Pioneer

Service Manual

ORDER NO.
CRT2376

CD MECHANISM MODULE

CX-890

NOTE:

- **This Service Manual outlines operations of the CD mechanism module used in the models listed blow.**
- **For repair, use this Service Manual and the Service Manual of the model used in the system.**

Model	Service manual	CD mechanism module	CD mechanism unit
CDX-PD6/UC	CRT2372	CXK4701	CXB2700

CONTENTS

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER ELECTRONIC [EUROPE] N.V. Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

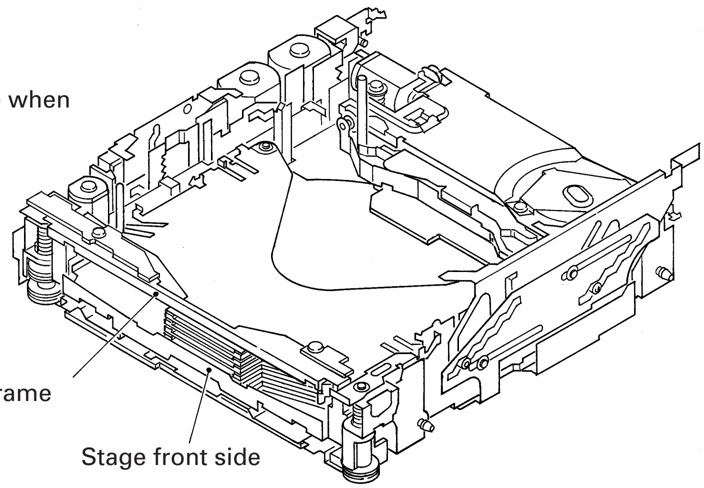
K-ZZS. FEB. 1999 Printed in Japan

● CD Player Service Precautions

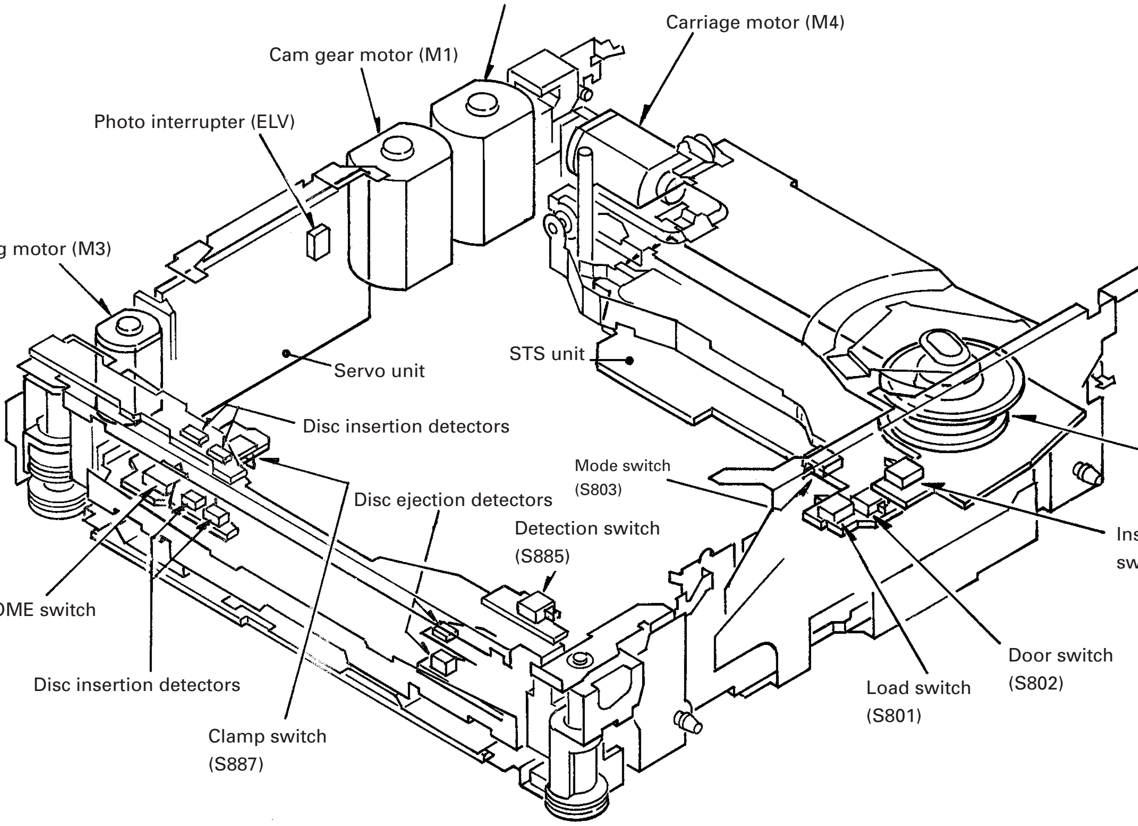
1. For pickup unit(CXX1311) handling, please refer to"Disassembly"(Page 21).
   During replacement, handling precautions shall be taken to prevent an electrostatic discharge(protection by a short pin).

Do not hold the upper frame of the disc insertion slot or the front side of the stage in the CD mechanism module when servicing to prevent them from being deformed.

2. During disassembly, be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.



1. MAIN PARTS LOCATIONS



2. CIRCUIT DESCRIPTIONS

2.1 Preamplifier (UPC2572GS: IC101)

The preamplifier processes pickup output signals to generate signals to be sent to the servo, demodulator, and controller. The preamplifier with built-in photodetector converts signals from the pickup into intermediate voltage in the pickup. Then, addition is made in the RF amplifier (IC101) to obtain RF, FE, TE, and TE zero cross signals. The system consists of the UPC2572GS and other components explained below. The system uses a single power source (+5 V). Therefore, the reference voltage of IC101 and the reference voltage of the power unit and servo circuit are REFOUT (+2.5 V). REFOUT is obtained from REFOUT of servo LSI (IC201: UPD63702GF) via a buffer, and is output from Pin 19 of IC101. This REFOUT is used as reference for all measurements.
Note:Do NOT short-circuit REFOUT and GND during measurement.

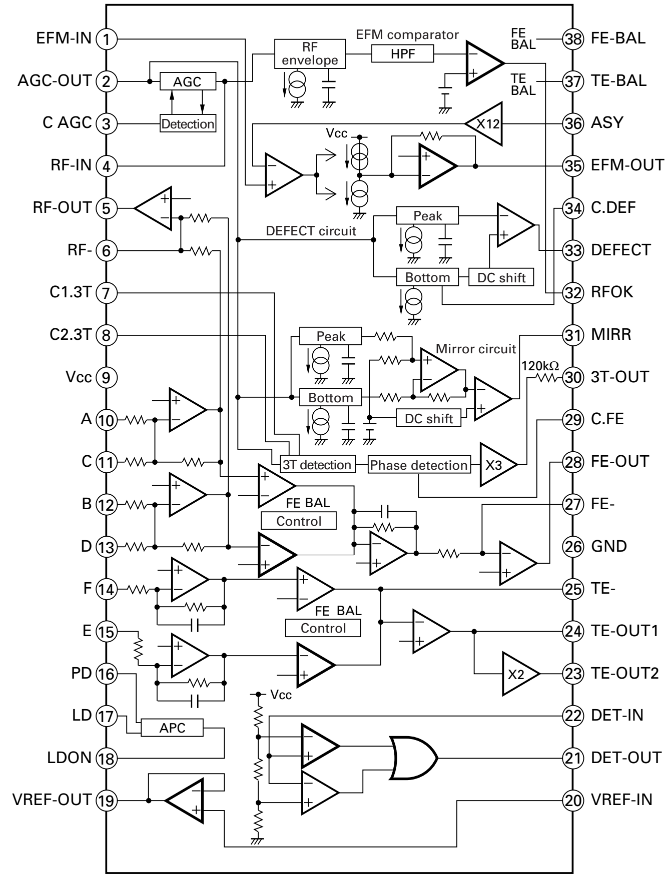


Fig. 1 Block Diagram of UPC2572GS

1) Automatic Power Control (APC) circuit

Laser diode has negative temperature characteristics with great optical output when the diode is driven with constant current. Therefore, current must be controlled by a monitor diode to ensure constant output. Thus functions the APC circuit. LD current can be obtained by measuring the voltage between LD1 and GND. The current value is approximately 35 mA.

$$\text{LD current(mA)} = \frac{\text{Voltage between LD1 and GND(mv)}}{10\ \Omega + 12\ \Omega}$$

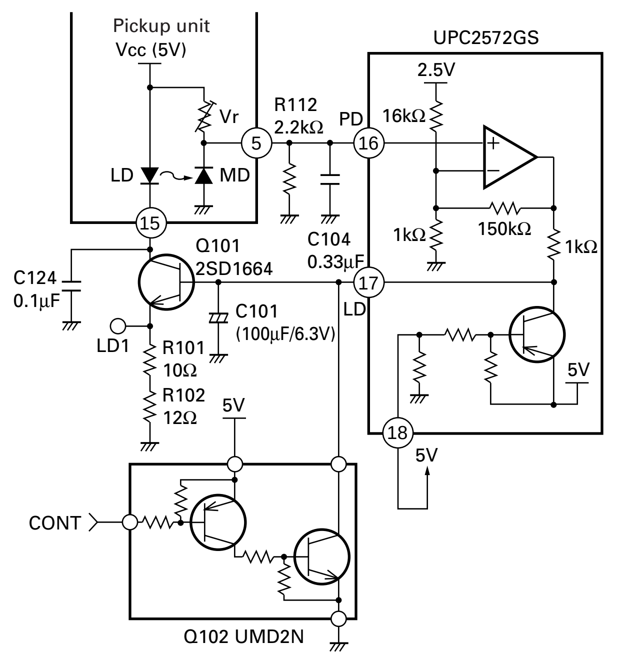


Fig. 2 APC Circuit

2) RF amplifier and RF AGC amplifier

Photodetector outputs (A+C) and (B+D) are added, amplified and equalized in IC101, and output to the RFI terminal as RF signal. (Eye pattern can be checked at this terminal.)

Low-frequency components of voltage RFI is:

RFI = ((A + C) + (B + D)) x 3.22

where R111 is offset resistor to keep RFI signal within the output range of the preamplifier. RFI signal is goes under AC coupling, and is input to Pin 4 (RFIN terminal).

IC101 contains an RF AGC circuit. RFO output from Pin 2 is maintained to a constant level (1.2 ±0.2 Vp-p). The RFO signal is used in the EFM, DFCT, and MIRR circuits.

3) EFM circuit

The EFM circuit converts RF signal into digital signals of "0" and "1". RFO signal after AC coupling is input to Pin 1, and supplied to the EFM circuit.

Asymmetry caused during manufacturing of discs cannot be eliminated solely by AC coupling. Therefore, the system controls the reference voltage ASY of the EFM comparator by using the fact that probability to generate "0" and "1" is 50% in EFM signal. This reference voltage ASY is generated by output from the EFM comparator through L.P.F. EFM signal is output from Pin 35. As signal level, amplification is 2.5 Vp-p around REFOUT.

4) DFCT (defect) circuit

DFCT signal detects mirror defect in discs, and is output from Pin 33. The system outputs "H" when a mirror defect is detected.

If disc is soiled, the system determines it as lack of mirror. Therefore, the system inputs the DFCT signal output to the HOLD terminal of servo LSI. Focus and tracking servo drives change to Hold status only when DFCT output is in "H" so that performance of the system upon detection of defect can be improved.

5) RFOK circuit

The RFOK circuit outputs signal to show the timing of focus closing servo, as well as the status of focus closing during playback. The signal is output from Pin 32. The system inputs the RFOK signal output to the RFOK terminal of servo LSI. The servo LSI issues Focus Close command. The system outputs signal in "H" during focus closing and playback.

