PIONEER

Service Manual

ORDER NO.
CRT 1057

1291

SUPER TUNER III

CENTRATE COMPONENT CAR STEREO
TUNER CONTROL CD PLAYER
WITH FM/AM HIDE-AWAY TUNER

DEX-77 US

COMPACT disc DIGITAL AUDIO

SPECIFICATIONS

General

Power requirements . . . . . 14.4 V DC (10.8 – 15.6 V possible)
Grounding system . . . . . Negative type
Power consumption . . . . . 8 W
Maximum power consumption . . . . . 16 W
Dimensions (Controller) . . . . . 180(W) × 50(H) × 163(D) mm
[7-1/8(W) × 2(H) × 6-3/8(D) in.]
(Tuner Unit) . . . . . 178(W) × 25(H) × 150(D) mm
[7(W) × 1(H) × 5-7/8(D) in.]
Weight (Controller) . . . . . 2 kg (4.4 lbs.)
(Tuner Unit) . . . . . 0.7 kg (1.5 lbs.)
Output impedance . . . . . 1 kΩ
Tone controls . . . . . Bass: ±12 dB (100 Hz)
Treble: ±12 dB (10 kHz)
Loudness contour . . . . . +10 dB (100 Hz) +7 dB (10 kHz)
(volume: −30 dB)

CD Player

System . . . . . Motor vehicle compact disc digital audio system
Disc . . . . . Diameter: 120 mm
Thickness: 1.2 mm
Maximum playing time: Over 60 minutes (stereo)
Linear velocity: 1.2 – 1.4 m/sec.
Rotation direction: Counterclockwise
Signal format . . . . . Sampling frequency: 44.1 kHz
Number of quantization bits: 16; linear
Transmission bit rate: 4.3218 Mbit/sec.
Modulation system: EFM
Error correction system: CIRC
Pre-emphasis: 50/15 µsec.
Laser . . . . . Semiconductor laser: wavelength 790 nm
Frequency characteristics . . . . . 5 – 20,000 Hz (±1 dB)
Signal-to-noise ratio . . . . . 90 dB (1 kHz) (IHF-A network)
Dynamic range . . . . . 90 dB (1 kHz)
Wow and flutter . . . . . Below measurement range
Distortion factor . . . . . 0.005% (1 kHz, 0 dB)
Output voltage . . . . . 300 mV (1 kHz, 0 dB) (PRE OUT)
200 mV (1 kHz, 0 dB) (SOURCE)
Number of channels . . . . . 2 (stereo)

FM tuner

Frequency range . . . . . 87.9 – 107.9 MHz
Usable sensitivity . . . . . 12 dBf (1.1 µV/75 Ω, mono)
50 dB quieting sensitivity . . . . . 17 dBf (1.9 µV/75 Ω, mono)
Signal-to-noise ratio . . . . . 70 dB (IHF-A network)
Distortion . . . . . 0.3% (at 65 dBf, 1 kHz, stereo)
Frequency response . . . . . 30 – 15,000 Hz (±3 dB)
Stereo separation . . . . . 40 dB (at 65 dBf, 1 kHz)

AM tuner

Frequency range . . . . . 530 – 1,620 kHz
Usable sensitivity . . . . . 20 µV (26 dB) (S/N: 20 dB)
Selectivity . . . . . 50 dB (±10 kHz)

These specifications were determined and are presented in accordance with specification standards established by the Ad Hoc Committee of Car Stereo Manufacturers.

Note:
Specifications and the design are subject to possible modification without notice due to improvements.

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PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia
TEL: (03) 580-9911

• CD Player Service Precautions

1. Since this screw protects the mechanism during transport, be sure to affix it when it is transported for repair, etc.

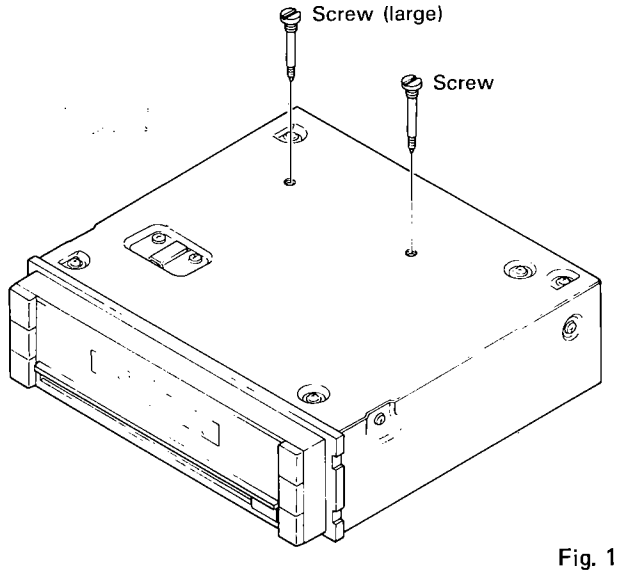


Fig. 1

2. For pickup unit (CGY1001) handling, please refer to "Disassembly" (Fig. 19). During replacement, handling precautions shall be taken to prevent an electrostatic discharge (protection by a short pin).
3. During disassembly, be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.

CONTENTS

1. SECRET CODE

This unit is equipped with a secret code function. The secret code (4-digit) electronically locks the unit to reduce the danger of theft.
The code is preset to 0000 at the time of purchase, and the unit can be used normally without altering the code as preset. It is recommended, however, that the user change the code to another value to take full advantage of the anti-theft properties of this system.
Once a code is set, the unit will operate normally without input of the secret code, even if the ignition of the vehicle is switched OFF and then ON again. Should power to the unit be interrupted due to a battery change, repairs, or theft, however, the unit will fail to operate when power is restored unless the preset secret code is first entered. Three consecutive wrong inputs of the code will cause the unit to lock electronically to accept no input of code for three hours. Once operation is restored, three more wrong code inputs result in another three hours of electronic lock up. This feature helps to prevent breaking of the secret code through sequential or random input.
These features mean that once the power supplied to the unit is completely cut, further operation is impossible except for those who know the secret code. This makes the unit unuseable if stolen, thus reducing the danger of theft.

- When taking the unit to a service station for repair, be sure to either tell the service personnel the registered code or return the value to 0000.
- Should you forget your registered secret number, consult your local service station taking along a such proof of purchase and ownership as the original receipt, etc.

Secret code registration

The secret code should be registered after all connection and installation procedures are complete. Perform the procedures outlined in "Registering the secret code" within one minute after switching the ignition key of the vehicle to ON or ACC. The internal microprocessor will judge that a secret code has not been set if registration is not begun within one minute, if the mode switch is pressed during the one-minute period, or if an attempt is made to load a disc. At this time, switch the ignition key OFF and then disconnect the unit's orange lead from the vehicle's battery. Then reconnect the lead and attempt secret code registration again.

Accessory Sticker and Card

- Affix the sticker on a window of the vehicle in which the unit is installed to inform potential thieves of the anti-theft function of the unit.
- Write the secret code, unit model number, and unit serial number on the card and store it in a safe place outside of the vehicle itself. The serial number of this device is located on the bottom of the unit. This information can then be made available to the police and your PIONEER service station should your unit be stolen.

Dealer Installation

When this unit is installed by the dealer, either inform the dealer of the desired secret code for presetting or be present during the installation procedures to set the secret code yourself.

Registering the Secret Code

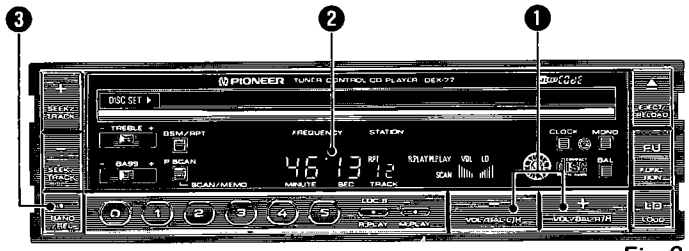


Fig. 2

1. Switch the ignition key of the vehicle to ON or ACC.
2. Simultaneously press the volume control buttons ❶ (+) and (−) within one minute after performing step 1.
3. The message CODE will flash on the display ❷ to indicate that secret code registration is now possible. During this period, the buttons illustrated below become numeric input buttons (0—9) for the purpose of secret code registration.

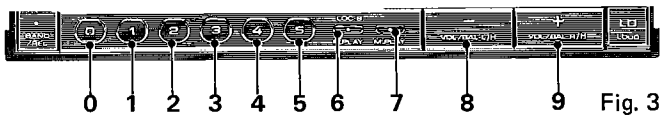


Fig. 3

4. Use the numeric input buttons to register the 4-digit secret number of your choice.

Ex. Registration of "8642"
Press:

1. Volume control button (−)	8
2. Random play button	86
3. Preset button 4	864
4. Preset button 2	8642

- If an input error is made, simply reinput the correct secret code from the beginning. The last four values input are registered as the secret code.
5. The entered value is registered as the secret code by pressing the band select/release button ❸ after input is complete. The display ❷ will be cleared once this is done and normal operation of the unit will be possible. Be sure to attempt operation only after thoroughly reading the owner's manual.

Interruption of Power Supply

Interruption the power supplied to the unit caused by battery replacement, repairs or theft of the unit causes the message CODE to flash on the display once power supply is resumed and the ignition key of the vehicle is switched to ON or ACC. At this time the previously registered secret code should be entered using the following procedures:

1. Use the numeric input buttons (see "Registering the secret code") to enter the previously registered 4-digit secret code.
2. Press the band select/release ❸ button. The message PASS will appear on the display, an audible beep will sound, and normal operation will resume if the number entered matches the secret code registered before the power to the unit was interrupted. If the two numbers do not match, CODE will flash on the display again and the unit will await input of the correct value.

Anti-theft Function

Three consecutive inputs of values which do not match the previously registered secret code activates an error timer causing the message Err to appear on the display. Once this occurs, all operation of the unit, including code input, will be impossible for three hours. The message CODE will return after three hours have passed. The anti-theft function will operate for all subsequent input until the correct value is entered.

Changing the Secret Code

1. Switch the ignition key of the vehicle OFF. Disconnect the unit's orange connecting cord from the battery of the vehicle and then reconnect it.
2. Switch the ignition key of the vehicle to ON or ACC and the message CODE will flash on the display indicating that the unit is waiting for input of a secret code.
3. Use the numeric input buttons (see "Registering the secret code") to enter the previously registered 4-digit secret code.
4. Press the band select/release button ❸. The message PASS will appear on the display, an audible beep will sound, and normal operation will resume if the number entered matches the secret code registered before the power to the unit was interrupted. If the two numbers do not match, CODE will flash on the display again and the unit will await input of the correct value.
5. Simultaneously press the volume control buttons ❶ (+) and (−) within one minute after performing step 4.
6. The message CODE will flash on the display ❷ to indicate is now possible to change the registered secret code.
7. Use the numeric input buttons to register the 4-digit secret number of your choice.
8. The entered value is registered as the new secret code by pressing the band select/release button ❸ after input is complete. The display will be cleared once this is done.

2. NOMENCLATURE AND FUNCTIONS (CD OPERATION)

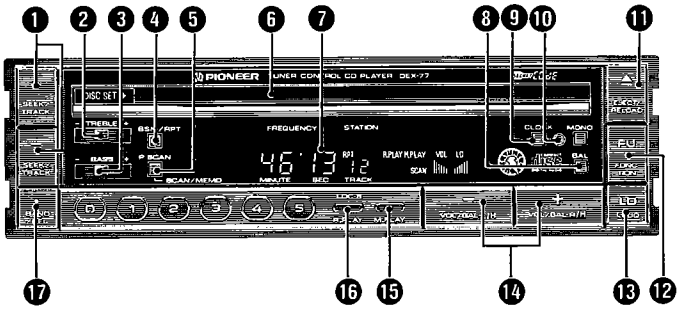


Fig. 4

❶ Track Number Search Button

Press to search for a specific selection (track number). Each press of the (+) side increases the displayed track number, while pressing the (−) side decreases the number. Holding down either side of this button causes the displayed number to successively change at high speed.

❷ Treble Control

❸ Bass Control

❹ Music Repeat Button

Press to repeat the current selection a number of times. Either the release button or the music repeat button can be used to cancel the music repeat operation once it is activated. All selections on a disc are continuously played when the music repeat function is not activated.

❺ Track Scan/Memory Button

Press once to play the beginning (approximately 10 seconds) of each selection from the current selection (track scan). Pressing again during track scan records the number of the current selection in memory (scan memory) for playback during memory play.

Track Scan

Press to play the beginning (approximately 10 seconds) of each selection in order. Pressing the release button when the desired selection is found releases track scan and returns to normal play. Track scan is automatically released and normal play resumes when the selection during which track scan was originally selected is reached again.

Scan Memory

Press during play of the beginning (approximately 10 seconds) of a selection to record the selection in memory. Up to eight selections can be stored in memory.

- Up to eight selections can be stored in memory. A beep is heard when the track scan/memory button is pressed to indicate a full memory. Storing a selection in memory automatically deletes any selection previously stored.

❻ Disc Insert Slot

Discs are loaded into the unit with the label on the disc facing up. Once a disc is inserted into the disc insert slot, it is automatically set and play begins.

- Turn the cassette deck power switch to the OFF position.

❼ Display

❽ Balance Button

Causes the volume display to be replaced by a balance display for approximately five seconds. The volume control button can be used for balance adjustment while the balance display is shown.

❾ Clock Button

Press to switch to the clock display. Pressing again switches to the elapsed play time display or frequency display.

❿ Clear Button

Not used for normal operation, this button is pressed using a thin, pointed object to reset the unit when such symptoms as power supply failure, operation button failure, and abnormal display indicate misoperation of the unit's built-in microcomputer caused by noise. Pressing this button causes the message CODE to appear on the display. Input the previously registered secret code at this time.

⓫ Eject/Reload Button

Press to eject a disc from the unit. Pressing again reloads the disc into the unit.

⓬ Mode Button

Switches power supply in the following sequence:
Tuner → CD → Power OFF
To use the tuner, press this button until the tuner display appears.

⓭ Loudness Button

Enhances the low and high ranges for listening at low volume settings.

⓮ Volume/Balance Control/Attenuator Buttons

Volume Control

Pressing the (+) button increase volume, while pressing the (−) button decreases volume.

Balance Control

Pressing the balance button replace the volume display with a balance display for approximately five seconds. The volume control buttons act as balance control buttons during this period. Pressing the (+) button increases the volume of the right speaker, while pressing the (−) increases the volume of the left speaker. The buttons return to their function of volume control at the end of the five-second period.

Attenuator Button
Simultaneously pressing the (+) and (−) buttons causes the output volume to decrease 1/10 its current setting. At this time, the volume display will flash. Repeating this operation causes volume to return to its original level.

⓯ Memory Play Button
Replays the selections prerecorded in the scan memory. Press again to cancel memory play.

⓰ Random Play Button
Causes paly of the selections (track numbers) on a disc to be selected and played in random order. Press again to cancel random play.

⓱ Release Button
Cancels track scan and music repeat functions during their operation.

System Remote Control Unit (Accessory)
Connection of a system remote control unit keeps track number search, volume control, and attenuator adjustments within easy reach.

Source Switch

This switch should be set to SOURCE when a cassette deck is connected.

3. FUNCTIONS (TUNER OPERATION)

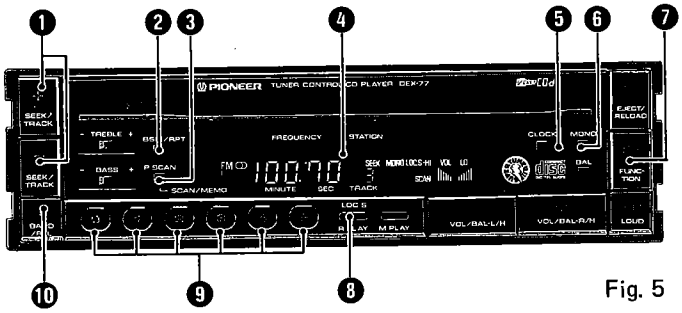


Fig. 5

❶ Seek/Manual Tuning Button
Simultaneously pressing these two buttons switches between manual and seek tuning.

Seek Tuning (SEEK appears on display)
Automatically tunes in the nearest receivable frequency. Pressing (+) tunes in the nearest higher receivable frequency, while pressing (−) tunes in the nearest lower receivable frequency.

Manual Tuning
Each press of (+) increases FM frequencies in 0.2 MHz steps, AM frequencies in 10 kHz steps. Each press of (−) decreases frequencies in the same steps. Pressing and holding down either button causes high speed changes in the frequency according to the respective steps.

❷ Best Station Memory Button
Automatically tunes strong frequencies and assigns them to preset buttons 0 through 5 for one-touch automatic tuning. The best station memory function is activated by pressing and holding down this button until a beep is heard (approximately two seconds). The best station memory function is indicated by – – – – flashing on the display, and this function can be canceled by pressing the release button.

- The best station memory is operational while – – – – is flashing on the display.
- The frequencies previously assigned to the preset buttons are retained when six strong frequencies cannot be located.

❸ Preset Scan Tuning Button
Sequentially recalls frequencies assigned to the preset buttons for play of approximately eight seconds each. Pressing the release button cancels this function when a desired frequency is located.

❹ Display

❺ Clear Button
Not used for normal operation, this button is pressed using a thin, pointed object to reset the unit when such symptoms as power supply failure, operation button failure, and abnormal display indicate misoperation of the unit's built-in microcomputer caused by noise. Pressing this button causes deletion of the frequencies store in memory. Pressing this button causes the message C 0 d E to appear on the display. Input the previously registered secret code at this time.

❻ FM Stereo/Monaural Button
This button is used to change from stereo to monaural for FM broadcasts, and is usually left in the stereo position. When a stereo broadcast is received, the stereo indicator will illuminate. With the "Super Tuner Ⅲ" function, stereo broadcasts can always be enjoyed in their optimal reception mode. If excessive noise is present, pressing this button allows monaural reception of the broadcast.

❼ Mode Button
Switches power supply in the following sequence:
Tuner → CD → Power OFF
To use the tuner, press this button until the tuner display appears.

- When using the tuner for the first time, it may be impossible to change to the tuner mode by pressing the mode button. In this case, press the clear button, and attempt to change to the tuner mode again.

❽ Local Station Button
Switches the seek level sensitivity of the seek tuning function among three levels in the following sequence:
OFF → LOC.S → LOC.S-HI
The OFF level has the greatest sensitivity, while the LOC.S-HI setting will tune in only the strongest broadcasts.

❾ Frequency Preset Buttons
Assignment of FM/AM frequencies to these buttons allows one-touch tuning. 18 FM frequencies (6 for FM1, 6 for FM2, 6 for FM3) and 6 AM frequencies can be assigned for a total of 24 different frequencies.

❿ Band Select/Release Button
Switches bands in the following sequence:
FM1 → FM2 → FM3 → AM
Also cancels seek tuning, preset scan tuning, and the best station memory function.

System Remote Control Unit (Accessory)
Connection of a system remote control unit keeps seek and manual tuning within easy reach.

- Sometimes normal operation of this unit is not possible (the unit does not switch to the tuner mode even when the mode button is pressed) immediately after connection of a tuner. Should this occur, press the clear button and normal operation should resume after a few seconds.
- Setting a disc while listening to either an AM or FM broadcast automatically switches from tuner output to CD output.

4. READING THE DISPLAY

4.1 CD OPERATION

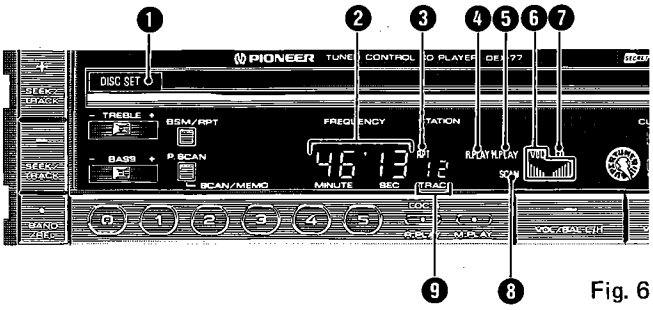


Fig. 6

❶ Disc Set Display
Lights when a disc is set in the unit.

❷Elapsed Play Time/Clock Display
Normally displays the elapsed play time of the current selection. The total play time contained on the disc is displayed for approximately five seconds after the disc is first loaded. Pressing the clock button switches to the clock display, and pressing once again returns to the elapsed play time display.

❸ Music Repeat Display
Lights when the music repeat button is pressed and remains lit while the music repeat function is in operation.

❹ Random Play Display
Lights when the random play button is pressed and remains lit while the random play function is in operation.

❺ Memory Play Display
Lights when the memory play button is pressed and remains lit while the memory play function is in operation. This indicator will not light and memory play will be impossible when there is nothing stored in memory.

❻ Volume/Balance Display
Shows the current volume level. Also shows the balance between the left and right speakers for approximately five seconds after the balance button is pressed (VOL display clears).

❼ Loudness Indicator
Appears when the loudness button is pressed to indicate that the loudness function is activated.

❽ Track Scan Display
Lights when the track scan/memory button is pressed and remains lit while the track scan/memory functions are in operation.

❾ Track Display
Indicates the track number of the selection being played. Also shows the total number of tracks included on a disc for approximately five seconds after the disc is loaded into the unit.

- A built-in function protects the semiconductor laser from damage by automatically suspending play when the ambient temperature of the unit exceeds a certain level. This condition is indicated by HHHH being shown on displays ❷. The disc should be ejected and the unit should not be used until the ambient temperature is reduced.
- When a space of a few seconds exists between the selections of the disc being used, ❷ will show –'02–'01 when the spaces are passed.

4.2 TUNER OPARATION

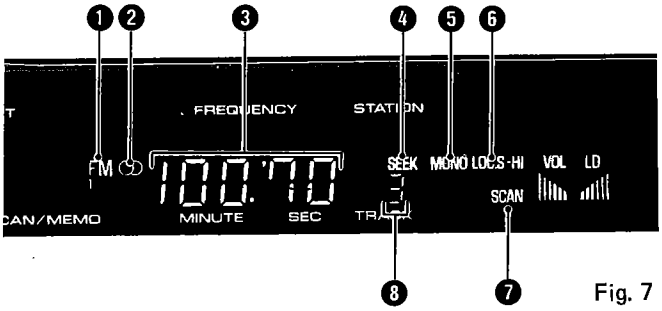


Fig. 7

❶ Band Indicator
Indicates the band, switching in the sequence FM1 → FM2 → FM3 → AM → FM1... with each press of the band select button.

❷ FM Stereo Indicator
Indicates reception of a strong FM stereo broadcast.

❸ Frequency Indicator
Shows - - - - while the best station memory function is in operation.

❹ Seek Tuning Indicator
Indicates operation of the seek tuning function.

❺ FM Monaural Indicator
Indicates reception of an FM broadcast while the stereo/monaural button is in the monaural position.

❻ Local Station Indicator
Indicates the seek level during operation of the seek tuning function.
LOC.S-HI: Low sensitivity
LOC.S: Medium sensitivity
OFF (no display): High sensitivity

❼ Preset Scan Tuning Display
Indicates operation of the preset scan tuning function.

❽ Preset Number Display
Indicates the number of the preset button pressed to tune in the current frequency.

5. OPERATION

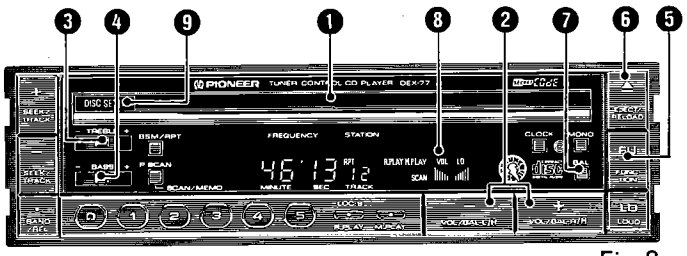


Fig. 8

1. Load a disc into the disc insert slot ❶ with the label on the disc facing up. Once a disc is inserted into the unit, it is automatically set and play begins. (The total number of selections on the disc and total disc play time will appear on the display for approximately five seconds.)
2. Adjust the volume ❷, treble ❸, and bass ❹ controls to the desired settings.
3. Press the mode button ❺ to stop play. Pressing again causes play to resume from the point at which it was originally stopped. Press the eject/reload button ❻ to eject the disc.

Balance Adjustment

1. Press the balance button ❼, and VOL indicator ❽ will clear for approximately five seconds. The volume control buttons ❷ become balance control buttons while VOL is cleared.
2. Pressing the (+) button will increase the volume of the right speaker, while pressing the (−) button will increase the volume of the left speaker. After approximately five seconds, the VOL indicator ❽ will light and the buttons will again act as volume control buttons.

- A short period of time will pass from when the disc is loaded to the point at which play begins. This "setting" time is required to allow the unit to begin reading the digital signals on the disc.
- DISC SET ❾ is illuminated on the display while a disc is set. Note that attempting to load another disc while one is already set can damage the discs and cause malfunction.
- Never attempt to load two discs at the same time. This can cause serious malfunction of the unit.

6. TUNING AND FM/AM STATION

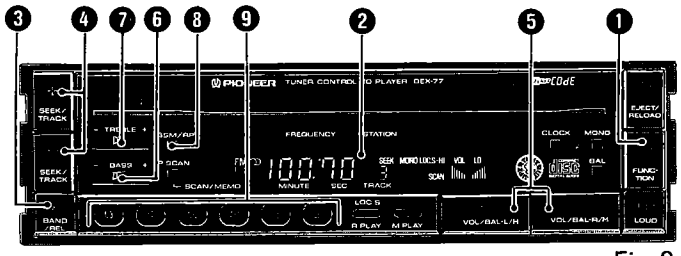


Fig. 9

1. Press the mode button ❶ until the tuner indicator is shown on the display ❷.
2. Press the band select button ❸ to select the desired band.
3. Press the (+) or (−) tuning button ❶. Pressing (+) tunes in the nearest higher receivable frequency, while pressing (−) tunes in the nearest lower receivable frequency (seek tuning).
4. Adjust the volume ❺ bass ❻ and treble ❼ controls to the desired settings.

- The unit is set for manual tuning when the seek indicator is not shown on the display ❷. Simultaneously pressing the (+) and (−) tuning buttons ❹ activates seek tuning (SEEK indicator appears on the display).

Local Station Setting

The seek level sensitivity can be set to one of three levels for seek tuning operations. The level is set to match the relative strength of the signals being received, and the current setting is shown on the display as outlined below:

LOC.S-HI: Seek level is set so that only the strongest broadcasts are tuned in, and is effective late at night when conditions cause reception of a large number of weak broadcasts.

LOC.S: Seek level is set at a medium level for wider reception than LOC.S-HI, and is effective for tuning in only stronger stations.

OFF (no display): Seek level is set so that even the weakest broadcasts are tuned in, and is effective when a broadcast is originating a long distance away or whenever the broadcast signal is weak.

Manual Tuning

When manual tuning is selected, tuning can be performed in 0.2 MHz steps for FM, and 10 kHz steps for AM. Manual tuning is useful when tuning in frequencies unobtainable with seek tuning.

1. Simultaneously press the (+) and (−) tuning buttons ❹ until the seek indicator disappears from the display ❷.
2. Now pressing the (+) button increases the frequency, while pressing the (−) button decreases the frequency. Pressing and holding down either button causes high speed change of the frequency in the respective direction.

- Simultaneously press the (+) and (−) tuning buttons ❹ until the seek indicator appears on the display to return to seek tuning.

7. SETTING THE TIME

Fig. 10

Hours

Press the (−) side of the volume control button ❷ while holding down the clock button ❶. Each press of the volume control button advances the hour display by one, and holding the button down causes continuous high speed advance.

Minutes

Press the (+) side of the volume control button ❸ while holding down the clock button ❶. Each press of the volume control button advances the minute display by one, and holding the button down causes continuous high speed advance.

8. CONNECTING THE UNITS

This unit as the main unit

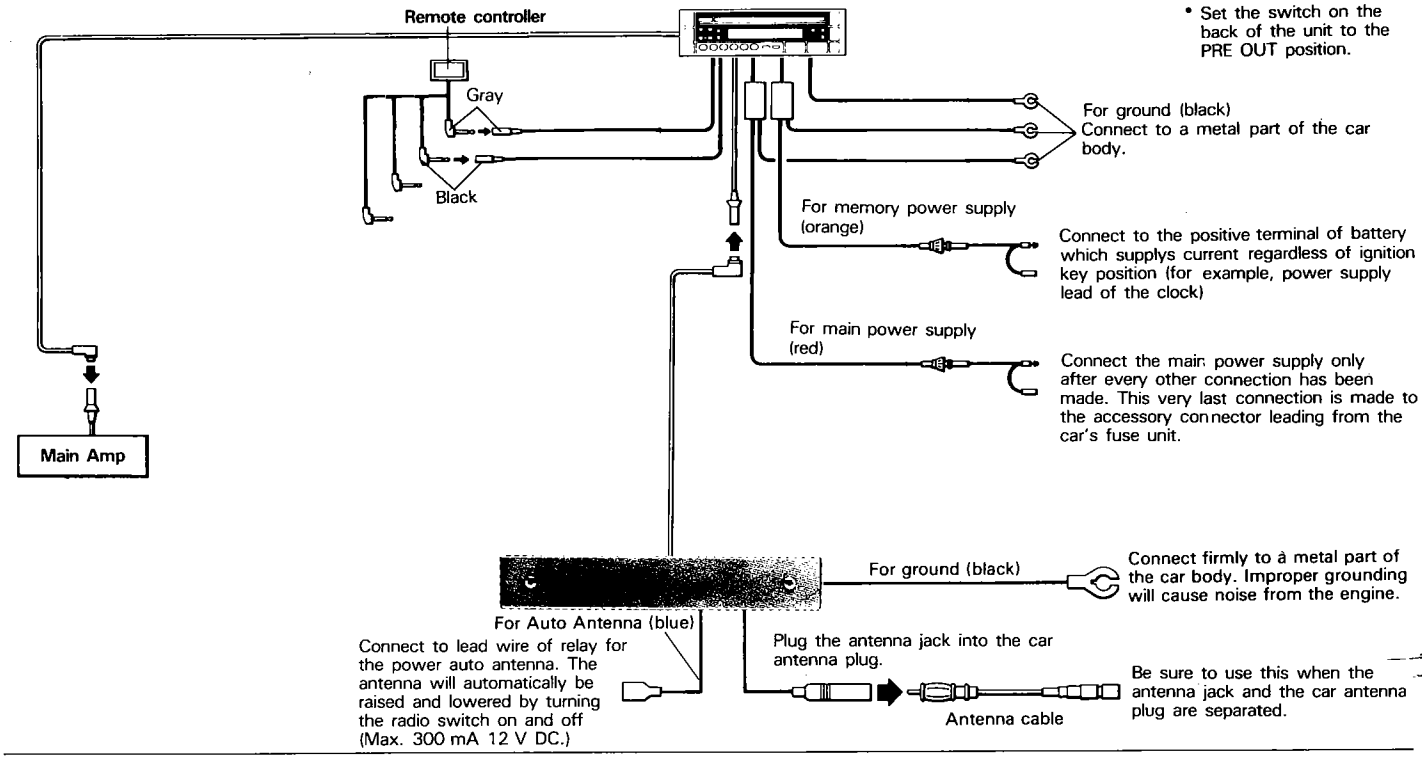


Fig. 11

9. PARTS LOCATION

- **Tuner Section**

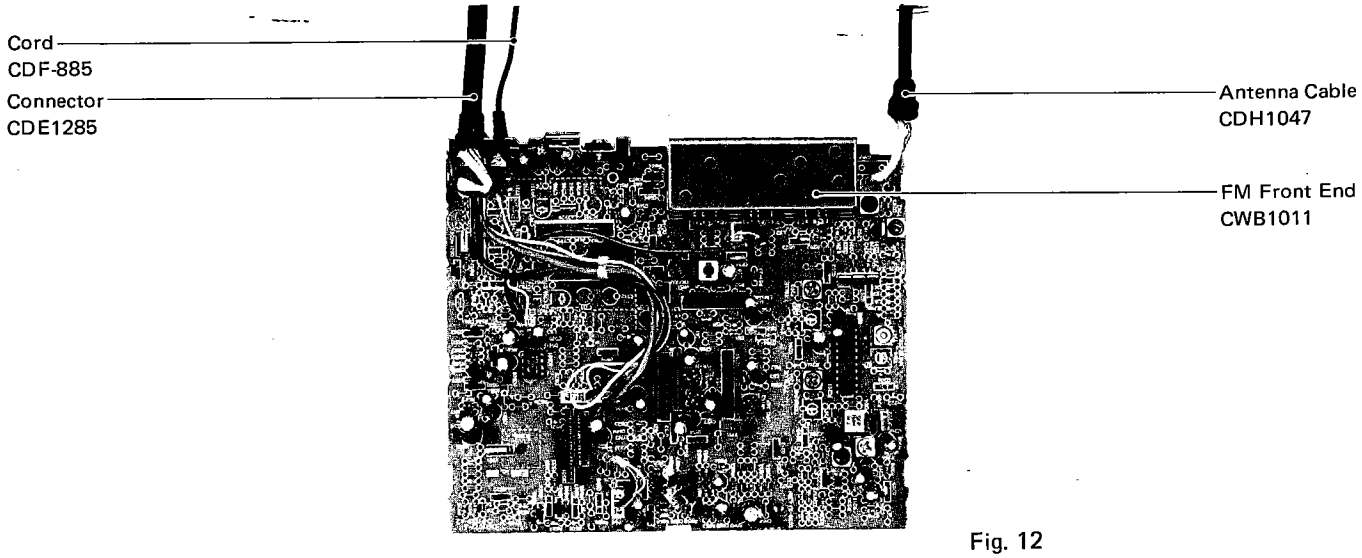


Fig. 12

• Control Section

NOTE:

- *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.*

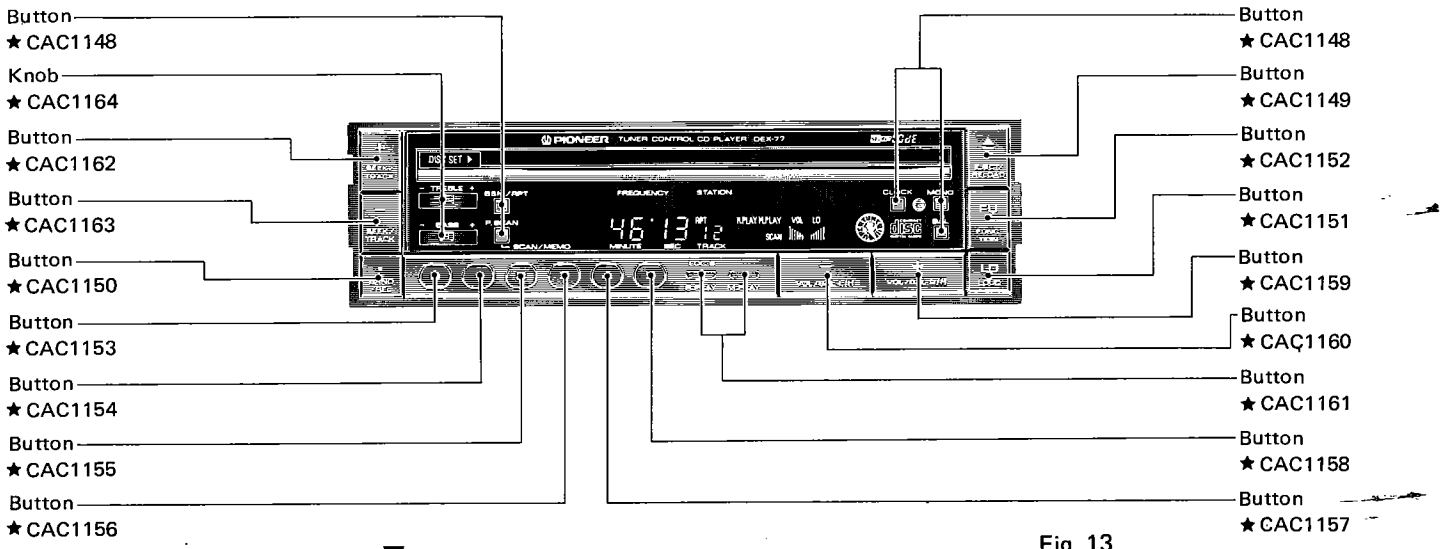


Fig. 13

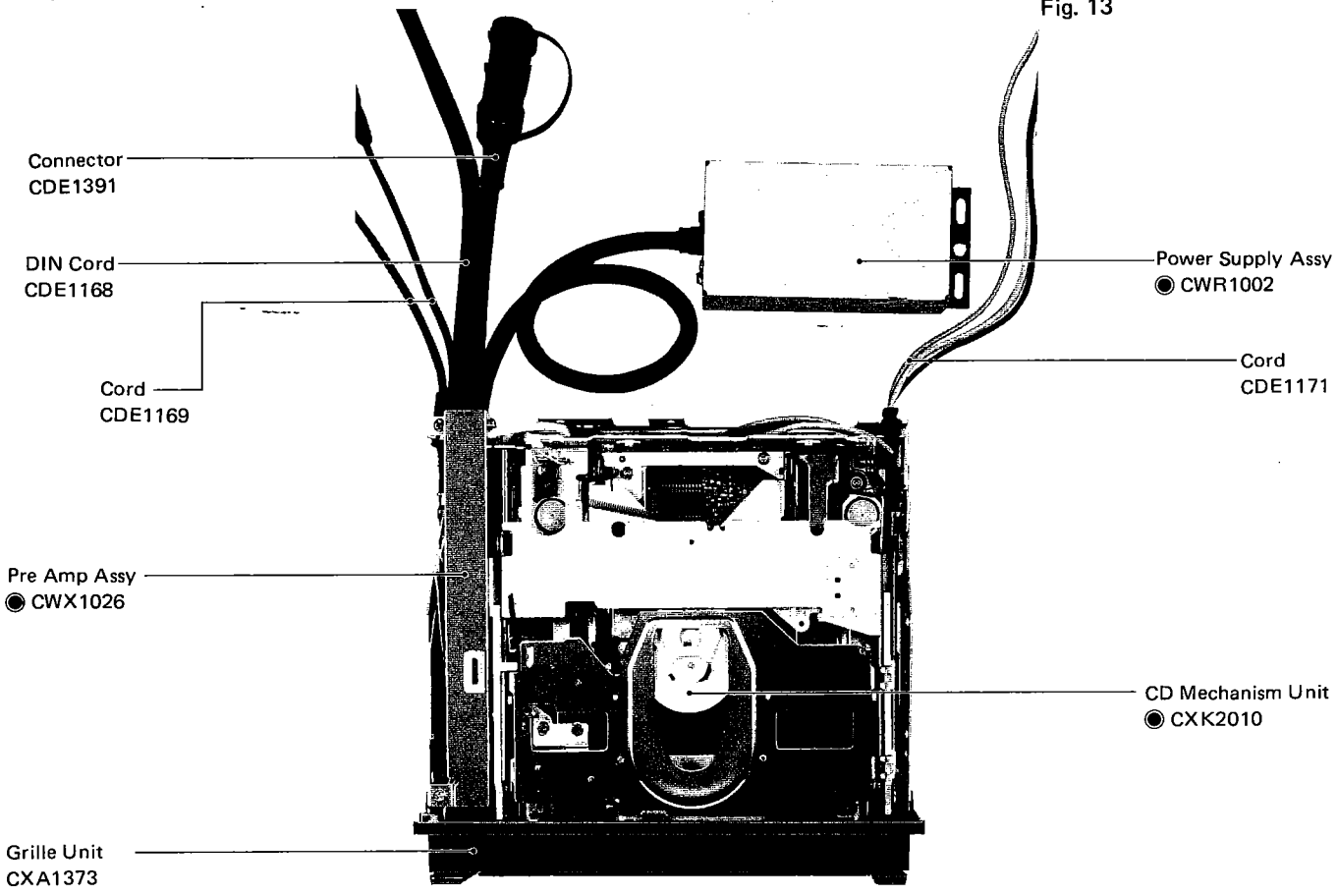


Fig. 14

10. DISASSEMBLY

• Case Removal (Fig. 15)

1. Remove 4 screws, then remove the case.

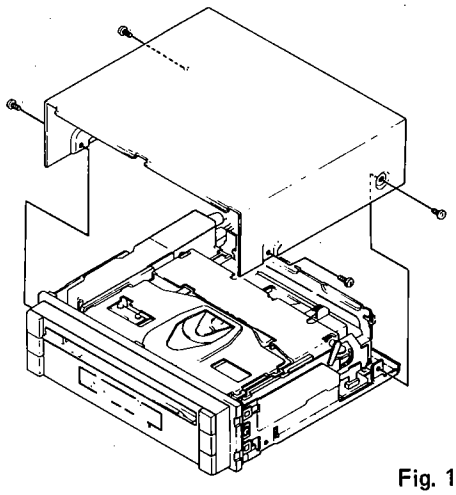
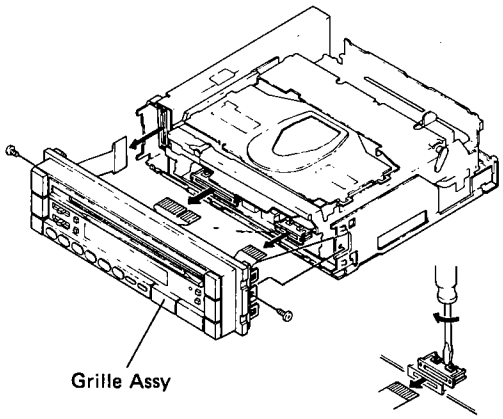


Fig. 15

• Grille Assy Removal (Fig. 16)

1. Remove 2 screws and release 4 catches, then remove the grille assembly.
2. Remove 3 connectors.



Insert a (−) screwdriver and turn it in the arrow direction, then two connector catches come off and the flexible circuit board can be removed.

