

TASCAM

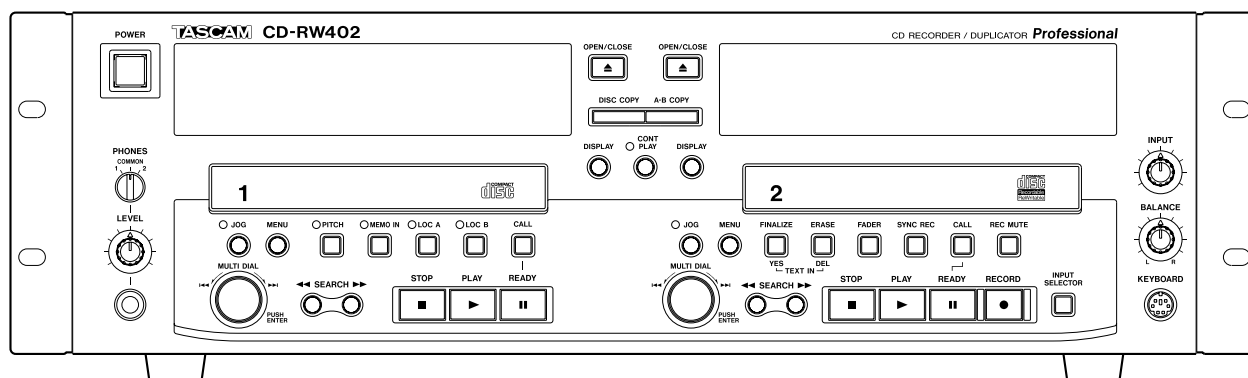
TEAC Professional Division

D00631501B

CD-RW402

CD Recorder / Duplicator

Professional



OWNER'S MANUAL



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

This appliance has a serial number located on the rear panel. Please record the model number and serial number and retain them for your records.

Model number _____
Serial number _____

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

Important Safety Precautions

IMPORTANT (for U.K. Customers)

DO NOT cut off the mains plug from this equipment.

If the plug fitted is not suitable for the power points in your home or the cable is too short to reach a power point, then obtain an appropriate safety approved extension lead or consult your dealer.

If nonetheless the mains plug is cut off, remove the fuse and dispose of the plug immediately, to avoid a possible shock hazard by inadvertent connection to the mains supply.

If this product is not provided with a mains plug, or one has to be fitted, then follow the instructions given below:

IMPORTANT: The wires in this mains lead are coloured in accordance with the following code:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

WARNING: This apparatus must be earthed.

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured GREEN-and-YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol \equiv or coloured GREEN or GREEN-and-YELLOW.

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

When replacing the fuse only a correctly rated approved type should be used and be sure to re-fit the fuse cover.

IF IN DOUBT — CONSULT A COMPETENT ELECTRICIAN.

For U.S.A

TO THE USER

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CAUTION

Changes or modifications to this equipment not expressly approved by TEAC CORPORATION for compliance could void the user's authority to operate this equipment.

For the consumers in Europe

WARNING

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Pour les utilisateurs en Europe

AVERTISSEMENT

Il s'agit d'un produit de Classe A. Dans un environnement domestique, cet appareil peut provoquer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre des mesures appropriées.

Für Kunden in Europa

Warnung

Dies ist eine Einrichtung, welche die Funk-Entstörung nach Klasse A besitzt. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen ; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.

IMPORTANT SAFETY INSTRUCTIONS

CAUTION:

- **Read all of these Instructions.**
- **Save these Instructions for later use.**
- **Follow all Warnings and Instructions marked on the audio equipment.**

1) Read Instructions — All the safety and operating instructions should be read before the product is operated.

2) Retain Instructions — The safety and operating instructions should be retained for future reference.

3) Heed Warnings — All warnings on the product and in the operating instructions should be adhered to.

4) Follow Instructions — All operating and use instructions should be followed.

5) Cleaning — Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

6) Attachments — Do not use attachments not recommended by the product manufacturer as they may cause hazards.

7) Water and Moisture — Do not use this product near water — for example, near a bath tub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like.

8) Accessories — Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.

9) A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.



10) Ventilation — Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.

11) Power Sources — This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.

12) Grounding or Polarization — This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.

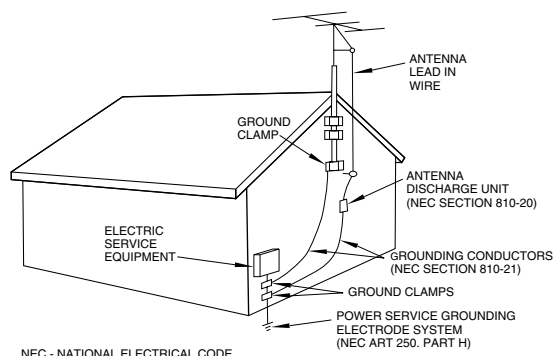
13) Power-Cord Protection — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.

14) Outdoor Antenna Grounding — If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

"Note to CATV system installer:

This reminder is provided to call the CATV system installer's attention to Section 820-40 of the NEC which provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

Example of Antenna Grounding as per
National Electrical Code, ANSI/NFPA 70



15) Lightning — For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.

16) Power Lines — An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.

17) Overloading — Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in risk of fire or electric shock.

18) Object and Liquid Entry — Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

19) Servicing — Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

20) Damage Requiring Service — Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- a) when the power-supply cord or plug is damaged.
- b) if liquid has been spilled, or objects have fallen into the product.
- c) if the product has been exposed to rain or water.
- d) if the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- e) if the product has been dropped or damaged in any way.
- f) when the product exhibits a distinct change in performance — this indicates a need for service.

21) Replacement Parts — When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.

22) Safety Check — Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

23) Wall or Ceiling Mounting — The product should be mounted to a wall or ceiling only as recommended by the manufacturer.

24) Heat — The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

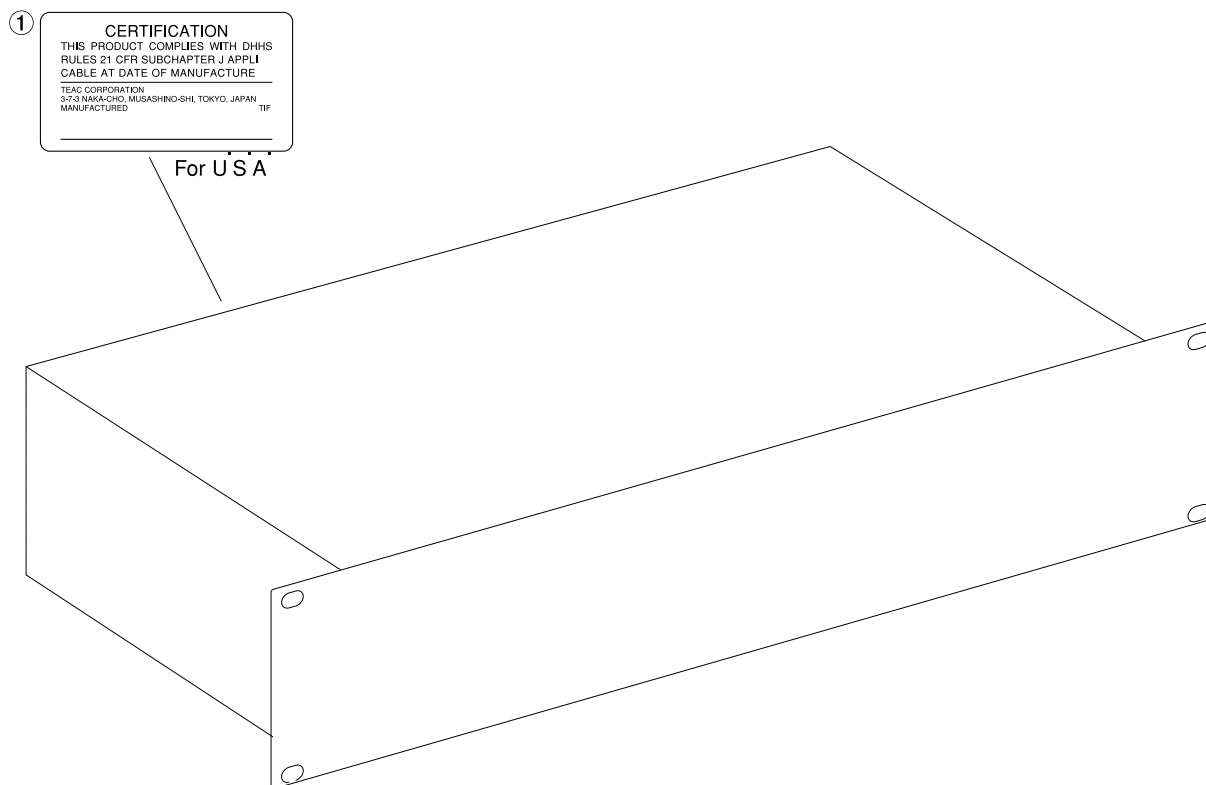
SAFETY INFORMATION

This product has been designed and manufactured according to FDA regulations "title 21, CFR, chapter 1, subchapter J, based on the Radiation Control for Health and Safety Act of 1968", and is classified as a class 1 laser product. There is no hazardous invisible laser radiation during operation because invisible laser radiation emitted inside of this product is completely confined in the protective housings.

The label required in this regulation is shown in ①.

CAUTION

- DO NOT REMOVE THE PROTECTIVE HOUSING USING A SCREWDRIVER.
- USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.
- IF THIS PRODUCT DEVELOPS TROUBLE, CONTACT YOUR NEAREST QUALIFIED SERVICE PERSONNEL, AND DO NOT USE THE PRODUCT IN ITS DAMAGED STATE.



Drive 1 (CD-ROM)

Optical pickup:	KSS-575B
Manufacturer:	SONY Corporation
Laser Output::	Less Than 0.4mW on the objective lens
Wavelength:	760 - 780nm

Drive 2 (CD-RW)

Optical pickup type :	KRS-202A or KRS-220B
Manufacturer :	SONY Corporation
Laser output :	Less than 0.1 mW (Play) and 32 mW (Record) on the objective lens
Wavelength :	777 - 787 nm

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The CD-RW402 is a sophisticated twin-deck CD recording and duplication system. It features state-of-the-art rewritable compact disc technology to allow recording and playback of audio material on compact disc media.

Operating is by means of the front panel, featuring an easy-to-use menu system, and the included wired remote control unit.

24-bit digital-to-analog and analog-to-digital converters provide excellent recording and playback quality for the CD recorder.

A sampling frequency convertor is incorporated, allowing the recording of CDs from digital audio sources which are at frequencies other than the CD standard sampling frequency of 44.1 kHz.

Balanced and unbalanced analog connectors are fitted for input and output at both the professional +4 dBu, and –10 dBV levels

Disc track divisions can be entered manually, or can be produced automatically as a response to the input signal level.

Jog function with preview allows precise setting of cue points

Cue function allows instant return to the previous start point

Pitch control allows time stretching and compression

Full index capability for recording

TOC editing allows the production of “virtual discs” for copying

A recording buffer ensures that even the first milliseconds of a disc track are recorded.

“One-touch” fade-ins and fade-outs over a specified time allow you to edit program material to your specific requirements.

A multi-function “multi dial” is used to set and confirm parameter settings.

NOTE

This product is designed to help you record and reproduce sound works to which you own the copyright, or where you have obtained permission from the copyright holder or the rightful licensor. Unless you own the copyright, or have obtained the appropriate permission from the copyright holder or the rightful licensor, your unauthorized recording, reproduction or distribution thereof may result in severe criminal penalties under copyright laws and international copyright treaties. If you are uncertain about your rights, contact your legal advisor. Under no circumstances will TEAC Corporation be responsible for the consequences of any illegal copying performed using the CD-RW402.

Supplied accessories

As well as this manual, you should receive with your CD-RW402:

- The RC-RW402 remote control unit
- An AC power cord for your area
- A rack mounting kit (four screws and washers)
- A quick-start guide

The RC-402 remote control unit is a wired remote control unit and draws its power from the main unit.

There is therefore no need to insert batteries into the remote control unit.

NOTE

If plug on the power cord supplied with your unit does not match your local power fittings, double-check the voltage rating on the back of the unit with your local supply. If it does not match, or you are in any doubt, contact your TASCAM representative, or a qualified electrician, as appropriate. If the voltages match, replace the cord with one appropriate for your area.

Some notes and precautions

Treat the CD-RW402 as you would any other piece of precision equipment.

Avoid exposing it to extremes of temperature and humidity and avoid mechanical shocks and vibration.

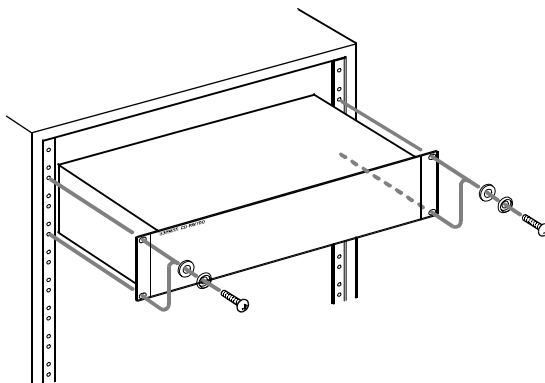
Keep the unit away from strong magnetic fields (TV sets, computer monitors, large electric motors, etc.).

1 – Introduction—Some notes and precautions

Rack-mounting the unit

Use the rack-mounting kit to mount the unit in a standard 19-inch equipment rack, as shown below. Remove the feet of the unit before mounting it.

See “Environmental considerations” on page 8 below for details of ventilation, etc.



Environmental considerations

The CD-RW402 may be used in most areas, but to maintain top performance, and prolong operating life, observe the following environmental conditions:

The nominal temperature should be between 5°C and 35°C (41°F and 95°F). The CD-RW402 is more sensitive to extremes of temperature than ordinary CD players.

Relative humidity should be 30 to 90 degrees non-condensing.

As the unit may become hot during operation, always leave sufficient space above the unit for ventilation. If you are mounting the unit in a rack, leave 1U of space above it.

Do not install this equipment in a confined space such as a bookcase or similar unit.

You should not place the unit on a piece of equipment generating heat, e.g. an amplifier, to avoid possible problems with overheating.

Make sure that the unit is mounted in a level position for correct operation. Do not mount the unit in a rack tilted 5° or more from the vertical position.

NOTE

If the mounting surface is more than 5 degrees away from the horizontal, the tray will not open or close.

The voltage supplied to the unit should match the voltage as printed on the rear panel. If you are in any doubt regarding this matter, consult an electrician.

NOTE

When transporting the unit, always use the original packing materials. For this reason, we strongly recommend that you save all the packing materials that came with the CD-RW402, in case you need to transport it in the future.

In addition, when transporting the unit, you should tape the disc tray closed, using an adhesive tape that will not spoil the finish of the unit.

Beware of condensation

If the unit (or a compact disc) is moved from a cold to a warm place, or used after a sudden temperature change, there is a danger of condensation; vapor in the air could condense on the internal mechanism,

making correct operation impossible. To prevent this, or if this occurs, leave the player for one or two hours with the power turned on, then turn the power off and on again.

About CD-R and CD-RW discs

The CD-RW402 uses CD-R and CD-RW media, and can also use CD-R and CD-RW Digital Audio media.

In this manual, when we refer to “CD-R” and “CD-RW” discs, we always include “CD-R Digital Audio”

and “CD-RW Digital Audio”, even when this is not explicitly stated.

CD-R discs can be recorded once only. Once they have been used for recording, they cannot be erased or re-recorded. However, if space is available on the

1 – Introduction—Some notes and precautions

disc, additional material can be recorded. The packaging of CD-R discs will include one of the following logos:



By contrast, a CD-RW disc can be used in much the same way as a CD-R disc, but the last track or tracks recorded can be erased before the disc has been “finalized”, and the space on the disc can be re-used

for other recordings. The packaging of CD-RW discs will include one of the following logos:



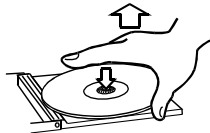
However, you should note that an audio CD created using a CD-RW disc may not play back satisfactorily on every audio CD player. It will, naturally, be playable on the CD-RW402. This is in no way a limitation of the CD-RW402 itself, but of the difference between the different types of media and the methods used to read them.

CD-R discs created on the CD-RW402, by contrast, may be played satisfactorily on the majority of audio CD players.

Handling of compact discs

Observe the following:

- Always place compact discs in the tray with their label facing upward (compact discs can only be played on one side).
- To remove a disc from its storage case, press down on the center of the case, and lift the disc out, holding it carefully by the edges.

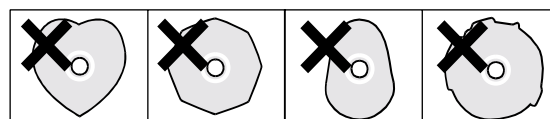


- Finger marks and dust should be carefully wiped off the disc's recorded surface with a soft cloth. Unlike conventional records, the compact disc has no grooves to collect dust and microscopic debris, so gently wiping with a soft cloth should remove most particles.
- Wipe in a straight motion from the inside to the outside of the disc. Small dust particles and light

stains will have absolutely no effect on reproduction quality.



