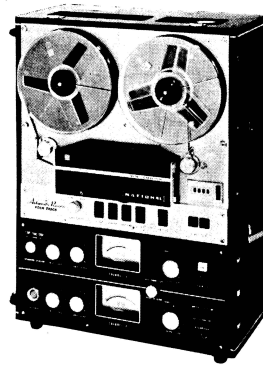


NATIONAL MODEL RS-1000S N33.

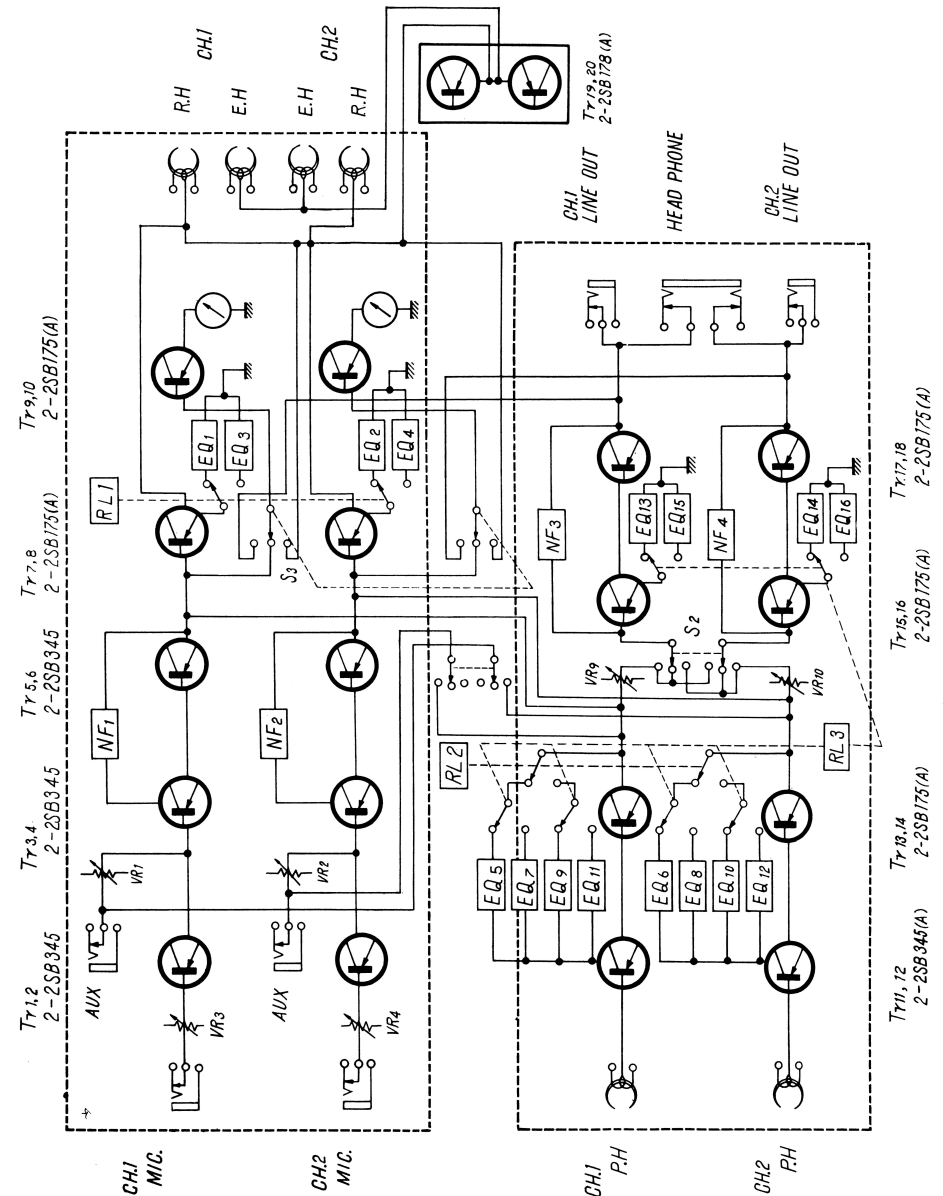
BLOCK DIAGRAM OF ELECTRICAL CIRCUITS



MODEL RS-1000S
4-TRACK STEREO TAPE RECORDER

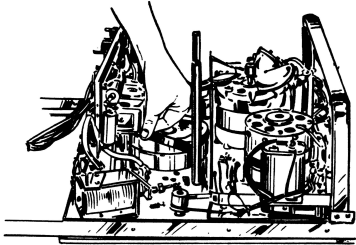
SPECIFICATIONS

Power Source:	AC 100, 117 volts 50, 60 cycles
Power Consumption:	130 Watts (approx)
Output Level:	0 db (1 V)
Transistors:	2SB-345 (8) 2SB-175 (10) 2SB-178 (2)
Diodes:	OA-70 (2) MB-01 (1)
Thermistor:	QVM-251A (1)
Recording System:	AC Bias 80 K cycles
Erase System:	AC Erase 80 K cycles
Monitor System:	TAPE/SOURCE Monitor
Tape Speeds:	HIGH (7-1/2 ips.) LOW (3-3/4 ips.)
Frequency Response:	25-20,000 c/s at HIGH tape speed 25-12,000 c/s at LOW tape speed Below 0.15 % at HIGH tape speed Below 0.25 % at LOW tape speed
Wow and Flutter:	Better than 50 db
Signal to Noise Ratio:	MIC. 60 db AUX. 20 db
Input Gain:	MIC. 20 K Ω AUX. 80 K Ω
Input Impedance:	2.5 K Ω
Output Impedance:	16" x 21" x 9"
Dimensions:	55-1/2 lbs.
Weight:	

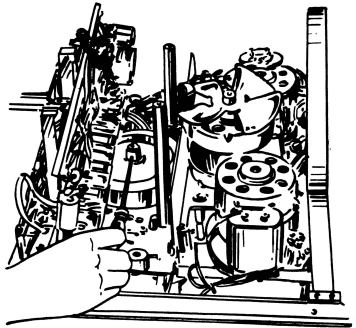


Flywheel

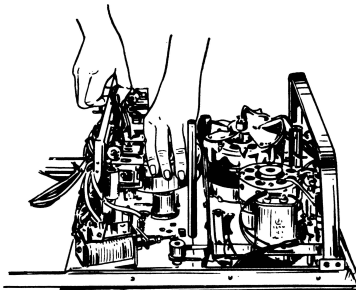
1. Remove Drive Belt.



2. Loosen two Screws which hold Flywheel.

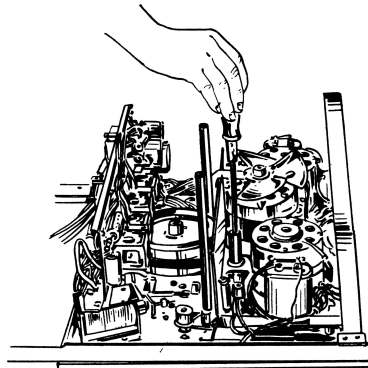


3. Lift Control Circuit Board slightly and gently. Lift out the Flywheel straight upward.

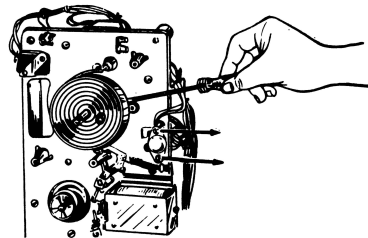


Lower Baseplate and Motor

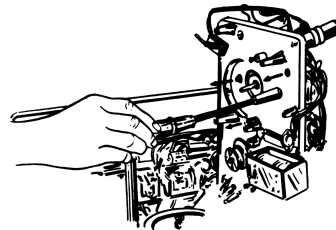
1. Remove 8 Screws and Nuts which hold Main Baseplate.



2. When you lift it, it can be separated from Main Baseplate. However it can not be completely disconnected, as there are Lead Lines and other wirings, which tie them together.
3. Place Lower Baseplate horizontally and loosen two Screws which fix Reel Table and Motor Shaft, and draw out Reel Table.
4. Remove 2 Screws which fix oil-cup.



5. Remove 4 Nuts which fix Motor on Lower Baseplate, then you can take out the Motor.



MECHANICAL OPERATING CONTROLS

1. Push AC Power ON/OFF Switch, then Pilot Lamp illuminates VU Meter. Then push down the right and left Tape Tension Arms toward outside. (Or set Tape on the tape recorder. It gives the same effect). Then Capstan Motor starts and it rotates Capstan.
2. As soon as Play Button is pushed, Pressure Roller is pressed against Revolving Capstan and Tape starts to run. Brakes on both reel tables are disengaged and both reel tables start to rotate and they wind up Tape which is supplied from Capstan.
3. In Normal Forward of Tape, it can perform either recording or play, but Reverse Forward performs only Playback Even when it is running to reverse run for Play by Sensing Tape or Manual Button.
4. Set Tape on the tape recorder and put both Tension Arms in motion, then Lamp of Manual Button illuminates the arrow mark which indicates normal direction.

When Play Button is pushed at this moment, the tape runs towards the direction of arrow mark. When you desire to start Tape to the reverse direction from the beginning, push Manual Button to the reverse direction and when the arrow mark indicating reverse direction is lighted up, push Play Button. One of the means to change the direction of Tape is to push Manual Button and select the tape direction as you wish or the other method is to short circuit Sensing Tape Pole.

When Sensing Tape is attached on Tape, every time when Sensing Tape touches Sensing Pole, it changes the direction of tape, just as when Manual Button was pushed.

When Sensing Tape is attached at the initial part and the end part of Tape which is wound on Reel, you can continuously forward Tape to and for automatically without pushing Manual Button.

The required length of Sensing Tape is about $18/20'' \sim 1-4/32''$.

5. There are 5 Tape Guides at the head part. These Guides are to hold the height of running tape stable as against the 4 Heads. The height of Tape is determined by Tape Guides at the right and left ends. The height of 3 Tape Guides which are positioned in between can be adjusted by Screw.
6. When Tape is mounted on the tape recorder and both Tension Arms are put into function and play button is pushed, it starts playback. When Pause Button is pushed while Tape is running, Pressure Roller detaches from capstan as long as Pause Button is pressed and Tape stops. When Pause Button is released, Tape again starts to run. If Recording Button is pressed during playback or when Recording Button is pressed at the same time as Play Button is pressed, it starts recording.

When Fast Forward Button is pressed while the set is in Recording, Playback, Rewind or Stop mode, the tape is wound by Take-up Reel in the normal direction. When Rewind Button is pressed when the set is in Recording, Playback, Fast Forward or Stop mode, Tape is wound by Reel to the reverse direction. When Stop Button is pressed in any mode, Tape stops.

When "Cue" Button is pressed during Fast Forward or Rewind, the running Tape hit Head and it regenerates the signals which are recorded on Tape. It is convenient for editing the Tape, etc.

When Speed Selector Knob is set to "High," Tape runs at $7-1/2''/s$, and when it is set to "Low", the speed becomes $3-3/4''/s$.

Play is not obtainable in Fast Forward or Rewind position.

7. Both tension arms are correlated to Safety Switch and they switch on or off the power to Mechanism Part. By mounting Tape, Motor starts, and when Tape comes to the end in Play, Fast Forward or Rewind, Safety Switch is cut off and the power source is disconnected and all Rotary Parts will stop and thus Reel comes to a standstill.

TAPE TRANSPORT OPERATION

1. TAPE SPEED SELECTION

Switching of tape speed can be done not only when the set is stopped but also when the set is in Record, Playback, Fast Forward or Rewind mode (However it is preferable that such speed change is done when the set is stopped.)

When Speed Selector Knob is switched, it switches Rotary Switch, which in turn changes the rotation of Capstan Motor. When it is high, Capstan Motor revolves at 1,800 rpm.

When it is low, it rotates at 900 rpm. (In case of 50 cycle, it is 1,500 and 750 rpm. respectively.)

2. RECORDING PLAYBACK AND REVERSING

When Tension Arms on the left and right are set into ON by Power "ON", RL-14, RL-16 and RL-17 become also "ON" and the lamp indicates the normal direction of Tape.

When Play Button is pressed, the Micro-Switch underneath Button will function and RL-13 becomes "ON" and Solenoid for Pressure Roller (E-61) becomes "ON" and the Pressure Roller is pressed against Capstan. Solenoid for Brake (E-62) also becomes "ON" and it disengages Brake on Reel Table, and both Torque Motors will start.

If Recording Button S-5 is pressed when the set is in play mode or when it is pushed while Play Button is being pressed, the set will be put in recording mode.

On the contrary, if it is too weak, the coil becomes loose, and at the same time Tension Arm on Takeup Reel will function to cut off Power Source and tape stops running.

