

SAMS
PHOTOFACT



**TAPE RECORDER
 SERIES**

TR-38
38
 MAY 1968



CONTENTS

TRADE NAME AND MODEL	PAGE
AIWA TP-712.....	5
CONCERTONE 700.....	18
GENERAL ELECTRIC M8040A.....	35
GENERAL ELECTRIC M8050A, M8060A.....	45
LAFAYETTE RK-860 (99-1530WX).....	61
MASTERWORK M650.....	79
RCA YGB11T, YGB29A, YHB22T, YHB26A.....	92
RCA YJS13J, YJS15G.....	103
UHER 9000 (22/24 Hi-Fi Special).....	115
WARDS AIRLINE GEN-3638A (62-3638).....	139

HOWARD W. SAMS & CO., INC.

Indianapolis, Indiana

\$4.95
\$5.95 IN CANADA
Cat. No. TR-38

SAMS PHOTOFACT[®]

TAPE RECORDER

SERIES

VOLUME
38

by the *Howard W. Sams* ENGINEERING STAFF



HOWARD W. SAMS & CO., INC.
INDIANAPOLIS, INDIANA

**FIRST EDITION
FIRST PRINTING—MAY, 1968**

**PHOTOFACT®
TAPE RECORDER SERIES
VOLUME 38**

Copyright © 1968 by Howard W. Sams & Co., Inc.
Indianapolis, Indiana 46206. Printed in the United States of America

All rights reserved. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein.

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed.

Library of Congress Catalog Card Number: 58-7339



TAPE RECORDER SERIES

TABLE OF CONTENTS

MODEL	PAGE
AIWA	
Model TP-712.....	5
CONCERTONE	
Model 700.....	18
GENERAL ELECTRIC	
Model M8040A.....	35
GENERAL ELECTRIC	
Models M8050A, M8060A.....	45
LAFAYETTE	
Model RK-860 (99-1530WX).....	61
MASTERWORK	
Model M650.....	79
RCA	
Models YGB11T (Ch. TCT-4, RS-217), YGB29A (Ch. TCT-4, RS-217A), YHB22T (Ch. TCT-4, RS-217), YHB26A (Ch. TCT-4, RS-217A).....	92
RCA	
Models YJS13J, YJS15G.....	103
UHER	
Model 9000 (22/24 Hi-Fi Special).....	115
WARDS AIRLINE	
Model GEN-3638A (62-3638).....	139

Cumulative Index to Prior Volumes 153

GENERAL SERVICING INFORMATION

The following information applies to all recorders in this volume, and should be followed before any adjustments are made or trouble diagnosis is attempted. Any exceptions or additions will be found in the detailed servicing procedures for each recorder.

POWER SOURCES

Many recorders require full supply voltage for proper operation. Be sure the supply voltage is maintained at the rated value *under load* while making adjustments.

CLEANING

All head faces should be cleaned with head cleaner to remove dust and accumulated oxide. (An applicator may be fashioned from absorbent cotton.) Do not use a screwdriver or any metallic object near the head faces.

CAUTION: Avoid getting head cleaner on any plastic surface.

Clean the capstan, pressure roller, pressure pads and all tape guides with alcohol using a soft lint-free cloth. Also use alcohol to remove oil and grease from drive belts, idler wheels, brake drums and shoes, and all other driving surfaces.

LUBRICATING

Clean all surfaces before lubricating. Apply a few drops of #20 machine oil to all bearings and rotating bushings. Apply a thin film of light nonhardening grease to all sliding surfaces and detent rollers. Always wipe excess oil or grease from parts that have been lubricated.

CAUTION: Oil and grease must be kept off all driving surfaces as well as any parts which may transfer oil or grease to them.

DEMAGNETIZING

Record-Play heads require demagnetizing at regular intervals to maintain high-frequency response, dynamic range, and low distortion. (Follow instructions included with the demagnetizing unit.) After demagnetizing the heads, keep all screwdrivers and other metallic objects away from the head faces. Tape guides may also require occasional demagnetizing.

IMPORTANT: Be sure to demagnetize the heads after making resistance measurements in the head circuits.



PHOTOFACT[®] with

CIRCUITRACE[®]

TRADE NAME : Aiwa Model TP-712
 SUPPLIER : For Current Address, See Annual Index
 TYPE SET : 2-Speed, 2-Track Monaural Recorder
 POWER SUPPLY : 6 Volts DC or 110-120 Volts AC,
 60 Cycles
 RATING : 3 Watts, 53ma @ 117 VAC (With Motor)

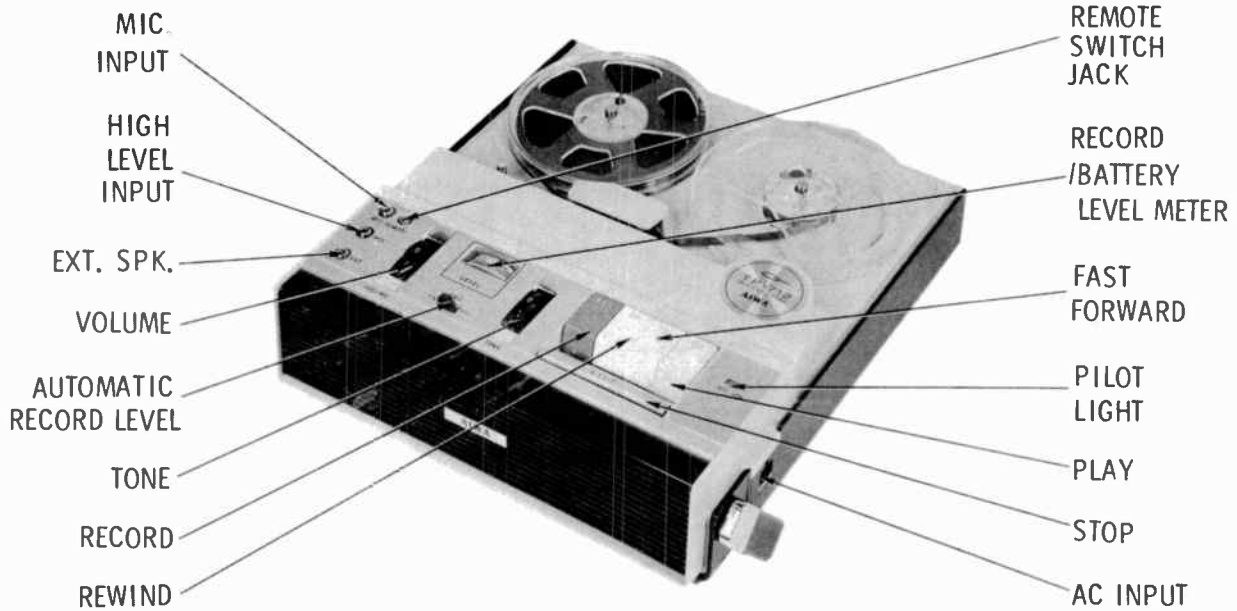
This unit is a two-track, monaural recorder having two speeds: 1 7/8 and 3 3/4 ips.

A record/battery level meter and an automatic recording level circuit is provided.

Jacks are provided for both low- and high-level inputs, remote control, and earphone/external speaker.

Power is supplied by six, 1 1/2-volt "D" cells or 110 - 120 volts AC, 60 cycles.

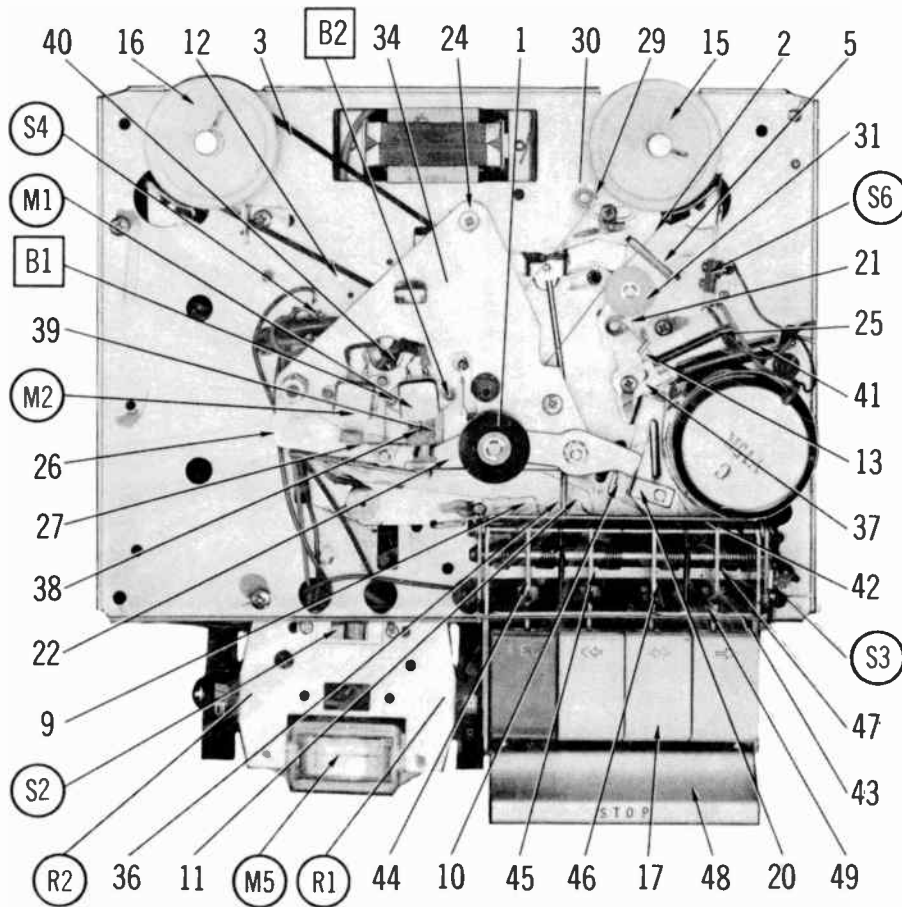
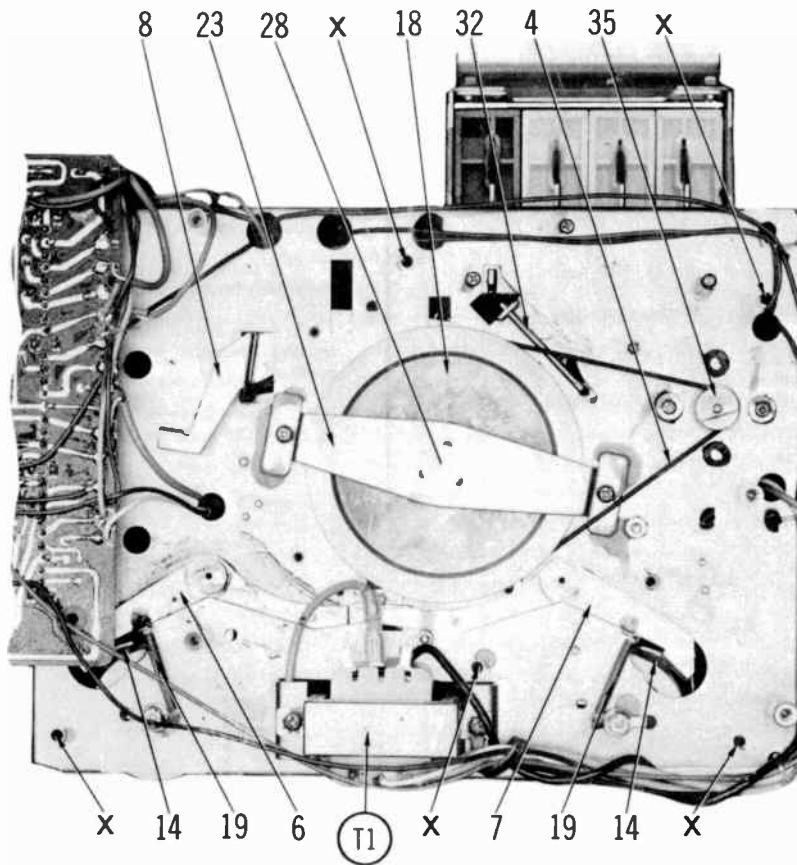
AIWA MODEL TP-712



HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

© 1968 Howard W. Sams & Co., Inc. Printed in U. S. of America C989

World Radio History



OPERATING INSTRUCTIONS

Record

1. Press Stop button, select the speed, thread the tape, and move the remote switch on microphone to the off position.
2. Connect a source, press Play and Record buttons simultaneously, and move the remote switch to the on position.
3. Move automatic Record Level switch to Off, and set the recording level with Volume control; or move Record Level switch to On and allow the

unit to automatically maintain the recording level.

Play

1. Repeat step 1 of "Record", press Play button, move the remote switch to the on position, and adjust Volume and Tone controls as desired.

Monitor

1. The recording source may be monitored by connecting an earphone to Ext. Speaker jack.

DISASSEMBLY

1. Remove four Phillips screws from wells in feet and remove bottom cover.
2. Remove five Phillips screws shown as "X" on bottom photo and loosen one Phillips screw shown as "Y" on printed board.
3. Remove two Phillips screws holding control and meter bracket.
4. Remove one Phillips screw holding pilot-light terminal strip and four nuts holding jacks.
5. Remove chassis assembly.

AIWA MODEL TP-712

SEQUENCE OF OPERATION

Play

Pressing the Play button pivots Lever (47), locked by Plate (43), to pivot Plate (42), pushing Rod (36) to pivot Lever (5). Lever (5) pivots Levers (6) and (7) to move Shoes (14) and to cause Lever (7) to actuate Switch (S6).

Lever (47) also pivots Lever (10) to swing Lever (20), causing Arm (21) to press Roller (31) against Belt (2). The motor, through Pulley (35), Belt (4), Assembly (18), and Belt (2) drives Platform (15).

Lever (10) also releases Assembly (22), pulled by Spring (39), to move Roller (1) against Assembly (18). Assembly (22) also releases Assembly (26), pulled by Spring (38), to move Pad "B" (27) against Heads (M1) and (M2).

Record

The Record sequence is the same as "Play" except the Record button is also depressed, pivoting Lever (44) to cause Lever (9) to pivot Lever (8) and to actuate Switch (S1).

Fast Forward

Pressing the Fast Forward button pivots Lever (46), locked by Plate (43), to pivot Plate (42), pushing Rod (36) to pivot Lever (5). Lever (5) pivots Levers (6) and (7) to move Shoes (14) and to cause Lever (7) to actuate Switch (S6).

Lever (46) also slides Plate (49) to actuate Switch (S3). Simultaneously, Lever (46) pivots Lever (20) to cause Arm (21) to press Roller (31) against Belt (2). The motor, through Pulley (35), Belt (4), Assembly (18), and Belt (2), drives Platform (15).

Rewind

Pressing the Rewind button pivots Lever (45), locked by Plate (43), to pivot Plate (42), pushing Rod (36) to pivot Lever (5). Lever (5) pivots Levers (6) and (7) to move Shoes (14) and to cause Lever (7) to actuate Switch (S6).

Lever (45) also pivots Lever (11) to actuate Switch (S4) and to pull Spring (40), pulling Lever (12). Lever (12) causes Pulley (34) to press Belt (3) against Assembly (18).

The motor, through Pulley (35), Belt (4), Assembly (18), and Belt (3), drives Platform (16).

Stop

Pressing Stop Push-button Assembly (48) pivots Plate (43), releasing any other depressed push button. Springs (19), (25), and (41), plus (33) in Record, reverse the "Play" sequence. Springs (13), (19), and (25) reverse the "Fast Forward" sequence. Springs (19) and (40) reverse the "Rewind" Sequence.

ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 3 3/4 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 3 3/4 ips with a spring scale applied to a point on an empty tape reel 2 inches from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 1 ounce . Controlled by repositioning of Lever (29).
Fast Forward Take-up Torque	Nominal value 2 1/2 ounces. Controlled by repositioning Plate (37). (Move toward heads to reduce).
Rewind Torque	Nominal value 2 1/2 ounces. Controlled by tension of Spring (40).
Supply Reel Drag	Dependent on reel weight.
Take-up Reel Drag	Dependent on reel weight.
Pressure Roller Pressure	Nominal value 6 ounces. Controlled by tension of Spring (39).
Braking Torque	Measured in Stop. Nominal value 5 1/2 ounces counterclockwise on supply reel. Nominal value 3 1/2 ounces clockwise on take-up reel. Controlled by condition of Shoes (14) and tension of Springs (19).
Pressure Pad Pressure	Nominal value 3/4 ounce. Controlled by tension of Spring (38).
Erase Head Height	No adjustment provided.
Erase Head Azimuth	No adjustment provided.
Record/ Play Head Height	No adjustment provided.
Record/ Play Head Azimuth	Play an azimuth test tape, connect an AC VTVM across output, adjust B1 and B2 equally in opposite directions for maximum.
Erase Current	Nominal value 5ma (3.5VDC). No adjustment provided.
Record Bias	Nominal value 31V rms (1.1ma). Controlled by setting of R3.
Bias Oscillator	Nominal frequency 34KC. Controlled by adjustment of L1 .
Record Level Indicator Calibration and ALC Operation.	Apply a 1000-cycle tone to mic input, slip a piece of paper under wiper of R3 to disable oscillator, and move Automatic Record Level switch to Off. Set Volume control to maximum and vary generator to give .95V rms across Head (M1). Normal maximum should be indicated on the level meter. Moving Automatic Record Level switch to On should drop voltage across head by .09V rms. No adjustment provided.

CLEANING

LUBRICATING

HEAD DEMAGNETIZING

Refer to "General Servicing Information" on page 4.

TROUBLE CHART

IMPORTANT: Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Belt (2) dirty or worn. 2. Take-up torque misadjusted. 3. Platform (15) binding.
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> 1. Fast Forward torque misadjusted. 2. Platform (15) binding. 3. Roller (31) binding. 4. Belt (2) dirty, worn, or broken.
Take-up reel revolves rapidly in Play or Record.	<ol style="list-style-type: none"> 1. Excessive take-up torque.
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Belt (3) dirty, worn, or broken. 2. Platform (16) binding. 3. Spring (40) supplying inadequate tension.
Reels do not stop immediately when Stop button is pressed.	<ol style="list-style-type: none"> 1. Shoes (14) dirty or worn. 2. Springs (19) supplying inadequate tension.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Belt (4) dirty, worn, or broken. 2. Assembly (18) binding. 3. Motor defective or not supplied with power.
Tape rides up and down between capstan and pressure roller.	<ol style="list-style-type: none"> 1. Excessive take-up torque. 2. Roller (1) dirty or worn. 3. The capstan is bent.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Roller (1) dirty, worn, or binding. 2. Excessive take-up torque. 3. Motor defective. 4. Assembly (18) binding.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Head (M1) dirty, misaligned, or defective. 2. Amplifier circuit defective. 3. Bias oscillator circuit defective. 4. Erase head polarity improper.
Erase weak or inoperative.	<ol style="list-style-type: none"> 1. Head (M2) dirty or defective. 2. Head (M2) not being supplied with adequate current.

AIWA MODEL TP-712

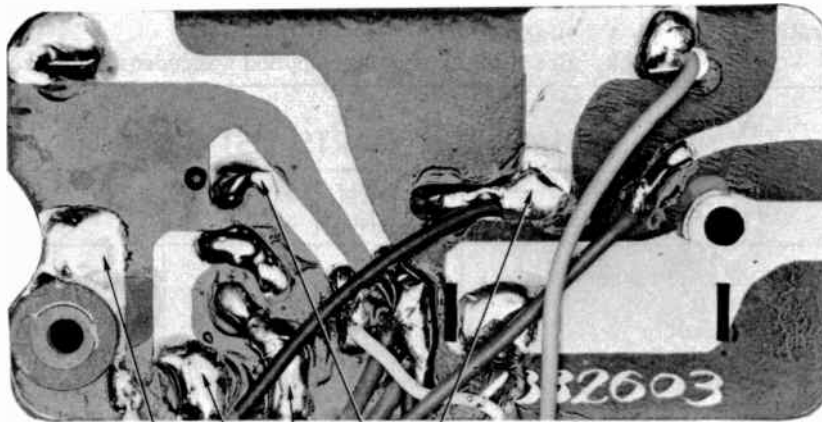
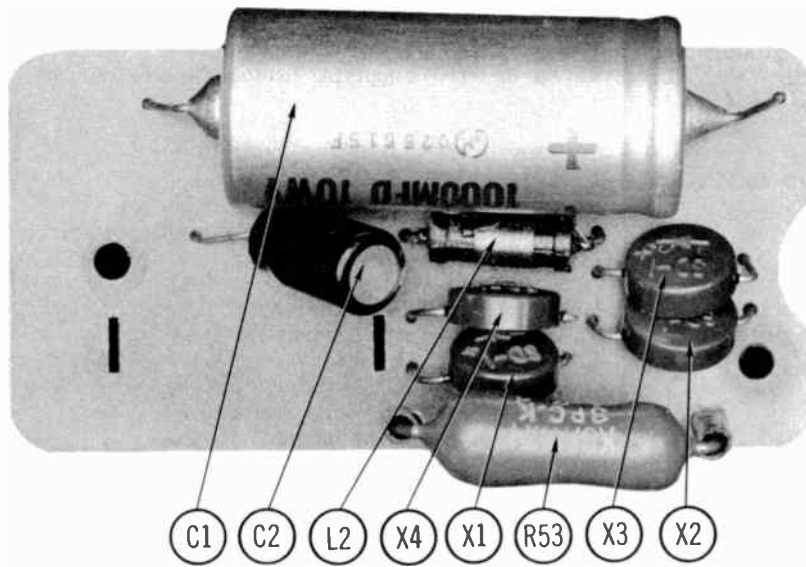
MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	2207137	Pinch Roller (Pressure Roller)	14	2332099	Brake Shoes (2 used)
2	T-11157	Take-up Belt	15	2332011	Take-up Reel Platform
3	2332052	Rewinding Belt	16	2332063	Supply Reel Platform
4	2209141	Rubber Belt "90"	17	2332165	Push-button Assembly
5	2332036	Main Brake Lever	18	2332029	Flywheel Assembly
6	2332167	Right Brake Lever	19	T-11029	Metal Fitting Lock Springs (2 used)
7	2332168	Left Brake Lever	20	2332140	Forward Lever "A"
8	2332058	Recording Lever	21	2332132	Tension Arm
9	2332142	Auxiliary Recording Lever	22	T-9120A	Pinch Roller Lever Assembly
10	2332152	"B" Forward Lever	23	T-9128A	Thrust Plate Assembly
11	T14-022	"A" Rewinding Lever	24	2332010	Subchassis Plate
12	2332096	"B" Rewinding Lever Assembly	25	2332064	Forward Lever "A" Spring
13	2332094	Tension Spring			

MECHANICAL PARTS LIST (Continued)

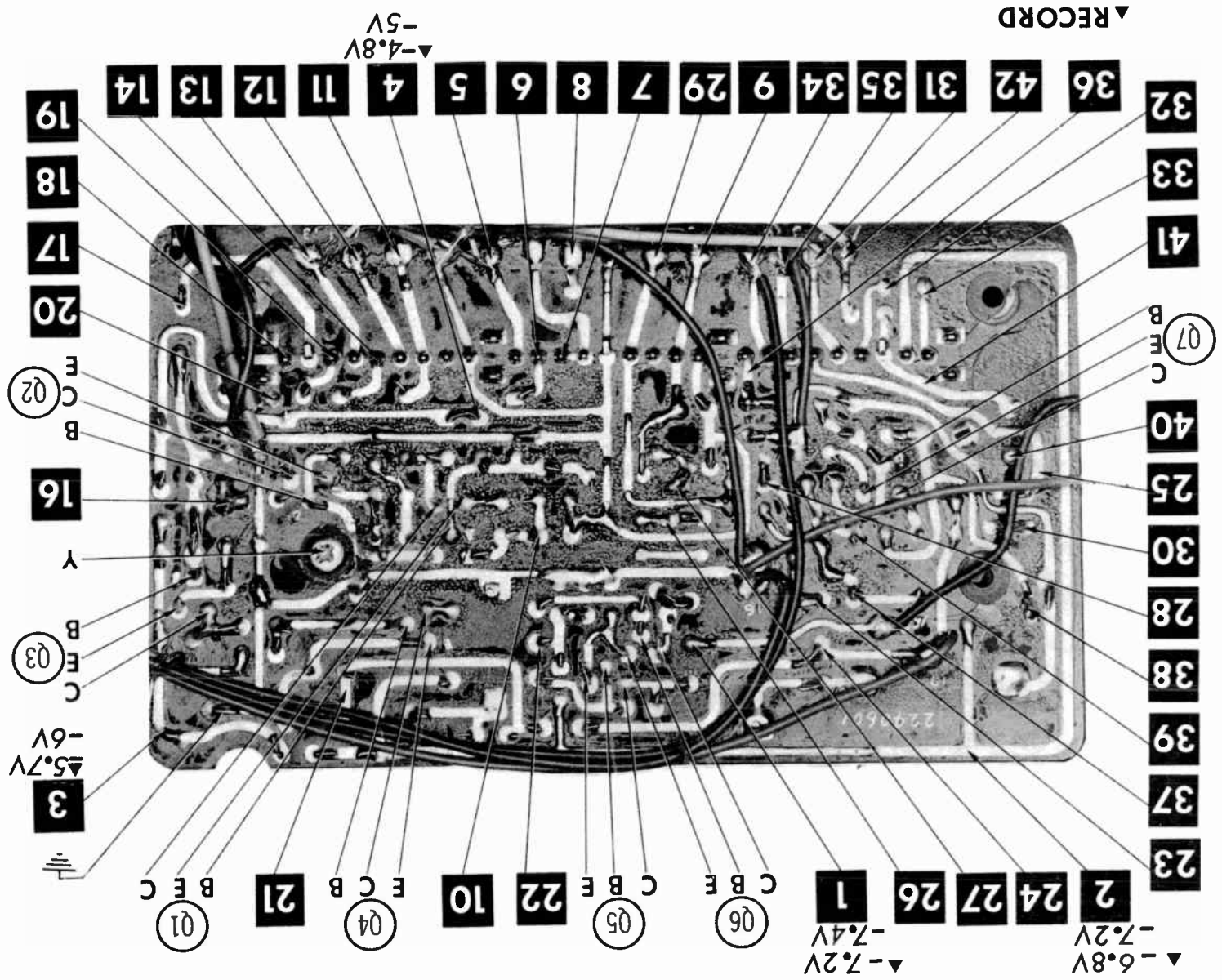
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
26	T-9125A	Head Pad "B" Assembly	39	2332136	Spring, 03H
27	2209127	Head Pad "B"	40	2209140	Spring, 03F
28	2207221	Steel Ribbon	41	2332133	Spring, 02
29	2332065	Adjusting Lever Assembly	42	①	Brake Actuation Plate
30	2332070	Adjusting Roller	43	①	Lock Plate
31	2209170	Tension Roller	44	①	Record Push-button Lever
32	2332153	Stopper Lever	45	①	Rewind Push-button Lever
33	2332054	Switch Spring	46	①	Fast Forward Push-button Lever
34	2207142	Rewinding Pulley	47	①	Play Push-button Lever
35	2240015	Motor Pulley	48	①	Stop Push-button Assembly
36	2332154	Coupling Rod	49	①	Switch Slide Plate
37	2332120	Spring Adjusting Plate			
38	2209135	Spring, 03A			

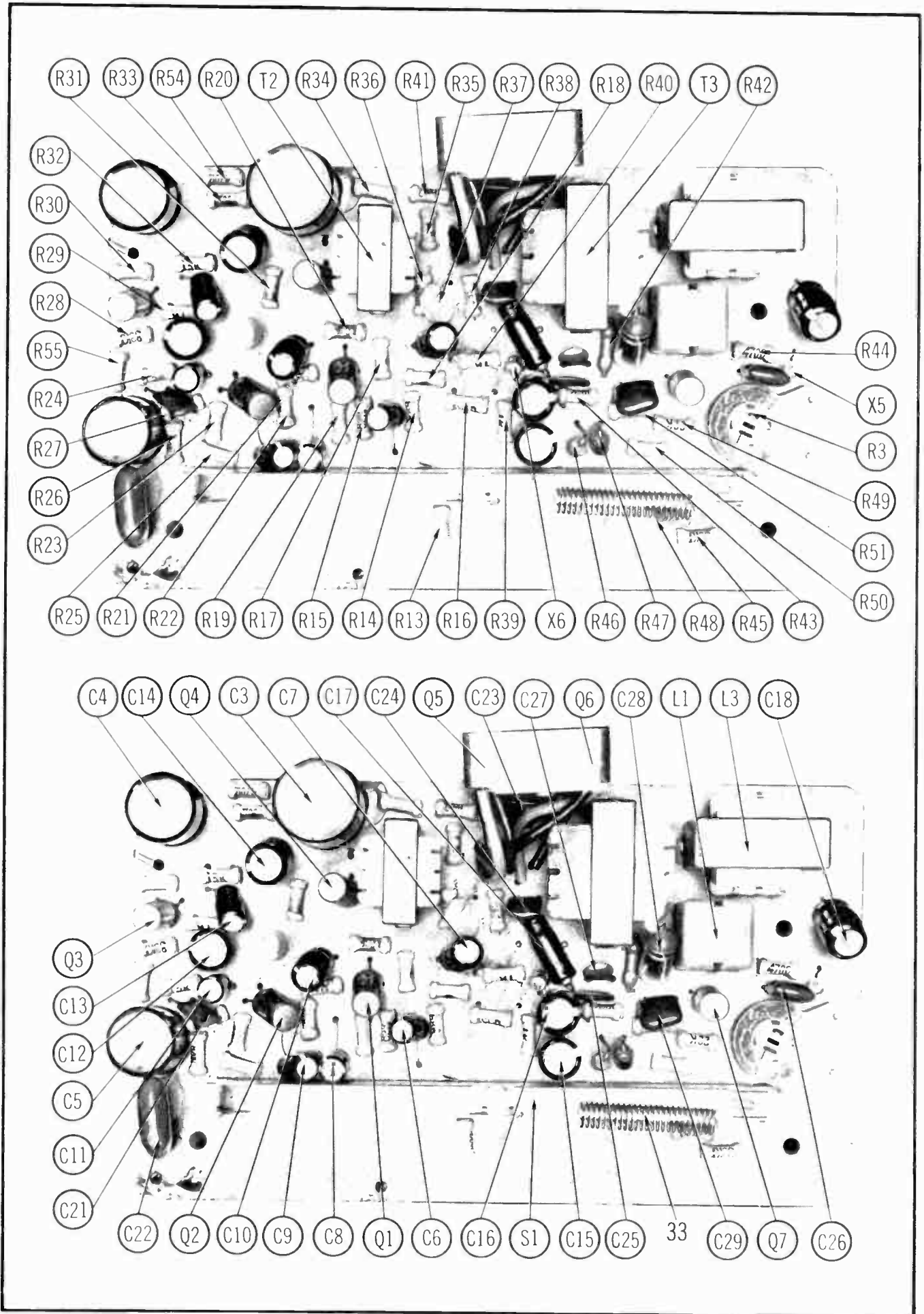
① Part of Push-button Assembly (Ref. No. 17)



45 43 44 46 1

-7.4V





PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES	
			DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	AIWA PART No.	NOTES
Q1	2SB389	Preamp	DS-26	GE-2	TR-18	SK-3004	8023892	PNP
Q2	2SB32	AF Amp	DS-26	GE-2	TR-14	SK-3004	8020322	PNP
Q3	2SB32	AF Amp	DS-26	GE-2	TR-14	SK-3004	8020324	PNP
Q4	2SB33	Driver	DS-26	GE-2	TR-14	SK-3004	8020333	PNP
Q5	2SB263	Output	DS-26	GE-2	TR-05	SK-3004	8022630	PNP
Q6	2SB263	Output	DS-26	GE-2	TR-05	SK-3004	8022630	PNP
Q7	2SB33	Bias Oscillator	DS-26	GE-2	TR-14	SK-3004	8020333	PNP

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MEASURED CURRENT	ORIGINAL Part or Type No.	RECTIFIERS & DIODES		RECTIFIERS	
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SARKES TARZIAN PART No.
X1	.290A	7027005	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X2	.290A	7027005	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X3	.290A	7027005	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X4	.290A	7027005	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X5		8051060	1N60	1N60		
X6		8051060	1N60	1N60		

AIWA MODEL TP-712

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		AIWA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	1000 10V	8433130	PRS1180	EA30-1000	BR1000-15	QT1-32	TC1210	TL-1142
C2	50 10V	8333510	BCD10050	EP15-50	NLW50-10	MT1-16	MTV50CB15	TE-1133
C3	500 10V	8433520	BCD12500	EA15-500	BR500-15	QT1-30	MTV500DN15	TL-1141
C4	200 10V	8433220	BCD10190	EA15-250	NLW200-12	MT1-23	MTV200CK10	TE-1137
C5	200 10V	8433220	BCD10190	EA15-250	NLW200-12	MT1-23	MTV200CK10	TE-1137
C6	1 6V	8332100	BCD6001	EP50-2	NLW1-6	MT1-1	MTV1CB50	TE-1080
C7	30 3V	8331310	BCD3025	EP6-25	NLW30-6	MT1-13	MTV30CB25	TE-1055.5
C8	1 6V	8332100	BCD6001	EP50-2	NLW1-6	MT1-1	MTV1CB50	TE-1080
C9	1 6V	8332100	BCD6001	EP50-2	NLW1-6	MT1-1	MTV1CB50	TE-1080
C10	30 3V	8331310	BCD3025	EP6-25	NLW30-6	MT1-13	MTC30VB25	TE-1055.5
C11	1 6V	8332100	BCD6001	EP50-2	NLW1-6	MT1-1	MTV1CB50	TE-1080
C12	50 3V	8331510	BCD3050	EP6-50	NLW50-3	MT1-15	MTV50CB15	TE-1058
C13	1 6V	8332100	BCD6001	EP50-2	NLW1-6	MT1-1	MTV1CB50	TE-1080
C14	50 3V	8331510	BCD3050	EP6-50	NLW50-3	MT1-15	MTV50CB15	TE-1058
C15	50 6V	8332510	BCD6050	EP6-50	NLW50-6	MT1-15	MTV50CB15	TE-1133
C16	50 6V	8332510	BCD6050	EP6-50	NLW50-6	MT1-15	MTV50CB15	TE-1133
C17	1 6V	8432100	CRE300A	EA15-2	NLW1-6	MT1-1	MTA1D50	TE-1080
C18	30 10V	8333310	BCD10025	EP15-25	NLW30-15	MT1-14	MTV30CB25	TE-1132.1

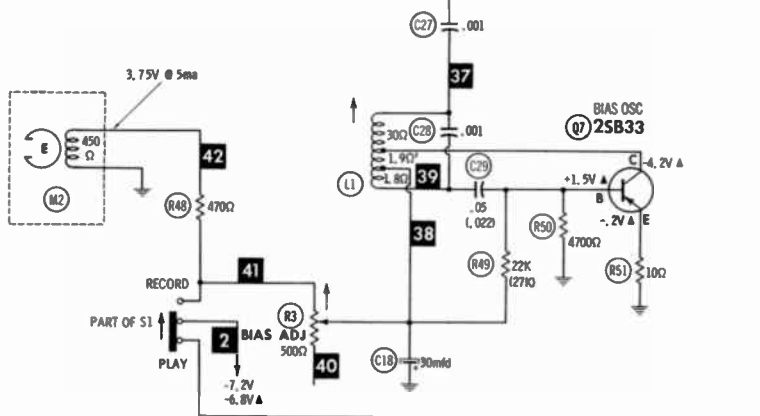
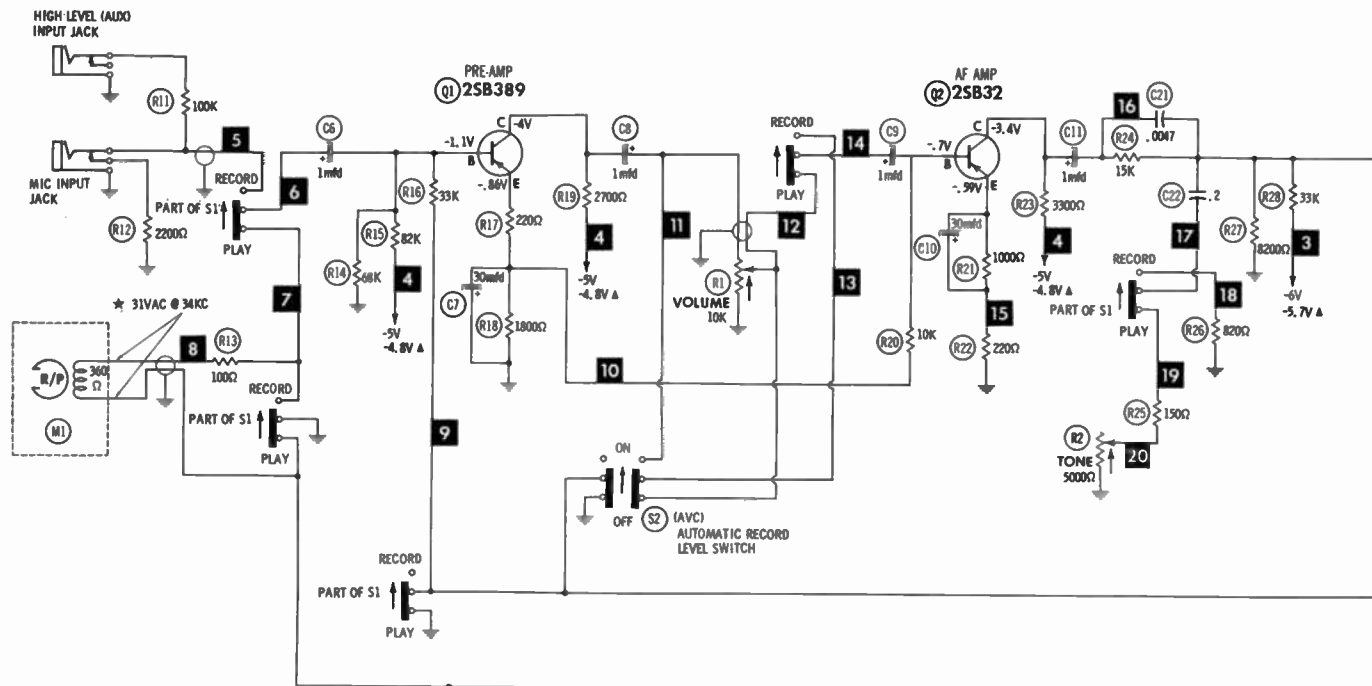
CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C21	.0047		GPD X5R472K	DD-472	JBT601YP472K	CCD-472	GP247	10TS-D47
C22	.2		DBE6P22		DMF4P22	4DP-5-224	PVC4022	4PS-P22
C23	.022		DBE6S22	DD-203	DMF4S22	4DP-2-223	PVC6122	4PS-S22
C24	.022		DBE6S22	DD-203	DMF4S22	4DP-2-223	PVC6122	4PS-S22
C25	240			DD-241			GP324	10TS-T24
C26	.05 50V	(.047) (1)	TTP-.05	CK-503	HOV101ZV503Z	CCD-503	TA150	TG-S50
C27	.001		GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C28	.001			CPR-1000J	CD19F102J500	DM-19-102J	SK210	MS-21
C29	.05 50V	(.022) (1)	TTP-.05	CK-503	HOV101ZV503Z	CCD-503	TA150	TG-S50

(1) Alternate Value.

(CONTINUED ON PAGE 16)

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



- ⊙ See parts list
- 1. Voltage measurements taken with vacuum tube voltmeter.
- 2. All controls set for normal operation, no signal applied.
- 3. Measured values are from socket pin or terminal to common ground.
- 4. All terminals viewed from bottom unless otherwise designated.
- 5. Numbers assigned to terminals may not be found on the unit.
- 6. Supply voltage maintained at rated value for voltage readings.
- 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

* Measured in "RECORD" position with an audio VTVM.

Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

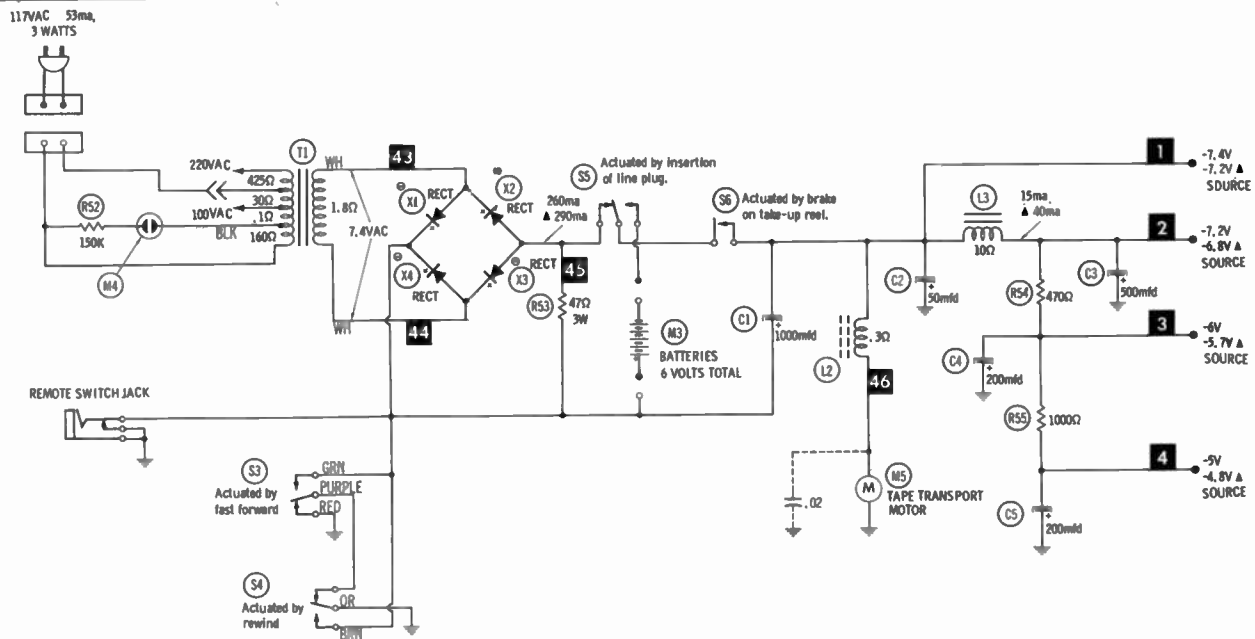
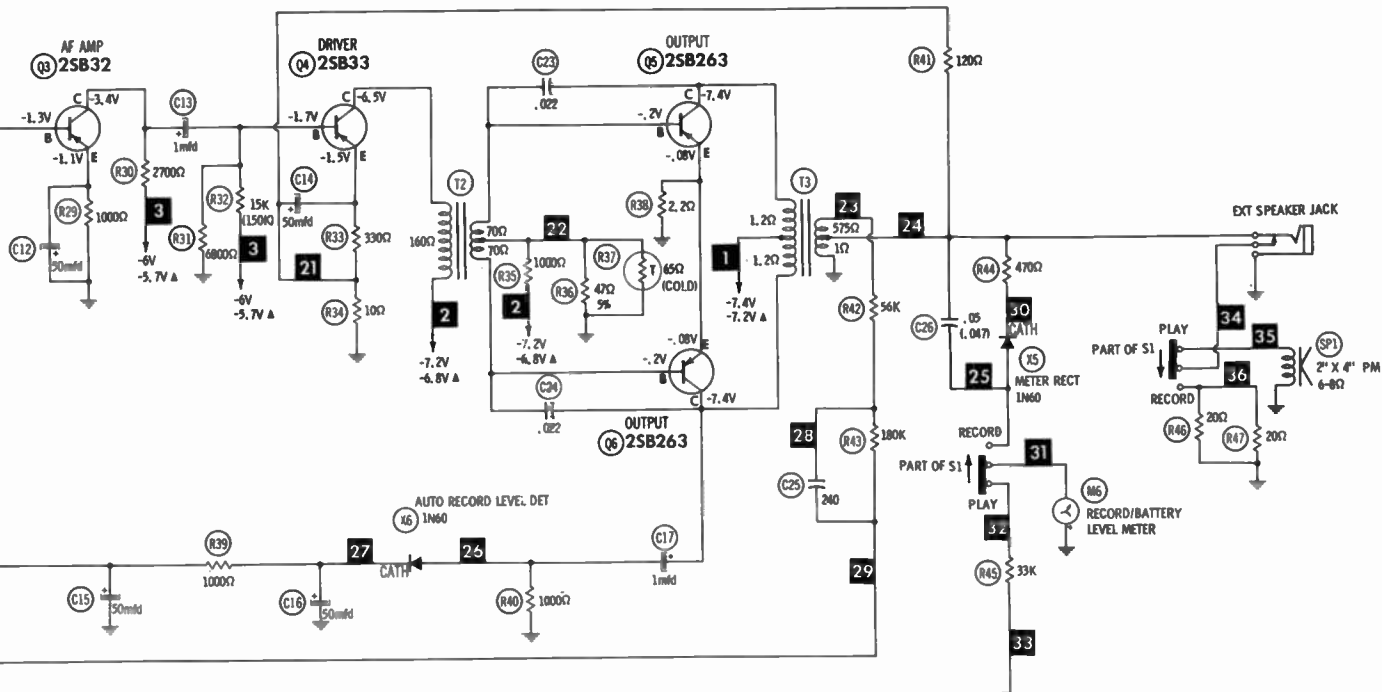
Arrows at controls indicate clockwise rotation viewed from actuator end.

▲ MEASURED IN RECORD

A PHOTOFAC STANDARD NOTATION SCHEMATIC

with **CIRCUITRACE**

© Howard W. Sams & Co., Inc. 1968



AIWA MODEL TP-712

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA				
			AIWA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume	10K	7021073				
R2	Tone	5000	7021068				
R3	Bias Adjust	500	7021070	T-500 (1)		U201R501B (1)	MTC52L4 (1)

(1) For horizontal mount, bend the two outside terminals to fit "PC" board. Use jumper wire to connect center terminal to "PC" board.

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	AIWA PART No.			IRC PART No.	WORKMAN PART No.	AIWA PART No.
R37	65 (Cold) Thermistor		GM68	8063470 (19D47)	R53	47 3W	PW5-50	5W-SQ-47.5	7025011

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Bias Decillator	7007006			
L2	Choke	2209313		74F186AP	T810

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000~)	AIWA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
L3	40ma	10	260mh	7003012					

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	AIWA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC @ .053Amp Taps @ 100V And @220V	7.4VAC @ .290A DC		7004014					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	AIWA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T2	1.15	1 CT		7002012					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	AIWA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T3	35/CT	8 with 575 DC resistance Tap	7002011					

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA			NOTES
		AIWA PART No.	JENSEN PART No.	QUAM PART No.	
SP1	2" X 4" PM 8 ohms	2211310			

TAPE HEADS

ITEM NO.	MEASURED			PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	300mh	31VRMS	34KC	2212303	3001 (2)	2-Track Monaural Record/Play
M2	500mh	3.75VDC @ 5ma		2209316	3600 (1) & QK-19	2-Track Monaural Erase

(1) Select polarity for best recording
(2) Cement to original mounting with suitable spacers.

BATTERIES

ITEM No.	VOLTAGE	AIWA PART No.	REPLACEMENT DATA			NOTES
			BURGESS	EVEREADY	MALLORY	
M3	6 Volts Total	7047001	230 or AL-2	1050 or E95	M13R or MN1300	4 required.

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M4	Neon Lamp	7035019	CHICAGO MINIATURE Replacement CM-NE-2A
M5	Motor	7045021	Tape Transport
M6	Meter	7040612	Record Level and Battery Level Indicator
S1	Switch	7031023	Record/Play
S2	Switch	7031017	Automatic Record Level (ARL)
S3	Switch	7031024	Fast Forward
S4	Switch	7031013	Rewind
S5	Switch	7032151	AC/Battery
S6	Switch	7031022	On/Off
	Microphone	525481	(DM-54A2)
	Earphone	7048019	
	Printed Circuit Board	2240606	Amplifier
	Printed Circuit Board	2332603	Power Supply

CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

ITEM	PART No.	ITEM	PART No.
Case (Main Section)	2332163	Knob, Tone	2332073
Back Lid, Case	2332158	Button, Forward	2332127
Upper Lid	2332090	Button, Fast Forward	2332128
Battery Compartment Cover	2332074	Button, Rewind	2332189
Head Cover	2332155	Button, Record	2332147
Knob, Volume	2332072	Button, Stop	2332153

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 8 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)

AIWA MODEL TP-712



PHOTOFACT[®] with

CIRCUITRACE[®]

This unit is a two-track, monaural recorder having four speeds: 15/16, 1 7/8, 3 3/4, and 7 1/2 ips.

Jacks are provided for both low- and high-level inputs, auxiliary microphone input, remote operation, line output, and external speaker.

Power is supplied by six, 1 1/2-volt "D" cells or 110 - 120 volts AC, 60 cycles.

TRADE NAME : Concertone Model 700

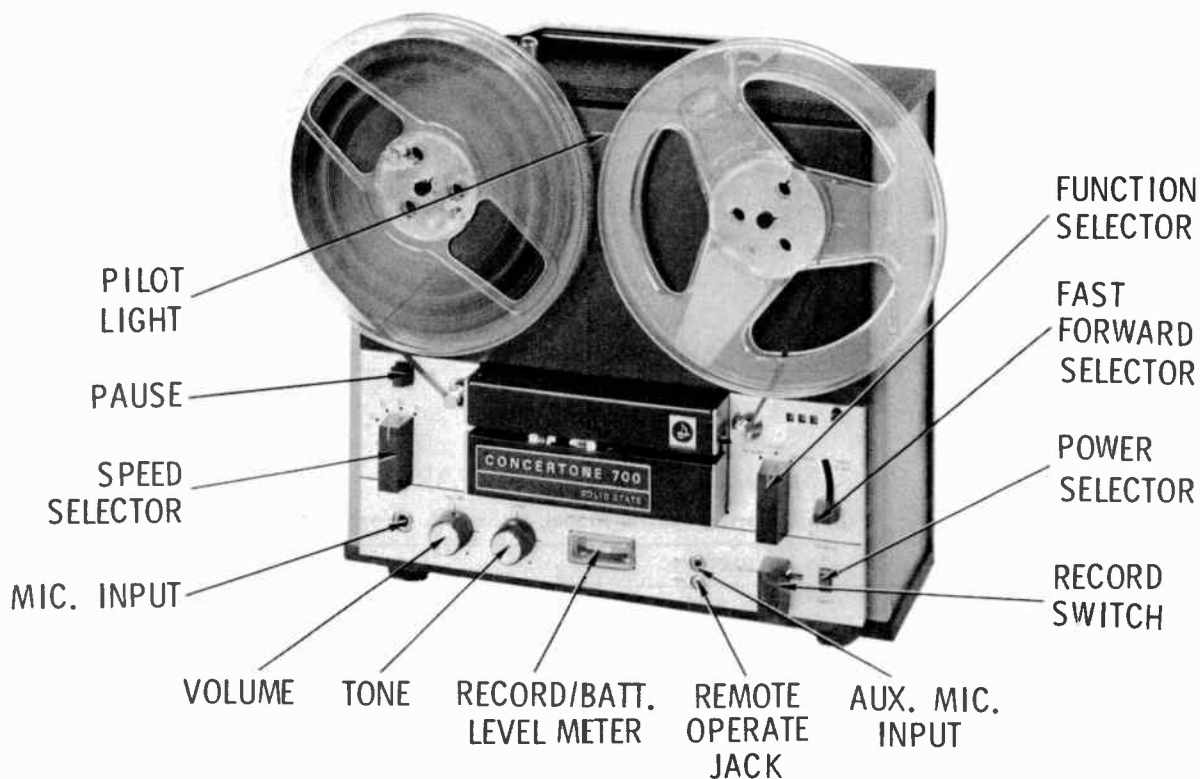
SUPPLIER : For Current Address, See Annual Index

TYPE SET : 4-Speed, 2-Track Monaural Recorder

POWER SUPPLY : 9 Volts DC or 110-120 Volts AC, 60 Cycles

RATING :
6 Watts, 92ma @ 117VAC (Record with Motor)
5 Watts, 82ma @ 117VAC (Play with Motor)

CONCERTONE MODEL 700



HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

© 1968 Howard W. Sams & Co., Inc. Printed in U. S. of America C991
World Radio History

OPERATING INSTRUCTIONS

Record

1. Move Function Selector to Stop, select the power source, select the speed, and thread the tape.
2. Move Speaker switch to Off, connect a recording source to an input, hold Record switch to the right while moving Function Selector to Operate, and move Pause knob to the left.
3. Set the recording level with Volume control, move Pause knob to the right, and record.

Play

1. Repeat step 1 of "Record", move Speaker Switch to On, and move Function Selector to Operate to play the previous recording.

Monitor

1. To monitor the recording source, move Speaker switch to On while recording.

DISASSEMBLY

1. Remove two push-on knobs and five knobs held with setscrews.
2. Remove four small Phillips screws from sides of deck cover and remove deck cover.
3. Remove two tape guides and four small screws from sides, and remove control cover.
4. Remove two screws holding upper head cover.
5. Remove four large Phillips screws from corners of transport assembly and remove assembly from cabinet.

SEQUENCE OF OPERATION

Play

Moving the Function Selector to Operate rotates Cam (50) to pivot Lever (51), pulling Link (15). Link (15) pivots Arm (42) to move the brake pad and to pull Link (14), pivoting Arm (24) to move the brake pad.

Simultaneously, Cam (50) pushes Link (13) to pivot Arm (23), moving Arm (22) to move Idler (3B) and pull Spring (60).

Cam (50) also pushes Link (12) to release Arm (11), allowing Arm (10), pulled by Spring (28), to press Idler (4) against Pulley (6) and Disc (7).

The motor, through Pulley (6), Idler (4), Disc (7), Felt (17), and Pulley (8), drives Rest (19).

Cam (50) also releases Lever (29), pulled by Spring (48), to press Roller (1) against the capstan and to release Lever (41), releasing Pads (53) and (54). Lever (29) also releases Lever (61), pulled by Spring (49), to lock the linkage to Switch (S1).

Lever (29) also releases Assembly (36), pulled by Springs (63) and (60), to press Idler (5) against Pulley (6) and Flywheel (33).

The motor, through Pulley (6) and Idler (5), drives Flywheel (33).

Record

The Record sequence is the same as "Play" except Lever (61), released by Lever (29) and pulled by Spring (49), holds the linkage to Switch (S1).

Fast Forward

Moving the Fast Forward Selector rotates Lever

(52) to tilt Lever (46), lowering Arm (11). Arm (11), allowed to move forward by Link (12), lowers Arm (10). Arm (10), pulled by Spring (28), presses Idler (4) against Pulley (6) and Pulley (8).

The motor, through Pulley (6), Idler (4), and Pulley (8), drives Rest (19).

Lever (52) also actuates Switch (S4) and pivots Lever (51), pulling Link (15). Link (15) pivots Arm (42) to move the brake pad and to pull Link (14), pivoting Arm (24) to move the brake pad.

Rewind

Moving the Function Selector to Rewind rotates Cam (50) to pivot Lever (51), pulling Link (15). Link (15) pivots Arm (42) to move the brake pad and to pull Link (14), pivoting Arm (24) to move the brake pad.

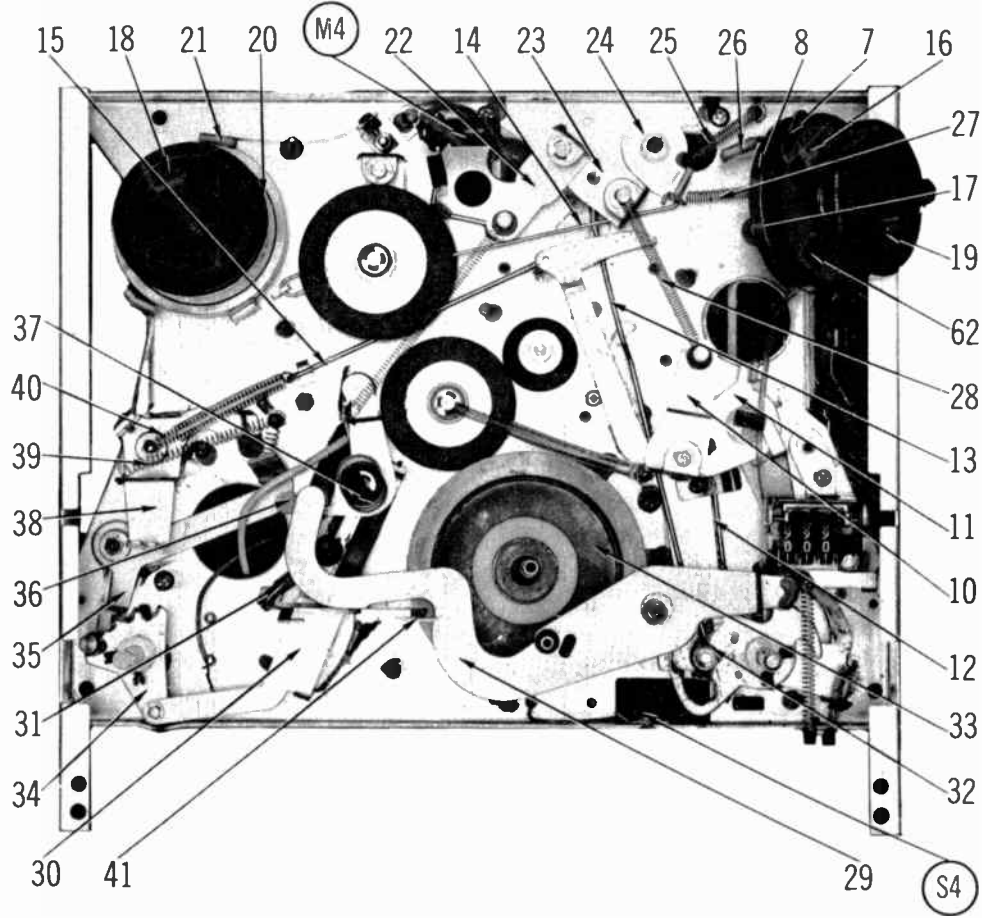
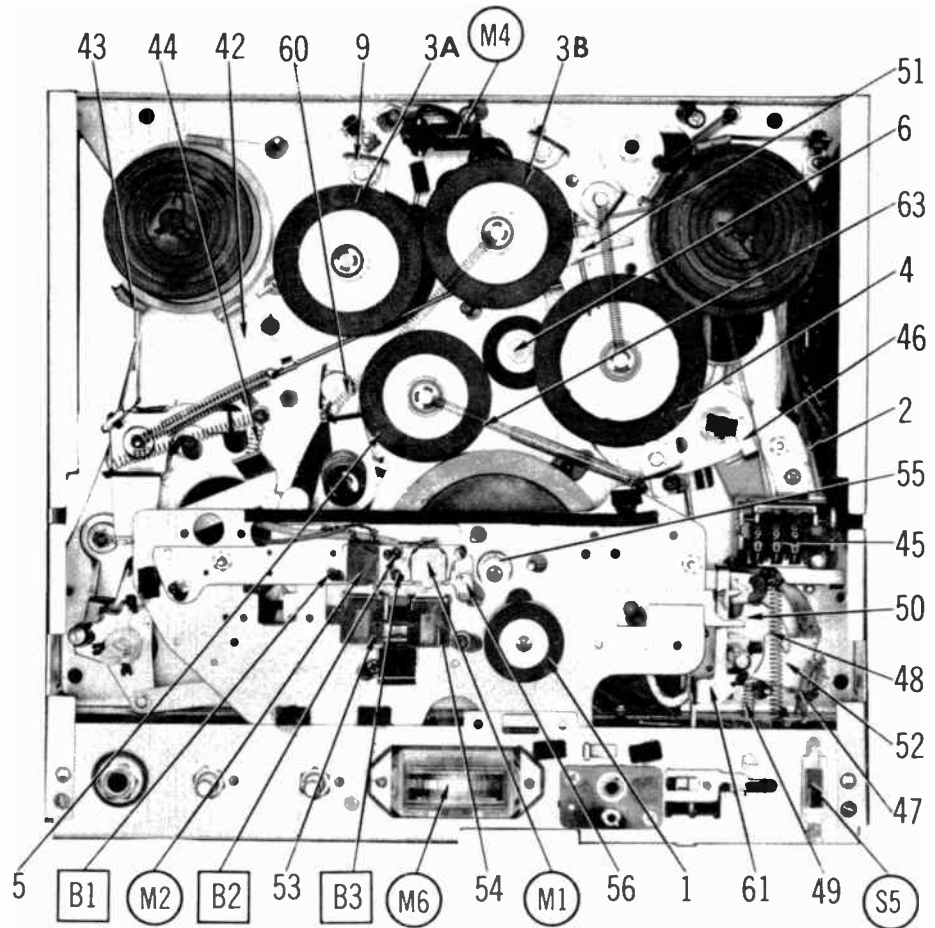
Cam (50) also pulls Link (12) to pivot Arm (11), pulling Arm (10) to move Idler (4) from Pulley (8).

Cam (50), at the same time, pulls Link (13) to pivot Arm (23), allowing Arm (22), pulled by Spring (60), to press Idler (3B) against Idler (3A) and pulley (6). Idler (3A), supported by Arm (9), contacts Pulley (20).

The motor, through Pulley (6), Idler (3B), Idler (3A), and Pulley (20), drives Rest (18).

Stop

Moving the Function Selector to Stop allows Springs (25), (27), (40), and (60) to reverse the sequences of "Play" and "Record". Springs (25), (27), (47), (59), and (40) reverse the "Fast Forward" sequence. Springs (25), (27), (40), and (28) reverse the "Rewind" sequence.



ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 7 1/2 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 7 1/2 ips with a spring scale applied to a point on an empty tape reel 2 inches from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 3/4 ounce. Controlled by condition of Felt (17) and tension of Spring (62).
Fast Forward Take-up Torque	Nominal value 4 ounces. Controlled by condition of Idler (4).
Rewind Torque	Nominal value 2 1/2 ounces. Controlled by condition of Idlers (3A) and (3B).
Supply Reel Drag	Nominal value 1/4 ounce. Controlled by repositioning Assembly (21).
Take-up Reel Drag	Nominal value 1/8 ounce. Controlled by repositioning Assembly (26).
Pressure Roller Pressure	Nominal value 12 ounces. Controlled by tension of Spring (48).
Braking Torque	Measured in Stop. Nominal value 2 ounces counterclockwise on Supply reel. Nominal value 3 ounces clockwise on take-up reel. Controlled by condition of pads on Arms (24) and (42).
Pause Braking Torque	Measured counterclockwise on supply reel. Nominal value 1 1/4 ounces. Controlled by condition of pad on Assembly (43).
Pressure Pad Pressure	Nominal value 1/2 ounce. Controlled by repositioning Assemblies (53) and (54).
Erase Head Height	No adjustment provided.
Erase Head Azimuth	Adjust B1 and B2 equally in opposite directions until pole piece is perpendicular to lateral tape motion.
Record/Play Head Height	No adjustment provided.
Record/Play Head Azimuth	Play an azimuth test tape, connect an AC VTVM across speaker and adjust B3 for maximum peak.
Erase Current	Nominal value 90ma (30V rms) in Head (M2). No adjustment provided.
Record Bias	Nominal value 19V rms (4.6ma) across Head (M1). Controlled by setting of R3.
Bias Oscillator	Nominal frequency 50KC. No adjustment provided.
Amplifier and Record Level Indicator Calibration	Place unit in the record function and turn Volume and Tone controls fully clockwise. Apply a 1000-cycle tone at .012V rms to the mic input. Adjust R5 for .03V rms across Line Output jack. Short secondary of L1 and adjust R4 for .23V rms across Head (M1). Remove short and adjust R6 for normal maximum peak on Record/Batt Level Meter.
RF Trap.	With unit in the record function, adjust L3 for MINIMUM RF at point \diamond .
Battery Level Indicator Adjust	Connect a 7.5VDC power supply to battery terminals, place unit in the play function, and adjust R7 for a reading at the low side of the red section of the Record/Batt. Level Meter.

TROUBLE CHART

IMPORTANT : Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Felt (17) dirty or worn. 2. Spring (62) weak. 3. Idler (4) dirty, worn, or binding. 4. Pulley (8) binding.
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> 1. Idler (4) dirty or worn. 2. Spring (28) stretched.
Take-up reel revolves rapidly in Play or Record.	<ol style="list-style-type: none"> 1. Roller (1) worn. 2. Excessive Play take-up Torque. 3. Pressure Roller Pressure inadequate.
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Idler (3A) and (3B) dirty, worn, or binding. 2. Spring (60) stretched. 3. Pulley (20) binding.
Supply reel spills tape in forward positions.	<ol style="list-style-type: none"> 1. Assembly (21) supplying inadequate drag.
Take-up reel spills tape in Rewind.	<ol style="list-style-type: none"> 1. Assembly (26) supplying inadequate drag.
Reels do not stop immediately when Stop button is pressed.	<ol style="list-style-type: none"> 1. Pads on Arms (24) and (42) dirty or worn. 2. Springs (27) and (25) stretched.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Idler (5) dirty, worn, or binding. 2. Bearing (55) binding. 3. Motor defective or not supplied with power. 4. Spring (63) stretched.
Tape rides up and down between capstan and pressure roller.	<ol style="list-style-type: none"> 1. Roller (1) worn. 2. Capstan bent. 3. Excessive Play Take-up Torque.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Roller (1) dirty, worn, or binding. 2. Idler (5) dirty or worn. 3. Flywheel (33) binding. 4. Excessive Play Take-up Torque. 5. Motor defective. 6. Inadequate Pressure Roller Pressure.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Head (M1) dirty, misadjusted, or defective. 2. Amplifier defective. 3. Bias Oscillator defective. 4. Pad on Assembly (54) matted or worn.
Erase weak or inoperative.	<ol style="list-style-type: none"> 1. Head (M1) dirty, misadjusted, or defective. 2. Pad on Assembly (53) matted or worn. 3. Head (M1) supplied with insufficient current.

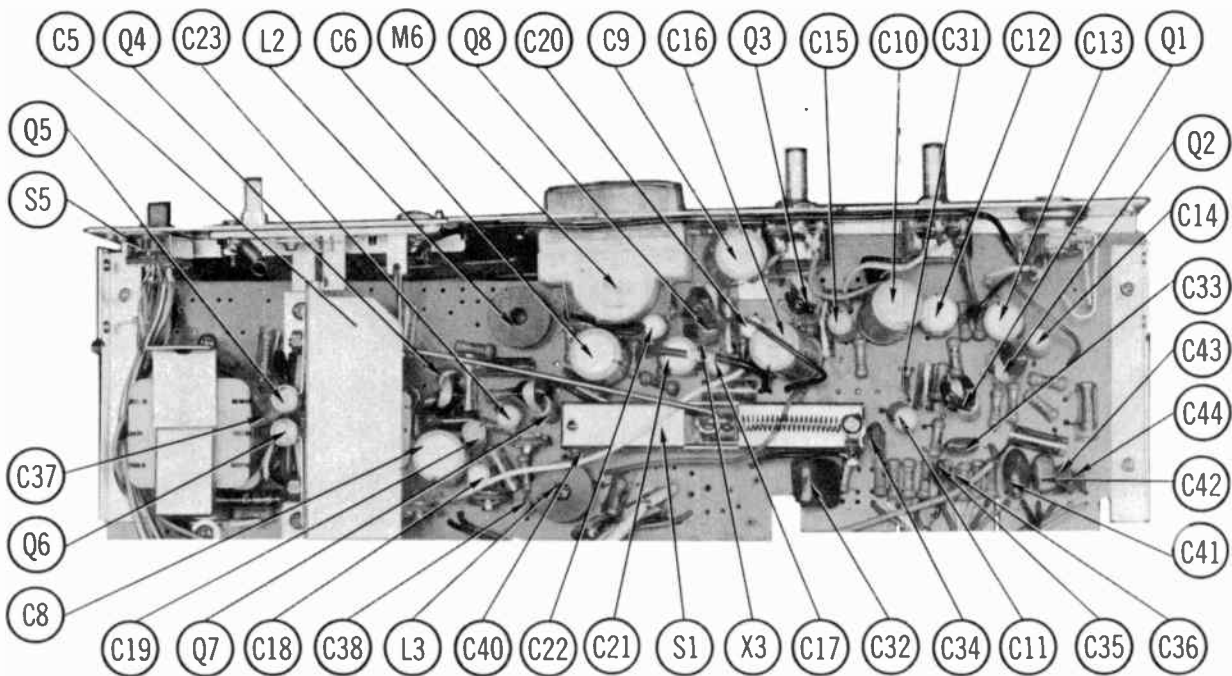
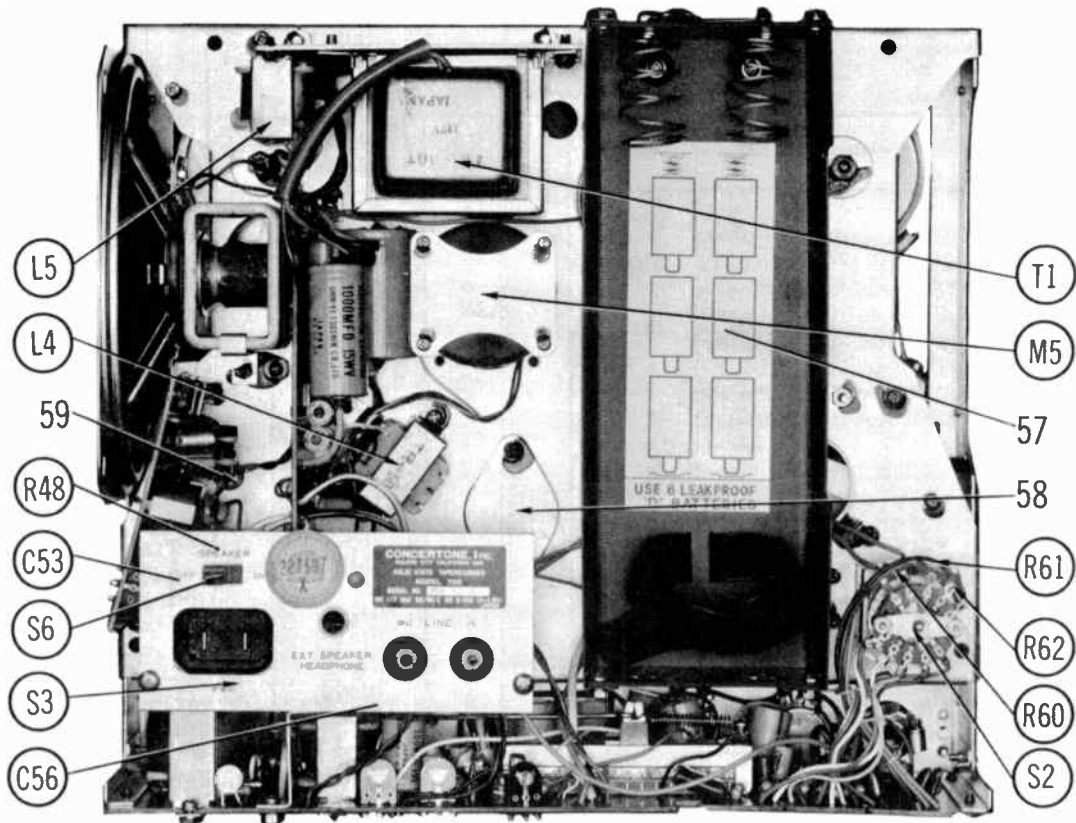
Refer to "General Servicing Information" on page 4.

