

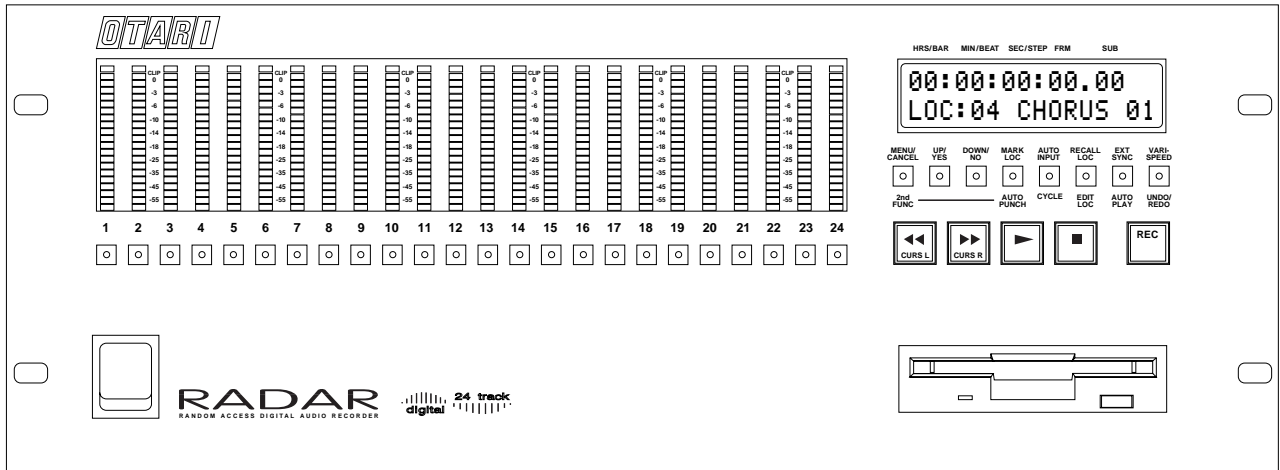


RADAR

RANDOM ACCESS DIGITAL AUDIO RECORDER

OPERATION MANUAL

Second Edition



CAUTION

To prevent fire or shock hazard:

Do not expose this unit to rain or moisture.

Do not remove panels (unless instructed to do so).

There are no user-serviceable parts inside.

Refer servicing to qualified service personnel.

PLEASE READ THROUGH THE SAFETY INSTRUCTIONS ON THE NEXT PAGE.

SAFETY INSTRUCTIONS

1. **Read Instructions** All safety and operating instructions should be read before operation.
2. **Retain Instructions** The safety and operating instructions should be retained for future reference.
3. **Heed Warnings** All warnings on the device and in the operating instructions should be complied with.
4. **Follow Instructions** All operating and use instructions should be followed.
5. **Water and Moisture** The device should not be used near water — for example, near a bathtub, wash bowl, sink, laundry tub, in a wet basement, near a swimming pool, etc.
6. **Carts and Stands** The device should be used only with a cart or stand that is recommended by the manufacturer.
7. **Ventilation** The device should be situated so that its location or position does not interfere with its proper ventilation. For example, the device should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
8. **Heat** The device should be situated away from heat sources such as a radiator, heat register, stove or other appliances (including amplifiers) that produce heat.
9. **Power Sources** The device should be connected to a power supply only of the type described in the operating instructions or as marked on the device.
10. **Grounding or Polarization** Precautions should be taken so that the grounding or polarization means of the device is not defeated.
11. **Power Cord Protection** Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the device.
12. **Cleaning** The device should be cleaned only as recommended by the manufacturer.
13. **Non-Use Periods** The power cord of the device should be unplugged from the outlet when left unused for a long period of time.
14. **Object and Liquid Entry** Care should be taken that objects do not enter and that liquids are not spilled into the enclosure through openings.
15. **Damage Requiring Service** The device should be serviced by qualified service personnel when:
 - A. The power supply cord or the plug has been damaged; or
 - B. Objects have entered, or liquid has been spilled into the appliance;
or
 - C. The appliance has been exposed to rain; or
 - D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
 - E. The appliance has been dropped, or the enclosure damaged.
16. **Servicing** The user should not attempt to service the device beyond what is described in the operating instructions. All other service should be referred to qualified personnel.

COMMUNICATION WITH OTARI

FOR SERVICE INFORMATION AND PARTS

All Otari products are manufactured under strict quality control. Each unit is carefully inspected and tested prior to shipment.

If, however, some adjustment or technical support becomes necessary, replacement parts are required, or technical questions arise, please contact your Otari dealer or contact Otari at:

Otari, Inc.

4-33-3 Kokuryocho, Chofu-shi,
182, Tokyo, Japan
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Fax : (81) 42481-8633
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Otari Singapore Pte., Ltd

40 MacTaggart Road
Singapore 1336
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Fax : (65) 284-4727
Telex : RS 36935 OTARI

Another part of Otari's continuing technical support program for our products is the continuous revision of manuals as the equipment is improved or modified. In order for you to receive the information and support which is applicable to your equipment, and for the technical support program to function properly, please include the following information, most of which can be obtained from the Serial number label on the machine, in all correspondence with Otari:

- Model Number:
- Serial Number:
- Date of Purchase:
- Name and address of the dealer where the machine was purchased and the power requirements (voltage and frequency) of the machine.

CERTIFICATIONS

FCC STATEMENT

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

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

Shielded cables and I/O cords must be used with this equipment to comply with the relevant FCC regulations.

Changes or modifications not expressly approved in writing by Otari, Inc. may void the user's authority to operate this equipment.

CANADIAN STANDARDS ASSOCIATION ASSOCIATION CANADIENNE DE NORMALISATION

 This product has been found to comply with all applicable CSA standards

UNDERWRITER'S LABORATORIES

This product has been found to comply with all applicable UL standards

LIMITED WARRANTY

The RADAR system and RE-8 session controller are warranted from the date of purchase to the original purchaser to be free from defects in material or workmanship for a period of one (1) year.

The hard disk drives contained within the RADAR chassis are warranted for a period of one (1) year.

This warranty does not apply to damage resulting from improper or negligent use, inadequate or improper packaging for shipment, damage incurred during shipment, or unauthorized modification.

The sole and exclusive remedy for breach of any warranty concerning the RADAR system, RE-8 session controller, and supplied internal hard disk drives shall be repair or replacement of defective parts at the discretion of Otari, Inc.

Repair or replacement of RADAR and/or RE-8 components will be performed at no charge for parts or labor for one (1) year from date of purchase to the original purchaser at a designated Otari service center or the factory, at Otari's discretion. Repair or replacement of the hard disk drives contained within the RADAR system will be performed at no charge for parts or labor for one (1) year from the date of purchase to the original purchaser at a designated Otari service center or the factory, at Otari's discretion.

Otari, Inc. disclaims any warranty, expressed or implied of suitability for specific use and disclaims any liability for incidental, special, or consequential damages.

Please Read this First...

Congratulations on the purchase of your new RADAR system!

In order for Otari to maintain contact with you regarding new system features for your RADAR machine and to provide you with the best service possible, we ask that you take a moment to fill out the form below and return it to us as soon as possible. Our address is:

Otari, Inc.
4-33-3 Kokuryocho, Chofu-shi
182, Tokyo, JAPAN
Attn: RADAR Service Department

RADAR User Information

Company:

Contact:

Address:

City: _____ **State & ZIP:** _____

Phone: _____ **Fax:** _____

Dealer:

Purchase Date:

RADAR S/N:

RE-8 S/N:

EXB-5G S/N:

EDB-3 S/N:

Type of Business

(Please check all that apply)

Music Recording TV Production Film Production

Broadcasting Other *(describe)* _____

**TO ALLOW US TO
SERVE YOU WITH THE
BEST CUSTOMER
SUPPORT POSSIBLE,
PLEASE TAKE THE TIME
TO FILL OUT AND
RETURN THE USER
INFORMATION FORM
ON THE REVERSE SIDE
OF THIS PAGE.
THANK YOU !**

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Welcome to RADAR!!!

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1.1 INTRODUCTION

Congratulations on your purchase of the Otari RADAR random-access digital audio recorder. RADAR has been designed to provide you with a fast, reliable, and feature-rich environment with which to record and edit audio material. All of us at Otari hope that you enjoy your system and that RADAR becomes an integral part of your day to day audio production needs.

1.2 RADAR SYSTEM FEATURES

Familiar Transport Controls: RADAR's familiar transport and track arming controls make it easy to become productive almost immediately; you get the advantages of advanced technology without needing to become a proficient computer user.

24 Discrete Audio Inputs and Outputs: RADAR acts just like a standard 24 track tape machine. Each track has its own balanced input and output. You can record on all 24 tracks at the same time to capture a live performance by a band or orchestra and then assign a separate external processor for compression or effects during mixdown.

Self-Contained System: RADAR is a fully integrated system. There are no compatibility, setup or interface problems arising from having to connect a computer with another manufacturer's audio card or external black boxes. This also makes RADAR much easier to learn for people who are not familiar with computers.

High Quality Digital Converters: The most important parts of a digital recorder are the converters that produce digital data from a microphone preamp or line mixer. RADAR's 16 bit input and 18 bit output converters use the latest technology for the purest sound possible.

Flexible Sync Capabilities: We have placed great emphasis on developing reliable external synchronization for RADAR. On RADAR, external sync is not an expensive option package, but is included in every system. And, RADAR's sync functions are flexible enough to tolerate variable speeds from the timecode source.

RADAR's transport speed control can continuously synchronize to wild SMPTE timecode. A highly specialized clock circuit can effortlessly track a varying SMPTE signal from a tape machine even if Varispeed has been applied; RADAR can even lock to timecode in reverse!

Manual or Automatic Punching with Undo: Punch-ins or punch-outs can be done in exactly the same way as on a tape recorder. You may arm tracks on the fly, punch into record manually on the fly, and/or punch into record automatically at marked punch points. RADAR's accuracy enables you to reliably punch the same location(s) over and over—and its Undo feature allows you to experiment with punch-ins until they are perfect!

Because of RADAR's unmatched processing power, there is no limit to the number of tracks that can be simultaneously punched, and RADAR's smooth adjustable crossfades make for seamless punch points.

RE-8 Session Controller (option): The RE-8 session controller is a dedicated remote control surface with all the features you'd expect from an Otari remote: track arming keys, transport, auto-location, and editing controls, plus a jog/shuttle wheel for accurate editing.

Modular System with Upgrade Path: RADAR can be purchased initially as an 8 track recorder with the chassis ready to accept up to two additional EM-8 8-track expansion kits for each additional 8 tracks. All the metering hardware and connectors are already on RADAR, making internal expansion easy and fast. Otari also offers the EDB-3 external disk drive chassis—this option adds up to three external disk drives for additional recording capacity. A RADAR system with this option can record on the internal drives, the external drives, or both. For more information about these options, please contact your Otari representative.

1.3 AN OVERVIEW OF HARD DISK RECORDING

The term hard disk recording refers to the conversion of analog audio signals from a microphone or instrument into digital form (data) and storing it on a hard disk drive. A hard disk could be compared to a roll of tape used in analog recording.

This is where the comparison ends, because once the data is stored on the disk it can be manipulated in ways much superior to tape (such as less generational loss during copying, instant location to any point within the program material and word processor or sequencer type editing of sound).

The digital conversion process is done by the analog-to-digital converter which takes a snapshot (sample) of the analog signal forty-four (or forty-eight) thousand times a second and transforms it into a number. This number is represented as a word in binary form eg. 1010110010100101. RADAR is a 16-bit system meaning that the data word has 65,536 different levels of resolution per sample. This sample is sent to RADAR's DSP (Digital Signal Processing) unit and on to the disk drive where it is stored as a tiny magnetized area.

A hard disk is similar to a phonograph in that it has spinning platters and a pickup mechanism. The main difference would be that the pickup arm of a hard disk never makes contact with the platter, but merely hovers over it and reads the data magnetically. Hard disk technology has improved dramatically in the last few years to the point where disk lifetime is measured in hundreds of thousands of hours of constant use; this is with absolutely no maintenance.

Converting back to audio form is done when the drive reads the data and sends it back to the CPU. From the CPU, the signals travel to the digital-to-analog converters and on to the mixer to become sound again. When sound is recorded and played back digitally it accumulates extremely low levels of distortion from analog to digital and back to analog form. The dynamic range (the difference between the quietest and loudest sounds) of the original signal is preserved so well that compression or gain riding is unnecessary to achieve a high signal to noise ratio.

1.4 MANUAL OVERVIEW

This manual is organized as follows:

Section 1 Welcome & Introduction
Section 2 Product Overview of Operation/Getting Started!
Section 3 Recording & Transport Operation
Section 4 RADAR Menu Features
Section 5 External Synchronization Features
Section 6 RE-8 Session Controller Features
Section 7 RADAR Editing Features
Section 8 Backup/Restore Operation
Appendix A Hardware/Software Installation
Appendix B Maintenance
Appendix C Exploded View Drawings & Parts Lists
Index

About this Manual: This manual is a comprehensive guide to operating RADAR that covers all of the functions available at the time of printing. Explanations of some recording basics are briefly covered to help the less experienced operator.

Because RADAR has two physical control interfaces, the front panel and the RE-8 session controller, operation of certain functions may be slightly different and where necessary are described separately.

How to Avoid Reading this Manual! While we put lots of effort into creating up-to-date, accurate, and lively documentation, we know how often people actually read the manual.

THEREFORE! Save yourself time and trouble—be sure to read the Product Overview/Getting Started section (Section 2)!

1.5 RADAR HARDWARE SPECIFICATIONS

1.5.1 AC Power

IMPORTANT!

IT IS EXTREMELY IMPORTANT WHEN FIRST HOOKING UP RADAR THAT, BEFORE THE UNIT IS POWERED UP, THE LINE VOLTAGE SELECTOR SWITCH IS CORRECTLY SET. IF THIS IS SET INCORRECTLY, THIS COULD EXTENSIVELY DAMAGE RADAR'S INTERNAL CIRCUITRY.

RADAR has a universal power supply that can accommodate AC voltages and frequencies anywhere in the world. The standards used by different countries fall in either of two ranges—100 to 120 volts at 50/60 Hz or 220 to 240 volts at 50 Hz. A switch on the back panel of RADAR determines which of these is to be used to provide power.

- **Power Requirements:** Switchable between AC 50/60 Hz, 100/120 V +5/-10% or AC 50 Hz, 220/240 V +5/-10%
- **Power Consumption:** 250 VA Max
- **Certifications:** UL, CSA, and FCC Class "A" certified

1.5.2 Audio Inputs & Outputs

RADAR has 24 audio input and 24 output female connectors on the rear panel. They will accept a two or three conductor male phone plug depending on whether your system is balanced or unbalanced. The jacks are high quality, quarter inch phone-type connectors that use a minimum amount of space. Each connector is bolted directly to the chassis for maximum strength.

Please Note: RADAR inputs and outputs are cross-coupled, so that both input and output levels stay the same if one side is using an unbalanced cable and the other is using a balanced cable.

An Overview of Level Standards and Balancing: RADAR can accept the two most common standards of analog input and output defined by the terms “plus 4” and “minus 10”. Generally, professional studio equipment’s inputs and outputs are balanced signals with the 0 VU level set at +4 dBu. Semi-professional and consumer equipment’s inputs and outputs are generally unbalanced signals, with 0 VU set to -10 dBV. These standards evolved from the different paths taken by separate industries developing their own audio equipment. To obtain an optimum signal to noise ratio, your mixing console and RADAR should be set to the same level; separate switches are provided on RADAR’s rear panel for selecting input and output level.

Balanced vs. Unbalanced Signals: Balanced audio cable has three conductors: two conductors carrying the same signal at opposite polarities and a ground. Balancing generally results in lower susceptibility to electromagnetic (EMI) and radio frequency (RFI) induced noise, and permits longer cable runs without risk of interference. As well, balanced cables do not necessarily need to be grounded at both ends and this means fewer ground loop problems. On the other hand, unbalanced cables have two conductors only: one for signal and one for return. The return must always be grounded in order for signal to flow. This scheme is more susceptible to radio or electromagnetic interference and poor quality cables can be noisy if they are handled. Many studios, however, successfully use unbalanced lines and they should not present problems if the equipment in the studio is properly grounded. *Wiring diagrams for balanced and unbalanced cables appears in Appendix A.*

1.5.3 Input and Output Reference Levels

Zero dB in digital audio equipment is the maximum signal level that an input device such as a mixer, effects unit or recording machine can accept to gain optimum signal-to-noise ratio before distorting. When a VU meter shows an input signal level of 0 VU, +4 gear will be actually 4 dB above .775 volts RMS. When the meter shows 0 VU on -10 gear, the signal is 10 dB below 1 volt RMS. RADAR will adjust its meter sensitivity to your selection.

RADAR can accept either of the two standards for reference level; +4 and -10. These levels may be set using switches on RADAR’s rear panel. (For further information, please refer to §2.3 or Appendix A.)

1.5.4 Grounding

The analog audio circuitry in RADAR operates with a separate ground, which is not connected to the AC power ground. This allows the user to determine the grounding scheme that best suits their studio's requirements.

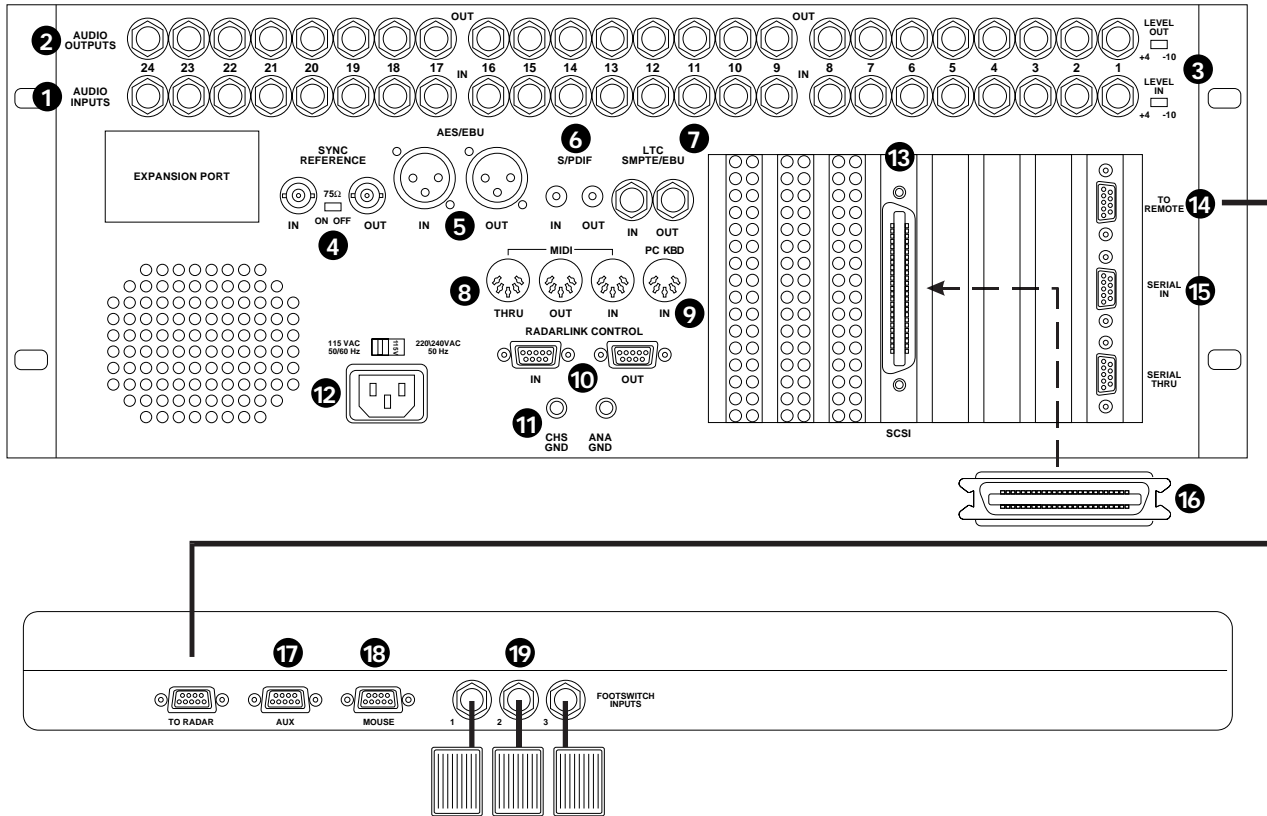
There are two grounding terminals on RADAR's back panel; CHS GND is connected directly to the metal chassis and the ground wire of the incoming AC power line. ANA GND is connected to the sleeve of each audio input and output including the SMPTE IN and OUT.

RADAR is shipped with the ANA GND and the CHS GND connected. If grounding problems do occur (hum or excessive crosstalk), the ANA GND and CHS GND may be unstrapped, and/or the analog ground may be connected to the technical ground shared by other equipment in the studio.

1.6 CONTROLS & INDICATORS

Please Note: This information is provided to familiarize you with your RADAR. Complete installation instructions appear in Appendix A.

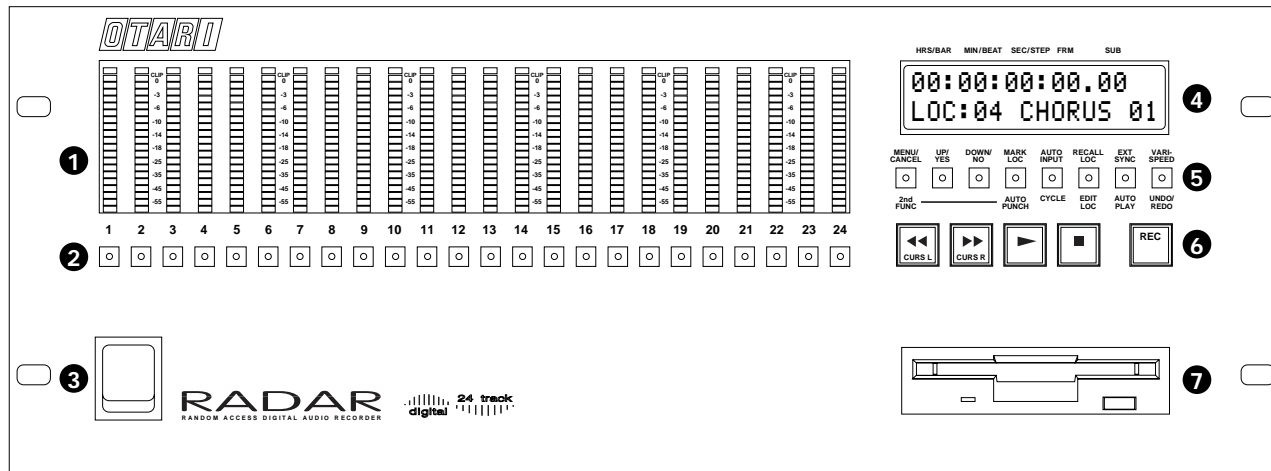
1.6.1 Rear Panel Connectors



- [1] Audio Inputs
- [2] Audio Outputs
- [3] -10/+4 Level Settings
- [4] Video Reference/Word Clock Input
- [5] AES/EBU Digital I/O
- [6] S/PDIF Digital I/O
- [7] SMPTE Timecode In/Out (*SMPTE output not currently active*)
- [8] MIDI Connections (*not currently active*)
- [9] PC Keyboard Connection (*not currently active*)
- [10] RADARLINK
- [11] External Grounding
- [12] AC Power Input Receptacle
- [13] External SCSI Port
- [14] RE-8 Connector
- [15] External Machine Control (*not currently active*)
- [16] SCSI Terminator: This must be installed here, or as the last item on the SCSI "chain".
- [17] RE-8 Session Controller Connector
- [18] Mouse Port (*not currently active*)
- [19] Foot Switch Inputs

1.6.2 RADAR Front Panel Controls & Indicators

Refer to this diagram to navigate RADAR's front panel:



- [1] **Meters and Input Level References:** For more information see §3.3.
- [2] **Track Arming keys:** For more information see §3.2.
- [3] **Power On/Off switch:** For more information see §2.4.
- [4] **LCD:** For more information see Section 4.
- [5] **Front Panel Function keys:** Consult the Index in this manual for individual descriptions.
- [6] **Transport keys:** For more information see Section 3.
- [7] **Floppy Disk Drive:** High density 3.5 inch floppy disk drive; software upgrades will be received through this drive. (See Appendix A for further information.)

IMPORTANT!

SYSTEM BOOT SOFTWARE IS ALREADY INSTALLED ON THE RADAR HARD DRIVE; THEREFORE IT IS NOT NECESSARY TO PUT THE SUPPLIED SYSTEM SOFTWARE DISKETTE IN THE DISK DRIVE. DO, HOWEVER, KEEP THE SYSTEM DISKETTE HANDY SHOULD IT BE NEEDED IN THE FUTURE.

1.7 IMPORTANT INITIAL INFORMATION

IMPORTANT NOTE #1:

Do not power up RADAR before checking that the AC power setting is correct for your area! This is preset at the factory for the shipping destination but it may still be incorrect. The switch is located at the lower left corner of the RADAR by the fan outlet vent.

IMPORTANT NOTE #2:

Do not power up RADAR unless the SCSI terminator is connected correctly. If you have no external backup device or hard drives connected, the terminator must be plugged into the SCSI port on RADAR. If you do have external devices connected, the terminator must be connected to the SCSI through port on the last external device.

IMPORTANT NOTE #3:

Always power down RADAR through the menu. The Shutdown submenu is for this purpose. Never power down while the LCD displays the Saving State message. The Saving State function organizes the contents of RADAR's RAM (temporary memory) and writes it in more permanent form to the hard disks. Saving State will occur only after recording or changing data, for example, after Record, Edit, Edit Loc and Marking In and Out points. It has been timed to occur five seconds after returning to Ready mode from these operations. (*This time is adjustable on the Preferences menu.*)

IMPORTANT NOTE #4:

If you want to "wipe the disks clean" (because you backed everything up and want to start with a fresh system, select "ERASE ALL DISKS" from the Project menu.

DO NOT select INIT DISKS from the Diagnostics menu, since you will erase the system software as well as the audio data! Use this function ONLY under supervision of Otari Technical Support!

Section 2 Product Overview/Getting Started!

This section includes the following subsections.

2.1	INTRODUCTION	2-2
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2.2.1	AC Power Level Setting	2-2
2.2.2	SCSI Terminator Installation	2-2
2.3	AUDIO INPUTS/OUTPUTS	2-3
2.3.1	About Audio Reference Levels	2-3
2.3.2	Audio Connections—Analog	2-3
2.3.3	Audio Connections—Digital	2-4
2.4	POWER ON/OFF PROCEDURE	2-5
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2.6	RECORDING & PLAYBACK OVERVIEW	2-6
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2.10	RADAR PROJECTS OVERVIEW	2-11
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2.10.3	Switching Between Projects	2-11
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2.10.1	Edit Markers (MARK IN, MARK OUT)	2-14
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2.1 GENERAL

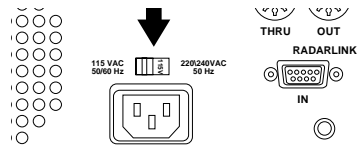
This section provides information on how to get started quickly and trouble-free on RADAR. This section divides into subsections which describe some helpful RADAR features, and provides some basic operation.

For convenience, a brief installation overview is provided here; however Appendix A provides complete system installation instructions.

2.2 BEFORE STARTING—PLEASE READ THIS!

In order to avoid inconveniencing yourself, and/or to avoid damaging the system, follow a few precautions:

2.2.1 AC Power Level Setting



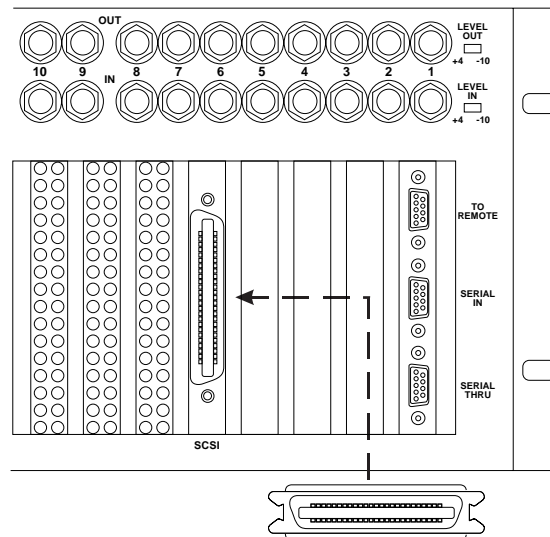
Please check the AC voltage setting on the back panel for the proper line voltage for your area! If you set this incorrectly, poor system performance (and/or smoke) may result!

If the voltage setting is incorrect, use a flat-blade screwdriver to change it.

2.2.2 SCSI Terminator Installation

Please check that the SCSI terminator is attached to the rear panel's SCSI connector!

CAUTION!
IF THE TERMINATOR IS NOT PROPERLY INSTALLED, POOR SYSTEM PERFORMANCE WILL RESULT!



Please Note: If you have a backup device connected, make sure that the SCSI terminator is attached to one of the SCSI connectors on the backup unit.

2.3 AUDIO INPUTS/OUTPUTS

RADAR uses 1/4" phone plugs for audio input and output; these may be balanced or unbalanced, +4 or -10 signal level. RADAR's AES/EBU inputs and outputs use one XLR cable per pair; the S/PDIF inputs and outputs use RCA connectors.

