

BUTOBA MODEL
MT-5



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MT-5

GENERAL INFORMATION

The Butoba Model MT-5 is a battery-operated, dual-speed, dual-track transistorized tape recorder.

Supplied as optional equipment is a converter unit which can be used on 110, 130, 150, 220, 240, or 260 volt AC, 50-60 cycles. Also connections can be made to a 6-volt car battery.

Recordings can be made from a radio, phonograph, television receiver, or telephone as well as those made directly from a microphone.

Tape speeds are 1 7/8 and 3 3/4 ips. The playing or recording times, using both tracks, are as follows:

Reel Size	1 7/8 ips	3 3/4 ips
5" (600 ft.)	2 hours	1 hour

Motor Power Supply — Four — 1.5V "D" Cell Batteries
Amplifier Power Supply — Four — 1.5V "D" Cell Batteries

Supplied By:

Stanford International
1227 Laurel Street
San Carlos, California

HOWARD W. SAMs & CO., INC. Indianapolis 6, Indiana

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FUNCTION OF CONTROLS AND JACKS

Stop Key, Symbol "O"

When depressed, stops the tape motion and shuts off the amplifier. Before operating a new key, the stop key should always be depressed first.

Recording Key, Symbol

When depressed, puts the recorder in the record mode.

Playback Key, Symbol

When depressed, puts the recorder in the playback mode.

NOTE: With the Recording key and Playback key depressed simultaneously, the recorder may be used as a public address system.

Fast Forward Key, Symbol

When depressed, moves the tape at a rapid rate onto the take-up spindle.

Fast Rewind Key, Symbol

When depressed, rewinds the tape on the rewind spindle.

Start-Stop Lever

After the Playback key or Record key is depressed, the Start-Stop lever must be moved to the left to put the tape in motion. This is also a pause or quick stop control; moving further to the left will stop the tape momentarily.

Volume Control

Turning control clockwise will increase volume

during playback. When recording, it controls the recording level.

Tone Control

Turn this control clockwise to increase the treble.

Speed Selector

To select the desired speed, move the lever to the left for 3 3/4 ips (9.5 cm ps) or to the right for 1 7/8 ips (4.75 cm ps).

NOTE: When recorder is not in use, the speed selector should be set for 1 7/8 ips.

Tape Counter Clock

When starting a new recording, set the tape clock to 12 o'clock. Logging the tape at different points makes it easy to locate any given part of a recording.

High Impedance Input-Output Receptacle

This receptacle is located on the right side of the recorder and can be used for recording from a radio, TV, or phonograph, and for connecting an external speaker or amplifier system.

Low Impedance Input-Output Receptacle

This receptacle is located on the left side of the recorder and can be used for recording from microphone, telephone adapter, and monitoring the recording by earphone.

OPERATING INSTRUCTIONS

Threading the Tape

1. Place a reel of tape on the left hand reel spindle.
2. Place an empty reel on the right hand reel spindle.
3. Unwind about 12" of tape from the supply reel.
4. Insert the free end of the tape into one of the radial slots in the right hand spindle reel. Turn the reel several turns counterclockwise to secure the tape to the reel and take up all slack between reels.

Microphone Recording

1. Rotate the volume clockwise.
2. Insert the microphone plug in the socket on the left side of the recorder.
3. Set the speed for 3 3/4 or 1 7/8 ips.
4. Push the Record (Ω) key down and shift the Stop-Start lever to the left to put tape in motion.

5. Hold the microphone about 6 to 12 inches from your mouth and speak in a normal voice.
6. Adjust the volume control so that line and magic eye indicator does not fade out on loud passages, but will flicker on soft passages.

Recording from Radio or Television Receiver

Insert plug end of the cable into plug located on the right side of recorder. Connect other end of cable to radio or television receiver.

Follow steps 3 through 6 in "Recording from Microphone".

Dual-Track Recording

This recorder is designed to record and play back one-half the width of the tape at a time; thereby, resulting in a two-track recording. After the first recording is completed, remove the full reel from the right-hand spindle; turn the reel over and place it on the left-hand spindle. Then make another recording. The tape can be played back in the same manner.

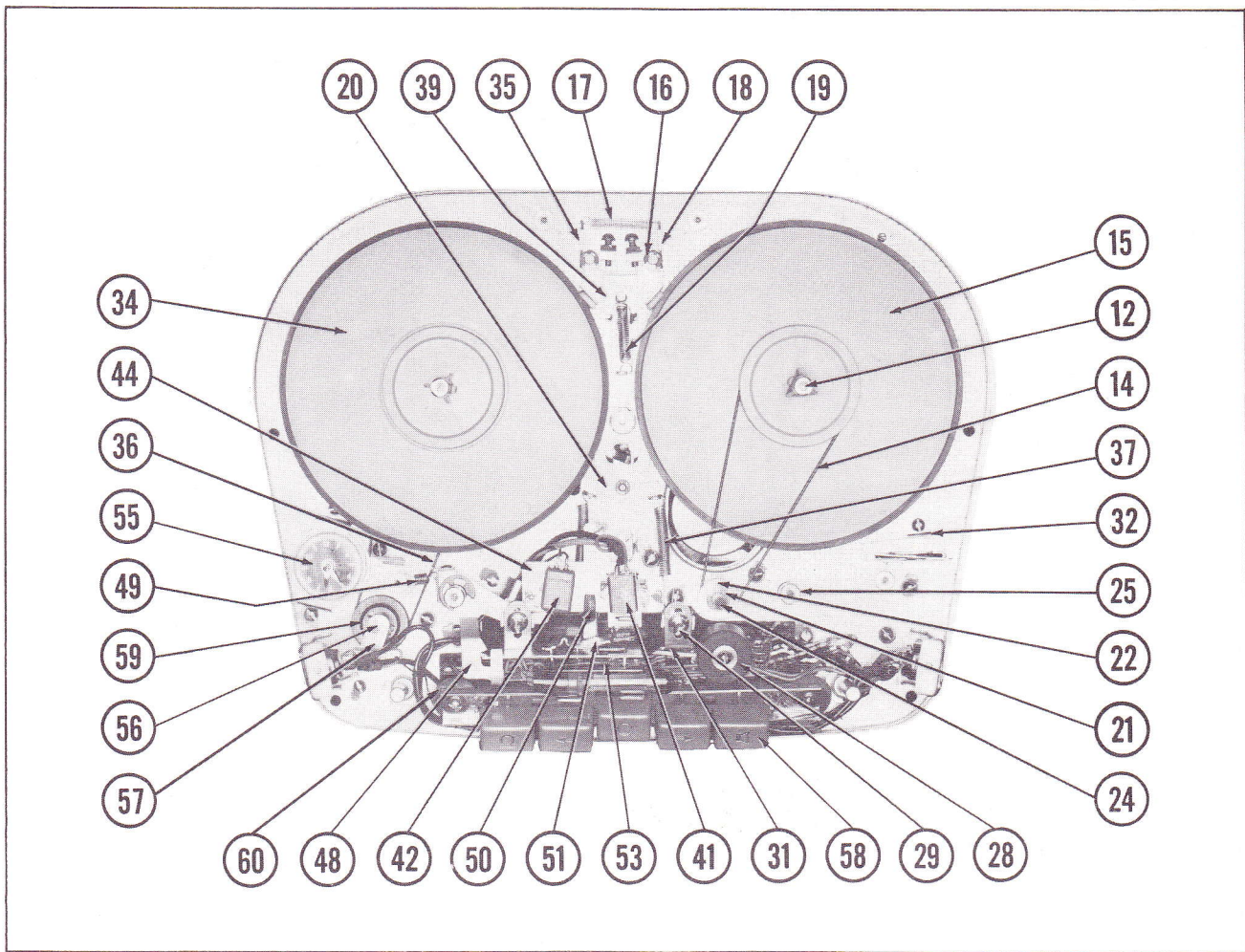


FIG.1 TOP VIEW OF MECHANISM

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To Erase a Recording

In the Record position, any recording on the tape is automatically erased before a new recording is made. Should it be desired to erase a recording without recording new material, follow the normal recording procedure, but set the volume control fully clockwise.

To Edit and Splice Tape

NOTE: It is impossible to edit and splice one track without affecting the other. Record-

ings to be edited should be limited to one track.

1. Tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements can be inserted between selections, etc. Unused tape can be spliced for re-use.
2. For best results, cut tape at a slight diagonal, butt ends together and fasten on the glossy side with splicing tape. Trim off any excessive width.

