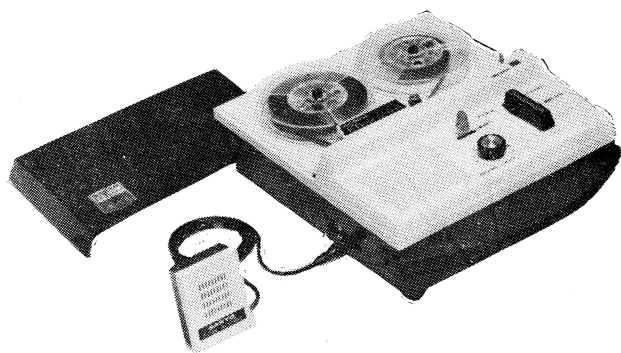


SANYO



All Transistorized AC Operated Tape Recorder

MODEL **MR-311**

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

SDT-20 (thermistor)	temperature compensator
FR-1P × 2	silicon rectifier

POWER SOURCE ... AC line power : 115 or 230V, 50 or 60 cps

POWER OUTPUT Maximum 500 mW. Undistorted 350 mW

SPEAKER 2½ 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 magnetic biasing

ERASING SYSTEM DC magnetic biasing

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

NET WEIGHT 4.2 lbs. 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 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.

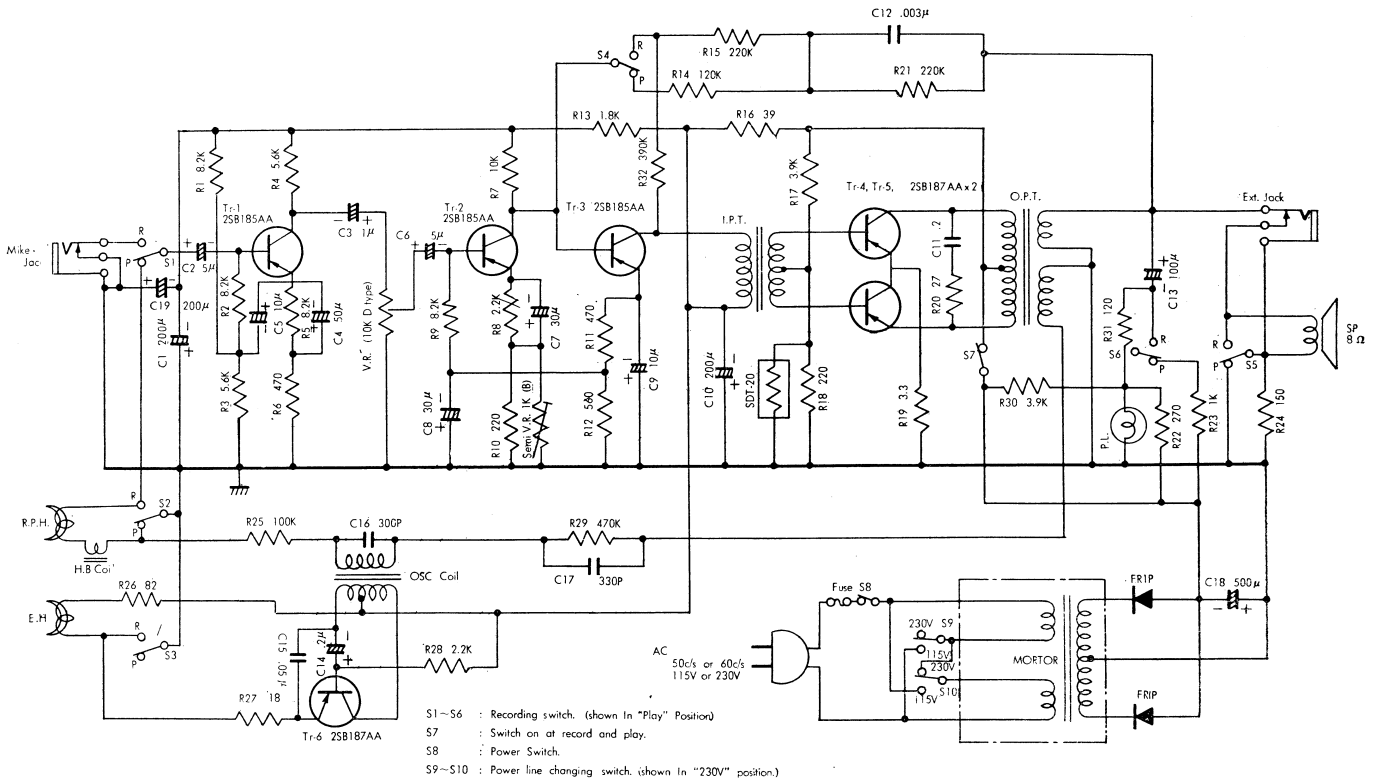
1) Necessary measuring equipments

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.

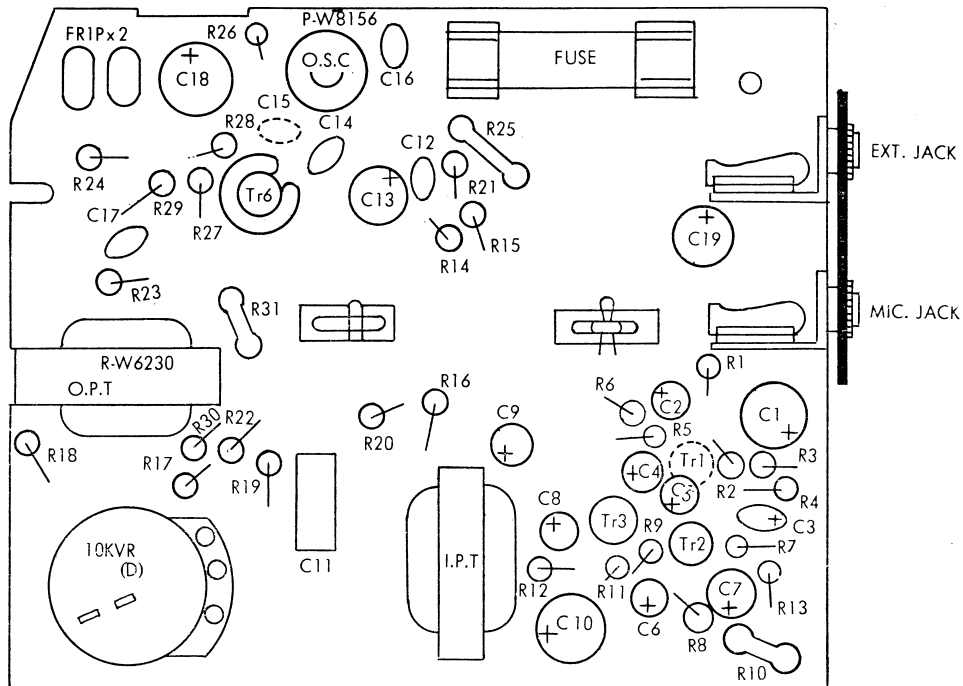
(Remarks)

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.

CIRCUIT DIAGRAM

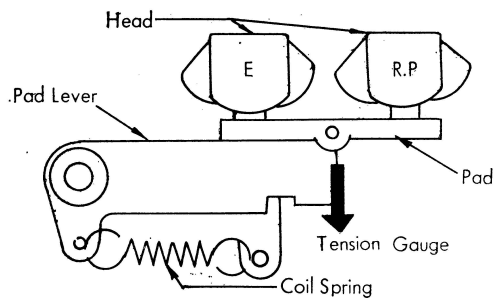


MAIN PARTS LOCATION



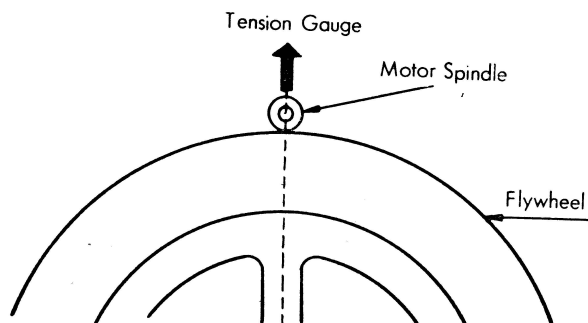
2) Head pad pressure

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)