Fig. 16

• Display Unit Removal (Fig. 17)

1. Disengage the 3 catch and lift up the P.C. board.
2. Remove the 6 screws, remove the insulator and holder, and remove the display unit.

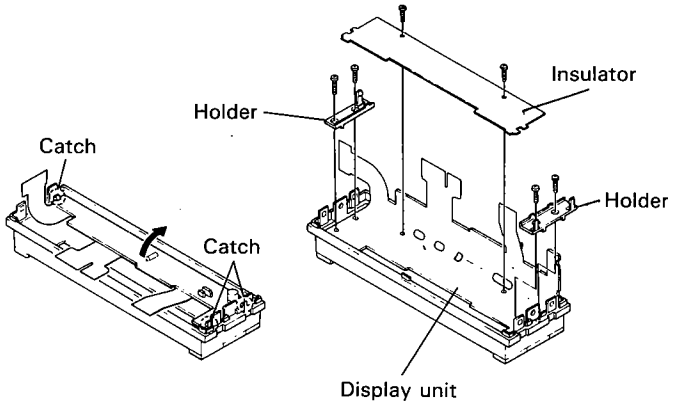


Fig. 17

• Chassis Removal (Fig. 18)

1. Turn the set the other way.
2. Remove 8 screws, then remove the chassis.

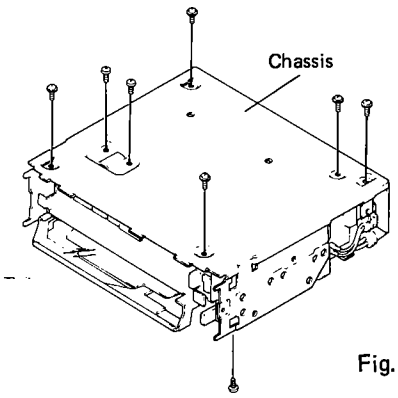


Fig. 18

• Mechanism Unit Removal (Fig. 19)

1. Remove 4 screws.
2. Remove 5 connectors.

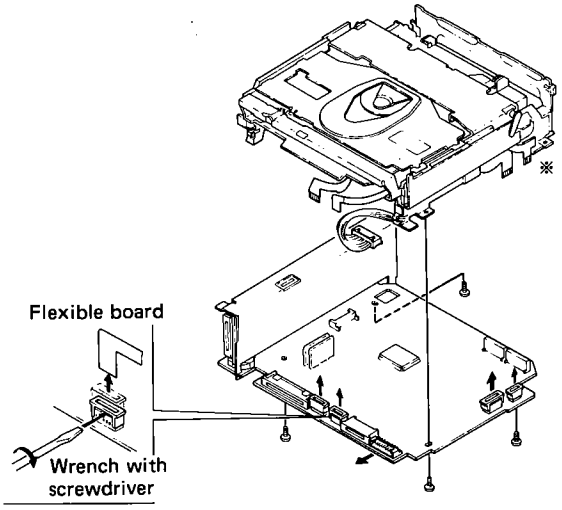


Fig. 19-1

※

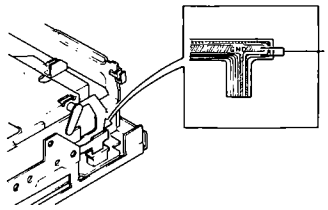


Fig. 19-2

When this connector (CN2, wiring to the semi conducter laser) is removed because the mechanism has to be removed, be sure to apply a shorting pin or short between the patterns with a jumper before removal.
When it is reconnected, connect it to the connecter, then remove the shorting pin or jumper.

• Loading Motor Unit Removal (Fig. 20)

1. Remove the screw (M2.6 x 4) at A, then remove the guide and gear unit.
2. Remove 2 screws (M2 x 2.5) at B, then remove the loading motor unit.

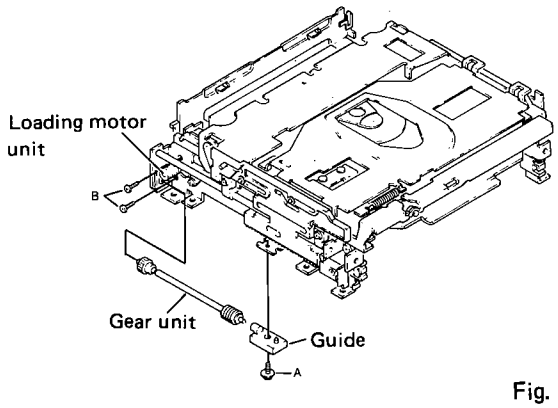


Fig. 20

• Clamper Plate Unit Removal (Fig. 21)

1. Remove 1 screw (M2 x 4) at P, then remove the flexible circuit board (to prevent circuit board cutting).
   * To tighten the screw at P, use a screw tightener.
2. Remove 2 screws (M2.6 x 4) at C, then remove a bracket.
3. Remove 1 screw (M2.6 x 4) at D, then remove a bracket (for a switch).
4. Remove the clamper plate unit toward the back as shown by an arrow while avoiding arm E and plate Q.

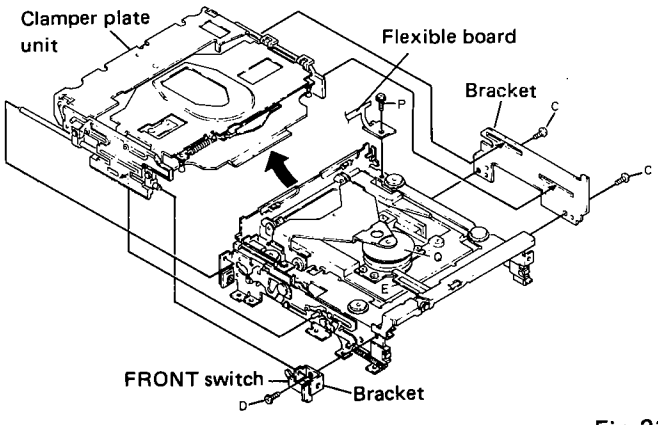


Fig. 21

• Vibration Proof Rubber (Bush) Removal (Fig. 22)

1. Remove the collar, then remove 4 screws (M2.6 x 5) at F.
   * Use a tightener to tighten the screw at F.
2. Remove the carriage mechanism unit.
3. Remove the bushing toward the bottom.

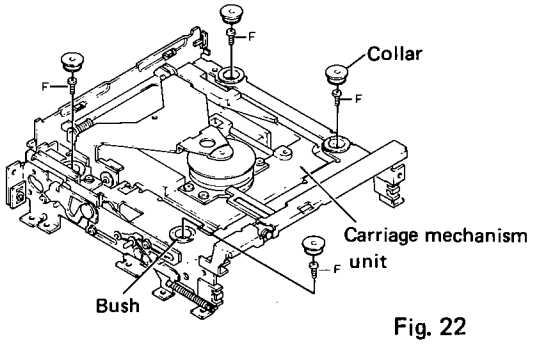


Fig. 22

• Carriage Mechanism Unit Removal (Fig. 23)

1. Turn the mechanism the other way.
2. Remove 2 screws (M2.6 x 5) at G, then remove the carriage mechanism unit as shown by an arrow.
   * Use a tightener to tighten the screws at G.

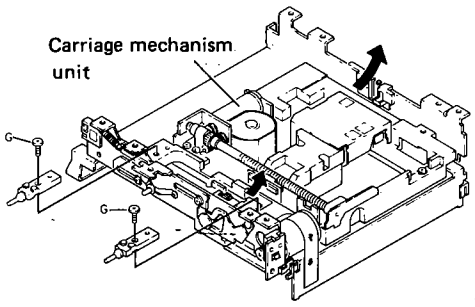


Fig. 23

• Spindle Motor Removal (Fig. 24)

1. Lower the pickup unit toward the back. (It can be shifted manually if shaft deviation is performed as shown in Fig. 25.)
2. Remove 3 screws (M2.6 x 4) at H, then remove the spindle motor as shown by an arrow.

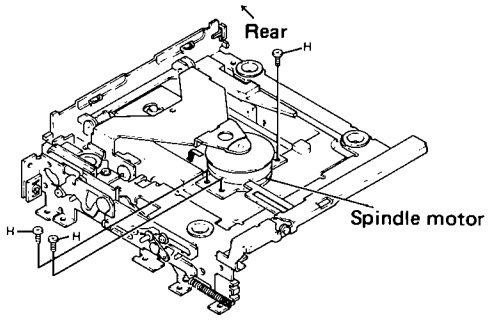


Fig. 24

• Pickup Unit Removal (Fig. 25)

1. Turn the mechanism the other way.
2. Remove 2 screws (M2 x 4) at J, then remove the holder shaft.
3. Remove 1 screw (M2 x 4) at K, then remove the holder.
4. Remove the pickup unit.

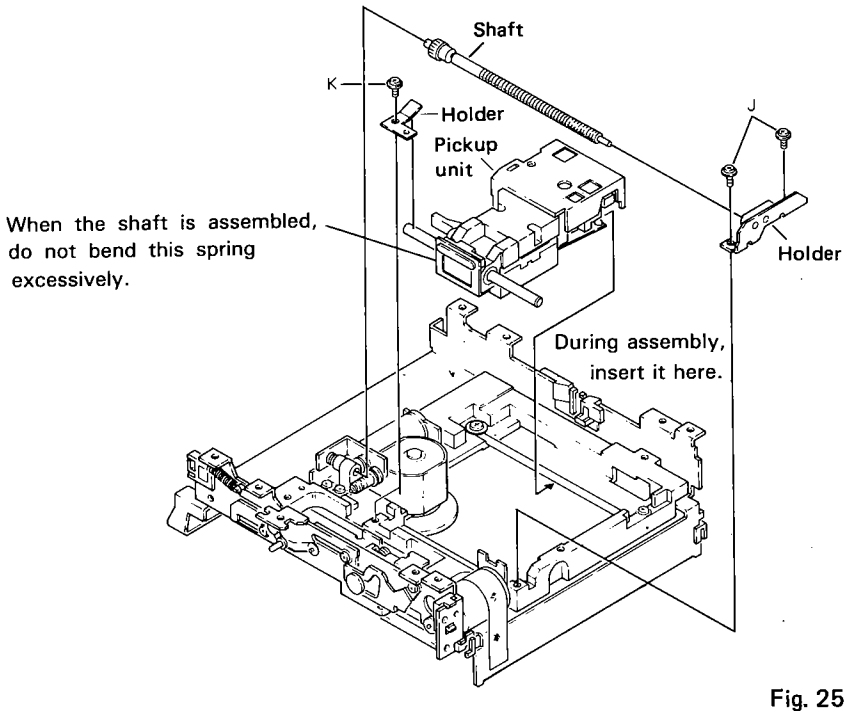


Fig. 25

• Carriage Motor Unit Removal (Fig. 26)

1. Remove 2 screws (M2 x 4) at L and 1 screw (M2 x 4) at M, then remove the carriage motor unit.

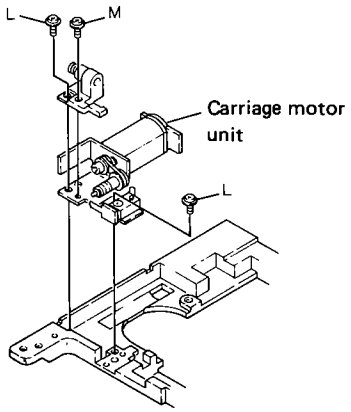


Fig. 26

11. MECHANISM DESCRIPTION

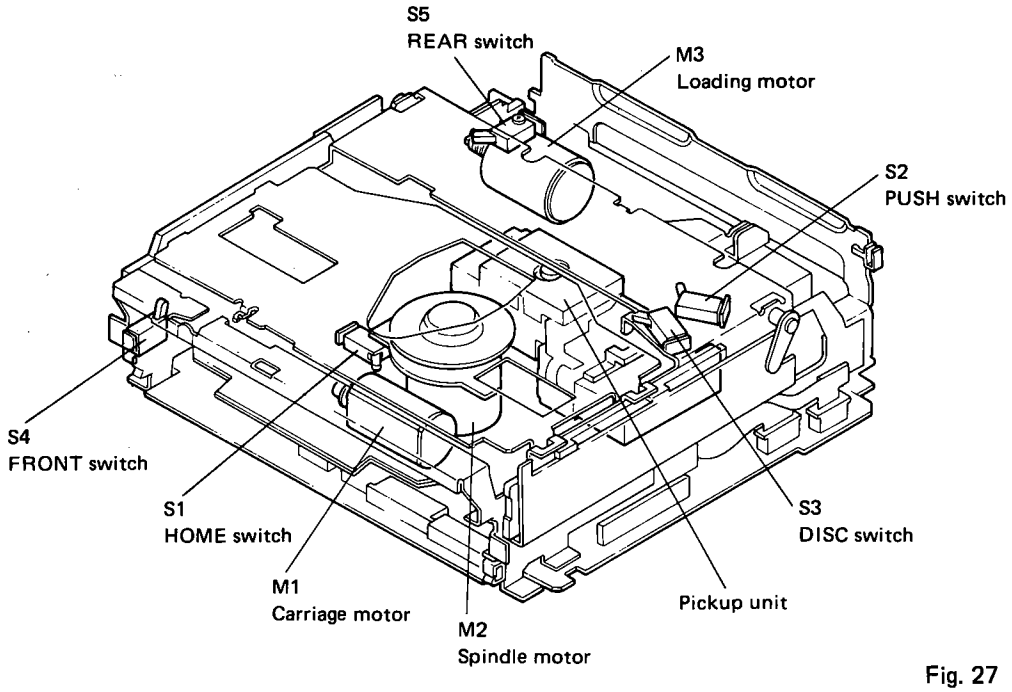


Fig. 27

1. When a disc is inserted, it is supported at point A, B and C. At the same time, a lever moves toward the arrow direction and the DISC switch is opened (Fig. 28).
2. When the disc is pushed further, a PUSH switch is turned on and the loading motor rotates to start loading (Fig. 28).

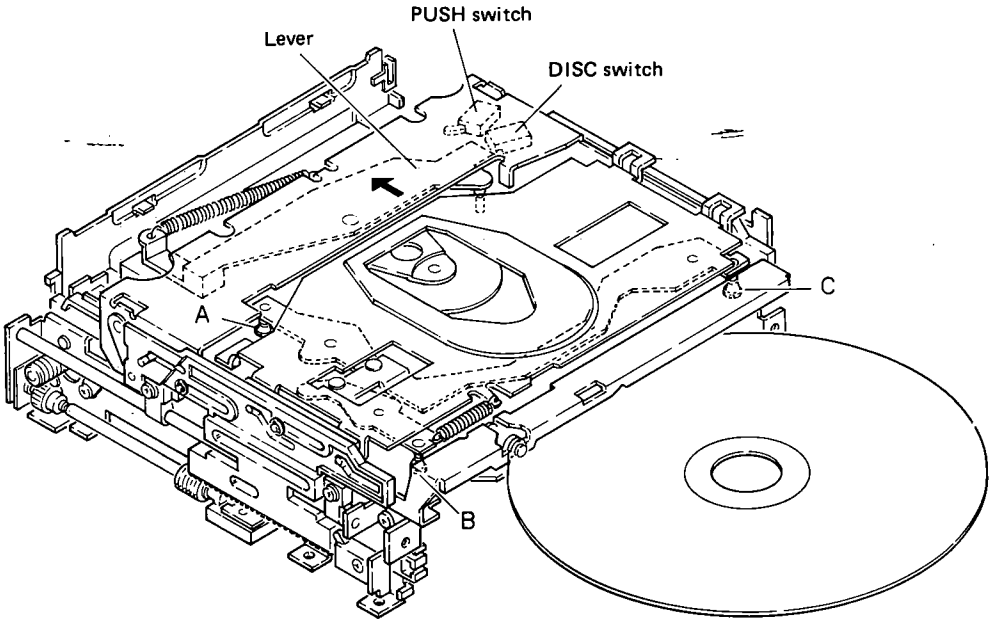


Fig. 28

5. A lever and plate unit are shifted toward the arrow direction, then the FRONT switch is opened (Fig. 29).
4. When the center of the disc comes to the spindle motor, plate unit movement toward the back is terminated and it is then shifted down by the pins of D and E (Fig. 29).
3. A lever moves further toward the back which widens point A, B and C (Fig. 28) using pin F and frees the disc (Fig. 29).

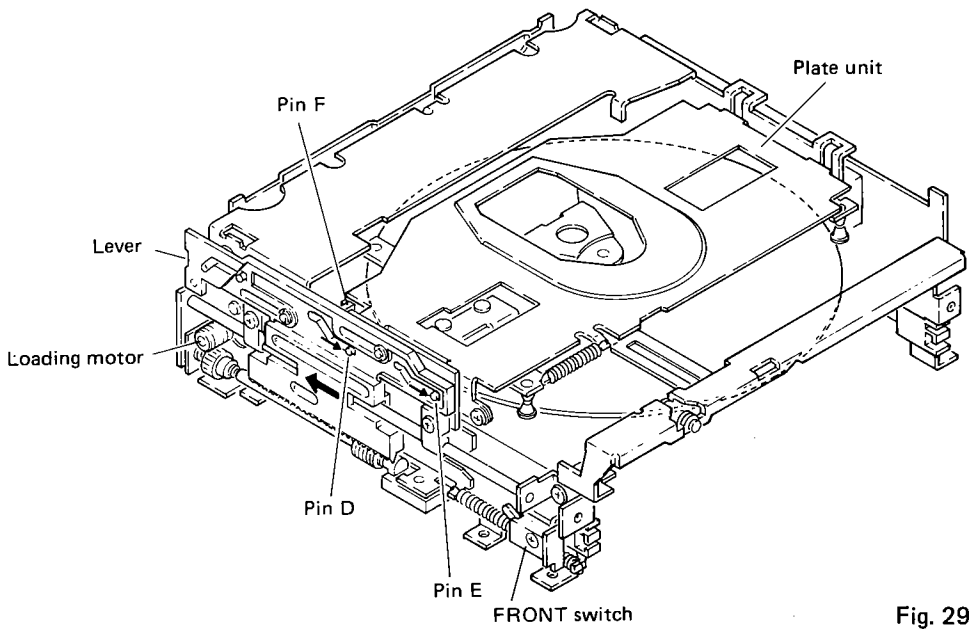


Fig. 29

6. A lever unit is moved toward the back by pin G the same as the lever. An arm unit presses the spindle motor shaft with spring L because pin H moves in the arrow direction, then a magnet holds the disc. After this, pin J and K become free and the die cast chassis becomes vibration proof. Also, the REAR switch is turned on and the loading motor stops to complete the loading operation (Fig. 30).

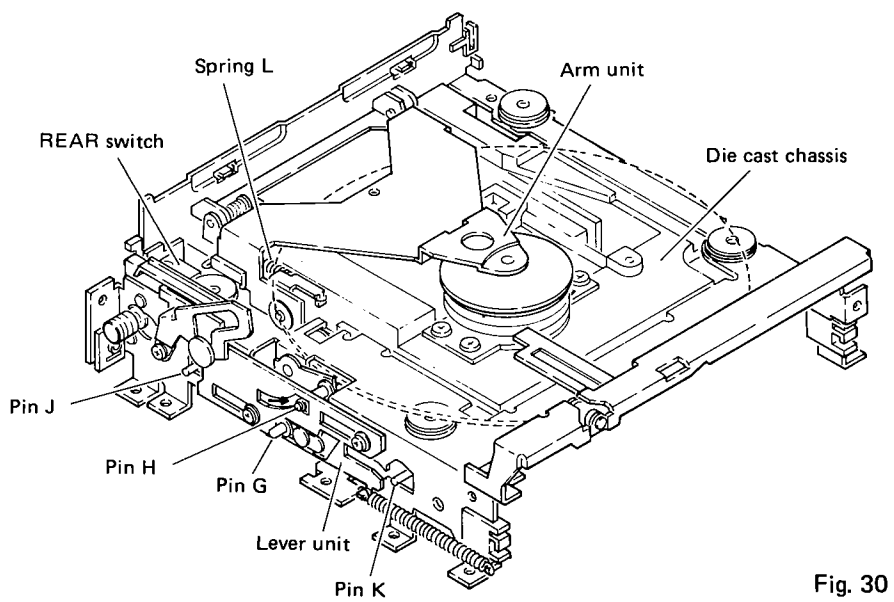


Fig. 30

CIRCUIT DESCRIPTION

ONTROL SECTION

k Diagram

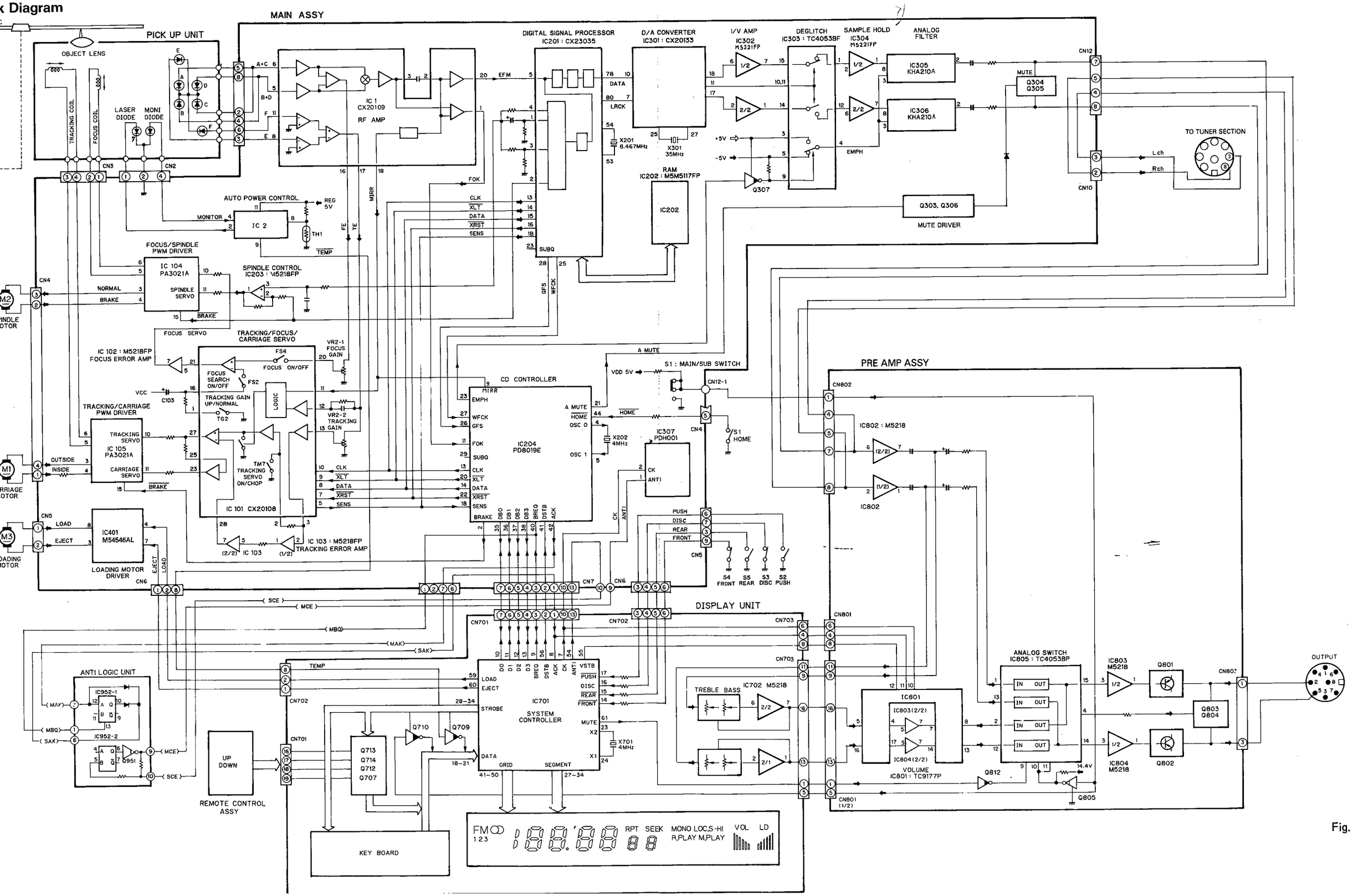


Fig. 31

+B Block Diagram

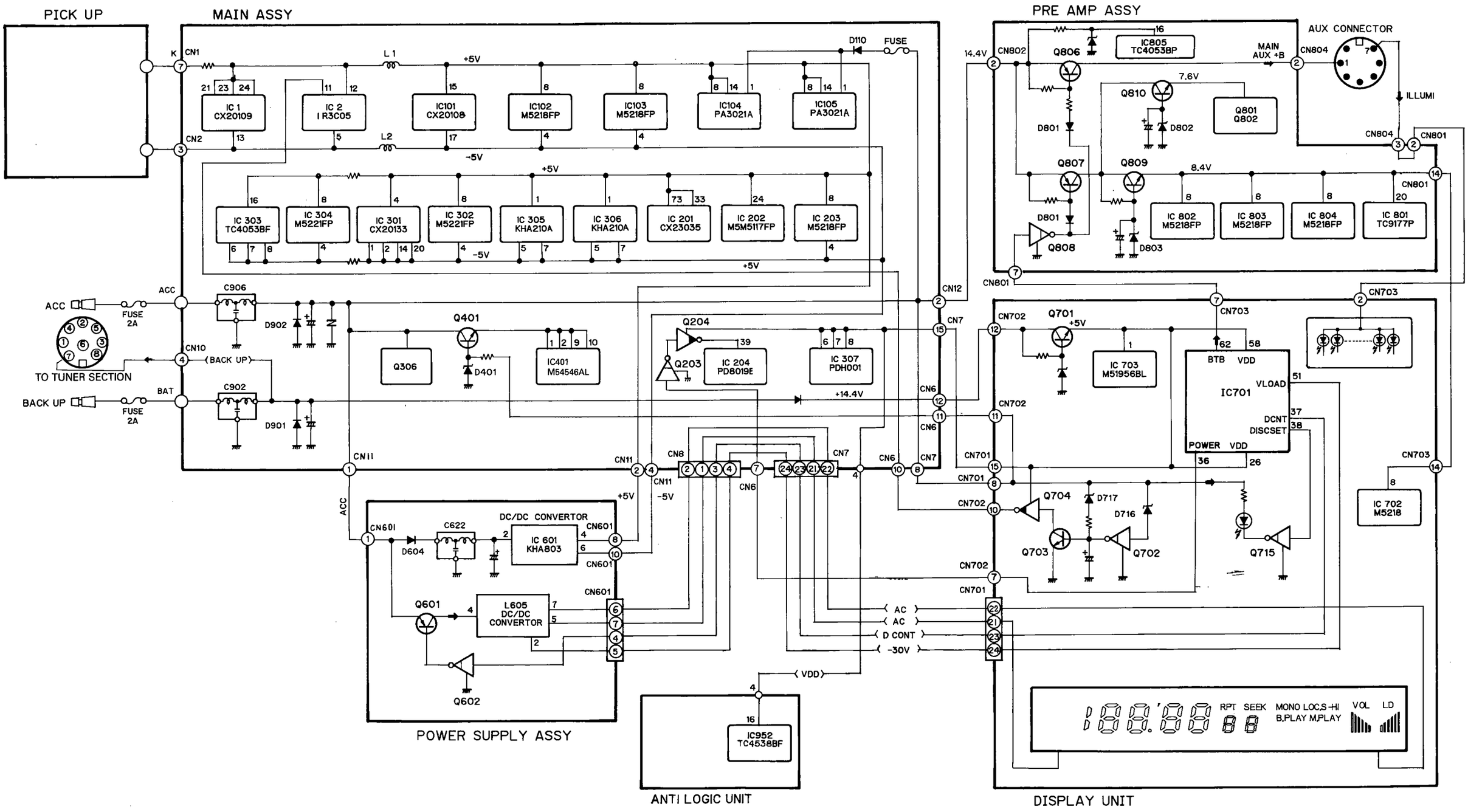
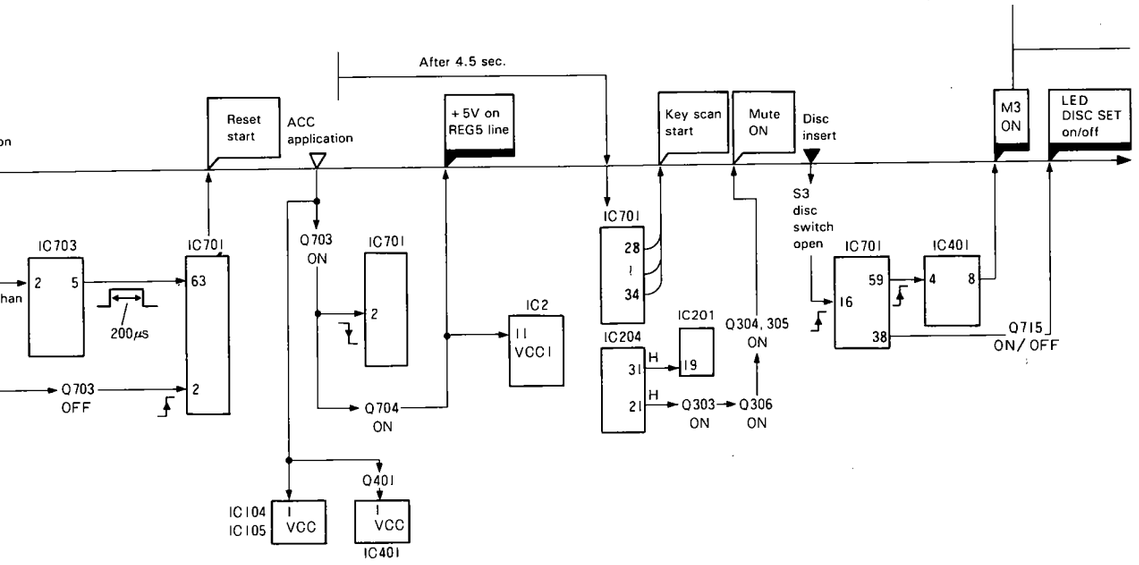
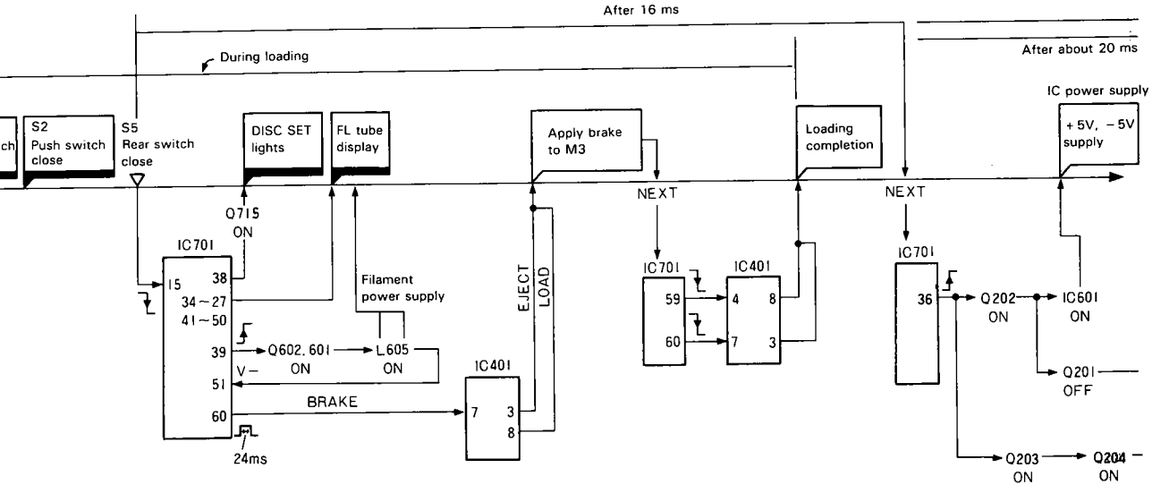
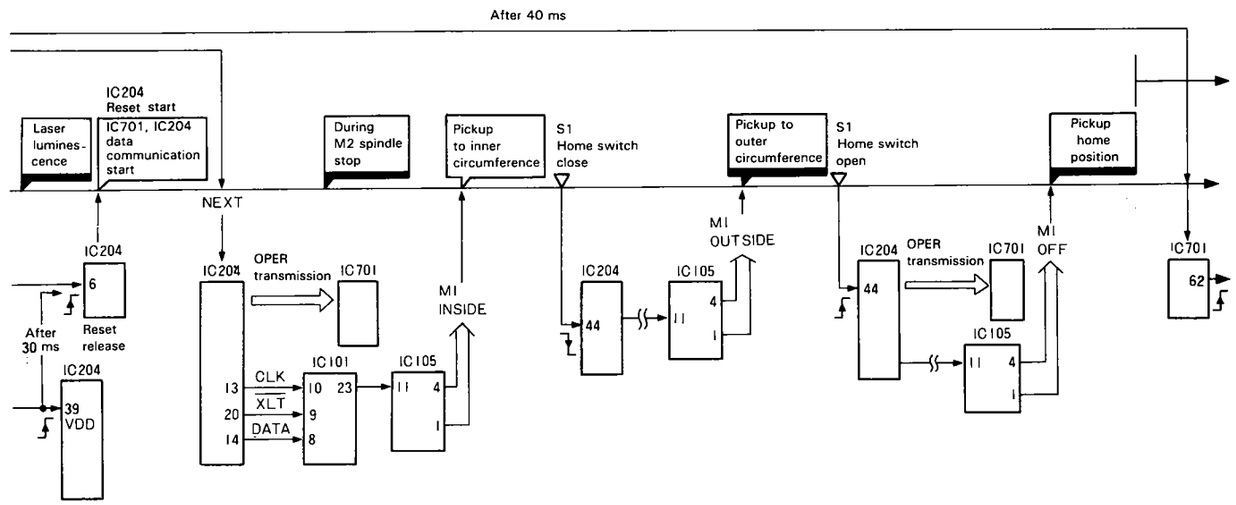


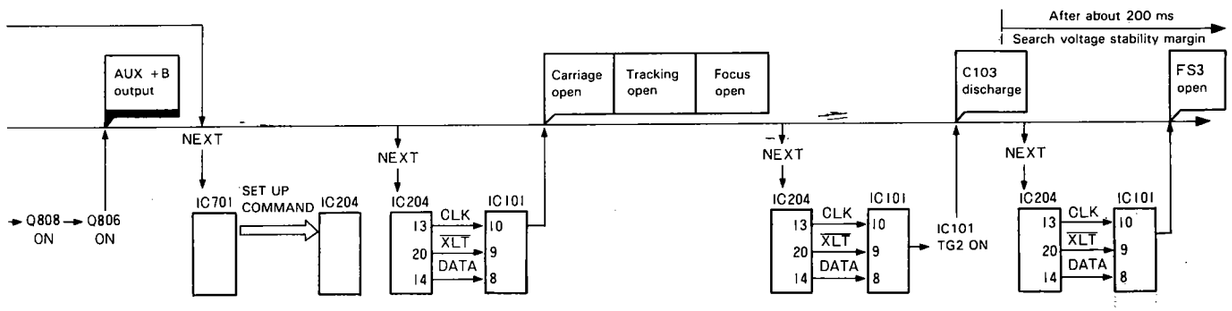
Fig. 32

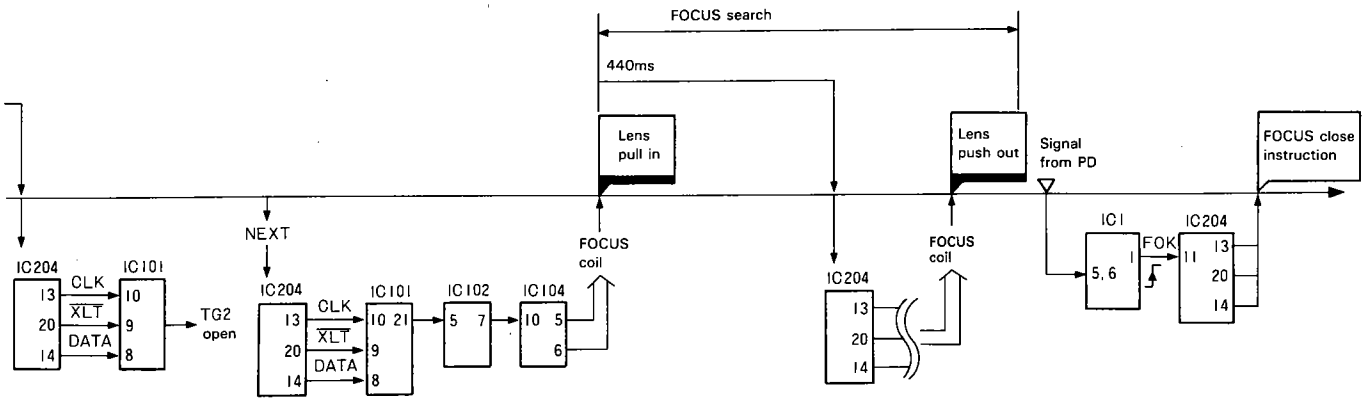
ver Supply Application ➡ PLAY

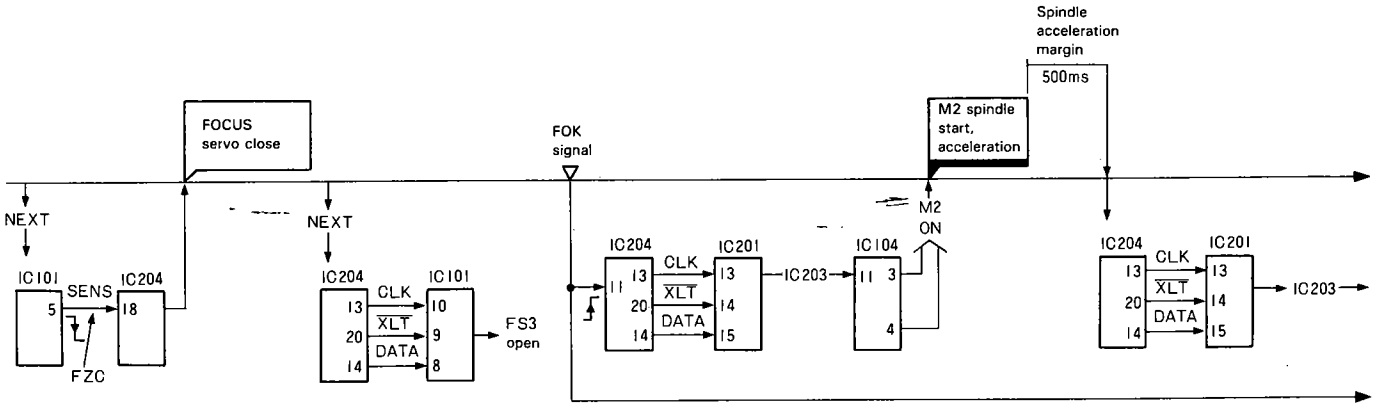


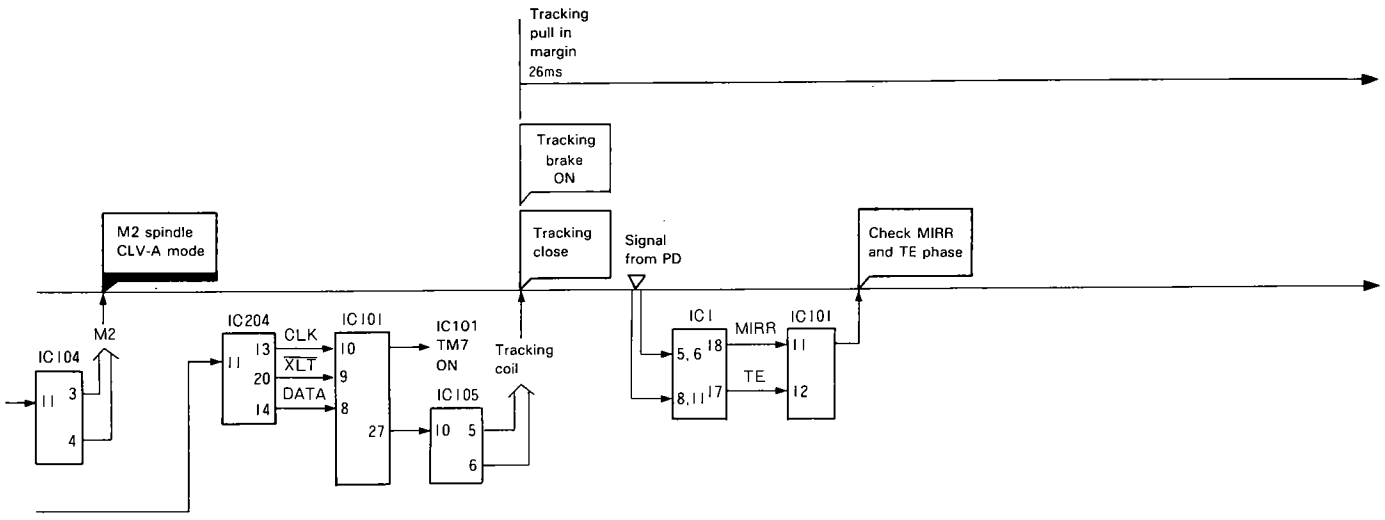


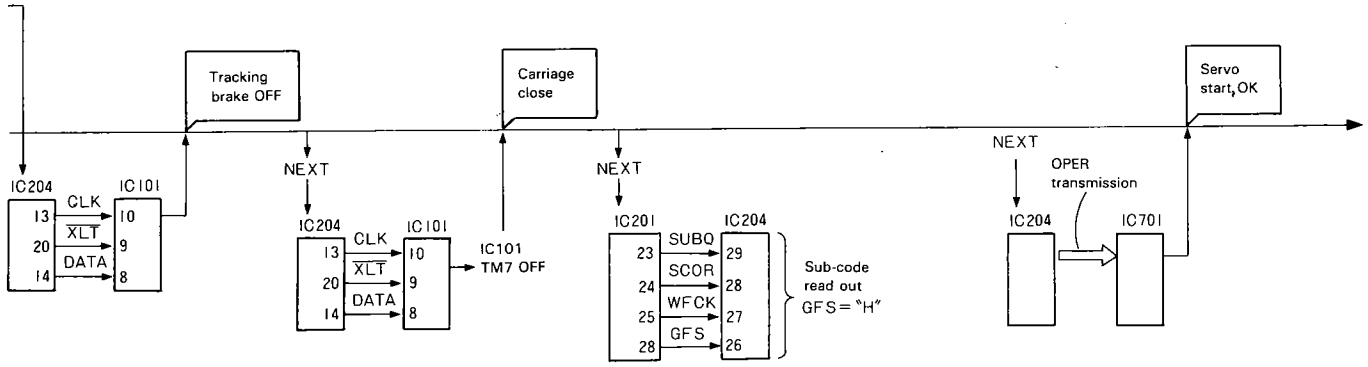


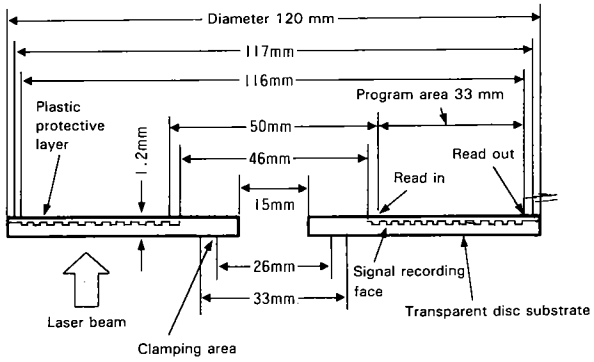



FOCUS search
440ms
Lens pull in
Lens push out
Signal from PD
FOCUS close instruction
NEXT
FOCUS coil
FOCUS coil
IC204
CLK
XLT
DATA
IC101
TG2 open
IC102
IC104
IC1
FOK
5, 6


Spindle acceleration margin
500ms
FOCUS servo close
FOK signal
M2 spindle start, acceleration
NEXT
NEXT
M2 ON
IC101
SENS
IC204
FZC
CLK
XLT
DATA
FS3 open
IC201
IC203
IC104







→ TOC read
Since all servo system rise is performed at the HOME position, the pick up is located in the disc program area where a signal is readable. Then the sub-code absolute address is read and the number of tracks up to recorded TOC (read-in part)are computed by the pickup shift distance to start TOC read.

