

# PHOTOFACT<sup>®</sup> with

# CIRCUITRACE<sup>®</sup>

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 connecting a microphone and an external speaker.

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

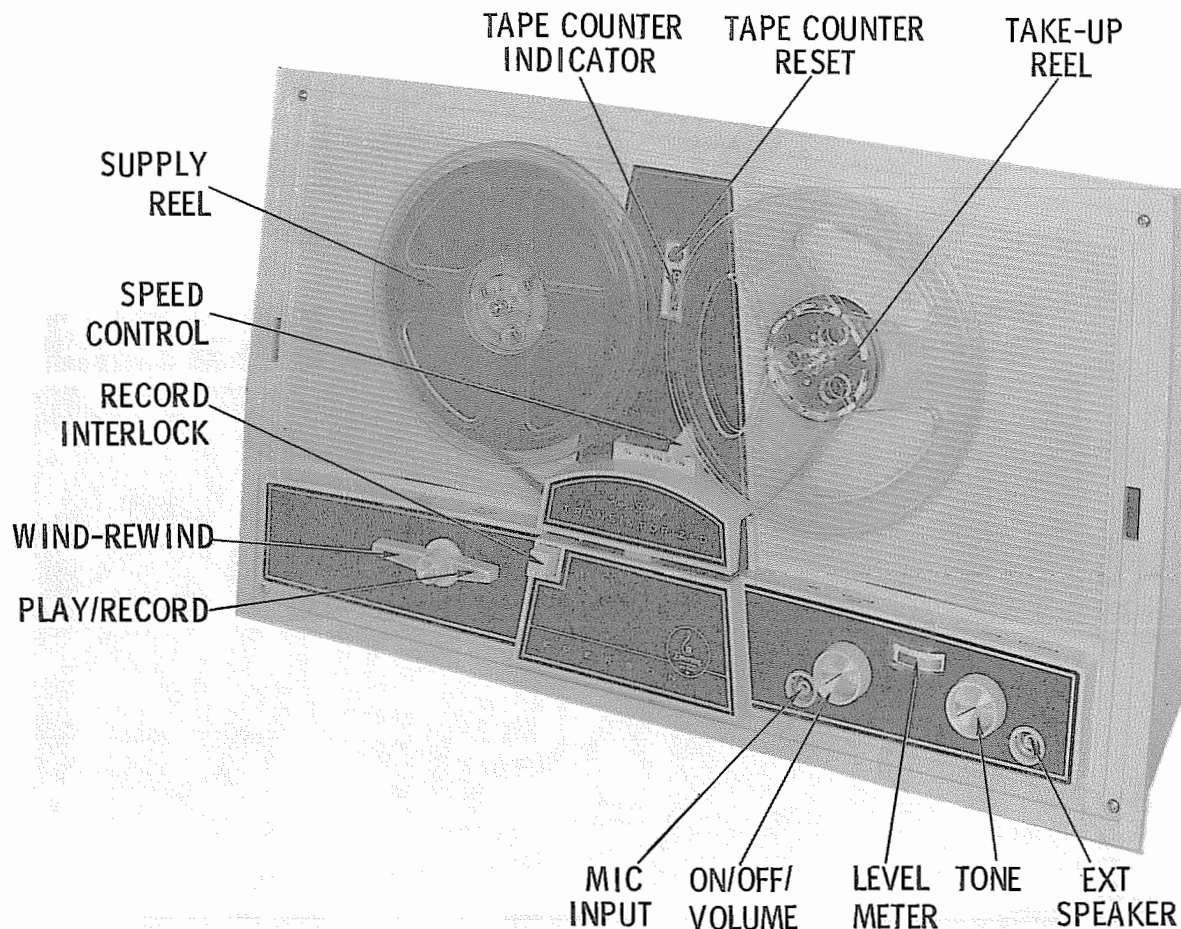
TRADE NAME: Emerson Models MM-314, MM-316, MM-317, MM-514, MM-516, MM-517

SUPPLIER: For Current Address, see Annual Index

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

POWER SUPPLY: 110 - 120 Volts AC, 60 Cycles

RATING: 38 Watts, .56 Amp. @ 117VAC



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

© 1966 Howard W. Sams & Co., Inc. Printed in U. S. of America

C806

# OPERATING INSTRUCTIONS

## Recording

1. Thread the tape, select the speed, and connect the recording source.
2. Press the Record button and hold while turning the Record/Play Lever to Record.
3. Adjust the recording level.
4. After recording track 1, reverse and invert the reels and repeat steps 1 through 3.

## Play

1. Select the speed and thread the tape.
2. Turn the Record/Play Lever to Play and adjust the volume as desired.
3. After playing the first track, reverse and invert the reels and repeat steps 1 and 2.

## DISASSEMBLY

1. Remove the head cover.
2. Remove five control knobs.
3. Remove five Phillips screws and two studs from the case top holding the deck cover.
4. Remove three hex screws from the upper rear of the case.
5. Remove five hex screws from the lower rear of the case holding the chassis in the case.

## SEQUENCE OF OPERATION

### Fast Forward (Wind)

Turning Fast Forward/Rewind Function Arm Assembly (55) clockwise pulls Fast Forward Rewind Cam Plate (44) to the right. Right Brake Assembly (42) and Left Brake Assembly (57) pivot as the rollers on the brake assemblies ride against the cutout in Fast Forward/Rewind Cam Plate (44), thus releasing the brakes.

Fast Forward Arm Assembly (40) is pulled into the cutout in Fast Forward/Rewind Cam Plate (44) by Rewind Spring (18), removing the slack in Take-up Belt (2) so Motor Pulley (9) can drive Take-up Spindle (6). Fast Forward/Rewind Detent Arm Assembly (51) pivots and locks Record/Play Cam Plate (41) in the Idle position.

### Rewind

Turning Fast Forward/Rewind Function Arm Assembly (55) counterclockwise pulls Fast Forward/Rewind Cam Plate (44) to the left. Right Brake Assembly (42) and Left Brake Assembly (57) pivot as the rollers on the brake assemblies ride against the cutout in Fast Forward/Rewind Cam Plate (44), thus releasing the brakes. Rewind Arm Assembly (38) is pulled into the cutout in Fast Forward/Rewind Cam Plate (44) by Rewind Spring (18) so Rewind Belt (1) can contact Motor Pulley (9) which drives Supply Spindle (5). Fast Forward/Rewind Detent Arm Assembly (51) pivots and locks Record/Play Cam Plate (41) in the Idle position.

### Play

Turning the Record/Play lever to Play causes

Record/Play Function Arm Assembly (56) to move Record/Play Cam Plate (41) to the right which forces the projections and cutouts on the cam to initiate the following actions:

1. Release the brakes.
2. Move Take-up Arm Assembly (39) toward Take-up Belt (2), putting tension on the belt and driving Take-up Spindle (6).
3. Release Pressure Roller Plate Assembly (33), allowing Pressure Roller (4) to move against Capstan Sleeve (31). Pressure Pad Assembly (29) also moves against the record/play head.

### Record

Pressing the Record Interlock not only positions the erase head magnet but also causes Switch Actuator Arm (50) to move the record/play switch to record position.

