

SERVICE MANUAL

**AKAI CARTRIDGE
TAPE RECORDER**

MODEL CR-80

ALSO APPLICABLE FOR MODEL CR-80D

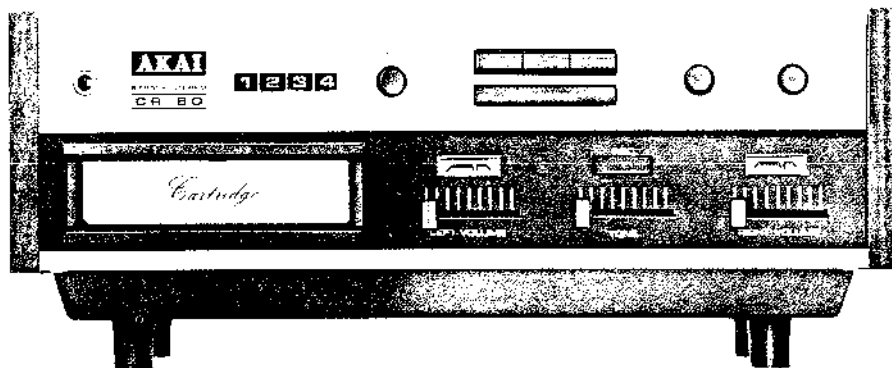


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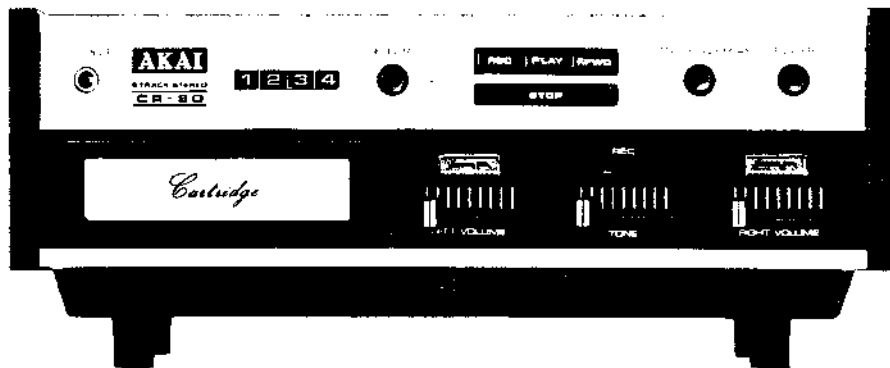


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I. SPECIFICATIONS

WEIGHT : 8.9 Kg (19.6 lbs.)

DIMENSIONS : 345(W) x 250(D) x 135(H) mm
(13-1/2(W) x 10(D) x 5-1/2(H)
inches)

POWER SUPPLY : AC 100 V to 240 V ; 50/60 Hz

RECORDING SYSTEM
: In-Line 8-Track stereo recording

PLAYBACK SYSTEM
: In-Line 8-track stereo playback

TAPE SPEED : Play : 3-3/4 ips.
Fast Forward : 15 ips.

TAPE SPEED DEVIATION
: $\pm 3\%$

WOW AND FLUTTER
: Less than 0.35% rms.

FREQUENCY RESPONSE
: 50 to 16,000 Hz (50 Hz \pm 5 dB)
(16 kHz - 6 dB)

SIGNAL TO NOISE RATIO
: Better than 42 dB

DISTORTION : Within 4% at 1,000 Hz 0 VU

CROSS-TALK : Less than -40 dB

ERASE RATIO : Less than -60 dB

INSULATION RESISTANCE
: More than 50 M Ohms

INSULATION DURABILITY
: 1,000 V AC for more than one minute
duration

OUTPUT

LINE OUTPUT : 1.23 V (0 VU) \pm 1.5 dB using 500 Hz
0 VU recorded tape
(Required load impedance more than
25 K Ohms)

DIN OUTPUT : 0.4 V (required load impedance more
than 50 K Ohms)

MAIN OUTPUT : More than 7 W (Impedance 8 Ohms)

INPUT

LINE INPUT : 50 mV (Impedance 180 K Ohms)

DIN INPUT : 10 mV (Impedance 30 K Ohms)

MIC INPUT : 0.5 mV (Impedance 4.7 K Ohms)

MOTOR : Condenser starting induction two-speed
(2-8 pole) motor.
Condenser Capacity : 4 μ F (50 Hz) ;
2.5 μ F (60 Hz)
Revolutions : 2900 to 725 rpm (50 Hz)
3480 to 870 rpm (60 Hz)

RECORD/PLAYBACK HEAD
: In-Line 8-track stereo
Gap : 1/1000 mm
Impedance : 750 Ohms \pm 15% at 1 kHz

ERASE HEAD : In-Line 8-track stereo
Gap : 0.1 mm
Impedance : 210 Ohms \pm 10% at 90 kHz

OSCILLATION FREQUENCY
: 65 kHz \pm 5%

TRANSISTORS USED

: 4 2SC693FU
4 2SC711 (D)
2 2SC971 (2) (3)
1 2SC1061 (A) (B) (C)
1 2SC968 (4)

IC USED

: 2 AA072D
2 STK-011A

SILICON DIODES USED

: 5 10D1, 1 10DC 1 (Red), 1 10DC1
(Blk), 1 10D4

II. MEASURING METHOD

TAPE SPEED DEVIATION

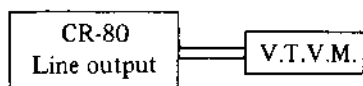
1. Method involving use of pre-recorded tape.

Playback on the tape recorder to be tested a tape pre-recorded at 1,000 Hz \pm 0.1% for measuring tape speed deviation. Connect the appropriate output to a frequency counter meter in order to measure the tape speed deviation from the deviation of the measured frequency.

WOW AND FLUTTER

Playback a 3,000 Hz pre-recorded tape of which the wow and flutter level is guaranteed to be smaller than 0.07% for measurement by means of a wow meter. It is also possible for a 3,000 Hz sine wave to be recorded and played for measurement by means of the wow meter. In this case, however, the wow meter indicates a value as much as twice the value given in the specification on the first page.

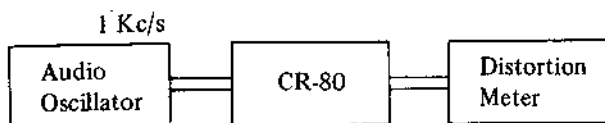
SIGNAL TO NOISE RATIO



Playback a tape containing a 1,000 Hz sine wave recorded at "0" VU level on a standard recorder. Connect a V.T.V.M. to the line output jack of the recorder and measure its output.

Then remove the tape and measure the noise level under the same condition. Convert each of the measured values into decibels.

TOTAL HARMONIC DISTORTION FACTOR



Connect the measuring instrument as shown above, and record the 1,000 Hz sine wave at "0" VU. Playback the resultant signal and measure the overall distortion factor. Measure the noise level of the tape recorder with the tape removed; connect the audio oscillator directly to the distortion meter for measurement of the distortion factor of the oscillator.

The required distortion factor may be obtained from the results of the above measurement by the following formula.

$$d_0 = d - d_1 - d_2$$

where, d_0 = Required

d = Overall distortion factor

d_1 = Noise level

d_2 = Distortion factor of the oscillator

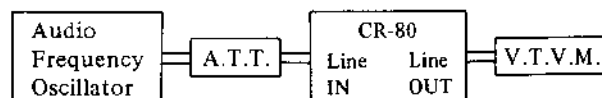
(Note : New tape of particularly good quality should be used for measurement of the distortion factor.)

POWER OUTPUT

Playback a tape containing a sine wave of 500 Hz recorded at 0 VU on a standard recorder.

Connect a V.T.V.M. to the line output jack of the recorder and measure the voltage at the output of the recorder to be tested.

FREQUENCY RESPONSE



Connect the measuring instrument as in the above diagram, and measure the frequency response in the following sequence :

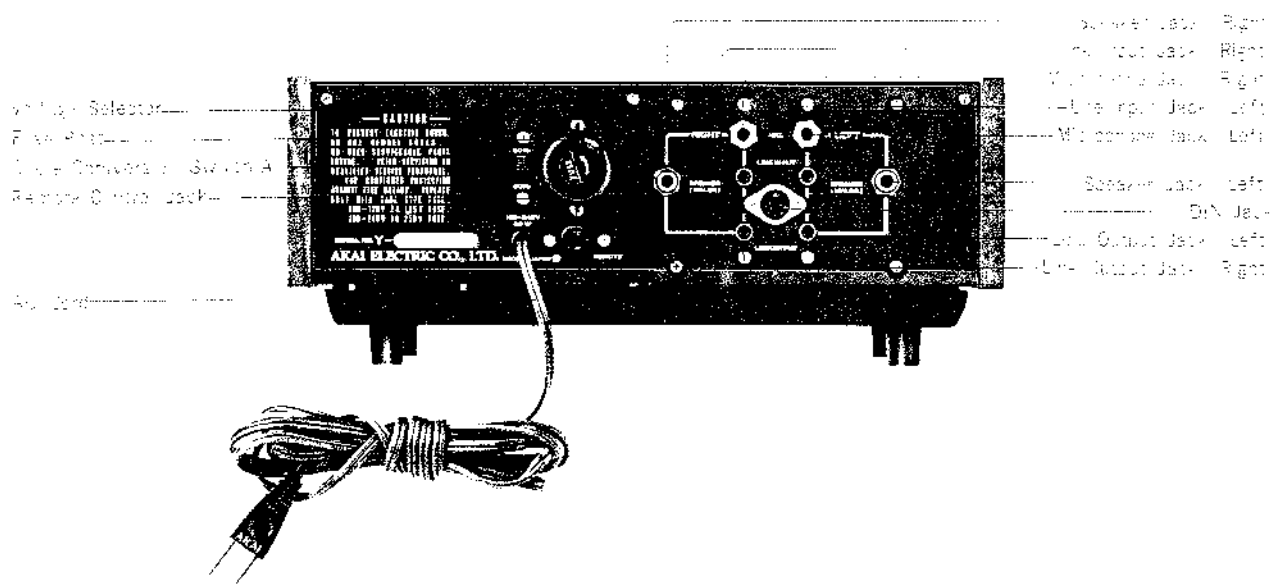
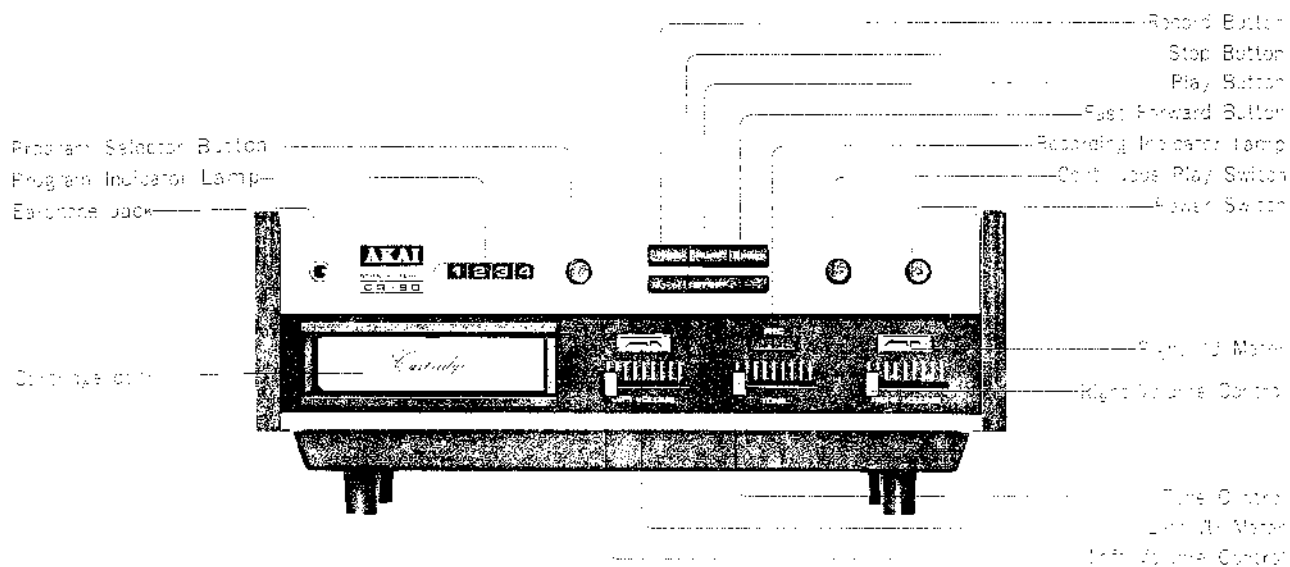
RECORD :

- 1) Give a sine wave of 1,000 Hz to the Line Input of the recorder to be tested, through an attenuator from an audio frequency generator.
- 2) Set the Record/Playback Knob in to "Rec" position and adjust the line input volume so that the VU meter needle indicates "0" VU.
- 3) Under the condition described in (2), lower the input level 10 dB by means of the attenuator.
- 4) Record the spot frequency in the range of 50 Hz to 16,000 Hz from the audio frequency generator.