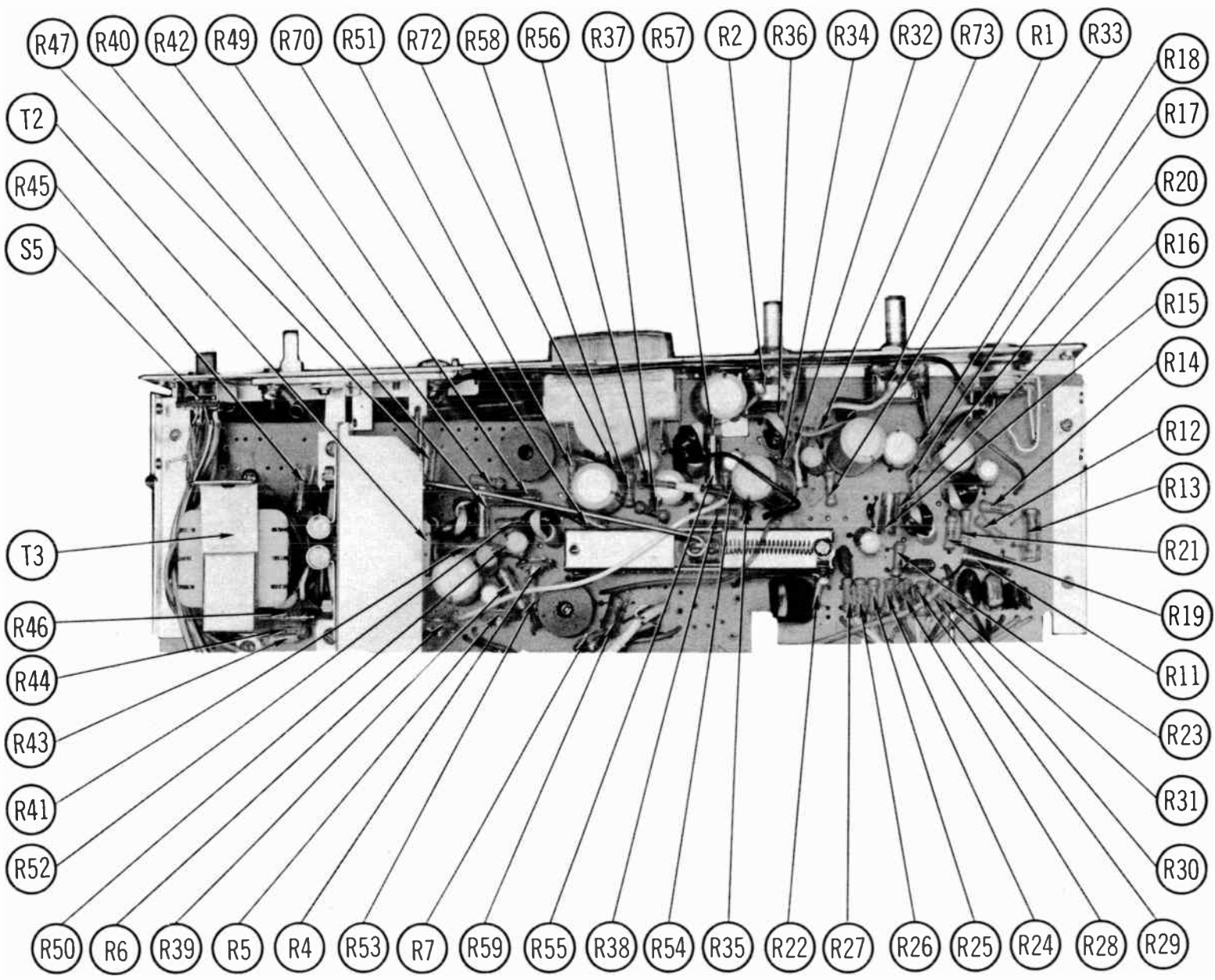
MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	06-0051	Pressure Roller	33		Flywheel and Capstan Assembly
2*	06-0046*	Counter Belt *	34		Speed Change Cam
3	06-0047	Rewind Idler Wheel (2 used)	35		Speed Change Cam Locking Lever
4	06-0048	Take-up Idler Wheel	36		Flywheel Idler Lever Assembly
5		Flywheel Idler Wheel	37		Flywheel Idler Lever Compression Spring
6	06-0037	4-Speed Motor Pulley	38		Pause Lever
7	06-0049	Take-up Clutch Disc	39		Pause Lever Return Spring
8	06-0050	Take-up Fixed Pulley	40		Brake Actuator Lever Spring
9	09-0153	Left Rewind Idler Arm	41		Pad Release Lever
10	09-0155	Fast Forward/Take-up Upper Idler Arm	42		Supply Brake Arm
11	09-0156	Fast Forward/Take-up Lower Idler Arm	43		Pause Brake Spring & Pad Assy
12	09-0157	Fast Forward Wire Link	44		Speed Change Cam Locking Lever Spring
13	09-0158	Rewind Wire Link	45		Counter Assembly
14	09-0159	Brake Coupling Wire Link	46		Fast Forward Lifting Lever
15	09-0160	Brake Actuator Wire Link	47		Fast Forward Actuator Lever Spring
16	10-0168	Take-up Assembly Fiber Disc	48		Pressure Roller Lever Spring
17	10-0169	Take-up Clutch Friction Felt	49		Record Lock Lever Spring
18		Supply Reel Rest	50		Actuator Cam Assembly
19		Take-up Reel Rest	51		Brake Actuator Lever
20		Supply Fixed Pulley	52		Fast Forward Actuator Lever
21		Supply Drag Pad Assembly	53		Erase Head Pad Assembly
22		Upper Right Rewind Idler Arm	54		Record Head Pad Assembly
23		Lower Right Rewind Idler Arm	55		Upper Flywheel Bearing
24		Take-up Brake Arm Assembly	56		Tape Guide
25		Take-up Brake Spring	57		Pause Lever Lock Plate Spring
26		Take-up Drag Pad Assembly	58		Lower Flywheel Bearing
27		Supply Brake Spring	59		Fast Forward Lift Lever Spring
28		Forward Idler Spring	60		Rewind Idler Arm Spring
29		Pressure Roller Lever	61		Record Lock Lever
30		Speed Change Lifting Lever	62		Take-up Clutch Spring
31		Pad Release Lever Spring	63		Flywheel Idler Spring
32		Brake Actuator Lever Roller			

* Counter Belt - WALSCO Part No. 1410-55.

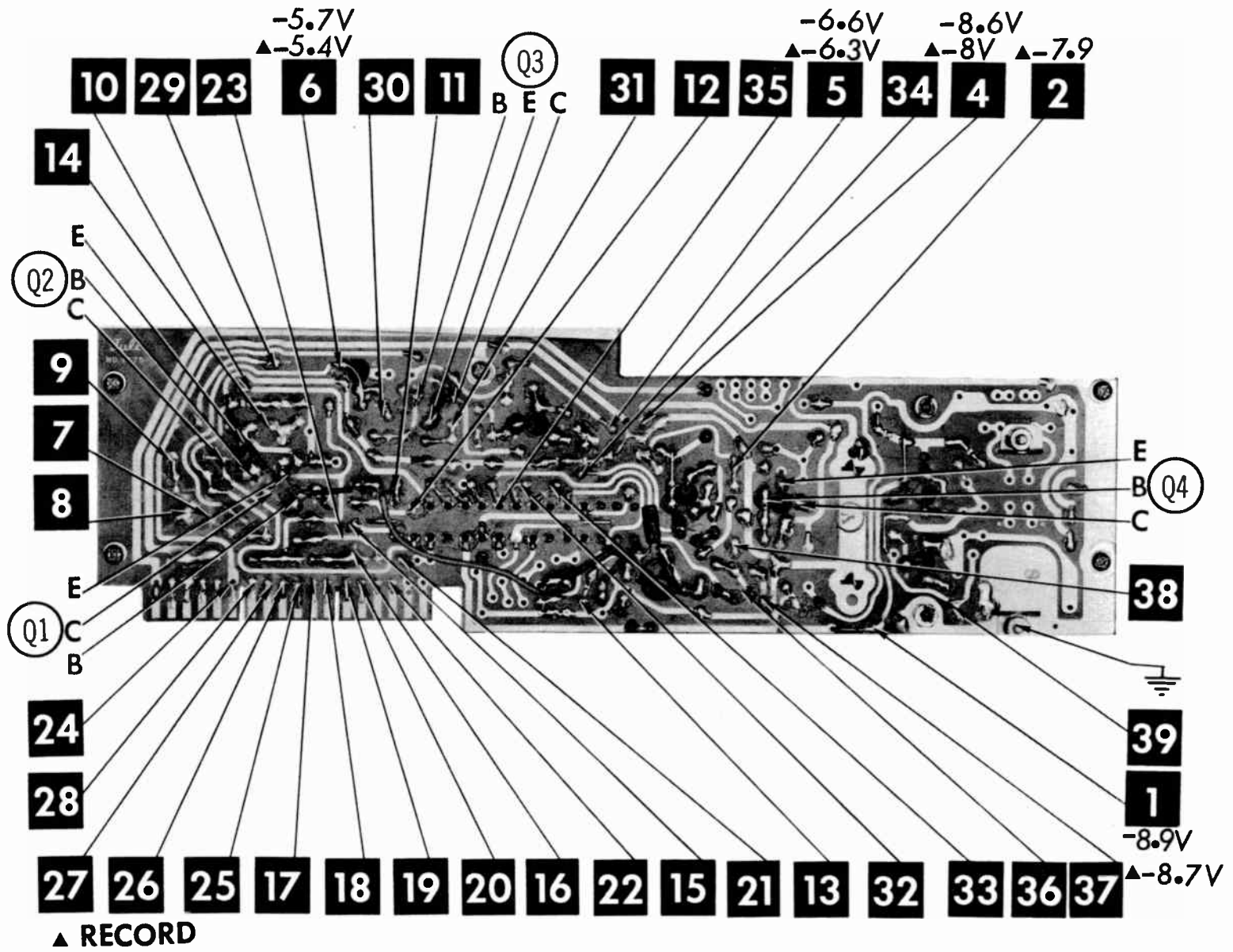
CONCERTONE MODEL 700



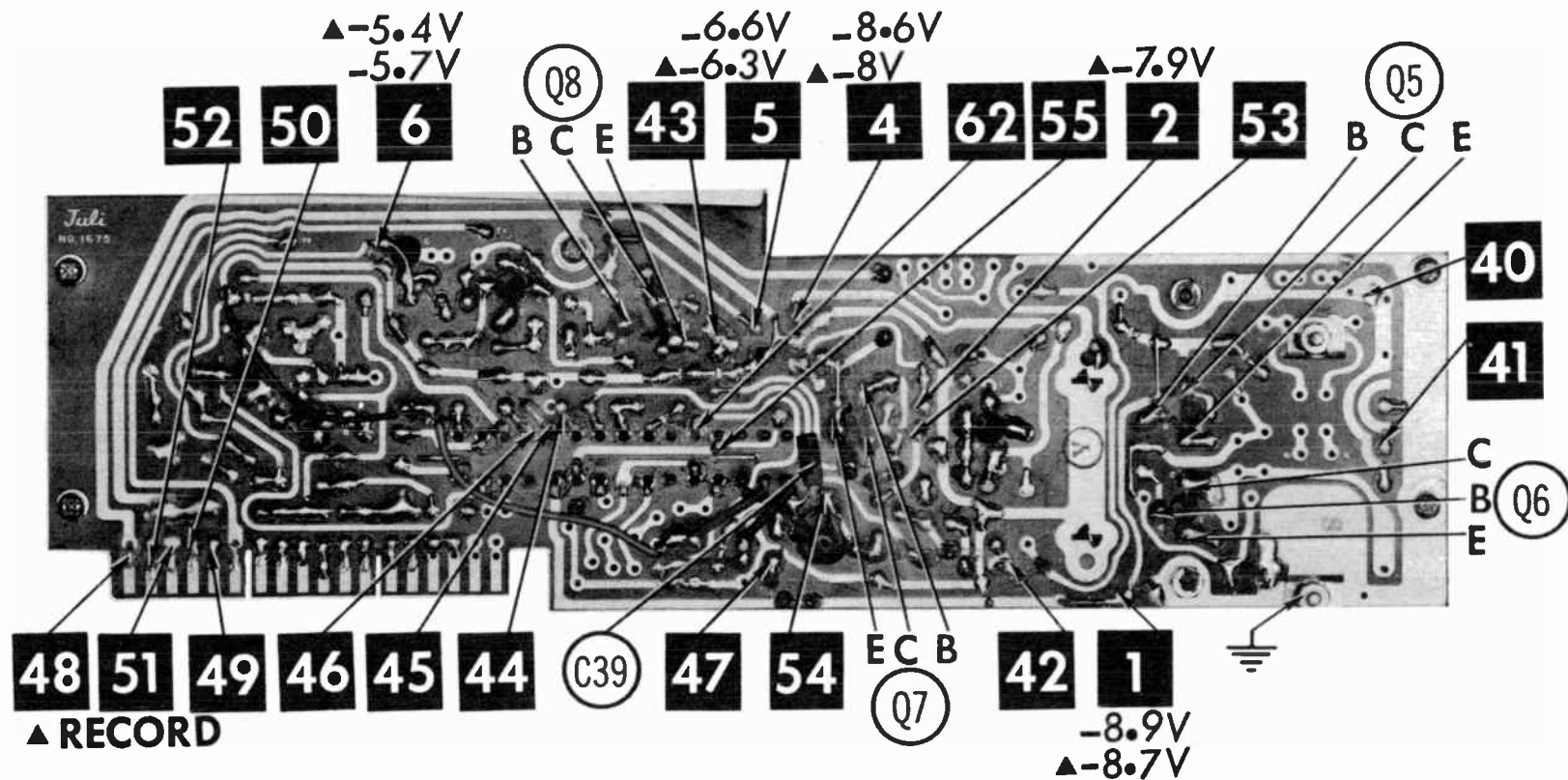


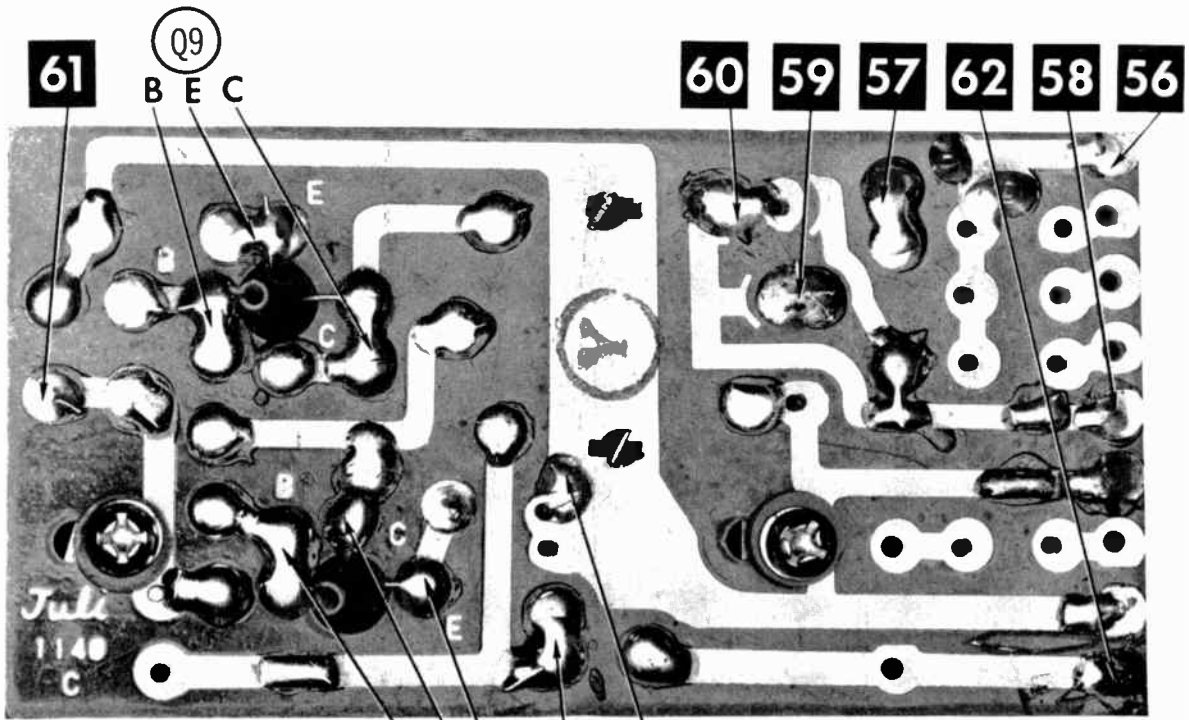
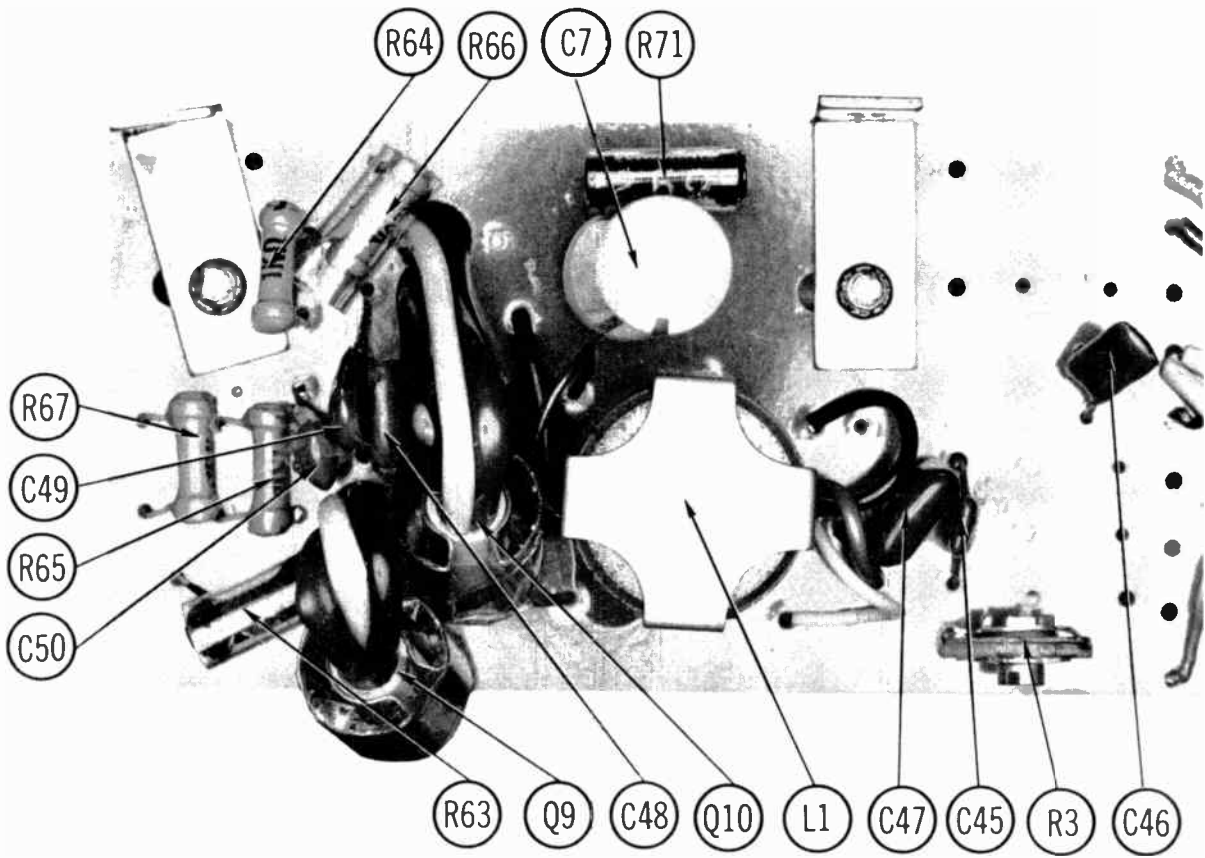
CONCERTONE MODEL 700

World Radio History



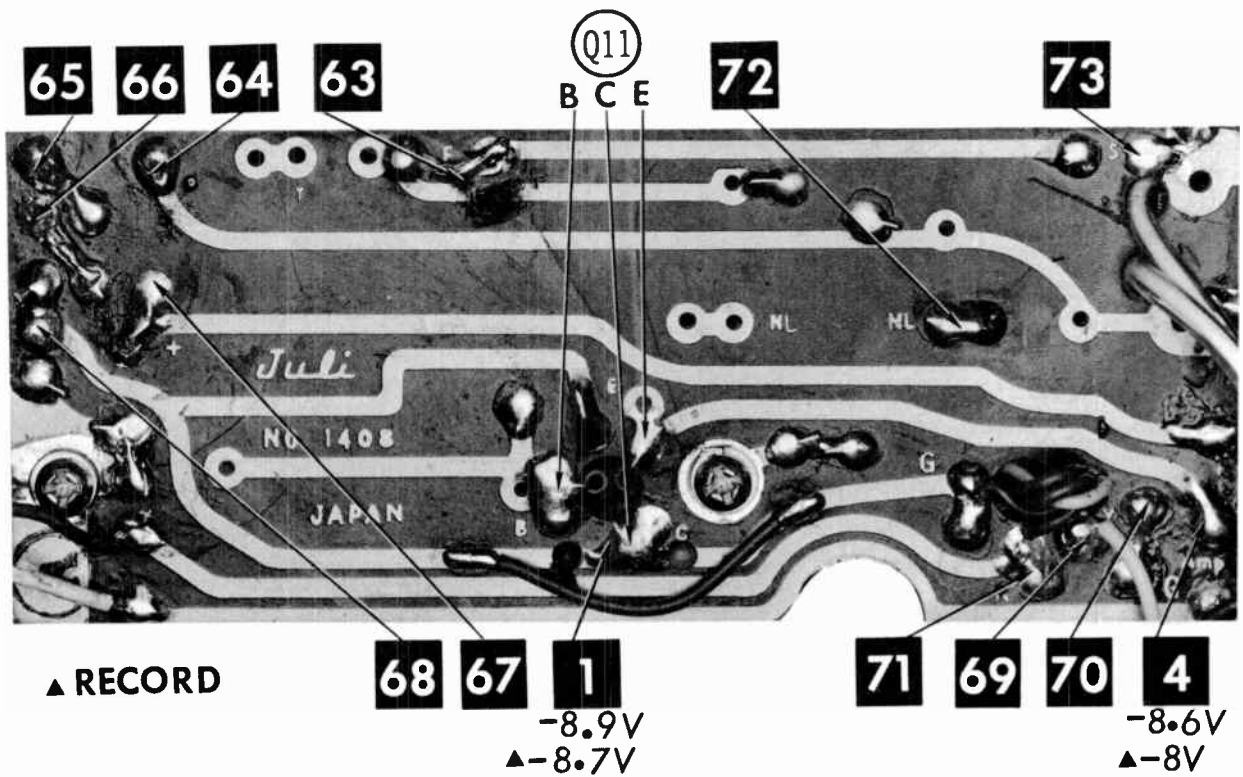
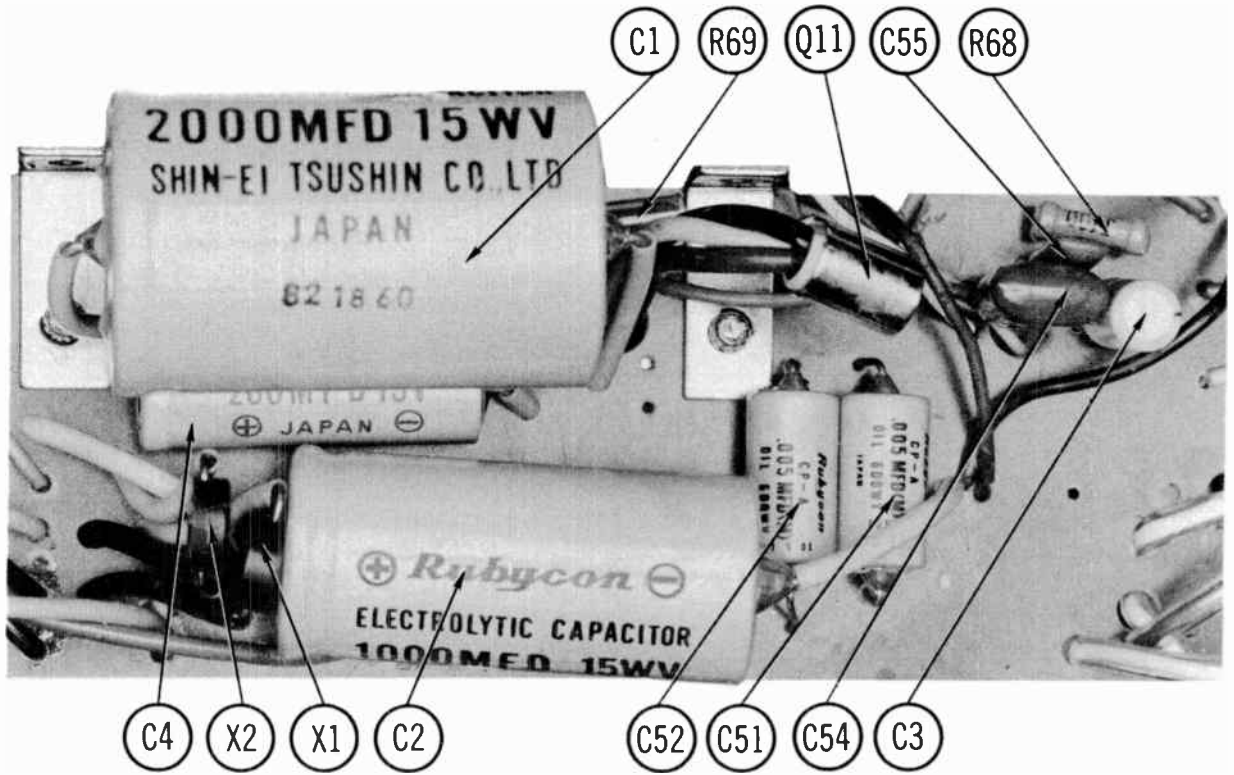
A Howard W. Sams CIRCUITRACE Photo





▲ RECORD

B C E
 3
 Q10 ▲ -7.8V



A Howard W. Sams CIRCUITRACE Photo

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

TRANSISTORS

ITEM No.	TYPE No.	FUNCTION	REPLACEMENT DATA					
			MFGR. PART No.	DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SYLVANIA PART No.
Q1	2SB187	Preamp	03-0020	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q2	2SB187	AF Amp	03-0020	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q3	2SB187	AF Amp	03-0020	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q4	2SB187	Driver	03-0020	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q5	2SB405	Output	03-0023	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q6	2SB405	Output	03-0023	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q7	2SB187	Record Amp	03-0020	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q8	2SB187	Meter Amp	03-0020	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q9	2SB187	Bias Oscillator	03-0022	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q10	2SB187	Bias Oscillator	03-0022	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q11	2SB187	Voltage Regulator	03-0020	DS-26	GE-2	TR-14	SK-3004	ECG 102

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MFGR. PART OR TYPE No.	REPLACEMENT RECTIFIERS & DIODES			REPLACEMENT RECTIFIERS		NOTES
		GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	SYLVANIA PART No.	RCA PART No.	SARKES TARZIAN PART No.	
X1		GE-504A	8D4 or 5A4-D	ECG 116 or ECG 117	SK-3030 or SK-3031	40C or F-4	
X2		GE-504A	8D4 or 5A4-D	ECG 116 or ECG 117	SK-3030 or SK-3031	40C or F-4	
X3	1S188	1N34AS	1N34A	ECG 109			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		Concertone PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	2000 15V	02-0049-0	PRS1240		BR2000-15	QT1-33	TC1520A	TL-1167.5
C2	1000 15V	02-0047-0	PRS1230		BR1000-15	QT1-32	TC1501A	TL-1166.5
C3	10 15V		BCD15010	EA30-1000	NLM10-15	MT1-5	MTV10CB50	TE-1155
C4	200 15V		BCD12250	EA15-250	NLW200-15	MT1-23	MTV200CP15	TE-1137
C5	200 15V		BCD12250	EA15-250	NLW200-15	MT1-23	MTV200CP15	TE-1137
C6	200 15V		BCD12250	EA15-250	NLW200-15	MT1-23	MTV200CP15	TE-1137
C7	100 15V		BCD15100	EP15-100	NLM100-15	MT1-19	MTV100CF15	TE-1162
C8	200 15V		BCD12250	EA15-250	NLW200-15	MT1-23	MTV200CP15	TE-1137
C9	200 15V		BCD12250	EA15-250	NLW200-15	MT1-23	MTV200CP15	TE-1137
C10	200 15V		BCD12250	EA15-250	NLW200-15	MT1-23	MTV200CP15	TE-1137
C11	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127
C12	100 6V	02-0053	BCD6100	EP6-100	NLM100-12	MT1-18	MTV100CB6	TE-1102
C13	100 6V	02-0053	BCD6100	EP6-100	NLM100-12	MT1-18	MTV100CB6	TE-1102
C14	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127
C15	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127
C16	200 15V		BCD12250	EA15-250	NLW200-15	MT1-23	MTV200CP15	TE-1137
C17	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127
C18	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127
C19	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127
C20	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127
C21	100 6V	02-0053	BCD6100	EP6-100	NLM100-12	MT1-18	MTV100CB6	TE-1102
C22	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127
C23	5 10V		BCD12005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1127

CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C31	.005 50V		TTP-005	CK-502	HCZ3R0XR502P	CCD-502	TA250	TG-D50
C32	.2 50V					1DP-3-204		
C33	.05 50V		TTP-05	CK-503	HCZ3R0XR503P	CCD-503	TA150	TG-S50
C34	.04 50V			DD-403		CCD-403	GP140	5GA-S40
C35	750 50V	(.001) (1)	GPD X5F751K	DD-751		CCD-751	GP375	10TS-T75
C36	750 50V	(.001) (1)	GPD X5F751K	DD-751		CCD-751	GP375	10TS-T75
C37	.04 50V			DD-403		CCD-403	GP140	5GA-S40
C38	.003 50V		GPD X5R302K	DD-302	BYS601ZU302P	CCD-302	GP230	10TS-D30
C39	300 50V		GPD X5F301K	DD-301		CCD-301	GP330	10TS-T30
C40	750 50V	(.001) (1)	GPD X5F751K	DD-751		CCD-751	GP375	10TS-T75
C41	.15 50V				DMF1P15	1DP-3-154	PVC1015	
C42	.07 100V		DBE4S68		DMF4S68	4DP-3-683		4PS-S68
C43	.03 50V		TTP-03	CK-303				TG-S30
C44	.015 50V		GPD Z5U153P	DD-153	BYT601ZU153Z	CCD-153	GP115	10TS-S15
C45	750 50V	(.001) (1)	GPD X5F751K	DD-751		CCD-751	GP375	10TS-T75
C46	.006 50V		GPD X5R562K	DD-562		CCD-562	GP256	10TS-D56
C47	.05 50V		TTP-05	CK-503	HCZ3R0XR503P	CCD-503	TA150	TG-S50
C48	.04 50V			DD-403		CCD-403	GP140	5GA-S40

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C49	.015 50V		GPD Z5U153P	DD-153	BYT601ZU153Z	CCD-153	GP115	10TS-S15
C50	.015 50V		GPD Z5U153P	DD-153	BYT601ZU153Z	CCD-153	GP115	10TS-S15
C51	.005 600V		DBE6D5	CPR-5000J	DPMS6D5	6DP-1-502	PVC625	6PS-D50
C52	.005 600V		DBE6D5	CPR-5000J	DPMS6D5	6DP-1-502	PVC625	6PS-D50
C53	.1 50V		TTP-1	CK-104	HOV101ZV104Z		TA010	TG-P10
C54	.1 50V		TTP-1	CK-104	HOV101ZV104Z		TA010	TG-P10
C55	.007 50V	(.01) (1)	GPD X5R682K	DD-682	BYX601ZU682P	CCD-682	GP268	30GA-D68
C56	.1 50V		TTP-1	CK-104	HOV101ZV104Z		TA010	TG-P10

(1) Alternate Value.

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA				
			Concertone PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume	5000		F2-5000 (1), SSK012		B13-114, SK6 (1), or (BU1 (1), CF60, SS6)*	RU53A, SL36, SL3250 or (UA53A (1), SK750) or (U12 (1))
R2	Tone	30K		F3-25K (1), SSK012		B17-120, SK6 (1), or (BU1 (1), CF49T (2), SS6)*	RU253R, SL36, SL3250 or (UA253R (1), SK750) or (U28 (1))
R3	Record Bias Adjust	5000		T-5000		X201R502B	MTC53L1
R4	Record Level Adjust	5000		T-5000		X201R502B	MTC53L1
R5	Playback Level Adjust	5000		T-5000		X201R502B	MTC53L1
R6	Level Meter Adjust	20K		T-25K		X201R253B	MTC24L1
R7	Battery Indicator Adjust	20K		T-25K		X201R253B	MTC24L1

(1) Enlarge mounting hole.

(2) Do not use Tap.

* "SNAPTROL"

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	Concertone PART No.			IRC PART No.	WORKMAN PART No.	PART No.
R43	50 (cold) Thermistor		GM-47						

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		Concertone PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Bias Oscillator				
L2	Equalization Choke	04-0031-0			
L3	50KC Trap	04-0032-0			

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000~)	Concertone PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
L4	.160A	2.15	2mh						
L5	.240A	.8	9mh						

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	Concertone PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC 0.092Amp	16VAC 0.400A DC							

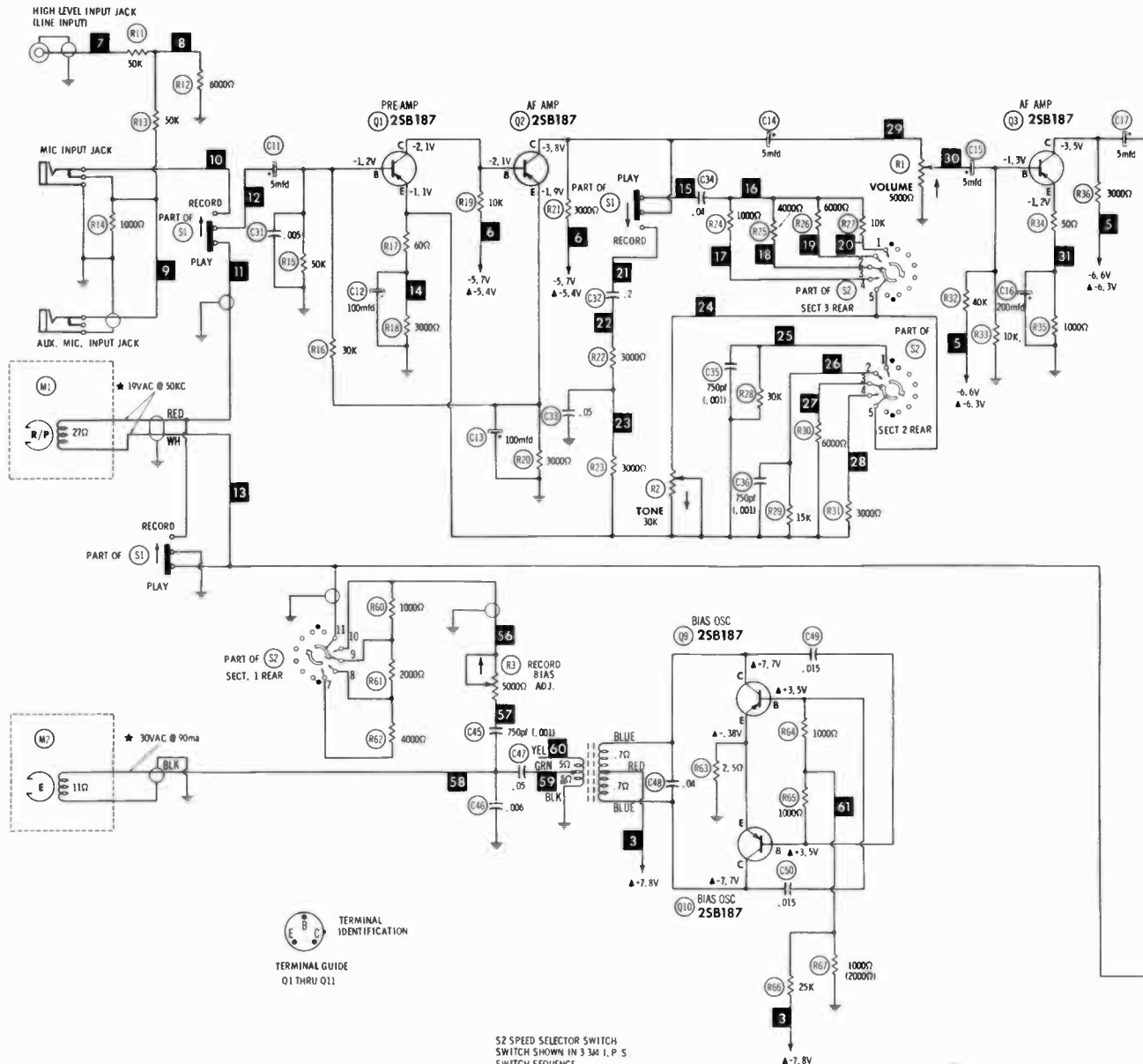
TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	Concertone PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T2	1	2							

(CONTINUED ON PAGE 34)

CONCERTONE MODEL 700

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



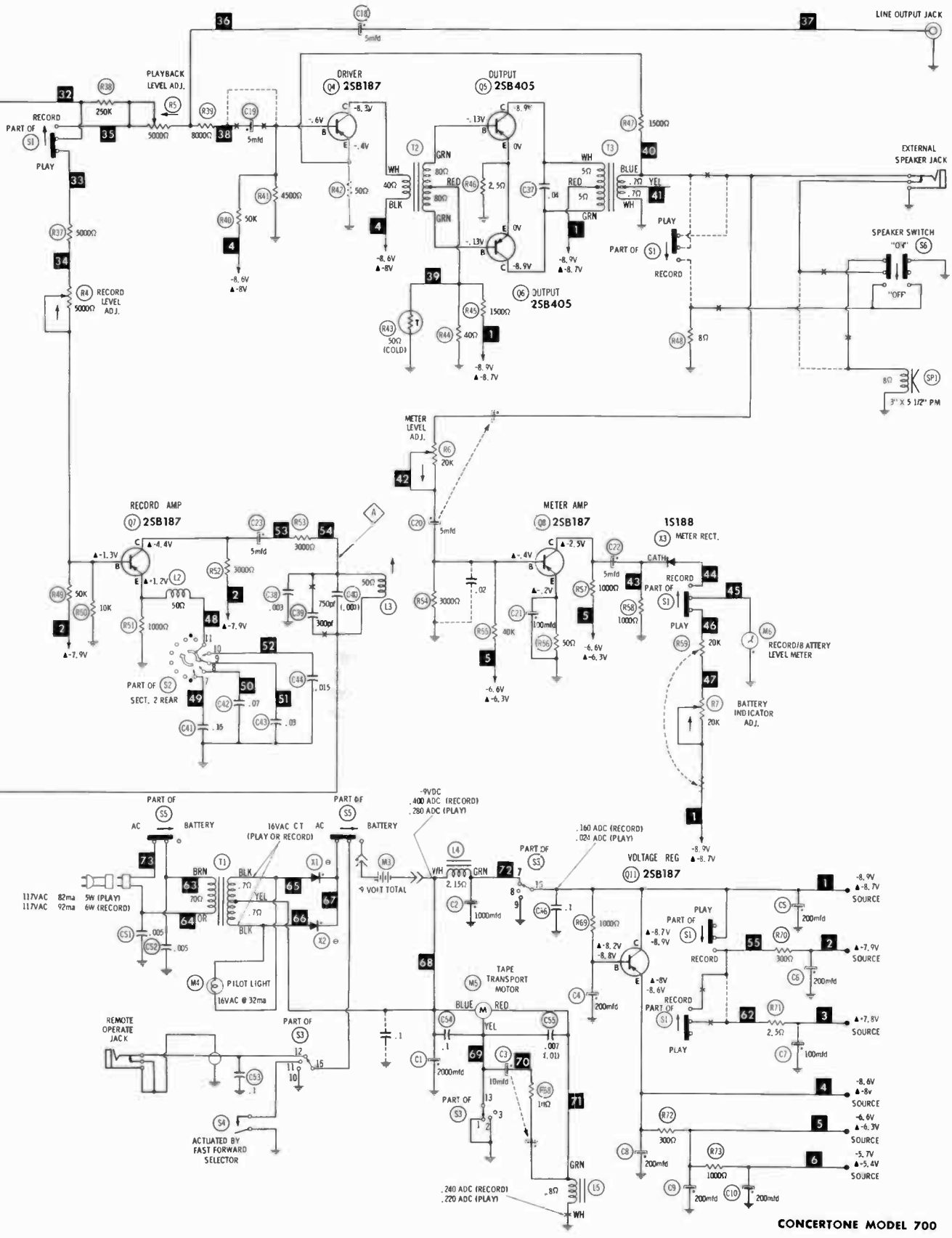
S2 SPEED SELECTOR SWITCH SHOWN IN 3 3/4 I. P. S SWITCH SEQUENCE
 1. 1 5/16 I. P. S.
 2. 1 7/8 I. P. S.
 3. 3 3/4 I. P. S.
 4. 7 1/2 I. P. S.

S3 FUNCTION SELECTOR SWITCH SHOWN IN OPERATE POSITION SWITCH SEQUENCE
 1. REWIND
 2. STOP
 3. OPERATE



- Arrows at controls indicate clockwise rotation viewed from actuator end.
- Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.
- ★ Measured in "RECORD" with Audio VTVM.
 - ▲ Measured in "RECORD".
 - ⊙ See parts list.
 - 1. Voltage measurements taken with vacuum tube voltmeter.
 - 2. All controls set for normal operation, no signal applied.
 - 3. Measured values are from socket pin or terminal to common ground.
 - 4. All terminals viewed from bottom unless otherwise designated.
 - 5. Numbers assigned to terminals may not be found on the unit.
 - 6. Supply voltage maintained at rated value for voltage readings.
 - 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.
 - 8. All measurements taken in "PLAY" unless otherwise indicated.

A PHOTOFACIT STANDARD NOTATION SCHEMATIC with **Circuitrace**
 © Howard W. Sams & Co., Inc. 1968



CONCERTONE MODEL 700

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
			Concertone PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
	PRI.	SEC.						
T3	58/CT	8						

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA			NOTES
				Concertone PART No.	JENSEN PART No.	QUAM PART No.	
SP1	3" X 5 1/2"	PM	8 ohms	04-0046	P3X5X8	35A05Z8	

TAPE HEADS

ITEM NO.	MEASURED			Concertone PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	40mh	19Vrms	50KC	04-0061 (1)	3002 (2)	2-Track Monaural Record/Play 2-Track Monaural Erase (1) Includes mounting bracket
M2	1.2mh	30Vrms	50KC	04-0062 (1)		

(2) Cement to original mounting.

BATTERIES

ITEM No.	VOLTAGE	PART No.	REPLACEMENT DATA			NOTES
			BURGESS	EVEREADY	MALLORY	
M3	9 Volts Total		230 or AL-2	1050 or E95	M13R or MN1300	6 required

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M4	Pilot Lamp	03-0025	Indicator
M5	Motor		Tape Transport
M6	Meter		Record and Battery Indicator
S1	Switch		Record/Play
S2	Switch		Speed Selector
S3	Switch		Function Selector
S4	Switch	Fast Forward	
S5	Switch	AC/Battery Selector	
S6	Switch	Speaker On-Off	
	Printed Circuit Board	08-0037	Amplifier Board, Complete Assembly
	Printed Circuit Board	08-0038	Oscillator Board, Complete Assembly
	Printed Circuit Board	08-0039	Power Supply Board, Complete Assembly

CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

ITEM	PART No.	ITEM	PART No.
Cabinet, Complete Assembly	07-0144	Knob, Record	07-0068
Head Cover	07-0142	Knob, Function	07-0069

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)



PHOTOFACT[®] with

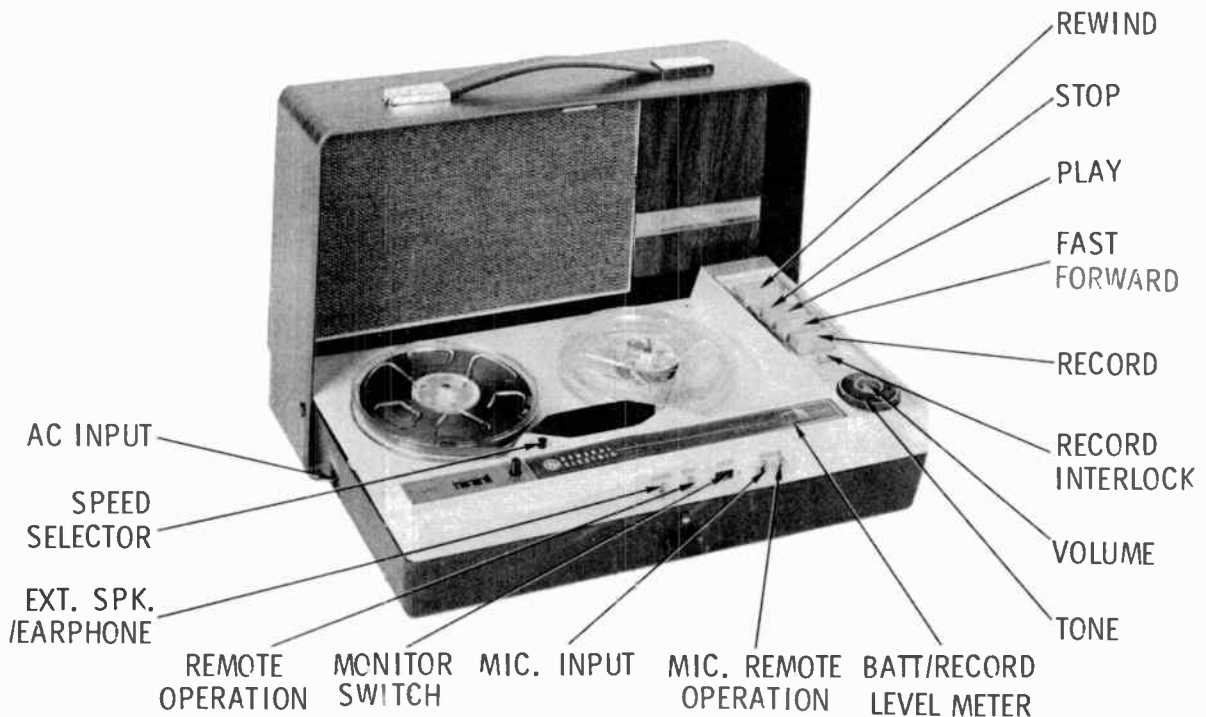
CIRCUITRACE[®]

TRADE NAME: General Electric Model M8040A
 SUPPLIER: For Current Address, See Annual Index
 TYPE SET: 2-Speed, 2-Track Monaural Recorder
 POWER SUPPLY: 12 Volts DC or 110 - 120 Volts AC,
 60 Cycles
 RATING: 4 Watts, 45ma @ 117Volts AC (with Motor)

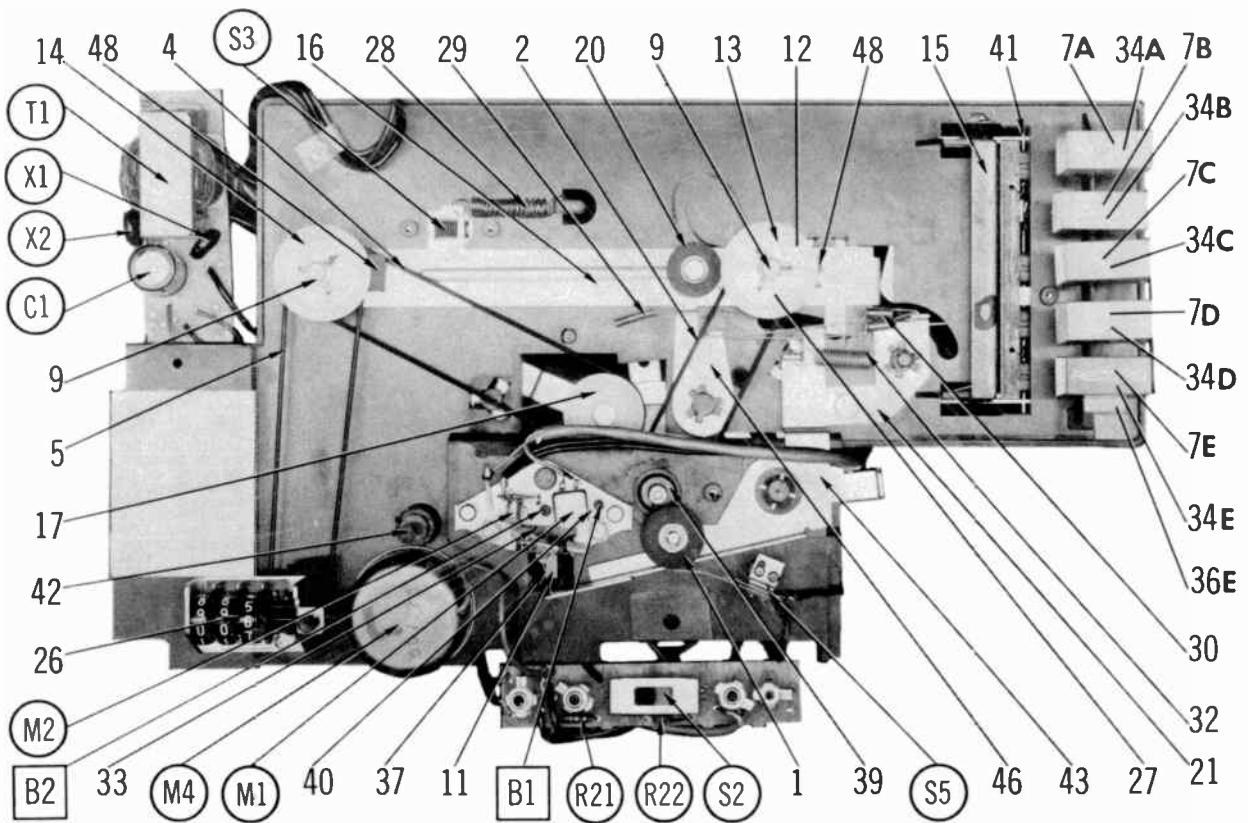
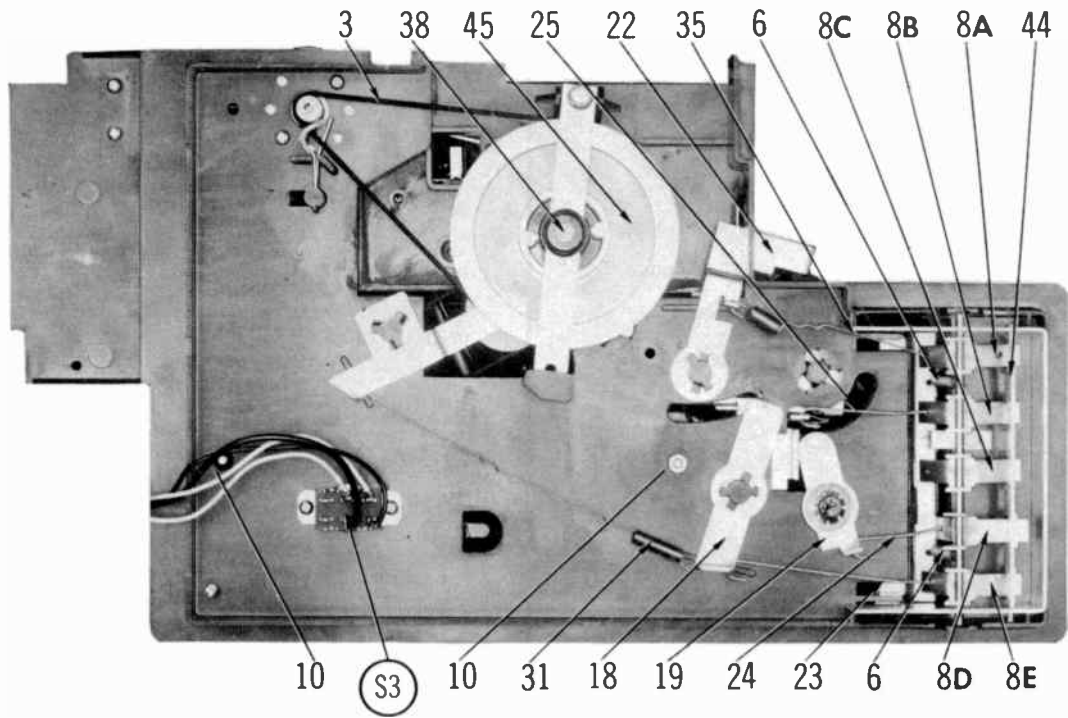
This unit is a two-track monaural recorder having two speeds: 1 7/8 and 3 3/4 ips.

Jacks are provided for microphone, remote operation, and earphone.

Power is supplied by eight, 1 1/2-volt "D" cells or 110 - 120 volts AC, 60 cycles.



GENERAL ELECTRIC MODEL M8040A



OPERATING INSTRUCTIONS

Record

1. Press Stop button, thread the tape, select the speed, and move Monitor switch to Off.
2. Connect the microphone, move the remote switch on microphone to the on position, press and hold Record Interlock, and press Record button.
3. Set the recording level with Volume control and record.

Play

1. Repeat step 1 of "Record", press Play button, and adjust Volume and Tone controls as desired.

Monitor

1. Move Monitor switch to On and separate the speaker and microphone to monitor the recording source.

Remote Operation

1. If remote operation other than with switch on the microphone is desired, connect an S. P. S. T. switch and a suitable cable to Mic Remote Operation jack.

DISASSEMBLY

1. Remove the top cover and speaker by spreading the top cover near the hinge points and removing two knobs.
2. Remove two Phillips screws from the rear of deck. (Not used in early production models.)
3. Insert a screwdriver between the deck cover and the cabinet bottom at each catch point along the sides and back, and pry laterally to release the catch tabs from the cabinet bottom.
4. Remove the nuts from four jacks and tilt the deck cover forward and remove deck cover.
5. Remove the Phillips screw near the take-up spindle and the retaining button from the fishpaper at the left of chassis.
6. Slide the AC jack from the retaining tabs, lift the mechanism slightly and slide the connector board from the retaining posts.
7. Remove the mechanism and chassis assembly.

SEQUENCE OF OPERATION

Play

Pressing the Play button causes Arm (7C) to pivot Lever (8C), raising Plate (15). Plate (15) locks Lever (8C) and releases Lever (8D) to release Link (24), releasing Lever (19). Lever (19) releases Plate (16), pulled by Spring (28), to move Pads (48).

Plate (16) also actuates Switch (S3) and releases Arm (43), pulled by Spring (32), to move Pinchwheel (1) against the capstan. Arm (43) also releases Link (37) to allow Bracket (11), pulled by Spring (33), to press the pads against Heads (M1) and (M2).

The motor, through Belt (3), drives Flywheel (45). Flywheel (45), through Belt (2), Hub (12), and Washer (27), drives Hub (13).

Record

The Record sequence is the same as "Play" except Arm (7E) pivots Lever (8A) to raise Plate (15). Lever (8A) also pulls Link (35) to pivot Lever (22), actuating Switch (S1).

Fast Forward

Pressing the Fast Forward button causes Arm (7D) to pivot Lever (8B), raising Plate (15). Plate (15) locks Lever (8B) and releases Lever (8D) to allow Link (24) to release Lever (19). Lever (19) allows

Plate (16), pulled by Spring (28), to move Pads (48) and to actuate Switch (S3).

Lever (8B) pulls Link (25) to pivot Lever (21), locking Arm (43) and pulling Spring (30). Spring (30) pivots Arm (46) to press Pulley (20) against Hubs (12) and (13).

The motor, through Belt (3), Flywheel (45), Belt (2), Hub (12), and Pulley (20), drives Hub (13).

Rewind

Pressing the Rewind button causes Arm (7A) to pivot Lever (8E), raising Plate (15) to allow Lever (8D) to release Link (24). Link (24) allows Lever (19) to release Plate (16), moving Pads (48) and actuating Switch (S3).

Lever (7E) also pulls Link (23) to pivot Lever (18), pulling Spring (31) to pivot Lever (47). Lever (47) causes Pulley (17) to press Belt (4) against Flywheel (45).

The motor, through Belt (3), Flywheel (45), and Belt (4), drives Hub (14). Hub (14), through Belt (5), drives Counter (26).

Stop

Pressing the Stop button reverses the sequence of any function.

GENERAL ELECTRIC MODEL M8040A

CLEANING

LUBRICATING

HEAD DEMAGNETIZING

Refer to "General Servicing Information" on page 4.

ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 3 3/4 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 3 3/4 ips with a spring scale applied to a point on an empty tape reel 2 inches from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 1/2 ounce. Controlled by tension of Washer (27).
Fast Forward Take-up Torque	Nominal value 1 1/2 ounces. Controlled by tension of Spring (30).
Rewind Torque	Nominal value 3 1/4 ounces. Controlled by tension of Spring (31) and condition of Belt (4).
Supply Reel Drag	Nominal value 3/8 ounce. Controlled by drag of Belts (4) and (5).
Take-up Reel Drag	Nominal value 3/8 ounce. Controlled by Play Take-up Torque.
Pinchwheel Pressure	Nominal value 12 ounces. Controlled by tension of Spring (32).
Braking Torque	Measured in Stop. Nominal value 1 ounce measured counterclockwise on supply reel and clockwise on take-up reel. Controlled by condition of Pads (48) and angle of pad support tabs on Plate (16).
Pressure Pad Pressure	Nominal value 1 ounce. Controlled by tension of Spring (33).
Erase Head Height	No adjustment provided.
Erase Head Azimuth	No adjustment provided.
Record/Play Head Height	No adjustment provided.
Record/Play Head Azimuth	Play an azimuth test tape, connect an Audio VTVM across output, and adjust B1 and B2 equally in opposite directions for maximum output.
Erase Current	Nominal value 3.5ma (2.35VDC). No adjustment provided.
Record Level Indicator Calibration	Apply a 1000-cycle tone to the mic input. Adjust Volume Control for .12V rms across Head (M1). Normal peak should be indicated. No adjustment provided.

TROUBLE CHART

IMPORTANT: Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Insufficient tension being applied by Washer (27). 2. Belt (2) dirty or worn.
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> 1. Spring (30) applying inadequate tension. 2. Pulley (20) binding, dirty, or worn.

TROUBLE CHART (Continued)

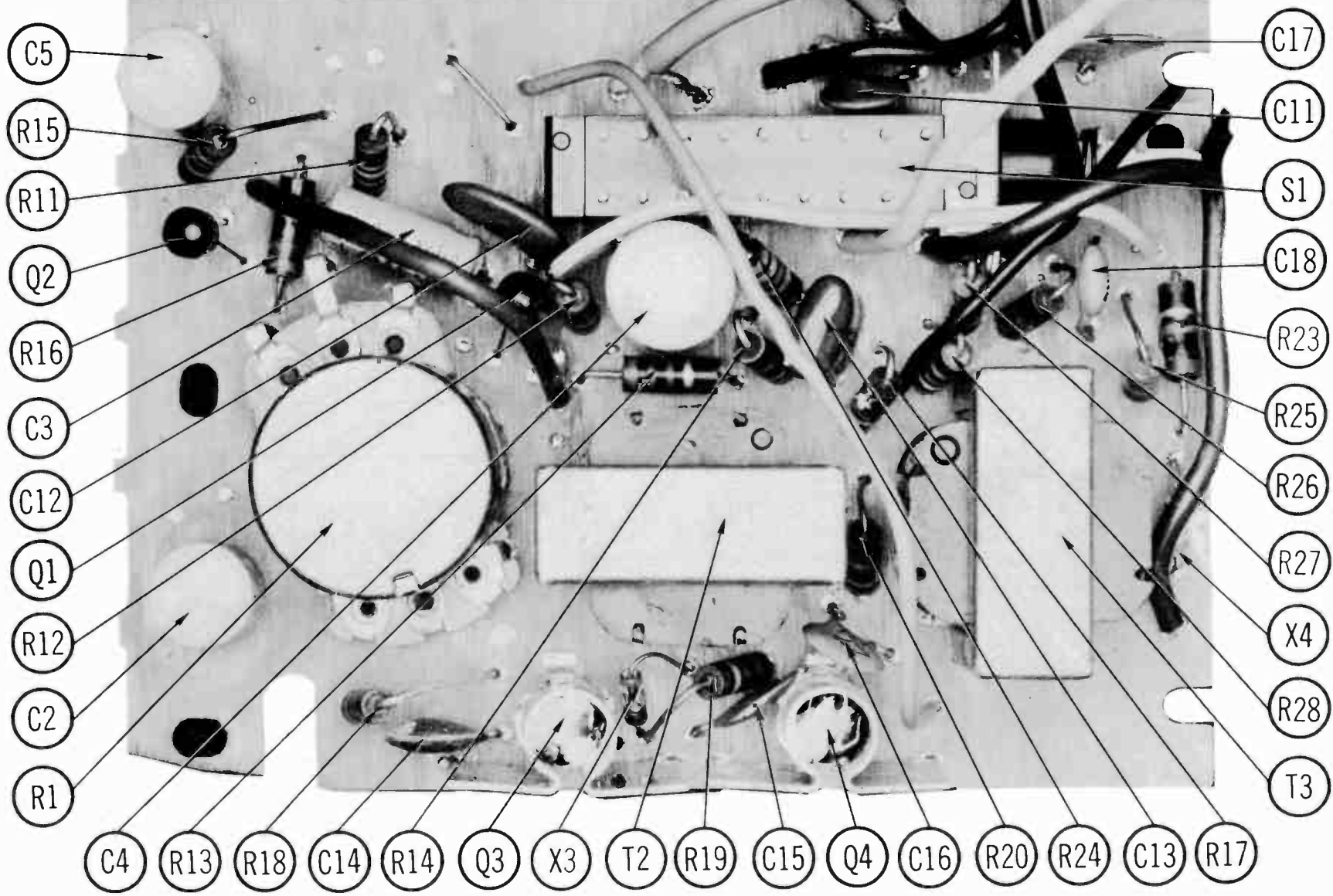
SYMPTOM	REMARKS
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Belt (4) dirty or worn. 2. Spring (31) applying inadequate tension.
Reels do not stop immediately when Stop button is pressed.	<ol style="list-style-type: none"> 1. Brake Pads (48) worn, dirty, or misadjusted.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Belt (3) worn, dirty, or broken. 2. Motor defective or not being supplied with power. 3. Bearings (38) and (39) binding.
Tape rides up and down between capstan and pressure roller.	<ol style="list-style-type: none"> 1. Excessive take-up torque. 2. Capstan bent. 3. Pinchwheel (1) worn.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Belt (2) dirty or worn. 2. Motor defective. 3. Excessive take-up torque. 4. Pinchwheel (1) dirty or worn. 5. Pinchwheel pressure inadequate.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Head (M1) dirty, misaligned, or defective. 2. Amplifier circuits defective.
Erase weak or inoperative.	<ol style="list-style-type: none"> 1. Head (M2) dirty or defective. 2. Head (M2) being supplied with inadequate bias.

GENERAL ELECTRIC MODEL M8040A

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	RT1236	Pinchwheel (Pressure Roller)	25	RT2512	Fast Forward Link
2	RT2507	Hub Belt	26	RT2513	Digital Counter
3	RT2448	Flywheel Drive Belt	27	RT2582	Drive Hub Spring Washer
4	RT2508	Rewind Drive Belt	28	RT2583	Brake Plate Spring
5*	RT2509*	Counter Drive Belt *	29	RT2584	Fast Forward Release Spring
6	RT1214	Latch Plate Spring(2 used)	30	RT2585	Fast Forward Spring
7	RT1218	Push-button Switch Arm (5 used)	31	RT2586	Rewind Spring
8	RT1219	Push-button Switch Lever (5 used)	32	RT2587	Pinchwheel Spring
9	RT1224	Hub Spindle (2 used)	33	RT2588	Tape-wiper Spring
10	RT1225	Hub Spindle Bushing (2 used)	34	RT2589	Switching Spring
11	RT1717	Head Pad Bracket	35	RT2590	Record Link
12	RT2463	Lower Drive Hub	36	RT2591	Record Interlock Spring
13	RT2464	Upper Drive Hub	37	RT2646	Tape-wiper Link
14	RT2465	Rewind Hub	38	RT9044	Flywheel Lower Bearing
15	RT2494	Latch Plate	39	RT9048	Flywheel Upper Bearing
16	RT2499	Brake Plate	40	RT9160	Head Rocker
17	RT2500	Rewind Pulley	41	RT9319	Pivot Shaft
18	RT2501	Rewind Lever	42	RT9320	Speed Change Shaft
19	RT2501	Stop Lever	43	RT9321	Pinchwheel Arm
20	RT2503	Fast Forward Pulley	44	RT9322	Slide Bar
21	RT2504	Fast Forward Lever	45		Flywheel
22	RT2505	Record Lever	46		Fast Forward Arm
23	RT2510	Rewind Link	47		Rewind Pulley Lever
24	RT2511	Stop Link	48		Brake Pads

* Counter Drive Belt — WALSCO Part #1410-51.



PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 13 Colors 8524 (Stranded) Available in 13 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Unshielded) 8429 (Two Conductor - Shielded) 8419 (Three Conductor - Shielded)

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	
Q1	RS-7408	AF Amp.	DS-66	GE-10	TR-21	SK-3020	NPN
Q2	RS-7410	Driver	DS-66	GE-10	TR-21	SK-3020	NPN
Q3	RS-7824	Output	DS-66	GE-10	TR-21	SK-3020	NPN
Q4	RS-7824	Output	DS-66	GE-10	TR-21	SK-3020	NPN

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MEASURED CURRENT	ORIGINAL Part or Type No.	RECTIFIERS & DIODES		RECTIFIERS	
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SARKES TARZIAN PART No.
X1	.08A	RS6471	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X2	.08A	RS6471	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X3		RT1106	1N34AS	1N34A		
X4		RS1811	1N34AS	1N34A		

SUBSTITUTION CHART

GROUP	Q1	Q2	Q3 & Q4	RT7	X3
1	RS7407 or RS7515	RS7411 or RS7519	RS7623	3000Ω	RT1106
2	RS7407 or RS7515	RS7411 or RS7519	RS7623	1800Ω	RT2447
3	RS7406 or RS7518	RS7410 or RS7518	RS7624	3600Ω	RT1106
4	RS7406 or RS7518	RS7410 or RS7518	RS7624	2200Ω	RT2447
5	RS7409 or RS7517	RS7409 or RS7517	RS7625	4300Ω	RT1106
6	RS7409 or RS7517	RS7409 or RS7517	RS7625	2400Ω	RT2447
7	RS7410 or RS7518	RS7408 or RS7518	RS7626	5100Ω	RT1106
8	RS7410 or RS7518	RS7408 or RS7518	RS7626	2700Ω	RT2447
9	RS7411 or RS7519	RS7407 or RS7515	RS7627	8200Ω	RT1106
10	RS7411 or RS7519	RS7407 or RS7515	RS7627	3300Ω	RT2447
11	RS7412 or RS7520	RS7406 or RS7514	RS7628	8200Ω	RT1106
12	RS7412 or RS7520	RS7406 or RS7514	RS7628	3000Ω	RT2447
X3	Color Key: RT1106 - Red, RT2447 - Orange				

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESIST-ANCE	REPLACEMENT DATA					
			G. E. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1A B	Tone Volume	50K 50K	RT2439	F2-50K ①, R2-50K, FFS101 ②, RFS109 ③, AK-38			† QJ-2524R	

† "CONCENTRKIT" Equivalent: K-8 Kit with Base Elements and Shafts: B13-123 ①, P22-027 ② (Panel)
B13-123, R16-106 ③ (Rear) R5

① Assemble Elements 180° apart. ② File flat to duplicate original.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		G. E. PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	500 15V	RS4884	BCD15500	EA15-500	BR500-15	QT1-30	MTV500DN15	TL-1166
C2	100 10V	RS4885	BCD10100	EP15-100	NLW100-12	MT1-19	MTV100CD10	TE-1135
C3	2 15V (25V)	RS2615	CRE451A	EA15-2	NLW2-50	MT1-1	MTA2D50	TE-1149
C4	250 10V	RS3403	BCD12250	EA15-250	NLW250-12	MT1-25	MTV250C P10	TE-1138
C5	50 10V	RS3967	BCD10050	EP15-50	NLW50-10	MT1-18	MTV50C B15	TE-1133

CAPACITORS

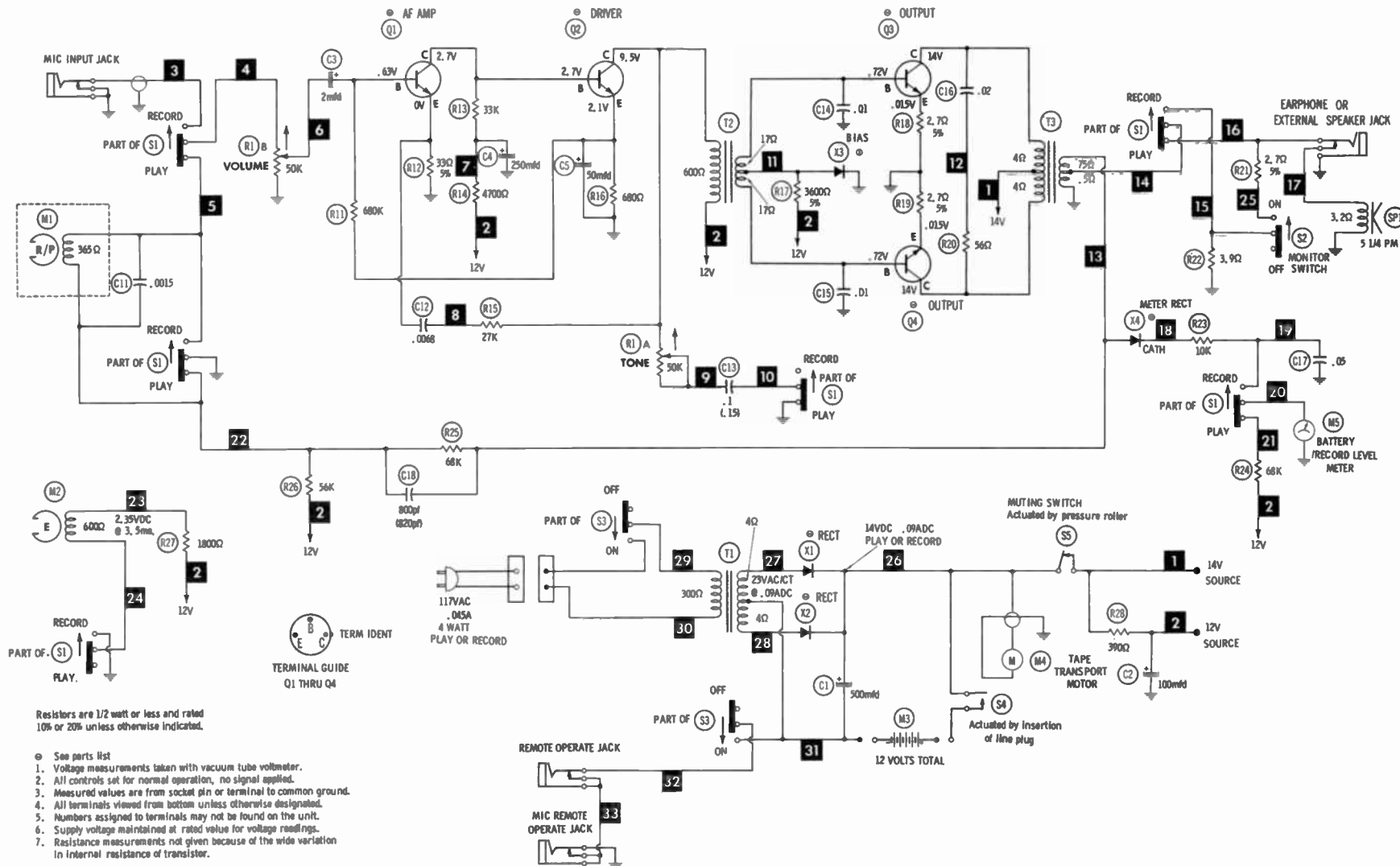
ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCOC PART No.	MALLORY PART No.	SPRAGUE PART No.
C11	.0015		GPD X5F152K	DD-152		CCD-152	GP215	10TS-D15
C12	.0068		GPD X5R682K	DD-682	BYX601Z U682P	CCD-682	GP268	10TS-D68
C13	.1 50V	(.15) †	DBE2P1		DMF2P1	2DP-3-104	PVC201	2PS-P10
C14	.01 25V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C15	.01 25V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C16	.02 50V		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C17	.05 50V		TTP-05	CK-503	HCZ3ROXR503P	CCD-503	TA150	TG-S50
C18	800	(820) †	BPD-0008	DD-801		CCD-801		10TS-T80

† Alternate Value

(CONTINUED ON PAGE 44)

GENERAL ELECTRIC MODEL M8040A

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

See parts list

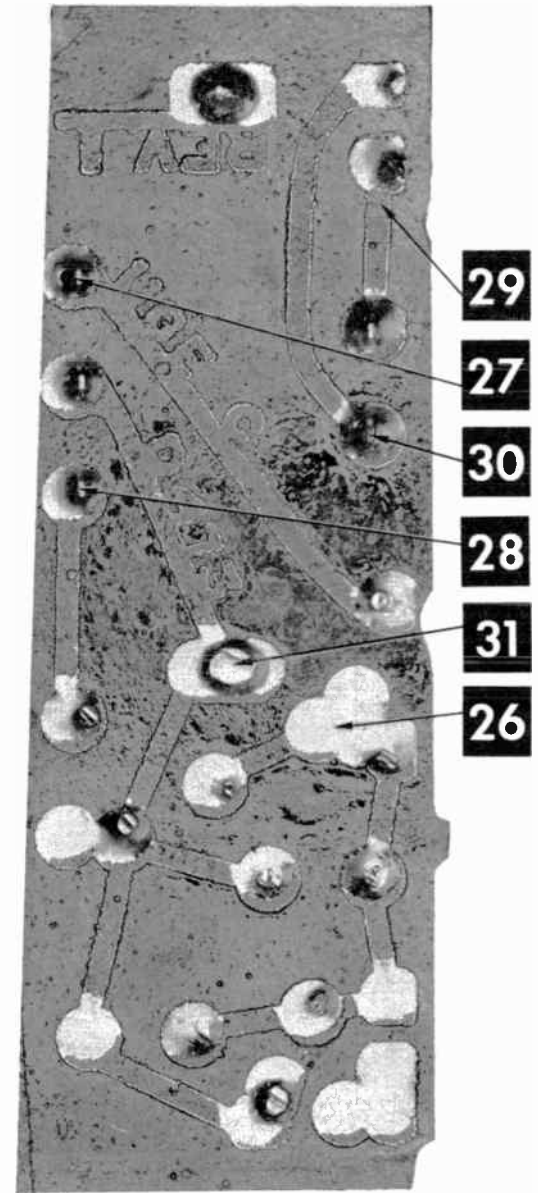
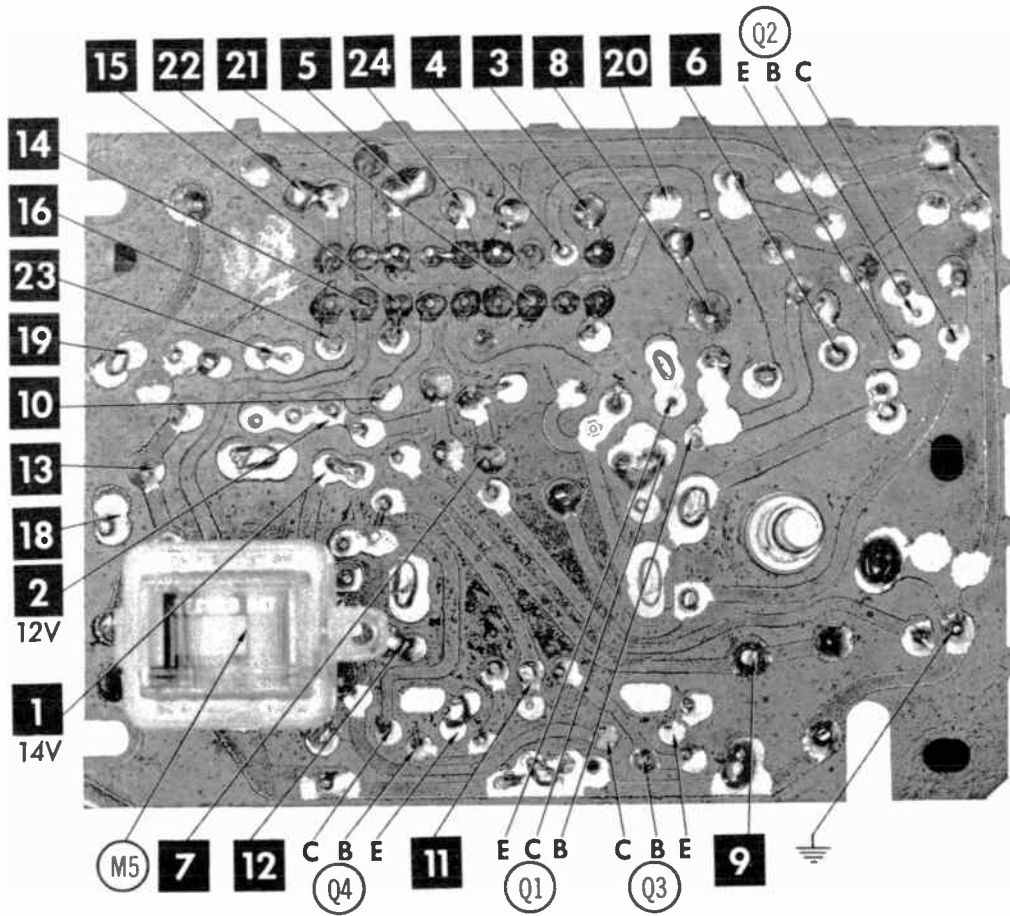
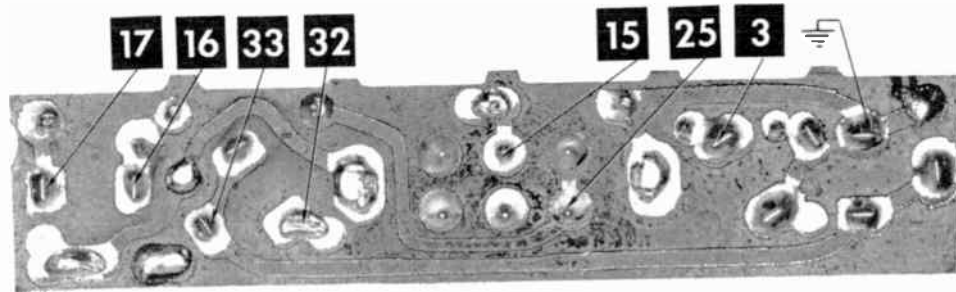
1. Voltage measurements taken with vacuum tube voltmeter.
2. All controls set for normal operation, no signal applied.
3. Measured values are from socket pin or terminal to common ground.
4. All terminals viewed from bottom unless otherwise designated.
5. Numbers assigned to terminals may not be found on the unit.
6. Supply voltage maintained at rated value for voltage readings.
7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

A PHOTOFACIT STANDARD NOTATION SCHEMATIC

with **CIRCUITRACE**

© Howard W. Sams & Co., Inc. 1968

GENERAL ELECTRIC MODEL M8040A



A Howard W. Sams **CIRCUITRACE** Photo

GENERAL ELECTRIC MODEL M8040A

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
				G. E. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
	PRI.	SEC. 1	SEC. 2						
T1	117VAC @ .045A	23VAC/CT @ .09ADC		RT2443					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
				G. E. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
	PRI.	SEC. 1	SEC. 2						
T2	2	1/CT		RT2441					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
			G. E. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
	PRI.	SEC.						
T3	32Ω/CT	144Ω Tap @ 8Ω	RT2442					

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA			NOTES
		G. E. PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5 1/4" PM 3.2Ω	RB2141			

TAPE HEADS

ITEM NO.	MEASURED			G. E. PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	310mh			RT2518	3101②	2-Track Monaural Record/Play 2-Track Monaural Erase
M2	365mh	2.35VDC		RT1718	3600① & QK-19	

① Select polarity for best recording.

