


ONKYO SERVICE MANUAL

COMPACT DISC PLAYER MODEL DX-100

UDN, UD	120V AC, 60Hz
UGV, UG	220V AC, 50Hz
UW	120/220V AC, 50/60Hz
UQA, UQB	240V AC, 50Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

SPECIFICATIONS

Type:	Compact Disc player with optical pickup
Quantization:	16 bit linear
Channels:	2 (Stereo)
Frequency response:	5Hz – 20kHz \pm 0.5dB
Dynamic range:	Over 96dB
Total harmonic distortion:	0.003% (1kHz)
Channel separation:	Over 90dB
Wow and flutter:	Unmeasurable
Output:	2.0 volts
Pickup:	Semiconductor laser type
Track location:	By track and index number
Power consumption:	16 watts
Dimensions:	330(W) x 85(H) x 312(D) mm
Weight:	5.0kg
Accessories:	Connection cables

Specifications are subject to change without notice.



LASER PICK-UP REMOVAL

1. Remove the disc tray and pick-up cover. (See Figure 21)
2. Remove four screws (A) of mecha. chassis (B) .
3. Remove two screws (C) of guide rack assembly (D) .
4. Short-circuit the P.C. Board using short plug, then remove connector and leads. (Refer to CAUTIONS ON REPLACEMENT OF PICK-UP.)
5. Remove outside spring (E) .
6. Remove two screws (F) , and the laser pick-up (G) will be removed.

*BEWARE OF THE SPRINGS
UNDER MECHA CHASSIS:
THEY JUMP VERY FAST*

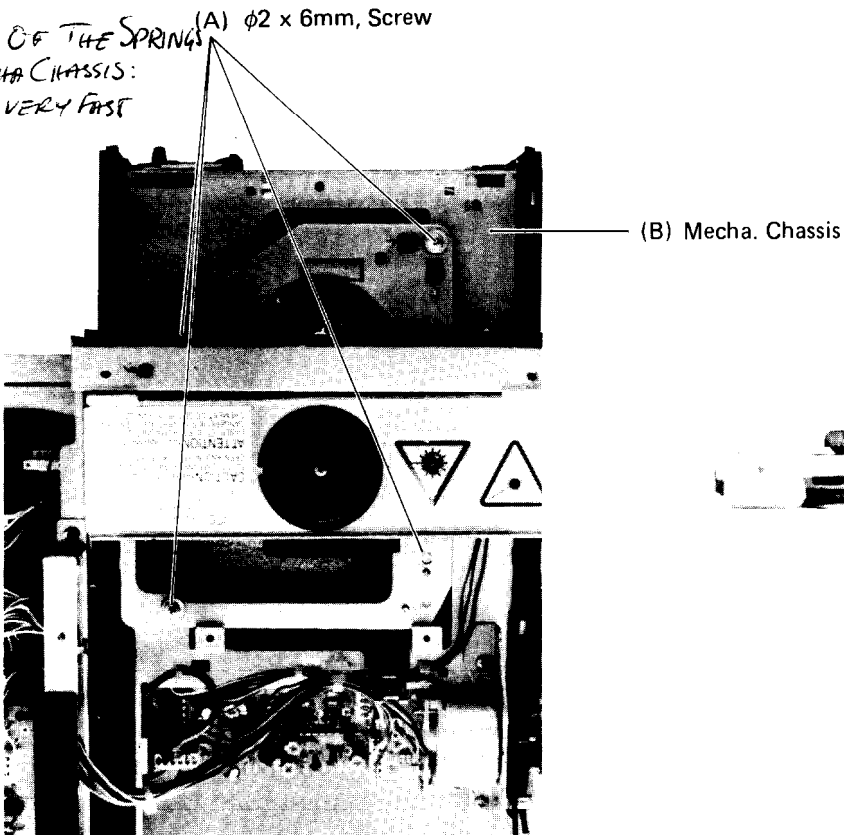
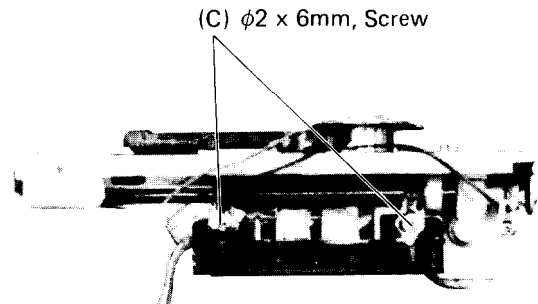


Figure 21



Guide Rack Assembly

Figure 22

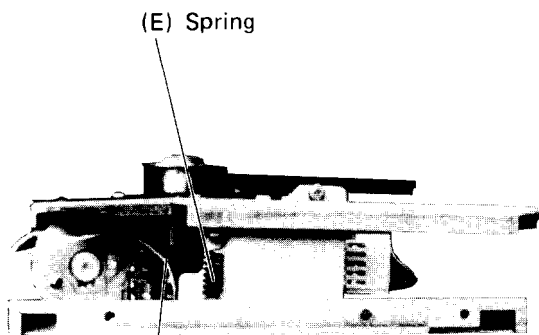


Figure 23

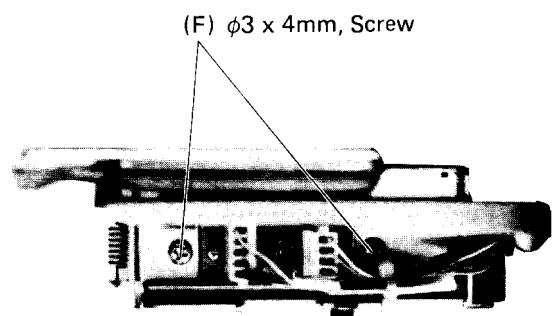
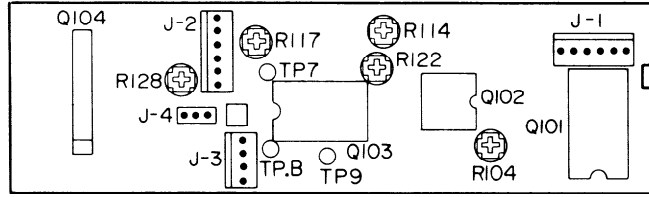


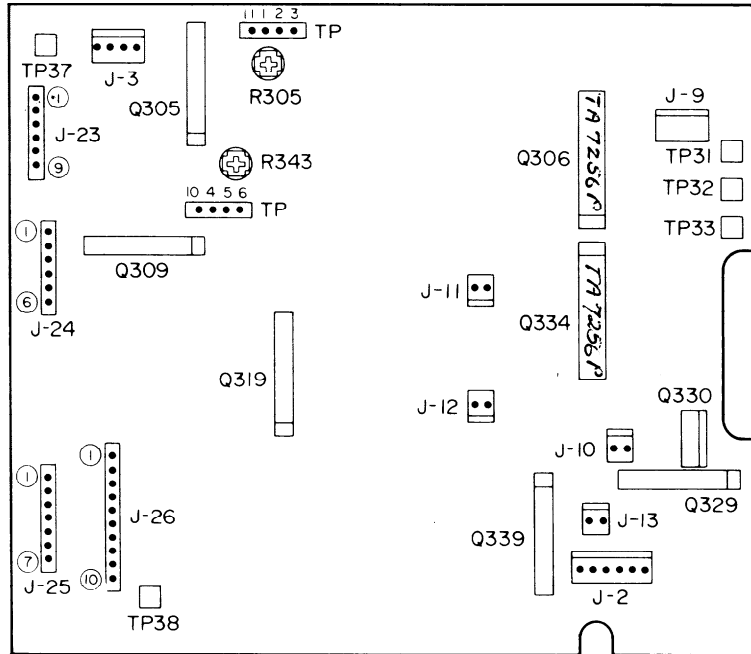
Figure 24

ADJUSTMENT PROCEDURES

Head ampli. P.C. Board



Servo P.C. Board



Main P.C. Board

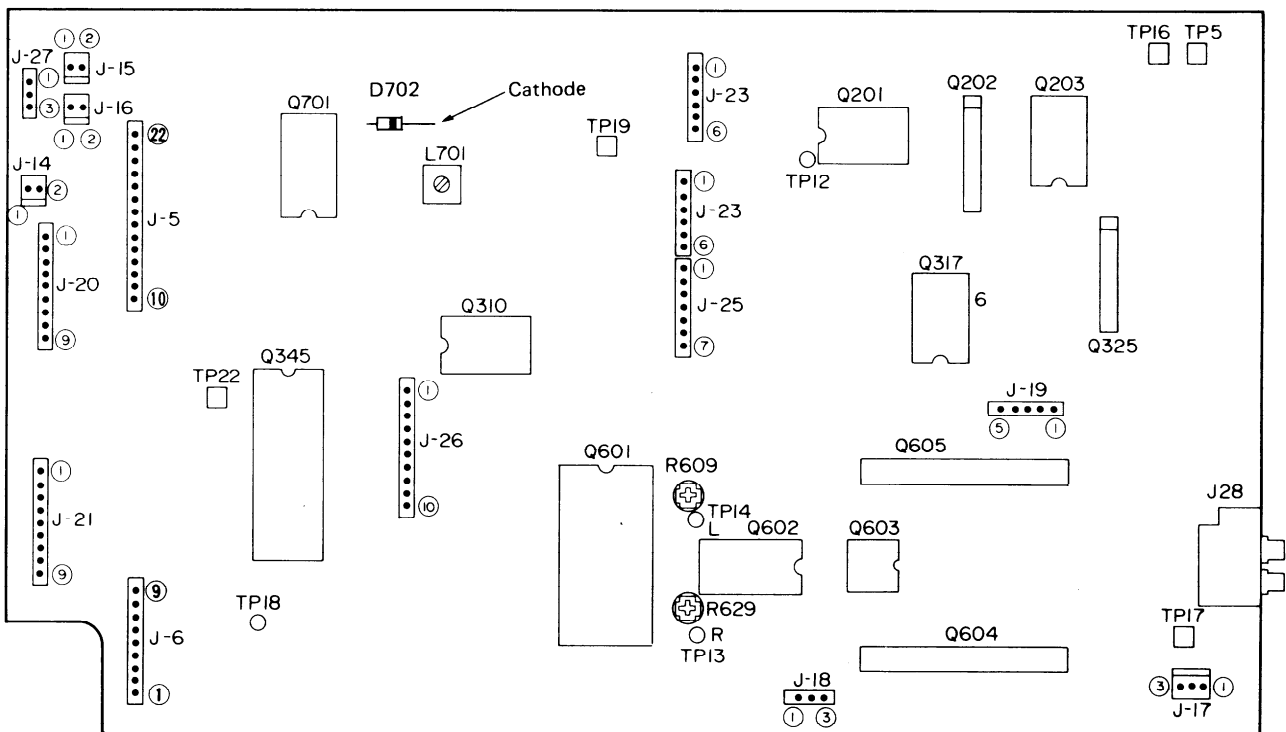


Figure 25

Instruments Required

- | | | |
|----------------------------------|---------------------------|-----------------------------------|
| 1. Laser Power Meter | 4. Tester | 7. Test Disc A (YEDS7) |
| 2. Oscilloscope | 5. AC Millivoltmeter | 8. Attachment Jig |
| 3. PU Alignment Jig (for DX-100) | 6. Regulated Power Supply | 9. Clamper (Exploded view No. 58) |

Adjustment Procedure in Pick-up Replacement

Step	Measurement Item	Measurement Reference Value	Disc	Operation Button	Test Point	Adjustment Point	Test/Setup	Note
1	Laser Power Adjustment	Light output $250\mu W \pm 5\mu W$	Not loaded	Power ON	Pick-up lens	R128	Figure 26, 27	J-2, J-9, J-10 J-11 S103, 104
2	PU Position (Height) Adjustment	DC 0V $\pm 50mV$	TYPE A	PLAY	Q101 Pin (15), (16) Attachment TP, A	R104 R117 pick-up lower side (A), (B), (C).	Figure 28, 29, 30, 31	J-2, J-3, J-9, J-10, 11 S103, S104
3	PU Tangential Direction Adjustment (Angle Adjustment)	AC milivoltmeter Max.	TYPE A	PLAY	TE, B	Pick-up lower side (C).	Figure 32, 33, 34	Keep unit under the same condition as for Step 2 just finished.
4	PU Radial Direction Adjustment (Angle Adjustment)	AC milivoltmeter Max.	TYPE A	PLAY	TE, B	Pick-up lower side (A).	Figure 32, 33, 34	Same as above
5	Repeat steps 2 via 4.							
6	DC Balance Adjustment	Tracking error 0V center	TYPE A	PLAY	TE, B	R117 (↻) R114	Figure 35, 36, 37, 38	Same as above
7	Tracking Error Balance Adjustment	DC offset value 0V center	TYPE A	PLAY	TE, B Attachment TP, B, C	R117	Figure 39, 40, 41	Same as above
8	AC Balance Adjustment	Tracking waveform 0V center	TYPE A	PLAY	TE, B Attachment TP, B, C	R122	Figure 39, 40, 41	Same as above
9	Focus Balance Adjustment	Jitter meter Min.	TYPE A	PLAY	TP12, Q317 Pin (6)	R104	Figure 42, 43, 44	J11

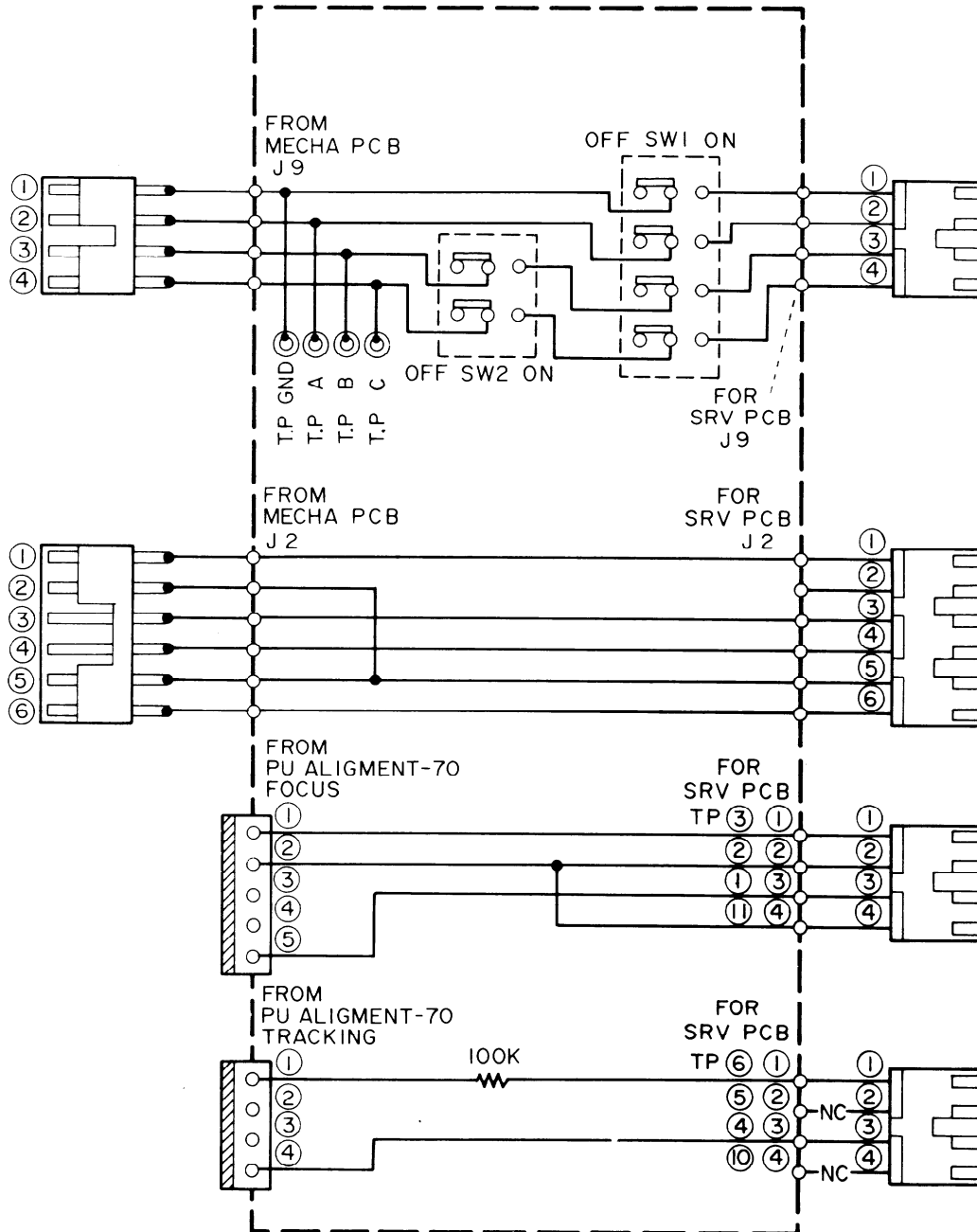
Servo Circuit Adjustment

Step	Measurement Item	Measurement Reference Value	Disc	Operation Button	Test Point	Adjustment Point	Test/Setup	Note
1	Focus Gain Adjustment	AC 28mV $\pm 2mV$ RMS	TYPE A	PLAY	Servo P.C. Board TP-11, 1, 2, 3	R305	Figure 45, 47, 48	1kHz
2	Tracking Gain Adjustment	AC 44mV $\pm 4mV$ RMS	TYPE A	PLAY	Servo P.C. Board TP-10, 4, 5, 6	R343	Figure 46, 49, 50	1.5kHz

Analog Circuit Adjustment

Step	Measurement Item	Measurement Reference Value	Disc	Operation Button	Test Point	Adjustment Point	Test/Setup	Note
1	DC Offset Adjustment	DC 0V ±10mV	TYPE A	PAUSE	Main P.C. Board TP13 (R) TP15 (L)	R629 (R) R609 (L)	Figure 51	

ATTACHMENT JIG



LASER POWER ADJUSTMENT

The laser diode and its S/N will be deteriorated if the light power output of the laser diode has been not adjusted within the specified limit of ($250\mu\text{W} \pm 5\mu\text{W}$). Accordingly, the light power output adjustment must always be made when the pick-up was replaced.

The height and angle adjustments for the pick-up can be made easily during replacement of the pick-up as long as the hex-adjustment screws (A), (B), & (C) are not rotated. (See Figure 30)

Adjustment Procedure

1. Turn power of unit OFF.

Disconnect connector J-9 on servo P.C. Board.

