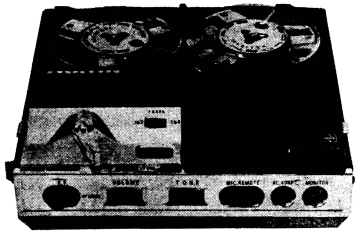
NATIONAL
TAPE RECORDER SERVICE NOTE



MODEL RQ-116

SPECIFICATIONS

Power source:	12 penlight dry cells UM3 9V (6 cells parallel)
Rated output:	500 mW (700 mW maximum)
Tracks:	4 Track
Transistors:	2SB172D (1) 2SB173B (1) 2SB175B (2) 2SB178D (2)
Recording system:	AC bias
Erasing system:	DC erasure
Tape speeds:	3¾ ips. (9.5 cm/sec), 1⅞ ips. (4.75 cm/sec).
Record/playback time:	30 min. at 3¾ ips., 60 min. at 1⅞ ips. with 3″ (300ft.) tape.
Fast forward time:	Less than 7 min.
Frequency response:	100-7.000 c/s at 3¾ ips. 100-4.000 c/s at 1 ⅞ ips.
Recording level indicator:	Level meter
Input impedance:	30 KΩ unbalanced
Output impedance:	8Ω unbalanced
Wow and Flutter:	3¾ ips·····less than 0.7 %
Dry cells life:	7 hours (continuous use)
Speaker:	3 ½″ (8 cm) permanent dynamic
Dimensions:	7¾″ × 2½″ × 7⅛″ (197×65×182 mm)
Weight:	4 ⅛ lbs. (1.8 kg.....cells not included)

MATSUSHITA ELECTRIC

FUNCTIONAL PARTS

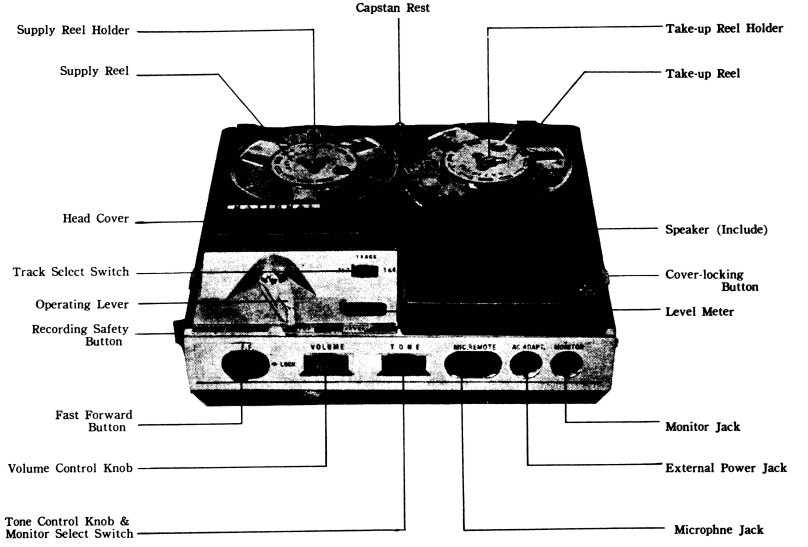


Fig. 1

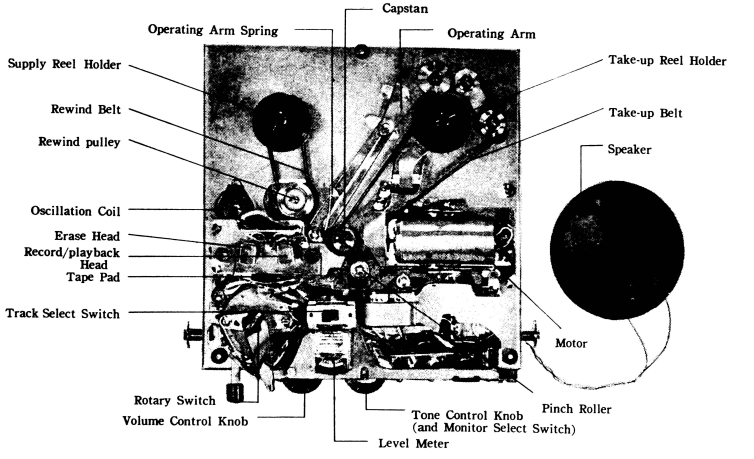
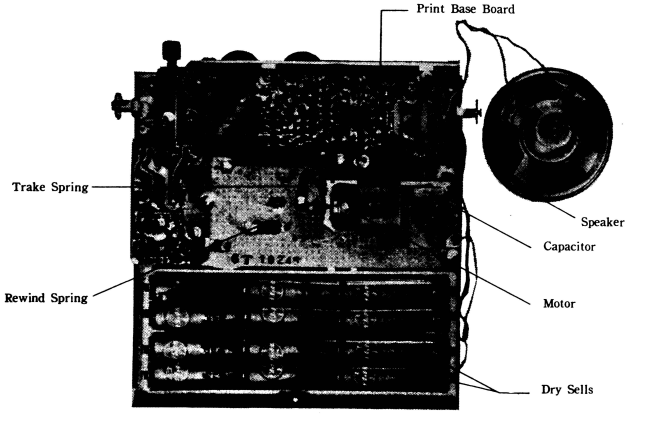


Fig. 2



HINTS FOR ADJUSTMENT

Adjustment of Functional Parts

As the adjustment of functional details according to numerical values is practically not easy, determin it by watching actual performances of each part. Balance of capstan and pressure of pads affect the performances of tape-recorder and tape, and shall be carefully conditioned.

Balance of Capstan and Pinch Roller

When balance is lost, it will result in irregular traveling of or even stretching of one edge of tape
Adjust as shown so that capstan and pinch roller are maintained in a close and parallel contact.

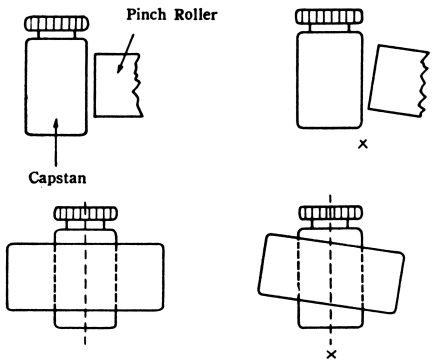


Fig. 9

Winding Torque for Playback

Measurement

a) Form a loop at the end of No. 3 Tape by sticking tape end with adhesive tape and place the reel on take-up reel holder as shown Fig. 12.
b) Hook Tension Gauge, 50g on the loop at the end of tape.
c) Set the unit in playback or record mode.
d) Let take-up reel pull Tension Gauge.
e) Read the gauge where it ceases to swing. (Repeat several times)
f) Normal torque shall be 6-14g for No. 3 Tape, fully wound up.

Adjustment

(Adjust with Friction Spring as shown Fig. 12)
If tension is insufficient, bend strongly the Friction Spring, and if too strong, stretch the Spring in the whole length.

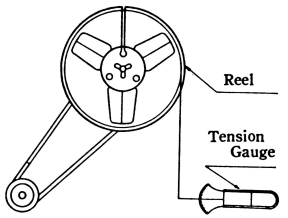


Fig. 10

Winding Torque for Fast Forward (Fig. 12)

Measurement

Measure in a manner similar to playback (Measure the unit in F.F. mode). Normal winding torque in fast forward mode shall be over 20g for No. 3 Tape, fully wound up.

Adjustment

Adjust with the pressure degree of supply reel holder to F.F. roller.

Winding Torque for Rewind

Measurement

Measure in manner similar to playback, but the unit in rewind mode.
Normal torque shall be over 20g for No. 3 Tape, fully wound up.

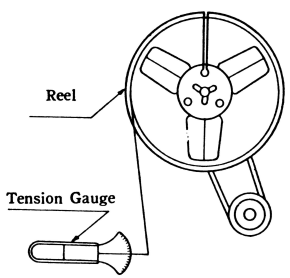


Fig. 11

Pressure of Tape Pads

Measurement

a) Set the unit playback mode.
b) Read the gauge where Tape Pads are released.
c) Normal pressure shall be 8-18g.

Positions of Heads

With tape in Record or Playback mode, pull forward pressure pad and adjust the level of the Head so that tape will be positioned in relationship to the Head as per the diagram above.
If the level of Head core is too low, lift the Head by inserting spacers underneath.

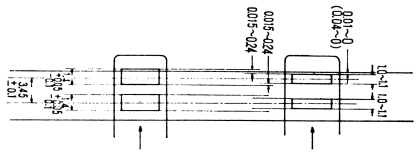


Fig. 12

Angle of Record/Playback Head

Thread the standard alignment tape on the recorder. playback signal (3000 c/s at 3¾ ips) on the tape, and adjust the screw (1) of the head mounting plate for the proper position which will produce maximum output.
After completion of head adjustment the relative positions of head core and tape shall be as shown below.
In case standard alignment tape is unavaiilable record a signal on tape with a reliable recorder and play it back, adjusting by hearing the head alignment so as to obtain maximum output.

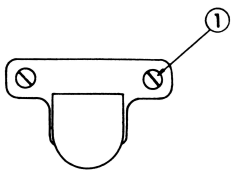


Fig. 13

Record Bias

A.C. bias system is employed for this tape-recorder, so that when replacing heads, oscillation transformer or transistors on oscillation circuit, etc., readjustment of bias must be mode. Adjust it according to the illustration below :

Bias Currcnt	0.7 mA
Bias Frequency	20~30 kc (25 kc disirable)

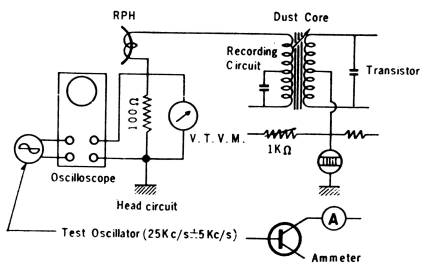


Fig 14

Adjust Frequency

a. Connect an oscilloscope (pre-adjusted to sync at approximately 25 kc) across a 100 ohm 5% resistor, placed in series with the record head.
b. Adjust core of oscillator coil to approximately 25 kc as indicated on oscilloscope.

