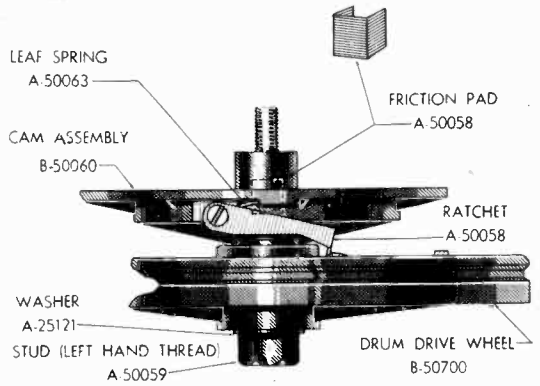
ADJUSTMENTS

J—CAM AND DRIVE WHEEL ASSEMBLY

This assembly consists of a stud (NOTE: THIS STUD HAS A LEFT HAND THREAD) which screws into the main motor board assembly, a washer, a drive wheel, a main cam and a friction pad. The pad is necessary to provide some drag on the cam for smooth action. It must be assembled carefully to prevent deforming. The center holes of the drive wheel and cam are countersunk for easier assembly of the friction pad.

The drive ratchet on the cam should pivot freely. A minimum of pressure should be exerted on this ratchet by the leaf spring.

Inside the groove on the main cam assembly, where the tone arm follower stud rides, is a small spring, fastened to the side of the groove. It causes the follower stud to ride the same side of the groove at each cycle, thus the tone arm will always set down at the same location on the record.



The changer will operate without this spring, but without it, the place at which the tone arm sets down on a record will vary about ⅛ inch. This will sometimes allow the tone arm to fall off the edge of a record.

MANUAL CONTROL

I—OPERATION

Record changers which have a manual control switch should be operated as follows:

1. Move the manual control lever to the "Manual" position.
2. Rotate the record shelf to the 12-inch position.
3. Flip the toggle plate toward the back.
4. Put the selected record over the spindle and down onto the turntable.
5. Move the "On-Off" control lever to the "On" position.
6. Place the tone arm by hand on the starting edge of any size record on the turntable.

When the machine is indexed for manual operation, it either must be turned off by hand after each record, or the tone arm placed on the rest between changes of records. The machine will not function as a changer, but only as a record player in this position.

II—SERVICE

Occasional failure of this switch is usually due to either too tight or too loose an engagement of the manual bracket with the ratchet on the main cam.

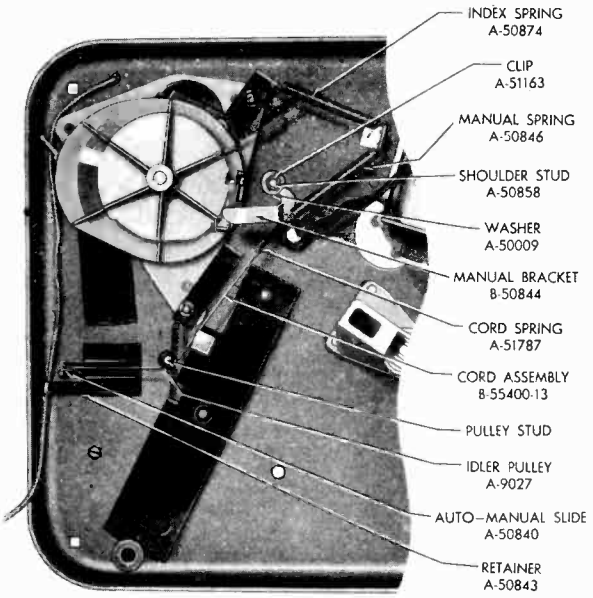
Too tight an engagement causes the bracket to remain in contact with the cam ratchet after the manual switch has been moved to the "Automatic" position. This prevents the operation of the change cycle.

Too loose a fit may cause a clicking noise due to the ratchet, held too low, being struck by the bosses on the drive wheel. At times the looseness of the engagement may be sufficient to allow the ratchet to drop completely, thus causing a jam between the ratchet and the manual bracket. This can usually be released by simply moving the manual switch to the "Automatic" position.

Very careful bending of the manual bracket, while it is still assembled to the changer, should correct these difficulties. (The cord which moves the bracket may be forced off its pulley by one of the above mentioned situations. This should be replaced before attempting any further correction.)

The tension spring which connects the dial cord to the manual bracket must be fastened in the hole in the bracket that is nearer the motorboard.

Should it be necessary to replace the cord, its length, loop end to loop end should be 5¼ inches, or of such length that when the switch is in the "Automatic" position, the end of the manual bracket clears the cam by approximately ⅛ inch.



BOTTOM VIEW
(DRIVE WHEEL AND SPRING REMOVED)

SERVICE AND ADJUSTMENTS

1—TONE ARM, ACTION NOT FREE

May be caused by:

(a) Bent trip lever assembly A-50320. Straighten or replace.

(b) Tone arm lead too tight. Pull up to allow some slack.

(c) Lubrication on tone arm bearing gummy. Clean and relubricate with fine oil.

(d) Bent or binding adjustment lever assembly A-50310. Straighten or replace.

(e) Lack of spacing in tone arm hub assembly which must be at least .005. (See adjustment A, page 7.)

2—TONE ARM, FAILURE TO SET DOWN PROPERLY

May be caused by:

(a) Counterbalance spring A-50069 hitting tone arm lift assembly A-50500. Reposition spring. (See adjustment D, page 9.)

(b) Bent tone arm lift lever. Straighten carefully.

3—TONE ARM DROPS TOO FAR IN ON RECORD OR MISSES RECORD

May be caused by:

(a) (See adjustment A, page 7.)

4—CLICKING NOISES

May be caused by:

(a) Bent release bracket assembly B-50400 which rubs on the bosses of the drum drive wheel. Straighten or replace.

5—FAILURE TO TRIP

May be caused by:

(a) Defective release bracket assembly B-50400. This part may be binding or bent out of square. (See adjustment F, page 10.)

(b) Bent or loose ratchet on main cam assembly B-50060. Straighten or replace.

(c) Bent trip lever assembly which fails to engage dog on release bracket assembly B-50400. Straighten or replace.

6—CHANGER CYCLES CONTINUOUSLY

(I.E., tone arm lifts immediately from record without playing)

May be caused by:

(a) Reject spring A-50076 from release bracket to the tab on ON-OFF lever missing or loose. Replace.

(b) Drive ratchet A-50062 on cam binding. Straighten and/or relubricate. Check leaf spring A-50063.

7—RECORD JAMS BETWEEN SHELF AND SPINDLE

May be caused by:

(a) Incorrect distance between record shelf and spindle or record shelf not aligned with spindle. (See adjustment B, page 8.)

8—RECORD FAILS TO DROP FROM SHELF

May be caused by:

(a) Toggle plate not flipped onto records. This must be done to provide tension on records. (Also see Item 9 below.)

9—UNIT STALLS WHEN EJECTING A RECORD

May be caused by:

(a) Weak spring drive belt B-50137. Replace.

(b) Low motor torque. Replace motor.

(c) (See adjustment H, page 11.)

10—TURNTABLE SPEED SLOW OR IRREGULAR

May be caused by:

(a) Frozen turntable bearing. Clean and relubricate or replace bearing. (See adjustment G, page 10.)

(b) (See adjustment H, page 11.)

11—JERKY ACTION DURING CYCLE

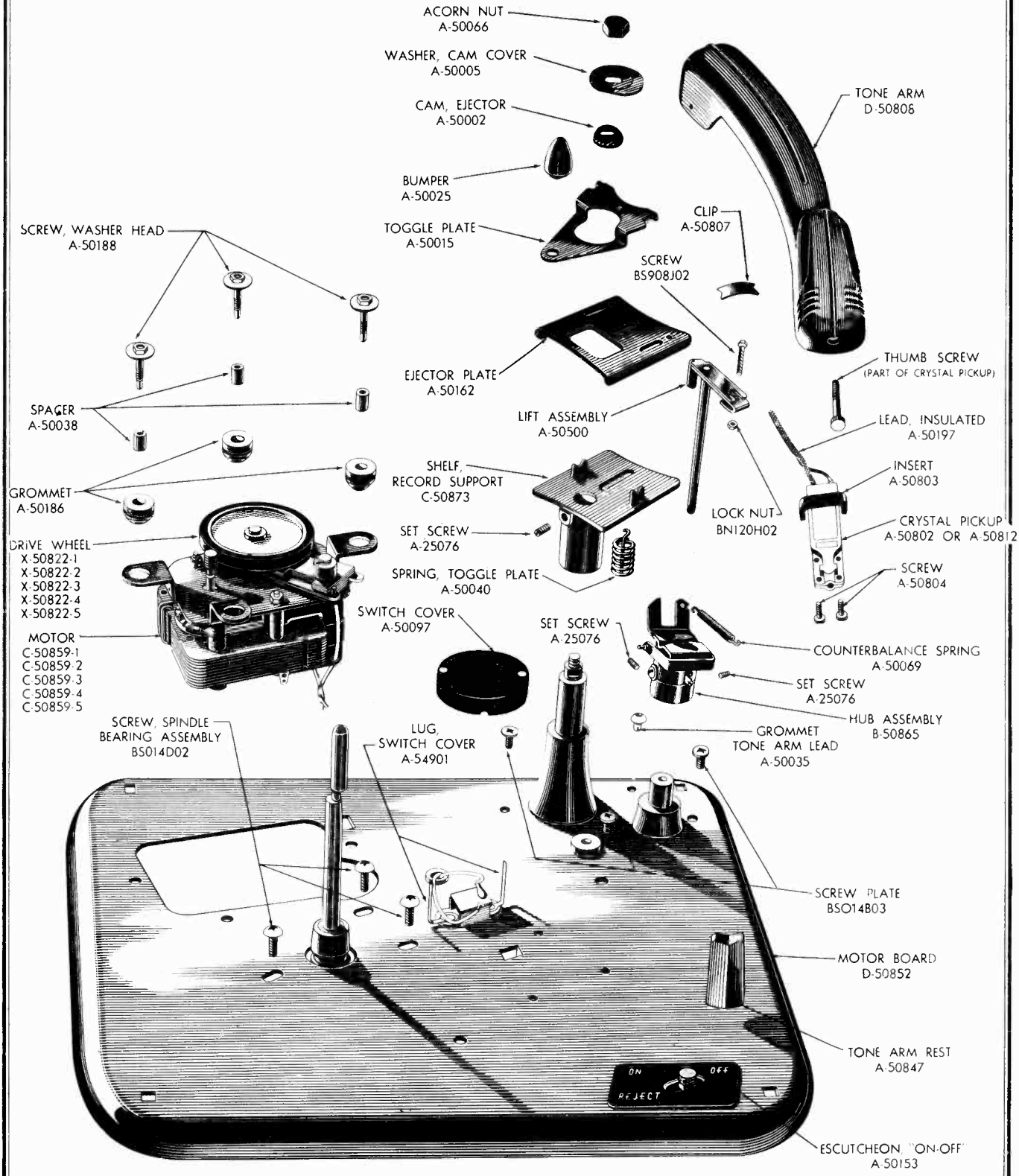
May be caused by:

(a) Worn belt damping core. Replace with new belt.

(b) Deformed friction pad A-50058 in cam and drive wheel assembly. Replace.

INTERNATIONAL DETROLA CORP. MODEL 650

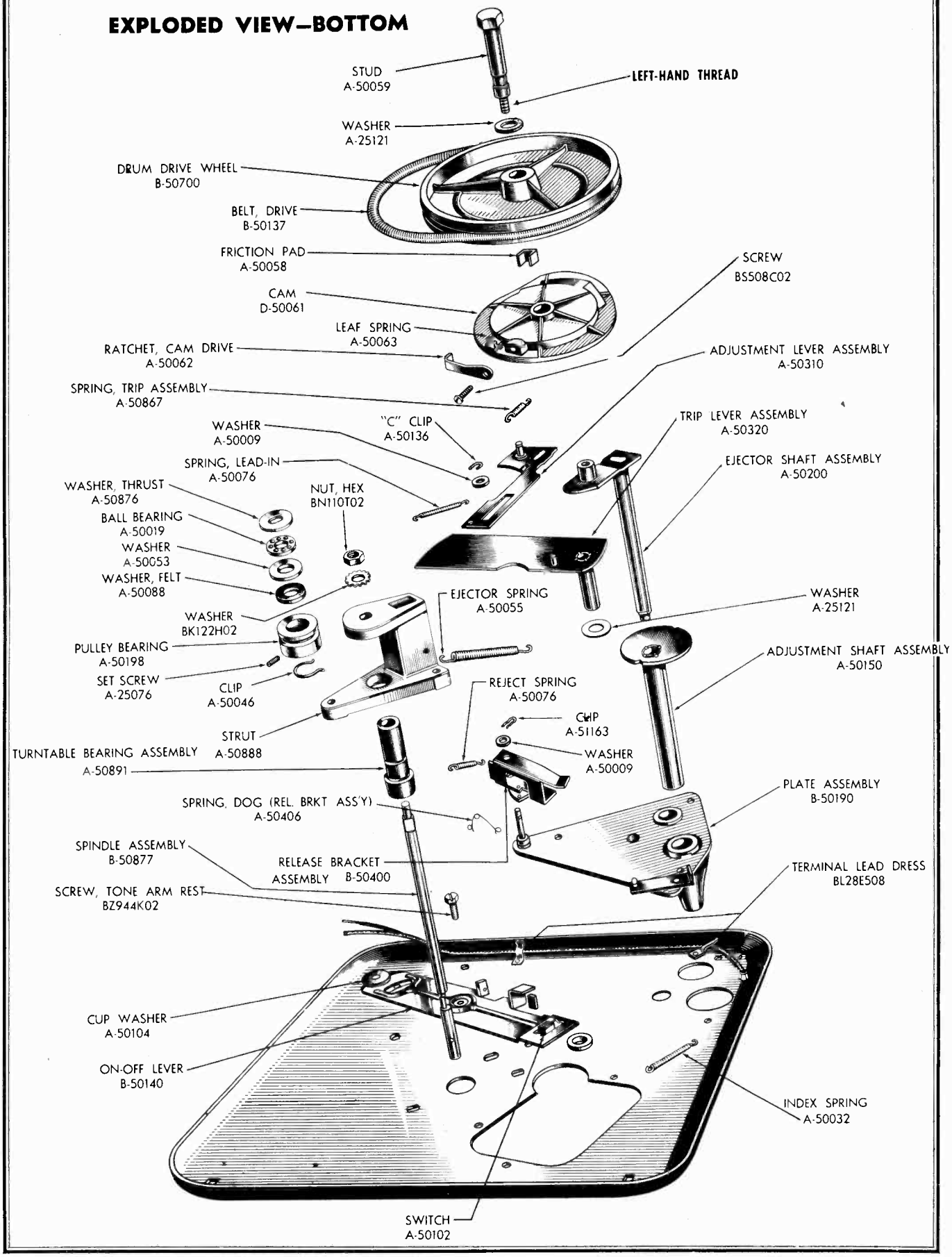
EXPLODED VIEW—TOP



MODEL 650

INTERNATIONAL DETROLA CORP.

EXPLODED VIEW—BOTTOM



SERVICE PARTS LIST

Part No.	Description
	Assemblies
C-50859	**Motor (For 60 Cycle, 117 v.)**
A-50186	Grommet
A-50188	Screw, No. 6-32 x 5/8 Thread Cutting, Hex Washer Head
A-50038	Spacer
*X-50822	Wheel, Drive
C-50850	**Motor Board Assembly**
A-50153	Escutcheon, On-Off
B-50140	Lever, On-Off
A-50301	Rivet, Shoulder (On-Off Lever)
BV321E03	Rivet, Tubular 1/8 x 3/16
A-50102	Switch
A-54901	Terminal (Switch Cover)
BL28E508	Term. (Tone Arm Lead Dress)
A-50104	Washer, Cup
B-50190	**Plate Assy., Ejector and Tone Arm**
BS014B03	Screw, No. 8-32 x 3/16
B-50400	**Release Bracket Assembly**
A-50406	Spring, Dog
A-50847	**Rest, Tone Arm**
BZ944K02	Screw, No. 8 x 3/4 Thrd. Cutting
C-50879	**Spindle Bearing Assembly**
A-50019	Ball Bearing, Thrust
A-50046	Clip, Spring
BN110T02	Nut, Hex No. 10-32
A-50198	Pulley Bearing
§A-50946	Pulley Bearing (threaded)
A-25076	Screw, Set No. 8-32 x 3/16
BS014D02	Screw, No. 8-32 x 5/16
B-50877	Spindle Assembly
A-50888	Strut and Insert Assembly
A-50891	Turntable Bearing Assembly
§A-50948	Turntable Bearing Assy. (threaded)
A-50053	Washer, Flat
A-50088	Washer, Felt
A-50876	Washer, Spindle Thrust
BK122H02	Washer, Shakeproof No. 10
A-50110	**Toggle Plate and Bumper Assembly**
A-50025	Bumper
A-50015	Plate, Toggle
B-50820	**Tone Arm Assembly**
A-50802 or A-50812	Crystal Pickup and Thumb Screw
A-50807	Clip
A-50803	Insert
A-50197	Lead, Insulated
A-50804	Screw, No. 4-40 x 1/4
D-50808	Tone Arm (Shell only)

Part No.	Description
	Miscellaneous Parts
B-50137	Belt, Drive
A-50002	Cam, Record Ejector
B-50060	Cam Assembly
A-51163	Clip (Release Bracket Assembly)
A-50136	Clip "C" (Index Arm)
A-50097	Cover, Switch
B-50700	Drum Drive Wheel
A-50200	Ejector Shaft Assembly
A-50035	Grommet (Tone Arm Lead)
A-50500	Lift Assembly, Tone Arm
A-50066	Nut, Acorn
A-50058	Pad, Friction
A-50162	Plate, Ejector
A-50150	Record Adjustment Shaft Assembly
A-50310	Record Adjustment Lever Assembly
A-50302	Rivet, Shoulder
A-25076	Screw, Set No. 8-32 x 3/16 Cup Point (Ejector Shelf, Tone Arm Hub and Pulley Bearing)
A-50873	Shelf, Record Support
A-50055	Spring, Ejector
A-50032	Spring, Index
A-50069	Spring, Tone Arm Counterbalance
A-50076	Spring, Tone Arm Lead-in and Reject
A-50040	Spring, Toggle Plate
A-50867	Spring, Trip Assembly
A-50059	Stud
A-50320	Tone Arm Trip Lever Assembly
B-50865	Tone Arm Hub Assembly
D-50910	Turntable
A-25121	Washer, .625 O.D. x .375 I.D. x .010 brass (Tone Arm Trip Assy., and Cam and Drum Assembly)
A-50005	Washer, Cam Cover
A-50009	Washer, 5/16 O.D. x .156 I.D. x .025 brass (Release Bracket Assembly and Index Arm)

The following service parts are listed for Model 650, Run No. 1, which was manufactured with an "Automatic-Manual Control Lever":

B-50844	Bracket, Manual
A-50842	Escutcheon, Auto-Manual
A-9027	Pulley, Idler (Cord for Manual Bracket)
A-50843	Retainer, Manual Slide
A-5917	Rivet, Shoulder (Idler Pulley)
BV321F09	Rivet, Tubular, 1/8 x 7/32
A-50840	Slide, Auto-Manual
A-51787	Spring (Cord for Manual Bracket)
A-50846	Spring, Manual Bracket
A-50858	Stud, Shoulder (Manual Bracket)
B-55400-13	Cord, Assembly
A-50009	Washer
A-50874	Clip
A-51163	Index Spring

MODEL 7000 INTERNATIONAL DETROLA CORP.

Non-Standard or **Imperfect** records are those which have enlarged center holes, or those which may be warped, chipped, cracked or scratched. Others have no starting grooves or eccentric grooves or may have grooves which are not complete nor pressed properly into the record. Edges of some records are rough or sharp and will cause more than one record at a time to drop to the turntable. Imperfect or sub-standard records prevent the record changer from operating automatically, and may cause the needle to slide off the record at the start of the recording.

ADJUSTMENTS

A simple adjustment to the changer may be made if the tone arm frequently falls off the edge of a standard record or starts playing a standard record too far in on the music grooves. Make the adjustment as follows:

1. Make certain that the needle is **straight** in the tone arm and that the thumb screw is **tight.**

2. Put 3 to 5 records **on the turntable.**

3. Start the changer and then stop it in the position where the tone arm begins to lower itself to the record, or you can turn the turntable by hand until the tone arm begins to lower itself to the record. It is then possible to see how much the tone arm needs adjusting to the right or left.

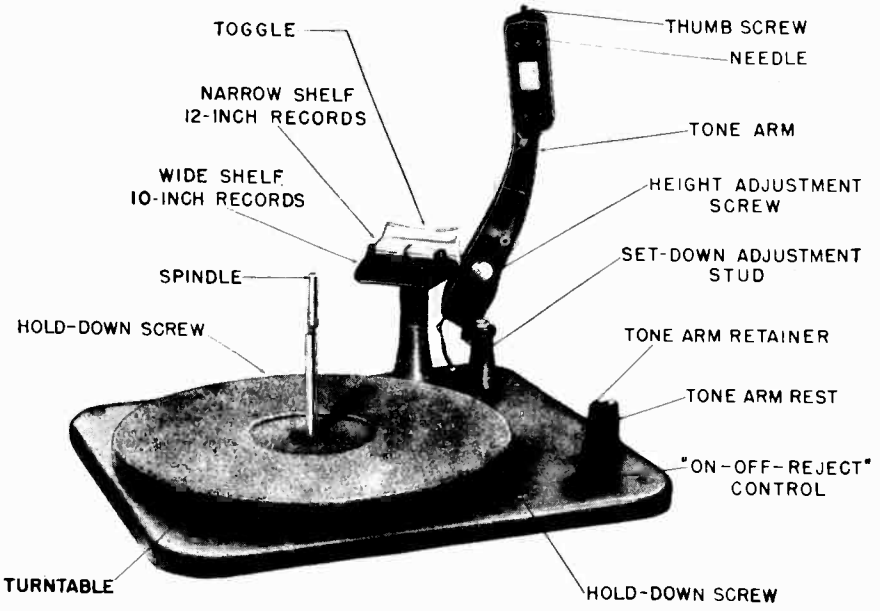
4. Insert a nail or small screwdriver in one of the holes in the adjustment stud under the tone arm (See Illustration 5) and turn the stud to the right or the left until the needle in the tone arm is directly above the starting groove of the record on the turntable.

Phonograph needles vary in length and may necessitate another adjustment of the tone arm. If the needle in the tone arm does not come down far enough to contact the first record on the turntable or if the tone arm does not rise high enough to clear the top of a complete stack of records on the turntable, adjust as follows:

(a) Raise the tone arm and turn the height adjustment screw (See Illustration 6) in either direction until the desired adjustment is obtained.

No other adjustments should be necessary. The record changer has been factory-tested for performance.

If the flocking on the turntable becomes flattened down, use a fine wire brush such as used on suede materials. Brush lightly to raise flocking.



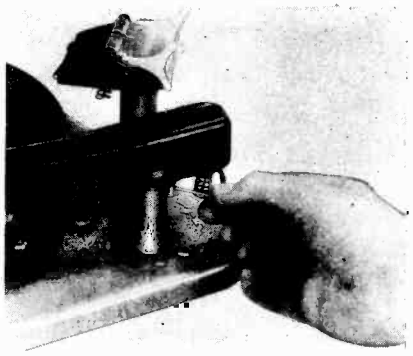
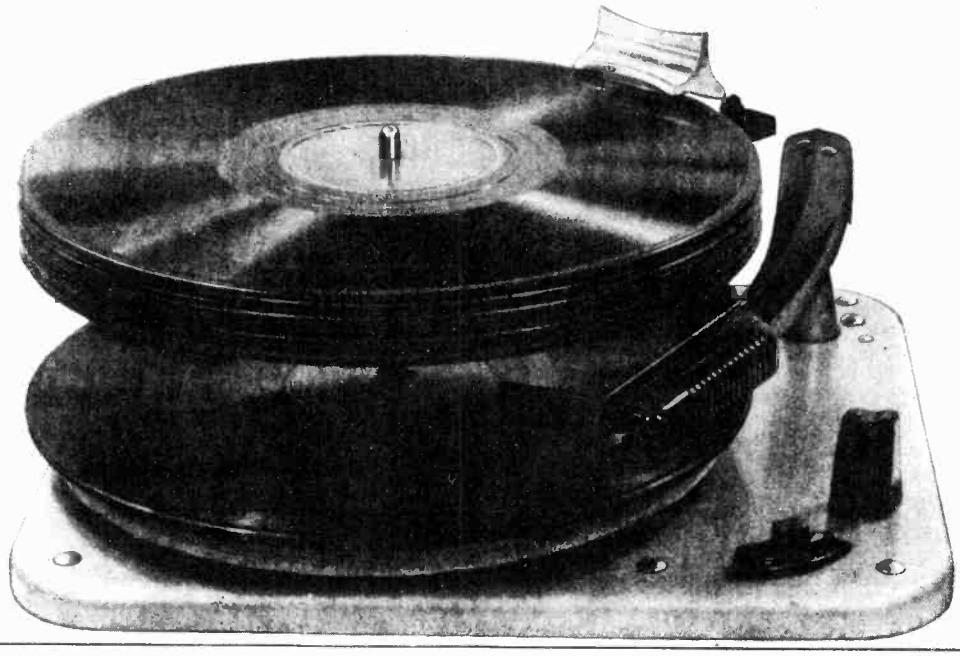


Illustration 5

Illustration 6

INTERNATIONAL DETROLA CORP. MODEL 7000

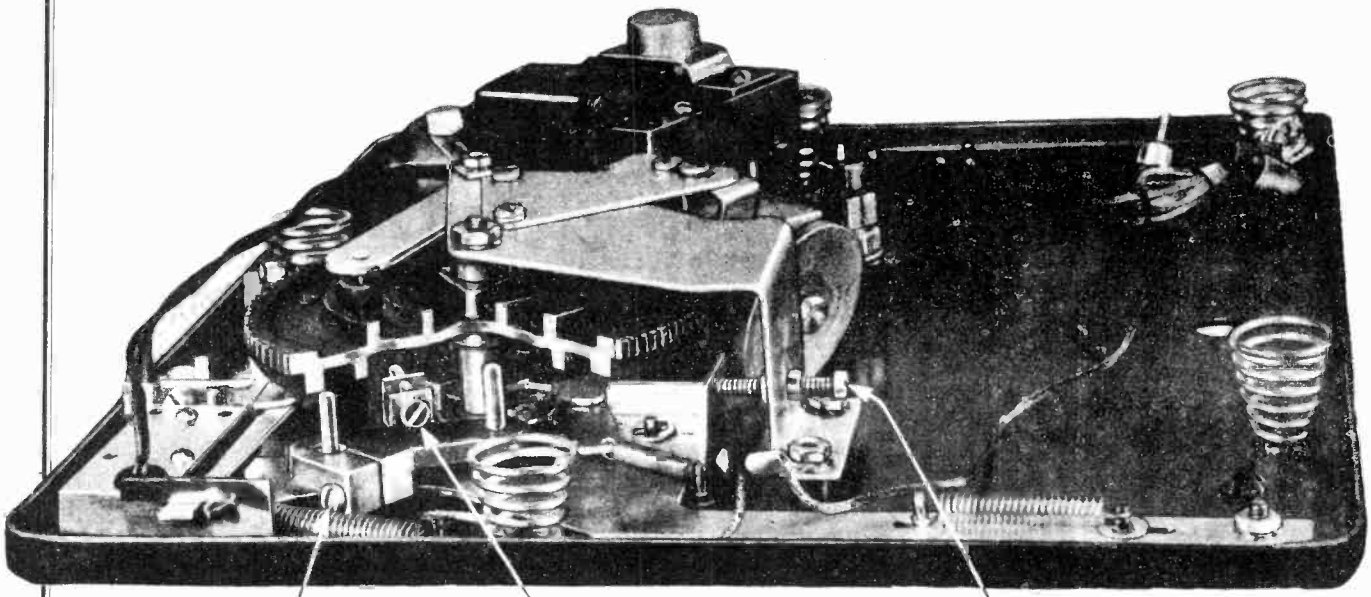


SERVICE PARTS LIST

Part No.	Description
	Assemblies
B-50060	Cam Assembly
A-50062	Ratchet, Cam Drive
A-50063	Spring, Leaf
D-50470	Motor (For 60 Cycle, 117 V.)
B-50462	Fastener, Snap
A-50186-1	Grommet
D-50460	Motor Board Assembly
B-50440	Lever, Switch
BL28E508	Lug, Solder
A-50301	Rivet, Shoulder
BV321E03	Rivet, Tubular
BV386J03	Rivet, Tubular
A-50475	Spring, Conical
A-50102	Switch, AC
B-50490	Plate Assembly, Ejector and Tone Arm
BS014B03	Screw, No. 8-32 x 3/16
B-50400	Release Bracket Assembly
A-50406	Spring, Dog
B-50480	Spindle Assy.
C-50429-1	Tone Arm Assembly
A-50802-1	Crystal Pickup and Thumb Screw (For use with Twisted Pickup Lead Assy.)
A-50802-2	Crystal Pickup and Thumb Screw (For use with Shielded Lead Assy.)
BS408C02	Screw, No. 4-40 x ¼
BS508C01	Screw, No. 4-40 x ¼
B-50385-2	Tone Arm (Shell only)
A-50469	Tone Arm Rest
B-55151-1	Fastener, Tubular Clip
B-50468	Retainer, Tone Arm
A-50467	Spring, Retainer
	Miscellaneous Parts
A-50395	Adjustment Lever Assy.
A-50907	Ball Bearing, Thrust
A-50946	Bearing, Pulley
B-50493	Bearing, Strut

Part No.	Description
	Miscellaneous Parts (cont'd)
B-50491	Bearing, Turntable
B-50137	Belt, Drive
B-50390	Bracket Assy., Pivot
A-50433	Cam, Ejector
A-51163	Clip, Release Bracket Assembly
B-55380-1	Clip, Spring
C-50700	Drum, Drive
A-50430	Ejector Lever Assy.
A-50035	Grommet (Tone Arm Lead)
A-50494	Nut, Strut Bearing
A-50058	Pad, Cam Friction
BN771W02	Palnut, ¾-16
B-50452	Plate, Record Ejector
A-50437	Roller
BS914C01	Screw, No. 8-32 x ¼
BA114B01	Screw, No. 8-32 x 3/16 Set
B-50483	Shaft and Cam, Adjustment
A-50431	Shaft, Record Ejector
A-50422	Shaft, Tone Arm Lift
C-50453	Shelf Cover
C-50451-1	Shelf, Record Support
A-50495	Spacer, Turntable Bearing
A-50471	Spring, Ejector Return
A-50499	Spring, Flat Spindle
A-50032	Spring, Index
A-50867	Spring, Trip Assembly
A-50455	Spring, Toggle
A-50076	Spring, Tone Arm Lead-In and Reject
D-50481	Strut, Center Post
A-50486	Stud, Cam
B-50454	Toggle
B-50420	Trip Lever Assembly
C-50496-1	Turntable (Grey)
BF24WYA1	Washer, Felt
BF1D3T13	Washer, Flat ⅝ O.D. x .381 O.D. x .010 (Trip Lever Assy.)
A-50497	Washer, Flat ⅞ O.D.
A-50832	Washer, Flat 5/16 x .167 — .172 x .025 (Release Bracket Assy.)

LEAR, INC. MODEL PC-206A

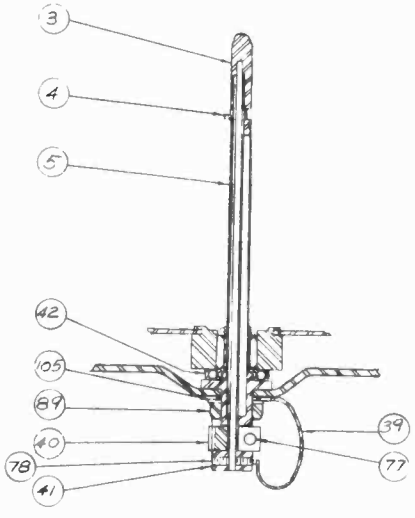


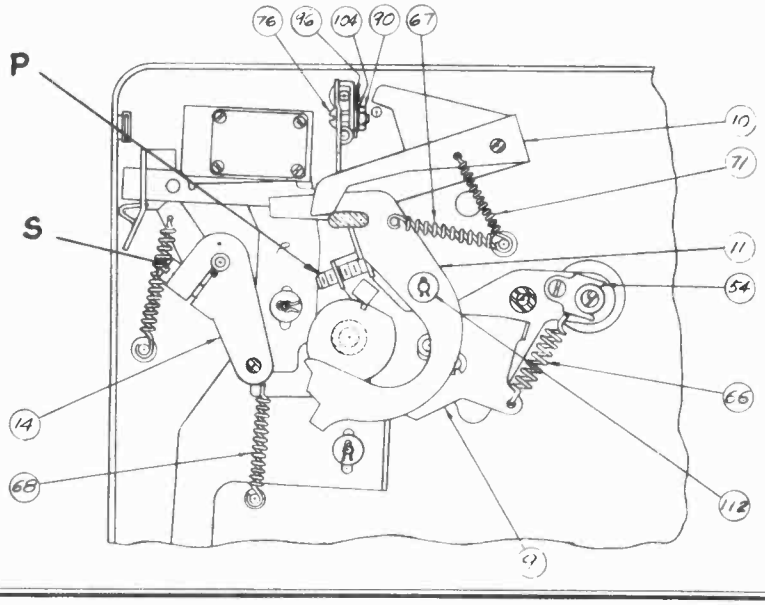
1. RECORDS FALL SHORT OF RECORD SUPPORT

SERVICE HINTS

Check spindle assembly to see it is not bent away from pedestal. Spindle should be vertical and records should just clear support with spindle in dropping position. If necessary to make clearance adjustment, loosen Hex Jam Nut (Ref. No. 89, just enough so that spindle base can be tapped toward (or away from) the pedestal. Caution. Use plastic hammer only.

NOTE: It is not necessary to loosen the Lock (Ref. No. 41) or the Pinion (Ref. No. 40) in making the above adjustment.



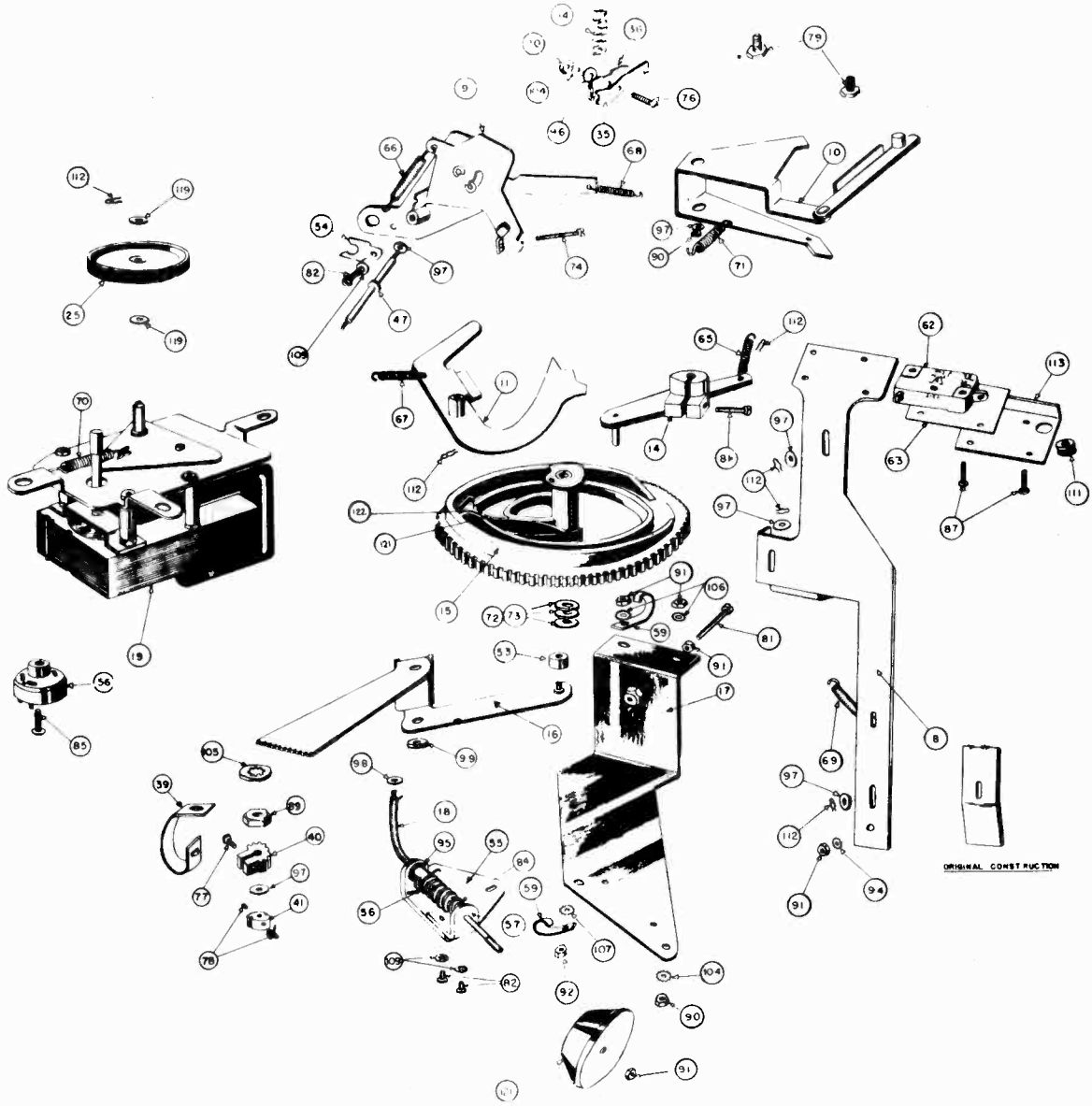


2. RECORDS DO NOT DROP PROPERLY

This may be caused by excessive end play in the spindle tip and eccentric. The spindle tip is clamped by the Lock (Ref. No. 41) and end play may be reduced by loosening the set screws in the lock and tapping the spindle tip down. The end of the spindle tip shaft should be flush with the surface of the lock. Also check the engagement of the Dropping Arm Assembly (Ref. No. 16) with the Pinion (Ref. No. 40) at point indicated by "R"

With the changer "out of cycle," the last tooth of the pinion should mesh between the teeth labeled "R." End of arm may be lifted enough to re-engage in correct position.

EXPLODED VIEW



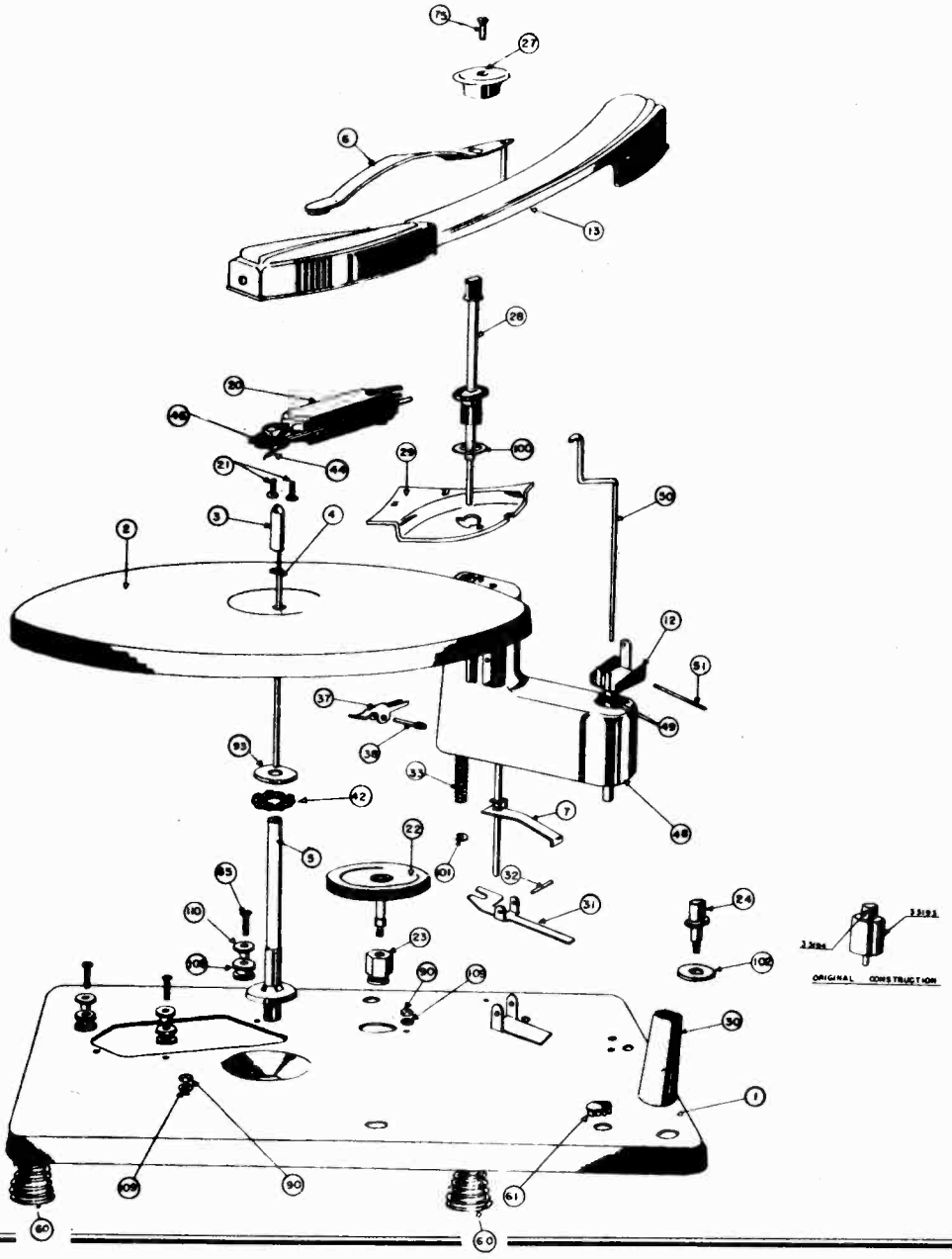
3. MOTOR WILL NOT START OR SHUT OFF

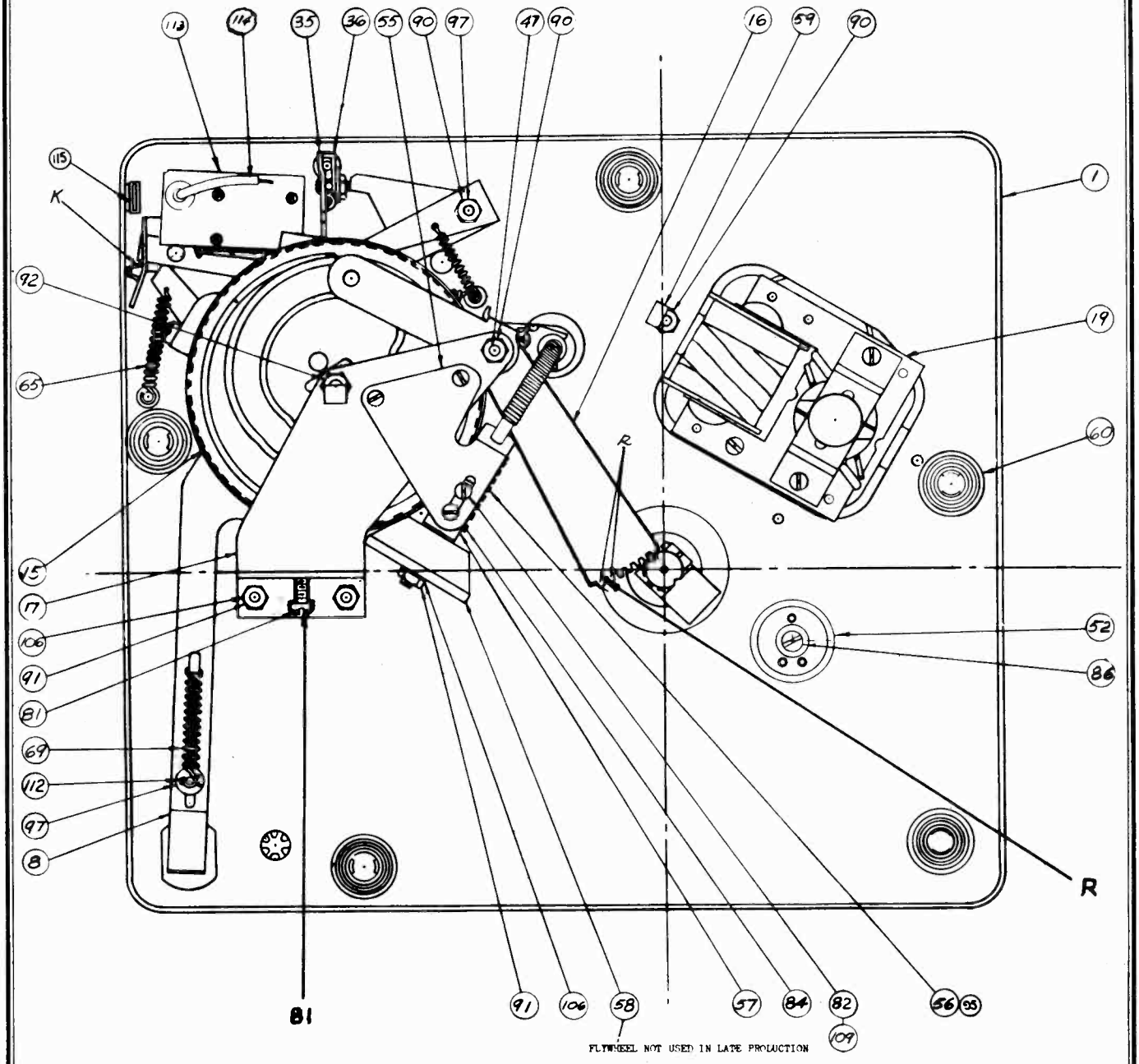
If motor will not start automatically the trouble may be due to incorrect adjustment of Screw (Ref. No. 81). This screw should be turned in just enough so that motor will start. If the motor will not stop automatically when the tone arm has returned to its rest position on the pedestal, this screw should be turned out until the proper adjustment is obtained.

4. TONE ARM WILL NOT LAND IN CORRECT POSITION ON RECORD

If tone arm is either in or out too far when starting to play records, it will be necessary to loosen screw "S" and move Crank Assembly (Ref. No. 14) to correct, after which screw "S" must be tightened.

EXPLODED VIEW





5. EARLY OR LATE TRIPPING

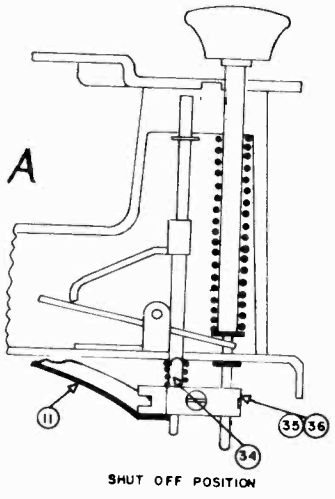
Automatic tripping at end of record is controlled by adjustment screw "P". Factory adjustment calls for tripping to occur when needle is approximately 2" from center of spindle. If this adjustment screw turns too freely, a slight bending of the bracket holding the screw will place more tension on the threads.

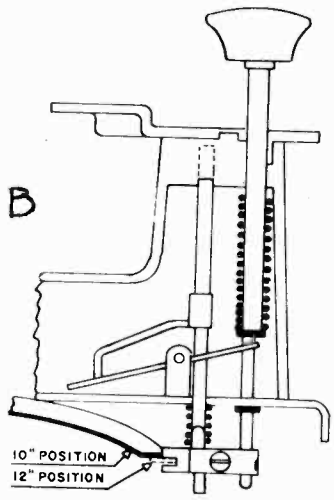
6. TONE ARM WILL NOT LAND IN SHUT-OFF POSITION

Check Compression Spring (Ref. No. 34). See that Record Clamp Shaft (Ref. No. 28) clears hole in base plate. If shaft binds in hole, ream with drill no larger than #8 standard twist drill.

In shut-off position Size Arm (Ref. No. 11) should fall below Positioner (Ref. No. 35) and Positioner Clip (Ref. No. 36.) Reference to Fig. B (shut-off position) will show the size arm in this position. When the mechanism is in the 12 inch position, the size arm should fall into the slot in the Positioner.

NOTE: In Fig. A, B, the Positioner and Positioner Clip are shown in at right angles to their true position, in order to illustrate the action of the size arm with respect to the mechanism, particularly inside the pedestal.





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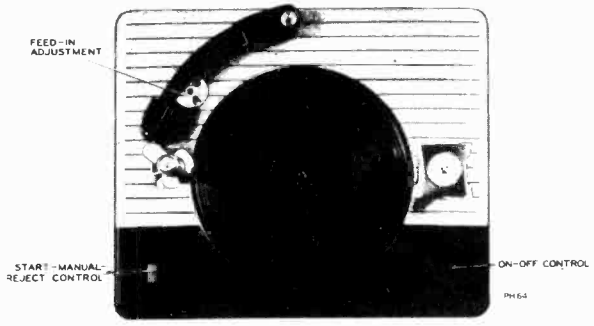
7. TONE ARM WILL NOT REMAIN ON REST POST AFTER AUTOMATIC SHUT-OFF

The metal cup under the pickup cartridge should engage the rim of the rest post to prevent the tone arm from sliding off. If necessary bend the edge of the cup slightly using extreme care.

8. TONE ARM DOES NOT SWING FREELY WHEN UNIT IS OUT OF CYCLE

Check clearance of end of Crank (Ref. No. 14) as it passes formed metal piece at point labled "K", If necessary bend metal to allow clearance, but be careful not to disturb the stop position of switch off bar (Ref. No. 10)

ITEM	PART #	DESCRIPTION	Q'TY
1	33289	BASE ASS'Y	1
2	33417	TURNTABLE & BEARING ASS'Y	1
3	33251	SHAFT & TIP ASS'Y	1
4	33245	ECCENTRIC & SHAFT ASS'Y	1
5	33252	SPINDLE ASS'Y	1
6	33394	CLAMP ASS'Y - RECORD	1
7	33393	ARM ASS'Y POSITIONER	1
8	33418	REJECT ARM & SWITCH ASS'Y	1
9	33364	LATCH ASS'Y	1
10	33368	SWITCH OFF ASS'Y	1
11	33238	ARM ASS'Y - SIZE	1
12	33239	POST & HINGE ASS'Y	1
13	33185	ARM TONE	1
14	33287	CRANK ASS'Y	1
15	33835	CAM ASS'Y	1
16	33247	ARM ASS'Y DROPPING	1
17	33309	BRACKET ASS'Y, MOUNTING	1
18	33416	POWER ASS'Y TAKE OFF	1
19	33112	MOTOR & DRIVE ASS'Y	1
20	33295	CARTRIDGE CRYSTAL PICK-UP	1
21	10523	SCREW, FIL. HEAD	2
22	33248	PULLEY - POWER TAKE OFF	1
23	33177	HUB ECCENTRIC	1
24	34703	BUTTON REJECT	1
25	33151	WHEEL ASS'Y - MOTOR	1
26			
27	33200	KNOB - RECORD CLAMP	1
28	33202	SHAFT RECORD CLAMP	1
29	33314	SUPPORT RECORD	1
30	33087	PLUG PEDESTAL	1
31	33150	ARM LAST RECORD	1
32	33193	PIN, LAST RECORD ARM	1
33	31656-04	SPRING, COMPRESSION	1
34	31656-07	SPRING, COMPRESSION	1
35	33155	POSITIONER	1
36	33302	CLIP, POSITIONER	1
37	33164	ARM SELECTOR	1
38	33246	AXLE, SELECTOR ARM	1
39	33059	SPRING SPINDLE	1
40	33039	PINION	1
41	33038	LOCK	1
42	33273	BEARING THRUST	1
43			
44	54061	NEEDLE, REPRODUCER	1
45	54060	CARD INSTRUCTION	1
46	33802	SCREW, SET	1
47	33053	SHAFT	1
48	33308	PEDESTAL	1
49	26032-02	BALL BEARINGS	9
50	33167	ROD, LIFT	1
51	33235	PIN HINGE	1
52	54569	CONNECTOR	1
53	33182	ROLLER, DROP ARM	1
54	33171	CLIP, POWER ARM	1
55	33168	SUPPORT WORM	1
56	33086	GEAR WORM	1
57	33159	ANGLE WORM SUPPORT	1
58			
59	33369	CLAMP CABLE	2
60	33391	SPRING MOUNTING	5
61	33414	PLUG, BUTTON	1
62	33389	SWITCH, MICRO LIMITED	1
63	33425	INSULATION	1
64			
65	33205-01	SPRING, COIL TENSION	1
66	33205-02	SPRING, COIL TENSION	1
67	33205-03	SPRING, COIL TENSION	1
68	33205-04	SPRING, COIL TENSION	1
69	33205-05	SPRING, COIL TENSION	1
70	33113	SPRING, COIL TENSION	1
71	33205-07	SPRING, COIL TENSION	1
72	61216	SCREW	AS REQ'D
73	54001	WASHER	
74	11142	SCREW, FIL. HEAD	1
75	12544	SCREW, OVAL HEAD	1
76	11058	SCREW, ROUND HEAD	1
77	11139	SCREW, FIL. HEAD	1
78	12585	SCREW, SET	2
79	33269	SCREW PEDESTAL	2
80			
81	11151	SCREW, FIL. HEAD	2
82	10887	SCREW	1
83			
84	12564	SCREW, SET	2
85	11061	SCREW	4
86			
87	10453	SCREW	2
88			
89	33347	NUT, HEX JAM	1
90	12937	NUT	6
91	12941	NUT	4
92	12944	NUT	
93	6918	WASHER, PLAIN	1
94	56240	WASHER, LOCK	
95	4645	WASHER, BAKELITE	2
96	29567-10	WASHER, PLAIN	1
97	29567-11	WASHER, PLAIN	6
98	29567-12	WASHER, PLAIN	1
99	29567-13	WASHER, PLAIN	1
100	33321	WASHER, TENSION	1
101	33371	WASHER HORSE SHOE	1
102	54002	WASHER	1
103			
104	56239	WASHER LOCK	3
105	56202	WASHER LOCK	1
106	56240	WASHER LOCK	3
107	56241	WASHER LOCK	1
108	52492	GROMMET	3
109	56197	WASHER INTERNAL TOOTH LOCK	5
110	52439	SLEEVE FLANGE	3
111	2824	GROMMET	1
112	29379-01	COTTER, HAIR PIN	6
113	33740	COVER SWITCH	1
114	31549-09	WIRE FLEX. LEAD	16"
115			
116			
117	61479	WASHER TURNTABLE (UPPER)	1
118	61478	WASHER TURNTABLE (LOWER)	1
119	33117	WASHER	2
120	61475	DECAL, PUSH	1
121	33172	FLYWHEEL	1
122	33319	SPRING LEAF	1
123	33316	SPRING RETAINER	1



RCA VICTOR

RP-176

Automatic Record Changer

SERVICE DATA

—1946 No. 12—

RADIO CORPORATION OF AMERICA
RCA VICTOR DIVISION
CAMDEN, N. J., U. S. A.

FEATURES

1. This record changer is a two-support, drop type, non-intermixing mechanism designed to play automatically a series of twelve ten-inch or ten twelve-inch records of the standard 78 RPM type.
2. The mechanism uses a lightweight, low-noise, crystal pickup cartridge, equipped with a long-life sapphire point.
3. The tone arm is automatically returned to rest position and the power removed from the drive motor, after the mechanism has finished playing the last selection of the stack.
4. The changer is equipped with an eccentric tripping device which insures tripping on all standard records.
5. A pickup muting switch is incorporated, which shorts out the pickup while the changer is in cycle. This prevents mechanical noises of moving parts from being amplified.
6. The record support and separator are mechanically linked, requiring only one operation for changing of record size.
7. Moving parts are few in number while playing records. This insures quiet reproduction, free from rumble and wow.
8. The mechanism is provided with a safety clutch which prevents damage to the mechanism in case of a jam due to a defective record.
9. The accessible feed-in adjustment is positive in action.

MANUAL OPERATION

1. Make certain the mechanism is out of cycle with the pickup on the rest.
2. Push "Start-Reject" knob to manual position.
3. Place record on turntable and push the power switch to the "on" position.
4. Lift and place pickup on record.
5. When the selection has finished playing, the pickup will continue to ride in the eccentric groove until the pickup is lifted from the record or the power is removed from the drive motor.

LUBRICATION

A light machine oil (SAE #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 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 shaft.)

It is important that the drive motor spindle and the rubber tire on the friction disc as well as that 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.

AUTOMATIC OPERATION

The pickup "rest" consists of a post incorporating a button and shaft connecting a switch beneath the motor board. This switch, which controls the power to the drive motor, is actuated by the weight of the pickup and tone arm while going in and out of rest position.

1. Turn the record support on the right-hand side of the changer, to position it for 10- or 12-inch records.
2. Load the records on the supports with the desired selections upward, the last record to be played on top. (Make certain the separator shelf is pushed down when stack is placed on the supports.)
3. Push the "On-Off" knob to the "on" position.
4. Push "Manual-Reject" knob to reject position and release. The mechanism will play the selections in the entire stack at which time the tone arm will return to rest position and the power will be removed from drive motor.
5. To reject a record being played, push the "Manual-Reject" knob to "Reject" and release.
6. Lift and turn separator shelf to facilitate the removal of records.
   (**Note:** For automatic operation, each record is required to have the standard eccentric groove.)

Cautions

Before servicing the automatic changer, inspect the assembly to see that all gears, cams, springs, levers, etc., are correctly assembled and in good working order.

1. Never use force to start or stop the motor or any part of the record changing mechanism.
2. Warped or damaged records may cause the mechanism to jam. **When jamming occurs, the safety clutch slips, causing a clicking sound.**
3. A cracked or chipped record may damage the sapphire.
4. Warped records may slide on one another while playing and result in unsatisfactory reproduction.
5. Do not leave the records on the record posts or on the turntable as they may warp, particularly in warm climates. Warped records may be flattened by placing them on a flat surface with a heavy flat article placed on top of them for a few days.
6. If, for any reason, the mechanism stalls, turn off the "On-Off" switch and remove the records from the posts. Start the turntable by turning the switch on and allow the pickup arm to complete its cycle.
7. Do not tighten copper-plated, cone-pointed screws until final adjustment has been made.

MODEL RP-176 RCA MFG. CO.

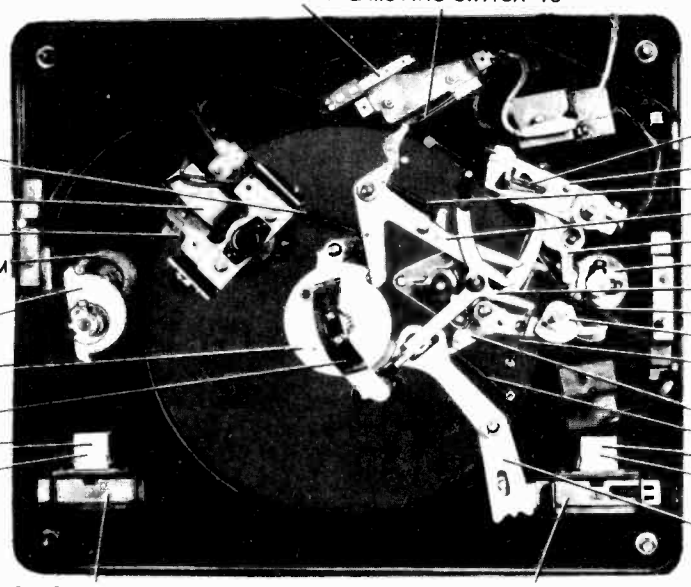


FIG. 1

FUNCTION OF PRINCIPAL PARTS

Trip Lever 85

When the pickup is riding in the eccentric groove, the trip pawl located on the trip lever engages the ratchet lever, starting the cycle.

Ratchet Lever 59

Portion of lever acts as a ratchet and the other portion acts as a stop or catch to hold the drive clutch from engaging.

Ratchet Wheel (fig. 4)

Acts as part of the safety clutch, which is engaged with the cam pawl during cycle.

Drive Cam, Gear and Pawl 41

Transfers motion from turntable through clutch to main gear.

Turntable Spindle Support 35

Forms a bearing for turntable spindle.

Main Cam 67 (fig. 2)

Has a series of tracks controlling cycling action.

Record Separator Lever, Link, Crank 97 (fig. 2)

Transfers motion from the main cam through the stud, lever and link to the separator post during change cycle.

Feed-in Lever Locking Pawl or Latch 130 (fig. 3)

Provides a means of locking feed-in lever until the pickup has landed on the record, then unlatching and allowing feed-in lever to gently push the pickup into starting groove.

Manual-Reject Control Knob and Lever Assembly

In "manual" position, it contacts the stud on clutch portion of drive cam thereby preventing the clutch from engaging and starting cycle.

In "automatic" position, it permits operation of the ratchet lever safety clutch and stop switch.

In "start reject" position, it momentarily closes control switch which is shunted across stop switch. It also moves the ratchet lever away from drive cam pawl, permitting the clutch to engage and start cycle.

Muting Switch Actuating Lever 133 (fig. 3)

Opens pickup muting switch during the playing cycle.

Tone Arm Lever 65

Directs horizontal motion of tone arm. It also incorporates an additional retard lever which stabilizes tone arm while the mechanism is in cycle.

Tone Arm Return Lever 62

Moves the tone arm inward and provides positioning for landing.

Feed-in Lever 88

A small lever under spring tension providing a small amount of force inward on tone arm, after the pickup has landed on record.

Tone Arm Elevating Lever 125 (fig. 2)

Directs vertical motion of tone arm.

Tone Arm Elevating Rod 79

Transfers motion from elevating lever to tone arm.

Record Support Cam 22

Functions as a lock for record support belt drum.

Record Support Belt and Drum 24-99-100

Forms a mechanical linkage between record support and record separator.

Record Support

Provides a support for the record stack and a handle for record size change.

Record Separator Post and Blade

Functions to support the records and, together with the selector blade, to separate the lowest record of the stack and allow it to drop to the turntable during the change cycle.

Shut-off or Segment Cam 118

Locks tone arm return lever preventing it from pushing the tone arm in for landing.

Retainer Spring 132 (fig. 3)

A small piece of phosphor-bronze functioning as a partial lock which stabilizes the tone arm when in the outermost position.

Stop Spring 131

A small piece of spring steel used as a stop, which determines the outermost position of tone arm. (Adjustable.)

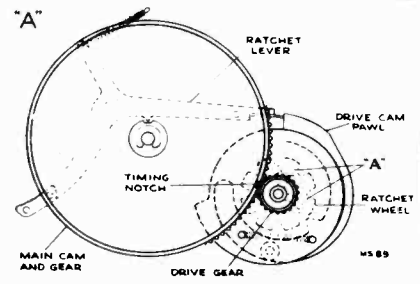
RCA MFG. CO. MODEL RP-176

Quick-Reference Chart for Automatic Record Changer Adjustments

Mechanism jams. General irregularity of operation.

(Mechanism Timing)

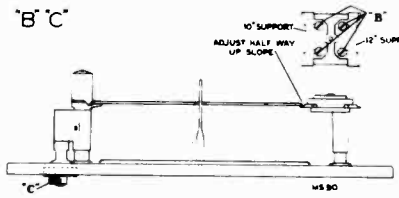
With the ratchet lever and the pawl on the drive shaft cam in playing position as shown, remove the bottom support bracket, link and lever assembly. Remove the "C" washer on the main cam shaft and slip the cam down far enough that it can be rotated with respect to the drive gear. Then rotate it until the timing notch is positioned as shown. Put the main gear back in mesh with the drive gear, replace the "C" washer, place the elevating lever on the cam ridge. Make certain the separator link and lever assembly is in its correct position and replace the bottom support bracket.



Records strike separator post or fail to stay on record shelf.

(Spacing Between Record Posts)

Turn the record support post to the ten-inch position. Loosen set screws "C," hold the separator post against the end of its slot in the motorboard and turn the belt drum to take up any slack in the belt. Tighten the zinc-plated, blunt-nosed screw and check to see that a ten-inch record fits the posts as shown. Then tighten the copper-plated, cone-pointed screw. Loosen set screws "B" and adjust support shelf so both 10- and 12-inch records set half-way up the slope when support post is turned to their respective positions.

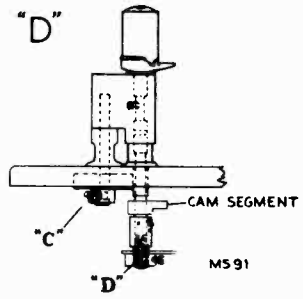


Records do not drop at proper time.

(Record Shelf Timing)

With the record supports turned to ten-inch position, place a ten-inch record on the supports. Loosen the set screws "D" and turn the record separator shaft until the edge of the record-separating knife is $\frac{3}{32}$ inch away from the edge of the record. The teeth on the inner circumference of the knife should be resting in the bottom of their slots at the time the adjustment is made. Tighten the zinc-plated screw first, run through cycle several times as a check, then tighten the copper-plated screw.

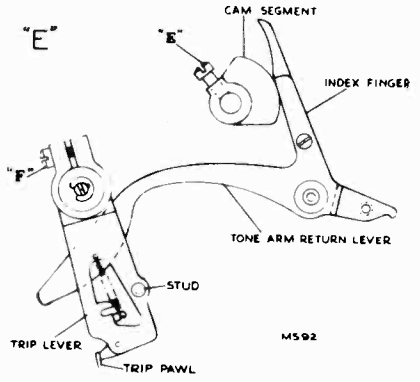
Note: It may be found necessary to deviate slightly from $\frac{3}{32}$ inch dimension if twelve-inch records do not drop properly.



Tone arm continues to repeat playing of top record or jams when part way in on record.

(Segment-cam height or radial position)

With record changer in the ten-inch position and the records removed from the posts, loosen the set screw "E." Set the record separator segment-cam so that the index finger of the tone arm return lever rides on the middle of the segment-cam, as shown. Rotate the segment-cam until it is in such a position that the index finger will not ride off either end. Check to see that the index finger rides in over top of the cam when the record shelf is depressed by the weight of one record. Tighten the set screw.



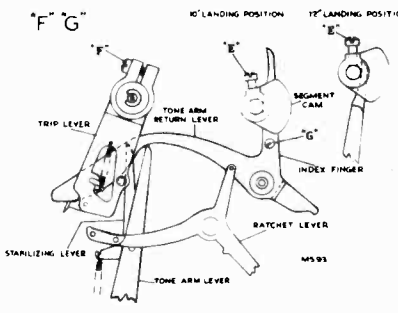
Sapphire does not land at correct point on 10-inch record.

(Tone Arm Position With Respect To Trip Lever)

Correct dimension from outside edge of spindle to sapphire $4\frac{11}{16}$ inches.

With the record changer in the ten-inch position, place a ten-inch record on the turntable and rotate the changer through cycle by hand, until the sapphire is just ready to land. Make certain that the index finger of the pickup arm return lever is against the record separator shaft and that the tone arm trip lever stud is held firmly against the return lever. Loosen the set screw "F" and move the pickup arm to the correct landing position. Maintain correct alignment between ratchet lever and trip pawl, when tightening set screw "F." (Note—Make certain trip lever stud does not come in contact with motorboard while making this adjustment.)

Place a twelve-inch record on the turntable and rotate the changer through cycle until the sapphire is just ready to land. Loosen screw "G" and adjust end of tone arm return lever so it is against separator shaft when pickup is in correct landing position.



MODEL RP-176

RCA MFG. CO.

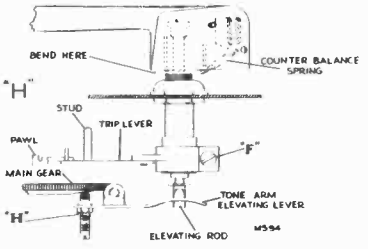
Top of tone arm strikes stack of records or sapphire fails to clear the records on the turntable.

(Tone Arm Height While In Cycle)

Rotate the changer through cycle until the tone arm has risen to its maximum height above the turntable but has not begun to move out. At this point adjust the screw "H" until the distance between the turntable and the sapphire is one and three-sixteenths inches. Tighten the locknut.

(Tone Arm Height While Out of Cycle)

Bend end of tone arm support bracket or pivot arm so the pickup end of tone arm clears the motorboard by $\frac{3}{32}$ inch.



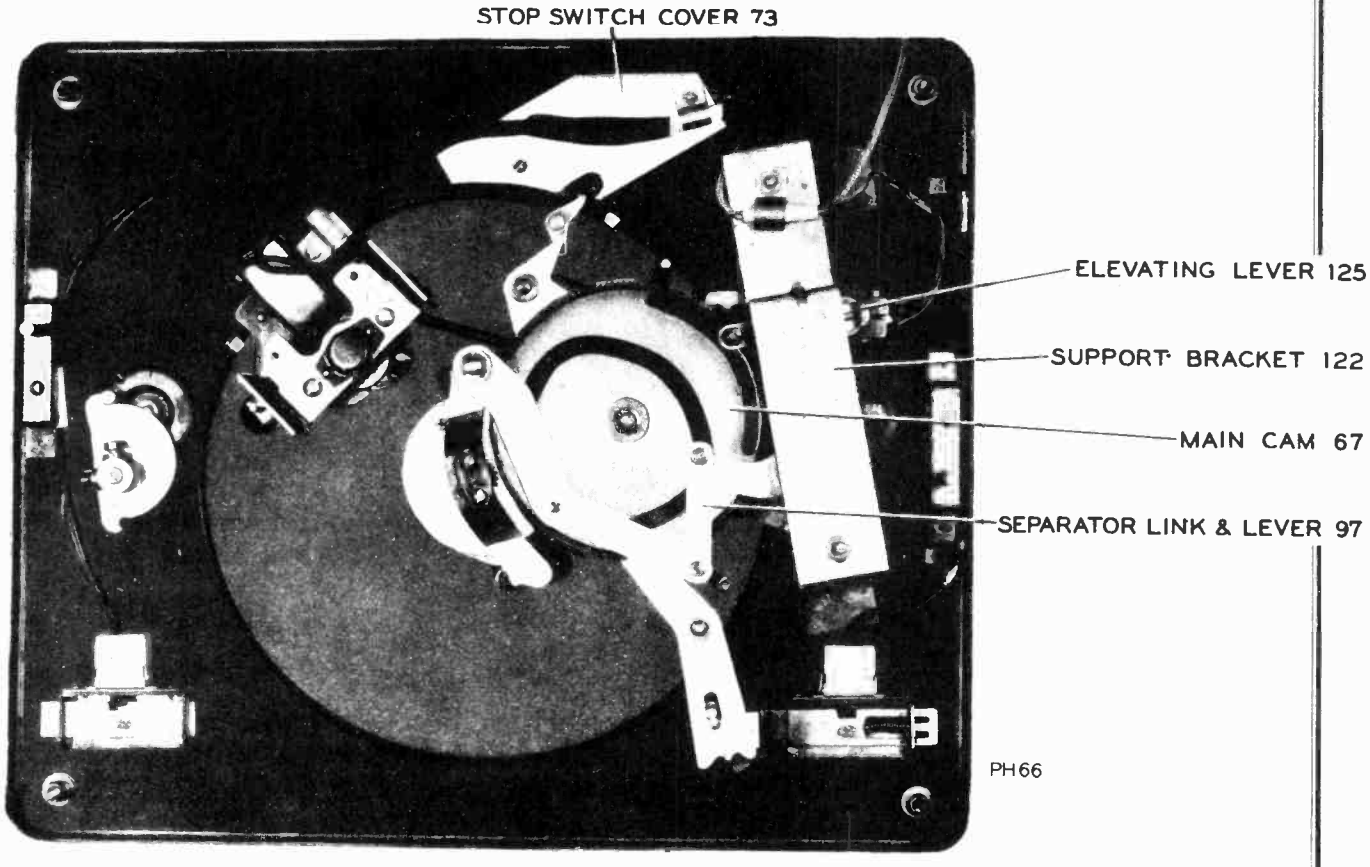
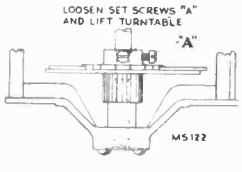
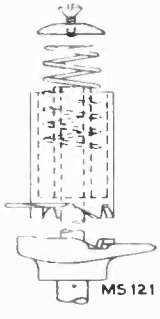


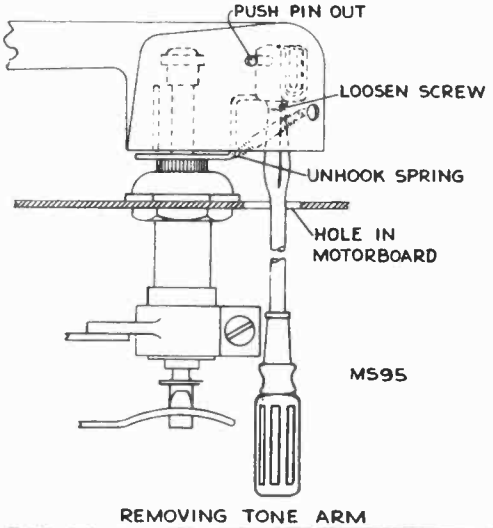
FIG. 2

To remove turntable loosen set screws "A" and lift the turntable.



To remove separator knife, loosen top screw and entire assembly can be dismantled as shown in drawing.