2. Connect connector J-9 on attachment jig to J-9 on servo P.C. Board. Set SW1 on attachment jig to OFF and SW2 to OFF.

Connect connector J-9 disconnected to terminal J-9 on attachment.

3. Disconnect J-2 of servo P.C. Board, connect J-2 on attachment to J-2 on servo P.C. Board, and connect connector J-2 terminal disconnected to J-2 on attachment.
4. Set 2-gang leaf switches S103 and S104 of mechanism assembly to ON.
5. Disconnect 2P connector J-10 (tray motor) and J-11 (feed motor) on servo P.C. Board.
6. Open tray by pulling it strongly with your hand (by exerting force of approx. 2.8kg).
7. Turn R128 10k ohm semi-fixed resistor clockwise fully. (Power MIN)
8. Set power supply switch to ON.

Apply laser power meter sensor to laser pick-up lens and slowly turn R128 of Head ampli. P.C. Board counter-clockwise so that the laser power meter indicates $250\mu\text{W} \pm 5\mu\text{W}$.

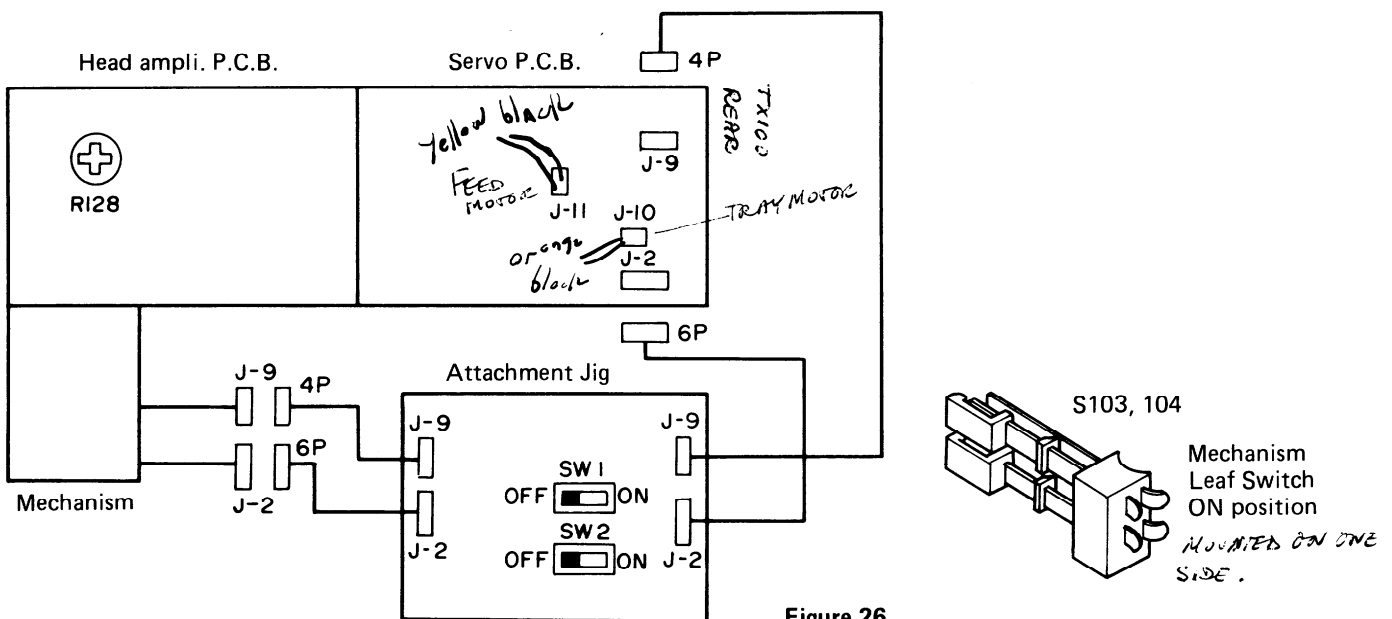


Figure 26

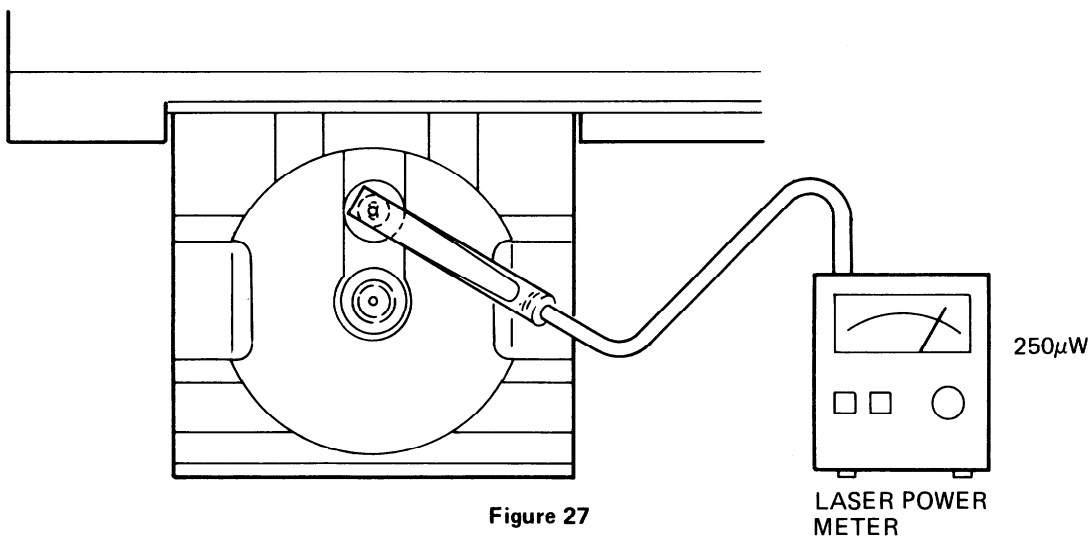
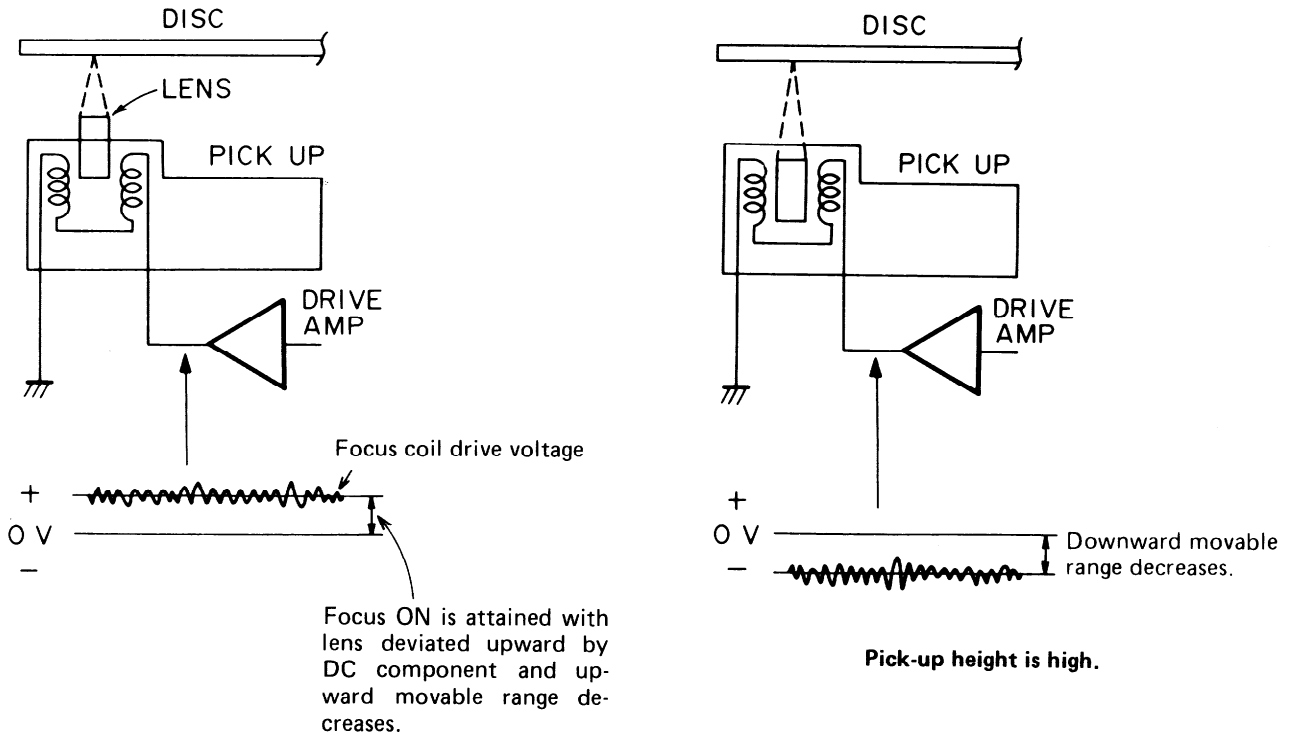


Figure 27

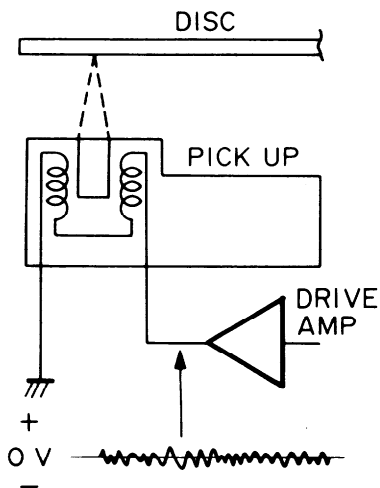
PICK-UP HEIGHT ADJUSTMENT

Pick-up's movable range in focus direction can be maximized by adjusting the DC voltage (offset voltage) applied to focus coil to 0V when the focus servo is actuated.



Pick-up height is low.

Figure 28



Pick-up height is suitable.

Pick-up height can be adjusted by moving pick-up or downward direction while observing focus coil drive voltage.

Figure 29

Adjustment Procedure

1. Turn power of unit OFF.
2. Connect connector J-9 on attachment jig to J-9 on servo P.C. Board. Set attachment switches SW1 and SW2 to ON. Connect connector J-9 disconnected to J-9 terminal on attachment.
3. Disconnect J-2 on servo P.C. Board, connect J-2 on attachment to J-2 on servo P.C. Board, and connect connector J-2 terminal disconnected to J-2 on attachment.
4. Set 2-gang leaf switches S103 (close switch) and S104 (power supply for laser diode) of mechanism assembly to ON.
5. Disconnect (2P) connector J-10 (tray motor) on servo P.C. Board.
6. Disconnect (4P) connector J-3 (SIGNAL) on servo P.C. Board.
7. Connect circuit tester (Ohm meter) to pin (15) and (16) of Q101, TA7731P on head ampli. P.C. Board and adjust R104 22K ohm semi-fixed resistor so that the tester indicates 10K ohm $\pm 0.5K$ ohm. (Focus balance coarse adjustment) After the coarse adjustment connect 4P connector J-3 to J-3 on servo P.C. Board.
8. Turn R117 10K ohm semi-fixed resistor counterclockwise (↺) fully.
9. Open tray.
10. Put TEST DISC YEDS-7 (TYPE 3) on DISC motor and hold it with clumper. (The clumper of mechanism assembly will be removed by removing only one screw.)
11. Connect oscilloscope to test point TP. A (focus coil) terminal on the attachment. (DC range 0.1V/DIV.)
12. Turn power of unit on and set unit to PLAY mode.
13. Disconnect (2P) connector J-11 (Feed motor) on servo P.C. Board.
14. Adjust pick-up adjusting hex screw with a hex wrench so that display on the scope deflects up and down with center or 0V while observing the scope display.

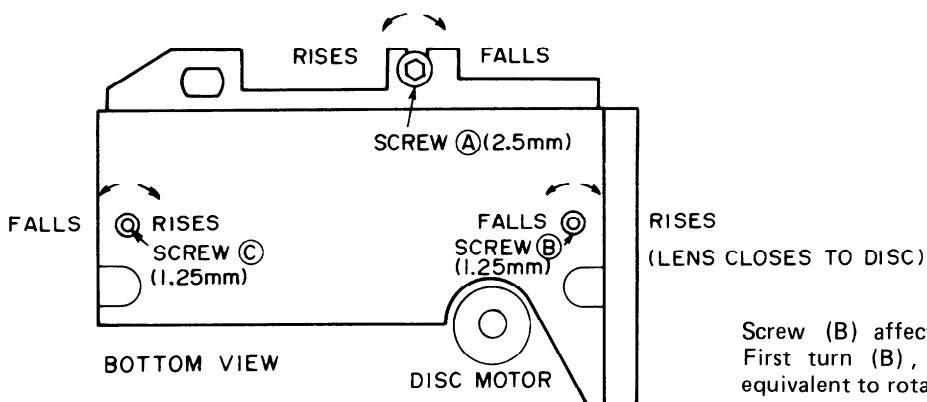


Figure 30

15. Keep power of unit ON for angle adjustment to be proceeded in the next item.

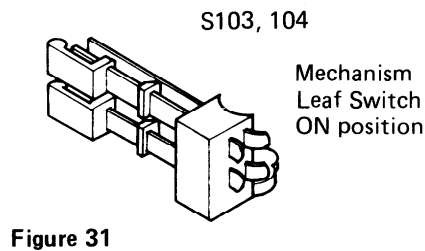
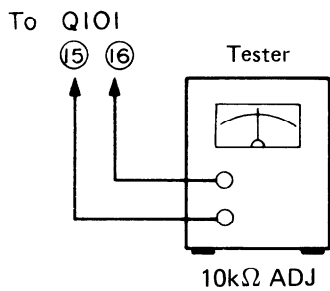
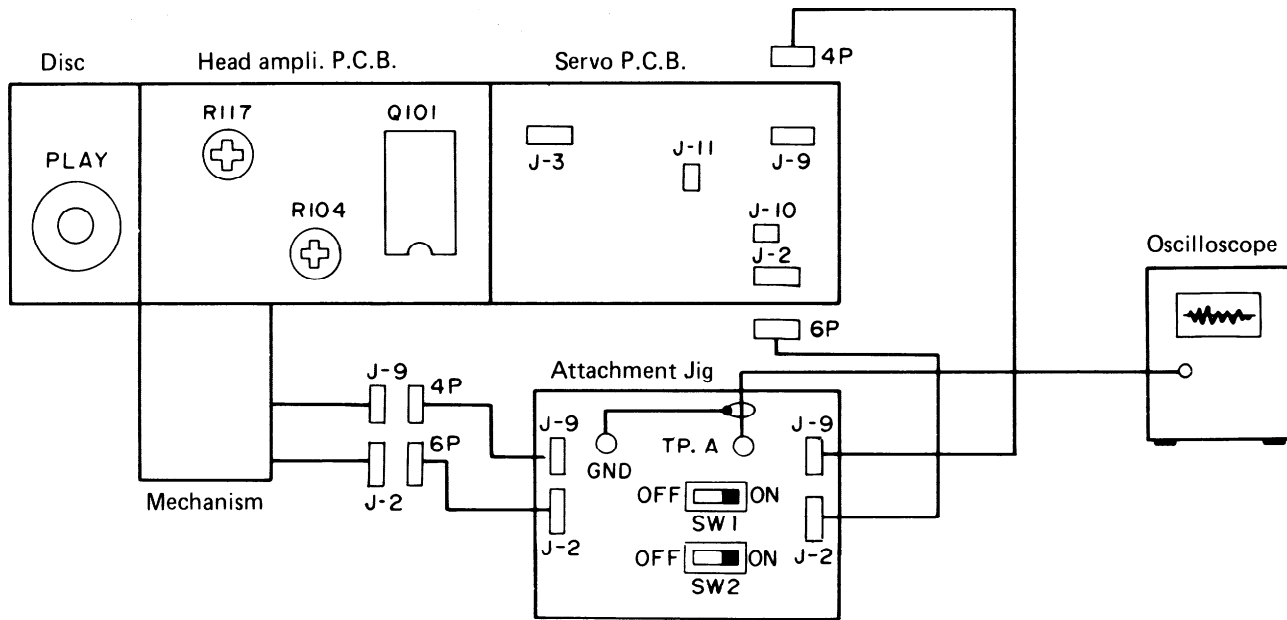


Figure 31

PICK-UP ANGLE ADJUSTMENT

Angle deviation of the pick-up can be divided into tangential direction and radial direction.

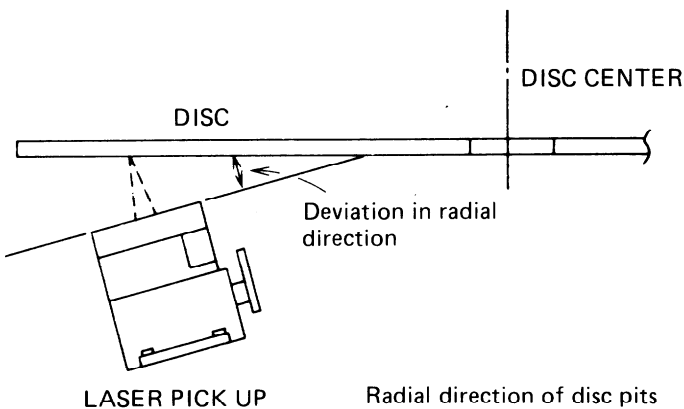


Figure 32

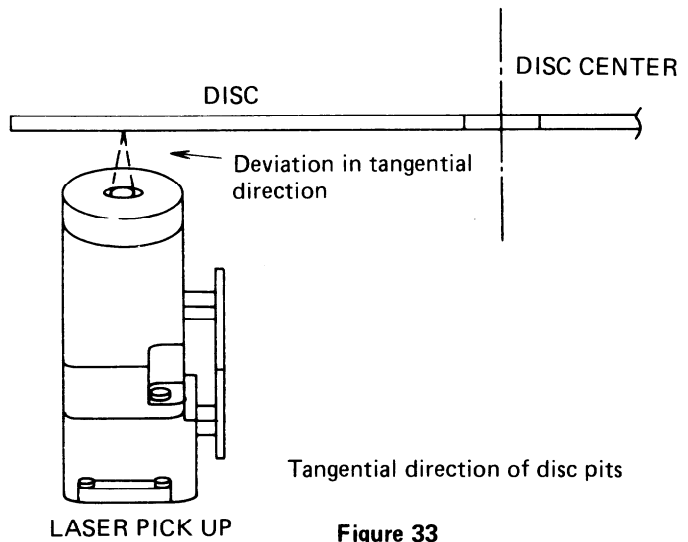


Figure 33

Since the angle deviation in both direction prevents a laser beam to fall at a right angle to a disc pit, random light reflection, etc. will be caused and normal reflection light cannot be obtained. Thus, angle adjustments for both tangential and radial directions will be needed. In this unit, outputs from the 4-division photo diodes are utilized to make adjustment for the optimum angle.

