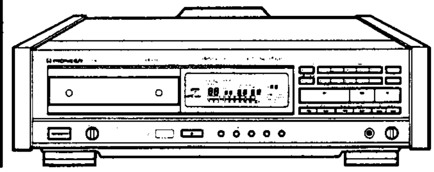
PIONEER®
The future of sound and vision.

# Service Manual



**ORDER NO.**
**ARP 1507**

## COMPACT DISC PLAYER

# PD-91

### MODEL PD-91 HAS TWO VERSIONS:

| Type | Power requirement | Export destination |
|---|---|---|
| KU/CA | AC 120 V only | U.S.A. and Canada |
| HEM | AC 220 V, 240 V (switchable) | European continent |

- **This manual is applicable to the KU/CA and HEM types.**
- **For the HEM type, refer to pages 133 and 134.**
- **Ce manuel pour le service comprend les explications en français de réglage. (p. 59 - p. 73).**
- **Este manual de servicio trata del método ajuste escrito en español. (p. 74 - p. 88).**

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# 1. SAFETY INFORMATION

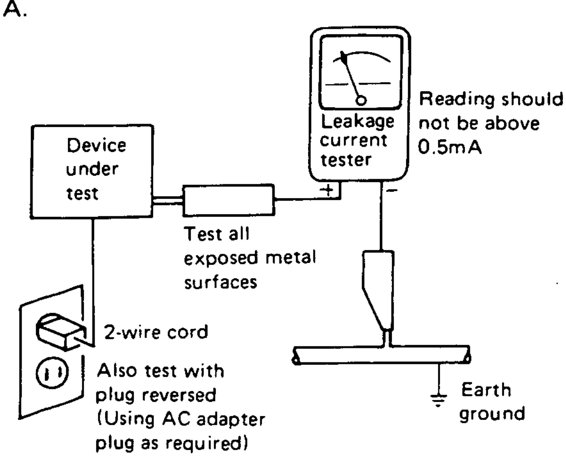
## (FOR USA MODEL ONLY)

### 1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

**LEAKAGE CURRENT CHECK**

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.




AC Leakage Test

**ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.**

### 2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

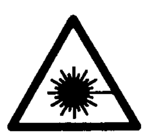
The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

## (FOR EUROPEAN MODEL ONLY)

**VAROITUS!**

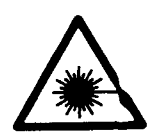
LAITE SISÄLTÄÄ LASERDIODIN, JOKA LÄHETTÄÄ NÄKYMÄTÖNTÄ, SILMILLE VAARALLISTA INFRAPUNASÄTEILYÄ LAITTEEN SISÄLLÄ ON LASERDIODIN LÄHEISYYDESSÄ KUVAN 1. MUKAINEN VAROITUSMERKKI.



LASER
Kuva 1
Lasersateilyn varoitusmerkki

**WARNING!**

DEVICE INCLUDES LASER DIODE WHICH EMITS INVISIBLE INFRARED RADIATION WHICH IS DANGEROUS TO EYES. THERE IS A WARNING SIGN ACCORDING TO PICTURE 1 INSIDE THE DEVICE CLOSE TO THE LASER DIODE.



LASER
Picture 1
Warning sign for laser radiation

**ADVERSEL:**

USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION UNDGÅ UDSAETTELSE FOR STRÅLING.

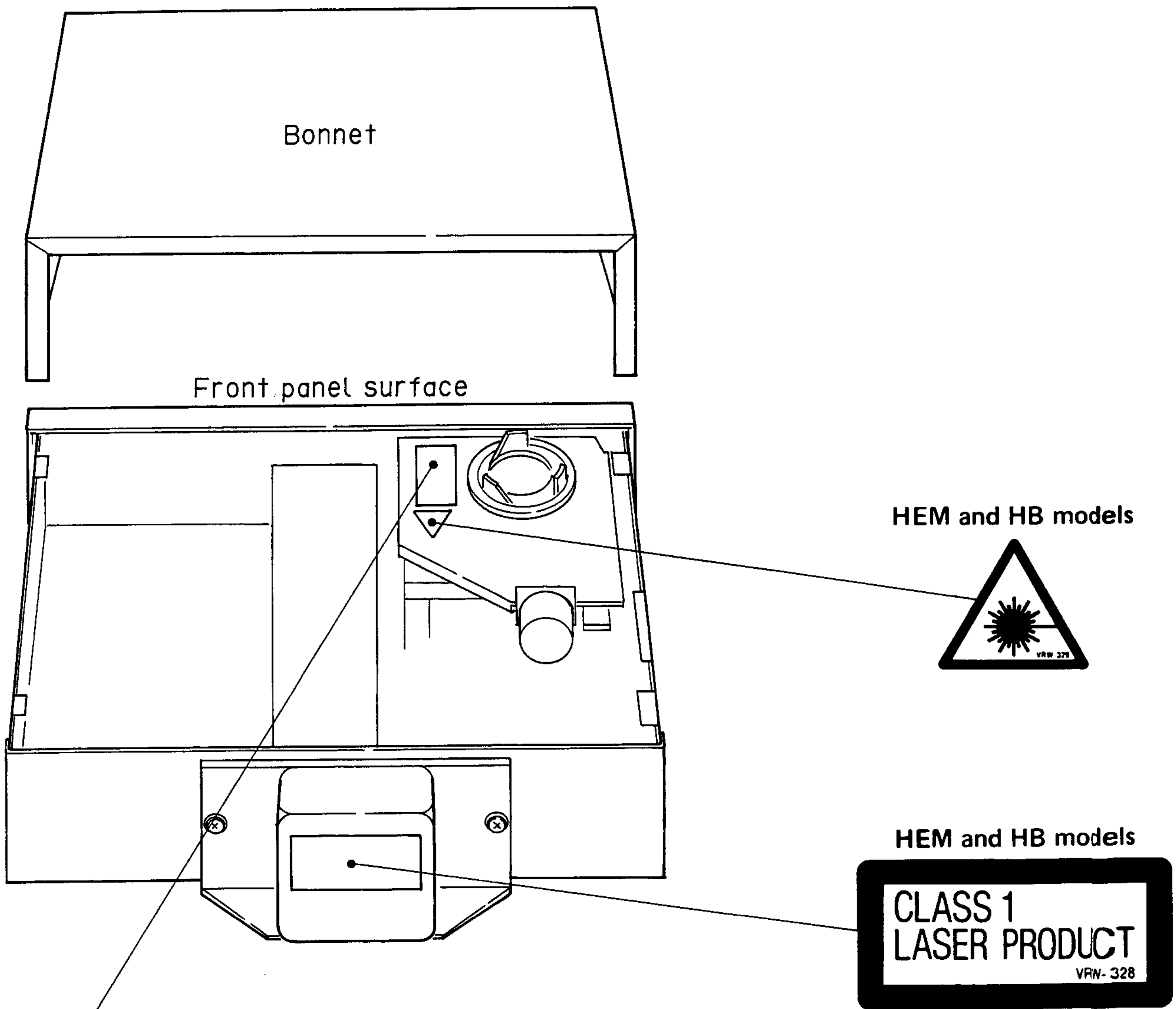
**IMPORTANT**

PIONEER COMPACT DISC PLAYER APPARATUS CONTAINS LASER OF HIGHER CLASS THAN 1. SERVICING OPERATION OF THE APPARATUS SHOULD BE DONE BY A SPECIALLY INSTRUCTED PERSON.

**VIKTIGT**

APPARATEN INNEHÅLLER LASER AV HÖGRE KLASS ÄN 1. INGREPP I APPARATEN BÖR GÖRAS AV SPECIELLT UTBILDAD PERSONAL.

# LABEL CHECK




HB model

CAUTION
INVISIBLE LASER
RADIATION WHEN OPEN,
AVOID EXPOSURE
TO BEAM PRW1018

HEM model

CAUTION
LASER RADIATION WHEN OPEN, AVOID EXPOSURE TO BEAM
ADVARSEL
FARE FOR USYNLIG LASERSTRÅLING VED ÅBNING AF DÆKSEL.
UNDGÅ AT UDSÆTTE ØJNENE FOR STRÅLING.
VORSICHT!
UNSICHTBARE LASER-STRAHLUNG TRITT AUS, WENN DECKEL
(ODER KLAPPE) GEOFFNET IST! NICHT DEM STRAHL AUSSETZEN!
PRW-175

**ADDITIONAL LASER PRECAUTIONS**

1. Laser Interlock Mechanism
   The clamp switch (S1305) detects the completion of the Load in operation, and the ON/OFF status of the clamp switch is in turn detected by the microcomputer. The laser diode is designed not to oscilllate while the clamp switch is in OFF status.
   Consequently, if S1305 is accidentally short-circuited, the interlock mechanism will become incapable of operation.
   Moreover, when short-circuiting occurs between Pins 4 or 5 of CXA1081S (IC 301) and GND, or between Pin 29 of CXA1081S (IC 301) and GND, or between the terminals of Q 304 (a Fault Condition will occur in all three cases), the laser diode will oscillate continuously.
   Note that during TEST Mode (see page 44), the interlock mechanism does not operate.
2. While the bonnet is in opened status, if while the bonnet is open, the pickup is positioned so that clamp base aperture and the exterior of the objective lens are visible and the clamp base is subsequently removed, the pickup can be flooded with radiation of more than class 1 of the laser optical system during any Fault Condition in Item 1 above or during TEST Mode.

# 2. SPECIFICATIONS

## 1. General

Type .................... Compact disc digital audio system
Usable discs ............................................ Compact Disc
Signal format ............. Sampling frequency: 44.1 kHz
Quantized bit number: 16 bit linear
D/A conversion ...................................................... 18 bit
Power requirements
European models ..................... AC 220 V, 50/60 Hz
U.S., Canadian models ................ AC 120 V, 60 Hz
Power consumption ............................................... 29 W
Operating temperature ....................... +5°C - +35°C
(+41°F - +95°F)
Weight ........................................ 11.7 kg (25 lb, 13 oz)
External dimensions ...........................................................
458(W) x 425(D) x 129(H) mm
18-1/16(W) x 16-13/16(D) x 5-3/32(H) in

## 2. Audio section

Frequency response ........... 2 Hz - 20 kHz (±0.3 dB)
Signal-to-noise ratio ............... 114 dB or more (EIAJ)
Dynamic range ......................... 99 dB or more (EIAJ)
Channel separation ................ 109 dB or more (EIAJ)
Total harmonic distortion ....... 0.0015% or less (EIAJ)
Output voltage .......................... 2.0 V ± 0.5 V (EIAJ)
Wow and flutter ...................... Limit of measurement
(± 0.001% W.PEAK) or less (EIAJ)
Number of channels .................... 2 channels (stereo)
Digital output .......... Coaxial output: 0.5 Vp-p (75Ω)
Optical output: –15 dBm to –20 dBm
(wavelength 660 nm)

## 3. Output terminal

Optical digital output terminal
Coaxial digital output terminal
Audio line output terminal
Headphone jack (with volume control)

## 4. Functions

- Play
- Pause
- Manual search
- Track search
- Index search
- Direct track search
- All track repeat
- Programmed repeat
- Programmed playback
- Pause program
- Add-on program
- Auto program editing
- Time fade editing
- Music Window (remote control)
- One touch fade (remote control)
- Fade time variation
- Random play
- Programmed random play
- Auto space
- Memory backup
- Timer start
- Random timer start
- Program timer start

## 5. Accessories

- Remote control unit .................................................. 1
- Size AAA/R03 dry cell batteries .............................. 2
- Output cable ............................................................ 1
- Operating instructions ............................................. 1

*NOTE:*
*Specifications and design subject to possible modifications without notice, due to improvement.*

# 3. PANEL FACILITIES

## FRONT PANEL

**Indicators**

PROGRAM : Lights after programming (after program has been memorized).

REPEAT : Lights during repeat play.

RANDOM : Lights during random playing.

TIME/REMAIN/TOTAL : Changes each time the TIME key is pressed.

- TIME : Displays the track number of the track being played, the index*1 number, and the playback time (minutes and seconds).
- REMAIN : Indicates the time remaining on the track being played. When the TIME key is pressed again, the time remaining on the disc will be displayed.
- TOTAL : Displays the total number of tracks on one disc (TRACK) and the overall playback time (MIN, SEC).

Programmed playback operation, displays the remaining playback time of the programmed tracks (REMAIN), and the total playback time (TOTAL).

TRACK : Indicates current track number, and track numbers within program. The lower figures light up in accordance with the number of tracks recorded on the disc, and the numbers of the tracks which have been played extinguish in order. (During programmed playback only the programmed tracks light.) Above number 21 the ➡ mark lights.

MIN : Displays the playback time or remaining time in minutes.

SEC : Displays the playback time or remaining time in seconds. Also, the auto space operation time (in seconds) and the fade-in and fade-out setting times (in seconds) are displayed.

MUSIC WINDOW : Lights when a Music Window has been programmed.

IN (IN) : Lights when the Music Window program starts or during fade-in.

OUT (OUT) : Lights when the Music Window program ends or during fade-out.

LEVEL : Displays the volume during fade-in and fade-out.

ATT : Displays the volume decrease (-dB) of fade-in and fade-out.

INDEX : Displays the index*1 number of the music section of a track or the track division.

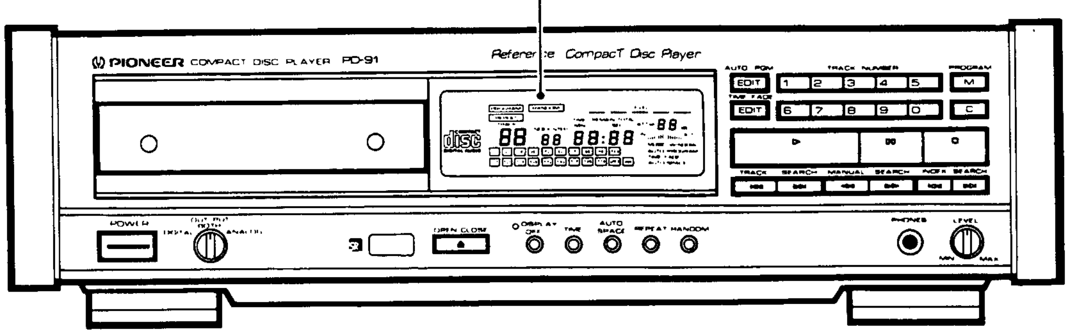
STEP : Displays the program steps.

AUTO PROGRAM: Displayed when Auto Program Editing is set or operated.

TIME FADE : Displayed when Time Fade Editing is set or operated.

AUTO SPACE : Lights during auto space playback.

*1 The INDEX is a signal which is recorded within a track, to indicate division of the track into separate tunes and items of music.



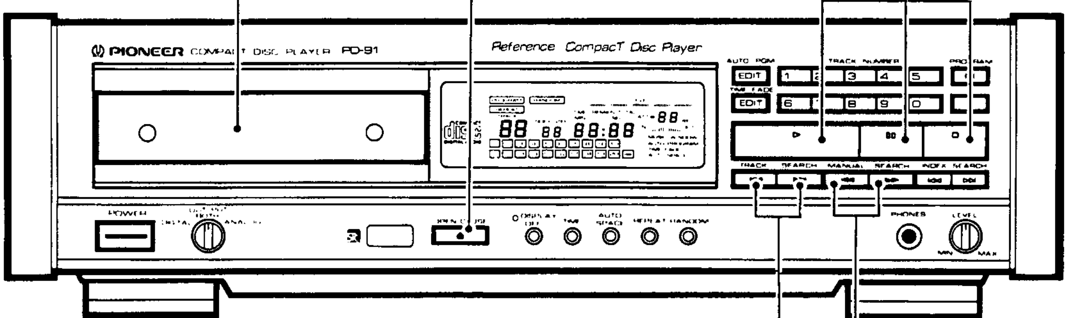
**OPEN/CLOSE key**
Press when you wish to eject or load a disc. Each time the key is pressed, the tray is alternately pushed out or pulled in.

**Disc Tray**
This is where the disc is set. When power is switched ON and the OPEN/CLOSE key is pressed, the tray is ejected forward.
To insert the tray, press the OPEN/CLOSE key, or lightly push the tray in with your finger. During play operation, pressing the PLAY key causes the tray to be inserted automatically.

**STOP key (□)**
Press to stop playback. When pressed, the player goes into stop mode and all operations stop.
Press to clear a program. When pressed during stop mode, the program stored in memory is cleared.

**PAUSE key (▯▯)/Indicator**
Press to temporarily interrupt playback. When pressed again, the pause mode is cancelled and playback resumes.

**PLAY key (▷)/Indicator**
Press to begin playback, and to cancel the pause mode.




**TRACK SEARCH keys**
When the player is in the normal play, (or during programmed or Music Window playback) or pause modes, these keys are pressed to search for a desired track. Pressing either key causes the player to advance to the next track, or return to the previous track. The keys can also be used to check the contents of a program during program entry (but only when the player is stopped).

[►►|] : When pressed once, the disc playback advances to the beginning of the next track on the disc; when pressed continuously, the disc playback moves to the beginning of succeeding tracks on the disc. (During programmed playback, it moves to the beginning of the next programmed track.)
During Music Window playback, the player advances to the beginning of the next programmed window.

[|◄◄] : When pressed once, the disc playback returns to the beginning of the currently playing track; when pressed continuously, the disc playback moves further in reverse to the beginning of previous tracks on the disc. (During programmed playback it returns to the beginning of the previously programmed track.)
During Music Window playback, it returns to the beginning of the previously programmed window.

**MANUAL SEARCH keys**
When the player is in play or pause modes, these keys are pressed to perform fast forward or fast backward operations, to allow manual searching. These operations are only carried out during the time either key is pressed.

[►►] : Fast forward operation (If fast forward operation is performed to the end of the disc," End" will be displayed and the player will enter pause mode.)

[◄◄] : Fast backward operation (If fast backward operation is performed to the beginning of the disc, the player will enter play mode.)

- For programmed playback, when the forward search reaches the next track, it will enter the pause mode. When it reaches the beginning of the track in backward search, the player will enter the playback mode.

**REPEAT key**

Press to perform repeat playback

- If pressed during normal playback mode, all tracks on the disc will be repeatedly played back.
- If pressed during programmed playback, the programmed tracks will be repeatedly played back in the programmed order.
- When all the tracks have been played at random during random play, the same tracks will be played again in a new pattern.

**TIME key**

- Use to select the method for displaying the playing time on the indicator panel.
  Each time the key is pressed, the indication changes from TIME, REMAIN, to TOTAL in that order. (For details concerning the display contents, refer to the explanation about the indicators.)
- If pressed after pressing the TRACK NO. key, the playback time of the selected track only is displayed.

**PROGRAM key (PROGRAM MEMORY)**

Used to program a sequence of tracks.

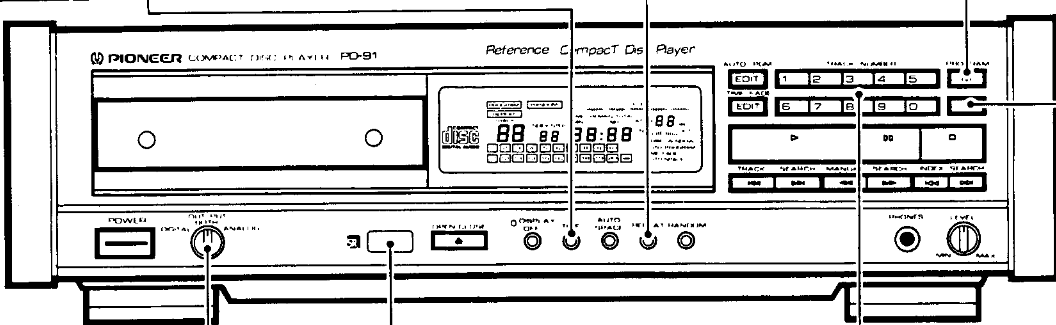
- Press this key after selecting a desired track with the TRACK NO. keys. Tracks will be added to the program in the order in which a track is selected.

**CLEAR key (PROGRAM CLEAR)**

Press this key to delete the last operation in the program or Music Window program during program input.

If pressed during program or Music Window playback, the entire program will be deleted.

Also, in the program time fade editing mode, the editing mode will be cancelled. If the key is pressed again, the program will be deleted.



**Output selector (OUTPUT)**

Select the output terminal to be used.

| | |
|---|---|
| ANALOG | : When using only the audio output terminal |
| BOTH | : When using both the audio output terminal and digital output terminal |
| DIGITAL | : When using only the digital terminal |

- The circuit not in use is inactivated to prevent any detrimental effect on sound quality.

**TRACK NO. keys (1 to 0)**

- Use to specify track numbers (track 1 - track 99) for selection of tracks, program entry, or to confirm playback time.
- For Auto Program Edit or Time Fade Edit operation, the track number keys are used to specify the time period (in minutes).

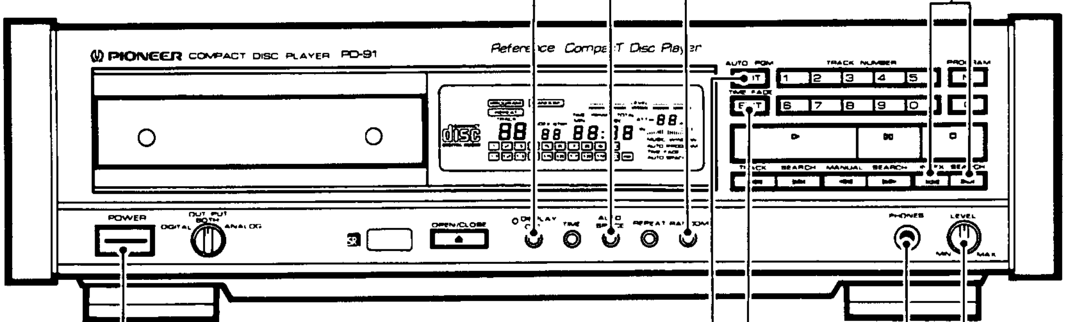
**REMOTE SENSOR window**

**AUTO SPACE key**
During playback, there will be a pause of about three seconds before the next track is played.

**DISPLAY OFF key**
Press this key to turn off the indicator display. The unused circuits are turned off to prevent any detrimental effect on sound quality.
- When an operation key is pressed, the display will go on for a few seconds.
- When not in playback mode (STOP, PAUSE, etc.), the display will be on.

**RANDOM play key**
Press to begin random playback.

**INDEX SEARCH keys**
Searches, during playback or pause, for the music section of a track or the track index. When pressed, the unit will return to the previous index or advance to the next index
▷▷|: Advances to the next index number.
|◁◁: Returns to the index number of the currently-playing music section or track.



**POWER switch**
Press to turn power to the unit ON and OFF.
If there is a disc in the unit when power is turned ON, playback will begin automatically. (Timer start function)

**AUTO PGM EDIT key**
Press to program a tune which may be played back within a specified time.

**PHONES (headphones) jack**
When you wish to use headphones, insert the plug for the headphones into the headphone jack.

**PHONES LEVEL control knob**
Use to adjust the level of sound when using headphones. Turning the knob to the right increases the sound level.

**TIME FADE EDIT key**
Press this key when ending play at a desired time with fade out.

**REMOTE CONTROL UNIT**

Refer to player front panel section regarding other key functions not specified here.

REPEAT key

TIME key

OPEN/CLOSE key

INDEX SEARCH key

TRACK SEARCH key

MANUAL SEARCH key

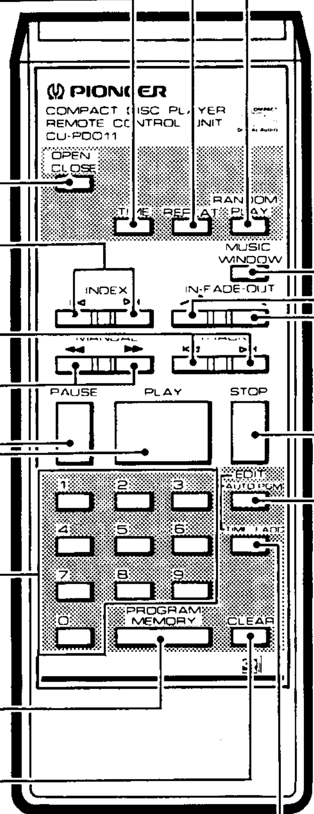
PAUSE key

PLAY key

TRACK NO. keys

PROGRAM MEMORY key

CLEAR key



**RANDOM PLAY key**

**MUSIC WINDOW key**

This is used to playback only the desired section (window) of a track.

- Press this key at the start of the desired music section. Continue playback and press the key again to specify the end of the desired section. This programs one Music Window. Up to 8 Music Windows can be programmed.

**FADE-IN key**

Press this key to start playback with fade-in sound. (Possible only during playback pause mode.)

**FADE-OUT key**

Press this key for fade-out sound. (After fade-out is completed, the unit will enter pause mode.)

STOP key

AUTO PGM EDIT key

TIME FADE EDIT key

*Reference:*

*Fade-in* : *With no sound, the sound fades in gradually getting louder.*

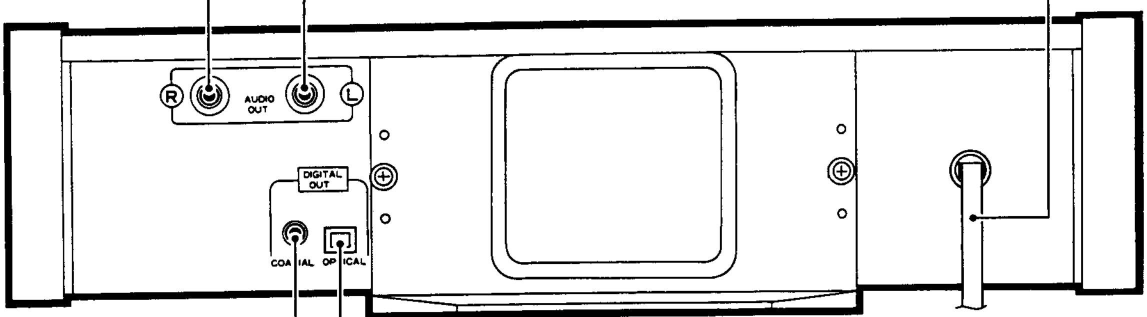
*Fade-out* : *The sound gradually gets softer until there is no sound.*

## REAR PANEL

**AUDIO OUT terminals**

**POWER CORD**

The terminal corresponding to the setting of the front panel output selector (OUTPUT) can be used.

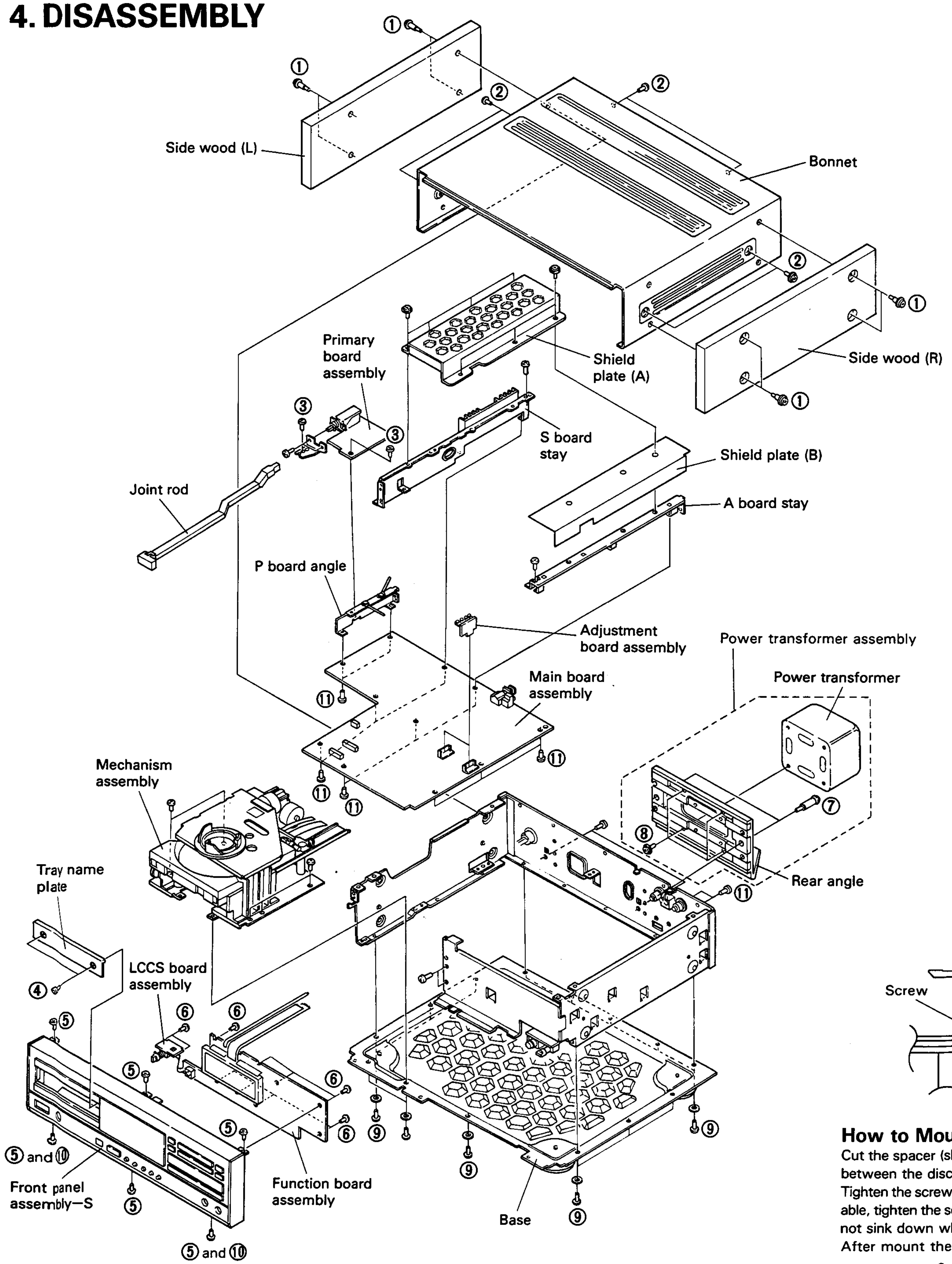


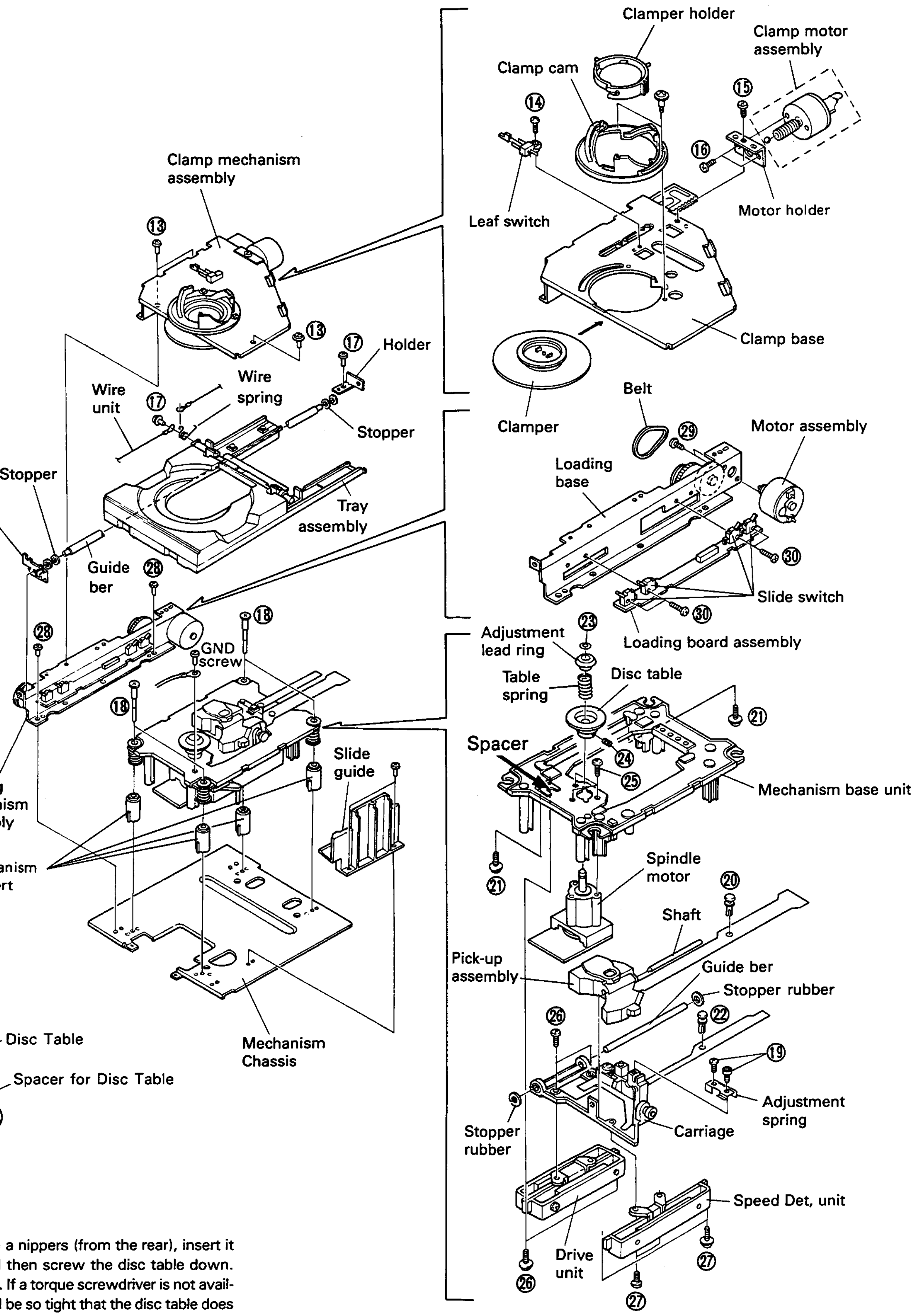

**Coaxial digital output terminal**
This terminal allows output of disc audio data and subcode (signals which can be recorded together with the audio signal) as digital signals.

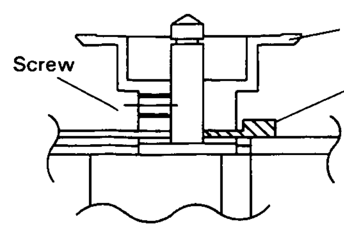
**Optical digital output terminal**
This terminal allows optical output of disc audio data and subcode (signal which can be recorded with the audio signal) as digital signals.

- The coaxial cable and optical fiber cable are sold separately.

# 4. DISASSEMBLY

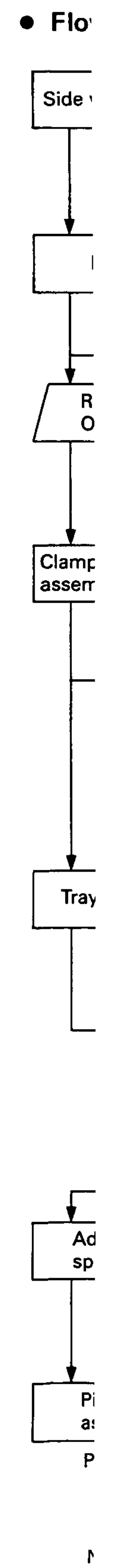


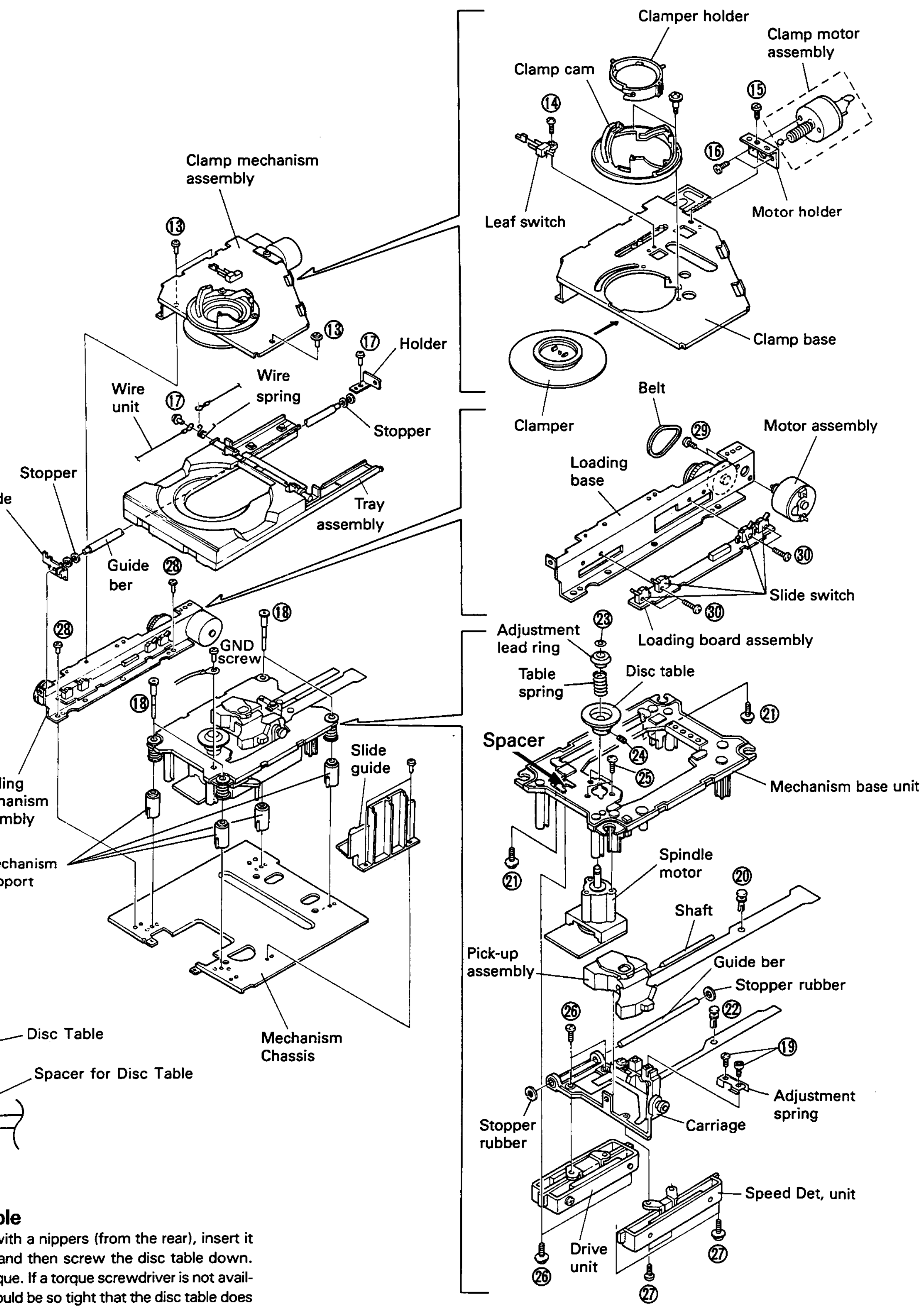



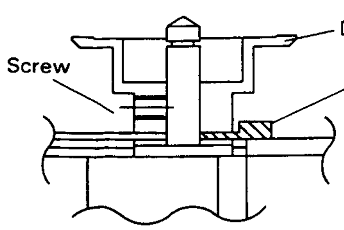




## How to Mount the Disc Table

Cut the spacer (shown by the arrow) with a nippers (from the rear), insert it between the disc table and the base, and then screw the disc table down. Tighten the screw to over 5kg cm of torque. If a torque screwdriver is not available, tighten the screw very firmly. It should be so tight that the disc table does not sink down when it is pressed down from above.
After mount the disc table remove the spacer.



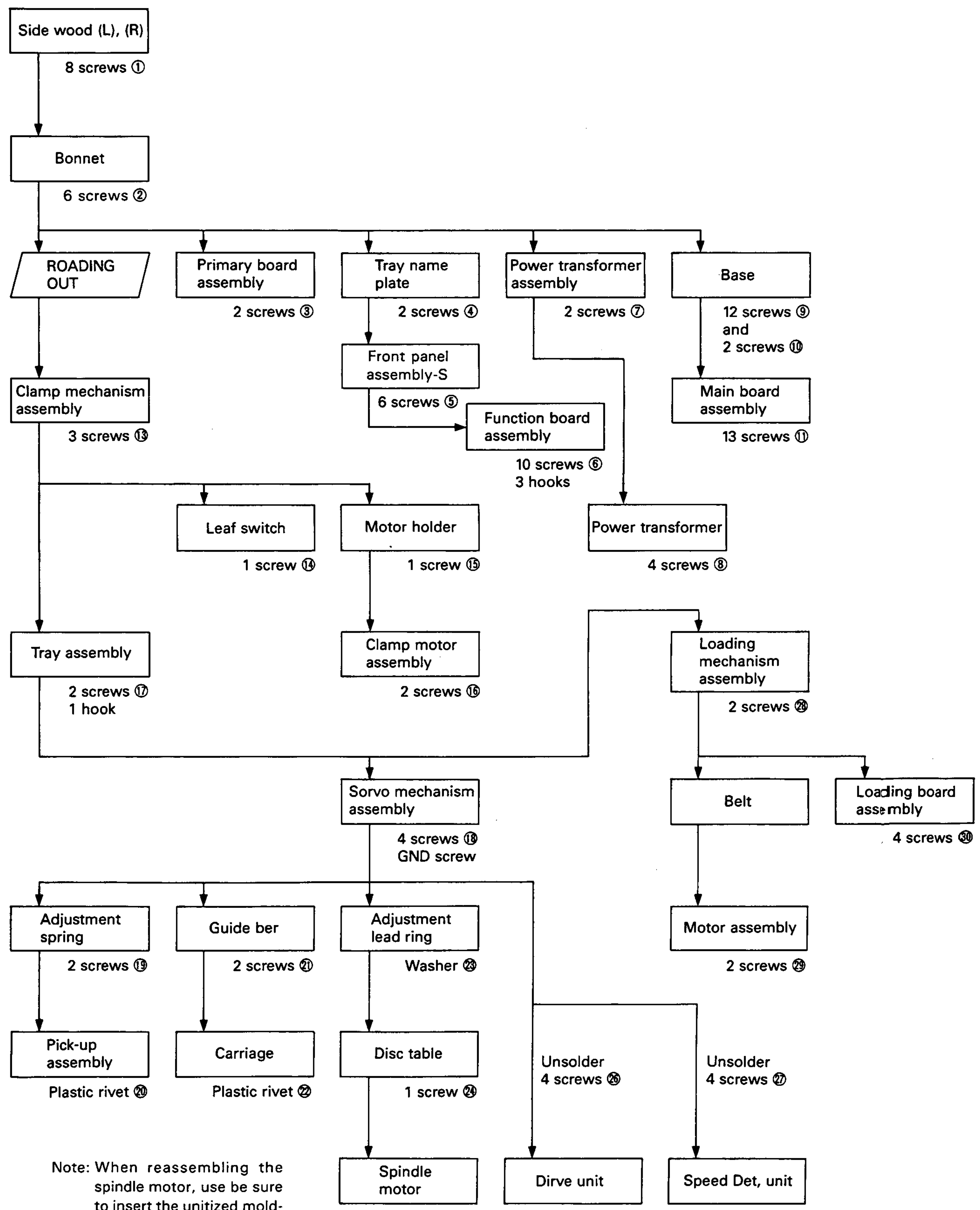




## How to Mount the Disc Table

Cut the spacer (shown by the arrow) with a nippers (from the rear), insert it between the disc table and the base, and then screw the disc table down. Tighten the screw to over 5kg cm of torque. If a torque screwdriver is not available, tighten the screw very firmly. It should be so tight that the disc table does not sink down when it is pressed down from above.
After mount the disc table remove the spacer.

- **Flowchart**

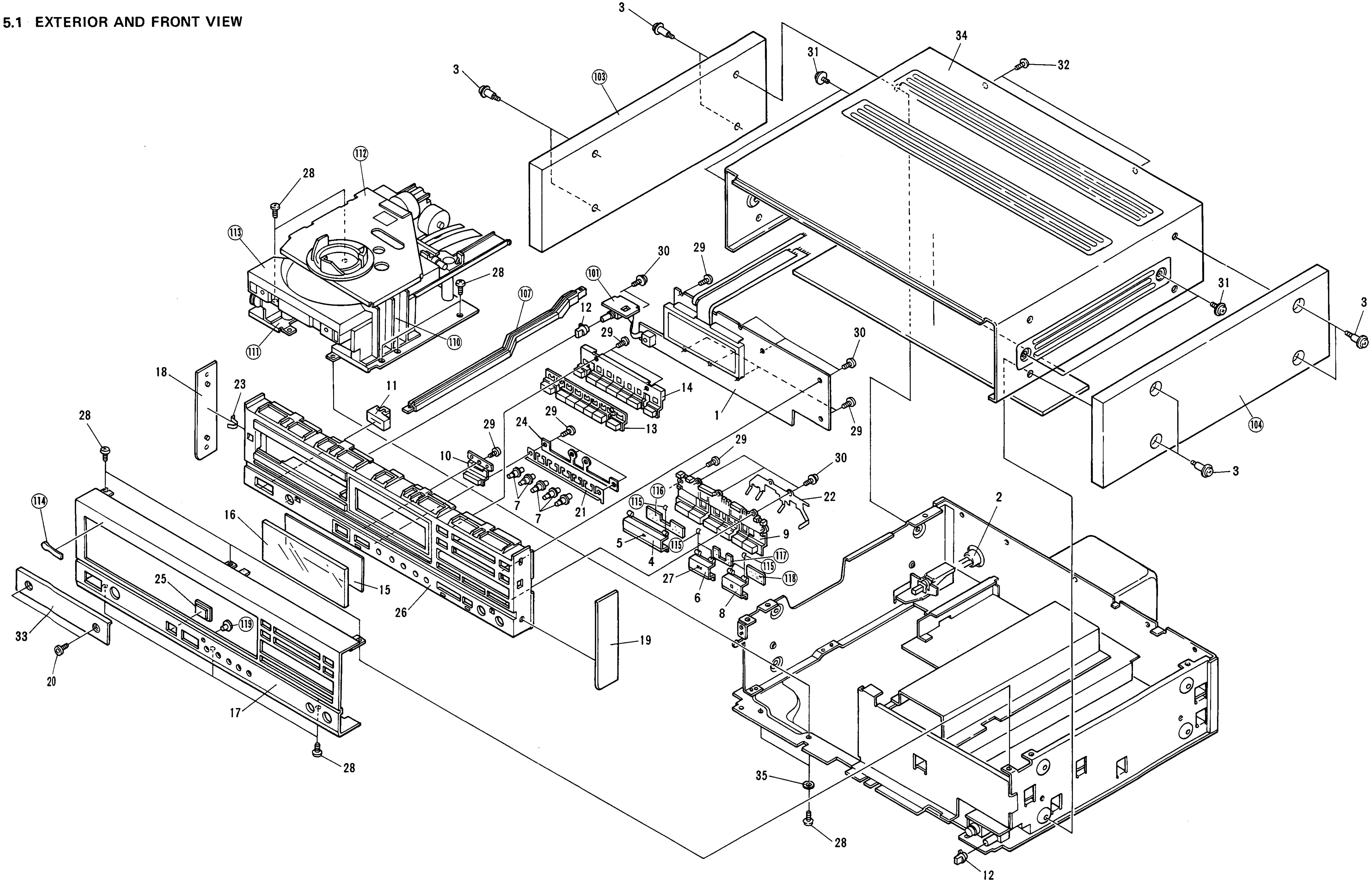



Note: When reassembling the spindle motor, use be sure to insert the unitized molded spacer (1 mm thickness).

Note: In order to remove the drive and speed sensor units you must first remove the spindle motor.

# 5. EXPLODED VIEWS AND PARTS LIST

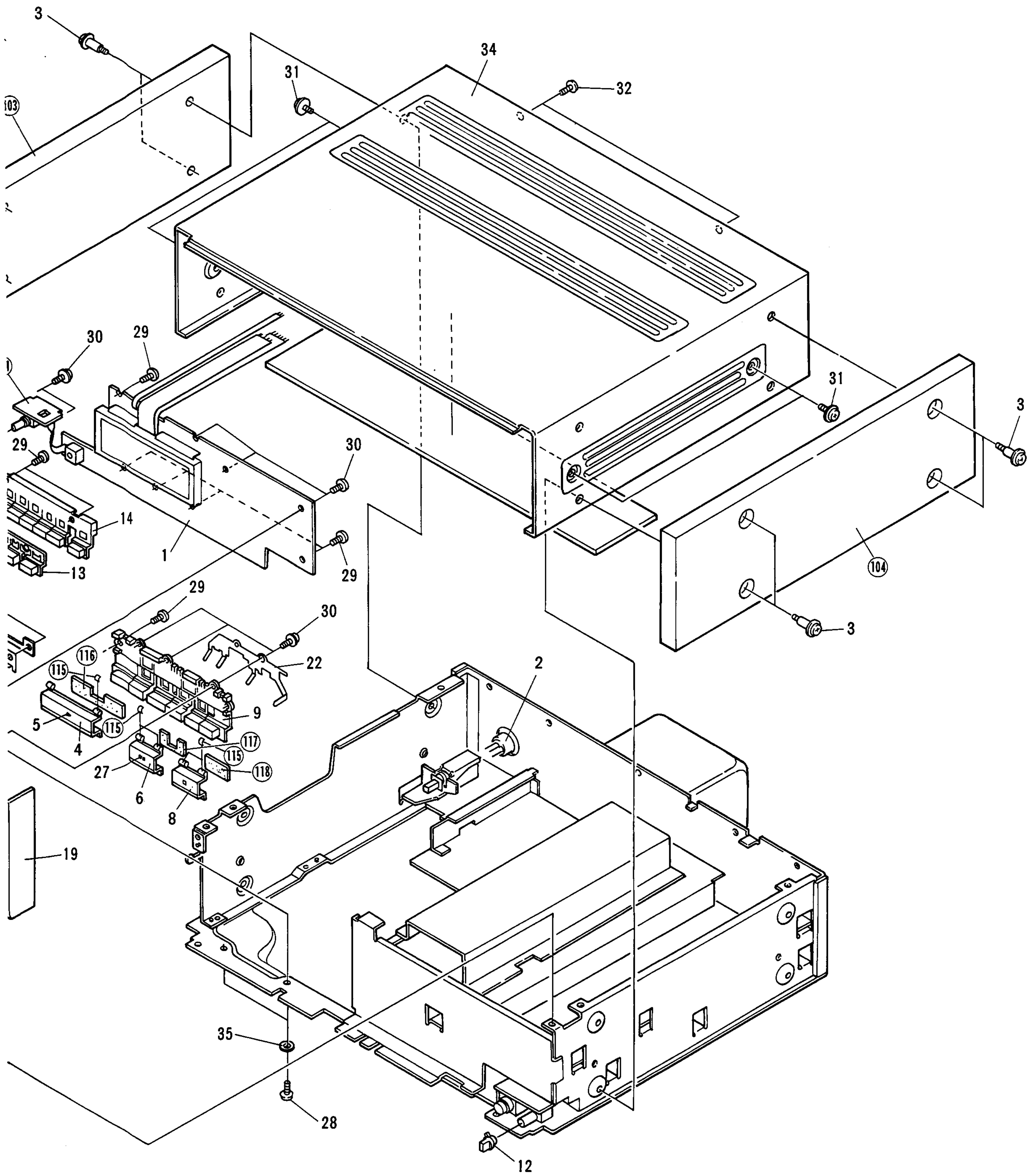
## 5.1 EXTERIOR AND FRONT VIEW




*NOTES:*
- *Parts without*
- *The ⚠ mark factor of the p tion.*
- *For your part and ★.*
  *★★ GENER. This classifica number, temp*
- *Parts marked than usual or*

**Parts List of**

| Mark | No. | |
|---|---|---|
| ◉ | 1. | F |
| ⚠ | 2. | C |
| | 3. | F |
| | 4. | F |
| | 5. | F |
| | 6. | F |
| | 7. | F |
| | 8. | F |
| | 9. | F |
| | 10. | F |
| | 11. | F |
| | 12. | F |
| | 13. | F |
| | 14. | F |
| | 15. | F |
| | 16. | F |
| | 17. | F |
| | 18. | F |
| | 19. | F |
| | 20. | F |
| | 21. | F |
| | 22. | F |
| | 23. | F |
| | 24. | F |
| | 25. | F |
| | 26. | F |
| | 27. | F |
| | 28. | E |
| | 29. | E |
| | 30. | I |
| | 31. | F |
| | 32. | E |
| | 33. | F |
| | 34. | F |
| | 35. | V |

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*NOTES:*
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  *★★ GENERALLY MOVES FASTER THAN ★*
  *This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

## Parts List of Exterior

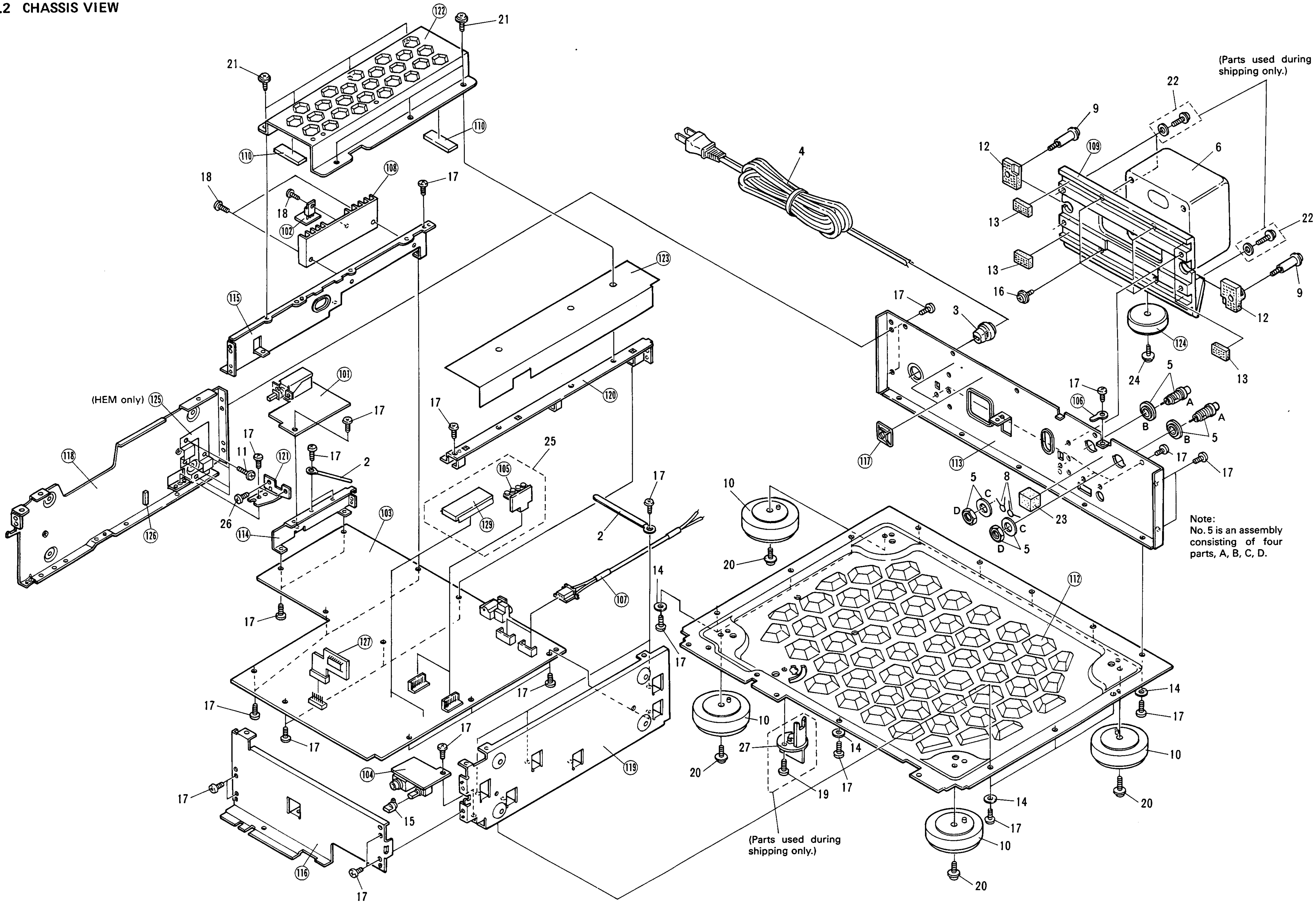
| Mark | No. | Part No. | Description |
|---|---|---|---|
| ◉ | 1. | PWZ1035 | Function board assembly |
| ⚠ | 2. | CM-22C | Strain relief |
| | 3. | RBA-093 | Screw (Side wood) |
| | 4. | PAB1010 | Play button |
| | 5. | PNW1258 | Play lens |
| | 6. | PAB1011 | Pause button |
| | 7. | PAA1003 | Mood button |
| | 8. | PAB1012 | Stop button |
| | 9. | PAC1204 | Track button |
| | 10. | PAC1206 | Open button |
| | 11. | PAC1207 | Power button |
| | 12. | PAC1208 | Headphone knob |
| | 13. | PAC1209 | Select button (A) |
| | 14. | PAC1210 | Select button (B) |
| | 15. | PAM1152 | FL filter |
| | 16. | PAM1135 | Display window |
| | 17. | PAN1078 | Front panel |
| | 18. | PAN1093 | Side sash (L) |
| | 19. | PAN1094 | Side sash (R) |
| | 20. | PBA1013 | Decoration screw |
| | 21. | PBK1025 | Plate spring (A) |
| | 22. | PBK1026 | Plate spring (B) |
| | 23. | PBK1027 | Plate spring (C) |
| | 24. | PNB1054 | Mode angle |
| | 25. | PNW1075 | Remote sensor window |
| | 26. | PNW1261 | Function panel |
| | 27. | PNW1259 | Pause lens |
| | 28. | BBZ30P060FCC | Screw |
| | 29. | BBZ30P080FCC | Screw |
| | 30. | IBZ30P080FCC | Screw |
| | 31. | FBT40P080FZK | Screw |
| | 32. | BBZ30P080FZK | Screw |
| | 33. | PAN1097 | Tray name plate |
| | 34. | PYY1056 | Bonnet |
| | 35. | VBE1003 | Washer |
| | 101. | | LCCS board assembly |
| | 102. | | . . . |
| | 103. | | Side wood (L) |
| | 104. | | Side wood (R) |
| | 105. | | . . . |
| | 106. | | . . . |
| | 107. | | Joint rod |
| | 108. | | . . . |
| | 109. | | . . . |
| | 110 | | Slide guide |
| | 111. | | Loading mechanism assembly |
| | 112. | | Clamp mechanism assembly |
| | 113. | | Tray assembly |
| | 114. | | Name plate |
| | 115. | | Tape A |
| | 116. | | PL spacer |
| | 117. | | PA spacer |
| | 118. | | ST spacer |
| | 119. | | Lens |