REMOVING TONE ARM

Cycle of Operation

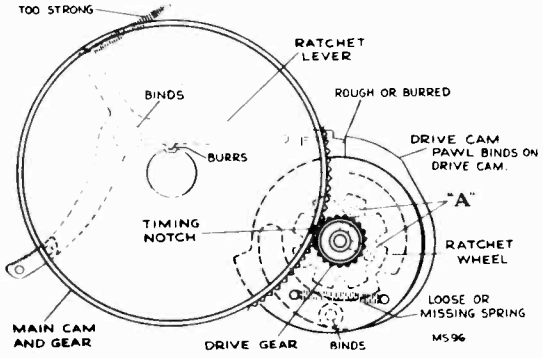
The changer can be conveniently rotated through the change cycle by pushing the reject knob and revolving the turntable by hand. Eight turntable revolutions are required for one change cycle. Block up the motor, so it is disengaged from the drive disc, to permit easier manual rotation of the turntable.

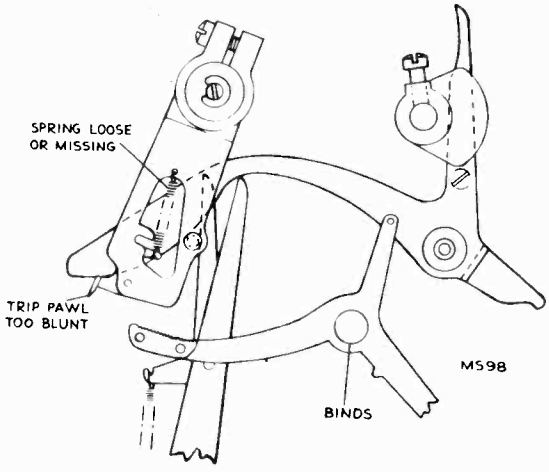
	Function	Explanation
Operator	Turn Record Support to 10" or 12" Position as Desired	1. Separator post positions itself by means of belt drive.
	Place Records on Posts	1. Separator shaft is pushed down against its spring and carries segment-cam out of path of index finger.
	Push Start Knob	1. Switch connected to start knob momentarily applies power to drive motor until tone arm is raised from stop button. 2. Manual-reject lever pushes ratchet lever. 3. Ratchet lever is pushed out of step on main gear shaft and releases drive cam pawl. 4. Drive cam pawl engages cam sprocket and it revolves, carrying drive gear with it.
Automatic Cycle	Tone Arm Rises	1. Main cam and gear revolves with drive gear. 2. Stud on tone arm lever rides in top track on main cam and directs movement of the lever. 3. Tone arm elevating lever rides up on ridge on main cam and pushes tone arm up by means of elevating rod.
	Tone Arm Moves Out	1. Tone arm lever pushes on trip lever stud. 2. Trip lever moves out. 3. Stud on trip lever, on its outermost swing, pushes feed-in lever into latch lever (130) (fig. 3). 4. Tone arm return lever is carried along by trip lever stud, and by stud on main cam top track.
	Record Knife Separates Bottom Record from Stack After Gauging Thickness of Record	1. Stud on separator lever follows main cam bottom track and directs the motion of the lever. 2. Through the separator link and crank, the separator lever turns the separator shaft. 3. Knife turns with shaft and strikes edge of bottom record. 4. Separator shaft continues to revolve and teeth on inner circumference of knife ride up on shelf teeth until knife is carried high enough against the action of spring (112) (fig. 4) to move in over top of record.
	Record Drops to Turntable	1. Separator shaft continues to turn until knife supports stack of records and shelf moves out from under bottom record.
	Tone Arm Moves In	1. Separator shaft reverses rotation. 2. Tone arm lever moves away from trip lever stud. 3. While tone arm lever moves away from stud on trip lever, the retard lever, hinged on tone arm lever, stabilizes tone arm for accurate landing. 4. Tone arm return lever pushes on trip lever stud. 5. Trip lever moves in.
	Tone Arm Lowers Sapphire on to Record	1. Index finger on tone arm return lever moves against separator shaft to insure proper landing position. 2. Tone arm elevating lever rides down on main cam ridge thus lowering the elevating rod and the tone arm. 3. Separator shaft returns knife to original position and allows stack of records to rest on shelf.
	Sapphire Moves In to Record Groove Record Begins to Play	1. Ratchet lever rides into eccentric step on main gear shaft and blocks drive cam pawl. 2. Pawl is disengaged from drive cam sprocket. 3. Drive gear and main gear stop. 4. Tone arm lever moves into cam to maintain disengagement. 5. As tone arm lever moves to its innermost position, it contacts feed-in latch (130) (fig. 3), unlatching feed-in lever. This allows it to gently push pickup into the first groove of the record.
	Last Record Drops and the Last Selection Is Finished Playing	1. As the mechanism goes into cycle the separator shaft raises, allowing segment cam to engage index finger and prevent tone arm return lever from pushing tone arm in for landing. 2. Tone arm is lowered into rest position. 3. Power is removed from drive motor by the weight of the tone arm resting on stop button which opens the stop switch.

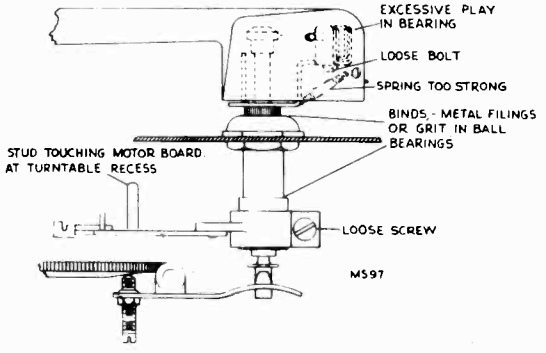
MODEL RP-176

RCA MFG. CO.

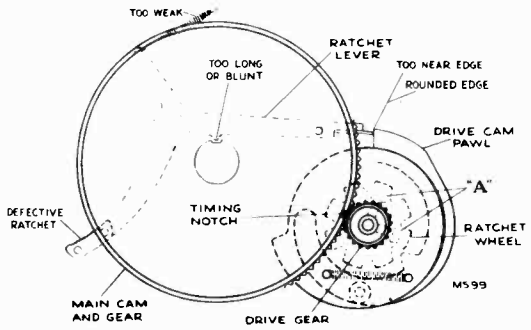
Fails to Trip:

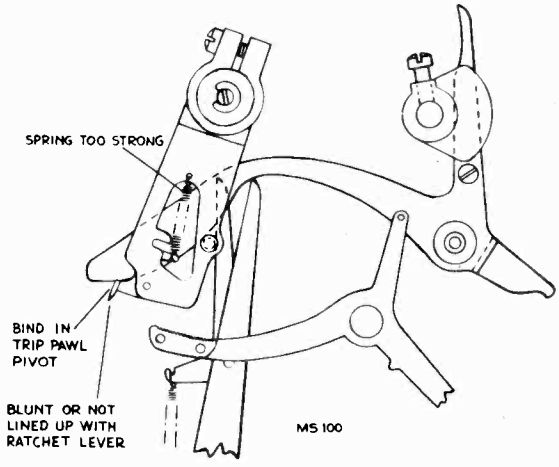




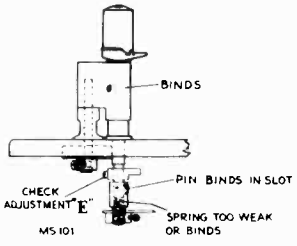


Trips Early:

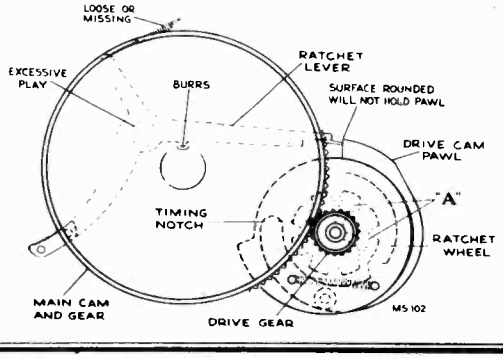


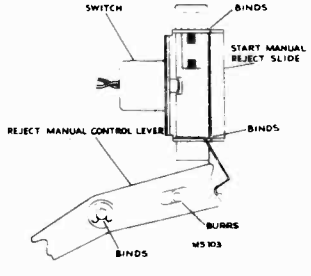


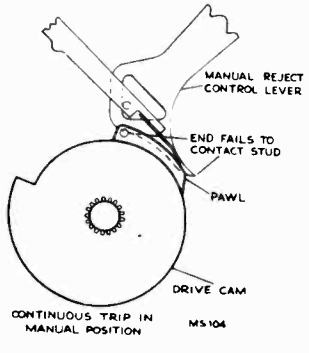
Repeats Playing of Last Record:



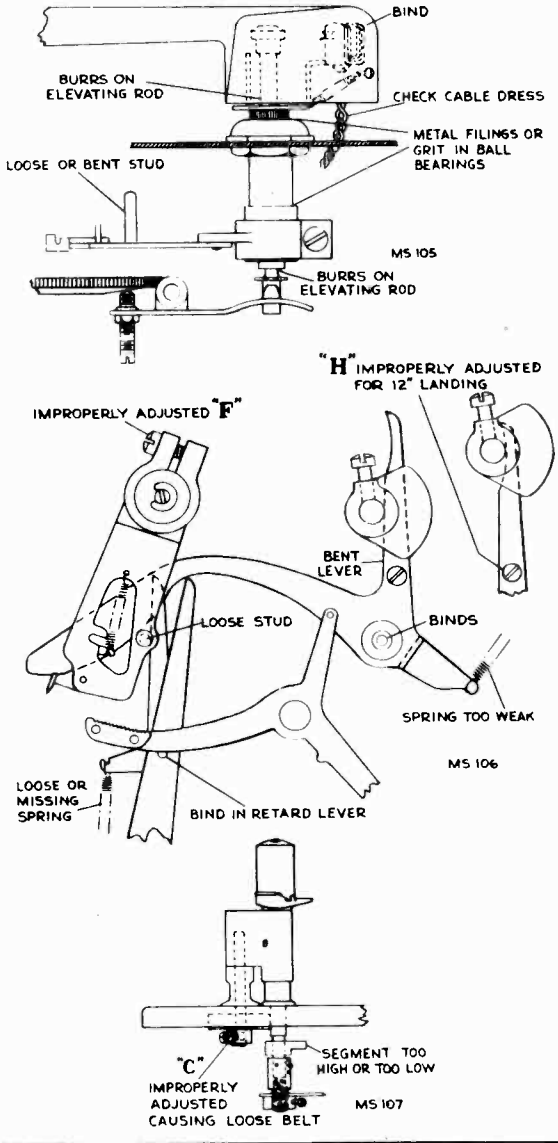
Trips Continuously:



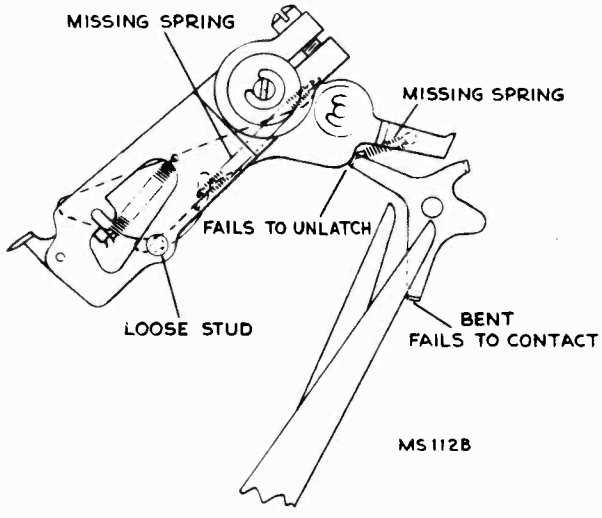




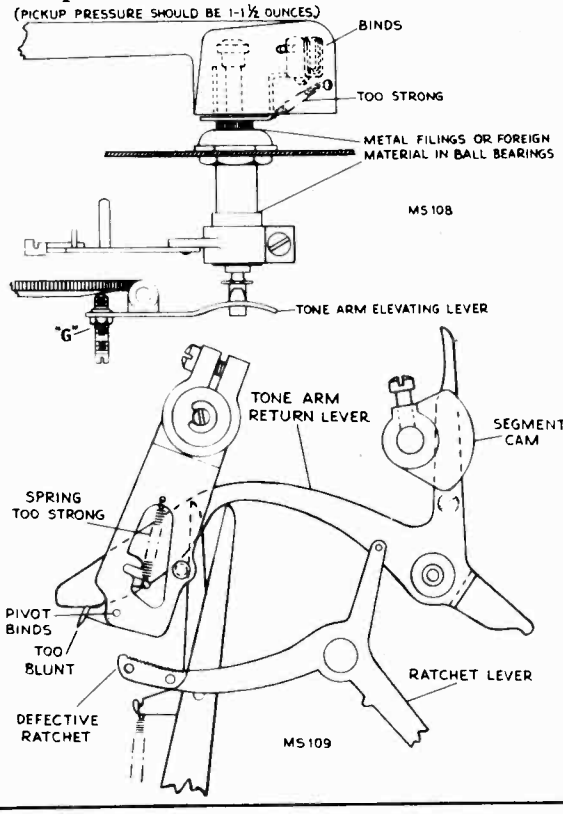
Lands Incorrectly:



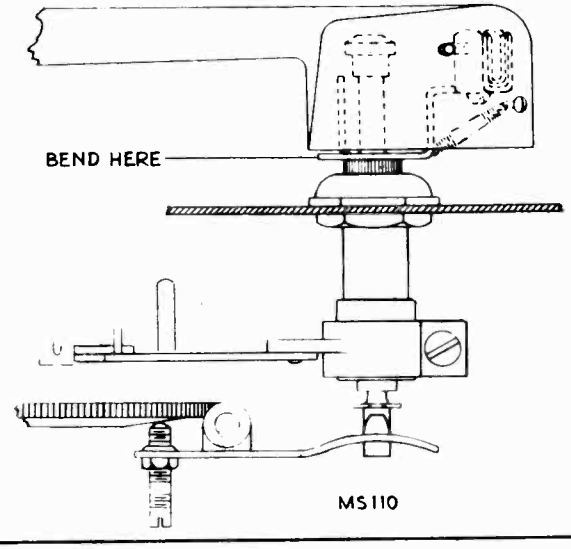
Incorrect Feed-in:



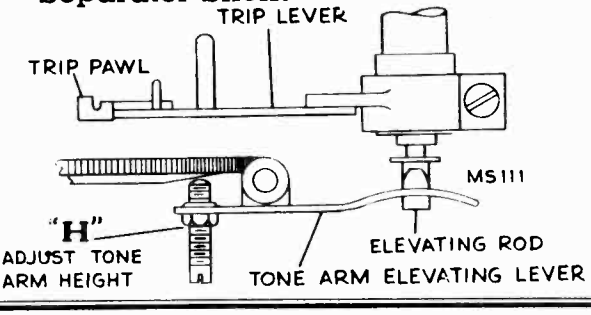
Repeats Grooves:



Sapphire Strikes Motorboard:



Tone Arm Touches Record on Separator Shelf:

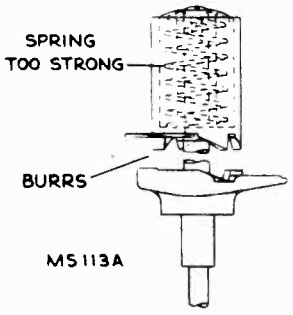


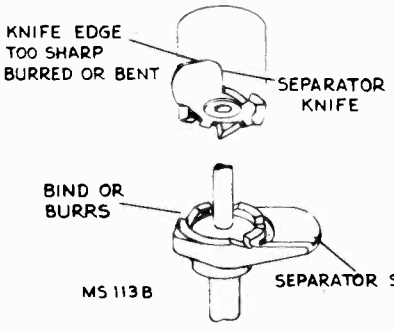
MODEL RP-176

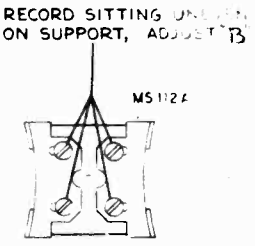
RCA MFG. CO.

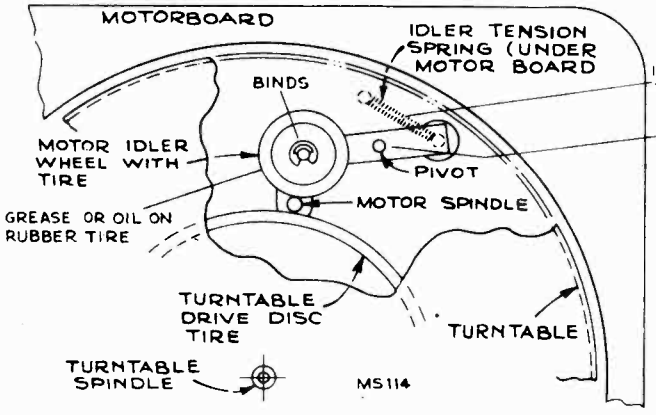
Records Jam or Stack Unsteady:

Record too thick, too thin, warped, or has rough edge.



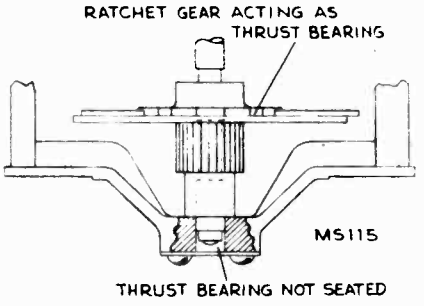




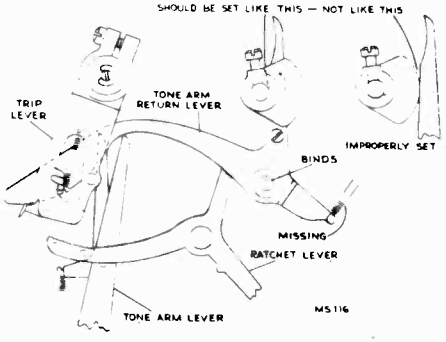


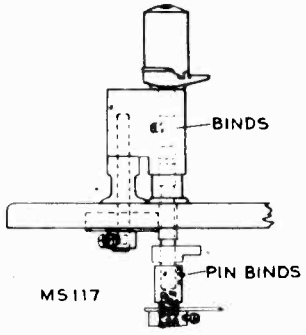
Slow Speed:

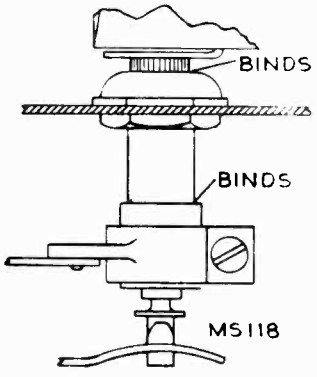
Turntable spindle binds on bottom or top bearing.



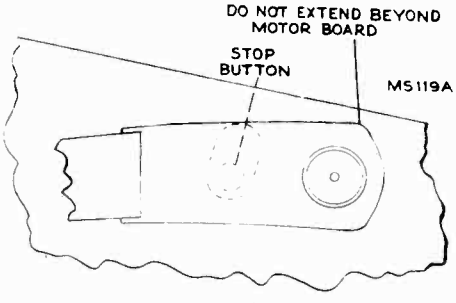
Tone Arm Continues to Come Down in Rest Position:



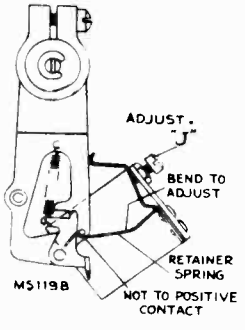




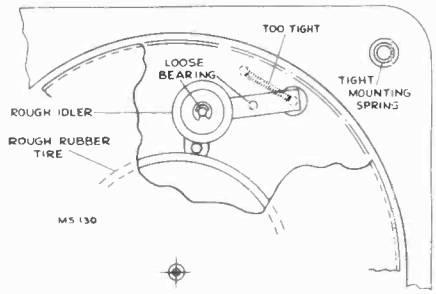
Tone Arm Lands Incorrectly on Rest, Drifts Off of Rest, or Jumps Suddenly When Moving in for Landing:

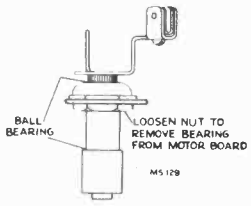


1. Adjust "J" for tone arm limit stop.
2. Bend retainer spring which contacts stud on trip lever, so tone arm is stabilized while on rest or in the outermost position. Do not make too positive contact or motion of tone arm will start motion with a sudden jump.



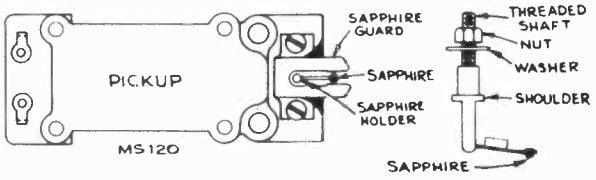
Rumble:





Do not remove ball bearings from tone arm bearing unless absolutely necessary. If cleaning is necessary immerse entire bearing in cleaning solution such as carbon tetrachloride.

Replacement of Sapphire:



Caution: Never bend the sapphire support wire.

The nut on the sapphire holder assembly is locked by a light cement (such as Glyptal). Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal.

Remove the two screws holding the sapphire guard in place and remove guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and push the shaft through the hole in the viscoloid until the sapphire holder assembly comes free.

Use of a drop or two of acetone will facilitate the removal of the nut and shaft. Do not use force as the crystal may be broken.

Insert threaded shaft of replacement sapphire holder through viscoloid and replace the washer and nut. Make sure that the sapphire is in the correct position. Take hold at the lower end of the shaft with a pair of pliers while tightening the nut, being very careful so as not to strip the threads or break the crystal. 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 (approx. .020) beyond the guard so that the guard will not strike the record. If necessary, bend the guard a little. Apply a drop of light cement (such as Glyptal) to the sapphire nut holder.

Note: Pickup force should be approximately 1½ oz.

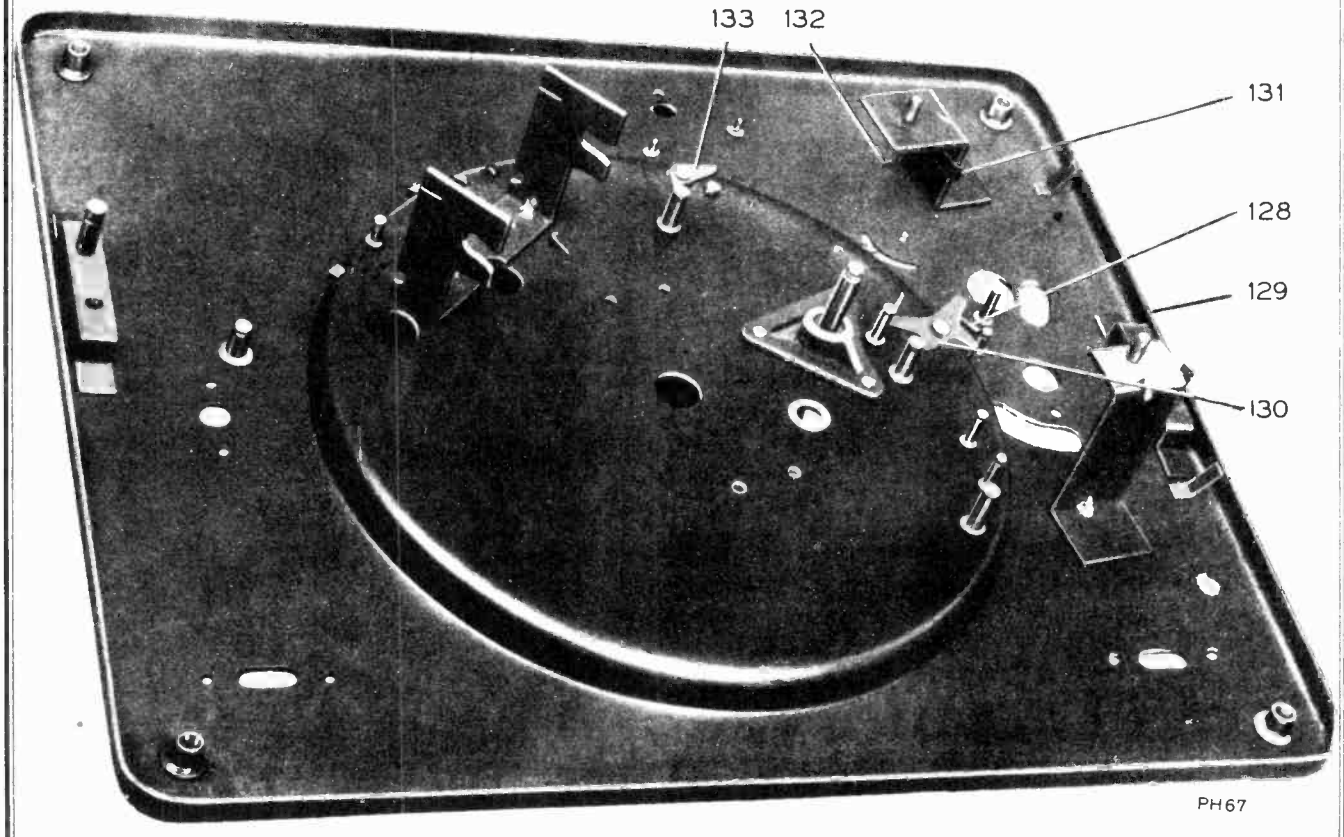


FIG. 3

MODEL RP-176

RCA MFG. CO.

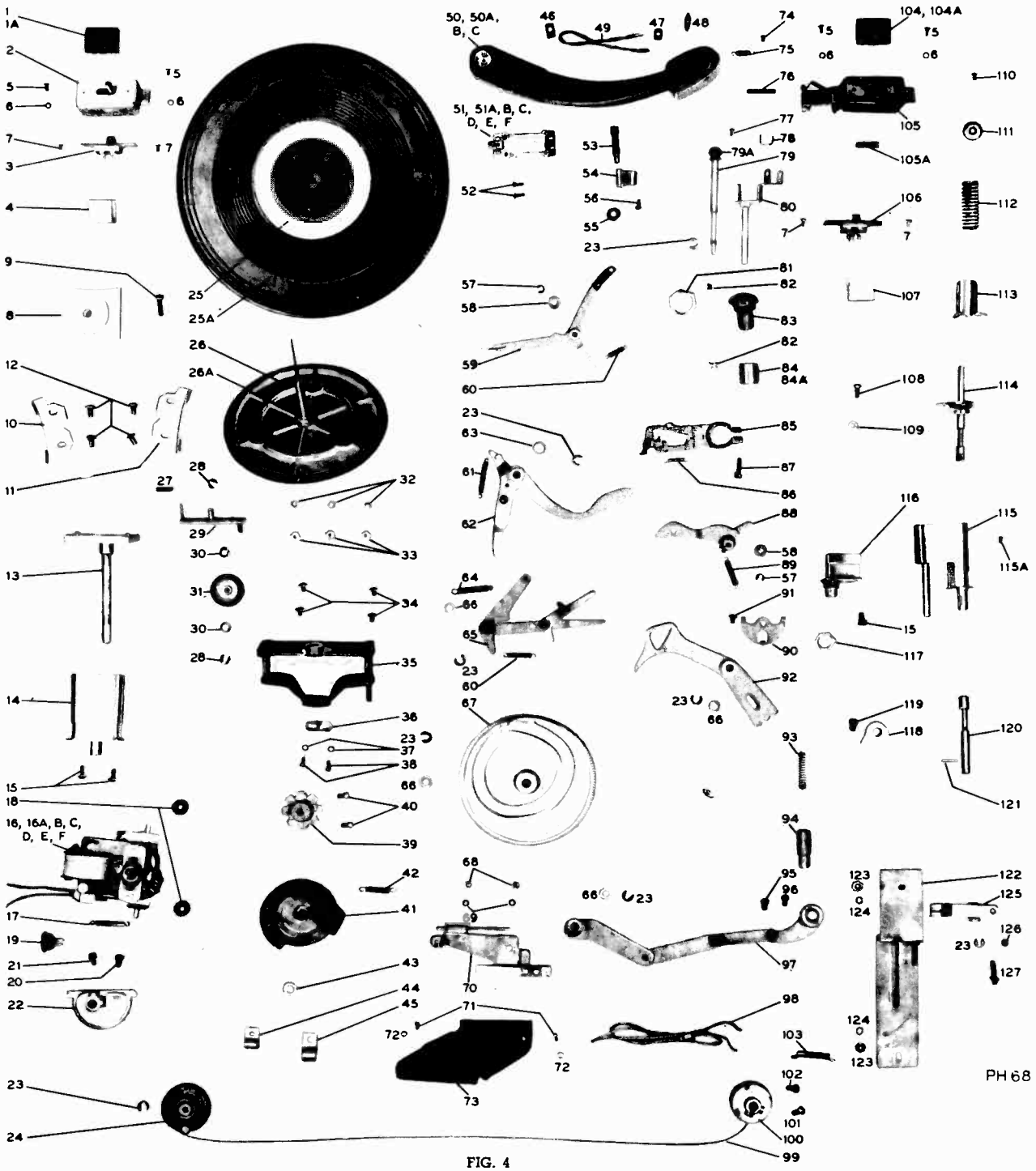


FIG. 4

Replacement Parts

REF. No.	STOCK No.	DESCRIPTION	REF. No.	STOCK No.	DESCRIPTION
1*	70946	Knob—"Off-On" knob	7†		Screw—Binding head screw, #4-40 x ¼" brass
1A	14270	Spring—Retaining spring for knobs	8*	70857	Cap—Record support cap
2*	70874	Slider—"Off-On" action slider—less switch	9*	70882	Screw—#10-32 x ¾" oval head screw for record support cap
3*	70875	Switch—"Off-On" switch			
4*	71106	Cover—Metal cover for "Off-On" switch	10*	70862	Support—Record support for 12" records only
5*	70881	Screw—#4-40 x ¼" binder head screw for slider controls	11*	70860	Support—Record support for 10" records only
			12*	70861	Screw—#10-32 x ⅜" binding head screw for record supports
6†		Washer—Lockwasher split type #4			

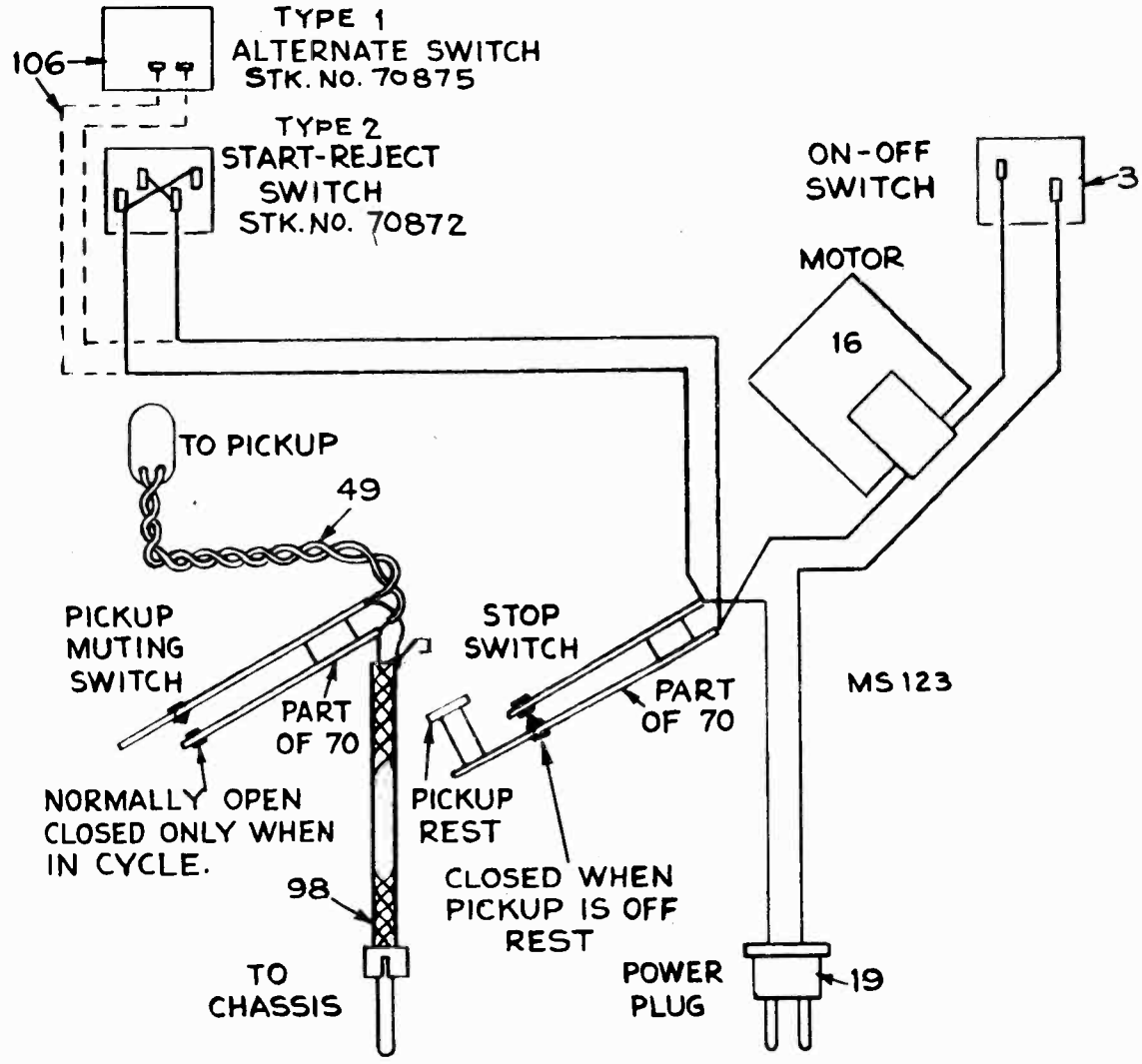


FIG. 5—WIRING DIAGRAM

Note:

This automatic record changer may be equipped with either of two types of "Manual-Reject" switches as indicated in the circuit diagram above.

Type 1 is the usual two position "On" and "Off" switch. This switch should be so installed as to have the "On" position toward the "Reject" position side of the "Start-Manual-Reject" control. Since the switch is shunted across the stop switch, it shorts out the stop switch when the control is placed in the "Reject" position. The switch is automatically returned to "Automatic" position by control slide spring 105-A, (fig. 4).

In the "Manual" position, the turntable will start rotating when the tone arm is lifted from the rest.

Type 2 is a three position "On-Off-On" switch (Ref. No. 106) which operates as type 1 in the "Reject" position, but in addition, it shorts out the stop switch when the control is in the "Manual" position. This allows the turntable to rotate whether the tone arm is on or off the rest if the control is in the "Manual" position.

When replacing switch of type 1 (Photographic Ref. 106) order Stock No. 70875.

The spring (Photographic Ref. 105A) used with type 1 switch is Stock No. 72515.

If, however, it becomes necessary to replace the slide of type 1 (Photographic Ref. 105) order type 2 slider, Stock No. 70871, and also switch, type 2 (Photographic Ref. 106), Stock No. 70872, used in conjunction with type 2 slider.

MODEL RP-176

RCA MFG. CO.

REF. No.	STOCK No.	DESCRIPTION
13*	70859	Shelf—Record support shelf and shaft minus supports
14*	70888	Base—Record support base
15†		Screw—Self-tapping screw, #10 x 3/8" long
16	38612	Motor—105-125 volts, 60 cycle (complete with mounting bracket)
16A	37108	Bearing—Bottom bearing and bracket
16B	37107	Bearing—Top bearing and bracket
16C	37109	Bracket—Motor mounting bracket
16D	37111	Coil—Motor field coil assembly
16E	37106	Pad—Rotor thrust pad
16F	37110	Rotor—Motor rotor complete with fan
17*	71545	Spring—Motor tension spring (.192" O.D. x 1½" —58 turns)
18	34368	Grommet—Rubber grommet to mount motor (2 required)
19	30870	Plug—2-prong male plug for power cable
20	39772	Screw—#10-32 x 5/16" fillister head cone point set screw for record support shaft cam
21*	32869	Screw—#10-32 x 5/16" fillister head screw for separator drum and record support shaft cam
22*	70845	Cam—Record support shaft cam—less mounting screws
23	2917	Washer—"C" washer for tone arm lever and for drum and belt assembly, tone arm return lever link and lever assembly, tone arm lever, main cam and manual lever and lift rod.
24*	70899	Drum—Record support belt drum
25*	70865	Turntable—Finished turntable plate (including mat)
25A*	70866	Mat—Rubber mat for turntable
26*	70867	Spindle—Turntable spindle (including disc with rubber tire)
26A	37873	Tire—Rubber drive tire
27*	71546	Spring—Idler arm tension spring (.187" O.D. x 7/8"—31 turns)
28	33726	Washer—"C" washer for idler arm and wheel
29*	70863	Arm—Motor idler arm—less wheel
30	39996	Washer—Fibre washer for idler wheel (2 required)
31	36274	Wheel—Idler wheel
32†		Washer—Lockwasher (split type #6)
33†		Nut—6 x 32 brass
34†		Screw—Machine screw #8-32 x 3/16" long
35*	70891	Support—Turntable spindle support
36*	70880	Plate—Spring thrust plate for turntable spindle
37†		Washer—Lockwasher (split type #6)
38*	70883	Screw—#6-32 x 5/16" round head screw for turntable spring plate
39	38624	Ratchet—Ratchet wheel (drive cam sprocket) for turntable drive—less mounting screws
40	38626	Screw—#8-32 x 1/4" fillister head set screw for ratchet wheel
41*	70853	Cam—Drive shaft cam and pawl—less tension spring
42*	70854	Spring—Drive shaft cam and pawl spring (.195" O.D. x 1-3/16"—42 turns)
43*	70879	Washer—Washer for cam and pawl
44†		Clamp—Metal clamp fastening pickup leads to bracket 122
45†		Clamp—Metal clamp fastening power and motor leads to cover 73
46	38458	Nut—Speed nut to hold cable—located in front of arm
47*	71095	Nut—Speed nut to hold cable—located in rear of arm
48*	71279	Nut—Speed nut to hold cable—located in rear of pivot arm
49*	71278	Cable—Pickup cable (twisted pair)
50*	70901	Arm—Tone arm complete, including reflector cap, crystalite button, and reflector—less pivot arm, crystal and cable
50A*	70903	Button—Crystalite button (part of tone arm)
50B*	70904	Cap—Reflector cap—lucite (part of tone arm)
50C*	70902	Reflector—Reflector (part of tone arm)
51*	70339	Crystal—Pickup crystal (complete)
51A	70019	Damper—Viscoloid damper—top front
51B*	70914	Damper—Viscoloid damper for sapphire
51C	38452	Guard—Sapphire guard
51D	70341	Nut—Mounting washer and nut for sapphire
51E*	70915	Sapphire—Sapphire and holder assembly
51F	37763	Screw—#2-56 x 1/8" screw for sapphire guard
52*	70912	Screw—#4-40 x 3/8" binder head screw to mount crystal (2 required)
53*	71102	Button—Pickup stop switch button
54*	70889	Rest—Pickup arm rest
55	32943	Nut—Pickup stop switch button speed nut
56†		Screw—Self-tapping screw, #10 x 3/8" long
57	20165	Washer—"C" washer for rachet lever and feed-in lever
58†		Washer—Steel washer, O.D. 1/2", I.D. .193", T-.020"
59*	70851	Lever—Ratchet lever assembly
60*	71549	Spring—Ratchet lever spring (.180" O.D. x 7/8" —54½ turns) and tone arm lever spring
61*	71726	Spring—Tone arm return lever spring (.218" O.D. x 1½"—48½ turns)
62*	70847	Lever—Tone arm return lever
63*	70884	Washer—Bearing washer for tone arm return lever
64*	71547	Spring—Tone arm lever tension spring (.218" O.D. x 1½"—48½ turns)
65*	70858	Lever—Tone arm lever
66*	70877	Washer—.280" I.D. x 7/16" flat washer for tone arm lever, main cam, manual lever and separator link
67*	70864	Cam—Main cam
68†		Nut—Hex. nut 6-32
69†		Washer—Lockwasher (split type #6)
70*	70876	Switch—Pickup muting switch (including stop switch and bracket)
71†		Screw—Round head brass screw, #4-40 x 3/16" long
72†		Washer—Lockwasher (split type #4)
73*	70855	Cover—Stop switch cover
74*	70913	Stud—Pivot arm spring stud
75*	71099	Spring—Pivot arm spring (.187" O.D. x 3/4"—24 turns)
76*	70905	Pin—Pivot pin
77*	71097	Screw—#4-1/4" long self-tapping screw to lock pivot clamps
78*	71098	Clamp—"U" clamp to lock pivot arm in position
79*	70909	Rod—Pusher rod (including rubber cushion)
79A	38607	Cushion—Rubber cushion for pusher rod
80*	70906	Arm—Pivot arm and shaft
81*	70886	Nut—3/4-32 hex nut for pickup arm
82	3658	Ball—Steel ball (3/32" dia.)
83*	70910	Bushing—Pivot arm bushing (upper)
84*	70911	Bushing—Pivot arm bushing (lower)
84A	5042	Screw—#8-32 x 1/8" set screw for lower pivot arm bushing
85*	70856	Lever—Trip lever (including trip pawl and trip pawl spring)
86*	71543	Spring—Trip spring (.135" O.D. x 21/32"—58 turns)
87†		Screw—Fil. head machine screw, #10-32 x 3/8" steel
88*	70873	Lever—Feed-in lever
89*	71550	Spring—Feed-in lever adjusting disc spring (.160" O.D. x 1¼"—75 turns)
90*	70885	Disc—Feed-in adjusting disc
91†		Screw—Binding head, #8-32 x 1/4" long
92*	70869	Lever—Manual reject lever
93*	70850	Spring—Record separator shaft bottom spring (.290" O.D. x 1.35"—14¾ turns)
94*	70849	Bushing—Record separator shaft bushing
95*	71100	Screw—#10-32 x 1/4" round head screw for link
96	31118	Screw—#10-32 x 5/16" fillister head set screw for link
97*	70852	Link—Record separator shaft link and lever
98*	71105	Cable—Shielded pickup cable complete with plug
99*	70900	Belt—Record separator to support belt—minus drum
100*	70898	Drum—Record separator drum
101	32869	Screw—#10-32 x 5/16" fillister head screw for separator drum and record support shaft cam
102	31118	Screw—#10-32 x 5/16" fillister head set screw for separator drum
103*	71544	Spring—Drum and belt tension spring (.255" O.D. x 1⅜"—27½ turns)
104*	70870	Knob—"Start-Reject-Automatic-Manual" knob
104A		Same as 1A
105*	70871	Slider—Reject action slider—less switch (Type 2) (See Fig. 5 and descriptive note)
105A†		Spring—Included in slider assembly (70871) (Type 2) (See Fig. 5 and descriptive note)
106*	70872	Switch—"Start-Reject-Automatic-Manual" switch (Type 2) (See Fig. 5 and descriptive note)
107*	71107	Cover—Metal cover for "Start-Reject-Manual-Automatic" switch
108†		Screw—Round head mach. screw, #8-32 x 7/16" brass
109†		Nut—Hex nut, #8-32 brass
110*	70893	Screw—#6-32 x 1/4" oval head screw for record separator cap
111*	70897	Cap—Record separator cap
112*	70895	Spring—Record separator spring—upper (.622" O.D. x 1-11/16"—13½ turns)
113*	70894	Knife—Record separator knife
114*	70896	Shelf—Record separator shelf and shaft
115*	70846	Swivel—Record separator swivel and shaft
116*	70887	Support—Record separator support
117*	70890	Nut—#9-16/32 hex nut for separator support
118*	70848	Cam—Shut-off or segment cam—fastens on record separator shaft
119*	70878	Screw—#10-32 x 5/16" round head screw for shut-off cam assembly
120*	71280	Shaft—Record separator bottom shaft
121*	71103	Pin—Drive pin for record separator shaft end bushing
122*	70868	Brace—Angle bracket or bottom support for tone arm elevating lever
123†		Nut—Hex nut #10-32
124†		Washer—Lockwasher, #10 split type
125	38631	Lever—Tone arm elevating lever
126*	71104	Nut—#10-32 hex locknut for tone arm lever adjustment
127	39691	Screw—#10-32 x 7/8" headless screw for adjusting tone arm lift lever
128*	71548	Spring—Feed-in control spring (.160" O.D. x 11/16"—52 turns)
129*	70844	Board—Motorboard sub-assembly complete with all welded and riveted parts—less detachable operating parts (Fig. 3)

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

* This is the first time this Stock No. has appeared in Service Data.
† These parts are not stocked.

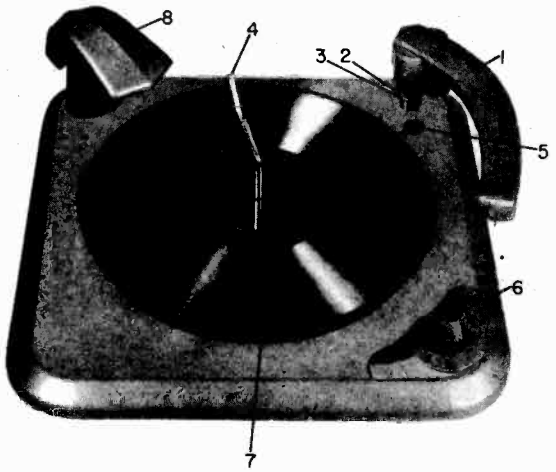


Fig. 1.

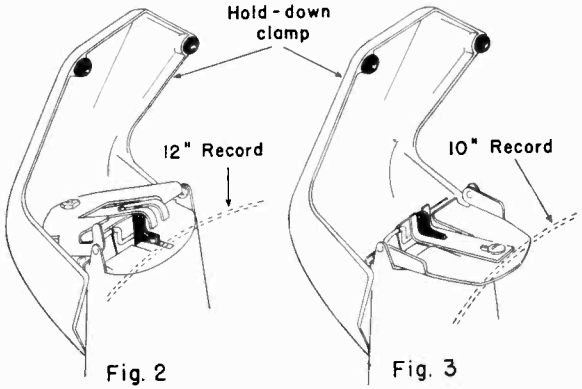


Fig. 2

Fig. 3

Fig. 5.

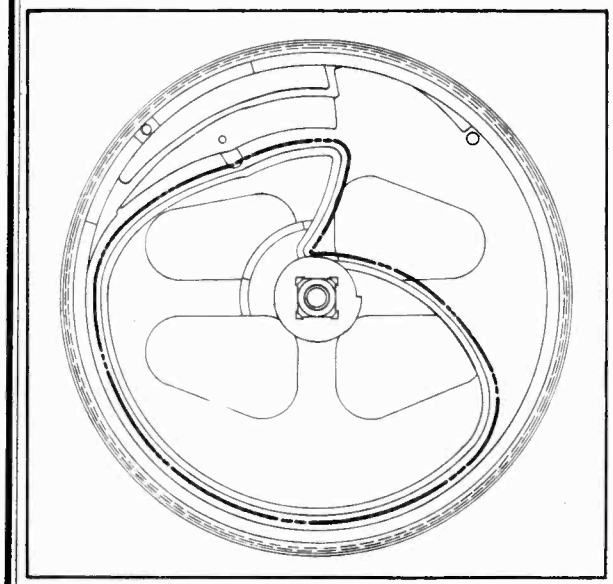


Fig. 4.

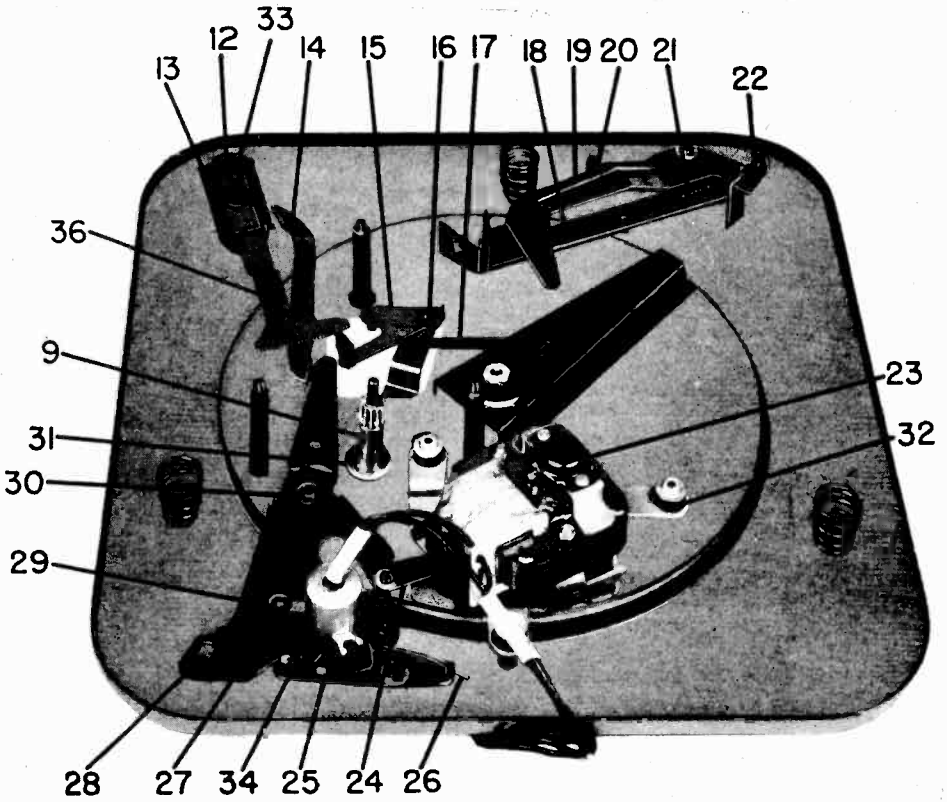


Fig. 6.

MODEL C-9

RUSSELL ELECTRIC CO.

SERVICE AND ADJUSTMENT NOTES

1. TONE ARM, ACTION NOT FREE	(a) Bent detent lever assembly (12). (b) Pin 36 must follow course of heavy dotted line in view of bottom of gear. (See fig. 4). (c) Tone arm lead too tight.
2. TONE ARM, FAILURE TO SET DOWN PROPERLY.	(a) After completing cycle adjust lift pin screw (37) for correct height of tone arm. Bottom of tone arm should be even with top of turntable. (b) Bent tone arm lift lever. (This lever holds screw 37).
3. TONE ARM DROPS TOO FAR IN OR MISSES RECORD.	(a) Minor adjustment—Thru hole in base plate near pickup arm post. Turn screw very slightly to right or left. (b) Major adjustment—Loosen lock screw 38 and slip tone arm bracket to compensate.
4. CLICKING NOISE.	(a) Missing ball retainer assembly (11).
5. FAILURE TO TRIP.	(a(Adjust screw on detent lever assembly (12). (b) Bent or loose positive tripping lever (14), or tripping lever assembly (15). (c) Defective or missing springs (16) or (17).
6. CYCLES TOO SOON OR CONTINUOUSLY.	(a) Weak spring (16).
7. RECORD JAMS BETWEEN SHELF AND SPINDLE.	(a) Bent spindle (4).
8. RECORD FAILS TO DROP FROM SHELF.	(a) Check spring 22.
9. STALLS WHEN REJECTING RECORD.	(a) Adjust idler wheel on changer drive assembly to make better contact with drum.
10. TURNTABLE SPEED SLOW OR IRREGULAR.	(a) Same as No. 9 above.
11. JERKY ACTION DURING CYCLE.	(a) Same as No. 9.

RUSSELL ELECTRIC CO. MODEL C-9

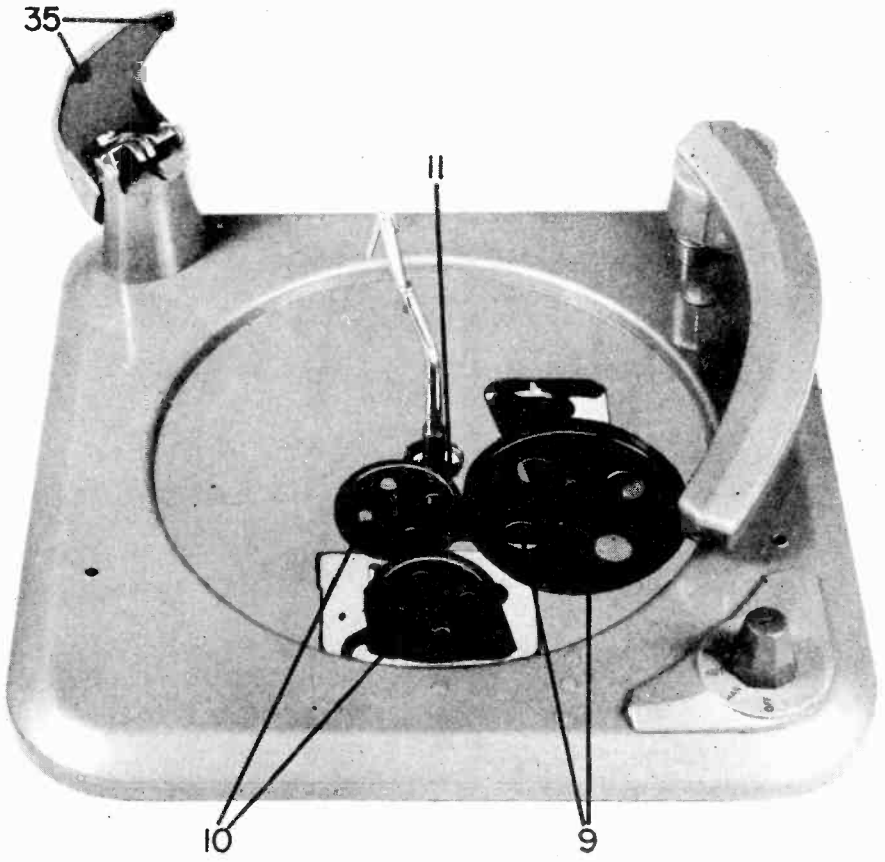


Fig. 7.

TABLE OF REPLACEABLE PARTS

Ref. No.	Part No.	Description
1	20505	Tone Arm Assembly
2	21259	Tone Arm Carrier Assembly
3	21372	Ball Retainer Assembly
4	21016	Center Post Assembly
5	16107	Plug Button
6	20571	Control Knob
7	21258D	Turntable Assembly
8	21252	Push Off Assembly
9	21010	Changer Drive Assembly
10	12757	Idler Wheel Assembly
11	21360	Ball Retainer Assembly
12	21257	Detent Lever Assembly
13	21256	Tone Arm Guide Assembly
14	12354	Positive Tripping Lever
15	21107	Tripping Lever Assembly
16	21287	Spring
17	21113	Spring
18	21254	Selector Bar Assembly
19	20508	Release Arm Assembly

Ref. No.	Part No.	Description
20	20126	Release Arm Spring
21	12761	Spring
22	20127	Spring, Push off Lever
23	21286	Motor
24	20572	Idler Pulley Holder
25	20509	Stop Lever Assembly
26	20570	Spring
27	21255	Tripping Arm Assembly
28	21003	Control Knob Arm Assembly
29	16064	"C" Washer
30	16026	"C" Washer
31	16027	"C" Washer
32	22068	Grommet
33	21260	Tone Arm Lift Post Assembly
34	21377	AC Switch
35	21075	Rubber Bumpers
—	21327	Spring (on top side of 18 selector bar assembly)
	21253	Cam Assembly

MODEL C-10

RUSSELL ELECTRIC CO.

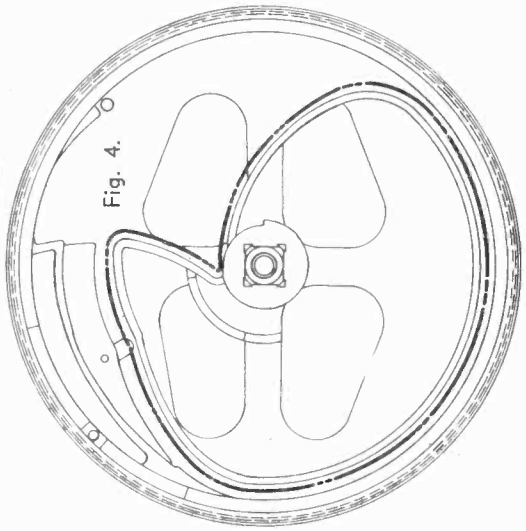


Fig. 4.

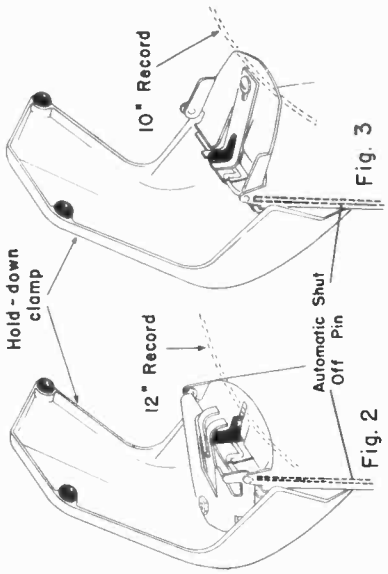


Fig. 3

Fig. 2

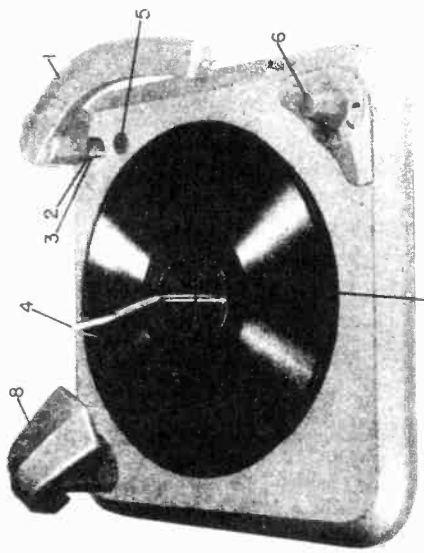


Fig. 1.

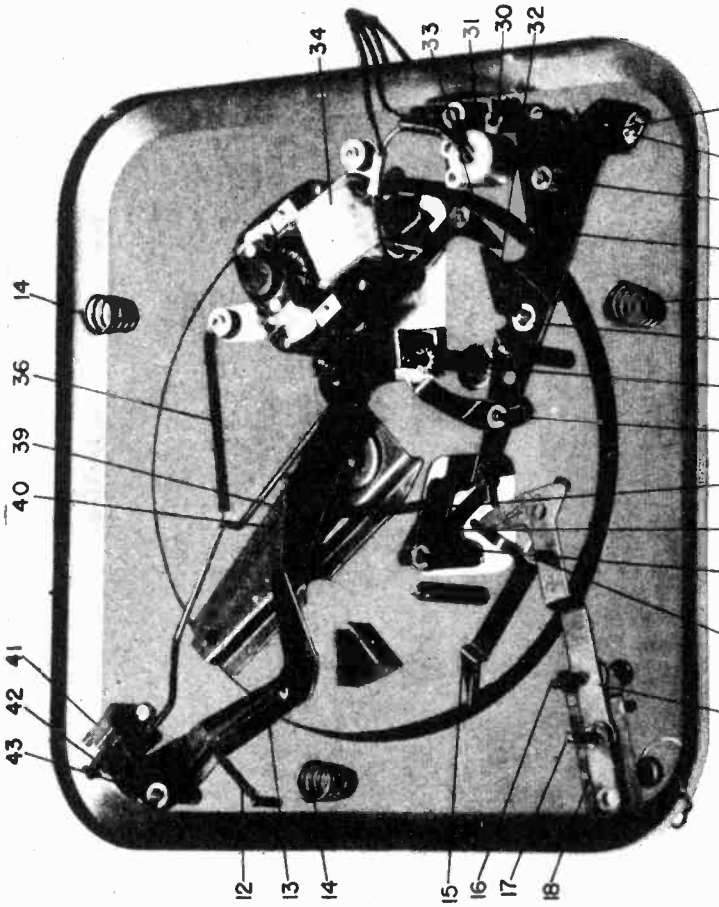


Fig. 6.

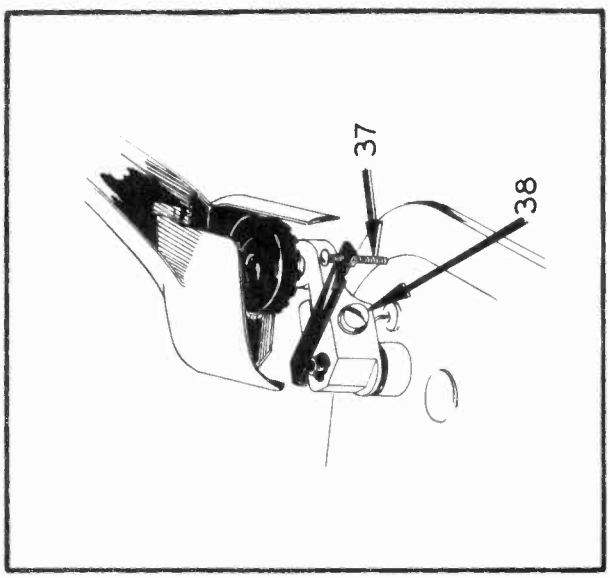


Fig. 5.

SERVICE AND ADJUSTMENT NOTES

1. TONE ARM, ACTION NOT FREE	(a) Bent detent lever assembly (18). (b) Pin 20 must follow course of heavy dotted line in view of bottom of gear. (See fig. 4). (c) Tone arm lead too tight.
2. TONE ARM, FAILURE TO SET DOWN PROPERLY.	(a) After completing cycle adjust lift pin screw (37) for correct height of tone arm. Bottom of tone arm should be even with top of turntable. (b) Bent tone arm lift lever. (This lever holds screw 37).
3. TONE ARM DROPS TOO FAR IN OR MISSES RECORD.	(a) Minor adjustment—Thru hole in base plate near pickup arm post. Turn screw very slightly to right or left. (b) Major adjustment—Loosen lock screw 38 and slip tone arm bracket to compensate.
4. CLICKING NOISE.	(a) Missing ball retainer assembly (11).
5. FAILURE TO TRIP.	(a) Adjust screw on detent lever assembly (18). (b) Bent or loose positive tripping lever (15), or tripping lever assembly (21). (c) Defective or missing springs (22) or (23).
6. CYCLES TOO SOON OR CONTINUOUSLY.	(a) Weak spring (22).
7. RECORD JAMS BETWEEN SHELF AND SPINDLE.	(a) Bent spindle (4).
8. RECORD FAILS TO DROP FROM SHELF.	(a) Check spring 42.
9. STALLS WHEN REJECTING RECORD.	(a) Adjust idler wheel on changer drive assembly to make better contact with drum.
10. TURNTABLE SPEED SLOW OR IRREGULAR.	(a) Same as No. 9 above.
11. JERKY ACTION DURING CYCLE.	(a) Same as No. 9.
12. NO AUTOMATIC SHUT-OFF.	Broken spring No. 36. Bent rod No. 39 sticking automatic shut-off pin or hinge (41).

Adjustment (13) if changer jams after last record is played, bend lever No. (33) about 10/1000 of an inch in direction of switch.

RUSSELL ELECTRIC CO.

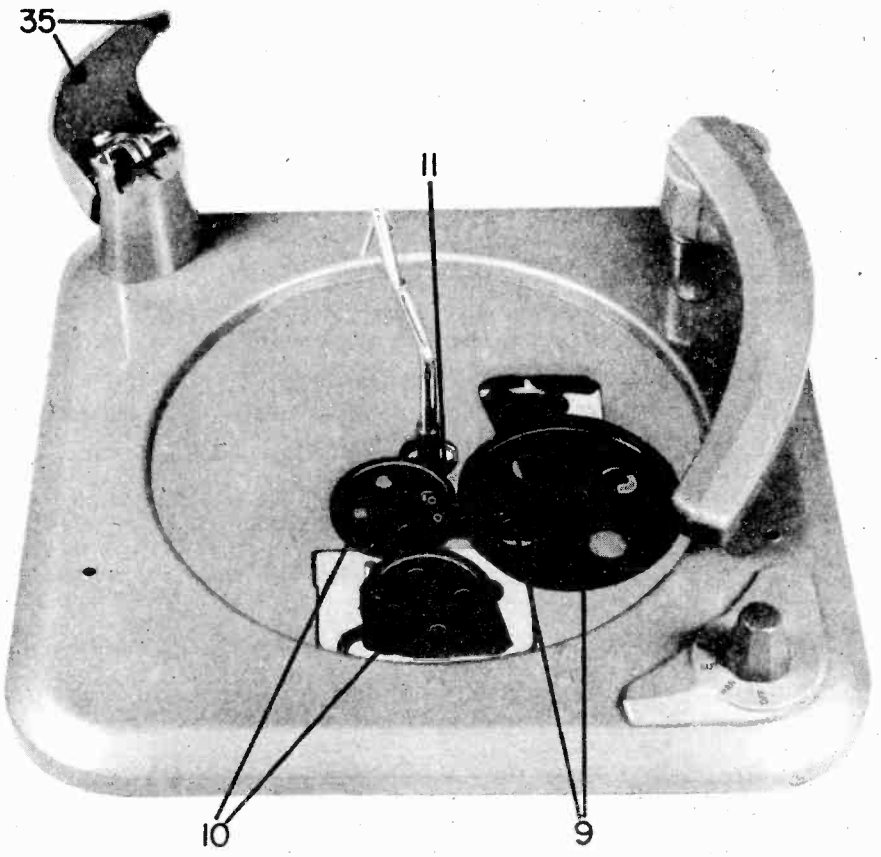


Fig. 7.

TABLE OF REPLACEABLE PARTS

Ref. No.	Part No.	Description
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11	21360	Ball Retainer Assembly
12	20126	Release Arm Spring
13	20508	Release Arm Assembly
14		Mounting Spring
15	12354	Positive Tripping Lever
17	21260	Tone Arm Lift Post Assembly
18	21257	Detent Lever Assembly
21	21107	Tripping Lever Assembly
22	21287	Spring
23	21113	Spring
24	21391	Connecting Lever
25	16026	"C" Washer
26	21396	Tripping Arm Assembly
27	16064	"C" Washer
28	21003	Control Knob Arm Assembly

Ref. No.	Part No.	Description
29	21377	AC Switch
31	20509	Stop Lever Assembly
33	20572	Idler Pulley Holder
34	21286	Motor
35	21075	Rubber Bumpers
36	21393	Spring
37		Height Adjustment Screw
38		Clamp Screw
39	21388	Connecting Rod
40	21395	Automatic Stop Lever Assembly
41	21386	Trunnion Support
41	21387	Hinge
41	21390	Pin
42	20127	Spring, Push off Lever
	21256	Tone Arm Guide Assembly
	21254	Selector Bar Assembly (under 13)
	12761	Spring
	20570	Spring
	16027	"C" Washer
	22068	Grommet
	21327	Spring (on top side of selector bar asembly)
	21253	Cam Assembly
	21394	Stop Rod

J. P. SEEBURG CORP.

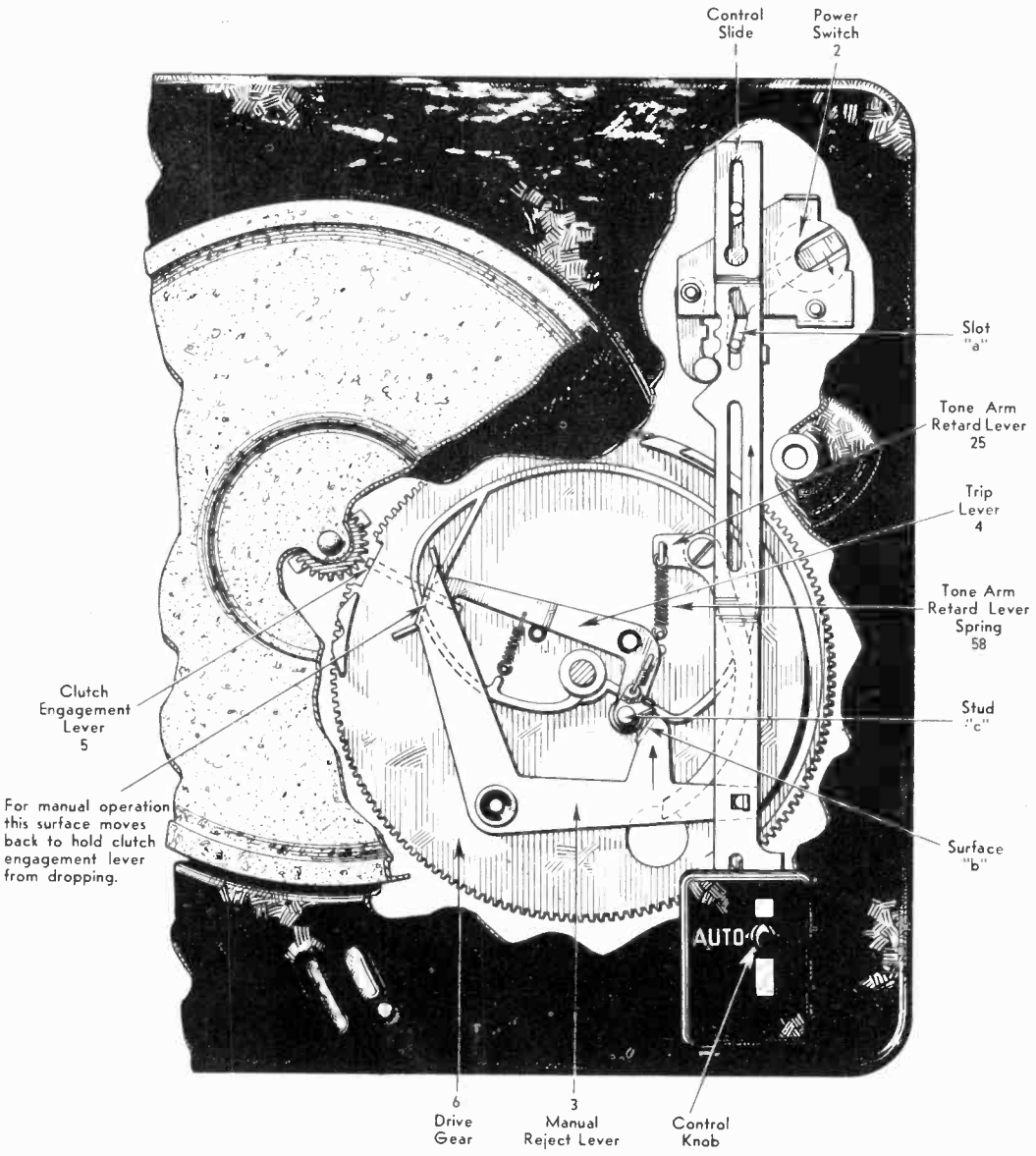


FIG. 2. CUTAWAY—BOTTOM VIEW

I CYCLE OF AUTOMATIC OPERATION—

After placing changer in operating position, with records on the selector arm posts, the control knob governs all subsequent automatic operations.

A. CONTROL SLIDE (1)—Moving the control slide from "OFF" to "REJECT" starts the changer into "AUTOMATIC" operation in three steps:

1. As the control slide moves from "OFF" past "AUTOMATIC", slot "a" in the control slide (1) turns on the power switch (2) starting the motor and turntable.

2. When the control knob reaches "REJECT", the changer is manually "tripped" as follows:

   The control slide pushes the manual reject lever (3) in the direction of the arrow. Surface "b" strikes trip lever stud "c". Trip lever (4) movement releases the clutch engagement lever (5), which drops by gravity. (Levers 4 & 5 are mounted on drive gear (6).)

3. When the control knob is released, it returns from "REJECT" to "AUTOMATIC".

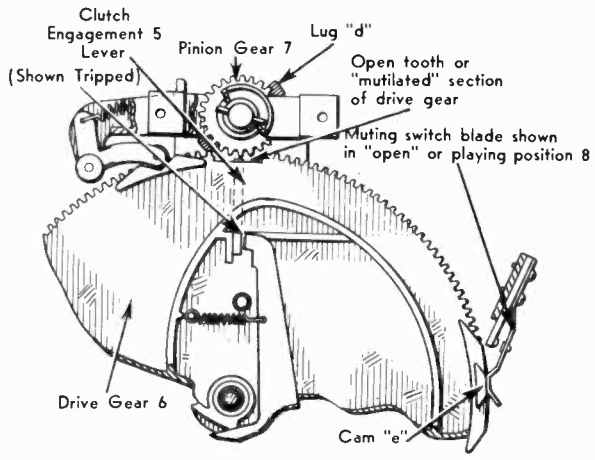


FIG. 3, CUTAWAY—TOP VIEW

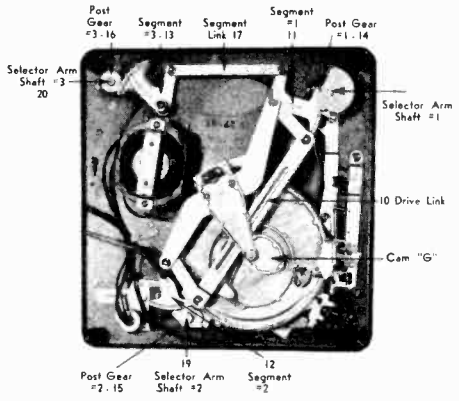


FIG. 5. BOTTOM VIEW

B. CLUTCH ENGAGEMENT—

Lug "d" on the rotating pinion gear (7) strikes extended portion of the clutch engagement lever (5), causing drive gear (6) to rotate and mesh with pinion gear (7). (Open tooth or "mutilated" section of drive gear permits pinion gear to rotate freely, EXCEPT during the change cycle.) As the drive gear rotates, the muting switch blade (8) leaves the cam "e" and shorts out the pickup lead during remainder of change cycle.