If the back tension is too strong, the tape speed becomes slower, while, if it is too weak, the contact of Tape to Head becomes improper and Tension Arm is disconnected and Tape stops running.

a) Proper Value of Takeup Tension:

Takeup Tension in Normal
Forward run and Reverse Forward run 1.4~1.8 ozs.
(40~50 g)

Back tension in Normal

Forward run and Reverse Forward run 0.82~1.1ozs.
(23~32 g)

b) Method of measurement:

To measure Takeup Tension in Normal Forward run in Play mode, wind Rope at the point 3-2/16" (radius) from the center of Reel. When the direction of rotation of Reel Table is to the arrow mark A, shift Spring Scale to arrow B direction at the speed of about 3-3/4 ips. and the value obtained at the time when it becomes about 12" from the center of Reel Table is taken as Takeup Tension of Reel. Measure Takeup Tension and Back Tension of both Reel.

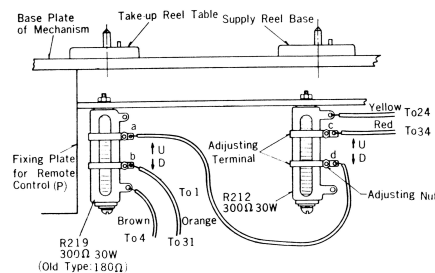
c) Method of Adjusting:

If the measured value is larger or smaller than the optimum value, then loosen Adjusting Nut of Resistors R212 and R219 which are attached to the rear side of mechanism main body and slide Adjusting Terminals a, b, c, d to the ↑ U and ↓ D direction, to change the resistance and consequently to change voltage loaded on the motor. Thus you can change the strength of Takeup Tension and Back tension.

- 1) To strengthen Takeup Tension Takeup Reel Table in Normal Forward run, slide Adjusting Terminal C to the direction of ↑ U.
- 2) To weaken the Takeup Tension, Takeup Reel Table in Normal Forward run, slide Adjusting Terminal C to the direction of ↓ D.

- 3) To strengthen Takeup Tension (Supply Reel) in Reverse Forward run, slide Adjusting Terminal B to the direction of ↓ D.
- 4) To weaken the Takeup Tension (Supply Reel) in Reverse Forward run, slide Adjusting Terminal B to the direction of ↑ U.
- 5) To strengthen Back tension in either Normal or Reverse Forward run, slide Adjusting Terminal A to the ↓ D direction and slide Adjusting Terminal D to ↑ U direction.
- 6) To weaken Back tension in Normal or Reverse Forward run, slide Adjusting Terminal A to ↑ U direction and Terminal ↓ D to ↑ U direction. After the adjustment is over, fix each Adjusting Nut tightly.

DIAGRAM OF RESISTORS (REAR SIDE)



5. FAST FORWARD, REWIND

Takeup Torque Motor is loaded with full input voltage, without decreasing it by Resistor.

Therefore it winds up Tape at a high speed.

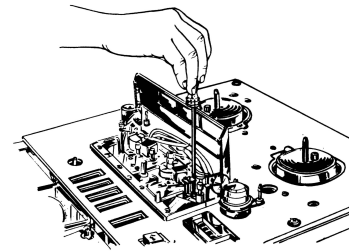
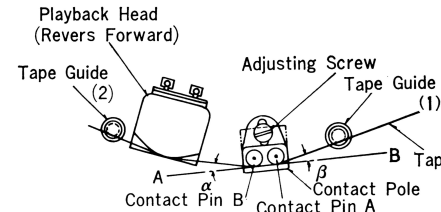
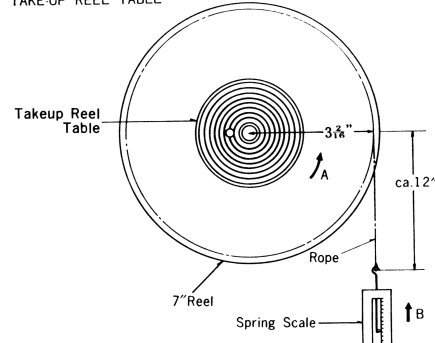
In this case supply (left side) Torque Motor is cut off the Power Source and there is Little Back tension. The above applies to Rewind. The method of measuring of Takeup Tension is same as the one for Reel Table Takeup Tension. The optimum rotation power of both reels in Fast Forward and Rewind is 1,050~1,350 g/cm

6. CONTACT OF CONTACT POLE AND TAPE

The following figure shows the status of contact of the right side Contact Pole with the Tape.

When the contacting condition of Contact Pins A and B and Tape is inferior, Pin can not detect Sensing Tape is inferior. Pin can not detect Sensing Tape even when it passes, and automatic reversing is not obtainable. Contact Pole can be freely shifted, when Adjusting Screw is loosened. So adjust it in such way that which is the angle of the common tangent of Contact Pins A and B, which is marked A-B against Tape is equal to. In this case, if Contact Pin is projecting too much forward, Tape Contact of Reverse Playback Head in Playback Head in Play mode becomes inferior, while if the Contact Pin is located too much backward, Tape contacts the front of Reverse Play Head at the time of Fast Forward and Rewind and it causes wearing. So pay careful attention to the above. You can adjust the left side Contact Pole in the same way as above.

TAKE-UP REEL TABLE



7. ADJUSTMENT OF HEAD AND TAPE GUIDE

Adjustment of Head and Tape Guide is done upon necessity while forwarding the tape in normal or reverse direction.

a) Contact of Head and Tape

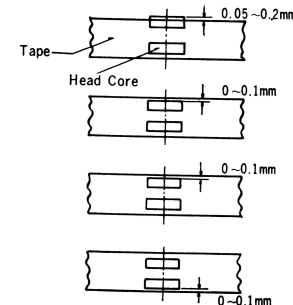
While Tape is running for Play, it should evenly contact the gap of each Head, and the front surface of Head should be in parallel with Tape Guide and Capstan.

b) Twisting of Tape

If Tape is twisted during Normal or Reverse Forward run, turn Tape Guide (a) (b) in case of Normal Forward run, to adjust the height. (Twisting of Tape occurs also when Capstan and Pressure Roller are not in parallel.)

c) Height of Tape

When it is confirmed that Tape is running stable in Normal or Reverse Forward run, turn Adjusting Screw of each head once or twice to Adjust the height of Head against Tape as shown below. Such adjustment is made while the head for normal Forward run is running to normal direction and that for reverse Forward is running to reverse direction.



8. ADJUSTMENT OF ANGLE

Playback Head is adjusted while playing the standard Tape for angle correction (7-1/2 ips. 15 kc/s Recorded Tape).

It is adjusted in such way that in case of Normal Forward run, Adjusting Screws 8 and 9 are turned, and in Reverse Forward run the screws 11 and 12 are turned, so that the Playback output becomes maximum.

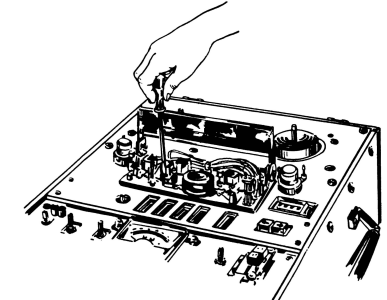
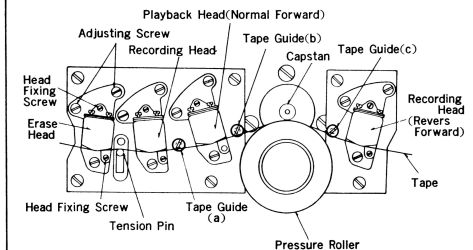
In this case when the angle at which the maximum output is produced is different between CH-1 and CH-2 of the same Head, it must be adjusted so that the two gives same output at a given angle.

When adjustment is finished, confirm if the height of Tape agrees with the descriptions given in section (c) above.

- As for Recording Head, let it record the signal of 10 kc at 7-1/2 ips. and simultaneously playback regenerate the recording and do adjustment, by turning Adjusting Screws 5 and 6, so that the maximum playback regeneration output is obtained. (In this case, the angle of Playback Head should be in right angle.)

When there is difference in the maximum output of CH-1 and CH-2, adjust the angle of Recording Head, so that they become equal. Confirm if Tape height is, as described in (c) above.

- When the height of Erasing Head is rightly adjusted, adjust its uprightness by eye observation. If it is slanted right or left, adjust it by Screws 2 and 3.
- To replace Head due to wearing etc., remove the two Set-Screws and replace Head.
- Pay attention not to damage Head Comber in case of adjustment or replacement of Head. Do not bring the Magnet near it nor use the Magnetized Driver, etc.

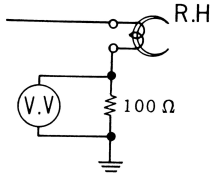


In this case, Semi-fixed Resistors VR19 and VR20 for bias level indication should be set at mediam point. The value of Bias Current should be adjusted so that the integrated Frequency Response will satisfy the following Values at each Tape Speed.

7-1/2 ips. 50~15,000 c/s ± 5 db
3-3/4 ips. 50~7,500 c/s ± 5 db

c) Adjustment of Bias Level

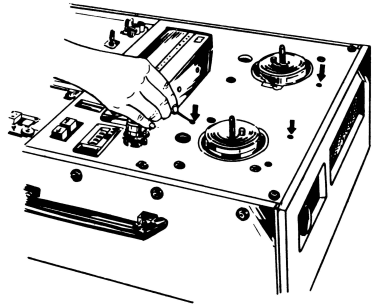
- Instruments required for Measurement: Vacuum-tube Voltmeter.
- Chart of Measurement:



- Method of Measurement: Place the knob of Meter Switch into the position of BIAS and put it in Stereo-Recording conditions. Then make adjustment by Semi-fixed Resistor VR19 and VR20, so that the VU Meter indicates 0 VU.

10. MAINTENANCE

Oil Feeding



a) Feeting of lube oil to Motor Lubricating Tank. (At 3 points as indicated on the photo) Remove Reel Table Frame, and then you can feed oil. Feed about 0.1 cc of oil through each oil feeding hole at every 300 hrs. (that is, every 100 days, if machine is used 3 hrs. every day.)

b) Pressure Roller Metal

Remove Pressure Roller Cap and feed about 0.1 cc to Pressure Roller Metal at every 300 hrs. When Feed Volume is too much, oil comes out to the outersurface of Pressure Roller and it gives rise to trouble in Tape running. So, please be careful not to feed too much oil.

c) Tension Roller Metal

Remove Cover of Tension Roller and feed about 0.1 cc of oil to Roller Metal at every 300 hrs or so.

Maintenance of Recording and Playback Head

Dusts and dirt which were brought by Tape may stick to Core Parts of Recording, Playback or Erasing, and they may deteriorate performance of Recording or Playback Head. So wipe off the surface of Head which contacts Tape, with a clean cloth soaked in carbon tetrachloride or benzene.

At the same time time clean Pressure Roller Capstan, Tape Guide and Tension Roller. Do not bring Magnet close to Head.

If you do so, Head will be magnetized.

Therefore, absolutely avoid to bring magnet or the like to Head.

Method of Repairing of Motor

If oiling does not eliminate vibration or other abnormalities of Motor, you have to replace Motor for a new one.

Method of Maintenance of Capstan

Magnet power of Tape or dirt tend to stick to the surface of Capstan where Tape contacts, and such dirts may stain the new Tape or cause slippage of Tape between Pressure Roller.

So clean up those dirt by a cloth soaked in carbon tetrachloride or benzene.

