SANYO

MODEL

MR-200
S-61TMR

ALL-TRANSISTORIZED BATTERY-OPERATED TAPE RECORDER

SERVICE MANUAL

SANYO ELECTRIC CO., LTD.

SANYO ELECTRIC CO., LTD.

OSAKA, JAPAN

INTERNATIONAL DIVISION : SANYO ELECTRIC TRADING CO., LTD.

Printed in Japan

SANYO TAPE RECORDER
MODEL MR-200 & S-61TMR

SANYO Tape Recorders are appreciated everywhere for their perfect sound and their high reliability and durability. It is our wish that it may be of much use to you and give you a great deal of pleasure. In order to help you, we have made up this instruction manual. In it you will find everything you wish to know about the operation of the recorder. Therefore, do not put this booklet aside without having read it.

INDEX

SPECIFICATIONS

(1) Performance Specifications

Recording Capability : Monophonic 2-track

Operative method :

1) **Mechanism :** Push-button switch method
2) **Volume control :** Variable resistor
3) **Tone control :** Variable resistor
4) **Tape Speed :** Capstan changing method

Transistors :

1) **2SB303A** First amplification stage
2) **2SB186** Second amplification stage
3) **2SB186** Third amplification stage
4) **2SB272×2** Output stage
5) **2SB22B** Oscillator for recording bias

Diode & Thermistor

1) **1N60**
2) **STD-09** For temperature compensation

Recording bias operation : AC bias (35K c/s)

Erasure operation : DC erase operation

Level indication : Level-meter

(on the recording : Recording voltage-level)

(on the playing : Battery voltage)

Microphone : Dynamic type
Impedance 5K ohm

Terminals

1) Microphone (Impedance 5K ohm)
2) Radio (Impedance 8 ohm)
3) External speaker (Impedance 8 ohm)
4) AC adaptor jack
5) Foot switch jack

Power source : Dry batteries 9 volts (composed of 6 unit)

Tape speed : 1-7/8 I.P.S. (4.75 cm/sec) & 3-3/4 I.P.S. (9.5 cm/sec)

Tape reel : Maximum 3 inch

Speaker : 4-3/16×2-15/16 inch, Impedance 8 ohm

Dimensions : 210mm (8-1/8″) (W)×262mm (10″) (L)×75mm (3″) (H)

Weight : Approx. 3kg (6 lbs 10 ozs)

(2) Technical specifications : (on the nominal voltage 8 volts)

Recording-Playback-frequency response :

3-3/4 inch per sec (9.5 cm/sec)	200 c/s	+5····· 4 db
	1,000 c/s	0 db
	5,000 c/s	+6·····−7 db
1-7/8 inch per sec (4.75 cm/sec)	200 c/s	+8····· 0 db
	1,000 c/s	0 db
	3,000 c/s	0··· −15 db

Non-distortion maximum output power : over than 500 mW

S/N ratio : over than 40 db
(the use of Weighting network curve C)

Distortion : Less than 7%

Erase rate : Less than −60 db (on 1,000 c/s)

Cross talk : Less than −60 db (on 1,000 c/s)

Wow & Flutter : Less than 0.45% WRMS

Forward-Rewind-time : Up to 2 minutes 30 seconds

Source : DC 9 volt

Inclusive accessories

1) Vinyl case (Leather case for S-61TMR)
2) Vinyl accessory case (Leather case for S-61TMR)
3) Shoulder Strap
4) Splicing tape
5) Recording wire (S-61TMR only)
6) Dynamic microphone (With remote switch)
7) Magnetic earphone
8) Empty 3⅓″ reel and full tape

Optional accessories

1) AC adaptor D9-MC
2) Foot switch FS-61
3) Telephone pickup TL-11

HOW IT WORKS

In a recorder the sound is recorded on the tape magnetically. After the sound vibrations have been caught by the microphone, they reach via electronic valves etc., one of the two magnetic heads, which are situated under the smaller plastic cover. The tape running along this head is coated with countless minute particles of iron oxide. These are magnetized by the magnetic head in the characteristic pattern of the sound vibrations, which thus become recorded. After the tape is rewound, the recorder is switched over for playback. The same head scans the magnetic pattern of the tape, which is finally made audible via the loudspeaker. In addition, a tape can be used over and over again for new recordings. The magnetic pattern already on the tape is automatically erased by a separate erasing head, which is switched on only during recording. Except for strong magnetic fields, such as arise in the immediate proximity of a loudspeaker magnet or transformer, there are practically influences harmful to the recording.

REMOVING THE MECHANISM OUT OF THE CABINET

In marking 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. All screws, with the exception of the Pinch Roller Screw, will loosen when turned counter-clockwise, and will tighten when turned clockwise. Pinch Roller Screw is exactly the opposite.

1) Pull out the Head Housing and the Volume Knob.
2) Remove the Pinch Roller Screw and pull out the Pinch Roller.
3) Turn the Recorder upside down and remove the four "Plus Screws" on the bottom lid, and take off the bottom lid.
4) Remove the "Plus Screw" of the Handle Attachment on the side of the Recorder.
5) Remove the red screw in the approximate center of the chassis and two red screws in the battery compartment.

The above will permit the removal of the Mechnism and Amplifier from the cabinet. But the Mechanism and the Amplifier will be still connected. Also pay attention to the Speaker Lead Wire which links the Amplifier and the Cabinet.

ADJUSTMENT OF MECHANISM

In making the repairs or adjustments, do not leave the controls at "Rapid Winding", "Rewinding", "Recording" or "Playback" position for long hours without connecting the power source. This may cause irregular rotations or may deteriorate the movement of recording tape. When the Rewinding or Rapid Winding of the machine is found unsatisfactory or when the recording tape become loosened in changing from stop to playback, or become strained too much, in spite of correct operation, the following adjustments are required:

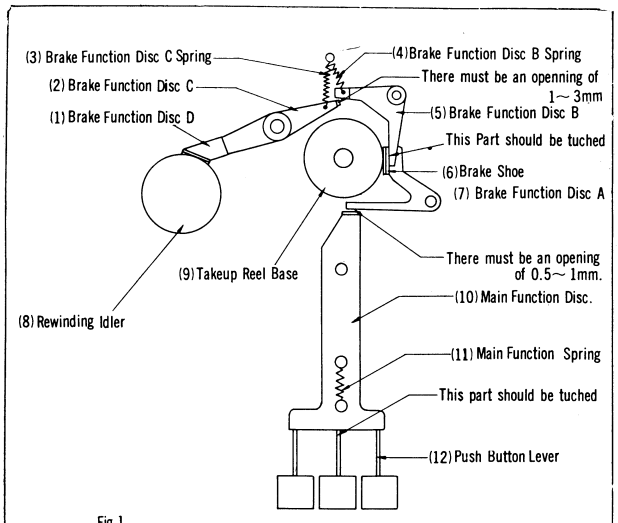


Fig 1

1) Equipment and gauges

In making adjustments no special tools or gauges will be needed. But in order to raise the degree of reliance on the machanism by checking the functions and comparing with the standard machine, the gauges listed under Table 1 will prove convenient.

