

SANYO



All-transistorized AC Operated Tape Recorder

MODEL MR-312

SERVICE MANUAL

SANYO ELECTRIC CO., LTD.

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

SPECIFICATIONS

TRANSISTORS

2SB185AA.....	1st audio amplifier
2SB185AA.....	2nd audio amplifier
2SB185AA.....	3rd audio amplifier
2SB187AA×2	power amplifier
2SB187AA.....	AC biasing oscillator

THERMISTOR & OTHER ELEMENTS

STD-20 (thermistor) ...	temperature compensator
SD-14	silicon rectifier

POWER SOURCE..... AC line power: 115/230 v 50/60 c/s

POWER OUTPUT Maximum 350mW. Undistorted 300 mW

SPEAKER 2-1/2 permanent dynamic. impedance 8 ohms

TAPE SPEEDS..... 3-3/4 and 1-7/8 inches per second

TAPE REELS 3-1/4 inches maximum

RECORDING SYSTEM ... AC bias dual track

ERASING SYSTEM..... DC erase

RECORDING TIME..... On 3-1/4" reel (300 ft.)
30 minutes at 3-3/4 ips (dual tracks)
60 minutes at 1-7/8 ips (dual tracks)

FAST FORWARD AND REWIND TIME ... Less than 2 minutes and 30 seconds

FREQUENCY RESPONSE..... 150-6,000 cps (at 3-3/4 ips)
150-4,000 cps (at 1-7/8 ips)

MICROPHONE Dynamic microphone, impedance 200 ohms

MOTOR 2-pole induction motor

DIMENSIONS..... 8" width×9" depth×4" height
205×230×100 mm

NET WEIGHT 4.2 lbs. approx.
2.0 kg approx.

REMOVING THE MECHANISM OUT OF THE CABINET

In making the repairs of the mechanism or the amplifier, or when cleaning them, it is necessary to remove the recorder set from the cabinet. In such cases, follow the instruction given below.

- 1) The volume control knob, recording knob and operation knob should be pulled upward and removed.
- 2) When loosening the small screw (+) and capstan rest pin to

tighten the upper panel, the upper panel can be removed from the cabinet.

- 3) For removing the chassis from the cabinet, loosen two small (+) screws. In this case you must take care of the lead wires to AC cord, speaker and pilot lamp.

ADJUSTMENT OF MECHANISM

When defective operation is encountered in rewind or fast forward, when unusual slack is produced at the time of changing from stop to play, or when improper tension is noted on the tape in each operation, although the tape recorder is properly operated, the following adjustment is necessary.

1) Necessary measuring equipments

Although no special measuring equipment or tool is necessary for adjusting the mechanism, it is convenient if a tension gauge (0-100g, 2kg with 100g scale) is given.

(Remarks)

The tools (such as screw drivers, etc.) used in adjusting the Head angle or installing the Head must be non-magnetic. In the event magnetized tools are used, the ferrous and permalloy parts located near the recording tape may become magnetized, and cause statics.

2) Head pad pressure

When the sound reproduction is uneven, or when the erasing is

not sufficient, the cause may be traced to weak pressure of the pad or uneven pressure on the erasing head and playback head. The pressure of the pad, as shown in Fig. 1 will show 25-30gr., when the tension gauge is placed between the pads and heads, and pulled in the direction of arrow. At the above reading of the gauge, pad-felt should be separated from the pad. (Fig. 1)

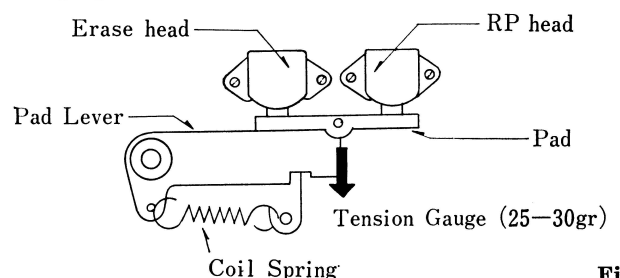


Fig. 1

Pressure between the motor and flywheel

When the pressure between the motor and flywheel is weak, it may cause slipping, and the recorder will not function as expected. The pressure of the motor is measured by pulling the tension gauge as shown in Fig. 2 and the gauge reading should be 200 ± 20 gr, when the motor pulley detaches from the flywheel and the latter stops rotation. (Fig. 2)

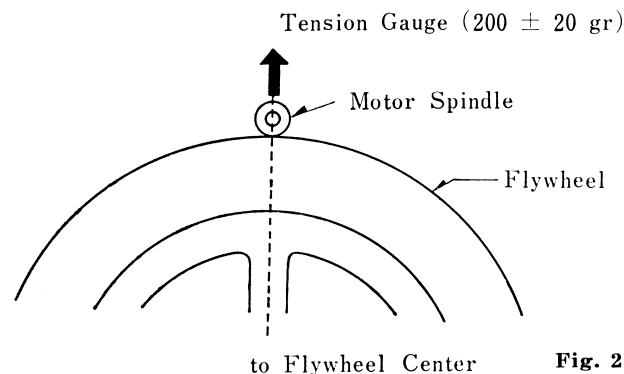


Fig. 2

Rewinding mechanism

The pressure between the supply reel base and flywheel should be 200 ± 50 gr. Measure should be done by pulling the tension gauge in the direction of arrow. (Fig. 3)

