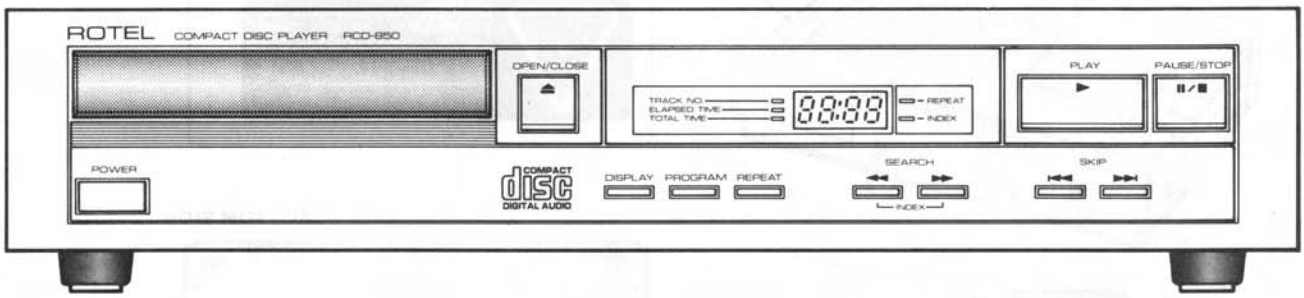
COMPACT DISC PLAYER

RCD-850

SERVICE MANUAL



■ CONTENTS

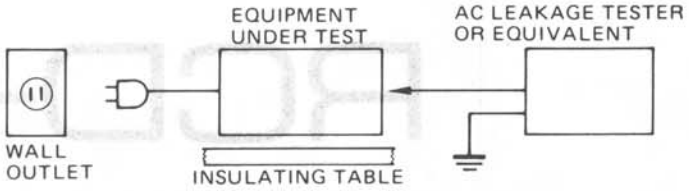
THE ROTEL CO., LTD.
1-36-8, OHOKAYAMA, MEGURO-KU,
TOKYO 152, JAPAN
Printed in Japan '86. I

■ TO SERVICE PERSONNEL

1. Critical Components Information.
   Components having special characteristics are marked ⚠ and must be replaced with parts having specifications equal to those originally installed.

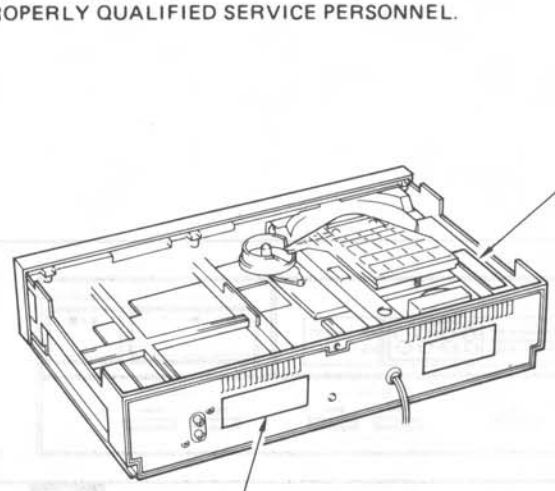
2. Leakage Current Measurement (For 120V Model Only).
   When service has been completed, it is imperative that you verify that all exposed conductive surfaces are properly insulated from supply circuits.

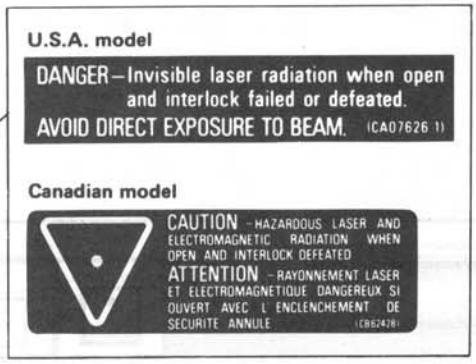
- Meter impedance should be equivalent to 1500 ohm shunted by 0.15μF
- Leakage current must not exceed 0.5mA.
- Be sure to test for leakage with the AC plug in both polarities.

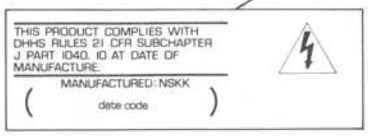


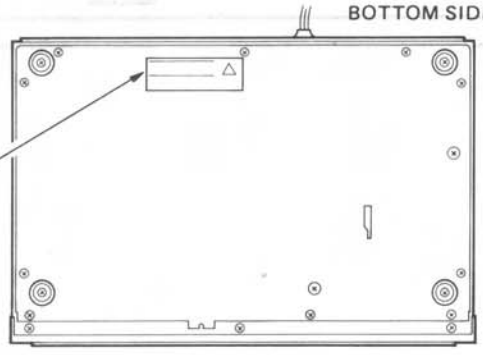
CAUTION – USE OF CONTROLS, ADJUSTMENTS, OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN, MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

THE COMPACT DISC PLAYER SHOULD NOT BE ADJUSTED OR REPAIRED BY ANYONE EXCEPT PROPERLY QUALIFIED SERVICE PERSONNEL.

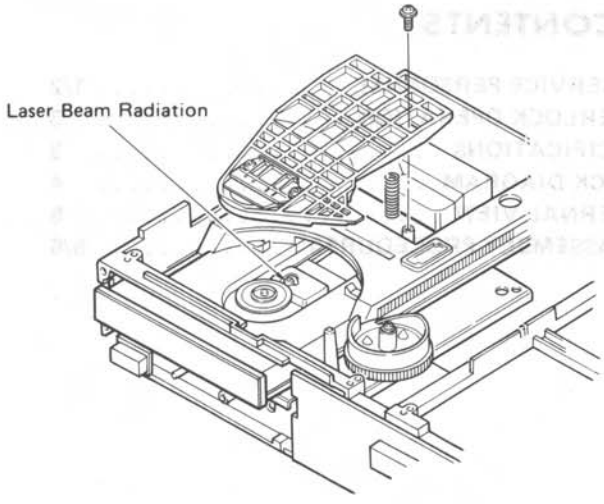






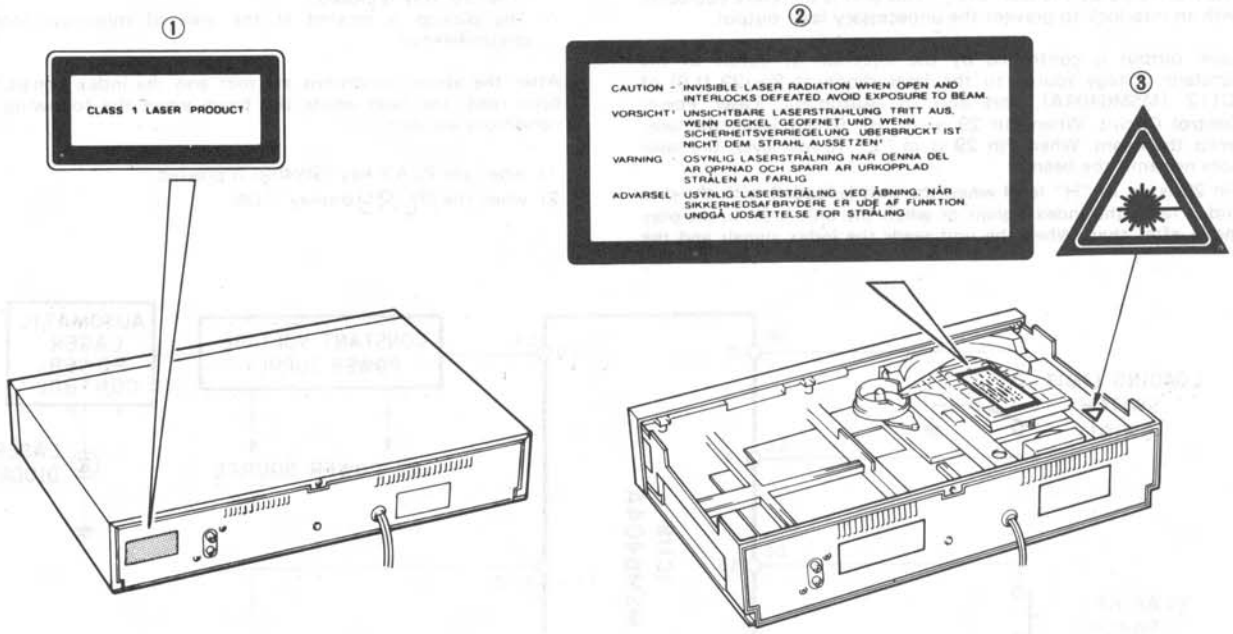


LASER BEAM RADIATION SPOT



Laser Diode Properties
Material: Ga-Al-As
Wavelength: 755 – 805 nm (25°C)
Laser Output: Continuous Wave max. 5 mW

European model



English

① THIS LABEL IS ATTACHED AT THE PLACE ILLUSTRATED TO INFORM THAT THE APPARATUS CONTAINS A LASER COMPONENT.

② THIS LABEL IS ATTACHED IN THE POSITION SHOWN IN THE ILLUSTRATION TO WARN THAT ANY FURTHER PROCEDURE WILL BRING THE USER INTO EXPOSURE WITH THE LASER BEAM.

③ THE WARNING LABEL INFORMING OF RADIATION IS PLACED INSIDE THE UNIT AS SHOWN IN THE ILLUSTRATION, TO WARN AGAINST FURTHER MEASURES ON THE UNIT. THE EQUIPMENT CONTAINS A LASER COMPONENT RADIATING LASER RAYS EXCEEDING THE LIMIT OF LASER PRODUCTS OF CLASS 1.

CAUTION–USE OF CONTROLS, ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN, MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

Swedish

① PÅSKRIFTEN SITTER PÅ APPARATEM SOM VISAS SOM EN UPPMANING OM ATT APPARATEN OMFATTAR EN INBYGGD LASERKOMPONENT.

② TEXTSKYLTEN FÖR LASERN ÄR PLACERAD PÅ APPARATEN SOM EN UPPMANING OM ATT APPARATEN INNEHÅLLER EN LASERKOMPONENT.

③ VARNINGSSKYLTEN FÖR STRÅLNING HAR PLACERATS I APPARATEN, SOM BILDEN VISAR, SOM EN VARNING OM YTTERLIGARE INGREPP I APPARATEN. MATERIELEN INNEHÅLLER EN LASERKOMPONENT SOM AVGER LASERSTRÅLNING ÖVERSTIGANDE GRÄNSEN FÖR LASERKLASS 1.

VARNING–INGREPP I APPARATEN BÖR ENDAST FÖRETAS AV FACKMAN MED KUNSKAP OM ATT RISK FÖRELIGGER FÖR RADIOAKTIV ATRÅLNING.

Danish

① DETTE MÆRKAT ER ANBRAGT SOM VIST I ILLUSTRATIONEN FOR AT ADVARE BRUGEREN OM AT APPARATET INDEHOLDER EN LASERKOMPONENT.

② DETTE MÆRKAT OM LASEREN ER ANBRAGT PÅ APPARATET SOM EN OPLYSNING OM AT APPARATET INDEHOLDER ET LASERKOMPONENT.

③ ADVARSELSKILTET OM STRÅLING ER PLACERET INDENI APPARATET, SOM VIST I ILLUSTRATIONEN, SOM EN ADVARSEL OM YDERLIGERE INDGREB I APPARATET. APPARATET INDEHOLDER ET LASERKOMPONENT SOM AVGIVER LASESTRÄLING DER OVERSTIGER GÆNSEVERDIEN FOR LASERKLASSE 1.

ADVARSEL! INDGREB BØR KUN FORETAGES AF EN FAGMAND DA DER ER RISIKO FOR RADIOAKTIV STRÅLING.

Finnish

③ "VAROITUS! LAITE SISÄLTÄÄ LASERDIODIN, JOKA LÄHETTÄÄ (NÄKYMÄTÖNTÄ) SILMILLE VAARALLISTA LASERSÄTEILYÄ:"

■ INTERLOCK OPERATION

The Digital Compact Disc Player reads the disc signals by laser beam detection. It must be avoided for the human body to be directly exposed to the laser beam. Human eyes are especially badly affected by the laser beam. This unit is therefore equipped with an interlock to prevent the unnecessary laser output.

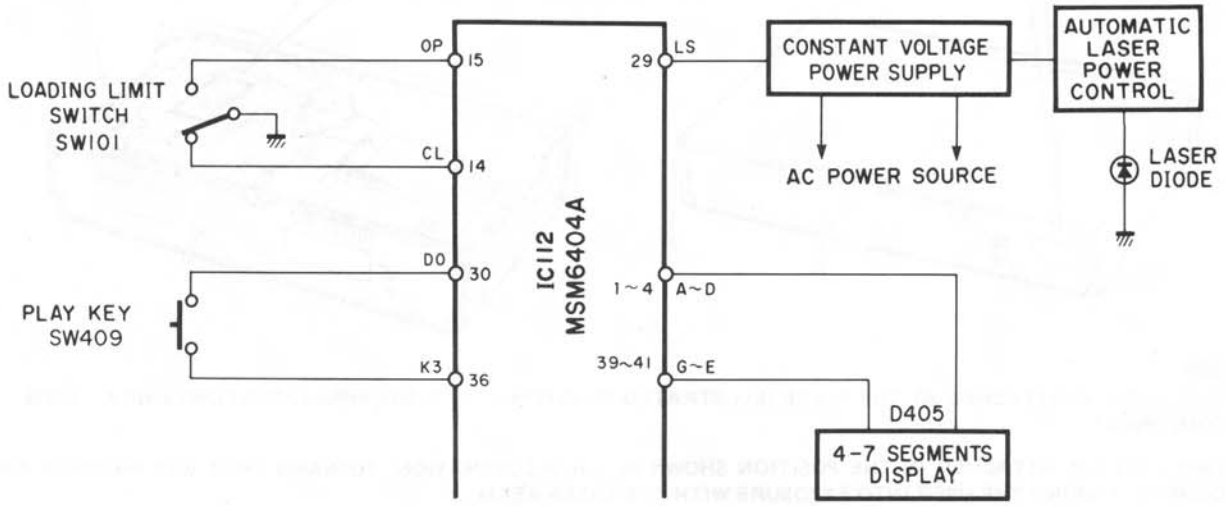
Laser output is controlled by the injection or cutoff of the constant voltage source to the laser diode at Pin 29 (LS) of IC112 (MSM6404A), and also by Automatic Laser Power Control Circuit. When Pin 29 is in "H" (High) level, the laser emits the beam. When Pin 29 is in "L" (Low) level, the laser does not emit the beam.

Pin 29 is set in "H" level when the unit is loaded with the disc and it reads the index signals or when the unit is set in the play mode after that. When the unit reads the index signals and the following two conditions are met, the laser emits the beam.

1) When the Loading Limit Switch (SW101) is set in "CL" side. (The disc tray is closed.)
2) The pickup is located at the area of minimum internal circumference.

After the above conditions are met and the index signals have been read, the laser emits the beam when the following two conditions are met.

1) when the PLAY key (SW409) is pressed.
2) when the PLAY display is ON.