Tester:	DC 100V, DC 100mA
Tension Gauge:	0–300 gr. Type
	0–100 gr. Type
	0–1 Kgr. Type

Table 1

2) At stop

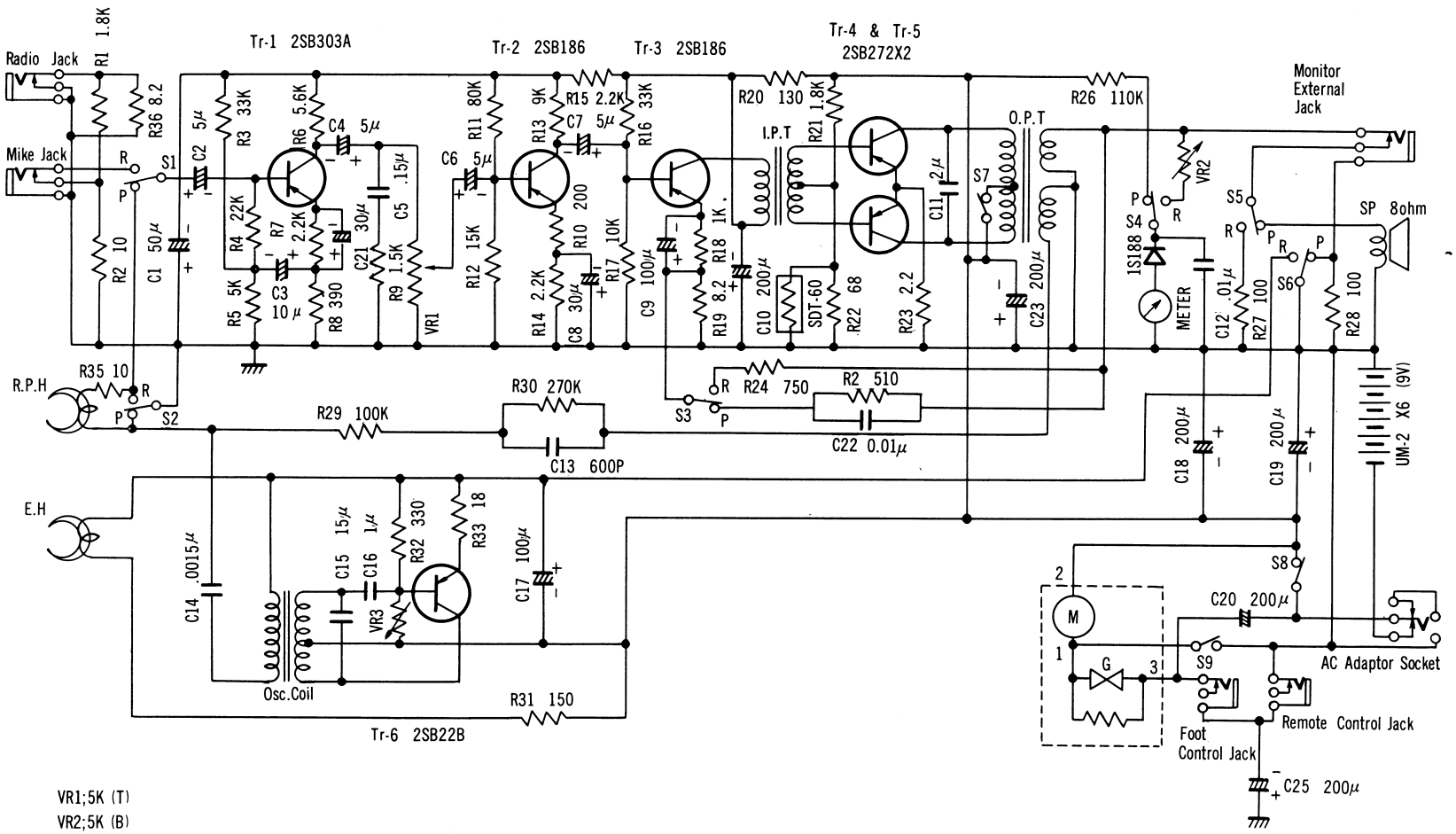
(A) Brake Mechanism

When the recorder is stopped from normal speed (viz. Recording or Playback) and Rapid Winding, Brake is applied weakly to Takeup Reel Base and stronger to Feed Reel Base. When the recorder is stopped from Rewinding, the Brake applied to Takeup Reel Base is stronger than that applied to Feed Reel Base.

When the Brake functions in reverse of the above description, this will result in the loosening of the tape position. Picture shows the position of the parts when the Brake is applied.

