

Service Manual

VOL. 3

ADJUSTMENT MANUAL

Compact Disc Player

SL-P10

COMPACT
disc
DIGITAL AUDIO

DIGITAL



Technics

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
DISCPLAYER DIVISION, SERVICE GROUP.

CONTENTS

	Page
1. Check of basic operation before adjustment	1
2. Adjustment of actuator balance	2
3. Offset adjustment of actuator balance	3
4. Adjustment of optical servo reference voltage	3
5. Adjustment of spindle motor reference voltage	4
6. Temporary adjustment of tracking offset	4
7. Temporary adjustment of focus offset	4
8. Adjustment of rough servo reference voltage	5
9. Balance adjustment of tracking error signal	5
10. Gain adjustment of tracking error signal	6
11. Primary adjustment of focus error signal balance (Best eye I)	7
12. Adjustment of rough servo	8
13. Adjustment of CLV servo	8
14. Regular adjustment of focus offset	9
15. Adjustment of focus gain	10
16. Adjustment of tracking gain	10
17. Adjustment of jump pulse	11
18. Adjustment of traverse gain and offset	12
19. Offset adjustment in case of drop-out	13
20. Secondary adjustment of focus error signal balance (Best eye)	14
21. Adjustment of PLL free-run	15
22. Adjustment of PLL reference voltage	16
23. Check of playback operation after adjustment	16

1. Check of basic operation before adjustment

Check to see that the conditions below are satisfied when the power switch is turned ON before adjustment. Otherwise, the system can not be adjusted properly.

- (1) The display should be as shown in Fig. 1.
- (2) The STOP, CLEAR, LED should be lit.
- (3) Pu position display LED should be lit at the innermost periphery.
- (4) The open/close button should work to open/close the door.
- (5) When a disc is inserted with the door opened, the door should close automatically. (Auto loading)
- (6) After disc loading, the disc should rotate.

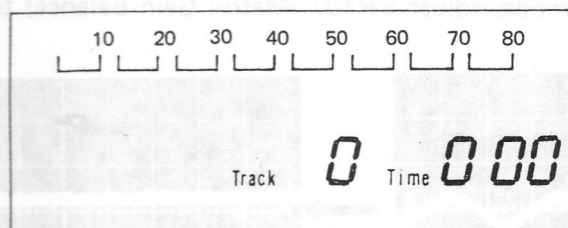


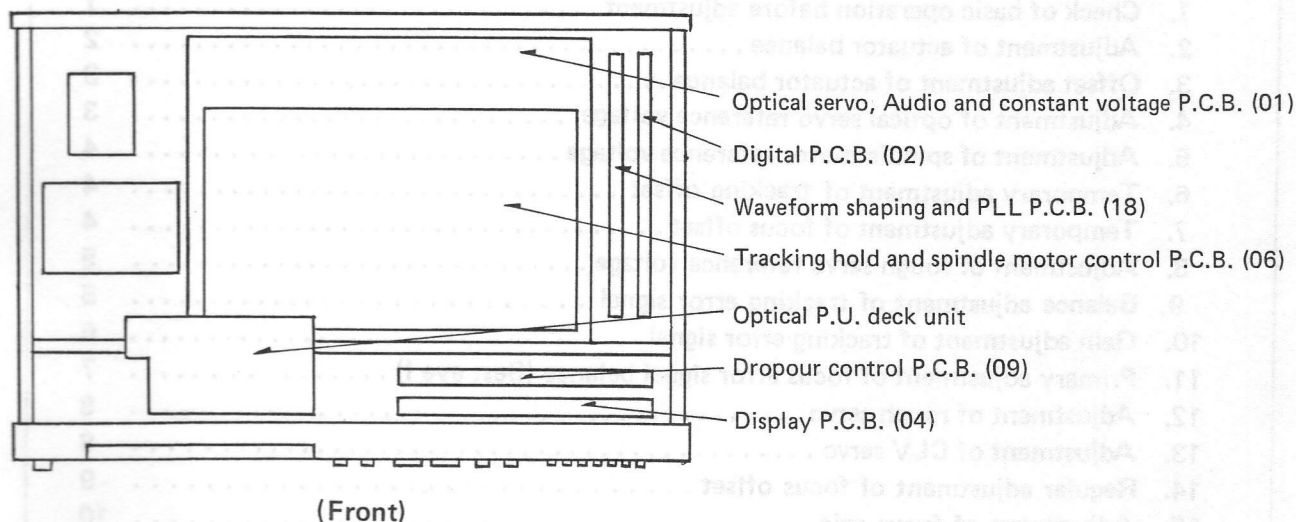
Fig. 1. Display section

• Equipment for Adjustments

- 1) Digital Volt Meter 0.001 – 50V (AC/DC)
- 2) Dual Oscilloscope more than 30MHz
- 3) Standard Test Disc
- 4) Eccentric detection Jig (SZZP1012F)
- 5) Capacitors
 - 10 μ F ECEA1CN10 (For Item 14)
 - 4700pF ECQM1H473 (For Item 16)
 - 0.15 μ F ECCD1H154 (For Item 18)
- 6) Audio Oscillator

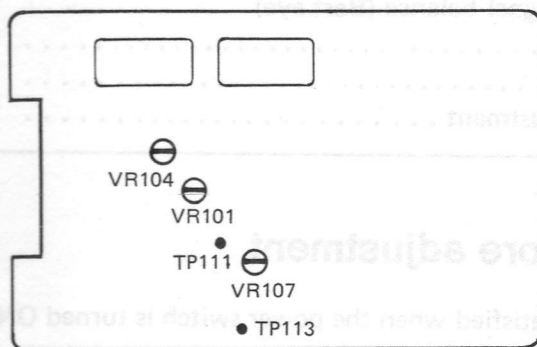
Perform all adjustments after the optical P.U. deck has been replaced or removed.

- Location of printed circuit boards (Please refer to page 8 of the Service Manual)



2. Adjustment of actuator balance

Optical servo, Audio and constant voltage P.C.B. (01)



(Oscilloscope)

* Connection Points

CH1 TP111

CH2 TP113 • R131

GND Chassis

* Conditions

Sweep 1ms/div.

Volt CH1 ... 500mV/div (AC)

CH2 ... 500mV/div (AC)

• Adjusting method

Step 1 Turn on the power switch without a disc inserted.

Step 2 Completely turn both VR101 (Focus Offset) and VR104 (Tracking Gain) Counter-clockwise.

Step 3 Apply a 400Hz (sine wave) into TP133 through a 10 μ F capacitor.

Step 4 Looking at both CH1 and CH2 adjust the output of the oscillator so that the waveform amplitude on the oscilloscope is 2Vp-p. (Ref. Fig. 2)

Step 5 With the oscilloscope set to the ADD mode, adjust VR107 (Matrix Gain Balance) to minimize the amplitude. (Ref. Fig. 3).