The angle deviation, scratches, dust, etc. give considerable affection on anti-vibration performance, so sufficient case should be given in the adjustments. After completion of the adjustments, the adjusting screws must be mechanically fixed securely, by using such as screw lock, etc.

Adjustment Procedure (Tangential Direction)

Keep unit under the same condition as for pick-up height adjustment just finished.

1. Set attachment switches SW1 to ON and SW2 to OFF. (Set tracking servo to OFF.)
2. Connect AC voltmeter between test point TE. B terminal on head ampli. P.C. Board and ground. (Range 0.3V)
3. Connect oscilloscope to test point TE. B terminal on head ampli. P.C. Board. Adjustment will be performed easily, if it is done while observing scope display.
4. Turn adjusting screws until AC voltmeter reads MAX output. (Adjusting screw (C) is the most critical for tangential direction adjustment.)

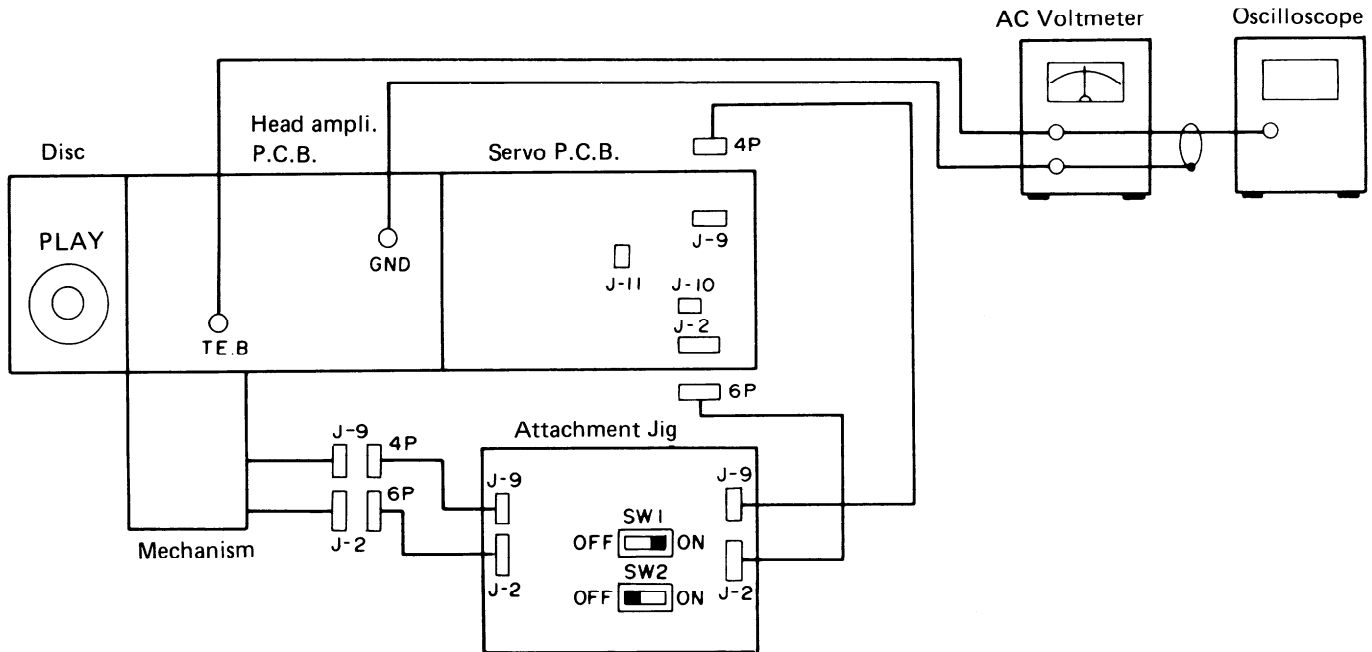


Figure 34

Adjustment Procedure (Radial Direction)

1. Turn adjusting screws so that AC voltmeter indicates a peak in the same way as for the tangential direction adjustment. (Adjusting screw (A) is the most critical for radial direction adjustment.)

Since angle adjustment may upset the pick-up height adjustment, always recheck pick-up height after the angle adjustment. And if the height adjustment is performed again, recheck angle adjustment again.

Namely, repeat height adjustment and angle adjustment 2 – 3 times, thus fine adjustment will be accomplished. Keep the unit under the same condition for next DC balance adjustment.

TRACKING ERROR DC BALANCE ADJUSTMENT

If the angle adjustment has been completed, photo diode outputs may develop different output due to parameter variations of 4-division photo diodes, and optional system, etc. Accordingly, DC balance adjustment will be made in considering offset values of the head amplifiers Q101 (TA7731P) and Q103 (TA75902P).

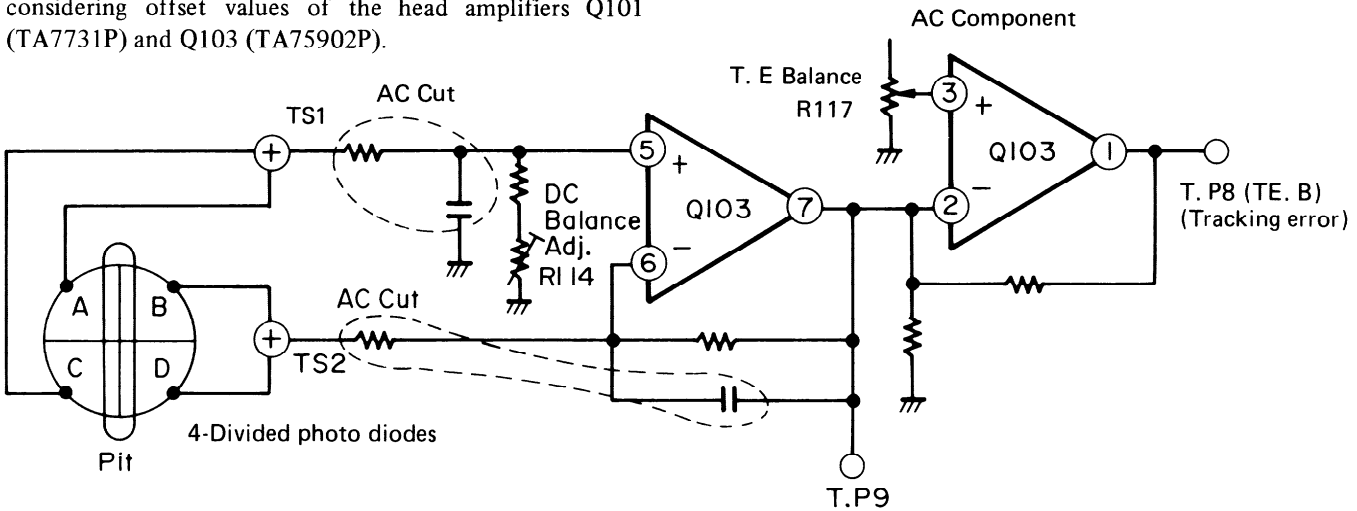


Figure 35

Difference of DC components will be developed at test point TE. B terminal on mechanism P.C. Board by adjusting tracking error balance to minimum (or by making input pin (3) of Q103 to GND level).

Adjusting DC balance adjusting resistor R114 on mechanism P.C. Board develops tracking error signal without offset at TE. B terminal on mechanism P.C. Board.

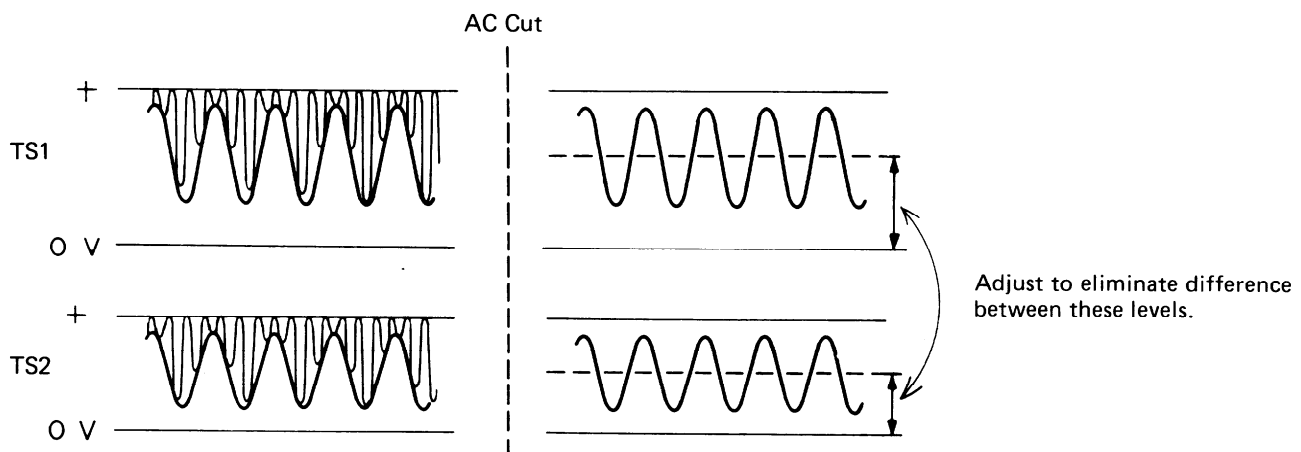


Figure 36

With DC balance adjustment upset tracking coil is always being biased by the DC voltage and this may cause difference in moving distance in horizontal direction. This also prevents normal reflection light beam from falling at 4-division photo diodes.

PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to follow carefully the instructions below when servicing.

WARNING!!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMISSION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 30cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.

Laser Diode Properties

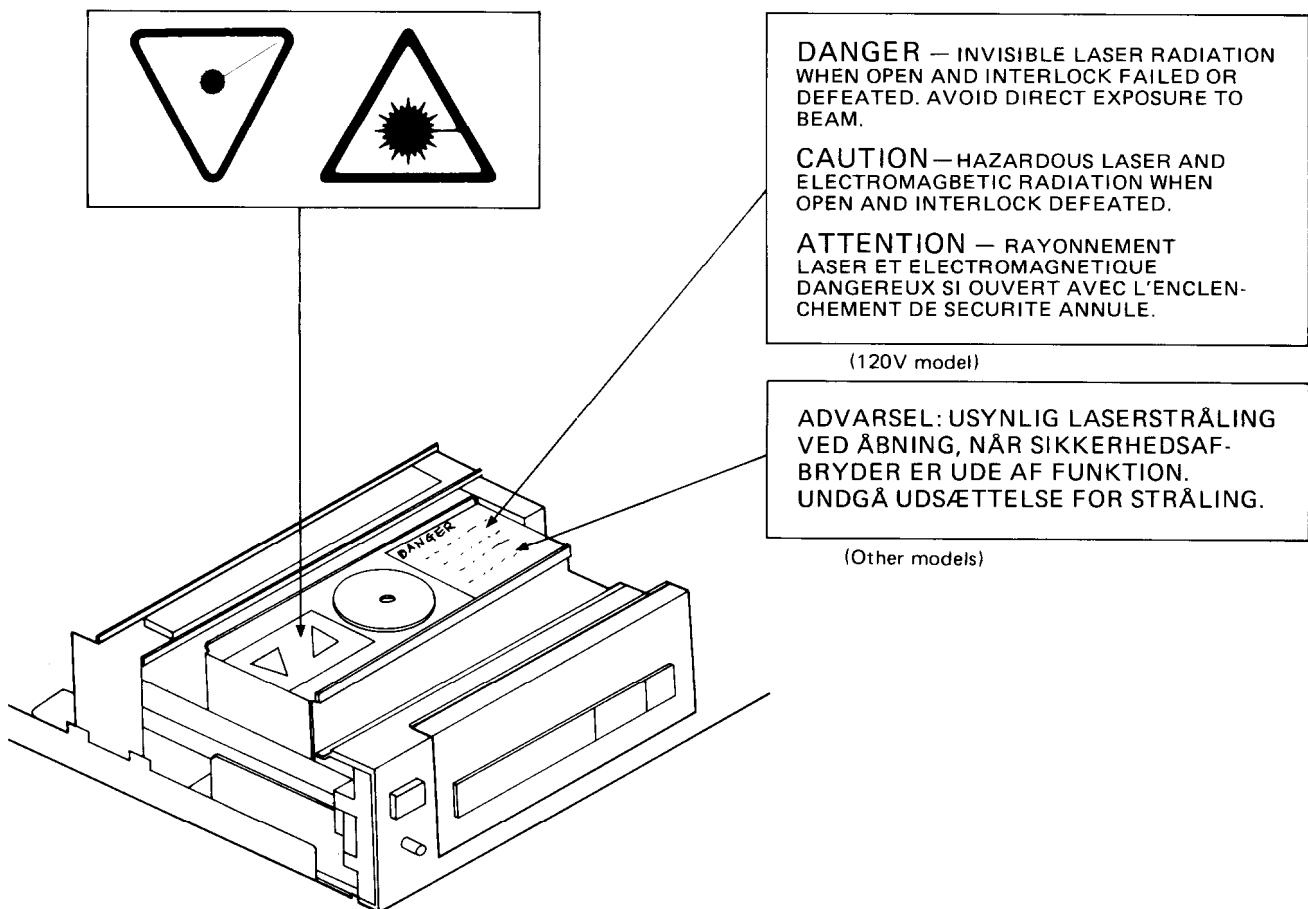
- Material: GaAs
- Wavelength: 780nm
- Emission Duration: continuous
- Laser output: max. 0.3mW*

*This output is the value measured at a distance about 1.8mm from the objective lens surface on the Optical Pick-up Block.

LASER WARNING LABELS

The labels shown below are affixed.

1. Warning labels



Adjustment Procedure

Keep unit under the same condition as for pick-up angle adjustment just finished.

1. Turn R117 10K ohm semi-fixed resistor on head ampli. P.C. Board ~~clockwise fully (MIN).~~
2. Connect oscilloscope to TE. B terminal on head ampli. P.C. Board. (DC range 0.1V/DIV.)

3. While observing scope display, adjust semi-fixed resistor R114, 47K ohm on head ampli. P.C. Board so that tracking error waveform deflects around 0V center.

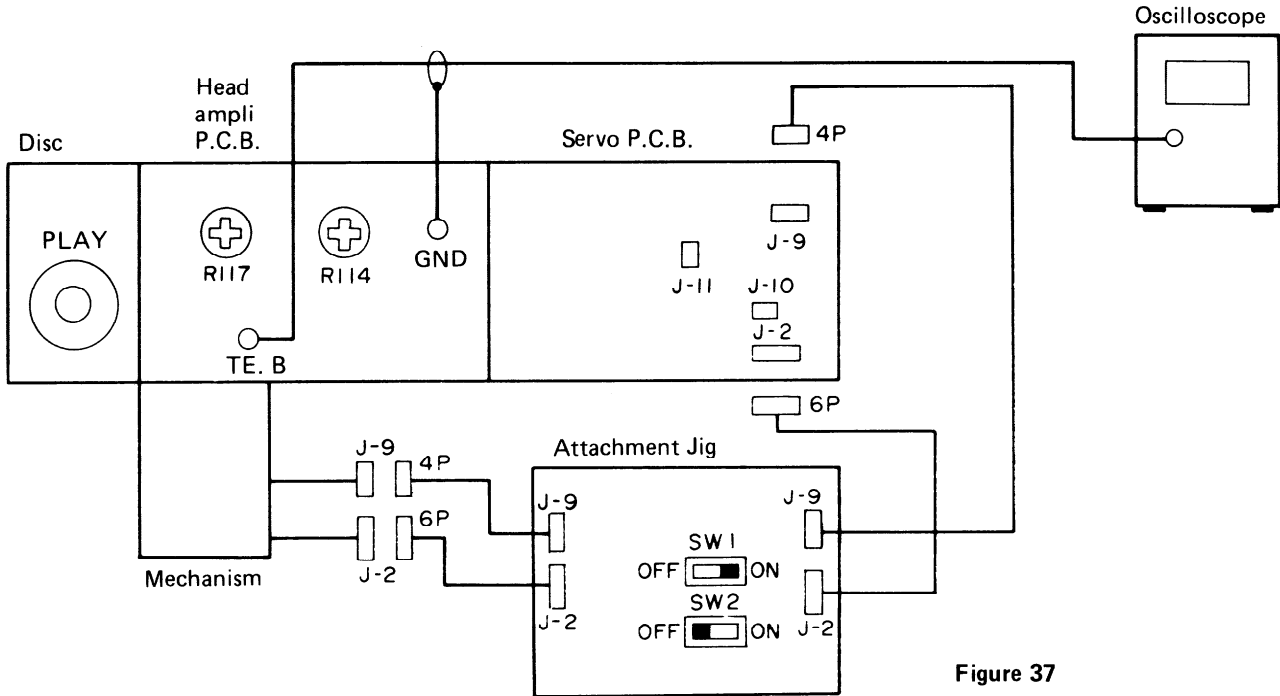


Figure 37

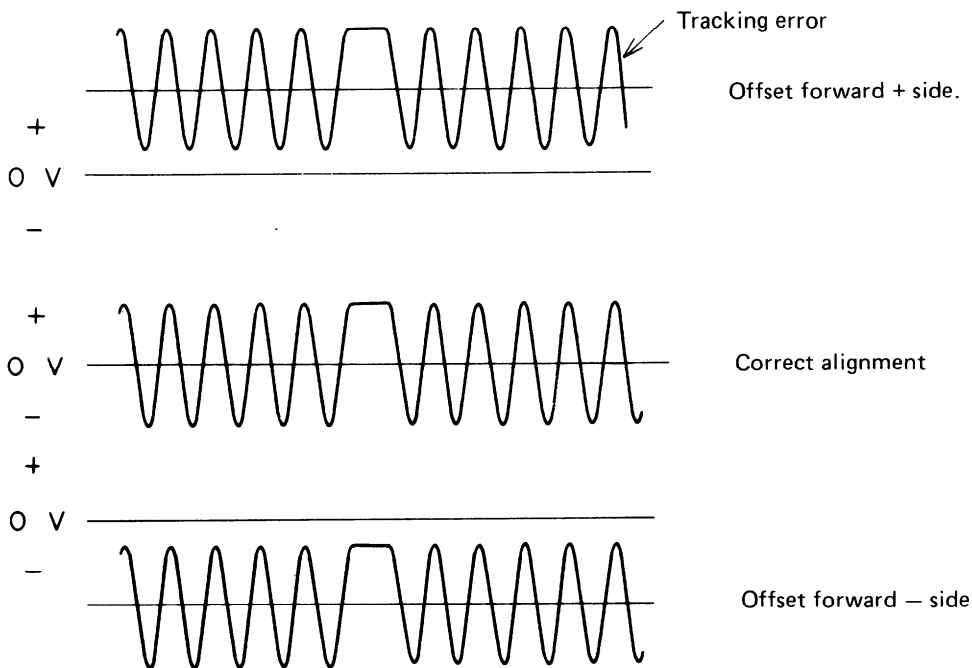


Figure 38

4. Keep unit under the same condition as above to proceed tracking error balance adjustment next.

TRACKING ERROR BALANCE ADJUSTMENT, AC BALANCE ADJUSTMENT

If pick-up lens is forced to move in searching operation, relative geographical deviation against 4-division photo diodes will be caused and this develops offset voltage in the tracking error signal.

