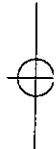


CD-ROM DRIVE UNIT

CR-589-B / CR-589-C



INSTRUCTION MANUAL

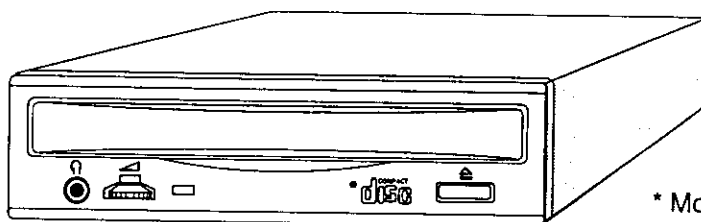
Please read through these instructions before operating this unit.

Interface : ATAPI



CD-ROM DRIVE UNIT CR-589-B / CR-589-C INSTRUCTION MANUAL

Please read through these instructions before operating this unit.
Interface : ATAPI



* Model CR-589-B

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IMPORTANT SAFETY NOTICE

NOTICE

- (1) You may not reproduce or transcribe any part of this publication without permission.
- (2) We reserve the right to revise this document at any time without notice.
- (3) If you have any questions about this document, contact your sales representative.

SAFETY NOTICE

- (1) To prevent fire or electric shock, do not expose this appliance to rain or moisture.
- (2) To avoid electric shock or damage to the eyes due to laser beam, do not attempt to disassemble the cabinet.

For USA (Model CR-589-B only)

FEDERAL COMMUNICATIONS COMMISSION (FCC) RADIO FREQUENCY INTERFERENCE STATEMENT

Class B Computing Device

NOTE : This equipment has been tested and found to comply with the limits for a Class **B** digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and , if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures :

- - Reorient or relocate the receiving antenna.
- - Increase the separation between the equipment and receiver.
- - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- - Consult the dealer or an experienced radio/TV technician for help.

FCC WARNING : Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

LASER SAFETY INFORMATION

Class 1 LASER Product

This equipment is certified to comply with DHHS Rule 21 CFR Chapter 1, Subchapter J in effect as of date of manufacture.

Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN60825 for Class 1 laser products.

Class 1 laser products are not considered to be hazardous. To ensure continued product safety, the following precautions should be heeded.

Caution :

- (1) The use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- (2) The drive is designed to be incorporated into a computer-based system or unit which has an enclosing cover. The drive may not be used as a stand-alone unit.
- (3) Do not open the drive unit; no user adjustments or serviceable parts are inside.

CLASS 1 LASER PRODUCT
LASER KLASSE 1
LUOKAN 1 LASERLAITE
KLASS 1 LASER APPARAT
APPAREIL A LASER DE CLASSE 1
EN60825

- This label is attached to the upper shield at the top of the drive unit.
- Dieses Etikett ist auf der oberen Abschirmung oben auf der Laufwerkseinheit angebracht. (For German)
- Märkningen återfinns på den översta kåpan överst på drivenheten. (For Sweden)
- Denne merkelappen er festet til det øverste dekselet på toppen av spilleren. (For Norway)
- Denne etiket er sat fast på den øverste skærm på drev-enhedens top. (For Denmark)
- Tämä etiketti on liimattu voimayksikön yläosan suojalevyyn. (For Finland)

CAUTION -INVISIBLE
LASER RADIATION WHEN OPEN
DO NOT STARE INTO BEAM OR VIEW
DIRECTLY WITH OPTICAL INSTRUMENTS

VORSICHT -UNSICHTBARE
LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET
NICHT IN DEN STRAHL BLICKEN
AUCH NICHT MIT OPTISCHEN INSTRUMENTEN

ADVARSEL -USYNLIG
LASERSTRÅLING VED ÅBNING
SE IKKE IND I STRÅLEN - HELLER
IKKE MED OPTISKE INSTRUMENTER.

ADVARSEL -USYNLIG
LASERSTRÅLING NÅR DEKSEL ÅPNES.
STIRR IKKE INN I STRÅLEN ELLER SE
DIREKTE MED OPTISKE INSTRUMENTER.

VARNING -OSYNLIG
LASERSTRÅLNING NÅR DENNA DEL ÄR ÖPPNAD
STIRRA EJ IN I STRÅLEN OCH BETRÄKTA
EJ STRÅLEN MED OPTISKA INSTRUMENT.

