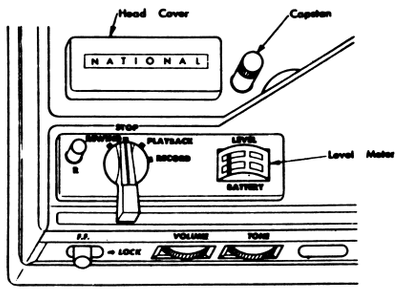
MECHANISM

a. Single Knob Control :



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

(1) Turn operation-knob clockwise to PLAY-BACK to set up mechanism for play-back and to turn ON power switches for amplifier and motor simultaneously.

(2) Turn operation-knob counter-clockwise to REWIND to set up mechanism for rewinding and to switch OFF amplifier.

(3) Press down R-button and turn operation-knob to RE-CORD. Amplifier now works for recording. R-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 indicates recording level only.

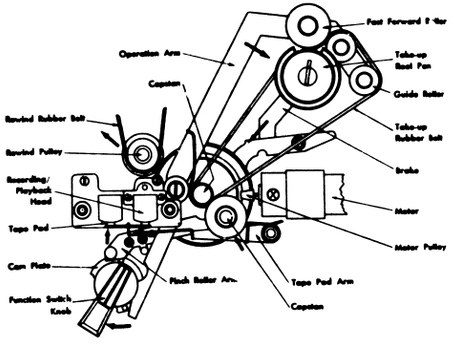
b. Change of Speeds :

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

c. Record (Play-back) Mechanism :

Performance of mechanism is exactly same for recording and for play-back except that in the former case, operation-knob shall be turned to RECORD after R-button is pressed down. Electrical connection within amplifier is shifted to and from recording and play-back by means of rotary switch which is controled by the movement of operation-knob

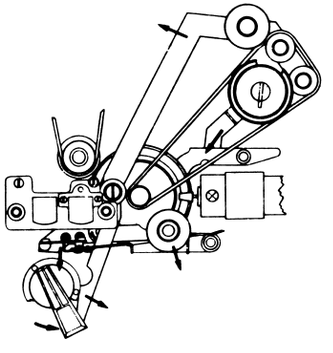
When operation-knob is set at RECORD or PLAY-BACK, cam-plate turns and cam-pin is freed and operation-arm, pinch-roller arm and brake move in the direction of arrow respectively whereby, pinchroller presses against capstan and transmits rotary motion to tape. Rubber belt touches pullev at the bottom of take-up-reel spindle and imparts rotary motion to spindle. At the same time, brake comes loose in the direction of arrow and allows spindle 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 flywheel. All these actions occur almost simultaneously and are transmitted from motor through flywheel capstan, and by belt to reel-spindle. By the rotation of each part, tape travels.



d. Rewind Mechanism :

Operation-knob at REWIND, cam-pin comes free and rewind-arm moves in the direction of arrow, rewind-pulley touches rubber tire of flywheel, and supply-reel spindle rotates by means of rubber belt.

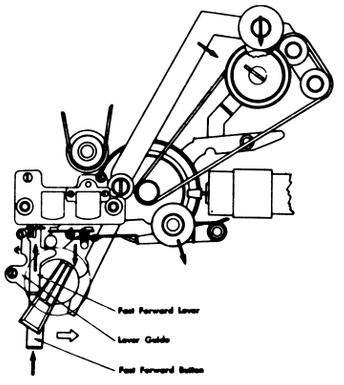
Rotary motion is transmitted from motor-pulley to flywheel as in the case of play-back. As for takeup reel spindle, operation-arm is freed and rubber belt and reel-spindle are clearly separated and brake comes off. Reel-spindle thus rotates freely as pulled by tape.



e. FAST-FORWARD Mechanism :

Set operation-knob at PLAY-BACK position and press F.F. button (black). Tape will be wound forward rapidly. For a long winding, press F.F. button and slide it to the right. The button is locked and enables continued FAST FORWARD winding. This F.F. device does work except at PLAY-BACK position. If pperation-knob is set at RECORD position, F.F. button can not be pressed down.

When F.F. button is pushed in the direction of arrow, the arm of F.F. lever presses the pin of pinch-roller arm;



pinch-roller disengages from capstan, and at the same time the pin of operation arm stopper of pinch-roller moves in the direction of arrow and Operation-knob also moves and F.F. roller is pressed against reel-holder. Thus rotation is transmitted to reel-holder which takes up tape rapidly. By sliding pressed F.F. button to the direction of ⇨ LOCK, the hook of F.F. lever is caught by F.F. lever guide; F.F. button is locked and enables continued F.F. winding with your hand off.

When Operation-knob is at RECORD position, F.F. stopper cam turns and is caught by the hook of F.F. Lever so that F.F. button can not be pressed down.

f. Stop Mechanism :

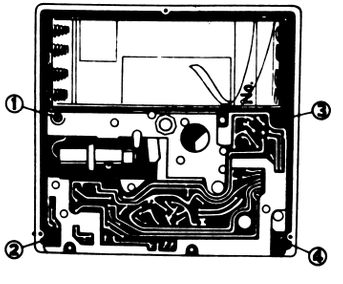
Operation-knob at STOP, lever is freed and motor stops, and tape also stops instantly without any over-run.

This is due to back-tension of rewind-belt, when stopped from record or play-back position, and by brake, when stopped from rewind position.

DISASSEMBLING

When disassembling RQ-114, it shall be taken apart in the order of head-cover, lower case and upper case.

a. Head-cover shall be pulled out upward by hand.
b. When removing lower case, first remove the screw at the center of the bottom. The case comes off easily.
c. When removing upper case, first pull out operation-knob upward after loosening the set screw. Pull out the case gently upward.
d. Then turn capstan-rest counter-clockwise and remove it together with capstan base.

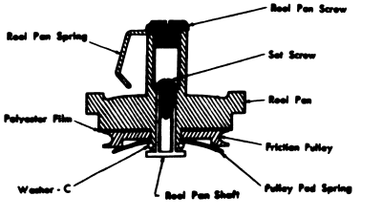


e. Remove 4 chassis-holding screws, ① ③ ⑨ and ④ as shown. Hold the back part of upper case and gently pull it out upward. Upper case now comes off mechanism.

◎ Care shall be taken not to break wiring connected to speaker.

