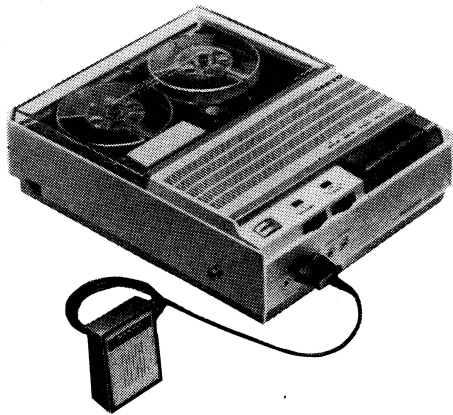


SANYO



All Transistorized Battery Operated Tape Recorder

MODEL **MR-101**

SERVICE MANUAL

SANYO ELECTRIC CO., LTD.

INTERNATIONAL DIVISION: SANYO ELECTRIC TRADING CO., LTD.

OSAKA, JAPAN

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 1e 188
- 2) STD-06 For temperature compensation

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

Erase 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 3-1/4 inch

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

Dimensions: 8 1/2" wide × 10 1/4" deep × 3 1/8" high
(205×257×77.5mm)

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

Undistorted output power: over than 650mW

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 volts

Inclusive accessories

- 1) Hard Leather Case
- 2) Accessory case (Hard leather case)
- 3) Shoulder Strap
- 4) Splicing tape
- 5) Patch cord
- 6) Dynamic microphone (With remote switch)
- 7) Magnetic earphone
- 8) Empty 3 1/8" reel and full tape

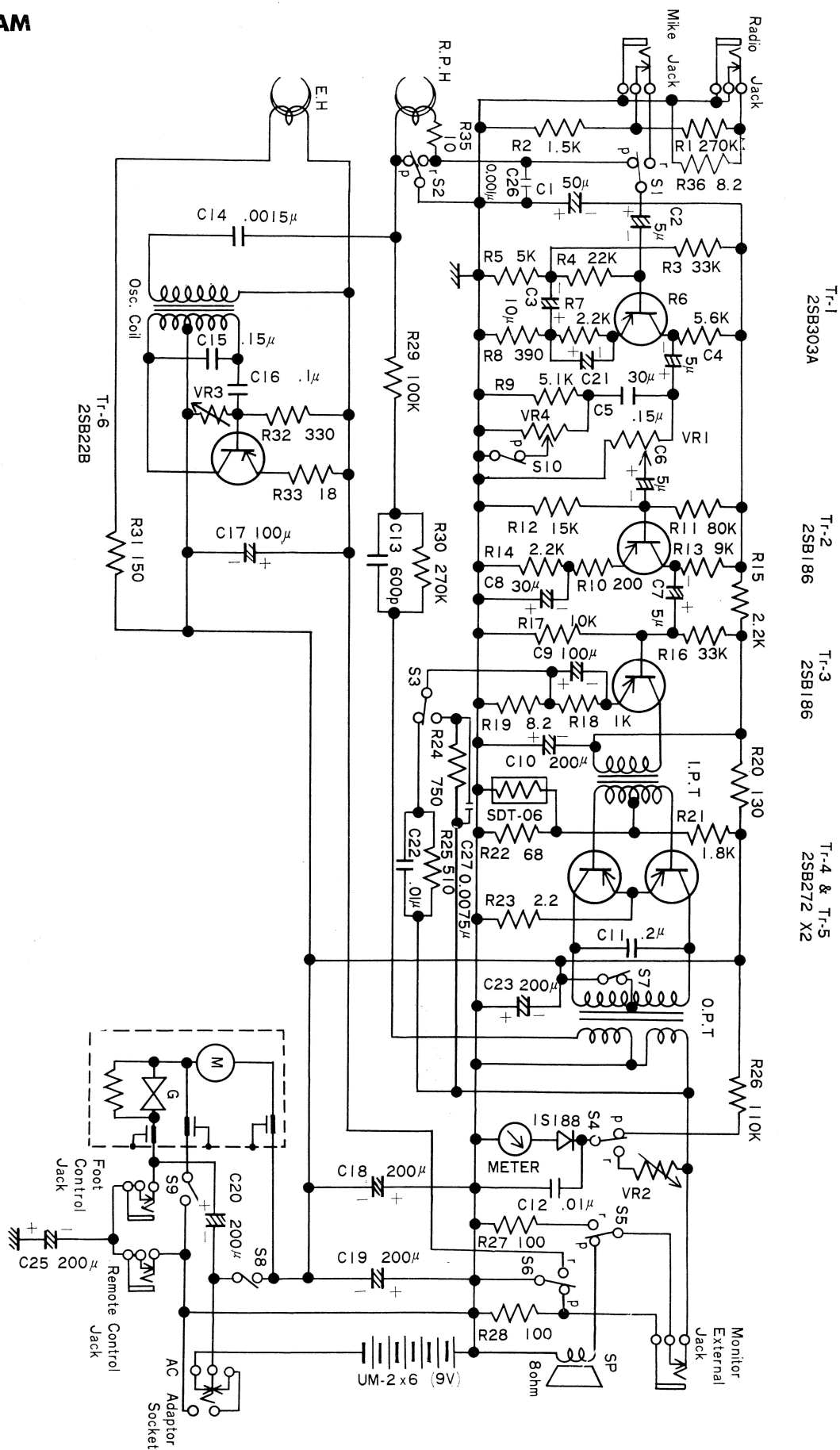
Optional accessories

- 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.

CIRCUIT DIAGRAM



REMOVING 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. 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 Mechanism 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:

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 mechanism by checking the functions and comparing with the standard machine, the gauges listed under Table 1 will prove convenient.

Tester:	DC 10V, DC 100mA
Tension Gauge:	0-300 gr. Type
	0-100 gr. Type
	0-1 Kgr. Type

Table 1

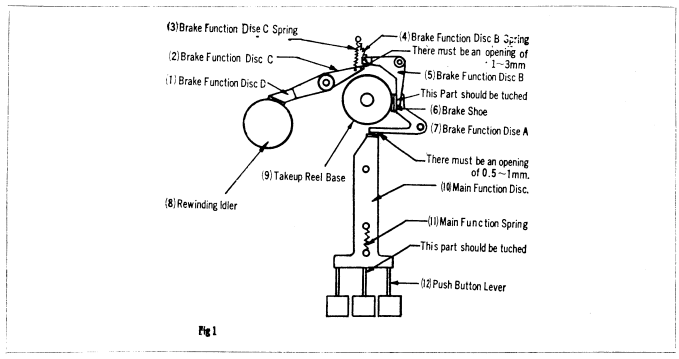
2) At stop

(A) Brake Mechanism

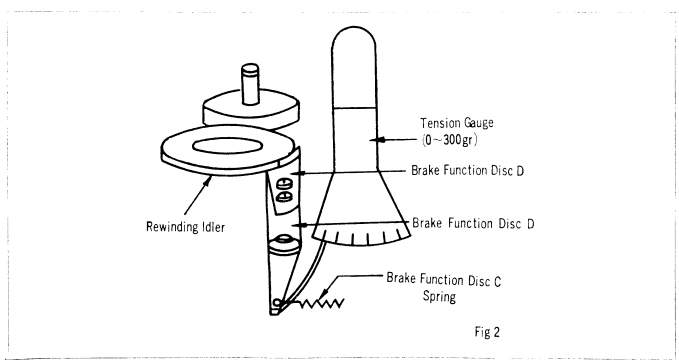
When the recorder is stopped from normal speed (viz. Recording or Playback) and Rapid Winding, Brake is applied weakly to Takeup Reel Base and stronger to Feed Reel Base. When the recorder is stopped from Rewinding, the Brake applied to Takeup Reel Base is stronger than that applied to Feed Reel Base.