■ SPECIFICATIONS

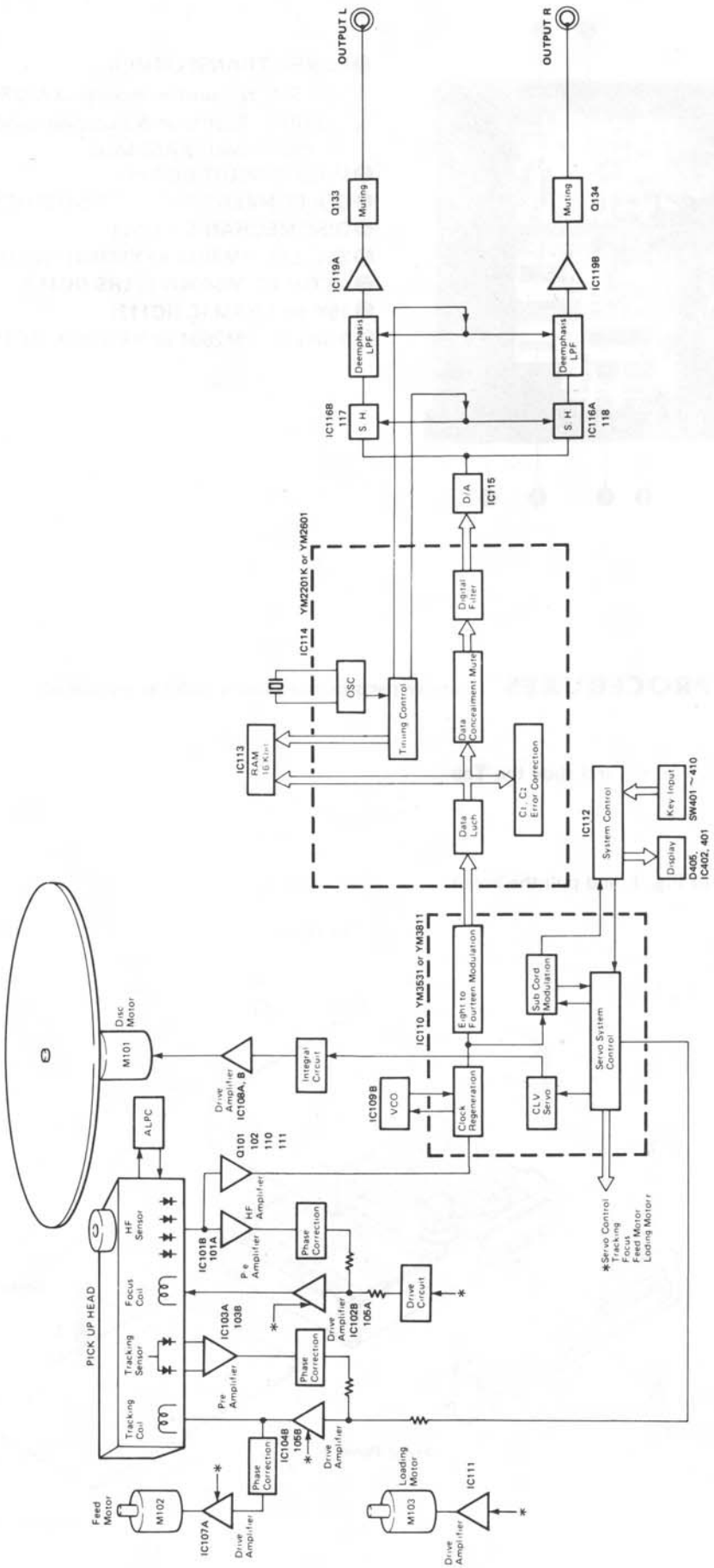
Format	Compact disc digital audio system
AUDIO SECTION	
Frequency response	5 Hz –20 kHz +0.5/–1.0 dB
Harmonic distortion (20Hz – 20 kHz)	Less than 0.003% (1 kHz) (IEC-A network)
Harmonic distortion + noise (20Hz – 20 kHz)	Less than 0.004% (1 kHz) (IEC-A network)
S/N ratio IEC FLAT	98 dB
Dynamic range	Better than 95 dB
Wow & Flutter	Unmeasurable
Channel separation	Better than 90 dB (1 kHz)
Output voltage/impedance	2V/1 k ohm (at full scale : 0 dB)
Headphone output (Headphone: 8 ohms)	0.15V (at –20 dB)
INTERNAL SYSTEMS	
Optical pick-up	3-beam laser
Error correction system	CIRC dual error correction system
D/A conversion	16 bit linear
Filter	Digital filter + third order active filter

FUNCTIONS	
Music search	"+" and "–" keys ordered program search
Index search	Search key (STOP mode only)
Fast forward/rewind	Dual speed automatic switching
Total music time display	DISPLAY key
Program function	9 selections, random
Repeat	Repeat of all selections or all program selections
Disc loading	Motor driven, horizontal loading
GENERAL	
Power requirements	
U.S. & Canadian Models	120V AC, 60Hz
European, British & Australian Models	240V · 220V AC, 50Hz
Other Model	110V ~ 130V/220V ~ 240V AC, 50/60Hz
Power consumption	20 W
Dimensions (W x H x D)	435 x 94 x 290 mm (17-1/8 x 3-11/16 x 11-7/16")
Weight	4.2 kg (9 lbs 4 oz.)
Accessories	Pin plug cord

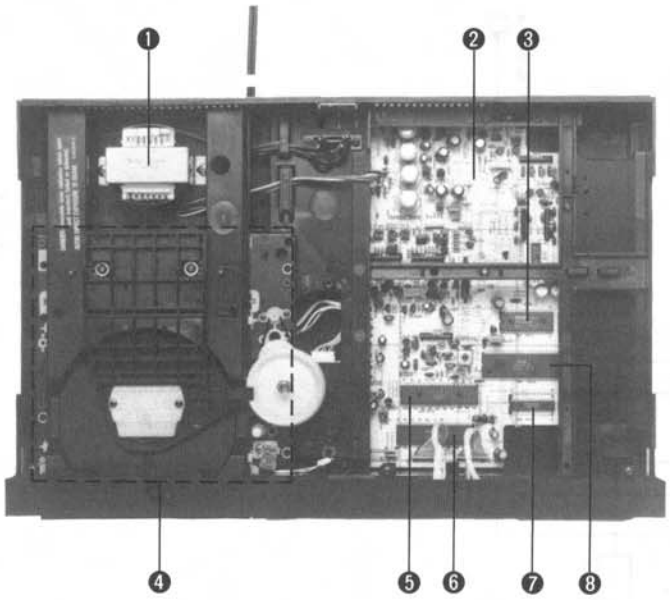
** Specifications subject to change without notice.*

(U) ..... U.S.A. model
(C) ..... Canadian model
(B) ..... British model
(A) ..... Australian model
(G) ..... European model
(R) ..... Other model

■BLOCK DIAGRAM



■ INTERNAL VIEW



❶POWER TRANSFORMER
U.S.A. & Canadian models: XA625A00
British, Australian & European models: XA626A00
Other model: XA624A00
❷MAIN CIRCUIT BOARD
❸D/A CONVERTER IC: PCM54HP (IC115)
❹DISC MECHANISM UNIT
❺SVC LSI: YM3811 or YM3531 (IC110)
❻μ-COM IC: M6404A-124RS (IC112)
❼16K bit SRAM IC (IC113)
❽SGP LSI: YM2601 or YM2201K (IC114)

■ DISASSEMBLY PROCEDURES (Remove parts in disassembly order as numbered)

1. **Removal of Top Cover**
   Remove 5 screws (①) in fig. 1, and slide the Top Cover to the back.

2. **Removal of Front Panel**
   Remove 7 screws (②) in Fig. 1, and pull the Front Panel forward.

3. **Removal of Bottom Cover**
   Remove 6 screws (③) in fig. 1.

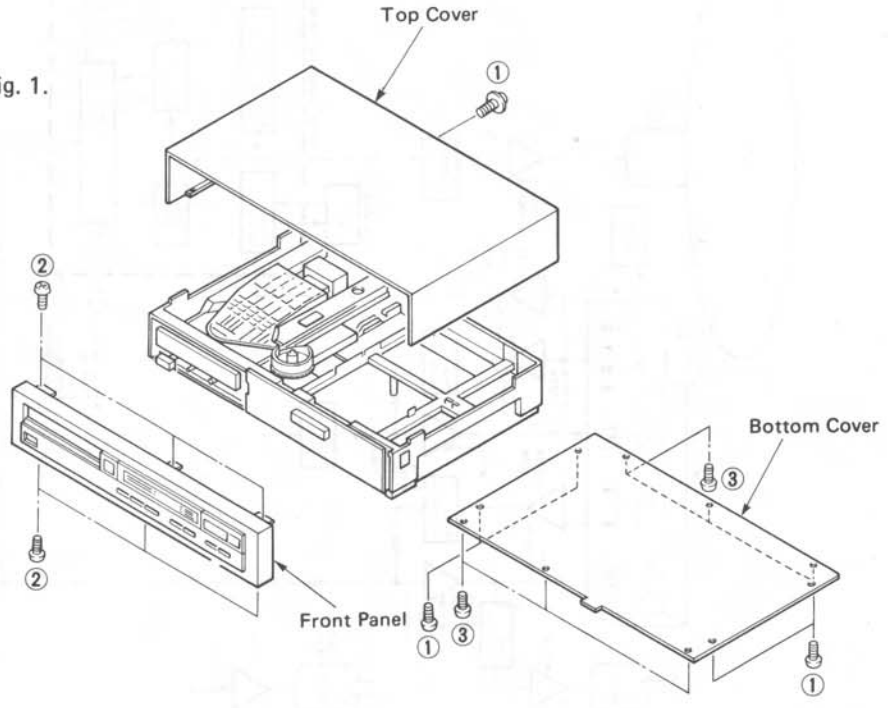


Fig. 1

4. Removal of DISC Tray Ass'y

Lift Flapper as shown in fig. 2, and pull Disc Tray Ass'y forward.

Then pull off Disc Tray Ass'y by pressing the hook Ⓐ in fig. 3. Now, the azimuth can be adjusted.

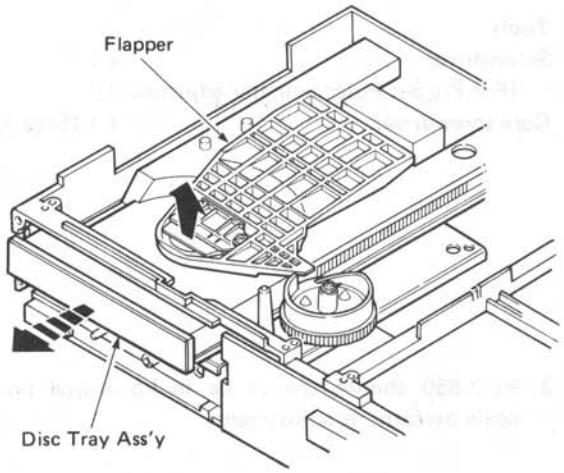


Fig. 2

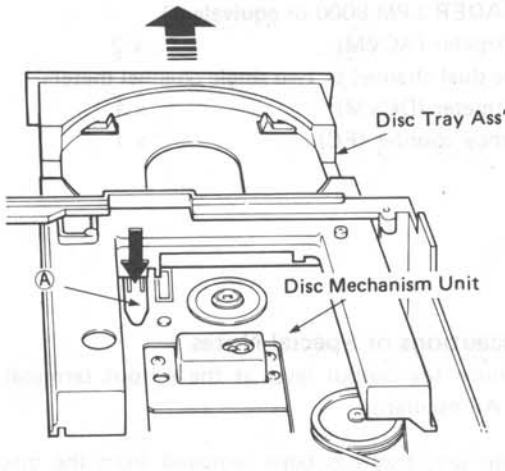


Fig. 3

5. Removal of DISC Mechanism Unit

Remove 4 screws (④) in fig. 4.

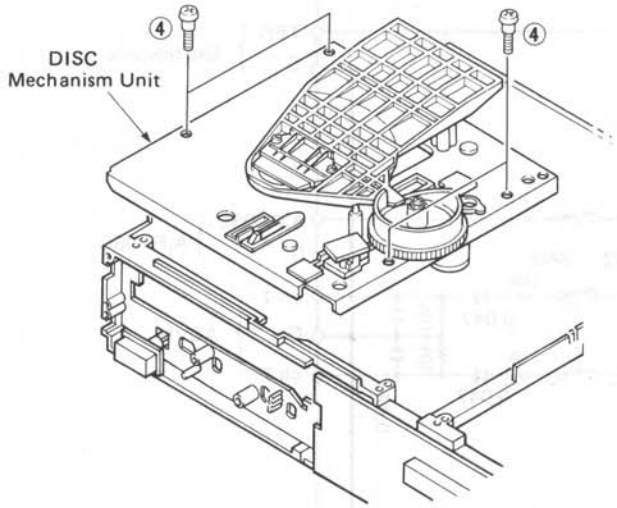


Fig. 4

6. Removal of Flapper

Loosen screw (⑤) fixing Flapper in fig. 5 and then remove the Flapper.

7. Removal of Cam

Remove screw (⑥) in fig. 5 and then pull up the Cam.

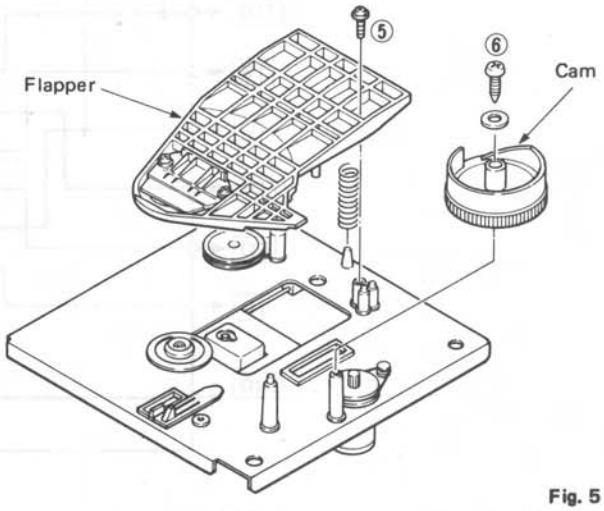


Fig. 5

■ ADJUSTMENTS

• Necessary items

Measuring instruments

Oscilloscope : x 2
(At least one shall have a bandwidth of 50 MHz or more)
Audio frequency oscillator (A.F.OSC) : x 1
Laser power meter : x 1
(LEADER LPM-8000 or equivalent)
AC voltmeter (ACVM) : x 2
(One dual channel or two single channel meters)
DC voltmeter (DCVM) : x 1
Frequency counter (FC) : x 1

Jigs

Filter (See Fig. A) : x 1
Shorting cord : x 1 (Step 3, P10)
MLP-3 Special tool : x 1 (Step 5, P12)
(See Pg. 14)

Tools

Screwdriver : x 1
(For Pre-Set Potentiometer adjustment)
Core screwdriver : x 1 (Step 3)

• Precautions or Special Notes

1. Measure the output level at the output terminal of the AF oscillator.
2. When disc tray has been removed from the mechanism, make sure the position of the loading cam and the leaf switch are correct.
3. RCD-850 should always be in horizontal position while performing adjustments.

• Adjustment jig (with internal filter)

Connect the filter in Fig. A before measurement.

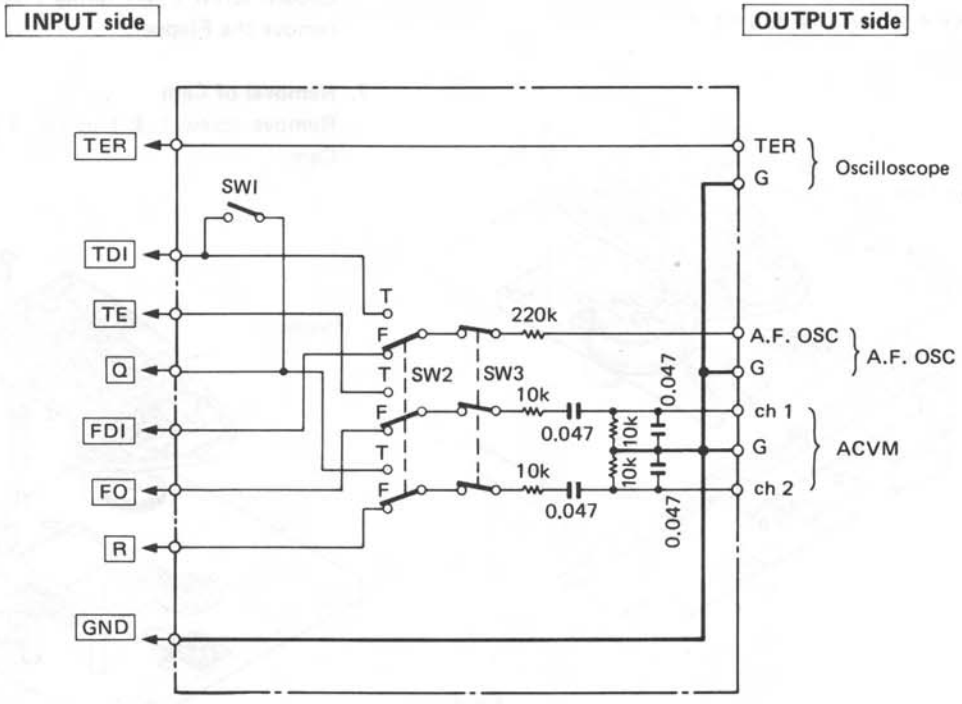
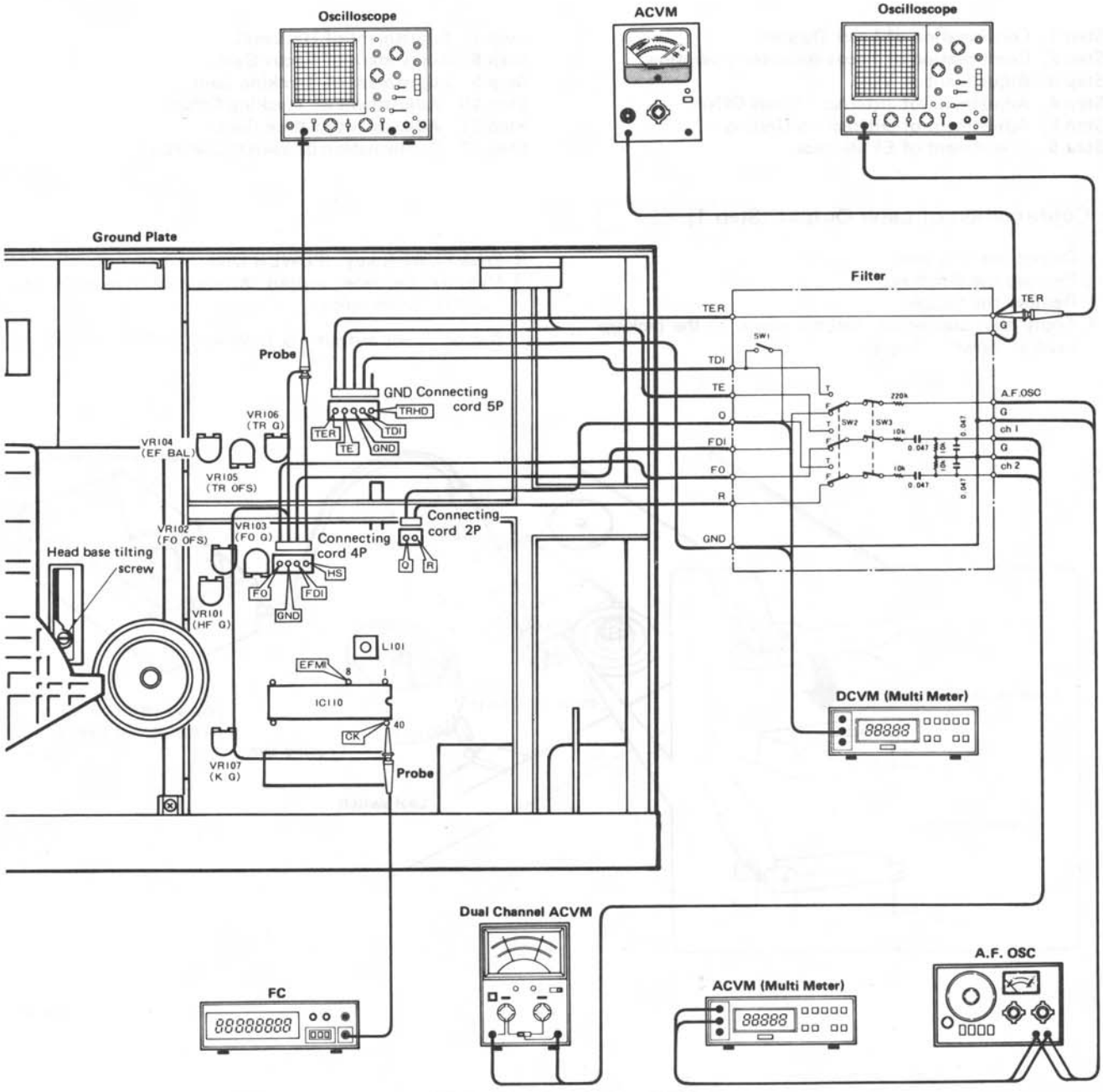