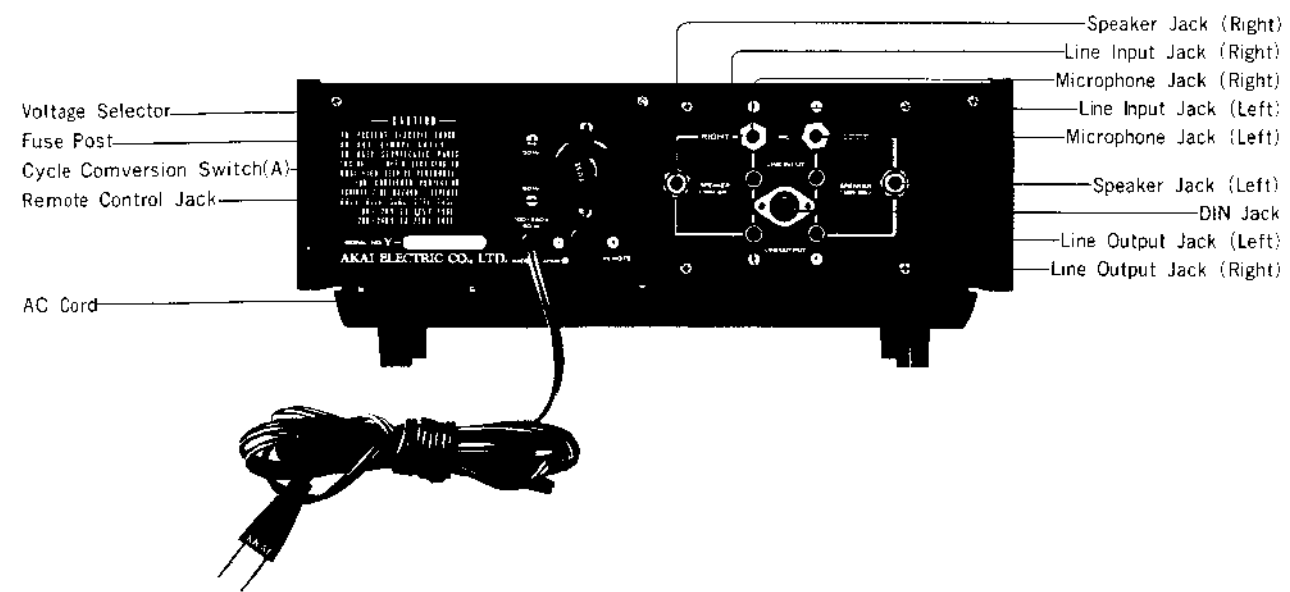
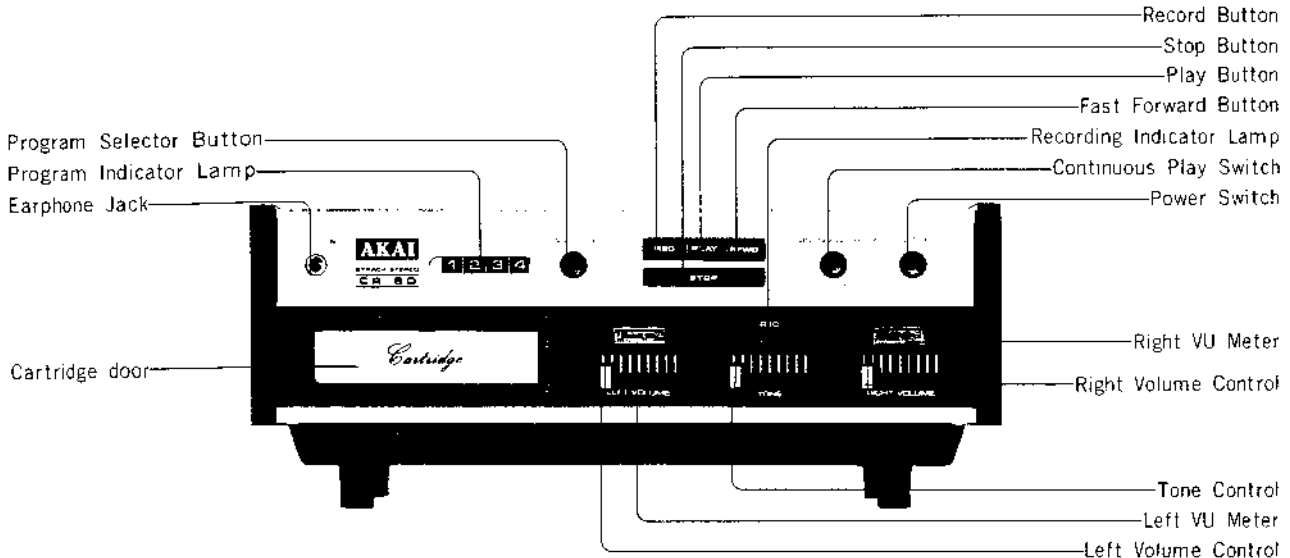
PLAYBACK :

- 5) Depress Play Button.
- 6) Connect a V.T.V.M. to the Line output.
- 7) Playback the tape previously recorded.
- 8) Adjust the output level to "0" dbm at 1,000 Hz as indicated on the V.T.V.M. by the range selector of a V.T.V.M.
- 9) Playback the recorded spot frequencies under the conditions in (8) ; make a memo of output level and plot the value on a graph.

III. CONTROL LOCATIONS



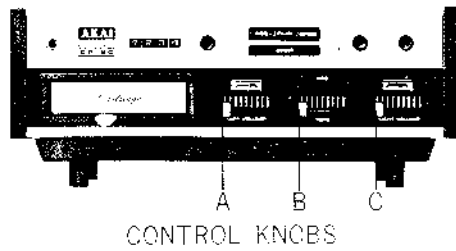
III. CONTROL LOCATIONS



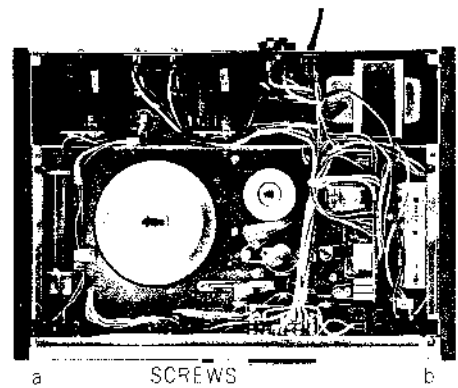
IV. DISMANTLING OF TAPE TRANSPORT UNIT & AMPLIFIERS

In case of trouble, etc. necessitating disassembly, please disassemble in the order shown in photographs. Reassemble in reverse order.

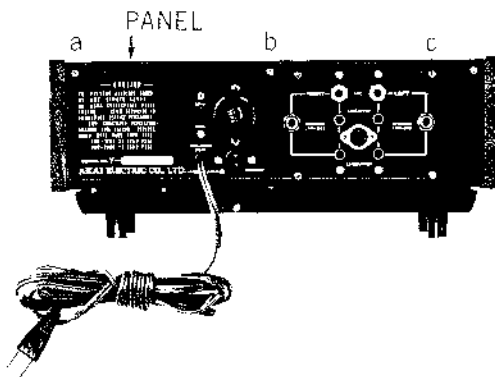
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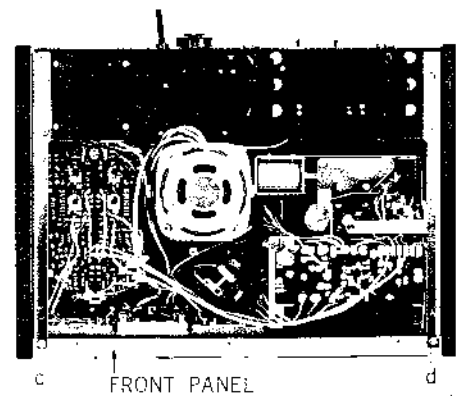
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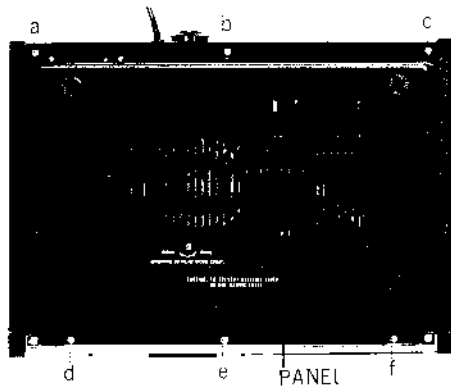
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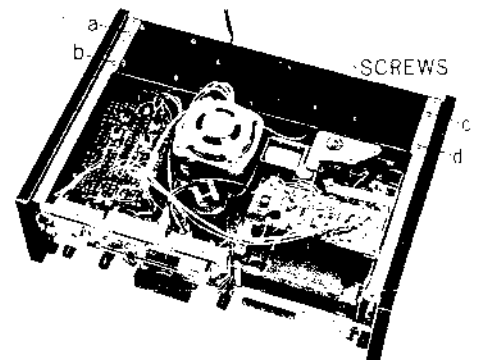
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3