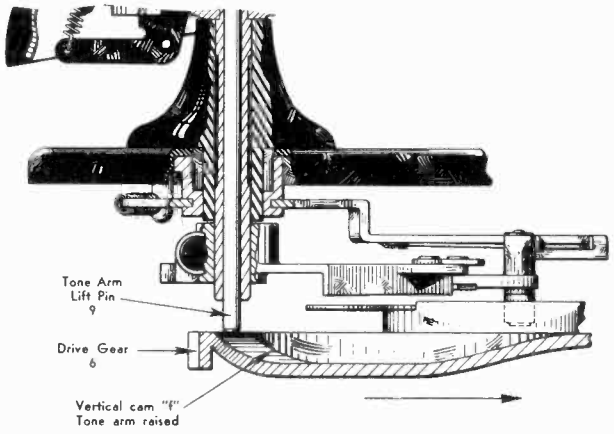


FIG. 4. CUTAWAY—SIDE VIEW

C. ROTATION OF DRIVE GEAR (6)—results in the following cam actions:

1. Vertical cam surface "f" moves the tone arm lift pin (9) and raises the tone arm.

2. Cam "g" (bottom surface of drive gear) actuates the drive link (10) that induces the quarter turn by which the selector arms release a record.

The motion is transmitted from the gear to the selector arms through the following parts: Drive link (10), Segments #1 (11), #2 (12), #3 (13), Segment link (17), Post gears #1 (14), #2 (15), #3 (16), and Selector arm shafts #1 (18), #2 (19), and #3 (20). All of the parts listed above operate as a unit. The three selector arms are always in synchronism whether operated through the drive link (10) or manually.

See page 21 (Fig. 30), for correct setting of these parts.

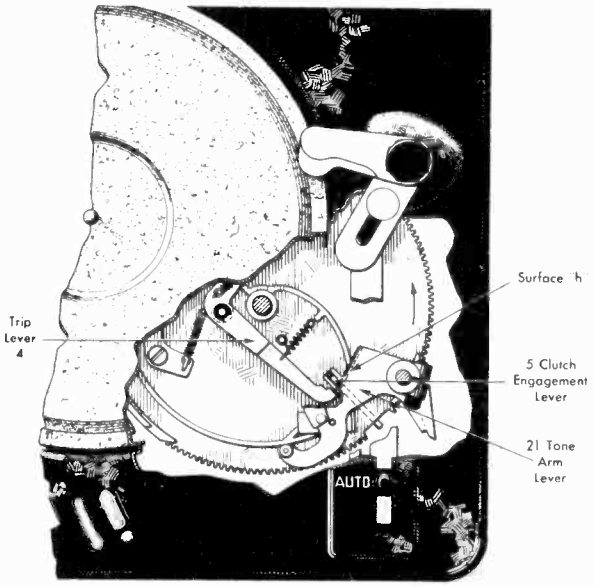


FIG. 6. CUTAWAY—TOP VIEW

3. Surface "h" on the locked tone arm lever (21) resets the trip by latching the clutch engagement lever (5) to the trip lever (4).

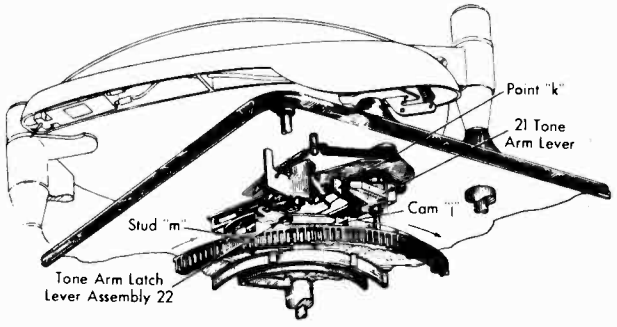


FIG. 7. CUTAWAY—BOTTOM VIEW

4. Cam surface "j" moves the tone arm latch lever assembly (22) so as to unlatch the tone arm lever (21) at point "k". Thereafter, the stud "m" on the tone arm lever follows the receding cam surface "n", which is part of the drive gear; this is shown in Figure 8.

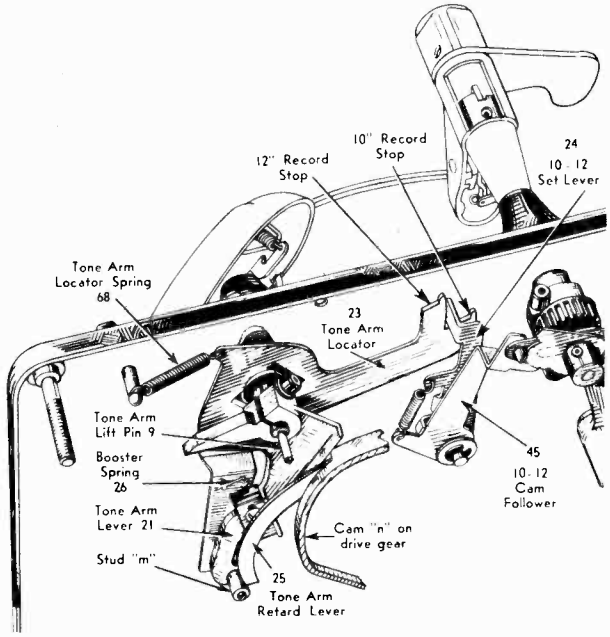


FIG. 8. CUTAWAY—BOTTOM VIEW

5. Spring pressure from tone arm locator (23) moves the tone arm lever (21) and the tone arm in toward the record.

The presence of a 10" or 12" record on the selector arms determines the point at which the tone arm locator (23) stops in contact with the 10-12 set lever (24). Fig. 8 shows 10" and 12" record stops. (See page 10 Fig. 12 for further description.)

6. The tone arm retard lever (25) contacts stud "m" and holds it in position during the time of lowering the needle on the record. (See page 18 on retard lever.)

7. Tone arm lift pin (9) follows vertical cam on drive gear and lowers tone arm to the record. After the needle has touched the record, the booster spring (26) exerts a slight pressure, causing the needle to enter the starting groove. (See page 19 on booster spring action.)

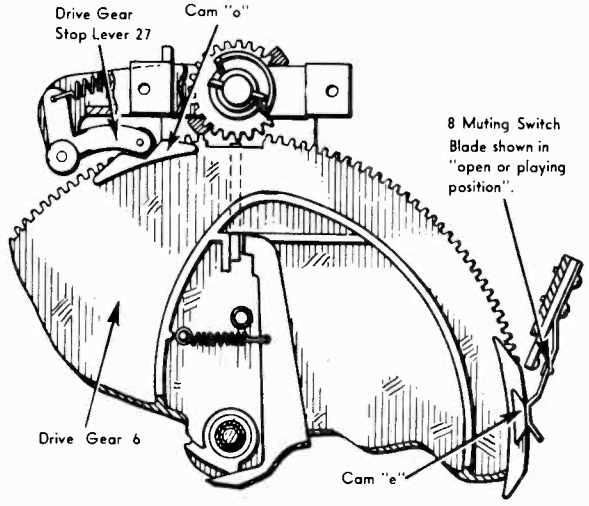


FIG. 9. CUTAWAY—TOP VIEW

8. As the needle starts in the groove, the drive gear (6) completes its rotation and is locked in open-tooth position by the drive gear stop lever (27) in detent in cam "o". Cam "e" engages the muting switch blade (8) and restores pickup lead circuit to normal position. (Both cam "e" and cam "o" are part of the drive gear.)

D. AUTOMATIC TRIPPING—at the end of a record, the needle enters the cutoff groove and a new change cycle is set in motion by either of two actions releasing the clutch engagement lever (5).

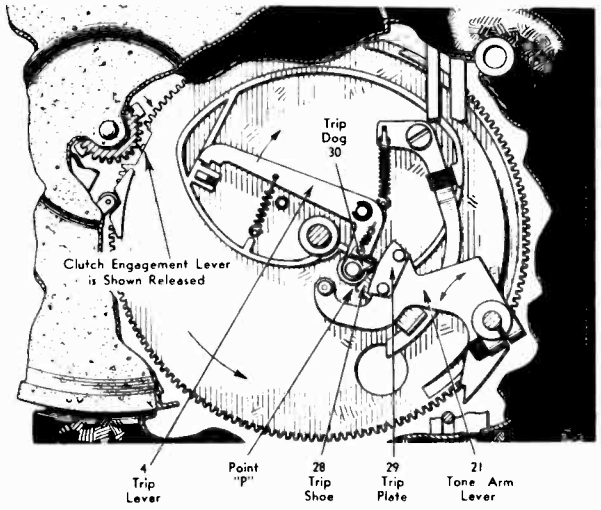


FIG. 10. CUTAWAY—TOP VIEW

1. MINIMUM DIAMETER CUTOFF· occurs when trip shoe (28) strikes trip lever (4) at point "p". This should take place at approximately 1-7/8" radius on the record.

2. ECCENTRIC GROOVE CUTOFF occurs when the tone arm is moved away from the spindle. The sawtooth edge of the trip plate (29) engages and moves the trip dog (30), causing the trip lever (4) to function. This trip operates at all positions of the tone arm, after it has played approximately half of the record.

The changer has now completed one cycle of automatic operation.

II INTERMIXING ACTION—

This changer is of a three-post, automatic intermixing type. Such performance requires three main actions, (A) separation of intermixed records, (B) automatic indexing of the tone arm in accordance with the diameter of the record to be played, and (C) the automatic shutoff is also actuated from the same parts:

Separation of 10" and 12" records, whatever the sequence, is achieved by the selector blades engaging the lowermost record of a stack. If the records are all of one diameter, either 10" or 12", the cam action of the selector blades results in its entering the stack and separating the lowermost record as in a conventional two-post type changer.

In case the stack is entirely 10" records, the post link shoes will contact the edge of each record in succession and will be pushed back.

In case the stack is entirely 12" records, the post link shoes will be depressed flush with the surface of the arm by the weight of the records. These two positions of the post link shoes—i.e., pushed back or depressed—determine the subsequent tone arm indexing and automatic shutoff operation as described below.

When 10" and 12" records are intermixed, there are two separate conditions under which the machine must function:

1. When a 12" record is below a 10"—the selector arms contact the edge of the 12" record, cam upwards to the thickness of the record and swing into the diameter of the 10" record, at which point the leading edges of the blades pass under the 10" record holding it and the remainder of the stack while the 12" record drops into a playing position.

2. If a 10" record is followed by a 12" record, some additional action is necessary to allow for the fact that the 10" record is nominally thinner—this is the most critical action of an intermixed changer, and it is accomplished by the post link shoe and the vertical action of the lifter plunger. Whenever the post link

shoe comes in contact with the edge of a 10" record, it is forced back as the selector arms rotate and the lifter plunger lifts the 12" record immediately above, together with the rest of the stack, to such a height that the selector blades enter into a clear space between the 10" and 12" records. Further rotation of the arms release the 10" records onto the turntable.

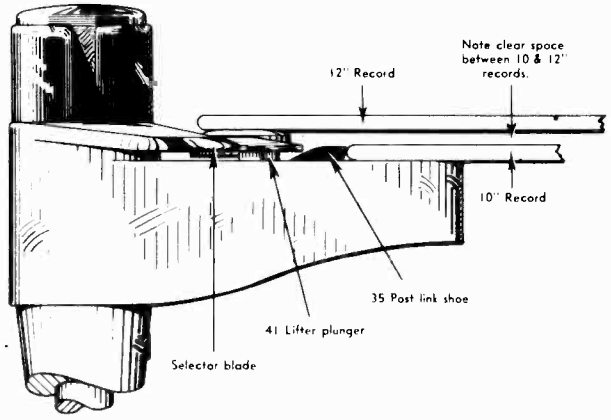


FIG. 11. CUTAWAY—SIDE VIEW

Figure 11 shows this action with the 12" record raised on the lifter plungers and a clear space available into which the selector blade can enter.

Figure 12 shows the cutaway view of the selector arm with the post link shoe and the lifter plunger in the normal unloaded position. These parts must operate freely and return to the normal position after the post link shoe has either been depressed (as in the case of the 12" record) or has been pushed back (as in the case of the 10" record). Any tendency to stick or bind in either position will cause incorrect operation of the changer.

B. SELECTOR ARM #2 controls the tone arm indexing for 10" or 12" records through the action of the post link shoe on post #2. If the post link shoe is pushed back by the edge of a 10" record, the tone arm will be indexed for a 10" record. If the post link shoe is depressed by a 12" record, the tone arm will be indexed for a 12" record.

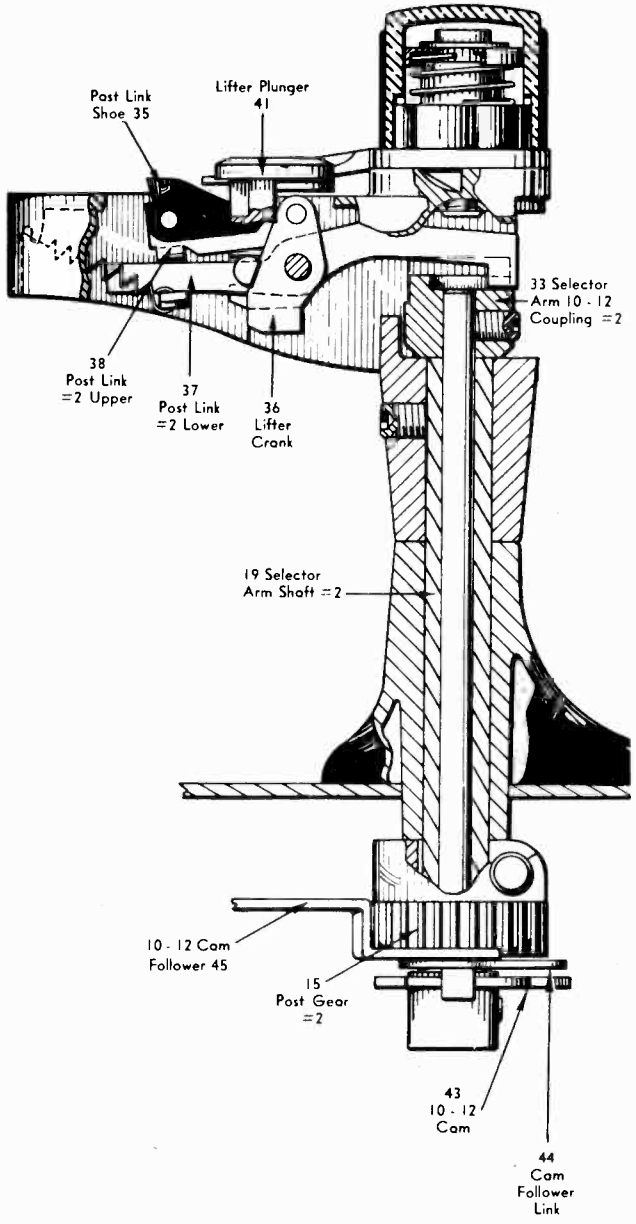


FIG. 12. CUTAWAY—SIDE VIEW

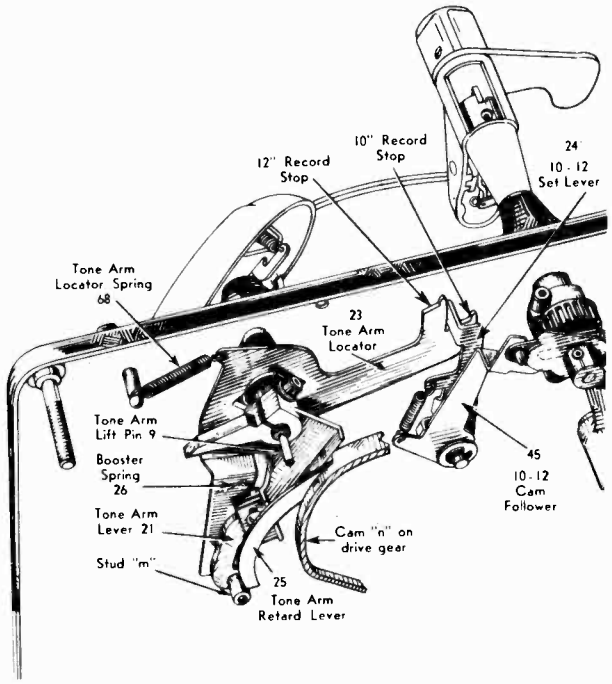


FIG. 12A. CUTAWAY—BOTTOM VIEW

The 10-12 set lever (24), the 10-12 cam follower (45), the 10-12 cam (43) and the 10-12 cam follower link (44) index the tone arm properly for a 10" or 12" record, depending on the lowest record on the selector arms. This is accomplished by the action of the selector arm 10-12 coupling #2 (33) when actuated by the post link shoe (35), the lifter crank (36), post link #2 lower (37), and post link #2 upper (38) in transmitting the motion of selector arm shaft #2.

The engagement of the 10-12 set lever, with the tone arm locator, determines the indexing of the tone arm. This engagement must be such that the hook on the tone arm locator prevents manual changing of the setting. All parts above must return freely. (See Fig. 8.)

It should be noted that when the post link shoe is depressed there is no mechanical connection with the selector arm coupling since post link #2 clears the selector arm coupling completely. Only when the post link shoe is in normal position or is pressed back is there mechanical connection with those components which control the tone arm indexing.

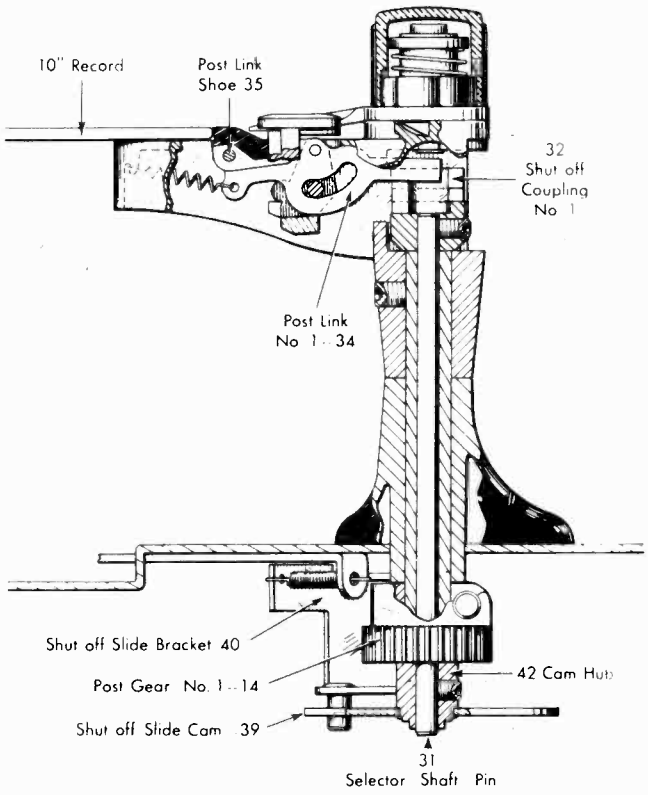


FIG. 13. CUTAWAY—SIDE VIEW

C. SELECTOR ARM #1 controls the automatic shutoff through the action of the post link shoe in post #1. There are three possible positions of this post link shoe: unloaded, pushed back (by a 10" record) or depressed (by a 12" record). Under the first condition, corresponding to an unloaded changer, the post link #1 will engage the selector arm coupling #1 and will set into motion the automatic shutoff cycle as described in Part III. In either of the other two positions —that is, either pushed back or depressed, the post link #1 entirely clears the shutoff coupling #1 (as shown in Fig. 13) and thus the automatic shutoff mechanism is not actuated.

D. SELECTOR ARM #3—provides a symetrical support and separating device in conjunction with arms #1 and #2. Unlike arms #1 and #2 there is no mechanical connection between the post link shoe or lifter plunger and the mechanism beneath the changer.

III A. AUTOMATIC SHUTOFF—

Is of the gravity triggered type. Upon completion of an automatic shutoff cycle the following functions have been performed: (a) Moved the tone arm into a positive locked position at the outside edge of panel, (b) moved the control knob to the "OFF" position, and (c) turned off the motor switch. After the last record has dropped from the selector arm posts, the following actions occur:

1. The dropping of the last record from the selector arms permits the post link shoe (35) to resume its normal rest position, so that on the next change cycle, the post link #1 (34) drops into the slot in the selector arm shutoff coupling #1 (32), in a position to move the shutoff slide bracket (40), through the action of the shutoff slide cam (39). This cam and hub are mounted on the selector shaft pin (31).

The last record having finished, the drive gear is set in motion by the automatic tripping action. (See page 8.)

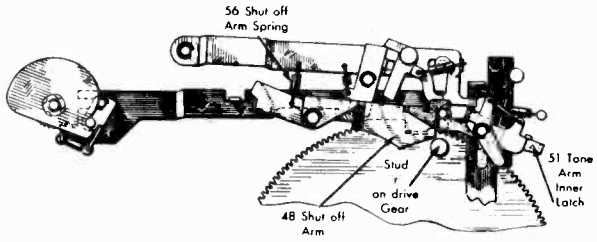


FIG. 14. CUTAWAY—BOTTOM VIEW

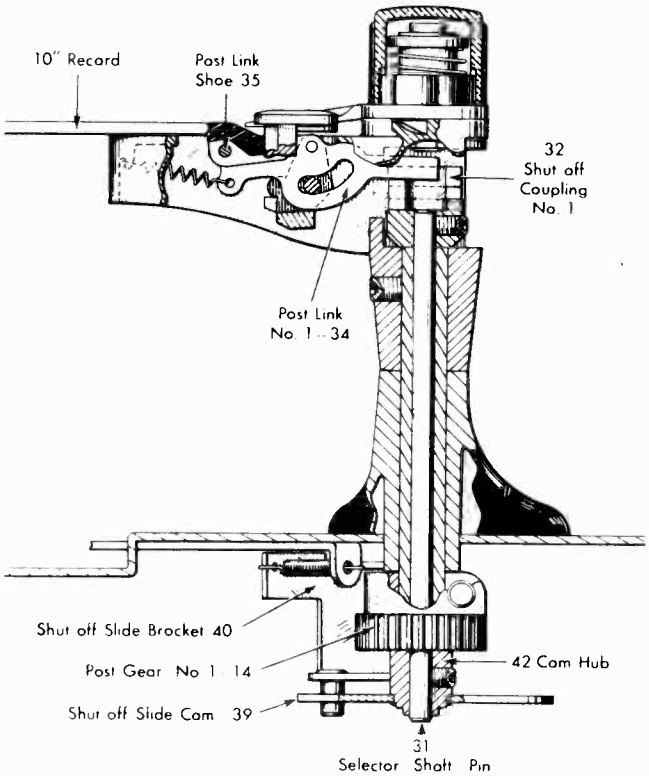


FIG. 13. CUTAWAY—SIDE VIEW

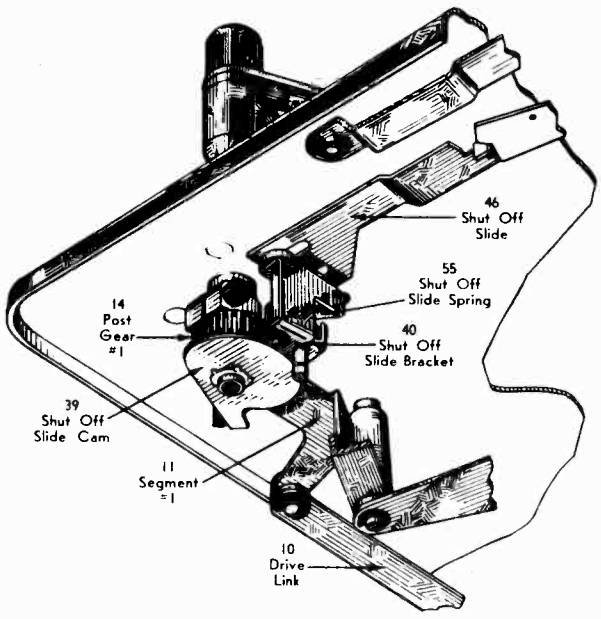


FIG. 15. CUTAWAY—BOTTOM VIEW

2. As the drive gear (6) rotates, the stud "r" leaves contact with the shutoff arm (48) which moves in toward the drive gear (6) by the action of the shutoff arm spring (56).

3. The drive link (10) and segment #1 (11) move the post gear #1 (14) rotating the shutoff slide cam (39) against the stud on the shutoff slide bracket (40). The shutoff slide (46) will be moved by the shutoff slide spring (55).

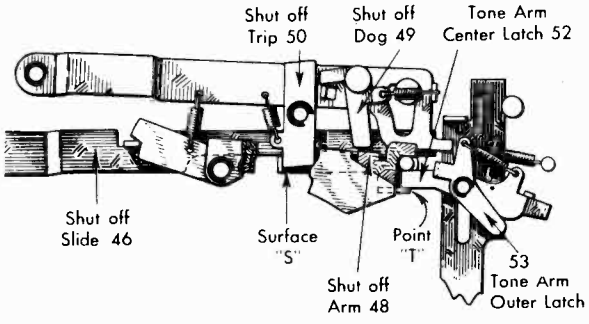


FIG. 16. CUTAWAY—BOTTOM VIEW

4. The shutoff slide (46) moves against the shutoff trip (50) at surface "s". The resulting rotation of the shutoff trip disengages it from the shutoff dog (49) and allows the latter to align itself with the shutoff arm (48). (See page 15 for detailed operation of shutoff trip and dog.)

During the preceding portion of the change cycle, the tone arm has been moved out to the rest position and momentarily locked by the tone arm inner latch (51). This preceding action is part of the normal change cycle. During an automatic shutoff cycle, the movement of the shutoff slide described above results in the end of that slide locking when the tone arm outer latch (53) is engaged by the cam on the outer edge of the drive gear. (See page 17 for detailed action of tone arm latches.) After the cam on the drive gear has passed the outer latch (53) the shutoff slide moves back to its normal position.

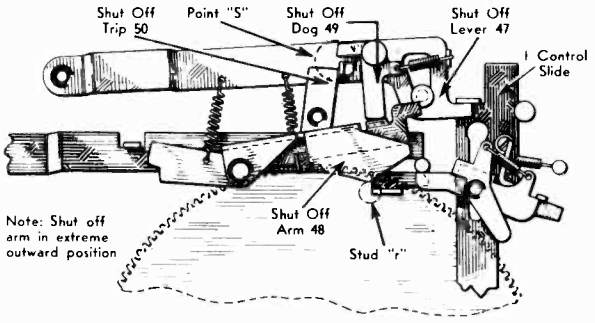


FIG. 17. CUTAWAY—BOTTOM VIEW

5. Just at the end of the drive gear cycle, the stud "r" engages the shutoff arm (48), moves the latter to its extreme outer position (this position shown in Fig. 17), and through the locked shutoff dog (49), moves the shutoff lever (47). This latter movement forces the control slide (1) into the "OFF" position and turns off the power switch (2). The completion of the drive gear cycle permits the shutoff arm (48) to resume its rest position. As the shutoff lever (47) moves to the rest position, the shutoff dog (49), pivoted thereon, is caught by the shutoff trip (50) and reset in its rest position. (See Fig. 14 for "rest" position of these parts. See page 15 for detailed operation of shutoff trip and dog.)

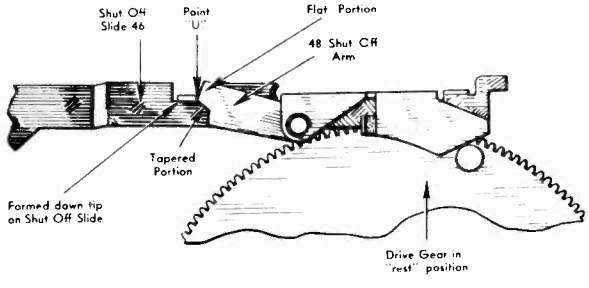


FIG. 18. DIAGRAMATIC

B. SHUTOFF GUARD ACTION is necessary to prevent tripping the automatic shutoff mechanism when the selector arms are manually rotated.

When the shutoff slide cam (39) is manually operated, through the selector arm knobs, while the drive gear is in the rest position and there are no records on the selector arms, an important action take place. The shutoff slide (46) moves forward until it is blocked by shutoff arm (48) at point "u". This blocking action prevents rotation of the shutoff trip (50) and subsequent tripping of the shutoff dog (49). The preceding motions prevent operation of the automatic shutoff mechanism. It should be noted that this guard action can occur only when the drive gear is in the rest position.

This guard action is cleared during an automatic shutoff cycle as soon as the shutoff arm moves in. Movement of the shutoff slide is then possible because the formed down tip on the shutoff slide can move until it strikes the tapered portion instead of being blocked at the flat portion at the rear of the shutoff arm.

C. CLEARANCE POINTS:

1. SHUTOFF CAM & POST #1

There are two conditions on post link #1 and the selector arm shutoff coupling #1 should be checked:

a. When there are records on the selector arms these two parts clear so there is no mechanical coupling.

b. When there are no records on the arms, the post link #1 should drop into the slot in the shutoff coupling so that there is positive engagement. (See Fig. 13, page 11.)

2. SHUTOFF SLIDE—(refer to Sec. II-A for action of the shutoff slide during normal automatic shutoff cycle, and to Sec. II-B for the guard action of the shutoff slide). There are two clearance positions that must be checked at point 1, Fig. 19.

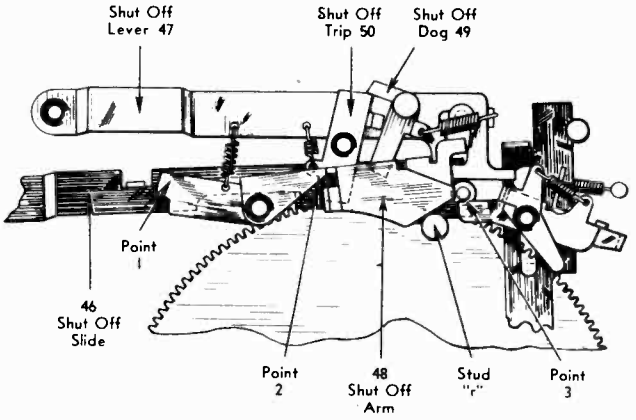


FIG. 19. CUTAWAY—BOTTOM VIEW

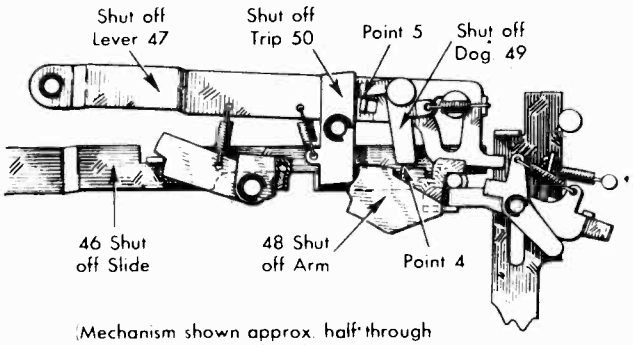
a. The first of these occurs when the shutoff arm is resting against the stud on the drive gear in the normal rest position. Under this condition the tail of the shutoff arm must clear the formed down portion of the slide so that it does not touch as the shutoff arm rotates, but this same clearance must be sufficiently small so that the slide cannot move forward far enough to take up the clearance at points 2 or 3 (the first of which would actuate the shutoff trip and the second of which would block the movement of the tone arm center latch).

b. The second condition under which this clearance point must be checked occurs when the stud on the drive gear has rotated just far enough into a change cycle so as to move out of contact with the shutoff arm and allow the arm to rotate into its extreme position against the stud on the panel. Under this condition there is additional clearance at point 1. This additional clearance must now be sufficient to:

(1) Allow the shutoff slide to actuate the shutoff trip at point 2. If the clearance at

point 1 is too small to allow sufficient motion of the slide, the shutoff trip may fail to operate (since it will not completely clear the shutoff dog and set up the mechanism for an automatic shutoff cycle). The shutoff slide must move far enough so that the shutoff trip completely clears the shutoff dog and the dog is free to rotate against the stop.

(2) Block the tone arm center latch at point 3 (See Fig. 16, point "t" for blocked condition). Excessive clearance at this point will allow the inner latch lever to be partially disengaged by the rotation of the drive gear. Insufficient clearance might cause a wedging action which would prevent smooth operation of the shutoff slide.



(Mechanism shown approx. half through an automatic shut off cycle.)

FIG. 20. CUTAWAY—BOTTOM VIEW

3. SHUTOFF TRIP AND SHUTOFF DOG: Point 4 is the point of contact between the shutoff arm and the shutoff dog. As described in the previous section, the shutoff slide actuates the shutoff trip clearing the shutoff dog and allowing it to rotate from the position shown in Figure 14 to the position in Figure 20. At point 4 and in the position shown in Figure 20, it is necessary that there be sufficient clearance between the formed up end of the shutoff arm and end of the shutoff dog at point 4 so that the dog can assume the position shown in Figure 20.

It should be understood that the shutoff trip is fastened to the changer panel and is spring loaded, while the shutoff dog is atached to the shutoff lever and is also spring loaded. As the automatic shutoff cycle progresses, the drive gear stud rotates until it strikes the shutoff arm with a cam action forcing it out toward the edge of the panel. This outward motion of the shutoff arm is transmitted to the shutoff lever because of the abutment shown in Figure 20 at point 4. (Remember that this alignment occurs only during an automatic shutoff cycle. At any other time, the shutoff dog does not engage the shutoff arm.) Further movement of the shutoff arm and the shutoff lever toward the outer edge of the panel will result in the shutoff dog completely clearing the shutoff trip. This position is shown in Figure 17. When this occurs the shutoff trip is free to rotate slightly so that when the shutoff arm, shutoff lever and the shutoff dog return, the shutoff dog will engage the trip at point 5, and will return to the position in Figure 14. Until such a time as movement of the control slide again operates the shutoff trip, the automatic shutoff mechanism will remain inoperative since the shutoff dog is not in a position to line up with the shutoff arm and engage it at point 4. The maximum outward motion of the shutoff arm and the shutoff lever must be sufficient so that the shutoff dog is carried far enough to completely clear the shutoff trip at point 5 in Figure 17.

Failure of the shutoff dog to return to the position shown in Figure 14 will result in repeated automatic shutoff cycles. This condition may result from insufficient clearance at either point 4 or point 5.

4. SHUTOFF LEVER—CONTROL SLIDE: Point 6 is the point of contact between the automatic shutoff mechanism and the control slide. It is through this contact that the control slide is moved to the "OFF" position

(which also turns off the motor switch). This operation occurs when the shutoff lever is moved toward the outside edge of the panel by stud "r" on drive gear as described in the preceding paragraph.

The tip of the shutoff lever in normal position must permit free movement of the control

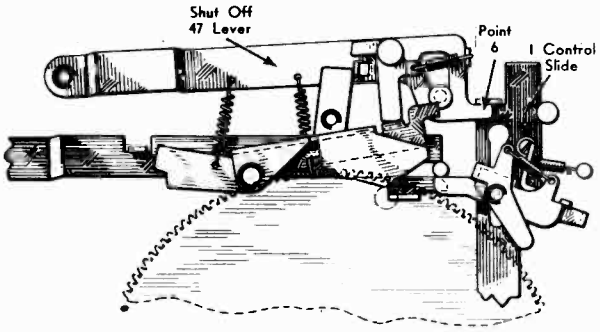


FIG. 21. CUTAWAY—BOTTOM VIEW

slide into the "REJECT" position. During shutoff cycle the shutoff lever must move the control slide into "OFF". Incorrect clearance will result in:

a. Moving the control slide too far into "MANUAL" or

b. Moving slide too little and leaving it in "AUTO", which will leave the motor switch turned on.

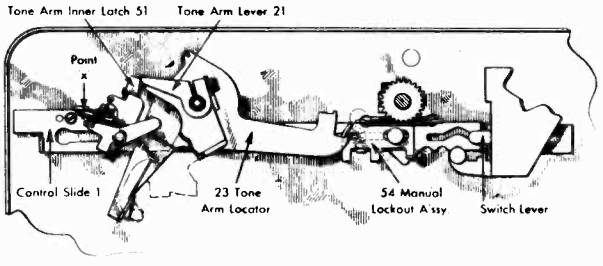


FIG. 22. CUTAWAY—BOTTOM VIEW

IV MANUAL OPERATION—

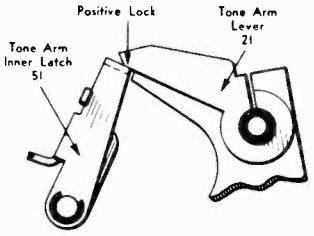
With the control knob in "MANUAL", the control slide (1) sets up four conditions:

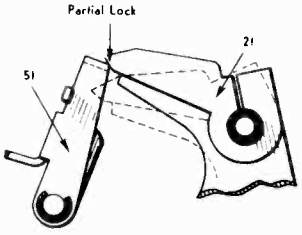
a. The motor switch is on.

b. The end of the control slide (1) at point "x" partially disengages the tone arm inner latch (51) from its locked position. This latch now serves as a detent for the tone arm while in the rest position, and prevents its movement due to accidental bumping.

c. The manual lockout assembly (54) on the control slide prevents the tone arm locator (23) from moving outward, thereby permitting free movement of the tone arm by hand. (See page 18 for detailed description of manual lockout operation.)

d. The manual reject lever (3) is pulled back so that the clutch engagement lever (5) is held up, and prevented from engaging the pinion gear. (See Fig. 2, page 6.)





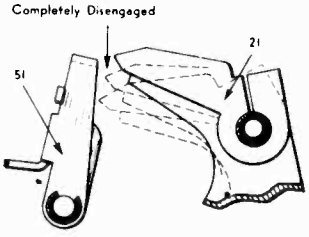


FIG. 23. DIAGRAMATIC

V DETAILED DESCRIPTION OF CERTAIN OPERATION AND PARTS—

A. TONE ARM LATCH LEVERS (also see Fig. 16, page 13)

1. Functions and Positions:

a. A positive lock for the tone arm when the latter is swung to the outside of the panel, in all positions of the control slide other than "MANUAL". This is brought about by the engagement between the tone arm lever (21) and the tone arm inner latch (51).

b. A partial lock, or detent, for the tone arm while the control slide is in "MANUAL". This results when the control slide is moved to "MANUAL" position. The back end of the control slide moves the tone arm inner latch (51).

c. Complete disengagement results through the cam "j" on the outside edge of the drive gear, acting on the tone arm outer latch (53) during the AUTOMATIC change cycle. Also, it is this unlatching action which puts the tone arm back into AUTOMATIC operation when the control slide is moved to the "REJECT" position.

2. ACTIONS

a. When the tone arm is playing a record in AUTOMATIC position and is moved to the rest position, the tone arm inner latch (51) must positively lock the tone arm lever (21).

b. When the control slide is moved to "MANUAL", the end of the slide must move the tone arm inner latch (51), and change its contact with the tone arm lever (21) from a positive lock to a partial lock, giving a light smooth detent action when the tone arm is in rest position.

c. When the changer goes through an automatic shutoff cycle, the tone arm must remain latched in the outermost position. Normally, the tone arm would attempt to follow the cam surface of the drive gear after being unlatched, as described under "cycle of automatic operation". During the automatic shutoff cycle, it is therefore necessary to prevent this automatic disengagement by allowing the outer tone arm latch lever to move with the cam surface of the drive gear but disengaging it from the inner latch lever (and hence maintaining the positive lock on the tone arm lever).

The disengagement between the outer and inner latch levers is accomplished by holding the center latch lever in position by blocking its movement with the shutoff slide. This blocking action allows:

(1) The outer latch lever to move independently, its movement being absorbed by a spring.

(2) Inner latch lever to operate as a "positive" tone arm latch.

(3) The center tone arm latch lever to serve as a limit device for the other two latch levers and as a connecting linkage between the two.

CAUTION: The blocking action between the shutoff slide and the center latch lever during an automatic shutoff cycle must be such that the center latch lever cannot rotate enough to disengage the positive tone arm latch.

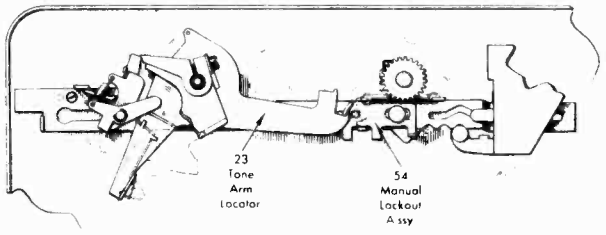


FIG. 24. CUTAWAY—BOTTOM VIEW

B. MANUAL LOCKOUT ASSEMBLY (54) engages and retains the tone arm locator (23) in its outermost position while the control slide is set in the MANUAL position. There are three actions involved:

1. When the tone arm is in the rest position, and the control slide is moved into MANUAL, the outer manual lockout can remain engaged to hold the tone arm locator from moving outward.

2. The outer manual lockout and the tone arm locator (23) must remain engaged while the control slide is moved into any other position, until automatically released by the drive gear cam.

3. With the control slide in "MANUAL" position the manual lockout will slide back and allow the lockout engagement described in 1 above if the tone arm is being moved into the rest position.

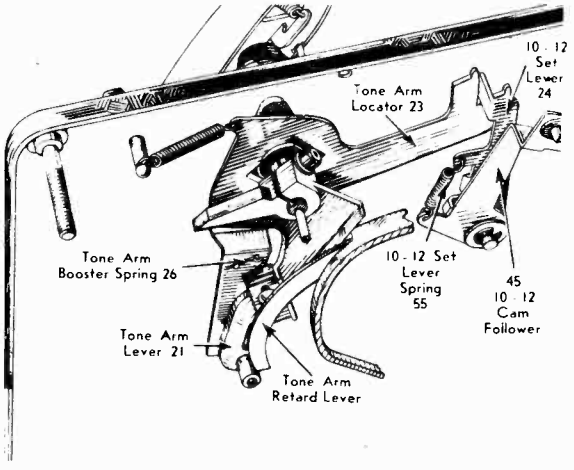


FIG. 25. CUTAWAY—BOTTOM VIEW

C. TONE ARM RETARD LEVER (25) has two functions:

1. To maintain a light pressure outwards during that part of the cycle after the tone arm lever (21) leaves the cam surface on the drive gear. The purpose is to prevent overswinging of the tone arm and, hold it at the radius previously determined by the tone arm locator (23) immediately prior to and during the time of lowering the needle on to the record.

2. To prevent action of the tone arm booster spring (26) until such a time that the needle has actually landed on the margin of the record. (See Fig. 2 for details of lever and spring.)

EXCESSIVE TENSION—on the tone arm retard lever spring (Fig. 2, item 58) would tend to cause a jerky motion of the tone arm during the part of the cycle described in "1" above. Extreme tension might even cause incorrect indexing by not allowing the tone arm to go into the proper diameter as determined by the tone arm locator (23).

INSUFFICIENT TENSION on the retard lever spring would result in a premature booster spring action so that the needle would land inside the margin of the record. Extremely weak pressure, or no pressure at all, would result in an overswing of the tone arm causing the needle to land some place in the middle of the record.

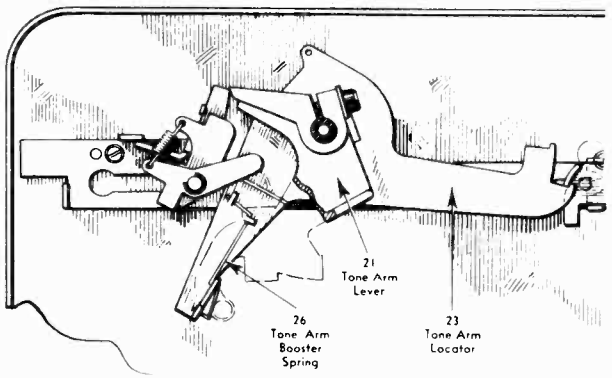


FIG. 26. CUTAWAY—BOTTOM VIEW

D. TONE ARM BOOSTER SPRING (26)—Its purpose is to move the needle into the first playing groove on records which do not have a lead-in groove. Booster spring pressure is correctly adjusted when it causes the needle to move from the index point to the starting groove and no further. Excess pressure may cause the needle to scrape across the first few grooves. See preceding section for tie-in with retard lever action.

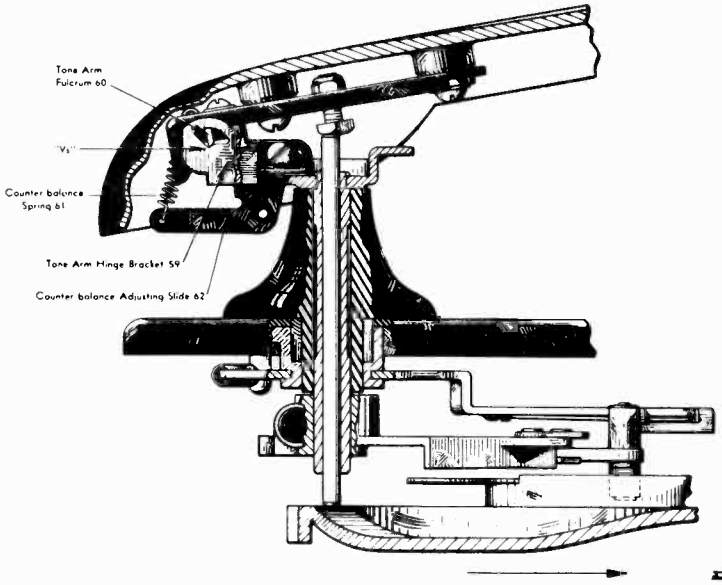


FIG. 27. CUTAWAY—SIDE VIEW

E. TONE ARM KNIFE EDGE HINGE:

In order to reduce vertical friction of the tone arm to a minimum, as required for best operation with light pressure pickups, the tone arm hinge bracket (59) is of the knife edge type. A hardened steel fulcrum (60) seats, under counterbalance spring (61) pressure, into "v's" in the lower bracket.

1. The fulcrum knife edge must not be broken or damaged.

2. There must be a slight amount of sidewise play between the bracket and the lower part of the fulcrum shoulder, and also between the brackets themselves.

NOTE: Side clearance of the fulcrum shoulder in its bracket will give correct performance during playing, since the knife edge is held solidly seated in the bracket by a spring. Also, the movement of the fulcrum in the bracket, when the arm is handled manually, has no significance since the knife edge reseats itself due to the spring action when released.

3. Incorrect side play or clearance:

a. Insufficient sidewise play will result in rubbing or vertical friction.

b. Excessive clearance will result in erratic tone arm landing and cutoff operation, since the whole arm may shift slightly during the change cycle.

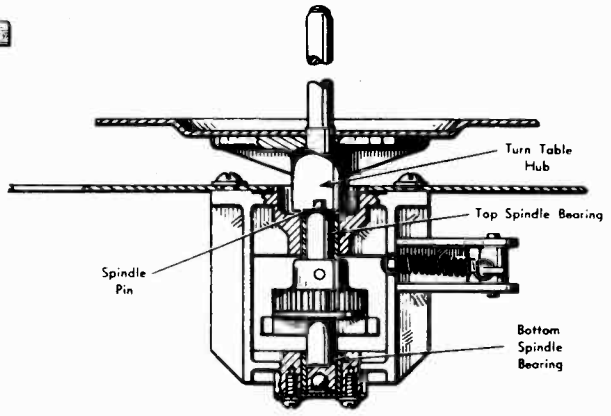


FIG. 28. CUTAWAY—SIDE VIEW

F. HOW TO REMOVE TURNTABLE

It should be removed, by lifting carefully, tapping spindle lightly if necessary. This will expose top spindle bearing. When replacing turntable, the slot in the hub must seat properly over the spindle pin. (Rotate 180° for best fit.)

CAUTION: Push idler wheel in while lowering, so rubber rim will not be damaged by turntable edge.

VI MECHANICAL ADJUSTMENTS—

A. MOTOR FAILURE, possible causes:

1. Power supply off, worn or broken wire, or defective plug.
2. Faulty switch.
3. Linkage between switch and control slide. CAUTION: The control slide must operate an over-center action of the switch when it is moved slowly in either of the positions adjacent to "OFF".
4. Burned out, or open motor coils.

B. MECHANICAL BINDS

1. During change cycle:

   a. Rotate turntable by hand, clockwise.

   b. If it seems to bind at one point only, examine the drive and pinion gears for foreign matter between the teeth.

   c. Examine the turntable spindle and selector arm bearings for lack of lubrication.

2. During playing cycle, idler wheel slide should move freely and its spring tension must be positive so that idler wheel maintains constant contact with turntable rim and motor pulley. (See Fig. 34, page 25.)

   CAUTION: Excessive tension on this spring will cause rapid wear of idler wheel and "rumble" when playing.

C. MECHANICAL JAMS

Shut off power and proceed as follows:

1. Rotate the turntable counter-clockwise slightly. This should free it.
2. Examine the mechanism for loose or bent parts, or foreign matter.
3. A bent clutch engagement lever (5) would cause a failure in the meshing of drive and pinion gear teeth at the start of a change cycle.
4. As further aid, it is recommended that the text and sketches, starting with page 7 , be studied.

D. RECORD JAMS are caused by:

1. Selector arms improperly set.
2. Odd-sized, badly warped or damaged records. Play these in "MANUAL" position.
3. Selector blades damaged or improperly adjusted. See V-G.

E. RECORDS DROP ONE SIDE ONLY if it has an unusually large center hole or a broken edge. Also examine the mechanism for a bent spindle or selector arm post, due to rough handling.

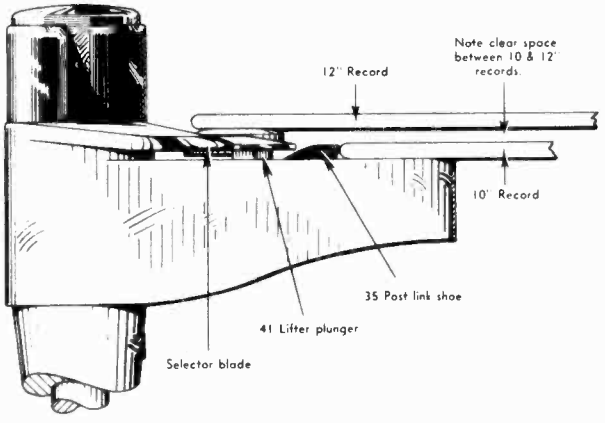


FIG. 29. CUTAWAY—SIDE VIEW

J. P. SEEBURG CORP.

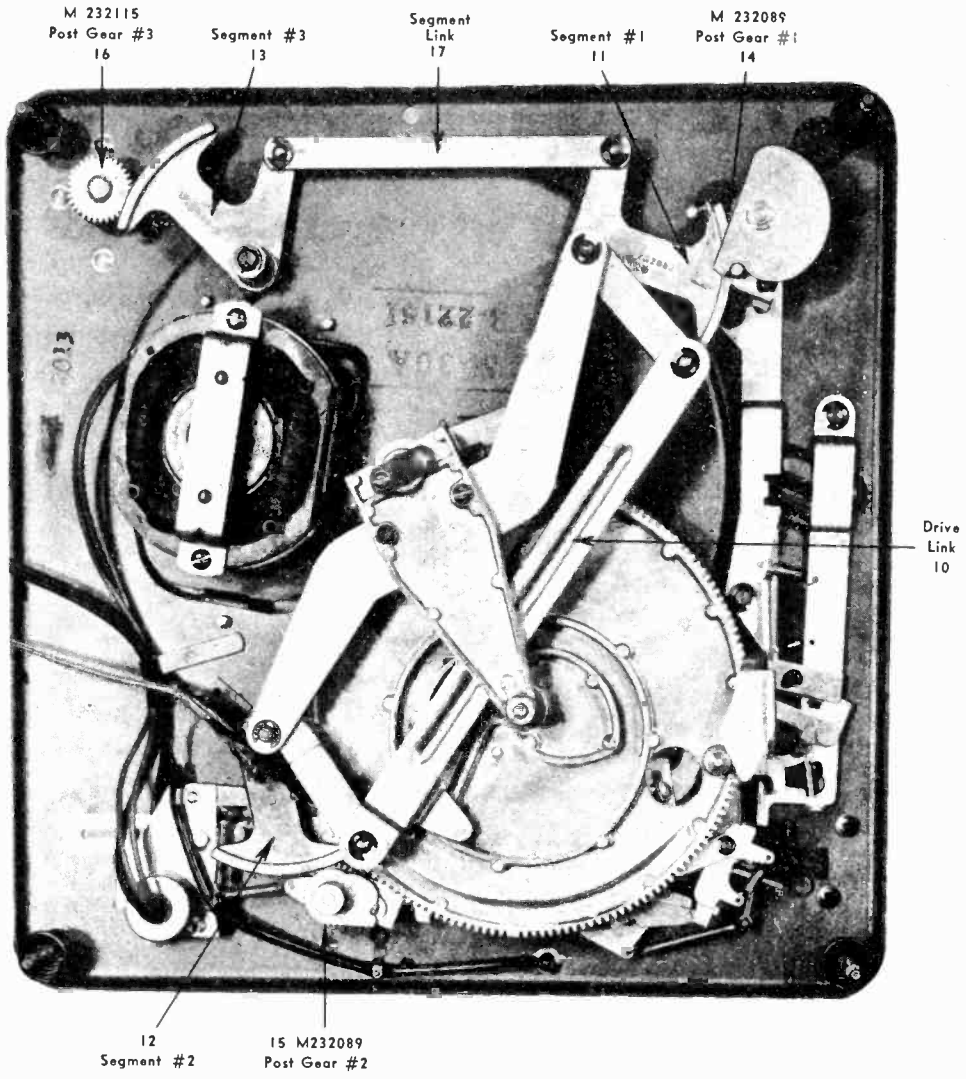


FIG. 30. BOTTOM VIEW

F. SELECTOR ARMS must be synchronized so that the record will drop evenly on the turntable. The arms are given a slight tilt downward (about .020"), in order to accommodate warped records.

Setting of Selector Arms, Gears, and Segments:

1. Set the drive gear in neutral position. Place a 10" record on the selector arms, with all arms turned to approximately a normal playing position, and with the edge of the record approximately 3/16" from the ends of the post link shoes.

2. With the mechanism set, as described above, the stud on the drive link must be in the extreme outer position on the drive gear cam. Post gears #1 and #2 must be meshed so that there are 4 teeth disengaged between the matching segment and the split in the post gear. The relationship of the three segments is fixed by the dimensions of the segment link and the drive link.

Should it be necessary to remove the segments from mesh with the post gears, it is suggested that the gear and segment be marked across the gear teeth before removal. This will definitely locate the gear mesh upon re-assembly.

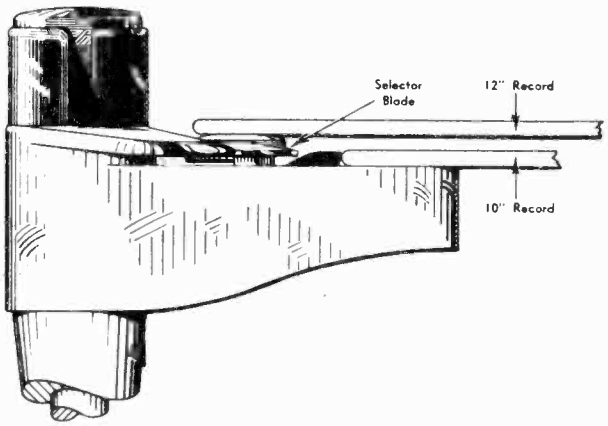


FIG. 31. CUTAWAY—SIDE VIEW

G. SELECTOR BLADES:

1. If an adjustment is necessary, place a 10" record of slightly less than average thickness (.070" on the selector arms, and manually rotate the arms, counter-clockwise. The blade must just clear the top of a record of the above thickness. The blade may be adjusted by bending, very slightly, to the correct position. (Use pliers with tape lined jaws.)

2. With a 12" record on the selector arms the blade will rise after it first contacts the edge of the record. This rising cam action results whenever pressure is applied to the leading edge of the selector blade. Unless the height of the blade is properly set (as described above) the blade will attempt to change two records at a time, due to the cam action which *always* operates in an *up* direction.

3. The blade must be free in its mounting so that it will return to normal position.

4. The leading edge of *each* blade must be smooth and well polished. This edge must not be sharp or rough. DO NOT USE FILE, SANDPAPER OR EMERY—the blades should be buffed if anything is required.

H. INCORRECT TONE ARM INDEXING:

1. Study the text and Fig. 25 on page 18. Examine the 10-12" set lever spring (55) for being loose, of improper tension or missing.

2. Incorrect spring tension of locator spring (68).

   a. Insufficient spring tension will produce erratic or incorrect tone arm landing since it will not seat in the fixed 10-12" indexing position. It will also result in a jerky action of the tone arm, since the tone arm lever will not accurately follow the cam surface of the drive gear.

   b. Excessive spring tension will result in a stiff, heavily loaded "feel" as the tone arm is moved into the rest position. It may also produce a stiff action of the control slide (when the manual lockout is engaged) and cause increased wear on moving parts.

3. Tone arm retard lever (25) binds. Examine its pivot point for foreign matter between gear casting and shoulder screw. Also examine retard lever spring (58) for proper action. (See Fig. 2, page 6.)

4. Excessive clearance at tone arm hinge bracket. (See page 19.)

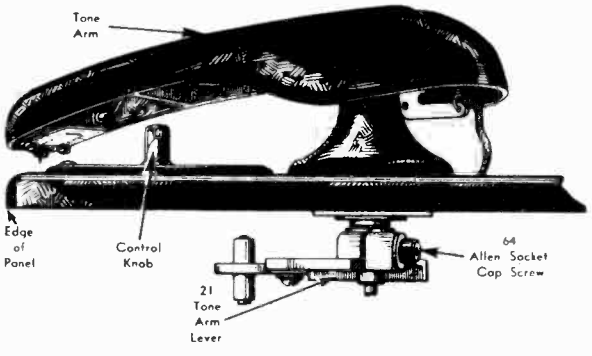


FIG. 32. CUTAWAY—SIDE VIEW

I. TONE ARM POSITIONING is as follows:

NOTE: Before attempting the following procedure in order to correct tone arm landing,

be sure to check the preceding section, since any one of those reasons may be the actual cause of incorrect landing.

1. Set the control knob in the "OFF" position (power plug out).

2. Place a 10" record on the turntable, and one on the selector arms, with the arms moved to an extreme clockwise position.

3. Loosen the Allen socket cap screw (64) just enough to allow the tone arm lever to still hold its position.

4. Line up the tone arm's outer edge evenly with the panel edge. This gives the tone arm an approximate setting.

5. Push the control knob to "REJECT" and release it. Rotate the turntable clockwise and observe where the needle first touches the record. This should be about 1/8" from the edge. Variations should be corrected by slipping the tone arm lever (21) in correct direction.

   CAUTION: Before tightening the Allen screw, make certain that there is enough vertical clearance in the tone arm shaft to avoid binding while the tone arm swings.

6. Replace the 10" with a 12" record on the turntable. Set selector arms in extreme clockwise position, place a 12" record on the arms, and check for positioning. If the 10" adjustment was properly made, the 12" indexing should be correct.

J. TONE ARM HEIGHT adjustment:

1. The height to which the tone arm rises is correct when there is an approximate 3/8" clearance between it and the bottom of a 10" record on the selector arms. This clearance is regulated by the tone arm adjusting screw (69).

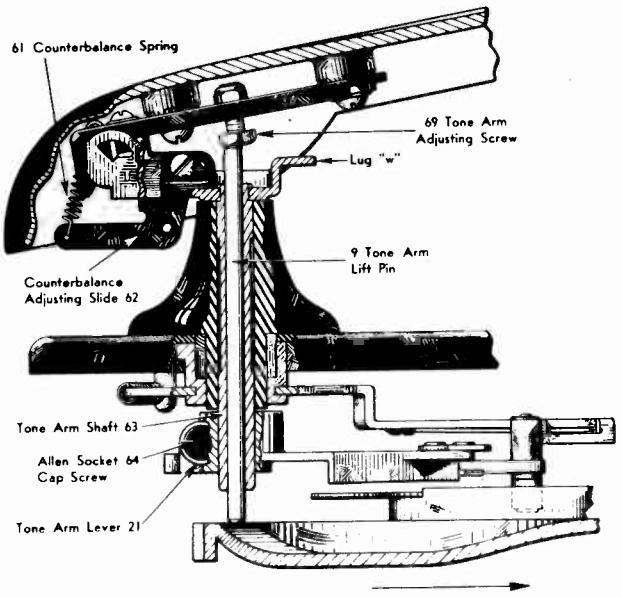


FIG. 33. CUTAWAY—SIDE VIEW

2. The down position of the tone arm is fixed by lug "w" on the tone arm hinge assembly. The correct height is that which will allow the bottom edge of the tone arm and cartridge to clear the turntable surface by approximately 1/16". This adjustment may be corrected by a slight bending of lug "w".

K. NEEDLE FORCE is controlled by the counterbalance spring (61) in back of the tone arm. The pressure is variable through the counterbalance adjusting slide (62). The needle force should not be less than 1 oz.

L. FAILURE TO TRIP may be caused by the following:

1. Old style records without proper cutoff grooves. These should be played in "MANUAL" position.

2. Broken, worn or improper needle which does not follow cutoff groove.

3. Closed-circle trip is incorrectly set. The trip shoe (28) is moveable and loosening its holding screw allows it to be adjusted as required. This adjustment is correct when the needle is 1-7/8" from the record center and the trip shoe pushes the trip lever which releases the clutch engagement lever.

4. Tight tone arm lead wire. The shielded wire emerging from the back of the arm should be draped so as to permit free movement of the tone arm. Never pull it tight or tie it down.

5. The clutch engagement lever (5) not unlatching. This lever has a loose fit at its pivot point and operates by gravity. It is intended to operate dry and must never be lubricated. Keep free from dust and lint. Rotate drive gear 180° from rest position for detailed examination of lever. (See Fig. 6, page 7.)

6. Trip lever (4) binding at its pivot point and failing to unlatch clutch engagement lever. Examine for foreign matter between gear casting, lever and shoulder screw. (See Fig. 2, page 6.)

7. Tone arm binds when moved toward spindle as a result of insufficient vertical clearance for tone arm shaft (63). This is caused by tone arm lever (21) being too close to underside of panel; loosen Allen socket cap screw (64), reset and retighten. (See Fig. 33.)

8. Trip failure with eccentric cutoff grove records. This can best be analyzed by studying the text and Fig 10 on page 9.

M. REPEATED TRIPPING IS caused by:

1. FAILURE OF CLUTCH ENGAGEMENT LEVER (5) TO LATCH. With the mechanism stopped in the playing position (pinion is open tooth portion of drive gear), latch the clutch engagement lever with the aid of a pencil and unlatch by moving the control knob to "REJECT". Repeat this several times. If it fails to latch:

a. Examine the trip lever (4) for binds or insufficient tension in the trip lever spring (65). Replacement of a weak spring will give a positive latch-up. Do not increase tension to a point where it will cause a trip failure. (See Fig. 2, page 6.)

b. Control knob binding in "REJECT" position due to sticking control slide (1) or its associated levers and springs. Examine for loose or missing springs.

c. Manual reject slide incorrectly positioned so that it fails to clear the trip lever while in "AUTOMATIC" operation.

2. FAILURE OF STOP LEVER to properly detent drive gear. (See Fig. 9, page 8.) Examine for proper spring tension.

N. TURNTABLE SPEED should be checked with a stroboscopic disc under running conditions and with the needle on a record. Slow speed may be produced by lack of lubrication in the spindle bearings or slipping of idler wheel (66). In the latter case, examine for a weak idler wheel spring (67) or for oil on the rubber rim which must be clean and dry.

VII REPRODUCTION FAULTS—

A. NO RESPONSE due to:

1. Pickup cartridge dead.

2. Short in shielded lead circuits.

3. Failure of amplifier system.

B. POOR TONE QUALITY.

1. Broken or worn needle. Replace with a new, approved needle.

2. Defective pickup cartridge, (try a new cartridge).

3. Improper needle force—Adjust to that recommended by the pickup manufacturer and in no case less than 1 oz.

4. Vertical friction—Examine tone arm hinge for binds while moving arm up and down. (See Fig. 22.) The shielded wire emerging from back of the tone arm should be draped so as to allow free movement of the arm.

C. NEEDLE JUMPS GROOVES due to:

1. Worn, broken or improper needle. Replace with new, approved needle.

2. Booster spring too strong. Relax booster spring (26) pressure slightly, by bending outward (Fig. 26, page 18).

3. Vertical friction. Examine tone arm hinge for binds while moving arm up and down. (See Fig. 27.) The shielded wire emerging from back of the tone arm should be draped so as to allow free movement of arm.

4. Lateral friction. Examine tone arm shaft (63) for insufficient vertical clearance and reset as required. (See par. L-7, page 24.) The shielded wire emerging from back of tone arm should be draped so as to allow free movement of the arm.

D. FEEDBACK or microphonism are produced if the changer is not floating freely on its four mountings, or output volume is too high. (Hold down devices should have been loosened or removed as required.)

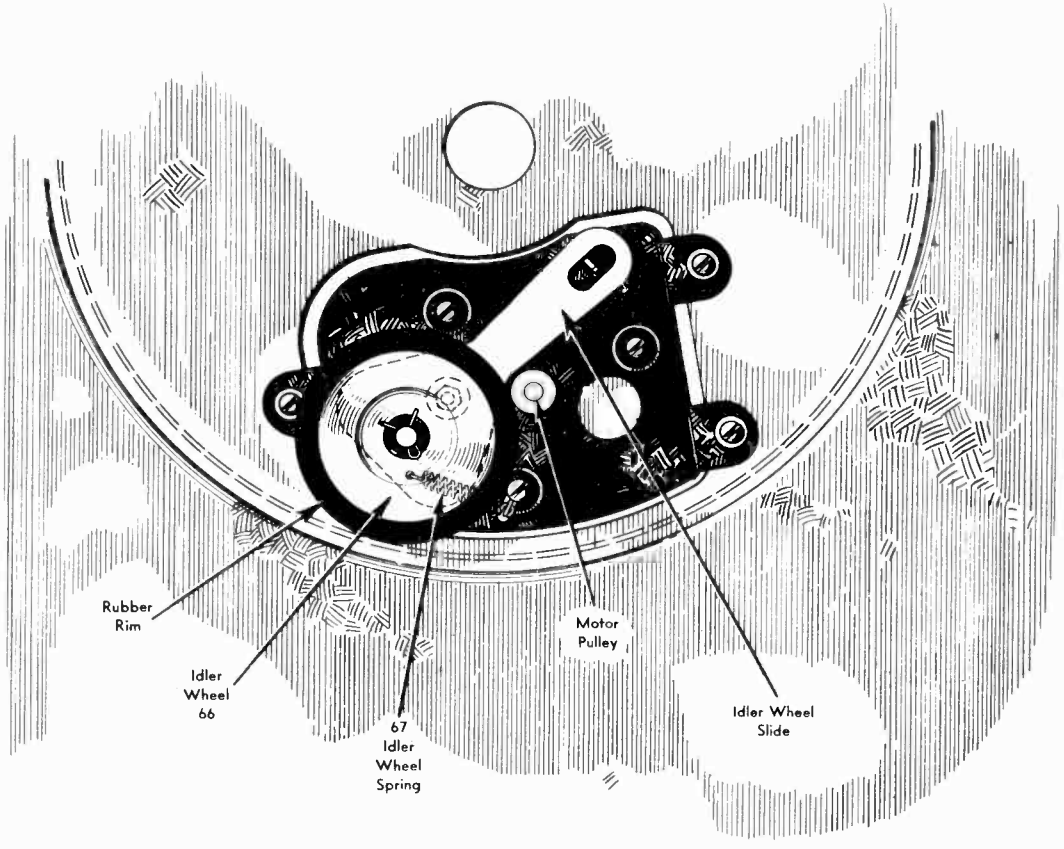


FIG. 34. CUTAWAY—TOP VIEW

E. "QUAVER" OR "WOW" is usually due to quick variations in turntable speed. With the drive gear in open tooth or playing position, remove turntable and check:

1. Rotation of spindle. Examine for bind at any point, and oil sparingly if required, after cleaning.
2. Idler wheel rubber rim should be undamaged and perfectly free from oil and grease.
3. Idler wheel mounting and slide should move freely. Spring tension on slide must be maintained. Oil slide sparingly if necessary. (See Fig. 34.)

F. RUMBLE is caused by:

1. Damaged or badly worn rubber rim on idler wheel.
2. Motor plate loose on panel, or motor loose on plate.
3. Damaged motor—rotor knocked out of alignment.

VIII LUBRICATION

A. DO NOT LUBRICATE:

1. Clutch engagement lever.
2. Idler wheel rim and turntable rim.
3. Moving parts on the selector arms and posts.

B. OIL, if necessary:

1. All shafts.
2. Spindle bearings.

C. GREASE, if necessary:

1. Cam surfaces and gear teeth.

WIPE OFF ALL EXCESS LUBRICANT—OVER LUBRICATION IS DANGEROUS

POOR TONE QUALITY
EXCESSIVE NEEDLE SCRATCH

Usually due to a damaged or worn needle or record. Replacing either, or both, is the obvious remedy.

RECORD HANGING OR CATCHING ON SELECTOR ARMS

May be caused by using defective or badly warped records. These should be played manually.

SLIPPING ON TURNTABLE

Is caused by a warped record that does not present enough contact surface to the record below it and slips, producing an uneven sound.

DO NOT STALL

The turntable by hand while it is in motion.

LUBRICATION

Lubrication applied at the time of manufacture is usually sufficient for several years of normal operation. If, after a prolonged period, there is reason to believe that further oiling is necessary, it is recommended that you consult your dealer.