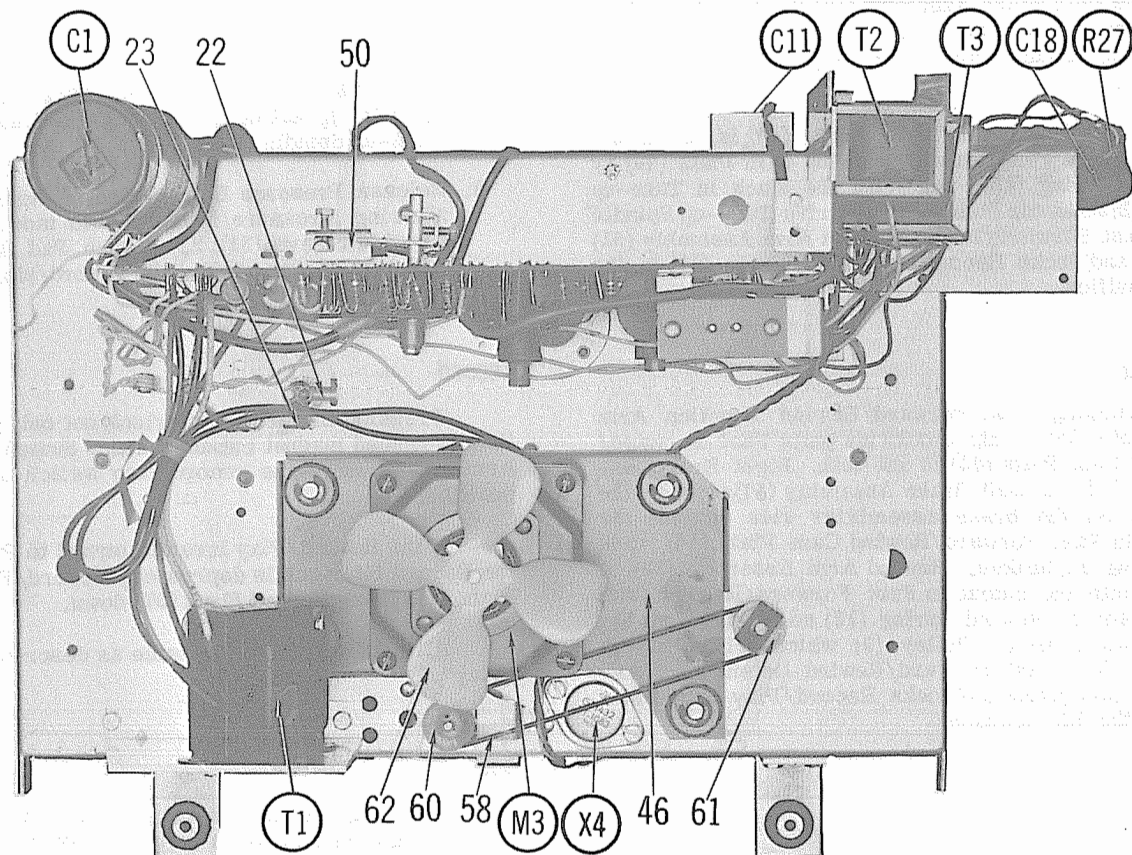
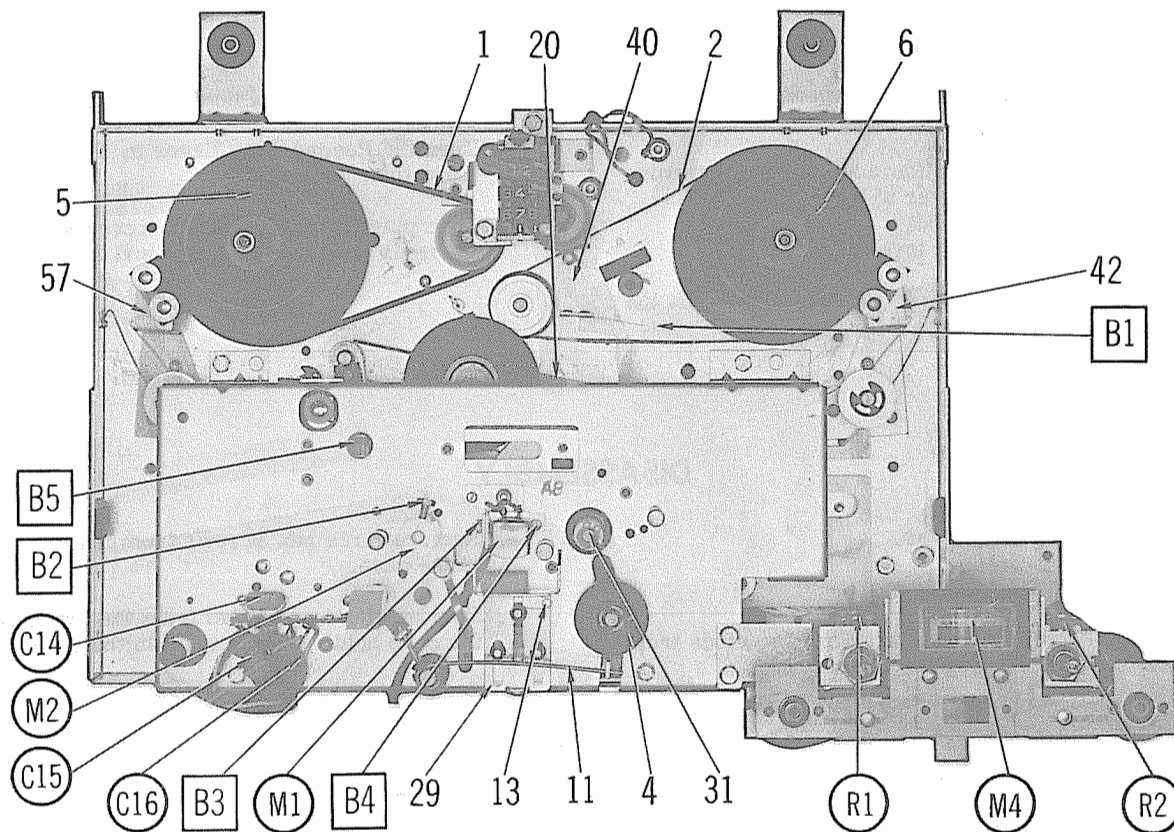
If the Record/Play lever is turned to Play while the Record Interlock is depressed, Record/Play Cam Plate (41) locks Record Shaft (37) down.

All other action is the same as described under "Play".

### Stop

Returning the Record/Play control or the Fast Forward/Rewind control to neutral position reverses the sequence of that control.

EMERSON MODELS MM-314/316/317/514/516/517



Refer to "General Servicing Information" on page 4.