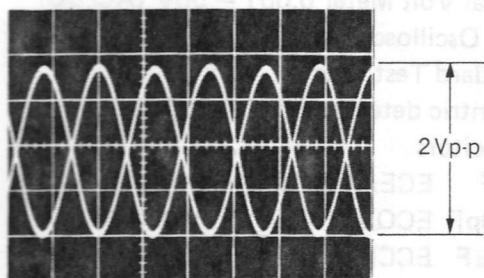


Fig. 2

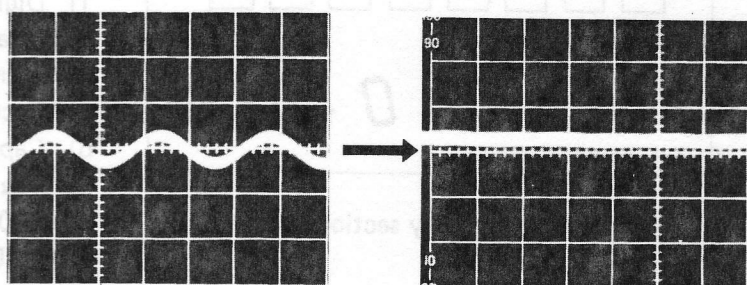
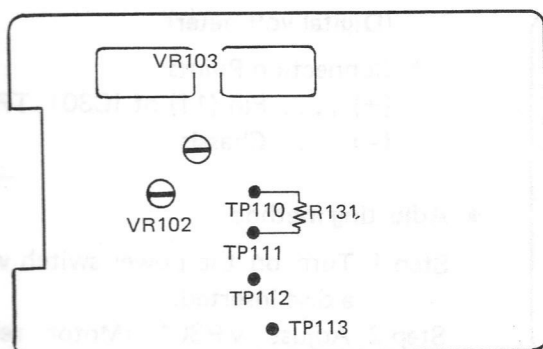


Fig. 3

3. Offset adjustment of optical servo IC

Optical servo, Audio and constant voltage P.C.B. (01)



(Oscilloscope)

* Connection Points

CH1 TP110 → TP111

CH2 TP112 → TP113

GND Chassis

* Conditions

Sweep 1ms/div.

Volt CH1 2V/div. (DC)

CH2 2V/div. (DC)

• Adjusting method

Step 1 Turn on the power switch without a disc inserted.

Step 2 Connect CH1 of oscilloscope to TP110, and CH2 to TP112.

Adjust the scope trace to the center of the screen. (Ref. Fig. 4)

Step 3 Shift CH1 from TP110 to TP111, and CH2 from TP112 to TP113.

Then adjust VR102 and VR103 to set the scope trace to the center of the screen. (Ref. Fig. 4)

* VR102 (Focus Gain) To match the potential differences of CH1 and CH2.

* VR103 (Tracking Offset) ... To vary the voltages of CH1 and CH2.

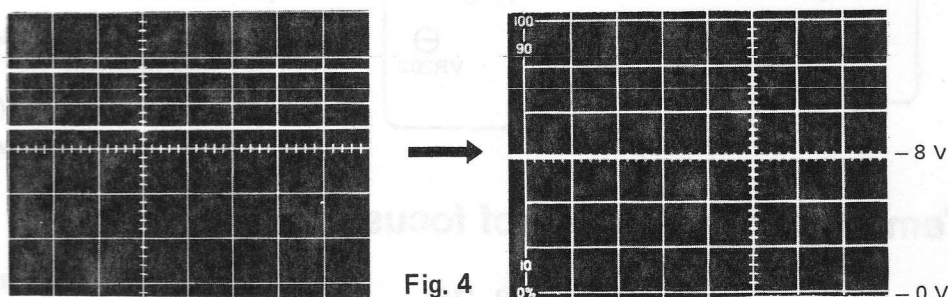
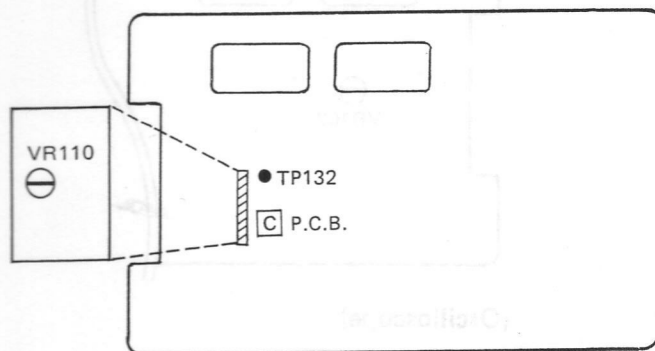


Fig. 4

4. Adjustment of optical servo reference voltage

Optical servo, Audio and constant voltage P.C.B. (01)



(Digital Voltmeter)

* Connection Points

(+) TP132

(-) Pin (4) of [C] P.C.B.

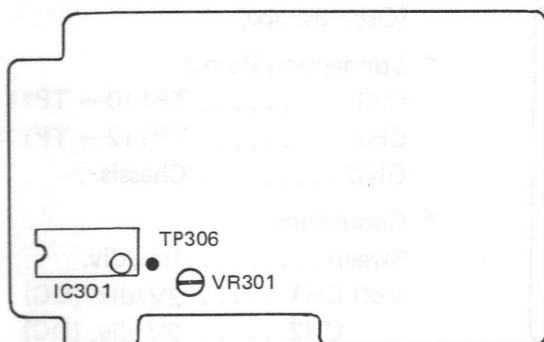
• Adjusting method

Step 1 Turn on the power switch without a disc inserted.

Step 2 Adjust VR110 (reference Voltage) so that the digital voltmeter indicates 0mV ±5mV.

5. Adjustment of spindle motor reference voltage

Tracking hold and spindle motor control P.C.B. (06)



(Digital voltmeter)

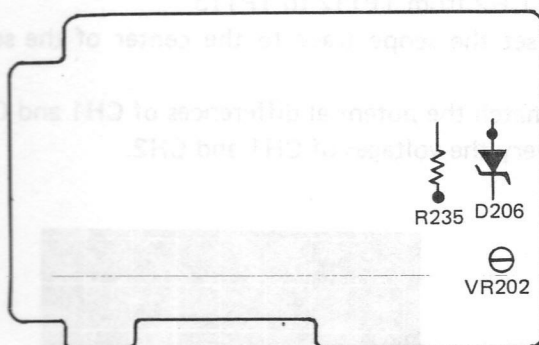
- * Connection Points
 - (+) Pin (11) of IC301; TP306.
 - (-) Chassis

• Adjusting method

- Step 1 Turn on the power switch without a disc inserted.
- Step 2 Adjust VR301 (Motor reference Voltage Adjust) so the the digital voltmeter indicates $6.4V. \pm 0.1V$.

6. Temporary adjustment of tracking offset

Tracking hold and spindle motor control P.C.B. (06)



(Digital voltmeter)

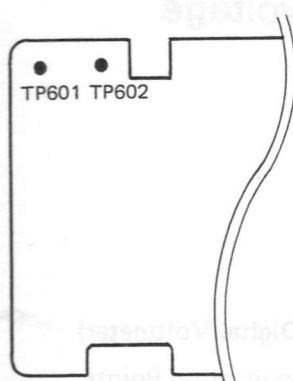
- * Connection Points
 - (+) R235 • Mark
 - (-) Anode of D206

• Adjusting method

- Step 1 Turn on the power switch without a disc inserted.
- Step 2 Adjust VR202 (offset Adjust) so that the digital voltmeter indicates $0mV \pm 2mV$.