Fig. A

SW1: For diffraction grating and EF balance adjustments
SW2: FOCUS gain and TRACKING gain switching
SW3: BPF ON/OFF switch

• Test Points


Oscilloscope
ACVM
Oscilloscope
Ground Plate
Filter
TER
TDI
TE
O
FDI
FO
R
GND
G
A.F.OSC
ch 1
ch 2
SW1
SW2
SW3
220k
10k
0.047
Probe
GND Connecting cord 5P
TRHD
TER
TDI
TE
GND
VR106 (TR G)
VR104 (EF BAL)
VR105 (TR OFS)
VR102 (FO OFS)
VR103 (FO G)
Connecting cord 4P
Connecting cord 2P
HS
FO
FDI
GND
Q
R
Head base tilting screw
VR101 (HF G)
L101
EFM
8
1
IC110
CK
40
VR107 (K G)
Probe
DCVM (Multi Meter)
Dual Channel ACVM
FC
ACVM (Multi Meter)
A.F. OSC

★Carry out following adjustments in the order as numbered.

Step 1. Confirmation of Laser Output.
Step 2. Confirmation of Focus Actuator Operation.
Step 3. Adjustment of VCO.
Step 4. Adjustment of Jitter and Focus Offset.
Step 5. Adjustment of Diffraction Grating.
Step 6. Adjustment of EF Balance.
Step 7. Adjustment of HF Level.
Step 8. Adjustment of Focus Gain.
Step 9. Adjustment of Tracking Gain.
Step 10. Adjustment of Tracking Offset.
Step 11. Adjustment of Kick Gain.
Step 12. Confirmation of Search Operation.

Confirmation of Laser Output (Step 1)

① Do not load the disc.
② Remove the disc tray.
③ Remove the flapper.
④ Apply the laser power meter's sensor to the pick-up head as shown in Fig. B.
⑤ Press POWER key. (POWER ON)
⑥ Measure the laser output during the 5 seconds of FOCUS search mode.

Rating: Laser output = 0.1mW to 0.3mW

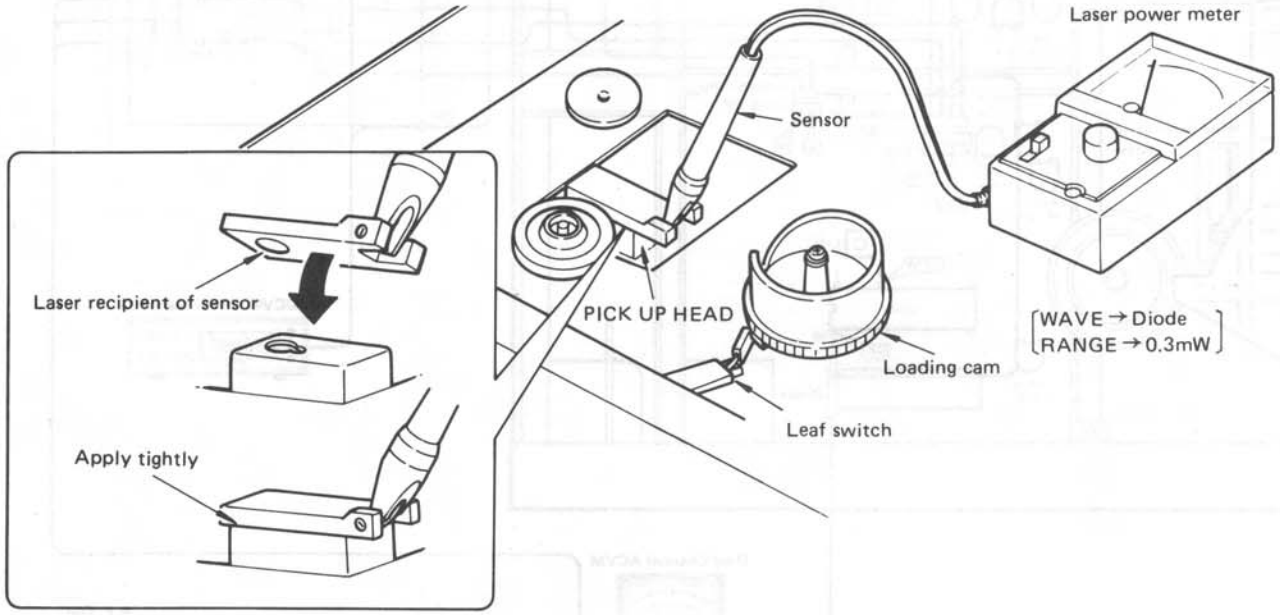


Fig. B

Precautions in handling pick-up head

(1) No soldering necessary for RCD-850.
(2) Since laser light is near-infrared, visual confirmation is difficult. While light is emitted, for safety, make sure your eyes are at least 30 cm away from the objective lens.
(3) Do not disassemble it.
(4) Do not drop or apply shock to it.
(5) Do not leave it under high temperature or humidity.
(6) Do not touch the objective lens. Should there be dirt on the lens, clean using a blower for cameras.

Confirmation of Focus Actuator Operation (Step 2)

Oscilloscope (1) settings

- DC coupling
- 1V/div range (Vertical)
  (0.1V/div when 10:1 probe is used)
- 0.5 sec/div or 1 msec/div time (Horizontal)

① Do not load a disc.
② Connect the oscilloscope (1) to [R] and [GND] terminals on the input side of the filter.
③ Press POWER key. (POWER ON)
④ After confirming that loading cam position is correct press OPEN/CLOSE key for CLOSE operation.
⑤ During 5 seconds of FOCUS search, confirm that the waveform is as shown in Fig. C.
⑥ Confirm that the pick-up head's objective lens moves smoothly between the lowest and highest points.

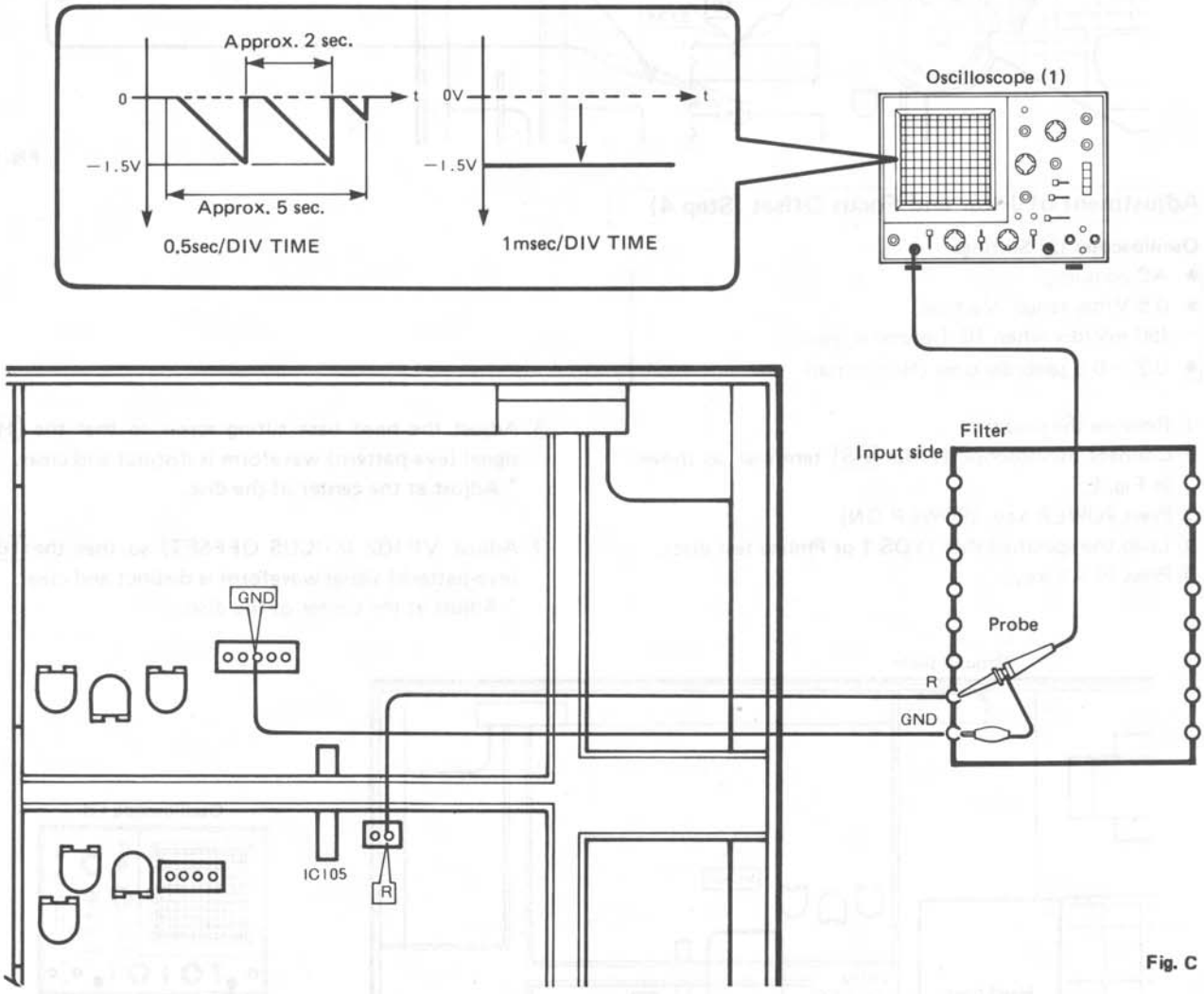


Fig. C

Adjustment of VCO (Step 3)

① Connect the shorting cord and measuring instruments, as shown in Fig. D.
② Do not load a disc.
③ Press POWER key. (POWER ON)
④ While observing the frequency counter indication (FVCO), adjust L101 so that it satisfies the rating.

Rating: FVCO = 4.3218 MHz ± 10 kHz

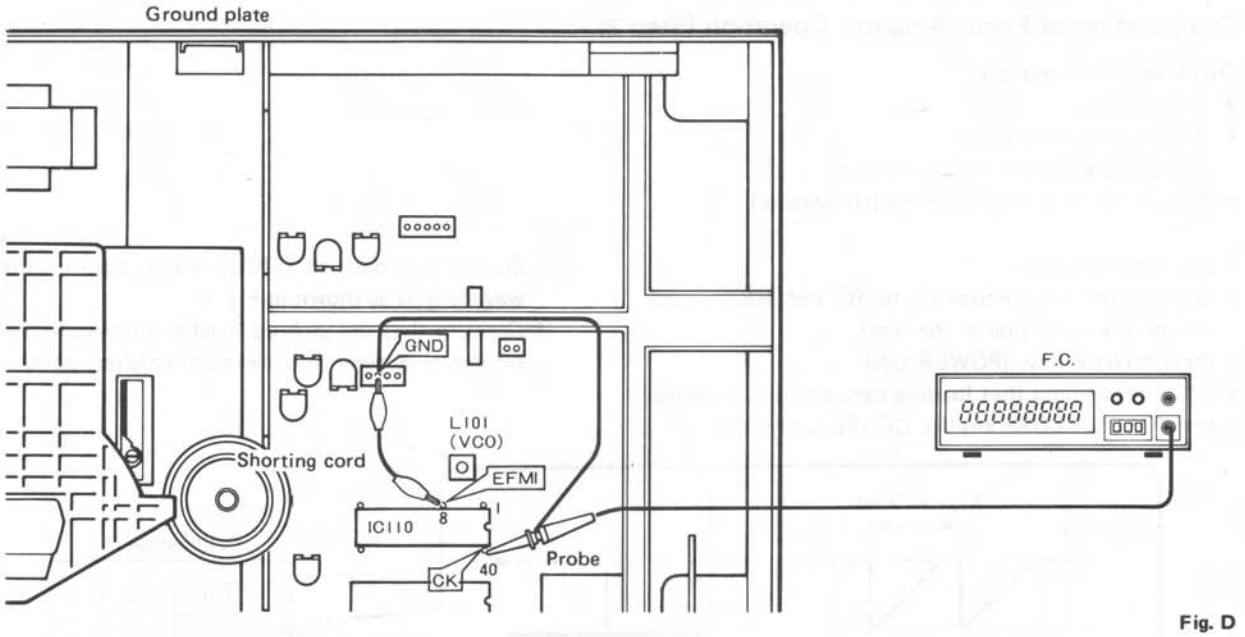


Fig. D

Adjustment of Jitter and Focus Offset (Step 4)

Oscilloscope (2) Settings

- AC coupling
- 0.5 V/div range (Vertical)
  (50 mV/div when 10:1 probe is used)
- 0.2 ~ 0.5 μsec/div time (Horizontal).

① Remove the disc tray.
② Connect oscilloscope (2) to HS terminal, as shown in Fig. E.
③ Press POWER key. (POWER ON)
④ Load the specified disc (YDS-1 or Philips test disc).
⑤ Press PLAY key.
⑥ Adjust the head base tilting screw so that the HS signal (eye-pattern) waveform is distinct and clear.
* Adjust at the center of the disc.
⑦ Adjust VR102 (FOCUS OFFSET) so that the HS (eye-pattern) signal waveform is distinct and clear.
* Adjust at the center of the disc.

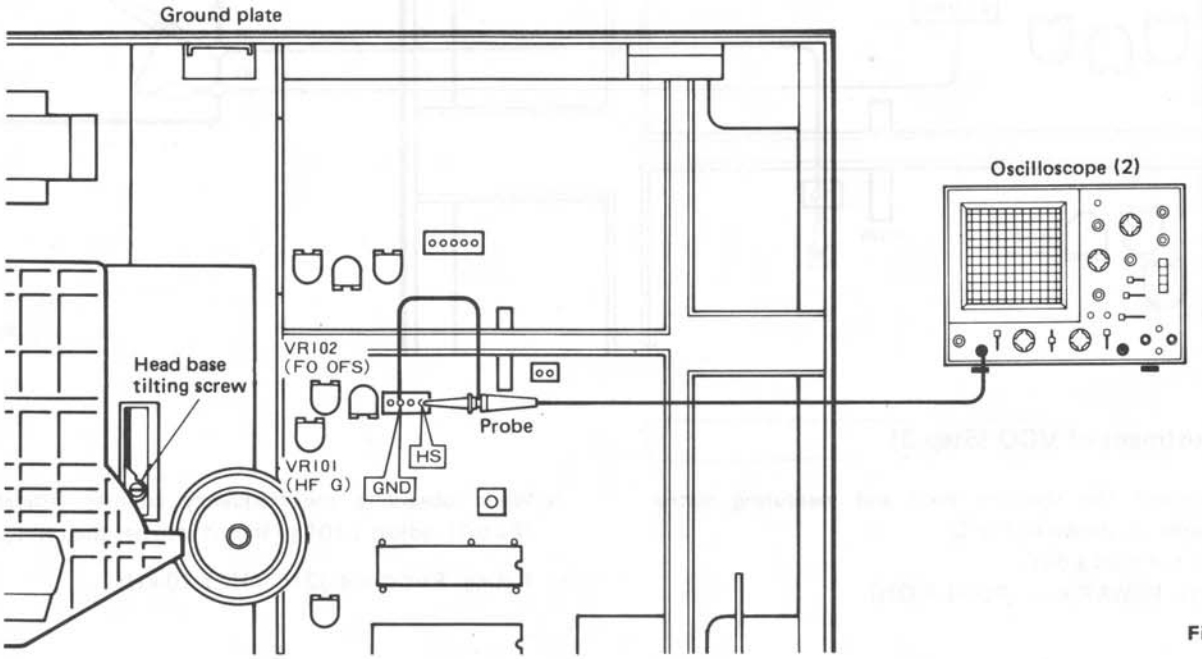
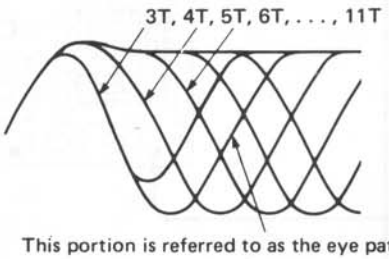


Fig. E

Waveforms 3T-11T.