VARO! NÄKYMÄTÖNTÄ AVATTAESSA
OLET ALTTIINA LASERSÄTEIL YLLÄ.
ÄLÄ TUJOTA SÄTEESEEN ÄLÄKÄ
KATSO SITÄ OPTISEN LAITTEEN LÄPI.

- This label is attached to the bottom of the drive unit.
- Diese Aufschrift befand sich auf der Bodenplatte des Gerätes. (For German)
- Märkningen återfinns på drivenhetens undersida. (For Sweden)
- Denne merkelappen er festet til undersiden av spilleren. (For Norway)
- Denne etiket er sat fast i bunden af drev-enheden. (For Denmark)
- Tämä etiketti on liimattu laitteen pohjaan. (For Finland)

For Finland

VAROITUS! Laitteen käyttäminen muulla kuin tässä käyttöohjeessa mainitulla tavalla saattaa altistaa käyttäjän turvallisuusluokan 1 ylittävälle näkymättömälle lasersäteilylle.

For Sweden

VARNING! Om apparaten används på annat sätt än i denna bruksanvisning specificerats, kan användaren utsättas för osynlig laserstrålning, som överskrider gränsen för laserklass 1.

LASER Specification

Type: Semiconductor laser GaAlAs
Wave Length: $790 \pm 25 \text{ nm}$
Divergence: $\theta = 53,5^\circ \pm 1,5^\circ$
Output Power: 0,22 mW

Laser-Daten: (For German)

Typ: GaAlAs-HalbleiterLaser
Wellenlänge: $790 \pm 25 \text{ nm}$
Divergenz: $\theta = 53,5^\circ \pm 1,5^\circ$
Ausgangsleistung: 0,22 mW

Laser- specifikationer: (For Sweden)

Typ: Laserhalvedare GaAlAs
Våglängd: $790 \pm 25 \text{ nm}$
Divergens: $\theta = 53,5^\circ \pm 1,5^\circ$
Uteffekt: 0,22 mW

LASER Spesifikasjon: (For Norway)

Type: Halvleder laser GaAlAs
Bølgelengde: $790 \pm 25 \text{ nm}$
Divergens: $\theta = 53,5^\circ \pm 1,5^\circ$
Utgangseffekt: 0,22 mW

Laser Specifikationer: (For Denmark)

Type: Semiconductor GaAlAs
Bølge-længde: $790 \pm 25 \text{ nm}$
Divergens: $\theta = 53,5^\circ \pm 1,5^\circ$
Udgang-effekt: 0,22 mW

LASERin tekniset tiedot: (For Finland)

Tyyppi: Laserpuolijohdin GaAlAs
Aallon pituus: $790 \pm 25 \text{ nm}$
Hajaantumisen: $\theta = 53,5^\circ \pm 1,5^\circ$
Teho: 0,22 mW

INTRODUCTION

CD-ROM is read-only memory using an audio compact disc system as a media package which handles digital data. To enjoy audio CD, please insert the Headphone plug into the Headphone jack.

This drive unit uses CD-ROM discs which bear the following mark.



Only compact discs having this mark can be used with this unit.



CHAPTER 1 PRECAUTIONS WHEN OPERATING

1.1 PRECAUTIONS WHEN TRANSPORTING

To avoid damage

- * Keep the original packing materials for the drive unit.
- * Before you transport the drive unit, remove the disc from the drive unit and repack the drive unit in its original packing.

1.2 INSTALLATION LOCATION

Do not place unit in the following environments.

- * High-temperature, high-humidity, extreme temperature changes.
- * Dusty
- * Excessive vibration/ sudden shock.
- * Inclined place.
- * Direct sunlight.

1.3 PRECAUTIONS FOR USE

- * Never push objects of any kind through the Cabinet slots, never spill liquid of any kind on the unit.
- * Do not place objects on the product.
- * Do not attempt to service this product yourself.
- * Do not open or remove covers.
- * Do not place foreign objects in the disc insertion slot and attempt to operate.
- * Do not use CD-ROM drive when vertically installed. (Horizontal installation type only)

1.4 PRECAUTIONS FOR OPERATION

To avoid error

- * Do not move the drive unit during operation.
- * Do not operate the unit directly after a sudden increase in temperature.

