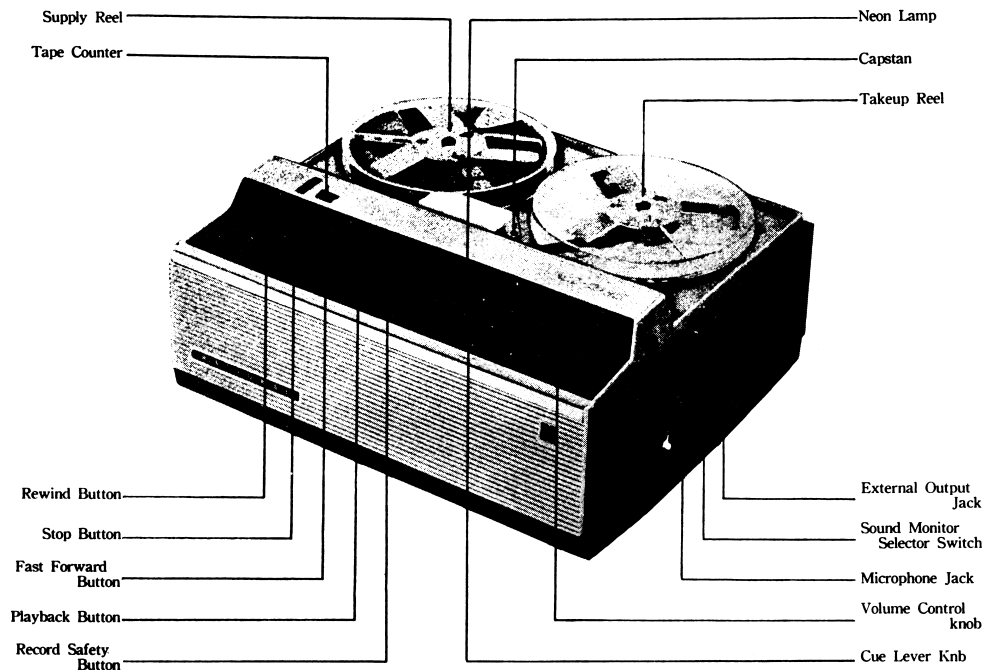
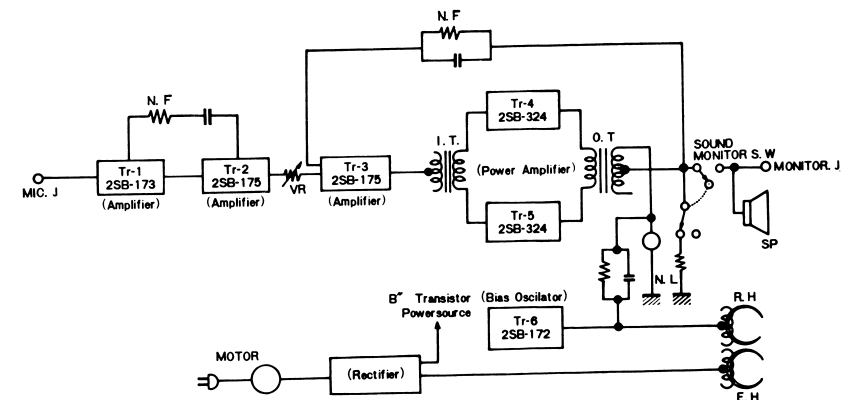
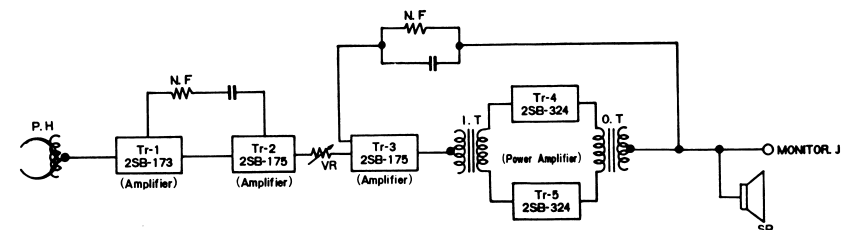


**CONTROLS****NATIONAL MODEL RQ-503S****RQ-503S****Fig. 1****SPECIFICATIONS**

<b>Power Source:</b>	A.C 110 V, 220 V (50 %, 60 %)
<b>Power Consumption:</b>	20 watts (abt)
<b>Audio Output:</b>	1 watts (max 1.5 watts)
<b>Transistors:</b>	2SB173 (1), 2SB175 (2), 2SB324 (2), 2SB172 (1)
<b>Rectifier:</b>	16C4
<b>Thermistor:</b>	MT-8T
<b>Recording System:</b>	A.C Bias 35 kc/s
<b>Erase System:</b>	D.C Erase
<b>Track System:</b>	Double Track Recording System
<b>Tape Speeds:</b>	3-3/4 i.p.s. (9.5 cm/s) 1-7/8 i.p.s. (4.75 cm/s)
<b>Playing Time:</b>	1 hour at 3-3/4 i.p.s. with 5" tape (600 ft) 2 hours at 1-7/8 i.p.s. with 5" tape (600 ft)
<b>Frequency Response:</b>	100~7,000 % at 3-3/4 i.p.s. 100~4,000 % at 1-7/8 i.p.s.
<b>Wow and Flutter:</b>	Less than 0.4 % (at 3-3/4 i.p.s.)
<b>Input Impedance:</b>	Microphone 10 K $\Omega$
<b>Output Impedance:</b>	External Speaker Out 8 $\Omega$
<b>Fast Forward &amp; Rewind Time:</b>	within 2 minutes
<b>Built-in Speaker:</b>	6" x 3" PM Dynamic
<b>Dimensions:</b>	11-1/8 x 5 x 9-5/8 inches
<b>Weight:</b>	8-7/8 lbs.

**ACCESSORIES**

Dynamic Microphone .....	1	Splicing tape .....	1
5" reel tape (RT-5) .....	1	2 Pin Plug (B) .....	1
5" empty reel (RP-5) .....	1		

**BLOCK DIAGRAM OF ELECTRICAL CIRCUITS****RECORDING CIRCUITS****Fig. 2****PLAYBACK CIRCUITS****Fig. 3**

Adjustment should be done by Brake Spring, Brake Lever or Brake leather.

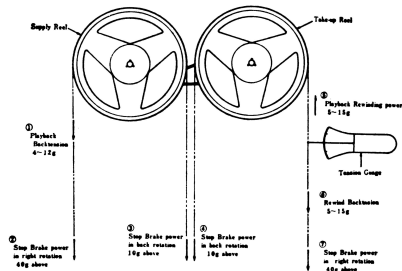


Fig. 11~(1)

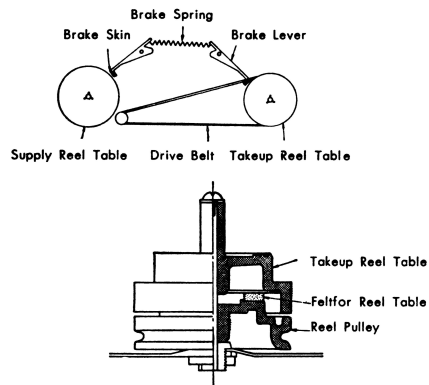


Fig. 11~(2)

### TAPE PAD PRESSURE (Fig. 12)

Set the unit in Playback mode, put the Tension Gauge on Pad Plate like in Fig. 5 and see the reading of the gauge when the felt on Pad Plate is apart from Head. The standard reading at this point is 35-45 gs. The adjustment should be done by Pad Spring.

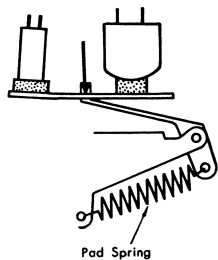


Fig. 12

### HEAD ADJUSTMENT

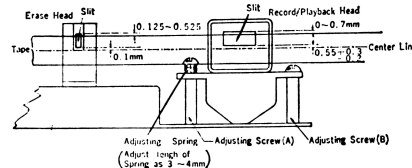


Fig. 13

### ERASE HEAD (Fig. 13)

To Adjust Erase Head Height

1. Thread the recorder with tape.
2. Turn the opening lever in the Playback position and pull back Tape-pads.
3. Adjust the relative position of Head-core and tape as shown in illustration.
4. If the position of Head-core is too low, raise by means of spacers.

### RECORD/PLAYBACK HEAD (Fig. 13)

To Adjust Record/Playback Head Height

Repeat Steps 1, 2, 3 as stated above.

Level the Head on its base by adjusting the relative position of Head to the tape as shown above. Use standard alignment tape (with recording of 7000 c/s) and Playback the signal on the tape. Find the maximum output point by adjusting screws (A) and (B).

When standard alignment tape is not available, properly record signal with a reliable Tape-recorder and play it back. Adjust screws (A) and (B) for maximum playback output.

### AMPLIFIER MEASUREMENT

#### STOP SWITCH

Install a switch so that the secondary side of the output transformer is short-circuited, in order to prevent the generation of noise from amplifier through the speaker when switching to STOP, F.F. and Rewind.

#### BIAS OSCILLATOR FREQUENCY (Refer to Fig. 14)

Adjust the core adjusting screw of the oscillator coil so that the oscillator frequency of the recording bias high frequency oscillator circuit is at  $33\text{ K}\% \pm 5\text{ K}\%$ .

Connect a 100 ohm resistor in series with the ground side of the R/P head and measure the frequency of the voltage across the resistor with an oscilloscope. Compare with the frequency of a standard oscillator (Lissajous wave-form to be observed on the oscilloscope).

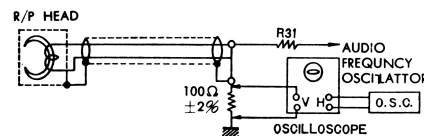


Fig. 15

#### BIAS CURRENT (Fig. 15)

Proper bias is necessary for optimum recording. Adjust the bias oscillator frequency as described above. Connect a 100 ohm resistor in series with the ground side of the Record/Playback head and measure the voltage across the resistor. Adjust with the V.R. 2 Proper AC bias: 0.6 mA

(voltage at both sides of 100 ohm resistor:  $0.6 \times 10^{-3} \times 100 = 0.6\text{V}$ )

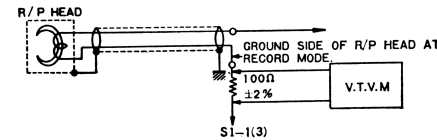


Fig. 15

#### ERASE CURRENT

Should the erase current be incorrect, imperfect erasure or over-heating of the Erase Head may occur.