7. Temporary adjustment of focus offset

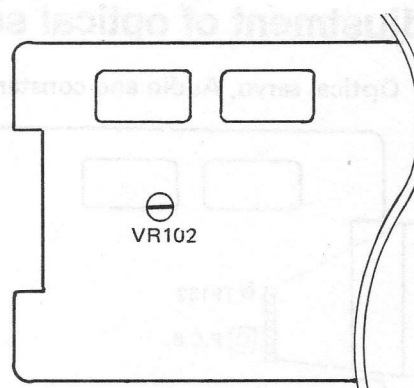
Waveform shaping and PLL P.C.B. (18)



(Oscilloscope)

- * Connection Points
 - CH1 . . . TP601
 - GND . . . TP602

Optical servo, Audio and constant voltage P.C.B. (01)



(Oscilloscope)

- * Conditions
 - Sweep 5ms/div.
 - Volt CH1 . . . 500mV/div. (AC)

- **Adjusting method**

Step 1 Insert the test disc. (Disc should rotate after auto loading.)

Step 2 Watching the waveform of the oscilloscope, adjust VR102 (Focus Gain) so that the RF signal appears. (Ref. Fig. 5)

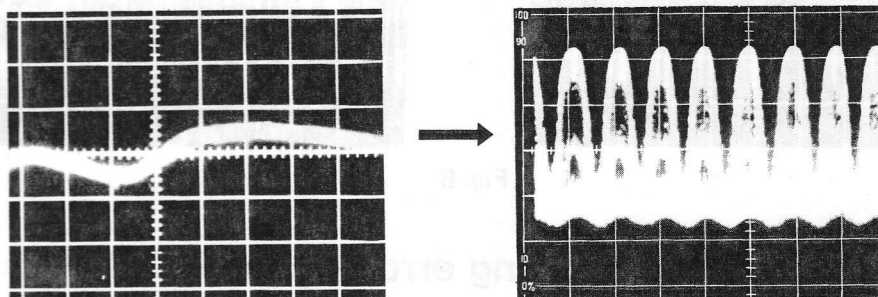
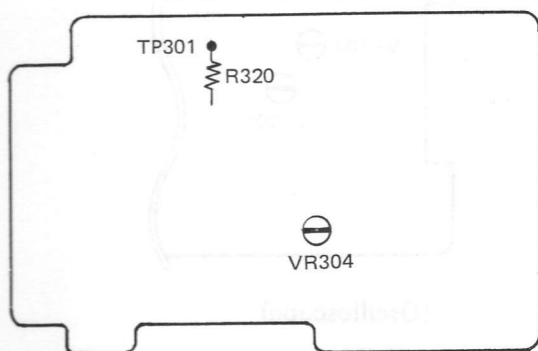


Fig. 5

8. Adjustment of rough servo reference voltage

Tracking hold and spindle motor control P.C.B. (06)



(Digital voltmeter)

* Connection Points

(+) TP301

(-) Chassis

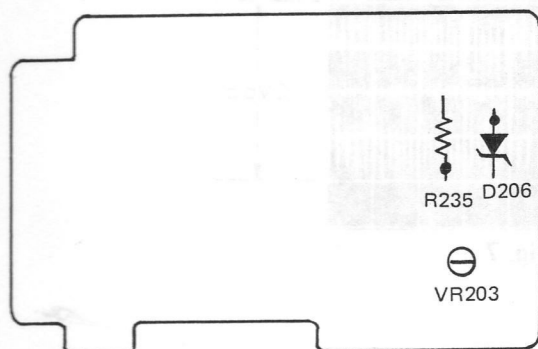
- **Adjusting method**

Step 1 Insert the test disc. (Disc should rotate after auto loading but the program may not load).

Step 2 Adjust VR304 (Reference Voltage Adjust) so that the digital voltmeter indicates 5V, ± 0.1 V.

9. Balance adjustment of tracking error signal

Tracking hold spindle motor control P.C.B. (06)



(Oscilloscope)

* Connection Points

CH1 R235 • Mark

GND Anode of D206 (VREF)

* Conditions

Sweep 2ms/div.

Volt CH1 ... 500mV/div. (DC)

- **Adjusting method**

Step 1 Shift the oscilloscope AC/GND/DC selector to GND, and set the scope trace to the center of the screen.

Step 2 Insert the Test disc (Disc should rotate after auto loading.)

Step 3 Shift the oscilloscope input to DC, and adjust VR203 (Head Amp Balance Adjust) so that the waveforms are centered vertically in the center of the screen. (Ref. Fig. 6)

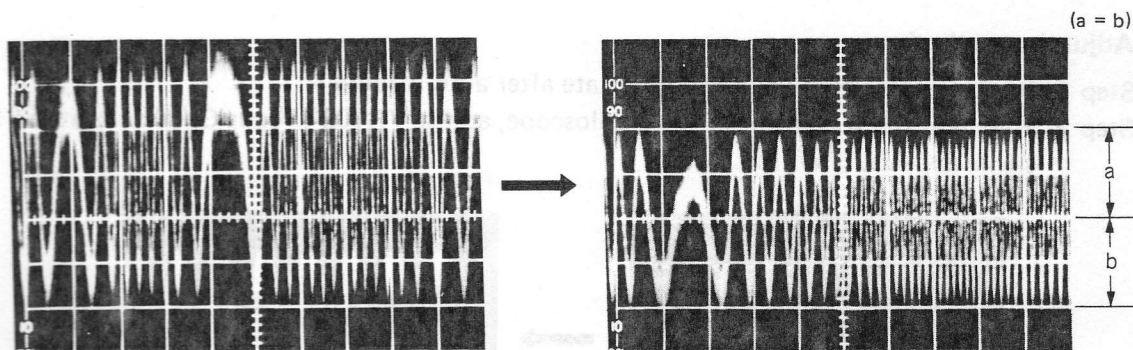
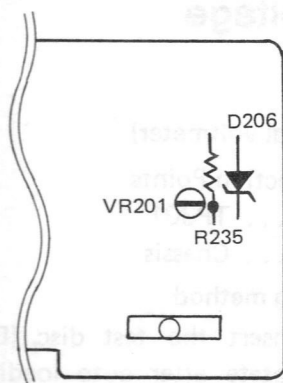


Fig. 6

10. Gain adjustment of tracking error signal

Tracking hold and spindle motor
control P.C.B. (06)



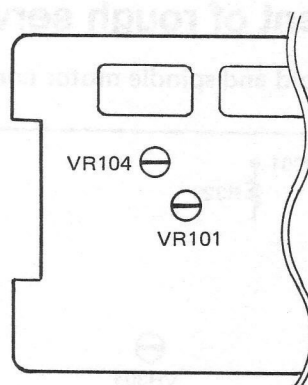
(Oscilloscope)

* Connection Points

CH1 R235 • Mark

GND Anode of D206 (VREF)

Optical servo, Audio and constant
voltage P.C.B. (01)



(Oscilloscope)

* Conditions

Sweep 2ms/div.