B

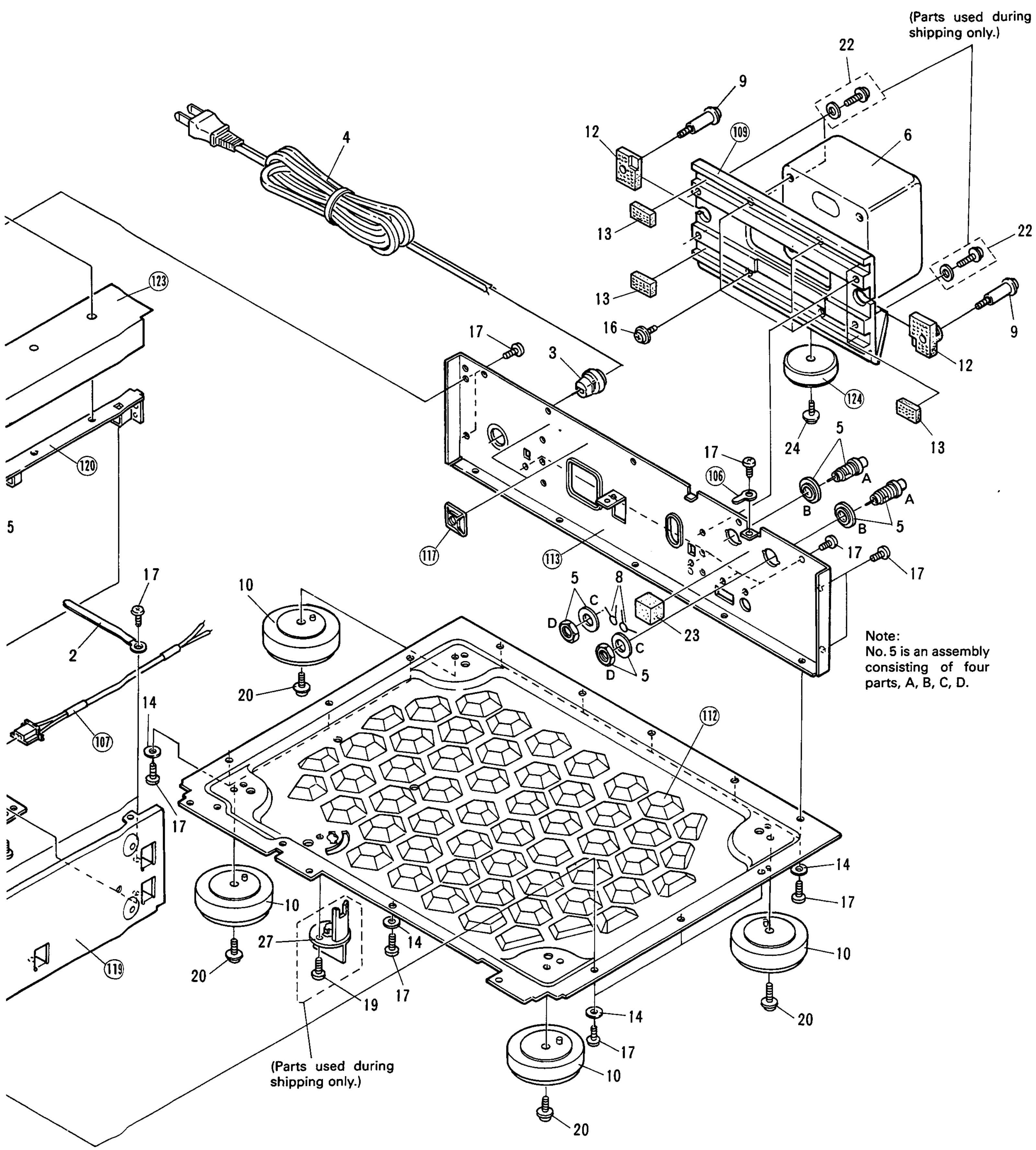
C

D

## 5.2 CHASSIS VIEW




Parts Li
Mark

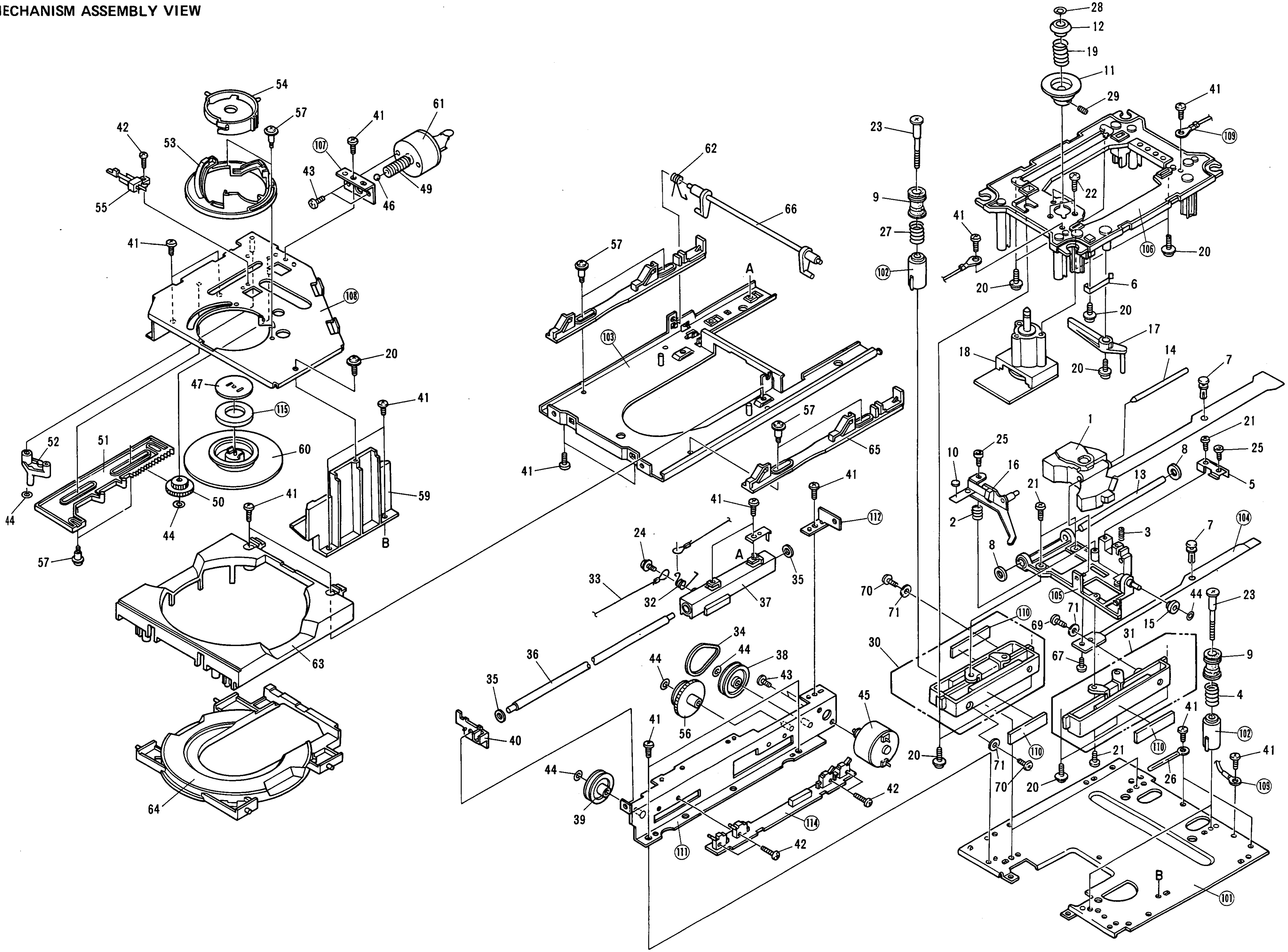



Note:
No. 5 is an assembly consisting of four parts, A, B, C, D.

## Parts List of Chassis

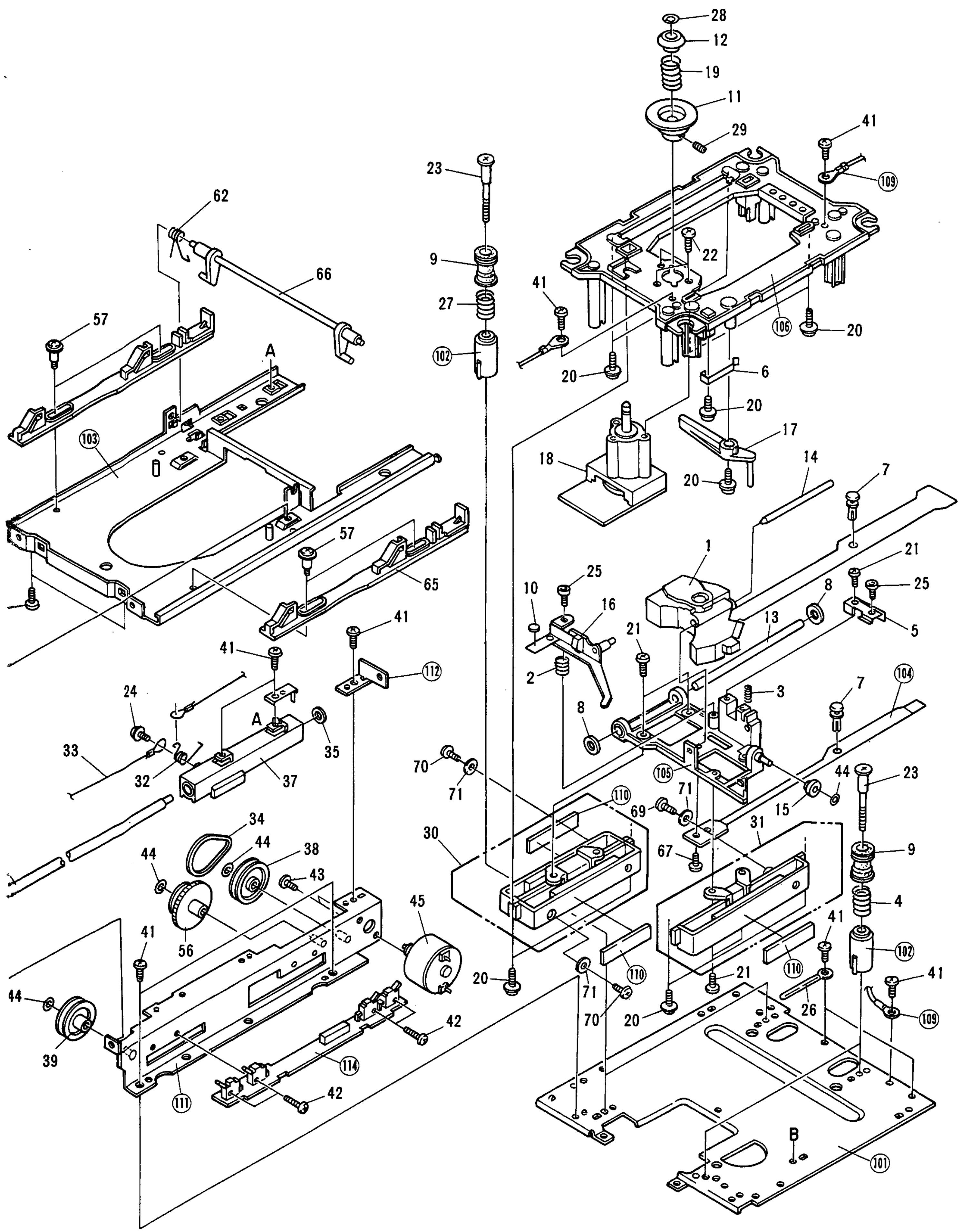
| Mark | No. | Part No. | Description |
|---|---|---|---|
| | 1. | . . . | . . . |
| | 2. | RNH-184 | Cord holder |
| ⚠ | 3. | CM-22C | Strain relief |
| ⚠ | 4. | PDG1002 | AC Power cord |
| | 5. | PKB1008 | 1P pin jack |
| ⚠ ★ | 6. | PTT1039 | Power transformer (AC120V) |
| | 7. | . . . | . . . |
| ⚠ | 8. | CKDYF103Z50 | Ceramic capacitor |
| | 9. | PBA1008 | Screw (A) |
| | 10. | AMR1159 | Leg assembly |
| | 11. | PCZ30P050FZK | Screw |
| | 12. | PEB1054 | Damper rubber (A) |
| | 13. | PEB1055 | Damper rubber (B) |
| | 14. | VBE1003 | Washer |
| | 15. | PAC1208 | Headphone Knob |
| | 16. | AMZ40P080FMC | Screw |
| | 17. | BBZ30P060FCC | Screw |
| | 18. | BBZ30P080FCC | Screw |
| | 19. | BBZ30P080FRD | Screw |
| | 20. | IBZ30P080FCC | Screw |
| | 21. | IBZ30P060FCC | Screw |
| | 22. | AMZ40P180FRD | Screw |
| | 23. | PNM1008 | Cushion |
| | 24. | IBZ30P120FCC | Screw |
| | 25. | PYY1043 | D/A converter assembly |
| | 26. | PMZ30P060FCC | Screw |
| | 27. | PNW1236 | Clamp knob |
| | 101. | | Primary board assembly |
| | 102. | | Regulator board assembly |
| | 103. | | Main board assembly |
| | 104. | | Headphone board assembly |
| | 105. | | Adjustment board assembly |
| | 106. | | GND plate |
| | 107. | | Connector assembly |
| | 108. | | Heat sink |
| | 109. | | Rear angle |
| | 110. | | Cushion (B) |
| | 111. | | . . . |
| | 112. | | Base |
| | 113. | | Rear base |
| | 114. | | P board angle |
| | 115. | | S board angle |
| | 116. | | Front stay |
| | 117. | | Binder holder |
| | 118. | | Side plate (L) |
| | 119. | | Side plate (R) |
| | 120. | | A board stay |
| | 121. | | Switch angle |
| | 122. | | Shield plate (A) |
| | 123. | | Shield plate (B) |
| | 124. | | Leg assembly (B) |
| | 125. | | Screw angle (HEM only) |
| | 126. | | Cushion rubber |
| | 127. | | Schmidt board assembly |
| | 128. | | . . . |
| | 129. | | IC (IC500, IC600) |

## 5.3 MECHANISM ASSEMBLY VIEW




Parts List of I

| Mark | No. | P |
| --- | --- | --- |
| | 1. | P' |
| | 2. | Pl |
| | 3. | Pl |
| | 4. | Pl |
| | 5. | Pl |
| | 6. | Pl |
| | 7. | Pl |
| | 8. | Pl |
| | 9. | P |
| | 10. | Pl |
| | 11. | Pl |
| | 12. | P |
| | 13. | Pl |
| | 14. | Pl |
| | 15. | Pl |
| | 16. | P |
| | 17. | P |
| ★★ | 18. | P |
| | 19. | P |
| | 20. | IE |
| | 21. | P |
| | 22. | P |
| | 23. | P |
| | 24. | IE |
| | 25. | P |
| | 26. | R |
| | 27. | P |
| | 28. | V |
| | 29. | Z |
| | 30. | P |
| | 31. | P |
| | 32. | P |
| | 33. | P |
| ★★ | 34. | P |
| | 35. | P |
| | 36. | P |
| | 37. | P |
| | 38. | P |
| ★★ | 39. | P |
| | 40. | P |
| | 41. | B |
| | 42. | P |
| | 43. | P |
| | 44. | V |
| ★★ | 45. | P |

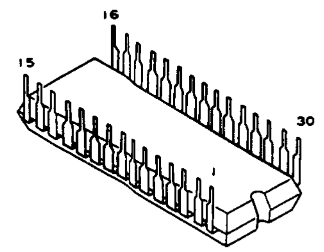


## Parts List of Mechanism Assembly

| Mark | No. | Part No. | Description |
|---|---|---|---|
| | 1. | PWY1004 | Pick-up assembly |
| | 2. | PBH1028 | Lever spring |
| | 3. | PBH1029 | Shaft spring |
| | 4. | PBH1030 | Float spring |
| | 5. | PBK1021 | Adjustment spring |
| | 6. | PBK1022 | Stopper spring |
| | 7. | PBM-015 | Plastic rivet |
| | 8. | PEB1035 | Stopper rubber |
| | 9. | PEB1036 | Damper rubber |
| | 10. | PEB1048 | Stopper rubber |
| | 11. | PLA1024 | Disc table |
| | 12. | PLA1025 | Adjustment lead ring |
| | 13. | PLA1026 | Guide bar |
| | 14. | PLA1027 | Shaft |
| | 15. | PLM1001 | Roller |
| | 16. | PNB1048 | Adjustment lever |
| | 17. | PNW1432 | Stopper |
| ★★ | 18. | PXM1005 | Spindle motor |
| | 19. | PBH1027 | Table spring |
| | 20. | IBZ30P080FCC | Screw |
| | 21. | PMZ26P060FCU | Screw |
| | 22. | PMZ30P080FCU | Screw |
| | 23. | PBA1021 | Float screw |
| | 24. | IBZ30P060FCC | Screw |
| | 25. | PBA1020 | Adjustment screw |
| | 26. | RNH-184 | Cord holder |
| | 27. | PBH1048 | Float spring (F) |
| | 28. | WT40D065D025 | Washer |
| | 29. | ZMD30H040FBT | Screw |
| | 30. | PYY1038 | Drive unit |
| | 31. | PYY1039 | Speed Det. unit |
| | 32. | PBH1025 | Wire spring |
| | 33. | PBL1001 | Wire unit |
| ★★ | 34. | PEB1037 | Belt |
| | 35. | PEB1076 | Stopper |
| | 36. | PLA1028 | Guide bar |
| | 37. | PNW1210 | Slider unit |
| | 38. | PNW1211 | Gear pulley |
| ★★ | 39. | PNW1213 | Pulley |
| | 40. | PNW1214 | L guide |
| | 41. | BBZ30P060FCC | Screw |
| | 42. | PMZ20P080FMC | Screw |
| | 43. | PMZ20P040FMC | Screw |
| | 44. | WT25D047D025 | Washer |
| ★★ | 45. | PYY-507 | Motor assembly (LOADING) |
| | 46. | PBP-001 | Steel ball ø4 |
| | 47. | PNB1049 | Yoke |
| | 48. | · · · | · · · |
| | 49. | PNW1220 | Worm |
| | 50. | PNW1221 | Worm wheel |
| | 51. | PNW1222 | Clamp drive plate |
| | 52. | PNW1223 | Clamp |
| | 53. | PNW1224 | Clamp cam |
| | 54. | PNW1225 | Clamper holder |
| ★★ | 55. | VSK-015 | Leaf switch |
| ★★ | 56. | PNW1212 | Drive pulley |
| | 57. | PBA-125 | Motor hold screw |
| | 58. | . . . | . . . |
| | 59. | PNW1219 | Slide guide |
| | 60. | PNW1208 | Clamper |
| ★★ | 61. | PXM-151 | Motor (CLAMP) |
| | 62. | PBH1026 | Slide cam spring |
| | 63. | PNW1215 | Tray |
| | 64. | PNW1216 | Disc plate |
| | 65. | PNW1217 | Slide cam |
| | 66. | PNW1218 | Connected lever unit |
| | 67. | PMZ26P030FCU | Screw |
| | 68. | PBA1024 | Screw |
| | 69. | PMZ30P160FCU | Screw |
| | 70. | PMZ30P350FCU | Screw |
| | 71. | WS30FMC | Washer |
| | 101. | | Mechanism chassis |
| | 102. | | Mechanism support |
| | 103. | | Slide base |
| | 104. | | Linear flexible |
| | 105. | | Carriage |
| | 106. | | Mechanism base unit |
| | 107. | | Motor holder |
| | 108. | | Clamp base |
| | 109. | | GND lead unit |
| | 110. | | Rubber cushion |
| | 111. | | Loading base |
| | 112. | | Holder |
| | 113. | | GND plate |
| | 114. | | Loading board assembly |
| | 115. | | Magnet (CLAMP MECHA.) |

## • ICs and Transistors

CXA1081S




CXA1082AS
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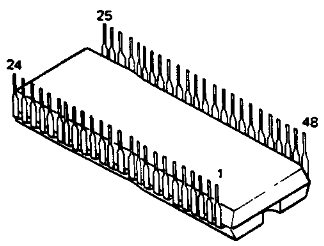
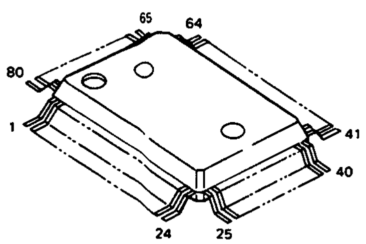
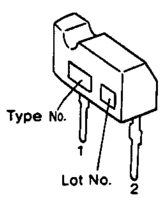


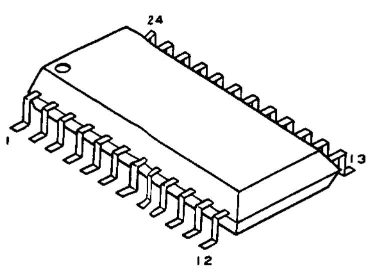

CXD1135QZ



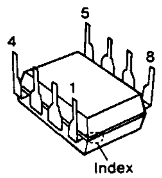

ICP-F10




LC3517AML-15




NJM072DE
NJM5532DD
NJM5534DD
M5238P

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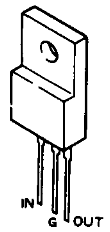


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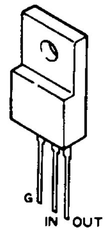
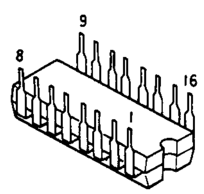
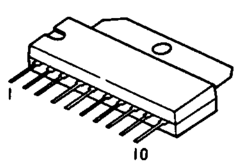
NJM79M12FA
NJM79M15FA



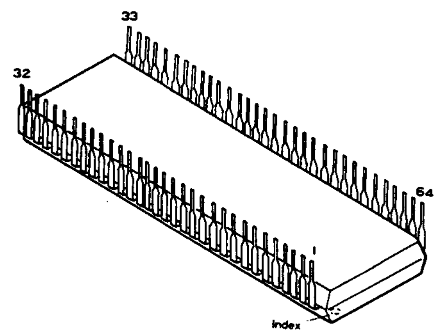

PD0026A




TA7256P




PD3094B

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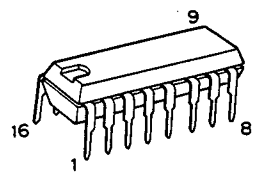
M5240PR

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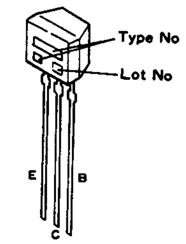
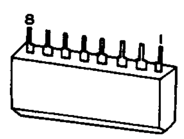
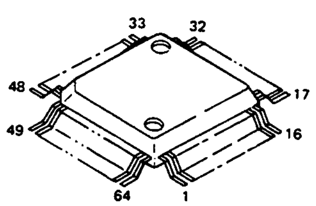
DTC124ES



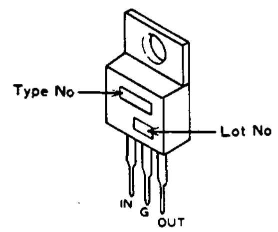

M5218L



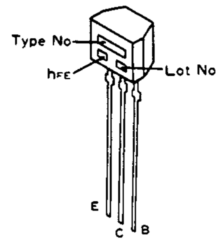

PDE023




NJM78M12A




2SA1048

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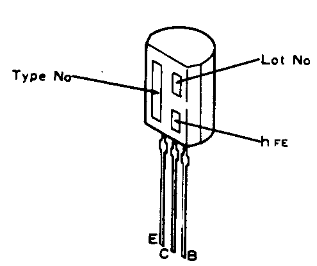
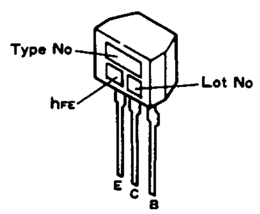
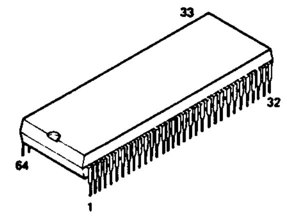
2SC3581



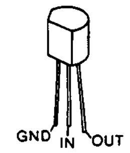

2SA933S
2SC1740S
2SC1740SLN



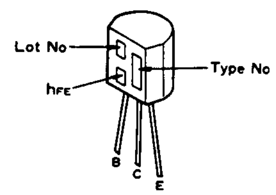

PDG010



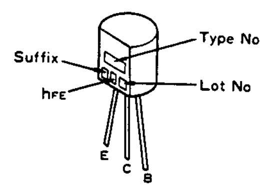

NJM79L12A



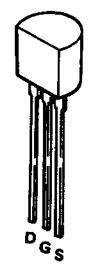

2SC2602



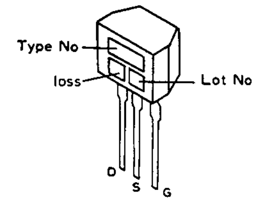

2SD1302



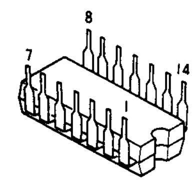

2SJ104
2SK364



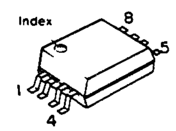

2SK241



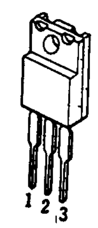

TC74HCU04P
TC74HC74P
TC74HC00P



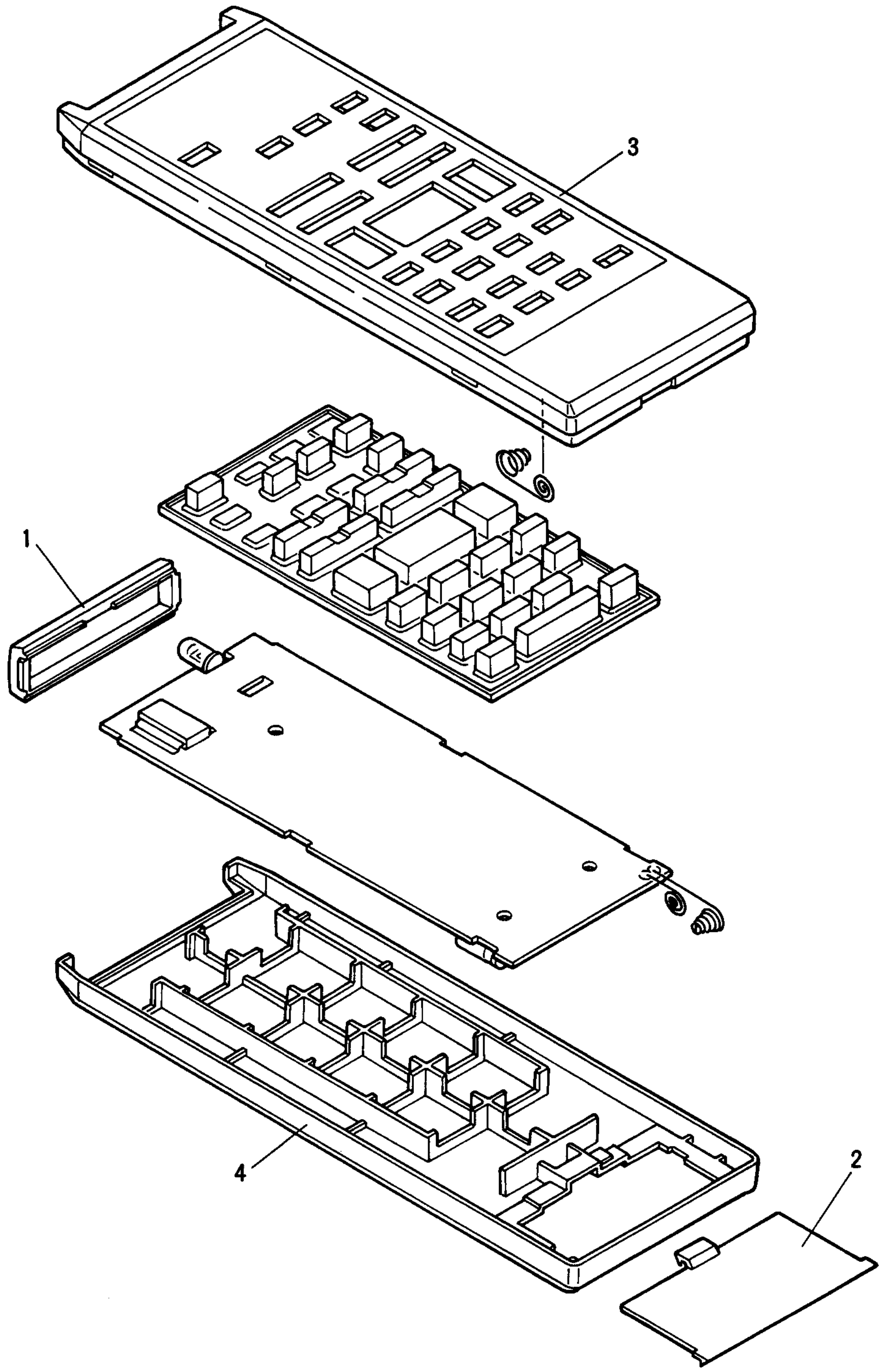

M5238PF




NJM78M15FA



## 5.4 REMOTE CONTROL UNIT

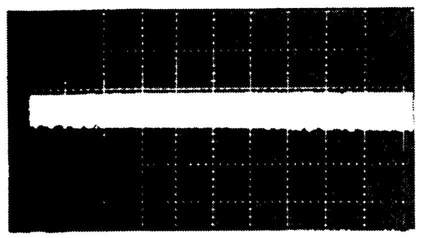



### Parts List of Remote Control Unit

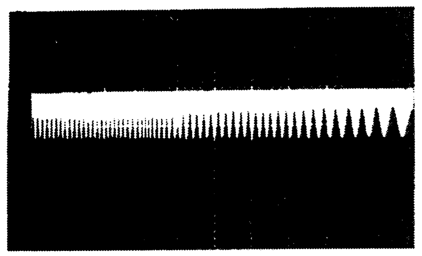
| Mark | No. | Part No. | Description |
|---|---|---|---|
| | 1. | PAM1071 | Filter |
| | 2. | PNW1153 | Battery cover |
| | 3. | PNW1278 | Case (T) |
| | 4. | PNW1279 | Case (B) |

• **Wave Forms**

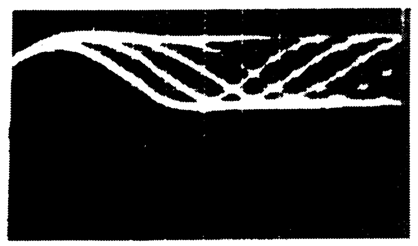
1 CN301-5 Pin : PLAY MODE
100mV/Div 5m sec/Div



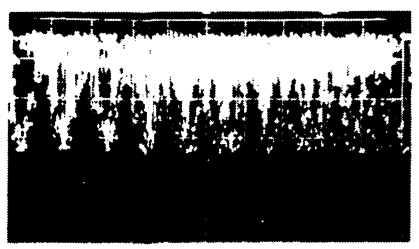
1 CN301-5 Pin : SEARCH MODE
100mV/Div 5m sec/Div



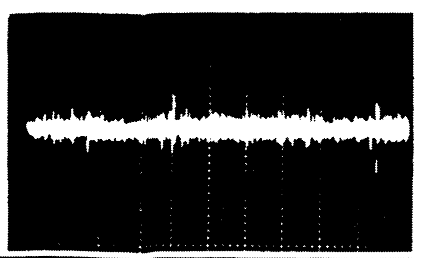
2 TP301-1 Pin : PLAY MODE
1V/Div 200n sec/Div



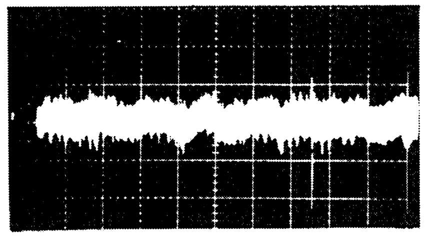
2 TP301-1 Pin : SEARCH MODE
500mV/Div 5m sec/Div



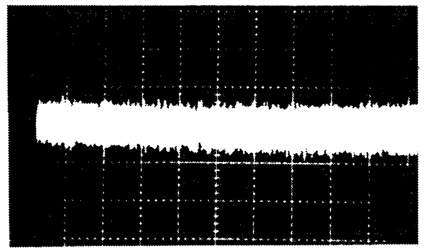
3 TP1-6 Pin: PLAY MODE
500mV/Div 10m sec/Div



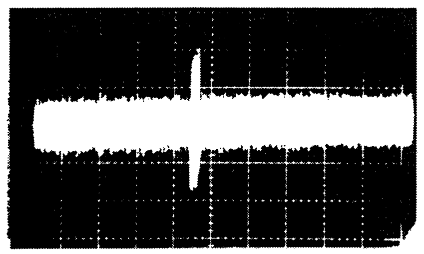
3 TP1-6 Pin: SEARCH MODE
500mV/Div 10mS/Div



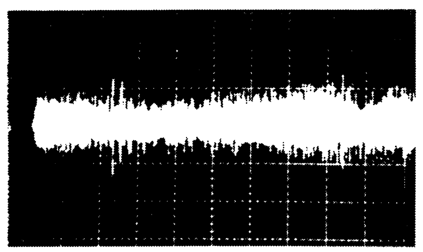
4 TP1-4 Pin: PLAY MODE
1V/Div 10mS/Div



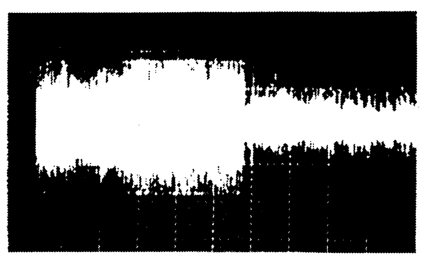
4 TP1-4 Pin: SEARCH MODE
1V/Div 10mS/Div



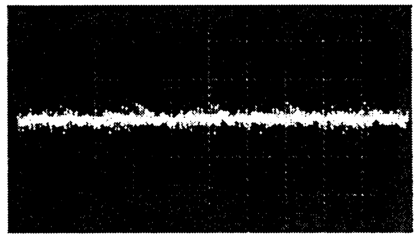
5 TP1-8 pin: PLAY MODE
200mV/Div 10mS/Div



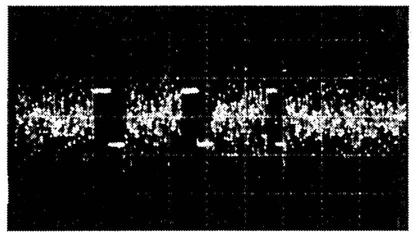
5 TP1-8 Pin : SEARCH MODE
200mV/Div 10mS/Div



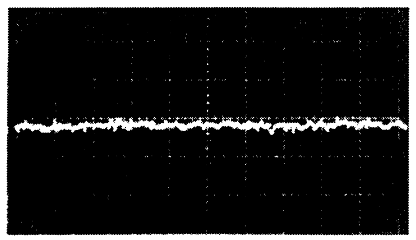
6 TP1-2 Pin : PLAY MODE
1V/Div 10mS/Div



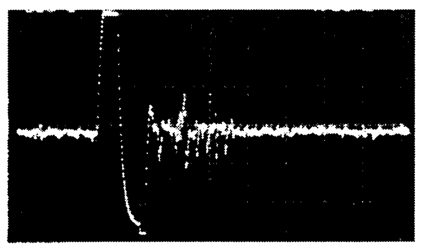
6 TP1-2 Pin : SEARCH MODE
1V/Div 10mS/Div



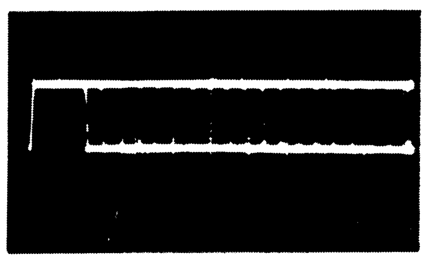
7 IC6-8 Pin : PLAY MODE
2V/Div 50mS/Div



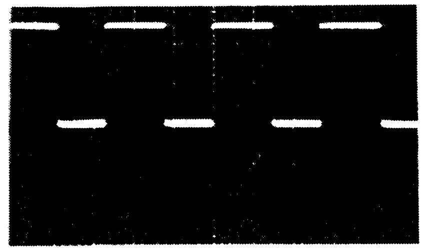
7 IC6-8 Pin : SEARCH MODE
2V/Div 100mS/Div



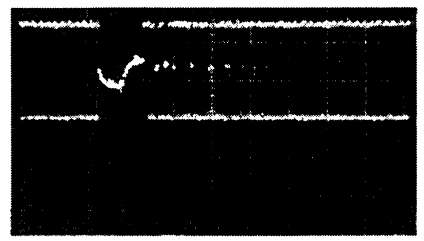
8 IC301 27 Pin: PLAY MODE
2V/Div 500n sec/Div



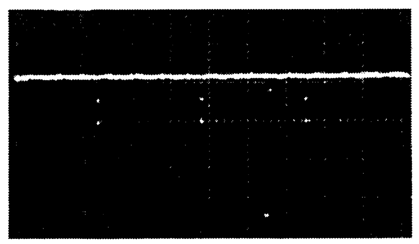
9 IC12-4: PLAY MODE
2V/Div 50µS/Div



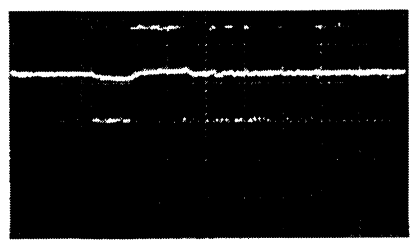
9 IC12-4 Pin : SEARCH MODE
2V/Div 100mS/Div



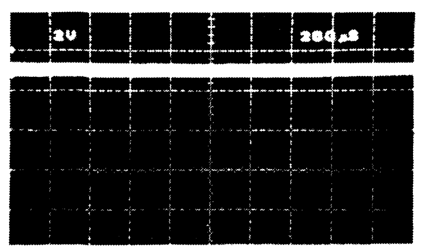
10 IC12-3 Pin : PLAY MODE
2V/Div 200µS/Div



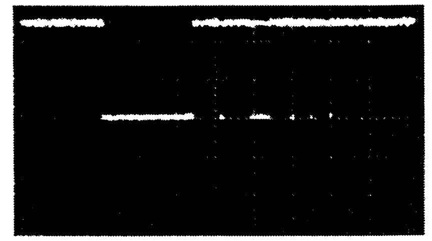
10 IC12-3 Pin : SEARCH MODE
2V/Div 50mS/Div



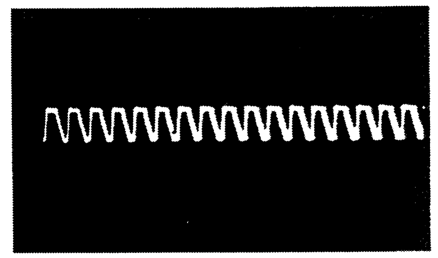
11 TP3-1: PLAY MODE
2V/Div 200µS/Div



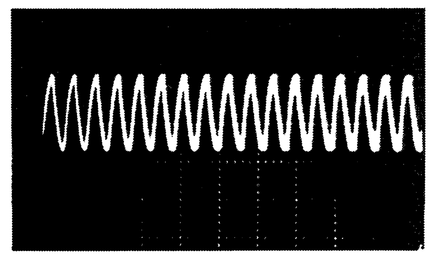
11 TP3-1 Pin : SEARCH MODE
2V/Div 50mS/Div



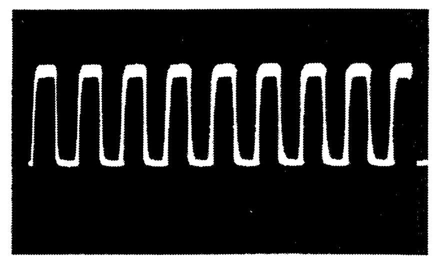
12 IC5-38: PLAY MODE
2V/Div 200µS/Div



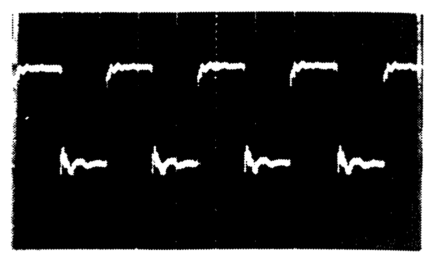
13 IC12-8: PLAY MODE
2V/Div 200µS/Div



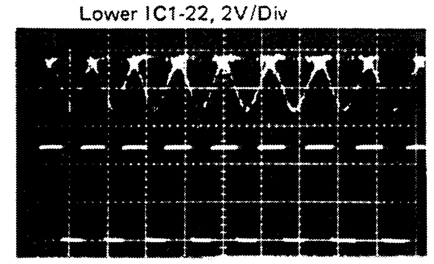
14 TP3-2: PLAY MODE
2V/Div 200µS/Div



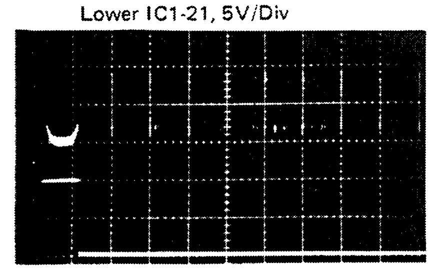
15 IC12-76: STOP MODE
2V/Div 200nS/Div



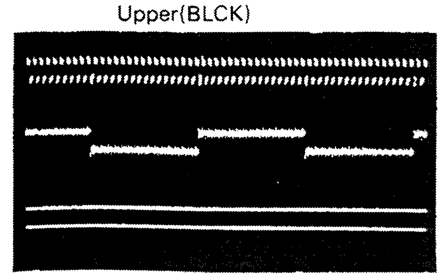
18 IC301-22: TR OPEN
1mS/Div
Upper TP1-1, 1V/Div
Lower IC1-22, 2V/Div



19 IC301-21: DFCT
1mS/Div
Upper TP1-1, 1V/Div
Lower IC1-21, 5V/Div



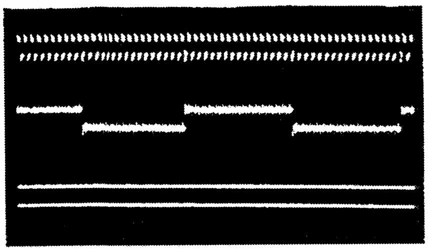
20 IC14-5: PLAY MODE
10V/Div 1µ/Div
Upper(BLCK)



㉑ IC14-6 : PLAY MODE

10V/Div 1μ/Div

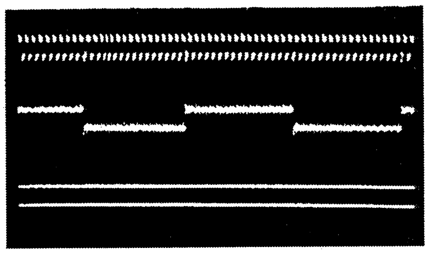
(LRCK)



㉒ IC14-7 : PLAY MODE

10V/Div 1μ/Div

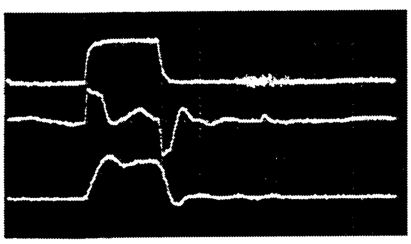
(DATA)



SEARCH MODE 50mS/Div

㉓ IC5-20 Pin 2V/Div
㉔ CN302-4 Pin 10V/Div
㉕ CN302-2 Pin 1V/Div

㉓
㉔
㉕

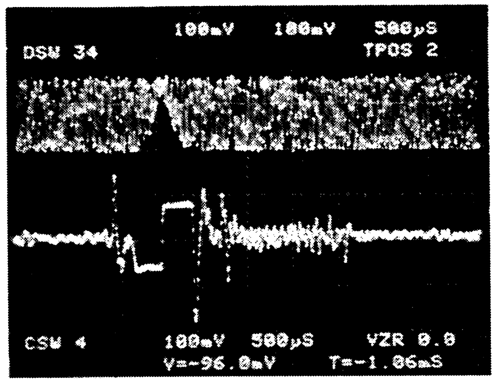


• Servo system

PAUSE MODE

② RF(TP301-1)

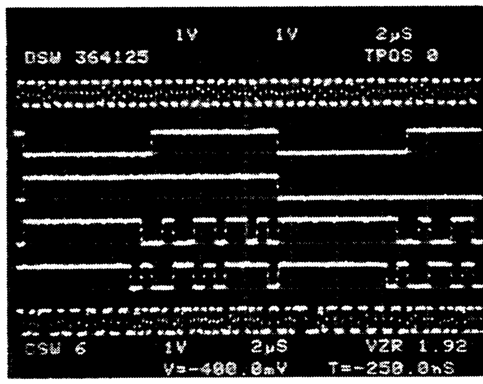
㉛ TR,RT(TP1-2)




1V/div
500μsec/div

PLAY MODE

⑮ BCLK(IC12-76)
㉞ WDCK(IC12-79)
㉟ LRCK(IC12-80)
㊱ DATA(IC12-78)
㊲ DOUT(IC11-4)
㊳ DOTX(IC12-27)

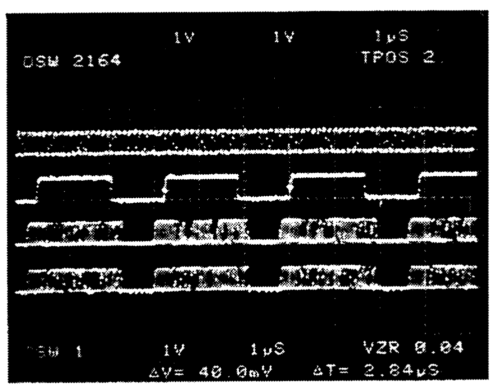



10V/div
2μsec/div

Unfixed

PLAY MODE

㊴ BCKI(IC14-12)
㊵ WCIN(IC14-11)
㊶ LDATA(IC14-9)
㊷ RDATA(IC14-10)