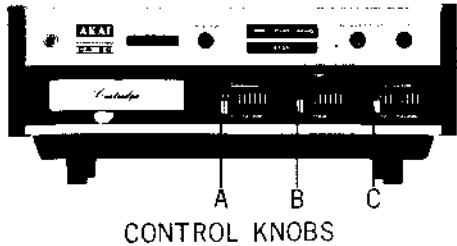
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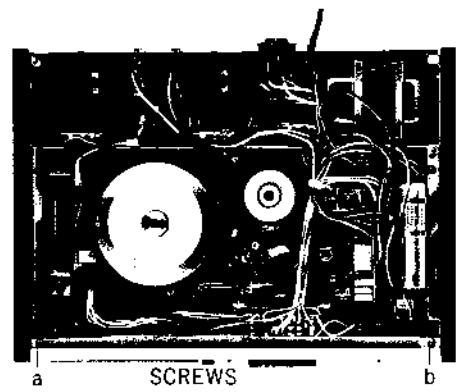
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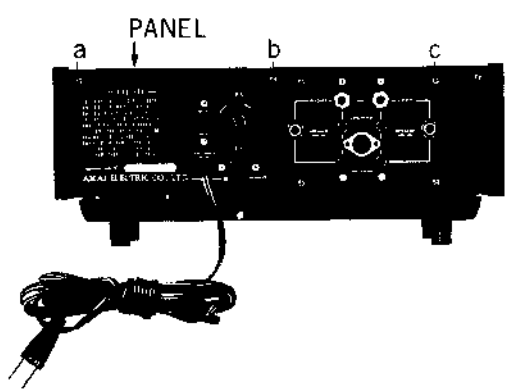
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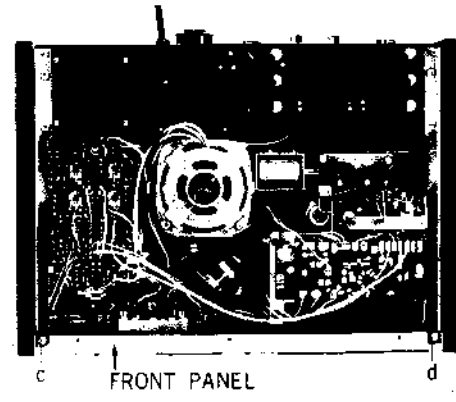
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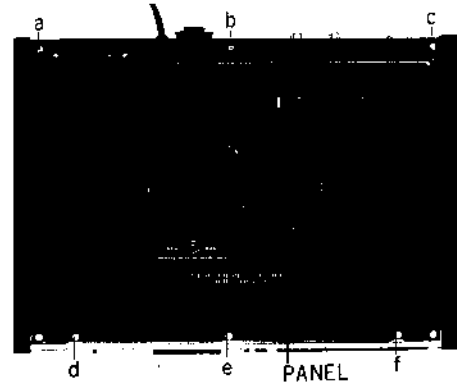
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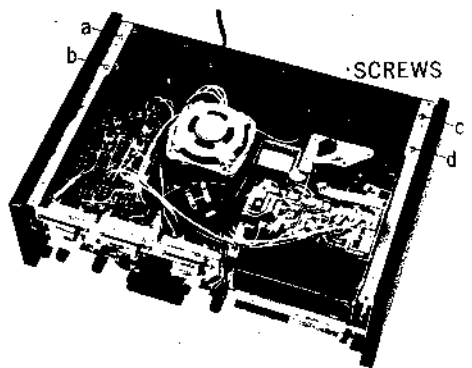
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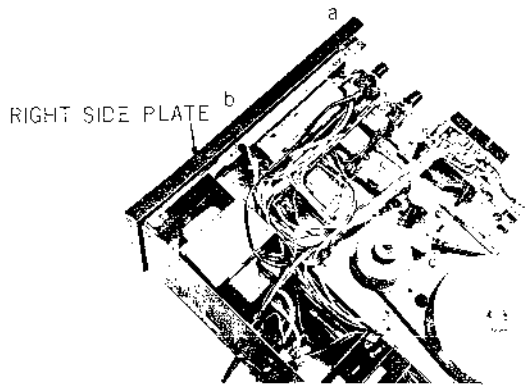
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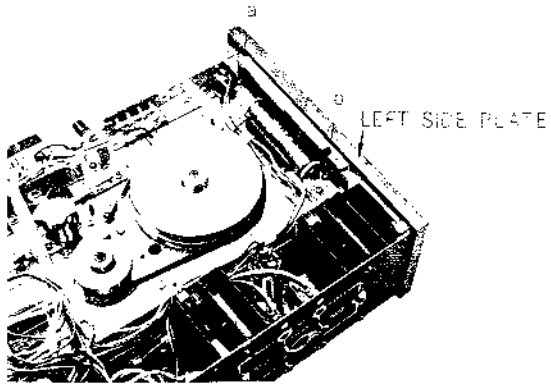
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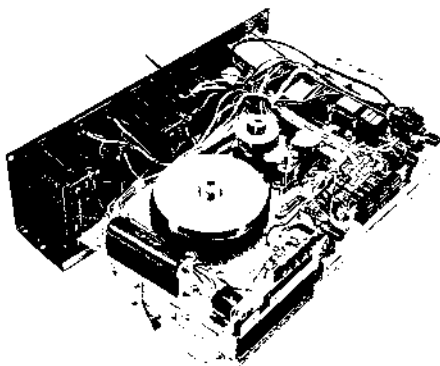
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8

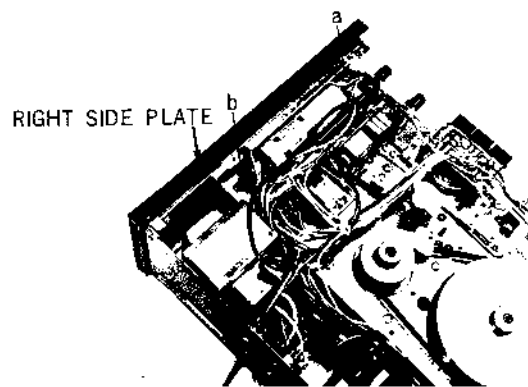


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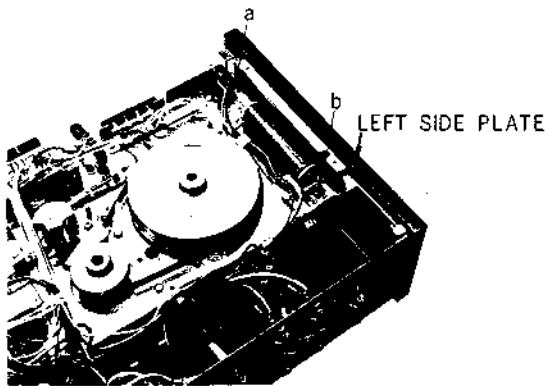


AMPLIFIER & MECHANISM ADJUSTMENT

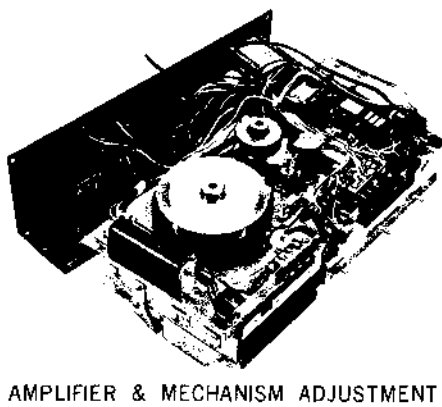
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8



9



V. MECHANISM ADJUSTMENT

1) ADJUSTMENT OF AZIMUTH ALIGNMENT (See Fig. 1)

Playback an azimuth alignment Test Tape (3,000 Hz recorded tape) and set the azimuth alignment of head assembly by turning screw (c) until maximum playback output of program 2 or 3 is obtained.

2) HEIGHT ADJUSTMENT (See Fig. 1)

A) Playback *a test tape and turn screw (d) until maximum gain of program 1 is obtained.

B) Set *a blank test tape to recorder, make a recording, and then make an erasing test. If erasing is not complete, adjust as follows :

(I) Turn screws (a) and (b) clockwise simultaneously forty-five degrees and then make erasing test again.

Note : The blank test tape should be demagnetized every time an erasing test is made.

(II) If the erasing is not complete after the above adjustment, turn screws (a) and (b) clockwise again ten to fifteen degrees simultaneously.

(III) If erasing is still not complete, repeat step 2) until complete erasure is accomplished. Playback Azimuth Alignment test tape again and turn screw (c) until maximum program gain of program 2 or 3 is obtained.

(IV) Playback test tape again and turn screw (d) until maximum gain of program 1 is obtained.

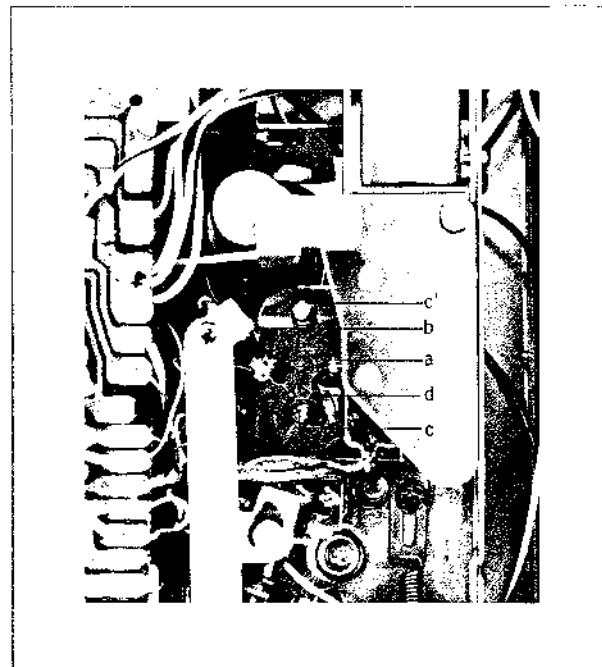


Fig. 1

* TEST TAPE

This test tape is specially designed by AKAI for Height Adjustment tests.

Program 1	.....	1,000 Hz
Program 2	.....	Blank
Program 3	.....	1,000 Hz
Program 4	.....	3,000 Hz

* BLANK TEST TAPE

This is also a special tape designed by AKAI. Duration of tape is only 15 seconds.

V. MECHANISM ADJUSTMENT

1) ADJUSTMENT OF AZIMUTH ALIGNMENT (See Fig. 1)

Playback an azimuth alignment Test Tape (8,000 Hz recorded tape) and set the azimuth alignment of head assembly by turning screw (c) until maximum playback output of program 2 or 3 is obtained.

2) HEIGHT ADJUSTMENT (See Fig. 1)

A) Playback *a test tape and turn screw (d) until maximum gain of program 1 is obtained.

B) Set *a blank test tape to recorder, make a recording, and then make an erasing test. If erasing is not complete, adjust as follows :

(I) Turn screws (a) and (b) clockwise simultaneously forty-five degrees and then make erasing test again.

Note : The blank test tape should be demagnetized every time an erasing test is made.

(II) If the erasing is not complete after the above adjustment, turn screws (a) and (b) clockwise again ten to fifteen degrees simultaneously.

(III) If erasing is still not complete, repeat step 2) until complete erasure is accomplished. Playback Azimuth Alignment test tape again and turn screw (c) until maximum program gain of program 2 or 3 is obtained.

(IV) Playback test tape again and turn screw (d) until maximum gain of program 1 is obtained.