REPLACEMENT PARTS LIST

MECHANICAL PARTS

Ref. No.	Description	Part No.
M 1	Manual Button Assembly	QXB-0039
M 2	Push Button	QGO-4013
M 3	CUE Button	QGT-2009A
M 4	Pressure Roller	QDP-1107
M 5	Head Cover Plate	QGK-3002
M 6	Capstan Assembly	QYQ-0040
M 7	Tape Tension Assembly	QYQ-0035
M 8	Tape Counter	QDC-0013
M 9-1	Reel Table Left	QXP-0129
M 9-2	Reel Table Right	QXP-0130

Ref. No.	Description	Part No.
M 10	Reel Table Frame Assembly	QGK-1097
M 11	Flywheel	QDW-1013
M 12	Spring Roller	QXP-0115
M 13	Drive Belt	QDB-0045-1
M 14	Counter Belt	QDB-0044
M 15	Remote Control Holding Plate	QTT-1203
M 16	Circuit Board Holding Plate-C	QTT-1201
M 17	Fiber Plate	QBK-1040
M 18	Mechanism Holding Frame	QYQ-0034
M 19	Pole	QMP-1076

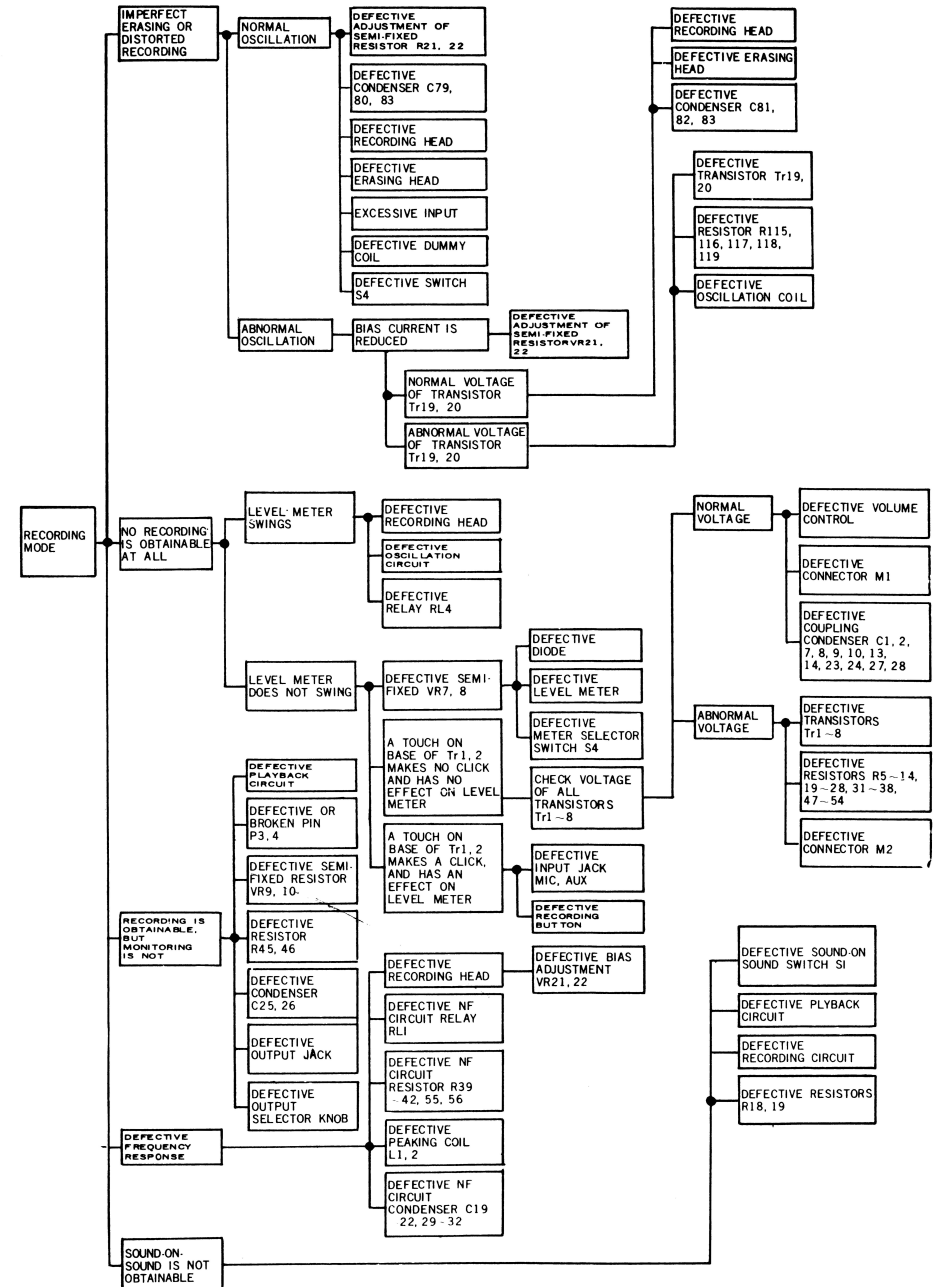
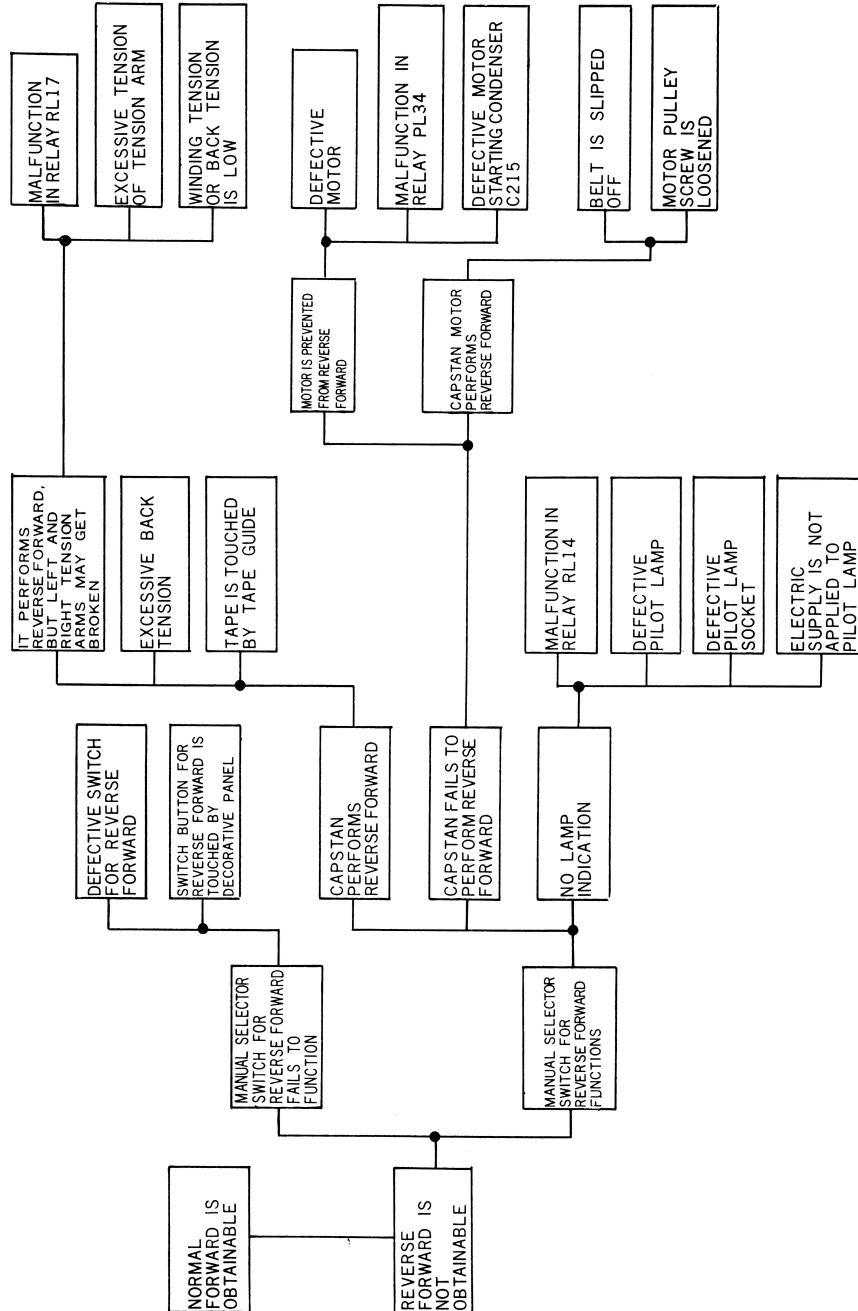
Ref. No.	Description	Part No.
M 20	Main Base Plate	QMK-1060
M 21	Top Panel	QGP-1040
M 22	Tape Shifter Pin-A	QAS-1020
M 23	Tape Shifter Pin-B	QAS-1021
M 24	Mount Washer	QWQ-1010-1
M 25	Counter Cover	QGK-1117
M 26	Pressure Roller Shaft	QMS-1202
M 27	Pressure Roller Cap	QBG-1092
M 28	Tape Tension Roller Bearing	QHM-1090
M 29	Tape Tension Roller Shaft	QMS-1201
M 30	Tape Tension Roller	QDP-1105
M 31	Tape Tension Roller Cap	QDP-1109
M 32	Tape Tension Pin	QMN-1107
M 33	Tape Tension Arm	QML-1251
M 34	Tape Guide-A	QAG-1079
M 35	Sensing Contact Pole	QMP-1045
M 36	Sensing Contact Plate	QJT-2006
M 37	Sub PLAY Switch Holding Plate	QMA-1103
M 39	MICRO-switch Holding Plate-B	QMF-1127
M 40	MANUAL-switch Holding Plate	QMF-1128
M 42	Tape Speed Selector Switch	Holding Plate QMF-1126
M 43	Tape Speed Selector Switch	ESR-C142L20A
M 44	Solenoid Holding Plate	QMF-1125
M 45	3-P Lug Board	QJT-3007
M 46	3-P Lug Board Holding Plate	QMA-1106
M 47	Pressure Roller Arm Shaft	QMS-1203
M 48	Circuit Board Holding Plate-D	QTT-1202
M 49	Tape Counter Holding Plate	QMA-1104
M 51	Shifter Shaft-B	QAS-1023
M 52	Shifter Shaft-A	QAS-1022
M 53	Shifter	QAS-1019
M 54	CUE Lever	QML-1226
M 56	Stop Switch Holding Plate	QMA-1105
M 57	Spring Hook	QMF-1129
M 58	Solenoid Lad	QMR-1052
M 59	Pressure Roller Arm	QML-1252
M 60	Spring Roller	QDP-1106
M 61	Safety Pin	QMN-1108
M 62	Tension Spring	QBT-1161
M 63	Pressure Roller Spring-A	QBC-1047
M 64	Pressure Roller Spring-B	QBT-1162
M 65	Lower Baseplate	QMK-1063
M 66	Counter Idler Pulley	QDP-1108
M 69	Brake Arm-A	QML-1249
M 70	Brake Arm-B	QML-1250
M 71	Brake Arm Pin	QMN-1112
M 72	Brake Band	QMQ-1051
M 73	Brake Felt	QBF-1086
M 74	Solenoid Tip	QMA-1108
M 75	Brake Spring	QBT-1160
M 76	Motor Shielding Plate-A	QTS-1061
M 77	Motor Shielding Plate-B	QTS-1062
M 78	Counter Belt Retainer	QMQ-1049
M 79	Motor Pulley	QDP-1103
M 80	6-P Lug Board	QJT-6002
M 81	Push Button Cushion	QBG-1093
M 82	Head Base Plate-A	QMK-1061
M 83	Head Base Plate-B	QMK-1062
M 84	Head Mounting Plate-B	QMF-1120
M 85	Record Head Mounting Plate	QMF-1121