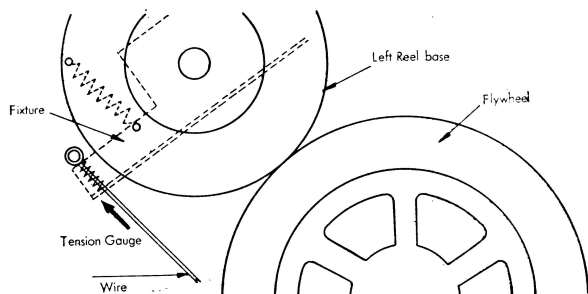
3) Pressure between the motor and flywheel

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 $200 \pm 20\text{gr}$, when the motor pulley detaches from the flywheel and the latter stops rotation. (Fig. 2)



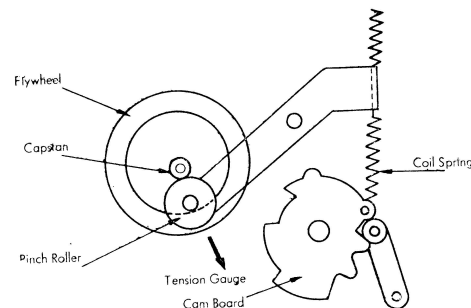
4) Rewinding mechanism

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



5) Pinch roller pressure

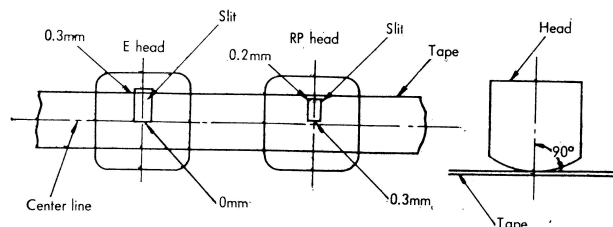
When the pressure of the pinch roller is weak, the recording tape may slip between the capstan and the pinch roller. The pressure of the pinch roller is the best at $230 \pm 30\text{gr}$. with $1\frac{7}{8}''/\text{sec}$, and at $400 \pm 60\text{gr}$. with $3\frac{3}{4}''/\text{sec}$. In order to measure 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)



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)



*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.

SUGGESTIONS FOR MECHANICAL TROUBLES

Symptom	Cause	Remedy
Capstan does not rotate Motor trouble Defective transmission mechanism	1. Coil failure 2. Burnt metal 3. Foreign material exists between rotor and stator 4. Oil adheres to motor shaft 5. Burnt or oil lack of flywheel shaft 6. Oil adheres to flywheel rubber 7. Defective coil spring of motor 8. Loosen capstan sleeve	1. Coil induction, replace and test 2. Lubricate or repair 3. Replace, remove foreign material 4. Clean with carbon tetrachloride or alcohol 5. Lubricate, replace flywheel or shaft bearing 6. Cleaning (same as 4) 7. Adjust pressure of spring. $200 \pm 20g$ is adequate 8. Observe fixing screw of capstan tighten perfectly
Defective rotation of motor Defective motor Defective transmission mechanism	9. Same as 3 10. Same as 4—9 11. Oil lack of winding or rewinding reel base	11. Lubrication
Wow, flutter Defective motor Defective transmission mechanism Defective tape transport	12. Slipping of rubber belt 13. Same as 3 14. Same as 4—9 15. Foreign material adheres flywheel rubber or transformation 16. Foreign material adheres to rubber belt or transform 17. Flywheel shaft is bent or inclined 18. Foreign material adheres to pinch roller or transformation 19. Dust adheres to tape transport section especially to pads 20. Poor pressure of pinch roller	12. Cleaning (same as 4) 15. Cleaning (same as 4) or replace 16. Cleaning (same as 4) or replace 17. Replace 18. Cleaning (same as 4) or replace 19. Cleaning (same as 4) 20. Pressure should be $400 \pm 60g$ ($3\frac{3}{4}"/s$) $230 \pm 30g$ ($1\frac{7}{8}"/s$)
Defective winding Reel base doesn't rotate when reel is not placed Reel doesn't rotate when reel is set	21. Same as 1—8, 12, 13 22. Rubber belt failure, slipping of pulley or flywheel to rubber belt 23. Slipping of pulley or flywheel to rubber belt 24. Oil slack of pulley or take up reel base 25. Oil lack of rewinding reel base	22. Replace or clean (same as 4) 23. Same as above 24. Inspect reel base, shaft and shaft bearing lubrication 25. Same as above, same as above
Defective rewinding Reel base doesn't rotate	26. Same as 1—8 27. Rewind roller doesn't contact reel base	27. Coil spring failure of rewinding reel base spring tension should be $200 \pm 50g$
Defective fast forward Take reel base doesn't rotate Slow speed rotation Defective brake mechanism Brake failure	28. Same as 1—8 29. Same as 12, 13 30. Broken brake shoe 31. Poor brake adjustment	30. Adherence, replace 31. Replace brake or adjust brake lever
Unable to record RP head select switch doesn't work properly	32. Spring for RP head select lever is broken	32. Replace select lever spring
Imperfect erasing	33. Defective pressure of tape pad 34. Noise of motor itself 35. Loosen screw of fixing motor 36. Same as 1—8, 27	33. Lubrication hinge section 34. Lubrication or replacement 35. Tighten the screw