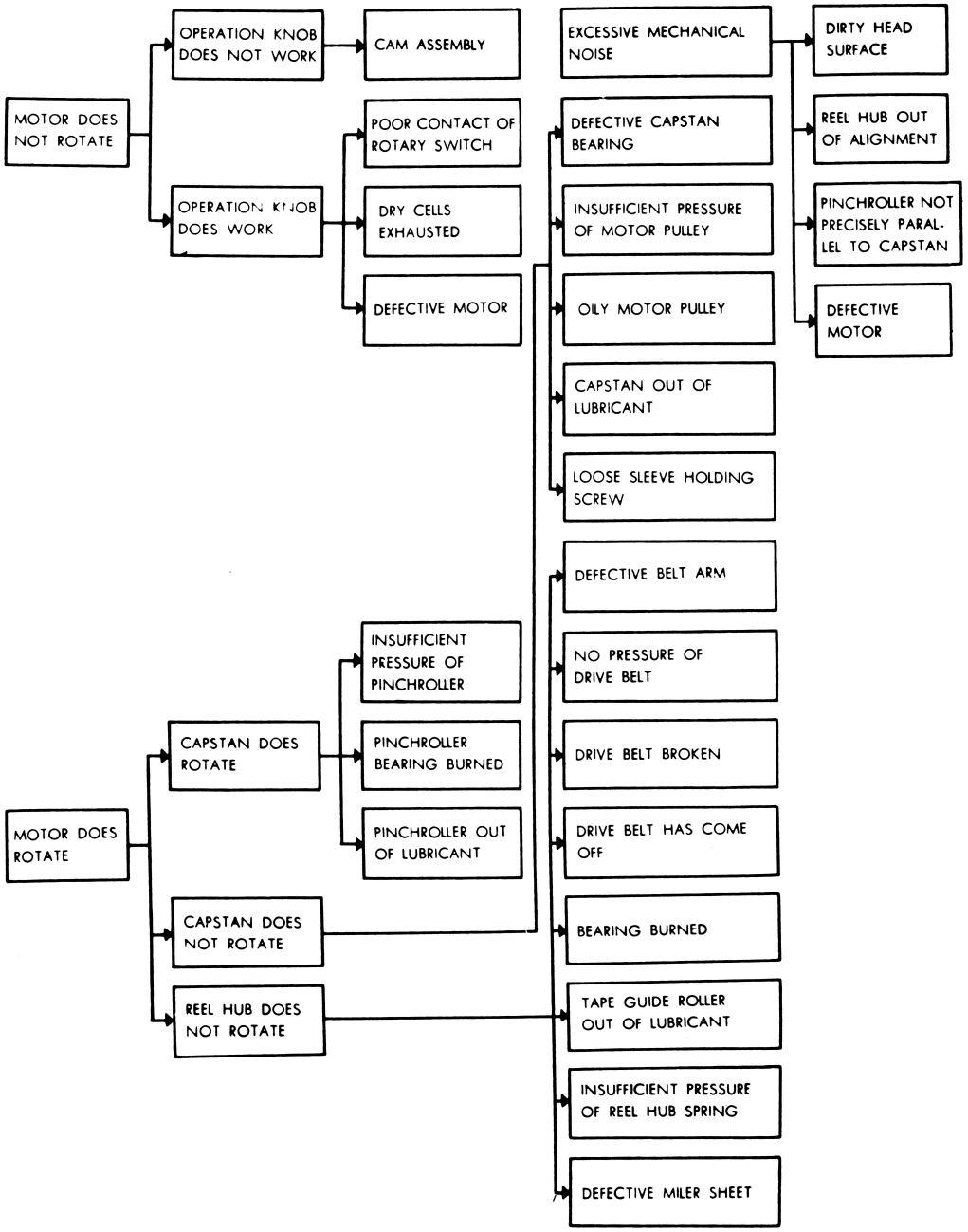
Constrution of Take-up Reel Spindle

Rotary motion of reel-pulley is transmitted to reel-holder by slippery of polyester-sheet. The strength of friction can be adjusted by the strength of pressure-spring on pulley.