Connect a D.C. ammeter in series with the ground side of Erase Head and measure the currents. Normally the proper erase current is 6 to 10 mA. If necessary, adjust current by replacing Resistor R23 (1 K ohm) which is connected in series to Erase Head.

#### RECORDING LEVEL (Fig. 16)

Unless recording level is adjusted properly, the output of the playback may be lowered or the sound may be distorted.

Adjust the level as follows if it is improper:

First stop the bias oscillator by either short-circuiting the base of Oscillator Transistor 25B-172 to ground or between the secondary side of Oscillator Transformer and ground. Then adjust variable control VR2 5 K ohm so that the signal current to Record Head shows 0.07 mA when measured by a V.T.V.M. The V.U. Meter should show zero.

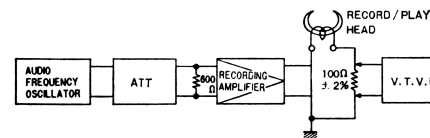


Fig. 16

### FREQUENCY ADJUSTMENT

This set is already adjusted for use at 50 c/s. So, when you use the set at 60 c/s, please re-adjust it as follows:

1. Remove the Top Panel and Bottom Case.
2. Loosen the head screw on the motor pulley, and take off the sleeve as illustrated.
3. Put the removed sleeve rest, and fix it with the head screw.
4. Turn over the set. Shift the vinyl lead wires from ⑬ to ⑭, and from ⑮ to ⑯ respectively.

**Note:** Refer to the diagrams below when you shift the lead wires.

Reverse the instructions to adjust the set for use at 50 c/s.

### MAINTENANCE

#### LUBRICATION & CLEANING

This tape recorder does not, as a rule, require oiling, however, this preferable to oil once a year or when parts are repaired, as follows:

Capstan Bearing	1—2 drops Oil
Pinch Roller Bearing	1—2 drops Oil
Rewind Pulley Bearing	1—2 drops Oil
Motor Bearing	1 drop Oil
Reel Spindles	1—2 drops Oil

#### RECORD/PLAYBACK HEAD & ERASE HEAD

When Heads get dirty, it is important to wipe off dirt using a soft cloth moistened with alcohol. As Heads are constantly brushed by tape they gradually wear out. After many hours of use, their characteristics may deteriorate somewhat.

It is desirable to replace Heads after about 1000 hours of use.

#### MOTOR

The motor also has to be oiled...once every 500 hours. Use a good quality spindle oil or machine oil.

#### IDLER

Clean the surface of Idler in contact with the belt with alcohol.

Also, clean the surface of Idler in contact with the Reel Tables. Oil the central shaft of Idler 1 to 2 drops once every 200 hours.

Use a good quality spindle or sewing machine oil.

#### PINCH-ROLLER

Clean the surface of the Pinch-Roller in contact with the Capstan with alcohol. Oil the central shaft of Pinch-Roller 1 to 2 drops once every 200 hours. Use a good quality spindle or sewing machine oil.

#### CAPSTAN

Clean the surface of Idler with alcohol. Oil the root of Capstan 1 to 2 drops once every 200 hours. Use spindle or sewing machine oil. Any remaining oil or grease on the surface of Capstan in contact with Pinch-Roller might cause the tape to slip and deteriorate the Pinch Roller.

### MOTION OF MECHANISM

#### POWER SOURCE

When you switch on the power source, the motor begins to rotate. Through Capstan Belt, the rotation will be conveyed to Flywheel, which gives the rotation to Capstan Shaft.

While, Reel Pulley will rotate by the work of Rewind Belt. Supply Reel Table and Rewind Reel Table are braked at that time.

## PARTS LIST

## CAPACITORS

C 1	ECE-A6V10	10 $\mu$ F Electrolytic Capacitor
C 2	ECQ-S1561K	560PF Styrol Capacitor
C 3	ECE-A15V3	3 $\mu$ F Electrolytic Capacitor
C 4	ECE-A6V30	30 $\mu$ F Electrolytic Capacitor
C 5	ECQ-M05222MZ	0.0022 $\mu$ F Mylar Capacitor
C 6	ECQ-M05473MZ	0.047 $\mu$ F Mylar Capacitor
C 7	ECE-A6V30	30 $\mu$ F Electrolytic Capacitor
C 8	ECE-A6V10	10 $\mu$ F Electrolytic Capacitor
C 9	ECE-A6V10	10 $\mu$ F Electrolytic Capacitor
C 10	ECE-A3V100	100 $\mu$ F Electrolytic Capacitor
C 11	ECE-B15V100	100 $\mu$ F Electrolytic Capacitor
C 12	ECE-A50V1M	1 $\mu$ F Electrolytic Capacitor
C 13	ECQ-M05562MZ	0.0056 $\mu$ F Mylar Capacitor
C 14	ECQ-M05562MZ	0.0056 $\mu$ F Mylar Capacitor
C 15	ECQ-S1821K	820PF Styrol Capacitor
C 16	ECQ-S1392K	3900PF Styrol Capacitor
C 17	ECQ-M05333MZ	0.033 $\mu$ F Mylar Capacitor
C 18	ECQ-M05104MZ	0.1 $\mu$ F Mylar Capacitor
C 19	ECE-A15V41	4 $\mu$ F Electrolytic Capacitor
C 20	ECE-A15V200	200 $\mu$ F Electrolytic Capacitor
C 21	ECE-A15V500	500 $\mu$ F Electrolytic Capacitor
C 22	ECE-A15V500	500 $\mu$ F Electrolytic Capacitor
C 23	ECQ-M05333MZ	0.033 $\mu$ F Mylar Capacitor
C 24	ECE-A6V30	30 $\mu$ F Electrolytic Capacitor

## RESISTORS

R 1	ERC-12BM	10 K $\Omega$ Solid Resistor
R 2	ERD-14TRK	18 K $\Omega$ Carbon Film Resistor
R 3	ERD-14TRK	10 K $\Omega$ Carbon Film Resistor
R 4	ERD-14TRK	2.2 K $\Omega$ Carbon Film Resistor
R 5	ERD-14TRK	82 $\Omega$ Carbon Film Resistor
R 6	ERD-14TRK	3.9 K $\Omega$ Carbon Film Resistor
R 7	ERD-14TRK	33 K $\Omega$ Carbon Film Resistor
R 8	ERD-14TRK	47 K $\Omega$ Carbon Film Resistor
R 9	ERD-14TRK	2.2 K $\Omega$ Carbon Film Resistor
R 10	ERD-14TRK	2.7 K $\Omega$ Carbon Film Resistor
R 11	ERD-14TRK	560 $\Omega$ Carbon Film Resistor
R 12	ERD-14TRK	15 K $\Omega$ Carbon Film Resistor
R 13	ERD-14TRK	1.8 K $\Omega$ Carbon Film Resistor
R 14	ERD-14TRK	180 $\Omega$ Carbon Film Resistor
R 15	ERD-14TRK	22 $\Omega$ Carbon Film Resistor
R 16	ERD-14TK	820 $\Omega$ Carbon Film Resistor
R 17	ERD-14TRK	4.7 K $\Omega$ Carbon Film Resistor
R 18	ERD-14TRK	100 $\Omega$ Carbon Film Resistor
R 19	ERD-14TRK	820 $\Omega$ Carbon Film Resistor
R 20	ERW-12L	1.5 $\Omega$ Wire-wound Resistor
R 21	ERC-12BM	10 $\Omega$ Solid Resistor
R 22	ERD-14TRK	100 K $\Omega$ Carbon Film Resistor
R 23	ERD-14TRK	1 K $\Omega$ Carbon Film Resistor
R 24	ERD-14TRK	2.7 K $\Omega$ Carbon Film Resistor
R 25	ERD-14TRK	560 $\Omega$ Carbon Film Resistor
R 26	ERD-14TRK	100 $\Omega$ Carbon Film Resistor
R 27	ERC-12BM	1.8 K $\Omega$ Solid Resistor
R 28	ERC-12BM	47 $\Omega$ Solid Resistor
R 29	ERC-12BM	220 $\Omega$ Solid Resistor
R 30	QRD-2PZK	150 $\Omega$ Carbon Film Resistor
R 31	ERD-14TRK	1.5 K $\Omega$ Carbon Film Resistor
R 32	ERC-12BM	470 K $\Omega$ Solid Resistor
R 33	ERD-14TK	180 K $\Omega$ Carbon Film Resistor

R 34	ERD-14TRK	3.9 K $\Omega$ Carbon Film Resistor
R 17	Spore Resistor	
R 17	ERD-14TRK	3.3 K $\Omega$ Carbon Film Resistor
R 17	ERD-14TRK	3.9 K $\Omega$ Carbon Film Resistor
R 17	ERD-14TRK	5.6 K $\Omega$ Carbon Film Resistor

## MECHANICAL PARTS

M 1	QHT 230-5C1	Screw for Reel Table
M 2	QXP 6106	Supply Reel Table Assembly
M 3	QXP 6107	Takeup Reel Table Assembly
M 4	QBF-1066	Felt for Supply Reel Table
M 5	QYQ 0029	Reel Table Shaft Assembly
M 6	QWQ-1008	Washer for Reel Table
M 7	QML-1135	Lever for Supply Reel
M 8	QMS-1127	Lever Shaft for Supply Reel Table
M 9	QMZ 1006	Rewind Rod Washer
M 10	QBC-1011	Rewind Spring
M 11	QMR 1009	Rewind Rod
M 12	QMP-1049	Brake Pole
M 13	QUV 1013	Left Brake Assembly
M 14	QUV-1012	Right Brake Assembly
M 15	QBT-1043	Brake Spring
M 16	QBT-1039	Vinyl Pipe for Spring
M 17	QML-1134	Brake Seesaw Lever
M 18	QXP 6108	Reel Pulley Assembly
M 19	QDB 0027	Capstan Belt
M 20	QDB 0026	Rewind Belt
M 21	QDB 0028	Counter Belt
M 22	QBF 1004	Felt for Pinch Roller
M 23	QXP 0071	Fast Forward Roller
M 24	QXL 0051	Fast Forward Roller Lever Assembly
M 25	QBC-1035	Holding Spring for Head
M 26	QMK-1035	Head Plate
M 27	QAG-1001	Screw for Tape Guide
M 28	QAG 1005	Washer for Tape Guide
M 29	QAG-1002	Tape Guide
M 30	QAG-1046	Plate for Tape Guide
M 31	QAG-1003	Guide Collar
M 32	QXP 0048	Pinch Roller
M 33	QXL 0054	Lever Assembly for Pinch Roller
M 34	QBT-1089	Pad Spring
M 35	QBN-1010	Spring for Pinch Roller
M 36	QMS-1126	Lever Shaft for Pinch Roller
M 37	QMP-1047	Lever Shaft Collar for Pinch Roller
M 38	QXL 0050	Lever (B) Assembly for Pinch Roller
M 39	QML-1140	Instant Stop Lever
M 40	QBP-1047	Spring (C) for Push Button
M 41	QMR-1032	Fast Forward Rod (A)
M 42	QYQ 0028	Capstan Assembly (for 9.5 cm/s)
M 43	QXK-1022	Upper Chassis Assembly
M 44	QDH-1001	Oil Cover for Capstan
M 45	QBF-1005	Felt for Capstan
M 46	QMM-1069	Metal for Capstan
M 47	QMF-1063	Holding Plate for Capstan Metal
M 48	QXF 0019	Flywheel Assembly
M 49	QDK-1001	Steel Ball for Flywheel 3 $\phi$
M 50	QXK-1023	Lower Chassis Assembly
M 51	QDC-0007	Tape Counter
M 52	QMH-1026	Tape Counter Holding Base
M 53	QXL-0052	Auto Stability Lever Assembly
M 54	QMP-1028	Pole (A)
M 55	QBP-1041	Push Button Spring (B)
M 56	QBP-1040	Push Button Spring (A)