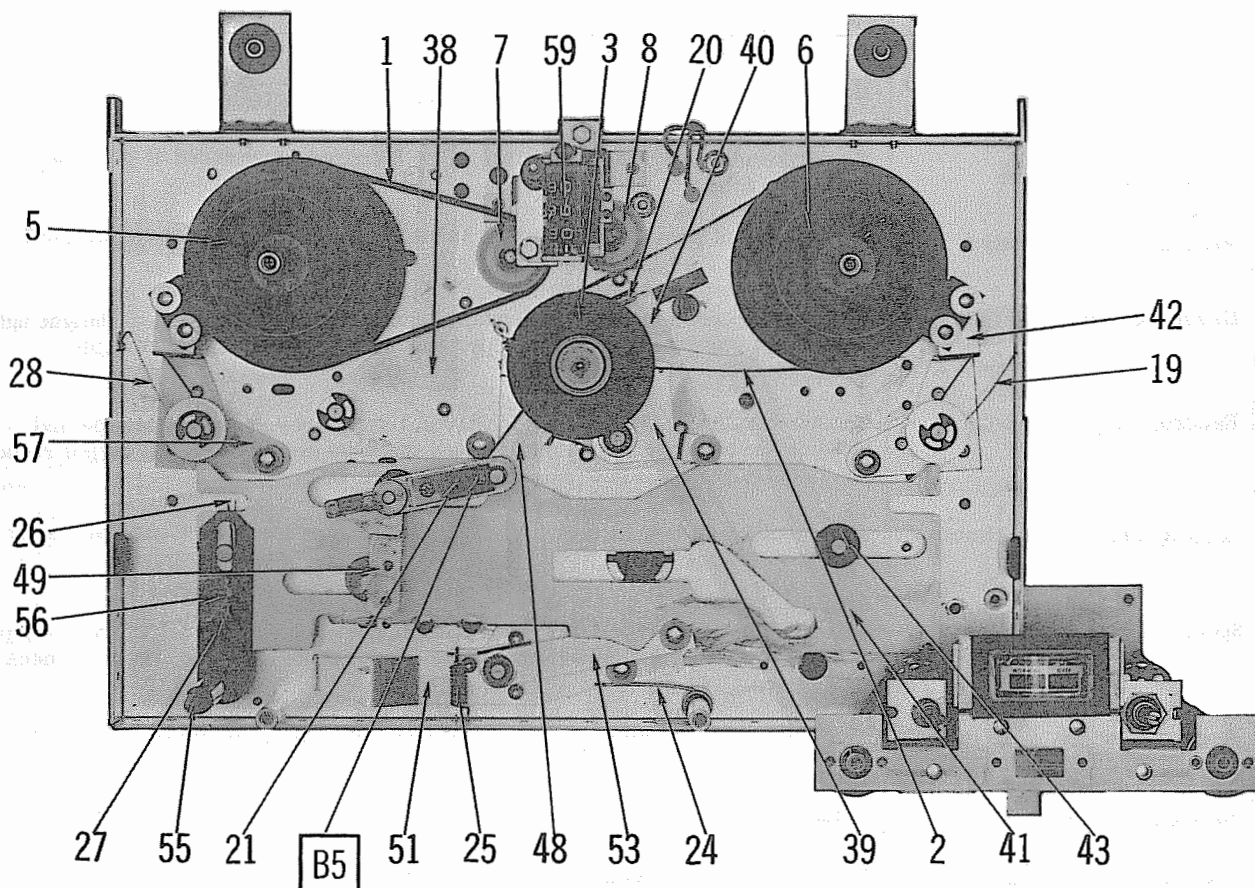
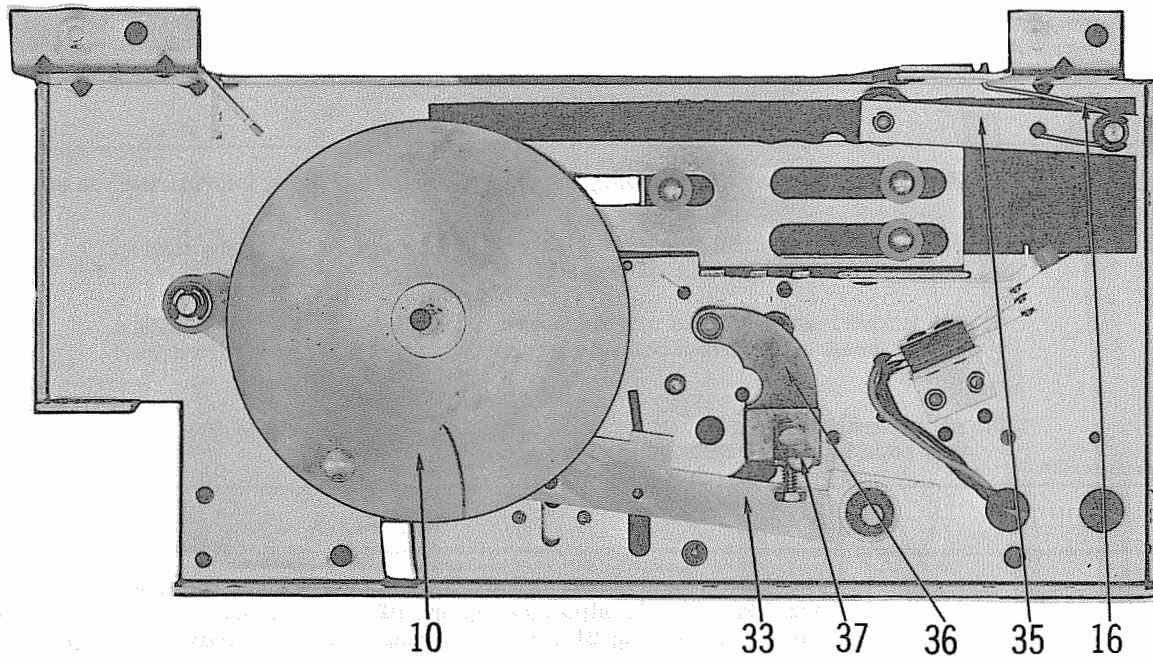
## ADJUSTMENTS

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

1. All voltage measurements are made at a tape speed of 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.

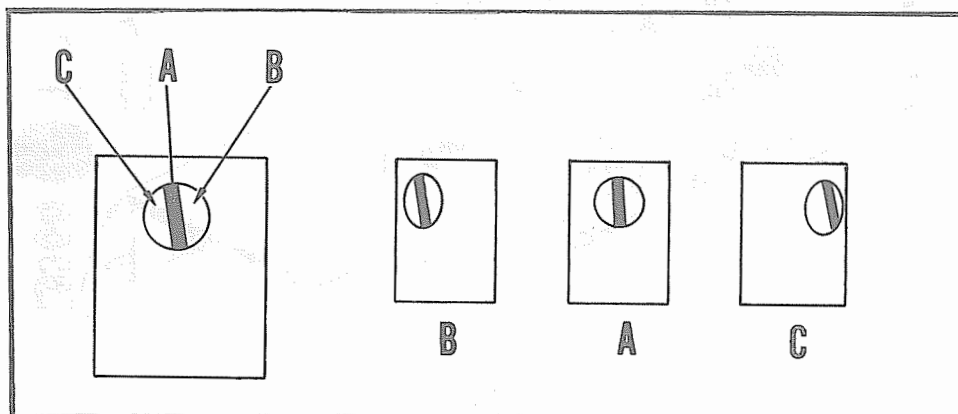
ADJUST	REMARKS
Play Take-up Torque	Nominal value 4 ounces. If too much tape stack occurs between the capstan and take-up reel, adjust leaf spring B2 for more pressure against Take-up Belt (2) by bending B1 spring mounting bracket slightly clockwise.
Fast Forward Take-up Torque	No adjustment provided. Nominal value 5 ounces.
Rewind Torque	No adjustment provided. Nominal value 8 ounces.
Supply Reel Drag	Dependent upon reel weight.
Take-up Reel Drag	Dependent upon reel weight.
Pressure Roller Pressure	No adjustment provided. Nominal value 18 ounces.
Brake Shoe Pressure	No adjustment provided. Nominal value 8 ounces, measured at point of contact in Stop.
Pressure Pad Pressure	No adjustment provided. Nominal value 2 1/2 ounces, measured at point of contact.
Erase Head Height	With the recorder in Record, loosen B2 and adjust the erase head height until the magnet gap just covers the upper half of a normally threaded tape. Retighten B2.
Record/ Play Head Height	Loosen head mounting nuts B3. Play a 2-frequency, height test tape and monitor the appropriate output. Adjust the head height for equal output voltage for each frequency. Retighten mounting nuts B3.
Record/ Play Head Azimuth	Play an azimuth test tape and monitor the appropriate output. Adjust B4 for maximum output voltage.
Speed Change Adjustment.	Adjust B5 so Idler Wheel (3) rests against the appropriate step of the 4-step motor pulley. Counterclockwise adjustment raises the Idler Wheel. Check each speed.
Record Bias	No adjustment provided. Nominal bias 18V rms (.62ma) across the record head.
Bias Oscillator	Adjust T3 for 70KC.
Record Level Indicator Calibration	No adjustment provided. Normal peak level should be indicated when the signal level at the record head is .12V rms with the bias oscillator disabled.