- Never use such chemicals as record sprays, anti-static sprays or fluid, benzine or thinner to clean compact discs. Such chemicals will do irreparable damage to the disc's plastic surface.
- Discs should be returned to their cases after use to avoid serious scratches that could cause the laser pickup to “skip”.
- Don't expose discs to direct sunlight or high humidity and temperature for extended periods. Long exposure to high temperature can warp the disc.
- Only use circular compact discs. Avoid using non-circular promotional, etc. discs.



- To keep the laser pickups clean, don't touch them. For the same reason, don't leave the disc trays opened unnecessarily.

Additional notes with regard to CD-R and CD-RW discs

There are additional precautions that you should take when handling CD-R and CD-RW discs, that are different to those that you should take when handling ordinary CDs.

- Avoid touching the recording (non-label) side of a disc on which you will be recording. Recording on a disc requires a cleaner surface than playing back, and fingerprints, grease, etc. can cause errors in the recording process.
- CD-R discs are more sensitive to the effects of heat and ultraviolet rays than ordinary CDs. It is important that they are not stored in a location where direct sunlight will fall on them, and which is away from sources of heat such as radiators or heat-generating electrical devices.
- Always store CD-R discs in their “jewel cases” to avoid dirt and dust accumulating on their surfaces.
- Do not put labels or protective sheets on the discs and do not use any protective coating spray.
- When labeling CD-R discs, always use a soft oil-based felt-tipped pen to write the information. Never use a ball-point or hard-tipped pen, as this may cause damage to the recorded side.
- Dirty discs may be cleaned using a soft dry cloth and/or a commercial CD cleaning fluid or ethyl alcohol. Do not use thinner, gasoline, benzene or LP cleaning fluid, as these will damage the disc.
- If you are in any doubt as to the care and handling of a CD-R disc, read the precautions supplied with the disc, or contact the disc manufacturer directly.

Never use a stabilizer or printable discs

Using commercially available CD stabilizers or printable recordable discs with this player will damage the mechanism and cause it to malfunction.

Finalizing

Although audio data may be written on a CD-R or CD-RW disc, a standard CD player will not be able to read the data (i.e. play back the audio) until a final table of contents (TOC) has been written at the start of the disc.

The process of writing this table of contents is known as “finalizing”. Once this has been done, no further data can be written to the disk. See “Finalizing” on page 40 for details.

In the case of a CD-RW disc which has been finalized, the whole of the disc may be erased, or the disc may be “refreshed”, and the disc re-used.

In addition, a CD-RW disc that has been finalized may be “unfinalized”, i.e. the TOC is removed. This allows further tracks to be recorded to the disc, provided that there is space on the disc.

“Recordable” discs

In this manual, we use the term “recordable” disc to describe a CD-R or CD-RW disc that has not been finalized, i.e. further recording is possible on the disc.

“Readable” discs

A “readable disc is one which can be read by the unit. In the case of drive 2, this is all discs, finalized or unfinalized.

However, drive 1 cannot read unfinalized discs (whether CD-R or CD-RW). It can also play back finalized CD-RW discs.

About this manual

In this manual, we use the following conventions:

- The names of keys and controls are given in the following typeface: **ERASE**.
- When the alphanumeric portion of the display shows a message, this is shown in the following typeface: **Welcome**.
- If a preset indicator in the display (i.e. one which cannot change, but is either on or off) is shown, this is shown as follows: **SHUFFLE**.
- The CD-RW402 can be used with a PS/2 computer keyboard. In this case, the key names are in bold type, inside square brackets, for example: **[F1]**.

The sections of this manual are arranged as follows:

1, "Introduction" This section, introducing the CD-RW402 and some key concepts, is essential reading!

2, "Using the menu system" Everything about how to use the flexible menu system built into the CD-RW402 and an explanation of the system menu options.

3, "Features and controls" A short "road-map" to guide you around the front and rear panels of the CD-RW402 as well as the remote control unit.

4, "Playback operations" Using the CD-RW402 as an ordinary CD player is straightforward, but there are many useful playback features in this unit which repay careful study.

5, "Recording" The different options available when recording discs on the CD-RW402.

6, "After recording" After recording a disc, you can finalize it, or erase the whole disc or part of it (CD-RW only). See this section for details.

7, "CD TEXT" CD TEXT allows the entry and display of title and artist by disc and by track. This section explains how to use this feature on the CD-RW402.

8, "Copying discs" Copying discs is a somewhat different process to recording audio on discs, and the CD-RW402 provides a number of options to perform these operations.

9, "External control" The CD-RW402 can be controlled by an external PS/2 computer keyboard, or through devices attached to the **CONTROL I/O** port.

10, "Specifications, etc." This section contains the specifications of the CD-RW402 as well as a guide to the messages which are shown at different times on the displays.

2 – Using the menu system

The CD-RW402 menu system is easy to use, and the different operations that can be performed all use the same method of working. This general guide to the way in which the menu system works on the unit will help you set up and use your CD-RW402 to maximum advantage.

There are two **MENU** keys, and two **MULTI DIALS**. Typically, the menus accessed from the **MENU** key (1) affect drive 1, particularly the specialized playback parameters, and the menus accessed from **MENU** key (2) affect drive 2, particularly the recording functions.

The basic principle involved in the menus is:

- 1 Press the appropriate **MENU** key for the setting you want to change.
- 2 Turn the appropriate **MULTI DIAL** until the menu you want is displayed.
- 3 Push the **MULTI DIAL**.

The menu item last accessed in that menu is displayed.

- 4 Turn the **MULTI DIAL** until the menu item you want is displayed.

- 5 Push the **MULTI DIAL**.

The menu item and the current parameter are shown on the display.

- 6 Turn the **MULTI DIAL** to set the parameter.

- 7 Push the **MULTI DIAL**.

The display returns to normal.

At any time, press the appropriate **MENU** key (1 or 2) to cancel the operation.

NOTE

For answers to “yes or no” questions, pushing the **MULTI DIAL** is equivalent to “yes” and pressing **STOP** is equivalent to “no”.

Inside a menu (that is, when a menu item is being displayed), pressing **MENU** moves up a level and shows the menu title. Turning the **MULTI DIAL** after this selects another menu.

When setting a parameter, pressing **MENU** moves up a level, and shows the menu item. Turning the **MULTI DIAL** selects another menu item.

Menus and items

The menus and menu items available are:

MENU keys 1 and 2

Menu	Menu item	Description	Parameter	Default
SYSTEM MENU				
	KEYBOARD	Selects either US or Japanese keyboard for titling ^a	US, JP	US
	DIMMER	Affects the brightness of the drive display ^b	1 – 8	6
	TIMER PLAY	Allows automatic playback on the drive when the unit is turned on ^c	OFF, ON	OFF
	INDEX DSP	Index markers displayed? ^c	OFF, ON	OFF
	ISRC COPY?	ISRC information is copied ^a	OFF, ON	OFF
	PEAK HOLD	Meter peak setting hold ^b	0.0 — 2.5 s + HOLD	1.2s
PLAY MENU				
	PLAY MODE	Selects the playback mode ^b	CONTINUE, SHUFFLE, PROGRAM	CONTINUE
	REPEAT MODE	Selects repeat mode ^b	OFF, ALL, 1	OFF
	PITCH	Sets pitch offset ^c	+9.9% — -9.9%	0.0%
	AUTO CUE	Allows the setting of the auto cue point ^b	OFF, -72, -66, -60, -54, -48, -42, -36, -30, -24 (dB)	OFF
	AUTO READY	Turns the auto ready function on or off ^b	OFF, ON	OFF
	INC PLAY	Turns incremental playback off or on ^b	OFF, ON	OFF
	JOG LENGTH	Sets the preview portion length ^b	12 – 99 frames	16f
	EOM TIME	EOM (End of Message) tally setting ^b	0 – 99 (s)	0s

2 – Using the menu system—Menus and items

- a. Drive 2 only
- b. Individual settings for each drive
- c. Drive 1 only

MENU key 1 only

Menu	Menu item	Description	Parameter	Default
TOC EDIT				
	DIVIDE	Splits a track into two		
	COMBINE	Combines two tracks into one		
	START Pt SET	Sets the start point for track operations		
	END Pt SET	Sets the end point for track operations		
	ERASE TRACK	Removes the track from the virtual TOC		
	ALL CANCEL	Restores the true “physical” TOC		

MENU key 2 only

Menu	Menu item	Description	Parameter	Default
REC MENU1				
	DIG VOLUME	Digital volume setting	-- (off) — +18dB	0dB
	AUTO TRACK	Allows the automatic division of tracks	ON, OFF	ON
	SOUND LEVEL (A)	Sets the trigger level for the analog signals	–72, –66, –60, –54, –48, –42, –36, –30, –24 (dB)	–54dB
	SOUND LEVEL (D)	Sets the trigger level for the digital signals	MIN_L, –72, –66, –60, –54, –48, –42, –36, –30, –24 (dB)	–54dB
	COPY ID	SCMS copy protection	PROH, 1GEN, FREE	1GEN
	FADE IN TIME	Time for recording fade-ins	1s — 24s	3s
	FADE OUT TIME	Time for recording fade-outs	1s — 24s	3s
REC MENU2				
	REC MUTE TM	The number of seconds the REC MUTE key affects recording	1s — 10s	4s
	INC WATCH TM	The number of seconds of “silence” that are ignored until a new track is started	1s — 6s	3s
	SYNC END TIME	The number of seconds from silence to the automatic end of a track	5s — 60s	5s
	SYNC TRIM	The number of frames that synchronized recording is shifted back or forward	–125f — +125f	0f
	INC TRIM	The number of frames that automatic incrementation is shifted back or forward	–125f — +125f	0f
	INDEX INC	Sets the increment mode off or on	OFF, ON	OFF
	INDEX 00 TIME	Sets the “index 00” time for a track	0s — 4s	0s
CD TEXT				
	TITLE EDIT	Edits disc or track title data		
	ARTIST EDIT	Edits disc or track “artist” data		
	TEXT STORE	Stores text data to a buffer area		
	TEXT RESTORE	Restores text data from the buffer area		

2 – Using the menu system—SYSTEM menu features

SYSTEM menu features

These features determine the settings for either the whole system, or for the individual drive on which the settings are made.

Dimmer settings

Individual settings for each drive.

The illumination level of the displays can be set using this menu option. Adjust this to suit the ambient lighting levels, personal preference, etc.

- 1 Press the appropriate MENU key.
- 2 Turn the MULTI DIAL until SYSTEM MENU? appears in the display. Push the MULTI DIAL.
- 3 Turn the MULTI DIAL until DIMMER ? appears in the display. Push the MULTI DIAL.
- 4 Turn the MULTI DIAL to set the value to DIMMER> x? (where x can be from 1 (darkest) to 8 (brightest)).
- 5 Push the MULTI DIAL.

Meter peak hold

Individual settings for each drive.

When playing back, the meters show the level of the signal read from the disc. The hold time of the meters (the time at which the loudest segments stay lit) can be set.

NOTE

For drive 2, this setting also affects the metering for recording.

- 1 Press the appropriate MENU key.
- 2 Turn the MULTI DIAL until SYSTEM MENU? appears in the display. Push the MULTI DIAL.
- 3 Turn the MULTI DIAL until PEAK HOLD ? appears in the display. Push the MULTI DIAL.
- 4 Turn the MULTI DIAL to set the value to P_HOLD> x.xs (where x.x can be from 0.0 to 2.5 in 0.1 second increments).

Alternatively, between the highest and lowest setting values, there is also a HOLD setting, which keeps the highest value displayed (the rightmost segment is lit) until this value is changed.

Reset the peak readings by pushing the MULTI DIAL.
- 5 Push the MULTI DIAL.

Timer play

Only available from drive 1 and only applies to drive 1.

When power is applied to the CD-RW402 and a disc is loaded in drive 1, playback can start automatically. If continuous playback is selected (see “Repeat playback” on page 24), playback starts with drive 1, and when this ends, continues on drive 2.

Drive 2 cannot be selected to start playback

- 1 Press MENU key 1.
- 2 Turn the MULTI DIAL until SYSTEM MENU? appears in the display. Push the MULTI DIAL.
- 3 Turn the MULTI DIAL until TIMER PLAY ? appears in the display. Push the MULTI DIAL.
- 4 Turn the MULTI DIAL to set the value to TM_PLAY>OFF? or TM_PLAY> ON?.
- 5 Push the MULTI DIAL.

Index display

Only available from drive 1 and only applies to drive 1.

The index marks in the CD subcode can be hidden or displayed.

When index marks are not displayed, the time display will look something like:

1Tr 0:47

When index marks are displayed:

1 01 0:47

- 1 Press MENU key 1.**
- 2 Turn the MULTI DIAL until SYSTEM MENU? appears in the display. Push the MULTI DIAL.**
- 3 Turn the MULTI DIAL until INDEX DISP ? appears in the display. Push the MULTI DIAL.**
- 4 Turn the MULTI DIAL to set the value to IndexDp> OFF? or IndexDp> ON?.**
- 5 Push the MULTI DIAL.**

Keyboard preferences

Only available from drive 2 and only applies to drive 2.

A PS/2 PC keyboard may be connected to the CD-RW402 for editing of CD TEXT entries. See “Entering characters using an external keyboard” on page 43 for details. Either a US-type of keyboard may be used, or a Japanese keyboard may be used (the Japanese keyboard has a different layout and extra keys to cope with the complexities of the Japanese language).

- 1 Press MENU key 2.**

- 2 Turn the MULTI DIAL until SYSTEM MENU? appears in the display. Push the MULTI DIAL.**
- 3 Turn the MULTI DIAL until KEYBOARD ? appears in the display. Push the MULTI DIAL.**
- 4 Turn the MULTI DIAL to set the value to KEYBOARD>US? or KEYBOARD>JP? (where US is the US type of keyboard, and JP is the Japanese type).**
- 5 Push the MULTI DIAL.**

Typically, you should always use the US setting here.

ISRC copy

Only available from drive 2 and only applies to drive 2.

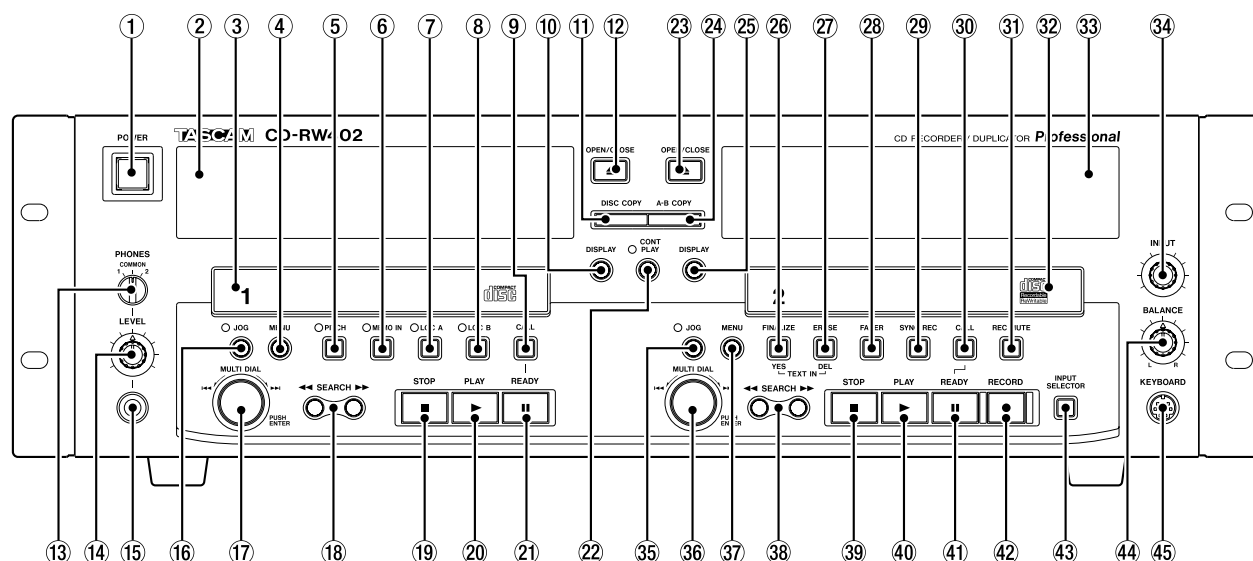
ISRC stands for International Standard Recording Code, and is the code embedded in CD recordings.

When copying an audio disc from drive 1 to drive 2 in DAO mode, it is possible to enable or disable the copying of this embedded information.

- 1 Press MENU key 2.**

- 2 Turn the MULTI DIAL until SYSTEM MENU? appears in the display. Push the MULTI DIAL.**
- 3 Turn the MULTI DIAL until ISRC COPY ? appears in the display. Push the MULTI DIAL.**
- 4 Turn the MULTI DIAL to set the value to ISRC Cp>ON ? or ISRC Cp>OFF?.**
- 5 Push the MULTI DIAL.**

Front panel



① **POWER switch** Use this to turn the unit on and off.

② **Drive 1 display** Shows track and playback information, etc. for drive 1, as well as the menu parameters and settings.

③ **Disc tray (1)** Holds the disc for drive 1.

④ **MENU key (1)** Press this in order to bring up the menu selections for drive 1.

⑤ **PITCH key and indicator** Press to light. When lit, and the pitch menu is set to a value other than 0.0%, playback will speed up and slow down and the pitch will alter, according to the menu value (pitch may be altered $\pm 9.9\%$).

⑥ **MEMO IN key and indicator** Press to light. When lit, the A and B points may be set.