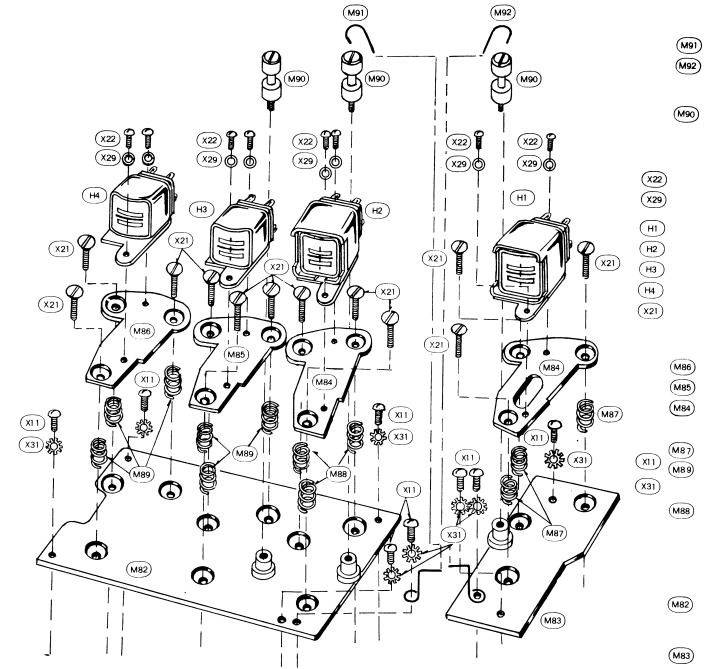
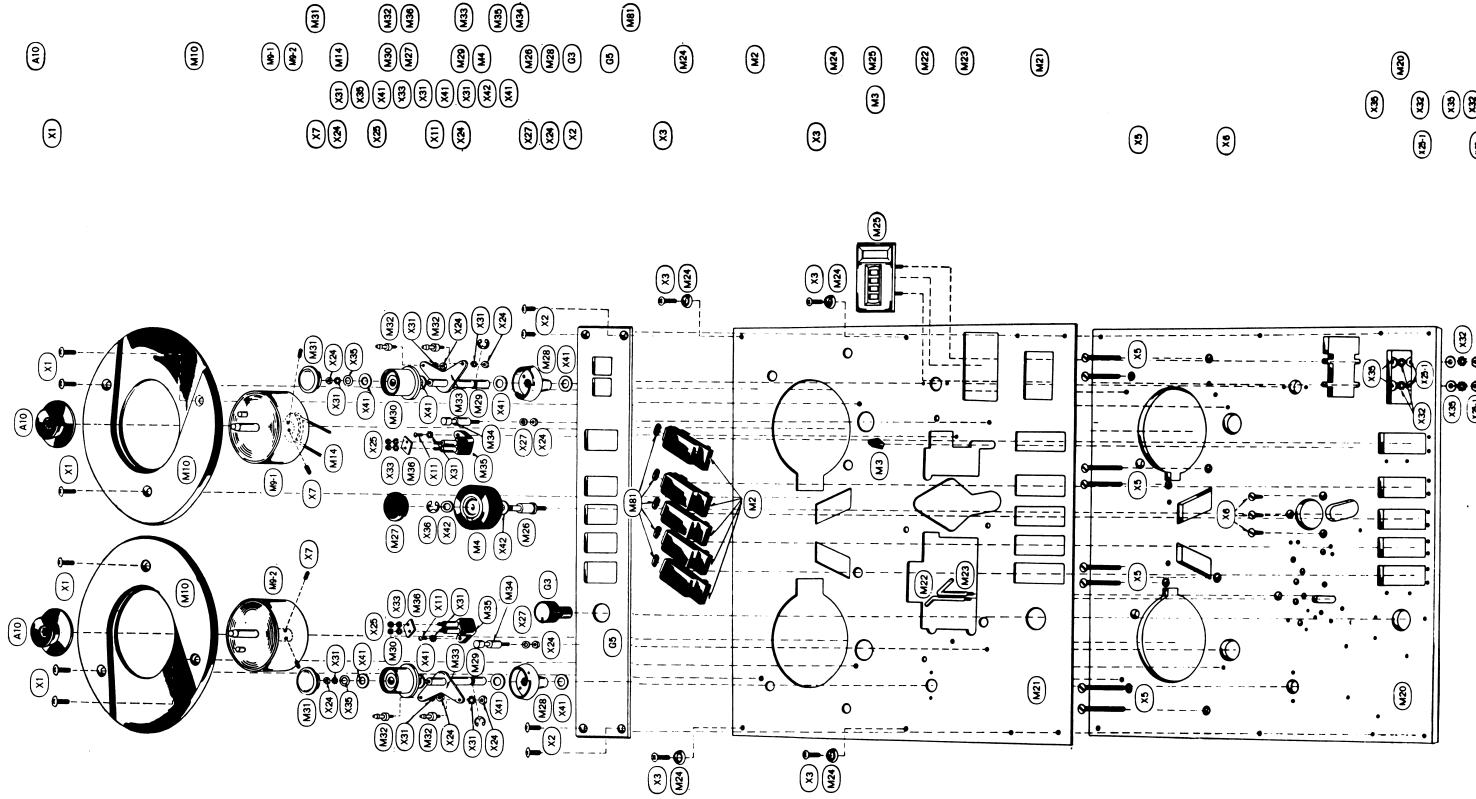
Ref. No.	Description	Part No.
M 86	Erase Head Mounting Plate	QMF-1122
M 87	Reverse Playback Head Spring	QBC-1048
M 88	Head Spring	QBC-1002
M 89	Head Adjustment Spring	QBC-1052
M 90	Tape Guide-B	QAG-1080
M 91	Tape Retainer-B	QMQ-1048
M 92	Tape Retainer-A	QMQ-1047
M 93	Head Cover Base	QGH-1031
M 94	Head Cover Side Plate, Right	QGH-1034
M 95	Head Cover Side Plate, Left	QGH-1035
M 96	Head Cover Only	QGH-1032
M 97	Head Cover Lid	QGH-1033
M 98	Head Cover Shaft	QMS-1204
M 99	Steel Ball 3/16"	QDK-1004
M100	Head Cover Spring	QBC-1049
M103	Dummy Plug	QEE-1050
X 1	Screw, Round Head 4 $\phi \times 10$	QHT-240 $\times 10$ CL1
X 2	Screw, Round Head PH4 $\phi \times 8$	QHN-240 $\times 8$ C1
X 3	Screw, Round Head MS4 $\phi \times 16$	QHY-240 $\times 16$ CL1
X 4	Screw, Round Head PH4 $\phi \times 6$	QHN-140 $\times 6$ U3
X 5	Screw, Round Head S4 $\phi \times 45$	QHS-140 $\times 45$ U3
X 6	Screw, Round Head S4 $\phi \times 12$	QHS-140 $\times 12$ U3
X 7	Small Screw, 4 $\phi \times 6$	QHP-840 $\times 6$ U3
X 7-1	Screw, Round Head PH4 $\phi \times 10$	QHN-140 $\times 10$ U3
X 8	Screw, Round Head MS3 $\phi \times 8$	QHY-230 $\times 8$ C1
X 9	Screw, Round Head 3 $\phi \times 8$	QHT-230 $\times 8$ C1
X 10	Screw, Round Head PH3 $\phi \times 10$	QHN-130 $\times 10$ U3
X 11	Screw, Round Head PH3 $\phi \times 8$	QHN-130 $\times 8$ U3
X 12	Screw, Round Head PH3 $\phi \times 6$	QHN-130 $\times 6$ U3
X 13	Screw, Round Head PH3 $\phi \times 5$	QHN-130 $\times 5$ U3
X 14	Screw, Round Head S3 $\phi \times 8$	QHS-130 $\times 8$ U3
X 15	Screw, Round Head S3 $\phi \times 6$	QHS-130 $\times 6$ U3
X 16	Screw, Round Head 2.6 $\phi \times 5$	QHT-226 $\times 5$ C1
X 17	Screw, Round Head S2.6 $\phi \times 5$	QHS-226 $\times 5$ C1
X 18	Screw, Round Head PH2.6 $\phi \times 15$	QHN-126 $\times 15$ U3
X 19	Screw, Round Head PH2.6 $\phi \times 10$	QHN-126 $\times 10$ U3
X 20	Screw, Round Head PH2.6 $\phi \times 6$	QHN-126 $\times 6$ U3
X 21	Screw, Round Head S2.6 $\phi \times 12$	QHS-126 $\times 12$ U3
X 22	Screw, Round Head M2 $\phi \times 5$	QHN-120 $\times 5$ U3
X 23	Hexagonal Nut N4 ϕ	QNN-4022U3
X 24	Hexagonal Nut N3 ϕ	QNN-3022N1
X 25	Hexagonal Nut N2 ϕ	QNN-2022N1
X 25-1	Hexagonal Nut N2.6 ϕ	QNN-2622N1
X 26	Spring Washer SW4 ϕ	QWS-402U3
X 27	Spring Washer SW3 ϕ	QWS-302U3
X 28	Spring Washer SW2.6 ϕ	QWS-262U3
X 29	Spring Washer SW2 ϕ	QWS-302U3
X 30	Lock Washer L4 ϕ	QWG-402K3
X 31	Lock Washer L3 ϕ	QWG-302K3
X 32	Lock Washer L2.6 ϕ	QWG-262K3
X 33	Lock Washer L2 ϕ	QWG-202K3
X 34	Flat Washer W4 ϕ	QWP-4011U3
X 35	Flat Washer W3 ϕ	QWP-3011N1
X 36	Stop Ring E5 ϕ	QNS-504T3
X 37	Stop Ring E4 ϕ	QNS-404T3
X 38	Stop Ring E3 ϕ	QNS-304T3
X 40	Paper Washer 5.2 $\times 10 \times 0.5$	QBK-7027
X 41	Paper Washer 6.2 $\times 8.2 \times 0.25$	QBK-7046
X 42	Paper Washer 6.2 $\times 8.2 \times 0.5$	QBK-7013
X 44	Paper Washer 4.2 $\times 9 \times 0.5$	QBK-7005
X 45	Felt Washer 4.2 $\times 10 \times 0.5$	QBJ-3023