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) must 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 Disc Spring (11) closer. (Fig. 1)

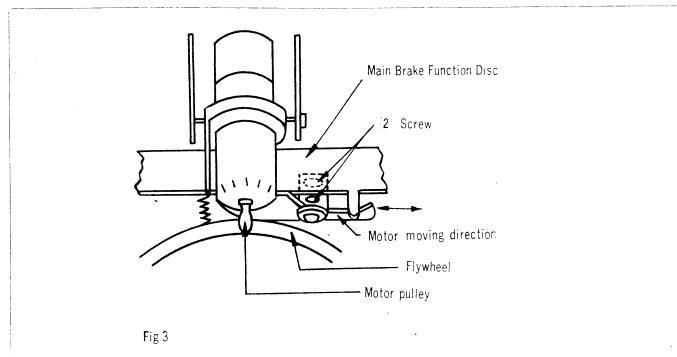


- (2) There must be an opening of 0.5 mm- 1 mm between the Brake Function Disc A (7) and Main Function Disc (10). In case there is no opening, it is possible that the Brake Shoe (6) is either worn out or missing. Check and replace. The attaching of Brake Shoe is described in Paragraph 3 o (2) under the 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 Function 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 Function Disc C (Remarks). Since the brake is applied to both Feed Reel Base and Takeup Reel Base, 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)

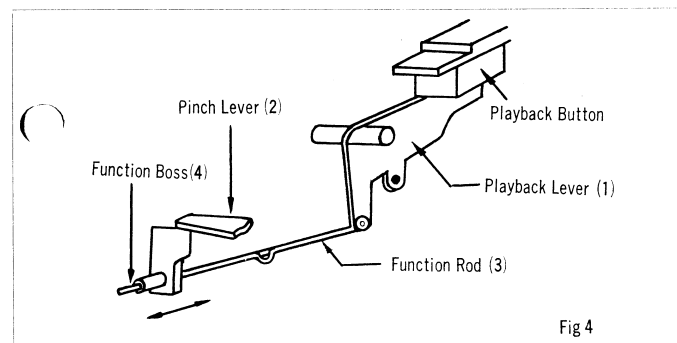


(C) Pinch Roller position

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/sec. 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)



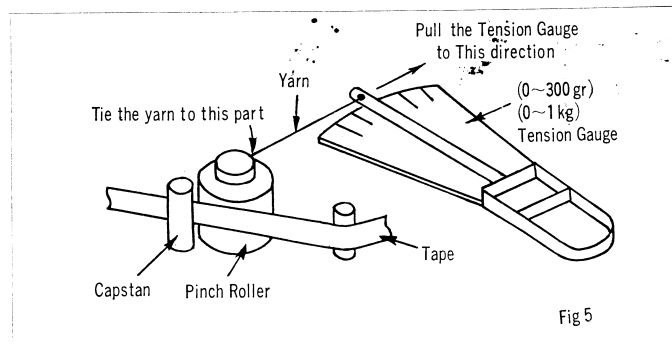
3) At Normal Speed Winding

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.

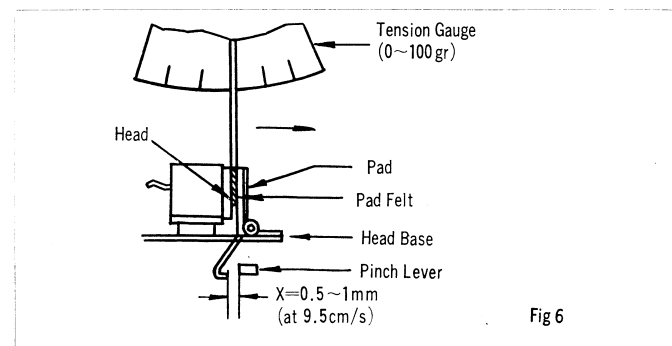
The pressure of the Pinch Roller is the best at 200g~260g with 9.5 cm/sec, and the adjustment is made by the Pinch Lever Spring. In order to measure the pressure, load the machine



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 touching both Heads. In case the Pad touches both Heads at 4.75 cm/sec, but does not touch the Heads at 9.5 cm/sec, 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.



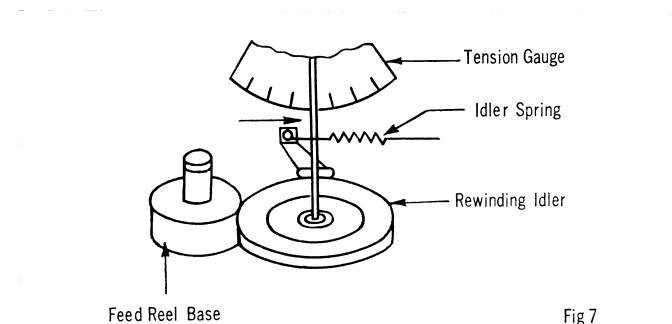
(C) Back Tension

When the recording tape gage 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 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)

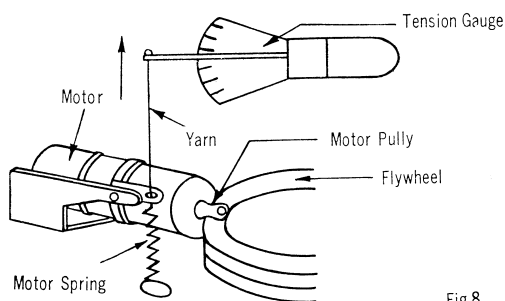


Fig 8

(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 this time should be 100~140gr (Fig. 9)

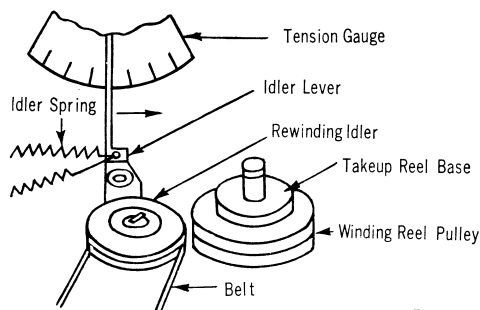


Fig 9

(C) Rapid Forwarding Roller

When the Takeup Reel Pulley is rotating and the Rapid Winding Roller is not in motion, or when the Rapid Winding Roller is rotating and the Takeup Reel Base is not in motion, the cause is traced to either the weak pressure of the Roller or unparallel positioning of the Takeup Shaft and the Rapid Wind-

ing Roller Shaft. In latter case, bend the Rapid Winding Roller Lever with a plier to make both shafts parallel. In the former case, remove the batteries from the recorder and stop the motion of all rotating parts, then use the gauge as indicated in Fig. 10. As shown in Fig. 10, hook the Tension Gauge to the Rapid Winding Roller and pull in the direction of arrow, so that the Roller will separate from the Takeup Reel Base. The Tension Gauge should indicate 140~160 gr. (Fig.10)

