

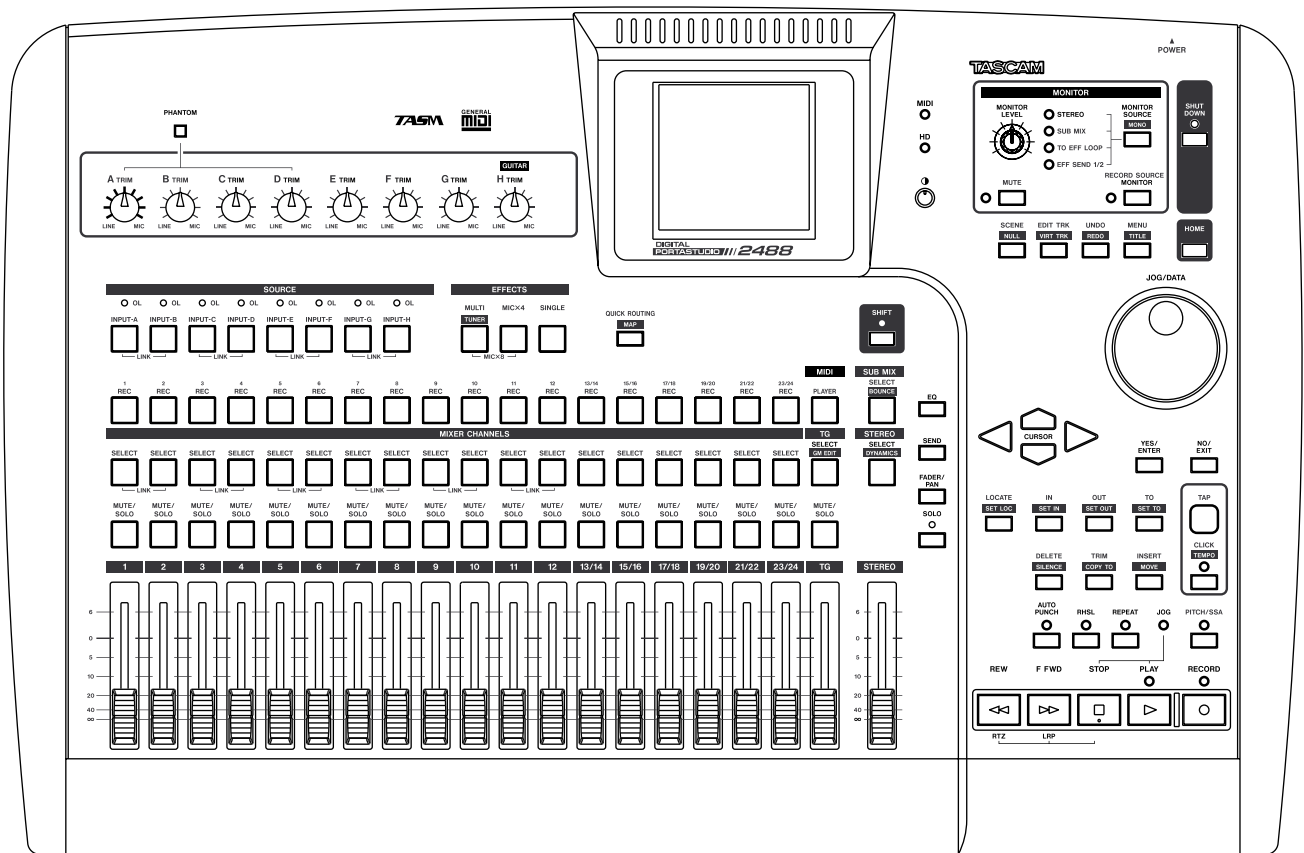
TASCAM

TEAC Professional Division

D00776200A

2488

Digital Portastudio



USER'S GUIDE



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.

Additions and changes to the TASCAM 2488 User's Guide

Since the original 2488 manual was produced, there have been a number of changes and revisions which should be noted carefully before attempting to use your 2488.

Notes on the use of the CD-RW drive

Media types Do not use 12x or high-speed (over 12x) CD-RW media with the 2488, as these types of media are not supported. Only use 1x–4x CD-RW discs.

Damaged media If a disc is scratched or dirty, the 2488 may not operate properly. If this happens, shut down the unit, and restart it. Do not attempt to re-use the defective disc.

Compatibility with players In common with other CD recorders, the 2488 can produce CD-RW discs, but such discs may not be playable on ordinary CD players (as mentioned on page 63 of the *User's Guide*). For compatibility with other CD players, we strongly recommend that you use only CD-R media.

Recorded disc types The 2488 recognizes for reading (and in the case of CD-RW media, erasing) only CD-ROM MODE1 or CD-DA discs. Other types of disc recorded using different standards cannot be read or erased by the 2488,

Ejecting discs It is important that you do not press the CD-RW drive eject button while the drive is operational. If you do, it may cause problems in the operation of the 2488. We therefore recommend that you always use the CD EJECT menu item (“CD EJECT” on page 67 of the *User's Guide*) to eject discs.

Notes on the hard disk format

As described in “Disk management and file import/export” on page 65, the 2488 uses two disk formats in its internal hard disk.

The FAT partition, used for USB data transfer, is 4GB in size and the size cannot be changed.

The TASCAM native partitions take up the remainder of the disk, and may be 4, 8, 16 or 32GB in size. A maximum of four partitions may be allocated. Note that it is possible to allocate four smaller partitions, and therefore leave part of the hard disk space

unused. TASCAM native partitions cannot be accessed from a host computer using USB.

Supported operating systems In “The 2488 and USB” on page 73 of the *User's Guide*, it is mentioned that MacOS 9.0 and above is supported. We strongly recommend that for best results, MacOS 9.2 is used. Upgrade from 9.0 or 9.1 if necessary.

Formatting As mentioned in “Formatting the disk” on page 66, you should not turn off the 2488 while formatting the hard disk, as this may prevent the 2488 from booting.

Corrections and additions to the manual

Page 18, step 8 Instead of “or press and hold **SHIFT** and press **EQ**”, read “or use **SHIFT** and **YES** to turn the EQ on, and use **SHIFT** and **NO** to turn the EQ off”.

Page 59, “Pre-mastering”, step 2 The screen shows PreMastering, not MASTERING.

Page 62, “TAO recording”, step 7 Instead of “The top line of the display gives an indication of the time remaining for the operation”, read “A progress bar is shown on screen”.

Page 64, “Playing back CDs using the 2488” As explained in “Playing back CDs using the 2488” on page 64, the **REW** and **F FWD** keys are used to skip playback forward and backward a track at a time. They cannot be used for search functions within tracks.

Page 65, “Disk management” Note that the FAT partition is FAT-32, not FAT-16 as described in the manual.

Page 66, “Formatting the disk” The information given in the manual is incorrect. The data on the FAT partition is erased, along with the data on the native TASCAM partitions, when the disk is formatted.

Pages 68, 70 and 74, USB mode Note the following procedure to close (exit) USB mode.

- 1 Disconnect the 2488 from the computer, following the notes in “The 2488 and USB” on page 73.**
- 2 Press and hold down the EXIT key.**
- 3 When the popup message appears, press the ENTER key to exit (close) the USB mode.**

Note that when USB mode is active, the HD indicator lights steadily. It is therefore very important that you follow step 1 above, to ensure the disk is not in use.

Page 79, “Metronome” Use the **CLICK** key, not the screen setting, to turn the metronome on (indicator lights orange) and off (indicator goes off).

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IMPORTANT SAFETY INSTRUCTIONS

- 1 Read these instructions.
- 2 Keep these instructions.
- 3 Heed all warnings.
- 4 Follow all instructions.
- 5 Do not use this apparatus near water.
- 6 Clean only with dry cloth.
- 7 Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. Grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11 Only use attachments/accessories specified by the manufacturer.
- 12 Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

- 13 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14 Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
 - Do not expose this apparatus to drips or splashes.
 - Do not place any objects filled with liquids, such as vases, on the apparatus.
 - Do not install this apparatus in a confined space such as a book case or similar unit.
 - The apparatus draws nominal non-operating power from the AC outlet with its POWER switch in the off position.

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 \perp 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 B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the

equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

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

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.

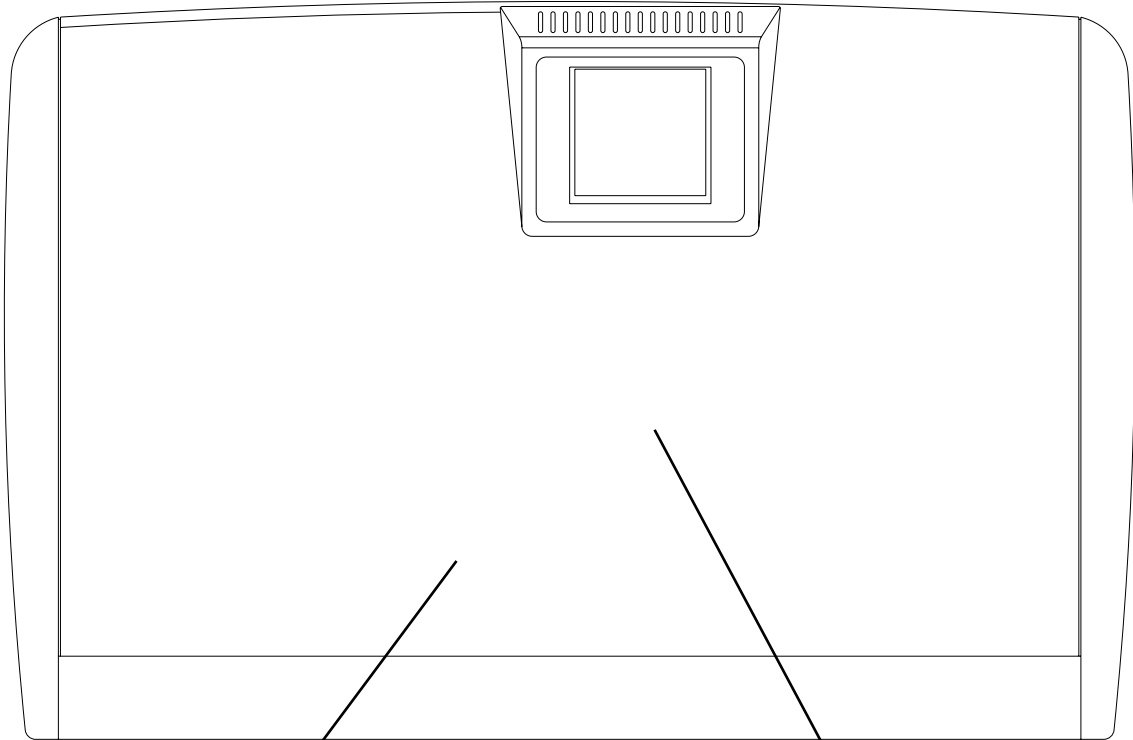
SAFETY INFORMATION

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.



① **CERTIFICATION**
THIS PRODUCT COMPLIES WITH DHHS
RULES 21 CFR SUBCHAPTER J APPLI
CABLE AT DATE OF MANUFACTURE
TEAC CORPORATION
3-7-3 NAKA-OHO, MUSASHINO-SHI, TOKYO, JAPAN
MANUFACTURED TIF

For U.S.A.

CLASS 1 LASER PRODUCT
LASER KLASS 1

Optical pickup: Type : SF-W35
Manufacturer : SANYO Electric Co. Ltd.
Laser output : Less than 0.7mW (Play) and 74mW
(Record) on the objective lens
Wavelength: 780 - 786 nm

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1 – Setting up and introduction

About this manual

This manual is designed to give you an overview of how to use the features of the 2488.

Read it carefully to understand how the different features work alone and with each other.

NOTE

Throughout this manual we show controls and indicators on the 2488 like this: HOME.

Inputs and controls of other equipment are written like this: AUX IN.

Messages shown on the 2488's display are written like this: Are you sure? .

We use the term "key" to describe a push-button control on the 2488's surface.

We use the term "soft switch" or "button" to describe an on/off control on the display.

Also note the difference between "disc" and "disk". When we refer to a disc, we are refer to a CD-R, CD-RW or pre-recorded audio CD. A disk, on the other hand, refers to the 2488's internal hard disk drive, or that of a connected computer.

The different sections of the manual are as follows (arranged roughly in the order in which you will carry out operations in a project):

1, "Setting up and introduction" (page 8)

This section. Read it carefully to get an overall picture of the 2488 and the basic operations which you will find yourself using all the time. It includes a brief tutorial to help you get acquainted with the way to work with the 2488.

2, "Mixer" (page 21) The 2488 incorporates a fully-featured mixer. Read this section to understand how the input assignment, the EQ, effect sends, etc. work, as well as scene memories and other information essential to the everyday operation of the unit.

3, "Effects" (page 31) There are three types of digital effects included in the 2488: mic effects for

insertion, a multi-effect, which may be inserted to give guitars, etc. some life, and a single effect which may be used on mixdown. This section explains the effects and how they work.

4, "Recorder" (page 36) The 2488's 24-track recorder incorporates many advanced features: location memories, rehearsal and auto-punch modes, undo and redo operations, and virtual tracks. Read this section to understand its operation.

5, "Mastering" (page 59) After recording, the final stage is mastering. Use the 2488's built-in CD recorder to produce your own CDs.

6, "Disk management and file import/export" (page 65) Like that of a personal computer, the 2488 internal hard disk can be formatted and managed, with audio and MIDI files being copied between the hard disk and recordable CD media, as well as a personal computer connected using a USB 2.0 connection.

7, "Backup and restore" (page 72) To ensure the integrity of your projects, you should back up your song data to recordable CD media or a personal computer (through USB).

8, "MIDI" (page 76) The 2488 integrates into your MIDI system as a master or slave device, allowing external MIDI devices to synchronize and play with the recorded audio. In addition, there is an internal GM-compatible tone generator, which can either be used to play backing patterns, or imported Standard MIDI files.

9, "General preferences" (page 84) This section explains the settings you can make to personalize the 2488 for your style of working.

10, "Specifications, etc." (page 86) The facts and figures (including block and level diagrams) about your 2488.

Important notice

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 2488.

1 – Setting up and introduction

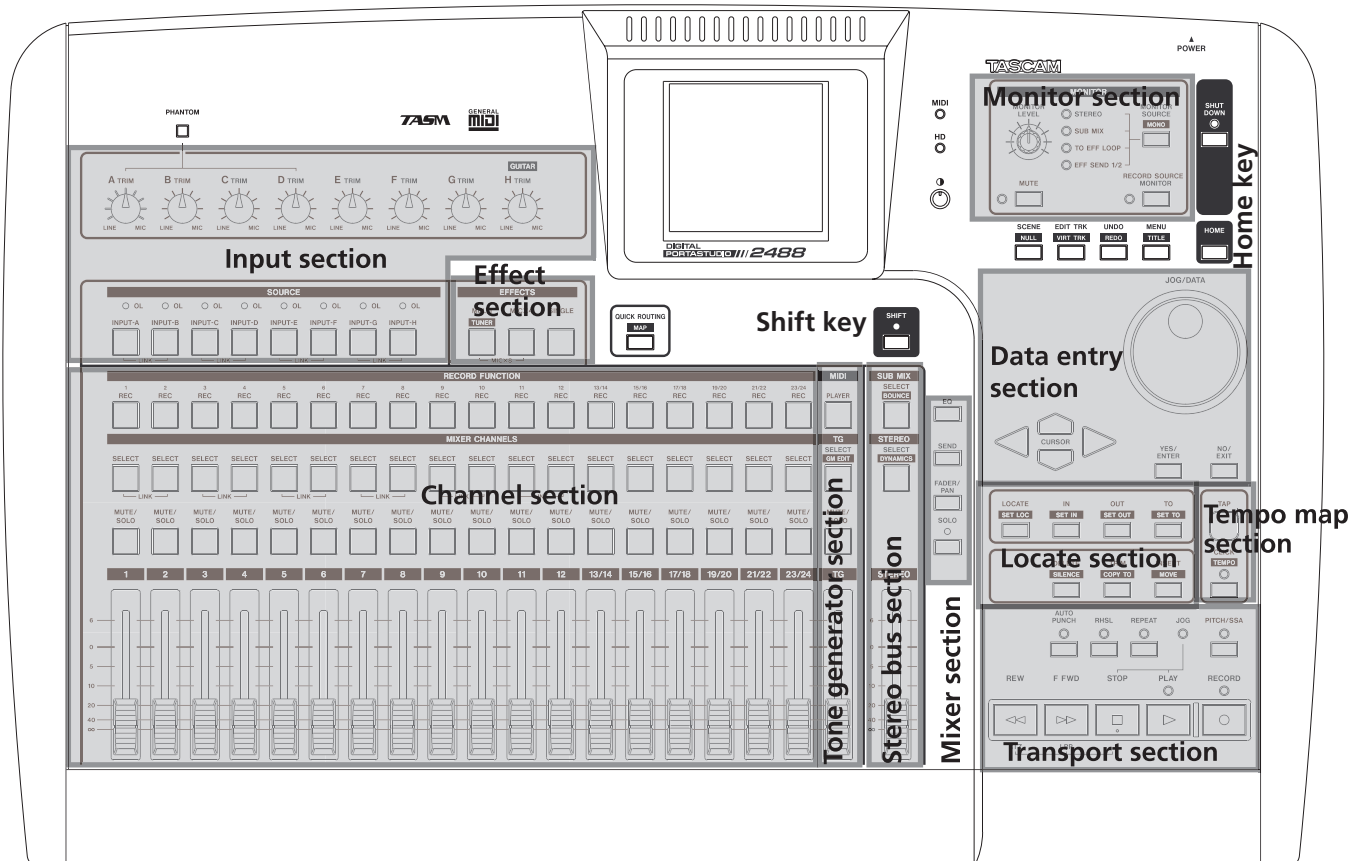
Copyright

Windows, Windows XP, and Windows 2000 are trademarks of Microsoft Corporation.

All other trademarks are the property of their respective holders.

Macintosh, MacOS, and MacOS X are trademarks of Apple Computer.

An overview of the 2488



The “road map” above can help you find your way around the 2488. At first, the array of keys and controls may seem a little daunting, but we are sure that

with a little time, you will become familiar with the layout and operation of the 2488.

1 – Setting up and introduction

Setting up the 2488

First, find a flat level surface for the 2488 which is stable and can't be jogged or jolted easily.

This should be a hard surface. Don't put the 2488 on a carpet or furnishings, as this will block the airflow and possibly cause overheating.

You should avoid moving the 2488 while it is switched on. Especially, you should never move it while the HD indicator by the display is lit or flashing.

Leave a little space at the back of the 2488 to plug and unplug microphones, etc.

Before switching on the 2488, you should connect the monitoring system (this term refers to the amplifier and speakers and headphones that you will use to listen to your recordings).

TIP

When you are recording electric guitars and basses, etc., you can listen through speakers. When you are recording using a microphone, this may cause acoustic feedback, so you should use headphones at this time.

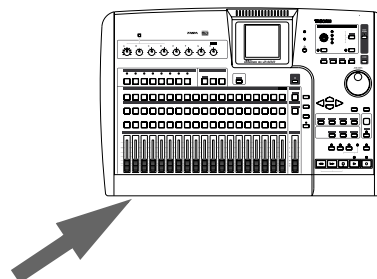
Most sound professionals recommend that you do not use headphones for monitoring all the time, even though they are very convenient and useful in some circumstances.

Connect the **MONITOR OUTPUT** jacks on the rear panel to your amplifier's **AUX** inputs (or any inputs except those designed for a record turntable). You will probably need a pair of 1/4"-to-RCA cables for this.

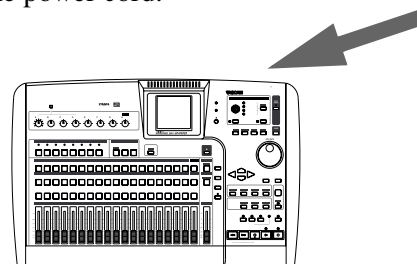
NOTE

The 2488 outputs balanced signals from the monitor outputs. If you are lucky enough to have an amplifier with balanced inputs, use balanced cables rather than unbalanced connections here.

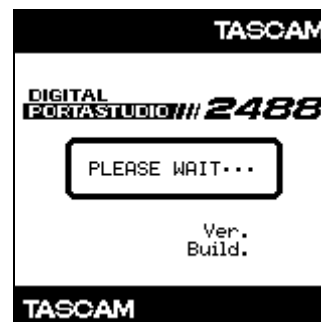
Plug a standard pair of headphones into the 1/4" **PHONES** jack at the front left of the 2488.



Plug in and turn on the 2488. The power switch is on the rear, by the power cord.

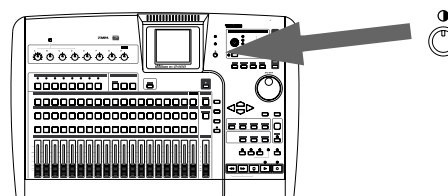


The display shows the "loading" screen.



After about 10 seconds, the 2488 will be ready and the **HD** (hard disk) indicator stops flashing.

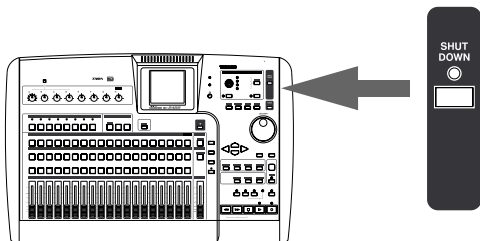
Adjust the display so that it is comfortable for you to read, using the contrast control.



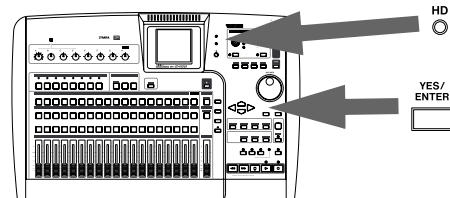
Shutting down the 2488

It may seem odd to talk about turning off the 2488 before you've even started to use it, but there is a reason for this. The 2488 contains a hard disk which is used to store your song data. If you simply turn off the unit using the power switch, there may be some data in the 2488's memory which hasn't been written to disk and you will therefore lose that data when you turn off the unit.

You should always use the **SHUT DOWN** key before turning off the 2488.



- 1 Press and hold down the **SHUT DOWN** key for a second or two. The red indicator lights, and the display shows an **Are you sure?** message.
- 2 Press the **YES** key. The **HD indicator (orange)** flashes as data is written to the hard disk (the display also shows this process).



- 3 When all data is written to the hard disk, the **SHUT DOWN** indicator flashes red. The display shows **SHUT DOWN COMPLETE**.
- 4 Use the power switch at the rear of the 2488 to turn off the unit.

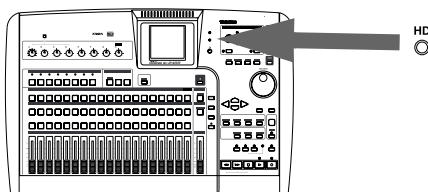
Some general notes on using the 2488

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 2488, 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.

The HD indicator This indicator, located by the display, shows when data is being read from the internal hard disk or written to it. You should avoid moving the 2488 when it is switched on, in any case, but you should **never** move or jolt the 2488 when the **HD** indicator is lit, as there is a (small) risk of your losing your data.

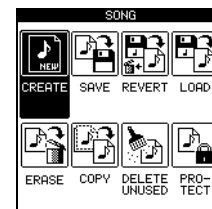


Saving songs To be sure that all your data is safe, you should save songs manually at intervals (just in case the power goes off unexpectedly).

NOTE

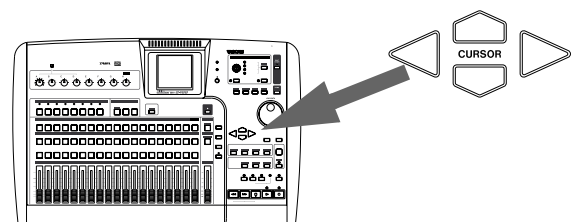
A "song" consists of not only the audio material that you have recorded, but the mixer and recorder settings, editing, etc. that you have made.

- 1 Press the **MENU** key, move to the **SONG** icon, and press **ENTER**.



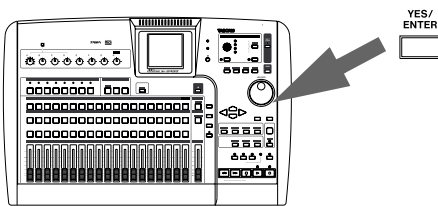
- 2 Move the cursor to highlight the **SAVE** option, and press **ENTER**. The song is saved, the **HD** indicator lights, and when the song is saved (progress is shown by an on-screen indicator), the display shows the home screen again.

Navigation To navigate inside the 2488 screens, use the cursor keys to move the cursor.

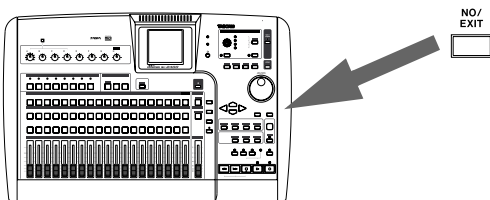


1 – Setting up and introduction

Confirming Press the **YES/ENTER** key to do an action, to enter a sub-menu or to answer “yes” to a question. We’ll often refer to this as just the **YES** key or the **ENTER** key.

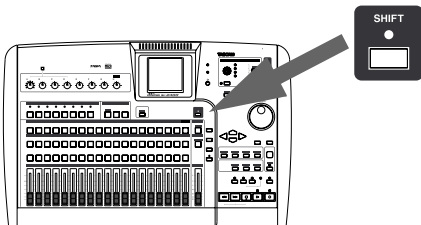


Escaping Press the **NO/EXIT** key to do the opposite of confirming (that is, to “escape” from a screen without performing an action, to go up a menu level, or to answer “no” to a question). We’ll often refer to this as just the **NO** key or the **EXIT** key.



SHIFT key Many keys have two functions: the first is written in normal (black) type, and the second is written under this in white on a blue background (the exception is the **HOME** key, which works in shifted or unshifted mode).

To access these second shifted functions:



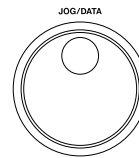
- 1 Press the **SHIFT** key so that the indicator lights.
 - 2 Press the key whose second function you want to use.
- The **SHIFT** indicator goes out.

NOTE
As the 2488 is shipped from the factory, if you press the **SHIFT** key and do not press another key within a second or so, the **SHIFT** indicator goes out. This prevents you from accessing unwanted functions by accident. If you hold down the **SHIFT** key while you are looking for the next key, it will stay on.

You can change this behavior so that the **SHIFT** key becomes a non-latching key—that is, you have to press

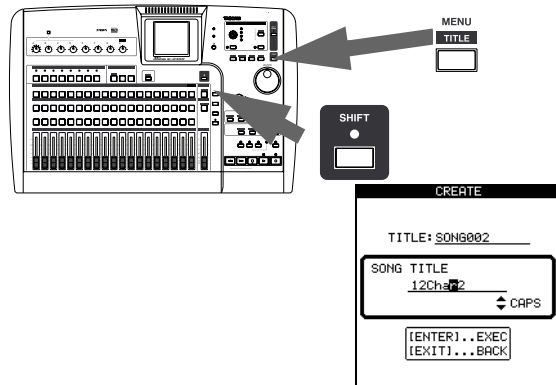
and hold it while you are pressing the other key, or a latching key that stays on until the other key is pressed. See “Shift key behavior” on page 84 for details of how to make this change.

Changing values Use the **JOG/DATA** wheel (we’ll just call it “the wheel” from now on) to increase or decrease values shown on the screen.