2.3.1 About Audio Reference Levels

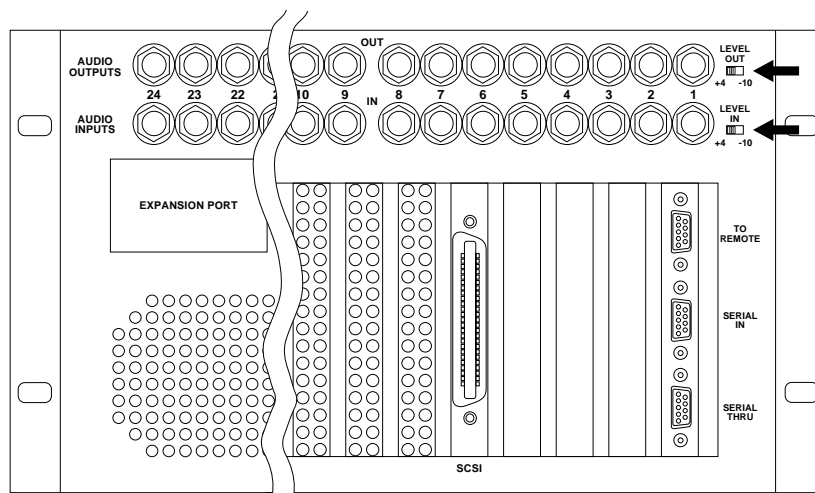
Zero dB in digital audio equipment is the maximum signal level that an input device such as a mixer, effects unit or recording machine can accept to gain optimum signal-to-noise ratio before distorting. When a VU meter shows an input signal level of 0 VU, +4 gear will be actually 4 dB above .775 volts RMS. When the meter shows 0 VU on -10 gear, the signal is 10 dB below 1 volt RMS. RADAR will adjust its meter sensitivity to your selection.

RADAR accepts either standard reference level; +4 and -10. These levels are set using switches on the rear panel (see Step 3, below). ***Be sure to consult your audio mixer's manual if you are unsure of the proper level at which to set RADAR.***

Please Note: The input and output levels do not always have to be set to the same settings. The input could be set to +4 dBu and the outputs could be at -10 dBV. This may be useful in the situation where a +4 dBu microphone preamp is connected directly to one of RADAR's inputs and you are using an -10 dBV unbalanced mixing console.

2.3.2 Audio Connections—Analog

1. Connect source audio to the audio inputs (on the lower row).
2. Connect a console (or other monitoring system) to the corresponding outputs (top row of RADAR connectors).
3. Set the LEVEL IN and LEVEL OUT switches to the correct level (i.e., +4 or -10). ***Please note that these switches may be set differently!***



2.3.3 Audio Connections—Digital

RADAR provides both AES/EBU (professional) and S/PDIF (consumer) digital audio interfaces. AES/EBU uses one balanced, XLR cable per pair; S/PDIF uses one unbalanced RCA cable per pair.

RADAR can record stereo digitally on any two track pairs, and can output digitally from any two adjacent track pairs (that share the same disk drive). Complete instructions for this feature appear in §3.17.

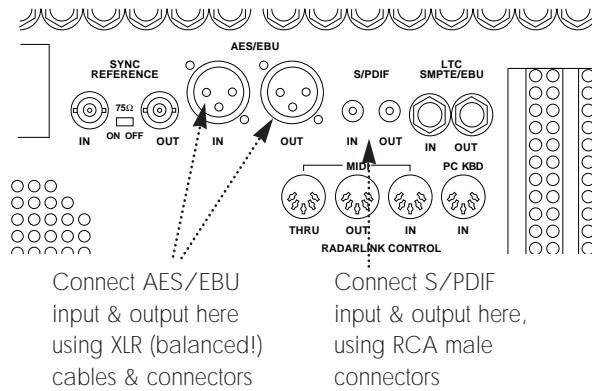
Please Note: Be sure to use the highest-quality shielded cables and best quality connectors for any digital audio application!

If using AES/EBU:

1. **Connect an AES/EBU source to RADAR’s AES/EBU IN XLR (female XLR connector), as shown below.**
2. **Connect RADAR’s AES/EBU OUT XLR to the desired device using a properly shielded cable and a female XLR cable connector, as shown.**

If using S/PDIF:

1. **Connect an S/PDIF source to RADAR’s S/PDIF IN (female RCA jack), as shown below.**
2. **Connect RADAR’s S/PDIF OUT to the desired device using a properly shielded cable and a male RCA cable connector, as shown.**



2.4 POWER ON/OFF PROCEDURE

2.4.1 Power Up Procedure

Please Note: Turn the backup device's power on before turning on RADAR.

Press the power switch located on the left side of the front panel of RADAR to the On position. RADAR will take a few moments to go through its power-up routine, and the LCD will display the following patterns:

```

RADAR
DIGITAL 24 TRACK
↓
DRIVES FOUND: 3
TESTING SCSI: 6
↓
Booting From
Floppy....
↓
Booting From
SCSI 0: \
↓
00:00:00:00.00
 * MOUNTING *
    
```

And finally...

```

00:00:00:00.00
LOC:01
    
```

This display means that RADAR is ready for operation. The LCD shows the current SMPTE location, and current location point.

2.4.2 Power off Procedure

IMPORTANT: DO NOT SWITCH OFF BEFORE MENU SHUTDOWN.

Before pressing the power switch to power down, you must have RADAR save system data to the hard disks.

1. **Press MENU/PREV (on RE-8) or MENU/CANCEL (on front panel).** The system will display the Main menu.

2. **Use the DOWN key to scroll to the last submenu, or simply turn the jog wheel to the right until the following item appears in the LCD:**

```

MAIN MENU:
SHUTDOWN RADAR
    
```

3. **Press ENTER.** RADAR will ask you to confirm the shutdown.

```

SYSTEM SHUTDOWN
PROCEED? NO
    
```

4. **Use the cursor up/down keys to change between NO and YES (or turn the jog wheel to make the selection). Press ENTER.** The LCD will indicate it is saving the current system state, then confirm a safe shutdown:

```

YOU MAY SAFELY
TURN OFF POWER
    
```

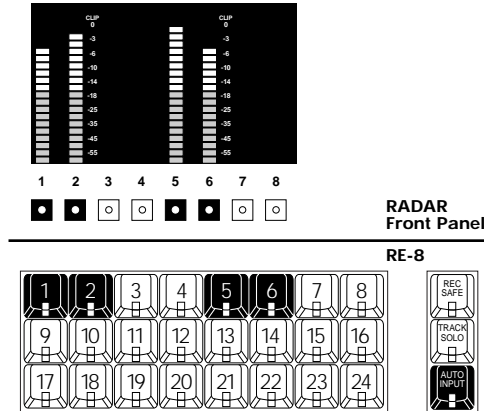
5. **Turn the power switch Off.**

Please Note: After a shutdown, RADAR cannot be operated again until the power has been switched off then on!

2.5 ARMING TRACKS OVERVIEW

Both the front panel and the RE-8 have track arming keys for all tracks—when tracks are armed, the key(s) show red flashing lights.

1. **Arm the track(s) you want to record on using the track arm keys on the front panel, or on the RE-8.**
2. **Cue and start the audio source.** You will see input levels on the front panel level meters:



3. **While watching the levels display(s) on the front panel, set the audio input levels to a safe (i.e. non-clipping) level using the console, etc.**

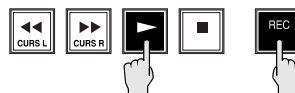
IMPORTANT NOTE: The maximum recording level allowable before digital clip is +22 dBu. This level corresponds to 0 dB on RADAR's meter display.

Clip Indicator LEDs: The red clip LED located at the top of each individual meter indicates that the input signal has clipped. More information about the clip indicators appears in §3.3.2.

2.6 RECORDING & PLAYBACK OVERVIEW

Recording and playback use the transport keys on either the front panel or the RE-8 session controller.

1. **To enter record, press/hold PLAY then press REC, or... press/hold REC and press PLAY.**



2. **Press PLAY to drop out of record with the transport still rolling, or press STOP to stop both recording and the transport as well.**
3. **To enter PLAY at any time, simply press PLAY.**

Please Note: Two methods of entering Record are provided—the traditional two-key method described here, or the REC key only. The desired method may be selected on the Preferences menu, described in §4.3.4.5.

2.7 LOCATING IN THE RECORDED AUDIO

RADAR provides a number of methods for locating the transport—you may use the transport controls or Jog/Shuttle features, you may enter the desired time and locate there, or you may set and recall autolocate points.

Please Note: Instructions on RADAR’s autolocator and direct time entry features are provided in §3.12.

2.7.1 Locating Using Fast Wind Keys

You may use the fast-wind keys to locate forward or backwards in the audio.

Please Note: Press the key once to fast-wind at six times play speed. Or, double-press the key to fast-wind at eighteen times play speed. (Other speed settings for fast-wind may be specified on the Preferences menu, described in §4.3.4.)

Cue to Audio: You may use RECALL LOC plus the fast wind keys to skip to the beginning or end of a silent section. *This feature is described in §3.12.1.2.*

2.7.2 JOG/Shuttle Operation (RE-8 only)

RADAR’s Jog/Shuttle modes provide fast, precise location in recorded material. Shuttle mode uses the jog wheel to vary the speed and direction of audio for locating points; Jog mode allows you to “scrub” the audio to find exact locations.

Please Note: The jog wheel may also be used as a convenient control device when scrolling through RADAR’s menus. When used as an input device, turning the wheel to the right increases the value on screen, and turning it to the left decreases the value.

2.7.2.1 Entering Jog Mode

Press the JOG key to the left of the wheel to engage Jog mode:



Turning the wheel clockwise or counterclockwise produces variable speed playback for as long as you continue turning it. When you stop turning the wheel, playback will stop. The speed of playback varies from scrub where you can accurately locate the first transient of an audio waveform by rocking the wheel gently forward and backward to slightly above normal playback speed.

Jog “Bump”: You may “bump” the current location while in Scrub by pressing the cursor left or right keys. Each cursor press will nudge the jog location by the smallest possible wheel increment.

To exit Jog mode, press any key (including JOG).

2.7.2.2 Entering Shuttle Mode

Press SHUTTLE (located below JOG) at any time to engage Shuttle mode:



Shuttle produces playback at variable speeds like Jog with one difference; when you stop turning the wheel, playback continues at the current speed until you move the wheel again or press a transport key.

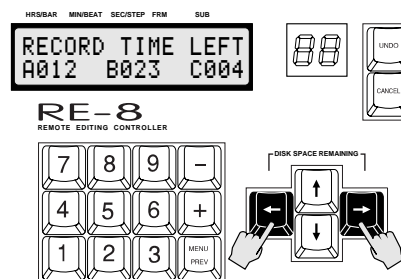
To exit Shuttle mode, press any key including SHUTTLE.

2.8 DISK TIME AVAILABLE

To check the amount of disk time available to you, press/hold the RE-8's cursor left and right arrows. The display will show the amount of free time on each of the system's hard disks.

The display is in ACTUAL recording minutes available—if you have 20 minutes of track time available on Disk 1, and no tracks armed, it shows 20 minutes. If, however, you have two tracks armed for recording, it will show 10 minutes (i.e. 10 minutes per track x 2 tracks = 20 minutes).

Please Note: If tracks are armed for a particular disk, the time left number for that disk will flash on and off.



Please Note: Disk Time Available is also available as an item on the System Menu (§4.3.1).

2.9 NAVIGATING RADAR'S MENUS

2.9.1 Menu Overview

RADAR provides a set of menus on the LCD for access to features that are used less often and do not require a dedicated key. The menu system consists of layers of topics ranging from general categories (five) to more specific functions; many of these end in what we call a “dialog”, which is a menu that needs your input.

When you press the MENU key on the RE-8 or the MENU/CANCEL key on the front panel, the LCD screen presents you with a Main menu, which includes the most general listing of topics:

SYSTEM MENU
PROJECT MENU
EDIT MENU
PREFERENCES MENU
DIAGNOSTIC MENU
SHUTDOWN RADAR

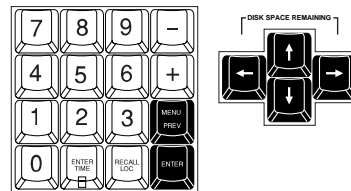
From these choices, you select more specific items called submenus. From a submenu, you will be presented with an editing dialog or an additional submenu.

2.9.2 Moving Around in Menus

Menu navigation is slightly different between the front panel or RE-8 session controller.

2.9.2.1 Menu Operation using the RE-8

The MENU/PREV and ENTER keys, plus the cursor keys, are used to enter/exit the menu and to travel up and down through the menu system, as shown. The jog wheel may be used to scroll quickly through menus—and when a menu item is selected requiring input, the jog wheel may be used to “dial in” a value.



2.9.2.2 Front Panel Menu Operation

The row of keys beneath the front panel’s LCD enable you to enter/exit the menu and to travel up and down through the menu system. However, to conserve key usage, the FFWD, RWD and STOP keys perform alternate functions while in Menu mode. (These keys are printed with two legends indicating their menu functions.)

RWD doubles as the cursor left control. This is for cycling *backward* through options shown in the LCD prompt.

FFWD doubles as the cursor right control. This is for cycling *forward* through options shown in the LCD prompt.

STOP doubles as the ENTER key. You may use the STOP/ENTER key to accept a choice offered in the LCD prompt.

2.9.3 Navigating the Menu

From the RE-8: Press MENU/PREV to enter the menu. (Press again or press CANCEL to exit.)

Please Note: You may enter the menu while playing or recording without interrupting either mode. Transport controls are inactive until you exit Menu mode.

Pressing MENU/PREV any time you are within the menu will cancel the last entry and present the previous (higher-level) menu. You can continue pressing MENU/PREV to cycle backward through the submenus and exit to Ready mode, or... you may press CANCEL at any time to leave the Menu and any other dialog screen right away. To select an item (or a submenu), press ENTER.

From the Front Panel: Press and release the MENU/CANCEL key to enter the menu. (There is no PREV function as on the RE-8.) You may only CANCEL back to Ready mode. Use the front panel keys to move through the menus; you may also use the UP/YES and DOWN/NO keys to enter numeric values.

2.9.4 Menu Structure

The Main menu is available, from the RE-8, by pressing the MENU/PREV key. Or, you may press the MENU/CANCEL key on the front panel.

Use the UP and DOWN keys (front panel) or the jog wheel (RE-8) to scroll through these listings.

Please Note: For a detailed description of all RADAR menu items, please refer to Section 4.

SYSTEM MENU	SYSTEM VERSION SHOW DISK SPACE DIGITAL I/O SYNC OUTPUT CONFIGURE DISKS SET TIME & DATE UPGRADE SYSTEM	PREFERENCES MENU	DEFAULT SMPTE FIELD TRACK SOLO MODE LOW DISK WARNING SLIDE TIME UNITS RECORD MODE FFWD & REW RATE PEAK HOLD TIME CLIP HOLD TIME SAVE STATE DELAY
PROJECT MENU	BACKUP MENU RESTORE MENU GOTO PROJECT CREATE PROJECT NAME PROJECT COPY PROJECT DELETE PROJECT SAMPLE RATE START TIME SYNC OFFSET RECLAIM SPACE RENUMBER LOCATES ERASE ALL DISKS	DIAGNOSTICS MENU	SCAN SCSI BUS MOUNT / UNMOUNT INIT DISK CHECK DISK REPAIR DISK SHOW FREE RAM CONFIGURE DEBUG SHOW DEBUG SAVE DEBUG PLAYLIST ERRORS REALTIME ERRORS
EDIT MENU	UNDO/REDO MODIFY EDIT CUT COPY PASTE MOVE ERASE LOOP SLIDE REVERSE LISTEN IMPORT *.WAV CROSSFADE TIME RECORD SAFE	SHUTDOWN RADAR	

2.10 RADAR PROJECTS OPERATION

In many ways, RADAR behaves exactly like a reel-to-reel tape machine. However, RADAR provides many important features that are only possible because of the random-access nature of hard disk digital recording.

RADAR supports up to 99 different projects, each of which is a playlist that has its own recorded material, locate points, sampling rate, sync offset, and start time.

With multiple projects, you may create, say, a *Project 01* that starts at SMPTE timecode of one hour; you may then create a new *Project 02*, that has completely different recorded material, but also starts at SMPTE timecode of one hour!

Another advantage of multiple projects is when editing—you may edit *Project 02* as needed, without changing *Project 01* in any way; you may record new material into a project without overwriting material in any other project. (*The only limitation is the amount of recording time remaining, which is shared among all projects.*)

A third advantage of RADAR's project architecture is that you may copy material between projects using the editing clipboard, and you may also copy entire projects! Thus, you may record raw material into *Project 01*, then copy '01 to '03. You can then edit *Project 03* as desired—but the original *Project 01* is always available in its un-edited form!

Please Note: Because projects are simply “playlists”, copying material between projects does NOT reduce the amount of free recording time.

2.10.1 Default Project

When RADAR boots on a “clean” system, it automatically creates and loads an empty project 01... you may use this project as desired (or all the time—since you are not forced to use the multiple-projects feature if you don't need to!).

Please Note: RADAR remembers the last active project number on shutdown, and re-loads it on power-up.

2.10.2 Creating a New Project

When you want to create a new project, select CREATE PROJECT from the Project menu. You may then enter a name for the new project—RADAR assigns the first available project number, which then appears on the 2-digit LED of the RE-8.

2.10.3 Switching Between Projects

To change the current project, select GOTO PROJECT from the Project menu. The system will display the current on the system; use the UP and DOWN keys, the cursor arrows, or the jog wheel to display the desired project, then press ENTER to select it.

2.10.4 Naming Projects

To name a project:

1. **Select NAME PROJECT from the Project menu.**
2. **Use the up/down arrows (or the jog wheel) to select the project to rename, then use the RE-8 QWERTY keyboard to enter the name.**

Please Note: On the front panel, use the cursor left/right keys to move on the LCD. Use the UP and DOWN keys to select letters. Press/hold UP or DOWN to scroll quickly through the available characters.

Each project may be named with up to 13 characters. (The system allows you to enter a 16-character name, but the last three characters may be erased if the project is ever copied.) *If a project is never explicitly named, it uses the name "UNTITLED".*

2.10.5 Copying Projects

To copy a project:

1. **Change to the project to be copied.** *(If not there already.)*
2. **Select COPY PROJECT from the Project menu.** RADAR will then copy the current project to the first unused Project location, append the project name with the suffix "V 2", then change to that project. *(If you copy the project from V 2, the suffix changes to V 3, etc.)*

2.10.6 Project Start Time

Each project may have a user-definable "start time", which is simply a reference marker, since recording over the entire 24-hour span is available. When switching to a project, the system automatically locates to the start time; this time is also available in the project as location point 0.

The default start time for projects is 00:00:00:00:00; to enter a different start time, select START TIME from the Project menu, then enter the desired time.

2.10.7 Project Sample Rate

Like start times, different projects may have different sample rates. To change the sample rate, first switch to the project (if not already active), then select SAMPLE RATE from the Project menu. Use the UP/DOWN keys or the jog wheel to select the desired sample rate, then press ENTER.

2.10.8 Deleting Projects

If you are finished with a project and want to remove it from the system, first change to the project to be deleted (if not there already). Select DELETE PROJECT from the Project menu. The system will ask for a confirmation, then the project playlist will be deleted, and the project number marked as unused.

Please Note: Audio used by a deleted project is NOT deleted until a "reclaim space" operation is performed (see below).

2.10.9 Reclaiming Disk Space from Deleted Projects

Since multiple projects can reference the same audio, when deleting a project, its playlist information (and locate points) are deleted, but the audio is NOT deleted. Also, as edits are performed, small amounts of disk space are used for crossfades, etc. This audio may not be released after a cut or erase operation; the Reclaim Space feature will release the space.

The “reclaim space” feature processes all projects on the system to determine what audio is not being referenced by any project. Once finished with the processing, RADAR erases the unused audio data, reclaiming the space for future use.

IMPORTANT:

Audio deleted using Reclaim Space is NOT recoverable! Also, the process may take up to five minutes to complete, depending on the number of projects on the system.

To use Reclaim Space, select this item from the Projects menu, then press ENTER. *We recommend you perform this operation occasionally, to free up unused disk space on your system.*

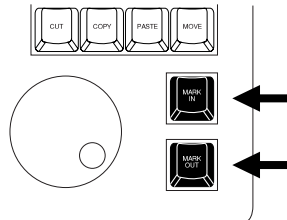
2.11 EDITING—AN OVERVIEW

RADAR provides all the editing features possible with tape and a razor blade, plus many more. Like a tape machine, you may mark and cut across all tracks; unlike a tape machine, you may cut on one track (or across any combination of tracks).

2.11.1 Edit Markers (MARK IN, MARK OUT)

In tape editing, the operator rocks reels to find edit points, then uses a grease pencil to mark them. Finally, edits are performed using a razor, at the marked edit points.

In RADAR editing, you rock reels to find edit points (or mark points on the fly, or set specific time code locations). Then, instead of the grease pencil, you set special mark points called Mark In and Mark Out. You may set these using the dedicated keys on the RE-8, as shown.



Please Note: From the front panel, you may set Mark In and Mark Out points by pressing MARK LOC plus UP/YES (for a Mark In at the current timecode location), or MARK LOC plus UP/DOWN (for a Mark Out at the current timecode location).

Once the Mark In and Mark Out points are set, the edit is performed using dedicated edit function keys or RADAR's Edit menu. The only additional steps in RADAR editing beyond those in tape are in selecting which track(s) you want to edit—these are selected using the track arm keys.

2.11.2 RADAR's Editing Clipboard

In tape editing, after you cut a piece for use elsewhere, you might hang it over your shoulder if it is short, or wind it onto an edit reel if it is longer. RADAR uses a "clipboard" for storing cut or copied pieces. Once audio is on the clipboard, it may be auditioned for content, and used elsewhere as needed.

Section 3 Recording & Transport Operation

This section describes RADAR's transport features, and the extensive control menus used for recording and editing, including installation and basic operations.

This section includes the following subsections.

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3.1 GENERAL

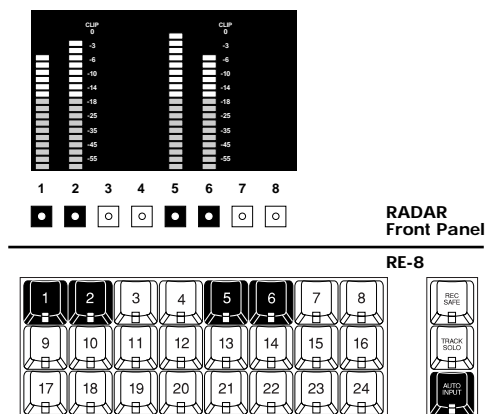
RADAR is designed with the best features of tape machines in mind—particularly its simplicity of operation. This will allow you to learn the operation of RADAR quickly and be productive with a minimum of down time.

This section describes recording and transport operation, including arming tracks, input monitoring, recording, playback monitoring, and all transport locate features including shuttle/jog and autolocation.

3.2 ARMING TRACKS FOR RECORD

There are 24 keys on the front panel of RADAR (and the RE-8) used to place tracks in Record Ready mode. (*These are referred to in this manual as Track Arm keys.*) The keys are momentary type with an LED in the center to indicate Record Ready status, and when tracks are armed, the key(s) show red flashing lights. Tracks may be armed in all transport modes including Record mode. Press any armed track's key again to disarm, and its LED will go out.

1. **Arm the track(s) you want to record on using the track arm keys on the front panel, or on the RE-8, then cue and start the audio source.** You will see input levels on the front panel level meters:



2. **While watching the levels display(s) on the front panel, set the audio input levels to a safe (i.e. non-clipping) level using the console, etc.**

Please Note: If your audio source is producing insufficient levels for recording, you may need to re-set the LEVEL IN/OUT switches on the rear panel. *These switches are described in §2.5.*

IMPORTANT NOTE: The maximum recording level allowable before digital clip is +22 dBu. This level corresponds to 0 dB on RADAR's meter display.

3.3 MONITORING/METERS DISPLAY

RADAR's 24 meters provide instant and highly accurate input level indication. Each individual meter has 20 LED parts: 10 green and 10 yellow. The LEDs are calibrated to display a logarithmic scale from 0 dB down to -55 dB.

3.3.1 Peak Hold Feature

RADAR uses peak program ballistics with peak hold for input and output metering. This type of metering most accurately allows you to assess transient peaks that could overload RADAR and cause distortion. The top LED will register a peak and will hold it momentarily before falling more slowly than the other LEDs. In a dynamic section, the top LED will show an average of the peaks it encounters.

Please Note: The peak hold duration may be set on the Preferences menu, described in §4.3.4.7.

3.3.2 Clip Indicator LEDs

The red clip LED located at the top of each individual meter indicates that the input signal has clipped. If clipping occurs, this LED will glow brightly for a moment and then remain dim. The activity of the clip indicator LEDs may be set on the User Preferences menu, described in §4.3.4.8.

Please Note: If a clip occurs, once you have reset the input level and no longer need to see the clip LED, press the track arm key associated with the clipped track off and then back on.

3.4 SAMPLE RATE SELECTION

3.4.1 Sampling Rate Overview

The number of times every second that a snapshot of the input audio signal is taken is referred to as the sampling rate. RADAR supports all currently used sampling rates: 32 kHz, 44.056 kHz, 44.100 kHz, 47.952 kHz, and 48 kHz.

The most important fact to consider before recording is that if you ever want to transfer tracks between RADAR and another machine digitally, their sampling rates must be the same. For instance, if you have a stereo rhythm track recorded on DAT at 48 kHz sampling rate and you want to transfer it to RADAR to build up a piece of music, RADAR's sampling rate must match that of the DAT recording at 48 kHz. If the sampling rates were set differently, the resulting playback on RADAR would be altered in pitch.

Below is a chart showing some applications of various sample rates.

Sample Rate (kHz)	Minutes of Recording Time/Gigabyte (approx)	General Applications
32	260	Digital spoken word recordings
44.056	189	Film & Video digital transfers
44.100	188	CD mastering
47.952	175	Video digital transfer
48	173	Digital transfer from DAT

3.4.2 Changing RADAR's Sample Rate

1. Press **MENU/PREV (RE-8)** or **MENU/ESC (front panel)**.
2. Scroll **UP/DOWN** through the choices until the **PROJECT** menu item is displayed:


```
MAIN MENU:
PROJECT MENU
```
3. Press **ENTER (RE-8)** or **STOP/ENTER (front panel)**.
4. Scroll through the submenus until the **SAMPLE RATE** item is displayed:


```
MAIN/PROJ MENU:
SAMPLE RATE
```
5. Press **ENTER**. The system will respond with:


```
SAMPLE RATE:
48          KHz
```
6. Use the cursor up/down keys (or the jog wheel) to select the desired **Sample Rate for the project**. The available rates are 32, 44.1, 44.056, 47.952, and 48 kHz.
7. **When you have selected the desired sample rate, press ENTER.** This will automatically accept the selection and escape from the menu.

Please Note: Sample rate setting is retained by the current project, and will be recalled on the next power up. Other projects may have different sample rates; however once a project has been created, its sample rate is retained.

3.5 RECORDING OPERATION

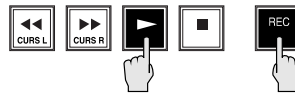
Recording and playback use the transport keys on either the front panel or the RE-8 session controller.

Please Note: Digital I/O recording and playback features are provided in §3.17.

3.5.1 Entering Record

To enter record, press/hold PLAY then press REC, or... press/hold REC and press PLAY. The lights on the armed tracks stop flashing and are lit steadily.

Please Note: You may select the method used to enter Record (either PLAY + REC, or just REC) on the Preferences menu, described in §4.3.4.5.



3.5.2 Punching In on Additional Tracks

RADAR provides on-the fly punch in for additional tracks while recording.

1. **With RADAR already in record on some tracks, arm the desired additional tracks.** (The track arm lights of the current record tracks are on solid; the track arm lights for the additional tracks will flash.)
2. **To enter record on the additional armed tracks, press PLAY and REC together.** (All track arm lights are now on solid.)

Please Note: When tracks are armed during Record, they will not actually begin recording until you press REC while holding PLAY. However, the Instant Record feature, available on the Preferences menu, enables you to “drop” tracks into record on the fly, simply by arming their tracks(s). This feature is described in §4.3.4.5.

3.5.3 Punch Out (Dropping Out of Record)

Press PLAY to drop out of record with the transport still rolling, or press STOP to stop both recording and the transport as well.

If you are monitoring playback material before and after the record punch-in, the system switches seamlessly to the input material on the punch in, then back to playback monitoring after the punch out.

If the operating conditions are right (determined by disk activity—see §3.5.3.2), RADAR automatically provides seamless punch-out monitoring. In all other cases, playback monitoring returns momentarily after the punch-out.

Standard Audible Punch Out: RADAR is a truly random-access recorder. Since the act of punching out of record is, as far as RADAR can tell, a purely random action, it cannot always have the underlying program material immediately available for playback. (A tape machine can simply switch to the playback head, and the correct playback material is right there!)

Please Note: On RADAR, the audio is always recorded seamlessly; it is only the playback monitoring that takes a moment to return after the punch.

To emulate the features of tape recorders as closely as possible, RADAR provides the punch-out playback instantly when possible. If the disks are playing and/or recording on all tracks, the punch-out playback will return, but with a brief delay. For more information about the necessary conditions for seamless punch-out, see §3.5.3.2.

Seamless Punch Out Monitoring: RADAR's disk drives support a maximum of eight tracks of audio data, either playback or record. If you perform a punch-in/punch out recording operation, the punch-out will be seamless (i.e. no gap—a smooth switch between input and track monitoring), if the following condition is met:

The punch-out monitoring will be seamless if the number of “free” disk tracks equals or exceeds the number of tracks you are recording on that disk unit.

Seamless punch-out will occur under these conditions:

- You have recorded four tracks of audio in a project, on tracks 1, 2, 3, and 4. (Tracks 5 through 8 are not active in this project.)
- You rewind the transport, then arm tracks 3 and 4 to do an overdub. Before you punch in, you will be monitoring tracks 1 through 4; on the punch in, you will be playback monitoring tracks 1 and 2, and input monitoring on tracks 3 and 4.
- When you punch out of record, tracks 3 and 4 switch instantly to playback monitoring, while tracks 1 and 2 stay in playback monitor.