The offset voltage offset operation of the tracking coil, thus making searching operation to a desired track be difficult.

Tracking error balance adjustment is to prevent this offset voltage from developing in tracking error signal even if the tracking coil is moved forcibly.

This adjustment is performed by forcibly moving the pick-up lens with 1.0V DC applied to tracking coil. DC component and AC component (peak) of the photo diodes developed when lens is moved are utilized in this adjustment.

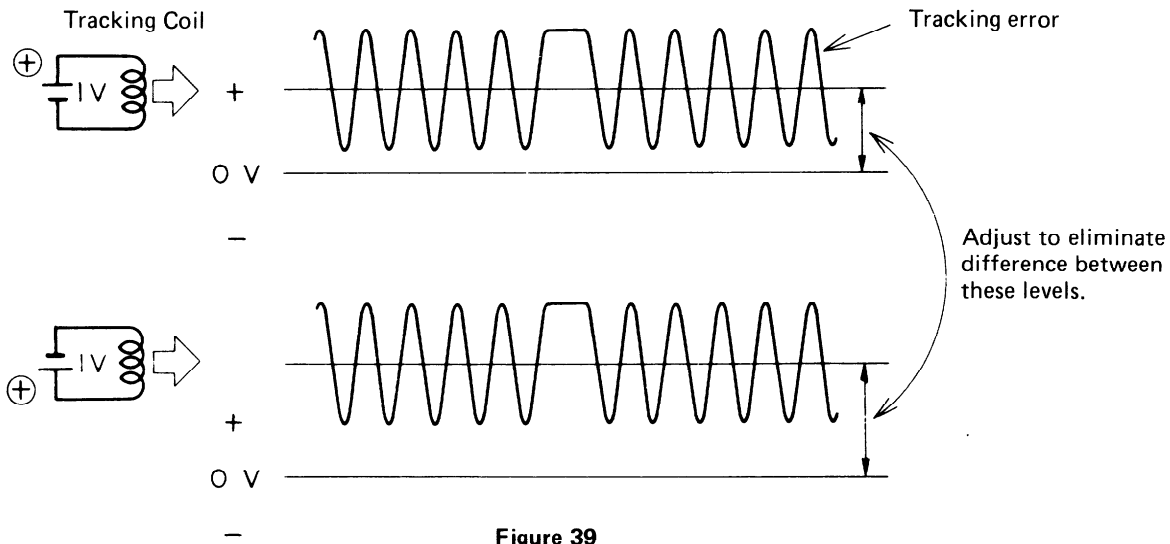


Figure 39

Adjust so that DC offset levels become a same level as shown above. To eliminate DC offsets perform AC balance adjustment.

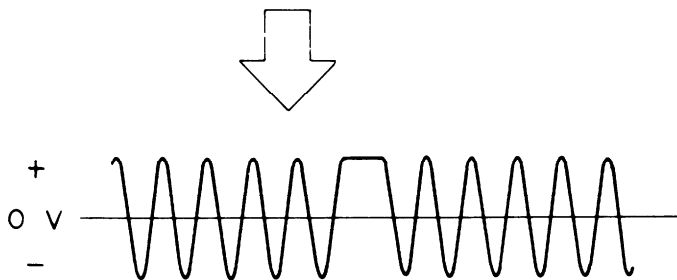


Figure 40

Adjustment Procedure

Keep unit under condition just finished tracking error DC balance adjustment.

Use voltage regulator power supply jig.

1. Apply +1.0V voltage from TP. B terminal of the power supply jig to the test point of attachment, and connect TP. C terminal to GND.
2. Connect oscilloscope to test point TE. B terminal on head ampli. P.C. Board. (DC ranged 0.2V/DIV.)
3. Observe scope display and note DC offset value.
4. Apply +1V voltage from TP. C terminal of the power supply jig to test point of attachment, and connect TP. B terminal to GND. (Reversed in step 1 above.)
5. Observe scope display and adjust semi-fixed resistor R117, 10K ohm until the same offset value as that obtained in step 3 is obtained.
6. Repeat steps 1 and 4 and make sure there is no offset difference.
7. Adjust semi-fixed resistor R122, 47K ohm on head ampli. P.C. Board until no offset is developed in tracking error signals.
8. Remove +1.0V from voltage regulator power supply jig.

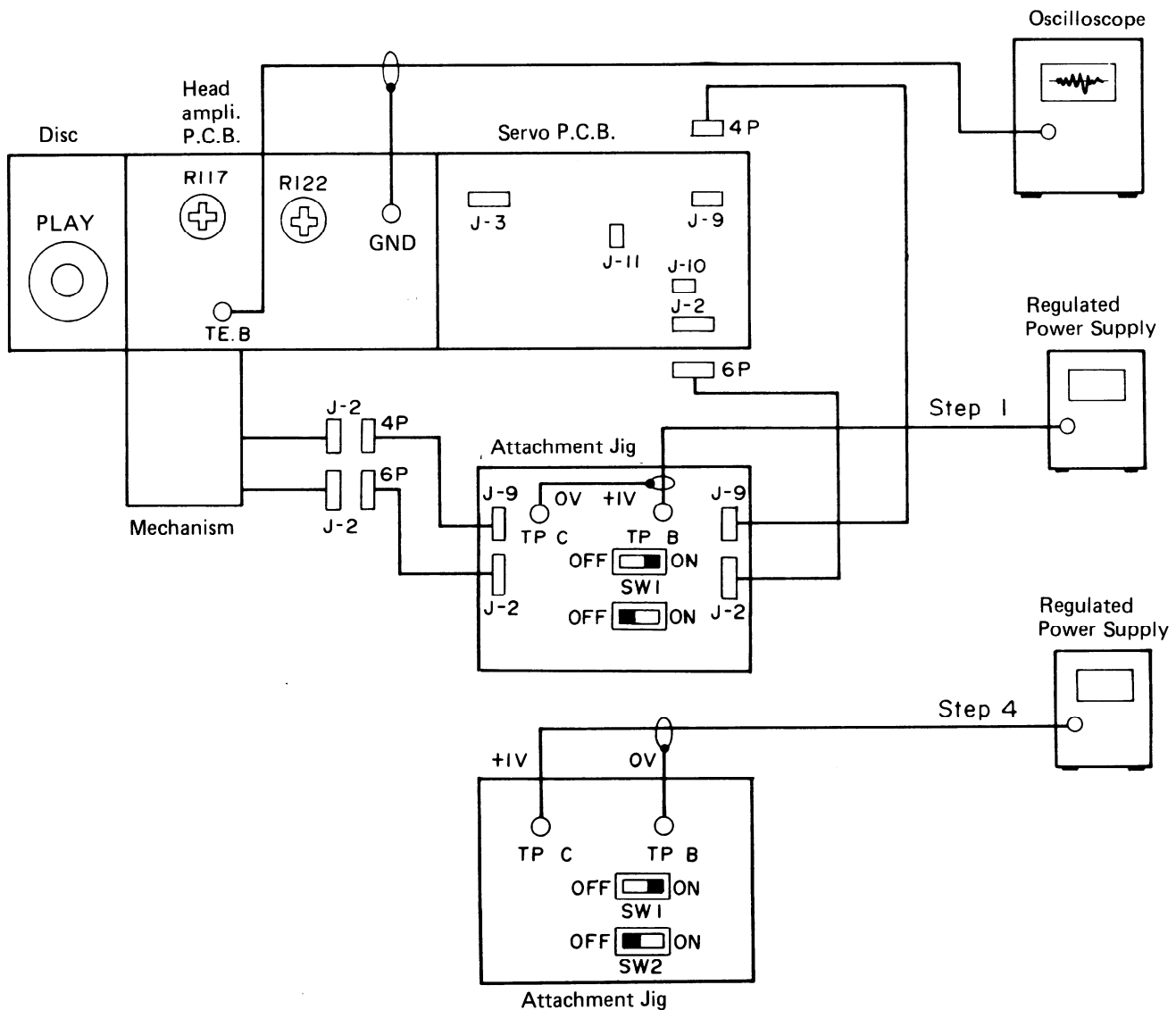


Figure 41

9. Keep unit under the same condition. (Power supply of unit may be turned OFF.)

FOCUS BALANCE ADJUSTMENT

Next, proceed focus direction adjustment.

In the step 7 of pick-up height adjustment, resistance between pins (15) and (16) of Q101 (TA7731P) has been adjusted to 10K ohm ± 0.5 ohm.

This adjustment stands for that coarse adjustment for focus direction has been made indirectly. However, with this coarse adjustment, deviation in Q101, addition amplifier, cannot be cancelled.

The purpose of the focus balance adjustment is to focus a beam completely by precisely adjusting critical deviation in focus direction.

Try to upset the focus balance while observing R.F signal (eye pattern), and the R.F signal will be disturbed, thus you can see condition of out of focus.

However correct adjustment point may be different, depending upon person making the adjustment, as long as the adjustment is performed by observing the scope display.

To prevent this, only the coarse adjustment is performed by observing the waveform, and the fine adjustment is carried out by first converting R.F. signal into EFM signal and then by adjusting jitter amount of 3T components for minimum.

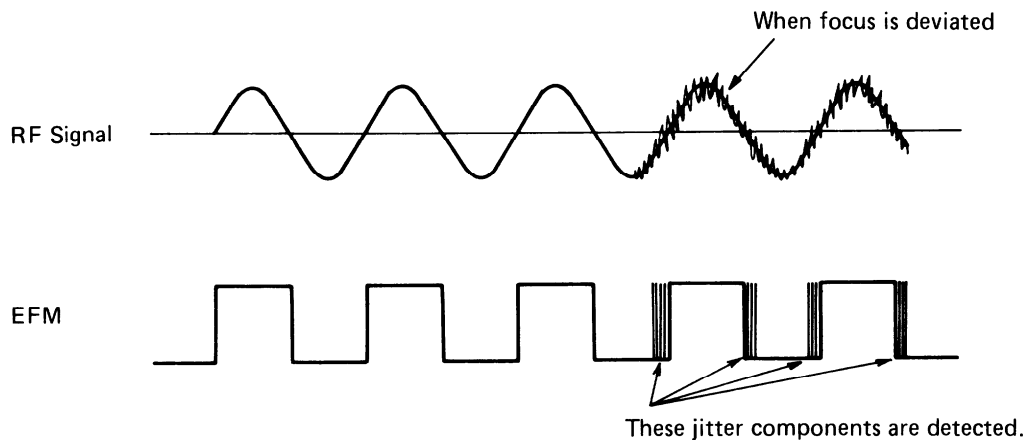


Figure 42

The jitter detector is incorporated in jig of PU-ALIGNMENT-70.

Adjustment Procedure

Keep unit under the same condition as for tracking error balance adjustment and AC balance adjustment just performed above.

1. Set attachment switches SW1 and SW2 to ON.
2. Connect 2P connector J-11 (Feed motor) on servo P.C. Board.
3. Connect JITTER IN on the rear of PU-ALIGNMENT-70 to Q317 (TC40H004P) pin (6) (or to EFM2 on flat package P.C. Board).
4. Turn power of PU-ALIGNMENT-70 ON and set unit to PLAY. Play Track No. 1 (YEDS-7)
5. Connect oscilloscope to test point TP12 (RF signal) terminal on main P.C. Board (lower P.C. Board). (AC range 0.1V/DIV. 0.5 μ Sec/DIV.)
6. Adjust R104, 22K ohm semi-fixed resistor by turning it so that the clearest waveform is obtained.
7. Adjust R104 slightly so that JITTER meter of PU-ALIGNMENT-70 indicates minimum reading.

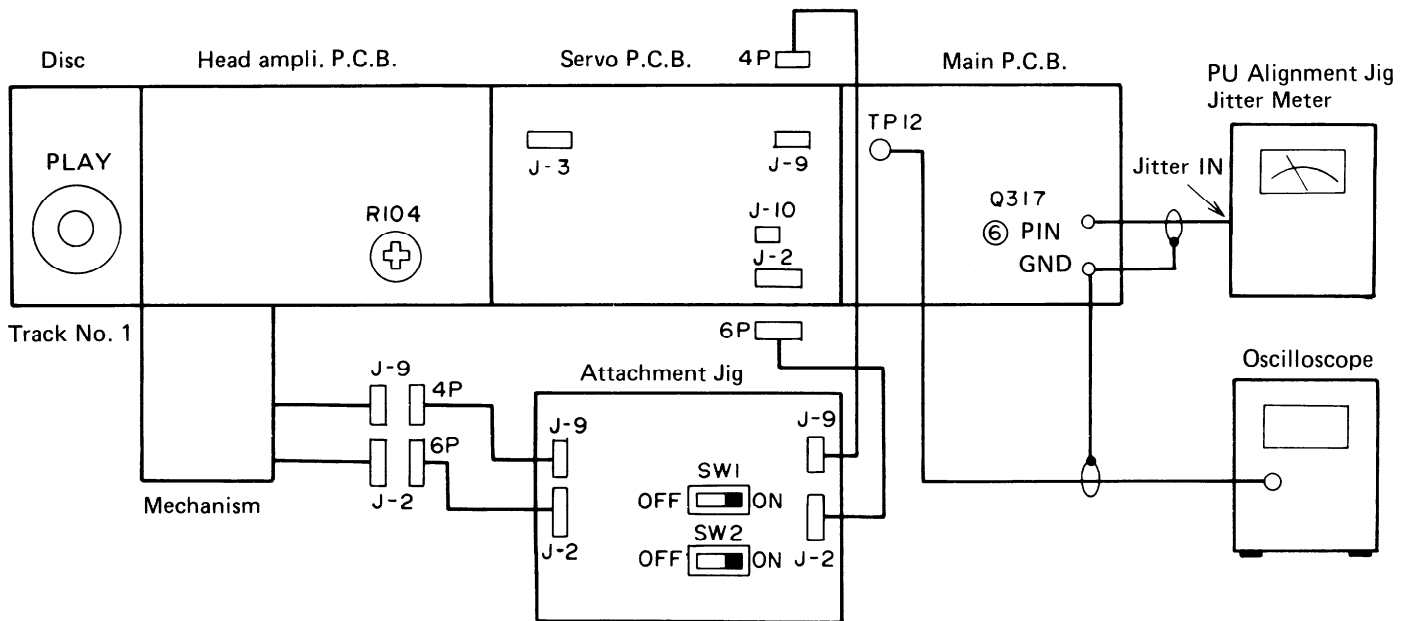


Figure 43

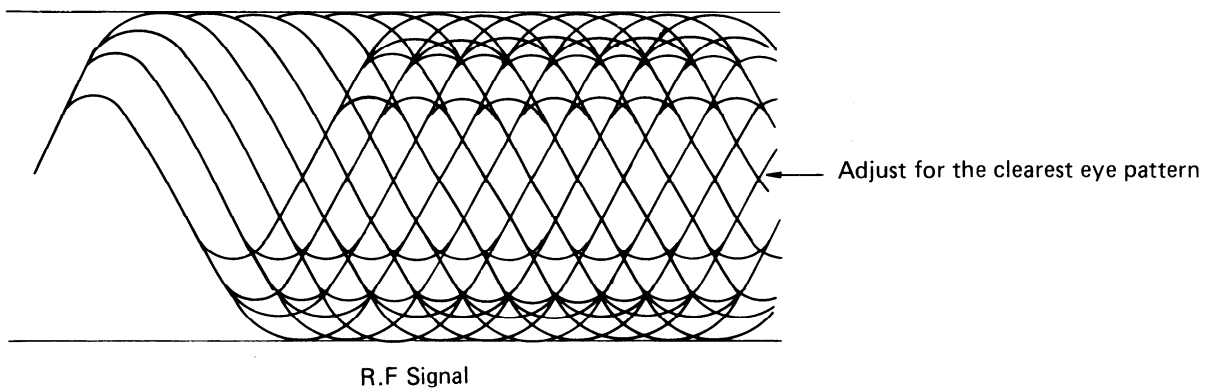


Figure 44

8. After adjustment is completed, set unit to original condition. (Connect all connectors normally.) Turn power of unit OFF.

FOCUS SERVO GAIN AND TRACKING SERVO GAIN ADJUSTMENTS

Servo gain adjustment is performed to suppress undesirable deflections of lens due to external disturbances. Included in the external disturbances are scratches on disc surface, dusts, vibration, shock, etc. If the gain adjustment has been not made properly, the performance becomes critical

against the external disturbances such as scratches and vibration. The gain adjustments are carried out with 1kHz for focus servo system and 1.5kHz for tracking servo system.