10V/div
1μsec/div

Unfixed

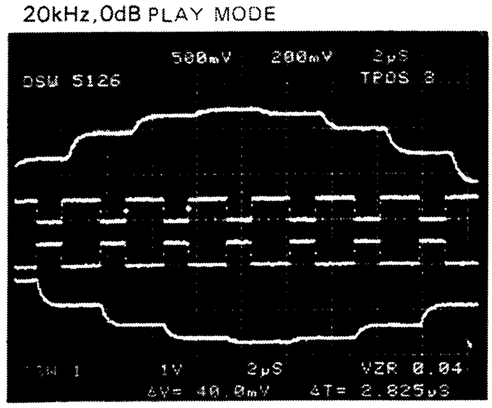
• Audio system 20kHz,0dB PLAY MODE

(51) Q501 > S
Q502

(52) D501 C

(53) D502 C

(54) Q506 > S
Q507

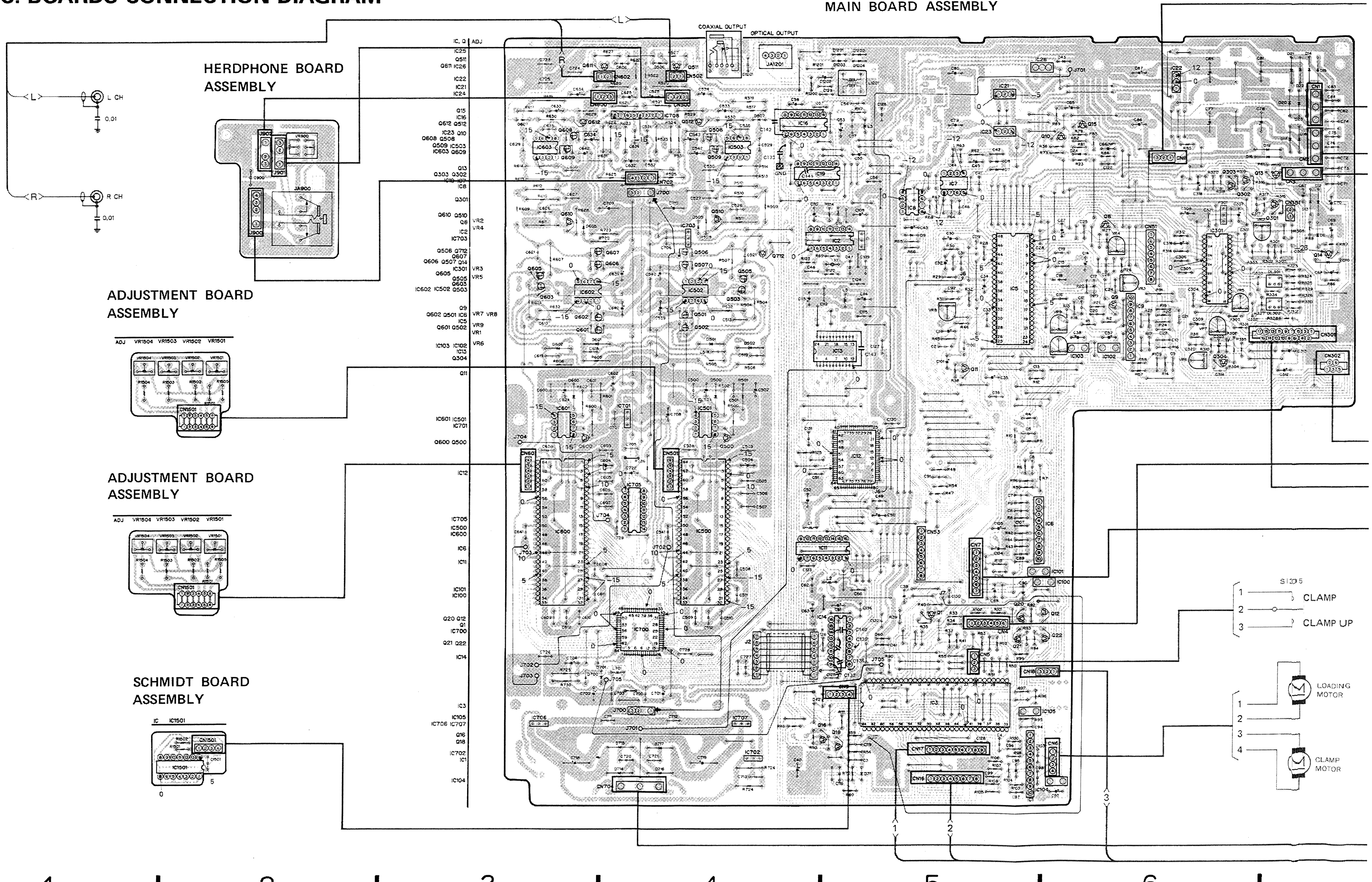


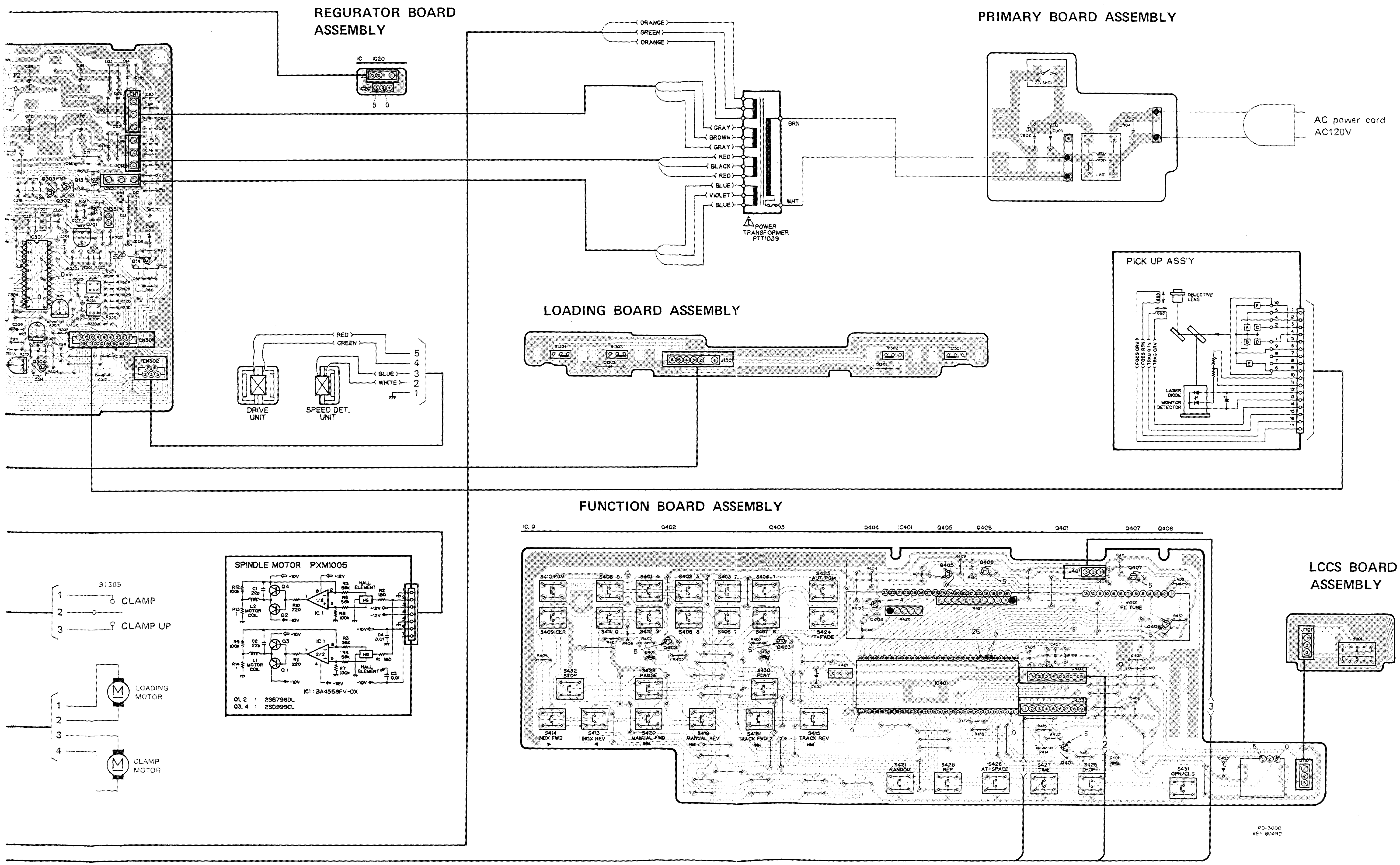

5V/div

10V/div

2V/div

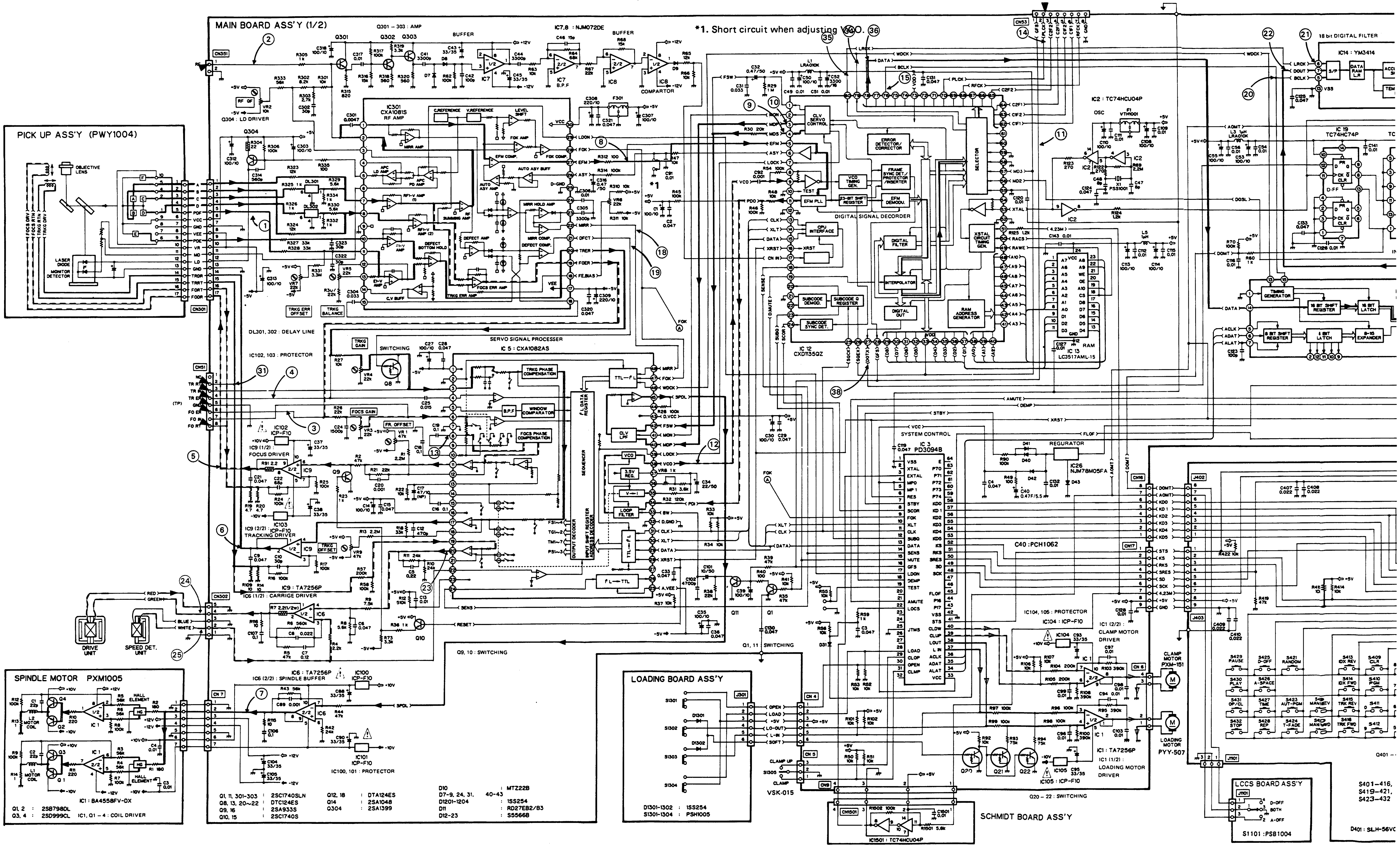
# 6. P.C. BOARDS CONNECTION DIAGRAM

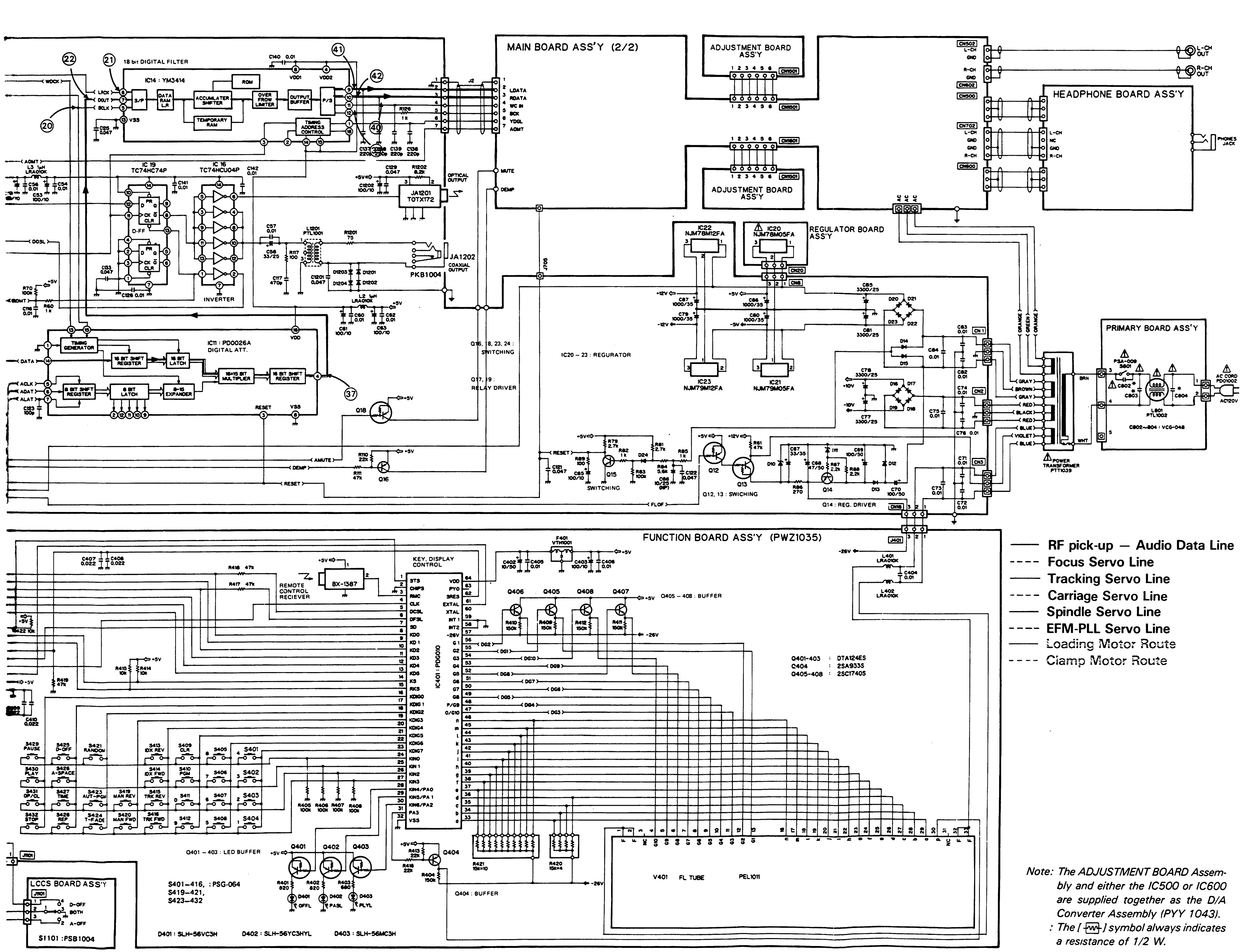




REGURATOR BOARD ASSEMBLY
PRIMARY BOARD ASSEMBLY
AC power cord
AC120V
POWER TRANSFORMER
PTT1039
ORANGE
GREEN
ORANGE
GRAY
BROWN
GRAY
RED
BLACK
RED
BLUE
VIOLET
BLUE
BRN
WHT
PICK UP ASS'Y
OBJECTIVE LENS
LASER DIODE
MONITOR DETECTOR
LOADING BOARD ASSEMBLY
RED
GREEN
BLUE
WHITE
DRIVE UNIT
SPEED DET. UNIT
FUNCTION BOARD ASSEMBLY
SPINDLE MOTOR PXM1005
IC1 : BA4558FV-DX
Q1, 2 : 2SB798DL
Q3, 4 : 2SD999CL
S1305
CLAMP
CLAMP UP
LOADING MOTOR
CLAMP MOTOR
LCCS BOARD ASSEMBLY
PD-3000 KEY BOARD

# 7. SCHEMATIC DIAGRAM






*Note: The ADJUSTMENT BOARD Assembly and either the IC500 or IC600 are supplied together as the D/A Converter Assembly (PYY 1043).*
*: The [-ww-] symbol always indicates a resistance of 1/2 W.*

**NOTE:**

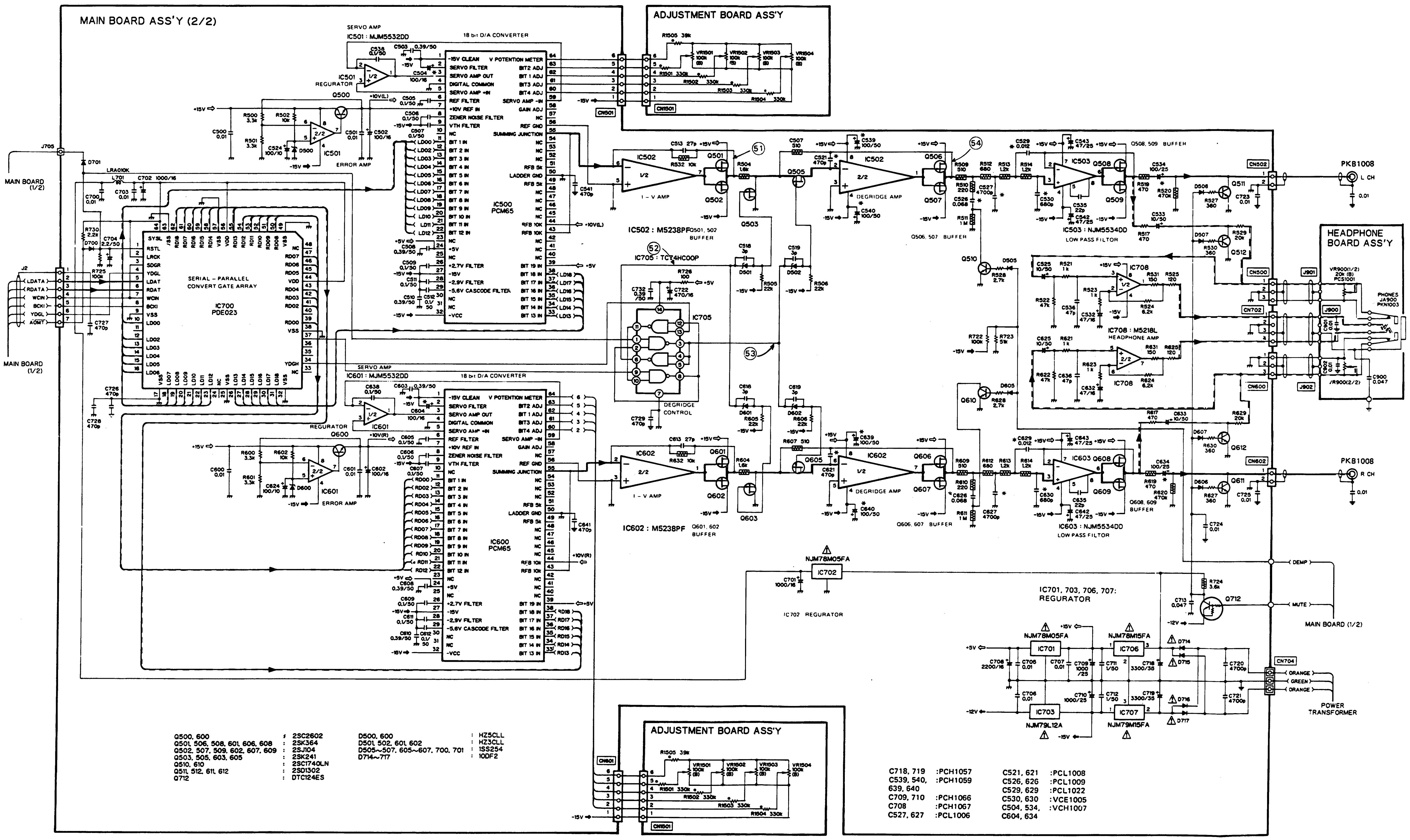
1. RESISTORS.
   Indicated in Ω, 1/4 W, 1/6 W, 1/8 W, ±5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F); ±1%, (G); ±2%, (K); ±10%, (M); ±20% tolerance
2. CAPACITORS:
   Indicated in capacity (μF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE
   ▭ ; DC voltage (V) at no input signal
4. OTHERS:
   ➡ ; Signal route.
   ⊘ ; Adjusting point.
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
   * marked capacitors and resistors have parts numbers.

   This is the basic schematic diagram, but the actual circuit may very due to improvements in design.
5. SWITCHES:
   FUNCTION BOARD ASSEMBLY
   S410-S412 : 1-10, PGM, CLEAR
   S413 : INDEX REV (⏮)
   S414 : INDEX FWD (⏭)
   S415 : TRACK REV (⏮)
   S416 : TRACK FWD (⏭)
   S419 : MANUAL REV (◀◀)
   S420 : MANUAL FWD (▶▶)
   S421 : RANDOM
   S423 : AUTO PGM EDIT
   S424 : TIME FADE EDIT
   S425 : DISPLAY OFF
   S426 : AUTO SPACE
   S427 : TIME
   S428 : REPEAT
   S429 : PAUSE ( ▯▯ )
   S430 : PLAY ( ▷ )
   S431 : OPEN/CLOSE
   S432 : STOP ( □ )
   PRIMARY BOARD ASSEMBLY
   S801 : POWER ON — <u>OFF</u>
   LCCS BOARD ASSEMBLY
   S1101 : OUTPUT ANALOGUE — <u>BOTH</u> — DIGITAL
   LOADING BOARD ASSEMBLY
   S1301, S1302, S1303, S1304
   : Loading position switch

| | OPEN | CLOSE |
|---|---|---|
| S1301 | ON | OFF |
| S1302 | ON | OFF |
| S1303 | OFF | ON |
| S1304 | OFF | ON |

OTHERS
S1305 : <u>CLAMP</u> — CLAMP UP

The underlined indicates the switch position.




—— Analog Audio Signal Line
---- Headphone Audio Signal Line
—— Serial Data Line
---- Parallel Data Line

# 8. ELECTRICAL PARTS LIST

*NOTES:*
- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  *★★ GENERALLY MOVES FASTER THAN ★*
  *This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.*
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*
  *Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).*
  *560Ω $56 \times 10^1$ 561........................RD1/4PS [5] [6] [1] J*
  *47kΩ $47 \times 10^3$ 473........................RD1/4PS [4] [7] [3] J*
  *0.5Ω 0R5........................................RN2H [0] [R] [5] K*
  *1Ω 010..........................................RS1P [0] [1] [0] K*

  *Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).*
  *5.62kΩ $562 \times 10^1$ 5621........................RN1/4SR [5] [6] [2] [1] F*

## Miscellaneous Parts

### P.C. BOARD ASSEMBLIES

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | Main board assembly | |
| | Primary board assembly | |
| | Regulator board assembly | |
| ◉ | Function board assembly | PWZ1035 |
| | Headphone board assembly | |
| | LCCS board assembly | |
| | Adjustment board assembly | |
| | Loading board assembly | |
| | Schmidt board assembly | |

### OTHERS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | Pick-up assembly | PWY1004 |
| | D/A converter assembly | PYY1043 |
| ⚠ | Strain relief | CM-22C |
| ⚠ | AC power cord | PDG1002 |
| ⚠ ★ | Power transformer (AC120V) | PTT1039 |
| ⚠ | Ceramic capacitor | CKDYF103Z50 |
| | 1P pin jack | PKB1008 |
| ★★ | Spindle motor | PXM1005 |
| ★★ | Motor assembly (LOADING) | PYY-507 |
| ★★ | Leaf switch (OPEN/CLAMP) | VSK-015 |
| ★★ | Motor assembly (CLAMP) | PXM-151 |

## Main Board Assembly

### SEMICONDUCTORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★★ | IC301 | CXA1081S |
| ★★ | IC5 | CXA1082AS |
| ★★ | IC12 | CXD1135QZ |
| ⚠ ★★ | IC100 – IC105 | ICP-F10 |
| ★★ | IC13 | LC3517AML-15 |
| ★★ | IC708 | M5218L |
| ★★ | IC502, IC602 | M5238PF |
| ★★ | IC7, IC8 | NJM072DE |
| ★★ | IC501, IC601 | NJM5532DD |
| ★★ | IC503, IC603 | NJM5534DD |
| ⚠ ★★ | IC26, IC701, IC702 | NJM78M05FA |
| ⚠ ★★ | IC22 | NJM78M12FA |
| ⚠ ★★ | IC706 | NJM78M15FA |
| ⚠ ★★ | IC703 | NJM79L12A |
| ⚠ ★★ | IC21 | NJM79M05FA |
| ⚠ ★★ | IC23 | NJM79M12FA |
| ⚠ ★★ | IC707 | NJM79M15FA |
| ★★ | IC700 | PDE023 |
| ★★ | IC11 | PD0026A |
| ★★ | IC3 | PD3094B |
| ★★ | IC1, IC6, IC9 | TA7256P |
| ★★ | IC2, IC16 | TC74HCU04P |
| ★★ | IC705 | TC74HC00P |
| ★★ | IC19 | TC74HC74P |
| ★★ | IC14 | YM3414 |
| ★★ | Q12, Q18 | DTA124ES |
| ★★ | Q8, Q13, Q20 – Q22, Q712 | DTC124ES |
| ⚠ ★★ | Q14 | 2SA1048 |
| ★★ | Q304 | 2SA1399 |
| ★★ | Q9, Q16 | 2SA933S |
| ★★ | Q510, Q610 | 2SC1740LN |
| ★★ | Q10, Q15 | 2SC1740S |
| ★★ | Q1, Q11, Q301 – Q303 | 2SC1740SLN |
| ★★ | Q500, Q600 | 2SC2602 |
| ★★ | Q511, Q512, Q611, Q612 | 2SD1302 |
| ★★ | Q502, Q507, Q509, Q602, Q607, Q609 | 2SJ104 |
| ★★ | Q503, Q505, Q603, Q605 | 2SK241 |
| ★★ | Q501, Q506, Q508, Q601, Q606, Q608 | 2SK364 |
| ★ | D501, D502, D601, D602 | HZ3CLL |
| ★ | D500, D600 | HZ5CLL |
| ★ | D10 | MTZ22B |
| ★ | D11 | RD27EB2 (RD27EB3) |
| ⚠ ★ | D12 – D23 | S5566B |
| ★ | D7 – D9, D24, D31, D40 – D43, D505 – D507, D605 – D607, D700, D701, D1201 – D1204 | 1SS254 |
| ⚠ ★ | D714 – D717 | 10DF2 |

### COILS AND FILTERS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | L1 – L3, L5, L701 (1μH) | LRA010K |
| | L1201 | PTL1001 |
| | F1, F301 3 terminal filter | VTH1001 |

### CAPACITORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | C47, C48 | CCCCH080D50 |
| | C10, C302, C322, C323 | CCCCH300J50 |
| | C42, C123 | CCCSL101J50 |
| | C46 | CCCSL150J50 |
| | C136 | CCCSL221J50 |
| | C117 | CCCSL471J50 |
| | C314 | CCCSL561J50 |
| | C22 | CCCSL680J50 |
| | C137 – C139 | CCDSL221J50 |
| | C66 | CEANP100M25 |
| | C17 | CEANP470M10 |
| | C32, C316 | CEASR47M50 |
| | C101 | CEAS100M50 |
| | C1, C14, C27, C30, C35, C39, C50, C53, C55, C61, C63, C65, C108, C110, C113, C114, C303, C307, C312, C313, C318, C1202 | CEAS101M10 |
| | C69 | CEAS101M50 |
| ⚠ | C70 | CEAS101M50 |
| | C34 | CEAS220M50 |
| | C308, C309 | CEAS221M10 |
| | C37, C38, C43, C45, C67, C88, C90, C93, C95, C104, C105 | CEAS330M35 |
| | C52 | CEAS332M16 |
| | C68 | CEAS470M50 |
| | C701, C702 | CENA102M16 |
| | C79, C80, C86, C87 | CENA102M35 |
| | C77, C78 | CENA332M25 |
| ⚠ | C81, 85 | CENA332M25 |
| | C542, C543, C642, C643 | CENA470M25 |
| | C525, C533, C625, C633 | CEYA100M50 |
| | C704 | CEYA2R2M50 |
| | C58 | CEYA330M25 |
| | C532, C632 | CEYA470M16 |
| | C524, C624 | CEZA101M10 |
| | C502, C602 | CEZA101M16 |
| | C722 | CEZA471M16 |
| | C57, C500, C501, C600, C601, C700, C703, C705 – C707, C723 – C725 | CFTXA103J50 |
| | C505 – C507, C509, C511, C512, C538, C605 – C607, C609, C611, C612, C638 | CFTXA104J50 |
| | C711, C712 | CFTXA105J50 |
| | C503, C508, C510, C603, C608, C610 | CFTXA394J50 |
| | C541, C641, C726 – C729 | CFTXA471J50 |
| | C713 | CFTXA473J50 |
| | C13, C49, C51, C54, C56, C60, C62, C71 – C73, C94, C96 – C99, C103, C109, C111, C112, C115, C116, C120, C126 – C128, C132 | CKCYF103Z50 |
| ⚠ | C74 – C76, C82 – C84 | CKCYF103Z50 |
| | C2 – C4, C9, C15, C21, C28, C29, C33, C36, C119, C121, C122, C124, C125, C129 – C131, C320, C321, C1201 | CKCYF473Z50 |
| | C140 – C143, C730 | CKDYF103Z50 |
| | C133 | CKDYF473Z50 |
| | C518, C519, C618, C619 | CMA030D500 |
| | C535, C635 | CMA220J500 |
| | C513, C613 | CMA270J500 |
| | C536, C636 | CMA470J500 |
| | C20, C89, C92 | CQMA102J50 |
| | C91, C306, C317 | CQMA103J50 |
| | C16, C18, C19, C106, C107 | CQMA104J50 |
| | C7 | CQMA124J50 |
| | C24 | CQMA152J50 |
| | C25 | CQMA153J50 |
| | C8 | CQMA223J50 |
| | C5 | CQMA224J50 |
| | C41, C44, C305 | CQMA332J50 |
| | C31, C304 | CQMA333J50 |
| | C12 | CQMA471J50 |
| | C102, C301 | CQMA472J50 |
| | C6 | CQMA473J50 |
| ⚠ | C720, C721 | CQSF472J125 |
| ⚠ | C718, C719 (3300μF/35V) | PCH1057 |
| | C539, C540, C639, C640 (100μF/50V) | PCH1059 |
| | C40 (0.47F/5.5V) | PCH1062 |
| | C709, C710 (1000μF/25V) | PCH1066 |
| | C708 (2200μF/16V) | PCH1067 |
| | C527, C627 (4700pF) | PCL1006 |
| | C521, C621 (470pF) | PCL1008 |
| | C526, C626 (68000pF) | PCL1009 |
| | C529, C629 (12000pF) | PCL1022 |
| | C530, C630 (680pF) | VCE1005 |
| | C504, C534, C604, C634 (10μF/25V) | VCH1007 |

## RESISTORS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ★ | VR2 | Semi-fixed (10kΩ) | VRTB6VS103 |
| ★ | VR3 – VR7 | Semi-fixed (2.2kΩ) | VRTB6VS223 |
| ★ | VR1, VR9 | Semi-fixed (47kΩ) | VRTB6VS473 |
| ★ | VR8 | Semi-fixed (1KΩ) | VRTS6VS102 |
| | R519, R619 | | RDM1/2P471J |
| | R504, R507, R532, R604, R607, R632 | | RDM1/2P□□□F |
| | R509 – R514, R520, R609 – R614, R620, R724, | | RDR1/2PM□□□J |
| | R500 – R502, R505, R506, R517, R521 – R525, R527 – R531, R600 – R602, R605, R606, R617, R621 – R625, R627 – R631, R722, R723, R725, R726, R730, R1201 | | RDR1/4PM□□□J |
| | R7, R91, R304 | | RD1/2PM□□□J |
| | R31 | | RN1/6PQ3601F |
| | | Other resistors | RD1/6PM□□□J |

## OTHERS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| | JA1202 | 1P pin jack (DIGITAL OUT (COAXIAL)) | PKB1004 |
| | JA1201 | Optical output unit (DIGITAL OUT (OPTICAL)) | TOTX172 |
| ★ | X1 | Crystal resonator (16.9344MHz) | PSS1001 |
| | DL301, D302 | Delay line (200msec) | PTF1009 (PTF1012) |

# Primary Board Assembly

## SWITCHES

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ⚠ ★★ | S801 | Power switch | PSA-009 |

## FILTER

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ⚠ | L801 | Line filter | PTL1002 |

## CAPACITORS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ⚠ | C802 – C804 | Ceramic capacitor (0.01μF/AC125V) | VCG-048 |

# Regulator Board Assembly

## SEMICONDUCTOR

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ⚠ ★★ | IC20 | NJM78M05A |

# Function Board Assembly (PWZ1035)

## SEMICONDUCTORS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ★★ | IC401 | | PDG010 |
| ★★ | Q401 – Q403 | | DTA124ES |
| ★★ | Q404 | | 2SA933S |
| ★★ | Q405 – Q408 | | 2SC1740S |
| ★ | D403 | LED | SLH-56MC3H |
| ★ | D401 | LED | SLH-56VC3H |
| ★ | D402 | LED | SLH-56YC3HYL |

## SWITCHES

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★★<br>★★ | S401 – S416, S419 – S421,<br>S423 – S432 Tact switch<br>(0 – 9, PGM, CLR, TRK. FWD, TRK. REV, IDX. FWD, IDX. REV, MAN. FWD, MAN. REV, T-FADE, AUT-PGM, RANDOM, REP., TIME, A-SPACE, D-OFF, PAUSE, PLAY, OP/CL, STOP) | PSG-064 |

## COILS AND FILTER

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| | L401, L402 | Coil (1μH) | LRA010K |
| | F401 | 3 terminal filter | VTH1001 |

## CAPACITORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | C402 | CEJA100M50 |
| | C403 | CEJA101M10 |
| | C404 – C406 | CKPUYF103Z25 |
| | C407 – C410 | CKPUYF223Z25 |

## RESISTORS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| | R421 | Resistor array (15kΩ x 10) | RA10S153J |
| | R420 | Resistor array (15kΩ x 4) | RA4S153J |
| | | Other resistors | RD1/6PM□□□J |

## OTHERS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ★ | V401 | Fluorescent tube | PEL1011 |
| | | Remote sensor unit | BX-1387 |

## Headphone Board Assembly

### CAPACITORS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| | C900 | | CKCYF473Z50 |
| | C901, C902 | | CKDYF103Z50 |

### RESISTORS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ★ | VR900 | Variable resistor (20kΩ) (PHONES LEVEL) | PCS1001 |

### OTHERS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| | JA900 | Headphone jack | PKN1003 |

## LCCS Board Assembly

### SWITCH

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ★★ | S1101 | Rotary switch (OUTPUT) | PSB1004 |

## Adjustment Board Assembly

### RESISTORS

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ★★ | VR1501 – VR1504 | Semi-fixed (100kΩ) | VRTS6HS104 |
| | | Other resistors | RD1/6PM□□□J |

## Roading Board Assembly

### SEMICONDUCTORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★ | D1301, D1302 | 1SS254 |

### SWITCHES

| Mark | Symbol & Description | | Part No. |
|---|---|---|---|
| ★★ | S1301 – S1304 | Slide switch (DISC POSITION) | PSH1005 |

## D/A Converter Assembly (PYY1043)

This assembly includes either the IC500 or IC600 D/A Converter IC and Adjustment Board Assembly.

*Note) The VR on the Adjustment Board Assembly has been set at the factory. Under no circumstances attempt to re-adjust it.*

## Schmidt Board Assembly

### SEMICONDUCTOR

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★★ | IC1501 | TC74HCU04P |

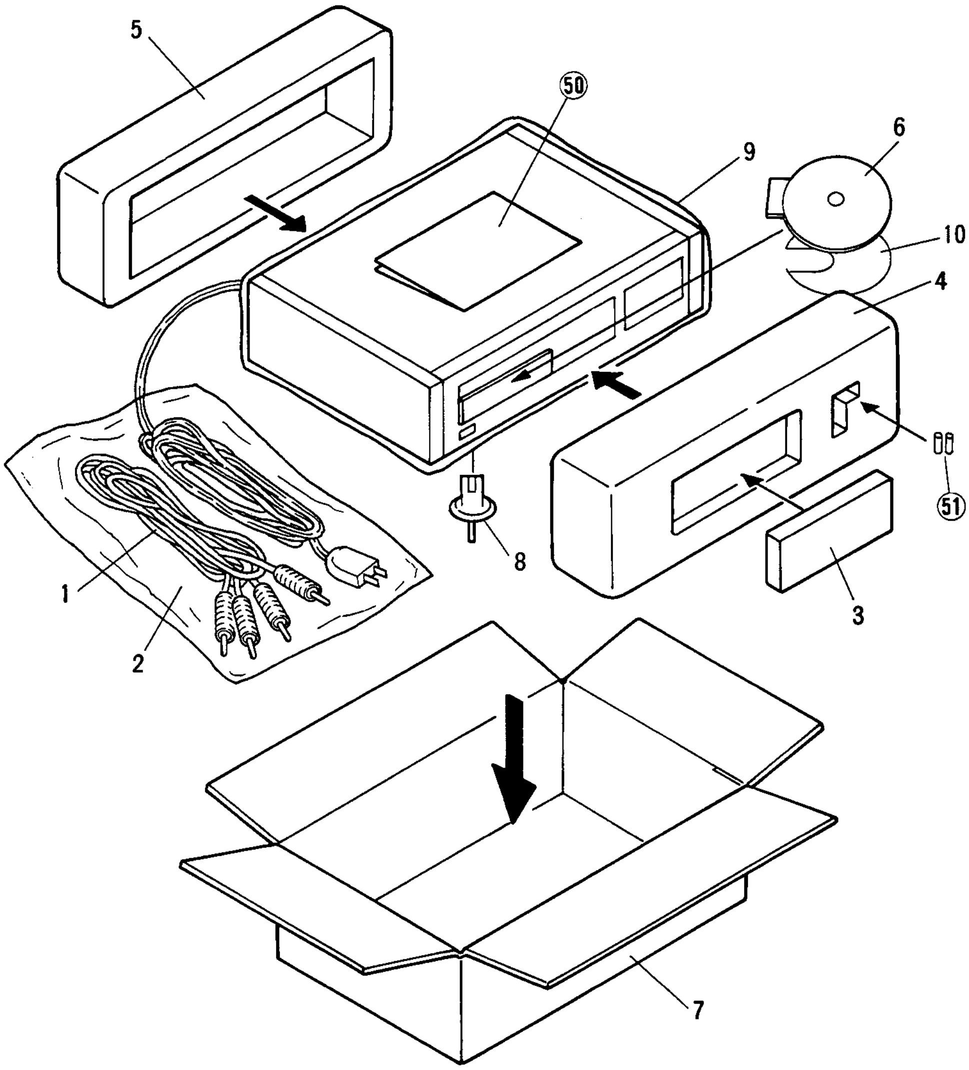
### CAPACITOR

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | C1501 | CKCYF103Z50 |

### RESISTORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | All resistors | RD1/6PM□□□J |

# 9. PACKING




## Parts List of Packing

| Mark | No. | Part No. | Description |
|---|---|---|---|
| | 1. | PDE1003 | Audio cord |
| | 2. | Z21-013 | Polyethylene bag |
| | 3. | PWW1017 | Remote control unit |
| | 4. | PHA1040 | Protector (F) |
| | 5. | PHA1041 | Protector (R) |
| | 6. | PHC1018 | Spacer (IN TRAY) |
| | 7. | PHG1152 | Packing case |
| | 8. | PNW1236 | Clamp knob |
| | 9. | PHL1003 | Sheet |
| | 10. | PHC1022 | Sheet |
| | 50. | | Operating instructions (English) |
| | 51. | | Battery UM-4 |

# 10. ADJUSTMENTS

A full list of adjustments is given below. Perform adjustments in the order in which they are given on the list.

## ● List of Adjustments

1. Tracking offset, focus offset and RF offset adjustments
2. Tracking return offset and focus return offset adjustments
3. LD (laser pick-up) power check
4. Focus lock, spindle lock checks
5. Grating adjustment
6. Tracking balance adjustment
7. Tangential adjustment
8. Radial adjustment
9. RF level check
10. Focus gain adjustment
11. Tracking gain adjustment
12. VCO Free run frequency adjustment
13. Focus Error Check

## ● Measurement Devices Required

1. Dual trace oscilloscope
2. Optical power meter
3. Test disc (YEDS7)
4. Focus and tracking adjustment filters
5. Loop gain adjustment bandpass filter
6. Signal generator
7. Grating driver
8. Other regular measuring equipment

## ● The Test Mode

Adjustments are to be made while the unit is in the Test Mode.

**How to Get In and Out of the Test Mode**

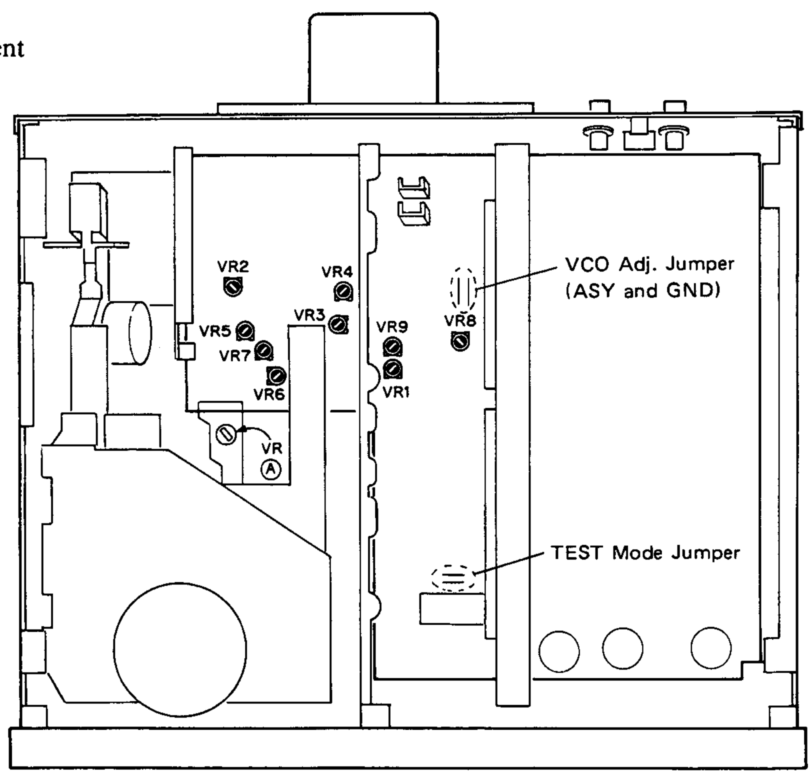
① With the Test Mode jumper short-circuited, turn the POWER SW to ON.
② Activating either MANUAL SEARCH FWD [ ►► ] or REV [ ◄◄ ] will then put the unit into the Test Mode.
③ To exit the Test Mode turn the POWER SW to OFF.

In the Test Mode the CD player operating keys will have the functions designated in Table 10-1.

## ● Names of Adjustment VRs

VR1 : Focus return offset (FR. OF)
VR2 : RF offset (RF. OF)
VR3 : Focus gain (FO. GA)
VR4 : Tracking gain (TR. GA)
VR5 : Tracking balance (TR. BL)
VR6 : Focus offset (FO. OF)
VR7 : Tracking offset (TE. OF)
VR8 : VCO frequency (VCOA)
VR9 : Tracking return offset (TR. OF)

*Note) The VR on the Adjustment Board Assembly has been set at the factory. Under no circumstances attempt to re-adjust it.*

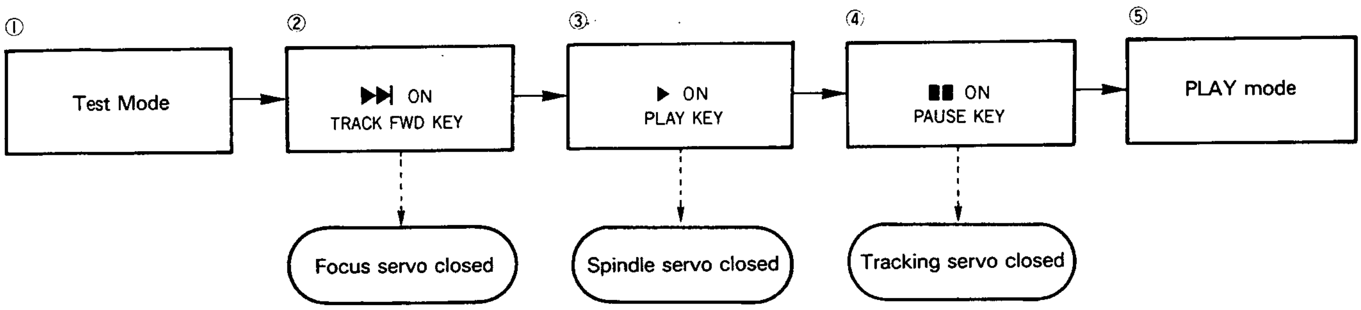



Location of Adjustment Screws

In the Test Mode each servo can be independently opened and closed. Consequently, to return to normal PLAY mode, each servo has to be closed in the right order (serial sequence) before PLAY mode can be reset.

Remember that once you are in the Test Mode, simply pressing the PAUSE key [ ❚❚ ] will not put the unit back into PLAY mode.

For instance, in order to go from STOP to PLAY mode:




* The servos are to be operated in serial sequence when in the Test Mode.

## ● Control Key Functions When CD Player is in Test Mode

| Symbol | Key Name | Test Mode Function | Explanation |
|---|---|---|---|
| \|◀◀ | TRACK BACK | Turns laser diode on | The laser diode will light up. |
| ▶▶\| | TRACK FWD | Focus servo closed | The laser diode will light up, the focus actuator is moved UP/DOWN and the focus servo is closed. |
| ▶ | PLAY | Spindle servo closed | After the spindle motor starts turning, the servo is closed in the CLV-H mode. |
| ❚❚ | PAUSE | Tracking servo closed/open | Operates as a toggle switch. When pressed once the tracking servo is closed and the unit goes into PLAY mode. However, since the focus and spindle servos are closed, the PAUSE indicator will light up. When pressed a second time the tracking servo is opened. |
| ◀◀ | MANUAL SERCH REV | Carriage reverse (from outer to inner tracks) | Rapidly moves the carriage towards the innermost disc tracks at a speed of 1 cm/sec. There is no automatic carriage STOP when the carriage reaches the innermost track so be careful not to move the carriage too far. |
| ▶▶ | MANUAL SERCH FWD | Carriage forward (from inner to outer tracks) | Rapidly moves the carriage toward the outer disc tracks at a speed of 1 cm/sec. There is no automatic carriage STOP when the carriage reaches the outermost track, so be careful not to move the carriage too far. |
| ▭ | REPEAT | Lens moved UP/DOWN | The laser diode lights up, the focus actuator is moved UP/DOWN, but the focus servo is not closed. |
| ■ | STOP | Stop | All servos are stopped and reset to initial status. |
| ⏏ | OPEN/CLOSE | Disc tray opened/closed | Opens and closes disc tray. However, the pick-up does not return to rest position when the tray is open. Closing the tray has no effect on the pick-up either. |

Table 10-1

| Step No. | Oscilloscope Range | | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| **1** | **TRACKING OFFSET, FOCUS OFFSET AND RF OFFSET ADJUJSTMENTS** | | | | | |
| | | | | | | • Set the CD player to Test Mode. (Refer to page 44) |
| | | | TP1 Pin4 (TR.ER) | VR7 (TE.OF) | 0V ± 50mV | • Adjust VR7 (TE.OF : Tracking Error Offset) so that TP1 Pin 4 (TE : Tracking Error) registers a voltage of 0V ± 50mV. |
| | | | TP1 Pin6 (FO.ER) | VR6 (FO.OF) | 0V ± 50mV | • Adjust VR6 (FO.OF : Focus Error Offset) so that TP1 Pin 6 (FO.ER : Focus Error) registers a voltage of 0V ± 50mV. |
| | | | TP301 Pin1 (RF) | VR2 (RF.OF) | 100mV ± 50mV | • Adjust VR2 (RF.OF : RF Offset) so that TP301 Pin 1 RF output voltage registers 100mV ± 50mV. |
| **2** | **TRACKING RETURN OFFSET AND FOCUS RETURN OFFSET ADJUSTMENTS** | | | | | |
| | | | | | | • Set the CD player to Test Mode. (Refer to page 44) |
| | | | TP1 Pin2 (TR.RT) | VR9 (TR.OF) | $0V^{+20}_{-10}$ mV | • Adjust VR9 TR.OF (Tracking Return Offset) so that TP1 Pin 2 TR.RT (Tracking Return) registers a voltage of $0V^{+20}_{-10}$ mV. |
| | | | TP1 Pin8 (FO.RT) | VR1 (FR.OF) | 35mV ± 17.5mV | • Adjust VR1 FR.OF (Focus Return Offset) so that TP1 Pin 8 FO.RT (Focus Return) registers a voltage of 35mV ± 17.5mV. |
| **3** | **LD (LASER DIODE) POWER CHECK** | | | | | |
| | | | | | | • Set the CD player to Test Mode. (Refer to page 44)<br>• Press the TRACK BACK key (⏮) to turn the LD (laser diode) ON.<br>• Place the optical power meter sensor directly above the objective lens and verify that LD power is at its proper specification level: 0.13mW ± 0.10mW. |
| | | | | VR Ⓐ | Standard Specification: Under 0.13mW | • If LD power is not at its proper specification level, adjust the VR for LD power control, VR Ⓐ . |

<table>
<tr><th rowspan="2">Step No.</th><th colspan="2">Oscilloscope Range</th><th rowspan="2">Test Point</th><th rowspan="2">Adjustment Point</th><th rowspan="2">Verification Item/Adjustment Specification</th><th rowspan="2">Adjustment Operation Sequence</th></tr>
<tr><th>V</th><th>H</th></tr>
<tr><td>4</td><td colspan="6">FOCUS LOCK AND SPINDLE LOCK CHECK</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>• Load the test disc into the player.<br>• Set the CD Player to Test Mode. (Refer to page 44)<br>• Use the MANUAL SEARCH FWD key [ ▶▶] to move the pick-up to the center of the disc.<br>This operation must be performed!</td></tr>
<tr><td></td><td>V<br>0.5/div</td><td>H<br>100msec<br>/div</td><td>TP301<br>Pin1<br>(RF<br>Output)</td><td></td><td>RF output generated<br><br>Normal rotation</td><td>• Observe RF output from TP301 Pin 1 RF with an oscilloscope. Then, after pressing the TRACK FWD key [▶▶|], verify whether or not an RF signal is being output.<br>• Press the PLAY key and verify that the disc is rotating clockwise and at normal speed (disc rotational speed near the center is about 300 RPMs).</td></tr>
</table>

| Step No. | Oscilloscope Range V | Oscilloscope Range H | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| **5-1** | **GRATING ADJUSTMENT (1) (WITH $\phi$80 DISC)** | | | | | |
| | | | | | | • Load the test disc into the player. ($\phi$80)<br>• Set the CD player to Test Mode. (Refer to page 44.)<br>• Press the TRACK FWD key [▶▶\|] and then the PLAY key [▶] in that order to close the focus and spindle servos. (The tracking servo is left open.)<br>• Use the MANUAL SEARCH FWD KEY [▶ ▶] to move the pick-up to the outermost circumference of the $\phi$80 disc. By moving the pick-up to this position, the Grating Adjustment Screw becomes accessible with a screwdriver from above. (See Fig. 10-3) |
| | 1V/div | 5ms/div | TP1<br>Pin4<br>(TR.ER) | Grating | Null point | • Observe the waveform output by TP1 Pin 4 TR.ER (Tracking Error) in the oscilloscope. Insert a low pass filter with a cutoff of 4kHz. (See Fig. 10-2.)<br>• Use a screwdriver to rotate the Grating Adjustment Screw until you find the null point waveform like that shown in Photograph 10-1. |

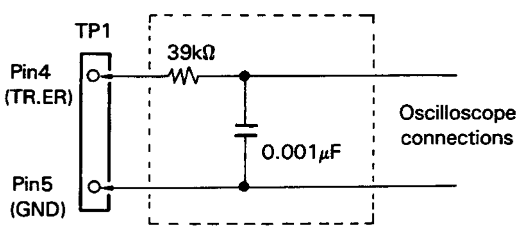
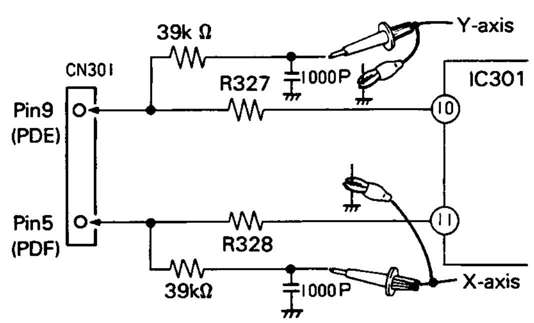



Fig. 10-2

| Step No. | Oscilloscope Range V | Oscilloscope Range H | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| | | | | Grating | Maximum amplitude | • Next, turn the screwdriver slowly clockwise from the null point until the first point where maximum amplitude of the waveform (tracking error signal) is reached. (See Photograph 10-3.) |
| | 5mV/div | YX | X-axis<br>R328<br>Y-axis<br>R327 | Grating | Phase difference 180° | • Connect the X-axis of the oscilloscope to the CN301 (PDF) side of R328, the Y-axis to the CN301 (PDE) side of R327, and insert a low pass filter with a cutoff of 4kHz. Move the pick-up to the outermost track of the $\phi$80 disc.<br>The Lissajous figure should be more or less a single line. If it is not, adjust the grating until the Lissajous figure is a single line. (See Photographs 10-4,5.) |



| Step No. | Oscilloscope Range V | Oscilloscope Range H | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| **5-2** | **GRATING ADJUSTMENT (2) (WITH A DISC OF OVER 60 MIN. PLAYING TIME)** | | | | | |
| | | | | | | • Load the test disc into the player.<br>• Set the CD player to Test Mode. (Refer to page 44.)<br>• Press the TRACK FWD key [▶▶|] and then the PLAY key [▶] in that order to close the focus and spindle servos. (The tracking servo is left open.)<br>• Use the MANUAL SEARCH FWD KEY [▶ ▶] to move the pick-up to the outermost track of the test disc. By moving the pick-up to this position, the Grating Adjustment Screw becomes accessible with a screwdriver from above. (See Fig. 10-3) |
| | 1V/div | 5ms/div | TP1 Pin4 (TR.ER) | Grating | Null point | • Observe the waveform output by TP1 Pin 4 TR.ER (Tracking Error) in the oscilloscope. Insert a low pass filter with a cutoff of 4kHz. (See Fig. 10-2.)<br>• Use a screwdriver to rotate the Grating Adjustment Screw until you find the null point waveform like that shown in Photograph 10-1. |

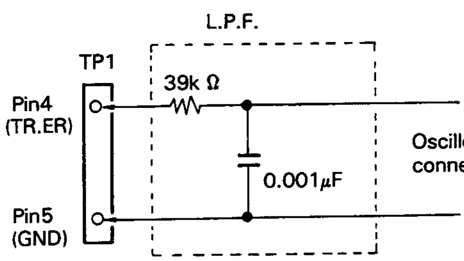



Fig. 10-2

| Step No. | Oscilloscope Range V | Oscilloscope Range H | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| | | | | Grating | Maximum amplitude | • Next, turn the screwdriver slowly clockwise from the null point until the first point where maximum amplitude of the waveform (tracking error signal) is reached. (See Photograph 10-3.) |
| | 5mV/div | 5ms/div | X-axis R328<br>Y-axis R327 | Grating | Phase difference 0° | • Connect the X-axis of the oscilloscope to the CN301 (PDF) side of R328, the Y-axis to the CN301 (PDE) side of R327, apply the signal in AC-coupled mode and move the pick-up to the center of the disc. The Lissajous figure at this time should be more or less a single line. If it is not, move the pick-up back to the outermost circumference and adjust the grating until the Lissajous figure is a single line. (See Photographs 10-4,5.) |

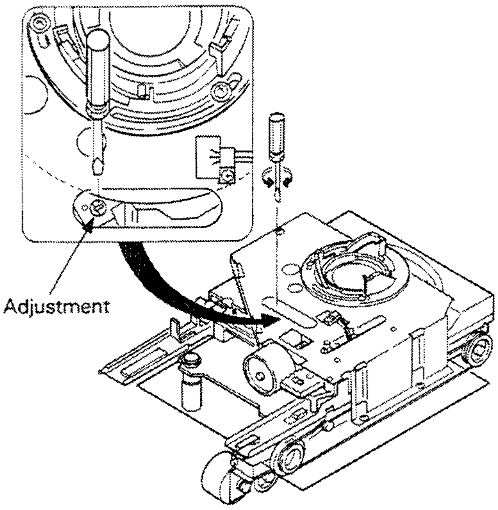
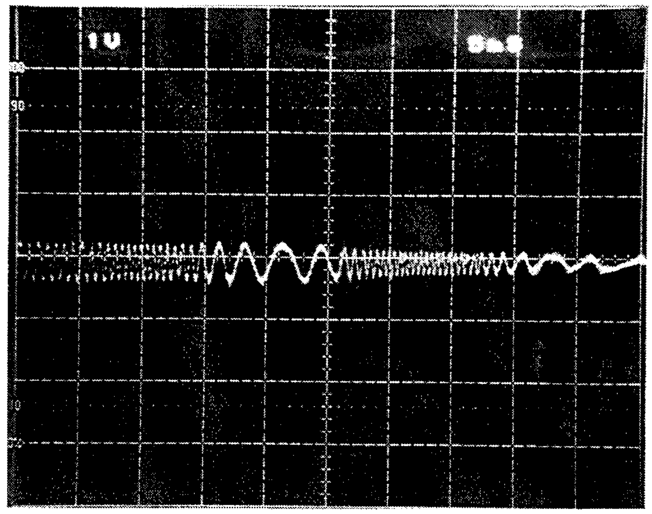
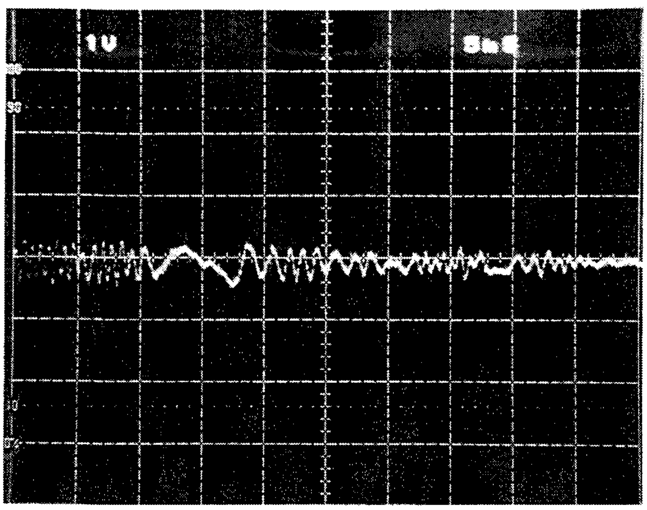


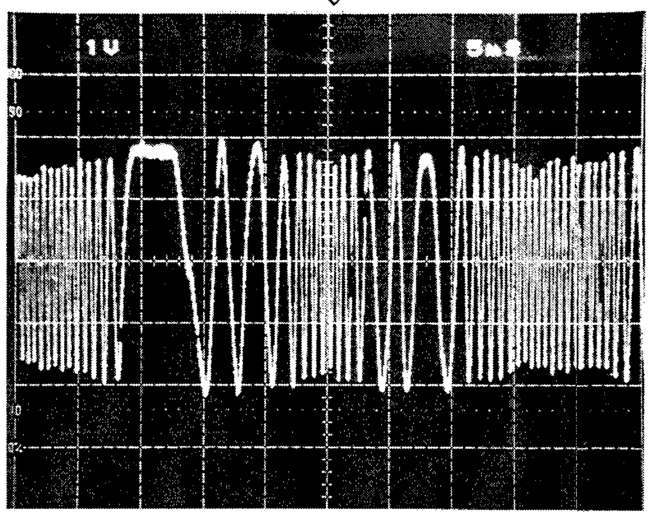

Fig. 10-3 Grating Adjustment



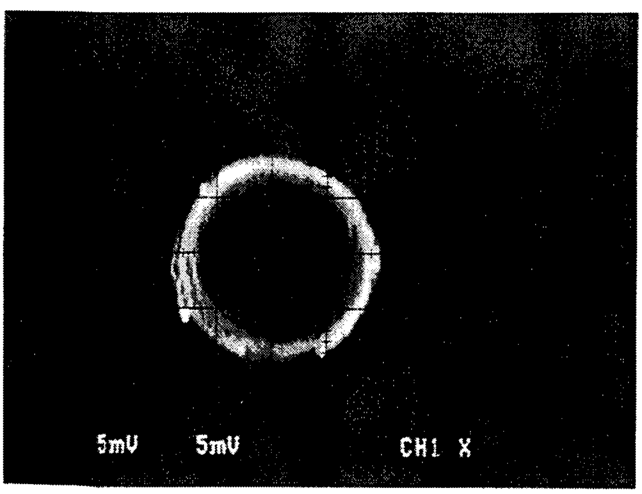

Photograph 10-1 Null Point waveform



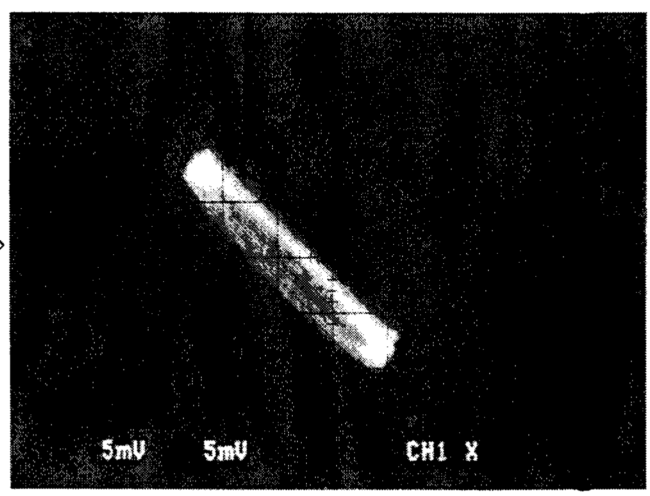

Photograph 10-2 Waveform off Null Point




Photograph 10-3 Maximum Amplitude

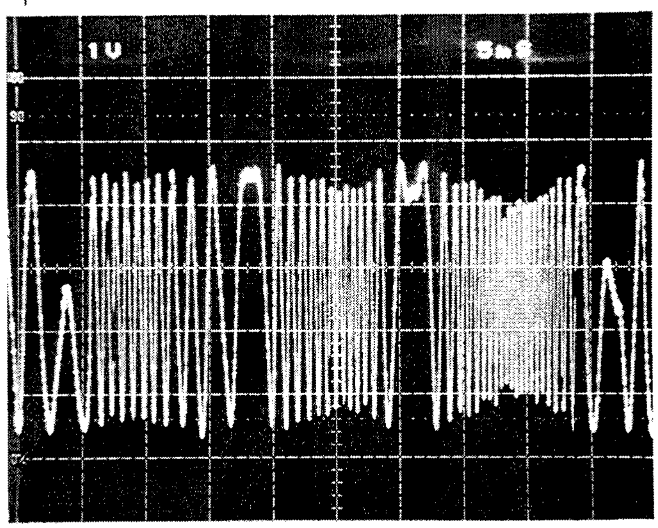



Photograph 10-4

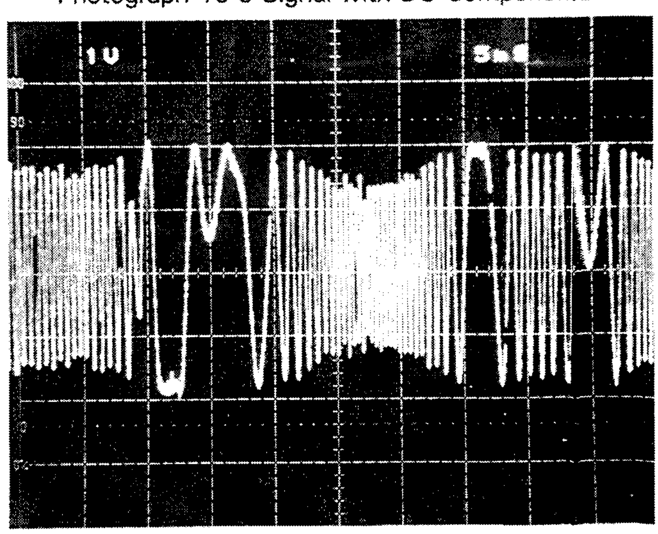



Photograph 10-5

| Step No. | Oscilloscope Range | | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| 6 | TRACKING BALANCE ADJUSTMENT | | | | | |
| | 0.5V/div | 5msec /div | TP1 Pin4 (TR.ER) | VR5 (TR.BL) | | • Load the test disc into the player.<br>• Set the CD player to Test Mode. (Refer to page 44.)<br>• Use the MANUAL SEARCH FWD key [ ▶▶ ] to move the pick-up to the center of the disc.<br>• Press the TRACK FWD key [ ▶▶\| ], then the PLAY key [ ▶ ] to start disc rotation.<br>• Observe the waveform output by TP1 Pin 4 TR.ER (Tracking Error) in the oscilloscope. Adjust VR5 TR.BL (Tracking Balance) so that all DC components are eliminated from the signal. |