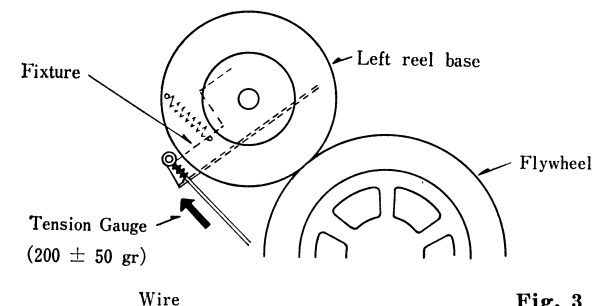


Fig. 3

Pinch roller pressure

When the pressure of the pinch roller is weak, the recording tape may slip between the capstan and the pinch roller. The pressure of the pinch roller is the best at 230 ± 30 gr. with 1-7/8"/sec, and at 400 ± 60 gr. with 3-3/4" sec. In order to measure the pressure, load the machine with recording tape, and shown in Fig. 4 pull the tension gauge away from the pinch roller so that the latter will separate from the capstan, and read the gauge when the tape stops. Adjustment is done by the coil spring. Measuring is required two or three times repeating to get average. (Fig. 4)

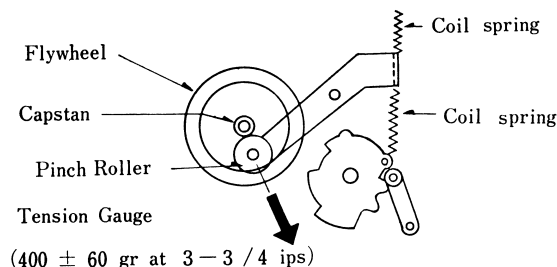


Fig. 4

6) Adjustment of heads

*Position of heads

Inadequate position of Erasing Head will cause insufficient erasing of the tape, or erasing of the upper and lower tracks at the same time although the upper track is intended to be erased. In case of recording and playback Head, the power output of reproduction may be insufficient, or high tones will not be reproduced sufficiently, or the recordings of upper and lower tracks may be reproduced at the same time. The proper positions of the Heads are as shown in Fig. 5, and the adjustment of the positions of the Head is done by turning the Head fixing screws. (Fig. 5)

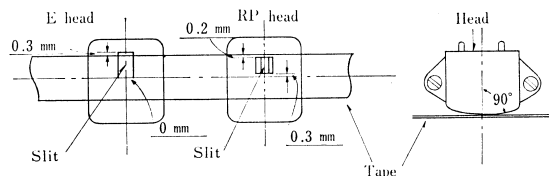
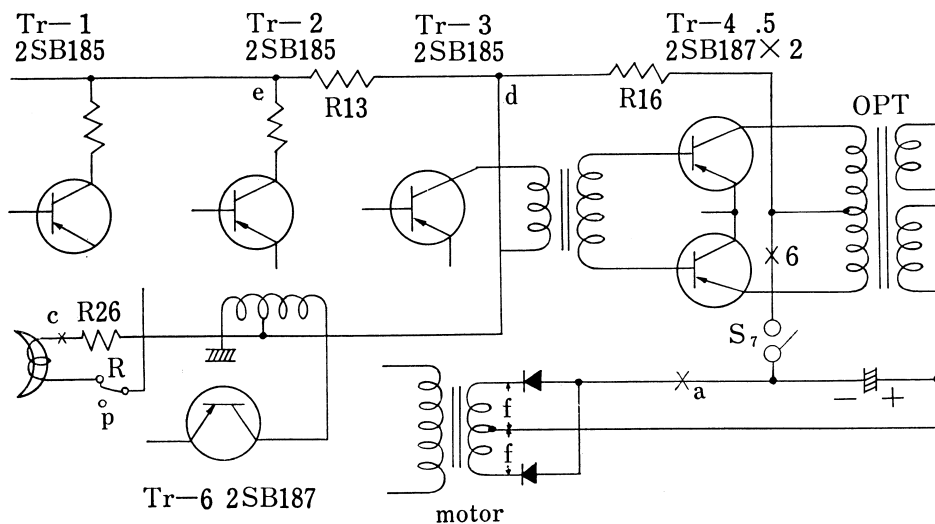


Fig. 5

*Angle of heads

Slanting of the Erasing Head to either right or left will not cause any problem, but when this to the Recording-Playback Head, the replayback frequency will be influenced greatly. The gap between the two poles should be perpendicular to the direction of the movement of the recording tape, otherwise the high tones will not be sufficiently reproduced.