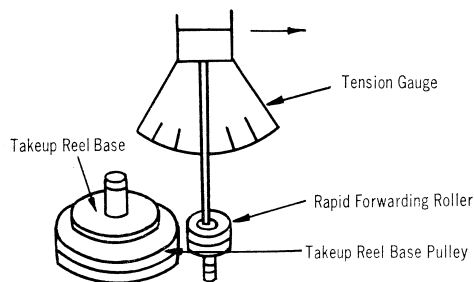


Fig 10

5) At Rewinding

When the defect is duplicated with that of Normal winding and Rapid Winding, the adjustments of these should be done first. Then the adjustment required will be reduced to adjusting of the pressure on the Winding Idler and Rewinding Idler.

(A) Adjustment of Rewinding Function Disc B.

When there is a slipping between the Rewinding Idler and the Winding Idler, make the adjustment by bending the joint of the Rewinding Function Disc B and Rewinding Function Disc A.

(Remarks) After this adjustment, check the adjustment of the Winding Idler as described in para. B and C of (4).

MAINTENANCE

1. Storing

Before storing the recorder, make sure that all the push buttons are in raised position, and then close the lid. When storing for a long period take out the batteries, as batteries may leak and cause damage to the mechanism.

2. Lubrication

This recorder needs little oiling, and in addition rotating shafts are equipped with lubrication device. Excessive lubrication may cause the oil to flow to the rubber part of the belt or the pinch roller and cause slipping.

2. 1 Lubricating the rotating parts

Among the rotating parts the Motor and the Flywheel are designed to last more than 1,000 hours without lubrication.

Oiling, therefore, will not be necessary, as it may cause drop in efficiency.

(1) Pinch Roller

The decorative screw (reverse thread) on top of the Pinch Roller can be loosened by turning it clockwise. After turning out the screw detach the Pinch Roller from the shaft by pulling.

(A) Wipe the shaft clean.

Wet the gauze or piece of cloth with alcohol or Carbon tetra chloride (Carbon Tetra Chloride is a transparent unflammable liquid obtainable at industrial medicine store. As the liquid is poisonous, wash hands after use.) and wipe the shaft.

After drying completely, apply a small quantity of oil, so that the thin film will cover the entire shaft.

(B) Wipe the Pinch Roller Shaft Bearing clean.

As in (A) wipe a piece of cloth or gauze soaked with alcohol or Carbon Tetra Chloride. Since alcohol or Carbon Tetra Chloride will remove the dust, it may be used in cleaning the rubber part. After drying completely, apply a little quantity of oil with painting brush, so that a thin film will cover the entire surface of the inside wall of the Shaft Bearing.

(2) Takeup Reel Base and Pulley

In order to lubricate the Takeup Reel Base and the Takeup Reel Base Pulley, press the Rewind Push Button, then remove the decorative Screw on top of the Rewinding Reel Shaft by turning it counter-clockwise, and then pull the Takeup Reel Base and Pulley.

The cleaning and lubrication of the Reel Base and the Reelley is exactly the same as that of the Pinch Roller. Caution must be paid not to put oil on the Winding Reel Base Felt.

In case the oil is spilt on the felt, press it with a piece of cloth or gauze soaked with Carbon Tetra Chloride.

(3) Feed Reel Base

In order to lubricate the Feed Reel Base, press the Reel Base Pulley Winding Button, then remove the decorative Screw on top of the Reel Shaft by turning it counter-clockwise, and then pull the Rewinding Reel Base. The cleaning and lubricating of the shaft and Reel Base is the same as that of Pinch Roller.

Pay attention to the Rewinding Idler which is in contact with the Reel Base.

2. 2 The oil used for lubrication

The oil for the rotating parts should be the one used for watches and clocks, in order to minimize the consumption of the batteries and to work satisfactorily even under temperature changes.

3. Handling of the Attachment Parts

Felt for the Head Pad, Oil-spray Prevention Felt on top of the Winding Idler, Brake Shoe for the Brake Band, will be changed in the following manner when they alter in quantity and or lose efficiency through long use.

(1) Head Pad

In changing the Felt of the Head Pad the Push Button should be in Playback position. When the two screws are removed from the Head Pad it will be removed easily. In addition to pressing the recording tape to the Head with Felt, the Head Pad also reduces the hum picked up by the Head. This latter function may be impaired when the Head Pad is damaged by screw driver in removing the Felt. It is best to remove by using alcohol or Carbon Tetra Chloride. Felt should be about 6×4 mm and 1~1.5 mm thick.

(2) Brake

The Brake Shoe uses a piece of leather 1~1.5 mm thick.

A stiff leather strip should be used always, as the Rubber, Vinyl, or Felt will damage the recording tape.

(3) Cleansing of Tape Contact Parts

The recording tape passes through (from the Feed Reel side) two Tape Guides, Erasing Head, Recording Head, pad, Tape Guide, Capstan, Pinch Roller, and Tape Guide. When dusts or ferrous powder from the Tape adhere to above mentioned places, it will cause insufficient erasing, unsatisfactory recording, insufficient high tones, lack of volume, or slipping. Careful cleaning will be necessary. Clean the Tape Guides, Heads, Pinch Roller, and Capstan with gauze or a piece of cloth soaked with Carbon Tetra Chloride. Do not use absorbent cotton as the lints will adhere.

In cleaning the Pad Felt, press the playback Button and place the cloth damped with Carbon Tetra Chloride between the Head and the Pad, pull and release the Pad repeatedly.

4. Cleansing of Rubber Parts

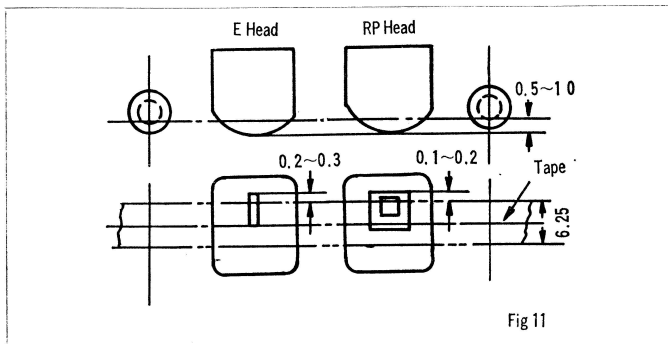
Pinch Roller, Flywheel, Belt, will also slip when soiled, and cause uneven rotations. Wipe these parts with a piece of cloth or gauze damped with Carbon Tetra Chloride once in half a year.