Photograph 10-6 Signal with DC Components



Photograph 10-7 Signal without DC Components

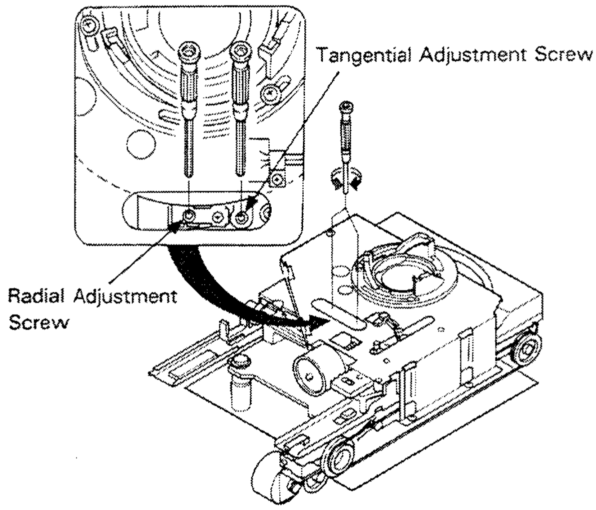
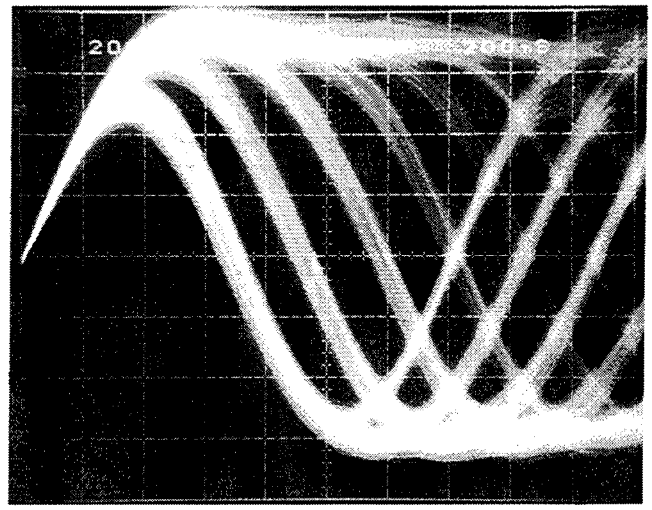
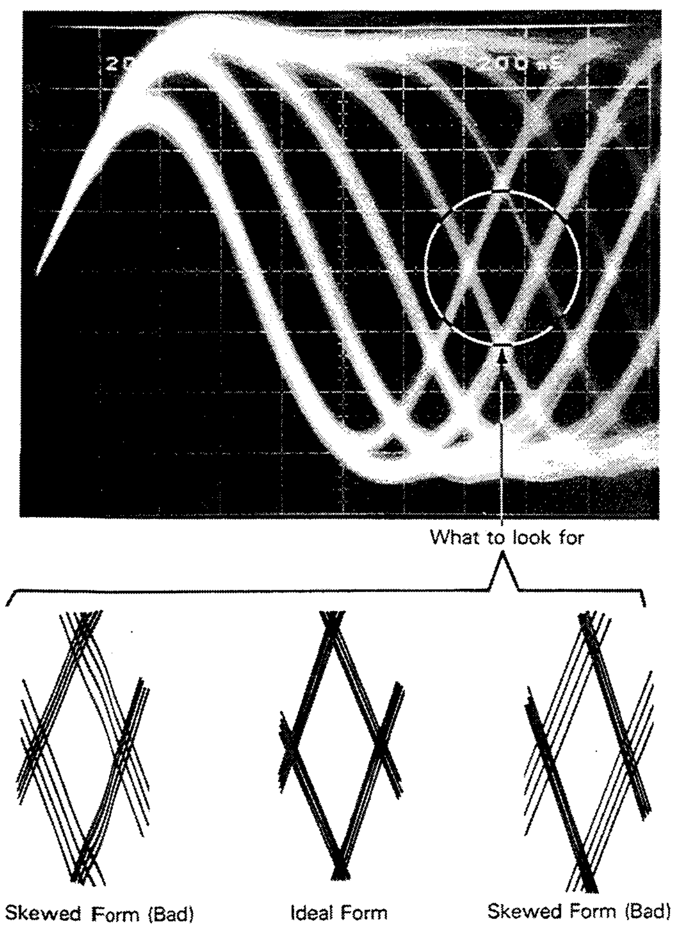


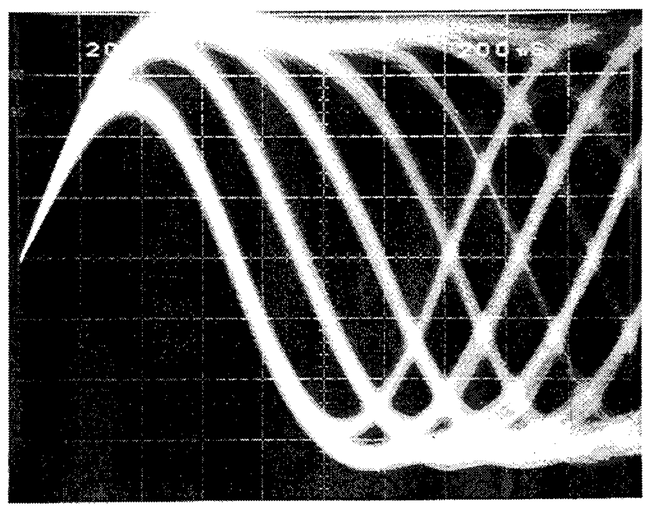

Fig. 10-5 Tangential Adjustment



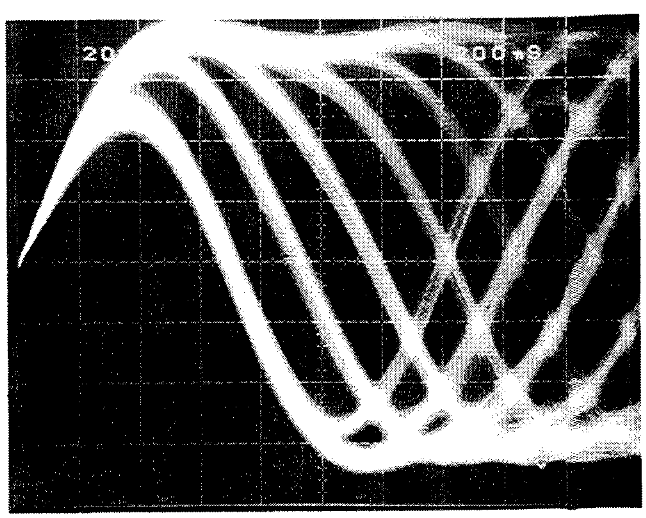
Photograph 10-9




Photograph 10-8



Photograph 10-10



Photograph 10-11

| Step No. | Oscilloscope Range | | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| 7 | **TANGENTIAL ADJUSTMENT** | | | | | |
| | | | | | | • Load the test disc into the player.<br>• Set the CD player to Test Mode. (Refer to page 44.)<br>• Use the MANUAL SEARCH FWD key [ ▶▶ ] to move the pick-up to the center of the disc. With the pick-up in this position the tangential adjustment screw becomes accessible from above. (See Fig. 10-5.)<br>• Press the TRACK FWD key [ ▶▶\| ], the PLAY key [ ▶ ] and then the PAUSE key [ ▮▮ ] in that order to close all servos. (The PAUSE indicator will light up.) |
| | | | TP301 Pin1 (RF Output) | Tangential Adjustment Screw | Optimal crosshatch pattern | • Observe the waveform of RF output from the TP301 Pin 1 RF in the oscilloscope. Turn the tangential adjustment screw until the ideal single crosshatch pattern is achieved. (Fig. 10-5.)<br>• The proper adjustment point is that point where any further turning of the tangential adjustment screw in either direction will degrade the crosshatch pattern.<br>The aim is to achieve an overall good waveform pattern with crosshatch lines forming a single diamond shape (Photograph 10-8). At the proper adjustment point you should still be able to make out the relatively fine lines that form the diamond. |

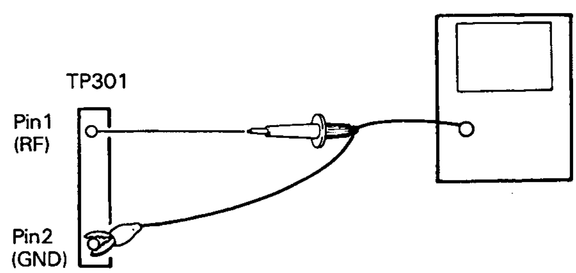



Fig. 10-4

| Step No. | Oscilloscope Range | | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| 8 | RADIAL ADJUSTMENT | | | | | |
| | | | | | | • Load the test disc into the player. |
| | | | | | | • Set the CD player to Test Mode. (Refer to page 44.) |
| | | | | | | • Use the MANUAL SEARCH FWD key [ ▶▶ ] to move the pick-up to the center of the disc. With the pick-up in this position the radial adjustment screw becomes accessible from above. (See Fig. 10-5.) |
| | | | | | | • Press the TRACK FWD key [ ▶▶\| ], the PLAY key [ ▶ ] and then the PAUSE key [ ▮▮ ] in that order to close all servos. (The PAUSE indicator will light up.) |
| | | | TP301 Pin1 (RF Output) | Radial Adjustment Screw | Optimal crosshatch pattern | • Observe the waveform of RF output from the TP301 Pin 1 RF in the oscilloscope. Adjust the radial adjustment screw until the ideal single crosshatch pattern is achieved. (Fig. 10-5.) |
| | | | | | | • The proper adjustment point is that point where any further turning of the radial adjustment screw in either direction will degrade the crosshatch pattern.<br>The aim is to achieve an overall good waveform pattern with crosshatch lines forming a single diamond shape (Photograph 10-8). At the proper adjustment point you should still be able to make out the relatively fine lines that form the diamond. |
| | | | | | | • Be sure to perform the tangential and radial adjustments in turn more than twice. |

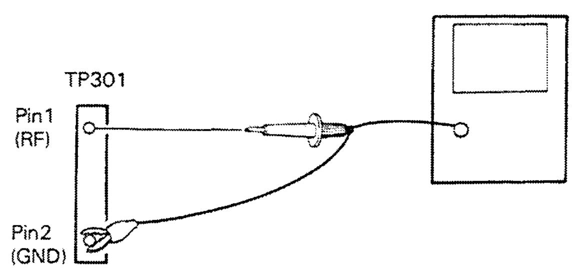



Fig. 10-4

| Step No. | Oscilloscope Range | | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| 9 | **RF LEVEL CHECK** | | | | | |
| | | | | | | • Set the CD player to Test Mode. (Refer to page 44.)<br>• Connect the oscilloscope probe to TP301 Pin 1 RF (RF Output). |
| | | | TP301 Pin1 (RF) | Check | 1.6V±0.1V | • With the test disc playing, measure the P-P voltage of the RF waveform to verify that it is at 1.6V ±0.1V. |
| | | | TP301 Pin1 (RF) | VR Ⓐ | 1.6V±0.1V | • If the P-P voltage level is not at 1.6V ±0.1V, adjust VR Ⓐ until the voltage level is correct. |

| Step No. | Oscilloscope Range V | Oscilloscope Range H | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| 10 | **FOCUS GAIN ADJUSTMENT** | | | | | |
| | CH1(X), CH2 (Y)<br>20mV/div, 5mV/div<br>Probe 10:1 | | X-axis<br>TP1<br>Pin7<br>(FO.IN)<br>Y-axis<br>TP1<br>Pin6<br>(FO.ER) | VR3<br>(FO.GA) | Phase Difference<br>90° | • With POWER OFF, connect oscilloscope and signal generator as shown in Fig. 10-6.<br>• Set the CD player to Test Mode. (Refer page .44)<br>• Press the TRACK FWD key [ ▶▶\| ], the PLAY key [ ▶ ] and the PAUSE key [ ▮▮ ] in that order to turn focus, spindle and tracking servos ON.<br>• Turn the signal generator POWER ON and output a 1kHz signal at 1Vp-p.<br>*Note: Some signal generators momentarily generate DC when they are turned on. For this reason, it is advisable to connect the oscilloscope only after signal generator POWER is ON.)*<br>• Adjust VR3 FO.GA (Focus Gain) so that the Lissajous figure on the oscilloscope becomes a perfect circle (Phase Difference 90). |

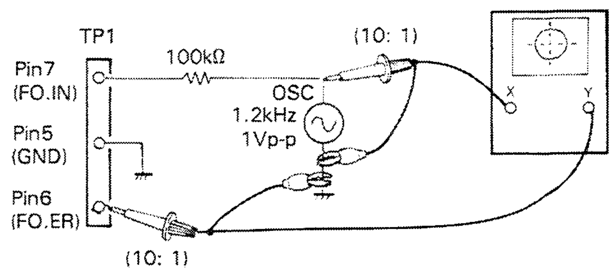
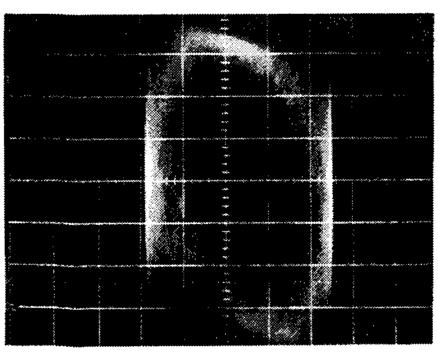
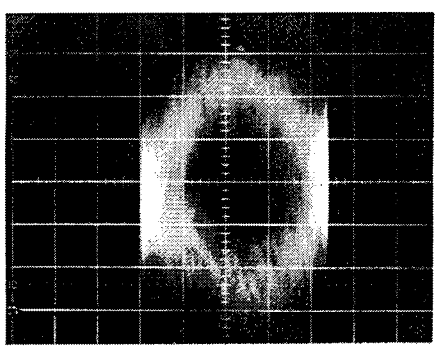


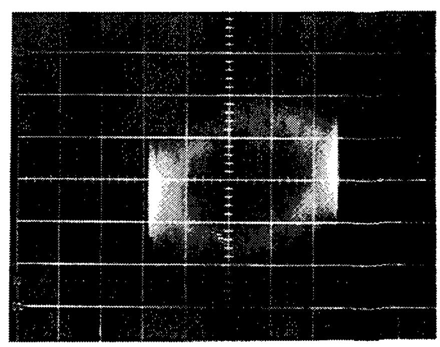

Fig. 10-6



Photograph 10-12 Gain too high



Photograph 10-13 Optimal gain



Photograph 10-14 Gain too low

| Step No. | Oscilloscope Range V | Oscilloscope Range H | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| 11 | **TRACKING GAIN ADJUSTMENT** | | | | | |
| | CH1(X), CH2 (Y)<br>50mV/div, 5mV/div<br>Probe 10:1 | | X-axis<br>TP1<br>Pin3<br>(FO.IN)<br>Y-axis<br>TP1<br>Pin4<br>(TR.ER) | VR4<br>(TR.GA) | Phase Difference<br>90° | • With POWER OFF, connect oscilloscope and signal generator as shown in Fig. 10-7.<br>• Set the CD player to Test Mode. (Refer page 44.)<br>• Press the TRACK FWD key [ ▶▶| ], the PLAY key [ ▶ ] and the PAUSE key [ ▮▮ ] in that order to turn focus, spindle and tracking servos ON.<br>• Turn the signal generator POWER ON and output a 1kHz signal at 2Vp-p.<br>*Note: Some signal generators momentarily generate DC when they are turned on. For this reason, it is advisable to connect the oscilloscope only after signal generator POWER is ON.)*<br>• Adjust VR4 TR.GA (Tracking Gain) so that the Lissajous figure on the oscilloscope becomes a perfect circle (Phase Difference 90). |

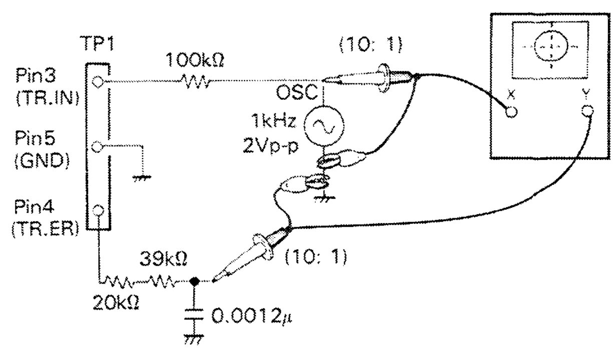
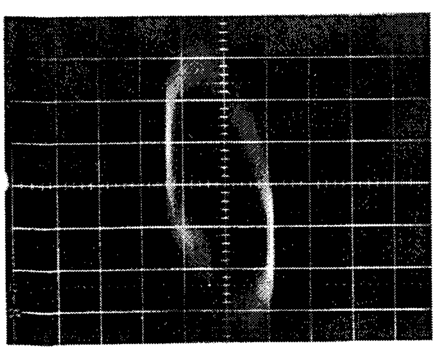
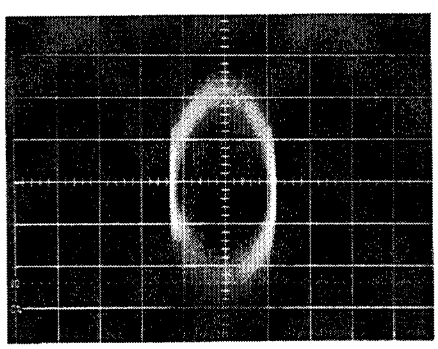


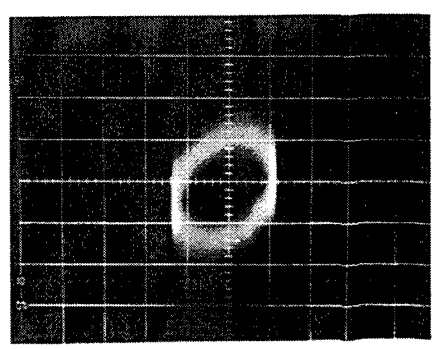

Fig. 10-7



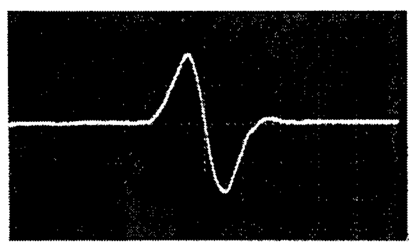
Photograph 10-15 Gain too high



Photograph 10-16 Optimal gain



Photograph 10-17 Gain too low

| Step No. | Oscilloscope Range V | Oscilloscope Range H | Test Point | Adjustment Point | Verification Item/Adjustment Specification | Adjustment Operation Sequence |
|---|---|---|---|---|---|---|
| **12** | **VCO FREE RUN FREQUENCY ADJUSTMENT** | | | | | |
| | | | TP3<br>Pin2 | | Frequency<br>4.375MHz<br>±0.05MHz | • Set the CD player to Test Mode. (Refer page 44.)<br>• Short the ASY and GND jumpers with an alligator clip.<br>• Connect a frequency counter (10MHz range) to TP3 Pin 2.<br>• Adjust VR8 (VCO.A) until you get a 4.375MHz ±0.05MHz reading on the frequency counter.<br>*Note: Perform this adjustment while the CD player is in the STOP mode.* |
| **13** | **FOCUS ERROR CHECK** | | | | | |
| | | | TP1<br>Pin6<br>(FO.ER) | Check | Waveform | • Set the CD player to Test Mode. (Refer page 44.)<br>• Connect TP1 Pin 7 FO.IN (Focus In) to GND.<br>• Press the TRACK FWD key and verify the waveform generated by TPI Pin 6 FO.ER (Focus Error) on the oscilloscope.<br>2V:Div 1mS/Div<br><br>S-shaped waveform generated by FO.ER |

# 10. RÉGLAGE

La liste complète des réglages est donnée ci-dessous. Effectuer les réglages dans l'ordre de cette liste.

## • Liste des réglages

1. Réglage de poursuite, réglage de focalisation et réglage du décalage radiofréquence.
2. Réglage du retour de poursuite et réglage du retour de focalisation
3. Vérification de la puissance de la diode laser
4. Vérification du calage de focalisation et du calage du moteur d'entraînement
5. Réglage du réseau optique
6. Réglage de l'équilibrage de la poursuite
7. Réglage tangentiel
8. Réglage radial
9. Réglage du niveau radiofréquence
10. Réglage du gain de la boucle de focalisation
11. Réglage du gain de la boucle de poursuite
12. Réglage de la fréquence d'oscillation libre du VCO
13. Vérification de l'erreur de focalisation

## • Appareils de mesure requis

1. Oscilloscope double trace
2. Appareil de mesure de la puissance lumineuse
3. Disque d'essai (YEDS7)
4. Filtre pour le réglage de la focalisation et de la poursuite
5. Filtre passe-bande pour le réglage du gain de boucle
6. Générateur de fréquence
7. Tournevis pour réseau optique
8. Outillage habituel

## • Mode essai

Les réglages doivent être effectués alors que l'appareil est en mode essai.

**Comment venir en mode essai et comment le quitter**

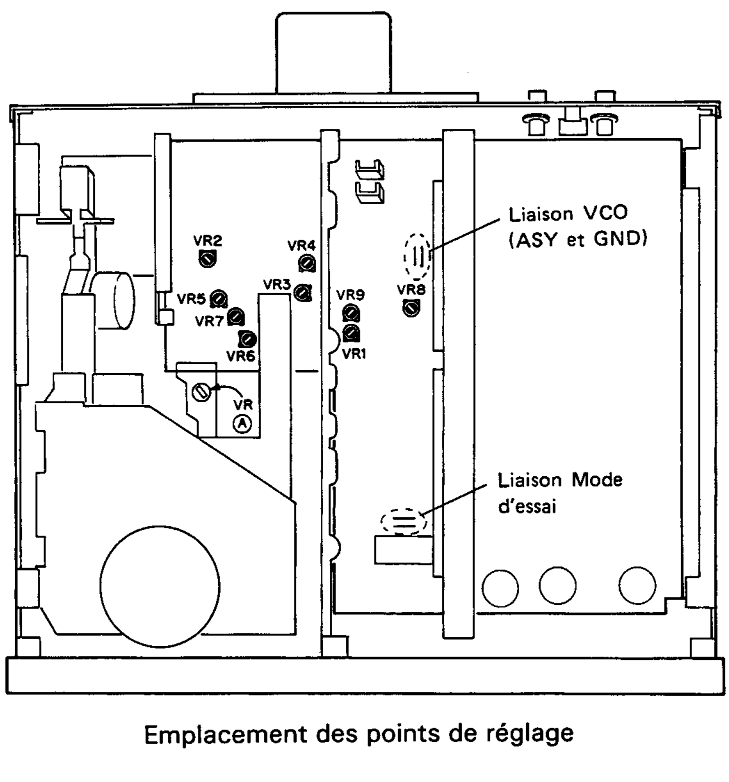
① Placer le cavalier de mode essai et mettre l'interrupteur général sur la position ON.
② L'appareil vient en mode essai lorsque l'on appuie sur MANUAL SEARCH FWD [►►] ou REV [◄◄].
③ Pour quitter le mode essai, placer l'interrupteur général sur OFF.

En mode essai, les touches du lecteur ont les fonctions énumérées au tableau 10-1.

## • Nom des résistances variables (VR)

VR1: Décalage du retour de focalisation (FR. OF)
VR2: Décalage radiofréquence (RF. OF)
VR3: Gain de la boucle de focalisation (FO. GA)
VR4: Gain de la boucle de poursuite (TR. GA)
VR5: Equilibrage de poursuite (TR. BL)
VR6: Erreur de focalisation (FO. OF)
VR7: Erreur de poursuite (TE. OF)
VR8: Fréquence de l'oscillateur local (VCO)
VR9: Décalage du retour de poursuite (TR. OF)

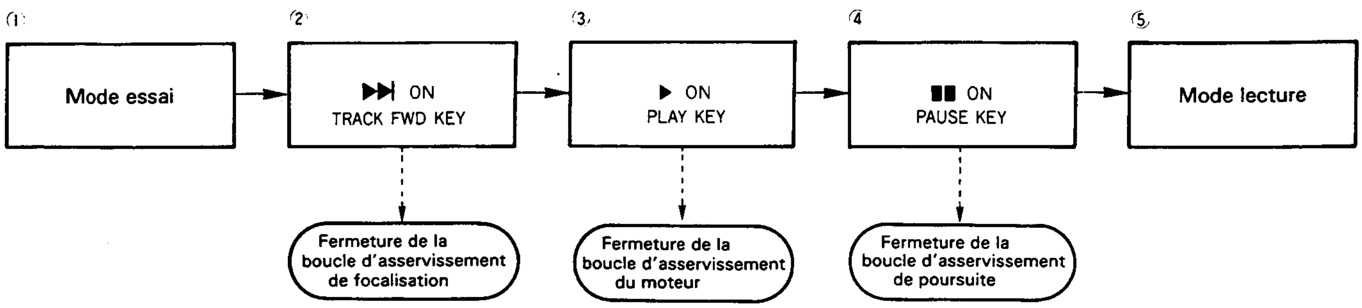
*Remarque: Les résistances variables (VR) du circuit du convertisseur D/A ont été réglées en usine. Ne tenter, en aucun cas, de modifier ces réglages.*




Emplacement des points de réglage

En mode essai, chaque boucle d'asservissement peut être ouverte ou fermée indépendamment. En conséquence, pour revenir en mode lecture, chaque boucle d'asservissement doit être fermée dans un ordre précis (ordre séquentiel). Se rappeler que, l'appareil étant dans le mode essai, le simple fait d'appuyer sur la touche PAUSE [ ❚❚ ] ne suffit pas à le replacer en mode lecture.

Ainsi, pour passer de l'arrêt au mode lecture la séquence suivante doit être réalisée:




* Les asservissements ne fonctionnent pas dans l'ordre séquentiel lorsque l'appareil est en mode essai.

## • Rôle des touches de commande lorsque l'appareil est en mode essai

| Symbole | Nom de la touche | Fonction en mode essai | Remarques |
|---|---|---|---|
| \|◀◀ | TRACK BACK | Met la diode laser sous tension. | La diode laser s'éclaire. |
| ▶▶\| | TRACK FWD | Ferme la boucle d'asservissement de focalisation. | La diode laser s'éclaire, l'actuateur de focalisation se déplace vers le haut et vers le bas et la boucle d'asservissement de focalisation se ferme. |
| ▶ | PLAY | Ferme la boucle d'asservissement du moteur d'entraînement. | Après mis en rotation du moteur d'entraînement, la boucle d'asservissement se ferme en mode CLVH. |
| ❚❚ | PAUSE | Ouvre et ferme la boucle d'asservissement de poursuite. | Fonctionne comme un basculeur. Une pression sur cette touche ferme la boucle d'asservissement de poursuite et l'appareil vient en mode de lecture. Par ailleurs, du fait que les boucles d'asservissement de focalisation et du moteur d'entraînement sont fermées, le témoin PAUSE s'éclaire. Une seconde pression sur cette touche ouvre la boucle d'asservissement de poursuite. |
| ◀◀ | MANUAL SERCH REV | Déplace le chariot des plages extérieures vers les plages intérieures. | Déplace rapidement le chariot vers l'intérieur du disque à une vitesse de 1cm/s. Il n'existe aucun dispositif pour arrêter le chariot lorsqu'il atteint la plage la plus intérieure; en conséquence, veiller à ne pas déplacer le chariot outre mesure. |
| ▶▶ | MANUAL SERCH FWD | Déplace le chariot des plages intérieures vers les plages extérieures. | Déplace rapidement le chariot vers l'extérieur du disque à une vitesse de 1cm/s. Il n'existe aucun dispositif pour arrêter le chariot lorsqu'il atteint la plage la plus extérieure; en conséquence, veiller à ne pas déplacer le chariot outre mesure. |
| □ | REPEAT | Déplace le bloc optique vers le haut et vers le bas. | La diode laser s'éclaire, l'actuateur de focalisation se déplace vers le haut et vers le bas mais la boucle d'asservissement de focalisation ne se ferme pas. |
| ■ | STOP | Arrête le fonctionnement. | Arrête tous les asservissements et replace l'appareil dans son état initial. |
| ⏏ | OPEN/CLOSE | Ouvre et ferme le tiroir. | Ouvre et ferme le tiroir. Cependant, le capteur ne revient sur sa position de garage lorsque le tiroir est ouvert. La fermeture du tiroir est également sans effet sur le capteur. |

Tableau 10-1

| Numéro d'ordre | Gamme de l'oscilloscope V | Gamme de l'oscilloscope H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| **1** | **RÉGLAGE DE POURSUITE, RÉGLAGE DE FOCALISATION ET RÉGLAGE DU DÉCALAGE RADIOFRÉQUENCE.** | | | | | |
| | | | | | | • Placer le lecteur en mode essai. (Se reporter page 59.) |
| | | | TP1 Borne 4 (TR.ER) | VR7 (TE.OF) | 0V ± 50mV | • Régler VR7 (TE. OF: Erreur de poursuite) de manière que la tension sur la borne 4 de TP1 soit égale à 0 V ± 50 mV. |
| | | | TP1 Borne 6 (FO.ER) | VR6 (FO.OF) | 0V ± 50mV | • Régler VR6 (FO. OF: Erreur de focalisation) de manière que la tension sur la borne 6 de TP1 soit égale à 0 V ± 50 mV. |
| | | | TP301 Borne 1 (RF) | VR2 (RF.OF) | 100mV ± 50mV | • Régler VR2 (RF. OF: Décalage radiofréquence) de manière que la tension sur la borne 1 de TP301 soit égale à 0 V ± 50 mV. |
| **2** | **RÉGLAGE DU RETOUR DE POURSUITE ET DU RETOUR DE FOCALISATION** | | | | | |
| | | | | | | • Placer le lecteur en mode essai. (Se reporter page 59.) |
| | | | TP1 Borne 2 (TR.RT) | VR9 (TR.OF) | $0V^{+20}_{-10}$ mV | • Régler VR9 TR.OF (Décalage du retour de poursuite) de manière que la tension sur la borne 2 TR.RT (Retour de poursuite) de TP1 soit égale à 0 V + 20/− 10 mV. |
| | | | TP1 Borne 8 (FO.RT) | VR1 (FR.OF) | 35mV ± 17.5mV | • Régler VR1 FR.OF (Décalage du retour de focalisation) de manière que la tension sur la borne 8 FO.RT (Retour de focalisation) soit égale à 35 mV ± 17,5 mV. |
| **3** | **VÉRIFICATION DE LA PUISSANCE DE LA DIODE LASER** | | | | | |
| | | | | | | • Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Appuyer sur la touche TRACK BACK (⏮) afin de mettre la diode laser sous tension.<br>• Placer le capteur de l'appareil de mesure de la puissance directement au-dessus du bloc optique et vérifier que la puissance de la diode est égale à la valeur nominale, à savoir: 0,13 mW ± 0,01 mW. |
| | | | | VRⒶ | Valleur nominale: moins de 0,13 mW | • Si la puissance fournie par la diode n'est pas égale à cette valeur, agir sur la résistance variable de commande de la puissance, VRⒶ. |

| Numéro d'ordre | Gamme de l'oscilloscope | | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| 4 | **VÉRIFICATION DU CALAGE DE FOCALISATION ET DU CALAGE DU MOTEUR D'ENTRAÎNEMENT** | | | | | |
| | | | | | | • Mettre en place le disque d'essai.<br>• Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Déplacer le capteur vers le centre du disque au moyen de la touche MANUAL SEARCH FWD [▶▶].<br>* Cette manoeuvre doit obligatoirment être réalisée. |
| | V<br>0.5V/div | H<br>100msec/div | TP301<br>Borne 1<br>(Sortie radiofréquence) | | Génération d'un signal radiofréquence | • Brancher l'oscilloscope sur la sortie du signal radiofréquence, borne 1 de TP301. Appuyer sur la touche TRACK FWD [▶▶\|] et noter si un signal radiofréquence est présent sur cette borne. |
| | | | | | Rotation normale | • Appuyer sur la touche PLAY et s'assurer que le disque tourne dans le sens des aiguilles d'une montre et que sa vitesse de rotation est normale (la vitesse normale, près du centre, est de l'ordre de 300 tr/mn). |

| Numéro d'ordre | Gamme de l'oscilloscope V | Gamme de l'oscilloscope H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| **5-1** | **RÉGLAGE DU RÉSEAU OPTIQUE (1) (AVEC UN DISQUE DE DIAMÈTRE 80)** | | | | | |
| | | | | | | • Mettre en place le disque d'essai ($\phi$80)<br>• Placer le lecteur en mode essai. (Se reporter page 59)<br>• Appuyer sur la touche TRACK FWD [▶▶\|] puis sur la touche PLAY [▶] de manière à fermer les boucles d'asservissement de focalisation et du moteur d'entraînment. (La boucle d'asservissement de poursuite est conservée ouverte.)<br>• Amener le capteur au-dessus de la circonférence du disque de diamètre 80 au moyen de la touche MANUAL SEARCH FWD [▶ ▶]. Le capteur étant dans cette position, la vis de réglage du réseau optique devient accessible au moyen d'un tournevis. (Se reporter à la fig. 10-3.) |
| | 1V/div | 5ms/div | TP1 Borne 4 (TR.ER) | Réseau optique | Origine | • Brancher l'oscilloscope sur la borne 4 TR.ER (Erreur de poursuite) de TP1. Raccorder un filtre passe-bas dont la fréquence de coupure est égale à 4 kHz. (Se reporter à la fig. 10-2.)<br>• Tourner la vis jusqu'à ce que l'allure de l'onde soit semblable à celle de la photographie 10-1. |

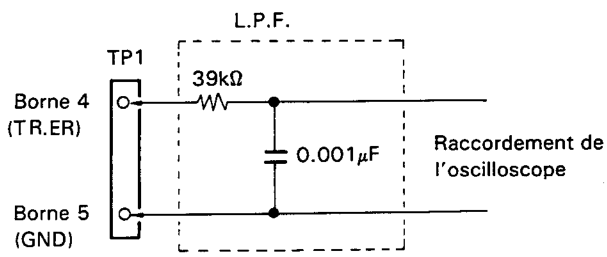
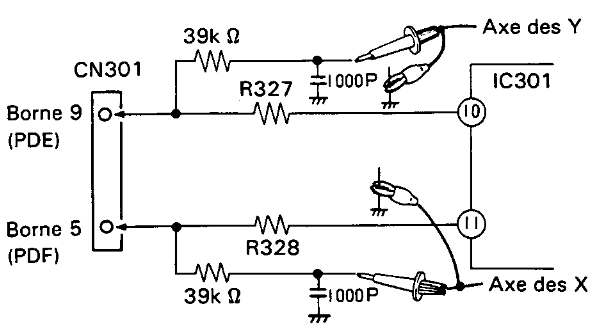



Fig. 10-2

| Numéro d'ordre | V | H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| | | | | Réseau optique | Amplitude maximale | • Cela étant, tourner doucement la vis dans le sens des aiguilles d'une montre jusqu'à ce que le premier maximum de l'amplitude de l'onde (signal d'erreur de poursuite) soit obtenu. (Se reporter à la photographie 10-3). |
| | 5mV/div | XY | Axe des X | Réseau optique | Décalage de phase 180° | • Brancher l'entrée X de l'oscilloscope sur la borne PDF de CN301, côté R328, et l'entrée Y sur la borne PDE de CN301, côté R327, à travers deux filtres passe-bas de fréquence de coupure égale à 4 kHz.<br>Déplacer le capteur jusqu'à ce qu'il soit audessus de la plage la plus extérieure du disque de diamètre 80.<br>La figure de Lissajous ainsi obtenue doit ressembler grossièrement à une droite. Dans le cas contraire, agir sur la vis de réglage. (Se reporter aux photographies 10-4 et 10-5.) |



| Numéro d'ordre | Gamme de l'oscilloscope V | Gamme de l'oscilloscope H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| **5-2** | **RÉGLAGE DU RÉSEAU OPTIQUE (2) (AVEC UN DISQUE D'UNE DURÉE SUPÉRIEURE À 60 MINUTES)** | | | | | |
| | | | | | | • Mettre en place le disque d'essai ($\phi$80)<br>• Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Appuyer sur la touche TRACK FWD [▶▶\|] puis sur la touche PLAY [▶▶] de manière à fermer les boucles d'asservissement de focalisation et du moteur d'entraînement. (La boucle d'asservissement de poursuite est conservée ouverte.)<br>• Amener le capteur au-dessus de la plage la plus extérieure au moyen de la touche MANUAL SEARCH FWD [▶▶]. Le capteur étant dans cette position, la vis de réglage du réseau optique devient accessible au moyen d'un tournevis. (Se reporter à la fig. 10-3.) |
| | 1V/div | 5ms/div | TP1 Borne 4 (TR.ER) | Réseau optique | Origine | • Brancher l'oscilloscope sur la borne 4 TR.ER (Erreur de poursuite) de TP1. Raccorder un filtre passse-bas dont la fréquence de coupure est égale à 4 kHz. (Se reporter à la fig. 10-2.)<br>• Tourner la vis jusqu'à ce que l'allure de l'onde soit semblable à celle de la photographie 10-1. |

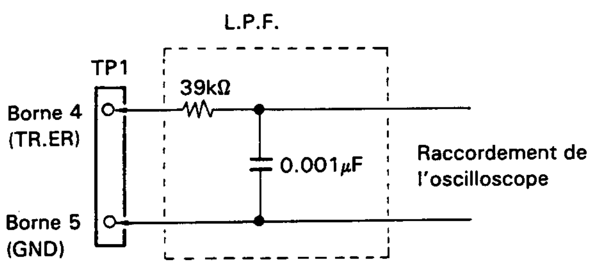


Fig. 10-2

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Réseau optique | Amplitude maximale | • Cela étant, tourner doucement la vis dans le sens des aiguilles d'une montre jusqu'à ce que le premier maximum de l'amplitude de l'onde (signal d'erreur de poursuite) soit obtenu. (Se reporter à la photographie 10-3). |
| | 5mV/div | 5ms/div | Axe des X, axe des Y | Réseau optique | Décalage de phase | • Brancher l'entrée X de l'oscilloscope sur la borne PDF de CN301, côté R328, et l'entrée Y sur la borne PDE de CN301, côté R327, (couplage alternatif). Amener le capteur au centre du disque.<br>La figure de Lissajous ainsi obtenue doit ressembler grossièrement à une droite. Dans le cas contraire, amener le capteur au-dessus de la circonférence extérieure du disque et reprendre le réglage. (Se reporter aux photographies 10-4 et 10-5.) |

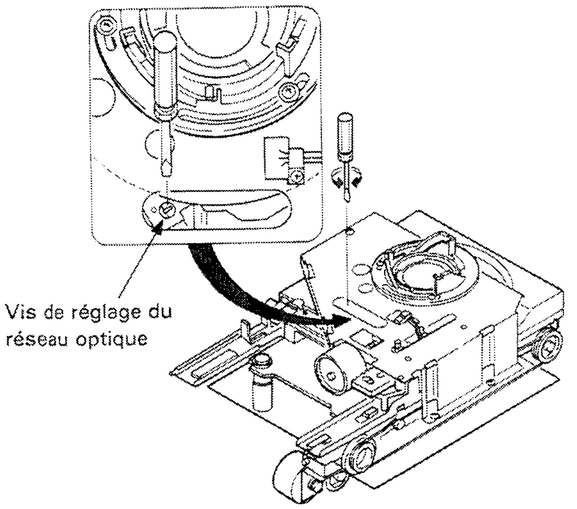
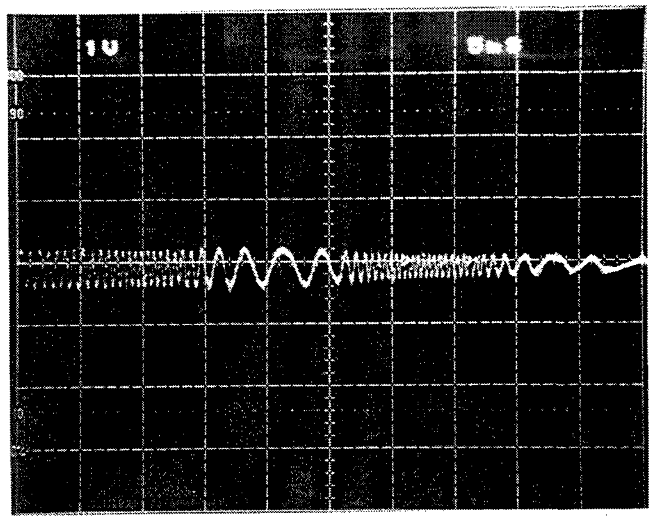
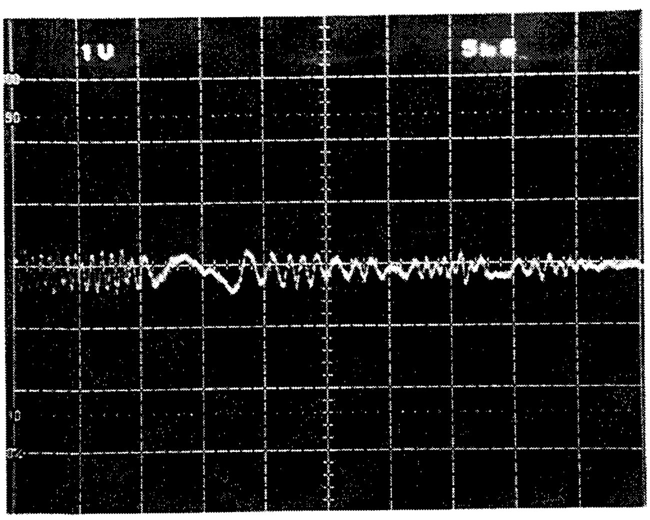


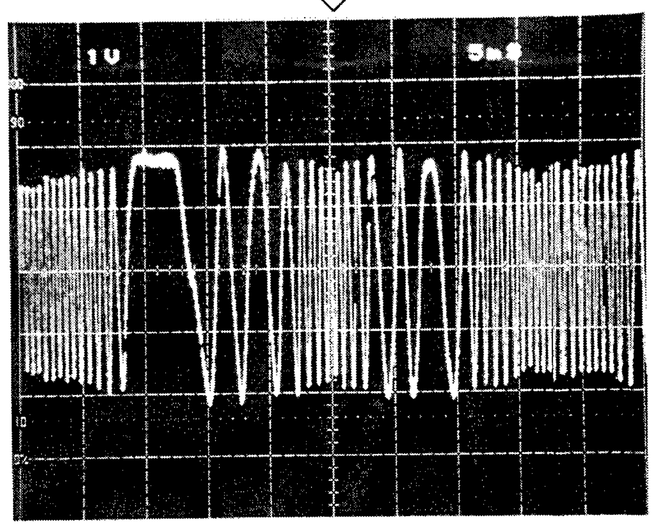

Figure 10-3 Réglage du réseau optique



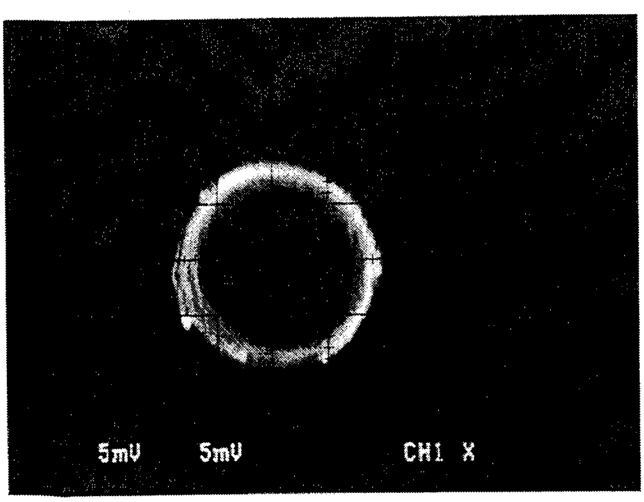

Photographie 10-1 Allure de l'onde à son minimum



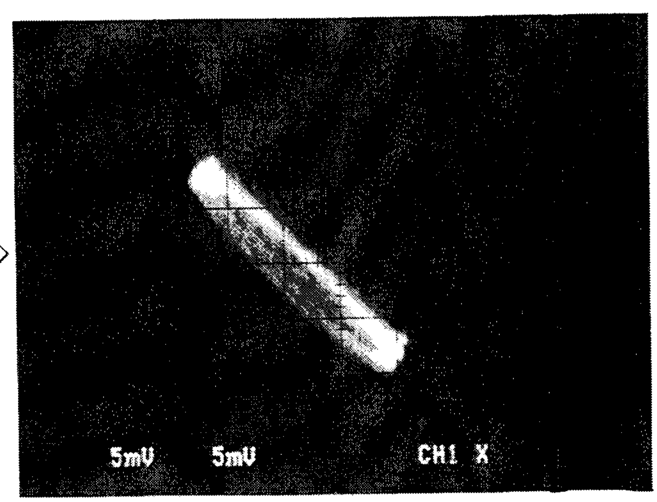

Photographie 10-2 Allure de l'onde en dehors du minimum




Photographie 10-3 Amplitude maximale de l'onde

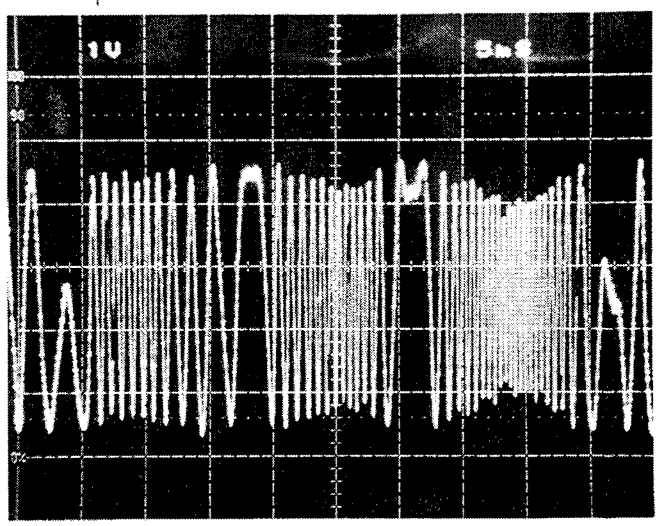



Photographie 10-4

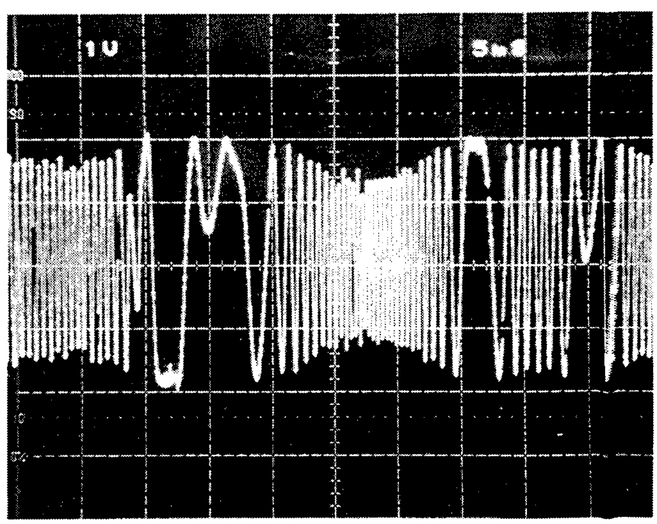



Photographie 10-5

| Numéro d'ordre | Gamme de l'oscilloscope V | Gamme de l'oscilloscope H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| **6** | **RÉGLAGE DE L'ÉQUILIBRAGE DE POURSUITE** | | | | | |
| | 0.5V/div | 5msec/div | TP1 Borne 4 (TR.ER) | VR5 (TR.BL) | | • Mettre en place le disque d'essai.<br>• Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Amener le chariot au centre du disque au moyen de la touche MANUAL SEARCH FWD [ ▶▶ ].<br>• Appuyer sur la touche TRACK FWD [ ▶▶\| ] puis sur la touche PLAY [ ▶ ] pour mettre le disque en rotation.<br>• Brancher l'oscilloscope sur la borne 4 TR.ER (Erreur de poursuite) de TP1. Régler VR5 TR.BL (Equilibrage de poursuite) de sorte que toutes les composantes continues soient éliminées. |



Photographie 10-6 Allure du signal avec composantes continues



Photographie 10-7 Allure du signal sans composantes continues

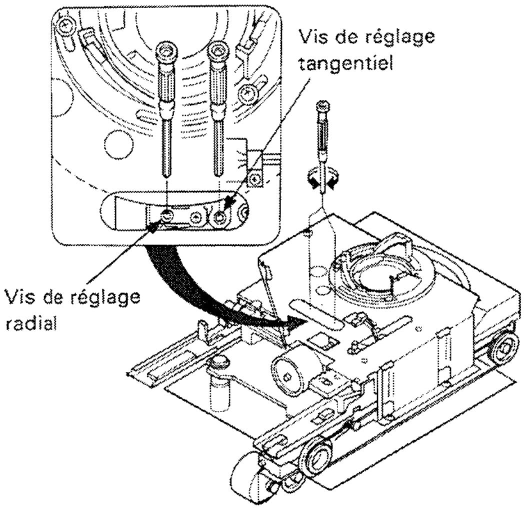
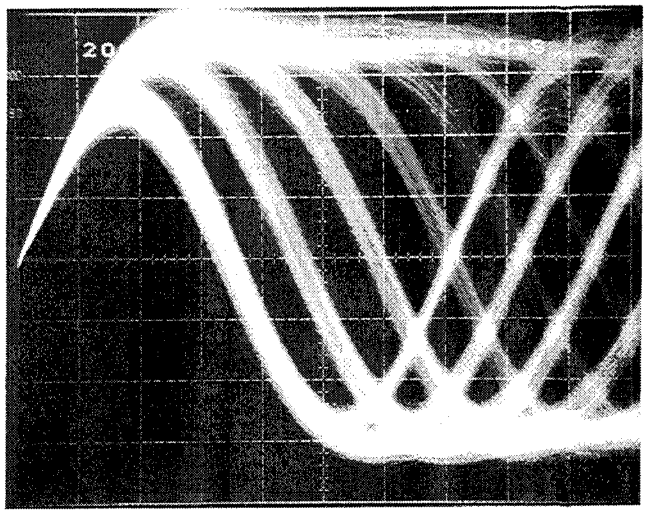
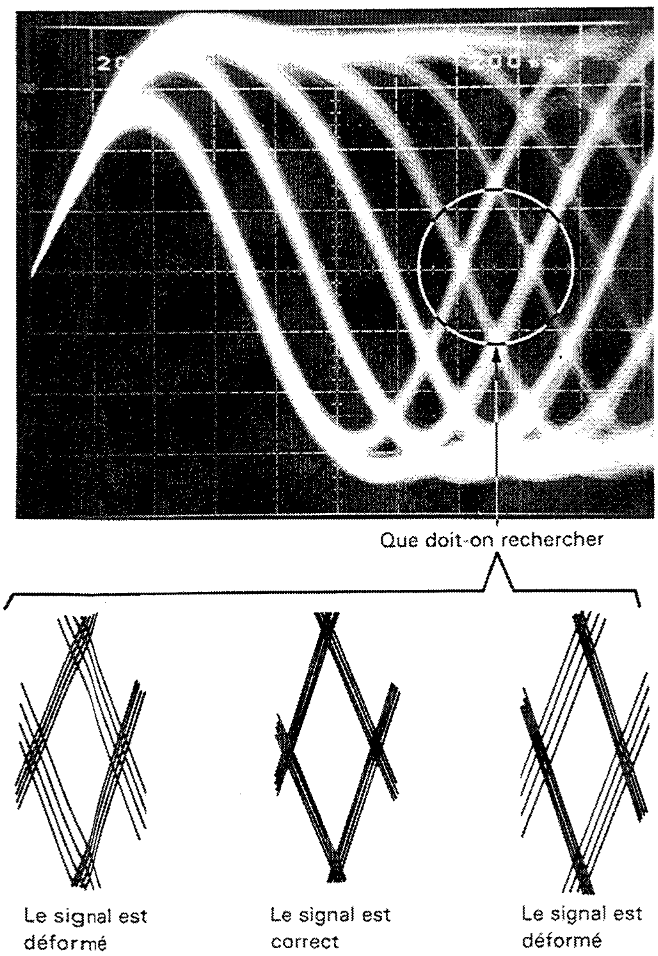