CHECK POINT OF VOLTAGE & CURRENT



SUGGESTIONS FOR ELECTRICAL TROUBLES

Syptom	Cause	Remedy
When switch is tured on pilot lamp doesn't light and motor doesn't start operaing	1. Defective power cord or plug 2. Blown or loosen fuse 3. Defective power switch 4. Short of smoothed circuit C18	1. Verification, repair or replacement 2. Adjustment and verification 3. Verification and replacement 4. Same as above
Pilot lamp lights but motor doesn't rotate	5. Defective motor 6. Failure or shortage of lead wire to motor	5. " 6. "
Poor voltage of B power supply	7. Short of B power supply load side 8. Defective rectifier 9. Lack of supply voltage on primary side	7. Check voltage of each section 8. Verification and replacement 9. Verification
Unable to record or reproduce	10. Defective amplifier 11. Defective R.P. head or hum balance coil 12. Poor contact between tape and record reproduce head 13. R.P. select switch failure	10. Check voltage of each part 11. Replace when faultly or short circuited 12. Check tape loading and head contact section 13. Inspection, or replacement
Reproduces but doesn't record *Pilot lamp doesn't light	14. Select switch doesn't work for poor 15. Defective microphone 16. Defective mike input jack	14. Check select mechanism switch contacting condition, adjust switch 15. Check microphone or cord 16. Check, adjust and replace
*Pilot lamp lights	17. Defective constant current circuit (R25, R29, C17, C16, OSC coil) 18. Defective oscillator circuit especially R28, C14	17. Inspection and replacement 18. Inspection and replacement
*Cross talk of former recording and latter	19. Broken wire at third winding of OPT	19. Verification and replacement
Records but doesn't reproduce	20. Defective E head or R26 21. Defective RP select switch or poor contact of the switch 22. Failure or short of output transformer 23. Defective speaker jack 24. Defective speaker	20. Inspection or replacement 21. Check select switch mechanism and switch 22. Check and replacement 23. External adjustment or replacement 24. Check with external speaker connected to speaker jack
Noise	25. Defective contact of volume control 26. Defective transistor (especially TR-1) 27. Bad of circuit element or poor contact with adjoining element defective soldering 28. Magnetized RP heads 29. Distortion wave 30. Bad earth of printed wiring board	25. Verification and replacement 26. Inspection and replacement 27. Check, adjust or replace 28. Erase with de-msgnetizer 29. Check and adjust circuit elements 30. Verification and replacement
*Noise loud when connecting microphone	31. Bad microphone 32. Defective insulation of C2 33. Poor capacity of smoothed circuit (C1, C10, C18)	31. " 32. -ditto- 33. "
Bad tones	34. Bad circuit element or transistor 35. Inadequate high frequency bias 36. Bad contact of tape and head 37. Bad speaker	34. Inspection and replacement 35. Adjust bias 36. Check positioning of tape or clean the contacting part of head 37. Compair by plugging in another speaker to EXT SP jack, replace
Lack of high tones	38. Head not perpendicular 39. C12 capacity too big	38. Check and adjust 39. Inspection and replacement
Unable to erasing	40. Improper position of E head 41. Poor contact between E head and tape 42. Lack of erasing current 43. Failure or short of E head	40. Adjust position 41. Adjust and clean 42. Verification and replacement 43. -dittor-
Much hum	44. Poor adjustment of hum balance coil 45. Arrangement of RP shielded wire close	44. Readjust 45. Move as far as possible
Cross talk of upper and lower tracks	46. Improper lower and upper positions of head 47. Defective tape guide and tape moving up or down due to tilt of head	46. Reinstall and adjust 47. Adjust tape guide and head vertically

PARTS RIST

Stock No.	Description	Q'ty
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CABINET		
R-AT09501	Cabinet bottom Assembly	
R-AT09502	Lid Assembly	
R-AT09503	Top Panel Assembly	
R-423865	Speaker baffle plate	1
R-25145	Bracket for Speaker	2
R-24942a	Capstan sleeve Rest	1
R-S81331	Handle Assembly	1
R-S8879	Volume Knob Assembly	1
R-S8968	Operation Lever Assembly	1
R-37032	Record Knob	1
	Cushion for Operation Lever	1
	Fixer for Speaker Leads	2
R-241186	Bracket for Handle	2
	Plastic Washer for Handle	4
	Plastic Washer for Handle	2

CHASSIS		
R-36154	Eschation plate for Jacks	1
R-39201a	Base for Record/Play Switch	1
R-25144	Terminate spring for R.P. Switch	6
R-15141	Pin for R/P Switch Lever	2
R-13075	Plate Spring for R/P Switch Base	2
R-41381e	Printed Circuit Board	1
R-23753	Bracket for Voltage Changing Switch	1
R-AT09504	Record/Play Changing Lever Assembly	
R-41395	Sheet for R/P Changing Lever	1
R-44045	Cushion for Pilot Lamp	1
	Sheet for Operation Lever	1
R-112332	Bracket for Cord fixer	1
	Washer	1