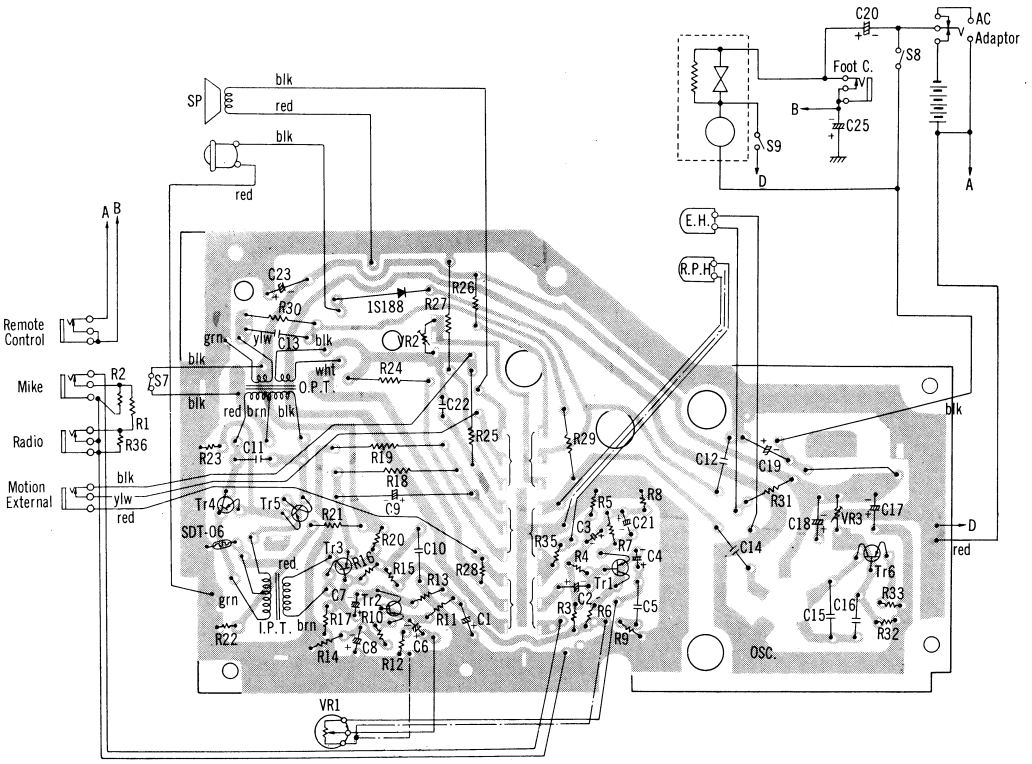
(1) The Main Function Disc (10) murt be connected to Button Lever (12) for Playback, Rapid Forward, and Rewinding. Should there be an aperture, it is necessary to move the Main Function Dise Spring (11) closer. (Fig. 1)

CIRCUIT DIAGRAM

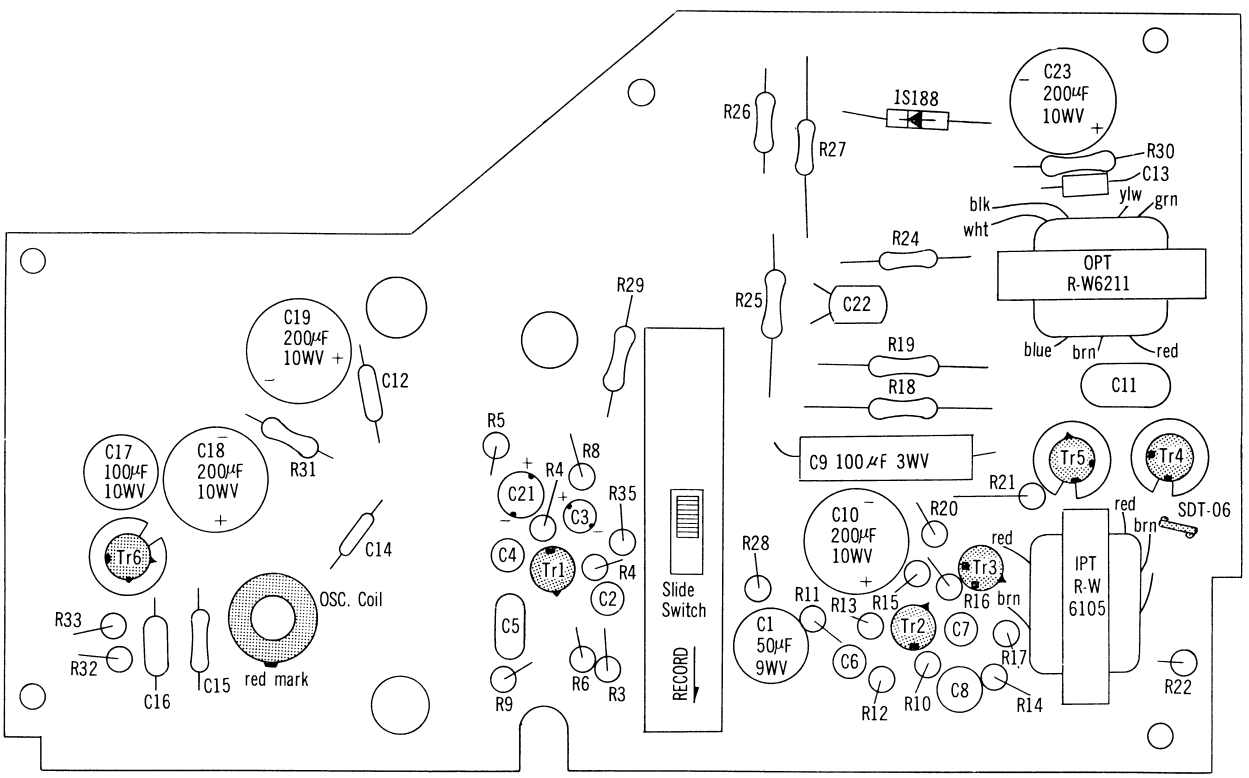


VR1;5K (T)
VR2;5K (B)
VR3;10K (B)
S1-S6, RECORDING SWITCH SHOWN IN "PLAY" POSITION
S7, SWITCH ON AT RECORD AND PLAY
S8; SWITCH OFF AT STOP
S9; SWITCH ON AT REWIND AND FAST FORWARD
CH; SWITCH ON AT REWIND AND FAST FORWARD
INSIDE DOTTED LINE; MICROMOTOR CHOKE COIL