MODEL M

J. P. SEEBURG CORP.

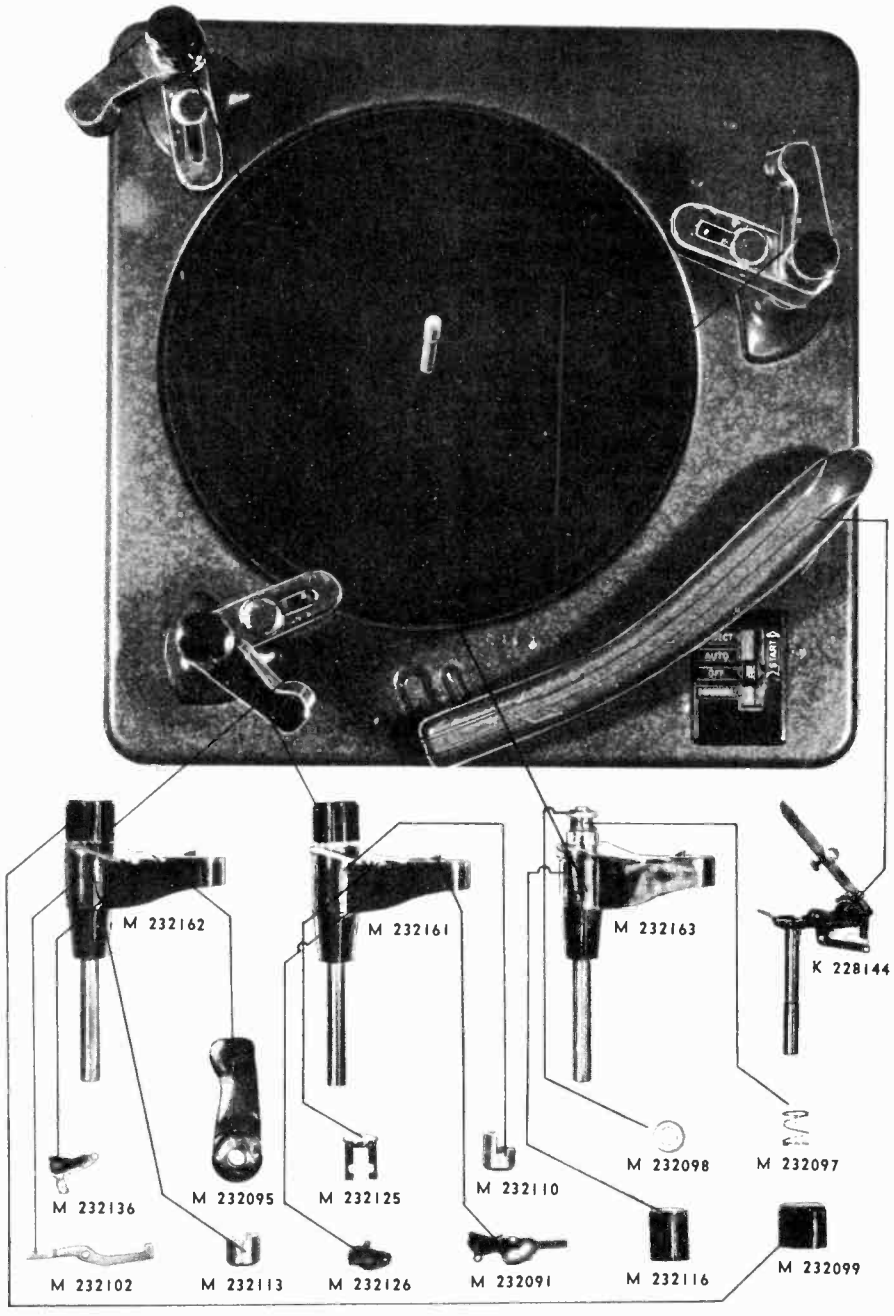


FIG. 35

M-232162	Selector Arm Assembly #2	M-232163	Selector Arm Assembly #3
M-232136	Post Link #2 (Upper) Assembly	M-232110	Selector Arm Shutoff Coupling #1
M-232102	Post Link #2—Lower	M-232091	Post Link #1 and #3 Assembly
M-232161	Selector Arm Assembly #1	M-232098	Cup Washer
M-232095	Selector Blade	M-232116	Selector Arm Cover
M-232113	Selector Arm 10-12" Coupling #2	K-228144	Tone Arm Hinge Assembly
M-232125	Lifter Plunger	M-232097	Selector Blade Spring
M-232126	Lifter Crank	M-232099	Selector Arm Knob

J. P. SEEBURG CORP. MODEL M

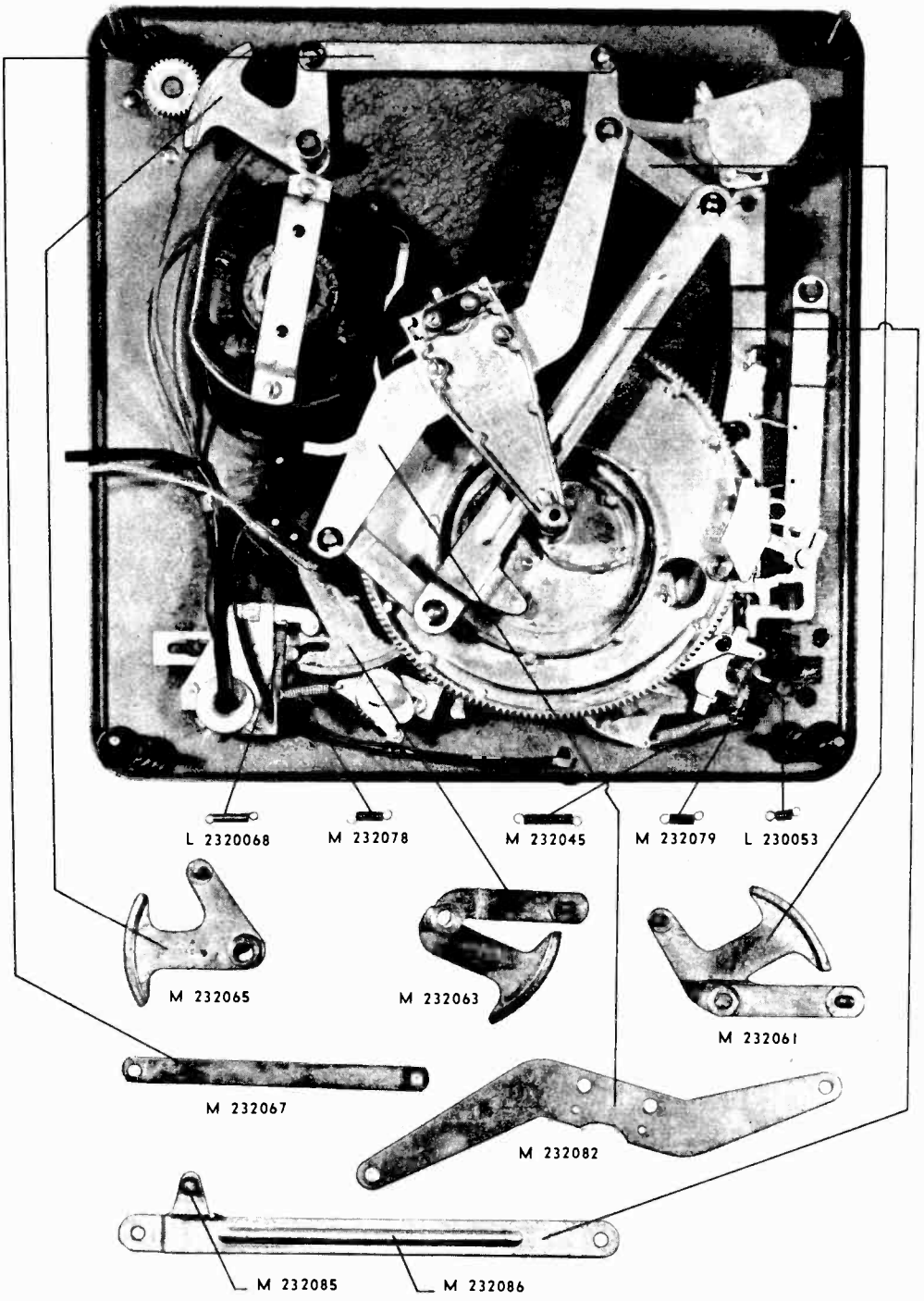


FIG. 36

L-230068	Detent Arm Spring	M-232063	Segment #2 Assembly
M-232078	Shutoff Lever Spring	M-232067	Segment Link
M-232045	Tone Arm Locator Spring	M-232061	Segment #1 Assembly
M-232079	Shutoff Arm Spring	M-232082	Segment Tie Plate
M-232065	Segment #3 Assembly	M-232086	Drive Link Assembly
L-230053	Tone Arm Latch Spring (Outer)	M-232085	Drive Link Roller

MODEL M

J. P. SEEBURG CORP.

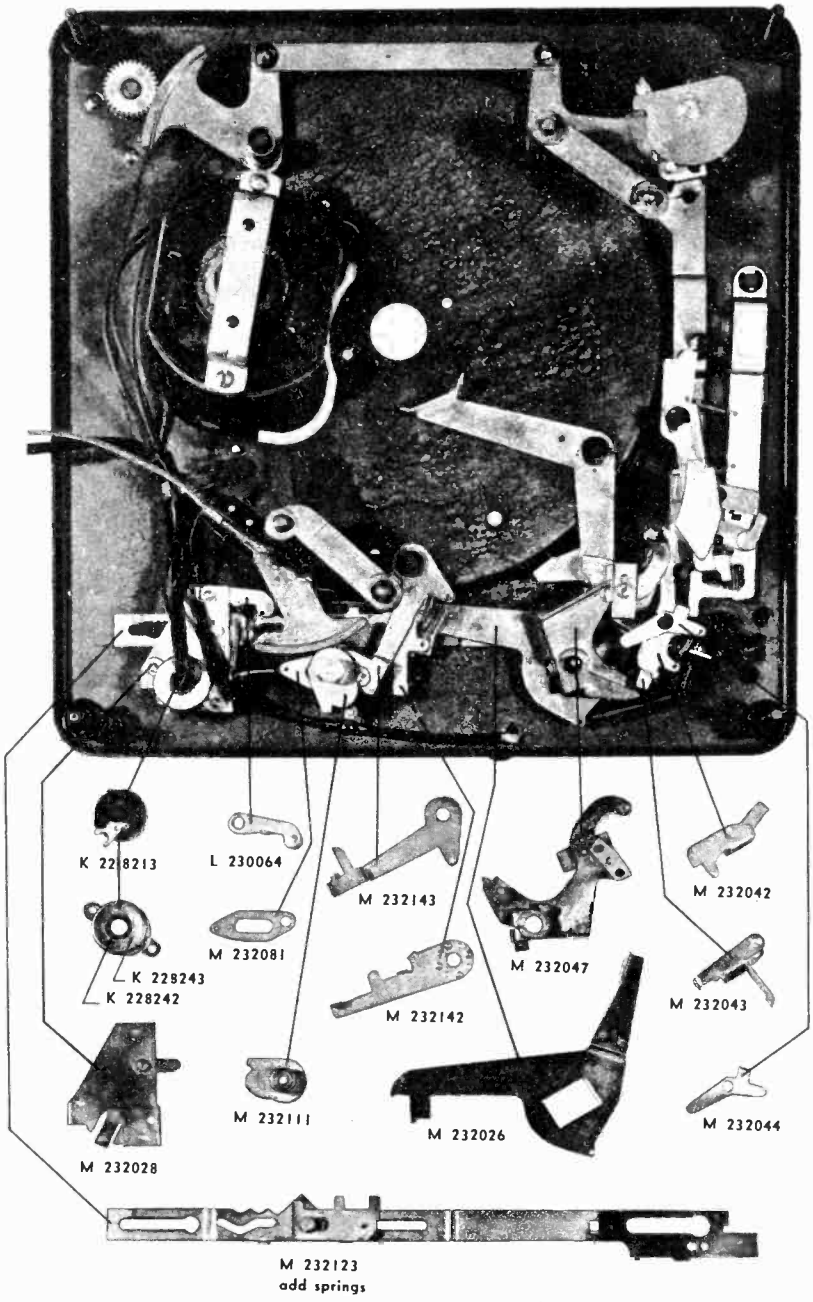


FIG. 37

K-228213	Switch
L-230064	Detent Arm Assembly
K-228243	Switch Cover
K-228242	Switch Cover Insulator
M-232081	10-12" Cam Follower Link
M-232028	Switch Plate Assembly
M-232111	10-12" Cam Assembly
M-232123	Control Slide Assembly
M-232143	10-12" Cam Follower
M-232142	10-12" Set Lever
M-232026	Tone Arm Locator Assembly
M-232047	Tone Arm Lever Assembly
M-232042	Tone Arm Latch—Center
M-232043	Tone Arm Latch—Inner
M-232044	Tone Arm Latch—Outer

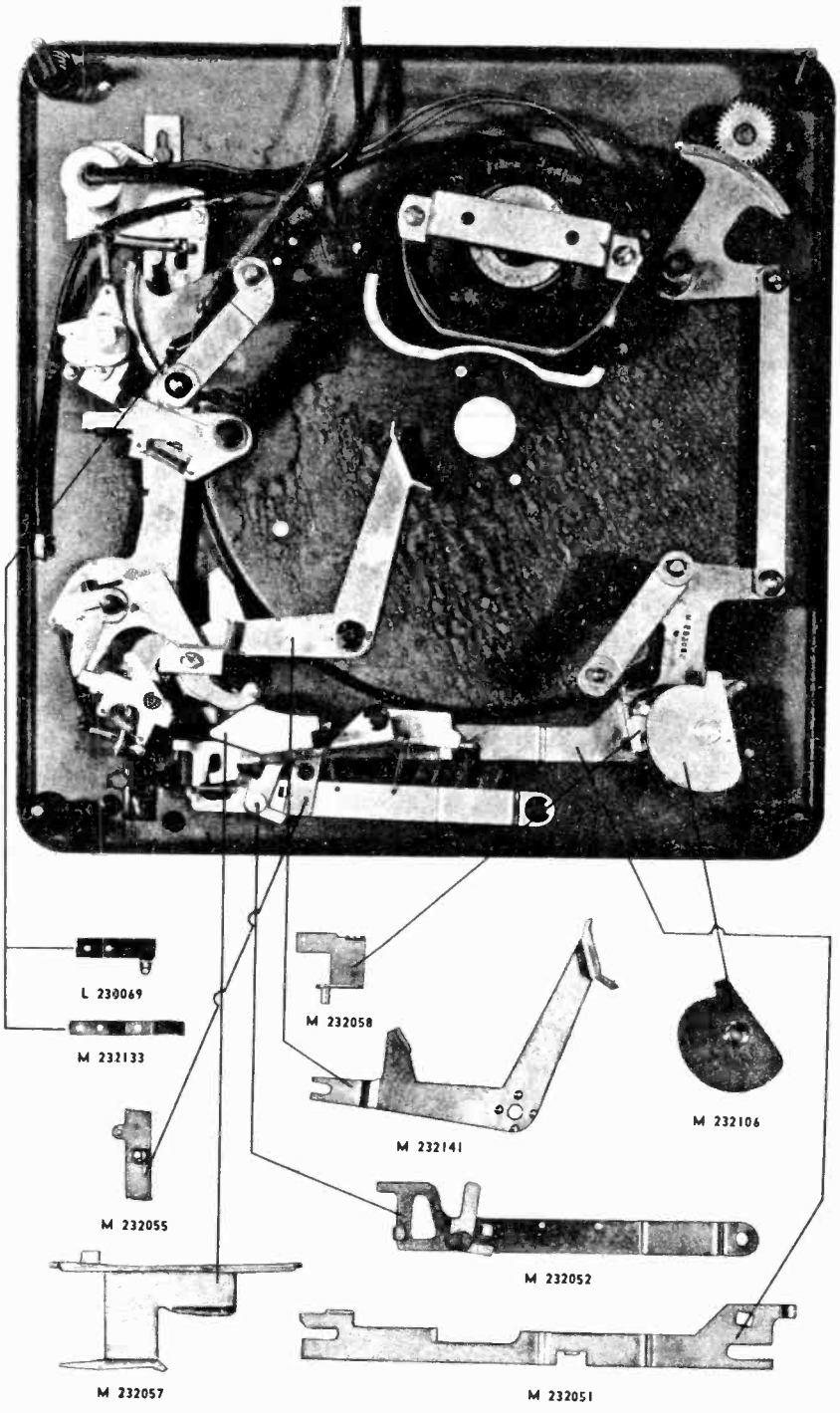


FIG. 38

L-230069	Contact Mounting Strip Assembly	M-232141	Manual Reject Lever
M-232133	Muting Switch Blade Assembly	M-232106	Shutoff Slide Cam Assembly
M-232055	Shutoff Trip Assembly	M-232052	Shutoff Lever Assembly
M-232057	Shutoff Arm	M-232051	Shutoff Slide
M-232058	Shutoff Slide Bracket Assembly		

J. P. SEEBURG CORP.

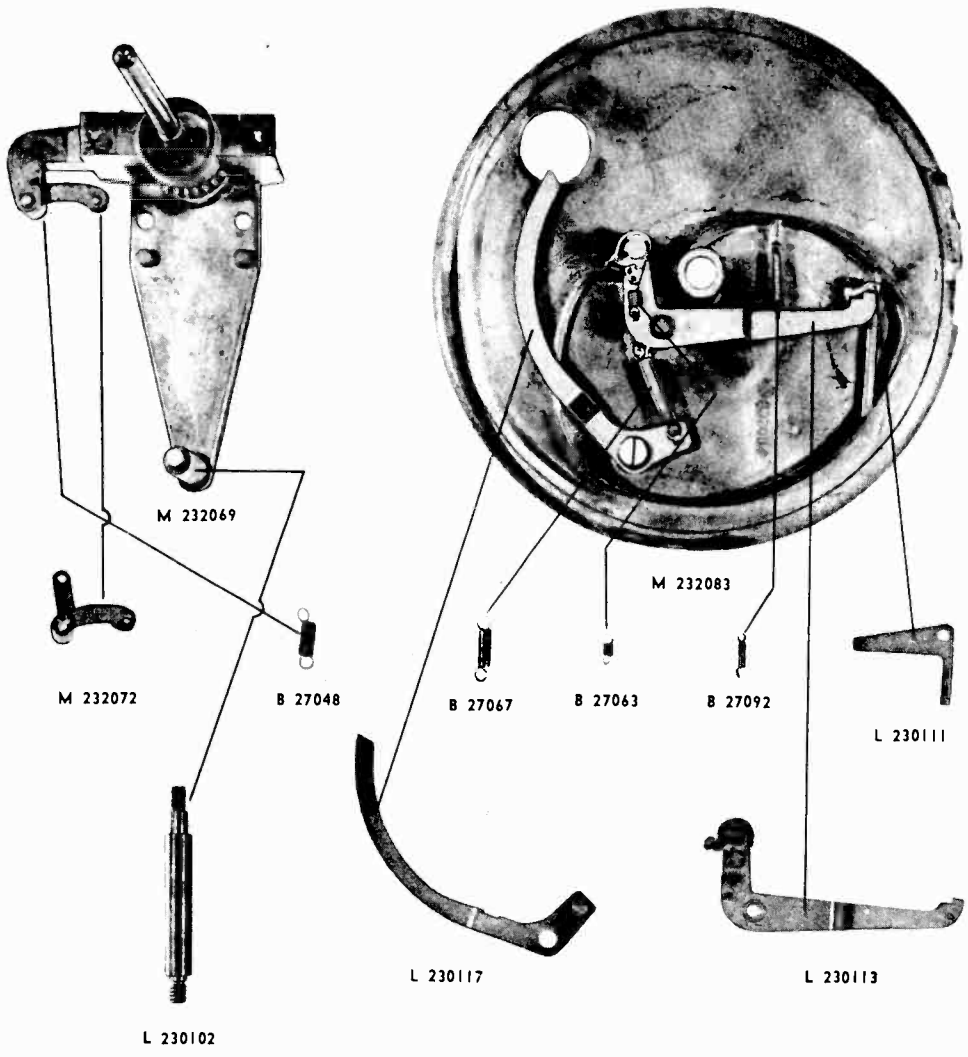


FIG. 39

M-232069	Spindle & Housing Assembly	M-232083	Drive Gear Assembly
M-232072	Drive Gear Stop Lever Assembly	B-27063	Trip Dog Spring
L-230102	Drive Gear Shaft	B-27092	Trip Lever Spring
B-27048	Stop Lever Spring	L-230111	Clutch Engagement Lever
B-27067	Retard Lever Spring	L-230113	Trip Lever Assembly
L-230117	Tone Arm Retard Lever		

Ref. No.	Description	Part Number
1	Control Slide	M-232020
2	Power Switch	K-228213
3	Manual Reject Lever	M-232141
4	Trip Lever	L-230114
5	Clutch Engagement Lever	L-230111
6	Drive Gear	M-232084
7	Pinion Gear	L-230101
8	Muting Switch Blade	M-232118
9	Tone Arm Lift Pin	K-228199
10	Drive Link	M-232087
11	Segment #1	M-232062
12	Segment #2	M-232064
13	Segment #3	M-232066
14	Post Gear #1	M-232089
15	Post Gear #2	M-232089
16	Post Gear #3	M-232089
17	Segment Link	M-232067
18	Selector Arm Shaft #1	M-232088
19	Selector Arm Shaft #2	M-232088
20	Selector Arm Shaft #3	M-232114
21	Tone Arm Lever	M-232049
22	Tone Arm Latch Lever Assembly	M-232042, 3, 4
23	Tone Arm Locator	M-232027
24	10-12" Set Lever	M-232142
25	Tone Arm Retard Lever	L-230117
26	Tone Arm Booster Spring	H-20129
27	Drive Gear Stop Lever Assembly	M-232072
28	Trip Shoe	K-228156
29	Trip Plate	B-27037
30	Trip Dog	K-228174
31	Selector Shaft Pin	M-232109
32	Selector Arm Shutoff Coupling #1	M-232110
33	Selector Arm 10-12 Coupling #2	M-232113
34	Post Link #1 and #3	M-232092
35	Post Link Shoe	M-232127
36	Lifter Crank	M-232126
37	Post Link #2 Lower	M-232102
38	Post Link #2 Upper	M-232103
39	Shutoff Slide Cam	M-232107
40	Shutoff Slide Bracket	M-232059
41	Lifter Plunger	M-232125
42	Cam Hub	M-232108
43	10-12" Cam	M-232112
44	10-12" Cam Follower Link	M-232081
45	10-12" Cam Follower	M-232143
46	Shutoff Slide	M-232051
47	Shutoff Lever	M-232053
48	Shutoff Arm	M-232057
49	Shutoff Dog	M-232054
50	Shutoff Trip	L-230045
51	Inner Tone Arm Latch	M-232043
52	Center Tone Arm Latch	M-232042
53	Outer Tone Arm Latch	M-232044
54	Manual Lockout Assembly	M-232019
55	Shutoff Slide Spring 10-12" Set Lever Spring	L-230038
56	Shutoff Arm Spring	M-232079
57	Shutoff Lever Spring	M-232078
58	Retard Lever Spring	B-27067
59	Tone Arm Hinge Bracket	K-228146
60	Tone Arm Fulcrum	K-228224
61	Counterbalance Spring	K-228099
62	Counterbalance Adjusting Slide	K-228150
63	Tone Arm Shaft	K-228147
64	Allen Socket Cap Screw	71468
65	Trip Lever Spring	B-27092
66	Idler Wheel	M-232038
67	Idler Wheel Spring	See numerical list
68	Tone Arm Locator Spring	M-232045
69	Tone Arm Adjusting Screw	K-228238

Part Number	Item
H-20065	"C" Washer
H-20129	Tone Arm Booster Spring
H-20143	Panel Support Spring (Upper)
H-20199	Clamp Nut
J-22021	"C" Washer (small)
J-22058	Manual Lockout Spring (outer)
J-22096	Thrust Plate
J-22117	Thrust Wafer
B-27048	Stop Lever Spring
B-27050	Thrust Washer

Part Number	Item
K-228145	Hinge Bracket & Shaft Assembly Consists of: K-228146 Tone Arm Hinge Bracket 72134 Flatwasher K-228147 Tone Arm Shaft
K-228150	Counterbalance Adjusting Slide
K-228156	Trip Shoe
K-228175	Retard Lever Rubber Bumper
K-228199	Tone Arm Lift Pin
K-228202	Trip Dog Rubber Bumper
K-228203	Trip Lever Bumper
B-27063	Trip Dog Spring
B-27067	Retard Lever Spring
B-27088	Retard Lever Screw
B-27092	Trip Lever Spring
71468	3/4x10-32 Allen Socket Cap Screw
72040	Spring Washer
75042	1/4x10-32 Allen Head Set Screw
75047	5/8x10-32 Allen Socket Cap Screw
75068	3/16x8-32 Hex Socket Head Set Screw
80036	3/4x3 0 Taper Pin
K-228099	Counterbalance Spring
K-228144	Tone Arm Hinge Assembly Consists of: K-228145 Hinge Bracket & Shaft Assembly K-228225 Tone Arm Bracket Assembly K-228224 Tone Arm Fulcrum K-228223 Fulcrum Clamp 71789 Round Head Machine Screw
L-230069	Contact Mounting Strip Assembly Consists of: L-230070 Contact Mounting Strip L-230071 Mounting Strip Contact 74058 Solder Lug
L-230076	Muting Switch Clamp
L-230087	Tone Arm Rubber Bumper
L-230101	Pinion Gear
L-230102	Drive Gear Shaft
L-230113	Trip Lever Assembly Consists of: L-230156 Trip Lever & Bushing Assembly K-228174 Trip Dog L-230115 Trip Dog Stud L-230158 Trip Roller L-230159 Trip Roller Bushing
L-230146	Turntable Assembly
L-230193	Panel Retainer Spring
*L-230211	Tone Arm—Aluminum
M-232023	Manual Lockout Spring—Inner
M-232025	Tone Arm Locator Hub

Part Number	Item
K-228211	Stop Lever Pivot Pin
K-228212	Wire Clip
K-228213	Switch
K-228217	Tone Arm Special Washer
K-228225	Tone Arm Bracket Assembly Consists of: 70086 Elastic Stop Nut K-228148 Tone Arm Bracket
K-228238	Tone Arm Adjusting Screw
K-228242	Switch Cover Insulator
K-228243	Switch Cover
L-230022	Speed Nut
L-230028	Control Knob Assembly
L-230038	Shutoff Slide Spring
L-230053	Tone Arm Latch Spring (Outer)
L-230064	Detent Arm Assembly Consists of: L-230065 Detent Arm L-230066 Detent Arm Pin
L-230067	Pickup Lead Clamp
L-230068	Detent Arm Spring
**M-232032	Motor Assembly (See Note 2)
**M-232038	Idler Wheel Assembly (See Note 2)
M-232042	Tone Arm Latch—Center
M-232043	Tone Arm Latch—Inner
M-232044	Tone Arm Latch—Outer
M-232045	Tone Arm Locator Spring
M-232047	Tone Arm Lever Assembly Consists of: M-232048 Lever Pin & Trip Plate Assembly K-228156 Trip Shoe 72036 Flatwasher 71050 Binding Head Machine Screw 73076 Kantlink Lockwasher 71468 Allen Screw
M-232051	Shutoff Slide
M-232052	Shutoff Lever Assembly Consists of: M-232053 Shutoff Lever M-232054 Shutoff Dog L-230042 Shutoff Dog Rivet
M-232055	Shutoff Trip Assembly Consists of: L-230045 Shutoff Trip

Part Number	Item
M-232065	Segment #3 Assembly
M-232067	Segment Link
M-232069	Spindle & Housing Assembly
	Consists of:
	M-232070 Housing and Bushing Assembly
	M-232072 Drive Gear Stop Lever Assembly
	K-228211 Stop Lever Pivot Pin
	B-27048 Stop Lever Spring
	M-232074 Turntable Spindle Assembly
	L-230101 Pinion Gear
	80036 Taper Pin
	J-22096 Thrust Plate
	J-22117 Thrust Wafer
	71759 Shakeproof Sems
	L-230102 Drive Gear Shaft
	73087 Split Lockwasher
	70077 1/4-20 Nut
	M-232082 Segment Tie Plate
	71791 Shakeproof Sems
M-232070	Spindle Bushing & Housing Assembly
	Consists of:
	M-232071 Spindle Housing
	J-22082 Spindle Bushing
M-232072	Drive Gear Stop Lever Assembly
	Consists of:
	M-232073 Drive Gear Stop Lever
	B-27045 Stop Lever Roller
	B-27046 Stop Lever Roller Pin
M-232074	Turntable Spindle Assembly
	Consists of:
	M-232076 Spindle
	K-228279 Drive Pin
	11266 Steel Ball
	M-232132 Sleeve
M-232106	Shutoff Slide Cam Assembly
	Consists of:
	M-232107 Shutoff Slide Cam
	M-232108 Cam Hub
M-232109	Selector Shaft Pin
M-232110	Selector Arm Shutoff Coupling #1
M-232111	10-12" Cam Assembly
	Consists of:
	M-232112 10-12" Cam
	M-232108 Cam Hub

Part Number	Item
M-232078	Shutoff Lever Spring
M-232079	Shutoff Arm Spring
M-232081	10-12" Cam Follower Link
M-232082	Segment Tie Plate
M-232083	Drive Gear Assembly
	Consists of:
	M-232138 Drive Gear Sub-Assembly
	L-230113 Trip Lever Assembly
	J-22021 C Washer
	B-27063 Trip Dog Spring
	B-27092 Trip Lever Spring
	K-228202 Trip Dog Bumper
	K-228203 Trip Lever Bumper
	L-230117 Tone Arm Retard Lever
	K-228175 Retard Lever Bumper
	72040 Spring Washer
	B-27088 Retard Lever Screw
	B-27067 Retard Lever Spring
M-232085	Drive Link Roller
M-232086	Drive Link Assembly
	Consists of:
	M-232087 Drive Link
	K-228186 Drive Link Stud
M-232089	Post Gears #1, and #2 & #3
M-232091	Post Link #1 and #3 Assembly
	Consists of:
	M-232092 Post Link #1
	M-232127 Post Link Shoe
	M-232131 Lifter Link Pin
M-232095	Selector Blade
M-232097	Selector Blade Spring
M-232098	Cup Washer
M-232099	Selector Arm Knob
M-232102	Post Link #2—Lower
M-232104	Lifter Crank Screw
M-232135	Post Link Spring
M-232136	Post Link #2 (Upper) Assembly
	Consists of:
	M-232103 Post Link #2—Upper
	M-232127 Post Link Shoe
	M-232131 Lifter Link Pin
M-232138	Drive Gear Sub-Assembly
	Consists of:
	M-232084 Drive Gear
	L-230110 Drive Gear Shutoff Sleeve
	L-230112 Trip Lever Stud

Part Number	Item
M-232113	Selector Arm 10-12" Coupling #2
M-232116	Selector Arm Cover
M-232117	Control Escutcheon
M-232123	Control Slide Assembly
	Consists of:
	M-232019 Manual Lockout Assembly
	M-232023 Manual Lockout Spring—Inner
	J-22058 Coil Spring
M-232125	Lifter Plunger
M-232126	Lifter Crank
M-232129	Lifter Crank Pin
M-232130	Pickup Lead
M-232133	Muting Switch Blade Assembly
	Consists of:
	M-232118 Muting Switch Blade
	L-230075 Muting Switch Contact
M-232134	Selector Arm & Shaft Assembly #1 and #2
	Consists of:
	M-232093 Selector Arm
	M-232088 Support Arm Shaft
	M-232096 Selector Blade Stud
	75042 Set Screw
	M-232095 Selector Blade
	M-232097 Selector Blade Spring
	M-232098 Cup Washer
	H-20065 C Washer
M-232162	Selector Arm Assembly #2
	Consists of:
	M-232134 Selector Arm Shaft Assembly
	M-232136 Post Link #2 (Upper) Assembly
	M-232102 Post Link #2 Lower
	M-232109 Selector Shaft Pin
	M-232113 Selector Arm 10-12" Coupling #2
	75068 Set Screw
	M-232125 Lifter Plunger
	M-232126 Lifter Crank
	M-232104 Lifter Crank Screw
	M-232129 Lifter Crank Pin
	M-232135 Post Link Spring
	M-232095 Selector Blade
	M-232097 Selector Blade Spring
	M-232098 Cup Washer
	H-20065 C Washer

Part Number	Item
	L-230111 Clutch Engagement Lever
	79102 Tubular Rivet
M-232141	Manual Reject Lever
M-232142	10-12" Set Lever
M-232143	10-12" Cam Follower
M-232152	Selector Arm & Shaft Assembly #3
	Consists of:
	M-232093 Selector Arm
	M-232114 Selector Arm Shaft #3
	M-232096 Selector Blade Stud
	75042 Set Screw
M-232161	Selector Arm Assembly #1
	Consists of:
	M-232134 Selector Arm & Shaft Assembly
	M-232091 Post Link Assembly
	M-232109 Selector Shaft Pin
	M-232110 Selector Arm Shutoff Coupling #1
	75068 Set Screw
	M-232125 Lifter Plunger
	M-232126 Lifter Crank
	M-232104 Lifter Crank Screw
	M-232129 Lifter Crank Pin
	M-232135 Post Link Spring
M-232163	Selector Arm Assembly #3
	Consists of:
	M-232152 Selector Arm & Shaft Assembly #3
	M-232091 Post Link Assembly
	M-232125 Lifter Plunger
	M-232126 Lifter Crank
	M-232104 Lifter Crank Screw
	M-232129 Lifter Crank Pin
	M-232135 Post Link Spring
	M-232095 Selector Blade
	M-232097 Selector Blade Spring
	M-232098 Cup Washer
	H-20065 C Washer
M-232180	Pickup Cartridge

CORRECTIVE ADJUSTMENTS

FOR FAILURE TO CYCLE AUTOMATICALLY: If the record changer fails to cycle, it may be due to improper operation of the automatic trip mechanism. Check for:

1. Control Button in "MANUAL" position.
2. No velocity lead-in groove or eccentric groove in center of record.
3. Velocity Trip and Roller Assembly binding (44, Fig. 4).
4. Actuating Pawl stuck. This part of Main Cam Assembly, (42, Fig. 4), is engaged by hook end of Velocity Trip and Roller Assembly (44).
5. Automatic Trip Arm (26, Fig. 3) bent and not hitting the Velocity Trip and Roller Assembly (44).
6. Needle jumping grooves due to foreign matter in record groove, badly worn record, or badly worn or bent needle.

Proper operation of the automatic trip mechanism is as follows: When the movement of the Pick-up Arm toward the Center Post is greater than ⅛ inch in ½ revolution of the Turntable, the Automatic Trip Arm (26, Fig. 3) trips the Velocity Trip and Roller Assembly (44, Fig. 3). This releases the Actuating Pawl on the Main Cam Actuating Gear (43, Fig. 4) and drives the mechanism through the change cycle.

The Automatic Trip Arm follows the movement of the Pick-up Arm through a Spring-Compression Clutch (25, Fig. 3). This clutch must be kept free from oil or grease so that trip arm follows movement of Pick-up Arm.

Should it become necessary to clean the clutch, loosen the set screw (point "A", Fig. 5) to relieve the spring tension and clean the clutch parts with carbon tetrachloride. Reset the clutch spring tension by locking the collar at least ¼ inch below the Main Plate. This tension should be just sufficient to operate the trip mechanism without placing undue drag on the movement of the Pick-up Arm.

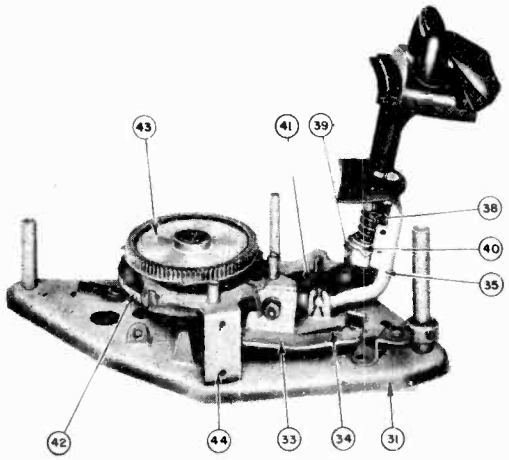


Fig. 4

FOR FAILURE TO CYCLE WHEN OPERATING "REJECT" CONTROL BUTTON: If record changer will not cycle when Control Button is pushed to "REJECT" position, check for:

1. Manual Trip Lever (29, Fig. 3) hair spring bent or broken.
2. Velocity Trip and Roller Assembly binding (44, Fig. 4).
3. Actuating Pawl stuck.

When the reject trip mechanism is operating properly, movement of the Control Button to the "START-REJECT" position actuates the Manual Trip Lever (29, Fig. 3). This lever trips the Velocity Trip and Roller Assembly and puts the mechanism in cycle.

FOR CONTINUOUS CYCLING: Check for:

1. Velocity Trip and Roller Assembly (44, Fig. 4) rubbing on Main-Cam-Actuating Gear (42, Fig. 4).
2. Manual-Trip Lever (29, Fig. 3) binding at rivet.
3. Hook end of Velocity Trip and Roller Assembly bent and not engaging pawl.
4. Bakelite roller broken on Velocity Trip and Roller Assembly.

FOR NEEDLE SKIPPING GROOVES: Check for:

1. Record changer not level.
2. Pick-up Arm binding.
3. Foreign matter in record groove.
4. Badly worn record groove.
5. Badly worn or bent needle.

Under normal operating conditions, with the Pick-up Arm in playing position, the arm is practically free-floating on its pivot. There is no lead-in spring which might drag the needle over the first few grooves of the record or minimum radius device to jam the arm on the inside grooves. The pressure required to operate the trip mechanism is negligible.

FOR PICK-UP ARM OR NEEDLE STRIKING EDGE OF RECORD: Needle should approach the top record of a full stack on the Turntable with approximately ⅛ inch clearance. Check for binding of the Pick-up Arm Raising Lever at its pivot. If the condition is not due to binding, adjust by bending the Pick-up Arm Raising Lever at Point C, Fig. 5. Do not attempt to move Pick-up Arm Raising Disc (27, Fig. 3) up or down.

FOR INCORRECT DROP POINT: If the needle doesn't land at the proper place on the record, this condition may be corrected by adjusting the Eccentric Screw. This screw is accessible through a hole at the top of the Pick-up Arm, and it may be rotated clockwise to move the needle toward the Center Post or counter-clockwise to move the needle away from the Center Post. Should further adjustment be necessary, proceed as follows:

1. Set the Record Support Arm to the 10" position.
2. Operate the mechanism by revolving the Turntable manually until the needle drops to within ⅛ inch of a ten inch record on the Turntable.
3. With a #8 Bristol wrench in each of the set screws (Points D and E, Fig. 5) alternately loosen one and tighten the other until the needle rests above the record lead-in groove at the desired point.
4. Turn the Record Support Arm to the "12" inch position and check the needle drop on a twelve inch record.
5. Be sure that both set screws are tight when this adjustment is completed.

FOR PICK-UP ARM DROPPING OFF REST POST: When the Pick-up Arm is placed on the Rest Post, the lip of the Pick-up Arm Raising Disc (27, Fig. 3) rests in the groove of the Collar (24, Fig. 3). Adjust the position of the Collar (Point F, Fig. 5) so that the lip of the Pick-up Arm Raising Disc rests in the groove of the Collar with the Pick-up Arm Pivot (22, Fig. 3) touching the Sub Plate. When properly adjusted, there should be 0.010 inches clearance between the lip of the Pick-up Arm Raising Disc and the bottom of the collar groove. This should also be checked by moving the Pick-up Arm back and forth manually to see that the lip approaches the Collar at about the middle of the chamfer.

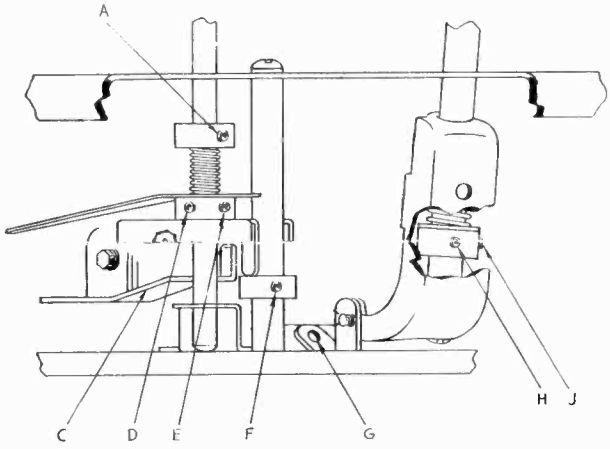


Fig. 5

FOR INCORRECT SUPPORT AND DROPPING OF RECORDS: If Record Support Arm is improperly positioned or spaced with respect to Center Post or if Floating Latch near top of Center Post is binding, one or more of the following faults may occur.

1. **Records do not rest securely on Support Arm.**
2. **Records dropping on Pick-up Arm.**
3. **Multiple dropping of records.**
4. **Incorrect ejection of records.**

Whenever any of these symptoms is encountered, it is advisable to carefully inspect operation of Floating Latch and to check positioning and spacing of Support Arm as described below.

The Floating Latch at the top of the Center Post is so spaced that only one record at a time can slide between the heel of the latch and the step of the Post. The hole in the Latch is elongated so that Latch can slip into recess of Post when records are being removed. If more than one record is dropped at a time, it may be due to:

a. Foreign matter in recess of Center Post causing Latch to bind and remain in wrong position.
b. Exceptionally thin records.

The Record Support Arm should be so positioned that the curve of the shelf matches the curve of the record. If position is incorrect it may be adjusted as follows:

a. Turn Record Support Arm to the "10" inch position.

b. Place a ten inch record on the Center Post in the normal position for automatic playing.
c. With a #8 Bristol wrench in each of the set screws (points H and J, Fig. 5) alternately loosen one and tighten the other until the angle of the Record Support Arm is correct. Be sure that both set screws are tight at the completion of this adjustment.

Spacing between Record Support Arm and Center Post should now be checked. Note that as the change cycle is started by the needle being in the center lead-in groove of the record, the first motion of the main cam causes the Support Arm to move toward the Center Post about 3/32 inches. This position is maintained until the Pick-up Arm has made its full lateral excursion at which time the Record Support Arm again moves toward the Center Post, causing the bottom record to drop down the post into playing position.

If the Record Support Arm has been bent back, away from the Center Post, it is possible for a standard record to rest on the Center Post step with its edge just over the edge of the Record-Support-Arm Shelf. Then as the change cycle is started, the record is pushed off the Center Post by the initial movement of the Record Support Arm, so that it drops on the Pick-up Arm.

To correct this condition, the Rocker Arm Assembly (35, Fig. 4) must be bent so that the Record Support Arm is brought nearer to the Center Post.

a. With the mechanism at rest, wedge the Rocker Arm firmly by inserting a screwdriver between the Rocker Arm and the Sub Plate at a point between the Rocker-Arm Pivot (36, Fig. 6) and the stud to the right of it.
b. With the heel of the hand, press the Record Support Arm toward the Center Post, so that a standard record rests at least half way over the Record Support Arm ledge when placed on the Center Post step.

CAUTION: Be certain that a standard size record is used in making this adjustment.

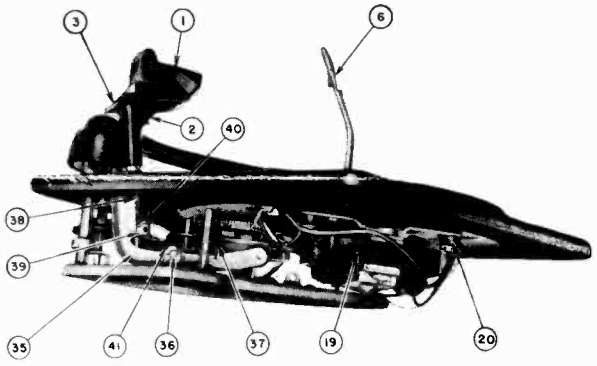


Fig. 6

LUBRICATION

The record changer leaves 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, lubrication should be performed more frequently as required.

AVOID EXCESSIVE LUBRICATION: Do not permit any oil or grease to get on the rubber Idler Drive Wheel or the Motor Pulley (11 and 21, Fig. 7), on Turntable drive rim or on the Automatic-Trip-Arm clutch. Any oil or grease on these parts should be removed with the aid of Carbon Tetrachloride.

The recommended lubricants and points of lubrication are as follows:

A. #10 OIL (apply with a small oil can or medicine dropper).

1. Motor Bearings. Saturate top and bottom felts.
2. Pick-up Arm Shaft (22, Fig. 3) Apply one drop each to bottom bearing point, bracket hole and hole through Main Base Plate.
3. Ball Bearing Assembly (7, Fig. 7).
4. Idler Wheel Felt (13, Fig. 7).

B. LUBRIPLATE (apply with small brush):

1. Idler Wheel Link (16, Fig. 7).
2. Turntable-Shaft Stud.
3. Pick-up Arm Hinge Pins.
4. Knife edge of Raising Lever (33, Fig. 4).
5. Main Cam Bearing. (It is necessary to remove the Sub Plate Assembly to lubricate this bearing. See "MECHANICAL REPAIRS").

C. STA-PUT (apply with small brush)

1. Teeth of Main-Cam-Actuating Gear (43, Fig. 4).
2. Track of Main Cam Gear (42, Fig. 4).
3. Teeth of Large and Small Idler Gears (9, Fig. 7).
4. Raising-Lever Bracket bearing surfaces (33, Fig. 4).
5. Selector-Lever Stop (40, Fig. 6).

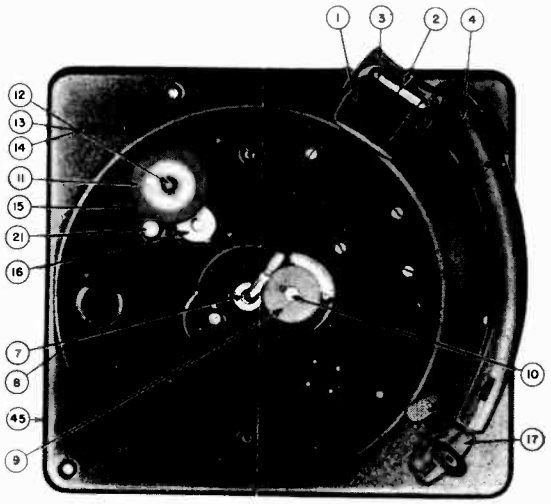


Fig. 7

REMOVING AND INSTALLING PARTS

TO REPLACE A PICK-UP CARTRIDGE:

1. Remove needle by taking out the small screw visible at the front of the Pick-up Arm.
2. Raise Pick-up Arm and remove two screws holding Cartridge.
3. The electrical connections to the Cartridge are of the "quick disconnect" type and may be removed without unsoldering. Merely slip the connector off the cartridge pin.

TO REMOVE THE SUB-PLATE ASSEMBLY: In the event that it becomes necessary to replace any of the major parts in the Sub-Plate Assembly (Fig. 4), the entire assembly should first be removed from the Main Plate.

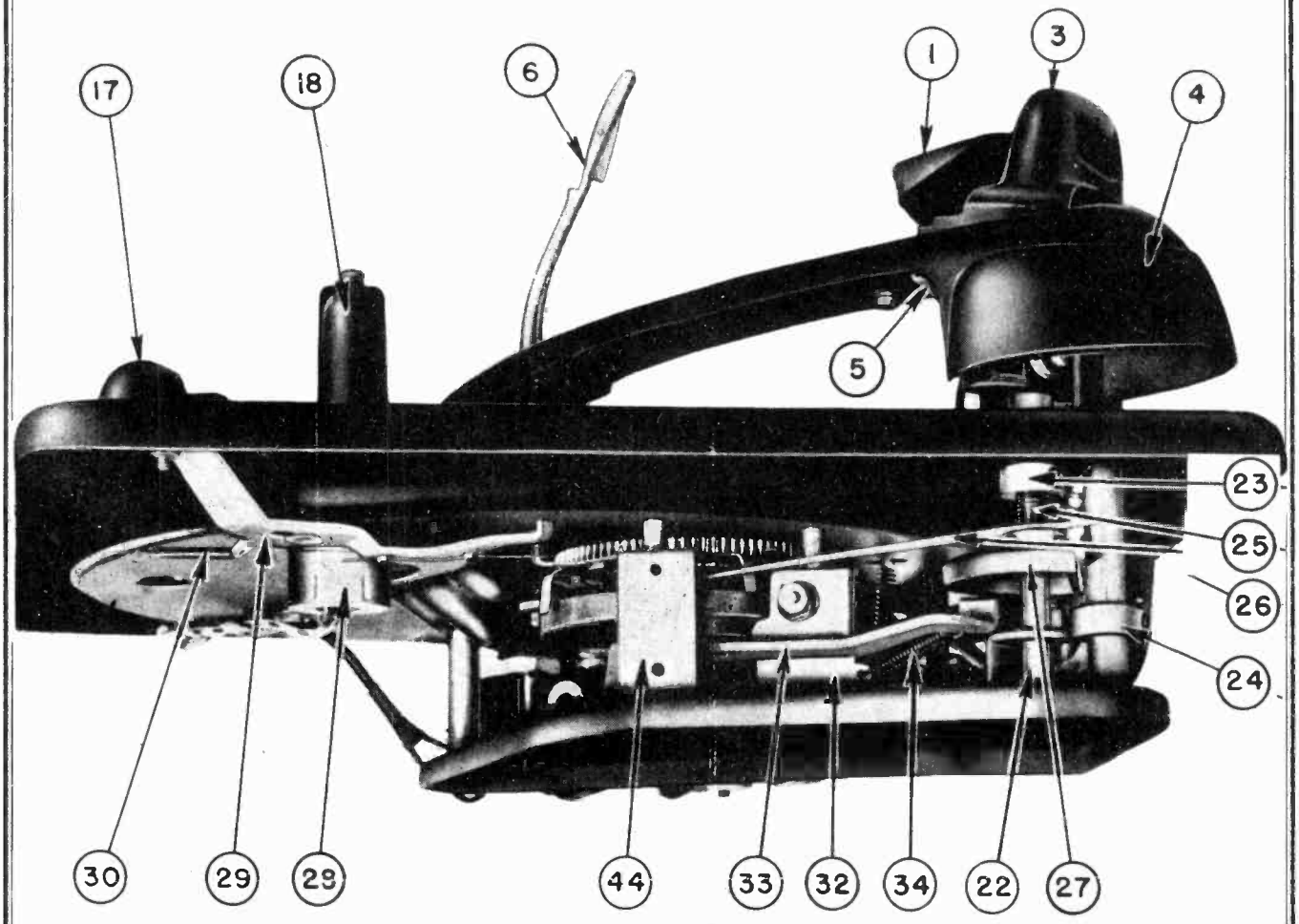
1. Remove the Center Post which is held in by a cotter pin under the Sub-Plate.
2. Remove the Turn-table.
3. Unhook the Rocker-Arm-Return Spring. (37, Fig. 6).
4. Remove the Rocker-Arm-Pivot Pin (36, Fig. 6).
5. Remove the five #8-32x¼ screws holding the sub-plate studs and the #8-32x⅜ screw holding the Main-Cam-Actuating-Gear Shaft to the Main Plate.

TO REPLACE THE SUB-PLATE ASSEMBLY: Reverse the above procedure making certain that all parts fall into their proper positions. Particularly note the Selector Lever and Selector-Lever Compression Spring (41, Fig. 4) to see that they are in position with the lever through the slot in the Pick-up-Arm-Raising-Lever Bracket. (32, Fig. 3).

TO REMOVE THE RECORD SUPPORT ARM AND ROCKER-ARM ASSEMBLY:

1. Unhook the Rocker-Arm-Return Spring (37, Fig. 6).
2. Remove the Rocker-Arm-Pivot Pin (36, Fig. 6).
3. Lift out the Record Support Arm, Rocker Arm and Crescent Assembly as a unit.
4. In replacing the Rocker-Arm Assembly, note position of Selector Lever as described in the above paragraph entitled "TO REPLACE THE SUB-PLATE ASSEMBLY."

STEWART-WARNER CORP. MODEL W-504138



PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIAG. NO.	PART NO.	DESCRIPTION
1	504600	Record Clip
2	504601	Spring; Record Clip tension
3	504602	Record Support Arm
4, 5, 22	504885	Pick-up Arm, Hinge and Shaft Assembly
6	504200	Center Post
7	504364	Ball Bearing for Center Post
8	504607	Washer; Bearing Race
9	504361	Fibre Drive Gear (1-5/8" dia.)
	504362	Fibre Drive Gear (1" dia.)
10	504608	Screw; Idler Gear Mtg.
11	504360	Rubber Drive Wheel
12	504609	Clip; Idler retaining
13	504610	Washer; idler felt
14	504611	Washer; idler fibre
15	504512	Spring; Idler Tension
17	504613	Knob; Control
18	504614	Rest Post
19	504201	Motor; 115 Volt, 60 cycle
20	504615	Grommet; Motor Mounting
21	504618	Motor Hub (60 cycle)
	504202	Motor Hub (50 cycle)
23	504621	Lock; Clutch Spring Tension
25	504622	Spring; Clutch Tension
26	504623	Lever; Automatic Trip
27	504624	Disc; Pick-up Arm Raising
28	504203	On-Off Switch
29	504625	Lever; Manual Trip Assy.
30	504626	Spring, Coil; Manual Trip Tension
32	504627	Bracket; Raising Lever Pivot

DIAG. NO.	PART NO.	DESCRIPTION
33	504628	Lever; Pick-up Arm Raising
34	504629	Spring; Raising Lever Tension
35	504630	Arm; Rocker Arm and Roller Assy.
36	504631	Pin; Rocker Arm Pivot
37	504633	Spring; Rocker Arm Tension
38	504634	Spring; Selector Shaft Compression
39	504635	Collar Assy.; Selector Lever
40	504636	Stop; Selector Lever
41	504637	Spring; Selector Lever Compression
42	504638	Cam; Main Cam Assy.
43	504639	Gear; Main Cam Actuating
44	504640	Trip Assy.; Velocity Trip and Roller Assy
	504620	Bracket; Pick-up Arm Lift Stop
	504609	Clip; Pivot Retaining
	502461	Crystal Cartridge
	500966	Male Plug—Single Prong
	501031	Male Plug—2 Prong
	504606	Nut; Bearing Stud Mtg.
	502460	Phonograph Needle
	504641	Rubber bushing; for mtg. record changer
	504632	Screw; for mtg. record changer
	504617	Screw; Motor Mounting
	504364	Set Screw for Needle
	504616	Sleeve; Motor Mounting
	504642	Spring; For Mtg. Record Changer
	504605	Stud; Turntable Bearing
	504363	Turntable
	504564	Wrench for No. 8 Bristol Set Screws

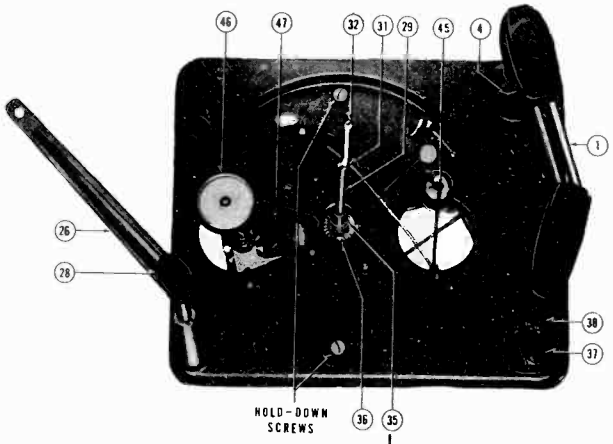


Fig. 3

NOTE: This Pinion Spring (35) must be located below the Pinion Gear (36) on record changers of the type shown in **Fig. 5** so that it holds the gear in mesh with the turntable hub at all times. Only changers of the type shown in Fig. 4 have the spring located above the gear.

DESCRIPTION OF CYCLE

STARTING . . . Turning the Control Button (37) to the "ON" position actuates the Control Link Assembly (39) which closes the Switch (45), thus supplying power to the Motor (47) causing the Turntable (34) to rotate.

With record changer shown in Fig. 4, continuing to turn the Control Button (37) to the "REJ." position causes a leg of the Control Lever (41) to move further hitting and tripping the Ratchet and Rod (48). The action of the rod releases the Catch (53) allowing the Latch Spring (55) to push the Latch (54) forcing up the Pinion Gear (36). This gear now engages rotating Turntable (34) and transmits this motion to Main Cam (56).

The record changer shown in Fig. 5 uses a different type trip mechanism which operates as follows: Continuing to turn the Control Button (37) to the "REJ." position causes a leg of Control Lever (41) to move further hitting the Ratchet and Rod (72). The action of the rod releases the Clutch Pawl (70) allowing the Clutch Pawl Spring (71) to pull it into engagement with the teeth on revolving Pinion Gear (35). This turns the Main Cam Assembly (69) past the open space in its periphery and starts the change cycle.

CYCLING . . . A single revolution of the Main Cam (56) results in complete automatic cycling of the changer. A roller on the Lift Arm (58) moves along a heart shaped groove, in the Main Cam (56), thus, moving the arm forward, then back again to the starting position. Inclined planes on either end of Lift Arm (58) effects the selection of record from stack, lifting Pick-up Arm (1) from rest position and setting needle on edge of record. Upon completion of its revolution, the lower rim of the Main Cam (56) (See Fig. 4) pushes down Latch (54) allowing Catch (53) to re-engage it. This allows Pinion Spring (35) to push Pinion Gear (36) away from Turntable (34) disengaging change mechanism during playing cycle (See Fig. 12).

The changer mechanism shown in Fig. 5 completes its cycle differently than that just described. Near completion of the revolution of the Main Cam Assembly (69) the arm of the Ratchet and Rod (72) engages the Clutch Pawl (70) pulling it away from Pinion Gear (36). At the same time Cam Stop Pawl (65) fits between two locating pins on the upper side of the Main Cam Assembly (69) holding it so that its open periphery is adjacent to the Pinion Gear (36).

RECORD FEED . . . As the Lift Arm (58) goes through its swing the inclined plane pushes up the Center Post Roller (30). This movement is transferred to the Ejection Lever (31) by a push-up rod inside the Center Post, pushing record off shoulder of the Center Post (29) allowing it to drop to the Turntable (34).

PICK-UP ARM MOVEMENT . . . The Lift Arm (58) also controls movement of Pick-up Arm (1). Lift is effected by the Lift Rod (23) riding along the incline plane of the Lift Arm (58) as the latter swings through its cycle. Direction is controlled by the engagement of the Ratchet Arm (15) with the Lift Arm (58). Upon completion of the latter's cycle it swings sufficiently clear to permit the Ratchet Arm (15) and the attached Pick-up Arm (1) to proceed across the record.

PICK-UP ARM SET DOWN POINT; 10" RECORD . . . While Pick-up Arm (1) completes its return movement, the Return Spring (22) forces Set Down Locator (20) against a stop in Base Plate (64). This provides the correct set down point of Pick-up Arm (1) for a 10" record.

PICK-UP ARM SET DOWN POINT; 12" RECORD . . . The record changer operates normally in the 10-inch position. When a 12-inch record drops, it hits the Trip Lever (4) at rear of Pick-up Arm (1). This in turn actuates the Index Cam (5) which causes the Index Lever (7) to move around and holds it in that position by a shoulder. A leg on the Index Lever (7) moves down an incline of the arm on the Adjusting Ring (8) (See Fig. 9) when the Pick-up Arm (1) moves back over the record. This provides the correct set down point for a 12-inch record.

PAWL TRIP ACTION . . . As the Pick-up Arm (1) approaches the Center Post (29) the Ratchet Pawl (16) engages the Ratchet and Rod (48) or (72). Any reversal of the Pick-up Arm (1), caused either by the eccentric spiral groove of the record or by returning arm manually, trips the Ratchet and Rod (48) or (72) thus starting the cycle.

AUTOMATIC SHUT-OFF . . . Dropping of the last record lowers the Record Support Arm (26) so that it rests on the offset shoulder of the

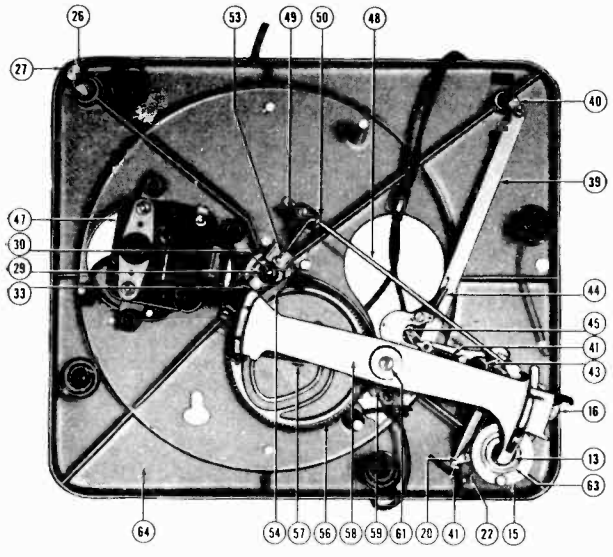


Fig. 4

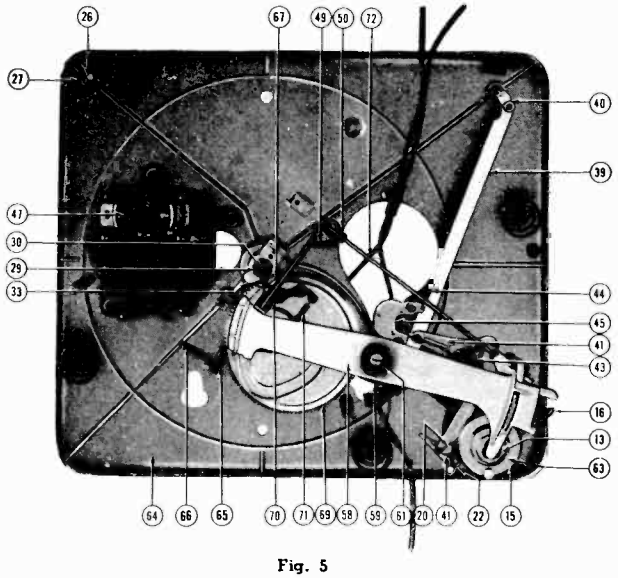


Fig. 5

Center Post (29). The hole in the arm prevents the Ejection Lever (31) from pushing all the way out, on the next change cycle. This allows the brass bushing at the base of the Center Post (29) to be in the path of the Automatic Shut-Off Rod (59). The latter is attached to the Lift Arm (58) and engages the brass bushing when the arm makes its incoming sweep. This turns the other end of the Automatic Shut-Off Rod (59) 90° so it will engage and push the Control Lever (41) when the rod makes its return sweep. The movement of the Control Lever (41) actuates the Switch (45) shutting the record changer off.

CORRECTIVE ADJUSTMENTS

FOR IMPROPER STARTING OF RECORD CHANGER: Investigate each of the following items:

1. Record Changer may have been stopped during change cycle. Merely rotate Turntable (34) **one** turn **clockwise** by hand and turn Control Button (37) on again.
2. Idler Wheel (46) not engaging rim of Turntable (34). Check for any binding action of plate or lever on which Idler Wheel (46) is mounted to motor.
3. Grease on Idler Wheel (46) or rim of Turntable (34). Clean with carbon tetrachloride.
4. Turntable bearing may be too tight or binding. Remove Turntable (34), clean and relubricate bearing with light oil.
5. Turn Control Button (37) to "REJ." position. Holding it in this position, check to see if a leg of Control Lever (41) is hitting and tripping the Ratchet and Rod (48) or (72) sufficiently to trip cycling mechanism. Check for loose Trip Rod Bearing (51). Also check to see that trip rod is not loose in ratchet.
6. If Ratchet and Rod (48), shown in Fig. 4, is operating correctly, check the following:
   a. Catch (53) not releasing Latch (54). Polish any burrs on contacting surfaces with a fine emery or crocus cloth. Lubricate with light oil. (See Fig. 12.)
   b. Latch (54) being released properly but not lifting Pinion Gear (36) to engage teeth on hub of Turntable (34). Latch (54) may be binding with center post bearing clean and remove burrs, or Latch Spring (55) which fits under Latch (54) may be defective or missing.
7. If the record changer incorporates the trip mechanism shown in Figure 5 and the Ratchet and Rod (72) is operating correctly, check to determine that the Clutch Pawl (70) moves forward and engages the teeth on the Pinion Gear (36). A defective Pawl Spring (71) or binding between Clutch Pawl (70) and the Cam would prevent this action. If binding occurs, clean out foreign matter and check for freedom but do not oil.

   Pinion Gear Spring (35) broken or missing. This spring holds pinion gear in contact with turntable hub at all times.
8. Operating temperature too low. If the 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.
9. If changer continues to be inoperative in the change cycle, check section entitled "For Changer Stalling During Cycle" on Page 6.

FOR INCORRECT DROP POINT OF PICK-UP ARM WHEN PLAYING 10-INCH RECORDS: If, when playing 10" records Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record, it may be due to one of the following:

1. Improper setting of Pick-up Arm.
   a. With a 10" record on the Turntable (34), start changer and turn Control Knob (37) to "REJ." position. Allow changer to cycle and just **after** Pick-up Arm (1) drops down, shut changer off. Raise Pick-up Arm (1) and be sure that leg of Index Lever (7) is in the **first** step of the Adjusting Ring (8) as shown in Fig. 6.

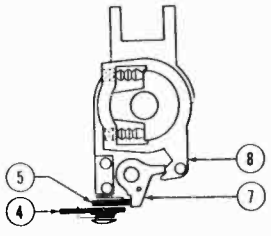


Fig. 6

   b. Note two Adjustment Screws (See Fig. 7). If needle is setting too far out on edge or off record, loosen the **back** screw about ¼ turn and tighten front screw to lock adjustment in place.
   c. If needle is setting too far in on the record, loosen the **front** screw about ¼ turn and tighten back screw.

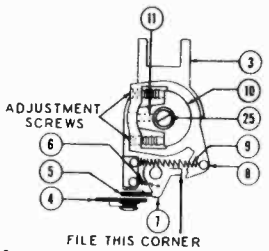


Fig. 7

2. Hinge Bearing (10) out of relation with Pick-up Arm Locator (12). This may be adjusted as follows:
   a. Place the Pick-up Arm (1) on the rest post and turn Control Knob (37) to "OFF" position.
   b. Control Lever (41) should be engaging leg on Set Down Locator (20) as shown in Figs. 4 and 8. If improperly set, position Set Down Locator (20) correctly.
   c. Lift Pick-up Arm (1) and note Set Screw (11) (See Fig. 7). Note: It may be necessary to line up hole in Adjusting Ring (8) by moving Adjustment Screws, to gain access to Set Screw (11). After loosening Set Screw (11), turn Ratchet Arm (15) until pin on upper side reaches end of slot closest to leg on Set Down Locator (20) (See Fig. 8).

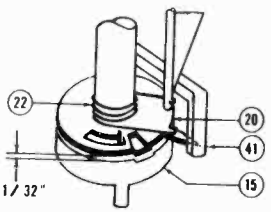


Fig. 8

   d. Place a 1/32" shim between Ratchet Arm (15) and Set Down Locator (20). Take up all the play between the parts by pressing up on the bottom of Ratchet Arm (15) and down on the top of Hinge Bearing (10). Be sure that Hinge Bearing (10) is turned **counterclockwise as far as it will go.** Now tighten Set Screw (11).
   e. Recheck set down point of Pick-up Arm (1) by referring to items 1 a, b, and c.
3. If Pick-up Arm continually lands in 12" position it may be due to Index Lever (7) not returning to 10" record position and may be corrected by the following:
   a. Stop record changer in mid-cycle at the point when the Lift Arm (58) has moved as far out as it will go and is about to start to move back to its starting point.
   b. Lift Pick-up Arm (1) and see if there is a gap of at least 1/64" between the end of the leg of the Index Lever (7) and outer tip of the Adjustment Ring (8). This space allows Index Spring (6) to pull Index Lever (7) against Index Cam (5). (See Fig. 7.)
   c. Allow the changer to cycle and Pick-up Arm (1) to set down in the 12" position. Trip Lever (4) should return to a horizontal position. If this should not be the case, check if there is a clearance of about 1/64" between Index Lever (7) and Index Cam (5) (See Fig. 9). File the edge of the Index Lever (7) closest to the Index Cam (5) to provide the required space. If space is adequate check for loose or broken index cam spring.
   d. Check for binding between Hinge Bearing (10) and body of Hinge Assembly (3). Clean and relubricate with Lubriplate. See section entitled "To Disassemble Pick-up Arm Mechanism" on Page 7.
4. Should the Pick-up Arm (1) have an erratic set down point, that is not consistently setting down in the same place, it may be due to a broken, loose or missing Ring Spring (9). The above condition may also be due to binding between Safety Spring (14) and Ratchet Arm (15) and can be checked and corrected as follows:

a. Remove the lower part of the Pick-up Arm Assembly. See section entitled "To Disassemble Pick-up Arm Mechanism on Page 7.

b. Hold Pick-up Arm Locator (12) shaft in one hand and turn Ratchet Arm (15) with other. Check to see if locator is returned all the way to stop in Ratchet Arm (15).

c. Remove Safety Spring (14). Now turn Pick-up Arm Locator (12) and check for binding. Remove all burrs and sharp edges on both locator and spring.

d. Reassemble and adjust according to Item 2 above followed by Item 1.

FOR INCORRECT DROP POINT OF PICK-UP ARM WHEN PLAYING 12" RECORDS: If, when playing 12" records Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record, it may be due to one of the following:

1. Check to see if record is hitting Trip Lever (4). Standard Records should be used. They should have a diameter of 11⅞" plus or minus 1/32".

2. Trip Lever (4) should be in a horizontal position before record drops.

   a. If it is raised up above this point, when a 12" record drops, it will miss it entirely. If this is the case, check to see if spring on Trip Lever (4) is loose or broken.

   b. If it is lower than the horizontal position, see Item 3c in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Record" on page 3.

3. Records with too large a center hole will produce the same effect as an undersize record.

4. If record still does not hit the Trip Lever (4) the projection on the bottom end of the Hinge Assembly (3) which contacts a stop in the Base Plate (64) may be defective. This would allow Pick-up Arm (1) to swing out too far creating the same effect as an undersize record. To remove, see section entitled "To Disassemble Pick-up Arm Mechanism" on page 7.

5. If record hits Trip Lever (4) but lever fails to stay down, raise Pick-up Arm (1) and check Index Lever (7) to see that there is freedom of movement and that Index Spring (6) is not unhooked or missing. This spring should keep Index Lever (7) against Index Cam (5).

6. Pick-up Arm (1) not properly adjusted. Check Adjustment 1 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records." **This adjustment should be carefully made.**

7. If record hits Trip Lever (4) but Pick-up Arm (1) lands in the 10" position, it may be due to improper relation of Index Lever (7) and leg on Adjusting Ring (8).

   a. Check to see if leg of Index Lever (7) is sliding down incline as described in section entitled "Pick-up Arm Set Down Point; 12" Record" under "Description of Cycle" and note that final position should be as shown in Fig. 9.

   b. If Index Lever (7) does not slide down incline, file about a 1/64" bevel on corner of Index Lever (7). (See Fig. 7 for location.) Be careful not to round off end.

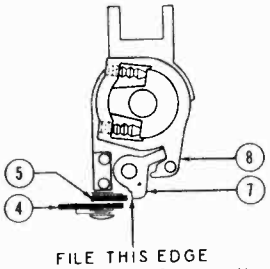


Fig. 9

8. If Pick-up Arm lands correctly in 10" position but does not land properly in 12" position, the distance that controls the indexing is improper and may be corrected as follows:

   a. Allow a 12" record to drop to the Turntable (34) as described in the instruction section on Page 1.

   b. Should the Pick-up Arm approach the record but land too far on the record, it will be necessary to file the "12" stop" deeper (See Fig. 10).

   c. Should the Pick-up Arm (1) approach the record, but land to the right of it, it will be necessary to file the "10" stop" deeper (See Fig. 10).

   d. Carefully readjust set-down point as described in Adjustment 1 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" after each filing.

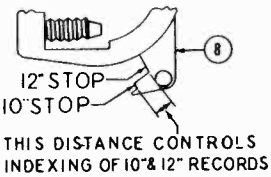


Fig. 10

9. Binding between Safety Spring (14) and Ratchet Arm (15). See Adjustment 4 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records."

FOR INCORRECT HEIGHT OF PICK-UP ARM: The following faults may occur:

1. **Needle striking edge of top record.**
2. **Needle not contacting record.**
3. **Pick-up Arm striking records still resting on offset of Center Post.**
4. **Pick-up Arm striking rest post.**

Whenever any of the above symptoms are encountered it will be necessary to adjust height of Pick-up Arm (1) as described below:

a. Raise the Pick-up Arm (1) and note Height Adjusting Screw (25) (See Fig. 7).

b. Hold Lift Rod (23) steady and turn screw clockwise to lower Pick-up Arm (1) and counterclockwise to raise arm.

Edge of Pick-up Arm (1) should clear Rest Post by about ⅛" when changer is going thru its cycle.

FOR FAILURE OF RECORDS TO DROP: Check for:

1. Pusher shaft in Center Post broken. Roller Assembly will drop out. Replace with new Center Post (29) which may be done in the following manner:

   a. Locate Set Screw (33) (See Fig. 4 or 5). Loosen screw, and Center Post (29) may be withdrawn from top of changer.

   b. Replace with new Center Post (29) making sure Set Screw (33) engages hole near bottom of Center Post (29) (See Fig. 11).

2. Ejector Lever (31) does not move out far enough.

   a. Check to see if the scored indents on the side of the Center Post (29) opposite the Ejector Lever (31) are preventing this lever from coming out far enough. If this is so, file off any interfering burrs at sides of scored areas.

   b. Check to see if Screw (61) is loose.

3. Ejector Lever (31) pushing up whole stack of records. This lever should first rise inside the slot in the Center Post (29) then move forward pushing one record off the shoulder of Center Post (29). If Ejector Lever (31) is being pushed forward prematurely, the Center Post (29) will have to be replaced.

4. Lift Arm (58) not turning during cycle. Check for broken roller on Lift Arm (58).

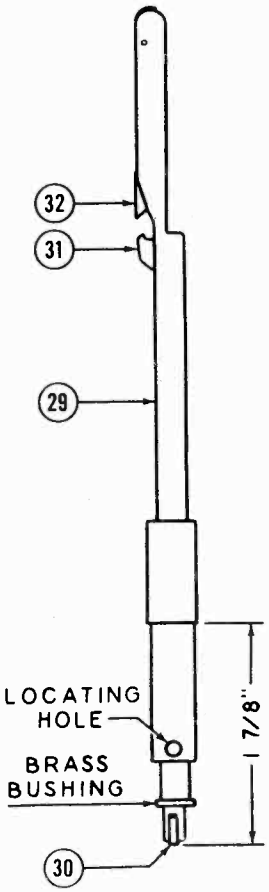


Fig. 11

FOR MULTIPLE DROPPING OF RECORDS: Check for:

1. Center hole in record too large or badly worn.
2. Record Changer not level.
3. Improper setting of Record Support Arm (26). See Instructions for "Placing Records on Changer" on Page 1. The Record Support Arm (26) must be able to slide down by its own weight. If this support does not follow the records down as they are being lowered to the Turntable (34) multiple dropping of records will result. Where this occurs, it is generally due to binding between the Support Arm (26) and the Center Post (29).
   a. Check to see if Center Post (29) is straight. Carefully straighten.
   b. Tip of Record Support Arm (26) bent up slightly. Straighten so that when shaft of Support Arm (26) comes to rest the tip should be resting on the shoulder of offset of Center Post (29).
   c. If hole in tip of Record Support Arm (26) is not centered over the Center Post (29) after checking the above steps, raise support arm up as far as it will go and with the heel of your hand, bend shaft slightly until hole is centered over Center Post (29). Lower Record Support Arm (26) 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 (26) is loose on its shaft, replace.
4. Slide (32) in upper part of Center Post (29) not all the way down. Check to see that it is not binding at any point. When records are placed on the Center Post (29), be sure the Slide (32) is all the way down. It will normally raise slightly as a record is being dropped but it should return to place immediately after record has dropped.

FOR IMPROPER DROPPING OF RECORDS: If when ejecting a record it should land on Pick-up Arm (1) or if when ejecting a 12" record, it should wabble by and fail to hit Trip Lever (4), check for:

1. Ejector Lever (31) does not move out far enough. See Item 2 in section entitled "For Failure of Records to Drop."
2. Ejector Lever (31) extending out too far. Turn Control Button (37) to "REJ." position and then turn it back to "OFF" position. Now rotate Turntable (34) by hand until Ejector Lever (31) reaches its maximum outward position, then, with a **new** record as a gauge, check to see if any binding occurs. With a fine file remove high spots.
3. Pick-up Arm (1) improperly adjusted. See Adjustments 1 a, b, and c in section entitled "For Incorrect Drop Point of Pick-up Arm when Playing 10" Records" on page 3.

FOR NEEDLE SKIPPING GROOVES: Check for:

1. Foreign matter in record groove.
2. Badly worn record.
3. Badly worn or bent needle.
4. Ratchet Arm (15) not disengaging from the Set Down Locator (20) when a cycle is completed. There should be a space of approximately 1/32" between the above parts. See Fig. 8 as well as section entitled "To Disassemble Pick-up Arm Mechanism" on Page 7.