SUGGESTIONS FOR ELECTRICAL TROUBLES

Symptom	Cause	Remedy
When switch is turned on, pilot lamp doesn't light and motor doesn't start operating	<ol style="list-style-type: none"> Defective power cord or plug Blown or loosen fuse Defective power switch Short of smoothed circuit C18 	<ol style="list-style-type: none"> Verification, repair or replacement Adjustment and verification Verification and replacement Same as above
Pilot lamp lights but motor doesn't rotate	<ol style="list-style-type: none"> Defective motor Failure or shortage of lead wire to motor 	<ol style="list-style-type: none"> " "
Poor voltage of B power supply	<ol style="list-style-type: none"> Short of B power supply load side Defective rectifier Lack of supply voltage on primary side 	<ol style="list-style-type: none"> Check voltage of each section Verification and replacement Verification
Unable to record or reproduce	<ol style="list-style-type: none"> Defective amplifier Defective R.P. head or hum balance coil Poor contact between tape and record reproduce head R.P. select switch failure 	<ol style="list-style-type: none"> Check voltage of each part Replace when faulty or short circuited Check tape loading and head contact section Inspection, or replacement
Reproduces but doesn't record *Pilot lamp doesn't light *Pilot lamp lights *Cross talk of former recording and latter	<ol style="list-style-type: none"> Select switch doesn't work for poor contact of select switch Defective microphone Defective mike input jack Defective constant current circuit (R25, R29, C17, C16, OSC coil) Defective oscillator circuit especially R28, C14 Broken wire at third winding of OPT Defective E head or R26 	<ol style="list-style-type: none"> Check select mechanism switch contacting condition, adjust switch Check microphone or cord Check, adjust and replace Inspection and replacement Inspection and replacement Verification and replacement Inspection or replacement
Records but doesn't reproduce	<ol style="list-style-type: none"> Defective RP select switch or poor contact of the switch Failure or short of output transformer Defective speaker jack Defective speaker 	<ol style="list-style-type: none"> Check select switch mechanism and switch Check and replacement External adjustment or replacement Check with external speaker connected to speaker jack
Noise *Noise loud when connecting microphone	<ol style="list-style-type: none"> Defective contact of volume control Defective transistor (especially TR-1) Bad of circuit element or poor contact with adjoining element defective soldering Magnetized RP heads Distortion wave Bad earth of printed wiring board Bad microphone Defective insulation of C2 Poor capacity of smoothed circuit (C1, C10, C18) 	<ol style="list-style-type: none"> Verification and replacement Inspection and replacement Check, adjust or replace Erase with de-magnetizer Check and adjust circuit elements Verification and replacement " -ditto- "
Bad tones	<ol style="list-style-type: none"> Bad circuit element or transistor Inadequate high frequency bias Bad contact of tape and head Bad speaker 	<ol style="list-style-type: none"> Inspection and replacement Adjust bias Check positioning of tape or clean the contacting part of head Compare by plugging in another speaker to EXT SP jack, replace
Lack of high tones	<ol style="list-style-type: none"> Head not perpendicular C12 capacity too big 	<ol style="list-style-type: none"> Check and adjust Inspection and replacement
Unable to erasing	<ol style="list-style-type: none"> Improper position of E head Poor contact between E head and tape Lack of erasing current Failure or short of E head 	<ol style="list-style-type: none"> Adjust position Adjust and clean Verification and replacement -ditto-
Much hum	<ol style="list-style-type: none"> Poor adjustment of hum balance coil Arrangement of RP shielded wire close 	<ol style="list-style-type: none"> Readjust Move as far as possible
Cross talk of upper and lower tracks	<ol style="list-style-type: none"> Improper lower and upper positions of head Defective tape guide and tape moving up or down due to tilt of head 	<ol style="list-style-type: none"> Reinstall and adjust Adjust tape guide and head vertically