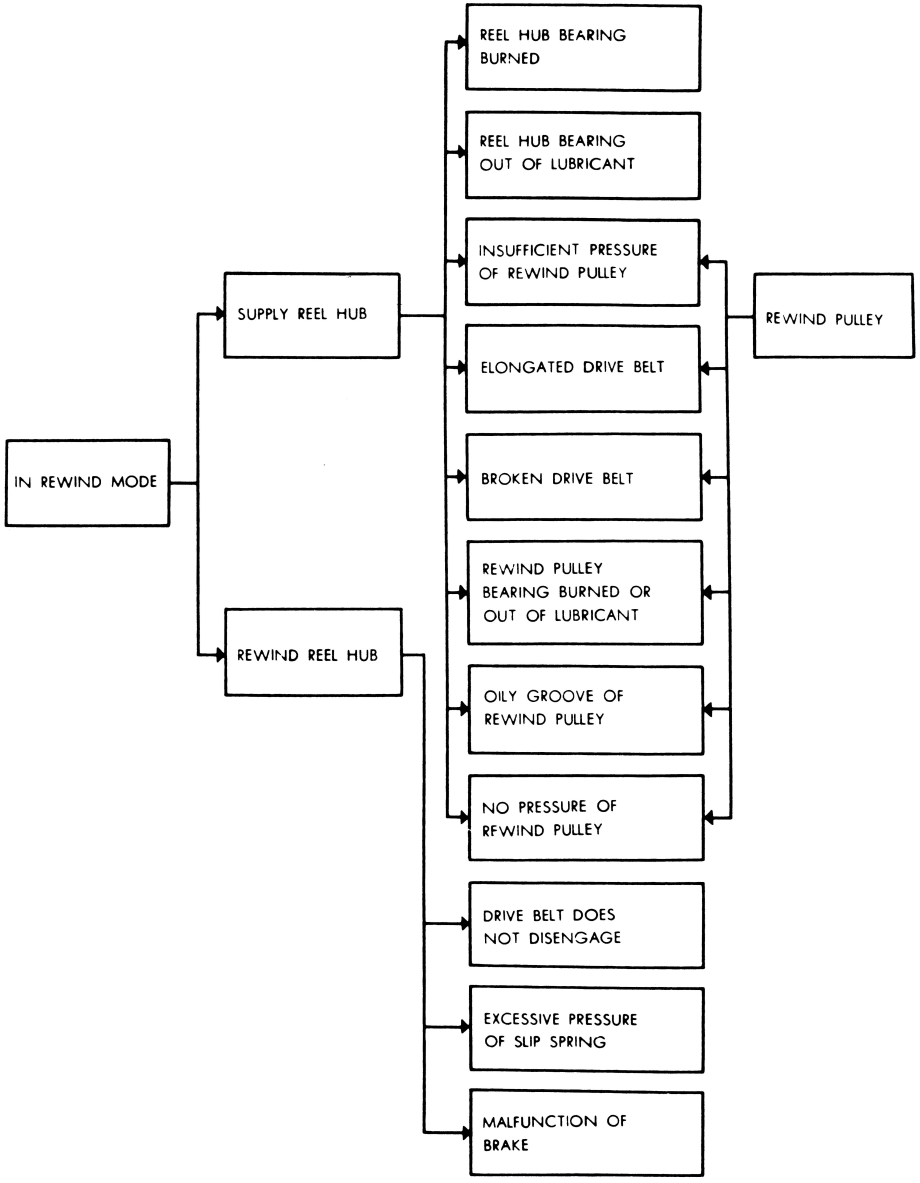
RQ-114 TROUBLE SHOOTING GUIDE 1

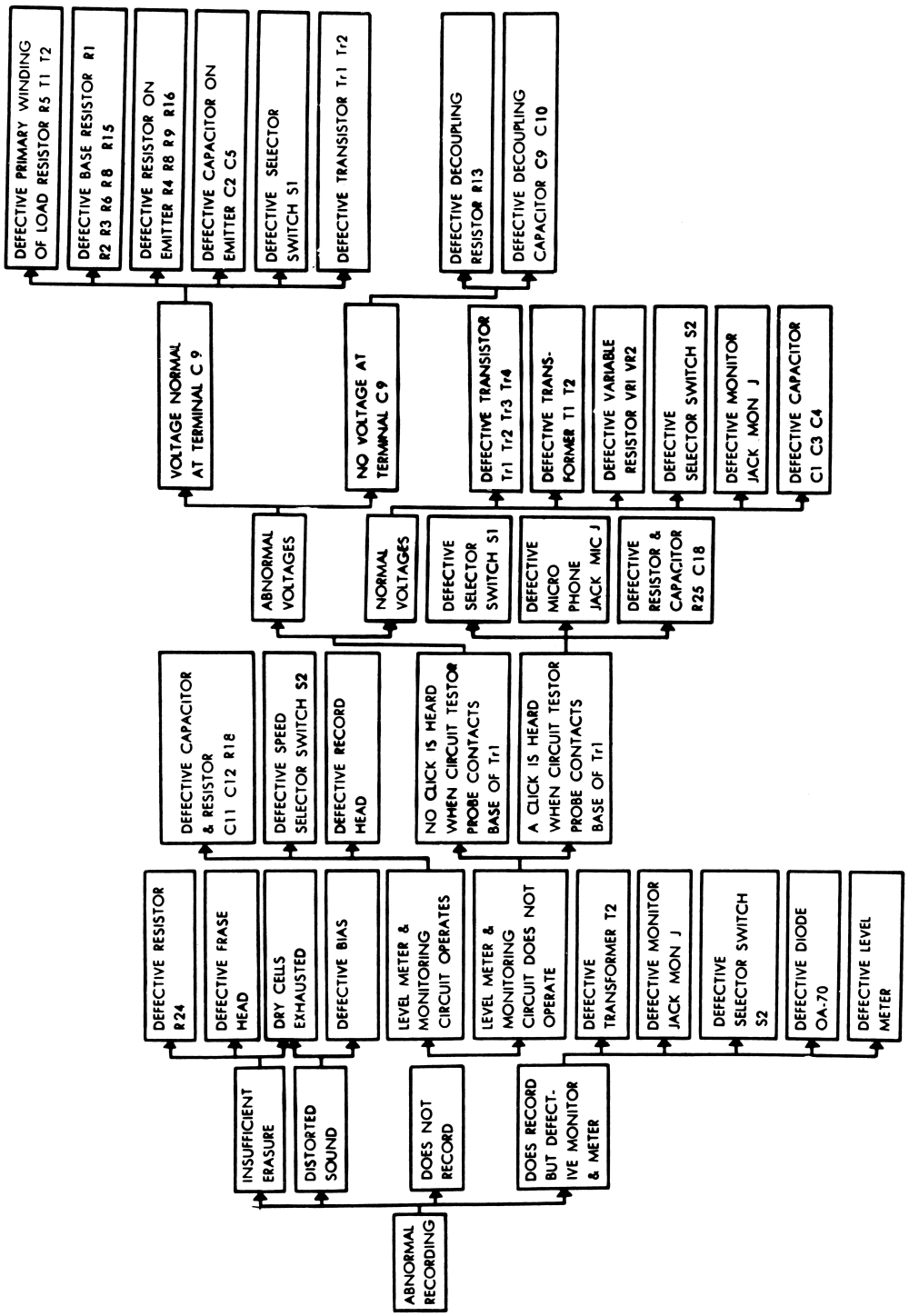
MALFUNCTIONS IN RECORD/PLAYBACK MOTION



RQ-114 TROUBLE SHOOTING GUIDE 2

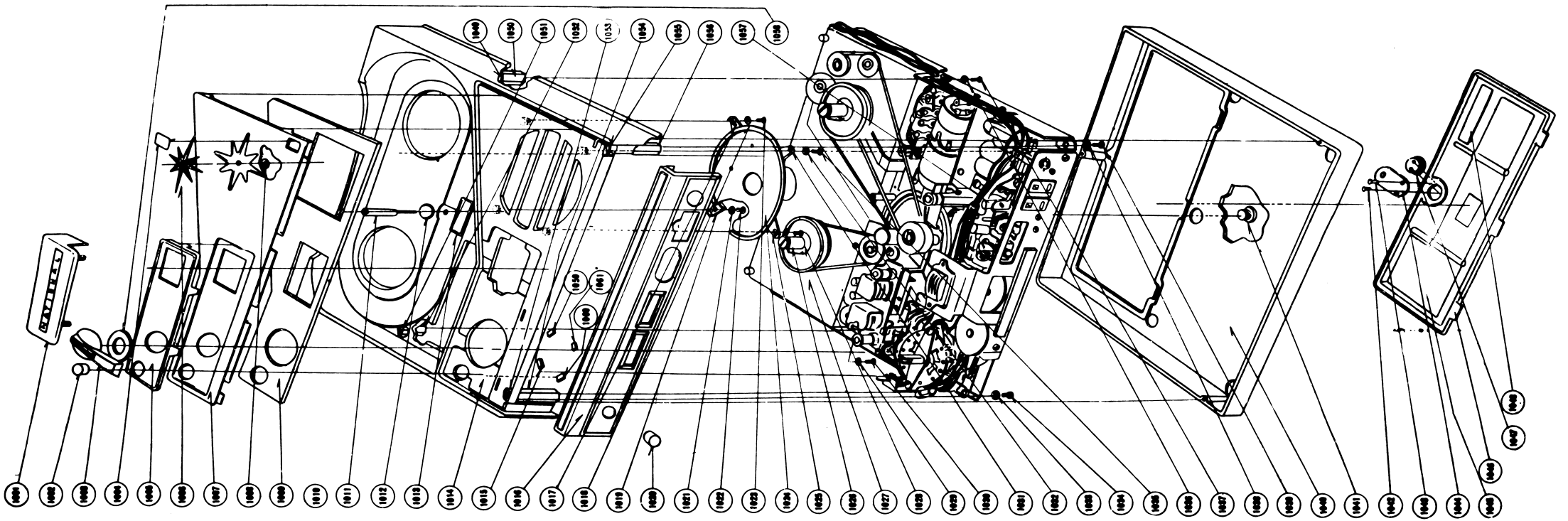
MALFUNCTIONS IN REWIND MOTION



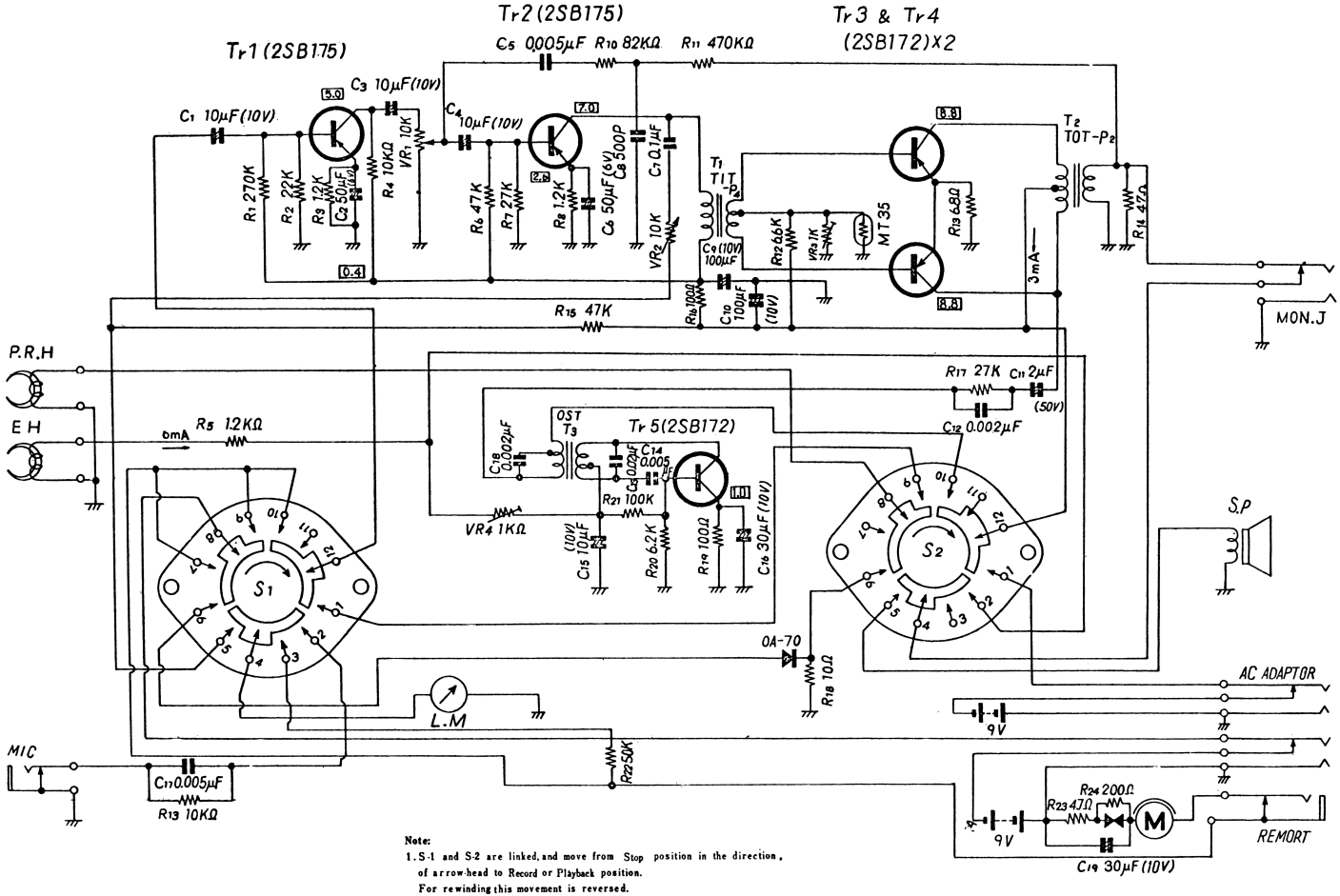


REPLACEMENT PARTS

1 Screw 2×10 Round-head for Head Adjusting Plate
2 Head Adjustment Spring
3 Screw 3×14 Countersink Flat-head for Head Plate
4 〃 2×5 Round-head for Head Adjusting Plate
5 Recording/Playback Head
6 Spring Washer 3φ for Head Plate
7 Screw 3×4 Round-head for Head Plate
8 Tape Guide
9 Spring Washer 3φ for Head Plate
10 Erasing Head
11 Tape Guide
12 Record/Playback Head Mounting Plate
13 Erase Head Spacer
14 Tape Guide Spring (Right)
15 〃 〃 〃 (Left)
16 Head Mounting Plate
17 Screw 3×11 Round-head for switch Plate
18
19
20 Spring Washer 2φ for Record Lock
21 Screw 2×3 Round-head for Record Lock
22 〃 〃 〃 〃 〃 〃 〃
23 Spring Washer 2φ
24 Record Lock Push Lever
25 〃 〃 〃 Guide (1)
26 〃 〃 〃 〃 (2)
27 〃 〃 Spring
28 〃 〃 Plate
29 Screw 3×12 Round-head for Switch Plate