M 57	QXB-0028	Push Button Assembly
M 58	QMS-1049	Shaft(A) for Push Button
M 59	QMS-1077	Shaft(D) for Push Button
M 60	QMS-1051	Shaft(C) for Push Button
M 61	QMS-1050	Shaft(B) for Push Button
M 62	QML-1136	Safety Plate for Push Button
M 63	QMF-1034-1	Holding Base for Push Button Shaft
M 64	QMA 1065	Belt Guide(B)
M 65	QDP-1070	Sleeve for 50 c/s
M 66	QXL 0032	Recording Lever Assembly
M 67	QBT 1045	Spring for Auto Stability
M 68	QMF-1033	Lack Plate for Push Button
M 69	QBT-1044	Spring for Fast Forward Roller and Instant Stop Lever

M 70	QDP 1064	Motor Pulley
M 71	QMP 1029	Brake Lever Guide
M 72	QXL 0053	Brake Lever Assembly
M 73	QBP-1017	Lack Spring for Push Button
M 74	QXM 0013	Brake Rod Assembly
M 75	QAG-1046	Brake Stopper
M 76	QML-1055	Switch Lever
M 77	QMA-1069-1	Guide for Switch Lever
M 78	QBT-1046	Spring for Switch Lever
M 79	QMK-1012-1	Base for Motor
M 81	QMF-1035	Shield Plate for Motor
M 82	QBG 1059	Holding Rubber for Motor
M 83	QMQ 1002	Catch for Motor Holding
M 84	QHQ 1024	Screw for Motor Holding
M 85	QNQ 1016	Polygon Nut
M 86	QMA-1064-1	Belt Guide(A)
M 87	QMA 1036	Mechanism Angle(A)
M 88	QMA-1037	Mechanism Angle (B)
M 89	QGO 1010-1	Recording Button

X 1	QHM-120 $\times$ 4U3	Screw —M2 $\times$ 4
X 2	QHM-120 $\times$ 8U3	Screw —M2 $\times$ 8
X 3	QHM-120 $\times$ 10U3	Screw —M2 $\times$ 10
X 4	QHM-230 $\times$ 4U3	Screw —M3 $\times$ 4
X 5	QHM-130 $\times$ 5U3	Screw —M3 $\times$ 5
X 6	QHM-230 $\times$ 5U3	Screw —M3 $\times$ 5
X 7	QHM-140 $\times$ 7U3	Screw —M4 $\times$ 7
X 8	QHP-830 $\times$ 5B3	Screw
X 9	QHB-230 $\times$ 5U3	Tapping Screw —B3 $\times$ 5
X 10	QWS 202U3	Spring Washer SW2 $\phi$
X 11	QWS 302U3	Spring Washer SW3 $\phi$
X 12	QWS 402U3	Spring Washer SW-4 $\phi$
X 13	QWS 802U3	Spring Washer SW8 $\phi$
X 14	QWP 2012U3	Washer W2 $\phi$
X 15	QNN 3022U3	Polygon Nut N3
X 16	QNN 4022B1	Polygon Nut N4
X 17	QNN 8032B1	Polygon Nut N8
X 18	QNS 304T3	Stop Ring E3
X 19	QNS 404T3	Stop Ring E4
X 20	QBK-7045	Fiber Washer 4 $\times$ 8 $\times$ 0.5
X 21	QBK-7026	Fiber Washer 4 $\times$ 8 $\times$ 1 t
X 22	QBK-7007	Fiber Washer 4 $\times$ 9 $\times$ 0.25
X 23	QBK-7012	Fiber Washer 4 $\times$ 9 $\times$ 0.5
X 24	QBK-7017	Fiber Washer 4 $\times$ 9 $\times$ 1
X 25	QBK-7053	Fiber Washer 5 $\times$ 9 $\times$ 0.25
X 26	QBK-7035	Fiber Washer 6 $\times$ 8 $\times$ 0.25
X 27	QBK-7056	Fiber Washer 6 $\times$ 10 $\times$ 0.25
X 28	QBL-1036	Polyethylene Washer 4 $\times$ 7.5 $\times$ 0.5

## CABINETS

G 1	QYA 0016	Top Cover Assembly
G 2	QYB-0060	Main Case Assembly
G 3	QYP-0034	Top Panel Assembly

G 4	QYQ-1007	Rubber Foot Assembly
G 5	QGT-1035	Volume Control Knob
G 6	QGT-2012	Instant Knob
G 7	QGS-2070	Voltage Selector Namer
G 8	QGS-1078	Main Namer
G 9	QKH-1020	Handle
G 10	QKT-1103	Holding Plate for Handle
G 11	QKT-1104	Lock Hinge for Handle
G 12	QHV230 $\times$ 120CU	Screw for Top Panel
G 13	QHN230 $\times$ 80CU	Screw for Top Panel

## VARIABLE RESISTORS

VR 1	EVG-A7CL36B13	Variable Resistor
VR 2	EVL-TOAA00B52	Semi-Fixed Variable Resistor

## SWITCHES

S 1	Slide Switch (ESD-162); (Record Playback Selector Switch)
S 2	Leaf Switch (QSB-124); (Stop Switch)
S 3	Slide Switch (QSS 1002); (Monitor Selector Switch)
S 4	Power ON/OFF Switch; (Coupled with VR 1)
S 5	Rotary Switch (ERS-E122S20AE); Voltage Selector Switch)

## ELECTRICAL PARTS

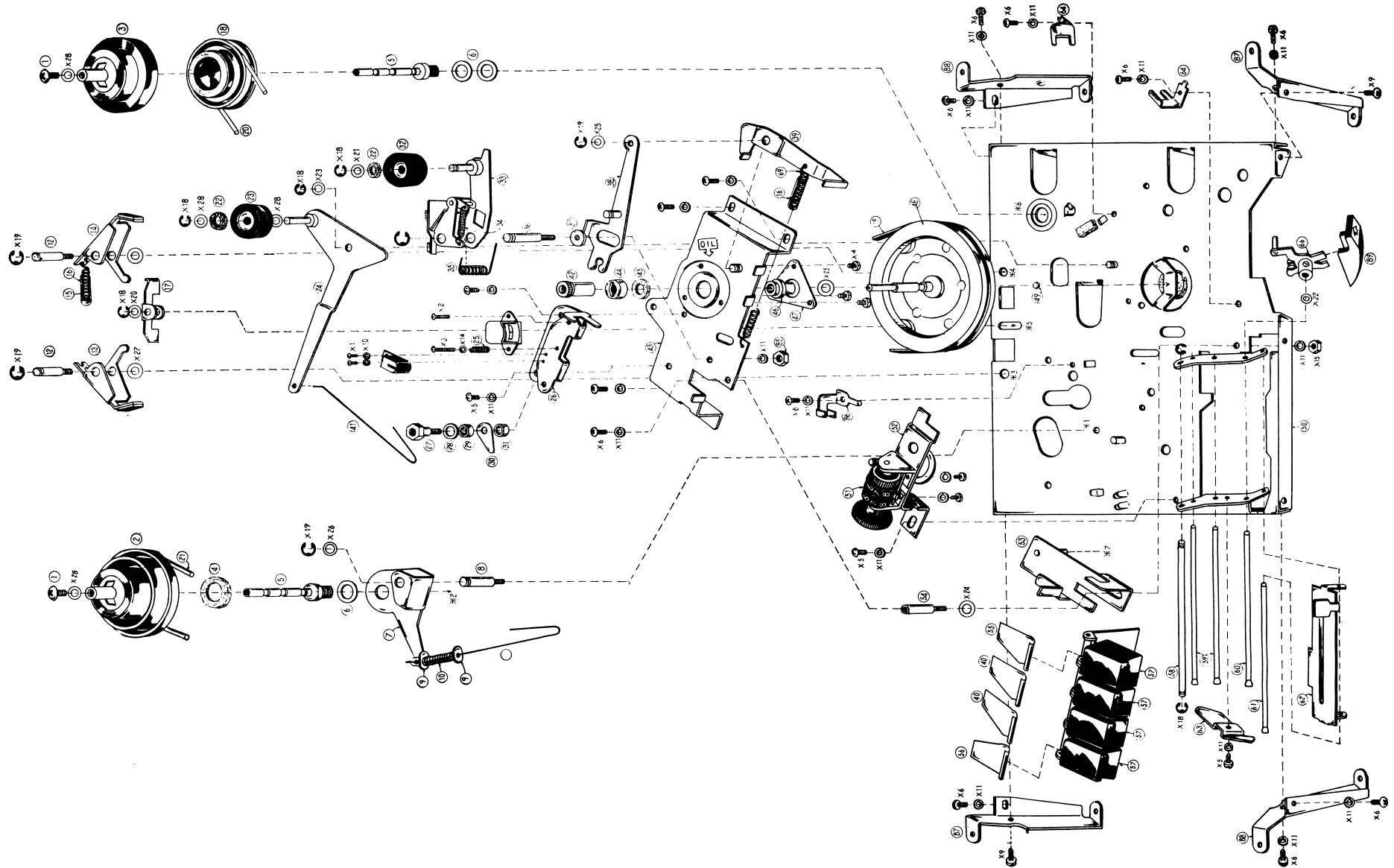
E 1	WY-009Z	Record Playback Head
E 2	WY-203Z	Erasing Head
E 3	2L-17D3N	Motor (3 Pin: 2L-17D3NA)
E 4	EAS-12D30SE	Speaker
E 5	QVL-301	Neon Lamp
E 6	QJA-104	MIC, Ext, Jack
E 7	QTF-1001	1P Fuse Holder
E 8	QJF-1001 (0.5A)	Fuse
E 9	MT-8T	Thermistor
E 10	16C-4	Selenium Rectifier
E 11	QLA-108	Input Transformer
E 12	QLA-317	Output Transformer
E 13	QLQ-0006	Neon Transformer
E 14	QLB-108	Oscillator Coil
E 15	QJ1-25-2	Printed Circuit Board
E 16	QFC-1001	Power Cord (with Plug)
E 17	QTT-1070	Radiation Angle
E 18	QTH-1001	Radiation Cap
E 19	QTT-1161	Voltage Selector Switch Angle
E 20	QTS-1033	Switch Shielding Plate
E 21	QBK-1020	Switch Shielding Plate (insulation Fiber)
E 22	QJQ-1001	GT Tube Foot
E 23	QTD-1111	Cord Clamper
E 24	QGJ-1034-2	Jack plate
Tr 1	2SB173A	Transistor
Tr 2	2SB175A	Transistor
Tr 3	2SB175A	Transistor
Tr 4	2SB324	Transistor
Tr 5	2SB324	Transistor
Tr 6	2SB172A	Transistor

