

# SANYO

**Solid state Portable Tape Recorder**

## MODEL MR-155

### SERVICE MANUAL

SANYO ELECTRIC CO., LTD.

INTERNATIONAL DIVISION : SANYO ELECTRIC TRADING CO., LTD.  
OSAKA, JAPAN



### SPECIFICATIONS

Recording System

AC bias, 2 track

Erasing System

AC erase

Tape Speeds & Recording Time

(With 5" reel, 2 tack 50 $\mu$  tape)

3-3/4 IPS (9.5 cm/sec) ..... 64 min.

1-7/8 IPS (4.8 cm/sec) ..... 128 min.

15/16 IPS (2.4 cm/sec) ..... 256 min.

Forward Time

2 min (5" reel 50 $\mu$  tape)

Rewind Time

2 min (5" reel 50 $\mu$  tape)

Frequency Response

100—8,000 c/s at 3-3/4 IPS

100—4,000 c/s at 1-7/8 IPS

100—3,000 c/s at 15/16 IPS

Output Power

Maximum 1.5 W

Undistorted 1.3 W

Transistor Complement

2SB400×1 2SB492×2

2SB303×1 2SB22×3

2SB186×3 2SB185×1

2SB187×1

Other Elements Used

Diode 1S188×1

Thermistor SDT-06×1

Rectifier DS-1P×2

Power Requirement

AC.....115V/230V 50-60 c/s

DC.....Size-D (UM-1)×6

Output Impedance

EXT. SP.....8 ohm

Loudspeaker

4"×2-1/4" permanent dynamic speaker×2

Voice coil impedance 8 ohm

Power Consumption

10W

Dimensions

10-5/8" width×5-7/8"depth×12-3/8"height

(270mm×150mm×317mm)

Weight

14.6 (6.6 kg) approx.

Accessories

Microphone×1 ; 5" full tape 1 ;

Empty reel×1 ; Patch cord×1 ;

Splicing tape×1 ; Power cord×1

### TO DISASSEMBLE:

- Step 1; Pull out control knobs.
- Step 2; Pull out speed control knob.
- Step 3; Remove set screw of pinch roller.
- Step 4; Pull out head housing.
- Step 5; Remove four screws of oval hd. and two screws of pan hd. on fixing of front panel.  
Remove panel.
- Step 6; Remove screws (two) fixing bottom leg & chassis of near front.
- Step 7; Remove screws (four) fixing chassis to rear of cabinet.  
Remove chassis carefully.

### TO REASSEMBLE

- Reverse the sequence of disassembly.
- For sub-disassembly and sub-reassembly refer to the illustration in the replaceable parts list;

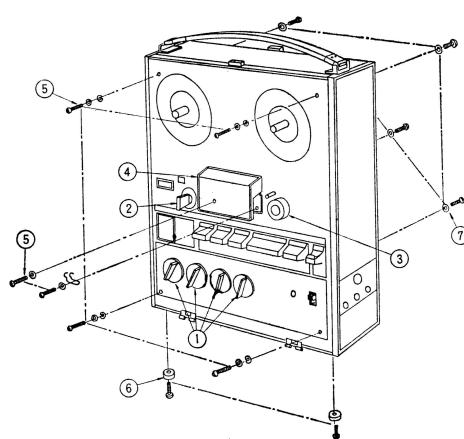
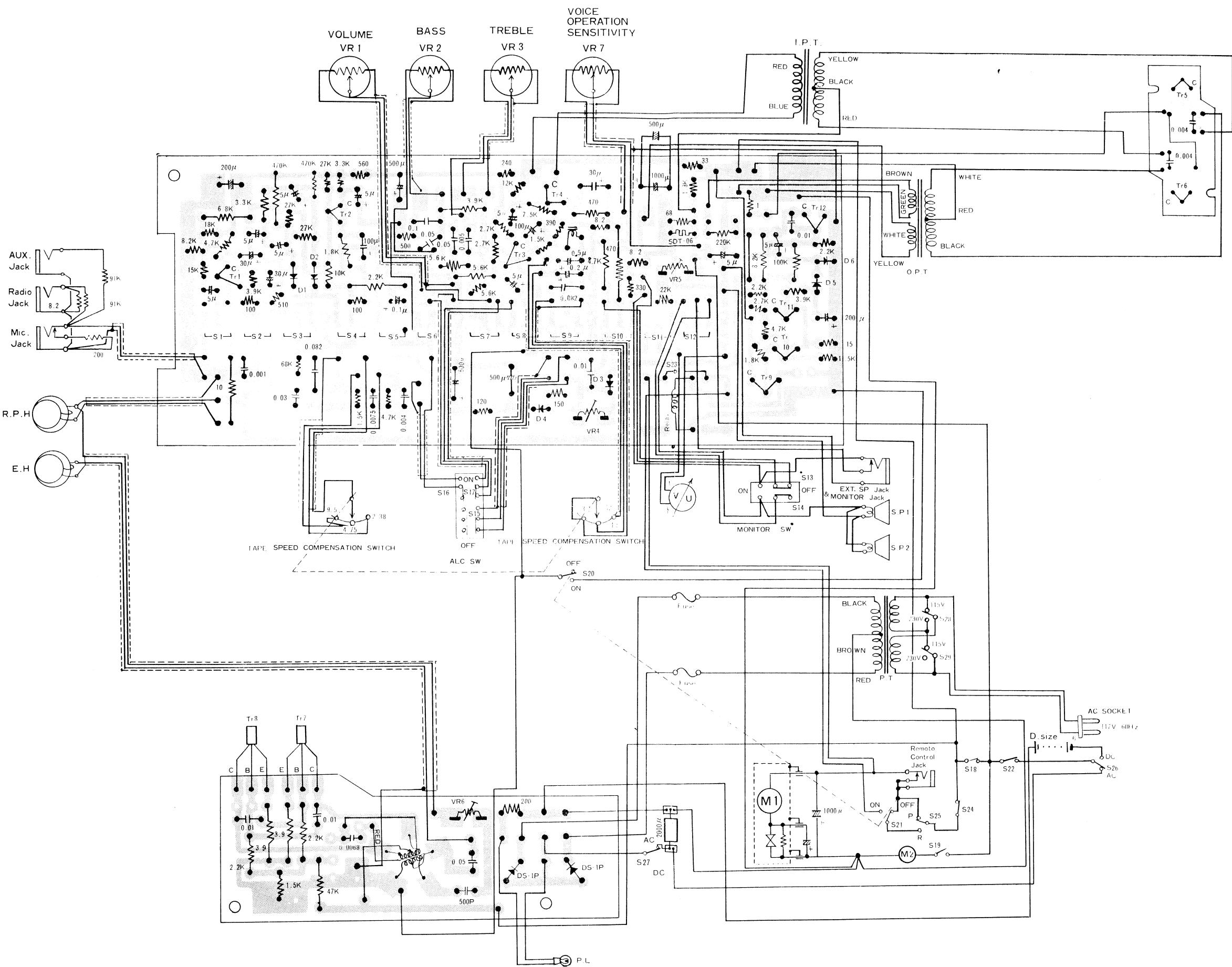
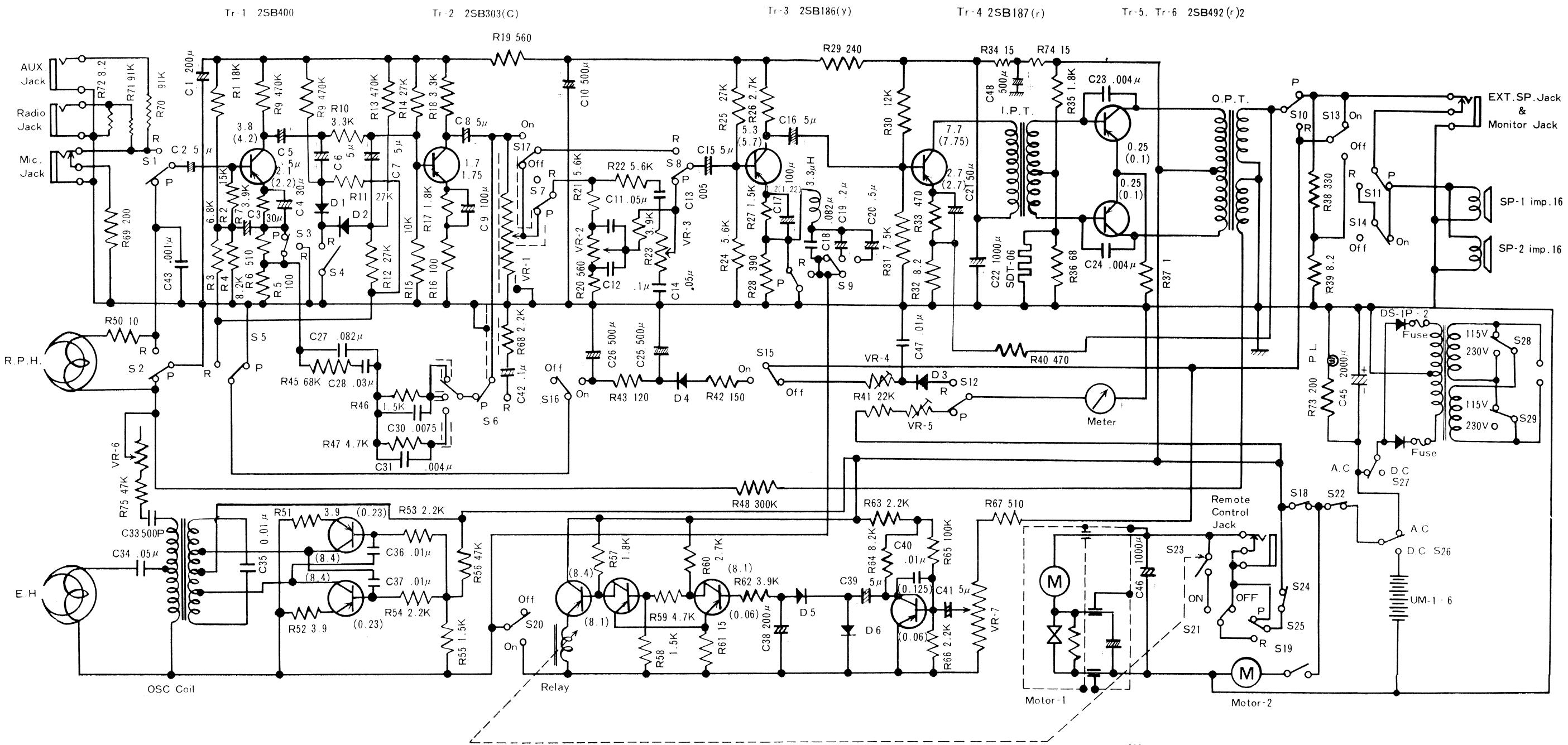