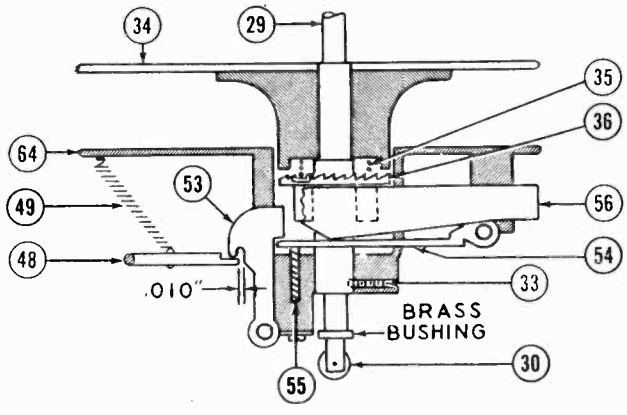


Fig. 12

5. Check for binding between Ratchet Arm (15) and Set Down Locator (20).
6. Check for binding in hinge bearing assembly. See section entitled "To Disassemble Pick-up Arm Mechanism" on Page 7.

FOR INCORRECT TRIP POINT: If Pick-up Arm (1) starts to cycle before reaching end of the record, check for:

1. Hole in record too large.
2. The edge of the Catch (53) on which end of Ratchet and Rod (48) rests, (see Figs. 4 and 12), should be smooth and highly polished. Clean and polish with emery or crocus cloth. If polishing fails, replace Catch. There should be free movement of Catch (53) on its hinge pin.
3. Not enough space between end of Ratchet and Rod (48) and Catch (53) to allow the former to swing into its locking position. There should be about .010" space between the above parts when the raised portion of the lower rim of Main Cam (56) has depressed Latch (54) as far as it will go (See Fig. 12). Move or bend Trip Rod Bearing (50) to provide this space.
4. Binding of Catch (53) on its hinge pin. Also be sure that slot into which Catch (53) fits is free from burrs.
5. Ratchet and Rod (48) or (72) should have perfect freedom of movement in its bearings.
6. Trip Rod Spring (49) has insufficient tension. After checking the above five items, making sure there is no binding and space requirements are sufficient, adjust spring either by taking off a few coils or by replacing.
7. With the mechanism shown in Fig. 5 the Trip Rod Spring (49) should have enough tension to pull the Ratchet and Rod (72) back to a fully engaged position if an eccentric record is being played. The Ratchet and Rod (72) should trip on an eccentric of 3/16" and not trip on an eccentric of 1/8". If spring tension is insufficient adjust by taking off coils, or replace.

FOR RECORD CHANGER FAILING TO CYCLE: If Pick-up Arm (1) fails to trip mechanism when it reaches spiral groove in record, it may be due to one of the following:

1. Record has no eccentric groove.
2. Binding between Ratchet and Rod (48) or (72) and Bearings (50) and (51).
3. Ratchet Pawl (16) not properly engaging serrated section on Ratchet and Rod (48) or (72).
   a. Check to be sure that Ratchet Pawl (16) has freedom of movement, that Pawl Spring (17) has sufficient tension and that point on Ratchet Pawl (16) is sharp. Resharpen with a stone.
   b. Ratchet section on Ratchet and Rod (48) or (72) may be too far away from Ratchet Pawl (16) requiring an excessive eccentric motion. Move or bend Trip Rod Bearing (51) to move ratchet sector closer. Be careful not to move it too far in as this will cause excessive tripping pressure.
4. Defective Catch (53) or rough surface on Trip Rod (48). See Item 2 in section entitled "For Incorrect Trip Point."
5. Needle jumping out of eccentric groove. This may be due to:
   a. Eccentric groove too shallow. Try a record which is known to have a good groove.
   b. Needle badly worn or bent.
   c. Trip pressure may be too great. Check to see that ratchet sector is not in too far against Ratchet Pawl (16).
   d. Check for defective Catch (53). See Item 4 above.
6. With the mechanism shown in Figs. 4 and 12 the changer may fail to trip due to the Clutch teeth on Pinion Gear (36) not engaging teeth on hub of Turntable (34).
   a. Check to see that Catch (53) and Latch (54) are operating correctly.
   b. Pinion Gear (36) binding on center post bearing. Clean and relubricate with Lubriplate.
   c. Foreign matter in teeth of Pinion Gear (36) or Main Cam (56).
   d. Latch Spring (55) may be broken or missing.

7. Clutch Pawl binding on the Cam face. On the record changer mechanism shown in Fig. 5 the Clutch Pawl (70) must be free to move forward and engage the Pinion Gear teeth when the Ratchet and Rod (72) releases it. Check for burrs or foreign matter lodged between the Clutch Pawl (70) and the Cam. Do not oil.

   Pinion Gear Spring (35) broken or missing. On changers with mechanism shown in Fig. 5 this spring must be located **under** Pinion Gear (36) so that it holds the gear in mesh with hub of turntable at all times.

FOR CONTINUOUS TRIPPING: If record changer continuously cycles, it may be due to one of the following:

1. Catch (53) defective or not engaging Latch (54) properly. See Item 2 under "For Incorrect Trip Point."
2. Binding between Ratchet and Rod (48) or (72) and Trip Rod Bearings (50) and (51).
3. Insufficient tension on Trip Rod Spring (49). See Item 6 under "For Incorrect Trip Point."
4. Changers having the trip mechanism shown in Fig. 5, the arm of the Ratchet and Rod (72) should contact the bent up section of the Clutch Pawl (70) and push it out of engagement with the Pinion Gear (36). If the Ratchet and Rod (72) is not free to meet the Clutch Pawl (70) continuous cycling will result. Check Items 2 and 3.
5. Control Lever (41) holding Ratchet and Rod (48) or (72) in reject position. Check to see that there is no binding in Control Link Assembly (39) including Control Crank (40) and Control Lever (41). Also check for loose or missing Reject Spring (44).
6. With the mechanism shown in Fig. 4 and 12 the Pinion Gear (36) must disengage from the turntable hub at the end of the cycle. Should this not occur, check following:
   a. Pinion Spring (35) missing.
   b. Burrs or binding between Pinion Gear (36) and center post bushing. Clean out and relubricate with Lubriplate.
   c. Foreign matter in teeth of Pinion Gear (36) or Main Cam (56).
7. Latch (54) not being forced down far enough to allow Catch (53) to engage it. If this should occur try placing a thin fiber washer between Main Cam (56) and Base Plate (64). The above trouble may also be due to cam bearing having an excessive amount of play, a warped Main Cam (56) or a bent cam bearing.
8. During change cycle Pinion Gear (36) is held up against hub of Turntable (34) by upper rim of Main Cam (56). Upon completion of cycle recess in rim allows Pinion Gear (36) to drop thus disengaging from hub of Turntable (34). Check for foreign matter, or burrs in recess. Clean and relubricate with Lubriplate.

FOR CHANGER STALLING DURING CYCLE:

1. Idler Wheel (46) slipping or not engaging Turntable (34). Check to see if plate or lever on which Idler Wheel (46) is mounted is free. Also check for grease on the tire or rim of Turntable (34). Clean with carbon tetrachloride.
2. Turntable bearing may be too tight or binding. Remove turntable (34), clean and relubricate bearing with light oil.

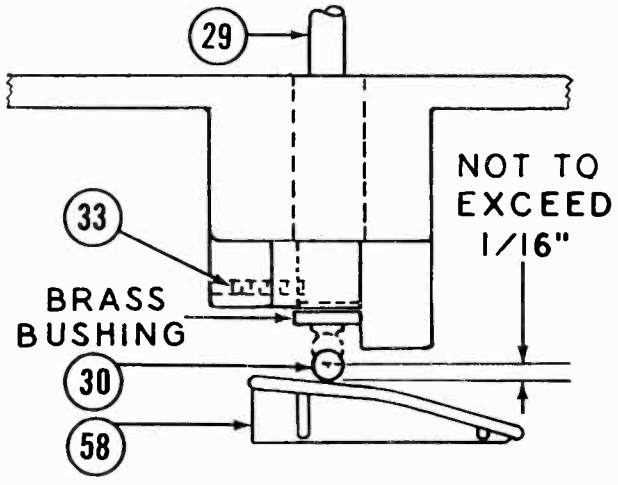


Fig. 13

3. Operating temperature too low. See Item 8 in section entitled "For Improper Starting of Record Changer" on Page 3.
4. Line voltage too low. It should not be less than 105 volts.
5. Binding in drive mechanism.
   a. Remove Idler Wheel (46). Take off Lift Arm (58). Turn Control Button (37) to "REJ." position. Replace Turntable (34) and rotate it very slowly by hand thru one cycle, checking for any binding action. If binding occurs check for: foreign matter in the gear teeth of the Main Cam (56) or (69), bent main cam bearing shaft, bent center post bushing.
   b. Replace Lift Arm (58). This time remove "C" Washer (62) at base of Lift Rod (23). Lift Pick-up Arm (1) and take out rod. Remove Lift Rod Spring (63). Now loosen Set Screw (33) and raise Center Post (29) so that inclined plane of Lift Arm (58) will not contact it. While holding Center Post in this position, cycle changer by hand and again check for any binding action. If binding occurs, check lift arm bearing for freedom and lift arm roller to be sure it is not bent causing binding in the heart shaped groove in the Main Cam (56) or (69).
6. Binding between Lift Rod (23) and inclined plane of Lift Arm (58). Replace Lift Rod (23) taken off in Instruction 5 b, but leave Center Post (29) in raised position. Now rotate Turntable (34) until Lift Arm (58) has moved out as far as it will go and is about to return. Lift Pick-up Arm (1) and raise Lift Rod (23), by pulling up. Feel the Lift Arm (58). There should be a small amount of play. Lift Rod (23) may still be contacting the inclined plane but it should not bind. If this does occur, the lift arm bearing shaft may be bent or the fiber washer under the Lift Arm (58) should be removed to lower the arm.
7. Center Post Roller (30) being compressed too far. Replace Center Post (29) to its normal position which was raised for Tests 5 and 6. Turn Control Button (37) to the "REJ." position. Rotate the Turntable (34) by hand while watching the action of the lower part of the Center Post (29) as the roller goes up the inclined plane of the Lift Arm (58). As the Center Post Roller (30) approaches the end of the face, the brass bushing is stopped by the Base Plate (64) (See Fig. 13) but the Center Post Roller (30) continues and is further compressed a distance not to exceed 1/16". Should the latter movement exceed this, the changer may stall in the cycle due to excessive pressure caused by binding of Lift Arm (58).
   a. Should the above occur check the lift arm bearing shaft to determine that it is square with the Base Plate (64).
   b. Try removing fiber washer between metal washer and bottom of Lift Arm (58).
   c. Center Post (29) may be too long. The critical 1 7/8" dimension shown in Fig. 11 should not be exceeded.
8. If change mechanism is not binding and Idler Wheel (46) is not slipping it may be assumed that the motor is weak (has low torque) and should be replaced.

FOR FAILURE OF CHANGER TO SHUT OFF AUTOMATICALLY: Check for:

1. Record Support Arm (26) binding and not dropping all the way to the offset in the Center Post (29). See Item 3 in section entitled "For Multiple Dropping of Records" on Page 5.
2. Changer stalling during cycle. See section on "For Changer Stalling During Cycle."
3. Automatic Shut-Off Rod (59) not engaging brass bushing as described in "Automatic Shut-Off" paragraph on Page 2. Check for the following:
   a. Record Support Arm (26) tip not resting on off set or shoulder of Center Post. See Item 3 in section entitled "For Multiple Dropping of Records" on Page 5.
   b. Set Screw (33) not fitting properly in locating hole of Center Post (29), thus not holding it securely.
   c. Screw (61) that holds Lift Arm (58) loose.
   d. Bent up end of Automatic Shut-Off Rod (59) too short. Replace.

FOR INCORRECT REST POSITION OF PICK-UP ARM AFTER AUTOMATIC SHUT-OFF: Check for:

1. Control Lever (41) not engaging Set Down Locator (20) as shown in Fig. 8. On the return sweep of the Automatic Shut-Off Rod (59) it should contact a projection on the Control Lever (41) moving the levers so as to bring a leg in the path of the Set Down Locator (20).

2. Hinge Bearing out of relation with Pick-up Arm Locator (12). See Item 2 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on Page 3.

FOR RECORD CHANGER SHUTTING OFF PREMATURELY: Check for:

1. Center Post Roller (30) moving up too far. See Item 7 in section entitled "For Changer Stalling During Cycle."
2. Record too thick. In this case, the changer will shut off instead of dropping the record.
3. Automatic Shut-Off Rod (59) not being reset. On the change cycle following a cycle in which the changer was automatically shut off, the Automatic Shut-Off Rod (59) should return to its original position. On the in sweep, the bent-up part of the rod engages a projection on the Control Lever (41) which turns the rod 90°. It is held against a stop on the Lift Arm (58) by a flat Spring (60).
   a. Check the tension of Spring (60). Should it be insufficient it would allow the Automatic Shut-Off Rod (59) to be out of position thus turning off changer prematurely.
   b. Lubricate the automatic shut-off rod bearings and Spring (60) with Lubriplate.
   c. In normal operation there should be enough clearance between the projection on the Control Lever (41) and the Automatic Shut-Off Rod (59) when the latter is turned fully down. Bending of rod may be necessary.

FOR SLOW TURNTABLE SPEED: Check for:

1. See Items 1, 2, 3, and 4 in section entitled "For Changer Stalling During Cycle."
2. Motor weak, (has low torque).

FOR NOISY OPERATION DURING PLAYING CYCLE: Check for:

1. Rumble. If a low pitched rumbling sound is heard while playing records, it may be due to Motor (47) not floating freely on its rubber mounts. Also check to be sure wire leads are not pulled tight. Rumbling may also be due to defective or dirty turntable bearing. Clean and relubricate.
2. If a rapid thumping sound is heard while motor is running, it is probably due to a flat spot on the Idler Wheel (46). Replace.
3. If a scraping sound is heard when Turntable (34) is revolving, check for:
   a. Turntable (34) warped, causing outer rim to rise and fall.
   b. Idler Wheel (46) bent.
   c. Wire beneath turntable rubbing.
4. If squeaking sounds are heard, it would indicate lack of oil. See section under "Lubrication" on Page 8.

FOR NOISY OPERATION DURING CHANGE CYCLE:

There is a certain amount of clicking noise as the mechanism goes through its cycle. If any excessive grinding sounds are heard, check for worn or defective parts or a lack of lubricant.

REPLACEMENT OF PARTS

TO REPLACE A PICK-UP CARTRIDGE:

1. Remove needle by taking out the small screw visible at the front of the Pick-up Arm.
2. Raise Pick-up Arm and remove two screws holding Cartridge.
3. The electrical connections to the Cartridge are of the "quick disconnect" type and may be removed without unsoldering. Merely slip the connector off the cartridge pins.

TO DISASSEMBLE PICK-UP ARM MECHANISM: The support which holds and locates the Pick-up Arm (1) is made up of an upper and lower major assembly.

These assemblies are held together by Set Screw (11). (For location see Fig. 7.) It may be necessary to line up hole in Adjusting Ring (8) by moving adjustment screws.

TOP ASSEMBLY: Before attempting to work on top assembly, it will be necessary to unsolder and disconnect the shielded lead at the terminal strip on underside of Base Plate (64). Then withdraw lead from Hinge Assembly (10) and proceed as follows to disengage top assembly:

1. Loosen Set Screw (11). It will be noted that top assembly may now be lifted straight out.
2. Disconnect one end of Ring Spring (9), being careful not to break the peened over stud around which it is fastened.
3. Loosen adjustment screws on Adjusting Ring (8). The major assembly may now be separated into three assemblies; Adjusting Ring (8), Hinge Bearing (10) and Hinge Assembly (3).
4. Pick-up Arm (1) and Counterbalance Spring (68) may be taken off of Hinge Bearing (3) by driving out Hinge Pin (2).

Care should be exercised not to lose three Ball Bearings (18) and Ball Bearing Spacer (19) resting in ball cup on Base Plate (64).

BOTTOM ASSEMBLY: Before attempting to work on bottom assembly, it will be necessary to take off Lift Arm (58) by removing Screw (61). Disassembling bottom assembly may now proceed as follows:

1. Loosen Set Screw (11). It will be noted that 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 (62) and withdraw Lift Rod (23). Take out Safety Spring (14). Remove "C" Washer (13). Ratchet Arm (15) and Pick-up Arm Locator (12) may now be separated.

REASSEMBLING PICK-UP ARM MECHANISM: The Pick-up Arm mechanism should be reassembled by reversing the procedure given in the preceding paragraphs, exercising the following precautions:

1. When replacing shielded lead in Pick-up Arm (1) care should be exercised that after lead comes out of hole in Hinge Bearing (10) that it lays in groove provided for it and then is passed around both Hinge Pin (2) and Counterbalance Spring (68). It should then be laid in special recesses around inside edge of Pick-up Arm (1).
2. When replacing Lift Arm (58) roller on arm should fit into heart shaped groove in Main Cam (56) or (69).

For final setting of Set Screw (11) and adjustment of Pick-up Arm (1), reference should be made to adjustments 2 c, d, and e in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on Page 3.

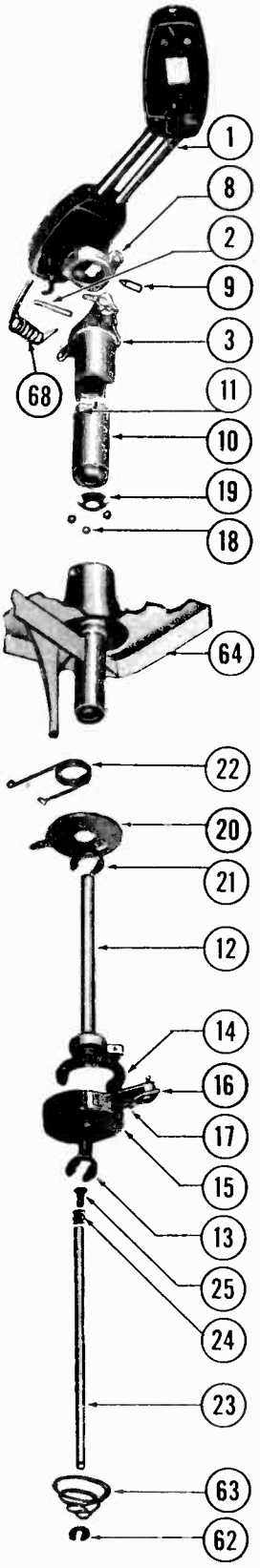


Fig. 14

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 (10).
2. Ratchet Arm (15) and Set Down Locator (20).
3. Inclined Planes on Lift Arm (58), lift arm bearing, and automatic shut-off rod bearing.
4. Between Automatic Shut-Off Rod (59) and Spring (60).
5. Heart shaped groove in Main Cam (56) or (69) and main cam bearing.
6. At lower section of Center Post (29) where the brass bushing and center post roller support go in body of Center Post (29).
7. Ball bearings in hub of Turntable (34).

B. **LIGHT OIL** (apply with small oil can or medicine dropper):

1. Pickup Arm Locator (12) inside of Ratchet Arm (15) and bearing surfaces.
2. Ball Bearings (18) inside pickup arm housing in Base Plate (64).
3. Ratchet Pawl (16) bearing.
4. Automatic Shut-Off Rod (59) bearings.
5. Control Link Assembly (39) bearings.
6. Catch (53) bearing.
7. Latch (54) bearing.
8. Turntable bearing; that is where Turntable (34) comes in contact with body of Center Post (29).
9. Pinion Gear (36) bearing.
10. On contacting surface of Catch (53) and Latch (54).

PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIAG. NO.	PART NO.	DESCRIPTION	LIST PRICE
1	505240	Pick-up Arm	$ 2.10
2	505241	Hinge Pin for Pick-up Arm	.20
—	502461	Crystal Cartridge	6.10
—	502460	Needle	1.50
—	504364	Thumb Screw for Needle	.15
3	505242	Hinge Assembly	2.10
4	———	Trip Lever (part of Item 3)	—
5	———	Index Cam (part of Item 3)	—
6	———	Spring, Index (part of Item 3)	—
7	———	Index Lever (part of Item 3)	—
8	505243	Adjusting Ring	.95
9	505244	Ring Spring	.06
10	505245	Hinge Bearing	2.00
11	505246	Set Screw 8-32x3/16	.20
12	505247	Pick-up Arm Locator	1.00
13	505248	"C" Washer for Pick-up Arm Locator	.02
14	505249	Safety Spring	.04
15	505250	Ratchet Arm	1.00
16	———	Ratchet Pawl (part of Item 15)	—
17	505251	Pawl Spring	.16
18	505252	Ball Bearing	.02
19	505253	Ball Bearing Spacer	.02
20	505254	Set Down Locator	.10
21	505255	"C" Washer for Set Down Locator	.02
22	505256	Return Spring	.10
23	505289	Lift Rod	.30
24	505290	Lock Spring	.04
25	505291	Height Adjusting Screw	.02
26	505257	Record Support Arm	2.80
27	505248	"C" Washer for Record Support Arm	.02
28	505258	Knob for Record Support Arm	.30
29	505259	Center Post Assembly (includes Ejection Lever, Slide and Roller)	6.80
30	———	Center Post Roller (part of Item 29)	—
31	———	Ejector Lever (part of Item 29)	—
32	———	Slide (part of Item 29)	—
33	505260	Set Screw for Center Post	.04
34	505261	Turntable	5.30
35	505262	Pinion Spring	.02
36	505263	Pinion Gear	.30
37	505258	Control Button (Knob)	.30
38	505264	Escutcheon, "OFF-ON-REJ"	.30

DIAG. NO.	PART NO.	DESCRIPTION	LIST PRICE
39	505265	Control Link Assembly	$ 1.55
40	———	Control Crank (part of Item 39)	—
41	———	Control Lever (part of Item 39)	—
42	505266	"C" Washer for Control Crank	.02
43	505267	"C" Washer for Control Lever	.02
44	505268	Reject Spring	.16
45	505269	Switch	.85
46	505270	Idler Wheel used with Sampsel Motor which is identified by having name printed on winding	1.90
	505271	Idler Wheel used with G. I. Motor which is identified by a red dot of paint	1.90
	505272	Idler Wheel used with Russell Motor has no identification marking	1.90
47	505273	Motor; 115V—60 Cyc.	10.90
	505274	Motor; 115V—50 Cyc.	11.25
48	505275	Ratchet and Rod	1.20
49	505276	Trip Rod Spring	.06
50	505277	Trip Rod Bearing	.09
51	505278	Trip Rod Bearing	.10
52	505279	"C" Washer on Control Rod	.02
53	505280	Catch	.16
54	505281	Latch	.25
55	505282	Latch Spring	.02
56	505283	Main Cam	1.20
57	505284	"C" Washer for Main Cam	.02
58	505285	Lift Arm (includes Items 59 & 60)	1.90
59	505286	Automatic Shut-off Rod	.30
60	505287	Spring, Automatic Shut-off Lever	.02
61	505288	Screw for Lift Arm	.04
62	505267	"C" Washer for Lift Rod	.02
63	505292	Spring, Lift Rod	.02
64	505293	Base Plate	7.95
65	505646	Cam Stop Pawl	.20
66	505647	Spring for Cam Stop Pawl	.04
67	505648	Washer, Pinion Gear Spring Support	.02
68	505642	Spring, Pick-Up Arm Counterbalance	.04
69	505643	Main Cam Assembly includes Clutch Pawl (70) and Clutch Pawl Spring (71)	3.00
70	———	Clutch Pawl (part of item 69)	—
71	505251	Clutch Pawl Spring	.16
72	505645	Ratchet and Rod	1.25

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

DESCRIPTION OF CYCLE

STARTING: By sliding the Control Button (7) to the "ON-REJECT" position, the attached On-Off Lever (8) will snap the Switch (9) to the "ON" position which supplies power to rotate the Turntable. This revolving motion is transmitted to the Turntable Bearing (13) and its attached Pulley (15) causing the Drive Belt (45) to rotate the Drum (31).

The movement of the On-Off Lever (8) also starts automatic cycling by engaging the Release Bracket (41). This releases the Drive Dog (34) which is attached to the Main Cam (32), causing it to drop

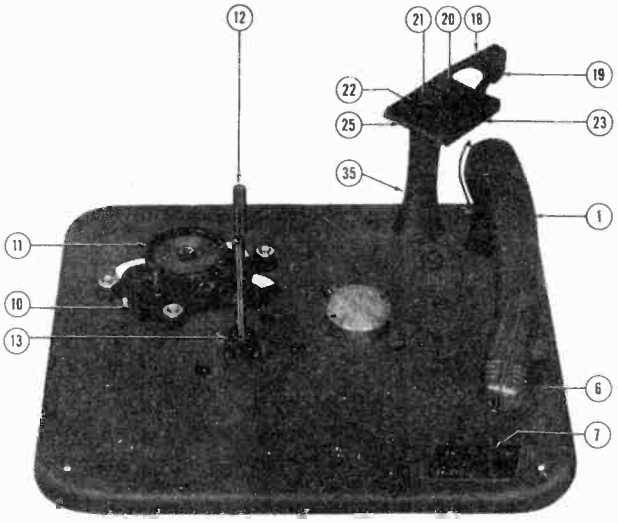


Fig. 3

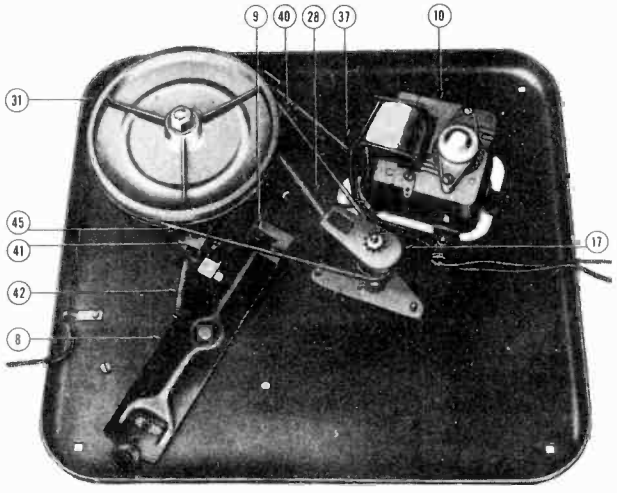


Fig. 4

down onto the rotating Drum (31). It now comes in contact with one of the bosses on the Drum (31) causing the Main Cam (32) to rotate with it.

CYCLING: A single revolution of the Main Cam (32) results in complete automatic cycling of the changer. This includes selection of record from stack, lifting Pick-up Arm (1) from rest position and setting needle on edge of record. Upon completion of the revolution, Release Bracket (41) lifts Drive Dog (34) from Drum (31) thus disengaging Main Cam (32) (see Fig. 5).

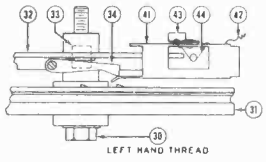


Fig. 5

RECORD FEED: Edge of Main Cam (32) controls record selection. Motion of the Record Feed Roller (27) about the edge of the Cam results in a forward and backward movement of Record Selector Lever & Shaft (26). This causes Record Feed Cam (24 in Fig. 10) to move Record Feed Plate (23) forward thus pushing record off the shoulder of Center Post (12) and allowing it to drop to the Turntable.

PICK-UP ARM MOVEMENT: The upper side of the Main Cam (32) controls Pick-up Arm (1) movement. Lift is effected by motion of the Lift Rod Assembly (4) along the top edge of the cam as the latter rotates. Direction is controlled by Sweep Lever & Pin (38) which follows a groove in the Main Cam (32).

PAWL TRIP ACTION: As the Pick-up Arm (1) approaches the Center Post (12) the Trip Lever (5) engages a Trip Pawl (43) on the Release Bracket (41). Any reversal of the Pick-up Arm, caused either by the eccentric spiral groove of the record or by returning arm manually causes the Trip Lever (5) to disengage the Release Bracket (41) and allowing the Drive Dog (34) to drop onto the Drum (31) thus putting the mechanism into a change cycle.

TEN-INCH OR TWELVE-INCH OPERATION: Adjustment of the Record Support Arm (See Fig. 1) to the ten-inch or twelve-inch position rotates the Record Selector Cam (29) thru 180 degrees. The stud, which holds the Index Lever (36) and Sweep Lever (38) together, fits into the detent of the Record Selector Cam (29). Any change in relative position of this stud makes a corresponding change in the position of the Sweep Lever & Pin (38). The location of this pin with respect to the pivot point on the Trip Lever (5) determines the drop point of the Pick-up Arm (1).

CORRECTIVE ADJUSTMENTS

FOR INCORRECT DROP POINT: If Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record, it may be due to one of the following:

1. Record player not level.
2. Shielded lead binding or pulling on rear of Pick-up Arm (1). This may cause it to approach the correct drop point and then suddenly swerve to the left so that it lands on the middle of the record. The condition should be remedied by relieving the bind and providing enough slack to avoid pulling.
3. Pick-up Arm (1) out of position with respect to Sweep Lever and Pin (38). This will cause Pick-up Arm to drop before reaching record or needle to land on wrong point. Before adjusting for incorrect drop point, be certain that Pick-up Arm (1) is in correct position. Pick-up Arm (1) may be moved sideways forcing it out of position. To reposition Arm (1) move it toward Center Post until it snaps into normal position.

   To adjust drop point, proceed as follows:

   a. Slide Control Button (7) to "ON-REJECT" position and allow changer to start cycling momentarily then slide Control to "OFF" position. Continue the change cycle by revolving the turntable by hand until Pick-up Arm (1) is about to land on the record. At this point the Sweep Lever and Pin (38) is still securely held by the groove in the Main Cam (32), thus retaining all the working parts in their correct relationship.

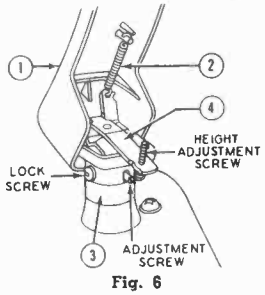


Fig. 6

   b. Loosen Lock Screw on Hub Sleeve (See Fig. 6).
   c. Now turn Adjusting Screw (on front of hub sleeve) in either direction until proper point is reached.
   d. Carefully tighten Lock Screw.

4. If in turning the Adjustment Screw, you are unable to swing the Pick-up Arm (1) to the position desired it will be necessary to do the following:
   a. Proceed as in adjustment "3a."
   b. Now loosen the two set screws at the back and side of the middle part of Hub Assembly (3), move Pick-up Arm to desired position.
   c. Tighten set screws carefully.
   d. Now make final adjustment by following steps "3b, 3c, and 3d."

NOTE: These are the only adjustments to be made. There are no adjustments to be made under the motor board for setting drop point of Pick-up Arm (1).

FOR FAILURE TO PLAY FIRST RECORD: If Pick up Arm (1) approaches record and drops correctly but Needle does not touch record, or does not raise high enough to clear the top record of a full stack, adjustment may be made as follows:

1. Lift Pick-up Arm (1) and note Height Adjustment Screw (see Fig. 6). Loosen the Lock Nut on this screw.
2. Adjust screw to lower or raise Pick-up Arm (1).
3. Retighten Lock Nut.

CAUTION: Be sure bracket which holds Height Adjustment Screw is not bent before making the above adjustments.

FOR INCORRECT TRIP POINT: If Pick-up Arm (1) starts to cycle before reaching the end of the record or if it fails to cycle after reaching the spiral groove at the center of the record it may be due to the following:

1. Shielded lead on Pick-up Arm (1) binding or too tight. Loosen and provide sufficient slack.
2. Eccentric groove in record not deep enough and needle cannot follow the groove.
3. Sticky Release Bracket (41) and Trip Pawl (43). This is a critical item and should pivot freely on the stud upon which it is mounted. To remove Release Bracket (41) take off Drive Belt (45) and Release Bracket Spring (42). Then remove clip on stud and work Release Bracket (41) clear of Drum (31). Clean and relubricate with light machine oil. Check Trip Pawl Spring (44). also see that Trip Pawl (43) moves freely. If still sluggish, replace entire Release Bracket assembly. Also check to see that Release Bracket Spring (42) is not loose or missing.

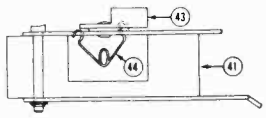


Fig. 7

4. Pick up Arm (1) may be sticking due to gummy lubricant.
   a. Proceed as in "3a" under "For Incorrect Drop Point." This will give you a reference point when replacing Pick-up Arm.
   b. Remove Pick-up Arm (1) by loosening the two set screws at the back and side of the middle part of Hub Assembly (3).
   c. Clean and relubricate with light machine oil.
   d. Replace Pick-up Arm and with set screws still loose proceed as in adjustment "4b, c, and d," under "For Incorrect Drop Point."
5. Trip Lever (5) may be loose on Pick-up Arm Bearing. Check by holding Pick-up Arm steady in one hand and see if there is any play when moving Trip Lever (5). If there is, replace with new Trip Lever and Pick-up Arm Bearing (5).
6. Trip Lever (5) may be pressed too close to base plate so that it will slide between base plate and the Trip Pawl (43) and not contact the trip pawl as it should. Merely bend Trip Lever (5) away from base plate so that it will engage Trip Pawl (43) when Pick-up Arm (1) is swung toward Center Post (12).

FOR INCORRECT SUPPORT AND DROPPING OF RECORDS: One or more of the following symptoms may occur:

Records do not rest securely on Record Support Shelf (25).
Records dropping on Pick-up Arm (1).
Multiple dropping of records.
Incorrect ejection of records.
Records fail to drop.

These symptoms may be due to the following faults:

1. Exceptionally thin or thick records.
2. Records with too large or badly worn center hole.
3. Record Support Shelf (25) out of position with respect to Center Post (12).

The Record Support Shelf (25) should be so positioned that the curve of the plate matches the curve of the record and both corners are equidistant from the center of the Center Post (1); (see Fig. 8).

If record rests on only part of the Record Support Shelf (25), it should be adjusted in the following manner:

a. With Record Support in 10-inch position, carefully place a standard 10-inch record so that it rests on Record Support Shelf and shoulder off-set in the Center Post (12).
b. Loosen Set Screw at rear of Record Support Post (see Fig. 8). Rotate the shelf in either direction until curve of the shelf matches the curve of the record and both corners are equidistant from the edge of the record.
c. Tighten set Screw.

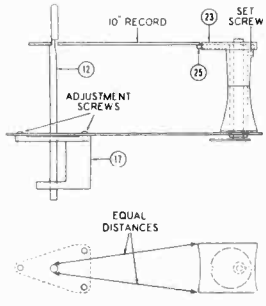


Fig. 8

If the Record Support Shelf (25) is spaced too far away or too close to the Center Post (12), its position may be changed by shifting the position of the center Post (12) in the following manner:

d. Remove Turntable from changer. Loosen three Phillips head Adjustment Screws (see Fig. 8) that hold Center Post Support (17) to base plate.
e. With Record Support in 10-inch position, carefully place a standard 10-inch record so that it rests on Record Support Shelf (25) and shoulder off-set in the Center Post (12).
f. Adjust the distance by sliding the Center Post (12) assembly until record rests on the Record Support Shelf (25) but not on Record Feed Plate (23). There should be a small amount of play to allow next record to drop and to prevent record from jamming between Record Support Shelf (25) and Center Post (12).
g. Retighten the three Phillips head adjustment screws which hold Center Post Support and then replace the Turntable.

FOR CONTINUOUS TRIPPING: If Pick-up Arm (1) goes into cycle immediately without playing the record check for:

1. Sticking Release Bracket. See adjustment "2" under "For Incorrect Trip Point."
2. Drive Dog (34) on Main Cam (32) may be stuck or stiff. Clean and relubricate. Also check leaf spring on Main Cam (32). This should exert a downward pressure on the Drive Dog of about 2 grams.

FOR RECORD CHANGER STALLING DURING CYCLE: Check for:

1. Grease on motor Drive Wheel (11). Clean with carbon tetrachloride.
2. Records jamming between Center Post (12) and Record Support Shelf (25). See adjustments starting with "d" under "For Incorrect Support and Dropping of Records."
3. Main Cam (32) sticking or hard to turn. Check Friction Spring (33). If broken or deformed, replace. See section entitled "To Replace Main Cam and Drum Assembly" in next column.
4. If changer mechanism is not binding and drive wheel does not slip, it may be due to weak or slipping Drive Belt (45). Replace Drive Belt.
5. If the changer still continues to stall after the above four items have been checked it may be assumed that motor is weak, (has low torque) and should be replaced.

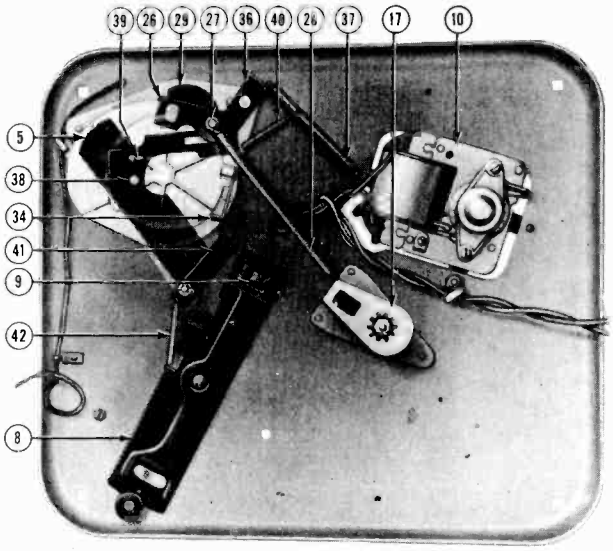


Fig. 9

FOR SLOW TURNTABLE SPEED: Check for:

1. Turntable Bearing (13) sticking. Clean and relubricate or replace bearing.
2. Drum (31) sticking. Clean and relubricate (see section entitled "To Replace Main Cam and Drum Assembly" that follows).
3. Low line voltage.
4. Motor (10) weak (has low torque). Replace. **CAUTION:** In replacing Motor (10). Index Spring (37) should be anchored under one of the nuts holding motor. (See Fig. 9).

REMOVING AND INSTALLING PARTS

1. Remove thumb screw and needle at front of Pick-up Arm.
2. Raise the arm and remove two screws holding Cartridge.
3. The electrical connections to the Cartridge are of the "quick disconnect" type and may be removed without unsoldering. Merely slip the connectors off the Cartridge pins.

TO REMOVE PICK-UP ARM:

1. Lift Pick-up Arm and unhook counter balance spring.
2. Squeeze pivot spring together until pivot points are out of Pick-up Arm.
3. Disconnect electrical connections as described above.

TO REPLACE MAIN CAM AND DRUM ASSEMBLY: In event it becomes necessary to remove Main Cam or Drum or any other part associated with these two parts, which is otherwise inaccessible, use the following procedure.

1. Remove Drive Belt (45). Disconnect Release Bracket Spring (42) and swing bracket to one side. Also unhook Record Feed Lever Spring (28) and turn lever away from Main Cam (32).

2. To remove Main Stud (30) turn it in a **clockwise** direction until it is completely out. NOTE: Main Stud (30) has a **left hand thread.**
3. Main Cam (32) may now be lifted off. Care should be exercised not to damage or deform Friction Spring (33). Drum (31) will slip off easily.

In replacing Main Cam (32) & Drum (31), care should again be exercised not to damage or deform Friction Spring (33).

To re-assemble to the base plate, the reverse of the above procedure should be followed. Be sure that Pin on Sweep Lever (38) falls into proper groove in Main Cam (32) and does not exert any pressure on the wire spring in the groove of the Main Cam (32).

TO REPLACE RECORD SELECTOR CAM & TUBE: In event this part must be replaced, relationship between Record Selector Cam (29) and Record Support Shelf (25) should be maintained. When the support shelf is in the 10-inch position, the large side of the Record

LUBRICATION

The record changer leaves the factory completely oiled and lubricated. This should be adequate for the normal life of the unit. However, if it is subjected to severe operating conditions, it is well to clean and relubricate the moving parts.

AVOID EXCESSIVE LUBRICATION: Do not permit any oil or grease to get on the rubber Drive Wheel (11) or the rim of Turntable.

a. **LUBRIPLATE No. 105** should be applied liberally to Main Cam (32).
b. **LIGHT MACHINE OIL** should be applied to all other precision fitting parts.

Selector Cam (29) should be toward the Center Post (12). Final check should be made by referring to adjustments "a, b, and c" under "For Incorrect Support and Dropping of Records."

TO REPLACE RECORD CLIP: Should Record Clip (18) be replaced or removed, care must be exercised in replacing it in the correct position. Fig. 10 shows Record Support Shelf (25) in 10-inch position and Record Clup (18) as well as Rubber Finger (19) in correct relative position.

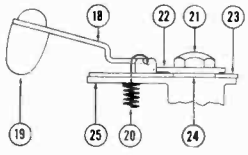


Fig. 10

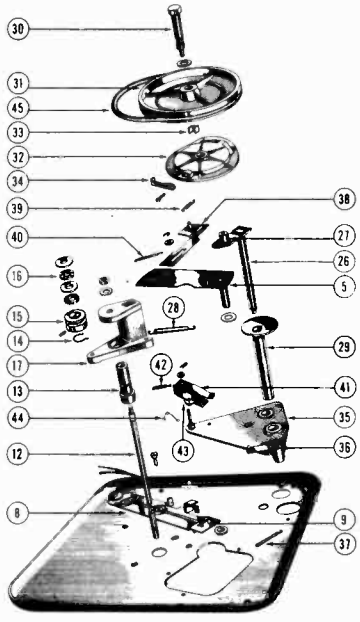


Fig. 13

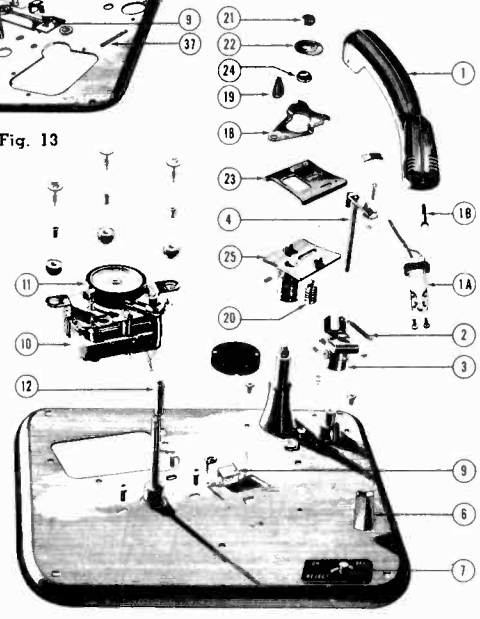
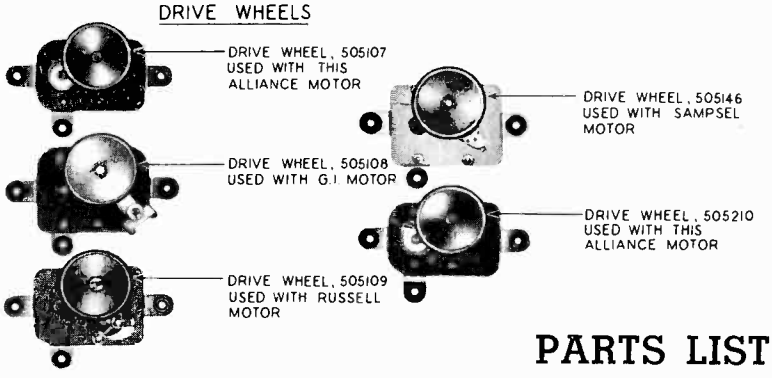


Fig. 12

DRIVE WHEELS



PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIAG. NO.	PART NO.	DESCRIPTION
1	505110	Pick-up Arm
1A	502461	Crystal Cartridge
—	502460	Needle
1B	504364	Thumb Screw for Needle
2	505111	Counter Balance Spring
3	505112	Hub and Hinge Assembly
4	505113	Lift Rod Assembly
5	505114	Trip Lever and Tone Arm Bearing
6	505115	Rest Post
7	505116	Control Button
8		On-Off Lever (part of item 7)
9	505117	Switch
10	505118	Motor 115 Volt; 60 cycle
	505019	Motor 115 Volt; 50 cycle
11	505107	Drive Wheel used with Alliance Motor
	505108	Drive Wheel used with G.I. Motor
	505109	Drive Wheel used with Russell Motor
	505146	Drive Wheel used with Sampsell Motor
	505210	Drive Wheel used with Alliance Motor
		NOTE
		See Figure 11 for identification of above drive wheels.
12	505119	Center Post
13	505120	Turntable Bearing
14	505121	Clip, Turntable Bearing
15	505122	Pulley
16	505123	Thrust Bearing
17	505124	Center Post Support
18	505125	Record Clip
19	505126	Rubber Finger
20	505127	Spring, Record Clip

DIAG. NO.	PART NO.	DESCRIPTION
21	505128	Nut, Record Selector Arm
22	505129	Washer, Cover
23	505130	Record Feed Plate
24	505131	Record Feed Cam
25	505132	Record Support Shelf
26	505133	Record Selector Lever & Shaft
27		Record Feed Roller (part of item 26)
28	505134	Spring, Record Feed Roller
29	505135	Record Selector Cam and Tube
30	505136	Stud for Main Cam
31	505137	Drum
32	505138	Main Cam
33	505139	Friction Pad
34	—	Drive Dog (part of item 32)
35	505140	Sub Plate, Pick-up Arm Bearing & Record Sup.
36		Index Lever (part of Item 35)
37	505141	Spring, Index Lever
38	505142	Sweep Lever & Pin
39	505143	Spring, Sweep Lever
40	505144	Spring, Pull In
41	505145	Release Bracket (includes Trip Pawl (43) and Spring (44))
42	505144	Spring, Release Bracket
43	—	Trip Pawl (part of item 41)
44	505147	Spring, Trip Pawl
45	505148	Drive Belt
—	505149	Turntable
—	504989	Spring, Mounting
—	504988	Rubber Pad, Mounting
—	19121	Screw 10-24x1 3/4" Chg. Mtg.
—	19122	Lock Nut, Chg. Mtg.

DESCRIPTION OF CYCLE

STARTING . . . Turning the Control Button (37) to the "ON" position actuates the Control Link Assembly (39) which closes the Switch (45), thus supplying power to the Motor (47) causing the Turntable (34) to rotate.

Continuing to turn the Control Button (37) to the "REJ." position causes a leg of Control Lever (41) to move further hitting the Ratchet and Rod (72). The action of the rod releases the Clutch Pawl (70) allowing the Clutch Pawl Spring (71) to pull it into engagement with the teeth on revolving Pinion Gear (36). This turns the main Cam Assembly (69) past the open space in its periphery and starts the change cycle.

CYCLING . . . A single revolution of the Main Cam (69) results in complete automatic cycling of the changer. A roller on the Lift Arm (58) moves along a heart shaped groove, in the Main Cam (69), thus, moving the arm forward, then back again to the starting position. Inclined planes on either end of Lift Arm (58) effects the selection of record from

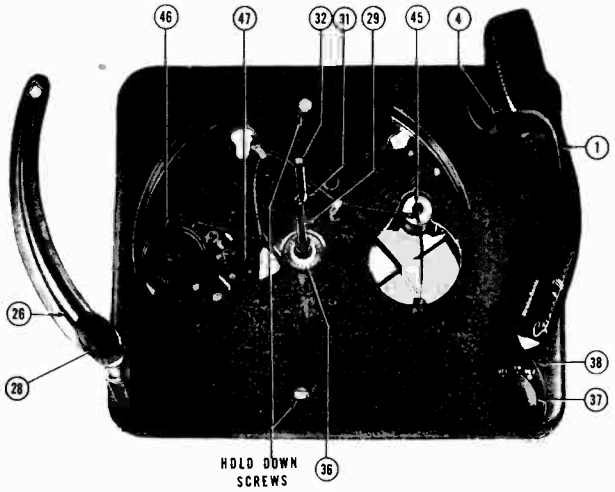


Fig. 3

stack, lifting Pick-up Arm (1) from rest position and setting needle on edge of record. Near completion of the revolution of the Main Cam Assembly (69) the arm of the Ratchet and Rod (72) engages the Clutch Pawl (70) pulling it away from Pinion Gear (36). At the same time Cam Stop Pawl (65) fits between two locating pins on the upper side of the Main Cam Assembly (69) holding it so that its open periphery is adjacent to the Pinion Gear (36).

RECORD FEED . . . As the Lift Arm (58) goes through its swing the inclined plane pushes up the Center Post Roller (30). This movement is transferred to the Ejection Lever (31) by a push-up rod inside the Center Post, pushing record off shoulder of the Center Post (29) allowing it to drop to the Turntable (34).

PICK-UP ARM MOVEMENT . . . The Lift Arm (58) also controls movement of Pick-up Arm (1). Lift is effected by the Lift Rod (23) riding along the incline plane of the Lift Arm (58) as the latter swings through its cycle. Direction is controlled by the engagement of the Ratchet Arm (15) with the Lift Arm (58). Upon completion of the latter's cycle it swings sufficiently clear to permit the Ratchet Arm (15) and the attached Pick-up Arm (1) to proceed across the record.

PICK-UP ARM SET DOWN POINT; 10" RECORD . . . While Pick-up Arm (1) completes its return movement, the Return Spring (22) forces Set Down Locator (20) against a stop in Base Plate (64). This provides the correct set down point of Pick-up Arm (1) for a 10" record.

PICK-UP ARM SET DOWN POINT; 12" RECORD . . . The record changer operates normally in the 10-inch position. When a 12-inch record drops, it hits the Trip Lever (4) at rear of Pick-up Arm (1). This in turn actuates the Index Cam (5) which causes the Index Lever (7) to move around and holds it in that position by a shoulder. A leg on the Index Lever (7) moves down an incline of the arm on the Adjusting Ring (8) (See Fig. 8) when the Pick-up Arm (1) moves back over the record. This provides the correct set down point for a 12-inch record.

PAWL TRIP ACTION . . . As the Pick-up Arm (1) approaches the Center Post (29) the Ratchet Pawl (16) engages the Ratchet and Rod (72). Any reversal of the Pick-up Arm (1), caused either by the eccentric spiral groove of the record or by returning arm manually, trips the Ratchet and Rod (72) thus starting the cycle.

AUTOMATIC SHUT-OFF . . . Dropping of the last record lowers the Record Support Arm (26) so that it rests on the offset shoulder of the Center Post (29). The hole in the arm prevents the Ejection Lever (31) from pushing all the way out, on the next change cycle. This allows the brass bushing at the base of the Center Post (29) to be in the path of the Automatic Shut-Off Rod (59). The latter is attached to the Lift Arm (58) and engages the brass bushing when the arm makes its incoming sweep. This turns the other end of the Automatic Shut-Off Rod (59) 90° so it will engage and push the Control Lever (41) when the rod makes its return sweep. The movement of the Control Lever (41) actuates the Switch (45) shutting the record changer off.

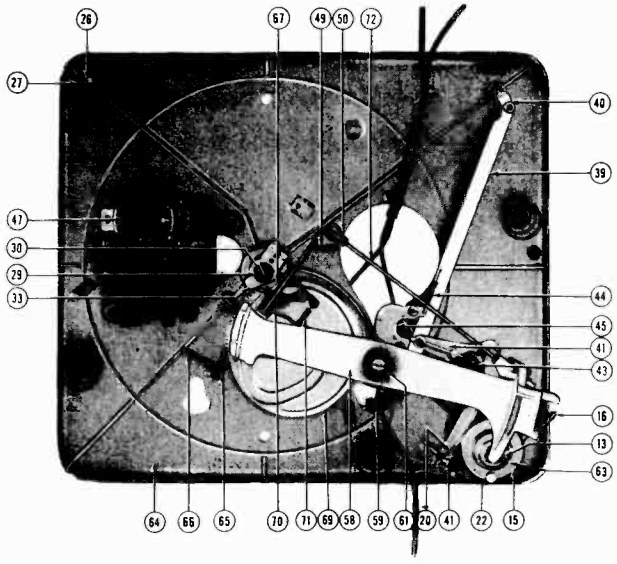


Fig. 4

CORRECTIVE ADJUSTMENTS

FOR IMPROPER STARTING OF RECORD CHANGER: Investigate each of the following items:

1. Record Changer may have been stopped during change cycle. Merely rotate Turntable (34) **one** turn **clockwise** by hand and turn Control Button (37) on again.

2. Idler Wheel (46) not engaging rim of Turntable (34). Check for any binding action of plate or lever on which Idler Wheel (46) is mounted to motor.

3. Grease on Idler Wheel (46) or rim of Turntable (34). Clean with carbon tetrachloride.

4. Turntable bearing may be too tight or binding. Remove Turntable (34), clean and relubricate bearing with light oil.

5. Turn Control Button (37) to "REJ." position. Holding it in this position, check to see if a leg of Control Lever (41) is hitting and tripping the Ratchet and Rod (72) sufficiently to trip cycling mechanism. Check for loose Trip Rod Bearing (51). Also check to see that trip rod is not loose in ratchet.

6. If the Ratchet and Rod (72) is operating correctly, check to determine that the Clutch Pawl (70) moves forward and engages the teeth on the Pinion Gear (36). A defective Pawl Spring (71) or binding between Clutch Pawl (70) and the Cam would prevent this action. If binding occurs, clean out foreign matter and check for freedom but do not oil.

   Pinion Gear Spring (35) which fits under Pinion Gear (36) broken or missing. This spring holds pinion gear in contact with turntable hub at all times.

7. Operating temperature too low. If the 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.

8. If changer continues to be inoperative in the change cycle, check section entitled "For Changer Stalling During Cycle" on Page 5.

FOR INCORRECT DROP POINT OF PICK-UP ARM WHEN PLAYING 10-INCH RECORDS: If, when playing 10" records Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record, it may be due to one of the following:

1. Crystal Cartridge may be off center which would cause needle to set down on wrong point on record. Merely slide it until it is centrally located.

2. Improper setting of Pick-up Arm.

   a. With a 10" record on the Turntable (34), start changer and turn Control Knob (37) to "REJ." position. Allow changer to cycle and just **after** Pick-up Arm (1) drops down, shut changer off. Raise Pick-up Arm (1) and be sure that leg of Index Lever (7) is in the **first** step of the Adjusting Ring (8) as shown in Fig. 5.

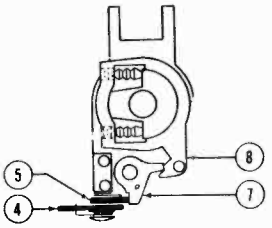


Fig. 5

   b. Note two Adjustment Screws (See Fig. 6). If needle is setting too far out on edge or off record, loosen the **back** screw about ¼ turn and tighten front screw to lock adjustment in place.

   c. If needle is setting too far in on the record, loosen the **front** screw about ¼ turn and tighten back screw.

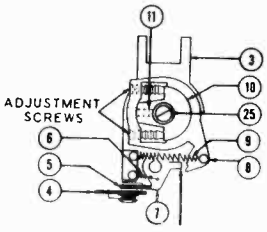


Fig. 6

3. Hinge Bearing (10) out of relation with Pick-up Arm Locator (12). This may be adjusted as follows:

   a. Place the Pick-up Arm (1) on the rest post and turn Control Knob (37) to "OFF" position.

   b. Control Lever (41) should be engaging leg on Set Down Locator (20) as shown in Figs. 4 and 7. If improperly set, position Set Down Locator (20) correctly.

   c. Lift Pick-up Arm (1) and note Set Screw (11) (See Fig. 6). Note: It may be necessary to line up hole in Adjusting Ring (8) by moving Adjustment Screws, to gain access to Set Screw (11). After loosening Set Screw (11), turn Ratchet Arm (15) until pin on upper side reaches end of slot closest to leg on Set Down Locator (20) (See Fig. 7).

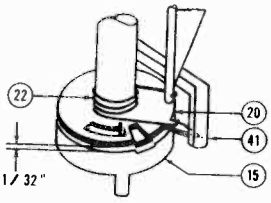


Fig. 7

   d. Place a 1/32" shim between Ratchet Arm (15) and Set Down Locator (20). Take up all the play between the parts by pressing up on the bottom of Ratchet Arm (15) and down on the top of Hinge Bearing (10). Be sure that Hinge Bearing (10) is turned **counterclockwise as far as it will go.** Now tighten Set Screw (11).

   e. Recheck set down point of Pick-up Arm (1) by referring to items 1, 2a, b and c.

4. If Pick-up Arm continually lands in 12" position, it may be due to Index Lever (7) not returning to 10" record position and may be corrected by the following:

   a. Stop record changer in mid-cycle at the point when the Lift Arm (58) has moved as far out as it will go and is about to start to move back to its starting point.

   b. Lift Pick-up Arm (1) and see if there is a gap of at least 1/64" between the end of the leg of the Index Lever (7) and outer tip of the Adjustment Ring (8). This space allows Index Spring (6) to pull Index Lever against Index Cam (5). (See Fig. 6.)

   c. Allow the changer to cycle and Pick-up Arm (1) to set down in the 12" position. Trip Lever (4) should return to a horizontal position. If this should not be the case, check if there is a clearance of about 1/64" between Index Lever (7) and Index Cam (5) (See Fig. 8). File the edge of the Index Lever (7) closest to the Index Cam (5) to provide the required space. If space is adequate check for loose or broken index cam spring.

   d. Check for binding between Hinge Bearing (10) and body of Hinge Assembly (3). Clean and relubricate with Lubriplate. See section entitled "To Disassemble Pick-up Arm Mechanism" on Page 6.

5. Should the Pick-up Arm (1) have an erratic set down point, that is not consistently setting down in the same place, it may be due to a broken, loose or missing Ring Spring (9). The above condition may also be due to binding between Safety Spring (14) and Ratchet Arm (15) and can be checked and corrected as follows:

   a. Remove the lower part of the Pick-up Arm Assembly. See section entitled "To Disassemble Pick-up Arm Mechanism" on Page 6.

   b. Hold Pick-up Arm Locator (12) shaft in one hand and turn Ratchet Arm (15) with other. Check to see if locator is returned all the way to stop in Ratchet Arm (15).

   c. Remove Safety Spring (14). Now turn Pick-up Arm Locator (12) and check for binding. Remove all burrs and sharp edges on both locator and spring.

   d. Reassemble and adjust according to Item 3 above followed by Item 2.

FOR INCORRECT DROP POINT OF PICK-UP ARM WHEN PLAYING 12" RECORDS: If, when playing 12" records Pick-up Arm (1) approaches record but drops to the right of it, or needle lands on wrong point on record it may be due to one of the following:

1. Crystal Cartridge may be off center which would cause needle to set down on wrong point on record. Merely slide it until it is centrally located.

2. Check to see if record is hitting Trip Lever (4). Standard Records should be used. They should have a diameter of 11⅞" plus or minus 1/32".

3. Trip Lever (4) should be in a horizontal position before record drops.

   a. If it is raised up above this point, when a 12" record drops, it will miss it entirely. If this is the case, check to see if spring on Trip Lever (4) is loose or broken.

   b. If it is lower than the horizontal position, see Item 4c in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Record."

4. Records with too large a center hole will produce the same effect as an undersize record.

5. If record still does not hit the Trip Lever (4) the projection on the bottom end of the Hinge Assembly (3) which contacts a stop in the Base Plate (64) may be defective. This would allow Pick-up Arm (1) to swing out too far creating the same effect as an undersize record. To remove, see section entitled "To Disassemble Pick-up Arm Mechanism" on page 6.

6. If record hits Trip Lever (4) but lever fails to stay down, raise Pick-up Arm (1) and check Index Lever (7) to see that there is freedom of movement and that Index Spring (6) is not unhooked or missing. This spring should keep Index Lever (7) against Index Cam (5).

7. Pick-up Arm (1) not properly adjusted. Check Adjustment 1 and 2 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records." **This adjustment should be carefully made.**

FOR NEEDLE SKIPPING GROOVES: Check for:

1. Foreign matter in record groove.
2. Badly worn record.
3. Badly worn or bent needle.
4. Ratchet Arm (15) not disengaging from the Set Down Locator (20) when a cycle is completed. There should be a space of approximately 1/32" between the above parts. See Fig. 7 as well as section entitled "To Disassemble Pick-up Arm Mechanism" on Page 6.
5. Check for binding between Ratchet Arm (15) and Set Down Locator (20).
6. Check for binding in hinge bearing assembly. See action entitled "To Disassemble Pick-up Arm Mechanism" on Page 6.

FOR INCORRECT TRIP POINT: If Pick-up Arm (1) starts to cycle before reaching end of the record, check for:

1. Hole in record too large.
2. Ratchet and Rod (72) should have perfect freedom of movement in its bearings.
3. Trip Rod Spring (49) has insufficient tension. Trip Rod Spring (49) should have enough tension to pull the Ratchet and Rod (72) back to a fully engaged position if an eccentric record is being played. The Ratchet and Rod (72) should trip on an eccentric of 3/16" and not trip on an eccentric of 1/8". If spring tension is insufficient adjust by taking off coils, or replace.

FOR RECORD CHANGER FAILING TO CYCLE: If Pick-up Arm (1) fails to trip mechanism when it reaches spiral groove in record, it may be due to one of the following:

1. Record has no eccentric groove.
2. Binding between Ratchet and Rod (72) and Bearings (50) and (51).
3. Ratchet Pawl (16) not properly engaging serrated section on Ratchet and Rod (72).
   a. Check to be sure that Ratchet Pawl (16) has freedom of movement, that Pawl Spring (17) has sufficient tension and that point on Ratchet Pawl (16) is sharp. Reshapen with a stone.
   b. Ratchet section on Ratchet and Rod (72) may be too far away from Ratchet Pawl (16) requiring an excessive eccentric motion. Move or bend Trip Rod Bearing (51) to move ratchet sector closer. Be careful not to move it too far in as this will cause excessive tripping pressure.
4. Needle jumping out of eccentric groove. This may be due to:
   a. Eccentric groove too shallow. Try a record which is known to have a good groove.
   b. Needle badly worn or bent.
   c. Trip pressure may be too great. Check to see that ratchet sector is not in too far against Ratchet Pawl (16).
5. Clutch Pawl binding on the Cam face. Clutch Pawl (70) must be free to move forward and engage the Pinion Gear teeth when the Ratchet and Rod (72) releases it. Check for burrs or foreign matter lodged between the Clutch Pawl (70) and the Cam. **Do not oil.**
6. Pinion Gear Spring (35) broken or missing. This spring must be located **under** Pinion Gear (36) so that it holds the gear in mesh with hub of turntable at all times.

FOR CHANGER STALLING DURING CYCLE:

1. Idler Wheel (46) slipping or not engaging Turntable (34). Check to see if plate or lever on which Idler Wheel (46) is mounted is free. Also check for grease on the tire or rim of Turntable (34). Clean with carbon tetrachloride.
2. Turntable bearing may be too tight or binding. Remove turntable (34), clean and relubricate bearing with light oil.
3. Operating temperature too low. If the 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.
4. Line voltage too low. It should not be less than 105 volts.
5. Binding in drive mechanism.
   a. Remove Idler Wheel (46). Take off Lift Arm (58). Turn Control Button (37) to "REJ." position. Replace Turntable (34) and rotate it very slowly by hand thru one cycle, checking for any binding action. If binding occurs check for: foreign matter in the gear teeth of the Main Cam (69), bent main cam bearing shaft, bent center post bushing.
   b. Replace Lift Arm (58). This time remove "C" Washer (62) at base of Lift Rod (23). Lift Pick-up Arm (1) and take out rod. Remove Lift Rod Spring (63). Now loosen Set Screw (33) and raise Center Post (29) so that inclined plane of Lift Arm (58) will not contact it. While holding Center Post in this position, cycle changer by hand and again check for any binding action. If binding occurs, check lift arm bearing for freedom and lift arm roller to be sure it is not bent causing binding in the heart shaped groove in the Main Cam (69).
6. Binding between Lift Rod (23) and inclined plane of Lift Arm (58). Replace Lift Rod (23) taken off in Instruction 5 b, but leave Center Post (29) in raised position. Now rotate Turntable (34) until Lift Arm (58) has moved out as far as it will go and is about to return. Lift Pick-up Arm (1) and raise Lift Rod (23), by pulling up. Feel the Lift Arm (58). There should be a small amount of play. Lift Rod (23) may still be contacting the inclined plane but it should not bind. If this does occur, the lift arm bearing shaft may be bent or the fiber washer under the Lift Arm (58) should be removed to lower the arm.

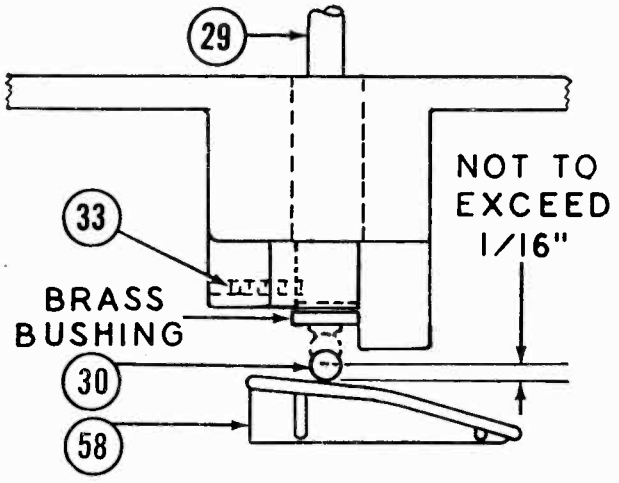


Fig. 11

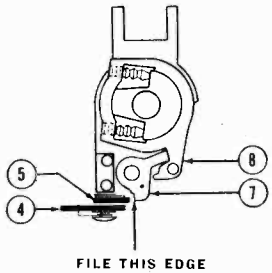
7. Center Post Roller (30) being compressed too far. Replace Center Post (29) to its normal position which was raised for Tests 5 and 6. Turn Control Button (37) to the "REJ." position. Rotate the Turntable (34) by hand while watching the action of the lower part of the Center Post (29) as the roller goes up the inclined plane of the Lift Arm (58). As the Center Post Roller (30) approaches the end of the face, the brass bushing is stopped by the Base Plate (64) (See Fig. 11) but the Center Post Roller (30) continues and is further compressed a distance not to exceed 1/16". Should the latter movement exceed this, the changer may stall in the cycle due to excessive pressure caused by binding of Lift Arm (58).
   a. Should the above occur check the lift arm bearing shaft to determine that it is square with the Base Plate (64).
   b. Try removing fiber washer between metal washer and bottom of Lift Arm (58).
   c. Center Post (29) may be too long. The critical 1 7/8" dimension shown in Fig. 10 should not be exceeded.
8. If change mechanism is not binding and Idler Wheel (46) is not slipping it may be assumed that the motor is weak (has low torque) and should be replaced.

FOR CONTINUOUS TRIPPING: If record changer continuously cycles, it may be due to one of the following:

1. Binding between Ratchet and Rod (72) and Trip Rod Bearings (50) and (51). The arm of Ratchet and Rod (72) should be free to contact the bent up section of the Clutch Pawl (70) and push it out of engagement with Pinion Gear (36).

8. If record hits Trip Lever (4) but Pick-up Arm (1) lands in the 10" position, it may be due to improper relation of Index Lever (7) and leg on Adjusting Ring (8).

   a. Check to see if leg of Index Lever (7) is sliding down incline as described in section entitled "Pick-up Arm Set Down Point; 12" Record" under "Description of Cycle" and note that final position should be as shown in Fig. 8.



FILE THIS EDGE
See Adjustment 4c in section entitled "For Incorrect Drop of Pick-up Arm When Playing 10" Records."

Fig. 8

   b. If Index Lever (7) does not slide down incline, file about a 1/64" bevel on corner of Index Lever (7). (See Fig. 6 for location.) Be careful not to round off end.

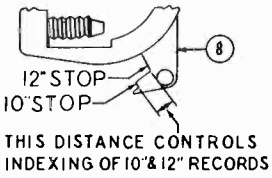
9. If Pick-up Arm lands correctly in 10" position but does not land properly in 12" position, the distance that controls the indexing is improper and may be corrected as follows:

   a. Allow a 12" record to drop to the Turntable (34) as described instruction section on Page 1.

   b. Should the Pick-up Arm approach the record but land too far on the record, it will be necessary to file the "12" stop" deeper (See Fig. 9).

   c. Should the Pick-up Arm (1) approach the record, but land to the right of it, it will be necessary to file the "10" stop" deeper (See Fig. 9).

   d. Carefully readjust set-down point as described in Adjustment 2 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" after each filing.



THIS DISTANCE CONTROLS INDEXING OF 10" & 12" RECORDS

Fig. 9

10. Binding between Safety Spring (14) and Ratchet Arm (15). See Adjustment 5 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records."

FOR INCORRECT HEIGHT OF PICK-UP ARM: The following faults may occur:

1. **Needle striking edge of top record.**
2. **Needle not contacting record.**
3. **Pick-up Arm striking records still resting on offset of Center Post.**
4. **Pick-up Arm striking rest post.**

Whenever any of the above symptoms are encountered it will be necessary to adjust height of Pick-up Arm (1) as described below:

   a. Raise the Pick-up Arm (1) and note Height Adjusting Screw (25) (See Fig. 6).

   b. Hold Lift Rod (23) steady and turn screw clockwise to lower Pick-up Arm (1) and counterclockwise to raise arm.

Edge of Pick-up Arm (1) should clear Rest Post by about 9/16" when changer is going thru its cycle.

FOR MULTIPLE DROPPING OF RECORDS: Check for:

1. Center hole in record too large or badly worn.
2. Record Changer not level.
3. Improper setting of Record Support Arm (26). See Instructions for "Placing Records on Changer" on Page 1. The Record Support Arm (26) must be able to slide down by its own weight. If this support does not follow the records down as they are being lowered to the Turntable (34) multiple dropping of records will result. Where this occurs, it is generally due to binding between the Support Arm (26) and the Center Post (29).

   a. Check to see if Center Post (29) is straight. Carefully straighten.

   b. Tip of Record Support Arm (26) bent up slightly. Straighten so that when shaft of Support Arm (26) comes to rest the tip should be resting on the shoulder of offset of Center Post (29).

   c. If hole in tip of Record Support Arm (26) is not centered over the Center Post (29) after checking the above steps, raise support arm up as far as it will go and with the heel of your hand, bend shaft slightly until hole is centered over Center Post (29). Lower Record Support Arm (26) 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 (26) is loose on its shaft, replace.

4. Slide (32) in upper part of Center Post (29) not all the way down. Check to see that it is not binding at any point. When records are placed on the Center Post (29), be sure the Slide (32) is all the way down.

FOR IMPROPER DROPPING OF RECORDS: If, when ejecting a record it should land on Pick-up Arm (1) or if, when ejecting a 12" record, it should wabble by and fail to hit Trip Lever (4), check for:

1. Ejector Lever (31) does not move out far enough. Check to see if Screw (61) is loose.
2. Ejector Lever (31) extending out too far. Turn Control Button (37) to "REJ." position and then turn it back to "OFF" position. Now rotate Turntable (34) by hand until Ejector Lever (31) reaches its maximum outward position, then, with a **new** record as a gauge, check to see if any binding occurs. With a fine file remove high spots.
3. Pick-up Arm (1) improperly adjusted. See Adjustments 1, 2a, b, and c in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on page 2.

FOR FAILURE OF RECORDS TO DROP: Check for:

1. Pusher shaft in Center Post broken. Roller Assembly will drop out. Replace with new Center Post (29) which may be done in the following manner:

   a. Locate Set Screw (33) (See Fig. 4). Loosen screw, and Center Post (29) may be withdrawn from top of changer.

   b. Replace with new Center Post (29) making sure Set Screw (33) engages hole near bottom of Center Post (29) (See Fig. 10).

2. Ejector Lever (31) does not move out far enough. Check to see if Screw (61) is loose. (See Fig. 4 for location.)
3. Ejector Lever (31) pushing up whole stack of records. This lever should first rise inside the slot in the Center Post (29) then move forward pushing one record off the shoulder of Center Post (29). If Ejector Lever (31) is being pushed forward prematurely, the Center Post (29) will have to be replaced.
4. Lift Arm (58) not turning during cycle. Check for broken roller on Lift Arm (58).

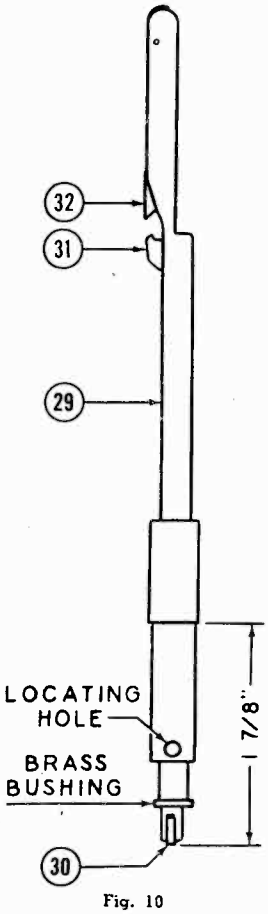


Fig. 10

FOR FAILURE OF PICK-UP ARM TO PROPERLY TRACK ACROSS RECORD: If Pick-up Arm (1) properly approaches record but needle fails to track across the record check for the following:

1. Pick-up cartridge locked in a "retracted" position. Slide cartridge until it is centrally located and it should regain its "floating" action.
2. Needle recessed into metal guard at bottom of cartridge. Merely bend needle until it protrudes 1/32" beyond metal guard at base of cartridge.

2. Insufficient tension on Trip Rod Spring (49). See Item 3 under "For Incorrect Trip Point."
3. Control Lever (41) holding Ratchet and Rod (72) in reject position. Check to see that there is no binding in Control Link Assembly (39) including Control Crank (40) and Control Lever (41). Also check for loose or missing Reject Spring (44).

FOR FAILURE OF CHANGER TO SHUT-OFF AUTOMATICALLY: Check for:

1. Record Support Arm (26) binding and not dropping all the way to the offset in the Center Post (29). See Item 3 in section entitled "For Multiple Dropping of Records" on Page 4.
2. Changer stalling during cycle. See section on "For Changer Stalling During Cycle" on Page 5.
3. Automatic Shut-Off Rod (59) not engaging brass bushing as described in "Automatic Shut-Off" paragraph on Page 2. Check for the following:
   a. Record Support Arm (26) tip not resting on off set or shoulder of Center Post. See Item 3 in section entitled "For Multiple Dropping of Records" on Page 4.
   b. Set Screw (33) not fitting properly in locating hole of Center Post (29), thus not holding it securely.
   c. Screw (61), that holds Lift Arm (58), is loose. (See Fig. 9 for location.)
   d. Bent up end of Automatic Shut-Off Rod (59) too short. Replace.