DISASSEMBLY INSTRUCTIONS

To Remove Recorder from Case

1. Remove the battery holder or the converter by loosening the large screw in the center.
2. Remove the plastic lid from the top of cabinet.
3. Remove two screws. Remove the Pushbutton escutcheon (7).
4. Remove two screws (5). Remove head cover (6).
5. Remove tape counter knob (11).

6. Loosen set screw on speed selector (3). Remove knob (2).
7. Remove four screws (4) from top dress plate (1).
8. Remove top dress plate (1).
9. Remove 4 wood screws from recorder. Lift recorder straight up until it clears the top, then unsolder speaker leads.
10. To reassemble, reverse the foregoing procedure.

FOLDER 6

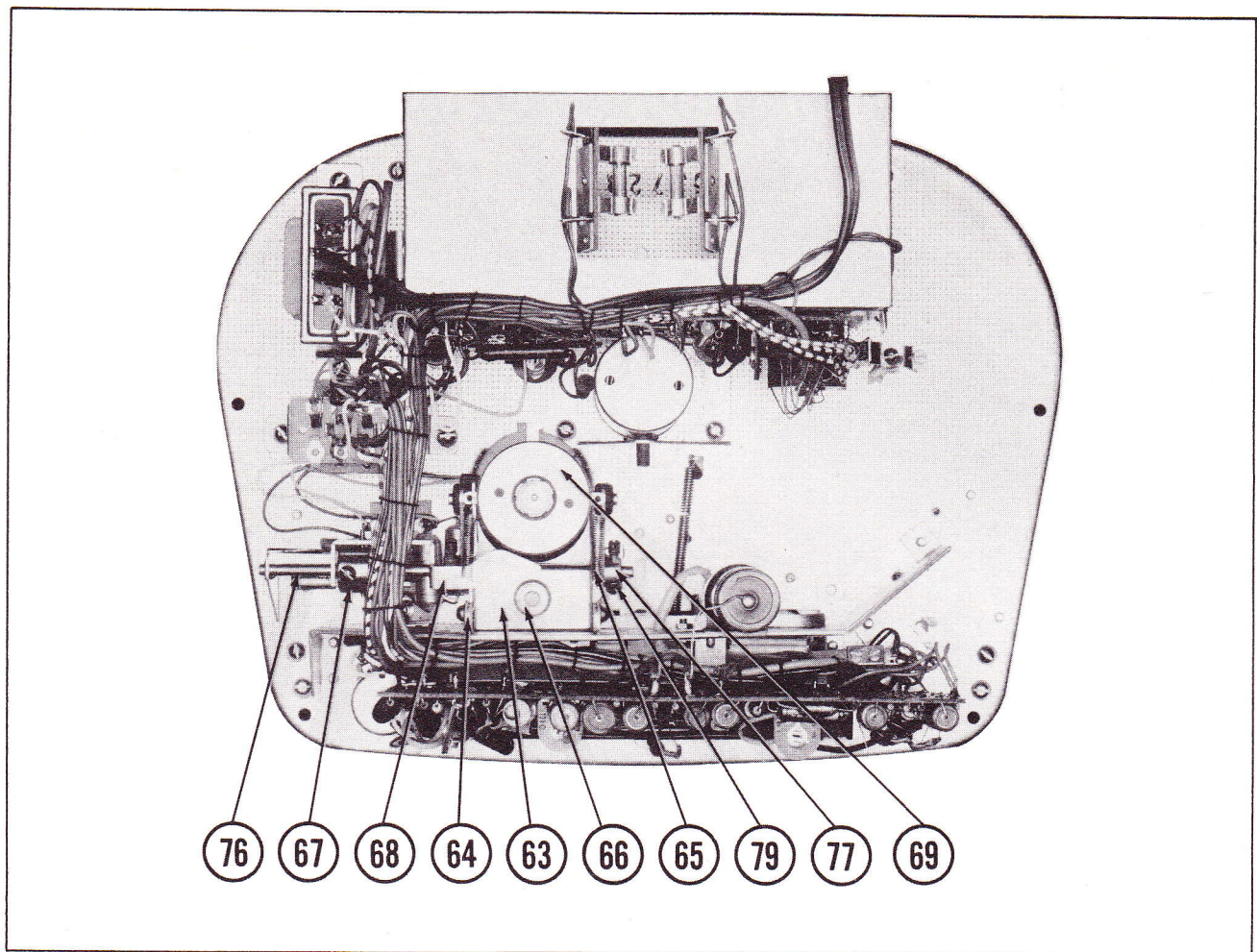


FIG. 2 BOTTOM VIEW OF MECHANISM WITH FLYWHEEL REMOVED.

ADJUSTMENTS

Motor Speed

The speed regulator screw is accessible through the cut-out section in the motor case and the opening of the regulator cap. To increase speed, turn regulator screw clockwise. To decrease speed, turn screw counterclockwise.

Tape Tension

There should be a certain amount of drag on the supply reel, to keep tension on the tape. If tape jerks while playing a recording, turn adjusting screw (71A) until proper tension is obtained.

Head Alignment

1. Remove the pressure lever (51).
2. Thread a tape onto the recorder.

3. Adjust screws (43) until the ferrite edge of the erase head (42) is flush with the top edge of the tape. Adjust screws (43) until the pole piece on the record-playback head (41) is flush with the top edge of the tape.

4. If the pole piece of the record-playback head is not vertical, it may be adjusted by threading a 5,000-cycle note tape onto the recorder.

5. Place the recorder in the playback mode. Set volume to the center of its range.

6. Adjust the screws, located on each side of record-playback head (41) for maximum sound.

The two brakes (18 and 35) are released when the recorder is in the record or playback mode. If the brakes fail to release, adjust the screws on the brakes until proper clearance is obtained.

CLEANING

The record head, erase head, capstan, pressure roller, and tape guides should be cleaned occasionally to remove the tape residue which is worn off the tape as it passes these parts. Use a soft cloth and alcohol to remove residue.

Clean the rubber tired spindles and belts with cleaning fluid.

CAUTION: Never clean the magnetic heads with tetrachloride.

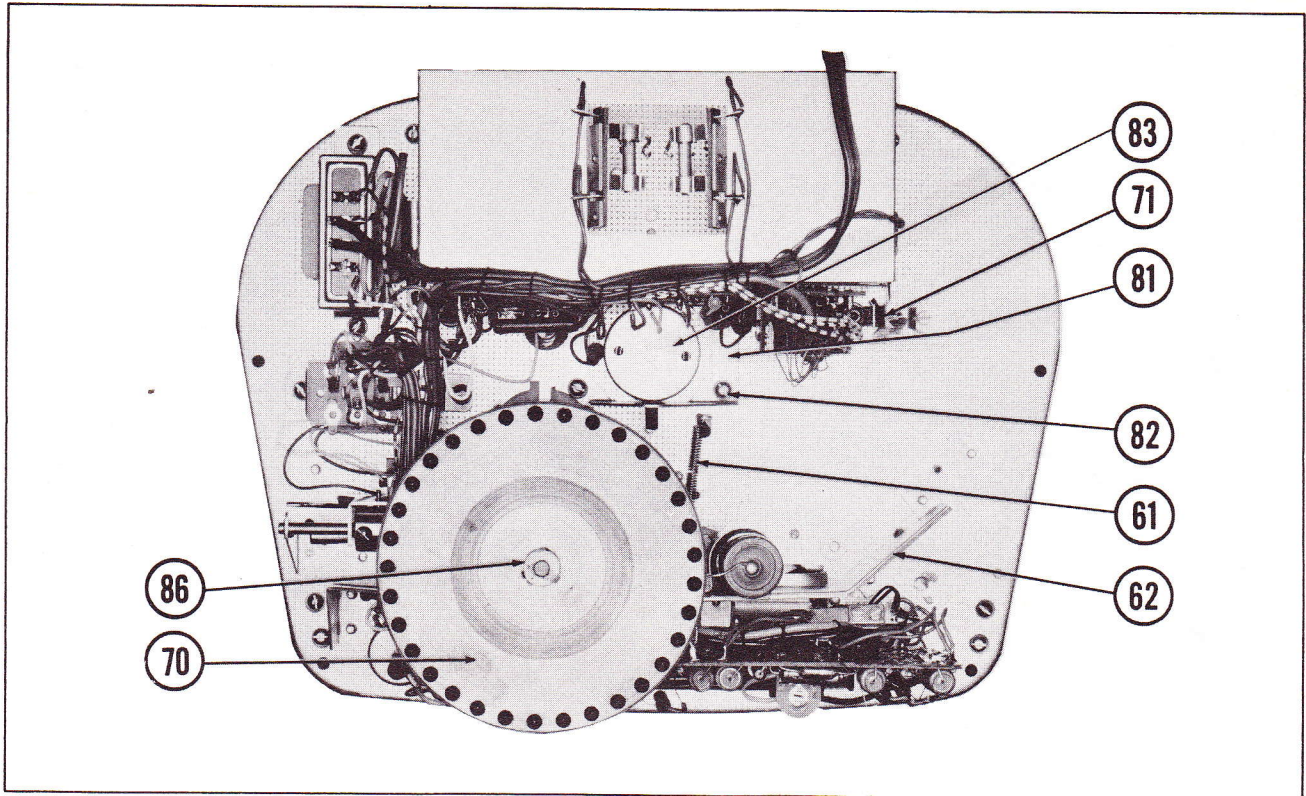


FIG. 3 BOTTOM VIEW OF MECHANISM

LUBRICATION

Lubrication should not be required for a long period of time. If the recorder is disassembled for repair, apply a thin coat of grease on the sliding levers