30 Spring Washer 3φ
31 Record Lock Felt
32 Rotary Switch
33 Switch Plate Spacer 5φ ×6.5
34 〃 〃 〃 〃
35 Catch Lever Shaft
36 Catch Lever
37 Screw 2×4 Round-head for Pinch Roller Lever
38 〃 〃 〃 〃 〃 〃 〃
39 Spring for Catch Lever
40 Spring Washer 2φ for Pinch Roller Lever
41 〃 〃 〃 〃 〃 〃 〃
42 〃 〃 3φ
43 〃 (C) 3φ for Clutch Lever Shaft
44 Nut. 3φ
45 F.F Stopper
46 Washer (C) 3φ for Clutch Lever Shaft
47 Washer 3φ
48 〃 〃
49 Pinch Roller
50 Washer 3φ
51 Nut 3φ
52 Spring Washer 3φ
53 Screw 3×6 Half-round Head
54 Screw 3×6 Half-round Head
55
56 Operater Plate
57 Spring Washer 3φ for Catch Lever Shaft
58 Nut 3φ for Catch Lever Shaft
59 Spring Washer 2.6φ
60 Screw 2.6×4 Round-head
61 Spring Washer 2.6φ
62 Screw 2.6×4 Round-head
63 Switch Shaft Spacer
64 Screw 3×5 Round-head for Switch Shaft Bushing
65 Washer 3φ for Switch Shaft Bushing
66 Spring Washer 3φ for Switch Shaft Bushing
67 Screw 3×6 Round-head for Head Plate Holder
68 Spring Washer 3φ for Head Plate Holder
69 Conserve Plate
70 Screw 3×6 Round-head for Head Plate Holder
71 Spring Washer 3φ for Head Plate Holder
72 Head Plate Holder