Volt CH1 ... 500mV/div. (DC)

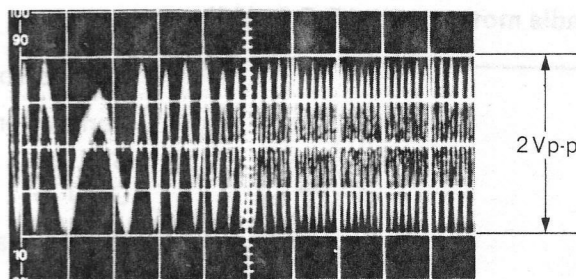


Fig. 7

• Adjusting method

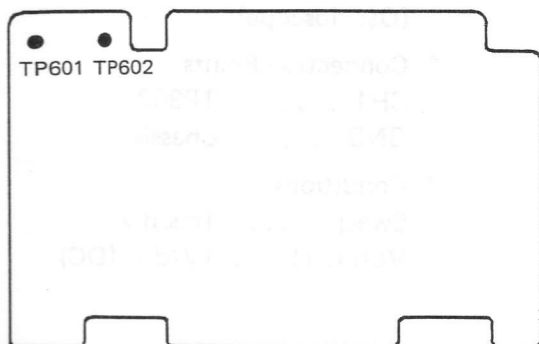
Step 1 Insert the Test disc (Disc should rotate after auto loading)

Step 2 Adjust VR201 (Head Amp Gain Adjust) so that the waveform amplitude on the oscilloscope is 2Vp-p. $\pm 0.2V$. (Ref. Fig. 7)

Step 3 After completion of the above adjustment, set VR101 (Focus offset) to maximum (turning it completely clockwise), and VR104 (Tracking Gain) to center. Then make sure that TOC is displayed.

11. Primary adjustment of focus error signal balance (Best eye I)

Waveform shaping and PLL P.C.B. (18)



(Oscilloscope)

* Connection Points

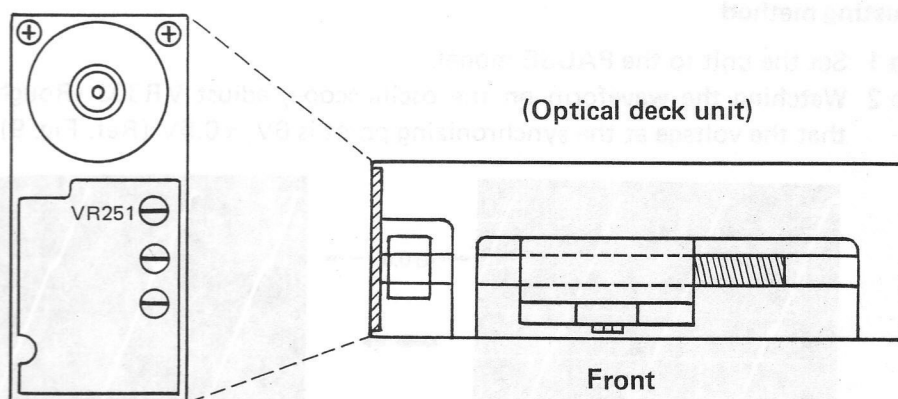
CH1 TP601

GND TP602

* Conditions

Sweep $0.5\mu\text{s}/\text{div.}$

Volt CH1 ... $500\text{mV}/\text{div. (AC)}$



• Adjusting method

Step 1 Set the unit to the PLAY mode. (Use the Test disc Band 1)

Step 2 Adjust VR251 (Best Eye Adjust) so that the eye pattern of the RF signal has the sharpest focus. (Ref. Fig. 8)

* VR251 is located at the top of No.3 P.C.B.

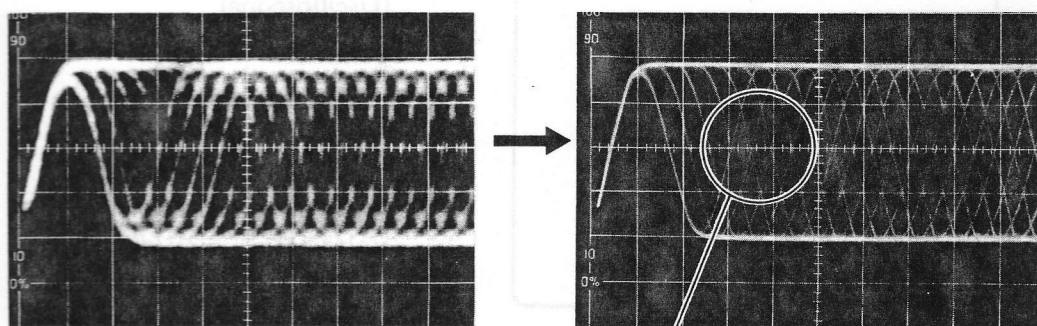
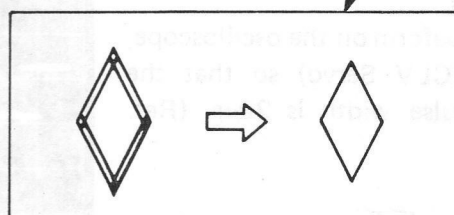
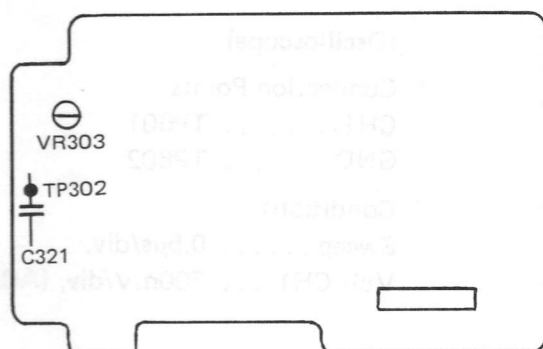


Fig. 8



12. Adjustment of rough servo

Tracking hold and spindle motor control P.C.B. (06)



(Oscilloscope)

- * Connection Points
 - CH1 TP302
 - GND Chassis
- * Conditions
 - Sweep 1ms/div.
 - Volt CH1 ... 1V/div. (DC)

• Adjusting method

Step 1 Set the unit to the PAUSE model.

Step 2 Watching the waveform on the oscilloscope, adjust VR303 (Rough Servo Adjust) so that the voltage at the synchronizing point is $6V, \pm 0.5V$ (Ref. Fig. 9)

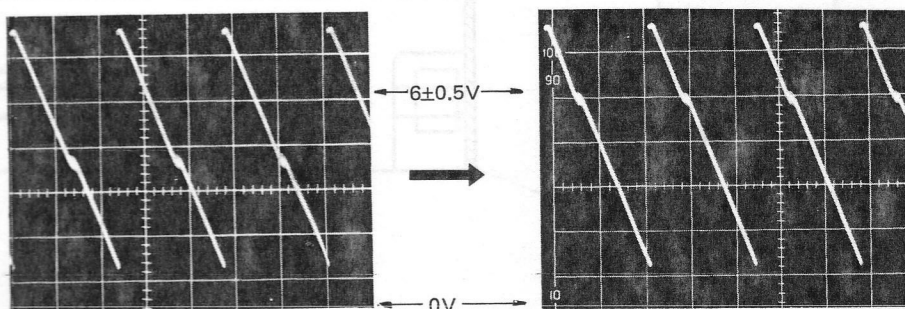
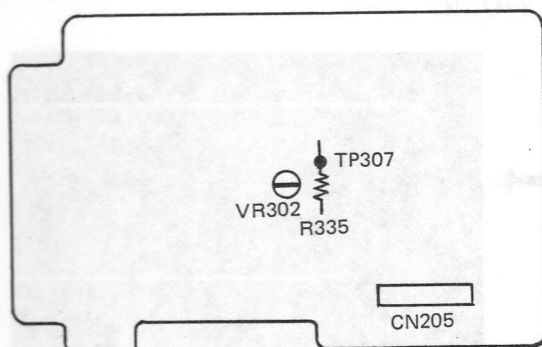