*TOC (Table of Contents)
Data concerning the music No. and musical performance time period which is recorded at the disc inner circumference.

→ Since the TOC is recorded at IC701, the TOC is transferred from IC204 to IC701.

→ Program search → Play

• CD Player Control

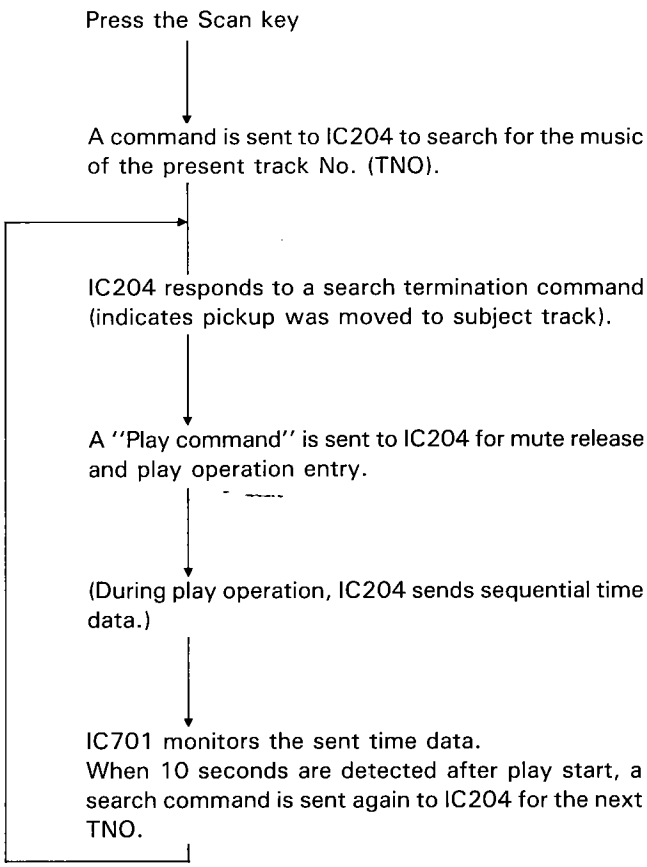
Unit control is performed by a system controller (IC701: PD4096B).

The system controller in the display unit controls the CD controller (IC204: PD8019D) by using a communication line. The CD controller performs all CD player operations such as focus servo, tracking servo, basic play operations, and sequence control for the signal processing LSI group (CX20108, CX23035, etc.) related to search operations.

Normally the system controller provides CD player system external interface as indicated below.

- Key matrix sense and beep control
- Display control
- Loading system mechanism control
- Power supply line monitoring and control such as for ACC, back up, etc.
- High temperature sense and protective operation control
- CENTRATE, LC II interface management

Also, the system controller takes care of CD player functions (search, random play, scan, etc.). For example, in regard to the scan function,



IC701 provides sequential control for IC204 that only performs basic operations as mentioned above. Therefore, this unit is roughly divided into:

- IC701 that controls the entire CD player.
- IC204 that controls the pickup system servo.

• Communication Bus

The following provides an explanation of the dedicated communication bus that facilitates data exchange between the system controller (IC701) and the CD controller (IC204). This communication bus consists of 7 lines which are 4 data lines (D0-D3), ACK, STB handshake lines and a bus request (BREQ) line. Data exchange is parallel 4-bit bi directional. ACK, STB handshaking is provided so that data transfer is confirmed. Also, the BREQ line is used to control the timing for data string (play command, search command, etc.) output. Generally, IC204 output is "L" periodic with a 26 ms cycle (Fig. 33).

Ordinary communication processing chart (commands sent from IC701 and responses received from IC204)

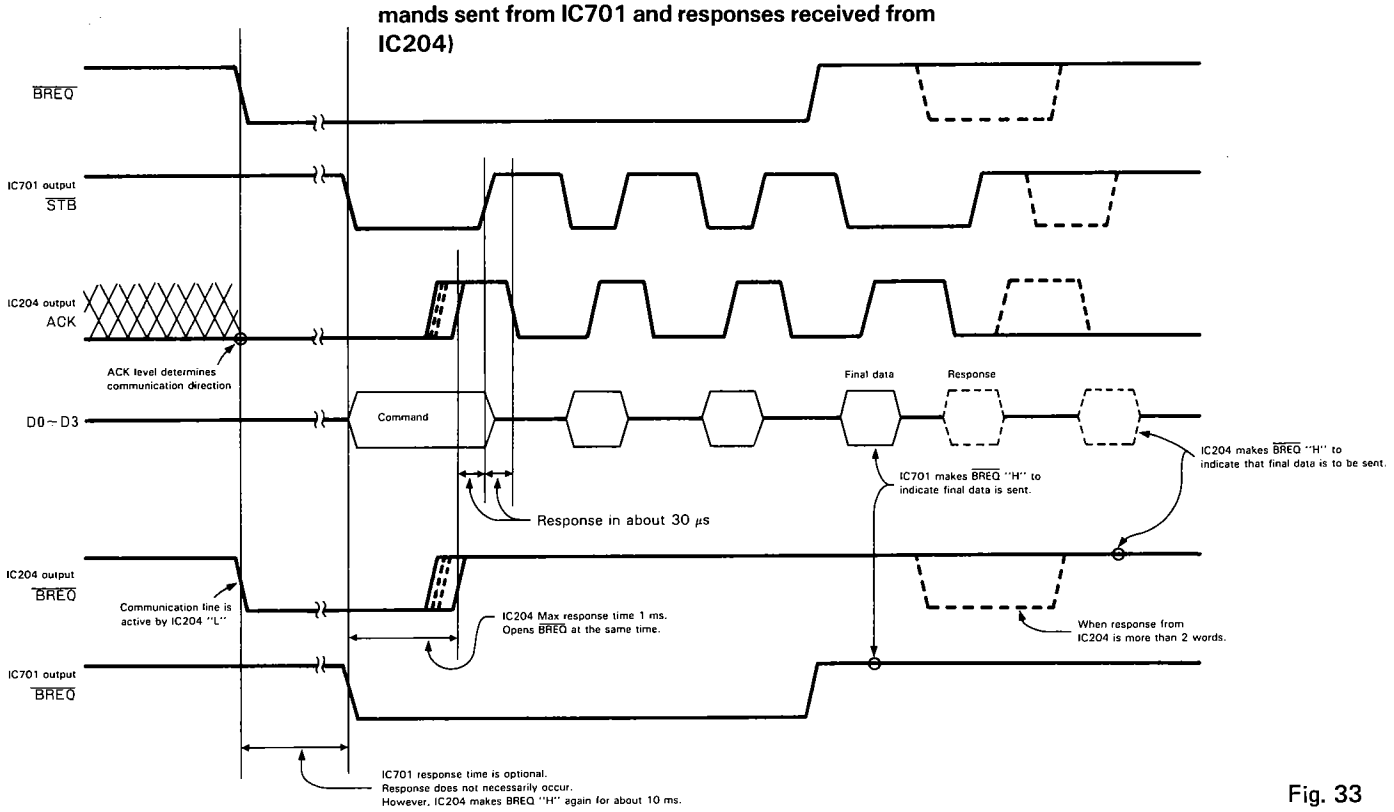


Fig. 33

1) Data format

Data is sent by D0-D3 data lines. The instructions and request data sent by the system controller are called commands and response data sent by the CD controller is called a response.

Command, response code allocation

Command	Code D3	D2	D1	D0	Response	Contents
?	0	0	0	0	?	Resend request
. . .	0	0	0	1	. . .	
. . .	0	0	1	0	NACK	Not acknowledged
. . .	0	0	1	1	. . .	
STAT	0	1	0	0	STAT	Mechanism status
. . .	0	1	0	1	OPER	Operation satus change. When operation is normal.
. . .	0	1	1	0	INT	Operation status change. When operation is abnormal.
PARAM	0	1	1	1	ACK	Parameter set
STOP	1	0	0	0	ACK	Stop operation instruction
SET UP	1	0	0	1	ACK	Set up operation instruction
PLAY	1	0	1	0	ACK	Play operation instruction
SEARCH	1	0	1	1	ACK	Search operation instruction
FF	1	1	0	0	ACK	High speed forward operation instruction
REV	1	1	0	1	ACK	High speed reverse operation instruction
. . .	1	1	1	0	. . .	
. . .	1	1	1	1	. . .	

ACK: Response signal that indicates acceptance.

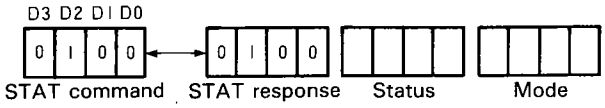
Represenative examples of each command and response format are provided as follows. (Also, communication can be performed with other formats.)
[Operation instruction command]([Operation parameter]) ↔ [Command response] ..... [Asynchronous response] [Operation status data]

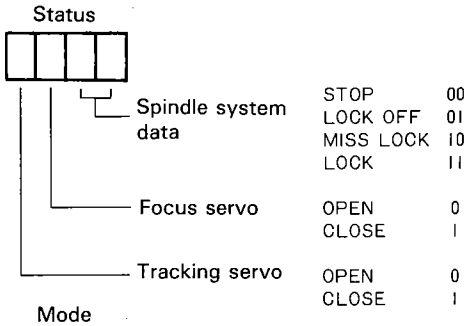
This format is used when the system controller provides a certain operation instruction for the CD controller. When the CD controller receives a command, it immediately returns a command response depending on the controller status, and starts mechanism operation at the same time. Although communication is suspended once, the CD controller sends an asynchronous response to the system controller depending on a change in the mechanism operation status, then it sends operation change data. Since operation change data is sent for an operation instruction command, that for an operation instruction command just sent is sent until a new operation instruction command is sent. The operation parameter that suceeds the operation command depends on a different operation command. When it is omitted, operation is prescribed by a previously determined default value or a value set by a parameter set command.
[Status request command] ↔ [Synchronous response] [Mechanism status data]

When the system controller sends a status request command, the CD controller provides a direct synchronous response instead of a command response and a command response is omitted. In this case, mechanism status data is sent after a synchronous response.
[Parameter set command][Parameter data] ⟷ [Command response]
Format when CD controller parameter is set.
When this command is received, the CD controller returns "ACK" unconditionally as a command response, and at the same time rewrites the internal CD controller parameter.

- **STAT command**

STAT is a command sent by the system controller as a status send request. The CD controller responds with a synchronous STAT response and sends the following data.





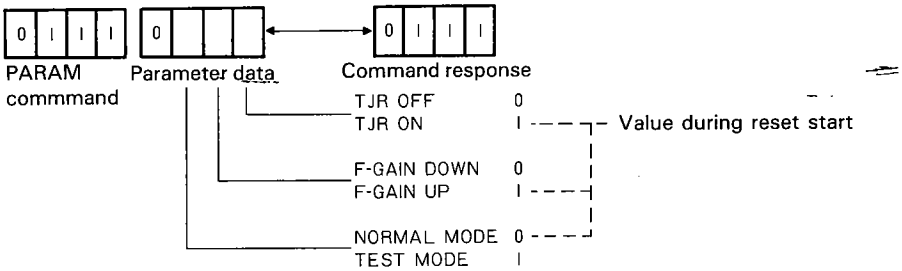
Mode

$	Contents
0	STOP
1	SETUP
2	PLAY
3	SEARCH
4	FF
5	REV

$: HEX

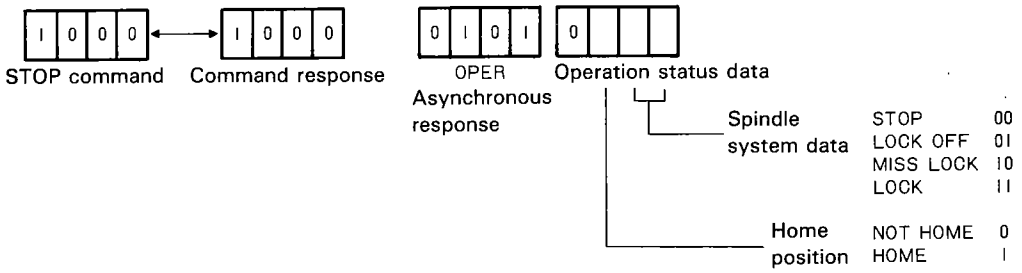
- **PARAM command**

PARAM, a parameter set comand, sets the following data.



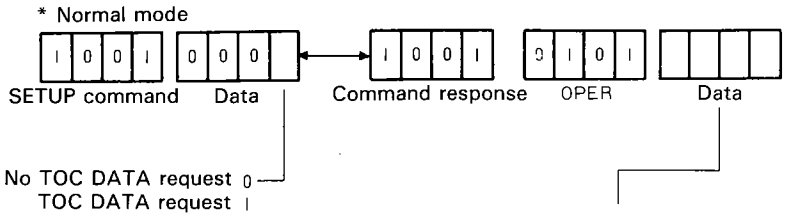
※ TJR: Tracking Jump Return

- **STOP command**

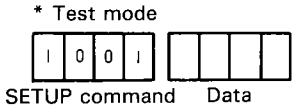


- **SETUP command**

The SETUP command format depends on the mode set by PARAM.



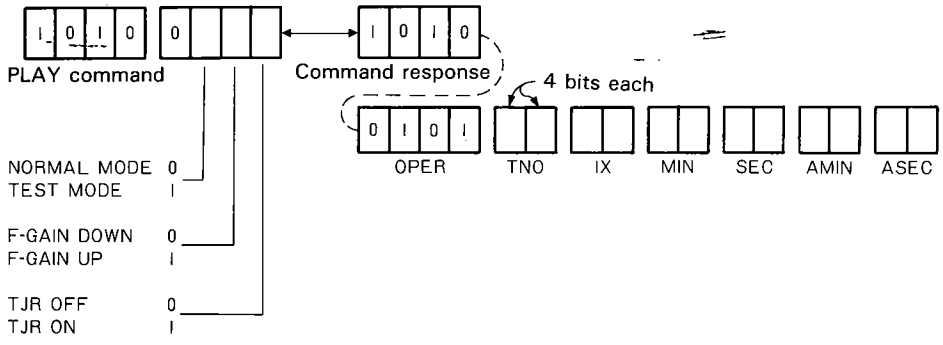
Data	Semantics
0	Servo start OK
Status	TOC data send mode (sent with a 26 ms cycle) □□ □□ □□ 6 ward POINT PMIN PSEC



Data($)	Operation	Data ($)	Operation
2	Focus open	9	Carriage FWD
3	Focus close	A	Carriage REV
4	Tracking open	C	PLAY
5	Tracking close	D	FWD jump
6	All servos on	E	REV jump
8	Carriage off		

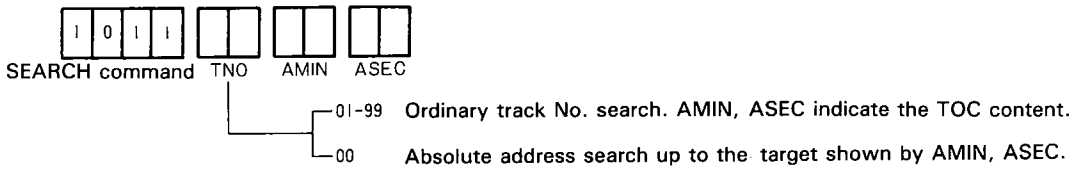
*As a response format, one equivalent to the STAT response is sent when servo operation has been terminated.

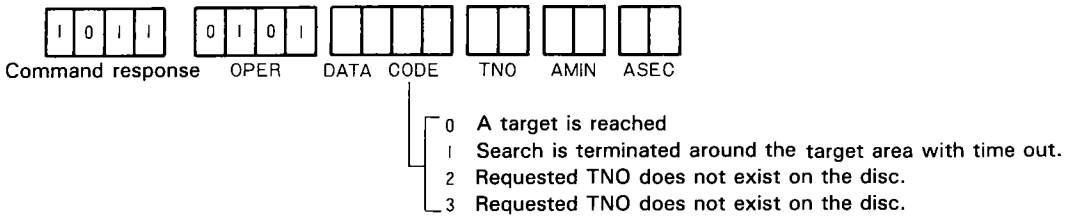
- **PLAY command**



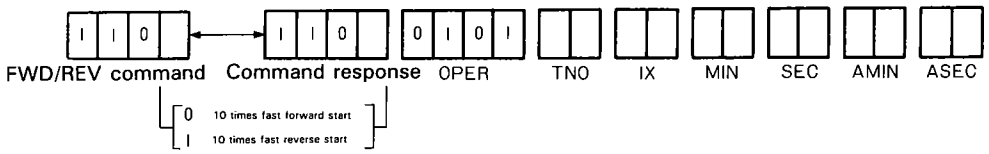
As a response, 12 woad sub-code data is sent continuously to OPER. Also, the response is sent every second because it is sent only with a second change. However, it is sent immediately when the parameter is changed, or in other words when the music or index is changed.

- **SEARCH command**





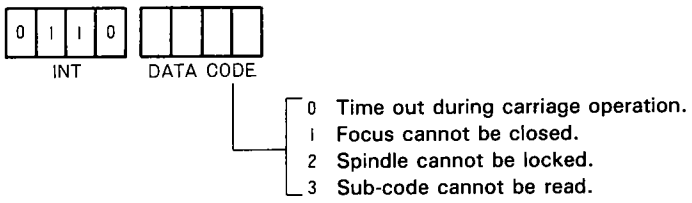
- **FWD/REV command**



A response is sent after OPER when it changes every 26 ms. When a parameter (TNO, IX, etc.) change occurs, it is sent immediately.

- **INT response**

An INT response can be accepted with any system controller operation status as an asynchronous response to notify the system controller that the CD controller has entered the STOP mode.



• CD Controller (IC204)

The servo IC CX20108 (IC101) and digital processing IC CX23035 (IC201) are controlled by DATA, CLK, $\overline{XLT}$, $\overline{XRST}$ outputted by the CD controller PD8019E (IC204) in which a SENS signal that matches the data content is outputted to IC204. The timing for DATA, CLK, $\overline{XLT}$ is shown in Fig. 28.

DATA transfer is by 8 bit serial data. This data is latched by the $\overline{XLT}$ signal which executes the instruction. The $\overline{XRST}$ signal clears the IC shift register during ACC ON.

The content of data to IC101, 201 is as shown in the table below.

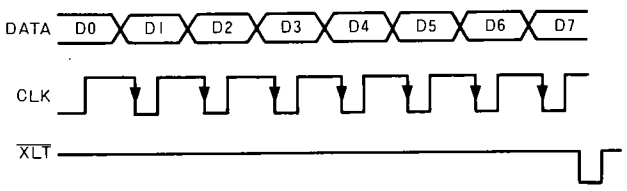


Fig. 34

Communicate to	Kinds (command)	Address		Task			SENS terminal
		D7 – D4	D3	D2	D1	D0	
IC101 CX20108	Focus control	0 0 0 0	FS4 Focus on	FS3 F gain down	FS2 F search ON	FS1 F search UP	FZC
	Tracking control	0 0 0 1	Anti shock	Brake on	TG 2	TG 1	AS
					Gain set		
	Tracking mode	0 0 1 0	Tracking mode		Sled mode		TZC
IC201 CX23035	Sync protection, attenuator control	1 0 1 0	GSEM	GSEL	WSEL	ATTM	Z
	Counter set, lower 4 bits	1 0 1 1	Tc3	Tc2	Tc1	Tc0	$\overline{COMPLETE}$
	Counter set, upper 4 bits	1 1 0 0	Tc7	Tc6	Tc5	Tc4	$\overline{COUNT}$
	CLV control	1 1 0 1	DiV	TB	TP	GAIN	Z
	CLV mode	1 1 1 0	CLV mode				$\overline{PW \geq 64}$

FZC: Focus zero cross, AS: Anti shock, TZC: Tracking zero cross, Z : High impedance

1) Focus control command

Provides the focus search voltage in order to search for the zero cross point by moving the lens up and down. Outputs the FZC signal (H ~~to L~~) from the IC101 SENS terminal at the zero cross point to fetch the focus lock timing.

2) Tracking control command

This command controls the tracking gain and brake circuit.

The tracking gain is increased when TG1 = TG2 = 1.

TG1 changes the high pass compensation time constant by turning the phase compensation selection switch on. TG2 switches the high pass gain. When a large impact is detected in the anti shock circuit, a sound skip is prevented by increasing the tracking gain. Also, during track jump, spot return is prevented by increasing the gain to realize a track jump.

The anti shock circuit consists of a window comparator (in IC101) for checking the tracking error signal magnitude by input from IC101 terminal (19). When the entry of an error signal larger than the window occurs, player mechanical impact is detected and the servo gain is increased to keep the beam on the track. The anti-shock circuit functions when D3 = 1. During this command, SENS output expresses AS (Anti Shock). If tracking error input exceeds the window size (large impact), AS = 1 occurs.

If 100 track jump or 10 track jump occurs during access, the brake circuit turns the tracking servo circuit on and off to stop the beam at a desired position quickly. The brake functions when D2 = 1.

3) Tracking mode command

This command is used to cause a jump pulse and fast forward pulse during access, and tracking servo and carriage servo ON/OFF.

Operation	Tracking mode		Operation	Carriage mode	
	D3	D2		D1	D0
Servo off	0	0	Servo off	0	0
Servo on	0	1	Servo on	0	1
FWD jump	1	0	Fast FWD	1	0
REV jump	1	1	Fast REV	1	1

Command Code

4) Sync protection, attenuator control command

D3	D2		D1		D0		
GSEM	GSEL	Number of interpolated frames	WSEL	Window width (clock)	ATTM	MUTG terminal (pin 19)	Attenuation (dB)
0	0	2	0	±3	0	0	0
0	1	4	1	±7	0	1	$-\infty$
1	0	8			1	0	−12
1	1	13			1	1	−12

Command Code

- **Sync protection (D3−D1)**

Although a data pattern (3T−11T) the same as a frame sync signal (24T) does not exist during recording, sometimes the same pattern is detected in data due to the influence of dropout and jitter. Also, on the other hand, since an original frame sync signal is not detected sometimes, protection and interpolation as well as detection are necessary.

Only the edge of the EFM signal latched by PLCK is input as "1" and the other part is input to the 23 bit shift register after conversion to "0" to detect a frame sync signal.

A window is provided to protect a frame sync signal, and the same pattern outside the window is eliminated. When a frame sync signal does not exist in the window, interpolation is performed by a signal generated by the 588 octal counter (4.3218 MHz / 588 = 7.35 kHz). A 4 bit counter is provided that counts the number of interpolated frames. When this value reaches the number of frames selected by GSEL, GSEM, the window is ignored and the 4 bit counter is reset when the next frame sync signal occurs during which GTOP (pin 27) becomes "H". Also, the GFS terminal (pin 28) becomes "H" while the frame sync signal generated by the 588 octal counter for interpolation is synchronized with the frame sync signal from the disc.

The write request signal (WREQ) and timing such as the write frame clock (WFCK) are generated based on the protected and iterpolated frame sync signal.

- **Attenuator (D0)**

A signal appears at the MUTG terminal (pin 19) from IC204 (CD controller). Muting or −12dB attenuation is executed by a 2 bit signal.

5) Counter set (lower bit, upper 4 bits)

During access, a track count pulse enters the CNIN terminal (pin 17) from the IC101 CSET terminal (pin 6). This command presets the counter preset value that counts the pulse.

6) CLV control command and CLV mode command

DiV	D3	0	RFCK/4 and WFCK/4	Phase comparison frequency during CLV-P mode
		1	RFCK/8 and WFCK/8	
TB	D2	0	RFCK/32	Bottom hold cycle during CLV-S, CLV-H mode.
		1	RFCK/16	
TP	D1	0	RFCK/4	Peak hold cycle during CLV-S mode.
		1	RFCK/2	
GAIN	D0	0	−12dB	MDP terminal (pin 3) gain during CLV-S, CLV-H mode.
		1	0dB	

CLV Control Command

Mode	D3 – D0	MDP (pin3)	MDS (pin4)	FSW (pin1)	MON(pin 2)
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 Mode Command Z: High impedance

These signal are commands that concern the CLV servo. IC204 (CD Controller) selects each CLV mode and sends a command to IC201. IC201 controls spindle motor rotation by the following output. IC201 output is by the MDP terminal that controls the speed and phase synchronization, the MDS terminal that controls speed synchronization, the FSW terminal that performs filter constant switching, and the MON terminal that controls motor on/off. A signal that matches each motor is applied to the spindle control circuit for these terminals.

Usually each control signal outputted from IC201 during play has a modulated pulse width. These signals are applied to the spindle servo circuit (IC203) before application to the PWM driver (IC104) to stabilize operation. The spindle servo circuit consists of a low pass filter with IC203, R206, 207, C205, 204 which converts a signal (pulse) to DC. D201-203 are connected to IC203 output through R210. This circuit is a limiter that prevents excessive motor current flow when a signal becomes abnormally large and is set so that the PWM driver (IC104) output duty range does not become 100%. When IC203 output becomes a large positive value, D202, 203 are turned on and are fixed at +2.5 to 2.7V. When it becomes a large negative value, D201 is turned on and is fixed at −0.5 to −0.7V.

- **STOP mode**

During this mode, the ±5V D/D convertor (IC601) operates and the spindle motor does not rotate (during EJECT, etc.). In regard to each IC201 output, MDP = "L", MDS = "Z", FSW = "L", and MON = "L". IC203 pin 1 output is 0V (SPDD). Also, the MON pin is connected to IC104 pin 15. When this terminal becomes "H", the spindle driver operates. When it is "L", no output occurs (to prevent driver operation by the IC203 offset voltage).

- **KICK mode**

In this mode, when the spindle motor shifts from a stop status to an operation status, it is forced to operated (forward rotation) so that PLL pull in can be easily performed. Pin 1 (SPDD) of IC203 becomes +4 or +5V which is applied to IC104. Since MON = "H", IC104 operates.

- **BRAKE mode**

In this mode, when motor stop is required during spindle motor forward rotation, a voltage reverse to the forward rotation is applied to the motor to reduce motor rotation rapidly to stop the motor quickly. IC203 pin 1 (SPDD) becomes −3 or −4V. After low speed motor rotation is detected by the signal from IC201 pin 18 SENS terminal, IC204 stops sending the BRAKE command.

- **CLV-S mode (S:SPEED)**

Rough servo mode used when EFM-PLL circuit lock is released during rotation start, track jump, etc.

- **CLV-H mode**

Used when the RF signal has an intermittent status such as during high speed search.

- **CLV-P mode**

Ordinary play mode used during PLL lock.

- **CLV-A mode**

When the CLV-P mode becomes unstable due to vibration and disc scratches, or when track jump (several tracks) occurs, a switch is made to the CLV-S mode, then an automatic switch is made to the CLV-P mode when disc rotation and PLL are stabilized.

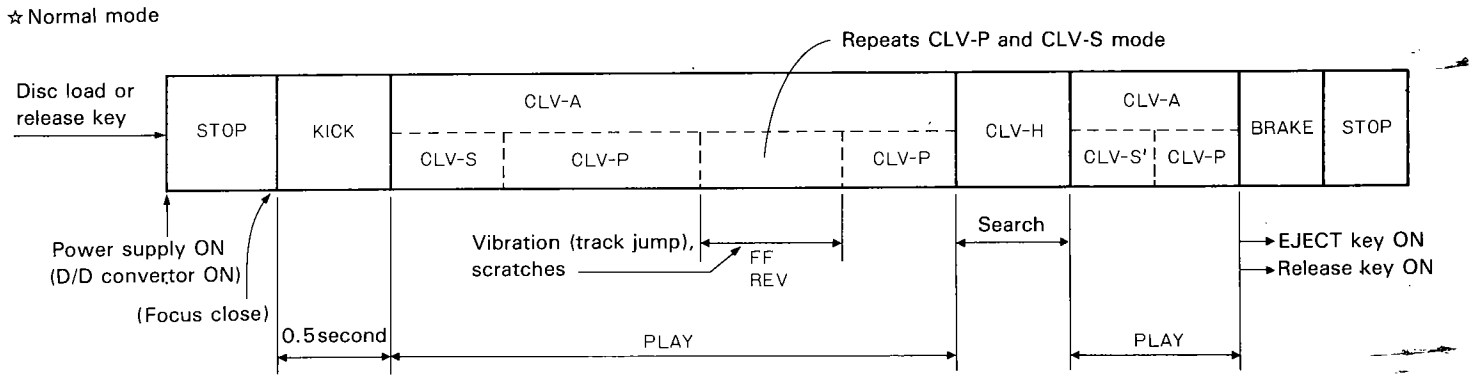


Fig. 35 Spindle motor control mode selection

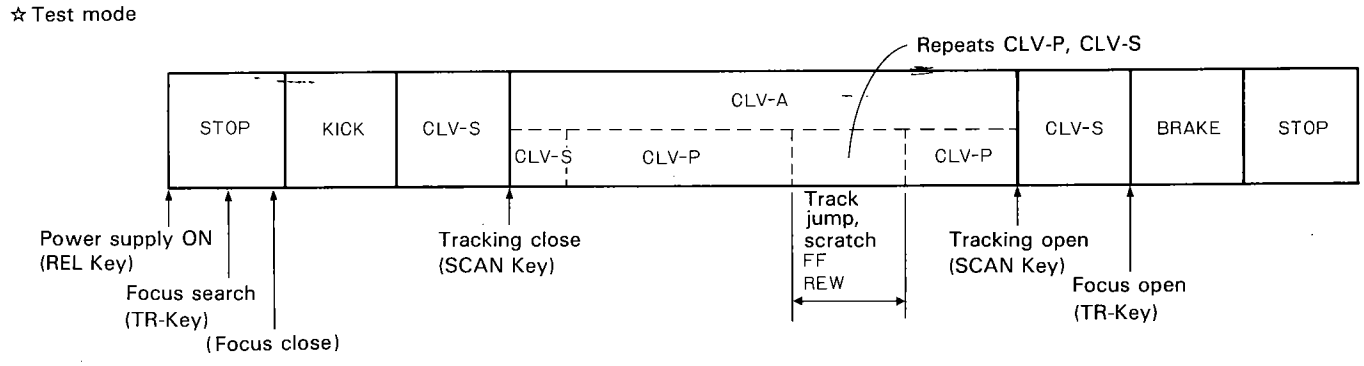


Fig. 36 Spindle motor, control mode switching

• RF Amplifier (IC1:CX20109)

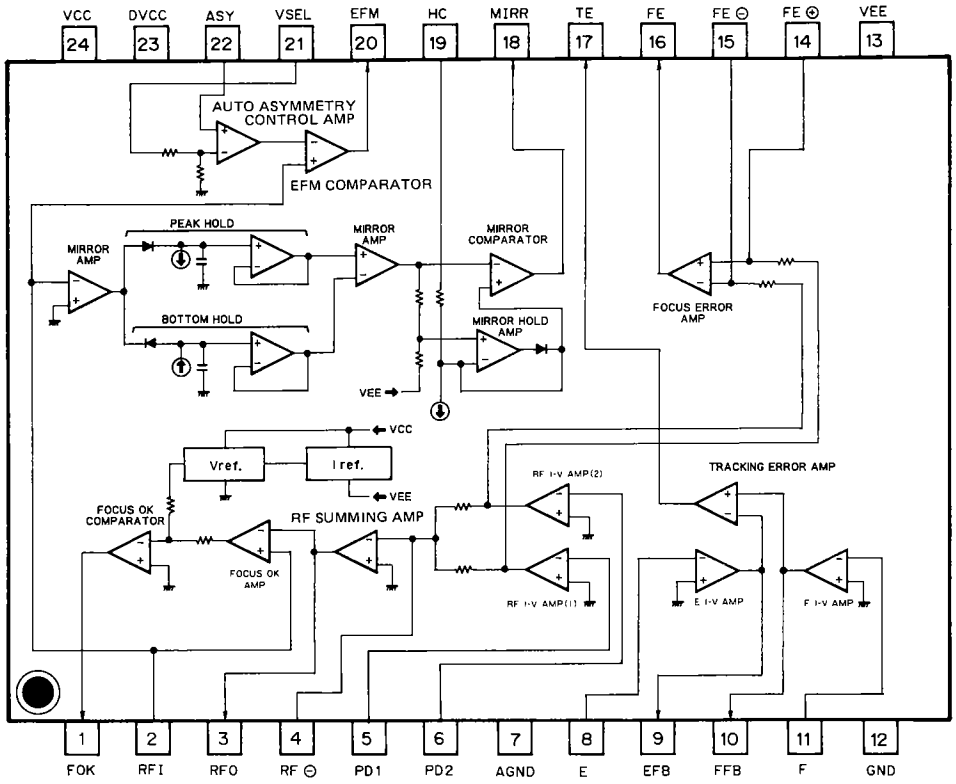


Fig. 37

A circuit that processes the 3 spot pickup output signal and provides a signal to the next step, servo section, demodulator section and servo controller.

1) RF amplifier

Photo diode current input to pin 5, 6 is converted to I-V by the RF I-V amplifier. Also, summation by the RF summing amplifier (A + B + C + D) is output to pin 3.

2) EFM comparator

The RF binary signal input by pin 2 is output to pin 20 as an EFM signal. Since asymmetry that occurs due to uneven disc manufacture cannot be removed just by AC coupling, the 50% probability of a 1, 0 binary EFM signal is used to control the reference voltage of the EFM comparator.

3) Focus error amplifier

The RF I-V amplifier (1) output (A + C) and RF I-V amplifier (2) output (B + D) difference is provided as focus error signal (A + C − B − D) output from pin 16.

4) Tracking error amplifier

Side spot photo diode current input to pin 8, 11 is converted to I-V by the E, F I-V amplifier. Also, the E, F I-V amplifier difference used by the tracking error amplifier is provided as tracking error signal (E − F) output from pin 17.

5) Focus OK circuit

This circuit provides the timing window which turns the focus servo on from a focus search status. In regard to the Focus OK signal (an RF comporator signal), when pin 3 becomes more than 0.4V, pin 1 becomes "H".

6) Mirror circuit

Peak and bottom hold occurs after the pin 2 RFI signal is amplified. A DC reproduced envelope signal is obtained by differential amplification of the peak/bottom hold signals. This signal is compared to a signal in which 2/3 of the peak value is peak held with a large time constant to obtain mirror output. Since the mirror signal becomes "L" on a disc track and "H" between tracks (mirror part), the track difference is detected when the pickup crosses a track. Also, "H" output occurs during defect detection.

• D/A Convertor (IC301) and Integrator (IC302)

IC301 is used to convert 16 bit data to a current signal. IC301 receives each signal (DATA, LRCK, WDCK, BCLK) from IC201 to extract data. Current (I OUT L, R) output occurs from count start until the count becomes zero. In regard to IC302 operation, current output from IC301 charges condensor C310, 311 connected between the (−) input terminal (pin 6, 2) and the output terminal (pin 7, 1). Then voltage that matches this is outputted from IC302 (pin 7, 1) as current conversion to voltage.

When current from IC301 stops, IC302 output holds the voltage.

However, since new data entry is continuous, the hold voltage must return to 0V. Therefore, C310, 311 are discharged by Q301, 302 before new data is extracted. In regard to discharge timing, it is provided as DCL, DCR output by IC301. The output of IC302 varys between 0V and 4V (Fig. 38).

It is as shown in Fig. 38 during non-signal (−∞dB) reproduction. Audio signal operation is with a 2V offset.

Fig. 38

Fig. 39

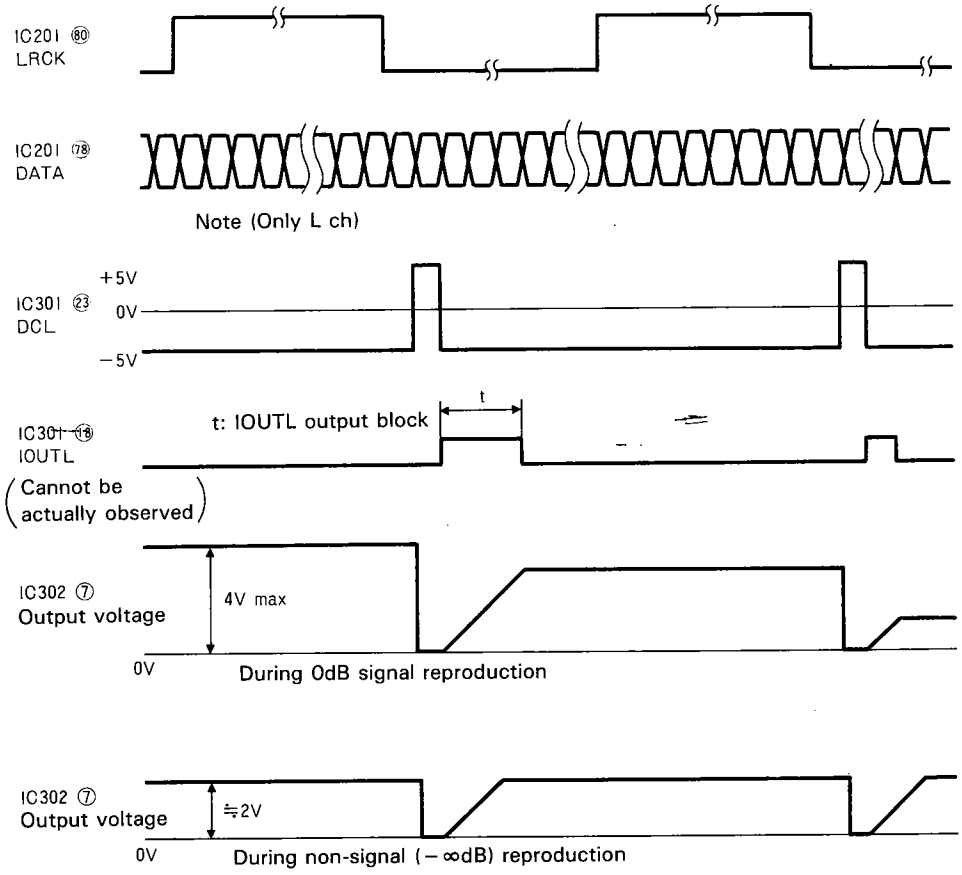


Fig. 40

- **Deglitch (IC303) and Sample Hold (IC304) Circuit the Following Gives Description for L-ch Only.**

IC302 signal output is connected to the IC304 (−) input terminal through R306 and the IC303 switch. In regard to the IC303 switch, pin 15 and 1 are turned on by the LRCK "H" section output from IC201. Pin 15 and 2 are turned on by the "L" section, the signal from R306 drops to GND and the IC304 (−) input terminal is opened.