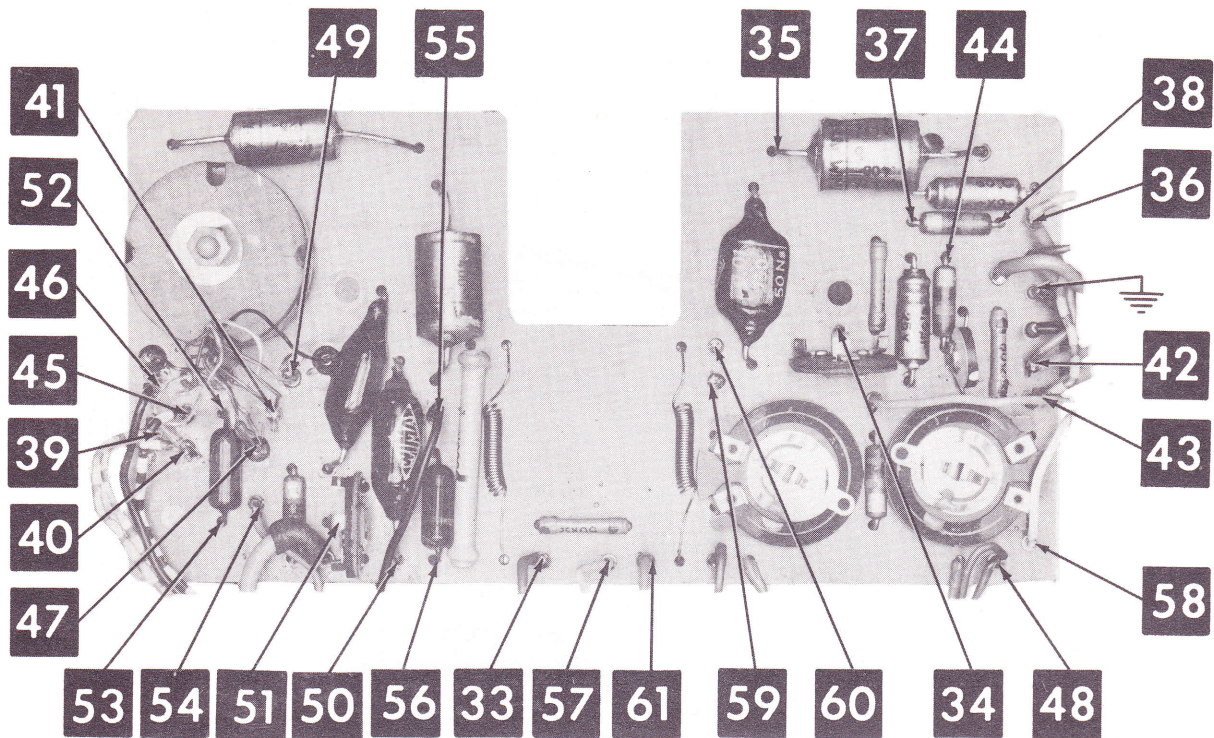
and a drop of oil on the bearings of the spindles and capstan shaft bearings.

TROUBLE CHART

Symptom	Cause	Remedy
Pushbuttons will not stay in when depressed or jump out at the slightest movement.	1. Notches of key assembly worn.	1. Replace key assembly.
No rewind, but motor runs.	1. Broken or disconnected spring (37).	1. Replace or connect spring (37).
No fast forward but motor runs.	1. Broken or disconnected spring (37A).	1. Replace or connect spring (37A).
No takeup in play or record position.	1. Take-up spring belt (14) broken.	1. Replace take-up spring belt (14).
Capstan pressure plate fails to engage after start-stop lever is moved.	1. Broken or disconnected spring (61).	1. Replace or connect spring (61).
No erase.	1. Erase head (42) defective. 2. Erase head (42) positioned wrong.	1. Replace erase head (42). 2. Position erase head (42) so it is parallel with the tape when in the record position.
No record or playback.	1. Play-record head (41) defective.	1. Replace play-record head (41).

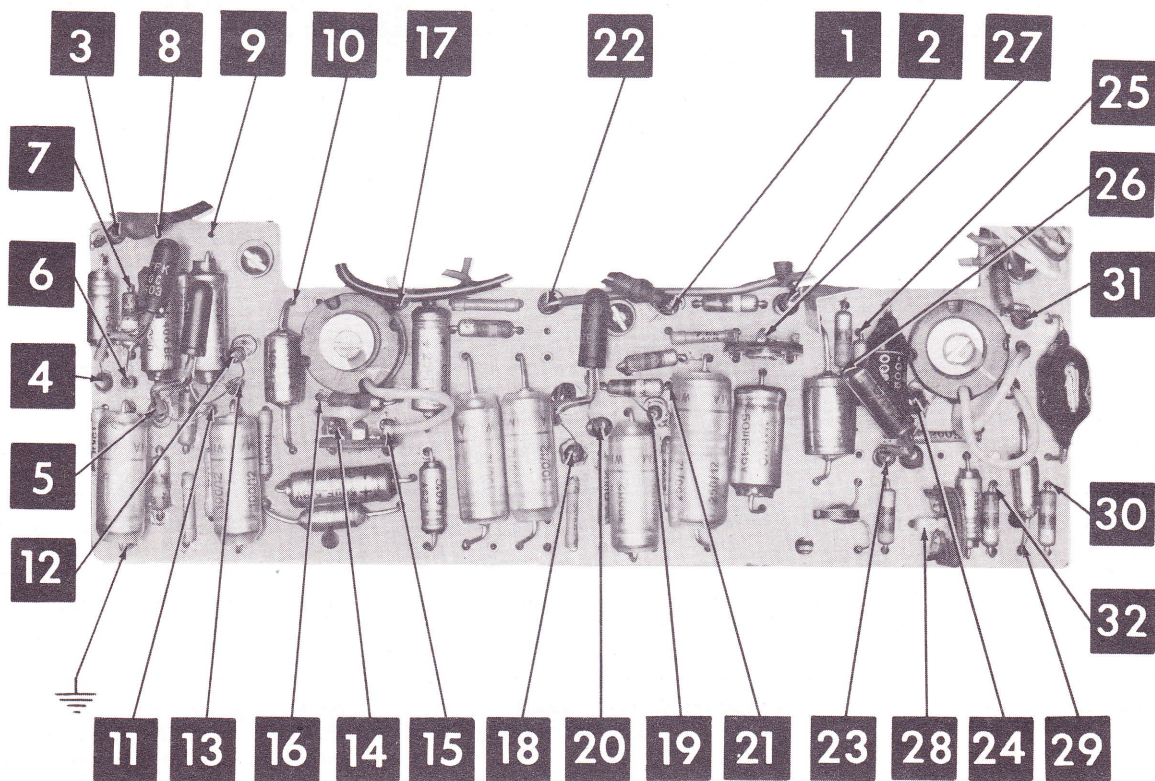
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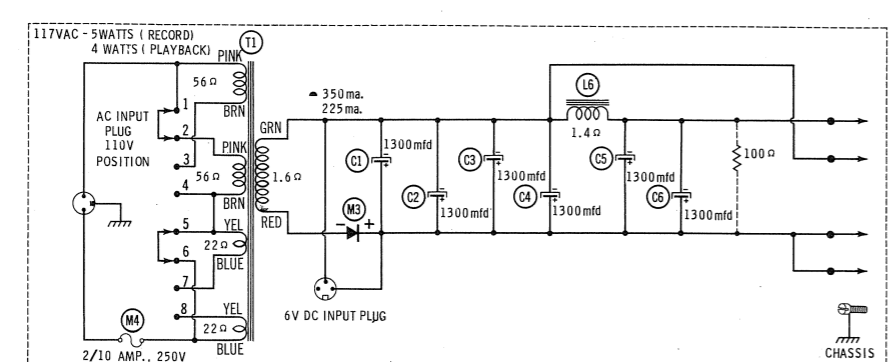
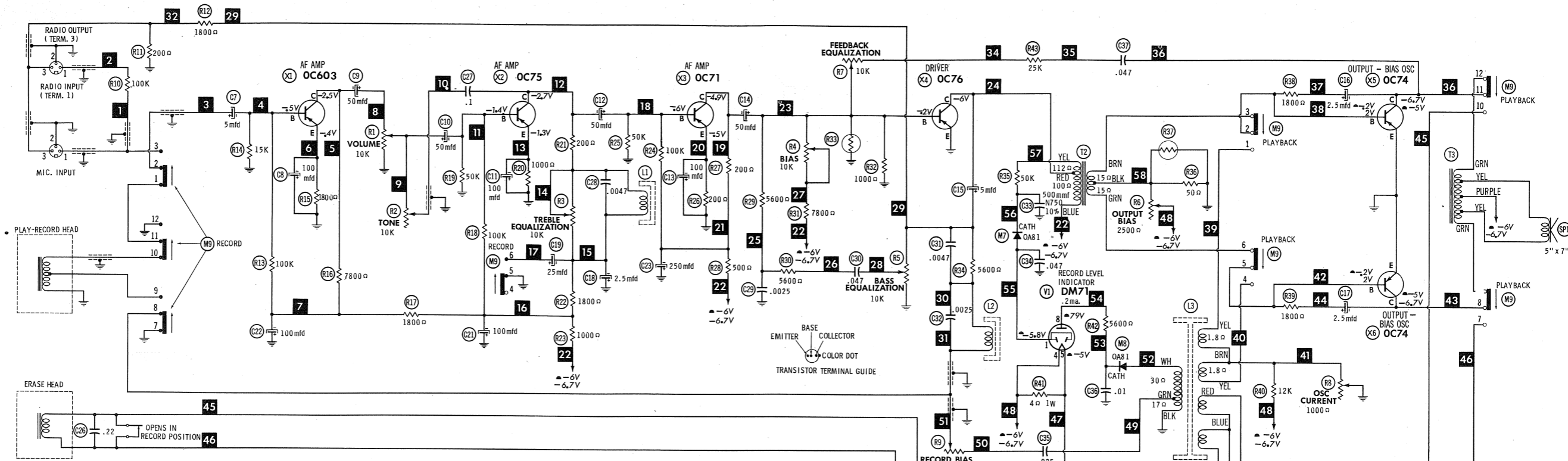
A Howard W. Sams **CIRCUITRACE** Photo