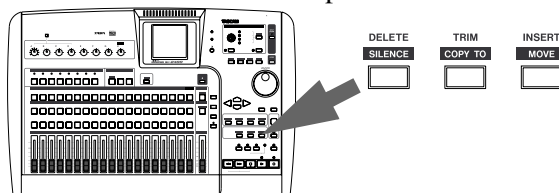
Titling An important feature of the 2488 is the ability to give real names to songs, virtual tracks, effect settings and so on.

Press and hold the **SHIFT** key and press the **TITLE** key to set or edit the title of one of these objects. A popup appears allowing you to edit the title:



Use the left and right cursor keys to move around inside the title, and the wheel to select a character at the cursor position.

Use the **INSERT** and **DELETE** keys to insert and delete characters at the cursor position.



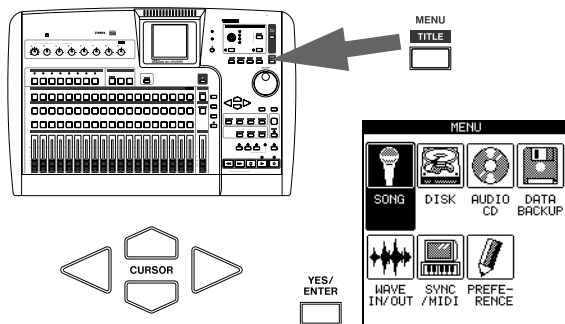
You can also use the up and down cursor keys as “shift” keys, allowing you to select between:

- CAPS—uppercase CAPITAL LETTERS
- small—lowercase small letters
- NUM—numbers
- WORD—you can use the wheel to select from a range of preset words (VERSE, CHORUS, etc.)

The preset words can be edited to meet your needs, as described in “User word” on page 85.

Main menu This is the “control center” for the 2488’s setup, maintenance and preference setting, etc. operations.

Press the **MENU** key to enter the main menu screen:

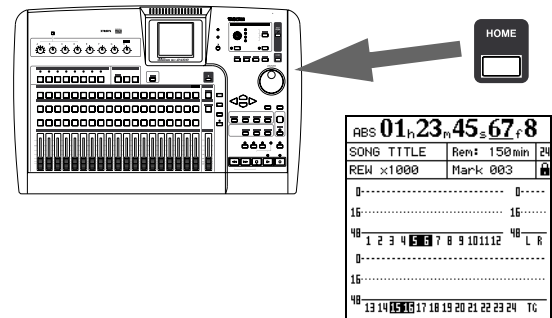


Use the cursor keys to move around the screen, and press **ENTER** when the function you want to use is highlighted.

NOTE

When the menu screen is active, you may not be able to perform some operations on the 2488 (including transport operations).

Home screen This shows the track levels, current position in the song, the current song and the total number of minutes remaining on the disk for recording further material. Press the **HOME** key to see this screen:



Some notes on CD-R media

The 2488 incorporates a CD-RW drive. To obtain the best results when using this, please take the trouble to read these notes.

About CD-R and CD-RW discs

The 2488 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 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 2488. This is in no way a limitation of the 2488 itself, but of the difference between the different types of media and the methods used to read them.

CD-R discs created on the 2488, by contrast, may be played satisfactorily on the majority of audio CD players.

1 – Setting up and introduction

Handling of compact discs

Observe the following:

- Always place the compact discs in the trays 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.

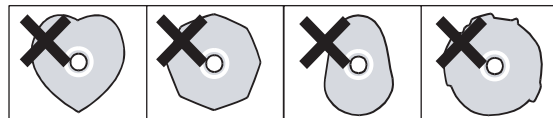


- Finger marks and dust should be carefully wiped off the disc's recorded surface with a soft cloth. Unlike traditional vinyl records, the compact disc has no grooves to collect dust and microscopic debris, so gently wiping with a soft cloth should remove most particles.
- Wipe in a straight motion from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

NOTE

Never use a disc that has had a stabilizer mounted to it. The residual adhesive may cause the disc to stick to the mechanism of the 2488. If it sticks to the mechanism, you will need a technician to get it out.

Setting up your first song

This first song won't be very musical, but it will help you get used to finding your way around the 2488.

We really suggest that you do through these procedures—it will help you later when you come to do more complex work with the 2488.

New song

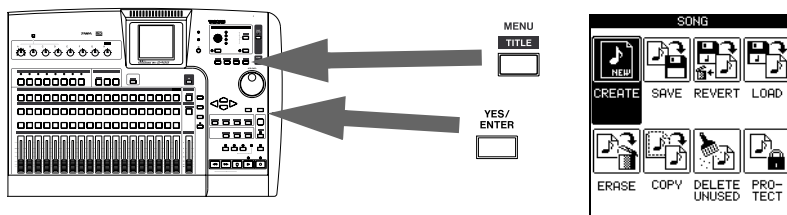
To make sure we start with a “clean slate”, we'll create a new song.

NOTE

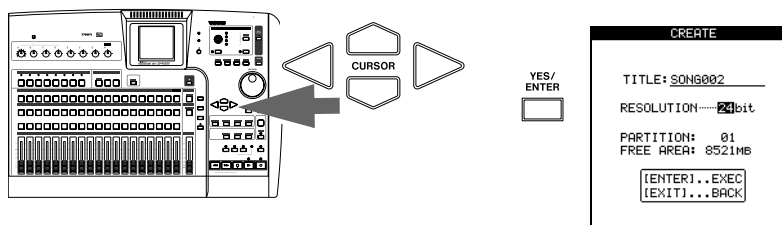
The 2488 is shipped from the factory with a new song ready to for you to record. However, if the 2488 has

been used before, it will automatically load the last song that was worked on, and you may need to follow these instructions to create a new song. Normally, though, this won't be needed.

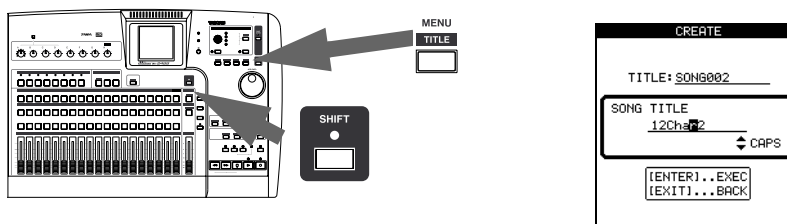
- 1 Press the **MENU** key, and use the cursor keys to highlight the **SONG** item. Press **ENTER**.



- 2 At the **SONG** menu, use the cursor keys to highlight the **CREATE** option. Press **ENTER**.

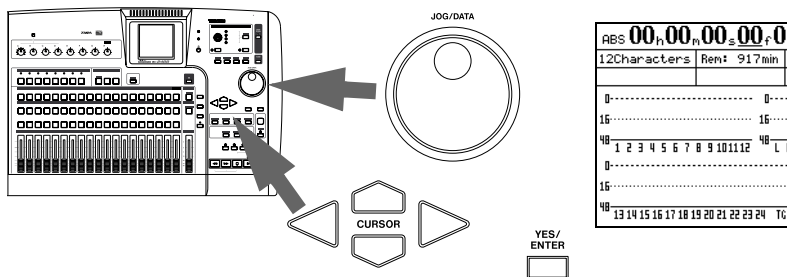


- 3 In the **CREATE** screen, press the **SHIFT** key followed by the **TITLE** key to enter titling mode.



- 4 Use the wheel and the cursor keys to give the song a name up to 12 characters in length.

Press **ENTER** when you're done. The display shows the home screen.



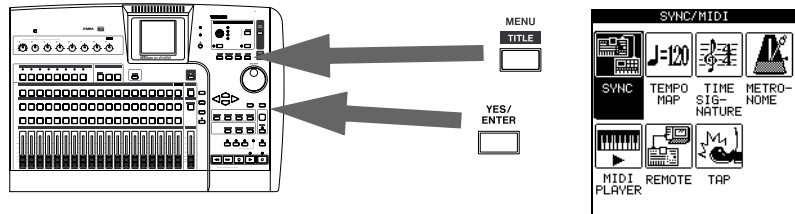
1 – Setting up and introduction

Setting the tempo

The 2488 has a built-in metronome. We'll set up a very simple 4/4 beat which stays the same all the way

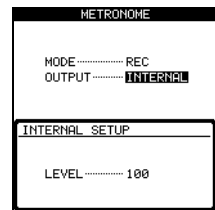
through, to drive the metronome and help you stay in time.

- 1 Press the **MENU** key, and use the cursor keys to highlight the **SYNC/MIDI** item. Press **ENTER**.

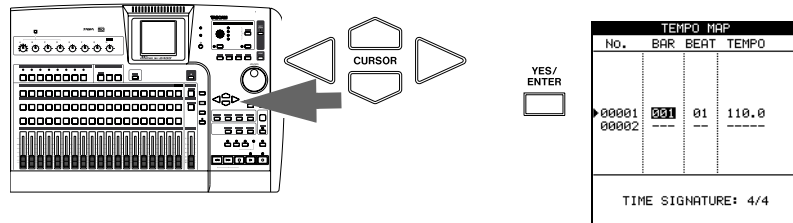


- 2 Highlight the **METRONOME** option in the SYNC/MIDI menu and press **ENTER**.

Use the cursor keys and wheel to set the **OUTPUT** to **INTERNAL**, set the mode to **REC**, the **LEVEL** to **100**, and press **ENTER**.

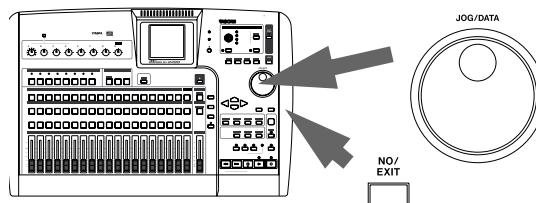


- 3 At the SYNC/MIDI menu, use the cursor keys to highlight the **TEMPO MAP** option. Press **ENTER**.

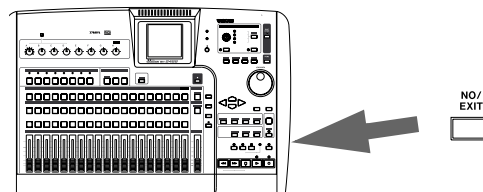


- 4 Move the cursor to the **TEMPO** field, and use the wheel to set a value (if you want to tap a value, see “Tapping the tempo” on page 78).

Press **EXIT** when you're done, to return to the **HOME** screen.



- 5 Press the **CLICK** key. The indicator lights orange.



Making the first recording

We assume that you're recording the rhythm guitar to start with, and that you are going to be recording it on track 1.

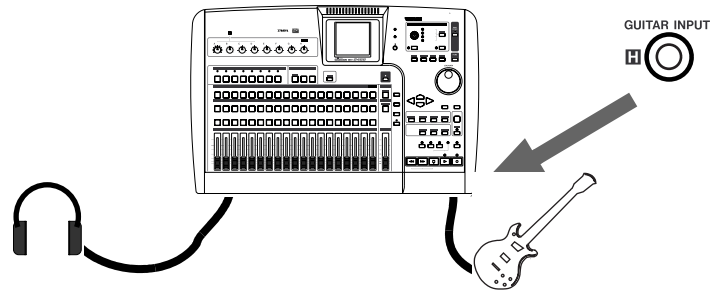
Note that inputs on the 2488 are lettered from **A** through **H**. Tracks are numbered from **1** through **24**.

Input **H** is special on the 2488—it is duplicated at the front of the 2488 with an input for electric guitars and passive basses (active basses should use a 1/4" **LINE** jack at the rear of the unit). Only use this front input jack for electric guitars (and basses) and do not plug these instruments into any other jacks.

Recording the guitar

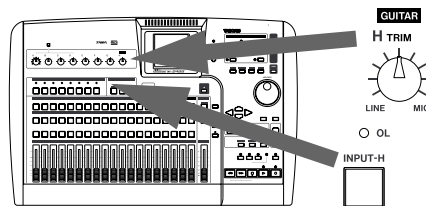
- 1** Plug the guitar into the GUITAR [H] input on the front of the 2488.

Then plug a pair of headphones into the PHONES jack on the front panel.



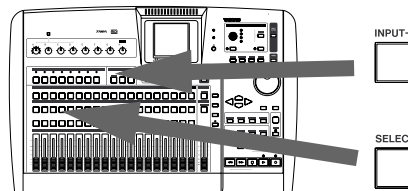
- 2** Play the guitar, and adjust the level using TRIM control H so that when you play a loud note, the OL indicator above the INPUT-H key lights very briefly. Then turn the TRIM counterclockwise a little more.

If you want to tune the guitar using the 2488, see “Tuner” on page 35.

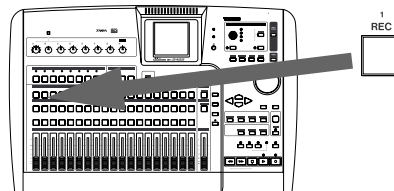


- 3** Press and hold the INPUT-H key so that it starts to flash. While holding it down, press the SELECT key of channel 1. Now both these keys will flash.

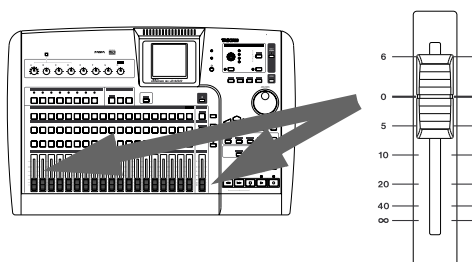
Now release both keys. They will both be lit. This means that input H is now *assigned* to track 1.



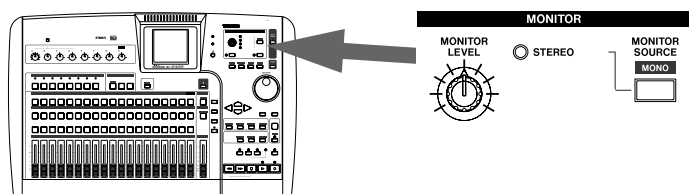
- 4** Press the REC key of track 1. It starts to flash.



- 5** Set both fader 1 and the STEREO fader to the 0 position.

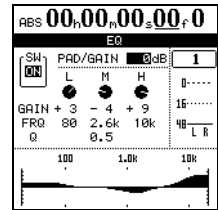
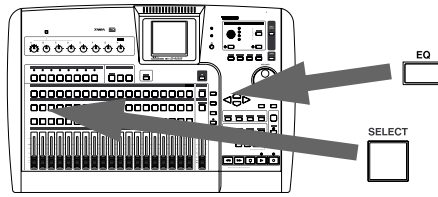


- 6** Adjust your listening level by using the MONITOR level control with the MONITOR SOURCE set to STEREO.



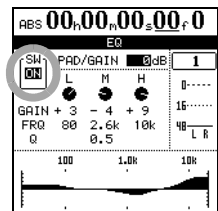
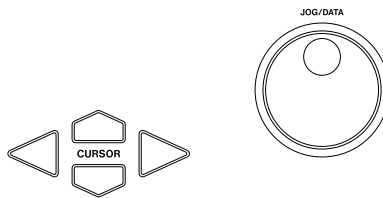
1 – Setting up and introduction

- 7** Adjust the tone of the guitar, by pressing the **SELECT** key of channel 1, and then pressing the **EQ** key.

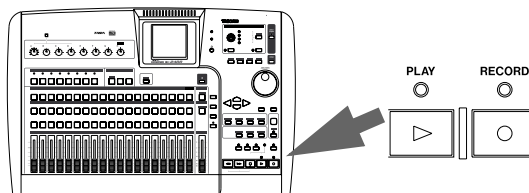


- 8** Use the cursor keys and the wheel to move around the display and change values. The settings are shown as numbers and as a graph.

Use the on-screen SW on the left side of the display (or press and hold **SHIFT** and press **EQ**) to compare the sound with and without the equalization.

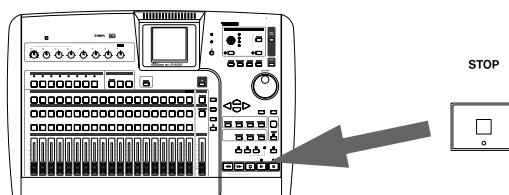


- 9** Press and hold down the **RECORD** key and press the **PLAY** key. The **PLAY** and **RECORD** indicators above the transport keys both light, and the **REC** key of track 1 lights solidly.

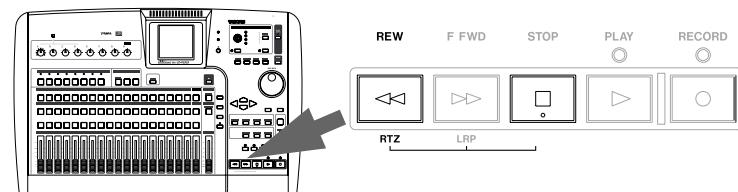


- 10** The metronome you set up earlier starts to play, and you can play your rhythm part along with it, recording as you go.

Press the **STOP** key when you are finished.



- 11** To return to the zero position, where your song began, press and hold the **STOP** key, and press the **REW** key (marked as **RTZ**—“return to zero”).



- 12** When you've finished recording, press channel 1's **REC** key to save the track.

Lead line

Now we can use track 2 to record the lead guitar line. We'll add an effect to the lead guitar to make it sound a little more interesting.

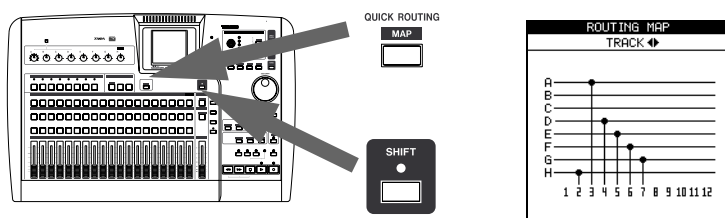
If you don't want to play through the whole song, you can use the procedures described in "Auto punch operations" on page 46.

NOTE

You can also perform audio edits, cutting, copying and pasting between tracks, etc. to correct small mistakes. These operations are explained in "About track editing" on page 49.

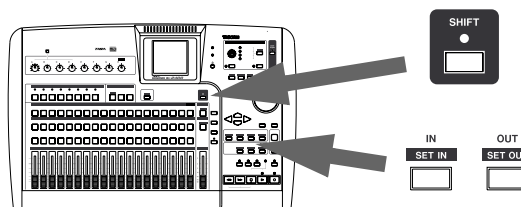
- 1 Assign the guitar input (H) to track 2.

You can always see all the current mappings by pressing **SHIFT** followed by the **MAP** key (use the cursor keys to view the mappings for tracks 13 through 24).

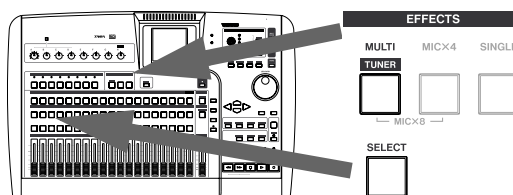


- 2 Play the song to a little before the place where you want the guitar solo to start. Use fader 1 to adjust the level of the previous track.

Use the transport keys to move back about five seconds before this. Press and hold the **SHIFT** key and press the **IN** key to set a convenient location point.

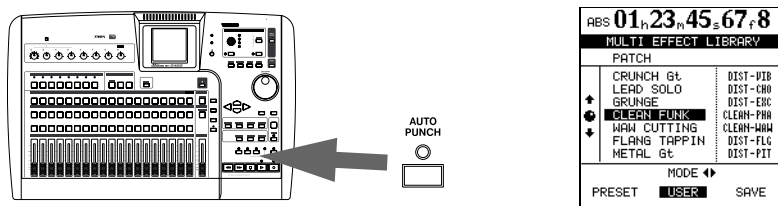


- 3 Press and hold the **MULTI** key, and press the channel 2 **SELECT** key to assign the multi-effect to channel 2.



- 4 Press the **MULTI** key again to bring up the multi-effect screen.

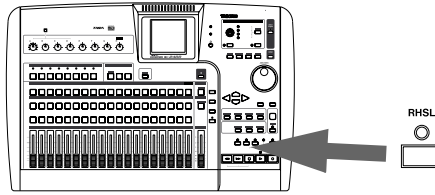
Press **ENTER** to show the library choices, move the cursor to **PRESET** to select the preset multi-effect library.



- 5 Use the wheel to select the preset multi effect. See "Using the multi-effect library" on page 33 for details of the effects available.

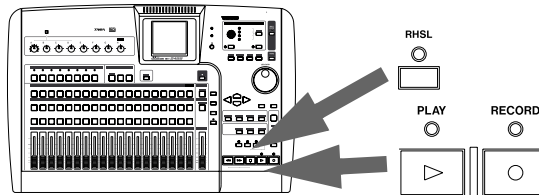
1 – Setting up and introduction

- 6** Press the RHSL key to enter rehearsal mode. When this mode is active, you do not actually record when the RECORD key and PLAY keys are pressed (the RECORD indicator flashes).



Continue rehearsing, and use the IN key (without SHIFT) to locate back to the point you set earlier.

- 7** When you're happy with the solo, press the RHSL key once more to turn the indicator off.
- 8** Use the RECORD and PLAY keys to record the solo.



- 9** Press channel 2's REC key to save the track.

Congratulations!

By now you should be familiar with the basic concepts of the 2488: how the inputs and channels work together; how the mixer controls are accessed and

operated, how recording and playback take place, and a little about the location and effect facilities provided by the 2488.

Inputs and assignments

The 2488 has eight inputs, marked from **A** through **H**, and twenty-four mixer channels.

Inputs **A** through **D** are fitted with dual XLR-1/4" balanced inputs and can be supplied with +48V phantom power for condenser microphones.

WARNING

*Never connect or disconnect microphones to or from inputs **A** through **D** with the phantom power turned on.*

*Never use unbalanced dynamic microphones with microphone inputs **A** through **D** with phantom power turned on. If you are in any doubt, consult your local audio expert.*

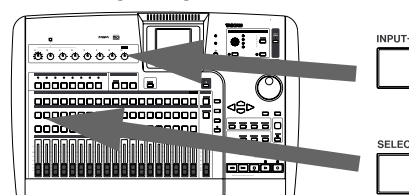
Inputs **E** through **H** are suitable for line input, and are fitted with 1/4" balanced jacks. An unbalanced “mirror” of H, with an impedance suitable for electric guitars and basses, is provided at the front of the unit.

It is possible to record up to eight tracks at one time, with the inputs being freely assignable to the tracks.

Assigning inputs is carried out by pressing and holding the appropriate input key below the **TRIM** controls (the key flashes), and then pressing the appropriate channel **SELECT** key(s) which will also flash. It is also possible to reverse the order (press and hold a channel’s **SELECT** key and press the appropriate input key).

An input can be assigned to more than one channel, but of course a channel cannot be fed by more than one input.

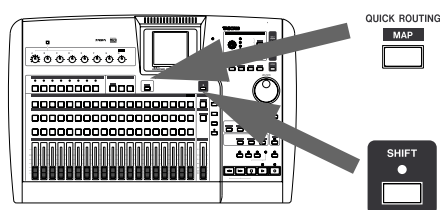
This shows an instrument (guitar or bass) plugged into input **H** being assigned to channel 1



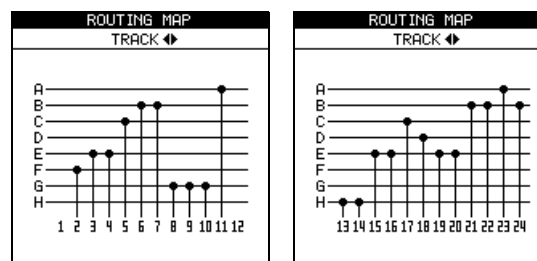
Checking assignments

When either an input key (or channel **SELECT** key) is pressed and held down it flashes, together with the channel (or input key) to which it has been assigned.

Also, if the **SHIFT** key is pressed, followed by the **MAP** key, a screen is shown with the current assignments.



The eight inputs are represented by horizontal lines, which are joined to the channel labels at the bottom of the screen by vertical lines when they are assigned to the channels.



Use the left and right cursor keys to change between viewing channels 1 through 12, and 13 through 24.

Breaking assignments

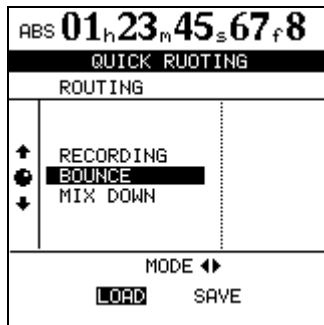
If an input or channel **SELECT** key is held down, the assigned channel (or input) key flashes. Press the other key to break the assignment.

NOTE

*Assigning and unassigning linked channels (see “Linking channels” on page 25) works in much the same way as for single channels. Pressing one **SELECT** key of a linked channel pair is typically the same as pressing both together.*

Saving and loading assignments (QUICK ROUTING)

There are three “slots” that can be used to save commonly used routing assignments. These slots accessed through the **QUICK ROUTING** key:



1 Press the **QUICK ROUTING** key to bring up the screen shown here.

2 Use the wheel or “up” and “down” cursor keys to select the slot to be loaded or to which the current routing assignments will be saved.

3 Use the “left” and “right” cursor keys to select **LOAD** or **SAVE**.

4 Press **ENTER**. The routing assignments are either stored (the home screen shows **Save routing briefly**) or loaded (the home screen shows **Load routing briefly**).

NOTE

If you save a routing assignment to the **BOUNCE** slot, even if you are not in bounce mode (“Making a bounce mix” on page 49), the 2488 will enter bounce mode when this assignment is next recalled.

The channels

Each of the 24 channels provides the following facilities:

- Digital pad/gain
- 3-band parametric EQ
- Effect sends
- Phase reversal switch
- Panpot
- A physical fader (which may be overridden by an internal “virtual fader”)
- A mute key
- Solo facilities

Input channels

Like the 24 track channels, the eight inputs are provided with phase, digital pad/gain, EQ, effect sends, etc.

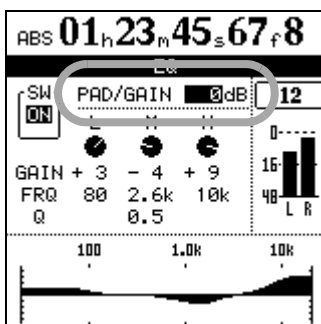
They are not provided with physical faders, but the output from these “extra channels” can be adjusted on-screen. Although these settings can be made at any time, they are only effective when the inputs have been assigned to the sub mix. See “Sub mix” on page 29 for details.

In this manual we talk about “pressing a channel’s **SELECT** key” to select the appropriate screen, often this includes the **INPUT** keys as well, even when this is not actually stated.

Many times, there will be no need for these facilities to be used on the input channel (there are times when this is useful, though—see the sections on “Monitoring” on page 27 and “Sub mix” on page 29).

Digital pad/gain

Press the channel’s **SELECT** key, followed by the **EQ** key (this order can be reversed).



Use the cursor keys to navigate to the **PAN/GAIN** area, and set the value to between -42 and $+6$ dB.

Usually, this value will be set to 0.

Use this to add volume to a quiet instrument or to remove excess volume from a loud one.

When a channel’s EQ screen is shown, simply pressing the **SELECT** key of another channel will show the EQ screen for that channel.

EQ

Set the three-band equalization for each channel using the same screen as the digital pad/gain (see above)

On the 2488 channels, you can adjust the gain (the amount that the signal is cut and boosted) by ± 12 dB, and the frequency (high or low) affected by the equalization in three bands. The frequencies are (in Hz):

Low (L) 32 — 1.6k
 Mid (M) 32 — 18k
 High (H) 1.7k — 18k

Note that the frequencies are set in discrete steps; it is not possible to set the center frequencies to intermediate values.

In addition, you can adjust the “Q” (the width of the effect) in the center band from 0.25 to 16.

TIP

“Q” is defined as the center frequency of the equalization band divided by the bandwidth. A high Q value provides narrow filtering.

As you adjust the equalization, the graph at the bottom of the screen changes to provide an idea of how the equalization affects the signals.