Head Current

a. Connect a VTVM across a 100 ohm 5% resistor placed in series with the record head.
c. Adjust the 1k ohm variable resistor, so that the VTVM reads within the range of 40-70 millivolts. (Current 0.4- 0.7 mA.)

Oscillator Transistor Current

Connect a milli-ammeter in series with the collector. Current must not exceed 0.9 mA. Adjust 1k ohm variable resistor for 0.9 eA reading on the milliammeter. The circuit is so designed that 0.9 mA collector current will produce a bias current of 0.7 mA.

Erase Current

Normally, 4-6 mA DC will flow through the erase head (Fig. 17). When replacing the erase head, observe polarity.

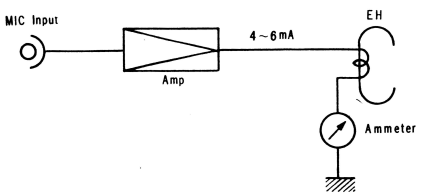


Fig 15

Recording Level

The level meter indicates the recording level. Should the level meter fail to indicate the correct range of current in the record head, distortion due to over-modulation, or poor Signal to Noise ratio due to under-modulation, may occur. To test level meter, a VTVM and a 1000 cps oscillator is used.

1. Connect a VTVM across a 100 ohm 5% resistor in series with the record head.
2. Introduce a 1000 cps signal into the microphone jack.
3. The level meter should indicate "O" at a current flow of 40 μA through the record head.

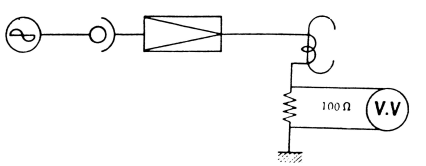


Fig 16

TO TAKE APART MAIN PARTS

Mechanism and Case

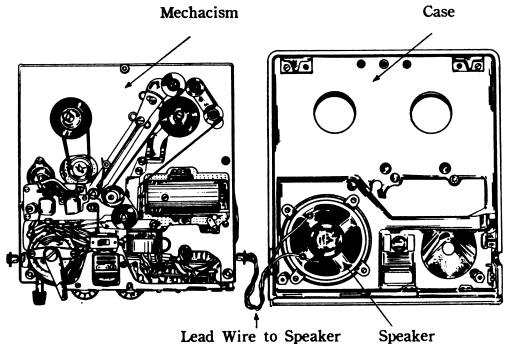


Fig. 19

Arrangement of Main Parts

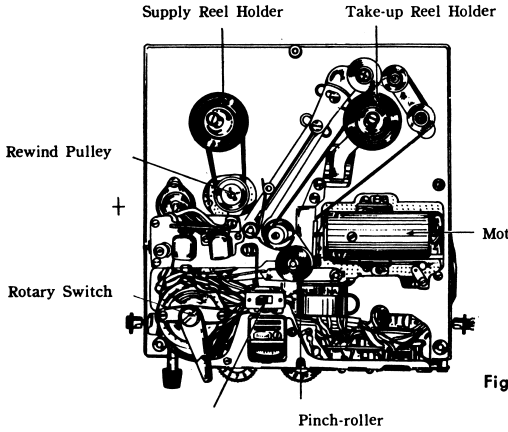


Fig. 20

Pinch-roller

1. Take off Pinch-roller spring and pull out pinch roller.

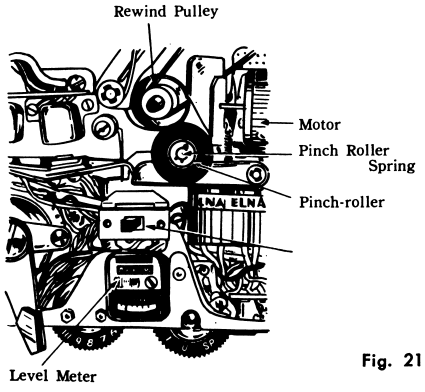


Fig. 21

Supply Reel Holder

1. Remove screw on Reel Holder taking care not to damage the screw, also remove Reel Holder Spring.
2. Remove Rubber belt, connecting with Rewind Pulley.
3. Pull out Reel Holder.

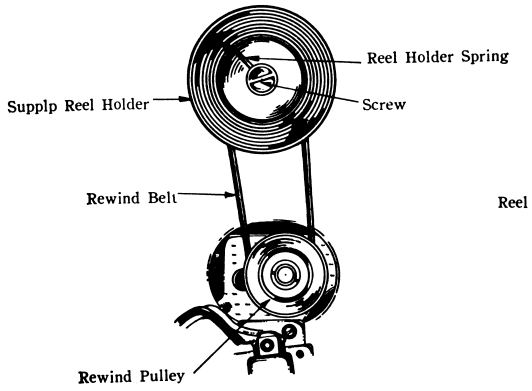


Fig. 22

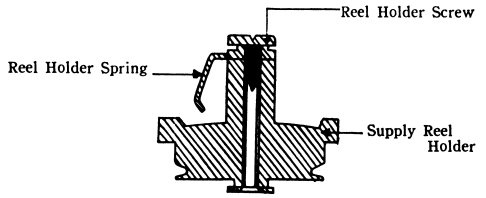


Fig. 23

Take-up Reel Holder (Same as the case of Supply Reel Holder above)

Take apart the Take-up Reel Holder as bellow condition.

1. When adjusting the pressure of Reel pressing spring.
2. When friction washer is oiled or soiled it has to be removed for cleaning.
   Friction washer shall be removed as follows:
   a. Remove holding ring.
   b. Remove friction spring.
   c. Remove Reel Pulley.
   d. Remove friction washer.

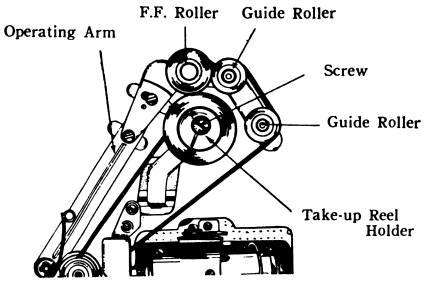


Fig. 24

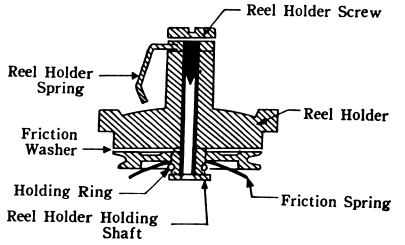
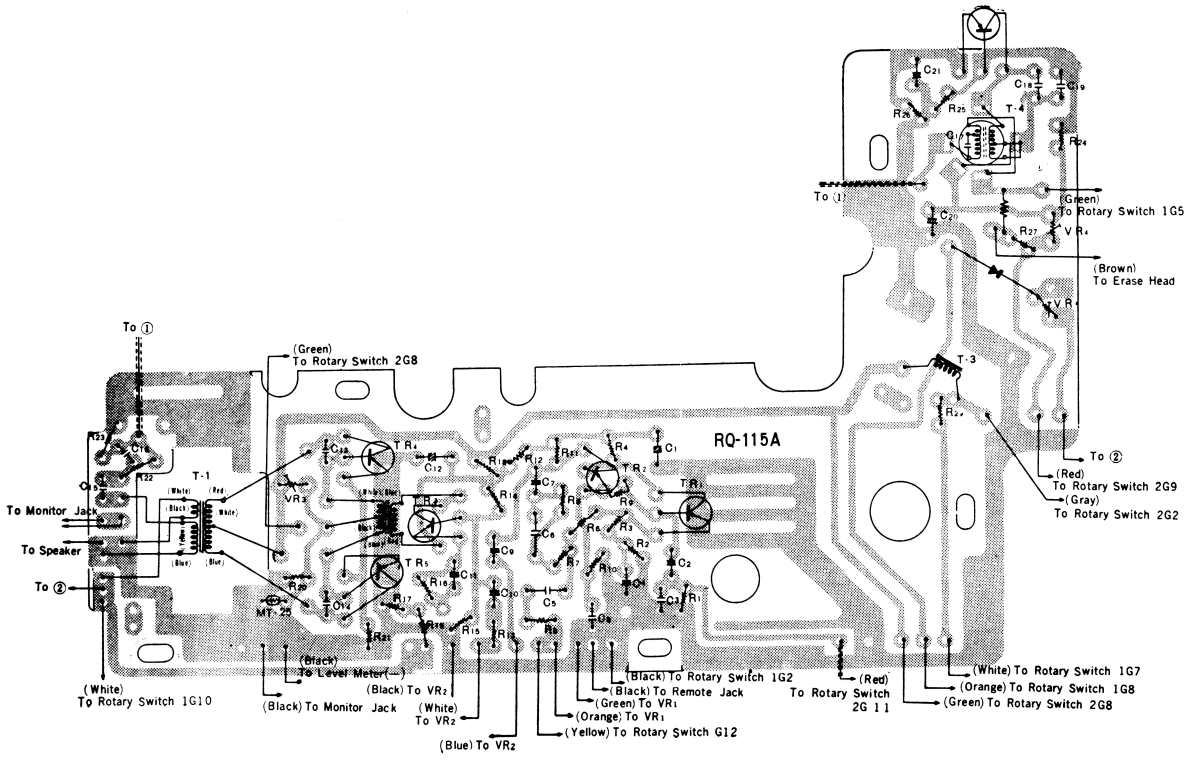
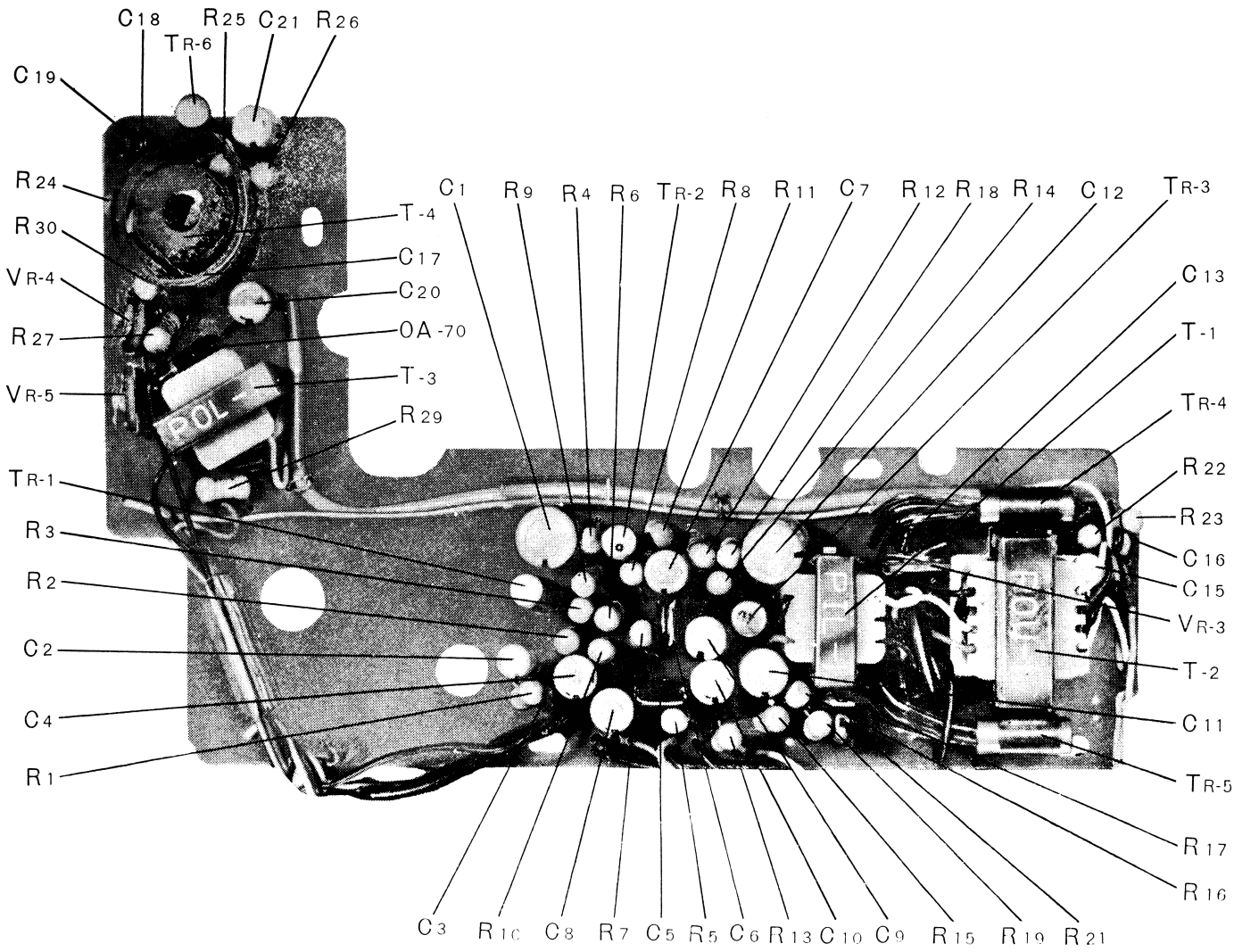