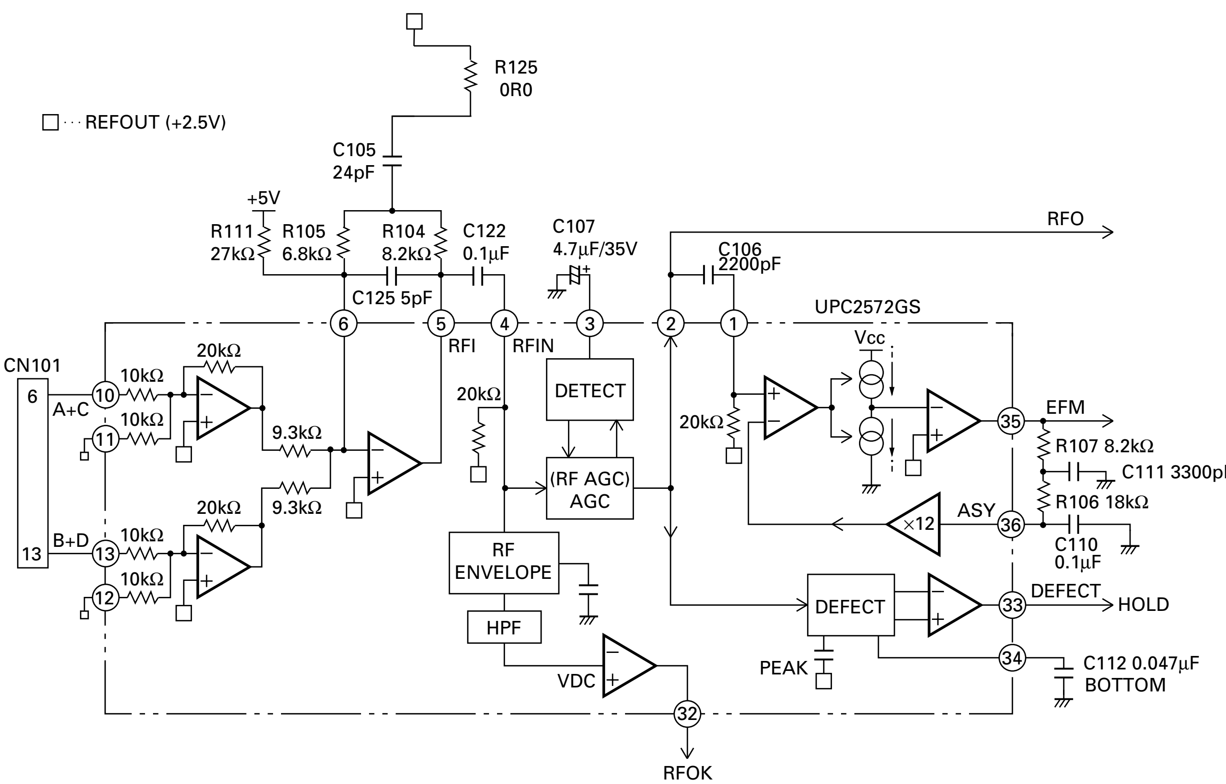


Fig. 3 RF AMP, RF AGC, EFM, DFCT, RFOK Circuit

6) Focus-error amplifier

The system outputs photodetector output (A+C) and (B+D) as FE signal (A+C)-(B+D) from Pin 28 via the difference amplifier, then via the error amplifier.

Low-frequency components of voltage FEY is:

$$FEY=(A+C)-(B+D) \times \frac{20k\Omega}{10k\Omega} \times \frac{90k\Omega}{68.8k\Omega} \times \frac{R108}{17.2k\Omega}$$

: (FE level of pickup unit x 5.02)

An S curve equivalent to approximately 1.6 Vp-p is obtained at FE output (Pin 28) by using REFO as reference. The cut-off frequency of the amplifier of the last layer is 12.4 kHz.

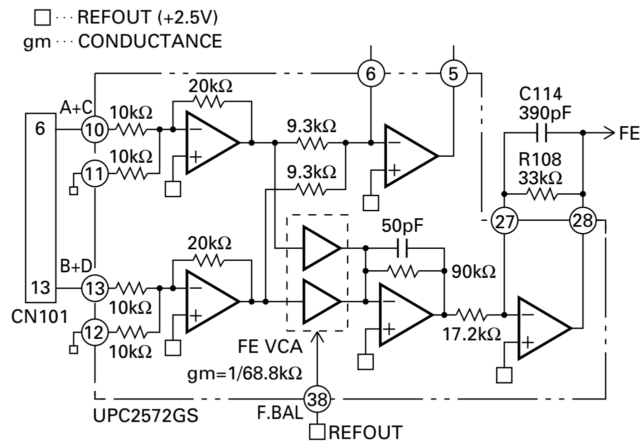


Fig. 4 Focus-error amplifier

7) Tracking-error amplifier

Outputs E and F from the photodetector are output as TE signal (E-F) from Pin 24 via the difference amplifier, then via the error amplifier.

Low-frequency components of voltage TEY is:

$$TEY=(E-F) \times \frac{63k\Omega}{(31k\Omega+16k\Omega)} \times \frac{68k\Omega}{17k\Omega}$$

: (TE level of pickup unit x 5.36)

TE waveforms equivalent to approximately 1.5 Vp-p are obtained at TE output (Pin 24) by using REFO as reference. The cut-off frequency of the amplifier of the last layer is 19.5 kHz.

8) Tracking zero-cross amplifier

Tracking zero-cross signal (TEC signal) is generated by amplifying TE waveforms (voltage at Pin 24) by a factor of four. The signal is used for detecting the zero-cross point of tracking error in the servo LSI UPD63702AGF. The purposes of detecting the zero-cross point are as follows:

(1) To be used for counting tracks for carriage move and track jump.

(2) To be used for detecting the direction of lens movement when tracking is closed. (To be used in the tracking brake circuit mentioned later.)

The frequency range of TEC signal is from 500 Hz to 19.5 kHz.

Voltage TEC = TE level x 4

In other words, the TEC signal level is calculated as 6 Vp-p. This level exceeds the D range of the operation amplifier, resulting in the signal to clip. However, there shall be no problem, since the servo LSI uses only zero-cross point.

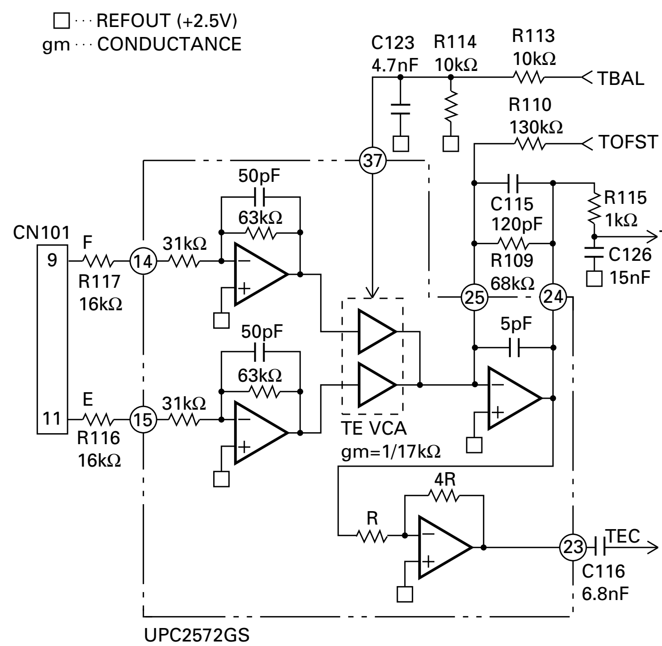


Fig. 5 Tracking-error amplifier, Tracking zero-cross amplifier

9) MIRR (mirror) circuit

MIRR signal shows ON and OFF track information. The signal is output from Pin 31.

The status of MIRR signal is as follows:

Laser beam ON track: MIRR = "L"

Laser beam OFF track: MIRR = "H"

The signal is used in the brake circuit mentioned later.

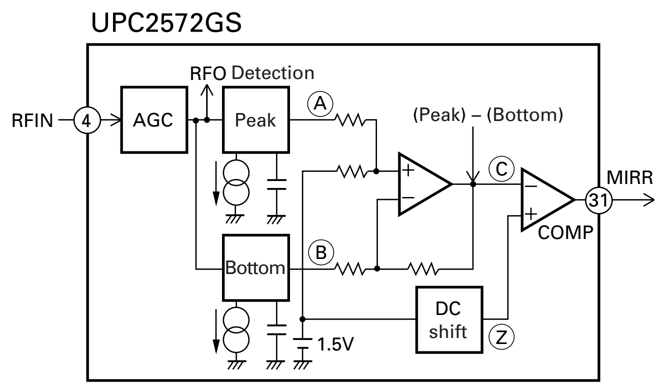


Fig.6 MIRR Circuit

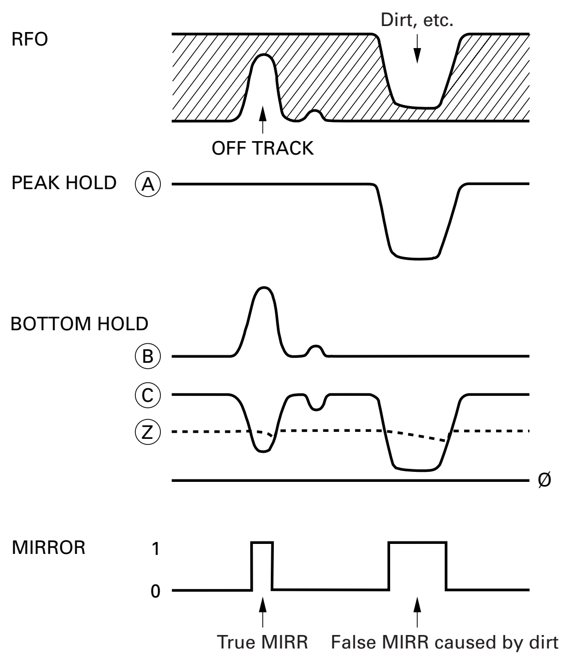


Fig. 7 MIRR Circuit

10) 3T OUT circuit

The system detects flickering of RF signal when disturbance is input to the focus servo loop, and outputs the difference of phase between FE signal and RF-level fluctuation signal from Pin 30. The resulting signal is obtained through L.P.F. with a fc of 40 Hz. This signal is used for automatic adjustment of FE bias.

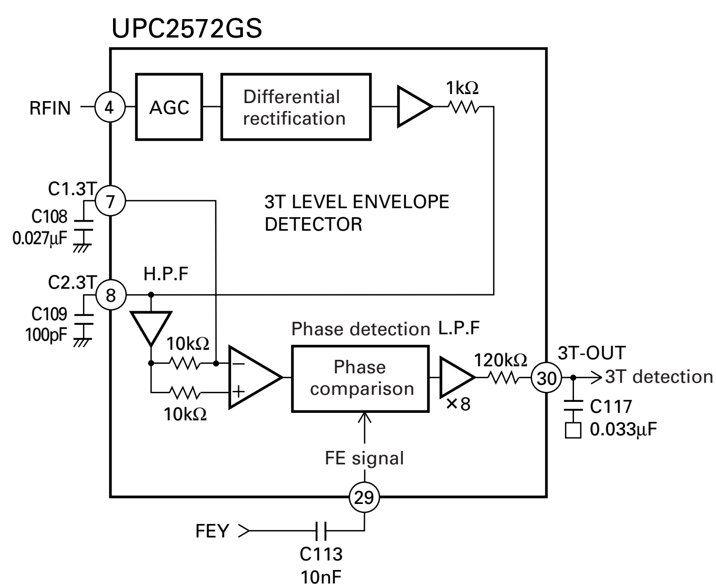


Fig. 8 3T OUT Circuit

2.2 Servo (UPD63702AGF: IC201)

The servo consists of mainly two parts. The first part is the servo processing unit to equalize error signals and control track jump, carriage move, in focus, etc. The second part is the signal processing unit to perform data decoding, error correction, and interpolation.
The system converts FE and TE signals from analog to digital in IC201, then outputs drive signals of the focus, tracking, and carriage systems via the servo block. The EFM signal input from the preamplifier is decoded by the signal processing unit, and eventually output as audio signal after conversion into analog from digital signals via the DA converter (IC201 contains audio DAC). Then, the system generates error signal for the spindle servo in the decoding process, sends the signal to the spindle servo to generate drive signal for spindle.
After that, drive signals for focus, tracking, carriage, and spindle are amplified in IC301 and BA5986FM, and supplied to respective actuators and motors.