Fig. 1



# CIRCUIT DIAGRAM



## NOTE

NO signal operating voltage indicated.  
Value in ( ) is "RECORD" mode.

S1 - S12 : Recording SW, Play Position

S13 S14 : Monitor SW.

S15 S17 : A.L.C. SW.

S18 : SW. on at Play & Record.

S19 : SW. on at Rewind & Fastforward.

S20-S21 : Voice operation "ON-OFF" SW.

S22 : DC. Power SW.

S23 : Relay SW.

S24 : Motor Stop OFF at Pause

S25 : Recording SW Play Position

S26 S27 : A.C., D.C changing SW.

S28-S29 : A.C. Voltage changing SW.

VR-1 10KΩA VR-2 50KΩB VR-3 50KΩB VR-4 5KΩB VR-5 50KΩB VR-6 100KΩ VR-7 10KΩA

D1, D2 SV30 D3, D4 IS188 D5, D6

Motor-1 .....Play back and Record  
Motor-2 .....Rewind and Fastforward

# MECHANICAL ADJUSTMENTS

## PRESSURE ROLLER TENSION

### \* Measurement (refer to figure 2)

Pressure between the pressure roller and capstan (flywheel shaft) should be gauged; satisfactory tension is between 300 and 400 gr. To take a reading, play the tape at 3-3/4 ips., then pull the pressure roller toward you until the tape stops and read the tension gauge. This process should be repeated two or three times.

### \* Adjustment (refer to figure 2).

If the pressure roller spring tension is too weak, cut the spring 1-2 turns shorter. If the spring tension is too strong, stretch the spring throughout its length.

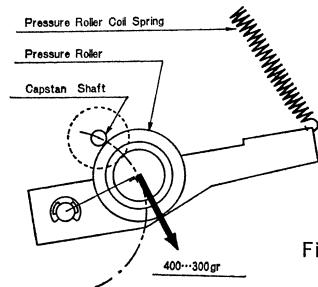


Fig. 2

## TAPE PAD PRESSURE

Set the unit in Play mode. Press the tension gauge against the shaft of the head pad plate. Lightly separate the tape pads from the heads and read the tension gauge at the time the pads separate from the heads. Normal pressure at the top of the plate should be 14~28 gr.

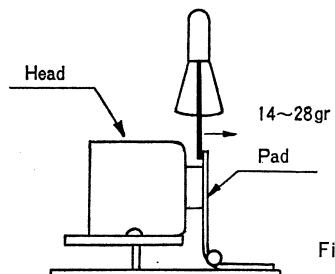


Fig. 3

## TENSION OF FWD. & REW. MOTOR

Pressure between both reel bases and the FWD. & REW. Motor pulleys should be gauged; satisfactory tension is between 550 and 850 grams at the points of measurement indicated in the following figure.

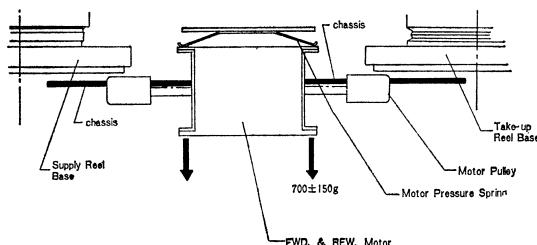


Fig. 4

## WINDING TORQUE FOR PLAY, REWIND & FORWARD

Prepare an empty reel (1-3/4" hub) with a few turns of thread, and hook on a tension gauge.

### Take-up Torque

Place the reel on the take-up spindle. Operate in Play mode and pull the thread in the direction of the arrow (fig. 5-A).

## Fast Forward Back Tension

Place the reel on the rewind spindle. Pull the thread through the tape guide, erase and playback heads, tape guide and capstan. Operate in Fast Forward mode (fig. 5-B).

## Rewind Back Tension

Place the reel on the take-up spindle. Pull the thread through the capstan, tape guide, erase and playback heads and tape guide. Operate in Play mode (fig. 5-C).

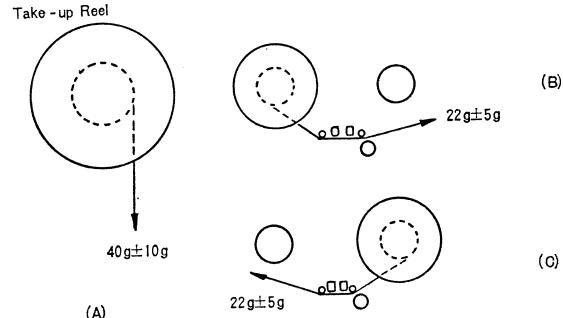


Fig. 5

# ELECTRICAL ADJUSTMENTS

## BIAS OSCILLATOR FREQUENCY

As shown in Fig. 6, connect a 10 ohm resistor (R 50) in series with the ground lead wire of the Record/Playback head. Connect the vertical input of the oscilloscope across the resistor; connect the horizontal input of the oscilloscope to the output terminal of an Audio Frequency Oscillator (A F Oscillator). With the switch set to RECORD mode and connected as above, a lissajous figure will appear on the oscilloscope. Standard frequency is 60 Kc/s  $\pm$  5 Kc/s. If the frequency is not within the above range, change the oscillator coil or C35 (0.0068  $\mu$ F).

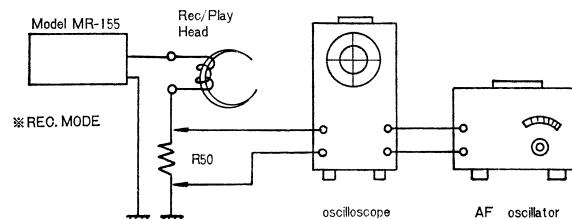


Fig. 6

## BIAS CURRENT

Proper bias is necessary for optimum recording. Adjust the bias oscillator frequency as described above. Bias current during recording is measured at both ends of R 50 (10 ohm). Adjustment is made by a semifixed VR-6 so that the voltage will be 6.5 mV on an AC VTVM.

Recording bias current is 0.65 mA  $\pm$  10%. (Voltage across the 10 ohm resistor;  $(0.65 \text{ mA} \times 10 \times 10 = 0.0065 \text{ V}) = 6.5 \text{ mV}$ ).