Fig. 25

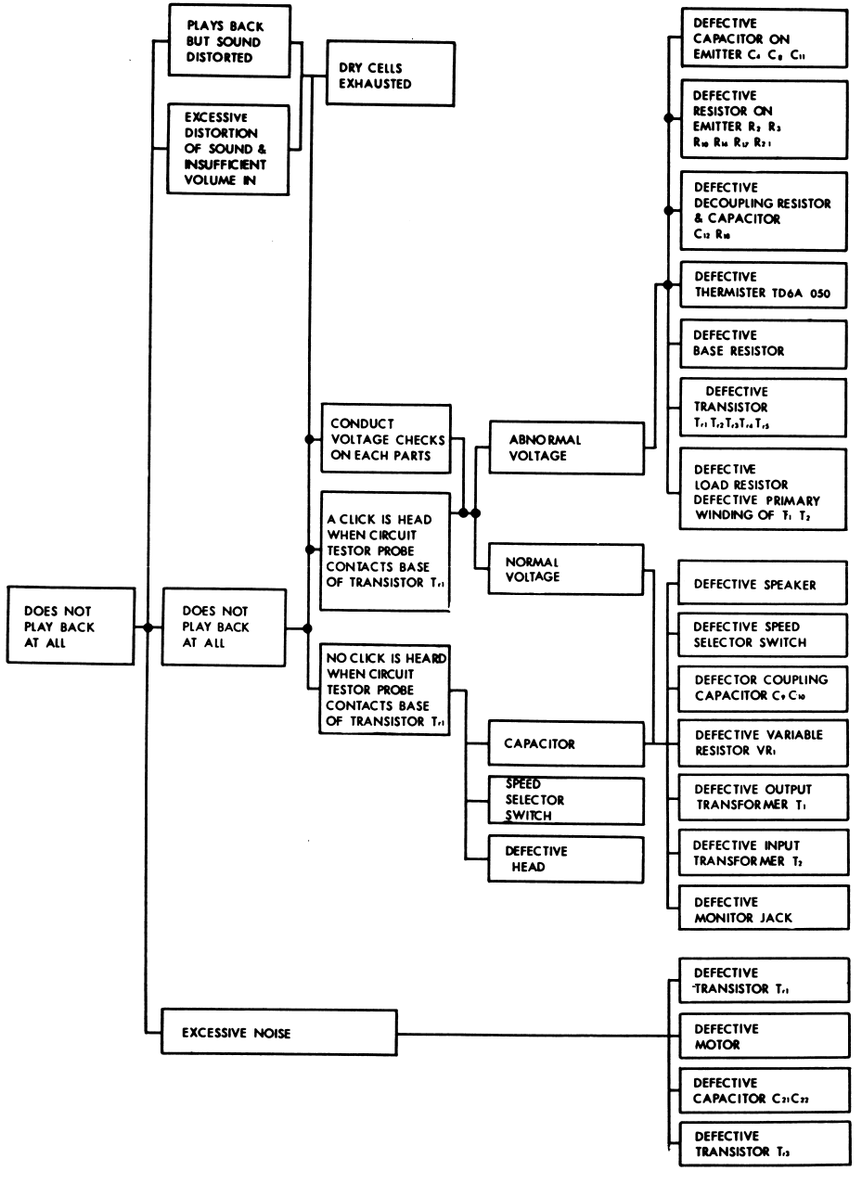
NATIONAL MODEL RQ-116



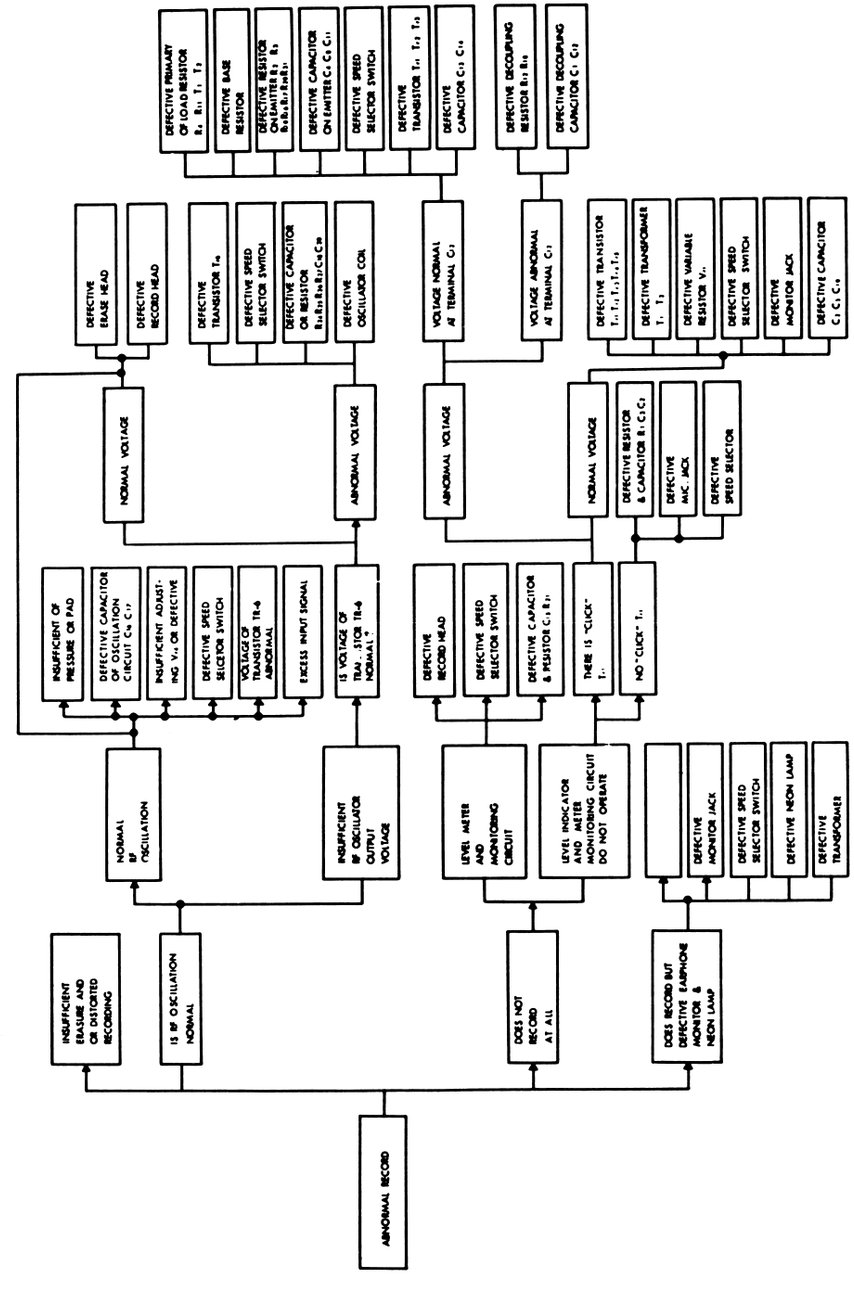


TROUBLE SHOOTING GUIDE 4

NO PLAYBACK



ABNORMAL RECORDING CIRCUIT



M174	Spring Washer for Capacitor Mounting Board 2ϕ			
M175	Spring Washer for Adaptor Jack 2ϕ			
M176	Nut for Adaptor Jack 2ϕ			
M177	Main Prin Base Board			
M178	Print Base Board Spacer			
M179	Screw for Print Base Board 2.6×4 Round Head			
M180	Screw for Print Base Board 2.6×8 Round Head			
M181	Spring Washer for Prin Base Board 2.6ϕ			
M182	Spring Washer for Print Base Board 2.6ϕ			
M183	Fiber Washer for Print Base Board 0.5×2.6×6			
M184	Fiber Washer for Print Base Board 0.5×2.6×6			
M185	52 Holder			