FOR INCORRECT REST POSITION OF PICK-UP ARM AFTER AUTOMATIC SHUT-OFF: Check for:

1. Control Lever (41) not engaging Set Down Locator (20) as shown in Fig. 7. On the return sweep of the Automatic Shut-Off Rod (59) it should contact a projection on the Control Lever (41) moving the lever so as to bring a leg in the path of the Set Down Locator (20).
2. Hinge Bearing out of relation with Pick-up Arm Locator (12). See Item 3 in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on Page 3.

FOR RECORD CHANGER SHUTTING OFF PREMATURELY: Check for:

1. Center Post Roller (30) moving up too far. See Item 7 in section entitled "For Changer Stalling During Cycle."
2. Record too thick. In this case, the changer will shut off instead of dropping the record.
3. Automatic Shut-Off Rod (59) not being reset. On the change cycle following a cycle in which the changer was automatically shut off, the Automatic Shut-Off Rod (59) should return to its original position. On the in sweep, the bent-up part of the rod engages a projection on the Control Lever (41) which turns the rod 90°. It is held against a stop on the Lift Arm (58) by a flat Spring (60).
   a. Check the tension of Spring (60). Should it be insufficient it would allow the Automatic Shut-Off Rod (59) to be out of position thus turning off changer prematurely.
   b. Lubricate the automatic shut-off rod bearings and Spring (60) with Lubriplate.
   c. In normal operation there should be enough clearance between the projection on the Control Lever (41) and the Automatic Shut-Off Rod (59) when the latter is turned fully down. Bending of rod may be necessary.

FOR SLOW TURNTABLE SPEED: Check for:

1. See Items 1, 2, 3 and 4 in section entitled "For Changer Stalling During Cycle."
2. Motor weak, (has low torque).

FOR NOISY OPERATION DURING PLAYING CYCLE: Check for:

1. Rumble. If a low pitched rumbling sound is heard while playing records, it may be due to Motor (47) not floating freely on its rubber mounts. Also check to be sure wire leads are not pulled tight. Rumbling may also be due to defective or dirty turntable bearing. Clean and relubricate.
2. If a rapid thumping sound is heard while motor is running, it is probably due to a flat spot on the Idler Wheel (46). Replace.
3. If a scraping sound is heard when Turntable (34) is revolving, check for:
   a. Turntable (34) warped, causing outer rim to rise and fall.
   b. Idler Wheel (46) bent.
   c. Wire beneath turntable rubbing.
4. If squeaking sounds are heard, it would indicate lack of oil. See section under "Lubrication."

FOR NOISY OPERATION DURING CHANGE CYCLE:

There is a certain amount of clicking noise as the mechanism goes through its cycle. If any excessive grinding sounds are heard, check for worn or defective parts or a lack of lubricant.

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 lubricants are as follows:

A. **LUBRIPLATE** (apply with small brush):
   1. Hing Bearing (10).
   2. Ratchet Arm (15) and Set Down Locator (20).
   3. Inclined Planes on Lift Arm (58), lift arm bearing, and automatic shut-off rod bearing.
   4. Between Automatic Shut-Off Rod (59) and Spring (60).
   5. Heart shaped groove in Main Cam (69) and main cam bearing.
   6. At lower section of Center Post (29) where the brass bushing and center post roller support go in body of Center Post (29).

B. **LIGHT OIL** (apply with small oil can or medicine dropper):
   1. Pick-up Arm Locator (12) inside of Ratchet Arm (15) and bearing surfaces.
   2. Ball Bearings (18) inside pick-up arm housing in Base Plate (64).
   3. Ratchet Pawl (16) bearing.
   4. Automatic Shut-Off Rod (59) bearings.
   5. Control Link Assembly (39) bearings.
   6. Turntable bearing; that is where Turntable (34) comes in contact with body of Center Post (29).
   7. Pinion Gear (36) bearing.

REPLACEMENT OF PARTS

TO REMOVE A PICK-UP CARTRIDGE:

1. While holding the Pick-up Arm (1) in a vertical position, grasp the cartridge near the front. Now pull cartridge outward and push it down toward the rear of the Pick-up Arm.
2. The electrical connections to the Cartridge are of the "quick disconnect" type and may be removed without unsoldering. Merely slip the connectors off the cartridge.

TO REPLACE A PICK-UP CARTRIDGE:

1. Hook flat spring which is located at top of crystal Cartridge so that it hooks over lip of bracket which is attached to the Pick-up Arm (1). With cartridge in this position pull it away from Pick-up Arm until step on it clears the bracket. Now push forward on rear of cartridge until the two ears on the bracket fit into "V" groove in body of cartridge.
2. Slip the "quick disconnect" type electrical connectors on prongs of crystal cartridge.

NOTE: Be sure crystal cartridge is centrally located and has a "floating action." Also be sure that needle protrudes 1/32" beyond metal guard at base of cartridge.

TO DISASSEMBLE PICK-UP ARM MECHANISM: The support which holds and locates the Pick-up Arm (1) is made up of an upper and lower major assembly.

These assemblies are held together by Set Screw (11). (For location see Fig. 6.) It may be necessary to line up hole in Adjusting Ring (8) by moving adjustment screws.

TOP ASSEMBLY: Before attempting to work on top assembly, it will be necessary to unsolder and disconnect the shielded lead at the terminal strip on underside of Base Plate (64). Then withdraw lead from Hinge Assembly (10) and proceed as follows to disengage top assembly:

1. Loosen Set Screw (11). It will be noted that top assembly may now be lifted straight out.

2. Disconnect one end of Ring Spring (9), being careful not to break the peened over stud around which it is fastened.

3. Loosen adjustment screws on Adjusting Ring (8). The major assembly may now be separated into three assemblies; Adjusting Ring (8), Hinge Bearing (10) and Hinge Assembly (3).

4. Pick-up Arm (1) may be taken off of Hinge Bearing (3) by driving out Hinge Pin (2).

Care should be exercised not to lose three Ball Bearings (18) and Ball Bearing Spacer (19) resting in ball cup on Base Plate (64).

BOTTOM ASSEMBLY: Before attempting to work on bottom assembly, it will be necessary to take off Lift Arm (58) by removing Screw (61). Disassembling bottom assembly may now proceed as follows:

1. Loosen Set Screw (11). It will be noted that bottom assembly may now be withdrawn.

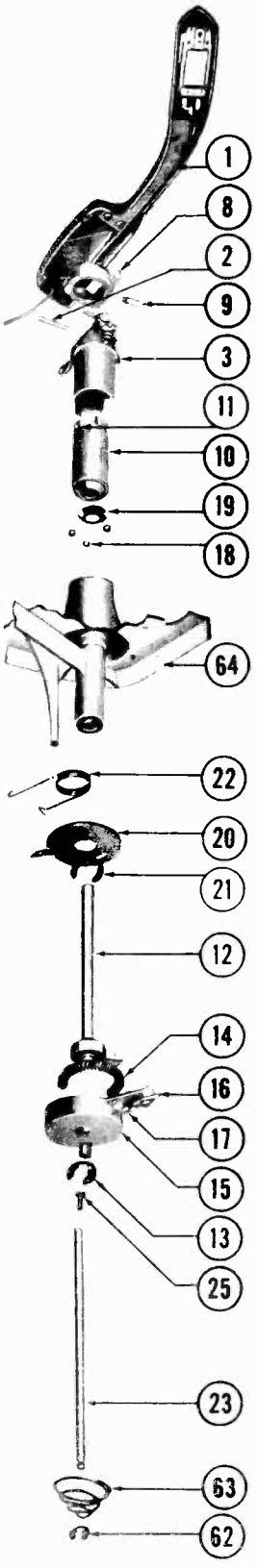
2. If a further breakdown is required, it may be done in the following manner: Take off "C" Washer (62) and withdraw Lift Rod (23). Take out Safety Spring (14). Remove "C" Washer (13). Ratchet Arm (15) and Pick-up Arm Locator (12) may now be separated.

REASSEMBLING PICK-UP ARM MECHANISM: The Pick-up Arm mechanism should be reassembled by reversing the procedure given in the preceding paragraphs, exercising the following precautions:

1. When replacing shielded lead in Pick-up Arm (1) care should be exercised that after lead comes out of hole in Hinge Bearing (10) it lays in groove provided for it and then is passed around Hinge Pin (2). It should then be laid in special recesses around inside edge of Pick-up Arm (1) and routed under strengthener plate.

2. When replacing Lift Arm (58) roller on arm should fit into heart shaped groove in Main Cam (69).

For final setting of Set Screw (11) and adjustment of Pick-up Arm (1), reference should be made to adjustments 3 c, d and e in section entitled "For Incorrect Drop Point of Pick-up Arm When Playing 10" Records" on Page 3.



PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIAG. NO.	PART NO.	DESCRIPTION
1	505828	Pick-up Arm includes strengthener plate (less cartridge)
2	505241	Hinge Pin for Pick-up Arm
—	505100	Crystal Cartridge (includes needle)
—	505717	Needle
—	505716	Set Screw for Needle
3	505242	Hinge Assembly
4	———	Trip Lever (part of Item 3)
5	———	Index Cam (part of Item 3)
6	———	Spring, Index (part of Item 3)
7	———	Index Lever (part of Item 3)
8	505243	Adjusting Ring
9	505244	Ring Spring
10	505245	Hinge Bearing
11	505246	Set Screw 8-32x3/16
12	505247	Pick-up Arm Locator
13	505248	"C" Washer for Pick-up Arm Locator
14	505249	Safety Spring
15	505250	Ratchet Arm
16	———	Ratchet Pawl (part of Item 15)
17	505251	Pawl Spring
18	505252	Ball Bearing
19	505253	Ball Bearing Spacer
20	505254	Set Down Locator
21	505255	"C" Washer for Set Down Locator
22	505256	Return Spring
23	505289	Lift Rod
25	505291	Height Adjusting Screw
26	505832	Record Support Arm
27	505248	"C" Washer for Record Support Arm
28	505829	Knob for Record Support Arm
29	505259	Center Post Assembly (includes Ejection Lever, Slide and Roller)
30	———	Center Post Roller (part of Item 29)
31	———	Ejector Lever (part of Item 29)
32	———	Slide (part of Item 29)
33	505260	Set Screw for Center Post
34	505833	Turntable
35	505262	Pinion Spring, fits under Pinion Gear (36)
36	505263	Pinion Gear
37	505829	Control Button (Knob)
38	505830	Escutcheon, "OFF-ON-REJ"
39	505265	Control Link Assembly
40	———	Control Crank (part of Item 39)
41	———	Control Lever (part of Item 39)
42	505266	"C" Washer for Control Crank
43	505267	"C" Washer for Control Lever
44	505268	Reject Spring
45	505269	Switch
46	505271	Idler Wheel used with G. I. Motor which is identified by a letter "G" stamped on plate or "GI" stamped on bottom bearing
	505272	Idler Wheel used with Russell Motor which is identified by a letter "R" stamped on plate and absence of identifying mark on lower bearing
47	505273	Motor; 115V—60 Cyc.
	505274	Motor; 115V—50 Cyc.
49	505276	Trip Rod Spring
50	505277	Trip Rod Bearing
51	505278	Trip Rod Bearing
52	505279	"C" Washer on Control Rod
57	505284	"C" Washer for Main Cam
58	505285	Lift Arm (includes Items 59 & 60)
59	505286	Automatic Shut-off Rod
60	505287	Spring, Automatic Shut-off Lever
61	505288	Screw for Lift Arm
62	505267	"C" Washer for Lift Rod
63	505292	Spring, Lift Rod
64	505831	Base Plate
65	505646	Cam Stop Pawl
66	505647	Spring for Cam Stop Pawl
67	505648	Washer, Pinion Gear Spring Support
69	505643	Main Cam Assembly includes Clutch Pawl (70) and Clutch Pawl Spring (71)
70	———	Clutch Pawl (part of Item 69)
71	505251	Clutch Pawl Spring
72	505645	Ratchet and Rod
—	500966	Plug—Phono Pick-up Cable
—	501031	Plug—Phono Motor Cable

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MODEL 800

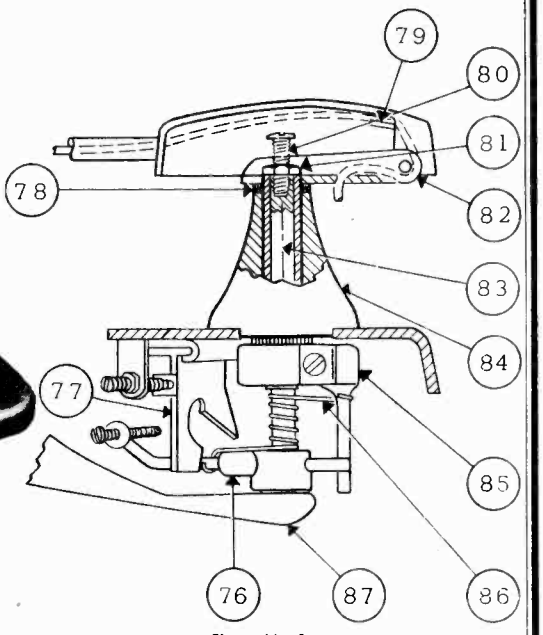

Figure No. 1

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:

APPLY LUBRIPLATE TO:

1. Worm threads (106).
2. Lift shaft (83).
3. Contact point between pickup crank (85) and trip crank (76).
4. Follower arm (30, 87).
   a. At pivot of fulcrum (51).
   b. At contact point of trip crank (76).
   c. At contact point of sub-frame (63).
5. Ejector Arm (55).
   a. At contact point with trigger (95).
   b. At contact point of follower arm (30) and screw head (53).
6. Index (77) on surfaces of slide for trip crank arm (76).
7. Follower guide (65) where follower (64) bears.

APPLY A SMALL QUANTITY OF LIGHT OIL TO:

1. Between turntable shaft (102) and storage shaft (100).
2. Follower (64) at pivot with follower arm (30).
3. Ejector arm (55) at pivot with ejector fulcrum (59).
4. Index (40) at bearing with slide bracket (48).
5. Trip link (52).
   a. At bearing in fulcrum (51).
   b. At bearing in trip bracket (60).
6. Trip plate (50) at bearing in fulcrum (51).

ADJUSTMENTS

NEEDLE SET-DOWN: Set-down of needle is adjusted by index screw (36). If needle sets down too far out, turn screw clockwise. Conversely, if needle sets down too far in, screw must be turned counter-clockwise. If set-down has been disturbed from holding tone arm during cycle or other wilful damage, tone arm crank (44) must first be properly aligned with tone arm. Loosen crank screw (43) slightly, turn tone arm crank (44) until it is stopped by screw (42) in base place, push tone arm (10) until it is approximately ¼" from storage shaft (3); lock tone arm crank into this alignment with tone arm by tightening crank screw (43) securely. Proceed to adjust set-down as above described.

CENTER TRIP: Center trip is adjusted by turning the trip screw (35) until changer trips when the needle reaches a point 1⅞" from the center of the record.

EJECTOR SLIDE POSITION: Tabs on ejector slide (93) should be approximately 1/32" from the edge of a record. This is adjusted by screw (97).

TIMING: Timing of record drop is adjusted by screw (53) on end of ejector arm (55). Adjustment should be such to just release the bottom record of a stack of ten 12" records during cycle.

TONE ARM HEIGHT: The tone arm height is adjusted by the screw (80) located on top of the tone arm lift rod. Turn the screw out or in until the top of the tone arm clears the records on the storage shaft by 1/16" to ⅛" during cycle.

Caution: All adjustments must be locked into position by means of lock nuts provided for each adjusting screw.

SERVICE INFORMATION

TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION:

1. Machine stalled in cycle:
   Turn turntable carefully by hand until it starts rotating under it's own power.
2. No current at motor:
   a. Check to determine if current is reaching A. C. leads of changer.
   b. Check switch to determine if it is closing the electrical circuit.
   c. Check wiring and soldered terminals in changer.
3. Motor defective:
   Remove turntable to allow motor to operate without load. If current is reaching motor and pulley does not rotate, the motor is defective. Repair or replace.
4. Motor idler wheel not engaging turntable rim:
   If motor pulley is turning but turntable is not;
   a. Check motor idler assembly to determine if it is free to contact the motor pulley and the turntable.
   b. Wipe off the inside rim of the turntable to remove flock or if oily, clean turntable rim and rubber tire of idler wheel with carbon tetrachloride.
5. Turntable bearing tight:
   Hold idler wheel away from turntable or remove idler wheel and rotate turntable by hand to see if it is free. If binding occurs, remove turntable and lubricate the oilite turntable shaft bearing with light oil.

CHANGER DOES NOT CYCLE WHEN CONTROL KNOB IS TURNED TO "REJ" POSITION:

1. Changer stalled or motor not driving turntable. (See "TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION"-1, 2, 3, 4 and 5.
2. Manual reject not actuating trip:
   Turn control knob to "REJ" position, hold and see if hook on end of trip link (52) is pulled back sufficiently to allow worm follower (64) to drop and engage in worm threads (106).
   a. If trip link does not release follower, check control link rod (28). If rod is bent, carefully straighten and check for trip again.
   b. If trip link is not restricting follower, but follower still does not engage in worm, the follower must be removed from the follower arm (30) and dirt or other foreign particles cleaned from the pivot point and from between the line of contact between the two parts.

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To remove follower:

(1) Be sure changer is not in cycle.

(2) Remove turntable.

(3) Remove two screws (62) from base plate and sub-frame (63).

(4) Carefully work sub-frame assembly (63) out of base plate and revolve assembly counter-clockwise to work off of follower and follower arm.

(5) Remove follower.

c. If follower drops but does not engage in worm:

(1) Check for excessive wear in pivot of follower and follower arm.

(2) Check to see if spring (29) has become unhooked.

(3) Check for dirt in follower—follower arm pivot as per paragraph 2-b, above.

3. Turntable not engaging turntable lock:

If turntable has become unseated from the turntable lock, re-seat per first paragraph, (PREPARING FOR OPERATION).

4. Turntable lock loose on turntable shaft:

Replace with new lock (103) or with new turntable shaft assembly (102).

RECORD DOES NOT DROP WHEN CHANGER CYCLES:

1. Check for bent storage shaft (3).
2. Check for under or over size record or enlarged center hole.
3. Check position of ejector slide (93) per third paragraph under "ADJUSTMENTS."
4. Check screw in ejector arm (53) to see if it hits follower arm (30) when follower (64) is at bottom of worm (106). If lock nut on this screw has worked loose, reset screw per fourth paragraph under "ADJUSTMENTS."
5. Check to see if ejector slide (93) is properly seated with its pushing mechanism on the trigger (95).
6. Check for defective trigger (95) by slowly pulling ejector arm (55) down by hand and checking if record drops. If record does not drop, trigger (95) must be repaired or replaced. To remove trigger:
   a. Unhook index spring (49) from ejector link (56).
   b. Remove 4 screws (57) from base plate and housing assembly.
   c. Lift trigger from housing and check for broken weld on strengthening brace.

TWO RECORDS DROP AT ONCE:

1. Hole in record too large or records undersized.
2. Slide (101) in storage shaft (100) not fully down.
   a. Check slide to be sure it is free and does not bind at any point. Clean out foreign matter or straighten if necessary. **DO NOT OIL.**
   b. When records are placed on storage shaft, be sure the slide is all the way down.
3. Check for position of ejector slide (93) per third paragraph under "ADJUSTMENTS."

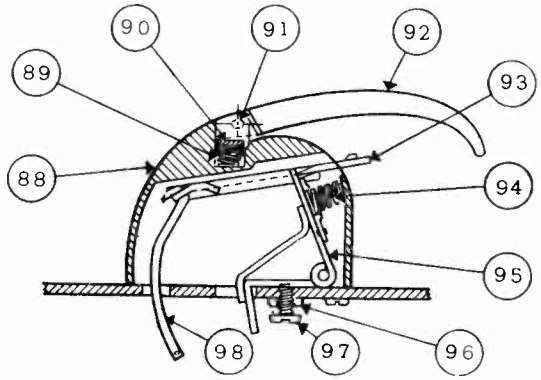

Figure No. 2

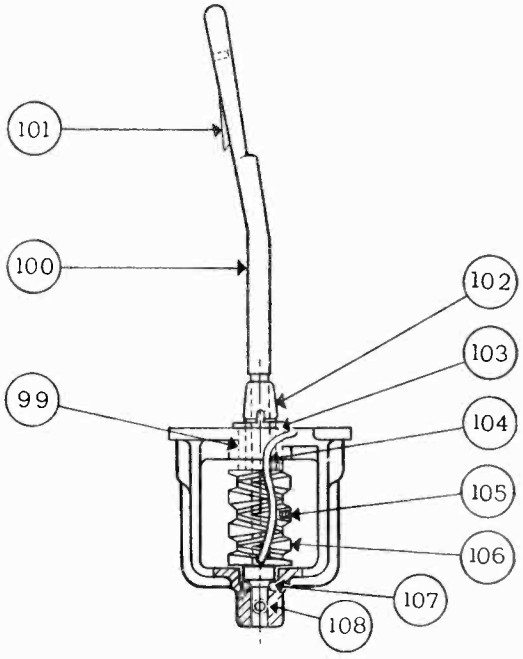

Figure No. 3

RECORD HITS PICKUP ARM:

1. Check timing of changer cycle per fourth paragraph under "ADJUSTMENTS."
2. Check for a creeping index (40). Index "creeps" if it moves when changer goes through cycle. To correct this condition:
   a. Be sure that the pickup (10) and pickup crank (44) are aligned with each other as described in first paragraph under "ADJUSTMENTS."
   b. Place ejector slide (5) in 12" position, cycle changer until follower (64) is at bottom of worm (106). Index spring (49) should be **just barely slack.** Ejector link (56) may be bent forward or back to give the index spring this required slack.
3. Check for too much gap between follower arm (87) and trip crank (76). This gap should be about the thickness of a sheet of paper (.005 to .016). To reduce gap, do **one** of the following:
   a. Bend follower arm up.
   b. Replace follower arm.

NEEDLE DOES NOT SET ON BOTH 10" AND 12" RECORDS:

1. Check needle set-down for 10" position by holding the index (40) in with the fingers as far as it will go and cycle changer.
2. Check needle set-down for 12" position by holding the index out with the fingers as far as it will go and cycle changer.
3. If 1 and 2 above are all right, when index is held in either position, check for "creeping index" per paragraph "RECORD HITS PICKUP ARM"-2.
4. Check for bind between guide tabs on index (40) and index screw (36).
5. Check for bind between index (40) and index slide bracket (48).

NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY:

1. Check for gap between follower arm (87) and trip crank (76). This gap should be about the thickness of a sheet of paper (.005 to .016). To increase gap do **one** of the following:
   a. Bend follower arm down.
   b. Place an appropriate thickness washer over the lift shaft (83) and under the lift nut (81).
2. Check for lack of vertical play of pickup shaft in the pickup post (84). There should be .003 to .010 play here. To correct, loosen screw in pickup crank (85), place shim between pick-up hinge washer and pickup post and re-set pickup and pickup crank per first paragraph under "ADJUSTMENTS," and remove shim.
3. Check for lack of lubrication between pickup shaft and pickup post.

CENTER TRIP DEFECTIVE:

1. Check to be sure control knob is in "AUT" position.
2. If changer trips too soon or too late, re-adjust per second paragraph under "ADJUSTMENTS."
3. If changer does not center trip, push trip plate (50) back by hand and see if hook on trip link (52) is pulled back sufficiently to release worm follower (64) "CHANGER DOES NOT CYCLE WHEN CONTROL KNOB IS TURNED TO "REJ" POSITION"-2. If trip link hook does not release the follower, check for the following:
   a. Weak or damaged spring (61).
   b. Bind between trip bracket (60) and trip link (52).
   c. Binding due to burrs between die-cast fulcrum (51) and trip link.
   d. If none of the above show trouble, bend the tail of the trip link (52) in toward the side of the fulcrum (51). This will allow the hook on the other end of the trip link to pull back farther.
4. If changer continues to trip, check for the following:
   a. Spring (33) weak or unhooked.
   b. Binding between trip plate rod (50) and the die-cast fulcrum (51).
   c. Too much clearance between hook on trip link (52) and follower (64). Correct by bending tail on trip link away from side of fulcrum casting (51). This will cause the hook end of the trip link to engage the follower more closely.
5. If needle jumps out of eccentric groove in record:
   a. Check trip pressure. This should not exceed 12 grams. If trip pressure is too high, check:
      (1) For binding as in 4-b above.
      (2) Spring (33) too strong. May be weakened by carefully stretching one of the center loops.
   b. Record may be defective. The trip grooves are often too shallow. Check with a record known to be good.
   c. Needle point may be worn.

TURNTABLE SPEED TOO SLOW:

1. Binding in turntable bearing. See "TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION"-5, this section.
2. Motor pulley too small in diameter. Replace with motor pulley of greater diameter.
3. Line voltage too low. Voltage in a 115 Volt changer should not be less than 100 Volts.
4. Operating temperature too low. Surrounding temperature should not be less than 60° F.

TURNTABLE SPEED TOO FAST:

Motor pulley too large in diameter. Replace with motor pulley of smaller diameter.

TURNTABLE STALLS IN CYCLE:

1. Motor idler not engaging turntable. See "TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION"-4.
2. Turntable bearing tight. See "TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION"-5.
3. Operating temperature to low. See "TURNTABLE SPEED TOO SLOW"-4.
4. Line voltage too low. See "TURNTABLE SPEED TOO SLOW"-3.
5. Binding between follower (64) and worm (106).
   a. Check lubrication of follower arm (30) at point of bearing with sub-frame (63).
   b. Check lubrication of worm threads.
   c. File some metal from follower arm (30) at point of bearing with sub-frame (63) to allow more clearance between worm (106) and follower (64). To remove follower arm (30):
      (1) See "CHANGER DOES NOT CYCLE WHEN CONTROL KNOB IS TURNED TO "REJ" POSITION."
      (2) Remove spring (29).
      (3) Remove cotter pin (31).
      (4) Remove follower arm.
5. Trip crank (76) jams on index (77):
   a. Check for lubrication on index at point of bearing with trip crank.
   b. Check for burrs on index (77) incline surface. Surface must be very smooth. Polish with crocus cloth.
   c. Check for grooves worn into trip crank arm at contact point with index. File smooth with fine file, if necessary.

NOISE DURING PLAYING OF RECORD:

1. Rumble:
   a. **From Motor:** If a low pitched rumbling sound comes from the loud speaker while a record is being played, check the motor grommets (22) to be sure the motor is freely suspended on them. The motor lead wires should have slack to allow the motor to float. Motor rumble may also come from an out of balance motor rotor. In this case, the motor should be replaced.
   b. **From Bearings:** Defective turntable shaft bearings can cause rumble. Check for foreign matter. Lubricate with lubriplate or light oil.
2. Defective Motor Idler Wheel:
   A rapid thumping sound while the motor is running may indicate a flat spot on the motor idler wheel (21). Remove the turntable and check the rubber tire on the idler. If the surface of the rubber tire is not smooth and even, replace the idler.
3. Defective Needle:
   A bad needle will cause loud needle scratch or hiss through both the speaker and the air directly from the needle. For reduced needle scratch and "needle talk," use a needle with high vertical compliance such as an off-set "dog leg" type needle.
4. Defective Record:
   Worn or defective records cause needle scratch and distortion of the recorded sound. If the record is warped, it may slip on the other records causing "wow," a waver in the recorded sound. An enlarged hole in the record can also cause "wow."
5. Turntable scrapes:
   If a scraping sound occurs as the turntable revolves, check:
   a. Turntable warped, causing outer rim to rise and fall.
   b. Motor idler bent.
6. Squeaks:
   Squeaking sound as changer operates, indicates lack of lubricant. Lubricate points indicated under LUBRICATION.

NOISE DURING CYCLING:

1. There is normally an audible snap when the follower (64) engages with the hook end of the trip link (52) at the end of the cycle.
2. Squeaks: See LUBRICATION.
3. Grinding sound indicates lack of lubrication or worn parts.

DISTORTION OF RECORDED SOUND:

1. Defective needle. See "NOISE DURING PLAYING OF RECORD"-3.
2. Defective record. See "NOISE DURING PLAYING OF RECORD"-4.
3. Defective pickup cartridge:
   When the cartridge is defective, the recorded sound may be distorted, weak or stop entirely.
4. Defective amplifier:
   Check phonograph amplifier and speaker.

NO SOUND DURING PLAYING

1. Defective cartridge. See "DISTORTION OF RECORDED SOUND"-3.
2. Defective wiring.
   Check pickup leads for a shorted or open lead.
3. Defective amplifier. See "DISTORTION OF RECORDED SOUND"-4.

EXCESSIVE RECORD WEAR:

1. Binding in pickup arm. See "NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY"-1 & 2.
2. Defective needle. See "NOISE DURING PLAYING OF RECORD"-3.
3. Excessive needle pressure:
   The pickup arm is designed to give the proper needle pressure when an aluminum cased cartridge is used. If a cartridge with a die-cast housing is used, a compensating spring must be used to bring the needle pressure down to the usual standard of 1 oz. to 1½ oz. If the needle pressure is too great on a pick-up arm using a compensating spring, bend the long end of the spring.

TURNTABLE CONTINUES TO ROTATE AFTER CONTROL KNOB IS TURNED TO "OFF" POSITION:

Switch defective, check for defects and replace if necessary.

MODEL 800

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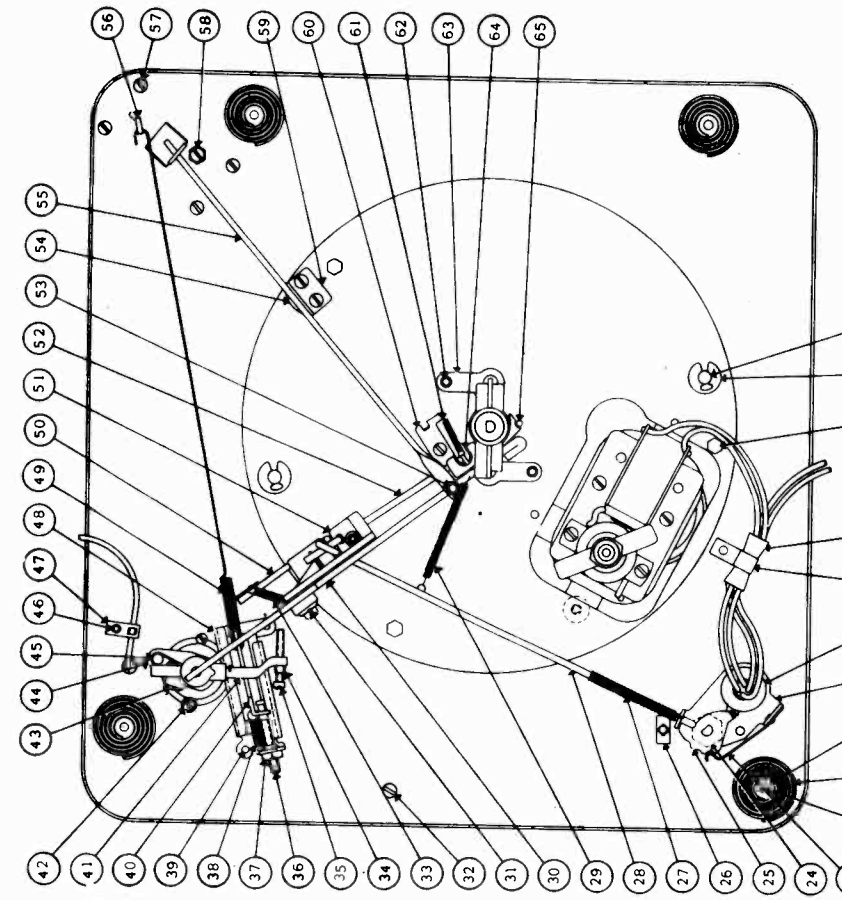

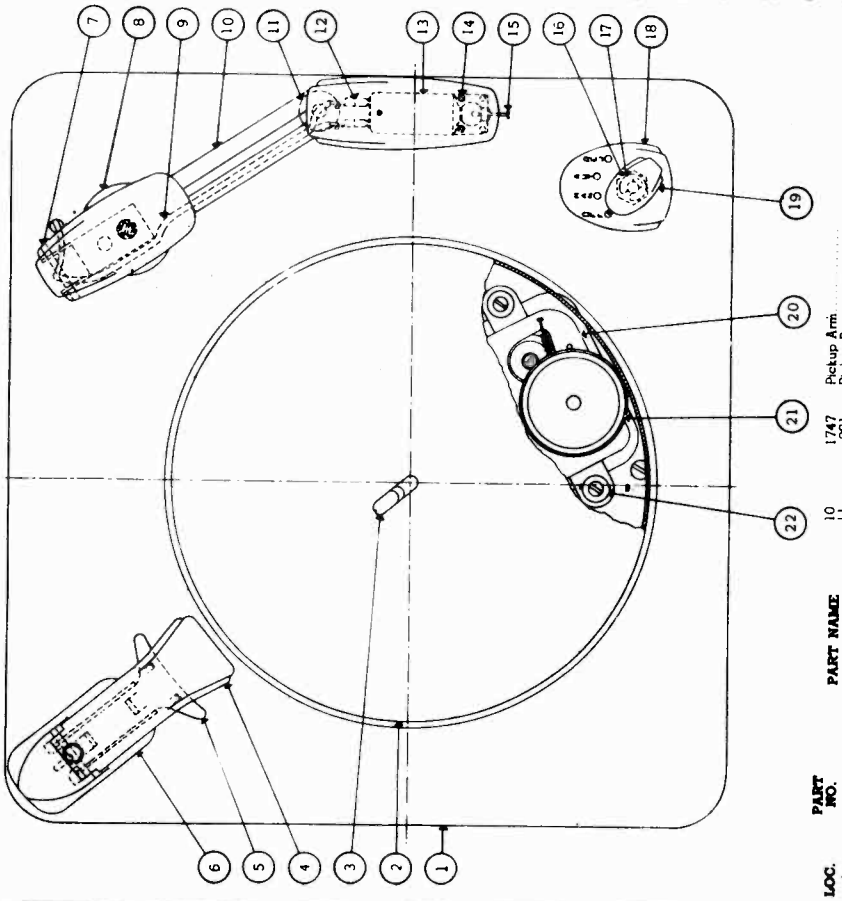

LOC.	PART NO.	PART NAME	
1	1750	Base Plate Assembly	10
		1—89 Pickup Cord Clamp	11
		4—90 Rivet	12
		2—94 Rivet	13
		1—127 Motor Cord Clamp	14
		4—478 Spring—Mounting	15
		1—681 Pickup Post	16
		2—709B Screw	17
		4—934 Cup Washer	18
		1—1741 Base Plate	19
		2—1771 Rivet	20
		1—1806 Index Slide Assembly	21
	518	Turntable Shaft	22
2	1754	Storage Shaft Assembly	22
3		1—1555 Guide Spring	23
		1—1556 Guide	24
		1—1655 Storage Shaft	25
		1—1656 Pin	26
4	1746	Hold-Down	27
5	1802	Ejector Slide	28
6	1793	Housing	29
7	941-B	Hinge Pin—Tone Arm	30
8	681	Pickup Post	31
9	984-B	Cable and Clip Assembly	32
		1—560-B Cable	33
		2—962 Cartridge Clip	34
10	1744	Pickup Assembly	35
		2—713 Screw	36
		1—589B Lead Clip	37
		1—649B Cartridge	38
		1—944 Cable & Clip Assembly	39
		1—1747 Pickup Arm	40

	1747	Pickup Arm	
	961	Pickup Reel	
	982	Cartridge Clip	
41	649-E	Cartridge	
1755	713	Screw #4 x ¼ Type "Z"	
	1572	Cartridge Thumb Screw	
	1789	Control Shaft Bearing	41
	1796	"C" Washer	42
	963-3	Escutcheon	43
	711	Knob	44
	711-B	Screw #10-32 x ⅜ R. H.	45
	1743	Motor Assembly	46
	666	Idler Wheel	47
	94	Motor Spacer	48
	516	Grommet	48
	1786	Washer—Motor Mounting	
	1806	Screw—#6 x ⅜ Type "Z"	
		Cam Spring	
	1717	Control Bearing Nut	
	1788	Control Cam Assembly	
	1660	Speed Nut	
	1800	Spring—Control rod	49
	983	Control Link	50
	62	Spring—Follower Arm	
	1784	Follower Arm Assembly	51
	1876	Corner Pin	52
	1791	Screw #10 x ½ Type "Z"	53
	796-B	Spring Clip Plate	53
	1728	Nut #6-32 x ¼ Hex.	54
	1909	Screw—#6-32 x 1	55
	1732	Index Screw	
	873-A	Nut—#10-32	
	1787	Spring—Slide Return	
	712	Rivet	
	1663	Index	56
	1771		
	1785		

	1796	Trip Crank	76
	1785	Index	77
	48	Fibre Washer	78
	589-B	Pickup Lead Clip	79
	1616-A	Screw—#5-40 x ½ BH	80
	1617	Nut—#5-40 x 3/16 Hex.	81
	746	Pickup Hinge Assembly	82
	833	Lift Shaft	83
	681	Pickup Post	84
	1743	Pickup Crank	85
	686	Spring Crank	86
	1791	Follower Arm Assembly	87
	1793	Housing	88
	728	Spring	89
	1737	Hold-down Cup	90
	941-A	Hinge Pin—Hold-down	91
	1746	Hold-Down	92
	1802	Ejector Slide	93
		Spring	94
	423	Trigger Assembly	95
	777	Nut #6-32 x 3/16 Hex.	96
	466	Screw #6-32 x ½ B. H.	97
	1668	Ejector Link	98
	695	Storage Shaft Assembly	99
	689-A	Bearing	100
	1754	Guide	101
	1556	Turntable Shaft	102
	1804	Turntable Shaft Assembly	
	1805	1—679 Turntable Lock	
		1—1804 Turntable Shaft	

42	1663	Nut	57
41	1785	Index	58
40	1796	Trip Crank Assembly	
39	1755	1—833 Lift Shaft	
38		1—1796 Trip Crank	
37	1796	Trip Crank	57
36	1877	Stop Washer	58
35	711-B	Screw #10-32 x ⅜ R. H.	59
34	1743	Pickup Crank	60
33	666	Spring—Crank	61
32	94	Rivet—Cord Clamp	62
31	47	Pickup Cord Clamp	63
30	98	Slide Bracket	64
29	1786	Index Slide Assembly	65
28	1806	1—1663 Nut	66
27		1—1785 Index	67
26		1—1786 Slide Bracket	68
25		1—1787 Index Screw	69
24		Spring—Index	70
23	884	Trip Plate Assembly	71
22	1772		72
21	926	Fulcrum	
20	1794	Trip Link	
19	466	Nut #6—32x5/16 Hex.	
	1807	Screw—#6-32 Phillips B. H.	
	706	Rivet	
	669	Ejector Arm and Fulcrum Assembly	72
	1821	1—669 Ejector Arm	73
		1—706 Rivet	74
		1—926 Ejector Arm Fulcrum	75
56	695	Ejector Link	76

57	709-B	Screw #6-32 x ½ B. H.	76
58	1668	Screw	77
59	1766	Ejector Arm Fulcrum	78
60	1765	Trip Bracket	79
61	1790	Spring—Trip Link	80
62	409	Screw with Lockwasher	81
63	1658	Sub-Frame	82
64	1795	Follower	83
65	875	Follower Guide	84
66	1723-A	Shipping Bolt	85
67	1736	"C" Washer (shipping bolt)	86
68	1902	Leg Stud	87
69	138	Motor Cord Loom	88
70	127	Motor Cord Clamp	89
71	467	Switch Cover	90
72	1737	Switch Bracket Assembly	91
	1748	1—467 Switch	92
		1—1737 Switch Cover	93
		1—1769 Switch Bracket	94
		1—1788 Cam Spring	95
		Switch Bracket	96
	1769	Cup Washer—Mounting Spring	97
	934	Spring—Mounting	98
	478	Rivet—Mounting Spring	99
	90	Trip Crank Assembly	100
	1755	1—833 Lift Shaft	101
		1—1796 Trip Crank	102

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MODEL 70

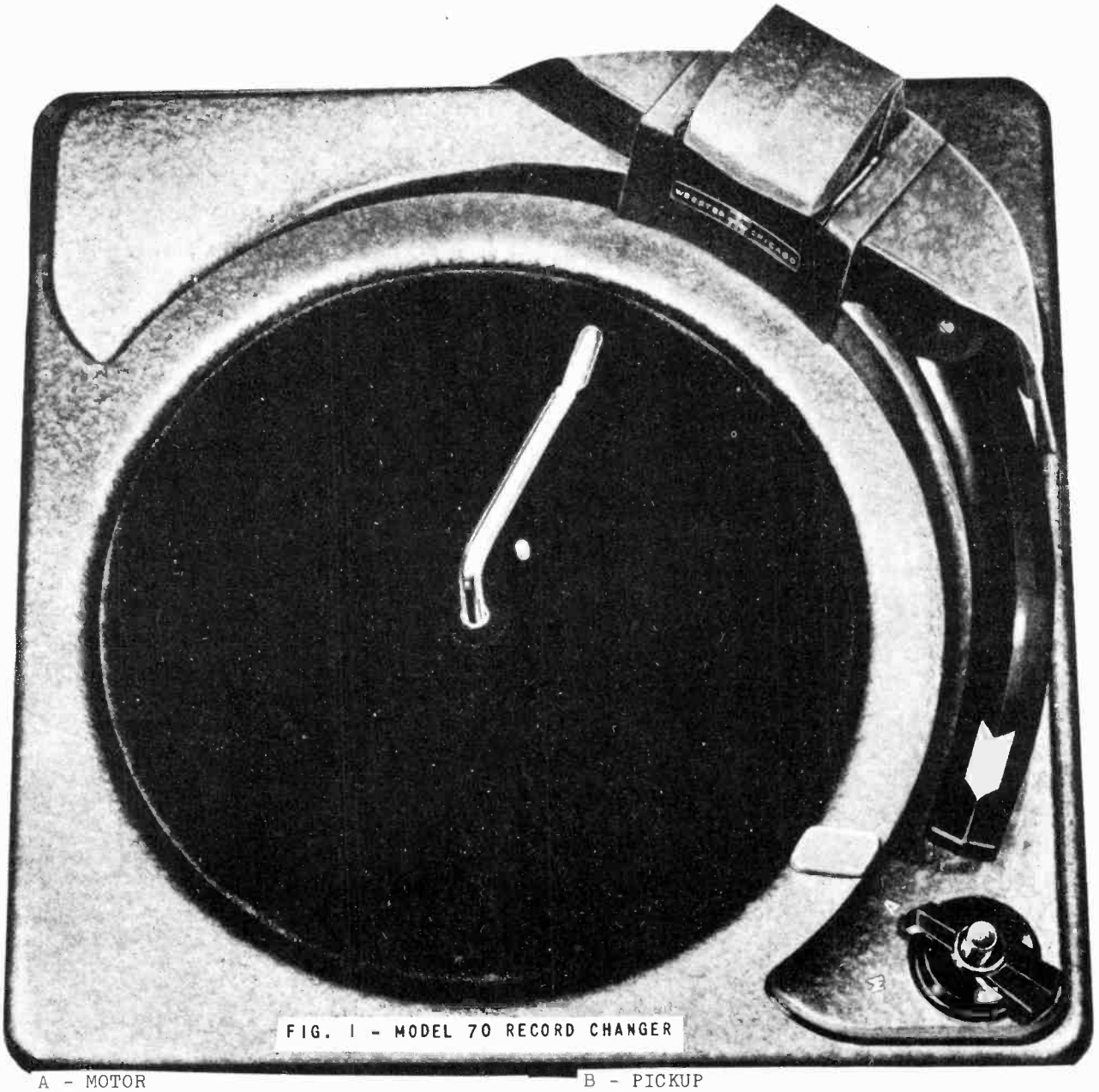

FIG. 1 - MODEL 70 RECORD CHANGER

A - MOTOR

B - PICKUP

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 pulley (Part No. 17X412-4) must be used in place of the one supplied with the changer in order to drive the turntable at the required speed of 78 R.P.M.

NOTE: When the 50 cycle drive sleeve is used, the idler wheel will not be completely retracted from the turntable but will still have some pressure applied to it when the motor is off. This is due to the larger diameter of the 50 cycle pulley.

Do not under any circumstances connect the motor to a source of direct current or to alternating current of any other frequencies.

The high impedance crystal cartridge supplied with this changer is the Astatic Nylon 1-J. This cartridge features a genuine Nylon, knee-action, sapphire-tipped needle, having all the advantages of a permanent or fixed needle, with the additional advantage of being easily replaced. When making replacements, the Nylon needle is removed from the Nylon Chuck by means of an ejector screw which fits in a hole in the cartridge housing directly above the top of the needle. Any type screw with a 2-64 thread may be used. It is then a simple matter to insert the new needle in the tapered groove of the chuck until the needle fin locks in place.

Replacement needles can be obtained through any radio distributor handling Astatic products.

MODEL 70

WEBSTER CHICAGO CORP.

C - OPERATION - AUTOMATIC

Model 70 requires no adjustments for the playing of either 10" or 12" records. When a record or stack of records is placed on the spindle step with the edge of the record resting on the Record Selector Shelf, the changer will automatically select and index for the correct record size.

1 - With the Record Ballast Weight turned back, place up to ten 12" records, twelve 10" records or a 1-1/8" stack of intermixed records on the spindle so that the bottom record rests on the step of the spindle and on the shelf of the Record Selector.

2 - Turn the Record Ballast Weight forward to rest on the top record.

3 - Turn the Selector Switch (sleeve of ON button) to AUTOMATIC.

4 - Press the ON button down firmly and release. This action turns on the motor, engages the idler wheel and starts the mechanism in cycle to drop the bottom record of the stack into playing position.

To reject any record while playing in the Automatic position, press the ON button.

NOTE: The OFF button may be pressed during any portion of the change cycle. The Pickup Arm may be moved manually at any time without damage to the mechanism. However, after the last record has been played the Pickup Arm should not be touched until it has come to rest on the OFF button.

5 - 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 - Remove the Spindle.

b - Remove the entire stack of records from the turntable and place them to one side.

c - Replace the Spindle making sure that it is inclined toward the Selector Post and that it is engaged in the D slot in the sub-plate.

d - Turn the record ballast weight back out of position.

e - Place the new stack of records on the Spindle, one at a time.

D - OPERATION - MANUAL

1 - Turn the Selector Switch (sleeve of ON button) to MANUAL. When the switch is in this position, the pickup arm will not move to the edge of the record when the ON button is pushed, nor will it lift from the record upon reaching the center grooves.

2 - With the Record Ballast Weight turned back and the spindle in position, place a record on the spindle as in Automatic Operation. The record may then be moved forward slightly to slip over the spindle step and lowered to the turntable in playing position.

3 - Press the ON button.

4 - 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.

The high compliance of the Nylon needle plus the protection offered by the needle guard will protect the sapphire from fracturing or chipping if accidentally dropped on the record. However, it is advisable to use care in handling the pickup arm.

5 - To stop the mechanism at any time, press the OFF button.

This unit has been accurately adjusted, lubricated and tested at the factory and should require no further adjusting in the field. If service repairs become necessary, this bulletin should be studied carefully before making any adjustments or replacing parts.

Service parts are available at the factory. All parts must be ordered by Part Number, Model Number and production number stamped on the under side of the main plate.

Service repairs and adjustment on the Model 70, listed by the apparent condition are as follows:

A - AUTOMATIC TRIP FAILS TO FUNCTION

When the movement of the pickup arm toward the spindle is greater than 1/8 inch in 1/2 revolution of the turntable, the Automatic Trip Arm trips the Velocity Trip and Roller Assembly. This releases the Actuating Pawl on the Main Cam Assembly, allowing it to engage the Main Cam Actuating Gear and driving the mechanism through the change cycle.

The automatic trip arm follows the movement of the pickup arm through a spring compression clutch. This clutch must be kept free of oil or grease.

Should it become necessary to clean the clutch, loosen the lock (Point "A" Figure 8) to relieve the spring tension and clean the clutch parts with carbon tetrachloride. Reset the clutch spring tension by setting the lock at least 1/4 inch below the main plate. This tension should be just sufficient to 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 (Illus. 47 Fig. 7).

2 - Actuating pawl stuck. (Part of Main Cam assembly, Illus. 46 Fig. 7, engaged by hook end of Velocity Trip and Roller Assembly.)

3 - Automatic Trip Arm (Illus. 30 Fig. 6) bent and not hitting the Velocity Trip and Roller assembly.

4 - Insufficient compression on clutch spring (Illus. 29 Fig. 6).

5 - Manual Trip Lever binding at rivet (Illus. 34 Fig. 6).

6 - Manual • Trip Lever rubbing on switch mounting bracket.

7 - No velocity lead-in groove or eccentric groove in center of record.

8 - Foreign matter in record groove.

9 - Badly worn record.

10 - Badly worn or bent needle.

B - MANUAL TRIP FAILS TO FUNCTION

The manual trip is operated by the ON button. When the button is pressed, the Manual Trip Lever is actuated, tripping the Velocity Trip and Roller Assembly and putting the mechanism in cycle.

1 - Manual Trip Lever (Illus. 34 Fig. 6) hair spring bent or broken.

2 - Velocity Trip and Roller Assembly binding (Illus. 47 Fig. 7).

3 - Actuating pawl stuck.

C - NEEDLE SKIPS GROOVE

With the pickup arm in playing position, the arm is practically free-floating on its pivot. There is no lead-in spring which might drag the needle over the first few grooves of the record or minimum radius device to jam the arm on the inside grooves.

The pressure required to actuate the trip mechanism is negligible.

Should the needle skip grooves at any time, check for:

1 - Record Changer not level.

2 - Pickup Arm binding.

3 - Foreign matter in record groove.

4 - Pickup cord pulled too tight or caught in hinge assembly.

5 - Badly worn record groove.

6 - Badly worn or bent needle.

D - MECHANISM CONTINUES TO CYCLE

At the completion of the change cycle the actuating pawl is engaged 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. This hook should be adjusted for about .005 - .015 clearance from the bottom of the main cam drive gear. Greater clearance may permit the pawl to bounce past the hook and re-engage. Also check for:

1 - Velocity Trip and Roller Assembly (Illus. 47 Fig. 7.) rubbing on Main Cam Actuating gear (Illus. 45 Fig. 7).

2 - Manual Trip Lever (Illus. 34 Fig. 6.) binding at rivet.

3 - Hook end of Velocity Trip and Roller assembly bent and not engaging pawl.

4 - Bakelite disengage roller broken on Velocity Trip and Roller Assembly.

E - CONTINUES TO PLAY LAST RECORD AND DOES NOT SHUT OFF

1 - Check floating spindle to be sure that it moves up and down freely.

2 - With no records on spindle, check Automatic Shut Off Lock Lever (Point B, Fig. 8.) Hook end of this arm should catch the Pickup Arm Raising Disc at the beginning of the cycle to prevent travel of the arm and to cause it to drop on the OFF button. With no records on the Spindle, this hook should clear the Pickup Arm Raising Disc by 1/32 inch with the mechanism at rest. Bend lip (Point G Fig. 8) if necessary to make this adjustment. Do not attempt to move Pickup Arm Raising Disc up or down.

F - MOTOR DOES NOT SHUT OFF

1 - OFF button stuck.

2 - Defective switch mechanism.

3 - Defective Switch.

NOTE - Do not attempt repairs on the Switch Mechanism or the Switch. If either becomes defective, the entire assembly should be replaced.

G - PICKUP ARM LIFT TOO HIGH OR TOO LOW

1 - The needle should approach the top record of a full stack on the turntable with approximately 1/8 inch clearance. Adjust by bending the Pickup Arm Raising Lever at Point C., Fig. 8. Do not attempt to move Pickup Arm Raising Disc up or down.

H - NEEDLE LET DOWN INDEXING INCORRECT

The eccentric screw, accessible through the top of the Pickup Arm, should take care of any normal 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 - Operate the mechanism by revolving the turntable manually until the needle drops to within 1/8 inch of a ten inch record on the turntable.

2 - With a #8 Bristol wrench in each of the set screws (Points D and E, Fig. 8) alternately loosen one and tighten the other until the needle rests above the record lead-in groove at the desired point.

3 - Be sure that both set screws are tight when this adjustment is completed.

4 - The twelve inch position is indexed automatically by the pressure of a 12 inch record on the front of the push-off fingers. These fingers are pivoted and gravity balanced and must move freely. (See Fig. 3).

I - PICKUP ARM DROPS OFF "OFF" BUTTON

When the Pickup Arm is indexed to the OFF position, the lip of the Pickup Arm Raising Disc rests in the groove formed by the inside bevel of the lower Pickup Arm Pivit Shaft Bracket touching the Stud post. (Fig. 8).

Adjust the position of the bracket so that the lip of the Pickup Arm Raising Disc rests in the groove with the Pickup Arm Pivot Shaft touching the sub plate. When properly adjusted, there should be .010 clearance between the lip of the Pickup Arm Raising Disc and the bottom of the groove. The position of the Pickup Arm on the Off Button is adjusted by bending the lip of the Pickup Arm Raising Disc, so that when the Pickup Arm is resting on the Off Button, the lip of the Pickup Arm Disc rests in the groove formed by the bracket and stud. After making this adjustment, check the setdown of the needle on a 12" record to be certain that the lip of the Pickup Arm Raising Disc does not hit the beveled side of this bracket.

J - INCONSISTENT RECORD DROP OR CENTER HOLE DAMAGE

The distance between the push-off fingers and the spindle is critical and should be adjusted as accurately as possible. If this distance is too great, records of minimum diameter will not be pushed off the spindle step during the change cycle. If it is too short, records of maximum diameter will either lie over the tips of the push-off fingers (resulting in no record drop and improper index) or be pushed against the spindle with undue force, causing center hole damage.

CAUTION: Be certain that a standard size record is used in making this adjustment. A standard 10" record measures 9-7/8" ± 1/32" diameter. A standard 12" record measures 11-7/8" ± 1/32" diameter.

With a standard 10" record on the spindle, check the distance between the edge of the record and the front push-off fingers. This distance should

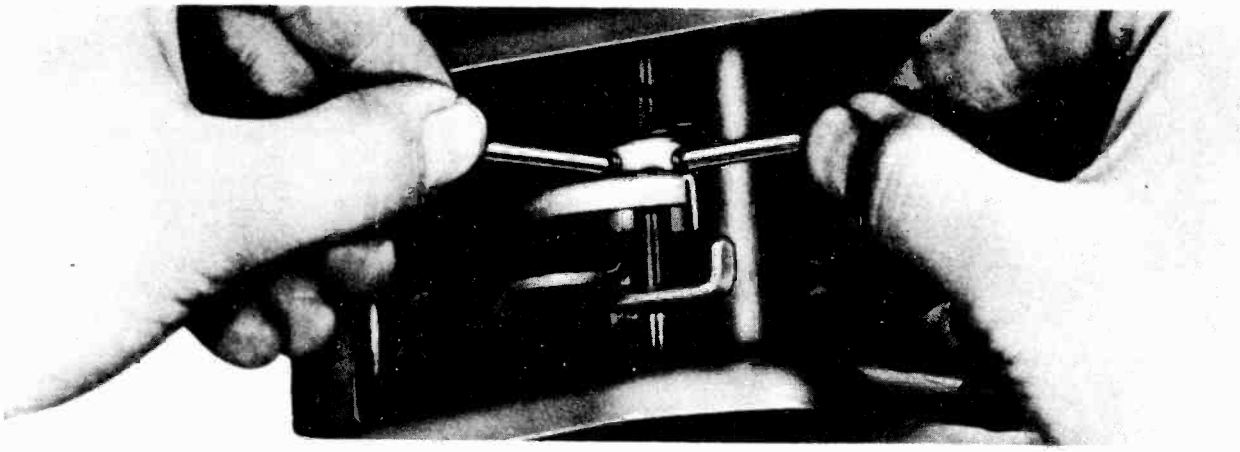

FIG. 2 - ALTERNATE NEEDLE LET DOWN INDEXING ADJUSTMENT

be approximately 5/32" and should be the same for both fingers. With a full stack of records on the spindle, the weight of the records will reduce this distance to about 1/8"

Do not attempt to bend the spindle to adjust this distance. Bending the spindle will destroy the relationship between the heel of the spindle off-set and the horizontal plane of the record. This spacing is set to permit only one record at a time to slide between the heel of the off-set and the step of the spindle.

Standard records are 0.70 to 0.100 in thickness and any change in the angle of the spindle will either close the angle of the off-set, which will result in torn center labels on thick records, or open the angle, permitting two thin records to drop at one time.

To adjust the pushoff distance:

1 - Remove the four screws under the main plate which hold the center trim section.

2 - Remove the center trim section by lifting straight up.

3 - For forward adjustments of the push-off, wedge a screw driver between the rocker arm and the sub-plate in front of the rocker arm pivot. With the heel of the hand, bend the record selector post toward the spindle.

4 - For backward adjustment, wedge the screw driver between the rocker arm and the sub-plate in back of the rocker arm pivot. Pull back on the selector post.

5 - After making any adjustment, make sure that both push-off fingers are equi-distant from the edge of the record.

Model 70 Record Changer leaves 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.

NOTE: AVOID EXCESSIVE LUBRICATION

Do not permit any oil or grease to get on the rubber idler drive wheel or the Motor Pulley (Illus. 14 and 27, Fig. 4), 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 - #10 Oil (apply with small oil can or medicine dropper)

1 - Motor Bearings. Saturate top and bottom felts.

2 - Pickup Arm Shaft (Illus. 5 Fig. 6). Apply one drop each to bottom bearing point, bracket hole and hole through Main Base Plate.

3 - Ball Bearing Assembly (Illus. 8 Fig. 4).

4 - Idler Wheel Felt (Illus. 21 Fig. 4).

B - LUBRIPLATE (APPLY WITH SMALL BRUSH)

1 - Idler Wheel Linkage.

2 - Turntable Shaft Stud.

3 - Pickup Arm Hinge Pins.

4 - Knife edge of Raising Lever (Illus. 38 Fig. 7).

5 - Main Cam bearing. (It is necessary to remove the sub-plate assembly to lubriplate this bearing. See paragraph VI-C).

C - STA-PUT (APPLY WITH SMALL BRUSH)

1 - Teeth of Main Cam Actuating Gear (Illus. 45 Fig 7).

2 - Track of Main Cam Gear (Illus. 46 Fig. 7).

3 - Teeth of Large and Small Idler Gears (Illus. 11-12 Fig. 4).

4 - Raising Lever Bracket bearing surfaces (Illus. 38 Fig. 7).

A - TO REMOVE THE PICKUP ARM OR REPLACE A PICKUP CARTRIDGE

A pickup cartridge can be most easily replaced by first removing the pickup arm.

A spring is inserted between the pins of the hinge bracket to prevent its coming apart in shipment. This spring must be removed before the hinge can be taken apart.

1 - Hold the Pickup Arm firmly.

2 - Remove the spacing spring by pressing down on its center until it snaps off the hinge pins.

3 - With a screw driver or long nosed pliers, bend in one of the blue steel pickup arm hinge brackets while lifting up on the arm. This will release the pickup arm hinge pin.

4 - Repeat on the other pickup arm bracket.

5 - The pickup arm, when released from the hinge brackets, may then be turned over and laid on the turntable for easy access to the cartridge.

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B - TO REPLACE THE PICKUP ARM

1 - Hook the roller (on the rear of the hinge assembly) under the pickup arm lift stop bracket.

2 - Use a pair of long nosed pliers to place the Pickup Arm Hinge Brackets over the pins in the Shaft Bracket.

In performing this operation, be sure that the pickup cord lies outside of the hinge and does not become wedged in the bracket.

The spacing spring need not be replaced unless the unit is to be reshipped.

C - TO REMOVE THE SUB-PLATE ASSEMBLY

In the event that it becomes necessary to replace any of the major parts in the sub-plate assembly (Fig. 7) the entire assembly should first be removed from the main plate.

1 - Remove the spindle.

2 - Remove the Turntable.

3 - Remove the Pickup Arm.

4 - Remove the Center Trim Section.

5 - Unhook the Rocker Arm Return Spring.

6 - Remove the Rocker Arm Pivot Pin.

7 - Remove the four #8-32 screws holding the sub-plate studs and holding the center post to the main plate.

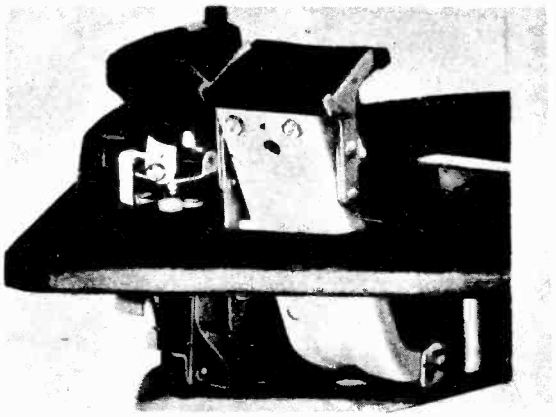


FIG. 3 - REAR VIEW WITH CENTER ESCUTCHEON REMOVED

D - TO REPLACE THE SUB-PLATE ASSEMBLY

Reverse the above procedure making certain that all parts fall into their proper positions.

E - TO REMOVE THE RECORD SELECTOR AND ROCKER ARM ASSEMBLY

1 - Unhook the Rocker Arm Return Spring. (Illus. Fig. 5).

2 - Remove the Rocker Arm Pivot Pin. (Illus. Fig. 5).

3 - Lift out the Selector and Rocker Arm Assembly as a unit.

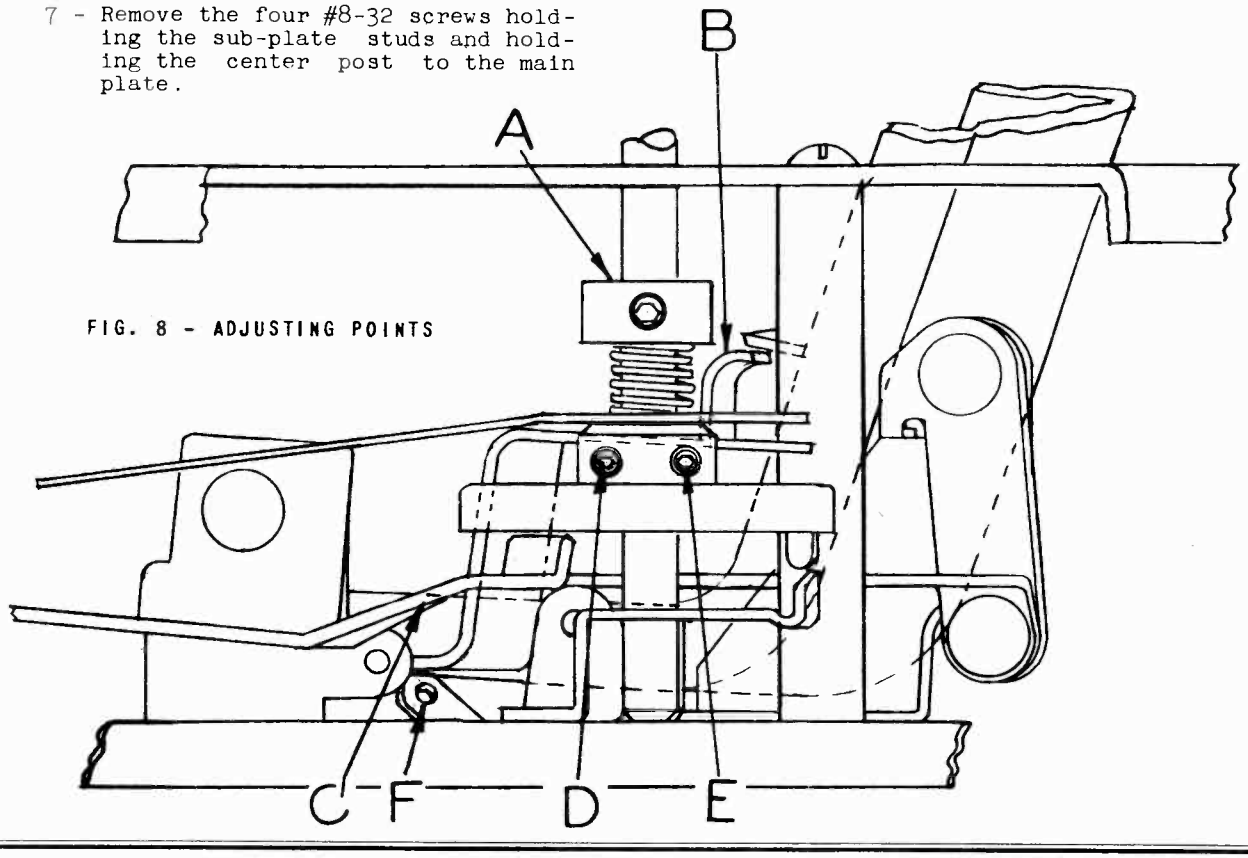


FIG. 8 - ADJUSTING POINTS

WEBSTER CHICAGO CORP. MODEL 70

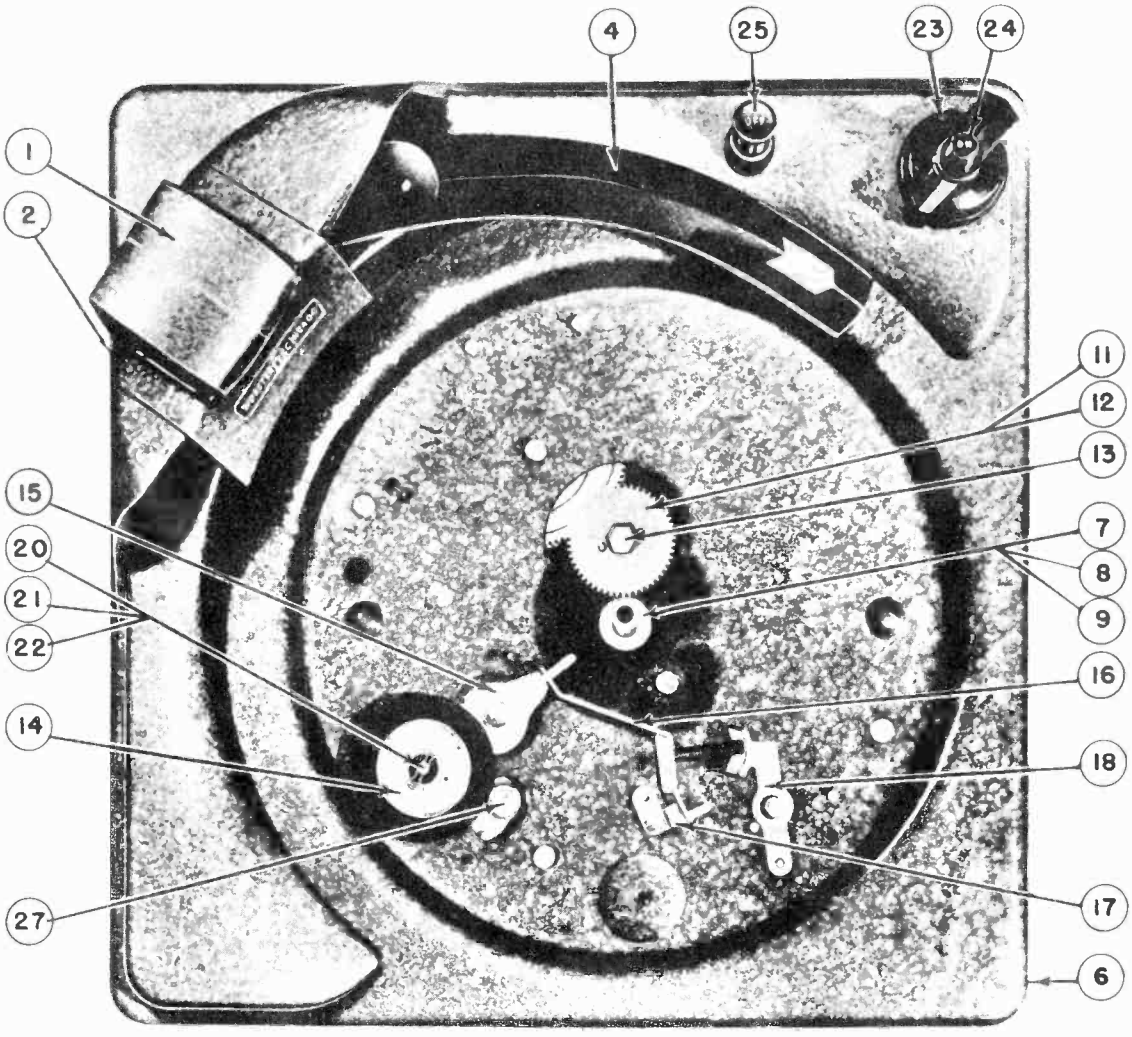


FIG. 4 - PARTS LOCATION - TOP VIEW

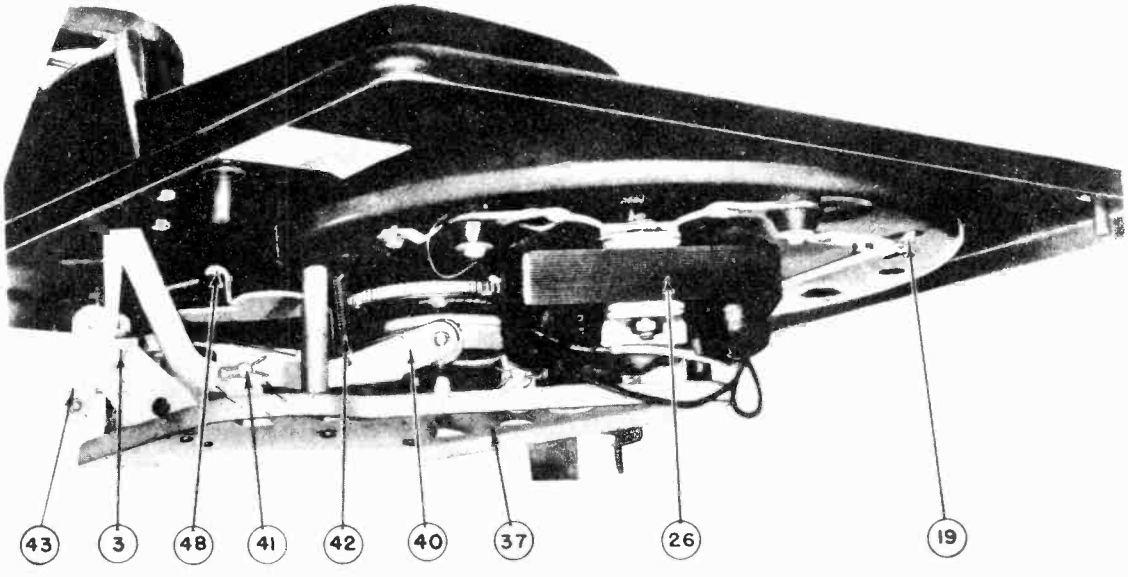


FIG. 5 - PARTS LOCATION -- LEFT SIDE VIEW

MODEL 70 WEBSTER CHICAGO CORP.