Fig. 9

13. Adjustment of CLV servo

Tracking hold and spindle motor control P.C.B. (06)



(Oscilloscope)

- * Connection Points
 - CH1 TP307
 - GND Chassis
- * Conditions
 - Sweep $20\mu s$ /div.
 - Volt CH1 ... 2V/div. (DC)

• Adjusting method

Step 1 Set the unit to the PLAY mode. (Use the Test disc Band 1)

Step 2 Watching the waveform on the oscilloscope, adjust VR302 (CLV Servo) so that the synchronizing pulse width is $20\mu s$. (Ref. Fig. 10 and 11).

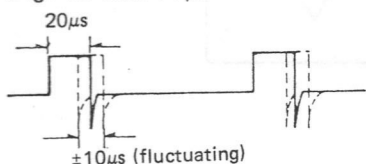


Fig. 10

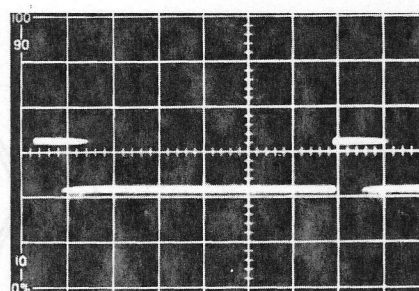
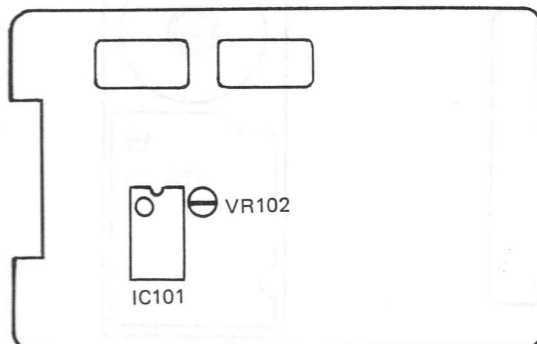


Fig. 11

14. Regular adjustment of focus offset

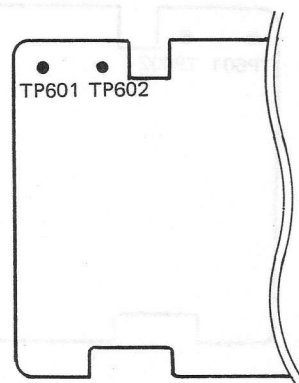
Optical servo, Audio and constant voltage
P.C.B. (01)



(Oscilloscope)

- * Connection Points
- CH1 TP601
- GND TP602

Waveform shaping and PLL P.C.B. (18)



- * Conditions
- Sweep 50ms/div.
- Volt CH1 ... 500mV/div. (AC)

• Adjusting method

- Step 1 Set the unit to the PLAY mode.
- Step 2 With the unit in the PLAY mode, ground Pin 1 (FE IN) of IC101 (AN7673) to the chassis through a 10 μ F Capacitor.
 - * The RF signal becomes a burst signal.
- Step 3 Make sure that the RF burst signal amplitude is not decreased to less than 1/3 when the Pick-up is moved from inner to outer or outer to inner periphery with the search button.
- Step 4 If the amplitude is not decreased to less than 1/3, proceed to the next adjustment. If it is decreased to less than 1/3, proceed to step 5.
- Step 5 Move the Pick-up to a point where the amplitude is decreased to less than 1/3, and adjust VR102 (Focus Gain) so that RF burst waveform becomes more than 1/3, and then check the step 3 once again.

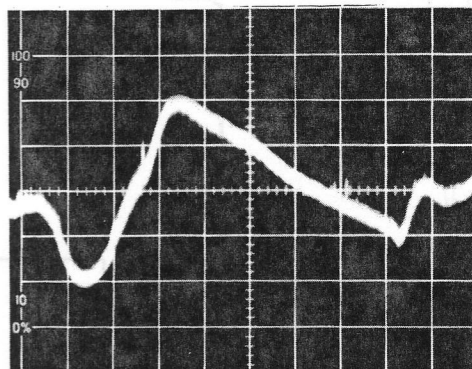
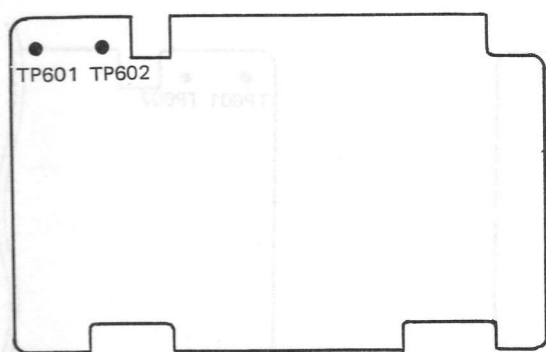


Fig. 12

15. Adjustment of focus gain

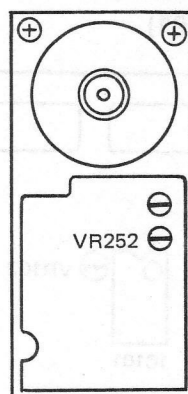
Waveform shaping PLL P.C.B. (18)



(Oscilloscope)

- * Connection Points
- CH1 TP601
- GND TP602

(Optical deck unit)



- * Conditions
- Sweep 50ms/div.
- Volt CH1 ... 500mV/div. (AC)

• Adjusting method

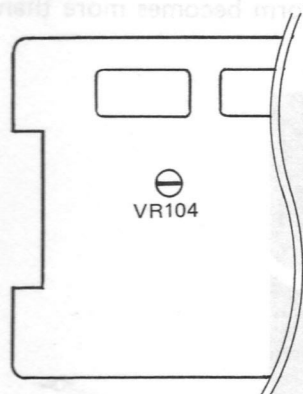
Step 1 Set the unit to the PLAY mode. (Use the Test disc Band 1)

Step 2 Watching the RF signal on the oscilloscope, press PLAY and STOP repeatedly and adjust VR252 (Focus Gain Adjust) so that the waveform appears in the shortest time. (After adjusting VR252, its position should be near the center of its rotating range.)

* VR252 is located in the middle of No. 3 P.C.B.