ELECTRICAL PARTS		
R-R124124	Variable Resistor	1
R-W6245a	Input Transformer	1
R-W6230a	Output Transformer	1
R-W8156	Oscillator Coil	1
R-S6282d	Microphone Assembly	1
R-S6304	Speaker	1
R-R11014	Semifixed Resistor 1 K Ω	1
R-W1038	Hum Balance Coil	1
R-S2109	Jacks for Mic & Ext	2
R-261193	Heat Sink for 2SB187	1
R-S1228	Pilot Lamp	1
R-S1041a	Fuse	1
R-23232	Fuse Holder	2
R-32126a	3-1/4" Empty Reel	1
	Splicing tape	1
R-S4280a	Spring Switch	1
R-S3063	Lug for Earth	2
R-S3008	Lug for Leads fixer	2
R-S4286	Voltage Changing Switch	1
R-S8479b	3-1/4" Full tape Reel	1
R-S3134	AC power cord twin Leads System	1
R-S85746	Ziemens pin type adaptor	1
R-S85756	England pin type adaptor	1
	AC power cord third Leads system	1
R-S1245	Australia 3 pin type plug	1
R-S3134	AC power cord twin Leads system	1
R-S8694	Australia 3 pin type adaptor	1

Stock No.	Description	Q'ty
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ELECTRICAL PARTS		
R-S1076a	AC power cord third Leads system	1
	England type 3 pin plug	1
	Cushion	1
R-S1804	AC power cord third Leads system	1
	Photex type 3 pin plug	1
R-S1076a	England type 3 pin plug	1
R-S1258	Silicon Rectifier	2
	Thermistor SDT-20	1
	Transistor 2SB185AA	3
	Transistor 2SB187AA	2
	Transistor 2SB187AA with Heat Sink	1

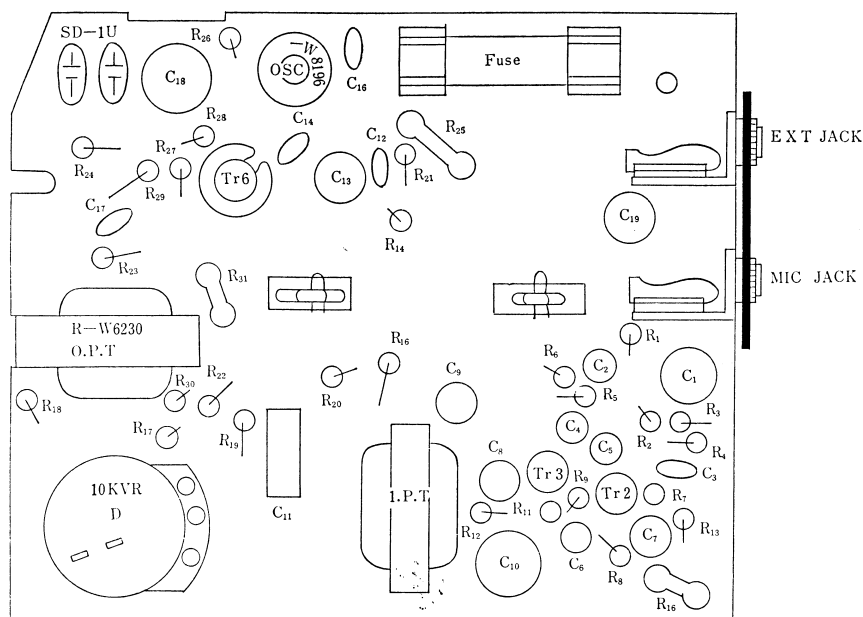
RESISTORS

Description					Q'ty
Carbon	P-type	1/4W	$\pm 10\%$	470 K	1
		"	"	220 K	2
		"	"	120 K	1
		"	"	100 K	1
		"	"	10 K	1
		"	"	8.2 K	4
		"	"	5.6 K	2
		"	"	3.9 K	2
		"	"	2.2 K	2
		"	"	1.8 K	1
		"	"	560	1
		"	"	470	2
		"	"	220	1
		"	"	120	1
		"	"	39	1
		"	"	27	1
		"	"	150	1
		"	"	1 K	1
Carbon	P-type	"	"	82	1
		"	"	220	1
		"	"	390 K	1
		1/2W	$\pm 5\%$	270	1
		1/4W	"	18	1
		"	"	3.3	1

CAPACITORS

Description					Q'ty
Capacitor					
Myler	Squere	50WV	+30 -20	0.05 μ F	1
			"	0.003 μ F	1
Styrol	Axis	25WV	$\pm 10\%$	330 pF	1
			"	300 pF	1
MP Capacitor	Axis	150WV	$\pm 20\%$	0.2 μ F	1
				500 μ F	1
		10WV		200 μ F	1
				100 μ F	1
		3WV		30 μ F	3
				5 μ F	2
		10WV		10 μ F	1
				1 μ F	1
		10WV		0.2 μ F	1
				200 μ F	2
		6V			