PARTS LIST

Stock No.	Description	Q'ty
R-31584	Cabinet	1
R-31585b	Lid	1
R-31586a	Panel	1
R-261019	Badge	1
R-261023	Badge	1
R-32454	Sign board (for Pilot lamp)	1
	Speaker net	1
R-423865	Baffle board	1
R-261018b	Label (for voltage selector)	1
R-25145	Fixing metal	2
R-44213	Leg	3
R-44225	Strap (for fixing AC cord)	2
R-24942	Pin (rest bar)	1
R-47886	Circuit diagram	1
R-S8879	Knob (complete) (for VR)	1
R-37032	Knob (for REC. knob)	1
R-S8968	Knob (complete) (for operation lever)	1
	Cushion (6×8×1.2t black rubber)	1
	Cushion (fixing SP lead)	3
	Cushion (for cabinet protection)	3
R-39185	Hundle	1
	Cushion (on lid)	1
CHASSIS		
R-36154	Screen (for jack mounting)	1
R-39201a	Base (for RP switch)	1
R-25144	Jack plate (for RP switch)	5
R-15141	Pin (for RP switch)	2
R-13075	Plate spring (for RP switch)	2
R-41381b	Printed circuit board	1
R-112251	Fixing metal (for RP switch)	1
R-112227	Shift lever (")	1
R-15200	Spring (")	1
R-24905	Spacer (")	1
R-44045	Cushion (for pilot lamp)	1
R-41395	Sheet (for RP lever)	1
	Sheet (for operation lever)	1
R-112313	Shielding Plate (for motor)	1
R-23753	Mounting plate (for voltage selector)	1
ELECTRIC		
R-R124124	Volume (with AC switch)	1
R-W6245	I.P.T. (5K ohms: 2K ohms)	1
R-W6230a	O.P.T. (160 ohms: 8 ohms)	1
R-W8156	OSC coil	1
R-S6282d	Microphone (compl.)	1
R-S6304	Speaker	1
R-R11014	Semi-fixed volume	1
R-W1038	Hum balance coil	1
R-C9135	Electrolytic capacitor 500 μ F 15WV C18	1
R-C9101	-do- 200 μ F 10WV, C10	1
R-C9134	-do- 100 μ F 3WV, C13	1
R-C9133	-do- 30 μ F 3WV, C4, C7, C8	3
R-C9131	-do- 5 μ F 6WV, C2, C6	2
R-C9106	-do- 10 μ F 10WV, C9	1
R-C9132	-do- 10 μ F 3WV, C5	1
R-C9115	-do- solid Al 1 μ F 10WV C3	1
R-C9120	-do- 0.2 μ F 10WV C14	2
R-C9143	-do- 200 μ F 6WV, C1, C19	2
R-S2109	Jack (for MIC, EXT)	1
R-26627a	Fin (for 2SB187)	1