② Cement to original mounting with suitable spacers.

BATTERIES

ITEM No.	VOLTAGE	G. E. PART No.	REPLACEMENT DATA			NOTES
			BURGESS	EVEREADY	MALLORY	
M3	12 Volts Total		230 or AL2	1050 or E95	M13R or MN1300	8 Required

MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M4	Motor	RT2515	Tape Transport Record Level and Battery Indicator Record/Play Monitor On/Off Power AC/Battery Muting Complete Assembly
M5	Meter	RT2424	
S1	Switch	RT2453	
S2	Switch	RT1162	
S3	Switch	RT2516	
S4	Switch		
S5	Switch	RT2647	
	Microphone	RT9283	
	Earphone	RS4520	

CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

ITEM	PART No.	ITEM	PART No.
Cabinet Top	RB2136	Button, Play	RT2485
Cabinet Bottom	RB2137	Button, Stop	RT2486
Speaker Grille	RB2140	Button, Record	RT2487
Storage Cover	RB2139	Button, Record Lock	RT2488
Battery Cover	RT2481	Knob, Volume	RT2489
Head Cover	RT2482	Knob, Tone	RT2490
Button, Fast Forward	RT2483	Handle	RT2496
Button, Rewind	RT2484		



PHOTOFACT[®] with

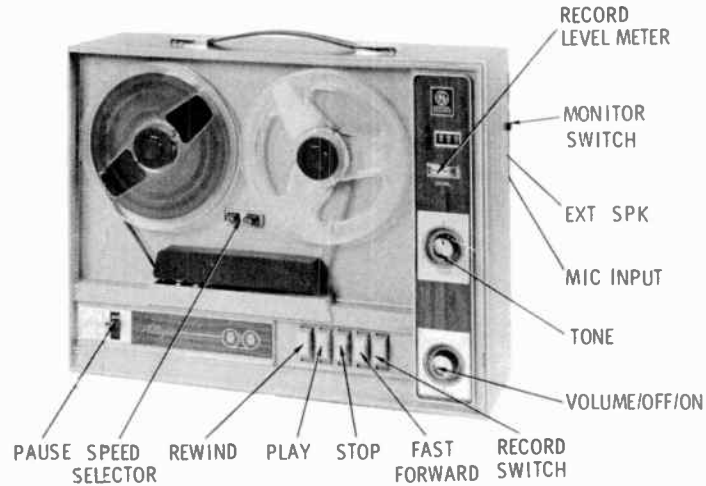
CIRCUITRACE[®]

TRADE NAME : General Electric Models M8050A, M8060A
 SUPPLIER : For Current Address, See Annual Index
 TYPE SET : 2-Speed Recorders
 POWER SUPPLY : 110-120 Volts AC, 60 Cycles
 RATING : 25 Watts, .48 Amp @ 117 VAC (With Motor)

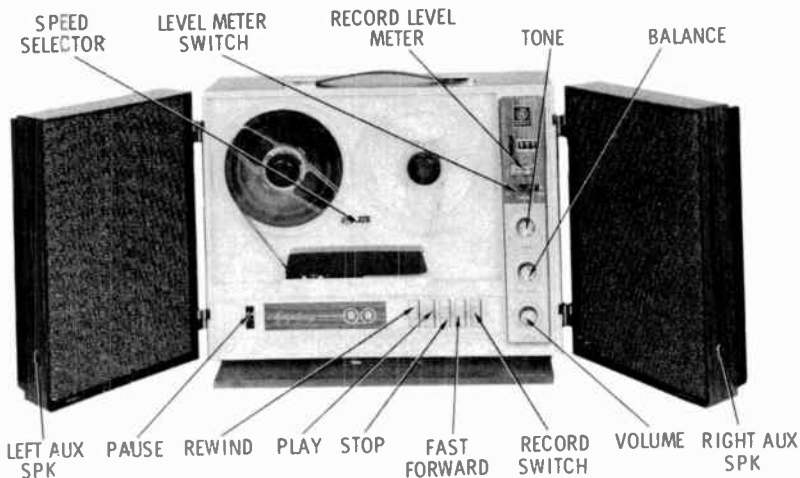
These units have two speeds: 3 3/4 and 7 1/2 ips. Model M8060A is a four-track, stereo recorder and Model M8050A is a two-track, monaural recorder.

Jacks are provided for microphone, external speaker, and earphone.

A power source of 110 - 120volts AC, 60 cycles is required.

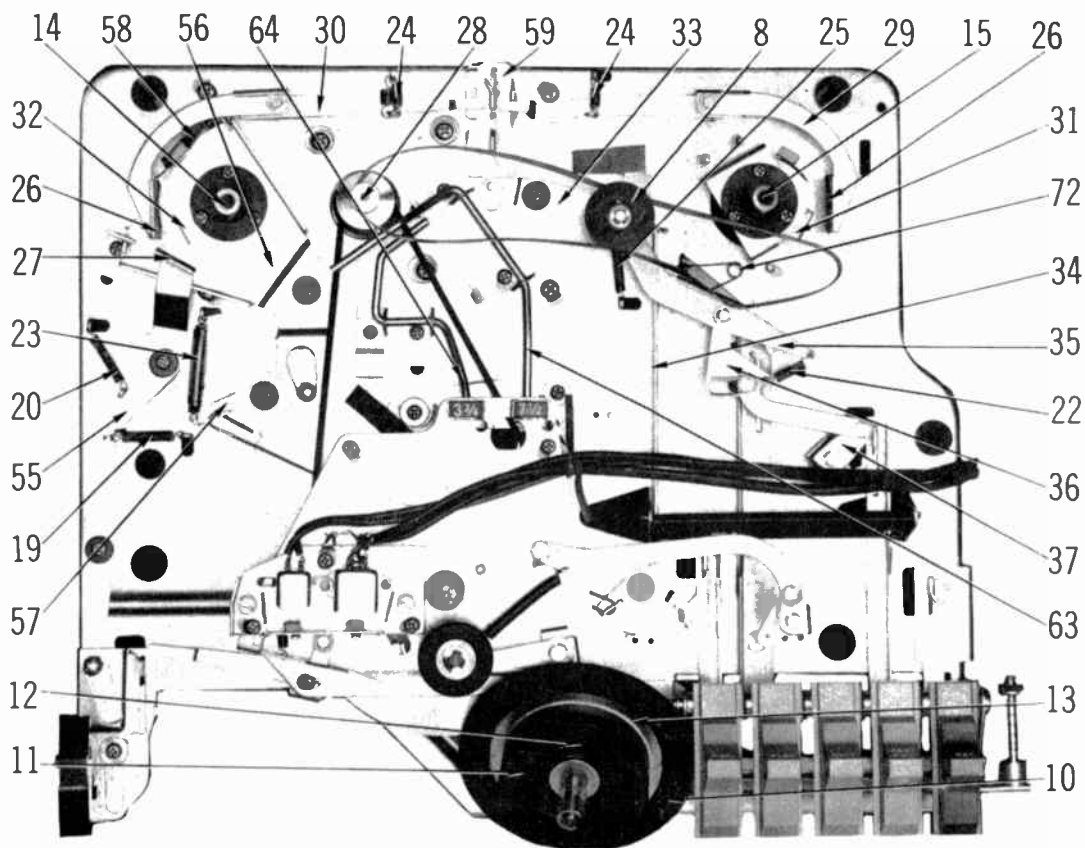
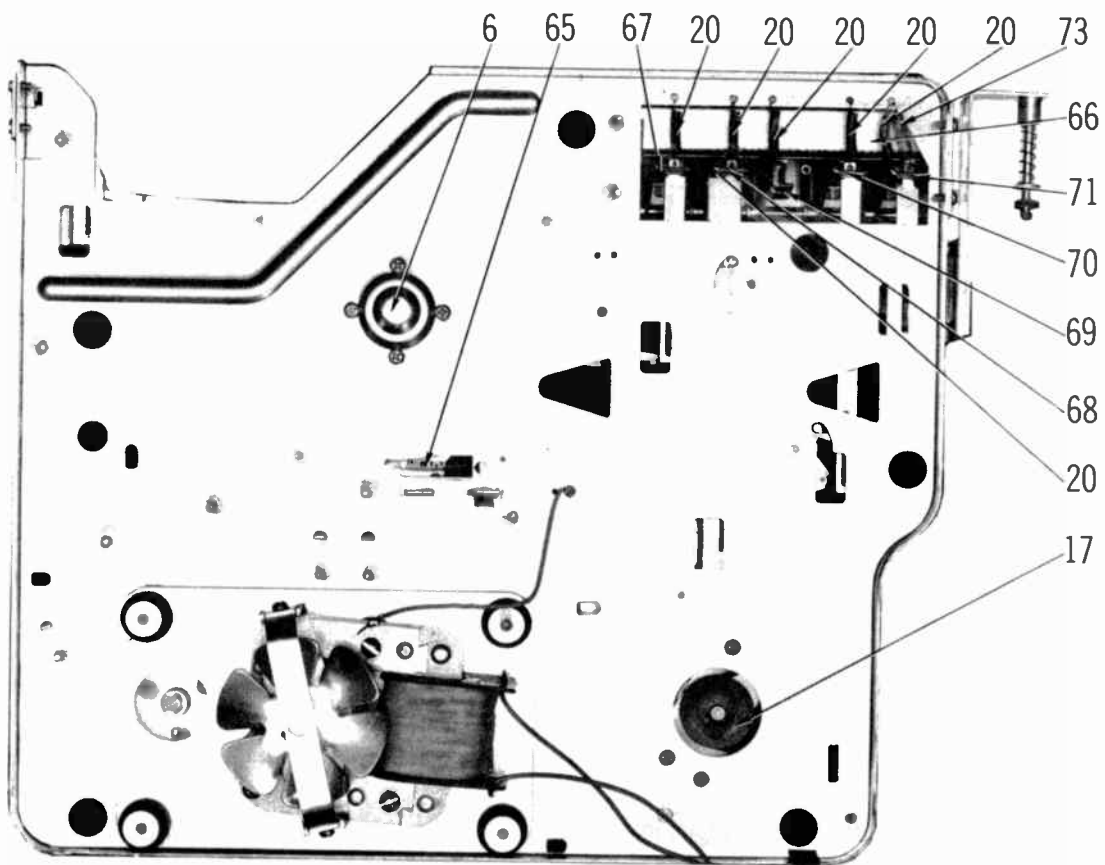


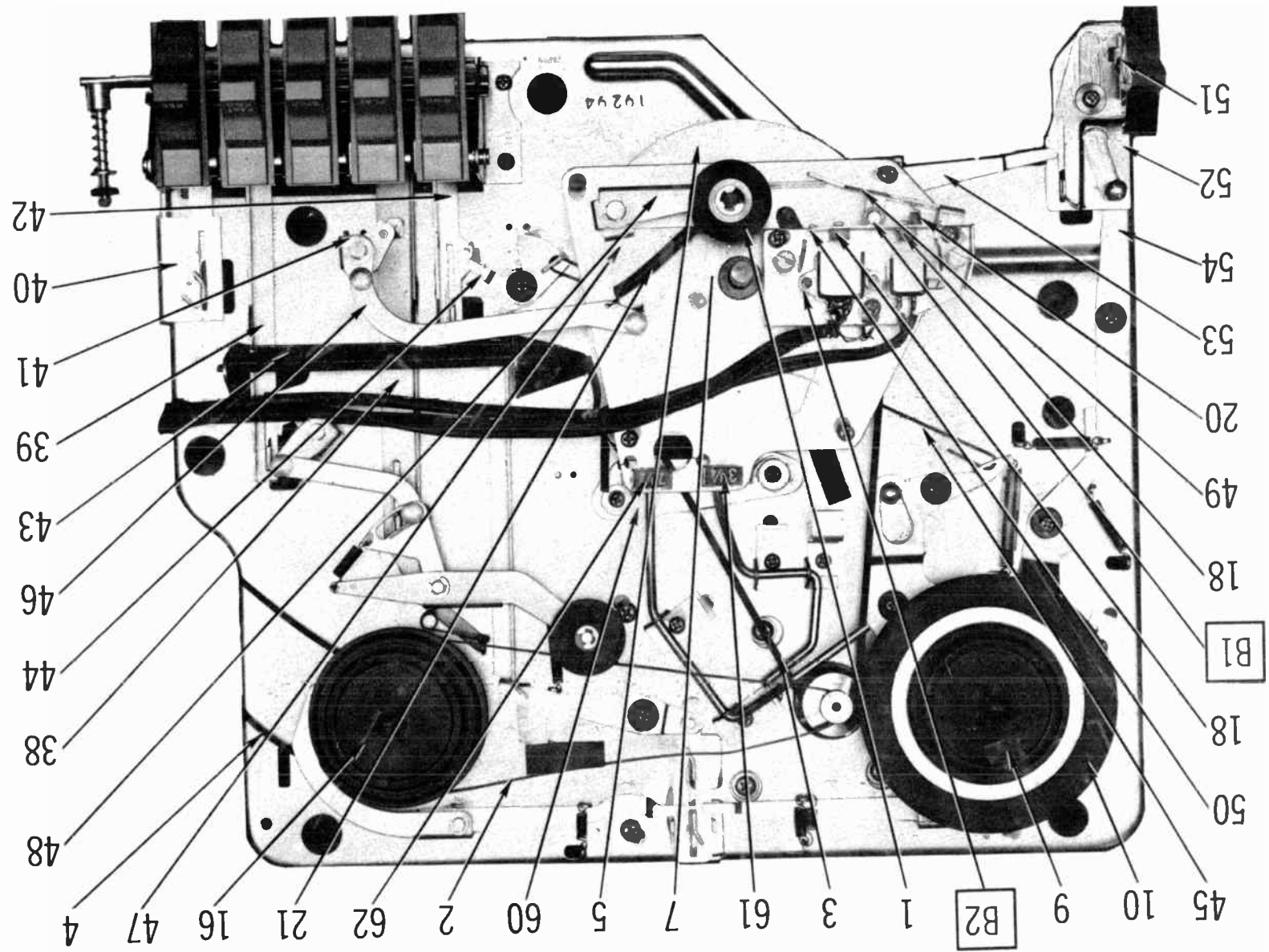
MODEL M8050A



MODEL M8060A

GENERAL ELECTRIC MODELS M8050A, M8060A





OPERATING INSTRUCTIONS

Record

1. Press Stop button, select the speed, thread the tape, and move Monitor Switch to Off.
2. (Model M8060A only) Press Pause button, connect two sources, press Play and Record buttons, move Meter Switch to Left to set left recording level with Volume control, and move Meter Switch to Right to set right recording level with Volume control. Compromise setting of Volume controls.
3. (Model M8050A only) Press Pause button, connect a source, press Play and Record buttons, and set recording level with Volume control.

4. Raise Pause button to record.

Play

1. Repeat step 1 of "Record", press Play button, and adjust controls as desired.

Monitor

1. Move Monitor Switch to On and separate microphone and speakers to monitor the source while recording.

DISASSEMBLY

1. Remove knobs, remove four Phillips screws from wells in back of cabinet, lift deck cover to remove counter belt and disconnect meter, and remove deck cover.

(Model M8060A only) Remove screw holding Meter Switch.)

2. Remove four screws from power supply panel and remove power supply board and audio board.
3. Disconnect speakers and AC cord.
4. Remove five 1/4-inch screws from deck and remove mechanism and chassis assembly.

SEQUENCE OF OPERATION

Play

Pressing the Play button pivots Lever (68), locked by Plate (66), to move Slide (38), swinging Plate (43) to move Slide (34). Slide (34) pivots Lever (33) to pull Slide (59), pivoting Arms (29) and (30) to move Shoes (26) from Reel (16) and Drum (11).

Slide (38) also pulls Spring (72) to pivot Arm (35), pressing Roller (8) against Belt (2). The motor, through Pulley (28) and Belt (2), drives Reel (16), and also, through Pulley (28) and Belt (3), drives Flywheel (5).

Slide (38) also pivots Lever (41) to pull Link (46), pulling Link (47) to pull Spring (21). Spring (21) pulls Arm (48) to press Pinchwheel (1) against the capstan. Arm (48) releases Lever (49), pulled by Spring (20), causing Bracket (50) to move Pads (18) against Heads (M1) and (M2).

Record

The Record sequence is the same as "Play" except the Record push button is also depressed to pivot Lever (71), moving Assembly (40) to actuate Switch (S1).

Fast Forward

Pressing the Fast Forward button pivots Lever (70) to push Slide (39), swinging Plate (43) to move Slide (34). Slide (34) pivots Lever (33) to pull Slide (59), pivoting Arms (29) and (30) to move Shoes (26) from Reel (16) and Drum (11).

Slide (39) also causes Lever and Link (37) to pivot Lever (36), pulling Spring (22). Spring (22) pulls

Arm (35) to press Roller (8) against Belt (2). The motor, through Pulley (28) and Belt (2), drives Reel (16).

Rewind

Pressing the Rewind button pivots Lever (67) to push Slide (42), swinging Plate (43) to move Slide (34). Slide (34) pivots Lever (33) to pull Slide (59), pivoting Arms (29) and (30) to move Shoes (26) from Reel (16) and Drum (11).

Slide (42) also pivots Lever (44) to pull Link (45), pivoting Arm (57). Arm (57) releases Plate (56), pulled by Spring (58), to press Idler (10) against Pulley (28).

The motor, through Pulley (28), Idler (10), Ring (13), and Drum (11), drives Hub (9).

Stop

Pressing the Stop button allows Springs (20), (72), (24), (25), and (21), plus (73) in Record, to reverse the "Play" sequence. Springs (20), (22), (25), (72), and (24) reverse the "Fast Forward" sequence. Springs (20), (24), (25), and (23) reverse the "Rewind" sequence.

Pause

Moving the Pause button down pivots Lever (51) to slide Plate (52), pivoting Lever (53) to move Arm (48).

Simultaneously, Plate (52) swings Lever (54) to allow Arm (55), pulled by Spring (20), to press Shoe (27) against Drum (11).

ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 7 1/2 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 7 1/2 ips with a spring scale applied to a point on an empty tape reel 2 inches from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 1 1/2 ounces. Controlled by tension of Spring (72) and condition of Belt (2).
Fast Forward Take-up Torque	Nominal value 8 ounces. Controlled by moving Spring (22) from hole to hole in Arm (35), and by condition of Belt (2).
Rewind Torque	Nominal value 8 ounces. Controlled by condition of Idler (10) and tension of Spring (58).
Supply Reel Drag	Nominal value 1/2 ounce. Controlled by tension of Plate (32).
Take-up Reel Drag	Nominal value 1/4 ounce. Controlled by tension of Plate (31).
Pressure Roller Pressure	Nominal value 1 3/4 pounds. Controlled by tension of Spring (21).
Braking Torque	Measured in Stop. Nominal value 12 ounces counterclockwise on supply reel. Nominal value 10 ounces clockwise on take-up reel. Controlled by tension of Springs (24) and condition of Shoes (26).
Pause Brake Torque	Measured in Play/Pause. Nominal value 12 ounces counterclockwise on supply reel. Controlled by condition of Shoe (27) and tension of Spring (20).
Pressure Pad Pressure	Nominal value 1 ounce measured at B1. Controlled by tension of Spring (20).
Erase Head Height	No adjustment provided.
Erase Head Azimuth	No adjustment provided.
Record/ Play Head Height	No adjustment provided.
Record/ Play Head Azimuth	Play an azimuth test tape, connect an AC VTVM across output and adjust B2 for maximum.
Erase Current	Nominal values 3ma 2.3VDC (Model M8050A) and 3.5ma 2.5VDC (Model M8060A). No adjustment.
Record Bias	Nominal values 20Vrms 2.2ma (Model M8050A), and 12.5V rms .52ma (Model M8060A) across each section of Head (M1). Controlled by the setting of the slug in L1.
Bias Oscillator	Nominal values 30KC (Model M8050A) and 40KC (Model M8060A). Dependent on Record Bias voltage.
Record Level Indicator Calibration	Disable the bias oscillator by shorting the secondary of L1. Apply a 1000-cycle tone to a mic input. Adjust Volume control for .11V rms across the appropriate section of Head (M1). Normal peak should be indicated on the Record Level Meter. No adjustment.

GENERAL ELECTRIC MODELS M8050A, M8060A

TROUBLE CHART

IMPORTANT : Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Belt (2) dirty, worn, or broken. 2. Reel (16) binding. 3. Inadequate take-up torque.
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> 1. Inadequate Fast Forward torque. 2. Belt (2) dirty or worn.
Take-up reel revolves rapidly in Play or Record.	<ol style="list-style-type: none"> 1. Excessive take-up torque.
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Idler (10) dirty or worn. 2. Ring (13) dirty or worn.
Supply reel spills tape in forward positions.	<ol style="list-style-type: none"> 1. Plate (32) supplying inadequate drag.
Take-up reel spills tape in Rewind.	<ol style="list-style-type: none"> 1. Plate (31) supplying inadequate drag.
Reels do not stop immediately when Stop button is pressed.	<ol style="list-style-type: none"> 1. Shoes (26) dirty or worn. 2. Springs (24) stretched.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Belt (2) dirty, worn, or broken. 2. Motor defective or not supplied with power. 3. Flywheel (5) binding.
Tape rides up and down between capstan and pressure roller.	<ol style="list-style-type: none"> 1. Roller (1) worn. 2. Excessive take-up torque.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Excessive take-up torque. 2. Roller (1) dirty, worn, or binding. 3. Motor defective. 4. Bearing (7) binding. 5. Hub (9) binding.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Head (M1) dirty, misaligned, or defective. 2. Amplifiers defective. 3. Pad (18) matted or worn. 4. Bias oscillator defective.
Erase weak or inoperative.	<ol style="list-style-type: none"> 1. Head (M2) dirty, defective, or not supplied with power. 2. Pad (18) matted or worn.

CLEANING

LUBRICATING

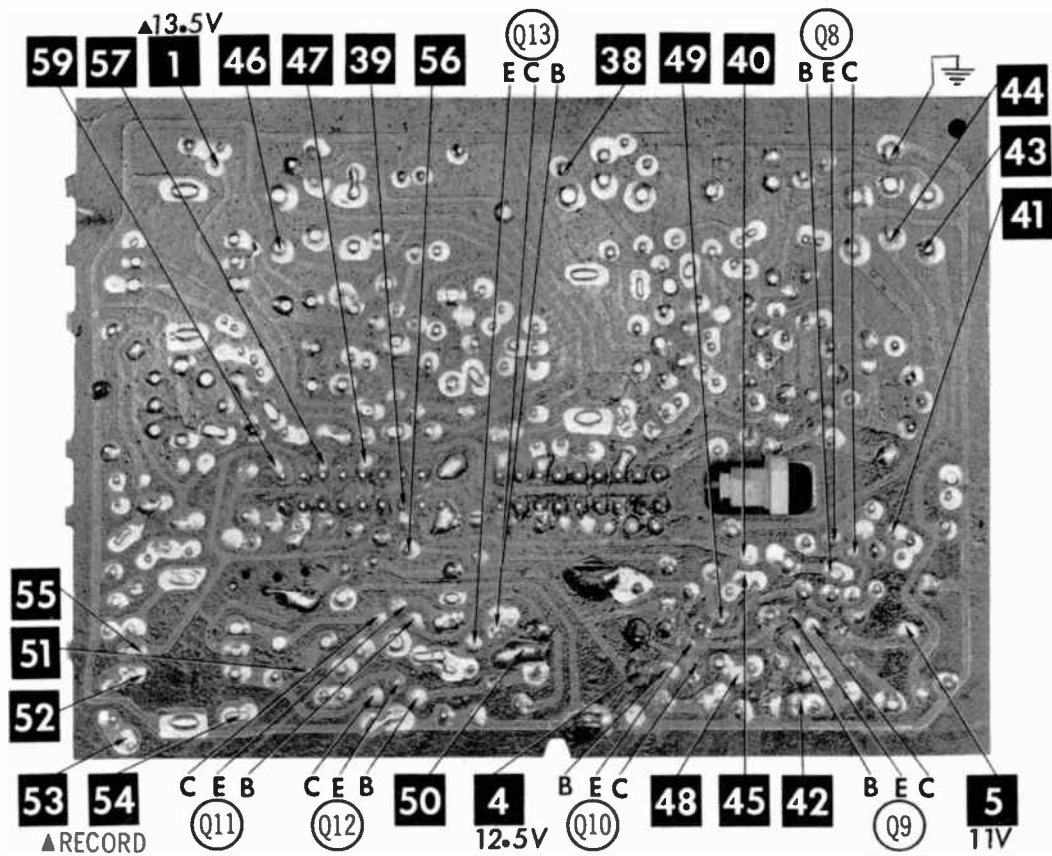
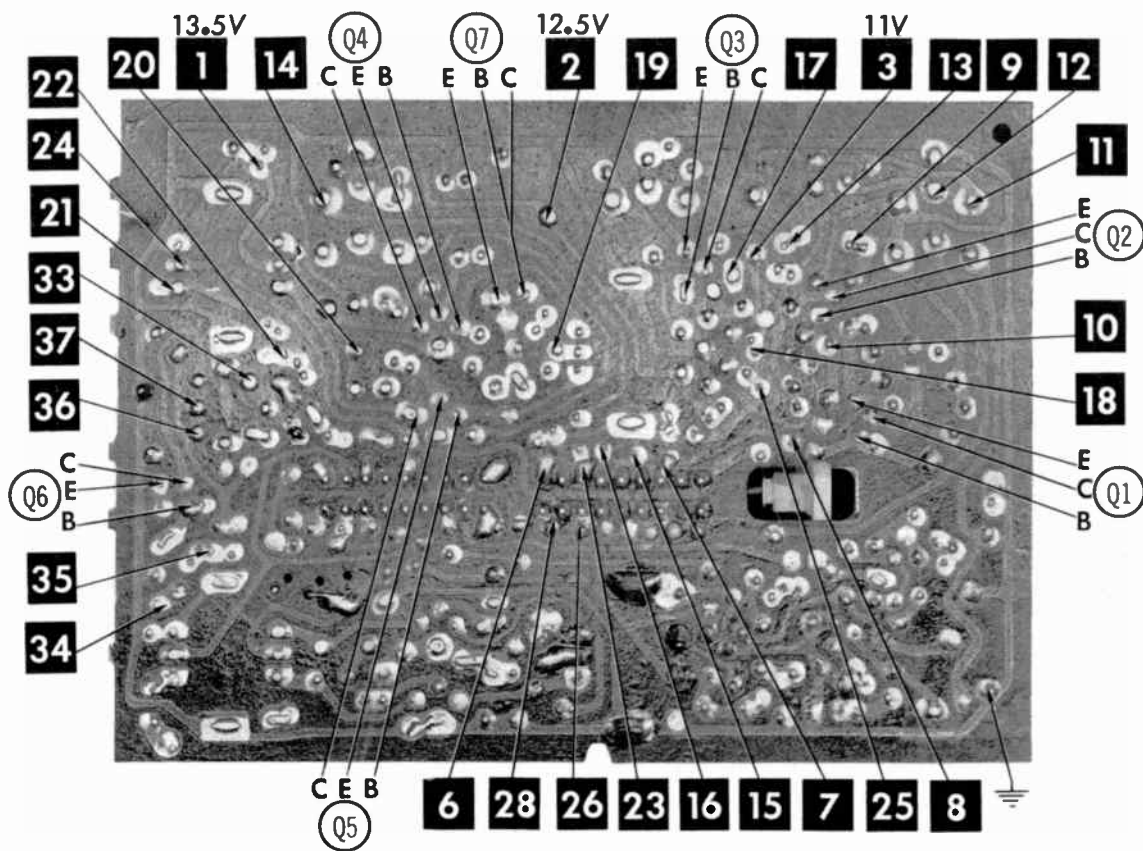
HEAD DEMAGNETIZING

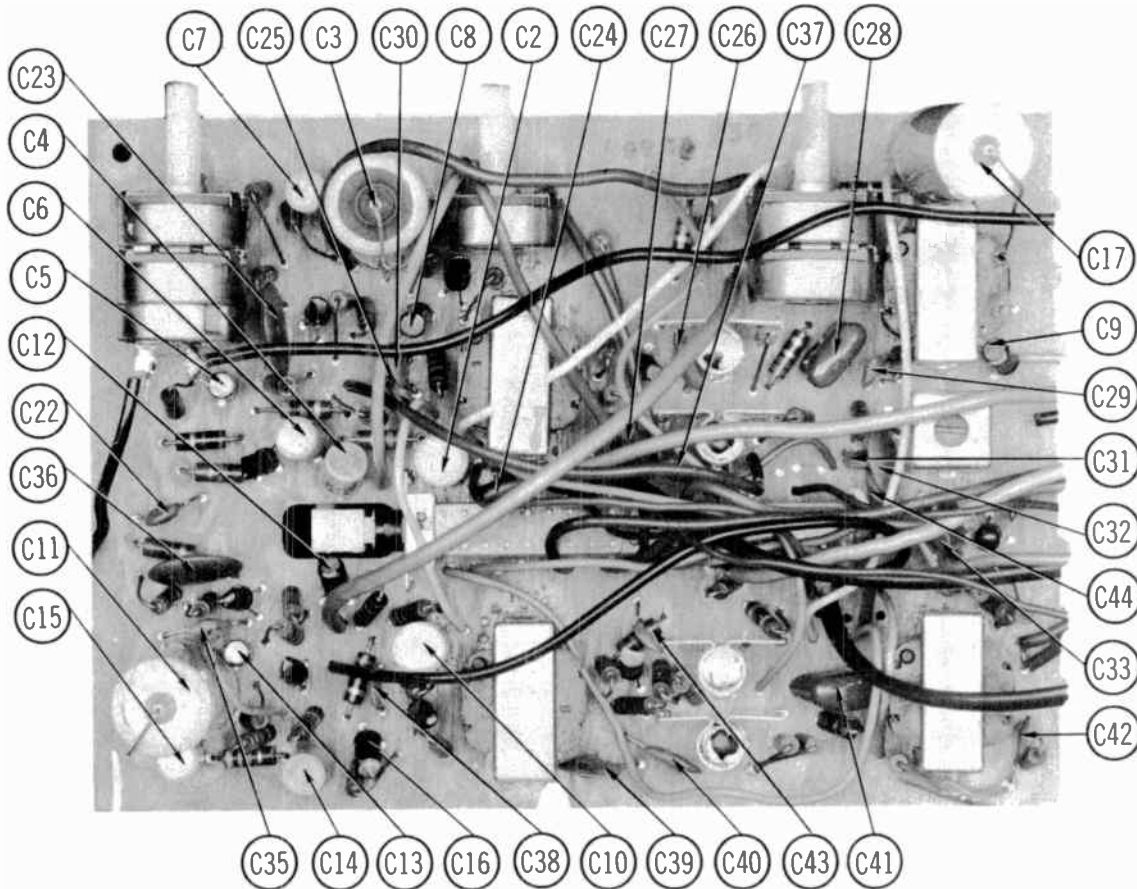
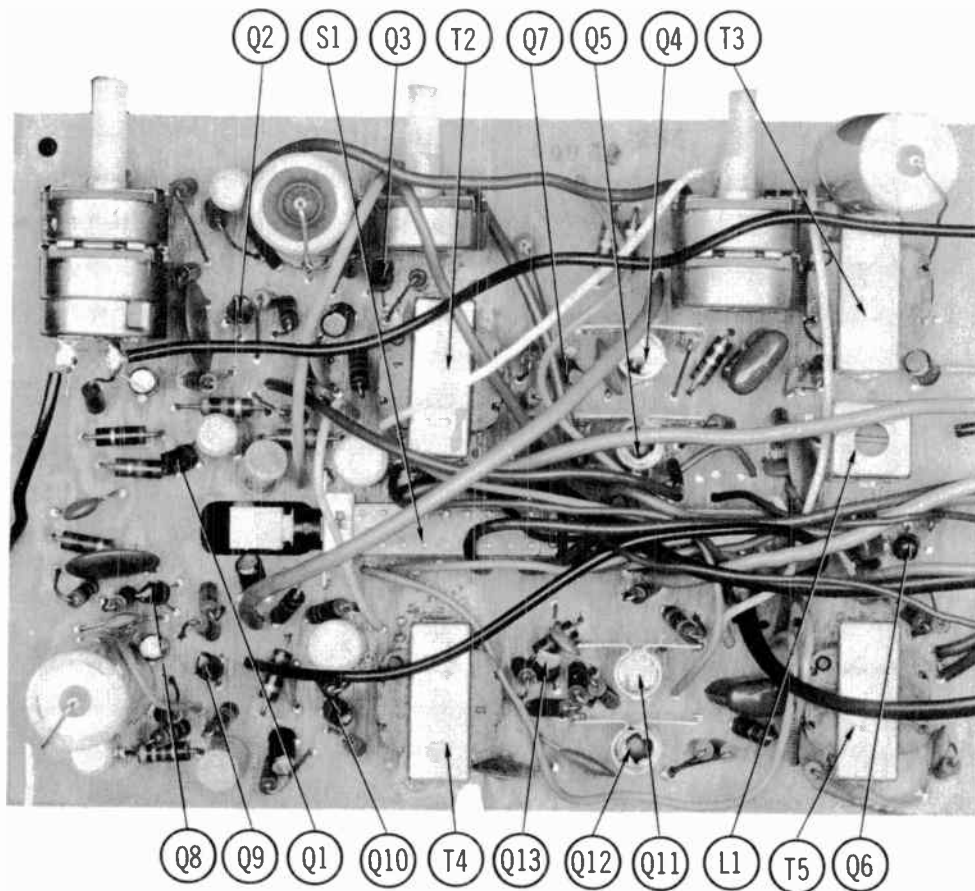
Refer to "General Servicing Information" on page 4.

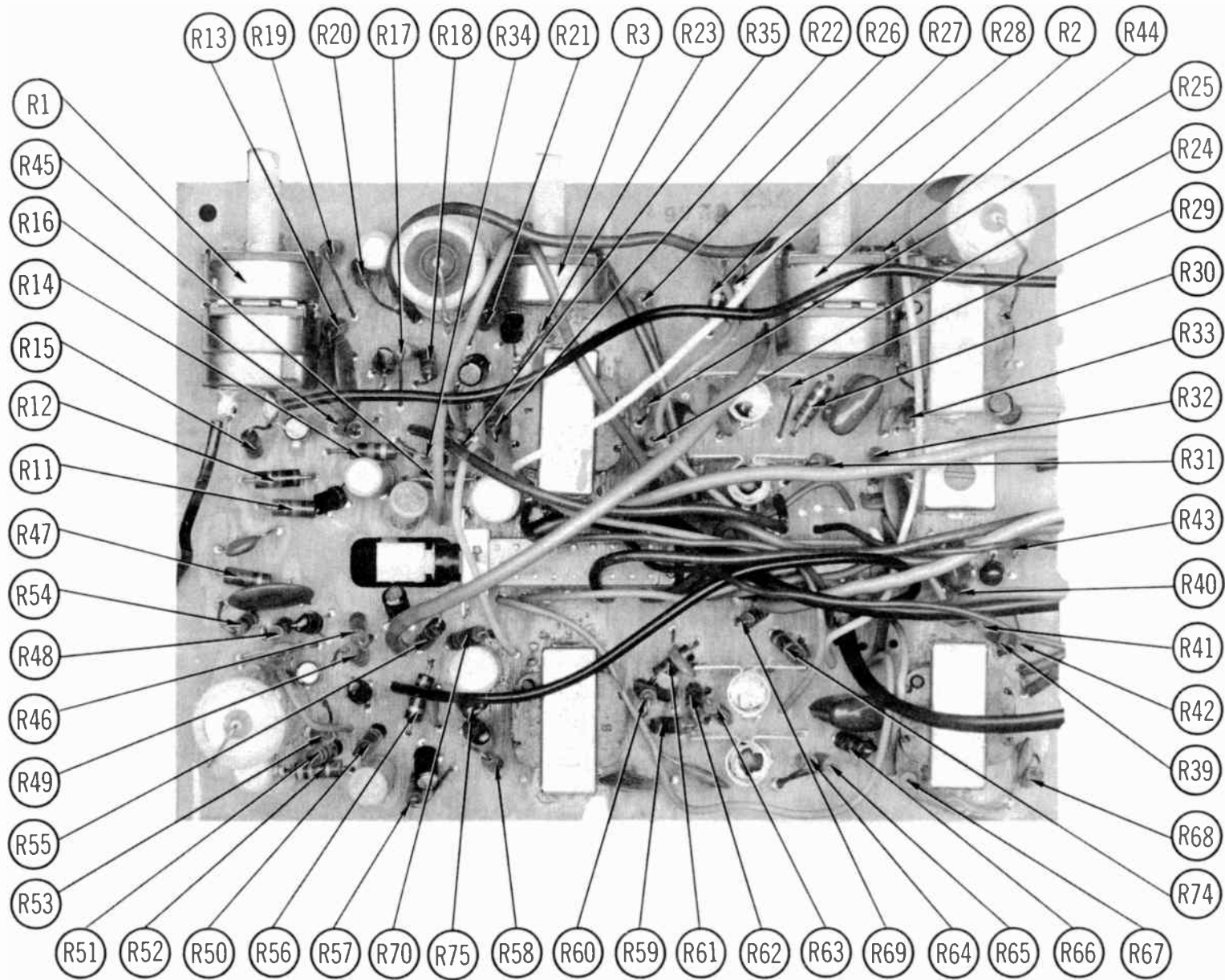
MECHANICAL PARTS LIST

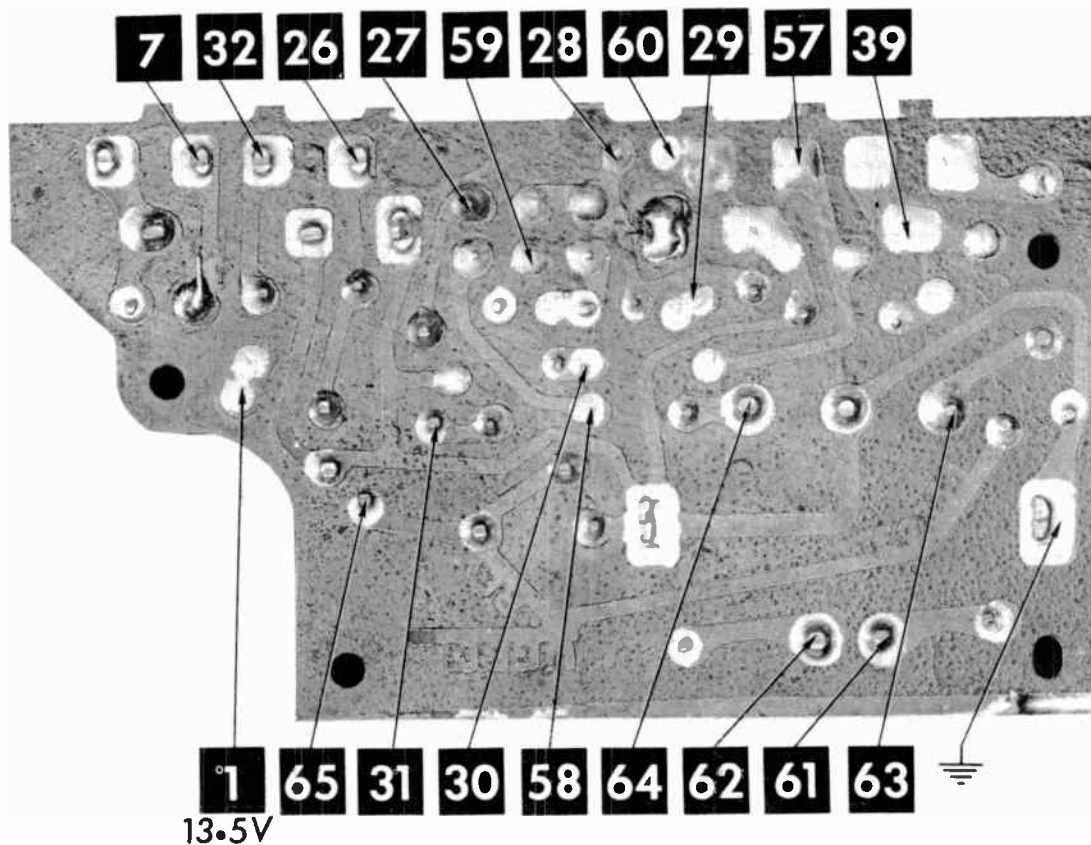
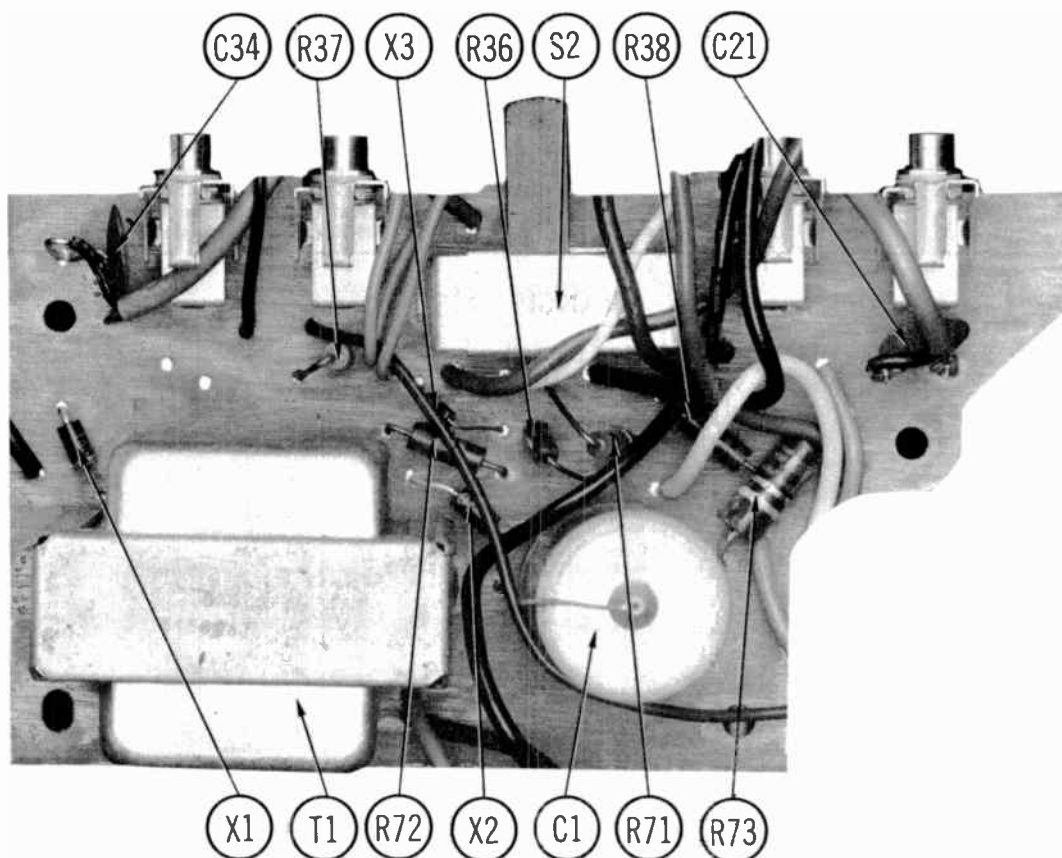
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	RT2605	Pinchwheel (Pressure Roller)	37		Fast Forward Transfer Lever and Link
2	RT2621	Cloth Belt	38		Play Slide
3	RT2622	Main Rubber Belt	39		Fast Forward Slide
4		Counter Belt	40		Record Slide Assembly
5	RT2602	Flywheel	41		Pinchwheel Transfer Lever
6	RT2603	Steel Ball	42		Rewind Slide
7	RT2604	Flywheel Metal (Bearing)	43		Brake Transfer Plate
8	RT2606	Tension Roller	44		Rewind Transfer Lever
9	RT2607	Supply Reel Hub	45		Rewind Link
10	RT2608	Clutch Idler	46		Pinchwheel Long Link
11	RT2609	Reel Hub Drum	47		Pinchwheel Short Link
12	RT2610	Reel Hub Spring	48		Pinchwheel Arm
13	RT2611	Clutch Ring	49		Pressure Pad Lever
14	RT2612	Left Reel Hub	50		Pressure Pad Bracket
15	RT2613	Right Reel Hub	51		Pause Lever
16	RT2614	Take-up Reel	52		Pause Slide Plate
17	RT2615	Counter Pulley	53		Pinchwheel Retractor Lever
18	RT2616	Felt Pad	54		Pause Transfer Lever
19	RT2623	Spring	55		Pause Pad Arm
20	RT2624	Control Spring (8 used)	56		Supply Reel Pivot Plate
21	RT2625	Pinchwheel Spring	57		Rewind Pivot Arm
22	RT2626	Take-up Tension Spring	58		Rewind Tension Spring
23	RT2627	Rewind Return Spring	59		Brake Actuator Slide
24	RT2628	Brake Spring (2 used)	60		Speed Selector Slide Plate
25	RT2630	Brake Return Spring	61		3 3/4" Plunger
26	RT2631	Brake Shoe	62		7 1/2" Plunger
27	RT2632	Instant Brake Shoe	63		7 1/2" Belt Transfer Arm
28	RT2600	Motor Pulley	64		3 3/4" Belt Transfer Arm
29		Take-up Brake Arm	65		Speed Selector Slide Plate Spring
30		Supply Brake Arm	66		Latch Plate
31		Take-up Drag Plate	67		Rewind Push-button Lever
32		Supply Drag Plate	68		Play Push-button Lever
33		Brake Transfer Lever	69		Stop Push-button Lever
34		Brake Transfer Slide	70		Fast Forward Push-button Lever
35		Tension Roller Arm	71		Rec. Push-button Lever
36		Fast Forward Tension Lever	72		Play Take-up Tension Spring

GENERAL ELECTRIC MODELS M8050A, M8060A









13.5V

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8896 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	
Q1	RS7518	Preamp	DS-66	GE-10	TR-21	SK-3020	NPN
Q2	RS7516	AF Amp	DS-66	GE-10	TR-21	SK-3020	NPN
Q3	RS7516	Driver	DS-66	GE-10	TR-21	SK-3020	NPN
Q4	RS7625	Output	DS-66	GE-18	TR-21	SK-3020	NPN (1)
Q5	RS7625	Output	DS-66	GE-18	TR-21	SK-3020	NPN (1)
Q6	RS7412	Bias Oscillator	DS-66	GE-10	TR-21	SK-3020	NPN
Q7		Bias Regulator	DS-66	GE-10	TR-21		NPN
Q8	RS7518	Preamp	DS-66	GE-10	TR-21	SK-3020	NPN (2)
Q9	RS7516	AF Amp	DS-66	GE-10	TR-21	SK-3020	NPN (2)
Q10	RS7516	Driver	DS-66	GE-10	TR-21	SK-3020	NPN (2)
Q11	RS7625	Output	DS-66	GE-18	TR-21	SK-3020	NPN (2) (1)
Q12	RS7625	Output	DS-66	GE-18	TR-21	SK-3020	NPN (2) (1)
Q13		Bias Regulator	DS-66	GE-10	TR-21		NPN (2)

- (1) When replacing transistor, apply silicone grease to transistor before replacing heat sink.
 (2) Not used in Model M8050A.

SUBSTITUTION CHART

Group	Q1,Q8	Q2,Q9	Q3,Q10	Q4,Q5,Q11,Q12	R24,R59	Q6	Q7,Q13
1	RS7405	RS7413	RS7408	RS7625	680 ohms	RS7405 or RS7410	RS7528
2	RS7406	RS7412	RS7408	RS7625	680 ohms	RS7406 or RS7411	RS7529
3	RS7407	RS7411	RS7408	RS7625	560 ohms	RS7407 or RS7412	RS7530
4	RS7408	RS7410	RS7407	RS7626	620 ohms	RS7408 or RS7413	RS7528
5	RS7409	RS7409	RS7407	RS7626	620 ohms	RS7409	RS7529
6	RS7410	RS7408	RS7407	RS7626	560 ohms		RS7530
7	RS7411	RS7407	RS7406	RS7627	620 ohms		RS7526
8	RS7412	RS7406	RS7406	RS7627	560 ohms		RS7527
9	RS7413	RS7405	RS7406	RS7627	470 ohms		RS7528
10			RS7405	RS7628	620 ohms		RS7526
11			RS7405	RS7628	560 ohms		RS7527
12			RS7405	RS7628	470 ohms		RS7528

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MEASURED CURRENT	ORIGINAL Part or Type No.	RECTIFIERS & DIODES		RECTIFIERS	
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SARKES TARZIAN PART No.
X1	.09 Amp	RS6471	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X2	.09 Amp	RS6471	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X3		RT1667	1N34AS	1N34A		

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		G. E. PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	1000 15V	RS6476 (154A5424-9)	PRS1230	EA30-1000	BR1000-15	QT1-32	TC1501A	TL-1166.5
C2	100 15V	RS6480 (113A7617-18)	BCD15100	EP15-100	NLW100-15	MT1-19	MTV100CF15	TE-1162
C3	1000 12V	RT2519 (154A5424-8)	PRS1180	EA30-1000	BR1000-15	QT1-32	TC1210	TL-1142
C4	1 12V	RS3489 (113A7617-7)	BCD12001	EP50-2	NLW1-50	MT1-1	MTV1CB50	TE-1120
C5	3 12V	RS2984	BCD12003	EP50-2	NLW3-15	MT1-3	MTV3CB50	TE-1122
C6	2 12V	RS3960 (113A7617-9)	BCD12002	EP50-2	NLW2-50	MT1-1	MTV2CB50	TE-1121
C7	6 12V	RS3958 (113A7617-8)	BCD12006	EP30-5	NLW6-15	MT1-5	MTV6CB50	TE-1127.1
C8	3 12V	RS2984	BCD12003	EP50-2	NLW3-15	MT1-3	MTV3CB50	TE-1122
C9	8 12V	RS3017 (113A7617-2)	BCD12008	EP15-10	NLW8-25	MT1-5	MTV8CB50	TE-1127.3

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

ELECTROLYTIC CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						
			PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C10	100	15V	RS6480 (1) (113A7617-18)	BCD15100	EP15-100	NLW100-15	MT1-19	MTV100CF15	TE-1162
C11	1000	12V	RT2519 (1) (154A5424-8)	PRS1180	EA30-1000	BR1000-15	QT1-32	TC1210	TL-1142
C12	1	12V	RS3489 (1) (113A7617-7)	BCD12001	EP50-2	NLW1-50	MT1-1	MTV1CB50	TE-1120
C13	3	12V	RS2984 (1)	BCD12003	EP50-2	NLW3-15	MT1-3	MTV3CB50	TE-1122
C14	2	12V	RS3960 (1) (113A7617-8)	BCD12002	EP50-2	NLW2-50	MT1-1	MTV2CB50	TE-1121
C15	6	12V	RS3958 (1) (113A7617)	BCD12006	EP30-5	NLW6-15	MT1-5	MTV6CB50	TE-1127.1
C16	3	12V	RS2984 (1)	BCD12003	EP50-2	NLW3-15	MT1-3	MTV3CB50	TE-1122
C17	1000	12V	RT2519 (1) (154A5424-8)	PRS1180	EA30-1000	BR1000-15	QT1-32	TC1210	TL-1142

(1) Not used in Model M8D50A.

CAPACITORS

ITEM No.	RATING		REMARKS	REPLACEMENT DATA					
				AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C21	.01	25V	(1)	TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C22	470			GPD X5F471K	DD-471	JBZ601YP471K	CCD-471	GP347	10TS-T47
C23	.0082			GPD XSR822K	DD-822		CCD-822	B282	30GA-D82
C24	.2	10V			UK10-204				
C25	.003	25V		GPD X5R302	DM-302	BYS601ZU302P	CCD-302	GP230	10TS-D30
C26	.02	25V		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C27	.02	25V		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C28	.2	50V							
C29	330			GPD X5F331K	DD-331	JBZ601YP331K	CCD-331	GP331	10TS-T33
C30	.003	25V		GPD X5R302	DM-302	BYX601ZU302P	CCD-302	GP230	10TS-D30
C31	390			GPD X5F391K	DD-391		CCD-391	GP339	10TS-T39
C32	.0068			GPD X5R682K	DD-682	BYX601ZU682P	CCD-682	GP268	10TS-D68
C33	.1	50V		TTP-1	CK-104	HOV101ZV104Z		TA010	TG-P10
C34	.01	25V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C35	470			GPD X5F471K	DD-471	JBZ601YP471K	CCD-471	GP347	10TS-T47
C36	.0082			GPD XSR822K	DD-822		CCD-822	B282	30GA-D82
C37	.2	10V			UK10-204				
C38	.003	25V		GPD X5R302	DM-302	BYS601ZU302P	CCD-302	GP230	10TS-D30
C39	.02	25V		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C40	.02	25V		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C41	.2	50V					1DP-3-204		
C42	330			GPD X5F331K	DD-331	JBZ601YP331K	CCD-331	GP331	10TS-T33
C43	.003	25V		GPD X5R302	DM-302	BYS601ZU302P	CCD-302	GP230	10TS-D30
C44	390			GPD X5F391K	DD-391		CCD-391	GP339	10TS-T39

(1) Alternate Value.

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESIST-ANCE	REPLACEMENT DATA				
			G. E. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1A B C	Volume, Left Volume, Right Switch	50K 50K	RT2533 (1) (137B6703-4)	F1-50K (3), R1-50K, SF014, CPL-2, KR-1	NP-50K-S (3), NR-50K-S, UP-B-400, DC-2, NWE-12	B11-123, B11-123, TM5 (3), QCM, 76-1	FA54L (3), RU54L, CS3500, US41
	Volume & Switch	50K	RT2531 (2) (137B6703-5)	F1-50K (3), SN100, KR-1	A47K-50K-S (3), FS-3, SWE-12 or (NP-50K-S (3), NML-A-300, NWE12)	Q11-123 (3), 76-1	UA54L (3), SN875, US41 or (RU54L (3) SN875, US41) or (TA54L (3), US26)
R2A B	Tone-Left Tone-Right	50K 50K	RT2534 (1) (137B6703-5)	F1-50K (3), R1-50K, SF014, CPL-2	NP-50K-S (3), NR-50K-S, UP-B-400, DC-2	B11-123, B11-123, TM5 (3), QCM	FA54L (3), RU54L CS3500
	Tone	50K	RT2532 (2) (137B6703-3)	F1-50K (3), SN100	A47-50K-S (3), FS-3 or (NP-50K-S (3), NML-A-300)	B11-123, TM4 (3)	UA54L (3), SN875, or (RU54L (3), SN875) or (PTA54L (3))
R3	Balance	50K	RT2535 (1) (137B6703-2)	F1-50K (3), SN100	A47-50K-S (3), FS-3 or (NP-50K-S (3), NML-A-300)	B11-123, TM4 (3)	UA54L (3), SN875 or (RU54L (3), SN875) or (PTA54L (3))

(1) Used in Model M8060A.

(2) Used in Model M8050A.

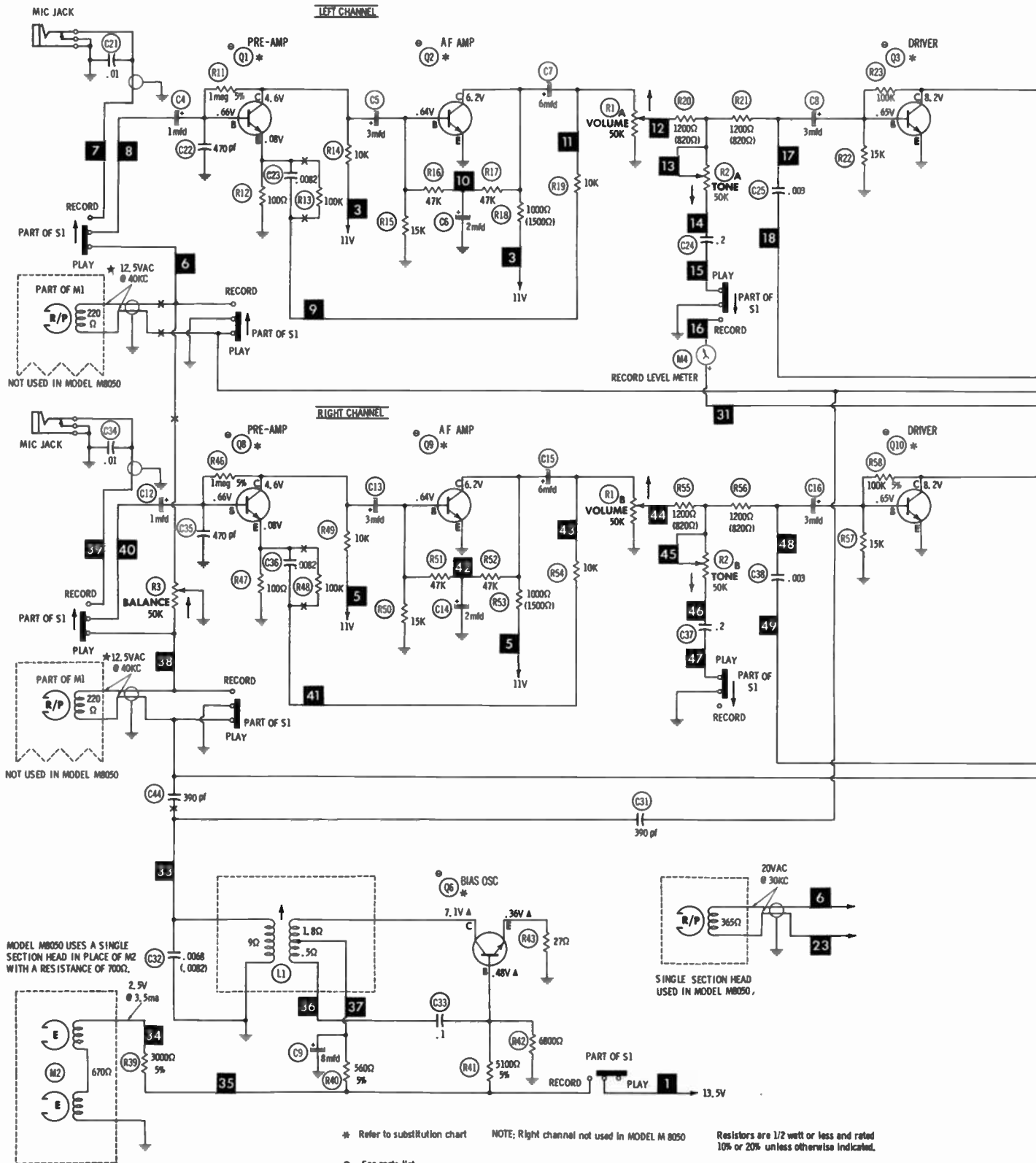
(3) Use original mounting bracket.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Bias Oscillator	RT2530			

(CONTINUED ON PAGE 60)

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



A PHOTOFACT STANDARD NOTATION SCHEMATIC
with **CIRCUITRACE**
© Howard W. Sams & Co., Inc. 1968

* Refer to substitution chart

NOTE: Right channel not used in MODEL M 8050

Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

- ① See parts list
- 1. Voltage measurements taken with vacuum tube voltmeter.
- 2. All controls set for normal operation, no signal applied.
- 3. Measured values are from socket pin or terminal to common on ground.
- 4. All terminals viewed from bottom unless otherwise designated.
- 5. Numbers assigned to terminals may not be found on the unit.
- 6. Supply voltage maintained at rated value for voltage readings.
- 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

Arrows at controls indicate clockwise rotation viewed from actuator end.

* Measured in "Record" with an audio VTVM

▲ Measured in "Record"

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	G. E. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC @ .48Amp	21VAC/CT @ .09ADC		RT2529 (137B6588-1)					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	G. E. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T2	2	1/CT		RT2441 (178A5301)					
T4	2	1/CT		RT2441 (178A5301)					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	G. E. PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T3	81	625 Tap @4	RT2528 (178A5300)					
T5	81	625 Tap @4	RT2528 (178A5300)					

SPEAKER

ITEM No.	TYPE				REPLACEMENT DATA			NOTES
					G. E. PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5" X 7"	PM	4 ohms	RB2146 (1)	P5X7V3	57A1	(1) Used in Model M8050A	
	6"	PM	4 ohms	RB2150 (2)	C6T3		(2) Used in Model M8060A	
SP2	6"	PM	4 ohms	RB2150 (2)	C6T3			

TAPE HEADS

ITEM NO.	MEASURED			G. E. PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	125mh	12.5VRMS	40KC	RT2618 (1)	1008 & QK-66	4-Track Stereo Record/Play
	270mh	20VRMS	30KC	RT2617 (2)	3101 & QK-21	2-Track Monaural Record/Play
M2	450mh	2.5VDC	DC	RT2620 (1)	1400 (3) & QK-19	4-Track Stereo Erase
	420mh	2.3VDC	DC	RT2619 (2)	3600 (3) & QK-19	2-Track Mono Erase

(3) Change series resistor to 2200 ohms
Select polarity for best recording.

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M3	Motor	RT2599	Tape Transport
M4	Meter	RT2558	Record Level Indicator
S1	Switch	RT2526	Record/Play, Model M8050A
S2	Switch	RT2527	Record/Play, Model M8060A
S3	Switch	RT1991	Record Monitor
	Printed Circuit Board	RT2571	Level Meter Selector, Model M8060A only
	Microphone	RT9324	
		RT9284	

CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

ITEM	MODEL	PART No.	ITEM	MODEL	PART No.
Cabinet-Bottom	M8050	RB2142	Push Button-Rewind	M8050A	RT2539
Cabinet-Bottom	M8060A	RB2147	Push Button-Stop	M8050A	RT2540
Cabinet-Base	M8060A	RB2148	Push Button-Fast Forward	M8050A	RT2541
Cabinet-Top Cover	M8050A	RB2145	Push Button-Record	M8050A	RT2542
Head Cover		RT2537	Push Button-Play	M8060A	RT2559
Knob-Volume, Tone, Balance		RT2543	Push Button-Rewind	M8060A	RT2560
Knob-Pause		RT2544	Push Button-Stop	M8060A	RT2561
Knob-Speed (7 1/2 ips Control)		RT2545	Push Button-Fast Forward	M8060A	RT2562
Knob-Speed (3 3/4 ips Control)		RT2546	Push Button-Record	M8060A	RT2563
Push Button-Play	M8050A	RT2538			



PHOTOFACT[®] with

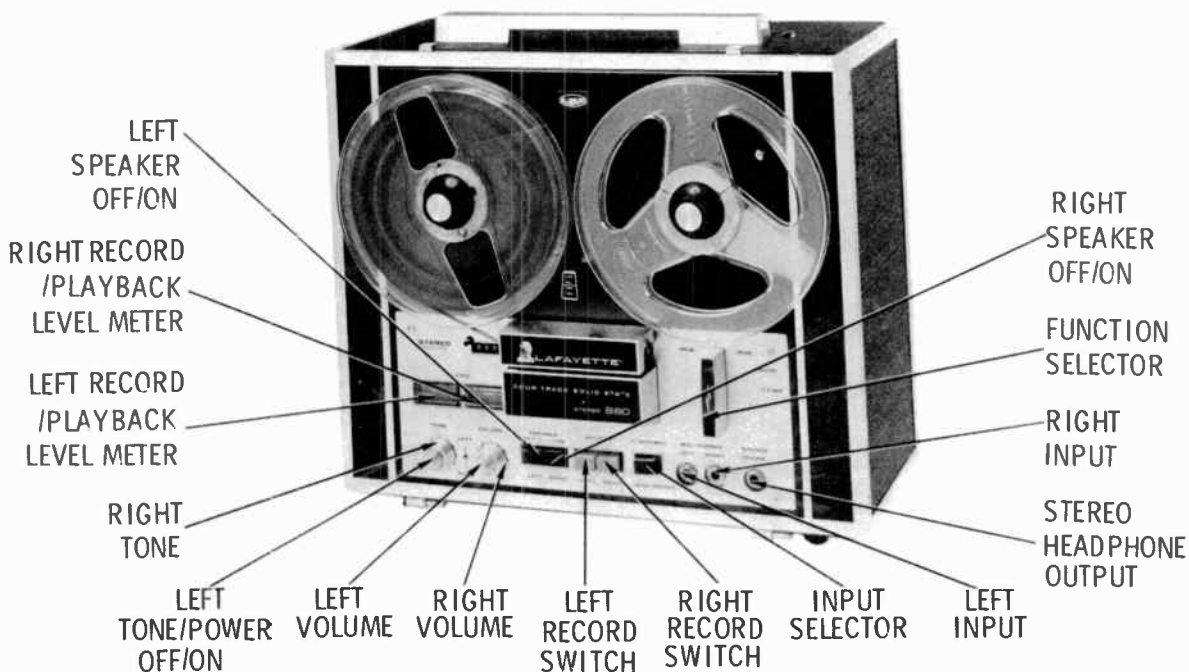
CIRCUITRACE[®]

TRADE NAME : Lafayette Model RK-860 (99-1530WX)
 SUPPLIER : For Current Address, See Annual Index
 TYPE SET : 3-Speed, 4-Track Monaural Recorder
 POWER SUPPLY : 110-120 Volts AC, 60 Cycles
 RATING : 60 Watts, .67 Amp @ 117 VAC (Record with Motor)
 56 Watts, .63 Amp @ 117 VAC (Play with Motor)

This unit is a four-track, monaural recorder having three speeds: 1 7/8, 3 3/4, and 7 1/2 ips.

Jacks are provided for both low- and high-level inputs, external amplifier, external speaker, and stereo headphones.

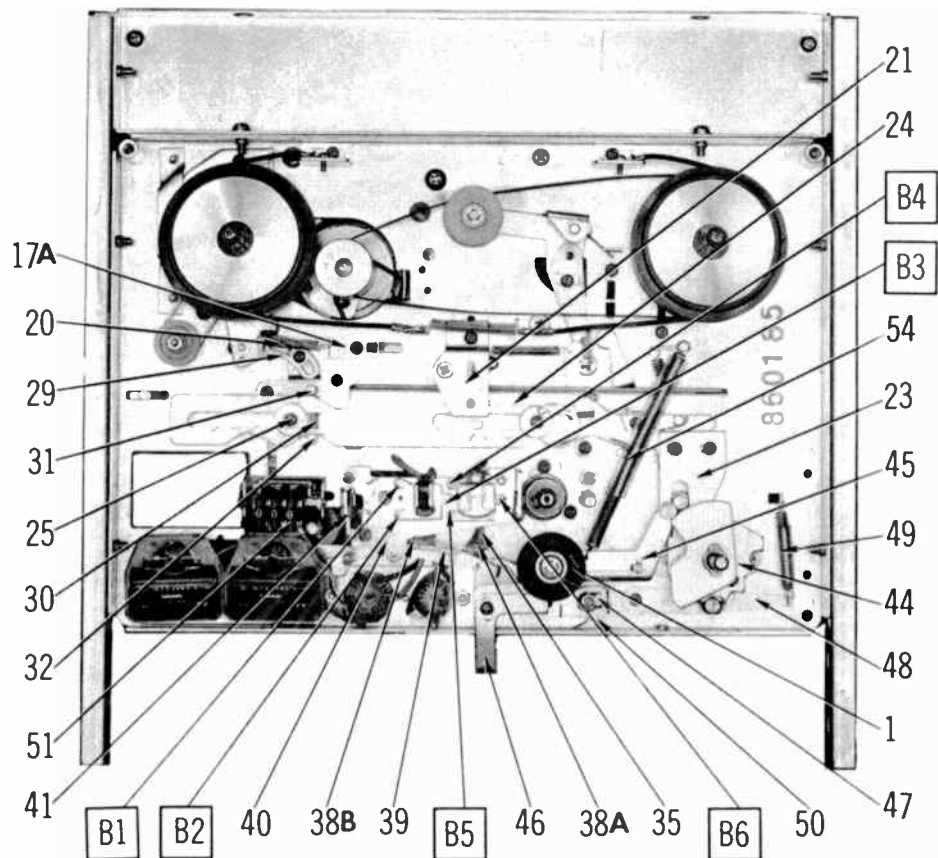
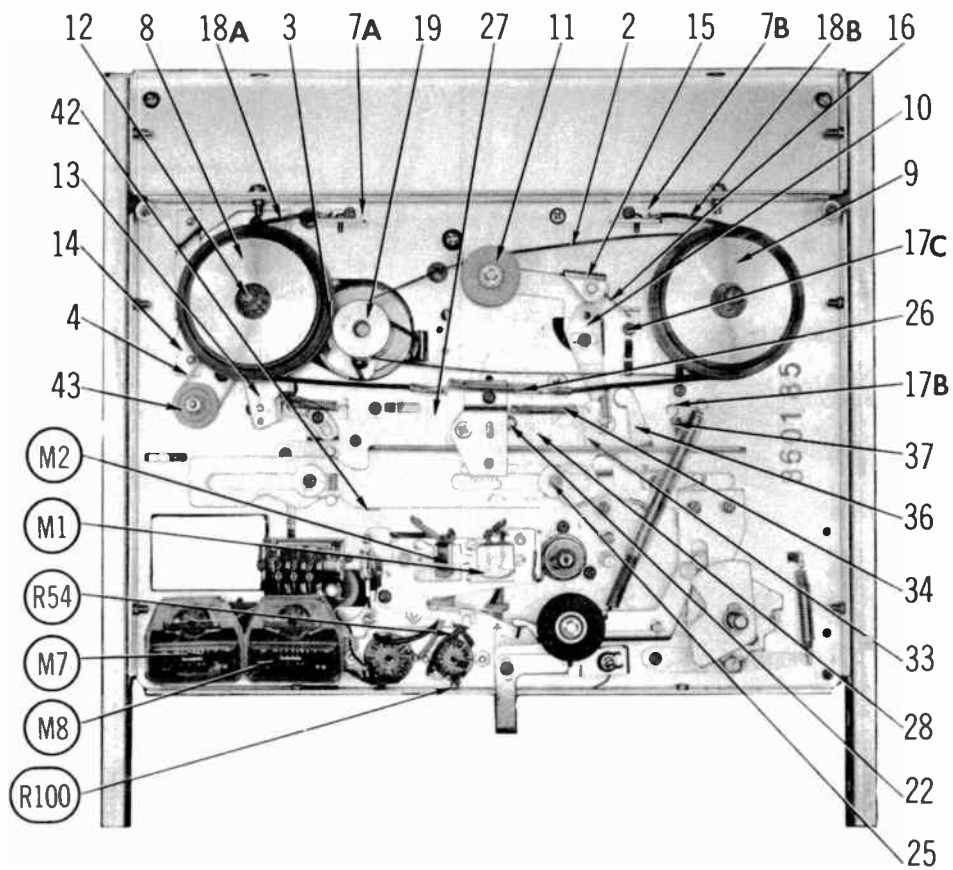
A power source of 110 - 120 volts AC, 60 cycles is required.