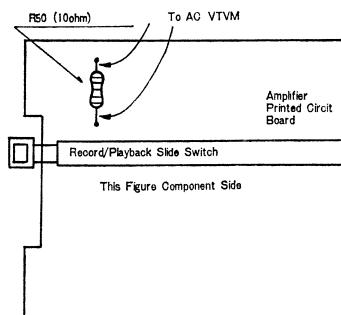


Fig. 7a

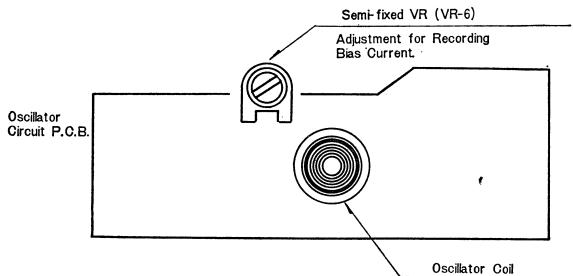


Fig. 7b

### BATTERY LEVEL ADJUSTMENT

VR5 is the battery indicator meter calibration adjustor. This control is located on the circuit bord of the Oscillator.

Adjust as follows:

1. Substitute a 6.5-Volt DC supply for the normal 9-Volt battery supply, taking care to observe the correct polarity.
2. Adjust VR5 until the indicator on the meter rests on the O line of the VU meter.

### RECORDING LEVEL ADJUSTMENT

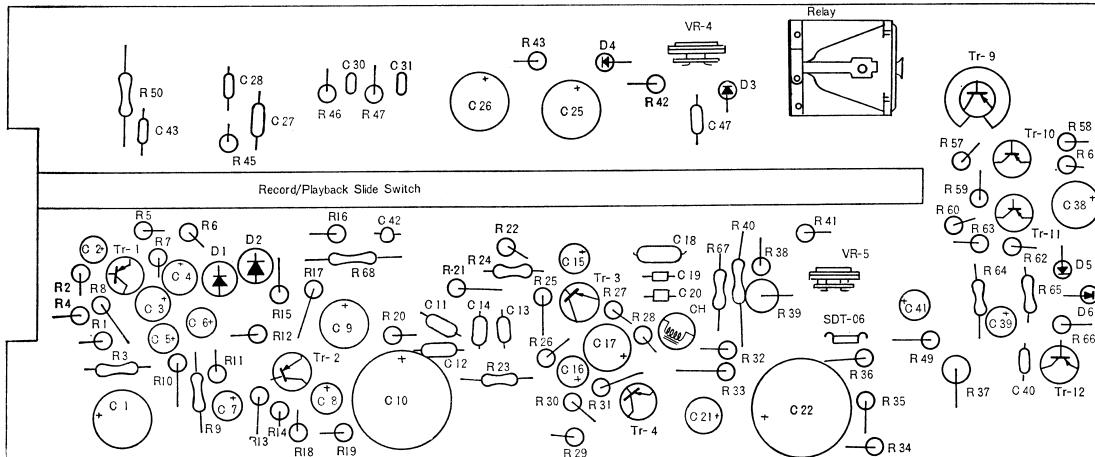
VR4 is the calibration adjustor for the record level indicator; it is located on the circuit board of the Amplifier.

Adjust as follows:

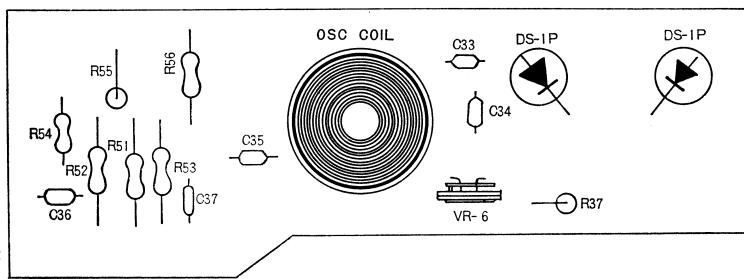
1. Apply a 0.22 mV 1 Kc signal to the microphone input using a suitable miniature phone plug.
2. Press the PLAY and RECORD buttons to put the set in "record" mode. Adjust the volume control to maximum and turn the ALC switch off.
3. Adjust VR 4 so that the record meter needle rests at exactly on 0.

## PARTS LOCATION

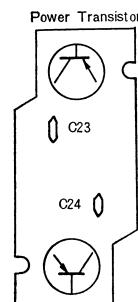
### Audio Amplifier



### Oscillator



### Power Transistor



### AZIMUTH ALIGNMENT

Play/Record head azimuth alignment depends on the adjustment of the two screws which attach the head to the mounting plate. Azimuth adjustment is done by "rocking" the screws. That is, adjusting one screw by rotating it in a clockwise (down) direction, and then rotating the other screw in a counter-clockwise (up) direction. Alternately reversing the direction of rotation of the screws will give a "rocking" action to the head. A test tape having a 5 Kc tone recorded on one track can be used for the azimuth alignment. Adjust the head as follows:

1. Thread the alignment tape onto the tape recorder.
  2. Connect an AC volt meter across the speaker terminals.
  3. Press the PLAY button.
  4. Adjust the screws as described above for maximum meter indication. Care should be taken that the screws are not over-tightened, or the head mounting will be damaged.
- Lock the screws in place by applying a drop of fast drying cement to the edge of each screw.

The erase head is mounted in a fixed position and no adjustment is required.