Seamless punch-out will NOT occur under these conditions:

- You have recorded on tracks 1 through 6.
- You rewind the transport, then arm tracks 1 through 4 for an overdub. When you punch in, monitoring switches automatically from playback to input; however when you punch out, there is a brief (sub 1 second) delay. *The seamless punch out does not occur because the disk's throughput would have exceeded its 8-track limit!*

What if I REALLY have to get a seamless punch out here???

In these situations, you may make use of RADAR's Mute Tracks feature, available under the Edit menu. With Mute Tracks, you may temporarily “turn off” tracks that are not in use, increasing the amount of disk drive throughput. In the above example, you would use Mute Tracks to temporarily mute tracks 5 and 6; the disk overhead would allow you to punch in on tracks 1 through 4, and get a seamless punch-out on all four tracks.

Please Note: Track Solo/Track Mute features are monitor functions, and do not affect the amount of disk activity. You must use the Mute Tracks feature (Edit menu, §7.13) to temporarily turn off unneeded tracks.

3.5.4 Record Safe Feature

The record-ready keys may be placed in and out of “Rec Safe” mode using the CLEAR/SAFE key on the RE-8.

Pressing this key turns off all REC-READYs; pressing it again returns the previously rec-readied tracks to Rec-Ready status.

Please Note: Record Safe is available from the front panel through the Edit menu.

3.5.5 Clear Rec-Ready (RE-8 only)

You may use the RE-8’s CLEAR/SAFE key to clear all Rec-Readied tracks—simply press SHIFT (upper right corner of RE-8) then press CLEAR/SAFE. This clears all Rec-Readied tracks (or all soloed tracks).

3.5.6 Recording to Timecode

RADAR will record while synced to an external timecode source, enabling frame-accurate editing to almost any external source. Timecode features are described in Section 5.

3.6 PLAYBACK OPERATION

3.6.1 Standard Playback

RADAR provides two playback modes—Forward Play and Reverse Play. In addition, playback may be vari-speeded, or locked to an incoming sync source.

Please Note: Playback locked to external sync is described in §5.4.

Press PLAY (from either Front Panel or RE-8) to enter Play mode at any time.

Press STOP (from either location) to Stop playback.

3.6.2 Reverse Playback

To enter Reverse Play from the current location, press REW and PLAY simultaneously. *You may even do this while the transport is already in Play!*

3.6.3 Playback to Timecode

RADAR will play back while synced to an external timecode source, enabling frame-accurate lock to almost any external source. This feature is described in §5.3.3.

3.7 TRACK SOLO FEATURE (RE-8 ONLY)

RADAR provides a Track Solo feature for auditioning individual or multiple tracks *on playback*, while muting the remaining tracks. Track Solo is also useful as a stereo-in-place solo function if your mixing desk is not capable of this.

Track Solo uses a dedicated key on the RE-8, with the track arm keys acting as solo keys.

Please Note: Three Track Solo modes are provided—Additive, Interlock, and Momentary. A description of each mode appears below. The desired mode may be selected through the Preferences menu, described in §4.3.4.2.

3.7.1 Additive Solo Mode Operation

In Additive Solo mode, each time a track solo key is pressed, the track is “added” to any others being soloed, as follows:

1. **Press TRACK SOLO.** The key’s LED will flash quickly and the LCD will prompt:

```
SELECT TRACK
TO SOLO
```

2. **Choose one or several tracks from the track arming group.** When selected, the track arming LEDs will blink for each soloed track. You may now perform all transport operations *except* recording.

Please Note: During playback, the meters will show levels for only those tracks soloed.

3. **To take a soloed track out of Solo mode, simply press its track arm key again.** Its LED will turn off, and it will no longer appear on the meters.
4. **To disable Track Solo,** press the track solo key again. Its LED will go out and you can resume normal operation. The tracks that were previously set in Track Solo are remembered for the next time you engage this function.

3.7.2 Interlock Solo Mode Operation

In Interlock Solo mode (the system default; selectable from the Preferences menu), every time a solo key is pressed, the previous soloed track(s) are taken out of Solo.

If you want to solo more than one track, simply press *and hold* the first track solo key, then select additional tracks to be soloed.

3.7.3 Momentary Solo Mode Operation

Momentary Solo mode (available from the Preferences menu) means that track(s) are kept in solo for as long as their solo keys are held.

3.8 VARISPEED RECORDING/PLAYBACK

3.8.1 Varispeed Overview

Varispeed is used to change the speed (and pitch) of recording and playback. Potential uses of Varispeed include: lowering the pitch of existing tracks during an overdub session so a vocalist can sing in a more comfortable range, thickening the voice by recording multiple tracks in altered pitches, and matching the tuning of recorded tracks with difficult to tune instruments such as a piano.

RADAR's Varispeed can be adjusted in terms of the percent of deviation from normal speed or cents (hundredths of a semitone) deviation from A440 Hz. The range is variable from minus 15% or 241 cents to a maximum of plus 15% depending on the sample rate you use for your recording.

Varispeed Variation/Ranges by Sample Rate:

Sample Rate	Plus	Minus
48 kHz	2.8% or 48 cents	43.75% or 995 cents
47.952 kHz	2.9 or 50 cents	43.69 or 993 cents
44.1 kHz	11.9% or 195 cents	38.77% or 848 cents
44.056 kHz	12% or 196 cents	38.71% or 847 cents
32 kHz	54.2% or 750 cents	15.62% or 293 cents

3.8.2 Changing Pitch With Varispeed

1. **Press VARISPEED.** The system will respond with:

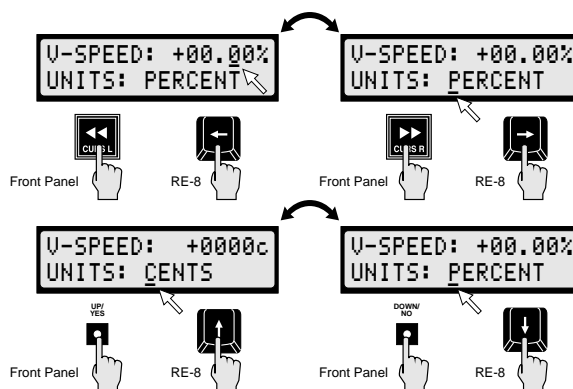
```
U-SPEED: 00.00%
UNITS: PERCENT
```

2. **Press UP or DOWN to raise or lower the percentage value.** On the RE-8 you may enter a number using the plus/minus and numeric keys, or use the jog wheel to dial the number up or down. *(The cursor keys and/or jog wheel provide instant speed change—if you use the numeric entry method, the speed change occurs upon pressing ENTER.)*
3. **Press VARISPEED again to activate and return to Ready mode.** To enable and disable, press VARISPEED twice to enable, twice to disable. *This can be done during any transport mode, including Record.* The LED on the VARISPEED key indicates On/Off status.

Please Note: To check a Varispeed value without turning the function Off, press VARISPEED, then CANCEL (RE-8) or MENU/CANCEL (front panel).

3.8.3 Changing Varispeed Units

1. **Press VARISPEED.**
2. **Press the cursor right key to move the cursor from the varispeed value field to the units field.**
3. **Use the UP/DOWN keys to change from PERCENT to CENTS.**



Press the cursor left key to move the cursor back to the value field and use UP/DOWN keys (or jog wheel) to adjust the amount of varispeed.

3.9 AUTO INPUT

3.9.1 Auto Input Overview

AUTOmatic INPUT *monitor* selects whether or not program material on record-readied tracks is monitored during playback. This feature has been provided because different recording situations require different monitoring strategies.

Auto Input manages the monitor status of rec-readied tracks by monitoring existing track material during Play. When you enter Record, you will hear input material before switching back to track monitor when you exit Record. At other times (while the transport is in any mode besides Play), the inputs are monitored. (*When Auto Input is OFF, the input from any tracks armed will be monitored at all times, including record and playback.*)

3.9.2 Turning Auto Input On and Off

Press AUTO INPUT to engage and disengage Auto Input. The LED will light indicating automatic input monitoring is enabled. This function defaults to On when RADAR powers up and, in most recording circumstances, may be left On.

3.10 AUTO PUNCH

The Auto Punch function is useful when you need to punch in and out at precisely timed location points. To get the absolute best performance of a single word or note, for example, RADAR can handle the punching while you can concentrate exclusively on monitoring the performance.

Auto Punch uses the Mark In and Mark Out times as punch points. This function may be initiated from the Front Panel or from the RE-8.

3.10.1 Setting-up for an Auto Punch

From the RE-8:

- 1. Using the jog wheel, transport or calculator, locate to the section you will be Auto Punching over.**
- 2. Press MARK IN and OUT to define the beginning and end points, respectively, of the section.**
- 3. Arm the tracks to record upon using the track arm keys. Press AUTO PUNCH.** The AUTO PUNCH LED will glow solid.
- 4. Locate before the section using the transport or locate functions.**
- 5. Hold PLAY and press REC.** RADAR will automatically enter and exit Record when the Mark In and Out points are reached.

Press AUTO PUNCH to enable or disable this function.

Auto Punch from the Front Panel:

- 1. Using the transport or Recall Loc functions, locate near the beginning of the section you will be Auto Punching over.**
- 2. In Play, press and hold MARK LOC and then press UP and DOWN to define the beginning and end points of the Auto Punch section. Arm the tracks to record upon using the track arm keys.**
- 3. Hold MENU/CANCEL and press AUTO PUNCH.** The AUTO PUNCH LED will indicate On or Off status whenever the MENU/CANCEL key is pressed and held.
- 4. Locate to the beginning of the section using the transport or locate functions.**
- 5. Hold PLAY and press REC.** RADAR will automatically enter and exit Record when the Mark In and Out points are reached.

To disable and re-enable this function, hold MENU/PREV and press AUTO PUNCH.

3.10.2 Editing Auto Punch In and Out locations

There are two ways to fine tune the Auto Punch In and Out (Mark In and Mark Out) locations. On the RE-8 only, you may use the jog wheel to scrub audibly to the exact location and press either of the MARK IN or OUT keys. On both the RE-8 and front panel, you may also use the Edit Loc function to directly nudge the SMPTE times of the Mark points by frames or subframes.

Please Note: Complete procedures for scrub/shuttle operation are provided in §3.12.2.

3.11 UNDO/REDO FUNCTIONS

Probably one of the most useful features of RADAR is the ability to undo a previous recording action or audio edit. You may undo a recording operation even after you use the transport controls to locate, play and rewind. The new take becomes permanent as soon as you enter Record again.

There is no limit to the number of recorded tracks that an Undo operation can be performed upon. You can undo a single syllable recorded on one track or an entire band on all 24. The only limiting factor is the amount of disk space remaining when you record. This is because when RADAR records over previous audio, it is adding to the data on the disk drive, not overwriting like a tape machine. There is always a copy of the new and old takes as long as there is space for both.

Along with the Undo function is the Redo function. Redo will “undo” the Undo if you should decide to keep the new part after all.

Performing an Undo or Redo from the RE-8:

1. **Press UNDO after performing a Record or Edit operation.** The display will read:

```
UNDO RECORD?
NO YES
```

Please Note: RADAR shows the last operation by name in the undo or redo menu. Thus, if the last action was a Paste, the menu would read: “UNDO PASTE?”

2. **Press ENTER.** RADAR will undo the previous operation. Press CANCEL if you want to abort. Repeat this procedure to redo.

From the Front Panel:

1. **Hold MENU/ESC, then press UNDO.**
2. **Press STOP/ENTER.**
3. **Press MENU/ESC if you want to abort.**

Repeat this procedure to redo.

Please Note: If there is no function to undo, the system will display:

```
NOTHING TO UNDO
PRESS ANY BUTTON
```

3.12 LOCATING IN THE RECORDED MATERIAL

RADAR provides five methods for locating in the recorded material:

- Fast-Wind keys
- “Cue to Audio”
- Shuttle/Jog
- Autolocator Features
- Direct Time Entry

3.12.1 Cueing with Fast Forward and Rewind

RADAR is a random access device with any location point able to be cued virtually instantly. We have also retained Fast Wind functions for tape machine users.

Fast Forward/Rewind Operation: Press either the FFWD (>>) or RWD (<<) key once to fastwind the transport. (Normally, the fast wind rate is 6 times normal speed; this may be changed on the Preferences menu—see note below.)

Press either key *twice* within 1 second to fastwind at 3 times the regular fast wind speed (normally 18 times normal play speed). Press the fast wind key again to slow the transport to the standard fast wind rate.

During these modes, the LCD shows the changing SMPTE time and the names and numbers of any programmed location points passed during the wind.

Please Note: The standard fast wind speed is set to 6 times normal play speed. You may change this rate on the Preferences menu—described in §4.3.4.6.

“Cue to Audio” Using Fast Wind Keys: RADAR provides a powerful “Cue to Audio” feature that will, when selected “skip” the current transport location to the beginning of the current audio section, or—if in a silent section, “Cue to Audio” will locate you to the next audio on the system. This feature is very convenient for locating takes in a project that may be separated by large unrecorded gaps. Cue-To works by locating ahead (or back) to the nearest transition from audio program to silence. *If Track Solo is active, this feature operates using just the soloed tracks.*

To skip to the end of the current audio section: Press RECALL LOC followed by FFWD to cue to the next transition of audio. Or...

Press RECALL LOC followed by RWD to locate to the previous transition.

If you are currently in a silent section, RADAR locates to the head (or tail) of the silent section.

3.12.2 Jog/Shuttle Mode (RE-8 only)

RADAR’s Jog/Shuttle modes provide fast, precise location in recorded material. Shuttle mode uses the jog wheel to vary the speed and direction of audio for locating points; Jog mode allows you to “scrub” the audio to find exact locations.

Please Note: The jog wheel may also be used as a convenient input device when prompted by the LCD to enter a numeric value, and also as a means of scrolling through RADAR's menus. When used as an input device, turning the wheel to the right increases the value, and turning it to the left decreases the value.

Entering Jog Mode: Press the JOG key to the left of the wheel to engage Jog mode:

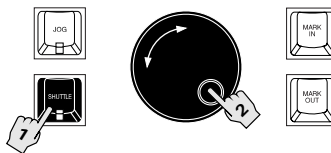


Turning the wheel clockwise or counterclockwise produces variable speed playback for as long as you continue turning it. When you stop turning the wheel, playback will stop. The speed of playback varies from scrub where you can accurately locate the first transient of an audio waveform by rocking the wheel gently forward and backward to slightly above normal playback speed.

Jog “Bump”: You may “bump” the current location while in Jog by pressing the cursor left or right keys. Each cursor press will nudge the jog location by the smallest possible wheel increment.

To exit Jog mode, press any key (including the JOG key).

Entering Shuttle Mode: Press the SHUTTLE key (located below JOG) to engage Shuttle mode:



Shuttle produces playback at variable speeds like Jog with one difference; when you stop turning the wheel, playback continues at the current speed until you move the wheel again or press a transport key.

To exit Shuttle mode, press any key including the SHUTTLE key.

3.13 AUTO LOCATION

Because RADAR is a hard disk recorder, you can instantly cue to a location without having to wait for rewind or fast forward. In this way, the program material is more like a phonograph record than a tape machine because you can drop the needle at the precise moment from which you want to start playback. You may program up to 99 location points with the ability to assign and edit each individual name and SMPTE location.

There are also two temporary points called Mark In and Mark Out. These are used to designate sections for Auto Punch and Editing as well as being useful as quick locate points that you will not need permanently.

3.13.1 Programming a New Auto Location Point

On the RE-8 or Front Panel:

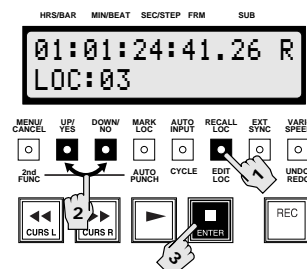
1. **Press MARK LOC once for each location point you wish to store.**
Programming may be done at any time during playback, recording, or stopped modes, and you may store multiple location points in one pass.
2. **To program the temporary Mark points, press MARK IN and MARK OUT.** Each subsequent key press overwrites the previous point.

RADAR will automatically assign location numbers in the order in which they were programmed. For example: you have just programmed a locate point at 01:00:00:00 and RADAR has assigned it as #1. Next, you program another point at 01:00:05:00 and it is assigned point #2. If you then rewind a bit and press MARK LOC at 01:00:03:00 this would become locate point #3. The most recently programmed point is set as the current locate point. You may also choose to enter new location points using the Edit Loc function described in Editing a Locate, Mark In or Mark Out point below. This may be preferable if you already know the SMPTE times at which you would like to have location points.

Please Note: The RENUMBER LOCATES menu item (under the Projects menu) re-numbers all Locate points in the current Project in SMPTE order. See §4.3.2.11 for more information about this feature.

3.13.2 Recalling Marked Locate Points from the Front Panel

Refer to to the following diagram for front panel operation:

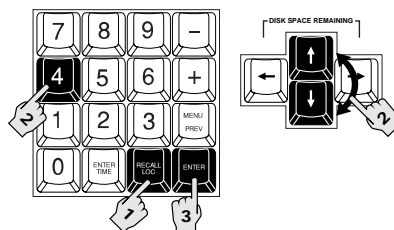


1. **Press RECALL LOC.** The key lights, and the LCD changes to show a flashing R at its upper right corner.
2. **Use UP/YES and/or DOWN/NO to scroll through the numbered locate points until you come to the desired one, then...**
3. **Press ENTER** (which, on the front panel, is also the STOP key).

3.13.3 Recalling a Locate Point from the RE-8

The RECALL LOC key is on the numeric keypad near the center of the RE-8.

1. **Press RECALL LOC.** The LCD will show a flashing R at its upper-right corner, as shown above.



2. **Use the cursor up and down arrows to scroll through the locate points, or...**

Enter the number of the locate point using the numeric keypad.

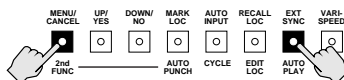
SHORTCUT: With the RE-8, you have the option of directly entering the number of the location point in the calculator or entering the first letter of any named location point using the QWERTY keyboard.

3. **Press ENTER to process the locate.**

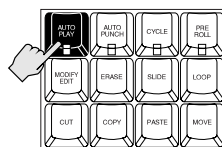
3.13.4 Auto Play after Locate

RADAR begins playback automatically after a locate if Auto Play is enabled. This is useful for quickly auditioning certain sections of a performance using Recall Loc without having to press PLAY every time. This is also useful when you are recording; instead of pressing STOP to halt Record, you could press RECALL LOC with Auto Play engaged and immediately hear playback of the take you have just recorded.

Auto Play is available from the front panel by holding the 2nd FUNC key, then pressing the EXT SYNC/AUTO PLAY key:



Auto Play is also available from the RE-8 as a lighted key in the utility group:



If Auto Play is turned on, every time you locate the transport using the Recall Loc feature, the system will play automatically. As mentioned above, this can be a time saver during repeated overdubs and voice-over operations.

3.13.5 Editing a Locate, Mark In or Mark Out Point

Using the Edit Loc function, you can change the name and SMPTE time of any locate point or change the time of any Mark In or Mark Out point. You can also enter new location points directly or delete them. All Edit Loc operations may be performed during Play or Stop transport modes. *For more information on Mark In and Out see §6.12.*

Please Note: Edit Locate features use the EDIT LOC key, in the Utility section of the RE-8, or as the 2nd function of the RECALL LOC key on the front panel.

From the RE-8:

1. **Press EDIT LOC.** The LCD displays the EDIT, DELETE, NEW, and SWAP options, along with the current locate point (if any).

```
EDIT DEL NEW SWP
LOC:
```

2. **Select the operation you require** (Edit, Delete, New, or Swap) **using the right and left arrows, then press ENTER.** The system will respond with a dialog that resembles Ready mode with the addition of a letter (E for Edit, D for Delete, or N for New) in the upper right-hand corner.
3. **Select the location point you want to edit by number (using the numeric keys) or, in the case of the MARK IN/MARK OUT keys, simply press the desired mark key.**

```
01:09:18:12.78
LOC:03 GO GAL!
```

4. **Use the cursor left/right keys to move among the fields—you may use the cursor up/down keys to make changes, or use the numeric keypad to enter numbers, or, use the jog wheel to change the numbers.**
5. **To assign or edit the name of the location (in EDIT or NEW only), press cursor right until the cursor is to the right of the location number.** This places the cursor beneath the first letter of the name. Use the QWERTY keyboard to type or edit the nine character name.

Please Note: The jog wheel may be used to enter non-alphabet characters. In the Delete dialog, you may change only the location number to be deleted. **Use the cursor up/down keys or the jog wheel to do this.**

6. **Swap only.** The Swap function provides a different screen when selected:

```
SWAP: 03
WITH: 01
```

Use the cursor up/down keys to select the point(s) to be swapped—these include any numbered autolocator points, plus the Mark In and Mark Out points. Use the cursor left/right keys to move between rows on the LCD.

7. **Press ENTER to complete the Edit, Delete, New, or Swap operation and return to the initial Edit Loc dialog.**

OR...

Press EDIT LOC again to return to Ready mode or choose one of the Edit, New or Delete options.

From the Front Panel: This is essentially identical in operation as the RE-8 except for the following:

- 1. Hold MENU/CANCEL and press EDIT LOC to show the initial dialog.**
- 2. Use the >>/CURS R and <</CURS L key instead of the cursor keys to move the cursor to the desired field.**
- 3. Use the STOP/ENTER key to accept an option highlighted by the cursor, and to complete an operation.**

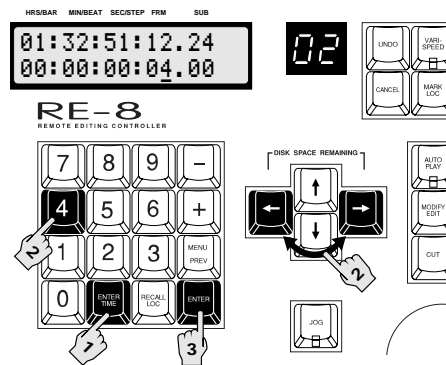
3.13.6 Naming Locate Points from the Front Panel

To assign or edit a name, enter the first letter in the name by pressing the UP/DOWN keys to scroll to the letter you want. Press the FFWD key to move the cursor to each of the next fields and select letters as before. Use the RWD key to move the cursor to a previous field.

3.14 LOCATING VIA DIRECT TIME ENTRY (RE-8 ONLY)

This function allows you to cue the transport to an exact SMPTE location by typing it in on the RE-8's numeric keypad. *This function is available during any transport mode, including Record.*

1. **Press ENTER TIME.** The LCD will change to show the captured SMPTE time on the bottom line and the current time on the top line. If the transport is stopped, these numbers will be the same. In Play, the number on the top line will continue to increment. The cursor will be flashing beneath the frames or seconds field of the captured time.
2. **Enter the SMPTE time you want starting with frames, then seconds and finally minutes and hours.** (You may also use the arrow keys to move the cursor among the fields, so you may enter times directly.)



3. **Press ENTER to accept the new SMPTE location.** RADAR will cue to the new location and return to Ready mode.
 +/- **Shortcut:** You may simply press the keypad + or – key followed by a numeric entry—this will add (or subtract) the entered value from the current location.

Please Note: You may change the “default” field of Enter Time so that when you select the function, the cursor is on the seconds field rather than the frames field. For information on changing this default setting, refer to §4.3.4.1.

3.15 CYCLE

Cycle continuously plays back audio between the Mark In and Mark Out points. This feature is useful for repeating audio sections while you change equalization or rehearse a Punch In.

Cycle from the RE-8:

- 1. Locate to the start of the section you want to cycle between using transport and jog wheel.**
- 2. Press PLAY.**
- 3. Press MARK IN at the start of the section to repeat.**
- 4. Press MARK OUT at the end of the section.**
- 5. Press CYCLE.** Playback will automatically cycle between the two points.
- 6. Press CYCLE again to disable.**

Cycle from the Front Panel:

- 1. Locate to the start of the section you want to cycle.**
- 2. Press PLAY.**
- 3. Hold MENU/CANCEL and press UP and DOWN at the start and end of the section respectively.**
- 4. Hold MENU/CANCEL and press CYCLE.** Playback will automatically cycle between the two points.
- 5. Hold MENU/ESC and press CYCLE again to disable.**

3.16 PRE/POST ROLL

Preroll allows you to cue to a user definable time previous to any recalled location point. It is useful when you need to hear the audio leading up to the location point for Punch Ins and do not want to add any more location points. Preroll also works with the Cycle function by providing an extra few seconds of lead-in before the marked beginning and end points.

Postroll works along with the Cycle mode to provide extra play-out time after the end point is reached.

Please Note: Preroll is only available using the RE-8 session controller.

Only from the RE-8:

- 1. Press PRE ROLL.** The dialog will show the default settings for both PRE and POST ROLL at two seconds each.
- 2. Press PRE ROLL again if you accept the default settings.**
If you wish to edit these settings, press the left or right arrows to locate to the appropriate field and use the UP/DOWN keys to change them.
- 3. Press PRE ROLL to accept the new settings and return to Ready mode.**

To disable Preroll, press PRE ROLL twice from Ready mode. To re-enable without changing, press twice again.

3.17 DIGITAL I/O OPERATION

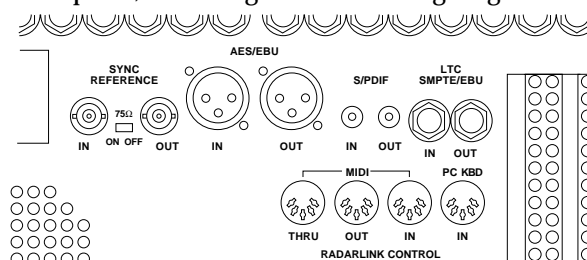
RADAR provides both AES/EBU and S/PDIF stereo digital interfaces, enabling up to two tracks of digital audio to be recorded or output. The ADATLink® option, available from Otari, connects your RADAR to up to three ADAT-format digital recorders.

RADAR's menu interface is used to specify the input and/or output track(s), and also the format to be used. Several conditions apply to Digital I/O operation:

- Digital I/O may be recorded to/output from two tracks that share the same disk drive. Track pairs that split across 8-track drive boundaries are not permitted (i.e. tracks 8 and 9 cannot be used as a digital I/O channel pair).
- If tracks are patched to the digital inputs, the corresponding analog inputs are inactive. (However, RADAR tracks patched to digital outputs are still routed to the corresponding analog outputs.)
- RADAR's user interface permits you to select a track number of 0—this signifies that no track will be patched to the digital channel.

Please Note: In both the AES/EBU and S/PDIF digital formats, digital wordclock is encoded with the audio on the same cable. Therefore, in normal operation, no additional digital wordclock is required.

Digital I/O Operation: Connect a digital input source (either format) to the RADAR's rear panel, according to the following diagram:



Digital I/O Format/Routing Selection from the RE-8:

1. Press **DIGITAL I/O**. The system will respond with:

```
DIG I/O ROUTING:
AES/EBU, S/PDIF
```

2. Use the **cursor up/down keys (or the jog wheel)** to select the desired format ("AES/EBU, S/PDIF" or "ADATLINK"), then press **ENTER**. (If you selected "AES/EBU, S/PDIF", the system responds with:)

```
DIG IN L: 11 R: 12
OUT L: 11 R: 12
```

3. Select the desired input (and output) tracks. Use the **cursor left/right keys and the up/down keys** to make your selection(s).

Remember that the tracks must be from the same 8-track disk drive block (although they need not be adjacent to each other). Also, specifying Track 00 means the channel will be inactive.

Routing Selection from the Front Panel:

1. Press **MENU/CANCEL** to display the Main menu. Using the up/down keys, scroll to the **SYSTEM** item (if not already displayed), then press **ENTER**. The system will respond with:

```
MAIN MENU:
SYSTEM MENU
```

2. Press **ENTER**. Use the up/down keys to select the **DIGITAL I/O** submenu:

```
MAIN/SYS MENU:
DIGITAL I/O
```

3. Press **ENTER**. The system will respond with:

```
DIG I/O ROUTING:
AES/EBU, S/PDIF
```

4. Use the up/down keys to select the desired format, then press **ENTER**. (If you selected "AES/EBU, S/PDIF", the system responds with:)

```
DIG IN L:11 R:12
OUT L:11 R:12
```

5. Select the desired input (and output) tracks. Use the cursor left/right keys and the up/down keys to make your selection(s).

Remember that the tracks must be from the same 8-track disk drive block (although they need not be adjacent to each other). Also, specifying Track 00 means the channel will be inactive.

Enabling Digital I/O Operation:

1. To enable Digital I/O operation, press **OFFSET/SYNC (RE-8)** or **EXT SYNC (front panel)**. The system will respond with the Sync Source dialog box, below. Use the cursor keys (or jog wheel) to select **SYNC SOURCE: DIGITAL**:

```
SYNC SOURCE:
DIGITAL
```

2. Press **ENTER**. The system responds with a format query:

```
DIG I/O FORMAT:
AES/EBU
```

3. Select the desired digital I/O format (**AES/EBU, S/PDIF, or ADATLINK**), then press **ENTER**. The external sync key(s) will flash to indicate that digital I/O is now active.

Start the digital input source (if selected), or press **PLAY** to enable the digital output. *If digital input is active, you will see levels activity on the digital input channel(s) you selected.*

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4.1 GENERAL

RADAR provides a set of menus on the LCD for access to features that are used less often and do not require their own dedicated keys.

This section provides a description of general menu operation, and a complete description of each item in the menu structure. For menu item descriptions requiring detailed instructions, the appropriate paragraph reference is provided.

4.2 MENUS OVERVIEW

RADAR's menu system consists of layers of topics ranging from general categories (five) to more specific functions; many of these end in what we call a "dialog", which is simply a menu that requires your input.