TIP

You can press and hold the **SHIFT** key and press the **EQ** key to “zero” (return to default setting) the selected channel’s EQ settings.

There is also an on/off soft switch provided at the upper left of the screen to allow A/B comparison of the equalized and unequalized signals. Press **SHIFT + YES** to turn it on, and **SHIFT + NO** turn it on off (you can also use the cursor).

Effect send

There is one stereo “loop” send (using the internal effects) in addition two effect sends (using the external **EFFECT SENDS** jacks) for each channel.

NOTE

Recording effects can also be inserted at the input stage. See the section on effects (“Effects” on page 31) for full details of the effect architecture and use. Such effects are not affected by these channel sends.

Press the channel’s **SELECT** key, followed by the **SEND** key (this order can be reversed).

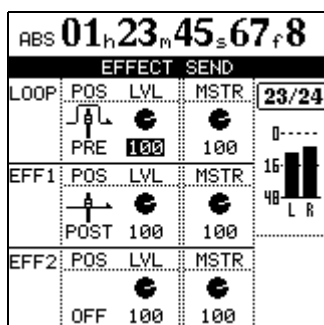
For each effect send, there is a soft switch at the left side of the screen. Use the wheel to set this switch either OFF or POST (post-fader) or PRE (pre-fader).

TIP

“Pre-fader” means that the channel fader does not affect the level of the effect send, as opposed to “post-fader” where the effect send level is affected by the channel fader setting.

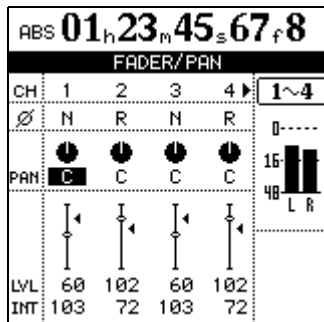
Set the level of each channel send (LVL) from 0 to 127.

This screen also allows the master send level (MSTR) to be set (again from 0 to 127).



The fader/pan screen

Press the channel's **SELECT** key, followed by the **FADER/PAN** key (this order can be reversed) to bring up this screen:



Here, you can make phase and pan settings and view the fader settings for four channels at a time (linked channels still count as two channels here).

Phase

Use this to correct miswired microphones, etc. Out-of-phase sources can result in unnatural EQ and a “hole in the middle” stereo effect.

The phase symbol (∅) shows the current status of the channel: either normal (N) or reversed (R). Use the cursor keys and wheel to change these settings.

Pan

The pan position (PAN) refers to the stereo position (left or right) of the channel in the mix.

Full left (“hard left”) is represented by L63, and hard right by R63. The center position, where the signal is sent equally to the left and right is represented by C.

TIP

Press and hold **SHIFT** and press the **PAN** key to reset the highlighted channel's pan position to the center. In the case of linked channels, the pan position both of the highlighted channel and the channel to which it is linked will be centered.

Faders

The faders cannot be set in this screen (except for the inputs). However, it is possible to obtain a numerical representation of the physical position of the fader, as well as a view of the virtual position of the fader, if this is different.

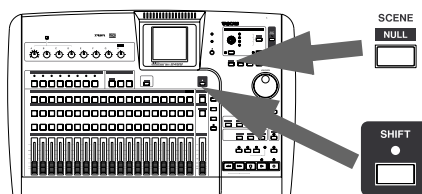
The minimum fader value as shown on screen is 0 (full cut), and the full level is 127. A level of 100 corresponds to the “unity gain” position of 0dB.

Because the 2488 supports the storage and recall of scenes (see “Scene memories” on page 29), as well as MIDI control of the faders and other mixer controls, it may sometimes happen that the physical fader position is not the same as the internal “virtual” fader level, as set by the software control.

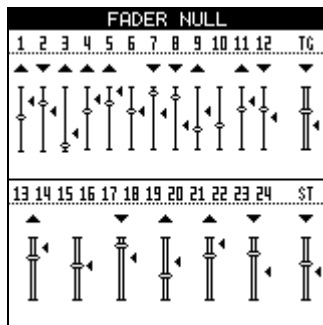
See “Fader matching” on page 84 for an explanation of the different ways in which the physical and virtual faders can be set to interact.

In order to reconcile the physical position with the virtual position, a process known as *nulling* must be carried out.

1 Press and hold the **SHIFT** key and press the **NULL** key:



- 2 In this screen, the physical faders are represented with side-pointing triangles beside them representing the virtual fader positions.



Above each on-screen fader whose position does not correspond to that of the internal virtual fader, there is an arrow pointing either up or down, depending on whether the physical fader must be moved up or down to null it.

A fader which is nulled (faders 15+16 in the screen above) has no triangle above it.

Mute

The **MUTE** keys for each channel also serve as solo keys (see “Soloing and toggle” on page 29).

When a channel’s **MUTE** key is pressed (when soloing is not active), the orange indicator lights, and the sound from that channel is not sent to the stereo bus.

The channel’s recording source is also muted.

Linking channels

Stereo linking provides a way of controlling two channels (usually, but not always, a stereo pair) with one set of controls.

Controls shared by linked channels are:

- Fader (the left fader of the pair controls the level for both channels)
- EQ
- Digital pad/gain
- Effect send levels and pre/post position
- **SELECT** keys

Record arming, muting and soloing are carried out separately for each linked pair.

Pan and phase are linked, but these can be changed independently after linking.

An odd-numbered channel can be linked to the even-numbered channel to its right. In other words, channels 1 can be linked to channel 2, but to no other channel (and channel 2 cannot be linked to any channel other than 1).

Linking channels is done by pressing and holding down the **SELECT** key of one of the pair of channels to be linked, and pressing the other.

Unlinking channels is done by pressing the **SELECT** key of one of the linked pair (both keys flash) and pressing the other.

NOTE

It is also possible to link two inputs together in the same way so that the EQ, etc. for each input is controlled in common.

Stereo bus

The stereo bus may be thought of as a special permanently-linked pair of channels.

The output from this bus can be monitored as the **STEREO** selection (see “Monitoring” on page 27)

and is also as the source for mastering and rendering the final mix (see “Recorder” on page 36).

At the final mastering stage, it is possible to add equalization and dynamics to the stereo bus.

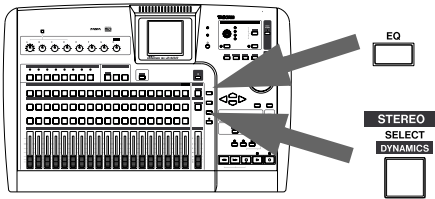
2 – Mixer

EQ

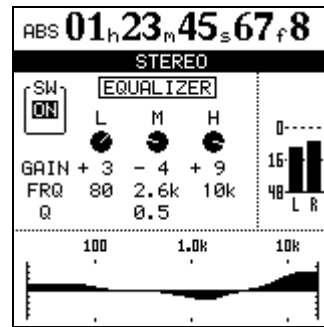
Like the ordinary channels, the stereo bus has three-band equalization, with sweepable center frequencies, and variable Q for the midrange.

To access this,

- 1 Press the **STEREO** key.



- 2 Press the **EQ** key:

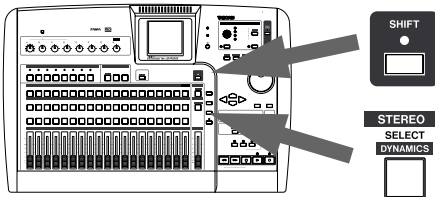


- 3 Use the cursor keys and wheel to select and adjust the EQ parameters for the stereo bus.

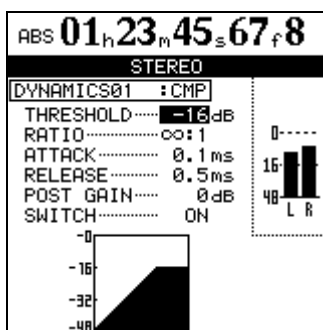
Dynamics

The stereo bus has a stereo dynamics processor (compressor or expander) available.

- 1 Press and hold the **SHIFT** key.
- 2 Press the **STEREO** key.



- 3 Use the cursor keys and wheel to select and adjust the parameters for the effect. Note that the last parameter is an on/off switch. When set to OFF, the dynamics processor is bypassed.



Dynamics library From the screen above, pressing **ENTER** brings up the stereo dynamics library screen.

DYNAMICS LIBRARY	
PATCH	
DYNAMICS001	CMP
DYNAMICS002	CMP
DYNAMICS003	CMP
DYNAMICS004	CMP
DYNAMICS005	CMP
DYNAMICS006	CMP
DYNAMICS007	CMP
MODE ←→	
PRESET	USER SAVE

Use the left and right keys to select the PRESET or USER libraries, or to SAVE the current setting.

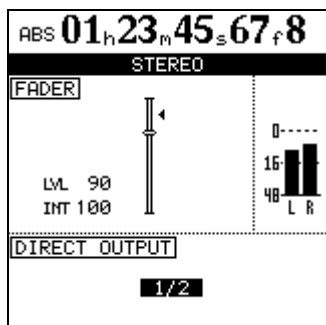
Use the wheel to select library entries and press **ENTER** to load the entry.

If you save a setting, you can add a title to the current stereo dynamics settings and press **ENTER** to save it as a user library effect.

Fader

Like the channel faders, the position of the **STEREO** fader can differ from the internal setting if it has been changed as the result of a MIDI command or a scene recall.

Press the **STEREO** key alone to bring up the stereo bus fader screen:



In this case, the LVL value corresponds to the physical fader level, and INT gives the internal virtual fader value (as marked by the triangular symbol beside the on-screen fader). In both cases, 0 is full cut, 127 is full up, and 100 is the unity gain value.

Output selection

A pair of tracks can be routed for direct output through the analog **STEREO OUT** terminals (and the **DIGITAL OUT**).

Usually, the **DIRECT OUTPUT** parameter should be set to OFF (that is, the stereo bus is the signal output from these terminals).

However, you can use the wheel to select a pair of tracks for output from these terminals, though.

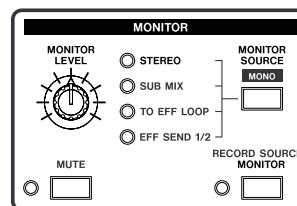
NOTE

When this function is on, the channel and stereo faders have no effect.

Monitoring

Monitoring is a vital part of the whole recording and production process. The 2488 provides stereo monitoring facilities through an external amplifier/speakers combination, as well as headphones.

The level for these two monitoring systems is set using the **MONITOR LEVEL** control.



This monitoring level is affected by the level from the **STEREO** fader, but does not affect the level of the stereo bus.

Monitor selection

As well as the stereo bus, it is possible to monitor the sub mix (see “Sub mix” on page 29), the effect loop, and the two effect sends (one in each channel), which are all shown by indicators; as well as turning off the monitoring, when no indicator is lit.

Monitoring the loop and effect sends is useful when you want to check the exact mix (as created by the effect sends) of the signals being sent to the effects.

Use the **MONITOR SELECT** key to cycle through the selections.

2 – Mixer

Mono monitoring

Typically monitoring is carried out in stereo, echoing the stereo bus. However, there may be times when you want to check what the mix sounds like in mono.

Record source monitoring

Record source monitoring is a feature of the 2488. It allows monitoring of the input sources rather than the monitoring coming from the mixer channels.

This has a number of advantages as can be seen when we examine a highly simplified block diagram.

The signal is passed through the input section, to the track. From there, it is passed through the channel.



Typically, monitoring is done from the track, and therefore any effects and EQ added to the channel, as well as any effects, EQ added to the input, will be monitored.

Sometimes, however, it's a good idea to record "dry" (that is, with no effect). An effect setting, for example, which sounds fine during recording, may clash with another effect added later on in the project.

However, singers and other performers often like to hear the effects in their headphones (it helps with the recording in many cases). The answer is to add some effects to the channel, allowing the artiste to hear the effected sound. Meanwhile, the sound is actually recorded dry.

This presents a minor problem, though; the effect may mask any imperfections in the source material

Monitor muting

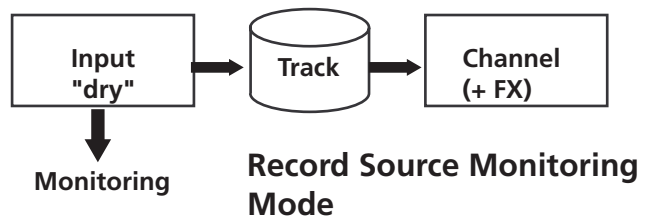
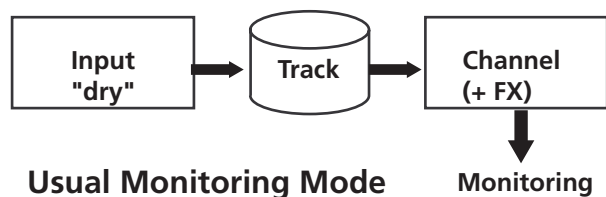
When recording with microphones, the microphones and speakers should not be in the same space, as this will cause feedback. If you are using the microphone in the same room as the 2488, you should then use headphones when monitoring.

- 1 Press the shifted **MONITOR SOURCE** key. While the monitoring is in mono, the appropriate monitor selection indicator flashes.

Use the **MONITOR SOURCE** key to turn off mono monitoring.

recording process, and it's a good idea to be able to monitor the "dry" signal sometimes.

This is where the record source monitoring comes in. As you can see from the illustration below, the usual monitoring source is the channel.



In the record source monitor mode, the source is the input.

- 1 Simply press the **RECORD SOURCE MONITOR** key. The indicator lights when record source monitoring is in operation.

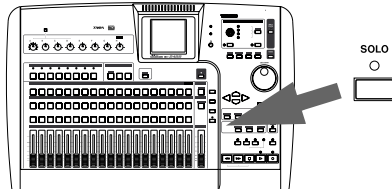
Note that this only applies to monitoring the **STEREO** bus, not to the sub mix or the effect sends or loops.

The monitor **MUTE** key allows you to cut the output to the monitor amplifier/speakers, while still monitoring through headphones. The **MUTE** indicator lights when muting is active.

Soloing and toggle

Soloing is also an important part of the recording process, allowing you to temporarily isolate problem areas (channels or tracks) and listen to them with your full attention.

The **MUTE** keys for each channel also act as **SOLO** keys when the **SOLO** indicator is flashing (solo mode is active).



The **MUTE/SOLO** keys of any soloed channels flash while being soloed.

Muted channels cannot be soloed or unmuted while solo mode is active.

The solo is an in-place solo—any changes to fader levels, pan position, etc. made in solo mode are reflected in the solo signal.

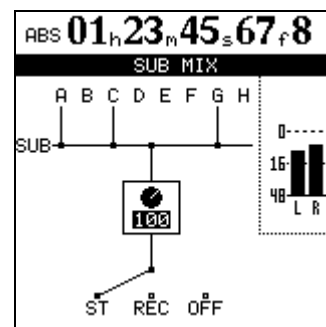
Sub mix

The 2488 sub mix facility allows you to add up to eight more inputs (usually on mixdown) to the twenty-four tracks already recorded. These could be inputs from a multi-timbral MIDI device, synchronized using MIDI clock information from the 2488 driving a sequencer.

The eight inputs from **A** through **H** are pressed into service here and they feed a bus that can be routed to the stereo bus (or to the recorder in bounce mix—see “Making a bounce mix” on page 49).

- 1 Press and hold down the source **INPUT** key of an input to be assigned to the sub mix and press the **SUB MIX** key (above the **STEREO** fader) to assign the input to the sub mix.
- 2 Repeat this process for all inputs to be assigned to the sub mix.
- 3 Finally, assign the sub mix itself to the stereo bus. Press and hold the **SUB MIX** key, and press the **STEREO** key.

Press the **SUB MIX** key to bring up the appropriate screen (if it's not already displayed):



This shows the current assignment of inputs to the sub mix, and the current assignment of the sub mix output.

There is also a level control (0 to 127, 100 is unity gain). Use the wheel to set this level.

NOTE

You can also bounce recorded tracks (“Bouncing tracks” on page 49). Because this uses the sub mixer, you cannot use the sub mix as described here and perform track bouncing at the same time.

Scene memories

The 2488 can store and recall up to 100 scene memories. Each memory stores all the digital parameters for:

- Input assignment
- EQ settings
- Effector settings and assignment (assignment and parameters for both internal effects units)
- Effect send and loop levels
- Pan
- Digital pad/gain
- Fader settings (including the **STEREO** fader)
- Sub-mixer settings

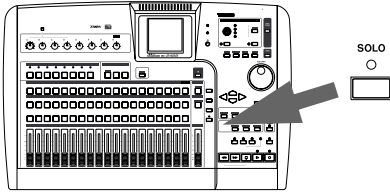
2 – Mixer

NOTE

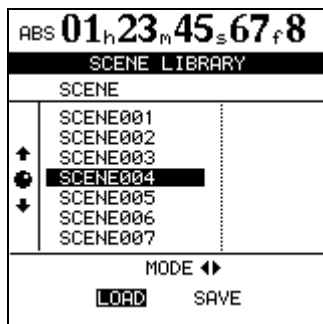
Monitor settings and **TRIM** control settings are not stored as part of a scene.

To access the scene memories:

1 Press the **SCENE** key:



2 From the scene library screen, use the wheel to select a scene.



3 Use the left and right cursor keys to select **LOAD** (settings from the library) or **SAVE** (current settings to the library).

4 When saving, use the wheel to select a setting which you will overwrite, or select the (new scene) option to create a new library entry.

When loading a scene, you should simply select the library entry.

5 Press **ENTER**. The scene will be loaded or saved.

NOTE

Take care when recalling a scene. The audio level may jump dramatically from the current level.

You can also add meaningful titles to the scenes by pressing the shifted **MENU** key (**TITLE**). See “Titling” on page 12.

The 2488 includes high-quality effects that may be used to enhance your playing.

They may be used in a number of different ways for use in different stages of the production process.

- Firstly, the effects may be used on up to eight channels and/or inputs (that is, eight signals in total) as inserted mic effects.
- Alternatively, up to four mic effects may be used together with an inserted multi-effect.
- Lastly, a single high-quality effect may be used. This is fed by the internal LOOP (“Effect send” on page 23).

Mic effects

MIC X 4 Select four mic effects and the multi-effect by pressing the **MICX4 EFFECT** key.

If the eight mic effects setting has previously been selected, the mic effect assignments already made are unassigned.

MIC X 8 Select eight mic effects by using the **MULTI** and **MICX4 EFFECT** keys (**MICX8**) located

Assigning mic effects

Assign and unassign channels and inputs in the same way that channels are assigned to inputs (see “Inputs and assignments” on page 21). In other words, pressing and holding the **MICX4** key (whether four or eight mic effects are selected) and pressing a channel or input **SELECT** key assigns or unassigns the mic effect to or from the channel/input.

The parameters of the effects may be edited and stored in libraries allowing the same effect setting to be used on multiple tracks or used in different parts of the same project.

These library effects are available between songs (and disk partitions—see “Disk management” on page 65).

Whether or not the parameters are stored in a library entry, effect assignments and parameters are always stored as part of a song.

above the channels. Press and hold one of these keys and then press the other one.

If the four mic effects + multi-effect setting is already selected, the multi-effect is unassigned, and the four mic effect assignments are left in place.

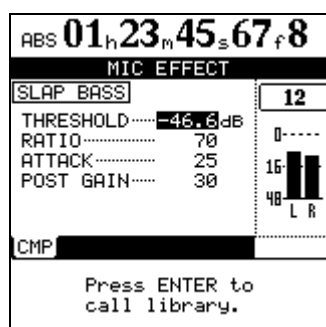
To “unlink” these two keys, press and hold them together again.

If all available mic effects are being used, attempting to assign another channel or input has no effect. You must free up some inputs or channels to allow new ones to be assigned.

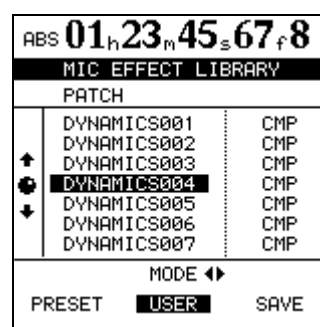
A stereo channel (13-14 through 23-24) counts as two channels. In other words, up to eight mono or four stereo, or intermediate combinations at a time, can use mic effects in this mode.

Selecting mic effects

- 1 When the **MICX4** key is pressed (regardless of whether eight or four mic effects have been selected), and the **SELECT** key of the input or track is pressed, the **MIC EFFECT** screen is shown:



- 2 Press **ENTER** to access the effect library:



- 3 Use the left and right keys to select either the preset (PRESET) library, the user library (USER) or save (SAVE) the current setting.

3 – Effects

The basic types of mic effects available are:

- **Vocal compressor** (VOCAL-COMP/CMP)
- **De-esser** (DE-ESSER/ DSR)
- **Vocal exciter** (VOCAL-EXC/EXC)

4 Use the wheel to select the effect to load (or when saving, the “slot” in which to save).

If you’re saving an effect, you can give it a title, such as SLAP BASS, FUNKY KOTO, etc. The

three-letter abbreviation for the effect type cannot be changed. See “Titling” on page 12.

5 Press ENTER to load (or save) the effect. The display shows the parameter editing MIC EFFECT screen.

Pressing EXIT cancels the load and returns the settings to the previous parameters.

Editing mic effects

The parameters to be edited for the effects differ according to the type of effect selected.

TIP

If you are unsure of the operation of a compressor or any of the effects described here, it is a good idea to read one of the many excellent introductory books on audio and recording.

Compressor (CMP) The THRESHOLD at which the compressor kicks in, the RATIO of the compressor, and the ATTACK and POST GAIN times.

De-esser (DSR) The FREQUENCY at which the de-esser operates and the DEPTH of the effect.

Exciter (EXC) The FREQUENCY and the DEPTH of the effect.

Multi-effect

On the 2488, a “multi-effect” is a chain of effects which can be used together as one insert effect for processing a guitar sound, for example.

A multi-effect is made available together with the four mic effect setting.

Selecting the multi-effect for use is done in the same way as selecting the four mic effects (see above).

Assigning the multi-effect to a channel or input

The multi-effect is assigned in the same way as the mic effects: press and hold the **MULTI** key and press the input or channel **SELECT** key.

Any input or channel assigned when the **MULTI** key is first pressed flash.

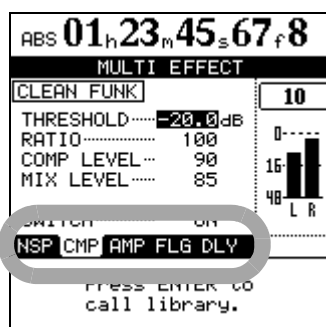
Unassigning the multi-effect follows the same procedure: press and hold the **MULTI** key, and press the flashing **SELECT** key.

NOTE

The multi-effect can be freely assigned to mono inputs or channels or to linked or stereo input or channels.

Editing the multi-effect

Pressing the **MULTI** key brings up the multi-effect screen.



At the bottom of the screen, below the parameters, is a block of three-letter abbreviations (circled in the illustration here). These represent the different individual components of the multi-effect. The positions of the effect components in the chain cannot be changed.

Use the right and left cursor keys to navigate between them.

- **NSP**: Noise Suppressor (noise gate). This effect is always at the start of the chain. Adjust the THRESHOLD, amount of SUPPRESSION, ATTACK and RELEASE. You can also SWITCH this effect on or off (in or out of the chain).

- **DST:** Distortion. Either this effect or the compressor (below) is in the second position in the chain. Adjust the DISTORTION level, TONE and amount of POST GAIN (gain applied after the effect). You can also SWITCH this effect on or off (in or out of the chain).
- **CMP:** Compressor. Either this effect or the distortion (above) is in the second position in the chain. Adjust the THRESHOLD, compression RATIO, the COMP LEVEL, and the amount of DIRECT MIX. You can also SWITCH this effect on or off (in or out of the chain).
- **AMP:** Amplifier model. This effect is always the third in the chain. Adjust the PRE GAIN (corresponds to pre-amplifier gain setting, the TONE, the BOX SIZE (speaker cabinet size), and the POST GAIN (overall output volume). You can also SWITCH this effect on or off (in or out of the chain).
- **Modulation, etc. effects** (see below). One of these effects is always in the fourth place in the chain.
- **DLY:** Delay. This is always the final effect in the chain. Adjust the DELAY TIME, amount of FEEDBACK, HI DAMP (the amount by which high frequencies are damped with successive repeats) and the overall MIX LEVEL. You can also SWITCH this effect on or off (in or out of the chain).
- **FLG:** Flanger. Adjust the SPEED, DEPTH, RESONANCE and MIX level of this flanging effect. You can also SWITCH this effect on or off (in or out of the chain).
- **PHA:** Phaser. Adjust the SPEED, DEPTH and RESONANCE of this phasing effect. You can also SWITCH this effect on or off (in or out of the chain).
- **CHO:** Chorus. Adjust the SPEED, DEPTH, TONE and MIX level of this chorus effect. You can also SWITCH this effect on or off (in or out of the chain).
- **EXC:** Exciter. Adjust the FREQUENCY and DEPTH of this exciter effect. You can also SWITCH this effect on or off (in or out of the chain).
- **PIT:** Pitch shifter. Adjust the PITCH (in semitones) and use the FINE setting for fine-tuning. Set the MIX LEVEL. You can also SWITCH this effect on or off (in or out of the chain).
- **TRM:** Tremolo. Adjust the SPEED and DEPTH as well as the SHAPE of the waveform. You can also SWITCH this effect on or off (in or out of the chain).
- **VIB:** Vibrato. Adjust the SPEED and DEPTH of this vibrato effect. You can also SWITCH this effect on or off (in or out of the chain).
- **WAH:** Wah effect. Adjust the ATTACK of the effect, the SENSE (sensitivity) of the effect, and whether the PEDAL (the **EXPRESSION** pedal connected at the front of the unit) is used or not to control the effect (if OFF, this becomes an auto-wah effect).

Modulation effects One of the following effects always takes the fourth place in the chain.

Using the multi-effect library

- 1 From the multi-effect parameter screen, press **ENTER**:



- 2 Use the left and right cursor keys to select either the PRESET memory banks, the USER memory banks, or SAVE the current setting.

The left side of the PRESET memory banks provides a description of the effect (GRUNGE, LEAD SOLO, etc.).

In the right column, you can see the chief components of the effect. The first part of the name represents the second effect in the chain (either DIST- for distortion, or CLEAN- for compression, followed by one of the eight modulation effects (FLG, PHA, CHO, EXC, PIT, TRM, VIB, and WAH). There are therefore 16 “starting points” for multi-effect settings.

- 3 To save the current settings as an effect in the USER bank, move the cursor to SAVE and press **ENTER**. Select an existing effect to overwrite, or pick a new library entry into which to save the parameters.

You can rename any entry in the user banks using the techniques described in “Titling” on page 12. The basic type of effect (for instance, DIST-FLG) is always shown in the right column of the list, so even if you call it HEAVY LEAD, for example, you can still recognize the basic starting point.

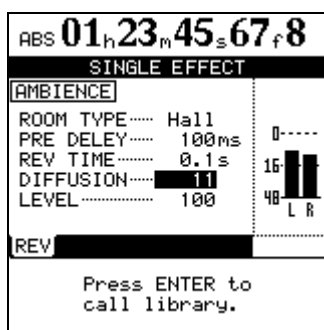
Single effect

The single effect provides you with a quality effect in the internal effect loop. This is most useful in the mixdown and mastering stages, but it can be used at any time.

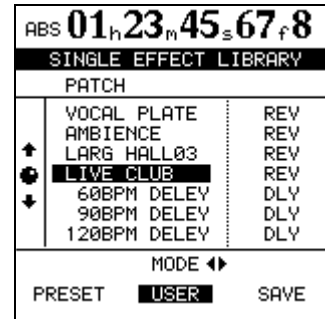
The send level to this effect is controlled by the channels' LOOP levels ("Effect send" on page 23) and the master LOOP level.