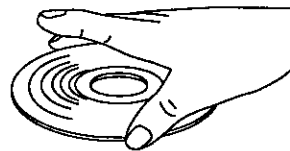
NOTE :

A great proportion of problems are usually caused by the following.

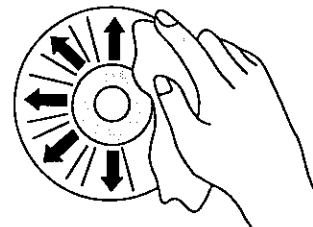
- ① Dust or Finger-prints on the surface of the CD-disc.
- ② Random Electrical Noise.
- ③ Scratches and Defects on the surface of the CD-disc.

1.5 PRECAUTIONS WHEN HANDLING DISCS

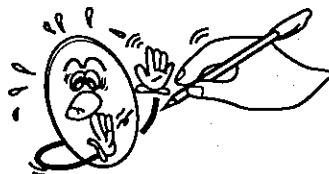
- ① Hold the disc by the edges, do not touch the surface of the disc.



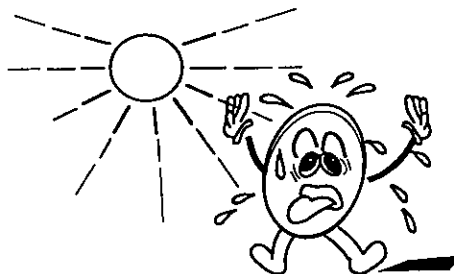
- ② To remove dust or fingerprint, use a clean, soft, dry cloth.



- ③ Do not write on, or paste paper to the surface of the disc.
Should not paste any label to the outer back surface (the label side) of the disc, or it generates drive vibration due to imbalance of the disc.



- ④ Do not store the disc in a place where the temperature is high.



- ⑤ Do not use benzine, thinners and cleaners, etc.



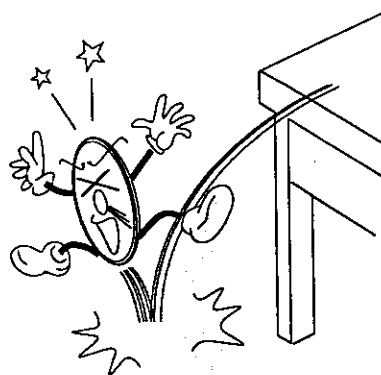
- ⑥ Do not make the center hole larger.



- ⑦ Do not bend the disc.

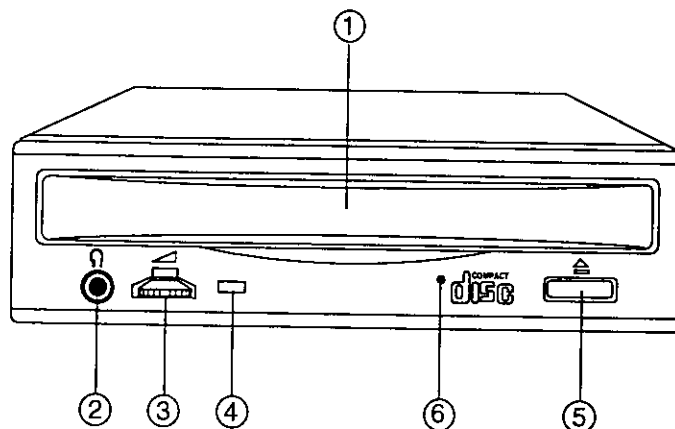


- ⑧ Do not drop the disc, or subject it to shock.



CHAPTER 2 PARTS AND FUNCTIONS

2.1 FRONT VIEW



① DISC TRAY

Accepts a disc.

② HEAD PHONE JACK (Model CR-589-B only)

Headphone can be connected using a 3.5mm stereo mini plug.

③ VOLUME (Model CR-589-B only)

Adjusts audio output level of Headphone.

④ BUSY INDICATOR

Lights when data is being accessed from the disc, or the drive is playing an audio CD.