⑦ **LOC A key and indicator** When the **MEMO IN** key (above) is lit, pressing this key will put the current playback position into the A memory point. The indicator lights. When the **MEMO IN** indicator is not lit and the **LOC A** indicator is lit, pressing this key will move the playback position to the set point.

⑧ **LOC B key and indicator** When the **MEMO IN** key (above) is lit, pressing this key will put the current playback position into the B memory point. The indicator lights. When the **MEMO IN** indicator is not lit and the **LOC B** indicator is lit, pressing this key will move the playback position to the set point.

⑨ **CALL key (1)** This key moves playback position to the last playback start position. See “Cue point” on page 22.

⑩ **DISPLAY key (1)** Changes the time display type of drive 1.

⑪ **DISC COPY key** Starts the copying process of discs from 1 to 2.

⑫ **OPEN CLOSE (1)** Opens and closes the tray of drive 1.

⑬ **PHONES selector switch** This selects the output from the **PHONES** jack to be either drive 1, drive 2 or **COMMON** (drive 1 if both are playing, or the deck that is playing if only one is playing).

⑭ **PHONES LEVEL** Adjust the level from the jack with the **LEVEL** control.

⑮ **PHONES jack** Use ordinary stereo headphones with this 1/4” stereo jack.

⑯ **JOG key and indicator (1)** Press to light the indicator. When it is lit, this allows the playback position of the disc in drive 1 to be adjusted (see “Using the jog function” on page 23).

⑰ **MULTI DIAL (1)** Turn this to select menu parameters, and values for menu parameters, and press it to select the parameters and set the values.

It can also be used for selecting tracks for playback, etc. as explained in the appropriate sections of this manual.

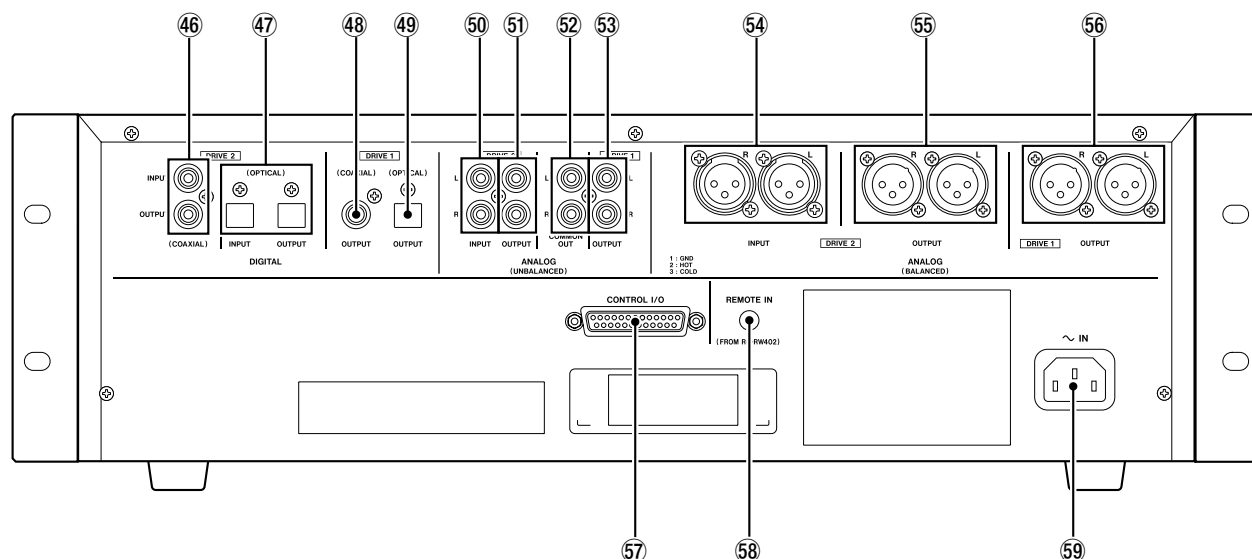
⑱ **SEARCH keys (1)** Allow “fast forward” and “fast rewind”.

- ⑲ **STOP key (1)** Stops playback on drive 1.
- ⑳ **PLAY key (1)** Starts playback on drive 1.
- ㉑ **READY key (1)** Pauses playback on drive 1.
- ㉒ **CONT PLAY key and indicator** When lit, allows continuous playback between drives 1 and 2 (when 1 finishes, 2 starts, and so on).
- ㉓ **OPEN/CLOSE (2)** Opens and closes the tray of drive 2.
- ㉔ **A-B COPY key** Starts the copying process of data between points A and B between drives 1 and 2.
- ㉕ **DISPLAY key (2)** Changes the time display type of drive 2.
- ㉖ **FINALIZE key** Used when finalizing recordable discs. Also serves as a confirm key when entering disc and track titles.
- ㉗ **ERASE key** Used when erasing data from CD-RW discs. Also serves as a delete key when entering disc and track titles.
- ㉘ **FADER key** Starts automatic fade in and fade out when recording.
- ㉙ **SYNC REC** Turns synchronized recording of the disc recorder on and off.
- ㉚ **CALL key (2)** This key moves playback position to the last playback See “Cue point” on page 22.
- ㉛ **REC MUTE key** When recording and this is pressed, records several seconds of silence before entering record ready mode (the amount of silence is set by menu operations).
- ㉜ **Disc tray (2)** Holds the disc for drive 2.
- ㉝ **Drive 2 display** Shows track and playback information, etc. for drive 1, as well as the menu parameters and settings.
- ㉞ **INPUT control** This control adjusts the level of an analog signal sent to the drive.
- ㉟ **JOG key and indicator (2)** Press to light the indicator. When it is lit, this allows the playback position of the disc in drive 2 to be adjusted (see “Using the jog function” on page 23).
- ㊱ **MULTI DIAL (2)** Turn this to select menu parameters, and values for menu parameters, and press it to select the parameters and set the values.

It can also be used for selecting tracks for playback, etc. as explained in the appropriate sections of this manual.
- ㊲ **MENU key (2)** Press this in order to bring up the menu selections for drive 2.
- ㊳ **SEARCH keys (2)** Allow “fast forward” and “fast rewind”.
- ㊴ **STOP key (2)** Stops playback or recording on drive 2.
- ㊵ **PLAY key (2)** Starts playback or recording on drive 2.
- ㊶ **READY key (2)** Puts the drive into play ready or record ready mode, depending on the previous state.
- ㊷ **RECORD key** Puts the drive into record ready mode.
- ㊸ **INPUT SELECTOR key** Allows the choice of the analog inputs, either of the digital inputs, or the internal drive 1 as a recording source.
- ㊹ **BALANCE control** Controls the left-right balance of an analog signal sent to the drive.
- ㊺ **KEYBOARD connector** Connect a standard computer PS/2 keyboard here for use with titling, etc. (see “CD TEXT” on page 42).

3 – Features and controls—Rear panel features

Rear panel features



Digital connections These connections all handle digital audio I/O.

46 COAXIAL INPUT and OUTPUT (DRIVE 2) These RCA connectors accept and transmit digital audio data to and from drive 2 respectively in SPDIF format.

The **IN** connector accepts AES3-1992 (TYPE I) as well as SPDIF (TYPE II) format data. The unit automatically detects the data type. Input may be from 32 kHz to 48 kHz, and output is always at 44.1 kHz.

47 OPTICAL INPUT and OUTPUT (DRIVE 2) These TOSLINK-type optical connectors accept and transmit digital audio data to and from drive 2 respectively in SPDIF format.

The **IN** connector accepts AES3-1992 (TYPE I) as well as SPDIF (TYPE II) format data. The unit automatically detects the data type. Input may be from 32 kHz to 48 kHz, and output is always at 44.1 kHz.

48 COAXIAL OUTPUT (DRIVE 1) This RCA connector outputs digital audio data from drive 1 in SPDIF format.

49 OPTICAL OUTPUT (DRIVE 1) This TOSLINK-type optical connector outputs digital audio data from drive 1 in SPDIF format.

Analog connections These connections all handle analog audio I/O.

50 UNBALANCED INPUT (2) These unbalanced RCA connectors allow the input of –10 dBV nominal level signals to drive 2 (red=right).

51 UNBALANCED OUTPUT (2) These unbalanced RCA connectors output the signal from drive 2 at –10 dBV nominal levels (red=right).

52 UNBALANCED COMMON OUT These connectors are used in the same way as the **COMMON** setting for the headphone monitoring **13**. Drive 1 takes priority if both drives are playing, otherwise the currently-playing drive takes priority (red=right).

53 UNBALANCED OUTPUT (1) These unbalanced RCA connectors output the signal from drive 2 at –10 dBV nominal levels (red=right).

54 BALANCED INPUT [L, R] (2) These balanced XLR-type female connectors accept analog signals at +4 dBu nominal levels to drive 2.

55 BALANCED OUTPUT [L, R] (2) These balanced XLR-type male connectors output the analog outputs from drive 2 at +4 dBu nominal levels.

56 BALANCED OUTPUT [L, R] (1) These balanced XLR-type male connectors output the analog outputs from drive 1 at +4 dBu nominal levels.

NOTE

All XLR-type connectors are wired with 1=ground, 2=hot, and 3=cold.

Other connections These are control and power connections.

57 CONTROL I/O This connector allows for remote control and fader stop/start control of the

3 – Features and controls—Rear panel features

drives. See the Specifications section for details of pinouts, etc.

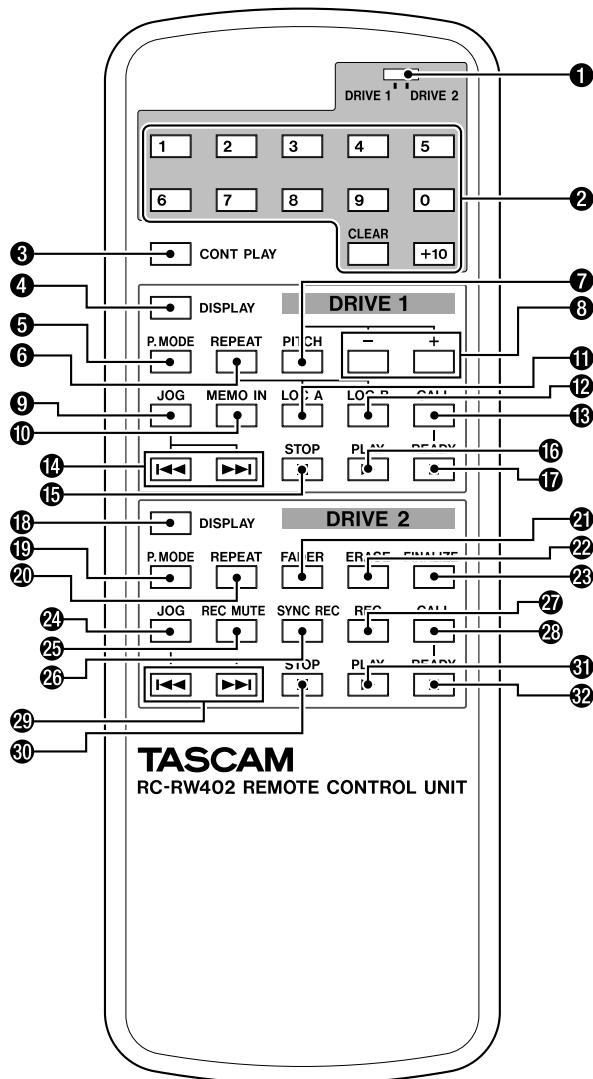
⑤⑧ **REMOTE IN** Use this to connect the RC-RW402 remote control unit.

NOTE

Never attempt to attach any other remote control device other than the RC-RW402, as damage may be caused to the unit if you do.

Remote control unit

This describes the features of the wired RC-RW402 remote control unit.



① **DRIVE 1/DRIVE 2 switch** Use this switch to determine which drive will be controlled by the number keys and **CLEAR** key.

② **Number keys** As well as number keys from 1 through 9 and 0, there is also a +10 key and a **CLEAR** key. These keys are used for selecting tracks and for programmed playback.

⑤⑨ **Power inlet (~ IN)** Use an AC power cord appropriate for your area to connect the CD-RW402 to the power supply.

NOTE

*The equipment draws nominal non-operating power from the AC outlet with its **POWER** switch in the off position.*

③ **CONT PLAY key** This key performs the same function as the **CONT PLAY** key on the main unit ②②. The indicator on the main unit lights when the function is activated from the remote control unit.

Drive 1 functions The following keys all affect the operation of drive 1 only.

④ **DISPLAY key** This key changes the time display type for drive 1, equivalent to the **DISPLAY** (1) key on the main unit ⑩⑩.

⑤ **P.MODE key** This key cycles through the different playback modes (shuffle, programmed playback and normal) as shown on the display. These functions can also be set using menu functions on the main unit.

⑥ **REPEAT key** This key cycles through the different repeat modes (all, single or off). These functions can also be set using menu functions on the main unit.

⑦ **PITCH key** This key turns pitch control on or off and shows the current pitch on/off status on the display as well as turning the main unit indicator ⑤ on and off.

⑧ **PITCH + and – keys** Change the pitch setting ($\pm 9.9\%$ relative to normal) and shows the setting on the screen. Unless the pitch indicator ⑤ is lit, the effects will not be audible.

⑨ **JOG key** Equivalent to the **JOG** (1) key on the main unit ⑩⑩. When the jog mode is activated from the remote control unit, the main unit indicator lights. Use the track skip keys on the remote control unit or the **MULTI DIAL** (1) to adjust the jog position.

⑩ **MEMO IN key** Equivalent to the **MEMO IN** key on the main unit ⑥⑥. The indicator lights on the main unit when the mode is activated from the remote control.

⑪ **LOC A key** Equivalent to the **LOC A** key on the main unit ⑦⑦.

3 – Features and controls—Rear panel features

12 LOC B key Equivalent to the **LOC B** key on the main unit is **8**.

13 CALL key Equivalent to the **CALL (1)** key on the main unit **9**.

14 Track skip keys These keys are used for track skip and for changing jog position, etc.

15 STOP key Equivalent to the **STOP (1)** key on the main unit **19**.

16 PLAY key Equivalent to the **PLAY (1)** key on the main unit **20**.

17 READY key Equivalent to the **READY (1)** key on the main unit **21**.

Drive 2 controls The following keys all affect the operation of drive 2 only.

18 DISPLAY key This key changes the time display type for drive 2, equivalent to the **DISPLAY (2)** key on the main unit **25**.

19 P.MODE key This key cycles through the different playback modes (shuffle, programmed playback and normal) as shown on the display. These functions can also be set using menu functions on the main unit.

20 REPEAT key This key cycles through the different repeat modes (all, single or off). These functions can also be set using menu functions on the main unit.

21 FADER key Equivalent to the **FADER** key on the main unit **28**.

22 ERASE key Equivalent to the **ERASE** key on the main unit **27**.

23 FINALIZE key Equivalent to the **FINALIZE** key on the main unit **26**.

24 JOG key Equivalent to the **JOG (2)** key **35**. The indicator lights on the main unit when jog mode is entered from the remote control unit. When the jog mode is activated from the remote control unit, the main unit indicator lights. Use the track skip keys on the remote control unit or the **MULTI DIAL (1)** to adjust the jog position.

25 REC MUTE key Equivalent to the **REC MUTE** key on the main unit **31**.

26 SYNC REC key Equivalent to the **SYNC REC** key on the main unit **29**.

27 REC key Equivalent to the **RECORD** key on the main unit **42**.

28 CALL key Equivalent to the **CALL (2)** key on the main unit **30**.

29 Track skip keys These keys are used for track skip and for changing jog position, etc.

30 STOP key Equivalent to the **STOP (2)** key **39**.

31 PLAY key Equivalent to the **PLAY (2)** key **40**.

32 READY key Equivalent to the **READY** key **41**.

The following operations explain how to play back discs. If an operation can be performed on only one of the drives, this will be shown in the heading for this operation, for example “(drive 1 only)”.

The CD-RW402 can be used to play back CDs (including CD-R and CD-RW discs that have been recorded and finalized on other types of recorder), as

well as CD-R discs and CD-RW discs that have been recorded on the unit.

However, drive 1 cannot play back recordable discs (unfinalized discs).

NOTE

In some rare circumstances, a disc may not be replayable by drive 1. In such a case, use drive 2 for playback of the disc.

Simple playback operations

- 1 Press the appropriate OPEN/CLOSE key to open the disc tray.**
- 2 Discs should be inserted in the tray with the label uppermost.**
- 3 Press the OPEN/CLOSE key to close the tray again.**

When a disc is loaded into the unit, the display briefly shows TOC Reading., with a flashing period following the word “Reading” as the unit determines the contents of the disc. When the TOC has been read, the display shows (at the left of the display) one of the following:

CD	A commercial pre-recorded CD or a finalized CD-R
CD-R, NO TOC ^a	A CD-R which has yet to be finalized
CD-RW, NO TOC ^a	A CD-RW which has yet to be finalized
CD-RW ^a	A finalized CD-RW (this differs from a CD, as it may be unfinalized and erased)
[blank]	Unusable or unreadable disc or no disc

a. Drive 2 only

- 1 Press the PLAY key to start playback**
- 2 Press the STOP key to stop playback**
- 3 Press the READY key to pause playback temporarily.**

The track number indicators at the bottom of the display light, to show the available unplayed tracks. If there are thirteen tracks on the disc, for example, indicators 1 through 13 will light. If there are more than 20 tracks on a disc, the track number OVER indicator (at the bottom of the display) will light.