ADJUSTMENT OF HEADS

1. Position of Heads

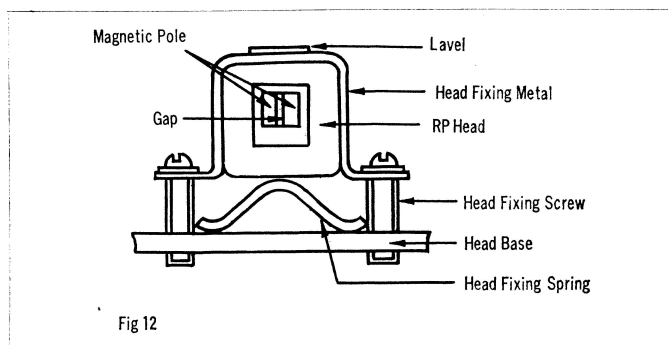
Inadequate positioning of Erasing Head will cause insufficient erasing of the tape, or erasing of the upper and lower tracks at the same time although the upper track is intended to be erased.

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 MECHANICAL TROUBLE

Trouble	Causes	Repair
Capstan fails to rotate	<p>*Defect of motor</p> <ol style="list-style-type: none"> Open in motor coil or defective contact of carbon brush. Burnt metal bearing. <p>*Defect of Transmission mechanism:</p> <ol style="list-style-type: none"> Skidding of motor pulley. Oil on Flywheel rubber. Lack of oil on capstan shaft. Defective motor spring. 	<ol style="list-style-type: none"> Replace <ul style="list-style-type: none"> *If capstan turns in Rapid Winding, or Rewinding, but fails in Recording or Playback, the cause is the defective contact of Governor. Terminal resistance of normally operating Governor at both ends should be 0 ohm. Replace Tighten the screw. Clean <ul style="list-style-type: none"> *Wipe with alcohol or Carbon Tetra Chloride. Lubricate <ul style="list-style-type: none"> *Replace Flywheel together with shaft bearing. Replace or adjust
Slow rotation.	<p>*Defect of motor</p> <ol style="list-style-type: none"> Burnt metal bearing <p>*Defect of Transmission mechanism.</p> <ol style="list-style-type: none"> (Same as 3-6) Lack of oil in winding idler. Lack of oil in Winding Reel Pulley 	<ol style="list-style-type: none"> Replace or lubricate <ul style="list-style-type: none"> *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. Lubricate Lubricate
Presence of wow and flutter	<p>*Defect of Motor</p> <ol style="list-style-type: none"> Defective function of Governor. <p>*Defect of transmission mechanism</p> <ol style="list-style-type: none"> (Same as 3-10) Alien objects on flywheel rubber. Deterioration of Flywheel rubber. <p>*Defective movement of recording tape.</p> <ol style="list-style-type: none"> Defective back tension on Rewinding Reel. Defective pressure of Pinch Roller. Change of quality or shape of Pinch Roller. Adherence of dust on points contacting recording tape. 	<ol style="list-style-type: none"> Lubricate or Replace Clean. (Same as 4) Replace. (Same as 5) Replace Adjust Pinch Lever Spring Replace Clean. (Wipe with Carbon Tetra Chloride.)

Trouble	Causes	Repair
Unsatisfactory winding.	<p>*Reel Base does not rotate even when the tape is not mounted.</p> <p>19. Broken belt or change of quality.</p> <p>20. weak transmission of Winding Idler & Winding Reel Pulley.</p> <p>21. (Same as 1-10,16, & 19).</p> <p>*Reel base does not rotate when the tape is mounted.</p> <p>22. Weak pressure of Rapid Forwarding Roller, Reel Base & Reel Base Pulley.</p> <p>23. Lack of oil on Reel Base.</p>	<p>19. Replace belt.</p> <p>20. Adjust Winding Idler Spring</p> <p>22. Adjust Rapid Winding Roller Spring.</p> <p>23. Lubricate</p>
Unsatisfactory rewinding.	<p>*Reel base does not rotate either with or without reel or tape.</p> <p>24. Weak transmission between Winding Idler & Rewinding Idler.</p> <p>25. (Same as 1-10, 16, 19-21).</p>	<p>24. Adjust Rewinding Function Disc B.</p>
Brake does not uncton	<p>*Defect of Brake</p> <p>26. Peeled brake shoe.</p> <p>27. Brake shoe touching Winding Reel Base Pulley.</p> <p>28. Defective adjustment</p> <p>29. (Same as 29).</p>	<p>26. Use adhesive.</p> <p>27. Adjust the size of Brake shoe. *In case of Right Reel.</p> <p>28. Adjust spring. *In case of Left Reel Brake, adjust Brake Function Disc D.</p>
Unable to record.	<p>*Switch fails to function the recording circuit.</p> <p>30. Defective joint of RP Slide Lever B and C.</p>	<p>30. Tighten screw. *In adjusting the screw, press Rec. Button, and adjust the position of switch with over stroke so that RP Slide Switch will become Recording position.</p>
Unable to erasing	<p>31. Weak pressure of Head Pad.</p>	<p>31. Adjust *Loosen the Pad fastening screw, and bring the pad forward or move the head front, or replace felt with thicker one.</p>
Uneven winding of tape.	<p>*During Recording or Playback</p> <p>32. Reel shaft is not perpendicular to operating panel.</p> <p>33. Weak Takeup Reel Base Pulley Spring.</p> <p>34. Pressure difference at top & bottom of Pinch Roller & Capstan.</p>	<p>32. Replace. *Replacement is extremely difficult as Reel shaft is fastened tight onto chassis.</p> <p>33. Adjust spring.</p> <p>34. Replace Pinch Lever, or adjust.</p>