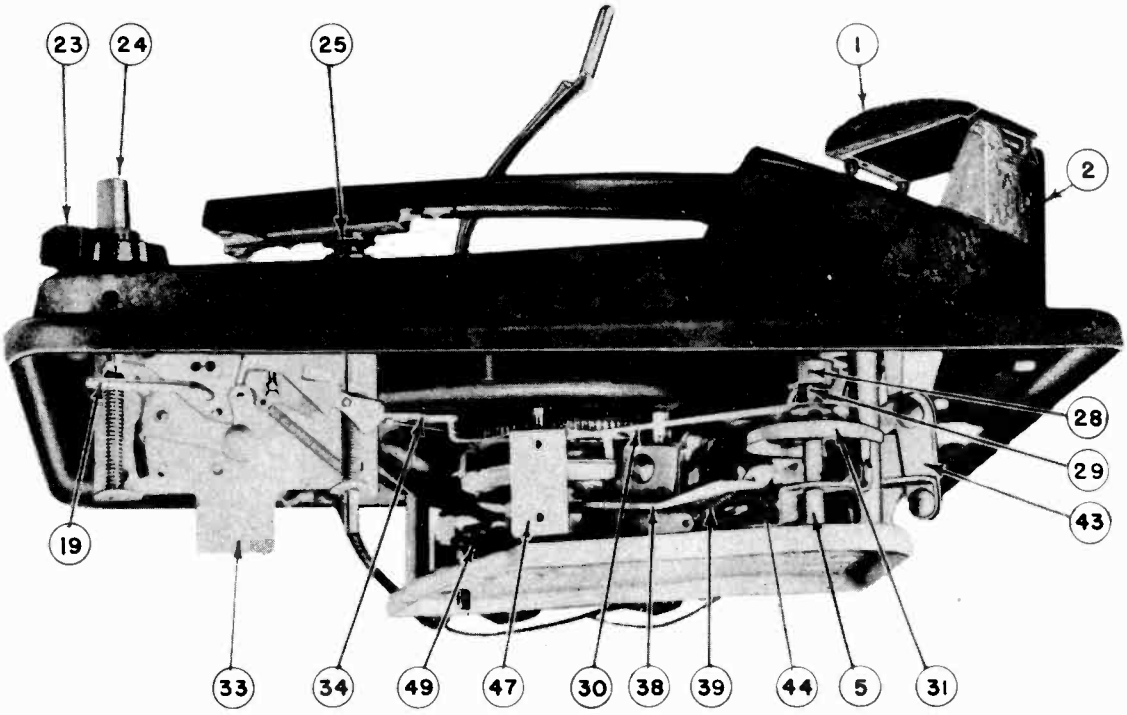


FIG. 6 - PARTS LOCATION -- RIGHT SIDE VIEW

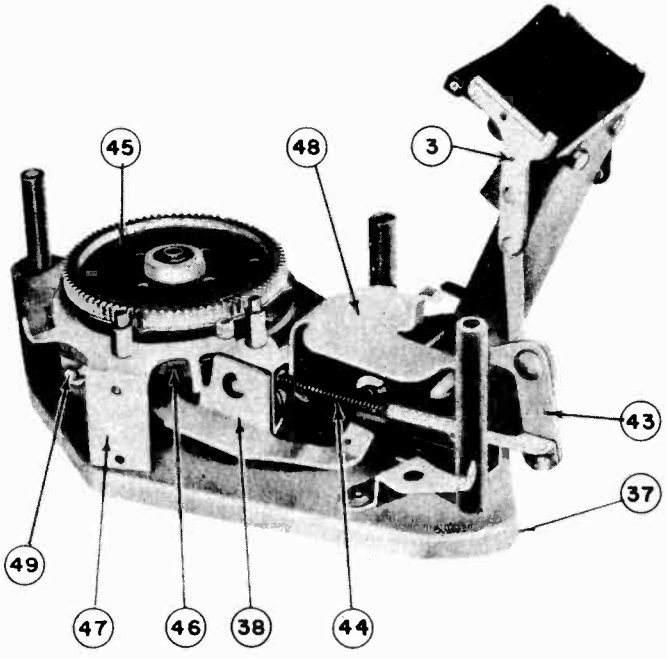


FIG. 7 - PARTS LOCATION -- SUB PLATE ASSEMBLY

ILLUS. NO.	FIG.	PART NAME	DESCRIPTION	PART NO.
1	4-6	Weight	Record Stabalizer	42P159
		Pin	Weight Pivot	27P074
2	4-6	Escutcheon	Center Trim & Weight Assy.	11G169
3	5-7	Selector	Record Selector & Shelf Assy.	49P044
4	4	Pickup Arm	Less Hardware & Cartridge	49X041
		Hinge Assembly	Pickup Arm Mounting	21X251
		Spring	Hinge Spacing	45P442
5	6	Shaft Assembly	Pickup Arm Pivot	11X136
		Cartridge	Crystal Pickup	(Use Mfgr. No.)
		Cord	Pickup	20X256
		Spindle	Record Spindle	42P163
		Pad	Needle Pad	24P014
		Turntable	Inc. Gear	11X138-1C
6	4	Plate	Main Base Plate	*
7	4	Washer	Bearing Race	25P269
8	4	Bearing	Ball & Retainer Assembly	11X058
9	4	Stud	Turntable Shaft Bearing	41P414
		Nut	Turntable Stud Mtg.	26P687
11	4	Gear	Small Idler (Fibre)	47P023
12	4	Gear	Large Idler (Fibre)	47P024
		Coupling	Idler Gear	45P342
13	4	Screw	Shoulder - Idler Gear Mtg.	41P333
14	4	Wheel	Idler Assembly - (Rubber)	11X003
15	4	Link	Idler Mtg. Assembly	11X075
16	4	Link	Connecting Link & Spring Assy.	11X152
17	4	Bracket	Connecting Link Bracket	45P453
18	4	Lever	Idler Release	45P447
19	5-6	Wire	Idler Release	45P440
		Bracket	Idler Release Wire	45P452
20	4	Washer	Idler Fibre	25P046
21	4	Washer	Idler Felt	25P030
22	4	Clip	Idler Retaining	50P125
23	4-6	Knob	Manual Control	49P040
		Spring Washer	Knob Tension	25P182

ILLUS. NO.	FIG.	PART NAME	DESCRIPTION	PART NO.
24	4-6	Button	ON	49P026
25	4-6	Button	OFF	49P025
26	5	Motor Assembly	50-60 Cycle 117 Volt.	15X084
		Grommet	Motor Mounting	25P281
27	4	Drive Pulley	60 Cycle	17X412-1
		Drive Pulley	50 Cycle	17X412-4
28	6	Lock Collar	Clutch Spring Tension	11X057
29	6	Spring	Clutch Tension	46P127
30	6	Arm	Automatic Trip	45P345
31	6	Disc & Hub Assembly	Pickup Arm Raising	11X031
		Screw	#8/32 x 1/4 Bristol	26P629
		Switch	A-C Power	32P002
		Cover	Switch Cover	32P033
33	6	Switch Assembly	Complete Less Buttons	11X134
34	6	Manual Trip	Lever & Wire Assembly	11X063
		Spring	Manual Trip Tension	46P017
		Shoulder Rivet	Trip Lever, Idler Bracket Idler Release Mtg.	27P102
37	5-7	Sub-Plate	Plate and Stud Assembly	*
38	6-7	Lever Assembly	Pickup Arm Raising Lever and Bracket Assembly	11X097
39	6	Spring	Raising Lever Tension	46P044
40	5	Lever	Rocker Arm Assembly	11X096
41	5	Pin	Rocker Arm Pivot	41P421
42	5	Spring	Rocker Arm Return	46P122
43	5-6-7	Lever	Index Selector	11X104
44	6-7	Spring	Index Compression	46P011
45	7	Gear	Main Cam Actuating	11X032
		"C" Washer	Cam Spacing	25P342
46	7	Cam	Main Cam Assembly	11X033
47	6-7	Trip	Velocity Trip & Roller Assembly	11X047
48	5-7	Lever	Automatic Shut Off Lock	11X079
49	6-7	Pin	Shut Off Lock Pivot	41P443
50	4	Escutchson	Center Trim Section	*

* Not Stocked for Service

WILCOX-GAY CORP. MODEL 6B40B, 6B40M, 6B42M, 6B42W

AUTOMATIC RECORD CHANGER ADJUSTMENTS

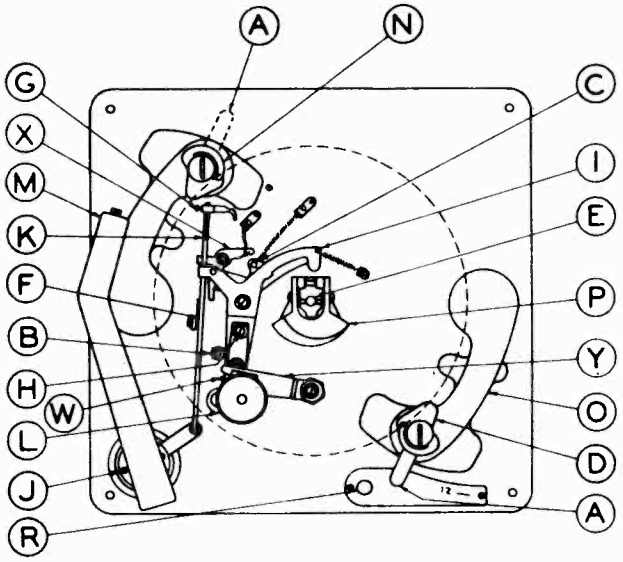
MODELS 6B40B — 6B40M — 6B42M — 6B42W.

DESCRIPTION OF TRIP MECHANISM

(1) In order to automatically change records, the record changer mechanism must first be put in motion. The trigger which accomplishes this purpose is the trip mechanism. The trip mechanism is actuated by the trip grooves at the end of the music grooves in all standard records.

(2) All commercial records manufactured in recent years have either an eccentric (oscillating), or spiral (run-in) type of trip groove.

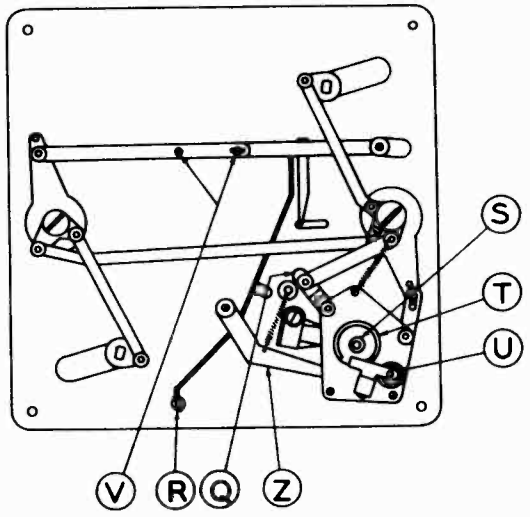
(3) This record changer will trip on any standard eccentric trip groove. It will also trip on any spiral trip groove provided that the spiral does not terminate at a larger diameter than that for which the trip mechanism is adjusted.



(4) To observe the operation of the trip mechanism, it is necessary to first remove the turntable and then move lever (A) to either the 10 or 12 inch position.

(5) To follow the action of the trip mechanism on eccentric trip groove records, it will be seen that as the pickup arm (M) swings inwardly, the trip rod (K) moves toward the pickup base until the serrations on the trip rod seen at (K) are in contact with the knife edge of the trip latch (X). If the pickup arm (M) is now moved outwardly, the serrations at (K) will engage with the trip latch (X) permitting the trip cam lift lever (C) to be released so that it will drop in and engage the trip cam (P).

(6) To observe the action of the trip mechanism on spiral trip groove records, swing the pickup arm (M) inwardly until the trip dog (G) comes in contact with the trip latch (X) and releases trip cam lift lever (C).



(7) The reject button (R), it will be noted, also operates to trip the mechanism by imparting motion to latch (X).

(8) After trip cam lift lever (X) has been released so that it can engage trip cam (P) the forces required to operate the balance of the trip mechanism are derived from the motor.

(9) As trip cam (P) engages trip cam lift lever (C), cam (P) is hinged upwards so that it engages the change mechanism drive wheel control lever (I) and forces the drive wheel (L) into positive frictional engagement with the inside of the turntable rim.

MODEL 6B40B, 6B40M, 6B42M, 6B42W

WILCOX-GAY CORP.

(10) To keep wheel (L) in engagement with the turntable rim after lever (I) carries past cam (P), lever (I) is engaged by latch (Y) and the tripping operation is complete.

DESCRIPTION OF SPEED REDUCER AND CAM SHAFT

(11) Driven by the wheel (L) through a double worm and gear reduction, the cam shaft (S) carries cams which control the pickup arm movements, the dropping of records, and at the conclusion of the change cycle, the release of latch (Y).

(12) Cam (T) which is mounted on the lower end of cam shaft (S) raises and lowers the pickup arm (M) through a rocker arm and push rod.

(13) The positioning of the pickup arm (M) for 10 or 12 inch records is controlled by two cams just above the lower cam shaft bearing. The lower of these cams (with short throw) positions the pickup for 12 inch records and the upper cam (with long throw) positions the pickup for 10 inch records.

(14) An examination of the pickup positioning cams will reveal spring fingers at the termination of the cam rise. These spring fingers are provided to urge the pickup needle into the starting groove on records which do not have lead in grooves.

(15) When lever (A) is set in the 10 or 12 inch position, the pickup positioning cam follower is shifted up or down so as to engage the proper cam. The pickup positioning cam follower can easily be distinguished by the coil spring mounted thereon and linking the cam follower to its extension. This coil spring will extend, preventing damage, if for any reason the pickup arm (M) becomes obstructed while the pickup positioning cam is forcing the pickup arm (M) inwardly.

(16) Just above the pickup positioning cams is the pickup removal cam which has the function of swinging the pickup arm (M) outwardly when the mechanism has been tripped.

(17) The last and uppermost cam operates through cam follower (Z) to release the wheel latch (Y) thus disengaging wheel (L) from the turntable rim at the completion of the change cycle.

(18) On the upper side of the latch control cam is mounted a roller which engages lever (Q) and actuates the record handling fingers (D) through the connecting links provided.

ADJUSTMENT OF SPIRAL TRIP MECHANISM

(19) To adjust the spiral trip to operate farther from the center of the record, loosen the set screw holding dog (G) and move the dog (G) away from the end of the trip rod (K). (Read paragraph 20 before making adjustment.)

(20) Dog (G) is set at the factory to trip when the pickup needle is 1 3/4" from the edge of the hole in the record center. This standard setting is correct for all late recordings and all but a very few of the older ones. To facilitate the location of dog (G) it is best to hold a scale with the end touching the turntable pin (E) and in such a manner that the pickup needle will swing directly above the scale graduations. As noted above, the trip should release when the pickup needle reaches the 1 3/4" graduation. NOTE: If for any reason the position of the pickup arm (M) with relation to the pickup base becomes changed, the trip dog (G) may require resetting. For this reason always check to see that the pickup is being lowered correctly onto the edge of the record before adjusting dog (G) (This pickup adjustment is covered in paragraph 34.)

MECHANISM FAILS TO TRIP

(21) If the mechanism fails to trip always examine the trip grooves on the record first before attempting to make any adjustments. The record grooves may be worn or scratched, in such a manner as to cause the pickup needle to jump the grooves. Also try a new pickup needle as the needle may have been damaged.

(22) The trip rod (K) is held in contact with the trip latch (K) by the trip rod tension spring (F). If the eccentric trip fails to operate, it may be necessary to increase the pressure of spring (F) against trip rod (K) but before changing the adjustment, observe the following:

(1) Make sure that the trip rod does not bind in the bearing where it is linked to the pickup base.

(2) Be sure that the trip rod floats freely.

(3) Examine the serrations at (K) to be certain that the sharp edges have not been damaged.

(4) Remove any dirt which may be embedded in the serrations and which would prevent the trip latch (X) from being engaged.

(5) Examine the knife edge of trip latch (X) to see if it has become damaged.

NOTE: Do not increase the pressure of spring (F) against trip rod (K) any more than is necessary to insure operation of the eccentric trip because excessive spring pressure will cause:

(1) Jumping of the pickup needle out of spiral trip grooves at the tripping point.

(2) The eccentric tripping action will require more power and the needle may jump the grooves and fail to trip altogether.

(23) If the trip mechanism still works in a faulty manner after the foregoing precautions have been taken, next check the trip latch (X) and the trip cam lift lever (C) to make sure that they work freely and do not bind on the studs on which they are mounted. If either of these levers are scraping on the base plate, make sure that the studs which carry them have not worked loose.

(24) If the lever (C) moves freely when it clears the trip latch (X) but does not swing into the path of the trip cam (P) then the spring which connects to lever (C) is either stretched or missing. If lever (C) makes a loud click when it drops in, the rubber bumper, against which it should strike, has worked up and should be pressed back into place.

CHANGE MECHANISM DRIVE WHEEL FAILS TO ENGAGE

(25) If the trip mechanism functions in a satisfactory manner and wheel (L) is latched in position to engage the turntable rim but does not contact the turntable rim with sufficient pressure to insure operation, loosen screws at (H) and move the wheel control lever extension outwardly a distance which will bring wheel (L) into positive contact with the turntable rim. CAUTION: This adjustment is very critical and should be carefully made. If wheel (L) is forced too tightly against the turntable rim, the latch (Y) will stick at the completion of the change cycle and prevent the wheel from becoming disengaged from the turntable rim. As an aid in making this adjustment, it is well to scribe a line on the wheel control lever at the end of the wheel control lever extension, so that it can be seen how far the extension is being moved each time. Before making any adjustment, it is also advisable to check the set screw in wheel (L) to make sure that wheel (L) is tight and not turning on the shaft which carries it.

(26) If latch (Y) fails to hold wheel (L) in position:

(1) Lever (I) may not be following through completely on cam (P), due to either lever (C) being bent down, or lever (I) bent up too far.

(2) At the end of lever (I) in vicinity of wheel (L) is noted a dog (W) which is meant to engage in latch (Y). This dog may have been bent outward so that it does not completely enter latch (Y), when lever (I) has completed its travel on cam (P).

(3) The adjustment of fingers on latch lever (Y) is such that the clearance for the dog (W) should be approximately .010". This can be determined by moving lever (I) outward from the center so that the dog (W) will move into latch (Y) and a feeler gauge inserted between the dog and finger to establish this clearance. To adjust for proper clearance, the finger on latch (Y) may be bent in or out.

(4) Check the spring on lever (Z) to make sure that the spring is not defective or missing.

MODEL 6B40B, 6B40M, 6B42M, 6B42W

WILCOX-GAY CORP.

MECHANISM REPEATS

(27) If the mechanism repeats (continues to change records without playing them), the wheel (L) may not be disengaging from the turntable rim. This failure to disengage may be due to the following:

(1) Faulty action of the latch (Y). (See "Caution" in paragraph 25.)

(2) A defective or missing return spring on wheel control lever (I).

(3) A defective or missing spring on lever (Z).

(4) Lever (Z) may be bent so that it is not contacting the wheel release cam. (See paragraph 17.)

(28) If wheel (L) disengages at the completion of the change cycle and immediately re-engages, the trip mechanism is at fault and it is suggested that the following be checked:

(1) Reject button (R) may be sticking in the depressed position.

(2) The trip cam (P) may be sticking in the raised position.

(3) The reset spring on trip latch (X) may be defective or missing.

(4) The stud on which wheel control lever (I) is mounted may have worked loose and should be tightened.

MECHANISM TRIPS DURING PLAYING CYCLE

(29) If the mechanism trips during the playing of a record and before the pickup arm has swung inwardly to the point where the trip is adjusted to operate on spiral trip groove records, the following conditions should be checked:

(1) Weak or missing reset spring on latch (X). Tension of spring may be increased by turning the spring anchor lug.

(2) Defective shoulder or trip latch (X) or rounded corner on cam lift lever (C), permitting lever (C) to slip off of the shoulder on trip latch (X).

(3) Rubber bumper (B), against which wheel control lever (I) strikes, may have worked up away from the base plate, permitting lever (I) to over-travel and lock trip rod (K) against trip latch (X). NOTE: Where over-travel of lever (I) due to lever (I) not striking bumper (B) causes tripping during the playing cycle, it is possible that either a weak reset spring on latch (X) or a damaged shoulder on latch (X) is a contributing factor.

PICKUP ARM STICKS OR JAMS

(30) If during normal operation of the unit the pickup arm acts as though it were jammed in any manner, the following procedure should be followed:

First, stop the motor, next remove the turntable, and trip the mechanism. The pickup arm (M) should now be capable of free motion between the normal limits of its travel. (From edge of base plate into within approximately 1" of the center pin (E) depending on the adjustment of trip dog (G).

If trip dog (G) will not slip by the lug against which it strikes on trip latch (X), or the serrations at (K) on trip rod (K) hang up on trip latch (X) and prevent trip rod (K) from sliding by trip latch (X) then investigate the following:

(1) Rubber bumper (B) pushed upwards away from base plate and permitting lever (I) to over-travel.

(2) Excessive pressure exerted against trip rod (K) by spring (F).

(3) Trip rod (K) bent.

(4) An extension on trip latch (X), which extends rearwardly along trip rod (K), may be bent or broken. The function of this extension is to swing trip rod (K) clear of trip latch (X) as soon as tripping takes place.

RECORD SUPPORT ADJUSTMENT

(31) An examination of the unit will disclose the front record support "O" has fixed positions determined by dedents which are located by lever (A). The opposite record support however, is adjustable by means of an overlapping connecting link between the two support bases, underneath the changer unit.
The record support posts should be equidistant from the center of the turntable, so that the opposite sides of the record will be released at nearly the same instant, and so that only one record at a time will be dropped to the turntable. The correct adjustment may best be determined by placing a 10 inch record on the supports, with the support posts in the 10 inch position, and making the adjustment by loosening the screws shown at (V) and moving the record support post (O) to a position so that the entering edges of both separating fingers (N) are equidistant from the edge of the record. (NOTE: The record selected for making this adjustment must be flat and the center hole must fit the center post (E) without excessive looseness.) CAUTION: Before making this adjustment always make sure that lever (A) is firmly located in the proper dedent, and the three feed screw assembly mounting screws are tight. (Vertical alignment of the record centering pin (E) is dependent upon correct feed screw mounting.)
After the adjustment has been made, and the two screws tightened, turn on the motor and observe that the record is released from both support fingers at nearly the same instant. Then place a full stack of records on the supports and observe the dropping of each record. It will be noticed that the combined weight of ten or twelve records resting on the supports, will cause the support posts to spring outward slightly as the change mechanism goes through cycle; and the degree to which the posts swing outward is lessened with a decrease of total record weight. It will also be oberved that one post may spring out more than the other during the change cycle, and this should be taken into consideration in making an adjustment of the support posts, so that the degree of unevenness with which the records are released from the support fingers will be "averaged" for the entire stack of records.

RECORD SUPPORT AND SEPARATING FINGERS

(32) As there is a difference in thickness between 10 inch and 12 inch records, and the equipment is designed to accommodate both sizes, the separating fingers (N) must be in correct adjustment so that they will slide in between the two lower records of the stack, and have no tendency to strike the edge of either record. The record supports (D) and the record separating fingers (N) are so designed that, when in proper alignment, no chipping of standard records will take place. If, however, the separating finger should strike the edge of a record, due to a warped record, or one having chipped edges, fingers (N) may be sprung out of alignment. For proper operation, the fingers (N) must be perfectly flat. As the fingers are usually found to be bent upwards, rather than downwards, when out of correct alignment, it is necessary to remove the fingers from the support posts to straighten them. A heavy screw driver will be required to loosen the large screw at the top of the post, and the order or placement of the fingers and spacers should be noted in removing these parts so that they may be replaced in correct order. Ordinarily, straightening can be accomplished by holding the main part of the finger (N) through which the clamping screw passes, with one hand, and then taking hold of the sickle shaped part of (N) with the fingers of the other hand, bending the sickle shaped part until it is lined up with the main body. DO NOT USE PLIERS NOR ATTEMPT TO STRAIGHTEN THE FINGER (N) IN A VISE. After bending, lay the finger (N) on a flat surface to make sure the straightening has been properly done.

PICKUP ARM LIFT ADJUSTMENT

(33) The height to which pickup arm (M) is lifted during the change cycle may be adjusted by the screw (U). In making this adjustment, make sure that the pickup arm will not lift high enough to strike the bottom record on the record supports. Also make sure that the pickup needle drops low enough to rest properly on <u>one</u> record on the turntable. (Recommended needle length 5/8"). If the timing of the pickup lift is not correct, loosen the set screw holding lift cam (T) on shaft (S) and relocate the cam. (The relative position of the remaining cams is fixed.)

MODEL 6B40B, 6B40M, 6B42M, 6B42W

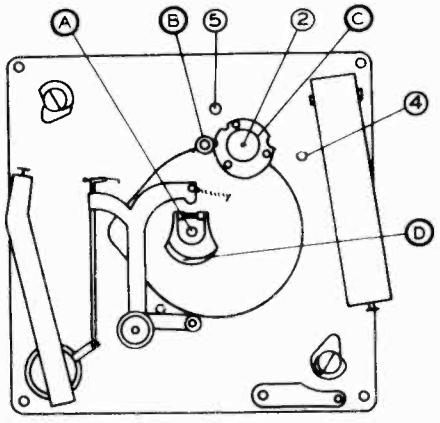
WILCOX-GAY CORP.

ADJUSTMENT OF PICKUP LOWERING POINT

(34) To adjust the pickup arm (M) so that it will be lowered to the correct point on the outside of the record, first shift the lever (A) to the 10" position, and then stop the mechanism with pickup arm positioned ready to set down on edge of record. Now raise the pickup arm to the vertical position and loosen screws at (J) so that the arm (M) can be moved with relation to the pickup base but not too freely. Next holding the pickup base so that it will not turn, force the pickup arm (M) toward the record centering pin (E). Next, carefully pull the pickup arm (M) outwardly until the pickup needle is 4-45/64" from the pin (E). Raise the pickup arm (M) and tighten the locking screws at (J) being careful not to move arm (M) outwardly past the correct setting before tightening the screws. This adjustment will automatically take care of 12" records as well as 10" as will be seen by moving lever (A) to the 12" position and running the unit through its cycle. If the pickup arm (M) always lowers in the 12" position regardless of the position of the lever (A) the pickup positioning cam follower is sticking in the down position.

OILING

When the RECORDIO leaves the factory, the equipment is properly lubricated and requires no immediate attention.



Frequent oiling of the recording mechanism is not required, although the use of a small amount of oil judiciously applied about once a year, in accord with the following directions, will suffice to maintain the equipment in good order.

Remove the turntable by applying upward pressure at the rim of the table, at the same time lightly tapping the top of the turntable spindle with a small tool.

Remove the retaining clip and washer from the drive wheel shaft and remove drive wheel.

Lubricate the oiling positions indicated in the accompanying drawings, using only two or three drops of electric motor oil at each position, unless otherwise specified.

A. Turntable shaft bearing.

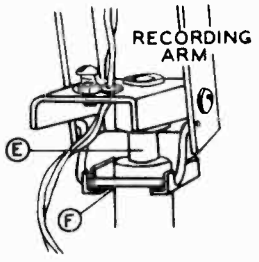
B. Upper motor bearing.

C. Between drive wheel mounting disc and bed plate.

D. Place a coating of petroleum jelly on the lip of the master cam.

E. Recording arm pivot post.

F. Pivot post straddle plate slot.



Carefully apply one or two drops of oil to each drive wheel bearing, so that the oil will not run out on to the rubber rims of the wheels.

The lower motor bearing may be lubricated by application of oil to the felt wick surrounding the lower end of the motor shaft.

AUTOMATIC RECORD CHANGER ADJUSTMENTS

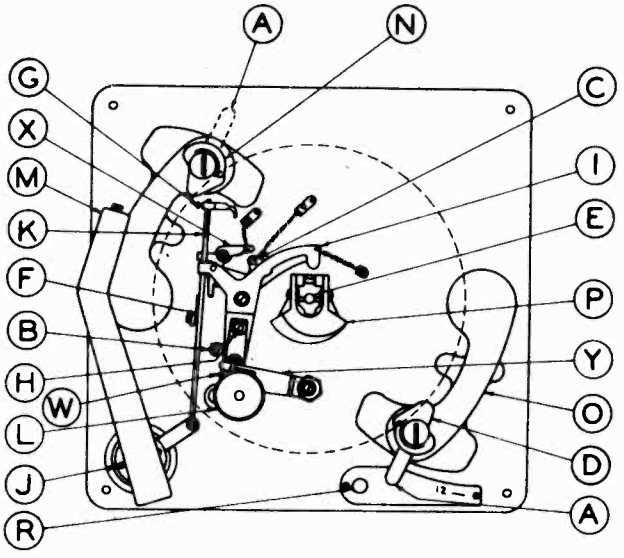
MODELS 6B45B — 6B45B — 6B45W

DESCRIPTION OF TRIP MECHANISM

(1) In order to automatically change records, the record changer mechanism must first be put in motion. The trigger which accomplishes this purpose is the trip mechanism. The trip mechanism is actuated by the trip grooves at the end of the music grooves in all standard records.

(2) All commercial records manufactured in recent years have either an eccentric (oscillating), or spiral (run-in) type of trip groove.

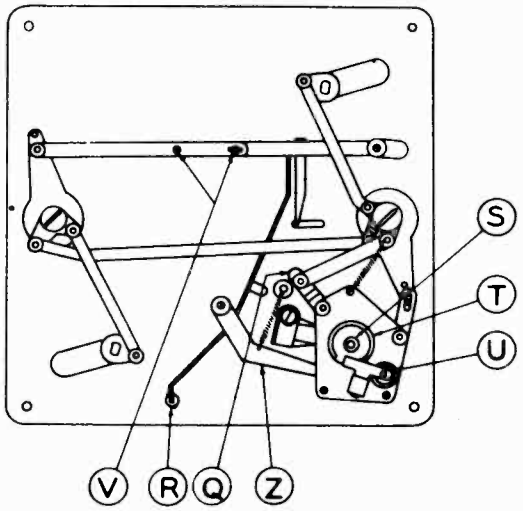
(3) This record changer will trip on any standard eccentric trip groove. It will also trip on any spiral trip groove provided that the spiral does not terminate at a larger diameter than that for which the trip mechanism is adjusted.



(4) To observe the operation of the trip mechanism, it is necessary to first remove the turntable and then move lever (A) to either the 10 or 12 inch position.

(5) To follow the action of the trip mechanism on eccentric trip groove records, it will be seen that as the pickup arm (M) swings inwardly, the trip rod (K) moves toward the pickup base until the serrations on the trip rod seen at (K) are in contact with the knife edge of the trip latch (X). If the pickup arm (M) is now moved outwardly, the serrations at (K) will engage with the trip latch (X) permitting the trip cam lift lever (C) to be released so that it will drop in and engage the trip cam (P).

(6) To observe the action of the trip mechanism on spiral trip groove records, swing the pickup arm (M) inwardly until the trip dog (G) comes in contact with the trip latch (X) and releases trip cam lift lever (C).



(7) The reject button (R), it will be noted, also operates to trip the mechanism by imparting motion to latch (X).

(8) After trip cam lift lever (X) has been released so that it can engage trip cam (P) the forces required to operate the balance of the trip mechanism are derived from the motor.

(9) As trip cam (P) engages trip cam lift lever (C), cam (P) is hinged upwards so that it engages the change mechanism drive wheel control lever (I) and forces the drive wheel (L) into positive frictional engagement with the inside of the turntable rim.

(10) To keep wheel (L) in engagement with the turntable rim after lever (I) carries past cam (P), lever (I) is engaged by latch (Y) and the tripping operation is complete.

DESCRIPTION OF SPEED REDUCER AND CAM SHAFT

(11) Driven by the wheel (L) through a double worm and gear reduction, the cam shaft (S) carries cams which control the pickup arm movements, the dropping of records, and at the conclusion of the change cycle, the release of latch (Y).

(12) Cam (T) which is mounted on the lower end of cam shaft (S) raises and lowers the pickup arm (M) through a rocker arm and push rod.

(13) The positioning of the pickup arm (M) for 10 or 12 inch records is controlled by two cams just above the lower cam shaft bearing. The lower of these cams (with short throw) positions the pickup for 12 inch records and the upper cam (with long throw) positions the pickup for 10 inch records.

(14) An examination of the pickup positioning cams will reveal spring fingers at the termination of the cam rise. These spring fingers are provided to urge the pickup needle into the starting groove on records which do not have lead in grooves.

(15) When lever (A) is set in the 10 or 12 inch position, the pickup positioning cam follower is shifted up or down so as to engage the proper cam. The pickup positioning cam follower can easily be distinguished by the coil spring mounted thereon and linking the cam follower to its extension. This coil spring will extend, preventing damage, if for any reason the pickup arm (M) becomes obstructed while the pickup positioning cam is forcing the pickup arm (M) inwardly.

(16) Just above the pickup positioning cams is the pickup removal cam which has the function of swinging the pickup arm (M) outwardly when the mechanism has been tripped.

(17) The last and uppermost cam operates through cam follower (Z) to release the wheel latch (Y) thus disengaging wheel (L) from the turntable rim at the completion of the change cycle.

(18) On the upper side of the latch control cam is mounted a roller which engages lever (Q) and actuates the record handling fingers (D) through the connecting links provided.

ADJUSTMENT OF SPIRAL TRIP MECHANISM

(19) To adjust the spiral trip to operate farther from the center of the record, loosen the set screw holding dog (G) and move the dog (G) away from the end of the trip rod (K). (Read paragraph 20 before making adjustment.)

(20) Dog (G) is set at the factory to trip when the pickup needle is 1 3/4" from the edge of the hole in the record center. This standard setting is correct for all late recordings and all but a very few of the older ones. To facilitate the location of dog (G) it is best to hold a scale with the end touching the turntable pin (E) and in such a manner that the pickup needle will swing directly above the scale graduations. As noted above, the trip should release when the pickup needle reaches the 1 3/4" graduation. NOTE: If for any reason the position of the pickup arm (M) with relation to the pickup base becomes changed, the trip dog (G) may require resetting. For this reason always check to see that the pickup is being lowered correctly onto the edge of the record before adjusting dog (G) (This pickup adjustment is covered in paragraph 34.)

MECHANISM FAILS TO TRIP

(21) If the mechanism fails to trip always examine the trip grooves on the record first before attempting to make any adjustments. The record grooves may be worn or scratched, in such a manner as to cause the pickup needle to jump the grooves. Also try a new pickup needle as the needle may have been damaged.

(22) The trip rod (K) is held in contact with the trip latch (K) by the trip rod tension spring (F). If the eccentric trip fails to operate, it may be necessary to increase the pressure of spring (F) against trip rod (K) but before changing the adjustment, observe the following:

(1) Make sure that the trip rod does not bind in the bearing where it is linked to the pickup base.

(2) Be sure that the trip rod floats freely.

(3) Examine the serrations at (K) to be certain that the sharp edges have not been damaged.

(4) Remove any dirt which may be embedded in the serrations and which would prevent the trip latch (X) from being engaged.

(5) Examine the knife edge of trip latch (X) to see if it has become damaged.

NOTE: Do not increase the pressure of spring (F) against trip rod (K) any more than is necessary to insure operation of the eccentric trip because excessive spring pressure will cause:

(1) Jumping of the pickup needle out of spiral trip grooves at the tripping point.

(2) The eccentric tripping action will require more power and the needle may jump the grooves and fail to trip altogether.

(23) If the trip mechanism still works in a faulty manner after the foregoing precautions have been taken, next check the trip latch (X) and the trip cam lift lever (C) to make sure that they work freely and do not bind on the studs on which they are mounted. If either of these levers are scraping on the base plate, make sure that the studs which carry them have not worked loose.

(24) If the lever (C) moves freely when it clears the trip latch (X) but does not swing into the path of the trip cam (P) then the spring which connects to lever (C) is either stretched or missing. If lever (C) makes a loud click when it drops in, the rubber bumper, against which it should strike, has worked up and should be pressed back into place.

CHANGE MECHANISM DRIVE WHEEL FAILS TO ENGAGE

(25) If the trip mechanism functions in a satisfactory manner and wheel (L) is latched in position to engage the turntable rim but does not contact the turntable rim with sufficient pressure to insure operation, loosen screws at (H) and move the wheel control lever extension outwardly a distance which will bring wheel (L) into positive contact with the turntable rim. CAUTION: This adjustment is very critical and should be carefully made. If wheel (L) is forced too tightly against the turntable rim, the latch (Y) will stick at the completion of the change cycle and prevent the wheel from becoming disengaged from the turntable rim. As an aid in making this adjustment, it is well to scribe a line on the wheel control lever at the end of the wheel control lever extension, so that it can be seen how far the extension is being moved each time. Before making any adjustment, it is also advisable to check the set screw in wheel (L) to make sure that wheel (L) is tight and not turning on the shaft which carries it.

(26) If latch (Y) fails to hold wheel (L) in position:

(1) Lever (I) may not be following through completely on cam (P), due to either lever (C) being bent down, or lever (I) bent up too far.

(2) At the end of lever (I) in vicinity of wheel (L) is noted a dog (W) which is meant to engage in latch (Y). This dog may have been bent outward so that it does not completely enter latch (Y), when lever (I) has completed its travel on cam (P).

(3) The adjustment of fingers on latch lever (Y) is such that the clearance for the dog (W) should be approximately .010". This can be determined by moving lever (I) outward from the center so that the dog (W) will move into latch (Y) and a feeler gauge inserted between the dog and finger to establish this clearance. To adjust for proper clearance, the finger on latch (Y) may be bent in or out.

(4) Check the spring on lever (Z) to make sure that the spring is not defective or missing.

MECHANISM REPEATS

(27) If the mechanism repeats (continues to change records without playing them), the wheel (L) may not be disengaging from the turntable rim. This failure to disengage may be due to the following:

(1) Faulty action of the latch (Y). (See "Caution" in paragraph 25.)

(2) A defective or missing return spring on wheel control lever (I).

(3) A defective or missing spring on lever (Z).

(4) Lever (Z) may be bent so that it is not contacting the wheel release cam. (See paragraph 17.)

(28) If wheel (L) disengages at the completion of the change cycle and immediately re-engages, the trip mechanism is at fault and it is suggested that the following be checked:

(1) Reject button (R) may be sticking in the depressed position.

(2) The trip cam (P) may be sticking in the raised position.

(3) The reset spring on trip latch (X) may be defective or missing.

(4) The stud on which wheel control lever (I) is mounted may have worked loose and should be tightened.

MECHANISM TRIPS DURING PLAYING CYCLE

(29) If the mechanism trips during the playing of a record and before the pickup arm has swung inwardly to the point where the trip is adjusted to operate on spiral trip groove records, the following conditions should be checked:

(1) Weak or missing reset spring on latch (X). Tension of spring may be increased by turning the spring anchor lug.

(2) Defective shoulder or trip latch (X) or rounded corner on cam lift lever (C), permitting lever (C) to slip off of the shoulder on trip latch (X).

(3) Rubber bumper (B), against which wheel control lever (I) strikes, may have worked up away from the base plate, permitting lever (I) to over-travel and lock trip rod (K) against trip latch (X). NOTE: Where over-travel of lever (I) due to lever (I) not striking bumper (B) causes tripping during the playing cycle, it is possible that either a weak reset spring on latch (X) or a damaged shoulder on latch (X) is a contributing factor.

PICKUP ARM STICKS OR JAMS

(30) If during normal operation of the unit the pickup arm acts as though it were jammed in any manner, the following procedure should be followed:

First, stop the motor, next remove the turntable, and trip the mechanism. The pickup arm (M) should now be capable of free motion between the normal limits of its travel. (From edge of base plate into within approximately 1" of the center pin (E) depending on the adjustment of trip dog (G).

If trip dog (G) will not slip by the lug against which it strikes on trip latch (X), or the serrations at (K) on trip rod (K) hang up on trip latch (X) and prevent trip rod (K) from sliding by trip latch (X) then investigate the following:

(1) Rubber bumper (B) pushed upwards away from base plate and permitting lever (I) to over-travel.

(2) Excessive pressure exerted against trip rod (K) by spring (F).

(3) Trip rod (K) bent.

(4) An extension on trip latch (X), which extends rearwardly along trip rod (K), may be bent or broken. The function of this extension is to swing trip rod (K) clear of trip latch (X) as soon as tripping takes place.

RECORD SUPPORT ADJUSTMENT

(31) An examination of the unit will disclose the front record support "O" has fixed positions determined by dedents which are located by lever (A). The opposite record support however, is adjustable by means of an overlapping connecting link between the two support bases, underneath the changer unit.
The record support posts should be equidistant from the center of the turntable, so that the opposite sides of the record will be released at nearly the same instant, and so that only one record at a time will be dropped to the turntable. The correct adjustment may best be determined by placing a 10 inch record on the supports, with the support posts in the 10 inch position, and making the adjustment by loosening the screws shown at (V) and moving the record support post (O) to a position so that the entering edges of both separating fingers (N) are equidistant from the edge of the record. (NOTE: The record selected for making this adjustment must be flat and the center hole must fit the center post (E) without excessive looseness.) CAUTION: Before making this adjustment always make sure that lever (A) is firmly located in the proper dedent, and the three feed screw assembly mounting screws are tight. (Vertical alignment of the record centering pin (E) is dependent upon correct feed screw mounting.)
After the adjustment has been made, and the two screws tightened, turn on the motor and observe that the record is released from both support fingers at nearly the same instant. Then place a full stack of records on the supports and observe the dropping of each record. It will be noticed that the combined weight of ten or twelve records resting on the supports, will cause the support posts to spring outward slightly as the change mechanism goes through cycle; and the degree to which the posts swing outward is lessened with a decrease of total record weight. It will also be oberved that one post may spring out more than the other during the change cycle, and this should be taken into consideration in making an adjustment of the support posts, so that the degree of unevenness with which the records are released from the support fingers will be "averaged" for the entire stack of records.

RECORD SUPPORT AND SEPARATING FINGERS

(32) As there is a difference in thickness between 10 inch and 12 inch records, and the equipment is designed to accommodate both sizes, the separating fingers (N) must be in correct adjustment so that they will slide in between the two lower records of the stack, and have no tendency to strike the edge of either record. The record supports (D) and the record separating fingers (N) are so designed that, when in proper alignment, no chipping of standard records will take place. If, however, the separating finger should strike the edge of a record, due to a warped record, or one having chipped edges, fingers (N) may be sprung out of alignment. For proper operation, the fingers (N) must be perfectly flat. As the fingers are usually found to be bent upwards, rather than downwards, when out of correct alignment, it is necessary to remove the fingers from the support posts to straighten them. A heavy screw driver will be required to loosen the large screw at the top of the post, and the order or placement of the fingers and spacers should be noted in removing these parts so that they may be replaced in correct order. Ordinarily, straightening can be accomplished by holding the main part of the finger (N) through which the clamping screw passes, with one hand, and then taking hold of the sickle shaped part of (N) with the fingers of the other hand, bending the sickle shaped part until it is lined up with the main body. DO NOT USE PLIERS NOR ATTEMPT TO STRAIGHTEN THE FINGER (N) IN A VISE. After bending, lay the finger (N) on a flat surface to make sure the straightening has been properly done.

PICKUP ARM LIFT ADJUSTMENT

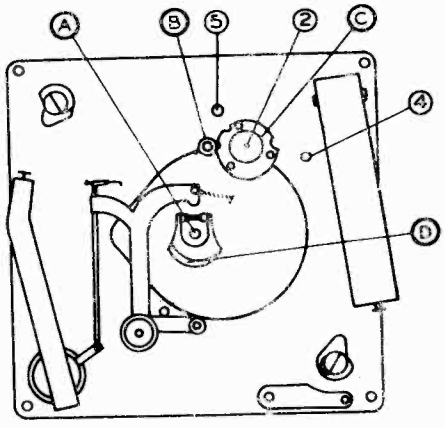
(33) The height to which pickup arm (M) is lifted during the change cycle may be adjusted by the screw (U). In making this adjustment, make sure that the pickup arm will not lift high enough to strike the bottom record on the record supports. Also make sure that the pickup needle drops low enough to rest properly on <u>one</u> record on the turntable. (Recommended needle length 5/8"). If the timing of the pickup lift is not correct, loosen the set screw holding lift cam (T) on shaft (S) and relocate the cam. (The relative position of the remaining cams is fixed.)

ADJUSTMENT OF PICKUP LOWERING POINT

(34) To adjust the pickup arm (M) so that it will be lowered to the correct point on the outside of the record, first shift the lever (A) to the 10" position, and then stop the mechanism with pickup arm positioned ready to set down on edge of record. Now raise the pickup arm to the vertical position and loosen screws at (J) so that the arm (M) can be moved with relation to the pickup base but not too freely. Next holding the pickup base so that it will not turn, force the pickup arm (M) toward the record centering pin (E). Next, carefully pull the pickup arm (M) outwardly until the pickup needle is 4-45/64" from the pin (E). Raise the pickup arm (M) and tighten the locking screws at (J) being careful not to move arm (M) outwardly past the correct setting before tightening the screws. This adjustment will automatically take care of 12" records as well as 10" as will be seen by moving lever (A) to the 12" position and running the unit through its cycle. If the pickup arm (M) always lowers in the 12" position regardless of the position of the lever (A) the pickup positioning cam follower is sticking in the down position.

OILING

When the RECORDIO leaves the factory, the equipment is properly lubricated and requires no immediate attention.



Frequent oiling of the recording mechanism is not required, although the use of a small amount of oil judiciously applied about once a year, in accord with the following directions, will suffice to maintain the equipment in good order.

Remove the turntable by applying upward pressure at the rim of the table, at the same time lightly tapping the top of the turntable spindle with a small tool.

Remove the retaining clip and washer from the drive wheel shaft and remove drive wheel.

Lubricate the oiling positions indicated in the accompanying drawings, using only two or three drops of electric motor oil at each position, unless otherwise specified.

A. Turntable shaft bearing.

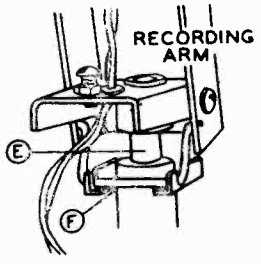
B. Upper motor bearing.

C. Between drive wheel mounting disc and bed plate.

D. Place a coating of petroleum jelly on the lip of the master cam.

E. Recording arm pivot post.

F. Pivot post straddle plate slot.

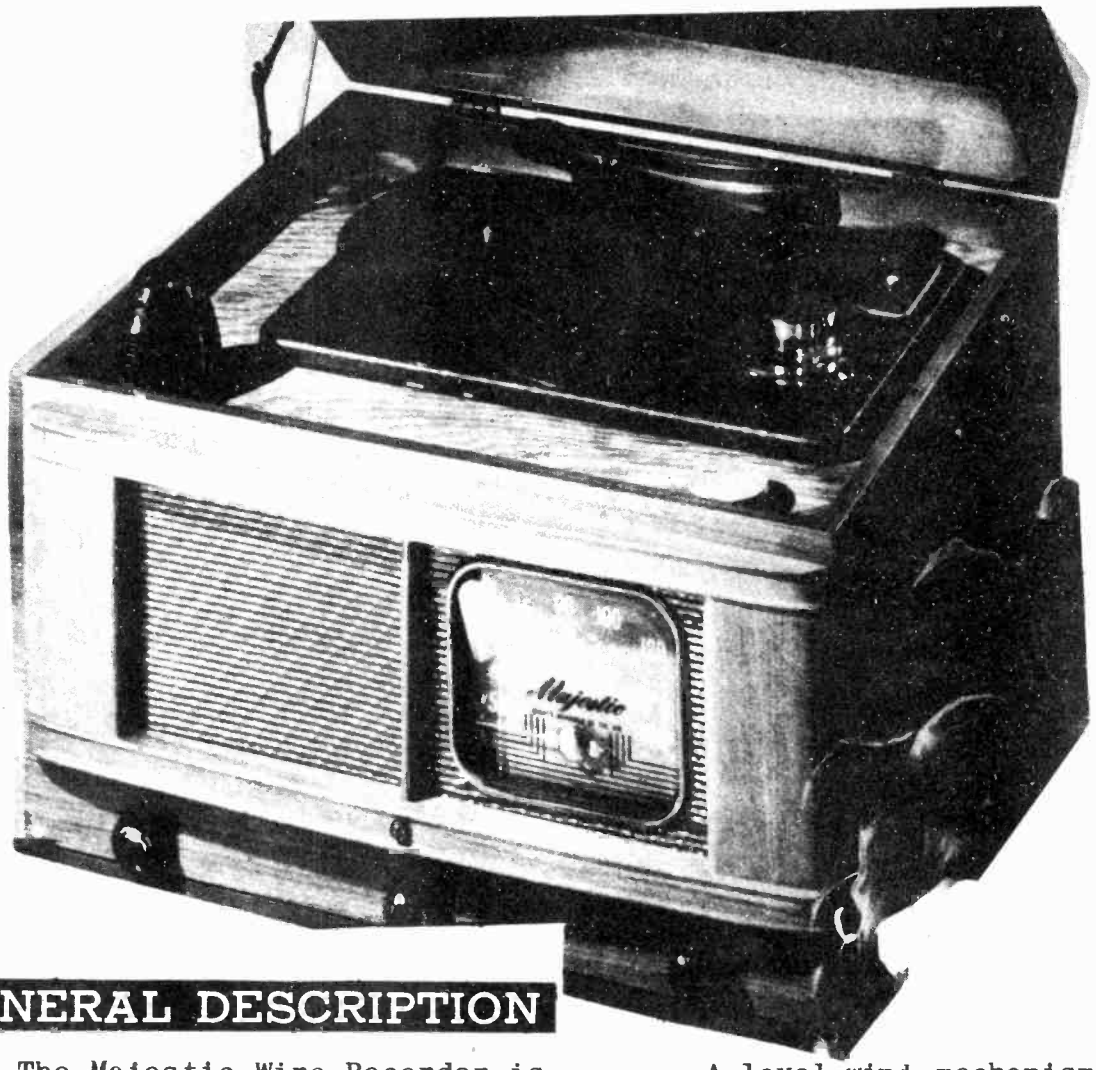


Carefully apply one or two drops of oil to each drive wheel bearing, so that the oil will not run out on to the rubber rims of the wheels.

The lower motor bearing may be lubricated by application of oil to the felt wick surrounding the lower end of the motor shaft.

MAJESTIC RADIO & TELEV. CORP.

MODEL 7YR752
CHASSIS 7B04A



GENERAL DESCRIPTION

The Majestic Wire Recorder is designed to record at 78 R.P.M. and rewind at about 400 R.P.M Two motors are provided for the purpose. On play, or record wire position, the 140-59-1 PLAY motor drives the record turntable through 140-57-1 Idler Wheel. The Idler Wheel, mounted on the Idler Bracket Assembly is held against the turntable by slide bracket tension spring 140-63. The drive tension is varied by adjusting the eccentric washer 140-50. CAUTION - this adjustment if improperly made will cause the wire to break or leave the recording head when switching from from rewind to play. In addition a "wow" may result in play back.

On rewind the Idler Wheel is disengaged from the turntable and the rewind motor is energized by the Idler Wheel Slide Bracket closing the base plate motor switch 140-34.

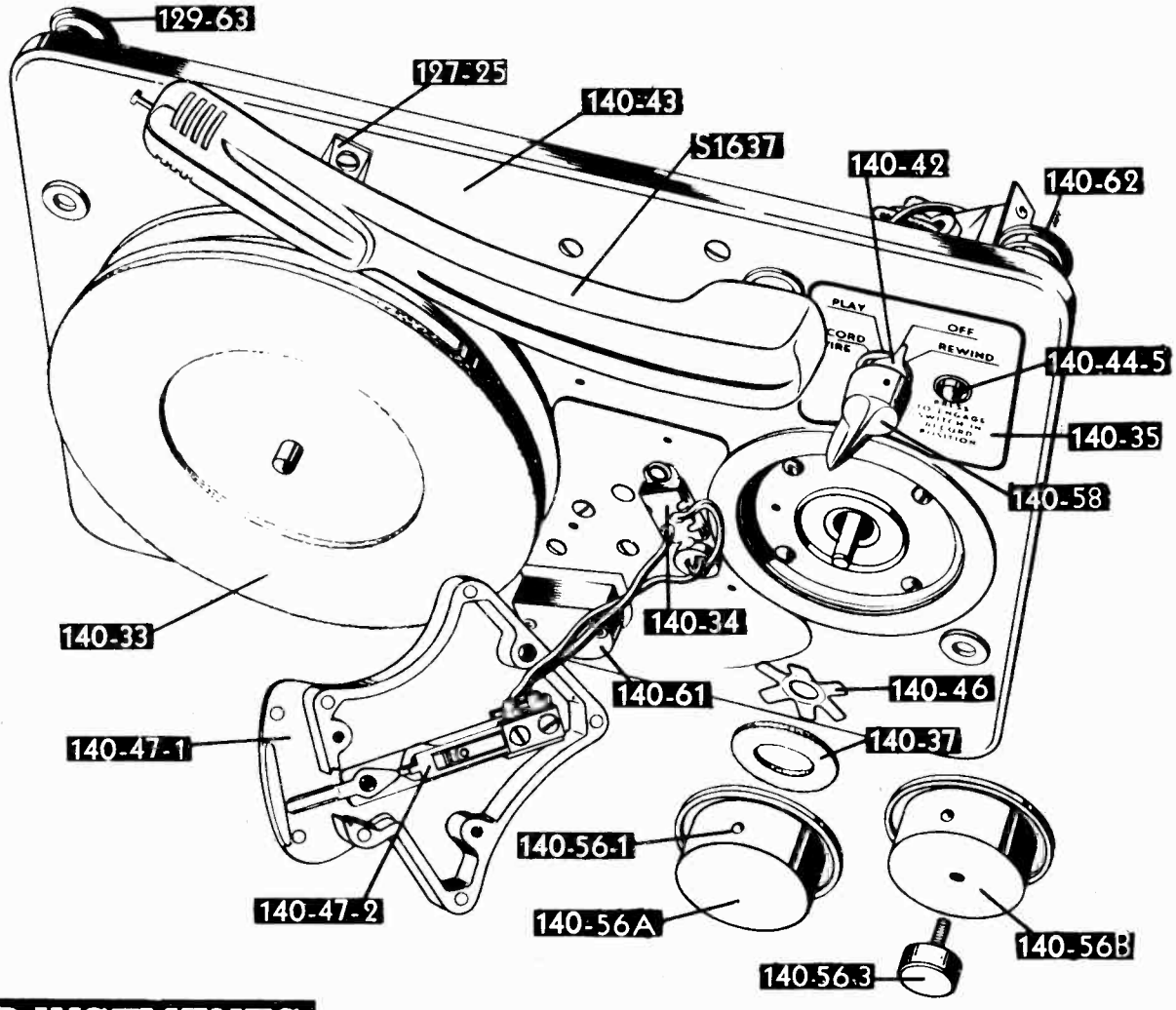
A level wind mechanism is provided to keep uniform wire distribution on the spool in both rewind and play. The mechanism is driven by worm gear 140-54 or 140-55 and its mating gear assembly 140-51-1 or 140-51-2. The mating gear shaft turns the heart shaped eccentric cam 140-51-3 which drives the cam follower which drives the cam follower attached to the Slide Bracket 140-52-1.

A push button safety switch is provided as part of the selector switch assembly to prevent accidental eraser should the control be rotated beyond the play position.

An automatic cut off switch with a manual reset button is provided to shut off either motors at the end of the wire spool. The celluloid leader passing under the bakelite housing block trips the switch and shuts off AC supply to both motors.

MODEL 7YR752
CHASSIS 7B04A

MAJESTIC RADIO & TELEV. CORP.



ADJUSTMENTS

A. IDLER WHEEL

If the wire breaks or leaves the recording head when switching from rewind to play, the Idler Wheel Tension is incorrect. To properly adjust, set the selector switch to play with a spool of wire in position, and rotate the eccentric washer 140-50 until the large turntable turns too slowly. Gradually rotate cam until turntable speed just exceeds 78 R.P.M. (this may be checked with a record stroboscope) if wire continues to break or leave the recording head, a slight correction one way or the other may be necessary. In event this still does not cure wire breakage loosen the bolts holding the play motor to the motor mounting plate and slide the motor forward to provide greater friction between the motor drive shaft and the Idler Wheel. Readjust the eccentric cam as outlined above.

B. SELECTOR SWITCH

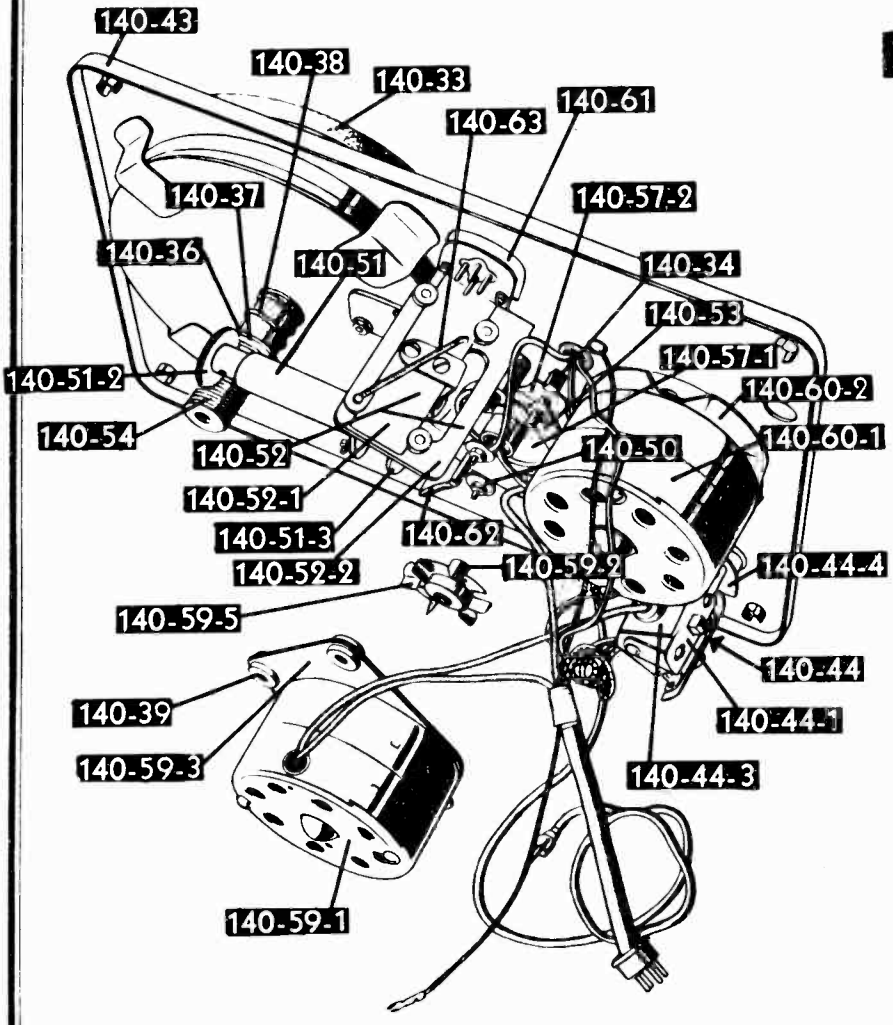
Should either of the two slide switches on the Selector Switch Assembly fail to make or break contact, bend the motor cam assembly 140-44-4 to effect proper switch movement.

C. AUTOMATIC CUT-OFF SWITCH

If the motor fails to cut off on the end of a spool, the lever arm or cut off switch 140-47-2 should be bent down slightly being careful not to break the assembly.

MAJESTIC RADIO & TELEV. CORP.

MODEL 7YR752
CHASSIS 7B04A



D. HEAD POSITION

With the cam follower in the lowest position of the heart shaped cam, if the wire touches the base plate loosen the two screws holding the cam follower to the head slide bracket and move the head up until the wire just clears the base plate.

E. CLEANING RECORDER HEAD WIRE GAP

If the overall quality and volume of recording seems to decrease with use, there is a strong possibility that the Recording Head Gap has been filled with microscopic slivers of wire. A stiff tooth brush should be used to clean the gap in the recording head.

RADIO UNIT

The wire recorder chassis consists of a standard 5-tube radio to which a sub-chassis has been added. The sub-chassis has one 12BA6 used as a resistance coupled high gain amplifier to provide necessary gain for mike recording and to amplify the minute voltage developed by the recording head in play-back position.

In addition, this chassis contains a 50B5 tube used as a 40KC oscillator. In recording position the oscillator develops approximately 2.8 VAC (40 K.C.) under the low impedance recording head load. In all positions except recording, the oscillator is made inoperative by opening the cathode with the master selector switch on the recording unit.

The recording head has two magnetic fields, one of which is a low impedance winding energized by the oscillator. The wire passing this field has its previous magnetic structure destroyed, thereby erasing the previously recorded sound.

The wire after passing this part of the head, passes the high impedance winding magnetic field which is energized by the output tube of the radio. The magnetic structure of the wire is re-arranged to conform to the field variations caused by the speech or music impressed on the head.

The 40 K.C. oscillator may cause hetrodynes with powerful local stations when in recording position. This condition varies with location. If objectionable, adjust C29, located on the rear of the small oscillator chassis until minimized.

MODEL 7YR752
CHASSIS 7B04A

MAJESTIC RADIO & TELEV. CORP.

REPLACEMENT PARTS

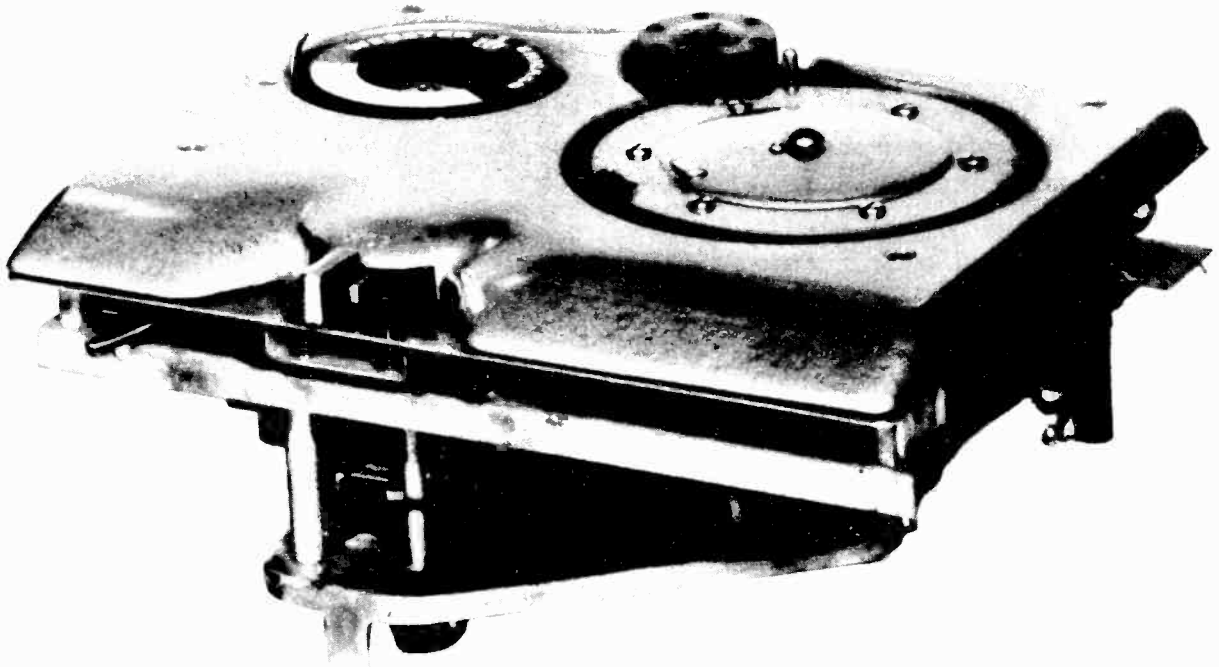
WIRE RECORDER UNIT

PART NO.	DESCRIPTION
140-33	Turntable Assembly, (6A)*
140-34	Base Plate Motor Switch, (40)*
140-35	Nameplate, Selector Switch, (57)*
140-36	Key Washer, (58)*
140-37	Washer, felt, (59)*
127-25	Bracket, Pickup Arm, (77)*
140-38	Turntable Spring, (93A)*
140-39	Grommet, rubber motor mounting, (96A)*
140-40	Washer, (98A)*
140-41	Washer, (120)*
140-42	Pointer, selector Switch knob, (124)*
140-43	Chasiss base assembly, Staked & Welded, (126A)*
140-44	Selector switch assembly, (129B)*
140-44-1	Switch Assembly, (210)*
140-44-2	Detent Assembly, (200)*
140-44-3	Shield Assembly, (167)*
140-44-4	Motor Cam Assembly, (135)*
140-44-5	Push button assembly, (209)*
140-44-6	"U" Clamp, (222)*
140-44-7	Bracket, (38)*
140-45	Washer, (138)*
140-46	Star spring, re-wind hub, (154A)*
140-47	Reset Switch Assembly, (162A)*
140-47-1	Bakalite Mounting Block (13)*
140-47-2	Automatic Stop Switch, (65)*
140-47-3	Button, (68)*
140-48	Washer, rewind hub, (166)*
140-49	Spring Washer, (168A)*
140-50	Eccentric Washer, (186A)*
140-51	Level Wind Assembly, (194)*
140-51-1	Worm Gear Shaft Assembly, 27 tooth, (195)*
140-51-2	Worm Gear Shaft Assembly 51 tooth, (195)*
140-51-3	Cam & hub, (136)*
140-51-4	"L" Bracket, (153)*
140-51-5	Washer, (98)*

PART NO.	DESCRIPTION
140-52	Level Winder Slide Assembly, (196)*
140-52-1	Slide Bracket, (1)*
140-52-2	L Bracket, die cast, (211 or 15)*
140-52-3	Cam follower
140-53	Link Arm Assembly, (202)*
140-53-1	Roller, (172)*
140-53-2	Spring Clip, (55)*
140-54	Worm Gear, Long, (203)*
140-55	Worm Gear, Short,*
140-56A	Rewind Hub Assembly, Set screw mounting, (204B)*
140-56B	Rewind Hub Assembly, Knurled Knob Mounting
140-56-1	Spring Pin, (190)*
140-56-2	Spring, (189)*
140-56-3	Knurled Knob
140-57	Pulley & Idler Bracket Assembly, Complete, (206)*
140-57-1	Idler Wheel Assembly, (133)*
140-57-2	Slide Bracket less Idler Wheel, (205)*
128-81	Knob, Selector Switch
140-59	Forward Motor Assembly, (216)*
140-59-1	Motor, (174 or 214)*
140-59-2	Extension Shaft, (176)*
140-59-3	Motor Plate, (150)*
140-59-4	Grommets, (96)*
140-59-5	Fan, (177)*
129-62	Mounting Spring, heavy (copper plated), (237)*
129-63	Mounting Spring, light (cad. plated), (238)*
S-1637	Astatic Pickup Arm (with crystal & cord) (241)*
140-65	Crystal Cartridge (Astatic L-71A)
140-60	Rewind Motor Assembly, (275)*
140-60-1	Motor, (215 or 175)*
140-60-2	Motor Plate Assembly, (179)*
140-61	Recording Head, (260)*
140-62	Spring, rewind slide bracket, (99)*
140-63	Spring, Slide Bracket tension, (163)*
140-64	Shoulder washer, motor mounting (37)*

* Indicates St. George Part

WEBSTER CHICAGO CORP. MODEL 79



GENERAL

The Webster-Chicago Model 79 is a wire recorder foundation unit for those who prefer to build their own wire recorder. It may be used in any location where sound recording is desired and where a source of 105-120 volt 50-60 cycle current is available.

It consists of:

A. A complete, reversible, wire transporting mechanism driven by a four pole, shaded pole induction motor. (50-60 cycle, 105-120 volt).

B. A triple purpose head which records, plays back or erases. This head is mounted on the unit and is actuated by the mechanism to level wind the wire in either the run or rewind position.

C. A 15 minute spool of .004 stainless steel wire which may be used for thousands of successive recordings and from which a recording may be played back thousands of times. Accessory spools of wire are available in 15 minute, 30 minute and one hour lengths.

D. A special oscillator coil designed to give the best results in recordings and erasing when used as recommended in the accompanying circuit diagrams.

The Model 79 mechanism is identical to that used in the Model 80 portable wire recorder.

PURPOSE

The purpose of this unit is to give the experimenter, amateur and professional engineer a basic unit around which to build his own wire recorder and player. It is not in itself a complete recorder. Neither are the accompanying circuit diagrams so complete as to stifle ingenuity or individual accomplishment. Each constructor can best work out his own circuits to meet his exact requirements. However, a simple, basic circuit is offered under the heading "Amplifier Construction". The results obtained from the completed recorder will be largely dependent upon the skill used in following the basic diagrams and in building the necessary amplifier-oscillator circuits.

Those desiring a completely assembled recorder should consider the Webster-Chicago Model 80 Wire Recorder.

MOUNTING INSTRUCTIONS

The Model 79 mechanism must be mounted horizontally and will not operate properly if mounted on a slant or in a vertical position. The motor is mounted on pivot points and is physically shifted to the run and rewind positions. When mounted in a radio console, to be used for recording radio programs and playing back through the radio amplifier and speaker, the wire recorder mechanism should be mounted in much the same manner as an automatic record changer. Four holes for mounting on wooden braces by means of wood screws or on metal supports by means of bolts are accessible by removing the top cover. The Model 79 cover is shaped to permit mounting flush with the panel, which results in a neat, professional appearance in the completed recorder.

If used in locations where excessive vibration is experienced, such as in an automobile, sound truck, small boat or airplane, it is recommended that the entire unit be spring mounted to prevent the motor from bouncing away from the rubber drive wheel.

SHIPPING SCREWS

Before placing the instrument in operation, remove the two shipping screws which hold the motor rigid. The recorder will not operate until these have been removed. Be sure to replace these screws if the Model 79 is reshipped. However, they are not required for normal carrying or travelling.

While the top plate is off, note that the AC line fuse is located in the far righthand corner of the sub plate.

TO REMOVE SHIPPING SCREWS

1. Remove the four top plate screws.
2. Lift the top plate straight up, exposing the wire transporting mechanism.
3. Remove the two shipping screws, indicated by red washers.
4. Replace the top plate and the screws.

LINE VOLTAGE

The Model 79 mechanism is designed to operate on 105-120 volt 60 cycle current, and has a power consumption of 18 watts. It may be used on 50 cycle current providing that recording and playback are made at the same line frequency. On 50 cycle operation, however, the motor will run about 17% slower which will somewhat impair the fidelity of the recording.

CAUTION: DO NOT connect the Model 79 to Direct Current or to sources of any other voltage or frequency. If in doubt, call the local power company and give them your address; they will tell you what current you use.

AMPLIFIER CONSTRUCTION

Recordings whch have been made properly on a magnetic wire recorder may be played back through any good high gain amplifier. In other words, the output of the recording head voice coil on the Model 79 (terminals 1 and 2) could be connected to any good microphone amplifier for playback only.

In designing a complete unit for recording and playback, the following functional circuits must be considered:

1. A recording amplifier with high gain for microphone and low gain for radio-phono recording.
2. An oscillator to provide a "supersonic bias" for recording and erase voltage.
3. A playback amplifier.
4. A power supply.

In the interests of cost and size, it is also desirable to keep the number of tubes and associated circuits at a minimum and to construct the amplifier from standard parts which are readily available. This can lead to complications since in using the same tubes for recording and playback, normal construction would bring the grid of the first tube and the plate of the second tube into an unshielded switch in an "in phase" condition. This would result in regeneration in the amplifier.

The impedance of the head without the matching network is 15,000 ohms at 1,000 cycles.

The oscillator develops 5 volts at 1.0 ampere (R.F.) at 35-40 kc. This may be tested by shorting a 6.3 volt pilot light across the secondary of the oscillator coil, since most meters will not accurately measure radio frequency values. The pilot light should light to a medium brilliance if the oscillator is functioning properly.

The circuit shown is unusual in one respect, a 6SN7 is used in cascade for the second stage. This inversion circuit permits taking off the recording signal out of phase with the 6SJ7 grid, eliminating any tendency toward oscillation when the plate-grid circuits are controlled by a common switch.

SUGGESTED CIRCUIT

In order to overcome this and other problems and as a guide to the experimenter who wishes to build his own amplifier, Webster-Chicago engineers have developed this suggested circuit for recording and playback. It is designed to record from a crystal or high impedance dynamic microphone with a sensitivity of about —55DB or from a crystal phono pickup or the second detector of a radio receiver when the signal is approximately 1.0 volt.

The output on playback is approximately 1.0 volt which may be used for listening or monitoring with earphones or can be used to drive a power amplifier. When used with an external amplifier, the output of the Model 79 amplifier is fed into the phono input of the amplifier.

When a radio receiver is provided with a phono-input, the wire recorder output may be connected into the phono-input jack. When it is not provided with a special input jack, the recorder may be connected directly into the circuit as explained later under the section on "connections"

The compensating R-C network consisting of R-1 and C-1 is designed to flatten the middle register response which is characteristic of magnetic recording. These components may be varied to give more highs or more lows but as specified should give good response from 50 to 5,000 cycles.

The .25 megohm volume control for the second triode section of the 6SN7 may be mounted with the shaft protruding from the top of the chassis. It should be adjusted so that the output of the second section is approximately 10 volts with .005 volts input at terminal 2 on P-1, Fig. 3 and the volume control on full.

NOTE: The power supply shown in the diagram will not accommodate additional tubes. Select a heavier power transformer and associated parts if a transformer coupled push pull stage is to be added for direct speaker operation.

Switch SW-1 is a rotary wafer switch such as a Mallory No. 1312L or equivalent. When using the Mallory switch, the connections indicated on the diagram are recommended.

Many circuit variations will occur to the experienced constructor, including power supplies, choice of rectifier tube, input circuits and additional amplification. Two examples of alternate input circuits are shown on page 10.

CONSTRUCTION NOTES

The usual care must be exercised in dressing the leads. Keep plate leads as far from grid leads as possible. Keep grid leads as far from AC leads as possible. Use a toggle "on-off" switch; do not use a switch on the volume control for this purpose. A metal cover over the bottom of the chassis helps to eliminate hum pickup from surrounding apparatus.

A high inductance in the plate lead of the 6V6 oscillator permits operating it as a pentode with increased output. The primary of an inexpensive output transformer was used because of its relatively high inductance and availability. Cut off and ignore the voice coil leads.

The transformer T-1 has a 5 volt filament which will permit the use of a 5Y3G rectifier if desired.

If a glass 6SJ7 must be used, be certain it is shielded. A metal tube is preferred.

Connecting the volume control between the 6SJ7 and the 6J5 avoids thermal noises inherent in circuits placing the volume control ahead of the first tube.

Condenser C-2 must be shielded by the constructor if a shielded input condenser cannot be purchased. Use foil and insulate it with waxed paper.

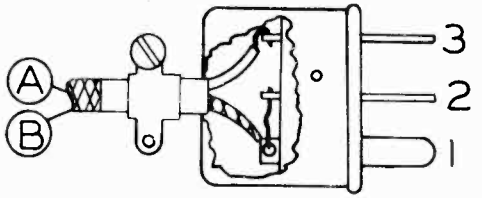


Fig. 1 — Radio-phono Input Connections

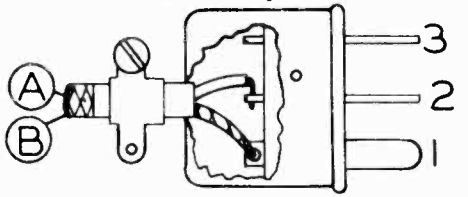


Fig. 2 — Microphone Input Connections

MODEL 79 WEBSTER CHICAGO CORP.