16. Adjustment of tracking gain

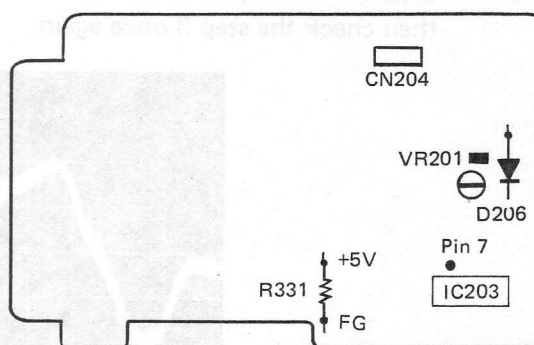
Optical servo, Audio and constant voltage P.C.B. (01)



(Oscilloscope)

- * Connection Points
- CH1 IC203 Pin 7
- GND Anode of D206 (VREF)

Tracking hold and spindle motor control P.C.B. (06)



- * Conditions
- Sweep 2ms/div. and 20ms
- Volt CH1 ... 500mV/div. (DC)

• Adjusting method

- Step 1 Connect the eccentric detection jig (SZZP1012F)
 (Red) +5V ... **06** P.C.B. VR304 side of R331
 (Black) GND ... Chassis
 (Yellow) F.G ... **06** P.C.B. Q301 side of R331
 (Blue) T.E ... **06** P.C.B. R235 • Mark
- Step 2 Set the unit to the PLAY mode (use any Disc)
- Step 3 With the unit set to PLAY, pull out CN204 on **06** P.C.B. The stepping motor should stop. If it does not, adjust VR203 (Head Amp Balance Adjust) to the point where the stepping motor does stop.
- Step 4 Read the waveform voltage (P-P) on the oscilloscope. This voltage is described as V_{TEO} [V]. (Ref, Fig. 13)
- Step 5 Repeatedly press the ON and OFF switches of the TEST JIG about 5 times and calculate the average value from the counter. The average value equals X. Do not use the counter reading if the RED LED is lit. If the LED lights often go back to Step 3.
- Step 6 Calculate V_{TEC} from the following equation.

$$V_{TEC} = .0008 \times V_{TEO} \times X.$$
- Step 7 Set CN204 back to its original position. Use a 4700pF capacitor to filter the input of the oscilloscope. Adjust VR104 (Tracking Gain) so that the amplitude of the waveform equals V_{TEC} (Ref, Fig. 14)

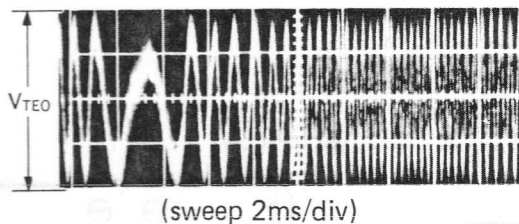


Fig. 13 With CN204 removed

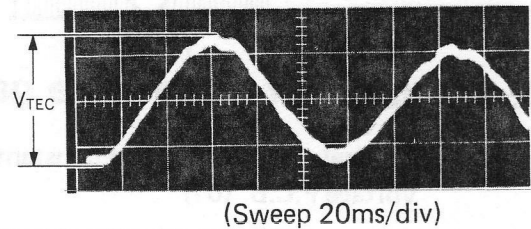
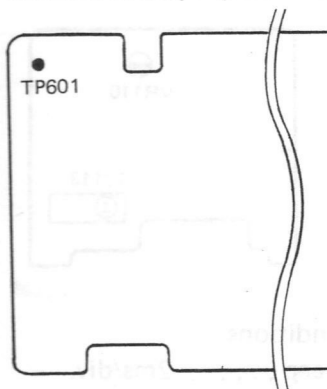


Fig. 14 With CN204 inserted
 (Oscilloscope voltage setting should be 20mV/div with filter set.)

17. Adjustment of jump pulse

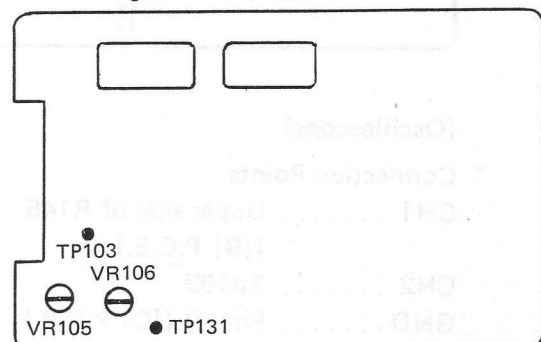
Waveform shaping and PLL P.C.B. (06)



(Oscilloscope)

- * Connection Points
 CH1 TP103
 CH2 TP601
 EXT TP131 (J. Pulse)
 GND Chassis

Optical servo, Audio and constant voltage P.C.B. (01)



- * Conditions
 Sweep 0.1ms/div.
 Volt CH1 ... 500mV/div. (AC)
 Volt CH2 ... 1V/div. (AC)
 Trigger EXT (NORM), + Trigger

- **Adjusting method**

Set the unit to the PLAY mode. (Use the Test disc Band 1)

Step 1 Shift the set to the PAUSE mode.

Step 2 Watching the waveform of CH1, adjust VR106 (Kick Pulse Brake Adjust) so that the speed reducing pulse width is $80 \pm 10\%$ of the accelerating pulse width. (Ref. Fig. 15 and 16)

Step 3 Watching the waveform of CH2, adjust VR105 (Kick Pulse Voltage Adjust) so that the shoulder (o-mark) of depression of the RF signal is clear and the wave peak value is high. (Ref. Fig. 15 and 16)

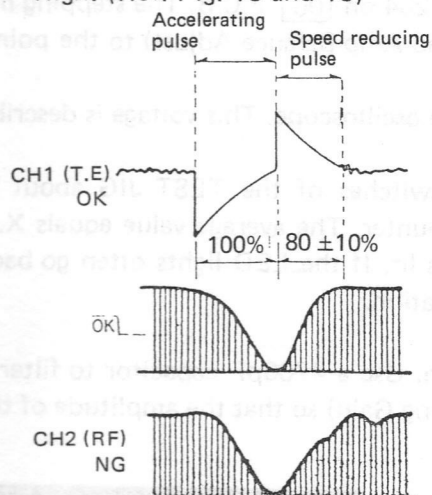


Fig. 15

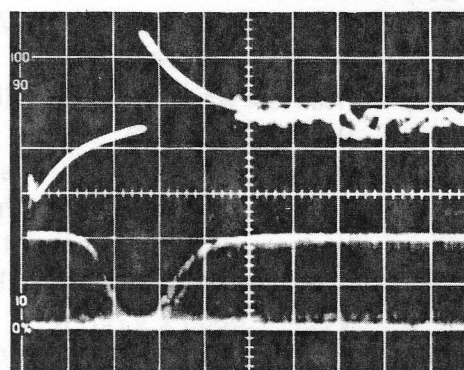
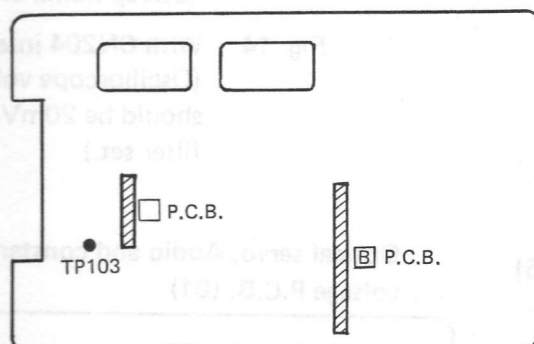


Fig. 16

18. Adjustment of traverse gain and offset

Optical servo, Audio and constant voltage P.C.B. (01)



(Oscilloscope)

* Connection Points

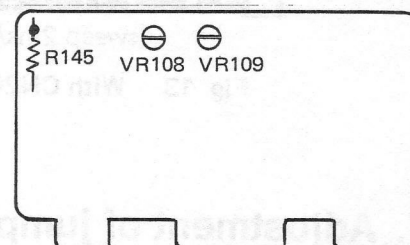
CH1 Upper side of R145
([B] P.C.B.)