MAIN PARTS ROCAATION



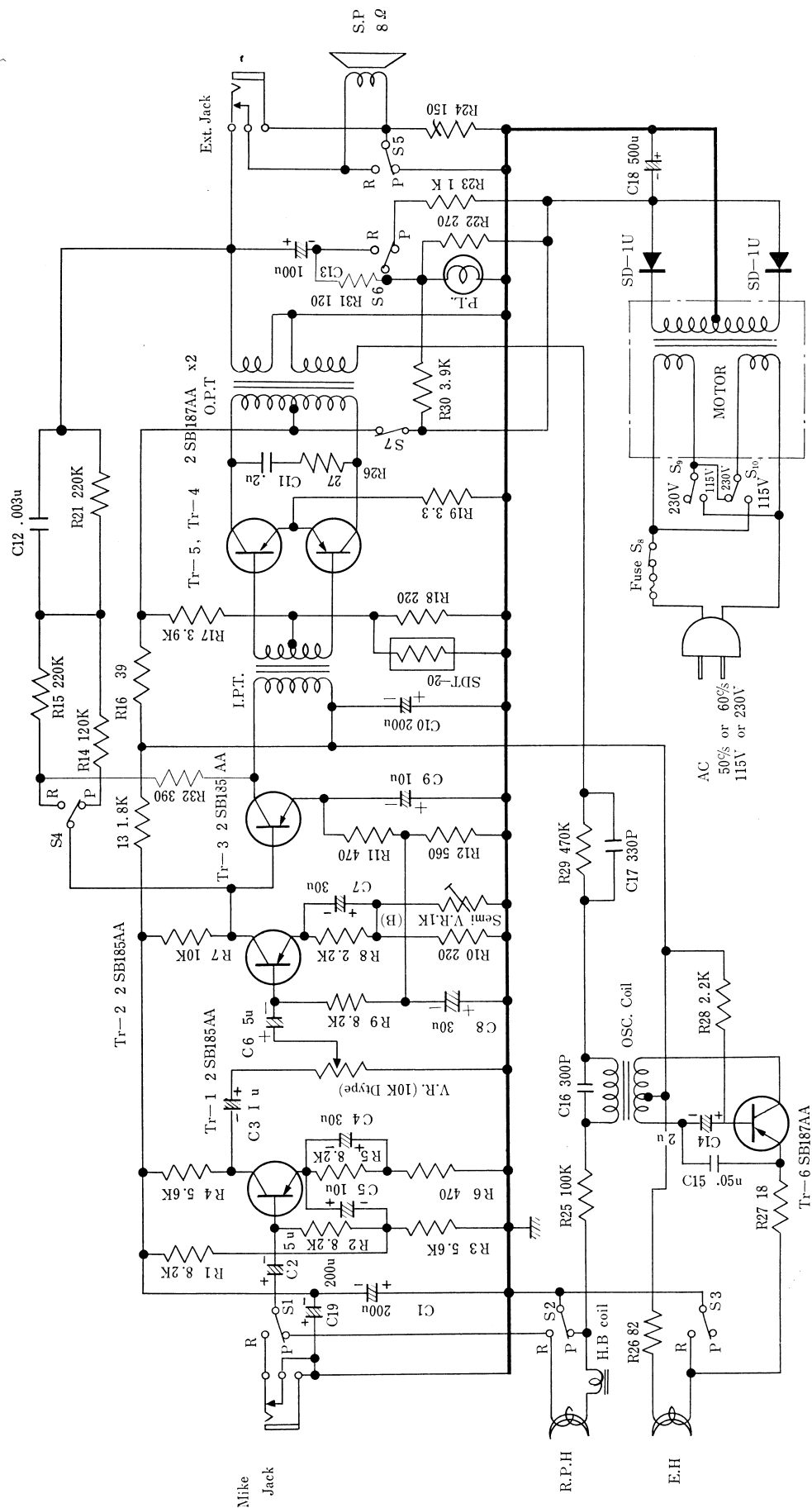
Key No.	Stock No.	Description	Q'ty
CHASSIS			
1	R-112283a	Chassis	1
2	R-112284a	Fixing metal-for left reel shaft base	1
3	R-112285	Lever-for left brake	1
4	R-112286	Lever-for right brake	1
5	R-112287	Slide-for brake movement	1
6	R-112288a	Panel-for motor mounting	1
7	R-112289	Cam plate-for operation cam	1
8	R-112290	Arm	1
9	R-112291	Mounting metal-for cam shaft	1
10	R-112292	Lever-for fast forward lock	1
11	R-112293	Lever-for motor	1
12	R-112294	Mounting metal-for head base	1
13	R-112295a	Arm-pad arm	1
14	R-112296	Pad-for pad plate	1
15	R-112297	Mounting motor adjusting stopper	2
16	R-112298a	Lever-for pinch lever	1
17	R-112299a	Shielding board	1
18	R-34115a	Reel base-for upper right reel base	1
19	R-112308a	Ring, for right reel weight	1
20	R-34116	Pulley-under right reel	1
21	R-34117	Reel base-for left reel	1
22	R-14150	Shaft-for motor panel hanging	1
23	R-24928	Boss-for panel hanging	1
24	R-14151	Pin-for motor	1
25	R-24929a	Shaft-for brake slide	1
26	R-14152a	Shaft-for pinchroller shaft	1
27	R-24930	Shaft bearing-for pinch roller shaft base	1
28	R-24940	Shaft-for pinch lever shaft	1
29	R-24931	Roller	1
30	R-14154	Shaft-roller shaft	1
31	R-24932	Tape guide	2
32	R-24933	Boss-for motor	1
33	R-24934	Boss-for pinch lever spring	1
34	R-14155a	Shaft-right reel shaft	1
35	R-14153a	Shaft-left reel shaft	1
36	R-24941a	Shaft-for cam shaft	1
37	R-25241	Shaft bearing-for flywheel shaft bearing	1
38	R-S81011a	Flywheel (compl.)	1
39	R-12254a	Shaft-Flywheel	1
40	R-28092	Flywheel	1
41	R-44232	Belt-Drive	1
42	R-S81012	Capstan sleeve (compl.)	1
43	R-24936	Special Screw	1
44	R-24937	Capstan	1
45	R-24938	Boss for right and left brake	2
46	R-24939	Boss for reel base plate	1
47	R-12253	Spring-for motor pulley only for 50 c/s	1
48	R-15211	" -for pinch roller pressure	1
49	R-15212	" -for cam	1
50	R-15213	" -for fastforward lock	1
51	R-15214	" -for pad and reel base	2
52	R-15215	" -for brake slide	1
53	R-15216	" -for right and left brakes arm	2
54	R-15217	" -for pinch lever	1