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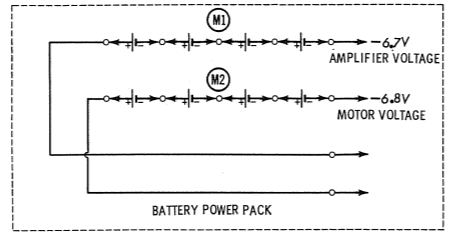
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ROTATING INPUT VOLTAGE SELECTOR PLUG & SOCKET DEVICE

VOLTAGE	TERMINALS CONNECTED
150V	1-2 6-7
220V	2-3 7-8
130V	3-4 5-6
260V	2-3 6-7
110V	1-2 7-8
240V	2-3 7-8

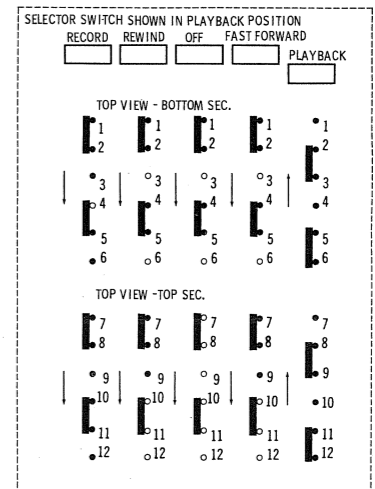
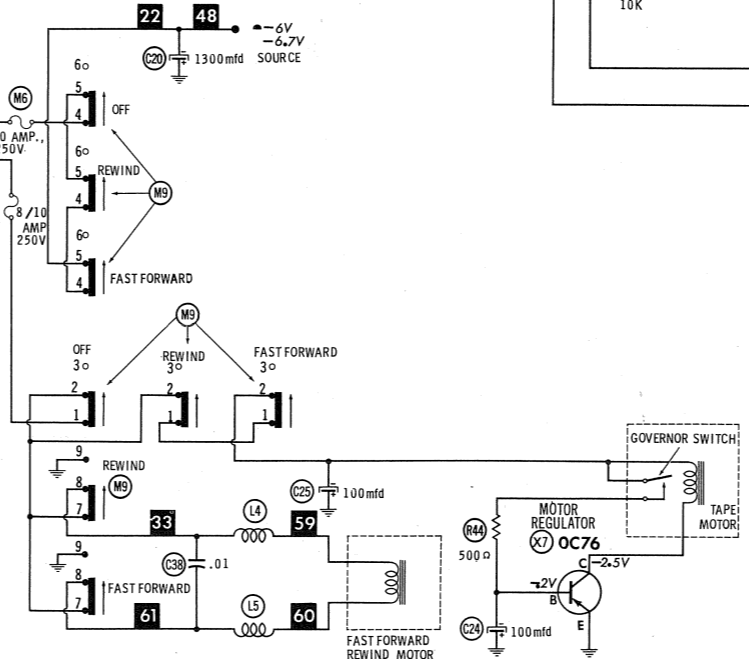
- DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
- DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
 - Socket connections are shown as bottom views.
 - Measured values are from socket pin to common ground.
 - Line voltage maintained at 117 volts for voltage readings.
 - Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
 - All controls at minimum, proper output load connected.