Stock No.	Description	Q'ty
R-S1228	Pilot lamp (for recording level and power source)	1
	AC cord (with plug)	1
R-S1041a	Fuse (0.7A)	1
R-23232	Holder (fuse folder)	1
R-S8479b	3 $\frac{1}{4}$ " Tape (300 feet)	1
R-3225a	3 $\frac{1}{4}$ " reel	1
	Splicing tape	1
R-S4280a	Spring switch	1
R-S3063	Lug (for wiring board earth)	1
R-S3008	Lug (for mounting thermistor lead)	2
R-S3063	Lug (for mounting hum coil lead)	1
R-S4286	Rotary switch (115V, 230V selector)	1
R-S1234	Silicon rectifier	2
	Thermistor (SDT-20)	1
	Transistor (2BS185AA) (for Tr1, Tr2, Tr3)	3
-do-	(2SB187AA) (for Tr4, Tr5)	2
-do-	(2SB187AA) (for AC biasing)	1
RESISTORS		
Carbon P type $\frac{1}{4}$ W \pm 10%		
	470K ohms R29	1
"	220K " R15, R21	2
"	120K " R14	1
"	100K " R25	1
"	10K " R7	1
"	8.2K " R1, R2, R5, R9	4
"	5.6K " R3, R4	2
"	3.9K " R17, R30	2
"	2.2K " R8, R28	2
"	1.8K " R13	1
"	560 " R12	1
"	470 " R6, R11	2
"	220 " R18	1
"	120 " R31	1
"	39 " R16	1
"	27 " R20	1
"	150 " R24	1
"	1K " R23	1
"	82 " R26	1
"	220 " R10	1
Carbon or solid P type $\frac{1}{4}$ W 10%		
	390K ohms R32	1
Carbon P type		
	$\frac{1}{2}$ W \pm 5% 270 ohms R22	1
	$\frac{1}{4}$ W " 18 " R27	1
"	" " 3.3 " R19	1
CAPACITORS		
Mylar, Square type		
	50WV +30, -20% 0.05 μ F C15	1
"	" " " 0.003 μ F C12	1
Styrol Tube type		
	25WV \pm 10% 330 pF C17	1
"	" " 300 pF C16	1
Mold plain Tube type		
	15WV \pm 20% 0.2 μ F C11	1

Illust No.	Stock No.	Description	Q'ty
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		CHASSIS	
1	R-112283	Chassis	1
2	R-112284	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-112288	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
	R-112294	Mounting metal-for head base	1
13	R-112295a	Arm-pad arm	1
14	R-112266	Pad-for pad plate	1
15	R-112297	Mounting motor adjusting stopper	1
16	R-112298	Lever-for pinch lever	1
	R-112299a	Shielding board	1
18	R-34115	Reel base-for upper right reel base.	1
	R-112308	Ring, for right reel weight	1
	R-34116	Pulley-under right reel	1
21	R-34117	Reel base-for left reel	1
	R-14150	Shaft-for motor panel hanging	1
	R-24928	Boss-for panel hanging	1
	R-14151	Pin-for motor	1
25	R-24929a	Shaft-for brake slide	1
26	R-14152a	Shaft-for pinchroller shaft	1
	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
	R-14155	Shaft-right reel shaft	1

Illust No.	Stock No.	Description	Q'ty
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	R-14153	Shaft-left reel shaft	1
36	R-24941	Shaft-for cam shaft	1
37	R-25241	Shaft bearing-for flywheel shaft bearing	1
38	R-S81011	Flywheel (compl.)	1
39	R-12254	Shaft — Flywheel	1
	R-28092	Flywheel	1
41	R-44232	Belt	1
43	R-S81012	Capstan (compl.)	1
	R-24936	Screw	1
	R-24937	Capstan	1
45	R-24938	Boss for right and left brake	2
46	R-24939	Boss for reel base plate	1
	R-12253	Spring-for motor pulley only for 50c/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
55	R-51218	" -for motor	1
56	R-15219	" -for reel base	1
57	R-15220	Wire -for rewind operation bar	1
		Felt -for right reel	1
63		Felt -for pad metal	2
		Brake-for right and left brakes	2
58	R-44205a	Roller-for pinch roller	1
59	R-25187	Plate spring -for head adjustment	2
	R-24764	Boss	2
67	R-24763	Boss-for pad arm	1
		ELECTRIC	2
64	R-S5096	AC motor	1
65	R-S6315	RP head	1
66	R-S6284	E head	1