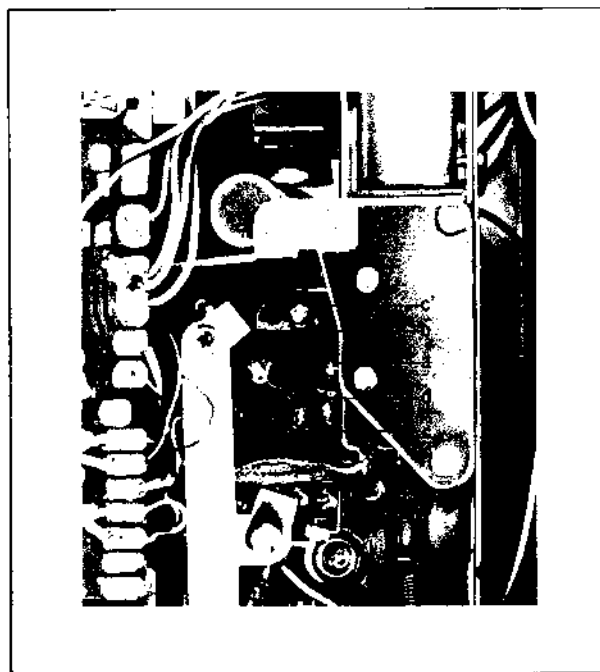


Fig. 1

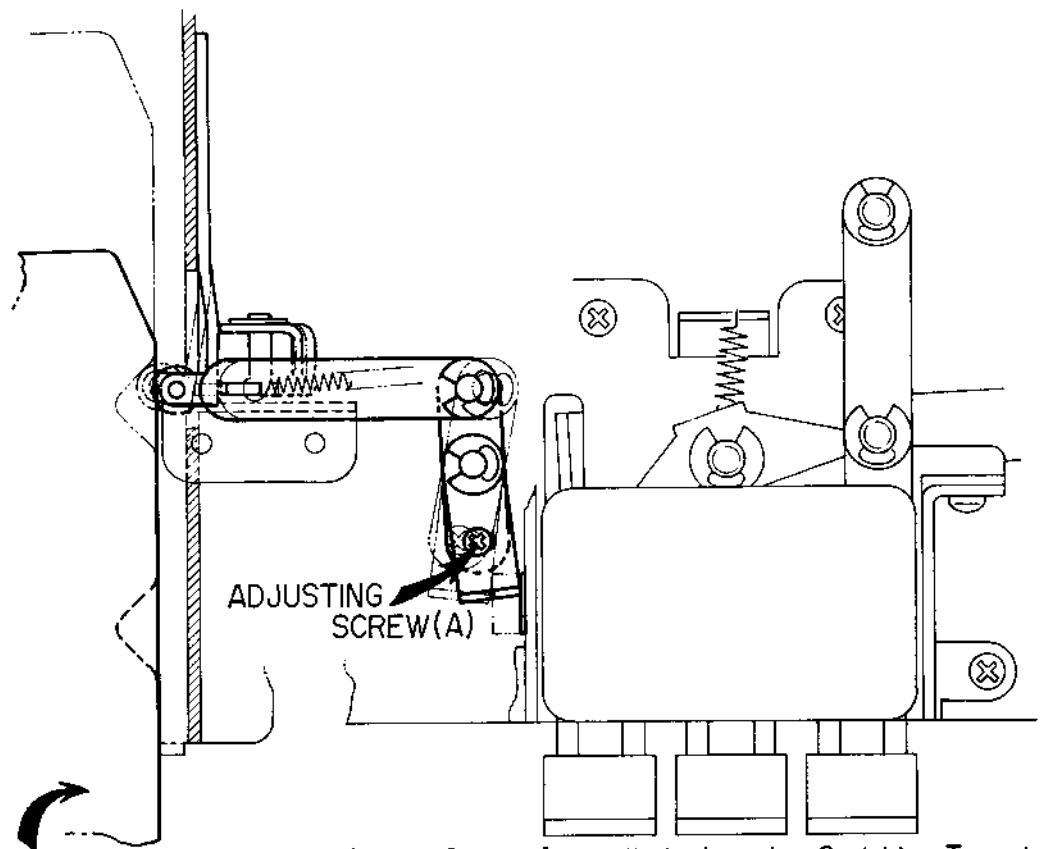
* TEST TAPE

This test tape is specially designed by AKAI for Height Adjustment tests.

Program 1	.....	1,000 Hz
Program 2	.....	Blank
Program 3	.....	1,000 Hz
Program 4	.....	3,000 Hz

* BLANK TEST TAPE

This is also a special tape designed by AKAI. Duration of tape is only 15 seconds.



CARTRIDGE TAPE (Adjust Screw (A) so that when the Cartridge Tape is removed ,or reset ,the Mode Selector Knob stops .)

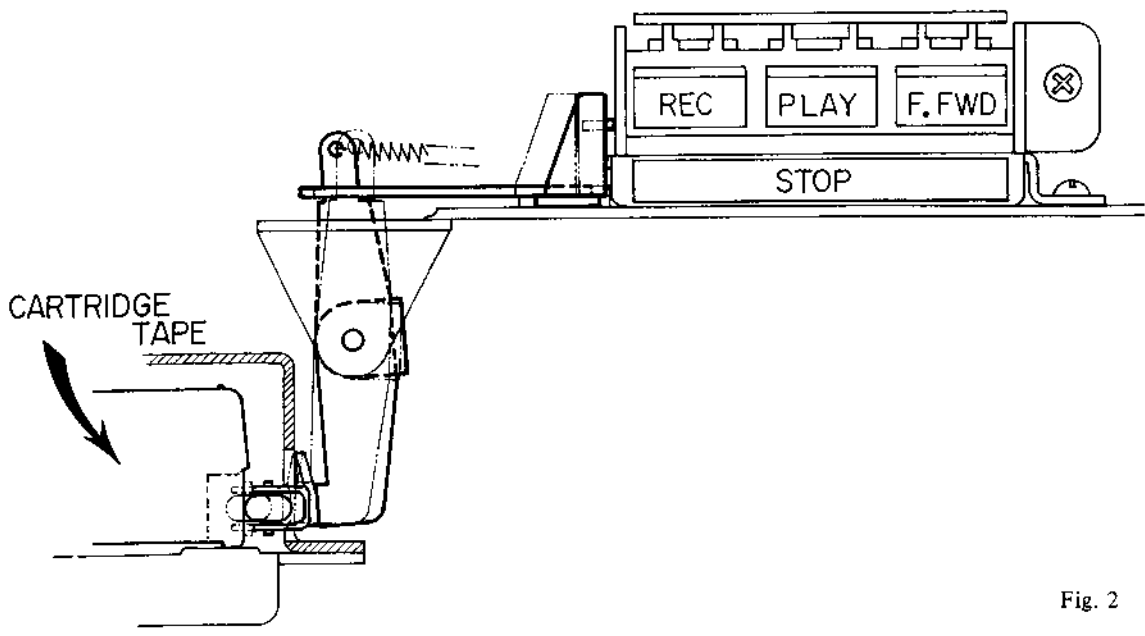
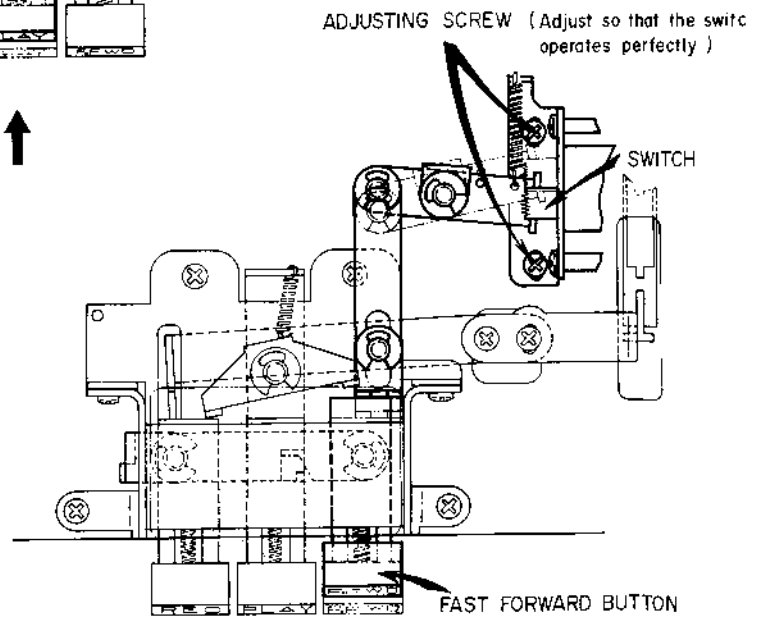
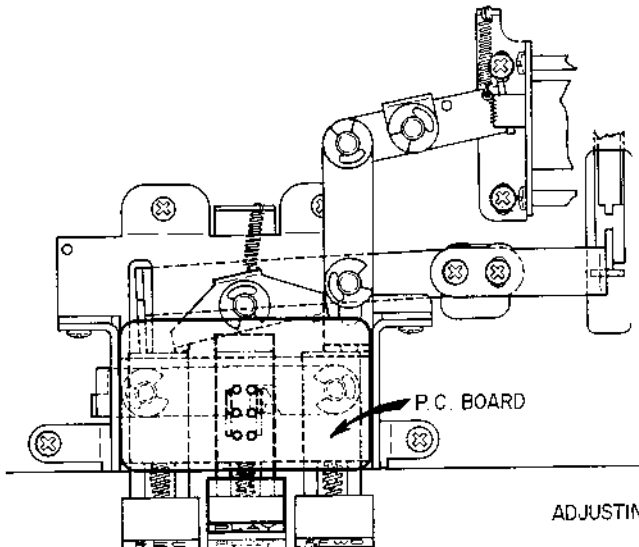
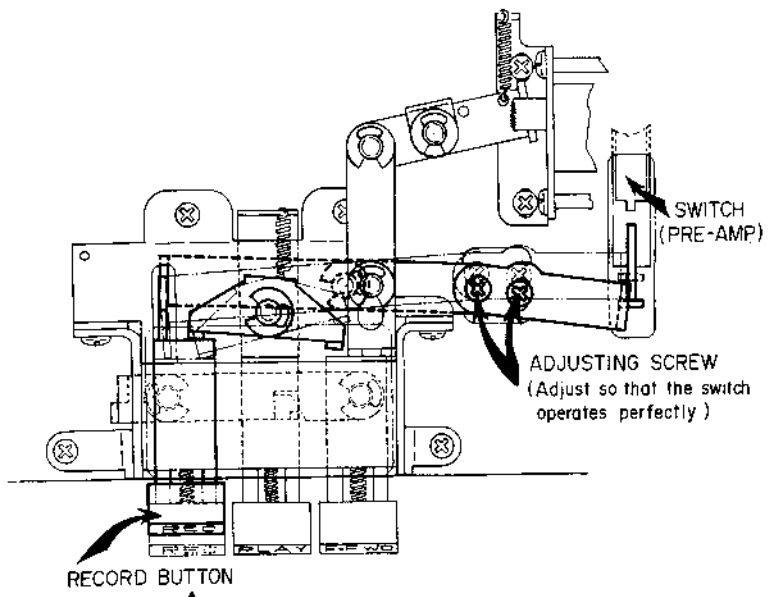


Fig. 2



VI. AMPLIFIER ADJUSTMENT

1. ADJUSTMENT OF RECORDING BIAS FREQUENCY (See Fig. 1)

- Put on the resistor 10 or 50 Ohms in series with the Bias Head and connect the Vertical Input Terminal of the Oscilloscope to points (A) and (B).
- Feed in a sine wave signal from an Audio Frequency Oscillator to the Horizontal Input of the Oscilloscope and tune the Dial of the Audio Frequency Oscillator until the Oscilloscope displays a circular or linear pattern. Then read the figure on the Dial of the Audio Frequency Oscillator.
- If it reads 65 KHz (± 5 KHz), the Recording Bias Frequency is correct.
- If incorrect, it may be adjusted by inserting another condenser (CO-404) value 1000 PF (820 PF).

2. ADJUSTMENT OF RECORDING BIAS VOLTAGE

Connect a V.T.V.M. to point (a) and (b) and measure the Bias Voltage. Correct Bias Voltage is between 18 to 20 V AC. Adjustment can be made by inserting another resistor or changing resistors (R-408, R-409 value 120 K Ohms).