This portion is referred to as the eye pattern.

The abnormal eye pattern has less distinct lines and smaller amplitude than that of the good waveform.

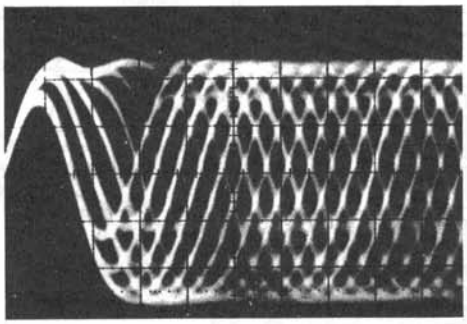
Good waveform

Abnormal waveform

Adjust so that the good waveform is obtained.

Oscilloscope (2)

Eye pattern



0.5μsec/div time (Horizontal)
0.5V/div (Vertical)

Adjustment of Diffraction Grating (Step 5)

* This adjustment requires use of 2 oscilloscopes.

* Power should not be turned OFF during steps ② through ⑨ .

Oscilloscope (1) setting conditions

- DC coupling
- 0.1V/div range (Vertical)
  (10mV/div when 10:1 probe is used)
- 5 to 20 msec/div time (Horizontal)

Oscilloscope (2) setting conditions

- AC coupling
- 0.5 V/div range (Vertical)
  (50mV/div when 10:1 probe is used)
- 0.2 ~ 0.5 μsec/div time (Horizontal)

① Connect the filter and measuring instruments, as shown in Fig. F.
  1) Connect oscilloscope (1) to [TER] terminal.
  2) Connect oscilloscope (2) to the [HS] terminal.

② Press POWER key. (POWER ON)

③ Load Philips test disc. (Have lead-in data read.)

④ Press PLAY key then Pause.

⑤ Set SW1 in the filter to ON.
(Short-circuit [TDI] terminal and [Q] terminal: TRACKING SERVO to open)

⑥ Observe waveform on oscilloscope (1).

⑦ Using the special tool (See Pg. 14) adjust diffraction grating for maximum signal amplitude [TER] at oscilloscope (1).

Rating: $E_{TER} \geqq 150$mVp-p

* When disc has stopped rotating, press PLAY key again and make adjustment.

* Adjust at the inner circumference of the disc.

⑧ Set SW1 of the filter to OFF.
(Open the [TDI] and [Q] terminals: TRACKING SERVO → closed)

⑨ Confirm that [HS] (eye-pattern) signal appears on oscilloscope (2).

* Set to the point where [TER] signal amplitude is maximum and [HS] (eye-pattern) signal can be observed finely and clearly.

* Oscilloscope (2), should have frequency response of 50 MHz or greater.

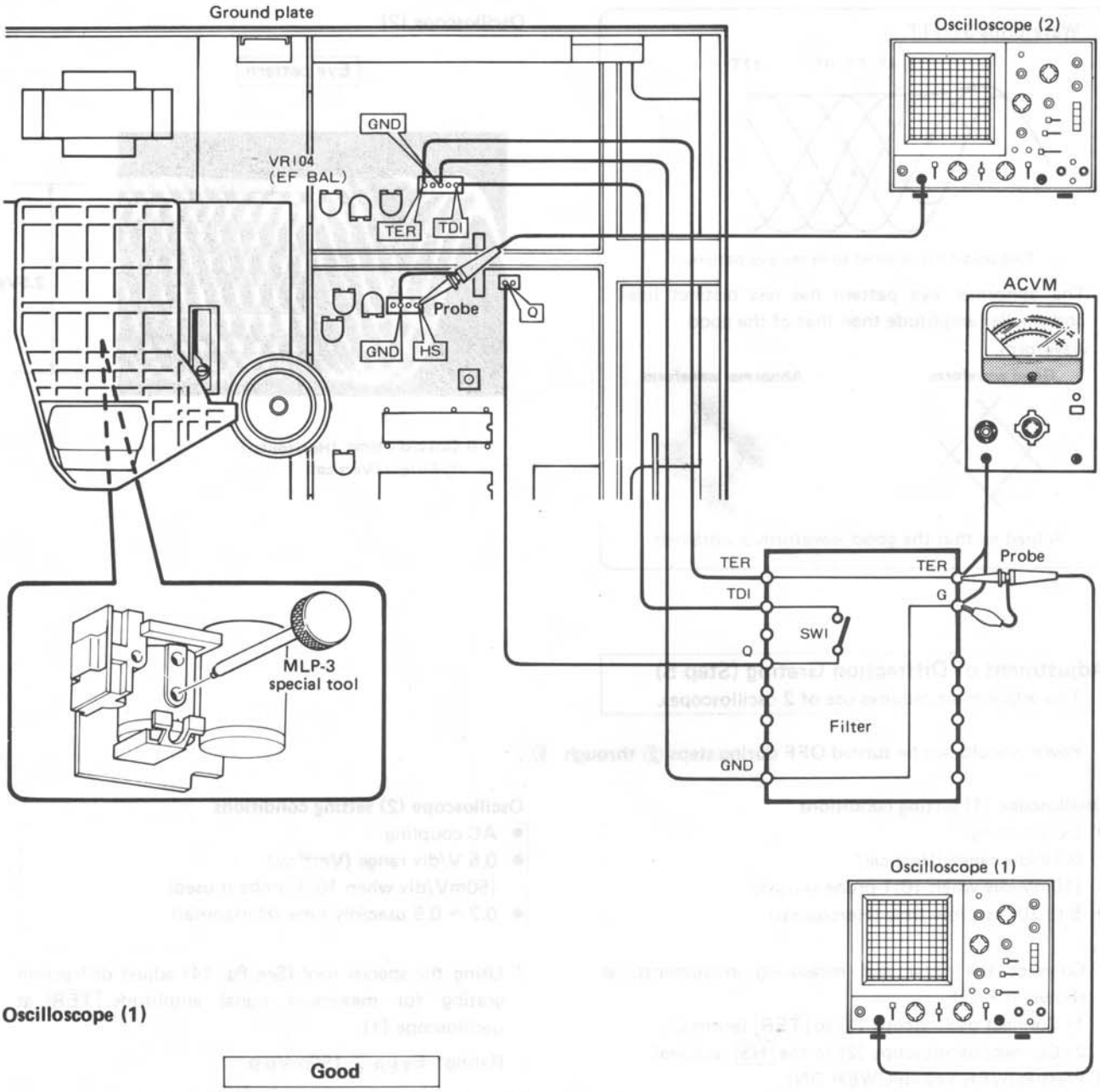
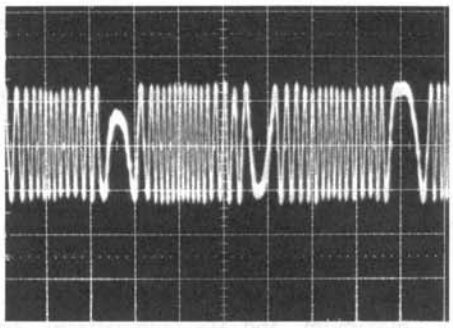


Fig. F

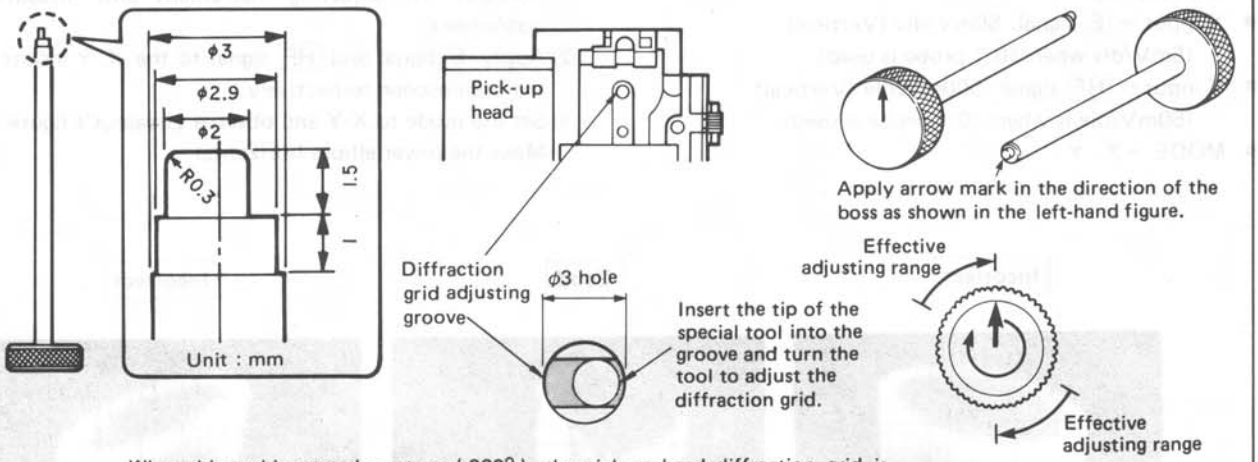
Oscilloscope (1)

Good



TER signal amplitude in this state is 250m Vp-p.

Special tool for MLP-3

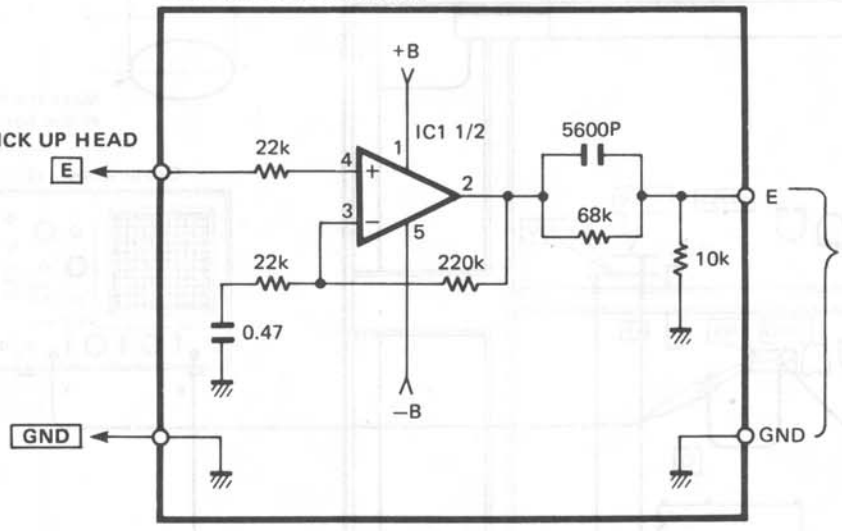


When this tool is rotated one turn (360°), the pick-up head diffraction grid is adjusted through its entire range. However, the pick-up head diffraction grid is roughly adjusted at the factory, do not excessively rotate the tool.
For effective adjustment, refer to the arrow mark on the tool knob.

• SUPPLEMENT

For adjustment by Lissajous's figure use the following adjustment instrument (buffer amplifier).

IC1: NJM4558S (iG076800)



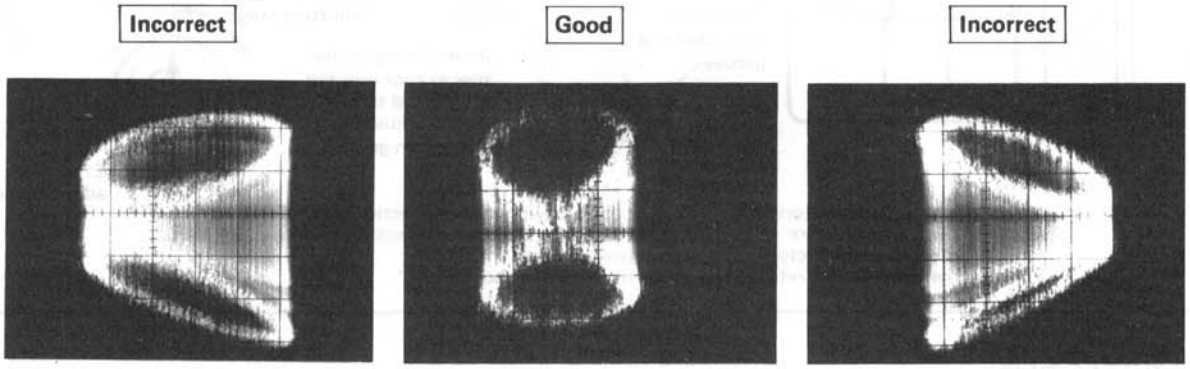
+B = +10V to +15V
−B = −10V to −15V
And +B, −B voltage should be the same.

* The buffer amplifier is used only for this adjustment. Don't leave it connected in other adjustments.
(Continued on P. 15)

Oscilloscope (1) settings

- DC coupling
- X input → [E] signal: 50mV/div (Vertical)
  (5mV/div when 10:1 probe is used)
- Y input → [HF] signal: 500mV/div (Vertical)
  (50mV/div is when 10:1 probe is used)
- MODE → X–Y

① Connect the adjusting instrument and measuring instrument.
② Apply [E] signal and [HF] signal to the X, Y inputs of the oscilloscope respectively.
③ Set the mode to X-Y and observe Lissajous's figure. Make the lower ellipse horizontal.



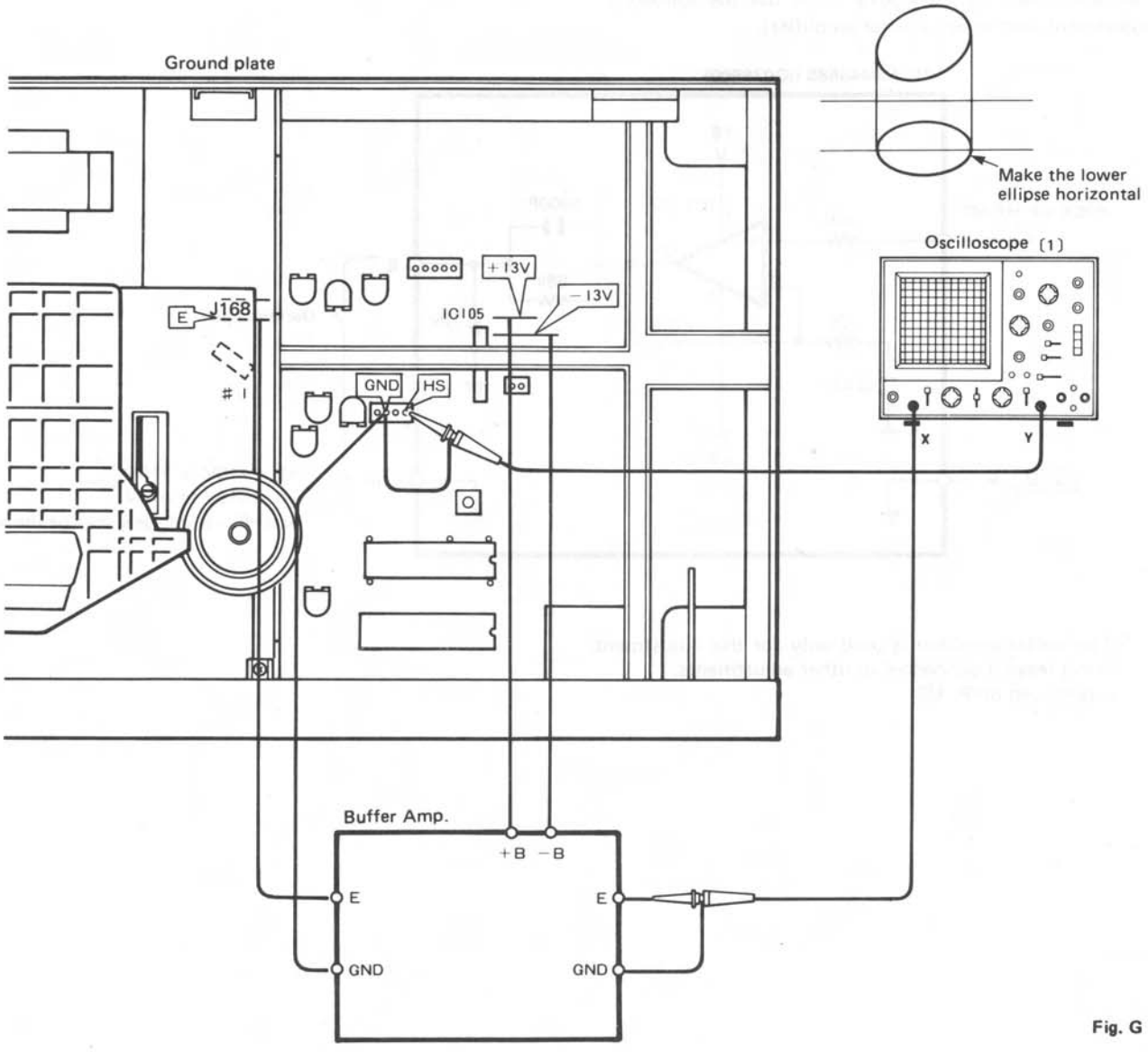


Fig. G

Adjustment of EF Balance (Step 6)

* Power should not be turned OFF during steps ② through ⑦

Oscilloscope (1) settings

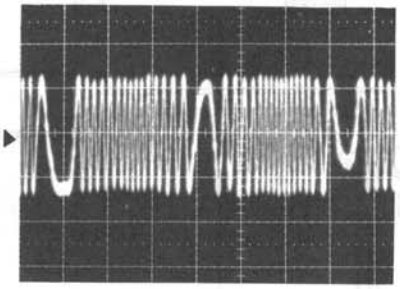
- DC coupling
- 0.1 V/div range (Vertical)
  (10 mV/div when 10:1 probe is used)
- 1 to 20 msec/div time (Horizontal)

① Connect the filter and measuring instruments as in Step 5.
② Press POWER key. (POWER ON)
③ Load Philips test disc. (Have lead-in data read.)
④ Press PLAY key then Pause.
⑤ Set SW1 in the filter to ON.
(Short [TDI] terminal to [Q] terminal: TRACKING SERVO is OPEN)
⑥ Observe the waveform on oscilloscope (1).
⑦ Adjust VR104 (EF BALANCE) so that the amplitude of [TER] signal becomes equal above and below DC 0V position.