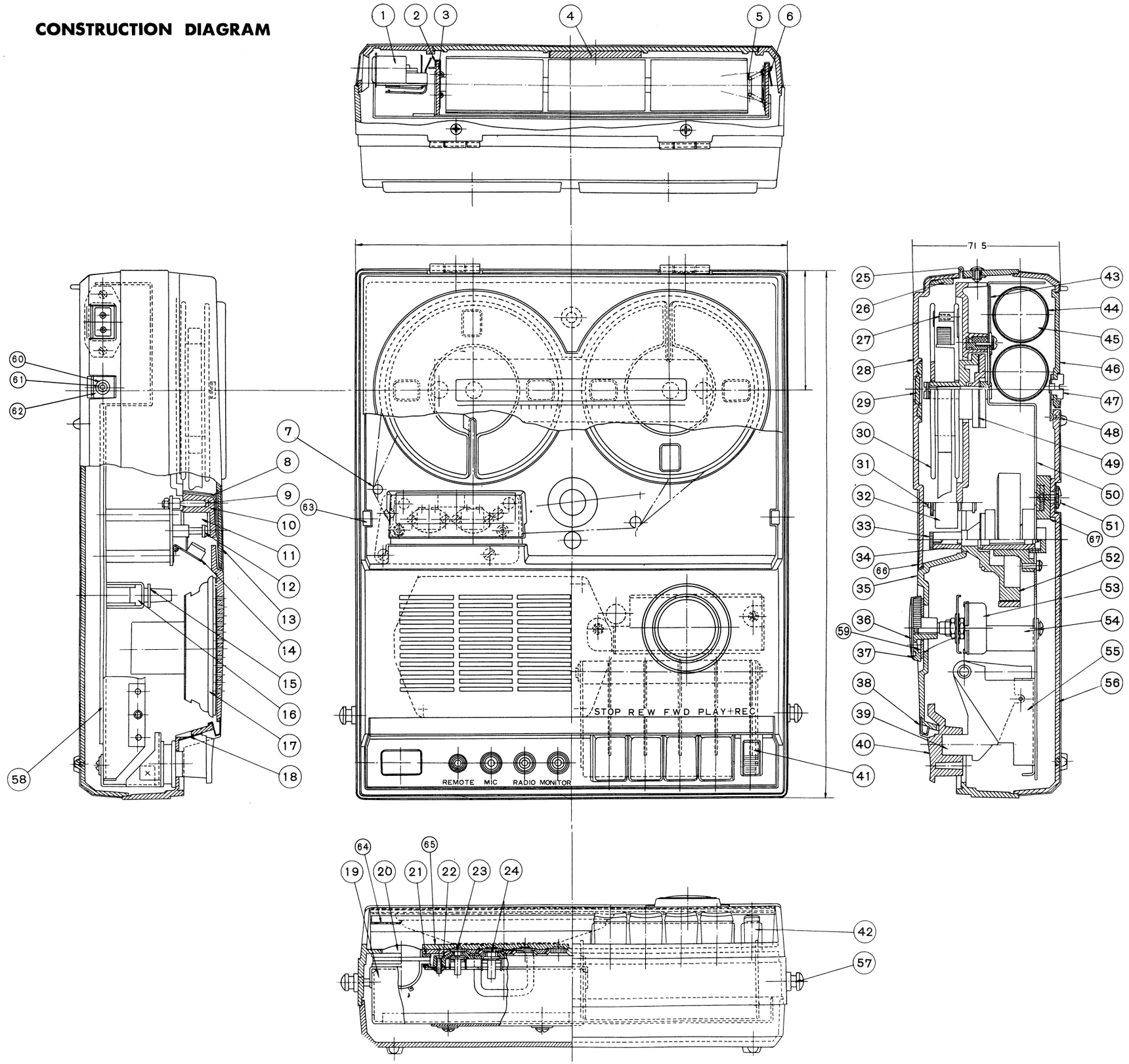
INNER-PARTS CONNECTION



MAIN PARTS LOCATION



CONSTRUCTION DIAGRAM



PARTS NO.	STOCK NO.	DESCRIPTION
1	R-S2113	Socket
2	R-23603	Battery terminal
3	R-34057	Insulator
4		Mouldplane
5	R-25173	Coil spring
6	R-23604	Battery terminal
7	R-12106	Guide pin
9	R-24324	Chip
10	R-32350	Head housing
11		Head
12		Guide pin
13	R-26612	Badge
14		Pad
15		RP switch lever C
16	R-S4214	Slide switch
17	R-S6203	Speaker
18	R-26730	Panel
19	R111566d	Fixing metal
20	R-S5516a	Meter
21	R-42177a	Cushion
22	R-35197	Fixing base
23	R-S2112	Jack
24	R-S2123	Jaek
25	R-S8512a	Hinge
26	R-32308	Base
27	R-24699	Chip
28	R-39068	Lid
29	R-32307a1	Cover
30	R-32126	3½″ reel
31		Biss for pinch roller
32		Pinch roller
33		Capstan stop screw
34		Capstan
35	R-39067	Cabinet
36	R-26814	Knob decoration
37	R-33348	Knob
38	R-23595	Golden strip
39		Push button lever
40	R-33343a	Button
41	R-26615a	Decoration metal
42	R-33344a	Button
43	R-47492	Battery paper
44	R-35196	Battery cover
45		Battery (not provided)
46	R-39070	Battery cover
47	R-24558	Fixing metal
48	R 23647	Cover sttoper
49		Take up reel base
50		Chassis
51	R-26691	Ravel
52		Flywheel
53	R-R12484	VR
54	R-111565	Fixing metal
55		Push button SW base

Stock No.	Description	Q'ty
R-S8440	Recording wire (for S-61TMR)	1
R-W8107	OSC coil	1
R-W6210	Choke coil (S-61TMR)	1
R-W6211	OPT	1
R-R11012	Semi-volume (5K ohm)	1
R-R11013	Semi-volume (10K ohm)	1
R-S4214	Slide SW	1
R-S2112	Jack	1
R-S3063	Lag	2
R-23641	Fin	2
R-23624	Fin	1
R-S2123	Jack	3
	Transistor 2SB303A	1
	〃 2SB186	1
	〃 2SB185 (Yell)	1
	〃 2SB272	2
	〃 2SB22B	1
	Thermistor SDT-06	1
	Diode 1S188	1

Stock No.	Description			Q'ty	
	110K	〃	〃	1	R26 (for S-61TMR)
	80K	10%	〃	1	R11
	33K	〃	〃	1	R3
	22K	〃	〃	1	R4
	15K	〃	〃	1	R12
	5.6K	〃	〃	1	R6
	5K	〃	〃	1	R5
	2.2K	〃	〃	1	R7
	1.8K	〃	〃	1	R1
	390	〃	〃	1	R8
	200	〃	〃	1	R10
	10	〃	〃	1	R2
Solid	8 2	10%	½W	1	R36
Carbon	9K	10%	¼W	1	R13 (for MR-200)
〃	33K	10%	¼W	1	R16 (for MR-200)
〃	10K	10%	¼W	1	R17 (for MR-200)
〃	8.2K	10%	¼W	1	R19 (for MR-200)
	750	5%	¼W	1	R24 (for MR-200)