1) Focus servo system

The main equalizer of focus servo is located in the UPD63702AGF. Fig. 9 shows block diagram of the focus servo.
For the focus servo system, the lens must be positioned within the focusing range in order to perform focus closing. To achieve this, the system moves the lens upward/downward by focus-search voltage of triangular waveform to detect the focusing point. During searching, the system kicks the SPDL motor to maintain rotation speed to set speed.
The servo LSI monitors FE and RFOK signals so that focus closing is performed automatically at an appropriate point.
Focus closing is performed when the following four conditions are satisfied:
(1)When the lens moves nearer to the disc.
(2)RFOK = "H"
(3)FZD signal (in IC) is latched to "H"
(4)FE = 0 (REFOUT as reference)

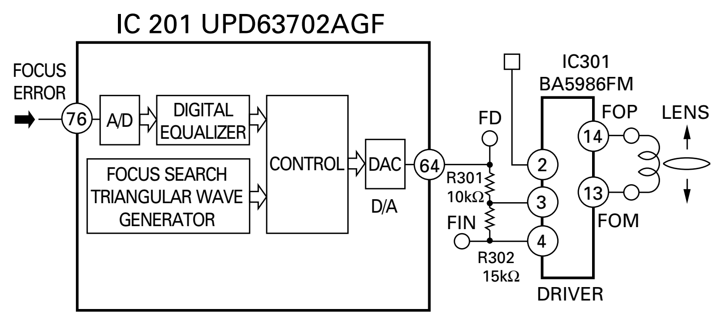


Fig. 9 Focus servo block diagram

When the conditions mentioned above are satisfied and focus is closed, the XSO terminal changes from "H" to "L". Then, the microcomputer starts monitoring RFOK signal through L.P.F after 40 ms.
If the system judges RFOK signal as "L", the microcomputer takes actions, including protection.
Fig. 10 shows operations related to focus closing. (The illustration shows when the system cannot perform focus closing.) S curve, search voltage, and actual lens behavior can be checked by pressing the Focus Close button when "01" is shown in Focus Mode Select in Test mode.

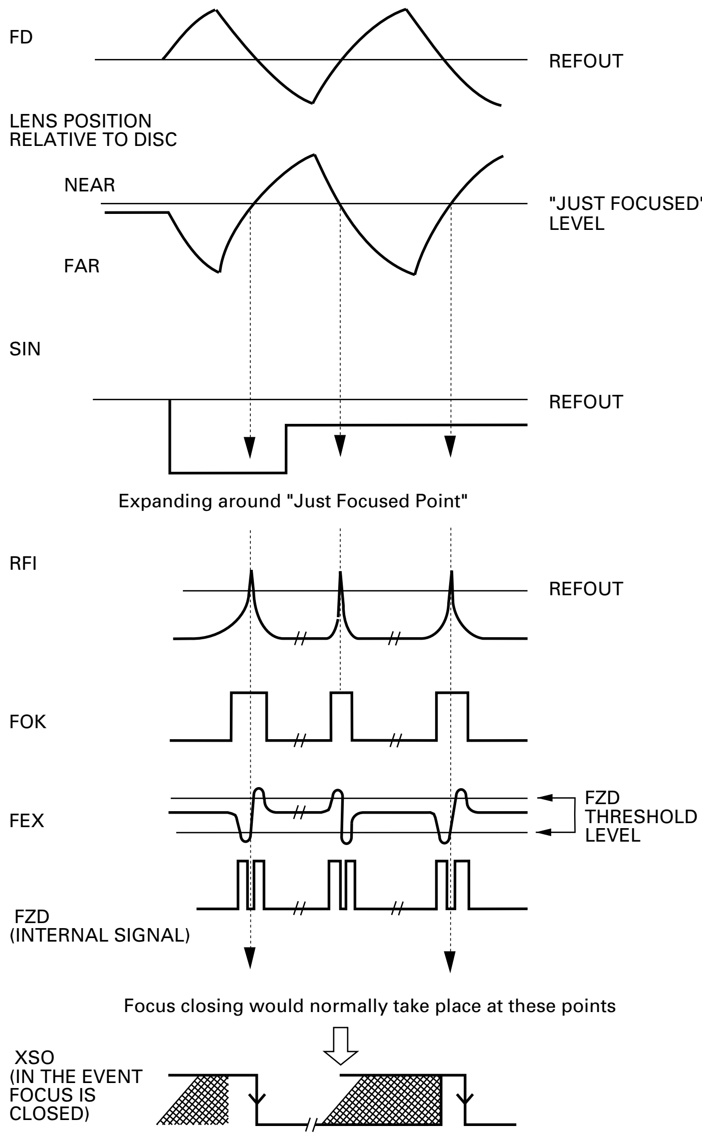


Fig. 10 Sequence of Focus Closing

2) Tracking servo system

The main equalizer of tracking servo is located in the UPD63702AGF. Fig. 11 shows block diagram of the tracking servo.

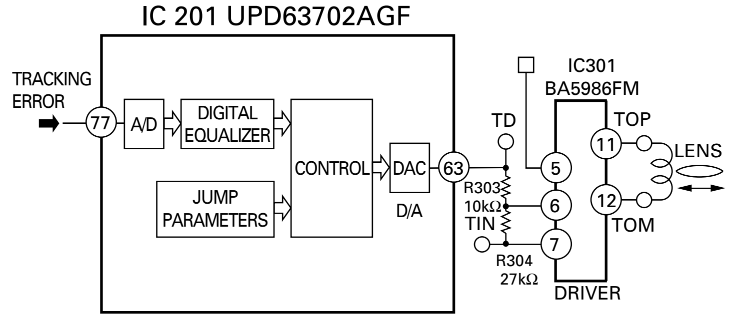


Fig. 11 Tracking servo block diagram

a) Track jump

Track jump is automatically performed by the auto sequence function in LSI when the LSI accepts command. The system has six types of jump (1, 4, 10, 32, 32x2, and 32x3) for truck jump during searching. In Test mode, the system can select and check these jump types and CRG move by selecting a mode. The microcomputer sets half of the total number of track jumps (two tracks if the total number of tracks are four), and counts the set number of tracks by using TEC signal. The system outputs brake pulse for a specified time (set by the microcomputer) from the point of time when the set number is counted, and stops the lens. Thus, tracking is closed, and the system can continue normal playback.

To improve servo withdrawal during track jump, the system sets the brake circuit to ON for 60 ms after brake pulse so that gain of the tracking servo can be increased.

FF/REV in normal mode is made by continuously performing single jump approximately ten times faster than in normal playback.

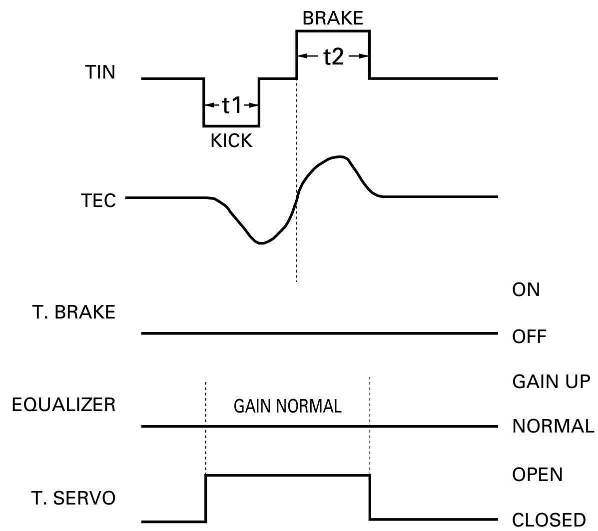


Fig. 12 Single track jump

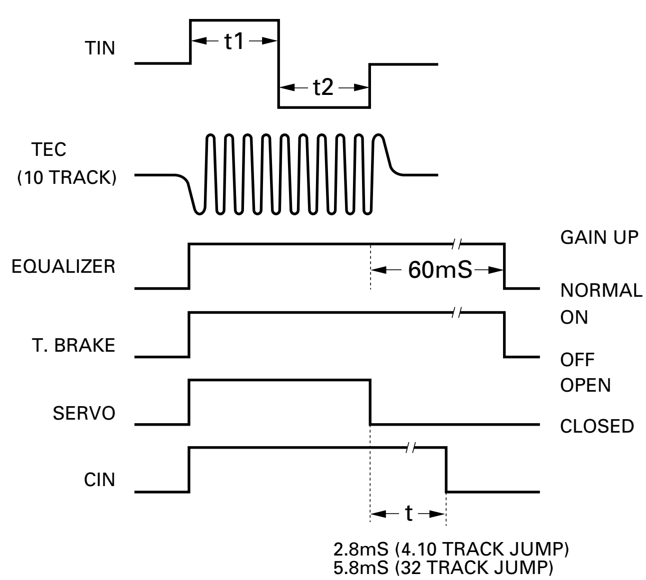


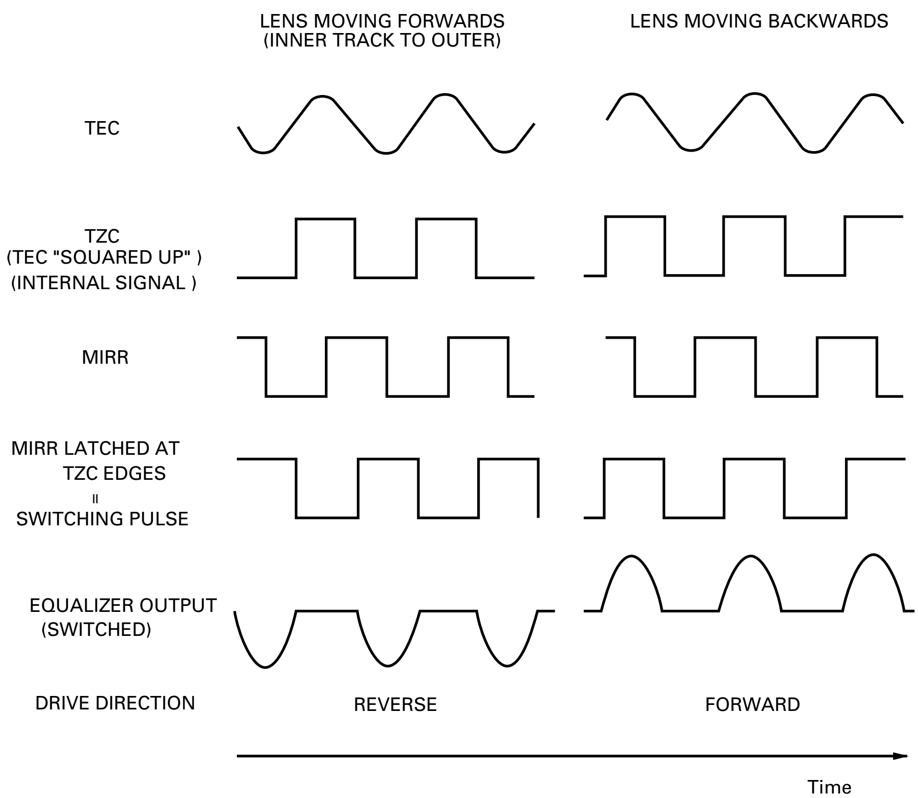
Fig. 13 Multi track jump

b) Brake circuit

Servo withdrawal will deteriorate during setting and track jump. Thus, the system uses the brake circuit to provide stable withdrawal to servo loop.