* Adjust at the inner circumference of the disc.

Good

Rating DC offset → Less than ± 15mV.



This shows DC 0V state.

Adjustment of HF Level (Step 7)

Oscilloscope (2) settings

- AC coupling
- 0.5 V/div range (Vertical)
  (50 mV/div when 10:1 probe is used)
- 0.2 ~ 0.5 μsec/div time (Horizontal)

① Connect oscilloscope (2) to [HS] terminal (Same as in Step 4).
② Press POWER key. (POWER ON)
③ Load Philips test disc.
④ Press PLAY key.
⑤ Adjust VR101 (HF GAIN) so that the [HS] signal waveform is 2.5Vp-p.

* Adjust at the center of the disc.

Adjustment of Focus Gain (Step 8)

*This confirmation requires two single channel voltmeter or one dual channel AC voltmeter.

① Connect the filter and measuring instruments, as shown in Fig. H. (Pg. 17)
Apply an 800 Hz, 4.5 Vrms signal from the AF oscillator to [FDI] terminal via the resistor (220 kilohms) in the filter.
② Set SW3 to OFF.
③ Set SW2 to F (FOCUS).
④ Press POWER key. (POWER ON)
⑤ Load Philips test disc.
⑥ Press PLAY key.
⑦ Set SW3 to ON.
⑧ Read the indications of the AC voltmeters (CH1: E_{FO}, CH2: E_R), adjust VR103 (FOCUS GAIN) so that they satisfy the rating.

Rating: $E_R = E_{FO} + 14dB$

Example [0dBV = 1V]
E_{FO} = −32dBV (19.5mV)
E_R = −18dBV (130mV)

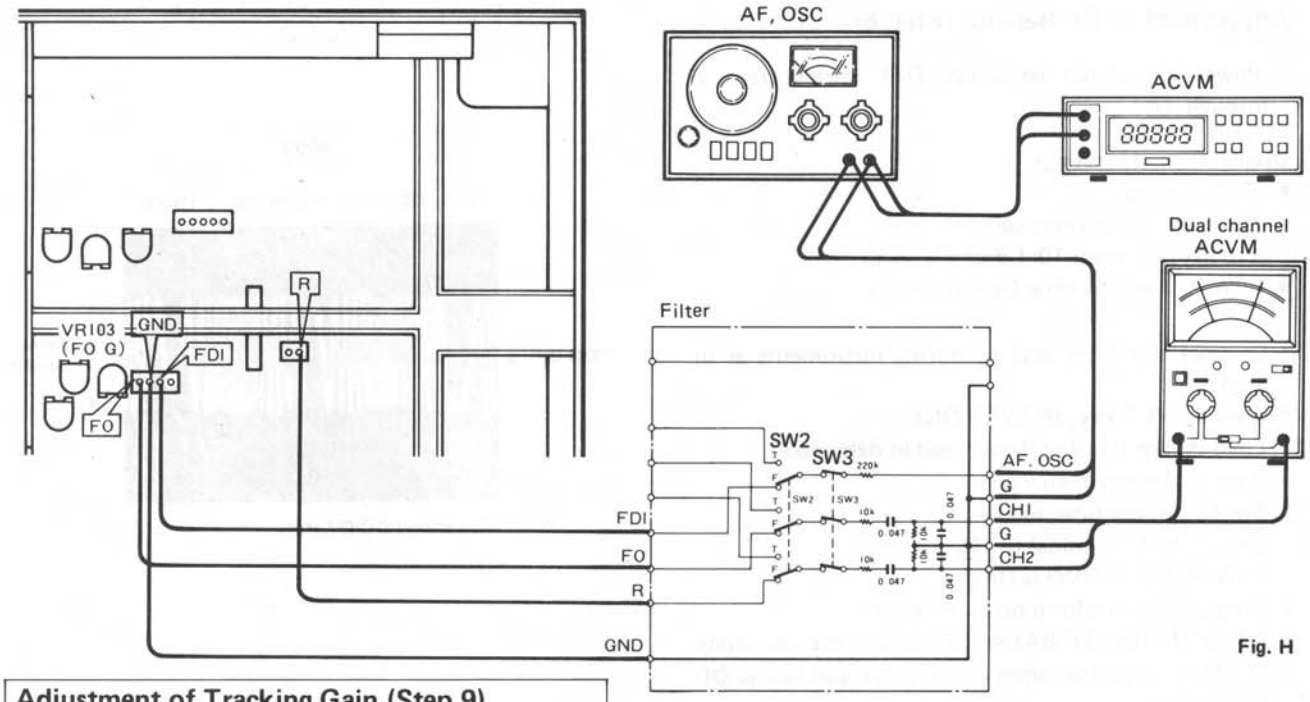


Fig. H

Adjustment of Tracking Gain (Step 9)

*This adjustment requires use of two single channel AC voltmeters or one dual channel AC voltmeter.

① Connect the filter and measuring instruments, as shown in Fig. I.
Apply a 800 Hz, 100 mVrms signal from the AF oscillator to TDI terminal via the resistor (220 kilohms) in the filter.
② Set SW3 to OFF.
③ Set SW2 to T (TRACKING).
④ Press POWER key. (POWER ON)
⑤ Load Philips test disc.
⑥ Press PLAY key.
⑦ Set SW3 to ON.
⑧ While observing the indications of the AC voltmeters (CH1: E_{TE}, CH2: E_Q), adjust VR106 (TRACKING GAIN) so that they satisfy the rating.

Rating: $E_{TE} = E_Q + 9dB$

Example [0dBV = 1V]
$E_Q = -19dBV$ (110mV)
$E_{TE} = -10dBV$ (250mV)

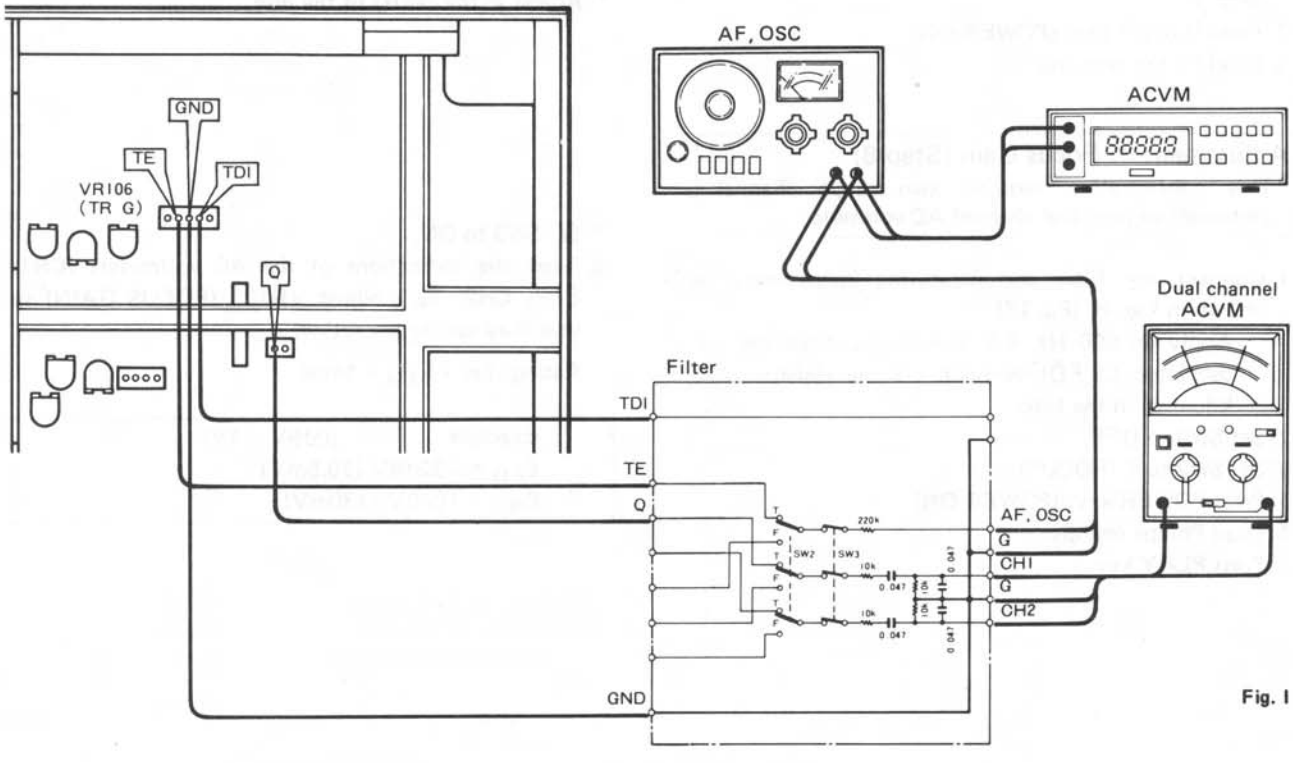


Fig. I

Adjustment of Tracking Offset (Step 10)

① Connect a DC voltmeter to [Q] and [GND] terminals on the Input side of the filter.
② Press POWER key. (POWER ON)
③ Load Philips test disc.
④ Press STOP key. (STOP mode: Display " 1:00")
⑤ While observing the indication (E_Q) of the DC voltmeter, adjust VR105 (TRACKING GAIN) so that it satisfies the rating.

Rating: E_Q = 0 V DC ± 50mV DC

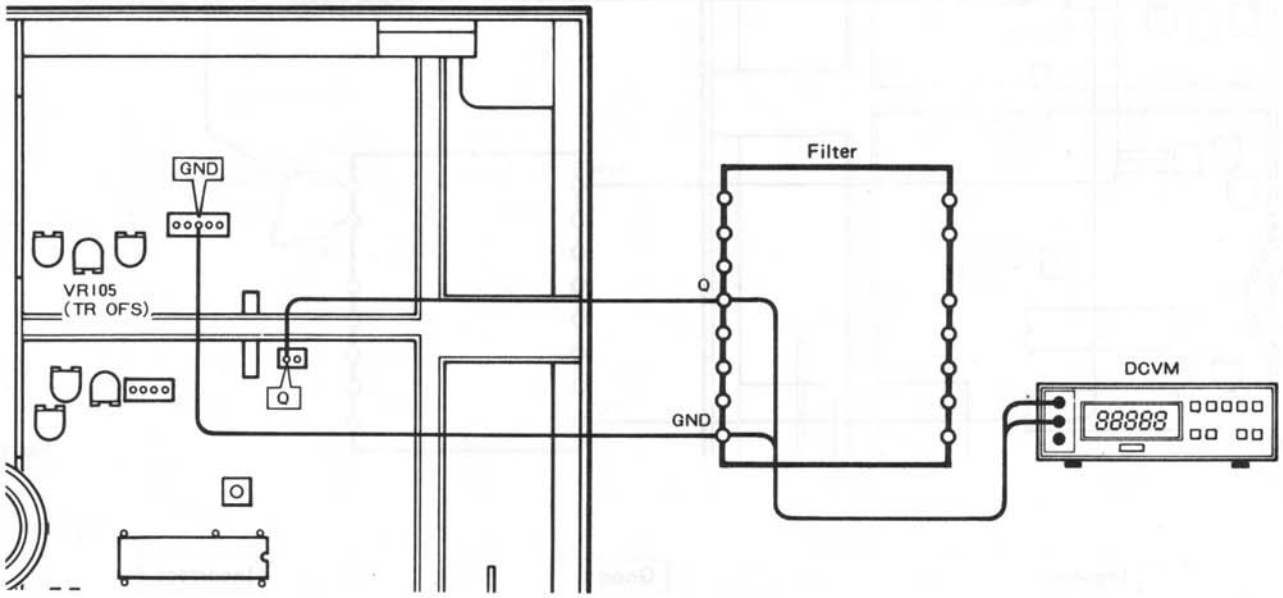


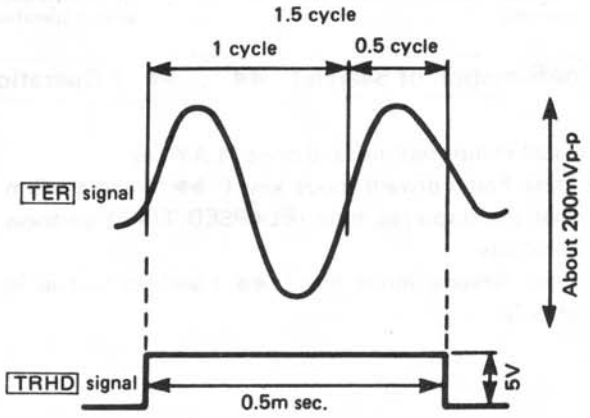
Fig. J

Adjustment of Kick Gain (Step 11)

Oscilloscope (1) (2-ch oscilloscope) Settings

- DC coupling
- CH1 → [TER] terminal (IC102, 2 pin): 0.1 V/div (Vertical) (10 mV/div when 10:1 probe is used)
- CH2 → [TRHD] terminal (IC207, 21 pin): 5 V/div (Vertical) (0.5 V/div when 10:1 probe is used)
- TRIGGER MODE: 2 CH
- 0.2 msec/div time (Horizontal)

① Connect the filter and measuring instruments, as shown in Fig. K.
② Press POWER key. (POWER ON)
③ Load Philips test disc.
④ Press PLAY key.
⑤ Observe waveform while pressing Fast Forward mode key (▶▶) for 3 seconds.
⑥ Adjust VR107 (KICK GAIN) so that the [TER] signal cycle is 1.5 ± 0.5 when [TRHD] signal level is High.
* Adjust at the inner circumference of the disc.
⑦ Press Reverse mode key (◀◀) for 3 seconds and confirm that [TER] signal cycle is within the above specification but in reverse phase.



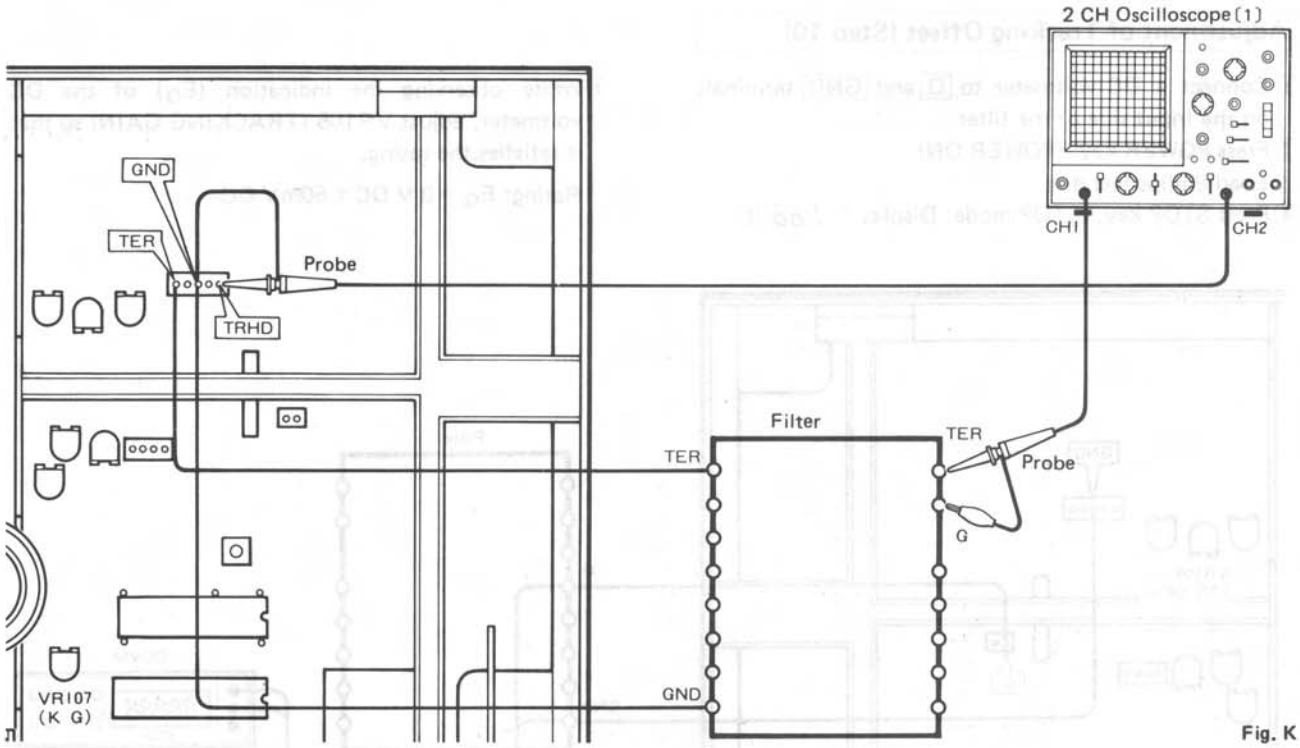
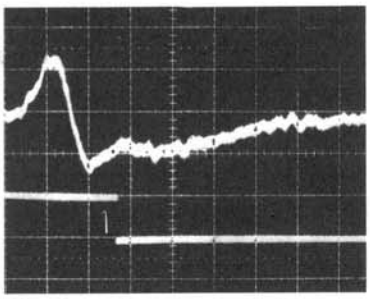


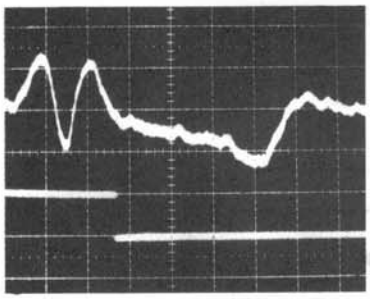
Fig. K

Incorrect



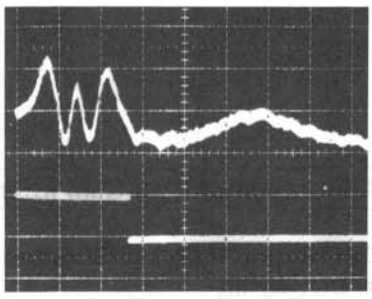
This shows about 0.9 cycle which is incorrect.