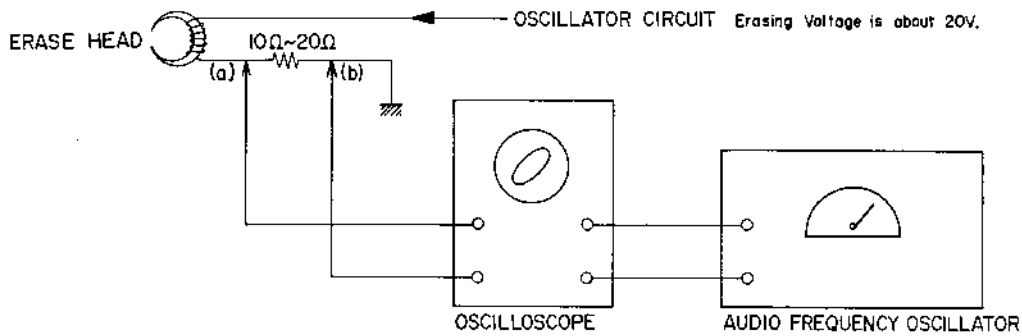


Fig. 1

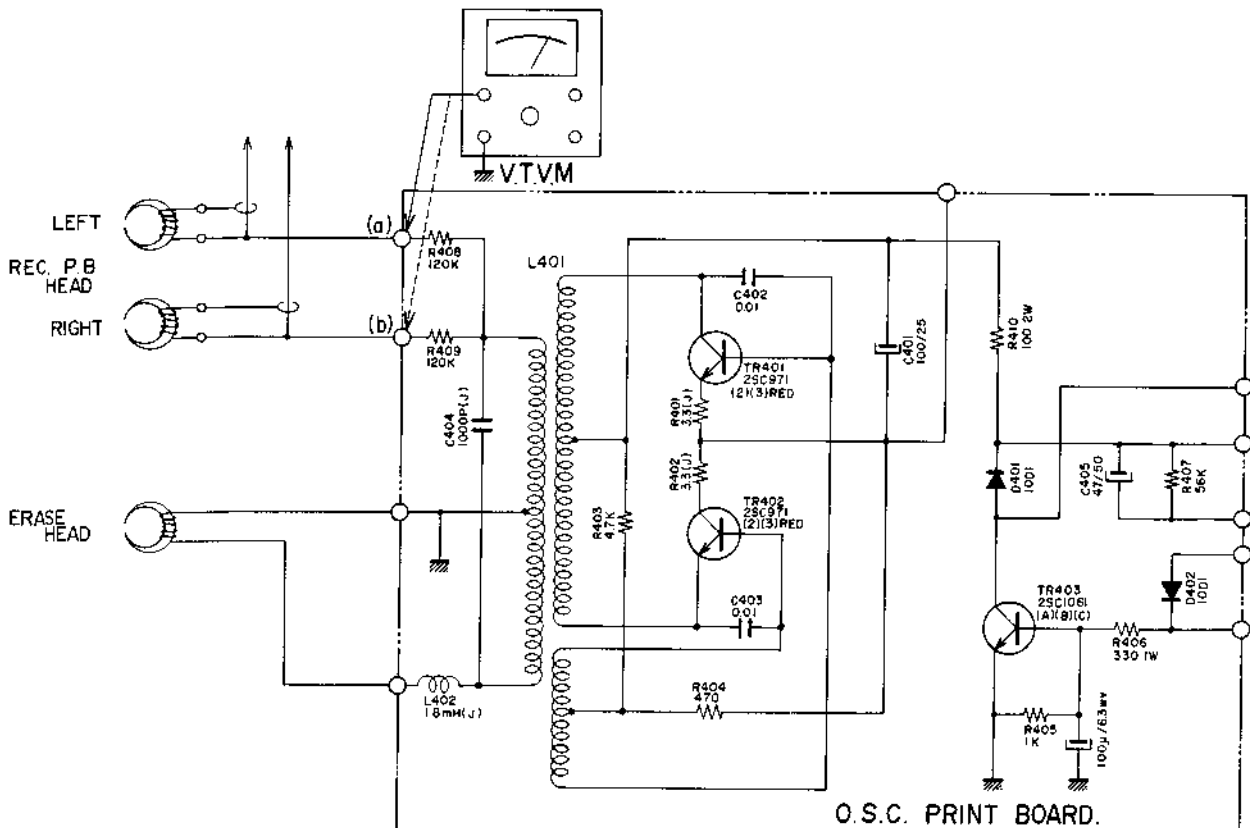


Fig. 2

3. ADJUSTMENT OF LINE OUTPUT LEVEL PLAYBACK (See Fig. 3)

- 1) Turn Volume Control (VR-1) (50 KA) up to maximum.
- 2) Set machine to "Play" position.
- 3) Connect a V.T.V.M. (use VTVM with milli-volt scale) to the Line Output Jack.
- 4) Play back a Test Tape (500 Hz "0" VU recorded) and turn the volume (VR-101) (20 KB) until the line output level reaches +4 dB 1.238 V.

4. RECORDING AND PLAYBACK (Figs. 3 and 4)

- 1) Load a Blank Test Tape.
- 2) Set recorder to Recording Mode.
- 3) Supply a 1000 Hz sine wave signal from an Audio Frequency Oscillator through the attenuator to the Line Input of CR-80 and adjust the attenuator so that the VU Meter needle indicates "0" VU (intermediate between red and black).
- 4) After a few seconds of recording, playback the recorded tape from the starting position, turning the main volume up to maximum.
- 5) If the line output level does not reach 0 (± 2 dB), repeat recording and playback procedure (from item 3), adjusting semi-fixed VR-102 (2 KB) until 0 dB (± 2 dB) is obtained, both on recording and playback.

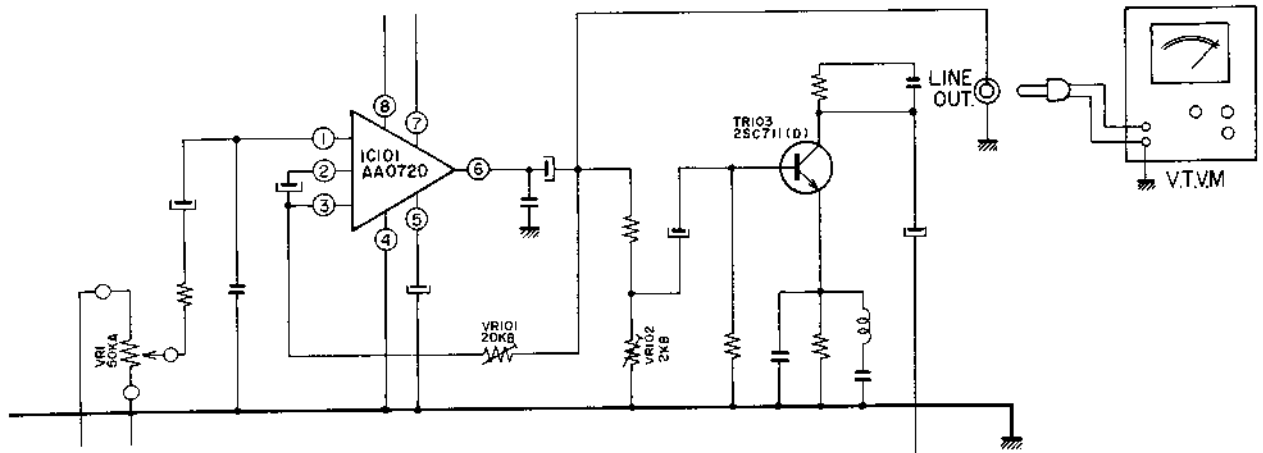


Fig. 3

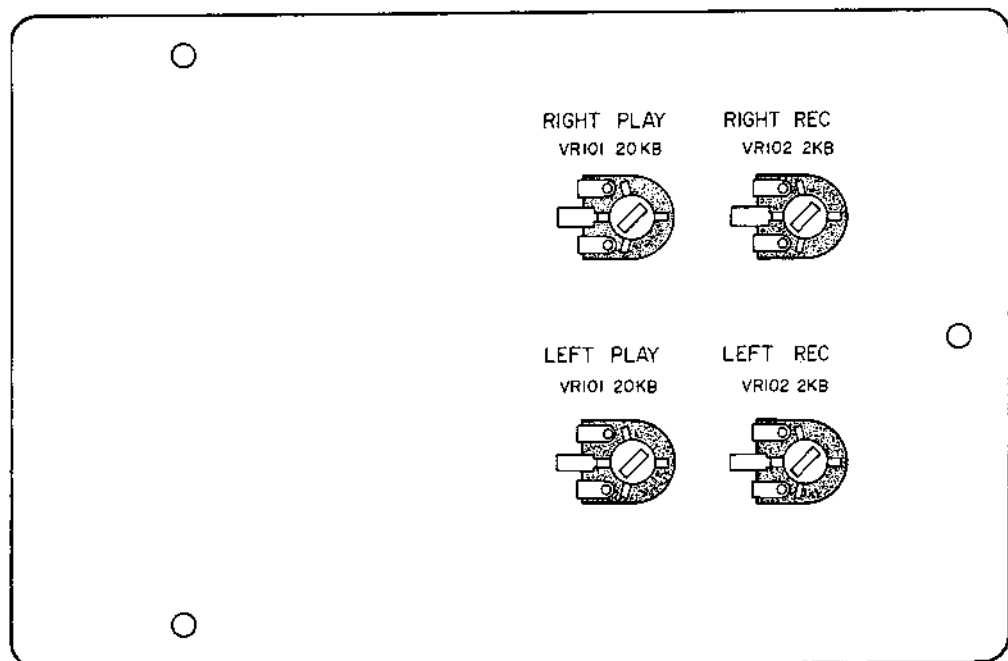


Fig. 4

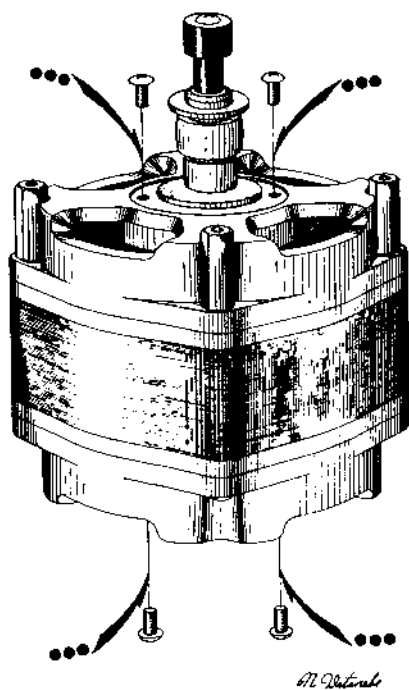
VII. MAINTENANCE PROCEDURES

1. LUBRICATION INSTRUCTION

For maximum service life and optimum performance, lubricate the parts identified below after each 500 hours of operation. Use only light machine oil of good quality.

Motor (See Fig. 1)

CAUTION : DO NOT OVER-LUBRICATE, AND WIPE OFF EXCESS OIL WITH A COTTON SWAB SOAKED IN ALCOHOL. OTHERWISE, THE EXCESS LUBRICANT MAY BE SCATTERED DURING OPERATION, AND THE RUBBER COMPONENT PARTS WILL DETERIORATE.