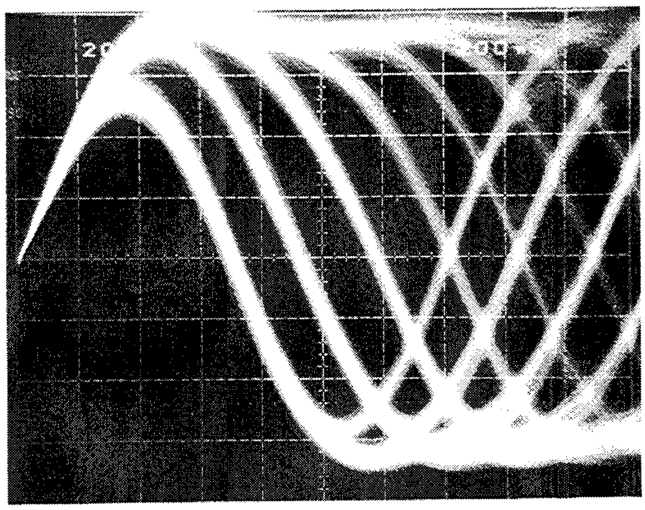

Figure 10-5 Réglage tangentiel



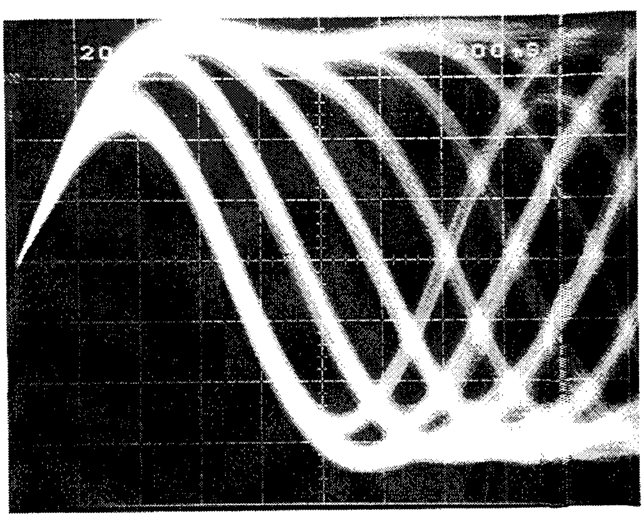
Photographie 10-9




Photographie 10-8



Photographie 10-10



Photographie 10-11

| Numéro d'ordre | Gamme de l'oscilloscope V | Gamme de l'oscilloscope H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| 7 | **RÉGLAGE TANNGENTIEL** | | | | | |
| | | | | | | • Mettre en place le disque d'essai.<br>• Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Amener le capteur au centre du disque au moyen de la touche MANUAL SEARCH FWD [ ▶▶ ]. Le capteur étant dans cette position, la vis de réglage tangentiel devient accessible au moyen d'un tournevis. (Se reporter à la fig. 10-5.)<br>• Appuyer sur la touche TRACK FWD [ ▶▶\| ] puis sur la touche PLAY [ ▶ ] et enfin sur la touche PAUSE [ ▮▮ ] pour fermer toutes les boucles d'asservissement. (Le témoin PAUSE s'éclaire.) |
| | | | TP301 Borne 1 (Sortie radiofréquence) | Vis de réglage tangentiel | Meilleur motif de hachures en croix | • Brancher l'oscilloscope sur la borne 1 de TP1 (sortie radiofréquence). Agir sur la vis de réglage tangentiel pour obtenir le meilleur motif de hachures en croix. (Se reporter à la figure 10-5.)<br>• Le point de réglage est obtenu lorsque le motif est le meilleur et que toute nouvelle action sur la vis ne peut que le dégrader. On doit chercher à obtenir un motif formant un losange aussi régulier que possible. (Se reporter à la photographie 10-8.) Lorsque le réglage est correct, on doit être en mesure de distinguer les lignes qui composent le losange. |

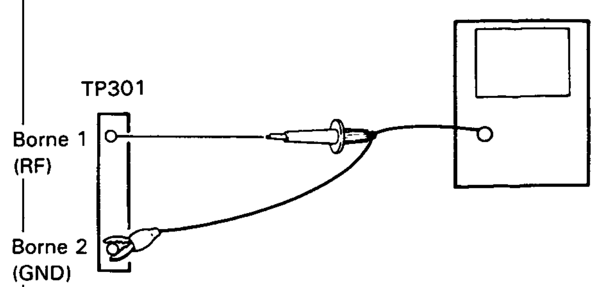



Fig. 10-4

| Numéro d'ordre | Gamme de l'oscilloscope | | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| **8** | **RÉGLAGE RADIAL** | | | | | |
| | | | | | | • Mettre en place le disque d'essai.<br>• Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Amener le capteur au centre du disque au moyen de la touche MANUAL SEARCH FWD [ ▶▶ ]. Le capteur étant dans cette position, la vis de réglage radial devient accessible au moyen d'un tournevis. (Se reporter à la fig. 10-5.)<br>• Appuyer sur la touche TRACK FWD [ ▶▶\| ] puis sur la touche PLAY [▶] et enfin sur la touche PAUSE [ ▮▮ ] pour fermer toutes les boucles d'asservissement. (Le témoin PAUSE s'éclaire.) |
| | | | TP301 Borne 1 (Sortie radiofré-quence) | Vis de réglage radial | Meilleur motif de hachures en croix. | • Brancher l'oscilloscope sur la borne 1 de TP301 (sortie radiofréquence). Agir sur la vis de réglage radial pour obtenir le meilleur motif de hachures en croix. (Se reporter à la fig. 10-5.)<br>• Le point de réglage est obtenu lorsque le motif est le meilleur et que toute nouvelle action sur la vis ne peut que le dégrader. On doit chercher à obtenir un motif formant un losange aussi régulier que possible. (Se reporter à la photographie 10-8.) Lorsque le réglage est correct, on doit être en mesure de distinguer les lignes qui composent le losange.<br>• Veiller à effectuer les réglages tangentiel et radial, l'un après l'autre, plus de deux fois. |

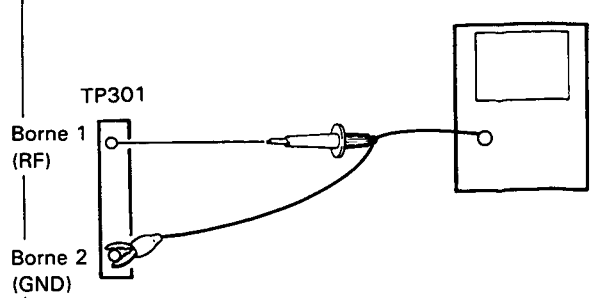



Fig. 10-4

| Numéro d'ordre | Gamme de l'oscilloscope | | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| **9** | **VÉRIFICATION DU NIVEAU RADIOFRÉQUENCE** | | | | | |
| | | | | | | • Placer le lecteur en mode essai. (Se reporter page 59.) |
| | | | | | | • Brancher la sonde de l'oscilloscope sur la borne 1 de TP301 (sortie radiofréquence). |
| | | | TP301 Borne 1 (RF) | Vérification | 1.6V ± 0.1V | • Lire le disque d'essai et vérifier que la tension crête à crête du signal radiofréquence est égale à 1,6 V ± 0,1 V. |
| | | | TP301 Borne 1 (RF) | VRA | 1.6V ± 0.1V | • Dans le cas contraire, agir sur la résistance variable VRA. |

| Numéro d'ordre | Gamme de l'oscilloscope V | H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| 10 | RÉGLAGE DU GAIN DE LA BOUCLE D'ASSERVISSEMENT DE FOCALISATION | | | | | |
| | CH1 (X), CH2 (Y)<br>20mV/div, 5mV/div<br>Sonde 10:1 | | Axe des X<br>TP1<br>Borne 7<br>(FO.IN)<br>Axe des Y<br>TP1<br>Borne 6<br>(FO.ER) | VR3<br>(FO.GA) | Déphasage 90° | • L'interrupteur général étant sur la position OFF, brancher l'oscilloscope et le générateur de fréquence comme le montre la fig. 10-6.<br>• Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Appuyer sur la touche TRACK FWD [ ▶▶\| ] puis sur la touche PLAY [ ▶ ] et enfin sur la touche PAUSE [ ▮▮ ] pour mettre en service les boucles d'asservissement de focalisation, de poursuite et de moteur d'entraînement.<br>• Mettre en service le générateur de fréquence; tension 1 Vc-c, fréquence 1,2 kHz.<br>Remarque: Certains générateurs produisent une tension continue à la mise sous tension. Il est donc recommandé de ne brancher l'oscilloscope qu'après la mise en service du générateur.<br>• Régler VR3 FO.GA (Gain de la boucle d'asservissement de focalisation) de sorte que la figure de Lissajous soit un cercle parfait (déphasage de 90°). |

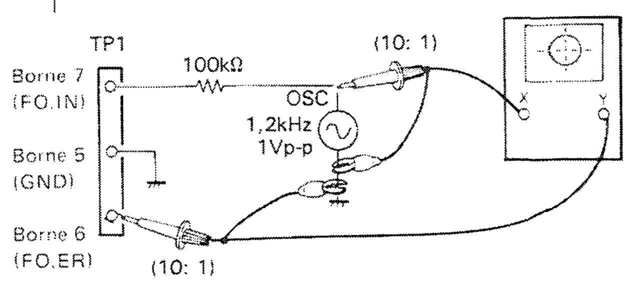
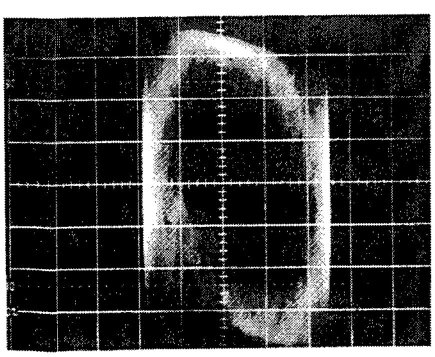
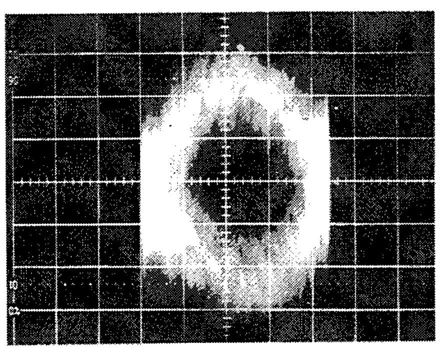


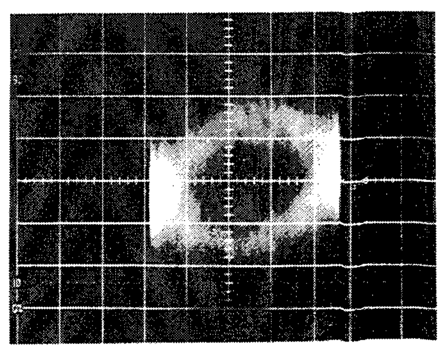

Fig. 10-6



Photographie 10-12 Gain trop élevé



Photographie 10-13 Gain correct



Photographie 10-14 Gain trop faible

| Numéro d'ordre | Gamme de l'oscilloscope V | Gamme de l'oscilloscope H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| **11** | **RÉGLAGE DU GAIN DE LA BOUCLE D'ASSERVISSEMENT DE POURSUITE** | | | | | |
| | CH1 (X), CH2 (Y) 50mV/div, 5mV/div Sonde 10: 1 | | Axe des X TP1 Borne 3 (TR.IN) Axe des Y TP1 Borne 4 (TR.ER) | VR4 (TR.GA) | Déphasage 90° | • L'interrupteur général étant sur la position OFF, brancher l'oscilloscope et le générateur de fréquence comme le montre la fig. 10-7.<br>• Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Appuyer sur la touche TRACK FWD [ ▶▶| ] puis sur la touche PLAY [ ▶ ] et enfin sur la touche PAUSE [ ▮▮ ] pour mettre en service les boucles d'asservissement de focalisation, de poursuite et de moteur d'entraînement.<br>• Mettre en service le générateur de fréquence; tension 2 Vc-c, fréquence 1 kHz.<br>Remarque: Certains générateurs produisent une tension continue à la mise sous tension. Il est donc recommandé de ne brancher l'oscilloscope qu'après la mise en service du générateur.<br>• Régler VR4 TR.GA (Gain de la boucle d'asservissement de poursuite) de sorte que la figure de Lissajous soit un cercle parfait (déphasage de 90). |

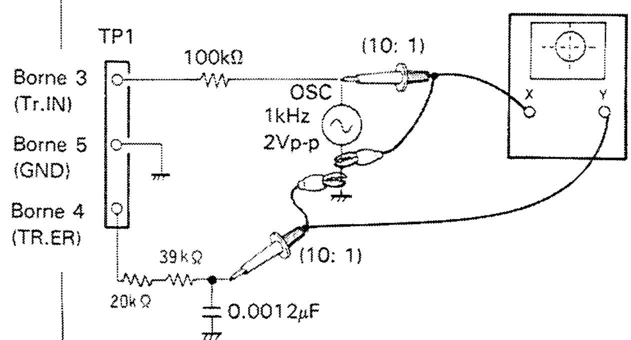
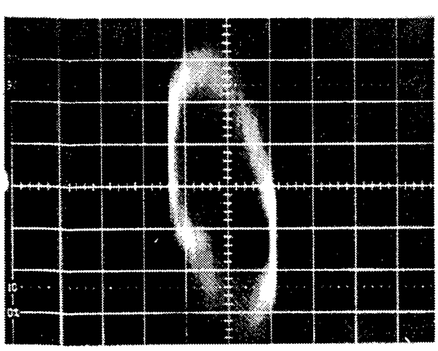
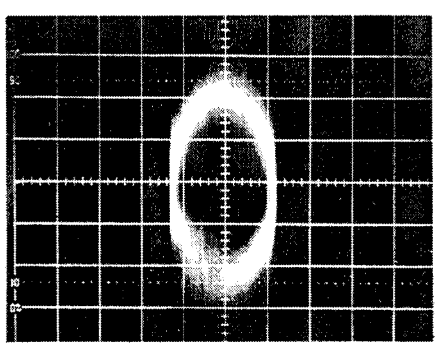


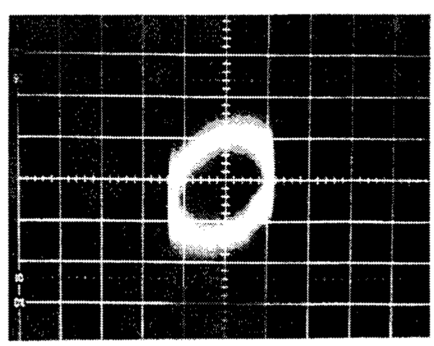

Fig. 10-7



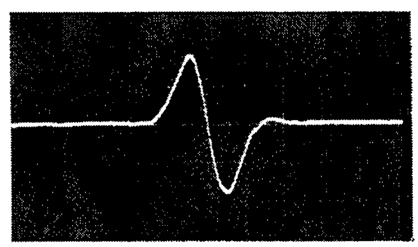
Photographie 10-15 Gain trop élevé



Photographie 10-16 Gain correct



Photographie 10-17 Gain trop faible

| Numéro d'ordre | Gamme de l'oscilloscope V | Gamme de l'oscilloscope H | Point d'essai | Point de réglage | Point à vérifier /Caractéristique de réglage | Ordre des opérations de réglage |
|---|---|---|---|---|---|---|
| **12** | **RÉGLAGE DE LA FRÉQUENCE D'OSCILLATION LIBRE DU VCO** | | | | | |
| | | | TP3<br>Borne 2 | | Fréquence<br>4,375MHz<br>±0.05MHz | • Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Court-circuiter ASY et GND à l'aide d'une pince crocodile.<br>• Brancher un compteur de fréquence (classe 10 MHz) sur la borne 2 de TP3.<br>• Régler VR8 (VCO.A) pour obtenir une fréquence égale à 4,375 MHz ±0,05 MHz.<br>Remarque: Ce réglage doit être effectué alors que le lecteur est arrêté. |
| **13** | **VÉRIFICATION DE L'ERREUR DE FOCALISATION** | | | | | |
| | | | TP1<br>Borne 6<br>(FO.ER) | Vérification | Forme d'onde | • Placer le lecteur en mode essai. (Se reporter page 59.)<br>• Placer une jarretière entre la borne 7 FO.IN (Entrée focalisation) de TP1 et la masse (GND).<br>• Appuyer sur la touche TRACK FWD et vérifier au moyem de l'oscilloscope, l'allure du signal présent sur la borne 6 FO.ER (Erreur de focalisation) de TP1.<br>2V/Div 1mS/Div<br><br>Allure en S de l'onde produite par FO.ER |

# 10. AJUSTE

A continuación se da una lista completa de los ajustes. Realice los ajustes en el orden que salen en la lista.

## • Lista de los ajustes

1. Ajustes del descentramiento de seguimiento, del descentramiento de foco y del descentramiento de RF
2. Ajustes del descentramiento de retorno de seguimiento y del descentramiento de retorno de foco
3. Comprobación de la luminosidad de LD (laser diódico)
4. Comprobación del enclavamiento del eje y del enclavamiento del foco
5. Ajuste de rejilla
6. Ajuste del balance de seguimiento
7. Ajuste tangencial
8. Ajuste radial
9. Comprobación del nivel RF
10. Ajuste de la ganancia de foco
11. Ajuste de la ganancia de seguimiento
12. Ajuste de frecuencia en marcha libre de VCO
13. Comprobación de error de foco

## • Dispositivos necesarios para la medición

1. Osciloscopio de seguimiento doble
2. Medidoróptico de luminosidad
3. Disco de pruebas (YEDS7)
4. Filtros de ajuste de seguimiento y foco
5. Filtro de paso de banda para el ajuste de la ganancia de bucle
6. Generador de señales
7. Destornillador de rejillas
8. Otros equipos normales de medición

## • Modo de pruebas

Los ajustes deben realizzarse con la unidad en el modo de pruebas.

**Cómo entrar y salir del modo de pruebas**

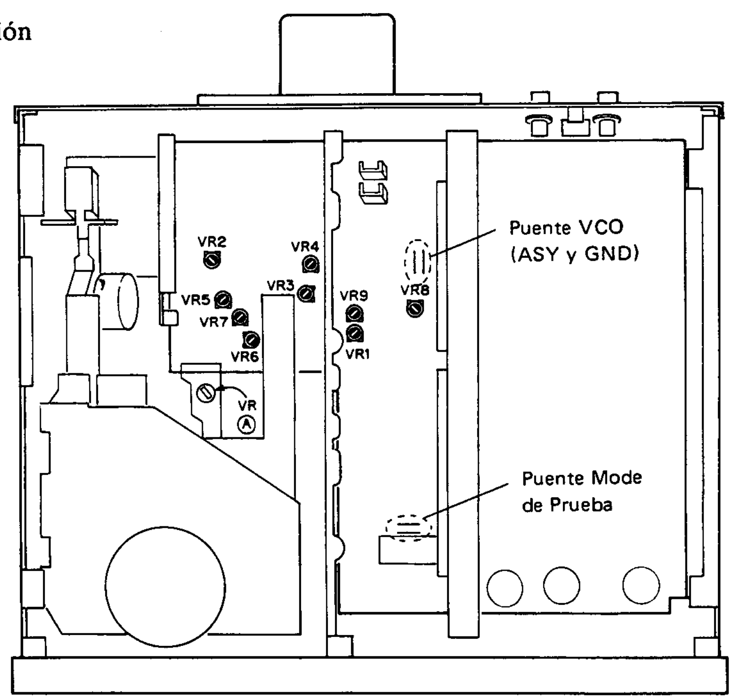
① Con el puente de conexión del modo de pruebas cortocircuitado, gire el interruptor POWER SW a la posición ON.
② Si luego activa la función MANUAL SEARCH FWD [ ►► ] o REV [ ◄◄ ], la unidad se establecerá en el modo de pruebas.
③ Para salir del modo de pruebas, gire el interruptor POWER SW a la posición OFF.

En el modo de pruebas, las teclas de funcionamiento del tocadiscos CD tienen las funciones designadas en la tabla 10-1.

## • Nombres de los VR de ajuste

VR1: Descentramiento de retorno de foco (FR. OF)
VR2: Descentramiento de RF (RF. OF)
VR3: Ganancia de foco (FO. GA)
VR4: Ganancia de seguimiento (TR. GA)
VR5: Balance de seguimiento (TR. BL)
VR6: Descentramiento de foco (FO. OF)
VR7: Descentramiento de seguimiento (TE. OF)
VR8: Frecuecia VCO (VCOA)
VR9: Descentramiento de retorno de seguimiento (TR. OF)

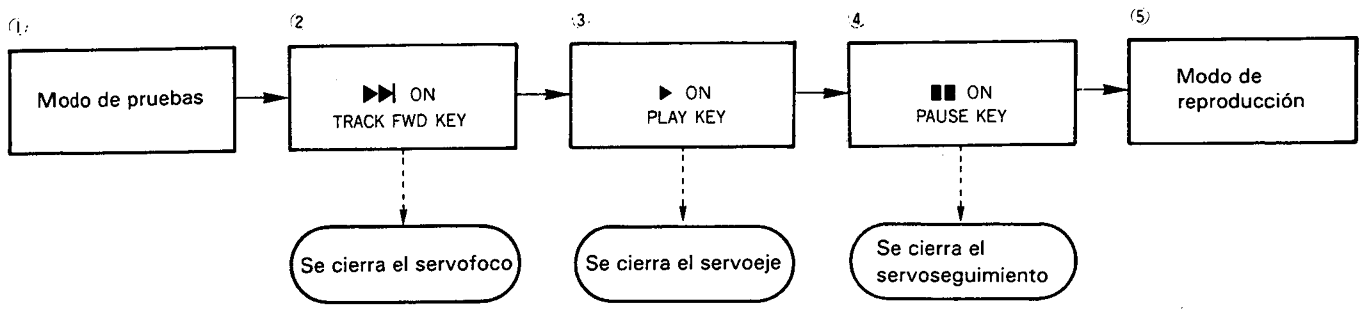
*Nota) El VR del tablero de ajustes ha sido ajustado en la fábrica. No intente reajustarlo bajo ninguna circunstancia.*




Localización de los tornillos de ajuste

En el modo de pruebas cada servodispositivo puede abrirse y cerrarse independientemente. Por lo tanto, para volver al modo de reproducción normal, debe cerrarse cada servodispositivo en el orden adecuado (secuencia en serie) antes de poder reestablecerse el modo de reproducción. Recuerde que, una vez está en el modo de pruebas, simplemente presionando la tecla PAUSE [ ▮▮ ] la unidad de se establecerá en el modo de reproducción.

Por ejemplo, para pasar del modo de parada al modo de reproducción:




* En el modo de pruebas, los servodispositivos deben activarse en el orden de la secuencia en serie.

## ● Funciones de las teclas de control cuando el tocadiscos CD está en el modo de pruebas

| Símbolo | Nobre de la tecla | Función en el modo de pruebas | Explicación |
|---|---|---|---|
| \|◀◀ | TRACK BACK | Se activa el laser diódico | Se enciende el laser diódico |
| ▶▶\| | TRACK FWD | Se cierra el servofoco | Se enciende el laser diódico, se mueve el activador de foco hacia arriba/hacia abajo, y se cierra el servofoco. |
| ▶ | PLAY | Se cierra el servoeje. | Después que el motor del eje empiece a girar, se cierra el servodispositivo en el modo CLV-H. |
| ▮▮ | PAUSE | Se abre y se cierra el servoseguimiento. | Funciona como un conmutador de palanca. Cuando se presiona una vez, se cierra el servoseguimiento y la unidad se establece en el modo de reproducción. Sin embargo, puesto que el servofoco y el servoeje están cerrados, se encederá el indicador PAUSE. Cuando se presiona otra vez, se abre el servoseguimiento. |
| ◀◀ | MANUAL SERCH REV | Retroceso del carro (de los surcos exteriores a los interiores) | El carro se desplaza rápidamente hacia los surcos interiores del disco a una velocidad de 1 cm/seg. No hay provisto ningún dispositivo de parada automática del carro cuando éste alcanza el último surco del disco, por lo tanto tenga cuidado en no mover el carro demasiado lejos. |
| ▶▶ | MANUAL SERCH FWD | Avance del carro (de los surcos interiores a los exteriores) | El carro se desplaza rápidamente hacia los surcos exteriores del disco a una velocidad de 1 cm/seg. No hay provisto ningún dispositivo de parada automática del carro cuando éste alcanza el último surco del disco, por lo tanto tenga cuidado en no mover el carro demasiado lejos. |
| ▭ | REPEAT | Desplazamiento mueve las lentes hacia arriba/hacia abajo | Se enciende el laser diódico, se mueve el activador de foco hacia arriba/hacia abajo, pero no se cierra el servofoco. |
| ■ | STOP | Se interrumpe el funcionamiento | Se paran todos los servodispositivos y la unidad se repone al estado inicial. |
| ▲ | OPEN/CLOSE | Se abre y se cierra la bandeja de discos | Se abre y se cierra la bandeja de discos. Sin embargo, el fonocaptor no retorna a la posición de apoyo cuando la bandeja está abierta. El cierre de la bandeja tampoco tiene ningún efecto sobre el fonocaptor. |

Tabla 10-1

| No. de paso | Margen del osciloscopio V | Margen del osciloscopio H | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| **1** | **AJUSTES DEL DESCENTRAMIENTO DE SEGUIMIENTO, DEL DESCENTRAMIENTO DE FOCO Y DEL DESCENTRAMIENTO DE RF** | | | | | |
| | | | | | | • Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.) |
| | | | TP1 Aguja4 (TR.ER) | VR7 (TE.OF) | 0V ± 50mV | • Ajuste VR7 (TE.OF: descentramiento de error de seguimiento) de manera que la aguja ④ TP1 (TE.OF: error de seguimiento) registre un tensión de 0V ± 50mV. |
| | | | TP1 Aguja6 (FO.ER) | VR6 (FO.OF) | 0V ± 50mV | • Ajuste VR6 (FO.OF: descentramiento de error de seguimiento) de manera que la aguja ⑥ TP1 (FO.ER: error de foco) registre una tensión de 0V ± 50mV. |
| | | | TP301 Aguja1 (RF) | VR2 (RF.OF) | 100mV ± 50mV | • Ajuste VR2 (RF.OF: descentramiento de RF) de manera que la aguja ① TP301 registre una tensión de salida RF de 100mV ± 50mV. |
| **2** | **AJUSTES DEL DESCENTRAMIENTO DE RETORNO DE SEGUIMIENTO Y DEL DESCENTRAMIENTO DE RETORNO DE FOCO** | | | | | |
| | | | | | | • Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.) |
| | | | TP1 Aguja2 (TR.RT) | VR9 (TR.OF) | 0V $^{+20}_{-10}$ mV | • Ajuste VR9 (TR.OF: descentramiento de error de seguimiento) de manera que la aguja ② TP1 (TR.RT: retorno de seguimiento) registre una tensión de 0V $^{+20}_{-10}$mV. |
| | | | TP1 Aguja8 (FO.RT) | VR1 (FR.OF) | 35mV ± 17.5mV | • Ajuste VR1 (FR.OF: descentramiento de retorno de foco) de manera que la aguja ⑧ TP1 (FO.RT: retorno de foco) registre una tensión de 35mV ± 17,5mV. |
| **3** | **COMPROBACIÓN DE LA LUMINOSIDAD DE LD (LASER DIÓDICO)** | | | | | |
| | | | | | | • Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.) |
| | | | | | | • Presione la tecla TRACK BACK [⏮] para conectar el LD (laser dódico). |
| | | | | | | • Coloque el sensor del medidor óptico de luminosidad directamente encima de las lentes del objetivo y compruebe que la potencia de LD esté al nivel especificado: 0,13mW ± 0,1mW. |
| | | | | VRⒶ | Especificación normal: inferior a 0,13mW | • Si la potencia de LD no se encuentre en el nivel especificado, ajuste el VR de control de luminosidad de LD, VRⒶ. |

| No. de paso | Margen del osciloscopio | | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| **4** | **COMPROBACIÓN DEL ENCLAVAMIENTO DEL EJE Y YEL ENCLAVAMIENTO DEL FOCO** | | | | | |
| | | | | | | • Introduzca el disco de pruebas en el tocadiscos.<br>• Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.)<br>• Con la tecla MANUAL SEARCH FWD [ ▶▶ ] mueva el fonocaptor al centro del disco.<br>No se olvide de realizar este paso! |
| | V<br>0.5V/div | H<br>100msec/div | TP301<br>Aguja1<br>(Salida de RF) | | Se geneva salida de RF | • Observe la salida de RF desde la aguja ① TP301 RF con un osciloscopio. Luego, después de presionar la tecla TRACK FWD [▶▶|], compruebe si sale o no la señal RF. |
| | | | | | Rotación normal | • Presione la tecla PLAY y compruebe que el disco esté girando hacia la derecha a velocidad normal (la velocidad de rotación del disco cerca del centro es de 300 rpm). |

| No. de paso | Margen del osciloscopio | | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| **5-1** | **AJUSTE DE REJILLA (1) (CON UN DISCO DE $\phi$80)** | | | | | |
| | | | | | | • Introduzca el disco de pruebas en el tocadiscos ($\phi$80).<br>• Establezca el tocadiscos CD en el modo de pruebas. Refiérase a la página 74.)<br>• Presione la tecla TRACK FWD [▶▶\|] y luego la tecla PLAY [▶] en este orden para cerrar el servofoco y el servoeje. (El servoseguimiento se deja abierto.)<br>• Con la tecla MANUAL SEARCH FWD [▶ ▶] mueva el fonocaptor al extemo exterior de la circunferencia del disco de $\phi$80. Al mover el fonocaptor a esta posición, se puede tener acceso al tornillo de ajuste de rejilla con un destornillador aplicado desde de arriba. (Vea la Fig. 10-3.) |
| | 1V/div | 5ms/div | TP1<br>Aguja4<br>(TR.ER) | Rejilla | Punto nulo | • Observe la salida de forma de onda en la aguja ④ TP1 (TR.ER: error de seguimiento) en el un osciloscopio. Inserte un filtro de paso bajo con un punto de corte de 4kHz. (Vea la Fig. 10-2.) |
| | | | | | | • Con un destornillador haga girar el tornillo de ajuste de rejilla hasta que encuentre la forma de onda de punto nulo parecida a la que se muestra en la Fotografía 10-1. |
| | | | | Rejilla | Amplitud máxima | • Luego, gire el destornillador lentamente hacia la derecha a partir del punto nulo hasta que alcance el primer punto de máxima amplitud de la forma de onda (señal de error de seguimiento). (Vea la Fotografía 10-3.) |
| | 5mV/div | XY | Eje X<br>R328<br>Eje Y<br>R327 | Rejilla | 180° de diferenia de fase | • Conecte el eje X del osciloscopio con el lado CN301 (PDF) de R328, el eje Y con el lado CN301 (PDE), e inserte un filtro de paso bajo con un punto de corte de 4kHz. Mueva el fonocaptor al primer surco exterior del disco de $\phi$80. La figura Lissajous tiene que aparecer más o menos como una sóla línea. Si no es así, ajuste la rejilla hasta que la figura Lissajous sea un sóla línea. (Vea las Fotografías 10-4,5.) |

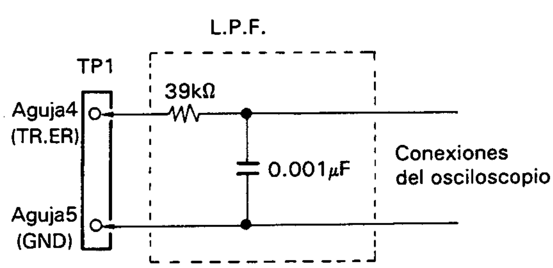
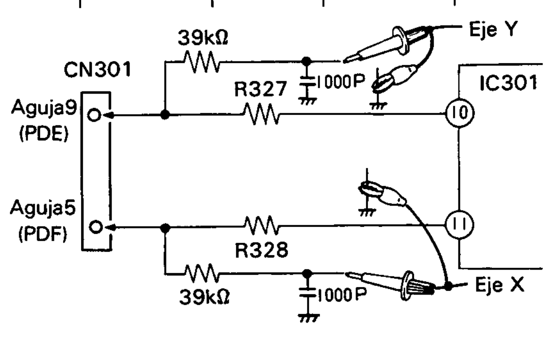



Fig. 10-2



| No. de paso | Margen del osciloscopio V | Margen del osciloscopio H | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| 5-2 | **AJUSTE DE REJILLA (2) (CON UN DISCO DE MÁS DE 60 MIN. DE TIEMPO DE REPRODUCCIÓN)** | | | | | |
| | | | | | | • Introduzca el disco de pruebas en el tocadiscos.<br>• Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.)<br>• Presione la tecla TRACK FWD [ ▶▶| ] y luego la tecla PLAY [▶] en este orden para cerrar el servofoco y el servoeje. (El servoseguimiento se deja abierto.)<br>• Con la tecla MANUAL SEARCH FWD [▶ ▶] mueva el fonocaptor al extremo exterior de la circunferencia del disco de $\phi$80. Al mover el fonocaptor a esta posición, se puede tener acceso al tornillo de ajuste de rejilla con un destornillador aplicado desde de arriba. (Vea la Fig. 10-3.) |
| | 1V/div | 5ms/div | TP1 Aguja4 (TR.ER) | Rejilla | | • Punto nulo * Observe la salida de forma de onda en la aguja ④ TP1 (TR.ER: error de seguimiento) en el osciloscopio. Inserte un filtro de paso bajo con un punto de corte de 4kHz. (Vea la Fig. 10-2.)<br>• Con un destornillador haga girar el tornillo de ajuste de rejilla hasta que encuentre la forma de onda de punto nulo parecida a la que se muestra en la Fotografía 10-1. |

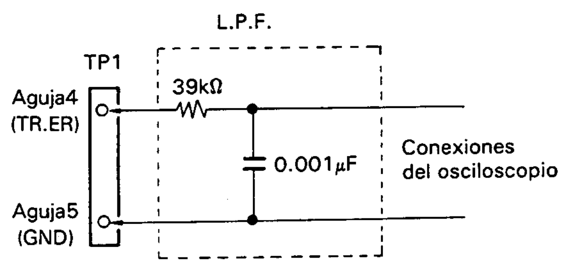



Fig. 10-2

| No. de paso | V | H | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| | | | | Rejilla | Amplitud máxima | • Luego, gire el destornillador lentamente hacia la derecha a partir del punto nulo hasta que alcance el primer punto de máxima amplitud de la forma de onda (señal de error de seguimiento). (Vea la Fotografía 10-3.) |
| | 5mV/div | 5ms/div | Eje X R328<br>Eje Y R327 | Rejilla | Diferencia de fase | • Conecte el eje X del osciloscopio con el lado CN301 (PDF) de R328, el eje Y con el lado CN301 (PDE) de R327, aplique la señal en el modo de acoplamiento de CA y mueva el fonocaptor al centro del disco.<br>Entonces la figura Lissajous tiene que aparecer más o menos como una sóla línea. Si no es así, mueva otra vez el fonocaptor al extremo exterior de la circunferencia y ajuste la rejilla hasta que la figura Lissajous sea un sóla línea. (Vea las Fotografías 10-4,5.) |

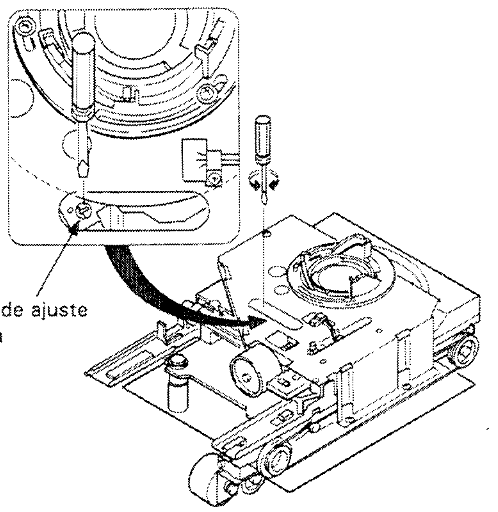
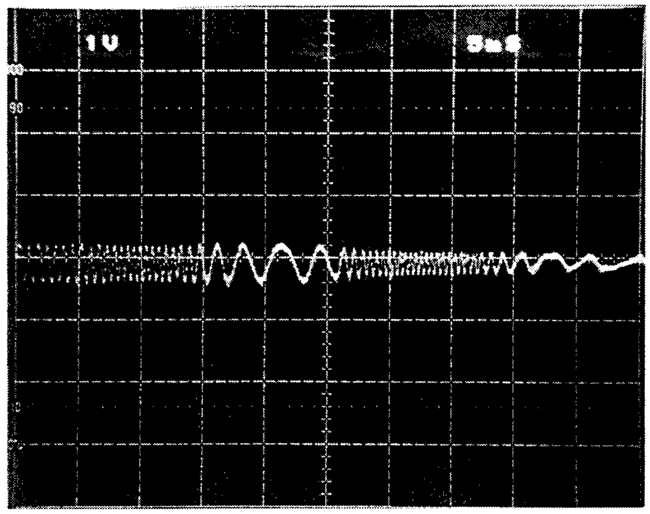
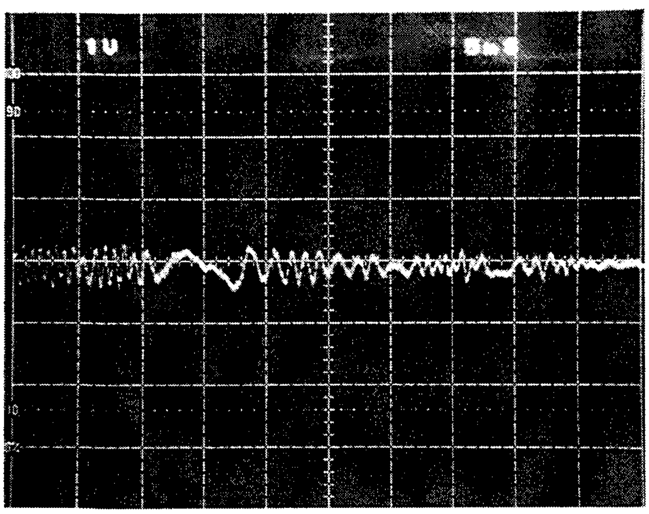


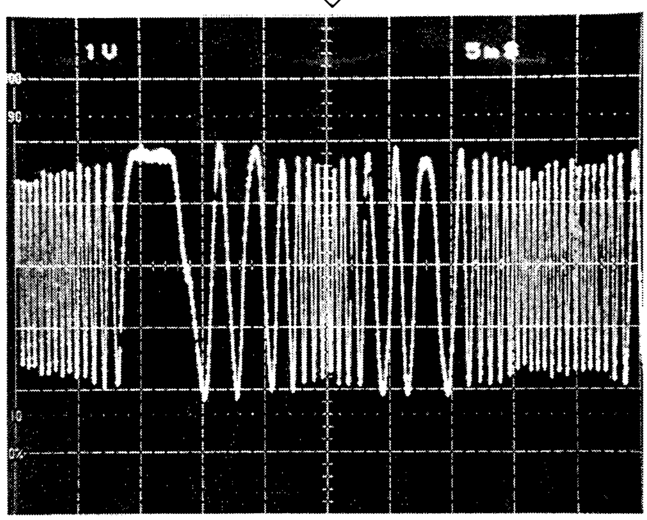

Figura 10-3 Ajuste de rejilla



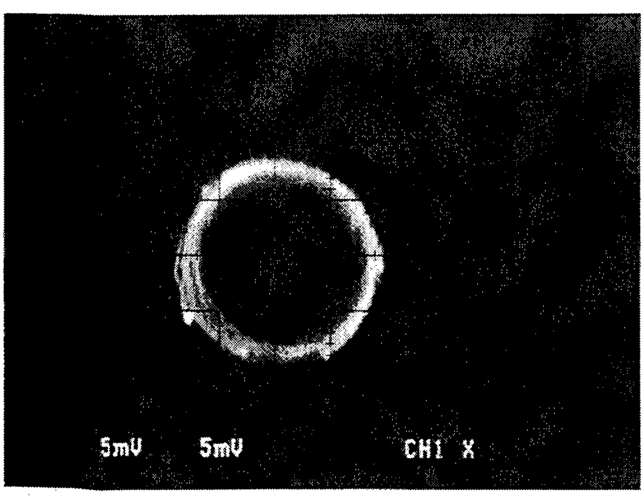

Fotografía 10-1 Forma de onda de punto nulo



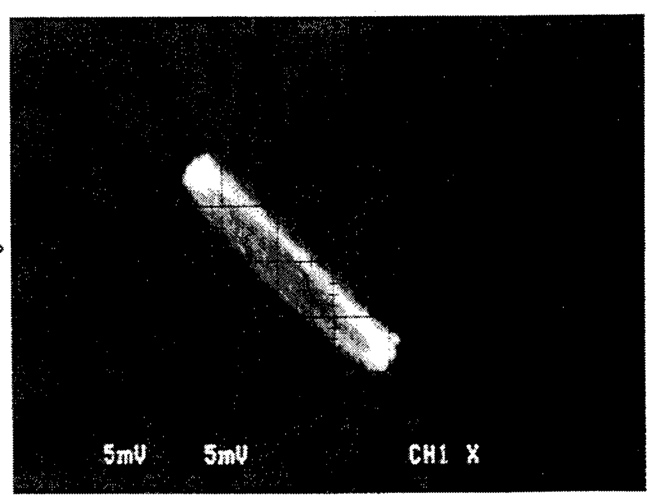

Fotografía 10-2 Forma de onda descentrada de punto nulo




Fotografía 10-3 Amplitud máxima

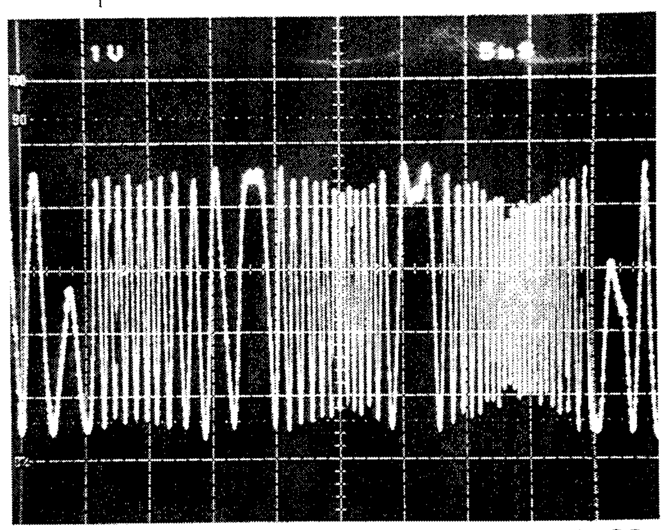



Fotografía 10-4

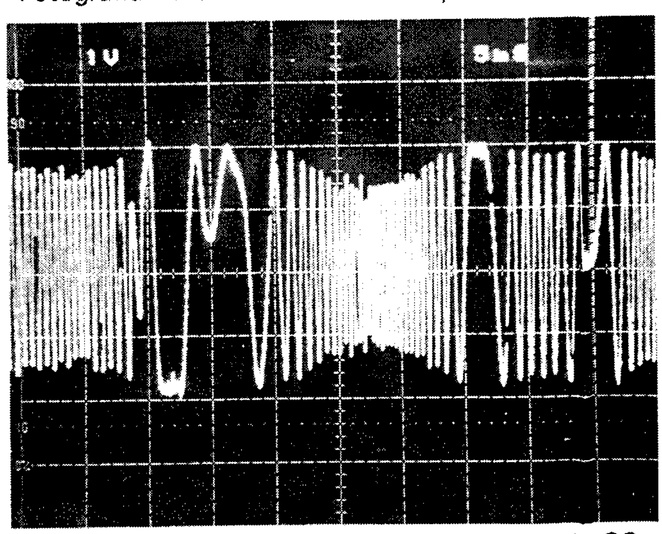



Fotografía 10-5

| No. de paso | Margen del osciloscopio | | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| 6 | **AJUSTE DEL BALANCE DE SEGUIMUENTO** | | | | | |
| | 0.5V/div | 5msec/div | TP1 Aguja4 (TR.ER) | VR5 (TR.BL) | | • Introduzca el disco de pruebas en el tocadiscos.<br>• Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.)<br>• Con la tecla MANUAL SEARCH FWD [▶▶] mueva el fonocaptor al centro del disco.<br>• Presione la tecla TRACK FWD [▶▶\|], y luego la tecla PLAY [▶] para iniciar la rotación del disco.<br>• Observe la salida de forma de onda en la aguja ④ TP1 (TR.ER: error de seguimiento) en el osciloscopio. Ajuste VR5 (TR.BL: balance de seguimiento) de manera que todos los componentes de CC estén fuera de la señal. |



Fotografía 10-6 Señal con los componentes de CC



Fotografía 10-7 Señal sin los componentes de CC

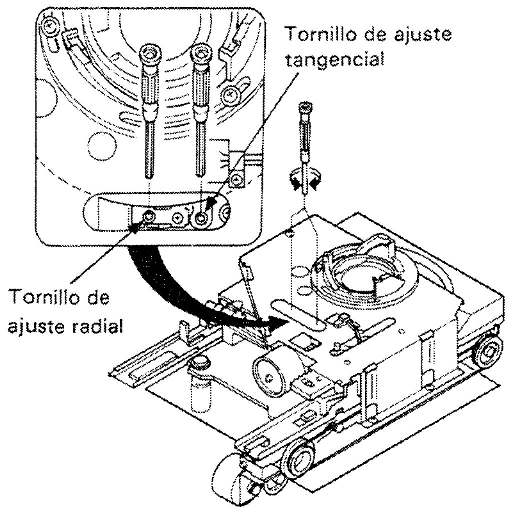
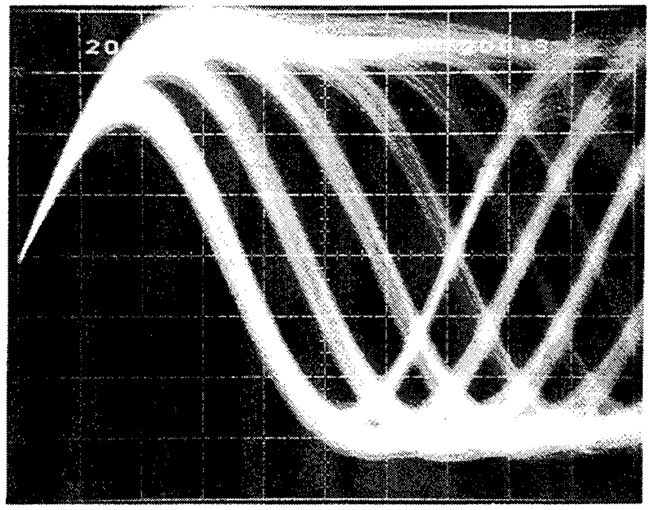
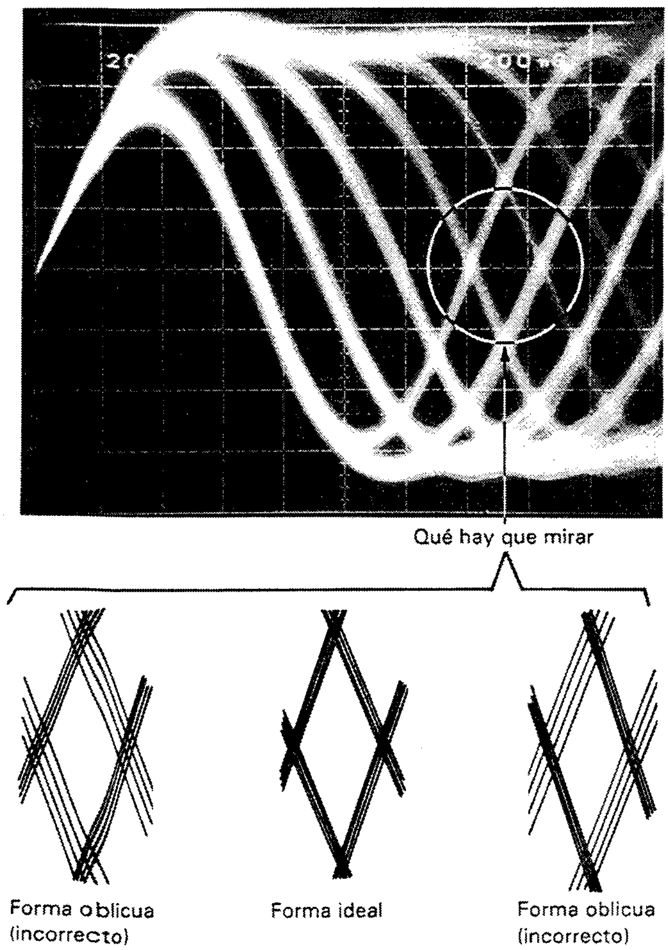


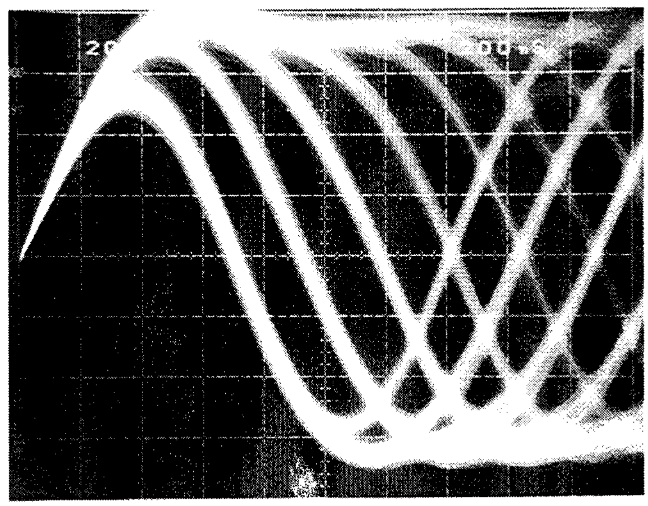

Fig. 10-5 Ajuste tangencial



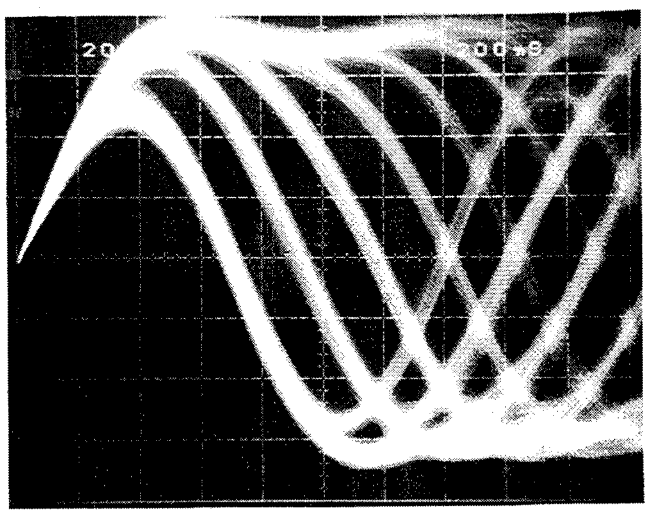
Fotografía 10-9




Fotografía 10-8



Fotografía 10-10



Fotografía 10-11

| No. de paso | Margen del osciloscopio | | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| **7** | **AJUSTE TANGENCIAL** | | | | | |
| | | | | | | • Introduzca el disco de pruebas en el tocadiscos. |
| | | | | | | • Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.) |
| | | | | | | • Con la tecla MANUAL SEARCH FWD [ ▶▶ ] mueva el fonocaptor al centro del disco. Con el fonocaptor en esta posición se tiene acceso al tornillo de ajuste de tangencial desde arriba. (Vea la Fig. 10-5.) |
| | | | | | | • Presione la tecla TRACK FWD [ ▶▶\| ], la tecla PLAY [ ▶ ] y la tecla PAUSE [ ▮▮ en este orden para cerrar todos los servodispositivos. (Se encenderá el indicador PAUSE.) |
| | | | TP301 Aguja1 (Salida de RF) | Tornillo de ajuste tangencial | Imagen de cuadrícula óptima | • Observe la forma de onda de la salida de RF en la aguja ① TP301 RF en el osciloscopio. Gire el tornillo de ajuste de tangencial hasta que se logre la única imagen ideal de cuadrícula. (Fig.10-5). |
| | | | | | | • El punto de ajuste idóneo es aquel en el cual si se gira más el tornillo de ajuste de tangencial en cualquier dirección, se degrada la imagen de cuadrícula. El objetivo es lograr una buena imagen de forma de onda con líneas cruzadas que formen una sóla figura en forma de diamante (Fotografía 10-8). En el punto de ajuste idóneo incluso podrá distinguir las líneas relativamente claras que forman el diamante. |

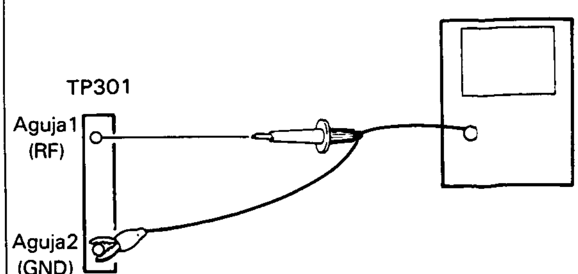



Fig. 10-4

| No. de paso | Margen del osciloscopio | | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| | V | H | | | | |
| **8** | **AJUSTE RADIAL** | | | | | |
| | | | | | | • Introduzca el disco de pruebas en el tocadiscos. |
| | | | | | | • Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.) |
| | | | | | | • Con la tecla MANUAL SEARCH FWD [ ▶▶ ] mueva el fonocaptor al centro del disco. Con el fonocaptor en esta posición se tiene acceso al tornillo de ajuste radial desde arriba. (Vea la Fig. 10-5.) |
| | | | | | | • Presione la tecla TRACK FWD [ ▶▶| ], la tecla PLAY [ ▶ ] y la tecla PAUSE [ ▮▮ en este orden para cerrar todos los servodispositivos. (Se encenderá el indicador PAUSE.) |
| | | | TP301 Aguja1 (Salida de RF) | Tornillo de ajuste radial | Imagen de cuadrícula óptima | • Observe la forma de onda de la salida de RF en la aguja ① TP301 RF en el osciloscopio. Gire el tornillo de ajuste radial hasta que se logre la única imagen ideal de cuadrícula. (Fig. 10-5). |
| | | | | | | • El punto de ajuste idóneo es aquel en el cual si se gira más el tornillo de ajuste radial en cualquier dirección, se degrada la imagen de cuadrícula. El objetivo es lograr una buena imagen de forma de onda con líneas cruzadas que formen una sóla figura en forma de diamante (Fotografía 10-8). En el punto de ajuste idóneo incluso podrá distinguir las líneas relativamente claras que forman el diamante. |
| | | | | | | • Cerciórase de realizar los ajustes tangencial y radial alternativamente más de dos veces. |

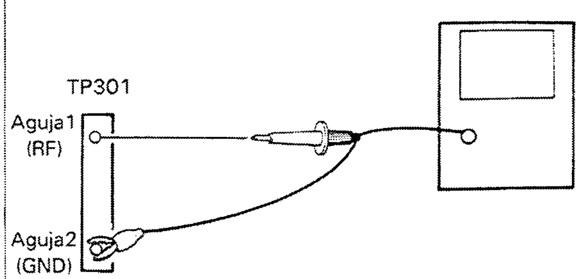
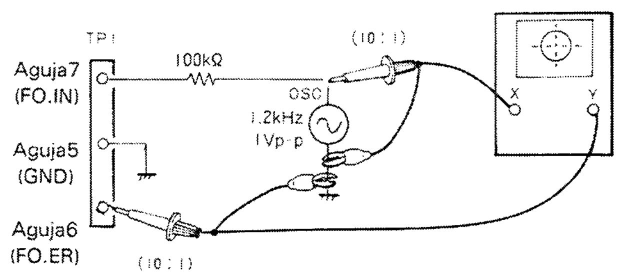
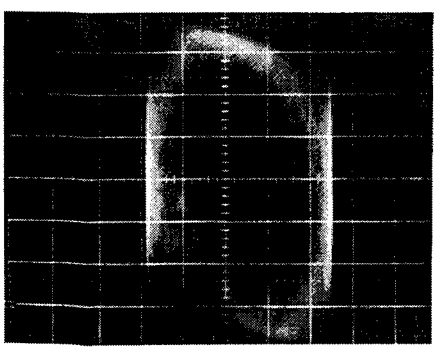



Fig. 10-4

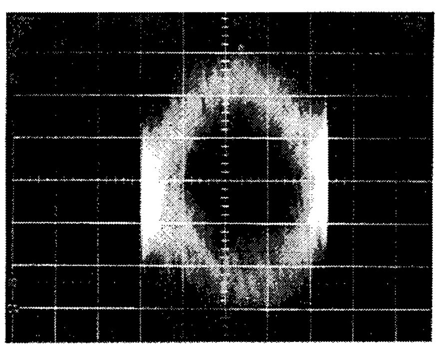
| No. de paso | Margen del osciloscopio V | Margen del osciloscopio H | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| 9 | COMPROBACIÓN DEL NIVEL RF | | | | | |
| | | | | | | • Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.) |
| | | | | | | • Conecte la sonda del osciloscopio en la aguja ① TP301 RF (salida de RF). |
| | | | TP301 Aguja1 (RF) | Comprobación | 1.6V±0.1V | • Mientras reproduce el disco de pruebas, mida la tensión P-P de la forma de onda de RF para comprobar que seade 1,6V ±0,1V. |
| | | | TP301 Aguja1 (RF) | VRⒶ | 1.6V±0.1V | • Si el nivel de tensión P-P no es de 1,6V ±0,1V, ajuste VRⒶ hasta que el nivel de tensión sea el correcto. |

| No. de paso | Margen del osciloscopio V | Margen del osciloscopio H | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| **10** | **AJUSTE DE LA GANANCIA DE FOCO** | | | | | |
| | CH1 (X), CH2 (Y)<br>20mV/div, 5mV/div<br>Sonda 10: 1 | | Eje X<br>TP1<br>Aguja7<br>(FO.IN)<br>Eje Y<br>TP1<br>Aguja6<br>(FO.ER) | VR3<br>(FO.GA) | 90° de diferencia de fase | • Con la alimentación desconectada,couecte el osciloscopio y el generador de señales tal como se indica en la Fig. 10-6.<br>• Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.)<br>• Presione la tecla TRACK FWD [ ▶▶| ], la tecla PLAY [ ▶ ] y la tecla PAUSE [ ▮▮ ] en este orden para activar el servofoco, el servoeje y el servoseguimiento.<br>• Conecte el generador de señales y dé salida a una señal de 1,2kHz a 1Vp-p.<br>Nota: Algunos generadores de señales generan momentáneamente corriente de CC cuando se los conecta. Po esta razón, es aconsejable conectar el osciloscopio después de haber conectado el generador de señales.<br>• Ajuste VR3 (FO.GA: ganancia de foco) de manera que la figura de Lissajous del osciloscopio sea un círculo perfecto (90° de diferencia de fase). |