SUGGESTIONS FOR ELECTRICAL TROUBLE

Trouble	Causes	Repair
<p>1. Even at Playback motor does not turn and Indicator of Meter does not move.</p> <p>Motor does not turn. Needle of Meter fails to move.</p>	<p>1. Adaptor socket bad.</p> <p>2. Power switch (S8) bad.</p> <p>3. S8 does not turn on.</p> <p>4. Inoperative filter circuit (C18, C19)</p> <p>5. Remote socket & Foot switch socket bad or chassis contacting.</p> <p>6. C (200μF) bad.</p> <p>7. Motor bad. 5, 6, 7 or above.</p> <p>1. CH broken, R26 (110K)</p> <p>2. RP switch bad.</p> <p>3. Diode, C12 bad.</p> <p>4. Meter bad.</p>	<p>1. Determine cause replace.</p> <p>2. -ditto-</p> <p>3. Adjust mechanism so as to turn it on.</p> <p>4. Replace.</p> <p>5. Check and rebalance or repair.</p> <p>6. Replace.</p> <p>7. Check and replace.</p>
<p>2. Motor does not turn fast at Rapid Winding or Rewinding.</p>	<p>1. Switch (S9) does not turn on.</p> <p>2. Insufficient voltage</p>	<p>1. Adjustment.</p> <p>2. Check voltage and current of power source.</p>
<p>3. Unable to record and playback.</p>	<p>1. Inoperative amp. circuit.</p> <p>2. Recording/Playback Head or R35 bad.</p> <p>3. Defective contact between Tape & Record/Playback Head.</p> <p>4. Broken lead wire between Head & Amplifier.</p> <p>5. Switch S7 does not turn on.</p> <p>6. R15, R20 broken</p> <p>7. IPT, OPT wire broken.</p> <p>8. Bad contact of extension jack.</p>	<p>1. Check voltage and amplification gain of each part.</p> <p>2. Replace if broken wire of short circuit.</p> <p>3. Check the position of tape. Check & clean the contact points of Head.</p> <p>4. Check inductance or insulation.</p> <p>5. Adjust or replace.</p> <p>6. Check voltage of each part. Replace broken wires.</p> <p>7. -ditto-</p> <p>8. -ditto-</p>
<p>4. Plays back but cannot record.</p> <p>a. Meter does not move.</p> <p>b. Meter moves normal.</p>	<p>1. RP Switch bad.</p> <p>2. Meter circuit bad.</p> <p>3. Microphone bad.</p> <p>4. Mike jack bad, radio jack bad, R1, R2, R36 bad contact.</p> <p>5. R27 (100 ohm) bad.</p> <p>6. 1S 188 bad.</p> <p>1. Bad wiring and rated current circuit (R30, C13, R29) from last stage amplification to Head.</p> <p>2. Bad oscillation circuit. Bad C14 or VR3.</p>	<p>1. Check switch mechanism, switch contact, adjust.</p> <p>2. Check & see if meter moves at playback.</p> <p>3. Determine whether Mike is bad or broken cord.</p> <p>4. Check, adjust or replace.</p> <p>1. Check each element and wiring and replace.</p> <p>2. Check each element and confirm oscillation bias volume.</p>
<p>5. Records but does not playback.</p>	<p>1. Bad switch, or bad contact.</p> <p>2. Bad speaker or broken wiring.</p> <p>3. Bad contact of EXT. SP jack.</p> <p>4. Broken wire of short circuit in power output transformer.</p>	<p>1. Check Switch mechanism and switch.</p> <p>2. Connect amplifier or speaker to EXT. SP jack and determine.</p> <p>3. Check, adjust or replace.</p> <p>4. Check to see if the meter moves in recording, and replace.</p>

Trouble	Causes	Repair
6. Excessive noises and statics	<ol style="list-style-type: none"> 1. Bad contact or Volume. 2. Bad Transistor. (Especially Tr-1) 3. Deterioration of circuit element, or contact with adjacent element. Bad solder. 4. Magnetized head. 5. Distortion of oscillation wave. 6. Bad earth of printed circuit, 7. If noise loud when connecting Mike, C25 or Microphone bad. 	<ol style="list-style-type: none"> 1. Check, replace. 2. Find bad transistor & replace. 3. Check, adjust or replace. 4. Erase with de-magnetizer. 5. Check & adjust circuit elements. 6. Detect & replace. 7. Replace.
7. Bad Tones	<ol style="list-style-type: none"> 1. Bad circuit element or transistor. 2. Inadequate High Frequency Bias. 3. Bad contact of Tape and Head. 4. Head worn down. 5. Bad Microphone. 6. Bad speaker. 7. Bad Feed-back circuit. (R24) 	<ol style="list-style-type: none"> 1. Check voltage gain of each part. 2. Adjust bias. 3. Check positioning of tape or clean the contacting part of Head. 4. Replace. 5. Replace. 6. Compare by plugging in another speaker to EXT SP jack, Replace. 7. Check, adjust.
8. Lack of High Tone	<ol style="list-style-type: none"> 1. Head not perpendicular. 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. 3. Not enough pressure in Recod/Playback Head Pad. 	<ol style="list-style-type: none"> 1. Check and adjust. 2. Check. 3. Adjust.
9. Excessive High Tone	<ol style="list-style-type: none"> 1. C5 capacity small. C22 capacity small, or R25 value big. C11 capacity small short circuit in semivolume in Meter circuit. Broken wire in C5 R9 circuit. 	<ol style="list-style-type: none"> 1. Check.
10. Unable to erase	<ol style="list-style-type: none"> 1. Bad positioning of erasing head. 2. Bad contact or tape & erasing head. 3. Lack of erasing current. 	<ol style="list-style-type: none"> 1. Adjust position. 2. Adjust, clean. 3. Check and replace.
11. Cross talk between top and bottom tracks.	<ol style="list-style-type: none"> 1. Bad positioning of Tape Guide and wobbling of Tape due to slanting of head. 2. Bad positioning of top & bottom of head. 	<ol style="list-style-type: none"> 1. Adjust Tape Guide Adjust Head position. 2. Adjust height of head.
12. Tape speed is irregular	<ol style="list-style-type: none"> 1. Motor governor not functioning. 2. C24 has short circuit of developing short circuit. 	<ol style="list-style-type: none"> 1. If not repaired by opening C24 R34, governor is bad. 2. If repaired, C24 bad. Replace.
13. Motor Noises	<ol style="list-style-type: none"> 1. Opening of C24 R34 circuit. 	<ol style="list-style-type: none"> 1. Determine, replace.

PARTS LIST

Stock No.	Description	Q'ty
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CABINET PARTS

R-S81021b	Cabinet	1
R-39208	Lid	1
R-31581a	Back cover	1
R-32437	Battery case cover	1
R-39166	Knob for battery case	1
R-12187a	Spring board for battery case	1
R-32442a	Cabinet cover	2
R-26990	SP panel	1
R-26991	Jack panel	1
R-12243	Hinge metal	2
R-12244	Bar	
R-23739	Decoration metal (cabinet)	
R-23740	Decoration metal (lid)	
R-23741	Decoration metal (Lid hinge)	1
R-12245	Spring board	
	Speaker net	
R-26992a	Badge on SP panel	
R-26982	Specification board (on back cover)	
R-47790	Printed circuit diagram	
R-44227	Rubber cushion (SP panel protection)	
R-41277a	Protector	
	Cushion	
R-12106	Tape guide	2
R-24557	Capstan rest bar	

CASSIS

R-S8516	Battery terminal (+)	
R-S8517a	Battery terminal (-)	
R-47492	Battery explanation paper	
R-35216	Ribbon to pull out batt.	
R-41246d	Printed circuit board	
R-112151a	Mounting metal	
R-112198	Mounting metal	
R-39156	Knob assembly (Volume, Tone)	
R-32449	Mounting base	