R 1	Carbon Film Resistor	Rb1/6 RNZK	22KΩ	(±10%)
R 2	〃	〃	12KΩ	〃
R 3	〃	〃	120Ω	〃
R 4	〃	〃	10KΩ	〃
R 5	〃	〃	200Ω	〃
R 6	〃	〃	2.7KΩ	〃
R 7	〃	〃	1.2KΩ	〃
R 8	〃	〃	33KΩ	〃
R 9	〃	〃	100KΩ	〃
R10	〃	〃	2.2KΩ	〃
R11	〃	〃	2.7KΩ	〃
R12	〃	〃	1.2KΩ	〃
R13	〃	〃	820Ω	〃
R14	〃	〃	47KΩ	〃
R15	〃	〃	10KΩ	〃
R16	〃	〃	560Ω	〃
R17	〃	〃	8.2Ω	〃
R18	〃	〃	270Ω	〃
R19	〃	〃	820Ω	〃
R20	〃	〃	150Ω	〃
R21	〃	〃	2.2Ω	〃
R22	〃	〃	100KΩ	〃
R23	〃	〃	47KΩ	〃
R24	〃	〃	100KΩ	〃
R25	〃	〃	6.8KΩ	〃
R26	〃	Rb1/4LZK	4.7Ω	〃
R27	〃	Rbl/6RNYJ	1.2KΩ	(±-5%)
R28	〃		10Ω	(±10%)
R29	〃		50KΩ	
R30	〃		270KΩ	
R31	〃		200Ω	(±10%)

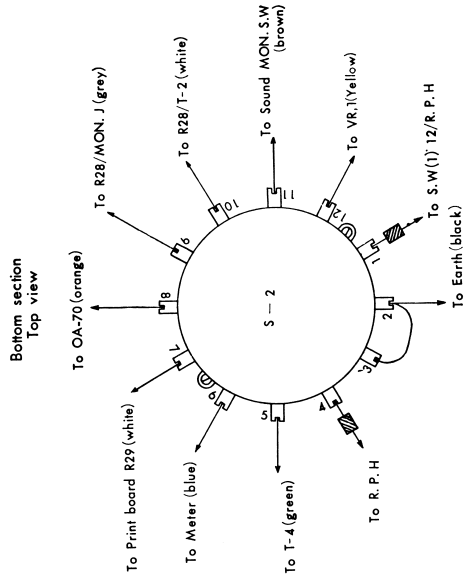
C 1	Electrolytic Capacitor	NCA	10V	50μF
C 2	Electrolytic Capacitor	NCA	10V	1μF
C 3	Myler Capacitor	MV		820PF
C 4	Electrolytic Capacitor	NCA	6V	30μF
C 5	Myler Capacitor	MV		0.05μF
C 6	Myler Capacitor	MV		0.05μF
C 7	Electrolytic Capacitor	NCA	10V	10μF
C 8	Electrolytic Capacitor	NCA	6V	30μF
C 9	Electrolytic Capacitor	NCA	10V	10μF
C10	Electrolytic Capacitor	NCA	10V	10μF
C11	Electrolytic Capacitor	NCA	6V	50μF
C12	Electrolytic Capacitor	NCA	10V	50μF
C13	Myler Capacitor	JV		0.01μF
C14	Myler Capacitor	JV		0.01μF
C15	Electrolytic Capacitor	NCA	10V	1μF
C16	Myler Capacitor	MV		820PF
C17	Myler Capacitor	JL		0.002μF
C18	Myler Capacitor	JV		0.02μF
C19	Myler Capacitor	JV		0.005μF
C20	Electrolytic Capacitor	NCA	10V	10μF
C21	Electrolytic Capacitor	NCC	6V	30μF
C22	Electrolytic Capacitor	NCT	12V	200μF
C23	Electrolytic Capacitor	NCA	12V	200μF
C24	Oil Capacitor		10V	10μF

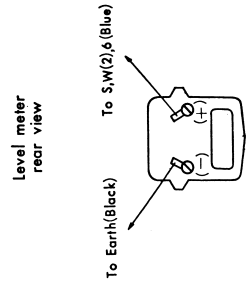
E 1	Record/Playback Head	SHL-333
E 2	Erase Head	EHL-113
E 3	Motor	
E 4	Speaker	P-346S
E 5	Level Meter	V-20331

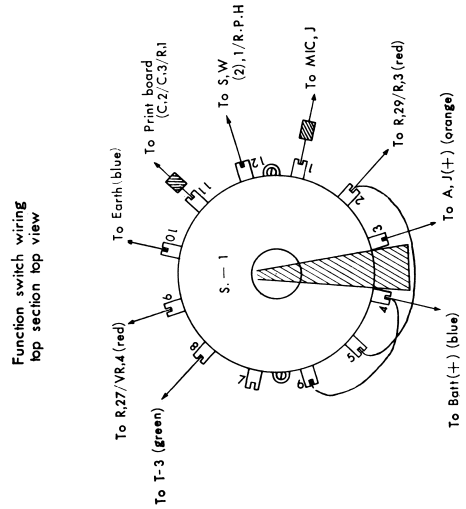
T 1	Input Transformer	PIL-1
T 2	Output Transfomer	POU-1
T 3	Filter Coil	TCL-1 PCL-1
T 4	Oscillation Transformer	
Tr 1	Transistor	2SB 173B
Tr 2	〃	2SB 175A
Tr 3	〃	2SB 175A
Tr 4	〃	2SB 178D
Tr 5	〃	2SB 178D
Tr 6	〃	2SB 172A
	Diode	OA-70
	Thermister	MT 25

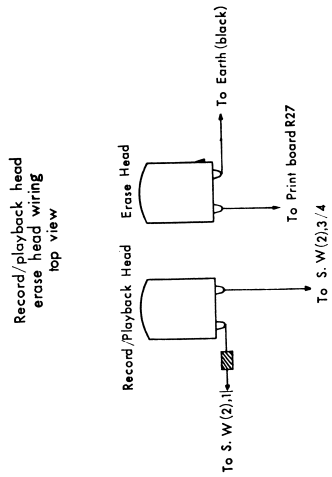
VR 1	Variable Resistor	SNV16ZC	10KA
VR 2	Variable Resistor	NV16	10KA
VR 3	Semi-Fixed Variable Resistor		10KΩ
VR 4	Semi-Fixed Variable Resistor		1KΩ
VR 5	Semi-Fixed Variable Resistor		2KΩ