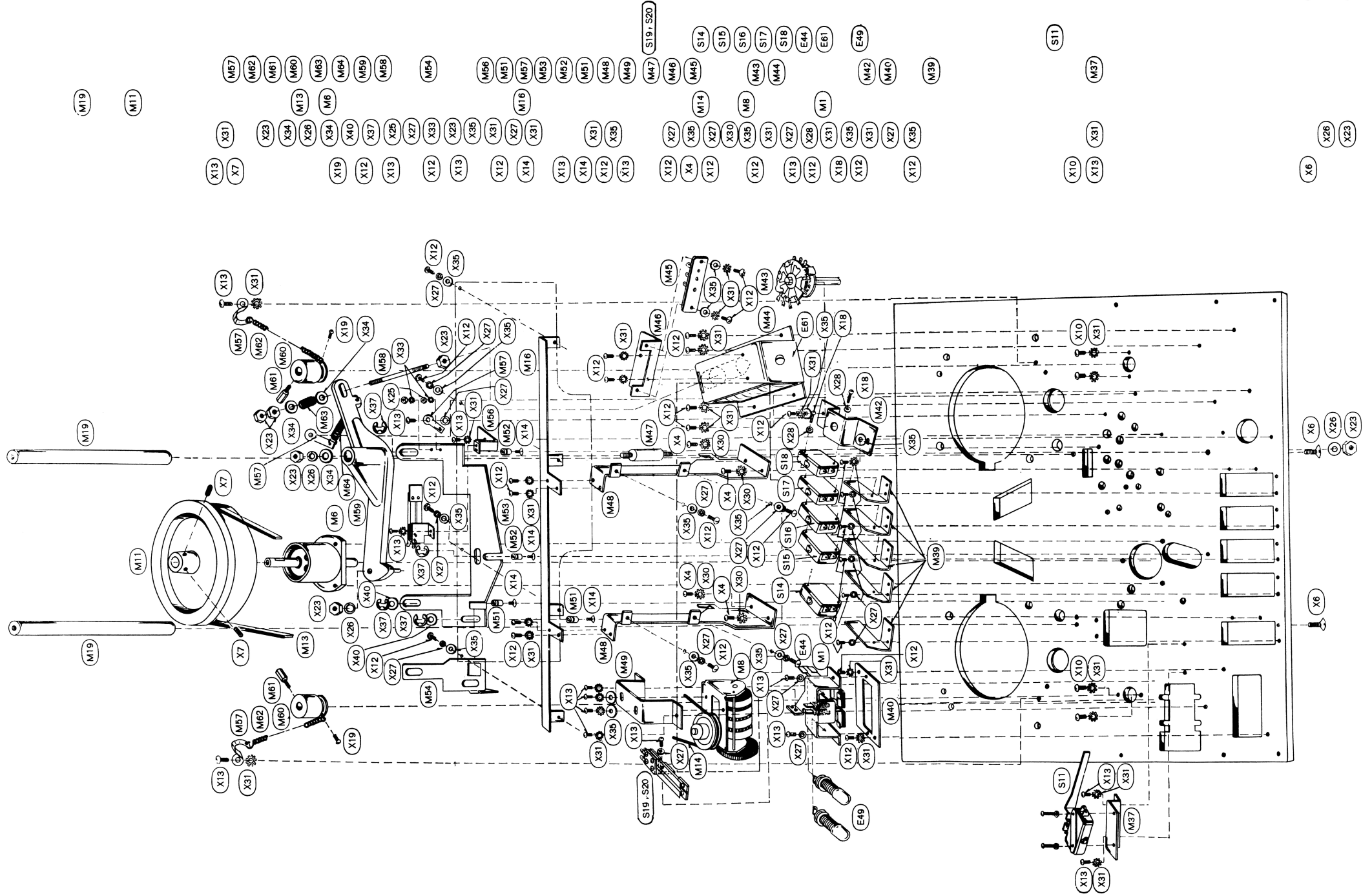
TROUBLE SHOOTING GUIDE

DEFECTIVE RECORDING CIRCUIT

MALFUNCTIONS IN RECORD/PLAYBACK MOTION 3







STANDARD VOLTAGE/CURRENT CHART

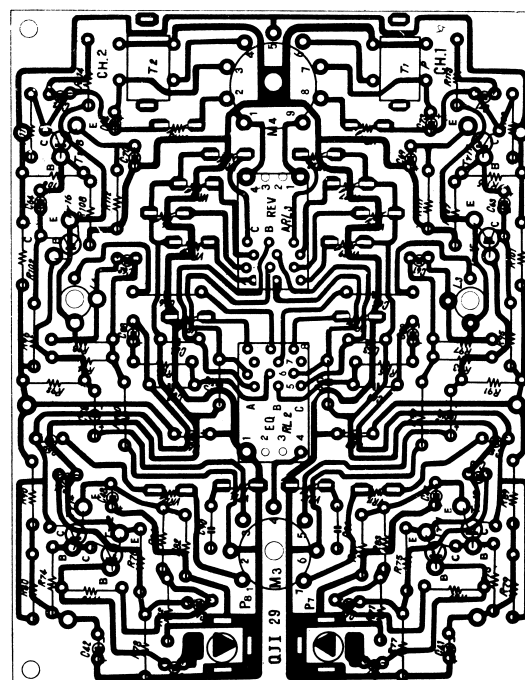
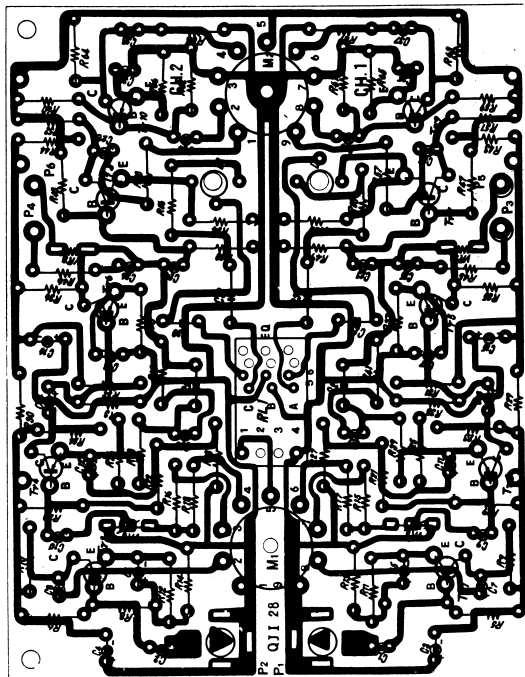
RECORDING AMPLIFIER		
Check Point	Standard Voltage	Tolerance
①	D.C. -3.5 V	±15 %
②	D.C. -6.4 V	±15 %
③	D.C. -3.3 V	±15 %
④	D.C. -9.9 V	±15 %
⑤	D.C. -2.4 V	±15 %
⑥	D.C. -5.6 V	±15 %
⑦	D.C. -2.2 V	±15 %
⑧	D.C. -2.7 V	±15 %
⑨	D.C. -6.7 V	±15 %
⑩	D.C. -2.6 V	±15 %
⑪	D.C. -12.4 V	±15 %
⑫	D.C. -2.4 V	±15 %
⑬	D.C. -8.2 V	±15 %
⑭	D.C. -2.3 V	±15 %
⑮	D.C. -16.0 V	±15 %
⑯	D.C. -2.4 V	±15 %
⑰	D.C. -8.0 V	±15 %
⑱	D.C. -2.3 V	±15 %
⑲	D.C. -3.5 V	±15 %
⑳	D.C. -6.4 V	±15 %
㉑	D.C. -3.3 V	±15 %
㉒	D.C. -9.9 V	±15 %
㉓	D.C. -2.4 V	±15 %
㉔	D.C. -5.6 V	±15 %
㉕	D.C. -2.2 V	±15 %
㉖	D.C. -2.7 V	±15 %
㉗	D.C. -6.7 V	±15 %
㉘	D.C. -2.6 V	±15 %
㉙	D.C. -12.4 V	±15 %
㉚	D.C. -2.4 V	±15 %
㉛	D.C. -8.2 V	±15 %
㉜	D.C. -2.3 V	±15 %
㉝	D.C. -16.0 V	±15 %
㉞	D.C. -2.4 V	±15 %
㉟	D.C. -8.0 V	±15 %
㊱	D.C. -2.3 V	±15 %

PLAYBACK AMPLIFIER		
Check Point	Standard Voltage	Tolerance
⑳	D.C. -2.4 V	±15 %
㉑	D.C. -3.8 V	±15 %
㉒	D.C. -2.3 V	±15 %
㉓	D.C. -9.6 V	±15 %
㉔	D.C. -6.2 V	±15 %
㉕	D.C. -3.7 V	±15 %
㉖	D.C. -1.6 V	±15 %
㉗	D.C. -3.9 V	±15 %
㉘	D.C. -1.4 V	±15 %
㉙	D.C. -11.9 V	±15 %
㉚	D.C. -13.4 V	±15 %
㉛	D.C. -7.7 V	±15 %
㉜	D.C. -1.4 V	±15 %
㉝	D.C. -16.0 V	±15 %
㉞	D.C. -2.4 V	±15 %
㉟	D.C. -3.8 V	±15 %
㊱	D.C. -2.3 V	±15 %
㊲	D.C. -9.6 V	±15 %
㊳	D.C. -6.2 V	±15 %
㊴	D.C. -3.7 V	±15 %
㊵	D.C. -1.6 V	±15 %
㊶	D.C. -3.9 V	±15 %
㊷	D.C. -1.4 V	±15 %
㊸	D.C. -11.9 V	±15 %
㊹	D.C. -13.4 V	±15 %
㊺	D.C. -7.7 V	±15 %
㊻	D.C. -1.4 V	±15 %
㊼	D.C. -16.0 V	±15 %

POWER SOURCE		
Check Point	Standard Voltage/Current	Tolerance
㊽	D.C. -17.5 V	±15 %
㊾	D.C. 80 mA	±15 %
㊿	D.C. -19.0 V	±15 %
㋀	D.C. -16.0 V	±15 %
㋁	D.C. -12.0 V	±15 %

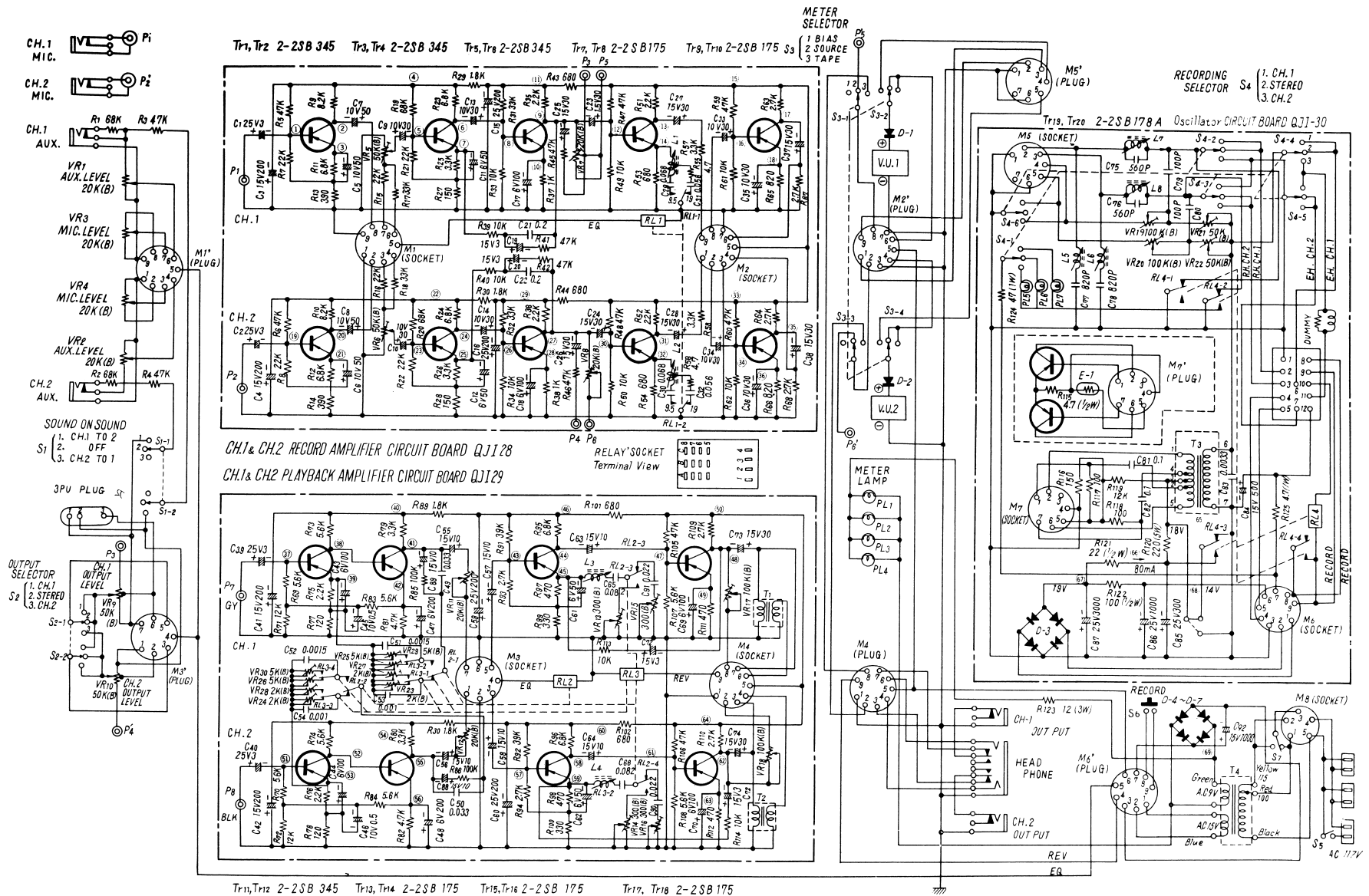
The measurements have to be done at the time of no signal operation and with VR1, 2, 3, 4, 9, 10 minimum position.
Use V.T.V.M. for voltage measurement.

VIEWED FROM THE CONDUCTOR SIDE



QJI-28

QJI-29

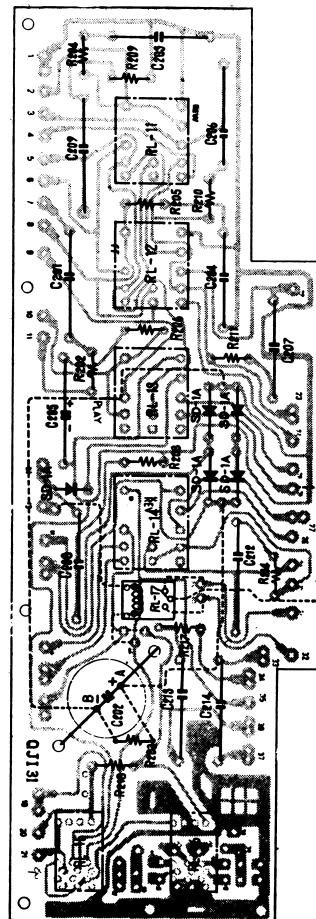
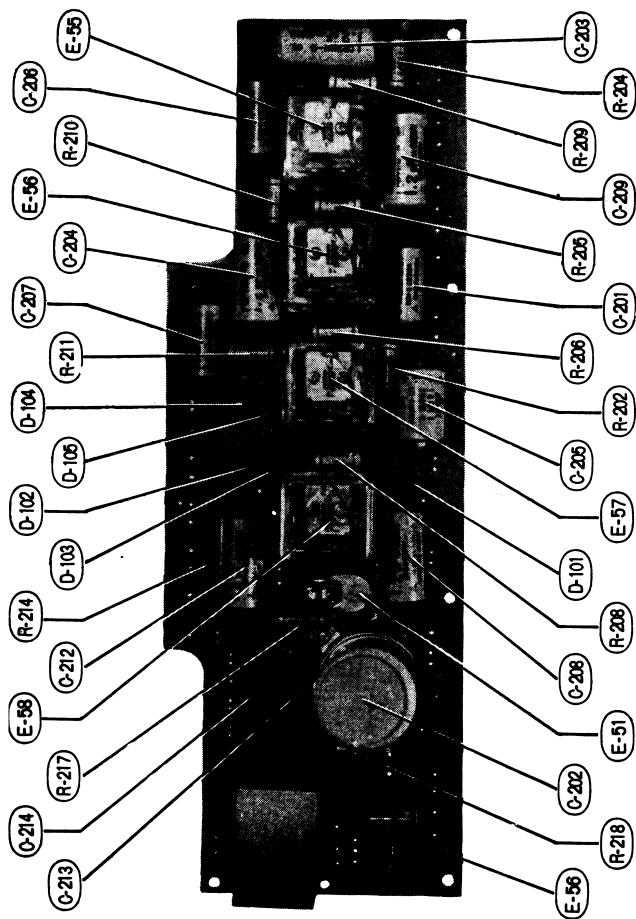


NOTE:

1. All Resistance in Ω . K=1,000 Ω . Resistor with no wattage indication is 1/4 watts.
2. All Capacitance in Micro Farads. P=Micro Micro Farads.
3. M1~M7 Socket
4. M1'~M7' Plug has same marking as corresponding socket.
5. P3~P6 Plug has same marking as corresponding socket.
6. P3'~P6' Socket
7. PL1, PL2 Equalization Circuit Selector Relay in accordance with the Tape Speed.
8. RL3 Tape Direction Selector Relay.
9. RL4 Relay for Recording.
10. S1 Slide Switch for Sound-on-Sound.
11. S2 Output Selector Switch.
12. S3 Selector Switch for V.U. Meter indication.
13. S4 Recording Selector Switch.
14. S5 A.C. Power ON/OFF Switch.
15. S6 Record Switch.
16. S7 Voltage Selector Switch.

N33-17.