ELECTRIC PARTS

R-R11635	Volume control 5K ohms (T)	
R-R11636	Tone control 5K ohms (B)	
R-S6269	Speaker-voice coil impedance 8 ohms	
R-S6314	Microphone-impedance 200 ohms	
R-S8479b	3" tape (B)	
R-32126a	3" reel	
R-S5516a	Level indicator	
R-S6222	Earphone assembly	
R-S8938	Shield wire assembly	
	Splicing tape	
R-W8107	Oscillator coil	
R-W6211	Output trans former	
R-R11012	Semi-fixed resistor (5K ohms), Indicator adjust	
R-R11013	Semi-fixed resistor (10K ohms), Bias adjust	
R-W6105	Input transformer (5K ohms : 2K ohms)	
R-W6243	Input transformer (5K ohms : 2K ohms)	
R-C9074	Electrolytic capacitor (Vertical type 200 μ 10WV)	4
R-C9093	" " " 100 μ 10WV)	1
R-C9080	" " " 30 μ 3WV)	2
R-C9079	" " " 10 μ 3WV)	1
R-C9081b	" " " 50 μ 9WV)	1

Stock No.	Description	Q'ty
R-C9078	Electrolytic capacitor (Vertical type 5 μ 6WV)	4
R-C9094a	" (Tubular type 100 μ 3WV)	1
R-S4214	Slide switch (6 channels 2 points for record & play switch	
R-S2112	Jack (small) for foot SW & remote SW	
R-S2123	Jack (medium) for mike, radio and extra input	
R-S3063	Earth lug	
R-S3008	Lead lug	
R-S4217	Spring switch, RP switch	
R-26627a	Radiation board	
2SB303A	Transistor Tr-1	
2SB186	" Tr-2	
2SB186	" (yellow) Tr-3	
2SB272	" (black & white) Tr-4,5	
2SB22B	" Tr-6	
1N60		
1S188	Diode	
SDT-06	Thermister (temperature compensator)	

CAPACITORS

Myler, Squire type	35WV.	+30, -20%	0.2 μ F	C17
" " "	"	\pm 10%	0.15	C5,15
" " "	"	+30, -20%	0.1	C16
" " "	50WV	"	0.01	C12,32
" " "	50WV.	\pm 20%	0.0075	C27
" " "	"	"	0.0015	C14
" Axias type	"	\pm 10%	0.001	C26
Styrol	125WV.	"	600pF	C13

RESISTER

Carbon, P type	$\frac{1}{4}$ W	10%	270K	R1
" " "	"	"	80K	R11
" " "	"	"	33K	R3,16
" " "	"	"	22K	R4
" " "	"	"	15K	R12
" " "	"	"	10K	R17
" " "	"	"	9K	R13
" " "	"	"	5.6K	R6
" " "	"	"	5K	R5
" " "	"	"	2.2K	R7
" " "	"	"	1.5K	R2
" " "	"	"	390	R8
" " "	"	"	200	R10
" " "	"	"	8.2	R19
" " "	"	5 %	270K	R30
" " "	"	"	110K	R26
" " "	"	"	100K	R29
" " "	"	"	5.1K	R9
" " "	"	"	1.8K	R21
" " "	"	"	150	R31
" " "	"	"	68	R22
" " "	"	"	18	R33
" " "	"	"	10	R35
" " "	"	"	2.2	R23
" " "	"	"	750	R24
Carbon Solid or, P type	"	10%	2.2K	R14 R15
" " "	"	"	1K	R18
" " "	"	"	330	R32
" " "	"	"	130	R20
" " "	"	"	100	R27 R28
" " "	"	5 %	510	R25
Solid.	$\frac{1}{2}$	20%	8.2	R36

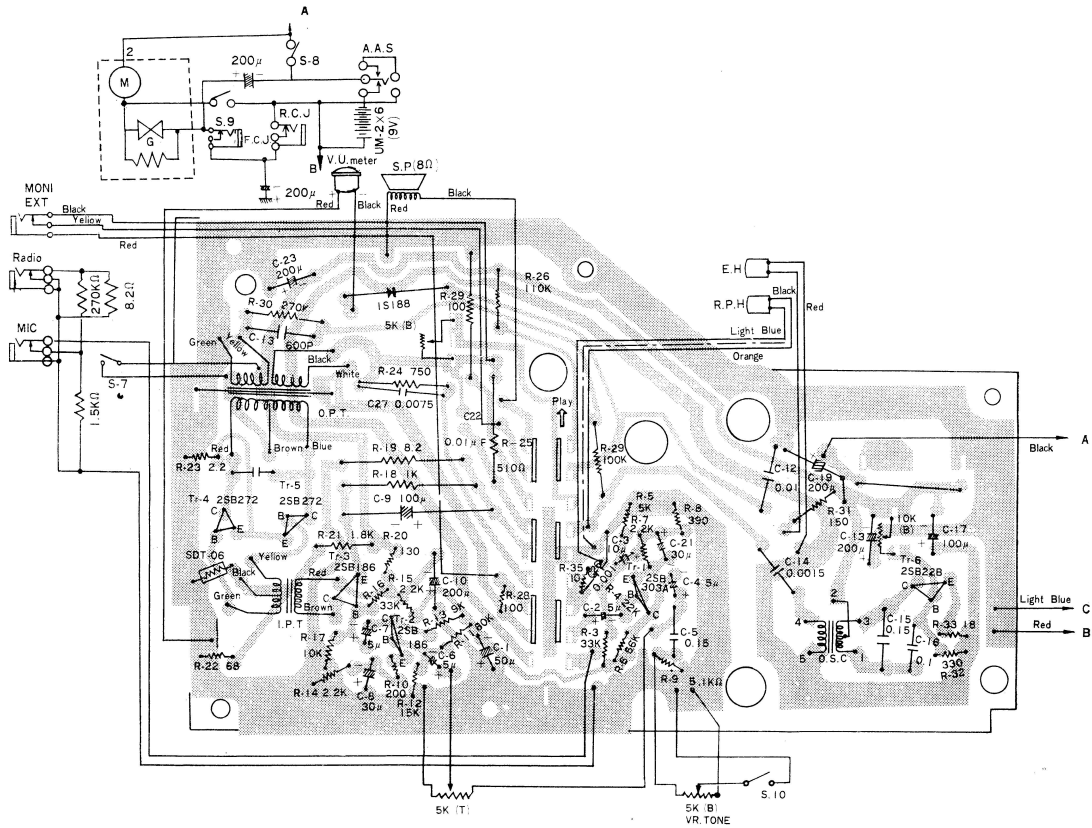
Stock No.	Description	Q'ty
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CHASSIS