If the disc contains CD TEXT information, this will also be shown on the display. The volume label of the disc is shown on the display if the disc is a computer CD-ROM disc.

Time display modes

When playing back a CD (or when in pause mode), there are four different time display modes.

In each mode, the current track number is given, followed by the time, as given below, e.g.

10Tr 0:48

Press the appropriate **DISPLAY** key to cycle through these time display modes, as described here:

Display shows	Meaning
TOTAL	Total elapsed time of the disc
[blank]	Elapsed time of the current track
TOTAL REMAIN	Time remaining of the current disc
REMAIN	Time remaining of the current track

NOTE

If programmed playback has been selected (“Programmed order playback” on page 24), the elapsed time and total remaining time refer to the programmed material, not the whole disc.

If the disc contains CD TEXT (see “CD TEXT” on page 42), there is another mode, which shows the track and track artist information on the display (while playing) or the disc and disc artist information (if playback is stopped).

If the disc or track does not contain such information, this mode is not available.

4 – Playback operations—Simple playback operations

Track skip

Use the **MULTI DIAL** (or the track skip keys on the remote control unit) to jump forward or backward by one track at a time, as shown on the display.

Note that going forward from the last track of the disc will “wrap round” to track 1, and going backward from the first track of the disc will “wrap round” to the last track of the disc.

The track number indicators at the bottom of the display shows the selected track (the lit indicator at the left of the row of indicators).

It is also possible to use the number keys on the remote control unit to jump directly to a particular track:

- 1 Select drive 1 or 2 with the switch as appropriate.

To play tracks 1 through 9, simply press the appropriate key (1 through 9).

- 2 To play a track whose number is higher than 9, press the **+10** key an appropriate number of times to set the “tens” digit of the track number, followed by a single key to set the “units” digit. For example:

Track 13 = **+10, 3**

Track 30 = **+10, +10, +10, 0**

NOTE

On the main unit only, the search keys can be used to “fast-forward” and “fast-rewind” through the disc.

Cue point

The *cue point* is the point at which playback last started from ready mode. Every time the unit goes from ready mode to play mode, the cue point is updated.

To return to the cue point, from stop, ready or play mode:

- 1 Simply press the **CALL** key. The playback position is returned to the cue point and the drive enters ready mode. Press **PLAY** to start playback from this point.

NOTE

This call function is not available in the shuffle playback mode.

A and B points (drive 1 only)

The A and B location points provide two more convenient memory locations and they may also be used when copying discs.

To set these points:

- 1 Press the **MEMO IN** key so that the indicator is lit.
- 2 At the playback point to be assigned, press either the **LOC A** or the **LOC B** key.

If a point has already been assigned to these locations, the indicator will be lit. If no point has been assigned to these locations, the indicator lights when the point is assigned.

The **MEMO IN** indicator goes out.

- 3 Repeat the process for the other location point, if desired.

Using the location points

To use these location points as points for playback, simply press the appropriate **LOC A** or **LOC B** key (when the indicator is lit). The playback position moves to the location point and the drive enters ready mode.

Erasing the location points

The location points are automatically erased (the point is unassigned from the location point) when the drive tray is opened, or they can be erased in stop mode by pressing **MEMO IN** followed by the **LOC A** or **LOC B** key (the indicator goes out).

NOTE

The A and B points should not be too close together (that is, less than four seconds) when being used for copying as described in “Copying discs” on page 44.

Searching inside tracks

Using the main unit While in play or play ready mode, pressing and holding the search keys on the main unit will move the playback position forwards or backwards by a small amount.

Pressing and releasing the keys will move the playback position backwards and forwards by one minute at a time.

Using the remote control unit The track skip keys on the remote control unit can be used for small movements of the playback position (similar to pressing and holding the search keys) if they are pressed and held for more than one second.

Using the jog function

The jog function allows you to set the playback position precisely, to frame accuracy (75 frames=1 second). This can be useful when copying or playing back only a selected part of the disc, or editing the TOC so that precisely selected portions can be deleted or extracted.

Jogging takes place in play or pause mode, and works in the following way:

- 1 **Position the playback point at approximately the position at which the jogged playback position will be.**
- 2 **Press the appropriate JOG key. The JOG indicator lights and the display shows the current playback position including the frame value (for example, 0:45:13).**
- 3 **Turn the MULTI DIAL (or use the skip keys on the remote control unit). The displayed playback position moves backwards or forwards (depending on the direction in which the dial is turned or on the skip key pressed). The**

“preview portion” of the track, immediately before the new playback position, is repeated.

Turning the dial faster increases the rate at which the position is moved (turning it slower moves it by only one frame per click).

- 4 **Continue to turn the dial or use the skip keys until end of the jogged preview portion reaches the desired playback point.**
- 5 **Press the JOG key so that the indicator goes out. The drive enters pause mode at the point at the end of the preview portion.**

Once the playback position has been set in this way in ready mode, it can be used as the **A** or **B** point or as the call point (see “Cue point” on page 22).

NOTE

If shuffle or programmed playback is selected and jogging takes place as described above, the play mode reverts to the normal “continue” mode.

Changing the preview portion length

- 1 **Press either MENU key. Turn the MULTI DIAL until the display shows PLAY MENU ?.**
- 2 **Push the MULTI DIAL.**
- 3 **Turn the MULTI DIAL until the display shows JOG LENGTH ?.**
- 4 **Push the MULTI DIAL.**
- 5 **Turn the MULTI DIAL to set the length of the preview portion in frames, from 12 frames through 99 frames.**
- 6 **Push the MULTI DIAL.**

Playback modes

The unit can be set to play back the whole disc in the order in which it was created, the tracks of the disc in a random (shuffled) order, or a programmed order.

This can be done either using the remote control or the main unit.

Using the remote control

- 1 **Press the appropriate P.MODE key repeatedly to cycle the display through the following:**

4 – Playback operations—Repeat playback

- **SHUFFLE** (random track order). In this mode, each track is played once before the disc repeats. Using the track skip functions will move backwards or forwards through the random order, e.g. if track 7 is followed by track 10, it is possible to use the track skip keys to go back to track 7, which is remembered as being before immediately before track 10. The red SHUFFLE display indicator lights in this mode.
- **PROGRAM** (see “Programmed order playback” on page 24 below). The red PROGRAM display indicator lights in this mode.
- **CONTINUE** Normal playback mode. Programming is cancelled, and playback continues in the normal order.

The selected mode is shown in large characters on the display. It disappears from the display a few seconds

after selecting the mode, and the display returns to its previous mode.

Using the main unit menu system

- 1 Press the appropriate **MENU** key.
- 2 Turn the **MULTI DIAL** until **PLAY MENU ?** appears in the display. Push the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until **PLAY MODE?** appears in the display. Push the **MULTI DIAL**.
- 4 Turn the **MULTI DIAL**. The three options detailed above are shown as **PMODE>SHUF ?** (shuffle), **PMODE>PGM ?** (programmed playback) and **PMODE>CONTI?** (continue playback).
- 5 Push the **MULTI DIAL** when the appropriate option is displayed.

Programmed order playback

The steps to set up to 99 program steps (tracks) to be played back in a specified order are as follows:

- 1 Set the play mode to Program as described above.
- 2 The display changes to show
0Tr 00:00 00,
meaning that no program steps have yet had tracks assigned to them.
- 3 Set the switch on the remote control to let the number keys control either drive 1 or drive 2.
- 4 Use the number keys on the remote control to enter a track number (including the +10 key to enter values greater than 9, as described above).

The track entered is assigned to the program step, and the display changes, showing the track number, the total time of the program so far, and the step number, e.g.

2Tr 14:56 03.

- 5 The next program step can then be entered.

NOTE

Steps 4 and 5 above can also be carried out from the main unit by turning and pushing the **MULTI DIAL**.

- 6 Repeat steps 4 and 5 above until the program is complete.
- 7 Press the **PLAY** key to start playback at the first program step.

The display shows the track, the current time display, and the program step number.

While in programmed playback mode, using the skip keys or the **MULTI DIAL** moves backwards and forwards in the order set in the program.

Use the **READY** key to halt playback temporarily or the **STOP** key to stop playback of the program.

If the **STOP** key is used, when playback is restarted, it starts from the first program step.

Clear the program by setting the Continue play mode. The program is also cleared when the disc tray is opened, and if the **STOP** key is pressed when playback is stopped in programmed order mode.

The programmed play order is not memorized when power is turned off.

If an attempt is made to enter more than 99 program steps, the message **PGM Full !** appears on the display.

Repeat playback

The repeat playback function allows repeated playback of the whole disc (**ALL**), a single track (**1**) or repeat off (**OFF**).

Using the remote control

- 1 Press the appropriate **REPEAT** key repeatedly on the remote control unit to cycle

through the three repeat modes: ALL, 1 or REPEAT.

The appropriate indicator (REPEAT ALL or REPEAT 1) lights in the display when a repeat mode is active.

Using the main unit menu system

- 1 Press the appropriate MENU key and turn the MULTI DIAL until the display shows PLAY MENU. Push the MULTI DIAL.

- 2 Turn the MULTI DIAL until the display shows REPEAT MODE?. Push the MULTI DIAL.

- 3 Turn the MULTI DIAL so that the display shows REPEAT> OFF?, REPEAT> ALL? or REPEAT> 1 ?. Push the MULTI DIAL.

The appropriate indicator (REPEAT ALL or REPEAT 1) lights in the display when a repeat mode is active.

Continuous playback

When this is enabled (the **CONT PLAY** indicator is lit), when playback ends on the drive currently playing back (either because the end of the disc or the end of programmed playback is reached), playback automatically starts on the other drive, if a playable disc is inserted in it.

If the playback order changes to a drive without a playable disc loaded, the playback stops when the lack of a disc is discovered by the CD-RW402.

NOTE

If a repeat mode is selected ("Repeat playback" on page 24), the repeat portion will keep repeating, and playback will not be transferred to the other drive while repeat is active.

When a drive is not playing back, the tray may be opened, and the disc may be replaced with another disc, allowing continuous playback of varied program material. The order of tracks to be played back may be programmed on the "idle" drive, and on drive 1 the TOC may be edited, etc.

Use the transport keys and control on the active drive to control playback.

Press the **CONT PLAY** key to turn off the indicator to cancel this function.

The **COMMON** analog outputs are probably most useful when using this function, as the output will always be that of the drive currently playing.

Pitch control (drive 1 only)

The pitch (and speed) of the playback can be altered between -9.9% and +9.9%.

This allows "stretching" or "compressing" of material to fit available slots.

NOTE

When pitch control is on, the display shows the nominal time taken from the code on the CD, not the actual elapsed or remaining time at the new speed. Do not use the display for timing pitch changed-material.

Turning pitch control on and off

Use the **PITCH** key on the main unit or the remote control unit to turn the function on or off. The indicator lights when pitch control is enabled (even if the pitch value is set to 0.0%).

Setting the pitch value (i)

To set the pitch control from the main unit:

- 1 Press the appropriate MENU key and turn the MULTI DIAL until the display shows PLAY MENU. Push the MULTI DIAL.

- 2 Turn the MULTI DIAL until the display shows PITCH ?. Push the MULTI DIAL.

- 3 Turn the MULTI DIAL so that the display shows PITCH> x.x%, where xx is anything between -9.9% and 9.9%. 0.0%, of course, is the standard pitch. The value is set immediately.

- 4 Push the MULTI DIAL to exit the menu setting mode.

4 – Playback operations—ISRC view (drive 2 only)

Setting the pitch value (ii) To set the pitch value from the remote control unit:

- 1 Press either of the **PITCH +** or **–** keys on the remote control unit when drive 1 is not in menu mode.

NOTE

*The pitch changes made in this way (or on the main unit) do not take effect if the **PITCH** indicator is not lit.*

ISRC view (drive 2 only)

On drive 2, the ISRC code (see “ISRC copy” on page 15 for more information about this code), if present on the disc, can be displayed during play-

back, if the **FINALIZE** key is pressed while playback is taking place.

RID view (drive 2 only)

The RID (recorder identification data)¹, if present, can be shown for discs playing back on drive 2.

Press the **ERASE** key while playback is taking place to display this data.

1. The first three digits of the RID are assigned as the Manufacturer Code, the next four digits as the Type Code, and the last five digits as the Recorder Unique Number. TEAC's Manufacturer Code is “TCJ”.

Auto Ready function

This function allows the playing back of a single track, and the automatic cueing of the next track ready for playback.

The unit is cued to the start of the track as determined by the subcode, not the start of the audio signal, unless the **AUTO CUE** function is on (see “Auto Cue function” on page 26).

The unit will enter pause mode in the continue, shuffle and programmed play modes, after the location has taken place.

If repeat is active (see “Repeat playback” on page 24), the unit will enter play ready mode at the start of the next track (REPEAT ALL), or the start of the track which is being repeated (REPEAT 1).

To set the function:

- 1 Press the appropriate **MENU** key and turn the **MULTI DIAL** until the display shows **PLAY MENU**. Push the **MULTI DIAL**.
- 2 Turn the **MULTI DIAL** until the display shows **AUTO READY ?**. Push the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** so that the display shows **A_READY>ON ?**. Push the **MULTI DIAL**.

Turning off the function is the same, except that **ON** is replaced by **OFF**.

When the function is on, the **A-READY** display indicator is lit.

Auto Cue function

The Auto Cue function allows you to set up the unit so that when a track is selected for playback in pause mode (cued), playback will start, not at the first position of the track as indicated by the subcode, but at the first position of the track where the audio level exceeds a set trigger level.

The trigger level is set as follows:

- 1 Press the appropriate **MENU** key and turn the **MULTI DIAL** until the display shows **PLAY MENU**. Push the **MULTI DIAL**.
- 2 Turn the **MULTI DIAL** until the display shows **AUTO CUE ?**. Push the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** so that the display shows **A_CUE> xxxdB**.

4 – Playback operations—Incremental play

The options here are OFF, -72dB, -66dB, -60dB, -54dB, -48dB, -42dB, -36dB, -30dB and -24dB.

When the function is on, the A-CUE display indicator is lit.

4 Push the MULTI DIAL.

Incremental play

Incremental playback means that when the **STOP** key is pressed (or if a STOP signal is received through the **CONTROL** connector) while a track is being played back, the playback position will be at the start of the next track.

If the **PLAY** key is pressed while the incremental playback mode is on, playback starts from the start of the next track.

To set the incremental play mode on:

- 1 Press the appropriate **MENU** key and turn the **MULTI DIAL** until the display shows **PLAY MENU**. Push the **MULTI DIAL**.

- 2 Turn the **MULTI DIAL** until the display shows **INC PLAY ?**. Push the **MULTI DIAL**.

- 3 Turn the **MULTI DIAL** so that the display shows **IncPlay> ON ?**. Push the **MULTI DIAL**.

Turning off the function is the same, except that **ON** is replaced by **OFF**.

NOTE

Although there is no indication on the display when the incremental play mode is selected, you will notice that it is in operation whenever you stop playback of a track.

EOM tally time

This allows the drive to send out an EOM (End of Message) tally signal a set number of seconds after the track has actually finished.

- 1 Press the appropriate **MENU** key and turn the **MULTI DIAL** until the display shows **PLAY MENU**. Push the **MULTI DIAL**.
- 2 Turn the **MULTI DIAL** until the display shows **EOM TIME ?**. Push the **MULTI DIAL**.

- 3 Turn the **MULTI DIAL** so that the display shows **EOM TIME> xs**, where **x** is a value between 0 and 99. The 0 value indicates that no tally signal is sent.

- 4 Push the **MULTI DIAL**.

See “CONTROL I/O” on page 51 for details of pinouts, etc.

TOC Editing (drive 1 only)

The concept of TOC editing may need a little explanation. Although a finalized (non-recordable CD) has its Table Of Contents (TOC) fixed, it is possible to “fool” drive 1 into believing that the TOC is actually different from the real disc’s TOC.

This is done by editing the existing TOC and creating a “virtual” TOC which is the table of contents for a “virtual disc”, that is, one which does not actually exist.

It is possible, for instance, to combine tracks, to split tracks into two, or to erase a track from the TOC. It is also possible to redefine the start point and end point of a track.

A disc whose virtual TOC differs from its physical TOC can be recognized by the **NO TOC** indicator flashing in the display.

When the disc is played back, this virtual TOC is used, and it may therefore be used when recording a disc with a different TOC from that of the original.

The virtual TOC is lost when the drive tray is opened or when power is turned off.

NOTE

The normal “Red Book” rules still apply. No more than 99 tracks may exist in the virtual TOC, and they must each be at least four seconds in length.

In all these operations, remember that pressing **STOP** is equivalent to answering “no” when you are asked if an operation is to be performed.

All TOC editing operations except clearing the virtual TOC must be performed in play ready (or play) mode.

4 – Playback operations—TOC Editing (drive 1 only)

Combining tracks

This allows the combination of a track with the track immediately before it. It cannot therefore be used when the playback position is anywhere in the first track, as there is no previous track (the display shows POINT ERROR! if you attempt this).

- 1 Press the **MENU** key and turn the **MULTI DIAL** until the display shows **TOC EDIT ?**. Push the **MULTI DIAL**.
- 2 Turn the **MULTI DIAL** until the display shows **COMBINE ?**. Push the **MULTI DIAL**.

The display now shows **COMBINE OK ?**.