Good



This shows about 1.7 cycle which is within specification.

Incorrect



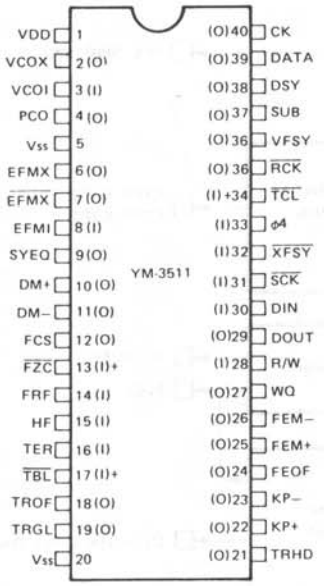
This shows about 2.5 cycle which is incorrect.

Confirmation of Search (◀◀ , ▶▶) Operation (Step 12)

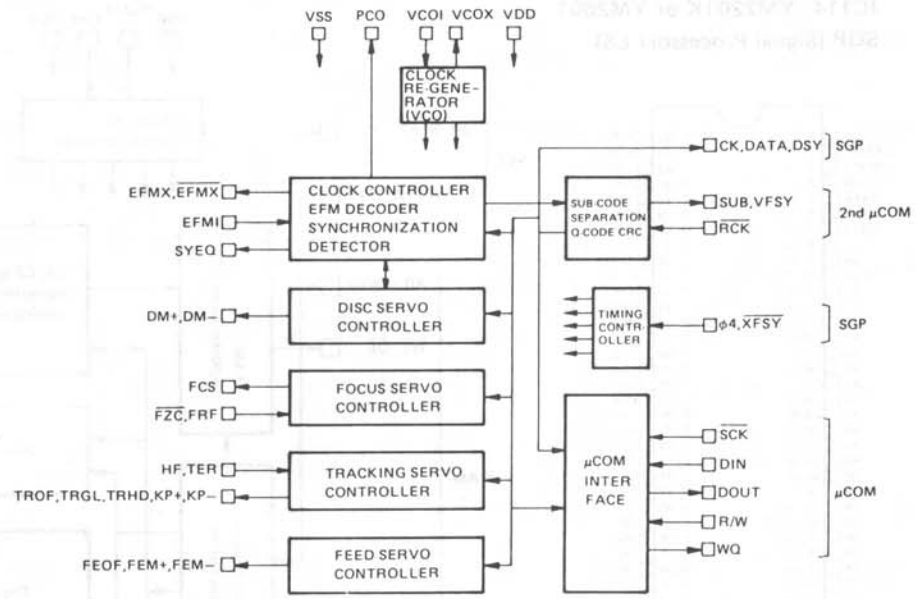
① Load Philips test disc and press PLAY key.
② Press Fast Forward mode key (▶▶) and confirm that the displayed time (ELAPSED TIME) advances smoothly.
③ Press Reverse mode key (◀◀) and confirm as in step ②

■ IC BLOCK

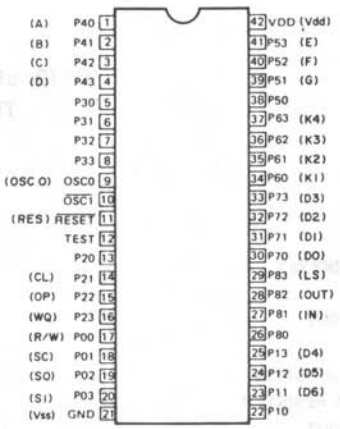
IC110: YM3531 or YM3811
SVC (Servo Controller) LSI

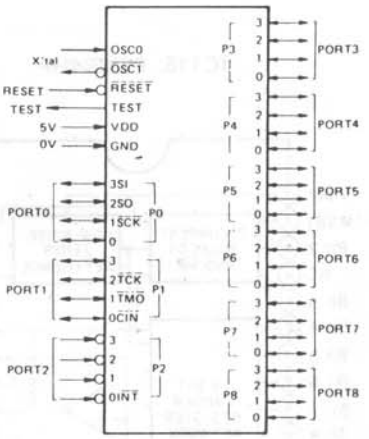


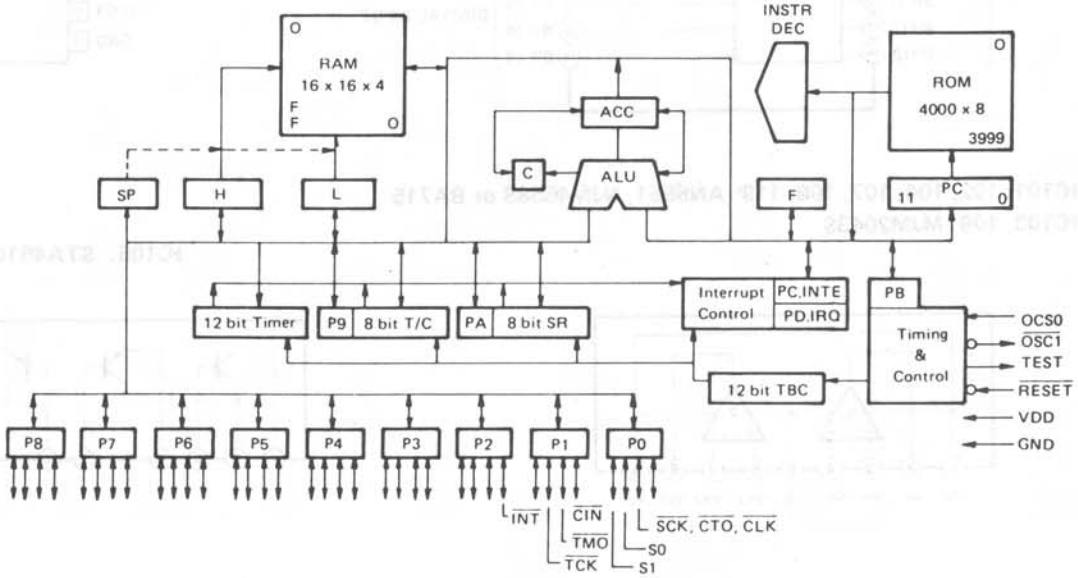
+ marked: internal pull up resistor



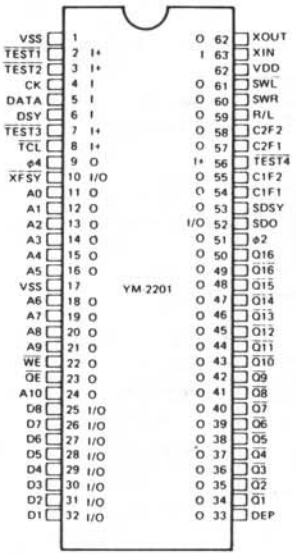
IC112: MSM6404A-124RS



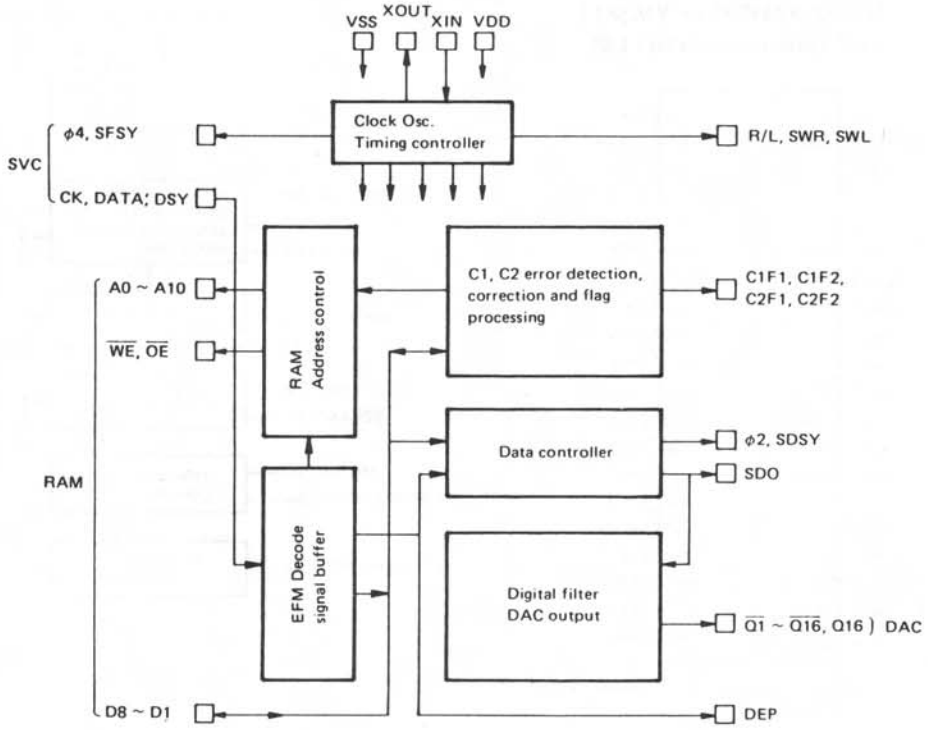




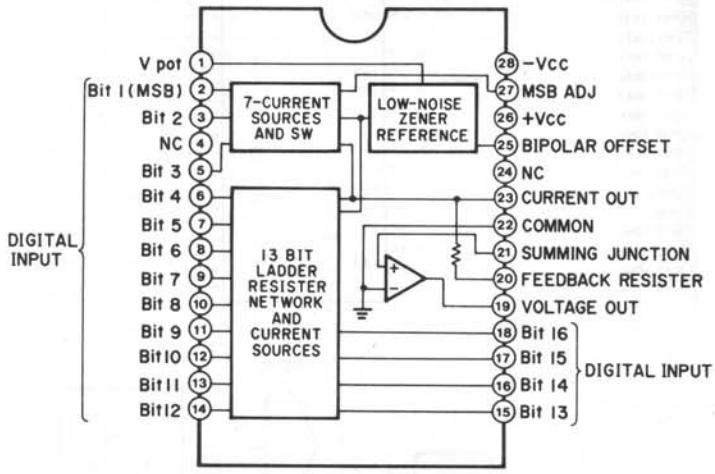
IC114: YM2201K or YM2601
SGP (Signal Processor) LSI



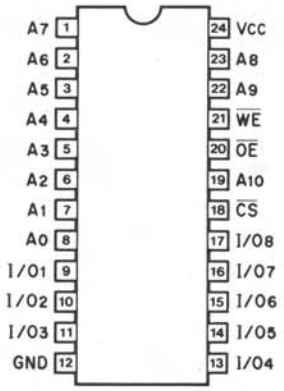
+ marked: internal pull-up resistor



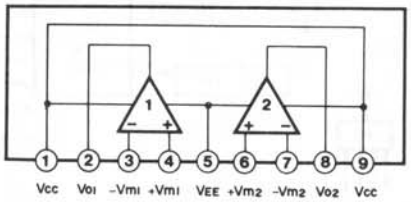
IC115: PCM54HP



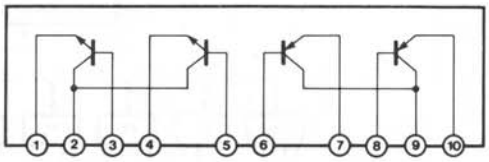
IC113: μPD4016CX, HM6116ASP-20 or TMM2115AT-15



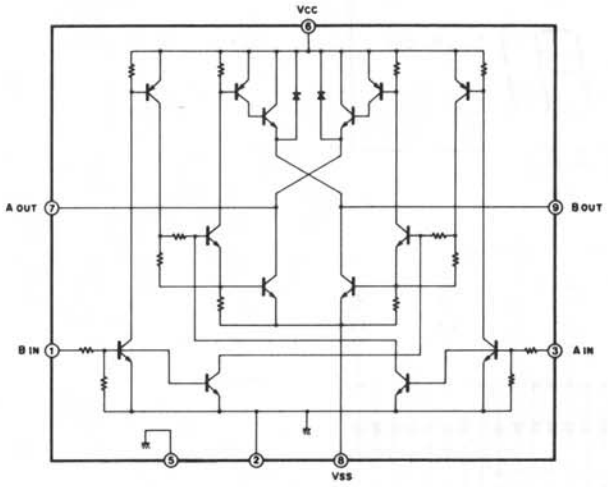
IC101, 102, 104, 107, 108, 119: AN6551, NJM4558S or BA715
IC103, 109: MJM2043S



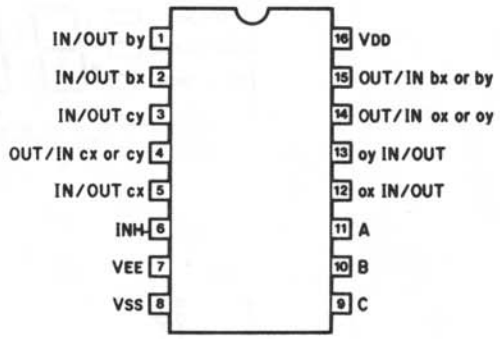
IC105: STA451C



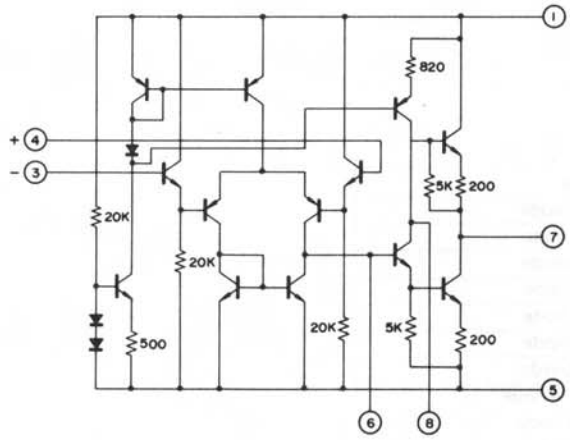
IC111: BA6218



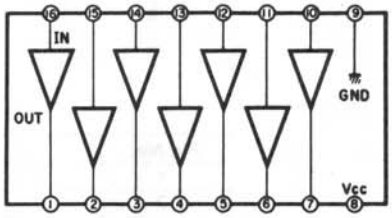
IC116: TC4053BP or HD14053BP



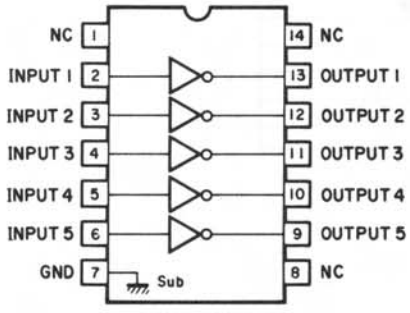
IC117, 118: LA3170



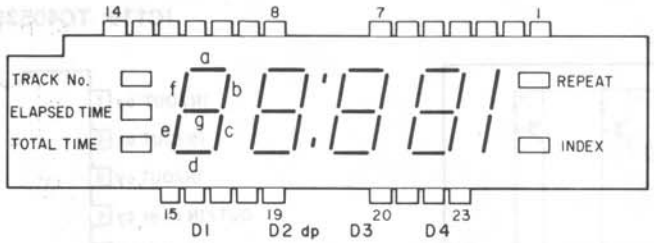
IC402: BA618

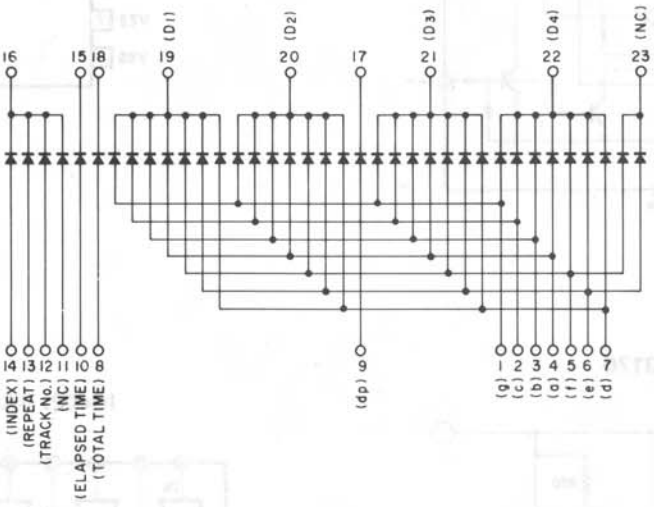


IC403: M54516P or BA612



D405 (Display Unit)