## ADJUSTMENTS (Continued)

ADJUST	REMARKS
Erase Head Contact Point	<ol style="list-style-type: none"> <li>1. Position the erase magnet so the tape rides against the full magnet surface as in "A" (Refer to the illustration below.) Make a microphone recording. Do not rewind the tape.</li> <li>2. Rotate the erase magnet slightly clockwise so the tape rides against surface "B". Make another recording, using the same record level. Do not rewind the tape.</li> <li>3. Rotate the erase magnet counterclockwise so the tape rides against surface "C". Make another recording using the same record level.</li> <li>4. Rewind the tape and play all three recordings. Reset the erase magnet to the position giving the highest recorded level.</li> <li>5. Rewind the tape and make another recording. Check the erase of the first recordings. If erasure is incomplete, turn the magnet surface slightly until complete erasure is obtained.</li> </ol>

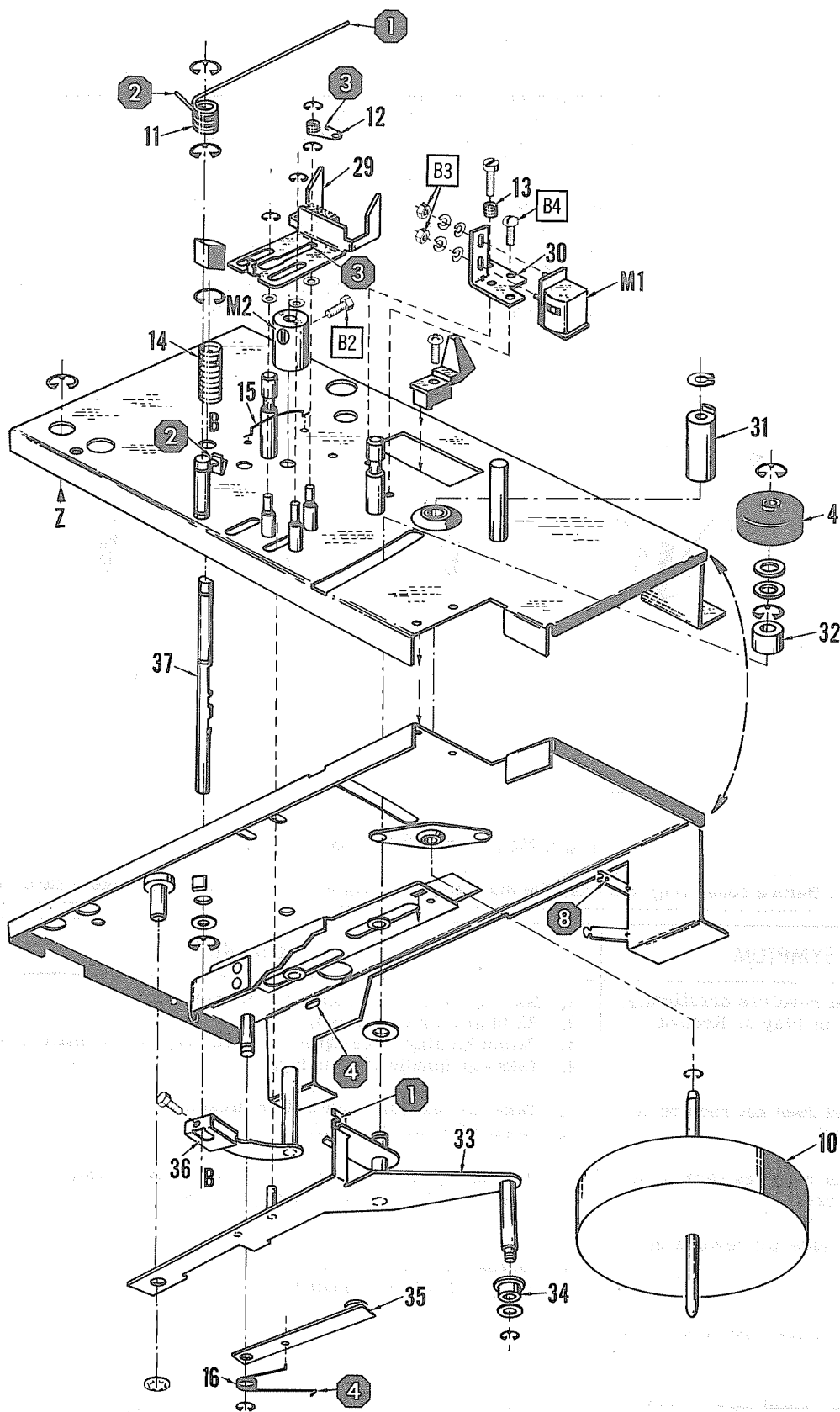


## TROUBLE CHART (Continued)

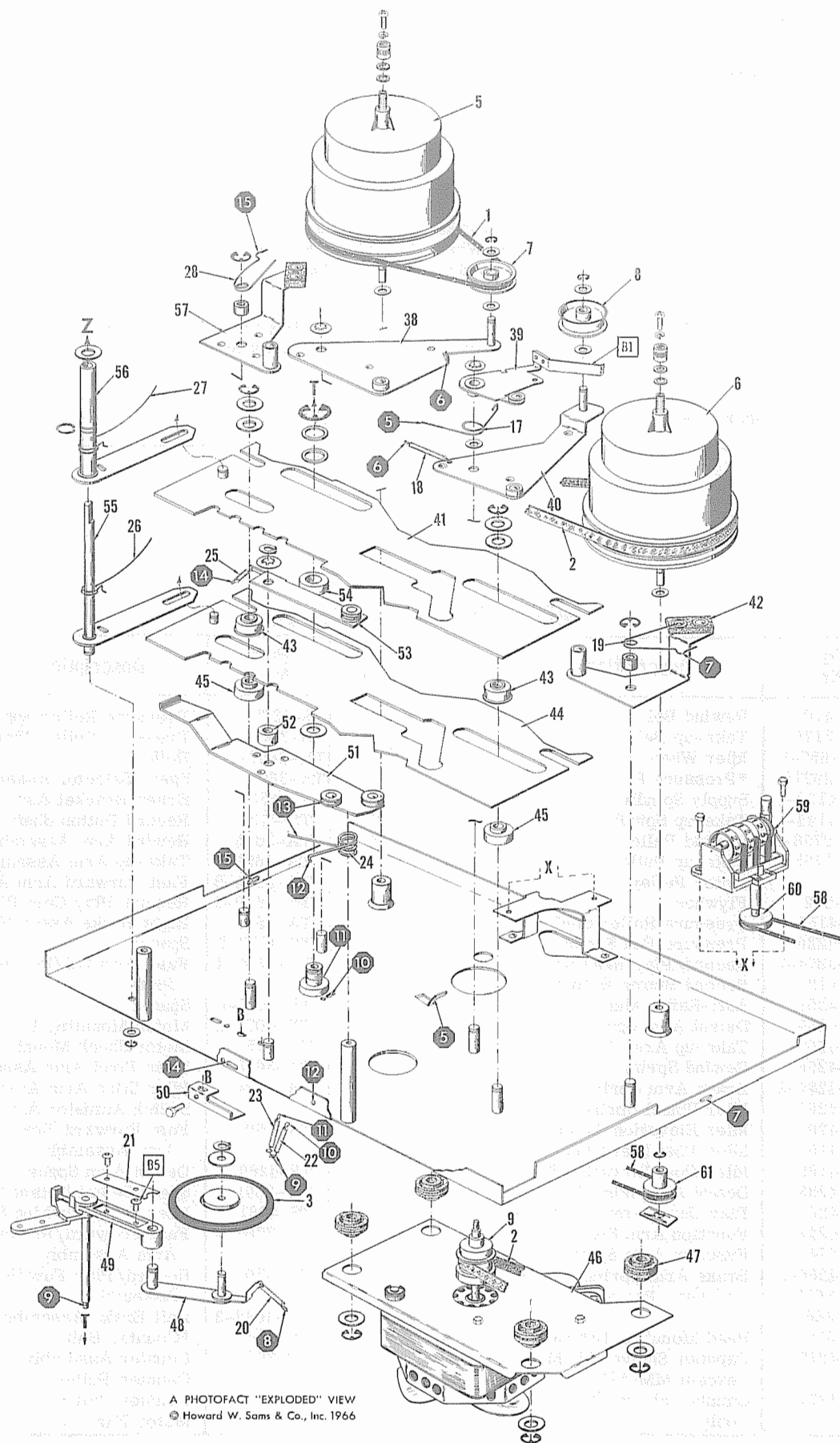
**IMPORTANT:** Before consulting this chart be sure all servicing procedures listed on page 4 have been followed.