- 3 Push the **MULTI DIAL** to combine the current track with the previous track.

The playback position is moved to the start of the newly-created combined track.

If the first track of the pair contains **CD TEXT**, this is the text used for the new track.

Erasing tracks

This erases the track from the TOC (of course, the data is not erased, but the track no longer exists in the table of contents).

- 1 Press the **MENU** key and turn the **MULTI DIAL** until the display shows **TOC EDIT ?**. Push the **MULTI DIAL**.

- 2 Turn the **MULTI DIAL** until the display shows **ERASE TRACK?**. Push the **MULTI DIAL**.

The display now shows **ERASE OK ?**.

- 3 Push the **MULTI DIAL** to erase the current track.

Dividing tracks

This splits the current track into two at the current playback position (remember that a track cannot be less than four seconds in length and there cannot be more than 99 tracks per disc).

- 1 Set the point at which the split is to occur. You may find that the jog function is useful here (“Using the jog function” on page 23).
- 2 Press the **MENU** key and turn the **MULTI DIAL** until the display shows **TOC EDIT ?**. Push the **MULTI DIAL**.

- 3 Turn the **MULTI DIAL** until the display shows **DIVIDE ?**. Push the **MULTI DIAL**.

The display now shows **DIVIDE OK ?**.

- 4 Push the **MULTI DIAL** to divide the current track at the playback position point.

NOTE

*If the track contains **CD TEXT**, this will be used for the first track of the pair of tracks created in this way.*

Redefining the start point

It may be useful to start the playback at a different point from the one marked by the track boundary (avoiding a false start, etc.).

- 1 Set the point at which the new start point is to occur. You may find that the jog function is useful here (“Using the jog function” on page 23).

- 2 Press the **MENU** key and turn the **MULTI DIAL** until the display shows **TOC EDIT ?**. Push the **MULTI DIAL**.

- 3 Turn the **MULTI DIAL** until the display shows **StartPt SET?**. Push the **MULTI DIAL**.

The display now shows **Pt SET OK ?**.

- 4 Push the **MULTI DIAL** to set the start point of the current track at the playback position point.

Redefining the end point

It may be useful to end the playback of a track at a different point from the one marked by the track boundary (avoiding a messy ending, or sound recorded after the end of the take, etc.).

- 1 Set the point at which the new start point is to occur. You may find that the jog function is useful here (“Using the jog function” on page 23).**
- 2 Press the MENU key and turn the MULTI DIAL until the display shows TOC EDIT ?. Push the MULTI DIAL.**
- 3 Turn the MULTI DIAL until the display shows End Pt SET?. Push the MULTI DIAL.**
The display now shows Pt SET OK ?.
- 4 Push the MULTI DIAL to set the end point of the current track at the playback position point.**

Clearing the virtual TOC

If you want to restore the original TOC, and clear all the edits, you can always eject the disc or turn the power off, or you can follow the procedure below:

- 1 With the drive stopped (not in ready mode), press the MENU key and turn the MULTI DIAL until the display shows TOC EDIT ?. Push the MULTI DIAL.**
- 2 Turn the MULTI DIAL until the display shows ALL CANCEL ?. Push the MULTI DIAL.**
- 3 Push the MULTI DIAL. The flashing NO TOC goes out, and the original TOC values (total running time and number of tracks) are displayed.**

NOTE

If no edits have been made to the TOC, the TOC EDIT menu does not appear in step 1 with the drive stopped. It will appear in ready or play mode, allowing you to perform a TOC editing operation.

5 – Recording

Before you start recording using the CD-RW402, make sure that you understand the following key points:

- Once you have recorded on a CD-R disc, the data cannot be erased from it.
- You can add tracks to an unfinalized recordable disc. Once finalized, a CD-R disc is “fixed” and behaves in the same way as a pre-recorded disc.

Finalized CD-RW discs, however, can be erased, refreshed and re-recorded.

NOTE

As well as recording, the CD-RW402 also provides copy facilities. You may want to look at “Copying discs” on page 44 before starting recording, as sometimes a copy operation may be more appropriate than a record operation (for instance, if you want to record a whole disc and make no changes to the contents, a copy operation is almost always preferable).

Input selection

To select the input to be recorded, press the **INPUT SELECT** key on the main unit.

Repeated presses of the key cycle through the following options:

ANALOG	Analog inputs
OPTICAL	Optical digital
COAXIAL	Coaxial digital
INTERNAL	Drive 1

In the case of the coaxial or optical inputs being selected, the boxed DIGITAL indicator shows on the

display, and the appropriate indicator: COAXIAL or OPTICAL, lights on the display.

If the analog signal is selected the boxed ANALOG indicator lights on the display.

NOTE

There is no way of changing the selection between the balanced and unbalanced analog inputs. If signals are present at both inputs, they will be mixed.

No indicator lights if INTERNAL is selected.

Signal volume

- The analog signals received at the **ANALOG IN** jacks are controlled with the **INPUT** and **BALANCE** controls.
- Digital signal levels (from whatever the source) as well as the level of analog signals once they have passed through the **INPUT** and **BALANCE** controls are adjusted in the following way:

- 1 Press the **RECORD** key to place the unit in record ready mode (or monitor mode, if a recordable disc is not loaded—see below).
- 2 Press the **MENU** key (2) and turn the **MULTI DIAL** to display REC MENU 1 ?.
- 3 Press the **MULTI DIAL**.

- 4 Turn the **MULTI DIAL** until DIG VOLUME ? (digital volume) is shown.
- 5 Press the **MULTI DIAL**.
- 6 Turn the **MULTI DIAL** to adjust the volume between –60dB and +18dB. There is also a -- setting (below the lowest level) which represents a total signal cut.

While you are adjusting the level, it is probably a good idea to play the signal source, and watch the meters, making sure that the OVER segments do not light.

- 7 Press the **MULTI DIAL** to leave the menu.

Input monitoring

When the unit is in record ready, or record mode, the input signal is output from the **OUT** jacks (digital and analog), allowing you to hear the input signal.

The meters also show the current signal level.

However, it is only possible to record, or to enter record ready mode, when a recordable disc is inserted. To allow monitoring of the input signal at other times, or when the unit is stopped, use the

RECORD key to enter monitor mode from stop mode when there is no recordable disc in the unit (when there is a recordable disc in the unit, pressing the **RECORD** key enters record ready mode).

The word MONITOR appears on the display to show that the output signal is an echo of the input signal(s). The meters show the current input level.

Exit the monitor mode by using the **STOP** key.

Frequency conversion

The sampling frequency for CDs is 44.1 kHz. The CD-RW402 will always record (and play back) CDs at this frequency.

However, if recording through a digital connection (either coaxial or optical) and the source has been recorded at a frequency other than 44.1 kHz, or is

being played back at a non-standard speed using a varispeed unit (more than 0.02% away from the standard), the CD-RW402's internal frequency converter can automatically convert the incoming frequency to 44.1 kHz.

Basic recording

NOTE

According to the “Red Book” (the specification for audio CDs), a track cannot be less than four seconds in length, and there can be a maximum of 99 tracks on an audio CD. Bear these limitations in mind when recording.

*If you press either the **STOP** or the **READY** key within four seconds of starting recording, the unit will continue recording until four seconds have elapsed (since the start of recording) and then stop or pause as appropriate.*

After selecting the input source (“Input selection” on page 30), it is possible to start recording.

The basic record procedure is as follows:

- 1 **Load a recordable disc into the unit. As the disc is loaded, the display shows TOC Reading.**

When the disc has been loaded, the display indicators show CD-R, NO TOC, or CD-RW, NO TOC, as appropriate.
- 2 **Press the **RECORD** key. The unit enters record ready mode, as shown by the REC and pause indicators on the display. As the unit enters record ready mode, the display shows Now OPC (Optimum Power Control), as the unit prepares to record on the disc.**

If the digital source selected (see “Input selection” on page 30) is not connected properly, or is not powered up, the message D-IN UNLOCK! (digital input is unlocked) is displayed to show that the system is not ready to record.
- 3 **Adjust the level of the source, following the guidelines in “Signal volume” on page 30.**

NOTE

The red OVER indicators on the meters should never light. Unlike analog equipment, digital audio units produce extremely unpleasant sounds when dis-

torted, and there is no “headroom” after the 0 mark. If recording digitally from a commercially-produced CD, the volume set in the menu should be 0dB. This will maintain all the dynamic range of the source CD without clipping. Only boost the signal if the source is exceptionally quiet.

- 4 **Press the **PLAY** key to start recording.**

Note that there is no need to “cue up” the recording position—the unit always finds the next available location on the disc and start recording to it.

- 5 **Press the **READY** key to pause recording temporarily. The pause indicator on the display shows this.**

Pressing **PLAY again restarts recording with a new track number.**

- 6 **Press **STOP** to stop recording. When recording stops, the display shows PMA Writing (Program Memory Area) and the REC indicator flashes for a few seconds as the unit writes to the disc.**

NOTE

While the “PMA Writing” message is displayed, all keys are disabled, and the unit is actually writing to disc. Do not disconnect the power or subject the unit to severe vibration or shocks at this time, as this will prevent proper recording of the information.

When this message disappears, you must press the **RECORD key (step 2) before restarting the recording. Recording restarts with a new track number.**

NOTE

Remember that every time recording is paused or stopped, when recording is restarted, a new track will always be started. It is not possible to record in two “stages” within one track.

5 – Recording—Basic recording

Playing back tracks

Although an unfinalized disc cannot be played back on an ordinary CD player or on drive 1, drive 2 can play back tracks that have been recorded.

Use the **MULTI DIAL** or the **SKIP** keys to select a track for playback.

Time display while recording

While a recordable disc is being played back, the four time display modes available in normal playback as described in “Time display modes” on page 21: elapsed track time (nothing lit), TOTAL, TOTAL REMAIN, and track REMAIN. CD information (title and artist) will also be added to this list if CD TEXT is present on the disc.

However, during recording there are fewer options available (obviously, the unit cannot see into the future and know how much time remains of the track which is being currently recorded!).

When in record or record ready mode, repeated presses of the **DISPLAY** key cycle between displaying the remaining time left for recording on the disc (TOTAL REMAIN) and the elapsed time of the track currently being recorded (no indicator lit).

When playback is stopped at the start of a recordable disc, there are only two options available: TOTAL (the total time recorded so far on the disc) and TOTAL REMAIN (the total time available on the disc for further recording).

Manual track division

It is possible to divide the recording into tracks “on the fly” while recording.

There are three options available for track division: automatic division triggered by the subcode when making a digital recording, track divisions triggered by a rise in sound level, and manual settings.

To make manual track divisions, while recording is taking place, press the **RECORD** key. The current track number is incremented by one.

For details of automatic track division while recording, see “Automatic track division” on page 35.

NOTE

According to the “Red Book” (the specification for audio CDs), a track cannot be less than four seconds in length, and there can be a maximum of 99 tracks on an audio CD. Bear these limitations in mind when adding track divisions.

Restricting the number of tracks

When making a recording using the CD-RW402, it is possible to restrict the number of tracks that may be recorded at one time. This applies whether the tracks are being divided manually, as described above (“Manual track division” on page 32) or being divided automatically (“Automatic track division” on page 35).

At any time within record or record ready mode, turn the **MULTI DIAL** or use the **SKIP** keys.

This sets the number of remaining tracks, as shown to the right of the time display. The maximum num-

ber here is limited by the standard limit of 99 tracks, and the number of tracks currently recorded.

Every time a track division is made, the number shown at the right of the display goes down by one. When the number shown is 1, and a track division is made, the display shows PMA Writing and the unit enters stop mode.

The number of remaining tracks can be changed during recording using the **MULTI DIAL**.

Full disc

If recording a long program, and the number of tracks has not been restricted, when there is no space remaining on the disc for recording, as shown by the time display (see “Time display while recording” on

page 32), just before the end of the disc is reached, the unit starts a fade-out over a few seconds (the display shows FADE OUT).

5 – Recording—Synchronized recording

When the fade-out has finished, the display shows Disc Full!! for a few seconds, and the unit then goes into stop mode (the display shows PMA Writing).

If the disc is a CD-RW, the final track can be erased, if required (see “Erasing tracks” on page 41) and the disc then finalized. If the disc is a CD-R, it must be finalized prior to use (see “Finalizing” on page 40).

These following sections cover more advanced recording techniques, such as synchronized recording to allow automatic starting and stopping of

recording, automated track divisions, fading recordings in and out, copy protection, etc.

Synchronized recording

Synchronized recording means that recording will begin automatically when a signal is received, and will stop when the signal ends.

To enable or disable synchronized recording:

- 1 **A recordable disc must be loaded.**
- 2 **With the unit in record ready or record mode, press the SYNC REC key.**

The display shows SYNC ON briefly, and then changes to the track and time display. When synchronized recording is enabled, the SYNC indicator lights in the display.

The SYNC REC key is also used to turn off synchronized recording (the display briefly shows SYNC OFF and then returns to the track and time display).

Setting the trigger levels

The signal level which may be used with synchronized recording operations, here called the “trigger level” or “threshold”, is set as described below.

The CD-RW402 provides two separate trigger levels: one for analog inputs and one for digital.

- 1 **Press the MENU key (2) and turn the MULTI DIAL to display REC MENU 1 ?.**
- 2 **Press the MULTI DIAL.**
- 3 **Turn the MULTI DIAL until the display shows either S_LEVEL(A) ? (analog) or S_LEVEL(D) ? (digital), as required.**
- 4 **Press the MULTI DIAL.**
- 5 **Turn the MULTI DIAL to change the SLVL A or SLVL D value between -24, -30, -36, -42, -48, -54, -60, -66, and -72 dB.**

On the digital menu item only, there is an additional setting: SLVL D>MIN_L, which means that any signal at all (even the quietest possible signal that can be recorded) acts as a trigger.

- 6 **Press the MULTI DIAL to leave the menu.**

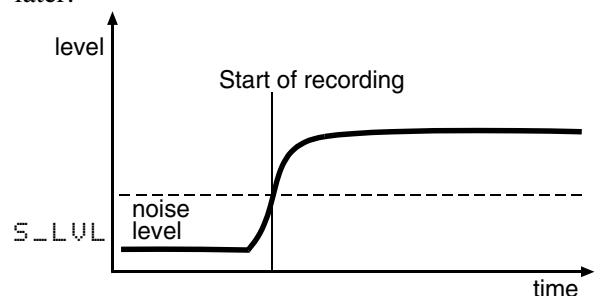
Low numerical values of this setting (towards -24) mean that it takes a louder signal to trigger the start of the synchronized recording. A high numerical value (towards -72) means that a relatively quiet signal will trigger the start of recording.

The conditions under which an input signal is used as the trigger to start recording are:

- when recording digitally, a digital start signal is detected

or

- the sound level rises above the threshold (see below) after having been below the threshold for one second or more. Note that the diagram below represents a special case (the source is stopped or paused) of the more general condition, as explained later:



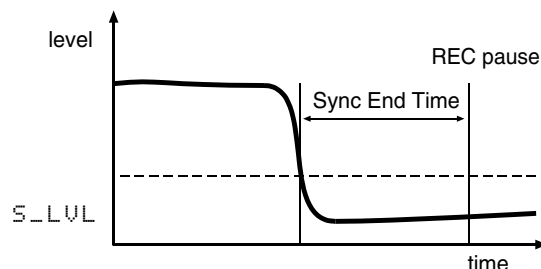
To start synchronized recording when the source is stopped or in pause mode:

- 1 **The unit must be in record ready mode, and the SYNC indicator in the display must be lit, as explained above.**
- 2 **Start playing the source. The pause indicator disappears from the display, and the unit starts recording.**

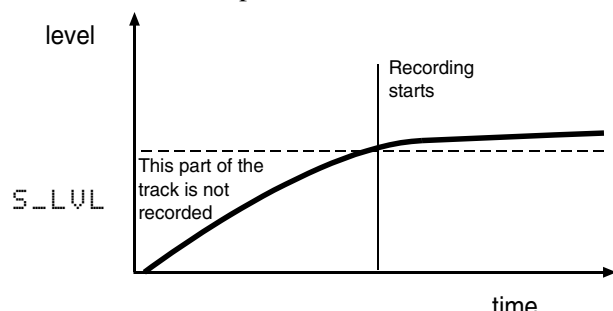
5 – Recording—Synchronized recording

The conditions under which synchronized recording stops are:

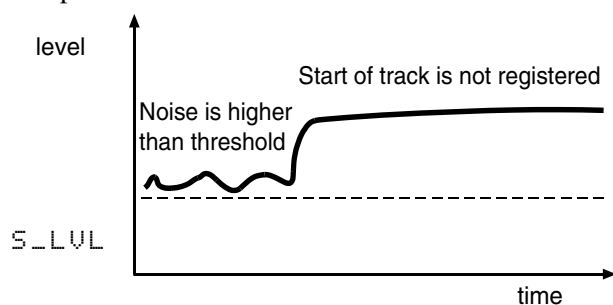
- the sound level drops below the threshold level for the time set by the Sync End Time function (“Adding extra time at the end of a recording” on page 35):



If you set the threshold value so that only high-level signals trigger recording, remember that this will not record the start of a piece with a slow fade-in:



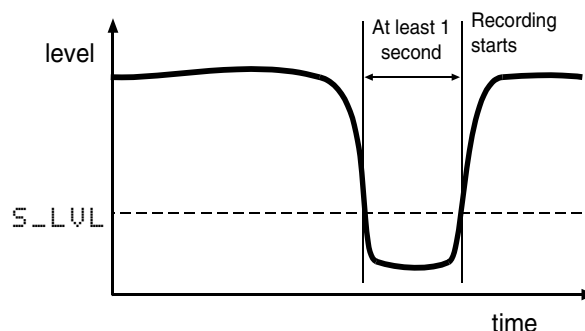
Also remember that when recording from an analog source, the threshold should be set so that it is higher than the “noise floor” (the base level of hiss, pops and crackles which may come from an older vinyl recording, for example). If the “noise floor” is higher than the threshold, synchronized recording will not take place:



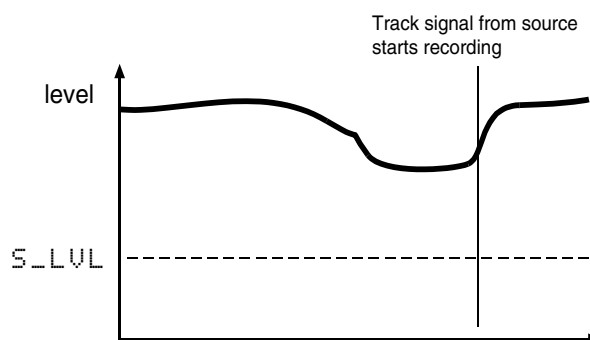
Because synchronized recording can be turned on and off while recording is taking place, it is therefore possible to record with a synchronized automatic start, and a manual end, or *vice versa*.