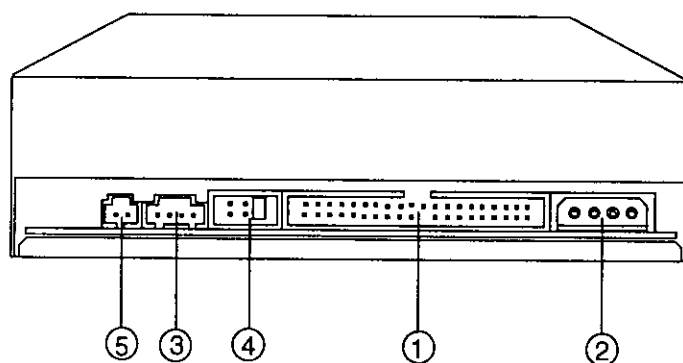
⑤ EJECT/LOAD BUTTON

Ejects and loads the disc tray.

⑥ EMERGENCY EJECT HOLE

Insert an instrument such as straightened paper clip into this hole to manually eject the tray. (See 4.1)

2.2 REAR VIEW



① INTERFACE CONNECTOR

Connects to host computer's interface connector.

② DC (IN) CONNECTOR

③ AUDIO OUT CONNECTOR (Analog)

④ JUMPER PIN

Insert the jumper according to the Master / Slave / CSEL drive. (See the figure in the next page.)

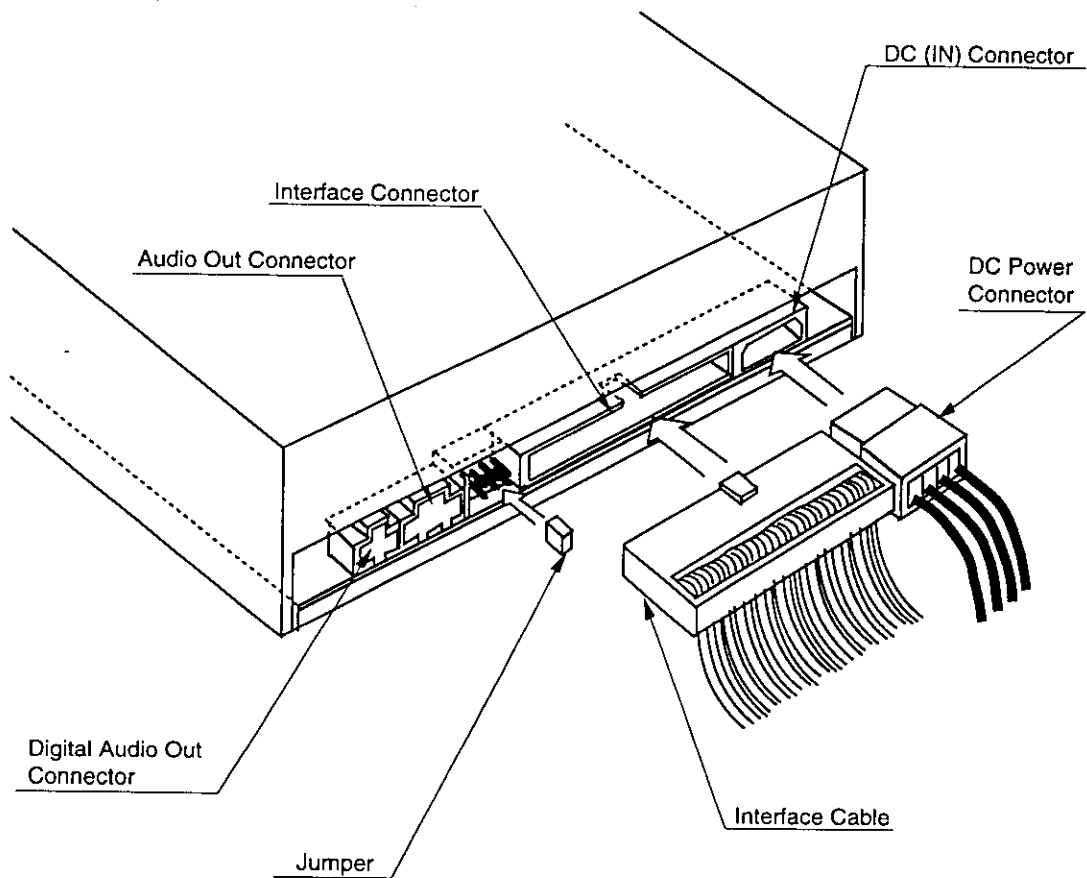
⑤ DIGITAL AUDIO OUT CONNECTOR

NOTE:

The serial format of digital data (not Audio data) output functions with some model.