# PARTS LIST

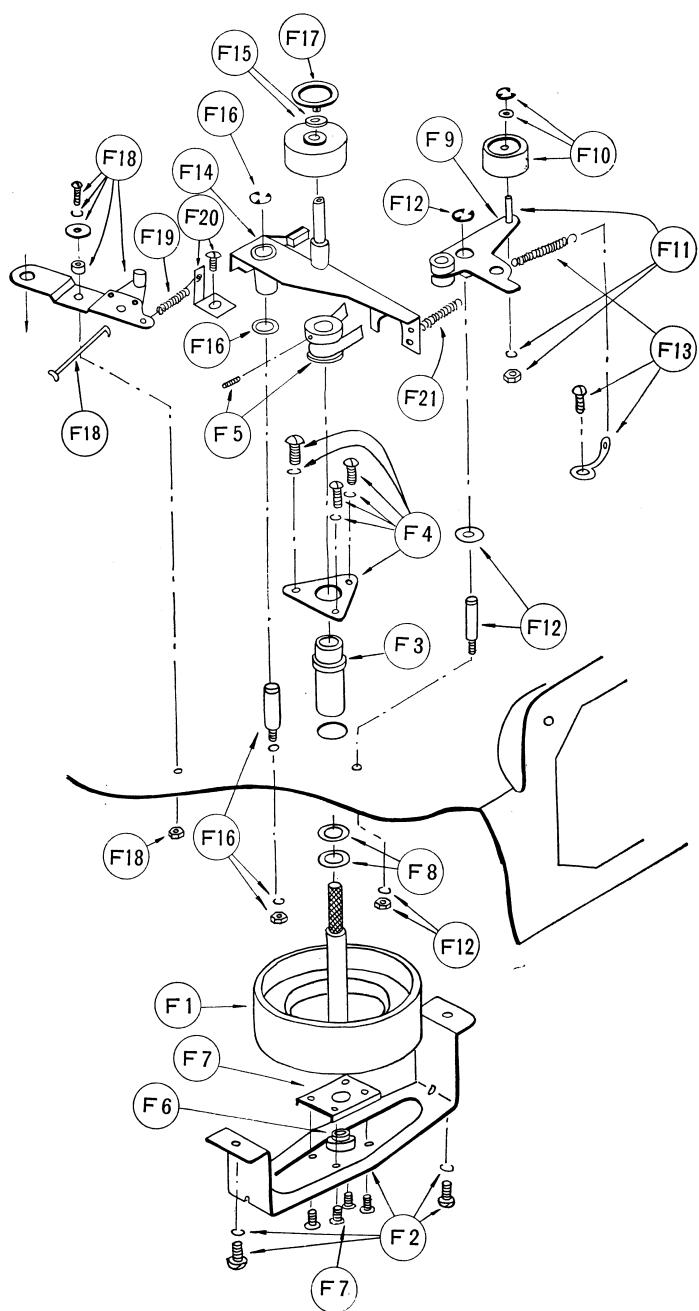
Stock No.	Description	Q'ty	Stock No.	Description	Q'ty
<i>Cabinet</i>			<i>Chassis</i>		
R-31692	Cabinet	1	R-118207	Bracket for P. C. B.	1
R-28128	Frame	2	R-268122	Index Plate-Jack (Right)	1
R-261464a	Metalic Edger (Top)	1	R-268125	Index Plate-Jacks (Left)	1
R-268087a	Metalic Edger (Bottom)	1	R-268184	Index Plate-AC input	1
R-S88082	Latch for Lid	1	R-118460	Bracket for AC input jack	1
R-288011	Bracket Cabinet Lid Holder	2	R-112912	Bracket for VU meter	1
R-358006	Sheet, Under Bracket	1	R-34183	Battery compartment case	1
R-268197	Spec. Plate	1	R-41277a	Cushion for VU meter	3
R-43135	Speaker Net 105×80mm	2	R-25292	Battery terminal (-) Coil spring	3
R-26691	Ribbon-Battery Take-up (Short)	1	R-23838	Battery terminal (+)	3
R-438004	Label Plate	1	R-14207	Stud Nut	2
R-31694	Net-Cabinet Corner	8	R-268088	Cushion 4×6×1.2mm	1
R-31694	Ribbon-Battery Take-up (Long)	1	R-158038	Decoration ring	2
R-12371	Lid	1	R-128943	Connecting Lid	1
R-478112	Spring-Reel Holder	2	R-118210	Coil Spring	1
R-478113	Operation Guide	1	R-248081	Bracket for Lever	1
R-368011	Operation Guide	1	R-118209	Shaft-R/P changing Lever	1
R-428015	Accessory Compartment Case	2	R-118209	Lever for R/P changing	1
R-268133	Sheet for Fixing of Case	2	R-158036	Connecting Hook	1
R-268133	Badge	1	R-118211	Bracket-Slide switch coupling	1
R-31693	Deck Panel	1	R-15270	Coil spring	1
R-268198	Index Panel-Controls	1	R-118283	Bracket for PL	1
R-268134	Metal Sash	1	R-398019	Spacer for Speaker	2
R-261459	Index Ring-Tape Speed	1	R-248170	Pipe for AC socket fixng	2
R-388002	Cover-Pilot Lamp	1	R-368014	Cover for ALC switch	1
R-398015	Cover-VU Meter	1	R-118315a	Lever-R/P changing actuation	1
R-268123	Index Panel-VU Meter	1	R-24697	Spacer-for lever	1
R-44228	Cushion-Panel Side	7	R-44045	Cushion rubber for PL	1
	Felt 20×10×4mm	2	R-118321	Band-C.C.Mtg.	1
	Felt 2×12×25mm	3	R-112864	Band-C.C.Mtg.	1
R-32691	Battery Lid	1	R-118335	Band-C.C.Mtg.	1
	Cushion 30×13×10mm	3		Sheet 17×35×0.35mm	1
	Cushion 4.5φ×1.5mm	4		Sheet 15×15×0.35mm	1
	Washer (Plastic) 10φ	10		Sheet 5×13× 0.5mm	1
	Cushion 2×10×0.5mm	6		Cushion 30×13×10mm Motor Mtg.	1
	Cushion 5×15×1mm	1		Washer 3φ×10φ×1mm	1
	Cushion 5×15×1mm	2	R-268180	Index plate for voltage selector SW	1
R-S81306	Hinge assembly	2	R-112913	Bracket for voltage selector SW	1
R-44213	Leg-Cabinet Bottom	4			
R-12368	Hinge	2			
R-32655	Knob for Battery Lid	1			
R-12367a	Plate Spring-for Battery Lid	1			
R-S88100a	Handle assembly	1			
R-128057	Bracket-Top Lid Holder	1			
R-S88196	Head Cover	1			
R-28133	Knob for Tape Speed Change	1			
R-35264	Leg-Cabinet Back	4			
R-24889	Special Washer-Deck Panel	4			
	Washer-Tape Speed Knob	1			
R-S88129	Knob-Volume, Tone V.O.	4			
	Knob Felt	4			
R-128061	Tape Guide	1			
	Cushion-Head Cover 2×10×0.5mm	2			
R-398042	Cover-Voltage Selector SW	1			
<i>Chassis</i>			<i>Electrical Parts</i>		
R-418017	Printed circuit board-Amplifier	1	R-S6833	Speaker	2
R-418018	Printed circuit board-Oscillator	1	R-R124810	Variable Resistor 10K ohm A VR-1	1
R-318031	Bracket for Jack Mtg.-Left	1	R-R124811	Variable Resistor 50K ohm B VR-2,3	2
R-318030	Bracket for Jack Mtg.-Right	1	R-W7824	Power transformer	1
R-418019	Printed circuit board-Power	1	R-W6813(1)	Output transformer	1
R-268139	Bracket for P. C. B.	1	R-S4812	Relay	1
	Washer 11φ×8φ×1.5mm	2	R-288201	5" Full tape	1
	Sheet-ALC switch	1	R-32143b	5" Empty reel	1
R-428022	Sheet	1	R-S6821L	Splicing tape	1
R-118110	Chassis for Amplifier	1	R-398002	Microphone	1
R-112917	Bracket for ALC switch	1	R-S5801	Microphone stand	1
R-S81315	Hinge assembly-for P. C. B.	1	R-W6263(1)	VU meter	1
R-S81314	Hinge assembly-for P. C. B.	1	R-R11012	Input transformer	1
R-112911	Bracket for P. C. B.	1	R-R11010	Semi VR 5K ohm B VR-4	1
			R-R11010	Semi VR 50K ohm B VR-5	1
			R-R11011	Semi VR 100K ohm B VR-6	1
			R-W8801	Oscillator coil	1
			R-W1808	Choke coil	1
			R-124812	Variable Resistor 10K ohm A VR-7	1
			R-S4806	Slide Switch R/P changing	1
			R-S4266	Slide Switch Monitor	1
			R-28085	Heat sink-(output TR)	2
			R-41370	Film-Insulation of Heat sink	2
			R-44223	Bushing-Insulation of Heat sink	2
			R-39320	Special washer-Heat sink Mtg.	4
			R-S2139	Jack-Mic. Ext. Radio, Aux.	4
			R-S2803	Jack-Remote	1
			R-261193	Heat sink (oscillator TR)	1
			R-S8678b	Patch cord	1
			R-S3813b	AC input socket	1

**PARTS LIST**

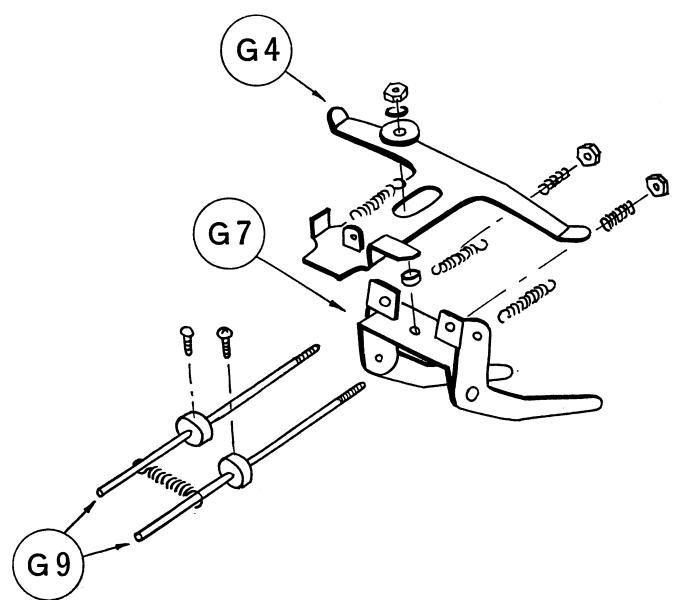
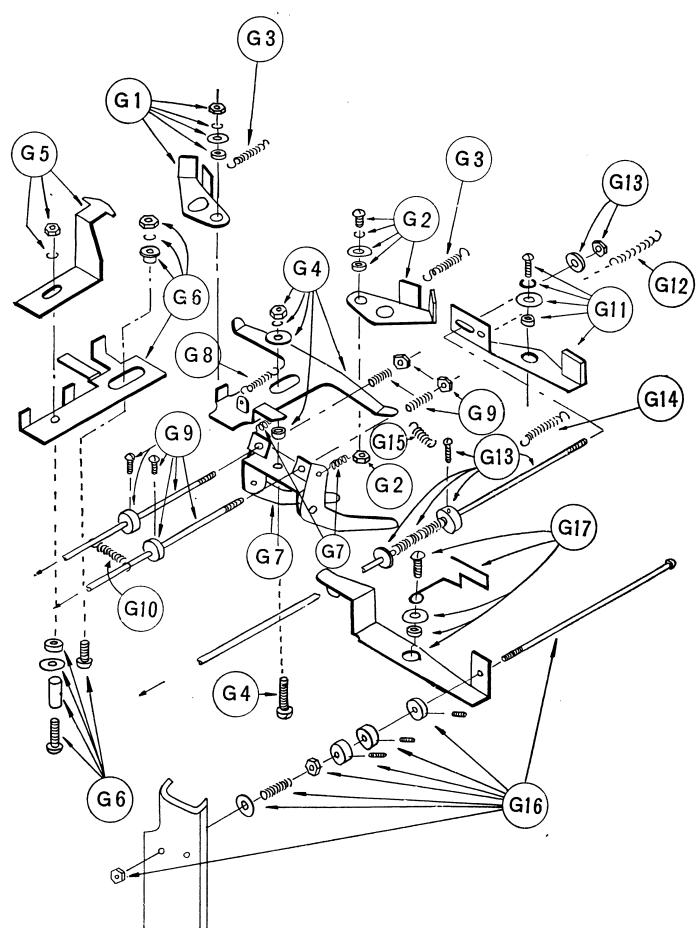
Stock No.	Description	Q'ty
<i>Electrical Parts</i>		
R-S1044	Fuse 1.2A	1
R-S3812	Power cord	1
R-S1202(2)	Pilot lamp	1
R-S3008	Lug-lead clump	4
R-112432	Lug-lead clump	5
R-S4311	Slide switch-ALC ON/OFF	1
R-S1816	Fuse holder	1
R-S4820a	Spring switch R/P changing	1
R-S4368	Spring switch	1
R-S3011	Lug board 1-2P	1
R-S3011	Lug board 2P	1
R-S1264	Silicon Rectifier DS-1P	2
	Varistor SV-3D D1,2	2
	Diode 1S118 D3,4,5,6	4
	Thermistor SDT-O6	1
	Transistor 2SB186 Tr-3, 10, 11	3
	Transistor 2SB185 Tr-12	1
	Transistor 2SB187 Tr-4	1
	Transistor 2SB 22 Tr-7, 8	2
	Transistor 2SB492 Tr-5, 6	2
	Transistor 2SB 22 Tr 9	1
	Transistor 2SB400 Tr 1	1
	Transistor 2SB303 Tr 2	1
R-S4821	Slide switch-Voltage selector	1
R-S4266	Slide switch-AC-DC selector	1