When the source material is being played back before synchronized recording is enabled, the conditions under which synchronized recording will start (after synchronized recording has been enabled) are:

When the signal drops below the threshold for one second or more and then rises above the threshold again (this is the general condition, of which starting synchronized recording from a stopped or paused source is a special case):



Alternatively, when recording digitally from sources (MD, CD and DAT) which output track divisions, synchronized recording starts when a track division is received, regardless of the level:



To stop synchronized recording:

- 1 The unit must be in record mode, and the SYNC indicator in the display must be lit.**
- 2 Stop the source. After a few seconds, the unit enters record ready mode. The time between the stopping of the source and entering record ready mode is used to record a gap at the end of the track.**
- 3 If no changes are made to the unit’s controls, restarting the source restarts recording, as the unit is still in sync mode and will start recording again when the source is detected.**

NOTE

When recording in sync mode, you may notice a slight delay between starting the source, and the CD-RW402 responding. This is due to the way in which the unit works, storing the data in a memory buffer before writing it to the disc. The resulting delay is therefore not a cause for concern—all audio data received between the start and end points will be recorded.

Adding extra time at the end of a recording

If the material being recorded from an analog source ends very quietly (it drops below the trigger level for some time before the actual end of the piece), the CD-RW402 may enter record ready before the actual end of a piece. You can allow for this by increasing the time between the detection of “silence” and the change to record ready mode.

The minimum value here is 5 seconds, and the maximum value is 60 seconds (1 seconds increments).

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 2 ?**.
- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **SYNC END TM?**.
- 4 Press the **MULTI DIAL**.
- 5 Turn the **MULTI DIAL** to change the **SyncEnd (increment watch time)** value between **5s and 60s (in 1 second steps)**.
- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

“Trimming” the sync

In addition to the extra time shown above, it is also possible to move the synchronized start and end backwards and forwards by up to 125 frames either before or after the received sync start and stop signals (in case you’re wondering how the CD-RW402 can start before it receives a signal, it’s not magic—just clever use of buffer memory!).

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 2 ?**.
- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **SYNC TRIM ?**.
- 4 Press the **MULTI DIAL**.
- 5 Turn the **MULTI DIAL** to change the **SYNC_T (sync trim)** value between **–125 frames and +125 frames (in 1 frame steps)**.
- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

Automatic track division

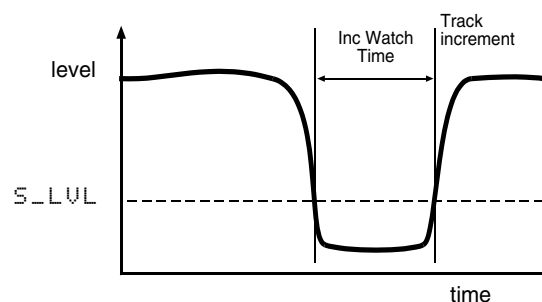
The trigger level, as set above (“Synchronized recording” on page 33) can also be used to divide tracks if the A-TRACK (auto track) function is enabled. When this function is enabled, the unit automatically inserts a track division in the recorded material when:

- recording digitally from MD, CD or DAT, an increment signal is detected

or

- increment signals are unavailable (e.g. analog recording or digital sources other than MD, CD or DAT) and the sound level has dropped below the threshold for more than the watch time (see

“Increasing the “watch” time” on page 36), and sound has re-started:



To enable or disable automatic track division:

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 1 ?**.
- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **AUTO TRACK ?**.
- 4 Press the **MULTI DIAL**.

5 – Recording—Automatic track division

- 5 Turn the **MULTI DIAL** to change the **A_TRACK** value between **ON** and **OFF**.
- 6 Press the **MULTI DIAL** to make the setting and leave the menu. The **A-TRACK** indicator shows in the display when the function is active.

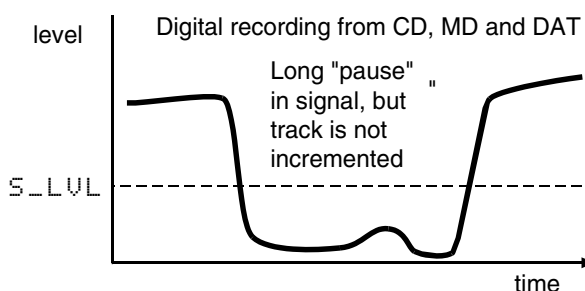
Automatic track division can be turned on or off while recording is taking place.

NOTE

When recording certain types of material (e.g. certain types of classical music or spoken word) through the analog connections, since the track divisions are determined by relative silence, it is possible that spurious track divisions will be inserted. Under these conditions, it may be better to use manual track division ("Manual track division" on page 32).

However, if recording through a digital connection, the track number will be incremented only when a track division signal is received.

A fall and subsequent rise in volume alone when recording digitally from CD, MD or DAT is not sufficient to trigger an automatic track increment.



You may find it helpful to use the track restriction facility (see "Restricting the number of tracks" on page 32) together with the automatic track division.

For instance, if you have recorded two albums on one DAT tape, and you wish to make two separate CDs from this tape, you can use the **MULTI DIAL** to set the number of tracks to the number of tracks comprising the first album.

When the final track of the first album has been recorded, the unit automatically performs the PMA writing procedure and enters stop mode.

NOTE

Note that the track division information may not be output by some models of CD player.

Increasing the "watch" time

It is possible to set a fixed time after the detection of a signal over the trigger level before the start of a track.

This can be used when making a disc of a live classical recording, for example, when the members of the audience all cough between movements before the conductor starts his downbeat, for example.

The time can be set from 1 second to 6 seconds in single-second increments.

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 2 ?**.
- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **IncWatch TM?**.
- 4 Press the **MULTI DIAL**.
- 5 Turn the **MULTI DIAL** to change the **IncWatch** (increment watch time) value between **1s** and **6s** (in 1 second steps).
- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

“Trimming” the increment time

It is also possible to move the track increment time backwards and forwards by up to 125 frames either before or after the received track division signals (in the same way as for sync recording as described in “Trimming” the sync” on page 35.

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 2 ?**.
- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **INC TRIM ?**.
- 4 Press the **MULTI DIAL**.
- 5 Turn the **MULTI DIAL** to change the **INC_T** (sync trim) value between **–125 frames** and **+125 frames** (in 1 frame steps).
- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

Rec mute function

The rec mute function allows instant cut-off of the input signal, and records silence on the disc.

- 1 While recording is in progress, press the **REC MUTE** key.
- 2 The display shows **REC MUTE**, the meters stop displaying the current level and the monitored sound is cut.
- 3 After a set time (see below), the unit enters record ready mode.

Setting the REC MUTE time:

The time during which recording is muted before the drive enters record ready after the **REC MUTE** key has been pressed is set in the following way:

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 2 ?**.
- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **REC MUTE TM ?**.
- 4 Press the **MULTI DIAL**.
- 5 Turn the **MULTI DIAL** to change the **MUTE_TM** (mute time) value between **1s** and **10s** (in 1 second steps).
- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

Fade-in and fade-out

To provide smooth beginnings and endings to recorded tracks, the unit provides fade facilities.

Fade-ins are from $-\infty$ (silence) to the set input level (“Signal volume” on page 30) and fade-outs go from the current input volume to silence.

The fade-in and fade-out times can be set independently in increments of one second, from 1 second to 24 seconds.

To set the fade times:

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 1 ?**.
- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **FADE IN TM?** or **FADE OUT TM?** as appropriate.
- 4 Press the **MULTI DIAL**.
- 5 Turn the **MULTI DIAL** to change the fade time (**FADE IN** or **FADE OUT**) value between **1s** and **24s** (in 1 second steps).
- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

5 – Recording—Copy-protection

To perform a fade-in:

- 1 With a recordable disc loaded, press the **RECORD** key so that the unit enters record ready mode.
- 2 Start the source material, and press the **FADER** key.

As the fade progresses, the monitored signal gradually becomes louder, reflecting the level recorded on disc.

To perform a fade-out:

- 1 While recording, press the **FADER** key.
As the fade progresses, the monitored signal gradually becomes quieter, reflecting the level recorded on disc.

- 2 When the end of the fade-out time is reached, the unit goes into record ready mode. Recording can be restarted with the **FADER** key or the **PLAY** or **READY** keys.

It is not possible to change the fade-in and fade-out times to new values while recording is in progress.

Copy-protection

The CD-RW402 allows copy-protection to be applied to the discs produced. Naturally, the copy-protection applies only to digital-to-digital copies made from the discs produced on the CD-RW402.

There are three settings:

- **FREE** (may be freely copied), where no copy-protection is applied to the recorded disc.
- **1GEN** (single-generation copying), where one digital copy (“child”) can be made from the recorded disc, but no digital copies (“grandchildren”) can be made from the child.
- **PROH** (copy prohibited) which prevents any digital copies being made from the recorded disc

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 1 ?**.
- 2 Press the **MULTI DIAL**.

- 3 Turn the **MULTI DIAL** until the display shows **COPY ID ?**.

- 4 Press the **MULTI DIAL**.

- 5 Turn the **MULTI DIAL** to change the fade time **COPY ID> setting between FREE, PROH and 1GEN**.

- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

NOTE

Copy-protection applies on a “per-track”, not a per-disc basis. This means that you can apply different copy-protection levels to different tracks (but you can’t apply different copy-protection levels to different parts of the same track). If copy-protection is important to your work, you may want to check this setting every time you make a recording, to ensure that you have the protection level that you want.

Index operations

Many CDs contain index information as sub-track divisions, often in classical music to mark scene divisions in opera or the beginning of instrumental passages, etc. The CD-RW402 also supports indexes,

and allows you to carry out a number of useful operations with regard to them.

Note that although both drives of the CD-RW402 can display index markers, there is no index locate facility built into the CD-RW402.

Index increment

Whether the index increment option is on or off (see below), it is possible to increment the index markers manually by pressing the drive 2 **CALL** key as recording takes place.

However, by setting the index increment option on, index markers outside the tracks in the SUB-Q code of SPDIF digital signals will be automatically recorded. Index numbers are shown in small digits to the right of the track number.

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 2 ?**.

- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **INDEX INC ?**.
- 4 Press the **MULTI DIAL**.
- 5 Turn the **MULTI DIAL** to change the fade time **IndexInc>** setting between **ON** and **OFF**.
- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

Setting the length of index 00

Index 00 is typically used as a lead-in track. The default length is 1 second, but it can be set in 1-second increments from 0 seconds to 4 seconds:

- 1 Press the **MENU** key (2) and turn the **MULTI DIAL** to display **REC MENU 2 ?**.
- 2 Press the **MULTI DIAL**.
- 3 Turn the **MULTI DIAL** until the display shows **INDEX00 TM?**.

- 4 Press the **MULTI DIAL**.
- 5 Turn the **MULTI DIAL** to change the fade time **INDEX00>** setting between **0s** and **4s** in 1-second increments.
- 6 Press the **MULTI DIAL** to make the setting and leave the menu.

Extended check (overburning)

On some media, it is possible to record over the stated time as marked on the disc.

To check this:

- 1 Press and hold the **RECORD** key of drive 2 (in stop mode) for more than 2 seconds.
- 2 The display shows **ExtendCheck?**. Press the **MULTI DIAL** or **REC** key to start the check, **STOP** to cancel the operation.

While the check is taking place, the display shows **ExtendCheck** with a flashing * (asterisk) to the right for some time.

When the check is complete, the display shows **COMPLETE**.

The check can be interrupted by pressing the Drive 2 **STOP** key. No other key is enabled while the check is taking place.

After the check is complete, the available time for recording may be extended, as shown on the display.

NOTE

Although the CD-RW402 may report that extended recording may take place on a disc, it may be that extended recording is not actually possible when it is attempted.

Because such extended recording does not conform to the Orange Book standard, discs created in this way may not be playable on other CD players.

6 – After recording

This section deals with the actions taken after recording: finalizing for CD-R and CD-RW discs, and erase operations for CD-RW discs.

NOTE

This section refers to drive 2 only. Finalizing and erase operations are only possible on drive 2 of the CD-RW402.

Once finalized, CD-R discs are truly final—no more can be recorded on them. By contrast, CD-RW discs can be “unfinalized” using the CD-RW402, i.e. their TOC can be deleted, and if there is space, further material can be recorded on them. Even if the disc is full, tracks can be erased following the unfinalize process, and new material can be recorded.

Finalizing

As has been explained earlier (“Finalizing” on page 10), in order for a disc to become a standard CD, it must have a Table of Contents (TOC) written to it. This process is known as finalizing.

An unfinalized disc can always be distinguished on the CD-RW402 by the NO TOC indicator under the disc type on the display being lit when the disc is inserted.

To finalize a disc:

- 1 **With the unfinalized (recordable) disc loaded, and the unit in stop mode, press the FINALIZE key.**
The display shows FINALIZE OK?.
- 2 **To start the finalizing process, push the MULTI DIAL or REC key.**

If you do not want to proceed with the finalizing process, press any other key (such as the STOP key).

If finalization has been chosen, the display changes. The NO TOC indicator goes out, and the word TOC and the REC indicator flash in the display. The unit starts counting down from a time shown on the display.

After finalization, a CD-RW NO TOC changes to CD-RW and a CD-R NO TOC changes to a CD.

NOTE

Although CD-R discs finalized on the CD-RW402 may be replayed on ordinary CD players, remember that finalized CD-RW discs may not play on CD players (but they may be played on drive 1 of the CD-RW402).

Unfinalizing CD-RW discs

If a CD-RW disc has been finalized, it is possible to erase the Table of Contents in the following way:

- 1 **With the finalized disc loaded and the unit in stop mode, press the ERASE key.**
- 2 **If the display does not show the word UNFINALIZE?, turn the MULTI DIAL until it is displayed.**
- 3 **To start the unfinalizing process, push the MULTI DIAL or REC key.**

If you do not want to proceed with the unfinalizing process, press any other key (such as the STOP key).

If unfinalization has been chosen, the NO TOC indicator starts flashing in the display, and the word ERASE also starts flashing. The unit starts counting down from a time shown on the display.

After unfinalization, a CD-RW indicator changes to a CD-RW NO TOC indicator.

Erasing

Unfinalizing (described above) is a special case of erasing a disc. It is also possible to erase a track or tracks, starting with the last-recorded track, a whole disc, or to “refresh” a disc.

NOTE

Erase procedures are possible only on a CD-RW disc. Even if a CD-RW disc has been finalized, selecting an

erase procedure will automatically unfinalize it prior to erasure. The disc may then have to be re-finalized. Any CD TEXT information (see “CD TEXT” on page 42) is therefore lost.

Remember that it is not possible to perform any erase procedures on a CD-R disc.

Erasing tracks

It is possible to erase the last recorded track, the last two recorded tracks, the last three recorded tracks, etc. It is not, however, possible to erase tracks in the “middle” of the disc.

- 1 With the disc loaded, and the unit in stop mode, press the **ERASE** key.
- 2 If the display does not show **ERASE XX-XX?**, where **XX** is the number of the last track recorded on the disc, turn the **MULTI DIAL** or use the skip keys until it is displayed.
- 3 Turn the **MULTI DIAL** to change the number of the first track to be erased. The highest value that this number can take is the last track recorded (for example, if 17 tracks have been recorded on the disc, 17-17 means that the last track only, number 17, will be erased). The lowest value that this number can take is 2 (if this number was 1, the whole disc would be erased, as described below).

If you do not want to proceed with the erase operation, press any other key (such as the STOP key).

NOTE

If only one track has been recorded on the disc, only the “erase disc” option (“Erasing a whole disc” on page 41) is available.

- 4 When the range of tracks to be erased has been selected, push the **MULTI DIAL** or **REC** key.

NOTE

This operation cannot be undone. If you are going to erase a track or tracks, make sure that they are recordings that you really want to erase!

If the erase operation has been selected, the word ERASE flashes on the display, and the timer starts counting down.