SYMPTOM	REMARKS
Take-up reel revolves erratically, or not at all in Play or Record	<ol style="list-style-type: none"> <li>1. Take-up Belt (2) stretched or broken.</li> <li>2. B2 improperly adjusted.</li> <li>3. Palnut holding Take-up Arm Assembly (39) to shaft is too tight.</li> <li>4. Take-up Spindle (6) binding.</li> </ol>
Take-up reel does not revolve in Fast Forward.	<ol style="list-style-type: none"> <li>1. Take-up Belt (2) stretched or broken.</li> <li>2. Rewind Spring (18) weak.</li> </ol>
Take-up reel revolves rapidly in Play or Record.	<ol style="list-style-type: none"> <li>1. Pressure Roller Spring (11) not properly seated.</li> <li>2. Pressure Roller Shaft binding in slot.</li> </ol>
Supply reel does not revolve in Rewind.	<ol style="list-style-type: none"> <li>1. Rewind Belt (1) loose or broken.</li> <li>2. Rewind Spring (18) weak.</li> <li>3. Supply Spindle (5) binding.</li> </ol>
Supply reel spills tape in forward positions.	<ol style="list-style-type: none"> <li>1. Left Brake Shoe worn.</li> <li>2. Brake Spring (28) weak or not seated properly.</li> </ol>
Take-up reel spills tape in Rewind.	<ol style="list-style-type: none"> <li>1. Right Brake Shoe worn.</li> <li>2. Brake Spring (19) weak or not seated properly.</li> </ol>
Reels do not stop immediately when Play/Record Selector is moved to Stop.	<ol style="list-style-type: none"> <li>1. Brake Shoes worn.</li> <li>2. Brake Springs (19, 28) weak or not seated properly.</li> </ol>

EMERSON MODELS MM-314/316/317/514/516/517



A PHOTOFACT "EXPLODED" VIEW  
 © Howard W. Sams & Co., Inc. 1966



A PHOTOFACT "EXPLODED" VIEW  
© Howard W. Sams & Co., Inc. 1966



# TROUBLE CHART (Continued)

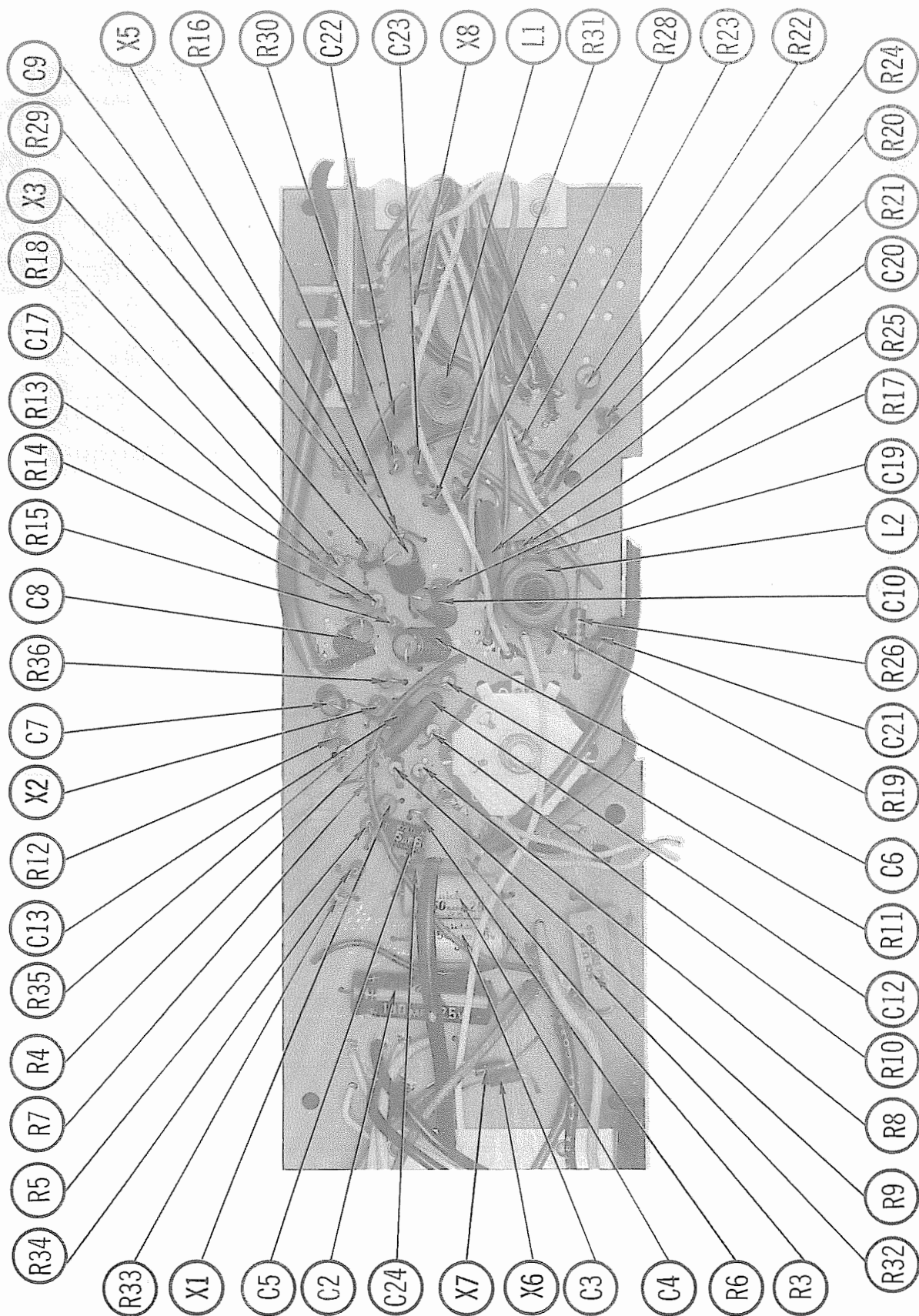
SYMPTOM	REMARKS
Capstan does not rotate in Play or Record.	1. Idler Wheel Spring (20) weak or broken. 2. Flywheel bearing binding.
Tape rides up and down between capstan and pressure roller.	1. Pressure Roller (4) worn or dirty. 2. Pressure Roller Shaft out of line.
Wow or Flutter.	1. Left Brake (57) dragging. 2. Idler Wheel (3) dirty or worn. 3. Supply Spindle (5) binding.
Sound is weak or distorted.	1. Record/Play Head (M1) dirty, misaligned or defective. 2. Pressure Pad Spring (12) weak or broken.
Erase weak or inoperative.	1. Erase Head (M2) misaligned.