Key No.	Description	Q'ty
<i>Resistors</i>		
R64	8.2K ohm 1/4W ±10%	1
R65	100 K " " "	1
R67	4.7K " " "	1
R69,73	200 " " "	2
R70,71	91 K " " "	2
R72	8.2 " 2/1W "	1
<i>Capacitor</i>		
Electrolytic Capacitor		
C45	2000µF 15WV	R-C9807
C10	500µF 15WV	R-C9135
C1	200µF 10WV	R-C9146
C25,26	500µF 3WV	R-C9144
C9,17	100µF 3WV	R-C9134
C3,4	30µF 3WV	R-C9080
C2,5,6,7,41,8 15,16,39	5µF 6WV	R-C9078
C38	200µF 6WV	R-C9143
C42	0.1µF 10WV	R-C9126
C19	0.2µF 10WV	R-C9120
C20	0.5µF 10WV	R-C9116
C46	1000µF 15WV	R-C9138
C21	30µF 6WV	R-C9105
C22	1000µF 15WV	R-C9801
C48	500µF 15WV	R-C9135
C11,14,34	Ceramic 0.05µF 50WV ±20%	3
C12	0.1µF 50WV "	1
C13	0.005µF 50WV "	1
C23,24,31	0.004µF 50WV "	3
C28	0.03µF 50WV "	1
C36,37,40,47	0.01µF 50WV "	4
C30	0.0075µF 50WV "	1
C33	500µF 50WV "	1
C43	0.001µF 50WV "	1
C18,27	0.082µF 50WV ±10%	2
C35	0.0068µF 50WV "	1

## FLYWHEEL AND PINCHROLLER



## BRAKING MECHANISM

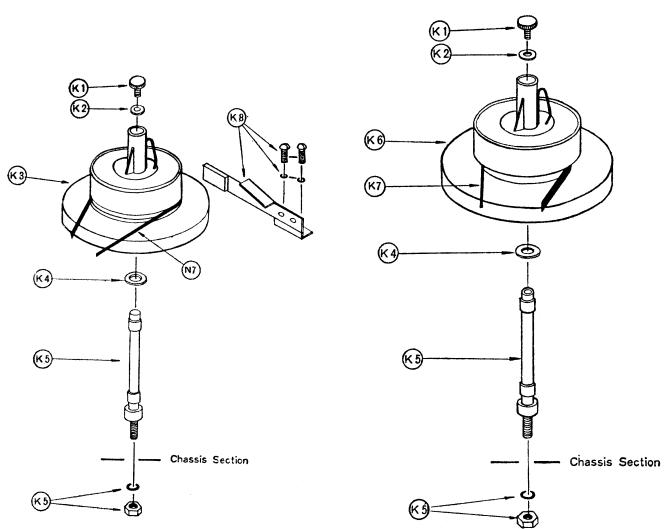
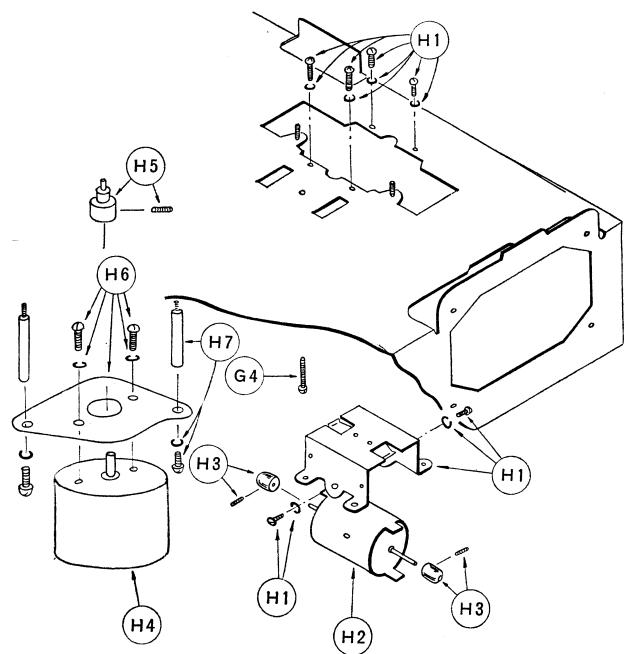