73 Screw 2.6×4 Round-head for F.F Lever Guide
74 〃 3×18 〃 〃 for Upper Deck
75 〃 〃 〃 〃 for Upper Deck
76 Spring Washer 2.6φ for F.F Lever Guide
77 Screw 3×5 Round-head for Upper Deck
78 〃 2×4 Flat-head for F.F Lever
79 Spring for Record Lock
80 Washer for F.F Stoper 2φ for F.F Lever
81 Spring Washer 2.6φ for F.F Lever Guide
82 F.F Lever
83 F.F Lever Guide
84 Main Pulley
85 Spring for Pinch Roller Lever
86 Upper Deck
87 Steel Washer
88
89
90 F.F Stoper Cam
91 F.F Cam Spacer
92 Reel Pan Screw
93 〃 〃 Spring
94 Screw 2.6×5 Round-head for Reel Pan Shaft
95 Rewind Reel Pan
96 Rubber Belt (Small)
97
98 Rewind Pulley Spring
99 Rewind Pulley
100 Head Plate Spacer



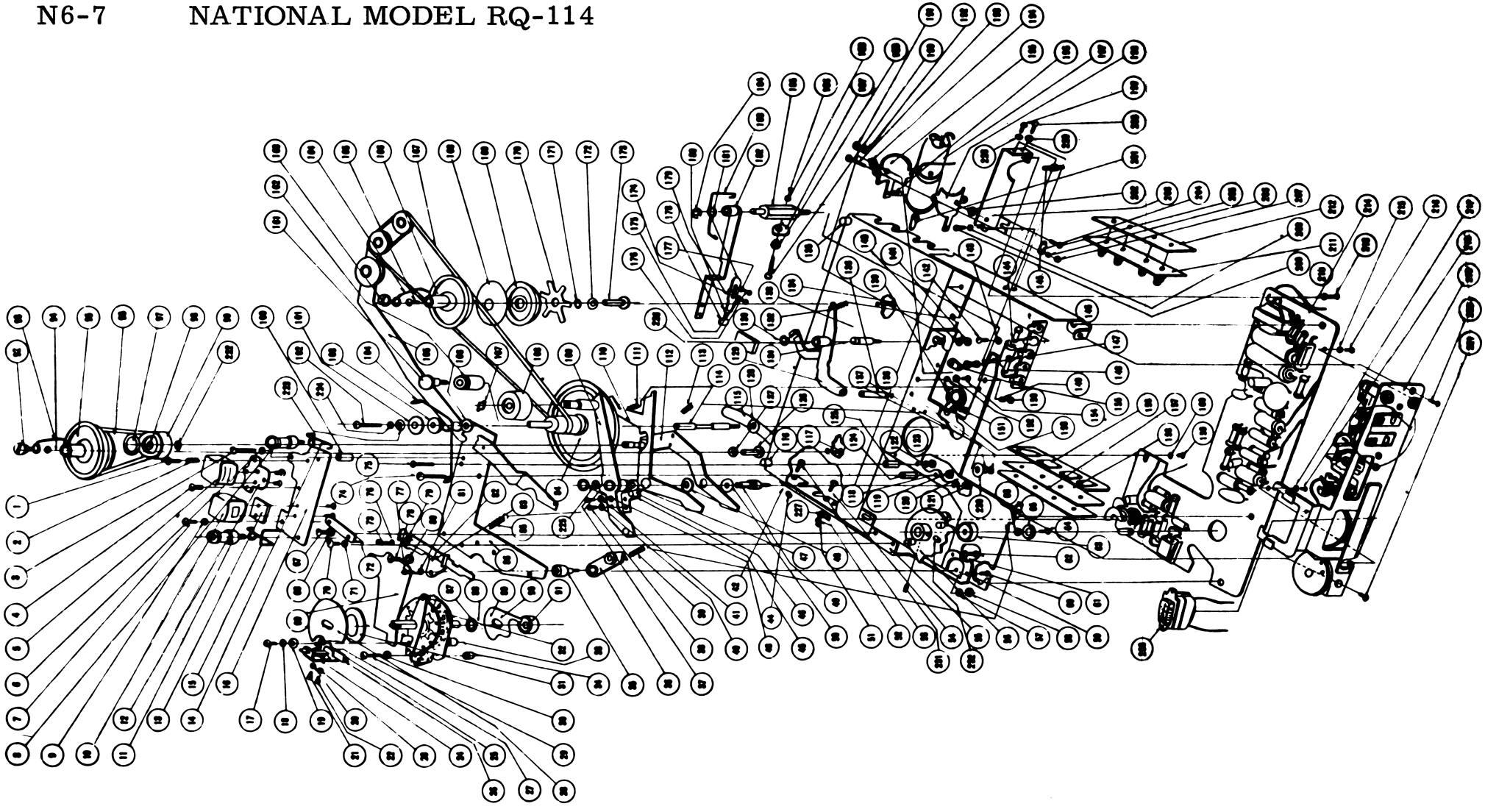
NATIONAL MODEL RQ-114 N6-8



Note:

1. S-1 and S-2 are linked, and move from Stop position in the direction of arrow-head to Record or Playback position. For rewinding this movement is reversed.
2. K for resistors stands for KΩ, M for MΩ.
3. Values of capacitors without unit are on the order of μF. P stands for PF (μμF)
4. Values indicated in □ are D.C. currents between the shassis.