Key No.	Stock No.	Description	Q'ty
55	R-15218	" -for motor	1
56	R-15219	" -for reel base	1
57	R-15220	Wire-for rewind operation bar	1
58	R-112313	Shield plate	1
59	R-44205a	Felt-for right reel	1
60	R-25187	Felt-for pad metal	2
61	R-24764	Brake-for right and left brakes	2
62	R-24763	Roller-for pinch roller	1
63	R-S5096	Plate spring-for head adjustment	2
64	R-S6315	Boss	2
65	R-S6284	Boss-for pad arm	1
66	R-S6284	AC Motor	1
67	R-S6284	Record/Play Head	1
68	R-S6284	Erase Head	1

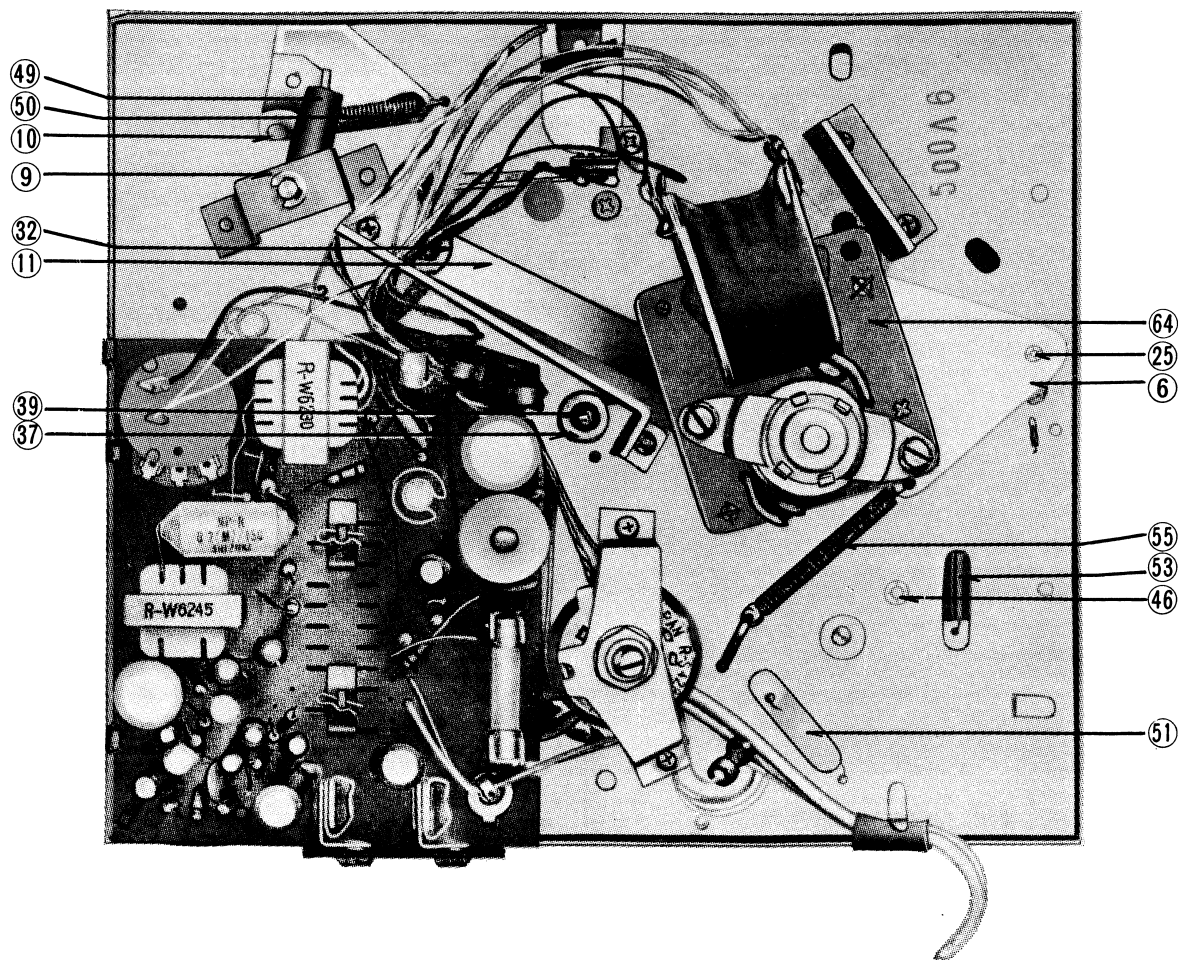
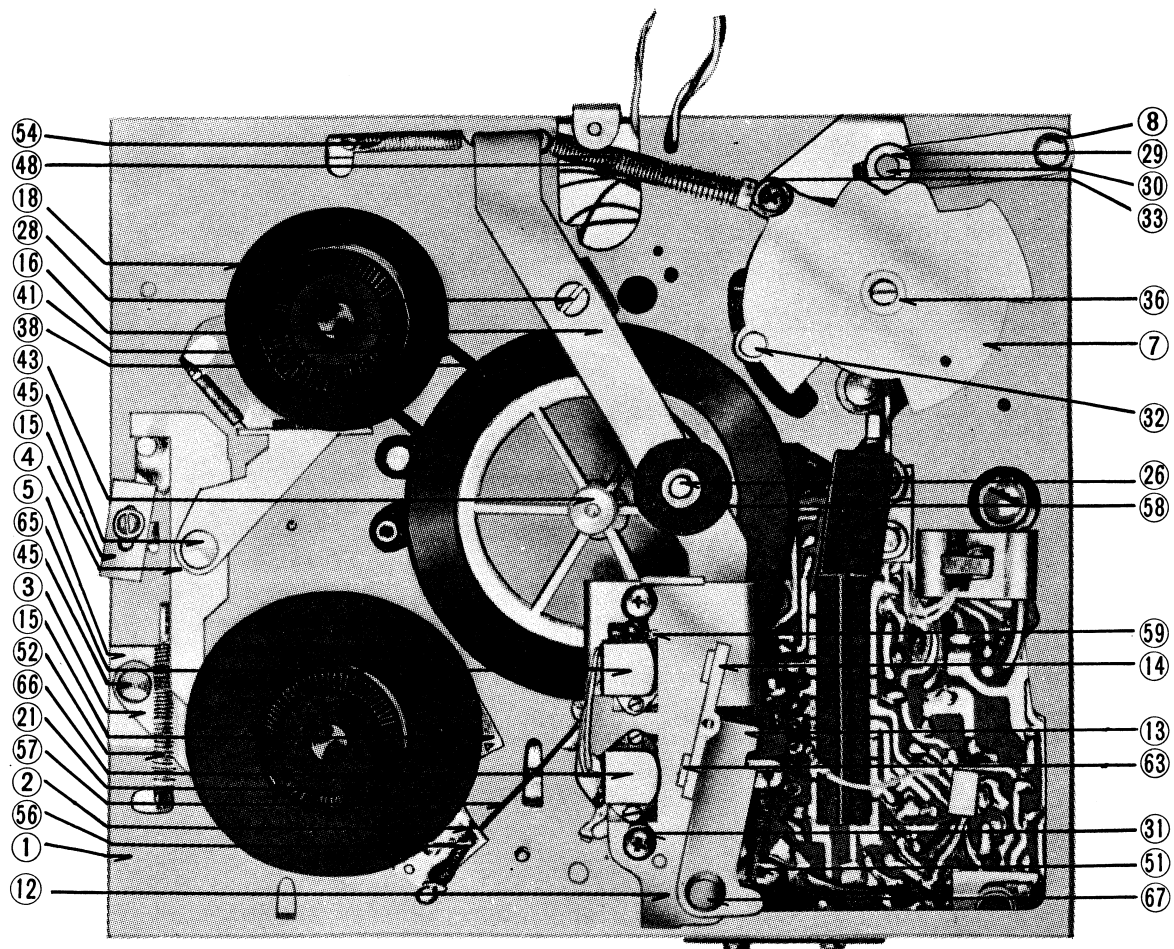
MOUNTING PARTS