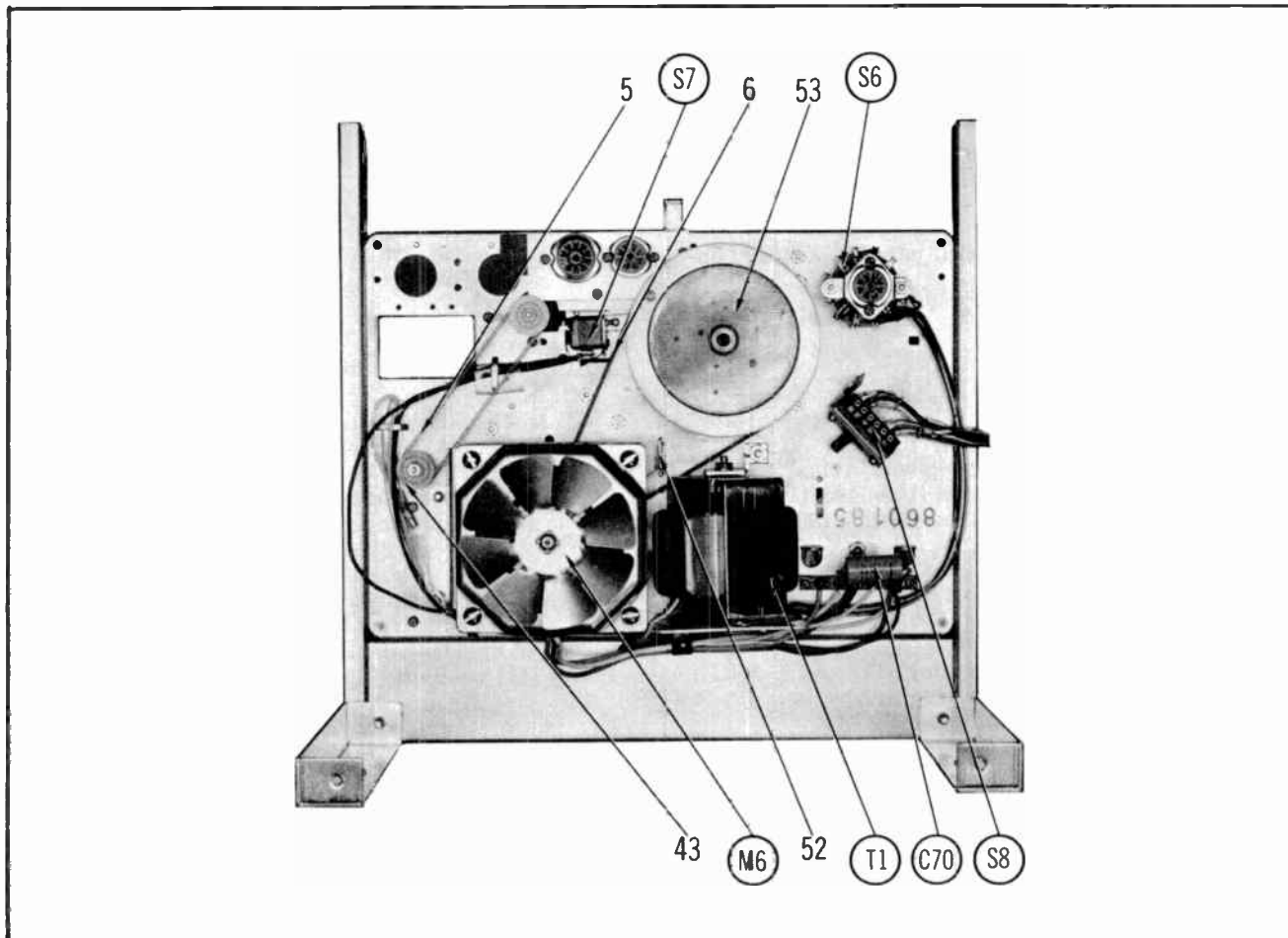


LAFAYETTE MODEL RK-860 (99-1530WX)

HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

© 1968 Howard W. Sams & Co., Inc. Printed in U. S. of America C995





OPERATING INSTRUCTIONS

Monaural Record

1. Move Function Selector to Stop, thread the tape, and select the speed.
2. Raise both of the speaker buttons, connect a source to a left input, and press and hold Left Record Switch button while moving Function Selector to Pause.
3. Set the recording level with Left Volume control and move Function Selector to Run.
4. To record the right-channel tracks, repeat steps 1 - 3 except connect the source to a right input, press Right Record Switch button, and use Right Volume control to set the record level.

Monaural Play

1. Repeat step 1 of "Monaural Record" press Left Speaker On/Off button, move Function Selector to Run, and adjust Left Volume and Tone controls as desired.
2. To play right-channel tracks, repeat step 1 of "Monaural Record", press Right Speaker On/Off button, move Function Selector to Run, and adjust Right Volume and Tone controls as desired.

Stereo Record

1. Repeat the procedure outlined under "Monaural

Record". However, press both Left and Right Record Switch Buttons, connect sources to Left and Right inputs, and set the recording level for each channel with the appropriate Volume control.

Stereo Play

1. Repeat the procedure outlined under "Monaural Play". However, press both of the speaker buttons and adjust Left and Right Volume and Tone controls as desired.

Input Selector

1. Raise the Input Selector to use a microphone in Left or Right inputs and to use the high-level inputs on the rear of unit.
2. Press the Input Selector when connecting a magnetic-phono cartridge directly to Left or Right Input jacks.

Monitor

1. To monitor the recording source, press appropriate speaker On/Off button or connect stereo headphones to Stereo Headphone Output jack.

DISASSEMBLY

1. Remove two Phillips screws from upper and lower front trim strips.
2. Remove two Phillips screws from top of cabinet, two from rear of cabinet, and four from bottom of cabinet.
3. Lay unit facedown, lift off cabinet, and disconnect the speakers.
4. For access to deck mechanism, remove Speed and Function Selector knobs held by setscrews, remove four push-on Volume and Tone knobs, and remove six Phillips screws holding deck plate.

SEQUENCE OF OPERATION

Play/Record (Run)

Moving the Function Selector to Run rotates Cam (44), locked by Plate (48), to slide Arm (24), pivoting Plate (32). Plate (32) pivots Arms (27) and (28) to release tension on Wires (18A) and (18B), and also allows Plate (42) to release Switch (S9).

Arm (24) also allows Arm (33), pulled by Spring (34), to release Plate (10) and Arm (15), pivoted by Spring (16), pressing Pulley (11) against Belt (2).

The motor, through Pulley (19) and Belt (2), drives Hub (9). Pulley (19) also drives Belt (6) to drive Flywheel (53).

Cam (44) also releases Arm (45), pulled by Spring (54), to press Roller (1) against the capstan and also to release Arms (46) and (47), pivoted by Spring (50). Arm (45) also releases Arm (40), pulled by Spring (35), to cause Plate (39) to press Pads (38A) and (38B) against Heads (M1) and (M2).

Pause (From Play/Record)

Moving the Function Selector to Pause rotates Cam (44), locked by Plate (48), to slide Arm (24) pivoting Plate (32). Plate (32) causes Plate (42) to actuate Switch (S9) and also releases Arms (27) and (28) to allow Spring (26) to apply tension to Wires (18A) and (18B).

Arm (24) pivots Arm (33) to pivot Plate (10) and Arm (15), moving Pulley (11) from Belt (2).

Cam (44) also pivots Arm (45) to move Roller (1) from the capstan and also to pivot Arm (40) to cause Plate (39) to move Pads (38A) and (38B) from Heads (M1) and (M2).

Fast Forward (From Pause)

Moving the Function Selector to Fast Forward rotates Cam (44), locked by Plate (48), to slide Arm (24), pivoting Plate (32). Plate (32) allows Plate (42) to release Switch (S9) and also pivots Arms (27) and (28) to release tension on Wires (18A) and (18B).

Arm (24) releases Arm (33), pulled by Spring (34), and also releases Arm (36), pulled by Spring (37). Arm (36) pivots Plate (10) and Arm (15) to press Pulley (11) against Belt (2). The motor, through Pulley (19) and Belt (2), drives Hub (9).

Cam (44) also pivots Arm (45) to move Roller (1), to pivot Arms (46) and (47), and to pivot Arm (40).

Rewind

Moving the Function Selector to Rewind rotates Cam (44), locked by Plate (48), to slide Arm (24), pivoting Plate (32). Plate (32) allows Plate (42) to release Switch (S9) and also pivots Arms (27) and (28) to release the tension on Wires (18A) and (18B).

Cam (24) also releases Arm (31) and Plate (29), pulled by Spring (30), to release Plate (13), pulled by Spring (20). Plate (13) moves Hub (8) to press Belt (3) against Pulley (19). The motor through Pulley (19) and Belt (3) drives Hub (8). Hub (8), through Belt (4), Pulleys (43), and Belt (5), drives Counter (51).

Stop

Moving the Function Selector to Stop reverses the Play/Record or Rewind Sequence.

CLEANING

LUBRICATING

HEAD DEMAGNETIZING

Refer to "General Servicing Information" on page 4.

TROUBLE CHART

IMPORTANT: Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Belt (2) dirty, worn, or broken. 2. Play Take-up Torque misadjusted. 3. Wire (18B) not releasing completely. 4. Hub (9) binding.
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> 1. Fast Forward Take-up Torque misadjusted. 2. Belt (2) dirty, worn, or broken.

TROUBLE CHART (Continued)

SYMPTOM	REMARKS
Take-up reel revolves rapidly in Play or Record.	<ol style="list-style-type: none"> 1. Insufficient Pressure Roller Pressure. 2. Excessive Play Take-up Torque.
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Belt (3) dirty or worn. 2. Rewind Torque misadjusted. 3. Hub (8) binding. 4. Pulley (19) dirty.
Reels do not stop immediately when Function Selector is returned to Stop.	<ol style="list-style-type: none"> 1. Braking Torque misadjusted. 2. Wires (18A) and (18B) dirty or worn.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Belt (6) dirty, worn, or broken. 2. Motor defective or not supplied with power. 3. Flywheel (53) binding.
Tape rides up and down between capstan and pressure roller.	<ol style="list-style-type: none"> 1. Roller (1) worn or dirty. 2. Excessive Play Take-up Torque.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Excessive Play Take-up Torque. 2. Roller (1) worn or binding. 3. Flywheel (53) binding. 4. Hub (8) binding. 5. Motor defective.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Head (M1) dirty, misadjusted, or defective. 2. Amplifiers defective. 3. Bias oscillator defective. 4. Pad (38A) matted or worn.
Erase weak or inoperative.	<ol style="list-style-type: none"> 1. Head (M2) dirty, misadjusted, or defective. 2. Head (M2) not supplied with current. 3. Pad (38B) worn or matted.

ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 7 1/2 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 7 1/2 ips with a spring scale applied to a point on an empty tape reel 2 inches from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 2 ounces. Controlled by repositioning Plate (17C).
Tension Arm Position	Position Plate (10) for 1/4-inch clearance from Arm (33) in Play.
Fast Forward Take-up Torque	Nominal value 7 ounces. Controlled by repositioning Plate (17B).
Supply Hub Clearance	Position Plate (29) for 1/16-inch clearance between Belt(3) and Pulley (19).
Rewind Torque	Nominal value 7 ounces. Controlled by repositioning Plate (17A).

LAFAYETTE MODEL RK-860 (99-1530WX)

ADJUSTMENTS (Continued)

ADJUST	REMARKS
Supply Reel Drag	Dependent on reel weight.
Take-up Reel Drag	Dependent on reel weight.
Pressure Roller Pressure	Nominal value 1 pound 10 ounces. Controlled by tension of Spring (54).
Braking Torque	Measured in Stop, clockwise on take-up reel and counterclockwise on supply reel. Nominal value 3 1/2 ounces. Controlled by repositioning Plates (7A) and (7B).
Pressure Pad Pressure	Nominal value 1 1/2 ounces. Controlled by tension of Spring (35).
Erase Head Height	Adjust B1, B2, and B3 equally until top of upper pole piece is .002 inch above top of a properly threaded tape.
Erase Head Azimuth	Adjust B3 until pole piece is perpendicular to lateral tape motion.
Record/ Play Head Height	Adjust B4, B5, and B6 until top of upper pole piece is .002 inch below top of properly threaded tape.
Record/ Play Head Azimuth	Connect an AC VTVM across left output, play an azimuth test tape, and adjust B6 for maximum peak.
Erase Current	Nominal value 80ma (7.5V rms) in each section. No adjustment provided.
Record Bias	Nominal value 14V rms (1ma) across each section. Controlled by setting of C54 for the left channel and C68 for the right channel.
Bias Oscillator	Nominal frequency 90KC. Controlled by setting of slug in L3 .
RF Trap	Play unit in stereo record mode. Connect an AC VTVM to point $\diamond A$ and adjust L1 for MINIMUM RF. Move VTVM to Point $\diamond B$ and adjust L2 for MINIMUM RF.
Record Level Indicator Calibration	Disable bias oscillator by shorting secondary, apply a 1000-cycle tone to a mic input, and adjust appropriate Volume control for .7 V rms across appropriate section of Head (M1). Record/Playback Level Meters should indicate normal maximum recording level.
Noise Level	With unit in Play mode, without tape, and with the Volume and Tone controls set for maximum, connect an 8-ohm resistor across each Ext. Speaker jack. With an AC VTVM across each resistor, rotate power transformer for MINIMUM voltage on each channel. Compromise if necessary.

MECHANICAL PARTS LIST

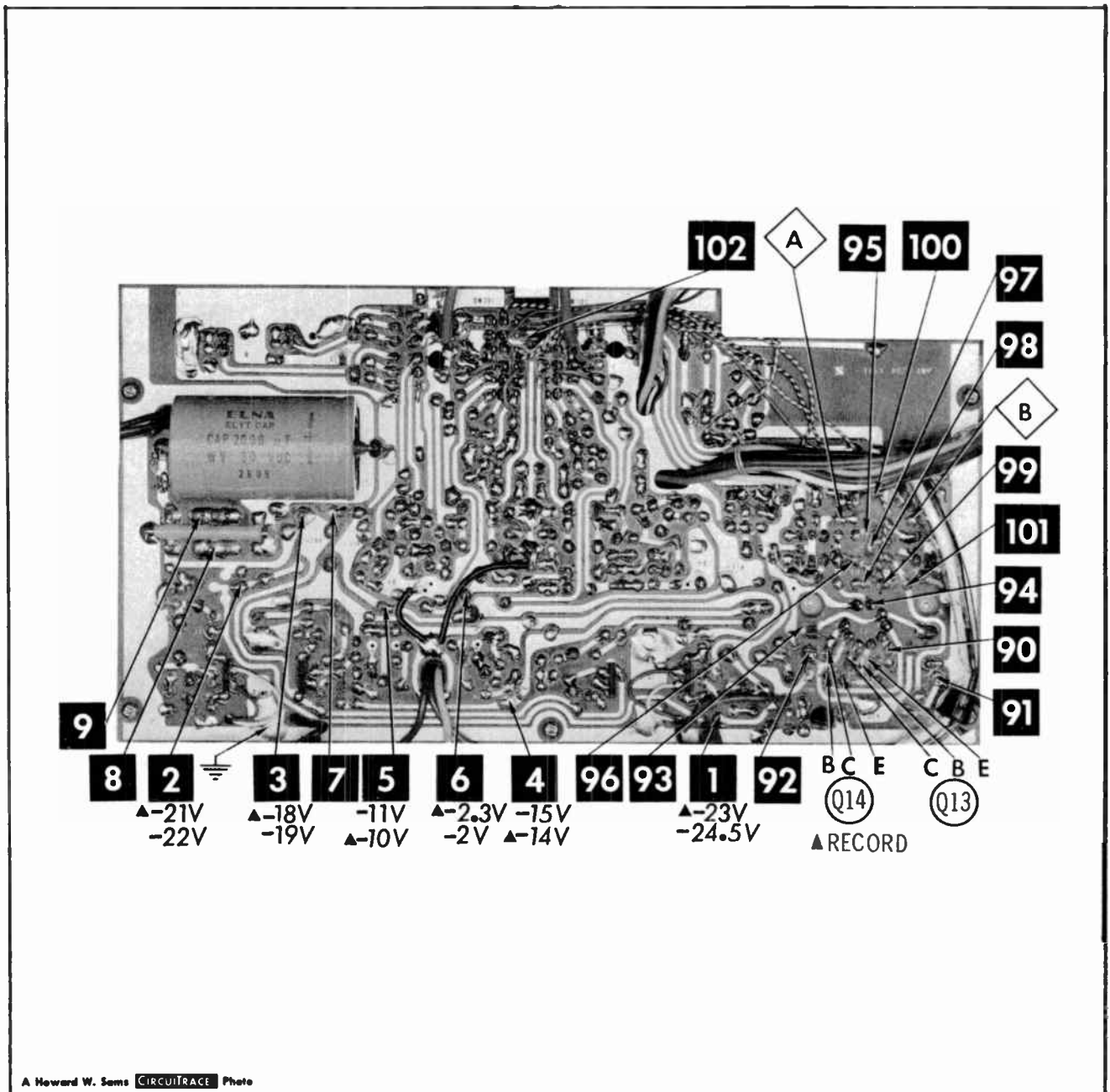
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	C-1036	Pressure Roller	16	C-1114	Tension Arm Spring
2	C-1075	Take-up Belt	17	C-1020	Tension Adjust Plate (3 Used)
3*	C-1123*	Rewind Belt*	18	C-1061	Brake Wire (2 Used)
4	C-1053	Counter Belt A	19	C-1072	Motor Pulley A
5*	C-1054 *	Counter Belt B*	20	C-1039	Rewind Spring
6	C-1074	Driving Belt	21	C-1011	Speed Change Arm Holder
7	C-1060	Brake Adjust Plate (2 Used)	22	C-1012	Speed Change Arm Spring
8	C-1050	Supply Reel Hub	23	C-1113	Slide Arm Adjust Plate
9	C-1049	Take-up Reel Hub	24	C-1131	Slide Arm
10	C-1006	Tension Arm Adjust Plate	25	C-1032	Slide Arm Guide
11	C-1008	Tension Pulley	26	C-1062	Brake Spring
12	C-1044	Supply Reel Hub Shaft	27	C-1013	Left Brake Arm
13	C-1045	Supply Reel Hub Plate	28	C-1014	Right Brake Arm
14	C-1165	Supply Reel Hub Plate Holder	29	C-1144	Rewind Arm Adjust Plate
15	C-1005	Tension Arm	30	C-1137	Auto Switch Spring

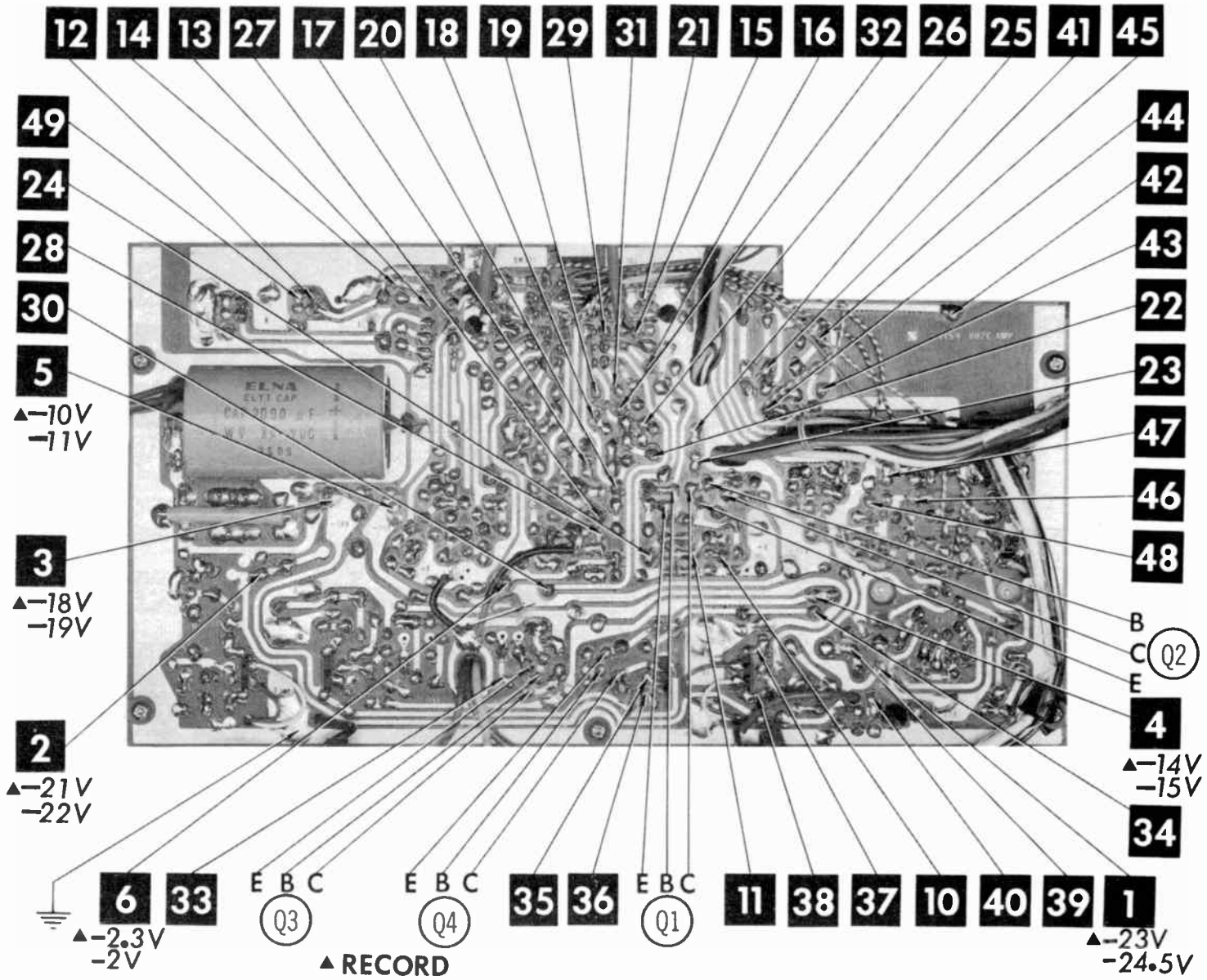
MECHANICAL PARTS LIST (Continued)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
31	C-1017	Rewind Arm	44	CA-1007	Control Cam Assembly
32	C-1015	Brake Linkage Plate	45	C-1033	Pressure Roller Arm
33	C-1021	Take-up Release Arm	46	C-1150	Record Switch Linkage Adjust Arm
34	C-1022	Tension Linkage Arm Spring	47	C-1151	Record Switch Linkage Arm
35	C-1093	Tape Pad Arm Spring	48	C-1023	Control Cam Lock Plate
36	C-1019	Fast Forward Linkage Arm	49	C-1030	Control Cam Lock Spring
37	C-1116	Fast Forward Linkage Arm Spring	50	C-1159	Record Switch Linkage Arm Spring
38	C-32	Tape Pad Felt	51	C-1055	Tape Counter
39	C-1091	Tape Pad Plate A	52	C-1010	Speed Change Arm
40	C-1090	Tape Pad Arm	53	CA-1002	Capstan Flywheel Assembly
41	C-1084	Tape Guide A	54	C-1034	Pressure Roller Spring
42	C-1110	Auto Switch Linkage Plate			
43	C-1051	Counter Inter Pulley (2 Used)			

* Rewind Belt — WALSCO Part No. 1410-06.

* Counter Belt B — WALSCO Part No. 1410-63.





A Howard W. Sams CIRCUITRACE® Photo

62 64 52 53 55 68 60 54 71 58 70 65 61 57 81 56 80

51
89

C
B
E
3
▲-15V
-19V

50
79
78
2
▲-21V
-22V
77

73 76 75 74

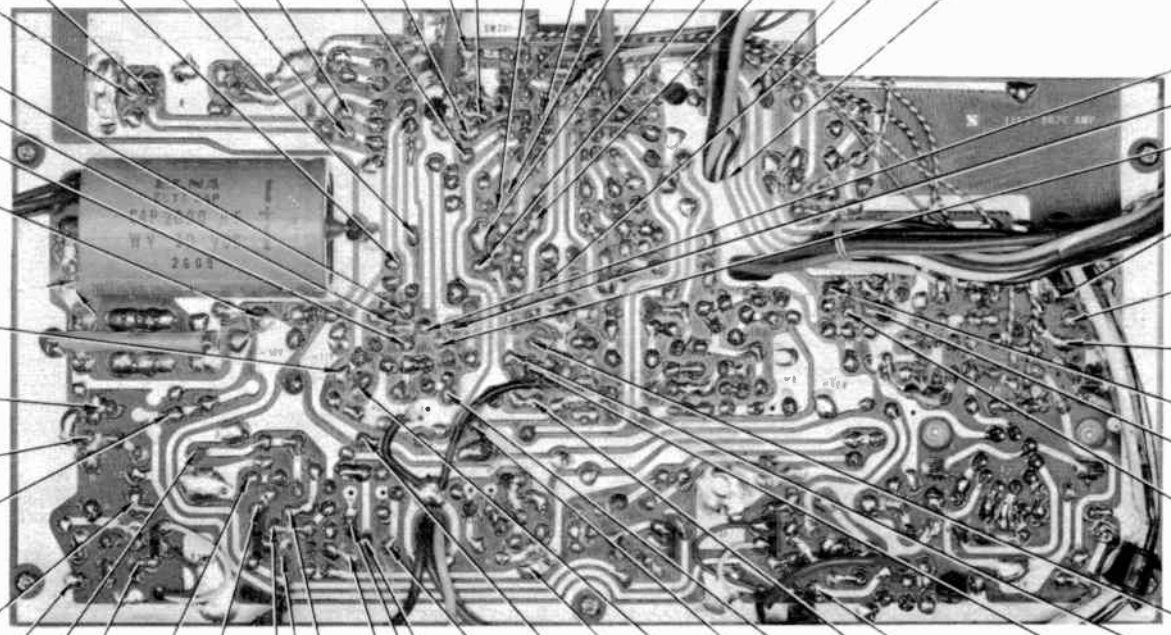
▲ RECORD

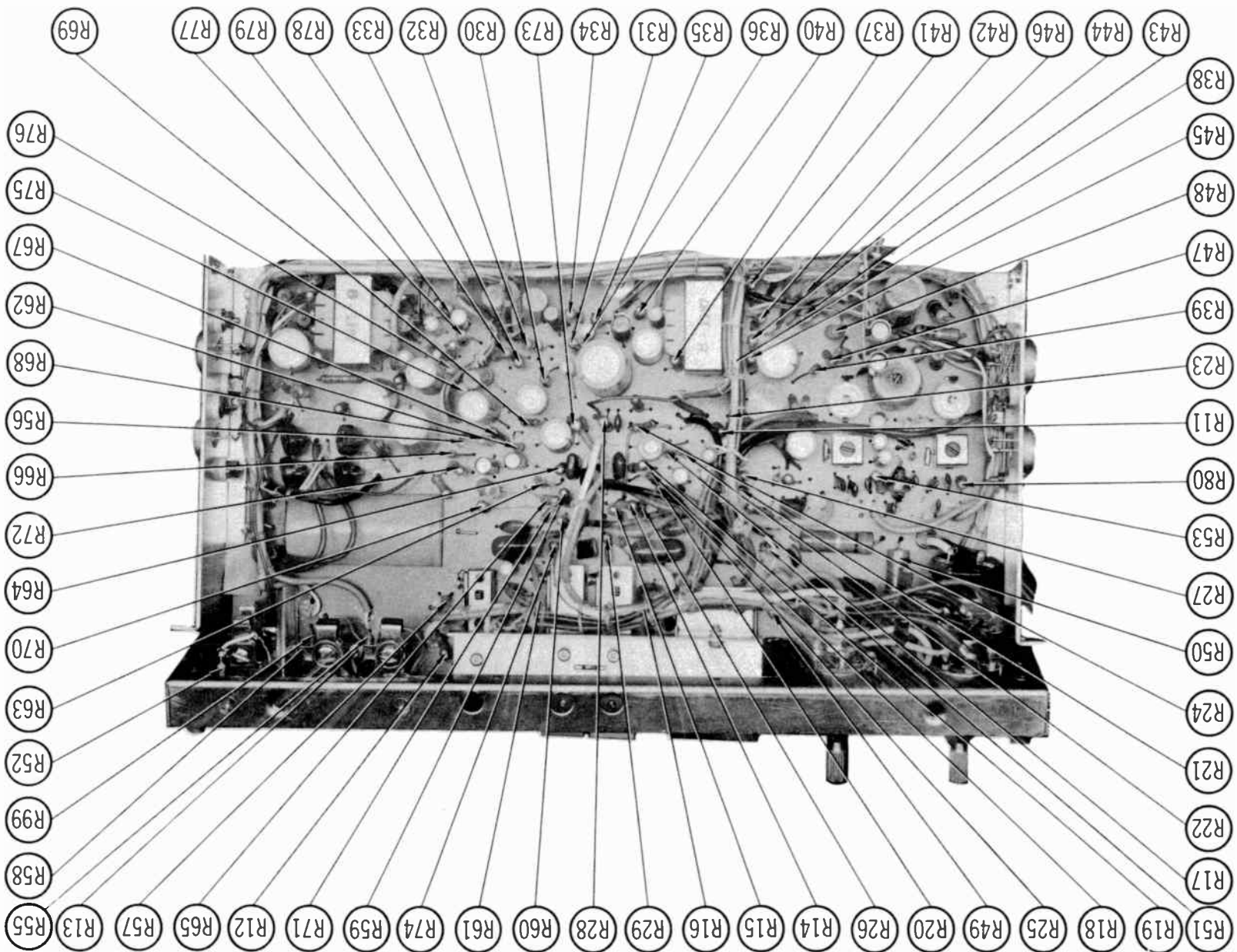
B C E
Q10
C E B
Q9

72 5 4 88 6 63 69 1

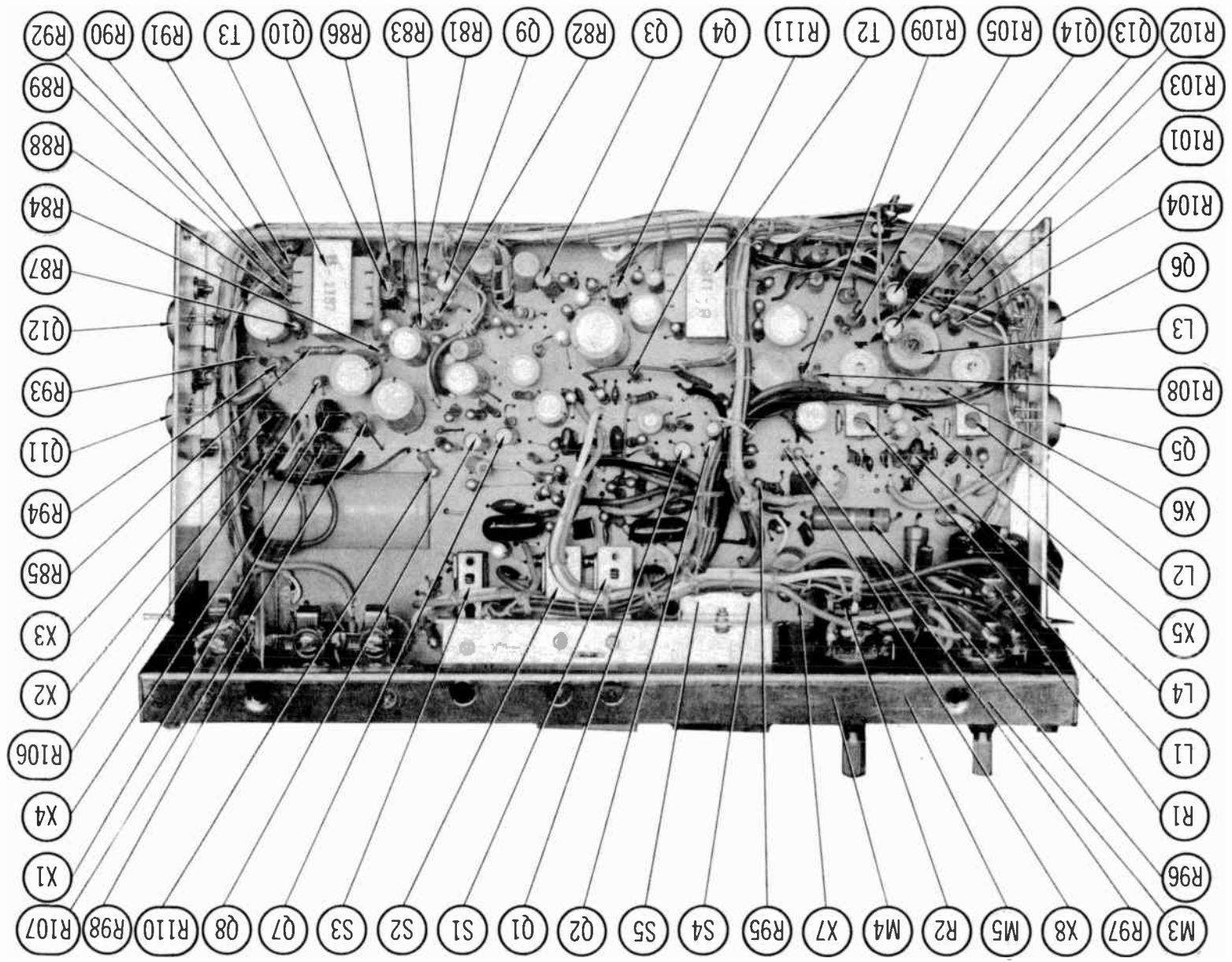
▲-10V ▲-14V ▲-2.3V -24.5V
-11V -15V -2V ▲-23V

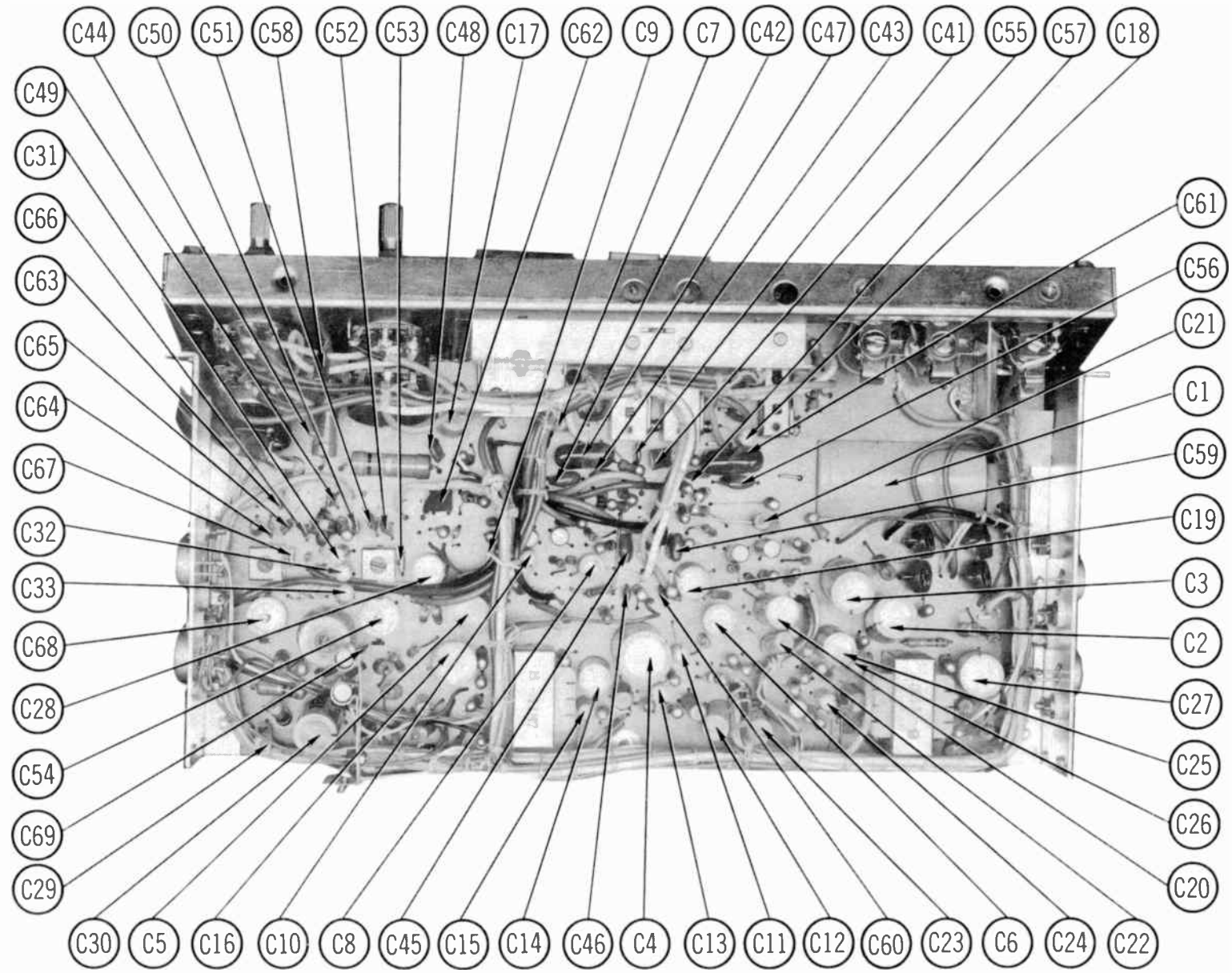
C
E
B
Q7
86
85
87
82
83
84
66
59
67





LAFAYETTE MODEL RK-860 (99-1530WX)





PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

TRANSISTORS

ITEM No.	TYPE No.	FUNCTION	REPLACEMENT DATA					
			MFGR. PART No.	DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SYLVANIA PART No.
Q1	2SB443	Preamp	B-22-3	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q2	2SB54	Preamp	B-23-1	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q3	2SB75	AF Amp	B-23	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q4	2SB56A	Driver	B-24-1	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q5	2SB367	Output	B-1058					
Q6	2SB367	Output	B-1058					
Q7	2SB443	Preamp	B-22-3	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q8	2SB54	Preamp	B-23-1	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q9	2SB75	AF Amp	B-23	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q10	2SB56A	Driver	B-24-1	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q11	2SB367	Output	B-1058					
Q12	2SB367	Output	B-1058					
Q13	2SB56A	Bias Oscillator	B-24-1	DS-26	GE-2	TR-05	SK-3004	ECG 102
Q14	2SB56A	Bias Oscillator	B-24-1	DS-26	GE-2	TR-05	SK-3004	ECG 102

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MFGR. PART OR TYPE No.	REPLACEMENT RECTIFIERS & DIODES			REPLACEMENT RECTIFIERS		NOTES
		GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	SYLVANIA PART No.	RCA PART No.	SARKES TARZIAN PART No.	
X1	.280A	B-31 (SD12)	GE-504A	8D4 or 5A4-D	ECG 116 or ECG 117	SK-3030 or SK-3031	40C or F-4
X2	.280A	B-31 (SD12)	GE-504A	8D4 or 5A4-D	ECG 116 or ECG 117	SK-3030 or SK-3031	40C or F-4
X3	.280A	B-31 (SD12)	GE-504A	8D4 or 5A4-D	ECG 116 or ECG 117	SK-3030 or SK-3031	40C or F-4
X4	.280A	B-31 (SD12)	GE-504A	8D4 or 5A4-D	ECG 116 or ECG 117	SK-3030 or SK-3031	40C or F-4
X5		B-30 (1N60)	1N60	1N60	ECG 109		
X6		B-30 (1N60)	1N60	1N60	ECG 109		
X7		B-30S (1N60S)	1N60	1N60	ECG 109		
X8		B-30S (1N60S)	1N60	1N60	ECG 109		

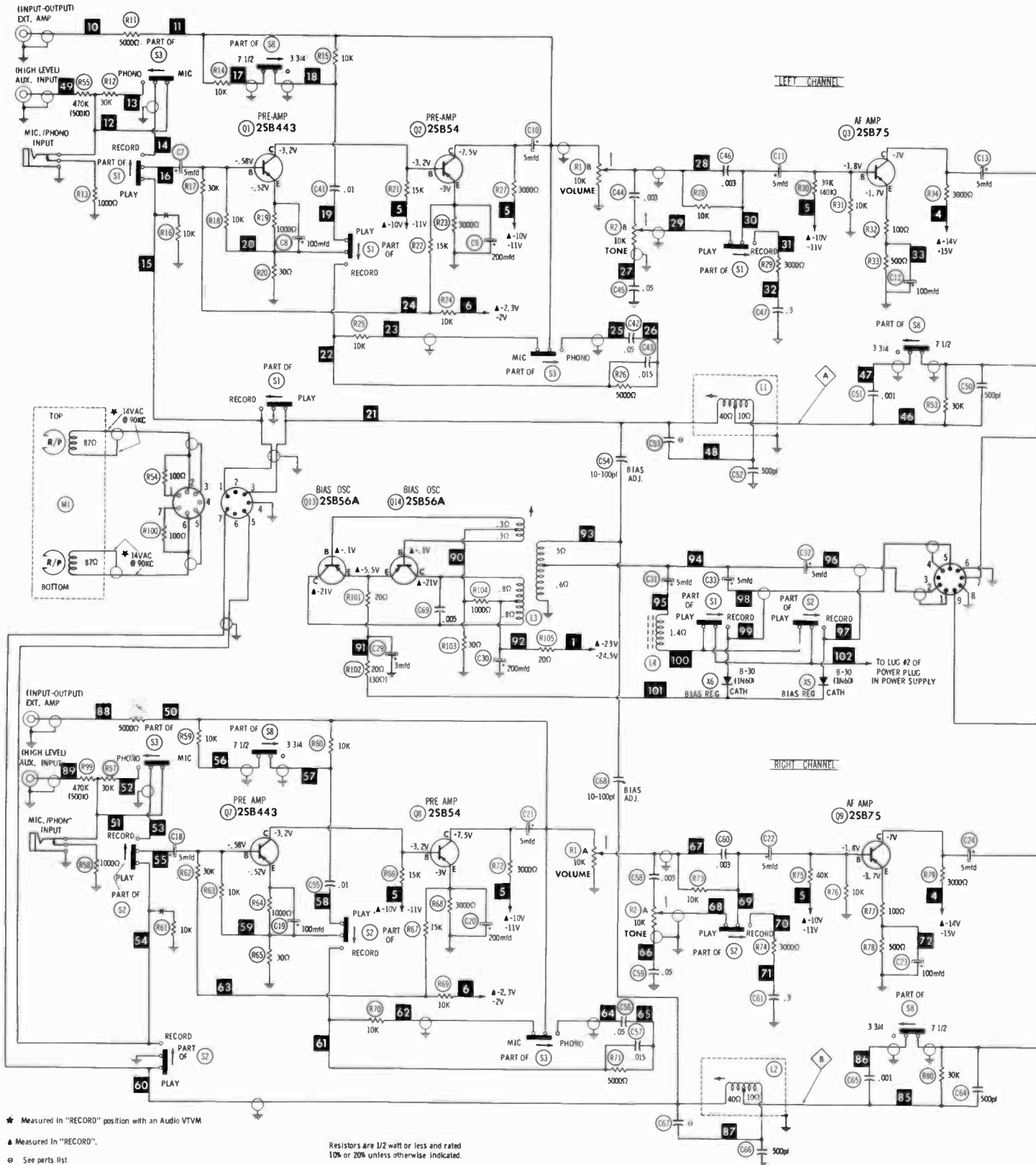
ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		Lafayette PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	2000 30V	B-149			BR2000-50			
C2	200 25V	B-85			BR250-25		MTV200DJ25	
C3	200 25V	B-85			BR250-25		MTV200DJ25	
C4	1000 15V	B-1167						
C5	500 15V	B-86	BCD15500		BR500-15		TC1505A	
C6	100 15V	B-73	BCD15100	EP15-100	NLW100-15	MT1-19	MTV100CF15	TE-1162
C7	5 6V	B-75	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C8	100 3V	B-81	BCD3100	EP6-100	NLW100-3	MT1-18	MTV100CB6	TE-1059.5
C9	200 6V	B-655	BCD6200	EA6-250	NLW200-12		MTV200CK10	TE-1104
C10	5 15V	B-74	BCD15005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1152
C11	5 6V	B-75	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C12	100 3V	B-81	BCD3100	EP6-100	NLW100-3	MT1-18	MTV100CB6	TE-1059.5
C13	5 15V	B-74	BCD15005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1152
C14	200 6V	B-655	BCD6200	EA6-250	NLW200-12		MTV200CK10	TE-1104
C15	1 25V	B-1173	BCD25001		NLW1-50	MT1-1	MTV1CB50	TE-1200
C16	500 15V	B-86	BCD15500		BR500-15		TC1505A	
C17	150 3V	B-113	BCD3150	EP6-100	NLW150-3	MT1-21	MTV150CD3	TE-1061
C18	5 6V	B-75	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C19	100 3V	B-81	BCD3100	EP6-100	NLW100-3	MT1-18	MTV100CB6	TE-1059.5
C20	200 6V	B-655	BCD6200	EA6-250	NLW200-12		MTV200CK10	TE-1104
C21	5 15V	B-74	BCD15005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1152
C22	5 6V	B-75	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C23	100 3V	B-81	BCD3100	EP6-100	NLW100-3	MT1-18	MTV100CB6	TE-1059.5
C24	5 15V	B-74	BCD15005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1152
C25	200 6V	B-655	BCD6200	EA6-250	NLW200-12		MTV200CK10	TE-1104
C26	1 25V	B-1173	BCD25001		NLW1-50	MT1-1	MTV1CB50	TE-1200
C27	500 15V	B-86	BCD15500		BR500-15		TC1505A	
C28	150 3V	B-113	BCD3150	EP6-100	NLW150-3	MT1-21	MTV150CD3	TE-1061
C29	3 25V	B-608	BCD25003	EP50-2	NLW3-25	MT1-3	MTV3CB50	TE-1201.1
C30	200 25V	B-85			BR250-25		MTV200DJ25	
C31	5 15V	B-74	BCD15005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1152
C32	5 15V	B-74	BCD15005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1152
C33	5 15V	B-74	BCD15005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1152

(CONTINUED ON PAGE 76)

LAFAYETTE MODEL RK-860 (99-1530WX)

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



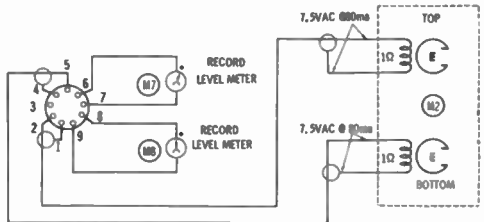
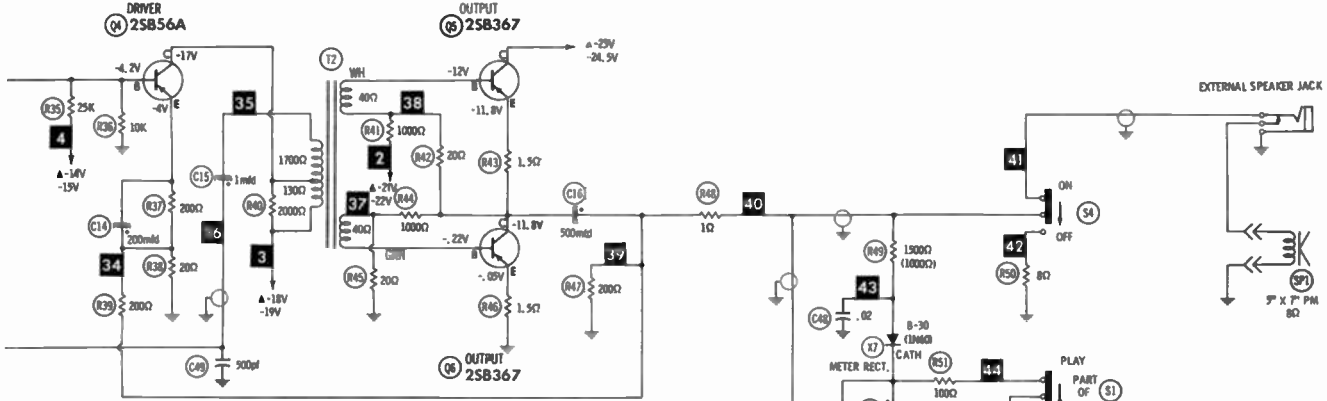
- ★ Measured in "RECORD" position with an Audio VTVM
 - ▲ Measured in "RECORD".
 - ⊙ See parts list.
 - 1. Voltage measurements taken with vacuum tube voltmeter.
 - 2. All controls set for normal operation, no signal applied.
 - 3. Measured values are from socket pin or terminal to common ground.
 - 4. All terminals viewed from bottom unless otherwise designated.
 - 5. Numbers assigned to terminals may not be found on the unit.
 - 6. Supply voltage maintained at rated value for voltage readings.
 - 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.
 - 8. All measurements taken in "PLAY" unless otherwise indicated.
- A PHOTOFACIT STANDARD NOTATION SCHEMATIC
with **Circuitrace**

Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

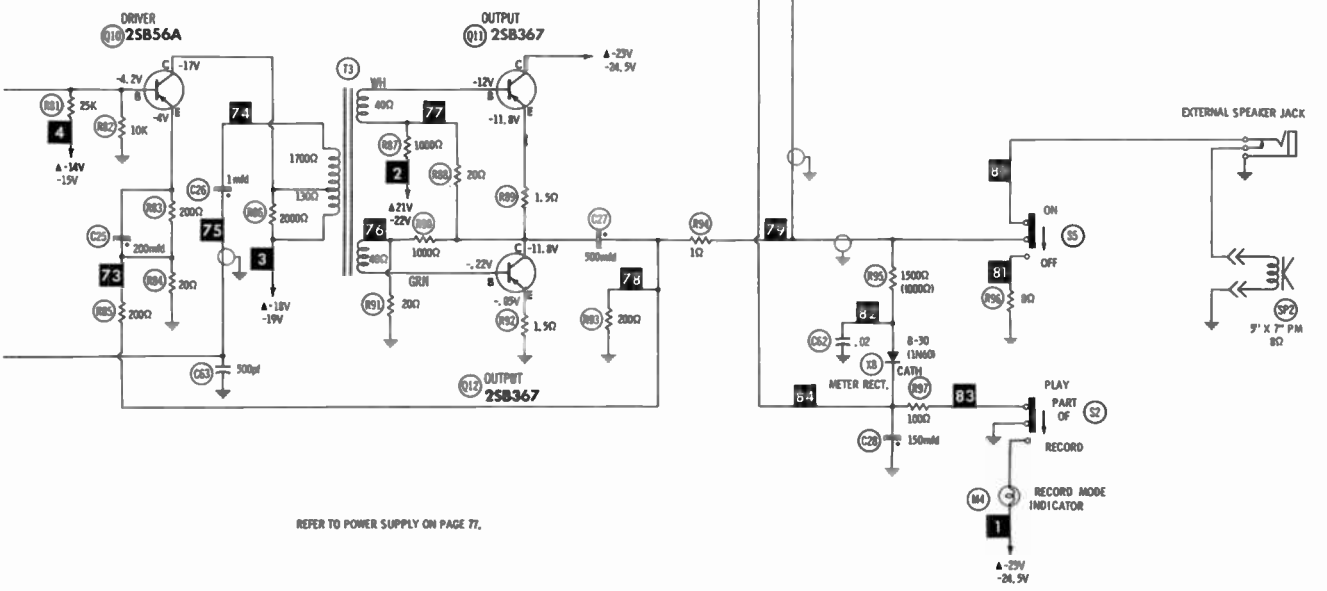
Arrows at controls indicate clockwise rotation viewed from actuator end.

Switches viewed from end opposite control knob or actuator.

LEFT CHANNEL



RIGHT CHANNEL



REFER TO POWER SUPPLY ON PAGE 77.

LAFAYETTE MODEL RK-860 (99-1530WX)

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA						
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.	
C41	.01 50V	B-97 (1)	TTP-01	CK-103	HOY1012V103P	CCD-103	TA110	TG-S10	
C42	.05 50V		TTP-05	CK-503	HCZ3ROXR503P	CCD-503	TA150	TG-S50	
C43	.015 50V		GPD Z5U153P	DD-153	BYT6012U153Z	CCD-153	GP115	10TS-S15	
C44	.003 50V		GPD X5R302K	DM-302	BYS6012U302P	CCD-302	GP230	10TS-D30	
C45	.05 50V		TTP-05	CK-503	HCZ3ROXR503P	CCD-503	TA150	TG-S50	
C46	.003 50V		GPD X5R302K	DM-302	BYS6012U302P	CCD-302	GP230	10TS-D30	
C47	.3 50V		V1612P33		OMF2P33	2DP-5-334	PVC2033	2PS-P33	
C48	.02 50V		TTP-02	CK-203	HOR1012V203P	CCD-203	TA120	TG-S20	
C49	500 50V		GPD X5F501K	DD-501	JBZ601YP501K	CCD-501	GP350	10TS-T50	
C50	500 50V		GPD X5F501K	DD-501	JBZ601YP501K	CCD-501	GP350	10TS-T50	
C51	.001 50V		GPD X5F102K	DM-102	JBS601YP102K	CCD-102	SM210	5GAB-D10	
C52	500 50V		GPD X5F501K	DD-501	JBZ601YP501K	CCD-501	GP350	10TS-T50	
C53									
C54	10-100		B-97 (1)	TTP-01	CK-103	HOY1012V103P	CCD-103	TA110	TG-S10
C55	.01 50V			TTP-05	CK-503	HCZ3ROXR503P	CCD-503	TA150	TG-S50
C56	.05 50V			GPD Z5U153P	DD-153	BYT6012U153Z	CCD-153	GP115	10TS-S15
C57	.015 50V			GPD X5R302K	DM-302	BYS6012U302P	CCD-302	GP230	10TS-D30
C58	.003 50V			TTP-05	CK-503	HCZ3ROXR503P	CCD-503	TA150	TG-S50
C59	.05 50V			GPD X5R302K	DM-302	BYS6012U302P	CCD-302	GP230	10TS-D30
C60	.003 50V			V1612P33		OMF2P33	2DP-5-334	PVC2033	2PS-P33
C61	.3 50V			TTP-02	CK-203	HOR1012V203P	CCD-203	TA120	TG-S20
C62	.02 50V			GPD X5F501K	DD-501	JBZ601YP501K	CCD-501	GP350	10TS-T50
C63	500 50V			GPD X5F501K	DD-501	JBZ601YP501K	CCD-501	GP350	10TS-T50
C64	500 50V			GPD X5F102K	DM-102	JBS601YP102K	CCD-102	SM210	5GAB-D10
C65	.001 50V			GPD X5F501K	DD-501	JBZ601YP501K	CCD-501	GP350	10TS-T50
C66	500 50V								
C67									
C68	10-100			B-97 (1)	TTP-005	CK-502	HOY1012V502P	4DP-3-104	TA250
C69	.005		DBE4P1			DMF4P1		PVC601	4PS-P10
C70	.1 400V								

(1) Lafayette Part Number.

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESIST-ANCE	REPLACEMENT DATA				
			Lafayette PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1A	Volume, Right	10K	B-1162				
B	Volume, Left	10K					
C	Switch						
R2A	Tone, Right	10K	B-1163				
B	Tone, Left	10K					

COILS (RF-IF)

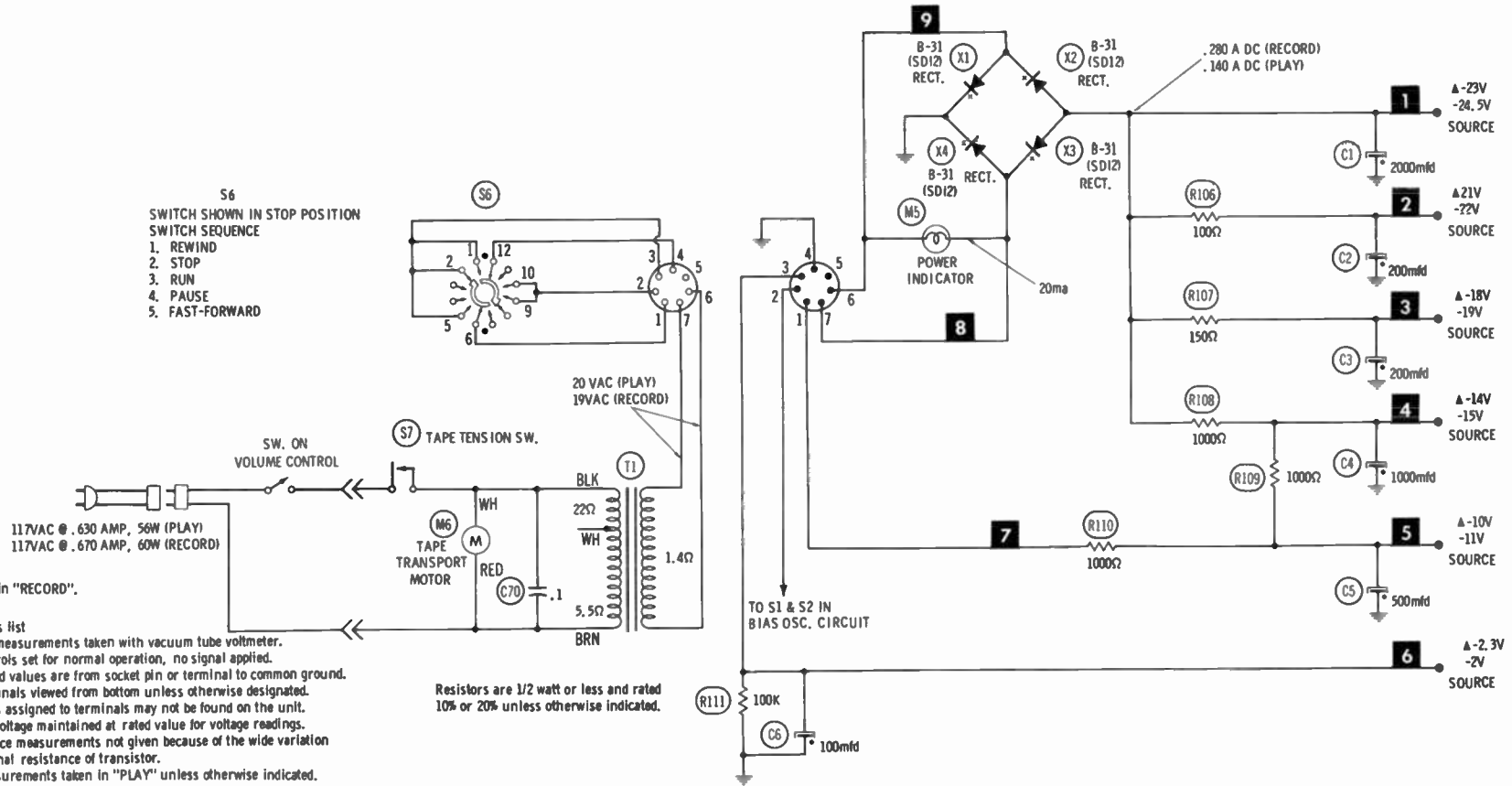
ITEM No.	USE	REPLACEMENT DATA			
		PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Wave Trap	B-68			
L2	Wave Trap	B-68			
L3	Bias Oscillator	B-632			
L4	Dummy Coil	B-648			

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	Lafayette PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC @.670A	20VAC @.280A DC		B-34A					

(CONTINUED ON PAGE 78)

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



S6
SWITCH SHOWN IN STOP POSITION
SWITCH SEQUENCE
1. REWIND
2. STOP
3. RUN
4. PAUSE
5. FAST-FORWARD

▲ Measured in "RECORD".

- ⊙ See parts list
- 1. Voltage measurements taken with vacuum tube voltmeter.
- 2. All controls set for normal operation, no signal applied.
- 3. Measured values are from socket pin or terminal to common ground.
- 4. All terminals viewed from bottom unless otherwise designated.
- 5. Numbers assigned to terminals may not be found on the unit.
- 6. Supply voltage maintained at rated value for voltage readings.
- 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.
- 8. All measurements taken in "PLAY" unless otherwise indicated.

Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

A PHOTOFACIT STANDARD NOTATION SCHEMATIC

with **CIRCUITRACE**

© Howard W. Sams & Co., Inc. 1968

LAFAYETTE MODEL RK-860 (99-1530WX)

POWER SUPPLY

LAFAYETTE MODEL RK-860 (99-1530WX)

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	Lafayette	MERIT	STANCOR	THORDARSON	TRIAD	
				PART No.	PART No.	PART No.	PART No.	PART No.	
T2	2.7 Feedback Winding 1700 ohms DC Resistance	1	1	B-1187					
T3	2.7 Feedback Winding 1700 ohms DC Resistance	1	1	B-1187					

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA			NOTES
				Lafayette PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5" X 7"	PM	8 ohms	A-1046	P5X7V8	57A15Z8	
SP2	5" X 7"	PM	8 ohms	A-1046	P5X7V8	57A15Z8	

TAPE HEADS

ITEM NO.	MEASURED			Lafayette PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	78mh	14Vrms	90KC	C-145	1002 & QK-66	4-Track Stereo Record/Play
M2	.21mh	7.5Vrms	90KC	C-123	1402 & QK-19	4-Track Stereo Erase

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M3	Lamp	B-1168	Record Indicator, Left
M4	Lamp	B-1168	Record Indicator, Right
M5	Lamp	B-17	Power Indicator
M6	Motor	C-1068	Tape Transport
M7	Meter	C-1148	Record Level, Left
M8	Meter	C-1148	Record Level, Right
S1	Switch	B-602	Record/Play, Left
S2	Switch	B-602	Record/Play, Right
S3	Switch	B-316	Mic/Phono Selector
S4	Switch	B-32	Speaker On/Off, Left
S5	Switch	B-32	Speaker On/Off, Right
S6	Switch	C-1029	Mode Selector (Rewind/Stop/Run/Pause/Fast Forward)
S7	Switch	C-1039	Automatic Tape Shut off
S8	Switch	C-1125	Equalization

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)



PHOTOFACT[®] with

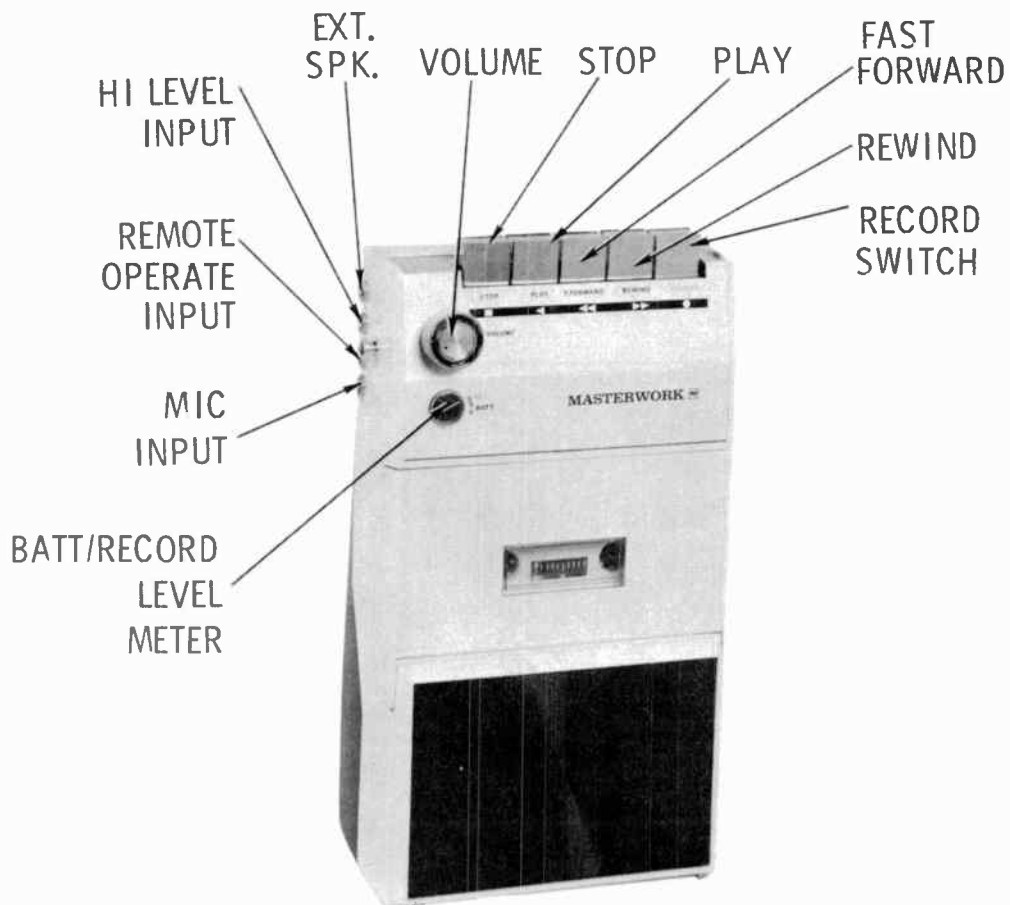
CIRCUITRACE[®]

TRADE NAME : Masterwork Model M650
SUPPLIER : For Current Address, See Annual Index
TYPE SET : 2-Track Monaural Recorder
POWER SUPPLY : 7.5 Volts DC or 110-120 Volts AC, 60 Cycles
RATING : 2 Watts, 45ma @ 117VAC

This unit is a cartridge-type, two-track, monaural recorder having a speed of 1 7/8 ips. Automatic recording level is provided.

Jacks are provided for both low- and high-level inputs, external speaker, and remote operation.

Power is supplied by five, 1 1/2-volt "C" cells or 110 - 120 volts AC, 60 cycles.

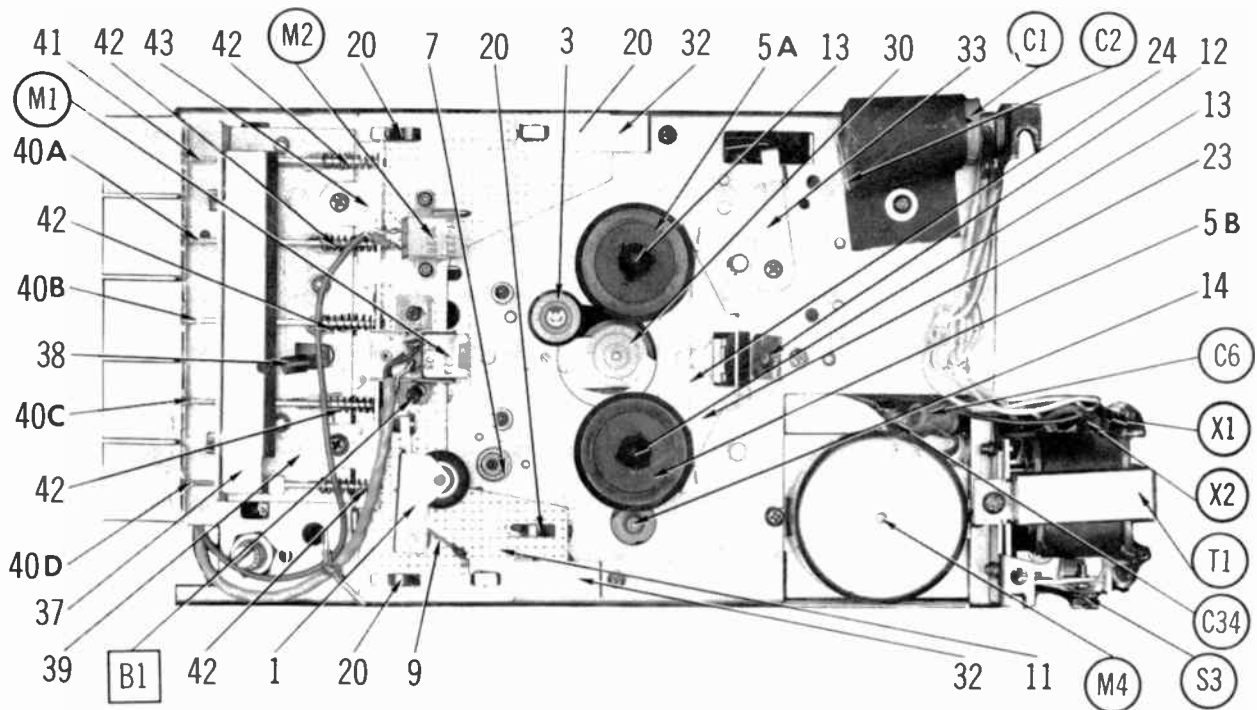
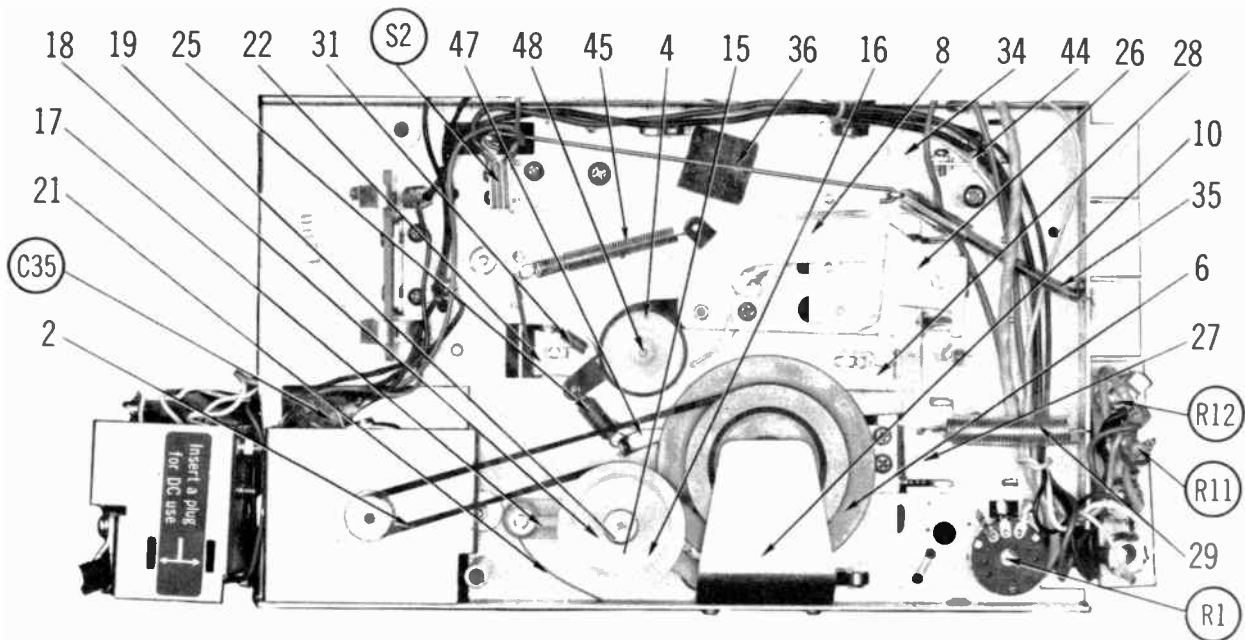


MASTERWORK MODEL M650

HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

© 1968 Howard W. Sams & Co., Inc. Printed in U. S. of America C996

World Radio History



OPERATING INSTRUCTIONS

Record

1. Press Stop button and insert the cassette (with an unbroken safety tab) closed side first.
2. Connect a recording source, move the remote switch on the microphone to Off, and press Play and Record buttons simultaneously.

3. Move the remote switch to the on position and record. The unit will maintain proper recording level automatically.

Play

1. Repeat step 1 of "Record", press Play button, and adjust Volume control as desired.

DISASSEMBLY

1. Remove one Phillips screw from cabinet back, one from AC cordwell, and one from battery compartment.
2. Remove cabinet back.

3. Remove Volume knob and remove two Phillips screws from carrying strap buttons.
4. Remove two Phillips screws from bottom corners of chassis assembly and remove chassis.

SEQUENCE OF OPERATION

Play

Pressing the Play button slides Lever (40C), locked by Locker (37), to press Lever (22), pushing Arm (23) to release Rests (5A) and (5B). Arm (23) also actuates Switch (S2).

Lever (40C) also pushes Lever (27) to slide Panel (11), releasing Arm (17), pivoted by Spring (21), to press Shaft (14) against Rest (5B).

The motor, through Belt (2), Pulley (16), Felt (18), Plate (15), and Shaft (14), drives Rest (5B).

Panel (11) also moves Heads (M1) and (M2) against the tape and presses Roller (1) against the capstan.

Record

The Record sequence is the same as "Play" except an unbroken safety tab on the cassette pivots Lever (32) to pull Rod (36), pivoting Lever (34). Lever (34) allows Lever (41) to move, causing Lever (44) to actuate Switch (S1).

Fast Forward

Pressing the Fast Forward button slides Lever (40B), locked by Locker (37), to push Lever (22), pushing Arm (23) to release Rests (5A) and (5B). Arm (23) also actuates Switch (S2).

Lever (40B) also pivots Lever (47) to pull Spring (25), pulling Arm (28) to press Idler (4) against Flywheel (6) and Idler (30) against Rest (5B).

The motor, through Belt (2), Flywheel (6), Idler (4), Shaft (48), and Idler (30), drives Rest (5B).

Rewind

Pressing the Rewind button slides Lever (40A), locked by Locker (37), to push Lever (22), pushing Arm (23) to release Rests (5A) and (5B). Arm (23) also actuates Switch (S2).

Lever (40A) also pivots Lever (26) to pull Arm (28), pressing Idler (4) against Flywheel (6) and Idler (30) against Idler (3). Simultaneously, Lever (40A) releases Arm (8), pulled by Spring (45), to press Idler (3) against Rest (5A).