An approximate circuit when IC303 pin 15 and 1 are turned on is as shown in Fig. 41. At that time, the circuit functions as an ordinary amplifier.

IC302 output voltage is increased by this amplifier gain to become IC304 output (180° phase deviation).

Next, the IC303 switch becomes as shown in Fig. 42 when pin 15 and 2 become on.

IC302 is separated from IC304. However, since C318 is charged by the previous output voltage, the voltage is held between this.

Also, IC302 output is offset +2V, negative voltage is applied by R308, R310 and C314 so that the offset is cancelled. IC304 functions as an adder with 0V output. There is a +/− audio signal shift centered on 0V.

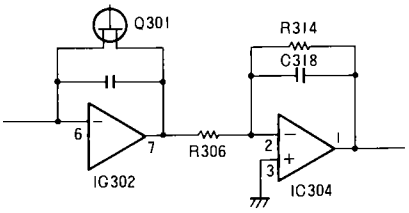


Fig. 41

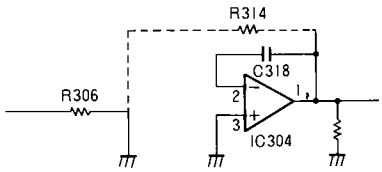


Fig. 42

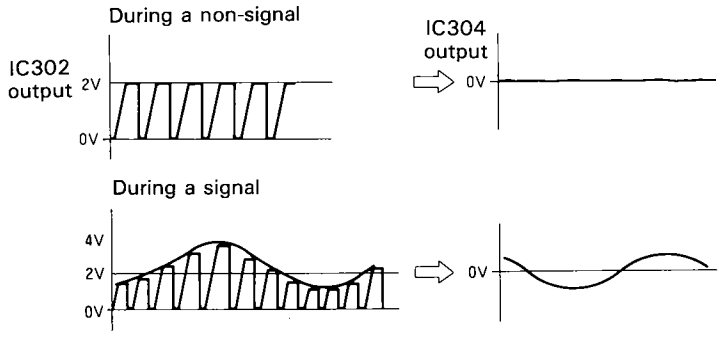
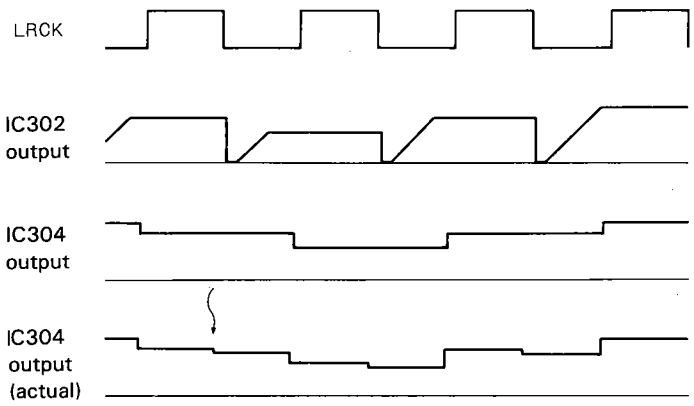


Fig. 43



There is a difference between the hold voltage and previous voltage influenced by a slight discharge of C318 and the IC offset voltage.

Fig. 44

• Low Pass Filter (IC305, 306) (LPF)

Since there is excessive spectral density in IC304 output, the frequency component in areas other than the audible zone is eliminated by an LPF provided with 6dB gain as well as an internal deemphasis circuit so that deemphasis ON/OFF can be controlled by applying +5V or −5V to pin 3. In regard to deemphasis ON/OFF, lead-out is performed by a disc sub-code, and signal output is by IC204 (CD controller). However, since IC204 output is 0V and 5V, the IC303 switch is controlled through Q307, then the switch selected voltage is applied to pin 3 of IC305. (Since IC305 pin 3 requires current, the Q307 collector cannot be directly connected.)

• PLL Circuit

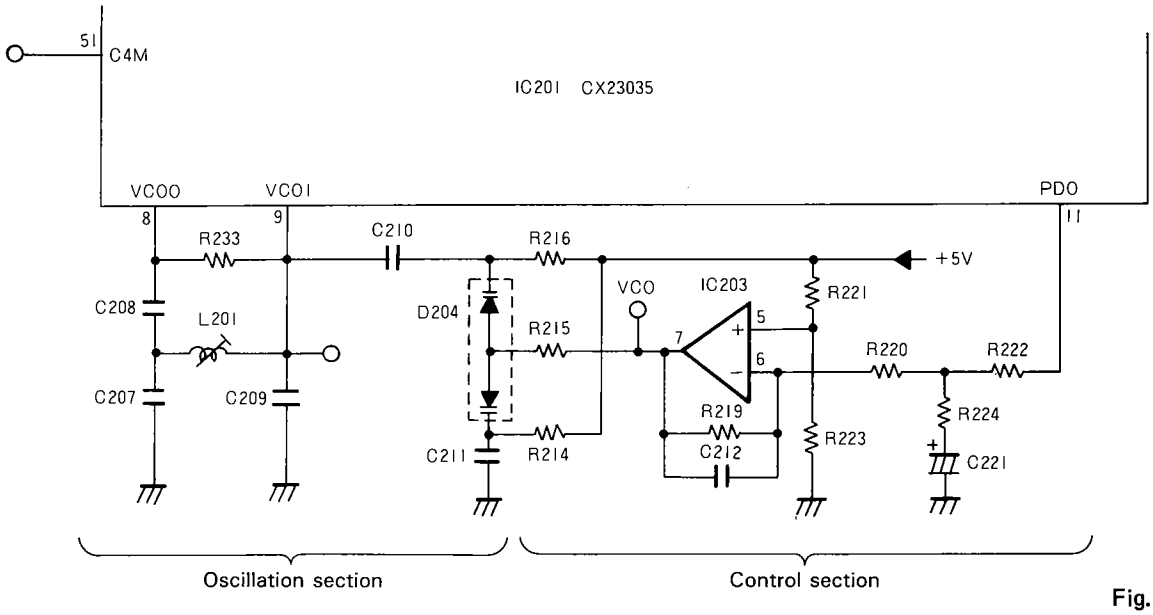


Fig. 45

This circuit is used to extract the EFM signal reproduction clock. The phase of the signal produced by the oscillation section and that of the EFM signal are compared, then the IC201 (PDO) pin 11 output result is amplified for application to the varicap (D204) anode. IC203 output is usually set for −0.5V during play. (Measured by a tester and millivolt meter. When it is measured by an oscilloscope, the voltage is seldom set because of overlapping high pass noise.)

When oscillation circuit frequency is high, the output is high (−0.5V → 0V → +2V) and when it is low, the output is low (−0.5V → −3V). The oscillation frequency is usually 8.643 MHz during play. However, if a measuring instrument is directly connected to the oscillation section, the circuit becomes unstable. Therefore precautions should be taken.

Also, PLL circuit lock or non-lock can be confirmed by IC201 pin 28 (GFS). When it is "H", a lock status occurs and when it is "L", a non-lock status occurs. When PLL lock does not occur, IC203 output is in a range from 0 to −1V.

• Search Mode

In regard to the search sequence, three steps (cross count search, step search, cueing step) are performed by a combination that depends on the situation.

• Cross count search (Fig. 46)

Computation of the shift direction and number of tracks is based on the present address and subject address to be searched.

When a command is sent to IC101 for tracking open, spindle CLV-H mode entry and the carriage voltage shifts toward a desired direction, carriage feed is by IC105 (carriage driver). Cross pulse output occurs from IC101 CNT (pin 6) every time one track is crossed and is sent to IC201. Next 1/256 frequency divided pulse output occurs from SENS (pin 18) of IC201 which is counted by IC204 (CD controller). When a prescribed track is crossed, reverse carriage drive occurs to apply a brake and to stop the pickup. (Since cross count search feed is with 256 track units, the fraction is shifted by a 128 track jump and multi jump.)

After braking is terminated, tracking close and tracking brake on occur and the spindle motor is changed to the CLV-A mode. Next, after 100ms, tracking brake off and carriage close occur and the present address is read in again. The number of tracks that are sent is computed again based on this address and the subject address. This operation is repeated until a subject address is reached. When a subject address is reached, shift to the final cueing step occurs. (In the last address search, a cueing step is not performed which terminates the search.)

The cross count search mentioned above can only be used when a subject address is known which is restricted to TOC data use and during search to the last address memory location. For a case other than that mentioned above, a step search (mentioned below) is performed.

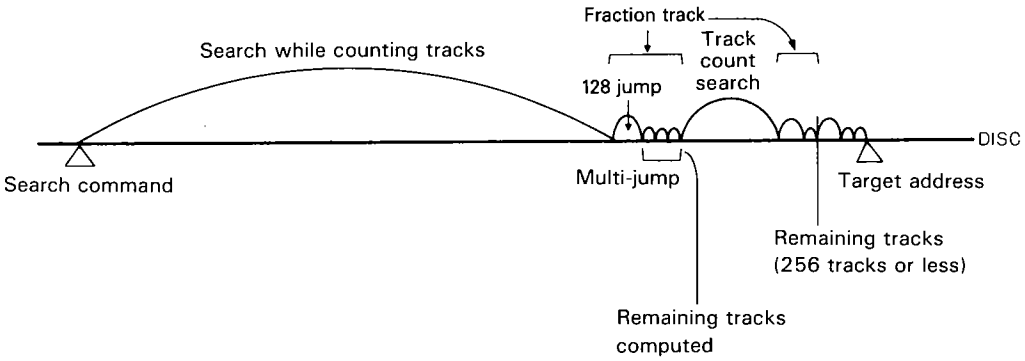


Fig. 46 Cross count search (When the target address is known)

• Step search (Fig. 47)

The basic pickup shift method and brake output method are the same as that for cross count search. Step search is performed when a subject address is unknown. Since the number of tracks up to the subject address cannot be computed, a certain value is set and the target is reached step by step.

First, the number of tracks is set as 768 (256 x 3) to shift the pickup, then the address is checked. The pickup is shifted by 768 tracks each time by repeating this until the target is passed. When the target is passed, the pickup shift is reduced to 1/2 that of the original shift, then the pickup is shifted again by reversing the shift direction. This procedure is repeated by reducing the shift to 1/2 that of the previous shift every time the target is passed and by reversing the shift direction. After this, a shift is made to the cueing step.

• Cueing step

The spindle motor quartz servo is out of sync because the pickup was rapidly shifted in a radial disc direction due to cross count search and step search. Therefore it is necessary to terminate the search operation before the original subject address and shift to the play mode because a quartz servo pull in margin must be obtained and mute release timing must be checked.

Also, in regard to cross count search, since the reliability precision of data recorded on TOC is only 1 second even if pickup shift precision is improved, it is necessary to perform a fine adjustment of the pickup position when it shifts to the play mode. Therefore, when a subject address is reached, a 3-track jump back is performed during play. If INDEX = 0 exists, MUTE is released 1 second before the subject address to shift to play, and if INDEX = 0 does not exist, MUTE is released at the subject address.

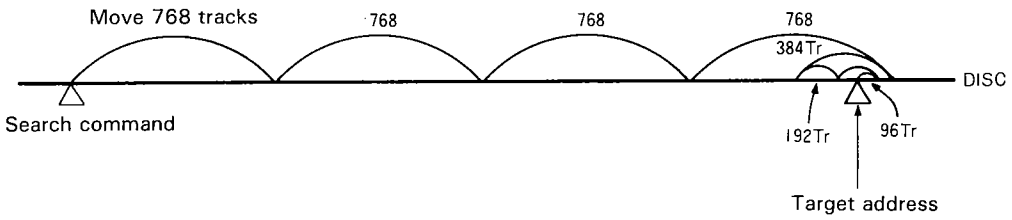


Fig. 47 Step search (When distance to target address is unknown)

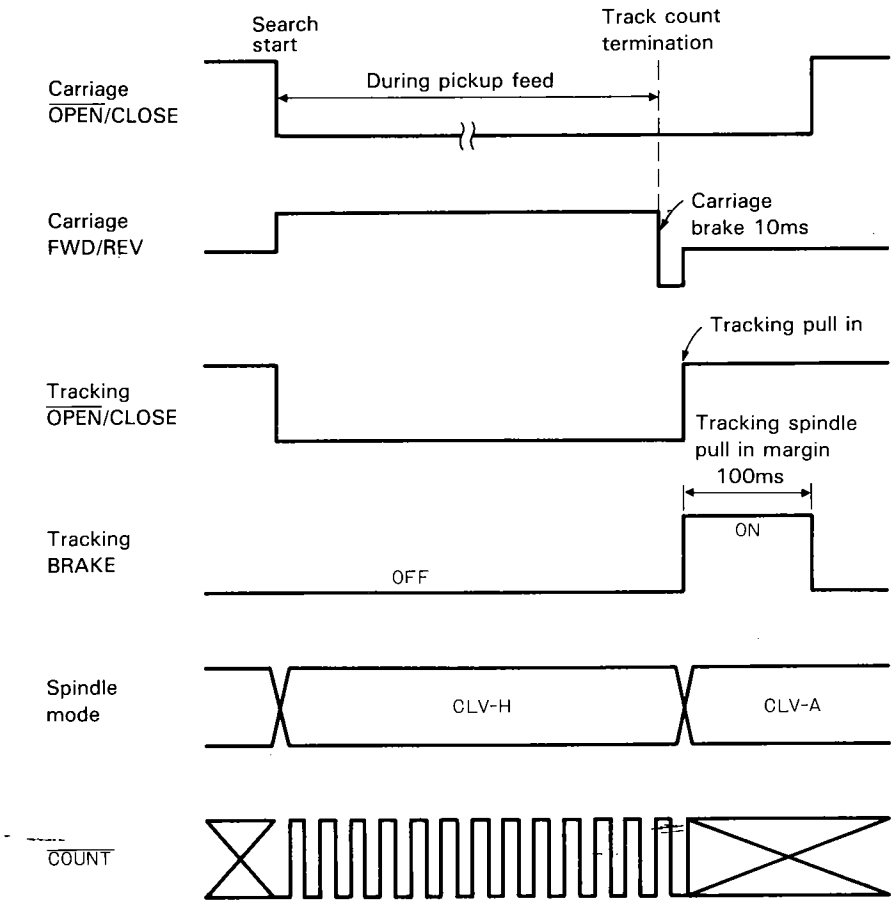


Fig. 48 Track, count sequence

• Protective operation during search

If the pickup jumps to the mirror face of the disc while it is being shifted, erroneous operation might occur. Therefore, it is necessary to provide quick pickup return to the inner circumference area where data is recorded. To accomplish this with IC204, the MIRR signal is checked with 1ms intervals while pickup shift occurs. When MIRR = "H" continues for 15ms, the projection of the pickup onto the mirror face is judged, the pickup shift direction is reversed, and a 100 track cross pulse count occurs to confirm that it has returned to the data face. Next, pickup shift stops, address read in occurs and and search continues. When the count is not terminated after 1 second has passed, it shifts to the STOP mode by judging that the servo system is abnormal, then it shifts to the set up mode again.

Also, when search cannot be performed after 10 seconds have passed due to an abnormality, stop occurs and the disc is ejected.

• Play Mode

The mode used for ordinary music playback. When no abnormality exists, active operation is not performed but monitoring of each part is performed in which the represenative pin status is as follows.

IC204
- Pin 21 AMUTE "L"
- Pin 22 $\overline{\text{XRST}}$ "H"
- Pin 31 MUTG "L"
- Pin 2 $\overline{\text{CBRAKE}}$ "H"

In regard to monitoring, the address of the reproduced location obtained by the FOK signal, GFS signal and the sub code is monitored once every 26ms. Also, carriage servo OPEN/CLOSE and emphasis ON/OFF switching is performed. The FOK signal indicates focus or out of focus to detect an abnormal focus servo system. If the FOK signal is "L" for 100ms, it is judged that the focus servo system is abnormal, then it shifts to the STOP mode.

The GFS signal indicates spindle PLL circuit lock or no lock to detect an abnormal spindle system. IF the GFS signal is "L" for more than 2 seconds, it is judged that the spindle system is abnormal, then it shifts to the STOP mode.

When a sound jump occurs during play reproduction due to a sudden shock, the pickup can be returned to an address that continues to the address just before the sound jump occured so that reproduction can continue and abnormal music reproduction can be performed. In regard to reproduction address monitoring, the reference address to be read out next is internally computed based on the reproduction position address that was read during play. When the address is read out next, the internally generated address is compared to the address that was actually read out. As a result, if a difference of more than 1 second exists 5 times continuously, it is judged that sound jump occurred due to some reason, and the reference address is searched as a target address.

To operate the function for sound jump return by monitoring the address of the reproduction location, it is necessary for the sub-code to be read correctly. Therefore, the sub code is checked during play to see if it can be read or not. When it cannot be read 16 times continuously, a shift is made to the STOP mode.

The purpose of carriage servo OPEN/CLOSE selection is to conserve power. When the pickup lens is near the center, servo open occurs and when it deviates from the center, servo close occurs which moves the carriage to move the lens relatively toward the center against the pickup.

Emphasis ON/OFF selection is performed to change the frequency characteristics of the reproduction system by matching the music emphasis ON/OFF during reproduction which is switched according to sub code data that was read in.

• Address read out by a sub code

In regard to sub code Q-channel demodulation, SCOR, WFCK, SUBQ signal output by the signal processing IC (IC201) is read out by IC204 to perform a CRC check.

SCOR is a synchronous 98 bit 1-frame sub code signal while WFCK is a serial clock for the 98 bit sub code, and SUBQ is sub code Q channel control data. Fig. 49 shows the timing for these signals.

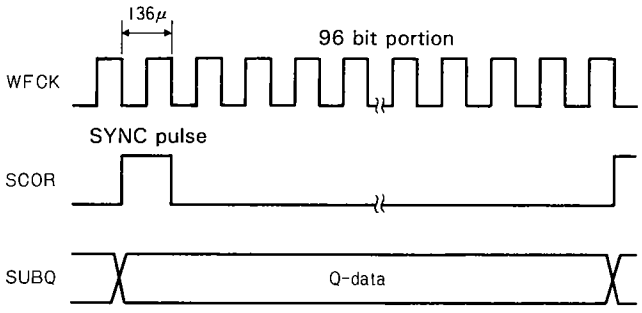


Fig. 49 Sub code read out timing

As evident in this figure, SCOR = H wait occurs and SUBQ data is read in with 96 bits at the WFCK rising edge at the frame sync point, then a CRC check is performed and the sub code is fetched. Since 1 cycle of WFCK is 136 μs, and the sub code consists of 98 bit data including the SCOR sync pattern, about 13.3 ms is necessary for a one time fetch of the sub code.

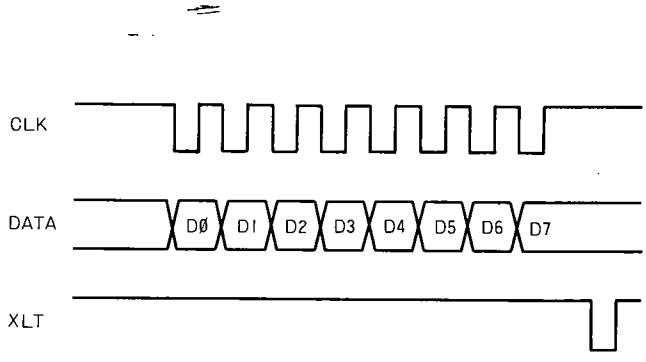


Fig. 50 Serial data output timing

• FF, REV Mode

A fast feed mode. In the FF mode, "sub code read once as a 2—7 track jump" is repeated toward the outer circumference, and in the REV mode, it is repeated toward the inner circumference. In regard to the number of tracks, 7 tracks are provided on the inner circumference and 2 tracks are provided on the extreme outer circumference so that the fast feed speed becomes constant at both the outer and inner circumference. When the FF mode exists at the extreme outer circumference, it shifts to the Play mode by a return to the extreme inner surface even if the REV mode exists. Also, when TR and index changes occur in the FF, REV mode, a shift to the Play mode occurs at this point.

• Protective Operation

1) When a disc is pulled out during loading and the disc switch is closed, the eject operation occurs.
2) When the REAR switch is not closed 6 seconds after loading has started, the eject operation occurs.
3) When a malfunction such as out of focus, spindle mislock, etc., occurs in the servo system while the CD player is operating, and attempts are again made to close the servo after that, ending in failure after 15 attempts, vibration is probably being applied to the set so the CD player should be placed in the release mode.
4) When an operation does not terminate within 7.5 seconds after the eject (loading) operation has started, the loading (eject) operation occurs.
5) When section 4 operation occurs 4 times continuously, the mechanism enters a stop status. If the eject key is pressed during this status, the eject operation starts.
6) When loading is performed by inserting a new disc to enter the set up mode, if servo close has not occurred, focus cannot be performed or tracking cannot be closed, it shifts to the eject operation after finding that the back of the disc is being read. Since disc reload is not accepted in this case, when loading is performed again, it must be performed after removing the disc once.
7) If the status does not change after 10 seconds have passed when a carriage shift is attempted such as when the carriage mechanism does not move or search does not occur, put the CD player in the release mode by a judgement that the carriage mechanism has trouble.
8) When data cannot be exchanged continuously 3 times during communication, put the CD player in the release mode by a judgement that a communication error has occurred.
9) When the temperature detection circuit detects a high temperature and makes IC701 pin 7 (TEMP) low, "HH HHHH" is displayed in a high temperature detection protective operation which turns the DC/DC converter (IC601) off to enter a release status.

• Tuner Control

This machine is connected between the system controller (IC701: PD4096B) and the hideaway tuner controller for the transfer of 8-bit serial data.

When ACC is on, the system controller checks whether or not the tuner is connected and, if it is connected, communicates with the tuner. When not connected, it does not communicate. When communicating, the system controller and tuner controller become talkers alternately using the interactive method. Detection of abnormal status in the communications and initialization are performed by the system controller.

When the tuner is connected, and tuner communication starts when ACC is on, the TUNER terminal of the system controller becomes "H." When the tuner is not connected, this terminal becomes "L."

○ Serial Data Communication

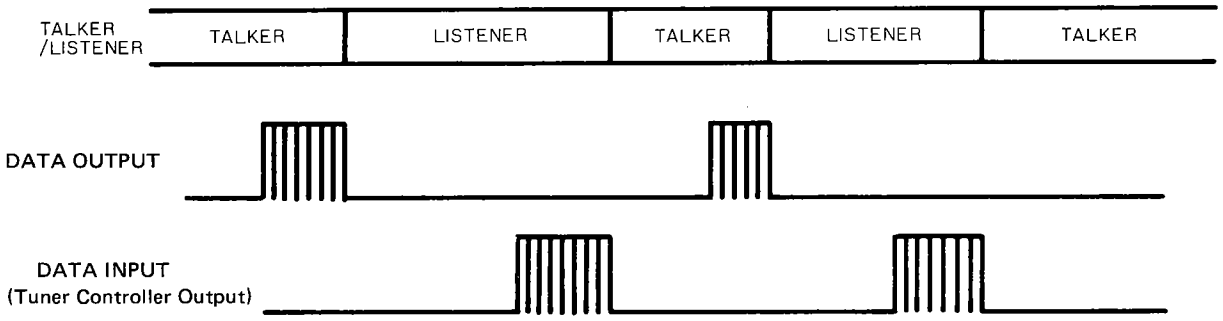


Fig. 51 Communication timing chart of system controller

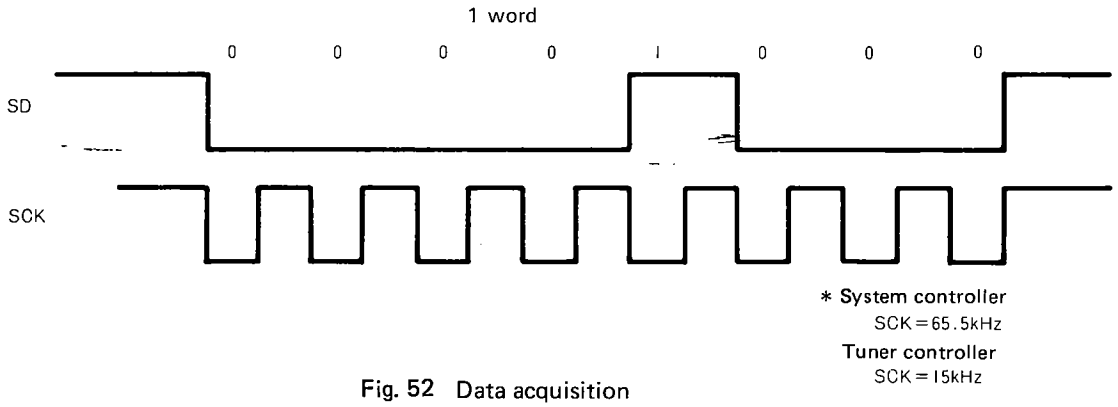
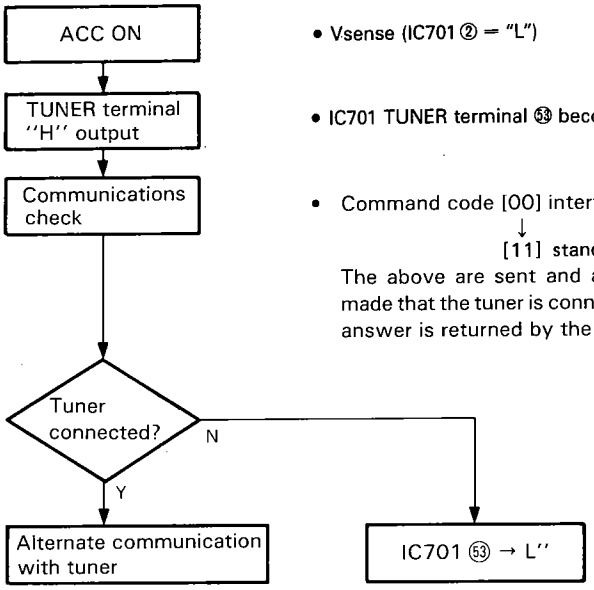


Fig. 52 Data acquisition

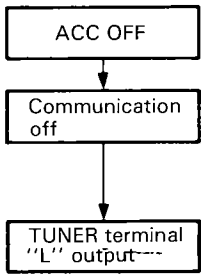
- **Data communication starts → Ends**

1) Data communication starts



- Vsense (IC701 ② = "L")
- IC701 TUNER terminal ⑤③ becomes "H"
- Command code [00] interface clear
  ↓
  [11] standby
  The above are sent and a decision made that the tuner is connected if an answer is returned by the tuner.

2) Data communication end



- Vsense (IC701 ② = "H")
- Command code [11] standby is output, and communications are turned off if a reply is received.
- IC701 ⑤③ → "L"

Command Codes

No.	Command Name	Data	No.	Command Name	Data
1	IFC	00(H)	12	BSM	19(H)
2	No key	01(H)	13	TEST	29(H)
3	Cancellation the standby	11(H)	14	SDK	39(H)
			15	0	59(H)
4	UP	41(H)	16	1	69(H)
5	DOWN	51(H)	17	2	79(H)
6	TUNER	71(H)	18	3	89(H)
7	BAND/REL	81(H)	19	4	99(H)
8	P.SCAN	B1(H)	20	5	A9(H)
9	MONO	D1(H)	21	Tuner shift	B9(H)
10	MPX	E1(H)	22	SEEK	C9(H)
11	LOC.S	F1(H)			

• Electronic Volume

○ Function of terminals (TC9177P)

Pin No.	Pin Name	I/O	Function and operation
2, 3 19, 18	L-Loudness 1, 2 R-Loudness 1, 2	Output	Loudness terminal When loudness data is input, this terminal will be −20 dB tap terminal. Loudness is controlled by the high-low boost circuit connected to this terminal.
4 17	L-OUT1 R-OUT1	Output	10dB step attenuator output Signal with IN is attenuated from 0 to 70 dB in 8 steps at the 10 dB step.
5 16	L-IN1 R-IN1	Input	10 dB attenuator input
6, 15	A-GND		AC ground terminal
7 14	L-IN2 R-IN2	Input	2 dB attenuator input
8 13	L-OUT2 R-OUT2	Output	2 dB attenuator output Signal with IN is attenuated from 0 to 8 dB in 5 steps at the 2 dB step.
11	DATA	Input	Data input of attenuation amount and chnnel selection Consisting of 20 bits, it is input by the CK signal.
10	CK	Input	Clock input Clock input to fetch data of the DATA terminal.
12	ST	Input	Strobe input Attenuation amount and channel selection data fetched from the DATA and CK terminal can be latched by having this terminal set to "H" level. If "H" level is not applied to this terminal, the previous data will be in effect.
20	VDD		(+) power applied terminal
9	GND		Ground terminal
1	VSS		(−) power applied terminal

See page 82 for TC9177P block diagram.

The TC9177P is a built-in electronic volume IC for loudness ON/OFF. The attenuation volume data output by the system controller (IC3), is input to the DATA, CK, and ST terminals. The data consists of 20 bits. It consists of the following.

Bit	Description
1, 2	Selection of L channel, R channel
3	Bit for loudness ON/OFF. "1" is ON, and "0" is OFF.
4 – 8	Setting of 2 dB step attenuator
9 – 16	Setting of 10 dB step attenuator
17 – 20	Chip select bit "0001" is select mode, for values other than this, there is no operation.

There will be infinite attenuation volume for −78 dB data. Therefore, step up from infinity to 1 will be −76 dB. Changes of the fetched data will all be synchronized with ST signal transition.

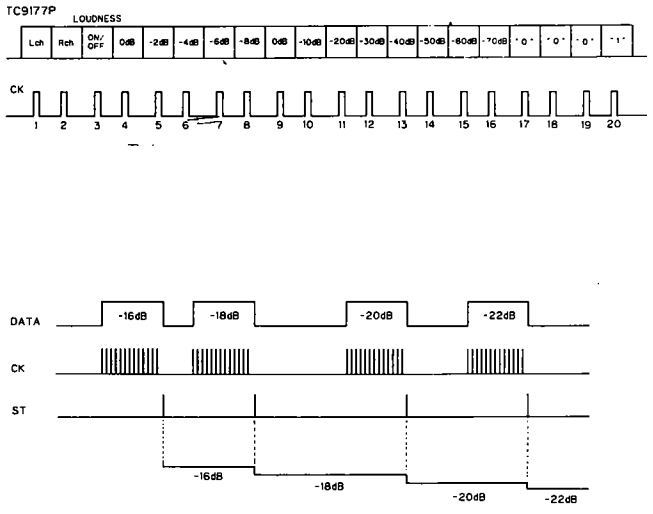


Fig. 53

The attenuator section consists of a diffused resistor array and an analog switch. Attenuator 1 can attenuate 0 to 70 dB at 10 dB step, and attenuator 2 can attenuate 0 to 8 dB at 2 dB step, for a total attenuation of 0 to 76 dB at 2 dB step.

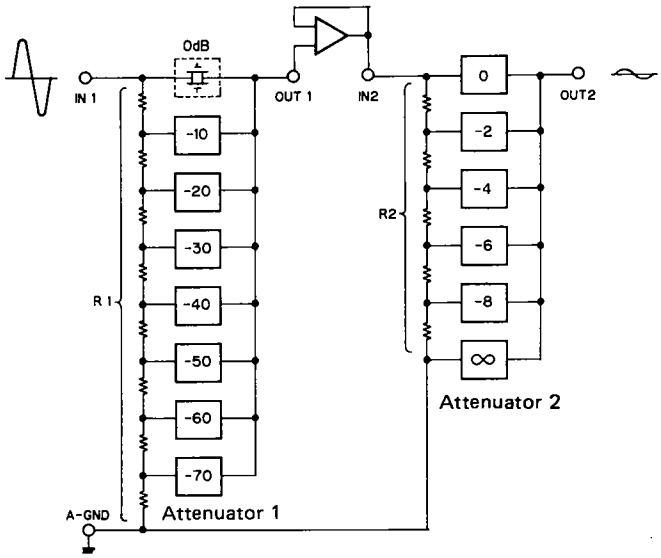


Fig. 54

○ **Loudness function**

The TC9177P has tap for loudness. When bit 3 of the data is made to "1, " loudness switch LS1 will turn ON, LS2 will turn OFF, and the −20 dB tap is output to loudness-1 and loudness-2 terminals.

With the loudness-1 and loudness-2 terminals having a high-low band boost circuit, loudness can be controlled below −20 dB.

When bit 3 of the data is made to "0, ", loudness switch LS1 will go OFF, and LS2 will go ON. Loudness will go OFF without high-low band boost circuit operation.

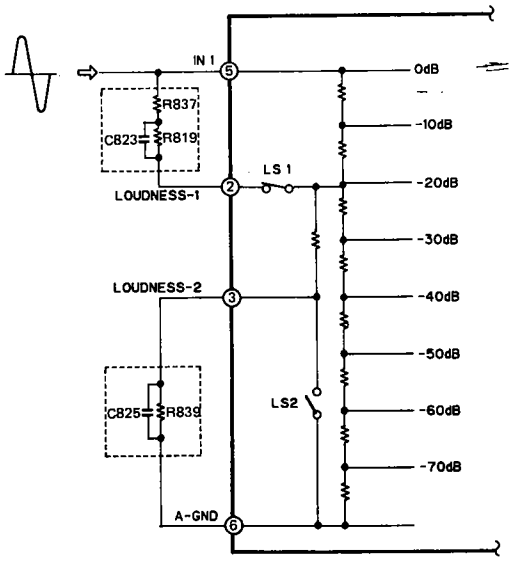
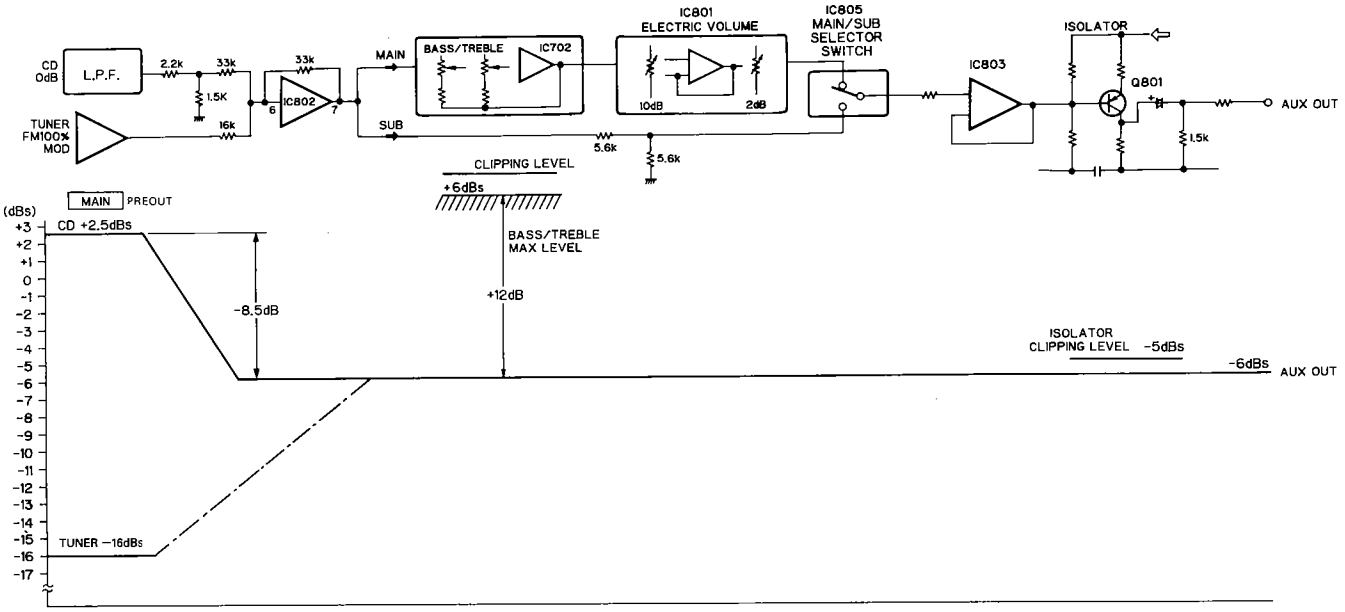


Fig. 55

• Level Diagram



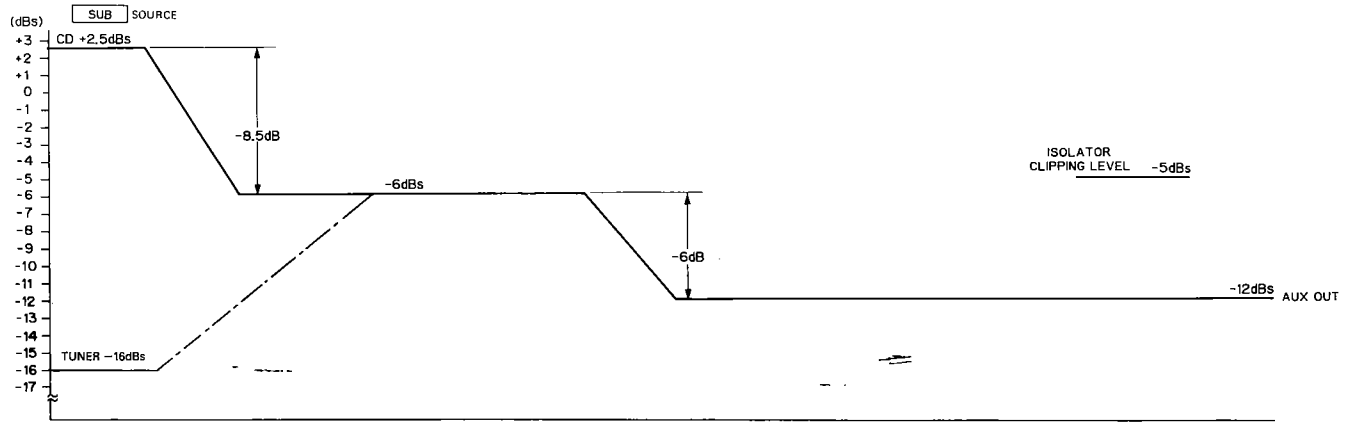


Fig. 56

2.2 TUNER SECTION

Block Diagram

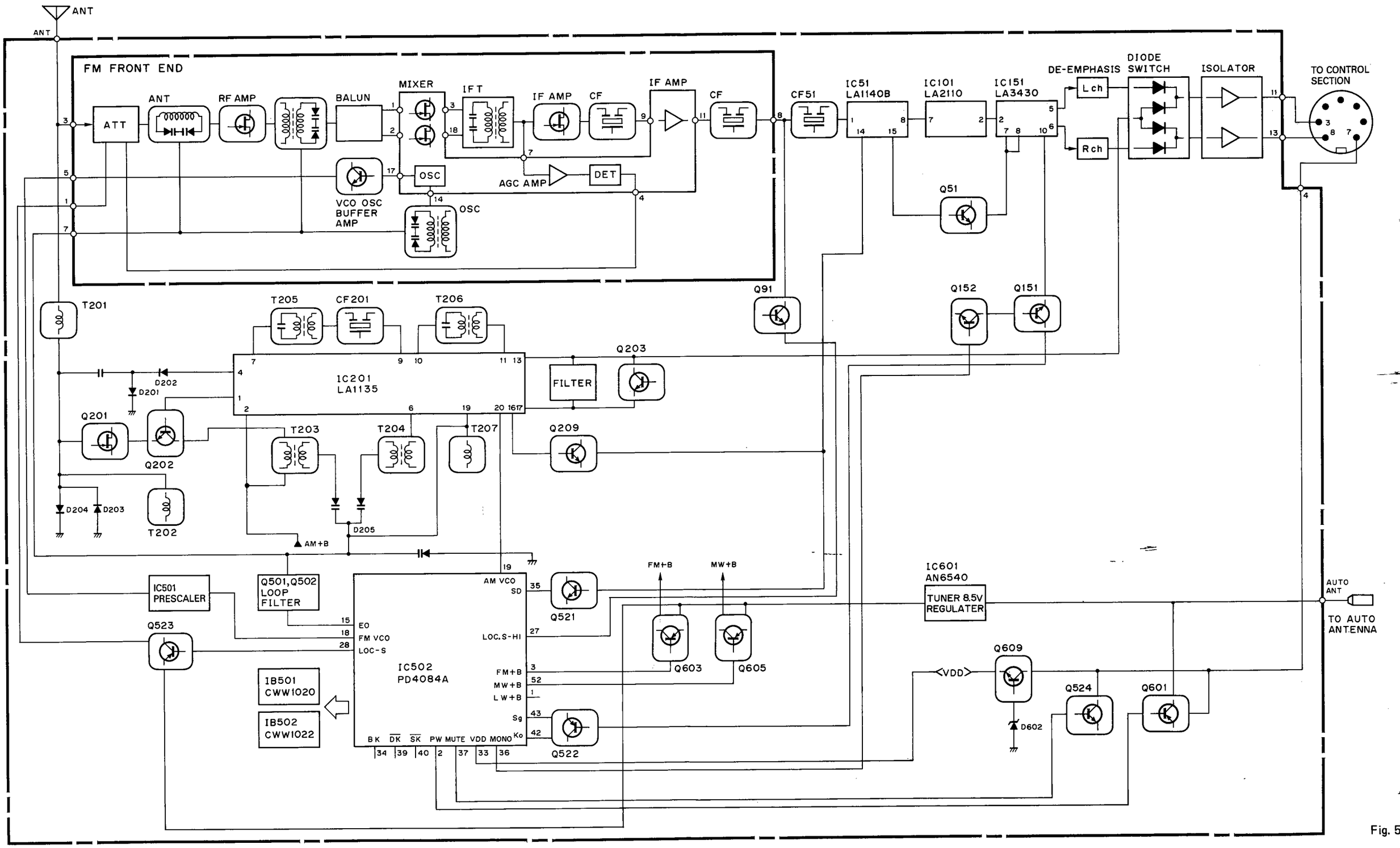


Fig. 57

-77

Tuner

FRONT END

front end employs a low noise dynamic range wide ET and performs high frequency amplification. An FM d IC (PA4009) with built-in double balance FET mix- oscillator, IF amp and AGC circuit, along with a twin diode used in the tuning circuit provide widely im- strong input characteristics.