The brake circuit detects the direction of lens movement, and outputs only drive signal in the opposite direction from the lens movement. Thus, the system delays the speed of the lens movement to stabilize withdrawal of the tracking servo.

The system judges sliding direction of track from TEC and MIRR signals, as well as the relationship of their phase.



Note: In the illustration, the phase of equalizer output is shown as the same as with that of TEC.

Fig. 14 Tracking Brake Circuit

3) Carriage servo system

Output from low-frequency components (lens position information) of the tracking equalizer is input to the carriage equalizer by the carriage servo. After obtaining a certain gain, the system outputs drive signal from the servo LSI. The signal is then applied to the carriage motor via the driver IC. More specifically, the pickup unit as a whole must be moved forward when lens offset during playback reaches a specified level. Therefore, gain of equalizer is set so that voltage higher than the activation voltage of the carriage motor is output. As actual operation, a certain threshold level is set for equalizer output in the servo LSI, and drive voltage is output from the servo LSI only when the equalizer output level exceeds that level. Thus, power consumption is reduced. Depending on eccentricity, etc. of disc, the equalizer output voltage may cross the threshold level several times before the pickup unit as a whole starts operation. At this time, waveforms of drive voltage from LSI are output as pulse.

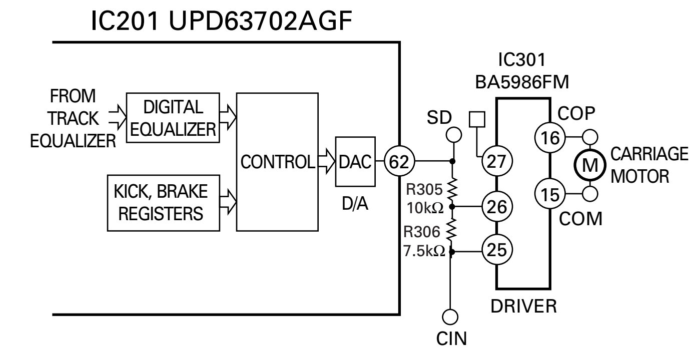


Fig. 15 Carriage Servo Circuit

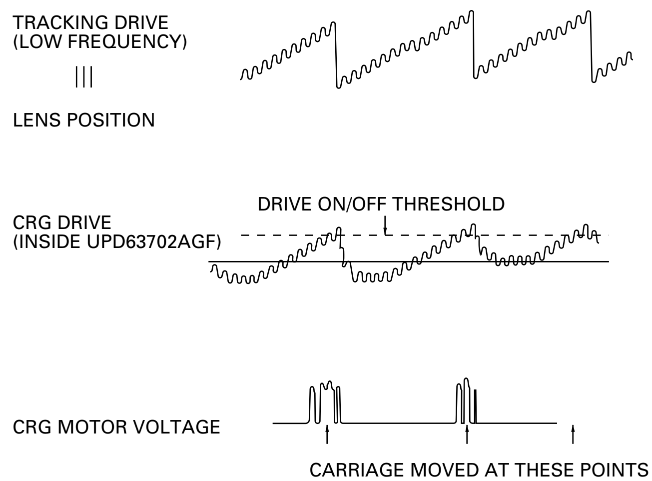


Fig. 16 Carriage Signal Waveforms

4) Spindle servo system

The spindle servo has the following modes:

(1)Kick mode:To be used for accelerating disc rotation during setting.

(2)Offset mode:

a)To be used after completion of kick until comple tion of spindle lock during setting.

b)If focus is out of range during playback, this mode is used until focus is recovered. In both cases, Offset mode is used for maintaining disc rotation to the speed close to specified rotation.

(3)Adaptive Servo mode: CLV servo mode during normal operation. The system samples every WFCK in 16 cycles whether frame synchronous signal matches output from the internal frame counter in EFM demodulation block, and generates signal that shows matching/unmatching status. If signal showing unmatching status continues for 8 times, the system deems it as asynchronous status. Except this case, the system judges as synchronous. In Adaptive Servo mode, the system automatically selects withdrawal servo for asynchronous status, and steady-state servo for synchronous status.

(4)Brake mode: Mode to stop the spindle motor.
The microcomputer outputs brake voltage from the servo LSI. Waveforms of EFM are monitored inside the LSI. If the longest pattern of EFM exceeds specified intervals (if the rotation speed adequately slowed down), flag is activated in the LSI, and the microcomputer turns brake voltage to OFF. If no flag is activated after a specified time, the microcomputer changes from Brake to Stop mode. This status continues for a specified time. If the system changes to Stop mode during ejection, disc is ejected after the specified time mentioned above.

(5)Stop mode: To be used when the power is turned to ON, and during ejection. In Stop mode, the end-to-end voltage of the spindle motor is 0 V.

(6)Rough Servo mode: To be used when returning carriage (carriage move during long search, etc.). The system calculates linear speed from waveforms of EFM, and inputs either "H" or "L" level to the spindle equalizer. This mode is also used for confirmation of grating in Test mode.

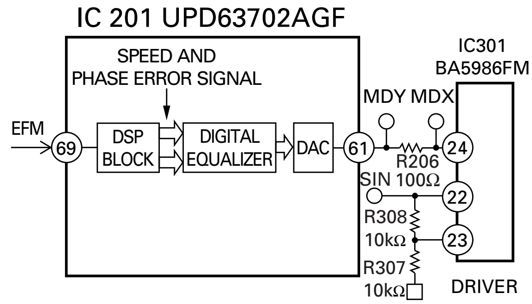


Fig. 17 Spindle servo block diagram

2.3 Automatic Adjustment Function

With this system, all circuit adjustments are automatically performed by using the preamplifier (UPC2572GS) and servo LSI (UPD63702AGF). All adjustments are automatically performed whenever disc is inserted or CD mode is selected by the Source key. Details of automatic adjustments are as follows:

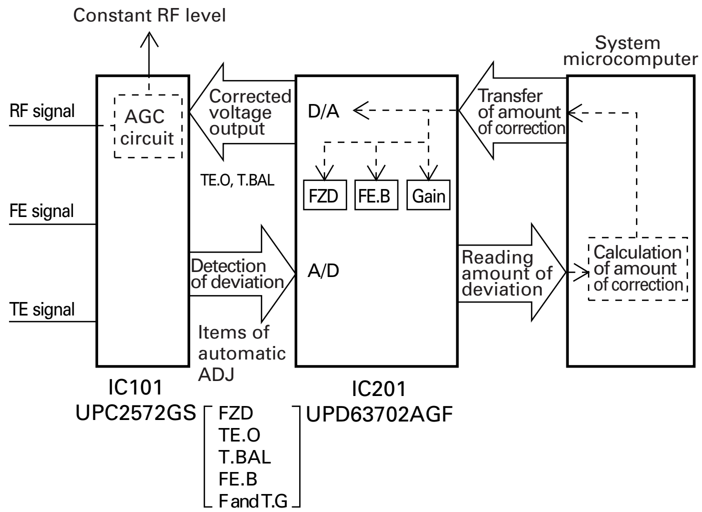


Fig. 18 Outline of Automatic Adjustment

1) Setting of FZD cancellation

This setting ensures focus closing. The system reads the FE offset level when the power is turned to ON, then writes the inverse voltage of offset value of that level to CRAM inside IC to cancel offset. Thus, the threshold level of FZD can be set to a constant value (+150 mV). As a result, "Latching FZD signal to H", which is one of the conditions required for focus closing in IC, is ensured.

2) TE offset automatic adjustment

Adjusts TE amplifier offset of the preamplifier to 0 V when the power is turned to ON.

Adjustment is made as follows:

(1)The microcomputer reads TE offset in LD OFF status via the servo LSI (TE1).

(2)The microcomputer calculates the voltage to be corrected using the TE1 value, and outputs from Pin 65 (pin name: TOFST) of the servo LSI. More specifically, calculation is made as follows:

TOFST2 = TOFST1 + TE1 x R110 / R109

3) Tracking balance (T.BAL) automatic adjustment

To make the sensitivity of Ech of TE output equal to that of Fch. In fact, adjustment is made so that the upper and lower portions of TE waveforms are symmetric to REFOUT.

Adjustment is made in the following steps:

(1)After focus close, the system kicks the lens in the radial direction to ensure TE waveforms to be generated.

(2)The microcomputer reads the peak bottom of TE waveforms via the servo LSI.

(3)The microcomputer calculates the amount of offset, then calculates the voltage to be corrected based on that offset. The system outputs the result from Pin 66 (pin name: TBAL) of the servo LSI.

(4)The voltage output from the servo LSI is input to Pin 37 of the preamplifier (IC101: UPC2572GS). Pin 37 is a control-voltage terminal of the TEVCA amplifier. According to voltage input, the system changes gain of Ech and Fch in the preamplifier, and adjusts the tracking balance to make the upper and lower portions of TE waveforms symmetric to REFOUT.

4) FE bias automatic adjustment

Maximizes the RFI level by optimizing focus point during playback. Adjustment is made by using 3T level waveforms of RF waveforms and the phase difference generated by input of disturbance of focus error. Since adjustment is made by inputting disturbance to focus loop, the system uses the same timing as with auto gain control (mentioned later~) for adjustment.

Adjustment is made in the following steps:

(1)Disturbance is input to focus loop by the command from the microcomputer (inside the servo LSI).

(2)The system detects flickering of 3T components of RF signal in the preamplifier.

(3)The system checks the phase difference between 3T components mentioned above and FE signal caused by input of disturbance to detect the direction of focus deviation. The result is output as DC voltage from Pin 30 (3TOUT) of the preamplifier.

(4)The 3TOUT voltage is input to Pin 75 (A/D port) of the servo LSI. The microcomputer reads this 3TOUT voltage via the servo LSI.

(5)The microcomputer calculates the amount of correction required. The results are transferred to offset of focus loop in the servo LSI.

As with auto gain control, the system repeats the same adjustment process several times to improve adjustment precision.

5) Auto gain control (AGC)

AGC adjustment is already used in the CD modules of the previous generation. This function automatically adjusts servo loop gain of focus and tracking.
Adjustment is made in the following steps:

(1)Disturbance is input to servo loop.

(2)The system extracts error signals (FE and TE) upon input of disturbance via the B.P.F. and obtains signals of G1 and G2.

(3)The microcomputer reads G1 and G2 signals via the servo LSI.

(4)The microcomputer calculates required amount of correction to adjust loop gain in the servo LSI.
The system repeats the same adjustment process several times to improve adjustment precision.

6) Initial adjustment value

For all automatic adjustments, the system uses the previous adjustment value as initial values, except when the power of the microcomputer has been turned to OFF (backup is turned to OFF). If backup has been turned to OFF, the system uses initial set value to perform automatic adjustment.