# PARTS LITS

Ref. No.	Mfg. No.	Description	Ref. No.	Mfg. No.	Description
<i>Mechanism Chassis</i>					
	R-118131d	Chassis for Mechanism	G 3	R-158084	Spring Washer 3φ
	R-118126	Bracket for Set Fixing	G 4	R-112893	Washer 3φ
	R-118127	" "		-	Nut Class 1, 3φ
	R-118128a	" "		-	Brake Shoe 7×7×1.5mm
	R-118129	" "		-	Coil Spring-Both Brake Lever—2
<i>Flywheel and Pinch Roller</i>					
F 1	R-S88249	Flywheel Assembly-W/Steel Ball & Felt Ring	G 5	R-112890	Slide-Brake Lever Actuation
F 2	-R-112879	Bracket for Flywheel	G 6	R-112889a	Spacer-for Side Mtg.
	-	Screw P.H 3φ×6mm—2		-	Washer 3φ
F 3	R-248148	Spring Washer 3φ—2		-	Screw P.H 3φ×12mm
F 4	-R-114878	Bearing for Flywheel (Upper)		-	Spring Washer 3φ
	-	Bracket for Flywheel Bearing (Upper)		-	Nut Class 1, 3φ
	-	Screw P.H 2.6φ×8mm—3		-	Slide-for Pad Actuating
F 5	-R-288030	Spring Washer 2.6φ—3		-	Spring Washer 3φ
	-	Pulley-Take up Belt		-	Nut Class 1, 3φ
	-	Screw 3φ×5mm		-	Screw P.H 3φ×10
F 6	R-298052	Bearing (Under) for Flywheel		-	Screw P.H 3φ×14
F 7	R-118633	Bracket-Flywheel Bearing (Under)		-	Spacer-for Switch Actuation
F 8		Screw F.H 2.6φ×8mm—4		-	Washer 3φ
		Washer for Flywheel Shaft		-	Spacer-for Side Mtg.
		6.1φ×10φ×0.5mm—2		-	Lever Assy-FWD-REW Motor Actuation
F 9	R-S81312	Lever Assy-Tension Roller		-	Coil Spring-Lever Assy.
F10	-R-39364	Pulley-Tension Roller	G 7	R-S81325	Coil Spring-Brake Actuating Slide Return
	-	External "E" ring 2φ		-R-158100	Bar-FWD-REW Motor Actuation—2
	-	Washer for Tension Roller	G 8	R-158093	Stopper-for Bar—2
	-	3.2φ×5φ×0.5mm	G 9	-R-14229a	Screw P.H 2φ×4—2
F11	-R-14223	Shaft for Tension Roller		-R-248114	Coil Spring—2
	-	Spring Washer 2φ		-	Nut Class 1, 2φ—2
	-	Nut Class 1, 2φ	G 10	R-158085	Coil Spring for Between Two Bars.
F12	-R-14222	Shaft for Tension Lever		-R-118051	Lever for Rew. Back Tension
	-	External "E" Ring 3φ		-R-24670	Spacer-for Lever
	-	Spring Washer 3φ		-	Washer 3φ
	-	Washer for Shaft 5.2φ×10φ×0.5mm		-	Spring Washer 3φ
F13	-R-158082	Nut Class 1, 3φ		-	Screw P.H 3φ×6mm
	-	Coil Spring for Tension Roller Lever		-	Brake Shoe 10×10×2t
	-	Lug for Coil Spring Hanger		-	Coil Spring-for Back Tension Lever
	-	Selftapping Screw PH. 3φ×4mm		-	Bar-for Back Tension & Pause Lever
F14	R-S81319	Lever Assy for Pinch Roller	G 13	-R-148109	Stopper-for Bar
F15	-R-S88134	Pinch Roller		-R-248074	Screw P.H 2φ×5
F16	-R-248146	Ring for Pinch Roller		-	Coil Spring-for Bar
	R-14228	Shaft for Pinch Roller Lever	G 14	-R-158089	Washer (Fiber) 2.2φ×10φ×1t
		External "E" Ring 3φ		-	Nut Class 1, 2φ
		Washer for Shaft 5.2φ×10φ×0.5mm	G 15	R-15268	Coil Spring-for Return Bar
		Nut Class 1, 3φ		-	Coil Spring-for Side Tension of
F17	R-248053	Spring Washer 3φ		-	Anti-resonance
F18	-R-S88216	Special Screw for Pinch Roller	G 16	-R-14232a	Bar-for Pause Actuation
	-	Lever Assy.		-	Stopper-for Bar—3
	-	Screw P.H 3φ×8mm		-	Screw Headless 2φ×3mm—3
	-	Spring Washer 3φ		-	Coil Spring-for Bar
	-	Washer 3φ		-	Nut Class 1, 2φ—1
	-R-24671a	Spacer		-	Washer 2φ
	-	Nut Class 1, 3φ	G 17	-R-118053a	Lever for Pause Actuating Lever
	-R-14230a	Bar-Lever Assy. Actuation		-R-24697	Spacer for Lever
F19	R-158117	Coil Spring		-	Washer 3φ
F20	-R-118573	Bracket for Coil Spring		-	Spring Washer 3φ
	-	Screw P.H 3φ×8mm		-	Screw P.H 3φ×6mm
F21	R-158090	Coil Spring-for Pinch Roller Pressure		-R-128007	Guide for Take-up Belt
<i>Brake</i>					
G 1	-R-112891	Brake Lever (Left)			
	-R-24670	Shaft-Brake Lever			
	-	Washer 3φ			
	-	Spring Washer 3φ			
	-	Nut Class 1, 3φ			
	-	Brake Shoe 7×7×1mm			
G 2	-R-112892	Brake Lever (Right)			
	-R-24670	Shaft-Brake Lever			
	-	Screw P.H 3φ×8mm			

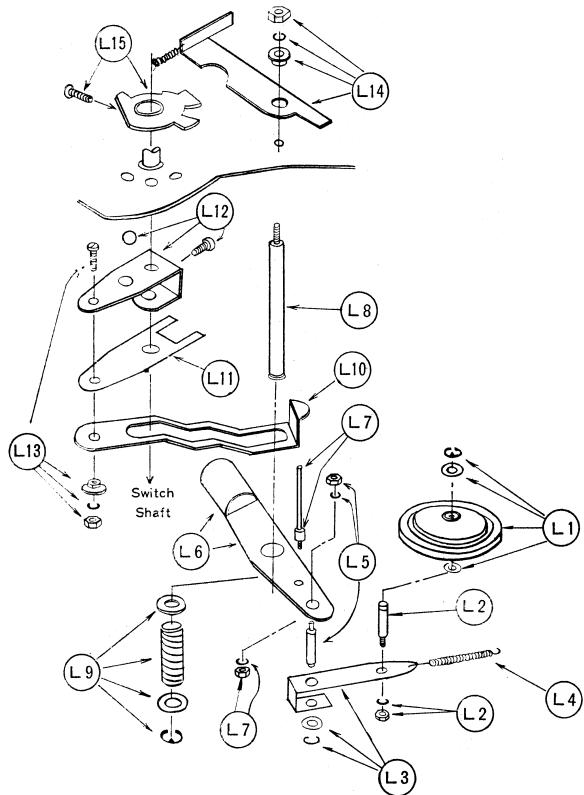
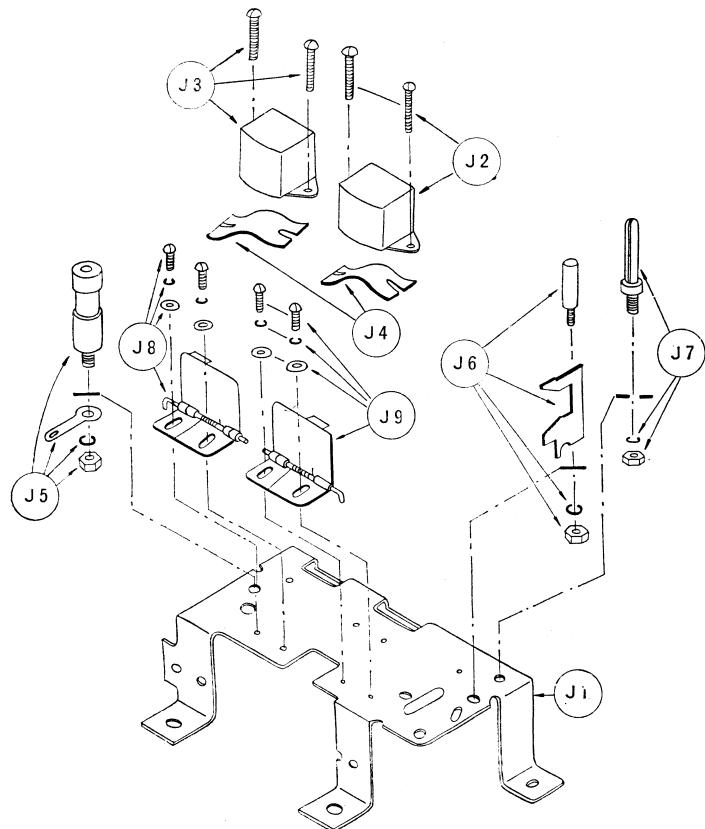
## MAIN & REW-FWD MOTOR