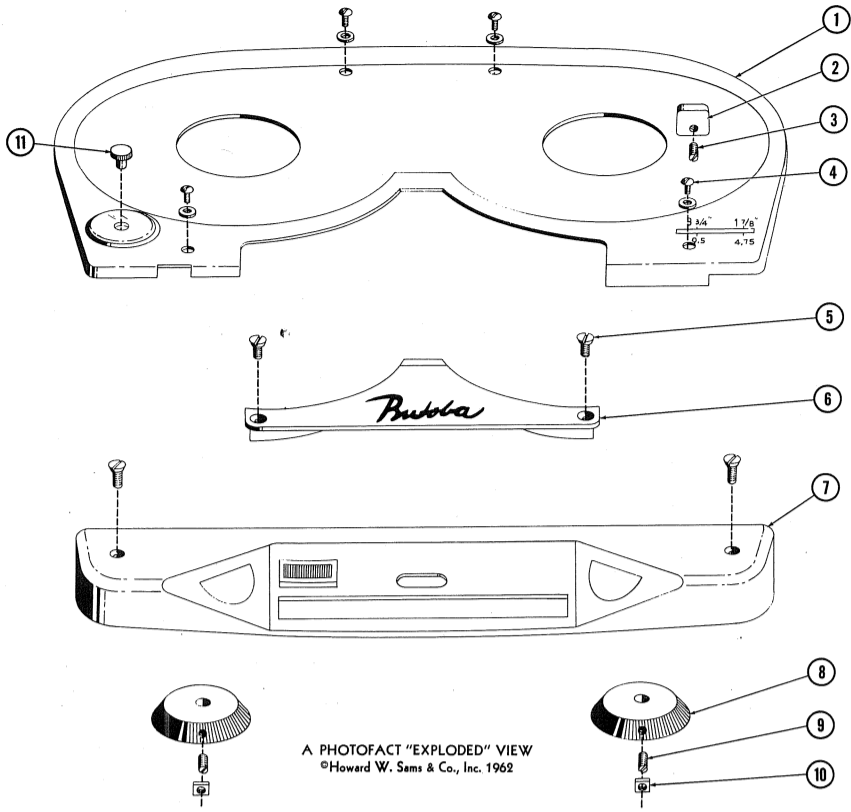


RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

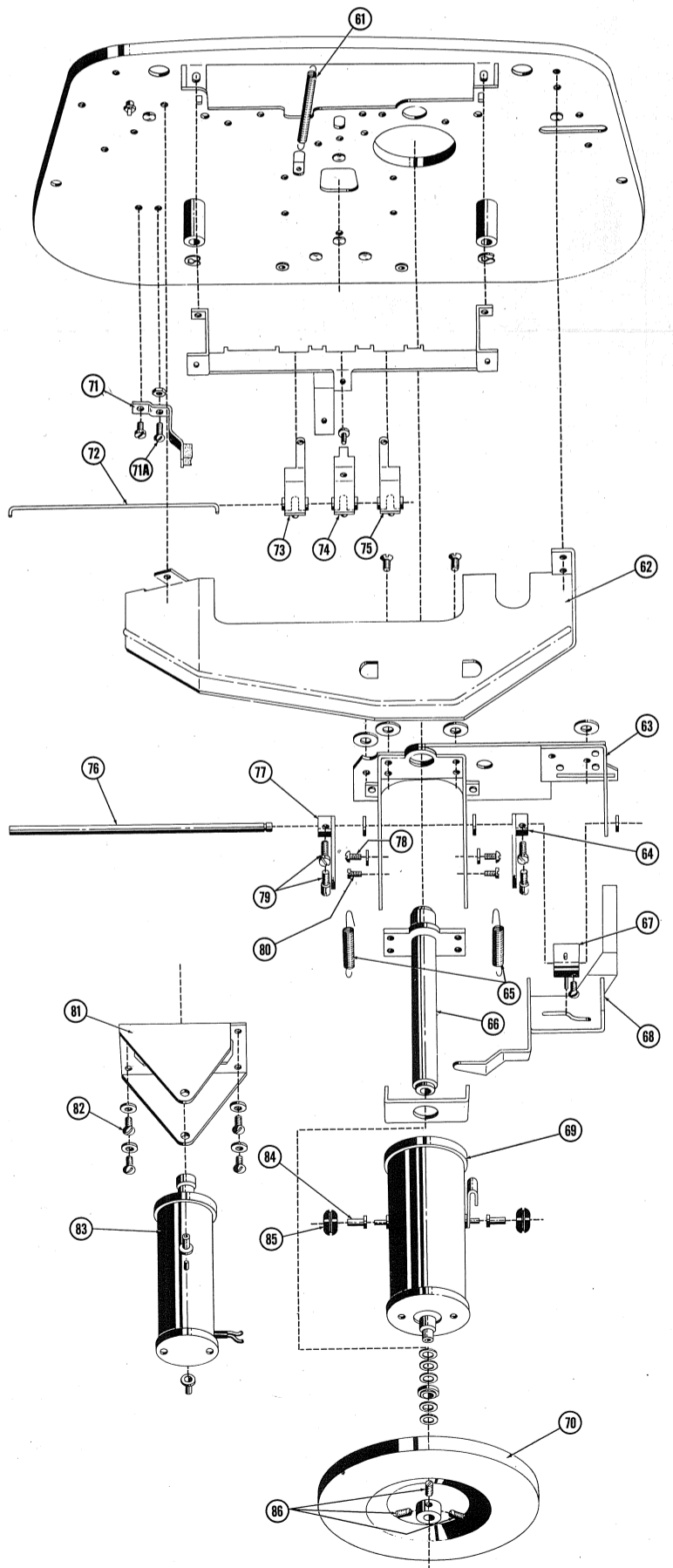
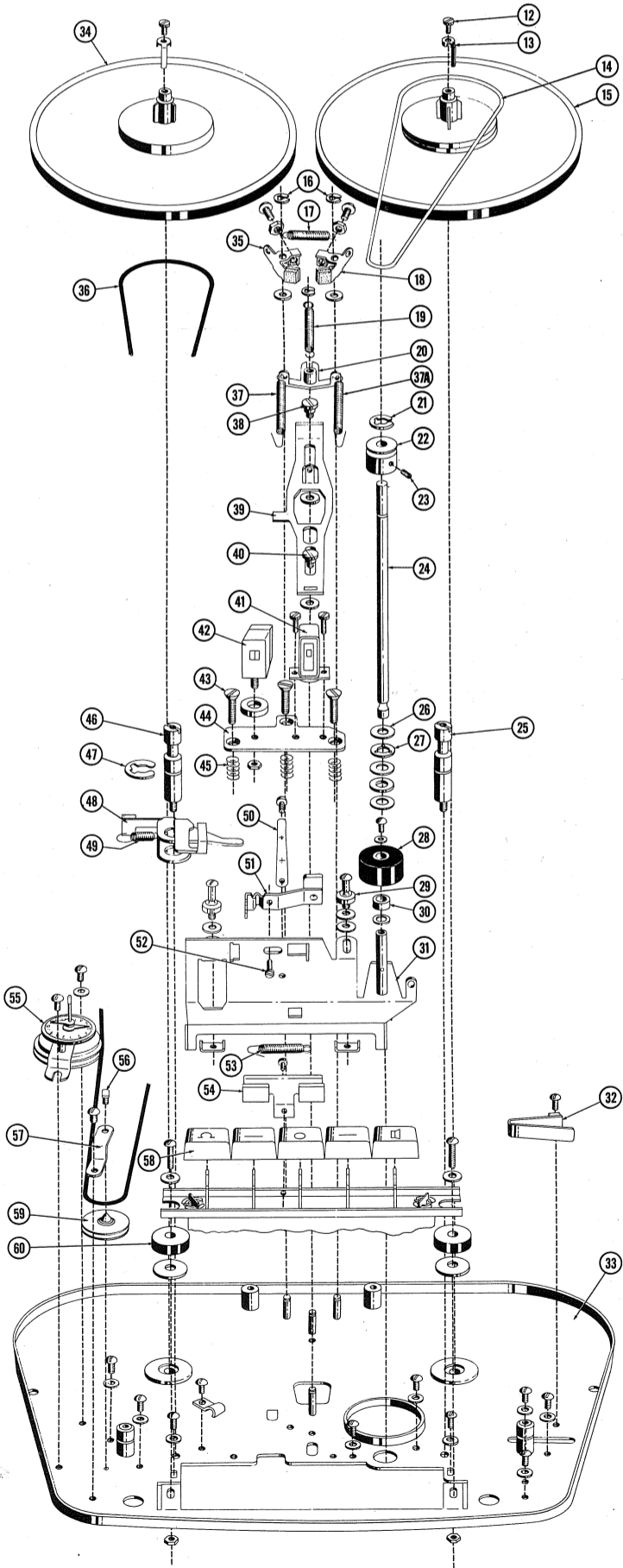
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