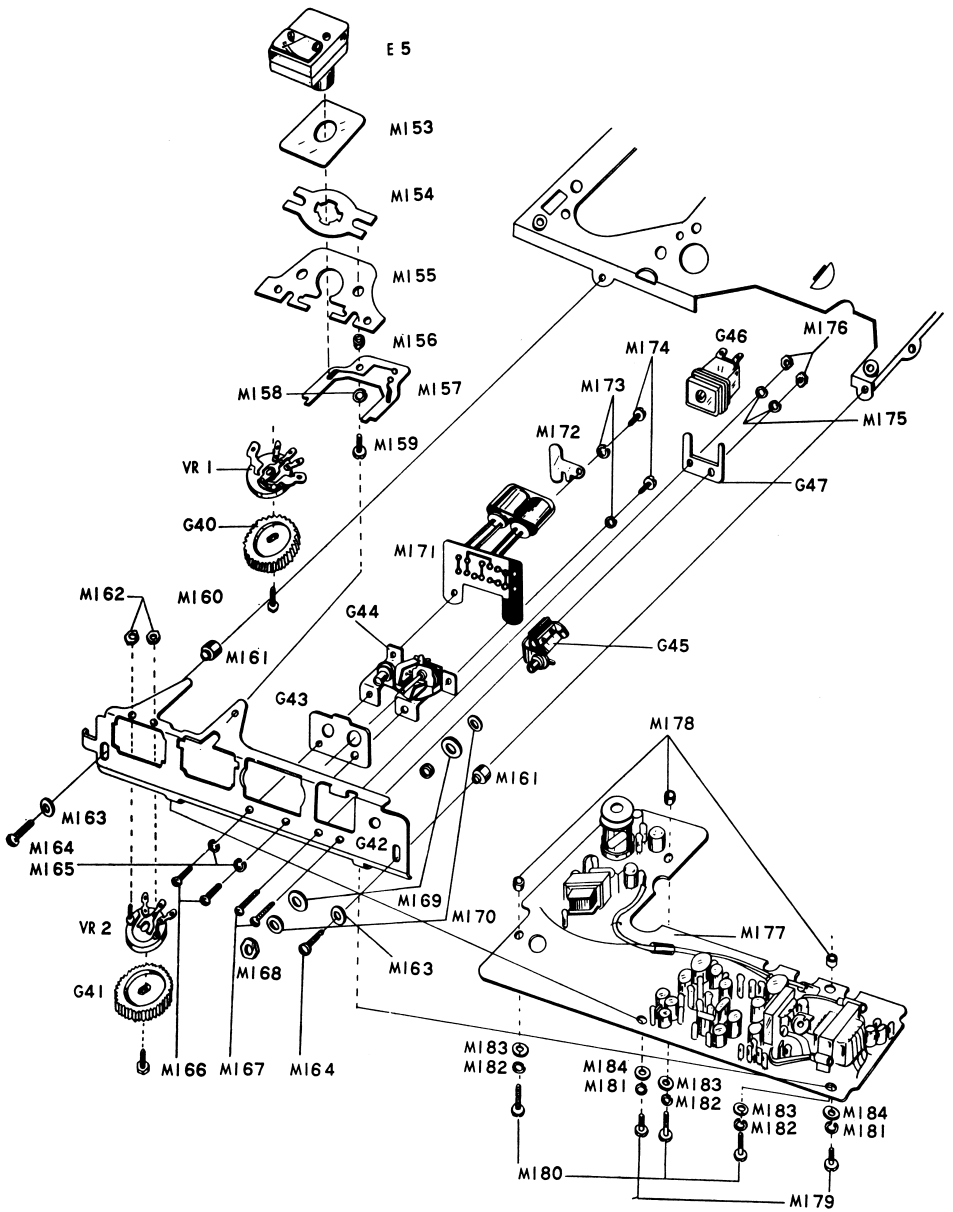
S 1	Rotary Switch
S 2	Slide Switch

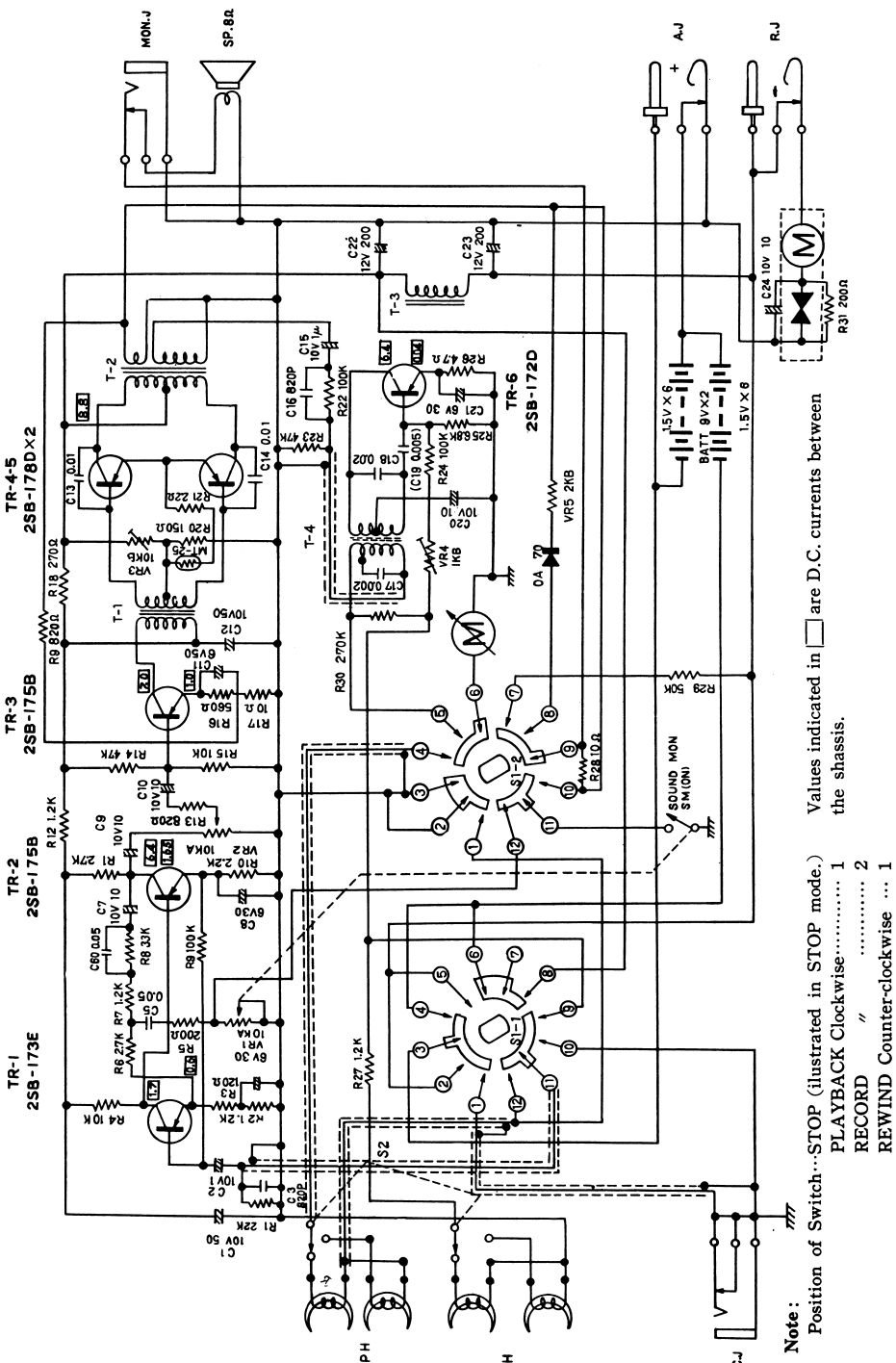








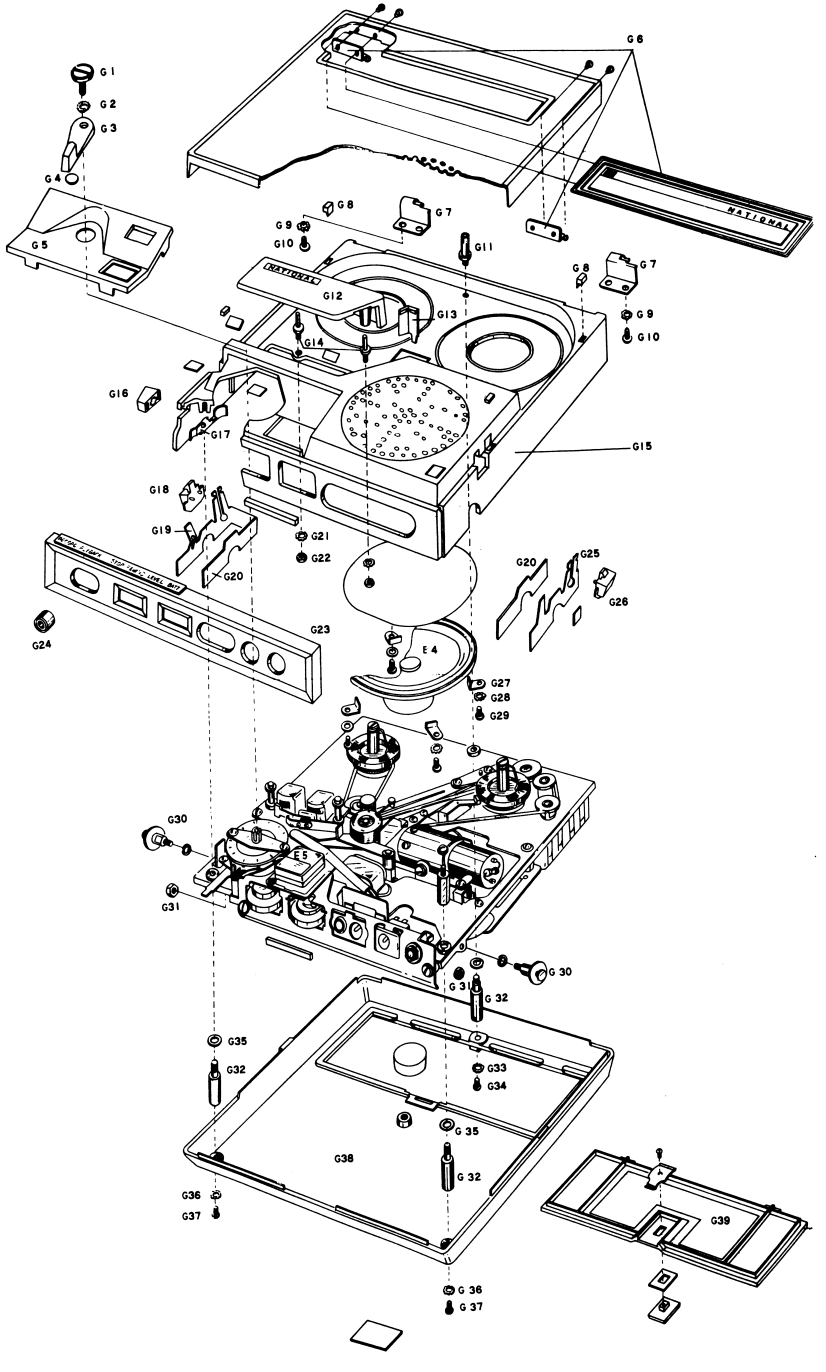


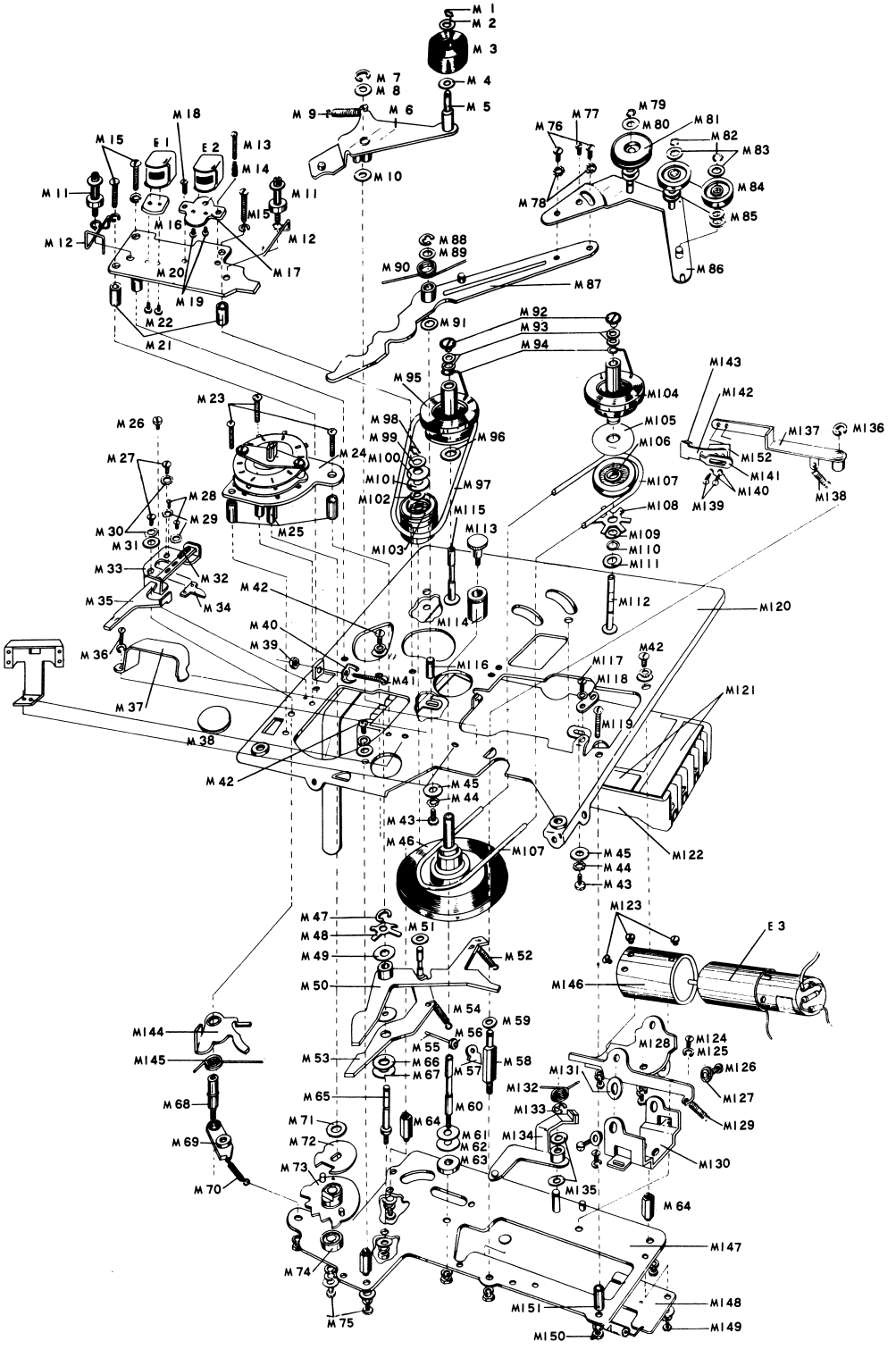


Values indicated in □ are D.C. currents between the shassis.