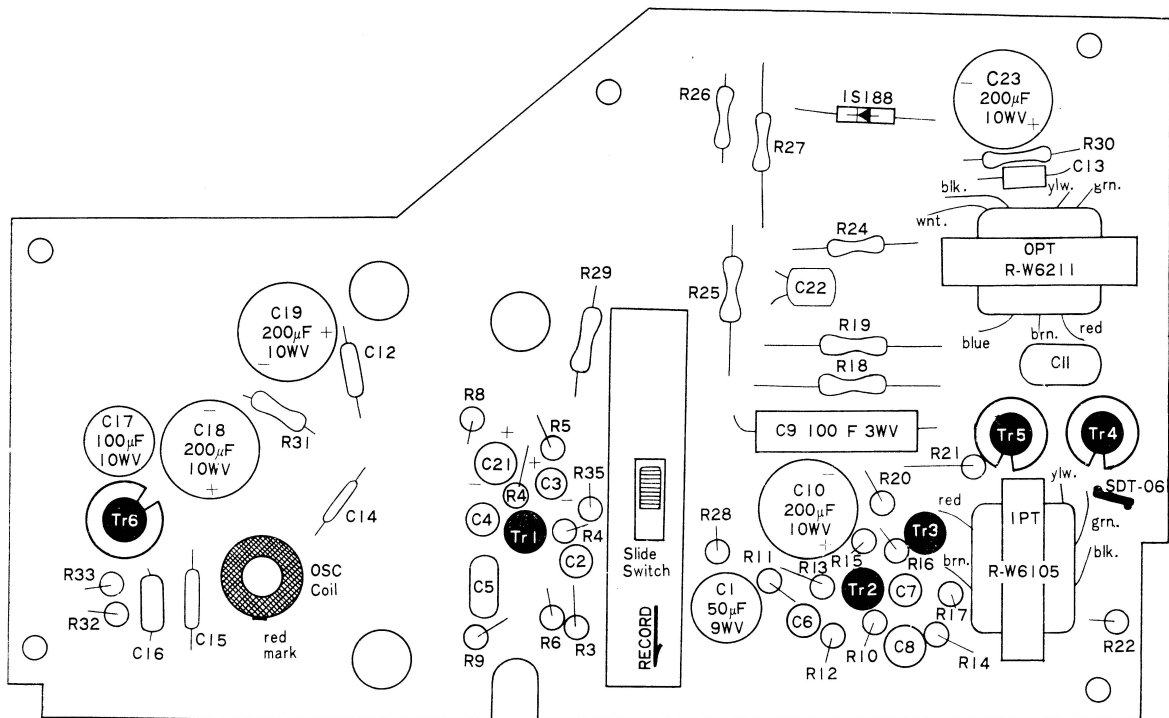
R-112152	Chassis	1
R-112153	Mounting Metal	2
R-112154	Mounting Metal	1
R-S5088	DC Motor	1
R-24816	Pulley-Motor Pulley	1
R-34112	Mounting part	1
R-112212	Mounting Metal	2
R-24817a	Special Screw	2
R-S8891	Lever (compl.)	1
R-112123	Mounting Metal	1
R-112124	Lever	1
R-24818	Boss	1
R-12205	Spring	1
R-12209	Coil Spring	1
R-S8529	Flywheel (compl.)	1
R-25217	Pin-Capstan stopper	1
R-24819	Sleeve-Capstan Sleeve	1
R-28083	Flywheel	1
R-12206	Shaft	1
R-25218	Shaft Bearing	1
R-34092	Mounting	1
R-24820	Special Screw	1
R-25219	Shaft Bearing	1
	Felt	1
	Felt	1
R-12207	Pin	1
	Stopper Ring	1
	Washer	1
	Ball	1
R-S8951	Special Switch	1
R-112125	Frame	1
R-14134	Shaft	1
R-112126	Lever	1
R-S8892	Lever (compl.)	1
R-112127	Lever	1
R-24821	Boss	1
R-S8893	Lever (compl.)	2
R-112128	Lever	2
R-24822	Boss	2
R-S8894	Lever (compl.)	1
R-112129	Lever	1
R-24822	Boss	1
R-39171	Button	5
R-12208	Coil Spring-STOP	1
R-12210	Coil Spring-REW. FWD	2
R-12211	Coil Spring-PLAY	1
R-12212	Coil Spring-REC	1
R-12220	Coil Spring-Operating Board	1
	Washer Ring	1
	Stopper Ring	1
R-S8944	Lever (compl.)	1
R-112204	Lever	1
R-24890	Boss	11
R-25221	Plate Spring	2
R-S8896	Pad (compl.)	1
R-43138	Felt	2
R-25220	Plate Spring-Pad Board	1
R-29010	Hinge	1
R-112130	Hinge	1
R-12221	Wire	1
R-12222	Coil Spring	1
R-23725	Mounting Metal	1
R-24825	Rivet	2
R-24826	Tape Guide	2
R-24827	Envelope Nut	1
R-112131	Mounting Metal-Head Base	1
R-S6248a	RP Head	1
R-S6242a	E Head	1
R-24828	Special Screw	1
R-44255	Pinch Roller	1
R-241068	Shaft Bearing	1
R-S8897a	Lever (compl.)	1
R-12223a	Shaft-Roller Shaft	1
R-24829	Boss	1
R-112132	Lever	1
R-24830	Boss	1
R-34094	Boss	1
R-15195	Wire-Operation Bar	1
R-24831	Boss-Lever	1
R-24832	Boss-Lever	1
R-14135	Shaft-Lever Shaft	1
R-12213	Coil Spring-Lever	1
R-24833	Pipe-Lever Shaft Base	1
R-34095	Roller	1
R-25224	Shaft Bearing	1
R-12224	Shaft-Idler	1
R-24834	Boss	1

Stock No.	Description	Q'ty
R-112146	Lever-Idler Lever	1
R-24838	Boss-Lever Shaft	1
R-12219	Coil Spring-Idler	1
R-44216	Drive Belt	1
	Felt 10φ × 22φ × 1.0t	1
R-12225	Coil Spring-Rewind Idler	1
R-24835	Boss	1
R-S8898	Idler (compl.)	1
R-112133	Frame	1
R-24836	Shaft Bearing	1
R-12226	Shaft	1
R-112134	Lever	1
R-24838	Boss	1
R-S8899	Lever (compl.)	1
R-112135	Lever	1
R-25225	Plate Spring	1
	Round Rivet	2
	Boss	1
R-24837	Slide (compl.)	1
R-S8900	Slide	1
R-112136	Slide	1
R-24835	Boss	2
R-24839	Ring	2
R-24840	Special washer	2
R-24841	Boss-Slide Shaft	2
R-112137	Slide-Fast Forward	1
R-12214	Coil Spring	1
R-12215	Coil Spring-Fast Forward	1
R-44217	Roller-Fast Forward	1
R-25222	Shaft Bearing	1
R-12227	Shaft-Roller Shaft	1
R-S8901	Lever (compl.)	1
R-112147	Lever	1
R-24842	Boss	1
R-14136	Shaft-Lever Shaft	1
R-12228	Coil Spring	1
R-S4218	Special Switch	1
R-112138	Mounting Metal	1
R-S4216	Spring Switch	1
R-34099	Insulation Paper	1
R-S4217	Spring Switch	1
R-34099	Insulation Paper	1
R-S8902	Reel Base (compl.)	1
R-34096	Reel Base	1
R-12230	Spring	1
R-24843	Special Screw	1
R-12231	Shaft-Reel Base Shaft	1
R-24844	Boss	1
	Felt-Washer Type	1
R-34097	Pulley	1
R-15196	Coil Spring	1
	Washer	1
	Washer	1
R-S8903a	Reel Base (compl.)	1
R-34098a	Reel Base	1
R-12230	Spring	1
R-24843	Special Screw	1
R-12231	Shaft	1
R-24844	Boss-Reel Shaft Base	1
	Washer	1
	Washer	1
	Slide	1
R-112139	Slide	1
R-112140	Slide	1
R-24845	Envelope Nut	1
R-12216	Coil Spring-Slide Spring	1
R-122141	Lever	1
R-24846	Shaft-Lever	1
R-24818	Boss	1
R-34093	Insulation Paper	1
	Washer	1
	Washer	1
R-112142	Lever-Right Brake	1
R-24847	Shaft-Right Brake	1
R-36155	Sheet-Brake	1
R-24837	Boss	2
R-12217	Coil Spring	1
R-112143	Lever	1
R-112144	Lever	1
R-24835	Boss	1
R-112145	Lever-Left Brake	1
R-12218	Coil Spring	1
	Washer	1
R-C9074	Electrolytic Capacitor	1
R-112211	Lever-for Back tension	1
R-24893	Shaft	1
R-24894	Stopper	1
R-12248	Coil Spring	1
	Felt 15 × 8 × 25	1
R-3008	Lug	3
R-S3121a	Lug Board	1
R-S2113	Socket	1