RESISTORS

Solid	270K	5%	¼W	1	R30
	100K	〃	〃	1	R29
	1.8K	〃	〃	1	R21
	150	〃	〃	1	R31
	68	〃	〃	1	R22
	18	〃	〃	1	R33
	2.2	〃	〃	1	R23
	33K	10%	〃	1	R16 (for S-61TMR)
	10K	〃	〃	1	R17 (for S-51TMR)
	9K	〃	〃	1	R13 (for S-61TMR)
	2.2K	〃	〃	2	R14,15
	1K	〃	〃	1	R18
	750	〃	〃	1	R24 (for S-61TMR)
	330	〃	〃	1	R32
	390	〃	〃	1	R25
	130	〃	〃	1	R20
	100	〃	〃	2	R27, 28
	8.2	〃	〃	1	R19 (for S-61TMR)
Carbon	1.5K	5%	¼W	1	R9
	10	〃	〃	1	R35

CAPACITORS

R-C9074	Electrolytic 200μF	10WV	5	C18, 19, 20, 23, 10
R-C9093	〃 100μF	10WV	1	C17
R-C9080	〃 30μF	3WV	2	C8, 21
R-C9079	〃 10μF	3WV	1	C3
R-C9081	〃 50μF	9WV	1	C1
R-C9078	〃 5μF	6WV	4	C7, 2, 4, 6
R-C9094	〃 100μF	3WV	1	C9
	Mylar (Square type) 0.15μF	35WV	1	C5
	〃 0.1μF	35WV	1	C16
	〃 0.02μF	50WV	1	C22
	〃 0.01μF	50WV	1	C12
	〃 0.2μF	25WV	1	C11
	〃 0.15μF	35WV	1	C15
	〃 0.0015μF	50WV	1	C14
	Styrol (Tube type) 600pF	25WV	1	C13

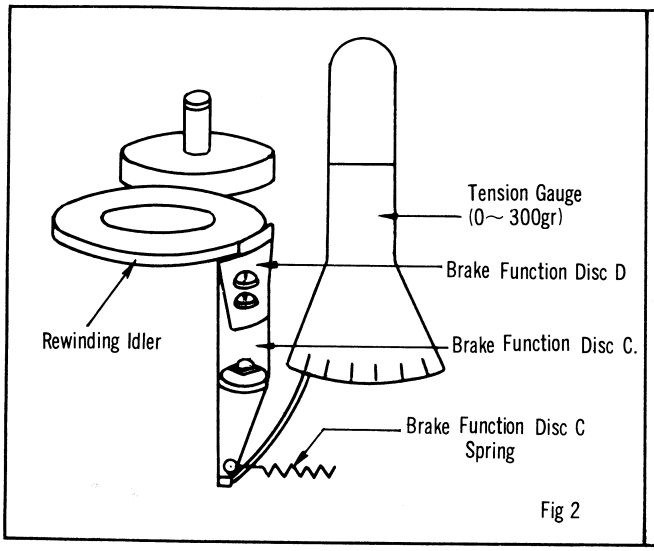


Fig 2

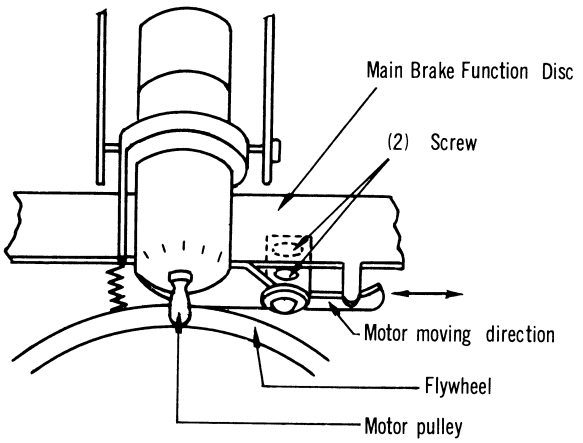


Fig 3

(2) There must be an opening of 0.5 mm—1 mm between the Brake Function Disc A (7) and Main Function Disc (10). In case there is no opening, it is possible that the Brake Shoe (6) is either worn out or missing. Check and replace. The attaching or Brake Shoe is described in Paragraph 3 of (2) under the title of Maintenance. The thickness of Brake Shoe is designed to withstand wear of up to 0.5 mm thickness.

(3) Brake Function Disc B (5) must be in contact with Brake Function Disc A (7), and should there be an aperture between the two, the Brake Function Disc B Spring (4) should be tightened.
(Remarks) The adjustment of Brake on the Takeup Reel Base side should be done with Brake Function Disc B Spring only after the checking described in 1-3 is conducted.

(4) Between the Brake Eunction Disc C (2) and the Brake Function Disc B there must be an opening of 1-3 mm. In case there is no opening, adjust the direction of Brake Function Disc D (1) by turning the Connecting Screw of Brake Function Disc D and Brake Function Disc C.

(5) Particular caution is necessary in making the adjustment as described in (4), so that the Brake Function Disc D will not be caught by Rewinding Idler (8) when the Feed Reel Base is turned counter-clockwise.

(6) If the Brake does not apply properly when the Feed Reel Base is turned clockwise, make the adjustment by tightening the Brake Function Disc C Spring. In making this adjustment, if the spring is tightened too much the shape of Idler may change. Therefore, as indicated in Fig. 2 insert the Tension Gauge between the contact point of Brake Function Disc C and Brake Function Disc B. Then make the adjustment so that the strength needed in separating Brake Function Disc D from Rewinding Idler will be 30-50 gr., by adjusting the spring of Brake Fuction Disc C. (Remarks) Since the brake is applied to both Feed Reel Base and Take-up Reel Rase, also make the check as described in 1-3 above.