## TAKE-UP & SUPPLY REEL DISK



## HEAD ASSEMBLY

## TAPE SPEED CHANGING MECHANISM

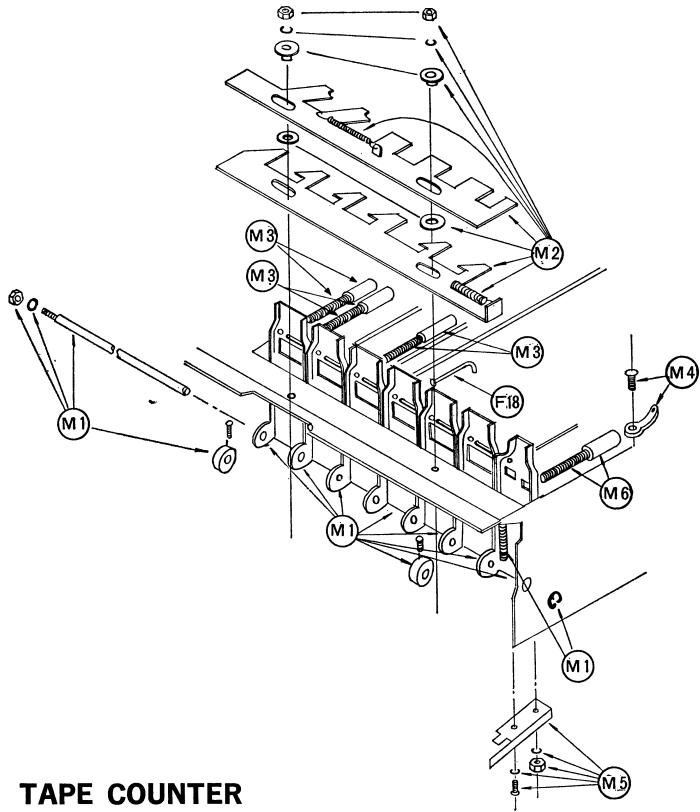


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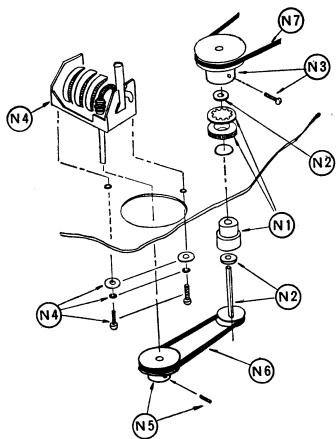
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<i>Main Rew-Fwd Motor</i>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
H 1	-R-112897 -R-12379 - -R-241297 - - - - H 2	Bracket, REW-FWD Motor Plate Spring, for REW-FWD Mtg. Rivet RH $2\phi \times 4\text{mm}$ —2 Screw-for Motor Pivot—2 Spring Washer $3\phi$ —2 Screw F.H $3\phi \times 6\text{mm}$ —2 Spring Washer $3\phi$ —4 Motor—for REW-FWD Pulley—for REW-FWD Motor Screw Headless $2\phi \times 3\text{mm}$ —2 Motor-Main Shield-Main Motor Pulley-Main Motor Screw Headless $2\phi \times 3$ Bracket-Main Motor Screw P.H $2.6\phi \times 4$ —2 Spring Washer $2.6\phi$ —2 Stud Nut—2 Screw P.H $3\phi \times 6\text{mm}$ —2 Spring Washer $3\phi$ —2	L 3	-R-112880 - - L 4	Lever-Idler Washer (Nylon) $4.2\phi \times 7.5\phi \times 0.5\text{mm}$ External "E" Ring $3\phi$ Coil Spring for Idler Lever Shaft-Idler Lever Spring Washer $3\phi$ Nut Class 1, $3\phi$ Lever-Idler Lever Actuation Pin-Idler Lever Actuation Lever Spacer-for Pin Spring Washer $3\phi$ Nut Class 1, $3\phi$ Shaft-Idler Lever Actuation Lever Coil Spring-Idler Lever Act. Lever Shaft Washer (Fiber) $6.2\phi \times 12\phi \times 1\text{mm}$ (Lower) Washer (Fiber) $8.1\phi \times 13\phi \times 0.5\text{mm}$ (Upper) External "E" Ring $5\phi$ Slide-Stepper Plate Spring-Steel Ball Lever-Stepper Lever Actuation Steel Ball $8\phi$ Screw Hex. Hole Head Spacer-L10, L11, L12 Mounting Screw F.H $2.6\phi \times 8\text{mm}$ Spring Washer $2.6\phi$ Nut Class 1, $2.6\phi$ Lever-Anti-miss-operation Spacer-Lever Mtg. Spring Washer $4\phi$ Coil Spring-Lever Nut Class 1, $4\phi$ Cam-Speed Change Screw P.H $3\phi \times 8\text{mm}$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
H 3	-R-248074 - H 4	Pulley-for REW-FWD Motor Screw Headless $2\phi \times 3\text{mm}$ —2 Motor-Main Shield-Main Motor Pulley-Main Motor Screw Headless $2\phi \times 3$ Bracket-Main Motor Screw P.H $2.6\phi \times 4$ —2 Spring Washer $2.6\phi$ —2 Stud Nut—2 Screw P.H $3\phi \times 6\text{mm}$ —2 Spring Washer $3\phi$ —2	L 5	-R-14225 - L 6	Shaft-Idler Lever Spring Washer $3\phi$ Nut Class 1, $3\phi$ Lever-Idler Lever Actuation Pin-Idler Lever Actuation Lever Spacer-for Pin Spring Washer $3\phi$ Nut Class 1, $3\phi$ Shaft-Idler Lever Actuation Lever Coil Spring-Idler Lever Act. Lever Shaft Washer (Fiber) $6.2\phi \times 12\phi \times 1\text{mm}$ (Lower) Washer (Fiber) $8.1\phi \times 13\phi \times 0.5\text{mm}$ (Upper) External "E" Ring $5\phi$ Slide-Stepper Plate Spring-Steel Ball Lever-Stepper Lever Actuation Steel Ball $8\phi$ Screw Hex. Hole Head Spacer-L10, L11, L12 Mounting Screw F.H $2.6\phi \times 8\text{mm}$ Spring Washer $2.6\phi$ Nut Class 1, $2.6\phi$ Lever-Anti-miss-operation Spacer-Lever Mtg. Spring Washer $4\phi$ Coil Spring-Lever Nut Class 1, $4\phi$ Cam-Speed Change Screw P.H $3\phi \times 8\text{mm}$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
H 5	-R-241302 - H 6	R-S5118 -R-29017a -R-112902 - H 7	L 7	-R-12376a -R-248137a - L 8	Pulley-for REW-FWD Motor Screw Headless $2\phi \times 3\text{mm}$ —2 Motor-Main Shield-Main Motor Pulley-Main Motor Screw Headless $2\phi \times 3$ Bracket-Main Motor Screw P.H $2.6\phi \times 4$ —2 Spring Washer $2.6\phi$ —2 Stud Nut—2 Screw P.H $3\phi \times 6\text{mm}$ —2 Spring Washer $3\phi$ —2	L 9	R-14226 -R-158096 - L 10	Shaft-Idler Lever Actuation Lever Coil Spring-Idler Lever Act. Lever Shaft Washer (Fiber) $6.2\phi \times 12\phi \times 1\text{mm}$ (Lower) Washer (Fiber) $8.1\phi \times 13\phi \times 0.5\text{mm}$ (Upper) External "E" Ring $5\phi$ Slide-Stepper Plate Spring-Steel Ball Lever-Stepper Lever Actuation Steel Ball $8\phi$ Screw Hex. Hole Head Spacer-L10, L11, L12 Mounting Screw F.H $2.6\phi \times 8\text{mm}$ Spring Washer $2.6\phi$ Nut Class 1, $2.6\phi$ Lever-Anti-miss-operation Spacer-Lever Mtg. Spring Washer $4\phi$ Coil Spring-Lever Nut Class 1, $4\phi$ Cam-Speed Change Screw P.H $3\phi \times 8\text{mm}$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
J 1	R-112904a -R-S6872 - J 3	Bracket for Heads Head Record/Play Screw R.H $2\phi \times 12$ —2 Head Erase Screw R.H $2\phi \times 12$ —2 Plate Spring for Head—2 Tape Guide(Left) Lug Lead Fixer Nut Class 1, $3\phi$ Spring Washer $3\phi$ Tape Guide (Right) Plate Tape Guide (Right) Pole Nut Class 1, $3\phi$ Spring Washer $3\phi$ Tip, Head Cover Mtg. Nut Class 1, $3\phi$ Spring Washer $3\phi$ Pad Assy. for Erase Head Washer $3\phi$ Screw P.H $2\phi \times 6\text{mm}$ —2 Pad Assy, for Record/Play Head Washer $3\phi$ Screw P.H $2\phi \times 6\text{mm}$ —2	J 2	-R-S6873 - J 4	J 5	J 6	J 7	J 8	J 9	L 13	L 14	L 15	L 16	L 17	L 18	L 19	L 20	L 21	L 22	L 23	L 24	L 25	L 26	L 27	L 28	L 29	L 30	L 31	L 32	L 33	L 34	L 35	L 36	L 37	L 38	L 39	L 40	L 41	L 42	L 43	L 44	L 45	L 46	L 47	L 48	L 49	L 50	L 51	L 52	L 53	L 54	L 55	L 56	L 57	L 58	L 59	L 60	L 61	L 62	L 63	L 64	L 65	L 66	L 67	L 68	L 69	L 70	L 71	L 72	L 73	L 74	L 75	L 76	L 77	L 78	L 79	L 80	L 81	L 82	L 83	L 84	L 85	L 86	L 87	L 88	L 89	L 90	L 91	L 92	L 93	L 94	L 95	L 96	L 97	L 98	L 99	L 100	L 101	L 102	L 103	L 104	L 105	L 106	L 107	L 108	L 109	L 110	L 111	L 112	L 113	L 114	L 115	L 116	L 117	L 118	L 119	L 120	L 121	L 122	L 123	L 124	L 125	L 126	L 127	L 128	L 129	L 130	L 131	L 132	L 133	L 134	L 135	L 136	L 137	L 138	L 139	L 140	L 141	L 142	L 143	L 144	L 145	L 146	L 147	L 148	L 149	L 150	L 151	L 152	L 153	L 154	L 155	L 156	L 157	L 158	L 159	L 160	L 161	L 162	L 163	L 164	L 165	L 166	L 167	L 168	L 169	L 170	L 171	L 172	L 173	L 174	L 175	L 176	L 177	L 178	L 179	L 180	L 181	L 182	L 183	L 184	L 185	L 186	L 187	L 188	L 189	L 190	L 191	L 192	L 193	L 194	L 195	L 196	L 197	L 198	L 199	L 200	L 201	L 202	L 203	L 204	L 205	L 206	L 207	L 208	L 209	L 210	L 211	L 212	L 213	L 214	L 215	L 216	L 217	L 218	L 219	L 220	L 221	L 222	L 223	L 224	L 225	L 226	L 227	L 228	L 229	L 230	L 231	L 232	L 233	L 234	L 235	L 236	L 237	L 238	L 239	L 240	L 241	L 242	L 243	L 244	L 245	L 246	L 247	L 248	L 249	L 250	L 251	L 252	L 253	L 254	L 255	L 256	L 257	L 258	L 259	L 260	L 261	L 262	L 263	L 264	L 265	L 266	L 267	L 268	L 269	L 270	L 271	L 272	L 273	L 274	L 275	L 276	L 277	L 278	L 279	L 280	L 281	L 282	L 283	L 284	L 285	L 286	L 287	L 288	L 289	L 290	L 291	L 292	L 293	L 294	L 295	L 296	L 297	L 298	L 299	L 300	L 301	L 302	L 303	L 304	L 305	L 306	L 307	L 308	L 309	L 310	L 311	L 312	L 313	L 314	L 315	L 316	L 317	L 318	L 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651	L 652	L 653	L 654	L 655	L 656	L 657	L 658	L 659	L 660	L 661	L 662	L 663	L 664	L 665	L 666	L 667	L 668	L 669	L 670	L 671	L 672	L 673	L 674	L 675	L 676	L 677	L 678	L 679	L 680	L 681	L 682	L 683	L 684	L 685	L 686	L 687	L 688	L 689	L 690	L 691	L 692	L 693	L 694	L 695	L 696	L 697	L 698	L 699	L 700	L 701	L 702	L 703	L 704	L 705	L 706	L 707	L 708	L 709	L 710	L 711	L 712	L 713	L 714	L 715	L 716	L 717	L 718	L 719	L 720	L 721	L 722	L 723	L 724	L 725	L 726	L 727	L 728	L 729	L 730	L 731	L 732	L 733	L 734	L 735	L 736	L 737	L 738	L 739	L 740	L 741	L 742	L 743	L 744	L 745	L 746	L 747	L 748	L 749	L 750	L 751	L 752	L 753	L 754	L 755	L 756	L 757	L 758	L 759	L 760	L 761	L 762	L 763	L 764	L 765	L 766	L 767	L 768	L 769	L 770	L 771	L 772	L 773	L 774	L 775	L 776	L 777	L 778	L 779	L 780	L 781	L 782	L 783	L 784	L 785	L 786	L 787	L 788	L 789	L 790	L 791	L 792	L 793	L 794	L 795	L 796	L 797	L 798	L 799	L 800	L 801	L 802	L 803	L 804	L 805	L 806	L 807	L 808	L 809	L 810	L 811	L 812	L 813	L 814	L 815	L 816	L 817	L 818	L 819	L 820	L 821	L 822	L 823	L 824	L 825	L 826	L 827	L 828	L 829	L 830	L 831	L 832	L 833	L 834	L 835	L 836	L 837	L 838	L 839	L 840	L 841	L 842	L 843	L 844	L 845	L 846	L 847	L 848	L 849	L 850	L 851	L 852	L 853	L 854	L 855	L 856	L 857	L 858	L 859	L 860	L 861	L 862	L 863	L 864	L 865	L 866	L 867	L 868	L 869	L 870	L 871	L 872	L 873	L 874	L 875	L 876	L 877	L 878	L 879	L 880	L 881	L 882	L 883	L 884	L 885	L 886	L 887	L 888	L 889	L 890	L 891	L 892	L 893	L 894	L 895	L 896	L 897	L 898	L 899	L 900	L 901	L 902	L 903	L 904	L 905	L 906	L 907	L 908	L 909	L 910	L 911	L 912	L 913	L 914	L 915	L 916	L 917	L 918	L 919	L 920	L 921	L 922	L 923	L 924	L 925	L 926	L 927	L 928	L 929	L 930	L 931	L 932	L 933	L 934	L 935	L 936	L 937	L 938	L 939	L 940	L 941	L 942	L 943	L 944	L 945	L 946	L 947	L 948	L 949	L 950	L 951	L 952	L 953	L 954	L 955	L 956	L 957	L 958	L 959	L 960	L 961	L 962	L 963	L 964	L 965	L 966	L 967	L 968	L 969	L 970	L 971	L 972	L 973	L 974	L 975	L 976	L 977	L 978	L 979	L 980	L 981	L 982	L 983	L 984	L 985	L 986	L 987	L 988	L 989	L 990	L 991	L 992	L 993	L 994	L 995	L 996	L 997	L 998	L 999	L 1000	L 1001	L 1002	L 1003	L 1004	L 1005	L 1006	L 1007	L 1008	L 1009	L 1010	L 1011	L 1012	L 1013	L 1014	L 1015	L 1016	L 1017	L 1018	L 1019	L 1020	L 1021	L 1022	L 1023	L 1024	L 1025	L 1026	L 1027	L 1028	L 1029	L 1030	L 1031	L 1032	L 1033	L 1034	L 1035	L 1036	L 1037	L 1038	L 1039	L 1040	L 1041	L 1042	L 1043	L 1044	L 1045	L 1046	L 1047	L 1048	L 1049	L 1050	L 1051	L 1052	L 1053	L 1054	L 1055	L 1056	L 1057	L 1058	L 1059	L 1060	L 1061	L 1062	L 1063	L 1064	L 1065