## ACCESSORIES

A 1	WM-2048N	Dynamic Microphone
A 2	QFT-SNR29	5" Recording Tape (600 ft)
A 3	QFR-SNZ	5" Empty Reel
A 4	RP-8020	Radio Cord M
A 5	QJP-910	2 Pin Plug B
A 6	QFS-2	Splicing Tape
A 7	QQT-0136	Instruction Book

## PACKING CASE

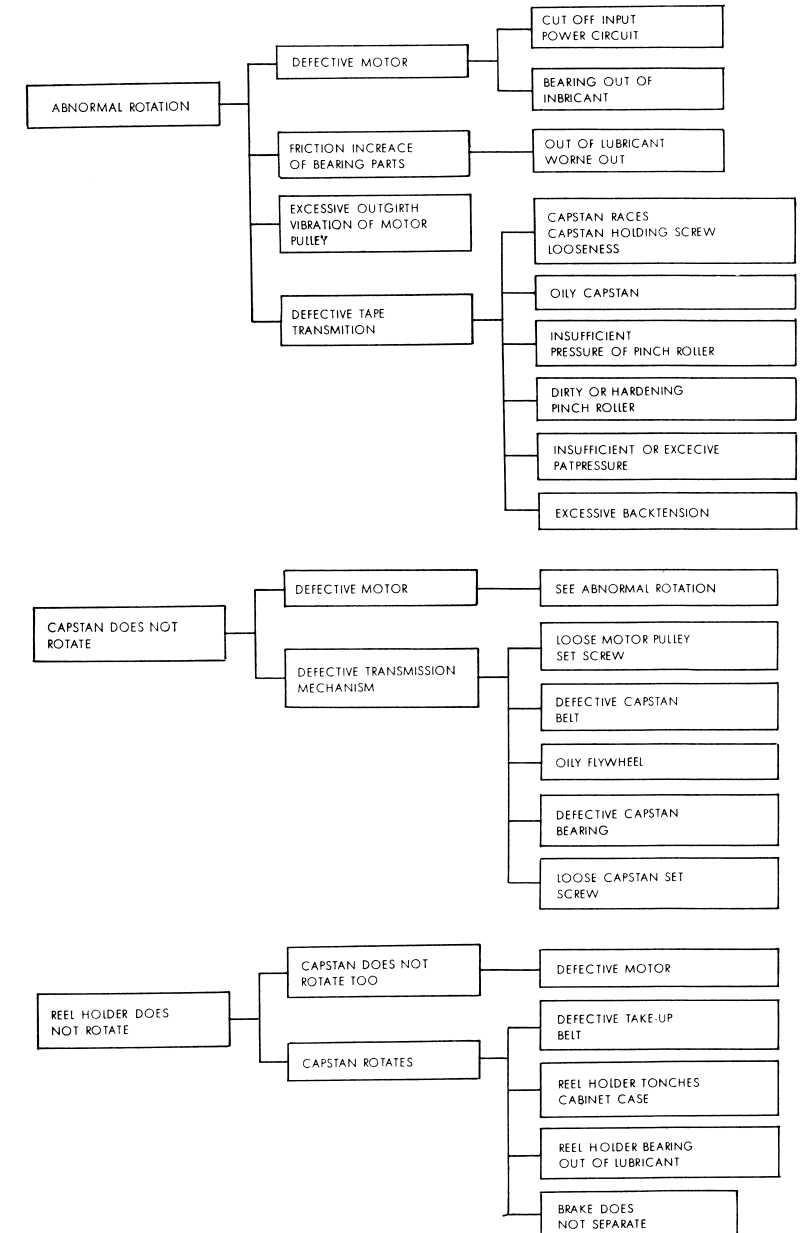
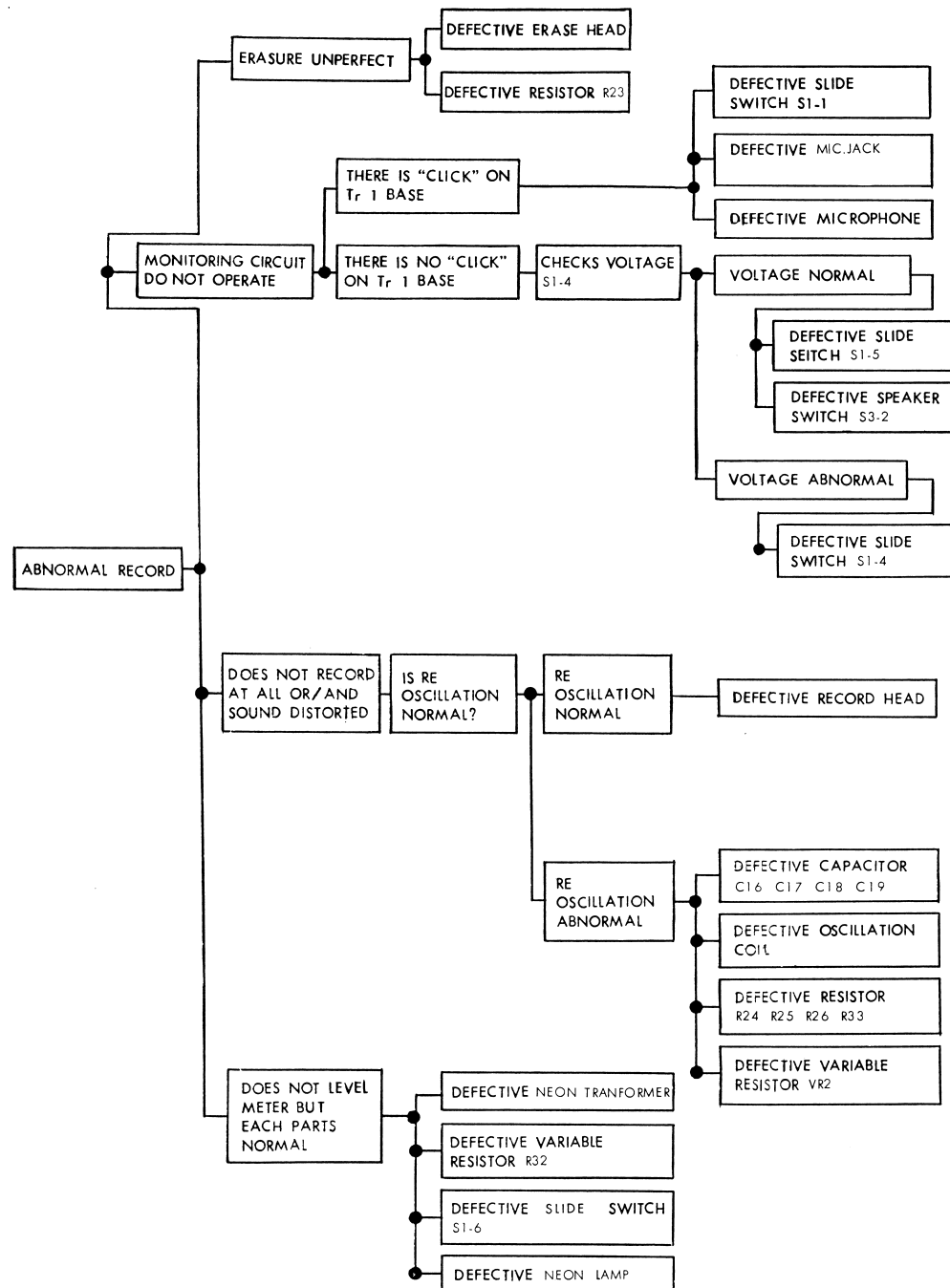
P 1	QPN-1180	Inner Packing Case
P 2	QPN-1167	Inner Packing Cushion (A)
P 3	QPN-1168	Inner Packing Cushion (B)
P 4	QPN-1169	Inner Packing Cushion (C)
P 5	QPK-1005-1	Gauze