The characteristics are as follows:

Focus system

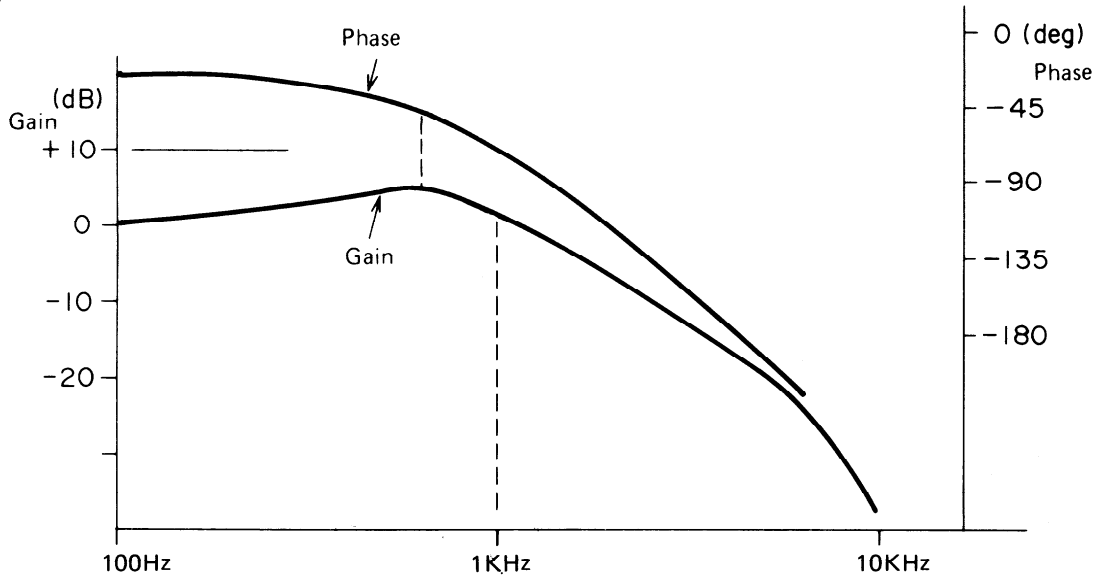


Figure 45

Tracking system

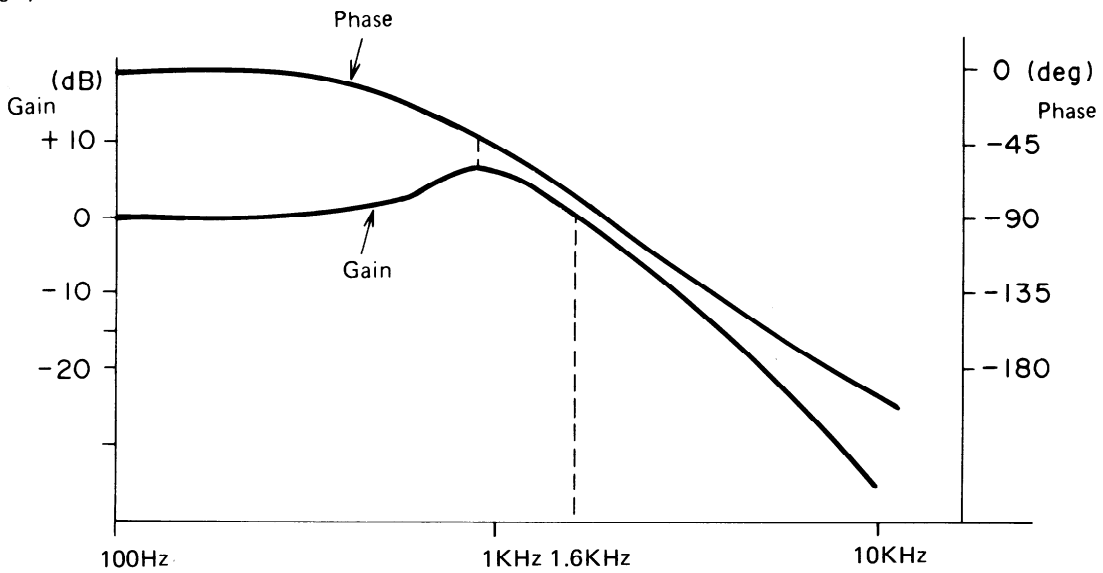


Figure 46

Adjustment Procedure (Focus Gain)

1. Turn power of unit to OFF.
2. Connect connector focus on attachment to FOCUS on the rear side of PU-ALIGNMENT-70. Connect focus connector on attachment to test point terminals TP (11), (1), (2), and (3) on servo P.C. Board.

3. Connect oscillator (1kHz 50mV (RMS)) to OSC IN on front panel of PU-ALIGNMENT-70.
4. Connect AC voltmeter between OUT and GND terminals on the front panel of PU-ALIGNMENT.
5. Set front panel switches of PU-ALIGNMENT as shown below.

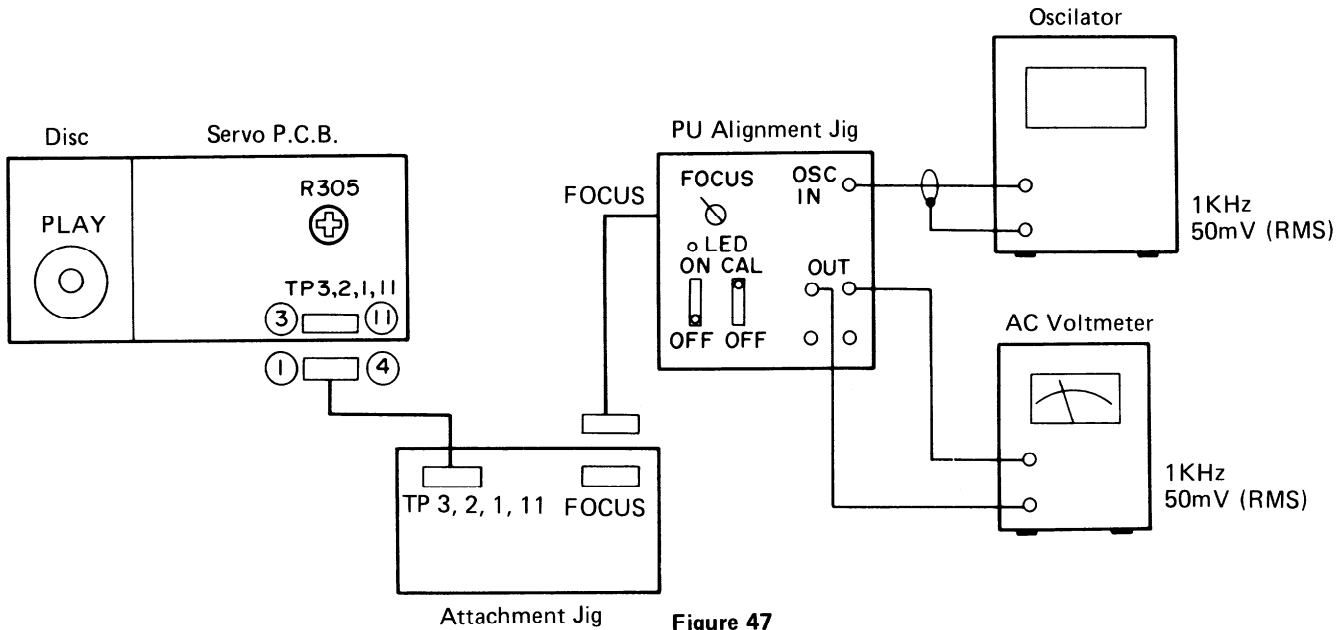


Figure 47

6. Turn power of PU-ALIGNMENT-70 and unit ON and set unit to PLAY mode. (Play YEDS-7 TRACK No.1.)
7. Adjust level of oscillator so that AC voltmeter indicates 50mV reading. (Vary frequency to find a frequency that gives maximum reading and the frequency.)

8. Set front panel switch of PU-ALIGNMENT as shown below.
9. Adjust R305, 10K ohm semi-fixed resistor on servo P.C. Board so that AC voltmeter indicates $28\text{mV} \pm 2\text{mV}$.

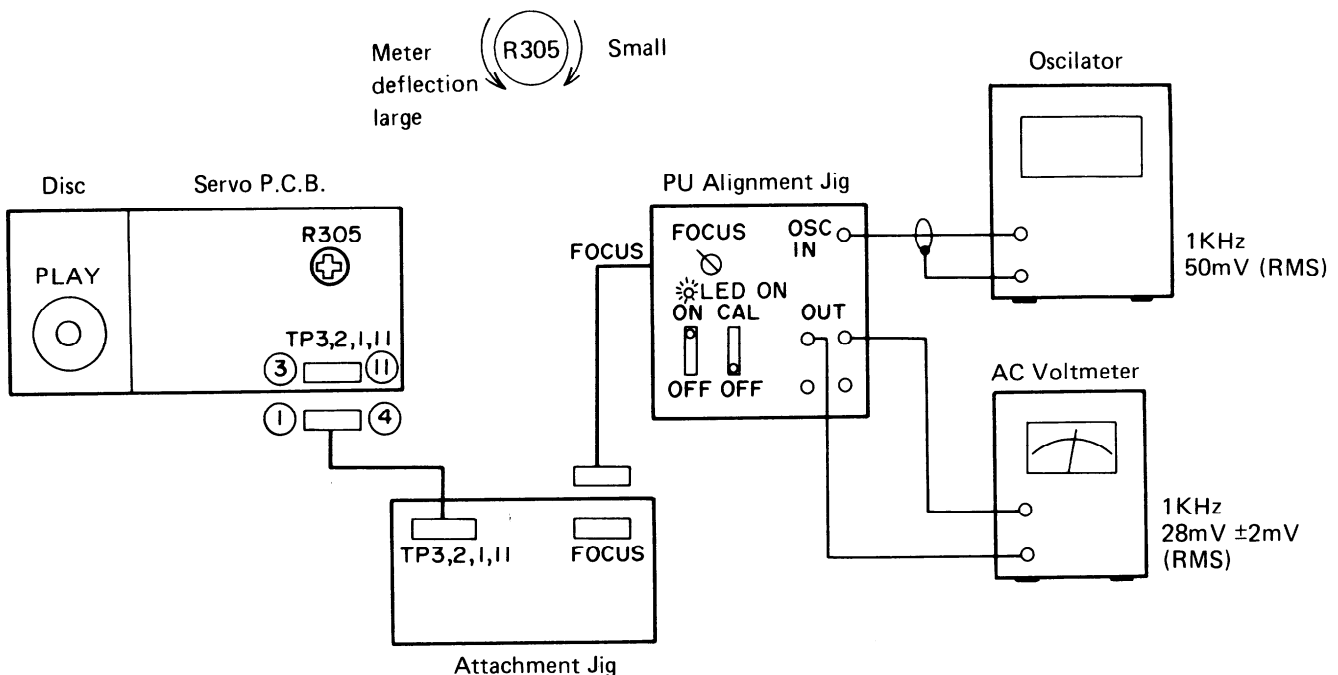


Figure 48

10. Keep the above connection.

Adjustment Procedure (Tracking Gain)

1. Turn power of unit OFF.
2. Connect TRACKING on the rear side of PU-ALIGNMENT-70 to tracking terminal on attachment. Connect tracking connector on attachment to test point terminals

- TP. (10) , (4) , (5) , and (6) on servo P.C. Board. (Keep FOCUS connected.)
3. Set switches on PU-ALIGNMENT front panel as shown below.

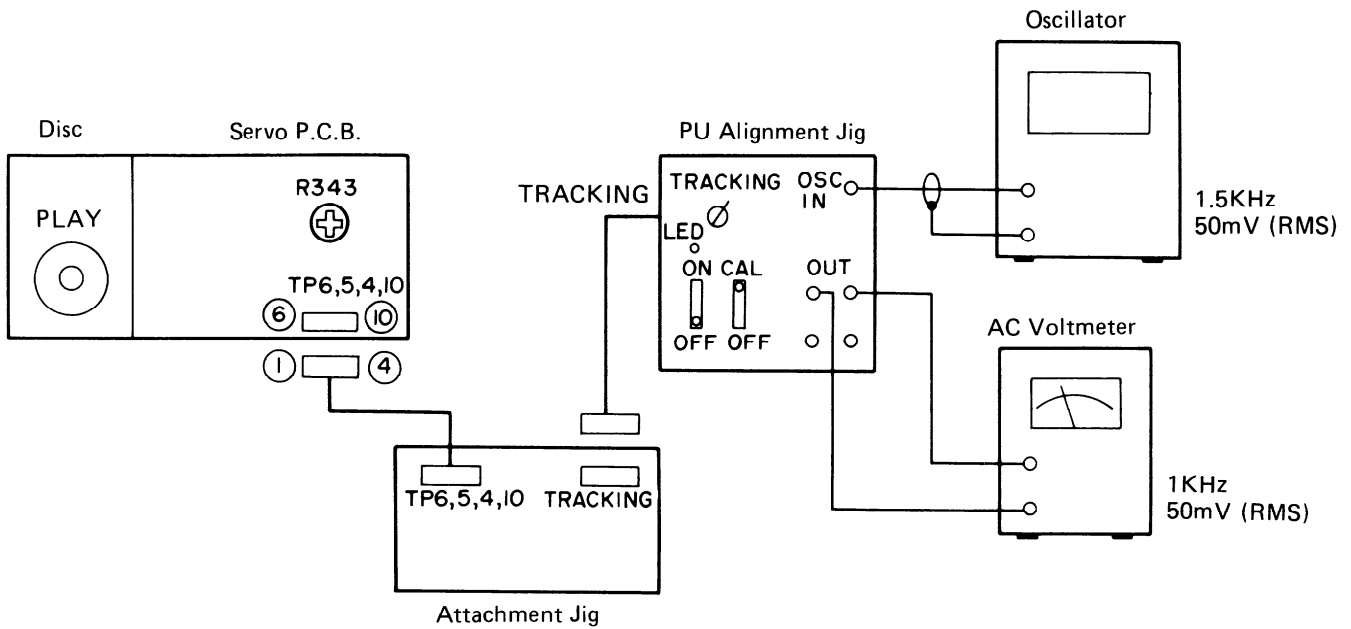


Figure 49

4. Set the unit to PLAY mode (and play both YEDS-7, TRACK No. 1).
5. Adjust oscillator output so that AC voltmeter indicates 50mV. (Vary 1.5kHz frequency and use the frequency that gives a peak.)
6. Set switches on PU-ALIGNMENT front panel as shown below.
7. Adjust semi-fixed resistor R343, 10K ohm until AC voltmeter indicates 44mV ±4mV.

Meter deflection Large
 Be careful because of rotational direction reversed against focus gain.

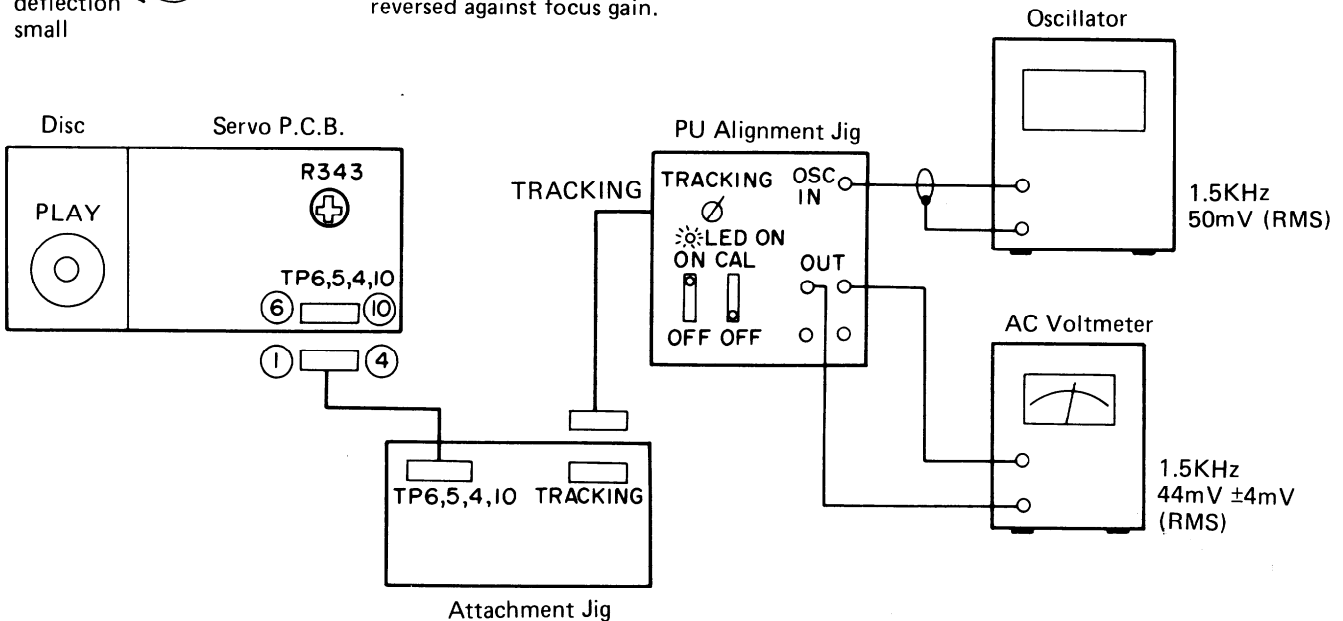


Figure 50

8. All adjustments, which should be made when pick-up was replaced, have been completed.

ANALOG CIRCUIT ADJUSTMENT

1. DC offset adjustment

- 1) Load a test disc and set the unit to PAUSE mode.
- 2) Connect test point TP. 13 (R) and TP. 14 (L) to oscilloscope.
- 3) Adjust the semi-fixed resistors R629 (R) and R609 (L) until $0V \pm 10mV$ DC is obtained on scope display.