MP DETECTION CIRCUIT

signal (10.7 MHz) output from the FM front end is a ceramic filter (CF51) to IF amp detection IC (IC51: 0) pin 1.

seek operations, 2 ~ 3 V is output IC51 pin 14 when al is present, so Q521 is ON. When Q521 is ON, con- C502) pin 35 becomes 0 V and seek operations con- When a signal is input, IC51 pin 14 becomes 0 V, pin 35 becomes "H", and seek operations are d.

age corresponding to the input signal level from IC51 s output. This voltage is amplified by Q51, and ap- IC151 (LA3430) pin 7 (stereo demodulation out- cut control terminal) and pin 8 (separation terminal). tage from IC51 pin 15 is also applied to IC502 pin t stations memory input signal level detection l).

CIRCUIT

LA2110) is the FM noise canceler IC.

MPX CIRCUIT

LA3430) is the non-adjustable type PLL FM multiplex demodulator IC. With input of a stereo composite sig- ccordance with a 19 kHz pilot signal, the IC-internal cks at 19 kHz and the L/R channel are isolated by Hz switching signal.

Tuner

5 (IC201) is used as the AM tuner IC. The signal in- m the antenna passes through FM/AM separation coil T201 and passes through the RF amp (Q201). he signal is selected and amplified by coil T203 and nd the varicap diode (D205 –1, –2) and condensers nd C210 double tuned circuit. The signal is then in- he IC internal mixer input terminal pin 6. The local nd antenna signal are frequency converted by the nd output to output terminal pin 7. They are then pin 9 via IFT (T205) and the ceramic filter (CF201). the IF amp input terminal, and the signal is amplified IC-internal IF amp and output from pin 10. This input at the detector pin 11 via the IFT (T206). he detected AF signal is output from pin 13, and the signal switching diode switching circuit.

● Tuner control IC (IC502. PD4084)

When connected to control section, data communication is performed with the system control IC. Key input and display data output is performed via this data communication.

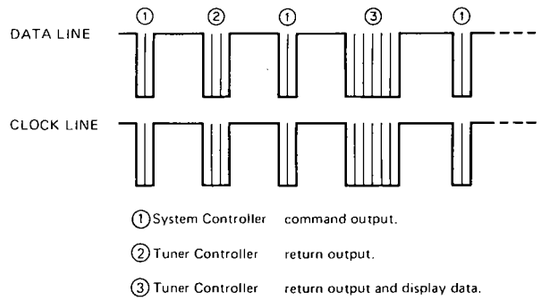


Fig. 58

1. DATA COMMUNICATION

As illustrated in Fig. 58, data output is performed with the system controller outputting each command. The return data attached to these commands are output to the data line. When this happens, the system controller outputs commands again. Data interchange is always performed in the order outlined above when power is switched ON. The system controller outputs a command to the tuner controller to enter the low power consumption modes when ACC power is switched OFF, and data communications are terminated. After this, the system controller CE terminal becomes "L" level. At this time, IC502 pins 50 ∿ 52 and 1 ∿ 3 become "L" level, other ports become high impedance, and the low power consumption mode is entered.
Display data is output after the return data.
The serial data communications shift clock outputs data with 15 kHz for IC502 and 65.5 kHz for the system controller. The data output terminal is pin 30, the data input terminal is pin 32, and clock terminal pin 31 is the input/output terminal.

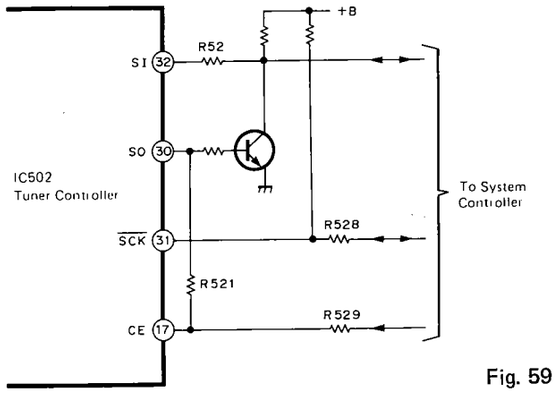


Fig. 59

2. MONO CONTROL OUTPUT (PIN 36)

When an FM signal is received, pin 36 is "H" when forced monaural "L" when AUTO.

3. TUNER ON

Pin 2 becomes "H" when a command is received from the system controller. At the same time, pin 3 become "H" for FM, pin 52 becomes "H" for AM, and pin 1 becomes "H" for LW. At this time, a divide ratio is set to the internal PLL, and pin 37 becomes "L" after approximately 650 ms. For FM, pin 36 becomes either "L" or "H" depending upon the AUTO/MONO status.

4. TUNER OFF

Pin 37 becomes "H", mute is applied, and pins 1, 2, 3 and 52 become "L".

5. BAND SWITCHING

Pin 37 becomes "H", mute is applied, and pins 1, 3, and 52 are switched. Next the PLL divide ratio is set, and pin 37 becomes "L" after approximately 650 ms. For FM, pin 36 becomes either "L" or "H" depending upon the AUTO/MONO status.

6. MANUAL TUNING

Pin 37 becomes "H", mute is applied, and a divide ratio is set to PLL. High speed operation begins when the button is pressed for more than approximately 0.5 seconds.

7. SEEK OPERATION

Pin 37 becomes "H" and mute is applied. Pins 27 and 28 respectively become "L" and "H" for DX, "L" and "L" for LOC. S, "H" and "L" for LOC. S-HI. Next, the divide ratio is sequentially set to PLL, and seek is terminated where pin 35 becomes H. Pin 37 becomes "L" after pin 27 becomes "L" and pin 28 becomes "H".

8. BEST STATION MEMORY

Pin 37 becomes "H", mute is applied, pin 27 becomes "H" and pin 28 becomes "L". Next, the divide ratio is set to PLL sequentially from the lower extreme of the band. When pin 35 becomes "H", the voltage impressed at pin 9 is read and stored in memory. The stored voltage of pin 9 is arranges from the lower end to the upper end of the band. At this time, pins 27 and 28 are "L" "L" respectively when the broadcasts for which pin 35 becomes "H" number 6 or less. The operation is repeated in the same way from the lower extreme of the band. When there are still 6 broadcasts or less, pins 27 and 28 are "L" "H", the operation is performed again, memory zero is called, and the operation is terminated. When there are 6 broadcasts or more at the upper limit of the band, memory 0 is immediately called and the operation is terminated.

9. PRESET SCAN OPERATION

Pin 37 becomes "H", and mute is applied. Next, if the present memory call is being performed and the next memory (if 6, next is 0) does not match, 0 memory call is performed and pin 37 becomes "L". The same operation is performed when approximately 8 seconds is approached.

● Frequency Synthesizer Section (FM) (Fig. 60)

During FM reception, IC502 controls the prescaler divide ratio to 1/16 and 1/17 to form a swallow counter.
The FM VCO is frequency-divided to a ratio of 1/16 or 1/17 by prescaler IC501.
An output of 4.5 MHz (X521) which becomes a clock pulse for IC502 is divided into 1/180 by the reference frequency divider to produce 25 kHz (all this is processed inside IC502). Since the reception frequency is 87.5 ~ 108 MHz, and the intermediate frequency (IF) is 10.7 MHz, the oscillator frequency of VCO will be 98.2 ~ 118.7 MHz. As the overall frequency division ratio is 3928 ~ 4748, the output of the programmable counter inside IC502 will be 25 kHz. This output is compared in phase with a reference frequency of 25 kHz by the phase detector in IC 502, and is output to pin 15 of IC502.
The loop filter consisting of Q501 and Q502 converts the signal into a DC voltage signal which in turn controls the tuning circuit in the front end section as a tuning voltage.

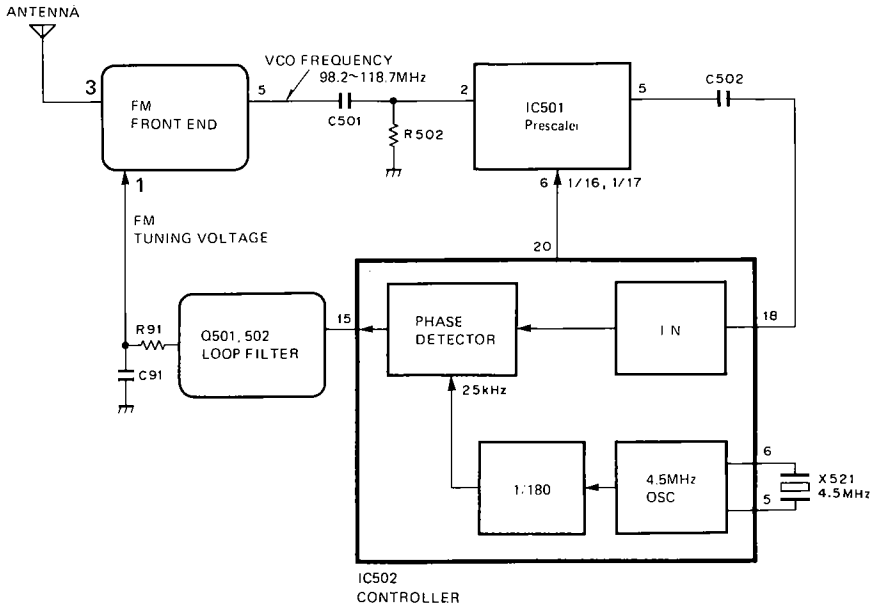


Fig. 60

• Frequency Synthesizer Section (AM)

The MW section employes a direct frequency dividing method. So that the reception frequency is incremented in 10 kHz, the frequency of the phase comparator is 10 kHz. This is produced by dividing 4.5 MHz (the output of X521), a clock frequency of IC502, to 1/450. Since the reception frequency range is 530 ∿ 1,620 kHz and the intermediate frequency is selected at 450 kHz, the frequency of the local oscillator (VCO) will be 980 ∿ 2,070 kHz.

This output is output from pin 20 of IC201 and enters pin 19 of IC502.

If the frequency dividing ratio of the programmable counter in IC502 is set to 98 ∿ 207, the output will be 10 kHz. This frequency is compared in phase with a reference frequency of 10 kHz by the phase comparator and is output from pin 15 of IC502.

The signal is converted into a DC voltage signal by the loop filter consisting of Q501 and Q502, which in turn controls the tuning circuit as a tuning voltage.

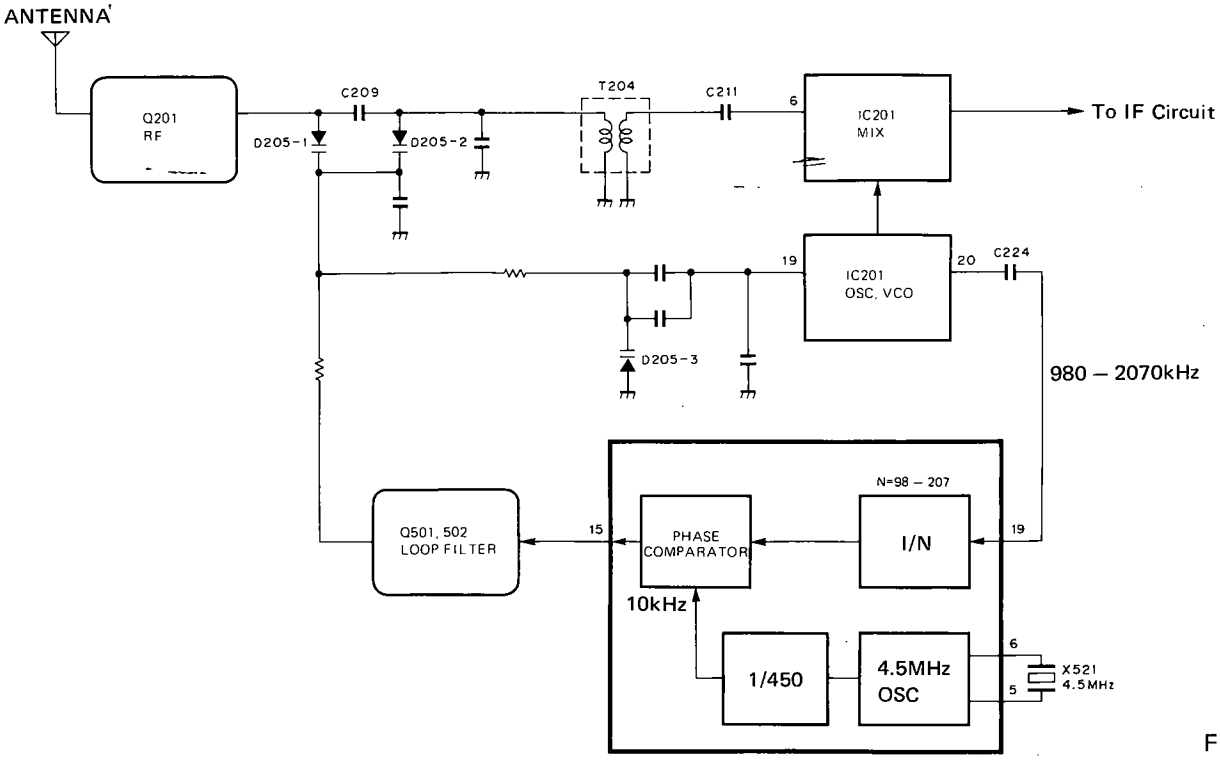


Fig. 61

• Seek Circuit

When the seek button (+ or –) is pressed, IC 502 changes the divide ratio and the seek mode is entered. With each step change in the divide ratio, the status of IC502 pin 35 is detected and seek is terminated when pin 35 becomes "H". A mute signal is output from pin 37 during seek operations, and the mute circuit is in operation. IC 51 pin 14 mute driver terminal is used for FM seek stop. When the receive mode is entered, pin 14 changes from "H" to "L" in order to cancel the mute, Q521 switches OFF, IC502 pin 35 becomes "H", and seek operations are stopped. There is DX, LOC. S and LOC. S-HI stop sensitivity. With LOC. S, an attenuator operates inside the FM front end. There are three settings for LOC. S-HI: the attenuator in the front end and C95 attenuate front end output. A switch can be used to sequentially switch modes. During seek operations, IC502 pin 28 or 27 become "L" or "H", and stop sensitivity is controlled by Q91 or Q523 switching ON. AM seek stop used IC201 pin 16 S meter output. When the receive mode is entered, IC201 pin 16 becomes "H", Q521 is switched OFF by Q209 switching ON, IC502 pin 35 becomes "H", and seek is stopped. There are DX, LOC.S and LOC.S-HI stop sensitivity. For LOC.S, IC502 pin 28 becomes "L" which switches Q523 ON. D201 and D202 also switch ON, the signal from the antenna is attenuated by C202, and the rise of IC201 pin 16 is delayed. For LOC.S-HI, the attenuation by C202, and IC502 pin 27 becomes "H" which switches Q210 ON, CF201 input side is resistor damped by R227 which attenuates the IF signal, and the rise of IC201 pin 16 is delayed.

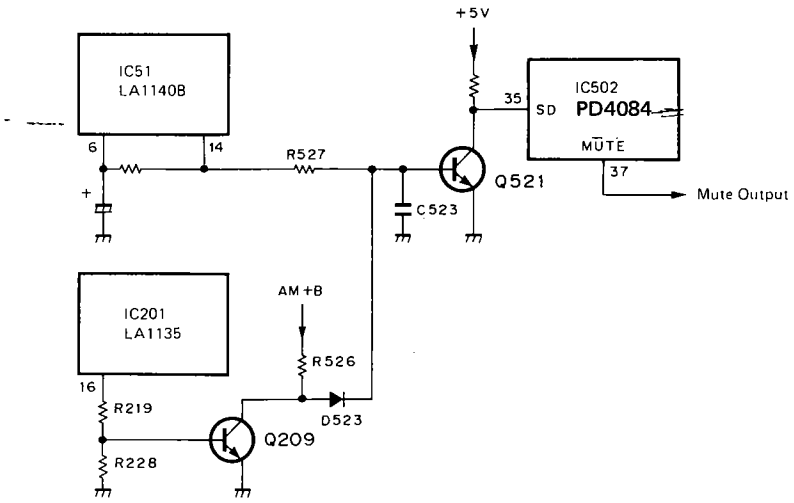


Fig. 62 SEEK STOP PERIPHERAL CIRCUIT

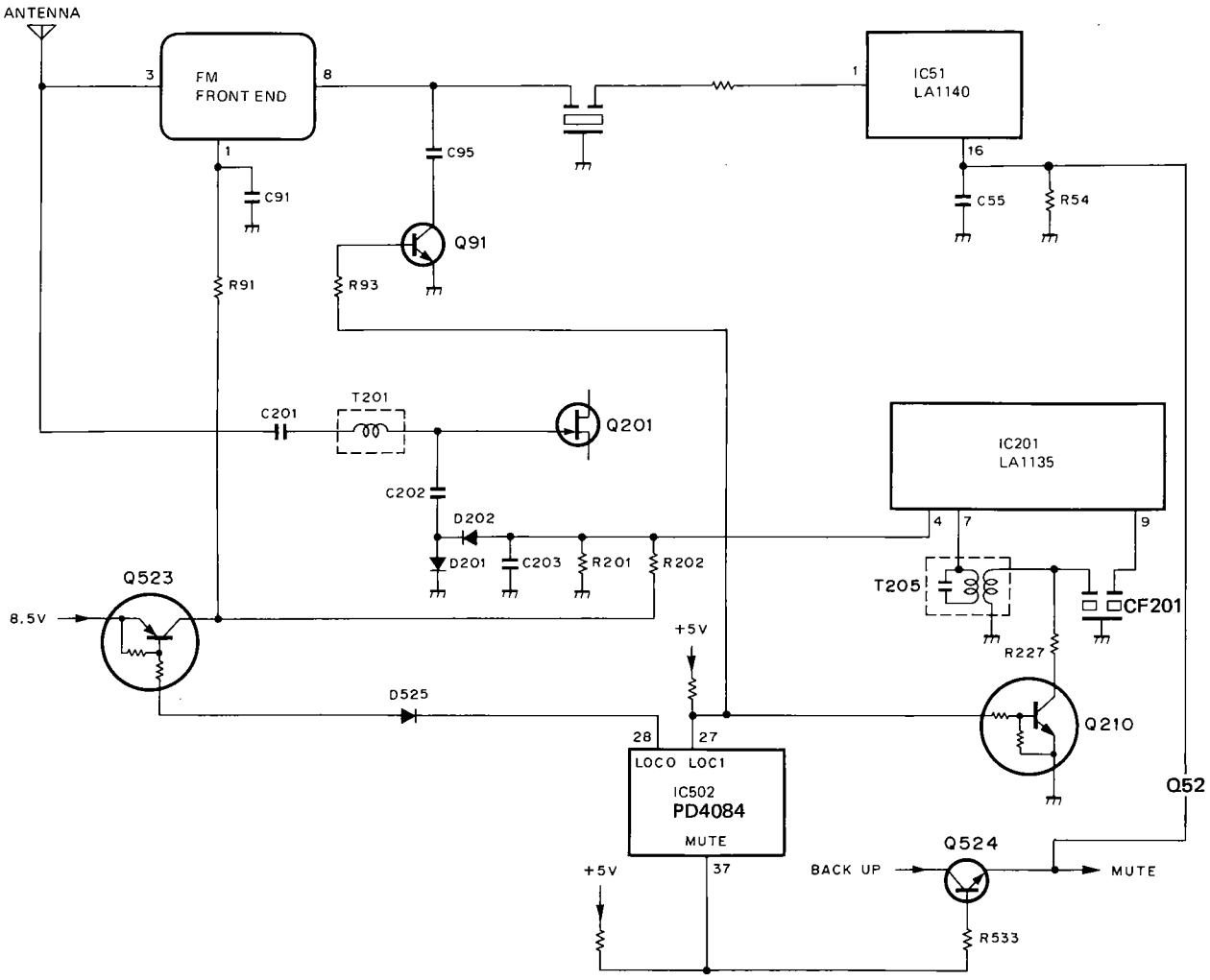
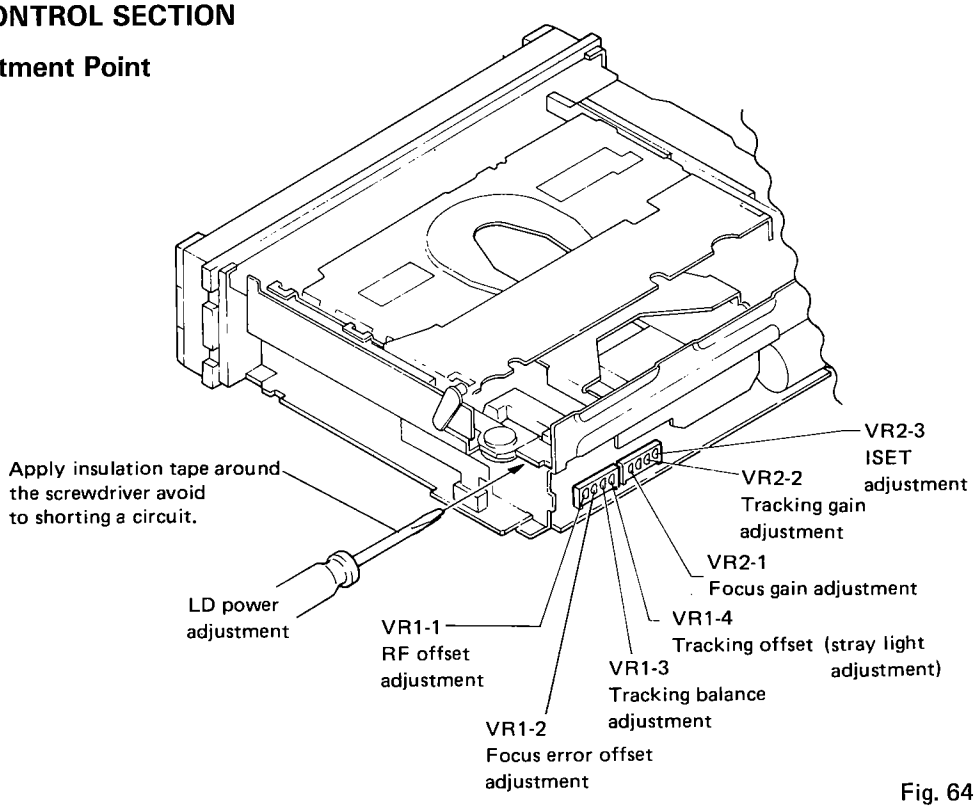


Fig. 63 SEEK SENSITIVITY PERIPHERAL CIRCUIT

13. ADJUSTMENT

13.1 CONTROL SECTION

- **Adjustment Point**



See Fig. 81 for tangential adjustment and grating adjustment points.
See Fig. 80 for clock adjustment point.

Fig. 64

- **Main Assy (Test Point)**

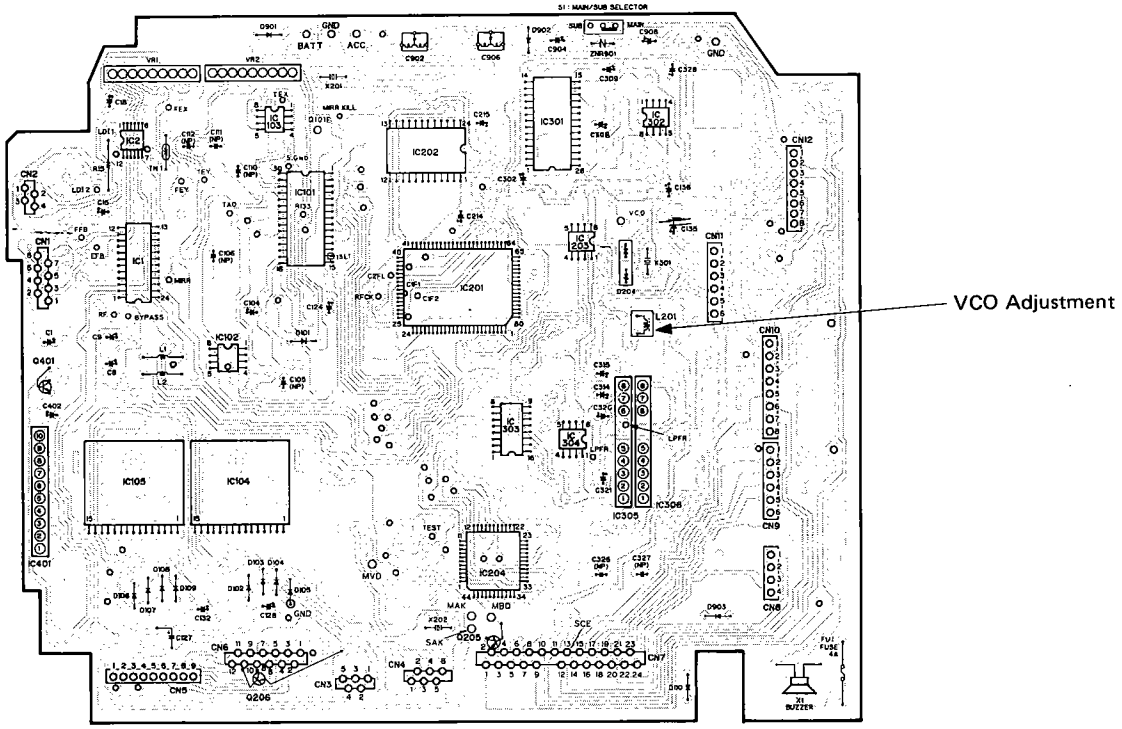


Fig. 65

• Test Mode

Note: Disconnect the main amp when in the test mode.

1) Starting

Starts by simultaneously pressing [TR+] [TR−] [Clear] to light all displays.

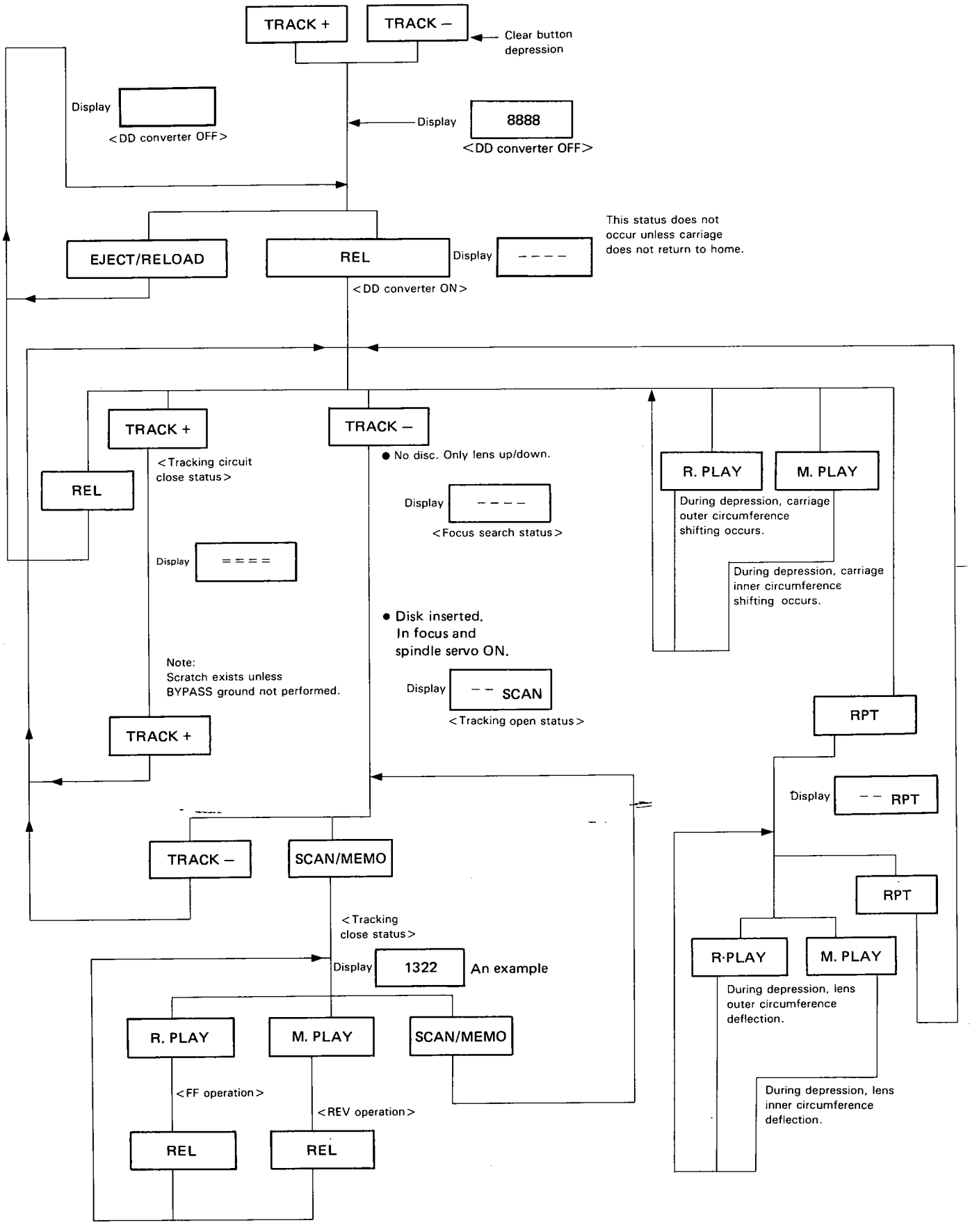
2) Functions

Button name	Operation
EJECT/RELOAD	Disc load, eject.
REL	DD converter ON, OFF. However, during continuous jump, play occurs with jump release.
R. PLAY M. PLAY	* In case DD converter is ON, Focus tracking OFF. • Repeat display OFF Carriage FWD/REV • Repeat display ON Tracking actuator FWD/REV *In case DD converter is ON, Focus tracking ON. • FWD/REV continuous jump
TRACK+	Carriage, tracking loop switch individual ON-OFF. (IC101 CX20108 system adjustment function)
TRACK−	Focus search ON-OFF
SCAN/MEMO	Tracking servo ON-OFF
RPT	* In case DD converter is OFF All display segments ON-OFF. * In case DD converter is ON. REPEAT display ON-OFF (FWD/REV function selection).

3) Display

Display	Status
	Indicates DD converter OFF. However, all lighting enabled by REPEAT.
– – – – – –	Indicates DD converter ON.
– – – – – – SCN	Indicates DD converter ON. Focus closed.
8.12345	Indicates tracking close.
– – – – – – – – – – – –	Indicates tracking close, non-drive.

4) Flow Chart


TRACK +
TRACK –
Clear button depression
Display
<DD converter OFF>
Display
8888
<DD converter OFF>
EJECT/RELOAD
REL
Display
– – – –
This status does not occur unless carriage does not return to home.
<DD converter ON>
TRACK +
TRACK –
<Tracking circuit close status>
REL
● No disc. Only lens up/down.
Display
– – – –
<Focus search status>
Display
= = = =
R. PLAY
M. PLAY
During depression, carriage outer circumference shifting occurs.
During depression, carriage inner circumference shifting occurs.
● Disk inserted. In focus and spindle servo ON.
Display
– – SCAN
<Tracking open status>
Note:
Scratch exists unless BYPASS ground not performed.
TRACK +
RPT
Display
– – RPT
TRACK –
SCAN/MEMO
RPT
<Tracking close status>
Display
1322
An example
R·PLAY
M. PLAY
During depression, lens outer circumference deflection.
R. PLAY
M. PLAY
SCAN/MEMO
During depression, lens inner circumference deflection.
<FF operation>
<REV operation>
REL
REL

Step No.	Oscilloscope range X	Oscilloscope range Y	Test point	Adjustment point	Confirmation /adjustment specification	Adjustment procedure
1						**Measuring instrument and jig used** • Two-channel oscilloscope with delayed sweep. • Optical power meter (LEADER: LPM8000) • Test disc (SONY TEST CD TYPE 4 YEDS-18) (TYPE 3 YEDS-7 is usable.) • Two needle voltmeter • DC power supply (More than 5A) • Gain adjustment filter • CR oscillator • Extension connector • Frequency Counter **Precautions** • Oscilloscope used must have a 10:1 probe as a rule. • Waveform photos are taken by using a 100 MHz oscilloscope. • When the laser is on, do not look into the object lens. **Preparation** • Remove the case top and chassis. **Test mode entry** Press the clear button while simultaneously pressing [TRACK +] [TRACK −] (or turn ACC, BACK UP on instead of pressing the clear button). [888888] is displayed. **Turn the DD converter on.** Press the [REL] key. [− − − − − −] is displayed. **Actuator, motor operation confirmation** • Carriage motor Confirm that the pickup shifts toward the outer circumference by pressing the [R. PLAY] key and toward the inner circumference by pressing the [M. PLAY] key. Then shift it to the extreme outer circumference. • **Focus actuator** When the [TRACK −] key is pressed, it is shifted downward first. After this, it shifts smoothly up and down about 1mm. When [TRACK −] is pressed again, lens up and down movement stops and the DD converter returns to an ON status. [− − − − − −] is displayed. • **Tracking actuator** Press the [RPT] key. [− − − − − − RPT] is displayed.

Step No.	Oscilloscope range X	Oscilloscope range Y	Test point	Adjustment point	Confirmation /adjustment specification	Adjustment procedure
						Confirm that the lens shifts toward the outer circumference when the [R. PLAY] key is pressed and toward the inner circumference when the [M. PLAY] key is pressed. Lens shift is about 0.2mm. Press the [RPT] key to return the DD converter to an ON status. [– – – – – –] is displayed.
2				VR in the pickup.	250±20μW	**LD power confirmation and adjustment** • Place a power sensor on the pickup object lens. • If it is outside the proper range, quickly adjust VR in the pickup so that it is within the proper range. (Increased by clockwise movement). • Turn it slow so that the meter index swing is not excessive.
3			RF	VRI-I (RF)	0.1±0.1V	**RF offset adjustment** • DD converter - ON. Perform this without a disc.
4			EFB FFB	VRI-3 (T.B)	0±0.5dB	**Tracking balance rough adjustment** • Insert a disc and set it by pressing the [EJECT /RELOAD] key twice. • Turn the DD converter ON by pressing the [REL] key. • Obtain focus by pressing the [TRACK-] key to enter a tracking open status. • Adjust the AC component level of sub beam output EFB, FFB by using a two needle voltmeter so that the level difference is a standard value.
5			TAO	VRI-4 (T.O)	0±50mV	**Stray light adjustment** • After ejecting a disc by pressing the [EJECT /RELOAD] key, remove the disc. • Provide the DD converter with an ON status by pressing the [REL] key. • Provide the non-drive tracking circuit with a close status. (While the tracking loop has an ON status.) → MIRR KILL: "L" - - - Grounded to S. GND (Tracking actuator, carriage - PWM non-drive) → BYPASS: "L" - - - - Grounded to S. GND If this is not performed, the actuator might be damaged by fire. Press the [TRACK+] key. * MIRR KILL: "L" can be preset. BYPASS: "L" shall occur after DD converter ON. [= = = = = =] is displayed. • Adjust it so that it is within the range. • After adjustment, return the DD converter to an ON status by pressing the [TRACK+] key. • BYPASS: "L" release.

Step No.	Oscilloscope range X	Oscilloscope range Y	Test point	Adjustment point	Confirmation /adjustment specification	Adjustment procedure
6	50mV/div	200ms/div	TAO	VR1-3 (T.B)	0±500mV	**Tracking balance fine adjustment** • Insert a disc and set it by pressing the [EJECT /RELOAD] key twice. • Press the [REL] key to provide a DD converter ON status. • Enter a non-drive tracking close status. After entering a tracking open status by pressing the [TRACK –] key, BYPASS entry: "L", MIRR KILL: "L", then press the [SCAN] key. • Adjust it so that the average value of the TAO 1 Hz low pass filter output is zero for several seconds. • When you are not certain, repeat this by inserting a disc again. • Enter a tracking open status by pressing the [SCAN] key, and BYPASS: "L" release and MIRR KILL: "L" release. Then return the DD converter to an ON status by pressing the [TRACK –] key. • After the above procedure has been terminated, confirm the stray light adjustment again. If it is within 50mV, it is OK. If it is more than 50mV, perform the stray light adjustment and tracking balance fine adjustment again.
7	50mV/div	0.5μs/div	RF			**Tangential skew confirmation** • Enter a normal mode. (Repress the clear button or ACC, BACK UP.) • Set the disc and play back the TNO 7 (TYPE3: TNO 23). • Confirm that the RF waveform 11T peak and through are even. (Fig. 70 – 72) • If there is an adjustment deviation, perform tangential skew adjustment (to be explained later).