The motor, through Belt (2), Flywheel (6), Idler (4), Shaft (48), Idler (30), and Idler (3), drives Rest (5A).

Stop

Pressing the Stop button lifts Locker (37), allowing Springs (42), (29), (31), and (24) to reverse the "Play" or "Record" sequence. Springs (42), (24), (25), and (31) reverse "Fast Forward". Springs (42), (24), and (31) reverse "Rewind".

ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 1 7/8 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 1 7/8 ips with a spring scale applied to a point on an empty tape reel 1 inch from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 3/4 ounce. Controlled by condition of Felt (18).
Fast Forward Take-up Torque	Nominal value 3/4 ounce. Controlled by condition of Idler (4).
Rewind Torque	Nominal value 5/8 ounce. Controlled by condition of Belt (2).
Supply Reel Drag	Dependent on internal drag of cassette.
Take-up Reel Drag	Dependent on internal drag of cassette.
Pressure Roller Pressure	Nominal value 8 ounces. Controlled by tension of Spring (9).
Brake Torque	Measured in Stop, counterclockwise on supply spindle and clockwise on the take-up spindle. Nominal value 1 ounce. Controlled by tension of Spring (24).
Erase Head Height	No adjustment provided.
Erase Head Azimuth	No adjustment provided.
Record/ Play Head Height	No adjustment provided.
Record/ Play Head Azimuth	Play an azimuth test cartridge, connect an AC VTVM across speaker and adjust B1 for maximum peak.
Erase Current	Nominal value 13ma (9V rms) in head. No adjustment provided.
Record Bias	Nominal value 2.9V rms (1.3ma). No adjustment provided.
Bias Oscillator	Nominal frequency 33KC. No adjustment provided.
Automatic Record Level/ Record Level Indicator Calibration	Record a 1000-cycle tone at .0015V rms applied to the mic input. Then record a second tone at .003V rms. Play back both tones with an AC VTVM across speaker. Playback level of both tones should not vary more than 2db. Record/Batt Level Indicator should indicate a recording level for both tones slightly below normal maximum.

CLEANING

LUBRICATING

HEAD DEMAGNETIZING

Refer to "General Servicing Information" on page 4.

TROUBLE CHART

IMPORTANT : Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Felt (18) dirty or worn. 2. Rest (5B) dirty, worn, or binding. 3. Shaft (14) dirty, worn, or binding.
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> 1. Idler (30) dirty or worn. 2. Idler (4) dirty or worn. 3. Shaft (48) binding.
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Rest (5A) worn, dirty, or binding. 2. Idler (3) worn, dirty or binding.
Tape is pulled from cassette.	<ol style="list-style-type: none"> 1. Capstan dirty. 2. Cassette defective.
Reels do not stop immediately when Stop button is pressed.	<ol style="list-style-type: none"> 1. Arm (23) dirty. 2. Spring (24) weak.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Belt (2) dirty, worn, or broken. 2. Motor defective or not supplied with power. 3. Bearing (7) binding.
Tape rides up and down between capstan and pressure roller.	<ol style="list-style-type: none"> 1. Roller (1) worn. 2. Capstan bent. 3. Excessive take-up torque.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Roller (1) worn. 2. Motor defective. 3. Flywheel (6) binding. 4. Belt (2) worn or dirty. 5. Cassette defective.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Head (M1) dirty, misaligned, or defective. 2. Amplifier defective. 3. Bias Oscillator defective.
Erase weak or inoperative.	<ol style="list-style-type: none"> 1. Head (M2) dirty or defective. 2. Head (M2) not being supplied with current.

MASTERWORK MODEL M650

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	65051	Pinch Roller Arm Assembly	26	65034	Fast Forward Function Lever B
2	65012	Rubber Belt	27	65055	Head Panel Function Lever
3	65043	Rewind Idler	28	65036	Fast Forward Idler Arm Ass'y.
4	65037	Fast Forward Idler (Bottom)	29	65056	Head Panel Spring
5	65014	Reel Rest (2 used)	30	65039	Fast Forward Idler (Top)
6	6507	Flywheel	31	65041	Brake Function Lever Spring
7	6508	Flywheel Metal (Bearing)	32	65057	Head Panel Holder (2 used)
8	65044	Rewind Idler Arm	33	65059	Recording Safety Lever B
9	65052	Pinch Roller Arm Assembly Spring	34	65060	Recording Safety Lever A
10	65011	Flywheel Bracket	35	65061	Recording Safety Lever Spring
11	65015	Head Panel	36	65063	Connection Rod
12	65053	Cassette Holder Spring	37	65064	Push-Button Lever Locker
13	65017	Reel Rest Cap (2 used)	38	65065	Push-Button Lever Locker Spring
14	65018	Wind Pulley Shaft	39	65066	Push-Button Lever Frame A
15	65020	Clutch Plate	40	65067	Push-Button Lever (4 used)
16	65021	Wind Pulley	41	65068	Record Push-Button Lever
17	65019	Wind Pulley Arm	42	65069	Push-Button Lever Spring (5 used)
18	65022	Clutch Felt	43	65070	Push-Button Lever Frame B
19	65023	Clutch Spring	44	65071	Record Function Lever Spring
20	65054	Head Panel Roller (4 used)	45		Rewind Idler Arm Spring
21	65026	Wind Pulley Arm Spring	46		Fast Forward Function Lever C
22	65027	Brake Function Lever	47	6505	Fast Forward Idler Shaft
23	65028	Brake Arm	48	65038	
24	65030	Brake Arm Spring			
25	65031	Fast Forward Idler Spring			

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

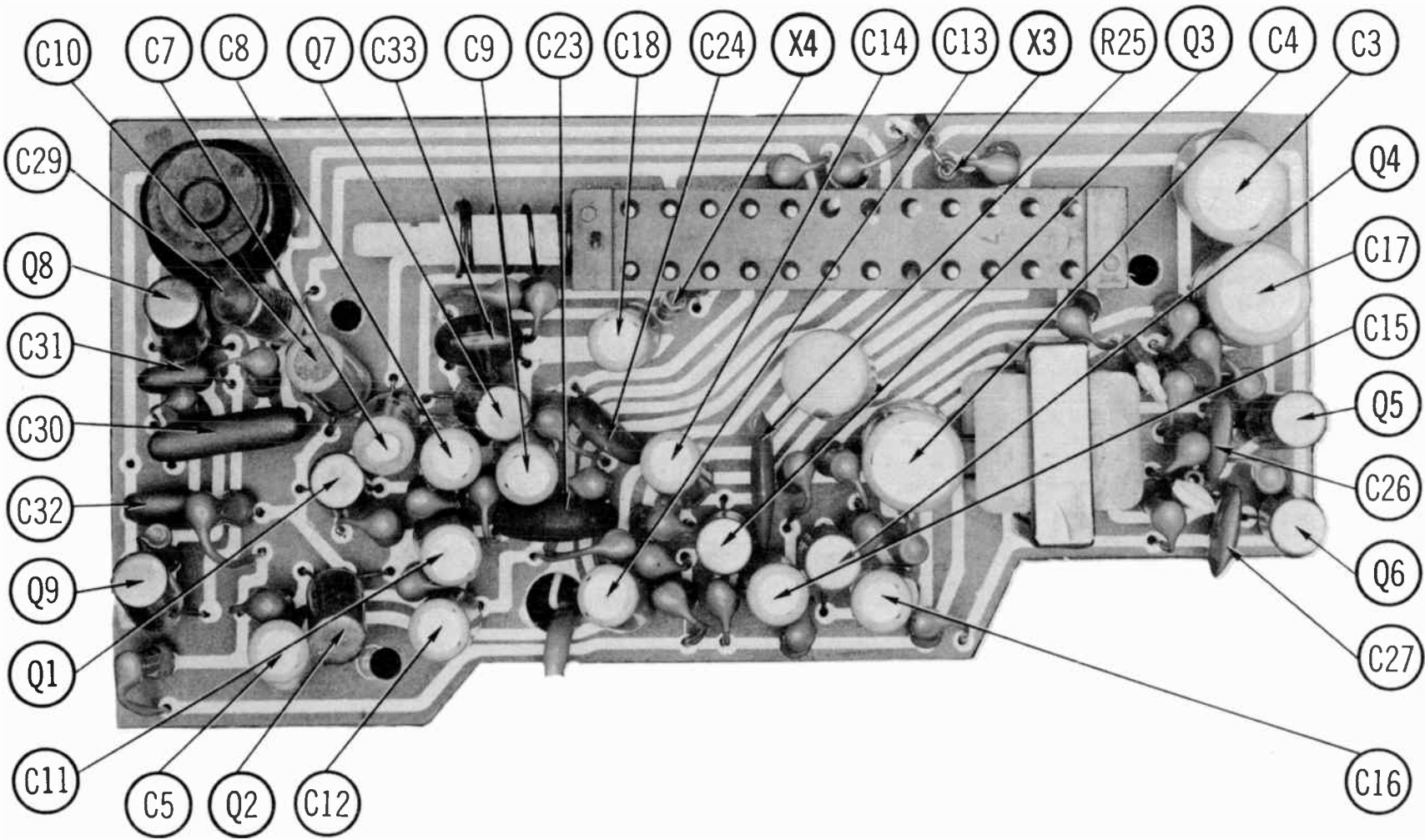
TRANSISTORS

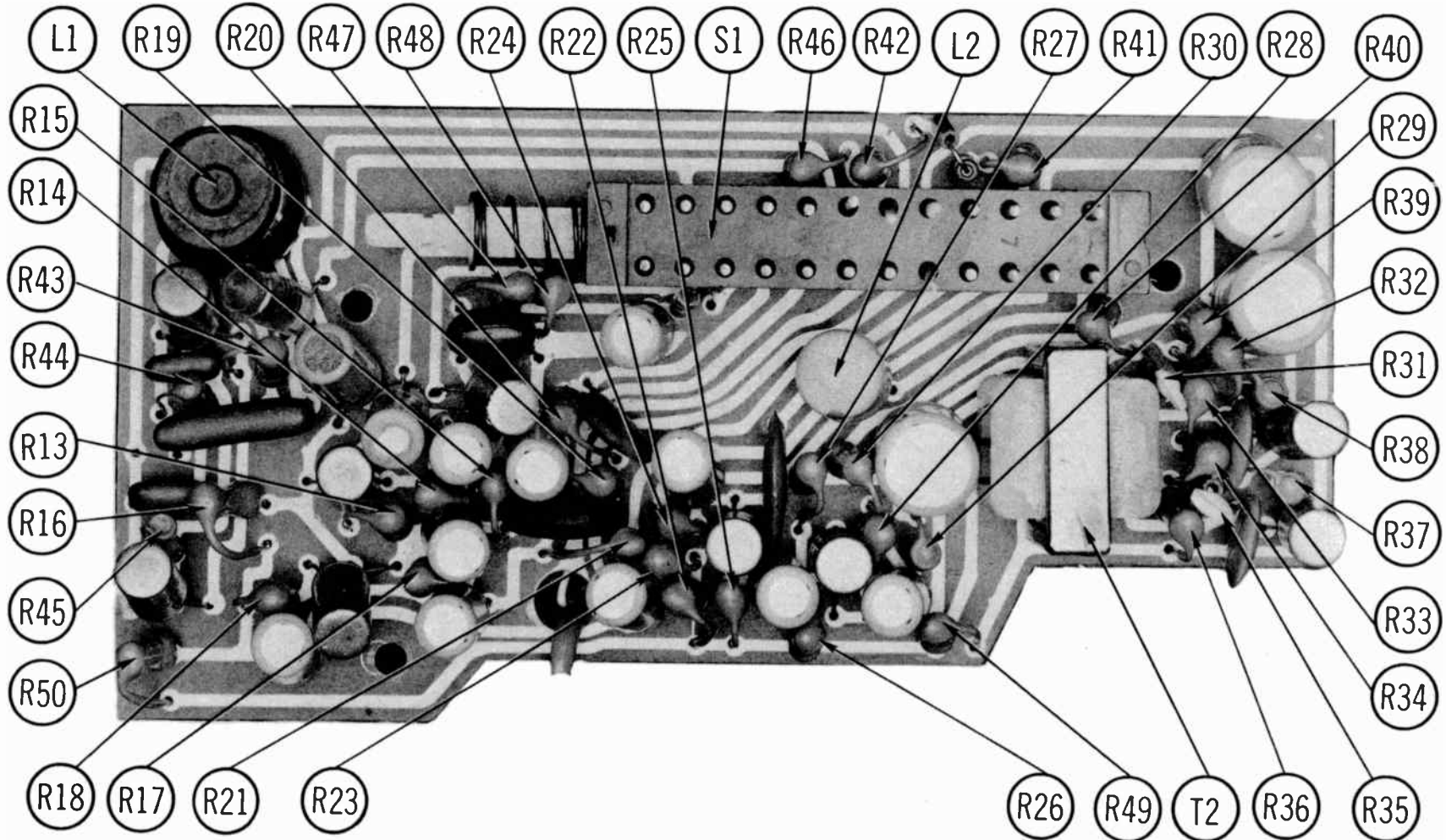
ITEM No.	TYPE No.	FUNCTION	REPLACEMENT DATA					
			MFG. PART No.	DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SYLVANIA PART No.
Q1	2SB173	Preamp	650-108	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q2	2SB175	AF Amp	650-107	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q3	2SB175	AF Amp	650-107	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q4	2SB172	Driver	650-106	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q5	2SB475	Output	650-105	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q6	2SB475	Output	650-105	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q7	2SD31	ARL Control	650-109	DS-66	GE-8	TR-19	SK-3010	ECG 103
Q8	2SB475	Bias Oscillator	650-105	DS-26	GE-2	TR-14	SK-3004	ECG 102
Q9	2SB475	Bias Oscillator	650-105	DS-26	GE-2	TR-14	SK-3004	ECG 102

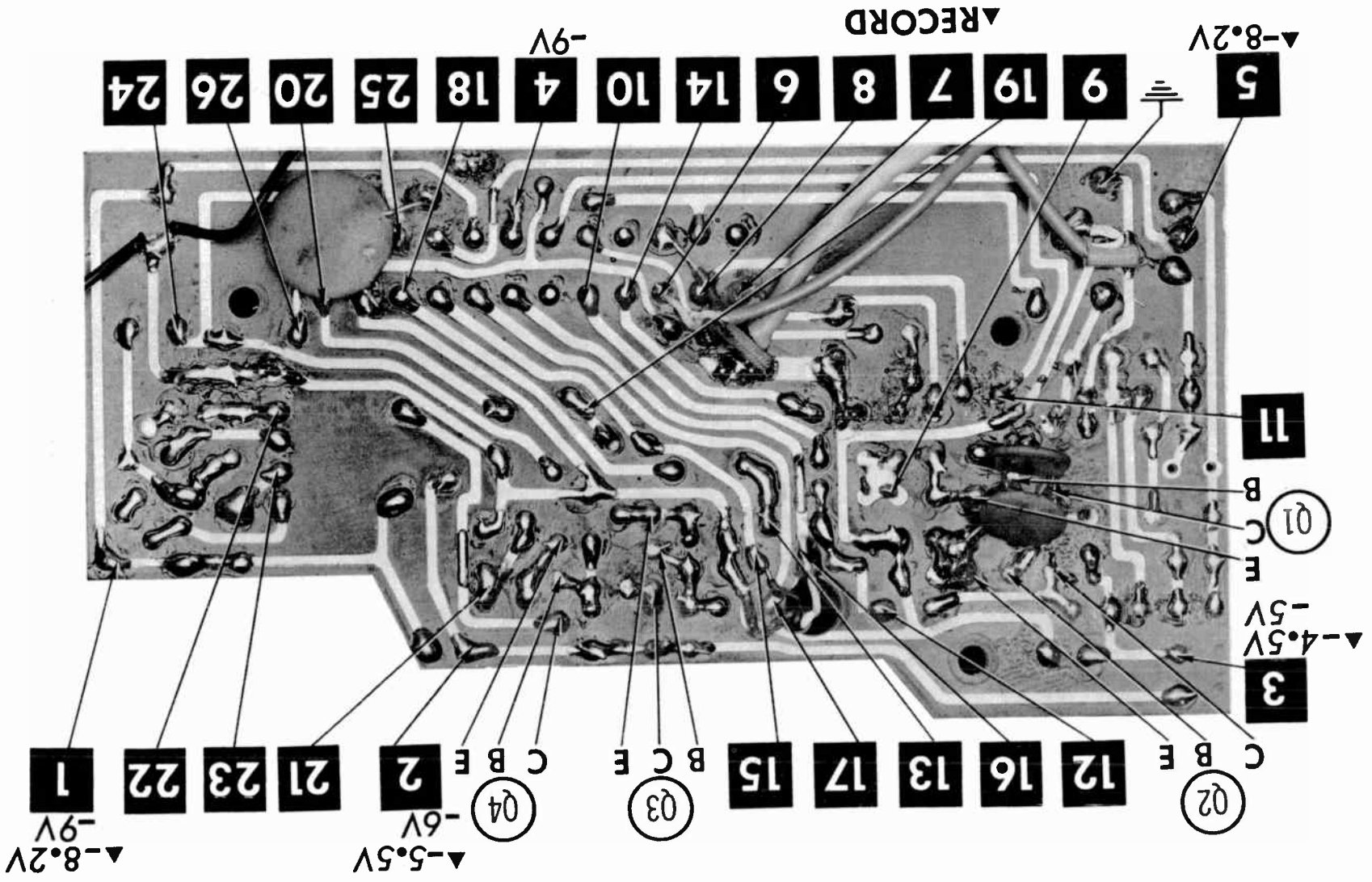
POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MFG. PART OR TYPE No.	REPLACEMENT RECTIFIERS & DIODES			REPLACEMENT RECTIFIERS		NOTES
		GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	SYLVANIA PART No.	RCA PART No.	SARKES TARZIAN PART No.	
X1	650-110 (T21312)	GE-504A	8D4 or 5A4-D	ECG 116 or ECG 117	SK-3030 or SK-3031	40C or F-4	
X2	650-110 (T21312)	GE-504A	8D4 or 5A4-D	ECG 116 or ECG 117	SK-3030 or SK-3031	40C or F-4	
X3	650-111 (T21313)	1N60	1N60	ECG 109			
X4	650-111 (T21313)	1N60	1N60	ECG 109			

(CONTINUED ON PAGE 90)

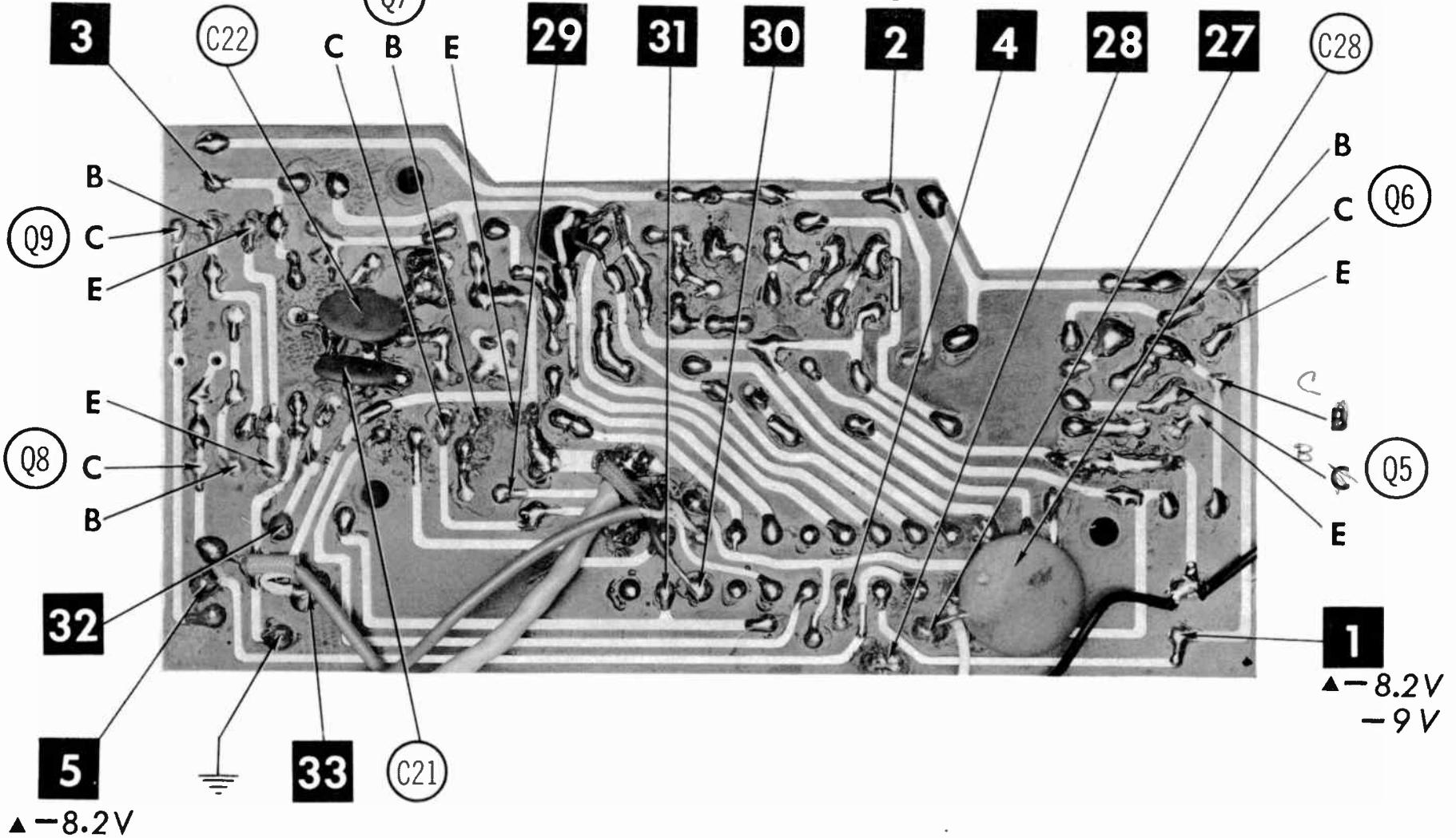






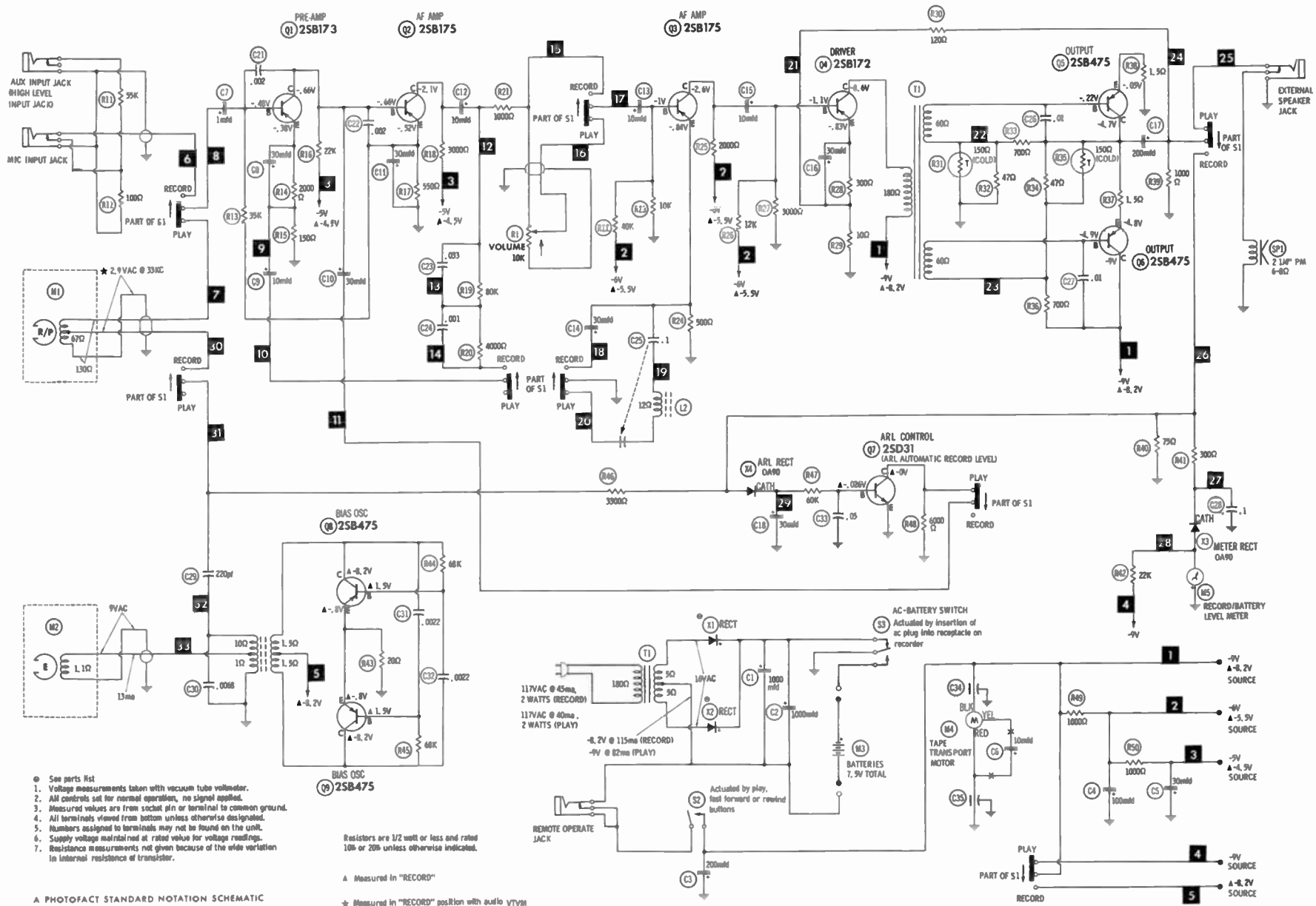
▲ - 4.5V
- 5V

▲ - 5.5V
- 6V



A Howard W. Sams **CIRCUITRACE** Photo

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



- See parts list
1. Voltage measurements taken with vacuum tube voltmeter.
 2. All controls set for normal operation, no signal applied.
 3. Measured values are from socket pin or terminal to common ground.
 4. All terminals viewed from bottom unless otherwise designated.
 5. Numbers assigned to terminals may not be found on the unit.
 6. Supply voltage measured at rated value for voltage readings.
 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

A Measured in "RECORD"

★ Measured in "RECORD" position with audio VTVM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with **CIRCUITRACE**
© Howard W. Sams & Co., Inc. 1968

MASTERWORK MODEL M650

MASTERWORK MODEL W650

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
			Masterwork PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	1000	10V	650-114 (T11432)						
C2	1000	10V	650-114 (T11432)						
C3	200	10V	650-115 (T11433)						
C4	100	10V	650-117 (T11435)						
C5	30	6V	650-118 (T11436)	BCD6025	EP6-25	NLW30-6		TT6X30	
C6	10	10V		BCD10010	EP15-10	NLW10-15		TT10X10	TE-1128
C7	1	6V	650-120 (T11438)	BCD6001	EP50-2	NLW1-6	MT1-1	TT6X1	
C8	30	6V	650-118 (T11436)	BCD6025	EP6-25	NLW30-6		TT6X30	
C9	10	6V	(1)	BCD6010	EP6-10	NLW10-6		TT6X10	TE-1087
C10	30	6V	650-118 (T11436)	BCD6025	EP6-25	NLW30-6		TT6X30	
C11	30	6V	650-118 (T11436)	BCD6025	EP6-25	NLW30-6		TT6X30	
C12	10	6V	(1)	BCD6010	EP6-10	NLW10-6		TT6X10	TE-1087
C13	10	6V	(1)	BCD6010	EP6-10	NLW10-6		TT6X10	TE-1087
C14	30	6V	650-118 (T11436)	BCD6025	EP6-25	NLW30-6		TT6X30	
C15	10	6V	(1)	BCD6010	EP6-10	NLW10-6		TT6X10	TE-1087
C16	30	6V	650-118 (T11436)	BCD6025	EP6-25	NLW30-6		TT6X30	
C17	200	6V	650-116 (T11434)						
C18	30	6V	650-118 (T11436)	BCD6025	EP6-25	NLW30-6		TT6X30	TE-1087

(1) Alternate 10mfd @ 3 Volts Part Number 650-119 (T11437).

CAPACITORS

ITEM No.	RATING		REMARKS	REPLACEMENT DATA					
				AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C21	.002	500V		GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C22	.022	500V		GPD X5F202K	DD-202	JBX601YP202K	CCD-202	GP220	10TS-D20
C23	.033			DBE4S33		DMF4S33	4DP-2-333	PVC6133	4PS-S33
C24	.001	500V		GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C25	.1	50V		TTP-1	CK-104	HOV101ZV104Z		TA010	TG-P10
C26	.01	50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C27	.01	50V		TTP-01	CK-103	HOY101ZV103P	CCD-103	TA110	TG-S10
C28	.1	50V		TTP-1	CK-104	HOV101ZV104Z		TA010	TG-P10
C29	220	250V		GPD X5F221K	DD-221	JBZ601YP221K	CCD-221	GP322	10TS-T22
C30	.0068	400V		6BE6D68	CPR-6800J	DMF6D68	6DP-1-682	PVC6268	6PS-D68
C31	.0022			GPD X5F222K	DD-222	JBX601YP222K	CCD-222	GP222	10TS-D22
C32	.0022			GPD X5F222K	DD-222	JBX601YP222K	CCD-222	GP222	10TS-D22
C33	.05	50V	(.047) (1)			MMF1S5	1DP-2-503		
C34									
C35									

(1) Alternate Value.

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESIST-ANCE	REPLACEMENT DATA				
			Masterwork PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume	10K	650-72				

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	Masterwork PART No.			IRC PART No.	WORKMAN PART No.	Masterwork PART No.
R31	150 (Cold) Thermistor		GM-150	650-112	R35	150 (Cold) Thermistor		GM-150	650-112

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		Masterwork PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Bias Oscillator	650-102 (T21311)			
L2	Equalization Choke	650-113 (T21314)			

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
				Masterwork PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
	PRI.	SEC. 1	SEC. 2						
T1	117VAC @45ma	16VAC/CT @.115ADC		650-81 (T2153)					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
				Masterwork PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
	PRI.	SEC. 1	SEC. 2						
T2	3.4	1	1	650-104 (T3189)					

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA			NOTES
				Masterwork PART No.	JENSEN PART No.	QUAM PART No.	
SP1	2 1/4"	PM	8 ohms	650-74 (T1222)	P20001		

TAPE HEADS

ITEM NO.	MEASURED			Masterwork PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	13mh (1) (Record) 55mh (1) (Play)	2.9Vrms	33KC	650-46		2-Track Monaural Record/Play
M2	1.1mh	9VDC		650-49		2-Track Monaural Erase (1) Center Tapped Winding

BATTERIES

ITEM No.	VOLTAGE	PART No.	REPLACEMENT DATA			NOTES
			BURGESS	EVEREADY	MALLORY	
M3	7.5 Volts	650-161	130 or AL-1	1035 or E93	M14R or MN1400	5 required

MISCELLANEOUS

ITEM No.	PART NAME	Masterwork PART No.	NOTES
M4	Motor	650-32	Tape Transport Record/Battery Level Indicator Record/Play Fast Forward AC/Battery
M5	Meter	M650-83	
S1	Switch	650-101	
S2	Switch		
S3	Switch		
	Printed Circuit Board	650-103	
	Microphone	650-97	
	Earphone	650-98	

CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

ITEM	PART No.	ITEM	PART No.
Case Assembly-Top	650-87 (T17308)	Leather Case and Strap	650-96 (T19310)
Case Assembly-Bottom	650-88 (T17309)	Push Button, Required	650-90
Lid Assembly	650-85 (T17307)	Knob, Volume	650-82
Speaker Grille	650-86 (T18777)		

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)

MASTERWORK MODEL M650



PHOTOFACT[®] with

CIRCUITRACE[®]

These units are four-track, monaural, cartridge-type tape recorders having two speeds: 1 7/8 and 3 3/4 ips.

Jacks are provided for microphone and auxiliary input/output. Earphone and remote control jacks are provided in Models YGB29A and YHB26A.

A power source of 110-120 volts AC, 60 cycles is required.

TRADE NAME : RCA Models YGB11T, YHB22T (Preamp. Ch. TCT-4, Amp. Ch. RS-217) YGB29A, YHB26A (Preamp. Ch. TCT-4, Amp. Ch. RS-217A)

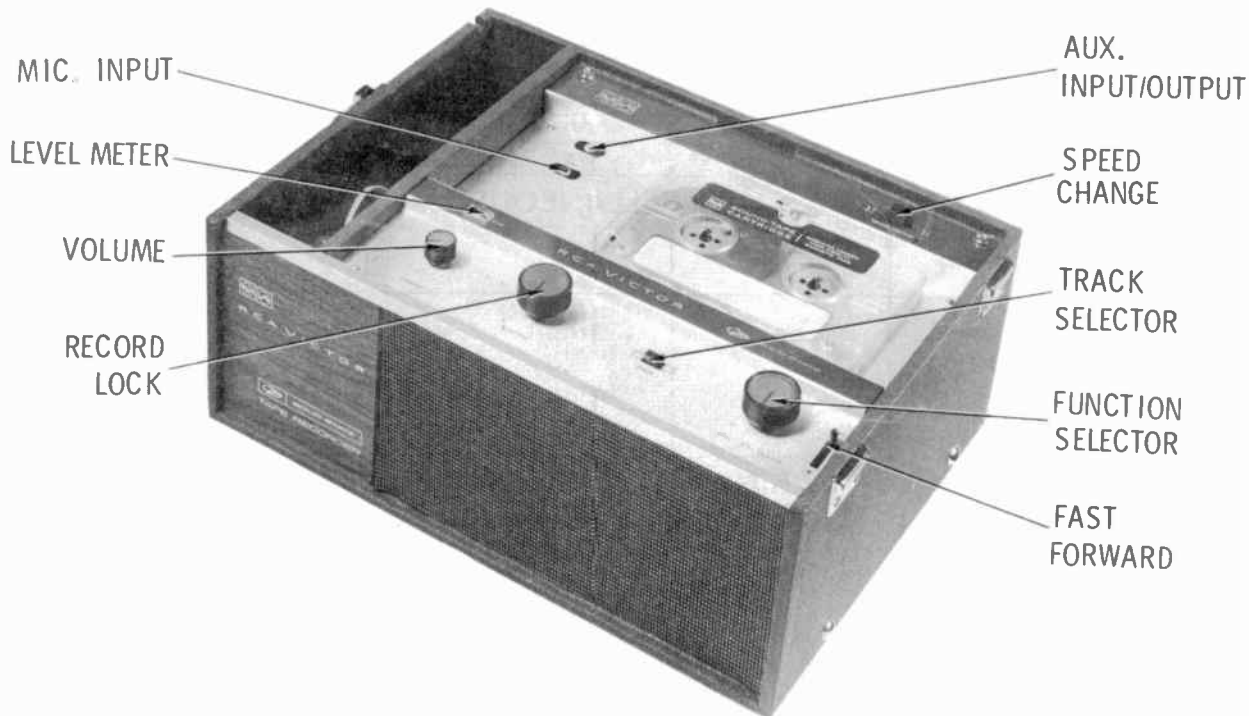
SUPPLIER : For Current Address, See Annual Index

TYPE SET : 2-Speed, 4-Track, Monaural Recorder

POWER SUPPLY : 110 - 120 Volts AC, 60 Cycles

RATING : 37 Watts, .48 Amp. @ 117 VAC (Play with Motor)
32 Watts, .45 Amp. @ 117 VAC (Record with Motor)

RCA MODELS YGB11T, YGB29A, YHB22T, YHB26A



HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

© 1968 Howard W. Sams & Co., Inc. Printed in U. S. of America C980

World Radio History

OPERATING INSTRUCTIONS

Record

1. Insert the cartridge (rear first) with open side forward, select the speed, and move Track Selector to 1 ab.
2. Connect a source, hold Record knob clockwise while moving Function Selector to Play, set the recording level with the Volume control, and record.

3. Move Track Selector to 2 ab to record the second track on each side.

Play

1. Insert cartridge, select the speed, select the track, and move Function Selector to Play.
2. Set Volume control to desired level.

DISASSEMBLY

1. Remove four knobs.
2. Remove five large Phillips screws from the edges of the deck plate.
3. Remove four small Phillips screws from the cartridge well and remove the deck plate.

4. Remove four, 1/4-inch hex screws from the edges of the deck assembly.
5. Lift deck, front edge first, from the cabinet and disconnect the speakers.

SEQUENCE OF OPERATION

Play

Turning the Function Selector to Play moves Pivot (6), pulled by Spring (8), to move the toggle plate, pulled by spring (7), which presses Detent (14), pulled by Spring (21).

Detent (14) moves Lever (13), through Spring (12), to move Bracket (10) and Roller (1), centered by Spring (11).

Pivot (6) slides Link (18) to move Lever (29), pulled by Spring (43), actuating the Off/On switch and pulling Link (28) to pivot Lever (27). Link (18) releases Latch (48), pulled by Spring (49), to pivot Latch (50), through Latch (48).

Detent (14) releases Lever (15) to release Slide (16), pulled by Spring (17), applying the pressure pads.

The motor, through the motor pulley, Belt (3), Pulley (39), Disc (51), and Felt (52), turns Turntable (5). Belt (3) also turns Flywheel (35).

Record

A cartridge tab or tape over the interlock notch on the cartridge moves Slide (53), pulled by Spring (49), to release Latch (47).

Turning the Record knob moves Latch (47) to be locked by Latch (50) as the Play sequence occurs and actuates the Play/Record switches.

Fast Forward

Moving the Fast Forward Lever (24) pushes Link (25) to pivot Lever (31), pulled by Spring (32). Lever (31) presses Spring (40) and also pulls Cord (30) to pivot Lever (27). Lever (27) pushes Link (28) to pivot Lever (29), pulled by Spring (43).

The motor, through the motor pulley, Belt (3), Pulley (39), Disc (51), and Felt (52), turns Turntable (5).

Rewind

Turning the Function Selector to Rewind moves Pivot (6), sliding Link (18) to move Lever (29), pulled by Spring (43), actuating the Off/On switch and pulling Link (28) to pivot Lever (27).

Pivot (6) pushes Link (19), moving Arm (37), pulled by Spring (38), to swing Roller (54), pressing Belt (3) to Pulley (41).

The motor, through the motor pulley, Belt (3), and Pulley (41), turns Turntable (4).

Automatic Shutoff

The tape, tightening at the end of the cartridge in Rewind or Record/Play, moves Lever (29) to pull Link (18), pulling Pivot (6). Pivot (6) is then centered by Spring (9), reversing the sequence initiated by Pivot (6).

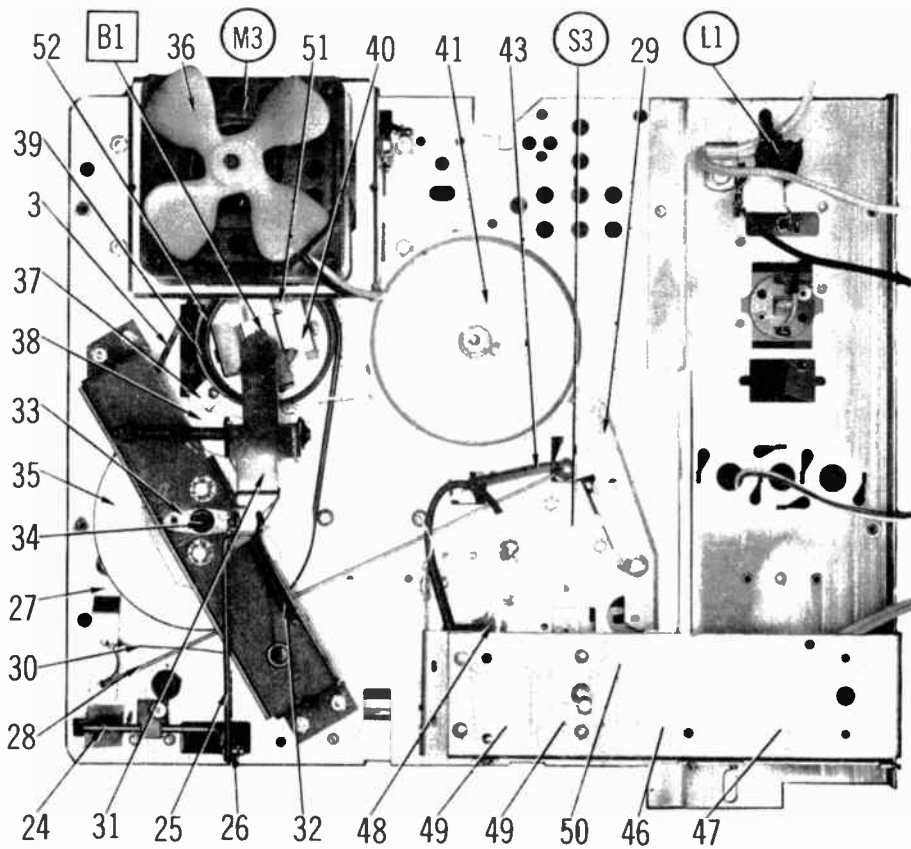
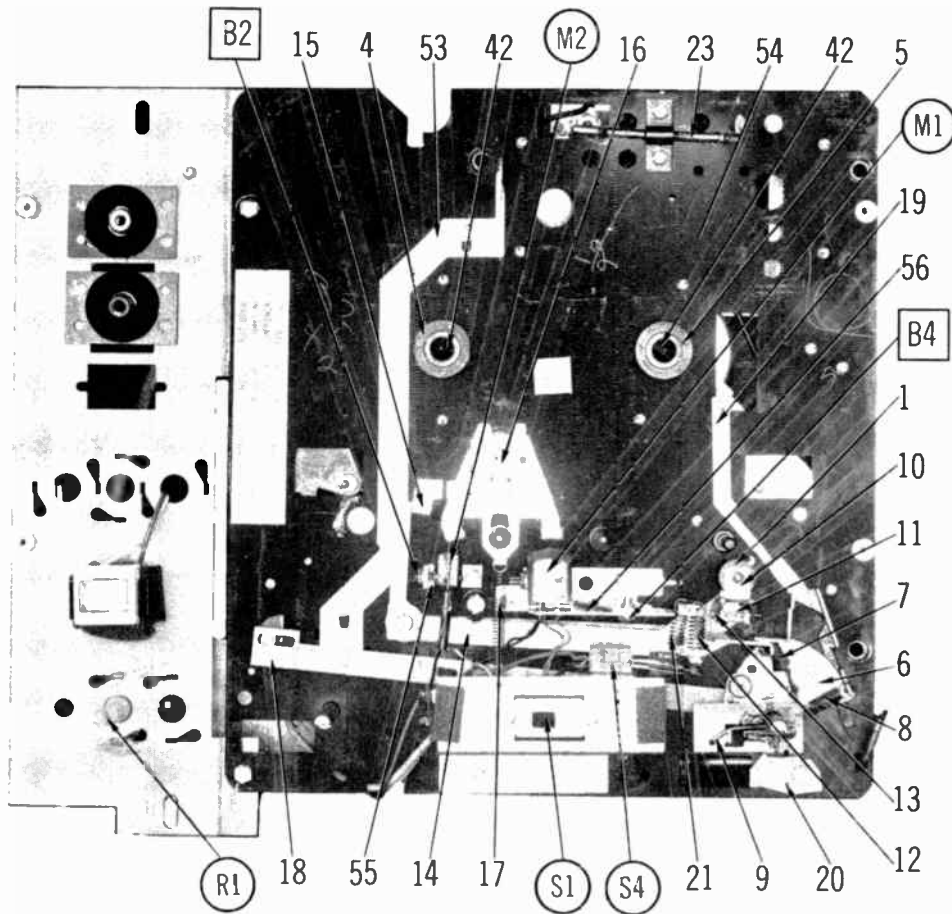
CLEANING

LUBRICATING

HEAD DEMAGNETIZING

Refer to "General Servicing Information" on page 4.

RCA MODELS YGB11T, YGB29A, YHB22T, YHB26A



ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 3 3/4 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 3 3/4 ips with a spring scale applied to a point on an empty tape reel 1 inch from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 2 1/2 ounces. Controlled by B1.
Fast Forward Take-up Torque	Nominal value 6 ounces. Controlled by pressure applied to Lever (24).
Rewind Torque	Nominal value 14 ounces. Controlled by tension of Spring (38) and condition of Belt (3).
Supply Reel Drag	Dependent on cartridge drag.
Take-up Reel Drag	Dependent on cartridge drag.
Pressure Roller Pressure	Nominal value 3 pounds. Controlled by tension of Spring (12).
Braking Torque	Measured in Stop. Nominal value 2 1/2 ounces, measured counterclockwise on supply reel. Nominal value 2 1/2 ounces, measured clockwise on take-up reel. Controlled by tension of spring (43) and condition of Belt (3).
Pressure Pad Pressure	Nominal value 3 ounces. Controlled by tension of spring (17).
Erase Head Height	Bottom of lower pole piece should be 15/32 above deck plate. Loosen B2 to make adjustment. Check for complete erasure and readjust as necessary.
Erase Head Azimuth	Pole piece should be perpendicular to lateral tape motion. Controlled by angle of Bracket (55).
Record/Play Head Height	Play a standard test cartridge and adjust B3 following directions on test cartridge.
Record/Play Head Azimuth	Play a standard test cartridge and loosen B4 and tilt bracket (56) following directions on test cartridge.
Erase Current	Nominal current 17ma (23V rms) measured in each section of Erase Head (M2). No adjustment.
Record Bias	Nominal bias 16V rms (.19ma) across each section of Record/Play Head (M1). No adjustment.
Bias Oscillator	Nominal frequency 58KC. No adjustment.
Record Level Indicator Calibration	Disable bias oscillator by shorting emitter to base of oscillator transistor. Apply a 1000-cycle tone to mike input. Adjust record level for .028V rms across record head. Normal peak level should be indicated on level meter. No adjustment.

RCA MODELS YGB11T, YGB29A, YHB22T, YHB26A

TROUBLE CHART

IMPORTANT: Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Tape moves erratically, or not at all in Play or Record.	<ol style="list-style-type: none"> 1. Belt (3) dirty or worn. 2. Pads on Slide (16) dirty or worn. 3. Felt (52) dirty or worn. 4. Springs lifting pins through Turntables (4) and (5) worn or damaged.
Tape does not move in Fast Forward.	<ol style="list-style-type: none"> 1. Spring (40) bent, touching the shaft of Turntable (5) when actuated. 2. Cord ((30) loose or broken.
Tape does not move in Rewind.	<ol style="list-style-type: none"> 1. Pulley (41) dirty or binding. 2. Roller (54) binding or damaged. 3. Motor pulley loose.
Record will not engage.	<ol style="list-style-type: none"> 1. Cartridge lockout tab intact. 2. Interlock Slide (53) damaged.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Flywheel (35) dirty or binding. 2. Motor switch defective. 3. Motor defective.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Turntable Bearings (42) binding. 2. Roller (1) deformed, worn, or dirty. 3. Capstan bent. 4. Motor defective. 5. Tape guides and pressure pads dirty or worn.
Function Selector will not latch in Play/Record position.	<ol style="list-style-type: none"> 1. Pressure Roller (1) worn or hardened. 2. Toggle catch on Control Pivot Assembly (6) worn. 3. Spring (7) weak or loose.
Function Selector will not latch in Rewind position.	<ol style="list-style-type: none"> 1. Link (19) damaged. 2. Spring (8) weak or loose.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Spring (17) weak. 2. Heads dirty or worn. 3. Defective wiring or circuitry.

MECHANICAL PARTS LIST

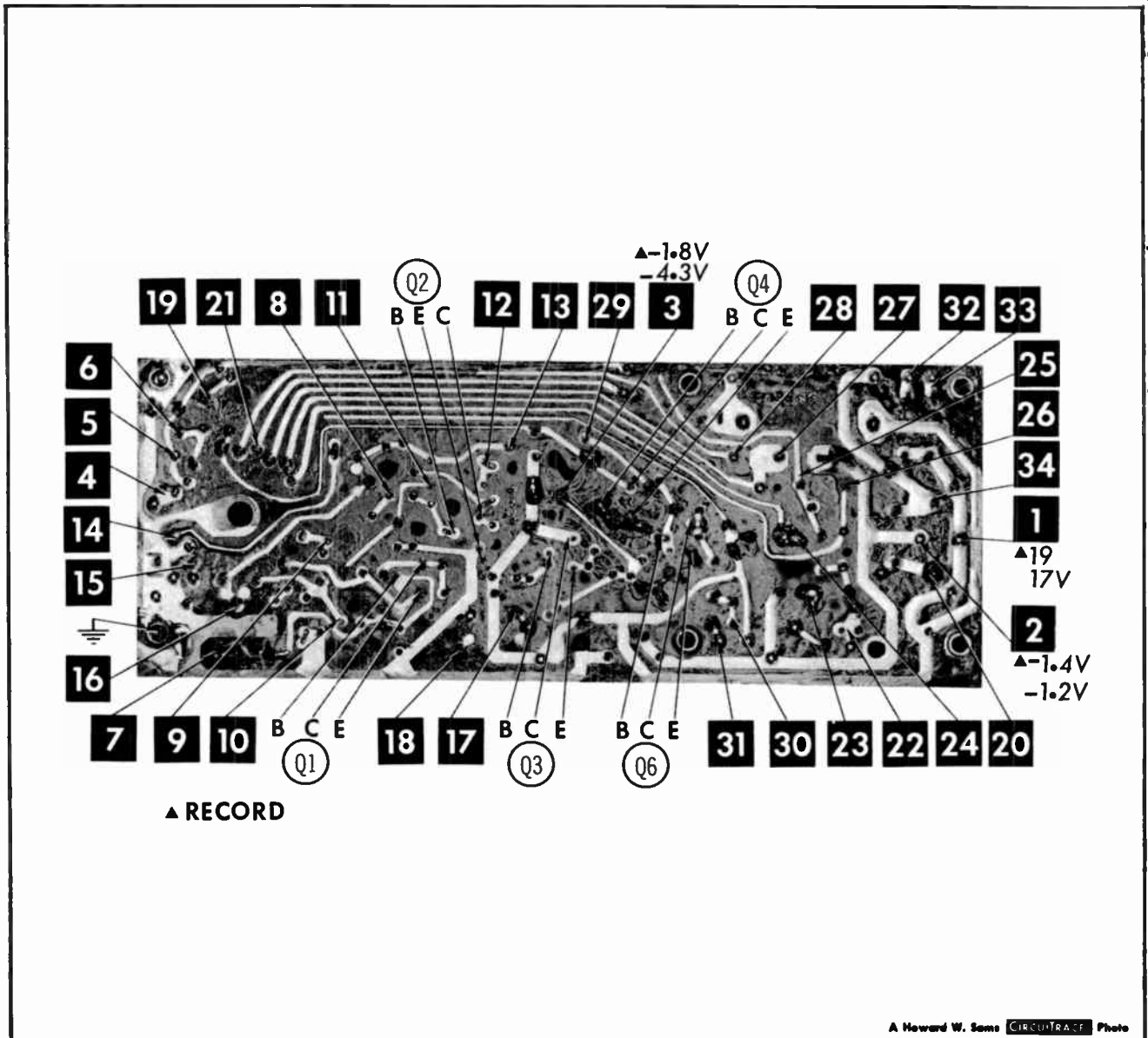
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1*	116370*	Pressure Roller *	14	111695	Toggle Detent, Cartridge Latch Lever
3	111206A	Drive Belt	15	116472	Pressure Pad Actuating Lever
4	110885	Left Turntable (Includes Spring, Washer, and Pin)	16	110430	Pressure Pad Slide (Includes Pads)
5	110886	Right Turntable (Includes Spring, Washer, and Pin)	17	116396	Pressure Pad Spring
6	116374	Control Pivot Assembly	18	116376	Shut-off Pin Link
7	110297	Toggle Spring	19	111696	Rewind Idler Link
8	110295A	Rewind Roller Actuating Lever Alignment Spring	20	116375	Trip Force Adjust Cam
9	110282	Control Detent Spring	21	110298	Toggle Detent Lever Spring
10	110278	Pressure Roller Bracket	23	116384	Speed Change Rod
11	116373	Pressure Roller Bracket Spring	24	116388	Fast Forward Lever
12	110296	Pressure Roller Spring	25	116390	Fast Forward Link
13	110279	Pressure Roller Lever	26	116391	Retainer Clip

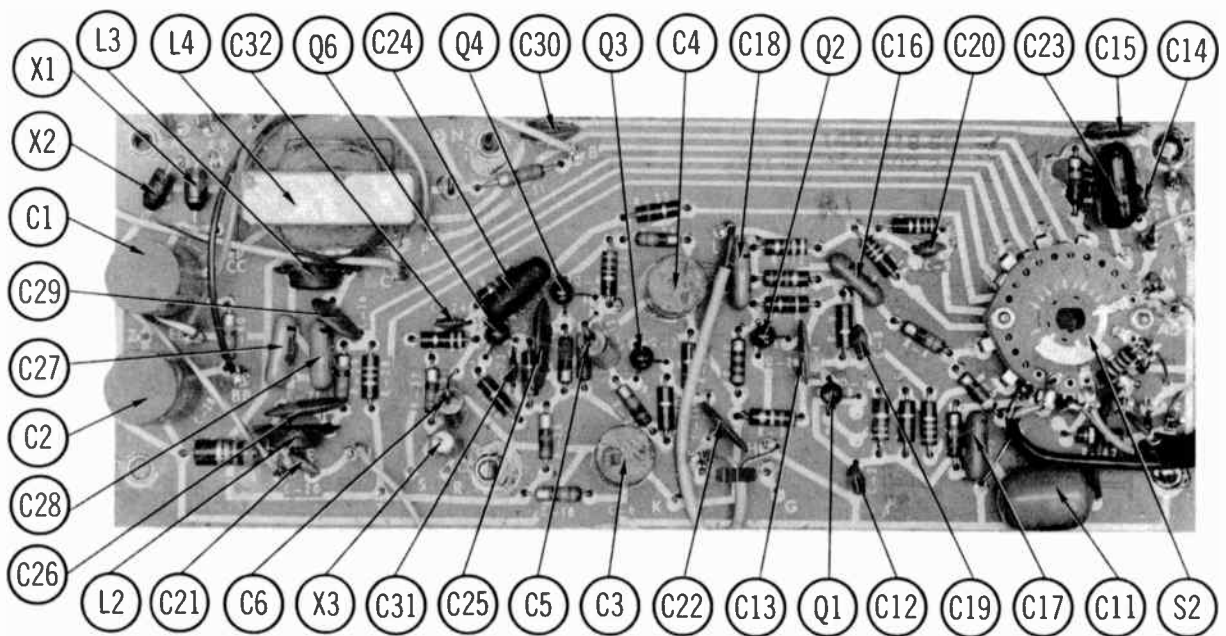
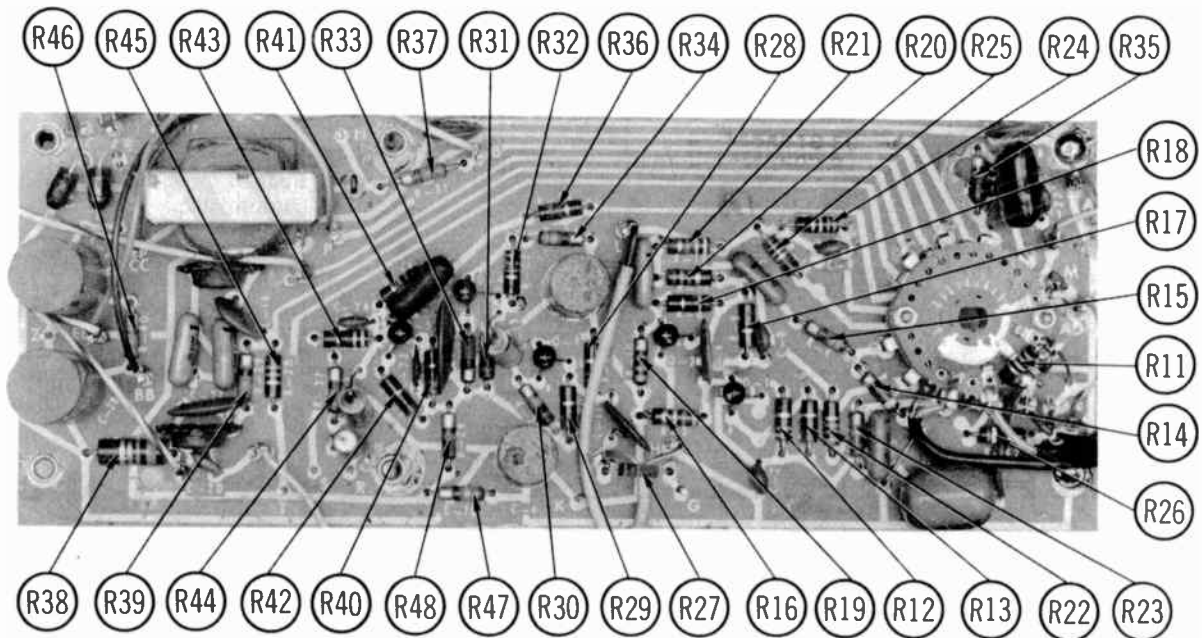
MECHANICAL PARTS LIST (Continued)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
27	116378	Right Shut-off Pin Lever	40	116393	Fast Forward Clutch Spring
28	110287	Shut-off Lever Link	41	110270	Rewind Pulley
29	110284A	Left Shut-off Pin Lever	42	110267	Turntable Bearing
30	72953	Cord (250 ft. Spool)	43	110300	Brake Spring
31	116386	Fast Forward Clutch Lever	46	116473	Record Switch Latch Link
32	116394	Fast Forward Clutch Lever Spring	47	116401	Switch Latch
33	115150	Flywheel Bearing Spring	48	116741	Record Switch Latch Spring
34	110264	Flywheel Bearing	49	110295A	Record Switch Latch Spring
35	110263	Flywheel	50	116473	Record Switch Latch
36	116398	Fan	51		Clutch Disc
37	110268	Idler Arm	52		Clutch Disc Felt
38	110299	Idler Arm Spring	53	116474	Interlock Slide
39	116475	Take-up Pulley (Includes Ref. Nos. 51 and 52)	54	116369	Rewind Roller
			55		Erase Head Mounting Bracket
			56		Record Head Mounting Bracket

* Pressure Roller - WALSCO Part No. 1499-05.

RCA MODELS YGB11T, YGB29A, YHB22T, YHB26A





PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8896 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA					RCA PART No.	RCA PART No.	NOTES
			DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	RCA PART No.			
Q1	S1076	Preamp.	DS-66	GE-10	TR-22	SK-3020	115225		NPN	
Q2	S1076	Preamp.	DS-66	GE-10	TR-22	SK-3020	115225		NPN	
Q3	S1076	AF Amp.	DS-66	GE-10	TR-22	SK-3020	115225		NPN	
Q4	S1076	AF Amp.	DS-66	GE-10	TR-22	SK-3020	115225		NPN	
Q5	38477 ①	Output/Bias Oscillator	DS-520	GE-3	TR-01	SK-3009	115063		② PNP	
Q6	S1076	Indicator Amp.	DS-66	GE-10	TR-22	SK-3020	115225		NPN	
Q7	38477 ①	Voltage Regulator	DS-520	GE-3	TR-01	SK-3009	115063		② PNP	

① Alternate Type #40254

② When replacing, apply silicone grease to both sides of insulator. Tighten mounting screws securely.

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MEASURED CURRENT	ORIGINAL Part or Type No.	RECTIFIERS & DIODES		RECTIFIERS	
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SARKES TARZIAN PART No.
X1	.4A	115039	GE-504A	5A4-D or 8D4	SK-3030 or SK-3031	40C or F-4
X2	.4A	115039	GE-504A	5A4-D or 8D4	SK-3030 or SK-3031	40C or F-4
X3		111776	GE-504A	5A4-D or 8D4		

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		RCA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	500 25V	111790	PRS1290	EA30-500	BR500-25	Q71-31	TC2505	TL-1217
C2	500 25V	117524	PRS1290	EA30-500	BR500-25	Q71-31	TC2505	TL-1217
C3	250 25V	115802	PRS1260	EA30-250	BR250-25	Q71-26	MTV250DN25	TL-1214
C4	250 25V	115802	PRS1280	EA30-250	BR250-25	Q71-28	MTV250DN25	TL-1214
C5	2 50V	111370	CRE751A	EA50-2	NLW2-50	MT1-1	TT50X2	TE-1301
C6	2 50V	111370	CRE751A	EA50-2	NLW2-50	MT1-1	TT50X2	TE-1301

CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENDO PART No.	MALLORY PART No.	SPRAGUE PART No.
C11	.47 75V		DBE2P47		DMF1P47	IDP-4-474	PVC1047	225P4749R75
C12	.220 100V		GPD X5F221K	DD-221	JBZ601YP221K	CCD-221	GP322	10TS-T22
C13	.047 100V							
C14	.220 100V		GPD X5F221K	DD-221	JBZ601YP221K	CCD-221	GP322	10TS-T22
C15	.0016 75V 10%		GPD X5F182K	DD-182	JBX601YP182K	CCS-182	GP216	10TS-D16
C16	.012 100V 10%				WMF1S12	1MD-1-123		225P12391
C17	.012 100V 10%	(.0068 10%)†			WMF1S12	1MD-1-123		225P12391
C18	.047 100V 10%		V1612S47		DMF1S47	1MD-1-473	PVC1147	225P47391
C19	560 10%		GPD X5F561K	DD-561	JBY601YP561K	CCD-561	GP356	10TS-T56
C20	330 10%		GPD X5F331K	DD-331	JBY601YP331K	CCD-331	GP333	10TS-T33
C21	.001 10%	(.0015 10%)†	GPD X5F102K	DD-102	JB8601YP102K	CCD-102	GP210	10TS-D10
C22	.047 100V				WMF1P16	1MD-3-184		225P1849R75
C23	.18 75V 10%				DMF1P1	1MD-2-104	PVC101	225P10491
C24	.1 100V		DBE2P1	UK10-474			MAG12047	HY-330
C25	.47 10V				JBV601YP332K	CCD-332	JF233	10TS-D33
C26	.0033	(.022 100V, 10%)†		DD-332				
C27	.047 100V 10%	(.082 100V, 10%)†	V1612S47		DMF1S47	1MD-1-473	PVC1147	225P47391
C28	.01 100V 10%	(.0018 10%)†	V1612S1		WMF1S1	1MD-1-103	PVC211	225P10391
C29	.0022 10%	(.0047 10%)†	GPD X5F222K	DD-222	JBX601YP222K	CCD-222	GP222	10TS-D22
C30	.0016 10%	(.0027 10%)†	GPD X5F182K	DD-182	JBX601YP182K	CCS-182	GP216	10TS-D16
C31	.0056		GPD X5R562K	DD-562		CCD-562		
C32	.047 10V							

† May be used in some versions.

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA				
			RCA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume	3meg	120339 ①	F1-3meg ②, SN200	A47-3meg-S ③, FS-3 or (NP-3meg-S ③, NML-A-300)	B11-140, TM5, or (BUL, CF21, SS1, DC1)*	RU36L ④, SN2000 or (UA36L ④, SN2000)

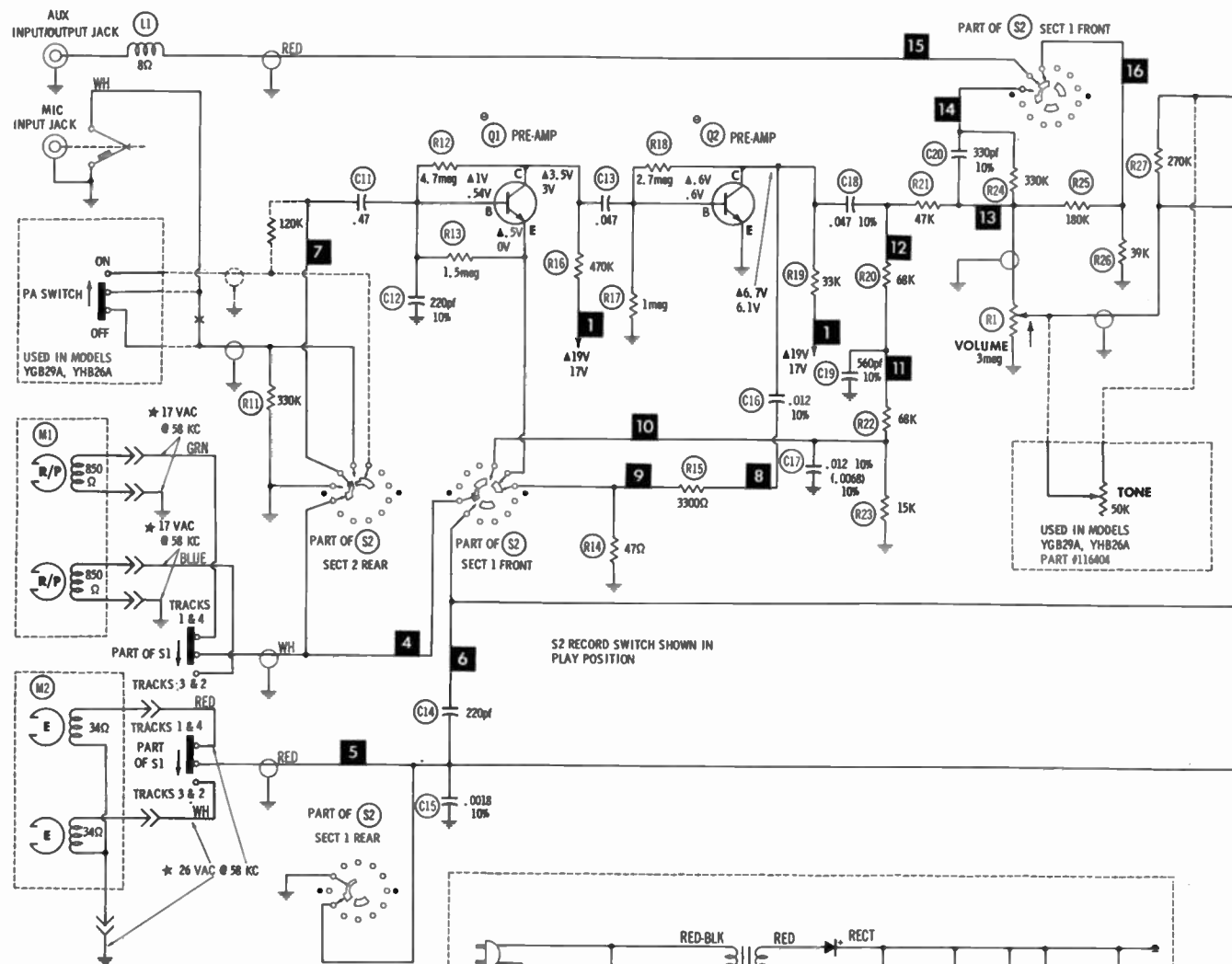
* "SNAPTROL"

① Part #116406 used in Models YGB11 & YGB29. ② Use original mounting bracket.

(CONTINUED ON PAGE 102)

RCA MODELS YGB11T, YGB29A, YHB22T, YHB26A

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



★ Measured in "RECORD" position with an audio VTVM.

Δ Voltage measured in "Record" position

Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

Arrows at controls indicate clockwise rotation viewed from actuator end.

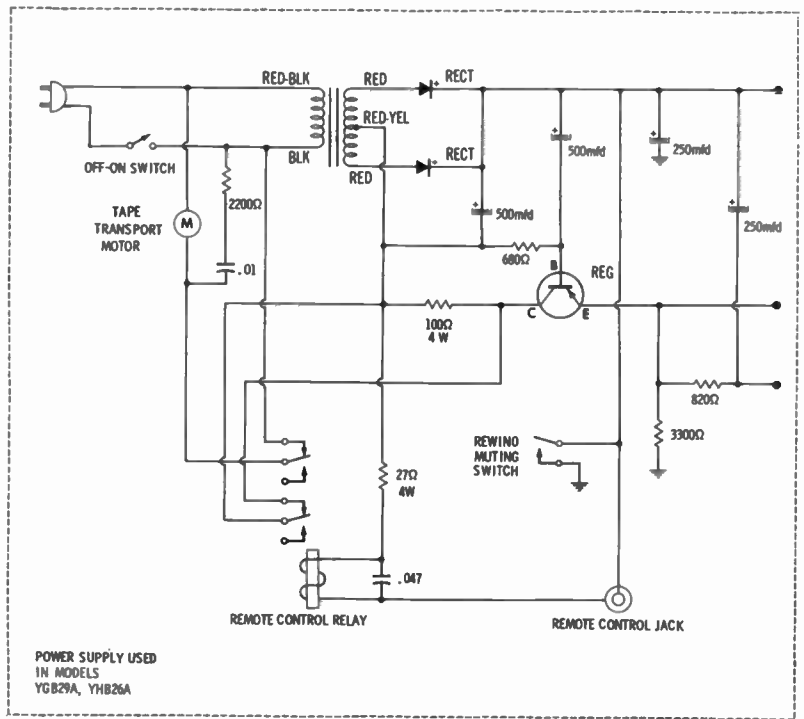
⊙ See parts list

1. Voltage measurements taken with vacuum tube voltmeter.
2. All controls set for normal operation, no signal applied.
3. Measured values are from socket pin or terminal to common ground.
4. All terminals viewed from bottom unless otherwise designated.
5. Numbers assigned to terminals may not be found on the unit.
6. Supply voltage maintained at rated value for voltage readings.
7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

A PHOTOFAC STANDARD NOTATION SCHEMATIC

with **CIRCUITRACE**

© Howard W. Sams & Co., Inc. 1968



POWER SUPPLY USED IN MODELS YGB29A, YHB26A

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	RCA PART No.			IRC PART No.	WORKMAN PART No.	RCA PART No.
R38	3.3Ω 2W	BWH-3.3	WS-3.3	116417					

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		RCA PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	RF Choke (820uh)	116911		73F 824AF	
L2	Bias Oscillator	116415		73F 824AF	
L3	Bias Oscillator	116415		73F 824AF	

OUTPUT CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (DC CURRENT 1000~)	RCA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
L4		4.6Ω	50mh	116414 (147135-6)					

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	RCA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC @ .48A	36VAC @ .4ADC		116411 (1464094-2)					

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA			NOTES
		RCA PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4" PM 35Ω 4" x 6" PM 35Ω	116431 ① (906041-7) 116432 ②			① Used in Models YGB11T and YHB22T ② Used in Models YGB29A and YHB26A

TAPE HEADS

ITEM NO.	MEASURED			RCA PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	475mh	17V rms	58KC	110293	1009 & QK-38	4-Track Monaural Record/Play
M2	10mh	26V rms	58KC	111697	1401 & QK-18	4-Track Monaural Erase

MISCELLANEOUS

ITEM No.	PART NAME	RCA PART No.	NOTES
M3	Motor	116366	Tape Transport (Includes Pulley)
M4	Meter	116409	Record Level
S1	Switch	116419	Track Selector
S2	Switch	120334	Function Selector
S3	Switch	110285	On/Off
S4	Switch	116421	Muting
	Microphone	117190	Models YGB11T and YHB22T
	Microphone	117191	Models YGB29A and YHB26A
	Printed Circuit Board	116900	Chassis RS-217
	Printed Circuit Board	116901	Chassis RS-217A

CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

ITEM	PART No.	ITEM	PART No.
Cabinet Bottom, Models YGB11T, YHB22T	X6089	Knob, Volume, Models YGB11T, YHB22T	116426
Cabinet Bottom, Models YGB29A, YHB26A	X6088	Knob, Volume-Tone-Balance, Models YGB29A, YHB26A	116429
Cabinet Lid, Models YGB11T, YHB22T	X6090	Knob, Function Selector, Models YGB11T, YHB22T	116427
Cabinet Lid, Models YGB29A, YHB26A	X6087	Knob, Function Selector, Models YGB29A, YHB26A	116430
Handle, Models YGB11T, YHB22T	116439	Knob, Speed Control	116428
Handle, Models YGB29A, YHB26A	116442		



PHOTOFACT[®] with

CIRCUITRACE[®]

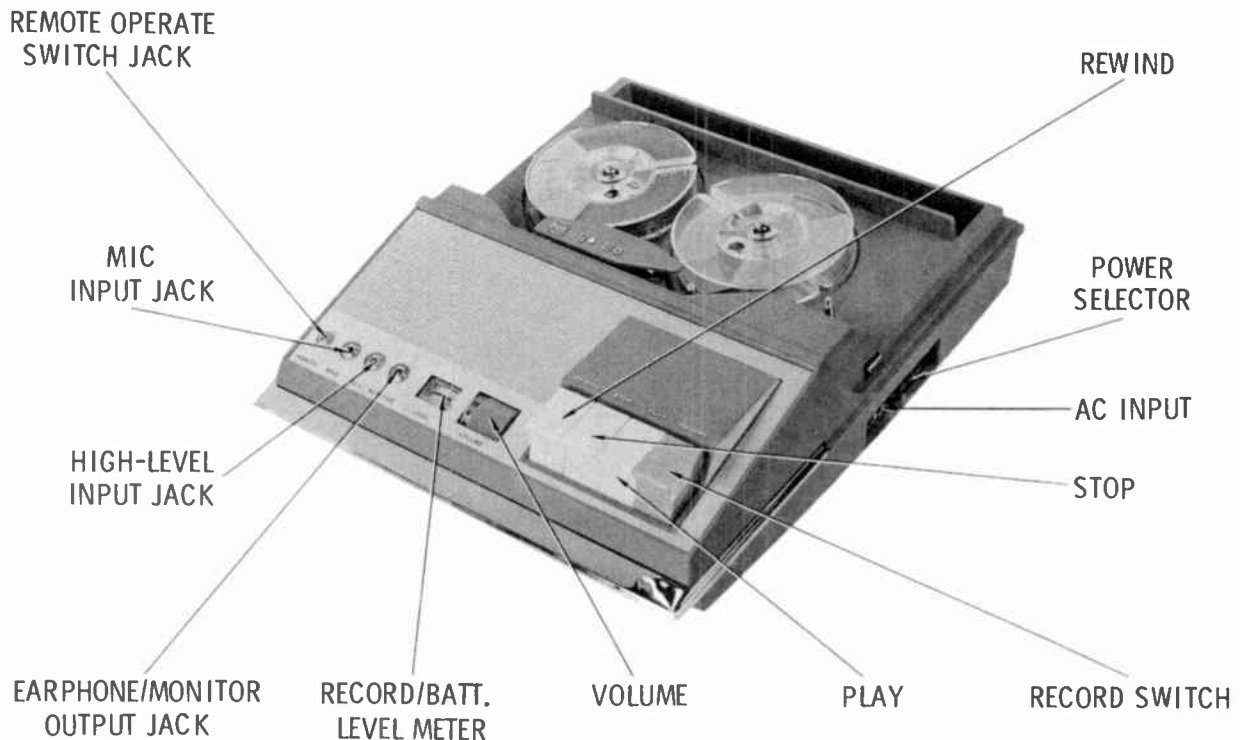
TRADE NAME : RCA Models YJS13J, YJS15G
 SUPPLIER : For Current Address, See Annual Index
 TYPE SET : 2-Speed, 2-Track Monaural Recorder
 POWER SUPPLY : 6 Volts DC or 110-120 Volts AC, 60 Cycles
 RATING : 2 Watts, 54ma @ 117 VAC (With Motor)

These units are two-track, monaural recorders having two speeds: 1 7/8 and 3 3/4 ips.