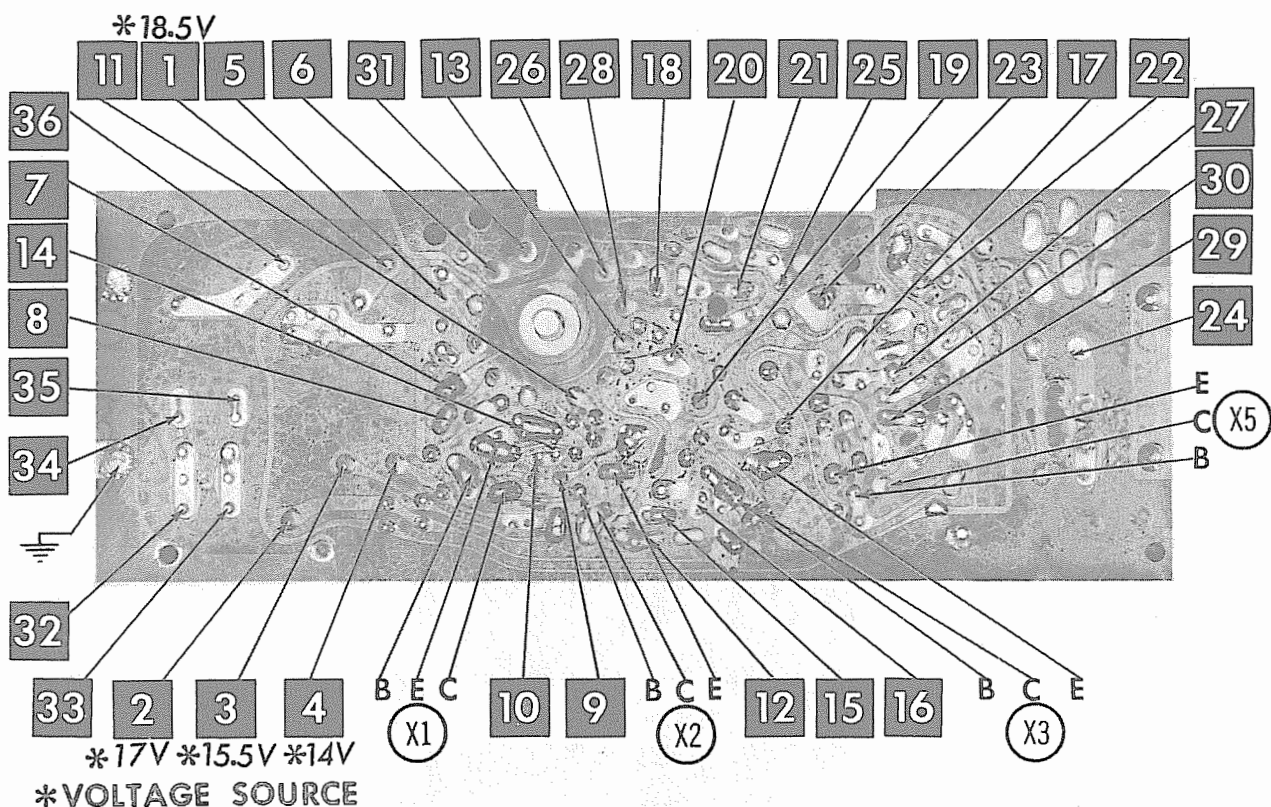
## MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	TB-4101	Rewind Belt	32	TS-4277	Pressure Roller Spacer
2	TB-3179	Take-up Belt	33	TA-3689-1	Pressure Roller Plate Ass'y.
3	TW-657-1	Idler Wheel	34	TR-2842-1	Roller
4*	TR-2921*	*Pressure Roller	35	TA-3693	Speed Selector Assembly Detent
5	TS-4128-1	Supply Spindle	36	TA-3633	Erase Bracket Assembly
6	TS-4144-1	Take-up Spindle	37	TS-4135	Record Button Shaft
7	TP-1756-1	Rewind Pulley	38	TA-3695	Rewind Arm Assembly
8	TP-1755	Take-up Pulley	39	TA-3692	Take-up Arm Assembly
9		Motor Pulley	40	TA-3694-2	Fast Forward Arm Assembly
10	TF-512	Flywheel	41	TA-3649-2	Record/Play Cam Plate
11	TS-4155	Pressure Roller Spring	42	TA-3559	Right Brake Assembly
12	TS-4226	Pressure Pad Spring	43	TS-4117-3	Spacer
13	TS-3874-1	Record/Play Head Spring	44	TA-3649-1	Fast Forward/Rewind Cam Plate
14	TS-4123	Record Button Return Spring	45	TS-4117-1	Spacer
15	TS-4268	Anti-Rattle Magnet Spring	46	TB-4072-1	Motor Mounting Bracket
16	TS-4159	Detent Arm Speed Change Spr.	47	TG-475	Motor Shock Mounts
17	TS-4263	Take-up Arm Assembly Spring	48	TA-3678	Idler Pivot Arm Assembly
18	TS-4256	Rewind Spring	49	TA-3634	Idler Slide Arm Assembly
19	TS-4264-2	Brake Arm Spring, Take-up	50		Switch Actuator Arm
20	TS-4267	Idler Wheel Spring	51	TA-3690	Fast Forward/Rewind Detent Arm Assembly
21	TS-4296	Idler Elevation Spring	52	TS-4260	Detent Arm Spacer
22	TS-4168	Idler Post Elevation Spring	53	TA-3691	Speed Select Detent Arm Ass'y.
23	TS-4168	Idler Post Elevation Spring	54	TS-4261	Idler Pivot Bushing Spacer
24	TS-4233	Detent Arm Wind/Rewind Spring	55	TA-3703	Fast Forward/Rewind Function Arm Assembly
25	TS-4208	Play Cam Detent Arm Spring	56	TA-3704	Record/Play Function Arm Assembly
26	TS-4242	Function Arm Spring	57	TA-3688-2	Left Brake Assembly
27	TS-4241	Function Arm Spring	58*	TB-4102*	*Counter Belt
28	TS-4264-2	Brake Arm Spring, Rewind	59	TC-3023	Counter Assembly
29	TA-3673 or TA-3669	Pressure Pad Assembly	60		Counter Pulley
30	TB-3171	Head Mounting Bracket	61	TP-1758	Counter Pulley
31	TS-4272	Capstan Sleeve (All Models except MM-513)	62		Motor Fan
	TS-4271	Capstan Sleeve (Model MM-513 only)			

\* Pressure Roller — WALSCO Part #1482-04

\* Counter Belt — WALSCO Part #1410-62





A Howard W. Sams **CIRCUITRACE** Photo

## 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.	RCA PART No.	
X1	TT-1097	AF Amp.	DS-46	GE-10		NPN
X2	TT-1097	AF Amp.	DS-46	GE-10		NPN
X3	TT-1097	Driver	DS-46	GE-10		NPN
X4	TT-1083	Output	DS-520	GE-3		PNP (Note 1)
X5	TT-1097	Bias Oscillator	DS-46	GE-10		NPN

Note 1. When replacing, apply silicone grease to both sides of insulator. Tighten mounting screws securely. Check bias adjustment when used.

### POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	MEASURED CURRENT	ORIGINAL Part or Type No.	RECTIFIERS & DIODES		RECTIFIERS		
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	MALLORY PART No.	RCA PART No.	SARKES TARZIAN PART No.
X6	.330A	TR-2880	1N1693	5A4D-C or SD500-C	1N3193 or 1N1488	SK-3016 or SK-3017	F4 or 40C
X7	.330A	TR-2880	1N1693	5A4D-C or SD500-C	1N3193 or 1N1488	SK-3016 or SK-3017	F4 or 40C
X8		TD-441 ①	1N34AS	1N60			

① Models MM-317, 517 only.