The return from this effect is sent to the stereo master bus, or to the bounce sub mix ("Making a bounce mix" on page 49).

Press the **SINGLE EFFECT** key. It lights, and the screen changes to the SINGLE EFFECT screen:



Press the **ENTER** key to enter the library screen to recall a preset effect or a user effect or to save the current parameters.



Use the "left" and "right" cursor keys to select the PRESET choices, the USER settings, or to SAVE the current parameters.

Scroll up and down through the list that appears, and press **ENTER** to confirm your choice.

Single effect library presets

The choices available from the PRESET library are based on the following basic types, as shown in the right column of the library screen:

REV A reverb effect with different types and characteristics. Adjust the ROOM TYPE, PRE DELAY, REV TIME, DIFFUSION and LEVEL.

DLY A flexible delay effect with different settings. Adjust the TYPE, PRE DELAY, FB DELAY (feedback delay), FEEDBACK and LEVEL.

CHO A warm-sounding chorus. Adjust the RATE, DEPTH, FB DELAY (feedback delay), FEEDBACK and LEVEL.

PIT Pitch shifting with delay. Adjust the PITCH (in semitones), the FINE pitch adjustment, the PRE DELAY, the FEEDBACK and the LEVEL.

FLG An expressive flanger. Adjust the RATE, DEPTH, FB DELAY (feedback delay), FEEDBACK and LEVEL.

PHA A phasing effect. Adjust the RATE, DEPTH, RESONANCE, STEP and LEVEL.

GRV Gated reverb. Adjust the TYPE, the gate THRESHOLD, GATE TIME, DENSITY (of the reverb) and LEVEL.

Once you have loaded a preset, you can adjust the parameters to suit your project.

Saving your own settings

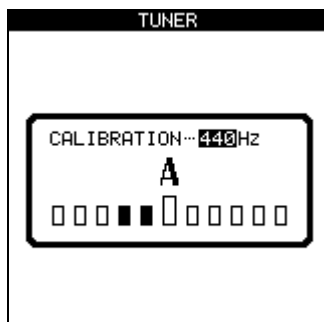
Like the mic and multi-effects, it is possible to save and name your own single effect settings, either overwriting an existing setting or adding a new setting.

In the library, no matter what name you give to an effect (for example HEAVY BASS), the three-letter abbreviation of the original preset that was edited to create the user setting is always shown (for example PHA).

Tuner

This is not really an effect, but uses one of the keys.

Press the shifted **MULTI** key to bring up the TUNER screen.



The tuner is used with the signal from input **H** on the front panel (reserved for guitars and basses). It cannot be used with any other input.

When a note is played, the 2488 tuner displays the note closest to that note, and the bars under the name show whether the actual note is more sharp (the bars to the right of the center are highlighted) or flat (the bars to the left of the center are highlighted) than the true value.

When the larger center bar alone is highlighted, the instrument is tuned to the displayed note.

You can set the reference A to a value other than 440Hz if necessary.

Exit the tuner by pressing the shifted **MULTI** key again.

First steps in recording (song management)

These functions are not completely recorder-related, but they do have play important roles in the recorder operation. These are all accessed through the SONG

menu from the main menu (press **MENU**, navigate to SONG, and press **ENTER**).

Creating a song

Before starting work on any project, you need to

- 1 Press the **MENU** key, and use the cursor keys to highlight the **SONG** item. Press **ENTER**.
- 2 At the **SONG** menu, use the cursor keys to highlight the **CREATE** option. Press **ENTER**.
- 3 Use the wheel to select between 16-bit and 24-bit resolution. As you might expect, 24-bit songs take up more space on disk than 16-bit songs of the same length, but the audio quality

is higher (there is more subtlety in the dynamic range).

- 4 In the **CREATE** screen, press the **SHIFT** key followed by the **TITLE** key to enter titling mode.
- 5 Use the wheel and the cursor keys to give the song a name up to 12 characters in length. Press **ENTER** when you're done. The display shows the home screen.

Loading a song

To load a previously-saved song from disk (the current song will be written to disk automatically when the song is loaded):

- 1 Press the **MENU** key and use the cursor keys to highlight the **SONG** item. Press **ENTER**.
- 2 At the **SONG** menu, use the cursor keys to highlight the **LOAD** option. Press **ENTER**.

- 3 Select the song to be loaded.

The current song is automatically saved, and the selected song is loaded from disk.

NOTE

This menu reads the songs stored on the currently-selected partition. If you are loading a song from another partition, you must select it first.

Saving a song

The function described here saves the song to disk.

- 1 Press the **MENU** key and use the cursor keys to highlight the **SONG** item. Press **ENTER**.
- 2 At the **SONG** menu, use the cursor keys to highlight the **SAVE** option. Press **ENTER**.

As the song is saved, appropriate messages are displayed. The current song will be reloaded after it has been saved, and you can resume work on it.

Reverting to the previously saved version of a song

If you have saved a song and you want to return to the version of the song at the time it was last saved:

- 1 Press the **MENU** key and use the cursor keys to highlight the **SONG** item. Press **ENTER**.
- 2 At the **SONG** menu, use the cursor keys to highlight the **REVERT** option. Press **ENTER**.

- 3 The 2488 asks if you are sure. Press **YES** if you want to throw away all changes since the last save operation, otherwise press **NO**.

NOTE

You will lose all recordings and edits made since the last save, and they will disappear from the undo list. This revert operation is not undoable. Be sure that the work you have done since the last save operation is really work that you do not want to keep before reverting to a previous version.

Erasing a song

To free up space on a disk partition, and delete a song or songs, you should perform the following operations:

- 1 Press the MENU key and use the cursor keys to highlight the SONG item. Press ENTER.**
- 2 At the SONG menu, use the cursor keys to highlight the ERASE option. Press ENTER.**
- 3 Select the song or songs to be erased using the wheel to highlight the songs and the INSERT key to place a check mark (✓) beside them.**

If you select a song for erasure by accident, use the DELETE key to deselect it.

- 4 Press YES to erase the selected song(s).**
- 5 The 2488 asks you if you are sure. Press YES if you really are sure that you want to erase these songs.**

NOTE

This operation cannot be undone. Erasing songs is a permanent operation. Always think carefully before you erase a song or songs.

This menu can erase only the songs stored on the currently-selected partition. If you want to erase a song or songs from another partition, you must select it first.

If you have selected all the songs on a partition for erasure, a new song will automatically be created after all the existing songs have been erased.

Copying songs

As well as copying songs, so that you can work on another version of them, you can also use this menu item as a tool to back up songs to another partition (you can also back up to CD-R, but this is a separate process).

- 1 Press the MENU key and use the cursor keys to highlight the SONG item. Press ENTER.**
- 2 At the SONG menu, use the cursor keys to highlight the COPY option. Press ENTER.**
- 3 Select the song or songs to be copied using the wheel to highlight the songs and the INSERT key to place a check mark (✓) beside them.**

If you select a song for copying by accident, use the DELETE key to deselect it.

- 4 When all the songs to be copied have been marked, press the ENTER key. A list of all the currently-available partitions is shown.**

- 5 Use the wheel to select the partition to which the selection will be copied, and press ENTER.**
- 6 The 2488 asks you if you are sure that you want to make the copy. Press YES to continue with the operation, and NO to cancel.**

NOTE

Copying a song may take some time. Be patient while the song is being copied, and take care not to power down the 2488 in the middle of a copy operation.

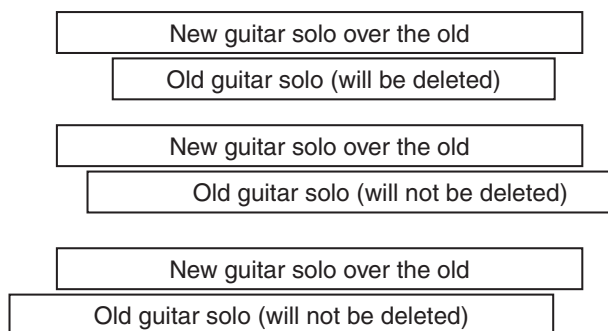
If you copy a song to the partition where it was originally stored, it will be copied with the same title as originally, so the list will contain two songs with the same title. If you want two copies of the same song on one partition, you should rename one of the copies immediately after the copy operation has been carried out.

When you make the selection for copying, only those songs in the currently-selected partition are listed. If you need to back up from many different partitions, you must select each partition in turn and then select the songs on the selected partition.

Deleting unused space from a song

As we explained earlier, a song does not consist of just the recorded audio, but also of the “playlist” and the recorded but unused parts of the song.

By “unused”, we mean parts of a song which have been completely overwritten by other parts. If the start or end or both of a new part extends beyond the start or end of a new part, it will not be deleted in this operation.



A virtual track which is not currently assigned as an active track does not count as “unused” here.

Protecting a song

When a song is protected, recording is not possible (the track **REC** keys are disabled), it cannot be edited using the track editing functions, and it cannot be erased, etc. using the **SONG** menu.

It is also impossible to set or edit location marks except the IN and OUT points for repeat operations, or to permanently reassign virtual tracks. Virtual tracks can be assigned for audition purposes, but not permanently saved.

In operations which show a list of available songs (for instance, loading a song), any protected songs have a small padlock icon beside the song title.

To free up this disk space, once you’ve made all your edit decisions (there’s no undo on this):

- 1 Press the **MENU** key and use the cursor keys to highlight the **SONG** item. Press **ENTER**.
- 2 At the **SONG** menu, use the cursor keys to highlight the **DELETE UNUSED** option. Press **ENTER**.
- 3 The **2488** asks you if you are sure. If you want to delete all the unused portions of the song, press **YES**. If you have second thoughts, press **NO**.

NOTE

Although there is no undo operation here, and you lose all the unused parts of the song permanently, you can back up the song to CD-R, before performing this “cleanup” operation. If you change your mind later on, you can restore this backed up version.

Remember that you cannot undo this operation.

Only the currently-loaded song can be protected or unprotected at any one time (though, of course, songs stored on the disk can be stored as protected or unprotected).

- 1 Press the **MENU** key and use the cursor keys to highlight the **SONG** item. Press **ENTER**.
- 2 At the **SONG** menu, use the cursor keys to highlight the **PROTECT** option. Press **ENTER**.
- 3 Use the wheel to set the protection **ON** or **OFF**, and press **ENTER** to confirm the setting.

Transport controls

Most of the 2488 controls work the same as a normal tape recorder, but there are a few important differences, as outlined below.

Setting the playback position

The 2488 provides you with a number of ways to set the position from which playback starts when you press the **PLAY** key. Some of these are described in the section on location operations (“Locating to the

points” on page 42) The ways of setting the playback point which involve the transport keys are described here.

Return to zero (RTZ)

This allows you to return instantly to the “zero point”, (expressed as the absolute time).

To return to zero (from stop, play or record):

- 1 Press and hold down **STOP**.
- 2 Press **REW**. Playback/recording stops and the playback position returns to the zero point.

Last Recording Position (LRP)

This is an extremely useful feature that allows you to return instantly to the point where recording last started. You can use this in any of the following situations (these are examples, you may think of others for yourself):

- after you interrupt a bad take halfway through the recording and want to return instantly to the same position to retake
- after a successful take, and you want to return to the point where recording started to check the take

- when you are recording a number of different tracks in turn, all to start from the same point
- after a take, you may want to set the point where the take started as a reference location mark

To return to the position where recording last started (from stop, play or record):

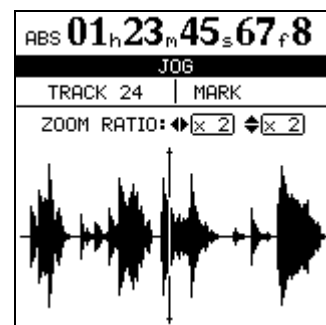
- 1 Press and hold down the **STOP** key
- 2 Press **F FWD**. Playback/recording stops, and the playback position returns to the point where recording last started.

Jog positioning

To position the playback point precisely, you can “jog” the playback position, using the wheel. As you move backwards and forwards through the recording, you can hear the recorded sound at slow speed, either backward or forward, depending on the direction you are turning the wheel.

- 1 Position the playback point to the rough position where you want the final point to be.
- 2 Press and hold the **STOP** key and press the **PLAY** key. The display shows a view of the

waveform of the currently selected track at the current playback position.



- 3 Press the **SELECT** key of the track that you want to view (pressing the **SELECT** key of any of the stereo tracks (13/14, 15/16, 17/18, 19/20, 21/22, 23/24) alternates between viewing the odd- and even-numbered tracks). The display changes to the waveform of that track.

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- 4 Use the ◀ and ▶ cursor keys to zoom out and in respectively horizontally.

In other words, pressing the ▶ key will increase the amount of space on the screen taken by a certain amount of time, and pressing the ◀ key will make the same amount of time take less space on the screen. The three zoom levels available are: x 1, x 2 (allowing approximately single-frame accuracy in adjustment), and x 32 (allowing approximately an accuracy of about 10 sub-frames). The resolution is shown below the time display.

- 5 Use the ▲ and ▼ cursor keys to adjust the vertical scale (the way that the volume of the sound is shown).

The zoom levels here are x 1, x 2, x 4, x 8, x 16 and x 32. Pressing the ▲ key increases the vertical scaling of the display, and pressing the ▼ key decreases the scale.

TIP

If you can't see any waveforms when you first enter this display, press the ▲ key to zoom the volume so that you can see the quiet passages.

- 6 Use the wheel to move the cursor. You can monitor the “jogged” sound of the selected track through the monitoring system.
- 7 To move past the edge of the screen and position the cursor roughly at the correct location, press and hold the F FWD or REW keys to play all the tracks forwards or backwards at normal speed. When you release the keys, the playback will stop. You can then use the wheel to position the cursor precisely.
- 8 Press STOP (or ENTER or EXIT) to return to the home screen, with the playback position now being the point which has just been set.

NOTE

Because only one track can be jogged at a time, only one track of a stereo pair can be heard at a time in this mode. If it is difficult to hear the track, you may want to monitor in mono (see “Monitoring” on page 27).

Fast forward and rewind

On a tape recorder, you can use the fast forward and fast rewind keys to spool through a tape. A disk recorder like the 2488 works in a somewhat different way.

The forward and rewind keys can be used in the following ways:

During playback When the 2488 is playing back material, if you press and hold either the F FWD or the REW key, the playback position moves forward or backward (depending on which key is being held down) at ten times the normal playback speed (as shown by the FF x10 or REW x10 in the home display).

At this time, playback is muted, and the PLAY indicator flashes.

When you release the F FWD or REW key, playback starts at the position which has been reached.

You cannot perform this operation while recording—only from playback.

From the stop position When playback is stopped, you can press and release the F FWD or REW keys to start “fast rewind” or “fast forward”. While this “winding” is taking place, playback is muted.

Holding down the keys for more than one second, or pressing the keys repeatedly, changes the “wind speed” from ten times (x10 shown on the home screen), to fifty times (x50) to one hundred times (x100) to one thousand times (x1000).

While the 2488 is “winding” in one direction, pressing the opposite key (for example, F FWD while rewinding) will immediately start location at 10x in the new direction.

Recording

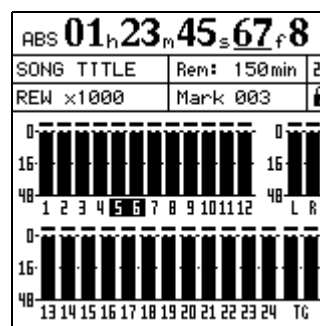
To start recording from the stopped state:

- 1 At least one track should be armed (press the REC key(s) of the track(s) on which recording is to take place). The REC keys(s) start to flash).
- 2 Press and hold down the RECORD key.
- 3 Press the PLAY key. Both the PLAY (green) and RECORD (red) indicators light, and the flashing REC indicator(s) light steadily.
- 4 Stop recording by pressing the STOP key.

NOTE

When a track is “armed” for recording (i.e. its **REC** indicator is lit or flashing), the corresponding track indi-

cator number in the bottom of the home screen is reversed to show this.



In the screen above, tracks 5 and 6 are armed.

Recording (ii)

To drop into record mode while playing back:

- 1 Start playing back a song by pressing the **PLAY** key. The **PLAY** indicator will light.
- 2 Arm one or more tracks by pressing their **REC** keys. Their indicators start to flash.

- 3 Press the **RECORD** key. The **RECORD** indicator will light, and the **REC** indicators of the armed tracks will also light.

NOTE

At least one track must be armed before you start to record. It is not possible to enter a “record ready” mode and press the **REC** keys of tracks to start recording.

Hands-free recording

You can also use a suitable footswitch (for example the TASCAM RC-30P) connected to the **PUNCH** jack on the front, to drop into record mode. When a track is armed, and playback is taking place, pressing

the footswitch will change from playback mode to record mode.

When recording, pressing the footswitch will drop out of record mode into playback mode.

Dropping out of record mode

When record mode has been entered in any of the ways described above, it is possible to drop out of the recording mode simply by pressing the **PLAY** key. The **RECORD** indicator goes out.

Of course, you can always press the **STOP** key to stop recording.

TIP

You can “undo” recordings, (unlike on a tape recorder). Even if you accidentally record over a perfect performance, the undo function can still retrieve the original. See “**UNDO and REDO**” on page 54 for details.

Rehearsing recording

Sometimes, even with the undo facilities and the virtual tracks of the 2488, it may be useful for you to rehearse a take without actually committing anything to disk. This is probably most useful in auto punch operations (see “Auto punch operations” on page 46) but can be useful in other situations as well.

In a rehearsal, the monitoring and other operations and recording functions are the same as when record-

ing, but the input signal, although passed through to the disk track, does not actually go to the disk.

To use the rehearsal mode, simply press the **RHSL** key so that the indicator is lit.

When actually “recording” in rehearsal mode, the **RECORD** indicator flashes, rather than lighting steadily, to show that the rehearsal is taking place.

IN/OUT/TO points

The IN and OUT points are used for repeat playback (“Repeat” on page 46), for punch operations (“Auto punch operations” on page 46) and, often with the TO

point, for track editing (“About track editing” on page 49).

Setting the IN, OUT and TO points

To set these points:

- 1 **Locate to the position where the IN, OUT or TO point is to be set.**
- 2 **Press the shifted IN, OUT or TO key.**

When the IN, OUT or TO key has been pressed, Set IN ! or Set OUT ! appears on the home display.

NOTE

You cannot set the IN and OUT points while the repeat mode is active (the REPEAT indicator is lit).

Locating to the points

Simply press the IN, OUT or TO key to locate to the appropriate point. You cannot do this in repeat mode or while recording.

Editing the IN, OUT and TO points

When the points have been set, it may be necessary to “trim” them, or to slip them backwards or forwards a little.

NOTE

You cannot edit the IN and OUT points while the repeat mode is active (the REPEAT indicator is lit).

To edit the points:

- 1 **Press the IN, OUT or TO key to locate to the appropriate point.**
- 2 **Press and hold the STOP key and press the PLAY key. The JOG indicator lights. The display shows a view of the waveform of the currently selected track at the IN or OUT point (depending on which was pressed).**

- 3 **Press the SELECT key of the track that you want to view. The display changes to the waveform of that track.**
- 4 **Follow the instructions in “Jog positioning” on page 39 for zooming and moving the current jog position.**
- 5 **When you have set the point where you want the point to be, press the shifted key to set the respective point. The display returns to the home screen.**

Press EXIT to return to the home screen without setting the points (remember that ENTER does not set these points).

Markers

As well as the IN and OUT points, which are used in punch and editing, there are also 999 location marks available for each song.

These can be inserted, deleted, named and edited freely, and they are stored with the song, allowing

you to return at any time to a part of the song which you have marked as needing attention.

There is also an easy method of directly locating to a position without using the location marks, as described here:

Direct location

In this method, you use the cursor keys and the wheel to locate to a specified position.

There are three modes in which the time can be shown on the home screen: ABS (the absolute time), MTC (MIDI Time Code) and BAR (which represents

the time in bars and beats, according to a tempo map from the following sources: the 2488’s internal map, that of a Standard MIDI File selected for playback, or else from the pattern tempo map (see “MIDI” on page 76 for details of these).

In the first two of these modes, you can locate to sub-frame accuracy. There are ten sub-frames in a frame, and the length of a frame depends on the frame rate set up in the sync operations, but is between 1/30 and 1/24 of a second. In the last mode, you can locate to beat accuracy.

Direct location (i) For the first two modes (ABS and MTC), the way to locate directly is as follows:

- 1 Make sure the transport is stopped. You cannot perform this direct location when playing back or recording.
- 2 If the “home” display is not shown, press the HOME key. There is an “underline” cursor at the top of the screen.

If the top left of the screen does not show ABS or MTC (that is, it shows BAR), move the cursor to under BAR, and turn the wheel counterclockwise until ABS or MTC is showing.

- 3 Use the left and right cursor keys to move the cursor to any of the following fields: hours (h), minutes (m), seconds (s), frames (s) or 10 sub-frames (no indication on the display, though the value is shown).

ABS 00^h 00^m 00^s 00^f 0
 Hours Minutes Seconds 10s of sub-frames

- 4 Use the wheel to increase or decrease the number over the cursor (in the illustration here, the cursor is under the “hours” value).

If you increase a value past the maximum (for example, if you try to increase the “seconds” value over 59), the number will “wrap round”; that is, the “minutes” value will increase by one, and the “seconds” value will be set to 0.

- 5 When you change a value, the values on the top line will start to blink and will continue to blink for a few seconds.
- 6 Press ENTER while the values are blinking to set the value, or PLAY to start immediate playback at that value. Also, if you do not press any keys or turn the wheel for a few seconds, the values stop blinking, and the new time value that has been set becomes the current playback position.

If you press the EXIT key (or the STOP key) while the values are blinking, the time value

will be reset to the previous value before you started to edit it.

Direct location (ii) As well as the ABS and MTC timings just described, it is possible to locate to a “musical” time, when the display shows bars (measures) and beats, and the 2488 is synchronized to a tempo map.

- 1 Make sure the transport is stopped. You cannot perform this direct location when playing back or recording.
- 2 If the “home” display is not shown, press the HOME key.

BAR 012 - 03 ♩=120

- 3 There is an “underline” cursor at the top of the screen.

If the top left of the screen does not show BAR (that is, it shows MTC or ABS), move the cursor under the left field, and turn the wheel clockwise until BAR is shown.

- 4 Use the cursor keys to move the cursor to either of the following: bars (3 digits), or beats (2 digits).

BAR 012 - 03 ♩=120
 Bars (measures) Beats

The tempo value cannot be altered here—it is set by the tempo map.

- 5 Use the wheel to increase or decrease the number over the cursor (in the illustration, the cursor is under the “bars” value).

If you increase the “beats” value past the maximum number of beats on a bar at that point in the tempo map, the number will “wrap round”; that is, the “bars” value will increase by one, and the “beats” value will be set to 1.

- 6 When you change a value, the values on the top line will start to blink and will continue to blink for a few seconds.
- 7 Press ENTER while the values are blinking to set the value, or PLAY to start immediate playback at that value. Also, if you do not press any keys or turn the wheel for a few seconds, the values stop blinking, and the new time value that has been set becomes the current playback position.

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If you press the **EXIT** key (or the **STOP** key) while the values are blinking, the time value

will be reset to the previous value before you started to edit it.

Location marks

As mentioned earlier, the 2488 allows you to set up to 999 location marks in each song. These location marks are stored in slots which may either be empty, or filled with a location point value.

As each mark is entered, its slot is filled (from 1 through 999). If a mark is deleted, the slot it occupied becomes available for another mark to be entered,

Location marks are handled in the following way:

Entering location marks Location marks can be entered when playing back or recording, in jog mode, or when the transport is stopped. They cannot

be entered when fast forward or rewind is taking place.

There are two ways of entering location marks:

1 Press the shifted LOCATE key.

or

1 Press the INSERT key.

2 When a mark has been entered, the location value is entered into the next available slot, and the number of this slot (now the number of the mark) is shown on the screen on the right, below the time line.

Active location marks

When you have entered location marks, as playback progresses, and the playback point passes the points at which the marks are located, the marks' titles are displayed on the screen. The location mark which is shown on screen is referred to as the *active mark*.

This active mark can be accessed easily for titling, deletion and editing, as explained below.

Giving a title to the active location mark

You can give a title to the active location mark while playing back or recording, or while the playback is stopped.

1 When the active mark's current title is displayed (this will be Mark xxx when the mark is first set), press the shifted TITLE key.

The pop-up screen appears on the display, and you can edit the title as described in "Titling" on page 12.

2 When you press ENTER after editing the name, the new name replaces the old mark name.

TIP

You can use the words here to enter location mark titles quickly.

Deleting the active location mark You can delete the active location mark while playback is stopped, but you cannot delete it while playing back or recording (a popup message appears briefly if you try and you must press **EXIT** to dismiss the message).

1 To delete the active mark, press the DELETE key. You do not have to confirm the deletion, but the words Clear mark! appear briefly on the display.

2 When the active mark has been deleted, the mark immediately before the active mark (if there is one) becomes the active mark, and its title is shown on screen.

NOTE

You cannot undo a mark deletion.

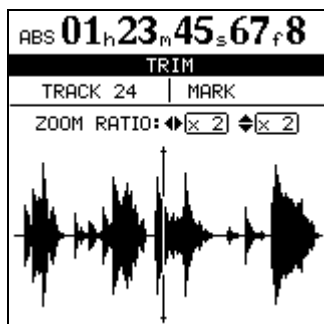
Editing the active mark

This process is sometimes referred to as trimming. This is a similar process to the jog positioning of the playback point (see "Jog positioning" on page 39), except that in this operation, the final position is stored as the position of the active mark.

You can edit the active mark when playback is stopped. You cannot edit the active mark when recording or playing back.

1 Make sure that the mark you want to edit is shown on the home display and that playback is stopped.

- Press the **TRIM** key. The display shows **TRIM** and a view of the waveform of the currently selected track at the active mark.



- Press the **SELECT** key of the track that you want to view. The display changes to the waveform of that track.

Although the location mark applies to all tracks, if you have a track selected with nothing or little recorded on it at that point, it will be impossible to see or hear anything using this function.

- Use the **◀** and **▶** keys to zoom out and in respectively horizontally. This is, pressing the **▶** key will increase the amount of space on the screen taken by a certain amount of time, and pressing the **◀** key will make the same amount of time take less space on the screen. The three zoom levels available are: x 1, x 2 at about single-frame accuracy), and x 32 at about 10-sub-frame accuracy (shown below the time display).

- Use the **▲** and **▼** keys to adjust the vertical scale (the way that the volume of the sound is shown). The zoom levels here are x 1, x 2, x 4, x 8, x 16 and x 32. Pressing the **▲** key increases the vertical scaling of the display, and pressing the **▼** key decreases the scale.

NOTE

If you can't see any waveforms when you first enter this display, press the **▲** key to zoom the volume so that you can see the quiet passages.

- Use the wheel to move the cursor. You can monitor the jogged sound of the selected track through the monitoring system.

NOTE

You cannot move the mark to a position before the previous mark or after the next mark.

- To move past the edge of the screen, press and hold the **F FWD** and **REW** keys to play the tracks forwards or backwards at normal speed for a rough position. When you release the keys, the playback will stop.
- Press **ENTER** to accept the new position as the location mark value (the playback position is now the new position), and return to the home screen.
- Press **EXIT** to return to the home screen with the playback position being the point which has just been set, but the location mark value is unchanged.

Using the location mark list

Every time a location mark is stored, it is entered into a list, and every time a mark is deleted, it is removed from the list.

You can use this list to select a mark for location, or for giving a title to a mark. You cannot edit the time value of a mark, or delete a mark using the list.