(B) Motor position

At the stop position the Motor Pulley (5) should be separated from Flywheel (4). If there is no aperture, the rubber surface of the Flywheel will be damaged and causes "wowing". In order to prevent this, turn the recorder upside down and move the motor in the direction marked by arrow by loosening the screw (2) from the reverse side of the chassis. (Fig. 3)

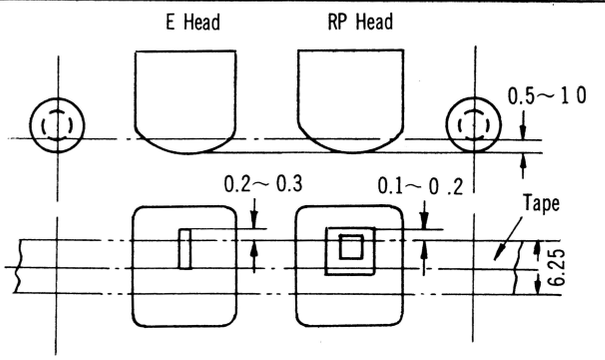


Fig 11

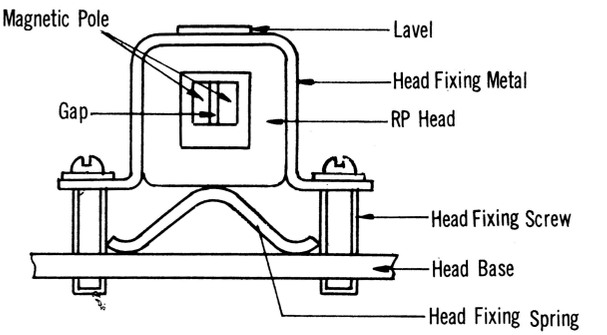


Fig 12

4. Cleansing of Rubber Parts

Pinch Roller, Flywheel, Belt, will also slip when soiled, and cause uneven rotations. Wipe these parts with a piece of cloth or gauze damped with Quad Carbon Chloride once in half a year.

ADJUSTMENT OF HEADS

1. Position of Heads

Inadequate positioning 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. 11, and the adjustment of the positions of the Heads is done by turning the Head Fixing Screws.

2. Angle of Head

Slanting of the Erasing Head to either right or left will not cause any problems, but when this happens to the Recording/Playback Head, the Reproduction Frequency will be influenced greatly. Fig. 12 shows the enlarged picture of the Recording/Playback Head from the front. 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. (Fig. 12)

(***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.*

SUGGESTIONS FOR MECHNICAL TROUBLE

Trouble	Causes	Repair
Capstan fails to rotate	***Defect of motor**	
	1. Open in motor coil or defective contact of carbon brush.	1. Replace *If capstan turns in Rapid Winding or Rewinding, but fails in Record ing or Playback, the cause is the defective contact of Governer. Terminal resistance of normally operating Governer at both ends should be 0 ohm.
	2. Burnt metal bearing.	2. Replace
	***Defect of Transmission mechanism:**	
	3. Skidding of motor pulley.	3. Tighten the screw.
	4. Oil on Flywheel rubber.	4. Clean *Wipe with alcohol or Quad Carbon Chloride.
	5. Lack of oil on capstan shaft.	5. Lubricate *Replace Flywheel together with shaft bearing.
	6. Defective motor spring.	6. Replace or adjust
Slow rotation.	***Defect of motor**	
	7. Burnt metal bearing	7. Replace or lubricate *Turn screw under Flywheel (under chassis) clockwise and put watch oil. The screw is set with adhesive, so warm it first with soldering iron etc.
	***Defect of Tranmission mechanism.**	
	8. (Same as 3-6)	
	9. Lack of oil in winding idler.	9. Lubricate
	10. Lack of oil in Winding Reel Pulley	10. Lubricate
Presence of wow and flutter	***Defect of Motor**	
	11. Defective function of Governer.	11. Lubricate or Replace
	***Defect of transmission mechaniam**	
	12. (Same as 3-10)	
	13. Alien objects on flywheel rubber.	13. Clean. (Same as 4)
	14. Deterioration of Flywheel rubber.	14. Replace. (Same as 5)
	***Defective movement of recording tape.**	
	15. Defective back tension on Rewinding Reel.	15. Replace
	16. Defective pressure of Pinch Roller.	16. Adjust Pinch Lever Spring
	17. Change of quality or shape of Pinch Roller.	17. Replace
	18. Adherence of dust on points contacting recording tape.	18. Clean. (Wipe with Quad Carbon Chloride.)

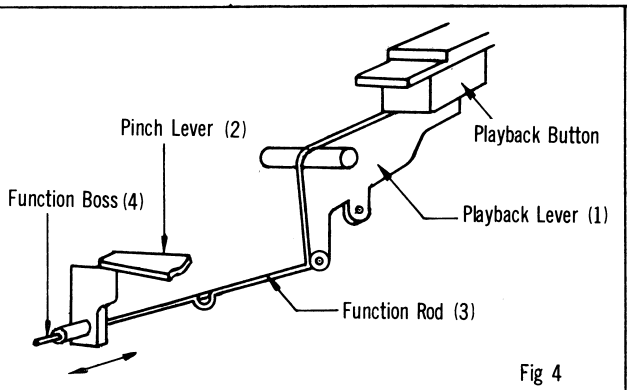


Fig 4

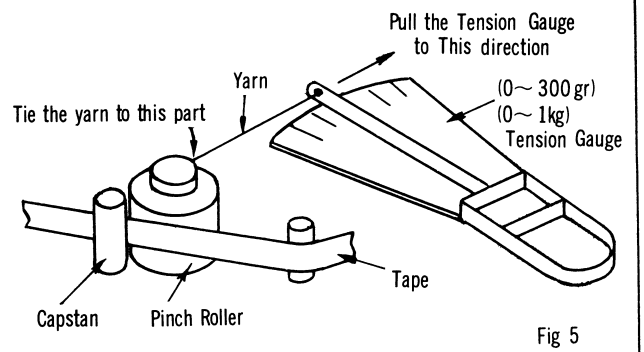


Fig 5

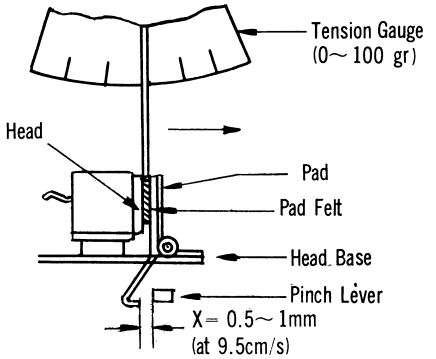


Fig 6

(C) Pinch Roller position

In Stop position, an aperture of approximately 2 mm is necessary between the Capstan Sleeve (9.5 cm/sec) and the Pinch Roller.