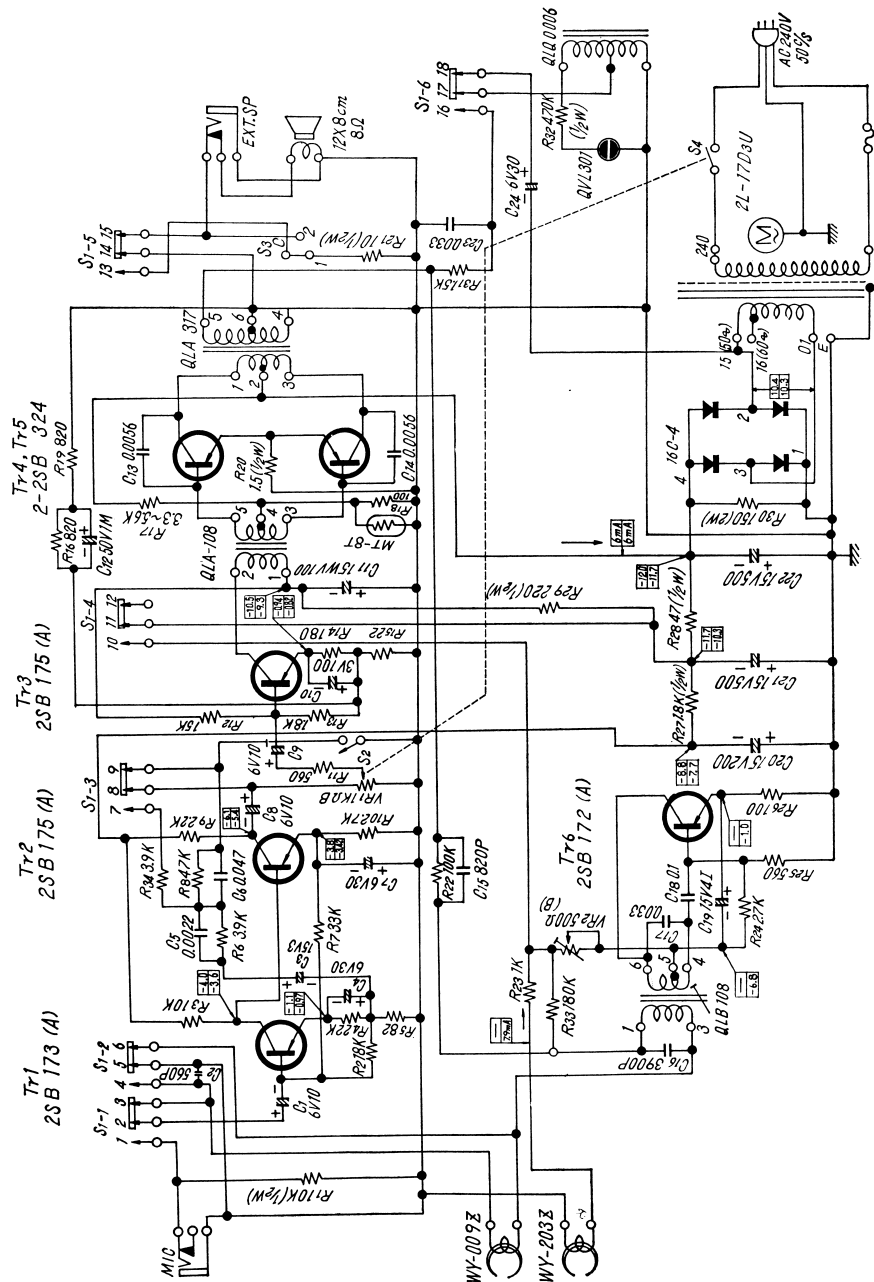


TROUBLE SHOOTING GUIDE 3

4 TROUBLE SHOOTING GUIDE 2



# SCHEMATIC CIRCUIT DIAGRAM RQ-503S (3 Pin Plug)



**NOTE:**

1. S<sub>1</sub>-1 to S<sub>1</sub>-6: Record/Playback Selector Switch (Shown in Play Position)
2. S<sub>2</sub>: Stop Switch
3. S<sub>3</sub>: Monitor Switch
4. S<sub>4</sub>: Power ON/OFF Switch (coupled with VR1)
5. All resistance in  $\Omega$ , K=1,000  $\Omega$ , M=1,000,000  $\Omega$

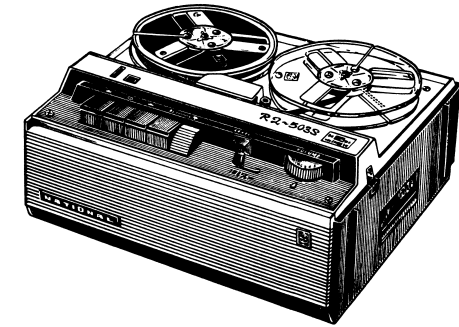
All resistance in  $\frac{1}{4}$  Wattage  
 6. All Capacitance in Microfarads P=Micro-microfarads  
 7. Values indicated in  $\square$  are D.C. to chassis ground with no signal applied  
 Values in  $\square$  with arrows are A.C. between arrows-points.  
 The upper values should be measured during playback and the lower values during recording.

## NATIONAL MODEL RQ-503 N18-10.

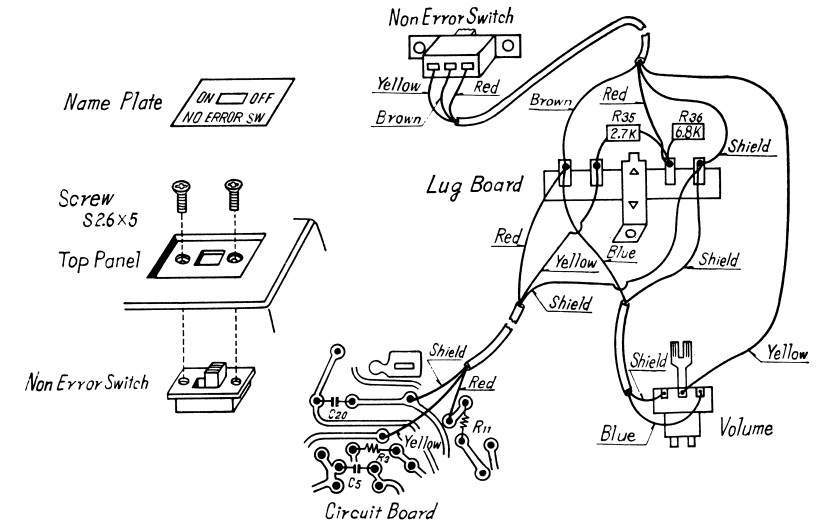
### RQ-503S MODIFICATION ON NON ERROR SWITCH

The following corrections and additions are required in RQ-503S Service Manual.