To see the list, press the **LOCATE** key:

LOCATE LIST	
TITLE	TIME
MARK 01	00:00:01:10
MARK 02	00:00:40:38
MARK 03	00:53:03:09

NOTE

Even when the time display on the home screen is shown in bars and beats, or the **MTC** time display is selected, the marks' time values are always shown using the absolute time values.

Items in the list are always sorted in time order, not the order of the location mark names or numbers.

Locating using the list To locate using the location mark list:

- Press the **LOCATE** key.
- Select the location mark using the wheel (or the cursor keys).
- Press **ENTER**. The playback point jumps to the selected location mark.

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Using the IN OUT and TO marks Jump to these marks simply by pressing the **IN**, **OUT** or **TO** key, as appropriate.

Titling using the list

- 1 Press the **LOCATE** key.
- 2 Select the location mark to be renamed, using the wheel (or the cursor keys).
- 3 Press the shifted **TITLE** key.

- 4 Give a title to the mark, using the procedure described in “Titling” on page 12.
- 5 When you press **ENTER** to confirm the name, the screen returns to the list.

Two marks can have the same title (but it is not a very sensible idea to give the same title to more than one mark), but they cannot have the same time value.

It is not possible to rename the **IN**, **OUT** or **TO** marks—these have special functions, and cannot be renamed.

Repeat

You can repeat playback between the **IN** and **OUT** points by pressing and releasing the **REPEAT** key so that the indicator lights.

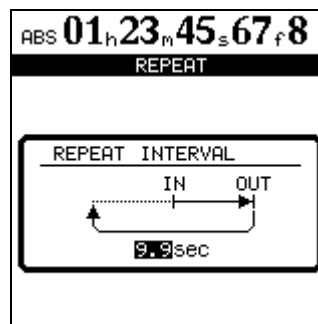
Repeat recording is handled using the auto punch facility (see “Auto punch operations” on page 46)

Setting the repeat interval

On a tape recorder repeating a section, there is a delay while the tape rewinds. The “instant rewind” of a disk recorder can give you no time to prepare your fingers, take a breath, etc. ready for the next take.

The 2488 allows you to set a time between reaching the **OUT** point and starting to replay from the **IN** point again: from 0 seconds to 9.9 seconds.

- 1 Press and hold the **REPEAT** key so that a popup screen appears.



- 2 Use the wheel to set the interval, and **ENTER** to confirm the value.

Auto punch operations

Punch operations allow you to start and stop recording at predefined points, and these can be automated, as described here.

When auto punch recording begins, playback starts at pre-roll point some time before recording is due to start, the punch-in point is reached, and recording starts. When the punch-out point is reached, recording stops, and playback continues until the post-roll point.

In addition, when you perform an auto punch recording, during the pre-roll period, you hear what has previously been recorded, together with the signal source; during the punch recording itself, you hear the signal source alone; and for the post-roll period,

you hear the previously recorded material and the signal source together.

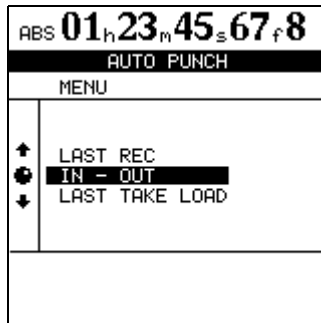
The 2488 allows all of this to happen in rehearsal mode as well as in an actual recording mode. The rehearsal mode allows you to simulate the punch recording, both to practise the actual take, and also to check punch points before recording actually begins.

You can also use the repeat function together with the punch operations, allowing you to make repeated rehearsals of a punch section, as well as repeated takes of the same section (multi-takes) or when you're recording, repeated recordings can be used as multi-takes. When you have recorded a section many times in this way, you can then choose the best possible take to insert into the track.

Setting the punch points

The 2488 provides three different punch settings.

- 1 With at least one track armed (the **REC** indicator flashing), and playback stopped, press the **AUTO PUNCH** key:



- 2 Select one of the three options, explained below, using the wheel or cursor keys to move the cursor, and the **ENTER** key to confirm the selection (**EXIT** exits this screen without making any settings).
- 3 When the selection has been made, the **AUTO PUNCH** indicator lights, and the home display shows **AUTO**.

NOTE

*It is not strictly necessary to have a track armed when you first press the **AUTO PUNCH** key, but this is probably the most logical way to work.*

LAST REC This sets the punch-in point to be the last point at which recording started (the same as the LRP described in “Last Recording Position (LRP)” on page 39. The punch-out point is set to be the point at which recording stopped (either when recording dropped into play mode, or when the transport was stopped). Note that this last recording does not have to be a punch recording.

IN -> OUT This uses the IN and OUT points as the punch-in and the punch-out points. The first of these points will be used as the punch-in point, and the second as the punch-out point, even if the OUT point is before the IN point.

LAST TAKE LOAD This option is only available if a punch recording has taken place, and no recording, no track editing or undo/redo operations or virtual track assignments have been done since then. It allows you to select the takes from this punch session, in the same way as described later in this section.

Checking the punch points

When the punch points have been set, you can press the **PLAY** key. The home display shows **CHECK**, and the playback starts at the pre-roll point. It continues to the post-roll point.

If the punch positions are not what you want, you can press the **AUTO PUNCH** key to turn off the punch mode, and reset the punch points as described above.

You can also adjust the pre-roll and post-roll time using the menu system (see “Recorder” on page 85), but you must exit the auto punch mode first by pressing the **AUTO PUNCH** key so that the indicator goes out.

If you the punch points and pre and post-roll times are what you want, you should proceed to the rehearsal stage, as described below.

Rehearsing the punch

Although you don’t have to use the rehearsal feature (see “Rehearsing recording” on page 41) with the auto punch, it’s probably a good idea to rehearse most punch recordings a few times before making a take.

- 1 With the **AUTO PUNCH** indicator lit, and a track armed, press the **RHSL** (rehearsal) key. The indicator lights.
- 2 Press and hold down the **RECORD** key and press the **PLAY** key.
 - The display shows **TAKE**.

- **Playback starts at the pre-roll point. Both the input source and previously-recorded material can be monitored.**
- **When playback reaches the punch-in point, the monitored signal on the armed track(s) is muted. The **RECORD** indicator flashes (to show that it is a rehearsal).**
- **When playback reaches the punch-out point, the recorded material is added to the monitored signal. The **RECORD** indicator goes out.**

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- Playback continues to the punch-out point and stops.
- Playback continues to the post-roll point and stops.

If you press the **REPEAT** key before the rehearsal, so that the indicator is lit (as well as the **AUTO PUNCH**

and **RHSL** indicators), the rehearsal process will repeat until you press the **STOP** key. There is about a second's interval between the post-roll and the restarting of the rehearsal at the pre-roll point. You cannot change this interval.

Recording the punch

When you are happy with the rehearsed punch material, you record the punch in the following way:

- 1 Press the **RHSL** key so that the indicator goes out.
- 2 Press and hold the **RECORD** key and press the **PLAY** key.
 - The display shows **TAKE**.
 - Playback starts at the pre-roll point. Both the input source and previously-recorded material can be monitored.
 - When playback reaches the punch-in point, the monitored signal on the armed track(s) is muted. The **RECORD** indicator lights steadily.

- When playback reaches the punch-out point, the recorded material is added to the monitored signal. The **RECORD** indicator goes out.
- Playback continues to the punch-out point and stops.

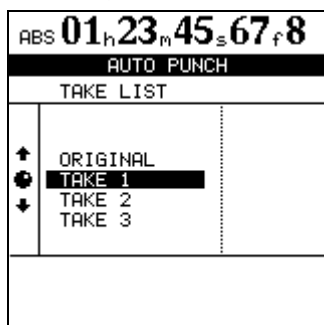
If the **REPEAT** indicator is lit, the punch recording will continue to repeat (up to 99 times) until you press **STOP**, allowing you to select from a list of “multi-takes” (see “Checking the take” on page 48).

The time between repeat takes is about one second. You cannot change this time.

Checking the take

After a take or series of takes has completed, you can make an instant check of the take by following the procedure here.

- When the take is complete, a screen similar to the following appears:



- The screen above shows three takes and the original track.
- Use the wheel to highlight a take from the list, including the original track before the punch was started.
- Press **PLAY** to check the highlighted take by playing it back (starting at the pre-roll point, and continuing to the post-roll point).
- If you are happy with the take, you can move to the next stage below (“After finishing the punch” on page 48).
- If you want to record another take, press and hold **RECORD**, and press **PLAY**.

After finishing the punch

When you have finished the punch recording:

- 1 Use the wheel to highlight the take which you feel is the best (or if none of them was any good, select **ORIGINAL**, which is the unchanged version).
- 2 Press to select the selected take (or the original version).

A pop-up display asks you if you are sure that you want to use the take.

- 3 Press **ENTER** if you are sure, but if you change your mind to select another take, press **EXIT**.

NOTE

You must select one of the takes or the original to exit auto punch mode.

The recording between the punch-in and punch-out points is now replaced by the selection. The AUTO PUNCH indicator goes out.

If you change your mind

Like recording, a punch operation is undoable. It is shown in the list of operations as an AUTO PUNCH operation.

In addition, as we mentioned earlier, the third choice when you press the **AUTO PUNCH** key, LAST TAKE LOAD, allows you to select any of the multi-takes from the last punch session.

However, if you have recorded anything, performed an undo or redo operation, or any track editing opera-

tions, (whether punch recording or not) since the last punch session, the list of multi-takes is no longer available. The list is available if a song has been saved, closed and reopened, however, if none of the above operations have been carried out.

NOTE

Even if you undo the recording that has overwritten the list of multi-takes, the multi-take list will not be available to you after the undo.

Bouncing tracks

Like many multitrack recorders, the 2488 allows you to “bounce” a collection of recorded tracks to a smaller number of tracks. This allows you to record more than 24 tracks (but once bounced onto a track or pair of tracks, the original tracks cannot be separated out again).

In the case of the 2488, you can bounce up to 23 tracks into one track or 22 tracks into two tracks. In this case, a stereo track counts as two tracks.

While you are performing a bounce operation, you cannot use the sub mix facility (“Sub mix” on page 29).

Making a bounce mix

- 1 Press the shifted **BOUNCE** key (located above the **STEREO** fader).

The words **BOUNCE MODE** are displayed on the home screen while bounce is active.

- 2 Select the destination. Press the **REC** keys for a single track (mono bounce), or two tracks (or a stereo track) for a stereo bounce.

- 3 Adjust the source tracks’ levels, EQ and pan positions, etc. for the bounce mix.

TIP

When you monitor the bounce, you are monitoring the bounce destination. If any EQ etc. is applied to the destination track(s), this is added to the signal you are monitoring. You may therefore want to make sure that the EQ is turned off on the destination tracks.

- 4 Make the recording from the start of where you want to do the bounce in the normal way. You can undo the recording if you find that your bounce mix is not perfect.
- 5 When you’ve finished bouncing tracks, restore normal recording mode by pressing **SHIFT** and **BOUNCE** again.

About track editing

One of the most useful features of a disk-based recorder such as the 2488 is the ability to edit material easily. When working with a stereo tape recorder in the past, the usual editing method involved a white pencil, a razor blade and sticky splicing tape. This was not an easy process, and was very difficult to undo if there were any mistakes.

The 2488 allows you to edit songs, copying and moving material from one part of a song to another. This editing is known as non-destructive editing, meaning that the operation does not actually destroy data, and you can undo mistaken editing operations easily.

If you have ever used a word-processor on a computer, you will probably find most of the 2488’s editing operations pretty simple. If you have never used a

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computer, the 2488's editing operations are nothing to be scared about—just read through this section to see how it all works.

IN, OUT and TO

We have previously seen how the IN, OUT and TO points can be used for punching and for location. They are also used in these track editing operations.

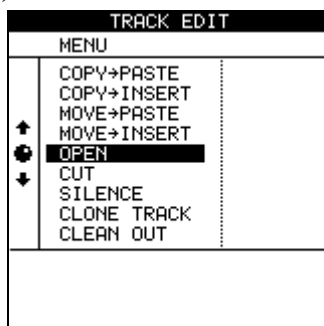
The IN point marks the start of the part of the track which is selected when editing a part of a track (rather than a whole track).

The OUT point marks the end of the part of the track which is selected when editing part of a track.

The TO point marks the final destination of a copy or a move operation.

Entering the edit mode

- 1 Make sure that the 2488 is stopped (not playing back or recording).
- 2 Press the EDIT TRK key (below the monitor controls).



- 3 Use the wheel to highlight the track editing function you will be using and press the ENTER key.
- 4 Select the appropriate values, as described below.
- 5 Press YES to perform the operation, or NO to exit without performing the operation.

Track editing functions

The track editing functions available on the 2488 are:

- COPY->PASTE
- COPY->INSERT
- MOVE->PASTE
- MOVE->INSERT
- OPEN
- CUT
- SILENCE
- CLONE TRACK
- CLEAN OUT

See the sections below for details of how to use these functions.

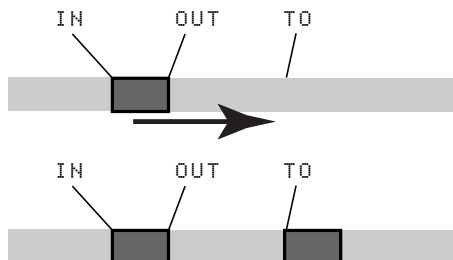
NOTE

You can undo any of these operations (see "UNDO and REDO" on page 54). Even if you delete all the material on every track using these functions, you can still get it back with only a few key-presses.

Although you cannot use virtual tracks as the source for copy and move operations, you can assign a virtual track to a track temporarily to (say) copy part of a virtual track to an already-assigned track and then reassign the original.

COPY -> PASTE

This function takes the section of a track or tracks marked by the IN and OUT points, copies it, and places it at the TO point on the chosen track or tracks.



The original source is left unchanged.

The copy operation overwrites anything which is already recorded at the destination. The destination is the same length as it was before the operation.

You can copy the section more than once in one operation.

You can change the following values:

Src.Trk This sets the source track or tracks from which the section is copied. Choose 1 through 24 to

select an individual track. Choose 1/2, 3/4, 5/6 etc. to select a pair of tracks. Choose 1-24 to select all tracks.

Dst. Trk This sets the destination track or tracks to which the selected section is pasted. What you can select here depends on what you have selected for the source track. If you have selected a single track, you can select tracks 1 through 24 here. If you have selected a pair of tracks (for instance, 1/2), you can only select track pairs here. If you have selected all tracks (1-24), then 1-24 is the only option available to you here.

Times This is the number of times that the selected section is pasted into the destination track or tracks. You can set this value from 1 to 99.

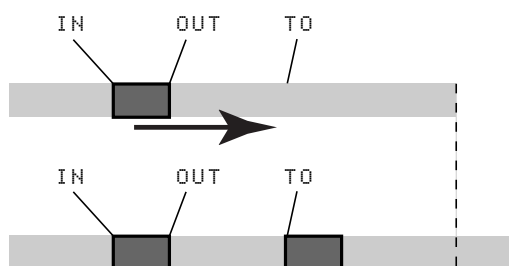
Press **YES** to perform the operation or **NO** to leave this screen.

NOTE

*You can also use the **SHIFT + TRIM** key combination to enter this function easily.*

COPY -> INSERT

This function takes the section of a track or tracks marked by the IN and OUT points, copies it, and places it on the chosen track or tracks, inserting it as new material, starting at the TO point.



The original source is left unchanged.

The insert operation adds the selected section as new material to the destination. Nothing is overwritten on the destination, as any existing material following the TO point is moved to the end of the newly-inserted section. The destination is longer than it was before the operation.

You can copy the section more than once in one operation.

You can change the following values:

Src. Trk This sets the source track or tracks from which the section is copied. Choose 1 through 24 to select an individual track. Choose 1/2, 3/4, 5/6 etc. to select a pair of tracks. Choose 1-24 to select all tracks.

Dst. Trk This sets the destination track or tracks into which the selected section is inserted. What you can select here depends on what you have selected for the source track. If you have selected a single track, you can select tracks 1 through 24 here. If you have selected a pair of tracks (for instance, 1/2), you can only select track pairs here. If you have selected all tracks (1-24), then 1-24 is the only option available to you here.

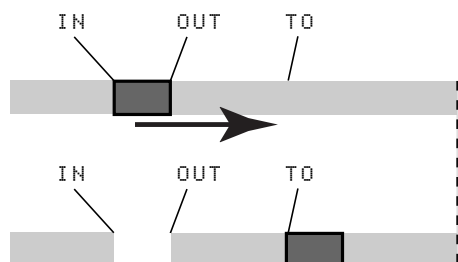
Times This is the number of times that the selected section is inserted (end-to-end) in the destination track or tracks. You can set this value from 1 to 99.

Press **YES** to perform the operation or **NO** to leave this screen.

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MOVE -> PASTE

This function takes the section of a track or tracks marked by the IN and OUT points, and moves it to the chosen track or tracks, starting at the TO point.



After the operation, the selected section of the source between the IN and OUT points is replaced by silence.

This operation overwrites anything which is already recorded at the destination. The destination is therefore the same length as it was before the operation.

You can change the following values:

Src. Trk This sets the source track or tracks from which the section is taken. Choose 1 through 24 to select an individual track. Choose 1/2, 3/4, 5/6, etc. to select a pair of tracks. Choose 1-24 to select all tracks.

Dst. Trk This sets the destination track or tracks to which the selected section is moved. What you can select here depends on what you have selected for the source track. If you have selected a single track, you can select tracks 1 through 24 here. If you have selected a pair of tracks (for instance, 1/2), you can only select track pairs here. If you have selected all tracks (1-24), then 1-24 is the only option available to you here.

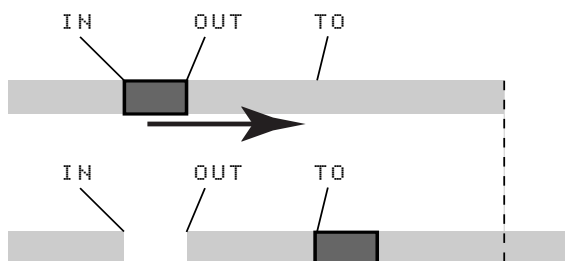
Press **YES** to perform the operation or **NO** to leave this screen.

NOTE

You can also use the **SHIFT + INSERT** key combination to enter this function easily.

MOVE -> INSERT

This function takes the section of a track or tracks marked by the IN and OUT points, and moves it to the chosen track or tracks, inserting it as new material, starting at the TO point.



After the operation, the selected section of the source between the IN and OUT points is replaced by silence.

The insert operation adds the selected section as new material to the destination. Nothing is overwritten on the destination, as any material following the TO point is moved to the end of the newly-inserted

section. The destination is therefore longer than it was before the operation.

You can change the following values:

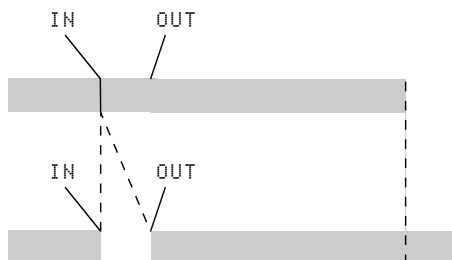
Src. Trk This sets the source track or tracks from which the section is taken. Choose 1 through 24 to select an individual track. Choose 1/2, 3/4, 5/6, etc. to select a pair of tracks. Choose 1-24 to select all tracks.

Dst. Trk This sets the destination track or tracks into which the selected section is inserted. What you can select here depends on what you have selected for the source track. If you have selected a single track, you can select tracks 1 through 24 here. If you have selected a pair of tracks (for instance, 1/2), you can only select track pairs here. If you have selected all tracks (1-24), then this is the only option available to you here.

Press **YES** to perform the operation or **NO** to leave this screen.

OPEN

This function “opens up” a silent gap between the IN and OUT points on the chosen track or tracks.



The source and destination are the same, and after the operation, the track is split at the IN point, with the material which followed the IN point now moved to follow the OUT point. The result is therefore longer than the original.

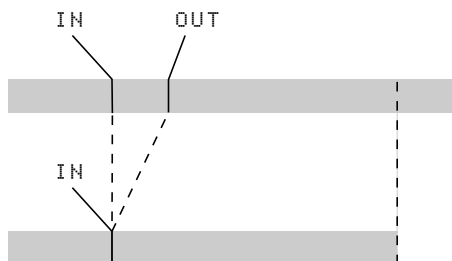
There is only one value that you can change:

Src. Trk Select an individual track (1 through 24), a pair of tracks (1/2, 3/4, 5/6, etc.), all of the tracks (1-24) or all tracks, including the virtual tracks (all).

Press **YES** to perform the operation or **NO** to leave this screen.

CUT

This function deletes the material between the IN and OUT points on the chosen track or tracks and “closes up” the gap.



point now moved to follow the IN point. Material which was between the IN and OUT points is deleted. The result is therefore shorter than the original.

There is only one value that you can change:

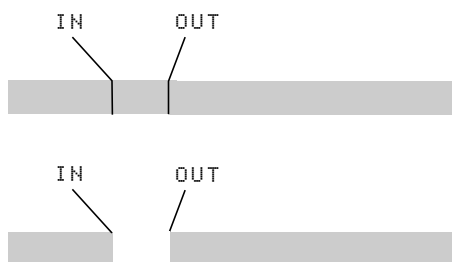
Src. Trk Select an individual track (1 through 24), a pair of tracks (1/2, 3/4, 5/6, etc.), all of the “real” tracks (1-24) or all tracks, including the virtual tracks (ALL).

Press **YES** to perform the operation or **NO** to leave this screen.

The source and destination are the same, and after the operation, the material which followed the OUT

SILENCE

This function is equivalent to recording silence between the IN and OUT points on the chosen track or tracks.



No material is added or deleted, and the length of the result is therefore the same as that of the original.

There is only one value that you can change:

Src. Trk Select an individual track (1 through 8), a pair of tracks (1/2, 3/4, 5/6, etc.), or all the tracks (1-24).

Press **YES** to perform the operation or **NO** to leave this screen.

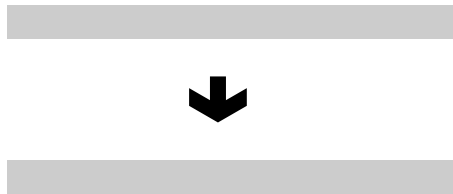
NOTE

You can also use the **SHIFT + DELETE** key combination to enter this function easily.

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CLONE TRACK

This copies a track or pair of tracks to another track or pair of tracks. The IN and OUT points do not have any meaning here.



There are two values that you can change:

Src. Trk Select an individual track (1 through 24), or a pair of tracks (1/2, 3/4, 5/6, etc.) or the MASTER stereo track.

Dst. Trk This sets the destination track or tracks to which the source track is cloned. What you can select here depends on what you have selected for the source track. If you have selected a single track, you can select tracks 1 through 24 here. If you have selected a pair of tracks (for instance, 1/2), you can only select track pairs here.

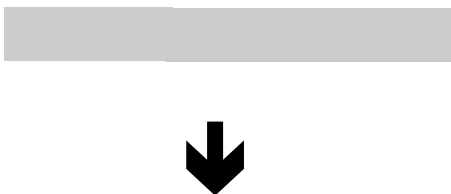
Press **YES** to perform the operation or **NO** to leave this screen.

If you try to select the same track as a destination that you have selected as the source, when you press the **YES** key, a message will appear: SAME TRACK.

Redo the operation with a different set of tracks.

CLEAN OUT

This deletes all the material in a track or tracks. The IN and OUT points do not have any meaning here.



There is only one value that you can change:

Src. Trk Select an individual track (1 through 24), a pair of tracks (1/2, 3/4, 5/6, etc.), or all the tracks (1-24).

Press **YES** to perform the operation or **NO** to leave this screen.

If you need to delete the contents of a virtual track that is not currently assigned to a track, you must assign it to a track and then perform this operation.

UNDO and REDO

Unlike a tape recorder, but like most word-processors, you can undo your mistakes (the 2488 remembers up to the last 999 operations you perform in each song). What is more, you can undo your undo operations (redo).

The operations that you can undo are:

- The different track editing functions described in this section
- Recording operations

- Auto punch operations
- Mastering operations

In addition, all these operations are stored as part of the song on the disk; even when you turn the machine off, the history of all the previous operations is stored ready for next time.

What this means is that you can finish your work for the day, come back in the morning with fresh ears, and decide that maybe you didn't want that overdub after all. With the 2488, this is no problem.

Undoing and redoing actions

- 1 Press the **UNDO/REDO** key and a list of the operations that you have done since the start of the song is shown on screen:

UNDO/REDO		
HISTORY	No.	
RCORDING	8	
AUTO PUNCH	7	
→AUTO PUNCH	6	
AUTO PUNCH	5	
● COPY→PASTE	4	
RCORDING	3	
RCORDING	2	
RCORDING	1	
START UP	0	

The first action (START UP) at the bottom of the display is numbered 0, and all the actions after this (above this) are then numbered in order.

- 2 Use the wheel to scroll through the list until the cursor highlights the action to where you want to undo.

- 3 Press **ENTER**, to return to the point in your work just before you made your mistake.

You can also redo an action that you have undone in exactly the same way.

TIP

As well as using the wheel to scroll through the list, you can also use the **UNDO/REDO** key to position the cursor automatically at the event before or after the current event.

If you press the **UNDO** key (unshifted), the cursor moves to the event immediately before the current event. Press **ENTER** to undo the last event.

If you press **REDO** (**SHIFT + UNDO**), the cursor moves to the event immediately following the current event (i.e. the last action that has been undone). Press the **ENTER** key to redo this action.

NOTE

Performing an action after the redo clears the list of redoable actions (i.e. those actions which have been undone).

An undo/redo example

Here's an extremely simplified example (in fact, it's extremely unlikely that you'd work this way, but it shows the principles involved):

>RECORDING	12	This is yet another retake of the lead vocal
RECORDING	11	Another attempt at the whole of the lead vocal
AUTO PUNCH	10	A try to correct a bad note in the lead vocal
RECORDING	9	First try at the lead vocal
AUTO PUNCH	8	Repairing the bad guitar bridge
RECORDING	7	Recording the guitar solo
RECORDING	6	Piano (alternative part)
RECORDING	5	Piano
RECORDING	4	Guide vocals
RECORDING	3	Bass line
COPY→PASTE	2	Looping the drum part
RECORDING	1	Basic drum loop
START UP	0	Beginning of song

This is the history of a recording session so far. Suppose that you decide that items 11 and 12 in the list are not needed (in other words, the first take (9) with its correction (10) have been overwritten by 11 and 12, but you feel that the original take (9) with its correction (10) has more energy, so you want to retrieve it:

- 1 Press the **UNDO** key.
- 2 Use the wheel to scroll down to the step to where you want to undo (here it's 11—the first retry of the original take).
- 3 Press **ENTER**. All steps up to and including the selected step are now undone.

Now you have the track back again. If you press the **UNDO** key, you'll see that there's a check mark beside 10 - this shows that this is the "undo mark".

RECORDING	12	This is yet another retake of the lead vocal
RECORDING	11	Another attempt at the whole of the lead vocal
✓AUTO PUNCH	10	A try to correct a bad note in the lead vocal
RECORDING	9	First try at the lead vocal
AUTO PUNCH	8	Repairing the bad guitar bridge
RECORDING	7	Recording the guitar solo
RECORDING	6	Piano (alternative part)
RECORDING	5	Piano
RECORDING	4	Guide vocals
RECORDING	3	Bass line
COPY→PASTE	2	Looping the drum part
RECORDING	1	Basic drum loop
START UP	0	Beginning of song

This line marks the point to where we have made the undo

Notice that we can still see items 11 and 12. This is because we can still redo them, if we decide that the first vocal take (9 and 10) wasn't so great after all.