The aperture at this point and between the Head Pad and Head Surface are closely related, and if the opening is less than 2 mm it will be difficult to load the recording tape at the Head part also. To adjust the length of the Pinch Lever Function Rod (3) which connects Playback Button Lever (1) of Fig. 4 with Pinch Lever (2), it will be necessary to unscrew the Pinch Lever Function Boss (4) and melt the solder, and then move the Pinch Lever Function Boss in the direction of arrow. After the adjustment, remove the Capstan Sleeve and replace it with 4.75 cm/s and push the playback Button.

At this time the aperture between the Pinch Lever and Pinch Lever Function Boss should be 0.5–1 mm. (Fig. 4)

3) At Normal Speed Winding

The important factor in normal speed winding is to see that the tape will move to the right without slipping. The recorder is adjusted as shown below which will be of help in making the repairs.

(A) 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 200 g~260 g with 9.5 cm/s, and the adjustment is made by the Pinch Lever Spring. In order to measure the pressure, load the machine with thin recording tape, and as shown in Fig. 5 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.

(B) Head Pad

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 reproduction head. In normal speed winding, the Pad Felt should be tounching both Heads. In case the Pad touches both Heads at 4.75 cm/s, but does not touch the Heads at 9.5 cm/s, change the felt to thicker one. In changing the Felt, make sure there is some aperture between the Head Pad and the Pinch Lever as indicated in Fig. 6. The pressure of the Pad, as shown in Fig. 6, will show 9~15 gr., when the Tension Gauge is placed between the pads (top part) and pulled in the direction of arrow. At the above reading of the gauge, Pad Felt should be separated from the Head.

PARTS LIST

Stock No.	Description	Q'ty

CABINET

R-39067	-Cabinet	1
R-24556	-Insert nut	2
R-24631	-Insert nut (for S-61TMR)	1
R-24631a	-Insert nut (for MR-200)	1
R-39068	-Lid	1
R-39069	-Back lid	1
R-23595	-Golden strip	1
R-32307a	-Cover	2
R-S8512a	Hinge	2
R-32308	Base	2
R-12105	Plate spring	2
R-35216	Ribbon	1
R-41277	Cushion	2
R-39071	Speaker net (for S-61TMR)	1
R-39072a	Speaker net (for MR-200)	1
R-S8513	-Battery lid (for S-61TMR)	1
R-39070	-Battery lid (for MR-200)	1
R-24558	-Fixing metal	1
R-23647	-Stopper	1
R-35082	-Washer	1
R-12106	Guide pin	2
R-24699	Chip	1
R-S8514	Head housing (for S-61TMR)	1
R-32350	Head housing (for MR-200)	1
R-35196	Battery cover	2
R-S8515	-Knob (Compl.) (for S-61TMR)	1
R-S8735	-Knob (Compl.) (for MR-200)	1
R-33348	-Knob	1
R-26614	-Knob decoration (for S-61TMR)	1
R-26814	-Knob decoration (for MR-200)	1
R-24691	Band metal	2

CHASSIS

R-S8516	-Battery terminal (Compl.)	1
R-22603	-Battery terminal	2
R-34057	-Insulator	1
	-Stopper	2
R-S8517	-Battery terminal (for S-61TMR)	1
R-S8517a	-Battery terminal (for MR-200)	1
R-25173	-Coil spring	2
R-23604	-Battery terminal	2
R-34057	-Insulator	1
	-Stopper	2

Stock No.	Description	Q'ty

R-47492	-Battery paper	1
R-111565	-Fixing metal	1
R-111566b	-Fixing metal (for S-61TMR)	1
R-111566a	-Fixing metal (for MR-200)	1
R-35197	-Fixing base	1
R-471246a	Printed circuit board (for MR-200)	1
R-41246	Printed circuit board(for S-61TMR)	1

MECHANISM

R-S5072	-Mechanism (for S-61TMR)	1
R-S5078	-Mechanism(Compl.) (for MR-200)	1
R-S4246	-Push SW (for MR-200)	1
R-S4215	-Push SW (for S-61TMR)	1
R-S8773	-Head (Compl.) (for MR-200)	1
R-S8522	-Head (Compl.) (for S-61TMR)	1
R-S6253	-RP head (for MR-200)	1
R-S6204	-RP head (for S-61TMR)	1
R-S6254	-E head (for MR-200)	1
R-S6205	-E head (for S-61TMR)	1
R-S4126	-Spring SW	1
R-S4217	-Spring SW	1
R-S4218	-Special spring	1
R-S8523	-Take up reel (for S-61TMR)	1
R-S8711	-Take up reel (for MR-200)	1
R-S8524	-Feed reel base (for S-61TMR)	1
R-S8712	-Feed reel base (for MR-200)	1
R-S8525	-Idler (Compl.)	1
R-S8526	-Rewind idler (Compl.)	1
R-S8528	-Pinch roller (Compl.)	1
R-S8527	-Roller	1
R-S8529	-Flywheel (for S-61TMR)	1
R-S8713	-Flywheel (for MR-200)	1
R-111567a	-Chassis	1
R-S2112	-Jack	1
R-S3008	-Lag	3
R-S8706	-Motor (Compl.) (for S-61TMR)	1
R-S8740	-Motor (Compl.) (for MR-200)	1
R-S5077	-Motor (for S-61TMR)	1
R-S5079	-Motor (for MR-200)	1
R-S3121	-Lag	1
R-S5516	Meter	1
R-R12484	VR	1
R-S6203	Speaker	1
R-S6216a	Microphone	1
R-W6105	IPT	1
R-S6222	Earphone (for MR-200)	1