#### APPEARANCE



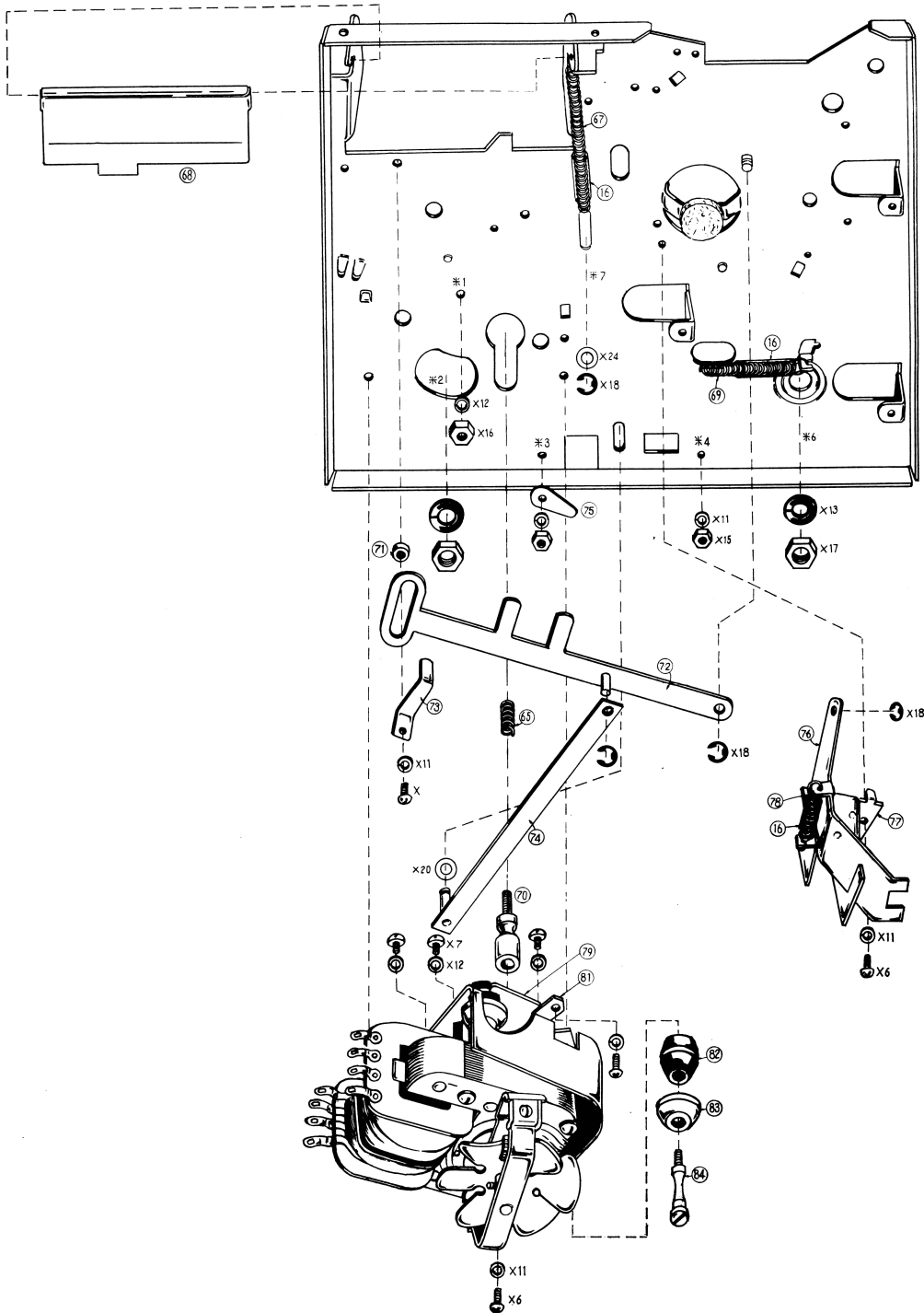
#### PARTS TO BE ADDED



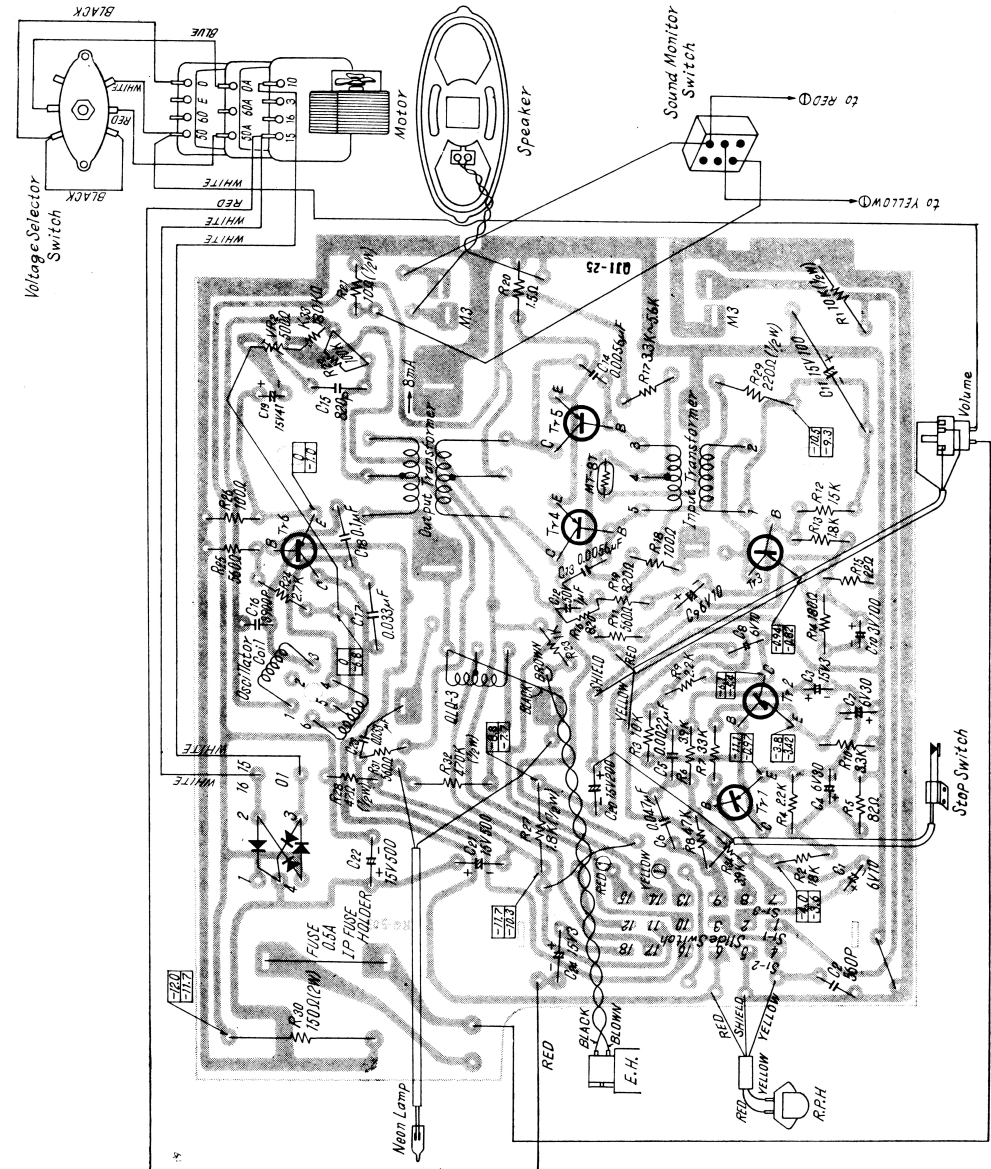
#### REPLACEMENT PARTS TO BE ADDED

Ref. No.	Parts No.	Description
G-3A	QYP-0051	Top Panel Assembly
E-25	QJT-4001-1	Lug Board
S-5	QSS-1002	Non Error Switch
R-35	ERD-14TK 2.7 K $\Omega$	Carbon Film Resistor
R-36	ERD-14TK 6.8 K $\Omega$	Carbon Film Resistor
X-29	QHM-130 $\times$ 5U3	Screw $\times$ S2.6 $\times$ 5
X-11	QWS-302U3	Spring Washer SW3 $\phi$

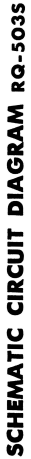
# N18-11. NATIONAL MODEL RQ-503



## PRINTED CIRCUIT BOARD

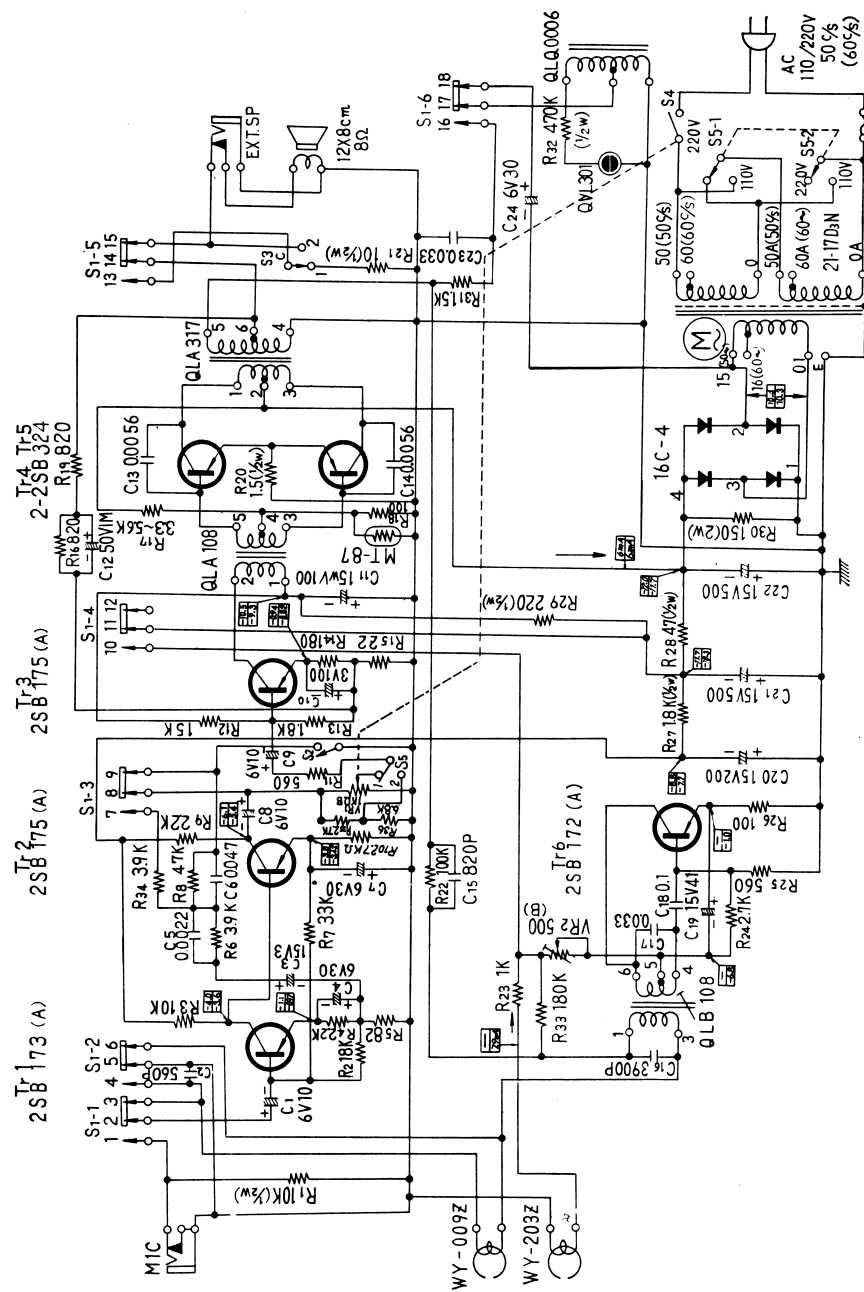


## TROUBLE SHOOTING GUIDE

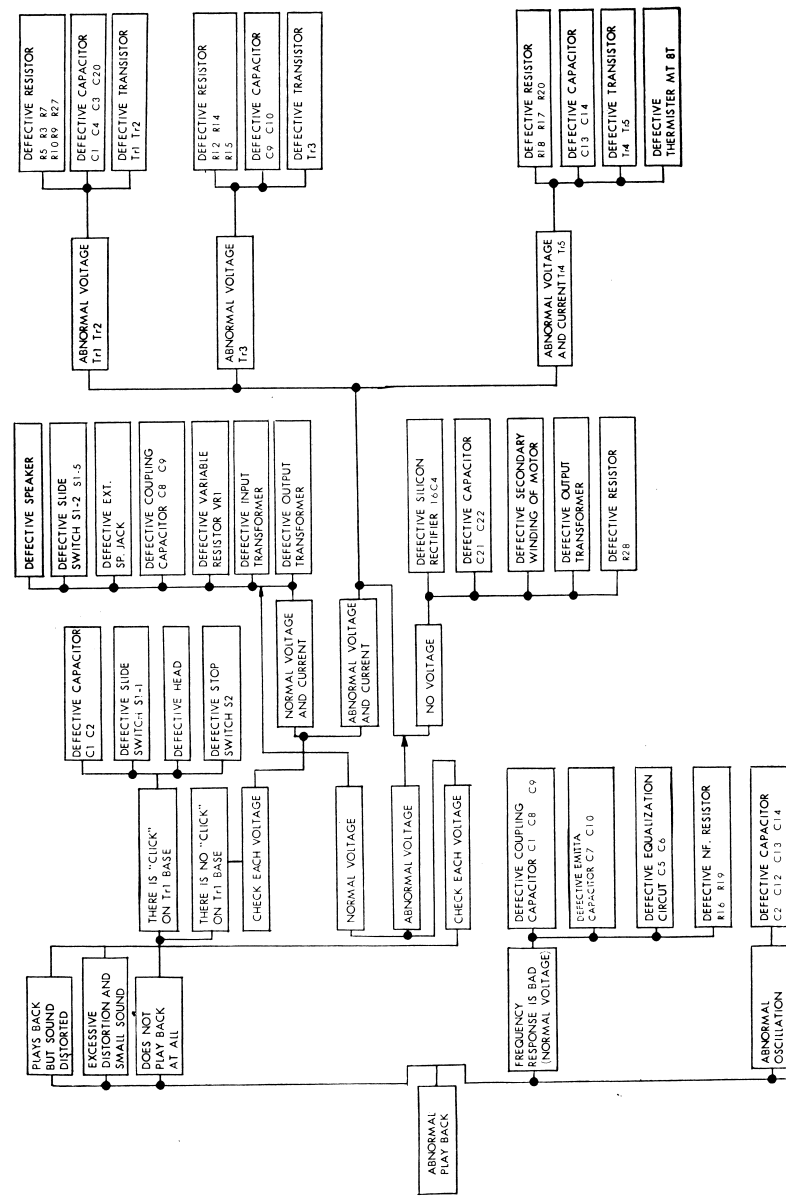


1. S<sub>1</sub>-1 ~ S<sub>1</sub>-6: Record/Playback Selector Switch (Shown in Play Position)
2. S<sub>2</sub>: Stop Switch
3. S<sub>3</sub>: Monitor Switch
4. S<sub>4</sub>: Power ON/OFF Switch (coupled with VRI)
5. S<sub>5</sub>: Voltage Selector Switch
6. All resistance in  $\Omega$ , K=1,000  $\Omega$   
M=1,000,000  $\Omega$
7. All resistance in  $\frac{1}{2}$  Wattage
8. All Capacitance in Microfarads
9. Values indicated in  $\square$  are DC. to Chassis ground with no signal applied.
10. Values in  $\square$  with arrows are A.C. between arrow-points.
11. The upper values should be measured during Playback and the lower values during recording.