A PHOTOFACIT STANDARD NOTATION SCHEMATIC with CIRCUITRACE
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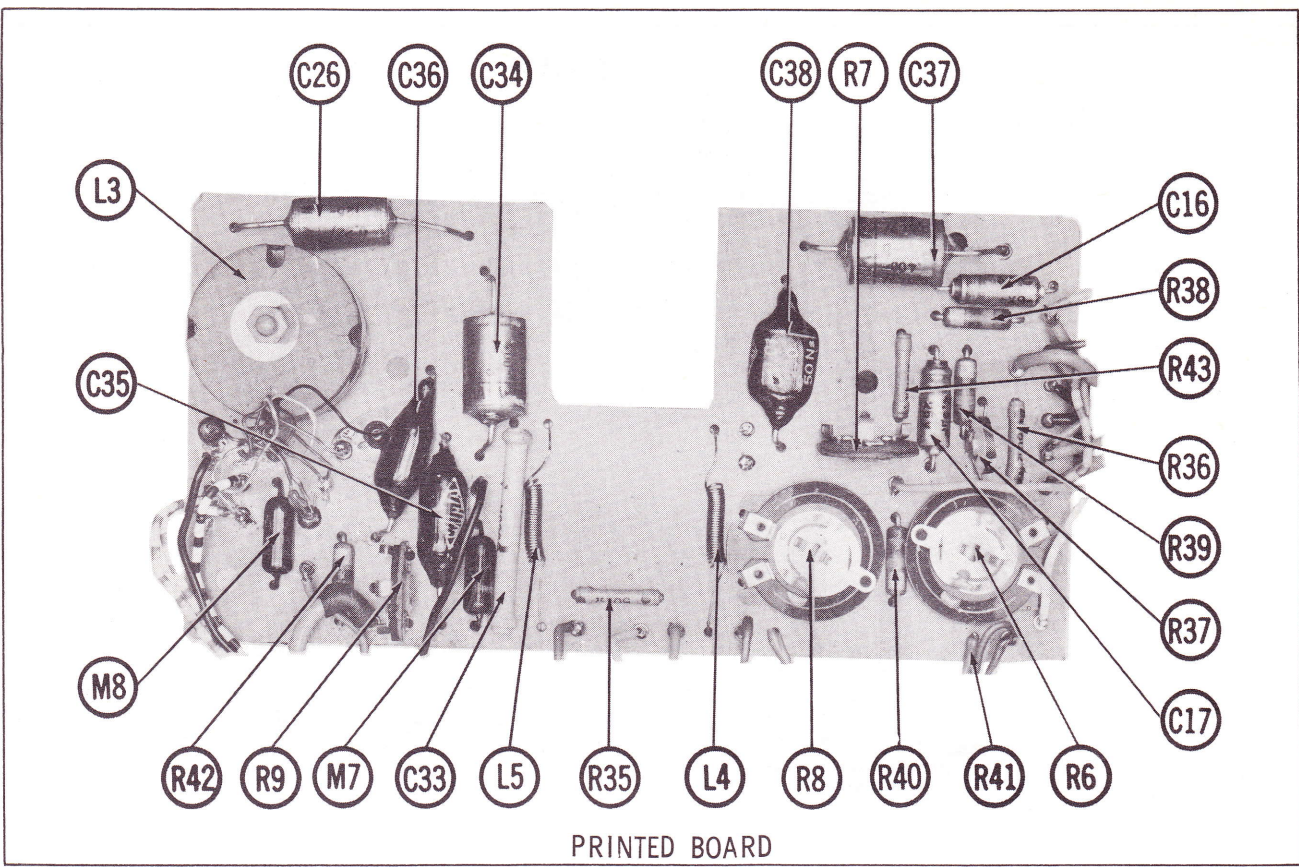




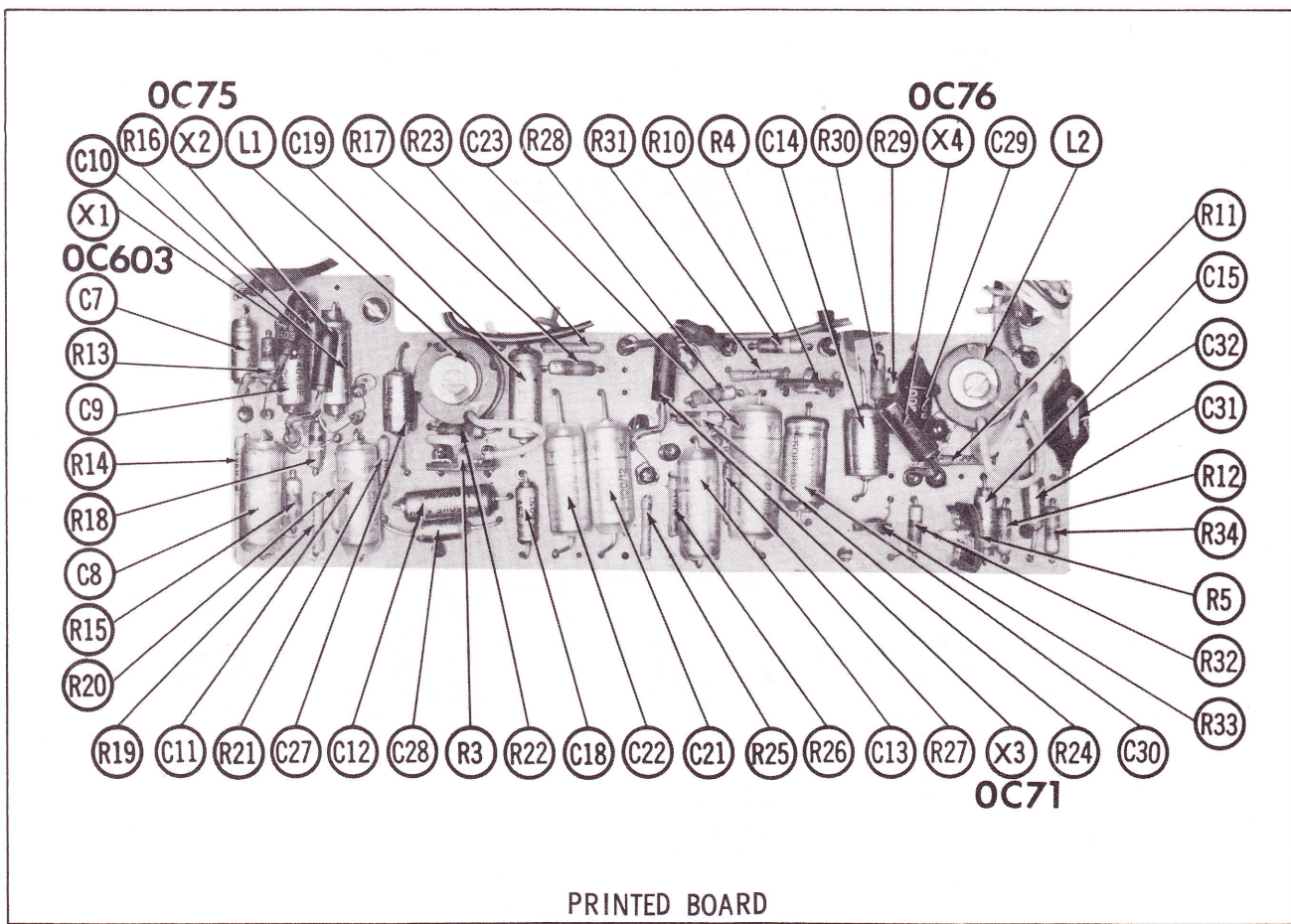
A PHOTOFAC "EXPLODED" VIEW
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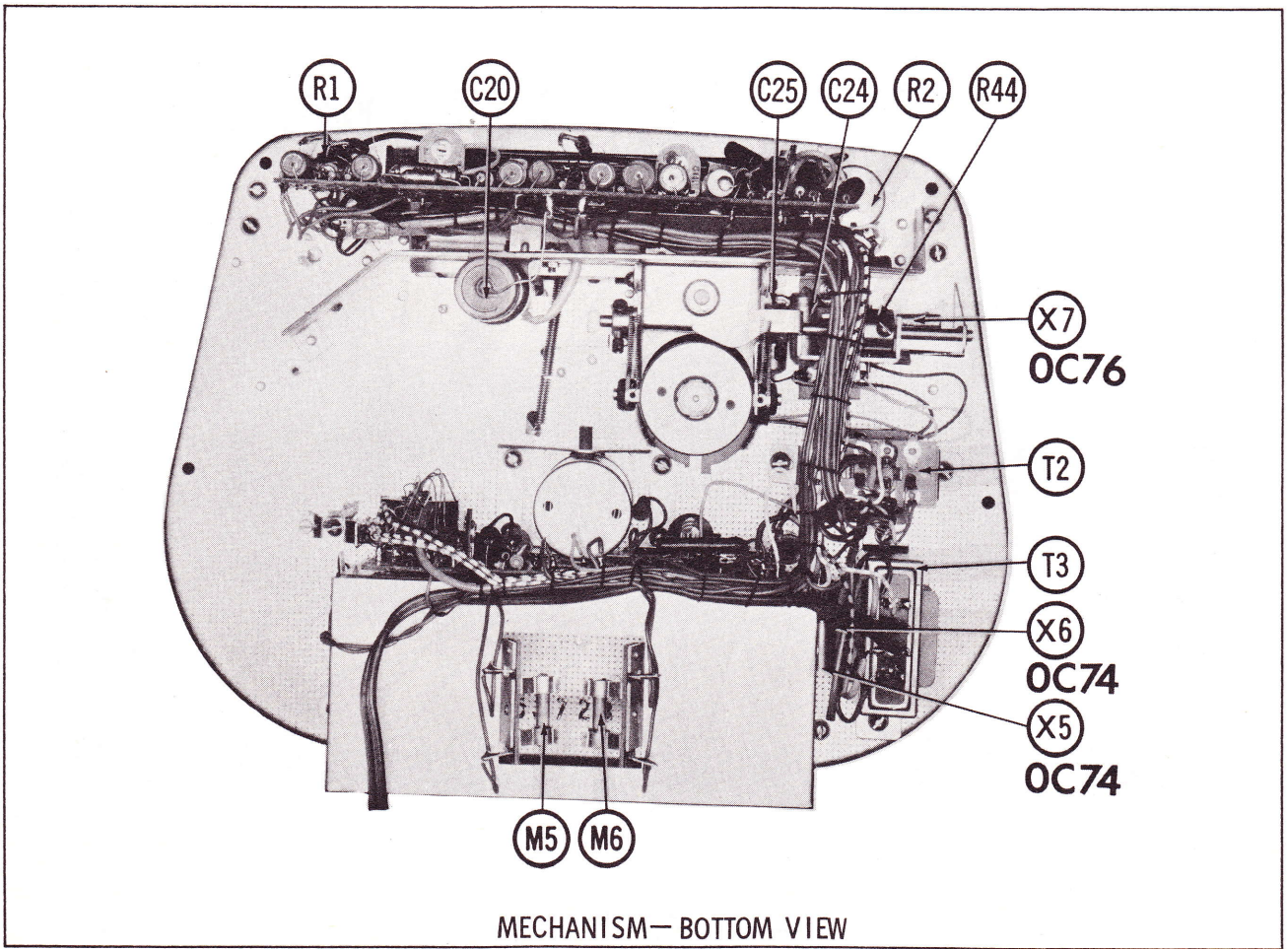
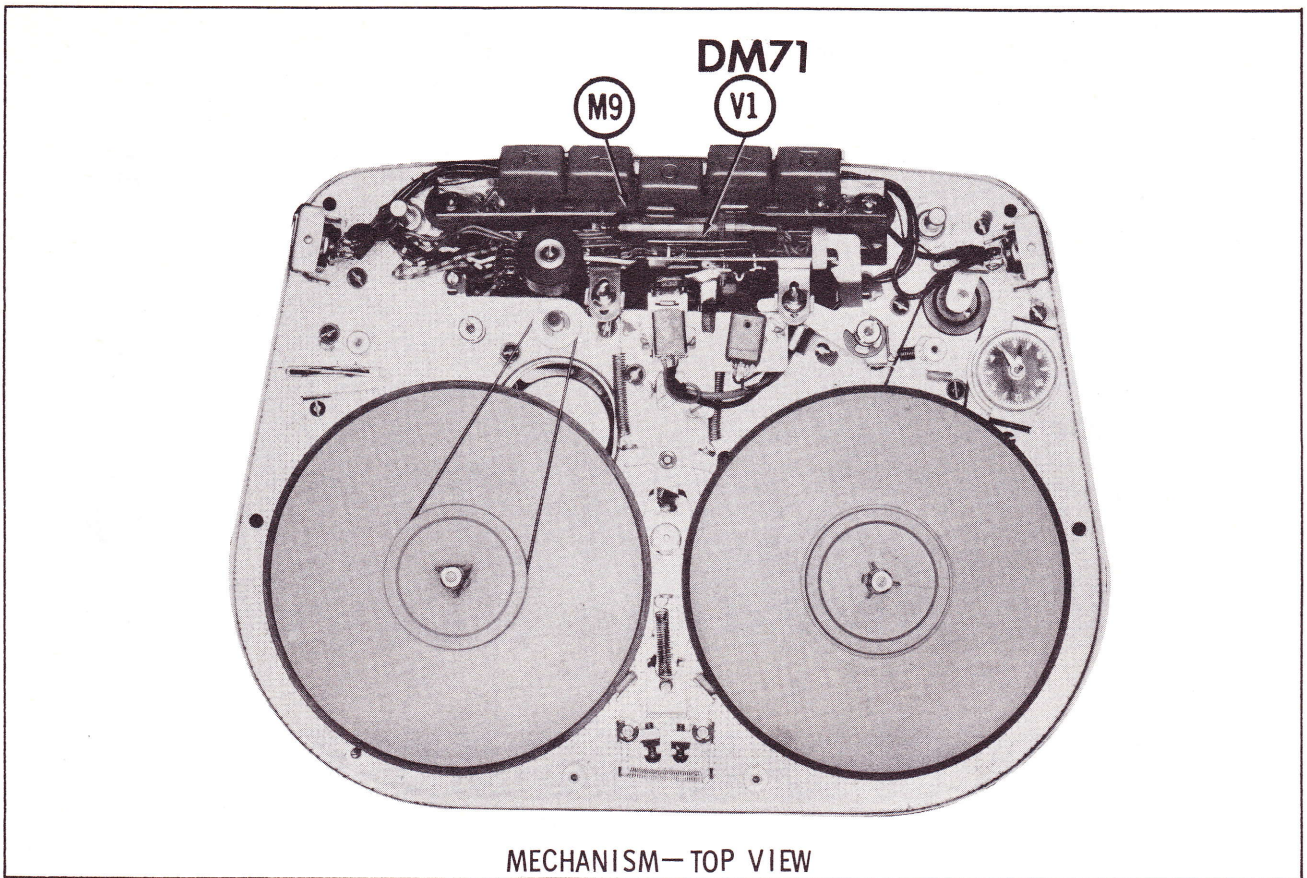
EXPLODED VIEWS OF MECHANISM