## **PARTS LIST-**

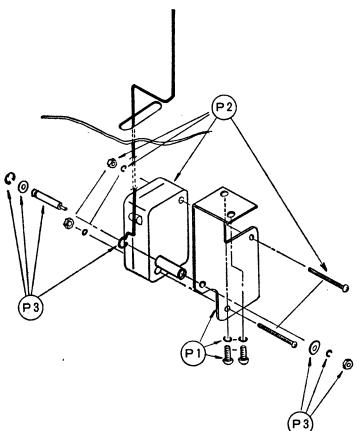
## **OPERATION BOTTOM LEVER**



## **TAPE COUNTER**



## **AUTOMATIC SHUT-OFF SWITCH**



### *Tape Counter*

N 1	-R-241283 -R-448027 -	Bearing Counter Drive Pulley Washer (Rubber) Circular Nut CS-8
N 2	-R-S88061 -	Pulley assy. for Counter Drive (Lower) Washer (Nylon) $2.8\phi \times 5\phi \times 0.5\text{mm}$ - 2
N 3	-R-278027 -	Pulley-for Counter Drive (Upper) Screw P.H $2\phi \times 8\text{mm}$
N 4	-R-S5810 - - -	Tape Counter Screw P.H $3\phi \times 6\text{mm}$ - 2 Spring Washer $3\phi - 2$ Washer (B) $3\phi - 2$
N 5	-R-278028 -	Counter Pulley Lock Screw $3\phi \times 6\text{mm}$
N 6	R-44280	Belt-for Counter Drive (Small)
N 7	R-448010	Belt-for Counter Drive (Large)

## *Automatic-Shut off Switch*

P 1	-R-112903a -	Bracket-for Microswitch Screw, R.H. $3\phi \times 6\text{mm}$ —2
P 2	-R-S4836 -	Spring Washer $3\phi$ —2 Micro-switch Screw, R.H. $2.6\phi \times 15\text{mm}$ —2
P 3	-R-12378 -R-241305 -R-14233 -	Spring Washer $2.6\phi$ —2 Nut Class 1, $2.6\phi$ —2 Actuation Lever-Automatic-Shut-off Spacer (pipe) Shaft Washer (Nylon) $5\phi \times 2.8\phi \times 0.5\text{mm}$ External "E" Washer $3\phi$ Spring Washer $3\phi$ mm Nut Class 1, $3\phi$