Jacks are provided for both low- and high-level inputs, earphone/external speaker output, and remote. An external power jack is provided on Model YJS13J.

Power is supplied by four, 1 1/2-volt "D" cells or 110 - 120 volts AC, 60 cycles. Model YJS13J requires an AC adapter for AC operation.

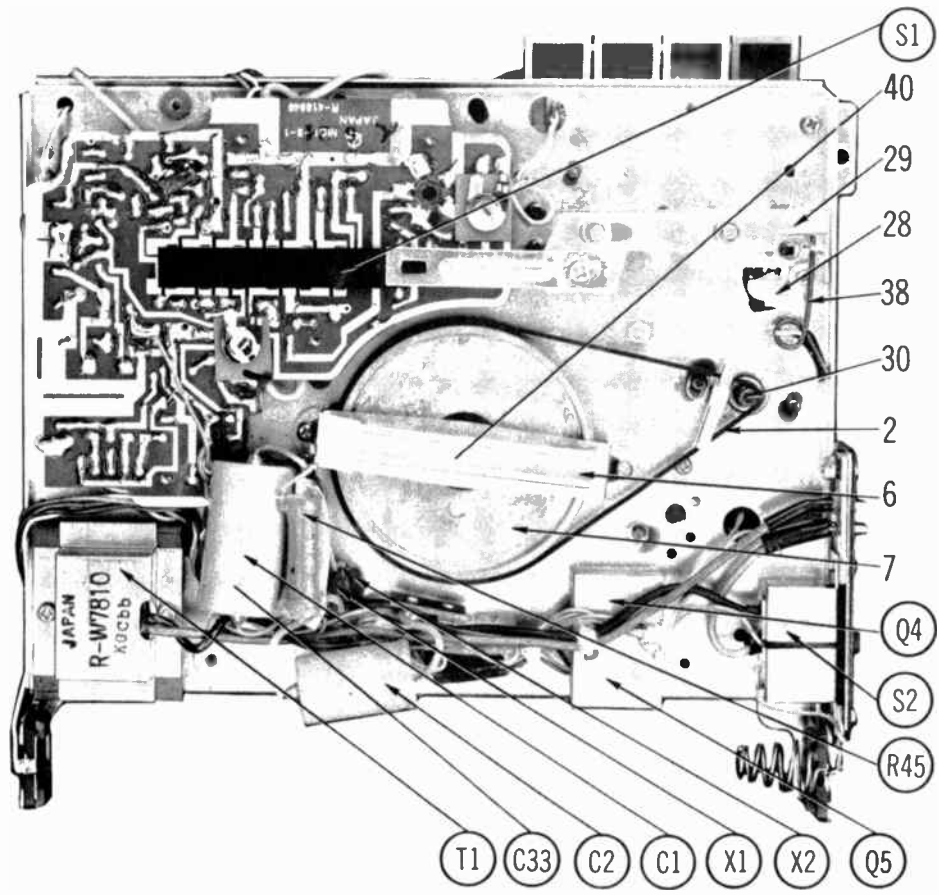
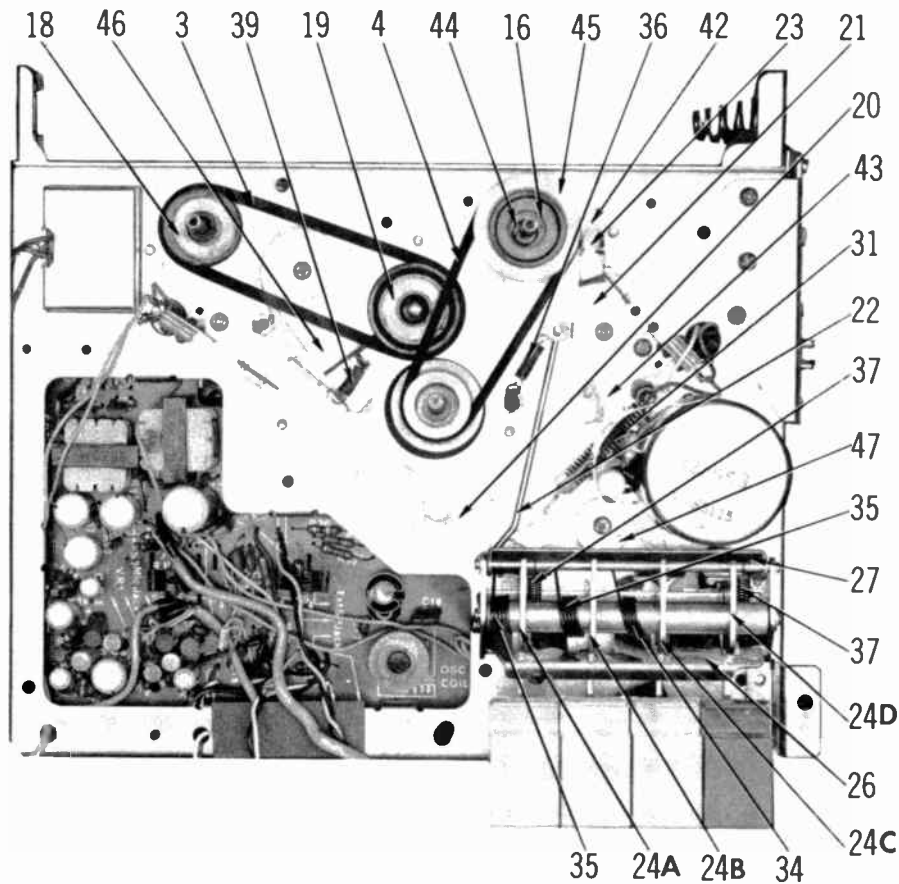
RCA MODELS YJS13J, YJS15G



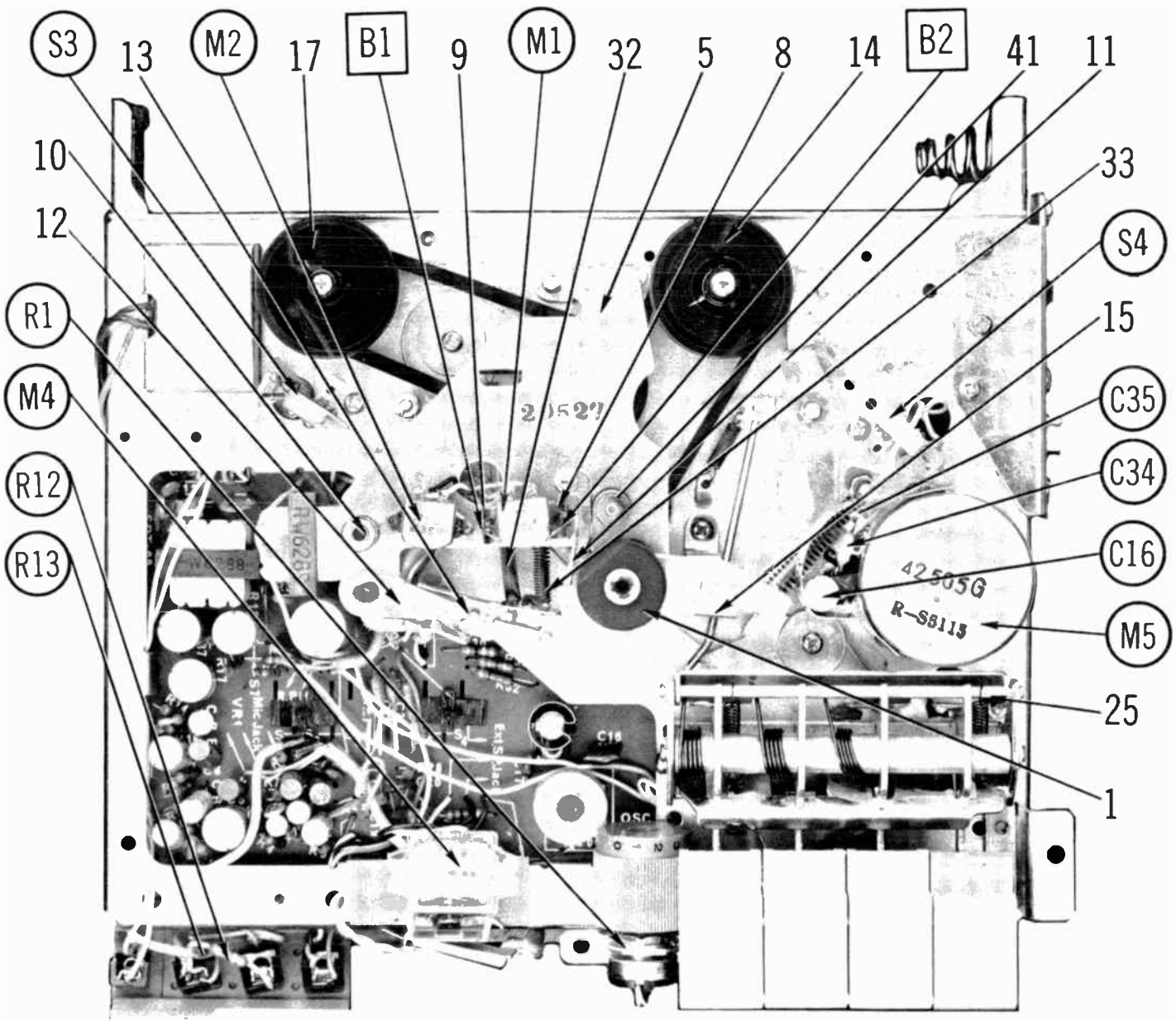
HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

© 1968 Howard W. Sams & Co., Inc. Printed in U. S. of America C999

World Radio History



RCA MODELS YJ513J, YJ515G



OPERATING INSTRUCTIONS

Record

1. Thread the tape, select the power source, select the speed, and move the remote switch on microphone to Off.
2. Connect a source, press Play and Record buttons simultaneously, move the remote switch to the on position, and set the recording level with Volume control.

Play

1. Repeat step 1 of "Record", press Play button, move the remote switch to the on position, and set Volume control as desired.

Monitor

1. Connect an earphone to Earphone/Monitor Output jack to monitor the recording.

DISASSEMBLY

1. Remove head cover and battery compartment cover.
2. Remove seven Phillips screws from bottom of case.
3. Separate case halves by pressing on front corners of bottom half to remove chassis.

SEQUENCE OF OPERATION

Play

Pressing the Play button pivots Lever (24C), locked by Lever (26), to actuate Switch (S5) and to pivot Lever (27). Lever (27) pushes Rod (22) to move Lever (21), moving Pad (23) from Turntable (14) and actuating Switch (S4).

Lever (24C) also moves Slide (43) to raise Spring (42), raising Pulley (16) to compress Clutch (45). The motor, through Pulley (30), Belt (2), Flywheel (7), Belt (4), Pulley (16), and Clutch (45), drives Turntable (14).

Slide (43) also pivots Lever (47) to release Lever (15), pulled by Spring (33), moving Roller (1) against the capstan. Lever (15) also releases Lever (12), pulled by Spring (32), to move Plate (13) and the pads against Heads (M1) and (M2).

Record

The Record sequence is the same as "Play" except pressing the Record button pivots Lever (24D),

locked by Lever (26), to move Lever (28), pushing Slide (29) to actuate Switch (S1).

Rewind

Pressing the Rewind button pivots Lever (24A), locked by Lever (26), pivoting Lever (27) to push Rod (22). Rod (22) swings Lever (21), moving Pad (23) from Turntable (14) and actuating Switch (S4).

Lever (24A) also pivots Lever (20) to actuate Switch (S3) and to pull Spring (39). Spring (39) pulls Lever (46) to cause Pulley (19) to press Belt (3) against Flywheel (7).

The motor, through Pulley (30), Belt (2), Flywheel (7), Belt (3), and Pulley (18), drives Turntable (17).

Stop

Pressing the Stop button allows Springs (34), (31), and (36), plus (38) for Record, to reverse the "Play" sequence. Springs (35), (36), and (39) reverse the "Rewind" sequence.

CLEANING

LUBRICATING

HEAD DEMAGNETIZING

Refer to "General Servicing Information" on page 4.

ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 3 3/4 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 3 3/4 ips with a spring scale applied to a point on an empty tape reel 2 inches from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 1 1/4 ounces. Controlled by thickness of washers between Spring (42) and Pulley (16).
Rewind Torque	Nominal value 2 ounces. Controlled by condition of Belt (3) and tension of Spring (39).
Supply Reel Drag	Dependent on reel weight.
Take-up Reel Drag	Dependent on reel weight.
Pressure Roller Pressure	Nominal value 8 ounces. Controlled by tension of Spring (33).
Brake Torque	Measured in Stop. Nominal value 3 ounces clockwise on take-up reel. Controlled by condition of Pad (23).
Pressure Pad Pressure	Nominal value 3/4 ounce. Controlled by tension of Spring (32).
Erase Head Height	No adjustment provided.
Erase Head Azimuth	No adjustment provided.
Record/ Play Head Height	Top of pole piece should be .002 inch below top of tape. Controlled by turning B1 and B2 equally in the same direction.
Record/ Play Head Azimuth	Play an azimuth test tape, connect an AC VTVM across speaker, and adjust B1 and B2 equally in opposite directions for peak output.
Erase Current	Nominal value 11.5ma (4.5VDC). No adjustment.
Record Bias	Nominal value 34V rms (1ma). Controlled by setting of R3.
Bias Oscillator	Nominal frequency 52KC. No adjustment.
Record Level Indicator Calibration	Disable bias oscillator by shorting secondary of L1. Apply a 1000-cycle tone to High-Level Input, and adjust Volume control for 1.1V rms across Head (M1). Adjust R2 for normal peak indication on Record/Batt. Level Meter.

RCA MODELS YJ513J, YJ515G

TROUBLE CHART

IMPORTANT: Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Clutch (45) worn or dirty. 2. Take-up torque misadjusted. 3. Belt (4) worn or dirty.

TROUBLE CHART (Continued)

SYMPTOM	REMARKS
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Belt (3) dirty, worn, or broken. 2. Spring (39) stretched.
Reels do not stop immediately when Stop button is pressed.	<ol style="list-style-type: none"> 1. Pad (23) worn or dirty. 2. Spring (36) stretched.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Belt (2) dirty, worn, or broken. 2. Flywheel (7) binding. 3. Motor defective or not supplied with power.
Tape rides up and down between capstan and pressure roller.	<ol style="list-style-type: none"> 1. Roller (1) worn. 2. Excessive take-up torque. 3. Capstan bent.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Belt (2) dirty or worn. 2. Roller (1) dirty or worn. 3. Motor defective. 4. Bushing (41) binding.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Head (M1) dirty, misaligned, or defective. 2. Amplifier defective. 3. Bias oscillator defective or misadjusted. 4. Pads on Plate (13) worn.
Erase weak or inoperative.	<ol style="list-style-type: none"> 1. Head (M2) dirty, defective, or not supplied with power. 2. Pads on Plate (13) worn.

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	117083	Pressure Roller	25	123133	Brake Actuating Lever Shaft
2	123061	Flywheel Belt	26	123099	Push-button Lever Rocking Plate Lever
3	123060	Rewind Belt	27	123100	Brake Actuator Lever
4	123059	Take-up Drive Belt	28	123098	Record/Play Changing Lever
5	123114	Head Mounting Plate	29	123136	Record/Play Changing Slide
6	123052	Flywheel Mounting Bracket	30	123123	Motor Pulley
7	123087	Flywheel Assembly	31	123140	Pressure Roller Actuator Lever Spring
8	123119	Spring Head Adjust Plate	32	123149	Tape Pressure Pad Spring
9	123053	Record/Play Head Bracket	33	123150	Pressure Roller Lever Spring
10	123090	Tape Guide	34	123143	Button Lever Spring
11	123091	Tape Guide	35	123142	Button Lever Spring (2 used)
12	123107	Pressure Plate Lever	36	120723	Brake Lever Spring
13	123118	Tape Pressure Pad Plate	37	123145	Rocking Plate Spring (2 used)
14	123154	Right Take-up Turntable	38	123144	Record/Play Changing Spring
15	123106	Pressure Roller Lever	39	123141	Rewind Actuator Turntable Spring
16	123121	Right Turntable Drive Pulley	40	123051	Flywheel Assembly Ball
17	123153	Left Turntable	41	123062	Flywheel Assembly Bushing
18	123124	Left Turntable Pulley	42	123117	Take-up Actuator Plate Spring
19	123122	Rewind Pulley	43	123137	Take-up Reel Actuator Slide
20	123103	Rewind Actuation Lever	44	123146	Right Turntable Clutch Spring
21	123102	Brake Lever	45	123158	Felt Clutch
22	123127	Brake Actuator Rod	46	123104	Rewind Actuator Lever
23	123111	Brake Pad	47	123105	Pressure Roller Actuator Lever
24	123101	Push-button Lever (4 used)			

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17108 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				RCA PART No.	NOTES
			DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.		
Q1	2SB346	Preamp	DS-26	GE-2	TR-06	SK-3004	120075	PNP
Q2	2SB186	AF Amp	DS-26	GE-2	TR-14	SK-3004	116206	PNP
Q3	2SB186	Driver	DS-26	GE-2	TR-14	SK-3004	116206	PNP
Q4	2SB22	Output	DS-26	GE-2	TR-14	SK-3004	116998	PNP
Q5	2SB22	Output	DS-26	GE-2	TR-14	SK-3004	116998	PNP
Q6	2SB187	Bias Oscillator	DS-26	GE-2	TR-14	SK-3004	116686	PNP

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MEASURED CURRENT	ORIGINAL Port or Type No.	RECTIFIERS & DIODES		RECTIFIERS	
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SARKES TARZIAN PART No.
X1	.225A	120554 (1)	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X2	.225A	120554 (1)	GE-504A	8D4 or 5A4-D	SK-3030 or SK-3031	40C or F-4
X3		119919 (1S118)	1N60	1N60		

(1) X1 and X2 used in Model YJS15G only.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		RCA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	1000 15V	120528 (1)	PRS1230	EA30-1000	BR1000-15	QT1-32	TC1501A	TL-1166.5
C2	500 15V	123066 (1)	PRS1220	EA15-500	BR500-15	QT1-30	TC1505A	TL-1166
C3	200 10V		BCD10190	EA15-250	NLW200-12	MT1-23	MTV200CK10	TE-1137
C4	200 6V	117795	BCD6200	EA6-250	NLW200-12	MT1-23	MTV200CK10	TE-1104
C5	100 6V	117606	BCD6100	EP6-100	NLW100-12	MT1-18	MTV100CB6	TE-1102
C6	200 6V	117795 (1)	BCD6200	EA6-250	NLW200-12	MT1-23	MTV200CK10	TE-1104
C7	5 6V	116725	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C8	10 3V	116983	BCD3010	EP6-10	NLW10-3	MT1-5	MTV10CB50	TE-1053
C9	30 6V	116727	BCD6025	EP6-25	NLW30-6	MT1-13	MTV30CB25	TE-1132.1
C10	5 6V	116725	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C11	5 6V	116725	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C12	30 6V	116727	BCD6025	EP6-25	NLW30-6	MT1-13	MTV30CB25	TE-1132.1
C13	5 6V	116725	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C14	100 3V	116986	BCD3100	EP6-100	NLW100-3	MT1-18	MTV100CB6	TE-1059.5
C15	500 10V	123067 (2)	BCD12500	EA15-500	BR500-15	QT1-30	MTV500DN15	TL-1141
C16	20 10V	116229	BCD12020	EP15-25	NLW20-15	MT1-10	MTV20CD50	TE-1130
C17	0.1 10V	116679			TYR13B-ER10K		TAS104K010P0A	196D104X0035 DB
C18	0.1 10V	116726			TYR13B-ER10K		TAS104K010P0A	196D104X0035 DB

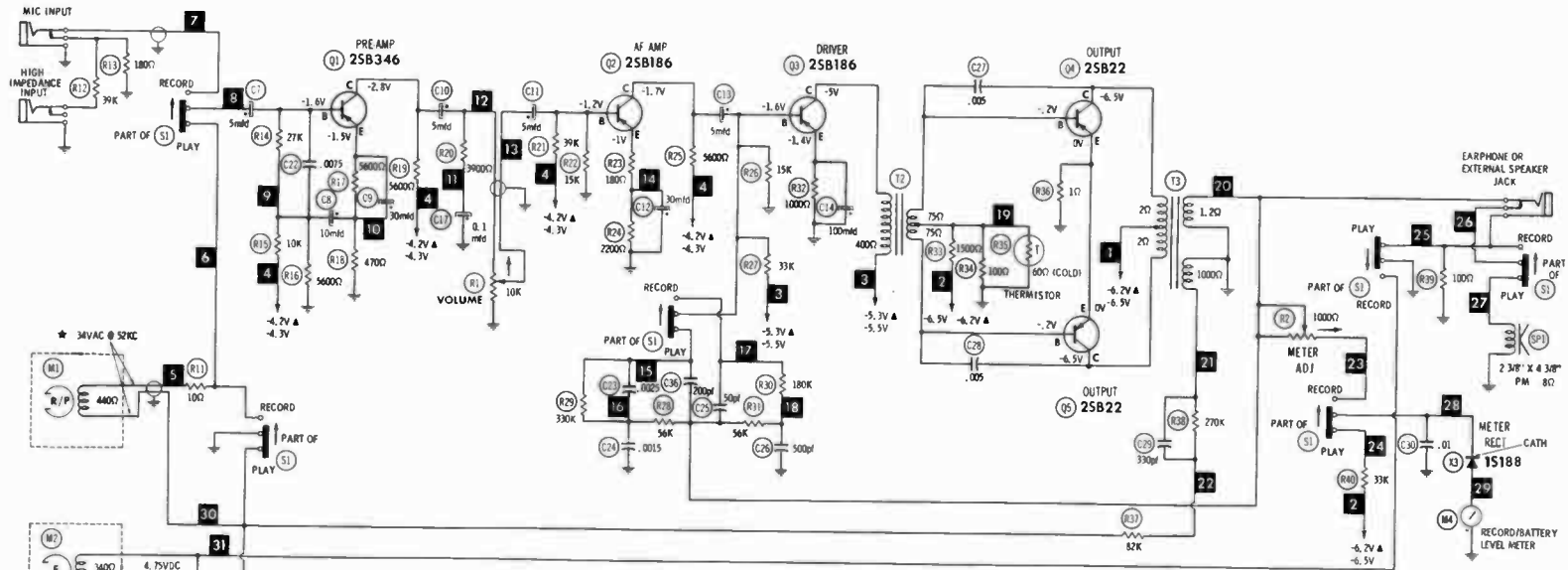
(1) Used in Model YJS15G only.

(2) Model YJS13J uses 200mfd @10V in this application.

(CONTINUED ON PAGE 113)

RCA MODELS YJS13J, YJS15G

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



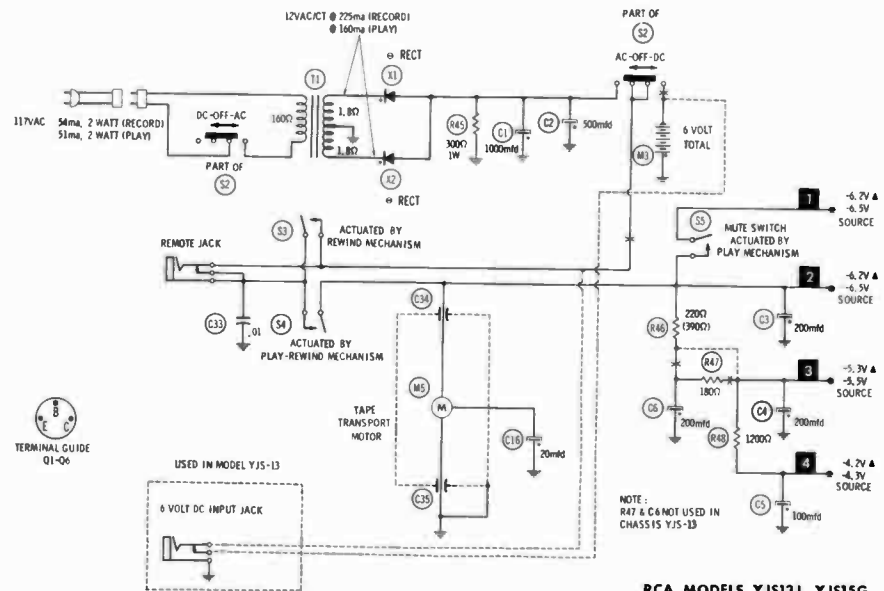
- ⊖ See parts list
- 1. Voltage measurements taken with vacuum tube voltmeter.
- 2. All controls set for normal operation, no signal applied.
- 3. Measured values are from socket pin or terminal to common ground.
- 4. All terminals viewed from bottom unless otherwise designated.
- 5. Numbers assigned to terminals may not be found on the unit.
- 6. Supply voltage maintained at rated value for voltage readings.
- 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

★ Measured in "Record" with an audio VTVM.
▲ Measured in "Record"

Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

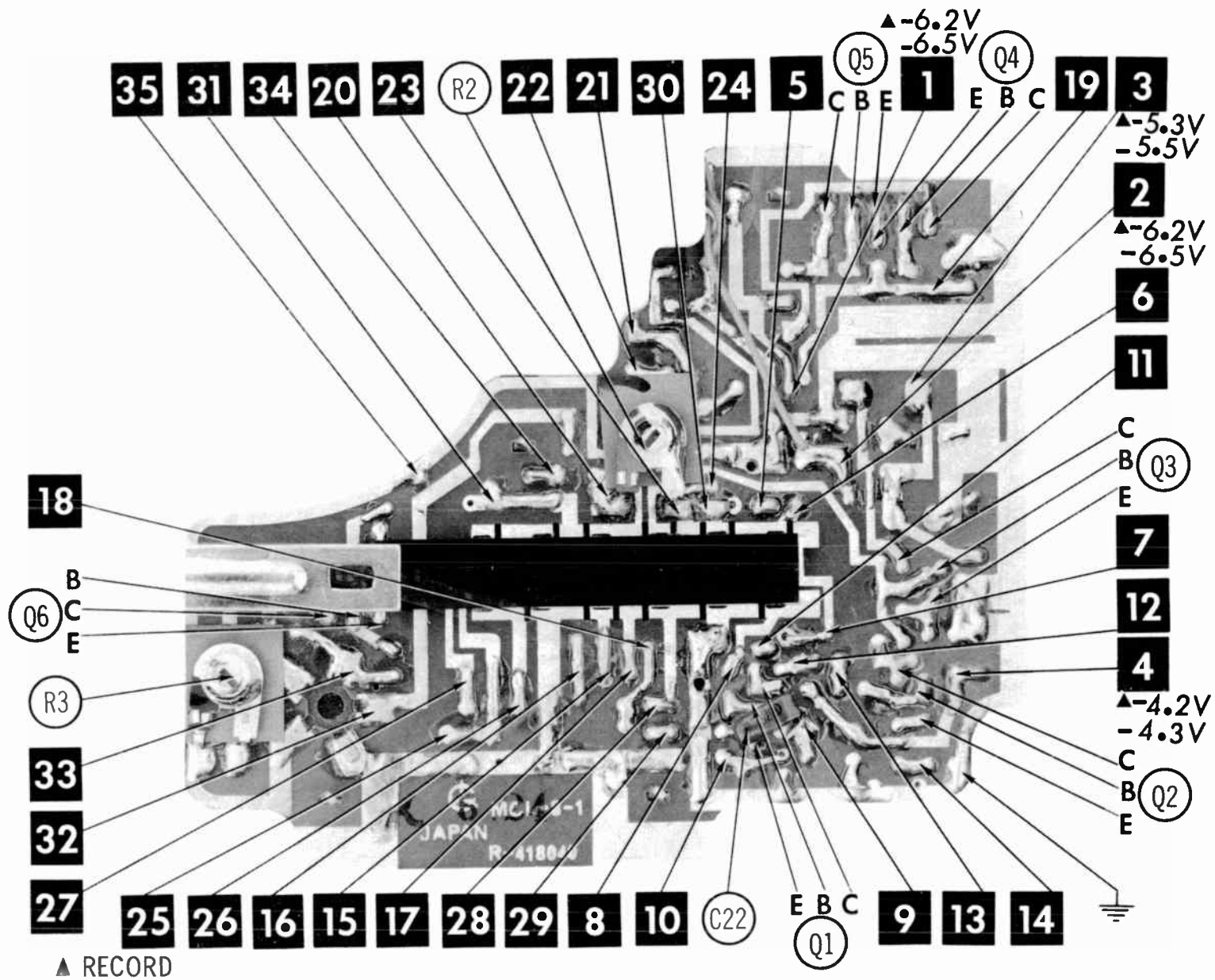


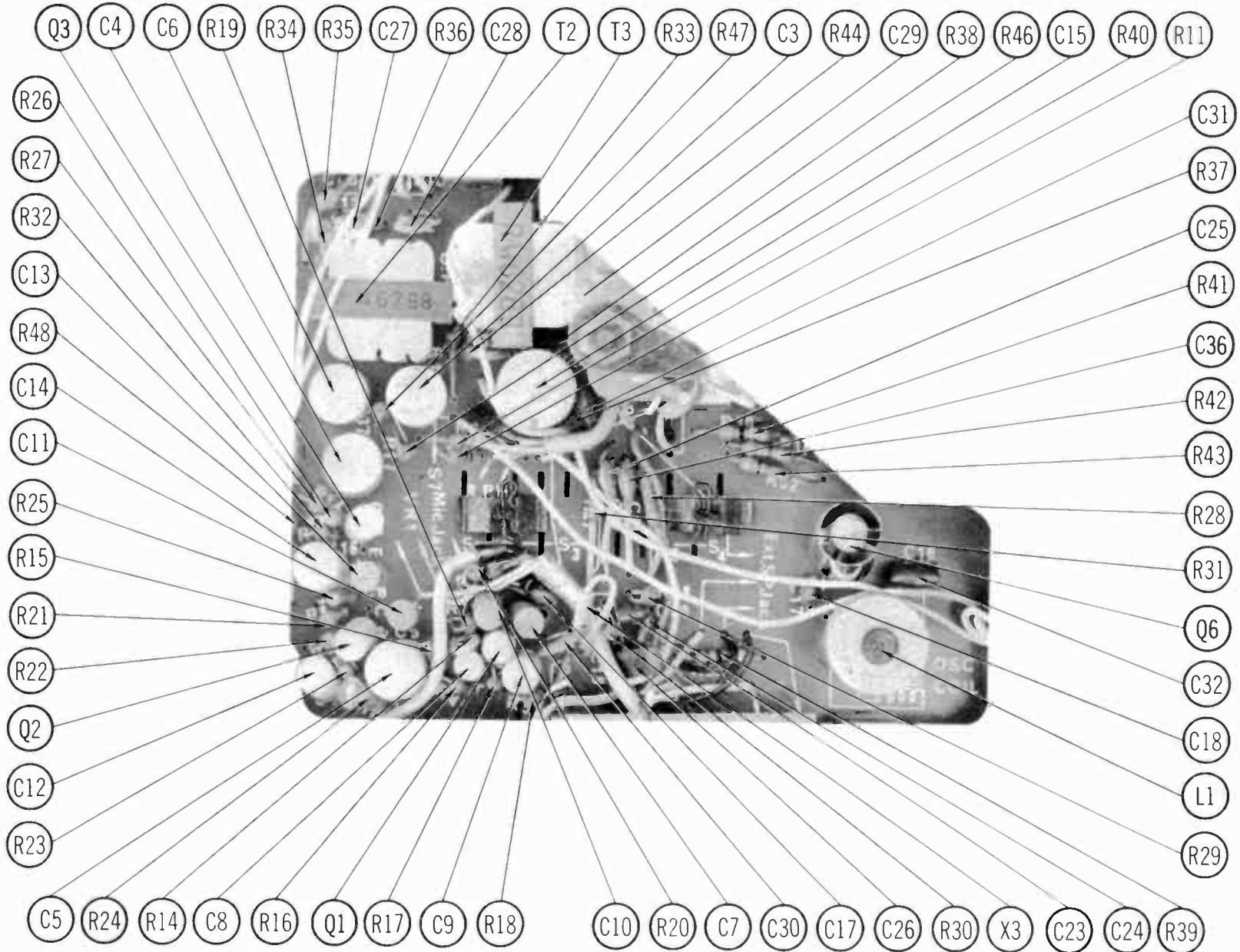
A PHOTOFACT STANDARD NOTATION SCHEMATIC
with **Circuitrace**
© Howard W. Sams & Co., Inc. 1968



NOTE: R47 & C6 NOT USED IN CHASSIS YJ5-13

RCA MODELS YJ513J, YJ515G





PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA						
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.	
C22	.0075 50V		GPD XSR752K	DD-752				GP275	10TS-D75
C23	.0025 50V		GPD XSF252K	DD-252			CCD-252	GP225	10TS-D25
C24	.0015 50V		GPD XSF152K	DD-152			CCD-152	GP215	10TS-D15
C25	50 50V		GPD XSF500K	DD-500	JBZ601YP500K		CCD-500	GP450	10TS-Q50
C26	500 50V		GPD XSF501K	DD-501	JBZ601YP501K		CCD-501	GP350	10TS-T50
C27	.005 50V		TTP-.005	CK-502	HC23R0XR502P		CCD-502	TA250	TG-D50
C28	.005 50V		TTP-.005	CK-502	HC23R0XR502P		CCD-502	TA250	TG-D50
C29	330			CPR-330J	CD15F331J500		DM-15-331	SX333	MS-333
C30	.01 50V		TTP-01	CK-103	HOY1012V103P		CCD-103	TA110	TG-S10
C31	.0015 50V		GPD XSF152K	DD-152			CCD-152	GP215	10TS-D15
C32	.033 50V		DBE6S33	DD-303	DMF4S33		4DP-2-333	PVC6133	4PS-S33
C33	.01 50V		TTP-01	CK-103	HOY1012V103P		CCD-103	TA110	TG-S10
C34									
C35									
C36	200 50V		GPD XSF201K	DD-201	JBZ601YP221K		CCD-201	GP320	10TS-T20

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA				
			RCA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume	10K	123125				
R2	Meter Adjust	1000		T-1000 (1)		X201R102B (1)	MTC13L1 (1)
R3	Bias Adjust	10K	116991	T-10K (1)		X201R103B (1)	MTC14L1 (1)

(1) Cut off one of the outside terminals, bend terminals to fit "PC" board.

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	RCA PART No.			IRC PART No.	WORKMAN PART No.	PART No.
R35	60 (Cold) Thermistor		GM-68	120550					

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Bias Oscillator	123072			

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	RCA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC 0.054Amp	12VAC 0.225A DC		123164					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	RCA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T2	1.6	1		123163					

RCA MODELS YJ513J, YJ515G

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	RCA PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
		SEC. 2						
T3	36	8 2300	123162					

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA			NOTES
		RCA PART No.	JENSEN PART No.	QUAM PART No.	
SP1	2 3/8" X 4 3/8" PM 8ohms	117000			

TAPE HEADS

ITEM NO.	MEASURED			RCA PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	320mh	34Vrms	52KC	123094	3001 & QK-20 & L-5 3600(1) & Q-19	2-Track Monaural Record/Play
M2	190mh	4.5VDC		123093		2-Track Monaural Erase

(1) Mount on original plate and shorten spacers.
Select polarity for best recording.

BATTERIES

ITEM No.	VOLTAGE	PART No.	REPLACEMENT DATA			NOTES
			BURGESS	EVEREADY	MALLORY	
M3	6 Volts Total	VS335	130 or AL-1	1035 or E93	M14R or MN1400	4 required

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M4	Meter	120742	Record and Battery Level
M5	Motor	123108	Tape Transport
S1	Switch	123138	Record/Play Assembly
		123113	Slider (Plastic)
		123139	Pin,Retaining (2 required)
		123147	Spring,Plate (2 required)
S2	Switch		Spring,Contacts (6 required)
S3	Switch	123151	AC/DC (YJS15G only)
S4	Switch	123151	Rewind
S5	Switch	123152	Motor
	Microphone	120708	Mute
			Dynamic (200 ohms)

CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

ITEM	MODEL	PART No.	ITEM	MODEL	PART No.
Case,Bottom	YJS13J	123077	Cover,Head	YJS15G	123082
Case,Bottom	YJS15G	123074	Handle		123092
Case,Top	YJS13J	123076	Knob,Volume	YJS13J	123095
Case,Top	YJS15G	123075	Knob,Volume	YJS15G	123096
Cover,Battery Compartment	YJS13J	123079	Button,Record		123063
Cover,Battery Compartment	YJS15G	123080	Button,Rewind,Stop,Play (3 required)		123064
Cover,Head	YJS13J	123081			



PHOTOFACT[®] with

CIRCUITRACE[®]

TRADE NAME : Uher Model 9000 (22/24 HI-FI Special)

SUPPLIER : For Current Address, See Annual Index

TYPE SET : 2-Speed, 4-Track Monaural/Stereo Recorders

POWER SUPPLY : 110-120 Volts AC, 60 Cycles

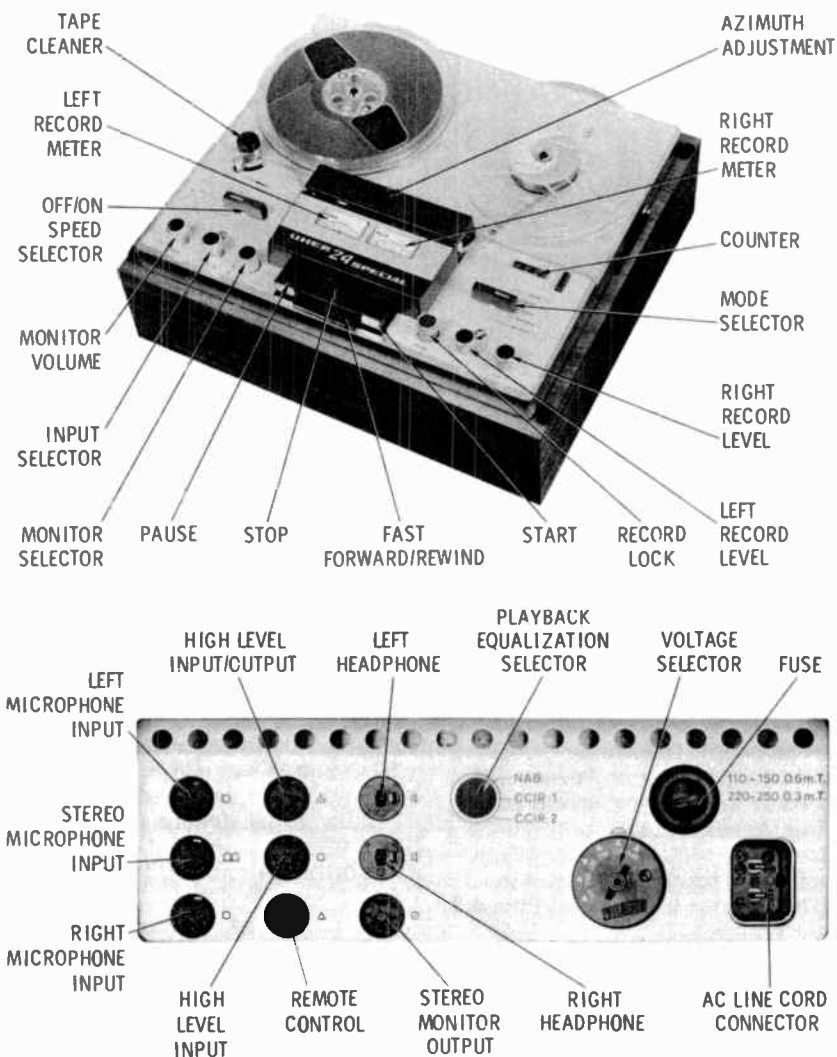
RATING : 37 Watts, .370A @ 117 VAC (Record with Motor)
34 Watts, .350A @ 117 VAC (Play with Motor)

These units are four-track monaural/stereo recorders having two speeds: 3 3/4 and 7 1/2 ips. Sound-On-Sound recordings can be made.

An external amplifier/speaker system is required for playback.

Jacks are provided for both low- and high-level inputs, high-level output, headphones, remote control, and stereo monitor.

A power source of 110/130/150/220/240/250 volts, 50-60 cycles is required.



UHER MODEL 9000 (22/24 Hi-Fi Special)

HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

© 1968 Howard W. Sams & Co., Inc. Printed in U. S. of America C972

World Radio History

FUNCTION OF SPECIFIC CONTROLS, JACKS

Left Microphone Input (Upper)

Used for left-channel microphone input in stereo and as sole microphone input in monaural (15mv maximum, 5 meg impedance, use 200 Ω microphone).

Right Microphone Input (Lower)

Used for right-channel microphone input in stereo (15mv maximum, 5 meg impedance, use 200 Ω microphone).

Stereo Microphone Input

Used for connecting left and right microphones sharing a common connector.

Input/Output

For use with an amplifier/tuner having a corresponding input/output jack to record from, as playback through the amplifier (300mv maximum input, input impedance 47K, 1.5V maximum output).

High-Level Input

For use as an input when output voltage of source exceeds 300mv.

Remote Control Input

For connection of optional remote control accessories.

Left Headphone Output (Upper)

Used for connection to left channel of stereo headphones or a monaural headset to monitor left-channel tracks.

Right Headphone Output (Lower)

Used for connection to right channel of stereo headphones or a monaural headset to monitor right-channel tracks.

Monitor Output

For connection to a power amp. to monitor in A-test or B-test as selected by monitor selector on power amplifier.

Input Selector

High-Level Input Input/Output Microphone

OPERATING INSTRUCTIONS

Monaural Recording

1. Press Stop button, set Voltage Selector, turn on unit by selecting speed, move Mode Selector to Mono 1-4 (Mono 1 for Model 22), and thread tape.
2. Connect a recording source to an input jack, set Input Selector to the appropriate position, press Pause button, press Record Lock while pressing Start button, and set the recording level with Left Record Level control.
3. Press Pause button to start tape motion and record left-channel tracks.
4. To record right-channel tracks, repeat steps 1 through 3, except move Mode Selector to Mono 2-3 (Mono 2 for Model 22), and set the recording level with Right Record Level control.

Monaural Play

1. Repeat step 1 of "Monaural Recording", connect Input/Output jack to a power amp, press Start button, and set power amplifier controls as desired to play left-channel tracks.
2. To play right-channel tracks, repeat step 1, except move Mode Selector to Mono 2-3 (Mono 2 for Model 22).

Stereo Recording

1. Follow the procedure outlined under "Monaural Recording", except move Mode Selector to Stereo, connect stereo sources, and set the recording levels with the Left and Right Record Level controls.

Stereo Play

1. Follow procedure outlined under "Monaural Play", except move Mode Selector to Stereo.

Sound-On-Sound Recording

1. Make a recording on left-channel tracks, unwind tape, connect headphones to Right Headphone jack, move Mode Selector to Multiplay II, and connect new recording source.
2. Press Record Lock while pressing Start button, advance Monitor Volume control to hear original recording, advance Left Record Level control to set the level of the new recording, and advance Right Record Level control to set the level of the transferred information.
3. New information and the original information will be recorded together on the right-channel tracks.
4. To transfer information on right-channel tracks and add new information, set Mode Selector to Multiplay I and reverse the settings of Left and Right Record Level controls.

Sound-On-Sound Play

1. Follow procedure outlined under "Monaural Play" to play the appropriate tracks for the combined recording.

Monitor

1. Connect headphones to the appropriate headphone jacks and adjust Monitor Volume control to desired level for B-test monitor.

2. For A-test monitor, press Monitor Selector.

Playback Equalization

Playback Azimuth Correction

1. Set Azimuth Adjustment for maximum high-frequency output during playback.

1. Set Equalization Selector to the position giving the most correct equalization (usually NAB).

DISASSEMBLY

1. Remove four feet and remove bottom cover.
2. Remove six knobs, tape cleaner, and Fast Forward/Rewind Bar.

3. Remove four screws and remove top cover.

SEQUENCE OF OPERATION

Play/Record (Start)

Pressing the Start button moves Lever (77), pivoting Arm (81), pulled by Spring (82), to pull Spring (80), swinging Bracket (76) and Roller (75).

Bracket (76) slides Lever (84) to pivot Arm (60), pressed by Spring (61), and to pivot Arm (62), pressed by Spring (63).

The Start button also slides Lever (9), pulled by Spring (10), to pull Spring (11), pivoting Arm (32).

The motor, through Pulley (24), Belt (3), Flywheel (51), Idler (57), Belt (1), Clutch (31), Idler (30), and Disc (27), drives Table (26).

The Start button slides Bracket (36), pulled by Spring (38), to lock Shaft (35). The Start button pivots Bracket (99), and then Bracket (99), pulled by Spring (98), latches the Start button.

The motor, through Idler (7), drives Flywheel (89).

Fast Forward

Moving Bracket (97) to the right pivots Lever (45), moving Arm (56), pivoting Bracket (55) to slide Lever (84), pivoting Arm (60), pressed by Spring (61), and pivoting Arm (62), pressed by Spring (63).

Arm (56) pulls Lever (46) to pivot Arm (47), pressed by Spring (48). Bracket (54) on Arm (56) moves Spring (53) to pivot Arm (52), moving Flywheel (51) which pushes Idler (57), pivoting Arm (58) which is pulled by Spring (64).

The motor, through Pulley (24), Belt (3), Flywheel (51), Idler (57), and Disc (27), drives Table (26).

Bracket (97) pivots Bracket (99), and then Bracket (99), pulled by Springs (98), latches Bracket (97).

Rewind

Moving Bracket (97) to the left produces the same sequence of operations as listed under "Fast Forward", except Arm (49) moves instead of Arm (47). Flywheel (51) releases Idler (57) to allow Spring (64) to pivot Arm (58). Flywheel (51) drives Disc (5) to rotate Reel Table (4).

Pause

(Manual) Depressing the Pause button pivots Lever (83), pulling Lever (84) to release Arm (62), pressed by Spring (63). Lever (84) pushes Bracket (76) to move Roller (75).

(Remote) Solenoid (K1) pivots Lever (86), pulling Lever (84) to release Arm (62), pressed by Spring (63). Lever (84) pushes Bracket (76) to move Roller (75).

UHER MODEL 9000 (22/24 Hi-Fi Special)

TROUBLE CHART

IMPORTANT: Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Idlers (30) and (57), Belts (1) and (3), and Flywheel (51) dirty or worn. 2. Spring (11), (29), or (25) weak. 3. Felt rings on Table (26) and/or Disc (27) dirty or worn.
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> 1. Bracket (55) bent or free of Arm (56). 2. Lever (84) bent. 3. Arm (62) bent. 4. Spring (53) weak or bent.

TROUBLE CHART (Continued)

IMPORTANT: Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves rapidly in Play or Record.	<ol style="list-style-type: none"> 1. Screw in Bracket (76) loose. 2. Bracket (72) bent or binding. 3. Spring (80) weak or loosen. 4. Roller (75) dirty or worn.
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Felt ring on Table (4) dirty or worn, 2. Spring (25) weak. 3. Bracket (55) bent or free of Arm (56).
Supply reel spills tape in forward positions.	<ol style="list-style-type: none"> 1. Pad on Arm (49) dirty or worn. 2. Felt on Disc (5) dirty or worn. 3. Spring (50) loose.
Take-up reel spills tape in Rewind.	<ol style="list-style-type: none"> 1. Pad on Arm (47) dirty or worn. 2. Felt on Disc (27) dirty or worn. 3. Spring (48) loose.
Reels do not stop immediately when Stop button is pressed.	<ol style="list-style-type: none"> 1. Lever (84) binding. 2. Arm (60) and/or (62) binding or defective. 3. Spring (61) and/or (63) loose.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Idler (7) dirty or worn. 2. Spring (13) weak or loose. 3. Speed Selector between speeds.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Pulley (24) dirty, loose, or damaged. 2. Idler (7) dirty or worn. 3. Flywheel (89) dirty or binding. 4. Capstan dirty or bent. 5. Motor defective.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Head (M1) or (M2) dirty or worn. 2. Circuitry defective.

ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 7 1/2 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 7 1/2 ips with a spring scale applied to a point on an empty tape reel 2 inches from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

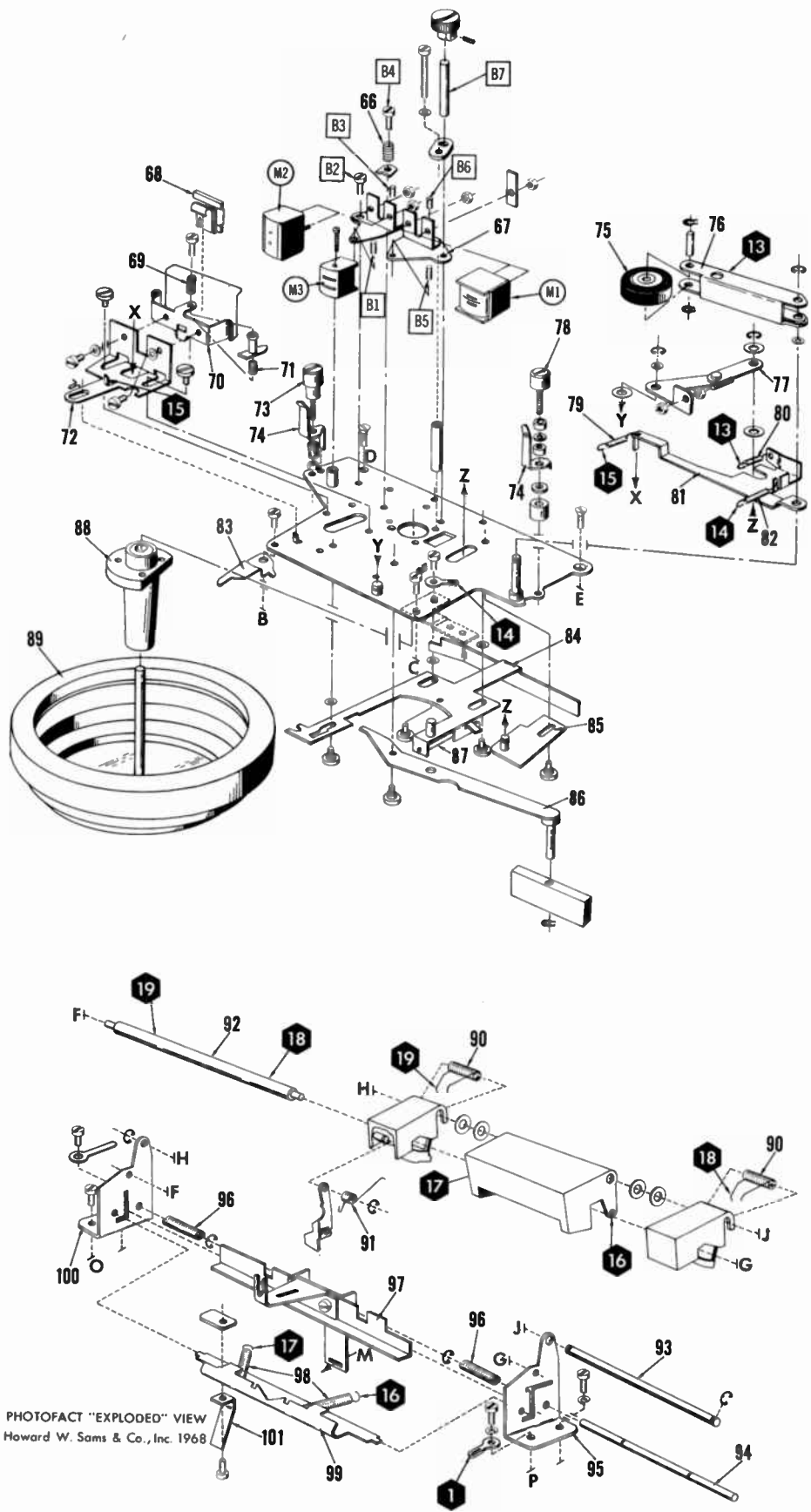
ADJUST	REMARKS
Play Take-up Torque	No adjustment provided. Nominal value 1 1/2 ounces, dependent on condition of Spring (11), Spring (29), and Idler (30).
Fast Forward/Rewind Torque	Flywheel (51) and Idler (57) should clear Discs (5) and (27) by equal amounts, adjusted by positioning Bracket (54). Fast Forward/Rewind torque 14 ounces, dependent on condition of Belt (3), Flywheel (51), Idler (57), Springs (25), and felt ring on Disc (5), Disc (27), Table (4), and Table (26). Rewind torque also dependent on Spring (64).

ADJUSTMENTS (Continued)

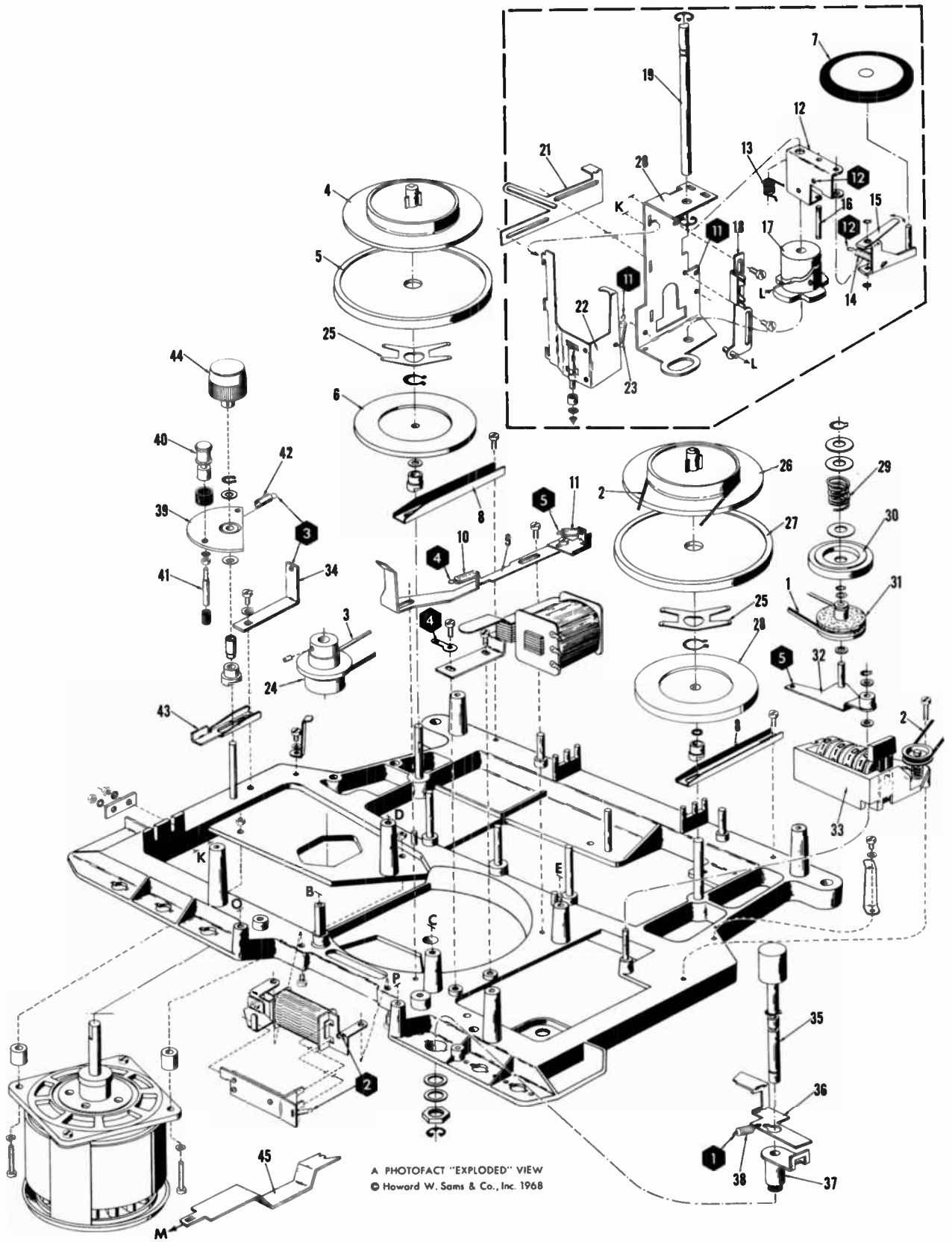
ADJUST	REMARKS
Supply Reel Drag	No adjustment provided. Nominal value 1/2 ounce, dependent on condition of felt ring on Disc (5) and reel weight.
Take-up Reel Drag	No adjustment provided. Nominal value 3/4 ounce, dependent on condition of felt ring on Disc (27) and reel weight.
Pressure Roller Pressure	No adjustment provided. Nominal value 2 1/2 pounds, controlled by condition of Spring (80).
Brake Torque	No adjustments provided. Nominal values, supply measured counterclockwise 10 ounces, take-up measured clockwise 16 ounces. Dependent on condition of brake pads on Arms (62) and (60), Springs (25), and felt rings on Tables (4) and (26).
Remote Pause Adjust	Press Start button and energize Solenoid K1 (Pause). Loosen two screws on the frame of the energized solenoid and the screw accessible through the hole in Bracket (76). Adjust Solenoid K1 (Pause) to allow Lever (84) to just clear Arm (62). Adjust Roller (75) to clear the capstan by approximately 1/64 inch.
Automatic Stop Adjust	Arm (101) should have 1/16 inch travel remaining, measured at point of contact with the solenoid arm when the Start button is released. Controlled by bend in Arm (101).
Erase Head Height	No adjustment provided. Top edge of top pole piece 45/64 inch above mounting plate.
Erase Head Azimuth	No adjustment provided. Pole pieces should be perpendicular to the direction of tape travel.
Tape Travel Adjust	Loosen the locknut and adjust Guide (73) to guide the tape so the top edge of moving tape is just below (.002 in.) the top edge of the top pole piece on the erase head. Reel Tables (4) and (26) and Pivot Arm (39) heights are adjusted by loosening the screw holding Adjustment Brackets (8) and (43) and sliding the brackets so the tape clears the flanges of tape reels and rides in the middle of Guides (40) and (78).
Record Head Height	Adjust B1 and B3 equally until the top edge of the top pole piece is even with the top edge of a properly threaded tape.
Record Head Azimuth	Apply a 10KC signal to pins 3 and 5 of High Level Input/Output jack, record monaurally on Left Channel at "0" db, and connect an AC VTVM to pins 3 and 5 of Stereo Monitor Output jack. Allowing for the time lag between the record and play heads, adjust B2 for maximum.
Play Head Height	Adjust B5 and B6 equally until the top edge of the top pole piece is just below (.002 in.) the top edge of a properly threaded tape.
Play Head Azimuth	Play an azimuth test tape, connect an AC VTVM across pins 3 and 5 of Stereo Monitor Output jack, and remove Azimuth Adjustment knob. Turn Azimuth Adjustment shaft for maximum output and replace Azimuth knob with setscrew 180° from stop.
RF Trap Alignment	Prepare unit to record stereo, advance Monitor Volume control 25%, connect an AC VTVM across Left Headphone Output jack, and adjust L3 for MINIMUM RF. Connect VTVM across Right Headphone Output jack and adjust L4 for MINIMUM RF. Connect VTVM to point \diamond with low side to ground and adjust L5 for MINIMUM RF. Connect VTVM to point \ominus with low side to ground and adjust L6 for MINIMUM RF. Connect VTVM across Left Headphone jack, switch the unit to monaural recording on the left channel, and adjust L2 for MINIMUM RF. Switch unit to monaural record on right channel, connect VTVM across Right Headphone jack, and check for MINIMUM RF by rocking slug in L2. Compromise the adjustment of L2 to give equal MINIMUM RF on both channels.

(CONTINUED ON PAGE 124)

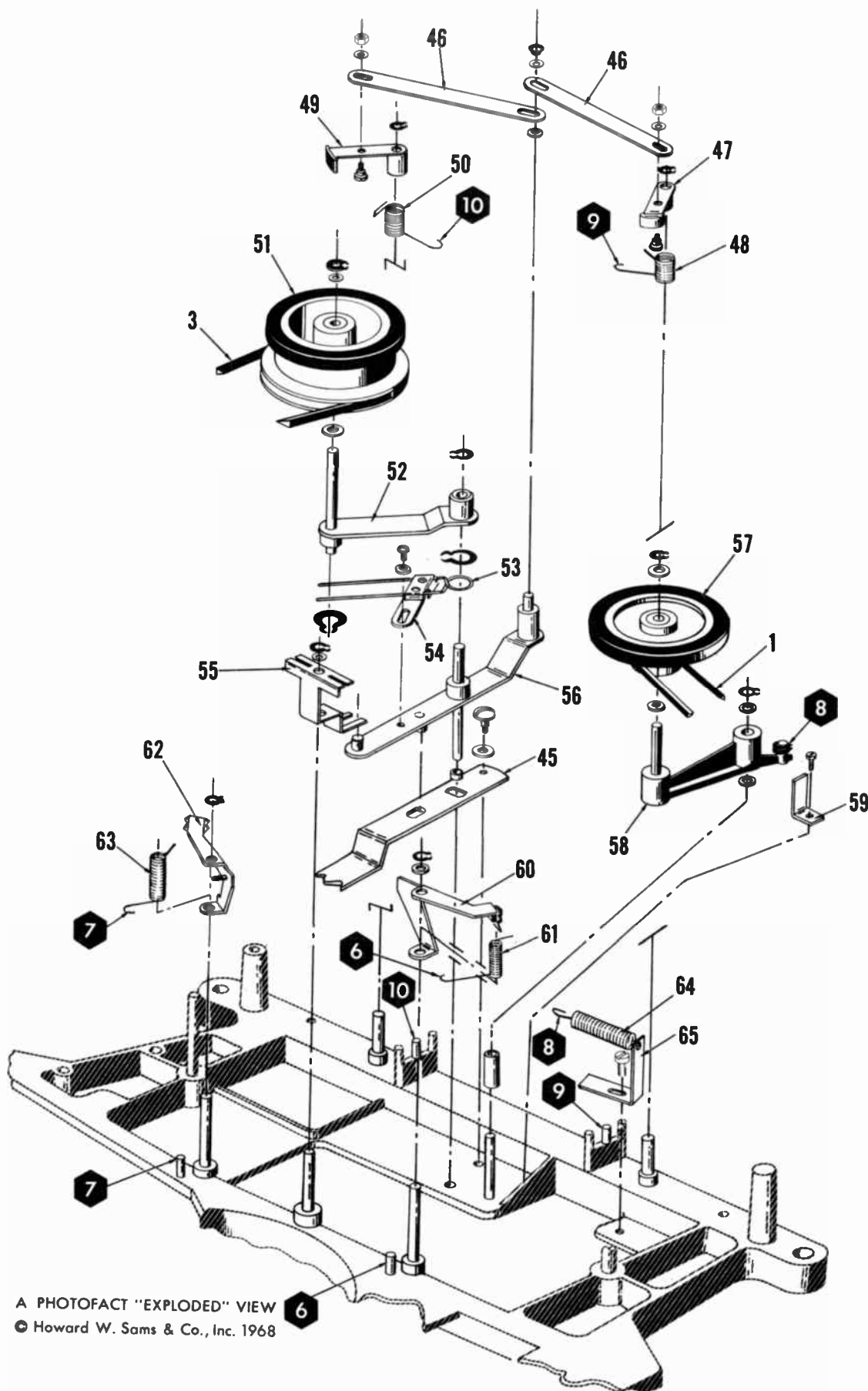
UHER MODEL 9000 (22/24 Hi-Fi Special)



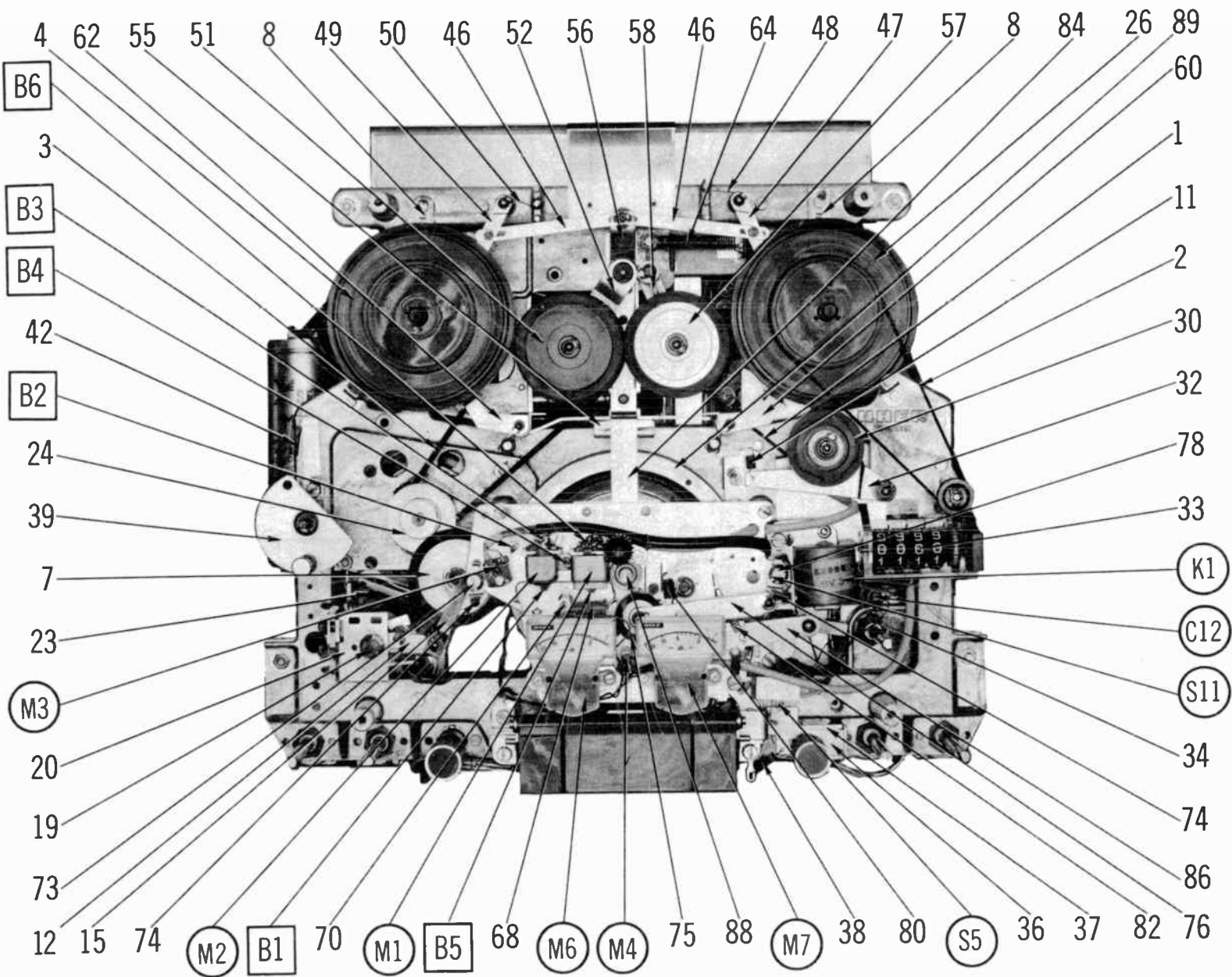
A PHOTOFAC "EXPLODED" VIEW
 © Howard W. Sams & Co., Inc. 1968



A PHOTOFAC "EXPLODED" VIEW
© Howard W. Sams & Co., Inc. 1968



A PHOTOFAC "EXPLODED" VIEW
 © Howard W. Sams & Co., Inc. 1968



ADJUSTMENTS (Continued)

ADJUST	REMARKS
Recording Preamp. Adjust	Set the unit to record a 2.5mv 1000-cycle signal applied to pins 3 and 5 (1 and 5) of the High-Level Input/Output jack with the Left (Right) Record Level set to maximum level. Connect a meter to pins 1 and 2 (4 and 2) of the Stereo Monitor jack and adjust R5) (R6) for 3 volts.
Record Level Indicator Adjust	With the record preamps properly aligned, apply a 1000-cycle signal to pins 3 and 5 (1 and 5) of the High-Level Input/Output jack. Adjust Left (Right) Record Level for 3 volts across pins 1 and 2 (4 and 2) of the Stereo Monitor Output jack. Adjust R10 (R11) for "O" db. on the Left (Right) Record Meter.
Playback Preamp. Adjust	Apply a 1000-cycle tone to pins 3 and 5 (1 and 5) of High Level Input/Output jack, record on Left (Right) channel at "O" db. Connect an AC VTVM to pins 3 and 5 (1 and 5) of Stereo Monitor Output jack. Depress Monitor Selector and note the reading. Release the Monitor Selector and adjust R4 (R7) for the noted reading.
Bias Adjust	Connect an AC VTVM to pins 3 and 5 (5 and 1) of Stereo Monitor Output. Apply 1000-cycles to pins 3 and 5 (1 and 5) of High-Level Input/Output and record in Monaural Left (Right), (NAB Equalization), at -20db on the Record Meter Note the VTVM reading. Record a 13KC signal at -20db on the Record Meter. Adjust R8 (R9) for the same reading as the 1000-cycle signal.

CLEANING

LUBRICATING

HEAD DEMAGNETIZING

Refer to "General Servicing Information" on page 4.