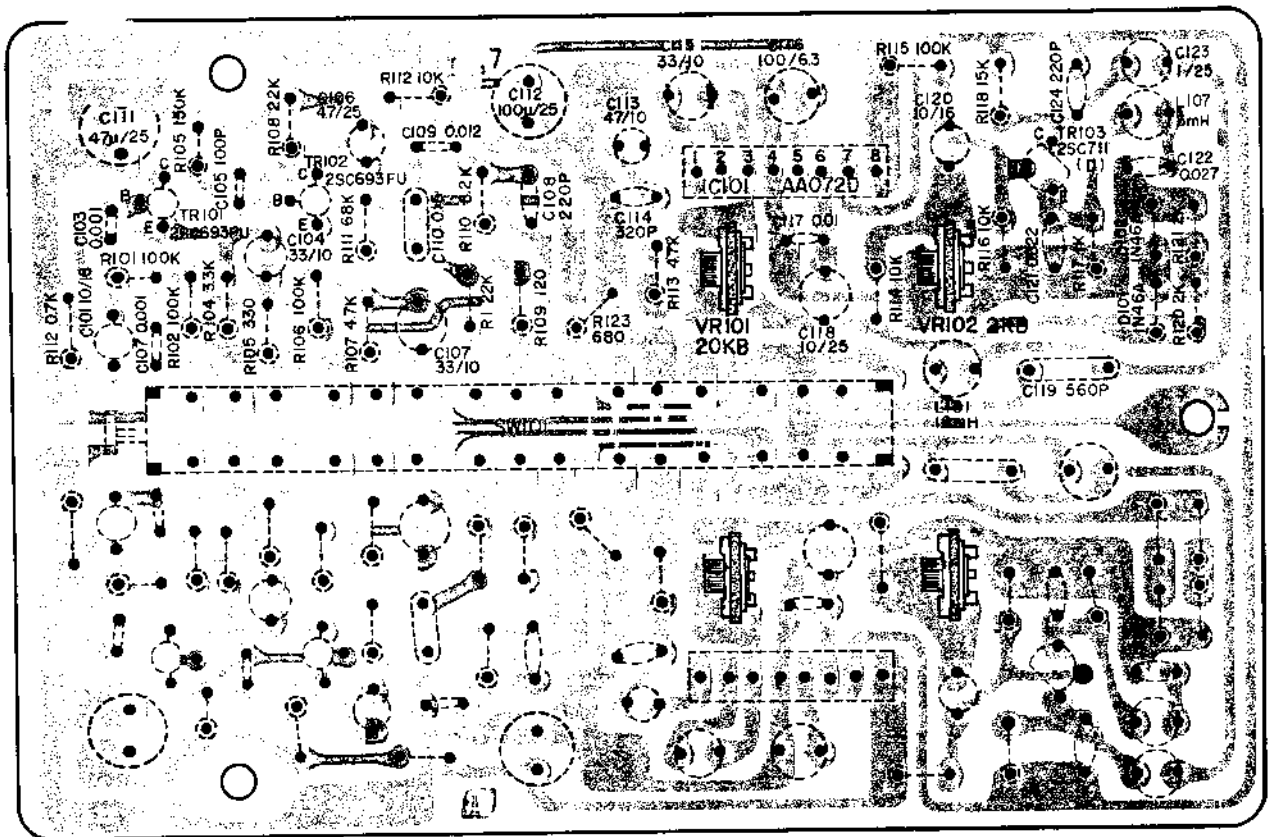
● 1 drop

MOTOR

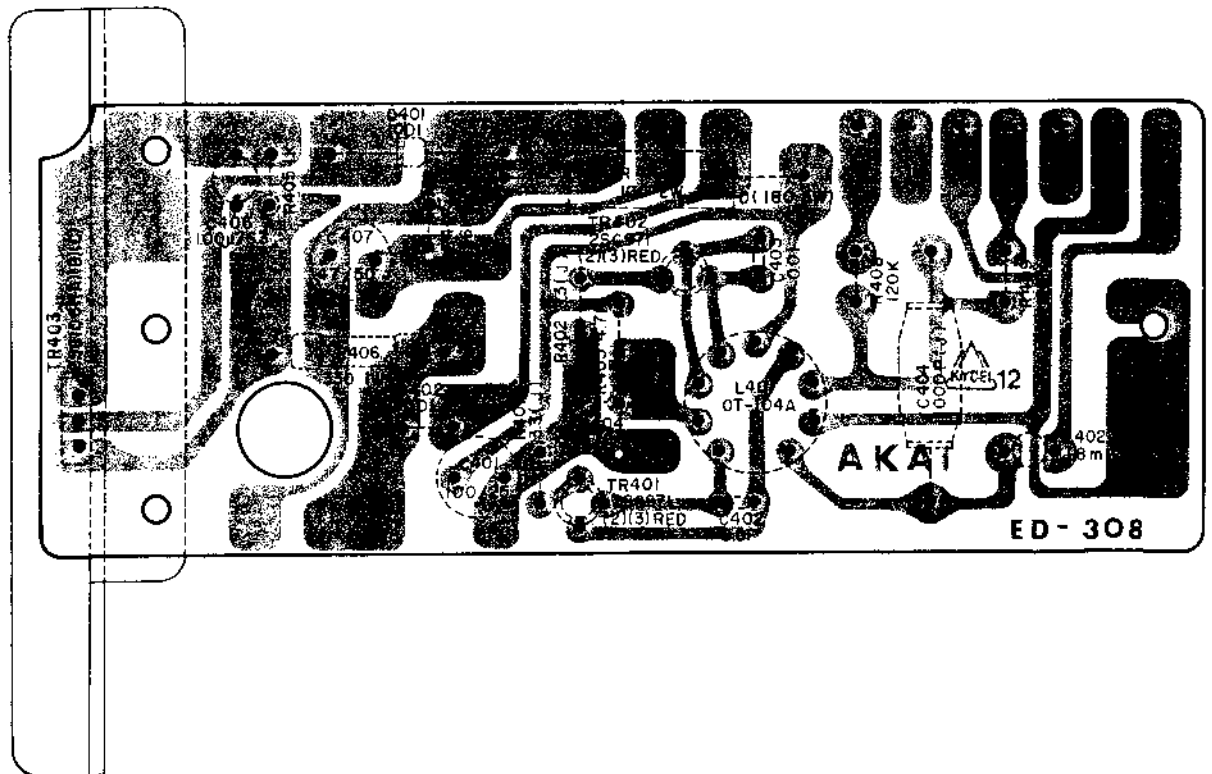
Fig. 1

VIII. COMPOSITE VIEWS OF COMPONENTS

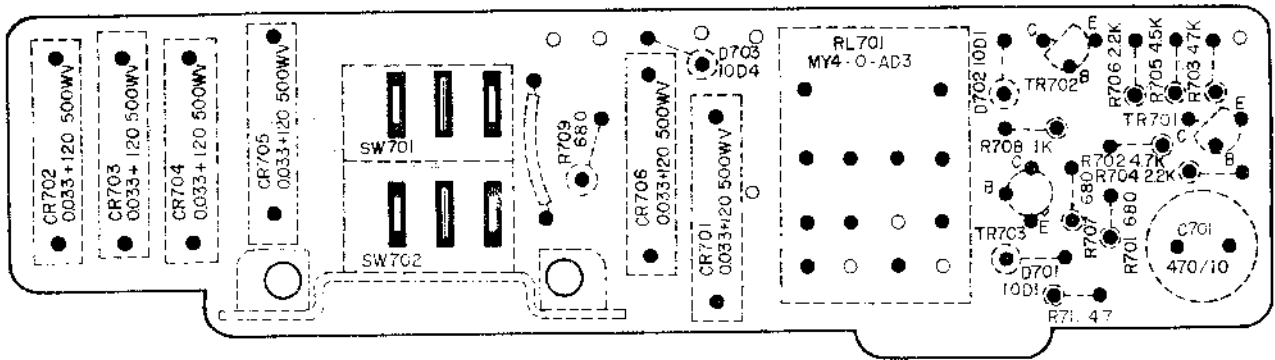
PRE-AMP. P.C. BOARD (ED0506)



OSC. P.C. BOARD (ED-308)

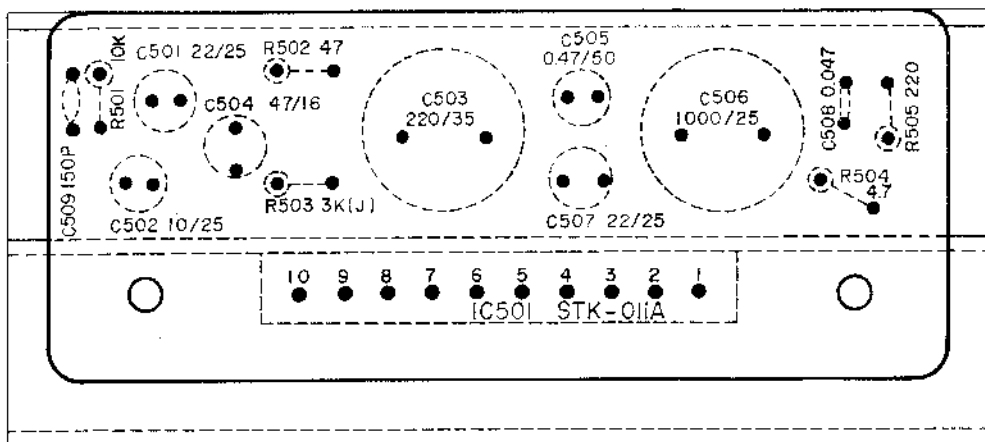


RELAY P.C. BOARD (ED-522)

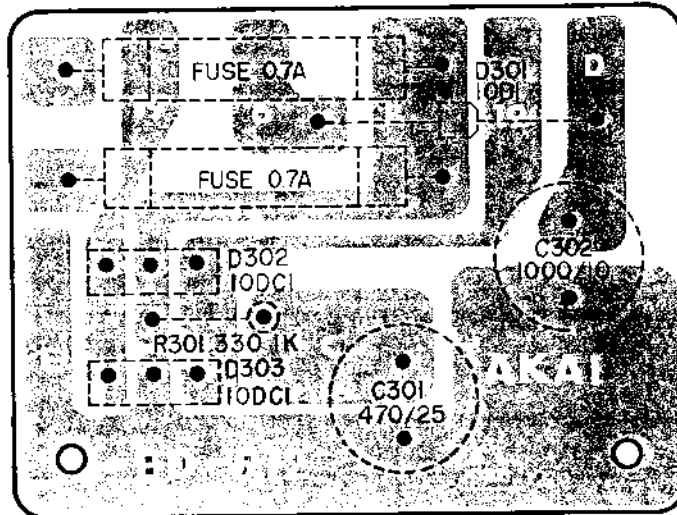


- TR701 2SC271(D)
- TR702 2SC71(D)
- TR703 2SC968(A)

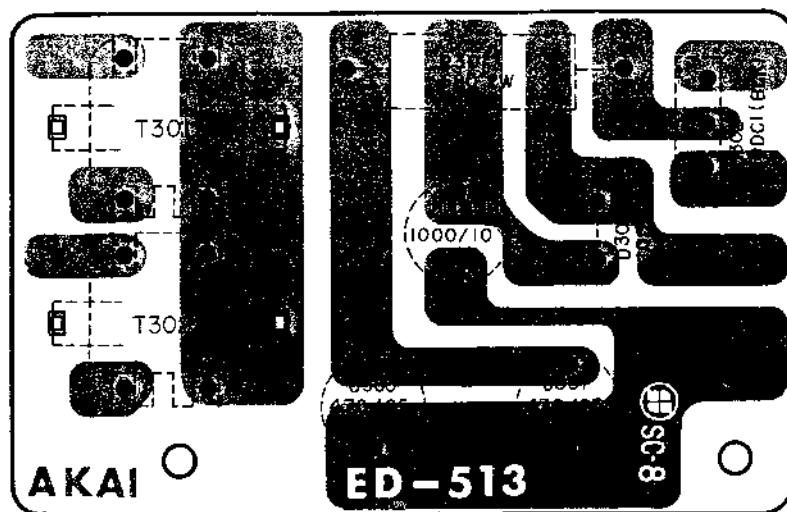
MAIN AMP. P.C. BOARD (ED-515)



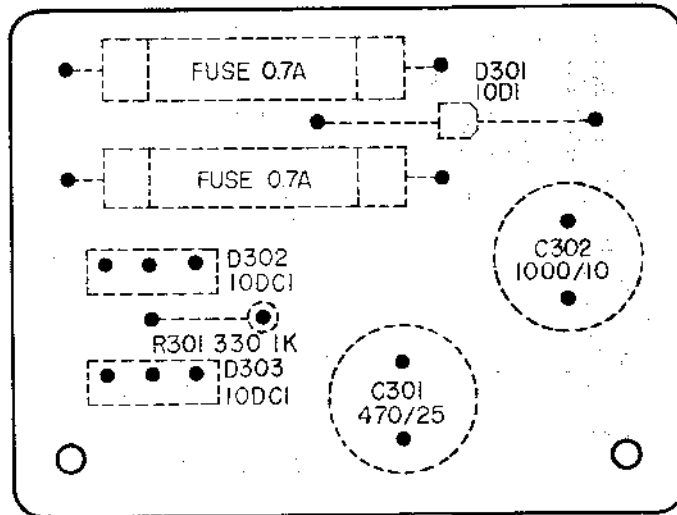
POWER SOURCE P.C. BOARD (ED-512)