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ELECT. PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	GENERAL ELECTRIC		RAYTHEON		SYLVANIA	
	USE	TYPE	USE	TYPE	USE	TYPE
V1	Record Level Ind.	DM7L				

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA		NOTES
			RCA PART No.	RAYTHEON PART No.	
X1	OC603	AF Amplifier	2N406		PNP
X2	OC75	AF Amplifier	2N406		PNP
X3	OC71	AF Amplifier	2N406		PNP
X4	OC76	Driver	2N406	2N362	PNP
X5	OC74	Output-Bias Osc.	2N408		PNP
X6	OC74	Output-Bias Osc.	2N408		PNP
X7	OC76	Motor Regulator	2N406		PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP. VOLT.	BUTOBA PART No.	REPLACEMENT DATA				SPRAGUE PART No.
			AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	
C1	1300 6		PTT64	NLW6-15	MTL-3	TT25X5	TE-1152
C2	1300 6		PTT68	NLW50-10	MTL-15	TT15X100	TE-1135
C3	1300 6		PTT29	NLW50-10	MTL-15	TT6X50	TE-1100
C4	1300 6		PTT68	NLW50-10	MTL-19	TT15X100	TE-1135
C5	1300 6		PTT29	NLW50-10	MTL-19	TT6X50	TE-1100
C6	5 15		PTT68	NLW50-15	MTL-16	TT15X100	TE-1135
C7	5 15		PTT68	NLW5-25	MTL-3	TT25X5	TE-1160
C8	5 15		PTT68	NLW5-25	MTL-3	TT150X3	TE-1201.1
C9	5 15		PTT68	NLW5-25	MTL-3	TT150X3	TE-1201.1
C10	5 15		PTT68	NLW25-15	MTL-10	TC28	TE-1157-1
C11	5 15		PTT68	NLW25-15	MTL-10	TC28	TE-1133
C12	5 15		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C13	5 15		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C14	5 15		PTT68	NLW250-12	MTL-25	TC50025	TE-1138
C15	5 15		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C16	2.5 25		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C17	2.5 25		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C18	2.5 25		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C19	2.5 25		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C20	100 12		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C21	100 12		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C22	250 12		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C23	250 12		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C24	100 12		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135
C25	100 12		PTT68	NLW100-12	MTL-19	TT15X100	TE-1135