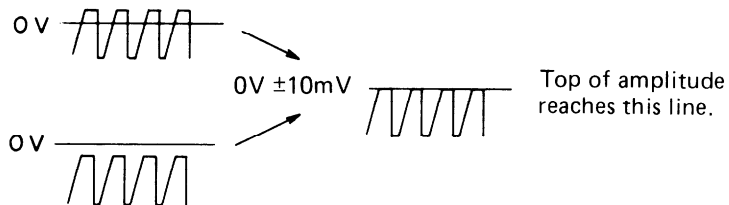
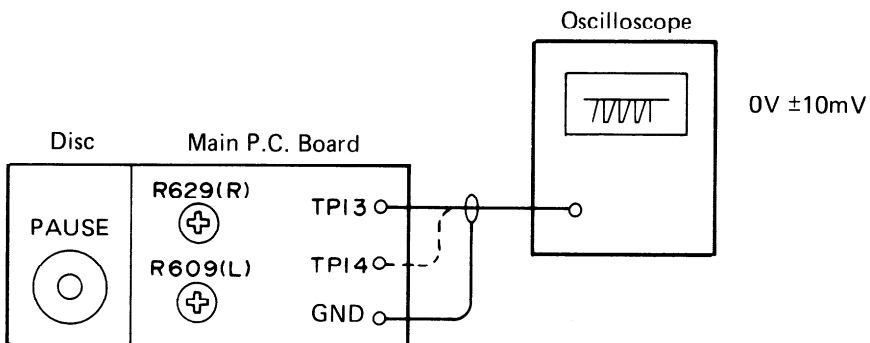
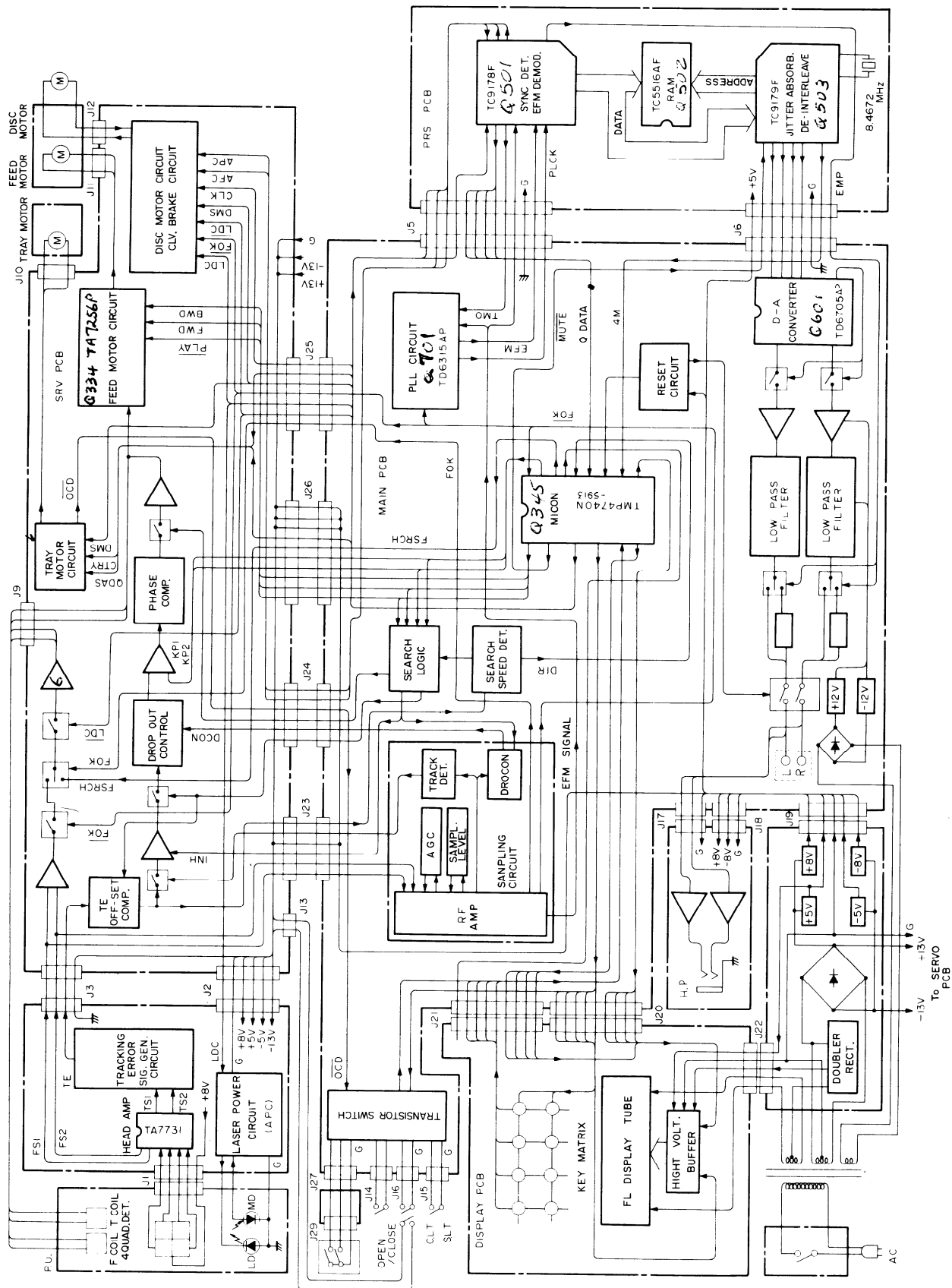


Figure 51

PLL CIRCUIT ADJUSTMENT

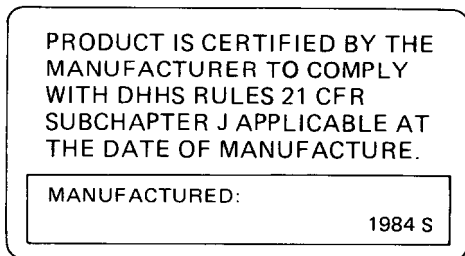
- Connect the DC voltmeter to the cathode of diode D702.
 Load a test disc and play the test disc.
 Adjust the coil L701 until DC voltmeter reads $4.7 \pm 0.2V$.

BLOCK DIAGRAM



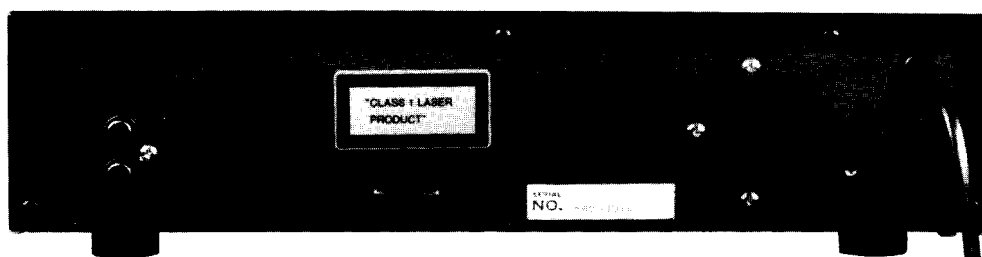
2. Certification label (UD model only)

This label is located on the back panel.

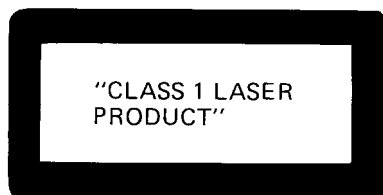


3. Class 1 label (UG/UW model only)

This label is located on the back panel.

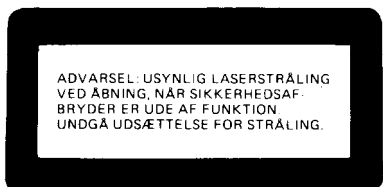


ADVARSEL



Denne mærkning er anbragt på apparatets højre side og indikerer, at apparatet arbejder med laserstråler af klasse 1, hvilket betyder, at der anvendes laserstråler af svageste klasse, og at man ikke på apparatets yderside kan blive udsat for utilladelig kraftig stråling.

APPARATET BØR KUN ÅBNES AF FAGFOLK MED SÆRLIGT KENDSKAB TIL APPARATER MED LASERSTRÅLER!



Indvendigt i apparatet er anbragt den her gengivne advarselmærkning, som advarer imod at foretage sådanne indgreb i apparatet, at man kan komme til at udsætte sig for laserstråling.

EXPLODED VIEW

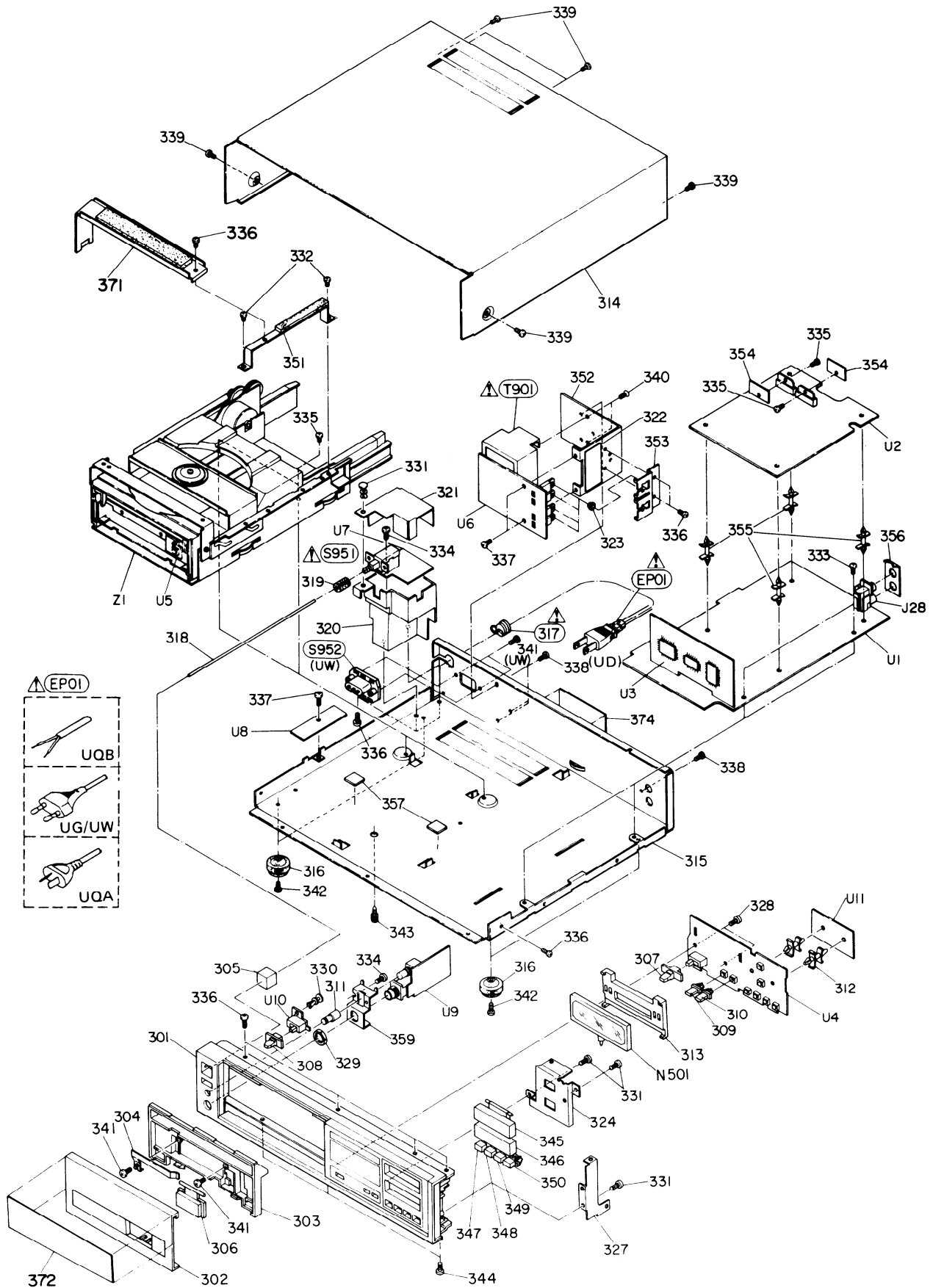


Figure 52

NOTE: The parts unwritten Part No. in the parts list are not stocked since they are seldom required for routine service.

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
301	27210496	Front panel ass'y			
302	27210499	Tray panel ass'y			
303	28400194	Tray mold			
304	27180255	Spring, ground			
305	28320954	Knob, Power			
306	28321685	Knob, Open/Close			
307	28321686	Knob, Search			
308	28321688	Knob, Timer			
309	28321695	Knob, Display			
310	28321696	Knob, Memory			
311	28321698	Knob, Headphone			
312		Holder, pc board			
313		Holder, fluorescent tube			
314	28184239	Top cover			
315	27100054	Chassis (D)			
	27100055	Chassis (G)			
	27100056	Chassis (W)			
	27100057	Chassis (QA/QB)			
316	28400195	Leg			
317	27300722	SR-4N-4, Strainrelief			
318		Lod			
319	27273032	Joint			
320		Case			
321		Cover			
322		Insulator			
323		Washer, transistor			
324		Bracket, holding, knob			
325	29360714	Label			
326	29360715	Label, Danger			
327		Bracket, panel			
328		3x8 (Red), Tapping screw			
329		M12, Nut			
330	880009	Rivert			
331		3x8, Tapping screw			
332	82512606	2.6x6, Binding screw			
333		3x6 (Red), Screw			
334		2.6x8 (Red), Screw			
335		3x4, Binding screw			
336		3x6, Binding screw			
337		3x6 (Red), Tapping screw			
338	838330082	3x8 (Cr), Tapping screw			
339	801316	3x8 (BL), Tapping screw			
340		3x8, Screw			
341		3x10, Flat head screw			
342		3x10 (BL), Tapping screw			
343	801313	Screw, special			
344		3x6, Tapping screw			
345	28321689	Knob, Play			
346	28321690	Knob, Pause/Stop			
347	28321693	Knob, Down			
348	28321694	Knob, Up			
349	28321691	Knob, FR			
350	28321692	Knob, FF			
351		Bracket ass'y			
352		Radiator			
353		Holder, transistor			
354		Radiator			
355		Holder			
356		Shield plate			
357		Cushion			
359		Bracket, headphone			
371		Bracket, ass'y			
372	22906545	Label, caution, screw			
374		Label, Class 1			
		Label, Class 1 (QB)			

(D) : 120V model
(G) : 220V model
(W) : Universal model
(QA) : Australian model
(QB) : England model

REF. NO.	PART NO.	DESCRIPTION
EP01	253112	△ AS-UC-4 #18, Power supply cord (D)
	253083-1	△ AS-CEE, Power supply cord (G/W)
	253118	△ AS-SAA, Power supply cord (QA)
	728320	△ Power supply cord (QB)
J28	25045160	Output terminal
N801	212025	Fluorescent indicator tube
S951	25035435	△ NPS-111-L399P, Power switch
T901	230834	△ NPT-847D, Power transformer (D)
	230832	△ NPT-847G, Power transformer (G)
	230836	△ NPT-847DG, Power transformer (W)
	230835	△ NPT-847QA, Power transformer (QA)
	230833	△ NPT-847QB, Power transformer (QB)
U1	10208503	NAMAIN-2103, Main circuit pc board ass'y
U2	10208505	NASER-2105, Servo circuit pc board ass'y (D)
	10214505A	NASER-2105a, Servo circuit pc board ass'y (G)
	10210505B	NASER-2105b, Servo circuit pc board ass'y (W)
	10213505C	NASER-2105c, Servo circuit pc board ass'y (QA)
	10215505D	NASER-2105d, Servo circuit pc board ass'y (QB)
U3	10208504	NAPRO-2104, Processor pc board ass'y
U4	10208506	NADIS-2106, Display pc board ass'y
U5	10208507	NATRAY-2107, Tray pc board ass'y
U6		Power supply pc board ass'y
U7		Power switch pc board ass'y
U8		Terminal pc board ass'y
U9		Headphone terminal pc board ass'y
U10		Timer switch pc board ass'y
U11		Sub display pc board ass'y
Z1	24506668	Mechanism ass'y

NOTE: THE COMPONENTS IDENTIFIED BY MARK △ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

MECHANISM EXPLODED VIEW

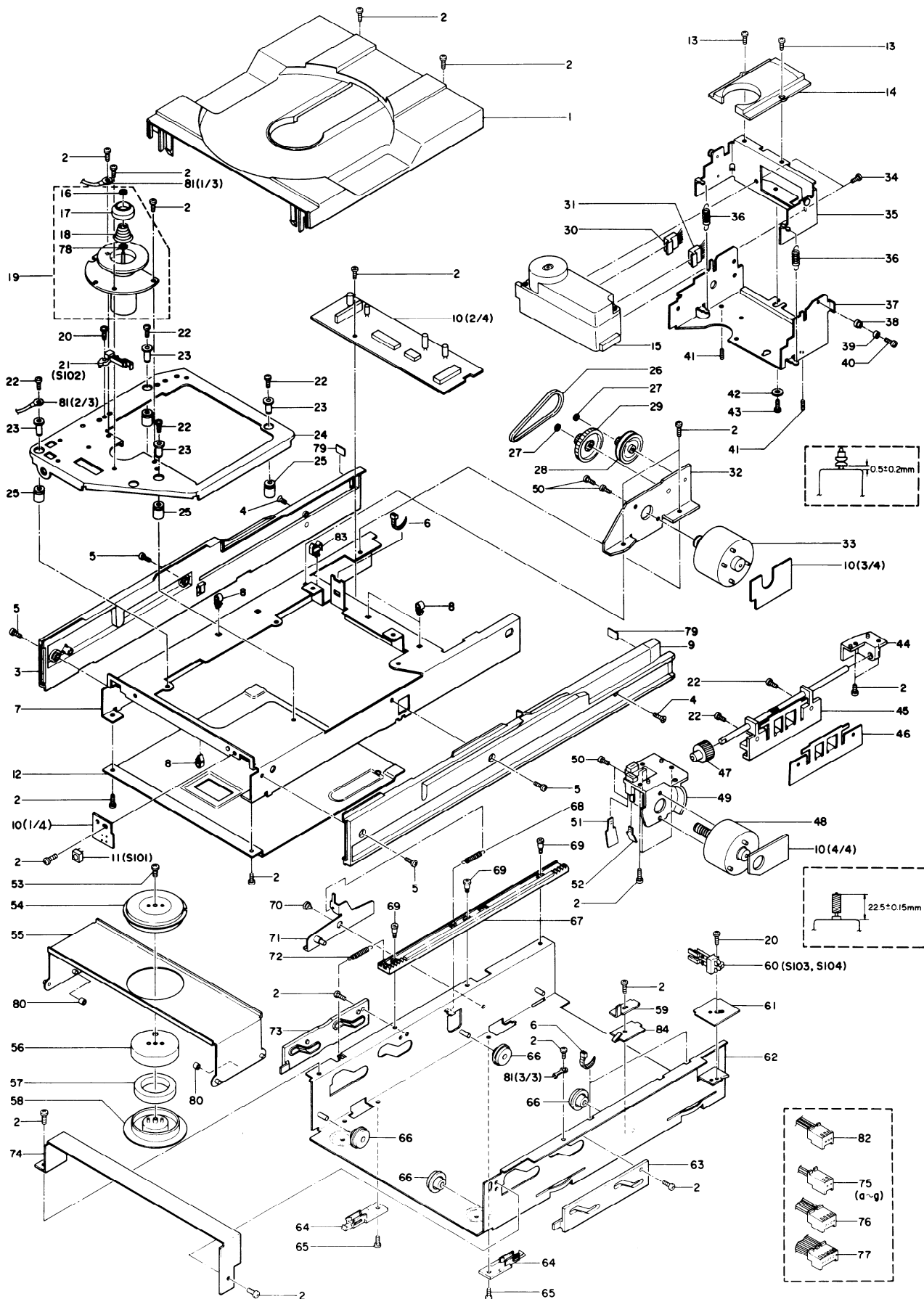


Figure 53

NOTE: The parts excluded in the parts list are not stocked since they are seldom required for routine service.