Fotografía 10-12
Ganancia demasiado alta



Fotografía 10-13 Ganancia óptima

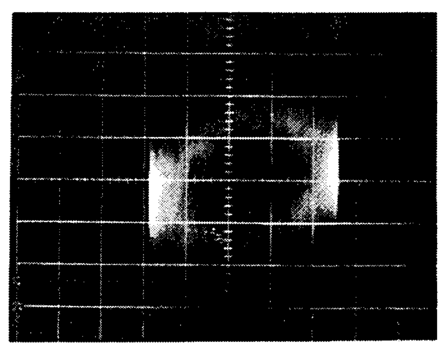


Fig. 10-6
Fotografía 10-14 Ganancia demasiado baja

| No. de paso | Margen del osciloscopio V | Margen del osciloscopio H | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| **11** | **AJUSTE DE LA GANANCIA DE SEGUIMIENTO** | | | | | |
| | CH1 (X), CH2 (Y)<br>50mV/div, 5mV/div<br>Sonda 10: 1 | | Eje X<br>TP1<br>Aguja3<br>(TR.IN)<br>Eje Y<br>TP1<br>Aguja4<br>(TR.ER) | VR4<br>(TR.GA) | 90° de diferenci de fase | • Con la alimentación desconectada, couecte el osciloscopio y el generador de señales tal como se indica en la Fig. 10-7.<br>• Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.)<br>• Presione la tecla TRACK FWD [ ▶▶| ], la tecla PLAY [ ▶ ] y la tecla PAUSE [ ▮▮ ] en este orden para activar el servofoco, el servoeje y el servoseguimiento.<br>• Conecte el generador de señales y dé salida a una señal de 1kHz a 2Vp-p.<br>Nota: Algunos generadores de señales generan momentáneamente corriente de CC cuando se los conecta. Po esta razón, es aconsejable conectar el osciloscopio después de haber conectado el generador de señales.<br>• Ajuste VR4 (TR.GA: ganancia de seguimiento) de manera que la figura de Lissajous del osciloscopio sea un circulo perfecto (90° de diferencia de fase). |

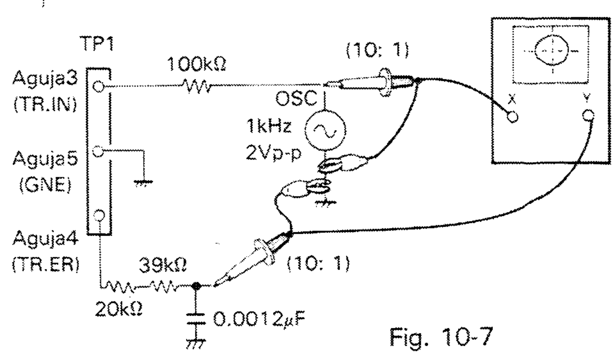
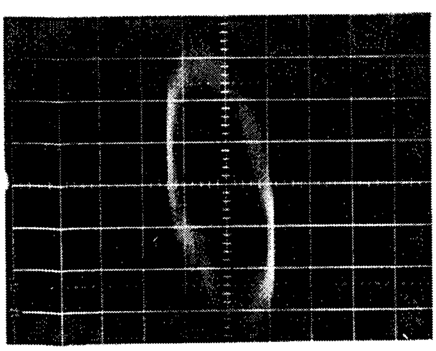
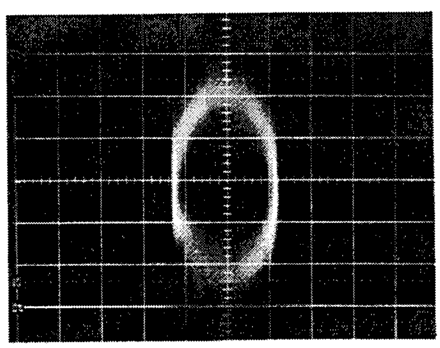


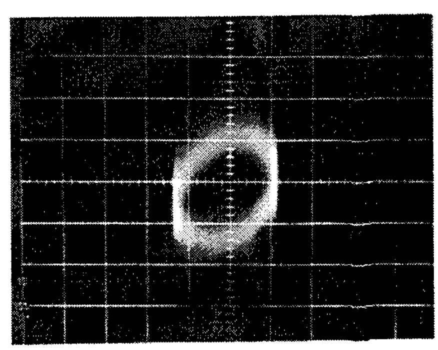

Fig. 10-7



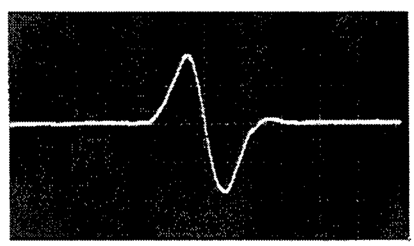
Fotografía 10-15
Ganancia demasiado alta



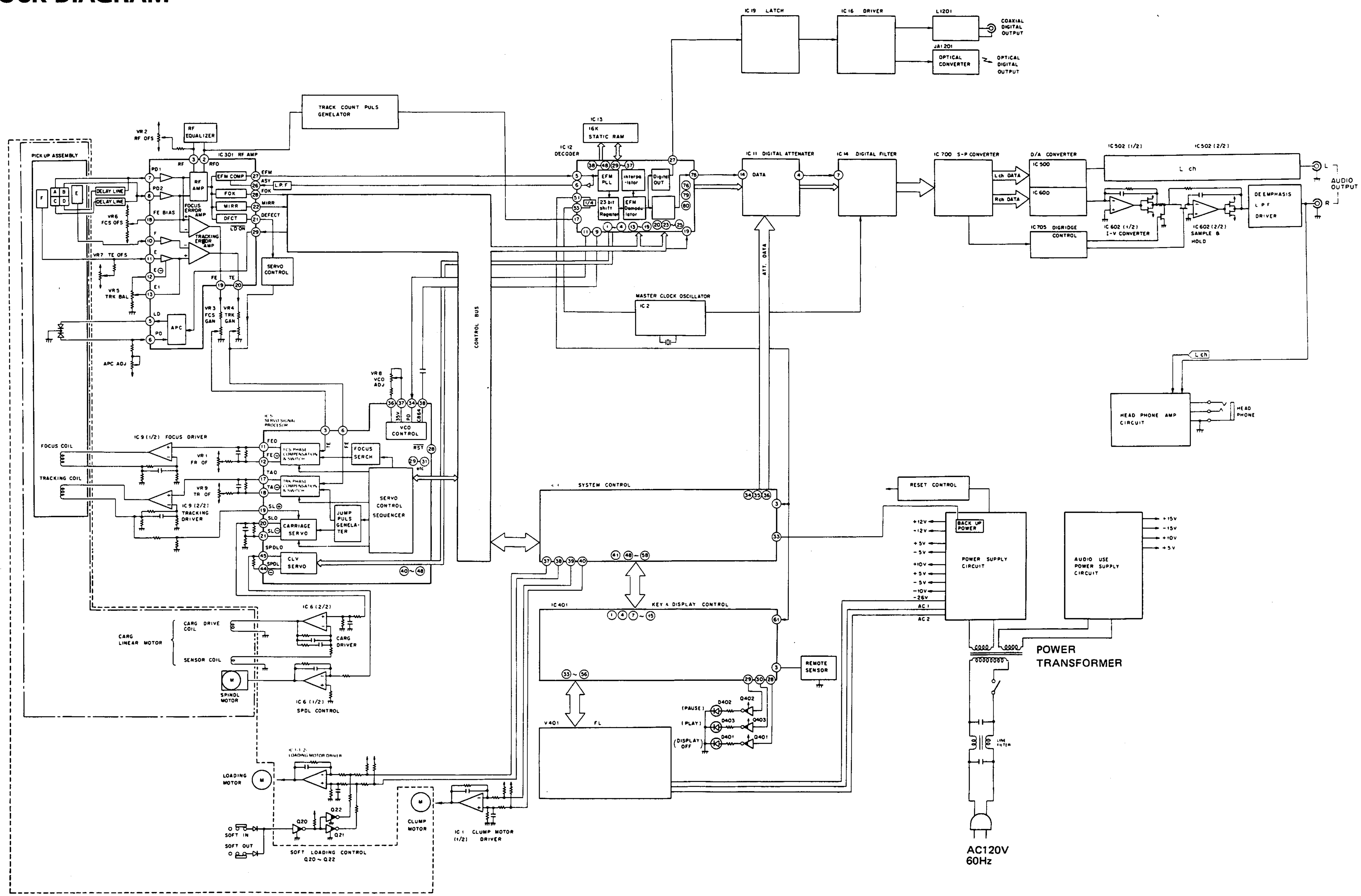
Fotografía 10-16 Ganancia óptima



Fotografía 10-17
Ganancia demasiado baja

| No. de paso | Margen del osciloscopio V | Margen del osciloscopio H | Punto de prueba | Punto de ajuste | Punto de verificación/especificación del ajuste | Secuencia de la operación de ajuste |
|---|---|---|---|---|---|---|
| **12** | **AJUSTE DE FRECUENCIA EN MARCHA LIBRE DE VCO** | | | | | |
| | | | TP3<br>Aguja2 | | Frecuencia<br>4.375MHz<br>±0.05MHz | • Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.)<br>• Cortocircuite los puentes de conexión ASY y GND con una pinza cocodrilo.<br>• Conecte un frecuencímetro (10MHz de margen) a la aguja ② TP3 .<br>• Ajuste VR8 (VCO.A) hasta que obtenga una lectura de 4,375MHz ±0,05MHz en el frecuencímetro.<br>Nota: Realice este ajuste con el tocadiscos CD en el modo de parada. |
| **13** | **COMPROBACIÓN DE ERROR DE FOCO** | | | | | |
| | | | TP1<br>Aguja6<br>(FO.ER) | Comprobación | Forma de onda | • Establezca el tocadiscos CD en el modo de pruebas. (Refiérase a la página 74.)<br>• Conecte la aguja ⑦ TP1 (FO.IN: entrada de foco) a GND.<br>• Presione la tecla TRACK FWD para comprobar la forma de onda generada por la aguja ⑥ TP1 (FO.ER: error de foco) en el osicloscopio.<br>2V/Div 1mS/Div<br><br>Forma de onda en 5 geuerada por FO.ER |

## 11. BLOCK DIAGRAM



# 12. PICK-UP DESCRIPTION

## 12.1 THE OPTICAL PATH AND OPTICAL PARTS

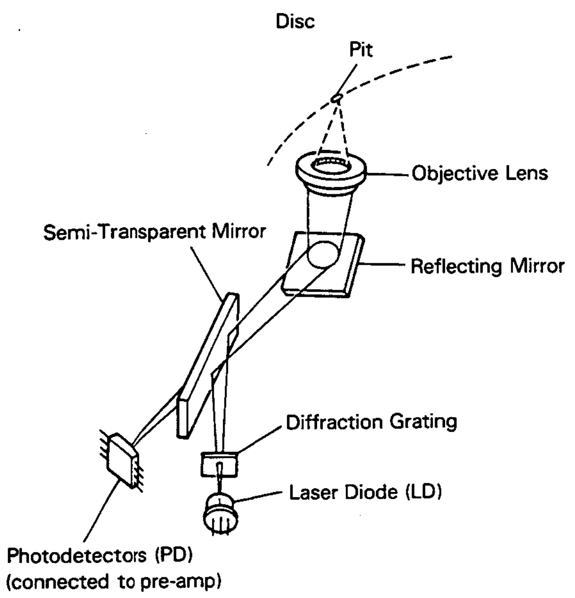



Fig. 2-1

Fig. 12-1 shows the arrangement of the optical assembly, or pick-up. The wave length of the light emitted by the laser diode is 780-790nm and is virtually invisible. The extremely tiny beam of light emitted by the LD is elliptic in form and radiates at a fixed angle of divergence. When the beam hits the diffraction grating it is diffracted into one main beam, 0, and two sub-beams, ±1.

Additional sub-beams, ±2, 3 ... n, are also generated, but these are weak and not used in the system. Next, the beams hit the semi-transparent mirror where 50% of the light is reflected and the rest is lost. The beam reflected off the semi-transparent mirror then hits the reflecting mirror where all the light is reflected onto the objective lens (finite type).

Because the pick-up in this CD player employs a finite objective lens (called 'finite' because focal length on the LD side is finite), a collimator is not necessary. The objective lens concentrates the reflected light into three extremely narrow beams, a main beam and two smaller sub-beams. The three beams are reflected off the surface of the disc, where again they pass through the objective lens. The beams then hit the semi-transparent mirror again where half of the light is reflected back onto the laser diode and the other half passes through the semi-transparent mirror and reaches the photodetectors.

This is a basic summary of the optical path. Next we will discuss in some detail the important parts in the pick-up.

## 12.2 IMPORTANT PARTS IN THE PICK-UP ASSEMBLY

### (1) The Laser Diode (LD)

A new and smaller LD, the $\phi$5.6 size, has now been developed to replace the previous $\phi$9 size. The new LD is more lightweight and generates narrower beams of light.

### (2) Objective Lens

Thanks to the introduction of the finite objective lens, the collimator is no longer necessary in the optical assembly. Costs have thus been lowered while still maintaining high pick-up performance.

Although the finite objective lens does not carry parallel beam components the way conventional infinite lenses do, it is neverthless a high quality objective lens designed to achieve ample optical performance.

### (3) Semi-Transparent Mirror

The beams of light reflected off the disc surface pass again through the objective lens and hit the semi-transparent mirror. It is a well known fact that astigmatism of the light beams occurs when they are diagonally aimed at the glass surface of a semi-transparent mirror. In conventional CD players employing such semi-transparent mirrors, the parts in the optical assembly were designed to counteract this astigmatism. In the pick-up of the PD-91, however, this astigmatism is actively utilized by the focus servo.

Furthermore, the multi-lens configuration found in conventional CD players has been discarded in the design of the PD-91. Again, greater cost effectiveness has been achieved without sacrificing high level pick-up performance. In fact, the reduced number of parts in the pick-up means less likelihood of part defects and increased reliability.

### (4) Axial Sliding Actuator

Precision positioning of the objective lens is a crucial factor of pick-up performance. In the PD-91 pick-up, the lens is driven by an axial sliding actuator. The actuator insures the maintenance of the micron-level precision required in positioning the objective lens vis-a-vis the audio track on the disc and stable tracking. Another advantage of the axial sliding actuator is the reduction in resonance it enjoys over conventional coil supported actuators and its smooth frrequency response.

### (5) Plastic Body

Computer simulation technology was used in the design process of the LD. It was determined that a plastic LD body would be most effective in suppressing structural deformation. The actual material to be used, however, was not chosen until the new plastic LD was thoroughly tested and proved that it could provide the same reliable service as conventional aluminum LD assemblies. Part plasticization also made possible a mounting configuration which had been impossible with conventional aluminum construction. The transition to plastic has substantially reduced the use of bonding agents in part construction thereby improving part reliability.

### (6) RF and Servo Signals

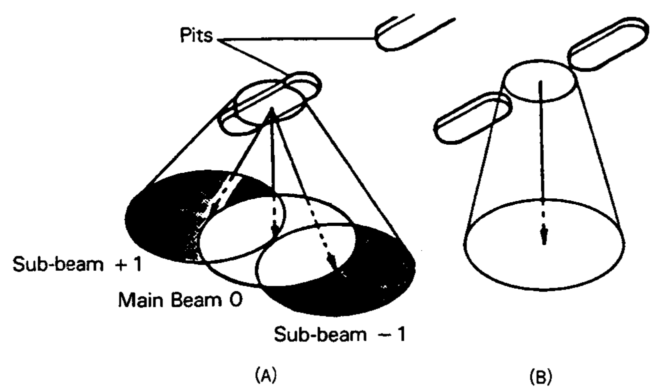



Fig. 12-2 Beam Reflection on the Disc Track Surface

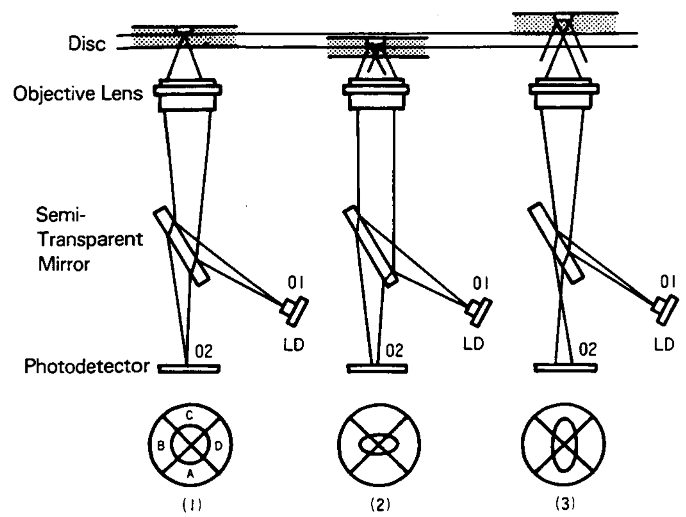



Fig. 12-3 Beam Focus on the Disc Surface

The light which has been focused and narrowed by the objective lens must be precisely beamed on the lands and pits that make up the signal on the disc track. The light reflected off the disc track passes again through the objective lens and travels through the semi-transparent mirror to the photodetectors.

Fig. 12-2 shows the way the signal is reflected off the disc signal track. In Fig. 12-2 (A) the beam is concentrated on a pit and in (B) it is concentrated between pits, or on land, as it is called. Where the beam is reflected off a pit, as in Fig. 12-2 (A), the light is diffracted and the light in the sections of the figure colored black is not reflected back through the objective lens. Only the center part of the beam passes back through the objective lens and travels to the photodetectors. In (B), the beam of light is not diffracted by the pit and is completely reflected back through the objective lens and on to the photodetectors. Obviously, the amount of light reaching the photodetectors is greater in (B) than in (A). This is the key to signal transmission in the CD player. The photodetectors sense the two levels (weaker-stronger, or more simply, on-off) of light intensity which is the high frequency EFM signal from the disc and convert it into an electrical signal. The signal is converted into an RF signal by means of an arithmetic circuit.

Fig. 12-3 shows how focus detection works. In (1), the light reflecting back through the objective lens forms a circle which touches all four photodetectors (labeled A through D) equally and signifies that the disc is in focus. The reflected pattern on the photodetectors forms an oval on the four photodetectors when there is a focus error. In (2), the disc is too close to the lens and in (3), the disc is too far. (The diffraction grating has been omitted from the figure for simplicity sake since it is not directly related to the focus signal and correction process.)

In (1) the light emitted from the LD at 01 is reflected and diffracted off the disc surface and concentrated at point 02. In (2), the point at which the light is most concentrated is beyond point 02, and in (3) the light is most concentrated at a point before point 02.

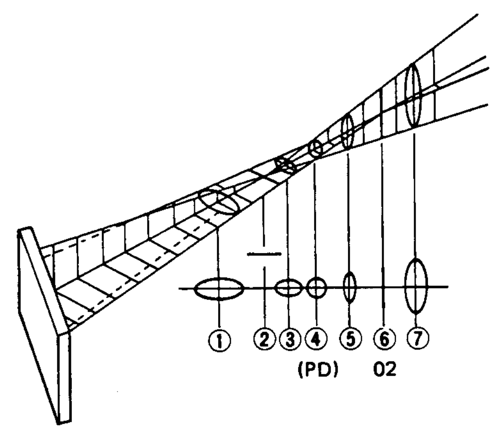



Fig. 12-4 Semi-Transparent Mirror

Fig. 12-4 displays the optical characteristics of the semi-transparent mirror. The lens affects only the vertical direction of the figures and not the lateral direction.

① through ⑦ in Fig. 12-4 show the beam shapes at varying distances from the semi-transparent mirror. Between the straight lines ② and ⑥ is the perfect circle ④. ⑥ corresponds to point (2) in Fig. 12-3. In order to make Fig. 12-4 coincide with Fig. 12-3 (1) to yield a circular beam shape, the photodetector must be set at ④. The beam shape in Fig. 12-3 (2) corresponds to a photodetector position in 12-4 that is relatively closer to the semi-transparent mirror, at about ③, with a horizontally elongated oval shaped beam. Conversely, Fig. 12-3 (3) corresponds to a photodetector position at around ⑤ with a vertically elongated oval.

The possible beam shapes that hit the photodetector are shown in Fig. 12-3. The focus signal is derived by simple arithmetic based on the signals from the four photodetectors: $(A+C)-(B+D)$.

When the objective lens is too near or far from the disc track surface most of the light does not reflect back to the photodetector. When the light that reflects back to the photodetector hits each of the four photodetectors uniformly, the focus signal is 0. When the objective lens moves too far from the disc surface it reflects a vertically elongated oval beam pattern like that of ⑦ in Fig. 12-4 on the photodetectors. In terms of the arithmetic for the focus signal, $(A+C)>(B+D)$ and the focus signal is a plus figure. As the lens moves closer to the disc to correct focus, the beam shape reaches its peak (a vertical line) at ⑥ and the lens continues to move away from the disc surface until $(A+C)-(B+D)=0$ and the beam reflects a perfect circle on the photodetectors. Conversely, when the objective lens is too close to disc surface, a horizontally elongated oval beam will fall on the photodetector. In terms of the focus signal $(A+C)<(B+D)$ is a minus figure. As the objective lens moves away from the disc, it passes the horizontal line peak at ② and continues until the focus signal is 0. Fig. 12-5 graphs the typical S-shaped curve derived from the $(A+C)-(B+D)$ focus signal.

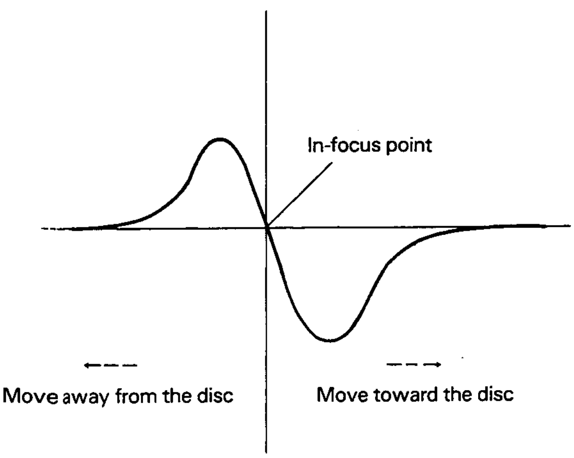



Fig. 12-5 The S-Shaped Curve

The focus servo functions to maintain a focus signal exactly equal to zero. In actuality, however, the very tiny non-linearities at the center of the S-curve show up as residual errors.

Fig. 12-6 shows how the tracking signal is detected.

As already mentioned above, the diffraction grating diffracts the light from the LD into a main beam and two sub-beams which are used to generate the tracking signal. These beams are concentrated on the disc surface in the same way as the main beam. The sub-beams should be equidistant from the main beam on the track surface, positioned in relation to the track surface and main beam as shown in Fig. 12-6. (On the actual track surface the distance from the main beam is actually proportionally larger than is shown in the diagram.) The sub-beams are reflected and diffracted back to their special photodetectors (E,F). If the beam intensity on both photodetectors is equal, the main beam is tracking properly.

Fig. 12-7 shows the wave output of the photodiodes A-F.

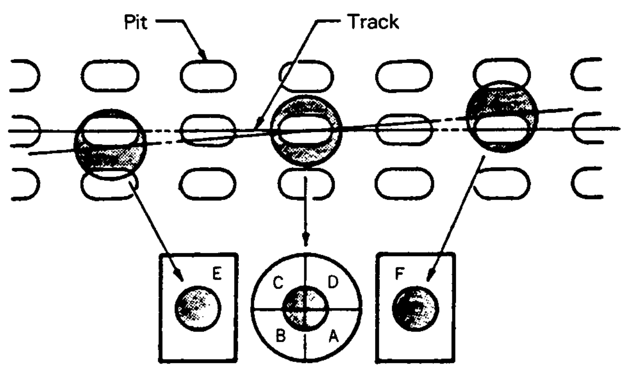



Fig. 12-6 Tracking Error Detection

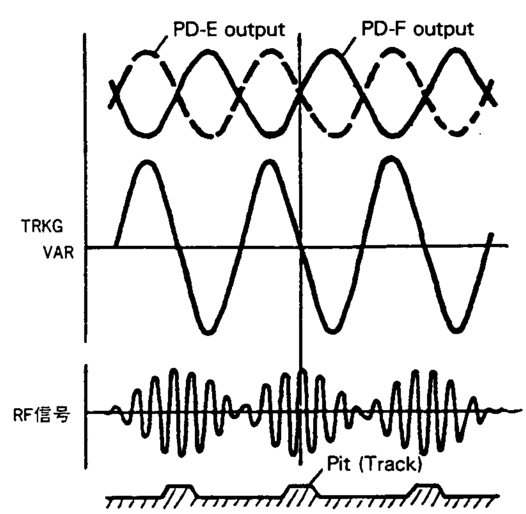



Fig. 12-7 Tracking Error and RF Signals

# 13. CIRCUIT DESCRIPTION

## 13.1 PRE-AMP

The pre-amp circuitry processes the pick-up output signal and generates signals destined for servo, decoding and system microprocessor circuitry.

It consists primarily of an IC301:CXA1081S. Below we will discuss this circuitry in some detail. Fig. 13-1 is a block diagram of the CXA1081S.

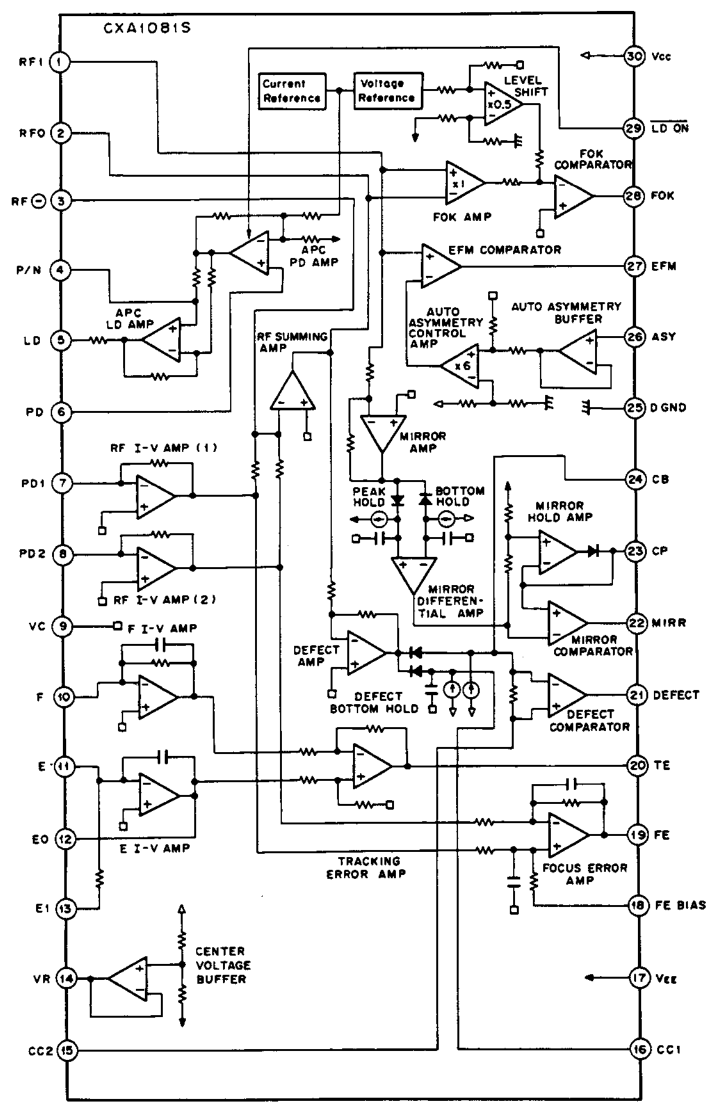



Fig. 13-1

### 13.1.1 Accufocus System

The PD-91 utilizes an Accufocus System to reduce distortion in the RF signal output by the pickup. Among the four main photodetectors, the output from two of the detectors is ahead of the other two and is delayed before adding with a view towards improved frequency response, distortion, S/N ratio and increased signal readout precision. (See Fig. 13-2.)

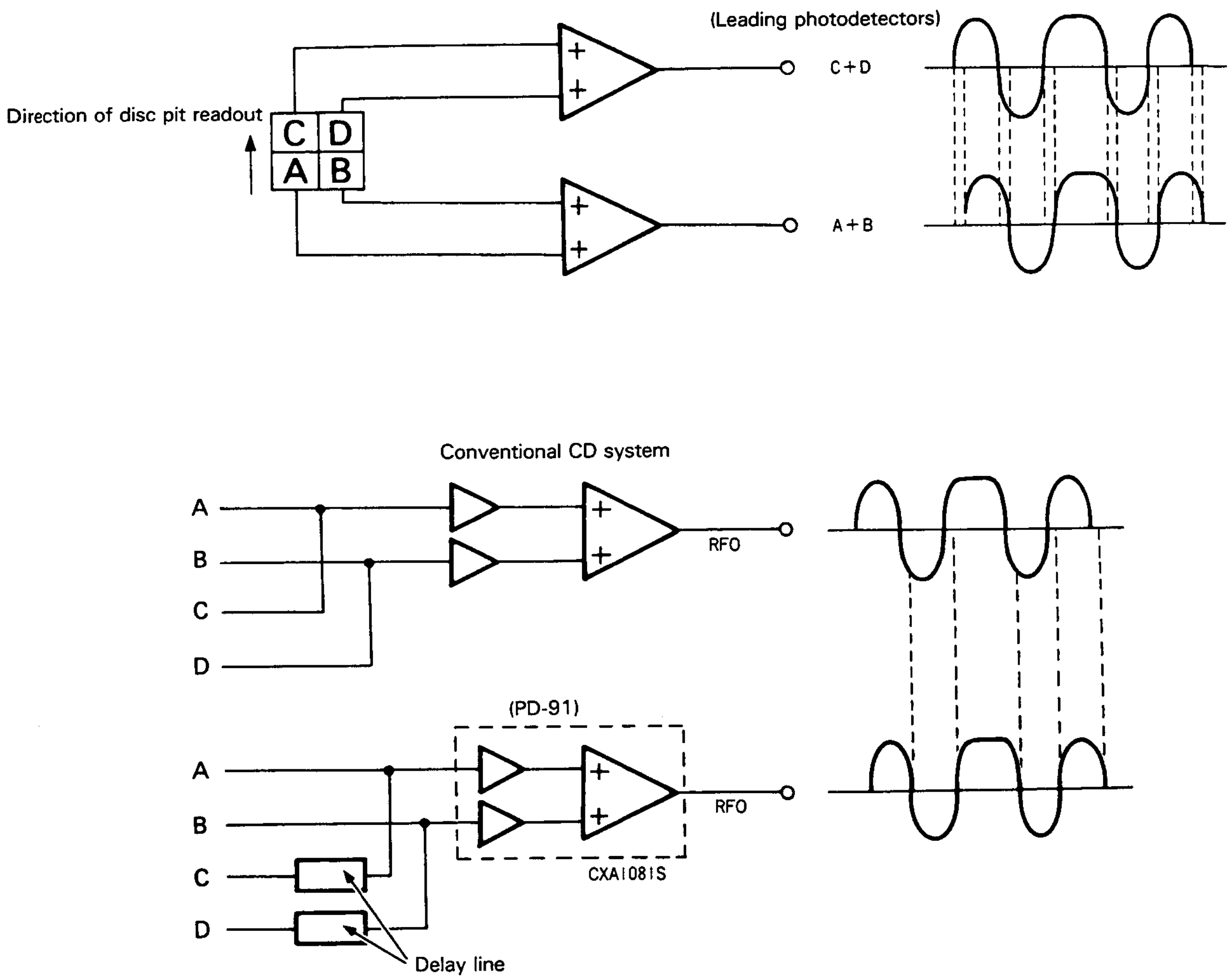



Fig. 13-2

### 13.1.2 RF Amp

The output voltage from the photodiodes, output to input terminals PD1 and PD2, is amplified by about 5 times at 58kΩ of resistance by RF I-V amps (1) and (2). The RF summing amp performs signal addition and the output voltage derived from the current to voltage conversion of the four photodetectors (A + B + C + D) is output to the RFO terminal. At this terminal an eye pattern check of the beam can be done.

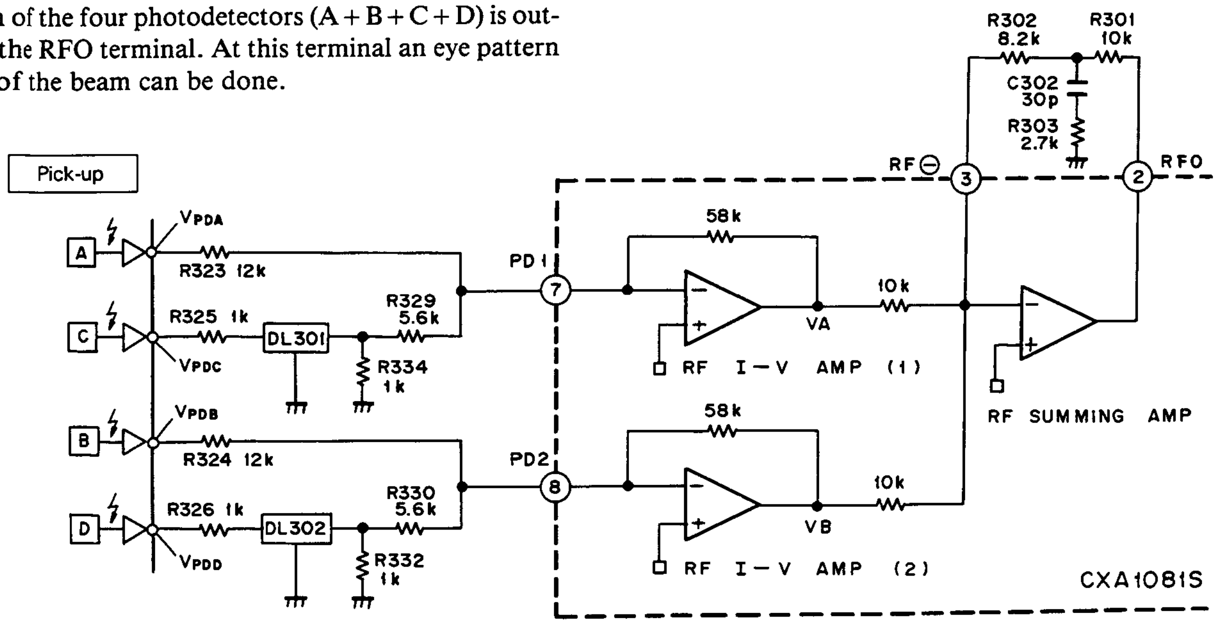



Fig. 13-3

The low frequency components of RFO output voltage $V_{RFO}$ are computed as follows:

$$V_{RFO} = 1.8 \times (V_A + V_B)$$
$$= 1.8 \times \frac{58K}{12K} \times (V_{PDA} + V_{PDB} + V_{PDC} + V_{PDD})$$

### 13.1.3 Focus Error Amp

The Focus Error Amp subtracts the output (VB) of RF I-V amp (2) from the output (VA) of RF I-V amp (1) and outputs the voltage derived from the current to voltage conversion of photodetectors (A + C) − (B + D).

FE output voltage (low frequency) is:

$$V_{FE} = 5.4 \times (V_A - V_B)$$
$$= 5.4 \times \frac{58k\Omega}{12k\Omega} \times (V_{PDA} + V_{PDC} - V_{PDB} - V_{PDD})$$

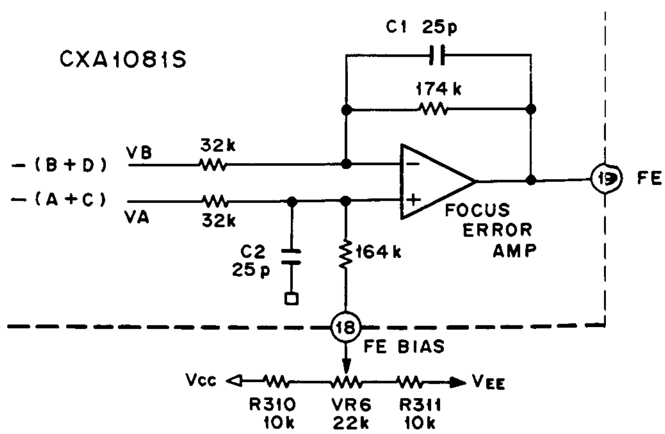



Fig. 13-4

### 13.1.4 Focus OK Circuit

The Focus OK Circuit creates a timing window for switching from focus search mode to focus servo ON.

Based on the RF signal at pin No. ②, both the HPF output at pin No. ① and the LPF output (in reverse phase) from the Focus OK amp are derived.

When Focus OK output, $V_{RFI}$-$V_{RFO}$ corresponds to $-0.37V$, it is reversed.

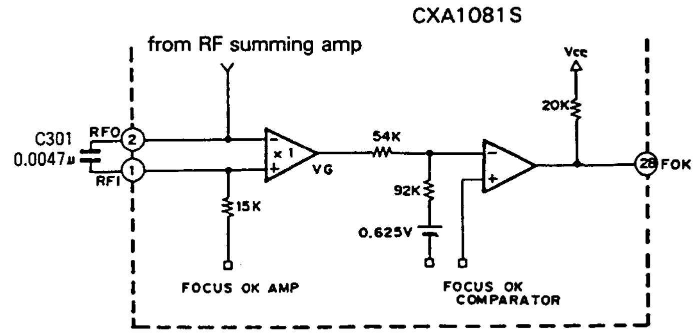



Fig. 13-5

### 13.1.5 Tracking Error Amp

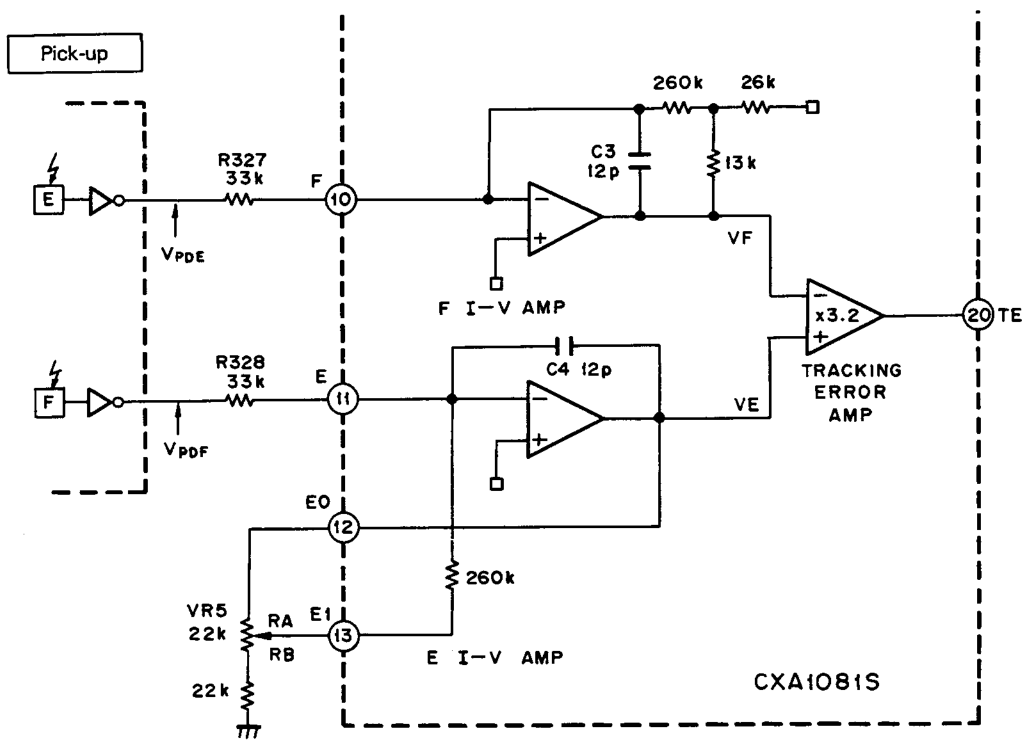



Fig. 13-6

The voltage generated by the side photodetectors (E and F), input to terminals E and F, is amplified by EI-V and FI-V amps.

$$V_F = \frac{403k\Omega}{33k\Omega} \times V_{PDE}$$

$$V_E = [260k\Omega \times RA/(RB + 22k\Omega) + (RA + 260k\Omega)]/33k\Omega \times V_{PDF}$$

The Tracking Error Amp takes the difference in output from EI-V and FI-V amps and derives an output voltage from the current to voltage conversions originating from the E-F photodetectors.

$$V_{TE} = (V_E - V_F) \times 3.2$$
$$= (V_{PDE} - V_{PDF}) \times \frac{403k\Omega}{33k\Omega} \times 3.2$$

### 13.1.6 Mirror Circuit

After the RFI signal is amplified, the Mirror Circuit performs peak and bottom hold functions. Peak hold can handle a traverse signal as high as 30kHz and bottom hold has a time constant that enables it to follow the rotation period of envelope fluctuations.

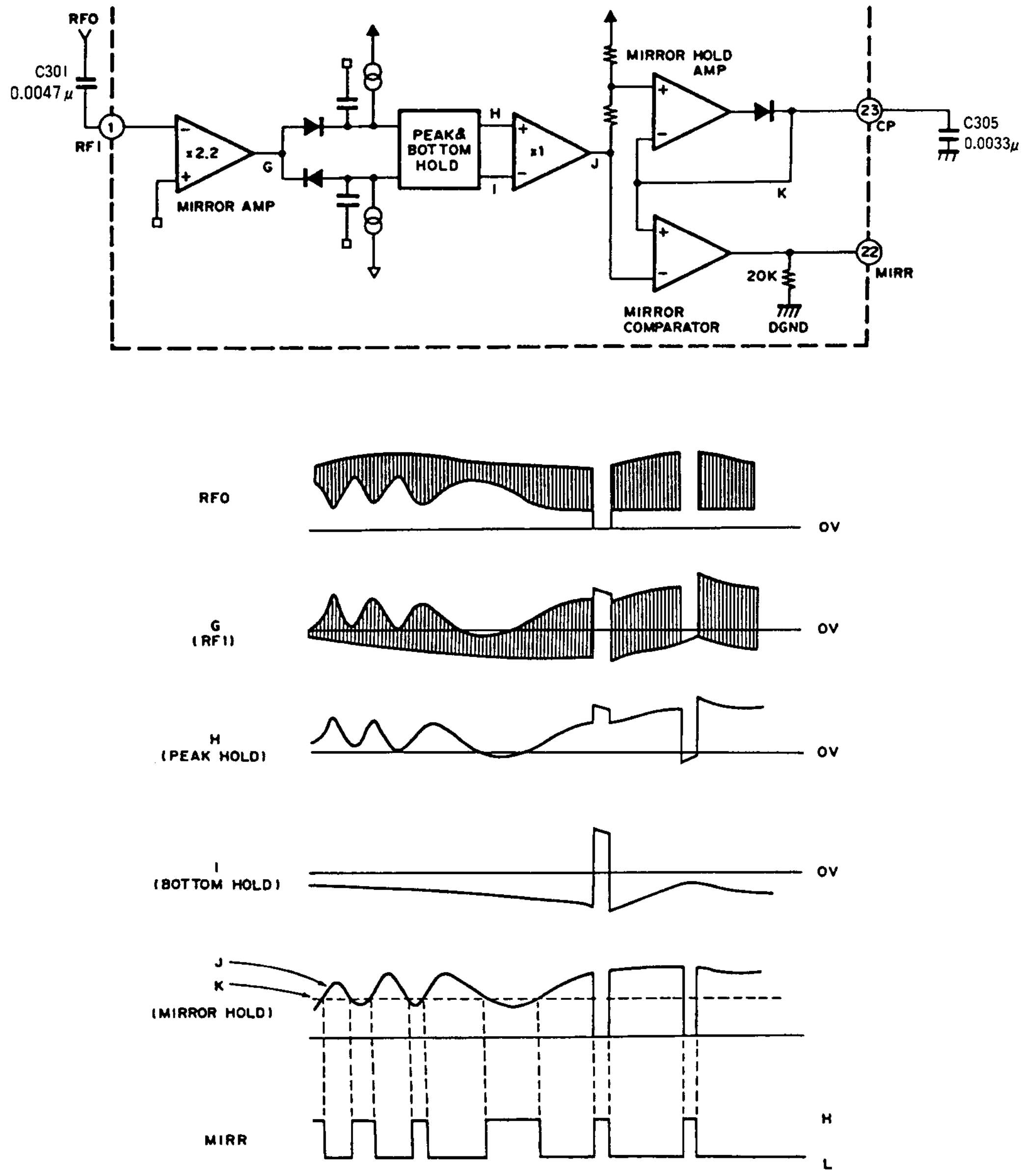



Fig. 13-7

The envelope signal J, DC-reproduced, is obtained by differential amplification of peak and bottom hold signals H and I. Mirror output is derived by a comparison between signal J and the peak hold signal K which is 2/3 of the peak value at a long time-constant. Mirror output is H when the primary beam is on a mirror (or land) section of the track or when a defect is detected.

### 13.1.7 EMF Comparator

The EFM comparator functions to convert the RF signal into binary signals. Since the asymmetry that arises as a result of irregularities in the disc track surface cannot be eliminated by mere AC coupling, the system utilizes the fact that there is a 50% probability of occurrence of a 1 or a 0 in the digitized binary EFM signal to control the nominal voltage of the EFM comparator.

Because the EFM comparator works as a current switch, the respective levels of H and L do not become equal to the supply voltage. Therefore, feedback has to be applied through the C-MOS buffer of the decoder.

R47, R314, C91 and C316 constitute a low pass filter for obtaining the DC of (Vcc + DGND)/2(V).

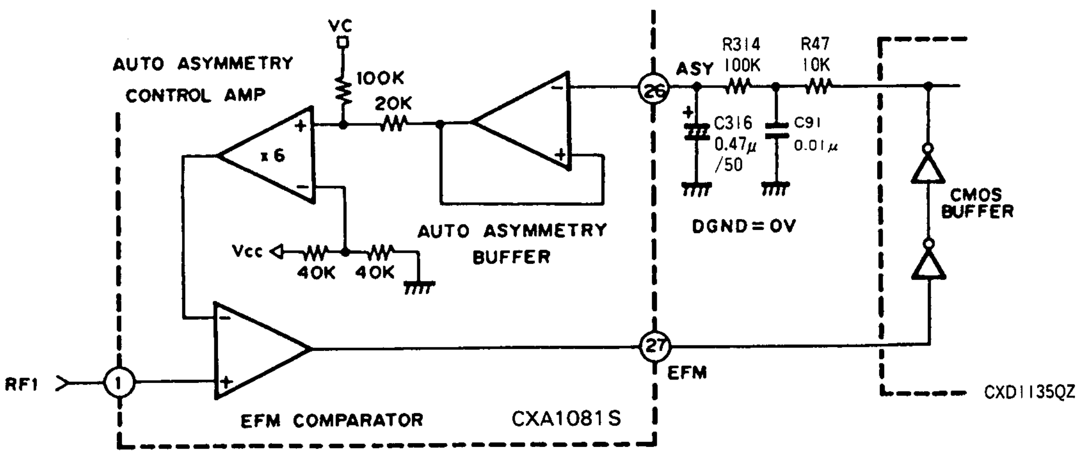



Fig. 13-8

### 13.1.8 DEFECT Circuit

After the RFI signal is reversed, bottom hold is performed at long and short time-constants. The short time-constant bottom hold responds to defects in the disc mirror surface that are longer than 0.1msec, while the long time-constant bottom hold maintains the level where it was right before the defect was encountered on the disc mirror surface. After passing through a C-coupler, differentiation and level shifting circuit, the surface defect detection signal is generated on the basis of comparison of these two signals.

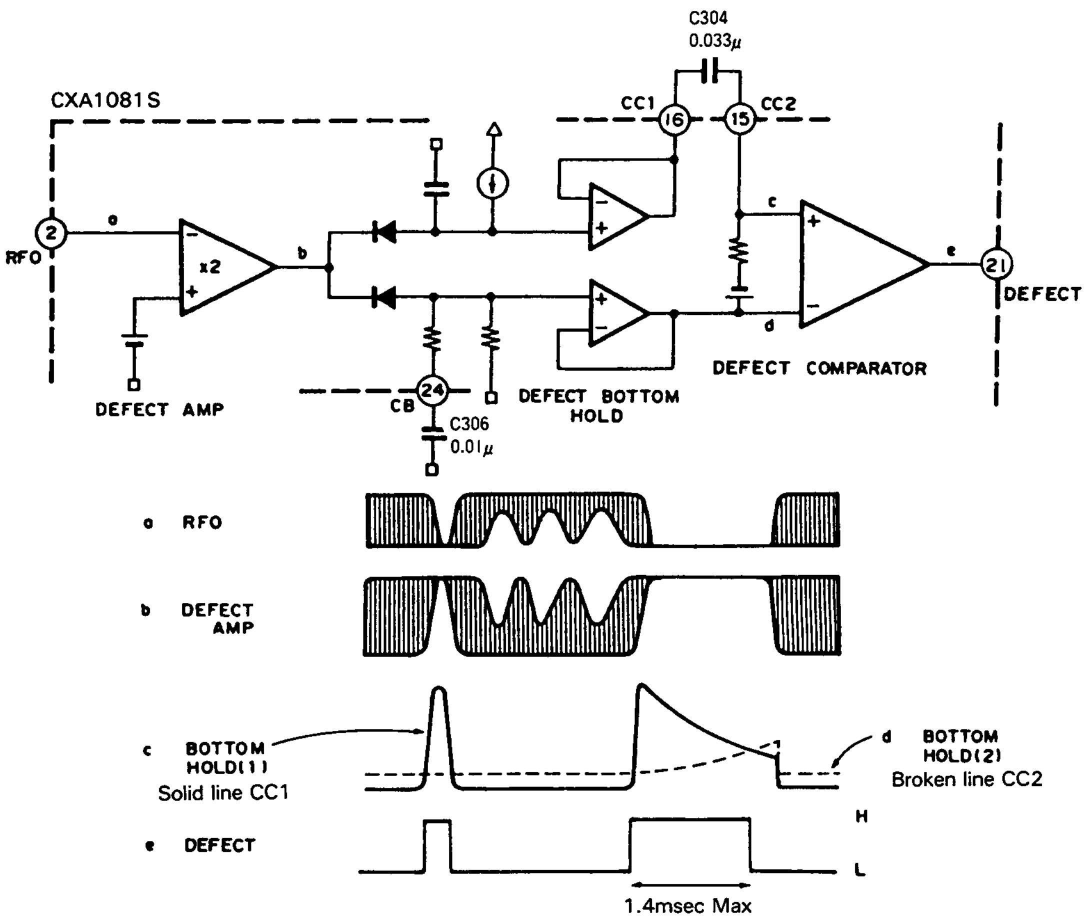



Fig. 13-9

### 13.1.9 APC (Automatic Power Control) Circuit

Because the LD imposes the thermal characteristics of a large load, LD output must be monitored by a photo-detector and the current supply to it controlled to insure constant output. This function is performed by the APC circuit.

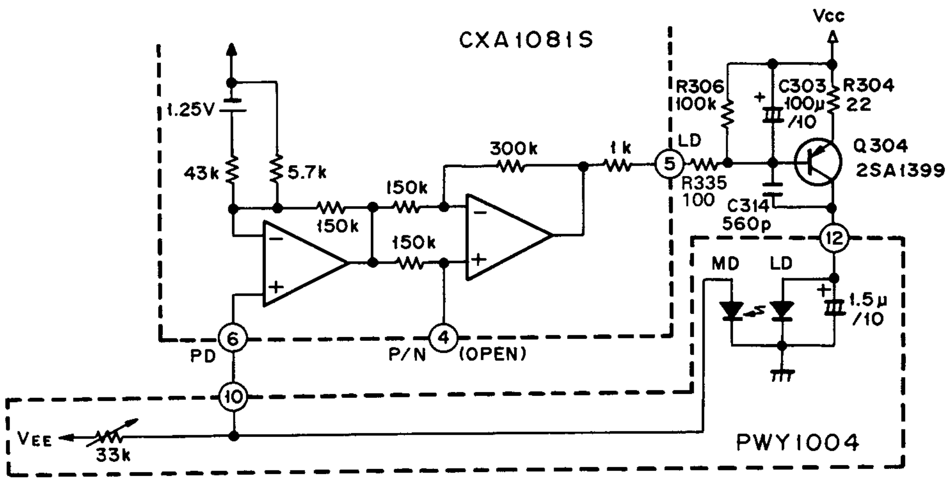



Fig. 13-10

### 13.1.10 Track Count Pulse Circuit

During a search operation when the carriage makes a large movement, this circuit generates a pulse signal so that the number of tracks jumped can be counted.

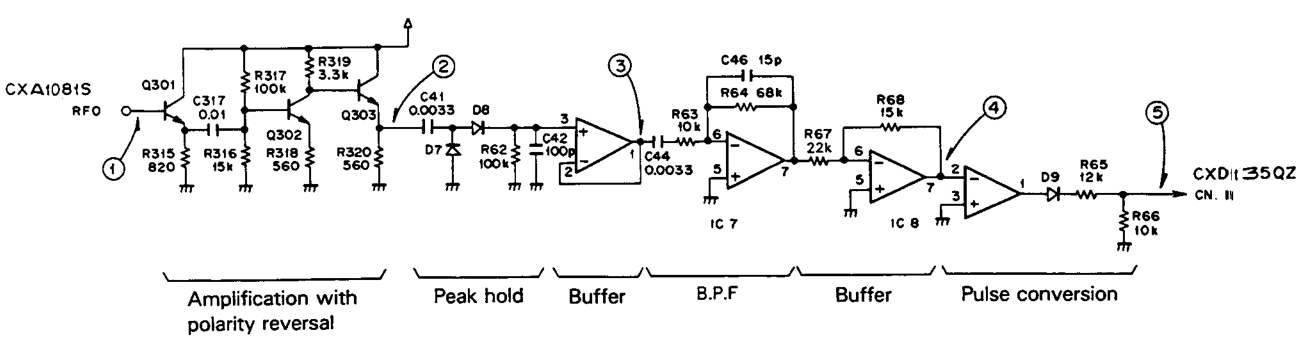



Fig. 13-11

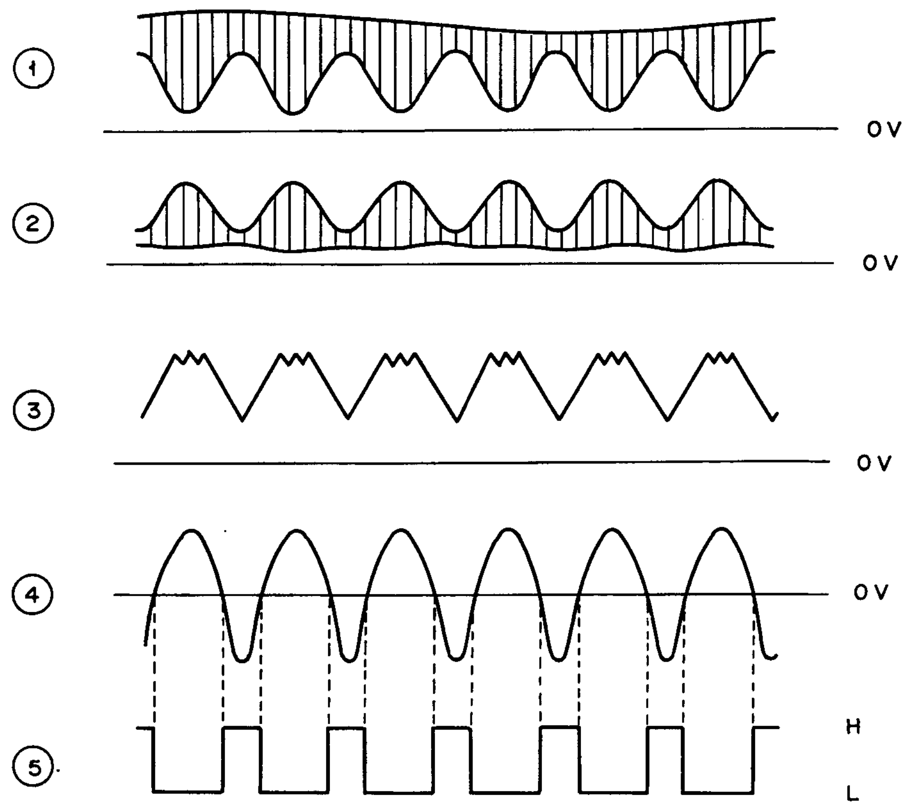



Fig. 13-12

After amplification with polarity reversal of the RFO signal, peak hold is performed and the envelope signal is demodulated (③). The track count pulse (⑤) (corresponding to the RF waveform envelope) is generated by passing the demodulated envelope signal (③) through a 4.8k—156kHz B.P.F. and performing pulse conversion with a zero cross comparator.