To redo them is just as simple as undoing them: press the **UNDO** key, highlight the step to which you want to return, and press **ENTER**.

Items above the "undo" line are visible and you can redo them until you perform another action after the undo operation.

For instance, if you decided that you wanted to have another go at repairing the lead guitar bridge...

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You could undo all items up to item 7:

RECORDING	12	This is yet another retake of the lead vocal
RECORDING	11	Another attempt at the whole of the lead vocal
AUTO PUNCH	10	A try to correct a bad note in the lead vocal
RECORDING	9	First try at the lead vocal
AUTO PUNCH	8	Repairing the bad guitar bridge
>RECORDING	7	Recording the guitar solo
RECORDING	6	Piano (alternative part)
RECORDING	5	Piano
RECORDING	4	Guide vocals
RECORDING	3	Bass line
COPY->PASTE	2	Looping the drum part
RECORDING	1	Basic drum loop
START UP	0	Beginning of song

...and then re-record the guitar bridge.

After this, though, if you wanted to restore the vocal tracks which we'd recorded, you wouldn't be able to.

The new recording would replace everything above the line".

All the previous items have now gone

AUTO PUNCH	8	This was the second go at repairing the bridge
>RECORDING	7	Recording the guitar solo
RECORDING	6	Piano (alternative part)
RECORDING	5	Piano
RECORDING	4	Guide vocals
RECORDING	3	Bass line
COPY->PASTE	2	Looping the drum part
RECORDING	1	Basic drum loop
START UP	0	Beginning of song

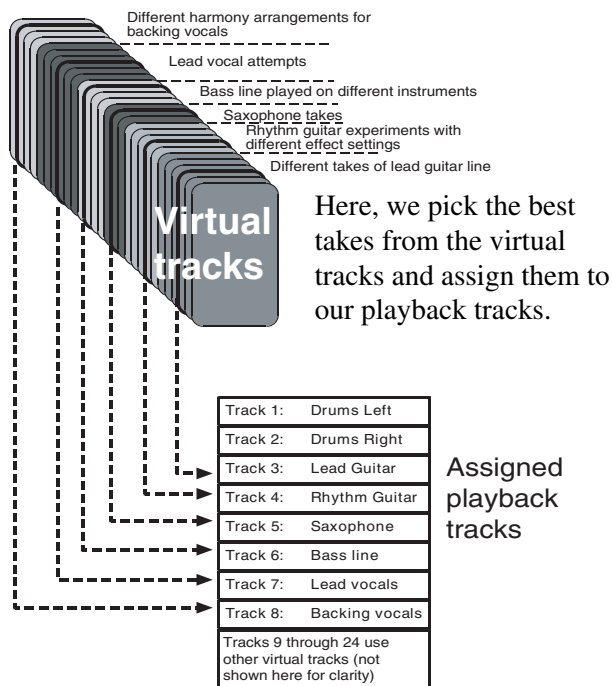
NOTE

Performing an action after the redo clears the list of redoable actions (i.e. those actions which have been undone).

Virtual tracks

When you use the 2488, you can record "spare" tracks; for instance, different versions of the lead vocals, and pick and choose between the different versions to find the one which works best.

These "spare tracks" are known as *virtual tracks*. With the 2488, you can record up to 250 tracks per song. From those 250 tracks, you pick the ones that you want and fit them together to make your finished mixed song. This can be re-takes of the same material (for instance, many attempts by a singer to capture the perfect vocal line), or alternative tracks (different guitar lines or effect settings, etc.). This allows you much more freedom to experiment than a tape recorder can provide.



When a virtual track is assigned to be an "active" disk track, it cannot be assigned to any other track.

Virtual tracks are mono tracks. You need to assign one virtual track to each track of a stereo pair.

To assign a virtual track to a disk track:

- 1 Press the shifted VIRT TRK key.

VIRTUAL TRACK ASSIGN											
V.TRACK											
KICK DRUM											
SNAR DRUM											
→OVERHEAD											
BASS GUITAR											
⬆ VTRACK05											
VTRACK01											
VTRACK02											
VTRACK03											
VTRACK04											
PHYSICAL TRACK											
1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24

- 2 Use the channel SELECT keys or the (◀ and ▶ keys) to select the disk track to which the virtual track will be assigned, as shown by the inverted numbers at the bottom of the screen.

Repeated pressing of the stereo channel SELECT keys (13/14 through 23/24) changes between the odd and even numbered channels of that pair.

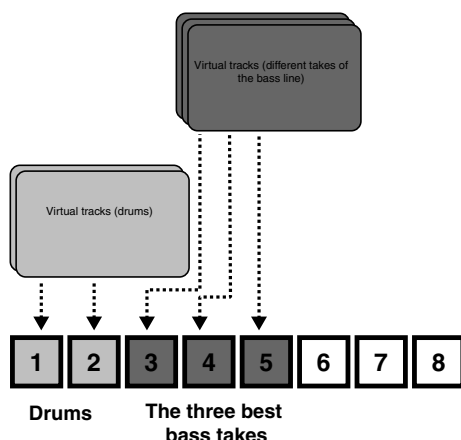
- 3 Use the wheel to choose which virtual track will be assigned to the disk track and become active.
- 4 Press ENTER (or PLAY) to make the assignment, or EXIT to exit the track assignment screen without actually making the assignment.

5 In this screen, you can press the TITLE key to name the highlighted virtual track for future reference.

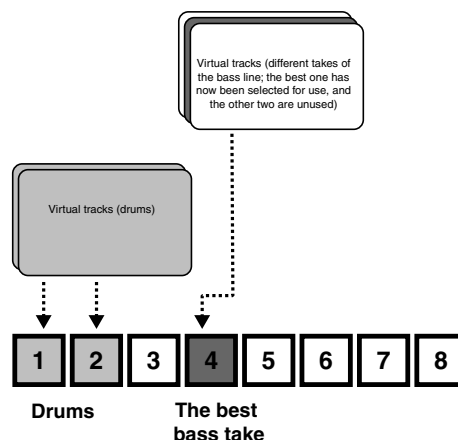
If you have not worked with a system using virtual tracks before, you may find it a little confusing.

Some ideas to bear in mind:

- A virtual track can only be assigned once (a virtual track cannot be used on two active tracks at the same time). When you start a song, virtual tracks 1 through 24 are assigned to active tracks 1 through 24.
- If you're recording a difficult part, you don't have to re-record over the top of "almost, but not quite perfect" takes. Keep these for later, just in case you never get a better take. Simply assign a different virtual track when you record the next take.
- You do not have to select all the final "active" tracks at the same time. For example, if you have recorded the drum part of a song, and you have recorded three different takes of the bass line on three different virtual tracks, you can assign these three virtual tracks to three disk tracks and use the faders to listen to each of them in turn (for simplicity, these illustrations show only the first eight tracks).



Then pick the one that fits best, and you can re-use the other two unused disk tracks with new virtual tracks—keep the alternative takes for the future if you change your mind later on.



Alternatively, if you want to assemble a track for the whole song, you could assign the three different takes of the part to three different active tracks and use the track editing functions to copy and paste the good parts of each track to make a perfect whole. Then use the two non-perfect tracks with other virtual tracks for new parts.

NOTE

Of course, virtual tracks take up disk space, even when you're not using them. If you really don't need a virtual track, you should assign it temporarily to a disk track and then clean it out to save disk space.

Varispeed operations (pitch and SSA)

You can play back and record at speeds which are greater or less than the original ($\pm 6\%$) to allow for differences in tuning, etc.

It is also possible to play back a selected pair of tracks at the same pitch, but slower than the original (the SSA—Slow Speed Audition feature). This allows you to rehearse tricky lead lines, etc. at a slower

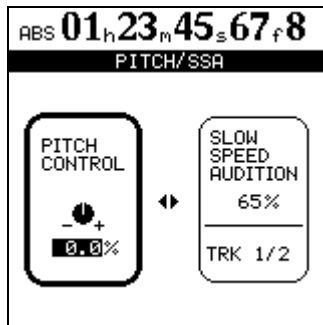
speed, and can be combined with repeat playback ("Repeat" on page 46) for easy rehearsals.

NOTE

The monitoring status of the tracks played back using the pitch (varispeed) or SSA features is exactly the same as for normal playback,; that is, if they have been assigned to a channel, the volume, etc. is controlled by the channel fader and controls.

Pitch

- 1 Press and hold the PITCH/SSA key for about a second and release it. The indicator lights and the display changes:



- 2 If the PITCH CONTROL section at the left of the screen is not active (it is not surrounded by the thicker frame), press the ◀ key to move the cursor there.
- 3 Use the wheel to change the pitch from -6.0% to +6.0% in 0.1% steps. If playback is being car-

ried out while this is done, you will be able to hear the change.

- 4 Press the PITCH/SSA key to return to the home screen and once again to turn off the pitch change.

NOTE

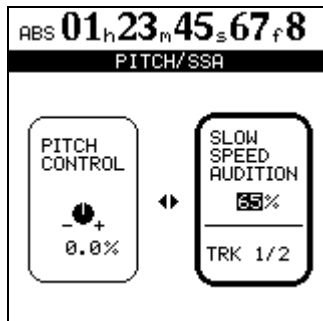
The above steps can be carried out while playback is stopped or in operation, but cannot be carried out during recording. It is also possible to start playback while adjusting the pitch, but not to start recording at that time.

To use the set pitch When the pitch change value has been set in the way described above, and the 2488 shows the home screen, simply press the PITCH/SSA key briefly to turn the indicator on and to change the pitch.

Press the PITCH/SSA key briefly once again to turn off the pitch change.

SSA (Slow Speed Audition)

- 1 Press and hold the PITCH/SSA key for about a second and release it. The indicator lights and the display changes:



- 2 If the SLOW SPEED section at the right of the screen is not active (it is not surrounded by the thicker frame), press the ▶ key to move the cursor there.
- 3 Use the channel SELECT keys to select the tracks which will be played back. These tracks are always in pairs.

- 4 Use the wheel to change the speed between 50%, 60%, 70%, 80%, and 90% (the displayed values are approximate). If playback is being carried out while this is done, you will be able to hear the change.

NOTE

The above steps can be carried out while playback is stopped or in operation, but cannot be carried out during recording. It is also possible to start playback while adjusting the speed, but not to start recording at that time.

- 5 Press the PITCH/SSA key to return to the home screen and once again to turn off the SSA mode.

To use the SSA When the speed change value has been set in the way described above, simply press the PITCH/SSA key briefly to turn the indicator on and to change the speed, but without changing the screen display.

Press the PITCH/SSA key briefly once again to turn off the speed change.

When all your tracks have been recorded, it's time to make a stereo mix onto CD. These operations are all controlled from the AUDIO CD menu.

NOTE

The operations all deal with songs on the currently-selected partition. If the song you want is on another partition, you must select another disk partition as the active partition before proceeding (see "Selecting the active partition" on page 65).

All mastering operations are accessed from the AUDIO CD menu.

1 Press the MENU key and navigate to AUDIO CD.

2 Press ENTER.



Pre-mastering

The start of the pre-mastered material is always the 00:00:00.00 point, and the end of the pre-mastered material is the OUT point.

Before starting the pre-mastering process, make sure that if you are using the sub-mixer, this is assigned to the stereo outputs.

- 1 Set the OUT point at the position where you want the pre-mastered material to stop.**
- 2 On the AUDIO CD menu, move the cursor to PRE MASTER and press ENTER.**

The screen changes to the home screen, but with the word MASTERING at the top left of the screen.

If any REC READY indicators are on, they are turned off, and they cannot be turned on again while pre-mastering is being carried out.

While pre-mastering, transport controls work in the usual way, except that:

- Playback and fast forward will stop at the OUT point, and the playback position cannot move past this point.
- Auto punch operations are disabled.
- Jog and trim are disabled.
- Pitch control and SSA are disabled.
- Direct location is disabled.
- Recording is carried out as explained below.

Recording the pre-master

To record the pre-master stereo tracks, press and hold the **RECORD** key, and then press the **PLAY** key. Both the **PLAY** and the **RECORD** indicators light.

Recording always starts (regardless of the current position) at 00:00:00.00.

The mastering records the effects of all mixer settings and effect settings, etc.

If you do not stop the recording before the OUT point, it will automatically stop at the OUT point. If you stop the recording at the OUT point, the master recording will stop there, and the length of the track will be from the 00:00:00.00 point to the point where the recording stopped.

NOTE

The minimum length for a CD track is four seconds. Make sure that all mastered recordings are at least this length.

The maximum length for a CD track recorded from the 2488 is 80 minutes. Tracks made from the 2488 should not exceed this length,

During the mastering operation, all channel operations (EQ, send, fader/pan) can be carried out, either from the 2488's controls, or by means of MIDI commands.

NOTE

While you are recording the master, synchronization and the sub-mixer can be used to add synchronized MIDI sound sources to the stereo master mix.

You can set and edit effect parameters and recall effects from the effect libraries while mastering.

It is also possible for you to make assignments while mastering, and recall scene memories.

When you have mastered the recording, you can either re-master the recording (simply press and hold

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the **RECORD** key and press the **PLAY** key again) or proceed to the master check operation (see below).

Mastering operations are included in the undo list. If you make an almost perfect pre-master, but all other

attempts after that fail to achieve the perfection you are looking for, you can decide to use the almost-perfect original, and undo all the less-than-perfect attempts which followed.

Exiting mastering

To exit the mastering operation and allow normal operation:

- 1 If the display does not show the home screen, press the **HOME** key.

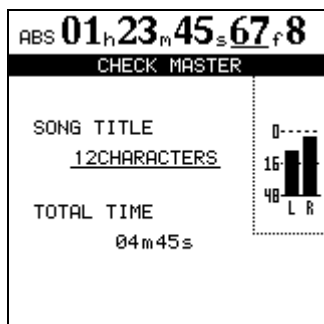
- 2 Press the **EXIT** key to remove the **MASTERING** from the display.

Checking the master

When the master has been recorded, you will almost certainly want to check it. After exiting from the mastering mode:

- 1 On the **AUDIO CD** menu, move the cursor to **CHECK MASTER** and press **ENTER**.

The screen changes to show the **CHECK MASTER** screen, which shows the title of the current song and its running time.



All monitoring is now from the **STEREO** selection only. All other monitor selections are disabled and cannot be changed.

No faders or other mixer controls (including assignment) have any effect. The only possible control is of the monitor volume is through the **MONITOR** controls.

The transport controls work in the following way:

- **PLAY** plays back from the current position to the end of the master track.
- **REW** and **F FWD** move the playback position backward or forward at 10x, 50x, 100x or 1000x the normal playback speed (as usual), but the wind “speed” is not shown on screen.
- **STOP** stops playback or “winding” at the current position.
- Recording is disabled.
- All location functions are disabled.
- Jog, varispeed, SSA, repeat, etc. are disabled.

NOTE

While playing back the master track, it is output from the **STEREO** (and **DIGITAL OUTPUT**) jacks as well as from the **MONITOR** and **PHONES** jacks. It is therefore possible to use the pre-mastering and master check functions to mix to a **DAT** or **MD** recorder, etc.

Exiting master checking When you have listened to the master, you may decide to proceed with burning a disc, or you may want to re-master the song.

In either case, press the **EXIT** key to return to the home screen, and restore the assignments, etc. which were in operation before the master check.

Trimming the master

You may sometimes want to trim the beginning or the end of a master track after checking it. For example, you may have made a perfect mix, except that there is too much “dead time” or a cough, fret noise, etc. before the start of the track, or there may be too much time after the end of the track, as the **OUT** point was not set correctly.

To correct these, without having to do the whole mix again:

- 1 Make sure the **2488** is in “normal” mode, that is, not in the master check mode or mastering mode.
- 2 Move the playback position to the approximate position where you want to trim (either the start or the end of the master).

If you want to trim the start of the master:

- 3 Set the IN point to be the 00:00:00:00 point.
- 4 Use the jog control to set the OUT point to the exact position where you want the master to start.

If you want to trim the end of the master:

- 3 Set the IN point to the point where you want the end of the master to be, using the jog method to set the point.
- 4 Set the OUT point to be some way after the existing OUT point.

In both cases (trimming the start and trimming the end):

- 5 Use the Track Edit CUT function to cut all tracks between the IN and the OUT point. You must select the all option for the master track to be cut in this way.

If you are trimming the end of the master:

- 6 Make sure that the OUT point is now located at the real end of the track (where you set the IN point previously).

In both cases (trimming the start and trimming the end):

- 7 Play back the master track, as described above. The start and end should now be as you want them.

Recording to CD-R

There are two ways of using the 2488 to record a disc either a track at a time; *TAO* (Track At Once) with the disc being finalized after the last track has been recorded, or a number of tracks together; *DAO* (Disk At Once), with the disc being finalized at the end of the session.

Recording many tracks at once allows you to reorder the tracks on the disc. It also allows you to put varying lengths of silence between tracks (ranging from 0 to almost 10 seconds).

Remember that whichever method you use to record your CDs, you can record a maximum of 99 tracks on one CD, the minimum length of a track is four seconds, and the maximum track length you can record from the 2488 is 80 minutes.

NOTE

It is not possible to record a disc using both methods of recording. If you record a disk using the track method, you cannot then add a number of tracks together, but you can add single tracks. Likewise, if you record a number of tracks together, you cannot add any tracks (singly or together) later on.

Recording to CD-R (TAO recording)

Before starting this operation you must make sure that there is a recordable disc inserted in the CD-RW drive. If there is no recordable disc (that is, a CD-R or CD-RW disc that has not been finalized), the 2488 shows an appropriate message.

- 1 Make sure the 2488 is in “normal” mode, that is, not in the master check mode or mastering mode. On the AUDIO CD menu, move the cursor to CD WRITER and press ENTER.

The 2488 checks the CD-RW drive. If there is a valid disc in the drive containing at least one pre-mastered song, the display shows a list of the songs which have been mastered on the current disk partition.

NOTE

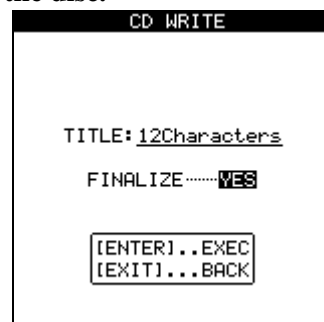
If a song has been recorded, but has not been mastered, it will not appear in the list.

If you want to change partitions, see “Selecting a disk” on page 32.

- 2 Use the wheel to select the song to be recorded, and press ENTER.

You may now rename the song using the TITLE key.

- 3 Choose at this point whether you want to finalize the disc.



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If you finalize the disc at this stage, you cannot record any further songs on it. If you do not finalize the disc, you will not be able to play it on ordinary audio CD players.

NOTE

If you choose not to finalize the disc at this point, you can finalize it later, without recording another song.

- 4 Press **ENTER** to continue, and **EXIT** if you want to choose a different song.
- 5 You are asked if you are sure that you want to record the song. Press **ENTER** to proceed with the recording, or **EXIT** to cancel.
- 6 If there is not enough space on the internal disk for preparation, or on the CD disc for the song that you have selected for recording, the 2488 gives an appropriate error message.

Finalizing the disc

When you have recorded the last track on the disc, you must finalize it in order to allow it to be played on ordinary CD players, but you can check the recorded tracks using the 2488's CD PLAYER function.

The CD-RW drive must contain an unfinalized disc before you start the process.

- 1 Make sure the 2488 is in “normal” mode, that is, not in the master check mode or mastering mode. On the **AUDIO CD** menu, move the cursor to **FINALIZE** and press **ENTER**.
 - A pop-up screen asks if you are sure. Press **ENTER** to continue, **EXIT** to stop the finalize process.

Recording to CD-R (multiple tracks)

When recording multiple tracks, the tracks can be recorded in any order, and varying lengths of silence can be added.

Once a CD has been made in this way, no further tracks can be added, as the CD is automatically finalized at the end of the operation.

There must be a recordable CD disc in the drive before starting this operation.

- 1 Make sure the 2488 is in “normal” mode, that is, not in the master check mode or mastering mode. On the **AUDIO CD** menu, move the cursor to **CD WRITER** and press **ENTER**.

- 7 The 2488 makes an image of the song on disc (to allow for smooth and easy transfer) and then starts writing it to the CD.

- The top line of the display gives an indication of the time remaining for the operation.
- While the image and writing to disc is going on, all the 2488 controls are disabled, and no action is possible.

NOTE

DO NOT TURN OFF the 2488 or the CD-RW drive while this writing operation is taking place. You will almost certainly spoil the disc and may corrupt the song data.

Two seconds of silence are added to the end of each track recorded to disc in this way.

- 8 To check the recorded disc, use the **CD PLAYER** option described below.

- If you continue, the CD session is closed and the finalizing material (Table of Contents or TOC) is written to the disc.

NOTE

You cannot record further tracks on a finalized disc. You can only finalize a disc once, and you cannot unfinalize a disc.

The CD-RW drive eject button is locked while writing is going on. You can only eject the disc after writing has finished.

If you use CD-RW media, you cannot play the resulting discs in most audio CD players.

The 2488 checks the CD-RW drive. If there is a valid disc in the drive, the display shows a list of the songs which have been mastered on the current partition.

NOTE

If a song has been recorded, but has not been mastered, it will not appear in the list.

If you have a song in another partition which you want to add to the list in the current partition, you should copy it from the old partition to the current partition (see “Copying songs” on page 29).

Use the wheel to scroll through the list of songs, and when you highlight a song that you

wish to add to the final CD, press the **INSERT** key.

A check mark (✓) appears by the title of every selected song. There is no need to worry about the final running order of the CD at this stage.

If you have made a mistake in adding a song to the list, you can remove it by highlighting the title and pressing the **DELETE** key.

- When you have added all the songs to the list that you want to record on the CD, press **ENTER**.

NOTE

If you have only selected one song, the procedure from now is as if you had highlighted the song and pressed **ENTER**, as described above. Read that section, and ignore the remainder of this section.

The screen changes to the song order screen (if you want to return to the song selection screen, press **EXIT**).

CD WRITE	
SONG ORDER	TIME
SONG001	03:12
SONG002	04:31
SONG005	03:58
SONG006	05:26
SONG007	04:52
SONG008	04:31
SONG009	04:24
SONG012	05:52
SONG013	03:53
TOTAL SONGS: 9	
TOTAL TIME :62m47s	

- Use the wheel to scroll through the list of songs.
- When a song title is highlighted, use the **▲** and **▼** keys to move it up and down in the list. As the song is moved up and down in the list it remains highlighted.
- Select further songs for rearrangement using the wheel.
- When you have completed the running order, press **ENTER**.

The screen changes to the “gap setting” screen. This allows you to set the gap between tracks on the CD (press **EXIT** to return to the song order screen)

CD WRITE	
SONG	GAP
SONG001	0.3 sec
SONG002	0.3 sec
SONG007	0.3 sec
SONG006	0.3 sec
SONG013	0.3 sec
SONG008	0.3 sec
SONG009	0.3 sec
SONG012	0.3 sec
SONG005	0.3 sec
TOTAL SONGS: 9	
TOTAL TIME :62m47s	

- Use the **▲** and **▼** keys to move the cursor to the gaps between the songs on the CD.
- Use the wheel to set the time in seconds between songs, from 0.0 seconds (no gap) through 9.9 seconds in 0.1 second steps.

NOTE

When you come to play back the disc on a CD player, the start of the gap will appear as Index 0 on the track following the gap, and the start of the track will appear as Index 1. Because the gap counts as a part of the track, the total length of the track and gap together cannot exceed 80 minutes.

- When all the gaps have been set, press **ENTER**. A pop-up asks if you are sure. Use the **YES** key to proceed with writing the CD or the **NO** key to cancel the operation.
- When you press **YES**, a disk image is made of each song in turn, which is then written to the CD.

NOTE

DO NOT TURN OFF the 2488 or the CD-RW drive while this writing operation is taking place. You will almost certainly spoil the disc and may corrupt the song data.

- When the last song has been written, the disk is finalized. You can now eject the disc and play it in a CD player.

NOTE

The CD-RW drive eject button is locked while writing is going on. You can only eject the disc after writing has finished.

If you use CD-RW media, you cannot play the resulting discs in most audio CD players.

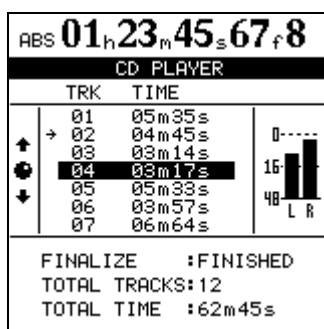
Playing back CDs using the 2488

If an audio CD (either finalized or unfinalized) is inserted into the 2488's CD-RW drive, the 2488 can play it back.

The sound is output through the **MONITOR** and **PHONES** jacks. The only control over the sound from the 2488 is through the **MONITOR** control knob. All other mixer controls are disabled.

- 1 **Make sure the 2488 is in “normal” mode, that is, not in the master check mode or mastering mode. On the AUDIO CD menu, move the cursor to CD PLAYER and press ENTER.**

The screen shows:



- Whether the disc is finalized or not
- The number of tracks and the total running time of the disc.

- **The track list and the lengths of the tracks. The current track is indicated by an arrow (when the CD player function is first entered, the track number will always be 1)**
- **The stereo meters also show the level of the audio recorded on the disc**

The 2488 transport controls are used to control playback of the CD, as explained here:

PLAY starts playback from the current playback position. While the disc is locating, the **PLAY** indicator flashes, and while playback is actually taking place, it lights steadily

STOP stops playback at the current position

REW and **F FWD** take the playback position forward or backward one track, while playback is stopped

The wheel can also be used to move the playback position forward or backward one track while playback is stopped

All other playback functions are disabled

NOTE

*While this screen is displayed (the CD Player function is active), the eject button on the CD-RW drive is disabled. To eject the CD, press **EXIT** to exit the CD player function, and then press the CD-RW drive eject key.*

Disk management

The 2488 formats its hard disk into multiple partitions. One of these partitions is in FAT-16 format and is used for exchanging files between the 2488 and a USB-equipped computer. The FAT partition is a fixed size, and does not appear in the disk partition or song menus, as it is only used for file exchange. The partition is only accessed with the backup and restore operations using USB and the wave import/export and SMF import operations.

The rest of the hard disk is formatted in the 2488 “native” format, further subdivided into partitions (see the section below for details of how to do this). These partitions are not accessible from a computer.

File names on the FAT section are restricted to 8.3 format (FILENAME.EXT). Any files taken from the native partitions to the FAT section are automatically renamed appropriately. Any long filenames taken from a computer to the 2488 are also renamed automatically by the 2488.

Selecting the active partition

As explained above, the “native” part of the hard disk may be divided into partitions.

When a partition is selected, it is said to be active, and data from other partitions is not accessible.

To select a partition:

- 1 With the transport stopped, from the DISK menu, highlight SELECT, and press ENTER.

SELECT		
PARTITION	FREE	
↑	→Part01	10284 MB
●	Part02	11314 MB
	Part03	8341 MB
↓	Part04	9423 MB

- 2 Use the wheel to select the partition (the free space on each is shown at the side of the screen).
- 3 Press ENTER to confirm the selection. The current song is saved, if necessary, before the partition is selected.

Enabling and disabling USB

When the 2488 is connected to a personal computer for backup/restore or file transfer to and from the 2488’s FAT partition, the USB must be enabled (opened) on the 2488 side in order to allow the 2488 and computer to communicate. After the data transfer, the USB must be disabled (shut off).

- 1 With the transport stopped, from the DISK menu, highlight USB OPEN/CLOSE, and press ENTER.
- 2 The 2488 saves your data, restarts, and a popup message appears.

While this popup is showing, you are “locked out” of any operations on the 2488. It can only be used as a USB disk.