4.2.1 RADAR Menu—Top Level

When you press MENU on the RE-8 or MENU/CANCEL on the front panel, the LCD screen presents you with a Main menu, which includes the most general listing of topics:

```

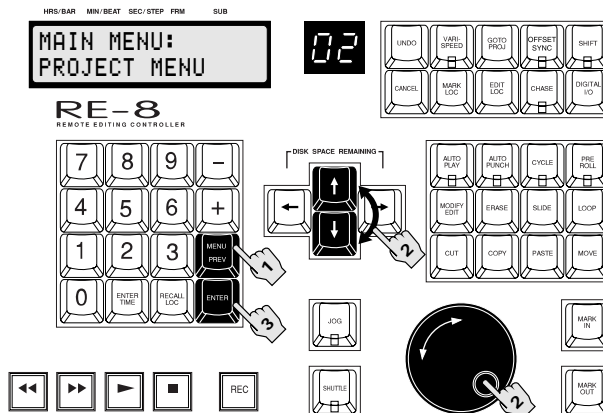
SYSTEM MENU
PROJECT MENU
EDIT MENU
PREFERENCES MENU
DIAGNOSTIC MENU
SHUTDOWN RADAR
    
```

From these choices, you may select a more specific layer called a submenu. And, from the submenu, you may be presented with an additional submenu.

4.2.2 Moving Around in Menus

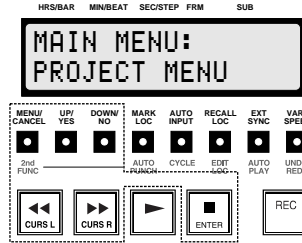
Controlling the selection of submenus and changing values is done with the jog wheel or arrow keys on the RE-8 session controller, or the UP/YES or DOWN/NO, <</CURS L and >>/CURS R keys on the front panel. These methods are described below.

Menu Operation using the RE-8: The MENU/PREV and ENTER keys, plus the cursor keys, are used to enter/exit the menu and to travel up and down through the menu system, as shown. The jog wheel may be used to scroll quickly through menus—and when a menu item is selected requiring input, the jog wheel may be used to "dial in" an value.



Front Panel Menu Operation: In order to provide menu access and navigation from RADAR's front panel with a minimum of extra keys, the transport keys have two functions.

The FFWD, RWD and STOP keys from the transport group each perform an alternate function while in Menu mode. These keys are printed with two legends indicating their dual functions:



- **RWD doubles as the cursor left control.** This is for cycling *backward* through options shown in the LCD prompt.
- **FFWD doubles as the cursor right control.** This is for cycling *forward* through options shown in the LCD prompt.
- **STOP doubles as the ENTER key.** You may use the STOP/ENTER key to accept a choice offered in the LCD prompt.

4.2.3 Menu Structure

The Main menu is available, from the RE-8, by pressing MENU/PREV. Or, you may press MENU/CANCEL on the front panel. Use the up and down keys (front panel) or the jog wheel (RE-8) to scroll through the listings.

Please Note: The major categories are underlined—to make selections from a major category, press ENTER while it is displayed, then use the cursor up/down arrows to move through the submenus.

<u>SYSTEM MENU</u>	SYSTEM VERSION SHOW DISK SPACE DIGITAL I/O SYNC OUTPUT CONFIGURE DISKS SET TIME & DATE UPGRADE SYSTEM	<u>PREFERENCES MENU</u>	DEFAULT SMPTE FIELD SMPTE LOCK SPEED TRACK SOLO MODE LOW DISK WARNING SLIDE TIME UNITS RECORD MODE FFWD & REW RATE PEAK HOLD TIME CLIP HOLD TIME SAVE STATE DELAY
<u>PROJECT MENU</u>	BACKUP MENU RESTORE MENU GOTO PROJECT CREATE PROJECT NAME PROJECT COPY PROJECT DELETE PROJECT SAMPLE RATE START TIME SYNC OFFSET RECLAIM SPACE RENUMBER LOCATES ERASE ALL DISKS	<u>DIAGNOSTICS MENU</u>	SCAN SCSI BUS MOUNT / UNMOUNT INIT DISK CHECK DISK REPAIR DISK SHOW FREE RAM DIS_PLAY TEST 1 DIS_PLAY TEST 2 CONFIGURE DEBUG SHOW DEBUG SAVE DEBUG PLAYLIST ERRORS REALTIME ERRORS
<u>EDIT MENU</u>	UNDO/REDO MODIFY EDIT CUT COPY PASTE MOVE ERASE LOOP SLIDE REVERSE LISTEN MUTE TRACKS IMPORT *.WAV CROSSFADE TIME RECORD SAFE	<u>SHUTDOWN RADAR</u>	

4.2.4 Entering/Exiting the Menu

From the RE-8:

1. **Press MENU/PREV to enter the menu.** The system responds with:

```
MAIN MENU:  
SYSTEM MENU
```

2. **Use the jog wheel (or cursor up/down keys) to display the desired submenu, then press ENTER to select it.**
3. **To exit the menu at any time, press MENU/PREV or press CANCEL.**

Please Note: You may enter the menu while playing or recording without interrupting either mode. Transport controls are inactive until you exit the menu.

Upon entering the menu, the LCD will display the first function. After a selection, the top line shows the current position in the menu hierarchy; the bottom line provides settings or additional submenus:

```
MAIN/SYS MENU:  
SYSTEM VERSION
```

Please Note: If you have entered the menu previously, your last selection will be shown on the display.

Pressing MENU/PREV any time you are within the menu will cancel the last entry and present the PREVIOUS dialog. You can continue pressing MENU/PREV to cycle backward through the submenus and exit.

You may press CANCEL at any time to leave the menu and any other dialog screen.

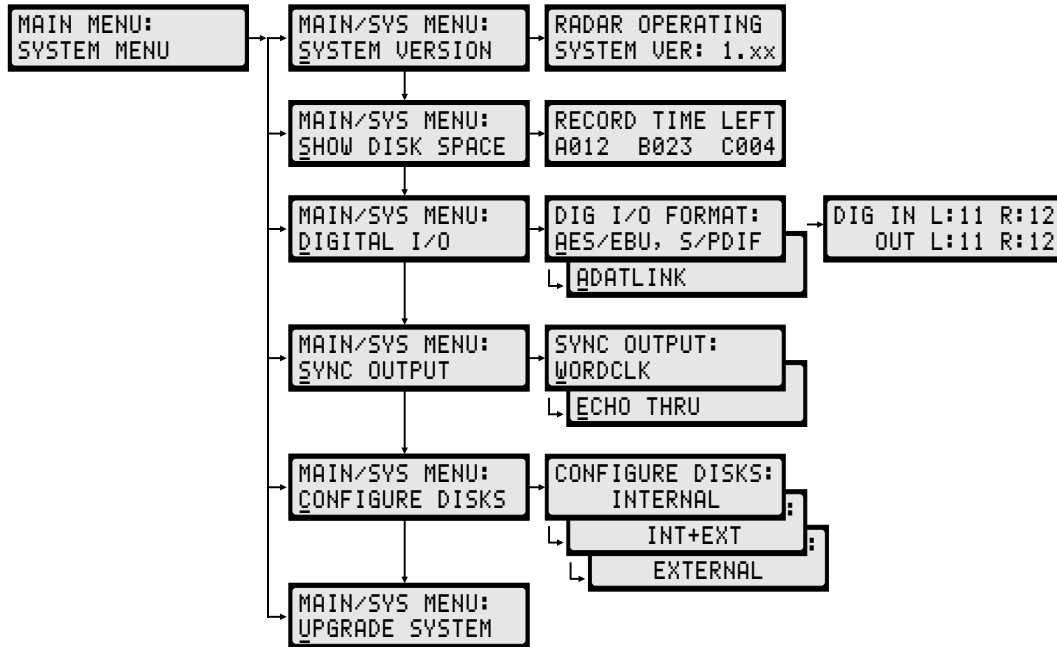
From the Front Panel:

1. **Press and release the MENU/CANCEL key to enter the menu.** (There is no PREV function as on the RE-8.)
2. **Press MENU/CANCEL again to return to Ready mode.**

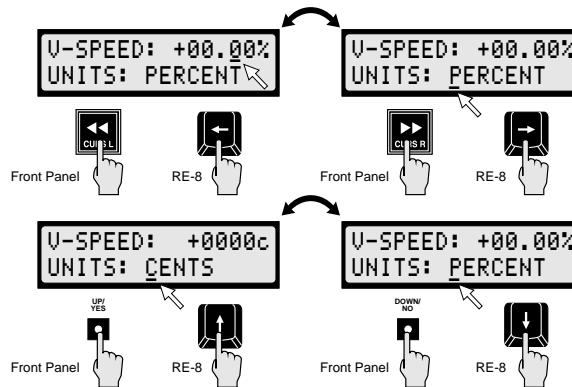
4.2.5 Scrolling and Selecting Within the Menu

1. After entering the menu as above, press UP/DOWN to move the flashing cursor up or down vertically through the sub-menu options.
2. Press ENTER (RE-8) or STOP/ENTER (front panel) once you have reached the submenu you want. The LCD will present the next submenu. Once you have reached the editing dialog you require, use the cursor left or cursor right key to move the cursor to another field.

The following diagram provides an example of the LCD menu operation—in this case, these are the submenu items under the System menu:



Moving the Cursor inside Menu Dialogs: This diagram shows how to move the cursor and change values in a menu dialog.



4.2.6 Editing Values in a Dialog Window

Press UP/DOWN to raise or lower a numerical value or to cycle through text options in the field above the cursor.

Press ENTER (RE-8) or STOP/ENTER (front panel) to accept the value you have chosen and proceed to the next dialog window.

4.3 A TOUR OF THE MENU...

This “tour” goes through each menu item, and provides a brief description. If the item is described elsewhere in the manual, a paragraph reference is provided.

4.3.1 System Menu

4.3.1.1 System Version

Select this item to display the system software version on RADAR.

```
RADAR OPERATING
SYSTEM VER: 1.XX
```

4.3.1.2 Digital I/O

This menu item allows you to select the active digital I/O parameters—including patched RADAR track and format.

```
DIG I/O FORMAT:      DIG I/O FORMAT:
AES/EBU, S/PDIF     ADATLINK
```

Complete digital I/O instructions are provided in §3.17.

4.3.1.3 Sync Output

This feature enables the wordclock routing feature—if set to WORDCLOCK, the wordclock output comes from RADAR’s internal clock. If set to ECHO THRU, the wordclock input is routed to the wordclock output. *These features are further described in Section 5.*

```
SYNC OUTPUT:        SYNC OUTPUT:
WORDCLOCK           ECHO THRU
```

4.3.1.4 Configure Disks

This item establishes the system disk configuration. Four selections are provided:

```
CONFIGURE DISKS:    CONFIGURE DISKS:
INTERNAL            INT+EXT
CONFIGURE DISKS:    CONFIGURE DISKS:
EXTERNAL            MONDO-8
```

- **INTERNAL** (*System Default*): RADAR uses internal SCSI disks (ID 0, 1, 2).
- **INT+EXT**: RADAR uses both internal (0,1,2) and external (3, 4, 5) disks.
- **EXTERNAL**: RADAR uses external SCSI disks (ID 3, 4, 5); as installed in EBD-3.
- **MONDO-8**: Mondo-8 reconfigures RADAR’s disks so that all disks are used for just tracks 1 through 8—tripling the available contiguous space on those disks.

After changing configurations, you must create a new (blank) project before operating, since projects do not support mixed modes. *Additional information about disk configuration appears in Appendix B, Maintenance.*

4.3.1.5 Set Time & Date

This menu item enables you to set the time and date on RADAR's internal clock. This date/time information is used for time stamping backup tapes, etc. Upon selecting this menu item, the system will respond with:

```
DATE: 1994-Oct-20
TIME:  12:25:11
```

Use the cursor up/down keys to change the value of each field; use the cursor left/right keys to move between fields and between lines. (You may also use the jog wheel to increase/decrease field values.) When completed, press ENTER.

4.3.1.6 Upgrade System

This item enters a mode which saves the current system state, then prepares the system for shutdown prior to installing factory-supplied software updates from disk.

```
SYSTEM UPGRADE
PROCEED? NO
```

Complete instructions for this menu item appear in Appendix A.

4.3.2 Project Menu

The Project menu contains the following submenus, defined below:

```
BACKUP MENU
RESTORE MENU
GOTO PROJECT
CREATE PROJECT
NAME PROJECT
COPY PROJECT
DELETE PROJECT
SAMPLE RATE
START TIME
SYNC OFFSET
RECLAIM SPACE
RENUMBER LOCATES
ERASE ALL DISKS
```

4.3.2.1 Backup Menu/Restore Menu

These items enter RADAR's Backup and Restore modes, as described in Section 8 of this manual.

```
MAIN/PROJ MENU:    MAIN/PROJ MENU:
BACKUP MENU        RESTORE MENU
```

4.3.2.2 GOTO Project

This item enables changing the currently active project:

```
PROJ: 04 94Oct21
COASTER SESS
```

GOTO Project is described in §2.10.3.

4.3.2.3 Create Project

This item is used to create a new RADAR project:

```
CREATE PROJ: 06
UNTITLED
```

Create Project is described in §2.10.2.

4.3.2.4 Name Project

This item is used to re-name a RADAR project, and is described in §2.10.4.

```
NAME PROJ: 04
COASTER2
```

4.3.2.5 Copy Project

This item is used to copy (or duplicate) an *entire* RADAR project into a new project number. *This feature is described in §2.10.5.*

```
COPY: 04 TO 06
COASTER2 U3
```

4.3.2.6 Delete Project

This item deletes the current RADAR project, and is described in §2.10.8.

```
DELETE PROJ: 04
COASTER2 U3
```

4.3.2.7 Sample Rate

This item sets the project sampling rate to one of RADAR's standard rates. This item is described in §2.10.7, and in Section 3.

```
SAMPLE RATE:
48 KHz
```

4.3.2.8 Start Time

Start Time enables you to set a default start time for a project; this time is used as locate point 0, and the project is automatically located to this point upon opening.

```
START TIME:
00:00:00.00
```

4.3.2.9 Sync Offset

Sync Offset allows the operator to enter a fixed offset between incoming time code and displayed time code; this can compensate for the lag induced between the video head and address track head on a VTR, can correct a difference between screen burn-in and the actual time code stripe on a video tape, etc.

```
SET SYNC OFFSET:
00:00:00.00+
```

This feature is described in Section 5.

4.3.2.10 Reclaim Space

This item reclaims unused audio from deleted projects, and is described in §2.6.9.

RECLAIM SPACE?
NO YES

4.3.2.11 Renumber Locates

Renumber Locates allows the operator to renumber locate points from the beginning of a project (in time code order), starting from 1.

RENUMBER ALL?
NO YES

4.3.2.12 Erase All Disks

This item erases all audio and all projects from RADAR. Use this item if you have backed up your disks and want to return to a “fresh” system with the full amount of recording time.

ERASE ALL DISKS?
NO YES

Please Note: As this operation is not recoverable, be very sure you have all important data backed up before proceeding.

Before RADAR erases all disks, there several warnings, as shown:

LOSE ALL AUDIO?
NO YES

And (finally...):

ARE YOU SURE?
NO YES

4.3.3 Edit Menu

The Edit menu contains items as shown. These items are described below:

```

UNDO / REDO
MODIFY EDIT
CUT
COPY
PASTE
MOVE
ERASE
LOOP
SLIDE
REVERSE
LISTEN
MUTE TRACKS
IMPORT *.WAV
CROSSFADE TIME
RECORD SAFE

```

4.3.3.1 Undo/Redo

This item undoes/redoes the previous RADAR operation or edit. Please note that there are several functions, such as Erase All Disks, that cannot be recovered using Undo!

```

UNDO PASTE?
NO YES

```

4.3.3.2 Modify Edit

This item may be used to modify the parameters (In time, Out time, paste point, etc.) of the previous edit. *This feature is described in §7.11.*

4.3.3.3 Edit Features

(Cut/Copy/Paste/Move/Erase/Loop/Slide/Reverse)

These features are described in Section 7, RADAR Editing Features.

4.3.3.4 Listen

The Listen function plays the clip currently on RADAR's clipboard. *This feature is described in §7.2.*

4.3.3.5 Mute Tracks

Mute Tracks is used to temporarily turn off disk tracks that are not in use. Unlike a monitor mute, which only turns off the track monitoring, Mute Tracks actually shuts off the track at the disk drive. This effectively increases the disk drive's available bandwidth.

Mute Tracks is most used for ensuring seamless punch-out monitoring during overdubs. If you perform a punch-in/punch out recording operation, the punch-out will be seamless (i.e. no gap—a smooth switch between input and track monitoring), if the following condition is met:

The punch-out monitoring will be seamless if the number of “free” disk tracks equals or exceeds the number of tracks you are recording on that disk unit.

Thus, if the disk activity exceeds the amount necessary for seamless punch-out (i.e. all 8 disk tracks are in playback), but you need to overdub on just two tracks, you may use Mute Tracks to turn off two other tracks on the disk, freeing the bandwidth to enable the seamless punch-out monitoring.

Complete operating instructions for this feature appear in §7.13.

4.3.3.6 Import *.WAV Files

This feature enables you to import any valid .WAV sound file from RADAR's floppy disk drive into the RADAR editing clipboard; from there the sound file may be placed into any RADAR project.

This feature is most useful for importing sound file samples directly, without a D/A conversion. Upon import, you may select the converted playback sample rate (which defaults to the current sample rate) and gain for the sound file. *This feature is described in §7.14.*

4.3.3.7 Crossfade Time

This item enables you to set and change the crossfade time to be used on all edits and record punch-ins. (Crossfade time is specified in milliseconds; the default setting is 5 milliseconds.) Minimum crossfade time is 0, maximum is 100 milliseconds.

To set or change Crossfade time, select this item, then use the up/down keys on the front panel, or the numeric keys (or jog wheel) on the RE-8, to set the new crossfade time. *This feature is described in §7.2.*

4.3.3.8 Record Safe

Record Safe enables you to globally place RADAR into Safe mode, mimicking the function of the SAFE key on the RE-8. If the system is placed into Record Safe, you cannot arm tracks, and the SAFE key is lit on the RE-8. To arm tracks again, you must re-select "RECORD SAFE: OFF:" from the Edit menu, or you must press the SAFE key on the RE-8.

RECORD SAFE:
ON OFF

4.3.4 Preferences Menu

The Preferences menu contains the following submenus and dialogs. These items are described below.

```
DEF SMPTE FIELD
SMPTE LOCK SPEED
TRACK SOLO MODE
LOW DISK WARNING
SLIDE TIME UNITS
RECORD MODE
FFWD & REW RATE
PEAK HOLD TIME
CLIP HOLD TIME
SAVE STATE DELAY
```

4.3.4.1 Default SMPTE Field

This item allows you to select on which field the LCD cursor is flashing when a timecode number is displayed for editing. (You may always move the cursor after the timecode number is displayed—however, having the cursor placed on the most-used field saves keystrokes.)

```
DEF SMPTE FIELD:
SECONDS FRAMES
```

The available choices are seconds or frames. Make your selection using the cursor left/right keys, then press ENTER.

4.3.4.2 SMPTE Lock Speed

This item allows you to select the behavior of RADAR's SMPTE timecode lock. A setting of Fast allows for fast, accurate tracking of the incoming SMPTE timecode. A setting of Slow allows for smoother tracking, especially of jittery timecode sources—this is at the expense of longer timecode lock time.

```
SMPTE LOCK SPEED:
FAST SLOW
```

Make your selection using the cursor left/right keys, then press ENTER.

4.3.4.3 Track Solo Mode

Track Solo is a playback monitoring feature using the RE-8. Three Track Solo mode settings are available:

```
SOLO MODE:          SOLO MODE:          SOLO MODE:
ADDITIVE            INTERLOCK          MOMENTARY
```

- **Additive:** In Additive Solo mode, each time a track solo key is pressed, the track is “added” to any others being soloed.
- **Interlock:** In Interlock Solo mode (the system default), every time a solo key is pressed, the previous soloed track(s) are taken out of Solo. If you want to solo more than one track while in Interlock Solo mode, simply press *and hold* the first track solo key, then select additional tracks to be soloed.
- **Momentary:** In Momentary Solo mode, track(s) are kept in solo for as long as their solo keys are held.

4.3.4.4 Low Disk Warning

This item allows you to set a low-disk space alarm, so that if available recording time gets below the specified amount, RADAR posts a warning on the LCD.

```
LOW DISK LEVEL
WARNING: 05 MIN
```

The default setting for this level is 5 minutes; you may change this as desired between 99 minutes and 0 minutes.

Please Note: To receive **no low disk space warning**, set the level to 0 minutes.

4.3.4.5 Slide Time Units

This menu item enables you to specify the type of units used when the Slide Edit feature is used.

```
SLIDE TIME UNITS
FRAMES MSEC
```

The choices are frames or milliseconds; make your selection with the cursor keys, then press ENTER,

4.3.4.6 Record Mode

The Record Mode menu item enables you to set two important preferences:

- Record Key Combination
- Punching Additional Tracks Behavior

When the Record Mode menu item is selected, the system will respond with:

```
RECORD:REC+PLAY    RECORD:REC
ARM TK:REC READY   ARM TK:INST REC
```

Use the cursor left/right keys to switch between the RECORD and ARM TK fields, and use the cursor up/down keys within the fields to change the settings. These submenu dialogs operate as follows:

- **RECORD (Record Key Combination):** The RECORD submenu provides two choices for how RADAR is placed into record: REC plus PLAY, or REC only. Make your selection as desired, then press ENTER to return to Ready mode. (Or, press the cursor right key to change to the ARM TK: field, below.)
- **ARM TK (Punching Additional Tracks Behavior):** Use the ARM TK: item to select how RADAR behaves during a recording when additional tracks are armed for record. Two choices are provided: REC READY and INST REC (“Instant Record”).

REC READY, the systems default setting, additional tracks may be **armed** for record while other tracks are already in record; to begin recording on the newly-armed tracks, you must enter Record again.

If, however, INST REC (instant record) is selected, the act of arming an additional track places that track **immediately** into record, with no additional keystrokes.

Make your selecting using the cursor up/down keys, then press ENTER to return to Ready mode, or press the cursor left key to return to the RECORD: submenu.

4.3.4.7 Fast Forward/Rewind Rate

Use this item to select the speed of fast-wind when either the FFWD or REW keys are pressed. (The range is from 1x to 99x play speed.) Make your selection using the cursor up/down keys, the numeric keypad, or the jog wheel; then press ENTER.

```
FFWD & REW RATE:
10 TIMES NORMAL
```

Please Note: RADAR provides two fast wind speeds—the standard speed as set on this menu, and a faster speed obtainable when the FF or REW key is pressed twice in a row. The double-press speed is 3x faster than the regular speed.

4.3.4.8 Peak Hold Time (Input/Playback Metering)

This menu item enables you to set how long RADAR's meters will hold a peak level indication. This duration is specified in seconds, with a top limit of 999 seconds:

```
PEAK HOLD TIME:
001 SECONDS
```

Make your selection using the cursor up/down keys, the numeric keypad, or the jog wheel; press ENTER to return to Ready mode.

Please Note: To hold level peaks indefinitely, enter “-1” for this setting. To disable the feature, enter “0”.

4.3.4.9 Clip Hold Time (Input/Playback Metering)

This menu item enables you to set how long RADAR's meters will display a clip level indication after a digital clip on input or playback. This duration is specified in seconds, with a top limit of 999 seconds.

```
CLIP HOLD TIME:
-01 SECONDS
```

Make your selection using the cursor up/down keys, the numeric keypad, or the jog wheel; press ENTER to return to Ready mode.

Please Note: To hold level clips indefinitely, enter “-1” for this setting. To disable the feature, enter “0”.

4.3.4.10 Save State Delay

This item enables you to specify how long after your last system action RADAR waits before it performs its periodic “Saving State” operation. This delay is set in seconds, as shown:

```
SAVE STATE DELAY
15 SECONDS
```

Save State Delay is specified in seconds from 1 to 99. Make your selection using the numeric keys or jog wheel, then press ENTER.

Please Note: The Save State feature cannot be shut off indefinitely.

4.3.5 Diagnostics Menu

This menu provides a variety of diagnostics for RADAR, its SCSI bus, SCSI devices, and display diagnostics. The Diagnostics menu hierarchy is shown below.

Please Note: The Diagnostics features on this menu are described in Appendix B, Maintenance. For your convenience, a brief description of each item is provided here.

```

SCAN SCSI BUS
MOUNT / UNMOUNT
INIT DISK
CHECK DISK
REPAIR DISK
SHOW FREE RAM
DIS_PLAY TEST 1
DIS_PLAY TEST 2
CONFIGURE DEBUG
SHOW DEBUG
SAVE DEBUG
PLAYLIST ERRORS
REALTIME ERRORS

```

4.3.5.1 Scan SCSI Bus

This item scans RADAR's SCSI bus for SCSI devices, then posts them to the LCD, where you may scroll through them to read device names and SCSI ID numbers.

4.3.5.2 Mount / Unmount

This item mounts and unmounts RADAR's file system—this function should only be used under the direction of Otari Technical Support!

4.3.5.3 Disk Diagnostics (INIT DISK/CHECK DISK/REPAIR DISK)

These menu items are used when diagnosing and repairing SCSI disk problems.

CAUTION!

INIT DISK IS DESTRUCTIVE TO BOTH THE AUDIO DATA ON THE DISK AND THE FILE SYSTEM—THEREFORE IT SHOULD ONLY BE USED UNDER DIRECTION OF OTARI TECHNICAL SUPPORT!

4.3.5.4 Show Free RAM

This menu item displays the amount of free RAM available on RADAR; this information may be helpful to Otari Technical Support when troubleshooting.

4.3.5.5 Debug/Error Logging

RADAR software contains extensive error logging features, including a "Debug" mode that records and captures real-time problems for storage on a floppy disk, as well as two project error logging mode:

```

PLAYLIST ERRORS
REALTIME ERRORS

```

Information from these modes may be useful to Otari Technical Support when troubleshooting. *These features are described in Appendix B.*

4.3.6 Shutdown RADAR

This item saves the current RADAR state, and enables safe, trouble-free power-down. After you select this item, the system will prompt you for confirmation via the LCD, then will say:

YOU MAY SAFELY
TURN OFF POWER

Please Note: After the SHUTDOWN RADAR item is selected, RADAR cannot be operated again until the system power is turned off then back on again!

Section 5 External Synchronization Features

This section describes RADAR's external synchronization features, including SMPTE timecode sync, external house sync, and digital word clock sync features.

This section includes the following subsections.

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5.1 GENERAL

RADAR provides power external sync features as standard equipment, making RADAR equally suited for large-format multitrack recording operation, video post production, and video-reference locked digital audio operation. This section describes the following RADAR features:

- SMPTE Timecode Chase Lock
- SMPTE Timecode Generator
- External Video (House) Sync Operation
- External Digital Word Clock Operation

5.1.1 Synchronization Overview

Synchronization is the process of making two things happen at the same time. An example in music production would be making a bass drum and bass guitar note happen at the same time. In film/video production work, synchronization is used to ensure that the sound of the car door slam and the visual of the door closing occur at exactly the same time. In our case Sync is used to make sure RADAR records and plays back perfectly in time with the various video and audio machines used in these environments.

Sync can also be used to expand the number of tracks available for recording. There may be times when you have more instruments than RADAR has tracks and you want to chain another multitrack machine to RADAR to augment your tracks. When you physically record tracks in two separate machines, sync makes it appear as though they are located on one large multitrack machine.

The relationship in a synchronized multi-machine setup is that of master and slave. The master machine dictates where the slaves should cue to and play from. The master also provides the ongoing timing information that keeps playback tracks on all synchronized machines together over time.

5.1.2 SMPTE Overview

SMPTE timecode is measured in terms of hours, minutes, seconds, frames (24 to 30 frames per second) and, in the case of RADAR, subframes which is one hundredth of one frame. There are a number of different frame rates that correspond to motion picture film, black and white video, color video, and the frequency of AC power mains in different parts of the world. RADAR is capable of synchronizing to all frame rates in use world wide.

SMPTE timecode is an audio signal, although the signal encodes an 80 bit digital word containing precise positioning information. This allows the device reading the timecode to accurately determine the position of the matching audio or video.

Normally, timecode is recorded onto one track of tape or video sources intended to be used in a master/slave control relationship. When the master source tape is put into play, any machines (slaves) will read the SMPTE signal and “chase” it, meaning they will start playback and continue playing in sync with the master source.

5.1.2.1 SMPTE Frame Rates

The frame rates of SMPTE timecode used throughout the world are 30 frames per second (fps), 29.97 fps, 25 fps, or 24 fps. In addition, the 30 and 29.97 fps rates also have drop-frame variants to compensate for the slight synchronization delay introduced by the NTSC broadcast television standard. (Detailed information about the various frame rates is beyond the scope of this manual, and appears in any text on timecode.)

Generally, 24 fps is used in film applications, 25 fps is used for PAL standard video, and 30 fps is used for audio and some NTSC video.

The 29.97 fps rate corresponds to the actual frame rate of the NTSC color video signal. (When television in North America was monochrome, the frame rate was 30 fps. The introduction of color television required that chrominance be encoded along with the luminance of B&W television. This compromise allowed older, B&W televisions to receive the same signals as the new color sets; however the frame rate was lowered to 29.97 frames per second.)

Drop Frame was introduced as a means of compensating for the difference between 29.97 and 30 frames per second over the broadcast day. Over the course of an hour, the difference between the old B&W and new color rates was about 3 seconds and 20 frames; over a day the difference was about a minute and a half.

In the drop frame scheme, two frames are “dropped” every minute (i.e. 00:00:59:29f jumps to 00:01:00:02f, dropping frames 00 and 01). To make the math work out, the “tens” minutes do not drop frames.

In North America, almost all broadcast video uses 29.97/drop frame timecode. Since this is not a universal rule, it's *always* important to check the frame rate before you start—since it is very difficult to change frame rates part way through a job!

5.1.2.2 Chasing a Variable-Speed Timecode Source

If the master timecode is coming from a tape-based machine, its rate may fluctuate as the playback speed increases and decreases due to tape inaccuracies. If the slave device does not respond to these fluctuations, master and slave will eventually become noticeably out of sync.

However, as a true timecode slave, RADAR continually checks the incoming SMPTE code and modulates its internal sample rate accordingly. This ensures that RADAR stays locked in perfect sync for the duration of the program material.