Note:
Position of Switch···STOP (ilustrated in STOP mode.)
PLAYBACK Clockwise····· 1
RECORD 〃 ····· 2
REWIND Counter-clockwise ··· 1

N8-11. NATIONAL MODEL RQ-116





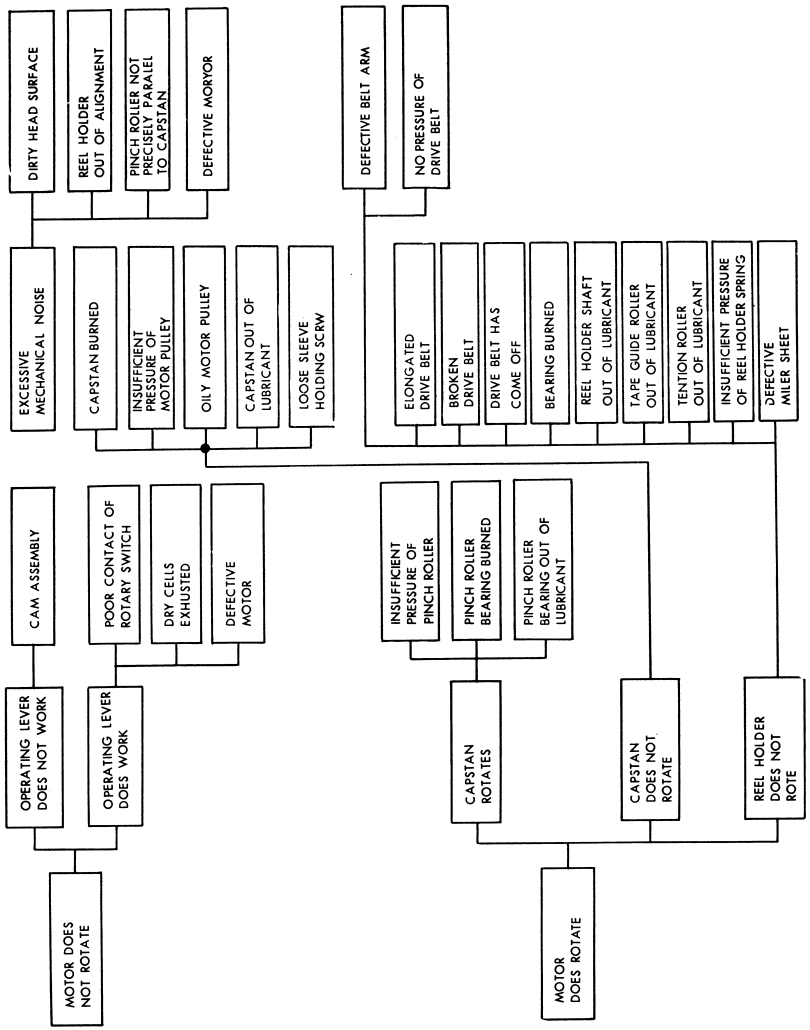
REPLACEMENT PARTS

G 1 Screw For Operating Level
G 2 Lock Washer 3.6φ
G 3 Operating Lever
G 4 Operating Lever Felt
G 5 Meter Panel
G 6 Cabinet Case A (Assembly)
G 7 Cabinet Case Hinge
G 8 Rubber Cusion (Large)
G 9 Lock Washer 3φ
G10 Screw 3φ Round Head
G11 Capstan Rest
G12 Head Cover
G13 Tape Slider
G14 Head Cover Plag
G15 Cabinet Case B
G16 Recording Safety Button
G17 Record Lock Lever
G18 Lock (Left)
G19 Lock Spring (Left)
G20 Lock Spring Plate
G21 Lock Washer 2.6φ
G22 Nut 2.6φ
G23 Front Panel
G24 F.F Button
G25 Lock Spring (Right)
G26 Lock (Right)
G27 Speaker Mounting Metal
G28 Lock Washer 2.6φ
G29 Speaker Mounting Screw 2.6×4 Round Head
G80 Band Hook Metal
G31 Nut For Band Hook Metal
G32 Chassis Pole (Round)
G33 Lock Washer 2.6φ
G34 Screw 2.6×8 Round Head
G35 Washer 3φ
G36 Lock Washer 2.6φ
G37 Screw 2.6×8 Round Head
G38 Cabinet Case C
G39 Cells Box Cover (Assembly)
G40 Tone Control Knob
G41 Volume Control Knob
G42 Control Board
G43 Conceal Plate for Jack
G44 MIC Remort Jack
G45 Monitor Jack
G46 Adaptor Jack
G47 Adaptor Jack Holder
M 1 Pinch Roller Spring
M 2 Pinch Roller Oil Cap
M 3 Pincn Roller
M 4 Washer 4.2φ
M 5 Pinch Roller Shaft
M 6 Pinch Roller Lever
M 7 C Washer 3φ
M 8 Fiber Washer 4.2φ
M 9 Pinch Roller Spring
M10 Fiber Washer 4.2φ
M11 Tape Guide
M12 Tape Guide Spring (Right)
M13 Screw for Head Adjust Plate 2×10 Round Head
M14 Spring for Head Adjust Plate
M15 Screw for Head Plate 3×15 Round Head
M16 Eraser Head Spacer
M17 R/P Head Adjust Plate
M18 Screw for Head Adjust Plate 2×5 Round Head
M19 Screw for Recording Head 2×3 Flat Head
M20 Head Plate
M21 Head Plate Spacer
M22 Screw for Erase Head 2×6 Round Head
M23 Screw for Switch Plate 3×10 Philips Head
M24 Switch Plate
M25 Switch Plate Spacer
M26 Screw for F.F. Lever 2.6×3 Flat Head
M27 Screw for F.F. Lever Guide 3×6 Round Head
M28 Screw for F.F Arm 2×4 Round Head
M29 Lock Washer for F.F Arm 2φ
M30 Lock Washer 3φ
M31 Washer 3φ
M32 Spring for F.F Lever
M33 F.F Lever Guide
M34 F.F Arm
M35 F.F Lever
M36 Screw for Capacitor Holder 3×4 Round Head
M37 Capacitor Holden
M38 Meter Cution
M39 Nut 3φ
M40 Lug A-4
M41 Screw 3×12 Round Head
M42 Screw for Chassi Spacer 3×5 Round Head
M43 Screw for Battery Box 3×6 Round Head
M44 Lock Washer 3φ
M45 Washer 3φ
M46 Main Pulley
M47 C Washer 3φ
M48 Spacer Spring
M49 Washer 4.1φ
M50 Clucth Lever
M51 Washer 4.2φ
M52 Spring for Clucth Lever
M53 Rewind Lever
M54 Spring for Rewind Lever
M55 Screw for Motor Lift 2×12 Round Head
M56 Motor Lift Bushing
M57 Motor Lift
M58 Tape Pad Arm Shaft
M59 Fiber Washer 4.2φ
M60 Main Pulley Shaft
M61 Washer 4.1φ
M62 Washer 4.1φ
M63 Main Pully Spacer
M64 Chassis Spacer
M65 Pinch Roller Lever Shaft
M66 Washer 6.2φ
M67 Washer 6.2φ
M68 Catch Lever Shaft
M69 Catch Lever
M70 Spring for Catch Lever
M71 Steel Washer 6.2φ
M72 F.F Cam
M73 Operating Plate
M74 Switch Shaft Bushing
M75 Screw for Switch Shaft 3×5 Round Head
M76 Screw for Guide Arm 3×4 Round Head
M77 Screw for Guide Arm Set 3.6×3
M78 Lock Washer 3φ
M79 Spring for F.F Roller
M80 Fiber Washer 3.7φ
M81 F.F Roller
M82 Spring for Guide Pulley
M83 Fiber Washer 3.7φ
M84 Take-up Guide Roller
M85 Fiber Washer 3.7φ
M86 Take-up Guide Arm
M87 Take-up Guide Lever
M88 C Washer 3φ
M89 Fiber Washer 4.2φ
M90 Spring for Take-up Lever
M91 Fiber Washer 4.2φ
M92 Screw for Reel Holder
M93 Washer 3.7φ
M94 Reel Holder Spring
M95 Supply Reel Holder
M96 Fiber Washer 4.2φ
M97 Rewind Belt
M98 Spring for Rewind Pulley
M99 Fiber Washer 4.2φ
M100 Washer 4.1φ
M101 Washer 4.1φ
M102 Rewind Pulley Oil Cap
M103 Rewind Pulley
M104 Take-up Reel Holder
M105 Friction Fiber
M106 Friction Pulley
M107 Take-up Belt
M108 Friction Spring
M109 Washer 6.1φ
M110 Spring for Friction Pulley
M111 Fibe Washer 4.2φ
M112 Take-up Reel Holder Shaft
M113 Capstan Screw
M114 Capstan
M115 Supply Reel Shaft
M116 Take-up Guide Lever Shaft
M117 Screw for Motor Spring Hook
M118 Motor Spring Hook
M119 Screw for Chassis Spacer 3×18 Round Head
M120 Upper Chassis
M121 Fiber for Cells Box
M122 Cells Box
M123 Screw for Motor Set 2.6×3 Flat Head
M124 Screw for Motor Holder 2.6×4 Round Head
M125 Spring Washer 2.6φ
M126 Screw for Motor Pivot 3×6 Round Head
M127 Motor Pivot
M128 Motor Clutch Arm
M129 Motor Spring
M130 Motor Holder
M131 Washer 6.2φ
M132 Spring for Brake
M133 C Washer 3φ
M134 Brake Arm
M135 Fiber Washer 4.2φ
M136 C Washer 3φ
M137 Tape Pad Arm
M138 Spring for Tape Pad Arm
M139 Screw for Tape Pad Metal
M140 Spring Washer 2φ
M141 Tape Pad Metal
M142 Tape Pad
M143 Tape Pad Felt (Erase)
M144 Record Lock
M145 Record Lock Spring
M146 Motor Ceild Cover
M147 Lower Chassis
M148 Print Base for Motor
M149 Screw for Motor Print Base 3×4 Round Head
M150 Nut 3φ
M151 Chassis Spacer
M152 Tape Pad Felt (Recording/Playback)
M153 Meter Isolation Plate
M154 Meter Stopper
M155 Meter Plate
M156 Tone VR Mounting Spacer 2φ
M157 Tone VR Mounting Board
M158 Spring Washer for Tone VR Mounting Board
M159 Screw for Tone VR Mounting Board 2.0×6 Round Head
M160 Screw for Tone VR Knob
M161 Control Board Spacer
M162 Nut for VR (Volume)
M163 Fiber Washer for Control Board
M164 Screw for Control Board 3×8
M165 Spring Washer for MIC Remort Jack 2φ
M166 Screw for MIC Remort Jack 2×4 Round Head
M167 Screw for Adaptor Jack 2×6 Round Head
M168 Nut for Monitor Jack
M169 Fiber Washer for Monitor Jack
M170 Steel Washer for Moniter Jack
M171 Capacitor Mounting Board
M172 Clip Metal
M173 Spring Washer for Capacitor Mounting Board