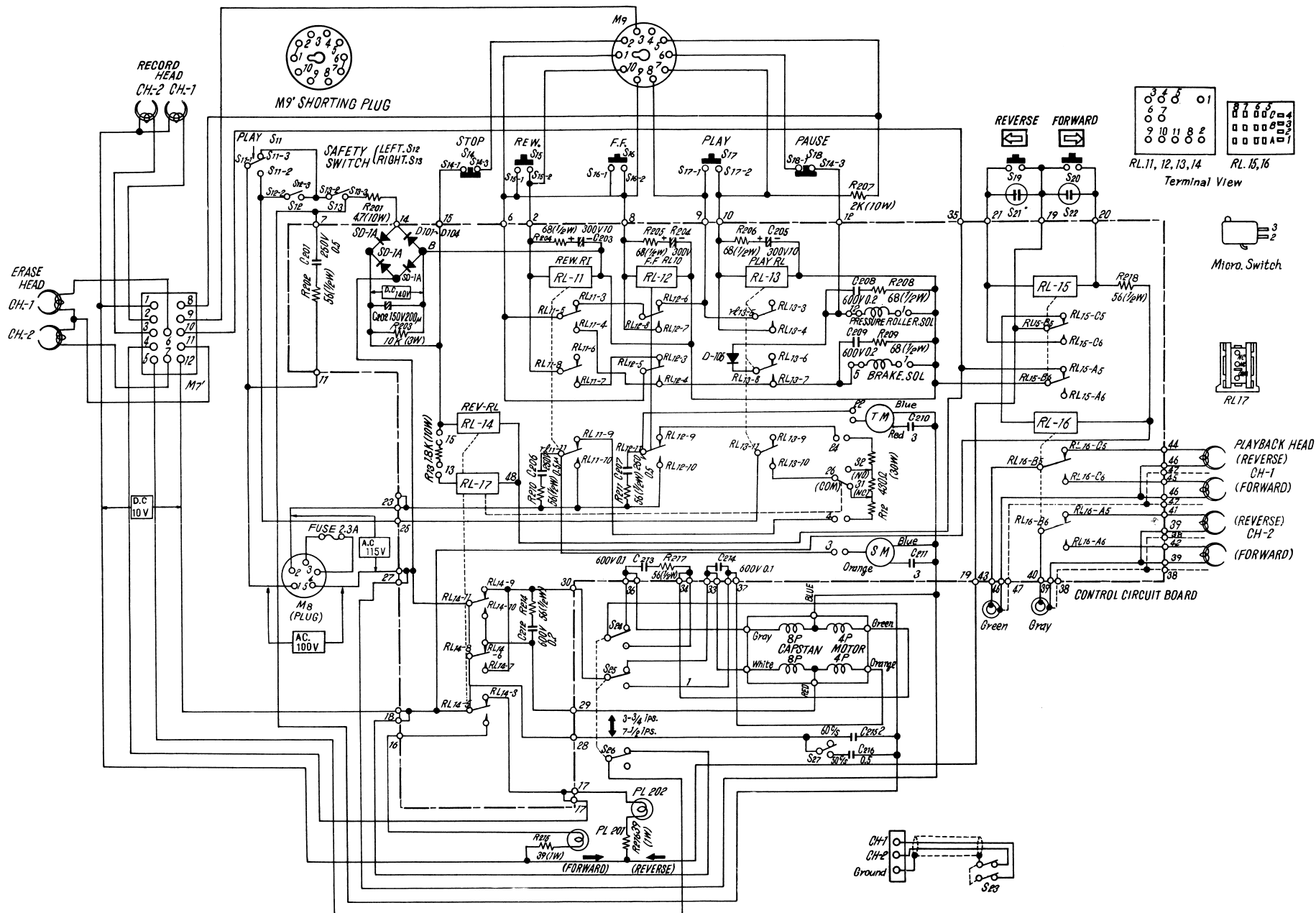
NATIONAL MODEL RS-1000S



N33-15.

NATIONAL MODEL RS-1000S

CONTROL CIRCUIT



NOTE:

1. All Resistance in Ω . K=1,000 Ω . Resistor with no wattage indication is 1/4 watts.
2. All Capacitance in Micro Farads. P=Micro Micro Farads.
3. M7' Plug to insert into Socket M7 of Amplifier.
4. M8..... Plug for Power Supply.
5. M9..... Socket to be connected to the Plug of Remote Control Box.

6. M9' Plug to insert into Socket M9 when Remote Control Box is not used.
7. RL11~RL17 ... Coil of Relay.
8. S11~S18 Micro Switch.
9. S20, S23 Leaf Switch.
10. S21, S22..... Sensing Contact Poles. (Sensing foil attached to Audio Tape)
11. S24, S25, S26... Tape Speed Selector Switch.
12. S27 Frequency Selector Switch.