# PARTS LIST AND DESCRIPTION (CONTINUED)

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

## ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA					
	CAP.	VOLT.	Emerson PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	1000	30	TC-2965					
B	3000	30						
C2	100	25	TC-2937	CRE626A	NLW100-25	MT1-20	TT25X100	TE-1211
C3	50	25	TC-2938	CRE617A	NLW50-25	MT1-17	TT25X50	TE-1209
C4	50	25	TC-2938	CRE617A	NLW50-25	MT1-17	TT25X50	TE-1209
C5	5	6		CRE304A	NLW5-15	MT1-3	TT6X5	TE-1084
C6	50	6	TC-2975	CRE317A	NLW50-6	MT1-15	TT6X50	TE-1100
C7	5	25	TC-2963	CRE604A	NLW5-50	MT1-3	TT25X5	TE-1202
C8	5	25	TC-2963	CRE604A	NLW5-50	MT1-3	TT25X5	TE-1202
C9	50	6	TC-2975	CRE317A	NLW50-6	MT1-15	TT6X50	TE-1100
C10	5	25	TC-2963	CRE604A	NLW5-50	MT1-3	TT25X5	TE-1202

## 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.
C11	.0068		DI-6800	DD-682	BYX601ZU682P	CCD-682	GP268	10TS-D68
C12	.015		P288N-015		PM1S15	1DP-1-153	GEM6115	4PS-S15
C13	.220		DI-220	DD-221	JBZ601YP221K	CCD-221	GP322	10TS-T22
C14	.015		P288N-015		PM1S15	1DP-1-153	GEM6115	4PS-S15
C15	.0068		DI-6800	DD-682	BYX601ZU682P	CCD-682	GP268	10TS-D68
C16	.0068		DI-6800	DD-682	BYX601ZU682P	CCD-682	GP268	10TS-D68
C17	.001		DI-1000	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C18	.2		P288N-2		PM2P22	1DP-3-204	GEM602	2PS-P20
C19	.001		DI-1000	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C20	.0068		DI-6800	DD-682	BYX601ZU682P	CCD-682	GP268	10TS-D68
C21	.50	(220) †	ADM-15-500		6D6C500J500	DM-15-500	CNO450	MS-45
C22	.0068		DI-6800	DD-682	BYX601ZU682P	CCD-682	GP268	10TS-D68
C23	.001		DI-1000	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10
C24	.001		DI-1000	DD-102	JBS601YP102K	CCD-102	GP210	10TS-D10

† Alternate Value

## CONTROLS

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

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA				
			Emerson PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Volume & Switch	10K	TC-2954①	F2-10K, SSK100	A47-10K-Z, KSS-3, SWE-12, or (NP-10K-Z, UP-C-400, NWE-12)	Q13-116, 76-1 or (BU1, CF61, SS1, GC)*	UA14A, SK1000, US41, or (RU14A, SL38, SK1000, US41) or (U18, US26)
R2	Tone	10K	TC-2969②	F1-10K, SSK100	A47-10K-S, KSS-3, or (NP-10K-S, UP-C-400)	Q11-116, or (BU1, CF9, SS1, DC1)*	UA14L, SK1000, or (RU14L, SL38, SK1000) or (U20)
	Bias Adjust	250Ω	TC-2961④				

① Models MM-317, 517. Models MM-314 and MM-514 use Part #TC-2978.

② Models MM-317, MM-517.

③ Models MM-316, MM-317 combine the volume and tone in a dual control Part #TC-2970.

④ Models MM-314, MM-316 MM-317 only.

\* "SNAPTROL"

## RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA			ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	Emerson PART No.			IRC PART No.	WORKMAN PART No.	Emerson PART No.
R32	6.8Ω 5W	PW5-75	5W-SQ-7.5						

## COILS (RF-IF)

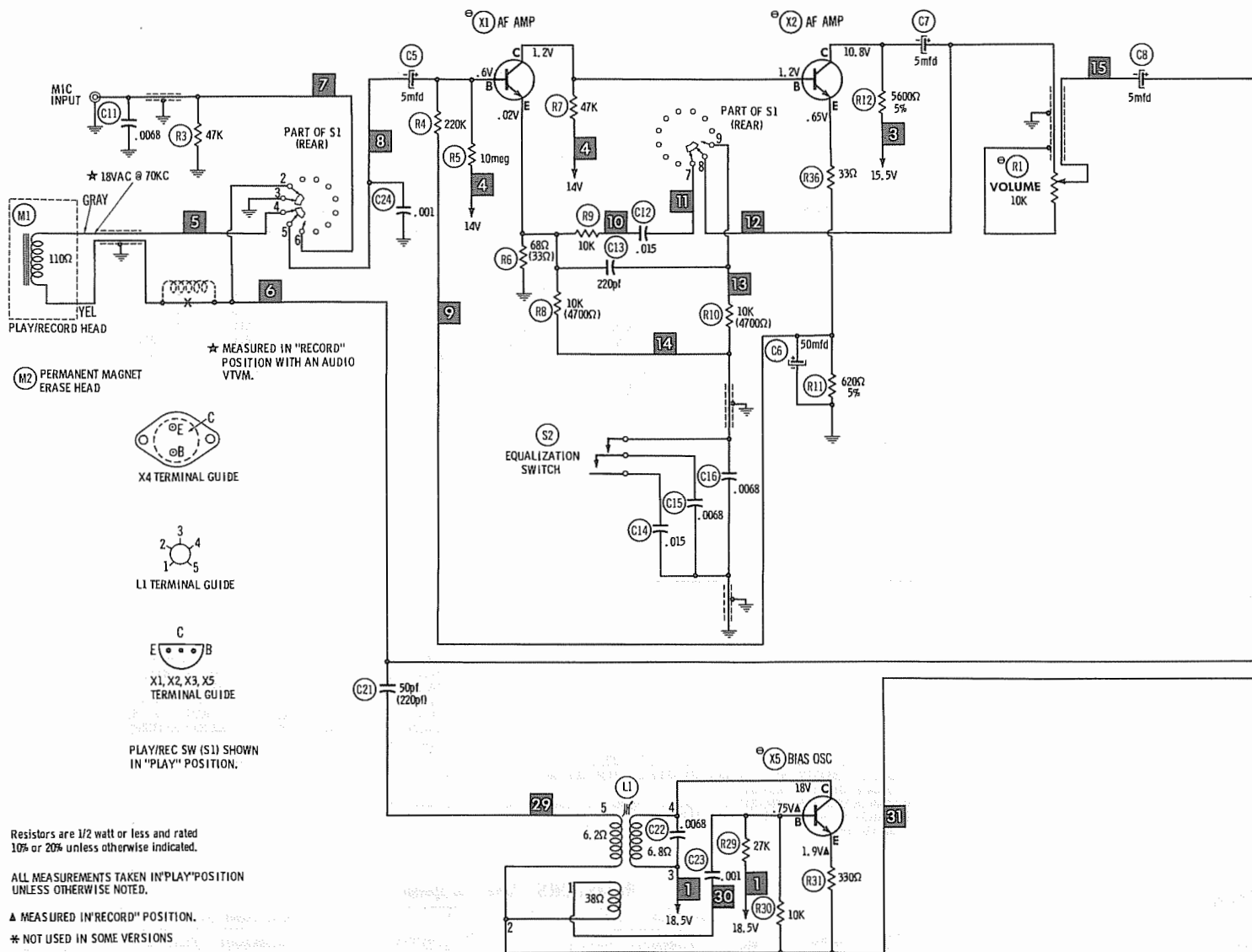
ITEM No.	USE	REPLACEMENT DATA					
		Emerson PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	STANCOR PART No.	WORKMAN PART No.
L1	Bias Oscillator	TT-1098					
L2	Trap Coll	TT-1085	WC-18	MWC-6		RTC-8628	