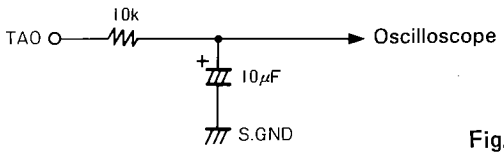
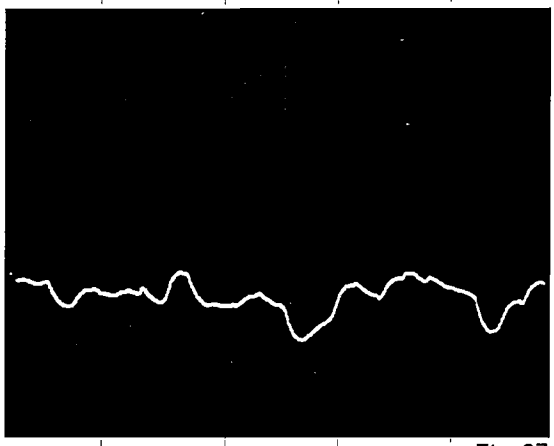
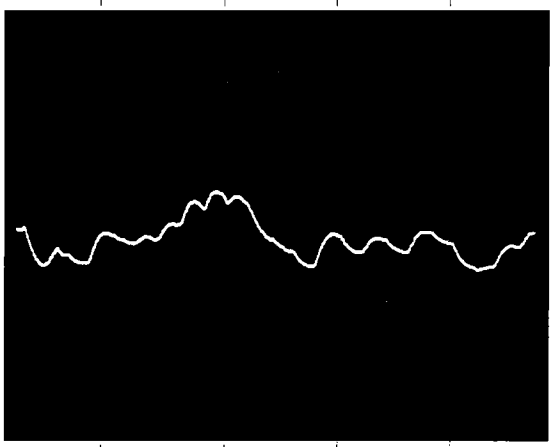


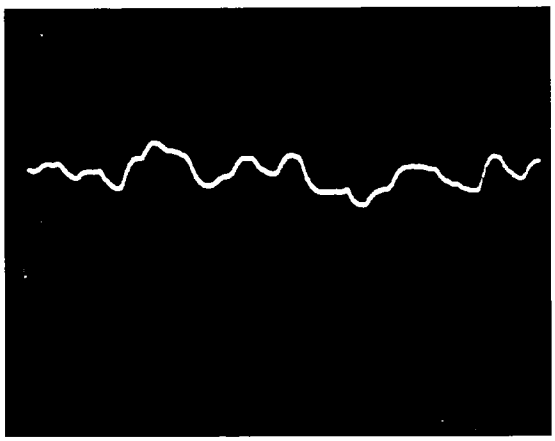
Fig. 66



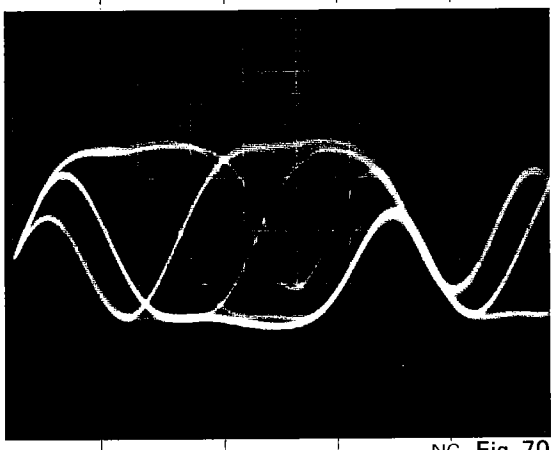
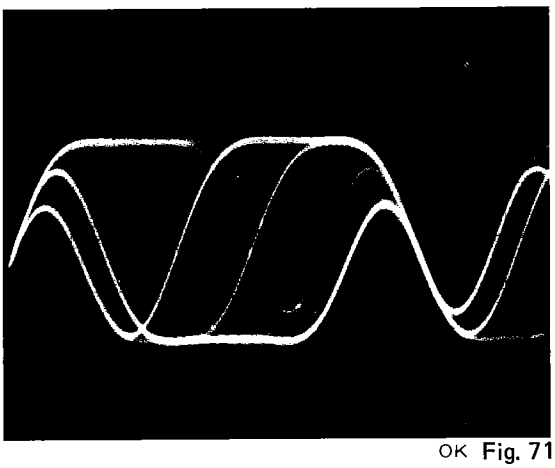
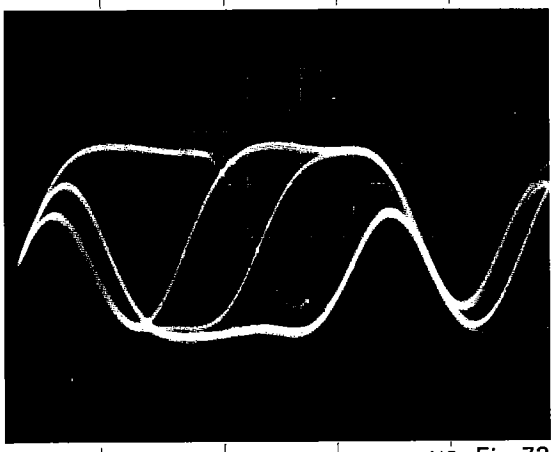
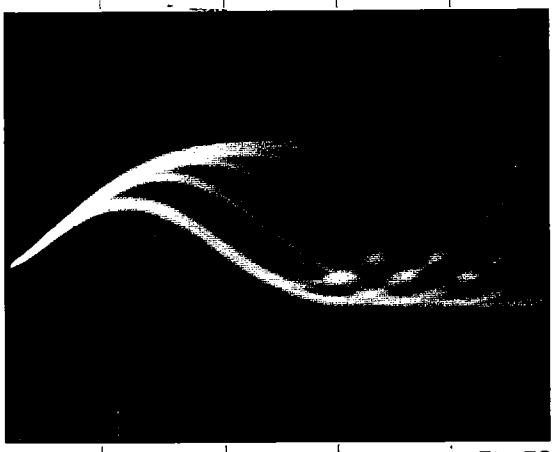
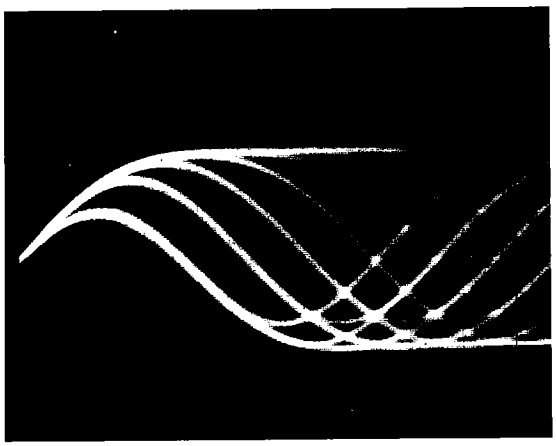
NG Fig. 67

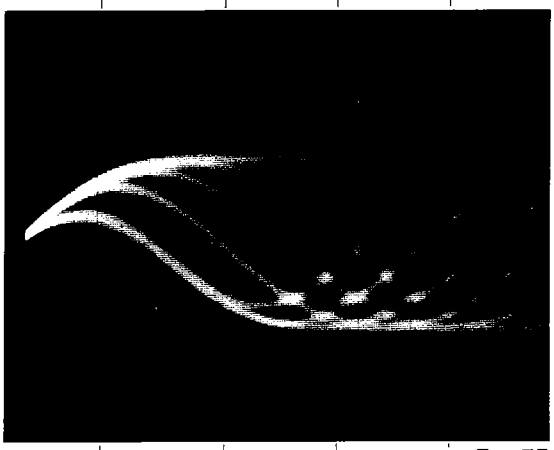


OK Fig. 68



NG Fig. 69

Step No.	Oscilloscope range X	Oscilloscope range Y	Test point	Adjustment point	Confirmation /adjustment specification	Adjustment procedure
					 NG Fig. 70	 OK Fig. 71
					 NG Fig. 72	
8	50mV/div	0.2μs/div	RF	VR1-2 (FE. OFFSET)	 NG Fig. 73	**Focus offset adjustment** • Play back the TNO 12 and adjust it so that RF is around maximum and the best eye pattern is obtained (TYPE3: TNO 14).  OK Fig. 74

Step No.	Oscilloscope range X	Oscilloscope range Y	Test point	Adjustment point	Confirmation /adjustment specification	Adjustment procedure
	 NG Fig. 75					
9			FEY FEX	VR2-I (FG)	$0^{+0.6}_{-0.3}$dB	**Focus servo gain adjustment** • Make the wiring as shown in the figure. • Set the oscillator output to 1 kHz, 50mVrms. • Play back the TNO 12, then adjust it so that the X, Y reading difference is within the range. (TYPE3: TNO 14).

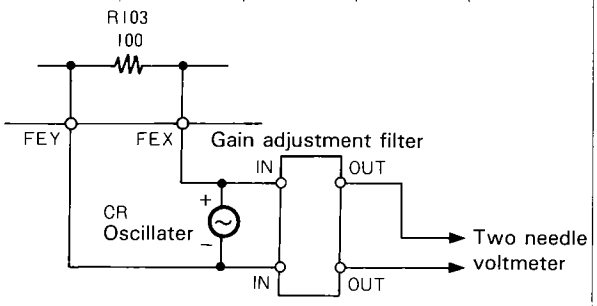
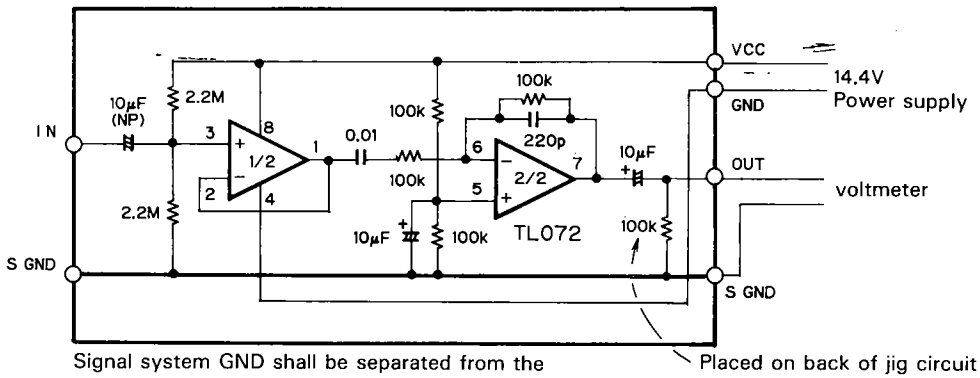


Fig. 76

Gain adjustment filter (only one channel shown)



Signal system GND shall be separated from the power supply GND.

Placed on back of jig circuit board

Fig. 77

Step No.	Oscilloscope range X	Oscilloscope range Y	Test point	Adjustment point	Confirmation /adjustment specification	Adjustment procedure
10			TEY TEX	VR2-2 (TG)	$0^{+0.6}_{-0.3}$dB	**Tracking servo gain adjustment** • Make the wiring as shown in the figure. • Set the oscillater output to 1.4 kHz, 50mVrms. • Play back the 12th music, then adjust it so that the X, Y reading difference is within the range.
11			ISET R133	VR2-3 (ISET)	3.6V±0.1V	**ISET confirmation** • Confirm that the voltage at both ends of R133 is within the range. • If it is outside the range, adjust it.
12	CH1 100mV/div	5ms/div	TEY			**Jump operation confirmation** • Perform this in a normal mode. • Confirm that the Jump operation is performed by y pressing the [R. PLAY], [M. PLAY] key. Also confirm that jump operation does not occur for two tracks or more. This is easy to check if the TAO trigger is used.
	CH2 50mV/div	5ms/div	TAO			
13			TEY		0±1.5dB	**Grating adjustment confirmation** • Perform this in the test mode. • Insert a disc, and press the [EJECT/RELOAD] key twice to set it. • Press the [REL] key to turn the DD converter ON. • Press the [TRACK−] key to obtain focus and enter a tracking open status. • Play back the TNO 6. (TYPE3: TNO 7) • Make the TE level standard while playing back the TNO 6. • Confirm that the difference for the TE level of the TNO 1 (TYPE3: TNO 1) and that for the TNO 20 (TYPE3: TNO 50) is within the range.

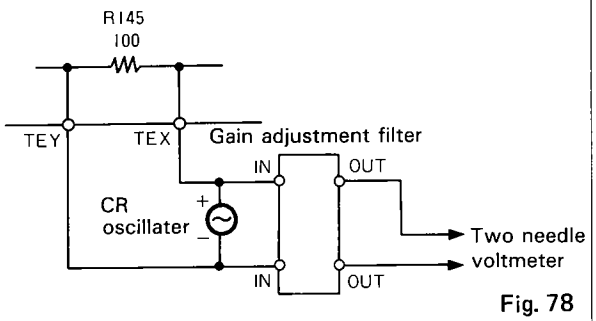


Fig. 78

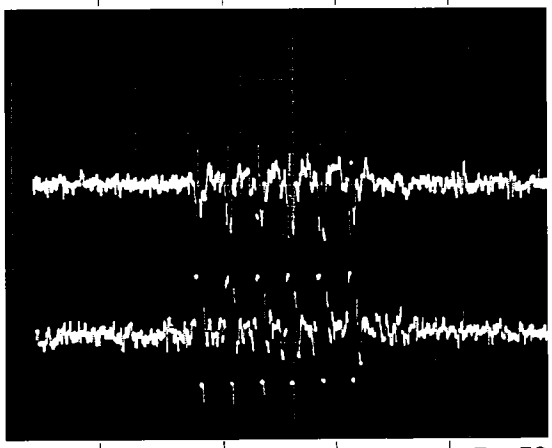


Fig. 79

Step No.	Oscilloscope range X	Oscilloscope range Y	Test point	Adjustment point	Confirmation /adjustment specification	Adjustment procedure
						• When it is outside the range, if eccentricity is within the range, perform the grating adjustment.
14			VCO	L201	−0.5V	**VCO adjustment** • Play back music in a normal mode. • Measure the voltage at IC201 pin 28 (GFS) with a millivolt meter and confirm if PLL lock has occurred or not. Lock - - - H level about 5V Unlock - - L level about −0.5V • Adjust L201 so that the VCO voltage becomes −0.5V during PLL lock.
15				CT701	4194304Hz	**Clock adjustment** • Connect the frequency counter via the buffer at the point shown in the diagram. • Monthly error is less than 30 sec. when the adjustment frequency is set at ±40 Hz. • Adjust to the rated values. Use a buffer with a small input capacity. When a high input capacity buffer is used, an offset of 4 Hz per 1 pF will occur. Example: With an input capacity of 10 pF, the adjustment frequency will be f = 4194264 Hz.
16			RF	TAN adj. screw		**Tangential adjustment** • When this adjustment is performed, be sure to perform the grating adjustment. • Perform this in a normal mode. • Play back the TNO 7, then adjust this so that the RF waveform peak becomes flat. (TYPE3: TNO 23) • After adjustment completion, apply screw lock.

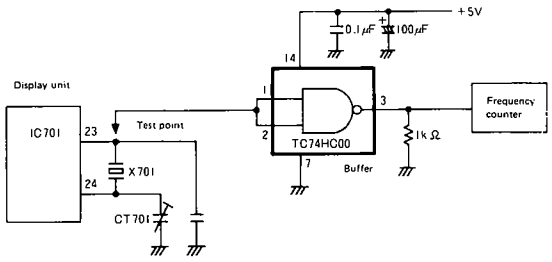
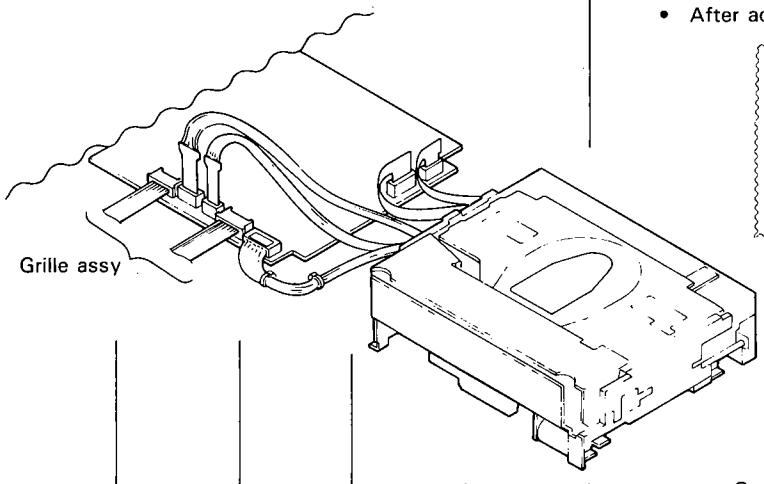


Fig. 80

Note: Make the adjustments described in steps No. 16, 17 and 18 after replacing the pickup unit or in case of faulty adjustment. Be sure to make readjustments from step No.1 after completing the adjustment described above.



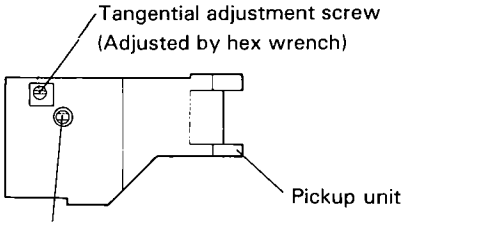
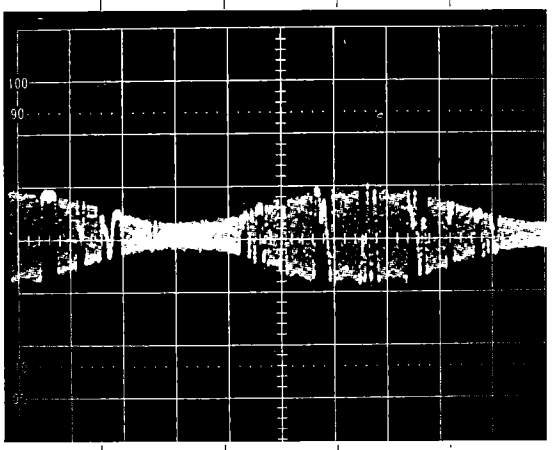
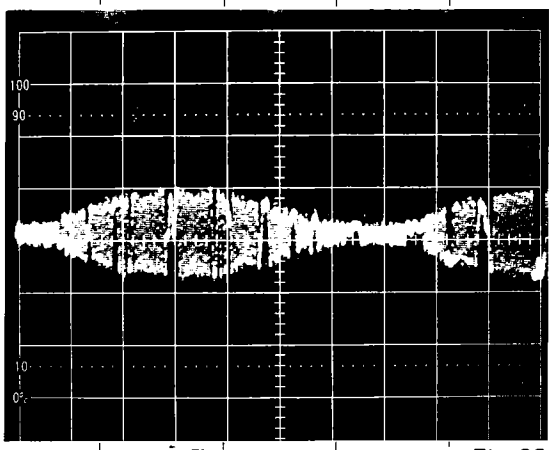


Fig. 81

Step No.	Oscilloscope range X	Oscilloscope range Y	Test point	Adjustment point	Confirmation /adjustment specification	Adjustment procedure
17	50mV/div	20ms/div	TEY			**Grating adjustment** • Insert a disc and set it by pressing the [EJECT/RELOAD] key twice. • Press the [REL] key to turn the DD converter ON. • Press the [TRACK –] key to obtain focus and to enter a tracking open status. • Play back the TNO 6. (TYPE3: TNO 7) • Measure the tracking error waveform by using an oscilloscope. At this time, insert a 4 kHz cutoff low pass filter. • Adjust it with the grating driver and find a status in which the main beam and sub beam are on one track (nullpoint). * There are many cases in which tracking error is minimized. The null point provides a status in which the envelope is cleanest and has less noise. • While slowly turning the grating driver clockwise starting from the null point, adjust it to the point where the waveform (tracking error signal) amplitude becomes maximum first. * If the driver is pressed too strongly, the pickup mainframe is lifted. Therefore, precautions shall be taken concerning this.
18						**Grating fine adjustment** • Adjust the TE level during tracking open so that the level for the TNO 1, 6, 20 becomes within 1.5 dB. (TYPE3: TNO 1, 7, 50)



OK Fig. 82



NG Fig. 83

13.2 TUNER SECTION

NOTICE:
Select C1 so that total capacity of 80pF is attained from the direction of the receiver jack.
Z: Output impedance of SSG.

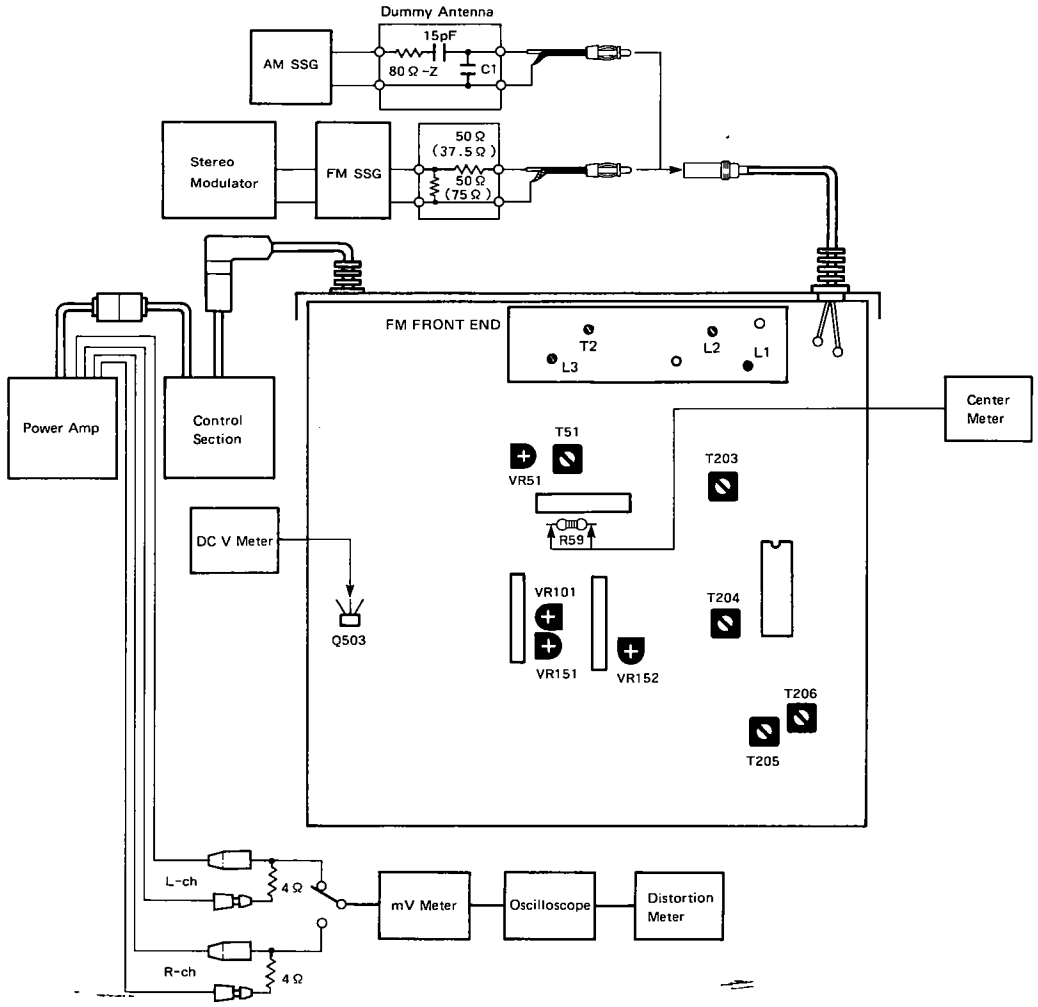


Fig. 84

- **AM Adjustment**

	No.	AM SSG (400 Hz, 30%)		Displayed Frequency (kHz)	Adjusting Point	Adjustment Method (Switch Position)
		Frequency (kHz)	Level (dB)			
Tracking	1			530		DC V Meter: More than 0.8V
	2	600	25	600	T203, T204	mV Meter (1): Maximum
	3	1,000	25	1,000	T205, T206	mV Meter (1): Maximum
	4			1,620		mV Meter (1): Less than 8.2 V

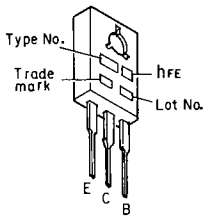
• FM Adjustment

*Stereo MOD.: 1kHz, L+R=90%, Pilot=10%

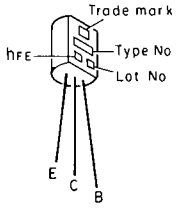
	No.	FM SSG		Displayed Frequency (MHz)	Adjusting Point	Adjustment Method (Switch Position)
		Frequency (MHz)	Level [dB (μV)]			
IF	1	98.1 (400 Hz, 30%)	60	98.1	T51	Center Meter: 0 (MONO SW: MONO)
Tracking	1			107.9	L3	DC V Meter: 7.0 V±0.2 V
	2			87.9	——	DC V Meter: 2.0 V±0.6 V
	3	89.9 (400 Hz, 100%)	5∿10	89.9	L1, L2	mV Meter (1): Maximum
	4	98.1 (400 Hz, 100%)	10	98.1	T2	mV Meter (1): Maximum
ARC	1	98.1 Pilot Only*	60	98.1	VR151	Oscilloscope: Minimum (MONO SW: AUTO)
	2	98.1*	60	98.1	VR101	mV Meter (1): Best separation VR152 rotated coutnerclockwise.
	3	98.1*	35	98.1	VR152	mV Meter (1): Separation 5 dB
SEEK	1	98.1	25		VR51	Make SEEK stops. (LOC.S SW: DX)
	2	98.1	14			Verify that SEEK doesn't stop.
	3	98.1	39			Verify that SEEK doesn't stop. (LOC.S SW: LOC.S)
	4	98.1	50±10			Verify that SEEK stops.
	5	98.1	60		——	Verify that SEEK doesn't stop. (LOC.S SW: LOC.S-HI)
	6	98.1	60±10		——	Verify that SEEK stops.
	7	Confirm each stop sensitivity falls within standard values after above adjustment.				

• ICs and Transistors

2SB772



2SA838



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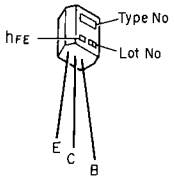
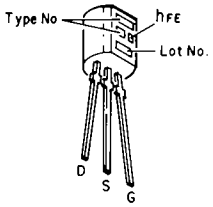
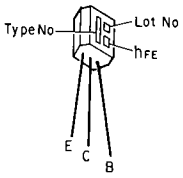
2SC1740S
2SC3113
2SA1048
2SA1150



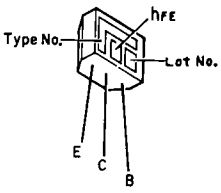
2SK435



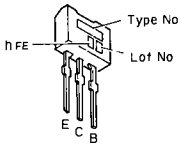
2SD1012



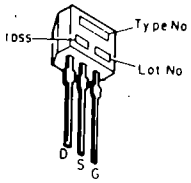
2SD1468S
2SA933S



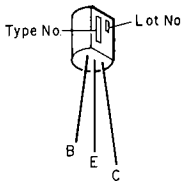
2SD1226M



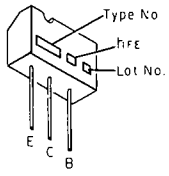
2SK241



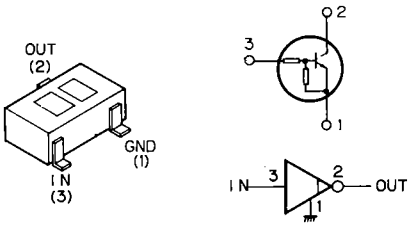
2SC2753



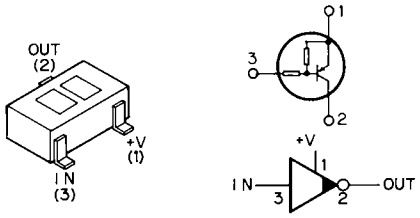
2SB822F



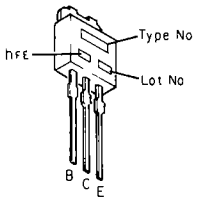
UN2211



UN2111



2SC3074



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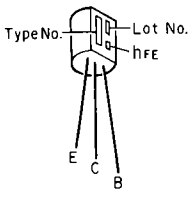

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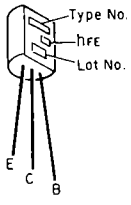

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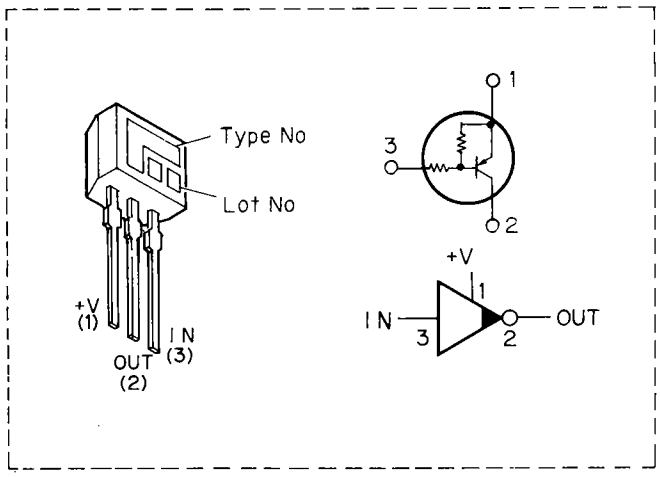

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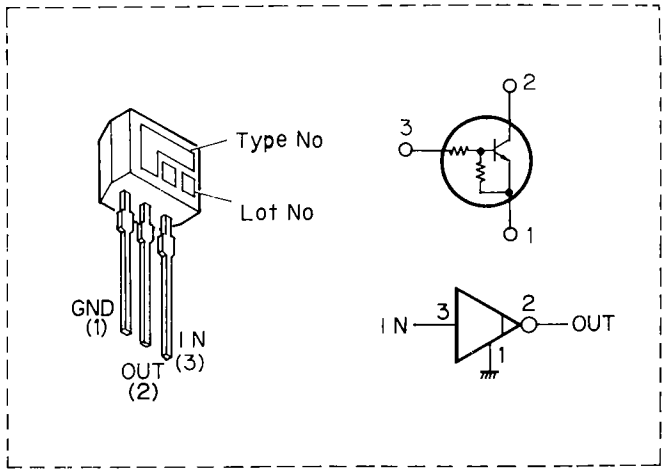
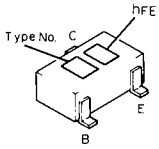
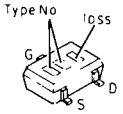


Chip Transistors

Part No.	Indication
2SD1048-X6	X6
2SD1048-X7	X7
2SD1048-X8	X8
2SD601-YQ	YQ
2SD601-YR	YR
2SA1162-SG	SG
2SA1162-SY	SY
2SC2712-LG	LG
2SC2712-LY	LY
2SK508-K52	K52
2SK508-K53	K53





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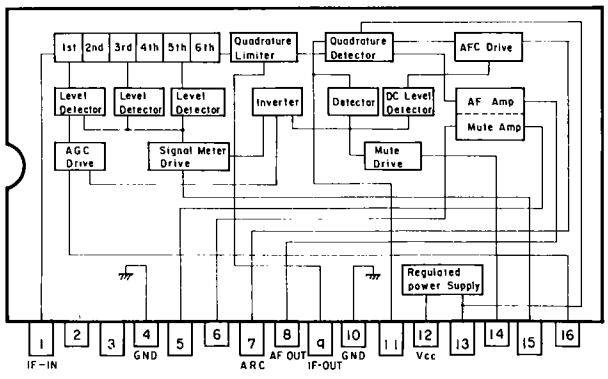

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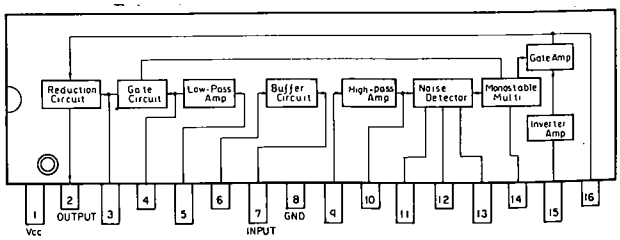

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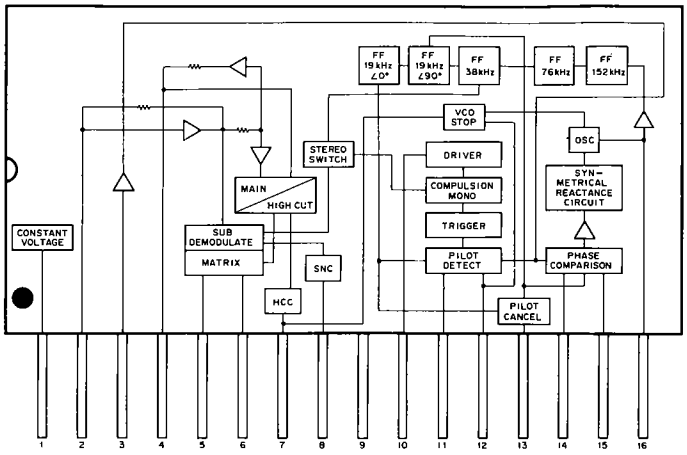

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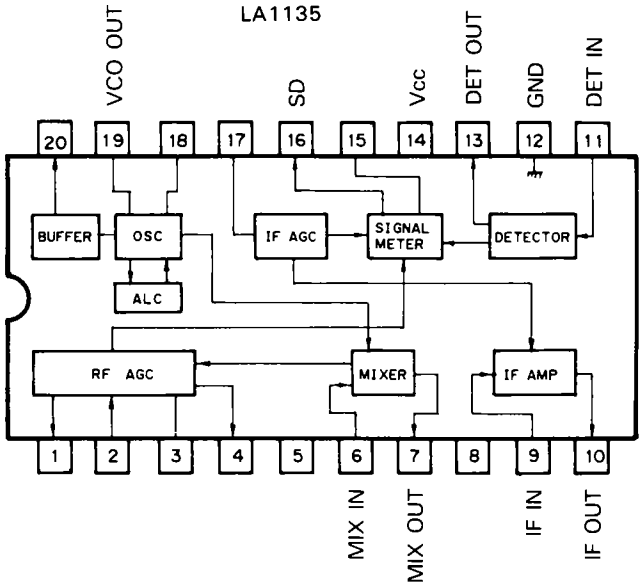
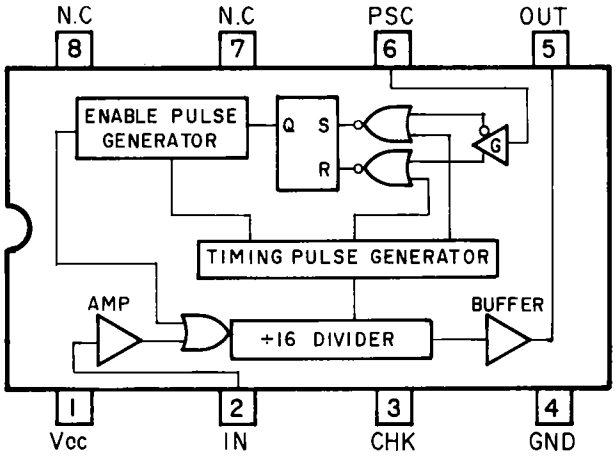
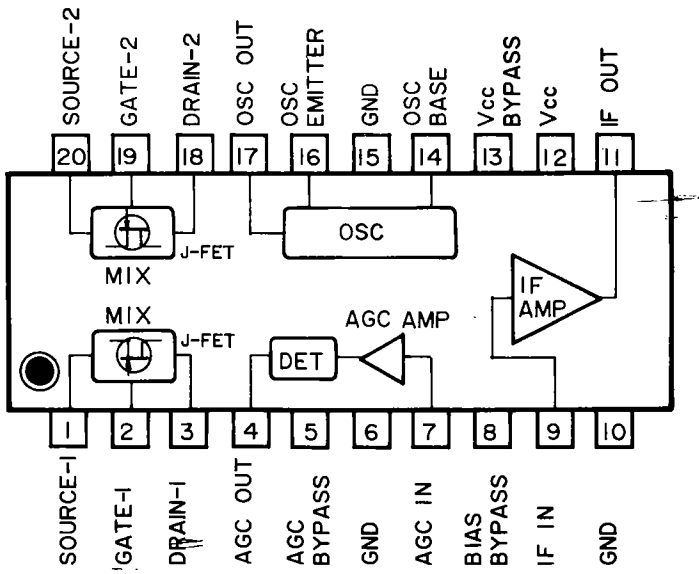


μPB553AC



PA4009



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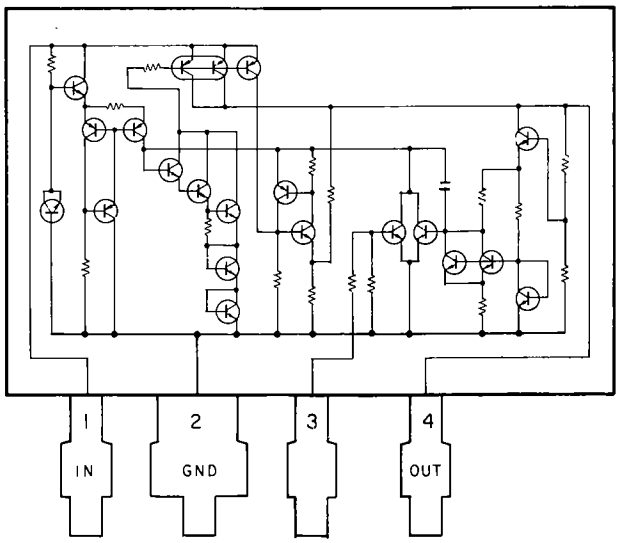
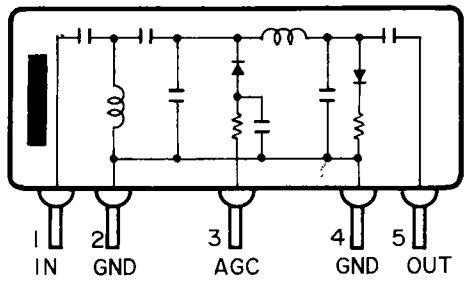
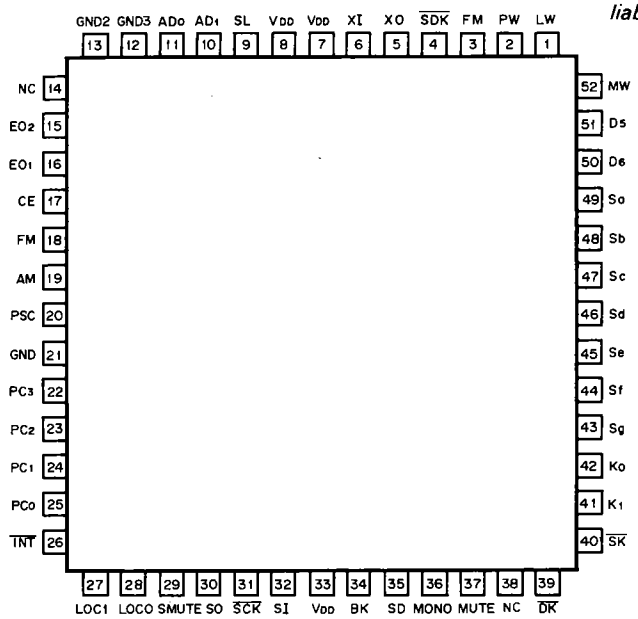


CWW-173
CWW1015



*PD4084A

*IC's marked by * are MOS type.*
Be careful in handling them because they are very liable to be damaged by electrostatic induction.



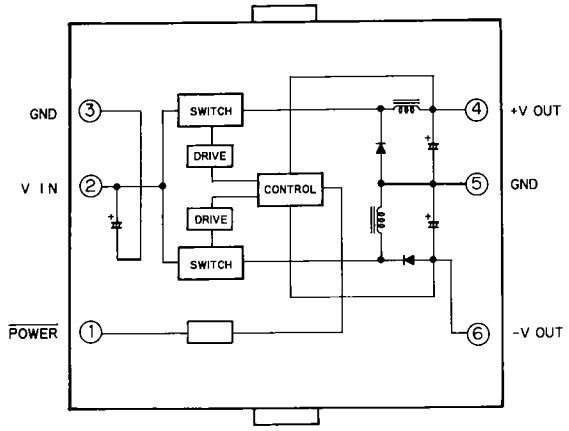
PD4084A Terminal Function

Tuner controller

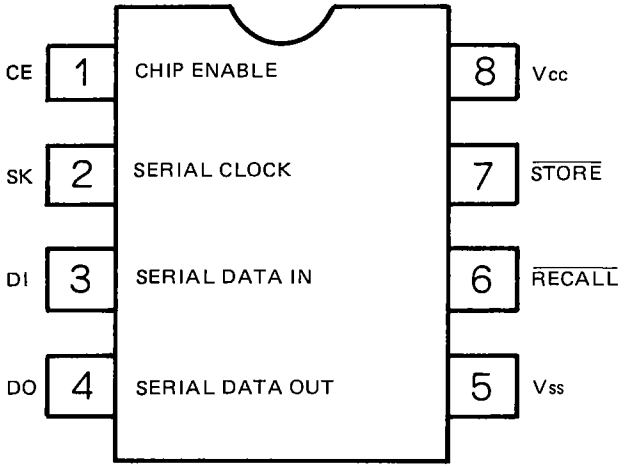
Pin No.	Pin Name	I/O	Functions and Operation
1	LW	Output	LW tuner power supply control output. Active "H" (Not used)
2	PW	Output	"H" output while tuner power supply is ON. CMOS push-pull.
3	FM	Output	FM tuner power supply control output. Active "H" CMOS push-pull.
4	$\overline{SDK}$	Output	SDK mode output. Active "L" CMOS push-pull. (Not used)
5	XO		Crystal connection for system clock circuit. (4.5 MHz)
6	XI		
7	V_{DD1}		Power supply GND terminal.
8	V_{DD2}	Input	A/D converter (SL terminal) reference voltage input terminal.
9	SL	Input	Field strength measuring terminal. A/D converter input.
10	AD_1	Input	Input port. Connected to GND.
11	AD_o	Input	Input port. Connected to GND.
12	GND_3		Power supply GND terminal.
13	GND_2		Power supply GND terminal.
14	NC		(Not used)
15	EO_2	Output	Phase wave detector output. Three-state.
16	EO_1	Output	Phase wave detector output. Three-state. (Not used)
17	CE	Input	Chip select signal. Low power consumption mode when "L".
18	FM	Input	FM programmable divider input.
19	AM	Input	AM programmable divider input.
20	PSC	Output	Outputs divided switching signal to prescaler (μPB553AC).
21	G		Power supply GND terminal.
22	PC_3	Output	Not used
23	PC_2	Output	
24	PC_1	Output	

Pin No.	Pin Name	I/O	Functions and Operation
25	PC_O	Output	SL terminal monitor output. "L" output when SL terminal is greater than 2 V, "H" when less. N ch open drain. (Not used)
26	$\overline{INT}$	Input	External interrupt input. Inputs $\overline{SCK}$.
27	LOC_1	Output	Scan sensitivity control output. "L" output when local and local high seek. N ch open drain.
28	LOC_O	Output	Scan sensitivity control output. "H" output when local high seek. N ch open drain.
29	SMUTE	Output	Switches from "H" to "L" when PLL frequency dividing ratio is set. N ch open drain. (Not used)
30	SO	Output	Serial interface data output terminal. N ch open drain.
31	$\overline{SCK}$	Input/output	Serial interface shift clock input/output terminal. Normal "H" CMOS push-pull.
32	SI	Input	Serial interface data input terminal.
33	V_{DD}		Connected internally with Pin 7.
34	BK	Input	BK signal input terminal. (For WG destination).
35	SD	Input	Station detector input terminal.
36	MONO	Output	Monaural control output. "H"—forced monaural, "L"—AUTO. N ch open drain
37	MUTE	Output	Muting output. Active "H". N ch open drain.
38	NC		
39	$\overline{DK}$	Input	DK signal input terminal. Active "L". (For WG destination)
40	$\overline{SK}$	Input	SK signal input terminal. Active "L". (For WG destination)
41	K_1	Input	Indicator stereo signal input and destination setting input. Active "L".
42	K_O	Input	Destination setting matrix input. Active "L".
43	S_g	Output	Destination setting matrix output. P ch open drain.
44	S_f	Output	Destination setting matrix output. P ch open drain.
45	S_e	Output	Destination setting matrix output. P ch open drain.
46	S_d	Output	Not used
47	S_c	Output	Not used
48	S_b	Output	Not used
49	S_a	Output	Not used
50	D_6	Output	Not used
51	D_5	Output	Not used
52	MW	Output	AM tuner power supply control output. Active "H"

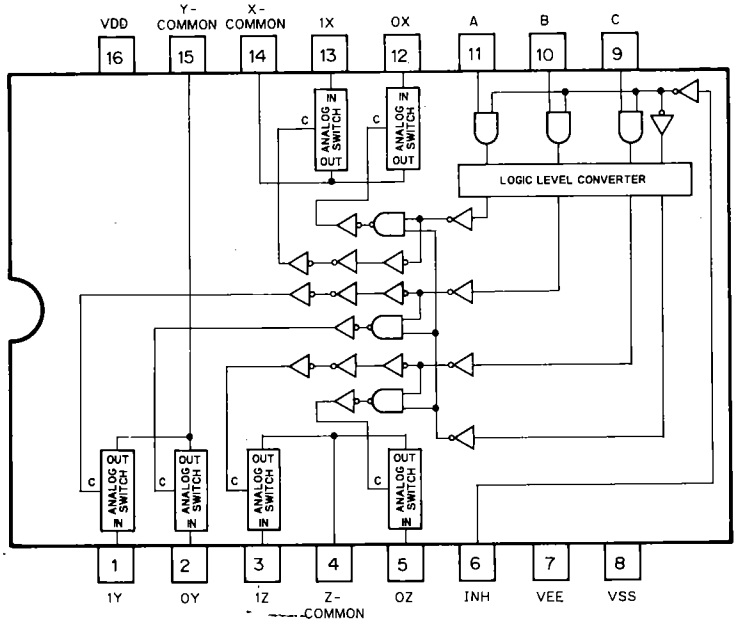
KHA803



PDH001



TC4053BF

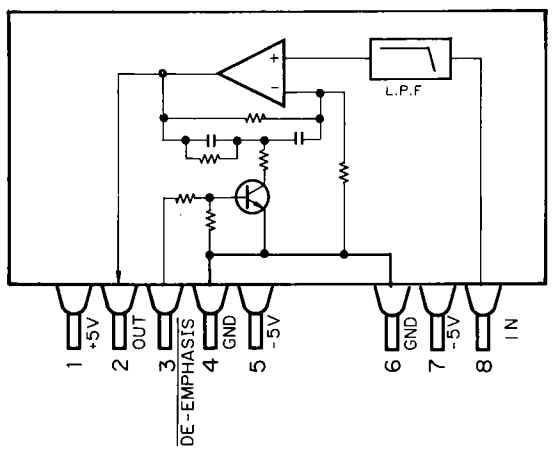


TC4053BF is a 2 channel x 3 multiplexer that enables an analog signal, digital signal selection and combination. The corresponding switch of each channel is turned on by a control terminal digital signal.