7) Display of coefficients of adjustment results

Results of automatic adjustments can be displayed in Test mode for confirmation. Display of coefficients in each automatic adjustment is as follows:

(1)FZD cancel, TE.OFST cancel, T.BAL, and FE bias
Reference = 32 (32: No adjustment was required)
Display is made in units of approximately 40 mV.
Example: Coefficient of FZD cancel = 35
35 - 32 = 3   3 x 40 mV = 120 mV
Corrected amount is approximately +120 mV.
Thus, FE offset before adjustment is -120 mV.

(2)Adjustment of F and T gain
Reference: Focus = 13, tracking = 20
The amount of reduced gain in comparison with the reference is known by looking at the coefficient dis played.
Example: AGC coefficient = 40
Amount of reduced gain = 20 log (20/40) = -6dB

2.4 Power Supply and Mechanism Control

The power supply VM (7.5V) is produced from the power supply VD (9.0V) supplied from the extension P.C. board, and used as the power supply for the loading motor driver, elevation motor driver, cam gear motor driver, and 5V Reg IC. As for the drive voltage for the disc detection LEDs and the power supply for the CD driver ICs, the power supply VD (9.0V) is used. The system IC controls the ON/OFF operations of the CD driver and laser diodes,the 5V power supply, and the drive voltage PVD for detection LEDs with "CONT", "POWER", and "LOAD" signals respectively.

2.5 STS(Sure Track System) Circuit

By pooling the musical data read in from a compact disc into the memory, even if the pickup should go off track for some reason, the Sure Track System enables prevention of sound interruption during recovery (approximately 3 seconds) by continuing to output data from the memory.

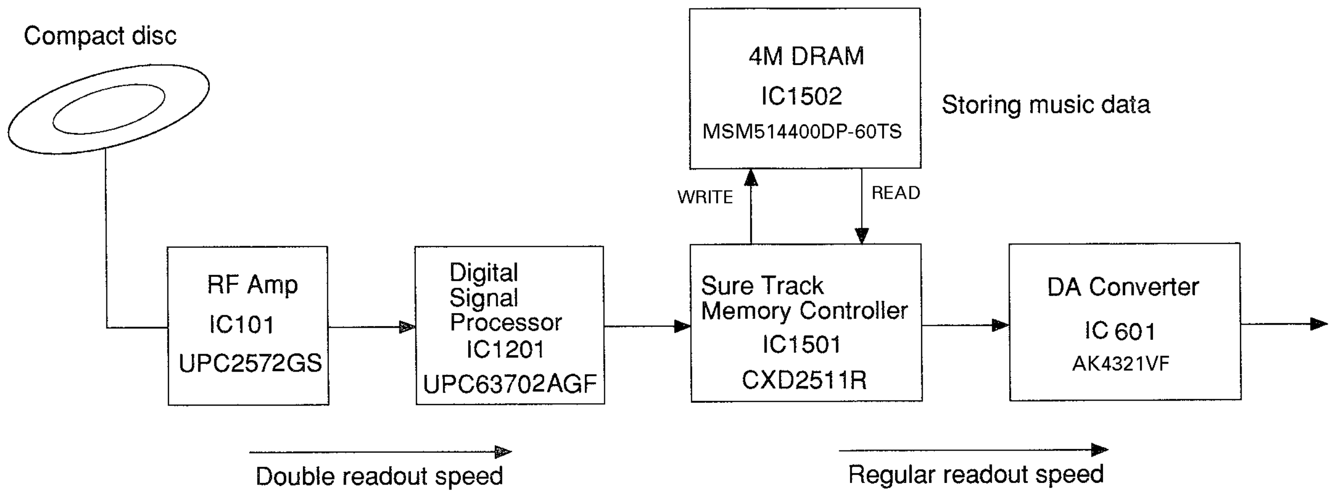


Fig. 19

Operation Principle

The STS circuit is controlled by the vibration free memory controller (CXD2511R). Data read in at double speed from a compact disc is input via the digital signal processing circuit into CXD2511R.

CXD2511R stores this DA data in DRAM (MSM5114400 DP-60TS), and reads and outputs the data at normal speed in synchronization with the internally generated FS system clock. In order to write the DA data at double speed and to read out at normal speed, the DRAM becomes full, but when it reaches capacity it will tentatively stop reading data. (The CD is in the pause mode during this time.) When an available area is created by data read-out from the DRAM, data writing will start again. (The available area of the DRAM can be monitored by ADRMON. By repeating this process, the DRAM is always used effectively, and approximately 2.67 seconds worth data can be stored. Even if the pickup should go off track due to vibrations for example, if recovered within 2.67 seconds while using the memorized data, sound interruption can be prevented.

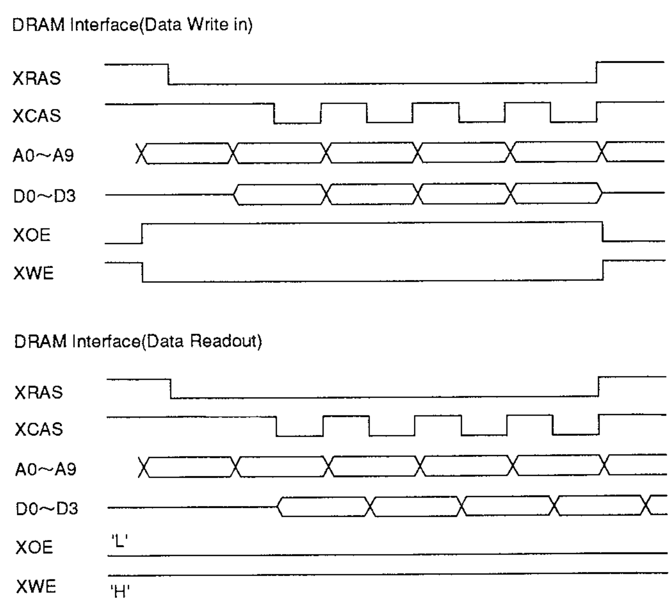


Fig. 20 TIMING CHART

3. MECHANISM OPERATIONS

3.1 Disc Insertion

a)The Cam gear rotates to the elevation OK position (See "How to remove the Tray Assy" on page 21). The Stage Mech Assy moves upwards or downwards to reach the height of the selected tray by using the elevation mechanism.

b)The Cam gear rotates counterclockwise until the LOAD switch is turned off. The Beak arms of the Stage Mech ASSY driven by the Cam gear's movement lift the selected tray.

c)The Stage Mech Assy with the tray lifted moves to the top position using the elevation mechanism.

* Disc insertion/ejection is performed at the top position (the 6th stage) irrespectively of tray position.

d)The Cam gear rotates counterclockwise to move the LOAD arms as shown in Fig.21.

e)The LOAD arms push the disc loaded on the tray and open the tray hooks.

f)When a disc is inserted, the disc interrupts the infrared LED light from the photo transistors, and the Rubber roller starts rotating.

* The photo transistors are connected in serial. When the light is interrupted from either photo-transistor, the start of disc insertion will be detected.

g)The disc is drawn in. Then the disc pushes the insertion completion switch via the arm.

h)The LOAD arms move forward to be released from the disc. At the same time, the tray hooks close to hold the disc on the tray.

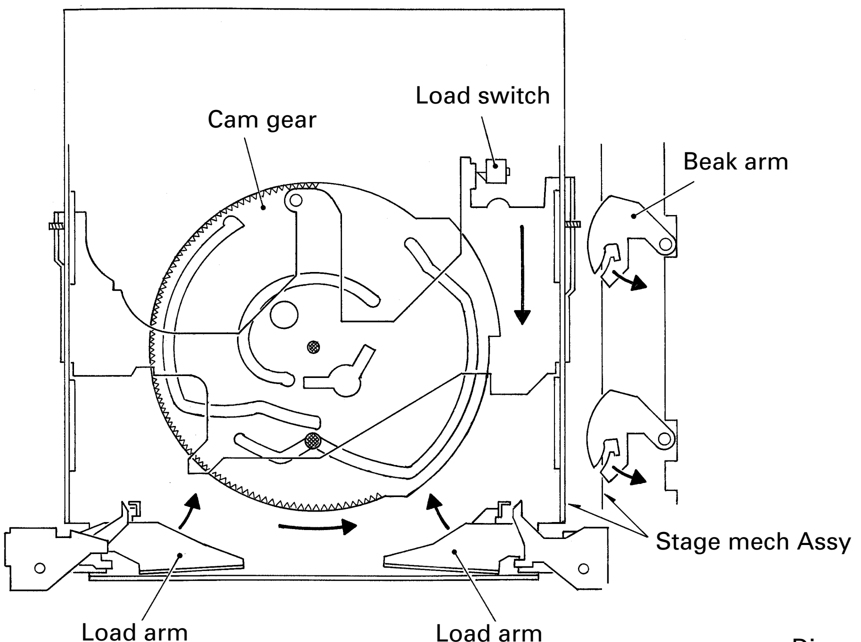


Fig. 21: Elevation OK position

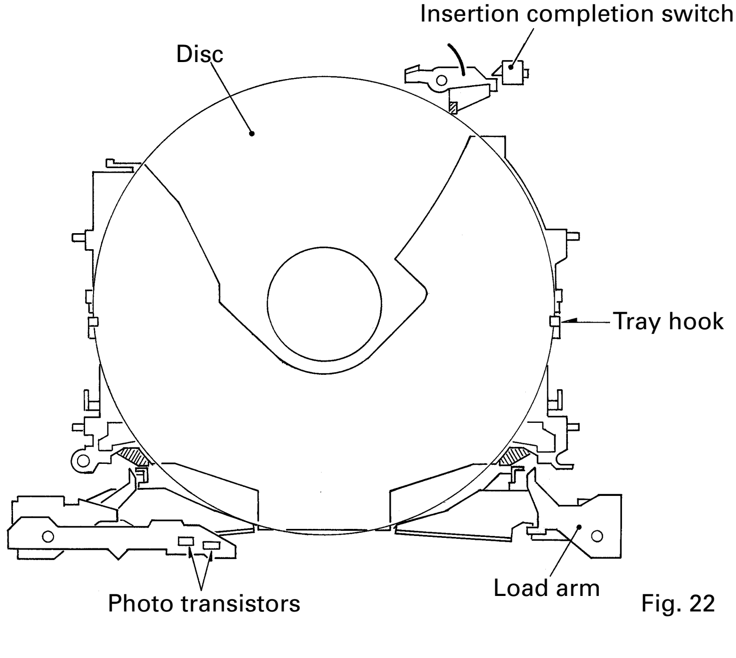


Fig. 22

3.2 Elevation

a)The Cam gear rotates to the elevation OK position.
b)The ELV motor rotates to slide the elevation lever via the gears.
c)The 2 elevation levers (left and right) can synchronize their sliding via the joint arm.
d)The shafts of the Stage Mech Assy engage with the stair-like grooves in the elevation levers and the vertical holes in the Main chassis via the rollers.
e) When the elevation levers slide, the Stage Mech Assy moves up and down.