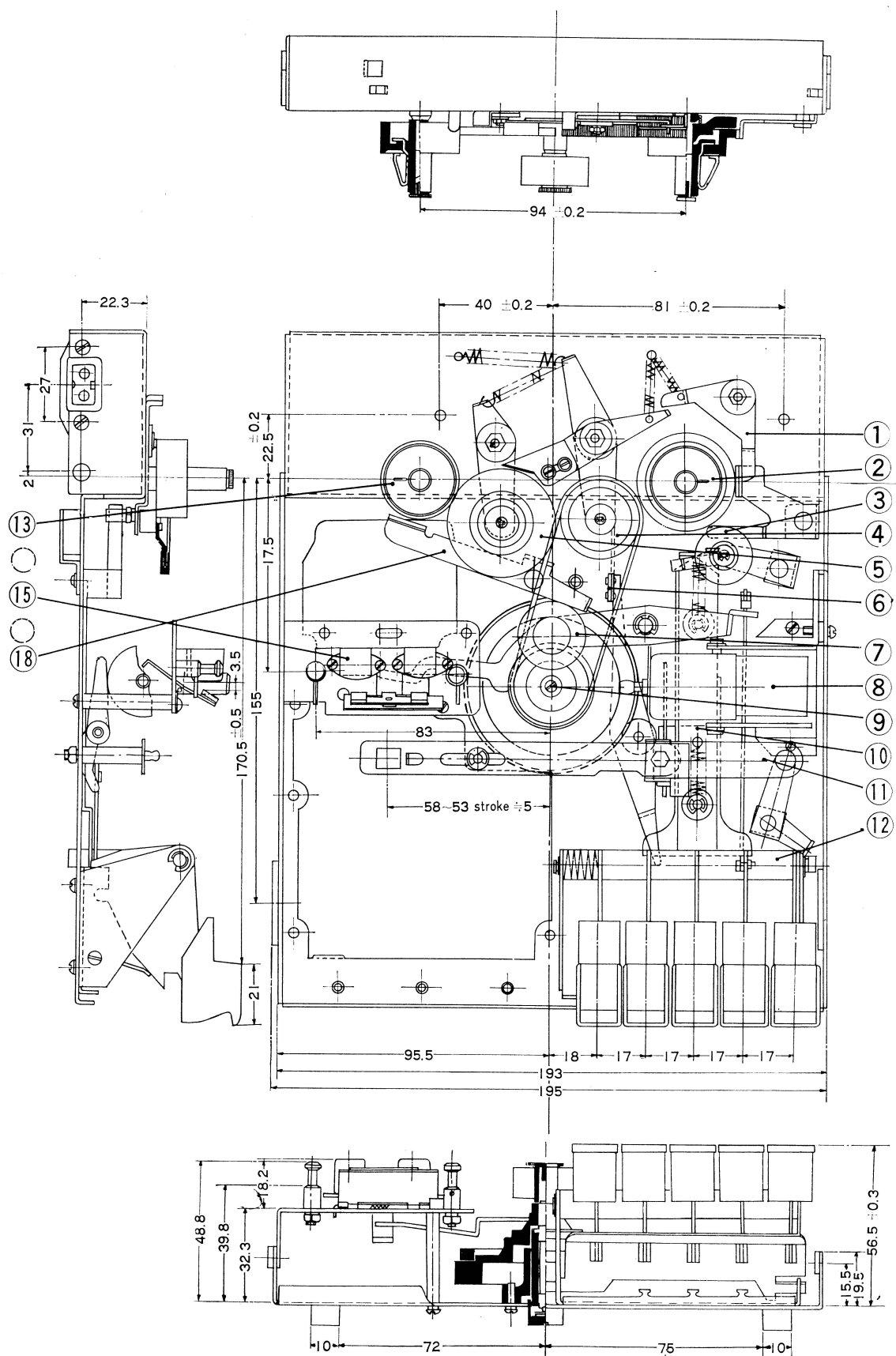
INTER-PARTS CONNECTION

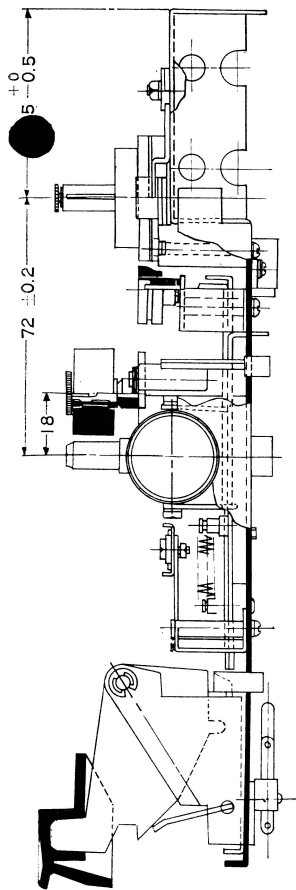


MAIN PARTS LOCATION



CONSTRUCTION DIAGRAM





CONSTRUCTION DIAGRAM - MECHANISM

REF. NO.	STOCK NO.	DESCRIPTIONS
(1)	MO	Brake Mechanism
(2)	ML	Take-up Reel Base Mechanism
(3)	MJ	Fast Forward Roller Mechanism
(4)	MF	Take-up Idler Mechanism
(5)	MG	Rewind Idler Mechanism
(6)	MH	Rewind Mechanism
(7)	ME	Pinch Roller
(8)	MA	Motor Mechanism
(9)	MB	Flywheel Mechanism
(10)	MI	Main Operation Mechanism
(11)	MN	RP Select Lever
(12)	MC	Switch Mechanism
(13)	MM	Feed Reel Mechanism
(14)	MK	Switch Mechanism
(15)	MD	Head Mechanism
(16)	MK	Switch Mechanism
(17)	MK	Switch Mechanism
(18)	MP	Back Tension Mechanism