FIXED CAPACITORS

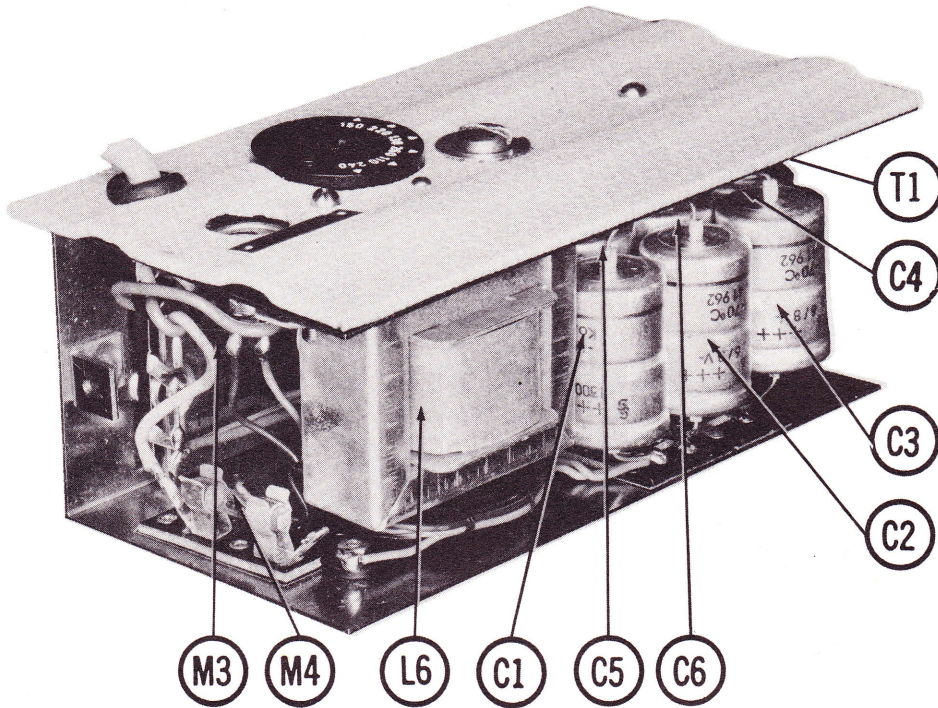
ITEM No.	RATING	REMARKS	REPLACEMENT DATA				SPRAGUE PART No.
			AEROVOX PART No.	CORNELL-DUBILIER PART No.	ELMOCO PART No.	MALLORY PART No.	
C26	.22 125V		P288N-22	CUB2P22	4DP-5-224	GEM-2022	2TM-P22
C27	.1 125V		P288N-1	CUB2P1	2DP-3-104	GEM-201	2TM-P10
C28	.0047 400V		P488N-0047	CUB6D47	6DP-1-472	GEM-6247	6TM-D47
C29	.0025 500V		P688N-0022	D6-252	DPM6SD25	GEM-6225	6TM-D25
C30	.047 400V		P488N-0047	DD-503	4DP-3-473	GEM-4147	4TM-S47
C31	.0047 400V		P688N-0047	D6-472	CUB6D47	GEM-6247	6TM-D47
C32	.0025 500V		P688N-0022	D6-252	DPM6SD25	GEM-6225	6TM-D25
C33	500 N750 10%		P488N-047	DD-503	4DP-3-473	GEM-4147	4TM-S47
C34	.047 400V		P488N-025	CUB6SD25	4DP-2-253	GEM-4125	4TM-S25
C35	.025 250V		P488N-01	D6-103	4DP-1-103	GEM-411	4TM-P10
C36	.01 250V		P488N-047	DD-503	4DP-3-473	GEM-4147	4TM-S47
C37	.047 400V		P488N-01	D6-103	4DP-1-103	GEM-411	4TM-P10
C38	.01 250V		P488N-01	D6-103	4DP-1-103	GEM-411	4TM-S10

FOLDER 6

BUTOBA MODEL

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POWER CHASSIS



CONTROLS

ITEM No.	RATING WATTS	REPLACEMENT DATA				INSTALLATION NOTES
		BUTOBA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	
R1	10K					Volume Tone Treble, Equalization Bias (OC76) Bias Equalization Output Bias Feedback Equalization Osc. Current Record Bias
R2	10K		B-15			
R3	10K					
R4	10K					
R5	10K					
R6	2500Q					
R7	10K					
R8	1000Q					
R9	10K					

ELECT. PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

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

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN TV PART No.	REMARKS			IRC PART No.	WORKMAN TV PART No.	REMARKS
R10	100K				R28	500Ω			
R11	200Ω				R29	5600Ω			
R12	1800Ω				R30	5600Ω			
R13	100K				R31	7800Ω			
R14	15K				R32	1000Ω			
R15	1800Ω				R33	Thermistor			
R16	7800Ω				R34	5600Ω			
R17	1800Ω				R35	50K			
R18	100K				R36	50Ω			
R19	50K				R37	Thermistor			
R20	1000Ω				R38	1800Ω			
R21	200Ω				R39	1800Ω			
R22	1800Ω				R40	12K			
R23	1000Ω				R41	40 1W			
R24	100K				R42	5600Ω			
R25	50K				R43	25K			
R26	200Ω				R44	500Ω			
R27	200Ω								

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		BUTOBA PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	Workman TV PART No.	
L1	Equalizing						
L2	Equalizing						
L3	Osc.						
L4	RF Choke						
L5	RF Choke						

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 C ₀)	BUTOBA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
L6	.200A	1.4Ω	70 MH						

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	BUTOBA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	260V Tap @ 240V, 220V, 150V, 130V, 110V, 117V @ 1A (110V Tap)	6V @ .350A							

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	BUTOBA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	2.8	1						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA					NOTES
		BUTOBA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T3	70Ω CT Tap @ 3-4Ω CT						

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	BUTOBA PART No.	QUAM PART No.	
SP1	5" x 7"	PM	3-4Ω	LP1318/19/100AF2LA225	57A1	

BATTERIES

ITEM No.	VOLTAGE	BUTOBA PART No.	REPLACEMENT DATA				NOTES		
			BURGESS "A"	BURGESS "B"	EVEREADY "A"	EVEREADY "B"		MALLORY "A"	MALLORY "B"
M1	1.5V			230		A100		M-13R	4 Required (Motor)
M2	1.5V			230		A100		M-13R	4 Required (Amp.)

POWER RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA			NOTES
		BUTOBA PART No.	RCA PART No.	SARKES TARZIAN PART No.	
M3	.25A	*	1N1763 †	F6 †	* Selenium † Silicon

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA						
			BUTOBA PART No.		LITTELFUSE PART No.		BUSS PART No.		
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER	
M4		2/10A 250V	*						
M5		5/10A 250V	†						
M6		8/10A 250V	‡						

* AC Input, AC Converter.
 † DC Input to Amp.
 ‡ DC Input to Motor.

SIGNAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		BUTOBA PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	
M7	OA81			1N295	Indicator Rect.
M8	OA81			1N295	Indicator Rect.

MISCELLANEOUS

ITEM No.	PART NAME	BUTOBA PART No.	NOTES
M 9	Switch		Function Selector (Pushbutton Type)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401

MECHANICAL PARTS LIST

Ref. No.	Description	Ref. No.	Description
1	Cover Plate for Tape Deck	44	Head Mounting Plate
2	Speed Control Knob	45	Spring
3	Set Screw	46	Tape Guide (Left Side)
4	Screw, Cover Plate	47	"E" Ring
5	Screw, Head Cover	48	Start Lever
6	Head Cover	49	Start Lever Spring
7	Cover Plate for Pushbuttons	50	Tape Release
8	Tone and Volume Control Knobs	51	Pressure Lever Pad Assembly
9	Set Screw	52	Screw
10	Nut	53	Spring
11	Tape Counter Knob	54	Eye Tube Holder
12	Screw	55	Tape Counter Clock
13	Reel Clips	56	Set Screw
14	Take-up Spring Belt	57	Counter Pulley Bracket
15	Take-up Spindle	58	Pushbutton Assembly
16	"E" Ring	59	Counter Pulley
17	Spring	60	Rubber Spacer
18	Brake Lever, Right	61	Spring
19	Spring	62	
20	Reverse and Fast Forward Lever	63	Motor Mounting Plate
21	"E" Ring	64	Motor Bracket
22	Take-up Drive Pulley	65	Spring
23	Set Screw	66	Guide Tube for Capstan Shaft
24	Capstan and Shaft	67	Speed Switching Cam
25	Tape Guide (Right Side)	68	Speed Switching Lever
26	Washer	69	Tape Drive Motor
27	Ball Bearing Assembly	70	Flywheel
28	Pressure Roller	71	Supply Reel Brake
29	Tape Guide (Small)	71A	Screw
30	Spacer	72	Pushbutton Lever Shaft
31	Capstan Pressure Plate	73	Rewind Lever
32	Speed Control Tension Spring	74	Stop Lever
33	Tape Deck	75	Forward Lever
34	Rewind Spindle	76	Speed Control Lever Shaft
35	Brake Lever, Left	77	Motor Bracket
36	Tape Counter Belt	78	Screw
37	Rewind Spring	79	Set Screw
37A	Take-up Spring	80	Screw
38	Guide Screw for Stoprail	81	Forward-Rewind Motor Bracket
39	Stoprail	82	Screw
40	Guide Screw for Stoprail	83	Forward-Rewind Motor
41	Record Head	84	Rubber Sleeve
42	Erase Head	85	Rubber Grommet
43	Screw	86	Set Screw

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