NATIONAL MODEL RQ-116

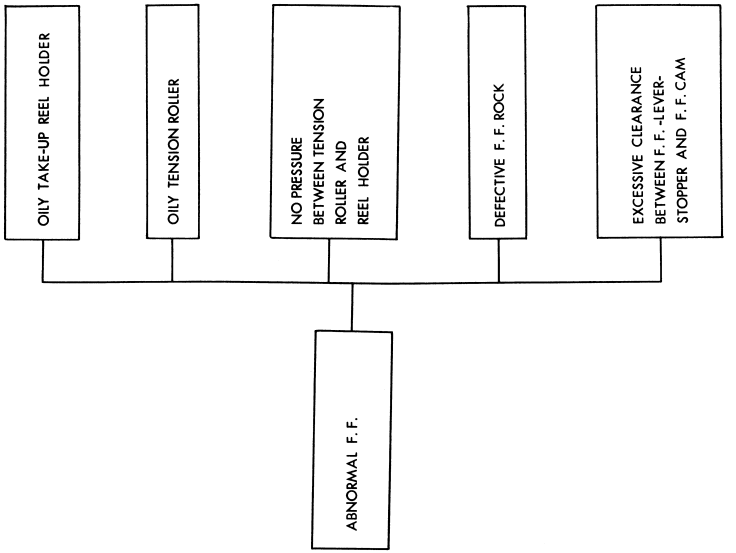
TROUBLE SHOOTING GUIDE 1

MALFUNCTIONS IN RECORD/PLAYBACK MOTION



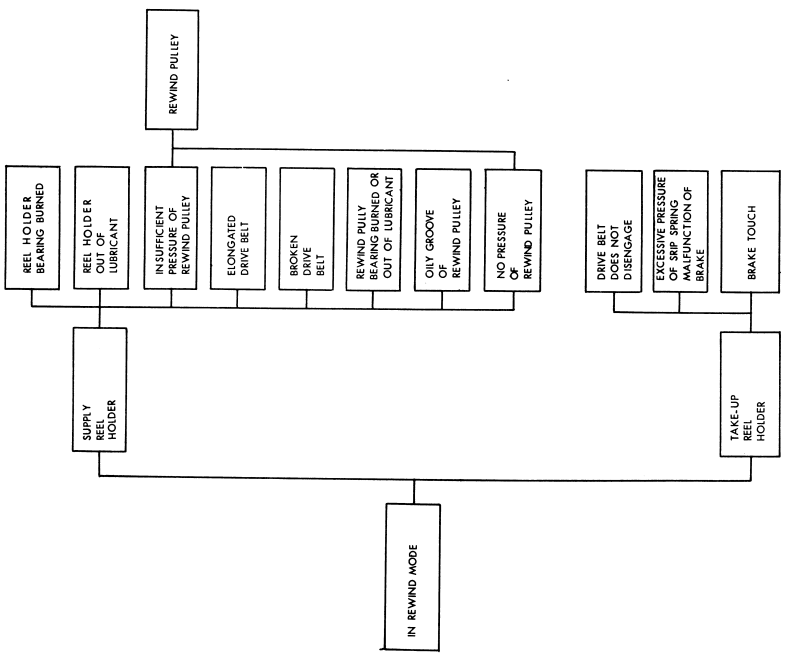
TROUBLE SHOOTING GUIDE 3

MALFUNCTIONS IN FAST FORWARD



TROUBLE SHOOTING GUIDE 2

MALFUNCTIONS IN REWIND MOTION



Rotary Switch

1. Remove 2 Switch holding screws.
2. Pull out Rotary Switch from Shaft.

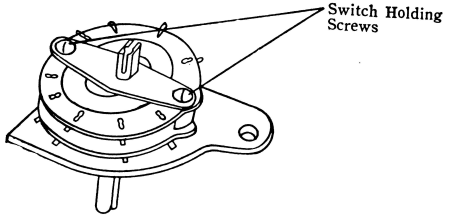


Fig. 26

Motor

1. Remove Motor lead wires from terminals.
2. Remove Motor-holder holding screw.
3. Remove Motor spring holding screw.
4. Remove Motor set screw.
5. Remove Motor.

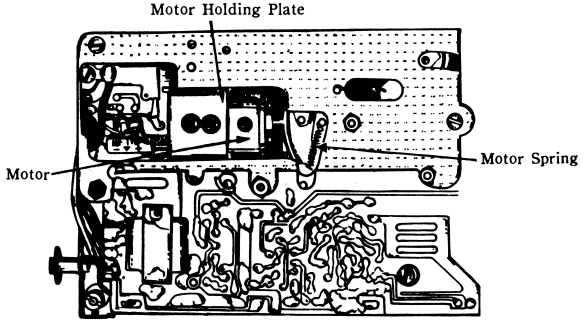


Fig. 27

Rewind Pulley

1. Remove Spring Washer.
2. Pull out Rewind Pulley upward.

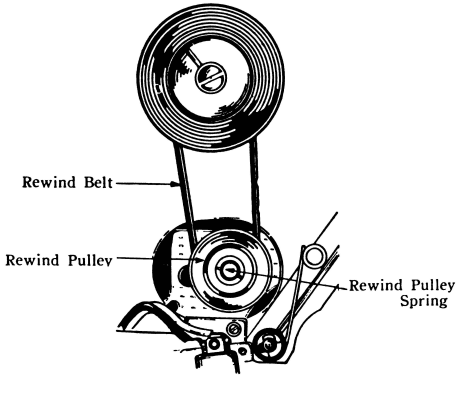


Fig. 28

Volume and Tone Controls

1. Remove 2 screws (3ϕ) from Front Chassis, taking care not to damage bakelite supports attached to it.
2. Remove 2 screws (2.6ϕ) on the front of Print Base-board.
3. Pull out Front Chassis.

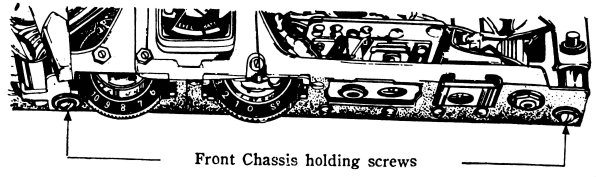


Fig. 29

Volume Control

1. Remove 2 nuts (2ϕ), holding Volume Control.
2. Remove wires on Terminals.

Tone Control

1. Remove 2 screws (2ϕ) on Front Chassis.
2. Remove white lacquer coating on Front Bakelite Board and Front Chassis.
3. Lightly push out Volume Control from Chassis.
4. Remove wires on Terminals.

Printed Circuit Board

1. Remove 5 screws (2.6ϕ), holding Print Base-board.
2. Remove brass supports with care.
3. Lift Base-board lightly from Chassis.

Speaker

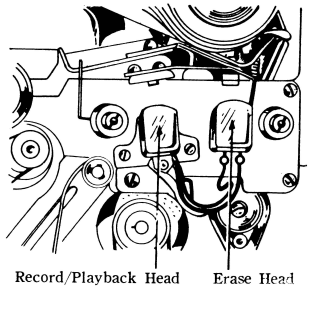
1. Remove 4 holding screws.

Record/Playback Head

1. Remove 2 holding (adjusting) screws. White lacquer lock shall be removed with thinner.
2. Remove lead wires on terminals.

Erase Head

1. Remove 3 screws, holding Head Base.
2. Remove 2 screws holding Head at Head Base.
3. Remove lead wires on terminals.



Fig

MAINTENANCE

Cleaning Ludrication

This tape recorder does not, as a rule, require oiling, but it is preferable to oil once in a year or when parts are repaired, as following;

Capstan bearing	1—2 drops
Pinch roller bearing	1—2 drops
Rewind Pulley bearing	2—2 drops
Motor bearing	1 drop
Reel spindles	1—2 drops

Record/Playback & Erase Head

Good performance of the recorder depends largely on the maintenance of heads. Accumulation of dust on head cores shoud not be overlooked.
Dust must be cleaned off with carbon tetrachloride.
Heads might lose their characteristic if used too long since they always have the friction with the tape. Replace with new ones after about 1,000 hours of use.