Bind Head Screw 3×30 mm	1
Washer for Small Screw 3 mm	4
Tapping Screw 3×8 mm	1
Tapping Screw 3×6 mm	11
Screw 3×6 mm	7
Screw 3×12mm	1
Nut 3mm	1
Spring Washer 3 mm	7
Washer 3.3×10×0.5	2
Washer 3 mm	1
Ext Lock Washer 3 mm	1
Spring Washer 4 mm	2
Washer for Small Screw 4 mm	2
Hexagon Nut 4 mm	2
Screw 3×6	5
Screw 3×5	3
Screw 3×8	2
Screw 3×20	1
Screw 3×16 Truss Hd.	2
Screw 2.6×5	3
Screw 2×8	4
Spring Washer 3 mm	11
Spring Washer 2.6 mm	3
Metal Washer 3 mm	3
Metal Washer 2.6 mm	2
Metal Washer 2 mm	2
Nut Class 12.6 mm	1
Nut Class 13 mm	1
Self tapping screw 3×6 mm Pan Hd.	1
External "E" ring 3 mm	2
External "E" ring 4 mm	1
Feiber washer 5.2×8×0.5	1
Nylon washer 5.2×8×0.5	1
Feiber washer 4×8×1.0	2
Feiber washer 4×8×0.5	2
Feiber washer 6×10×0.5	1
Metal washer 2.8×16×0.5	1

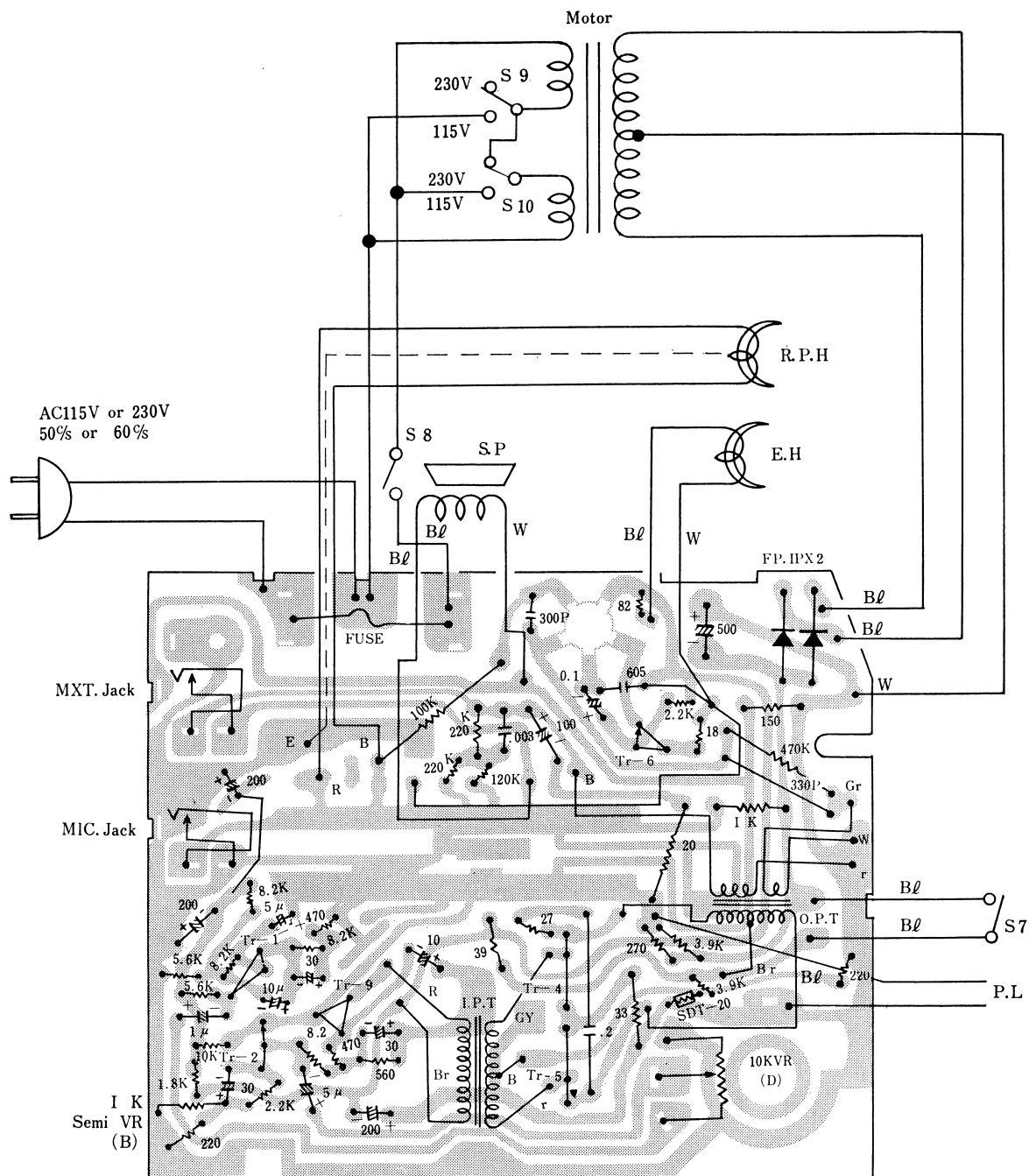
CIRCUIT DIAGRAM



Note : S1~S6 : Recording switch. (shown in "Play" Position).
S7 : Switch on at record and play.
S8 : Power Switch.
S9~S10 : Power line changing switch. (shown in "230V" position)



INTER PARTS CONNECTION



Tr-1 }
Tr-2 } 2 S B 185 A A
Tr-3 }

Tr-4 }
Tr-5 } 2 S B 187 A A
Tr-6 }