CH2 TP103

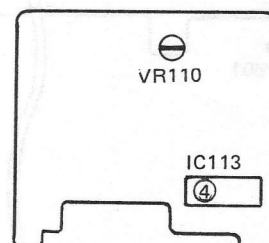
GND Pin (4) ([C] P.C.B.)

Note) CH2 should be filtered at the input terminal of oscilloscope with a $0.15\mu\text{F}$ capacitor.

[B] P.C.B.



[C] P.C.B.



* Conditions

Sweep 2ms/div.

Volt CH1 ... 500mV/div. (DC)

Volt CH2 ... 20mV/div. (DC)

• Adjusting method

Step 1 Set the unit to the STOP mode.

Step 2 Set the oscilloscope input selector DC/GND/AC of CH1 and GND and that of CH2 to DC, then set the scope trace of both channels to the center of the screen.

Step 3 Shift the unit to the PLAY mode. (Use the Test disc Band 1)

Step 4 Set the input of CH1 to DC, and adjust VR108 (Traverse Gain Adjust) so that the waveform voltage alteration of CH1 ranges from 0.5V to 0.8V. (See Fig. 17-a.)

Step 5 The waveform of CH1 intersects with that of CH2 at the center of the Screen. Adjust VR109 (Traverse offset Adjust) to match the timings. (See Fig. 17-b.)

If they fail to intersect, make the a-b width uniform. (See Fig. 17-c.)

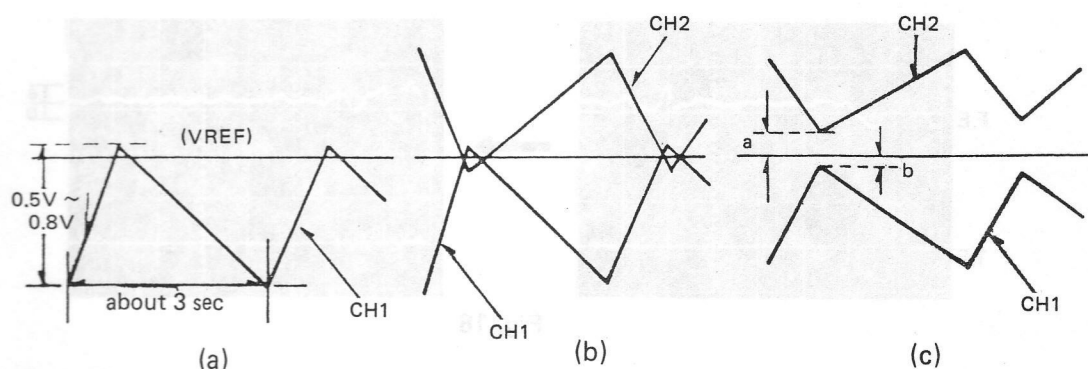
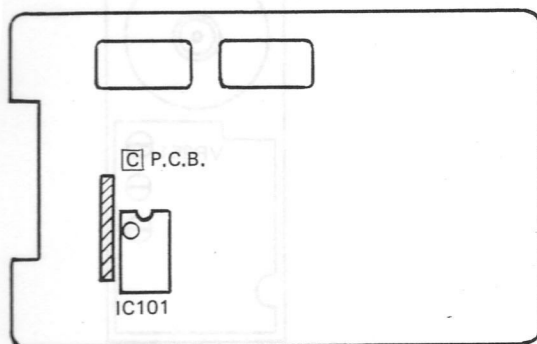


Fig. 17

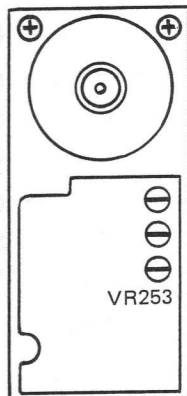
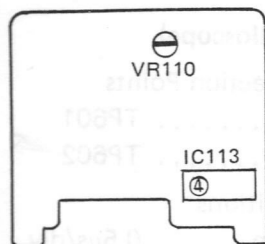
19. Offset adjustment in case of drop-out

Optical servo, Audio and constant voltage P.C.B. (01)

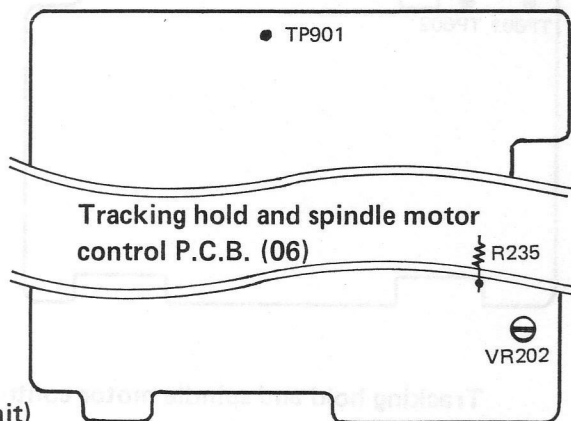


[C] P.C.B.

(Optical deck unit)



Dropout control P.C.B (09)



(Oscilloscope)

* Connection Points

CH1 Pin (1) of IC101

CH2 R235 • Mark

EXT TP901

GND Pin (4) of [C] P.C.B.

* Conditions

Sweep 1ms/div.

Volt CH1 ... 2V/div. (AC)

Volt CH2 ... 2V/div. (AC)

Trigger EXT (NORM), + Trigger

- **Adjusting method**

Step 1 Play back band 13 (0.5 mm retra-line) of the Test disc.

NOTE: If playback is not possible Disconnect CH1 of the oscilloscope. Then scan to band 13 and reconnect CH1 of the oscilloscope.

Step 2 Watching the waveform of CH1, adjust VR253 so that the waveform amplitude near the trigger point is minimized. (Ref. Fig. 18)

* VR253 is located at the lowest part of No. 3 P.C.B.

Step 3 Watching the waveform of CH2, adjust VR202 so that the waveform amplitude near the trigger point is minimized. (Ref. Fig. 18)

If the waveform amplitude is not minimized, make $a + b$ equal.