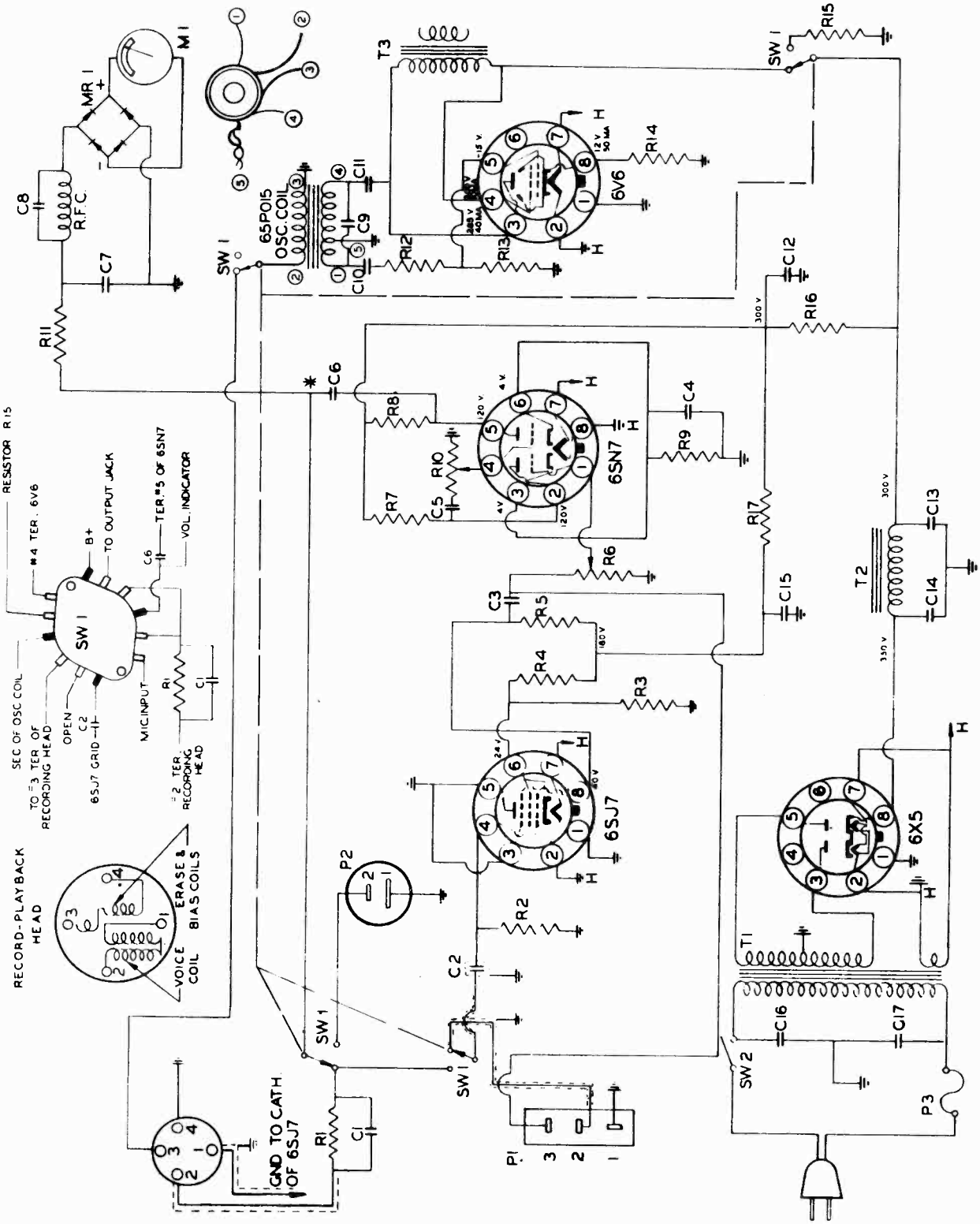


Fig. 3 — Suggested Circuit Diagram

Fig. 4 — Parts Layout of Laboratory Model of Amplifier Described in Fig. 3

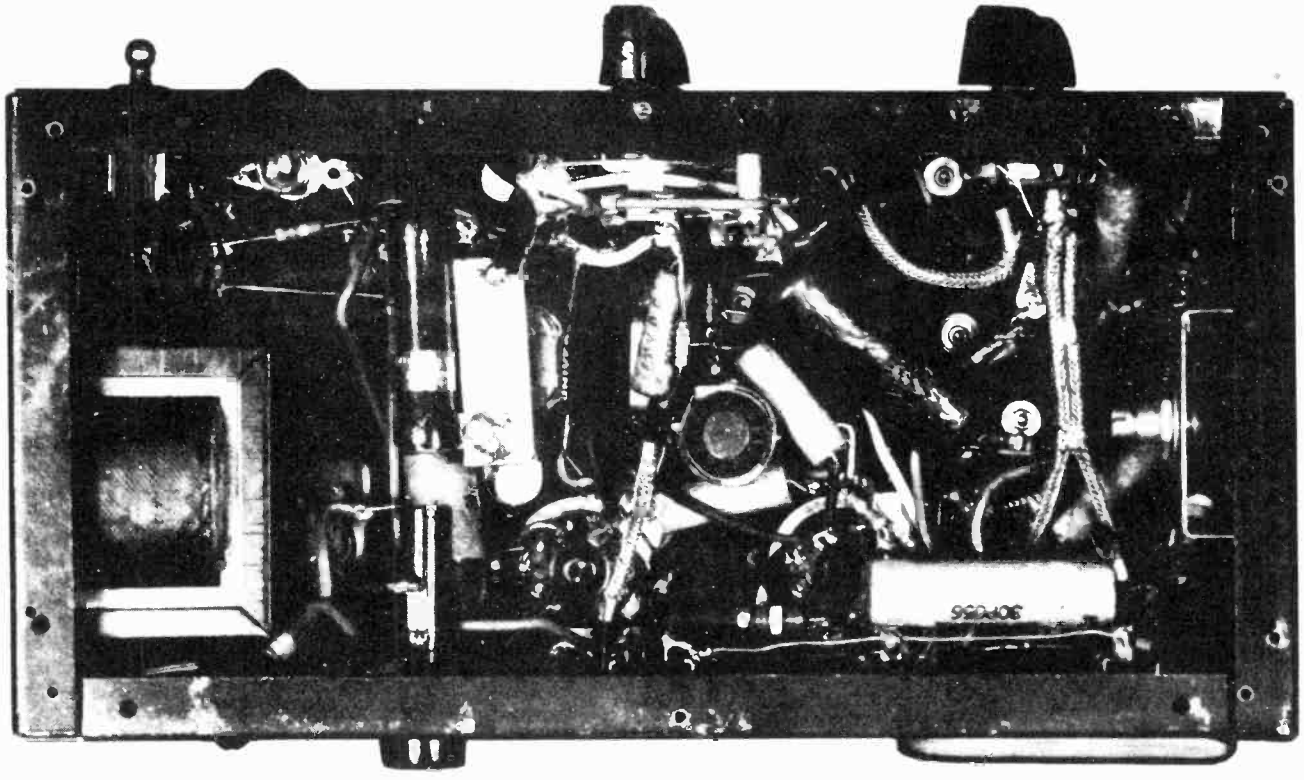


Fig. 5 — Wiring View of Laboratory Model Described in Fig. 3

For best results the ground terminal No. 3 of the oscillator coil should be carried directly to the chassis end of the braided ground lead from terminal No. 4 of the recording head. This lead carries 5 watts of high frequency R.F. so the connections must be especially good.

CONNECTIONS

To Record From Radio:

Connect the radio-phono input (Terminals 1 and 3 on P-1) across the volume control of the radio receiver by means of a suitable plug or connector. The volume will be controlled by the volume control on the recorder.

To Record From Phonograph:

Connect the radio-phono input to the leads from the high impedance crystal pickup by means of a suitable plug or connector as in Radio Recording.

NOTE: Connecting the radio or phono pickup to terminal 1 and 3 of P-1 automatically feeds the signal to the first grid of the 6SN7. This leaves the grid of the 6SJ7 open. Terminal 2 of the input-plug must be grounded to terminal 1 to short out the 6SJ7 grid and the input plug *must* be removed during playback. See Figs. 1 and 2.

To Record From Microphone:

Connect the leads from a high impedance crystal or dynamic microphone to the "microphone input" (Terminals 1 and 2 on P-1) by means of a suitable plug or connector.

To Playback Through a Radio:

Connect the output of the amplifier to the "television" or "FM, Audio" connection of the radio or across the volume control as indicated in the typical circuit diagram. A switch should be provided to break the B+ as indicated to silence the radio effectively. The volume may be controlled by either the radio or by the recorder volume control.

To Playback Through an Audio Amplifier:

Connect the output of the wire recorder amplifier to the "phono input" jack of the external audio amplifier.

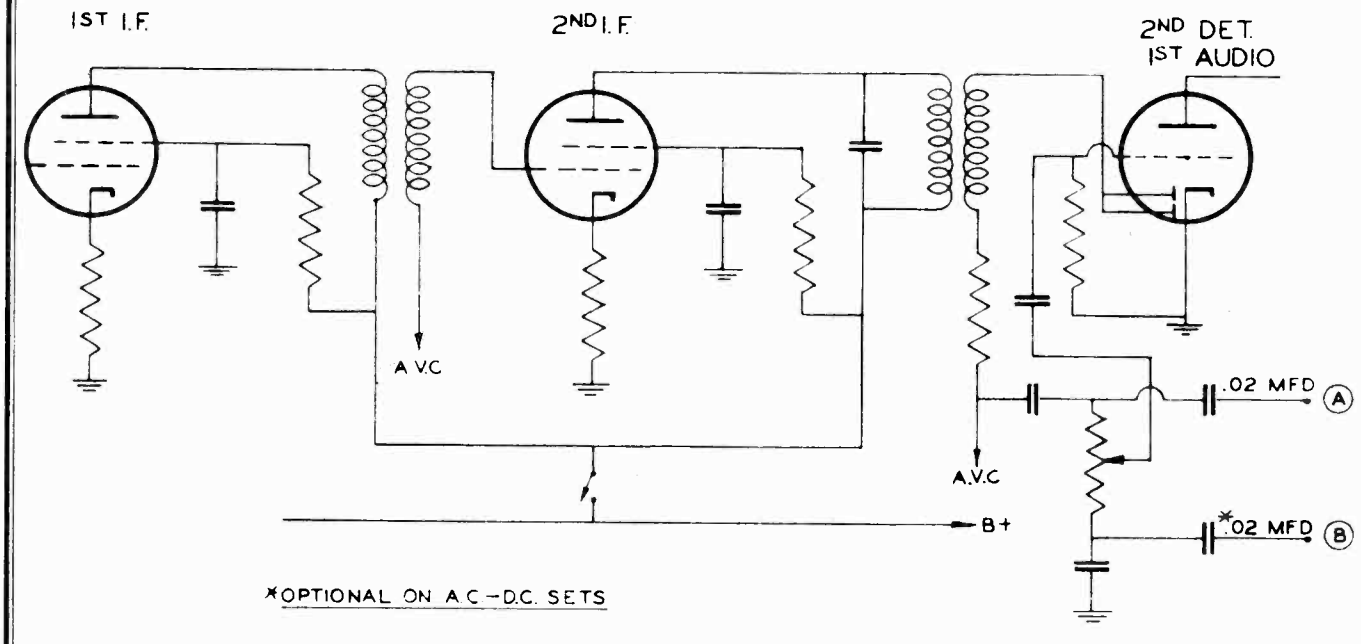


Fig. 6 — Connections to a Typical Radio Receiver

VOLUME LEVEL INDICATOR

Although experience will indicate the best volume setting for the proper recording level, visual volume level indicators are a definite advantage. Two methods of monitoring the volume level are illustrated.

1. A. C. Output Meter:

To Calibrate: Feed 7 volts at 400 cps from an audio oscillator to the input (indicated by an asterisk in Fig 3) measured with a VTVM. Calibrate the meter at that setting.

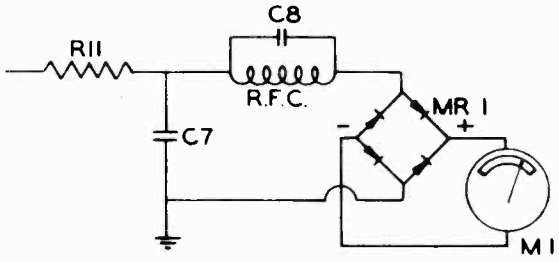


Fig. 7 — A.C. Output Meter

If a suitable audio oscillator and A.C. VTVM are not available, a "cut and try" method of calibration is as follows:

1. Secure a 1000 cycle test phonograph record.
2. Use a crystal phono pickup with an output of 1 volt.
3. Record the 1000 cycle tone at various volume control settings.
4. Mark the meter to indicate the level which is distorted and difficult to erase.

To Use:

Measure the voltage being applied to the recording head by connecting to the point (*) indicated in the schematic diagram. Do not exceed the over-load mark on the meter on peaks. In order to preserve the full dynamic range when recording, permit the level to rise and fall with the natural level of the program. Do not keep the needle at the "over-load" point.

2. Neon Bulb Volume Level Indicator:

To Calibrate: Substitute a variable resistor for the 220,000 ohm resistor. Fig. 8. Apply 7 volts from an audio oscillator, to the .01 mfd. condenser, measured with a VTVM, and adjust the variable resistor until the bulb just flashes. Replace with suitable resistor in the circuit. The values suggested in the circuit diagram are for a 300 volt D.C. power supply, hence the need for calibration.

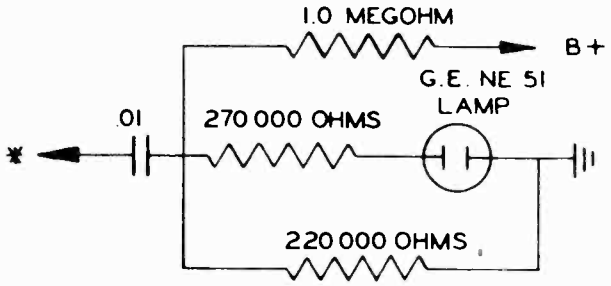


Fig. 8 — Neon Bulb Volume Level Indicator

To Use:

Connect permanently into the circuit at the point indicated by an asterisk in the amplifier diagram. Adjust the volume control when recording so that the neon bulb just flashes on peaks only. Most of the time the bulb should not flash if the full dynamic range of a program is to be preserved.

RECORDING

A 15 minute spool of recording wire is supplied with the Model 79 as standard equipment. Extra spools for 15 minutes, 30 minutes and 1-hour recordings are available as accessories.

1. Place the spool of wire in position with the label side up.
2. Rotate the large righthand drum by hand until the recording head reaches the top of its vertical travel. This is important for both recording and playback.
3. Pull the loose end of the wire from the spool so that it is long enough to reach across the back of the recording head, through the groove in the large drum and under the clip, with about one inch to spare.
4. Press down on the button in the center of the large drum to release the clip so that the wire can be slipped under it.
5. Press down on the Control Lever Limiting But-

ton and move the control lever from the "STOP" to the "RUN" position. (These buttons are provided to prevent moving the control past the stop position when returning from either the "RUN" or "REWIND" postions. Moving past the "STOP" position would release the brakes on the trailing drum and cause the wire to spill.) This will start the motor and wind the wire from the spool to the drum, across the recording head, at the rate of approximately two feet per second. The recording head will move up and down to distribute the wire evenly on the drum. The recording may be interrupted at any time by moving the control switch to the "STOP" position.

6. AT THE COMPLETION OF THE RECORDING, MOVE THE "RECORD-LISTEN" SWITCH TO LISTEN POSITION AND THE CONTROL SWITCH TO THE REWIND POSITION. The drum and spool will then start revolving in the reverse direction, increasing in speed to about seven times the recording speed.

If the wire is permitted to run all the way off the drum and onto the supply spool, the clip will release the end of the wire. Note that when this occurs, the last turn of wire will be "tucked" into the spool and the spool will not unravel.

However, it is not necessary to let the wire run all the way off the drum, especially if an immediate playback is to be made. The pilot light has been placed in such a position that the wire on the drum is easily watched and the mechanism can be stopped before it has completely unwound.

A recording may be played back thousands of times without any appreciable loss of volume or quality or it may be stored indefinitely. On the other hand, having served its purpose, the recordings may be erased and the wire used again and again for successive recordings. Further details are given in the paragraph entitled "Erasing a Recording".

NEW SPOOL OF WIRE

Before making a permanent recording on a new spool of wire, run the entire spool through the recorder once and rewind it. This is important for two reasons: First, the wire will then be phased on the spool in direct relation to the rise and fall of the recording head. Second, the rewound spool will be somewhat more loosely wound and the free end will "tuck in" more securely.

BROKEN WIRE

If the wire is accidentally broken, or if it is desired to remove or insert a section for editing purposes, splice the ends by tying them together with a simple square knot. Pull the knot tight and cut off the loose ends close to the splice. The knot will pull across the recording head without catching.

ERASING A RECORDING

As the wire passes across the recording head, with the control switch set to "RUN" and the "RECORD-LISTEN" switch to "RECORD", it is first demagnetized by the action of the erase coil before it reaches the recording coil, both coils being incorporated in the dual-purpose head. Therefore, recording is always done on demagnetized wire. It follows that if the wire passes through the recording head with the switch in "RECORD" and the volume control turned off, the wire will be erased and no recording will remain. This feature of magnetic recording makes it possible to erase a word or phrase in a voice recording and if desired, insert a new word or phrase in its place.

A wire may be used for thousands of successive recordings or a complete spool may be erased without putting any other sound on the wire.

It is possible, by turning the volume control on full and shouting into the microphone, to magnetize the wire to such a degree that the recording cannot be erased by normal means. Later recordings will not be clear but will be distorted due to the over-magnetization of the wire. When this occurs, "erase" the wire two or more times

to remove the over-magnetization before recording on the wire again.

SERVICE NOTES

The Model 79 Wire Recorder mechanism is carefully adjusted and lubricated before shipment. Additional lubrication should be added approximately every six months as explained in detail in the Service Manual.

Be careful to keep the rubber surfaces of the idler wheels and the face of the drums free of oil. Any lubricant on these surfaces should be removed immediately with carbon tetrachloride.

Dust will gradually accumulate in the recording head groove. This will cause noise and scratch sounds on the recording and during playback. Remove the dust by means of a small brush and carbon tetrachloride.

Should specific service problems arise, consult the service manual for additional suggestions.

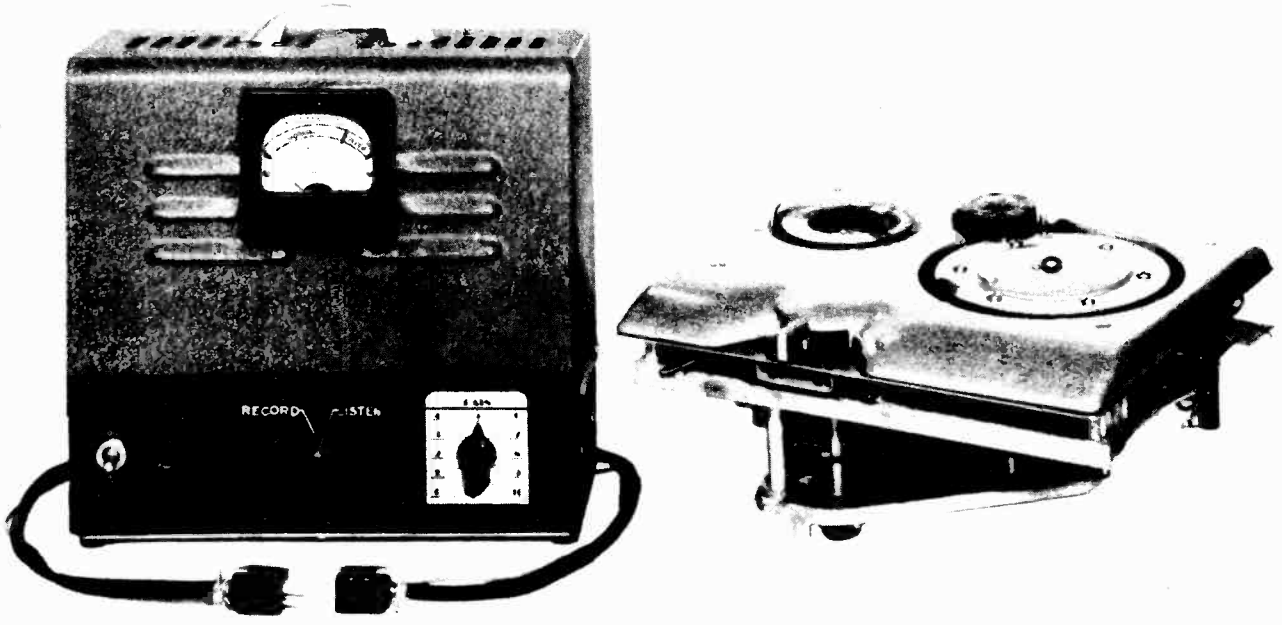


Fig. 9 — The circuit suggested in Fig. 3 can be assembled in an attractive chassis and cover as above and Fig. 4 or assembled and mounted to suit the constructor's convenience.

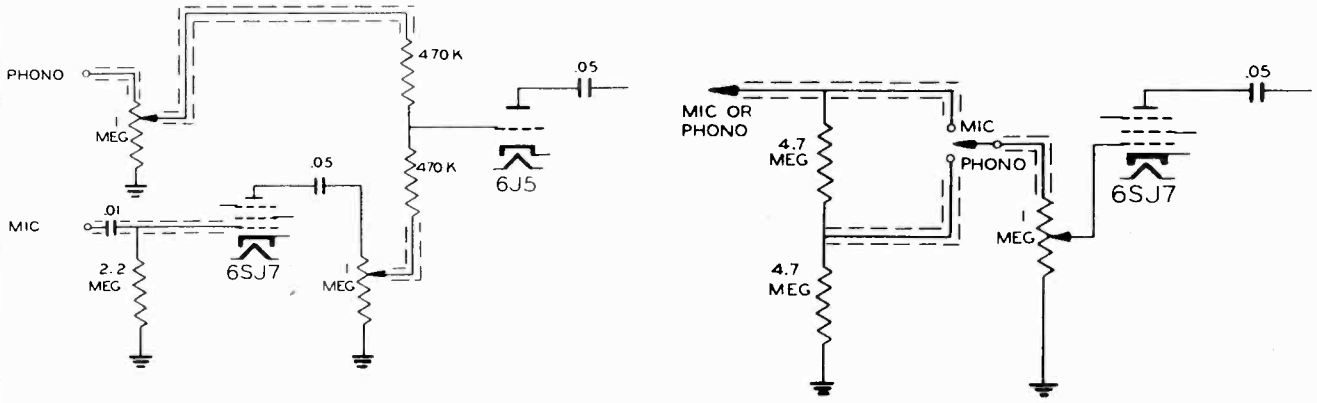


Fig. 10 — Possible Input Circuit Variations

MODEL 79

WEBSTER CHICAGO CORP.

Part No.	*Description*
R-1	68M ohm ½ watt — Carbon resistor
R-2	4.7 megohm ½ watt — Carbon resistor
R-3	47M ohm ½ watt — Carbon resistor
R-4	220M ohm ½ watt — Carbon resistor
R-5	220M ohm ½ watt — Carbon resistor
R-6	1 megohm — Volume control
R-7	39M ohm ½ watt — Carbon resistor
R-8	39M ohm ½ watt — Carbon resistor
R-9	470 ohm 1 watt — Carbon resistor
R-10	250M ohm — Volume control
R-11	15M ohm ½ watt — Carbon resistor
R-12	820 ohm ½ watt — Carbon resistor
R-13	68M ohm ½ watt — Carbon resistor
R-14	270 ohm 1 watt — Fixed resistor
R-15	10M ohm 20 watt — Fixed resistor
R-16	820 ohm ½ watt — Carbon resistor
R-17	100M ohm ½ watt — Carbon resistor
C-1	.001 mfd 600V — Paper condenser
C-2	.01 mfd 400V — Paper condenser
C-3	.02 mfd 400V — Paper condenser
C-4	10 mfd 25V — Electrolytic condenser
C-5	.02 mfd 400V — Paper condenser
C-6	.5 mfd 400V — Paper condenser
C-7	.002 mfd 400V — Paper condenser
C-8	.002 mfd 400V — Paper condenser
C-9	.01 mfd 600V — Mica condenser
C-10	.002 mfd 600V — Mica condenser
C-11	.002 mfd 600V — Mica condenser
C-12-15	20-20 mfd 450V — Electrolytic condenser (vertical)
C-13-14	20-20 mfd 450V — Electrolytic condenser (vertical)
C-16	.05 mfd 400V — Paper condenser
C-17	.05 mfd 400V — Paper condenser
	5" x 10" x 9" chassis and cover
	Bottom plate
	4 octal sockets
T-1	Stancor No. P6119 power transformer or equivalent
T-2	Stancor type No. C1003 — Filter choke or equivalent
T-3	Stancor type No. A3877 — Output transformer or equivalent
	6SJ7 tube
	6SN7 tube
	6V6 tube
	6X5 tube
SW-1	Mallory 1 gang, 4 position, non shorting switch type 1312L
P-1	Jones socket and plug 3 contact No. 303-AB
P-2	Jones socket and plug 2 contact No. 302-AB
P-3	Extractor fuse post and 1 amp fuse
SW-2	S. P. S. T. toggle switch
	Pilot light and Jewell socket
	Switch knob
	Volume control knob
	Dial plate for volume control
	Hookup wire
	Mtg. bracket for R-10
RFC	10MH R. F. choke
M-1	0-500 Microammeter Triplett model 327T or equivalent
MR-1	Conant meter rectifier, series 160 or equivalent
MM-35	Webster-Chicago crystal microphone or any high impedance crystal or dynamic microphone with output level of —55DB or better.

WIRECORDER CORP.

MODEL A-1

GENERAL:

The Model A-1 WiRecorder is a highly advanced design in a precision-built, professional type magnetic sound recorder fully capable of producing exceptionally high fidelity recordings, providing the operator familiarizes himself with the information contained in this manual, and providing the unit is properly connected to a suitable amplifier.

EQUIPMENT INCLUDED

The Model A-1 WiRecorder includes the newly engineered mechanical drive unit with patented "Magneflo" clutches, a four-purpose recording head, a set of chromed WIRecorder spools with approximately 7500 feet of the finest quality .004 stainless steel sound recording wire, (sufficient for more than one hour of continuous recording or playback,) a time indicator for re-locating any portion of a full hour's recording quickly and easily, an oscillator coil to be used in generating high frequency erase-bias voltage, four special rubber mounts for chassis adaptation, and complete schematic instructions for switching and connecting to an amplifier.

TO UNPACK:

Remove corrugated fillers surrounding the Model A-1 drive unit. The wire and spools will be found in a separate box which should be preserved as a storage container when new spools are purchased for future recordings.

The oscillator coil, time indicator bracket and flexible coupling cable, and envelope containing rubber mounts should next be removed and checked.

The WiRecorder drive unit, mounted on a corrugated board base, may now be taken from the top of the carton. Care should be taken to avoid bending brake arms 12 and 13 (Figure 1), when removing the unit from the carton.

While the WiRecorder may be operated on the corrugated board base with wooden supports, most owners will prefer a standard chassis base using the shock mountings furnished to support the unit.

If the WiRecorder is operated on the corrugated shipping base make sure the stop button and stop button arm 2 (Figure 2) are clear of the base. In any type mounting this stop button must operate freely without binding.

REMOVING REAR SEPARATOR BLOCKS

Next the separator blocks and retaining wire required for safe shipment must be removed. These will be found in the rear of the unit. The separator blocks are of masonite, punched to receive the retaining wire. Using ordinary wire cutters and pliers, sever wire and pull wire carefully through separator blocks. Blocks may now be removed with pliers or fingers, allowing clutch hubs 16 and 25 (fig.2) to bear against rear drive wheel 11.

HANDLING AND APPLYING SPOOLS:

The unit is now ready to operate mechanically, save for the final brake adjustment which must be done with spools in place and power connected.

Brake adjustment is made at the factory prior to shipment, and the following instructions are including only in event of maladjustment resulting from shipping. As a double check to assure proper brake operation it is advisable to familiarize oneself with the following procedure.

Note that the recording wire is attached to both spools and will remain so except in event of mishandling or accidental wire breakage. An automatic trip trigger on the rear flange of both spools stops the mechanism before the wire leaves either spool.

To apply the spools to the two shafts, first lift the front guide wire extending below the recording head. This wire is hinged at the head and will swing upward with the application of slight pressure at the bottom of the wire.

Now place the full spool on the left shaft and the nearly empty spool on the right shaft, pushing both spools firmly against the locking springs until they snap into position.

KEEP WIRE STRETCHED TIGHTLY BETWEEN SPOOLS DURING THIS PROCEDURE. ALWAYS MAKE SURE WIRE IS STRETCHED TIGHTLY BETWEEN THE TWO SPOOLS BEFORE STARTING WIRECORDER EITHER IN FORWARD OR REWIND. Any slack should be removed manually by turning either spool counter-clockwise.

With the spools securely in place the hinged wire guide may now be swung downward, and snapped into place against the rear guide, with the recording wire held between them.

Now with power disconnected, turn wire control knob 1 (fig.2) clockwise slowly until it locks in place. Neoprene pinch idler 3 (fig. 1) and guide arm 4 (fig.1) have now lifted the wire into the recording head, and the entire left hand clutch assembly has been pushed away from rear drive wheel 11 (fig. 1), as will be determined from clearance visible between clutch hub 25 and rear drive wheel tire.

BRAKE ADJUSTMENT:

In this position brake arm 12 (fig. 1) should be set by means of adjustment screws in rear so that the felt pad bears against the hub lightly. This is a preliminary adjustment only. Final setting must be made with power on, which will be described in later paragraph.

To set right hand brake 13, push stop button 2. This drops pinch idler and guide arm to neutral, and allows both clutches to engage rear drive wheel. Now turn wire control knob 1 counter clockwise to locking position. Clutch 16 is now pushed away from rear drive tire. In this position brake arm 13 is to be set, by means of rear adjustment screws, to bear against hub 16 lightly, as a preliminary adjustment.

FINAL BRAKE ADJUSTMENT

Once again press stop button 2, returning mechanism to neutral "off" position. Connect unit to standard 105-120 volt 60 cycle current and turn wire control clockwise to "forward" position, raising wire into head and starting motor. The WiRecorder is now moving the wire forward for recording or playback.

In this position, if the preliminary brake adjustment was made properly, brake arm 12 will bear against clutch 25 with just enough pressure to stop rotation of the hub. Meanwhile brake arm 13 should not be in contact with clutch hub 16 which is being driven freely from the rear drive tire.

Allow the unit to run for about 1 minute in the "forward" position, and then push stop button 2. Turning wire control knob counter clockwise, start WiRecorder into "rewind". In this position brake 13 should bear against clutch hub 16 with just enough pressure to stop rotation of the hub.

IMPORTANT: Brake pressures should always be set at a minimum to stop rotation of hub against which they are bearing.

TIME INDICATOR

A time indicator is furnished with each Model A-1 WiRecorder. It consists of a feed screw attached to a mounting bracket, an adjustable carriage and a flexible coupling shaft.

One end of the coupling shaft is to be connected to the feed screw while the other end is threaded into the center of fiber gear 19 (fig. 2).

The indicator bracket may be mounted vertically or horizontally providing no binding of the flexible shaft occurs.

The indicator carriage is movable manually along the feed screw by twisting the carriage knob slightly to the right or left and sliding. This is of special advantage when changing spools.

The time indicator automatically reverses itself in rewind, and when used with a calibrated panel scale which is easily made, gives ready reference to any portion of a recording. The indicator moves across the entire length of the feed screw in 65 minutes.

OPERATING SUGGESTIONS

ALWAYS make sure wire is taut between two spools before turning wire control knob. If wire is loose turn either spool counter-clockwise by hand to remove slack.

In going from "forward" to "rewind", or to stop unit, STOP button must be pushed before wire control knob is turned to new position.

Always allow spools to come to a full stop before turning wire control to new position.

When new spools and wire are placed on your WiRecorder for the first time it is advisable to run the entire hour spool through a complete cycle (forward and rewind) to "phase" the wire for best level winding action.

ADAPTATION TO AMPLIFIER

Less than a watt of power is required to record on the Model A-1 WiRecorder. Consequently, for recording, virtually any amplifier or radio will suffice. However, the output off the wire for playback is approximately one millivolt, making a high gain amplifier of the "public address" type essential.

High frequency "bias" of the wire, applied through a special winding in the recording head itself, is required for recording. The power for this biasing action, as well as for wire erasure, must be generated by a circuit separate from the amplifier proper.

THE BIAS-ERASE OSCILLATOR

The complete circuit diagram for the oscillator, the equalizer, and volume indicator is shown in Figure 6. The oscillator coil itself L4, L5, is furnished with the Model A-1 WiRecorder, and all connections with reference to the circuit may be easily identified from Figure 7 showing the terminals of the coil.

One watt of power is required from this oscillator, at a frequency between 30 and 40 kc. Thus a wide choice of readily available tubes is permitted.

Measured at points X_1X_2, with the head connected to the oscillator, between 3.5 and 4 volts should be indicated. Less than 3.5 volts will result in incomplete erasure and possible distortion at low frequencies. Too high a voltage, if sustained, may result in damage to recording head. If components shown in schematic diagram of oscillator circuit are followed, the correct voltage may be expected.

THE RECORDING-REPRODUCING HEAD

The Model A-1 WiRecorder is equipped with a specially designed multi-function head. Three windings are incorporated in the head: First, the erase winding, energized whenever the selector switch is in "recording" position; Second, the bias winding inductively coupled to the third section, which is the "voice coil" winding.

The voice coil winding is of high impedance, approximating 2200 ohms at 1000 cycles, making it feasible to couple from the plate of an amplifier tube without transformer matching, for recording, and to drive the grid of an amplifier tube directly for playback.

The incorporated erase winding assures automatic erasure of an old recording a split second before the new recording is made. With the erase oscillator cut off in playback, there is no danger of accidental erasure.

THE RECORD-LISTEN SELECTOR SWITCH

For quick switching of the WiRecorder from record to listen, and vice versa, a wafer-type switch is recommended. Figure 5, in conjunction with Schematic Figure 6 gives complete wiring information. To avoid interstage oscillation it is important that the diagram be followed faithfully.

THE EQUALIZER

All high frequency equalization is done in recording through a simple RC network shown in schematic diagram 6. This consists of a 75,000 ohm resistor shunted by a .001 condenser in series with the recording head. No bass boost should be used in recording, although 10 to 15 db of bass boost will improve playback quality.

VOLUME INDICATOR

Volume Indicator NE-51, a standard type neon glow tube, is adjustable through a 100K ohm resistor as shown in Figure 6. This indicator lamp should be set to flash at recording peaks of approximately .3 of a volt as measured across X_3X_4 in record position, using a vacuum tube voltmeter. Oscillator power must be cut off to measure this voltage. In the absence of such a meter the setting may be made by "cut and try" tests. Once adjusted properly this volume indicator setting need not be changed.

SHELF LIFE OF WIRE RECORDINGS

Wire recordings made on the Model A-1 may be stored indefinitely without loss of magnetism in the wire. Or, wire recordings may be played back thousands of times without appreciable wear, loss in quality or change in background noise.

It is entirely practical to "edit" wire recordings just as one might edit home movie film, taking portions from one spool and adding to another. Empty spools are available for this purpose, and wire may be spliced at will simply by tying an ordinary square knot to secure the ends. DO NOT USE HEAT as this weakens the wire. Ends of the wire should be cut off as close to the knot as possible.

SERVICING:

The following service information covers such adjustments and lubrication recommendations that may easily be taken care of by the owner of the Model A-1 WiRecorder.

In event of major repair or adjustments not covered in these pages it is advisable to return the unit to the factory.

LUBRICATION

Oilite bearings throughout the Model A-1 WiRecorder make frequent lubrication unnecessary and undesireable.

Oil wicks adjacent to these bearings may be lubricated every 100 hours, with a light machine oil. USE OIL SPARINGLY. In addition to the oil wicks readily visible from the top of the WiRecorder, the following points may be lubricated:

Shaft bearings behind spools. Remove spools and apply one drop of oil to each bearing.

Neoprene idler bearing. (3, Fig. 1). Remove idler retaining screw, slip idler from bearing and apply one drop of light oil. Great care must be taken to guard against oil creeping to surface of this idler.

Worm gear on right hand shaft, fiber gear and heart cam. Apply small amount of vaseline.

Motor. Apply one drop through ducts, front and rear, appearing at top of casing.

WARNING: Oil on any of the driving surfaces, such as the clutch hubs, the rear drive wheel, the front drive wheel, the neoprene idler, or capstan roller (5), capstan flange (10) or felt brake pads will cause serious slippage, resulting in varying wire speed. Oil creepage caused by centrifugal force or capillary action should be guarded against, and all driving surfaces kept clean.

LEVEL WIND ADJUSTMENT

In event of uneven level wind either in "forward" or "rewind" position, the recording head should first be checked. The head may have become bent with relation to the brass drive shaft. If it is not at right angles to this shaft from all positions, it may be straightened by light finger pressure.

If this fails to rectify the level wind trouble the spool shafts may have to be moved forward or backward. To move these shafts a single #8 Allan wrench is required to loosen the set screws in clutch hubs 23 and 24, figure 1.

When set screws have been loosened, ends of shafts may be tapped lightly for placement.

CAPSTAN FLANGE BRAKE ADJUSTMENT

When the WiRecorder is in STOP or REWIND position, the capstan flange 10 is pushed away from front drive puck 9, braking against arm 21 to stop rotation of the flange. This brake arm is adjustable by means of screws 22. IT MUST NOT contact the flange when the unit is moving the wire forward for recording or playback.

AUTOMATIC SHUT-OFF LEVERS

Immediately below the wire spools will be found trip levers 14 and 15. These are actuated by trigger wires in the spools themselves, released as the last layer of wire begins to unwind.

If the trigger wire from the spool fails to hit the lever the automatic shut-off will fail. These levers may be bent into proper position with ordinary pliers if care is taken to avoid fracturing the metal.

GLASS GUIDE ARM

Glass guide arm 4 is subject to some wear after many hours of operation, and should be rotated a few degrees whenever wire does not slide smoothly along its surface. The surface may be rotated by loosening the retaining screw on the end of the shaft. Avoid tightening this screw to the point where breakage of the quartz glass tube may occur.

It is advisable to clean the glass guide arm from time to time, removing lubricant deposited from the wire.

NEOPRENE IDLER

If lubricant from the wire collects on the neoprene idler 3, the idler may be removed and cleaned with soap and water. NEVER use carbon tetrachloride, gasoline, benzine or other types of cleaning compound on this roller, as such products may be injurious to the neoprene.

Watch for excessive wear on this idler, apparent from roughness of the surface. For perfect speed control of the wire the idler surface must be smooth, free from dirt or pock marks.

MODEL A-1 WIRECORDER CORP.

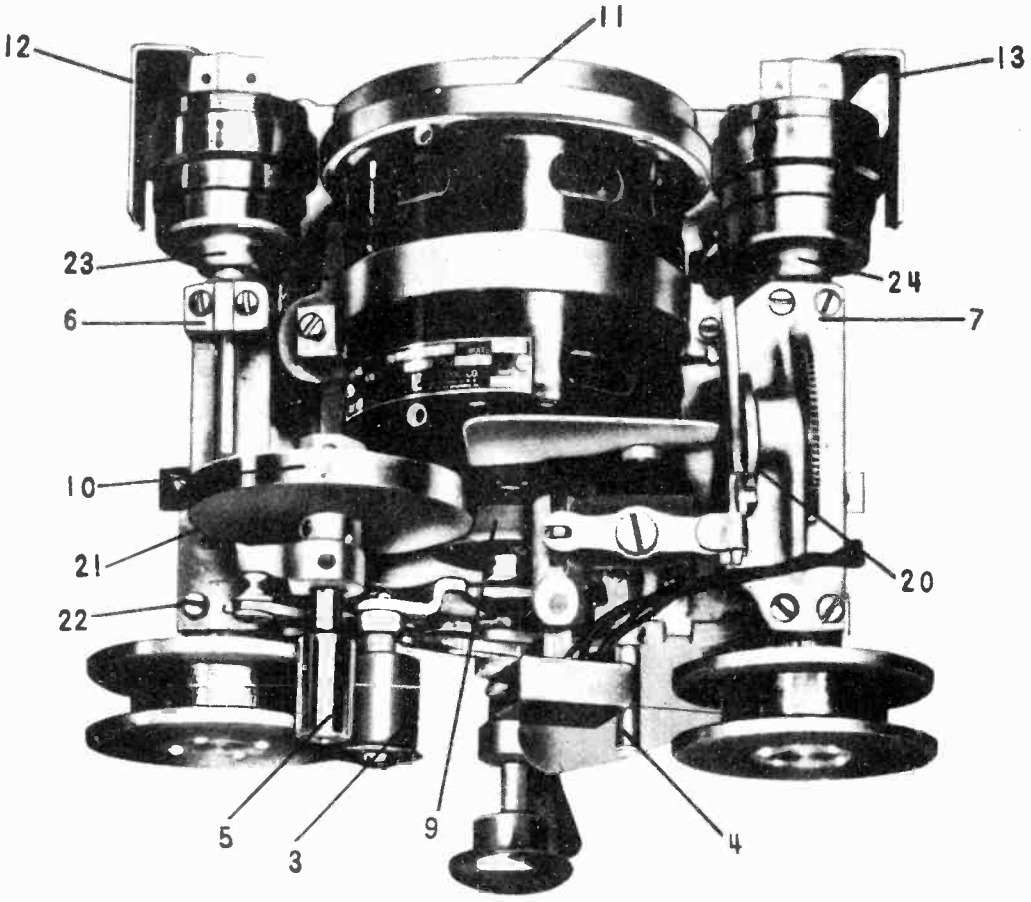


Fig. 1. TOP VIEW - MODEL A-1 WIRECORDER

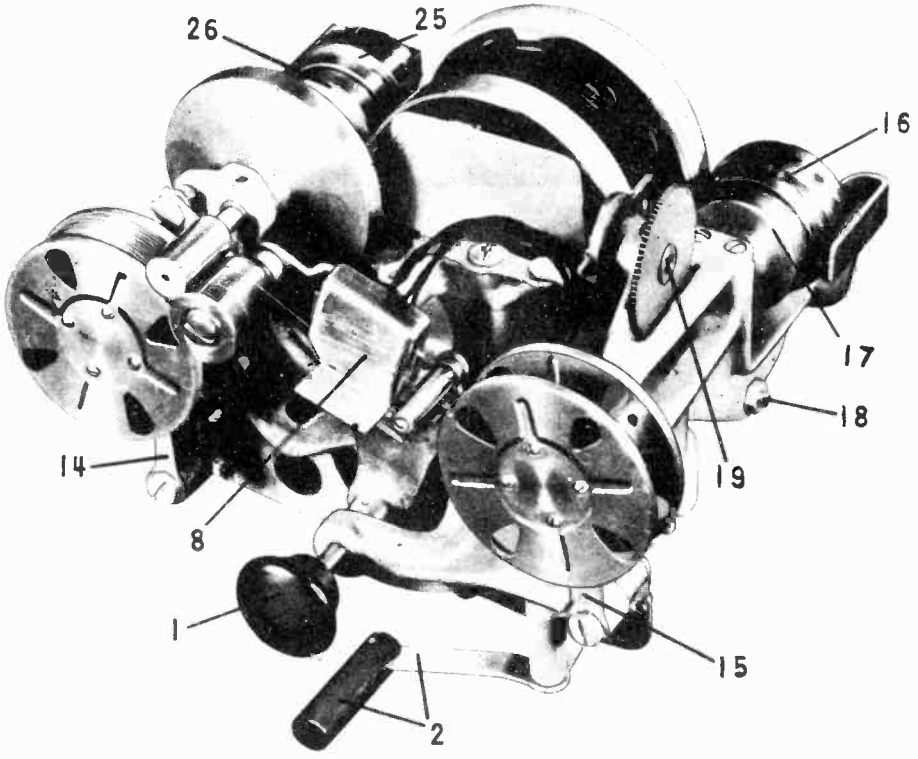


Fig. 2. FRONT VIEW - MODEL A-1 WIRECORDER

WIRECORDER CORP. MODEL A-1

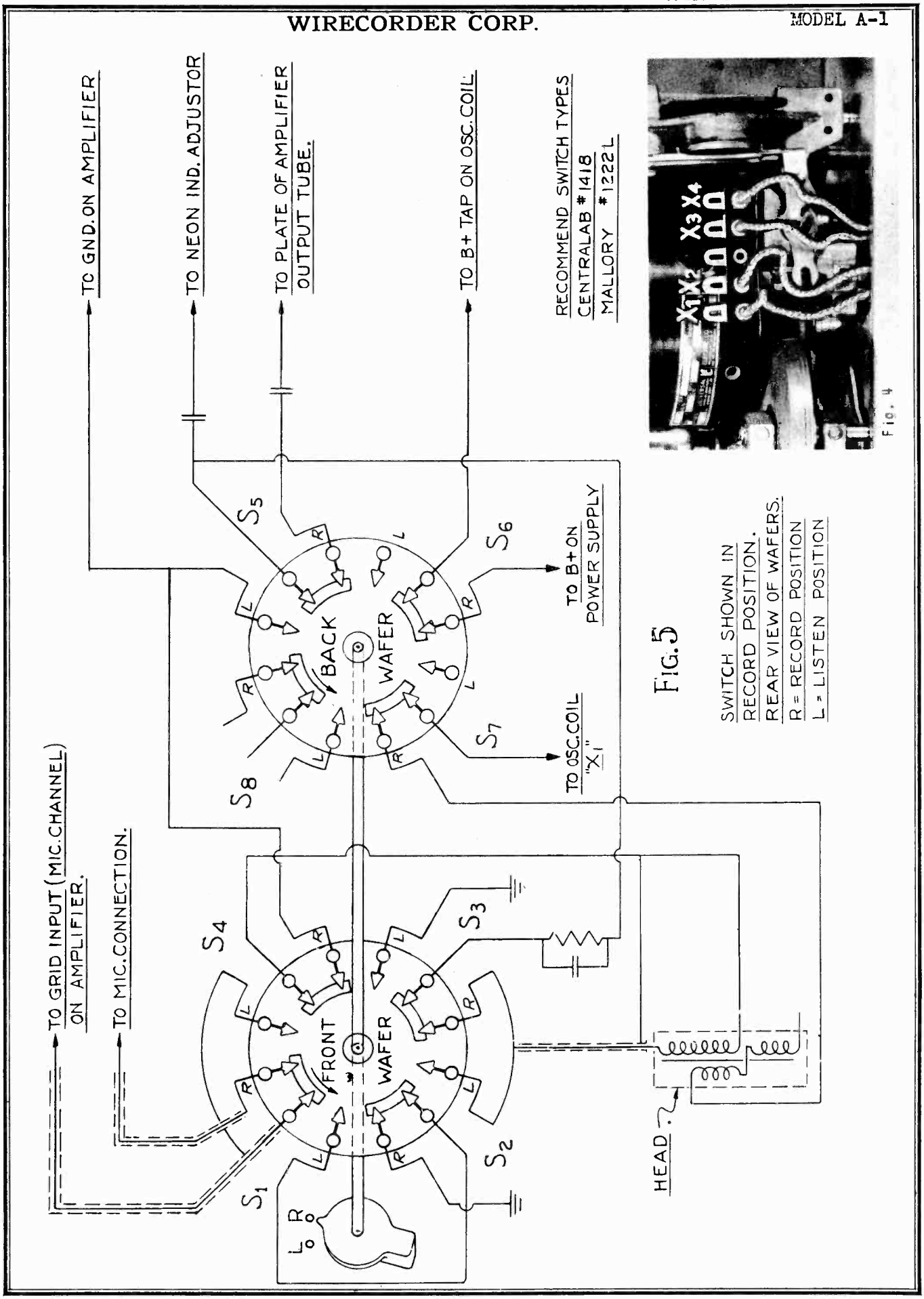


Fig. 5

MODEL A-1

WIRECORDER CORP.

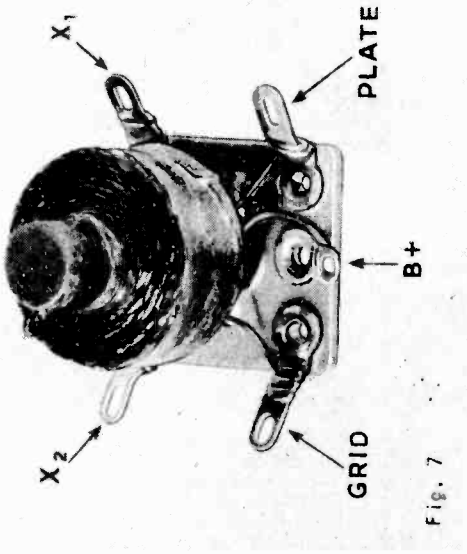


Fig. 7

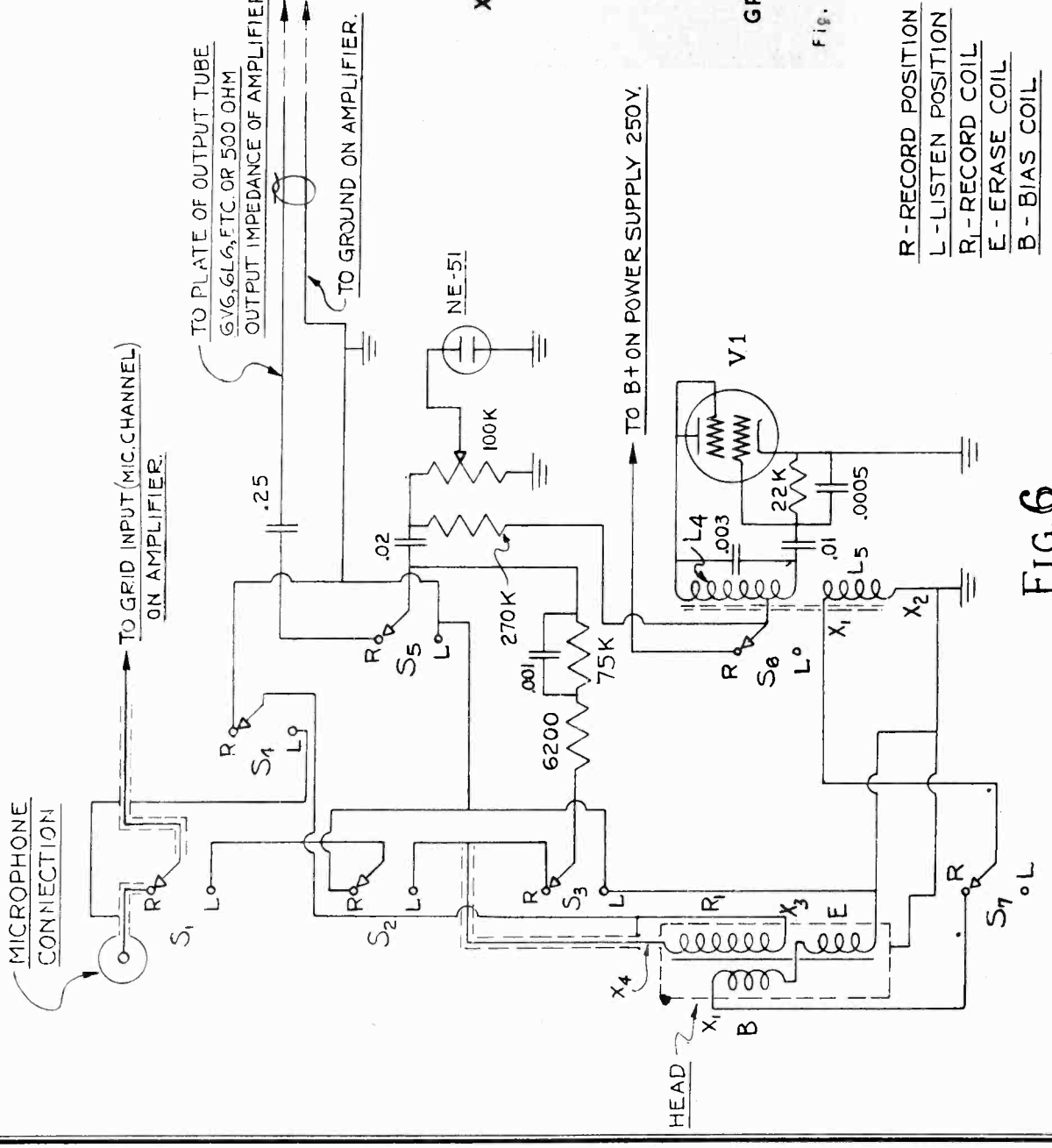


FIG. 6

WIRECORDER CORP.

GENERAL

The Model PA WiRecorder is a precision-built, professional type high fidelity magnetic recorder-reproducer unit for adaptation to any "public address" type amplifier.

The amplifier with which the Model PA WiRecorder is used should have an overall gain of not less than 100 db. Less than one watt of power is required for recording. Hence the power output of the amplifier is not important.

An advanced design in the wire recorder field, the Model PA is capable of continuous recording or playback for a period of 65 minutes, and spools may be changed at any time, without rewinding, in a matter of seconds.

It is EXTREMELY IMPORTANT that the owner familiarize himself with the operational instructions contained in this manual.

TO UNPACK

WARNING: The Model PA WiRecorder is shipped with special packing devices to insure safe delivery. The unit cannot be operated until these precautionary devices are detached from the mechanism.

First, remove the WiRecorder from the cabinet by removing the four chassis screws from the bottom, and the two panel screws from the upper left and upper right hand corners of the front panel. Now, by grasping the large WIRE CONTROL knob from the front, and pushing the chassis from the rear the unit will slide forward from the front of the cabinet.

Now, referring to Figure 3, a rear view of the chassis and WiRecorder shows the retaining wire 29, and the two separator blocks 27 and 31 all of which must be carefully removed. The wire should be severed with wire cutters, and withdrawn, and the two small blocks pulled out. Care should be taken in this operation to guard against forcing the two rear clutches against the left and right brake arms, and thus bending them.

Next the WIRE CONTROL knob must be removed, using the ALLAN WRENCH which will be found attached to the inside of the front cover of the cabinet. Reference to Figure 4 will show fiber collar 32 behind this control knob which must now be removed, and the WIRE CONTROL knob replaced securely on the shaft.

Screws 28 and 30 must now be removed, and the large washer under each screw discarded. The screws themselves should then be replaced.

The removal of the washers and the fiber collar permits the WiRecorder to float freely on the four shock mounts, dampening vibration.

Before replacing the unit in the cabinet it is advisable to actually operate the mechanism with the wire spools in place.

HANDLING AND APPLYING THE SPOOLS

One set of spools, containing some 7500 feet of .004" stainless steel recording wire sufficient for more than one hour of continuous recording or playback, is included with each Model PA WiRecorder, and will be found packed in an individual container.

Note that the recording wire is attached to both spools and will remain so except in event of mishandling or accidental wire breakage. An automatic trip trigger on the rear flange of both spools stops the mechanism before the wire leaves either spool.

To apply the spools to the two shafts, first lift the front guide wire extending below the recording head. This wire is hinged at the head and will swing upward with the application of slight pressure at the bottom of the wire.

Now place the full spool on the left shaft and the nearly empty spool on the right shaft, pushing both spools firmly against the locking springs until they snap into position.

KEEP WIRE STRETCHED TIGHTLY BETWEEN SPOOLS DURING THIS PROCEDURE. ALWAYS MAKE SURE WIRE IS STRETCHED TIGHTLY BETWEEN THE TWO SPOOLS BEFORE STARTING WIRECORDER EITHER IN FORWARD OR REWIND. Any slack should be removed manually by turning either spool counter-clockwise.

With the spools securely in place the hinged wire guide may now be swung downward, and snapped into place against the rear guide, with the recording wire held between them.

MECHANICAL OPERATION

Forward and reverse travel of the wire is controlled by the single large knob marked "Wire Control."

To start the wire moving forward (from left to right) for recording or playback, first make sure power switch is "on". Now turn wire control knob clockwise until it locks in position. Note that the wire has been lifted into the recording head by the neoprene pinch idler and by the guide arm to the right of the head, and the motor turned on.

To stop the motion of the wire, merely press the red button marked "Stop".

Now, to rewind, turn wire control knob counter-clockwise until it locks in position.

WARNING: In going from "forward" to "rewind" or vice versa or to stop wire motion, STOP button MUST be pushed before turning wire control knob to new position.

AUTOMATIC STOP

The specially designed WiRecorder spools include an automatic trip trigger which stops the wire before it leaves either spool, either in forward or rewind. Thus threading or handling of the wire is unnecessary at any time.

BRAKE ACTION

With the WiRecorder removed from the cabinet, note the mechanical operation of the patented "Magneflo" clutches at the rear of each spool shaft.

If the adjustment of brake arms 12 and 13 (figure 1) has not been disturbed in the process of removing the special shipping devices, the following action will be noted:

When the wire is moving forward, for recording or playback, the entire clutch assembly and shaft 6 (figure 1) is swung against brake arm 12, stopping rotation of outer clutch hub 25 (figure 2.)

When the wire is rewinding the clutch assembly and shaft 7 (figure 1) is swung against brake arm 13, stopping rotation of outer clutch hub 16.

If these brakes are operating as described, the unit may be replaced in the cabinet and is ready for service. If slippage of the clutch hubs is taking place, reference to brake adjustment in the servicing section of this manual will indicate the remedy.

CONNECTIONS TO AMPLIFIER

Two simple connections to any standard public address type amplifier are all that is required. In addition to the power cord extending from the rear of the Model PA chassis, two other cables will be found. One, a shielded cable terminated with a female Amphenol connector, is to be connected to the high impedance microphone input of the amplifier. The other, a twisted pair, must be connected to the voice coil output of the amplifier at any impedance between 3.2 and 16 ohms. The black lead should be connected to the grounded side of the output on the amplifier.

The speaker itself is to be disconnected from the amplifier, and plugged into the phone jack at the rear of the Model PA chassis.

Likewise, a high impedance microphone for voice recording is to be connected to the Model PA chassis, using the Amphenol male connector provided.

A feed from a record turntable or radio may be connected in normal fashion through the "phono" channel of the amplifier itself.

RECORDING PROCEDURE

To make a wire recording on the Model PA, the following steps must be taken:

1. Turn selector switch at lower left hand corner of panel to "record" position.
2. Adjust volume control on public address amplifier until level indicator neon light flashes on peaks. NOTE: Best results will be obtained with a minimum of flash. Constant flashing indicates too much volume. Amplifier tone controls should be set at "flat" position, with no treble or bass boost, or attenuation.
3. Turn wire control clockwise to a locking position, thus starting wire forward. You are now recording.

TIME INDEX

The time scale across the top of the panel is calibrated in minutes. With a full spool on the left and the index set at zero, the time scale will indicate the length of each recording. As the wire is rewound, the indicator motion is reversed thus making it easy to return to any desired spot in a recording.

The indicator carriage is movable manually along the feed screw by twisting the carriage knob slightly to the right or left and sliding. This is of special advantage when changing spools.

PLAYBACK PROCEDURE

To play back a wire recording, the following steps must be taken:

1. Having completed the recording, the STOP button must be pushed. The wire must now be rewound to the start of the recording. Turn wire control knob counter clockwise to a locking position, and watch time indicator for rewind to proper spot in wire.
2. Push stop button.
3. Turn selector switch at lower left hand corner to "Listen".
4. Turn wire control knob clockwise to locking position, thus starting wire forward.
5. Adjust volume of playback with volume control on the public address amplifier. Any tone controls on the amplifier may also be adjusted to suit the listener's ear.

OPERATING SUGGESTIONS

Always make sure wire is taut between two spools before turning wire control knob. If wire is loose turn either spool counter-clockwise by hand to remove slack.

In going from "forward" to "rewind", or to stop unit, STOP button must be pushed before wire control knob is turned to new position.

When turning wire control knob clockwise into recording or playback position, too rapid a motion is not advisable. Smooth, even, turning pressure will assure positive action.

Always allow spools to come to a full stop before turning wire control to new position.

When new spools and wire are placed on your WiRecorder for the first time it is advisable to run the entire hour spool through a complete cycle (forward and rewind) to "phase" the wire for best level winding action.

SHELF LIFE OF WIRE RECORDINGS

Wire recordings made on the Model PA may be stored indefinitely without loss of magnetism in the wire. Or, wire recordings may be played back thousands of times without appreciable wear, loss in quality or change in background noise.

It is entirely practical to "edit" wire recordings just as one might edit home movie film, taking portions from one spool and adding to another. Empty spools are available for this purpose, and wire may be spliced at will simply by tying an ordinary square knot to secure the ends. DO NOT USE HEAT as this weakens the wire. Ends of the wire should be cut off as close to the knot as possible.

SERVICING

The following service information covers such adjustments and lubrication recommendations that may easily be taken care of by the owner of the Model PA WiRecorder.

In event of major repair or adjustments not covered in these pages it is advisable to return the unit to the factory.

LUBRICATION

Oilite bearings throughout the Model PA WiRecorder make frequent lubrication unnecessary and undesirable.

Oil wicks adjacent to these bearings may be lubricated every 100 hours, with a light machine oil. USE OIL SPARINGLY. In addition to the oil wicks readily visible from the top of the WiRecorder, the following points may be lubricated:

Shaft bearings behind spools. Remove spools and apply one drop of oil to each bearing.

Neoprene idler bearing. (3, Fig. 1). Remove idler retaining screw, slip idler from bearing and apply one drop of light oil. Great care must be taken to guard against oil creeping to surface of this idler.

Worm gear on right hand shaft, fiber gear and heart cam. Apply small amount of vaseline.

Motor. Apply one drop through ducts, front and rear, appearing at top of casing.

Time indicator feed screw and end bearings. Use vaseline.

WARNING: Oil on any of the driving surfaces, such as the clutch hubs, the rear drive wheel, the front drive wheel, the neoprene idler, or capstan roller (5), capstan flange (10) or felt brake pads will cause serious slippage, resulting in varying wire speed. Oil creepage caused by centrifugal force or capillary action should be guarded against, and all driving surfaces kept clean.

LEVEL WIND ADJUSTMENT

In event of uneven level wind either in "forward" or "rewind" position, the recording head should first be checked. The head may have become bent with relation to the brass drive shaft. If it is not at right angles to this shaft from all positions, it may be straightened by light finger pressure.

If this fails to rectify the level wind trouble the spool shafts may have to be moved forward or backward. To move these shafts a single #8 Allan wrench is required to loosen the set screws in clutch hubs 23 and 24, figure 1.

When set screws have been loosened, ends of shafts may be tapped lightly for placement.

BRAKE ADJUSTMENT

If the brake action as described on page 2 is not functioning properly, the following adjustments may be made:

With the wire moving forward (in record or playback position) note that the right hand clutch assembly 16, figure 2, remains in contact with rear drive wheel 11, while the left hand clutch assembly 25 is swung against felt-padded brake arm 12. In this position brake arm 12 should be adjusted by means of two adjustment screws on the rear of the base so that it exerts just enough pressure on clutch hub 25 to stop rotation and thus furnish the proper amount of drag to stop wire whip.

Now set the wire control in rewind position. Note that clutch assembly 25 is in contact with the rear drive-wheel, while right hand clutch assembly 16 is swung away, bearing against brake arm 13. In this position brake arm 13 should be adjusted to give just enough braking pressure to stop rotation.

IMPORTANT: Brake pressures should always be set at a minimum to stop rotation of the hub against which they are bearing.

CAPSTAN FLANGE BRAKE ADJUSTMENT

When the WiRecorder is in STOP or REWIND position, the capstan flange 10 is pushed away from front drive puck 9, braking against arm 21 to stop rotation of the flange. This brake arm is adjustable by means of screws 22. IT MUST NOT contact the flange when the unit is moving the wire forward for recording or playback.

AUTOMATIC SHUT-OFF LEVERS

Immediately below the wire spools will be found trip levers 14 and 15. These are actuated by trigger wires in the spools themselves, released as the last layer of wire begins to unwind.

If the trigger wire from the spool fails to hit the lever the automatic shut-off will fail. These levers may be bent into proper position with ordinary pliers if care is taken to avoid fracturing the metal.

MODEL PA

WIRECORDER CORP.

GUIDE ARM

Guide arm 4, figure 1, has a specially treated smooth surface. It may show slight wear after many hours of use, causing the wire to slide across its surface irregularly. In this event the guide arm may be rotated a few degrees to expose a new surface to the wire.

CLEANING THE HEAD

Dirt, dust, and wire lubricant sometimes collect in a recording head, resulting in loss in high frequencies and level. If the accumulation becomes too severe actual jamming of the wire may take place.

To clean the head quickly and easily, lift the front wire guide and run a small piece of stout silk or linen thread through the wire groove, back and forth several times. Dipping the thread in a cleaning fluid such as carbon tetrachloride may prove helpful.

NEOPRENE IDLER

If lubricant from the wire collects on the neoprene idler 3, the idler may be removed and cleaned with soap and water.. NEVER use carbon tetrachloride, gasoline, benzine or other types of cleaning compound on this roller, as such products may be injurious to the neoprene.

Watch for excessive wear on this idler, apparent from roughness of the surface. For perfect speed control of the wire the idler surface must be smooth, free from dirt or pock marks.

CAPSTAN YOKE SPRING ADJUSTMENT

The yoke supporting the capstan (5, figure 1) and capstan flange (10, figure 1) pivots on a bearing in the base, moving against drive puck 9 when the wire is moving forward, and against brake 21 when the wire is rewinding, or when the WiRecorder is shut off.

An adjustable spring on the left hand side of the base casting immediately below brake arm 21 controls the amount of pressure between the capstan flange 10, and the drive puck 9.

If the wire has a tendency to "loop" between the recording head and the neoprene roller when the control knob is turned clockwise for recording or playback, this pressure may be too great.

On the other hand, if the pressure is too light the flange will slip on the drive puck thus failing to drive the wire at a constant speed of 2' per second, causing "wows".

This spring adjustment is critical, and has been properly made before shipment. It should not be tampered with unless adjustment is absolutely necessary.

VOLUME INDICATOR ADJUSTMENT

The volume indicator adjustment controlling the flash of the neon bulb is located on the right hand side of the chassis. Set at the factory, this adjustment is regulated to flash the neon bulb at peaks of .3 of a volt, measured across the voice coil of the recording head, with the 50L6 Oscillator tube removed from its socket. The voice coil leads are the two right hand leads on the terminal strip on top of the motor, looking down on the unit.

ERASE VOLTAGE

In event of incomplete erasure the voltage across the erase coil which is incorporated in the head itself should be measured. Erase coil leads are the two left hand leads on the terminal strip above the motor. This voltage should be between 3.5 and 4, measured with a vacuum tube voltmeter, and must be measured with the selector switch in record position. The frequency of the erase voltage is between 30 and 40 KC.

FREQUENCY RESPONSE

The frequency response of the Model PA WiRecorder, when used with an amplifier capable of delivering flat response from 100 to 10,000 cycles for recording, and delivering 10 db of bass boost for playback, will be flat ± 5 db from 100 to 6000 cycles.

The response curves off the wire with constant current input, equalizer curve and recommended amplifier playback curve are shown in Figure 6.

WARNING! Before turning the selector switch to "record" position, make sure microphone volume control on amplifier is at a low setting. Increase volume control slowly until level indicator on Wi ecorder flashes occasionally. Failure to follow this procedure may result in damage to recording head and level indicator.

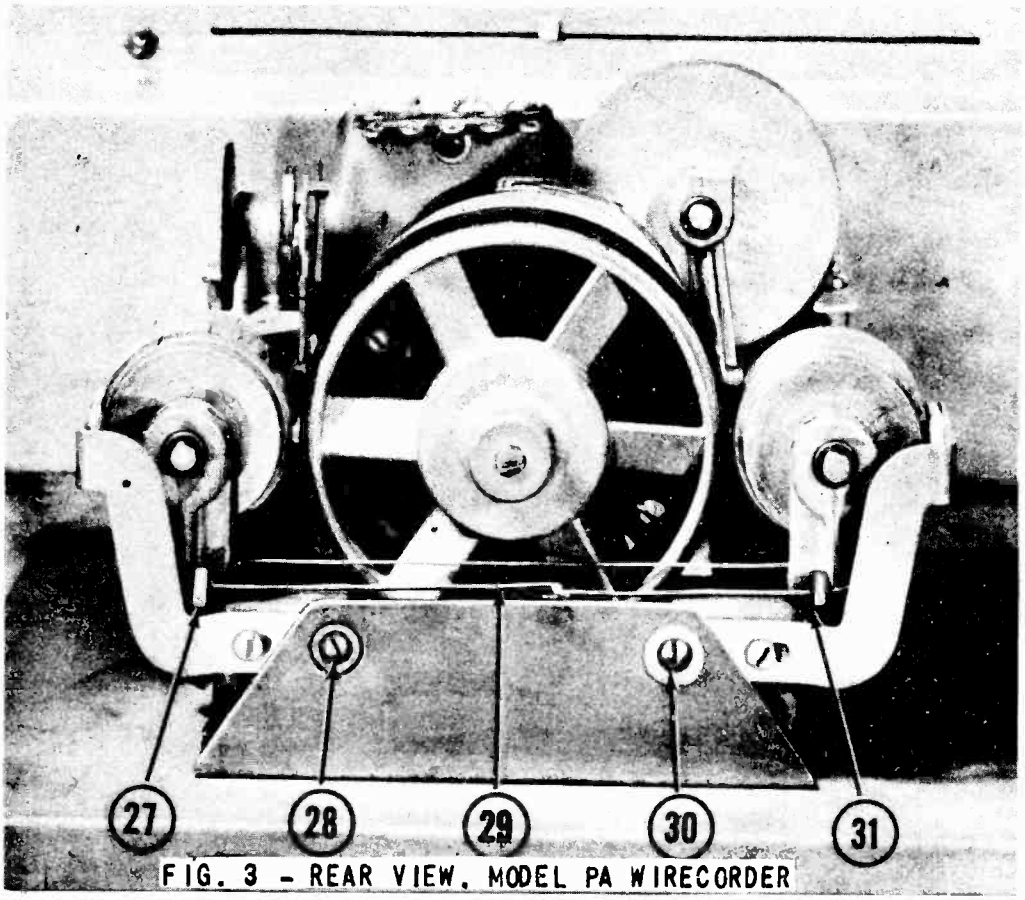


FIG. 3 - REAR VIEW, MODEL PA WIRECORDER

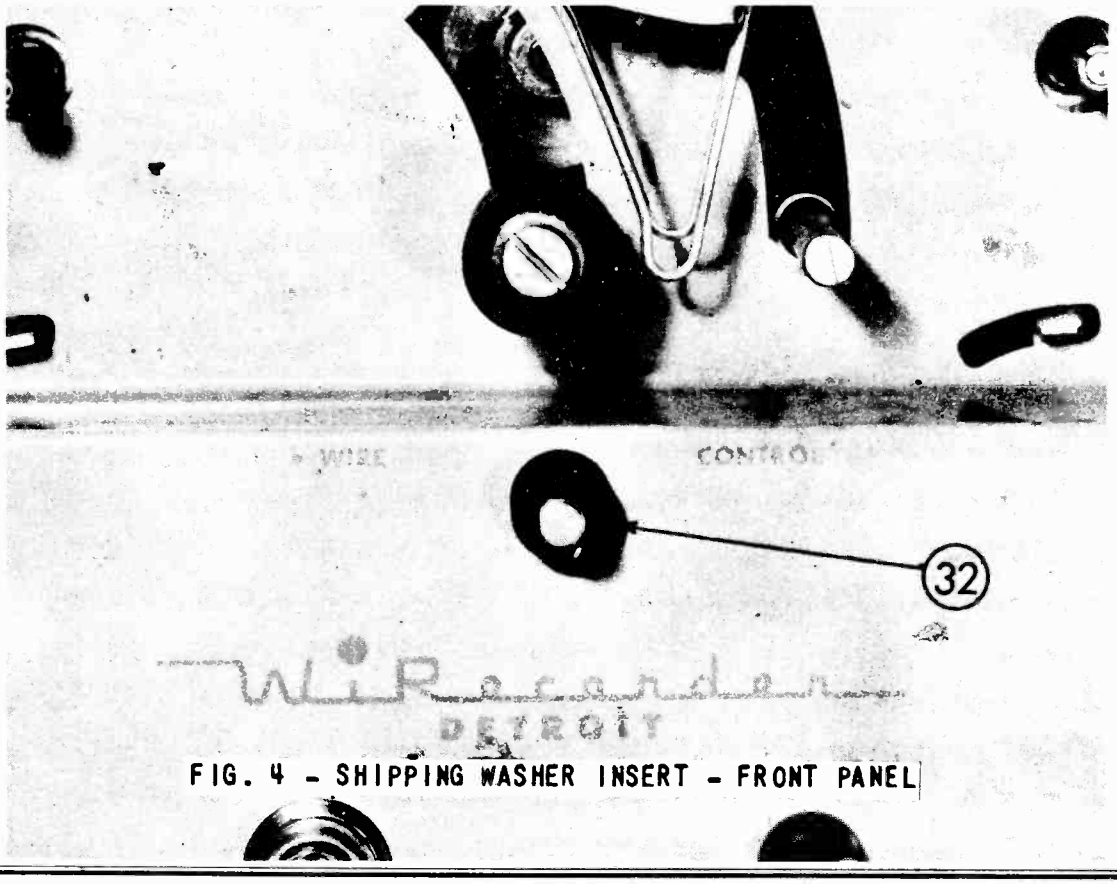


FIG. 4 - SHIPPING WASHER INSERT - FRONT PANEL