MECHANICAL PARTS LIST

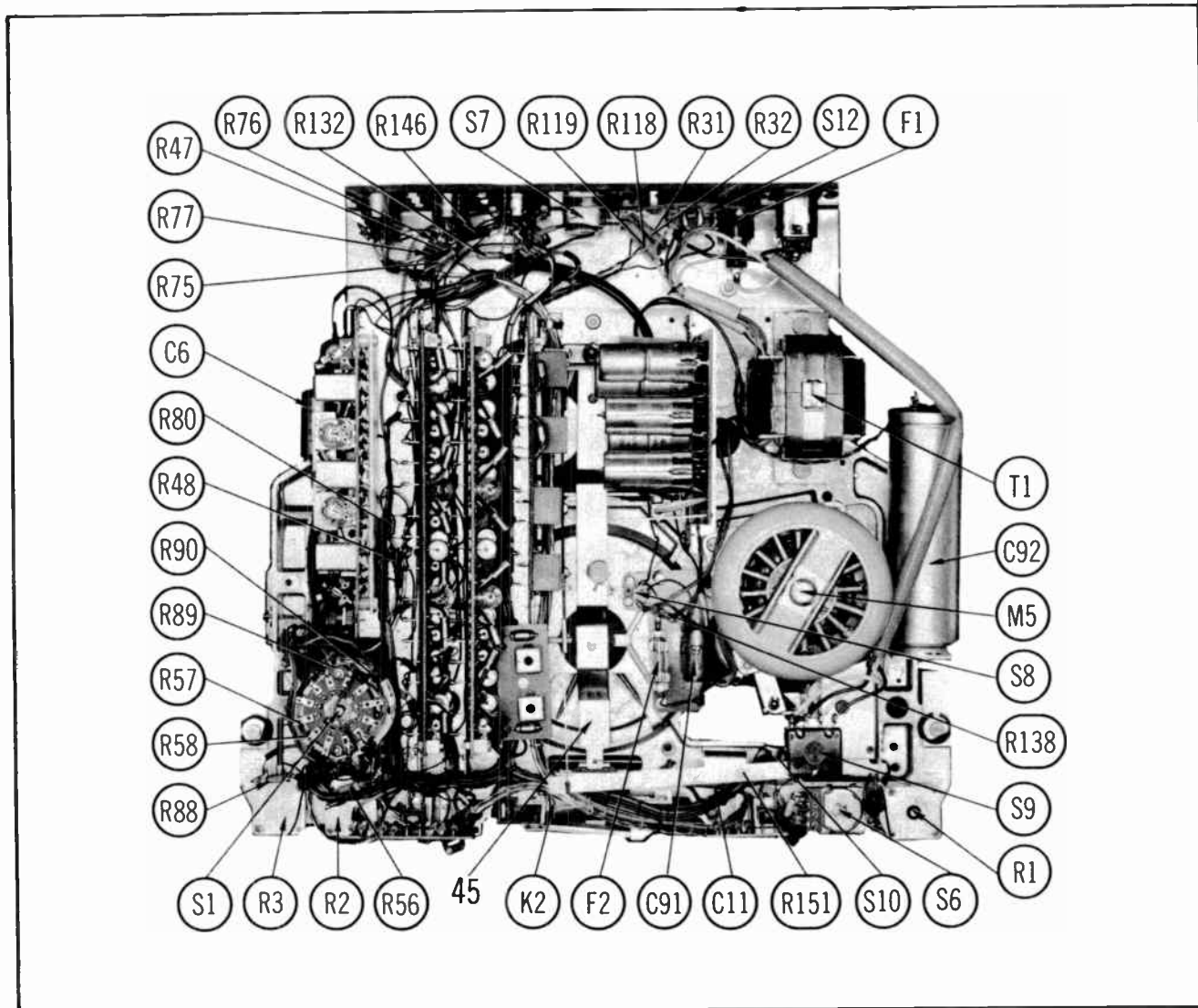
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1*		*Take-up Drive Belt	31		Take-up Drive Clutch
2*		*Tape Counter Drive Belt	32		Drive Clutch Arm
3		Motor Drive Belt	33		Tape Counter
4		Supply Reel Table	34		Spring Bracket
5		Driving Disc	35		Record Interlock Shaft
6		Rewind Clutch Plate	36		Interlock Locking Bracket
7		Flywheel Drive Idler	37		Interlock Guide Bracket
8		Reel Table Adjustment Brkt. (2 used)	38		Tension Spring
9		Take-up Actuating Lever	39		Pivot Arm
10		Tension Spring	40		Cleaner Arm Guide
11		Tension Spring	41		Pivot Arm Stop
12		Idler Arm Bracket	42		Tension Spring
13		Spring	43		Cleaner Adj. -Bracket
14		Tension Spring	44		Switch Actuating Arm
15		Flywheel Drive Idler Arm Assy.	45		Brake Lever
16		Idler Arm Pivot Pin	46		Brake Lever (2 used)
17		Speed Change Cam	47		Take-up Brake Arm
18		Cam Slide Plate	48		Brake Arm Spring
19		Speed Change Shaft	49		Supply Brake Arm
20		Speed Change Housing	50		Brake Arm Spring
21		Speed Change Slide Plate	51		Primary Flywheel
22		On/Off Switch Arm	52		Primary Flywheel Arm
23		Tension Spring	53		Return Spring
24		Motor Pulley	54		Return Retaining Bracket
25		Clutch Spring (2 used)	55		Brake Release Bracket
26		Take-up Reel Table	56		Brake Release Arm
27		Drive Disc	57		Fast Forward Idler
28		Take-up Clutch Plate	58		Fast Forward Idler Arm
29		Compression Spring	59		Idler Arm Stop Bracket
30		Take-up Drive Idler	60		Take-up Drive Disc Brake Arm
			61		Brake Arm Spring

MECHANICAL PARTS LIST (Continued)

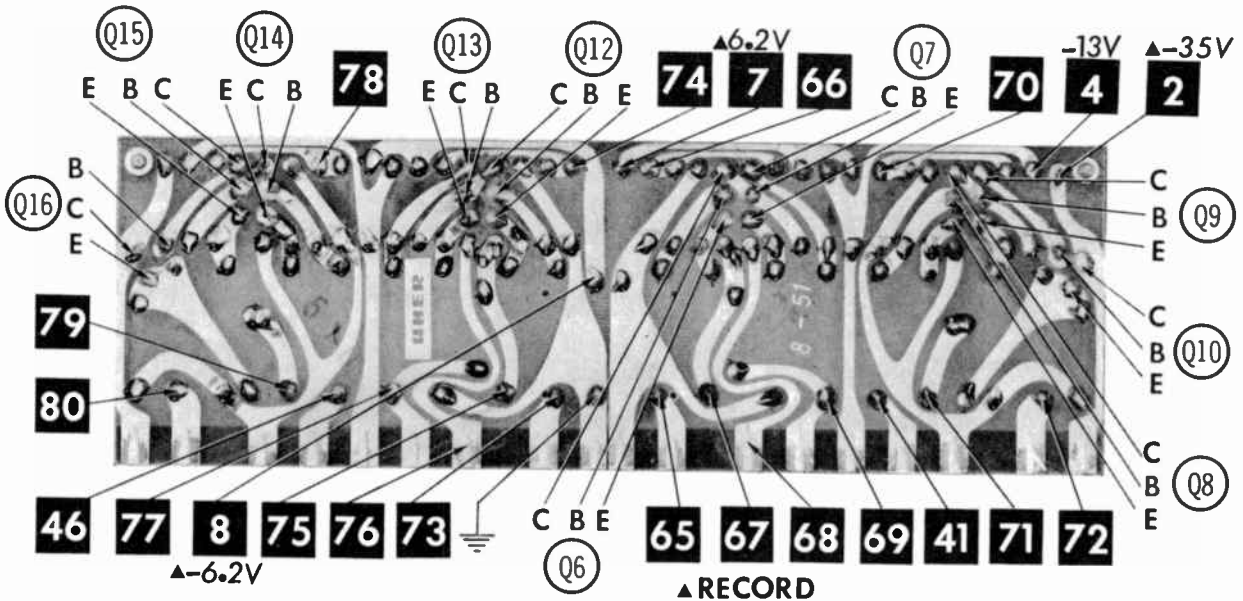
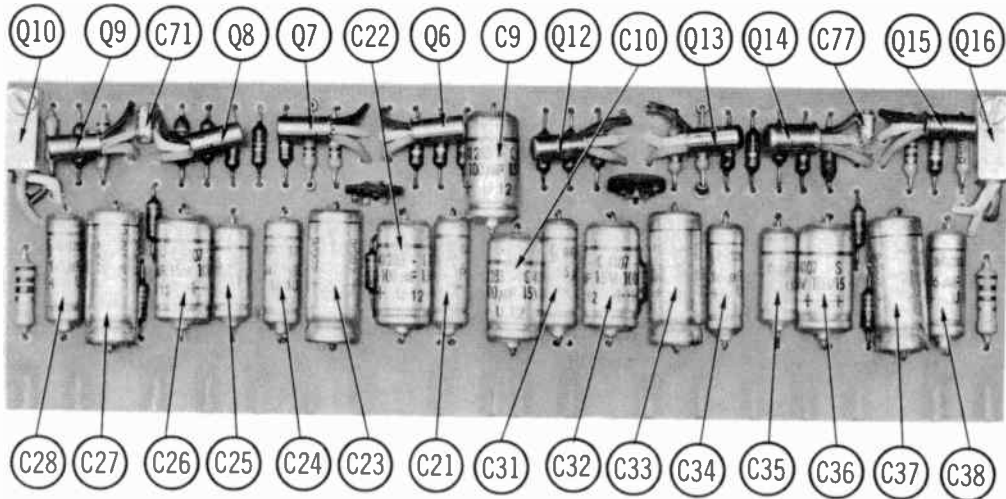
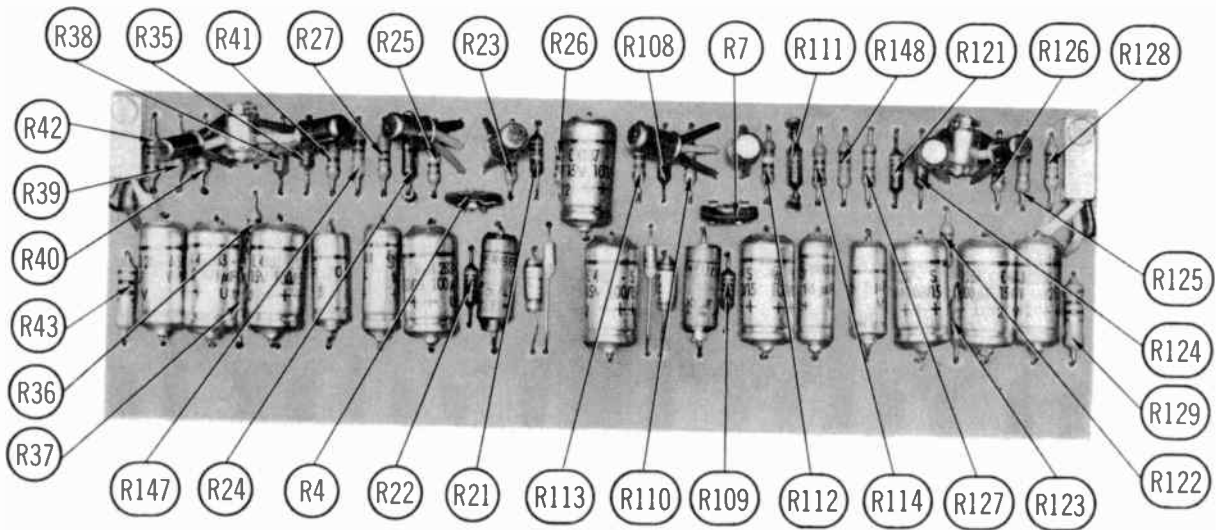
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
62		Supply Drive Dist Brake Arm	83		Manual Pause Lever
63		Brake Arm Spring	84		Brake Slide Lever
64		Tension Spring	85		Lever Stop Bracket
65		Tension Spring Bracket	86		Remote Pause Lever
66		Adjusting Spring	87		Tension Spring
67		Head Mounting Plate	88		Flywheel Bearing
68		Head Shield Assembly	89		Flywheel
69		Compression Spring	90		Push-button Return Spring (2 used)
70		Tape Guide Bracket	91		Pause Key Trip Spring
71		Compression Spring	92		Push-button Stop Rod
72		Tape Guide Slide Bracket	93		Push-button Shaft
73		Tape Guide Post	94		Stop Bracket Shaft
74		Tape Guide	95		Stop Bracket, Right Side
75		Pressure Roller	96		Stop Bracket Shaft Spring (2 used)
76		Pressure Roller Bracket	97		Fast Forward-Rewind Slide Brkt.
77		Start Lever	98		Tension Spring (2 used)
78		Tape Guide Post Assembly	99		Release Bracket
79		Tension Spring	100		Stop Bracket, Left Side
80		Tension Spring	101		Automatic Release Arm
81		Tape Guide Pad Slide Brkt. Arm			
82		Tension Spring			

* Take-up Drive Belt — WALSCO Part #1499-19

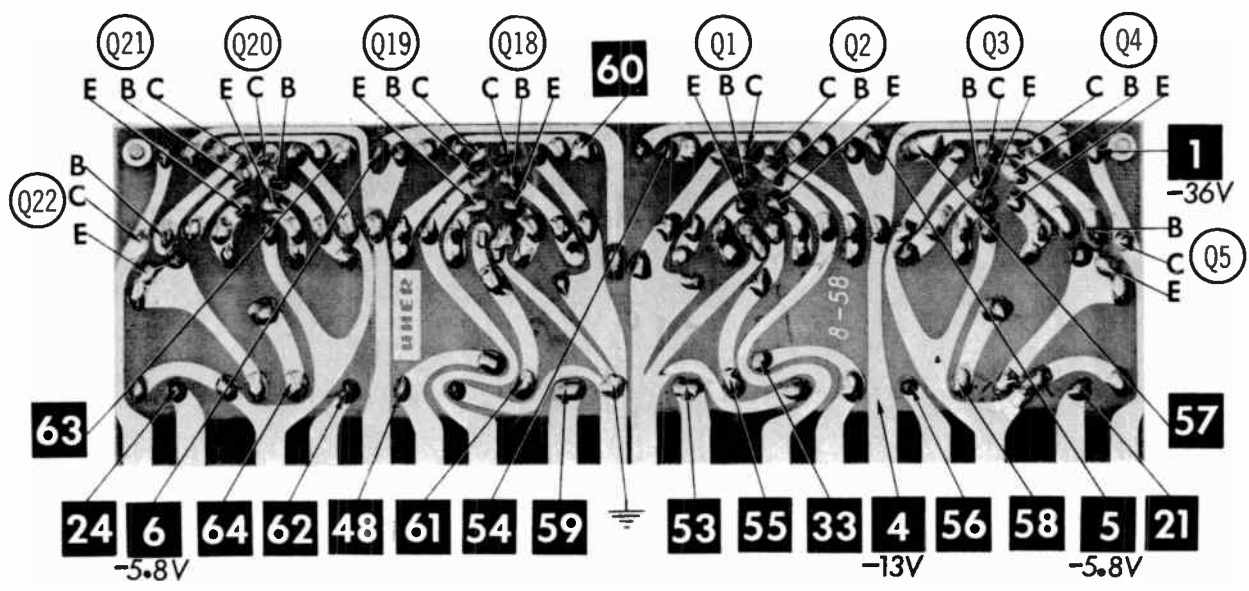
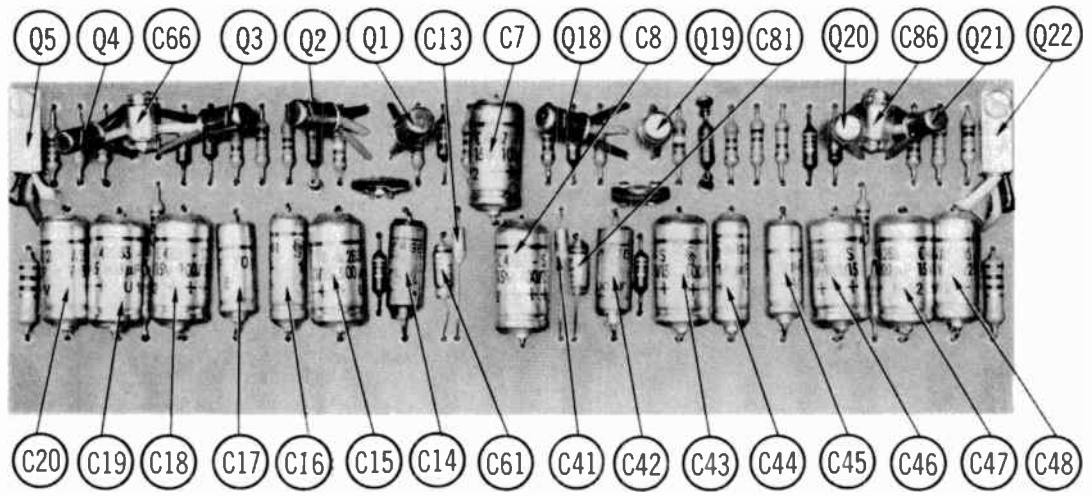
* Tape Counter Drive Belt — WALSCO Part #1410-51



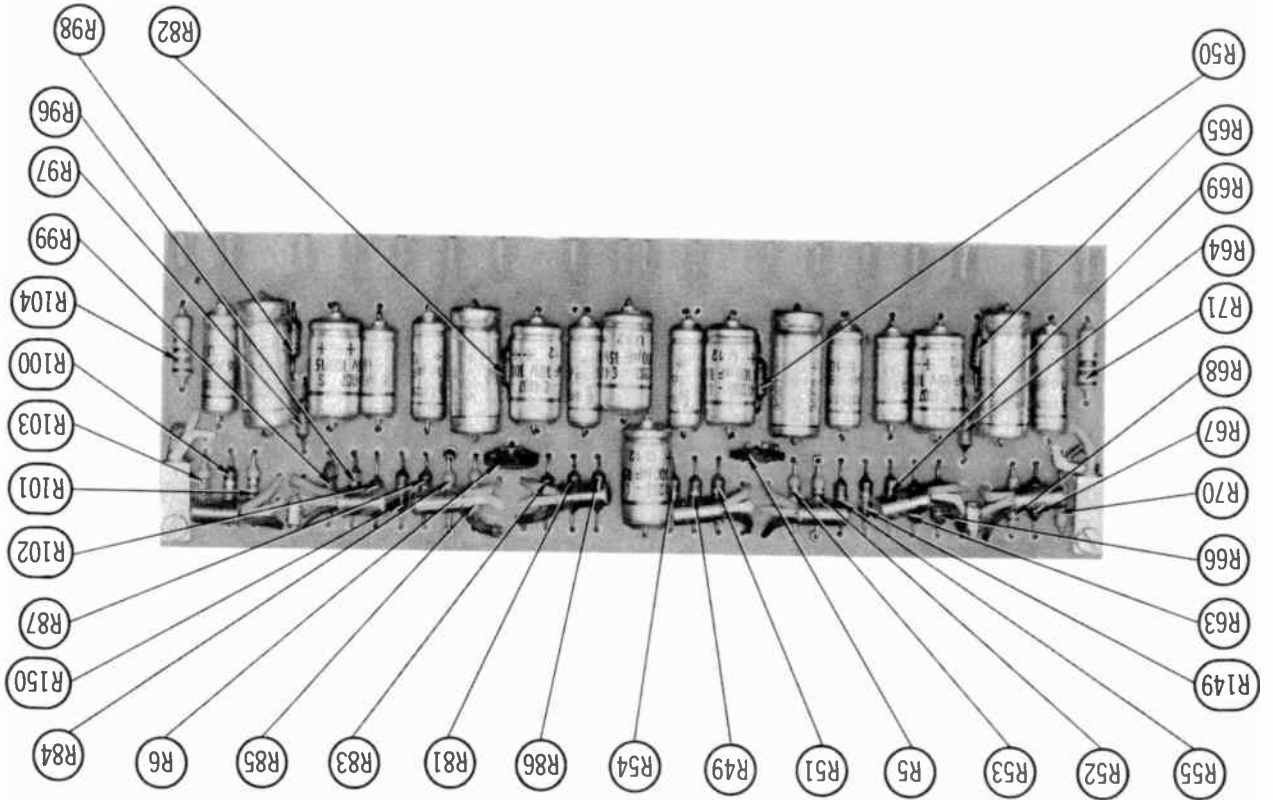
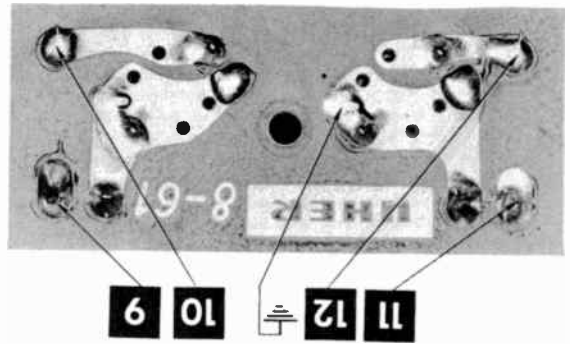
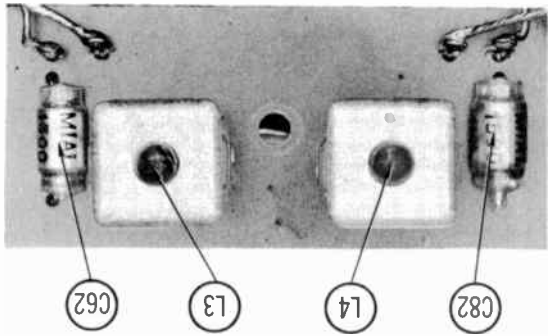
UHER MODEL 9000 (22/24 Hi-Fi Special)

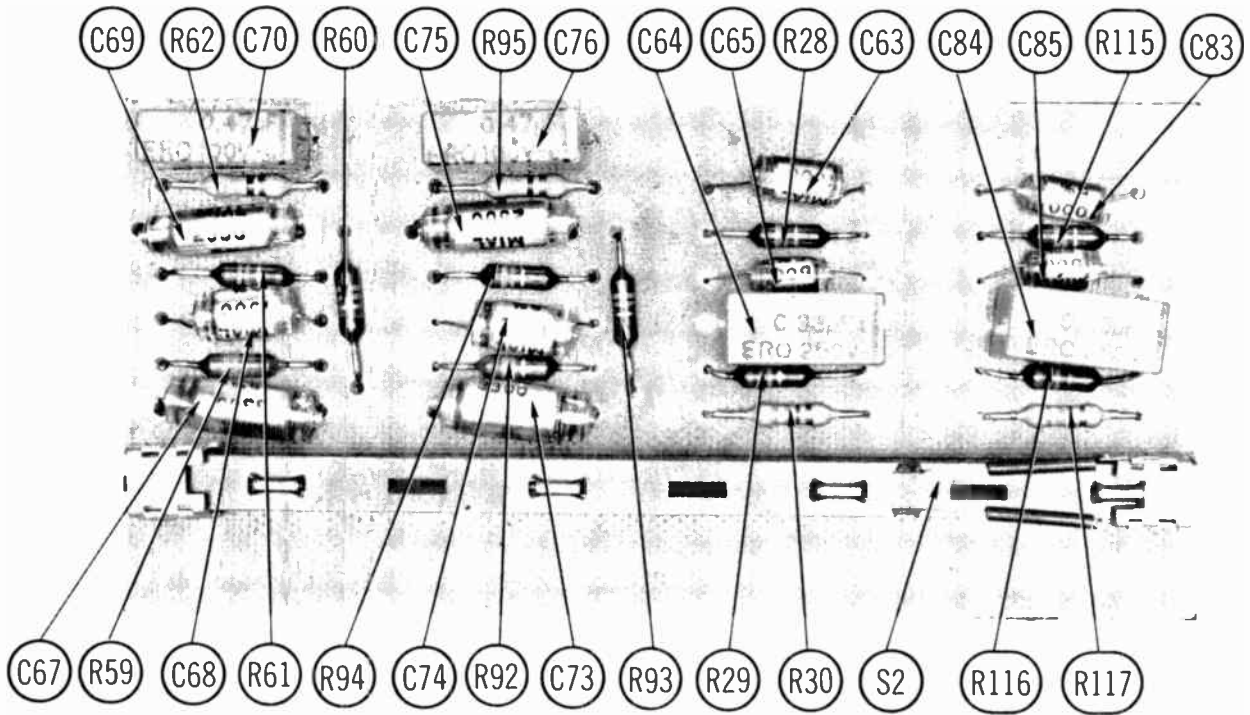


A Howard W. Sems CIRCUITRACE Photo

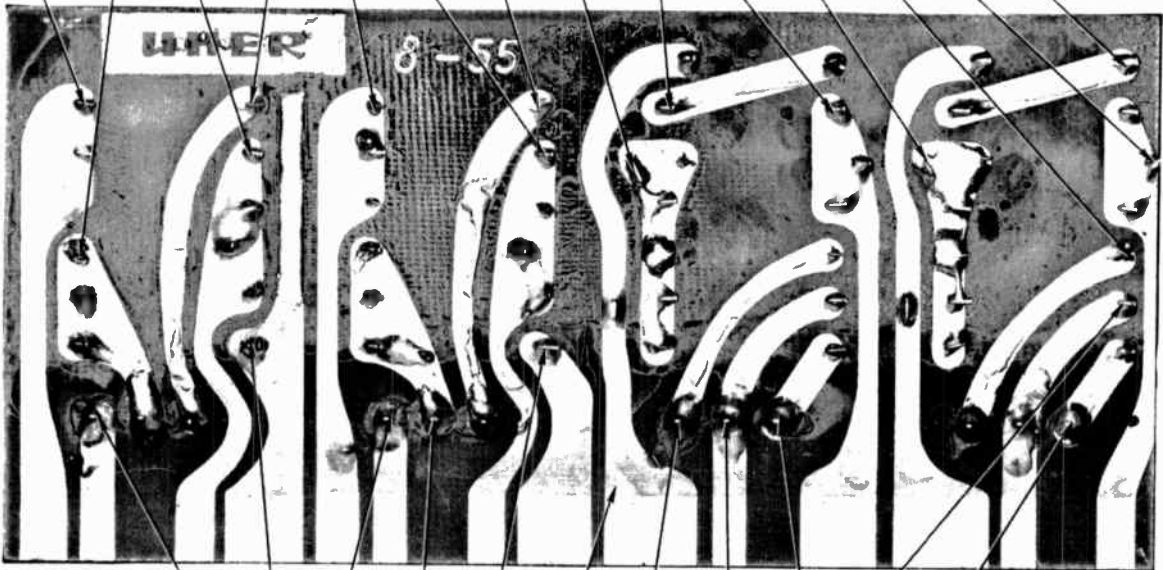


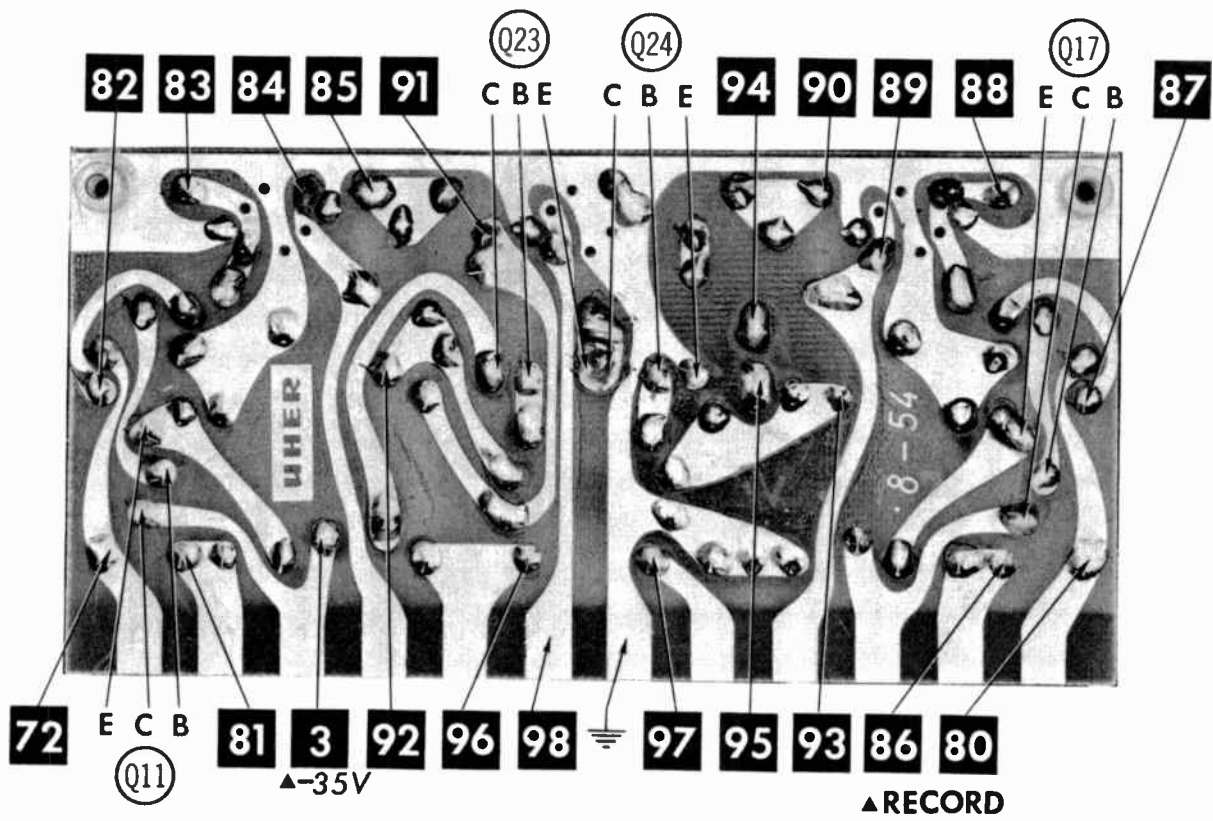
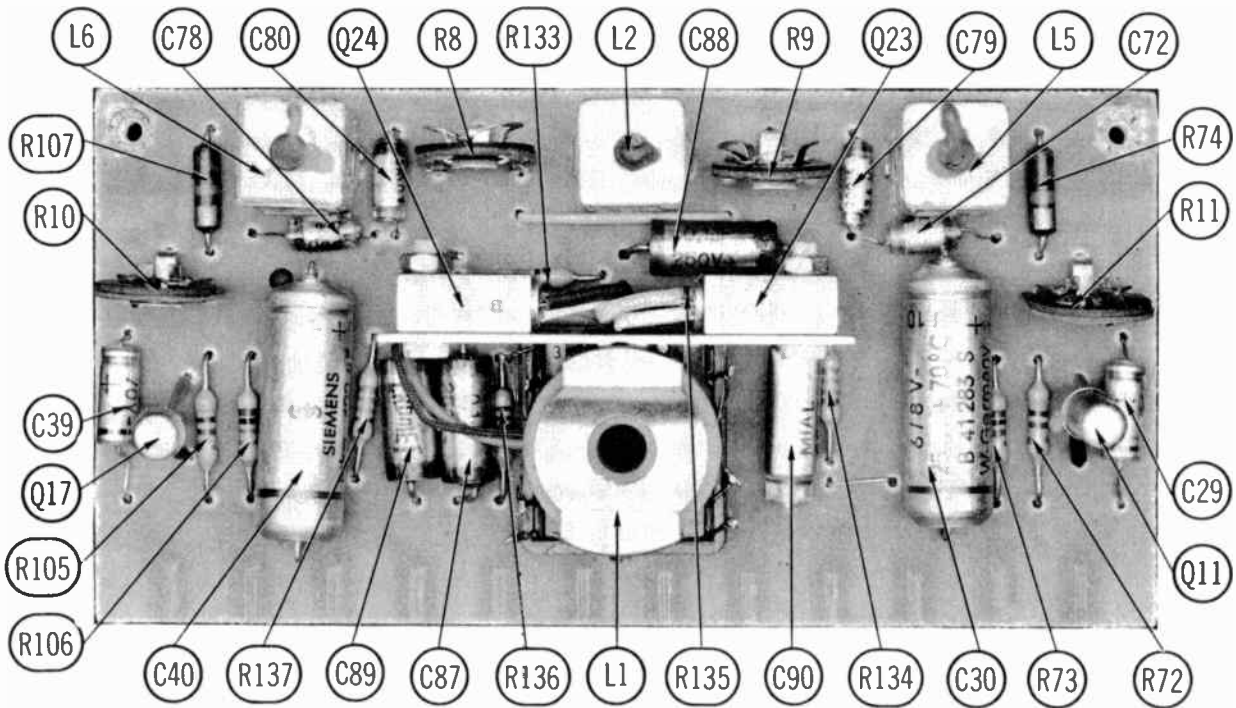
A Howard W. Sams **CIRCUITRACE** Photo



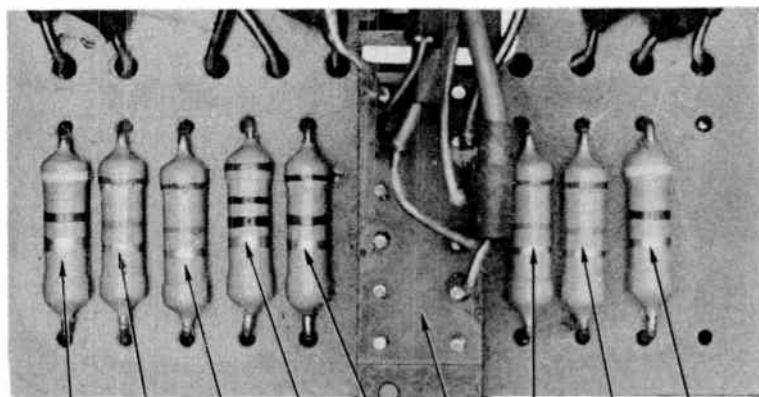


48 50 17 49 33 13 34 45 47 46 40 39 41 42



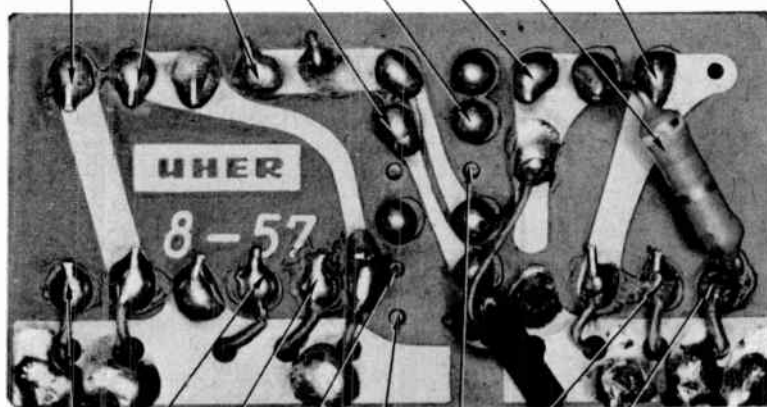


A Howard W. Sams **CIRCUITRACE** Photo

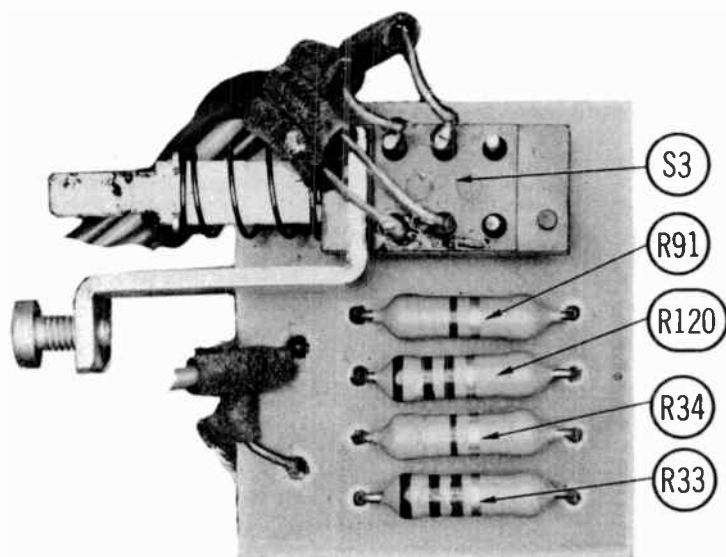


R46 R44 R45 R142 R145 S4 R79 R130 R131

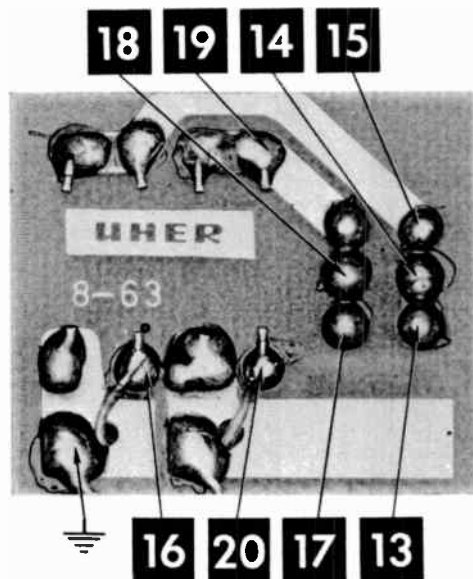
21 23 2 1 29 26 R78 24



22 3 28 31 32 30 25 27



S3
R91
R120
R34
R33



18 19 14 15
16 20 17 13

UHER MODEL 9000 (22/24 Hi-Fi Special)

A Howard W. Sams CIRCUITRACE® Photo

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Port Number, and Description.)

TRANSISTORS

ITEM No.	TYPE No.	FUNCTION	REPLACEMENT DATA					
			MFGR. PART No.	DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SYLVANIA PART No.
Q1	AC151	Preamp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q2	AC151	Preamp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q3	AC151	AF Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q4	AC151	AF Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q5	AC153K	AF Amp						
Q6	AC151	Preamp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q7	AC151	Preamp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q8	AC151	AF Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q9	AC151	AF Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q10	AC153K	AF Amp						
Q11	AC151	Meter Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q12	AC151	Preamp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q13	AC151	Preamp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q14	AC151	AF Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q15	AC151	AF Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q16	AC153K	AF Amp						
Q17	AC151	Meter Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q18	AC151	Preamp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q19	AC151	Preamp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q20	AC151	AF Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q21	AC151	AF Amp		DS-26	GE-2	TR-14	SK-3004	ECG 102
Q22	AC153K	AF Amp						
Q23	AC153K	Bias Oscillator						
Q24	AC153K	Bias Oscillator						
Q25	AC153K	Voltage Regulator						

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MFGR. PART OR TYPE No.	REPLACEMENT RECTIFIERS & DIODES			REPLACEMENT RECTIFIERS		NOTES
		GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	SYLVANIA PART No.	RCA PART No.	SARKES TARZIAN PART No.	
X1	860C300	GE-504A (1)	18D82A or 8D4 (1)	ECG 116 (1) or ECG 117 (1)	SK-3030 (1) or SK-3031 (1)	S-5959 or 40C (1)	(1) 4 required
X2	ZG33						

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
			UHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	250	70V						TC496A	
C2	250	70V						TC496A	
C3	500	35V		PRS1390	EA50-500	8R500-50		TC50050A	TL-1316
C4	500	35V		PRS1390	EA50-500	8R500-50		TC50050A	TL-1316
C5	1000	15V		PRS1230	EA30-1000	8R1000-15		TC1501A	TL-1166.5
C6	250	35V		PRS1380	EA50-250	8R250-50	QT1-31	TC50025A	TL-1313
C7	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C8	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C9	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C10	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C11	10	70V		CRE907A		NLW10-100	MT1-7	TT100X10	TE-1407
C12	1	70V		CRE900A		NLW1-150	MT1-2	TT100X1	TE-1400
C13	10	4V		CRE307A	EA6-10	TYR138-8106K	MT1-5	TAS106K006P0C	196D106X0015 ^{E8}
C14	100	3V		CRE223A	EA6-100	NLW100-3	MT1-18	MTA100E10	TE-1059.5
C15	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C16	16	25V		CRE609A	EA30-25	NLW15-25	MT1-11	MTA15D35	TE-1205
C17	5	70V		CRE904A		NLW5-150	MT1-4	TT100X5	TE-1404
C18	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C19	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C20	50	25V		CRE617A	EA30-50	NLW50-25	MT1-17	MTA50E25	TE-1209
C21	16	25V		CRE609A	EA30-25	NLW15-25	MT1-11	MTA15D35	TE-1205
C22	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C23	400	6V		CRE337A	EA6-500	8R500-6		MTA400F10	TE-1107
C24	16	25V		CRE609A	EA30-25	NLW15-25	MT1-11	MTA15D35	TE-1205
C25	5	70V		CRE904A		NLW5-150	MT1-4	TT100X5	TE-1404
C26	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C27	400	6V		CRE337A	EA6-500	8R500-6		MTA400F10	TE-1107
C28	16	25V		CRE609A	EA30-25	NLW15-25	MT1-11	MTA15D35	TE-1205
C29	2	70V		CRE901A		NLW2-100	MT1-2	TT100X2	TE-1401
C30	400	6V		CRE337A	EA6-500	8R500-6		MTA400F10	TE-1107
C31	16	25V		CRE609A	EA30-25	NLW15-25	MT1-11	MTA15D35	TE-1205
C32	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C33	400	6V		CRE337A	EA6-500	8R500-6		MTA400F10	TE-1107
C34	16	25V		CRE609A	EA30-25	NLW15-25	MT1-11	MTA15D35	TE-1205
C35	5	70V		CRE904A		NLW5-150	MT1-4	TT100X5	TE-1404
C36	100	15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C37	400	6V		CRE337A	EA6-500	8R500-6		MTA400F10	TE-1107
C38	16	25V		CRE609A	EA30-25	NLW15-25	MT1-11	MTA15D35	TE-1205

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

ELECTROLYTIC CAPACITORS (cont)

ITEM No.	RATING	REPLACEMENT DATA						
		UHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C39	2 70V		CRE901A		NLW2-100	MT1-2	TT100X2	TE-1401
C40	400 6V		CRE337A	EA6-500	BR500-6		MTA400F10	TE-1107
C41	10 4V		CRE307A	EA6-10	TYR13B-B106K	MT1-5	TAS106K006POC	196D106X0015 EB
C42	100 3V		CRE223A	EA6-100	NLW100-3	MT1-18	MTA100E10	TE-1059.5
C43	100 15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C44	16 25V		CRE609A	EA30-25	NLW15-25	MT1-11	MTA15D35	TE-1205
C45	5 70V		CRE904A		NLW5-150	MT1-4	TT100X5	TE-1404
C46	100 15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C47	100 15V		CRE473A	EA15-100	NLW100-15	MT1-19	MTA100E15	TE-1162
C48	50 25V		CRE617A	EA30-50	NLW50-25	MT1-17	MTA50E25	TE-1209

CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C61	200 125V		ADM-15-201	CPR-200J	CD15F201J500	DM-15-201	SX320	MS-32
C62	.0015 5%		ADM-20-152	CPR-1500J	CD19F152J500	DM-19-152	SX215	MS-215
C63	.001 5%			CPR-1000J	CD19F102J500	DM-19-102J	SX210	MS-21
C64	.33 250V		V1614P33		WMF4P33	4DP-5-334	PVC6033	6PS-P33
C65	500 5%		ADM-15-501			DM-16-501		MS-35
C66	.0018		ADM-20-182	CPR-1800J	CD19F182J500	DM-19-182	SX218	MS-218
C67	.0033 5%		ADM-20-332	CPR-3300J	CD19F332J500	DM-19-332	SX233	MS-233
C68	.0015 5%		ADM-20-152	CPR-1500J	CD19F152J500	DM-19-152	SX215	MS-215
C69	.0025 5%		ADM-20-252	CPR-2500J		DM-19-252	SX225	MS-225
C70	.47 100V		DBE2P47		DMF2P47	2DP-5-474	PVC2047	2PS-P47
C71	200 10%		ADM-15-201	CPR-200J	CD15F201J500	DM-15-201	SX320	MS-32
C72	500 5%		ADM-15-501			DM-16-501		MS-35
C73	.0033 5%		ADM-20-332	CPR-3300J	CD19F332J500	DM-19-332	SX233	MS-233
C74	.0015 5%		ADM-20-152	CPR-1500J	CD19F152J500	DM-19-152	SX215	MS-215
C75	.0025 5%		ADM-20-252	CPR-2500J		DM-19-252	SX225	MS-225
C76	.47 100V		DBE2P47		DMF2P47	2DP-5-474	PVC2047	2PS-P47
C77	200 10%		ADM-15-201	CPR-200J	CD15F201J500	DM-15-201	SX320	MS-32
C78	500 5%		ADM-15-501			DM-16-501		MS-35
C79	200 125V		ADM-15-201	CPR-200J	CD15F201J500	DM-15-201	SX320	MS-32
C80	200 125V		ADM-15-201	CPR-200J	CD15F201J500	DM-15-201	SX320	MS-32
C81	200 125V		ADM-15-201	CPR-200J	CD15F201J500	DM-15-201	SX320	MS-32
C82	.0015 5%		ADM-20-152	CPR-1500J	CD19F152J500	DM-19-152	SX215	MS-215
C83	.001 5%			CPR-1000J	CD19F102J500	DM-19-102J	SX210	MS-21
C84	.33 250V		V1614P33		WMF4P33	4DP-5-334	PVC6033	6PS-P33
C85	500 5%		ADM-15-501			DM-16-501		MS-35
C86	.0018		ADM-20-182	CPR-1800J	CD19F182J500	DM-19-182	SX218	MS-218
C87	.1 250V		DBE4P1		DMF4P1	4DP-3-104		4PS-P10
C88	.1 250V		DBE4P1		DMF4P1	4DP-3-104		4PS-P10
C89	.1 250V		DBE4P1		DMF4P1	4DP-3-104		4PS-P10
C90	.0068 10%	(.0025) (1)	ADM-30-682	CPR-6800J	CD30F682J500	DM-30-682	SX268	MS-268
C91	1.0 250V				WMF4W1		PVC61	4TM-M1
C92	38 42VAC				ETW43-220			

(1) Used in Uher 22 HI-FI Special.

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

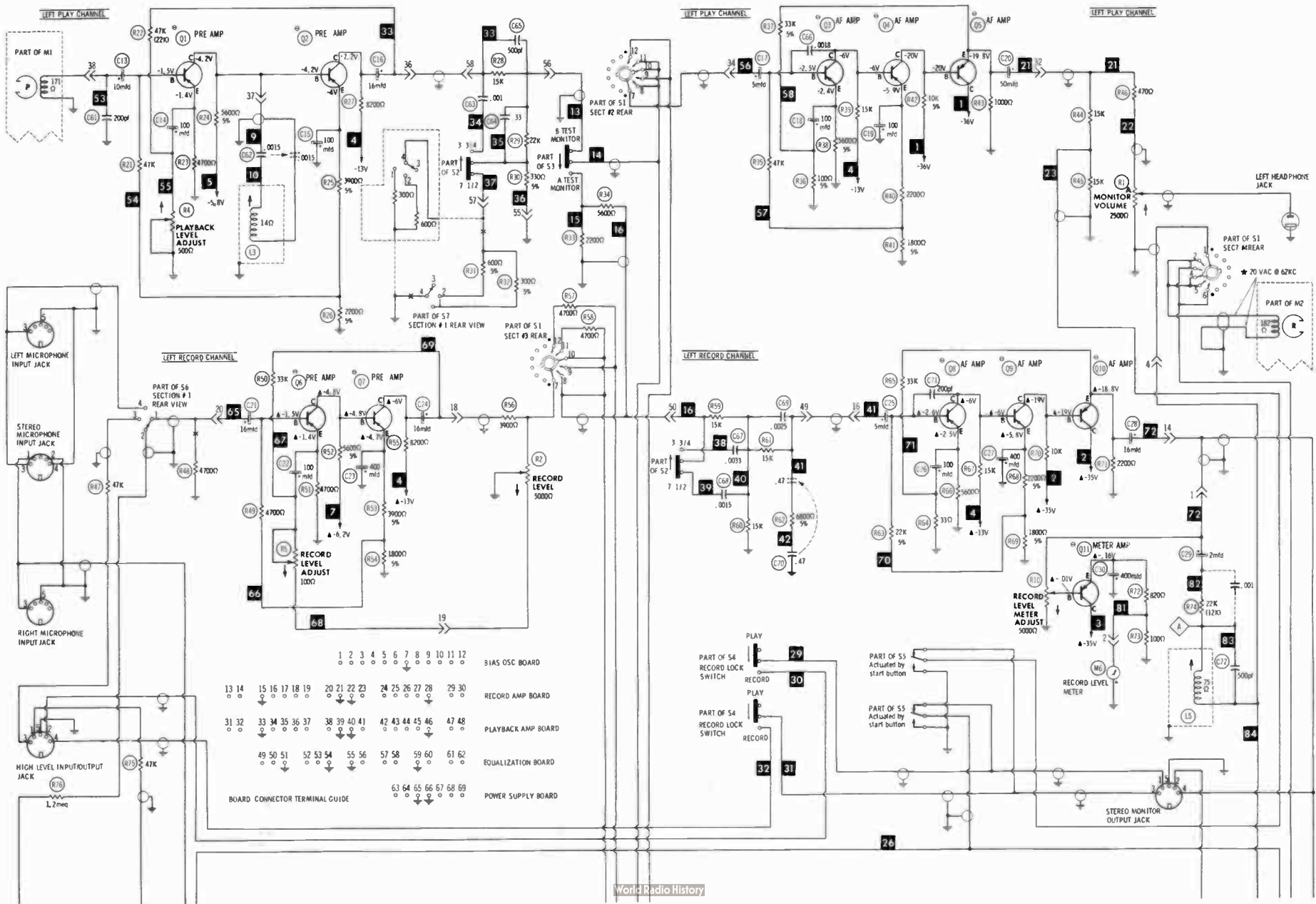
ITEM No.	USE	RESIST-ANCE	REPLACEMENT DATA				
			UHER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1A B	Monitor Volume, Left Monitor Volume, Right	2500 2500		F1-2500, R1-2500, TU304 (2)	NP-3000-S, NR-3000-S, UP-C-400 (2), DC-2	B11-111, B11-111, SK1 (2), QCM	FA252L, RU252L, CS3500 (2)
R2	Record Level, Left	5000		F5-5000, SU308 (2)	NP-5000-V, UP-C-400 (2)	Q17-114 (2) or (BU2, CF34, SS1 (2), DC1)*	RU53R, SL39, SL3500 (2)
R3	Record Level, Right	5000		F5-5000, SU308 (2)	NP-5000-V, UP-C-400 (2)	Q17-114 (2) or (BU2, CF34, SS1 (2), OC1)*	RU53R, SL39, SL3500 (2)
R4	Playback Level Adjust, Left	500		T-500		X201R501B	MTC52L1
R5	Record Level Adjust, Left	100		T-100		X201R101B	MTC12L1
R6	Record Level Adjust, Right	100		T-100		X201R101B	MTC12L1
R7	Playback Level Adjust, Right	500		T-500		X201R501B	MTC52L1
R8	Record Bias Adjust, Left	50K	(1)	T-50K		X201R503B	MTC54L1
R9	Record Bias Adjust, Right	50K	(1)	T-50K		X201R503B	MTC54L1
R10	Record Level Meter Adjust, Left	5000		T-5000		X201R502B	MTC53L1
R11	Record Level Meter Adjust, Right	5000		T-5000		X201R502B	MTC53L1

* "SNAPTROL"
(2) File flat.

(1) Uher 22 HI-FI Special uses 25K in this application.

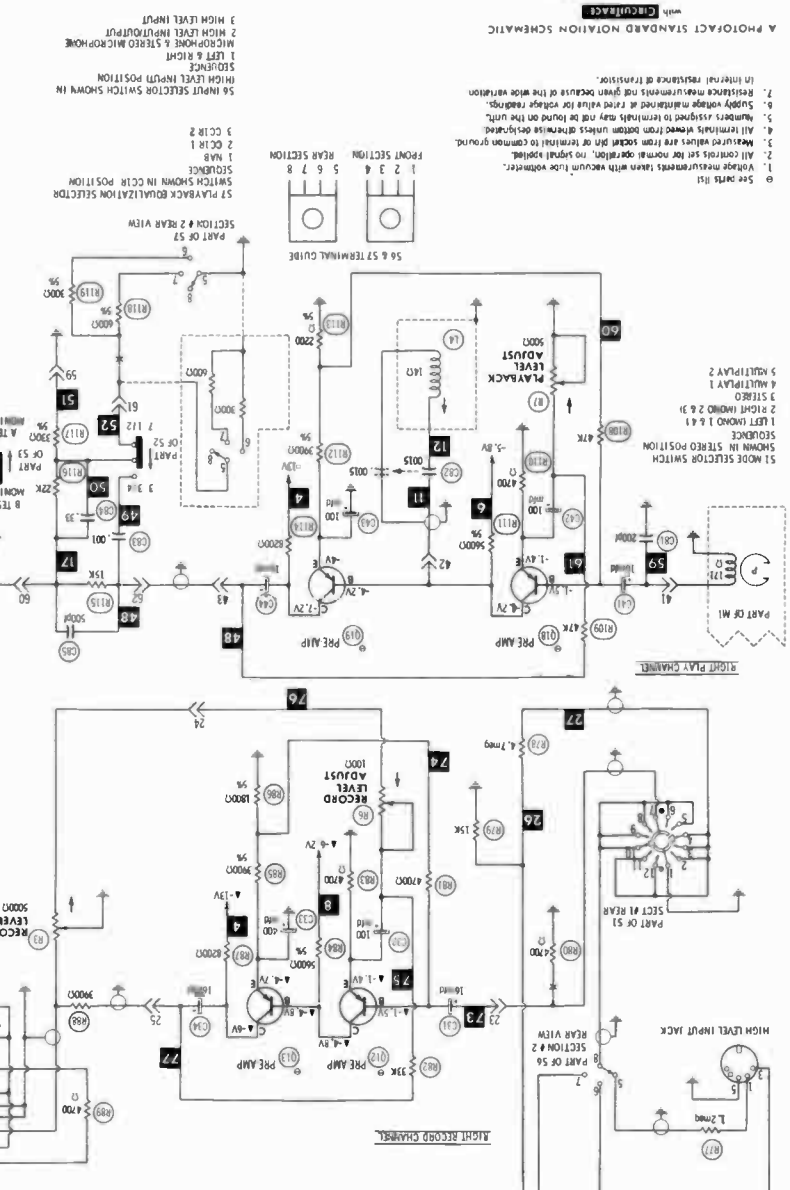
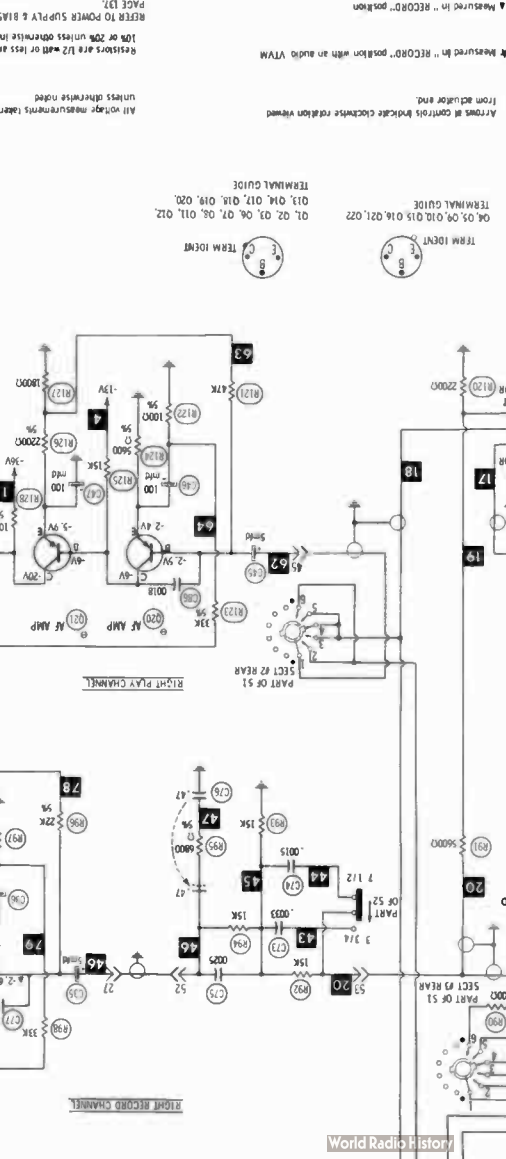
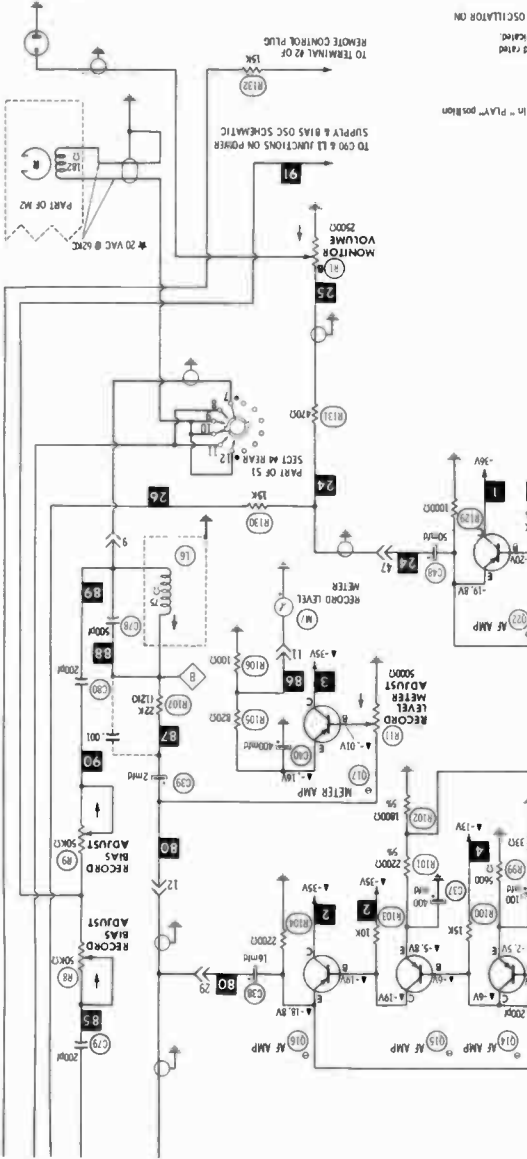
(CONTINUED ON PAGE 138)

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



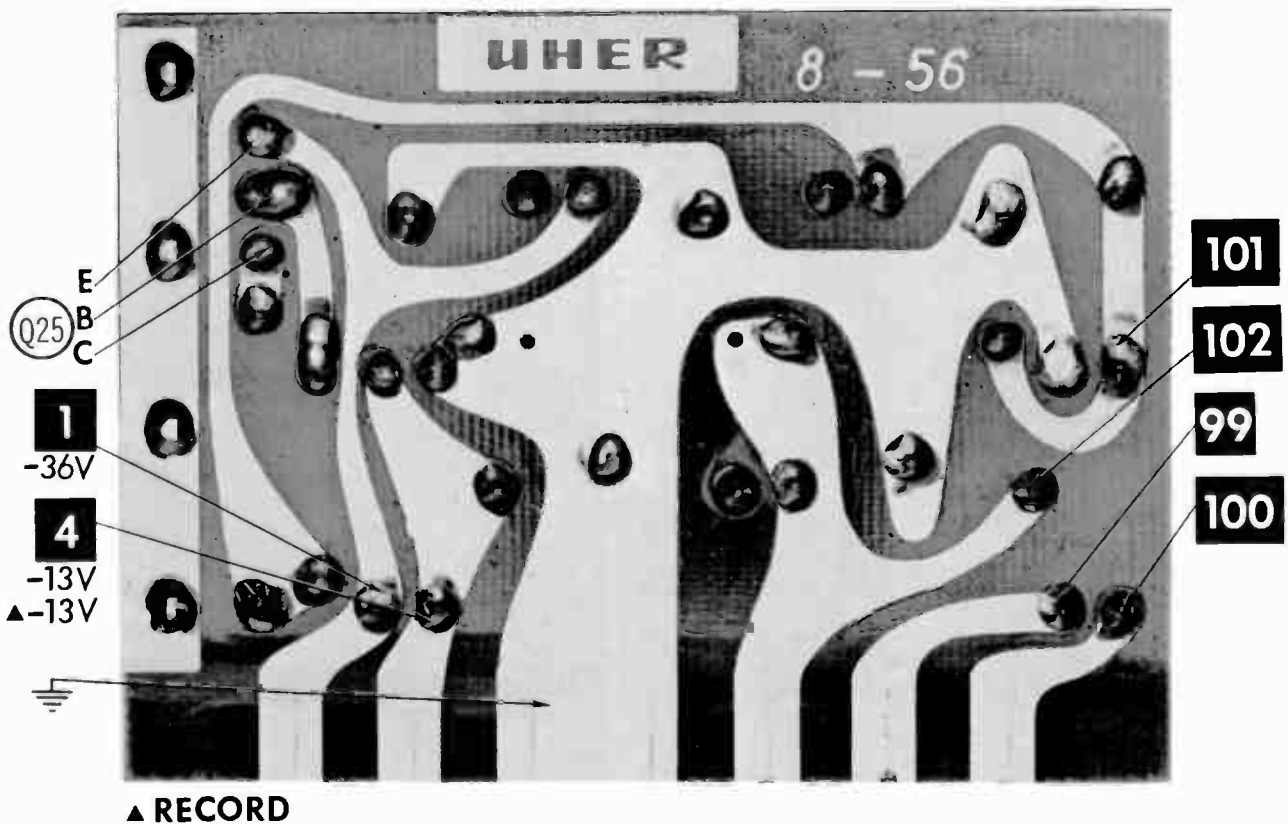
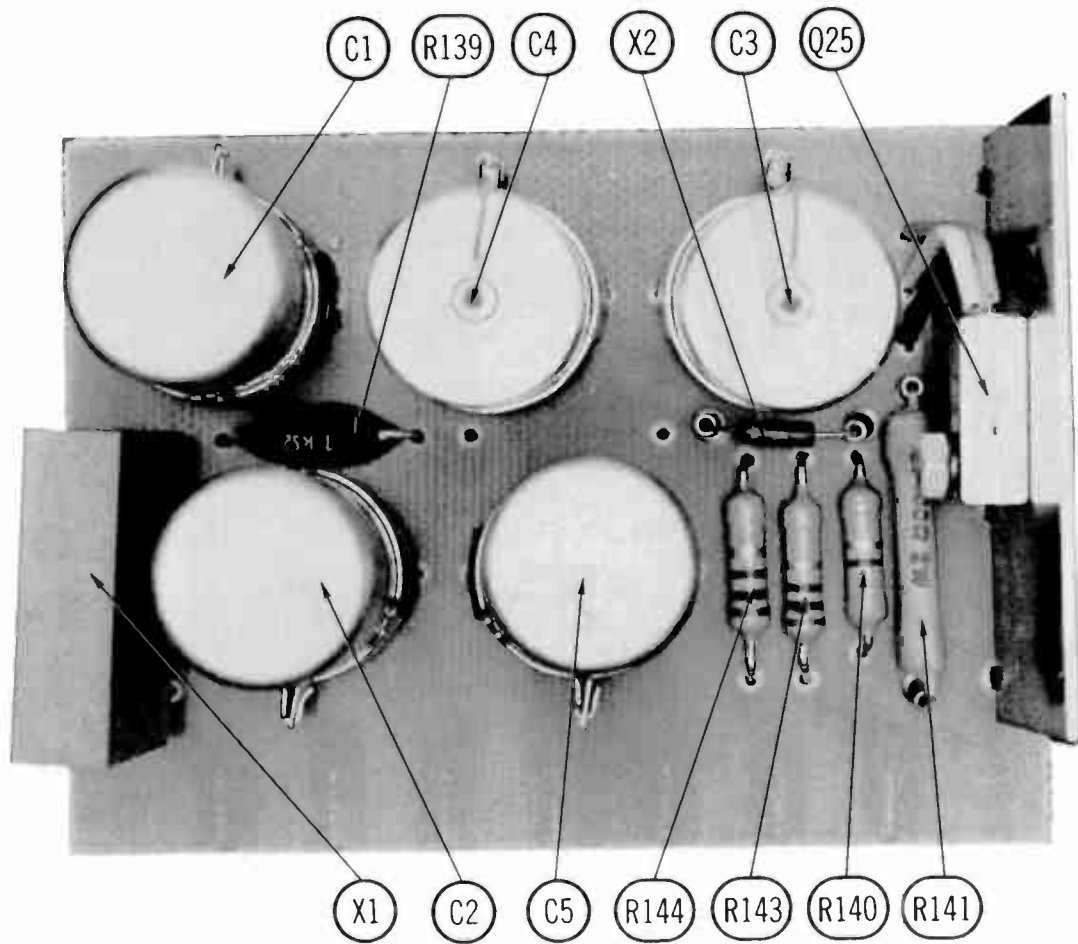
UHER MODEL 9000 (22/24 Hi-Fi Special)

UHER MODEL 9000 (22/24 Hi-Fi Special)



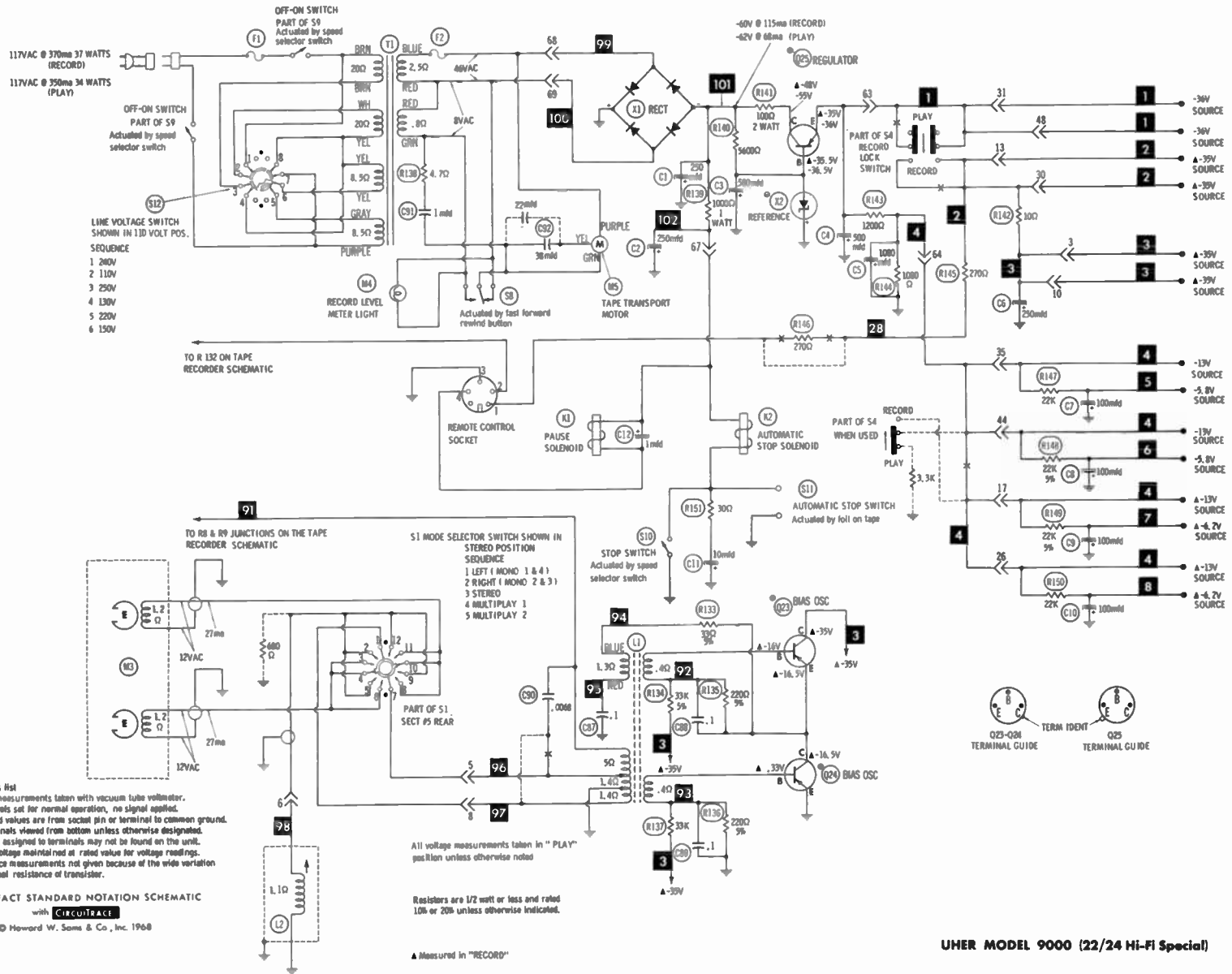
* Measured in "RECORD" position with an audio VTVM
 ▲ Measured in "RECORD" position
 REFERS TO POWER SUPPLY & BIAS OSCILLATOR ON PAGE 137.
 RESISTORS ARE 1/2 WATT OR LESS AND RATED 10% OR 20% UNLESS OTHERWISE INDICATED.
 ALL VOLTAGE MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE NOTED.
 TO C90 & L1 JUNCTIONS ON POWER SUPPLY & BIAS OSC SCHEMATIC.
 PARTS ARE 1/2 WATT OR LESS AND RATED 10% OR 20% UNLESS OTHERWISE INDICATED.
 PART OF M2

A PHOTOFACT STANDARD NOTATION SCHEMATIC with "CIRCUMFLEX" © Howard W. Sams & Co., Inc. 1968
 See parts list.
 1. Voltage measurements taken with vacuum tube voltmeter.
 2. All controls set for normal operation, no signal applied.
 3. Measured values are from socket pin or terminal to common ground.
 4. All terminals unless otherwise designated.
 5. Supply voltage measurements at test value for voltage readings.
 6. Numbers assigned to terminals are taken on the unit.
 7. Resistance measurements not given because of wide variation in internal resistance of transistor.
 8. Measured values are from socket pin or terminal to common ground.
 9. All terminals unless otherwise designated.
 10. Supply voltage measurements at test value for voltage readings.
 11. Numbers assigned to terminals are taken on the unit.
 12. Resistance measurements not given because of wide variation in internal resistance of transistor.



A Howard W. Sams CIRCUITRACE® Photo

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



- See parts list
1. Voltage measurements taken with vacuum tube voltmeter.
 2. All controls set for normal operation, no signal applied.
 3. Measured values are from socket pin or terminal to common ground.
 4. All terminals viewed from bottom unless otherwise designated.
 5. Numbers assigned to terminals may not be found on the unit.
 6. Supply voltage maintained at rated value for voltage readings.
 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

A PHOTOFAC STANDARD NOTATION SCHEMATIC with **CIRCUITFACT**
© Howard W. Sams & Co., Inc. 1968

All voltage measurements taken in "PLAY" position unless otherwise noted

Resistors are 1/2 watt or less and rated 10% or 20% unless otherwise indicated.

▲ Measured in "RECORD"

UHER MODEL 9000 (22/24 Hi-Fi Special)

POWER SUPPLY & BIAS OSCILLATOR

UHER MODEL 9000 (22/24 Hi-Fi Special)

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		UHER PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Bias Oscillator	BV6-45			
L2	Dummy Coil	BV6-46			
L3	61KC Trap	BV6-39			
L4	61KC Trap	BV6-39			
L5	60KC Trap	BV6-40			
L6	60KC Trap	BV6-40			

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	UHER PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC @.370Amp	46VAC @.115ADC	8VAC @30ma	BV1-15					

FUSE DEVICES

ITEM No.	DESCRIPTION	REPLACEMENT DATA							
		PART No.		BUSS PART No.		LITTELFUSE PART No.		WORKMAN PART No.	
		DEVICE	HOLDER	DEVICE	HOLDER	DEVICE	HOLDER	DEVICE	
F1	.63 Amp @ 250V, Slo-Blo Miniature					213.600			
F2	1.25 Amp @ 250V, Slo-Blo Miniature					2131.25			

TAPE HEADS

ITEM NO.	MEASURED			UHER PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	110mh				1202 & QK-74	4-Track Stereo Play
M2	150mh	20Vrms	62KC		1205 & QK-74	4-Track Stereo Record
M3	120uh	12Vrms	62KC		1408, L6 & QK-18	4-Track Stereo Erase

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
K1	Solenoid	BV3-9	Pause
K2	Solenoid	BV10A1/1V	Stop
M4	Lamp		Record Indicator
M5	Motor		Tape Transport
S1	Switch		Mode Selector
S2	Switch		Equalization
S3	Switch		Monitor Selector
S4	Switch		Record
S5	Switch		Amplifier
S6	Switch		Input Selector
S7	Switch		Playback Equalization
S8	Switch		Fast Forward/Rewind
S9	Switch		On/Off
S10	Switch		Stop
S11	Switch		Automatic Stop
S12	Switch		Line Voltage Selector

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)



PHOTOFACT[®] with

CIRCUITRACE[®]

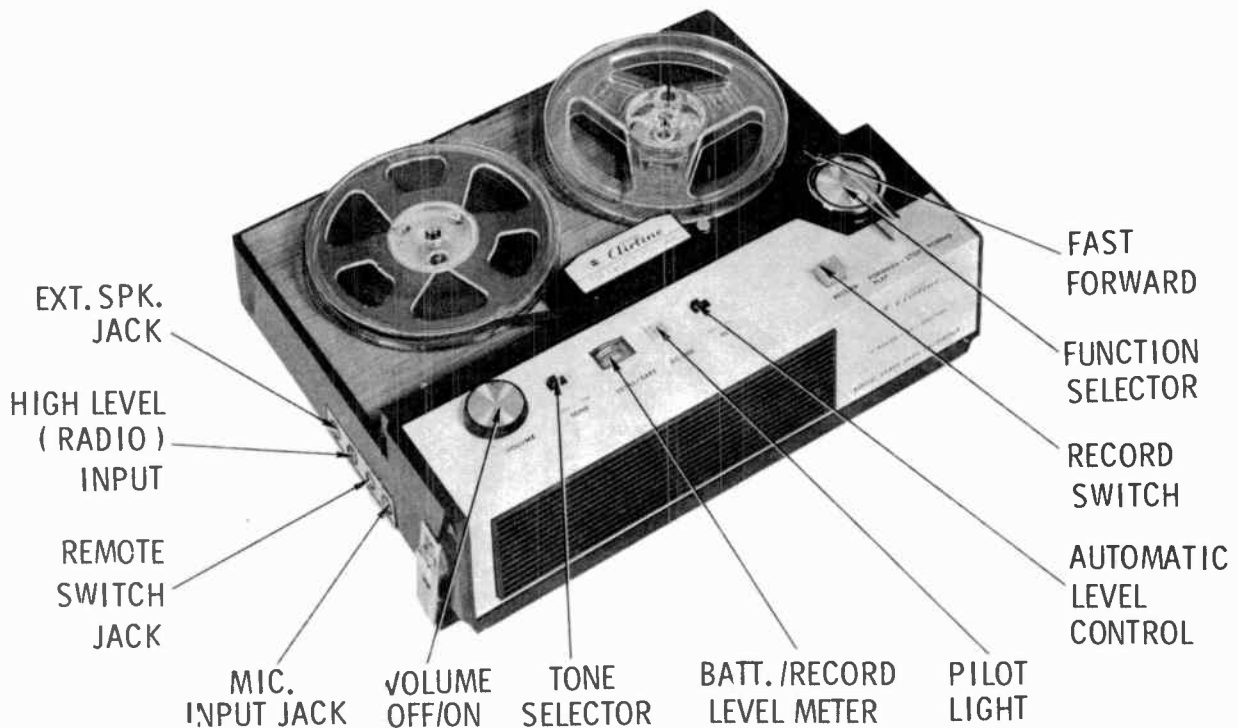
TRADE NAME: Wards Airline Model GEN-3638A (62-3638)
SUPPLIER: For Current Address, See Annual Index
TYPE SET: 2-Speed, 2-Track Monaural Recorder
POWER SUPPLY: 9 Volts DC or 110-120 Volts AC, 60 Cycles
RATING: 5 Watts, 65ma @ 117 VAC (Record with Motor) 4 Watts, 62ma @ 117 VAC (Play with Motor)

This unit is a two-track, monaural recorder having two speeds: 1 7/8 and 3 3/4 ips.

Jacks are provided for both low- and high-level inputs, external speaker, and remote switch.

An automatic level-control circuit is provided.

Power is supplied by six, 1 1/2-volt "D" cells or 110 - 120 volts AC, 60 cycles.