- 3 Connect the 2488 to the personal computer.
- 4 Perform all USB operations with the personal computer (file copy, etc.).
- 5 Disconnect the computer (you should first see “The 2488 and USB” on page 73).
- 6 Press EXIT to close the USB and restart the 2488.

Formatting the disk

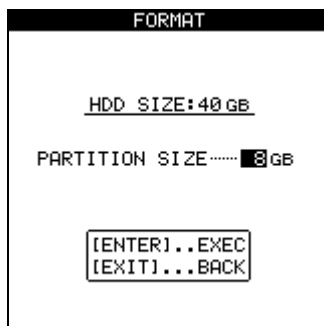
WARNING

When you perform this operation, all data on the native part of the disk is destroyed. This operation cannot be undone. Before performing this operation, make sure that all songs and data that you want to keep are backed up, either to disc or to a personal computer (see “Backup and restore” on page 72).

When you format a disk, you can also change the size of the native partitions. All partitions are created with the same size, which may be 4, 8, 16 or 32 gigabytes¹.

This operation does not affect the FAT partition.

- 1 With the transport stopped, from the DISK menu, highlight FORMAT, and press ENTER.



1. A gigabyte is defined here as 1024 megabytes. A gigabyte holds just under four hours' worth of 16-bit mono audio.

- 2 The hard disk size is shown at the top of the screen, and the partition size is shown below this. Use the wheel to change the partition size.
- 3 Ask yourself once more if you want to format the disk and erase all the data on it. Press ENTER to continue with the format operation. Press EXIT to halt the operation.
- 4 If you continue with the format, a popup message appears to ask you once again whether you are really sure you want to format the disk.

Press ENTER to continue with the format, and EXIT to stop the process.

NOTE

While the format operation is taking place, the HD indicator lights and you cannot perform any operations. Make sure that you do not turn off the 2488 during the format operation.

- 5 When the format operation is complete, a new blank song is automatically created on each partition.

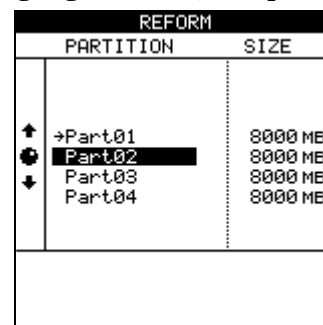
Reformatting individual partitions

In addition to formatting the whole disk, it is possible to clean out and reformat the entire contents of individual partitions.

NOTE

When you perform this operation, all data on the selected partition is destroyed. This operation cannot be undone. Before performing this operation, make sure that all songs and data that you want to keep are backed up, either to disc or to a personal computer (see “Backup and restore” on page 72).

- 1 With the transport stopped, from the DISK menu, highlight REFORM, and press ENTER.



- 2 Use the wheel to select the partition to be reformatted, Press ENTER.
A popup message appears.
- 3 Ask yourself once more if you want to format the partition and erase all the data on it. Press

6 – Disk management and file import/export

ENTER to continue with the format operation.
Press **EXIT** to halt the operation.

NOTE

While the format operation is taking place, the **HD** indicator lights and you cannot perform any operations.

Make sure that you do not turn off the 2488 during the format operation.

- 4 When the format operation is complete, a new blank song is automatically created on the partition.

Reformatting the FAT partition

If the FAT partition is full, you should follow the procedure below.

NOTE

Do not attempt to format the FAT partition using a computer. Use only this procedure to perform the operation.

Note that it is not possible to erase individual files from the FAT partition using the 2488 alone. To do that, you must connect the 2488 to a computer, and treat the FAT partition as a computer hard disk.

- 1 With the transport stopped, from the **DISK** menu, highlight **FAT REFORM**, and press **ENTER**.
- 2 A popup message appears.

- 3 Ask yourself once more if you want to erase all the data on the FAT partition. Press **ENTER** to continue with the operation when a popup appears, or press **EXIT** to halt the operation.

- When the FAT partition has been erased, three directories (folders) are automatically created, named **WAVE**, **SMF** and **BACKUP**. Use these folders for audio files, Standard MIDI Files and backup data respectively.

NOTE

When you perform this operation, all existing data on the FAT partition is destroyed. This operation cannot be undone. Before performing this operation, make sure that all data on the FAT that you want to keep are backed up to a personal computer (see "Backup and restore" on page 72).

CD-RW erase

To erase a CD-RW disc created on the 2488, you must use this function. You cannot erase such a disc on any other equipment.

Also note that you must erase the whole disc. You cannot erase individual data files (or songs on an audio disc). This operation cannot be undone. Once the data is erased from the disc it cannot be recovered from the disc. Make sure you have copies of any data you might want in the future.

- 1 Insert the CD-RW disc to be erased into the drive (use the drive eject key or the tray open/close function described below to do this).
- 2 With the transport stopped, from the **DISK** menu, highlight **CD-RW ERASE**, and press **ENTER**. A popup confirmation message appears.

Alternatively, press **EXIT** to cancel the operation.

- 3 After the disc has been erased, the drive tray opens automatically.

CD EJECT

You can use this function to open the disc drive tray. You can also use the drive button itself to open and close the tray, and you can push the tray itself, when it is open, to close it.

- 1 With the transport stopped, from the **DISK** menu, highlight **CD EJECT**, and press **ENTER**.
- 2 The tray opens and a popup appears. Remove or change or insert the disc.

6 – Disk management and file import/export

File import and export

The 2488 can import and export the following file types:

- WAV audio files (see below)
- SMF (Standard MIDI files) for playback by the 2488 internal tone generator

The WAV files used by the 2488 are assigned to virtual tracks. Since virtual tracks are mono, the audio files used must be also be mono.

The sampling frequency must be 44.1 kHz, and the word length may be either 16 or 24 bits.

Note that if you are importing a 16-bit audio file for use in a 24-bit song, you will only enjoy 16 bits of resolution in the imported audio—the 2488 cannot magically recreate the extra eight bits. And if you import a 24-bit audio file into a 16-bit song, the bottom eight bits will be truncated.

USB import (audio files)

USB file import is done using the FAT partition (see above).

1 Select the DISK option and press ENTER and then select the USB OPEN/CLOSE option and press ENTER.

2 Connect the 2488 to the computer.

The 2488 will appear as a removable disk on your computer system.

3 Drag and drop the wave file(s) from your computer's disk to the 2488.

4 You can now disconnect the 2488 from the computer (see “Using USB for backup and restore” on page 73).

5 Press EXIT to dismiss the popup message on the 2488.

The 2488 restarts.

6 Now copy the files from the FAT partition to the virtual tracks. From the WAVE IN/OUT menu, select the USB IMPORT option.

USB IMPORT	
WAVE FILE	SIZE
KICK	32MB
SNARE	43MB
BASS	45MB
TOM	51MB
GUITAR1	42MB
HAT	40MB
CYMBALS	49MB
AMBIENCE	0MB
TRACK009	0MB

FAT → PARTITION 01
FREE AREA : 5821MB
SONG TITLE:12characters

7 Use the wheel to select the wave file that you want to use. Press ENTER.

USB IMPORT	
V. TRACK	
TRACK001	
TRACK005	
TRACK007	
TRACK008	
TRACK009	
TRACK010	
TRACK012	
TRACK014	
TRACK016	

Select V.track
to which
wave file assign.

8 Now you can select the virtual track to which the wave file will be copied. Press ENTER.

9 Assign the virtual track to a 2488 track (see “Virtual tracks” on page 56).

NOTE

You can repeat step 3 as many times as you like (provided there is space on the disk), followed by steps 6 through 9 as many times as you like.

USB import (SMF files)

You can also import Standard MIDI Files through the USB connection. For full details of how to use the SMF files and the tone generator, see “MIDI” on page 76.

1 Select the DISK option and press ENTER and then select the USB OPEN/CLOSE option and press ENTER.

2 Connect the 2488 to the computer.

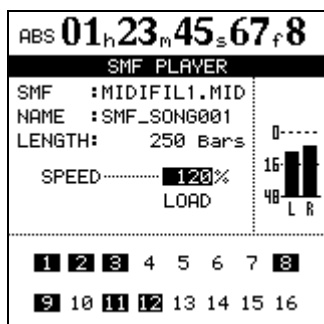
6 – Disk management and file import/export

The 2488 will appear as a removable disk on your computer system.

- 3 Drag and drop the Standard MIDI file(s) from your computer's disk to the 2488.
- 4 You can now disconnect the 2488 from the computer (see "Using USB for backup and restore" on page 73).
- 5 Press EXIT to dismiss the popup message on the 2488.

The 2488 restarts.

- 6 Now you can load the files from the FAT partition to the MIDI playback unit. From the MIDI PLAYER menu, with SMF set as the tone generator mode, press the MIDI PLAYER key (above the STEREO fader):



- 7 Move the cursor to the on-screen LOAD button, and press ENTER.

SMF LOAD	
SMF	SIZE
MIDIFIL1.MID	103KB
MIDIFIL2.MID	4KB
MIDIFIL3.MID	4KB
MIDIFIL4.MID	5KB
MIDIFIL5.MID	4KB
MIDIFIL6.MID	4KB
MIDIFIL7.MID	4KB
MIDIFIL8.MID	3KB
MIDIFIL9.MID	2KB

PARTITION :01
SONG TITLE:12characters

- 8 Move the cursor to the file you want to load and press ENTER.

NOTE

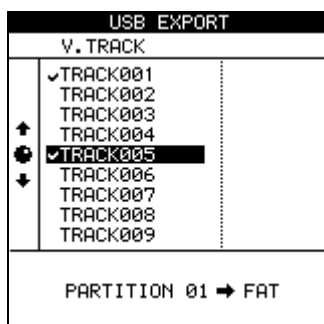
Note that there is no SMF export function (the 2488 cannot create or edit MIDI sequences).

You can repeat step 3 as many times as you like, followed by steps 6 through 8 as many times as you like.

USB export (audio files)

This is basically the reverse of the import procedure. First, select a virtual track and then export its contents to the FAT partition before connecting the 2488 to the computer and copying the file.

- 1 With the transport stopped, from the WAVE IN/OUT menu, select the USB EXPORT option.



- 2 Select the virtual track to be exported and press ENTER.



- 3 Select the resolution of the resulting file (16 or 24 bits). The resolution of the exported data affects the size of the file. Press ENTER to export the data to the FAT partition, or EXIT to cancel the process.
- 4 Select the DISK option and press ENTER and then select the USB OPEN/CLOSE option and press ENTER.
- 5 Connect the 2488 to the computer.

6 – Disk management and file import/export

The 2488 will appear as a removable disk on your computer system.

- 6 Copy the wave file from the FAT partition to the computer.



- 7 You can now disconnect the 2488 from the computer (see “Using USB for backup and restore” on page 73).

- 8 Press EXIT to dismiss the popup message on the 2488.

The 2488 restarts.

NOTE

You can repeat steps 1 through 3 as many times as you like (provided there is space on the disk), followed by steps 5 through 7 as many times as you like.

Disc import (audio files)

The 2488 can only read mono WAV format files from the top-level directory (root) of a data disc with no other files on the disk. Files in subdirectories cannot be imported.

When these files are imported, they are assigned to a virtual track, that must then be assigned to a real track.

- 1 Insert the disc containing the files into the disc drive.
- 2 With the transport stopped, from the WAVE IN/OUT menu, select CD IMPORT, and press ENTER.



- 3 Use the wheel to select the wave file to be imported, and press ENTER:

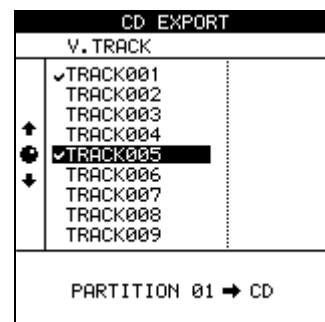


- 4 Use the ENTER key to confirm the load of the file to the virtual track (popup mess) or EXIT to cancel.

Disc export (audio files)

This allows you to export virtual tracks to audio files. Even if the song is being recorded at 24-bit resolution, you can export 16-bit files (and the other way round).

- 1 With the transport stopped, from the WAVE IN/OUT menu, select the CD EXPORT option.



6 – Disk management and file import/export

- 2 Select the virtual track to be exported and press **ENTER**.

CD EXPORT	
V. TRACK	
✓	TRACK001
	TRACK002
	TRACK003

	RESOLUTION.....16bit
	TOTAL : 164MB
	FREE AREA: 700MB
	TRACK009

PARTITION 01 → CD	

- 3 Select the resolution of the resulting file (16 or 24 bits). The resolution of the exported data affects the size of the file.
- 4 Press **ENTER** to copy the virtual track contents to disc, or **EXIT** to cancel the process.

Backup

You can use the 2488 disc drive to back up your work to disc. You can either use CD-R media (cheaper, but you can only use it once) or CD-RW media (slightly more expensive, but you can erase and reuse it a number of times).

NOTE

The operations all deal with songs on the currently-selected partition. If the song you want is on another partition, you must select another disk partition as the active partition before proceeding (see “Selecting the active partition” on page 65).

The discs you make in this way are not audio CD—you cannot play it on a CD player, and it can be read only by a 2488. If you have friends with 2488 units, this is a very convenient way of taking your songs around (you could record the drums in one location, take the CD over to the bassist, then the guitarist, and vocalist, and then finish the mixdown at yet another location with great monitoring facilities).

NOTE

Observe the usual precautions when working with recordable media: handle discs by their edges, avoid getting fingerprints or grease on the recording surface, and keep them clean. Also, avoid using hard pens or pencils or oil-based markers to label the discs.

Have a blank CD-R or CD-RW disc ready before proceeding with the instructions described here.

1 First, save all your song to disk.

Press **MENU**, select **SONG**, and then select **SAVE**.



2 Press **ENTER**, and a popup appears, telling you that the song is being saved. The **HD** indicator lights as the song is saved.

The display shows the home screen after the save has been done.

3 Open the CD-RW drive, using the eject button on the drive, and load your blank disc into the tray, recording side down. Use the drive button to close the tray.

Now press the **MENU** key and select **DATA BACKUP**.

CD BACKUP	
SONG	SIZE
SONG001	322 MB
SONG002	430 MB
SONG003	459 MB
SONG004	510 MB
SONG005	422 MB
SONG006	403 MB
SONG007	495 MB
SONG008	5 MB
SONG009	1 MB

PARTITION 01 → CD
FREE AREA: 700 MB

4 Select your song using the wheel and press **ENTER**. A pop-up message appears telling you how many discs will be needed to back up the song.

5 Press **ENTER** again. A pop-up message tells you the progress of the backup operation.

A backup may span more than one disc.

6 When the backup is complete or if the first disc is full, the disc drive tray opens. Remove the disc, label it and store it in a safe place.

7 Continue the process if more discs are needed until the backup is complete.

NOTE

If you are backing up to more than one disc, you must ensure that the discs are identical (from the same manufacturer). Even if two discs from different manufacturers have the same stated capacity, you may not be able to use them in the same backup operation.

Restoring

If you ever need to restore your data from a data backup CD or CDs, you basically reverse the process.

Before you start restoring a song, make sure that you have all the discs that were used to back up the song. If some of the discs are missing, you will not be able to restore the song (you cannot load half a song).

- 1 Put the first (or only, if there is only one) disc of the backup set into the CD-RW drive.**
- 2 With the transport stopped, press the MENU key.**

From the DATA BACKUP menu, select CD RESTORE. The 2488 reads the title of the song from the disc and asks you if you want to continue.
- 3 Press YES to continue, NO to eject the disc and cancel the operation.**
- 4 If you go ahead with the restore, the 2488 copies the data from the disc to the active disk partition. A bar graph on screen shows the progress.**
- 5 If the backup is spanning more than one disc, when the first disc has been read, it is ejected, and a message asks you to put in the next disc. Insert the next disc and press YES.**

If you insert the wrong disc (out of sequence or from a different backup set), the 2488 ejects the “bad” disc and asks you again for the correct one. If you really cannot find the right disc, you must press NO to cancel the restore.

If you cancel the restore operation part of the way through, none of the song is restored, and the 2488 goes back to the state before the restore was started.
- 6 When data is restored from the last disc, the disc is ejected, and the restored song is loaded.**

Using USB for backup and restore

By using a USB cable to connect the 2488 and a personal computer, it is possible to back up songs and restore them to and from the computer’s disk drive.

The song data backed up in this way is not audio data which can be played on the computer—it is an archive of tracks, virtual tracks and edits, just like the songs backed up to CD.

It is also possible to use the USB connection to import and export audio files. See “Disk management and file import/export” on page 65 for details.

The 2488 and USB

Data transfer is carried out at USB 2.0 speeds (but if your computer has the older 1.1 USB standard fitted, it will still work, just slower. Consult your computer documentation for details.

We recommend that you always use a cable designed for USB 2.0 operations to ensure accurate fast data transfer.

The 2488 will work with the following Microsoft operating systems: Windows Me, Windows 2000, and Windows XP. It will work with the following operating systems from Apple Computer: MacOS 9.0 and above, and MacOS X 10.2 and above.

For all the above operating systems, no driver is required. The 2488 simply appears as a removable disk.

However, you should always follow your computer’s instructions on how to disconnect a USB removable drive safely from your system.

Windows Me/Windows 2000/Windows XP

With Windows Me, Windows 2000 and Windows XP, the procedure is a little more complex.

In the system tray (typically at the bottom right of the screen), you see an icon picture of a PC card and an arrow.

Left-click this icon to show a popup bar: Click this popup bar to allow the 2488 to be removed from the computer. When the panel telling you it is safe to remove the 2488 appears, unplug the USB cable.

If a panel telling you that it is not safe to remove the 2488 appears, do not unplug the 2488. Close all programs and windows that are accessing the files on the 2488 and try again.

Macintosh

When removing the 2488 from a Macintosh system (OS 9 or OS X), drag the disk icon to the trash, or press Command-E (OS X 10.3 also has a button in the Finder which allows ejecting removable media). When the icon has disappeared from your desktop, you can disconnect the 2488.

Backing up

If you do not understand the 2488's disk arrangement, you should read "Disk management and file import/export" on page 65 before proceeding.

Backup to a computer connected via USB is a two-stage process. The first stage is copying the song data from the native partition to the FAT partition, and the second stage is copying from the FAT partition to the computer.

To backup:

- 1 With the transport stopped, press the **MENU** key. Note that you do not have to connect the 2488 to the computer at this stage.

From the **DATA BACKUP** menu, select **USB BACKUP**. The screen shows a list of songs on the current partition, and their size.

USB BACKUP	
SONG	SIZE
SONG001	322MB
SONG002	430MB
SONG003	459MB
SONG004	510MB
SONG005	422MB
SONG006	403MB
SONG007	495MB
SONG008	5 MB
SONG009	1 MB

PARTITION 01 → FAT
FREE AREA: 995MB

- 2 Note the size of the free space available on the **FAT** partition, and select a song which will fit onto that partition.
- 3 Press **ENTER** when you've selected the song. The **HD** indicator flashes as the song data is copied.

Restoring

This is basically the reverse of the backup process. The archived song data is copied from the computer onto the 2488's **FAT** partition and then onto the 2488's native disk partition.

- 1 Select the **DISK** option and press **ENTER** and then select the **USB OPEN/CLOSE** option and press **ENTER**.
- 2 Connect the 2488 to the computer.
The 2488 will appear as a removable disk on your computer system.

- The song files in the **FAT** partition will appear as "8.3" filenames, rather than with the 12-character internal names. The "real" longer names are stored as a part of the song.

- 4 When the copy is finished, attach the 2488 to your computer using a **USB 2.0** cable.
- 5 Select the **DISK** option and press **ENTER** and then select the **USB OPEN/CLOSE** option and press **ENTER** (see "Enabling and disabling USB" on page 65).

The 2488 will appear as a removable disk on your computer system.

- 6 Drag and drop the song file from the 2488 to your computer's disk. You can then archive it, burn a backup CD-R, etc. Note that you should not rename it at all—when you come to restore it, the 2488 needs the filename in its original state as it came from the 2488.
- 7 You can now disconnect the 2488 from the computer (see "Using USB for backup and restore" on page 73).
- 8 Press **EXIT** to dismiss the popup message on the 2488.

The 2488 restarts.

TIP

If you repeat this process many times, you may find that the **FAT** partition fills up. You can manage the files on the **FAT** partition from your computer, as well as erasing the **FAT** partitions's contents from the 2488.

- 3 Drag and drop the song file from your computer's disk to the 2488.
- 4 You can now disconnect the 2488 from the computer (see "Using USB for backup and restore" on page 73).
- 5 Press **EXIT** to dismiss the popup message on the 2488.

The 2488 restarts.

- 6 Press the **MENU** key. From the **DATA BACKUP** menu, select **USB RESTORE**. The screen shows a

list of songs on the FAT partition, and their size.

USB RESTORE	
SONG	SIZE
SONG001	422MB
SONG002	403MB

FAT → PARTITION 01
FREE AREA: 995MB

- 7 Use the wheel to select the song to restore and then press **ENTER**. The HD indicator flashes as the song is copied from the FAT partition to the native partition.
- 8 When the copy is finished, the song is automatically loaded and becomes your current working song. You can then use the song management features to load another song, if you want (“First steps in recording (song management)” on page 36).

8 – MIDI

The MIDI module inside the 2488 is a GM-compatible MIDI tone generator (TG) which can be used either to play Standard MIDI Files (SMFs) or drum

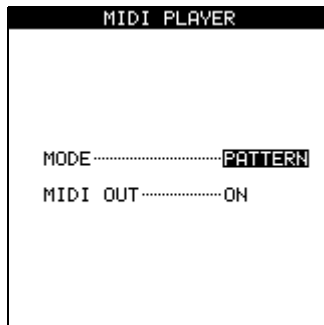
patterns as a backing for the audio tracks recorded on the 2488.

The instruments in the tone generator can be mixed (volume, pan position, etc.)

Internal module mode

To change between the MIDI file playback mode and pattern playback mode:

- 1 From the SYNC/MIDI menu, select and press MIDI PLAYER.



- 2 Use the wheel to select either SMF (file player) or PATTERN or OFF).

- 3 You can also turn MIDI OUT either ON or OFF.

NOTE

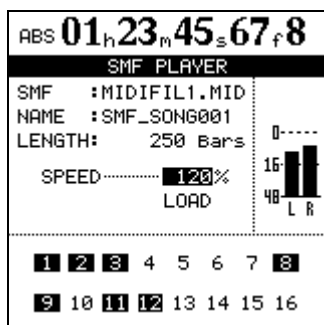
This allows you to use the 2488's playback facilities to drive external MIDI devices, whose audio outputs can then be recorded through the audio inputs of the 2488.

SMF

The Standard MIDI File format provides a common file format allowing MIDI songs to be transferred between different sequencers and sequencing software, etc.

These files may be transferred from a personal computer attached to the 2488 via USB using the procedure described in "USB import (SMF files)" on page 68.

When an SMF is read from the FAT partition in this way, it becomes the active SMF, as shown in the SMF PLAYER screen, which is also used to load the SMF:



There is only one parameter that can be changed on this screen, the SPEED, which is expressed as a percentage of the original speed (since an SMF can include tempo changes, expressing this in BPM is not very useful).

The screen shows how many bars (measures) are in the SMF, and also the MIDI channels used by the SMF (these are the numbers from 1 through 16 at the bottom of the screen. Active MIDI channels are shown in inverse).

Editing the MIDI instruments

Although it is not possible to edit the notes in the SMF, it is possible to edit the initial settings for the tone generator.

1 Press the shifted TG SELECT (GM EDIT) key.

GM EDIT			
PART	MUTE	INSTRUMENT	Ch KEY
1	ON	Piano1	1 +12
2	OFF	Jazz Gtr	2 -12
3	OFF	Nylon Gtr	3 0
4	OFF	Finger Bs	3 0
5	OFF	Harmonica	3 0
6	OFF	Rock Org	3 0
7	OFF	Violin	7 0
8	OFF	Viola	7 0
9	OFF	Cello	7 0
10	OFF	Standard	7 0
11	OFF	Harp	7 0

The numbers of parts which are playing are shown in the outline font (parts 1, 2, 3 and 4 in this illustration). Part numbers are initially set to incoming MIDI channels.

2 Use the cursor keys to navigate to the field you want to change, and the wheel to change the values.

There are three screens in all. Use the left and right keys to change between the screens (they don't "wrap round").

Screen 1				Screen 2				Screen 3			
GM EDIT				GM EDIT				GM EDIT			
PART	MUTE	INSTRUMENT	Ch KEY	PAN	VOLUME	REV	CHO	PART	MUTE	INSTRUMENT	Ch KEY
1	ON	Piano1	1 +12	R63	127	127	127	1	ON	Piano1	1 +12
2	OFF	Jazz Gtr	2 -12	L63	0	0	0	2	OFF	Jazz Gtr	2 -12
3	OFF	Nylon Gtr	3 0	C	100	100	100	3	OFF	Nylon Gtr	3 0
4	OFF	Finger Bs	3 0	C	100	100	100	4	OFF	Finger Bs	3 0
5	OFF	Harmonica	3 0	C	100	100	100	5	OFF	Harmonica	3 0
6	OFF	Rock Org	3 0	C	100	100	100	6	OFF	Rock Org	3 0
7	OFF	Violin	7 0	C	100	100	100	7	OFF	Violin	7 0
8	OFF	Viola	7 0	C	100	100	100	8	OFF	Viola	7 0
9	OFF	Cello	7 0	C	100	100	100	9	OFF	Cello	7 0
10	OFF	ContraBass	7 0	C	100	100	100	10	OFF	ContraBass	7 0
11	OFF	Harp	7 0	C	100	100	100	11	OFF	Harp	7 0

The parameters you can edit are:

- MUTE: Muting ON or OFF (muting ON means the instrument is off).
- INSTRUMENT: Select the instrument for this part from the standard GM instrument list.

- Ch: The MIDI channel which will be used to play this part.
- KEY: Sets transposition (from +63 to -64 semitones).
- PAN: Hard left is L63, center is C, hard right is R63.
- VOLUME: 0 is no output level, 127 is full volume. The on-screen fader moves as you change this value (there is no physical control corresponding to this fader).
- REVERB: The send level of this part to the tone generator's internal reverb effect.
- CHORUS: The send level of this part to the tone generator's internal chorus effect.

NOTE

The reverb and chorus of the tone generator are not connected with the other effects as described in "Effects" on page 31, and all settings etc. are independent of these "main" effects. It is not possible to use these tone generator effects with any sound sources other than the tone generator instruments.

In addition to the instrument settings, the last screen of the GM EDIT series also allows you to pick the effect to be assigned to the tone generator reverb and chorus effects. Apart from the type of effect, no parameters are available for editing the effect sounds:

Reverb	Chorus
ROOM1	CHORUS1
ROOM2 Room type reverbs	CHORUS2 Different "flavors" of
ROOM3	CHORUS3 chorus
HALL1	CHORUS4
HALL2 Hall-type reverbs	FEEDBACK Feedback effect
PLATE Plate-type reverb	FLANGER Flanger effect
DELAY Delay setting	SHRT DLY Short delay
PAN DLY Panned stereo delay	FB DLY Delay with feedback

NOTE

If you are playing back an SMF which includes any changes to these parameters, or if an external Control Change message is received to change any of them, the settings you make here are overridden.

Tempo map

Creating a tempo map is essential for working with beats and bars rather than minutes and seconds. If there is no tempo assigned to a song, the 2488 will have no way of “thinking” in bars and beats (see “Markers” on page 42 for details of how this is used), if it is not playing an SMF or patterns.

- 1 From the SYNC/MIDI menu item, select TEMPO MAP and press ENTER.