Trouble	Causes	Repair
6. Excessive noises and statics	1. Bad contact or Volume.	1. Check, replace.
	2. Bad Transistor. (Especially Tr-1)	2. Find bad transistor & replace.
	3. Deterioration of circuit element, or contact with adjacent element. Bad solder.	3. Check, adjust or replace.
	4. Magnetized head.	4. Erase with de-magnetizer.
	5. Distortion of oscillation wave.	5. Check & adjust circuit elements.
	6. Bad earth of printed circuit.	6. Detect & replace.
	7. If noise loud when connecting Mike, C25 or Microphone bad.	7. Replace.
7. Bad Tones	1. Bad circuit element or transistor.	1. Check voltage gain of each part.
	2. Inadequate High Frequency Bias.	2. Adjust bias.
	3. Bad contact of Tape and Head.	3. Check positioning of tape or clean the contacting part of Head
	4. Head worn down.	4. Replace.
	5. Bad Microphone.	5. Replace.
	6. Bad speaker.	6. Compare by plugging in another speaker to EXT SP jack, Replace.
	7. Bad Feed-back circuit. (R24)	7. Check, adjust.
8. Lack of High Tone	1. Head not perperndicular.	1. Check and adjust.
	2. C5 capacity big, C22 capacity big, or R25 value small, C11 capacity big. Slipping of By-path Capacitor of Emitter Bias at each stage of amplification.	2. Check.
	3. Not enough perssure in Recoad/ Playback Head Pad.	3. Adjust.
9. Excessive High Tone	1. C5 capacity small. C22 capacity small, or R25 value big. C11 capacity small short circuit in semi-volume in Meter circuit. Broken wire in C5 R9 circuit.	1. Check.
10. Unable to erase	1. Bad positioning of erasing head.	1. Adjust position.
	2. Bad contact or tape & erasing head.	2. Adjust, clean.
	3. Lack of erasing current.	3. Check and replace.
11. Cross talk between top and bottom tracks.	1. Bad positioning of Tape Guide and wobbling of Tape due to slanting of head.	1. Adjust Tape Guide Adjust Head position.
	2. Bad positioning of top & bottom of head.	2. Adjust height of head.
12. Tape speed is irregular	1. Motor governor not functioning.	1. If not repaired by opening C24 R34, governor is bad.
	2. C24 has short circuit of developing short circuit.	2. If repaired, C24 bad. Replace.
13. Motor Noises	1. Opening of C24 R34 circuit.	1. Determine, replace.
	2. Choke Coil short circuit.	2. -ditto-

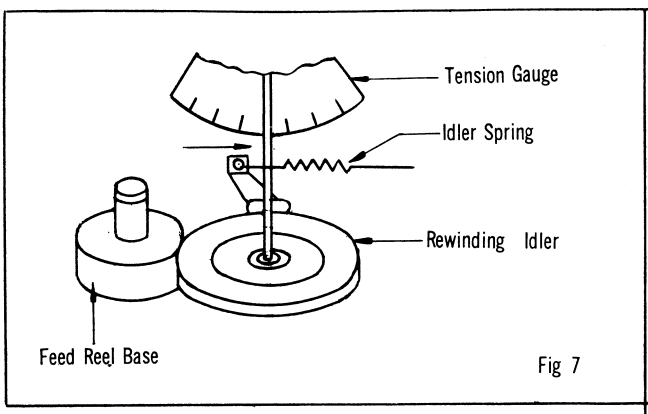


Fig 7

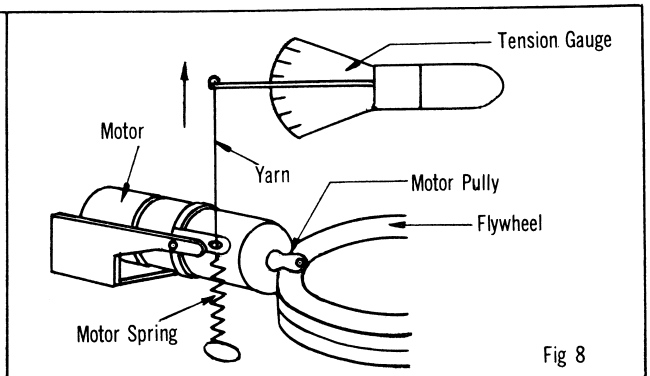


Fig 8

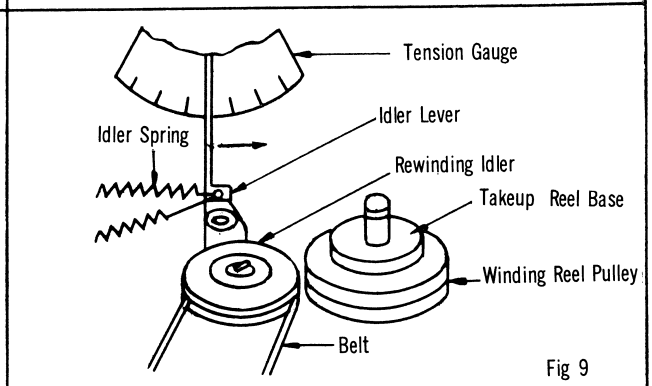


Fig 9

(C) Back Tension

When the recording tape sage between the Feed Reel and Erasing Head, the erasing becomes insufficient or sound reproduction becomes uneven.

This is adjusted by adjusting the pressure of the Rewinding Idler on the Feed Reel Base.

The pressure of the Rewinding Idler is measured by the way shown in Fig. 7, by moving the Tension Gauge in the direction of arrow.

Adjust the Winding Idler Spring so that the Tension Gauge will read 40~50 gr., when the Rewinding Idler separates from the Feed Reel Base.

4) At Rapid Winding

At the time of rapid winding, the most strength is applied to each revolving parts. It is therefore ideal to start the adjustment of motivating parts by following the adjustments described in rapid winding.

(A) Pressure between the Motor and Flywheel

When the pressure between the Motor and the Flywheel is weak, it may cause slipping, and the recorder will not function as expected. To measure the pressure of the Motor it should be done at Normal Speed, and not at Rapid Winding or Rewinding. When the Motor and Flywheel are separated at Rapid Winding or Rewinding position, the Motor may be damaged.

The pressure of the Motor is measured by pulling the Tension Gauge as shown in Fig. 8, and the Gauge reading should be 65~80 gr. when the Motor Pulley detaches from the Flywheel and the latter stops rotation. The adjustment is done by Motor Spring. (Fig. 8)

(B) Winding Idler

The pressure of the Winding Idler on the Winding Reel Pulley is measured by the method shown in Fig. 9. Inadequate pressure in this spot will cause the slipping the Belt and the Reel Pulley, or may cause accelerated wear of the Belt. As shown in Fig. 9, hook the Tension Gauge to the end of the Idler Lever where spring is attached, and pull the Tension Gauge in the direction of arrow until the Winding Reel Pulley stops rotation. Gauge reading at thi stime should be 100~140gr. (Fig. 9)