CHAPTER 3 CONNECTIONS

3.1 CONNECTING VIEW



Drive-Select(Master/Slave/CSEL)



Cable select (CSEL)



Slave



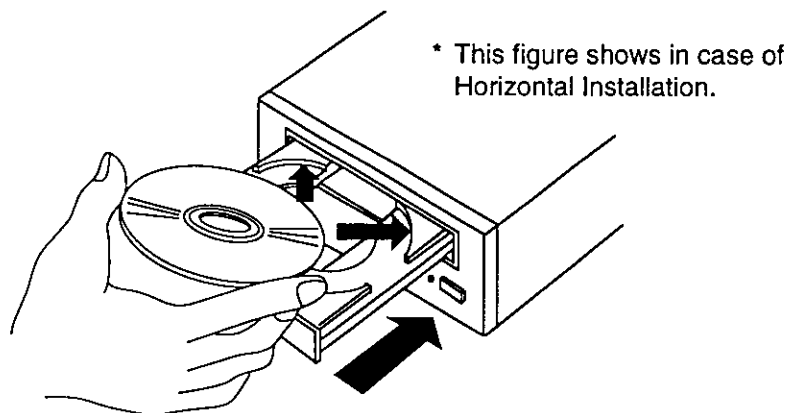
Master (default)

CHAPTER 4 GUIDE TO OPERATION

4.1 INSTALLATIONS

- Starting the drive.

- ① Turn on the power supply.
- ② Press the eject button. The tray is ejected from the drive.
- ③ Place the disc in the tray with the disc's label facing up.
- ④ Press the eject button or press the tray lightly as in the following figure. The tray is retracted automatically.

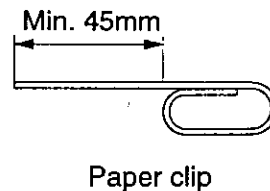


- ⑤ Loading start.

CAUTION:

- Do not insert any foreign objects into the disc tray. This could result in a malfunction.
- Do not manually force the tray to open.
- When the drive is not in use, keep the tray closed to protect against dust and dirt.
- Do not press down hard on the tray when loading a disc, since this may result in damage to or malfunction of the tray.

- In case of emergency, eject the tray manually
If for some reason the tray will not eject automatically, press the eject-bar (for example, insert a straightened paper clip minimum straight length = 45mm, Diameter = 1~ 1.5mm) into the emergency eject hole to manually eject the tray. (Before proceeding with this emergency step, make sure that the power is switched OFF.)



CHAPTER 5 GENERAL DESCRIPTION

5.1 FEATURE SUMMARY

- ① Embedded ATAPI Interface.
- ② Automatic Loading with tray.
- ③ Horizontal and Vertical Installation.
(Vertical : Vertical installation type only, 12 cm Disc only)
- ④ Audio Playback Capability.
- ⑤ MS-DOS CD-ROM Extensions Available.
- ⑥ 5 1/4" Half Height Design.

5.2 SYSTEM SET UP

The ATAPI Devices are selected by the Address field in the Drive Select Register. When a single Device is attached to the interface, it shall be set as Device 0. When the ATAPI Device is attached along with an ATA Mass Storage Device, the ATAPI Device will be set as Device 1 and respond as a Slave.

5.3 POWER SAVING

- ① When the drive waits for a command from the Host for more than five minutes, then the drive enters Power Save Mode. Laser and Spindle motor stop.
- ② Re-start is automatic when the Host Command is received.

NOTE :

- **ATAPI** : AT Attachment Packet Interface.
- **MS-DOS** and **MS Windows** are trademarks or registered trademarks of Microsoft Corporation.
- **IBM PC-AT** and **OS/2** are registered trademarks of International Business Machines Corporation.