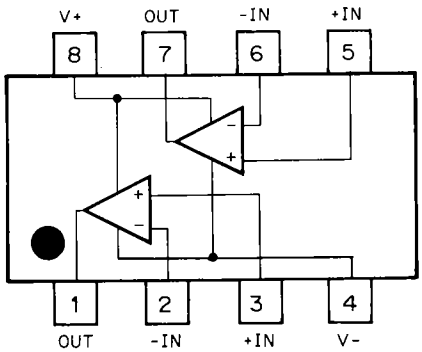
Truth Table for TC4053BF

Control input				"ON" channel
INH	C	B	A	
L	L	L	L	0X, 0Y, 0Z
L	L	L	H	1X, 0Y, 0Z
L	L	H	L	0X, 1Y, 0Z
L	L	H	H	1X, 1Y, 0Z
L	H	L	L	0X, 0Y, 1Z
L	H	L	H	1X, 0Y, 1Z
L	H	H	L	0X, 1Y, 1Z
L	H	H	H	1X, 1Y, 1Z

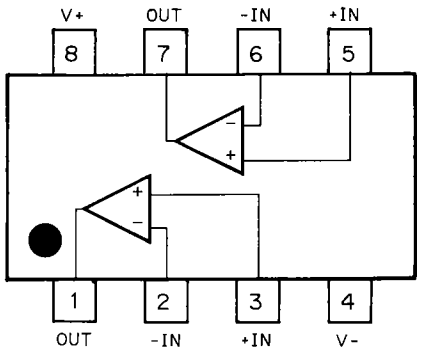
KHA210A



M5218FP



M5221FP(NJM072M)



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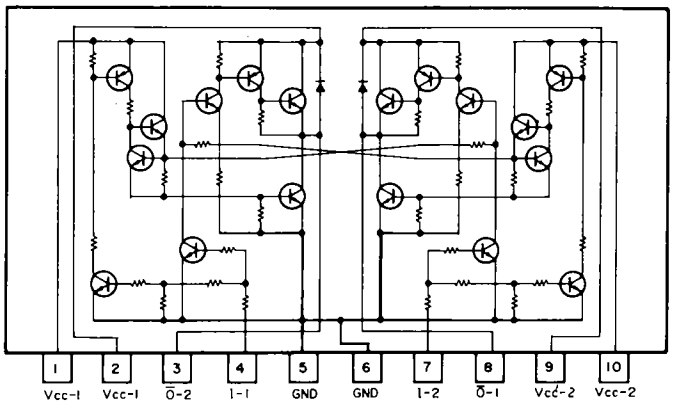
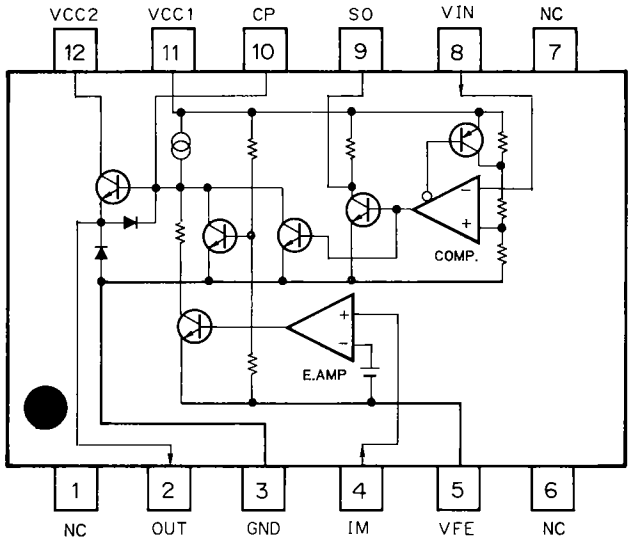


IR3C05

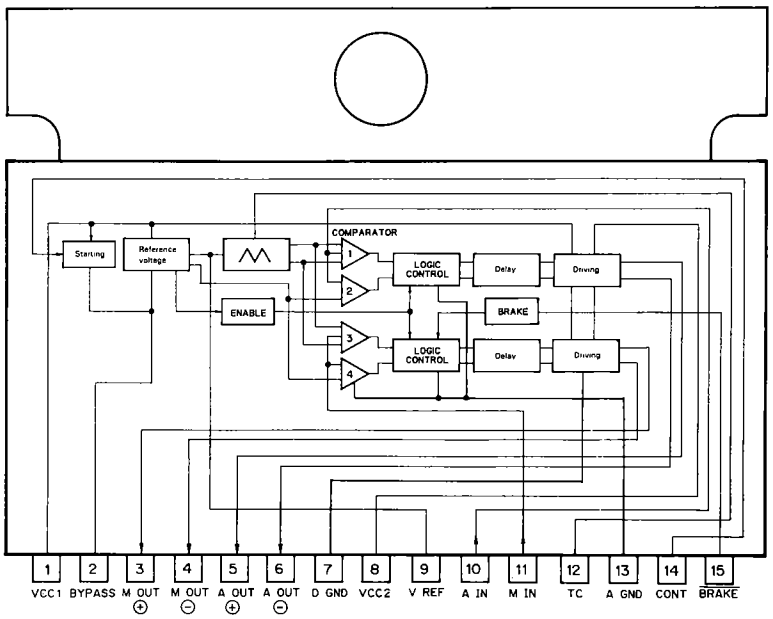


IR3C05 Terminal Function

Laser diode constant light output drive IC

Pin No.	Pin name	I/O	Function and operation
1	NC		
2	OUT	Output	Output
3	GND		Ground
4	IM	Input	Monitor input
5	VEE		(–) power supply
6	NC		
7	NC		
8	VIN	Input	Control input (ON/OFF), thermal shutoff
9	SO	Output	Operation signal output. "H" during operation, "L" during stop.
10	CP		Phase compensation
11	VCC1		Control (+) power supply
12	VCC2		Output (+) power supply

PA3021A

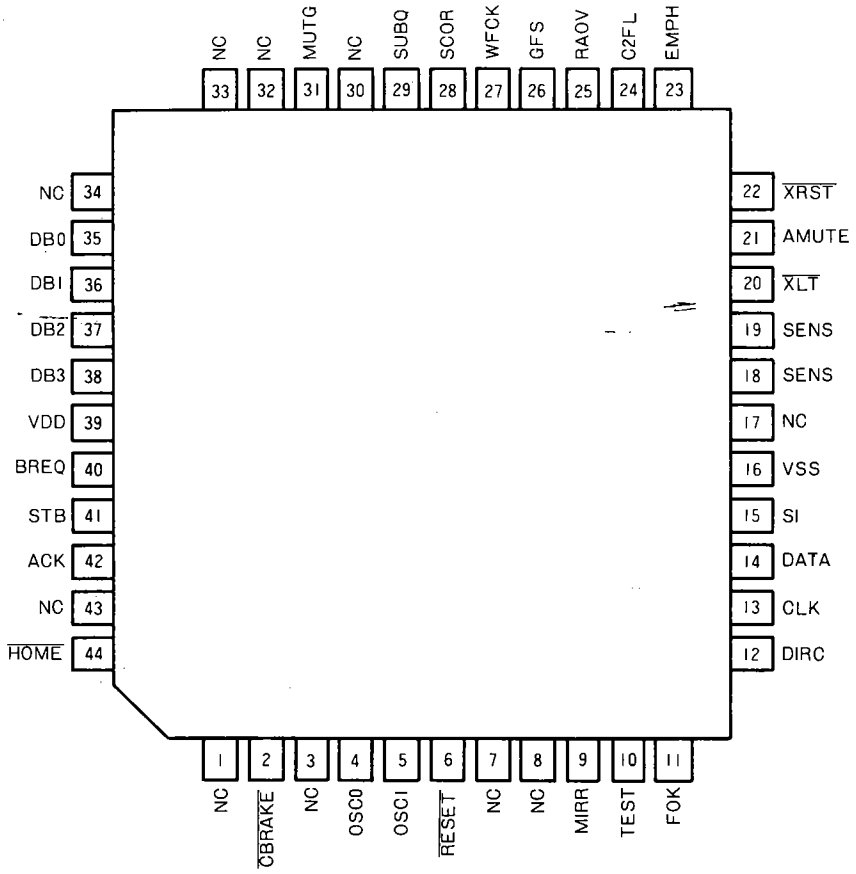


PA3021A Terminal Functions

PWM driver

Pin No.	Pin name	I/O	Function and operation
1	VCC1		ACC power supply
2	BYPASS		IC reference voltage ripple filter condensor connection terminal
3	MOUT+	Output	Motor driver positive output terminal
4	MOUT–	Output	Motor driver negative output terminal
5	AOUT+	Output	Actuator driver positive output terminal
6	AOUT–	Output	Actuator driver negative output terminal
7	DGND		Power step GND terminal
8	VCC2		+5V power supply
9	Vref	Output	IC stabilizing supply output terminal
10	AIN	Input	Actuator system analog signal input terminal
11	MIN	Input	Motor system analog signal input terminal
12	TC		Chopping waveform condensor connection terminal
13	AGND		Small signal system GND terminal
14	CONT	Input	Circuit operation status, standby status selection terminal. Active "H".
15	BRAKE	Input	Motor system operation, non-operation (STOP) selection terminal. Active "L".

*PD8019E



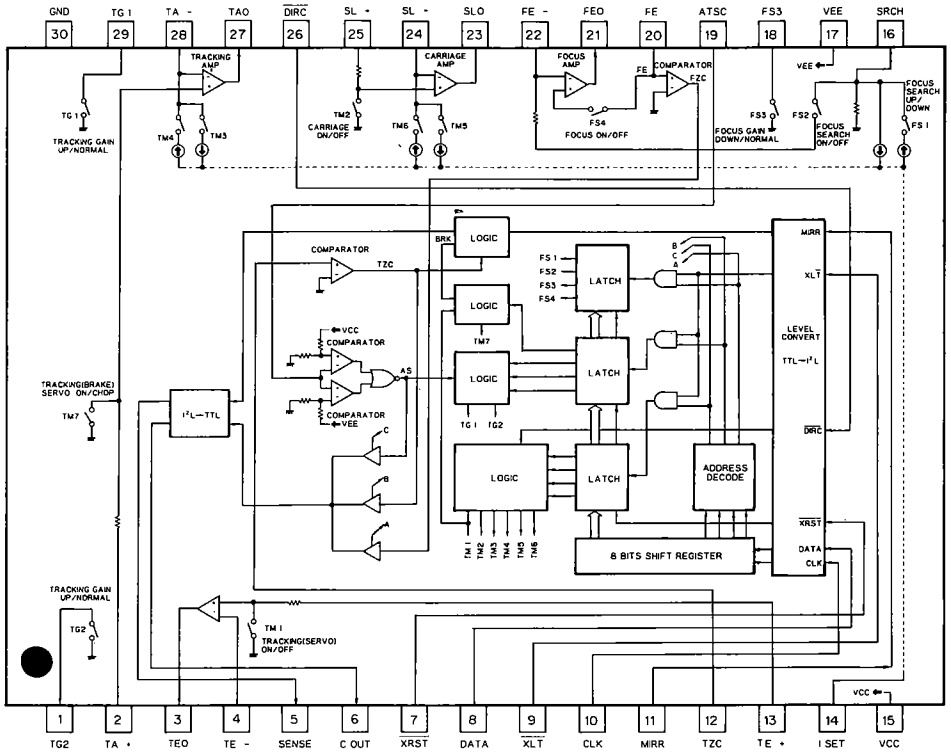
PD8019E Terminal Functions

CD controller

Pin No.	Pin name	I/O	Function and operation
1	NC		
2	$\overline{\text{CBRAKE}}$	Output	Carriage motor brake terminal. N-ch open drain with pull up. "L": Brake ON.
3	NC		
4	OSC0	Input	Clock oscillation terminal. 4MHz
5	OSC1	Output	Clock oscillation terminal
6	$\overline{\text{RESET}}$	Input	ICreset terminal. N-ch open drain with pull up. "L": Reset ON. "H" = Reset OFF.
7	NC		
8	NC		
9	MIRR	Input	Mirror signal input terminal. Input port with latch. "H": Mirror face, between tracks.
10	TEST	Input	Normal mode/chip check mode selection terminal. Input port with latch.
11	FOK	Input	FOCUS OK signal input termianl. Input port with latch. "H": Focus OK
12	DIRC	Output	Single jump control terminal. N-ch open drain with pull up.
13	CLK	Output	Serial data transmission clock output. N-ch open drain with pull up.
14	DATA	Output	Serial data output. N-ch open drain with pull up. Controls CX20108 and CX23035.
15	SI	Input	Chip checking command input terminal. N-ch open drain with pull up.
16	VSS		GND
17	NC		
18	SENS	Input	Sense signal input terminal. N-ch open drain with pull up.
19	SENS	Input	Sense signal input terminal. N-ch open drain with pull up.
20	$\overline{\text{XLT}}$	Output	Serial data latch pulse. N-ch open drain with pull up.
21	AMUTE	Output	Audio signal mute. N-ch open drain with pull up.
22	$\overline{\text{XRST}}$	Output	Reset terminal. N-ch open drain with pull up. Resets the shift registers, CX20108, CX23035.
23	EMPH	Output	Emphasis ON/OFF selection terminal. N-ch open drain with pull up. "H": Emphasis ON.
24	C2FL	Input	Error correction NG monitor input terminal. N-ch open drain with pull up.
25	RAOV	Input	Jitter extraction RAM overflow. N-ch open drain with pull up.
26	GFS	Input	Spindle lock detection. N-ch open drain with pull up. "H ' during spindle lock.
27	$\overline{\text{WFCK}}$	Input	Sub code read out clock. N-ch open drain with pull up.
28	SCOR	Input	Sub code sync. N-ch open drain with pull up.
29	SUBQ	Input	Sub code data. N-ch open drain with pull up.
30	NC		
31	MUTG	Output	Signal processing mute. N-ch open drain with pull up.
32 – 34	NC		
35 – 38	DB0 – DB3	I/O	Communication data bus. N-ch open drain with pull up.
39	VDD		Power supply terminal. +5V

<table>
<tr><th>Pin No.</th><th>Pin name</th><th>I/O</th><th>Function and operation</th></tr>
<tr><td>40</td><td>BREQ</td><td>Input/Output</td><td>Communication control line. N-ch open drain with pull up.
• Data link control.
Communication bus is enabled by "L" status entry from an "H" status. At the same time, the communication mode is determined by the ACK output level.
<table><tr><th>ACK</th><th>Communication mode</th></tr><tr><td>"L"</td><td>Indicates that PD8019 can accept a command.
Response for STB output from PD4096B with 1ms maximum.</td></tr><tr><td>"H"</td><td>Indicates a data send request status for PD4096B
The wait time from this status until a response by PD4096B is 5ms maximum.</td></tr></table>• Handshake control
When a data string is sent, "L" output occurs simulaneously with first data sending, and "H" output occurs with last data sending to indicate data string termination.</td></tr>
<tr><td>41</td><td>STB</td><td>Input</td><td>Communication control line
• Handshake control. N-ch open drain with pull up.
Communication direction (PD4096B → PD8019E)
Indicates that PD4096B data output at the rise of this signal is effective.
Communication direction (PD8019E → PD4096B)
Incicates that data output at the rise of this signal was accepted by PD4096B</td></tr>
<tr><td>42</td><td>ACK</td><td>Output</td><td>Communication control line. N-ch open drain with pull up.
• Data link control
The communication mode is determined by the level of this signal.
• Handshake control
Communication direction (PD4096B → PD8019E)
Outputs "H" which indicates that data output by PD4096B was accepted.
Communication direction (PD8019E → PD4096B)
Outputs "L" which indicates that data output for PD4096B is effective.</td></tr>
<tr><td>43</td><td>NC</td><td></td><td></td></tr>
<tr><td>44</td><td>$\overline{\text{HOME}}$</td><td>Input</td><td>HOME switch detection terminal. N-ch open drain with pull up.
Terminal that determines the pickup home position.
Home position: Location where this terminal changes from "L" to "H".</td></tr>
</table>

* CX20108



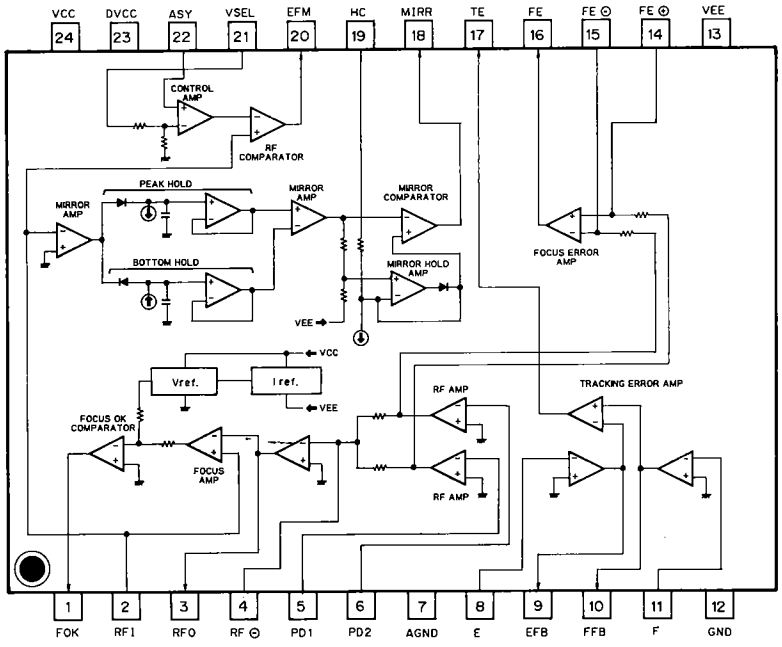
CX20108 Terminal Functions

Focus, tracking, carriage servo IC

Pin No.	Pin name	I/O	Function and operation
1	TG2	Output	Tracking amplifier gain selection terminal. Becomes open or GND level.
2	TA+	Input	Amp 2 (tracking amp) non-inverted input. Tracking error signal input.
3	TEO	Output	Amp 4 (tracking amp) output. Tracking error signal output.
4	TE–	Input	Amp 4 (tracking amp) inverted input.
5	SENSE	Output	Outputs an IC status that corresponds to the DATA address. (Changes with addres content of internal serial register.)
6	C OUT	Output	Track number counting signal output during high speed access.
7	$\overline{\text{XRST}}$	Input	Clears all internal registers when "L".
8	DATA	Input	Serial data input from CD controller (IC204). Inputted by LSB. D0–D7.
9	$\overline{\text{XLT}}$	Input	DATA latch (The content of the internal serial shift register is transferred to a latch that was address-decoded.) Transferred with "L". Since it is not an edge trigger, it is necessary to return it to H after execution.
10	CLK	Input	DATA transfer clock. Data transferred at the trailing edge.
11	MIRR	Input	Mirror signal input from RF amplifier.
12	TZC	Input	Tracking zero cross. Tracking error signal is inputted with a C coupler. Although the time constant is determined by the 1 track jump situation, it is usually about 2 kHz.
13	TE+	Input	Tracking error signal input.
14	ISET		Current value setting that determines the focus search voltage, tracking jump voltage and the carriage feed voltage.
15	VCC		Power supply terminal. Usually +5V.
16	SRCH		Connects a condensor that determines the focus search charge and discharge waveform time constant.

Pin No.	Pin name	I/O	Function and operation
17	Vee		Power supply terminal. −5V
18	FS3	Input	Focus amplifier gain selection terminal. OPEN or GND level.
19	ATSC	Input	Terminal that inputs data that indicates mechanical shock was applied to the player. Tracking error input through BPF.
20	FE	Input	Focus error signal input.
21	FEO	Output	Amp 1 output. Focus error signal output.
22	FE−	Input	Amp 1 invert input.
23	SLO	Output	Amp 3 output. Carriage servo signal output.
24	SL−	Input	Amp 3 invert input.
25	SL+	Input	Amp 3 non-invert input. Carriage servo signal input.
26	$\overline{DIRC}$	Input	Utilized during 1 track jump. Usually "H". WHen "L" reverses the track jump pulse direction. Set to a normal tracking mode by "H". When TZC rise and fall detection occurs, it is "L" for a certain period of time.
27	TAO	Output	Amp 2 output. Tracking error signal output.
28	TA−	Input	Amp 2 invert input. Tracking error signal input.
29	TG1		Tracking amp gain selection terminal. Becomes OPEN or GND level.
30	GND		GND terminal

* CX20109



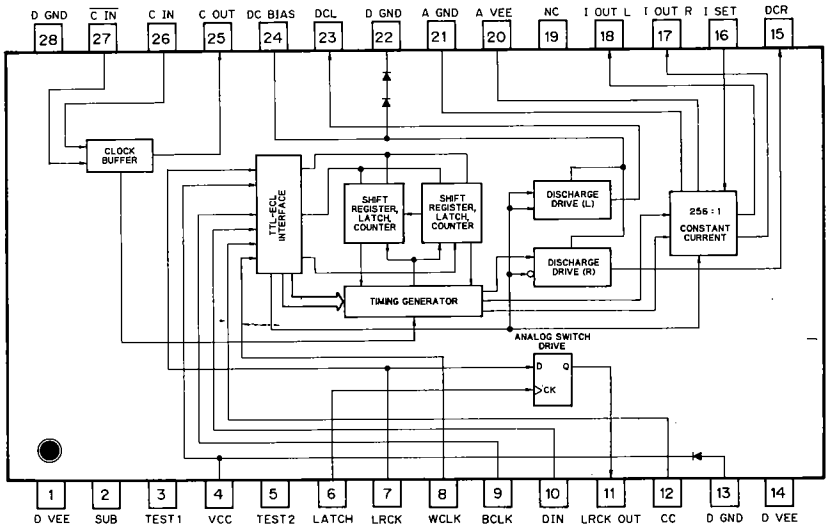
CX20109 Terminal Functions

RF amplifier

Pin No.	Pin name	I/O	Function and operation
1	FOK	Output	Allows focus servo output. Active "H". PNP open collecter.
2	RFI	Input	RF summing amp output is C coupled for input.
3	RFO	Output	RF summing amp output. Eye pattern test point.
4	RF−	Input	RF summing amp invert input. CR return connection to (3) − (4).
5	PD1	Input	RF I-V amp (1) invert input. Connects to PIN diode B+D for current input.

Pin No.	Pin name	I/O	Function and operation
6	PD2	Input	RF I-V amp (2) invert input. Connects to PIN diode A+C for current input.
7	AGND		Small signal analog system GND.
8	E	Input	E I-V amp invert input. Connects to PIN diode E for current input.
9	EFB	Output	E I-V amp output. CR return connection to (8) – (9).
10	FFB	Output	F I-V amp output. CR return connection to (10) – (11).
11	F	Input	F I-V amp invert input. Connects to PIN diode F for current input.
12	GND		
13	V_{EE}		Negative power supply. –5V.
14	FE+	Input	Focus error amp non-invert input. Low pass CR connection.
15	FE–	Input	Focus error amp invert input.
16	FE	Output	Focus error amp output. CR return connection to (15) – (16).
17	TE	Output	Tracking error amp output.
18	MIRR	Output	Mirror output. Active "H". PNP open collector.
19	HC	Input	Mirror hold condensor connection terminal.
20	EFM	Output	EFM output comparator output.
21	VSEL	Input	Auto, asymmetry control amp reference input level selection terminal. Connects to +5V.
22	ASY	Input	Auto, asymmetry control input. Slice the RF signal to generate a square wave.
23	DVcc		EFM comparator system positive power supply. Connects to +5V.
24	Vcc		Positive power supply. Connects to +5V.

* CX20133



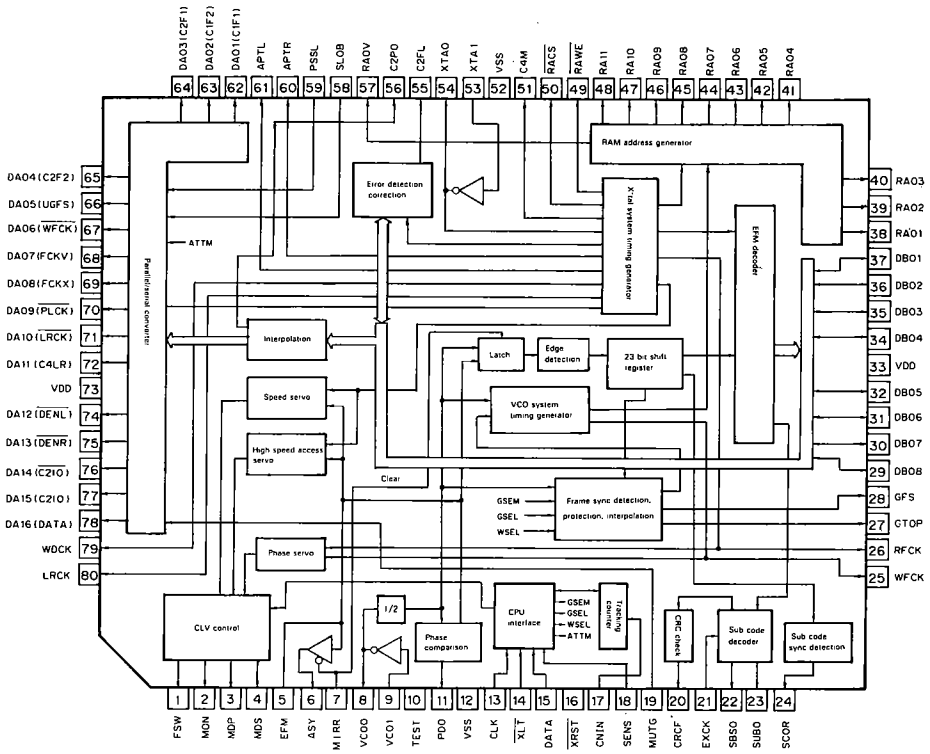
CX20133 Terminal Functions

16 bit D/A converter

Pin No.	Pin name	I/O	Function and operation
1	DVEE		– power supply terminal. –5V.
2	SUB		–5V
3	TEST1		Not used
4	VCC		+ power supply terminal. +5V.
5	TEST2		Not used.
6	LATCH	Input	Clock input. When PAM waveform jitter exists, a conversion error occurs. D type flip flop clock for this jitter.

Pin No.	Pin name	I/O	Function and operation
7	LRCK	Input	44.1 kHz strobe signal input. Data assignment during the stereo mode. LRCK = "L" — — — R ch data call. LRCK = "H" — — — L ch data call.
8	WCLK	Input	88.2 kHz strobe signal input. Word clock. Changes WCLK from "H" to "L" at 17th BCLK break, then 16 bit data is transferred from the shift register to the latch by this break signal.
9	BCLK	Input	Bit clock input. Data is sent to the IC sequentially from MSB by synchronization with the rise of this clock. (Data change is by BCLK break.)
10	DIN	Input	16 bit serial data input.
11	LRCKOUT	Output	TC4053BF (CMOS analog switch) drive output.
12	CC	Input	Conversion command. Changes CC to "H" and enters 3 clocks or more from CIN to reset all internal timing circuits. After reset, CC becomes "L" and enters a clock from CIN, then the internal timing circuit starts operating.
13	DGND		GND
14	DVEE		−5V
15	DCR	Output	Discharge signal Controlled by LRCK LRCK = "H" — — — Output from DCR. LRCK = "L" — — — Output from DCL
16	ISET	Input	Integrating current determination terminal. Integrating current is determined by a constant current value that flows from this terminal.
17	IOUTR	Output	Integrating current output terminal LRCK = "L" — — — Output from IOUTL LRCK = "H" — — — Output from IOUTR
18	IOUTL	Output	
19	NC		
20	AVEE		−5V
21	AGND		GND
22	DGND		GND
23	DCL	Output	Discharge signal Controlled by LRCK. LRCK = "L" — — — Output from DCL. LRCK = "H" — — — Output from $\overline{\text{DCR}}$.
24	DCBIAS		Bias terminal Bias circuit for the discharge signal output circuit.
25	COUT	Output	Clock terminal. 35 MHz.
26	CIN	Input	Clock terminal. 35 MHz.
27	$\overline{\text{CIN}}$	Input	Clock terminal. 35 MHz.
28	DGND		GND

* CX23035



CX23035 Terminal Functions

Digital signal processor

Pin No.	Pin name	I/O	Function and operation
1	FSW	Output	Spindle motor output filter time constant selection output.
2	MON	Output	Spindle motor ON/OFF control output.
3	MDP	Output	Spindle motor drive output. Rough control during CLV-S mode and phase control during CLV-P mode.
4	MDS	Output	Spindle motor drive output. Speed control during CLV-P mode.
5	EFM	Input	EFM signal input from RF amp.
6	ASY	Output	Output for EFM signal slice level control.
7	MIRR	Input	MIRROR input from RF amplifier. Connects to GND.
8	VCOO	Output	VCO output. When EFM signal lock occurs, f=8.6436 MHz.
9	VCOI	Input	VCO input
10	TEST	Input	GND
11	PDO	Output	Phase comparison output of EFM signal and VCO/2.
12	VSS		GND
13	CLK	Input	PD8019E serial data transmission clock input. Latches data at the clock rise edge.
14	$\overline{XLT}$	Input	PD8019E latch input. Latches 8 bit shift register data (serial data from PD8019E) to each register.
15	DATA	Input	PD8019E serial data input.
16	$\overline{XRST}$	Input	System reset input. Reset with "L".
17	CNIN	Input	Tracking pulse input.
18	SENS	Output	Outputs internal status by address correspondence.
19	MUTG	Input	Muting input. When internal register ATTM is "L", MUTG is "L" which is a normal status. When "H", a silent status occurs.
20	CRCF	Output	Outputs the SUB-Q CRC result. (Not used)

Pin No.	Pin name	I/O	Function and operation
21	EXCK	Input	Clock input for SUB-Q serial output. (Not used)
22	SBSO	Output	SUB-Q serial output. (Not used)
23	SUBQ	Output	SUB-Q output.
24	SCOR	Output	SUB-Q S0+S1 output.
25	WFCK	Output	Write Frame Clock output. When frame sync lock occurs, f = 7.35 kHz.
26	RFCK	Output	Read frame clock output. X'tal system 7.35 kHz.
27	GTOP	Output	Frame sync protective status display output. (Not used)
28	GFS	Output	Frame sync lock status display output.
29	DB08	I/O	External RAM data terminal. DATA 8 (MSB)
30	DB07	I/O	External RAM data terminal. DATA 7
31	DB06	I/O	External RAM data terminal. DATA 6
32	DB05	I/O	External RAM data terminal. DATA 5
33	VDD		Power supply terminal. +5V
34	DB04	I/O	External RAM data terminal. DATA 4
35	DB03	I/O	External RAM data terminal. DATA 3
36	DB02	I/O	External RAM data terminal. DATA 2
37	DB01	I/O	External RAM data terminal. DATA 1 (LSB)
38	RA01	Output	External RAM address output. ADDR01 (LSB)
39	RA02	Output	External RAM address output. ADDR02
40	RA03	Output	External RAM address output. ADDR03
41	RA04	Output	External RAM address output. ADDR04
42	RA05	Output	External RAM address output. ADDR05
43	RA06	Output	External RAM address output. ADDR06
44	RA07	Output	External RAM address output. ADDR07
45	RA08	Output	External RAM address output. ADDR08
46	RA09	Ouptu	External RAM address output. ADDR09
47	RA10	Output	External RAM address output. ADDR10
48	RA11	Output	External RAM address output. ADDR11 (MSB)
49	$\overline{\text{RAWE}}$	Output	Write enable signal output to external RAM. Active "L".
50	$\overline{\text{RACS}}$	Ouput	Chip select signal output to external RAM. Active "L".
51	C4M	Output	X'tal 1/2 frequency division output. f = 4.2336 MHz.
52	VSS		GND
53	XTAL	Input	X'tal oscillation circuit input. f = 8.4672 MHz.
54	XTAO	Output	X'tal oscillation circuit output. f = 8.4672 MHz.
55	C2FL	Output	Correction status output. When C2 system correction attempt is not successful, "H" occurs.
56	C2PO	Output	C2 pointer display output. Synchronized to audio data output. (Not used.)
57	RAOV	Output	± 4 frame jitter extraction RAM overflow and underflow display output.
58	SLOB	Input	Audio data output code selection input. With "L", 2's complement output. With "H", offset binary output.
59	PSSL	Input	Audio data output mode selection input. With "L", serial output. With "H" parallel output. (This unit uses "L".)
60	APTR	Output	Aperture compensation control output. "H" during R ch. (Not used.)
61	APTL	Output	Aperture compensation control output. "H" during L ch. (Not used.)
62	DA01	Output	When PSSL = "H", DA01 (parallel audio data LSB) output. When PSSL = "L", CIF1 output.

Pin No.	Pin name	I/O	Function and operation
63	DA02	Output	When PSSL = "H", DA02 output. When PSSL = "L", C1F2 output.
64	DA03	Output	When PSSL = "H", DA03 output. When PSSL = "L", C2F1 output. (Not used.)
65	DA04	Output	When PSSL = "H", DA04 output. When PSSL = "L", C2F2 output. (Not used.)
66	DA05	Output	When PSSL = "H", DA05 output. When PSSL = "L", UFGS output. (Not used.)
67	DA06	Output	When PSSL = "H", DA06 output. When PSSL = "L", $\overline{\text{WFCK}}$ output. (Not used.)
68	DA07	Output	When PSSL = "H", DA07 output. When PSSL = "L", FCKV output. (Not used.)
69	DA08	Output	When PSSL = "H", DA08 output. When PSSL = "L", FCKX output. (Not used.)
70	DA09	Output	When PSSL = "H", DA09 output. When PSSL = "L", $\overline{\text{PLCK}}$ output. (Not used.)
71	DA10	Output	When PSSL = "H", DA10 output. When PSSL = "L", $\overline{\text{LRCK}}$ output. (Not used.)
72	DA11	Output	When PSSL = "H", DA11 output. When PSSL = "L" C4LR output. (Not used.)
73	VDD		Power supply terminal. +5V
74	DA12	Output	When PSSL = "H", DA12 output. When PSSL = "L", $\overline{\text{DENL}}$ output. (Not used.)
75	DA13	Output	When PSSL = "H", DA13 output. When PSSL = "L", $\overline{\text{DENR}}$ outut. (Not used.)
76	DA14	Output	When PSSL = "H", DA14 output. When PSSL = "L", $\overline{\text{C210}}$ output.
77	DA15	Output	When PSSL = "H", DA15 output. When PSSL = "L", C210 output. (Not used.)
78	DA16	Output	When PSSL = "H", DA16 (parrallel audio MSB) output. When PSSL = "L", DATA output.
79	WDCK	Output	88.2 kHz strobe signal output
80	LRCK	Output	44.1 kHz strobe signal output

Notes:

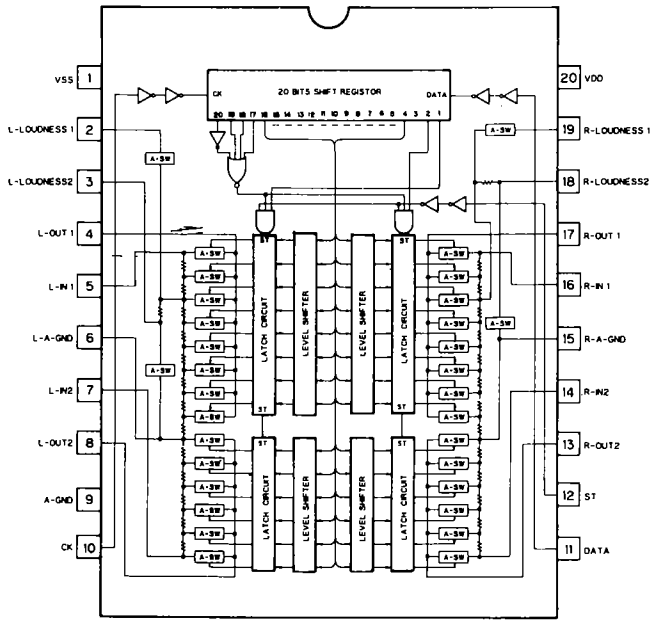
C1F1:
C1F2: [C1 decode error correction status monitor output.]

C2F1:
C2F2: [C2 decode error correction status monitor output.]