TEMPO MAP			
NO.	BAR	BEAT	TEMPO
00001	001	01	110.0
00002	009	04	130.0
00003	010	01	130.0
00004	014	01	100.0
00005	---	---	---

TIME SIGNATURE: 4/4

You can input up to 9999 tempo changes in one song. Tempos can be set between 20.0 and 250.0 beats per minute.

- 2 Use the cursor keys to navigate around the screen, and the wheel to change values.
- 3 Use the INSERT key to add a new line (tempo change) to the map, and the DELETE key to delete lines.

Tapping the tempo

In addition to setting numerical values for tempos, you can also tap along to the music in order to set the tempo.

- 1 With the transport stopped at the start, from the SYNC/MIDI screen, select TAP, and press ENTER.

ABS 00 _h 00 _m 00 _s 00 _f 0	
TAP	
TEMPO: ♩ =	0----- 16 48 L R
DIVISION..... ♩	
TIME..... 4	

Press PLAY key to play.

- 2 Set the tap DIVISION to either quarter notes (crochets) or eighth notes (quavers) and the lower parameter to either 2, 3 or 4 to tell the 2488 how many taps to expect when working out the tempo.

- 3 Press the PLAY key to start playback.

ABS 00 _h 00 _m 03 _s 15 _f 0	
TAP	
TEMPO: ♩ = 120	0----- 16 48 L R
DIVISION..... ♩	
TIME..... 4	

Press TAP key to start TEMPO MAP entry.

- 4 Press the TAP key to start entering the tempo to the map and tap. The time between taps is averaged out (either between two taps or four taps, as specified above) and added to the tempo maps for as long as you keep tapping and the transport is moving.

ABS 00 _h 04 _m 36 _s 45 _f 0	
TAP	
TEMPO: ♩ = 120	0----- 16 48 L R
DIVISION..... ♩	
TIME..... 4	

Press STOP key to stop TEMPO MAP entry.

- 5 Press STOP to stop the transport. The tapped tempos are now added to the map, which can be edited as described above.

Time signature

In order to accurately display bars and beats, the 2488 needs to know the time signature of the music being played.

Most pop and rock is in 4/4 time, but there are some famous exceptions, and many music outside these fields is in other time signatures.

Music may also change time signature part of the way through.

- 1 With the transport stopped, from the SYNC/MIDI screen, select TIME SIGNATURE, and press ENTER.

TIME SIGNATURE		
No.	BAR	TIME SIG.
001	001	5/4
002	009	4/4
▶ 003	010	4/4
004	014	12/4
005	---	---

- 2 This is very similar to the tempo map. Use the INSERT and DELETE keys to insert and delete entries and the cursor keys to scroll through the list.

Use the cursor keys and wheel to select and change the BAR in which the time signature changes (obviously, a time signature cannot change halfway through a bar!) and the time signature (TIME SIG.) itself.

- 3 Press ENTER when done.

Metronome

The metronome is an important tool to keep you in time while you play. The 2488's metronome can be a MIDI note output to an external tone generator, or it can be an audio click.

- 1 With the transport stopped, from the SYNC/MIDI screen, select METRONOME, and press ENTER.

METRONOME	
MODE	REC&PLAY
OUTPUT	INTERNAL
INTERNAL SETUP	
LEVEL	100

- 2 You can select the MODE of the metronome (when it will play) as either REC (the metronome plays through the monitoring system only when recording) or REC&PLAY (the metronome sounds both when playing back and recording).
- 3 The other parameter allows you to set up whether the metronome is an internal audio click (INTERNAL) or a MIDI note sent from the

MIDI OUT terminal (MIDI) or off (OFF). In the case of the INTERNAL setting, the level can be set between 0 and 127.

- 4 If MIDI is chosen, the following parameters can be set:

METRONOME		
MODE	REC&PLAY	
OUTPUT	MIDI	
MIDI SETUP		
MIDI Ch	10	
Position	Note	Velocity
Accent	C#-1	120
Normal	C#-1	120

Select the MIDI channel (MIDI Ch 10 is usually reserved for drums and percussion), and the Note and Velocity used for the Accent (the first note of each bar) and Normal beats.

Use the CLICK key above the transport keys can be used to turn the metronome click on and off easily (whether INTERNAL or MIDI is selected).

The indicator lights orange while waiting, and while the click is output, flashes red to mark the start of a bar, and green for other beats.

Patterns

In addition to being able to play SMF pieces, the 2488 can also play backing patterns (drums and percussion only).

Select PATTERN as the player mode to enable this feature (“Internal module mode” on page 76).

When the pattern mode is selected, pressing the **MIDI PLAYER** key brings up the PATTERN ARRANGE screen:

PATTERN ARRANGE				
BAR	TEMPO	STYLE	SECTION	LENGTH
1	120	RCK01	Intro	4
5	120	RCK01	VerseA	3*
8	120	RCK01	FillAB	1
9	120	RCK02	VerseB	3*
12	120	RCK01	FillBA	1
13	120	RCK01	Ending	4

TIME SIGNATURE: 4/4

To select a “global” playback style from this screen, press **ENTER**. The PRESET STYLE LIBRARY screen is shown:

PRESET STYLE LIBRARY	
STYLE	
RCK01	
RCK01	
RCK02	
RCK03	
RCK05	
RCK05	
RCK06	
RCK07	
RCK08	

Use the wheel to select from the range of styles, classified as rock, pop, etc.), and the **ENTER** key to confirm (the **EXIT** key cancels a selection) a style for the whole song, which is loaded along with its drum kit and its default tempo (the selected style replaces any previously-selected style throughout the whole song and the sections and lengths will change).

You can then use the cursor keys and wheel to select and edit (

- BAR at which the pattern starts
- TEMPO (in bpm)
- STYLE (set the individual section’s style from here)
- SECTION (this is the section of a song in the selected style, such as verse, fill, intro, etc.) The time signa-

ture of the selected section is shown at the bottom of the display.

- LENGTH (if you choose a length different to the default length of the selected section, the number of bars (measures) shows an asterisk * following it).

NOTE

Do not use **ENTER** to confirm your settings, as this will bring up the style library screen).

The tempos set here override any settings made using the tempo map (“Tempo map” on page 78).

All the settings made here become a part of the current song and are saved with it.

Deleting a section To delete a section from the arrangement, move the cursor to the section to be deleted, and use the **DELETE** key (locate section) to delete it.

Inserting a section To insert a section into the arrangement, move the cursor to the section above which the new part will be inserted, and use the **INSERT** key (locate section) to insert a new section which can then be edited.

Copying sections You may want to copy a number of sections that occur frequently in your song, such as verse+chorus+fill (which you can represent by different verse and fill variations). Here’s how you do it.

- 1 Move the cursor to the start of the block that you want to copy.
- 2 Press the **COPY TO** key (shifted **TRIM** key). The selected line is highlighted.
- 3 Use the wheel or cursor keys to move to the final section of the block that you want to copy.

PATTERN ARRANGE				
BAR	TEMPO	STYLE	SECTION	LENGTH
1	120	RCK01	Intro	4
5	120	RCK01	VerseA	3*
8	120	RCK01	FillAB	1
9	120	RCK02	VerseB	3*
12	120	RCK01	FillBA	1
13	120	RCK01	Ending	4

Set Copy Area.

4 Press ENTER.

PATTERN ARRANGE				
BAR	TEMPO	STYLE	SECTION	LENGTH
1	120	RCK01	Intro	4
5	120	RCK01	VerseA	3*
8	120	RCK01	FillAB	1
9	120	RCK02	VerseB	3*
12	120	RCK01	FillBA	1
13	120	RCK01	Ending	4

Set Insert Point.

5 Move the “line” cursor to the point to where the block will be copied and press ENTER once again. The block is copied.**NOTE**

If you select the bars and beats display (“Markers” on page 42), this reflects the settings made here.

Selecting the drum kit

The 2488’s tone generator includes a number of different drum kits, which you can use to give a different sound to your songs.

When a preset style is loaded, a suitable drum kit is also loaded along with the pattern type. The same drum kit is retained for the whole song.

With the PATTERN ARRANGE screen displayed, press **SHIFT** and **ENTER**.

DRUM KIT LIBRARY	
DRUM KIT	
STANDARD	
HI PITCH	
→LO-FI	
↑LAIN	
●JAZZ	
↓DISCO	
DEEP REV	
JUNGLE	
DRY	

Twenty different kits are available for use, including Latin sets, famous drum machine sounds, and so on.

Use the cursor keys or wheel to select a different drum kit for your song. Press **ENTER** when done (or **EXIT** to leave the kit as it is). The PATTERN ARRANGE screen is then shown.

MTC, MIDI clock, etc.

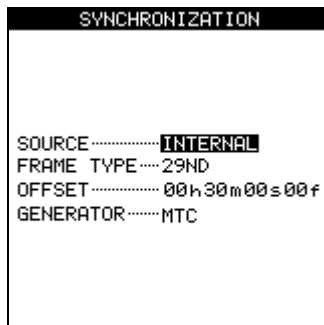
The 2488 can synchronize to external MIDI Time Code (MTC) or can generate MTC in order to synchronize other MIDI devices.

Other devices may be sequencers or DAWs which are enabled for MTC.

In addition it is capable of generating MIDI Clock commands which are typically used by drum and rhythm machines, as well as by some sequencers.

MIDI Time Code

With the transport stopped, from the SYNC/MIDI menu, select the SYNC option and press **ENTER**:



- SOURCE can be INTERNAL (the 2488 acts as the master unit) or EXTERNAL (the 2488 takes its synchronization from another unit).
- FRAME TYPE refers to the format of the MTC sent and received by the 2488. This can be either 24 (film), 25 (EBU TV), 29D (29 fps drop-frame, used with NTSC color), 29ND (29fps non-drop, also used with NTSC color), or 30 (NTSTC monochrome and often used for audio-only work)
- OFFSET allows you to select the offset of the 2488 relative to the incoming timecode (outgoing timecode is always the same as the absolute position). For example, your song always starts at the “all zeroes” position, but if you are dubbing it onto video at 30 minutes into the video, you should have an offset of 30 minutes set here.

- GENERATOR can be OFF, MTC or CLOCK. OFF and MTC explain themselves. See below for an explanation of the CLOCK setting.

NOTE

Timecode (including MTC) does not include any information about bars and beats or tempo. MIDI Clock does not contain any information about the absolute time at which events take place.

MIDI clock

MIDI Clock and associated MIDI commands (Start/Stop, Song Position Pointer etc.) can be transmitted from the 2488 when it is in INTERNAL mode and the GENERATOR parameter is set to CLOCK. In this setting, the 2488 can be used to control an external sequencers, drum machines, etc. whose audio outputs are fed to the 2488.

NOTE

Remember that there is no absolute time information contained in this MIDI Clock data. Any external devices synchronized to the 2488 which need timing information should either be synchronized using MTC, or have their own tempo maps.

Remote

From the SYNC/MIDI menu, this REMOTE option allows the setting of a number of parameters connected with remote control of the 2488.

REMOTE	
MIDI IN	
MODE	TG
MMC	
MODE	MASTER
Device ID	01
REMOTE CONTROL	
PROGRAM CHANGE SCENE	ON
PROGRAM CHANGE EFF	OFF
CONTROL CHANGE	ON

- MIDI IN MODE allows you to specify what will happen when MIDI messages are received. The choices are: OFF (incoming MIDI messages are ignored), TG (incoming MIDI messages control the tone generator) and REMOTE (incoming MIDI messages control

scene changes (“Scene memories” on page 29) and mixer parameters.

- MMC (MIDI Machine Control) The 2488 can act in MASTER or a SLAVE MODE, either controlling or being controlled by other devices in the system. Each device in such a setup must have an ID assigned to it. The settings here are from 1 to 127, or ALL (the last setting means that the 2488 will respond to all MMC commands received, not just those specifically addressed to it).

NOTE

It is possible for a device to act as an MMC master, and a timecode slave, or the other way around. MMC and timecode are independent of each other.

- REMOTE CONTROL settings. You can enable or disable Program Change messages for the following: SCENE and EFF (effect change). In addition you can turn CONTROL CHANGE messages on or off (for individual mixer parameters).

9 – General preferences

There are four sets of general preferences that you can make in order to customize the 2488 to your working style.

Access all of these through the PREFERENCES menu.

Global preferences

These all affect the overall operation of the 2488



Key sense time Some of the keys on the unit have two different functions, depending on whether they are pressed and released in a short space of time, or whether they are pressed and held down for a longer period.

The pitch control is a good example of this. If the **PITCH/SSA** key is pressed and released briefly, the pitch control is turned on. If it is pressed and held for the time set here, a screen appears allowing you to make the settings for the pitch and the slow speed audition functions.

The setting for the key sense time is from 0.3 to 2.0 seconds, in 0.1 second steps.

Meter peak hold time The meters shown on the home display and other pages can be configured to hold the peak value.

This parameter can take the following values: OFF, where the meters do not hold the peak value at all, ON; the peak meters hold the value for a second or so and then drop back, or KEEP, where the peak value is always shown on screen until this value is changed. You can also use **SHIFT + HOME** to clear these held peak values.

Use the cursor keys to highlight the parameter, and the wheel to change it

TIP

The KEEP setting is useful if you want a permanent record of the highest value, but you cannot keep your eyes on the meters during the whole take or rehearsal.

Meter release time The meter “drop-back” time can be configured to be from 30ms to 100ms in 10ms steps using the cursor keys to highlight the parameter, and the dial to change it.

Note that the meters are always peak meters, and the rise time is fixed.

Shift key behavior The **SHIFT** key can be used in one of three ways, as set by this parameter: AUTO SAFE, in which the **SHIFT** key can be pressed and released, and remain active for about a second; and UNLOCK, in which the key is non-latching; that is, you must press and hold the **SHIFT** key while pressing the other key to be shifted. The HOLD setting latches the **SHIFT** key on until another key is pressed.

Mixer preferences

As the name says, these affect mixer items:



Fader matching The option affects the way in which the physical and the virtual faders interact (see “Faders” on page 24). There are three options here:

- **REAL**: if the internal fader level is changed using a scene change or a MIDI Control Change, this is ignored. The actual physical fader is the only way in which the fader level is set.
- **JUMP**: the internal fader level jumps to the level set by the physical fader as soon as the physical fader is moved. Since this can result in sudden changes in volume, resulting in possible damage to hearing and monitoring equipment, this option should be used with caution.

- **CATCH:** the fader level remains the same initially. However, if you then move the physical fader so that the physical level becomes the internal level (the faders “catch” the internal level), the physical level changes at that point. This ensures that there are no sudden leaps in volume due to a difference between the physical fader and the internal setting.

NOTE

Note that the setting made for this option will apply to the current song, and any songs loaded afterwards, until the setting is changed.

Digital input The digital input can be assigned to any pair of inputs (A/B, C/D, E/F, G/H). These inputs may then be assigned to channels in the usual way.

Press the **ENTER** key to confirm the assignment. This assignment is not made until the **ENTER** key is pressed, with the digital source connected, and is not stored as part of the song information.

The 2488 can accept digital audio from 44.1 kHz sources.

Recorder

These preferences affect the recorder operation:

RECORDER	
PRE ROLL	1.5sec
POST ROLL	1.5sec

There are only two parameters here, used to change the pre roll and post roll times of the auto punch operation (see “Auto punch operations” on page 46).

User word

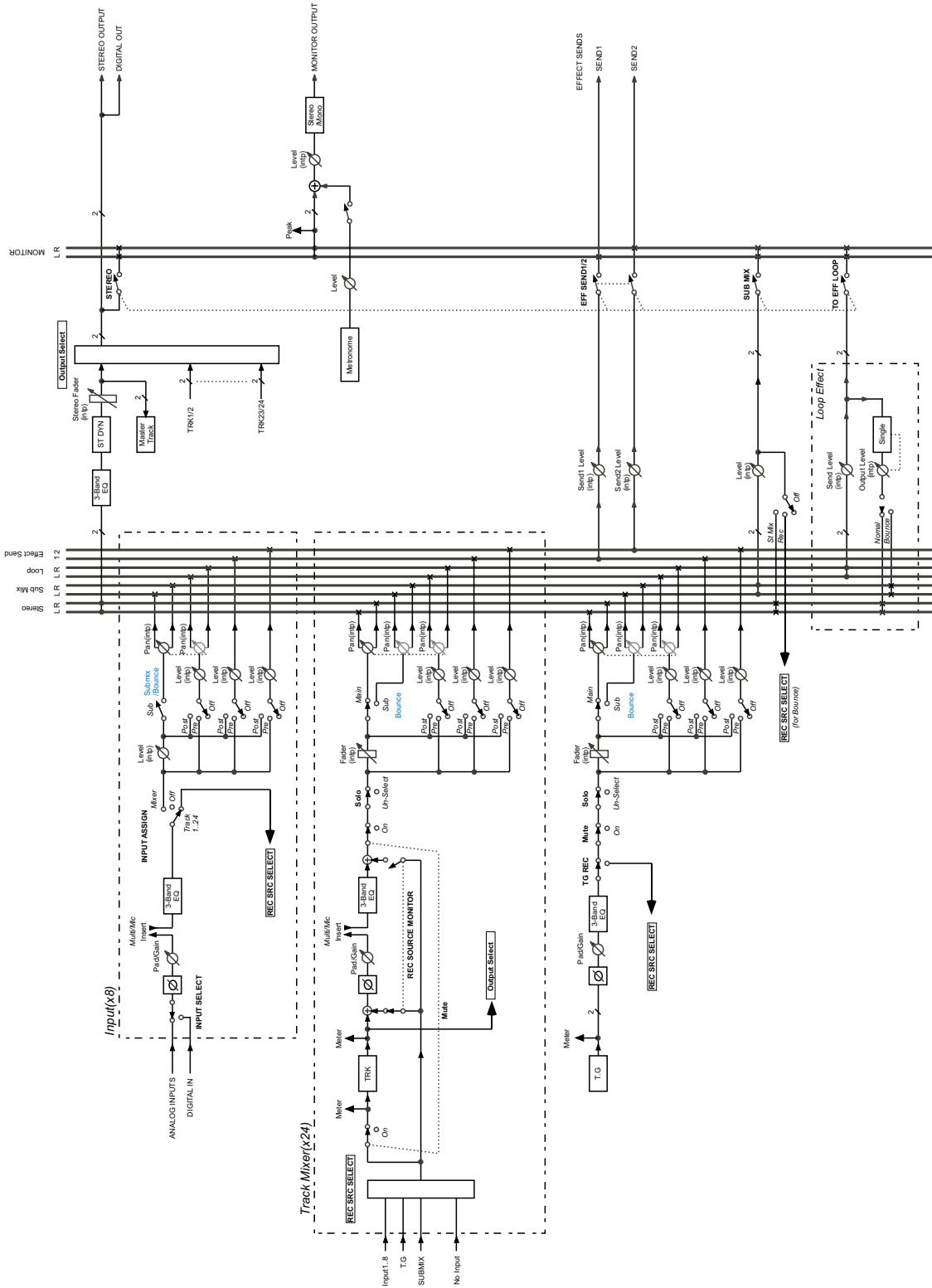
When titling, you can use preset words or phrases in your location points.

USER WORD	
WORD LIST	
	COUNT IN
	INTRO
	MELODY
↑	VERSE
●	CHORUS
↓	HOOK
	SOLO
	BRIDGE
	REFRAIN
Press SHIFT + MENU to edit WORD.	

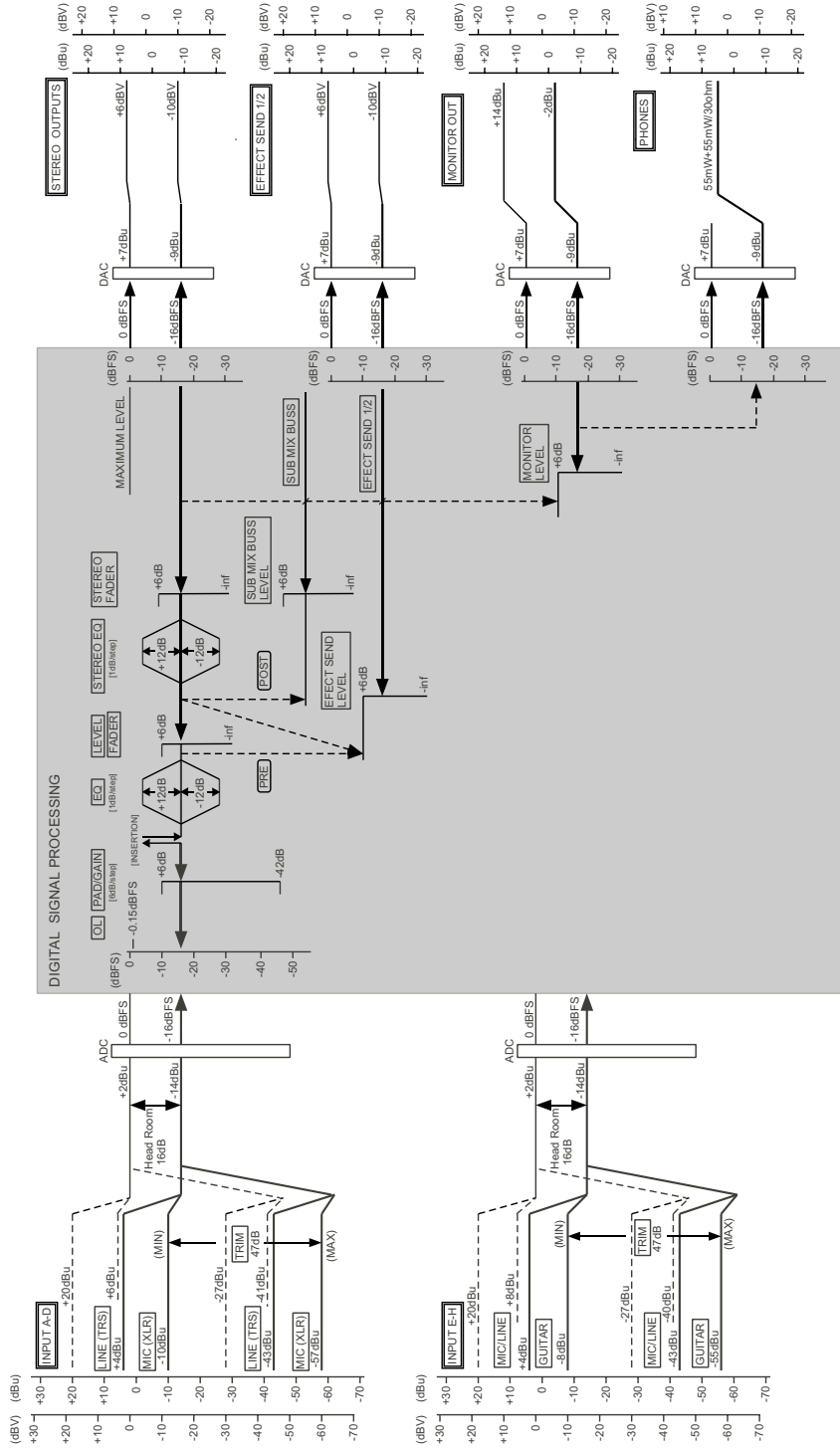
The 2488 comes with many standard useful phrases, but if you are playing a style of music not catered for by these words, you can use this preference screen to add your own words (up to 12 characters long), for example BANJO SOLO.

Select the word to be edited and then press **TITLE** (shifted **MENU**) to edit it, as described in “Titling” on page 12. Press **ENTER** when you have finished editing the word.

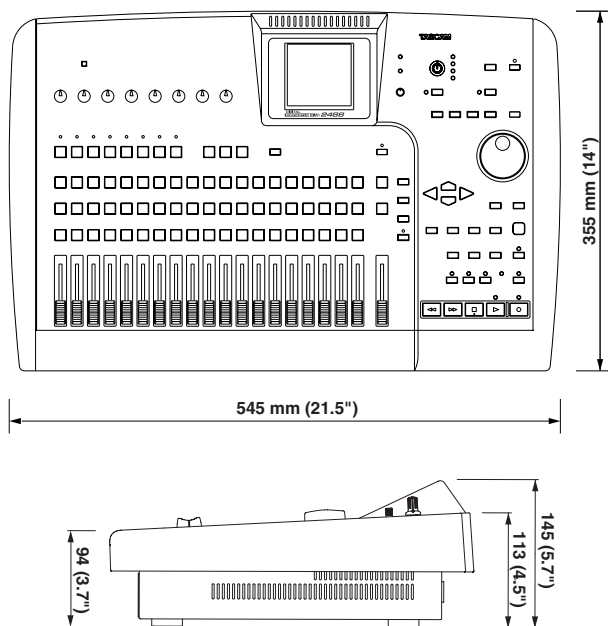
Block diagram



Level diagram



Dimensional drawing



Specifications

Audio connections

MIC/LINE inputs (A to D)	Combined XLR-1/4" TRS connector
XLR	Input impedance: 2 k Ω Input level: -57 dBu (MIC) to -10 dBu (LINE) Nominal input level: -10 dBu Maximum input level: +6 dBu
1/4" TRS	Input impedance: 8 k Ω Input level: -43 dBu (MIC) to +4 dBu (LINE) Nominal input level: +4 dBu Maximum input level: +20 dBu
MIC/LINE inputs (E to H)	1/4" TRS connectors (input H also has a GUITAR front panel unbalanced 1/4" jack—see below) Input impedance: 4 k Ω Input level: -43 dBu (MIC) to +4 dBu (LINE) Nominal input level: +4 dBu Maximum input level: +20 dBu
Input H (GUITAR)	Input impedance: 1 M Ω Input level: -55 dBu to -8 dBu
STEREO L/R outputs	2 x unbalanced RCA jacks Output impedance: 100 Ω Nominal output level: -10 dBV Maximum output level: +6 dBV
EFFECT SENDS 1 and 2	1 x unbalanced 1/4" jack per send Output impedance: 100 Ω Nominal output level: -10 dBV Maximum output level: +6 dBV

MONITOR L/R outputs	2 x TRS balanced TRS 1/4" jacks Output impedance: 100Ω Nominal output level: -2 dBu Maximum output level: +14 dBu
PHONES	Stereo 1/4" jack Maximum output level 55 mW + 55 mW (into 30Ω)
DIGITAL input	RCA jack Data format: IEC60958 consumer use (S/PDIF)
DIGITAL output	RCA jack Data format: IEC60958 consumer use (S/PDIF)

Audio performance

Sampling frequency:	44.1 kHz
Word length:	16-bit/24-bit (user-selectable, per song)
Crossfade time:	10ms
Number of tracks	24 (8 may be recorded simultaneously)
Frequency response	INPUTS A to H → STEREO/MONITOR/EFFECT SEND: 20Hz — 20kHz +1.0/-1.0dB (trim at min.)
Noise level (inputs with 150Ω terminator, faders at nominal, 20kLPF+A curve)	INPUTS A to H → STEREO/EFFECT SEND: <90 dBV → MONITOR <82 dBu (trim at min.)
Dynamic range	Faders at nominal, 20kLPF+A curve INPUTS A to H → STEREO/EFFECT SEND/MONITOR: >96 dB
Crosstalk	Faders at nominal, 20kLPF+A curve INPUTS A to H → STEREO/EFFECT SEND/MONITOR: >80 dB @ 1 kHz (trim at minimum, 1 input at max)
Total Harmonic Distortion	Inputs at Max, 20kLPF INPUTS A to H → STEREO/EFFECT SEND/MONITOR: < 0.01% (trim at min.)

Physical specifications, etc.

Dimensions (w x d x h)	545 x 355 x 145 (mm), 21.5 x 14 x 5.7 (in.)
Weight	8kg (17.6lbs)
Power requirements	(USA/Canada 120VAC, 60Hz International 230/240VAC, 50/60Hz)
Power consumption	41 W
Applicable electromagnetic environment:	E4
Supplied accessories	Power cord

TASCAM

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2488

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