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
1	28400192	Disc tray
2	82512606	2.6×6mm, Binding screw
3	27300703	Slide rail, left
4	82212606	2.6×6mm, Flat head screw
5	82542610	2.6×10mm, Binding screw
9	27300704	Slide rail, right
11	25035291	Key switch (S101)
13	82542004	2×4mm, Binding screw
14	28400193	Pick-up cover
15	27300588A	OPH-32, Laser pick-up
19	27300705	Disc motor ass'y
20	82112006	2×6mm, Pan head screw
21	25065244	Leafswitch (S102)
22		2.6×12mm, Binding screw
23	27270134	Spacer
25	28140548	Cushion
26	27300706	Drive belt
27	870115	φ2.1mm, Washer
28	27300707	Drive gear A
29	27300708	Drive gear B
33	27300709	Loading motor ass'y
34		3×4mm, Binding screw
36	27180219	Spring
38	27180220	Bushing
39	27300710	Roller
40	801314	2×8mm, Screw
41	801309	2.6×6mm, Screw
42		3mm, Washer
43	801310	3×10mm, Special screw
44	27300712	Thrust holder
45	27300713	Guide rack ass'y
46	27180221	Spring plate
47	27300714	Gear WH
48	27300715	Pick-up motor ass'y
49	27190297	Motor mount
50		2.6×4mm, Binding screw
51	27180222	Spring plate
52	27180223	Spring plate
53	837120042	2×4mm, Binding screw
54	27300716	Clamper plate
56	27300717	Clamper yoke
57	28181013	Clamper magnet
58	27300718	Clamper
60	25065245	Leafswitch (S103/S104)
64	27300719	Rail plate
65		2.6×3mm, Binding screw
66	27267351	Guide roller
67	27300720	Slide lack
68	27180224	Spring
69	801311	Lack screw
70	801312	2.6×13mm, Special screw
72	27180226	Spring
79	28140549	Stopper cushion
80	27300721	Roller lifter

PRINTED CIRCUIT BOARD-PARTS LIST

MAIN CIRCUIT PC BOARD (NAMAIN-2103)

CIRCUIT NO.	PART NO.	DESCRIPTION
ICs		
Q201	222755	TC74HCU004P or TC40H004P
Q202	222648	TA75458S
Q203	222818	TA75902P
Q310, Q317	222755	TC74HCU004P or TC40H004P
Q326	222829	TA75393S
Q344	222832	PST518
Q345	222831	TMP4740N-5913
Q352	222780123	TA78L012AP
Q353	222790123	NJM79L12A
Q601	222828	TA6705AP
Q602	222717	μ PD4053BC
Q603	222758	NJM0720-D
Q604, Q605	222833	AFL89GP
Q608	222755	TC74HCU004P or TC40H004P
Q701	222827	TD6315AP
Transistors		
Q204	2212186	2SK170 (BL)
Q205, Q206	2211255	2SC1815 (GR)
Q324, Q327	2211255	2SC1815 (GR)
Q328, Q341	2211255	2SC1815 (GR)
Q342	2211255	2SC1815 (GR)
Q314, Q343	2211455	2SA1015 (GR)
Q346-Q351	2211455	2SA1015 (GR)
Q606, Q607	2212375	2SK30ATM (GR)
Q702	2211723	2SC1923 (O)
Diodes		
D201-D204	223155 or	1SS138 or
D305-D312		1SS176
D325, D326	223155 or	1SS138 or
D601, D602		1SS176
D702		
D327	223885	Δ 1B4B41
D603	223105	1S1555
D701	223161	1SV147
Coil		
L701	233330	NFO-3034
Filter		
Z601	3010090	Z1383K
Capacitors		
C201	352741009	10 μ F, 16V, Elect.
C202	352780109	1 μ F, 50V, Elect.
C212	352982296	0.22 μ F, 50V, Non-polar elect.
C216	352734709	47 μ F, 10V, Elect.
C346, C708	352731019	100 μ F, 10V, Elect.
C347	352783399	0.33 μ F, 50V, Elect.
C348	352743309	33 μ F, 16V, Elect.
C355, C356	352751029	1,000 μ F, 25V, Elect.
C605, C606	3000047	1,200pF \pm 5%, 125V, Styrol, copper foil
C609, C610	352743319	330 μ F, 16V, Elect.
C612, C616	372122724	2,700pF \pm 5%, 50V, Styrol
C613, C617	372121224	1,200pF \pm 5%, 50V, Styrol
C619, C620	352941006	10 μ F, 16V, Non-polar elect.
C622, C623	352734719	470 μ F, 10V, Elect.
C624, C626	352734709	47 μ F, 10V, Elect.
C711, C712	351731019	100 μ F, 10V, Elect.
Resistors		
R219	4000096	9.5k Ω , 1/4W, Metal film
R220	4000097	10k Ω , 1/4W, Metal film
R384, R709	4000095	8.2k Ω , 1/4W, Metal film

CIRCUIT NO.	PART NO.	DESCRIPTION
R457	49121562405	5.6k Ω \times 5, 1/8W, Network
R466	49121563404	56k Ω \times 4, 1/8W, Network
R467, R468	49121273404	27k Ω \times 4, 1/8W, Network
R609, R629	5210013	N06HR10KBDM, Semi-fixed
R619, R626	431511065	10M Ω , 1/2W, Solid
R706	4000094	3.3k Ω , 1/4W, Metal film

Relay

L601	25065243
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SUB DISPLAY PC BOARD

CIRCUIT NO.	PART NO.	DESCRIPTION
Q804	222840131	TC4013BP, IC
Q803	2211255	2SC1815 (GR), Transistor
D808-D810	223155	1SS138 or 1SS176, Diode

HEAD AMPLIFIER PC BOARD (NAPRI-2102)

CIRCUIT NO.	PART NO.	DESCRIPTION
ICs		
Q101	222819	TA7731P
Q102	222735	NJM072D or NJM082D
Q103	222818	TA75902P
Q104	222648	TA75458S
Transistor		
Q105	2212464	2SA966 (Y)
Capacitors		
C102, C105	352734709	47 μ F, 10V, Elect.
C108, C109	352734709	47 μ F, 10V, Elect.
C114	352781009	10 μ F, 50V, Elect.
C115	352731019	100 μ F, 10V, Elect.
Resistors		
R104	5210015	N06HR22KBDM, Semi-fixed
R114, R122	5210017	N06HR47KBDM, Semi-fixed
R117, R128	5210013	N06HR10KBDM, Semi-fixed
R136	441621014	100 Ω , 1W, Metal oxide film

PROCESSOR PC BOARD (NAPRO-2104)

CIRCUIT NO.	PART NO.	DESCRIPTION
ICs		
Q501	222820	TC9178F (BL)
Q502	222822	TC5516AF
Q503	222821	TC9179F (BL)
X'tal		
Z501	3010089	8.5MHz

SERVO CIRCUIT PC BOARD (NASER-2015)

CIRCUIT NO.	PART NO.	DESCRIPTION
ICs		
Q301, Q309	222648	TA75458S
Q319, Q339	222648	TA75458S
Q329	222826	TA7354P
Q306, Q334	222825	TA7256P
Transistors		
Q308	2212526	2SK363 (V)
Q311, Q313	2212375	2SK30ATM (GR)
Q325, Q338	2212375	2SK30ATM (GR)
Q340	2212375	2SK30ATM (GR)
Q307, Q312	2211255	2SC1815 (GR)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q322, Q331 Q332	2211255	2SC1815 (GR)
Q302, Q304 Q305, Q315 Q318, Q321 Q333, Q335 Q336, Q337 Q354, Q355 Q316, Q320 Q323 Q330	2212286 2211455 2201074	2SC2878 (B) 2SA1015 (GR) 2SD880 (Y)
Diodes		
D315	224175	05Z8.2Y
D317	224139	05Z2.7Y
D318, D319	224151	05Z3.9Y
D320, D321	224157	05Z4.7Y
D323	224153	05Z4.3Y
D301-D304 D314, D316 D322, D324 D328-D330	223155	1SS138 or 1SS176
Capacitors		
C307	352984796	0.47 μ F, 50V, Non-polar Elect.
C317, C338	352941006	10 μ F, 16V, Non-polar Elect.
C311, C344 C345	352980106	1 μ F, 50V, Non-polar Elect.
C334, C339 C305	352983396 352781009	0.33 μ F, 50V, Non-polar Elect. 10 μ F, 50V, Elect.
C309, C321	352752209	22 μ F, 25V, Elect.
C336, C343 C310	352754709 352780109	47 μ F, 25V, Elect. 1 μ F, 50V, Elect.
C322, C328 C333	352780109 352780479	1 μ F, 50V, Elect. 4.7 μ F, 50V, Elect.
Resistors		
R406	4000098	220 Ω , 1/4W, Fuse
R376	441520104	1 Ω , 1/2W, Metal oxide film
R413	441520334	3.3 Ω , 1/2W, Metal oxide film
R446	441721004	10 Ω , 2W, Metal oxide film
R305, R343	5210013	N06HR10KBDM, Semi-fixed

POWER SUPPLY CIRCUIT PC BOARD

CIRCUIT NO.	PART NO.	DESCRIPTION
ICs		
Q901	222780080	TA78008AP
Q902	222790080	μ PC7908H
Q903	222780050	TA78005AP
Q904	222790050	μ PC7905H
Diodes		
D901	223884	\triangle 1B2Z1 (T)
D902	223883	\triangle 1B2C1 (T)
D903, D904 D905	223155 224208	1SS138 or 1SS176 05Z24Y
Capacitors		
C901, C902	3500079	0.01 μ Fx2, 250V, Ceramic
C903, C904	352743329	3,300 μ F, 16V, Elect.
C905, C906	352734709	47 μ F, 10V, Elect.
C909, C910	352734709	47 μ F, 10V, Elect.
C913	352751019	100 μ F, 25V, Elect.
C914	352780479	4.7 μ F, 50V, Elect.
Resistors		
R903, R904	4000093	1 Ω , 1/2W, Fuse

DISPLAY PC BOARD (NADIS-2106)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q801, Q802	222824	TC5066BP, ICs
D801-D806	223155	1SS138 or 1SS176, Diodes
N801	212025	FL-TUBE-Z84, Fluorescent indicator tube
R803, R805	49121563405	56k Ω x5, 1/8W, Network resistors
R804	49121563404	56k Ω x4, 1/8W, Network resistor

HEADPHONE AMPLIFIER PC BOARD

CIRCUIT NO.	PART NO.	DESCRIPTION
Q851	222823	TA75557S, IC
C851, C852	352780109	10 μ F, 50V, Elect.
R851	5104151	N09RGP50KA15, Variable resistor

TRAY PC BOARD (NATRAY-2107)

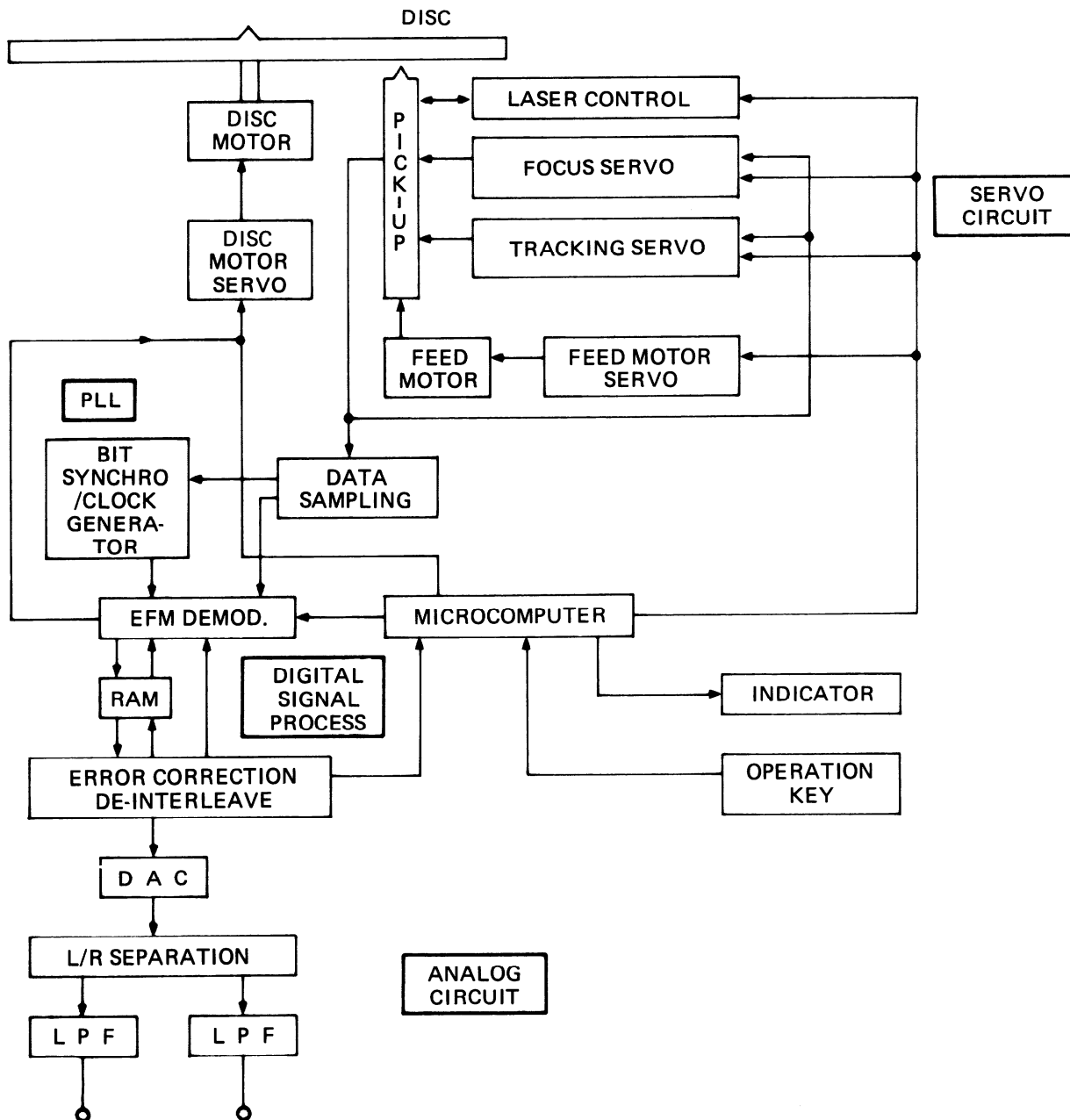
CIRCUIT NO.	PART NO.	DESCRIPTION
D807	225162	TLS143, LED
S101	25035291	NPS-111-S257, Push switch

POWER SWITCH CIRCUIT PC BOARD

CIRCUIT NO.	PART NO.	DESCRIPTION
S951	25035435	\triangle NPS-111-L399P, Power switch
C951	3500077	\triangle 4,700pF, AC 400V, Capacitor IS (G/W/Q)
	3500065A	\triangle 0.01 μ F, AC 125V/400V, Capacitor IS (D)

NOTES: THE COMPONENTS IDENTIFIED BY MARK \triangle ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

SYSTEM VIEW



This system can be divided into three parts: a servo circuit, which controls the pick-up and motor; a digital circuit, which processes signals read from discs; and an analog circuit, which processes sound signals.

TABLE OF CONTENTS

Specifications	1
Protection of eyes from laser beam during servicing	2
Laser warning labels	2
Precautions	4
Packing view	5
Caution of replacement of pick-up	6
Notes on compact disc	7
Disassembly instructions	8
Adjustment procedures	11
Block diagram	29
Exploded view	30
Parts list	31
Mechanism exploded view	32
Parts list	33
Printed circuit board parts list	34

PRECAUTIONS

1. The Pickup Attachment Screw

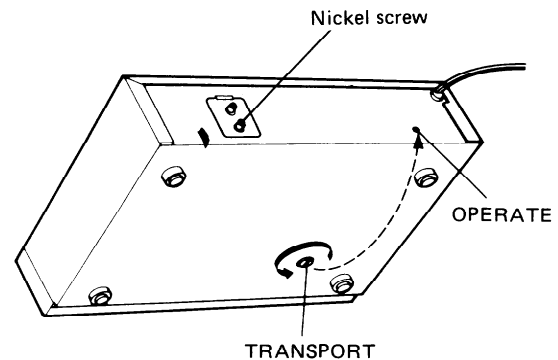
There is a pickup shipping screw on the bottom of the cabinet. Before playing a disc for the first time, this screw must be removed using a blade (-) screwdriver or coin. If the power is turned on with this screw attached, the unit will not operate properly. Save the screw by affixing it in the storage hole on the rear panel as it should be reattached if the player is ever moved or shipped.

Note: To transport, turn the power OFF with the disc tray open. Push the tray gently by hand, then tighten the screw by turning it clockwise.