NATIONAL MODEL RQ-114



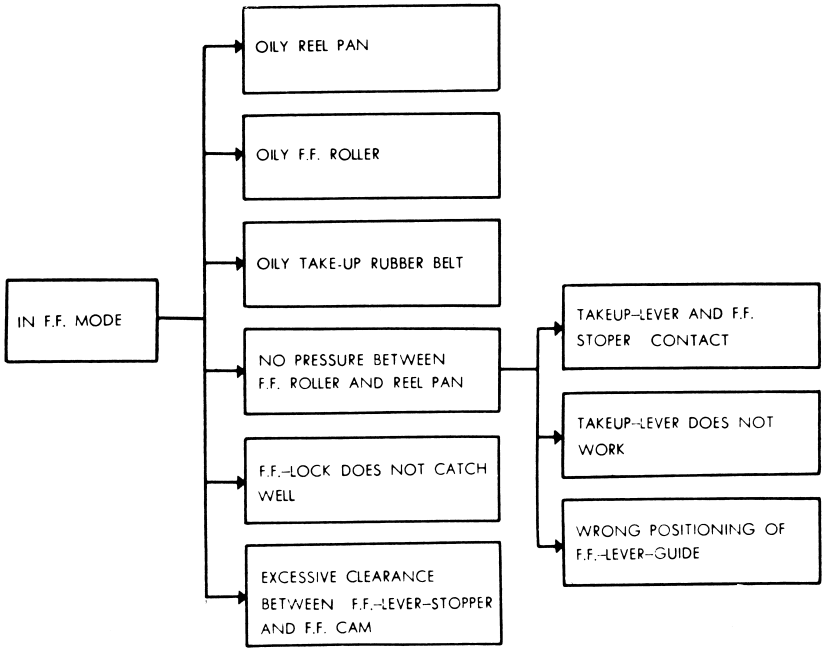
NATIONAL MODEL RQ-114

101 Steel Washer
102 Screw 3×6 Round-head for Tekeup Lever Bushing
103 Takeup Lever Bushing
104 Spring for Takeup Lever
105 Takeup Lever Guide
106 Steel Washer
107 Spring for Pinch Roller
108 Pinch Roller
109 Pinch Roller Lever
110 Clutch Lever
111 Spring for Clutch Lever
112 Rewind Lever
113 Spring for Rewind Lever
114 Main Pulley Shaft
115 Dry Cells Holder Belt
116 Panel Spacer (Short)
117 Screw 2.6×6 Flat-head for Reel Pan Shaft Holder
118 Spring Washer 3φ for Upper Deck
119 Nut 3φ for Upper Deck
120 Spring Washer 3φ for Pinch Roller Shaft
121 Nut 3φ
122 Spring Washer 3φ for Pinch Roller Shaft
123 Nut 3φ for Upper Deck
124 Upper Deck Specer
125 〃 〃 〃
126 Rewind Reel Pan Shaft
127 Fiber Washer for Reel Pan Shaft
128 Steel Washer for Main Pulley Shaft
29 Brake Arm
130 C Washer 3φ for Brake Arm
131 Brake Arm Shaft
132 Spring for Brake Arm
133 Chassis
134 Screw 2.6×6 Flat-head for Reel Pan Shaft Holder
135 Panel Spacer (Shart)
136 〃 〃 (Long)
137 Spring Washer for Main Pulley Shaft
138 Nut 3φ for Main Pulley Shaft
139 Chassis Spacer
140 Spring Washer for Black Arm Shaft
141 Nut 3φ for Brake Arm Shaft
142 Screw 3×5 Round-head for Lug Board
143 Spring Washer 3φ for Lug Board
144 1L5P Capacitor 10V 30μF
145
146
147 Screw 2×5 Round-head for Motor Spring Hook
148 Spring Washer 2φ for Motor Spring Hook
149 〃 〃 3φ for Pad Arm Shaft
150 Nut 3φ for Pad Arm Shaft
151 Screw 2.6×4 Round-head for Chassis Spacer
152 Spring Washer 2.6φ for Chassis Spacer
153 〃 〃 2φ for Chassis Spacer
154 Screw 2.6×4 Round-head for Chassis Spacer
155 Motor Spring hook
156 Dry Cells Terminal (+) side (Assembly)
157 〃 〃 〃 Spacer
158 〃 〃 〃 〃
159 Screw 2×3 Round-head
160 Spring Washer 2φ
161 Capstan Screw
162 Capstan
163 Takeup Reel Pan Screw
164 〃 〃 〃 Spring
165 Screw 2.6×5 Round-head for Reel Pan Shaft
166 Takeup Reel Pan
167 Rubber Belt (Large)
168 Friction Fiber
169 Friction Pulley
170 Friction Spring
171 Spring for Friction Pulley
172 Fiber Washer for Reel Pan Shaft
173 Reel Pan Shaft
174 Spring Washer 2φ for Pad Arm
175 Screw 2×3 Round-head for Pad Spring
176 〃 〃 〃 for Pad Spring
177 Spring Washer 2φ for Pad Arm
178 Tape Pad Felt
179 〃 〃 〃
180 〃 〃 Spring
181 〃 〃 Metal
182 〃 〃 Arm
183 〃 〃 〃 Spring
184 C Washer 3φ for Pad Arm Shaft
185 Tape Pan Arm Shaft
186 Nut for Pad Arm Shaft
187 Motor lift
188 Spring Washer 2φ for Pad Arm Shaft
189 Motor Lift Bushing
190 Screw 2×15 Round-head for Pad Arm Shaft
191 Nut for Motor Holder
192 Spring Washer 2φ for Motor Holder
193 Screw 2×10 Round-head for Motor Holder
194
195 Motor Holder
196 Motor Spring
197 Motor
198 Motor Holder
199 Screw 2×4 Round-head
200 〃 〃 〃
201 Motor Pulley
202
203 Motor Support
204 Lug Board
205 Screw 2×10 Round-head for Motor Holder
206 Spring Washer 2φ for Motor Holder
207 Nut 2φ for Motor Holder
208 Washer 2φ
209 Screw 2×3 Round-head
210 Spring Washer 2φ for Print Board
211 Dry Cells Terminal (−) side (Assembly)
212 〃 〃 〃 Spacer
213 Screw 2×3 Round-head for Print Board
214 Print Board
215 Spring Washer 2φ for Print Board
216 Screw 2×3 Round-head for Print Board
217 Spring Washer 2φ for Print Board
218 Screw 2×3 Round-head for Print Board
219 Control Board
220 Screw 2.6×5 Flat-head for Control Board
221 〃 〃 〃 〃 〃 〃
222 Fiber Washer 4φ
223 Washer 3φ
224 〃 〃
225 〃 4φ
226 Rubber Stopper
227 Lug Board
228 Spring Washer 2φ
229 〃 〃 〃
230 Washer 3φ
231 Screw 4×5
232 〃 〃
233 Level Meter (V-103)