Erasing a whole disc

When you want to erase a whole disc (all the tracks on a disc), follow the procedure below:

- 1 With the disc loaded, and the unit in stop mode, press the **ERASE** key.
- 2 Turn the **MULTI DIAL** until the display shows **ERASE DISC?**.

If you do not want to proceed with the erase operation, press any other key (such as the STOP key).

- 3 To erase the contents of the disc, push the **MULTI DIAL** or **REC** key.

NOTE

This operation cannot be undone. If you are going to erase a disc, make sure that it contains only recordings that you really want to erase!

If the erase operation has been selected, the word ERASE flashes on the display, and the timer starts counting down a time value shown on the display.

Refreshing a disc

If a CD-RW disc has been corrupted at any point (e.g. power has been cut off in the middle of a finalize operation, etc.), or has been used in a computer or another piece of equipment that makes it unreadable, it is possible to “refresh” the disc to make it usable again. This operation destroys all data on the disc.

- 1 With the disc loaded, and the unit in stop mode, press the **ERASE** key.
- 2 Turn the **MULTI DIAL** or use the **SKIP** keys until the display shows **DISC REFRESH**.
- 3 To refresh the disc, push the **MULTI DIAL** or **REC** key.

If you do not want to proceed with the refresh operation, press any other key (such as the STOP key).

NOTE

This operation cannot be undone. If you are going to refresh a disc, make sure that it contains only recordings that you really want to erase!

If the refresh operation has been selected, the words ERASE XX:XX are shown on the display, and the timer starts counting down (XX:XX).

At the end of the countdown period, the display returns to the track/time display (of course, there are no tracks, and the disc is at the start, with the total time of the disc available for recording).

7 – CD TEXT

When discs containing CD TEXT are played back on the CD-RW402, you can view titles of discs and of artists (as explained in “Time display modes” on page 21).

In addition, drive 2 allows you to record your own disc and track titles and artists onto recordable discs.

Each disc can have a title and artist associated with it, as can each track on the disc. Remember that not every player is equipped to read this information.

The maximum length of a title and artist together for one track (or for the disc) that can be entered with the CD-RW402 is eighty characters, and there is a limit of 2900 characters per disc.

CD TEXT entered in this way is not “visible” to suitably-equipped players until the disc has been finalized and a TOC has been written to the disc.

Ejecting discs with CD TEXT data

When a disc is ejected, the edited data (or the data that has been read from the disc) is cleared from the editing area (text data is also lost when the power is turned off).

However, there is a temporary storage area into which the text data can be stored when the disc is ejected.

If text data exists in the unit, and the **OPEN/CLOSE** key (2) is pressed, instead of the usual OPEN message, the display shows STORE TEXT ?.

Push the **MULTI DIAL** to store the text into the buffer.

Alternatively, press the **OPEN/CLOSE** key once more to eject the disc without storing the text data.

The data can also be stored from the menu:

- 1 Press the **MENU** key and turn the **MULTI DIAL** until the display shows CD TEXT ?. Push the **MULTI DIAL**.
- 2 Turn the **MULTI DIAL** until the display shows Text STORE?. Push the **MULTI DIAL**.
- 3 The display shows STORE OK?. Push the **MULTI DIAL** to store the data into the buffer.

Restoring CD TEXT data from the buffer

When the text data has been stored in the buffer, it may be retrieved again using the menu system:

- 1 Press the **MENU** key and turn the **MULTI DIAL** until the display shows CD TEXT ?. Push the **MULTI DIAL**.
- 2 Turn the **MULTI DIAL** until the display shows Text RESTORE?. Push the **MULTI DIAL**.
- 3 The display shows RESTORE OK?. Push the **MULTI DIAL** to restore the data from the buffer into the working edit area.

Entering characters from the main unit

To enter characters into a title or artist name:

- The cursor is shown as an underline character.
- If a title or name is too long to fit on the display, the characters scroll to fit.
- Use the **MULTI DIAL** or the remote control skip keys to change the character at the cursor.
- Push the **MULTI DIAL** to enter the character and move the cursor right one space.
- Use the **SEARCH** keys to move the cursor left and right.
- Use the **ERASE** key to delete a character at the cursor position

- The **DISPLAY** (2) key acts as a caps-lock key. When uppercase (CAPITAL) mode is in operation, the CAPS indicator lights in the display.
- Characters which may be input are a through z, A through Z, 0 through 9, and assorted punctuation.
- Insert spaces in the title by pressing and holding the **MULTI DIAL** for more than 2 seconds.
- Copy the whole of the title being edited by pressing the **JOG** key while editing.
- “Paste” the contents of the edit buffer (above) by pressing the **CALL** key when editing a title.

Entering characters using an external keyboard

NOTE

Always connect and disconnect the keyboard with the power to the CD-RW402 turned OFF. There is a risk of damage to the CD-RW402 if this connection is made or broken with the power turned on.

Set the keyboard type to either English (default) or Japanese (“Keyboard preferences” on page 15).

- Type in letters and symbols using the keyboard. The cursor moves automatically when a character is entered.
- The keyboard **[Shift]** keys can be used to shift between lowercase and uppercase characters (and shifted punctuation).
- The **[Esc]** key can be used into clear the entered text.

- The **[Enter]** key here is equivalent to the **FINALIZE** key.
- The **[Up]** and **[Down]** arrow keys are equivalent to turning the **MULTI DIAL** for drive 2 (**[Up]** = clockwise, **[Down]** = counterclockwise).
- The **[Left]** and **[Right]** cursor keys are equivalent to the **SEARCH** keys (cursor movement).
- The **[Backspace]** key deletes the character to the left of the cursor and the **[Delete]** key deletes the character at the cursor.
- The **[Insert]** key inserts a space at the cursor position.
- The **[Print Screen]** key copies the currently-displayed text.
- The **[Scroll Lock]** key pastes the copied text.

There are other keyboard commands for the transport, etc. These are explained in the next section.

Entering titles

- 1 Press the **MENU** key and turn the **MULTI DIAL** until the display shows **CD TEXT ?**. Push the **MULTI DIAL**.
- 2 Turn the **MULTI DIAL** so that the display shows **TITLE EDIT?** and push the **MULTI DIAL**.
If a keyboard is connected, **[Shift] + [F11]** also allows title editing.
- 3 Now the display shows **T_EDIT> xxxx**, where **xxxx** can be **DISC** or a track number (**1Tr** through

99Tr). Turn the **MULTI DIAL** to select the item to be titled and push the **MULTI DIAL**.

- 4 Edit the title as described above, and when finished, press the **FINALIZE (YES)** key to set this item title.

The next item is then shown, ready to be selected and for a title to be entered.

- 5 Repeat this process for all titles, and press **STOP** when finished.

Entering artists

The procedure for entering artists is almost identical to the procedure described above for entering titles.

NOTE

Although this is described as the “artist” field, it can actually be used for anything: the date and time of the session, the location, even the microphone type, etc. Remember, though that each title and artist field together cannot be more than 80 characters long, and there is a limit of 2900 characters per disc.

- 1 Press the **MENU** key and turn the **MULTI DIAL** until the display shows **CD TEXT ?**. Push the **MULTI DIAL**.
- 2 Turn the **MULTI DIAL** so that the display shows **ARTIST EDIT?** and push the **MULTI DIAL**.

If a keyboard is connected, **[Shift] + [F12]** also allows artist editing.

- 3 Now the display shows **A_EDIT> xxxx**, where **xxxx** can be **DISC** or a track number (**1Tr** through **99Tr**). Turn the **MULTI DIAL** to select the item to have this field entered, and push the **MULTI DIAL**.

- 4 Edit the artist field as described above, and when finished, press the **FINALIZE (YES)** key to set this item’s artist field.

The next item is then shown, ready to be selected and for the field to be entered.

- 5 Repeat this process for all artist fields, and press **STOP** when finished.

8 – Copying discs

Copying discs is a slightly different process from recording discs.

Here are a few of the differences between putting a disc in drive 1 and recording it on drive 2, and making a copy of it using the CD-RW402.

- Copying a disc can take place at up to four times real speed (that is, 20 minutes of audio can be copied in five minutes of real time) at either 1x, 2x or 4x speed.
- No volume or level processing is possible in copy operations, as it is in recording.
- Automatic or manual track divisions, index markers, etc. cannot be added to the copy and programmed playback cannot take place in a copy.
- It is only possible to record audio discs. Copying allows the transfer of data stored on CD-ROM discs, etc. (all such copying, of course, is subject to copyright provisions).

Types of copying

The CD-RW402 allows several types of copying to be carried out, as explained here:

DISC COPY	Disc copying. A copy of the disc is made. This differs from a recording in the ways described above.
PGM COPY	Program copying. A copy of the current disc is made, with the tracks recorded in the order that they have been programmed for programmed playback (“Programmed order playback” on page 24).
A-B COPY	A-B Copying. The A and B location points (“A and B points (drive 1 only)” on page 22) are used in a special way. They can be set on an audio disc to mark the boundaries between which the copy will be done. If location point B is set exactly 10 minutes after location point A, then an “A-B copy” will produce a disc with exactly 10 minutes of material.
A-B EXCL COPY	A-B Excluded copying. These A and B points can also be used to produce an “excluded copy”. In other words, all of the source disc, except the part between the A and B location points will be copied (on the final destination disc, the sound will jump straight from A to B).
DISC AT ONCE	DAO copying. This allows copying of an ISO 9660 disc (such as a CD EXTRA disc)

Some notes on copying

NOTE

DO NOT turn off the CD-RW402 during a copy operation. If power is cut off in the middle of a copy operation, the destination disc will be spoiled.

- Disc at once (DAO) copying can be carried out for DISC (disc) and PGM (program) copying. When DAO copying is carried out, the TOC is the first item read, so that there is no gap in the recording process.
- DAO is the only method available to copy ISO 9660 discs.
- Pitch control (“Pitch control (drive 1 only)” on page 25) is not available during copying.
- There may be problems with copying some discs at the 4x speed. In these cases, it is recommended that you use the 2x or 1x speed.
- During copying (except DAO), the **STOP** key is the only key available for use to halt the copy operation.
- Note that this stop operation above cannot be carried out during DAO copying.
- Index markers (except for index 00 and 01). Index markers above 01 are “collapsed” into marker 01 (DAO only).
- ISRC data can also be copied, or not copied (DAO only), depending on the menu item setting (“ISRC copy” on page 15).
- CD TEXT editing can be carried out at the same time as the copy is taking place. However, if the finalize option at the end of the copy has been selected, any edit in progress will be destroyed when the finalize process takes place.
- When making a program copy of a disc with a complex TOC EDIT containing many tracks and a complex programmed playback sequence, some time may elapse before the start of the copy process.
- During copying, the digital volume is disabled.

Disc copying and DAO

The CD-RW402 allows both disc copying and disc-at-once (DAO) copying. The main differences between these two operations are explained here:

Disc copying	Disc at once
Mainly used for audio.	Mainly used for data.
Cannot copy data discs.	Can copy data discs, including CD-ROM, and CD EXTRA discs as well as audio discs.
Choice of finalization after copying. If the disc is not finalized, further tracks can be added later (from other discs, if desired).	The DAO process includes the lead-out area, and so finalization is automatically performed. A disc copied using DAO cannot have any further data written to it.
ISRC data cannot be copied.	ISRC data can be copied ("ISRC copy" on page 15).
CD TEXT input is available (see "CD TEXT" on page 42).	CD TEXT input is not available.
Audio tracks are copied.	The whole disc is copied in order (lead in/TOC, then data/audio, then lead out), allowing "gapless" discs to be produced..

Disc copying

This operation allows the copying of audio discs (ISO 9660 discs are copied as disc-at-once). When such a copy is made, finalizing can be automatically performed after the disc copy has been made.

- A blank recordable disc should be placed in drive 2 (the destination) and the audio disc to be copied should be placed in drive 1 (the source).**

Drive 1 should be in Continue mode (see "Playback modes" on page 23) **Both drives should be stopped.**
- Press the DISC COPY key. Drive 1 display shows DISC COPY and drive 2 display shows COPY> DISC.**
- Push drive 2 MULTI DIAL to continue (either STOP key to cancel).**

Drive 2 display now shows the Copy Speed> selection.
- Turn the MULTI DIAL (2) to select between x4 (four times speed), x2 (double-speed) and x1 (real time) and press the MULTI DIAL (2).**

Display 2 now shows the FINALIZE> selection.
- Turn the MULTI DIAL (2) to select between YES (the disc will automatically be finalized after the copying), NO (the disc will not be finalized**

after the copy or if the destination disc is blank), DAO (disc at once; see "DAO copying" on page 46) is available. Press the MULTI DIAL (2).

Drive 2 display now shows COPY START ?.

- Press MULTI DIAL (2) to continue (or STOP to cancel).**

Drive 1 shows Wait... and Drive 2 shows Copy Standby and Drive 1 starts reading the source disc from track 1. When the unit is ready to start copying (a few seconds), the drive 1 display shows the track being copied (1Tr COPY), and the drive 2 display shows the track number and the running time of the track (this will be incremented at either x1, x2 or x4, depending on the copy speed selected) 101 2:23.

The track numbers are incremented as the copy progresses.

NOTE

If the source disc is a CD-EXTRA disc, use the DAO option to copy this disc. This will ensure that the audio and the data portions are copied.

If a non-recordable disc is in drive 2, the message DRV2 DiscErr appears. Replace the destination disc.

If a blank disc is loaded as the source disc, the display shows DRV1 NO TRK!. Replace the source disc.

8 – Copying discs—Program copy

If a recordable disc with not enough space to hold the contents of the source disc is used, the display shows Not enough.

If drive 1 is in shuffle mode, the display shows PLAY MODE!. If drive 1 is in programmed playback mode, the program copy is available, not the disc copy (see “Program copy” on page 46).

Program copy

Program copy is only possible with audio material.

If drive 1 is in programmed playback mode, disc copying is not possible. Only programmed copying is possible. This function is useful if you want to make a copy of a disc, missing out some tracks, or rearranging the order of the original tracks.

- 1 If a programmed playback order has not been set for the source disc, make a programmed playback order (“Programmed order playback” on page 24).**
- 2 Insert a recordable disc on drive 2.**
- 3 With both drives stopped, press the DISC COPY key.**

The drive 1 display shows PGM COPY and the drive 2 display shows COPY> PGM.

- 4 Set the speed and finalize options as described above (“Disc copying” on page 45). The DAO option is also available here (“DAO copying” on page 46).**
- 5 While copying, the display shows the track number and program step on drive 1: 4TR COPY 02p, with the track number and “countup timer” shown on drive 2.**
- 6 At the end of the program copy, drive 1 shows Wait... and disc 2 display is blank, while the disc is being finalized (if this has been selected).**

DAO copying

NOTE

Disc At Once copying must be carried out with a blank disc in drive 2.

DAO copying is the only option available for CD-ROMs and the whole of CD-EXTRA discs (music tracks of CD-EXTRA discs may be copied using the copy operations described above).

In the case of copying an audio disc, when the FINALIZE> option is shown (see step 5 above), as well as the YES and NO options, a DAO option is also shown. Select this option to perform DAO copying.

When a copy is made using the DAO copy option, the drive 2 display shows Lead In as a flashing display (and a timed countdown) while the lead-in data is being written.

During the copy process, drive 1 display shows Now Copy 1->2.

The data (or audio data) is then copied as described above).

When all the data has been copied, the drive 2 display shows Lead Out as a flashing display (and a timed countdown) while the lead-out data is being written.

In the case of a CD-ROM disc being copied in this way, an option to perform compare operation is given after the copy speed selection. Drive 2 shows COMPARE ?.

If the compare option has been selected for a CD-ROM, the comparison is carried out after the lead-out has been written (COMPARE 1:2 on drive 1 and COMPARE with a countdown time on drive 2.) This may take some time to complete, depending on the disc being copied.

An appropriate error message (COMPARE ERR!) is shown if there has been an error in copying.

At the end of the copy/compare operation, the displays briefly show Wait... and then return to their normal mode.

NOTE

Do not turn off the power or otherwise interrupt a DAO operation, or the destination disc will be unreadable (in the case of a CD-R disc, it will become totally useless, and in the case of a CD-RW it will have to be refreshed).

Disc compare

As well as the automatic compare operation following a copy as explained above, it is also possible to compare two finalized CD-ROMs at any time.

- 1 With the finalized disc in drive 2 and the original in drive 1, press **DISC COPY**.

Display 1 shows DISC COMPARE and display 2 shows COPY> COMPARE.

- 2 Press **MULTI DIAL (2)**. The display shows COMPARE GO?.
- 3 Press **MULTI DIAL (2)** to start the compare operation.

A-B copying

This allows the copying of material from an audio disc between the A and B points (“A and B points (drive 1 only)” on page 22).

- 1 The source disc should be in drive 1 and the destination disc in 2.
- 2 Set the A and/or the B points on the source disc (“A and B points (drive 1 only)” on page 22).

If only the A point is set, the copy will be from the A point to the end of the track. If only the B point is set, the copy will be from the start of the track to the B point.

If both points are set, in order that the final disc corresponds to the Red Book standard, these points must be at least 4 seconds apart. Point A must be before point B.

- 3 With both drives stopped, press the **A-B COPY** key. The displays show A-B COPY and COPY> A-B.