5.1.2.3 Recording to Timecode

RADAR can chase timecode while recording, and due to its advanced timecode features, can even track an unstable tape-based timecode source while recording, while maintaining timecode lock! Recording to timecode operates exactly like normal recording, however RADAR must be set up to chase the correct timecode format.

5.1.3 MIDI Timecode Sync Overview

The MIDI specification includes a timecode scheme not unlike SMPTE. Both timecode varieties use hours/minutes/seconds/frames; however the SMPTE variant also provides separate even and odd fields for each frame. (Another difference is that MTC is carried on RADAR's MIDI ports, while SMPTE is carried on the LTC jacks.)

This feature is not yet implemented.

5.1.4 Video Reference (House Sync) Overview

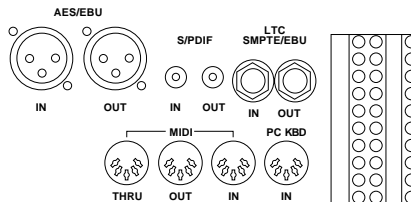
In video production/post production facilities, a high-quality, stable video signal must be maintained at all times. Since the stability of a video signal involves accurate timing of sync pulses and vertical blanking intervals, all equipment used in video production houses must be locked to a master, facility-wide clock signal. This clock signal enables RADAR to maintain a stable lock to any time code generated in the facility. And, when using RADAR in conjunction with high-end video equipment (such as D2 and Digital Betacam), RADAR's house sync capability enables flawless digital audio transfers while locked to timecode.

5.1.5 External Word Clock Overview

RADAR's digital audio hardware generates a stable **digital word clock**, used to synchronize digital data transfer over the AES/EBU or S/PDIF ports. Sometimes, it is necessary to use an external word clock, such as the one generated by a digital betacam machine, during digital audio transfers. An example of this is during digital audio "layback" to a video machine—its digital video synchronization (and its own internal digital word clock) has been derived from the house sync source, and to avoid any digital signal delay when transferring audio from RADAR back to the video deck, it generates a word clock. RADAR locks to this word clock, and transfers the audio accurately.

5.2 EXTERNAL SYNC CONNECTIONS

5.2.1 Timecode Connections



5.2.1.1 Timecode Input

RADAR accepts LTC on a 1/4" phone plug. This signal may be balanced or unbalanced. (*Input Level: 100 mV to 2.5 V p-p*)

- **Connect the timecode source to RADAR's SMPTE IN jack.**

5.2.1.2 Timecode Generator Output

RADAR's internal SMPTE generator may be used as a master source for slaving other devices. (*Output Level: 1V p-p balanced., 0.5V p-p unbalanced*)

- **Connect a 1/4" phone plug (balanced or unbalanced) to RADAR's SMPTE OUT jack.**

The timecode generator output is always active, even if the transport is stationary.

5.2.2 MIDI Timecode (MTC) Connections

MIDI timecode (MTC) is a sync protocol used by samplers and MIDI control equipment. *This feature is not yet implemented.*

5.2.3 Video Sync Connections

If using Video Sync (house sync), connect the sync source to the SYNC REFERENCE IN BNC connector on RADAR's rear panel.

The SYNC REFERENCE OUT connector provides a hard-wired loop through; you may connect this output to other device(s) requiring the same sync source.

Please Note: If the video source requires ground termination, a 75Ω termination resistor may be inserted using the switch between the SYNC REFERENCE IN and OUT connectors. Generally, termination is required if RADAR is the last device (or only device) in the sync chain, and if there is no downstream device connected to SYNC REFERENCE OUT.

Do not insert the termination resistor if loop through is configured, and any device is connected to SYNC REFERENCE OUT!

5.2.4 Digital Word Clock Connections

If using RADAR with an external digital word clock source, connect this source to the SYNC REFERENCE IN connector. If a loop-through is required, you may connect the SYNC REFERENCE OUT connector to the device requiring the same digital word clock.

Please refer to the above note regarding termination for digital word clock.

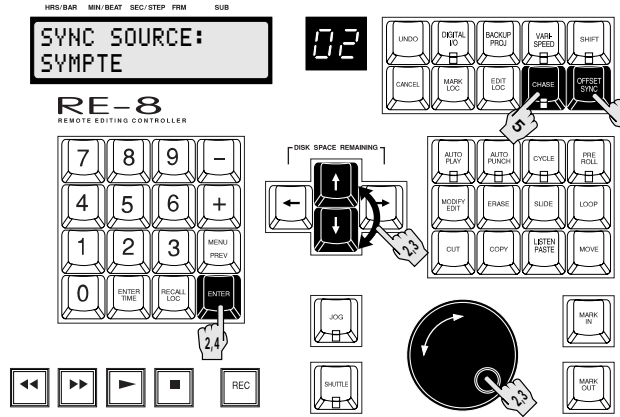
5.3 SMPTE/MIDI TIMECODE OPERATION

5.3.1 Setup for Timecode Operation

Before timecode operation, you must select the frame rate to be used. This setup is available as follows:

From the RE-8:

1. Press **SYNC/OFFSET**. The system will display:



The system will respond with the Sync Source dialog; there are a number of possible selections, as shown below:

```

SYNC SOURCE:      SYNC SOURCE:      SYNC SOURCE:
SMPTE             MIDI             DIGITAL
SYNC SOURCE:      SYNC SOURCE:      SYNC SOURCE:
VIDEO             WORDCLOCK
    
```

2. Use the cursor up/down keys to select **SMPTE (or MIDI)**, then press **ENTER**. The LCD will then present the Format dialog:

```

CONFIGURE SYNC:   CONFIGURE SYNC:   CONFIGURE SYNC:
RATE: 30         RATE: 30 DROP    RATE: 29.97 DROP
CONFIGURE SYNC:   CONFIGURE SYNC:   CONFIGURE SYNC:
RATE: 29.97     RATE: 25         RATE: 24
    
```

3. Use the up/down keys (or the jog wheel) to select a rate from one of the provided options, then press **ENTER**.
4. Press **CHASE** to enable **RADAR** to chase lock to incoming timecode. Press again to disable. The CHASE LED will blink indicating that RADAR is waiting for timecode. When timecode is received, this LED will glow solid.

From the Front Panel: Front panel operation is virtually identical to the above RE-8 description except for these minor differences:

- You must press **EXT SYNC** to enter the Configure Sync menu.
- The **STOP/ENTER** key is used in place of **ENTER**.
- When you have completed all of the edit dialogs and have returned to Ready mode, **RADAR** will have automatically entered Chase mode.

Chase Enable/Disable from Front Panel: To disable Chase mode from the front panel, press **EXT SYNC** twice. To re-enable, press **EXT SYNC** twice again.

5.3.2 Recording while Locked to Timecode

To maintain sync to a timecode master on playback, you must record the material while chasing the timecode source. To record while chasing timecode:

1. **Press CHASE (RE-8) or EXT SYNC (front panel) to enable timecode chase.**
2. **Start the timecode source.** RADAR begins to chase in a second or so.
3. **Enter Record using the transport keys.** (Record to timecode functions exactly like standard recording; this is described in §3.5.)
4. **Press PLAY or STOP to leave record, or stop the timecode source.**

5.3.3 Playback to Timecode

Playback to timecode requires that you select the timecode format (SMPTE or MIDI) and rate (24–30 fps). Then, simply supply the timecode to RADAR's SMPTE IN (or MIDI IN) jack; RADAR cues automatically, and will begin to play locked to the incoming timecode.

5.3.4 SMPTE Offset

Offset is used when there is audio beginning at one SMPTE location already recorded on RADAR and audio beginning at another SMPTE time on another machine and they both must play together. RADAR allows you to vary the offset, that is, the difference in hours, minutes, seconds, frames and subframes between its internal SMPTE time and the sync master. Offset may be edited while both machines are running in sync. Normally, the default offset is 00:00:00:00:00 but this can be changed when necessary. If you already know the exact Offset time, this can be entered directly in the Set dialog.

Setting SMPTE Offset from the RE-8:

1. **Press SHIFT, release it and then press SYNC/OFFSET.** The LCD will present the Set Sync Offset dialog:

```
SET SYNC OFFSET  
00:00:00:00.00+
```

2. **Enter the offset time from right to left starting with frames.** Or, use the jog wheel to dial in the desired value(s). *Use the + and - keys to make the offset positive or negative.*
3. **Press ENTER to return to Ready mode.**

From the Front Panel: This is essentially identical except for the procedure in which you enter the initial Offset dialog:

1. **Press and release MENU/ESC.**
2. **Use <</CURS L and >>/CURS R to scroll through the submenu options until the flashing cursor rests beneath the Project submenu.**
3. **Press STOP/ENTER.**
4. **Press DOWN/NO several times to scroll to the Set Sync Offset submenu and then press STOP/ENTER.**
Repeat the steps described above.

5.4 EXTERNAL SYNC (VIDEO REFERENCE) OPERATION

External Sync Overview: In video production/post production facilities, a high-quality, stable video signal must be maintained throughout the production cycle. Since the stability of a video signal involves accurate timing of sync pulses and vertical blanking intervals, all equipment used in video production houses must be locked to a master, facility-wide clock signal. This clock signal is variously called “Video Reference”, “House Sync,” “Black Burst,” or “RS-170.” (While the nature of these signals vary slightly depending on the needs of the facility, the basic function is the same as far as RADAR is concerned.)

House Sync enables RADAR to maintain a stable lock to any time code generated in the facility. And, when using RADAR in conjunction with high-end video equipment (such as D2 and Digital Betacam), RADAR’s house sync capability enables flawless digital audio transfers while locked to time code.

Positional Sync: Video reference provides RADAR with a synchronization signal only—and does not contain time code information. Therefore, RADAR’s video reference feature enables you to select the source for “positional” sync—this could be SMPTE timecode, MIDI timecode (MTC) or RADAR’s internal clock. In the case of SMPTE or MIDI timecode, the sync timing comes from the incoming video reference, while the position information comes from the incoming timecode.

Video Reference Operation:

1. **From the front panel, press EXT SYNC (or, on the RE-8, press OFFSET/SYNC).** The system will respond with the Sync Source dialog described earlier.
2. **Using the cursor up/down keys (or jog wheel), select VIDEO:**

```
SYNC SOURCE:
VIDEO
```

3. **Press ENTER.** The system will respond with the Video Reference (sync rate) dialog, as shown. This dialog has three choices—NTSC at 59.94 fps, NTSC at 60 fps, or PAL at 50 fps.

```
VIDEO REFERENCE: VIDEO REFERENCE: VIDEO REFERENCE:
NTSC 59.94      NTSC 60      PAL 50
```

4. **Select the desired video reference sync rate, then press ENTER.** The system will respond with a Positional Source selection:

```
POSITIONAL SRC: POSITIONAL SRC: POSITIONAL SRC:
INTERNAL       SMPTE       MIDI
```

5. **Select the desired positional source, then press ENTER.** Remember that video reference provides timing information only (i.e. when!), but the positional source provides the place (i.e. where!)

If you selected INTERNAL, the system returns to Ready mode. If you selected either SMPTE or MIDI, you must now specify an expected frame rate for the timecode. In these cases the system responds with:

```
CONFIGURE SYNC: CONFIGURE SYNC: CONFIGURE SYNC:
RATE: 30        RATE: 30 DROP   RATE: 29.97 DROP
CONFIGURE SYNC: CONFIGURE SYNC: CONFIGURE SYNC:
RATE: 29.97    RATE: 25        RATE: 24
```

6. Use the jog wheel or the cursor keys to select the desired frame rate, then press ENTER.

If you select INTERNAL for positional source, the system will use its internal clock. If you select SMPTE, RADAR uses the incoming timecode—if you select MIDI, MTC from the MIDI port is used. In any of these cases, the actual timing is derived from the incoming video sync.

5.5 DIGITAL WORD CLOCK SYNC OPERATION

Wordclock Sync Operation:

1. From the front panel, press EXT SYNC (or, on the RE-8, press OFFSET/SYNC). The system will respond with the Sync Source dialog described earlier.

2. Using the cursor up/down keys (or jog wheel), select WORDCLK:

```
SYNC SOURCE:  
WORDCLK
```

3. Press ENTER. Wordclock sync is now enabled.

Section 6 RE-8 Session Controller Features

This section describes the features and functions of RADAR's optional RE-8 session controller, including installation and basic operation.

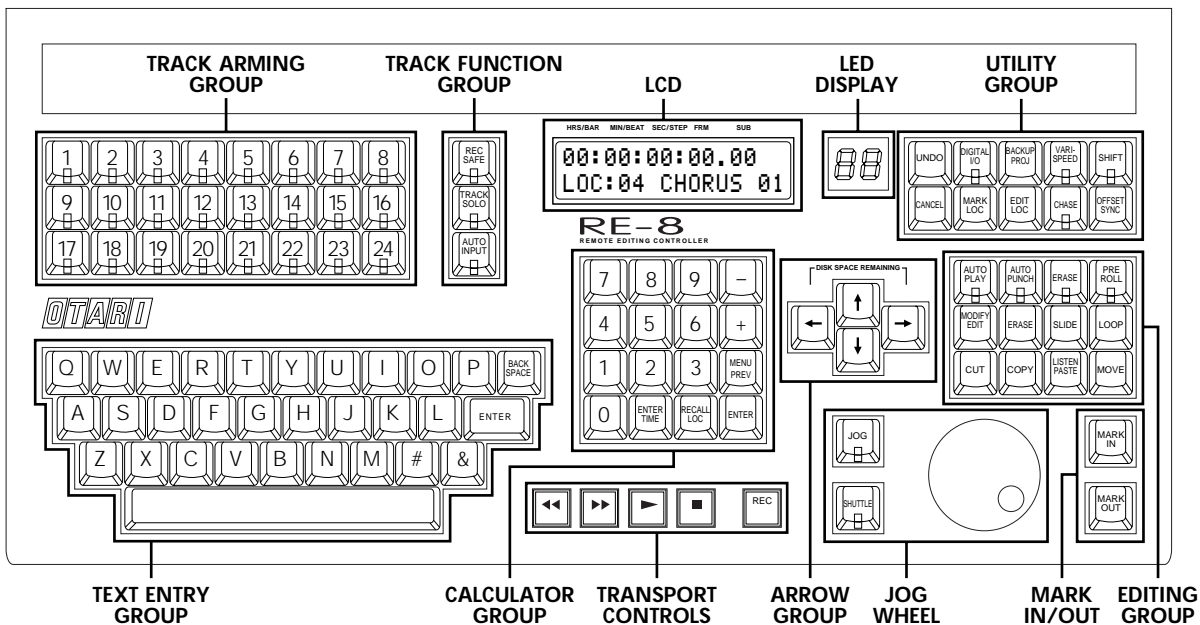
This section includes the following subsections.

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6.1 INTRODUCTION

The RE-8 session controller provides remote control of basic RADAR functions as well as providing the necessary functions and a jog wheel for the editing of audio data. The RE-8 also has input jacks for foot switches to allow hands-free control of selected transport functions.

The RE-8 function keys are arranged in groups to make them easier to learn as well as reducing unnecessary hand movements. These are explained in detail below.



6.2 A TOUR OF THE RE-8 SESSION CONTROLLER

6.2.1 Track Arm Keys

The track arm keys are used to for several purposes: for arming tracks prior to record, for punching in on additional tracks while recording, and in editing modes, for selecting track(s) to be edited. These switches are momentary type with an LED in the center to indicate active status.

6.2.2 Track Function Keys

6.2.2.1 REC SAFE/CLEAR (§3.5.4)

This function protects against accidental erasure by locking-out the track arming keys. It can also disarm a group of tracks any time you press the REC SAFE. SHIFT followed by this key will clear all selected tracks.

6.2.2.2 TRACK SOLO (§3.7)

This is used to audition individual or multiple tracks while muting the rest, and is designed to be a more convenient method for solo when editing audio with the RE-8. (*TRACK SOLO is also useful as a stereo-in-place solo function if your mixing desk is not capable of this.*)

To enable Track Solo:

1. **Press TRACK SOLO.** The key's LED will flash quickly and the LCD will prompt: Select Tracks To Solo.
2. **Choose one or several tracks from the track arming group.** When selected, the track arming LEDs will blink for each soloed track. You may now perform all transport operations except recording.

Please Note: During playback, the meters will show levels for only those tracks soloed.

To disable Track Solo, press TRACK SOLO again. Its LED will go out and you can resume normal operation. The tracks that were previously set in Track Solo are remembered for the next time you engage this function.

Track Solo Modes: Three Track Solo modes (Additive, Interlock, and Momentary) are available, as described in §3.7. The active Solo mode may be selected on the Preferences menu.

6.2.2.3 AUTO INPUT (§3.9)

The AUTO INPUT key is used to select if existing program material on Rec-Readied tracks is monitored during playback (i.e. prior to punch in). When set to Auto Input, RADAR monitors existing material on Rec-Readied tracks before and after a Record operation. During Record, RADAR automatically switches to input monitoring, and upon punch out, returns to the existing track material.

6.2.3 Text Entry Keys

The text entry area is used as a fast way to enter names for location points and backups. This area provides the alphabet in QWERTY format; and since naming functions on RADAR do not require them, the shift, numeric or control keys do not appear.

The QWERTY keys may also be used as an alternative way to navigate through menu fields. If you know the name of the desired menu selection, you can type only its first letter in place of using the cursor up/down keys. The same is true for autolocating. If you have previously named the locate points in your project, you can press RECALL LOC, then type the first letter of the location point's name to recall it!

6.2.4 LCD & Numeric Display**6.2.4.1 LCD**

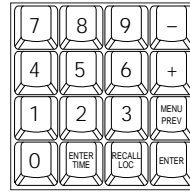
The main RE-8 display is a large 2 line by 16 character backlit LCD. This display offers feedback on all menu, configuration and editing functions, and duplicates the characters on the RADAR front panel display.

6.2.4.2 2-Digit LED Display

The smaller LED display to the right of the main LCD indicates the currently active RADAR project. *More information about this feature appears in §2.10.*

6.2.5 Calculator Keys

While not a true “calculator”, this group of RE-8 keys provides a numeric keypad and dedicated function keys relating to cueing the transport and navigating through menus.



6.2.5.1 Numeric Keypad

These keys are used for entering numbers into RADAR menus, and also as a quick way of selecting numbered locate points.

The numeric keys are also used in conjunction with the plus (+), minus (-) and Enter Time functions to allow direct entry of SMPTE location times.

6.2.5.2 + (Plus) and - (Minus) Keys

When RADAR is in Ready mode, the + and - keys enter an additive SMPTE cueing function, where you may enter the number of SMPTE frames you would like to nudge the current location ahead or behind in time.

If you are in a dialog screen, and the LCD is prompting you to enter a number, you may type either key before entering the number:

1. **Press the + (plus) or - (minus) key from Ready mode.** The LCD will present a dialog screen showing the current SMPTE time on the top line and 00:00:00:00.00 time on the lower line.
2. **Type in a number representing how many frames you would like to add or subtract to the current time, then press ENTER.** The number you have just entered will be automatically summed with the current time, the transport will be cued to the new time and you will be returned to Ready mode.

Please Note: The entered number of frames must be less than the current frame rate (e.g. if RADAR is set to 30 frames per second, and you enter “+31”, the system will respond with: INVALID SMPTE, PRESS ANY BUTTON. If you make a mistake, simply press either the + or - key again and re-enter the number.

Entering Numbers into Other Fields: Use the cursor left/right keys to move the cursor to a different field of the timecode display to enter into the field. The default field for direct entry is frames, but you may change this default to seconds in the Preferences submenu. See the description later in this section under the “**Changing the Default Field in the Preferences Submenu**” item for how to change this default field value.

6.2.5.3 MENU/PREV Key

Press the MENU PREVIOUS key to enter and exit the Main menu. This helps you navigate the menu system because it allows you to back-step through any submenus or dialogs you may have mistakenly entered into. If you changed something in one of the dialogs and then you press the PREV key, it will return to its original value.

6.2.5.4 ENTER Key

This key is used to select or execute menu items, to respond to YES/NO queries from the LCD, and to initiate edit operations.

6.2.5.5 RECALL LOC Key

This key is used to recall locate points, as described in Section 3: Recording & Transport Operation.

6.2.5.6 ENTER TIME Key

This function allows you to cue the transport to an exact SMPTE location by typing it in directly on the numeric keypad.

Cueing Directly to a SMPTE Location with Enter Time:

- 1. Press ENTER TIME.** (This function is available during any transport mode except Record.) The LCD will change to show the captured SMPTE time on the bottom line and the current time on the top line. If the transport is stopped, these numbers will be the same. In Play, the number on the top line will continue to increment. The cursor will be flashing beneath the frames or seconds field of the captured time.
- 2. Enter the SMPTE time you want starting with frames, then seconds and finally minutes and hours.** (You may also use the cursor keys to move the cursor among different fields, so you may enter times directly.)
- 3. Press ENTER to accept the new SMPTE location.** RADAR will cue to the new location and return to Ready mode.

Please Note: You may change the default SMPTE field (i.e. the flashing cursor rests on the seconds field rather than the frames field) on the Preferences menu, as described in §4.3.4.

6.2.6 Transport Keys

The transport keys on the RE-8 are identical to those on RADAR's front panel, as described in Section 3: Recording & Transport Operation.

6.2.7 Cursor Keys

The cursor keys on the RE-8 have several functions, depending on the particular menu you are operating within. For example, the up/down keys could scroll through menu selections or increase and decrease the number underscored by the flashing cursor. The left/right keys generally advance the cursor to the next editable field within a single menu window.

Please Note: For more information on navigating the menu, see Section 4: RADAR Menu Operation.

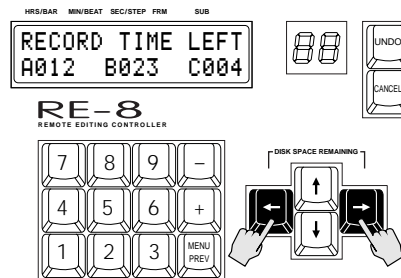
Cursor Key Audition: You may use the cursor left key to audition audio up to the current Mark In time (using the preroll time setting); conversely, you may press the cursor right key to play after the Mark Out point the amount of the preroll time. And, if you press the cursor down key, the system will play the audio between the Mark points.

Determining Disk Space Remaining Using Cursor Keys. The left/right arrow keys have another extremely useful function—that is to show, in track minutes, the amount of disk space remaining.

1. **Arm the tracks you wish to record upon.** (You may bypass this part of the procedure if you only need to know the total recording time remaining for one track.)
2. **Press and hold the left and right arrow keys simultaneously.** The LCD will show an A, B and C with a number. The A, B and C each represent a block of eight tracks. The number next to the letters represents the time in minutes that you can record given the number of tracks armed. *If tracks are armed for a particular disk, the time left number for that disk will flash on and off.*

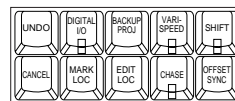
The display is in **actual** recording minutes available—if you have 20 minutes of track time available on Disk 1, and no tracks armed, it shows 20 minutes. If, however, you have two tracks armed for recording, it will show 10 minutes (i.e. 10 minutes per track x 2 tracks = 20 minutes). If you change the number of armed tracks, the remaining time number(s) will change accordingly.

Please Note: You may check available disk space at any time—even during recording.



6.2.8 Utility Keys

This group of RE-8 keys contains functions that are broken out from within the RADAR menu system. Most have been described elsewhere in this manual; cross references to the appropriate manual sections are provided.



UNDO: See either §3.11 (Recording), or §7.2 (Editing).

DIGITAL I/O: See §3.17.

CANCEL: Cancels or exits from current operation.

SHIFT: Selects 2nd (blue) functions on RE-8 or front panel.

VARISPEED: See §3.8.

MARK LOC: See §3.13.

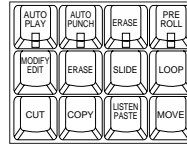
EDIT LOC: See §3.13.

CHASE: See §5.3.

SYNC/OFFSET: See §5.4.

6.2.9 RE-8 Dedicated Editing Keys

This area represents many RADAR editing features with dedicated keys:



These features are described elsewhere in this manual; cross references appear here:

AUTO PLAY: See §3.13.4.

AUTO PUNCH: See §3.10.

CYCLE: See §3.15.

PRE ROLL: See §3.16.

EDIT function keys: See Section 7.

6.2.10 Jog/Shuttle Wheel

RADAR's Jog/Shuttle modes provide fast, precise location in recorded material. Shuttle mode uses the jog wheel to vary the speed and direction of audio for locating points; Jog mode allows you to "scrub" the audio to find exact locations.

Please Note: The jog wheel may also be used as a convenient control device when scrolling through RADAR's menus. When used as an input device, turning the wheel to the right increases the value on screen, and turning it to the left decreases the value.

6.2.10.1 Entering Jog Mode

Press the JOG key to the left of the wheel to engage Jog mode:



Turning the wheel clockwise or counterclockwise produces variable speed playback for as long as you continue turning it. When you stop turning the wheel, playback will stop. The speed of playback varies from scrub where you can accurately locate the first transient of an audio waveform by rocking the wheel gently forward and backward to slightly above normal playback speed.

Jog "Bump": You may "bump" the current location while in Jog by pressing the cursor left or right keys. Each cursor press will nudge the jog location by the smallest possible wheel increment.

To exit Jog mode, press any key (including the JOG key).

6.2.10.2 Entering Shuttle Mode

Press the SHUTTLE key (located below the JOG key) at any time to engage Shuttle mode:



Shuttle produces playback at variable speeds like Jog with one difference; when you stop turning the wheel, playback continues at the current speed until you move the wheel again or press a transport key.

To exit Shuttle mode, press any key including the SHUTTLE key.

6.2.11 MARK IN & MARK OUT Keys

The MARK IN and MARK OUT keys set *temporary* location markers for audio editing and transport locating. Mark In defines the beginning of a clip and Mark Out defines the end point. Audio between these two points can then be placed on the clipboard, deleted or erased. *(You may use the cursor keys to audition the audio between and around the Mark points! See §6.2.7 for details.)*

The Mark In and Out points are not only used for editing, but are also useful as Auto Location points that you do not want to store permanently. Mark In and Out points can be recalled in the same way as location points.

6.2.11.1 Defining a Location using Mark In

1. **Cue to a desired location using the transport, auto locate, wheel or SMPTE time entry functions.**
2. **Press MARK IN.** This can be pressed during playback, record or with the transport stopped.

During playback or recording, repeated pressing of a MARK key will continuously update that point to reflect the new location and delete the previous one.

6.2.11.2 Defining a Location using Mark Out

1. **Cue to a desired location using the transport, auto locate, wheel or enter time functions.**
2. **Press MARK OUT during any transport mode.** This can be pressed during playback, record or with the transport stopped.

If you will be using Mark Out to define the end point of an audio clip, this point must be after Mark In. *This is not necessary if you are using Mark Out as a temporary location point.*

During playback or recording, repeated pressing of a MARK key will continuously update that point to reflect the new location, and will delete the previous Mark.

6.2.11.3 Recalling and Editing a Marked Location Point

1. **Press and release RECALL LOC, then press MARK IN or OUT—** whichever one you wish to edit.
2. **Press ENTER.** The transport will be cued to the point you have chosen.
3. **Press ENTER TIME, and make the desired changes using the methods described in §6.3.5.6.**

Once you have edited the current location to your satisfaction with Enter Time, press the MARK key you want changed. This will delete the previous Mark location and replace it with the edited one.

6.3 FOOT SWITCH FEATURES

RADAR's RE-8 provides external contact closure control of several transport functions—these are typically foot-switches, but could be any type of switch.

The back panel of the RE-8 has three 1/4-inch input jacks. To these you may connect three momentary contact foot switches.

Please Note: The contacts in the foot switches must be wired as normally open.

The foot switch inputs are numbered from one to three, with the following functions:

- Switch #1:** Toggles between Play and Stop.
- Switch #2:** Cues to the current auto location point. (This switch actually replaces two key presses: RECALL LOC and ENTER.)
- Switch #3:** Executes Record (from Play mode only).

Section 7 RADAR Editing Features

This section describes RADAR's powerful Audio Editing features, including a description of the editing clipboard, looping, and single-track crossfade editing. This section includes the following subsections.

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7.1 INTRODUCTION

This section describes audio editing using RADAR; most editing features make use of the MARK IN and MARK OUT keys; these were described earlier in this manual.

The beauty of recording audio in the digital domain is not only the high dynamic range and low noise floor, but the ability to rearrange the running order of an audio track; be it music, sound effects or spoken words. This can be compared to the process of editing text using a computer-based word processor: RADAR is a word processor for sound, not words!

7.1.1 RADAR v1.1 Editing Functions

Below is a list of the RADAR v1.1 editing functions and paragraph references:

Undo/Redo (§7.3): Enables repeated Undo/Redo on any RADAR edit operation.

Crossfade Time (§7.1.3): Enables setting/changing duration of RADAR's digital crossfades.

Listen (§7.2.3): Enables you to listen to (audition) RADAR's clipboard.

Cut (§7.4): Cuts between the Mark points—rejoins the cut ends, places the cut material on the clipboard.

Copy (§7.5): Copies between the Mark points—places the material onto the clipboard. Original material unchanged.

Paste (§7.6): Places full clipboard material starting at Edit mark; overwrites or pushes other material on the edited track(s) downstream (operator choice). If an Edit In is used, places material starting there. If an Edit Out is used, backtimes clipboard material to *end* at the Edit Out point.

Erase (§7.7): Erases between Mark points.

Move (§7.8): Moves a segment of audio to another location, leaving a blank spot in its place. This function combines the Erase and Paste features, but doesn't put the moved segment onto the clipboard.

Slide (§7.9): Slide moves the marked segment forward or back in millisecond (or frame) increments.

Loop (§7.10): Loops clipboard material end-to-end (with crossfades) for specified number of repeats. Loop operates in either forward or reverse (backtime) directions.

Modify Edit (§7.11): Enables you to modify the parameters of the previous edit operation, without having to undo it, make changes, then make the edit again.