1001 Head Cover
1002 Record Lock Button
1003 Function Switch Knob
1004 NATIONAL Mark
1005 Operation Plate
1006 Decoration
1007 Punching Metal
1008 Washer 2.6φ
1009
1010
1011 Capstan Rest
1012 Capstan Base
1013 Capstan Name
1014 Cabinet (Upper)
1015 Function Switch Felt
1016 Jack Name
1017 Speaker Mounting Board
1018 Spring Washer 2.6φ
1019 Speaker Mounting Board
1020 F.F Button
1021 Spring Washer 2.6φ for Speaker Mounting
1022 Screw 2.6×6 for Speaker Mounting
1023 〃 〃 〃 〃 〃
1024 Speaker
1025 Speaker Mounting Board
1026 Spring Washer 2.6φ
1027 Mechanism (Assembly)
1028 Screw 3×6 Round-head
1029 Spring Washer 3φ
1030 Screw 3×6 Round-head
1031 Speaker Mounting Board
1032 Spring Washer 2.6φ for Speaker Mounting
1033 Spring Washer 3φ
1034 Screw 3×6 Round-head
1035 〃 2.6×6 〃
1036 Spring Washer 3φ for Chassis Mounting
1037 Screw 3×6 〃 〃 〃
1038 Spring Washer 3φ 〃 〃 〃
1039 Screw 3×6 〃 〃 〃
1040 Cabinet (Lower)
1041 Case Mounting Screw
1042
1043
1044
1045 Dry Cells Life Indicator
1046 Dry Cells Cover
1047 〃 〃 〃 Lid Button
1048 〃 〃 〃 Name
1049 Spring Washer 3φ
1050 Chassis Pole (Short)
1051 Spring Washer 3φ
1052 Chassis Pole (Short)
1053 Spring Washer 3φ
1054 Chassis Pole (Long)
1055 Spring Washer 3φ
1056 Chassis Pole (Round)
1057 Amplifier (Assembly)
1058 Function Switch Felt 8×18×1
1059 Record Lock Felt 8×6×3
1060 〃 〃 〃 〃
1061 〃 〃 〃 〃

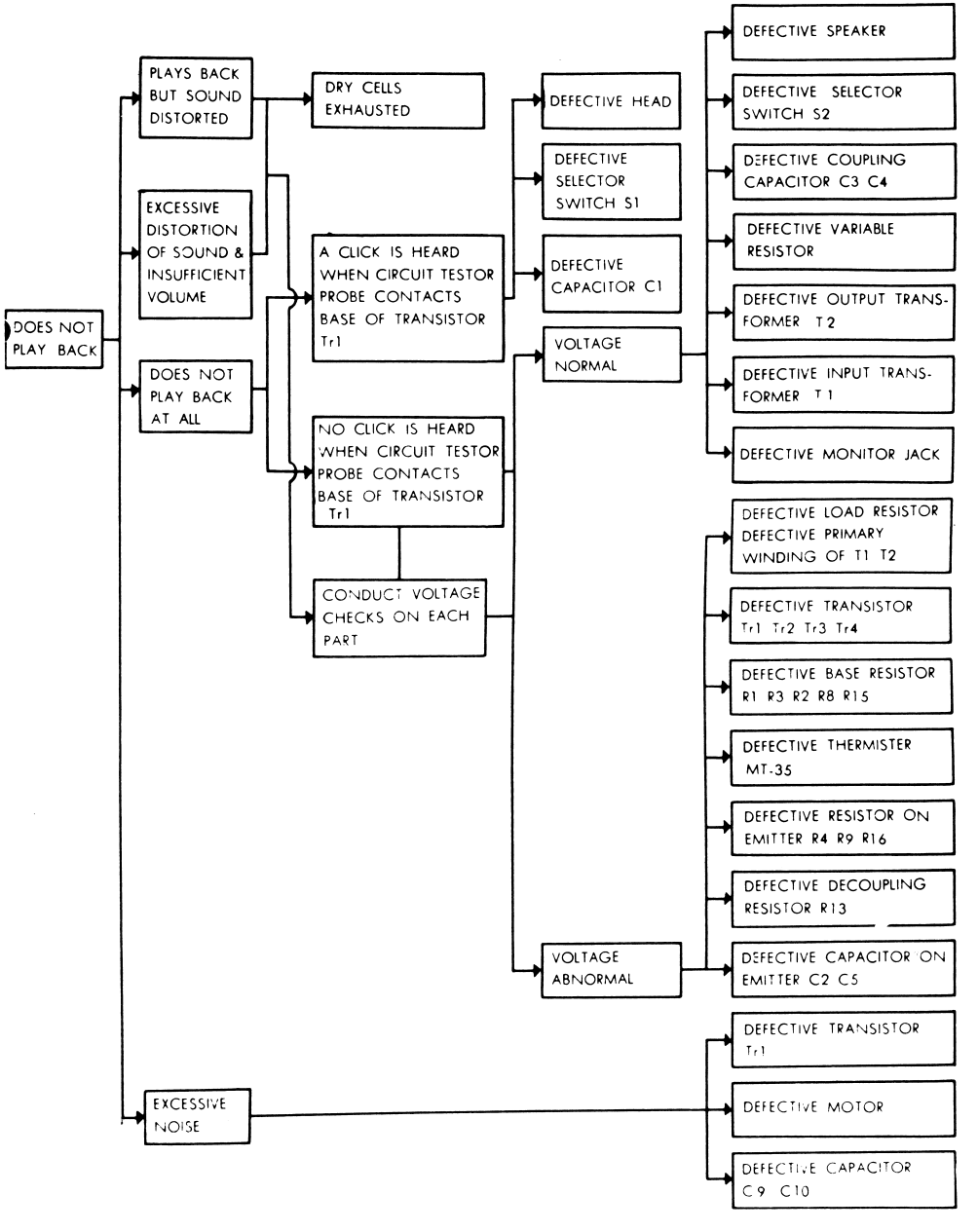
RQ-114 TROUBLE SHOOTING GUIDE 3

MALFUNCTIONS IN FAST FORWARD MOTION



RQ-114 TROUBLE SHOOTING GUIDE 4

NO PLAYBACK



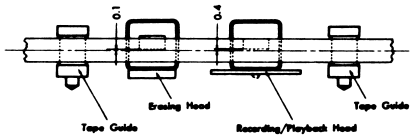
CONDITIONING AND MAINTENANCE

Record and play-back circuit system are as shown by block-diagrams, and single amplifier serves for the both systems by switching.