2. Safety-check out (U.S.A. model)

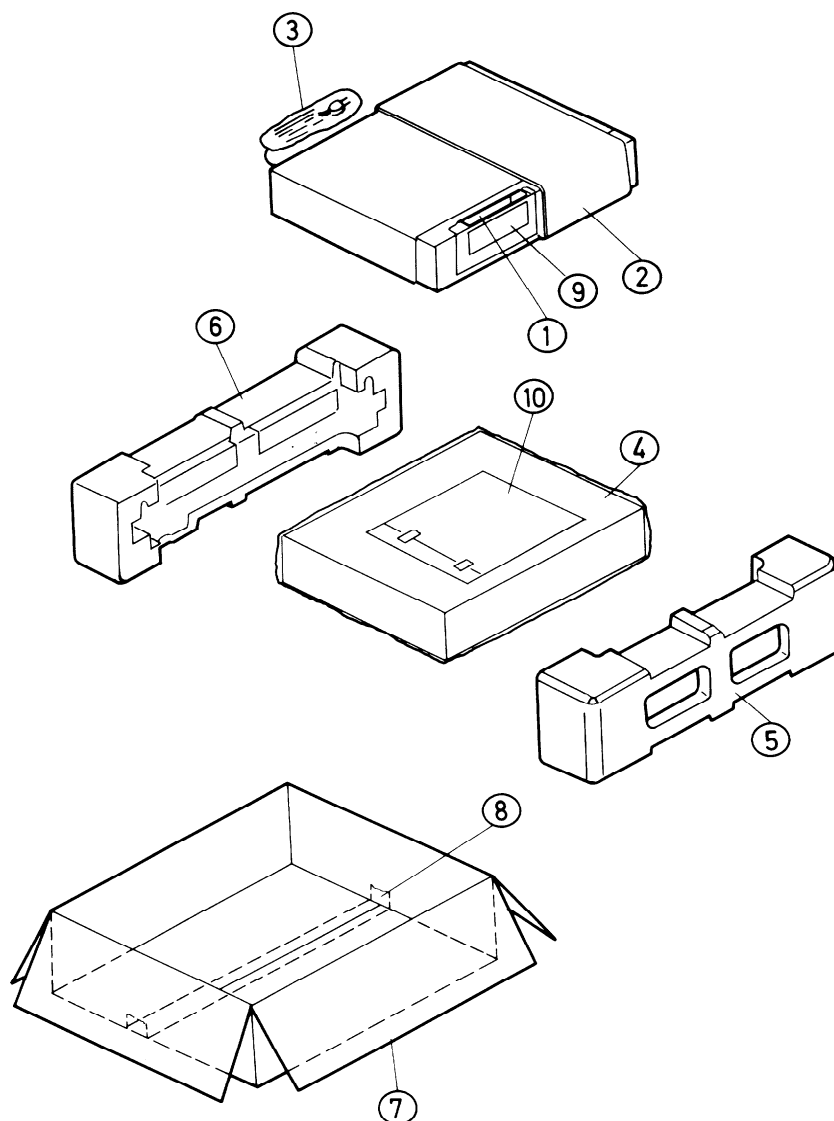
After correcting the original service problem, perform the following safety check before releasing the set to the customer:

Connect the insulating-resistance tester between the plug of power supply cable and nickel screw on the back panel.
Specifications: more than 10Mohm at 500V.



(Fig. 1)

PACKING VIEW



REF. NO.	PART NO.	DESCRIPTION
1		50x140mm, Protection sheet
2		186x810mm, Protection sheet
3	29100056	Poly = vinyl bag, power cord
4	29100074	Poly = vinyl bag
5	29090924	Pad, front
6	29090925	Pad, back
7	29050988	Master carton box
8	260013	Tape
9	29360715	Label, caution, screw
10		Accessory bag ass'y
	29340809	Instruction manual (120V model)
	29340810	Instruction manual (Other models)
	2010104	Connection cord
	29100006	250x350mm, Poly = vinyl bag

CAUTIONS ON REPLACEMENT OF PICK-UP

1. When removing the laser pick-up, temporarily connect (solder) the terminals to which red and black leads have been connected to protect the laser pick-up from damage which would be caused during removal work of the pick-up.
2. Disconnect the connector and leads after completion of soldering. Do not touch the terminals on the pick-up by your hand.
3. When mounting a new laser pick-up, first connect the connector and leads and then remove short-circuit spring on the P.C. Board (Refer to Fig. 4 and 5).

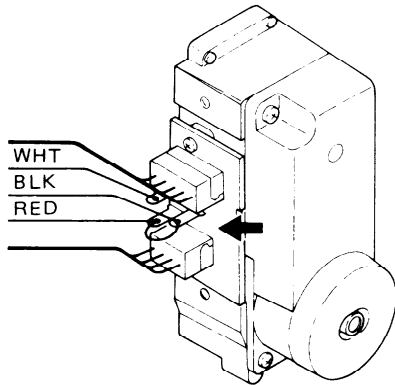


Figure 2

Solder or short-circuit these two terminals before disconnecting the connector leads.

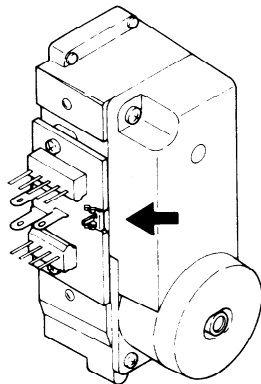


Figure 4

Shorting spring (to short-circuit the terminals)

RANKS OF PICK-UP

The pickups are divided into two rank groups, B and C, and one of ranks is indicated on a label put on a side of the pickup as shown. When a new pickup having the same rank as one of the pickup to be replaced is replaced, no additional resistor replacement is required. However, when the pickup has a different rank, one resistor must be changed as tabulated below, depending on the rank of the pickup to be replaced.

Symbol No.	R129	R130
Rank		
B	Use 18k ohm	Remove
C	Remove	Use 6.8 k ohm

When mounting the laser pick-up, the terminals (red and black) of which were soldered in the step 1. leftward, first connect the connector and leads before unsoldering the terminals (red and black). (Refer to Fig. 5)

- * Use a soldering iron grounded (or iron less leakage).
 - * Cover the working bench with a conductive mat which is also grounded.
 - Before proceeding job, always touch the conductive mat or ground lead with your both hand to discharge electric charges developed on your body.
4. The necessary distance between laser pick-up and the viewer's eye is only 2mm.

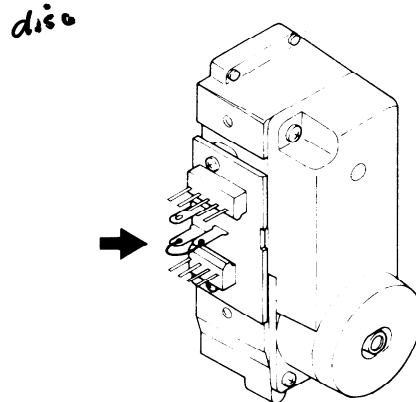


Figure 3

The terminals short-circuited.

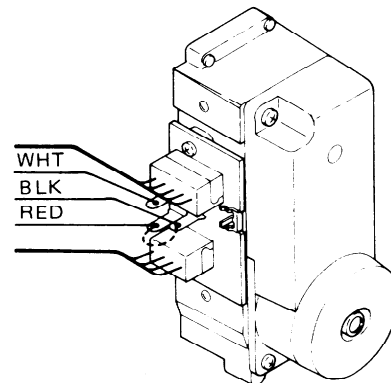


Figure 5

Remove the shorting spring after connection of the connector and leads have been completed.
Shorting spring

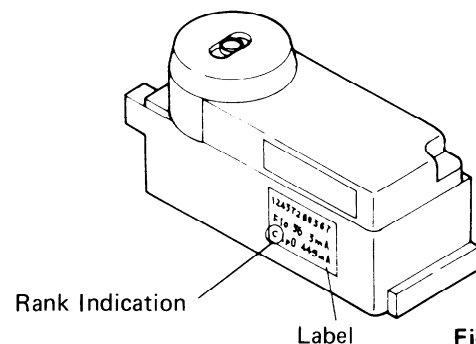


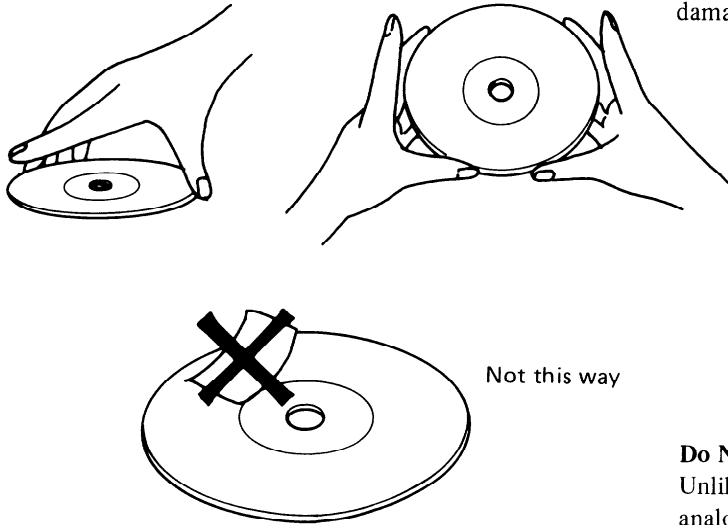
Figure 6

NOTES ON COMPACT DISC

• Holding Compact Discs

Hold Compact Discs by the edges so that you do not touch the surface of disc. Remember that the side of the disc with the "rainbow" reflection is the side containing the audio information.

Do not attach tape or paper to the label side of the disc and always be careful not to leave fingerprints on the side that is played.



• Storing Compact Discs

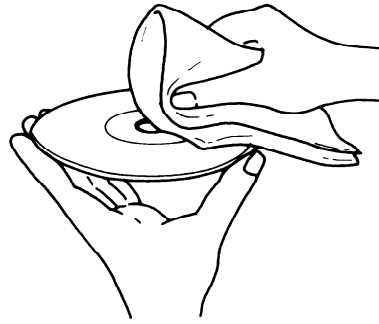
Store Compact Discs in a location protected from direct sunlight, high heat and humidity and extremely high and low temperatures. Discs should never be left in the trunk or interior of an automobile in the sun since the temperature can become very high in such a closed environment.

Always store Compact Discs in the holders in which they were sold. Never leave a disc in the player's disc holder for a long period of time.

• Cleaning Compact Discs

Before playing a disc wipe off the playing surface with a soft cloth to remove dust and other soil. Wipe the surface in straight lines from the center of the disc outward, not in a circular motion as you would with a phonograph record.

Do not use benzene, chemical cleansers or phonograph record cleaning solutions to clean Compact Discs. Also avoid static electricity prevention solutions since they can damage the surface of Compact Discs.



Do Not Set Volume Too High.

Unlike phonograph records, cassette tapes and other analog audio sources, Compact Discs have no background or surface noise (scratches, clicks, etc.).

Therefore, you can not adjust the volume level by listening to the "lead-in noise" as you would with a phonograph record, for example. Be careful not to set the volume control on your amplifier or receiver too high before the music on a disc begins since a high setting could damage your speaker system.

Problems Caused by Dew

Dew can form inside a Compact player when it is brought from a cold environment into a warm room, when a room is rapidly heated and if a player is left in a humid environment.

This dew can prevent the laser pickup from reading the data contained in the pits in the disc surface. If the player does not operate properly because of dew, remove the disc and leave the player's power switch on for about one hour to remove all moisture.

11. DISASSEMBLY INSTRUCTIONS

■ TOP COVER REMOVAL

1. Remove two screws (A) & (B) on both sides and four screws (C) on back side, and the top cover will be removed. (See Figure 7, 8 and 9).

(A) $\phi 3 \times 8\text{mm}$ Tapping Screw

Figure 7

(B) $\phi 3 \times 8\text{mm}$ Tapping Screw

Figure 8

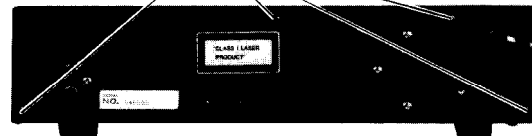
(C) $\phi 3 \times 8\text{mm}$ Tapping Screw

Figure 9

■ TRAY PANEL REMOVAL

1. Remove top cover.
2. Mechanism assembly comes out (open) by pulling mechanism assembly gear in direction (D) shown by arrow while pressing the gear with your finger. (See Figure 10)
3. Remove tray panel by pushing hook (E) or Tray mold securing tray panel. (See Figure 11)

VERY EASY TO TAKE OUT "MECHANISM BOTTOM BOARD"
SEE FIG. 19

(E) Hook

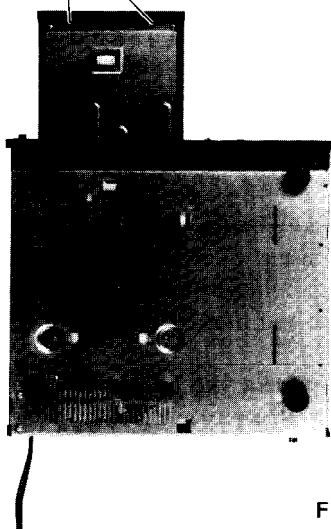


Figure 11

(D)

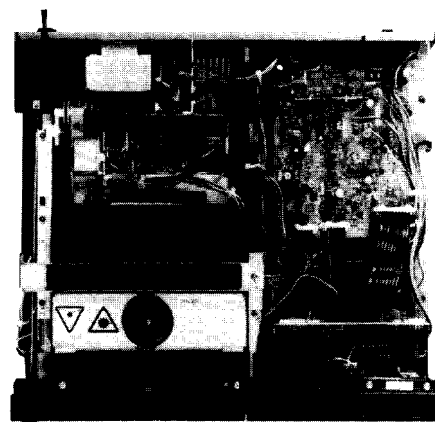


Figure 10

GROUND
COPPER
BAR SPRING

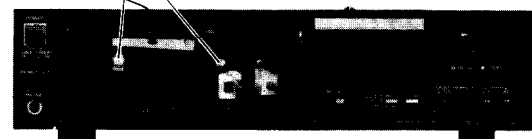
(F) $\phi 3 \times 10\text{mm}$, Screw

Figure 12

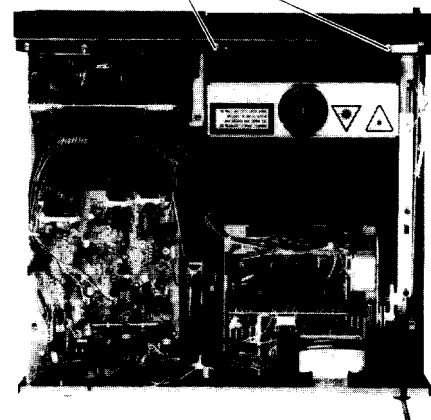
(G) $\phi 3 \times 6\text{mm}$, Tapping Screw

Figure 13

■ TRAY MOLD REMOVAL (PIECE OF PLASTIC IN FRONT OF TRAY, BUT BEHIND TRAY PANEL)

1. Remove top cover and tray panel.
2. Remove two screws (F) securing tray mold, and the tray mold will be removed. (See Figure 12)

■ FRONT PANEL ASSEMBLY REMOVAL

1. Remove top cover, tray panel, and tray mold.
2. Remove six screws (G), (H) & (I) securing front panel, and the front panel assembly will be removed. (Pay attention to connector leads and joint of power supply switch.) (See Figure 13, 14 and 15)

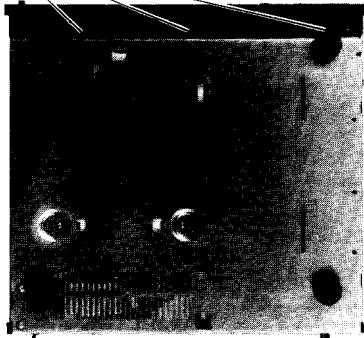
(H) $\phi 3 \times 6\text{mm}$, Tapping Screw

Figure 14

(I) $\phi 3 \times 6\text{mm}$, Tapping Screw

Figure 15

MECHANISM ASSEMBLY REMOVAL

1. Remove front panel assembly.
2. Move mechanism assembly forward. (Open it.)
3. Remove two screws (J) securing mechanism assembly, and the mechanism assembly will be removed. (See Figure 16)

DISC TRAY REMOVAL

1. Remove tray panel and tray mold.
2. Remove two screws (K) securing disc tray. (See Figure 17)
3. Move mechanism assembly forward. (Open it.)
4. Lift disc tray up with hool (L) pushed, the disc tray will be removed. (See Figure 18)

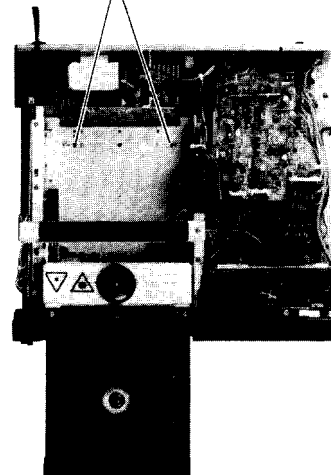
(J) $\phi 3 \times 4\text{mm}$, Screw

Figure 16

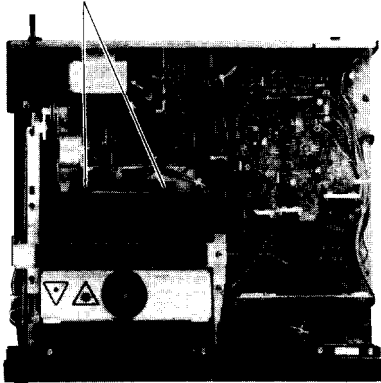
(K) $\phi 2.6 \times 6\text{mm}$, Screw

Figure 17

Hook

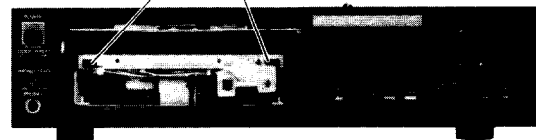


Figure 18

MECHANISM BOTTOM BOARD REMOVAL

1. Move mechanism assembly forward. (Open it.)
2. Remove two screws (M) securing bottom board, and the mechanism bottom board will be removed. (See Figure 19)

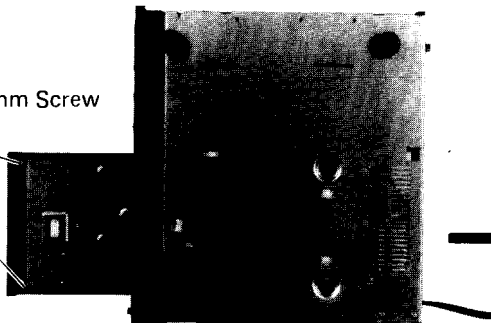
(M) $\phi 2.6 \times 6\text{mm}$ Screw

Figure 19

Removing of bottom board

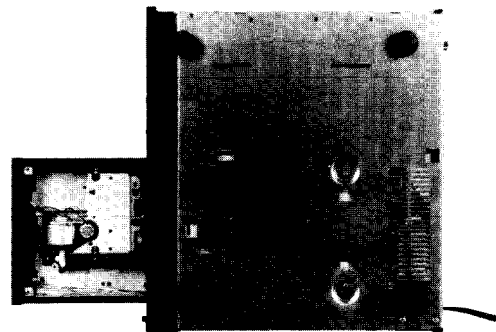


Figure 20