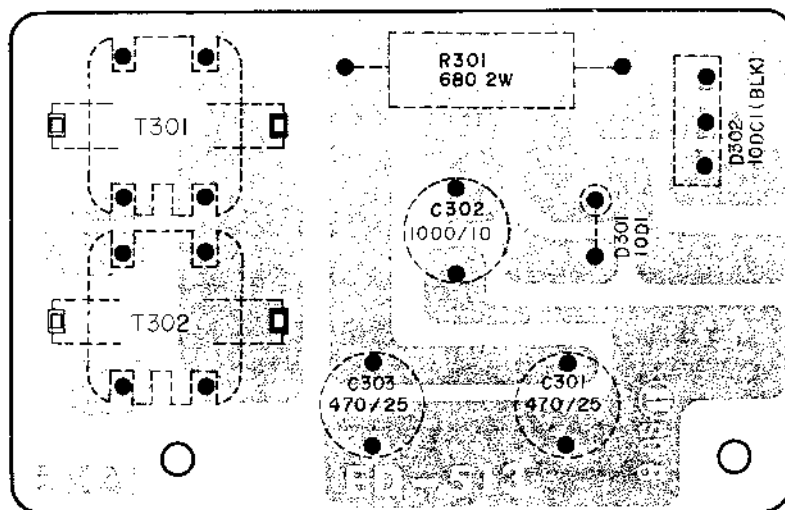
(D) POWER SOURCE P.C. BOARD (ED-513)



POWER SOURCE P.C. BOARD (ED-512)



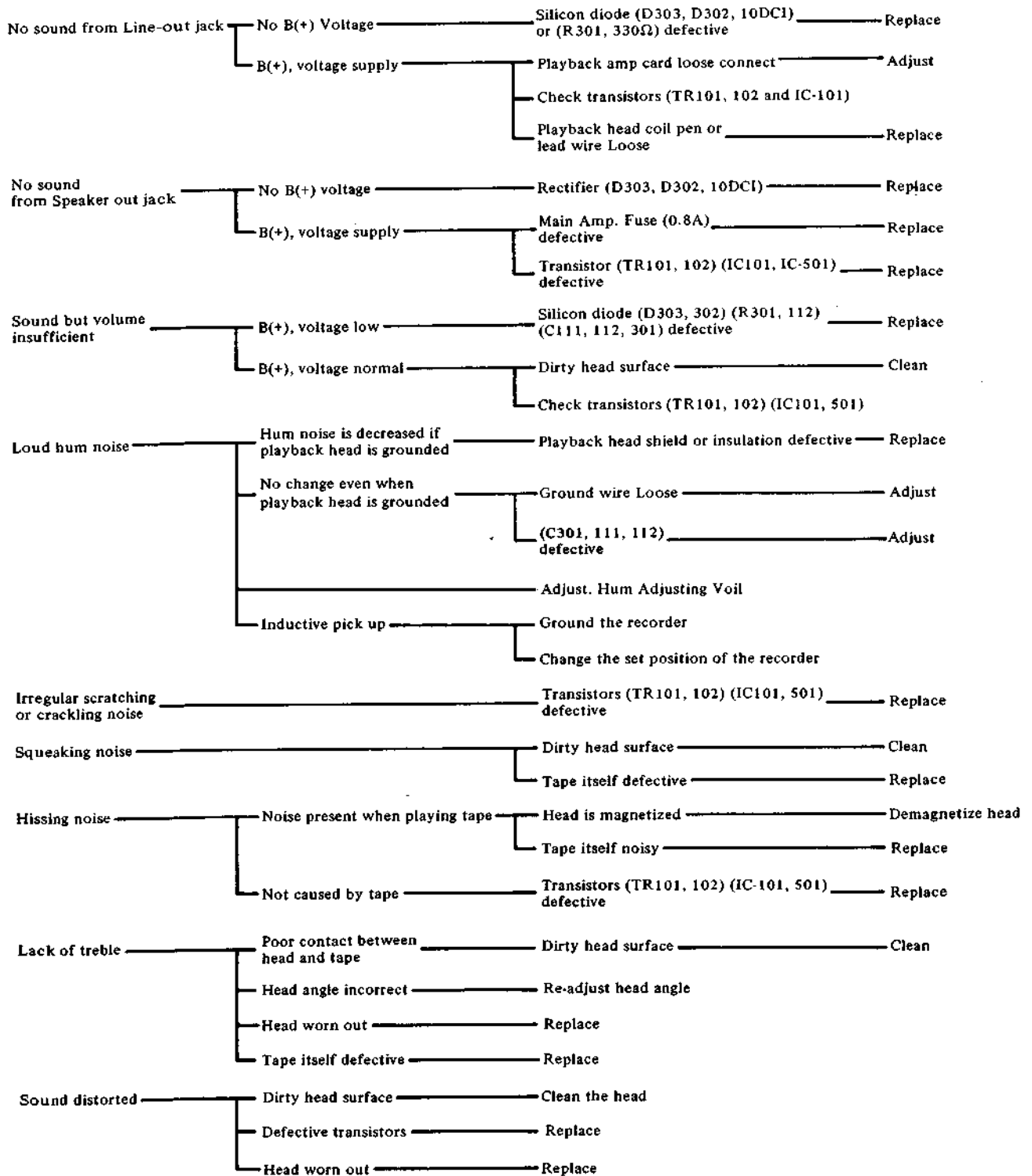
(D) POWER SOURCE P.C. BOARD (ED-513)



IX. TROUBLE SHOOTING CHART

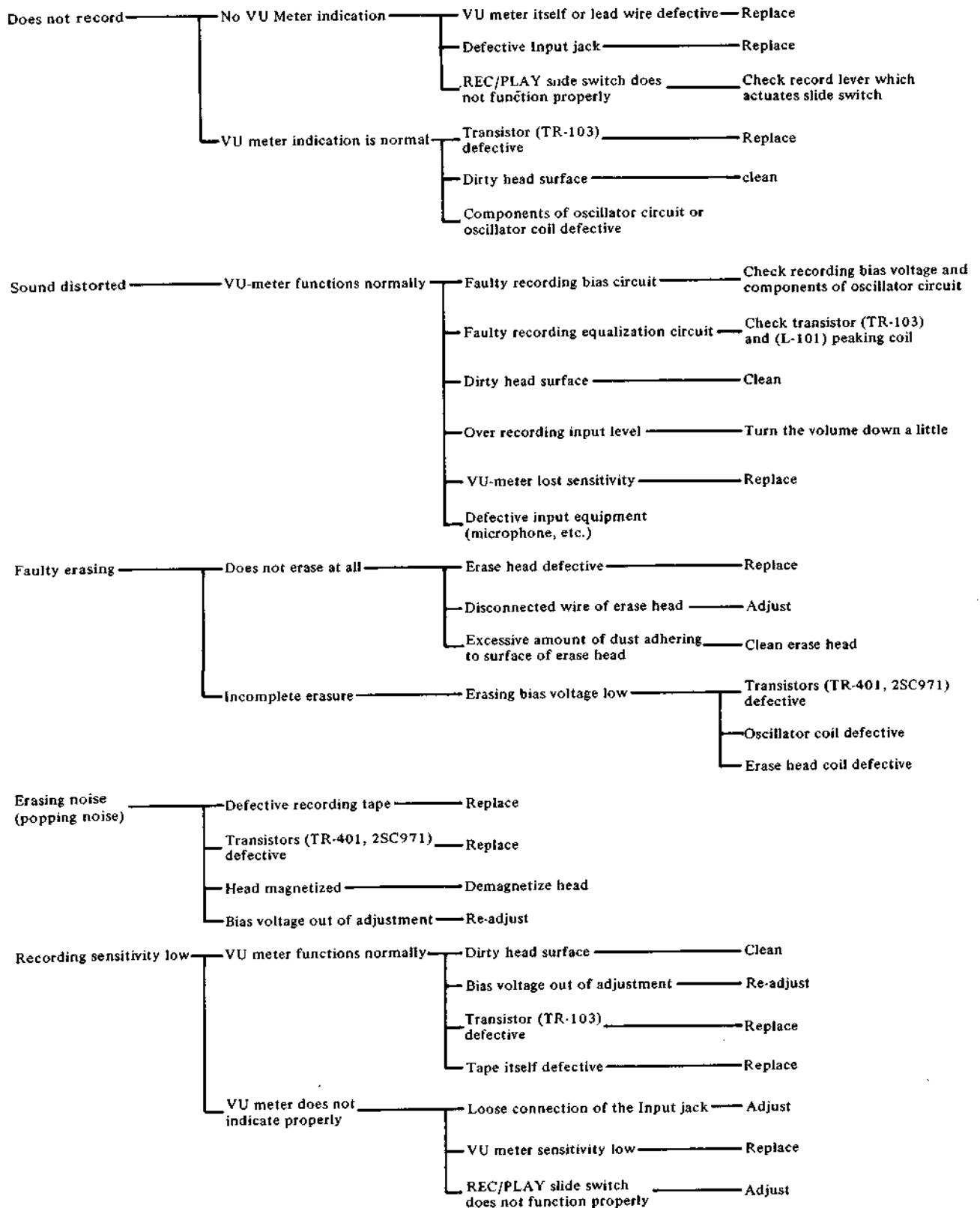
SECTION "A" TROUBLES WITH AMPLIFIER

1. Playback problems. (Unit set in play position.)



2. Recording problems.

(Unit plays back pre-recorded tapes satisfactorily, but recording unsatisfactory.)