Because the detection band of this circuit is in the range 1.2k—125kHz, it can be used when making large carriage movements. (See. Fig. 13-13)

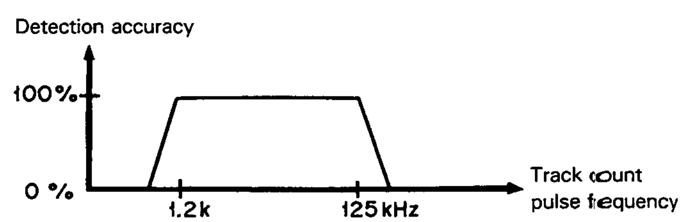



Fig. 13-13

### 13.2 THE SERVO SECTION

Signals from the system microprocessor control the normal operation of the focus, tracking, carriage, spindle and EFM-PLL servos as well as the control of special functions like focus-in, track skip, etc.

The servo section is primarily made up of IC5: CXA1082AS and IC12: CXD1135QZ. Explanations of the important sections of these ICs are given below.

Figs. 13-14 and 13-15 are block diagrams of the CXA1082AS and CXD1135QZ, respectively.

### CXA1082AS

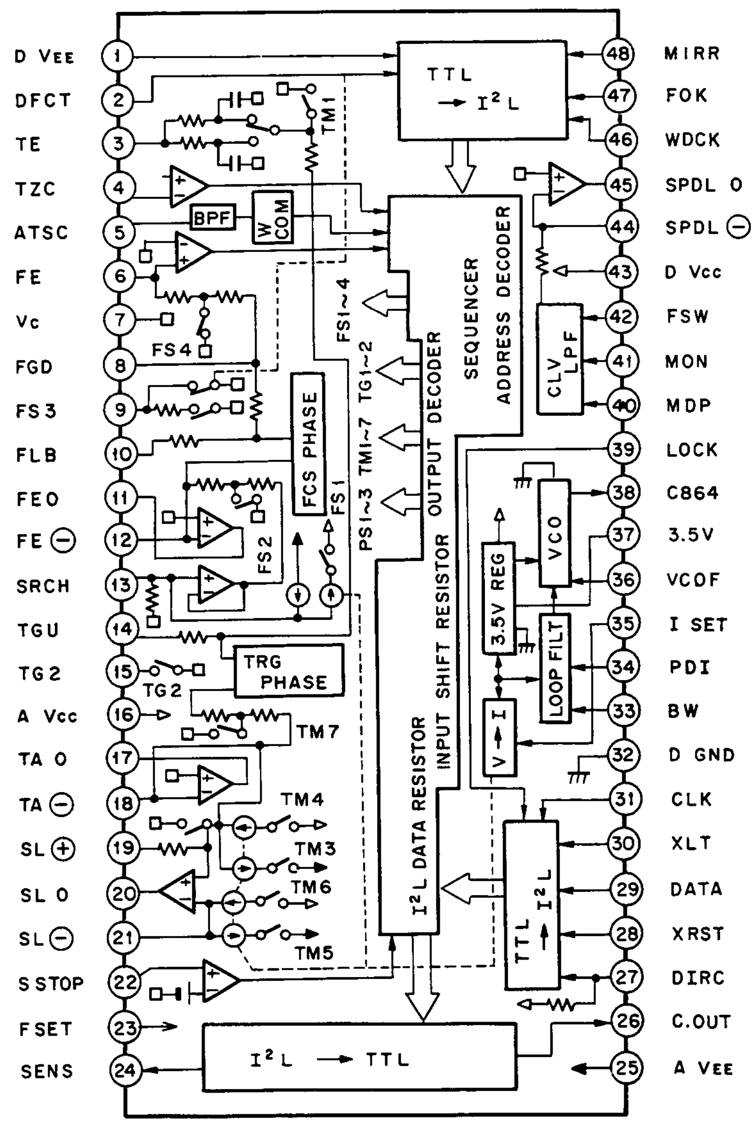



Fig. 13-14

CXD1135QZ

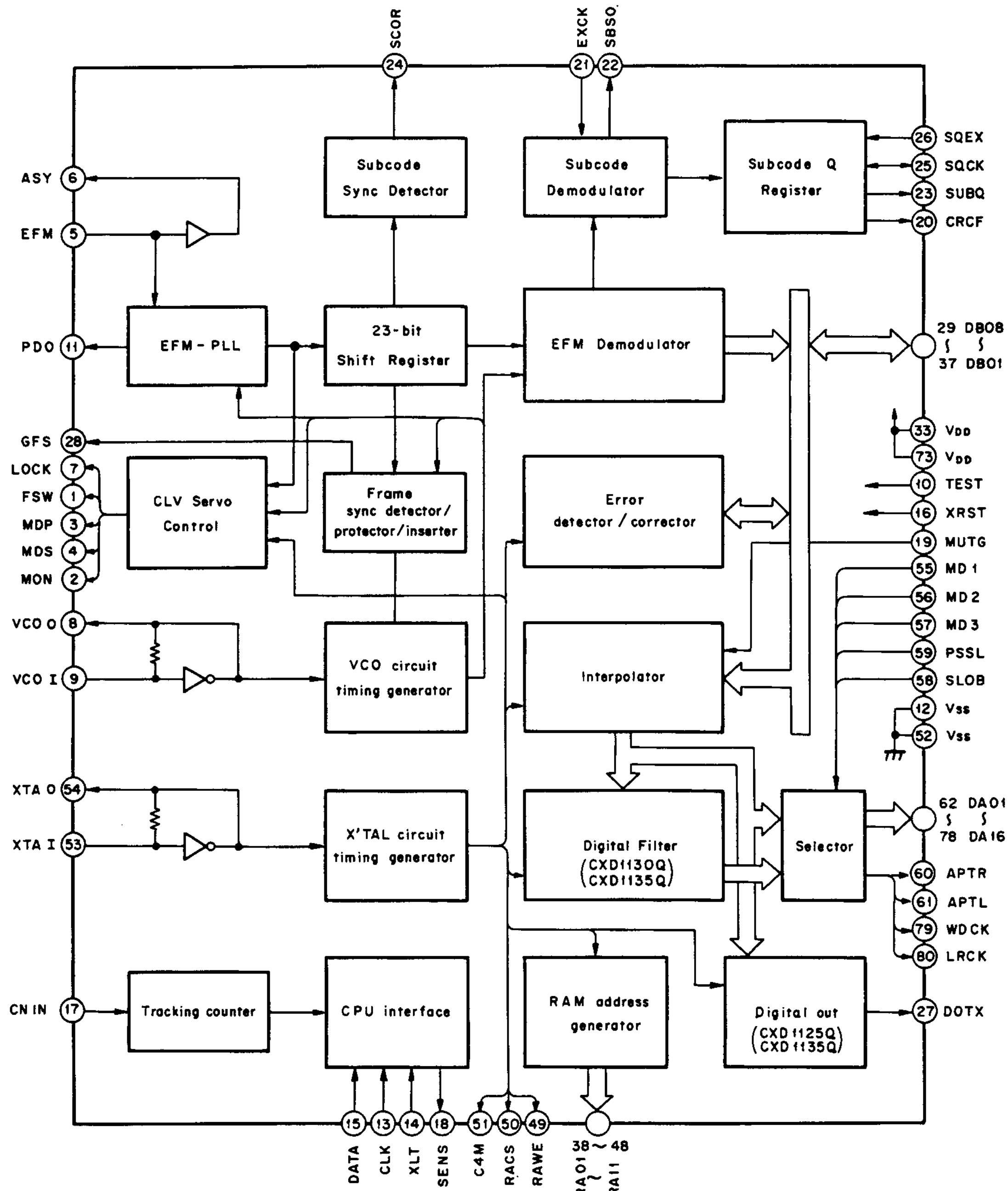



Fig. 13-15

### 13.2.1 Command Codes

Servo control functions are performed by IC5: CXA1082AS and IC12: CXD1135QZ in conjunction with serial data from the system microprocessor. Detection output from the ICs is output through the SENS terminal.

Control data and detection output are sent via bus line that connects system microprocessor, CXA1082AS and CXD1135QZ. Fig. 13-16 is the CPU Serial Interface Timing Chart and a listing of the timing units and their durations is given in Table 13-1. Table 13-2 lists the system microprocessor data and SENS terminal modes.

Table 13-1

| Item | Code | Minimum value | Standard value | Maximum value | Unit |
|---|---|---|---|---|---|
| Clock frequency | fck | – | – | 1 | MHz |
| Clock pulse width | fwck | 500 | – | – | ns |
| Setup time | tsu | 500 | – | – | ns |
| Hold time | th | 500 | – | – | ns |
| Delay time | $t_D$ | 500 | – | – | ns |
| Latch pulse width | $t_{WL}$ | 1000 | – | – | ns |

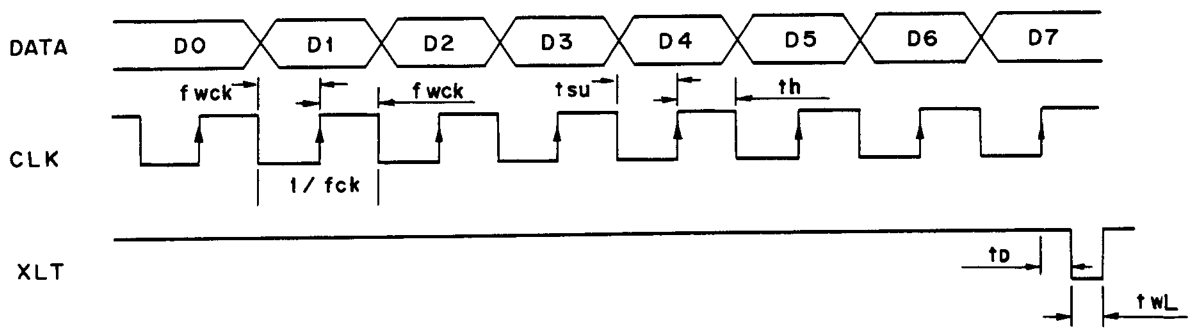



Fig. 13-16 CPU Serial Interface Timing Chart

Table 13-2 System Microprocessor

| Control IC | Item | | ADDRESS D7D6D5D4 | DATA D3 | D2 | D1 | D0 | SENS output |
|---|---|---|---|---|---|---|---|---|
| CXA1082AS | Focus Control | | 0 0 0 0 | FS4 Focus ON | FS3 Gain Down | FS2 Search ON | FS1 Search Up | FZC |
| | Tracking Control | | 0 0 0 1 | Anti Shock | Brake ON | TG2 Gain Set | TG1 Gain Set | A.S |
| | Tracking Mode | | 0 0 1 0 | Tracking Mode *1 | | Sled Mode *2 | | TZC |
| | Select *3 | | 0 0 1 1 | PS4 Focus Search +2 | PS3 Focus Search +1 | PS2 Sled Kick +2 | PS1 Sled Kick +1 | SSTOP |
| | Auto Sequency *4 | | 0 1 0 0 | AS3 | AS2 | AS1 | AS0 | BUSY |
| | *5 RAM SET | Blind (A,E)/Overflow(C) | 0 1 0 1 | 0.18ms | 0.09ms | 0.045ms | 0.022ms | Hi-Z |
| | | Brake (B) | | 0.36ms | 0.18ms | 0.09ms | 0.045ms | |
| | | Kick (D) | 0 1 1 0 | 11.6ms | 5.8ms | 2.9ms | 1.45ms | |
| | | Track Jump (N) | 0 1 1 1 | 64 | 32 | 16 | 8 | |
| | | Track Move (M) | | 128 | 64 | 32 | 16 | |
| CXD1135QZ | New function control *6 | | 1 0 0 1 | ZCMT | HZPD | NCLV | CRCQ | HiZ |
| | Synch protection, Attenuator *7 | | 1 0 1 0 | GSEM | GSEL | WSEL | ATTM | Hi-Z |
| | Counter set, lower 4 bits *8 | | 1 0 1 1 | Tc3 | Tc2 | Tc1 | Tc0 | COMPLETE |
| | Counter set, upper 4 bits *8 | | 1 1 0 0 | Tc7 | Tc6 | Tc5 | Tc4 | COUNT |
| | CLV control *9 | | 1 1 0 1 | DIV | $T_B$ | Tp | GAIN | Hi-Z |
| | CLV mode *10 | | 1 1 1 0 | CLV mode | | | | Pw264 |

Hi-Z : High impedance

*1 TRACKING MODE

| | D3 | D2 |
|---|---|---|
| OFF | 0 0 | 0 |
| ON | 0 0 | 1 |
| FWD JUMP | 1 1 | 0 |
| REV JUMP | 1 1 | 1 |

*2 SLED MODE

| | D1 | D0 |
|---|---|---|
| OFF | 0 | 0 |
| ON | 0 | 1 |
| FWD MOVE | 1 | 0 |
| REV MOVE | 1 | 1 |

*3 SELECT : Focus and carriage kick height control

*4 AUTO SEQUENCE

| | AS3 | AS2 | AS1 | AS0 |
|---|---|---|---|---|
| CANCEL | 0 | 0 | 0 | 0 |
| FOCUS ON | 0 | 1 | 1 | 1 |
| 1 TRACK JUMP | 1 | 0 | 0 | X |
| 10 TRACK JUMP | 1 | 0 | 1 | X |
| 2N TRACK JUMP | 1 | 1 | 0 | X |
| M TRACK MOVE | 1 | 1 | 1 | X |

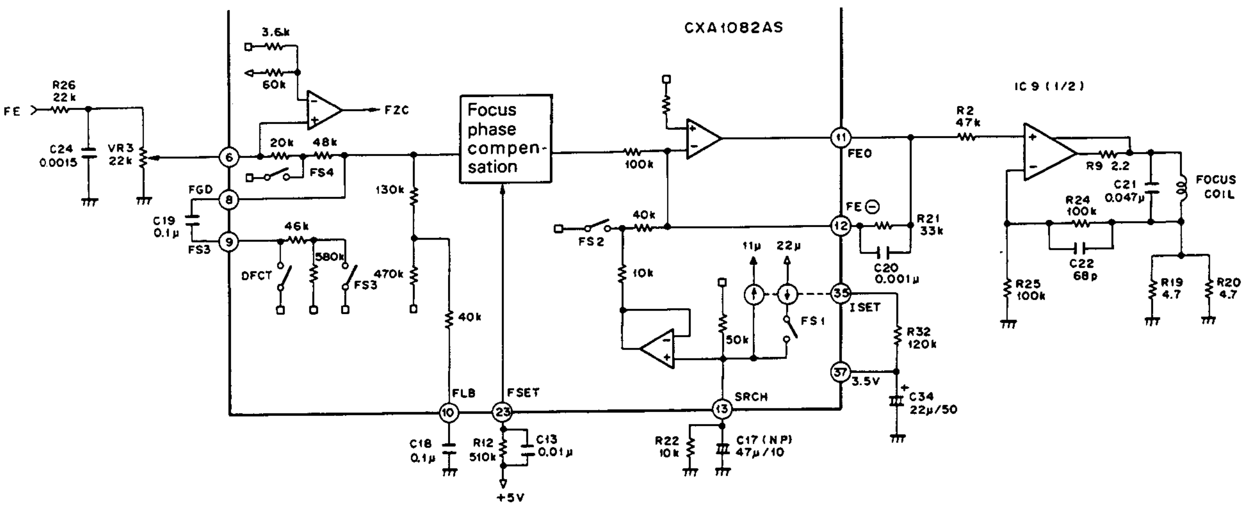
X=0 FORWARD
X=1 REVERSE

*5 RAM SET; Auto sequence timing control
*6 ZCMT; Zero cross mute
HZPD; EFM-PLL defect countermeasure
NCLV; New CLV-P servo
CRCQ; Q data output sequence
*7 GSEM, GSEL, WSEL; Frame synchronizing signal protection, Internal compensation control
ATTM; Attenuator control
*8 Tc0-Tc7; Setting the frequency division ratio in the Tracking counter
*9 CLV Control; CLV servo control
*10 CLV MODE

| Mode | D3~D0 | MDP terminal | MDS terminal | FSW terminal | MON terminal |
|---|---|---|---|---|---|
| STOP | 0 0 0 0 | L | Z | L | L |
| KICK | 1 0 0 0 | H | Z | L | H |
| BRAKE | 1 0 1 0 | L | Z | L | H |
| CLV-S | 1 1 1 0 | CLV-S | Z | L | H |
| CLV-H | 1 1 0 0 | CLV-H | Z | L | H |
| CLV-P | 1 1 1 1 | CLV-P | CLV-P | Z | H |
| CLV-A | 0 1 1 0 | CLV-S or CLV-P | Z or CLV-P | L or Z | H |
| CLV-A' | 0 1 0 1 | CLV-S'P | Z or CLV-P | L or Z | H |

Z : high impedance

### 13.2.2 Focus Servo Circuitry




Above is a block diagram of the focus servo circuitry. When FS3 is ON, higher range gain of the focus servo can be reduced. The control is determined by the low range time-constant generated by the capacitor and internal resistor connected between terminals No. 8 and 9.

Lower range control of the focus servo in the normal playback mode is controlled by the time constant generated by the capacitor located between terminal No. 10 and GND.

The peak frequency of focus phase compensation is inversely proportional to the value of R 12 connected to terminal No. 23. When resistance is 510k, peak frequency is set at approximately 1.2kHz.

The amplitude of the focus search signal obtained when FS1 and FS2 are controlled becomes 1.1Vp-p as in the case of the constants shown in the above diagram. The height is inversely proportional to the value of R12 which is connected between terminals No. 35 and 37. It should be remembered that when the resistance is altered not only focus search height but the height of track jump and carriage kick as well are altered. The setting can be varied by system control (serial data) within a range of 1 — 4 times.

The standard voltage for the reversed input of comparator FZC is set at 5.7% the value of Vcc and VC (terminal No. 7), i.e., (Vcc — VC) × 5.7%.

* Altering the resistance value of the resistor connected to terminal No. 23 will at the same time alter the phase compensation peak value for focus, tracking and carriage servo as well as the fc of the CVL LPF. It will, in addition also alter the dynamic range of the OP Amp and offset voltage.

#### (a) Focus In Sequence

Focus In Sequence drives the lens to the correct focus position over the disc surface, thereby producing the proper S-shaped focus error check waveform to close the servo loop.

The Focus In Sequence uses the built-in auto sequence function (Auto focus, Fig. 13-18) on IC5: CXA1082AS which is shown in Fig. 13-17.

When Focus In does not work on the first try, move the lens up and then down and then repeat the sequence.

### Auto Focus (CXA1082AS Auto Sequence)

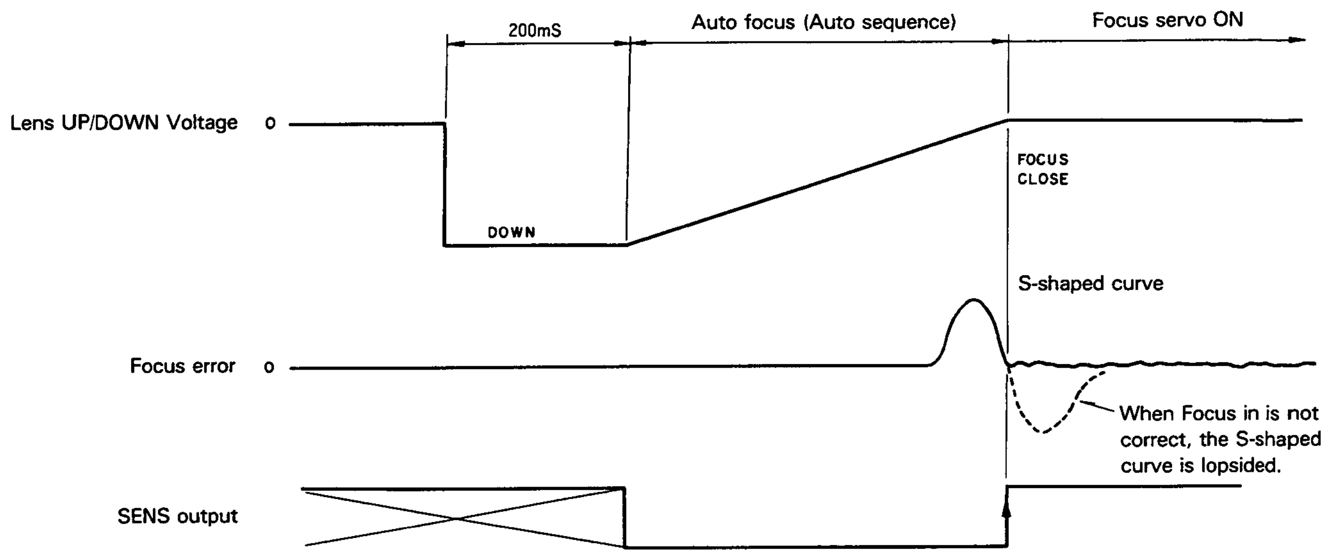



Fig. 13-18

### Timing Chart

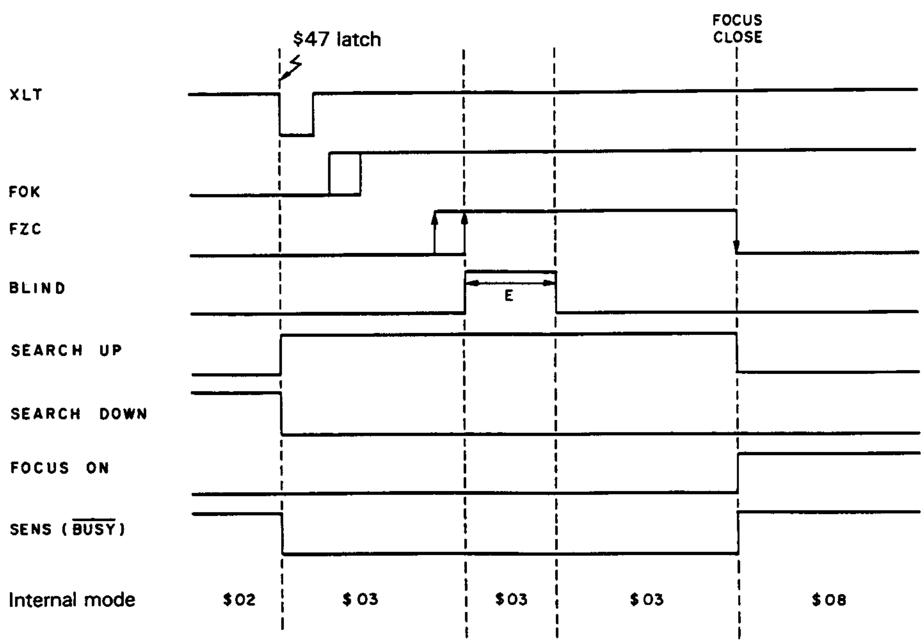



Fig. 13-19

### 13.2.3 Tracking Carriage Servo Circuitry

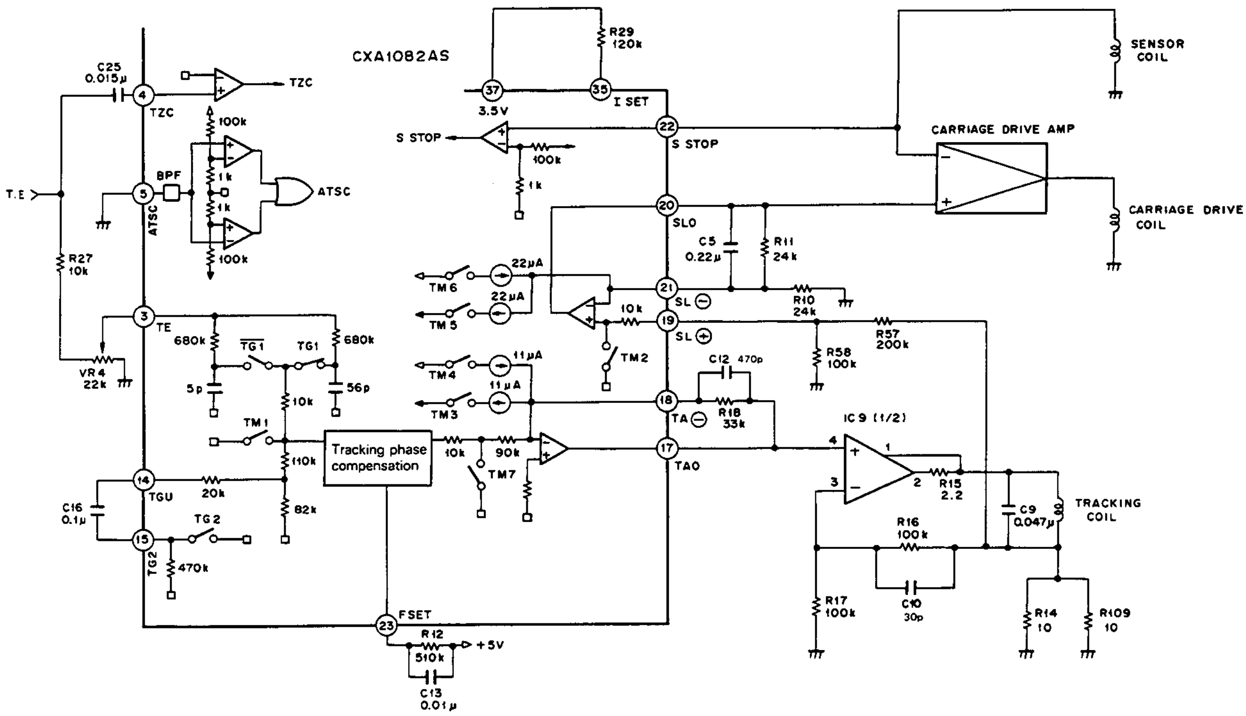



Fig. 13-20

Fig. 13-20 is a block diagram of the tracking carriage servo circuitry.

When TG2 is OFF, the capacitor between terminals No. 14 and 15 generates the time constant for reducing higher range gain. The peak frequency for tracking phase compensation is also inversely proportional to the value of R12 connected to Terminal No. 23. When the resistance is 510kΩ the peak frequency is approximately 1.2kHz.

For track jumping in the forward or reverse directions, TM3 or TM4 must be ON. At that time, the peak voltage of terminal TAO is determined by the current value of TM3 or TM4 and feedback resistor from terminal No. 18, i.e.,

Track skip peak voltage = TM3 (TM4) current value × feedback resistance value (R18).

Either TM5 or TM6 must be ON to operate carriage kick in either forward or reverse. At that time, the peak voltage for terminal SLO is determined by the current value of TM5 or TM6 and feedback resistor from terminal No. 21.

Carriage jump peak voltage = TM5 (TM6) current value × feedback resistance value (R11).

The resistor connected between terminals No. 35 and 37 determines the current level for the switches. When it is set at 120kΩ:

TM3, TM4 are $11\mu$A TM5, TM6 are $\pm 22\mu$A.

The settings for TM5 and TM6 can be varied within a range of ±1 — ±4 times by system control (serial data).

S-STOP is the signal used to detect the point at the innermost circumference of the disc beyond which the linear motor should not go.

Fig. 13-21 is a circuit diagram of the carriage circuitry only.

During normal play, the voltage at resistors R14 and R109 (in the tracking control system) is used as the input for driving the linear motor, and servo control is applied.

The speed feedback loop (shown in the marked off section of Fig. 13-21 which is labeled A) driven by a DC linear generator in the carriage drive amp section has greatly improved carriage response.

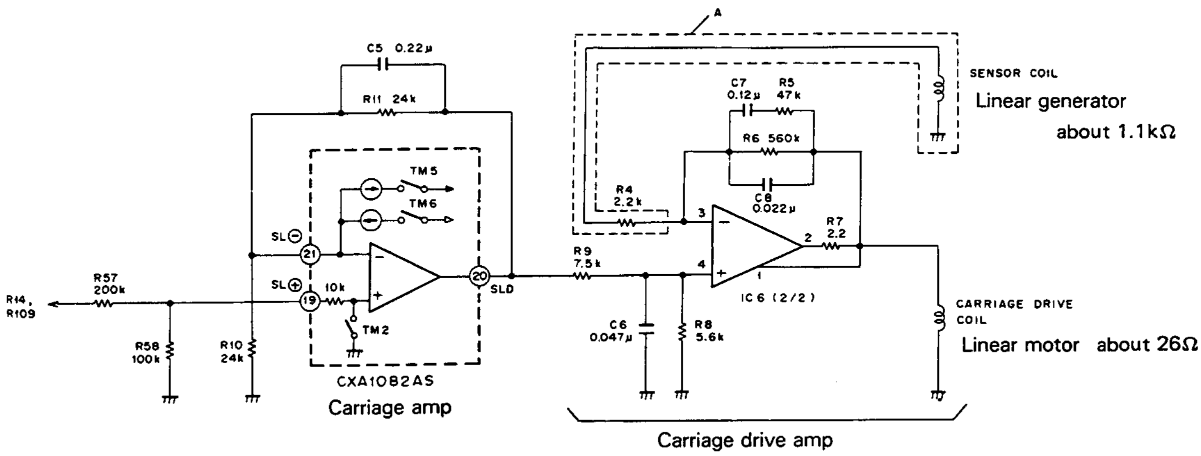



Fig. 13-21

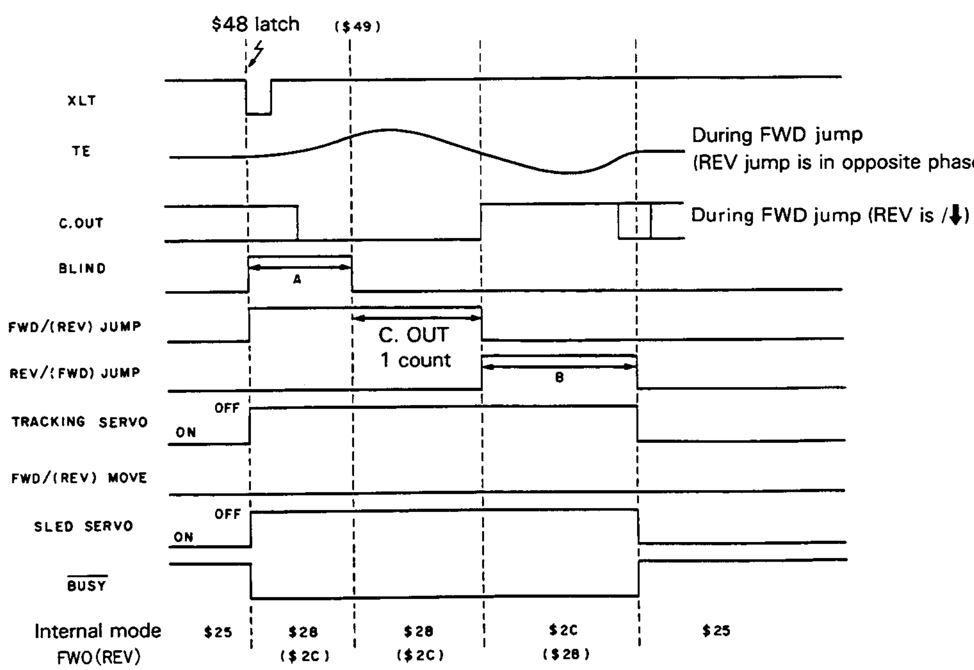
### (a) Track Skip

Accessing TRACK SEARCH is done by means of track count jump that rapidly moves the carriage, and track jump which (as described above) uses TM3-5 to kick tracking carriage.

Track jump utilizes the auto sequence function for 1, 10 and 2N track jump (Fig. 13-22,23,24) built into IC5: CXA1082AS. This design is more automated than the conventional design where the sequencer is directly controlled by the system microprocessor.

## Auto Sequence Timing Chart

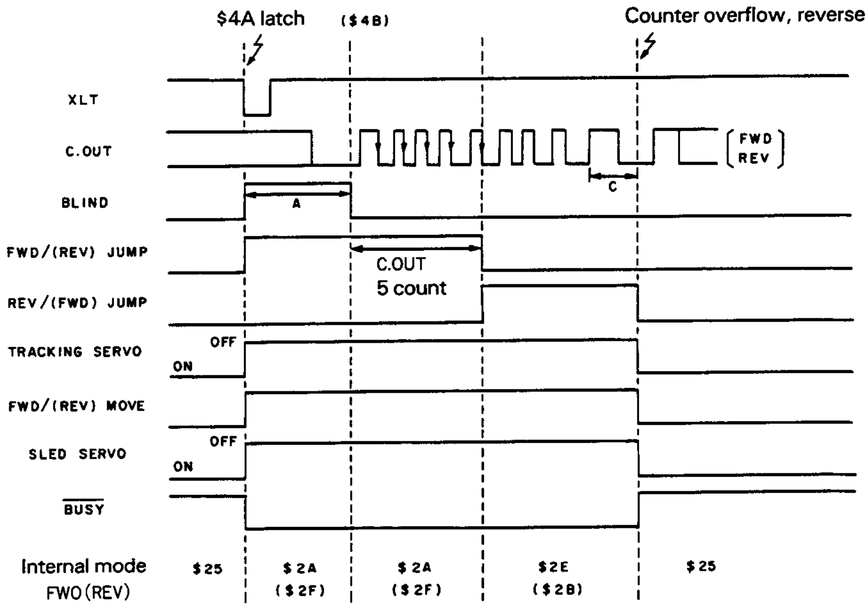
### 1-Track Skip




BLIND (A), Brake (B) (See Fig. 13-2.)

Fig. 13-22

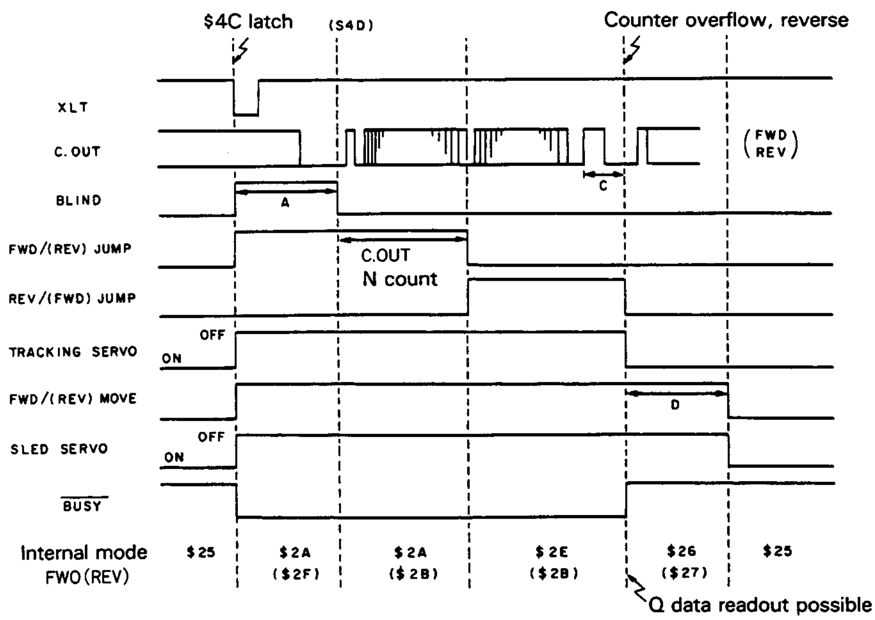
## 10-Track Skip




BLIND (A) (See Fig. 13-2.)

Fig. 13-23

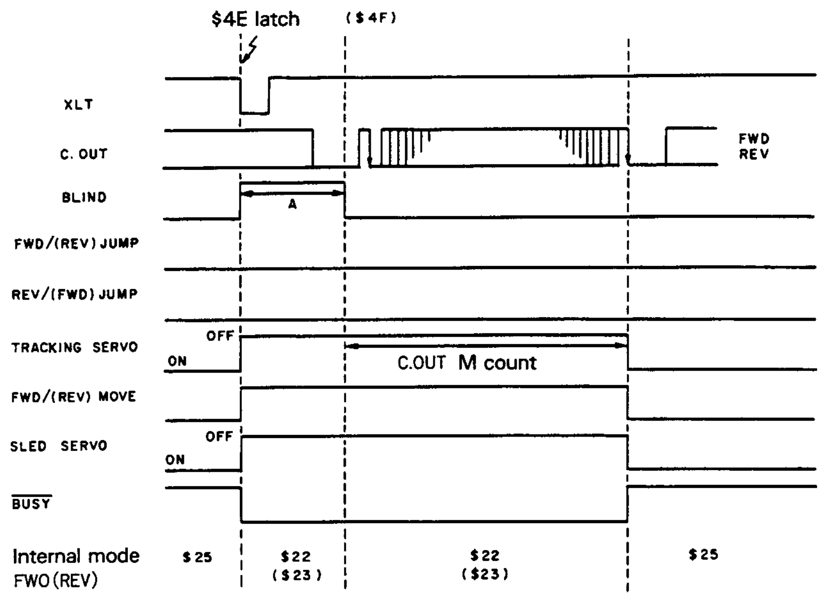
## 2N-Track Skip




BLIND(A),Overflow(C),Kick(D) (See Fig. 13-2.)

Fig. 13-24

### M Track Move




BLIND (A) (See Fig. 13-2.)

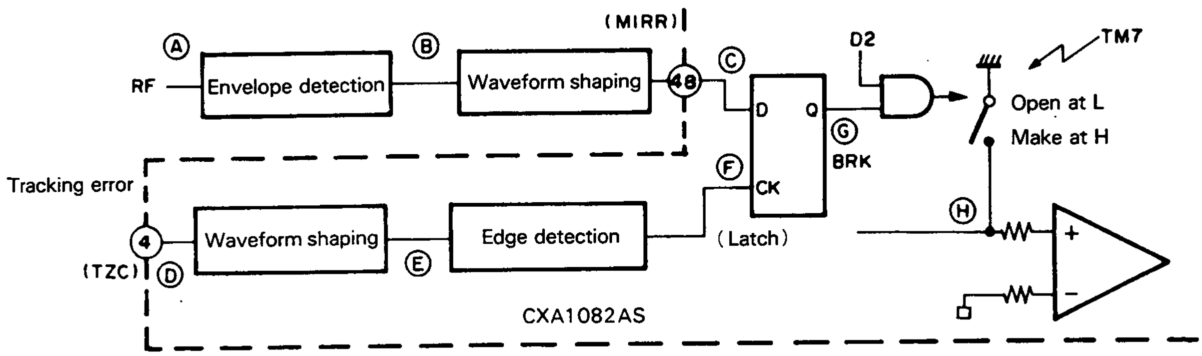
Fig. 13-25

### (b) Brake Mode Circuit

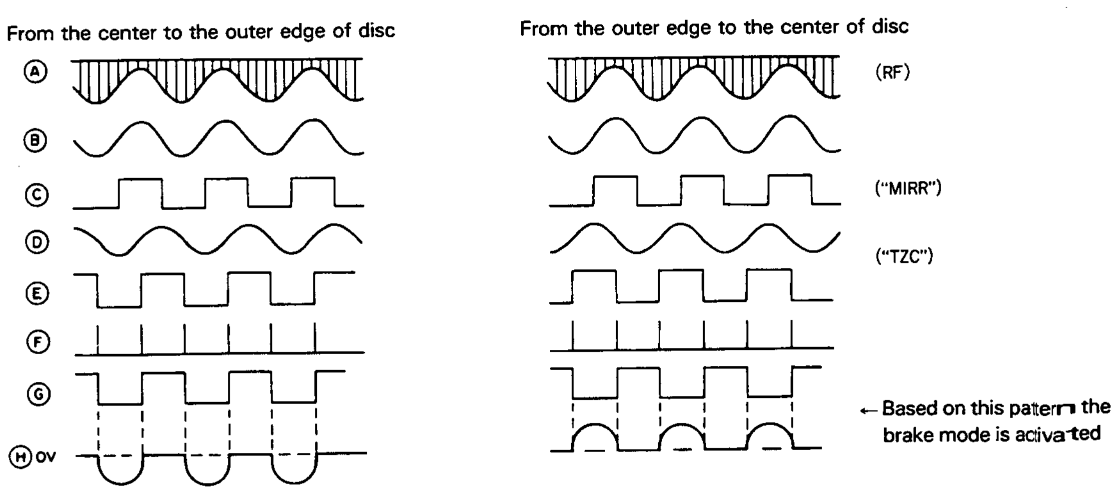
The brake mode facilitates a smooth tracking close when the lens has to be moved in relation to the track after track jump.

The braking operation works by detecting the direction of movement of track and lens on the basis of the phase relation between the RF signal envelope and tracking error, slowing tracking error acceleration and switching the tracking servo into a deceleration mode.

A circuit block diagram and the waveforms in the operation are shown in Fig. 13-26. The brake mode is turned ON/OFF on demand by the system microprocessor.




How TM7 Works




Waveforms

Fig. 13-26

### 13.2.4. Spindle Servo Circuitry (CLV Servo)

The CLV servos control spindle rotation based on the frame synchronizing signal which includes the EFM signal. There are four sets of servos: the two coarse servos, CLV-S/CLV-S', applied when the tracking servo is open, the CLV-H servo applied during high speed access, and the CLV-P servo applied when locked. Additional servos include CLV-A, employed for the automatic switching mode between CLV-S and CLV-P, and CLV-A' for the automatic switching mode between CLV-S' and CLV-P. Depending on the mode of operation, the system microprocessor (serial data) activates the suitable servo.

We take the operation of CLV-A governing the switching between CLV-S and CLV-P as an example for explanation. If, while CLV-S is applied, we take one 8.4672MHz cycle to be T and set the frame synch signal pulse at 22T, the applied servo functions to keep disc speed at the same speed as when the PLL lock is on. Then, when the disc EFM signal clock is taken as the standard frequency, the lock discriminant signal, "LOCK", changes from L → H. In response to this, CXD1135QZ switches from CLV-S to CLV-P. CLV-P does a phase comparison between WFCK (output by the VCO synchronized to the EFM signal) and RFCK (output by X'tal) and functions to keep the two equal. If CLV-P's lock should err during PLAY, servo control will immediately go to CLV-S and the whole set of operations here will once again be performed.

CXD1135QZ outputs the signals utilized by the various servos: Signals MDP (phase error signal when CLV-P is applied and speed error signal when CLV-S/S'/H are applied), FSW (filter time constant switch signal), MDN (motor ON/OFF signal). As Fig. 13-27 shows, the 200Hz LPF formed by C31 and R30 connected to terminal No. 42 of CXA1082AS and a built in LPF (at terminal No. 23, fc = 200Hz at 510Ωk) make up a two-stage LPF that eliminates spurious carrier frequencies from the CLV servo error signals, MDP and MOS.

When CLV-S or S'mode is applied, FSW = L and fc of the LPF at terminal No. 42 is automatically lowered and filter action is enhanced.

The amplified and filtered signal $V_{SPDLO}$ undergoes reverse polarization and amplification at IC6 and, as spindle motor control signal $V_{CONT}$, is input to the brushless motor PXM1005 to control rotation.

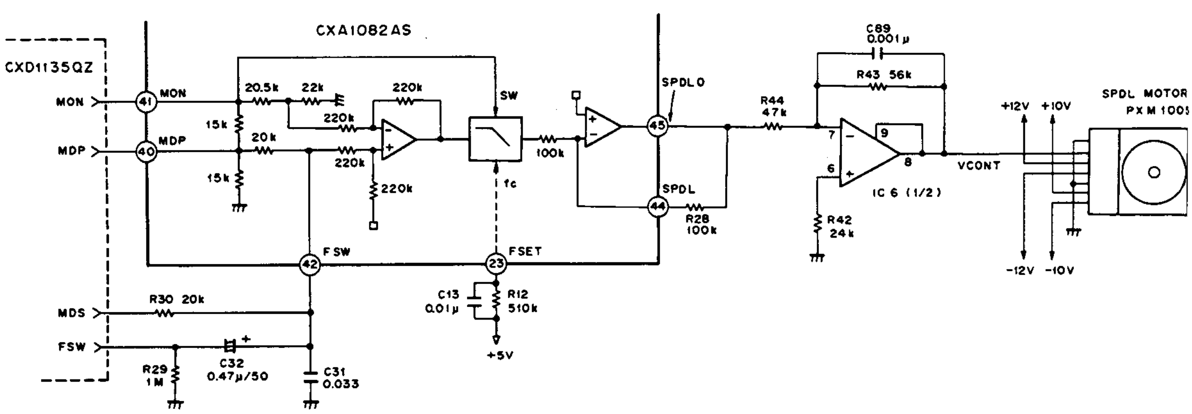



Fig. 13-27

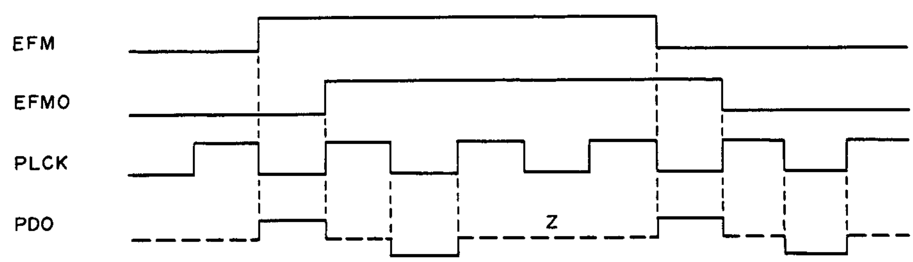
### 13.2.5 EFM-PLL Circuit

Because the EFM signal output by the optical section contains 2.16MHz clock signal components, a bit clock (PLCK) originating in the the EFM-PLL circuit which is synchronized with the clock signal at 4.32MHz takes out these components.

The PDO terminal in CXD1135QZ outputs a TRI STATE signal that performs phase comparison on the PLCK (which is twice VCO) and the EFM signal. PLCK should be in phase with the edge of the EFM signal as shown in the figure below. If the two signals are in phase the average voltage of terminal PDO will be 1/2 Vdd. If VCO frequency is too high the PDO voltage is lower and vice versa.

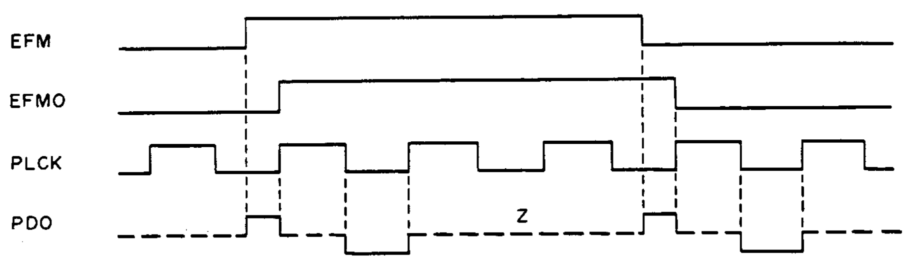
Timing charts for the EFM terminal, EFMO, PLCK and PDO shown below.

**EFM signal and VCO are synchronized**



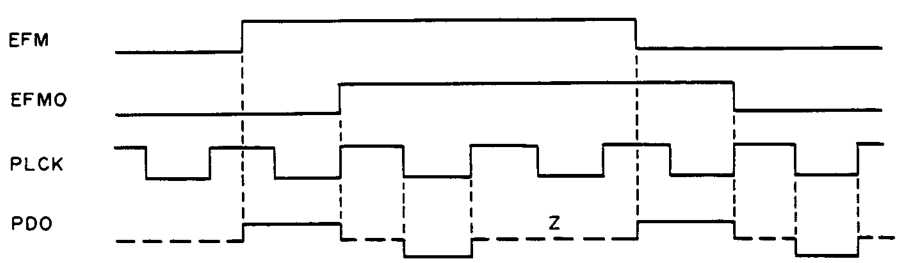

Z : High impedance

**VCO is higher than the EFM signal**




Z : High impedance

**VCO is lower than the EFM signal**




Z : High impedance

Fig. 13-28 EFM-PLL Circuit Timing Charts

Next, as Fig. 13-29 shows, the phase comparison output, PDO, is input to terminal No. 34 of CXA1082AS, passes through a loop filter which eliminates spurious carrier frequencies coming from PWM, undergoes V-I conversion and is added to the current for the free-run frequency from terminal No. 36 to ultimately control the VCO frequency. The free-run frequency of the VCO is nearly inversely proportional to the value of R31 between terminals No. 36 and 37.

The signal generated by the VCO (8.64 MHz when locked) is returned to terminal No. 9 of CXD1135QZ where it is divided to become the phase comparison signal PLCK to form a servo loop that acts to keep the PLCK phase and the phase of the EFM signal clock components locked in synchronization.

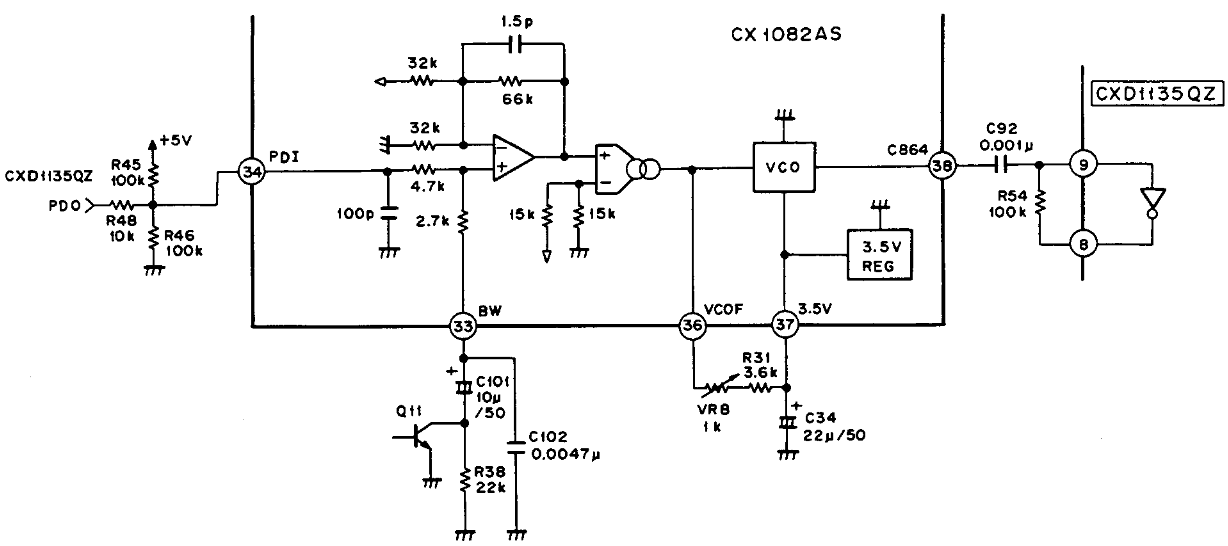



Fig. 13-29

## 13.3 DEMODULATOR

The demodulator is made up principally of the single chip LSI CXD1135QZ with some added external circuits. It performs the following functions:

1. Reproduces the bit clock from the EFM-PLL circuit
2. Demodulates EFM data
3. Detection, protection and interpolation of frame synch signal
4. Error detection and correction
5. Interpolation average value and holds occuring just before defective spots
6. Sub-code signal demodulation and sub-code Q error detection
7. Spindle motor CLV servo
8. 8 bit tracking counter
9. CPU interphase by serial bus
10. Sub-code Q register
11. Digital audio interface output

EFM data is converted into a TTL level signal in CXA1081S and then used to perform various functions. The tracking counter uses an RF generated pulse for counting.

## 13.4 DIGITAL AUDIO INTERFACE

The PD-91 CD player has an optical and coaxial dual system digital interface output. The digital audio interface output from IC12 is shaped into a wave form at IC19 and is converted to format output 0.5Vp-p at inverter driver IC16 and pulse transformer L1201. Since a TTL driver can be used for optical output, after polarity is brought into agreement, optical output is sent to optical driver JA1201.

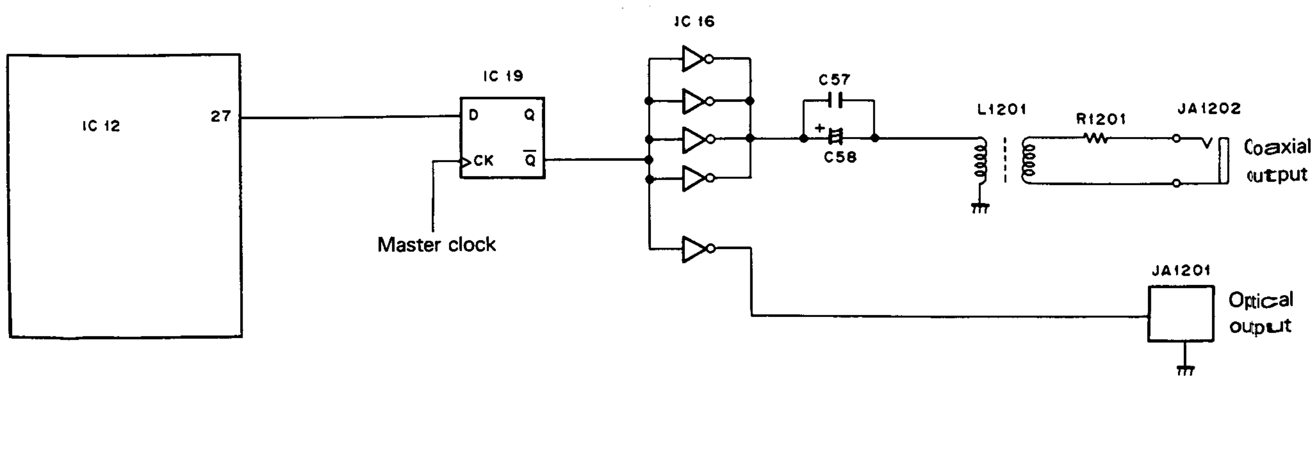



Fig. 13-30

## 13.5 DIGITAL ATTENUATOR

Of the digital data demodulated and de-interleaved in the decoder, the audio data is sent to the digital attenuator. Attenuator volume is set in the attenuator by control data sent from the system microprocessor. Attenuator volume and the digital data are multiplied and the digital data with an optimal level of attenuator volume are output.

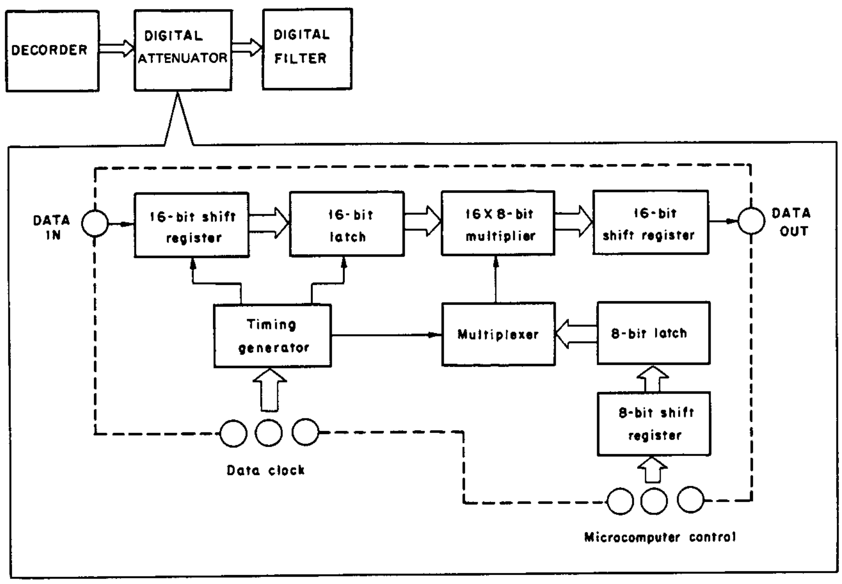



Fig. 13-31

## 13.6 DIGITAL FILTER

The digital filter used in the PD-91 has 8 times oversampling and 18-bit output. Arithmetic is performed by a three-stage cascade consisting of FIR225 + 41 + 21 sequence with 8 times oversampling.