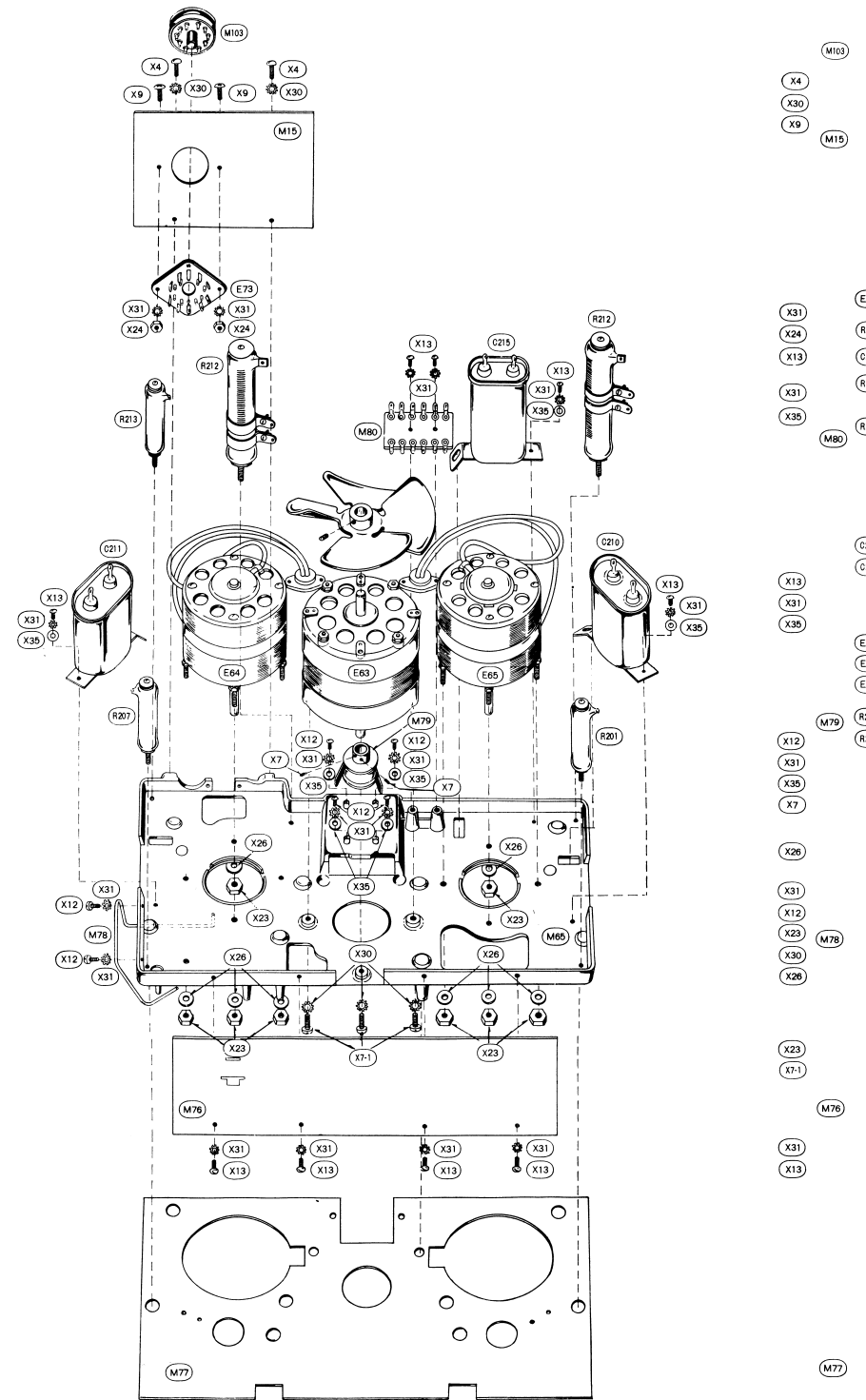
PARTS LOCATION

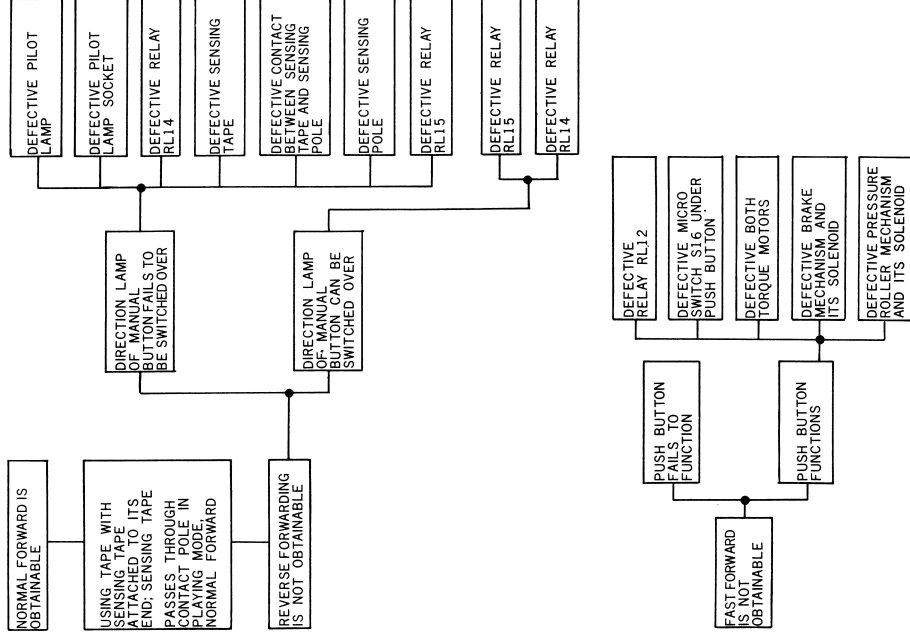
PARTS LOCATION



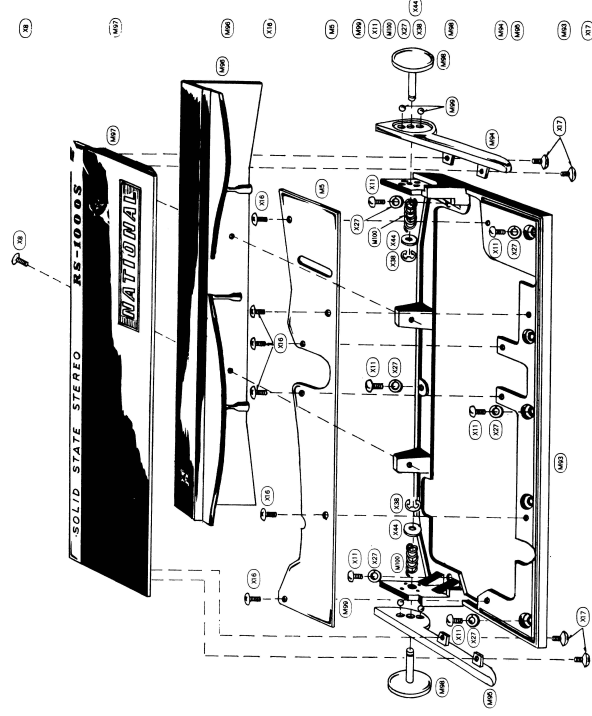
PARTS LOCATION

NATIONAL MODEL RS-1000S

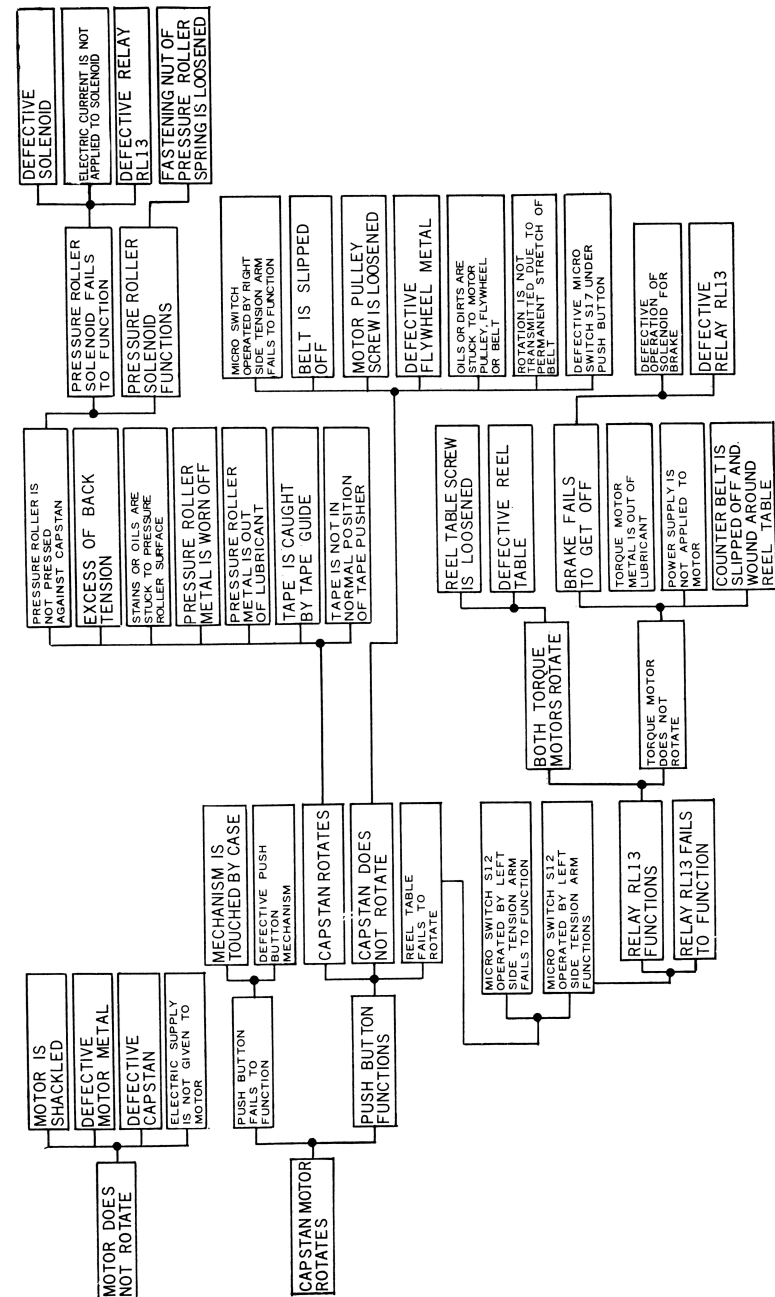




MALFUNCTIONS IN REWIND



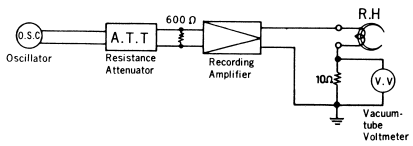
MALFUNCTIONS IN RECORD/PLAYBACK MOTION 1



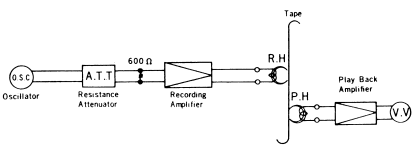
9. SPECIFICATION OF ADJUSTMENT OF ELECTRICAL PART

Recording

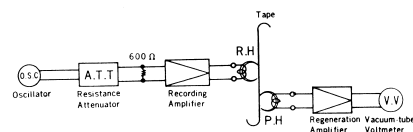
- a) Adjustment of Peaking Coil for Recording
 - Instruments required for Measurement: Oscillator, Resistance Attenuator, Vacuum-tube Voltmeter.
 - Chart of Measurement:



- Method of Measurement:
Stop oscillation (change connection of adjusting terminal) and place the system into Stereo-Recording mode and load AUX Jack with input power of -40 db (10 kc). Separate Recording Head and connect 10 Ω thereto and adjust Cores of L1 and L2 so that the voltage at both ends will become maximum. The Tape Speed is set at 3-3/4 ips.
- b) Adjustment of Recording Level (1)
 - Instruments required for Adjustment: Oscillator, Resistance Attenuator, Vacuum-tube Voltmeter.
 - Chart of Measurement:



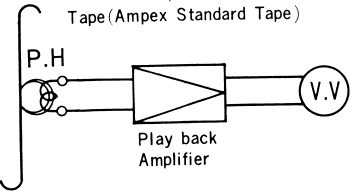
- Method of Measurement:
Placing the equipment in Stereo-Recording mode status, load it with 700 c/s at AUX Jack and conduct recording. Then adjust the Semi-fixed Resistor VR5 and VR6 in such way that in playback, the output of Line out Terminal will be 1 V.
The speed of Tape should be 7-1/2 ips.
- Specification:
0 ± 1 db
- c) Adjustment of Recording Level (2)
 - Instruments required for Measurement: Oscillator, Resistance Attenuator, Vacuum-tube Voltmeter.
 - Chart of Measurement:



- Method of Measurement:
In the Stereo-Recording mode status, conduct recording by loading 700 c/s input on AUX Jack and adjust VR7 and VR8 so that in Playback, the Level Meter should indicate 0 VU when output of Line Out Terminal is 1 V.

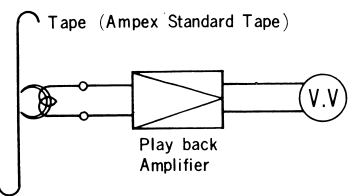
Playback

- a) Adjustment of Playback Output Level (1)
 - Instruments required for Measurement: Vacuum-tube Voltmeter
 - Chart of Measurement:



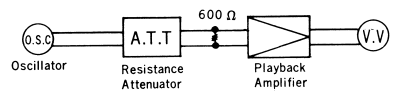
- Method of Measurement:
Set the Tape Speed at 7-1/2 ips. and place the equipment in Normal Forward run Stereo-Playing condition. Adjustment is made by Semi-fixed Resistors VR11 and VR12 in such manner that when Volume Regulators (VR 9, VR 10) are set at maximum tone (700 c/s) section of Ampex Standard Tape (7-1/2 ips.) is played, the output of Line Out Terminal is 1V. After adjustment is made in Normal Forward run, the Output is measured in reverse forward run and Line Output should be 1.0 V ± 0.2 V in reverse forward run.

- b) Adjustment of Playback Output Level (2)
 - Instruments required for Measurement: Vacuum-tube Voltmeter
 - Chart of Measurement:



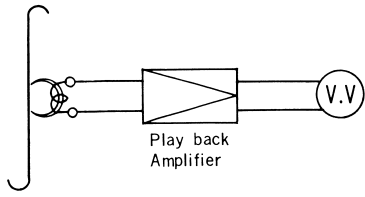
- Method of Measurement:
Adjustment is made by Semi-fixed Resistors (VR17, VR18), in such way that when Volume Regulators (VR9 and VR10) are set at maximum and Meter Switch Knob is set at the position of tape and maximum Tone Section of Ampex Standard Tape is played, th VU meter should indicate 0 VU when Output of Line Out Terminal is 1.0 V.
Incase of Reverse Forward run, it should be 0 ± 1 db. Specification: 0 ± 1 db.

- c) Adjustment of Playback Peaking Coil
 - Instruments required for Measurement: Vacuum-tube Voltmeter, Oscillator, Resistance Attenuator
 - Chart of Measurement:



- Method of Measurement:
Adjust Core of L3 and L4 so that when Playback Head is separated and input of -70 db (9 kc) is loaded, the Output Level of Line Out Terminal will become maximum.
In this case Semi-fixed Resistors (VR13, VR14, VR15 and VR16) are set at minimum and when adjustment is over, they are reset to the central point. Tape Speed should be 3-3/4 ips.

- d) Adjustment of Playback Frequency Response
 - Instruments required for Measurement: Vacuum-tube Voltmeter
 - Chart of Measurement:



- Method of Adjustment:
Adjustment is made by Volume Regulators (VR9, VR10) in such a way that when Adjusting Knobs of Semi-fixed Resistors (VR13, VR14, VR15, VR16, VR23, VR24, VR25, VR26, VR27, VR28, VR29 and VR30) are set at around the middle point and 700 c/s of Frequency Response Regulating Signal of Ampex Standard Tape is Played, the output of Line Out Terminal will become 0.15 V.

Adjust Semi-fixed Resistors in the following way so that the specified Playback features are exhibited at the Tape Speeds of 7-1/2 ips. and 3-3/4 ips.

When Tape Speed is 7-1/2 ips.

CH 1 Normal Forward run	VR 23
CH 1 Reverse Forward run	VR 27
CH 2 Normal Forward run	VR 24
CH 2 Reverse Forward run	VR 28

If it still deviates from specification even after these adjustments are made, do further adjustment by VR12 (CH1) and VR13 (CH2). However when VR23, VR24, VR27 and VR28 are adjusted, VR27 and VR28 should be set at maximum position.

When Tape Speed is 3-3/4 ips.

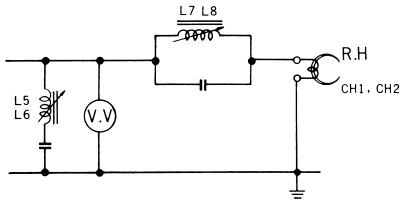
CH 1 Normal Forward run	VR 25
CH 1 Reverse Forward run	VR 29
CH 2 Normal Forward run	VR 26
CH 2 Reverse Forward run	VR 30

If it still deviates from specification even after the above adjustments are made, make further adjustment by VR15 (CH1) and VR16 (CH2). However when VR25, VR26, VR29 and VR30 are adjusted, set VR15 and VR16 at maximum. If it still deviates from specification even when all above adjustments are made, adjust the degree of the Head by Frequency Response Regulation Signal of Ampex Standard Tape so that it will satisfy the specification of both channels.

- Specification
In case when Tape Speed is 7-1/2 ips. Set 700 c/s of Ampex Standard Tape at 0 db, then it should be ± 3 db at 100~10,000 c/s. In case when Tape Speed is 3-3/4 ips. Set 500 c/s of Ampex Standard Tape at 0 db, then it should be ± 3 db at 100~7,500 c/s.

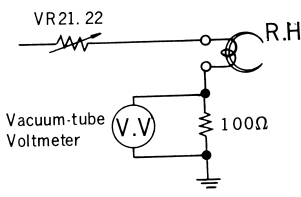
Oscillator

- a) Adjustment of bias trap
 - Instruments required for Measurement: Vacuum-tube Voltmeter
 - Chart of Measurement:



- Method of Measurement:
Put the equipment into Stereo-Recording mode and connect Vacuum-tube Voltmeter to the points indicated on the chart and adjust Core of L5, L6, L7 and L8 so that the readings of voltmeter become minimum.

- b) Adjustment of Bias Current
 - Instruments required for Measurement: Vacuum-tube Voltmeter.
 - Chart of measurement:



Method of Measurement:
In Stereo-Recording, connect 100 Ω to the ground side of Recording Head and measure the voltage on both ends. Make adjustment by Semi-fixed Resistor VR21 and VR22, so that current becomes 1.5 mA.
The order of adjustment is from CH1 to CH2, and then returns from CH2 to CH1 for further adjustment.

N33-3. NATIONAL MODEL RS-1000S

When you desire to reverse the direction of tape run, push Reverse Button or short circuit Sensing Pole, then RL-15 is set to "ON" and RL-14, 16, and 17 are set to "OFF" and Capstan Motor is reversed, and as soon as the channel of the head is switched, Tape will start to run in reverse. The recording is obtainable only on by forwarding in normal direction. If Tape Direction is reversed while it is being recorded in Normal Forward, the position is automatically changed into Playback at the reverse side Head.

3. INSTANT STOP

When Pause Button is pushed during Playback or Recording, Micro-Switch under the Button will function while it is pressed, and Solenoid (E-61) for Pressure Roller and Solenoid (E-62) for Brake become "OFF" and Pressure Roller detaches from Capstan, and both Reel Tables are braked and Tape stops to run. In this case both Torque Motors are loaded with voltage, but they stop rotation due to the action of Brake.

4. FAST FORWARD

When Fast Forward Button is pressed during Stop, Playback or Rewind, the Micro-Switch underneath the Button becomes "ON" and Pressure Roller and brake of Reel Table will detach from each other, and RL-12 (E-56) becomes "ON", and the right Torque Motor (E-64) revolves with strong revolving power, and left Torque Motor (E-65) is cut-off from Power Source, and thus Tape is wound on the right Reel at a very fast speed.

5. REWIND

When Rewind Button is pushed while the set is in Stop, Play, or Fast Forward, the Micro-Switch underneath becomes "ON" and Pressure Roller is disconnected from Capstan. Brake on Reel Table is released and RL-11 (E-55) becomes "ON". Thus the left Torque Motor (E-65) revolves with strong revolving power while the right Torque Motor (E-64) is disconnected from Power Source and Tape is wound on the left Reel at a high speed.