CHAPTER 6 SPECIFICATION SUMMARY

6.1 PERFORMANCE

① Disc diameter	12 cm, 8 cm
② Disc speed	
(1X mode) *1	200 ~ 530 r/min (CLV) *6
(32X mode) *2	6322 ~ 7376 r/min (CAV) *7
③ Data capacity	540 MBytes typical (12 cm Disc) 180 MBytes typical (8 cm Disc)
④ Data transfer Rate	
Sequential (1X mode)	150 KBytes/s (Mode 1)
Sequential (32X mode)	2055 ~ 4800 KBytes/s (Mode 1) (mean value; 3300 KBytes/s)
From buffer	16.7 MBytes/s (PIO Mode 4) 16.7 MBytes/s (Multi-word DMA Mode 2) 8.3 MBytes/s (Single word DMA Mode 2)
⑤ Access time *3	
Random access time *4 (1X mode)	420 ms typical
Random access time (32X mode)	100 ms typical
Fullstroke access time *5 (1X mode)	730 ms typical
Fullstroke access time (32X mode)	180 ms typical
⑥ Buffer Size	128 KBytes
MTBF	125,000 POH (duty 20%)

NOTE:

- *1 1x mode: 1x speed mode
 *2 32x mode: 32x speed mode
 *3 Access time:

This drive has two Read Buffer (called Multi-Segment Function). Thus, when we measure the access time that the read between two points is repeated, the cache data in two Read Data Buffers get the cache hit alternately, and the actual access time is not measured (the pick up does not move due to the cache hit).

To measure the actual access time, it is necessary to disable Multi-Segment Function to make the cache invalid. The following is a command to disable the Multi-Segment.

This command is Vendor Unique Command.

The command that disable the Multi-Segment (Command Code = CFh)

CF 00 05 08 00 00 54 00 00 00 00

When several ms of measured data is obtained at 1/3 Stroke and Full Stroke Access time measurement, the drive has the cache hit due to the Multi-Segment Function. If the access time is measured again after issuing the above CFh Command, you can get the access time value which is indicated in Drive Spec.

- *4 Random access time : Average Data read over the complete area from 00 min. 02 sec. 00 block to 59 min. 58 sec. 74 blocks, more than 2000 times including latency and layered error correction time.
- *5 Fullstroke access time : From 00 min. 02 sec. 00 block to 59 min. 58 sec. 74 blocks including latency and layered error correction time.
- *6 CLV : Constant Linear Velocity
- *7 CAV : Constant Angle Velocity

6.2 ERROR RATES

• Soft read errors	Less than 10^{-9}
• Hard read errors	Less than 10^{-12}

6.3 AUDIO PERFORMANCE

(1) Analog audio (Headphone functions with Model CR-588-B only)

① Number of channels	2
② Frequency response	100 Hz ~ 20 kHz (Headphone) 20 Hz ~ 20 kHz (Line-out)
③ SN Ratio	More than 80 dB (Line-out)
④ Distortion	
• Line-out	Less than 0.1% (1 kHz)
• Headphone	Less than 0.2% (1 kHz)
⑤ Output level	
• Line-out	0.60 Vrms
• Headphone	0.60 Vrms

(2) Digital audio

① Output level	TTL level
② Data format	Base a decision on IEC-958

6.4 GENERAL PERFORMANCE

① Power requirement	+5 V $\Rightarrow$ 1.2 A +12 V $\Rightarrow$ 0.8 A
② Dimensions (W x H x D)	146 x 41.3 x 190 mm (exclude Front Bezel)
③ Weight	762 g typ.

6.5 ENVIRONMENTAL CONDITIONS

	Operating	Non-operating
• Temperature	5 ~ 50 °C	- 30 ~ 65 °C
• Humidity	5 ~ 90 %Rh (Non-condensation)	5 ~ 95 %Rh (Non-condensation)

6.6 PICK UP LASER

• Type	Semiconductor laser GaAlAs
• Wave Length	790 ± 25 nm
• Divergence	$\theta = 53.5^\circ \pm 1.5^\circ$
• Output power	0.22 mW

CHAPTER 7 BEFORE REQUESTING SERVICE

7.1 TROUBLESHOOTING

- (1) There are many kinds of problems caused by misuse. When a problem occurs, check the table below which describes possible problems occurring with your CD-ROM drive.
- (2) If the CD-ROM drive is not operating correctly and you cannot restore operation by following the detailed procedures in the table below, do not remove the cover of the units or adjust further.
- (3) In the case of (2) above, unplug the unit and consult with your dealer or the nearest service station.

TROUBLE	CORRECTION
• CD-ROM drive does not operate and Busy Indicator does not light.	① Confirm that the connection between the CD-ROM drive and the host computer is correct. ② Confirm that the program is correct. ③ Confirm that the setting drive select switch is correct. ④ Confirm that the disc has been inserted label side up. ⑤ Confirm that foreign objects have not been inserted.

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

Printed in Japan

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