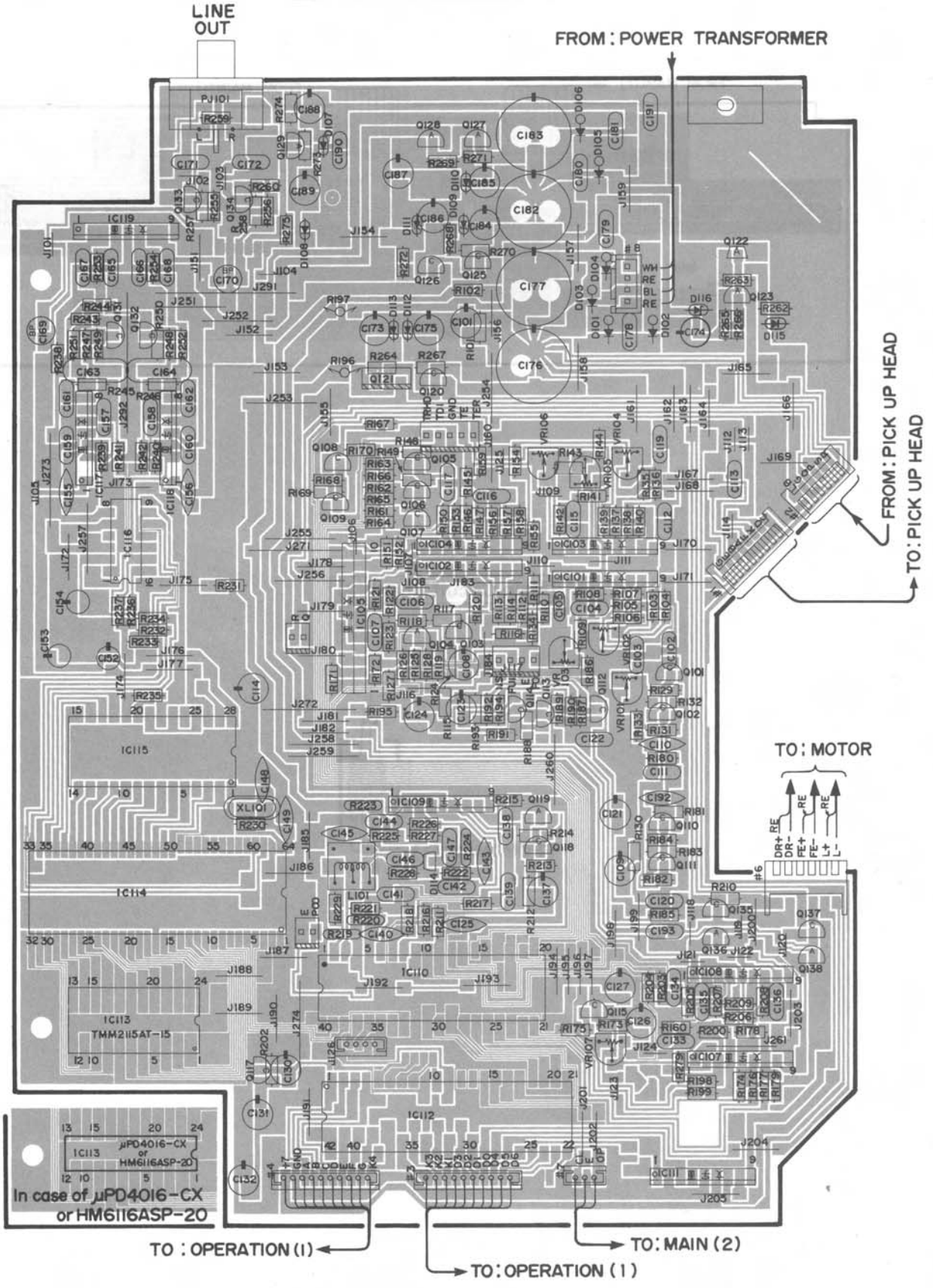




Pin No.	Function
1	segment "g" Anode
2	segment "c" Anode
3	segment "b" Anode
4	segment "a" Anode
5	segment "f" Anode
6	segment "e" Anode
7	segment "d" Anode
8	"TOTAL TIME" Anode
9	decimal point Anode
10	"ELAPSED TIME" Anode
11	Not Used
12	"TRACK NO." Anode
13	"REPEAT" Anode
14	"INDEX" Anode
15	"ELAPSED TIME" Cathode
16	"INDEX" "REPEAT" "TRACK NO." Cathode
17	decimal point Cathode
18	"TOTAL TIME" Cathode
19	digit "D1" Cathode
20	digit "D2" Cathode
21	digit "D3" Cathode
22	digit "D4" Cathode
23	Not Used

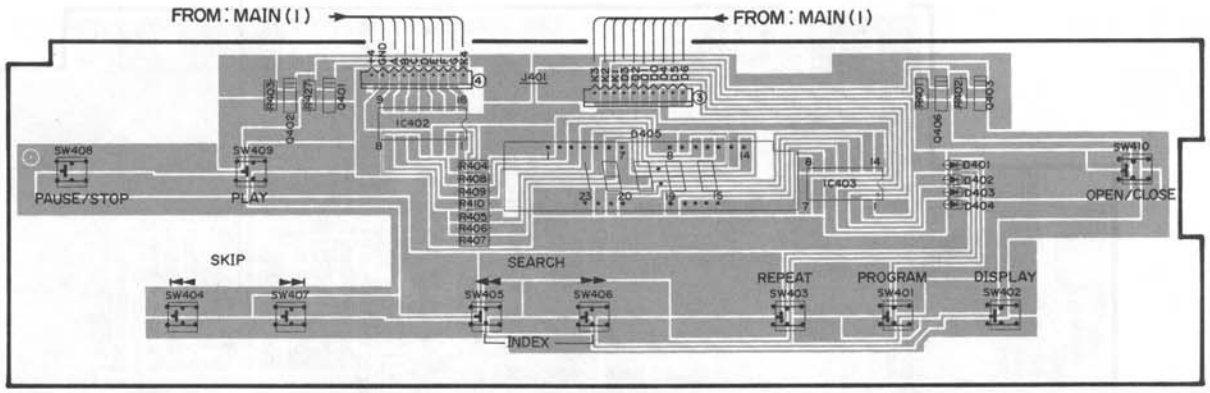
■ PRINTED CIRCUIT BOARD (Pattern side)

Main Circuit Board (1)

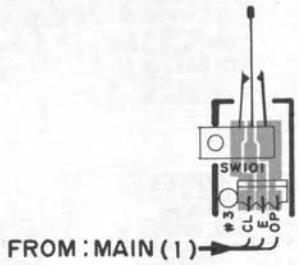


■ PRINTED CIRCUIT BOARD(Pattern side)

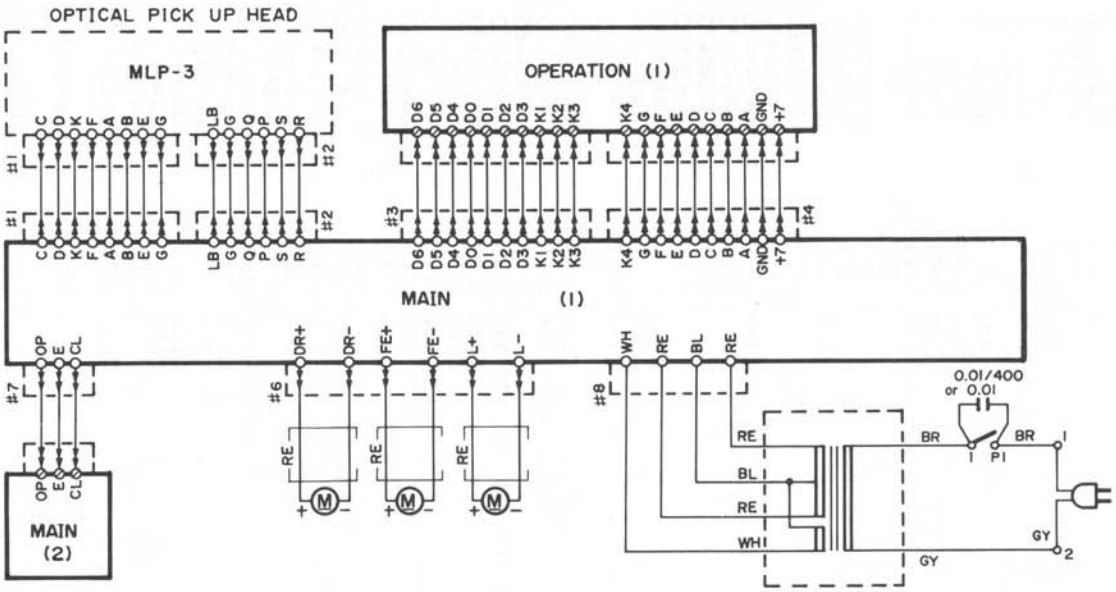
Operation Circuit Board

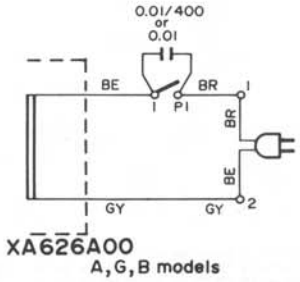


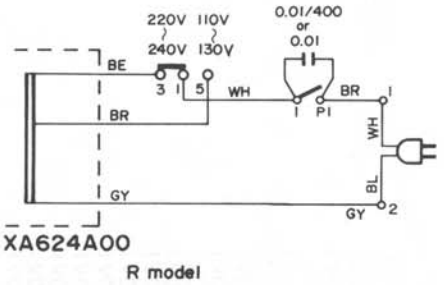
Main Circuit Board (2)



WIRING


OPTICAL PICK UP HEAD
MLP-3
OPERATION (1)
MAIN (1)
MAIN (2)
XA625A00
U,C models
0.01/400 or 0.01


0.01/400 or 0.01
XA626A00
A,G,B models


220V 110V
240V 130V
0.01/400 or 0.01
XA624A00
R model

PARTS LIST

■ELECTRICAL PARTS

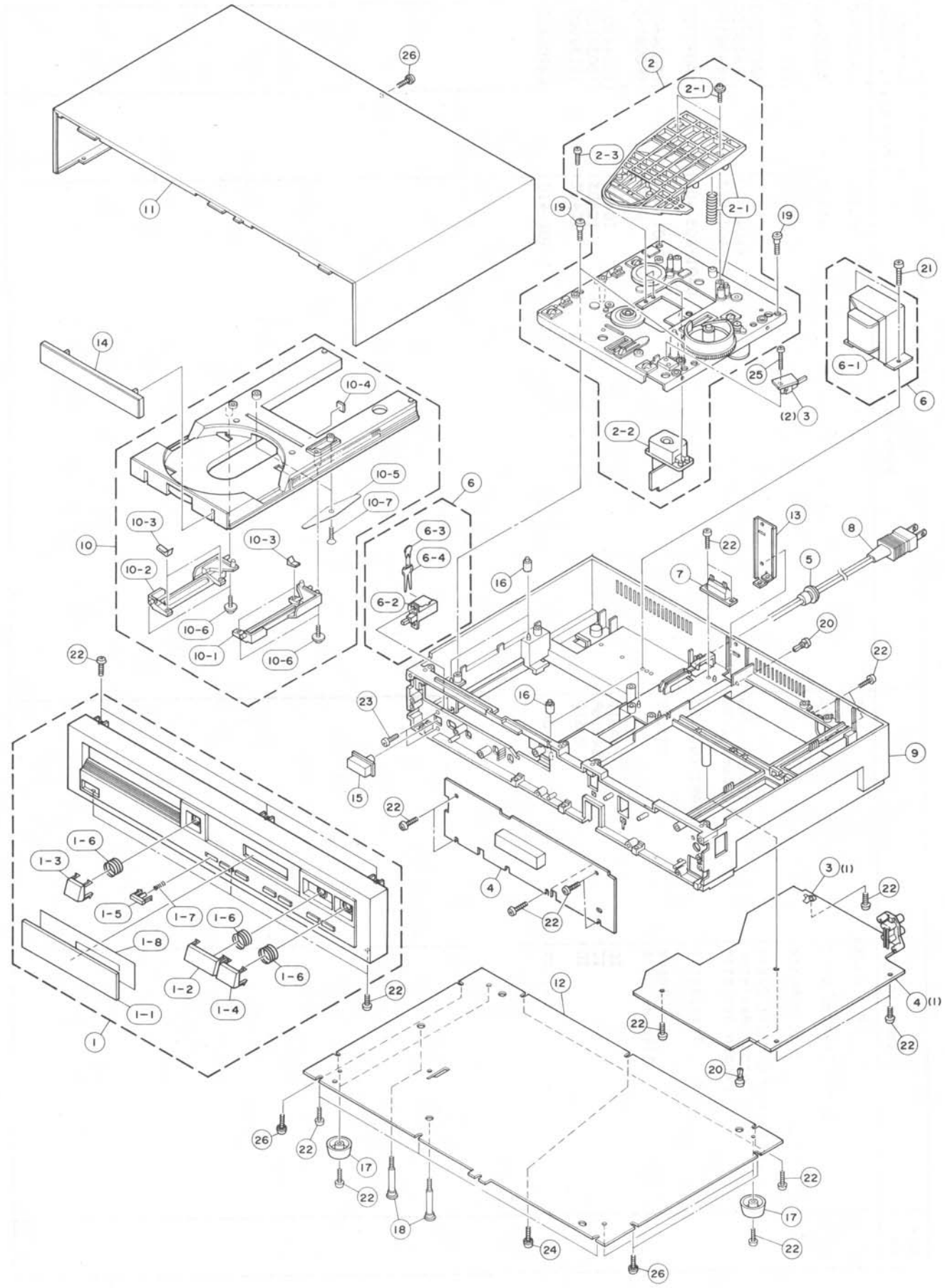
Ref No.	Description		Remarks	Markets	Common Model	
	Main Circuit Board				NA089150	
	Mylar Cap	0.068uF 50V	C163 164		UA654680	
	Mylar Cap	1000pF 50V	C147		UA653100	
	Mylar Cap	3300pF 50V	C144		UA653330	
	Mylar Cap	3300pF 50V	C139 171 172		UA653330	
	Mylar Cap	0.01uF 50V	C146		UA654100	
	Ceramic Cap	0.01uF 50V	C178-181 190 191		F1554100	
	Ceramic Cap	27pF 50V	C148 149		VA761100	
	Ceramic Cap	10pF 50V	C159 160		F1551100	
	Ceramic Cap	22pF 50V	C140 155 156 161 162		F1551220	
	Ceramic Cap	47pF 50V	C125		F1551470	
	Ceramic Cap	220pF 50V	C143		F1552220	
	Ceramic Cap	470pF 50V	C192		F1552470	
	Ceramic Cap	470pF 50V	C157 158		F1552470	
	Ceramic Cap	680pF 50V	C110		F1552680	
	Ceramic Cap	0.047uF 50V	C145		F1554470	
	Electrolytic Cap	4.7uF 25V	C169 170		UK546470	
	Mylar Cap	470pF 50V	C142		UA252470	
	Mylar Cap	0.47uF 50V	C116		UA555470	
	Mylar Cap	0.1uF 50V	C105		UA555100	
	Mylar Cap	1800pF 50V	C112 113		UA653180	
	Mylar Cap	2200pF 50V	C133 134		FA653220	
	Mylar Cap	2400pF 50V	C165 166		UA353240	
	Mylar Cap	6800pF 50V	C104		UA653680	
	Mylar Cap	0.016uF 50V	C167 168		UA354160	
	Mylar Cap	0.047uF 50V	C111 136 106		UA654470	
	Mylar Cap	0.068uF 50V	C135		UA654680	
	Mylar Cap	0.1uF 50V	C102 103 119 120 138 141 193		UA655100	
	Mylar Cap	0.12uF 50V	C115 122		UA655120	
	Mylar Cap	0.18uF 50V	C107 117		UA655180	
	Electrolytic Cap	470uF 6.3V	C124 132 114		U1818470	
	Electrolytic Cap	100uF 10V	C101 108 126		U1828100	
	Electrolytic Cap	33uF 16V	C184 185		U1837330	
	Electrolytic Cap	47uF 16V	C121		U1837470	
	Electrolytic Cap	220uF 16V	C173-175 186 187 189		U1838220	
	Electrolytic Cap	4.7uF 25V	C109		U1846470	
	Electrolytic Cap	1uF 50V	C123 130		U1866100	
	Electrolytic Cap	2.2uF 50V	C127		U1866220	
	Electrolytic Cap	10uF 50V	C131 137 188		U1867100	
	Electrolytic Cap	2200uF 16V	C176 177		UW839220	*
	Electrolytic Cap	2200uF 16V	C176 177		UW939220	*
	Electrolytic Cap	1000uF 25V	C182 183		UW849100	*
	Electrolytic Cap	1000uF 25V	C182 183		UW949100	
	Electrolytic Cap	1000uF 6.3V	C154		UH119100	
	Electrolytic Cap	470uF 16V	C152 153		UH138470	
	Coil	3uH	L101		GE901500	
	Carbon Resistor	2.2ohm 1/6W	R210		HF453220	
	Carbon Resistor	22ohm1/6W	R128 133		HF454220	
	Carbon Resistor	100ohm1/6W	R169 195 231 265 280-285		HF455100	
	Carbon Resistor	180ohm1/6W	R247 248		HF455180	