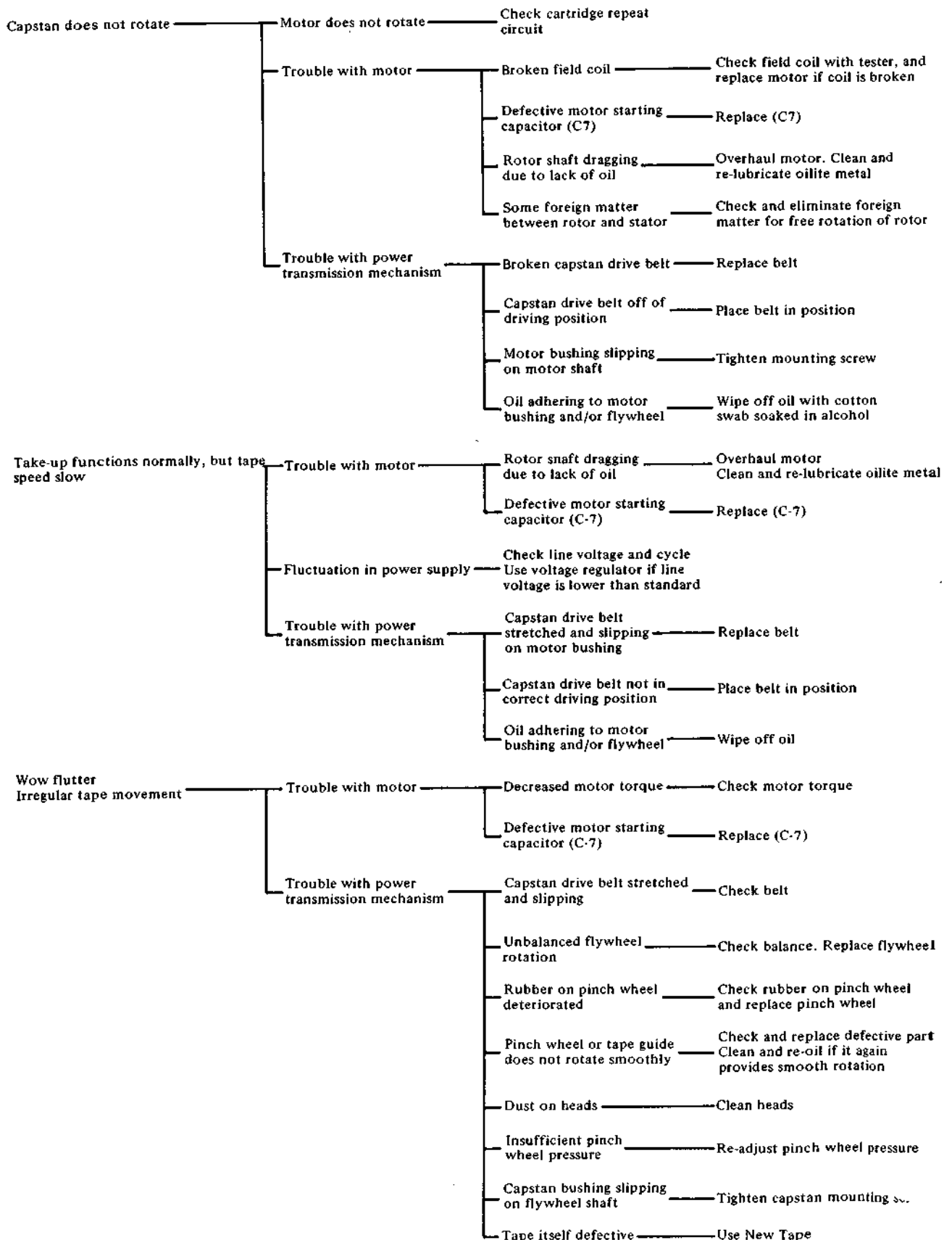
Sound fades or drops out

- Dirty head surface ————— Clean
- Tape itself defective ————— Replace recording tape
- Back tension too weak ————— Adjust the tension of supply spindle
- Recording bias voltage out of adjustment ————— Re-adjust

Much difference in recording levels between left and right channels

- Difference sensitivity of the line volume itself ————— Replace
- Recording level out of adjustment ————— Adjust (VR-102, 2KB)

SECTION "B" TROUBLE WITH TAPE TRANSPORT MECHANISM



Unit does not operate in Fast Forward mode — Motor does not rotate at Fast speed — Broker field coil — Replace Motor

Unit does not operate in Fast Forward mode — Motor does not rotate at Fast speed — Fuction switch does not operate properly — Repair or re-adjust

Cycle change switch does not move — No lubricant on cycle conversion lever — Relubricate lever

Cycle change switch does not move — Eccentric or bent cycle conversion lever — Check cycle conversion lever

Cycle change switch does not move — Capstan drive belt not on driving track of flywheel — Check capstan drive belt

Cycle change switch does not move — Loose motor bushing — Tighten mounting screw

Cycle change switch does not move — Loose motor mount screw — Tighten mounting screw

Cycle change switch does not move — Oil on motor bushing or on flywheel — Wipe off oil with cotton swab soaked in alcohol

Cartridge Auto-stop does not work properly — B(+), voltage supply to the Relay — Relay (RL-701) defective — Replace

Cartridge Auto-stop does not work properly — B(+), voltage supply to the Relay — Check (TR0703)

Cartridge Auto-stop does not work properly — No B(+), voltage supply — (D301, C302) defective — Replace

Cartridge Auto-stop does not work properly — Function Switch does not work properly — Adjust

Cartridge Program Selector does not operate — When operating the Program Selector Button — Solenoid Coil (RL-1) — Replace

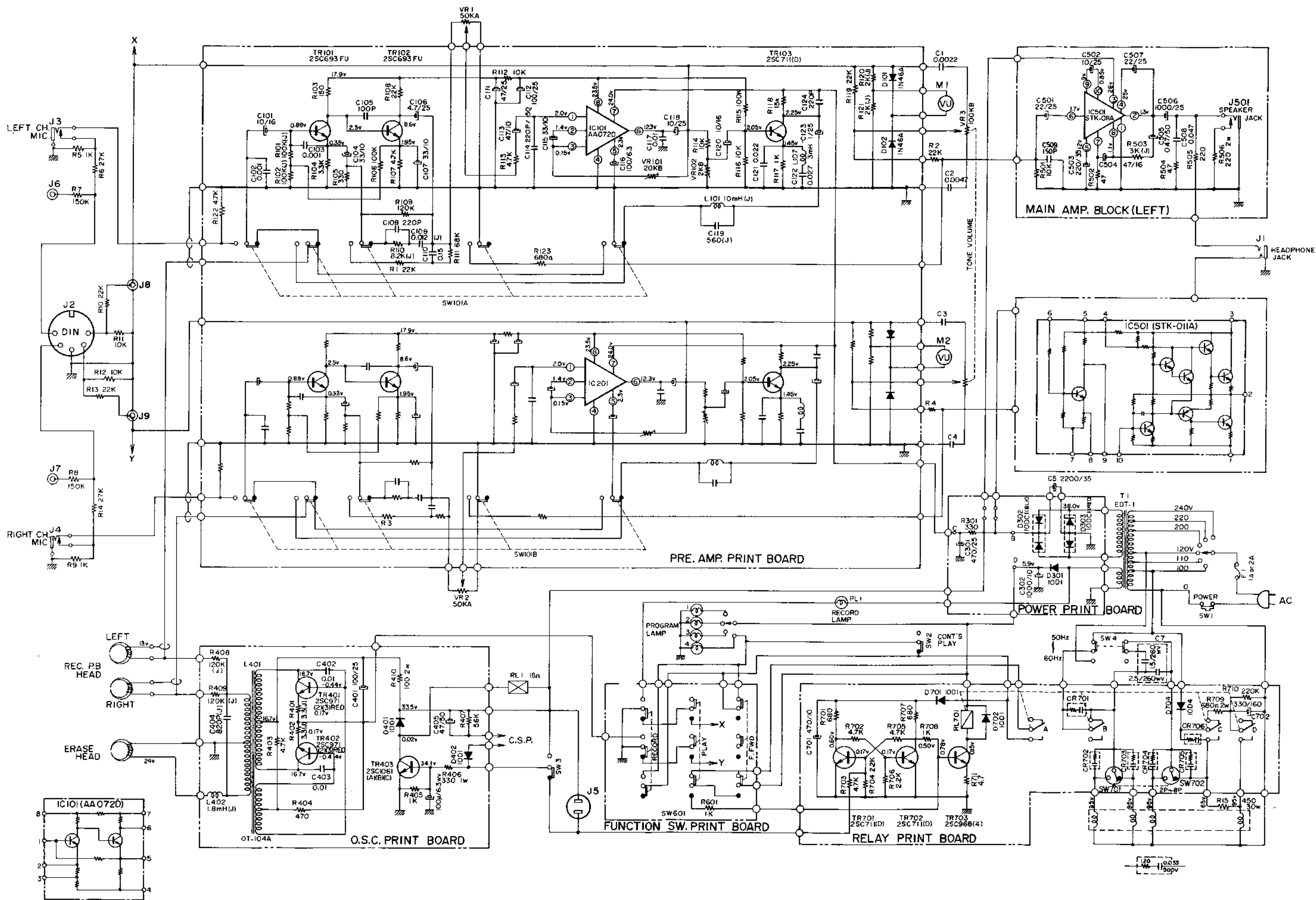
Cartridge Program Selector does not operate — When operating the Program Selector Button — Program Changing Switch (SW-3) defective — Replace

Cartridge Program Selector does not operate — When operating the Program Selector Button — (R406, 330 IW) (C406, 100 μ 6,3 WV) — Replace

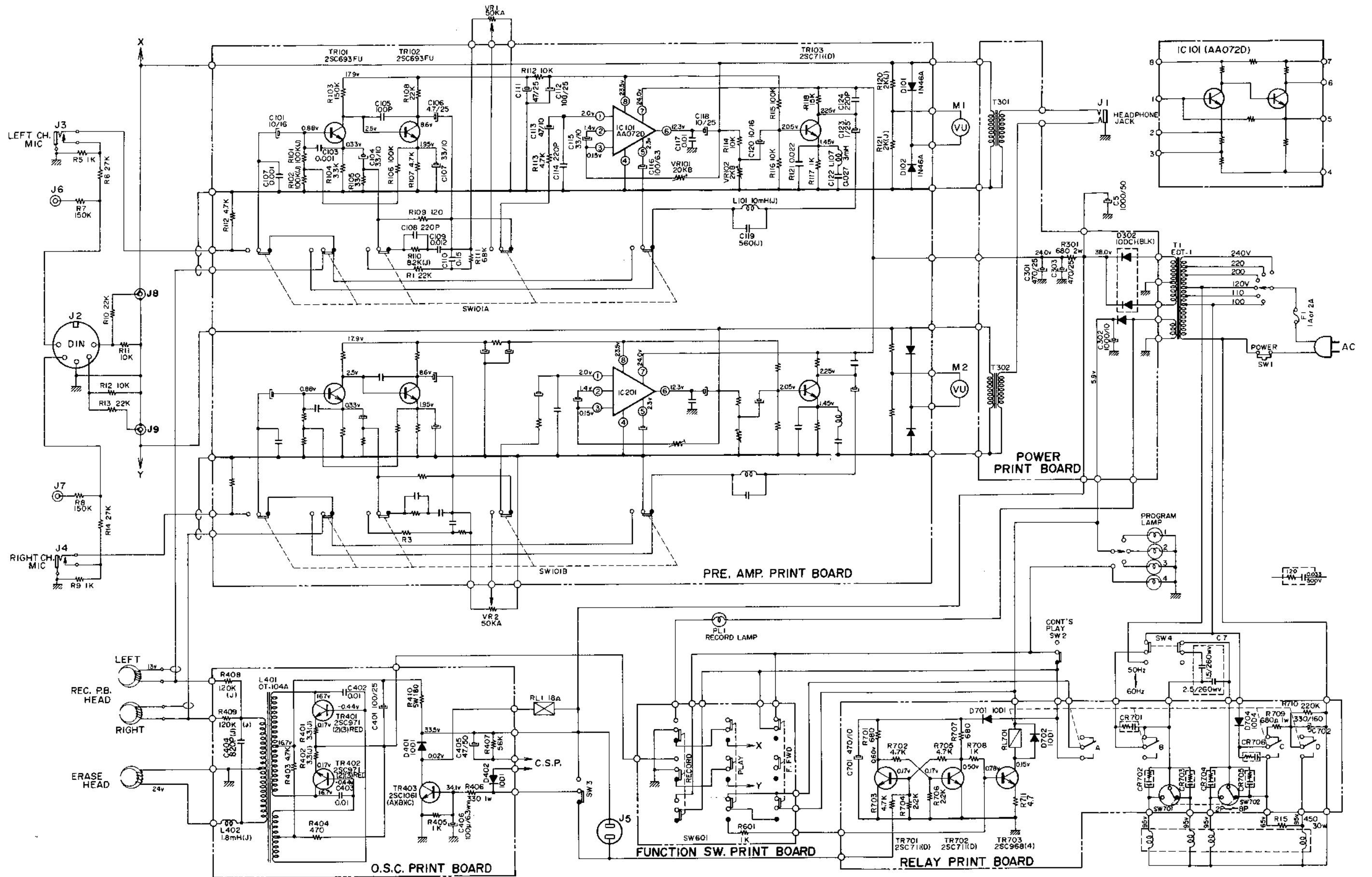
Cartridge Program Selector does not operate — When on automatic — Sensing tape itself defective — Replace

Cartridge Program Selector does not operate — When on automatic — Loosing contact point — Adjust

Cartridge Program Selector does not operate — When on automatic — D402 (101) defective — Replace



CR-80 SCHEMATIC DIAGRAM 14006482



CR-80D SCHEMATIC DIAGRAM 14006502