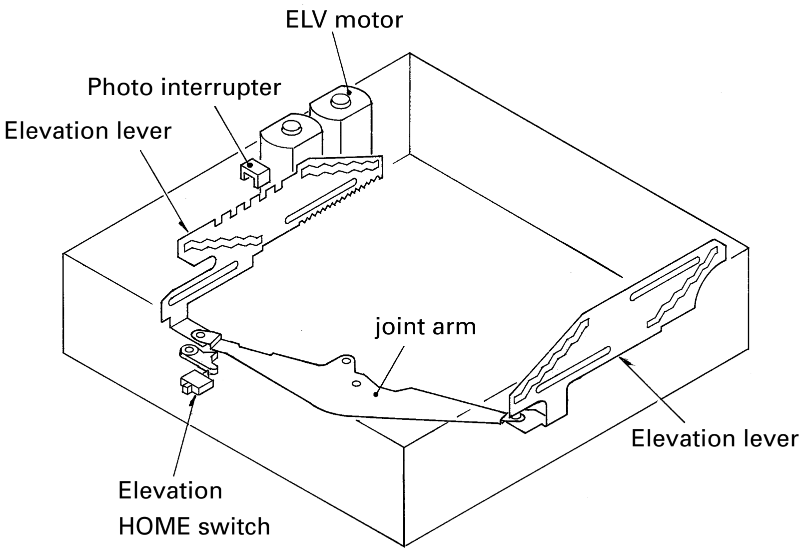


Fig. 23

3.3 Elevation Detection

a)The elevation detection (slit count) is performed by the photo interrupter.
b)After the elevation HOME switch is turned ON, the photo interrupter counts the slits of the elevation levers.
* The bottom position (the 1st stage) is detected when the elevation HOME switch is turned on (not detected by the photo interrupter).

3.4 Disc Clamp

a)The Stage Mech Assy moves up and down to reach the height of the selected tray, using the elevation mechanism.

b)The Cam gear rotates clockwise, the Carriage drive arm rotates, and then the Carriage Mech Assy moves toward the disc via the Carriage drive shaft.

c)The Cam gear continues rotating clockwise and the Carriage drive shaft moves the Clamp UP lever. Then the Clamp arm touching the Clamp UP roller moves down to clamp the disc.

d)The Cam gear stops when the Clamp switch is turned ON.

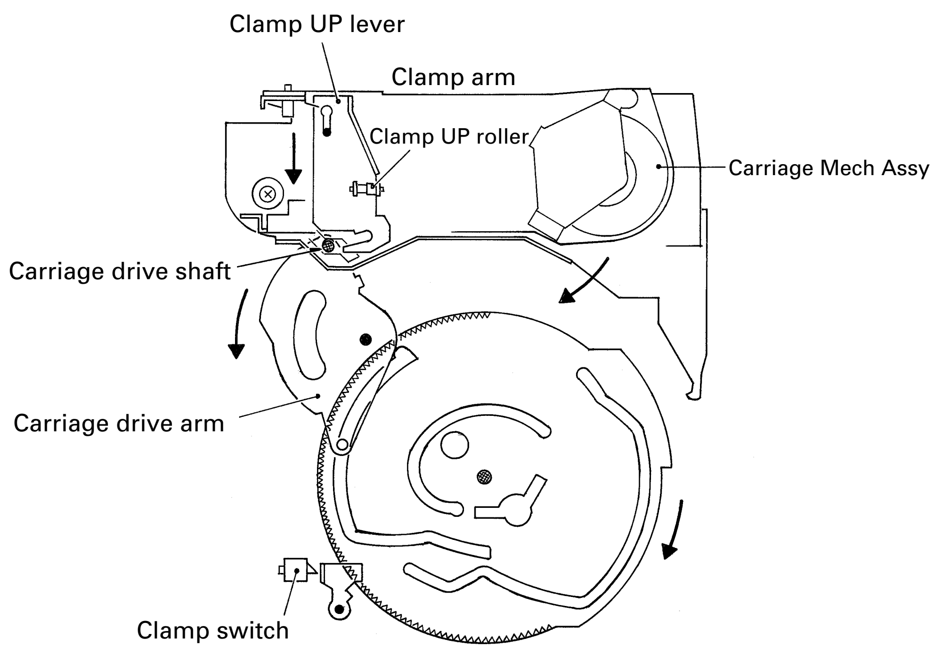


Fig. 24

3.5 Disc Sense (Initializing)

a)The disc sense operation is to detect if or not a disc is loaded on the trays 1 to 6.

b)While a disc is inserted using the robber rollers, the disc pushes the insertion completion switch via the arm to sense that a disc is loaded.

3.6 Disc Ejection

a)The same operations as the steps a) to e) on "3.1 Disc insertion" are performed.

b)The rubber roller(s) rotate(s) in the direction for disc ejection.

c)When the infrared LED light, which has been interrupted by the disc, passes toward the photo transistors, the rubber rollers stops.

3.7 Mechanism Lock

a)Mechanism lock operation is to push the mechanism downward and toward the disc slot in order to keep the mechanism at the correct position during disc insertion/ejection, and to leave the appropriate gap above the mechanism.

b)The Cam gear rotates to move the Mech lock lever toward the rear of the Mechanism. The lever pushes the inside surface of the product. It causes the mechanism to move forward.

c)With the movement of the Mech lock lever, the Mech lock lever (right) moves in a slanting direction as indicated by the arrow in Fig. 25 to push the mechanism forward and downward.

d)The Mech lock lever (left) is driven by the movement of the Mech lock lever via the Mech lock junction lever to push the Mechanism downward.

e)The mechanism lock is released only in the disc clamp mode.

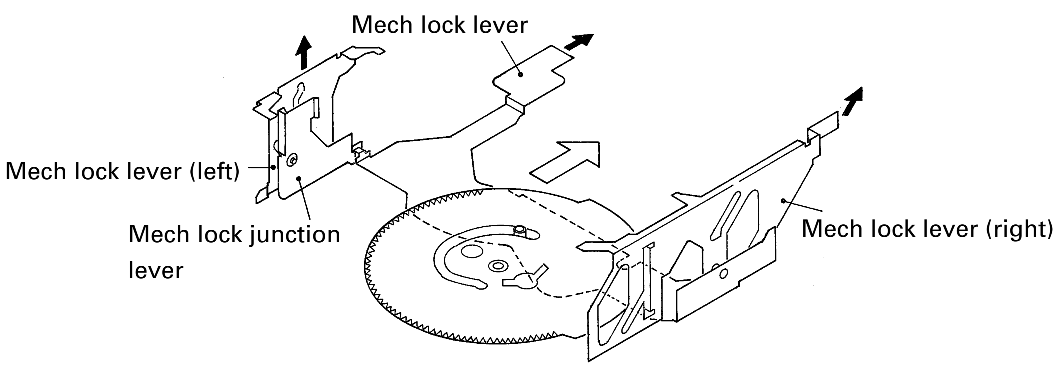


Fig. 25

3.8 Door Open

a)The Door open lever pushes the door on the product grille to open it.

b)The Cam gear rotates to move the door arm. Then, the door arm moves the door lever.

c)The door lever moves the door open lever via the buffer spring.

d)When the door switch is turned ON, the Cam gear motor stops rotating.

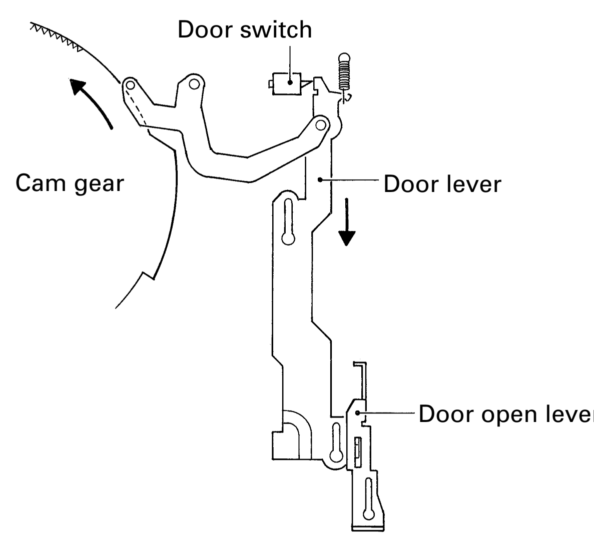


Fig. 26

3.9 Stage Mechanism Lock

a)To prevent the Stage mech assy from rattling during disc play, which may adversely affect the vibration-resistant performance, the Stage lock function works only in the disc clamp mode.

b)In the mode described at the step c) on "3.7 Mechanism lock" , the Stage lock lever (right) is driven by the movement of the Mech lock lever (right).

c)The 2 bent portions of the Stage lock lever (right) are pressed against the gear-like portions of the chassis to lock the right side of the Stage mech assy.

d)For the left side of the Stage mech assy, in the mode described at the step d) on "3.7 Mechanism lock", the Mech lock junction lever is driven to move the Stage lock lever (left).

e)The 2 bent portions of the Stage lock lever (left) are pressed against the gear-like portions of the chassis to lock the left side of the Stage mech assy.

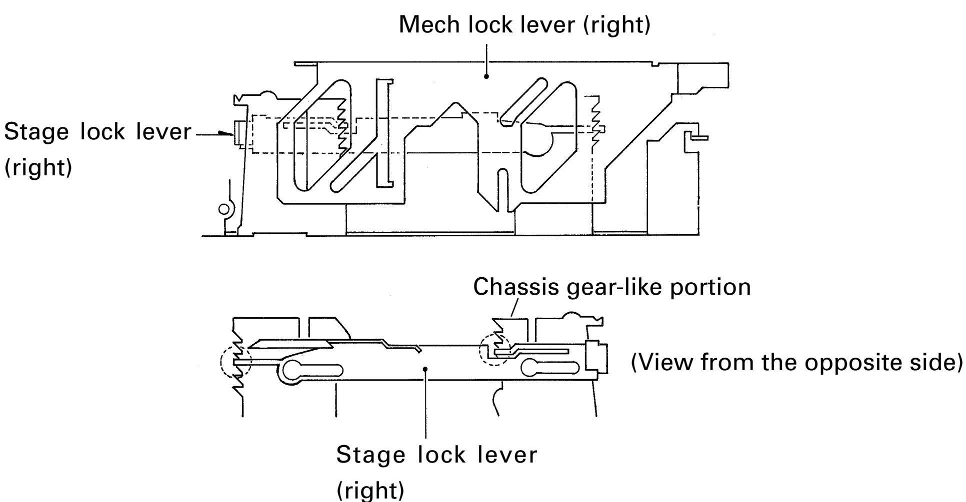


Fig. 27

4. DISASSEMBLY

● How to remove the Tray Assy

1. Apply about 6V current to the Cam gear motor until all holes match at the position (A) (elevation OK position).
2. Hook the three springs B temporarily as shown in Fig. 28. While pushing the Tray holder lock arms (right and left) in the direction (C), remove the Tray holder.
3. Lift up the Tray assy to remove it.

* Be careful not to remove the Tray hooks from the Tray assy.