- 4 Press the **MULTI DIAL (2)**.
- 5 Select the copy speed (x4, x2 or x1), and press the **MULTI DIAL (2)**.
Drive 2 display shows COPY START ?.
- 6 Press the **MULTI DIAL (2)**. Copying takes place (standby and copy) as for other copy operations.
The displays return to normal when the copy operation is complete.

NOTE

The error messages mentioned above appear if the wrong type of disc has been loaded as source or destination.

If the A and B points are too close together the display shows Not enough.

If the B point is set before the A point, the display shows A-B ERROR.

It is not possible to copy more than one track if the tracks have different emphasis status.

A-B Excluded copy

This allows the copying of a track (audio) **except** the portion delimited by the A and B location points. The A and B location points must be in the same track for this function to be enabled.

- 1 The source disc should be in drive 1 and the destination disc in 2.
- 2 Set the A and/or the B points on the source disc (“A and B points (drive 1 only)” on page 22).

If only the A point is set, the copy will be from the A point to the end of the track. If only the B point is set, the copy will be from the start of the track to the B point.

- 3 With both drives stopped, press the **A-B COPY** key. The displays show A-B COPY and COPY> A-B.
- 4 Turn the **MULTI DIAL (2)** to select the A-B excluded copy mode. Drive 1 display now shows A-B ExclCOPY and drive 2 display shows COPY>AB EXCL.
- 5 Press the **MULTI DIAL (2)**.

If both points are set, in order that the final disc corresponds to the Red Book standard, these points must be at least 4 seconds apart. Point A must be before point B.

8 – Copying discs—A-B Excluded copy

The drive 2 display shows **ExcIRHSL>**. This allows a preview of the material immediately before point A, immediately followed by the material following point B (in other words, a preview of the “join”).

- 6** To rehearse the copy, turn the **MULTI DIAL (2)** to select **YES**, and press the **MULTI DIAL**. The joined section is repeated. Display 2 shows **RehearsalOK?**. If the join is satisfactory, press the **MULTI DIAL**, otherwise press **STOP** and reset the A and B points.

If you do not want to rehearse, choose **NO**, and press the **MULTI DIAL**.

- 7** Select the copy speed (**x4**, **x2** or **x1**), and press the **MULTI DIAL (2)**.

Drive 2 display shows **COPY START ?**.

- 8** Press the **MULTI DIAL (2)**. Copying takes place (standby and copy) as for other copy operations.

The displays return to normal when the copy operation is complete.

NOTE

The error messages mentioned above appear if the wrong type of disc has been loaded as source or destination.

*If the A and B points are too close together the display shows **Not enough**.*

PC keyboard

A PS/2 keyboard can be attached to the CD-RW402 for titling purposes, as explained above (“Entering characters using an external keyboard” on page 43). The same keyboard can also be used as a remote control device for simple control of the two drives of the unit:

The keyboard controls for drive 1 are:

Key	Control
[F1]	STOP
[F2]	PLAY
[F3]	READY
[F5]	Track skip back
[F6]	Track skip forward
[Shift] + [Esc]	MENU key
[Shift] + [Enter]	Push MULTI DIAL ^a
[Shift] + [Up]	Turn MULTI DIAL clockwise ^a
[Shift] + [Down]	Turn MULTI DIAL counterclockwise ^a

a. In menu mode

The keyboard controls for drive 2 are:

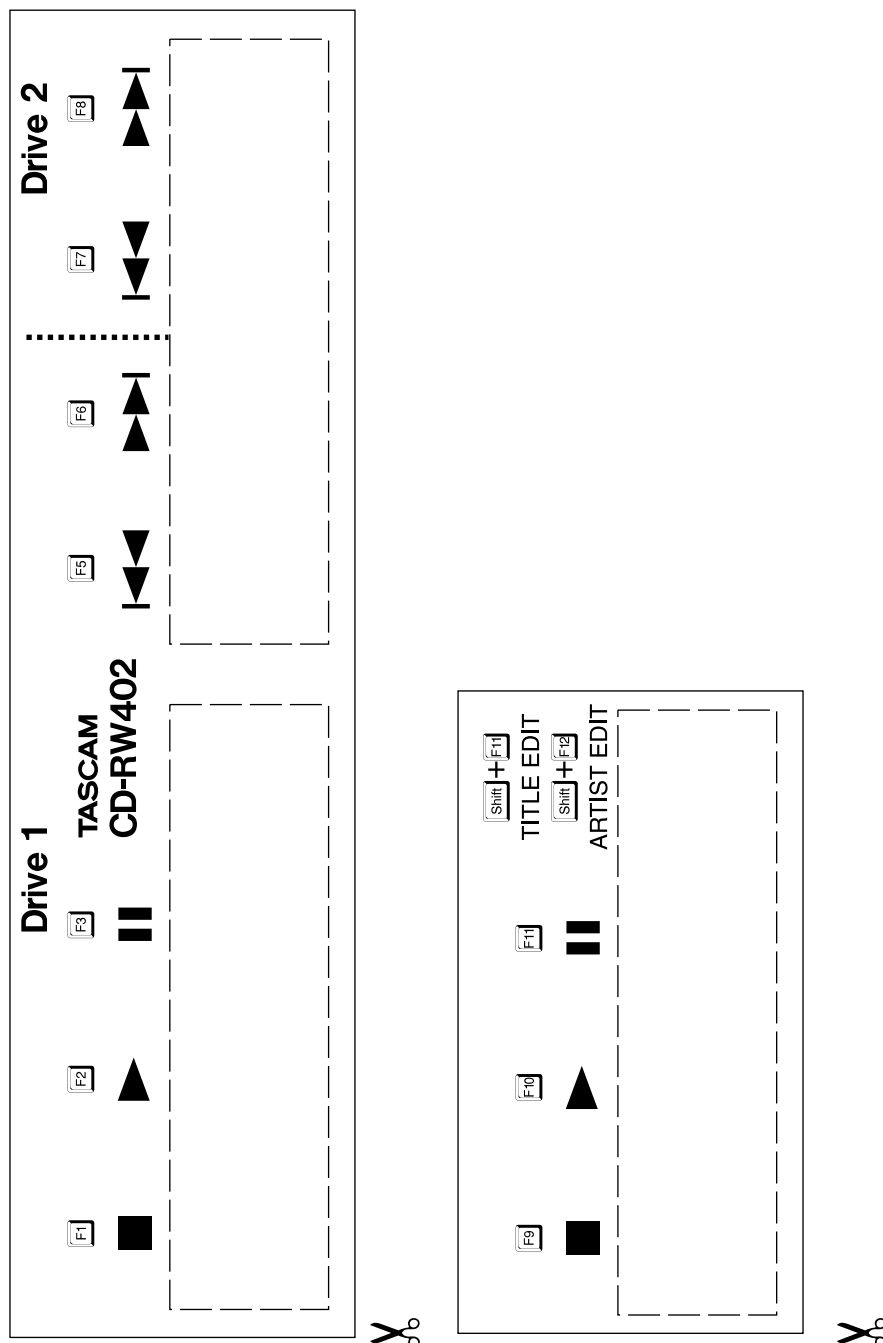
Key	Control
[F7]	Track skip back
[F8]	Track skip forward
[F9]	STOP
[F10]	PLAY
[F11]	READY
[Shift] + [F11]	Title edit
[Shift] + [F12]	Artist edit
[Esc]	MENU key
[Enter]	Push MULTI DIAL ^a
[Up]	Turn MULTI DIAL clockwise ^a
[Down]	Turn MULTI DIAL counterclockwise ^a

a. In menu mode

9 – External control—PC keyboard

Keyboard template

You may find it useful to make a copy of this page, cut out the templates below and attach them to the keyboard you use to control the CD-RW402.



CONTROL I/O

This connector allows for remote control by suitably-equipped units, and provides tally information to such units.

The total current of pin 6 (+5 V) and pin 8 must be less than 100 mA.

Input signals are active when grounded for at least 30 ms.

Output signals are connected to an open collector with maximum voltage 15 V, and maximum current 50 mA.

Pin	Signal name	IN/OUT
1	PLAY command (drive 2)	IN
2	STOP command (drive 2)	IN
3	CALL command (drive 2)	IN
4	FADER command (drive 2)	IN
5	Not connected	–
6	+5 V	–
7	Not connected	–
8	+5 V	–
9	Not connected	–
10	PLAY command (drive 1)	IN
11	STOP command (drive 1)	IN
12	CALL command (drive 1)	IN
13	FADER command (drive 1)	IN
14	PLAY tally (drive 2)	OUT
15	READY tally (drive 2)	OUT
16	EOM tally (drive 2)	OUT
17	GND	–
18	Not connected	–
19	Not connected	–
20	Not connected	–
21	Not connected	–
22	PLAY tally (drive 1)	OUT
23	READY tally (drive 1)	OUT
24	EOM tally (drive 1)	OUT
25	GND	–

10 – Specifications, etc.

This section gives the specifications of the unit, as well as information on error messages, etc.

Error messages and troubleshooting

The messages below do not indicate an error, but are status messages which show the current operations being performed on the appropriate drive:

Message	Meaning
Check Stop!!	The extended recording check has ended
COMPLETE	A finalize or erase operation is complete
COPY Standby	Waiting to start a copy operation
ExtendChk	Done when checking a disc for extended recording is taking place
NOW COMPARE	A compare operation is taking place
Now Copy 1->2	Copying from drive 1 to drive 2 (shown on drive 1 only)
NOW OPC	Checking the disc prior to a record operation
Now REPAIR	Shown when repairing a damaged disc
OPC Area CLR	Aa CD-RW disc is full, the OPC area is being cleaned for further recording
PMA Writing	Recording is stopped, and the disc is still being written
TOC Reading	Shown when a disc is first loaded
Wait...	The unit is in pre-copy or post-copy mode

The following messages typically indicate an error condition, or a condition which requires attention:

Symptom	Possible cause and remedy
No sound on playback (the disc is playing and the time display is incrementing)	The connections from the CD-RW402 to the amplifier system have not been made properly, or the amplifier's input source selector is not at the correct position.
No meter indication when a source is input	Analog and/or digital volume ("Signal volume" on page 30) is set too low. The signal is being input through an unselected input source ("Input selection" on page 30).
Copying is not possible (the copy keys do not work)	Both drives must be stopped (not just in ready mode)
D-IN UNLOCK!	A digital input source has been selected, but the source is not connected or is not switched on.
Cannot record on a disc (pressing RECORD shows MONITOR)	A finalized disc has been inserted. Use an unfinalized recordable disc.
PGM Full!	An attempt has been made to create more than 100 program steps.
Disc Full! or Cannot Rec!	There is no space on the disc, or no tracks are available, or a general recording error has occurred.
Disc Error	The disc is bad. If it is a CD-RW disc, you may refresh it (, "Refreshing a disc"), otherwise replace the disc.
Erase Error!	An error has occurred while trying to erase the disc.
The display suddenly shows PMA Writing	Either the disc is full (this message will be prefaced by Disc Full!! ("Full disc" on page 32) or an attempt has been made to write more than 99 tracks.
Rec Error	General recording error. This may be caused by vibration or a shock during recording, for example, or may be the result of a bad disc. Try recording again with the same disc. If the message appears again, try a different disc.
No OPC Area!	Appears only with CD-R discs. The OPC area is full, and no further recording is possible on this disc. Finalize the disc.

Symptom	Possible cause and remedy
CopyReadErr!	There is an error in reading the source disc in a copy operation.
TEXT FULL!	The text buffer for CD TEXT is full. No more can be entered.
POINT ERROR!	An error has been made when attempting to use the location points when editing the TOC of a disc.
CantCompare!	Comparison between the original and copy disc is not possible as the destination disc contains an audio track
COMPARE ERR!	The comparison between the original the copy has failed
DRV2 DiscErr	An error has occurred when drive 2 attempts to write to a disc.
DRV1 NO TRK!	This message is shown when an attempt is made to copy from a blank disc in drive 1
PLAY MODE!	When copying if an attempt is made to copy a disc when drive 1 is in shuffle mode. It also appears if drive 1 is not in continue mode when making an A-B or A-B excluded copy.
PGM EMPTY!	An attempt has been made to perform a program copy with an empty program.
A-B ERROR!	When attempting an A-B or A-B excluded copy, the A-B points have not been set or B is set ahead of A.
Not enough	There is not enough space on the destination disc for a copy, or the A and B points are too close together.
System Err!	System error.
Drive Error!	Error in the drive mechanism.

Specifications

Drive 1

Media type	CD-R, CD-RW, CD-RDA, CD-RWDA
Frequency response	20 Hz — 20 kHz (playback ± 0.8 dB)
S/N ratio	> 95 dB (playback)
Dynamic range	> 95 dB (playback)
Total harmonic distortion	< 0.005% (playback)
Channel separation	90 dB (playback: 1 kHz)
Wow & flutter	Unmeasurable (< 0.001%)

Drive 2

Recording media type	CD-R, CD-RW, CD-RDA, CD-RWDA
Recording resolution	16-bit linear
Recording sampling frequency	44.1 kHz
Frequency convertor input	32 kHz — 48 kHz
Frequency response	20 Hz — 20 kHz (playback ± 0.8 dB, recording ± 1 dB)
S/N ratio	> 95 dB (playback) > 90 dB (recording)
Dynamic range	> 95 dB (playback) > 90 dB (recording)
Total harmonic distortion	< 0.005% (playback) < 0.008% (recording)
Channel separation	90 dB (playback: 1 kHz) 80 dB (recording: 1 kHz)
Wow & flutter	Unmeasurable (< 0.001%)

10 – Specifications, etc.—Specifications

Digital I/O

Digital inputs (drive 2 only)

COAXIAL	RCA pin, IEC-60958 TYPE I, TYPE II — auto-detect
OPTICAL	TOSLINK, IEC-60958 TYPE I, TYPE II — auto-detect

Digital outputs (drives 1 and 2)

COAXIAL	RCA pin, IEC-60958 TYPE II (SPDIF)
OPTICAL	TOSLINK, IEC-60958 TYPE II (SPDIF)

Analog I/O

UNBALANCED LINE OUTPUTS (1, 2, COMMON)

Unbalanced RCA

Nominal output level	–10 dBV (FS –16 dB)
Maximum output level	+6 dBV
Output impedance	570 Ω (unbalanced)

BALANCED LINE OUTPUTS 1, 2

XLR-3 type (male) (1-gnd, 2=hot, 3=cold)

Nominal output level	+4 dBu (FS –16 dB)
Maximum output level	+20 dBu
Output impedance	75 Ω

UNBALANCED LINE INPUTS (2)

Unbalanced RCA

Nominal input level	–10 dBV (6dBV –16 dB)
Maximum input level	+ 6dBV
Input impedance	23 k Ω

BALANCED LINE INPUTS (2)

XLR-type (female) (1-gnd, 2=hot, 3=cold)

Nominal input level	+4 dBu
Maximum input level	+20dBu
Input impedance	12 k Ω

PHONES output (switchable 1, 2 or COMMON)

6 mm (1/4") stereo

Output level	20 mW + 20 mW (into 32 Ω)
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Control

CONTROL I/O

D-sub 25-pin female

KEYBOARD

Mini-DIN 6pin (conforms to PS/2 standard)

REMOTE IN

3.5 mm mini-jack (only for use with RC-RW402)

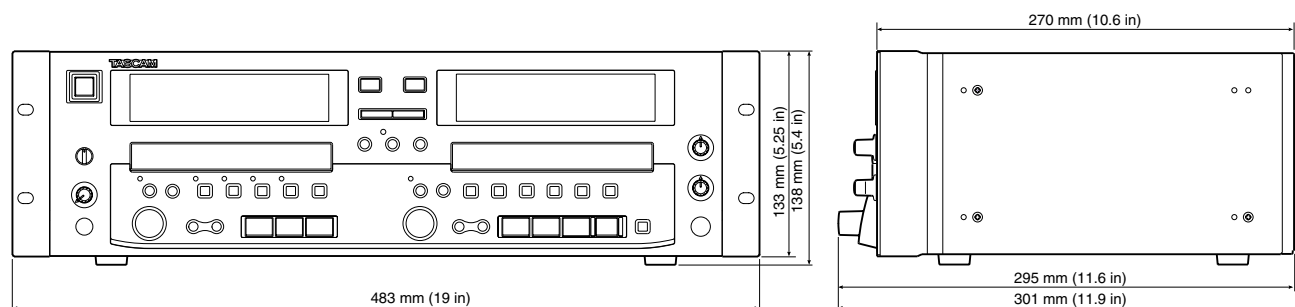
Writable disc formats

CD-DA (including CD-TEXT), CD-ROM (IS09660), CD Extra.
When copying CD Extra discs, DISC copying allows copying of audio data, and DAO copying allows copying of data.

General specifications

Voltage requirements	USA/Canada 120 VAC, 60 Hz U.K./Europe 230 VAC, 50 Hz Australia 240 VAC, 50 Hz
Power consumption	100 V — 120 V: 34 W, 220 V — 240 V: 39 W
Applicable electromagnetic environment	E4
Peak inrush current	6.1 A (Pro CE)
Dimensions	483 x 138 x 301 (mm) 19 x 5.4 x 11.6 (in)
Weight	8 kg (17.6 lb.)
Operating temperature	5°C to 35°C (41°F to 95°F)
Supplied accessories	RC-RW402 remote control unit 2m (6 ft.) AC cord Rack mount screw kit Quick start guide

Dimensional drawing



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