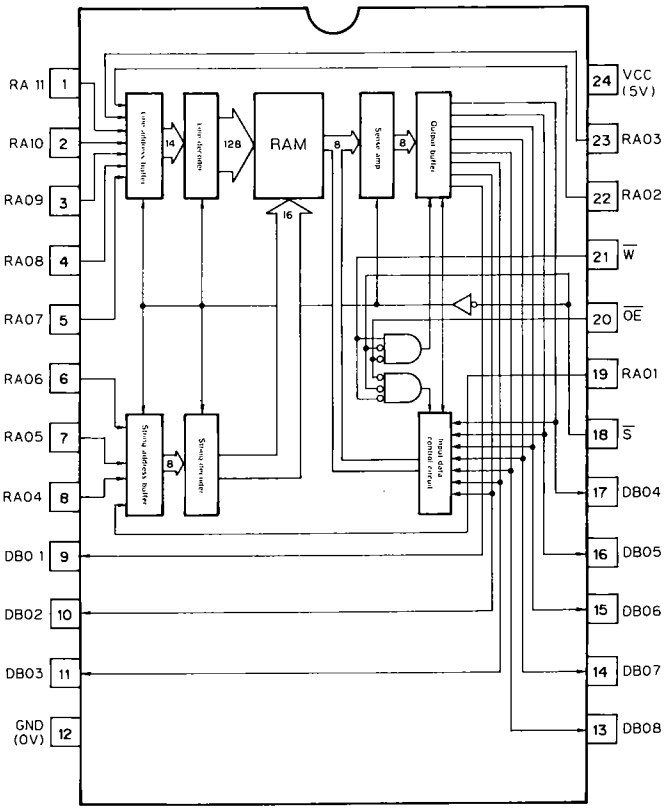
UGFS: Unprotected frame sync pattern output.
$\overline{\text{WFCK}}$: WFCK invert output.
FCKV: WFCK/4 or WFCK/8 output.
FCKX: RFCK/4 or RFCK/8 output.
$\overline{\text{PLCK}}$: VCO/2 output. When locked to EFM signal, f = 4.3218 MHz.
C4LR: 176.4 kHz strobe signal
$\overline{\text{DENL}}$: L-ch serial data enable signal.
$\overline{\text{DENR}}$: R-ch serial data enable signal.
$\overline{\text{C210}}$: C210 invert output.
C210: Bit clock output. f = 2.1168 MHz.
DATA: Audio signal serial data output.

TC9177P

See page 43 for function of terminals.



*M5M5117FP

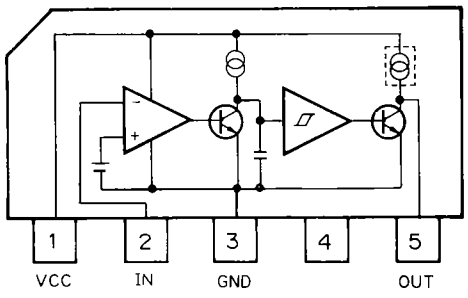


M5M5117FP Terminal Functions

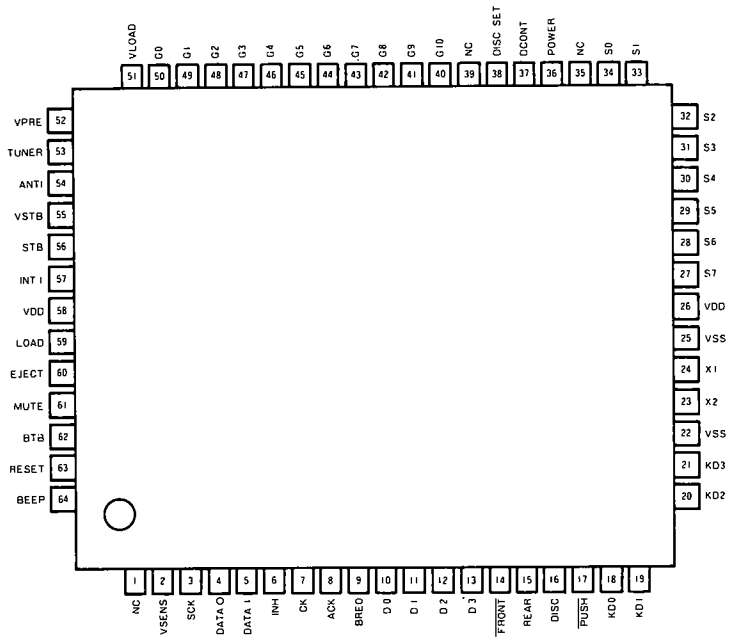
RAM

Pin No.	Pin name	I/O	Function and operation
1 – 8	RA11 – RA04	Input	Address input
9 – 11	DB01 – DB03	I/O	Data I/O
12	GND		0V
13 – 17	DB08 – DB04	I/O	Data I/O
18	$\overline{S}$	Input	Chip select input. "L" during write-in and read out.
19	A10	Input	Address input
20	$\overline{OE}$	Input	Output enable input. "L" during read out.
21	$\overline{W}$	Input	Write control input. "L" during wite-in, "H" during read out.
22, 23	RA02, RA03	Input	Address input.
24	Vcc		+5V

M51956BL



*PD4096B



PD4096B Terminal Functions

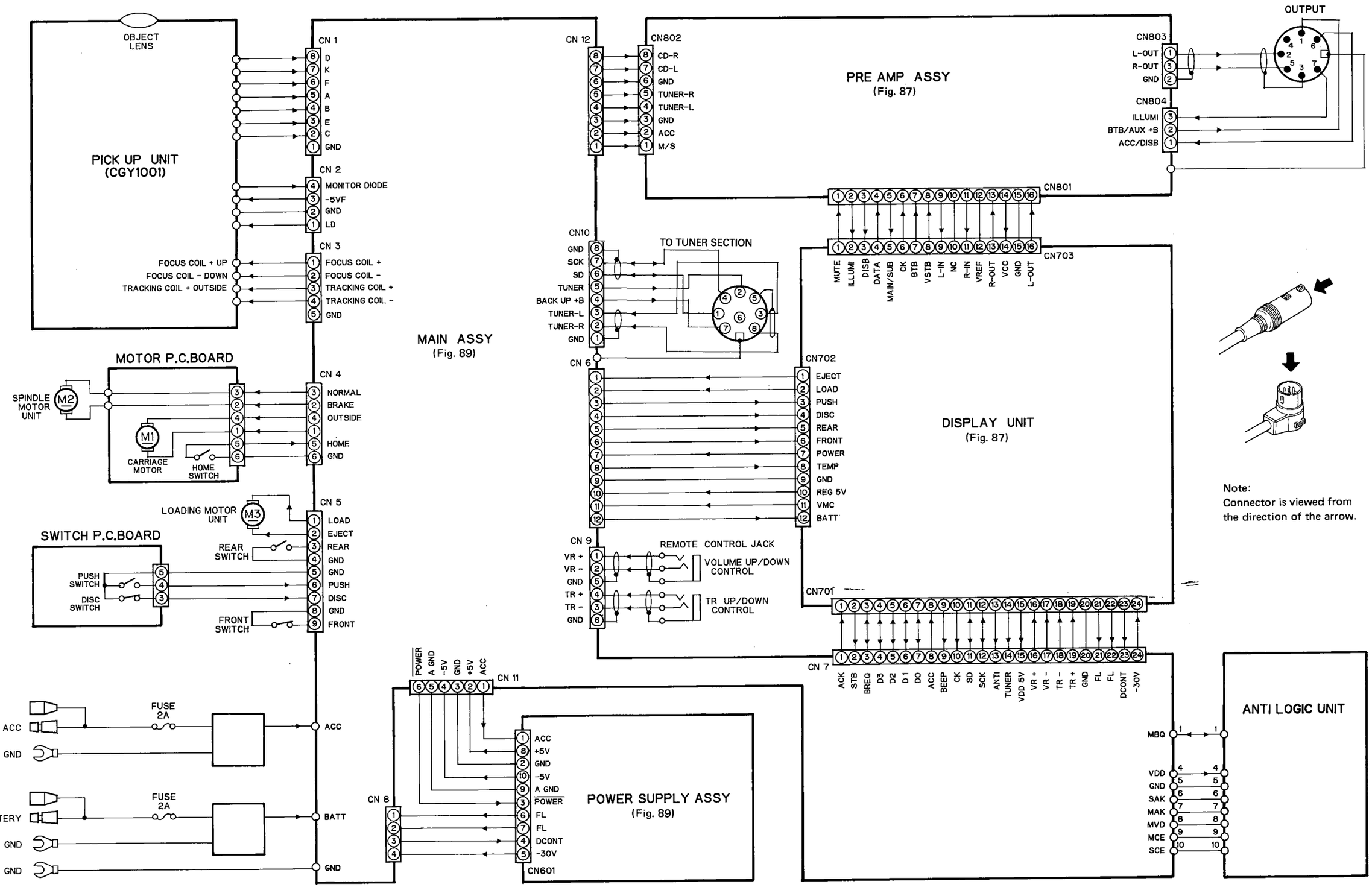
System Controller

Pin No.	Pin Name	I/O	Functions and Operation
1	NC		
2	VSENS	Input	ACC, back-up voltage sensor terminal. CMOS input.
3	SCK	Input Output	Serial interface clock input/output terminal. For the tuner. CMOS input/output.
4	DATA 0	Output	Serial interface data output terminal. For the tuner. CMOS output.
5	DATA I	Input	Serial interface data input terminal. For the tuner. CMOS input.
6	INH	Input	The IC operates when "H." Becomes "L" and stops when DIS B is input with a sub-system. CMOS input.
7	CK	Output	Serial interface clock output for the electronic volume and anti-theft IC. CMOS output.
8	ACK	Input Output	The data line for the electronic volume, anti-theft IC and the communication line for the CD controller. Output for the volume, input for the CD controller. CMOS input/output.
9	BREQ	Input Output	Communication line for the electronic volume and CD controller. CMOS input/output.
10~13	D0~D3	Input Output	Parallel data input/output for the CD controller. CMOS input/output.
14	$\overline{\text{FRONT}}$	Input	FRONT switch sensor terminal. CMOS input. This terminal detects whether or not the plate unit (mechanical parts) is in front. "H" during loading and Disc Set.
15	REAR	Input	REAR switch sensor terminal. CMOS input. This terminal detects whether or not the plate unit (mechanical parts) is in the rear. "H" when loading is completed.
16	DISC	Input	DISC switch sensor terminal. CMOS input. This terminal detects whether or not a disc is loaded. "H" when a disc is loaded.
17	$\overline{\text{PUSH}}$	Input	PUSH switch sensor terminal. CMOS input. This terminal detects whether or not a disc is pushed. "L" when a disc is pushed.
18~21	KD0~KD3	Input	The KEY data input terminal for the S6-S0 matrix. CMOS input.
22	VSS		GND
23	X2	Output	X'tal connection terminal.

Pin	Pin Name	I/O	Functions and Operation
24	X1	Input	Count clock input terminal. 4.19 MHz.
25	VSS		GND
26	VDD		Power supply terminal
27	S7	Output	Display segment data (h). Pch drain output.
28	S6	Output	Display segment data (g) and KEY strobe output. Pch drain output.
29	S5	Output	Display segment data (f) and KEY strobe output. Pch drain output.
30	S4	Output	Display segment data (e) and KEY strobe output. Pch drain output.
31	S3	Output	Display segment data (d) and KEY strobe output. Pch drain output.
32	S2	Output	Display segment data (c) and KEY strobe output. Pch drain output.
33	S1	Output	Display segment data (b) and KEY strobe output. Pch drain output.
34	S0	Output	Display segment data (a) and KEY strobe output. Pch drain output.
35	NC		
36	POWER	Output	Servo system DC/DC converter control terminal and CD controller reset. Pch drain output.
37	DCONT	Output	FL display DC/DC converter control terminal. Pch drain output. "H" when on.
38	DISC SET	Output	LED (DISC SET) control terminal. Pch drain output. "H" when a disc is set.
39	NC		
40 ~ 50	G10 ~ G0	Output	FL grid output. Pch drain output.
51	VLOAD	Input	FL driver power supply. − 30V.
52	VPRE		GND
53	TUNER	Output	Tuner chip enable. "H" when ACC is on. "L" when the tuner is off. CMOS output.
54	ANTI	Output	Anti-theft chip enable terminal.
55	VSTB	Output	Electronic volume and strobe signal. Becomes "H" after data transfer. CMOS output.
56	STB	Output	Communications strobe signal for the CD controller. CMOS output.
57	INT1	Input	Interrupt input. CMOS input.
58	VDD		+ 5V power supply terminal.
59	LOAD	Output	Disc load control signal. CMOS output. "H" for load.
60	EJECT	Output	Disc eject control terminal. CMOS output. "H" for eject.
61	MUTE	Output	Pre-amp output stage mute control output. CMOS output. "H" when mute is on.
62	BTB	Output	Pre-amp power supply control terminal. CMOS output. "H" when the pre-amp is on. Becomes AUX +B ON for a sub-system.
63	RESET	Input	Microcomputer reset input terminal. "H" when reset.
64	BEEP	Output	Buzzer drive output.

14. SCHEMTIC DIAGRAM AND P. C. BOARD PATTERNS (CONTROL SECTION)

14.1 OVERALL CONNECTIONS DIAGRAM

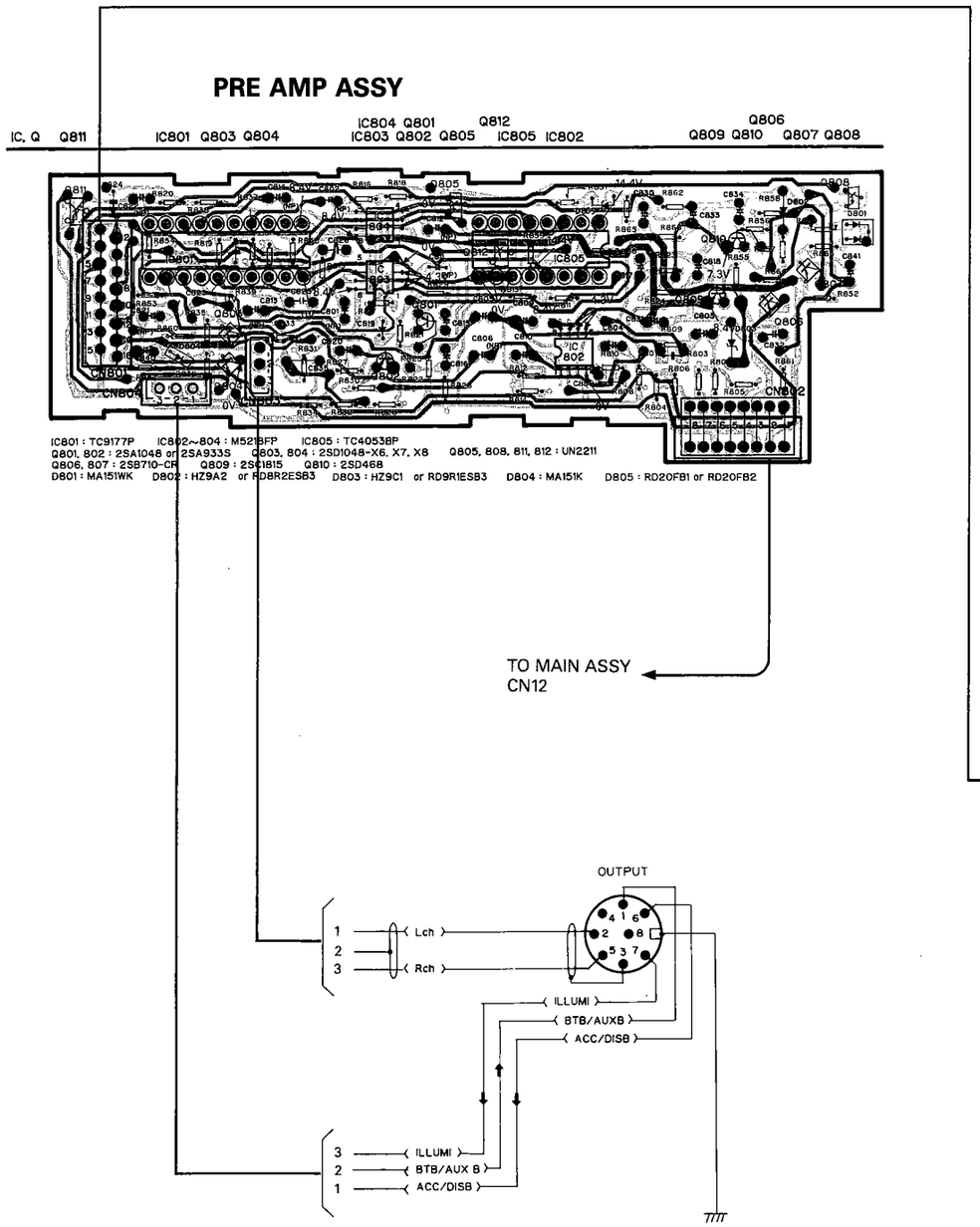


Note:
Connector is viewed from the direction of the arrow.

Fig. 85

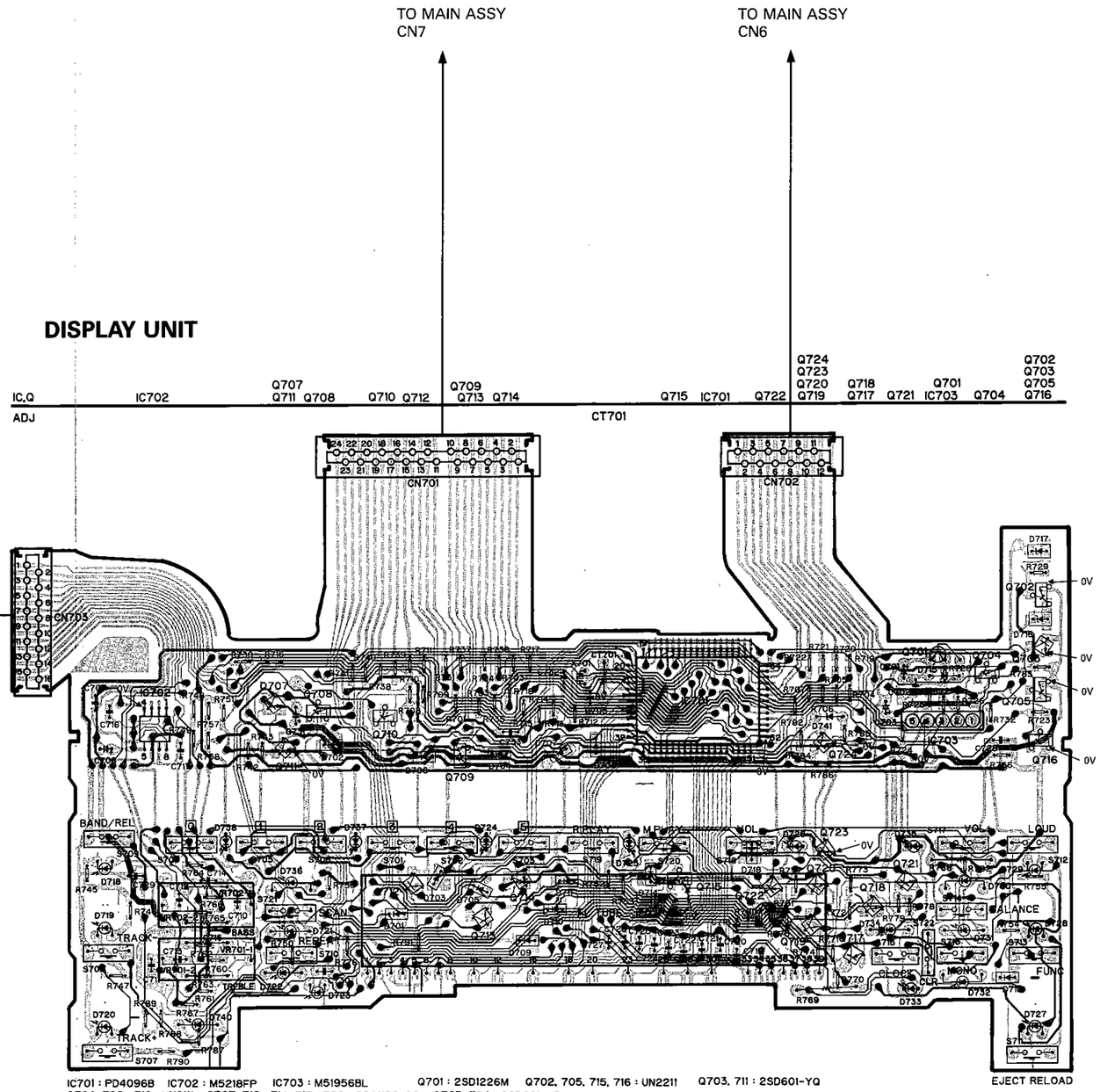
4.2 CONNECTION DIAGRAM (1)

PRE AMP ASSY



IC801 : TC9177P IC802~804 : M5218FP IC805 : TC4053BP
Q801, 802 : 2SA1048 or 2SA933S Q803, 804 : 2SD1048-X6, X7, X8 Q805, 808, 811, 812 : UN2211
Q806, 807 : 2SB710-CR Q809 : 2SC1815 Q810 : 2SD468
D801 : MA151WK D802 : HZ9A2 or RD8R2ESB3 D803 : HZ9C1 or RD9R1ESB3 D804 : MA151K D805 : RD20FB1 or RD20FB2

DISPLAY UNIT



IC701 : PD4096B IC702 : M5218FP IC703 : M51956BL Q701 : 2SD1226M Q702, 705, 715, 716 : UN2211 Q703, 711 : 2SD601-YQ
Q704, 708~710 : UN2111 Q707, 712~714, 717~722 : 2SA1162-SG Q723, 724 : 2SD601-YR
D701~714 : MA151 K D715 : HZ6L81 D716 : MA3200 D717 : MA3068 D718~720, 723, 727~729, 733 : BG4524K D721, 722, 730~732, 734, 736 : LN31GC6V
D724~726, 735, 737, 738 : BG5724K D740 : LN81RC5V D741 : RD4R7ESB3 or MTZ4R7JC

Fig. 86

20. ELECTRICAL PARTS LIST

NOTE:
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 × 10¹*	*561*	*..... RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³*	*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 × 10¹*	*..... RN1/4SR 5 6 2 1 F*

- *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 whose parts numbers are omitted are subject to being not supplied.*
- *The part numbers shown below indicate chip components.*
  Chip Resistor
  RS1/8S □□□J, RS1/10S □□□J
  Chip Capacitor (except for CQS.....)
  CKS....., CCS....., CSZS.....

Main Assy

MISCELLANEOUS

Mark	Symbol & Description	Part No.
★★	IC1	CX20109
★★	IC2	IR3C05
★★	IC101	CX20108
★★	IC102, 103, 203	M5218FP
★★	IC104, 105	PA3021A
★★	IC201	CX23035
★★	IC202	M5M5117FP
★★	IC204	PD8019E
★★	IC301	CX20133
★★	IC302, 304	M5221FP
★★	IC303	TC4053BF
★★	IC305, 306	KHA210A
★★	IC307	PDH001
★★	IC401	M54546AL
★★	Q101, 304, 305, 308, 309 Chip Transistor	2SD1048-X6 or 2SD1048-X7 or 2SD1048-X8
★★	Q201 – 203, 303 Chip Transistor	UN2211
★★	Q204, 306, 307 Chip Transistor	UN2111
★★	Q205	UN4216
★★	Q206	UN421D
★★	Q301, 302 Chip Transistor	2SK508-K52 or 2SK508-K53
★★	Q401	2SC3074
★	D101	MTZ5R6JC
★	D102 – 109	ERA82-004Y
★	D110, 901 – 903	ERA15-02
★	D201 Chip Diode	MA151K
★	D202, 203 Chip Diode	MA153
★	D204	KV1226Y
★	D205 Chip Diode	MA151WK
★	D301 Chip Diode	MA151WA
★	D401 Chip Diode	MA3075
	L1, 2 Ferri-Inductor	CTF1007
	L201 Coil	CTA1001
	L301 Inductor	CTF1006
★	TH1 Thermister	CCX-021
★★	VR1 Semi-fixed, 47kΩ(1B)x4	CCP1003
★★	VR2 Semi-fixed, 10kΩ(1B)x3	CCP1004
★	ZNR901 Surge Absorber	ERZ-C07DK220
	X1 Buzzer	CPV1005
	X201 X'tal	CSS1009
	X202 Ceramic Resonator	CSS-042
	X301 X'tal	CSS1008
★★	S1 Switch (Main/Sub)	HSH-156
★★	FU1 Fuse, 4A	CEK1002

RESISTORS

Mark	Symbol & Description	Part No.
	R15	RS1/2P150JL
	Other Resistors	RS1/10S□□□J

CAPACITORS

Mark	Symbol & Description	Part No.
	C1, C18	CSYA100M6R3OS
	C2, 6, 7, 16, 17, 19, 20, 101, 102, 107, 115, 119, 126, 130, 139, 202 – 204, 206, 213, 224, 301, 316, 317, 322, 323, 329, 401	CKSYB103K50L
	C4, 5	CCSQSL151J50
	C8, 9, 15	CEA220M10LS
	C10, 312, 313	CSZSR47M20
	C11	CKSYB333K25
	C13, 14, 109	CCSQSL101J50
	C103	CSZS220M10
	C104, 124	CEA100M6R3LS
	C105, 106	CEA010M50NPLL
	C108	CCSQSL561J50
	C110	
	C111, 112	CEA100M10NPLL
	C113, 207	CCSQCH271J50
	C114	CKSYB183K25L
	C116, 118	CKSYB563K25
	C120	CCSQSL152J50
	C121, 901, 903, 905	CKSYB473K25
	C123, 306, 310, 311	CCSQSL102J50
	C125, 129, 205, 210, 211	CKSYB222K50L
	C127 1000μF/16V	CCH1003
	C128, 132	CEA100M10LS
	C133, 134, 218	CKSYF224Z25
	C135, 136	CSYA220M6R3OS
	C201	CSZS2R2M6R3
	C208, 209	CCSQCH390J50
	C212, 219, 220, 304	CCSQCH330J50
	C214, 215, 302, 309	CSZA6R8M16L
	C216, 217	CCSQCH220J50
	C221, 222, 303	CSZS010M10
	C307	CCSQCH470J50
	C308, 320, 321, 328	CSYA6R8M6R3OS
	C314, 315	CEA220M6R3LS
	C318, 319	CCSQSL391J50
	C326, 327 33μF/6.3V(NP)	GGF-809
	C402	CSYA220M10OS
	C902, 906	CCG-104
	C904, 908	CEA101M16LL

Display Unit

MISCELLANEOUS

Mark	Symbol & Description	Part No.
★★	IC701	PD4096B
★★	IC702	M5218FP
★★	IC703	M51956
★★	Q701	2SD1226M
★★	Q702, 705, 715, 716 Chip Transistor	UN2211
★★	Q703, 711 Chip Transistor	2SD601-YQ or 2SD601-YR
★★	Q704, 708 – 710 Chip Transistor	UN2111
★★	Q707, 712 – 714, 717 – 722 Chip Transistor	2SA1162-SG or 2SA1162-SY
★★	Q723, 724 Chip Transistor	2SD601-YR
★	D701 – 714 Chip Diode	MA151K
★	D715	HZ6LB1
★	D716 Chip Diode	MA3200
★	D717 Chip Diode	MA3068
★	D718 – 720, 723, 727 – 729, 733 LED	BG4524K
★	D721, 722, 730 – 732, 734, 736 LED	LN31GC6V
★	D724 – 726, 735, 737, 738 LED	BG5724K
★	D740 LED	LN81RC5V
★	D741 LED	RD4R7ESB3 or MTZ4R7JC
	CT701 Trimmer	CCG-070
★★	VR701, 702 Volume (BASS, TREBLE), 50kΩ (1B)	CCS1030
	X701 X'tal	CSS1003
★★	S701 – 722 Switch	CSG-255
	FL Tube	CAW1012

RESISTORS

Mark	Symbol & Description	Part No.
	R738, 739 – 759, 787 – 789	RS1/8S□□□J
	R768, 769	RS1/2P□□□JL
	Other Resistors	RS1/10S□□□J

CAPACITORS

Mark	Symbol & Description	Part No.
	C701	CEA221M6R3LL
	C702	CKSYB103K50L
	C703	CEA220M16LS
	C705	CCSQCH090D50
	C706	CEA100M6R3LS
	C707	CKSYF473Z50
	C710 – 713	CCSQSL182J50
	C714, 715	CKSYB333K25
	C716, 717	CCSQCH330J50
	C718 – 727	CCSQSL101J50
	C728, 733	CKSYB473K25
	C729, 730	CKSQYB223K25
	C731 470μF/16V	CCH-114
	C732	CCSSL471J50L

Tuner Unit

MISCELLANEOUS

Mark	Symbol & Description		Part No.
★★	IC51		LA1140B
★★	IC101		LA2110
★★	IC151		LA3430
★★	IC201		LA1135
★★	IC501		μPB553AC
★★	IC502		PD4084A
★★	IC601		AN6540
★★	Q51, 54, 91, 151, 202, 203, 209, 502, 521, 524, 609		2SC2458 or 2SC1740S
★★	Q52, 152, 210, 602, 604, 606		DTC124ES or UN4212
★★	Q201		2SK435
★★	Q501		2SC3113
★★	Q503		2SA1048
★★	Q522, 523		DTA124ES
★★	Q601		2SB772
★★	Q603, 605		2SA1150
★★	Q851, 852		2SA838
★★	Q853		2SD1012
★★	Q854		2SD1012 or 2SD1468S
★	D151, 201 – 204, 503, 504, 521, 522, 523, 525, 601, 851 – 855		US1040M or 1SS176
★	D205		KV1235Z3 or KV1235Z5
★	D501, 524		RD5R1JSB1 or RD5R1JSB2 or MTZ5R1JA or MTZ5R1JB
★	D502, 602		RD5R6JSB2 or HZS5R6JB2
	L51	Micro Inductor	LAU2R7M
	L52, 53	Inductor	LAU150K
	L201	Ferri-Inductor	LAU101K
	L202	Micro-Inductor	LAUR68M
	T51	Coil	CTC-198
	T201	Coil	CTB-149
	T202	Coil	CTB-202
	T203, 204	Coil	CTB-172
	T205	Coil	CTE-205
	T206	Coil	CTE-160
	T207	Coil	CTB-164
★★	VR51	Semi-fixed, 330kΩ (B)	CCP-254
★★	VR101	Semi-fixed, 10kΩ (B)	CCP-245
★★	VR151	Semi-fixed, 150kΩ (B)	CCP-252
★★	VR152	Semi-fixed, 150kΩ (B)	CCP-246
	CF51	FM Ceramic Filter	CTF-101
	CF201	Filter	CTF-100 or CTF-240
	CF202	Ceramic Resonator	CTF-247
	CR101		CWW-107
	IB501		CWW1020
	IB502		CWW1022
	X151	Ceramic Resonator	CSS1002
	X521	X'tal Resonator	CSS-046

RESISTORS

Mark	Symbol & Description	Part No.
	R54, 57, 60, 61, 92, 93, 105, 151 – 153, 156 – 158, 230, 501, 502, 528 – 531, 537, 538	RS1/8S□□□J
	Other Resistors	RD1/4PS□□□JL

CAPACITORS

Mark	Symbol & Description	Part No.
	C51 – 54, 59, 92, 151, 162, 203, 205	CKSYF473Z50
	C55, 62	CCSSL330J50
	C56, 63, 216	CEAR47M50L2
	C57, 101, 102, 201, 213, 224, 501, 502, 508	CKSYB103K50
	C58, 156, 206, 524, 602	CEA010M50L2
	C60	CCSSL101J50
	C61	CEA4R7M16NPLL
	C91, 853, 854	CKSYB102K50
	C93, 607	CCSSL471J50
	C94, 153, 208, 606	CKSYB223K50
	C95	CCSUJ471J50
	C103, 105, 161, 204, 226	CEA470M16L2
	C104	CKSYB182K50
	C152	CKSYB332K50
	C154	CKSYB153K50
	C155, 217	CEA3R3M50L2
	C157	CSZAR22M35
	C159, 160	CKSYB333K25
	C202	CKSYB222K50
	C207, 210	CCSCH100D50
	C209	CCSCH010C50
	C211, 212, 214, 215, 225, 233, 504, 523, 857	CKSYF473Z50
	C218, 604, 851, 852, 859, 860	CEA4R7M35L2
	C219, 236	CKSYB473K25
	C220	CCSUJ220J50
	C222	CCSUJ560J50
	C223	CQPA431G100
	C237	CCSSL220J50
	C505, 603, 609	CEA101M10L2
	C506, 507, 855, 856	CEA100M16L2
	C509	CEA220M16L2
	C510	CEA101M16LL
	C521, 522	CCSCH090D50
	C525	CEA2R2M50L2
	C526	CEAR33M50L2
	C601	CKSYF104Z25
	C605, 858	CEA471M10
	C608	CEA221M10

FM Front End (CWB1011)

MISCELLANEOUS

Mark	Symbol & Description		Part No.
★★	IC1		CWW1015 or CWW-173
★★	IC2		PA4009
★★	Q1, 3		2SK241
★★	Q2		2SC2753 or 2SC2570
★	D1		KV1310A-3
	L1	Coil	CTC1001
	L2	Coil	CTC1002
	L3	Coil	CTC1003
	L4	Inductor	CTF-185
	T1	Coil	CTC1005
	T2	Coil	CTC1004
	CF1, 2	FM Ceramic Filter	CTF-101

RESISTORS

Mark	Symbol & Description	Part No.
	R3, 4	RD1/4PS□□□JL
	R13	RD1/4PS680JL or RD1/6PS680J
	Other Resistors	RS1/8S□□□J

CAPACITORS

Mark	Symbol & Description	Part No.
	C1	CCSSH330J50
	C2	CCSSH390J50
	C3	CCSCH060D50 or CCSCH060C50
	C4	CCSTH060C50 or CCSTH060D50
	C5, 11, 15, 20	CKSYB222K50
	C6	CCSCH040C50
	C7, 10	CKSYB103K50
	C8	CCSCH100D50
	C9	CCSSH560J50
	C12, 18	CCSTH150J50
	C13	CCSTH330J50
	C14	CCSTH100D50
	C16, 19, 21	CKSYB223K50
	C17	CCSUJ080D50
	C22	CEA2R2M35LS
	C23	CEA3R3M25LS
	C24	CCSSH030C50

Anti Logic Unit

Mark	Symbol & Description		Part No.
★★	IC952		TC4538BF
★★	Q951	Chip Transistor	UN2211
★	D951	Chip Diode	MA151WK
	R955 – 960		RS1/10S□□□J
	C952, 953		CKSQYB103K50
	C954		CKSQYB472K50
	C955		CSZSR22M35L

Power Supply Assy

MISCELLANEOUS

Mark	Symbol & Description		Part No.
★★	IC601		KHA803
★★	Q601		2SB822F
★★	Q602	Chip Transistor	UN2211
★	D603	Chip Diode	MA3075
★	D604		ERA15-02
	L601, 602	Coil	CTH-035
	L603	Coil	CTH1006
	L604	Ferri-Inductor	CTF-078
	L605	Transformer	CTX1005

RESISTORS

Mark	Symbol & Description	Part No.
	R601 – 608	RS1/8S□□□J

CAPACITORS

Mark	Symbol & Description		Part No.
	C606	1000μF/16V	CCH1003
	C607, 610		CEAUH221M10
	C608, 611, 615, 617 – 619		CKSYF473Z50
	C612		CEA101M16LL
	C613		CSYA1R5M25OS
	C614		CEA330M25LL
	C616		CEA330M35LL
	C622		CCG-104

Pre Amp Assy

MISCELLANEOUS

Mark	Symbol & Description	Part No.
★★	IC801	TC9177P
★★	IC802 – 804	M5218FP
★★	IC805	TC4053BP
★★	Q801, 802	2SA1048 or 2SA933S
★★	Q803, 804 Chip Transistor	2SD1048-X6 or 2SD1048-X7 or 2SD1048-X8
★★	Q805, 808, 811, 812 Chip Transistor	UN2211
★★	Q806, 807 Chip Transistor	2SB710
★★	Q809	2SC1815
★★	Q810	2SD468
★	D801 Chip Diode	MA151WK
★	D802	HZ9A2 or HZ9A3 or RD8R2ESB3
★	D803	HZ9C1 or HZ9C2 or RD9R1ESB3
★	D804 Chip Diode	MA151K
★	D805	RD20FB1 or RD20FB2

RESISTORS

Mark	Symbol & Description	Part No.
	R803 – 840, 850 – 868	RS1/8S□□□J

CAPACITORS

Mark	Symbol & Description	Part No.
	C801, 802, 811, 812, 821, 822	CEA010M50NPLL
	C803, 804, 809, 810, 815, 816	CEANL100M16LL
	C805, 806	CEA100M16NPLL
	C807, 808	CCSSL330J50
	C813, 314	CEA4R7M16NPLL
	C817, 818, 830, 832	CEA221M10L2
	C819, 820	CEANL220M16LL
	C823, 824	CCSSL331J50
	C825, 826	CQMA273J50L
	C831	CEA221M10L2
	C833	CEA470M16L2
	C834	CEA470M10L2
	C835	CQEA473J50
	C840	CEA100M16LL
	C841	CEA470M6R3L2

Switch P.C. Board

Mark	Symbol & Description	Part No.
★★	S2, 3 Switch (Push, Disc)	CSN-094

Motor P.C. Board

Mark	Symbol & Description	Part No.
★★	M1 Motor Unit (Carriage)	CXA1188
★★	S1 Switch (Home)	CSN-094

Miscellaneous Parts List

Mark	Symbol & Description	Part No.
	Pickup Unit	CGY1001
★★	M2 Motor Unit (Spindle)	CXM1005
★★	M3 Motor Unit (Loading)	CXA1189
★★	S4, 5 Switch (Front, Rear)	CSN-094

21. PACKING METHOD

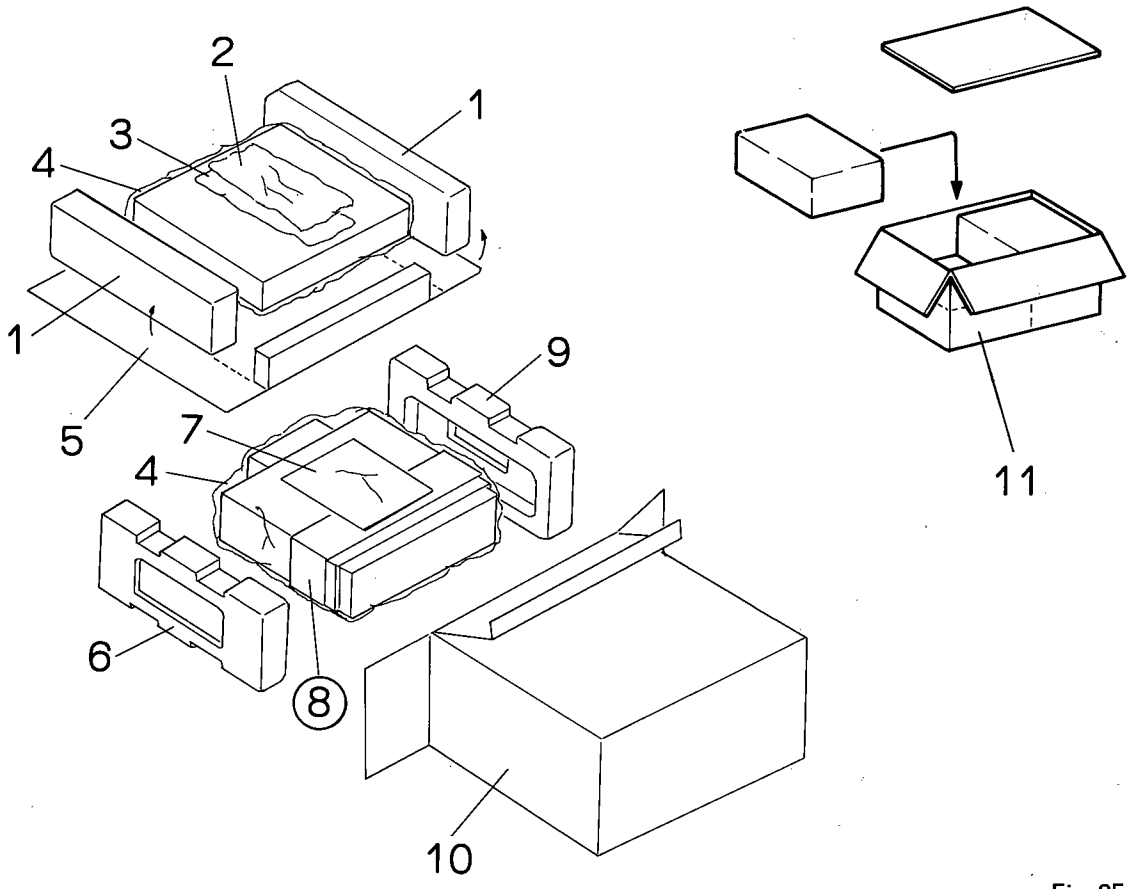


Fig. 95

● Parts List

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	CHP1038	Styrofoam		2-9-5.	NF50FMC	Nut
	2.	CEA-866	Accessory Kit		2-9-6.	WS40FMC	Washer
	2-1.	CBA1002	Screw		3.	CXA1610	Remote Control Assy
	2-2.	CDE-437	Cord		4.	CEG-157	Cover
	2-3.	CDF-714	Cord		5.	CHP1031	Protector
	2-4.	CDH-048	Sub Feeder		6.	CHP1028	Styrofoam
	2-5.	CNF-111	Strap		7.	CNB1044	Panel
	2-6.	CNF-382	Lever			CNW-757	Holder
	2-7.	CNM-667	Fastener			CRB1041	Owner's Manual
	2-8.	CNV1009	Bush		8.		Holder
	2-9.		Screw Kit		9.	CHP1029	Styrofoam
	2-9-1.	CBA-028	Screw for Strap		10.	CHG1079	Carton
	2-9-2.	CBA-101	Screw		11.	CHL1079	Contain Box
	2-9-3.	CBA-102	Screw				
	2-9-4.	NF40FMC	Nut				