Motor

The motor rarely goes wrong, but occasional oiling is necessary. Oil it after each 500 hours of performance. Use spindle oil or machine oil.

Mechanical Parts

1) Idler

Clean the surface of the idler in contact with the motor-pulley with carbon tetrachoride. Also, clean the surfaces of the motor-pulley and main pulley in contact with the idler. Oil 1-2 drops on bearing after every 200 hours of performance.

2) Pinch Roller

Clean the surface of the pinch roller in contact with the capstan.
Oil 2-3 drops on bearings after every 200 hours of performance.

3) Capstan

Clean the capstan with benzene. Oil 1-2 drops on bearing after every 200 hours. Keep free of oil the surface of the capstan in contact with the pinch roller. Otherwise, the tape may slip and the pinch roller rubber may be dameged.

4) Each parts roller

Oil bearings once every 200 hours. Clean the surface in contact the belt with benzene. Be sure to wipe off any amount of oil on the rubber surface in order to prevent slipping.

DISASSEMBLING OF MAIN PARTS

To Take Out Mechanical Parts

Mechanical parts shall be taken apart in sequence of Case Cover; Head Cover; Bottom Cover; Body Case and print Base-board.

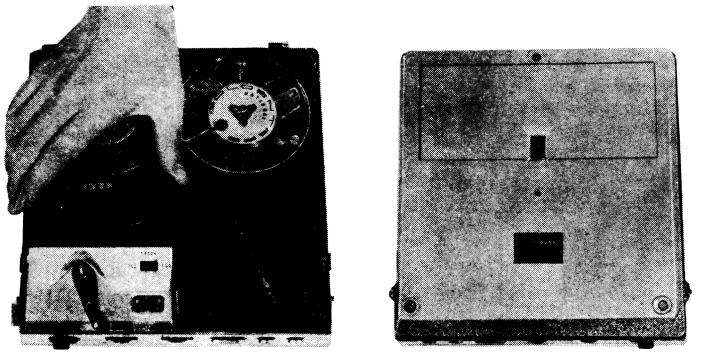


Fig. 17

1. Press Push Buttons on both sides and open Case Cover. Slide Case Cover to the right and take it off hinges.
2. Pull out Head Cover upward.
3. Turn over Tape-recorder, and remove 3 holding screws (2.6ϕ). Insert a coin in the slit at the side of Bottom Cover, and force it off.
4. To remove Body Case.
   a. Remove Rotary Switch Lever. Remove Lever holding screw.
   b. Remove Capstan.
   c. Turn over Tape-recorder (Bottom Cover already removed). Remove 3 Chassis Poles.
   d. Lift Chassis starting at Dry Cell Case carefully.

Mechanical parts are take apart as above, but when removing Body Case, care shall be not taken to break lead wires on Speaker.

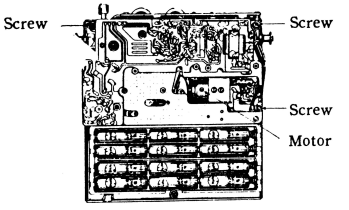


Fig. 18

MECHANISM

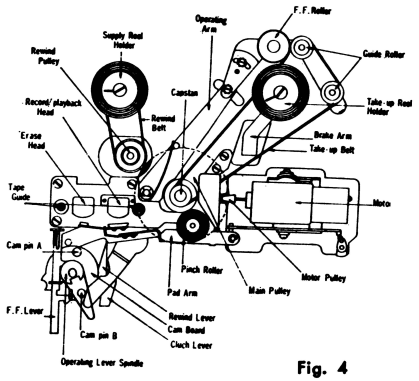


Fig. 4

Single-Lever Control

This tape-recorder operates by single-lever-contorl. All movements connected with tape is exclusively controled by operating-lever, which switches electric power ON and OFF at the same time.

1) Turn Operating-lever clockwise to PLAY-BACK to set up mechanism for play-back, and to turn ON power switches for amplifier and moter simultaneously.
2) Turn operating-lever couter-clockwise to REWIND to set up mechanism for rewinding and to switch OFF amplifier.
3) Press Recording Safty button and turn operating-lever to RECORD. Amplifier now works for recording.
   Recording Safty button is a locking device to prevent accidental erasure.
4) Volume-control knob is used to adjust recording. Level and volume of reproduced sound but has no direct connection to power switch.
   Level-meter indicate recording level and ary cells Voltage.

Change of Speeds

Two tape speeds are available by changing capstan diameters. Capstan equipped with outer sleeve works at the speed of 3-3/4 ips, (9.5 cm/sec) and without sleeve, at 1-7/8 ips. (4.75 cm/sec)

Record (Playback) Mechanism

Rerformance of mechanism is exactly same for recording and for playback that in the former case, operating-lever shall be turned to RECORD after Recording Safty button is pressed.
Electrical connection within amplifier is shifted to and from recording and playback by means of rotary switch which is controled by movement of operating lever.
When operation lever is set at RECORD or PLYBACK, cam-plate turns and cam-pin is freed operating arm, pinchroller arm and brake move in the pirection of arrow respectively whereby, pinchroller presses against capstan and transmits rotary motion to tape.
Take-up belt touches pulley at the bottom of take-up reel holder and impats rotary motion to holder. At the same time, brake comes loose in the direction of arrow and allows holder start winding up tape without slack,
Motor starts rotation by means of rotary switch which is synchronized to the movement of cam-plate, Motor-pulley touches rubber tire of main pulley,
All these actions occur almorst simultaneously and are transmited from motor through main pulley, capstan, and by the belt to reel-holder. By the rotation of each parts, tape travels.

Rewind Mechanism

Operating lever at REWIND, cam-pin comes free and rewind-arm moves in the direction of arrow, rewind-pulley touches rubber tire of main pulley, and supply reel holder rotates by means of rubber belt.
Rotary motion is transmitted from motr-pulley to main pulley as in the case of playback. As for take-up reel holder are clearly separated and brake comes off. Reel holder thus rotates freely as pulled by tape.

Stop Mechanism

Operating lever as STOP, lever is freed and motor stops, and tape also stops instantly without any over-run.
Thus is due to back-tention of rewind-belt, when stopped from record or play-back position, and by brake, when stopped from rewind position.

TRANSMISSION

a. Recording and Playback

Turn Operating Lever to PLAYBACK

Operating Arm moves toward Take-up Reel Holder, and rubber belt is pressed against Take-up Reel Holder and Motor-pulley is pressed against Main Pulley by which movement is transmitted to Take-up Reel Holder.
Main Pulley rotates and Capstan also rotates, Pinch-roller presses against Capstan and tape is advanced.
Rewind-pulley comes off Main Pulley, and Brake also comes off Take-up Reel Holder.
The above three movements take place almost simultaneously and back-tension in Playback mode is produced by the tension of belt hung between Supply Reel Holder and Rewind pulley.
Turn Operating Lever to RECORD after pressing Record Safety Button.
Electic circuit is set for Recording, while the movement of mechanism remains same as Playback mode.

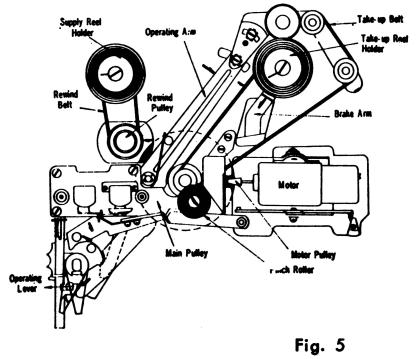


Fig. 5

b. Selecfion of Tape Speeds

Tape speed can be readily changed to 1 7/8 ips. (4.75 cm/sec.) by removing Capstan Sleeve.
By attaching Sleeve, a speed, 3 3/4 ips. (9.5 cm/sec.) can be obtained.

c. Fast Forward

By pressing F.F. Lever while in Playback mode, Operating Arm is freed from F.F. Pin at the back of Pinch-roller Arm, and F.F. Roller is pressed by the force of spring agaist Take-up Reel Holder and turns it fast.
Pinch-roller is freed from Capstan and Pad Arm is pushed by Pinch-roller shaft, and cmes off Heads.

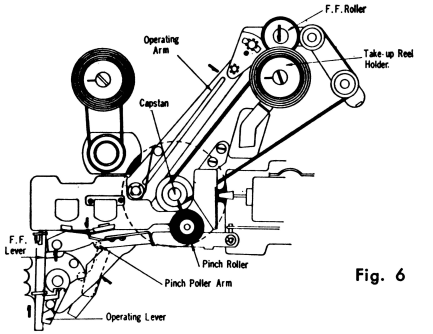


Fig. 6

d. Rewind

Turn Operating Lever to REWIND
By the action of Cam-plate, Clutch Lever is freed and Motor presses against Main Pnlley by the force of spring, and rotation is transmitted to Main Pulley.
Rewind-pulley presses against Main Pulley, and the rotation of Main Pulley is transmitted to Supply Reel Holder through Rewind-pulley and Supply Reel Holder. Thus tape is rewind fast. Brake is freed.

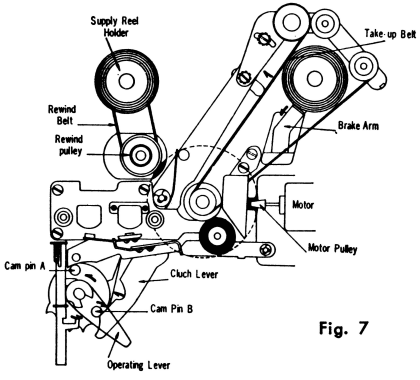


Fig. 7

e. Stop

Set Operating Lever at STOP
Motor-pulley. is freed from Main Pulley.
Pinch-roller is freed fsom Capstan, and Pads also come off Erase and Record Heads.
Brake is pressed against Supply Reel Holder.

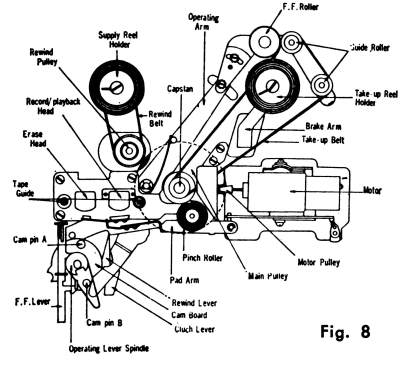


Fig. 8