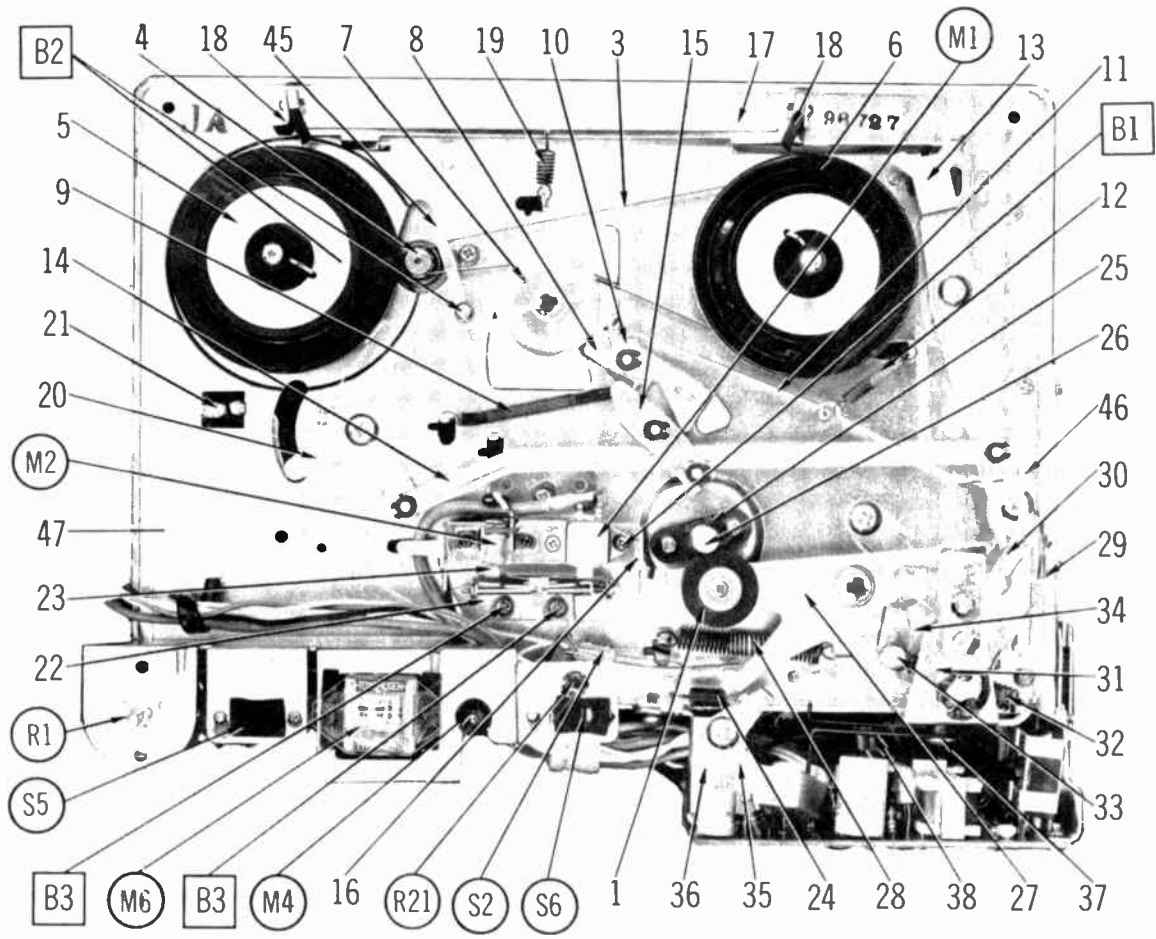
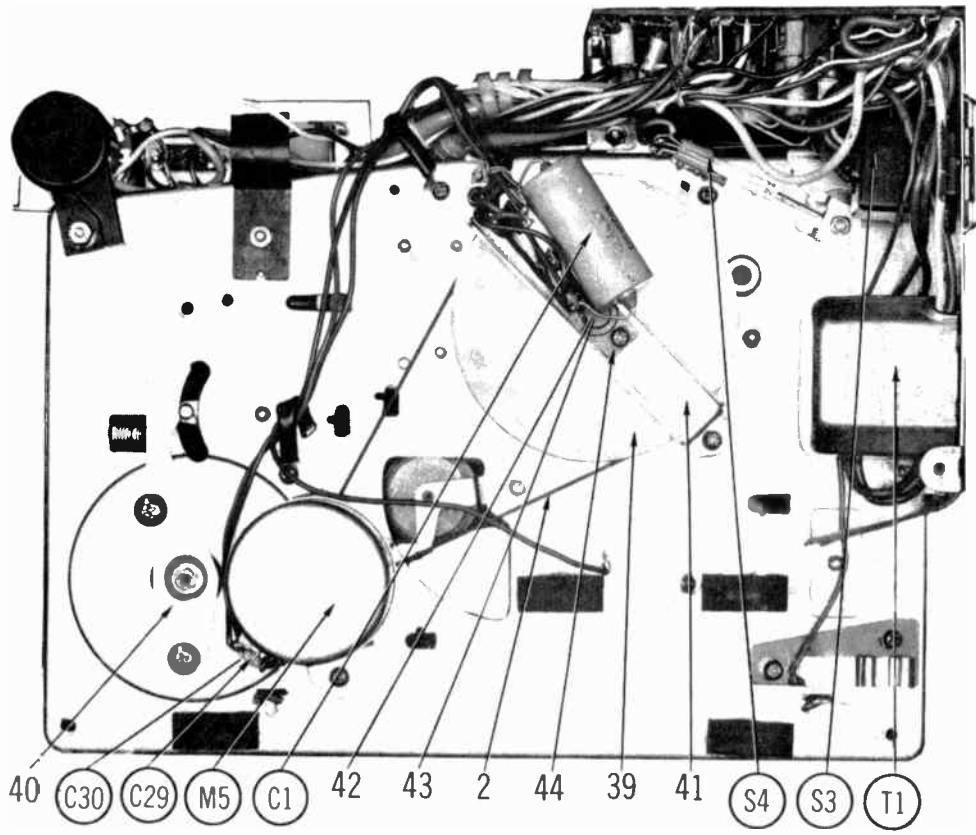


WARDS AIRLINE MODEL GEN-3638A (62-3638)

HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

© 1968 Howard W. Sams & Co., Inc. Printed in U. S. of America C988

World Radio History



OPERATING INSTRUCTIONS

Recording

1. Move Function Selector to Stop, select a power source, thread the tape, and select the speed.
2. Connect a recording source and press and hold Record Switch button while moving Function Selector to Forward.
3. Move Automatic Level Control Switch to Off and set recording level with Volume control; or move Automatic Level Control Switch to On and allow unit to maintain the correct recording level automatically.

Play

1. Repeat step 1 of "Record", move Function Selector to Forward, and set Volume and Tone controls as desired.

Monitor

1. Connect an earphone to Ext. Speaker jack to monitor recording.

DISASSEMBLY

1. Remove three Phillips screws holding bottom of case and remove three knobs.
2. Remove one Phillips screw under Function Selector knob.
3. Remove two Phillips screws from rear corners of deck.
4. Remove the Phillips screw on the deck near the Volume control and remove speaker clamp.
5. Gently rock speaker to loosen and to remove chassis.

SEQUENCE OF OPERATION

Play

Turning the Function Selector to Forward/Play turns Cam (34), pivoting Lever (13) to move Lever (14) and Lever (17). Lever (14) pivots Lever (15) to release Lever (8), pulled by Spring (9), to move Roller (7). Lever (14) also pivots Lever (20).

The motor, through Pulley (4) and Belt (3), turns Reel (6).

Cam (34) releases Lever (27), pulled by Spring (28), to release Bracket (22) to move Roller (1) and to release Lock (35), pulled by Spring (24).

Fast Forward

The Fast Forward sequence is the same as "Play" except moving the Fast Forward knob to the fast-forward position pivots Lever (30). Lever (30)

moves Spring (29) to tighten Belt (3), through Rod (11), aligned by Spring (12), Lever (8), and Roller (7).

Lever (30) pivots Lever (27) to move Bracket (22) and Roller (1). Lock (46), moved by a strap spring on Chassis (47), moves to lock Lever (30).

Rewind

Turning the Function Selector to Rewind turns Cam (34), pivoting Lever (13) to move Lever (14) and Lever (17). Lever (14) pivots Lever (20) to release Lever (40), pushed by Spring (21) to move Reel (5).

The motor through Pulley (4) drives Reel (5).

Stop

Returning the Function Selector to Stop from any function reverses the action of that function.

CLEANING

LUBRICATING

HEAD DEMAGNETIZING

Refer to "General Servicing Information" on page 4.

TROUBLE CHART

IMPORTANT: Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> 1. Reel Drive Belt (3) dirty, worn, loose, or broken. 2. Tension Roller Lever Spring (9) weak or loose. 3. Tension Roller Lever (8) binding. 4. Tension Roller (7) binding or damaged. 5. Take-up Reel Assembly (6) binding. 6. Motor Pulley (4) loose.

WARDS AIRLINE MODEL GEN-3638A (62-3638)

TROUBLE CHART (Continued)

SYMPTOM	REMARKS
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> 1. Reel Drive Belt (3) dirty, worn, loose, or broken. 2. Tension Roller Lever Spring (9) weak or loose. 3. Fast Forward Lever Spring (29) bent or loose. 4. Tension Roller Lever (8) binding. 5. Tension Roller (7) binding or damaged. 6. Take-up Reel Assembly (6) binding. 7. Motor Pulley (4) loose.
Take-up reel revolves rapidly in Play or Record.	<ol style="list-style-type: none"> 1. Pinch Roller Lever Spring (28) weak or loose. 2. Capstan Sleeve (26) loose. 3. Pinch Roller (1) worn or dirty.
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> 1. Supply Reel Spindle Lever Spring (21) weak or loose. 2. Motor Pulley (4) dirty, worn, or loose. 3. Supply Reel Spindle Lever (40) binding.
Supply reel spills tape in forward positions. Reels do not stop immediately when Function Selector is returned to Stop.	<ol style="list-style-type: none"> 1. Drag pad on Rewind Lever Assembly (20) worn. 1. Brake Pads (18) worn. 2. Brake Lever Spring (19) weak or loose.
Capstan does not rotate in Play or Record.	<ol style="list-style-type: none"> 1. Capstan Belt (2) dirty or loose. 2. Motor Pulley (4) loose. 3. Flywheel (39) binding. 4. Motor (M4) defective.
Tape rides up and down between capstan and pressure roller.	<ol style="list-style-type: none"> 1. Capstan Sleeve (26) loose. 2. Pinch Roller (1) dirty or worn. 3. Pinch Roller (1) not parallel to capstan.
Wow or Flutter.	<ol style="list-style-type: none"> 1. Pinch Roller (1) dirty or worn. 2. Pinch Roller Lever Spring (28) weak. 3. Capstan Belt (2) dirty or worn. 4. Motor Pulley (4) loose. 5. Motor (M4) defective. 6. Supply Reel Assembly (5) binding.
Sound is weak or distorted.	<ol style="list-style-type: none"> 1. Play/Record Head (M1) dirty, worn or misaligned. 2. Hinge spring on Tape Pad Bracket Assembly (22) weak. 3. Tape Pad Assembly (23) damaged or pads missing.

ADJUSTMENTS

IMPORTANT: Before making any adjustments, refer to "General Servicing Information" on page 4.

1. All voltage measurements are made at a tape speed of 3 3/4 ips with an audio VTVM having a flat response to 100KC.
2. All torque measurements are made at a tape speed of 3 3/4 ips with a spring scale applied to a point on an empty tape reel 1 inch from reel center.
3. All pressure measurements are made by using a spring scale to determine that point at which pressure is just removed.

ADJUST	REMARKS
Play Take-up Torque	Nominal value 1/2 ounce. Controlled by tension of Spring (9) and the condition of Belt (3).
Fast Forward Take-up Torque	Nominal value 4 ounces. Controlled by tension of Spring (29).
Rewind Torque	MINIMUM value 2 1/2 ounces. Controlled by tension of Spring (21) and the condition of Pulley (4).
Supply Reel Drag	Nominal value 1/4 ounce. Controlled by tension of pad arm on Lever (20).

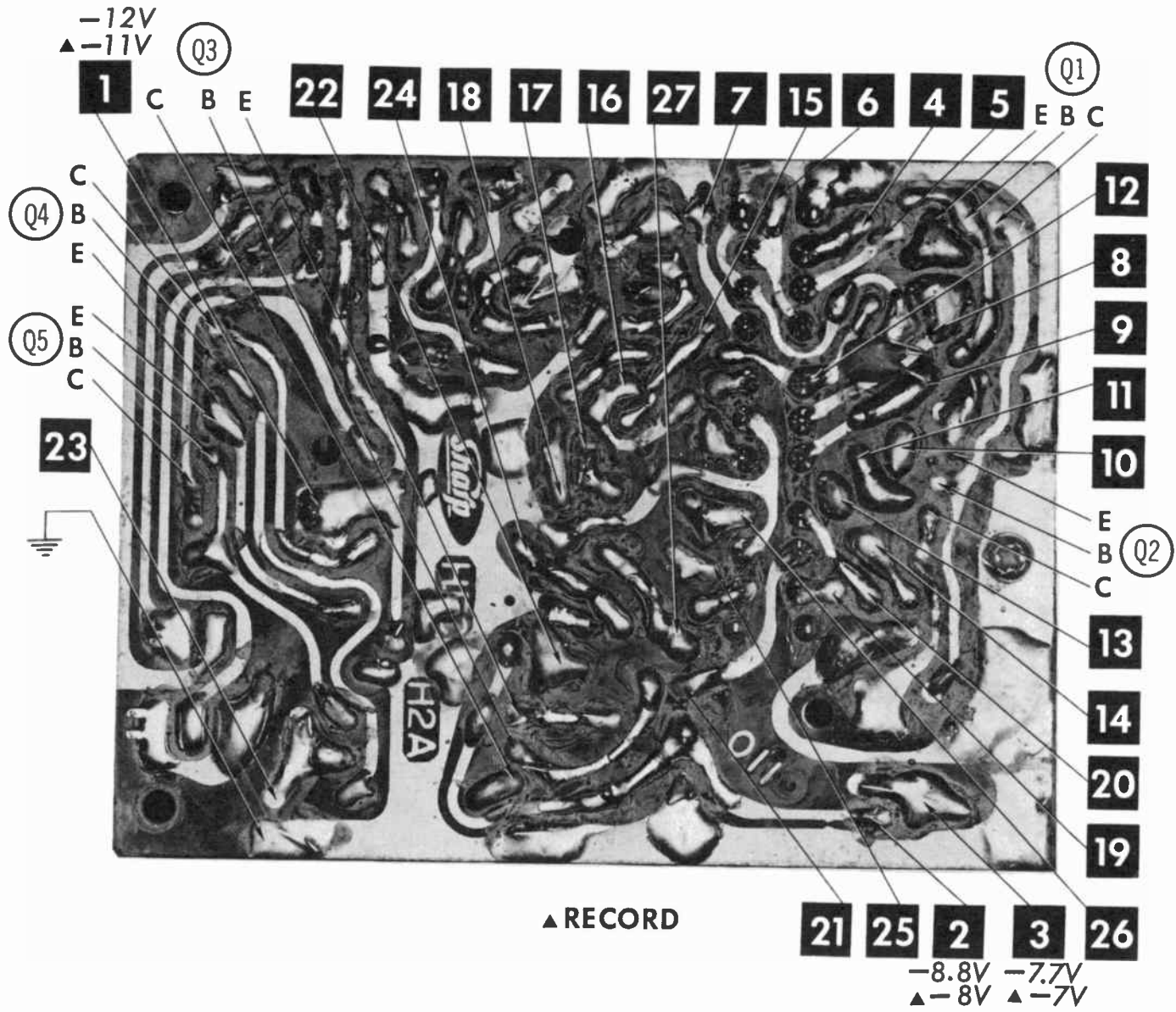
ADJUSTMENTS (Continued)

ADJUST	REMARKS
Take-up Reel Drag	Dependent on reel weight.
Pressure Roller Pressure	Nominal value 10 ounces. Controlled by tension of Spring (28).
Brake Torque	Measured in Stop. Nominal value 4 ounces, measured counterclockwise on supply reel and clockwise on take-up reel. Controlled by tension of Spring (19) and condition of Pads (18).
Motor Azimuth	Adjust screws at B2 until Pulley (4) is perpendicular to chassis.
Pressure Pad Pressure	Nominal value 1 ounce. Controlled by loosening screws at B3 and sliding Bracket (22).
Erase Head Height	No adjustment provided.
Erase Head Azimuth	No adjustment provided.
Record/Play Head Height	No adjustment provided.
Record/Play Head Azimuth	Play an azimuth test tape, connect an AC VTVM across output, and adjust B1 for maximum.
Erase Current	Nominal value 3ma (4.75VDC) in Head (M2).
Record Bias	Nominal bias 26V rms (1ma) across head. Controlled by setting of slug in L1.
Bias Oscillator	Nominal value 32KC. Dependent on record bias.
Record Level Indicator Calibration	Disable bias oscillator by shorting secondary of L1. Apply a 1000-cycle tone to the Mic Input. Adjust volume for .017V rms across head. Normal peak should be indicated on meter. No adjustment provided.
Automatic Level Control Range	Set Volume control to maximum, move Automatic Level Control switch to Off, apply a 1000-cycle tone at .032V rms to Mic. Input jack. Connect an AC VTVM across 8Ω resistor, across Ext. Speaker jack, select record function, and note voltage measured. Turn on Automatic Level Control switch, increase generator output to 1V rms, and check voltage across 8Ω resistor again. The second voltage should be 1.8 times the first.

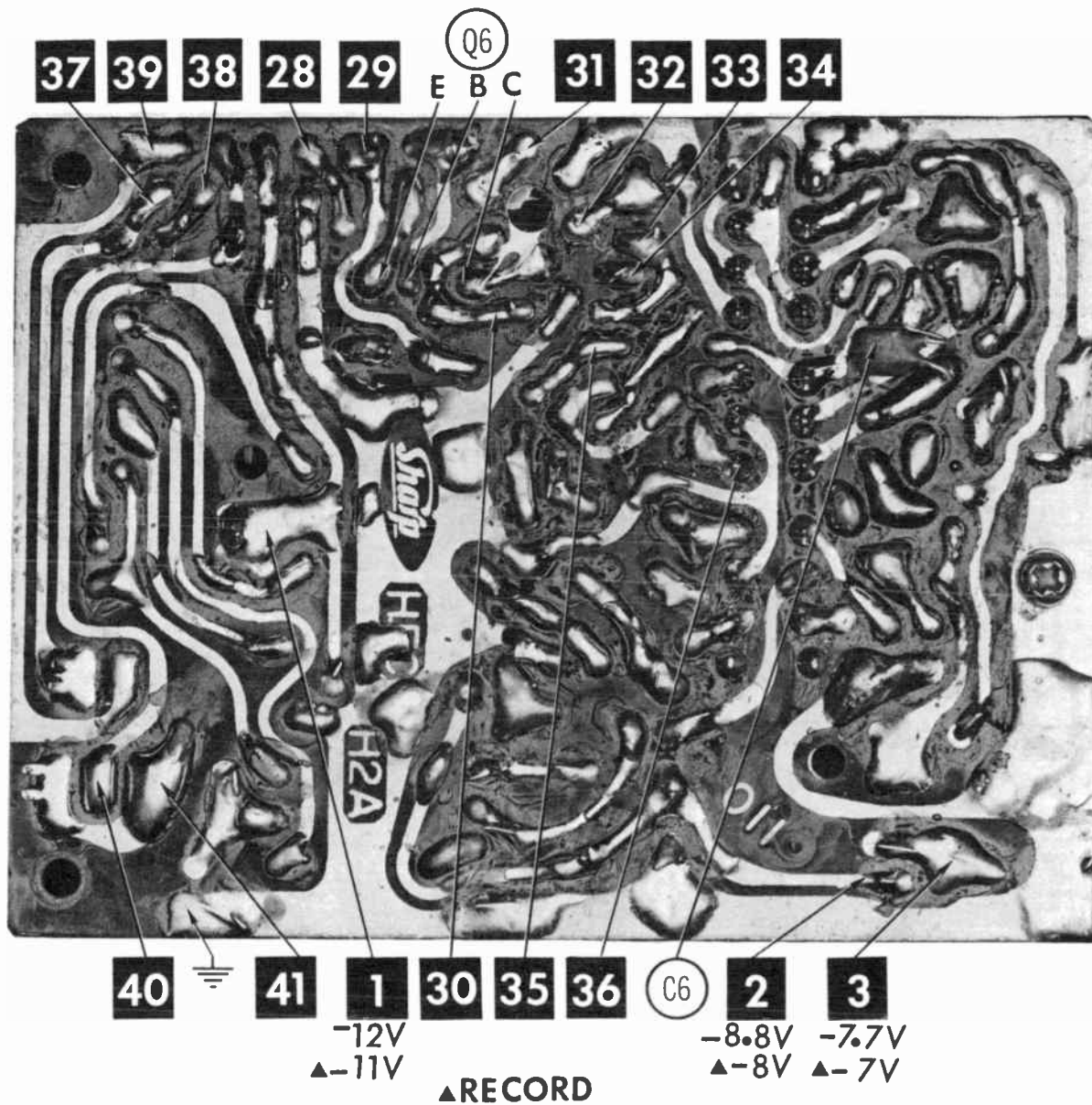
WARDS AIRLINE MODEL GEN-3638A (62-3638)

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	80MW109	Pinch Roller (Pressure Roller)	24	80MW69	Record Lock Spring
2	80MW100	Capstan Belt	25	80MW91	Capstan Bearing Plate
3	80MW101	Reel Drive Belt	26	80MW90	Capstan Sleeve
4	80MW89	Motor Pulley	27	80MW42	Pinch Roller Lever
5	80MW459	Supply Reel Assembly	28	80MW60	Pinch Roller Lever Spring
6	80MW460	Take-up Reel Assembly	29	80MW70	Fast Forward Lever Spring
7	80MW104	Tension Roller	30	80MW82	Fast Forward Lever
8	80MW53	Tension Roller Lever	31	80MW65	Fast Forward Lever Spring
9	80MW62	Tension Roller Lever Spring	32	80MW66	Selector Lock Spring
10	80MW49	Fast Forward Tension Lever	33	80MW50	Selector Lock
11	80MW86	Fast Forward Rod	34	80MW81	Selector Cam
12	80MW73	Fast Forward Rod Spring	35	80MW52	Record Lock
13	80MW44	Function Pivot Lever	36	80MW80	Record Lock Bracket
14	80MW45	Coupling Rewind and Tension Roller Actuating Lever	37	47MW18	Spring Pivot Screw
15	80MW51	Tension Roller Actuating Lever	38	80MW71	Record Button Spring
16	80MW75	Tape Head Mounting Bracket	39	80MW88	Flywheel
17	80MW43	Brake Lever	40	80MW47	Supply Reel Spindle Lever
18	80MW93	Brake Pads	41	80MW79	Flywheel Mounting Bracket
19	80MW67	Brake Lever Spring	42	80MW105	Ball Bearing
20	80MW46	Rewind Lever Assembly	43	42MW127	Special Bakelite Washer
21	80MW61	Supply Reel Spindle Lever Spring	44	80MW92	Bearing Plate
22	80MW76	Tape Pad Bracket Assembly	45	80MW85	Belt Guide
23	80MW77	Tape Pad Assembly	46	80MW48	Fast Forward Lock
			47		Chassis

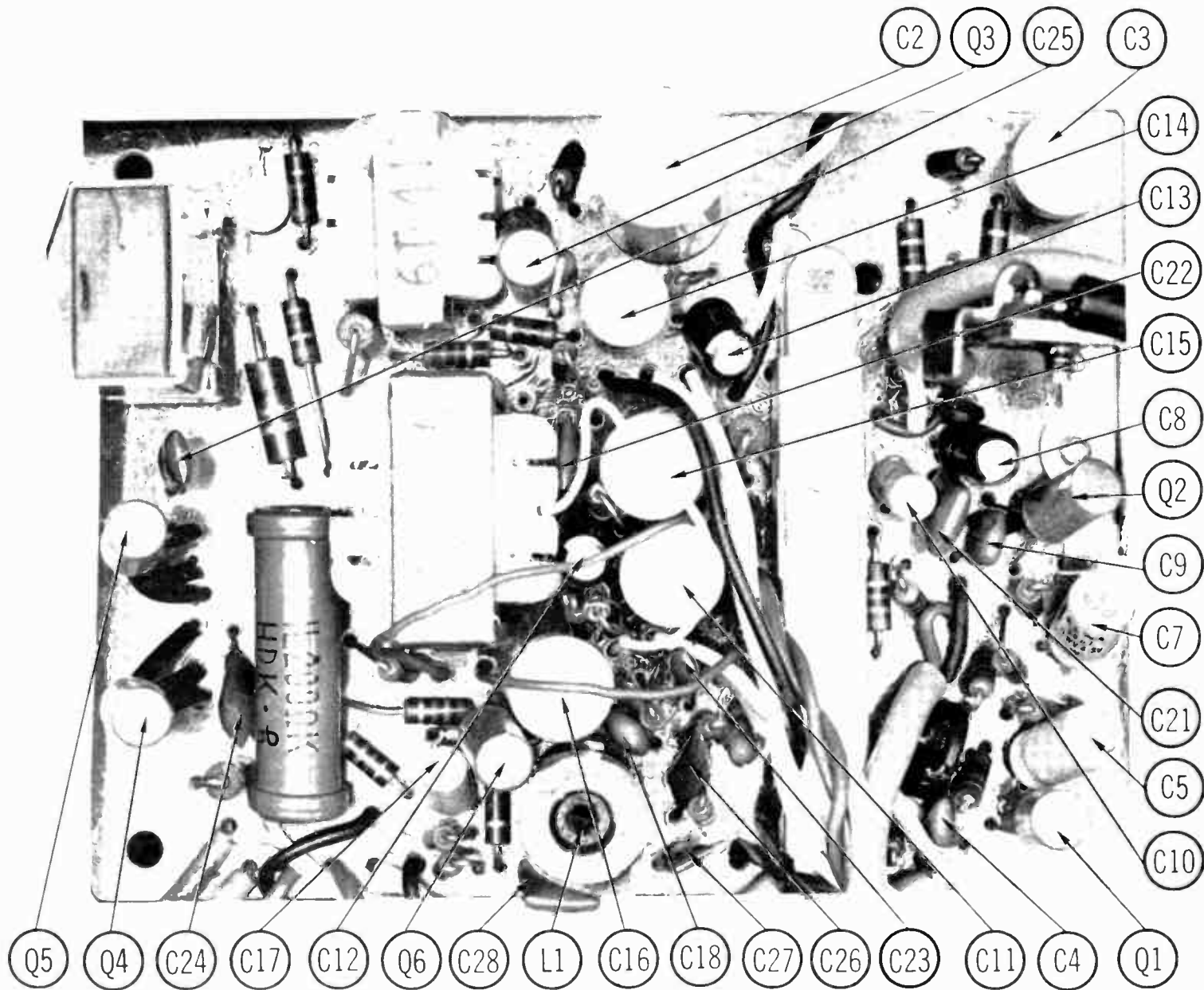


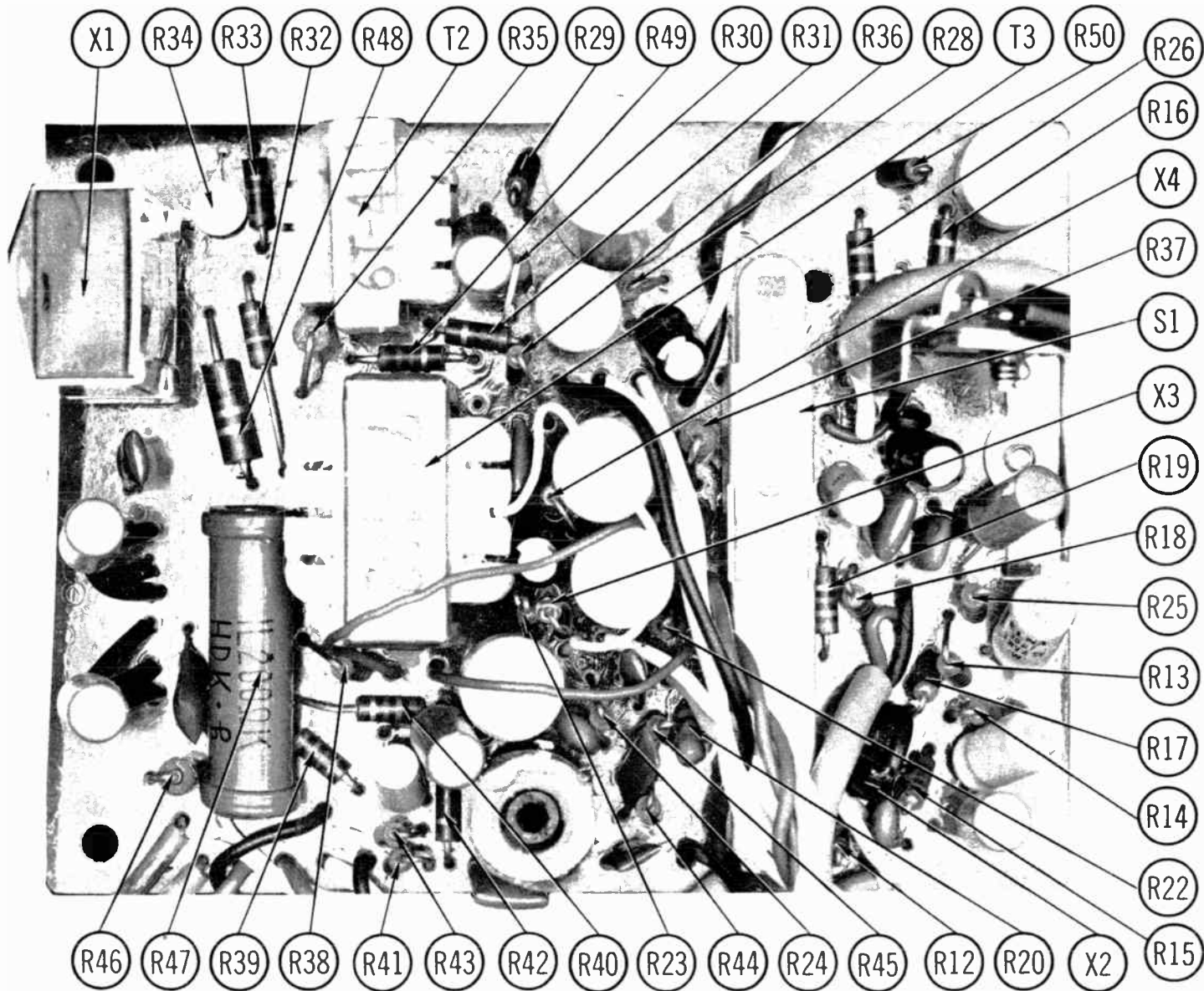
A Howard W. Sams CIRCUITRACE Photo



A Howard W. Sams CIRCUITRACE Photo

WARDS AIRLINE MODEL GEN-3638A (62-3638)





WARDS AIRLINE MODEL GEN-3638A (62-3638)

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Port Number, and Description.)

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES	
			DELCO PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	WARDS PART No.	NOTES
Q1	2SB75	Preamp	DS-26	GE-2	TR-05	SK-3004	24MW28	PNP
Q2	2SB75	AF Amp	DS-26	GE-2	TR-05	SK-3004	24MW28	PNP
Q3	2SB75	Driver	DS-26	GE-2	TR-05	SK-3004	24MW28	PNP
Q4	2SB156	Output					24MW116 (1)	PNP
Q5	2SB156	Output					24MW116 (1)	PNP
Q6	2SB77	Bias Oscillator	DS-26	GE-2	TR-05	SK-3005	24MW29	PNP

(1) Matched Pair.

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MEASURED CURRENT	ORIGINAL Port or Type No.	RECTIFIERS & DIODES		RECTIFIERS	
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	RCA PART No.	SARKES TARZIAN PART No.
X1	.200 Amp	24MW192	GE-504A	8D4 (1) 18DB2A	SK-3030 (1) SK-3031 (1)	40C (1) S-5959
X2		24MW197				
X3		1N34A	1N34AS	1N34A		
X4		1N34A	1N34AS	1N34A		

(1) Four required.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA						
		WARDS PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	1000 15V	32MW113	PRS1230	EA30-1000	BR1000-15	QT1-32	TC1501A	TL-1166.5
C2	200 10V	32MW77	BCD10190	EA15-250	NLW200-12	MT1-23	MTV200CK10	TE-1137
C3	100 10V	32MW65	BCD10100	EP15-100	NLW100-12	MT1-19	MTV100CD10	TE-1135
C4	0.2 6V	32MW120			TYR13B-BR22K		TAS224K006POA	196D224X0035DB
C5	30 3V	32MW11	BCD3025	EP6-25	NLW30-6	MT1-13	MTV30CB25	TE-1055.5
C6	0.2 6V	32MW120			TYR13B-BR22K		TAS224K006POA	196D224X0035DB
C7	30 3V	32MW11	BCD3025	EP6-25	NLW30-6	MT1-13	MTV30CB25	TE-1055.5
C8	10 6V	32MW46	BCD6010	EP6-10	NLW10-6	MT1-5	MTV10CB50	TE-1087
C9	0.1 6V	33MW195			TYR13B-ER10K		TAS104K006POA	196D104X0035DB
C10	5 6V	32MW3	BCD6005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1084
C11	100 10V	32MW65	BCD10100	EP15-100	NLW100-12	MT1-19	MTV100CD10	TE-1135
C12	10 6V	32MW46	BCD6010	EP6-10	NLW10-6	MT1-5	MTV10CB50	TE-1087
C13	10 6V	32MW46	BCD6010	EP6-10	NLW10-6	MT1-5	MTV10CB50	TE-1087
C14	50 3V	32MW37	BCD3050	EP6-50	NLW50-3	MT1-15	MTV50CB15	TE-1058
C15	200 6V	32MW38	BCD6200	EA6-250	NLW200-12	MT1-23	MTV200CK10	TE-1104
C16	60 10V	32MW38	BCD10050	EP15-50	NLW50-10	MT1-19	MTV60CB15	TE-1133.5
C17	5 3V	32MW12	BCD3005	EP30-5	NLW5-15	MT1-3	MTV5CB50	TE-1052.2
C18	0.1 10V	33MW195			TYR13B-ER10K		TAS104K006POA	196D104X0035DB

CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C21	.02		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C22	.02		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C23	.005		TTP-005	CA-502	HOY101ZV502P		TA250	TG-D50
C24	.005		TTP-005	CA-502	HOY101ZV502P		TA250	TG-D50
C25	.005		TTP-005	CA-502	HOY101ZV502P		TA250	TG-D50
C26	.001		GPD X5F102K	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C27	.003		GPD X5R302K	DD-302	BYS601ZU302P	CCD-302	GP230	10TS-D30
C28	.02		TTP-02	CK-203	HOR101ZV203P	CCD-203	TA120	TG-S20
C29								
C30								

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA				
			WARDS PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume/Switch	5000	25MW122	F2-5000 (1) SSK100, KR-1		Q13-114 (1) 76-1 or (BU1 (1), CF60, SS1, GC)*	RU53A, SL36, SL3250, US41 or (UA53A (1), SK3500, US41) or (U12 (1), US26)

* "SNAPTROL"

(1) Enlarge mounting hole.

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	WARDS PART No.			IRC PART No.	WORKMAN PART No.	WARDS PART No.
R34	85 (cold) Thermistor		GM82	24MW108	R47	200 1W	BWH-200	CB200	CC5124

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			
		PART No.	MEISSNER PART No.	MILLER PART No.	WORKMAN PART No.
L1	Bias Oscillator	61MW268			

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	WARDS PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117VAC @.065Amp	11VAC @.02A DC		11MW123					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	WARDS PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T2	1	1CT		11MW124					

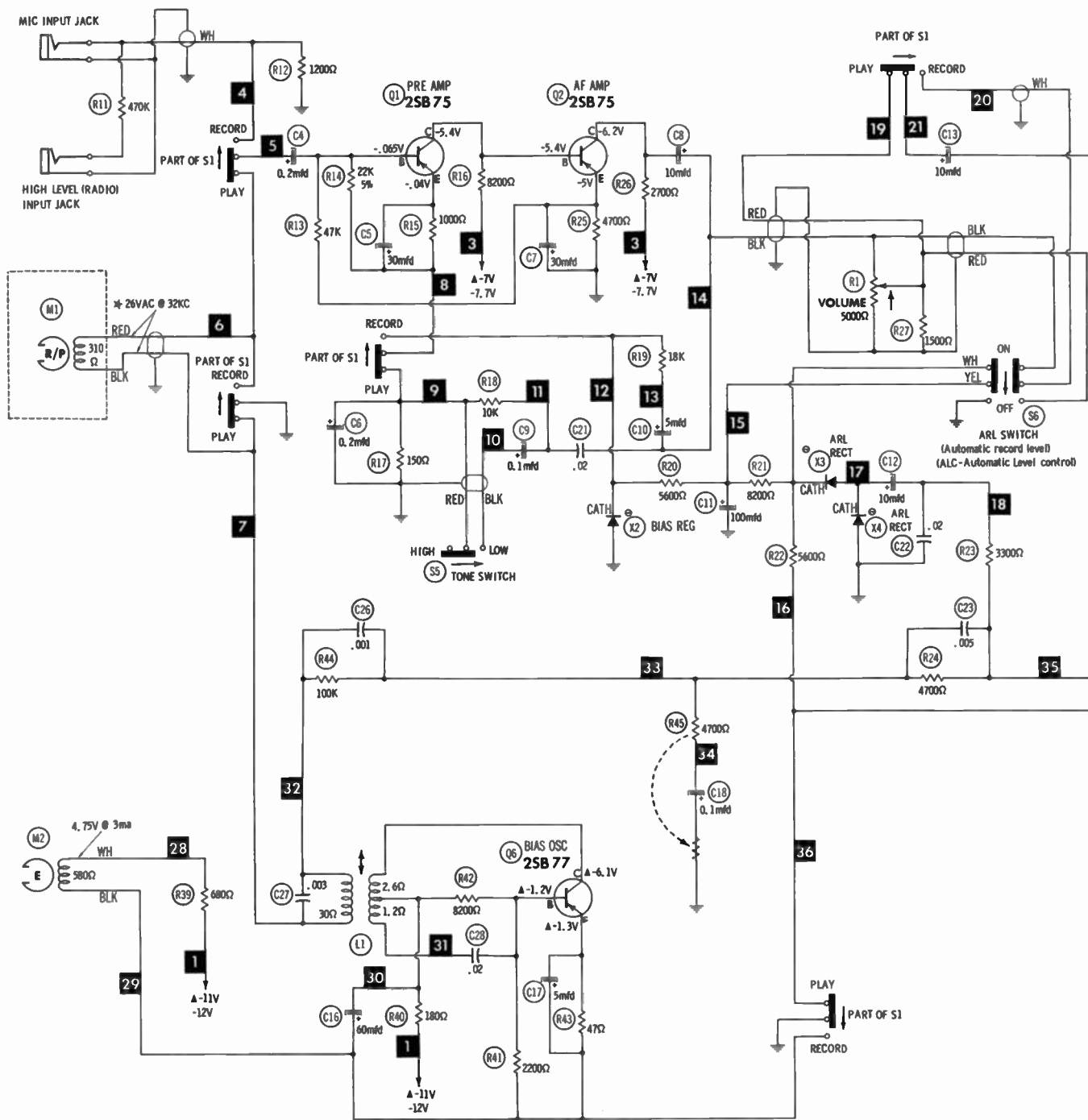
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	WARDS PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T3	110	8	11MW125					
		SEC. 2						
		660						

(CONTINUED ON PAGE 152)

WARDS AIRLINE MODEL GEN-3638A (62-3638)

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER



- ⊙ See parts list
- 1. Voltage measurements taken with vacuum tube voltmeter.
- 2. All controls set for normal operation, no signal applied.
- 3. Measured values are from socket pin or terminal to common ground.
- 4. All terminals viewed from bottom unless otherwise designated.
- 5. Numbers assigned to terminals may not be found on the unit.
- 6. Supply voltage maintained at rated value for voltage readings.
- 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.

★ Measured in "RECORD" position with an audio VTVM.

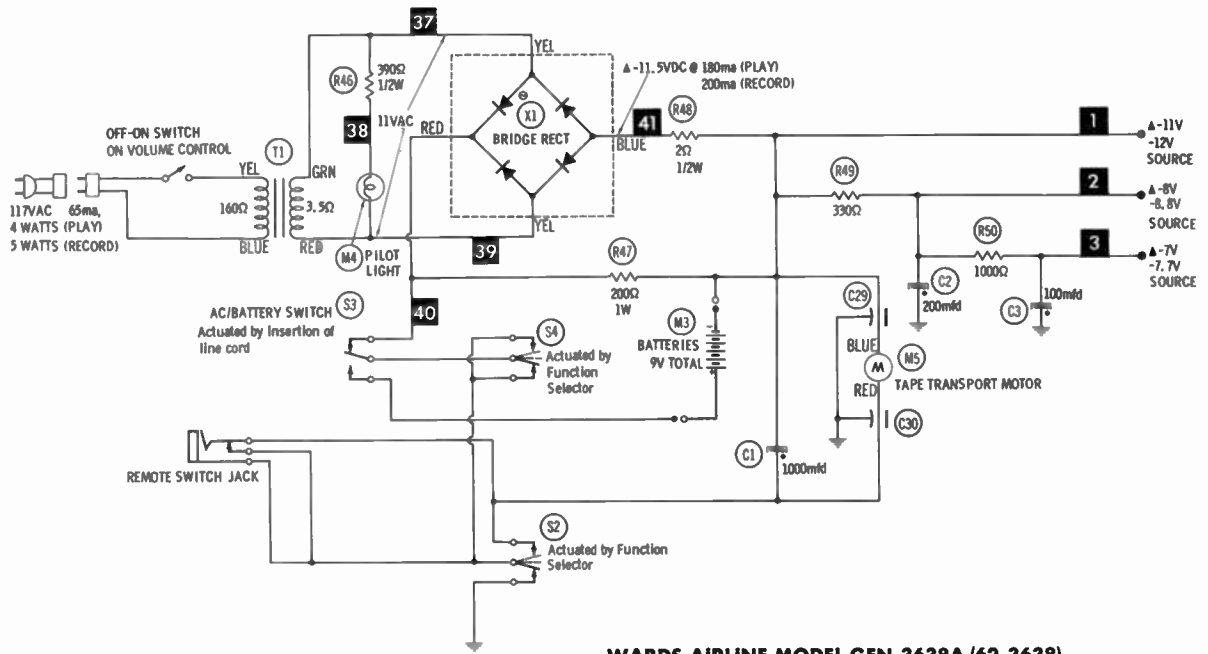
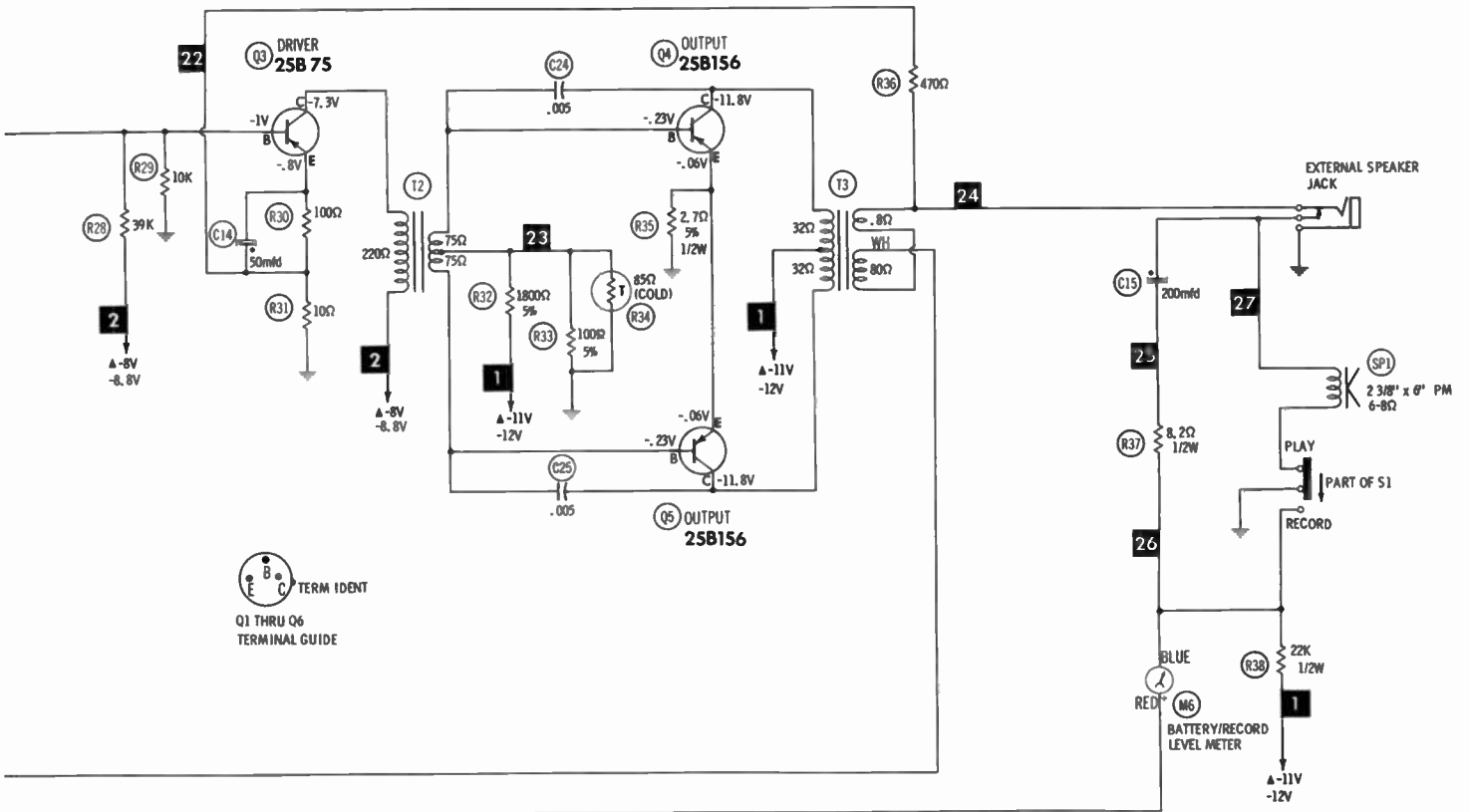
Resistors are 1/4 watt or less and rated 10% or 20% unless otherwise indicated.

Arrows at controls indicate clockwise rotation viewed from actuator end.

▲ MEASURED IN "RECORD"

A PHOTOFAC STANDARD NOTATION SCHEMATIC
with **CIRCUITRACE**

© Howard W. Sams & Co., Inc. 1968



PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA			NOTES
		WARDS PART No.	JENSEN PART No.	GUAM PART No.	
SP1	2 3/8"X 6" PH 8 ohms	1QMW59		26A0728	

TAPE HEADS

ITEM NO.	MEASURED			WARDS PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	310mh	26VRMS	32KC	80MW98	3101 (2)	2-Track Monaural Record/Play
M2	310mh	4.75VDC	DC	80MW99	3600 (1) & QK-19	2-Track Monaural Erase

(1) Select polarity for best recording
(2) Cement to original mounting.

BATTERIES

ITEM No.	VOLTAGE	PART No.	REPLACEMENT DATA			NOTES
			BURGESS	EVEREADY	MALLORY	
M3	9 Volts Total		230 or AL-2	1050 or E95	M13R or MN1300	6 required

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
M4	Pilot Lamp	18MW151	
M5	Motor	80MW97	Tape Transport
M6	Meter	18MW118	Record/Battery level indicator
S1	Switch	12MW71	Record/Play
S2	Switch	12MW73	Motor
S3	Switch	18MW119	AC/Battery (Includes socket)
S4	Switch	12MW72	Amplifier (DC Power)
S5	Switch	12MW49	Tone
S6	Switch	12MW49	ARL (Automatic Record Level)
	Microphone	63MW24	200 ohms

CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

ITEM	PART No.	ITEM	PART No.
Cabinet, Top Assembly	98MW302	Knob, Volume (Black)	50MW393
Cabinet, Bottom Assembly	98MW303	Knob, Function Selector	50MW394
Lid (Reel Cover)	98MW294	Knob, Fast Forward (Black)	50MW395
Handle Assembly	70MW140	Button, Record (Red)	50MW291

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Power Cord	Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft. 17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type)	Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor-Unshielded) 8429 (Two Conductor-Shielded) 8419 (Three Conductor-Shielded)

INDEX

This index lists all recorders and players (disc, wire and tape) that appear in the CM and TR Series manuals.

WIRE RECORDERS

Crescent H-1A.....	CM-4	Silvertone 70.....	CM-4
Crescent H-2A1.....	CM-3	Silvertone 101, 771 (771).....	CM-1
Crescent H-19 "Steno".....	CM-4	Silvertone 101.774-2, 101.774-4.....	CM-3
Crescent M-2000 Series.....	CM-4	St. George Series 1100.....	CM-1
Crescent M-3000 Series.....	CM-4	Webster-Chicago 79, 80.....	CM-1
Crescent 1000 Series.....	CM-2	Webster-Chicago 178.....	CM-3
Crescent 1000 Series (Revised).....	CM-3	Webster-Chicago 228.....	CM-4
Lear Dynaport WC-311-D.....	CM-2	Wire Recording Corp. WP.....	CM-2
RCA MI-12875.....	CM-2		

DISC RECORDERS

Brush BK501, BK503 (Mail-A-Voice)....	CM-1
General Industries R70, R90.....	CM-1

TAPE-DISC RECORDERS

General Industries 250.....	CM-4
Wilcox-Gay 3C10.....	CM-5



ADMIRAL

ACTR310, CTR300 (Ch. 6P4).....	TR-37
--------------------------------	-------

AIRCATTLE

795, 880.....	CM-8
---------------	------

AIRLINE (See Wards Airline)

AIWA

TP-30.....	TR-19
TP-40.....	TR-20
TP-50.....	TR-18
TP-60.....	TR-20
TP-701.....	TR-18
TP-703.....	TR-14
TP-704.....	TR-22
TP-706.....	TR-21
TP-707.....	TR-23
TP-708.....	TR-24
TP-710.....	TR-36
TP-712.....	TR-38
TP-801.....	TR-24
TP-1001.....	TR-32
TP-1002.....	TR-35

ALARON

RSC-51.....	TR-13
TR-563.....	TR-18

AMBASSADOR

ATR-6.....	TR-33
------------	-------

AMPEX

A121, A122, A124.....	TR-3
A621, A692.....	TR-3
400A, 401A.....	CM-5
600.....	CM-9
612.....	TR-1
850, 860, 865.....	TR-19
1050, 1070, 1080.....	TR-16
1150, 1160, 1165, 1180.....	TR-23
1260, 1270, 2012.....	TR-6
2050, 2070, 2080.....	TR-16

AMPRO

730.....	CM-4
745 "Career".....	CM-9
755.....	CM-6
757, 757A.....	CM-7

ARVIN

67L29, 67L39.....	TR-37
83L19.....	TR-10
83L48.....	TR-12
83L79.....	TR-11
85L08.....	TR-26
86L19.....	TR-27
86L29.....	TR-25
97C38 (1.27402).....	TR-36

AUTOMATIC

CSE-6381 (TapeDek-8).....	TR-31
ESP-5457A (Tape-Dek II).....	TR-33
Stereomatic (STP-4499C).....	TR-20

AUTOSTEREO

M1, MC5, MP5, WW1.....	TR-10
------------------------	-------

BELL

RT-75.....	TR-1
------------	------

BELL & HOWELL

300B, M, S.....	CM-9
770, 775G-1, 775G-10.....	TR-4

BELL SOUND

BT-205IB, BT-205OB.....	TR-4
RT-204.....	TR-2
T-347.....	TR-7
601, 603.....	TR-6

BELSONA

TRA-500.....	TR-14
TRQ-300.....	TR-13
TRQ-510.....	TR-29

BERLANT		1401.....	CM-4
BR-1.....	CM-8	CONCORD	
BRUSH		AS-1, 220.....	TR-9
BK-401.....	CM-1	F-90.....	TR-36
BK-403.....	CM-2	122.....	TR-35
BK-416.....	CM-2	320.....	TR-24
BK-437, S, BK-439.....	CM-5	330.....	TR-14
BK-441, BK-442, BK-443P.....	CM-5	350.....	TR-35
BK-455P.....	CM-6	400D, 400RP, 401.....	TR-10
BSR		440.....	TR-12
TD2.....	TR-10	550-4.....	TR-11
TD10.....	TR-33	700.....	TR-37
CHANNEL MASTER		880.....	TR-8
6464.....	TR-32	884.....	TR-18
6465.....	TR-31	990, 994.....	TR-20
6470.....	TR-29	CONTINENTAL	
6471.....	TR-31	TP-877T.....	TR-15
6473.....	TR-16	220.....	CM-8
6545.....	TR-10	CRAIG	
6546.....	TR-15	C-501, C-502.....	TR-21
6547.....	TR-15	490.....	TR-16
6548.....	TR-30	910.....	TR-28
6549.....	TR-28	3301.....	TR-37
CIPHER		CRESCENT	
V.....	TR-23	TR-672, TR-673.....	TR-2
VI.....	TR-23	900 Series.....	CM-6
CLARICON		2900.....	CM-7
ST-1100 (49-200).....	TR-21	9037.....	CM-7
49-090.....	TR-22	CRESTWOOD	
49-100.....	TR-24	CP201.....	CM-3
COLUMBIA		304.....	CM-9
461.....	CM-8	400 Series (401, 402).....	CM-6
462.....	CM-9	404.....	CM-8
COLUMBIA-BELL & HOWELL		CRITERION	
350.....	CM-7	1000 (99-1501WX).....	TR-21
355.....	CM-7	CROWN	
771 (See Similar Recorder).....	TR-4	CTR3000.....	TR-26
COLUMBIA RECORDS		CTR5300.....	TR-19
560, A.....	TR-1	CTR5400.....	TR-17
CONCERTONE		CTR5450.....	TR-28
400.....	TR-7	CVA-5001.....	TR-27
605-2, 605-2K, 605-4, 605-4K, 605-4R, 605-4RK.....	TR-9	CURTIS MATHES	
700.....	TR-38	R-5.....	TR-20
727.....	TR-37	DEJUR	
801, 802.....	TR-16	TK820.....	TR-2
		TMB-820.....	TR-2
		DELMONICO	
		PTR-55A.....	TR-21
		TRS-644.....	TR-17
		DIXIE-LAND	
		110.....	CM-8
		DUKANE	
		11A55FF, 11B55.....	CM-5
		11A75.....	CM-6
		11A200.....	CM-8

EICO	
RP-100W.....	TR-6
2400.....	TR-15
EICOR	
230.....	CM-6
400.....	CM-6
1000.....	CM-3
EKOTAPE	
101-8, 101-9, 102-9, 103-8.....	CM-5
109, 110, 111, 112.....	CM-4
114, 115, 116, 117.....	CM-5
205, 206.....	CM-8
212.....	CM-6
250, 251, 252, 253, 254, 255, 260, 261..	TR-1
270, 280.....	TR-5
ELLAMAC	
Language Master.....	TR-2
EMERSON	
MM-313.....	TR-22
MM-314/316/317/514/516/517.....	TR-26
SS-333.....	TR-21
SS-533 (Similar to SS-333).....	TR-21
SS-544.....	TR-29
FEDERAL (F-M-E)	
37-B.....	CM-6
37-C, 47-A.....	CM-8
FUJIYA	
FSR-765.....	TR-9
GELOSO	
G255-S.....	TR-3
GENERAL ELECTRIC	
M8000B/BB, M8001B/BB.....	TR-34
M8010A.....	TR-35
M8040A.....	TR-38
M8050A, M8060A.....	TR-38
TD100.....	TR-11
TD150-1/-2/-3.....	TR-21
TD155.....	TR-34
TD200-1.....	TR-34
TD200-2.....	TR-34
TP1100B.....	TR-32
TP1150 (Deck TD20-1, Ch. T7NE).....	TR-35
TP1200BWD-A (Deck TD200-1, Ch. T7T). TP1300BWD-A (Deck TD200-2, Ch. T20T)	TR-34
GRUNDIG	
TK-1.....	TR-9
TK5, TK8, TK8/3P, TK8E.....	TR-4
TK14.....	TR-18
TK40U.....	TR-12
TK42U.....	TR-13
TK45/U.....	TR-19
TK46/U, TK47/U.....	TR-17
TK200U.....	TR-22
TK400U.....	TR-24
TK820/3D (See Similar Recorder).....	TR-2
TM8, TM8E, TM8U.....	TR-4
TM45/U/USA.....	TR-19
HITACHI	
TRA-500.....	TR-14
TRQ-300.....	TR-13
TRQ-330.....	TR-27

TRQ-370.....	TR-6
TRQ-510.....	TR-29
TRQ-520.....	TR-34
TRQ-700.....	TR-33

INTERNATIONAL ELECTRONICS

PT3.....	CM-2
----------	------

KNIGHT

KG-415 (83U788MUW, RUW).....	TR-28
KN4000A/KN4003 (79RU850).....	TR-17
KN-4010 (91RZ750), KN-4020 (91RZ751)	TR-4
KN-4110 (35DU806).....	TR-6
KN-4200 (20HF280).....	TR-7
KN-4350 (95DU603).....	TR-9
KN-4400 (95DU677).....	TR-10
KN-4401 (79RU860).....	TR-22
KN-4450 (79S865U).....	TR-28
96RX635.....	CM-8
96RX676.....	CM-7
96RZ940.....	TR-2
96-144.....	CM-4
96-485.....	CM-5
96-499.....	CM-4
96-590.....	CM-6
99RZ177.....	TR-3
99RZ936.....	TR-3

KORTING

ME114.....	TR-7
MT136.....	TR-11
MT158S.....	TR-7
MT3633, 43.....	TR-13
TR-3000 (Constellation 66).....	TR-13
TR-4000.....	TR-14
2000 Series (Constellation 33).....	TR-12

LAFAYETTE

RK-137A (99-1511WX).....	TR-23
RK-140A.....	TR-11
RK-141.....	TR-13
RK-142.....	TR-13
RK-155.....	TR-20
RK-600A.....	TR-22
RK-650, RK-675.....	TR-22
RK-860 (991530WX).....	TR-38

LLOYD'S

LT-612.....	TR-25
LT-717.....	TR-20
5C41.....	TR-25

LUCOR

751.....	TR-17
----------	-------

LUXOR

MP-410A, MP-424A.....	TR-8
-----------------------	------

MAGNAVOX

TR-101M.....	TR-20
TR-200S.....	TR-26
1TC108M.....	TR-33
1-TR-102M.....	TR-18
1TR-106M.....	TR-29
1TR-107M.....	TR-28
2TR-107M.....	TR-31
701175-1.....	TR-26

MAGNECORD

Audiad AD-1R.....	CM-2
F-35B.....	TR-1
M30 Series (M-30, M-33, M-34).....	CM-7
PT6-A, -AH, -AHX, -AX.....	CM-5
PT6-J, PT6-6A, PT6-6J.....	TR-3
PT63-A, -AH, -AHX, -AX.....	CM-5
S-36B.....	TR-2
728, 748.....	TR-8
1020.....	TR-27

MASCO

D37R.....	CM-4
52, 52C, 52CR, 52L, 52LR, 52R.....	CM-5
375.....	CM-3
500.....	CM-8

MASTERWORK

M650.....	TR-38
M-700.....	TR-10
M-800.....	TR-22
M-810.....	TR-24

MAYFAIR

FT-1024B.....	TR-21
1020-B.....	TR-22

MERCURY

TR-3500.....	TR-20
TR-8000.....	TR-29

MITCHELL

1290.....	CM-6
1425A.....	CM-9

MOTOROLA

VM100TD, VM100TP, Ch. HS-2350.....	TR-25
------------------------------------	-------

NORELCO

Carry-Corder 150.....	TR-22
EL3310A (Continental 350).....	TR-33
EL3516.....	TR-5
EL3528 (Continental 201).....	TR-23
EL3534 (Continental 401).....	TR-15
EL3549 (Continental 301).....	TR-13
EL3586 (Continental 101).....	TR-13

NUTONE

2405.....	TR-7
2406.....	TR-30

OKI

111.....	TR-26
222.....	TR-27
300, 300D.....	TR-30
333.....	TR-27
555.....	TR-28

OLSON

AM-232A.....	TR-35
RA-707.....	TR-25

OLYMPIC

ST-802 (See Similar Recorder).....	TR-5
T-800, T-801 (See Similar Recorder).....	TR-5
TP-9 (Ch. SA35238, Ch. 352).....	TR-37
TP-10 (Ch. SA35238, Ch. 351).....	TR-37

ORRTRONIC

AutoMate P-600BF.....	TR-15
-----------------------	-------

PACKARD BELL

TPA-4.....	TR-34
TPAK-2m, TPAK-3.....	TR-36

PANASONIC

RP-8900S.....	TR-29
RQ-101S.....	TR-19
RQ-102S.....	TR-27
RQ-105S.....	TR-32
RQ-114.....	TR-9
RQ-115.....	TR-13
RQ-116.....	TR-22
RQ-152S.....	TR-30
RQ-303.....	TR-18
RQ-500.....	TR-15
RQ-555.....	TR-24
RQ-700.....	TR-14
RQ-705.....	TR-24
RS-755S.....	TR-21
RS-770S.....	TR-33
RS-1000S.....	TR-29

PENTRON

CT-1.....	CM-8
GR-15A, GR-15B, GR-15S.....	TR-10
GR-1500.....	TR-12
HF-400.....	CM-9
HT-225.....	CM-7
NL-1, NL-1S, NL-2, NL-2S, NL-3, NL-3S.....	TR-5
PB-A2, PB-1.....	CM-5
PR-65 (President).....	TR-14
T-90.....	CM-9
TM-1, TM-4.....	TR-5
TR-4.....	CM-7
9T3.....	CM-4
9T3-C.....	CM-4

PHILCO FORD

Q8WA/CTP.....	TR-37
---------------	-------

PHONOLA

A-104, 9001, 9002.....	TR-25
------------------------	-------

RCA VICTOR

MGC71W (Ch. RS-218A, TCT-4A).....	TR-36
MGG72W (Ch. RS-221A, TRT-2).....	TR-30
MHC 60W.....	TR-33
MHC74W (Ch. RS-218A, TCT-4A).....	TR-36
MHC75W (Ch. TRT-4, RS-233A).....	TR-35
SRT-301 (MI-15910).....	CM-6
SRT-401, SRT-402.....	CM-9
SRT-403 (MI-15917).....	CM-8
YGB11T (Ch. TCT-4, RS-217).....	TR-38
YGB29A (Ch. TCT-4, RS-217A).....	TR-38
YGD43E (Ch. RS-218, TCT-4A).....	TR-36
YGG45E (Ch. RS-221, TRT-2).....	TR-30
YGH31A (RS-220, TRT-1).....	TR-32
YGS11J.....	TR-25
YGS21E.....	TR-27
YHB22T (Ch. TCT-4, RS-217).....	TR-38
YHB26A (Ch. TCT-4, RS-217A).....	TR-38
YHD 38W.....	TR-33
YHD42E (Ch. RS-218, TCT-4A).....	TR-36
YHG44E, YHG47E (Ch. TRT-4, RS-233).....	TR-35
YJS13J, YJS15G.....	TR-38

YHH33J (Ch. RS-232, TRT-3).....	TR-34
YHS 15E.....	TR-33
YHS18J, YJS17J, YJS20E.....	TR-36
3YD11 (TCT-3A, RS-196A/A-1).....	TR-11
6-HFT-1 (TR-1, TR-1A).....	TR-3
7-TR-2, 7-TR-3.....	TR-2
8-STP-1, 8-STP-2.....	TR-2
8-TR-2, 8-TR-3 (Ch. RS-156F, H, TR-2A-1, -2).....	TR-4

REALISTIC

7A7 (14-711).....	TR-34
808 (14-808).....	TR-34

REELEST

C1A.....	CM-4
----------	------

REVERE

M-2.....	TR-7
M-3, M-3C, M-3D, M-3E.....	TR-16
M-20, M-30.....	TR-14
SA-421.....	TR-8
T11.....	TR-3
T-100.....	CM-4
T-700D, TR-800D.....	TR-4
T-900.....	CM-7
T-1100 (Early Version).....	CM-7
T-1100 (Late Version), T-1120.....	TR-5
T-70153, T-70157.....	CM-5
T-70163, T-70167.....	CM-5
T-70253, T-70257.....	CM-5
T-70263, T-70267.....	CM-5
T-77153, T-77157.....	CM-5
T-77163, T-77167.....	CM-5
T-77253, T-77257.....	CM-5
T-77263, T-77267.....	CM-5
TR-1000, TR-1200 (Early Version).....	CM-7
TR-1200 (Late Version).....	TR-5
TRS-1005, TRS-1025, TRS-1026.....	CM-7
TRS-1205, TRS-1225, TRS-1226.....	CM-7
TS-905, TS-925, TS-926.....	CM-7
TS-1105, TS-1125, TS-1126.....	CM-7
TS-1405, TS-1425, TS-1426.....	CM-7

REVERE-WOLLENSAK (See Revere and/or Wollensak)

RHEEM-ROBERTS (See Roberts)

RIVERSIDE

FJB-16595/597/599A.....	TR-24
-------------------------	-------

ROBERTS

144DPA.....	TR-9
330.....	TR-12
400X.....	TR-31
440.....	TR-9
720, 770.....	TR-11
990, 997.....	TR-8
1000, 1001.....	TR-28
1055.....	TR-13
1057.....	TR-10
1630.....	TR-26
6000M, 6000S.....	TR-28

SEARS SILVERTONE

836.62200.....	TR-28
836.62210.....	TR-30
837.630010.....	TR-31
3070 (Ch. 567.230 & Amp. Ch. 567.35001).....	CM-9
3230 (Ch. 528.58200).....	TR-6
3238 (Ch. 528.59990/991).....	TR-8
4070 (Ch. 567.34001 & Amp. Ch. 567.35001).....	CM-9

SEARS SILVERTONE (CONTINUED)

4072 (Ch. 567.34001 & Amp. Ch. 567.35000).....	CM-8
4234 (Ch. 528.69100/101/102).....	TR-17
4236 (Ch. 528.69110/111/112/113).....	TR-16
4238 (Ch. 528.69120, 528.66121, 528.69122, 528.69123).....	TR-12
5234 (Ch. 528.69102).....	TR-17
5238 (Ch. 528.69510).....	TR-12
5240 (Ch. 528.58310/313, 528.69280/281)	TR-19
5248 (Ch. 381.52480).....	TR-20
6070 (Ch. 567.34002 & Amp. Ch. 567.35006).....	CM-9
6072 (Ch. 567.34003 & Amp. Ch. 567.35002).....	CM-9
6974 (Ch. 567.34004 & Amp. Ch. 567.35005).....	TR-2
7074 (Ch. 567.34006 & Amp. Ch. 567.35011).....	TR-1
7080, 7081 (Ch. 567.34006 & Amp. Ch. 567.35011).....	TR-1
7237 (Ch. 528.69530/31/32, 528.58370)..	TR-32
7239 (Ch. 528.69540, 528.58371).....	TR-36
7414 (Ch. 528.69123).....	TR-12
8070, 8072 (Ch. 528.58010, 528.58011, 528.58030, 528.58031, 528.59040, 528.59041, 528.59060, 528.59061).....	TR-3
Chassis 528.58000, 528.58001.....	TR-5
528.59000, 528.59001.....	TR-5

SENTINEL

10.....	CM-7
---------	------

SILVERTONE (See Sears Silvertone)

SONY

SRA-2L.....	TR-26
SRA-3.....	TR-34
SSA-905A.....	TR-20
TC-102.....	TR-27
TC-123.....	TR-28
TC-135.....	TR-32
TC-200.....	TR-17
TC-211TS.....	TR-23
TC-260 (Serial No. 00001 to 23000).....	TR-32
TC-263D.....	TR-21
TC-300.....	TR-34
TC-350, TC-350C.....	TR-36
TC-500A.....	TR-30
TC-777S-2, TC-777S-4.....	TR-33
TC-801A.....	TR-18

TC-900..... TR-29
 TC-905A..... TR-20
 111..... TR-16
 464-D, 464-SL..... TR-19

STAR-LITE

TT-37..... TR-14

STENOTAPE

4-10..... TR-17

SYLVANIA

4901 (Ch. 1-400-1, -2, 1-628-1)..... TR-4

SYMPHONIC

BR-1200..... TR-2
 M2R01..... TR-23
 R-200..... TR-29
 R-600..... TR-31
 R-800..... TR-35
 R-1000..... TR-32
 R-1200..... TR-2
 S4P06..... TR-24

TANDBERG

62, 64..... TR-31
 62X, 64X..... TR-37
 72, 72B, 74, 74B..... TR-33
 82, 84, 821, 822, 823, 824, 841, 842, 843..... TR-29

TAPE MASTER

PT-121..... CM-5
 PT-125..... CM-5

TDC

Stereotone 130..... CM-6

TELECTRO (TAPE)

A..... CM-7
 MM113, MM213..... TR-11
 MM-215..... TR-19
 SR-122..... TR-8
 SS-132..... TR-7
 SS-233..... TR-21
 556..... CM-8
 1960..... TR-4
 1970..... TR-5

TELEFUNKEN

Magnetophon 85/85KLE..... TR-25
 Magnetophon 97/97L..... TR-31
 Magnetophon 200, 201..... TR-35

TELMAR

ST-410..... TR-35

TOWER

4691..... TR-4

TRUETONE

4DC7680..... TR-36

UHER

Universal 5000..... TR-25
 4000 Report - L..... TR-36
 4000 Report-S..... TR-24
 8000E (Royal Stereo)..... TR-23
 9000 (22/24 Hi-Fi Special)..... TR-38

UNITED STEREO TAPES

UST-4..... TR-10

V-M

700, 710, 711..... TR-1
 725-1..... TR-9
 726..... TR-14
 733-AV-1, 733-1..... TR-29
 735..... TR-6
 738-1..... TR-11
 739-1..... TR-32
 740-1, 741..... TR-8
 744..... TR-26
 750..... TR-1
 754..... TR-26
 760-1..... TR-24
 1471-1, 1481-1..... TR-15
 1482-1..... TR-30

VIKING

Auto-Tape 500..... TR-13
 FF75 Series..... CM-9
 PA9-A..... TR-19
 RP83, RP83-2/-3..... TR-18
 77..... TR-17
 86ERQ, 86ESM, 86RMQ..... TR-15
 87 Series..... TR-18
 88ERQ/RMQ, 880ERQ/RMQ..... TR-19
 807..... TR-29

VISTA

TM-70..... TR-12

WALTHAM

MR7000..... TR-16

WARDS AIRLINE

A-104, JWR-3656A, JWR-3656B..... TR-26
GEN-3627A..... TR-37
GEN-3637A (62-3637)..... TR-35
GEN-3638A (62-3638)..... TR-38
GEN-3647A (62-3647)..... TR-36

WAYFARER

500-C..... TR-18

WEBCOR

BP-2403-1..... TR-18
CP-2500-1..... TR-26
CP-2502-1..... TR-22
CP-2503-1..... TR-31
CP-2520-1..... TR-23
CP-2522-1..... TR-25
CP-2550-1, CP-2650-1..... TR-27

E-2020..... CM-8
EP-2207-1..... TR-6
EP-2208-1..... TR-10
EP-2250-1..... TR-6
EP-2300-1..... TR-7
EP-2303-1..... TR-13
EP-2323-1, EP-2323-1A..... TR-15
EP-2328-1..... TR-17
EP-2356-1/-1A/-1B, EP-2357-1..... TR-19
EP-2360-1..... TR-15
EP-2400-1..... TR-20
EP-2402-1..... TR-19
EP-2404-1..... TR-21
EP-2456-1, EP-2457-1..... TR-12
T-2020..... CM-8
2021, 2022, 2023, 2024..... CM-8
2101-1, 2205-1..... CM-8
2611, 2612..... CM-9
2718, 2719..... TR-2
2811..... TR-5
2812, 2816..... TR-3
2821..... TR-5
2891..... TR-5
2892, 2896..... TR-3

WEBSTER-CHICAGO

210..... CM-4

WEBSTER-ELECTRIC

Ekotape..... CM-3

WESTINGHOUSE

H-21R, H-22RS, H-24RS..... TR-6
H-25R1/A, R2/A, R3/A..... TR-13
H-26RS1..... TR-12
H-27R1 (Ch. V-2559-1)..... TR-25
H-28R1..... TR-15
H-29R1 (Ch. V-2555-1)..... TR-16
H-30R1 (Ch. V-2556-1)..... TR-23
H-32R1 (Ch. V-2557-1)..... TR-26

WILCOX-GAY

3A10, 3A11..... CM-5
3F10..... CM-5
4A10..... CM-6
4B10, 4F10..... CM-7
5F Series..... CM-9
5U Series..... CM-9
375..... TR-3
651..... TR-1
674..... TR-1
750..... TR-3
772..... TR-5

WOLLENSAK

M4..... TR-34
T-1400, B, C, D, E, /T-1440, B, C, D, E TR-9
T-1500..... TR-3
T-1500.(1966 Version) TR-30
T-1570..... TR-8
T-1580..... TR-7
T-1780/B/C/D/E..... TR-12
T-1980/B/C/D/E, T-1981/B/C/D/E..... TR-11
524..... TR-10
600..... TR-13
1220..... TR-17
1280..... TR-18
1500AV/D..... TR-30
5150..... TR-25
5200, 5250, 5280, 5300..... TR-28
7000, 7100, 7200..... TR-34

YASHICA

77..... TR-11

ZENITH

Y633, Y635..... TR-37
81Z..... TR-27

HOWARD W. SAMS

PHOTOFACT® SPECIALIZED SERIES

CB RADIO SERIES



Two to three volumes issued yearly for complete PHOTOFACT® coverage of all popular CB Radio models. Regular price, \$2.95 per volume—only \$2.65 when purchased on a Standing Order Subscription! Sign up and save 30¢ per volume!

TRANSISTOR RADIO SERIES



Twelve to fifteen volumes issued each year provide complete PHOTOFACT® coverage of Transistor Radios. Each volume covers 40 to 50 popular late models. Regular price per volume, \$2.95—only \$2.65 when purchased on a Standing Order Subscription! Sign up and save 30¢ per volume!

AUTO RADIO SERIES



Six to eight volumes per year brings you complete and up-to-date PHOTOFACT® coverage of Auto Radios. Each volume covers 40 to 50 models. Regular price \$2.95—only \$2.65 when purchased on a Standing Order Subscription! Sign up and save 30¢ per volume!



HOWARD W. SAMS & CO., INC.

PHOTOFACT® SPECIALIZED SERIES

are available from your local parts distributor

\$4.95
\$5.95 IN CANADA
78-38