Ref No.	Description		Remarks	Markets	Common Model	
	Carbon Resistor	220ohm1/6W	R130 132 141 184 227		HF455220	
	Carbon Resistor	330ohm1/6W	R117		HF455330	
	Carbon Resistor	470ohm1/6W	R116 180 185 245 246 267		HF455470	
	Carbon Resistor	680ohm1/6W	R121 152 181 266		HF455680	
	Carbon Resistor	1Kohm1/6W	R178 235 251-254 257 258 264 272		HF456100	
	Carbon Resistor	1.5Kohm1/6W	R103 104 229		HF456150	
	Carbon Resistor	1.8Kohm1/6W	R131 183		HF456180	
	Carbon Resistor	2.2Kohm1/6W	R107 126 156 173 221 268-271		HF456220	
	Carbon Resistor	2.7Kohm1/6W	R102		HF456270	
	Carbon Resistor	3.3Kohm1/6W	R112 115 159 186 187 189 190 222 241 242		HF456330	
	Carbon Resistor	4.7Kohm1/6W	R171 225 232-234 236 237 239 240 262		HF456470	
	Carbon Resistor	5.6Kohm1/6W	R144		HF456560	
	Carbon Resistor	6.8Kohm1/6W	R142 193 217 218 243 244		HF456680	
	Carbon Resistor	8.2Kohm1/6W	R118		HF456820	
	Carbon Resistor	10Kohm1/6W	R101 110 149 113 114 124 129 145 147 154 157 158 164 165 166 168 175 182 202 216		HF457100	
	Carbon Resistor	12Kohm1/6W	R194		HF457120	
	Carbon Resistor	15Kohm1/6W	R174 179 172		HF457150	
	Carbon Resistor	18Kohm1/6W	R177		HF457180	
	Carbon Resistor	22Kohm1/6W	R108 208 109 122 137 138 170 206 211-214 228 259 260 274		HF457220	
	Carbon Resistor	33Kohm1/6W	R120 188 191		HF457330	
	Carbon Resistor	39Kohm1/6W	R146 148 150 279 153 200		HF457390	
	Carbon Resistor	47Kohm1/6W	R105 125 127 167 263		HF457470	
	Carbon Resistor	82Kohm1/6W	R155		HF457820	
	Carbon Resistor	100Kohm1/6W	R106 134 198 199 226 238 255 256 273 275		HF458100	
	Carbon Resistor	120Kohm1/6W	R111 209		HF458120	
	Carbon Resistor	200Kohm1/6W	R139		HF458200	
	Carbon Resistor	180Kohm1/6W	R119		HF458180	
	Carbon Resistor	220Kohm1/6W	R123 135 136 140 161-163 192 207		HF458220	
	Carbon Resistor	270Kohm1/6W	R151 176		HF458270	
	Carbon Resistor	390Kohm1/6W	R203 204		HF458390	
	Carbon Resistor	470Kohm1/6W	R160 205 249 250		HF458470	
	Carbon Resistor	1Mohm1/6W	R215 230		HF459100	
	Carbon Resistor	2.2Mohm1/6W	R143		HF459220	
	Metal Film Resistor	22Kohm1/4W	R219 220 223 224		HU757220	
	Flame Proof Carbon Resistor	6.8ohm1/4W	R196 197		HV753680	
	Pre-Set Potentiometer	B10Kohm	VR101 105		VA788000	
	Pre-Set Potentiometer	B47Kohm	VR104 106		VA788300	
	Pre-Set Potentiometer	B100Kohm	VR102 103		VA788400	
	Pre-Set Potentiometer	B470Kohm	VR107		VA788700	
	Transistor	2SA1310(R,S,T)	Q104 119 122 129		iA131000	*
	Transistor	2SA933S(Q,R)	Q104 119 122 129		iA093320	
	Transistor	2SA1115(E,F)	Q104 119 122 129		iA111520	
	Transistor	2SB544	Q136 138 123 127 128		iB054430	*
	Transistor	2SA934	Q136 138 123 127 128		iA093410	
	Transistor	2SC535(A,B,C)	Q101 110		iC053540	
	Transistor	2SC3312(R,S,T)	Q102 108 109 111-115 117 118		iC331200	*

Ref No.	Description		Remarks	Markets	Common Model	
	Transistor	2SC1740S(S,R)	Q102 108 109 111-115 117 118		¡C174020	
	Transistor	2SC2603(E,F)	Q102 108 109 111-115 117 118		¡C260320	
	Transistor	2SD400	Q120 125 126 135 137		¡D040040	*
	Transistor	2SC2060	Q120 125 126 135 137		¡C206010	
	Transistor	2SD880(O,Y)	Q121		¡D088000	*
	Transistor	2SC1983	Q121		¡C198300	
	Transistor	2SD743(S,R,Q)	Q121		¡D074300	
	Transistor	2SC2878(A,B)	Q103 105-107		¡C287820	*
	Transistor	2SC3068	Q103 105-107		¡C306800	
	Transistor	2SC3327	Q103 105-107		¡C332700	
	Transistor	2SD655(E,F)	Q103 105-107		¡D065520	
	Transistor	2SD1302(R,S)	Q103 105-107		¡D130210	
	Transistor	2SC2878(A,B)	Q133 134		¡C287820	*
	Transistor	2SC3327	Q133 134		¡C332700	
	Transistor	2SC2878(A,B)	Q131 132		¡C287820	*
	Transistor	2SC3068	Q131 132		¡C306800	
	Transistor	2SC3327	Q131 132		¡C332700	
	Diode	1SS 133	D107 108 115		¡F004600	
	Varactor Diode	SVC 211	D114		¡F004920	*
	Varactor Diode	1SV 55	D114		¡F004910	
	Zener Diode	MTZ 13C T-77	D111		¡F008900	
	Zener Diode	MTZ10B	D116		¡F010890	
	Zener Diode	MTZ5.6B	D113		¡F006290	
	Zener Diode	MTZ7.5B	D112		¡F006300	
	Zener Diode	MTZ15A	D109 110		¡F006310	
	Diode	ISR35-100AT-93X	D101-106		VA791900	
	IC	NJM4558S	IC101 104 102 107 108 119		¡G076800	*
	IC	AN6551	IC101 104 102 107 108 119		¡G034700	
	IC	TA75558S	IC101 104 102 107 108 119		¡G131900	
	IC	BA715	IC101 104 102 107 108 119		¡G132200	
	IC	LA3170	IC117 118		¡G035410	
	IC	TC4053BP	IC116		¡G055100	*
	IC	uPD4053	IC116		¡G105900	
	IC	HD14053	IC116		¡G119900	
	IC	MN4053BP	IC116		¡G126100	
	IC	NJM2043S	IC103 109		¡G080200	
	IC	HM6116ASP-20	IC113		¡G121300	*
	IC	uPD4016-CX	IC113		¡G119200	
	IC	TMM2115AP-15	IC113		¡G131800	
	IC	STA451C	IC105		IG119400	
	IC	BA6218	IC111		¡G153500	
	IC	PCM54HP	IC115		XA394A00	
	IC	MSM6404A-124RS	IC112		XA393B00	
	IC	YM2601	IC114		XA492A00	*
	IC	YM2201K	IC114		¡T220120	
	IC	YM3811	IC110		XA491A00	*
	IC	YM3531	IC110		¡T353100	
	Switch	MSW-1485	SW101		KA906370	

Ref No.	Description		Remarks	Markets	Common Model	
	Pin Jack	2P	PJ101		LB201960	
	Quarz Crystal Unit	8.64MHz	XL101		QU005800	
	Ground Plate				BB068370	
	Operation Circuit Board				NA090520	
	Carbon Resistor	100ohm 1/6W	R404-410		HF455100	
	Carbon Resistor	100kohm 1/6W	R401-403,427		HF458100	
	Transistor	2SA937(Q,R,S)	Q401-403,406		iA093700	
	Diode	1SS133	D401-404		iF004600	
	Display Unit		D405		iF008340	
	IC	BA612	IC403		iG144200	*
	IC	MS4516P	IC403		iG031100	
	IC	BA618	IC402		iG132000	
	Switch	EVQ-QR8-04M	SW401-410		KA906380	

■EXPLODED VIEW

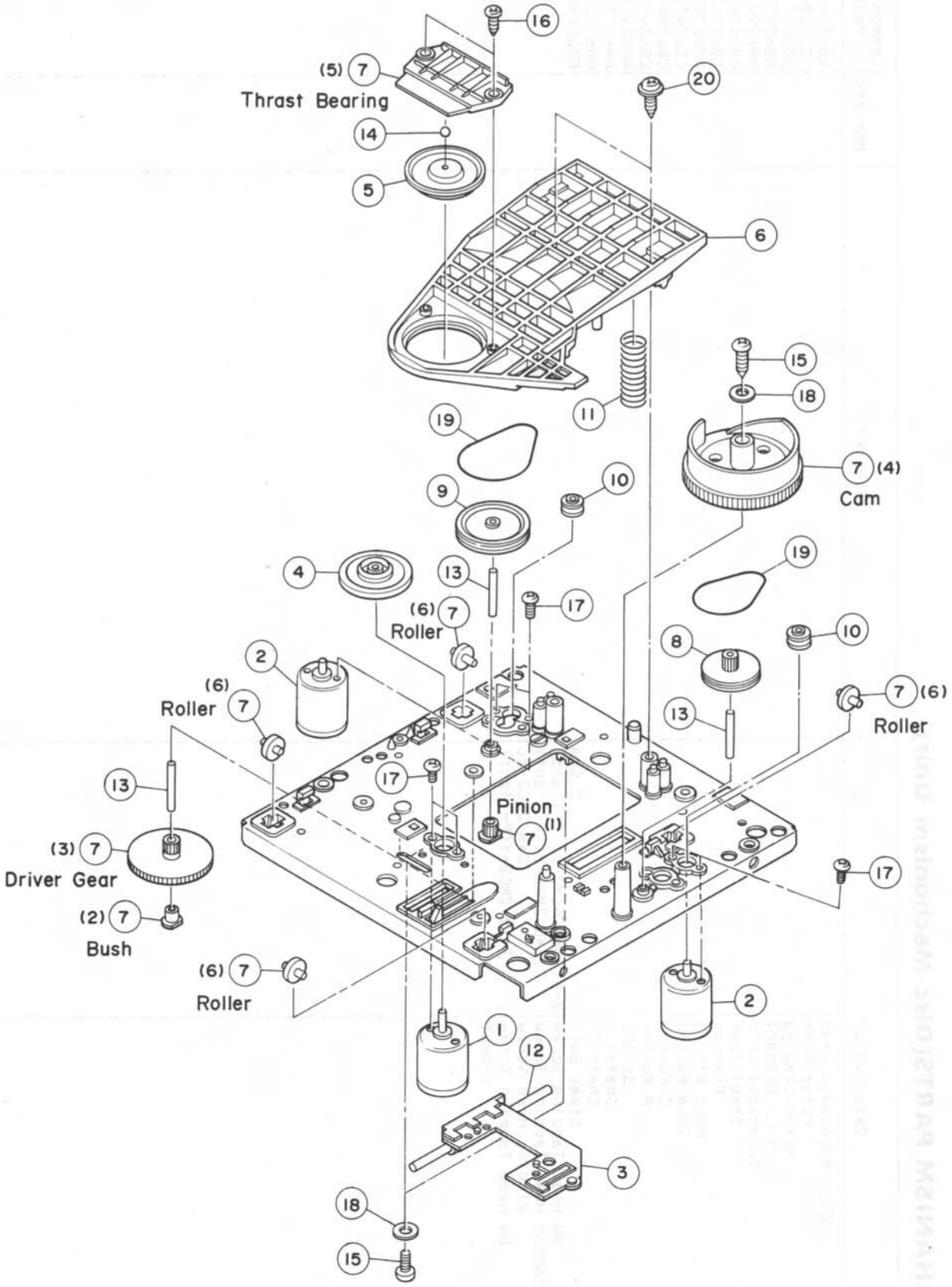


■ MECHANISM PARTS

Ref No.	Description		Remarks	Markets	Common Model
1	Panel Unit				NB635980
1-1	Window				VB351000
1-2	Button		PLAY		VB110500
1-3	Button		OPEN/CLOSE		VB199800
1-4	Button		STOP		VB199900
1-5	Button				VB110700
1-6	Spring				AA625350
1-7	Spring				AA622540
1-8	Adhesive Sheet				VB351200
2	Disc Mechanism Assy				NB634840
2-1	Disc Mechanism Unit	DM-3			NB631420
2-2	Optical Pick Up Head				VA757100
2-3	Binding Head Screw	2.6*4 FCM3-BL			
3	Main Circuit Board				NA089150
4	Operation Circuit Board				NA090520
5	Cord Stopper	CM-22A		U.C	CB616810
5	Cord Stopper	CM-22B		A.G	CB620190
6	Power Transformer Assy			U.C	MZ093340
6	Power Transformer Assy			A.G	MZ093350
6-1	Power Transformer			U.C	XA625A00
6-1	Power Transformer			A.G	XA626A00
6-2	Power Switch	SDLC-1P			KA803290
6-3	Ceramic Cap	0.01uF 400V			VA985300
6-3	Ceramic Cap	0.01uF			Fi504100
6-4	Cover	HY-0102		U.C	CB600810
6-4	Cover	HY-0105		A.G	CB644670
7	Terminal Plate	2P			LA002950
8	Power Cord	10A 125V 2m		U.C	MG000840
8	Power Cord	10A 125V 2m		U.C	MG001240
8	Power Cord	7.5A 250V 2.5m		A	MG000920
8	Power Cord	7.5A 250V 2.5m		A	MG001490
8	Power Cord	7.5A 250V 2m		A	MG002310
8	Power Cord	7.5A 250V 2m		G	MG000960
8	Power Cord	7.5A 250V 2m		G	MG001620
8	Power Cord	7.5A 250V 2m		G	MG002320
9	Main Chassis				CB630450
10	Disc Tray Assy				NB623740
10-1	Lifter (R)				CB623700
10-2	Lifter (L)				CB623710
10-3	Disc Pad				CB628470
10-4	Cushion Rubber				CB627960
10-5	SP Lifter				AA619180
10-6	BW Head Tapping Screw	3x8(10mm)FCM3-3L(P-Tight)			
10-7	Flat Head Tapping Screw	3*8 ZMC2-Y			
11	Top Cover				AA622570
12	Bottom Cover				AA622590
13	Ground Plate				AA619420
14	Lid				CB648330
15	Button		POWER		VB110600
16	FT Damper Rubber				CB628410
17	Leg				CB632190
18	Screw.Transport				AA622640

Ref No.	Description		Remarks	Markets	Common Model
19	Spacial Screw				AA621210
20	Plastic Rivet				CB068880
21	Binding Head Tapping Screw	4*12 FCM3-Bl(P-Tight)			
22	Binding Head Tapping Screw	3*10 FCM3-Bl(P-Tight)			
23	Binding Head Screw	3*8 FCM3-Bl			
24	Bonding Head Tapping Screw	3*8 FCM3-Bl(B-Tight)			
25	Binding Head Tapping Screw	2.6*10 FCN3-Bl(P-Tight)			
26	Bonding Head Tapping Screw	3*12 FCM3-Bl(B-Tight)			
	Accessories				
	Pin Plug Cord	1m			MI091120

■ EXPLODED VIEW(Disc Mechanism Unit)



■MECHANISM PARTS(Disc Mechanism Unit)

Ref No.	Description		Remarks	Markets	Common Model
	Disc Mechanism Unit				NB631420
1	Motor,Disc				JC001260
2	Motor,Loading				JC001270
3	S.L. Outsert				NB629980
4	Turntable Unit				NB629970
5	Stabilizer				CB642400
6	Flapper				CB623680
7	Mold Kit(2)				NB627920
8	Idle Pulley				CB634790
9	C Pulley				CB634800
10	P Pulley				CB634780
11	Spring				AA624350
12	Shaft(L)				AA619320
13	Shaft(S)				AA619330
14	Steel Ball	2.5mm			EZ001980
15	BW Head Tapping Screw	3*8(8mm) FCM3-Bl(P-Tight)			
16	Binding Head Tapping Screw	2.6*5 ZMC2-Bl(P-Tight)			
17	Binding Head Screw	2*5 ZMC2-Bl			
18	BW Head Tapping Screw	3*12 ZMC2-Y(P-Tight)			
19	V-Belt				CB637830