Reverse (§7.12): Reverses the clipboard material—which may then be pasted into the project as desired.

Mute Tracks (§7.13): Temporarily turns off selected tracks at the disk unit, releasing disk bandwidth for seamless punch-out monitoring operations.

Import *.WAV (§7.14): Allows you to import WAVE format sound files using RADAR's floppy drive. Imported sound file(s) are automatically converted, then saved to the clipboard for later use.

7.1.2 About the Clipboard...

Many RADAR editing functions make use of RADAR's clipboard, which is a temporary storage place for audio material while editing. Clipboard material does not take up additional disk space, and is not stored after a system shutdown.

Once audio is stored on the clipboard (via a Cut, Copy, etc.), the clipboard material can be pasted to another location as desired. In addition, the clipboard material may be reversed, then pasted into the project; the Import feature allows RADAR to accept *.WAV files, which are converted and placed onto the clipboard.

Please Note: Any new audio placed on the clipboard erases any previous clipboard audio!

7.1.3 Digital Crossfades on Edit Operations

Digitally "gluing" two different pieces of audio together in a Cut operation, for example, would normally cause an audible click or pop to be heard at the point where they are joined.

RADAR overcomes this problem by crossfading the two clips together. Crossfading calculates a simultaneous digital fade-out and fade-in of the two audio clips, and this results in a seamless-sounding edit. Crossfading does not only occur when editing; crossfades are also calculated for the punch in and punch out points when recording over existing audio.

The default crossfade time is preset at the factory at 5 milliseconds which is usually sufficient to provide smooth transitions between clips and for punching-in. Any changes to the crossfade time are retained until changed again.

Changing the Default Crossfade Time:

1. Press MENU/PREV. Press the letter E (on the RE-8 QWERTY keyboard) to locate the Edit submenu or use the UP or DOWN keys on the front panel.

```
MAIN/EDIT MENU:
CROSSFADE TIME
```

2. Press ENTER. The LCD will show the Crossfade Time Edit dialog:

```
SET XFADE TIME:
 005 mSec
```

3. Enter any number (up to 100 mSec) on the calculator keypad or use the UP or DOWN keys or jog wheel to enter the value. Press ENTER to save the setting and return to Ready mode.

7.2 DEFINING AN AUDIO CLIP USING MARK IN/MARK OUT

Whether or not you will be using the clipboard to paste audio to a different location, all editing procedures require you to define an **audio clip**. An audio clip is a piece of audio on one or more tracks that is located between two points in time.

7.2.1 Marking the Start and End of an Audio Clip

The MARK IN and MARK OUT keys are used for defining the start and end locations of an audio clip. (*MARK IN key sets the beginning of your clip; MARK OUT key sets the end.*) You may use the transport controls (including Jog/Shuttle features described in §6.11) to locate the transport—placing Mark In and Mark Out points is described in §6.12.

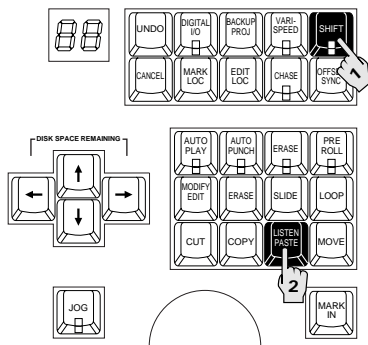
Please Note: Both a Mark In and a Mark Out point are required for many RADAR edits. If one or the other is not present at the time the editing function is selected, the system will respond with:

OUT NOT DEFINED
PRESS ANY BUTTON

7.2.2 Selecting Track(s) for Editing

RADAR supports editing on any number of tracks from 1 through 24; involved tracks do not have to be adjacent to each other. In many editing operations, RADAR prompts you to select the track(s) to be used in the edit. Tracks may be selected using the track arm keys, on either the RE-8 or the front panel.

7.2.3 Auditioning the Clipboard



You may, at any time, audition RADAR's clipboard using the Listen feature. Follow this procedure to audition the clipboard.

1. Press **SHIFT**. The LED in the key will light.
2. Press **LISTEN/PASTE**. You will hear playback of the audio on the clipboard. (*If there is no audio on the clipboard, the LCD will show an error message.*)
3. Press **LISTEN/PASTE** again to stop playback, and to return to Ready mode.

Listen from the Front Panel:

1. Press **MENU/CANCEL**, then press **UP** and/or **DOWN** to display the Edit menu. Press **ENTER**.
2. Select **LISTEN** from the Edit menu by using the **UP** and/or **DOWN** keys. Press **ENTER** again to audition the clipboard. Press **STOP** to end playback.

7.3 UNDO/REDO FUNCTIONS

RADAR provides a one-step Undo-Redo feature that permits you to “try out” editing operations without the fear of permanently losing audio.

Along with the Undo function is the Redo function. Redo will “undo” the Undo if you should decide to keep the edited part after all.

Performing an Undo or Redo from the RE-8:

- 1. Press UNDO after performing a Record or after any Edit operation.**

The display will read:

```
UNDO PASTE?  
NO YES
```

Please Note: RADAR shows the last operation by name in the Undo or Redo menu. Thus, if the last action was an Erase, the menu would read: UNDO ERASE?

- 2. Press ENTER.** RADAR will undo the previous operation. Press CANCEL if you want to abort. Repeat this procedure to redo.

From the Front Panel:

- 1. Hold MENU/ESC, then press UNDO.**
- 2. Press STOP/ENTER.**
- 3. Press MENU/ESC if you want to abort.**

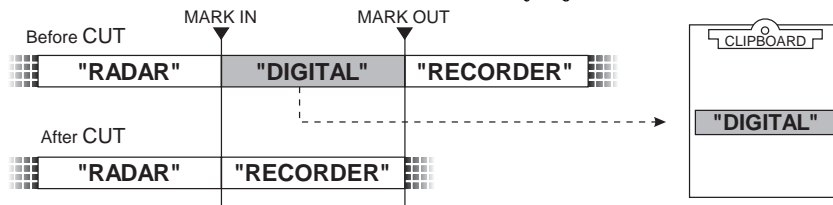
Repeat this procedure to redo.

Please Note: If there is no function to undo, the system will display:

```
NOTHING TO UNDO  
PRESS ANY BUTTON
```

7.4 CUT

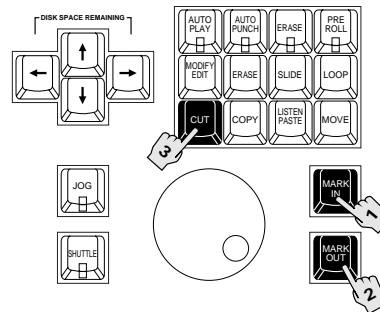
Cut removes a section of audio from the selected track(s). The “cut” section is then placed on the clipboard ready to paste to another location. The audio on either side of the in and out locations is seamlessly rejoined, as follows:



Please Note: RADAR uses single-track digital crossfade to minimize or eliminate the “click” or “pop” when rejoining dissimilar audio levels. The crossfade length defaults to 5 milliseconds—normally a quite sufficient length. However, the crossfade length is adjustable—refer to §7.11, Modify Edit, for further information.

Cut Procedure:

1. Define the start point of the clip you want to cut by locating to the beginning of the clip with either the jog wheel, transport or Enter Time functions, then press **MARK IN**.
2. Define the ending point of the clip you want to cut by locating to the end of the clip in the same manner, then press **MARK OUT**.



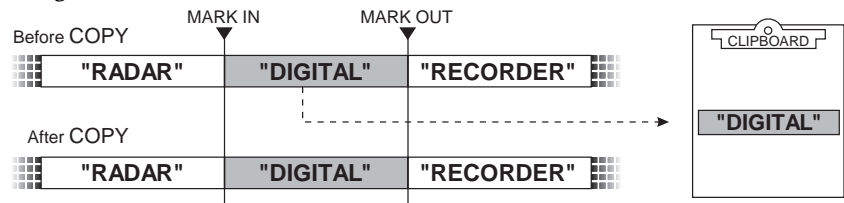
3. From the **RE-8**: Press **CUT**. The system will respond as shown below. From the Front Panel: Press **MENU/CANCEL**, then press **UP** and/or **DOWN** to display the Edit menu. Press **ENTER**. Select **CUT** from the Edit menu by using **UP** and/or **DOWN** again. Press **ENTER** to continue. The system will respond as shown:

```
CUT:      TRACKS
ALL      TRACK ARM
```

4. Select how you want to cut by using the cursor keys to select **ALL** (cut across all tracks in system), or **TRACK ARM** (cuts only those track(s) selected using the track arm keys). Press **ENTER**.
(If you selected **TRACK ARM**:) Select the track(s) you require using the track arm keys (on either the *RE-8* or front panel). Press **ENTER**. RADAR will perform the Cut operation and return to Ready mode. The sections of audio at the Mark In and Out points (on the selected tracks) will be joined together. *The cut material is now on the clipboard, ready to be used elsewhere as required.*

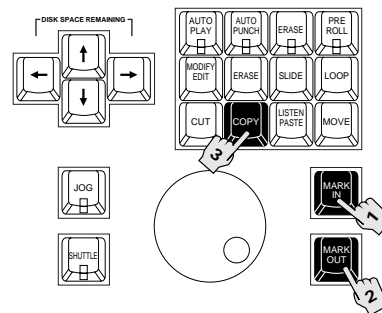
7.5 COPY

When you copy audio to the clipboard, you make a duplicate of the audio clip onto the clipboard (ready for use elsewhere). *The original material remains unchanged.*



Copy Procedure:

1. Define the start point of the clip you want to copy by locating to the beginning of the clip with either the jog wheel, transport or Enter Time functions, then press MARK IN.
2. Define the end point of the clip using the same method(s), then press MARK OUT.
3. From the RE-8: Press COPY.
From the Front Panel: Press MENU/CANCEL, then press UP and/or DOWN to display the Edit menu. Press ENTER. Select COPY from the Edit menu by using the UP and/or DOWN keys again. Press ENTER to continue.



4. The LCD prompts you to select tracks for the Copy. Use the CURS L/R keys to select ALL (copies all tracks between Mark In and Mark Out); or TRACK ARM (copies material on selected track(s) only).
(If you selected TRACK ARM:) Select the track(s) you require using the track arm keys (on either the RE-8 or front panel).

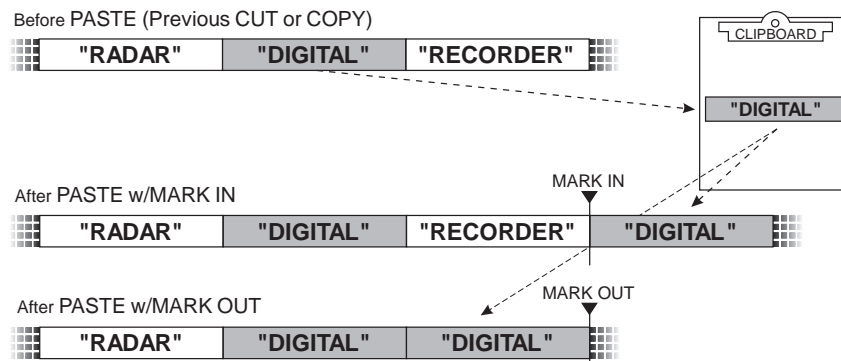
```
COPY:   TRACKS
ALL     TRACK ARM
```

5. Press ENTER. RADAR performs the Copy and return to Ready mode. The clip is now on the clipboard ready for your next operation.

7.6 PASTE

Paste copies the contents of the clipboard to the current time code location, or to any other location of your choosing. You have your choice of having the Paste **overwrite** audio (paste over existing audio, without changing track length), or to be **inserted** into it (splice, thus pushing audio at the paste point downstream).

Paste Options: By using Mark In as a paste point, the beginning of the clipboard material is pasted at that point, and the entire clipboard is pasted in. However, by using Mark Out as the paste point, the end of the clipboard material is pasted, and the earlier clipboard material is backtimed. See the following diagram to put these options into perspective:



Please Note: RADAR uses single-track digital crossfade to minimize or eliminate the “click” or “pop” when rejoining dissimilar audio levels. The crossfade length defaults to 5 milliseconds—normally a quite sufficient length. However, this crossfade length is adjustable—refer to §7.11, Modify Edit, for further information.

Please Note: If you are unsure about what is actually on the clipboard, use the Listen function to audition the clipboard. See §7.2.

Paste Procedure:

1. **Press PASTE.** The LCD will ask if you want to paste your clip to the same or another track:

```
PASTE: TO TRACKS
SAVE   OTHER
```

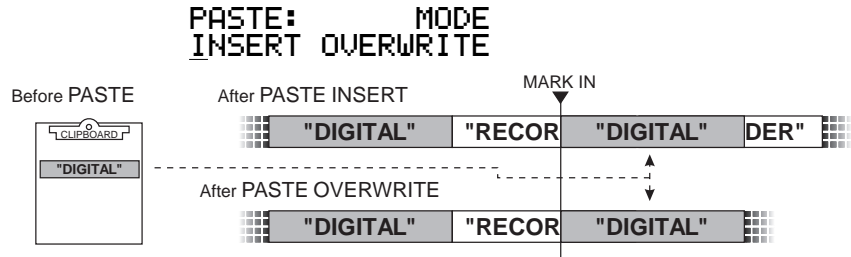
2. **To paste to the same track(s) as where the clip originated from, press ENTER.** These track(s) will be selected and flashing.
To paste to a different track, select any other track(s) from the track arming group. The cursor will move to OTHER, and the new track(s) will be flashing. **Press ENTER to continue.**

IMPORTANT PASTE NOTES: If your clip originates from multiple tracks, you may select any other tracks as destinations. However, a multiple track Paste will always end up in the numerical order from which it came. For example, if the clip originated on tracks 1 and 2 you are able to paste it to tracks 6 and 9; track 1 maps to track 6, and track 2 maps to track 9. It is not possible within one operation to simultaneously paste track 1 to 9 and track 2 to 6. Paste operations across 8-track drive boundaries (for example from track 1 to track 9) take slightly longer to complete. This is because the audio data must be RECREATED on the destination drive. Such a Paste operation also consumes space on the destination drive.

Please Note: If you select more (or fewer) tracks that are represented on RADAR's clipboard, the system will respond with:

02 TRAX REQUIRED
PRESS ANY BUTTON

- The LCD asks if you want to Insert or Overwrite at the paste location.
Press ENTER if you wish to accept the INSERT default.
If you want the clip to overwrite at the new location, cursor to OVERWRITE and press ENTER. (Refer to the following diagram):



Please Note: If you paste with only a Mark Out set, the system will back-time the clipboard material so that it ends at the Mark Out point. Insert & Overwrite operate in the same manner as described for Mark In if only a Mark Out is used.

- The LCD will ask where you want to paste the clip. (The default time is the current transport location before the Paste operation.)
Use the jog wheel, transport or the numeric keypad to cue to where you want the paste point to be.

PASTE: TO
01:51:37:14.57

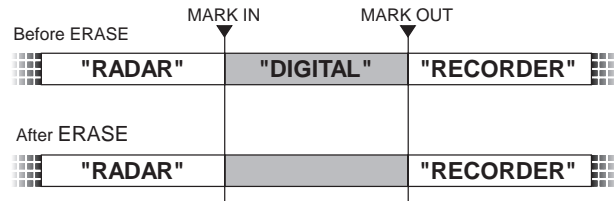
- Paste will automatically place the start of the clipboard material at the point you entered in Step 4.
To Back Time the clipboard material, press MARK OUT, followed by ENTER.
To Paste starting at the entered time, press ENTER.

Multiple Paste Feature: You may specify multiple Paste To locations by pressing MARK IN or MARK OUT, then changing the paste time and pressing MARK IN or OUT again. Repeat this as needed (the LCD shows the number of Pastes RADAR will do) then press ENTER to process the Pastes. You may also change the Paste To time simply by playing and marking with the transport in motion.

7.7 ERASE

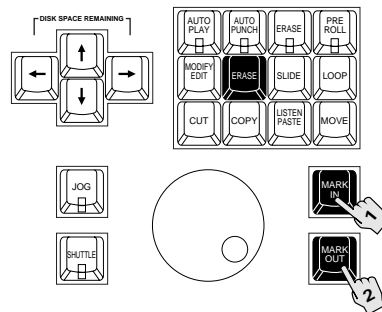
The Erase function deletes audio from the selected track(s), without changing their length(s).

To do an Erase, you select the track(s), and the beginning and end points of the section; the Erased clip is NOT placed on the clipboard (*but it can be restored using the Undo function*).



Erase Procedure:

1. Define the start point of the clip you want to erase by locating to the beginning of the clip with either the jog wheel, transport or Enter Time functions. Press MARK IN.
2. Define the ending point of the clip you want to erase in the same manner, then press MARK OUT.
3. Press ERASE.



4. The LCD will ask you to select which track(s) to erase. Select how you want to erase by using the cursor keys to select ALL (erase between marks across all tracks in system), or TRACK ARM (erases only those track(s) selected using the track arm keys). Press ENTER.
(If you selected TRACK ARM:) Select the track(s) you require using the track arm keys (on either the RE-8 or front panel). Press ENTER.

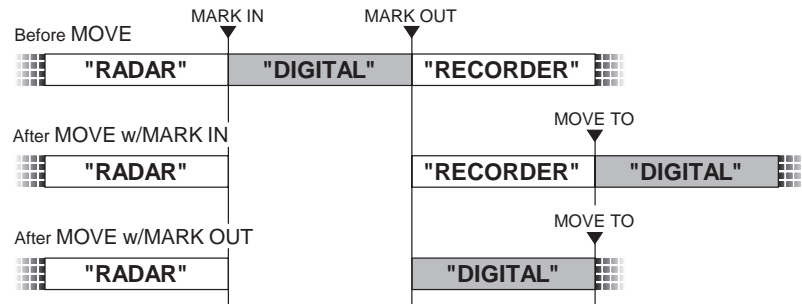
```
ERASE:   TRACKS
ALL     TRACK ARM
```

RADAR will perform the Erase operation and return to Ready mode. Audio material on the selected track(s) is now erased from the project, and HAS NOT BEEN PLACED ON THE CLIPBOARD!!! *Undo will restore the audio to its original location.*

7.8 MOVE

Move “relocates” an audio clip to another place and/or another track, leaving silence in the original location. *In other words, Move incorporates the Erase and Paste operations in a single edit.* The clip’s start or end point can be placed at the Move To position in the same way as Paste.

Please Note: The moved clip is NOT placed on the clipboard (*and does not displace any audio currently on the clipboard*).



Move Procedure:

1. **Define the start point of the clip you want to move by locating to the beginning of the clip with either the jog wheel, transport or Enter Time functions. Press MARK IN.**
2. **Define the ending point of the clip you want to move in the same manner, then press MARK OUT.**
3. **Press MOVE.** The LCD will prompt you to select which tracks your clip is to originate from and the track arming keys will flash.

```
MOVE: FROM TRACKS
      ALL   TRACK ARM
```

4. **Use the cursor keys to select ALL (moves all tracks between Mark In/Out points), or TRACK ARM (moves only those track(s) selected using the track arm keys). Press ENTER to continue.**
(If you selected TRACK ARM:) **Select the track(s) you require using the track arm keys (on either the RE-8 or front panel). Press ENTER to continue.**

5. **Press ENTER.** The system will respond with:

```
MOVE:  TO TRACKS
      SAME   OTHER
```

6. **To move the material to the same tracks, cursor to SAME then press ENTER. To move that material to other tracks, cursor to OTHER then press ENTER.** If you select OTHER, the system prompts you to select tracks:

```
02 TRAX REQUIRED
PRESS ANY BUTTON
```

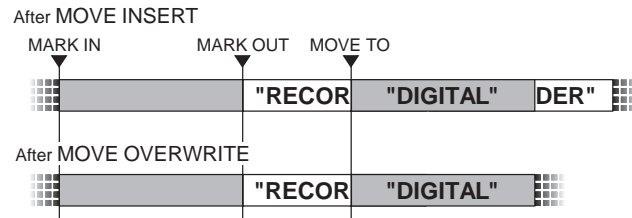
Select the desired track(s), then press ENTER to continue.

Please Note: If your clip originates from multiple tracks, you may select any other tracks as destinations; however a multiple track Move always ends up in the numerical order from which it came. Also, a Move across 8-track drive boundaries uses disk space on the destination drive(s). For further information, refer to “IMPORTANT PASTE NOTES” in §7.6.

8. The LCD asks if you want to insert or overwrite at the Move To location:

```
MOVE:      MODE
INSERT OVERWRITE
```

Press **ENTER** if you wish to accept the **INSERT** default. If you want the clip to overwrite at the new location, cursor to **OVERWRITE**, then press **ENTER**. Refer to the following diagram for RADAR's action:



9. RADAR responds with the Move To dialog (below). Use the **jog wheel, transport, numeric keypad, Enter Time, or Recall Loc** features to cue to where you want the move point to be.

```
MOVE:      TO
01:19:58:24.47
```

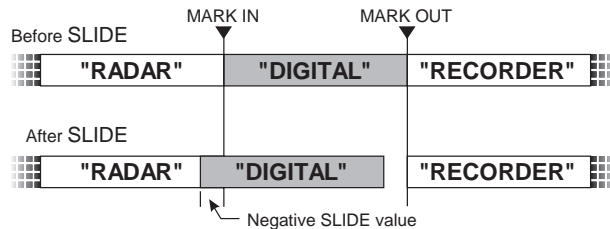
Please Note: If you move with only a Mark Out set, the system will back-time the clipboard material so that it ends at the Mark Out point. Insert & Overwrite operate in the same manner as described for Mark In if only a Mark Out is used.

10. Move will automatically place the start of the marked segment at the point you entered in Step 9.
- To Back Time the move segment, press MARK OUT, followed by ENTER.**
- To place the move segment starting at the entered time, press ENTER.** RADAR will perform the Move operation and return to Ready mode. No audio has been placed on the clipboard! *Undo will, however, restore the audio to its original location.*

7.9 SLIDE

Slide allows you to shift the timing of a section relative to the other tracks. It is similar to the Move function but with an editing interface more convenient for nudging audio back and forth in millisecond (or frame) increments.

Please Note: When a clip slides in time, it overwrites any audio that was there previously.



Slide Procedure:

1. Define the In point of your clip by locating to the beginning of the clip with either the jog wheel, transport or Enter Time functions, then press **MARK IN**.
2. Define the Out point for the clip in the same manner, then press **MARK OUT**.
3. Press **SLIDE**.
4. The LCD will ask you which tracks you want to slide. Use the cursor keys to select **ALL** (moves all tracks between Mark In/Out points), or **TRACK ARM** (moves only those track(s) selected using the track arm keys). Press **ENTER** to continue. (If you selected **TRACK ARM**;) Select the track(s) you require using the track arm keys (on either the RE-8 or front panel). Press **ENTER** to continue.

```
SLIDE:   TRACKS
ALL     TRACK ARM
```

5. Press **ENTER**. The LCD will prompt you for the number of frames (or milliseconds) you want to slide the clip:

```
SLIDE:   TIME
-05.24  FRAMES
```

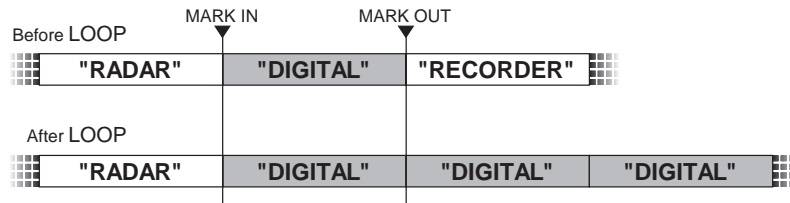
Enter the slide value directly by pressing either the + or - keys and typing a number on the numeric keypad. (Or, use the UP or DOWN or the jog wheel to enter a positive or negative value.) You may use the *PLAY* and *STOP* keys to audition the area while in the Slide Time dialog.

7. Press **ENTER** to complete the Slide and return to Ready mode. Slide does not place any audio onto the clipboard.

Please Note: Slide operations may be performed using either frames or milliseconds. You may select Slide Time Units through the Preferences menu, described in §4.3.4.4.

7.10 LOOP

Loop copies a clip consecutively for the number of times you select. This is useful for creating background ambience tracks as well as rhythmic effects. The clip can be looped in a positive or negative direction relative to the Mark Out point. Looping in a positive direction causes the clip to repeat starting at the Mark Out point while looping in a negative direction causes the clip to repeat previous to (and ending at) the Mark Out point.



Loop Procedure:

1. Define the In point of the clip to be looped by locating to the beginning of the clip with either the jog wheel, transport or Enter Time functions, then press **MARK IN**.
2. Define the Out point for the clip in the same manner, then press **MARK OUT**.
3. Press **LOOP**. The LCD will ask you which tracks you want to Loop:

```
LOOP:      TRACKS
ALL        TRACK ARM
```

4. Use the cursor keys to select **ALL** (loops all tracks between Mark In/Out points), or **TRACK ARM** (loops only those track(s) selected using the track arm keys). Press **ENTER** to continue. (If you selected **TRACK ARM**;) Select the track(s) you require using the track arm keys (on either the RE-8 or front panel.). Press **ENTER** to continue.
5. Press **ENTER**. The LCD asks if you want to insert or overwrite at the Loop To location:

```
LOOP:      MODE
INSERT OVERWRITE
```

Press **ENTER** if you wish to accept the **INSERT** default. If you want the loop(s) to overwrite at the new location, cursor to **OVERWRITE**, then press **ENTER**. The system will respond with:

```
LOOP:      COUNT
+014 REPEATS
```

6. Enter the number of loops desired using the jog wheel, transport or the numeric keypad. Press **ENTER**. The system will loop the material the selected number of times. No audio has been placed on the clipboard during this edit. *Undo will, however, restore the audio to its original location.*

Please Note: You may enter a negative loop count—this will loop the marked segment the entered number of times, ending at the current timecode location.

7.11 MODIFY EDIT

The Modify Edit function allows you to change any or all parameters of the preceding edit. It is a more convenient way of modifying an edit without the need to undo and re-enter new values when you need to make a change.

With the Modify Edit function, you even have the ability to change the crossfade time of an edit (see the following description).

Parameters available for Modify include Mark In/Out locations, crossfade time, original and destination tracks, insert or overwrite and any other parameters peculiar to individual editing functions (such as Slide Time or Loop Count).

Modify Edit Procedure:

- 1. Press MODIFY EDIT after completing an Edit operation.** The LCD will show the name of the previous Edit and the first dialog that pertains to it.
- 2. Make changes to each parameter as desired, followed by ENTER.** For each Edit operation, there is a different set of values to change. These are duplicates of the original operation with, in certain cases, the addition of Crossfade Time.

Please Note: If you do not need to change a parameter, simply press ENTER to continue to the next one.

- 3. Once you have completed the dialogs, press ENTER.** The new values you have set will be applied to the Edit for you to audition.

7.12 REVERSE (REVERSES CLIPBOARD MATERIAL)

Reverse takes the material on the clipboard and reverses its running order. The reversed clip may be placed into the project material as desired. Reverse provides a powerful editing feature, used frequently when creating ambient backgrounds for motion pictures and television production.

Reverse Feature Application: A typical workstation user can only loop audio in one direction. However, listeners can easily detect such a repeated loop, recognizing its pattern even if it is mixed deeply under other effects.

If the material was a human breathing, and a typical workstation user looped it, the listener would hear: “inhale/inhale/inhale/inhale.”

RADAR’s Reverse feature enables you to loop audio in forward and in reverse—this masks the “repeated loop” characteristic, making for a more natural sound.

Given the above example of human breathing, after a RADAR-created reversed loop, the listener hears a more natural “inhale/exhale/inhale/exhale.”

To create a reversed-loop ambience track:

- 1. Record audio to be reverse-looped.**
- 2. Locate to the head of the recording, then place a Mark In point.**
- 3. Locate to the end of the recording, then place a Mark Out point.**
- 4. Copy the marked segment to the clipboard.**
- 5. Press MENU/PREV, then select the Edit menu and press ENTER. Scroll down to the REVERSE item, then press ENTER again.**
- 6. Locate the transport to the end of the original recording, then back up the transport a few frames.**
- 7. Paste the reversed clipboard material into the project.**
- 8. Listen to the track to make sure you have achieved a smooth forward/backward sound.**
- 9. Mark the head and tail of the track with MARK IN/MARK OUT.**
- 10. Loop the audio as many times as necessary to fill the scene.**

7.13 MUTE TRACKS FEATURE

RADAR's Mute Tracks feature enables you to free up disk bandwidth to enable seamless punch out monitoring. This feature is not the same thing as track on/off or track solo—track solos are monitor functions, and do not affect the amount of disk activity.

Disk activity is critical when attempting seamless audio punch out monitoring. If you perform a punch-in/punch out recording operation, the punch-out will be seamless (i.e. no gap—a smooth switch between input and track monitoring), if the following condition is met:

The punch-out monitoring will be seamless if the number of “free” disk tracks equals or exceeds the number of tracks you are recording on that disk unit.

RADAR's disk drives support a maximum of eight tracks of audio data, either playback or record. If your punch-out would exceed the maximum disk bandwidth, you may make use of RADAR's Mute Tracks feature. With Mute Tracks, you may temporarily “turn off” tracks that are not in use, increasing the amount of disk drive throughput.

1. **To use Mute Tracks, select it from the Edit menu.** The system will respond with:

```
MUTE TRACKS:
ALL      TRACK ARM
```

2. **Select ALL (mutes all tracks in system), or TRACK ARM (mutes only those track(s) selected using the track arm keys). Press ENTER.**
3. (If you selected TRACK ARM:) **Select the track(s) you require using the track arm keys (on either the RE-8 or front panel).**
4. **Press ENTER.** RADAR will perform the Mute operation and return to Ready mode.
5. **Perform the desired punch in/punch out operations as desired.** (The tracks stay in the muted state until you un-mute them.)
6. **Repeat steps 1 through 3 to turn off Mute Tracks.**

7.14 IMPORT *.WAV TRANSLATOR FEATURE

RADAR includes a built-in translator for WAV-format sound files. These files are commonly used with PC-based sound hardware, samplers and workstations. The entry point for these files is RADAR's floppy disk drive; file(s) read from floppy disk are translated, then posted to RADAR's clipboard for use.