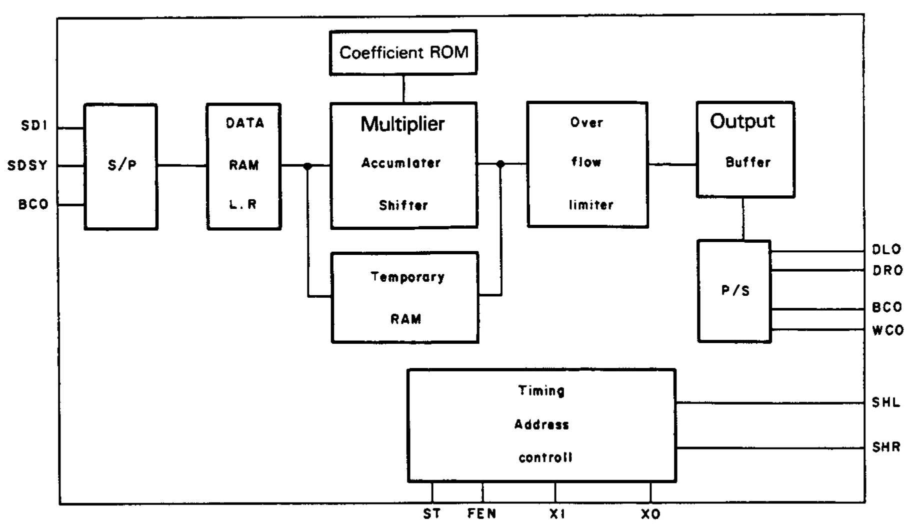



Fig. 13-32

## 13.7 SERIAL PARALLEL CONVERTER

Because the digital filter's output is the 18 bit serial data, it must be converted to parallel data before being transmitted to the D/A converter.

## 13.8 AUDIO SECTION

### 3.8.1 D/A Converter and Related Parts

The 18 bit parallel data which has passed through the serial data converter is converted to an analog signal by the D/A converters IC500,IC600. The D/A converters are of the ladder resistor type, and convert the current output. This current undergoes voltage conversion at the next stage IC 602 (1/2). Output has a peak of 10V. Q601, 602 are power boosters.Glitch noise is eliminated from the voltage converted waveform at the next stage circuit S/H. Deglitch control derives its timing from IC700 and sampling and hold operations are performed by turning Q603, 605 ON and OFF. During sampling, Q605 is ON and Q603 is OFF. During hold, the reverse is true. When Q605 is ON output from the preceding stage is being charged by C621 and when Q605 is OFF, hold is being performed. At this stage gain is controlled at R604 and 607 and is − 9.9dB. Sample holding is as shown in the diagram below. Q606 and 607 are power boosters.

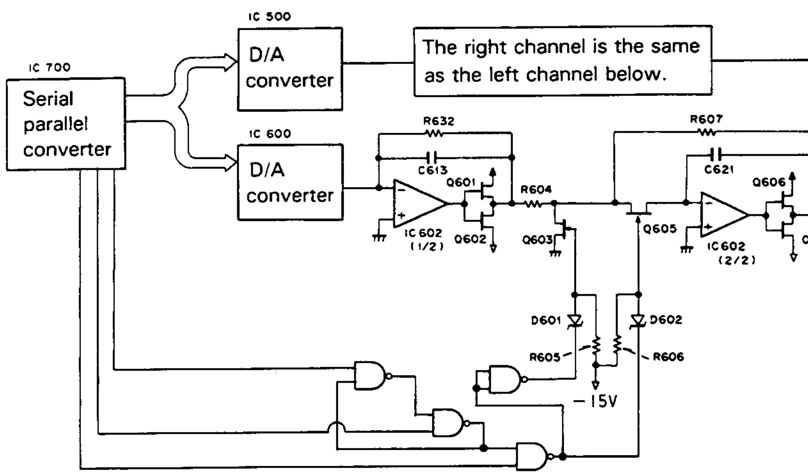



Fig.13-33

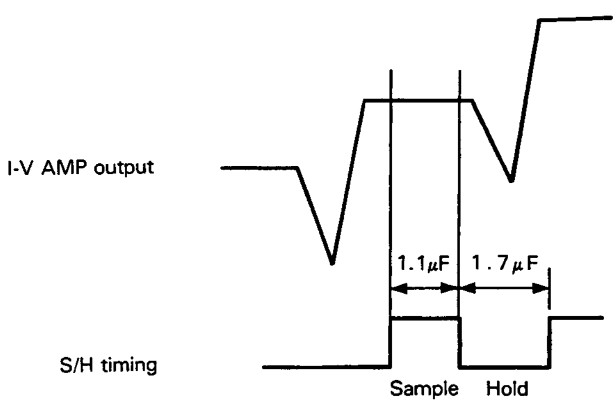



Fig. 13-34

### 13.8.2 Deemphasis, LPF

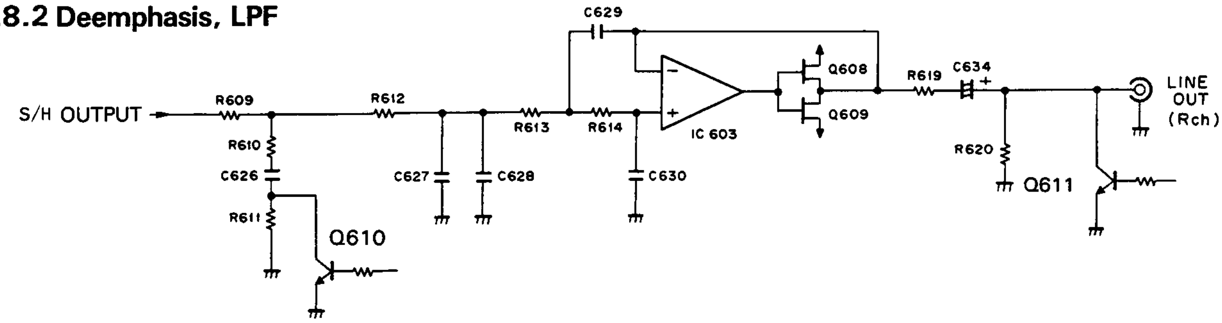



Fig. 13-35

S/H output passes through a demphasis circuit and then through a 3-stage active LPF. When deemphasis is ON, Q610 is ON and a −6dB/oct attenuation characteristic with time constants of 50$\mu$S, 15$\mu$S is generated at R609, 610, C626. Deemphasis control is governed by the IC3 system controller using sub-code Q.

The 3-stage active LPF is a Butterworth LPF with fc = 40kHz.

### 13.8.3 Output Selector

Output ON/OFF is controlled in the PD-91 by a rotary type switch with three modes:

1. DIGITAL ON
2. BOTH ON
3. ANALOG ON

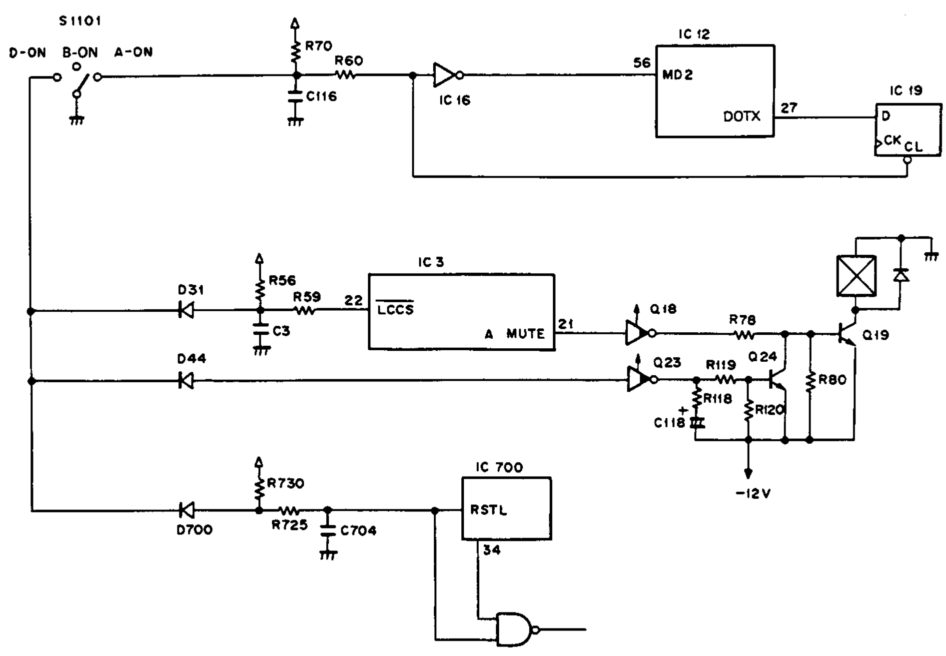
This control is performed at S1101.

When S1101 is set at ANALOG ON, the output of IC16 becomes H.

The output of Pin 27 DOTX is controlled by the logic of Pin 56 MD2 in IC12 and when Pin 56 is switched to "H", DIGITAL OUT output is cancelled. At this time Pin 27 outputs WFCK. This condition continues until the next stage IC19 D-FF gives an "L" signal to CLEAR. When S1101 is set to DIGITAL ON, the ANALOG signal for the following operations is cancelled:

1) RSTL on the IC700 serial-parallel converter goes to "L" level and serial-parallel operations cease,
2) IC705 NAND input goes to "L" and deglitching ceases,
3) MUTING relay driver is stopped and MUTING is ON.

When S1101 is set to BOTH ON, none of the above occurs and DIGITAL and ANALOG sections output signals normally.



# 14. MECHANISM DESCRIPTION

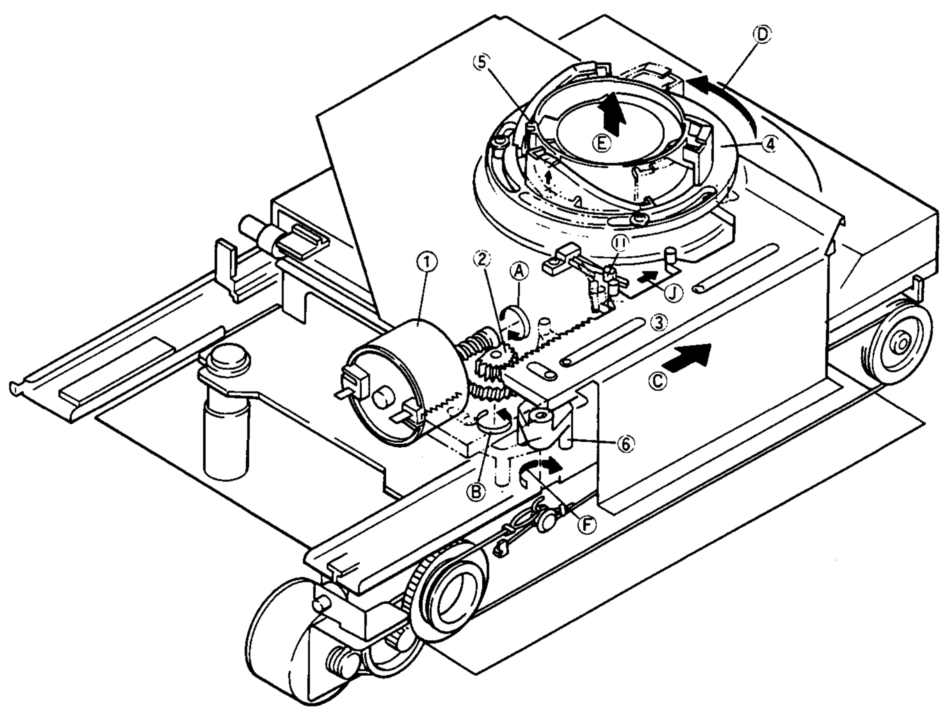
## • OPEN Operation

Clamp motor ① (• Arrow Ⓐ) → Worm wheel ② (• Arrow Ⓑ) → Clamp drive plate ③ (• Arrow Ⓒ) →

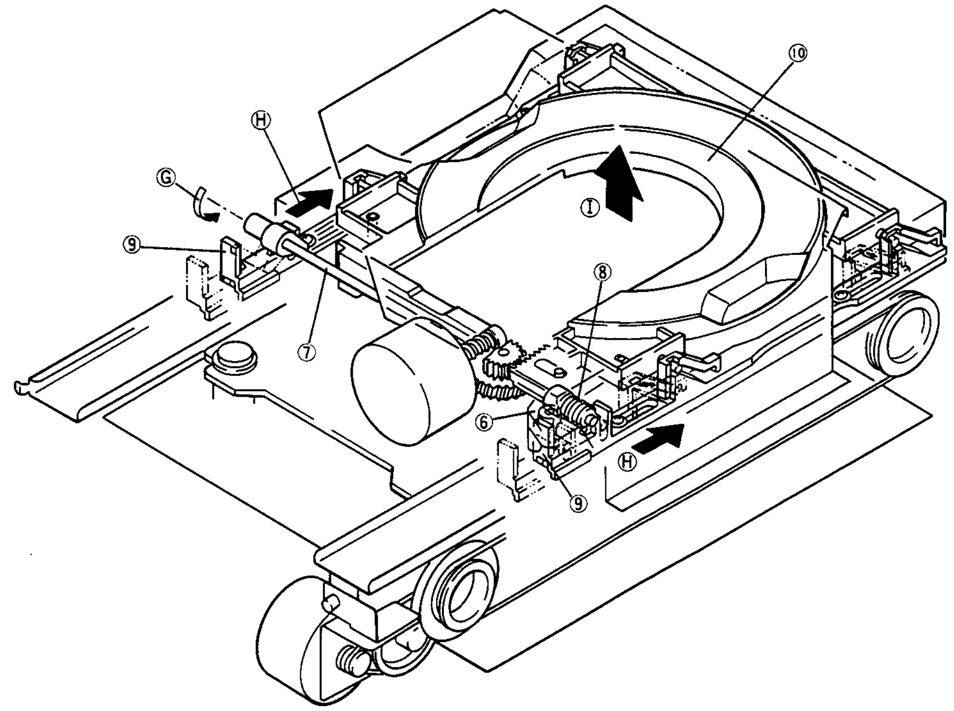
- → Clamp cam ④ (• Arrow Ⓓ) → Clamper holder ⑤ (• Arrow Ⓔ • Clamp up)
- → Clutch ⑥ (• Arrow Ⓕ) → Movement lever unit ⑦, spring ⑧ (• Arrow Ⓖ) → Slide cam ⑨ (• Arrow Ⓗ) → Disc plate ⑩ (• Arrow Ⓘ • Disc plate up)
- → Switch ⑪ (• Arrow Ⓙ • Clamp motor OFF)

(At the same time as switch ⑪ is ON)

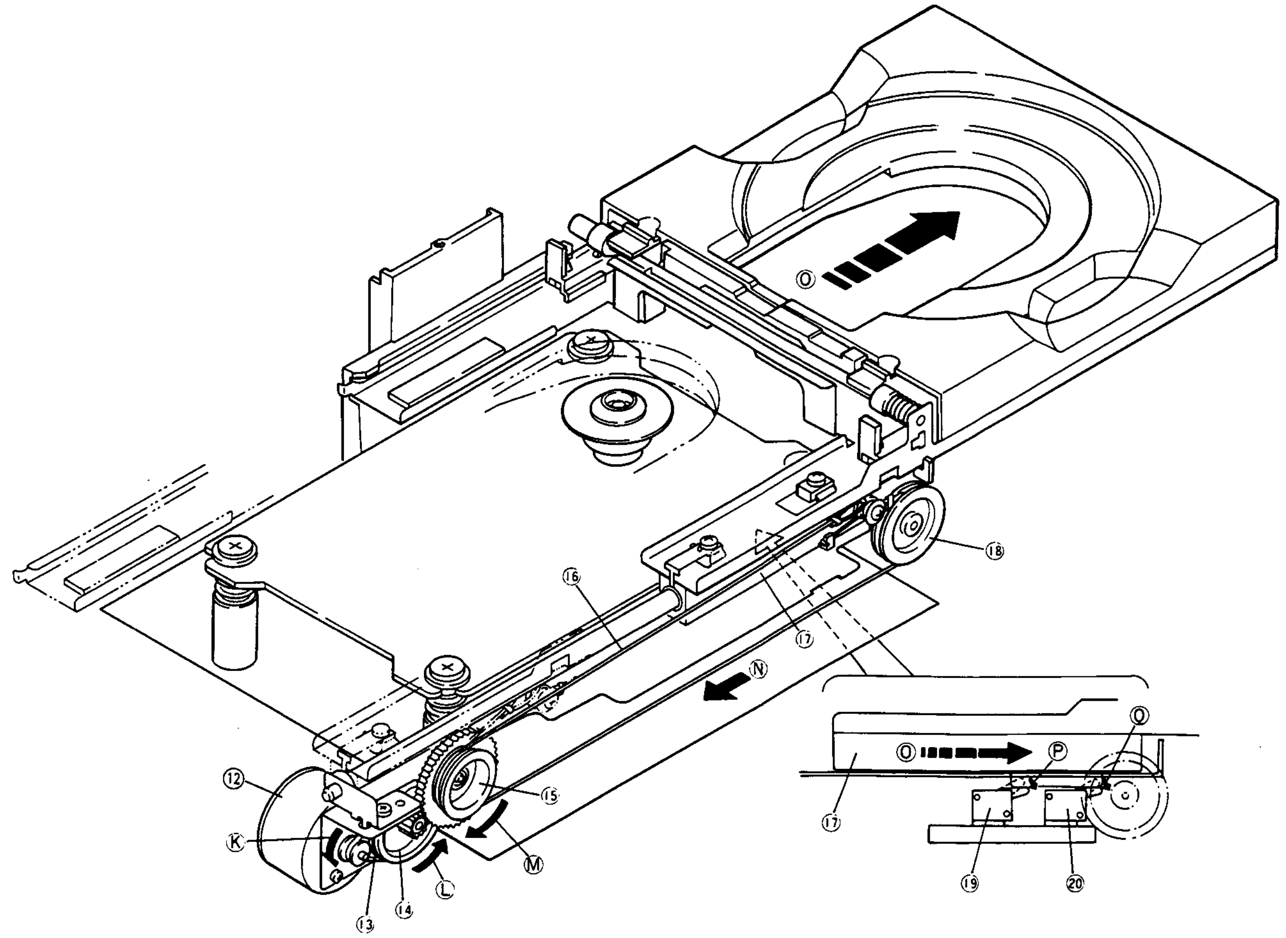
Loading motor ⑫ (• Arrow Ⓚ) → Belt ⑬ → Gear pulley ⑭ (• Arrow Ⓛ) → Drive pulley ⑮ (• Arrow Ⓜ) → Wire unit ⑯ (• Arrow Ⓝ) / Pulley ⑱ → Slider unit ⑰ (• Arrow Ⓞ) → Switch ⑲, ⑳ (• Arrow Ⓟ, Ⓠ • Loading motor OFF)



(1) Clamper UP operation



(2) Disc plate UP operation



(3) Loading tray OPEN operation

## • CLOSE Operation

Loading motor ① → Belt ② → Gear pulley ③ → Drive pulley ④ → Wire unit ⑤ / Pulley ⑥ → Slider unit ⑦ → Switch ⑧, ⑨

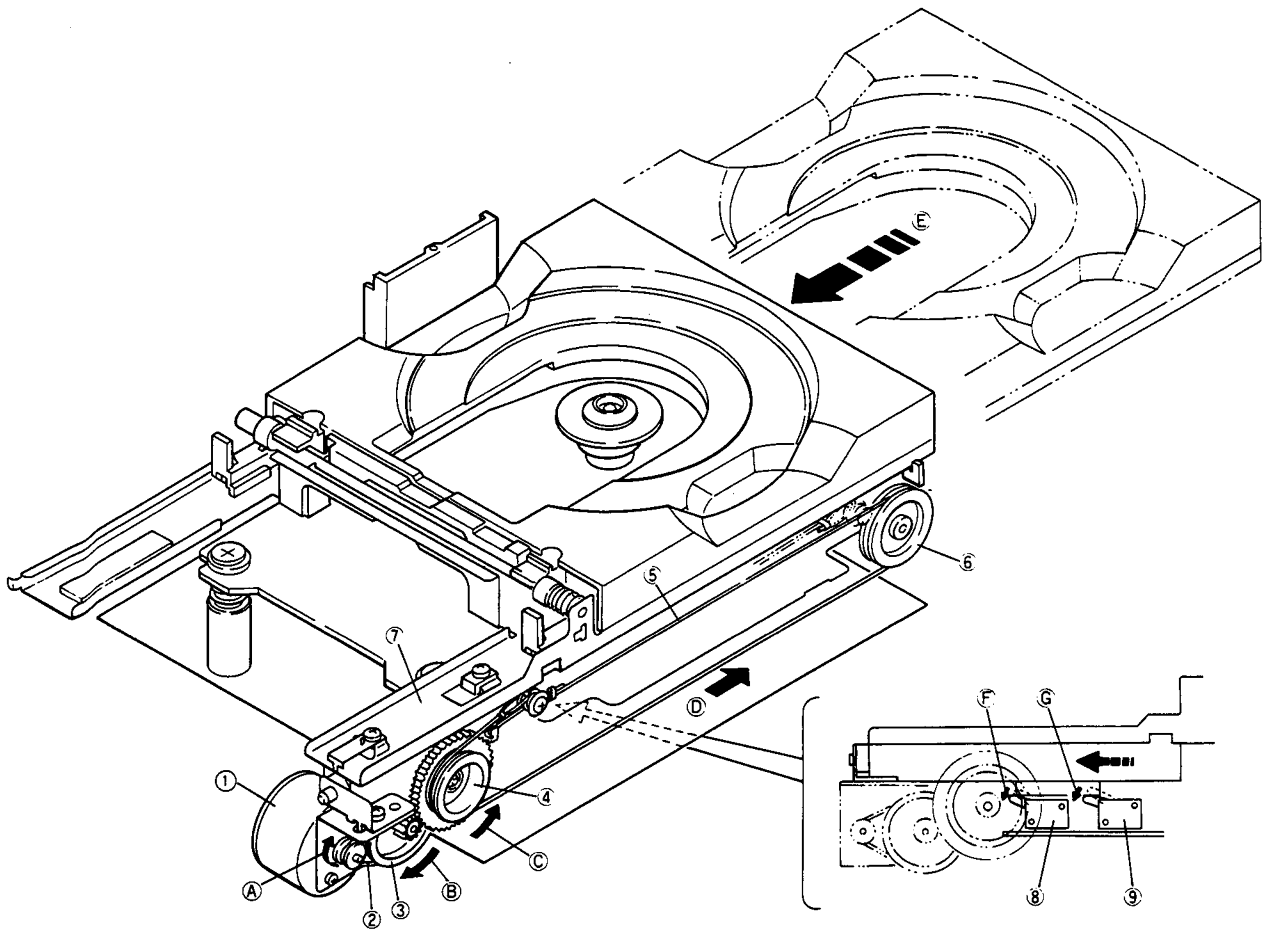
- Loading motor ①: • Arrow Ⓐ
- Gear pulley ③: • Arrow Ⓑ
- Drive pulley ④: • Arrow Ⓒ
- Wire unit ⑤: • Arrow Ⓓ
- Slider unit ⑦: • Arrow Ⓔ
- Switch ⑧, ⑨: • Arrow Ⓕ, Ⓖ • Loading motor OFF

(At the same time as switches ⑧ and ⑨ are ON)

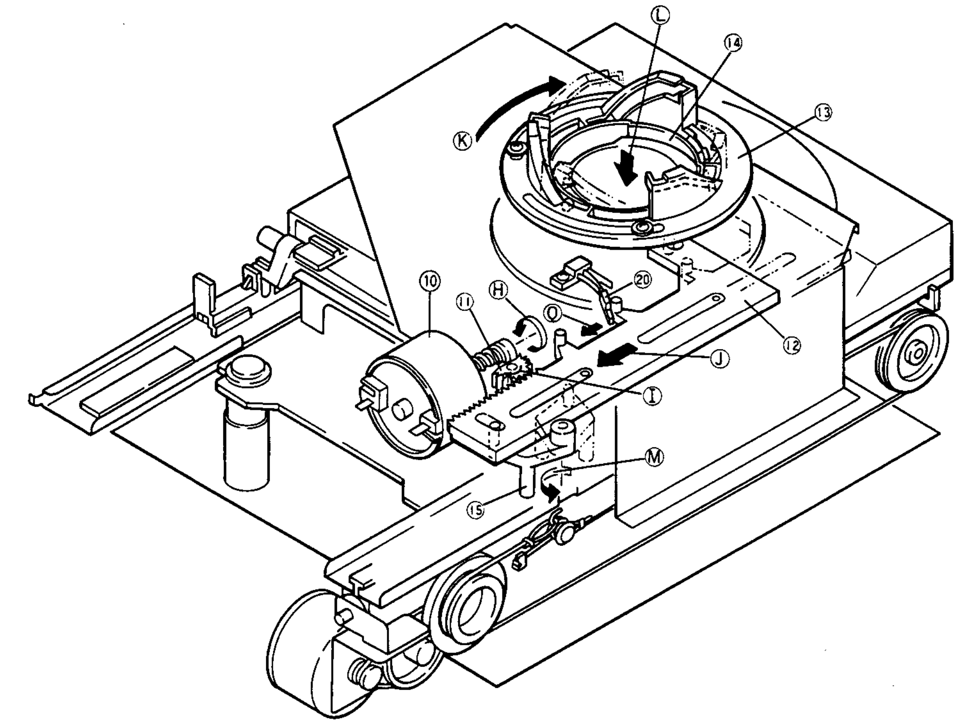
Clamp motor ⑩ → Worm wheel ⑪ → Clamp drive plate ⑫ →

- Clamp cam ⑬ → Clamper holder & Clamper ⑭
- Clutch ⑮ → Movement lever unit ⑯, spring ⑰ → Slide cam ⑱ → Disc plate ⑲
- Switch ⑳

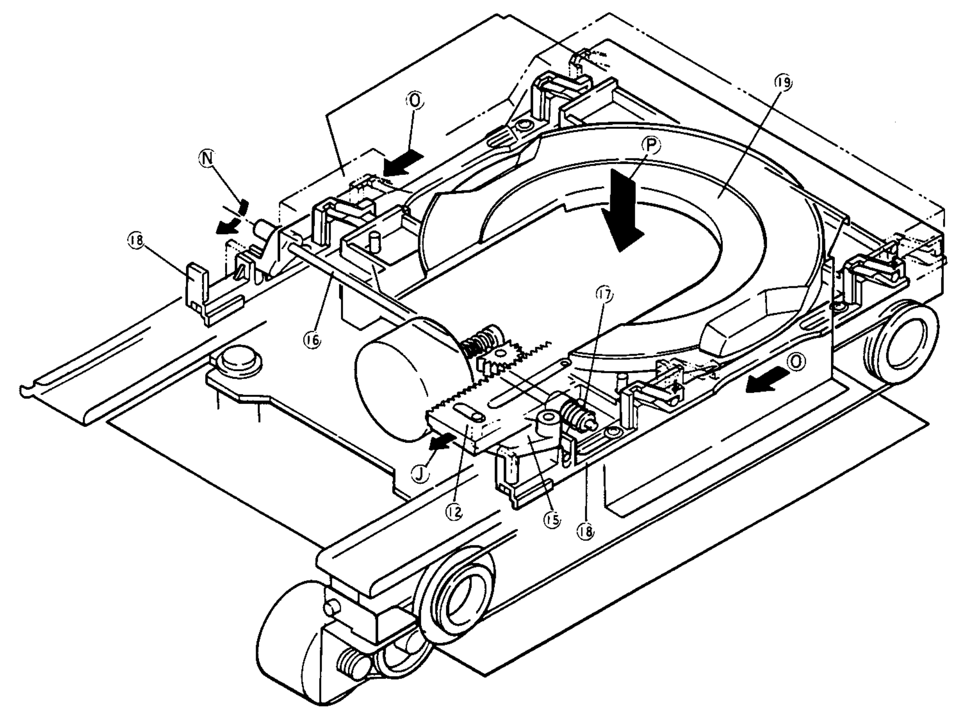
- Clamp motor ⑩: • Arrow Ⓗ
- Worm wheel ⑪: • Arrow Ⓘ
- Clamp drive plate ⑫: • Arrow Ⓙ
- Clamp cam ⑬: • Arrow Ⓚ
- Clamper holder & Clamper ⑭: • Arrow Ⓛ • Clamper DOWN
- Clutch ⑮: • Arrow Ⓜ
- Movement lever unit ⑯, spring ⑰: • Arrow Ⓝ
- Slide cam ⑱: • Arrow Ⓞ
- Disc plate ⑲: • Arrow Ⓟ • Disc plate DOWN
- Switch ⑳: • Arrow Ⓠ • Clamper motor OFF



(1) Loading tray CLOSE operation



(2) Clamper DOWN operation

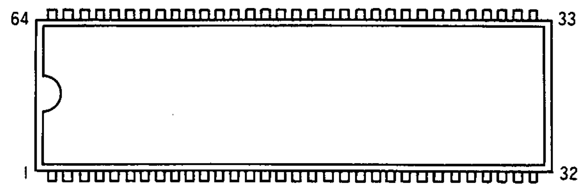


(3) Disc plate DOWN operation

# 15. IC INFORMATION

## PDG010

### • Layout of the Terminals on the IC




### • Terminal Names and Functions

| Terminal No. | I/O | Terminal Code | Terminal Name | When reset | After initializing | Explanation |
|---|---|---|---|---|---|---|
| 1 | O | $PY_0$ | STS | H | L | Serial transmission Accept / Ignore |
| 2 | I | $PY_1$ | CHIPS | — | — | Serial signal Permit / Prohibit |
| 3 | I | RMC | RMC | — | — | Remote control signal Reception terminal |
| 4 | I | $\overline{SC}$ | $\overline{CLK}$ | — | — | Serial external clock |
| 5 | I | $PX_1$ | DCSL | — | — | Remote control decode Static port select |
| 6 | I | $PX_2$ | DFSL | — | — | Data format select |
| 7 | I | SI | SD | — | — | Serial data |
| 8 | O | $PD_0$ | $KD_0$ | — | L | Key data 0 |
| 9 | O | $PD_1$ | $KD_1$ | — | L | Key data 1 |
| 10 | O | $PD_2$ | $KD_2$ | — | L | Key data 2 |
| 11 | O | $PD_3$ | $KD_3$ | — | L | Key data 3 |
| 12 | O | $PC_3$ | $KD_4$ | — | L | Key data 4 |
| 13 | O | $PC_1$ | $KD_5$ | — | L | Key data 5 |
| 14 | O | $PC_2$ | $\overline{KS}$ | — | H | Key strobe Key in / No |
| 15 | O | $PC_3$ | $\overline{RKS}$ | — | H | Remote control key strobe Remote control in / No |
| 16 | O | $PF_0$ | KDIG 0 | — | | Key digit 0 |
| 17 | O | $PF_1$ | KDIG 1 | — | | Key digit 1 |
| 18 | O | $PF_2$ | KDIG 2 | — | | Key digit 2 |
| 19 | O | $PF_3$ | KDIG 3 | — | | Key digit 3 |
| 20 | O | $PE_0$ | KDIG 4 | — | | Key digit 7 |
| 21 | O | $PE_1$ | KDIG5 | — | | Key digit 5 |
| 22 | O | $PE_2$ | KDIG 6 | — | | Key digit 6 |
| 23 | O | $PE_3$ | KDIG 7 | — | | Key digit 7 |
| 24 | I | $PB_0$ | KIN 0 | — | — | Key in 0 |
| 25 | I | $PB_1$ | KIN 1 | — | — | Key in 1 |
| 26 | I | $PB_2$ | KIN 2 | — | — | Key in 2 |
| 27 | I | $PB_3$ | KIN 3 | — | — | Key in 3 |
| 28 | I/O | $PA_ø$ | KIN4/PAø | — | —/H | Key in 4/Static output PAø |
| 29 | I/O | $PA_1$ | KIN5/PA1 | — | —/H | Key in 5/Static output PA1 |
| 30 | I/O | $PA_2$ | KIN6/PA2 | — | —/H | Key in 6/Static output PA2 |

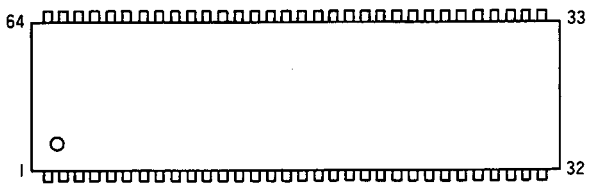


| Terminal No. | I/O | Terminal Code | Terminal Name | When reset | After initializing | Explanation |
|---|---|---|---|---|---|---|
| 31 | O | $PA_3$ | PA3 | — | H | Static output PA3 |
| 32 | — | Vss | GND | | | GND |
| 33 | O | $S_0$ | a | −26V | −26V | Segment a |
| 34 | O | $S_1$ | b | −26V | −26V | Segment b |
| 35 | O | $S_2$ | c | −26V | −26V | Segment c |
| 36 | O | $S_3$ | d | −26V | −26V | Segment d |
| 37 | O | $S_4$ | e | −26V | −26V | Segment e |
| 38 | O | $S_5$ | f | −26V | −26V | Segment f |
| 39 | O | $S_6$ | g | −26V | −26V | Segment g |
| 40 | O | $S_7$ | h | −26V | −26V | Segment h |
| 41 | O | $S_8$ | i | −26V | −26V | Segment i |
| 42 | O | $S_9$ | j | −26V | −26V | Segment j |
| 43 | O | $S_{10}$ | k | −26V | −26V | Segment k |
| 44 | O | $S_{11}$ | l | −26V | −26V | Segment l |
| 45 | O | $S_{12}$ | m | −26V | −26V | Segment m |
| 46 | O | $S_{13}$ | n | −26V | −26V | Segment n |
| 47 | O | $S_{14}/T_9$ | O/G10 | −26V | −26V | Segment o/Grid 10 |
| 48 | O | $S_{15}/T_8$ | P/G9 | −26V | −26V | Segment p/ Grid 9 |
| 49 | O | $T_7$ | G8 | −26V | −26V | Grid 8 |
| 50 | O | $T_6$ | G7 | −26V | −26V | Grid 7 |
| 51 | O | $T_5$ | G6 | −26V | −26V | Grid 6 |
| 52 | O | $T_4$ | G5 | −26V | −26V | Grid 5 |
| 53 | O | $T_3$ | G4 | −26V | −26V | Grid 4 |
| 54 | O | $T_2$ | G3 | −26V | −26V | Grid 3 |
| 55 | O | $T_1$ | G2 | −26V | −26V | Grid 2 |
| 56 | O | $T_0$ | G1 | −26V | −26V | Grid 1 |
| 57 | — | $V_{FDP}$ | −26V | | | −26V FL power supply |
| 58 | I | Int2 | Not in use | — | — | GND |
| 59 | I | Int1 | Not in use | — | — | GND |
| 60 | O | Xtal | — | | | Clock output |
| 61 | I | Extal | — | — | — | Clock input |
| 62 | I | RES | SRES | — | — | Reset input Reset / RUN |
| 63 | O | PYo | PYo | H | H | Static output PYo |
| 64 | — | $V_{DD}$ | +5V | | | +5V micro processor power supply 5V |

H: Hi-LEVEL L: Lo-LEVEL —: Hi-Imp

## PD3094

### • Layout of the Chip Terminals



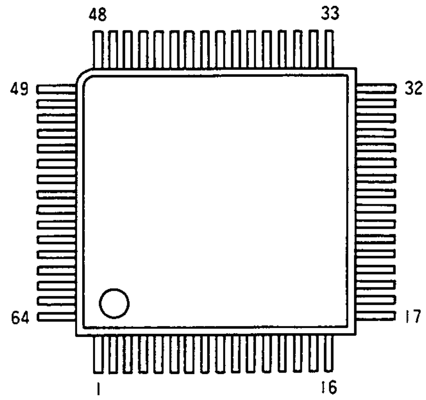

### • Terminal Names and Functions

| Terminal No. | Terminal Code | Terminal Name | I/O | Reset | Explanation |
|---|---|---|---|---|---|
| 1 | Vcc | — | — | — | GND |
| 2 | XTAL | — | — | — | (OPEN) |
| 3 | EXTAL | — | — | — | Internal clock circuit output |
| 4 | MP0 | — | Input | — | +5V |
| 5 | MP1 | — | Input | — | +5V |
| 6 | $\overline{\text{RES}}$ | — | Input | — | CPU reset input Reset RUN |
| 7 | $\overline{\text{STBY}}$ | — | Input | — | CPU standby input Stand-by RUN |
| 8 | $\overline{\text{NIMI}}$ | SCOR | Input | — | Sub code synch input Synch |
| 9 | P20 | LOK | Input | — | Focus OK NG OK |
| 10 | P21 | $\overline{\text{XLT}}$ | Ooutput | H | LSI control data deep pulse Execute |
| 11 | SCLK | CLK | Output | H | Serial transmission clock |
| 12 | Rx | SUBQ | Input | — | Sub-code Q data input |
| 13 | Tx | DATA | Output | L | Serial data output 0 1 2 3 4 5 6 7 |
| 14 | P25 | SENS | Input | — | LSI multi-mode input |
| 15 | P26 | MUTE | Output | H | Muting output (digital section) OFF ON |
| 16 | P27 | GFS | Input | — | Frame synch lock NG LOCK |
| 17 | P50 | $\overline{\text{LDON}}$ | Output | H | Laser diode ON/OFF ON OFF |
| 18 | P51 | $\overline{\text{DEMP}}$ | Output | H | Deemphasis ON/OFF ON OFF |
| 19 | P52 | $\overline{\text{TEST}}$ | Input | — | Test mode switch input TEST NORMAL |
| 20 | P53 | Not in use | Output | L | (OPEN) |
| 21 | P54 | AMUTE | Output | H | Muting output (analog section) OFF ON |
| 22 | P55 | $\overline{\text{LCCS}}$ | Input | — | Local circuit cancel input CANSEL NORMAL |
| 23 | P56 | Not in use | Output | L | (OPEN) |
| 24 | P57 | Not in use | Output | L | (OPEN) |
| 25 | P60 | $\overline{\text{JTMS}}$ | Input | — | Jump delay time SHORT LONG |
| 26 | P61 | Not in use | Output | L | (OPEN) |
| 27 | P62 | Not in use | Output | L | (OPEN) |
| 28 | P63 | $\overline{\text{LOAD}}$ | Input | — | Loading complete LOAD-IN NOT |
| 29 | P64 | $\overline{\text{CLOP}}$ | Input | — | Clamp-up complete CLAMP-UP NOT |
| 30 | P65 | $\overline{\text{OPEN}}$ | Input | — | Tray open complete OPEN NOT |
| 31 | P66 | $\overline{\text{CLMP}}$ | Input | — | Clamp complete CLAMP NOT |
| 32 | P67 | Not in use | Output | L | (OPEN) |
| 33 | Vcc | — | — | — | +5 |
| 34 | P47 | $\overline{\text{ALAT}}$ | Output | H | Attenuation level latch pulse output Execute |

| Terminal No. | Terminal Code | Terminal Name | I/O | Reset | Explanation |
|---|---|---|---|---|---|
| 35 | P46 | ADAT | Output | H | Attenuation level data 0 1 2 3 4 5 6 7 |
| 36 | P45 | ACLK | Output | H | Attenuation level clock |
| 37 | P44 | LIN | Output | L | Disc tray loading Free Brake IN |
| 38 | P43 | LOUT | Output | L | IN/OUT output OUT |
| 39 | P42 | CLUP | Output | L | Disc clamp Free Brake UP |
| 40 | P41 | CLDW | Output | L | UP/DOWN output DOWN |
| 41 | P40 | STS | Input | — | Display data transmission allow input Permit Prohibit |
| 42 | Vss | — | — | — | GND |
| 43 | P17 | Not in use | Output | L | (OPEN) |
| 44 | P16 | Not in use | Output | L | (OPEN) |
| 45 | P15 | FLOF | Output | H | FL display OFF control ON OFF |
| 46 | P14 | Not in use | Output | L | (OPEN) |
| 47 | P13 | Not in use | Output | L | (OPEN) |
| 48 | P12 | SCK | Output | H | Display data serial transmission clock |
| 49 | P11 | SD | Output | H | Display data serial output |
| 50 | P10 | SRES | Output | L | Key display system microprocessor reset output RESET RUN |
| 51 | P37 | $\overline{\text{RKS}}$ | Input | — | Remote control keep strobe input ON OFF |
| 52 | P36 | $\overline{\text{KS}}$ | Input | — | Unit key strobe input ON OFF |
| 53 | P35 | KD5 | Input | — | Unit remote control key code input (MSB) |
| 54 | P34 | KD4 | Input | — | Unit remote control key code input |
| 55 | P33 | KD3 | Input | — | Unit remote control key code input |
| 56 | P32 | KD2 | Input | — | Unit remote control key code input |
| 57 | P31 | KD1 | Input | — | Unit remote control key code input |
| 58 | P30 | KDø | Input | — | Unit remote control key code input (LSB) |
| 59 | P74 | Not in use | Output | L | (OPEN) |
| 60 | P73 | Not in use | Output | L | (OPEN) |
| 62 | P71 | Not in use | Output | L | (OPEN) |
| 63 | P70 | Not in use | Output | L | (OPEN) |
| 64 | E | — | Ouptut | — | (OPEN) |

PDE023

## ● Layout of the Chip Terminals




I : Input pin,
O : Output pin,
B : I/O pin,
P : Power pin,
NC : Not connected

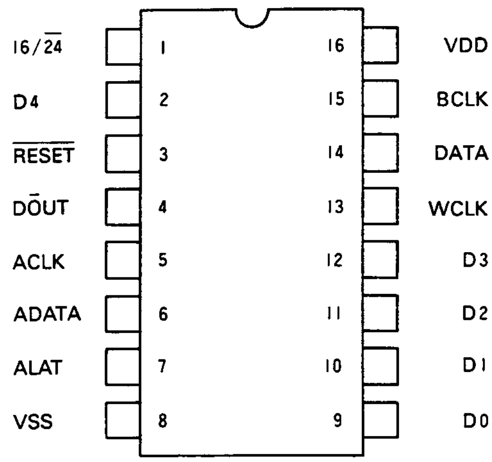
## ● Terminal Nos. and Codes

| Terminal No. | Terminal Code | I/O |
|---|---|---|
| 1 | RSTL | I |
| 2 | LRCK | I |
| 3 | SDGR | I |
| 4 | YDGL | I |
| 5 | LDAT | I |
| 6 | RDAT | I |
| 7 | WCIN | I |
| 8 | BCKI | I |
| 9 | Vss | P |
| 10 | LD 00 | O |
| 11 | LD 01 | O |
| 12 | LD 02 | O |
| 13 | LD 03 | O |
| 14 | LD 04 | O |
| 15 | LD 05 | O |
| 16 | LD 06 | O |
| 17 | Vss | P |
| 18 | LD 07 | O |
| 19 | LD 08 | O |
| 20 | LD 09 | O |
| 21 | LD 10 | O |
| 22 | LD 11 | O |
| 23 | LD 12 | O |
| 24 | NC | NC |
| 25 | Vss | P |
| 26 | LD 13 | O |
| 27 | LD 14 | O |
| 28 | LD 15 | O |
| 29 | LD 16 | O |
| 30 | LD 17 | O |
| 31 | LD 18 | O |
| 32 | Vss | P |

| Terminal No. | Terminal code | I/O |
|---|---|---|
| 64 | SYSL | I |
| 63 | Vss | P |
| 62 | RD 18 | O |
| 61 | RD 17 | O |
| 60 | RD 16 | O |
| 59 | RD 15 | O |
| 58 | RD 14 | O |
| 57 | Vss | P |
| 56 | VDD | P |
| 55 | RD 13 | O |
| 54 | RD 12 | O |
| 53 | RD 11 | O |
| 52 | RD 10 | O |
| 51 | RD 09 | O |
| 50 | RD 08 | O |
| 49 | Vss | P |
| 48 | NC | NC |
| 47 | RD 07 | O |
| 46 | RD 06 | O |
| 45 | RD 05 | O |
| 44 | VDD | P |
| 43 | RD 04 | O |
| 42 | RD 03 | O |
| 41 | RD 02 | O |
| 40 | RD 01 | O |
| 39 | RD 00 | O |
| 38 | Vss | P |
| 37 | SDGS | O |
| 36 | SDGH | O |
| 35 | YDGS | O |
| 34 | YDGH | O |
| 33 | NC | NC |

## PD0026

### ● Layout of Terminals




### ● Terminal Functions

| Terminal No. | Terminal Code | Terminal Name | I/O | Explanation |
|---|---|---|---|---|
| 1 | 16/$\overline{24}$ | 16/$\overline{24}$ | Input | DATA switch terminal |
| 2 | D4 | ATTENUATION DATA 4 | Output | Attenuation level (0 — −36dB) display terminal<br>Open drain output* |
| 3 | $\overline{\text{RESET}}$ | $\overline{\text{RESET}}$ | Input | IC internal reset terminal (Attenuation level, 0dB) |
| 4 | DOUT | DATA OUT | Output | 16-bit serial data output terminal for DAC (2 complements, MSB first) |
| 5 | ACLK | ATTENUATION CLOCK | Input | Attenuation level writing clock signal |
| 6 | ADATA | ATTENUATION DATA | Input | Attenuation level data input terminal (Binary, MSB first) |
| 7 | ALAT | ATTENUATION LATCH PULSE | Input | Attenuation level latch pulse input terminal |
| 8 | VSS | | | Ground terminal |
| 9 | D0 | ATTENUATION DATA 0 | Output | Attenuation level (0dB) display terminal<br>Open drain output* |
| 10 | D1 | ATTENUATION DATA 1 | Output | Attenuation level (0 — −6dB) display terminal<br>Open drain output* |
| 11 | D2 | ATTENUATION DATA 2 | Output | Attenuation level (0 — −12dB) display terminal<br>Open drain output* |
| 12 | D3 | ATTENUATION DATA 3 | Output | Attenuation level (0 — −24dB) display terminal<br>Open drain output* |
| 13 | WCLK | WORD CLOCK | Input | Word clock input terminal |
| 14 | DATA | DATA | Input | 16-bit serial data input terminal for DAC (2 complements, MSB first) |
| 15 | BCLK | BIT CLOCK | Input | Bit clock input terminal |
| 16 | VDD | | | Power terminal |

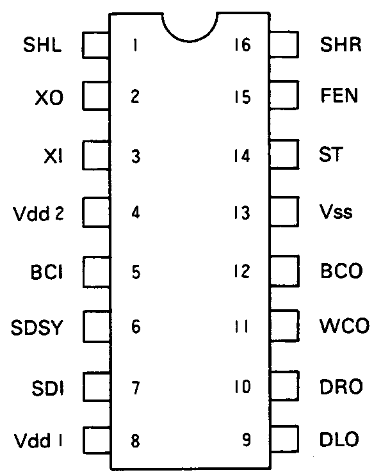
*** Attenuation Level Indicators**

| Attenuation data | Amount of ATT | Indicator intervals | | | | |
|---|---|---|---|---|---|---|
| | | D 0 | D 1 | D 2 | D 3 | D 4 |
| 1 0 1 1 0 0 0 0 ((2) | 0dB | * | ↑ | ↑ | ↑ | ↑ |
| ~ | | | | | | |
| 1 0 1 0 0 0 0 0 (2) | −6dB | — — | * | \| | \| | \| |
| ~ | | | | | | |
| 1 0 0 1 0 0 0 0 (2) | −12dB | — — | — — | * | \| | \| |
| ~ | | | | | | |
| 0 1 1 1 0 0 0 0 (2) | −24dB | — — | — — | — — | * | \| |
| ~ | | | | | | |
| 0 1 0 1 0 0 0 0 (2) | −36dB | — — | — — | — — | — — | * |
| ~ | | | | | | |
| 0 0 0 0 0 0 0 0 (2) | −∞ | — — | — — | — — | — — | — — |

An asterisk ("*") signifies an "L" output status

## YM3414

### ● Terminal Layout Diagram



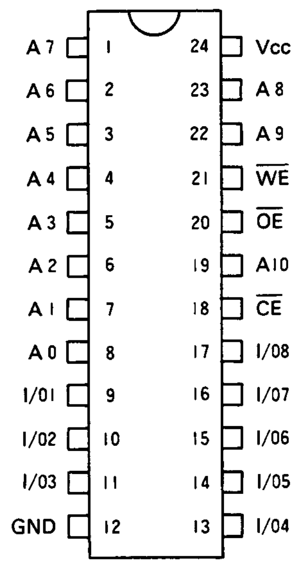

### ● Terminal Functions

| Terminal Code | Terminal No. | I/O | Explanation |
|---|---|---|---|
| SHL | 1 | O | When 1DAC, ST="L": Lch deglitcher signal<br>When 2DAC, ST="H": L/Rch deglitcher signals |
| XO<br>XI | 2<br>3 | O<br>I | There is a crystal oscillator between XI and XO. When FEN="L" at 392fs: 17.2872MHz.<br>When FEN="H" at 384fs: 16.9344MHz (XI can directly receive external input) |
| Vdd 2 | 4 | | +5V power source terminal for crystal oscillator and deglitcher signal. |
| BCI | 5 | I | Bit clock input terminal for input data |
| SDSY | 6 | I | L/Rch differentiation of input data and clock indicating input timing |
| SDI | 7 | I | Data input terminal |
| Vdd 1 | 8 | | +5V power supply terminal for digital signal section |
| DLO | 9 | O | When 1DAC, ST="L": L, Rch data output terminal<br>When 2DAC, ST="H": Lch data output terminal |
| DRO | 10 | O | Rch data output terminal |
| WCO | 11 | O | Word clock for output data DLO, DRO |
| BCO | 12 | O | Bit clock for output data. SPC-II, SPC-III system clocck output terminal |
| Vss | 13 | | GND terminal |
| ST | 14 | I | 1DAC/2DAC switching terminal (1DAC="L", 2DAC="H") |
| FEN | 15 | I | System clock switching terminal (392fs="L", 384fs"H") |
| SHR | 16 | O | Rch deglitcher signal when switched to 1DAC |

## LC3517

### ● Terminal Layout

TOP VIEW




| | |
|---|---|
| A 0 ~ A10 | Adddress input |
| $\overline{WE}$ | Read/write control input |
| $\overline{OE}$ | Output enable input |
| $\overline{CE}$ | Chip enable input |
| I/01 ~ I/08 | Data I/O |
| Vcc/GND | Power supply terminal |

### ● Table of Function

| Mode | $\overline{CE}$ | $\overline{OE}$ | $\overline{WE}$ | I/O | Power supply current |
|---|---|---|---|---|---|
| Read cycle | L | L | H | Data output | ICCA |
| Write cycle | L | X | L | Data input | ICCA |
| Output disable | L | H | X | High impedance | ICCA |
| Non-select | H | X | X | High impedance | ICCS |

### ● Terminal Function

| Terminal No. | Terminal code | Explanation of terminals |
|---|---|---|
| 1 ∫ 8 | A7 ∫ A0 | Address input |
| 9 ∫ 11 | I/01 ∫ I/03 | Data I/O |
| 12 | GND | GND |
| 13 ∫ 17 | I/04 ∫ I/08 | Data I/O |
| 18 | $\overline{CE}$ | Chip enable input |
| 19 | A10 | Address input |
| 20 | $\overline{OE}$ | Output enable input |
| 21 | $\overline{WE}$ | Read/write control input |
| 22 | A9 | Address uboyt |
| 23 | A8 | |
| 24 | VCC | Power supply terminals |

# 16. FOR HEM TYPE

## CONTRAST OF MISCELLANEOUS PARTS

*NOTES:*
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  *★★ GENERALLY MOVES FASTER THAN ★*
  *This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

**The PD-91/HEM type is the same as the PD-91/KU/CA type with the exception of the following sections.**

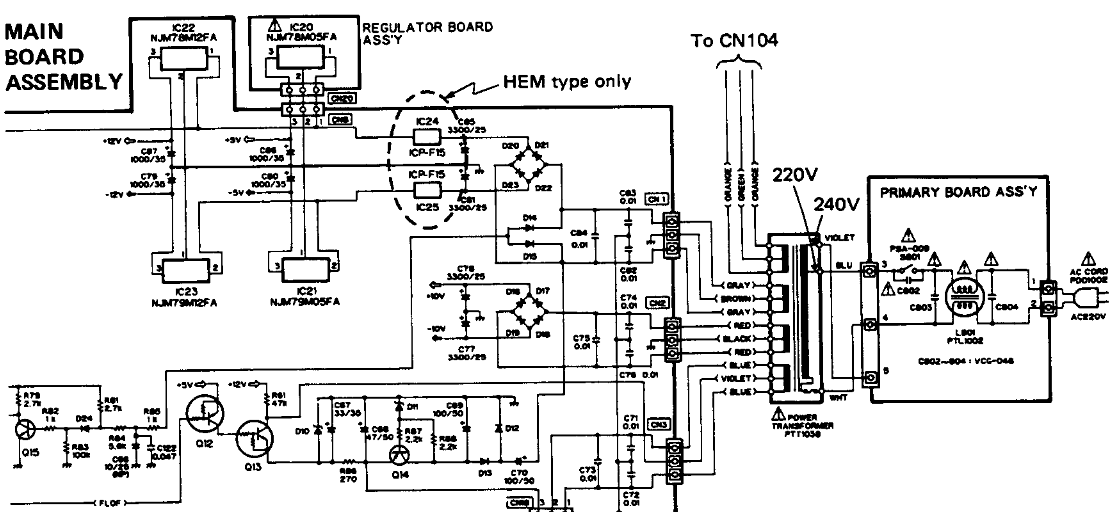
| Mark | Symbol & Description | Parts No. | | Remarks |
|---|---|---|---|---|
| | | PD-91/KU/CA | PD-91/HEM | |
| ⚠ | Main board assembly | Non supply | Non supply | |
| ⚠ | Strain relief | CM-22C | CCM-22B | |
| | FL filter | PAM1152 | PAM1134 | |
| ⚠ | AC Power cord | PDG1002 | PDG1003 | |
| ⚠ ★ | Power transformer (AC220/240V) | ... | PTT1038 | |
| ⚠ ★ | Power transformer (AC120V) | PTT1039 | ... | |
| | Operating instructions (English) | PRB1041 | ... | |
| | Operating instructions (English/German/French/Italian) | ... | PRE1038 | |
| | Operating instructions (Dutch/Swedish/Spanish/Portuguese) | ... | PRF1006 | |

## CONTRAST OF MAIN BOARD ASSEMBLY

**The Main Board Assembly (for PD-91/HEM) is the same as the Main Board Assembly (for PD-91/KU/CA) with the exception of the following sections.**

| Mark | Symbol & Description | Parts No. | | Renarks |
|---|---|---|---|---|
| | | KU/CA type | HEM type | |
| ⚠ ★★ | IC24, IC25 | ... | ICP-F15 | |

- **Schematic diagram**



### Line Voltage Selection for HEM Type

1. Disconnect the AC power cord.
2. Remove the bonnet case.
3. Change the connection of the power transformer primary lead wires as follows:
   220V: Connect the blue lead wire to the No. 3 terminal on the primary board assembly and connect the violet lead wire to the No. 5 terminal.
   240V: Connect the blue lead wire to the No. 5 terminal on the primary board assembly and connect the violet wire to the No. 3 terminal.
4. Stick the line voltage label on the rear panel.

| Description | Part No. |
|---|---|
| 220V label | AAX-193 |
| 240V label | AAX-192 |

### • P.C.Board pattern

MAIN BOARD ASSEMBLY