6. STOPPING

When Stop Button is pushed while the set is in Play, Rewind or Fast Forward, RL-11, 12 and 13 are cut-off from Power Source and both Torque Motors stop rotation. Simultaneously Solenoid for brake becomes "OFF" and Reel Table is braked. Solenoid for Pressure Roller also becomes "OFF" and Pressure Roller is detached from Capstan to stop Tape running.

7. REMOTE CONTROL

When Dummy Plug of the tape recorder main body is drawn out and Plug of Remote Controller is inserted, each push button of the main body and of Remote Controller function in the same way. That is, the Buttons on Remote Control for Stop,

Fast Forward, Rewind, Play, Instant Stop and Record, will control the function of each part just as the corresponding buttons on the main body do each job. Even when Remote Control Device is connected, Buttons on the main body can be operated.

8. When Cue Lever is pushed during Fast Forward or Rewind, Pressure Roller moves toward Head and Relief Switch which correlates with Arm becomes "OFF". Then as Head touches Tape, it regeorates sound if Tape is recorded.

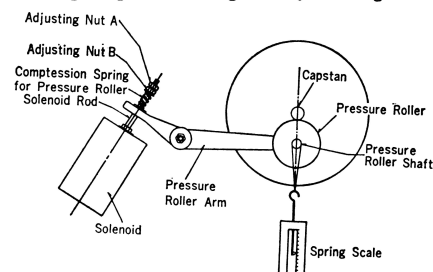
METHOD OF MEASUREMENT AND ADJUSTMENT OF MECHANISM

1. PRESSURE ROLLER TENSION

Pressure Roller Shaft and Capstan must be in parallel.

To measure the pressing power between Pressure Roller and Capstan.

- a) Put the tape recorder in Playback without mounting the tape.
- b) Spread Rope on Pressure Roller Shaft and Spring Balance. Pull the Rope until Pressure Roller detaches from Capstan and take reading on the scale when it detaches.
- c) The appropriate pressing power is 4.8~6.0 lbs. (2.2~2.7 kg)
- d) When pressing power is not appropriate, loosen Adjusting Nut A and turn Adjusting Nut B to change strength of Compression Spring of Pressure Roller.
- e) When pressing power of Pressure Roller is adjusted right, tighten Adjusting Nut B by Adjusting Nut B.



2. STRENGTH OF TENSION ARM

The structure and function of Tension Arm is as follows:

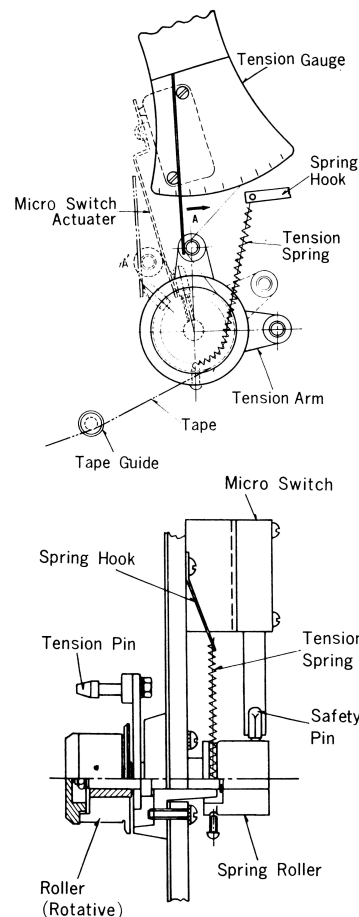
Tension Pin and Spring Roller are fixed on a Common Shaft. Due to the pulling power of Tension Spring, Tension Arm turns from A to A' and Safety Pin shifts Actuator of Micro-Switch to A' and changes the contact of Micro-Switch, thus cutting the motor off the power source.

If the turning power of Tension Arm from A to A' is too large, Micro-Switch is engaged during or at the start of Play, Fast Forward or Rewind action and it cuts off the power source.

Thereby, Tape is rept from running. Whereas if the turning power of Tension Arm is too weak, it can not energize the Micro-Switch. So even when Tape comes to an end, Micro-Switch does not function and motor will continue to rotate.

To measure the turning power of Tension Arm;

- a) Dismount Tape and put the tape recorder in vertical position.
- b) Place Tension Gauge against Tension Pin and take the reading as turning it from A' to A. The proper values should be 0.89~1.1 ozs. (25~35 g)
- c) If the measured values are not proper, loosen the Lock Screw of Spring Hook and let it turn to change the strength of Tension Spring. The right and left tension arms are symmetrical.

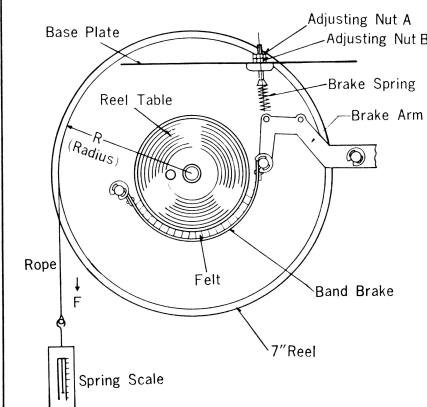


3. REEL TABLE BRAKE

When Reel Table Brake works in excess, it may cause expansion or breakage of Tape, while if the Brake works little, it causes troubles like loosening of Tape Coil or retardation of stop action, etc.

- a) The proper value of braking power:
Braking Power of Takeup Reel, in clockwise turning.....1.300~2.100 g/cm
Braking power of Takeup Reel, in anti-clockwise turning.....500~1,100 g/cm
Braking power of Supply Reel, in clockwise turning.....500~1,100 g/cm
Braking power of Supply Reel, in anti-clockwise turning.....1.33~2.100 g/cm
- b) Method of Measurement
Put the tape recorder in Stop mode and wind Rope on 7" Reel and measure the strength of turn by Spring Balance at the time when it starts to rotate.
The Value multiplied by the radius is taken as Braking Power. Exchange Supply Reel for the Takeup Reel, and measure the strength of rotation clockwise and anti-clockwise on both Reel Tables again.
Braking Power=Radius (R) cm×Readings on the Spring Scale g.
- c) Method of Adjustment
When the Braking Power is too strong or too weak, it should be adjusted.
You can adjust it by the following procedure.
Loosen the Adjusting Nuts A and B which fix the other end of Brake Spring hooked on Brake Arm and turn Adjusting Nut B to reset the strength of Spring. When it is set, screw Adjusting Nut A on B and fix it.

SUPPLY REEL TABLE



4. TAKEUP TENSION AND BACK TENSION OF REEL TABLE IN PLAYBACK

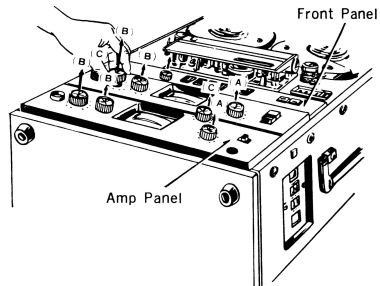
When the recorder is in Play, if Takeup Tension is too strong, Tape is coiled on Reel quite tightly.

N33-1. NATIONAL MODEL RS-1000S

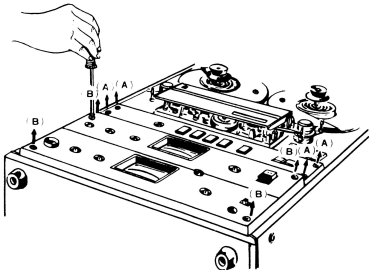
DISASSEMBLY INSTRUCTIONS

AMP Panel and Front Panel

1. Pull out 9 Knobs (A) (B) (C) on Front Panel and AMP Panel.

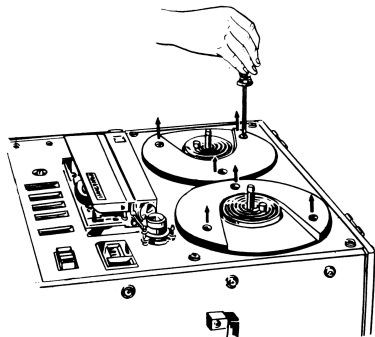


2. Take out 4 Screws (A) which fix Front Panel, and 4 Screws (B) which fix AMP Panel.



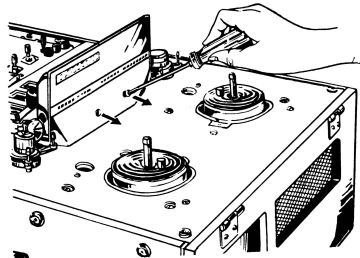
Reel Table Frame

1. Remove 6 Screws which fix Reel Table Frame.



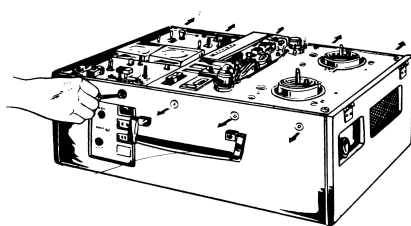
Head Cover

1. Remove 2 Screws which fix Head Cover.

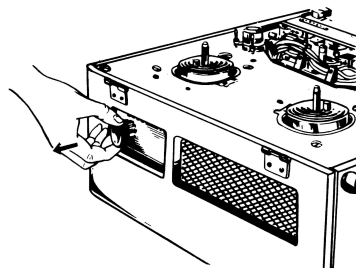


Main Cabinet Body Case

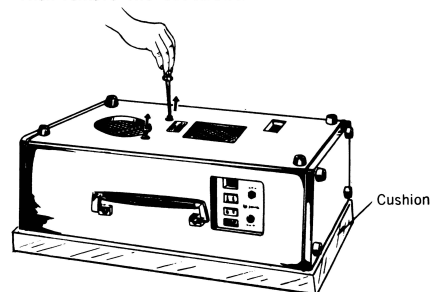
1. Remove 10 Set-screws on both sides of Case Body.



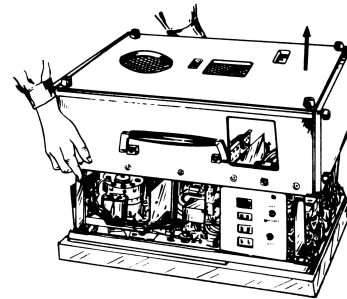
2. Pull out Remote Control Dummy Plug.



3. Place Main Body upside down on an Elastic Cushion, so that Head Cover and Reel Table are not oppressed. Then remove two Set-screws.

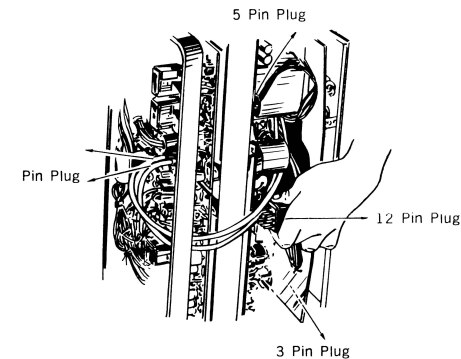


4. Pull Case Body straight up.

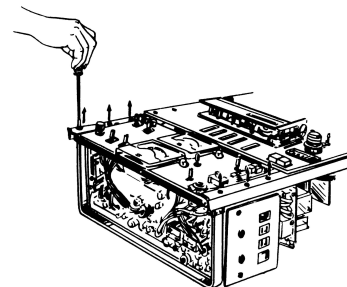


Amplifier Assembly and Mechanism Assembly

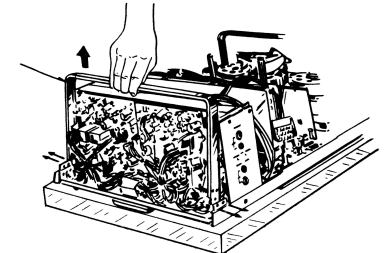
1. Pull out 12 Pin Plugs, 5 Pin Plug (2 pieces), and also 3 Pin Plugs which are attached to Mechanism Assembly.



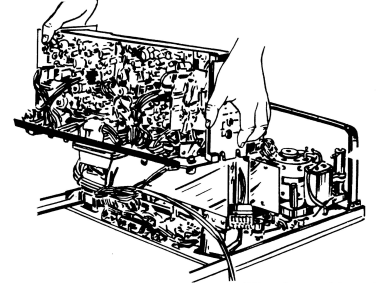
2. Remove 6 screws which fix Amplifier Assembly and Mechanism Holding Frame.



3. Then put the Body upside down. In this case, place the Body quietly on an Elastic Cushion and remove 4 Screws which fix Mechanism Holding Frame.



4. Lift Amplifier Assembly as it is, then you can separate it from Mechanism Assembly.



NOTE: After disconnecting Amplifier Assembly, place Mechanism Holding Frame back in place in order to protect Mechanism Assembly from damage.

Control Circuit Board

1. Remove 4 Screws which fix Fiber Plate.
2. Remove 4 Screws which fix Control Circuit Board.
3. However, since there are many Wirings such as Soldered lead Line, you can not completely disconnect it from Mechanism Assembly.