## SCHEMATIC CIRCUIT DIAGRAM RQ-503S with Non Error Switch

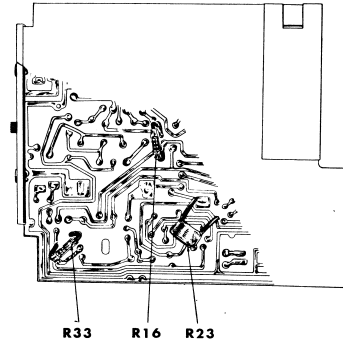
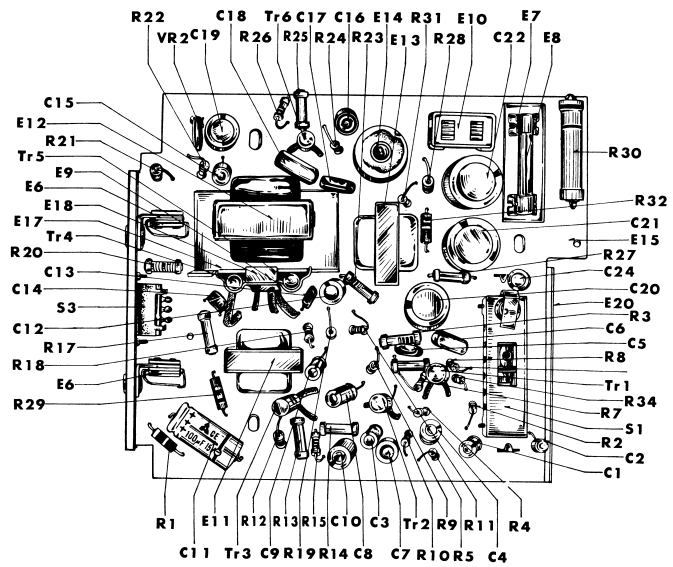
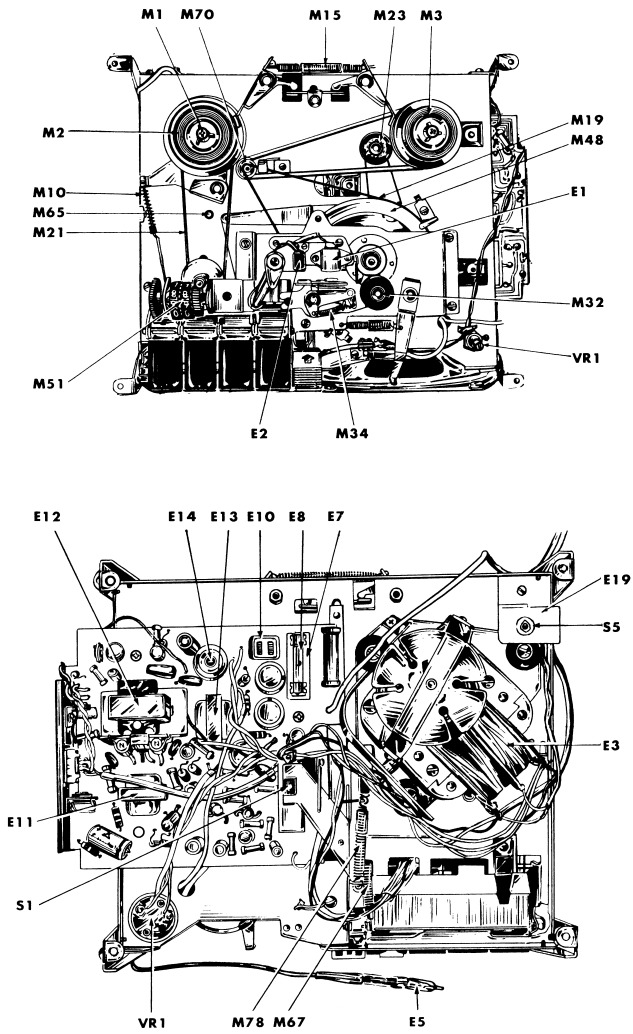


The modified part in this diagram of RQ-503S can be adopted to that of RQ-503S (with 3 Pin Plug)

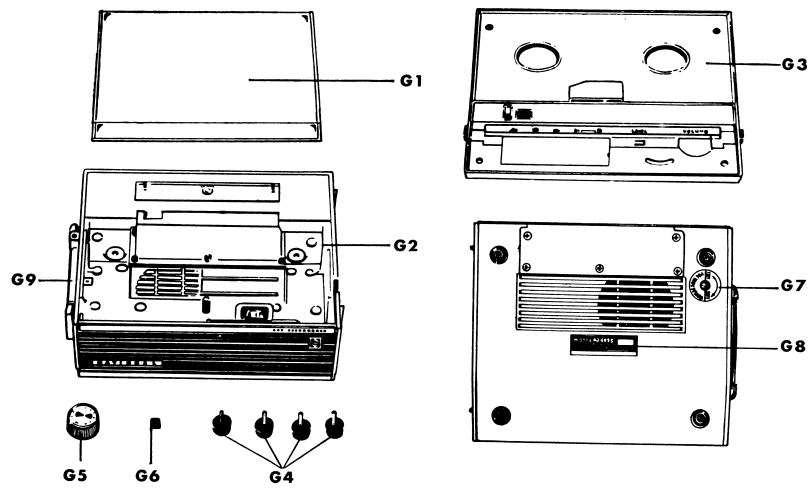


N18-5. NATIONAL MODEL RQ-503

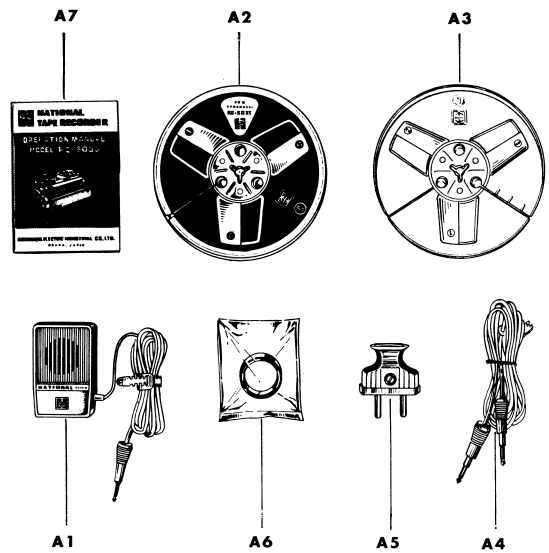
MECHANICAL PARTS LOCATION



CABINETS



ACCESSORIES



**PLAYBACK (Fig. 17)**

If Playback Button is pushed, the following movements come out simultaneously and tape will be sent out constantly,

1. By sliding Auto Stability Lever, Pinch Roller will be moved and Pinch Roller is pressed against Capstan Shaft. Thereupon the tape will be passed out constantly.
2. By the work of Pinch Roller Lever (B), Pad will be given motion and it will be pressed against Head.
3. By the work of Brake Mechanism, Brake will be removed from Reel Table and the friction of Reel Table Felt conveys the rotation of Reel Pulley to Takeup Reel Table.

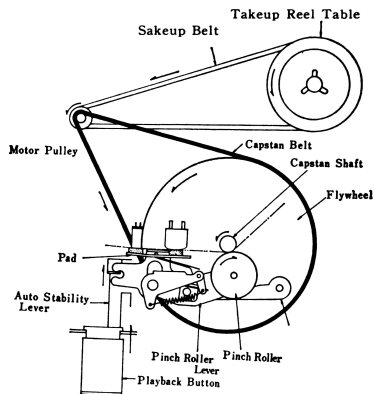


Fig. 17

**RECORDING (Fig. 18)**

When Recording Button and Playback Button are pushed simultaneously, the following movements will be added to those in Playback mode.

1. The movement to pass the tape out is the same as that in Playback mode.
2. When Recording Button is pushed, Recording Lever is moved and Switch Lever is slid to switch on Recording Circuit.
3. When playback Button is pushed, Auto Stability Lever is slid to lock Recording Lever.

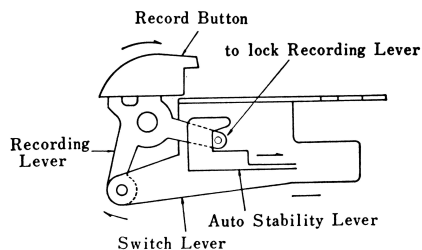


Fig. 18

**FAST FORWARD (Fig. 19)**

When Fast Forward Button is pushed, F.F. Rod and F.F. Roller Lever are slid and F.F. Roller is pressed against Rewind Reel Table and Reel Pulley. Accordingly, the rotation of Reel Pulley is conveyed to F.F. Roller and to Rewind Reel Table which rewind the tape promptly.

At the same time, the Brake is removed from Reel Table by the work of Brake mechanism.

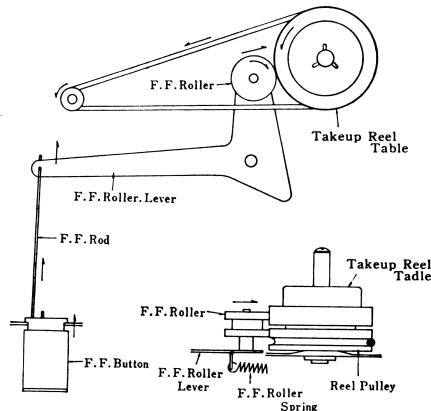


Fig. 19

**REWIND (Fig. 20)**

When Rewind Button is pushed, Rewind Rod and left Reel Table Lever are slid to press Supply Reel Table against Motor Pulley. And the rotation of Motor Pulley is conveyed to Supply Reel Table where the tape is rewound promptly.

At the same time, the brake is removed by the work of Brake mechanism.

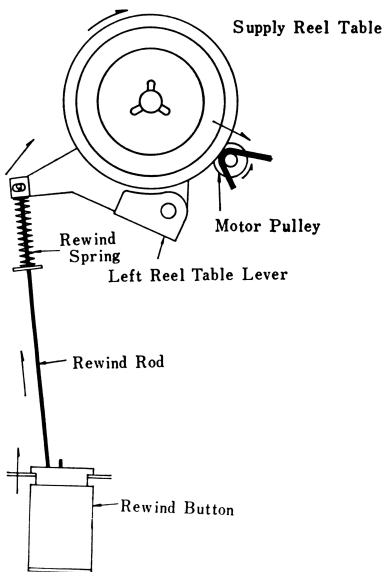


Fig. 20

**INSTANT STOP (Fig. 21)**

When Instant Stop Button is pushed in Recording or Playback mode. Instant Lever pushes Pinch Roller Lever and removes Pinch Roller from Capstan Shaft, where the tape is stopped. The Tape ceases only while Instant Button is pushed. The tape is stopped by the backtension on Supply Reel Table and by the friction made by the pressure on Pad.