When functional parts are changed, the performances of tape-recorder are liable to go wrong. Recondition troubles as described below:

a. Positions of Heads:

Record/play-back head and erase head function as a set. When the relative positioning of these two are not true, such troubles as imperfect erasure or cross-talk occur. Recondition as shown below:

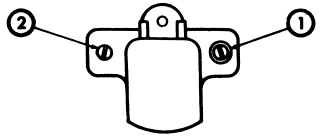


b. Angle of Heads:

If the gap line in brushing surface of record head does not keep true vertical to tape, frequency response may deteriorate in high-tone range. To correct this, head shall be re-positioned in the following manner:

Obtain a standard recorded tape for testing angle (3,000 c/s signal is recorded in accurate angle). Play-back this tape and find out the angle, by turning screw 2, at which the maximum output is obtained.

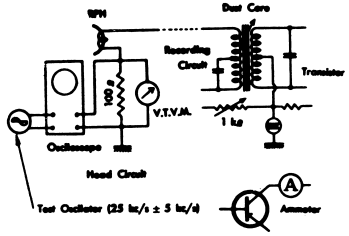
After conditioning, the screw shall best be paint-locked to prevent accidental divergency.



c. Record Bias:

A.C. bias system is employed for this tape-recorder, so that when replacing heads, oscillation transformer (T_3) transistors on oscillation circuit (2SB-172), etc., readjustment of bias is necessitated. Adjust it according to the illustration below:

Bias Current	*0.7 mA*
Bias Frequency	*20~30 kc/s (25 kc/s desirable)*



(1) First adjust frequency. Measure this way, put to oscilloscope the voltage at the both ends of resistor of 100Ω connected in series to head.

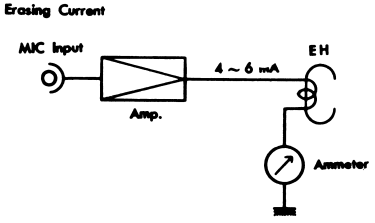
(2) Then check current. Connect V.T.V.M. to the both ends of resistor of 100Ω as shown, and adjust variable resistor of 1 kΩ. Current shall be maintained within the range of 0.4~0.7 mA. Volt-meter should then normally show 40~70 mV.

(3) Next ascertain that collector loss of transistor on oscillation circuit does not exceed normal rating. Connect Ammeter in series to collector as shown, and check if it does not exceed 9 mA, adjusting variable resistor of 1 kΩ.

It is designed that when bias current is 0.7 mA, collector current shall be about 9 mA.

d. Erase Current:

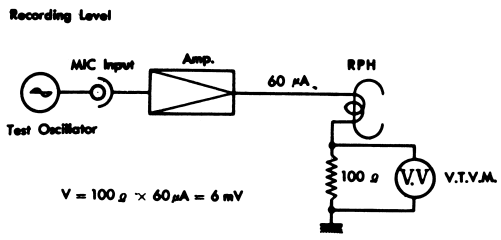
In erasure, the same applies. Poles shall not be changed to maintain perfect relation with record-head. 4~6 mA of current shall flow to erase-head in normal condition with can be found out by tester.



e. Recording Level:

Recording level is indicated by level-meter. If level-meter fails to indicate actual current to head correctly, it will cause distortion by over-recording or poor S/N ratio by under-recording. The meter has to be kept in good working order.

For testing level-meter, vacuum tube volt-meter and oscillator are used. Test with these instruments as follows: Introduce 1,000 c/s signal from Mic. Connect resistor, 100Ω in series to record-head, and let VU meter indicates 0 when current is 60 μA. If no testers are available, play-back tape recorded at the position of OVU and ludge by hearing.



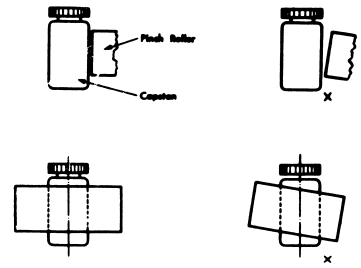
f. Conditioning of Functional Parts:

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

g. Balance of Capstan:

When balance is lost, it will result in irregular travelling 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.



h. Lubrication:

This taps-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*	*Small drops from needle point*
Pinch-roller bearing	*1~2 drops*	
Rewind-pulley bearing	*1~2 drops*	
Motor bearing	*1 drop*	
Reel spindles	*1~2 drops*	

Use fine spindle oil, but do not over-lubricate or soil other parts with oil, as such will have adverse effects.

SPECIFICATIONS

Power source	Dry cells: UM#3 6 for amplifier (9V)
	Dry cells: UM#3 6 for motor (9V)
Rated output	100 mW
Transistors	2SB 171 2 and 2SB 172 3
Recording system	A.C. bias
Erasing system	D.C. erasure
Tape speed	3¾" (9.5 cm) per sec. and 1⅞" (4.75 cm) per sec.
Recording (play-back) time	30 min. (double track) at 3¾" per sec.
	60 min. (double track) at 1⅞" per sec.
Frequency response	200~5,000 c/s at 3¾" per sec.
	200~3,000 c/s at 1⅞" per sec.
Recording level indicator	Level-meter
Input impedance	20 KΩ, unbalanced
Output impedance	10 Ω, unbalanced
Rewinding time	within 2 min. 30 sec.
Fast-forward time	within 5 min.
Life of dry cells	20 hours for amplifier
	5 hours for motor
Speaker	Permanent dynamic, 2½" (65 mm)
Measurement	7¾" (187 mm) × 2⅛" (53 mm) × 7¼" (182 mm)
Weight (not including dry cells)	3 lbs. 5 oz. (1.5 kgs.)