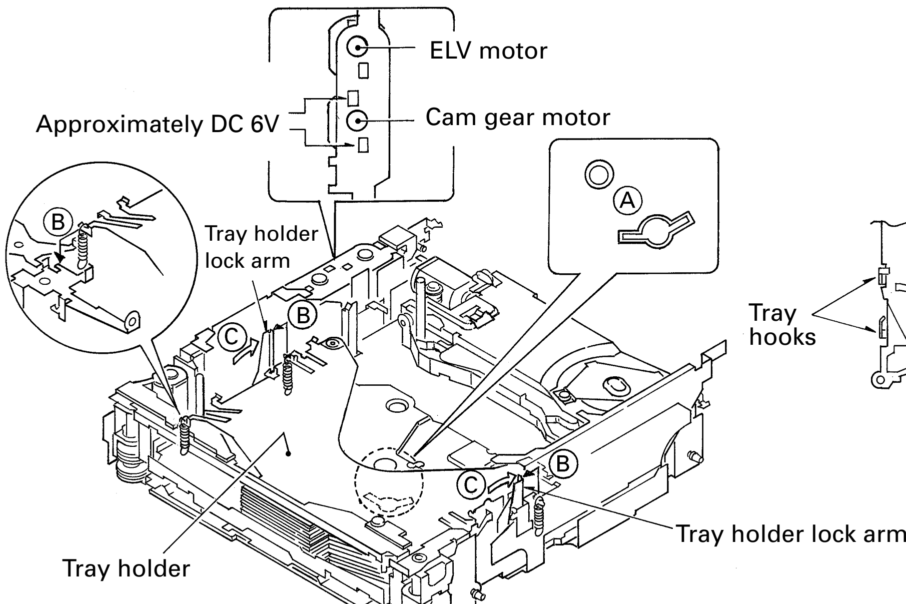


Fig.28

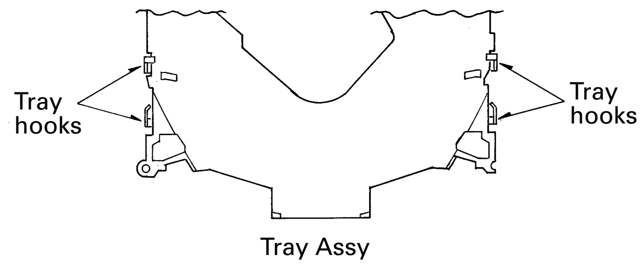


Fig. 29

● How to remove the Carriage Mech Assy

1. Insert a short pin into the flexible PCB of the Pickup unit.
2. While opening the resin hooks, remove the cover from the Servo unit.
3. Disconnect the flexible PCBs from the connectors CN101 and CN301.
4. Remove the Tray holder and the Tray assy. (See above)
5. Rotate the Cam gear motor until the positions of all holes (E) match, then stop the motor.
   (The Carriage Mech assy will stop as shown in the Fig.30.)

* When the positions of all holes match, they will be completely covered by the Carriage mech assy.

* To rotate the Cam Gear motor, see "How to remove the Tray assy".

6. Unhook the spring A.
7. Remove the flexible holder B (while opening the hooks).
8. Remove the flexible PCB (C) from the motor. (The flexible PCB (C) has been stuck on the motor with double-sided adhesive tape.)
9. Loosen the fixing screw and remove the flexible holder.

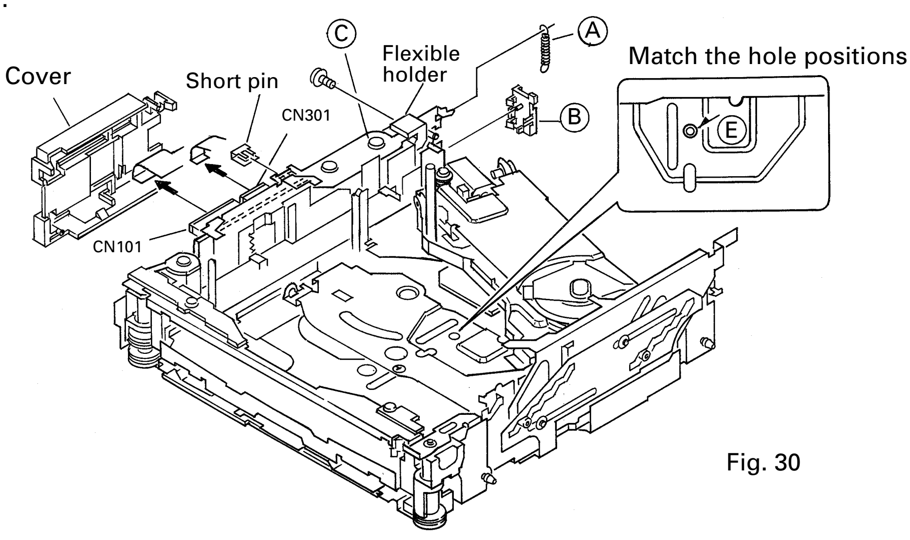


Fig. 30

10. Remove the screw, pressure spring and collar. Lift up the Carriage mech assy to remove it.
    * Screw tightening torque: 2.6kgfcm

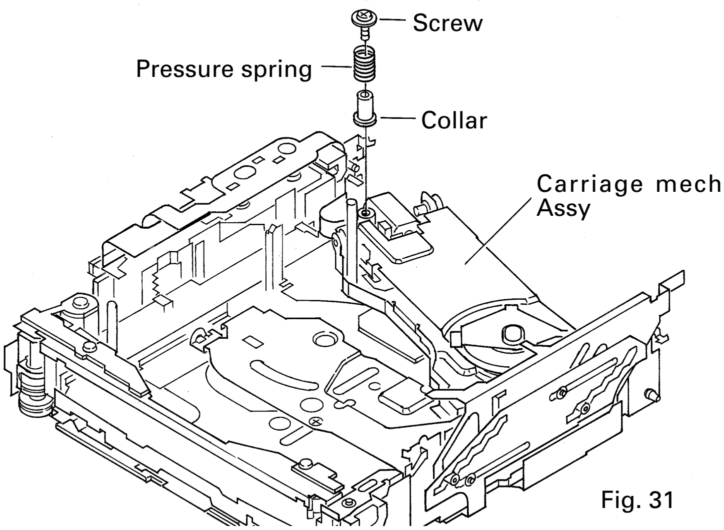


Fig. 31

● How to remove the Pickup unit

1. Remove the pulling spring, torsion spring and E-shaped ring. Then remove the Clamper arm.

* The spring (A) will be removed with the Clamper arm.

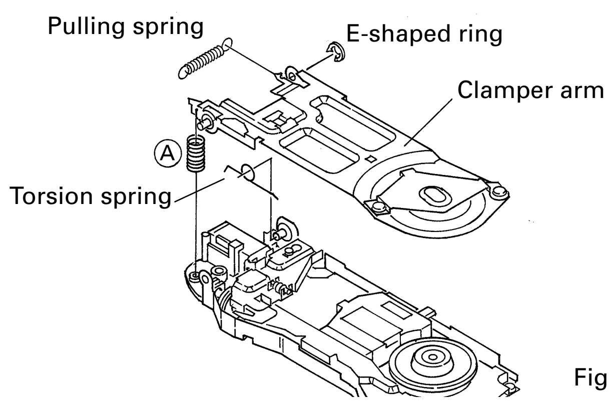


Fig. 32

2. Slide the Clamp UP lever (B) to remove it.
3. Loosen the 2 screws. Remove the feed-screw cover by sliding it.
4. Remove the feed-screw pressure spring (D).
5. Loosen the 2 screws. Remove the feed-screw holder (E).
6. Remove the belt.
7. Remove the Pickup unit together with the feed screw.

* Be careful not to lose the shaft holders at the both ends of the feed screw.
* Be careful not to damage the 2 flexible PCBs(for the Pickup and motor) when separating them. The flexible PCBs have been stuck each other with double-sided adhesive tape.

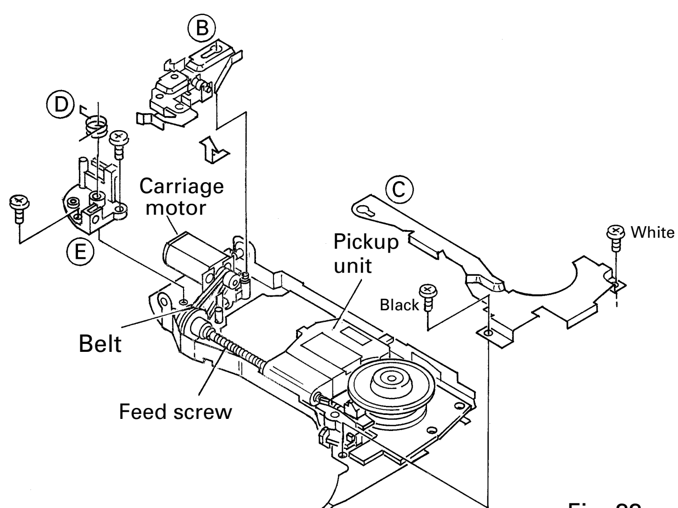


Fig. 33

8. Loosen the 2 screws. Remove the plate spring and the rack.
9. Pull out the feed screw from the Pickup unit.

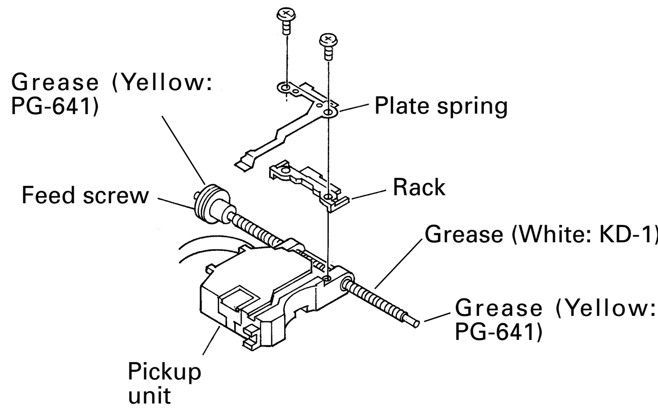


Fig. 34

● How to remove the Carriage Motor Assy

1. Loosen the 2 screws (A). Remove the Carriage motor assy.

● How to remove the Spindle Motor Assy

1. Remove the connector.
2. Loosen the 2 screws (B). Remove the Spindle motor assy.

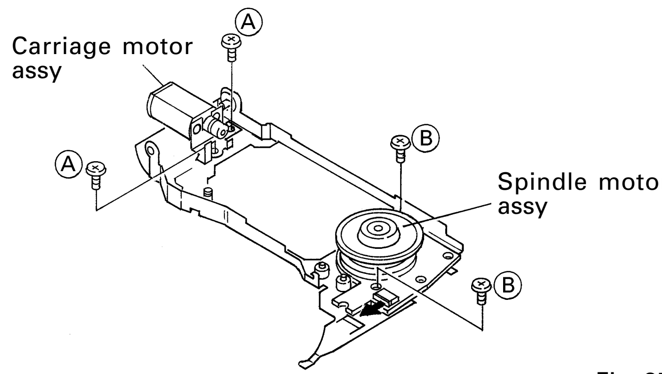


Fig. 35

● How to remove the Cam gear motor and ELV motor

1. Insert a short pin into the Pickup flexible PCB. (See Fig. 30)
   Remove the Cover from the Servo unit. (See Fig. 30)
   Disconnect the flexible PCBs from the connectors CN101 and CN301. (See Fig. 30)
2. Disconnect the the flexible PCB (Motor PCB(A)) from the connector CN201 on the Servo unit.
3. Disconnect the flexible PCB from the connector CN801 on the STS unit.
4. Loosen the 2 screws (A). Remove the Servo unit.
5. Loosen the screw (B). Remove the flexible PCB holder.
6. De-solder at the 4 portions (C). Remove the flexible PCB.