Import Procedure:

1. **Insert a DOS-formatted floppy disk drive containing the file(s) to be imported into RADAR's floppy disk drive.**
2. **Press MENU/PREV, select the Edit menu, then press ENTER.**
3. **Scroll down the menu to select the IMPORT *.WAV item:**

```
MAIN/EDIT MENU:
IMPORT *.WAV
```

4. **Press ENTER.** The system will respond with:

```
SELECT WAVE FILE
+WORKING+
```

then finally:

```
SELECT WAVE FILE
ORCHESTR.WAV
```

5. **Use the cursor up/down arrows (or jog wheel) to select the desired file, then press ENTER to continue.** The system will respond with information about the sound file including MONO or STEREO, encoding method, Sampling Rate, and gain (in percent):

```
MONO 22KHz 8bit
---> 48KHz 075%g
```

6. **You may specify the desired sample rate (range: 8 to 50 kHz), and gain (range: 0 to 999%) for the imported file. (Use cursor left/right to move between fields.) When the sample rate and gain fields are set as desired, press ENTER to write the sound file to RADAR's clipboard.**

Section 8 Backup & Restore Operation

This section describes RADAR's data backup and restore features, using the optional 8mm data cartridge drive.

This section includes the following subsections.

8.1	BACKUP/RESTORE OVERVIEW	8-2
8.2	EXABYTE DRIVE INSTALLATION/HOOKUP	8-3
8.3	BACKUP OPERATION	8-4
8.4	RESTORE OPERATION	8-6
8.5	TAPE DRIVE ACTIVITY INDICATORS	8-7
8.6	EXABYTE DRIVE CLEANING PROCEDURE	8-8
8.7	BACKUP/RESTORE ERROR MESSAGES	8-9

8.1 BACKUP OVERVIEW

Because RADAR's hard drives have a finite capacity they will eventually become full in the same way as a reel of tape or a floppy disk does. When this happens, the contents of the drives must be copied to another type of storage media to make room for new material. This procedure is known as "archiving" or "backup". We refer to this as "backup". The reloading process is called "restoring". Restored material exists in the exact same state of completion as when it was backed up so projects can be started and finished much later. The RADAR system is available optionally with an Exabyte 8505 drive. This device uses 8 millimeter tape to store all of RADAR's audio data. This tape drive was selected for its high speed and the low price of the recording media.

Please Note: The Exabyte 8505 is the only drive currently supported by RADAR v1.0.

Data Sets Concept: RADAR's backup/restore software operates using the concept of "data sets." *A Data Set is whatever material you have included in one backup operation.*

In a Backup operation, you may choose to:

- Back up ALL projects (including all audio data) at once, or
- Back up all versions of the current project, or
- Back up JUST the current project, or
- Back up a group of projects that you selected.

Each single backup operation creates a "data set". (If you backup the entire system using ALL PROJECTS, that is one Data Set; if you backup the current project only, that is also a Data Set.)

On Restore, you are offered two choices—you may restore ALL data sets on the tape, or you may select some of the data sets on the tape to restore. Therefore the smallest unit available for a backup or restore is a Data Set. You can restore two data sets, but you cannot restore only a half of a data set.

RADAR's Data Set concept was designed to provide flexibility in backup and restore operations—you decide what to back up (and how to do it) based on how you will be restoring the information. For example, before a major system software upgrade, you may decide to back up the system's entire contents using one data set—when you restore this you need only perform one operation. However, in day-to-day use you may back up every client's project as a separate data set—thus when they book their next session, you need only restore their data set (and not an entire system's worth of data).

As a RADAR user, how you bundle and back up your projects will determine how fast the data is backed up, and how flexible it will be to restore. Projects that share audio will be backed up much faster by bundling them into one data set, since any audio common to both projects will only be backed up once. However, if you want to restore just one project from that data you can't, since the entire data set needs to be restored.

SCSI Basics: SCSI (Small Computer System Interface) is a specification used for transmitting data between a main computer host and various peripherals. It allows all the parts of a computer system to communicate with one another. In our case, RADAR is the computer host and the peripherals are internal and external hard disk drives, and perhaps a tape backup unit.

The SCSI specification allows the host (RADAR) to address up to 7 separate devices. Including hard disks, tape units and the computer, the total number of external devices that may be connected to a twenty four track RADAR is four. (A sixteen track RADAR may access five SCSI devices, and an eight track RADAR may access six.) This is because RADAR claims one SCSI device for each of its internal hard disks and one for its internal SCSI controller.

Each SCSI device has an identification number assigned to it that falls between 0 and 7. On stand alone SCSI devices this is usually set using a hardware switch. RADAR's internal SCSI number assignments are set at the factory. SCSI peripheral devices generally have two 50 pin connectors: an in and a thru. This is done to allow chain connection of multiple devices. RADAR is the host and as such needs only one connector.

Connected to the last device in a SCSI chain is a terminator plug. Physically, it looks like a SCSI connector without a cable and it electrically completes the loop connection between all the devices in the chain.

IMPORTANT!

The SCSI terminator's importance CANNOT be overstated—this must be connected for SCSI communication between RADAR and any external devices to occur. If it is left unconnected, there is the danger of losing audio files or corrupting RADAR's file system.

See §2.3 for more information on installing the terminator plug.

8.2 EXABYTE DRIVE INSTALLATION/HOOKUP

Please Note: RADAR should be turned off when connecting the backup unit.

Connecting the Exabyte 8505 Tape Drive to RADAR

- 1. Remove the SCSI terminator plug from RADAR's SCSI connector on the rear panel of RADAR.**
- 2. Connect the supplied SCSI cable between RADAR's SCSI connector and either of the two SCSI connectors on the tape backup unit.**
- 3. IMPORTANT!** Connect the SCSI terminator plug supplied with RADAR to the other connector on the tape drive.
- 4. Confirm that the SCSI ID number of the backup device is correctly set!** (*We recommend you set this ID to #6.*) The ID is normally preset at the factory; however you should confirm that is any number other than zero, one, two or seven. If a conflict occurs between SCSI IDs, the two devices attempting to share one ID will generate a system error.
- 4. Turn the backup unit's power on.**
- 5. Turn RADAR on.** On power up, RADAR scans the SCSI bus for connected devices including its internal devices and the tape backup unit.

Verifying Proper Connection of the Tape Drive:

1. Press **MENU/PREV (RE-8)** or **MENU/ESC** (front panel).
2. Scroll using the **UP** or **DOWN** keys or press **D** on the **QWERTY** keyboard to proceed to the **Diagnostics** submenu, then press **ENTER**.
3. Select the **SCAN SCSI BUS** item using the cursor keys, then press **ENTER** again. The system will scan the SCSI bus; the LCD will then show the details of the first SCSI device.
4. Use the **UP** or **DOWN** key (or the jog wheel) to scrolling through the **ID numbers**. The tape drive will likely be ID number six, however, if it is not, continue scrolling until you find it on the SCSI bus.

Please Note: If the tape drive device is not shown in the LCD, this may be because the tape drive was not turned on, the SCSI connections are made incorrectly or the device is not an Exabyte 8505. Check that the tape backup unit power is on, and be sure that the SCSI terminator is correctly connected.

5. Press **CANCEL** to exit and return to **Ready** mode.

8.3 BACKUP PROCEDURE

Ensure that the SCSI cable between RADAR and the backup device is connected as described in §8.2. **THIS MUST BE DONE BEFORE POWERING UP.**

The functions and features of the 8 mm tape drive make it possible to safely back up your data. In order to get the best performance out of your tape drive over a period of time, be sure to follow the procedures and recommendations given in this section. And always be certain to use high quality 8 mm tape cartridges designed for computer data backup purposes, in order to ensure the integrity of your data.

Regular, commercially available 8 mm video cartridges should **NEVER** be used for backing up data. (The tape drive should automatically eject incompatible tapes.)

Recommended 8 mm Data Cartridges: It is important to always use the recommended tape in order to achieve optimum performance from the tape drive and safety for your data.

Recommended 8 mm (Data Grade) Tape (EXABYTE (U.S.) tape)

Length (capacity)	Otari Part No.	Exabyte Part No.	Sony Part No.
112 m (5 GB)	PZ9A056	EX1T8003A	QG-112M
54 m (2.5 GB)	PZ9A057	EX1T8002A	QG-54M
15 m (670 MB)	PZ9A058	EX1T8001A	n/a

Loading 8 mm Tape Cartridge:

1. Press the **Eject** button on the drive to open its access door, if it is not already open.
2. Place a blank tape in the drive.
3. When an 8 mm cartridge is inserted into the drive, apply a gentle pressure to the back of the cartridge until it is drawn in by the drive.

Backup Procedure:

1. **Press MENU/PREV (RE-8) or MENU/ESC (front panel) to enter the menu.** Scroll using the UP/DOWN keys or press P on the QWERTY keyboard to proceed to the Project submenu.
2. **Press ENTER.**
3. **Press ENTER once more to enter the Backup dialog.** The LCD will present the first backup option:

```

MAIN/PROJ MENU:
BACKUP
↓
../BACKUP MENU:    ../BACKUP MENU:
ALL PROJECTS       CURRENT VERSIONS
../BACKUP MENU:    ../BACKUP MENU:
CURRENT PROJECT    SELECTED PROJS
    
```

4. **Use the UP/DOWN keys to select the desired backup operation, then press ENTER.** The LCD will present the default backup name indicating the time and date of the backup. (You may edit this name using the cursor and UP/DOWN keys from the front panel or the QWERTY keys on the RE-8.)
5. **Press ENTER to accept the name and proceed with the backup operation.** Backup will begin and the system will lock out any further key presses from the RE-8 and/or the front panel. The LCD will show the time remaining until the procedure is finished. Upon completing the backup, the tape will be ejected and the LCD will display a BACKUP COMPLETE message.
6. **Remove the 8 mm tape,** carefully label it, and store it in a cool, dry place.

Aborting a Tape Backup Operation: If you must cancel a tape backup operation, press CANCEL. The system will prompt for a confirmation, then will break out of the backup operation.

Display Testing during Backup: At any time during the backup operation, you may press PLAY to begin any of the popular display diagnostics procedures.

Multi-Tape Backups: A RADAR fitted with internal and external disk drives contains a lot of audio data, potentially more than can fit on one 8 mm tape. In these cases, the system ejects the first tape, and displays the message:

```

TAPE #1 IS FULL!
INSERT NEXT TAPE
    
```

Remove and label the first tape, then insert another tape and press ENTER to continue.

Please Note: Tapes are numbered beginning with 1. However, each tape is also time-stamped, so that tape #2 from Friday's backup is distinguishable from Tape #2 from Monday's backup.

IMPORTANT! If the LCD displays any message other than BACKUP COMPLETE, the backup has not been correctly saved and you must repeat the procedure. See section 8.5 for error message descriptions.

8.4 RESTORE OPERATION

1. Load the desired RADAR backup tape into the drive.
2. Select, from the Main menu, the Projects menu.
3. Under the Project menu, select the RESTORE item (scroll down to it using the cursor keys, or simply press "R" from the QWERTY keyboard), then press ENTER. The system will respond with the Restore selections, as shown:

```

MAIN/PROJ MENU:
RESTORE
  ↓
.. /RESTORE MENU:  .. /RESTORE MENU:
ALL DATA SETS     SELECTED SETS

```

4. Use the UP/DOWN keys to select the desired action (e.g. restore all data sets, or restore selected data sets). Press ENTER once you have made your selection.
If you selected "All Data Sets", the restore will begin after a confirmation. Do not disturb the system during this time! If you selected "Selected Data Sets", continue with the following procedure.

Restore Selected Sets Procedure: If you selected "Selected Sets", the system will display the header information about the first project:

```

SET 01/07  SIZE
1.1 GB 204 TKMIN

```

Refer to the diagram below, and use the cursor keys to review the available information about each set:

↓Use the cursor keys to select data set number (in this example, we are looking at all the information about data set 1 out of the seven data sets on this tape). The first display shows the size of the selected data set.

```

SET 01/07  SIZE
1.1 GB 204 TKMIN

```

↓Use the cursor keys to view the time required by the data set if it is restored on each disk (i.e., disks A through G).

```

SET 01/07  A MIN
550 MB 096 TKMIN

```

↓With projects displayed, press ENTER to display a list of all projects in the data set. If there is only one shown, then it was the only one included in the backup.

```

SET 01/07  PROJS
01 PROJECT

```

↓Displays the date that the project was restored to tape.

```

SET 01/07  DATE
94-Oct-30 07:57A

```

↓Displays the name used by the project when it was backed up to tape.

```

SET 01/07  NAME
Coast01

```

Press ENTER. Loading will begin and the system will lock out any further key presses from the RE-8 and the front panel. The LCD will show the time remaining until the procedure is finished. Upon completion, the tape will be ejected and the LCD will display the RESTORE COMPLETE. message.

Reviewing Tape Contents with Restore Selected Feature: You may use the Restore Selected option to simply check the contents of a tape!

1. **Insert tape, then choose Restore Selected from the Restore menu.**
2. **Through the View Project routine (diagram above), select the Projects field.**
3. **Press Enter while displaying the Projects field to display a list of all projects in the data set.**
4. **Press Cancel to eject the tape if you do not wish to restore now.**

IMPORTANT! If the LCD displays any message other than RESTORE COMPLETE, the data may be incorrectly loaded and you must repeat the procedure. See §8.7 for error message descriptions.

8.5 TAPE DRIVE ACTIVITY INDICATORS

The 8 mm tape drive provides LED indicators to allow for proper care and feeding, as well as an indication of general drive health and if cleaning is needed.

Use the chart shown below to translate the status indicators. Please note that Slow means flashing at 1 flash per second, Fast means flashing at 4 per second, and Irregular means flashing based on drive activity.

	Top LED (errors)	Middle LED (SCSI)	Bottom LED (motion)
Power-On Self Test (first part)	On	On	On
Power-On Self Test (to completion)	Off	Irreg.	On
FAILED Power-On Self Test	Off	Irreg.	Fast
Ready — No Tape Loaded	Off	Irreg.	Off
Ready — Tape Loaded	On	Irreg.	Off
Normal Tape Motion	Slow	Irreg.	Off
High-Speed Tape Motion	Fast	Irreg.	Off
SCSI Bus Reset	On	Irreg.	On
ERROR	Off	Irreg.	Slow
Time to Clean Tape Drive	Fast	Irreg.	Fast
Cleaning Tape Loaded	Slow	Irreg.	Off

CAUTION! Should drive cleaning be necessary, use an approved 8 mm data drive cleaning cassette! Any other type of cleaning cassette (i.e., a camcorder cleaner) will NOT perform the correct cleaning cycle, and may damage the drive!! (See §8.6)

8.6 EXABYTE DRIVE CLEANING PROCEDURE

The tape head/tape path of the 8 mm tape drive requires cleaning once per month, or after approximately 60 GB of data transfer. RADAR will automatically detect if the drive needs cleaning, and will display a message on the LCD:

TAPE DRIVE NEEDS
CLEANING.

Please Note: If this message appears, you should clean the tape drive as soon as possible. The tape drive will still function; the message is a reminder.

To clean the tape head and path, an Otari-approved cleaning cassette **MUST** be used.

Procedure:

- 1. Prepare the unit for cleaning by powering on the chassis.**
- 2. When the power-on self test is completed (approx. 30 seconds), press the Eject button to open the drive; if a tape is in the drive, remove it.**
- 3. Place the cleaning cassette into the drive and close the drive door.** The drive senses that a cleaning tape was installed, and immediately begins the cleaning procedure.
- 4. When the cleaning system is completed (approx. 15–20 seconds), the cleaning cassette is automatically ejected. Remove the tape from the drive, and MARK it carefully with the date of cleaning.**

Please Note: The cleaning tapes provide a specific number of drive cleanings. **DO NOT** attempt to re-wind or re-use a cleaning tape—drive damage could result. If the cleaning tape is ejected without entering the cleaning cycle, then the tape has reached the end of its useful life and should be discarded.

8.7 BACKUP/RESTORE ERROR MESSAGES

Should there ever be a problem with backup/restore operation, one of the following error messages may be presented. Contact Otari Technical Support for more information.

NO BACKUP DEVICE:	SCSI cable not connected correctly. Check connection of cable and terminator plug.
Tape drive not mounted:	Turn off RADAR, reconnect cable and terminator and power up again.
CAN'T SAVE (READ) HDR:	No tape in the backup device.
Tape in backup device is write protected:	Slide tab on tape to unprotect.
Tape in backup device is bad:	Replace tape.
Tape in backup device is incompatible:	Use only approved Data Storage 8 mm tape.
CAN'T LOAD TAPE:	No tape in the backup device.
Tape in backup device is bad:	Replace tape.
Tape in backup device is incompatible:	Use only approved Data Storage 8mm tape.
CAN'T UNLOAD TAPE:	Tape device Eject mechanism is jammed. Contact Otari service department.
INVALID HDR, Unknown tape format (LOAD only):	Tape in drive has been formatted with an incompatible file system.
CAN'T SAVE AUDIO:	Tape in backup device is bad. Replace tape.
CAN'T READ AUDIO:	Tape in backup device is bad. Replace tape.

Appendix A Hardware/Software Installation

This section provides hardware and software installation procedures, as well as software upgrade installation.

This section includes the following subsections.

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A.1 INTRODUCTION

This Appendix provides hardware installation information, and software installation procedures.

A.2 RADAR PHYSICAL INSTALLATION

A.2.1 Rack Size

RADAR requires a rack that has a minimum of 4 spaces, and is at least 20 inches deep. (The actual chassis is slightly less than 20 inches deep; the extra space is required for AC power and audio connectors.)

A.2.2 Rack Mounting

To rack-mount RADAR, slide its chassis into the rack horizontally, while supporting the back panel carefully. Fasten the chassis to the rack rails using the supplied rack mounting screws.

A.2.3 Airflow/Cooling

RADAR must have unrestricted in and out airflow from the chassis rear openings. If airflow is insufficient due to blockage, audio performance may be degraded and component life will be shortened.

A.2.4 Rough Handling

If RADAR is to be used in a “mobile” environment, it is likely to be bounced in transit. Therefore, the chassis should be mounted in an aircraft-type flight case with a proper shock-resistant inner shell. RADAR’s internal components are very sturdy but may fail if subjected to extreme shocks.

Please Note: To avoid undue stress on the faceplate mounting bracket during transit, RADAR’s support feet should be resting on the bottom of the rack or on a device mounted below.

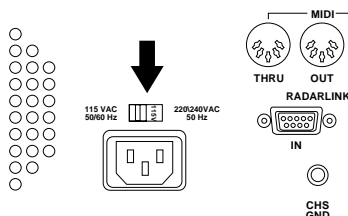
A.2.5 AC Power Level Setting

CAUTION!

It is extremely important when first hooking up RADAR that, before the unit is powered up, the line voltage selector switch is set to the correct position. If this switch is set incorrectly, extensive damage to RADAR’s internal circuitry may occur!

RADAR has a universal power supply that will accommodate AC voltages and frequencies as provided anywhere in the world. The standards used by different countries fall in either of two ranges—100 to 120 volts at 50/60 Hz or 220 to 240 volts at 50 Hz. A switch on the back panel of RADAR determines which of these is to be used to provide power.

Please check the AC voltage setting on the back panel for the proper line voltage for your area! If you set this incorrectly, poor system performance (and/or smoke) may result! If the voltage setting is incorrect, use a flat-blade screwdriver to change it:



A.2.6 Grounding

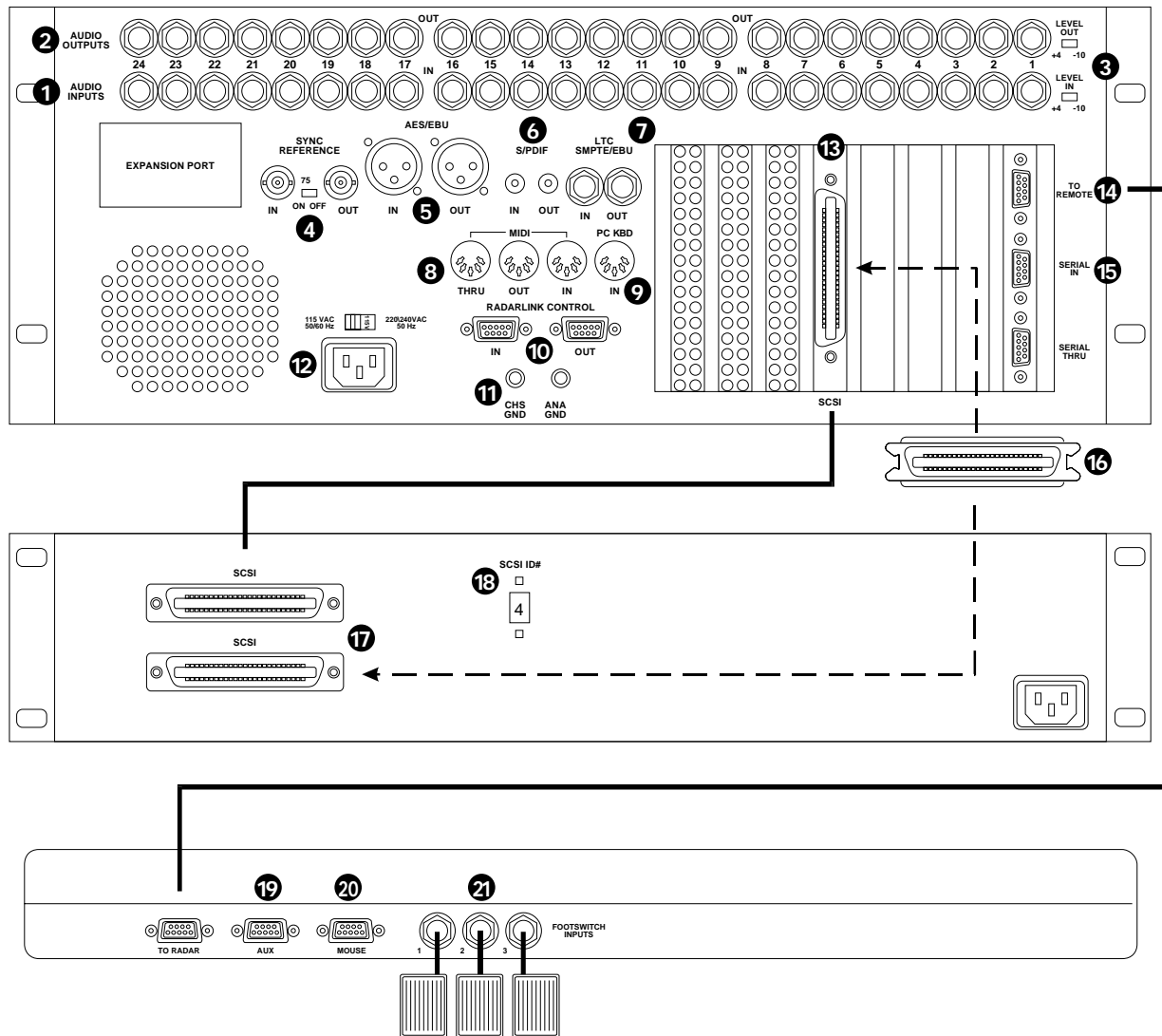
The analog audio circuitry in RADAR operates with a separate ground, which is not connected to the AC power ground. This allows the user to determine the grounding scheme that best suits their studio's requirements.

There are two terminals on the back panel of RADAR where these grounds are broken out. The chassis ground (CHS GND) is connected directly to the metal chassis and the ground wire of the incoming AC power line. The analog ground (ANA GND) is connected to the sleeve of each audio input and output including the SMPTE IN and OUT.

RADAR is shipped with the ANA GND and the CHS GND disconnected. When grounding problems do occur such as hum or excessive crosstalk, the ANA GND and CHS GND may be strapped together with a short piece of wire, or the analog ground may be connected to the technical ground shared by the other audio gear in the environment.

A.3 CONTROLS & INDICATORS OVERVIEW

A.3.1 Rear Panel Connectors

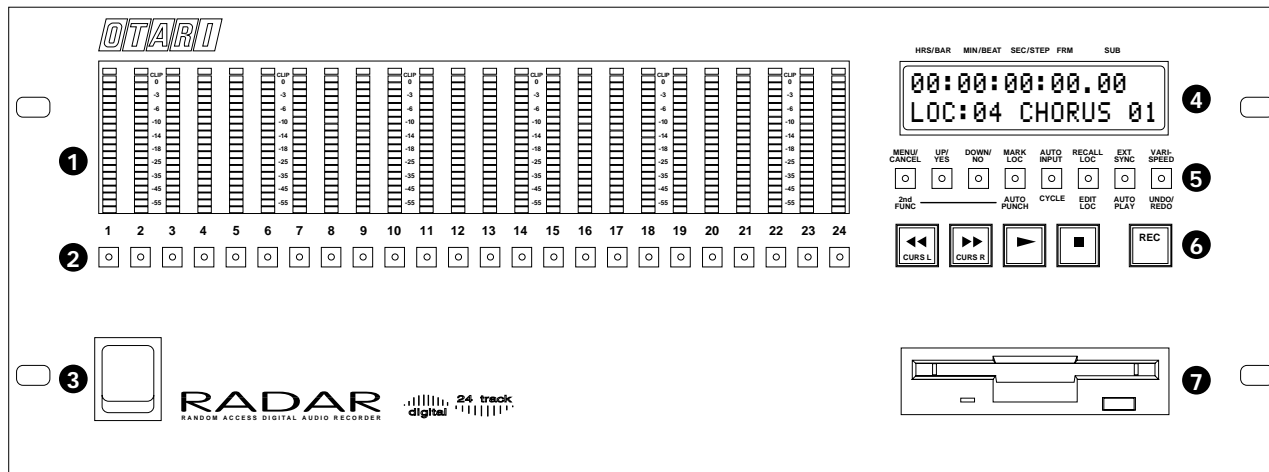


- [1] **Audio Inputs:** Analog audio inputs, balanced (tip/ring/sleeve) or unbalanced (tip/sleeve). 1/4-inch, TRS phone jack x24.
- [2] **Audio Outputs:** Analog audio outputs, balanced (tip/ring/sleeve) or unbalanced (tip/sleeve). 1/4-inch, TRS phone jack x24.
- [3] **-10/+4 Level Settings (Output & Inputs):** Sets the levels of the audio inputs and outputs according to the requirements of your system. (For more information see SA.4.2.)
- [4] **Video Reference/Word Clock input:** BNC (f) x1.
- [5] **AES/EBU Digital I/O:** Refer to SA.4.3 for hookup, §3.17 for operation. XLR (f) x1 (input); XLR (m) x1 (output).
- [6] **S/PDIF Digital I/O:** Refer to SA.4.3 for hookup, §3.17 for operation. RCA (f) x2.

- [7] **SMPTE Timecode In/Out:** Connect SMPTE IN to a SMPTE source.
Please Note: The SMPTE OUT feature is not currently available. 1/4-inch, TRS phone jack x2.
- [8] **MIDI Connections:** *(This feature is not currently available.) DIN-8 (f) x2.*
- [9] **PC Keyboard Connection:** Diagnostic connector provided for Otari technical support. *DIN-8 x1.*
- [10] **RADARLINK:** *DB-9: (m) x1; (f) x1.*
- [11] **External Grounding:** Connection with external ground or strapping of these connectors is only required when grounding problems occur. *(See §A.2.6.)*
- [12] **AC Power Receptacle/Voltage Setting:** Connects to AC outlet using the power cable provided, selects AC mains voltage.
- [13] **External SCSI Port:** Connects to external SCSI unit(s) supported by RADAR, such as backup unit or external disk drive bays. If no external devices are connected, the SCSI Terminator (item 16, below) must be installed! *Centronics 50-pin (f) x1.*
- [14] **RE-8 Connector:** Connects to RE-8 Session Controller. *DB-9 (f) x1.*
- [15] **External Serial Machine Control:** This feature not currently available. *DB-9 (m) x1.*
- [16] **SCSI Terminator:** This terminator must be installed as the last item on the SCSI "chain". If no external devices are connected, place this terminator on the external SCSI port (location 13).
- [17] **Backup Device SCSI Ports:** Connect a cable between either SCSI connector on the backup device to the SCSI connector on RADAR. (See also #13 and #16 above.) Plug the terminator block supplied with RADAR into the unused connector.
- [18] **Backup Device SCSI ID:** In most cases, this ID# should be set to **6**. (This SCSI ID# may be set to any number other than 0, 1, 2, or 7.)
- [19] **External Remote Controller connector:** *(Feature not available in RADAR v1.0)*
- [20] **Mouse Port:** *(This feature is not currently available.)*
- [21] **Foot Switch Inputs:** Connect to momentary foot switches to provide hands-free control over cue-to-location, record and playback. *For more information, see §6.3.*

A.3.2 RADAR Front Panel Controls & Indicators

Refer to this diagram to navigate RADAR's front panel:



[1] **Meters and Input Level References:** For more information see §3.3.

[2] **Track Arm keys:** For more information see §3.2.

[3] **Power On/Off switch:** For more information see §2.4.

[4] **LCD:** For more information see Section 4.

[5] **Front Panel Function keys:** Consult the Index in this manual for individual descriptions.

[6] **Transport keys:** For more information see Section 3.

[7] **Floppy Disk Drive:** High density 3.5 inch floppy disk drive; software and software upgrades are installed using this drive. The Import .WAV file utility (§7.13) uses this drive as an input device.

IMPORTANT!

System boot software is already installed on the RADAR hard drive; therefore it is not necessary to keep the supplied system software diskette in the disk drive. Do, however, keep the diskette handy should it be needed in the future.