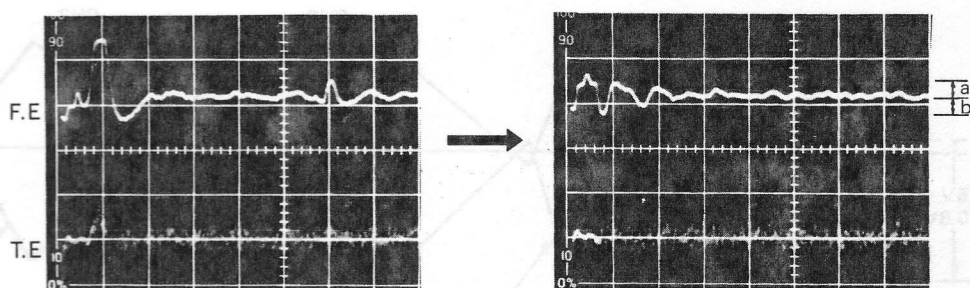
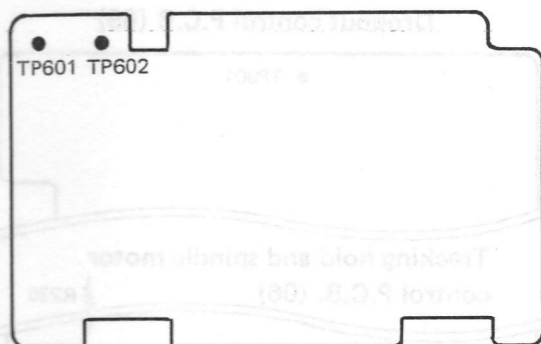


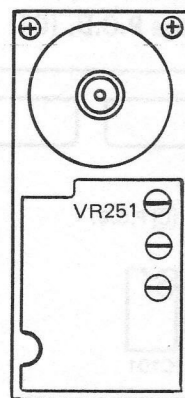
Fig. 18

20. Secondary adjustment of focus error signal balance (Best eye)

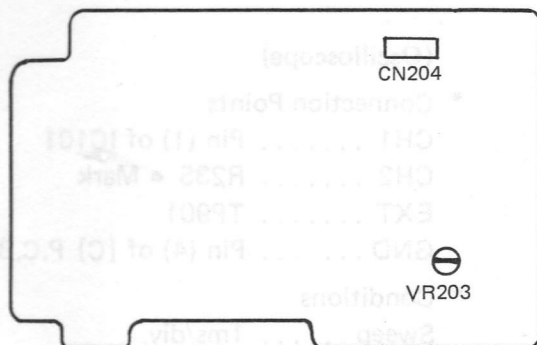
Waveform shaping and PLL P.C.B. (18)



(Optical deck unit)



Tracking hold and spindle motor control P.C.B. (06)



(Oscilloscope)

* Connection Points

CH1 TP601

GND TP602

* Conditions

Sweep $0.5\mu\text{s}/\text{div.}$

Volt CH1 ... $500\text{mV}/\text{div. (AC)}$

- **Adjusting method**

Step 1 Set the unit to the PLAY model. (Use the Test disc Band 1)

Step 2 Adjust VR251 (Best Eye Adjust) so that the eye pattern of RF signal has the sharpest focus. (Ref. Fig. 19). (VR251 is located at the uppermost of No. 3 P.C.B.)

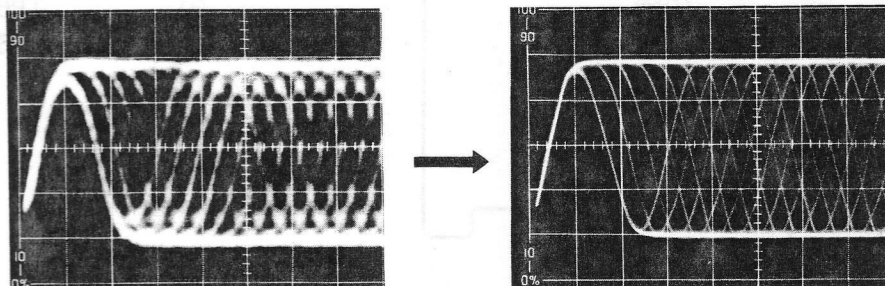


Fig. 19

Note)

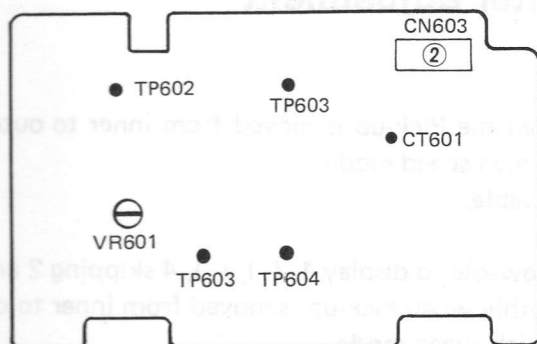
Check of traverse operation

- Repeat PLAY and STOP to make sure that the traverse motor does not move more than 3 steps.
- If it moves more than 3 steps, remove CN204 and adjust VR203 so that the motor stops rotating.

If it does not stop, repeat the adjustment of traverse of Section 18.

21. Adjustment of PLL free-run

(Waveform shaping and PLL P.C.B.)



Frequency Counter

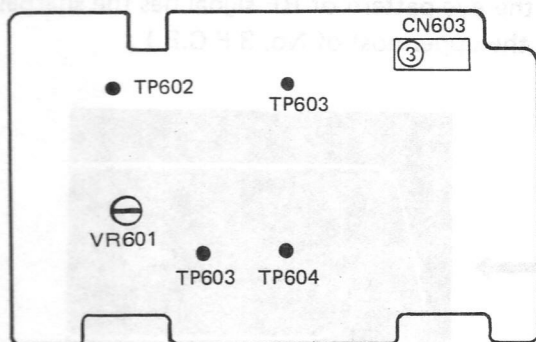
* Connection Points

- ⊕ CN603 pin ②
- ⊖ GND TP602

Step 1 All connectors should be removed except CN601 and CN602.

Step 2 Adjust the PLL free-run frequency to $4.3218 \pm 0.04\text{MHz}$ by CT601.

22. Adjustment of PLL reference voltage.



Digital Voltmeter

* Connection Points

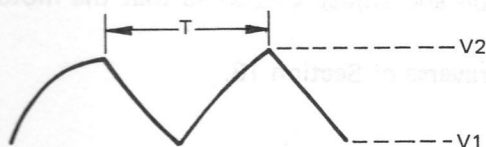
⊕ TP603

⊖ TP602 (GND)

Step 1 All connectors should be removed except CN601 and CN602.

Step 2 Adjust the PLL reference voltage $3.0V \pm 0.1V$ by VR601.

Step 3 Short CN605 with the shorting pin from CN606, and confirm the waveform shown below by monitoring TP603.



Cycle = 20~40 ms

Voltage V1 less than 2V

V2 more than 4V

Step 4 Remove the shorting pin from CN605, and short CN606 with the shorting pin.

Step 5 Connect all connectors previously removed, then play the test disc bank 1 and confirm that the voltage is $3.0V \pm 0.1V$ at TP603.

23. Check of playback operation after adjustment

Check of manual search

- (1) Make sure that the track display changes when the Pick-up is moved from inner to outer or outer to inner periphery in the manual search high-speed mode.

Skipping the display of 2 tracks or less is allowable.

Example:

When 1, 2, 3, 4 have to be displayed, it is allowable to display 1, (), (), 4 skipping 2 and 3.

- (2) Make sure that the time display changes smoothly when Pick-up is moved from inner to outer or outer to inner periphery in manual search high-speed mode.

Skipping the display within 1 sec. is allowable.

- (3) If the conditions (1) and (2) are not satisfied, go back to the adjustment of jump pulse of Section 17.

Technics