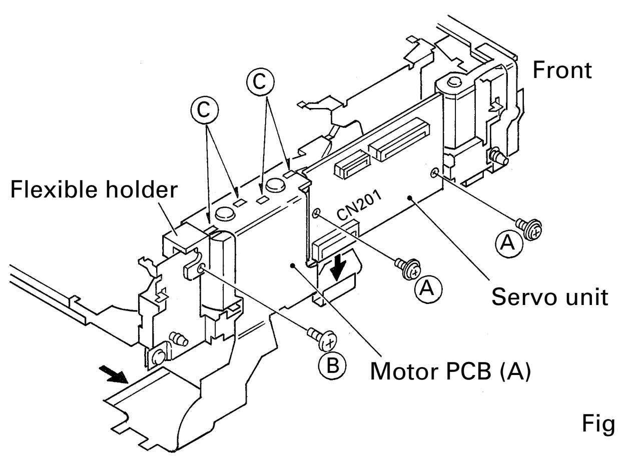


Fig. 36

7. Loosen the 2 screws (D). Remove the Gear cover.
8. Loosen the 3 screws (E). Remove the Motor bracket assy.

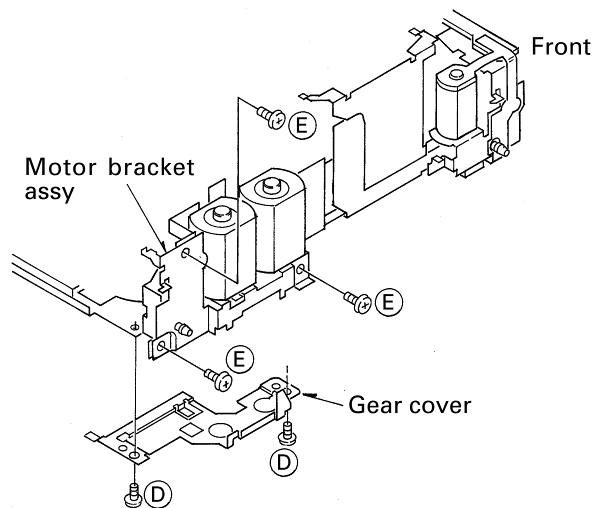
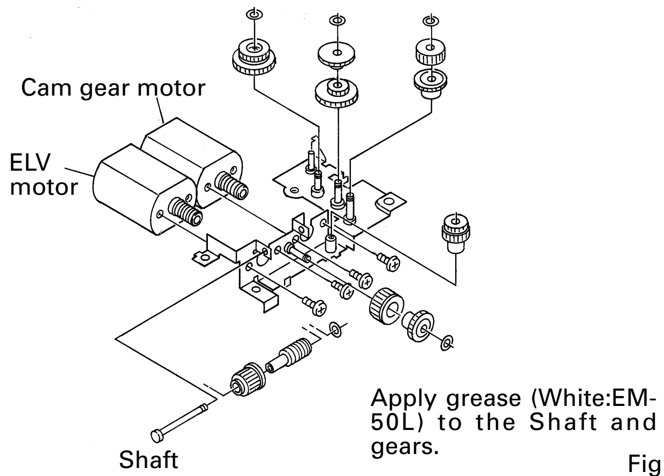


Fig. 37

9. Remove the 5 polyslider washers, then gears and shaft.
10. Loosen the 4 screws. Remove the Cam gear motor and ELV motor.



Apply grease (White:EM-50L) to the Shaft and gears.

Fig. 38

● How to remove the Loading motor

1. Insert a short pin into the flexible PCB of the Pickup unit.(See Fig. 30)
   Remove the Cover from the Servo unit. (See Fig. 30)
   Disconnect the flexible PCBs from the connectors CN101 and CN301. (See Fig. 30)
   Disconnect the the flexible PCB (Motor PCB (A)) from the connector CN201 on the Servo unit. (See Fig. 36)
2. Unhook the spring. Remove the Door open lever.
3. Loosen the 3 screws. Remove the PCB units (C) & (D) and the frame.
4. Remove the spring (A).

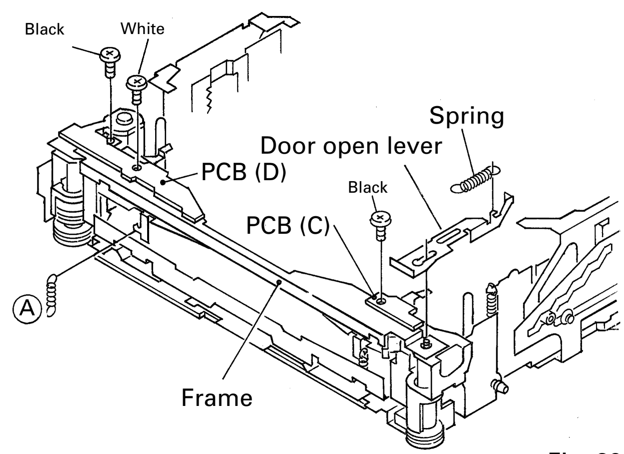


Fig. 39

5. Remove the belt (large).
6. De-solder at the points (B) and (C).
7. Loosen the 2 screws. Remove the Loading motor bracket.
8. Remove the belt (small).
9. Loosen the 2 screws. Remove the Loading motor.

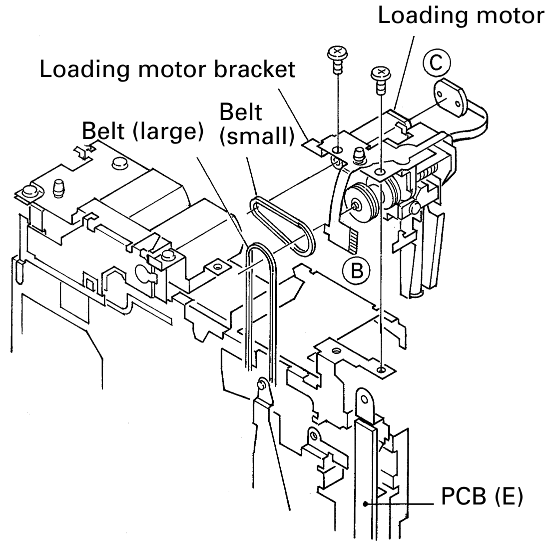


Fig. 40

● **How to remove the Stage Mech Assy**

1. Remove the Tray holder and the Tray assy. (See Fig. 28)
   Remove the Carriage mech assy. (See Fig. 30 and 31)
   Remove the Servo unit. (See Fig. 36)
   Remove the Motor PCB (A). (See Fig. 36)
   Remove the Gear cover. (Fig. 37)
2. Unhook the Spring (C). Remove the Door-open lever.
3. Loosen the screws (D), (E), and (F). Remove the PCB (C) and (D), and the frame.
4. Unhook the springs (A) and (B).
5. Pull out the Load arm assy (right) upward.
6. Unhook the spring (G). Remove the belt (large).
7. Loosen the screw (H). Remove the Load arm assy

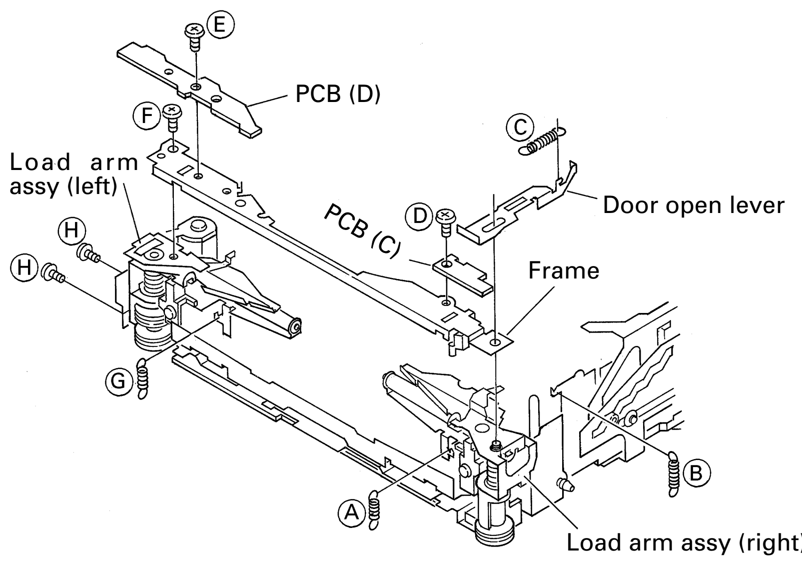


Fig. 41

(left) including the Loading motor.
8. Loosen the 4 screws. Remove the Motor bracket assy and Photo interrupter.

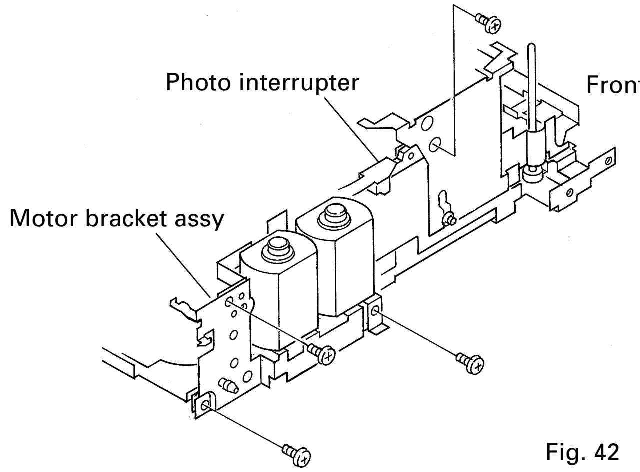


Fig. 42

9. Remove the 4 E-shaped rings (A) and 3 washers (B).
10. Remove the Mech lock lever (left).
11. Remove the 2 rollers (C).
12. Remove the Elevation lever (left). (Pay attention to the mounting direction.)
13. Remove the Mech lock junction lever and and roller (D).

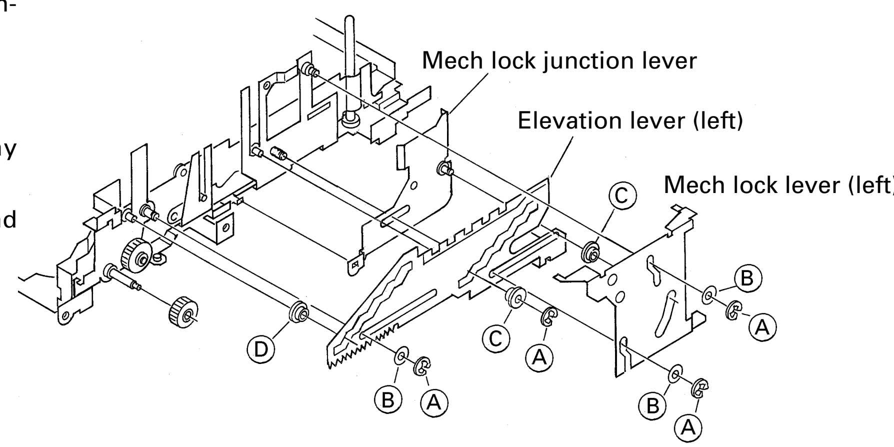


Fig. 43

(Pay attention to the mounting direction.)
14. Remove the 2 E-shaped rings (A) and 2 washers (B).
15. Remove the Elevation lever (right).
16. Remove the 2 rollers (C). (Pay attention to the mounting direction.)
17. Remove the Mech lock lever (right).
18. Lift up the Stage mech assy to remove it.

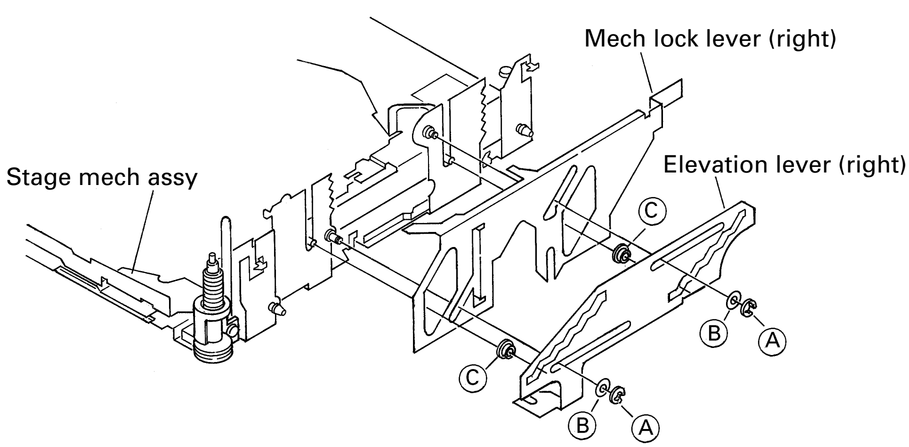


Fig. 44