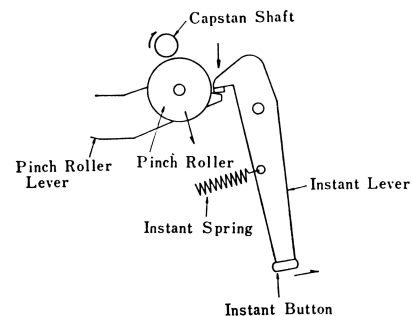


Fig. 21

**STOPPING**

When stop Button is pushed in Recording, Playback, Fast Forward and Rewind mode, all the locks on push Buttons are removed and every rotation is stopped by the work of Brake Mechanism which brakes Supply Reel Table and Rewind Reel Table.

**BRAKE MECHANISM (Fig. 22)**

When Playback, Fast Forward or Rewind Button is pushed, the brakes are off from Reel Tables by Brake Lever, Brake Rod, Brake Arm and right and left Brakes.

If Stop Button is pushed when the unit is in motion, all push Buttons are unlocked and the right and left Brakes stop Reel Tables by the work of Brake Spring.

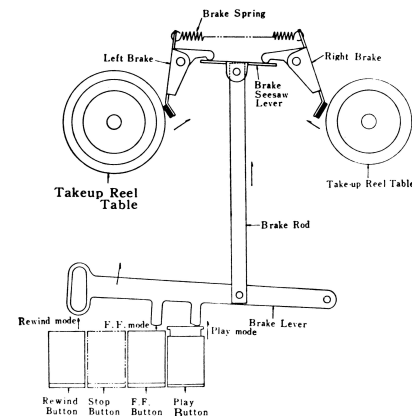


Fig. 22

## DISASSEMBLY INSTRUCTION

### TO REMOVE PANEL (Fig. 4)

- You can inspect and/or clean Mechanical Parts by removing Panel.
- Remove the five screws holding Panel.
- Incline the panel to this side (Push Button side) and remove Neon Lamp from the Panel.
- (note): Pay attention not to damage Neon Lamp when you turn over the set.

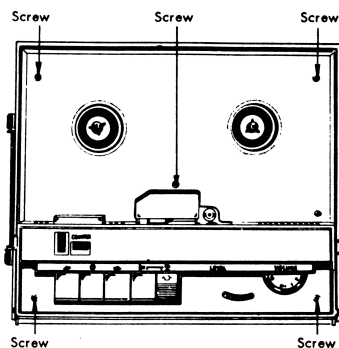


Fig. 4

### TO REMOVE CABINET CASE (Fig. 5)

- Put A.C Power Cord into Accessory Storage Case.
- Remove the screws holding Handle and Chassis.
- Turn over Cabinet Case and remove four Rubber Foot.
- Remove Cabinet Case holding upwards in this condition.

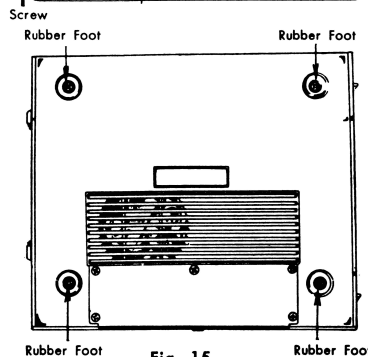
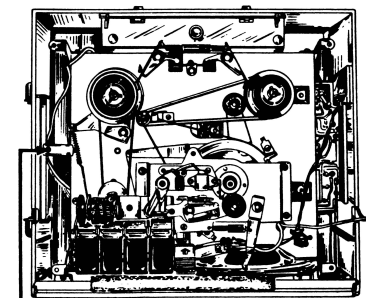


Fig. 15

### TO REMOVE REEL TABLE AND REEL PULLEY

- Unscrews (2) Reel Tables and take out Right and Left Reel Tables and Reel Pulleys.

### TO REMOVE FLYWHEEL (Fig. 6)

- Remove Tape Counter.
- Take off the screw holding Belt Limiter and remove it.
- Pull Flywheel out of Upper Chassis.

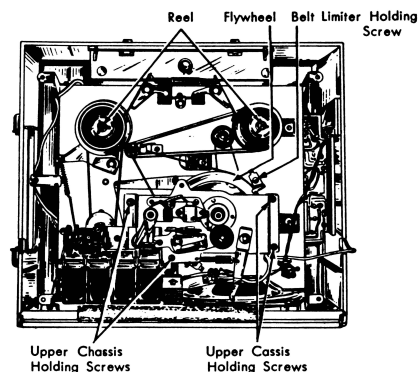


Fig. 6

### TO REMOVE MOTOR (Fig. 7)

- Unsolder Motor Terminals.
- Take off the screw holding Voltage Selector Angle and remove it.
- Take off two screws holding Motor Cover and remove it.
- Take off three screws holding Motor Base Plate and remove Capstan Belt and Rewind Belt from Motor Pulley.
- Remove three screws holding Motor on Motor Pulley side and take Motor out of Motor Base Plate.

### TO REMOVE PRINTED CIRCUIT BOARD (Fig. 7)

- Remove Cramp with Earth Wire holding on Motor Base Plate.
- Bring Lead Wire out of Speaker to the middle from the corner of Jacks Plate.
- Remove three screws holding Printed Circuit Board.
- Turn over Printed Circuit Board Putting sideways.

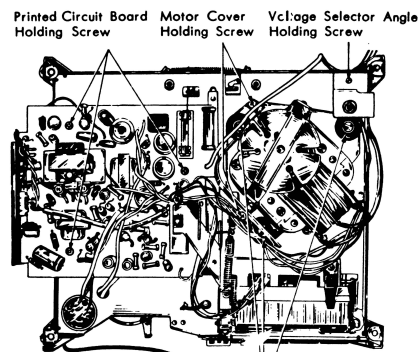


Fig. 7

## MEASUREMENT AND ADJUSTMENT

### PINCH ROLLER PRESSURE (Fig. 8)

- Set the unit in Playback mode and pull the Spring Gauge in the direction to connect the centers of Capstan and Pinch Roller like in the figure below.
- Pull it more gradually and see the reading at the point where the tape ceases.
- The measurement should be done at the middle part of the 5" tape where the standard reading is 400-550gr at the tape speed of 3-3/4 ips.

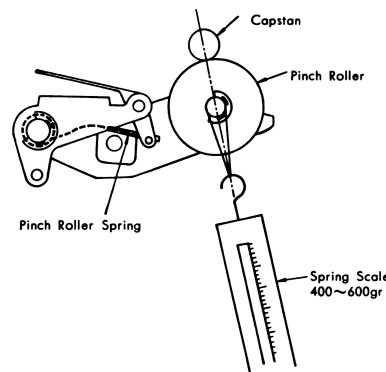


Fig. 8

### SUPPLY REEL TABLE PRESSURE (Fig. 9)

- In Rewind mode, pull the Spring Gauge in the direction of the Reel Table's rotation and see the reading at the point where the table's rotation ceases. The standard reading at this point is 150-300 gr. The adjustment should be done the Rewind spring.

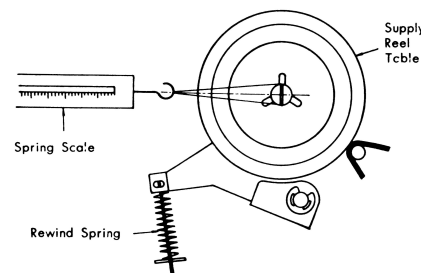


Fig. 9

### FAST FORWARD ROLLER PRESSURE (Fig. 10)

In Fast Forward mode, pull the Spring Gauge in the direction of F.F. Roller's rotation like in Fig. 10 and see the reading

of the gauge at the point where the F.F. Roller's rotation ceases. The adjustment should be done by Fast Forward Roller spring.

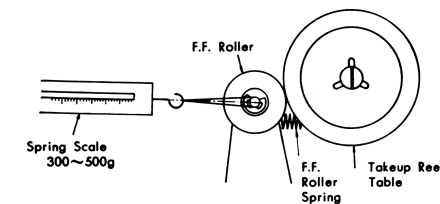


Fig. 10

## STRENGTH IN REWINDING AND BRAKE OF REEL TABLE (Fig. 11)

### (A) Adjustment of Rewinding in Playback mode.

Thread the 5" tape on the Rewind Reel Table and hook the tip of the tape to Tension Gauge. Set the unit in Playback mode. The reading of the Tension Gauge will follow the rewinding. Thereupon, see the reading of the gauge when its pointer ceases. If the reading is out of the standard, study whether the rotation of Rewind Reel Table is normal, whether the felt of the Reel Table is not rubbed out, whether the oiling is enough and whether the Rewind Belt is normal. Accordingly adjust these functions.

### (B) Adjustment of Backtension in Playback mode. (Refer to Fig. (1))

Thread the 5" tape on tape on the Supply Reel Table and hook the tip of the tape to the Tension Gauge. Set the unit in Playback mode. Pull the Tension Gauge in the direction same as that of sending tape and see the reading when the pointer ceases. The standard reading at that point is 4-12 gr. If the reading is out of the standard, study whether the rotation of the Supply Reel Table is normal, whether the felt on the reel table is not rubbed out and whether the oiling is enough or not and adjust these functions accordingly.

### (C) Adjustment of Backtension in Rewind mode (Refer to Fig. (11))

Thread the 5" tape on the Rewind Reel Table and in Rewind mode do the same measurement as in the item (B). The standard reading at this point is 5-15 gs. If the reading is out of the standard, study whether the rotation of the Supply Reel table is normal, whether the felt on the reel table is not rubbed out and whether the oiling is enough, and adjust these functions accordingly.

### (D) Adjustment of the Brake in Stop mode (Refer to Fig. 11 (2), (3), (4) and (7))

Thread the 5" tape on the Supply Reel Table or on the Rewind Reel Table and hook the tip of the tape to the Tension Gauge. Set the unit in Stop mode. Pull the Tension Gauge and see the reading of the gauge at the point where the pointer ceases. The standard reading at this point is more than 40 gs when normally rotates and more than 10 gr in inversion when the 5" tape is turned over.