## TRANSFORMER (POWER)

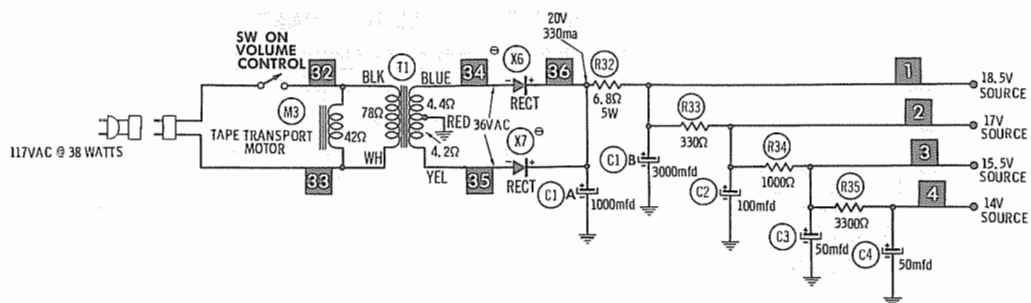
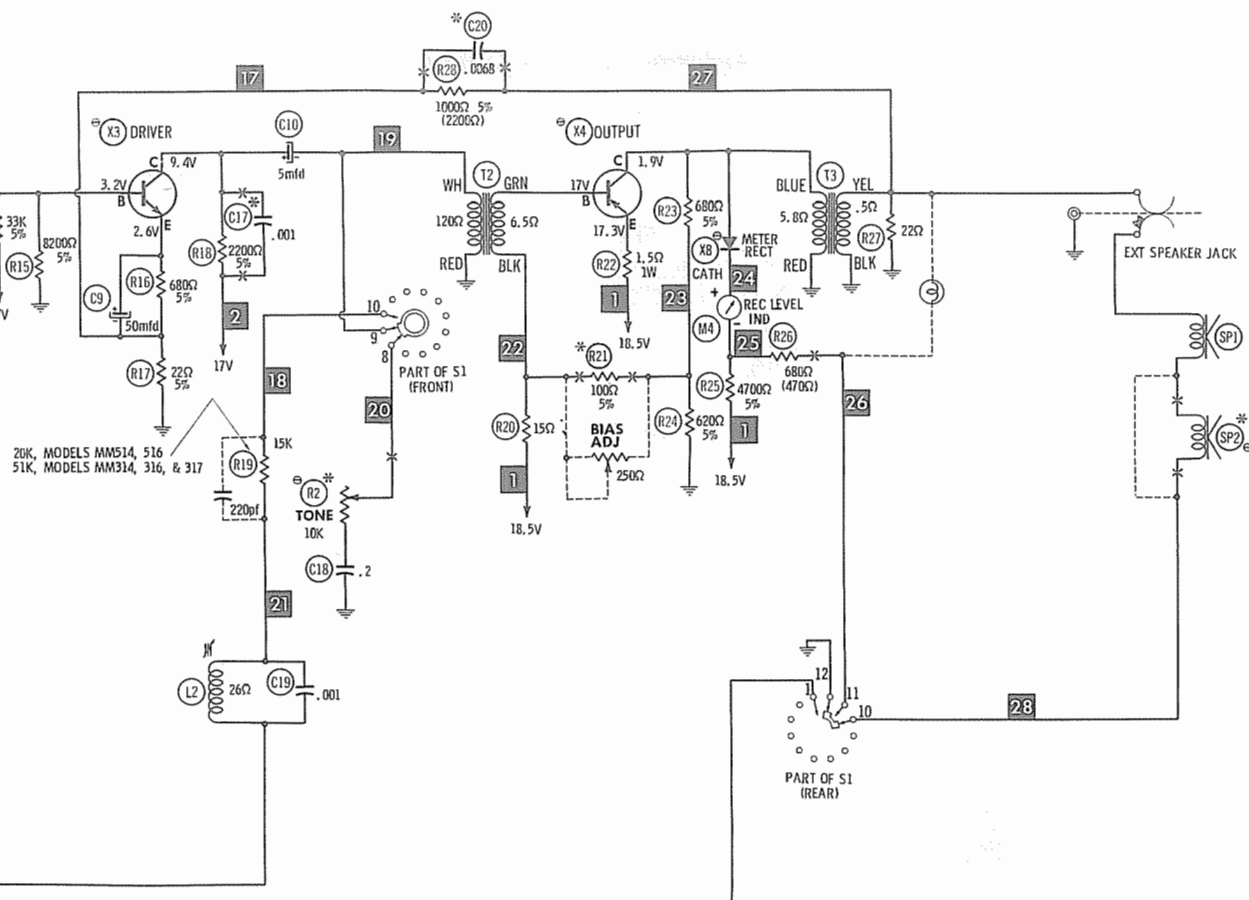
ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	Emerson PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	117V @ .115A	36VCT @ .330A		TT-1095					

EMERSON MODELS MM-314/316/317/514/516/517

NOTE: DEMAGNETIZE HEADS AFTER SERVICING RECORDER







EMERSON MODELS MM-314/316/317/  
514/516/517

## PARTS LIST AND DESCRIPTION (CONTINUED)

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

### TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
			Emerson	MERIT	STANCOR	THORDARSON	TRIAD	
	PRI.	SEC.	PART No.	PART No.	PART No.	PART No.	PART No.	
T2	2	1	TT-1091-1					

### TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
			Emerson	MERIT	STANCOR	THORDARSON	TRIAD	
	PRI.	SEC.	PART No.	PART No.	PART No.	PART No.	PART No.	
T3	200Ω CT	6-8Ω	TT-1091-2					

### SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		Emerson PART No.	QUAM PART No.	
SP1	4" x 8" PM 3-4Ω	TS-3809	48A2	Models MM317, MM517
SP2	4" x 8" PM 3-4Ω	TS-3809	48A2	Models MM317, MM517
	4" PM 6-8Ω	TS-3101		Models MM314, MM316, MM514, MM516

### TAPE HEADS

ITEM NO.	MEASURED			Emerson PART NO.	NORTRONICS PART NO.	DESCRIPTION
	INDUCTANCE	BIAS/ERASE VOLTS (RMS)	BIAS FREQ.			
M1	165mh	18V rms	70KC	TA-3629	3002* & QK-20	2-Track Monaural-Record/Play PM-Type Erase Magnet * Adjust bias for 20 volts.
M2				TA-1123-1		

### MISCELLANEOUS

ITEM No.	PART NAME	Emerson PART No.	NOTES
M3	Motor	TA-3616	Models MM-317, MM-517 only Play-Record, Rotary Wafer Speed Equalization, Leaf Power On-Off (Slide, DPDT) Model MM-317 only) Model MM-314 Model MM-316 Model MM-317 Model MM-514 Model MM-516 Model MM-517
M4	Meter	TD-598	
S1	Switch	TS-4185	
S2	Switch	TS-4182	
	Switch	TS-1997	
	Microphone	TM-601-2	
	Microphone	TM-601-1	
	Microphone	TM-584-4	
	Microphone	TM-601-3	
	Microphone	TM-609-1	
	Microphone	TM-584-5	

### CABINETS & CABINET PARTS

(When Ordering Specify Model, Chassis & Color)

DESCRIPTION OF ITEMS	MODELS AND PART NUMBERS						
	MM-314	MM-316	MM-317	MM-514 Black	MM-516 Black	MM-517 Brown	MM-517 Grey
Cabinet Shell (Bottom)	TA-3611	TA-3609	TA-3614	TA-3783	TA-3835	TA-3784	TA-3785
Cabinet Cover (Top)	TA-3602	TA-3598	TA-3608	TA-3787	TA-3787	TA-3592	TA-3588
Dress Plate Assembly	TA-3599	TA-3594	TA-3605	TA-3795	TA-3834	TA-3796	TA-3797
Escutcheon, Front	TA-3600	TA-3596	TA-3606	TA-3789	TA-3789	TA-3790	TA-3791
Escutcheon, Rear	TA-3601	TA-3597	TA-3607	TA-3792	TA-3792	TA-3793	TA-3794
Knob, Wind/Rewind	TK-339-2	TK-339-1	TK-341-3	TK-339-4	TK-339-4	TK-341-4	TK-341-5
Knob, Play/Record	TK-340-2	TK-340-1	TK-340-2	TK-340-4	TK-340-4	TK-340-5	TK-340-6
Knob, Record Safety	TK-342-2	TK-342-1	TK-342-2	TK-342-3	TK-342-3	TK-342-4	TK-342-5
Knob, Speed Change	TK-343-2	TK-343-1	TK-343-2	TK-343-3	TK-343-3	TK-343-4	TK-343-5
Knob, Volume Control	TK-346-2	TK-346-1	TK-346-2	TK-346-3	TK-346-2	TK-346-4	TK-346-5
Knob, Tone Control		TK-347-1			TK-347-2	TK-347-4	TK-347-5

### WIRING DATA

General-use Unshielded Hook-up Wire .....	Use BELDEN No. 8530 (Solid) Available in 12 Colors
Power Cord .....	8524 (Stranded) Available in 12 Colors
	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)