A.4 ELECTRICAL INSTALLATION

A.4.1 Audio Inputs & Outputs Overview

RADAR has 24 audio input and 24 output female connectors on the rear panel. They will accept a two or three conductor male phone plug depending on whether your system is balanced or unbalanced. The jacks are high quality, quarter inch phone-type connectors that use a minimum amount of space. Each connector is bolted directly to the chassis for maximum strength.

Please Note: RADAR inputs and outputs are cross-coupled, so that both input and output levels stay the same if one side is using an unbalanced cable and the other is using a balanced cable.

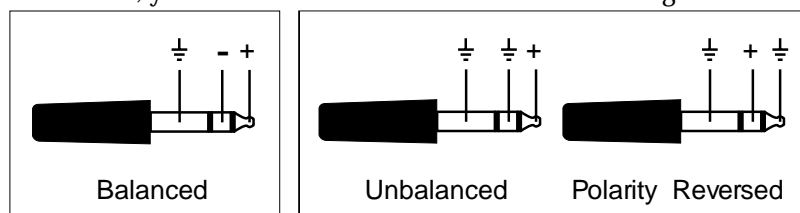
A.4.1.1 Balanced vs. Unbalanced Audio Signals

Balanced audio cable has three conductors: two conductors carrying the same signal at opposite polarities and a ground. Balancing generally results in lower susceptibility to electromagnetic (EMI) and radio frequency (RFI) induced noise, and permits longer cable runs without risk of interference. As well, balanced cables do not necessarily need to be grounded at both ends and this means fewer ground loop problems.

On the other hand, unbalanced cables have two conductors only: one for signal and one for return. The return must always be grounded in order for signal to flow. This scheme is more susceptible to radio or electromagnetic interference and poor quality cables can be noisy if they are handled. Many studios, however, successfully use unbalanced lines and you should not have any problems if the audio equipment in your studio is properly grounded. See the discussion of grounding at the end of this section.

A.4.1.2 Wiring for Balanced and Unbalanced Cables

RADAR's analog audio connectors accept either three conductor (balanced) or two conductor (unbalanced) male plugs. Whether your system is balanced or unbalanced, your cables must adhere to one of these wiring schemes:



A.4.1.3 Audio Reference Levels (-10 dBm/+4 dBu)

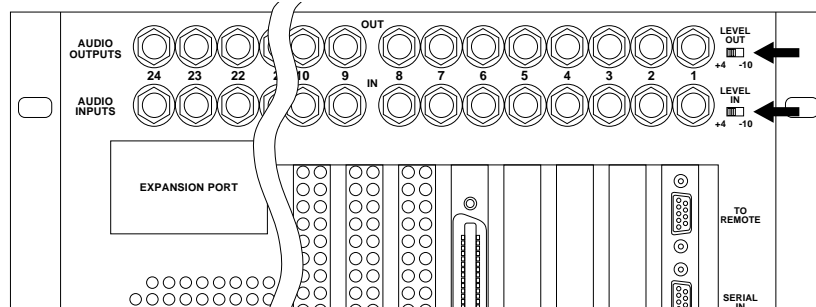
Zero dB in digital audio equipment is the maximum signal level that an input device such as a mixer, effects unit or recording machine can accept to gain optimum signal-to-noise ratio before distorting. When a VU meter shows an input signal level of 0 VU, +4 gear will be actually 4 dB above 0.775 volts RMS. When the meter shows 0 VU on -10 gear, the signal is 10 dB below 1 volt RMS. RADAR will adjust its meter sensitivity to your selection.

RADAR accepts either standard reference level; +4 and -10. These levels are set using switches on the rear panel (see Step 3, below). ***Be sure to consult your audio mixer's manual if you are unsure of the proper level at which to set RADAR.***

Please Note: The input and output levels do not always have to be set to the same settings. The input could be set to +4 dBu and the outputs could be at -10 dBm. This may be useful in the situation where a +4 dBu microphone preamp is connected directly to one of RADAR’s inputs and you are using an -10 dBm unbalanced mixing console.

A.4.2 Audio Connections—Analog

1. **Connect source audio to the audio inputs (on the lower row).**
2. **Connect a console (or other monitoring system) to the corresponding outputs (top row of RADAR connectors).**
3. **Set the LEVEL IN and LEVEL OUT switches to the correct level (i.e., +4 or -10). Please note that these switches may be set differently!**



A.4.3 Audio Connections—Digital

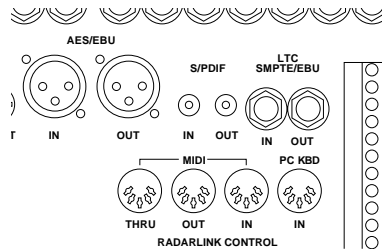
RADAR provides both AES/EBU (professional) and S/PDIF (high-end consumer) digital audio interfaces. AES/EBU uses one balanced, XLR cable per pair; S/PDIF uses one unbalanced RCA cable per pair.

RADAR can record stereo digitally on any two adjacent track pairs, and can output digitally from any two adjacent track pairs. Complete instructions for this feature appear in §3.17.

Please Note: Be sure to use the highest-quality shielded cables and best quality connectors for any digital audio application!

If using AES/EBU:

1. **Connect an AES/EBU source to RADAR’s AES/EBU IN XLR (female XLR connector), as shown below.**
2. **Connect RADAR’s AES/EBU output to the desired device using a properly shielded cable and a female XLR cable connector, as shown.**



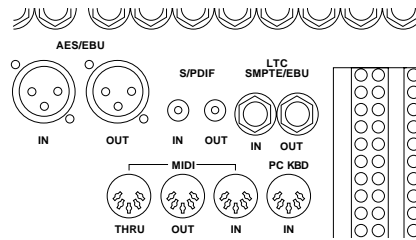
If using S/PDIF:

1. **Connect an S/PDIF source to RADAR’s S/PDIF IN XLR (female RCA jack), as shown below.**
2. **Connect RADAR’s S/PDIF output to the desired device using a properly shielded cable and a male RCA cable connector, as shown.**

A.4.4 External Sync Connections

A.4.4.1 Timecode Connections

Refer to this diagram showing RADAR's external sync connection locations:



A.4.4.2 Timecode Input

RADAR accepts LTC on a 1/4" phone plug. Like RADAR's audio inputs, this signal may be balanced or unbalanced.

Connect the timecode source to RADAR's LTC/SMPTE IN jack.

A.4.4.3 Timecode Generator Output

RADAR's internal SMPTE generator may be used as a master source for slaving other devices.

Connect a 1/4" phone plug (balanced or unbalanced) to RADAR's SMPTE OUT jack.

A.4.4.4 MIDI Timecode (MTC) Connections

MIDI Timecode (MTC) is a sync protocol used by samplers and MIDI control equipment. *This feature is not yet implemented.*

A.4.4.5 Video Sync Connections

If using Video Sync (house sync), connect the sync source to the Sync Reference In BNC connector on RADAR's rear panel.

The Sync Reference Out connector provides a hard-wired loop through; you may connect this output to other device(s) requiring the same sync source.

Electrical Termination of Video Source: If the video source requires ground termination, a 75Ω termination resistor may be inserted using the switch between the Sync Reference connectors. Generally, termination is required if RADAR is the last device (or only device) in the sync chain, and if there is no downstream device connected to Sync Reference Out.

Do not insert the termination resistor if any device is connected to the Sync Reference Out BNC!

A.4.4.6 Digital Word Clock Connections

If using RADAR with an external digital word clock source, connect this source to the Sync Reference In connector. If a loop-through is required, you may connect the Sync Reference Out BNC to the device requiring the same digital word clock.

Please refer to the above note regarding termination for digital word clock; insert the termination resistor if necessary to maintain proper signal conditions.

A.4.5 External SCSI Device Installation

RADAR uses the SCSI interface standard both for internal operation and for utilizing external resources, such as a tape backup device or external hard disk drives. This paragraph describes hookup instructions for both types of device.

A.4.5.1 SCSI Basics

SCSI (Small Computer System Interface) is a specification used for transmitting data between a main computer host and various peripherals, allowing all the parts of a computer system to communicate with one another. In our case, RADAR is the computer host and the peripherals are hard disk drives, or a tape backup unit.

The external SCSI port on RADAR consists of a 50 pin connector to which you may connect a SCSI cable to communicate with external SCSI devices.

The SCSI specification allows the host (RADAR's CPU) to address up to 7 separate devices. Including hard disks, tape units and the computer, the total number of external devices that may be connected to a twenty four track RADAR is four. (A sixteen track RADAR may access five SCSI devices, and an eight track RADAR may access six.) RADAR claims one SCSI device for each of its three internal hard disks, and one for its internal SCSI controller (the CPU). Each SCSI device has an identification number assigned to it that falls between 0 and 7. On stand alone SCSI devices this is usually set using a hardware switch. *RADAR's internal SCSI number assignments are set at the factory—SCSI ID's 0, 1, and 2 are reserved for the internal hard disk drives, and SCSI ID 7 is reserved for RADAR's CPU.*

SCSI peripheral devices generally have two 50 pin connectors: an in and a thru. This is done to allow chain connection of multiple devices. RADAR is the host and as such needs only one connector.

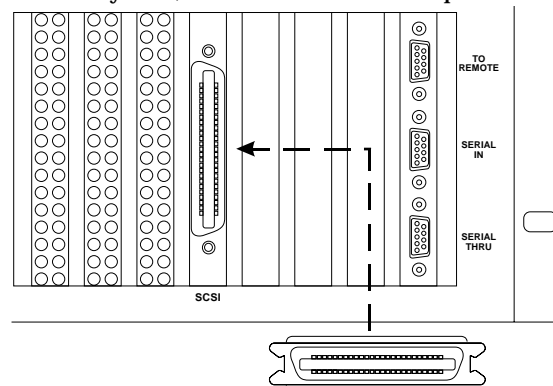
Connected to the last device in a SCSI chain is a terminator plug. Physically, it looks like a SCSI connector without a cable and electrically, it completes the loop connection between all the devices in the chain.

IMPORTANT!

The SCSI terminator's importance CANNOT be overstated—this must be connected for SCSI communication between RADAR and any external devices to occur. If it is left unconnected, there is the danger of losing audio files or corrupting RADAR's file system.

A.4.5.2 SCSI Terminator Installation

Before system operation, PLEASE CHECK that the SCSI terminator (supplied with the system) is attached to the rear panel's SCSI connector, as shown below:



Please Note: If you have a backup device hooked up to RADAR's SCSI connector, make sure that the supplied SCSI terminator is attached to one of the SCSI connectors on the backup unit!

A.4.5.3 Backup Tape Drive Installation/Hookup

Please Note: The Exabyte 8505 tape drive is the only backup device currently supported by RADAR software.

1. **Turn RADAR's power Off whenever connecting or disconnecting any SCSI device!**
2. **Remove the SCSI terminator plug from RADAR's SCSI connector on the rear panel of RADAR, if already installed.**
3. **Connect the SCSI cable (supplied with the backup device) between RADAR's SCSI connector and either of the two SCSI connectors on the tape drive.**
4. **IMPORTANT!** Connect the SCSI terminator plug (supplied with RADAR) to the other SCSI connector on the tape drive.
5. **Confirm that the SCSI ID number of the backup device is correctly set!**
This ID is normally preset at the factory to SCSI ID#6; however you should confirm that is any number other than zero, one, two or seven. (Seven is claimed by RADAR as the SCSI controller and zero, one, and two are IDs of the three drives used in a 24 track RADAR.

Please Note: If a conflict occurs between SCSI IDs, the devices attempting to share one ID will generate a system error.

6. **Turn RADAR on.** On power up, RADAR will scan the SCSI bus for connected devices including its four internal devices and the one external device.
7. Verify proper connection of the tape drive using the Diagnostics menu. **Press MENU/PREV (RE-8) or MENU/ESC (front panel).**
8. **Scroll using the jog wheel, UP/DOWN keys, or press D on the keyboard to proceed to the Diagnostics submenu:**

```
MAIN MENU:
DIAGNOSTICS MENU
```

9. **From this menu, select the Scan SCSI Bus dialog:**

```
MAIN/DIAG MENU:
SCAN SCSI BUS
```

10. **Press ENTER.** The LCD will present the Scan SCSI Bus prompt. Press ENTER. the LCD will show the details of the SCSI ID 0 device. This will be a description of the first hard disk.
11. **Press the UP key to continue scrolling through ID numbers..** The tape drive will likely be ID number four (as shown), however, if it is not, continue scrolling through all ID numbers.

```
6: BACKUP DEVICE
EXB_8502
```

Please Note: If the tape drive device is not shown in the LCD, this may be because the connections are made incorrectly or the device is not an Exabyte 8505.

12. **Press CANCEL to exit and return to Ready mode.**

A.4.5.4 External Disk Drive Chassis Installation/Hookup

In addition to a backup device, RADAR also support additional disk drives, generally installed in an external chassis (Otari Corporation part no. *EDB-3* or equivalent).

This hookup procedure for the external drive bay is the same as installing the backup unit—you must “chain” connect the external chassis, and you **MUST** install the SCSI terminator on the LAST device on the chain.

Please Note: It is necessary to check the SCSI ID numbers for all connected devices to ensure proper system operation. In a system with three internal SCSI disks, three external SCSI disks, and a backup unit, the ID numbers should be set according to the ID map below. *If assistance is required, please contact Otari Technical Support.*

SCSI ID map for fully-configured RADAR system:

ID's 0, 1, 2: Three internal hard disk drives
ID's 3, 4, 5: Three external hard disk drives
ID #6: Tape backup device
ID #7: Reserved for RADAR's CPU.

IMPORTANT!

You must change the disk configuration (though the System menu) in order for RADAR to recognize external hard disk drives. This procedure is provided in §4.3.1.4.

A.5 SOFTWARE INSTALLATION

A.5.1 Initial Installation Procedure

Please Note: RADAR is shipped with system software already installed onto the SCSI drives. This procedure is provided should you need to re-install the system software at any time.

1. **Back up any current audio projects to 8 mm tape.** This tape back up is just a precaution—software installation should not change existing audio in any way.
2. **Shut down RADAR, if not already off. Insert the floppy disk containing RADAR software into the floppy disk drive.**
3. **Turn the system power on.** The system will respond with its boot procedure status messages:

```

                RADAR
                DIGITAL 24 TRACK
followed by..

                INITIALIZING
                HARDWARE....

then...

                Booting From
                Floppy....

```

After booting from floppy disk, RADAR prompts for confirmation of the software installation:

```
UPGRADE 1.xx to
1.yy? NO YES
```

The system reads the software version numbers from floppy and the system. If you are downgrading, the menu will say so, and will provide the actual version numbers.

Running Software from Floppy Disk: You may elect to run RADAR from the software on the floppy disk, without installing it to the hard disk. To do so, simply select NO on the Upgrade? confirmation, then respond with YES to the prompt: RUN RADAR FROM FLOPPY?. Please note that SMPTE OUT will not function if you run v1.1 software from floppy disk. To use this feature, v1.1 software must be installed on your system's hard disks.

- 4. To proceed with the upgrade, select YES, then press ENTER to start the installation process.** The LCD will show a number of messages during the process:

```
Updating KS1
Initing Disk 0*
Initing Disk 1*
Initing Disk 2*
Copying EMSB.BIN
Copying RADARH.BIN
Copying RADARL.BIN
```

** skipped if the disks are already initialized...*
then, finally...

```
INSTALL COMPLETE!
PRESS ANY BUTTON
```

- 5. Press a key to continue.** The system will respond with:

```
Remove Floppy,
Power Off&Reboot!
```

- 6. Remove the floppy disk by pressing the EJECT button at the lower right corner of the drive, then turn the system power off.**

Please Note: Be sure to store the software disk in a cool, dry place, and make sure you will be able to find it if you need to!

- 7. Turn RADAR's power back on, then confirm proper system operation.**

Please Note: If any problems are encountered during this procedure, contact Otari technical support for assistance.

A.5.2 Software Upgrade Installation Procedure

RADAR provides a software upgrade installation method directly from the System menu. To use this method:

1. **Back up any current audio projects to 8 mm tape.** This tape back up is just a precaution—software upgrade installation should not change existing audio in any way.

2. **Press MENU/ESC (front panel) or MENU/PREV (RE-8) to display RADAR's Main menu:**

```
MAIN MENU:  
SYSTEM MENU
```

3. **Select the System menu, then press ENTER. From the submenus, select UPGRADE SYSTEM:**

```
MAIN/SYS MENU:  
UPGRADE SYSTEM
```

4. **Press ENTER.** The system will respond with:

```
SYSTEM UPGRADE  
PROCEED? NO
```

5. **Use the cursor up/down keys (or the YES/NO keys on the front panel) to select YES or NO, then press ENTER.** If you selected YES, the system responds with:

```
SYSTEM UPGRADE  
* SAVING STATE *
```

followed by..

```
TURN OFF POWER &  
BOOT UPGRADE S/W
```

6. **Shut down RADAR, if not already off. Insert the floppy disk containing RADAR software into the floppy disk drive, then turn the system on.** *Continue from Step 2 in the installation procedure provided in §A.5.1.*

This section describes RADAR's on-board Diagnostics utilities, which provide a variety of functions for fast troubleshooting of system difficulties, etc.

This section includes the following subsections.

B.1	GENERAL	B-2
B.1.1	Diagnostics Introduction	B-2
B.1.2	Diagnostics Utilities Operational Overview	B-2
B.2	RADAR DIAGNOSTICS OPERATION	B-3
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B.2.3.2	Repair Disk Operation	B-6
B.2.3.3	Init Disk Operation	B-8
B.2.4	Show Free RAM	B-9
B.2.5	Config Debug	B-9
B.2.6	Show Debug	B-10
B.2.7	Save Debug	B-10
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B.2.8.1	Playlist Errors Operation	B-11
B.2.8.2	Realtime Errors Operation	B-11

B.1 GENERAL

This section describes RADAR's extensive Diagnostics software, which is included in the standard software delivered with each system.

Using the built-in Diagnostics, RADAR users can:

- Troubleshoot SCSI bus problems
- Configure disk hardware
- Diagnose/repair hard disk problems
- Test the system display, and
- Log/review system errors encountered during operation.

Diagnostics features are available through the Diagnostics menu, and may be used from either the front panel or the RE-8 session controller.

IMPORTANT NOTE

RADAR's Diagnostics should be run only under the supervision and/or direction of Otari Technical Support personnel! Serious loss of data and system downtime may result if the Diagnostics software is misused!

B.1.1 Diagnostics Introduction

RADAR is a robust, reliable product, with years of development behind it to make its hardware and software rugged enough for strenuous daily studio use. However, problems can happen now and again, and it's important to have a good set of tools on hand. RADAR's Diagnostics utilities provide the field technician with a battery of tests to troubleshoot system problems, as well as the software tools necessary to fix any problems uncovered.

These tools are powerful—therefore, we must recommend that NONE of these tests be performed without the advice and counsel of Otari Technical Support or authorized service personnel.

We also recommend that before you proceed, you have any audio and project data backed up on tape. (If this is not possible due to a problem, PLEASE ADVISE TECHNICAL SUPPORT before proceeding!!!)

B.1.2 Diagnostics Utilities Operational Overview

RADAR's diagnostics are available through the Diagnostics menu, from either the RE-8 or the front panel. These menus appear in the following hierarchy:

```
MAIN/DIAG MENU:
  SCAN SCSI BUS →MOUNT / UNMOUNT →INIT DISK →
  REPAIR DISK →SHOW FREE RAM →DIS_PLAY TEST 1 →
  DIS_PLAY TEST 2 →CONFIGURE DEBUG →SHOW DEBUG →
  SAVE DEBUG →PLAYLIST ERRORS →REALTIME ERRORS
```

RADAR's diagnostics utilities divide into several functional groups:

1. SCSI bus diagnostics
2. RADAR file system diagnostics
3. Hard disk troubleshooting
4. System RAM testing
5. Meters Display diagnostics
6. Error logging/review utilities
7. "Debug" view and logging to floppy disk.

B.2 RADAR DIAGNOSTICS OPERATION

B.2.1 Scan SCSI Bus

This item scans RADAR's SCSI bus for SCSI devices, then posts them to the LCD, where you may scroll through them to read device names and SCSI ID numbers.

When should you scan the SCSI Bus? — You should scan the SCSI bus when you install a new device, or when you suspect a problem with the SCSI hardware. Such a problem would be related to a set of eight tracks, e.g. the system unexpectedly drops out of record when there is still disk space. Or, if the problem is backup related, you may wish to scan the SCSI bus to be sure that RADAR's CPU detects the tape drive.

1. **Press the MENU/PREV (RE-8) or MENU/ESC (front panel) button. Scroll up/down through the choices until the Diagnostics menu is displayed.**

```
MAIN MENU:
DIAGNOSTICS MENU
```

2. **Press ENTER (RE-8) or STOP/ENTER (front panel). Scroll through the submenus until the SCAN SCSI BUS item is displayed:**

```
MAIN/DIAG MENU:
SCAN SCSI BUS
```

3. **Press ENTER.** The system will respond with:

```
SCAN SCSI BUS...
+SCANNING+
```

After scanning the bus for all attached devices (this takes a few moments), the system displays information about the first item it finds, as shown:

```
0: QUANTUM DISK
EMPIRE_1080S
```

4. **Use the cursor up/down keys (or the jog wheel) to scroll through the other devices found in the SCSI scan.** A typical RADAR installation may have three internal disk drives, plus one tape drive, as shown in the example below. *Remember that SCSI ID #7 is always reserved for the CPU.*

Please Note: You may use the cursor keys to move from the SCSI ID field to the status field. Use the up/down keys to view the Type, Rev (firmware revision), and Serial Number.

```
0: QUANTUM DISK →1: QUANTUM DISK →2: QUANTUM DISK →
EMPIRE_1080S    EMPIRE_1080S    EMPIRE_1080S
3: UNKNOWN   ????→4: UNKNOWN   ????→5: UNKNOWN   ????→
NO DEVICE 3    NO DEVICE 4    NO DEVICE 5
6: EXABYTE TAPE →7: OTARI    CONT
EXB-85058SQANXR1 CM24 SCSI CNTRLR
```

5. **Press ENTER or CANCEL to exit.**

Please Note: If the system remains with the "+SCANNING+" message, or displays erroneous results (such as "No Device 0" when it actually is installed), check for a SCSI ID number conflict on the bus. *If you just installed a disk drive, or recently connected a tape drive, double-check the ID number assigned to the device! If there is a SCSI ID number conflict, the system may boot normally, but not function correctly.*

B.2.2 Mount / Unmount Operating System

This item mounts and unmounts RADAR's operating system—this function should only be used under the direction of Otari Technical Support!

“To mount a file” is a term that has come forward from the earliest days of the computer age. Originally, “Mount” meant to thread a computer tape (of the open-reel variety) and make its data available to the computer's central processor. In RADAR, “mounting the operating system” means the same thing: you are making the software and audio available to the CPU.

When should I mount or unmount the operating system? — You must inmount the file system before disconnecting external SCSI devices (prior to moving them to a backup station, for example).

Unmount Operating System Procedure:

1. Press MENU/PREV (RE-8) or MENU/ESC (front panel). Scroll up/down through the choices until the Diagnostics menu is displayed.

```
MAIN MENU:
DIAGNOSTICS MENU
```

2. Press ENTER (RE-8) or STOP/ENTER (front panel). Scroll through the submenus until the MOUNT / UNMOUNT item is displayed:

```
MAIN/DIAG MENU:
MOUNT / UNMOUNT
```

3. To continue with MOUNT or UNMOUNT, press ENTER. The system will respond with:

```
FILESYSTEM:
MOUNT  UNMOUNT
```

4. Use the cursor left/right keys to select UNMOUNT, then press ENTER. The system will begin the unmounting process, and will display:

```
FILESYSTEM:
+UNMOUNTING+
```

This message will remain for a few moments. When the process has finished, the system will display:

```
DISKS UNMOUNTED
PRESS ANY BUTTON
```

5. Press a key to continue. The system will respond with:

```
00:00:00:00.00
NO DISKS MOUNTED
```

Mounting Operating System Procedure:

1. Press MENU/PREV (RE-8) or MENU/ESC (front panel). Scroll up/down through the choices until the Diagnostics menu is displayed:

```
MAIN MENU:
DIAGNOSTICS MENU
```

2. Press ENTER (RE-8) or STOP/ENTER (front panel). Scroll through the submenus until the MOUNT / UNMOUNT item is displayed:

```
MAIN/DIAG MENU:
MOUNT / UNMOUNT
```

3. To continue with MOUNT or UNMOUNT, press ENTER. The system will respond with:

```
FILESYSTEM:
MOUNT  UNMOUNT
```

4. Use the cursor left/right keys to select MOUNT, then press ENTER.

The system will begin the unmounting process, and will display:

```
FILESYSTEM:
+MOUNTING+
```

This message will remain for a few moments. During this time, several other messages may appear on the second line of the LCD, i.e. CONVERTING PROJECTS and/or RECLAIMING SPACE. *These messages are a normal part of the file system mounting procedure.*

When the process has finished, the system will display:

```
DISKS MOUNTED
PRESS ANY BUTTON
```

5. Press a key. The system then returns to its regular operating display.

B.2.3 Disk Diagnostics (INIT DISK, CHECK DISK, REPAIR DISK)

These menu items are used when diagnosing and repairing SCSI disk problems.

Please Note: The operating system must be “unmounted” (described in §B.2.2) before Disk Diagnostics can be run.

When and Why Should I Use Disk Diagnostics? — You must use Disk Diagnostics when adding disk drives to a system—these must be INITed before use. Besides that, Disk Diagnostics is helpful during problem situations as described below. During operation, you would notice a disk problem if, for example, one disk's worth of tracks (let's say, tracks 9 through 16) was behaving oddly.

- Perhaps you can play back from those tracks, but you cannot record.
- Or, you see that you have plenty of disk time available, but when you attempt to record on any of those tracks, the time available drops to 000.
- Or, you try to copy data to or from the disk, or do a restore from tape, but the disk fails to record.

—**Could this be a hardware problem?** Maybe. Re-boot the system, and see if the problem goes away.

—**Could these problems be an Operating System problem in disguise?**

Perhaps, and it's simple to rule out an operating system problem. Simply perform the unmount/mount procedures in the previous paragraph, then re-boot the system.

“Soft” Disk Errors: Any of the above problems may be caused by a “soft” disk error, and Disk Diagnostics are useful for field-troubleshooting these problems. *A so-called “Soft” error is a problem with the data written on the disk, and not an actual physical problem. (Such an error could, for example, occur if RADAR's power is turned off at a critical time, when the CPU is in the middle of writing data to the disks.)*

If a soft error occurs in critical data, then RADAR cannot write further data there; and while the system is self-correcting as much as possible, there are problems that it is not prepared to deal with. RADAR's Disk Diagnostic routines can check a disk for trouble, repair any soft error problem(s) that are detected, and/or remove the formatting entirely (along with the problem) and replace it.

Please Note: The order that the disk diagnostics appears in the Diagnostics menu hierarchy does NOT indicate the order in which they should be used! Otari Technical Support can advise as to the order of use; which is normally CHECK, REPAIR, then (if necessary) INIT.

B.2.3.1 Check Disk Operation

Check Disk scans the disk(s) for soft errors, then displays the number of errors encountered.

When and Why should I use Check Disk? — Check Disk is called for when you feel you may have something like one of the problems described above. Remember that these problems are usually associated with ONE disk, and not ALL disks in the system; and neither a reboot nor the unmount/remount of the file system has corrected the problem.

Check Disk Procedure:

1. **Unmount RADAR's operating system (described in §B.2.2), if you have not already done so.**

2. **From the Diagnostics menu, select CHECK DISK.** The system will respond with:

```
CHECK DISK: 0
```

3. **Use the cursor up/down keys (or the jog wheel) to select the desired disk to check, then press ENTER.** The system will respond with:

```
CHECK DISK: 1
             NO YES
```

4. **Select YES to continue (or NO to abort), then press ENTER.** The system will display a +CHECKING+ message, followed by a report:

```
DISK ERRORS:
TOTAL:      0
```

Please Note: If no errors were encountered during the check, and you have already tried to unmount and mount the file system, you should attempt to re-install the same version operating system software from the floppy disk supplied by Otari. (This is helpful in ruling out a software file system problem.) If this does not repair the problem, contact Otari Technical Support.

5. Errors found during Check Disk are shown as a total number. These errors are divided into categories, which are helpful to Otari Technical Support.

Use the cursor up key to scroll through these categories:

- **OTHER:** ###
- **XLINK:** ###
- **TRUNC:** ###
- **STRAY:** ###
- **TOTAL:** ###

Be sure to record these numbers for future use.

Please Note: If there are errors encountered during the test, proceed to Repair Disk (§B.2.3.2).

B.2.3.2 Repair Disk Operation

Repair Disk attempts to correct soft disk errors on the selected disk, to restore it to normal operation.

When and Why should I use Repair Disk? — Repair Disk is called for when a Check Disk test has encountered errors. Please remember that Repair Disk cannot fix a disk hardware problem, but only certain kinds of repairable problems.

CAUTION! While Repair Disk is not normally destructive to audio data, you should get any important audio off the system onto other media before proceeding.

Repair Disk Procedure:

1. **Unmount RADAR's operating system (described in §B.2.2), if you have not already done so.**

2. **From the Diagnostics menu, select REPAIR DISK.** The system will respond with:

```
REPAIR DISK: 0
```

3. **Use the cursor up/down keys (or the jog wheel) to select the desired disk to check, then press ENTER.** The system will respond with:

```
REPAIR DISK: 0  
NO YES
```

4. **Select YES to continue (or NO to abort), then press ENTER.** The system will display a +REPAIRING+ message, followed by a report:

```
DISK ERRORS:  
TOTAL: 0
```

5. Errors found during Repair Disk are shown as a total number. These errors are divided into categories, which are helpful to Otari Technical Support.

Use the cursor up key to scroll through these categories:

- **OTHER: ###**
- **XLINK: ###**
- **TRUNC: ###**
- **STRAY: ###**
- **TOTAL: ###**

Be sure to record these numbers for future use.

B.2.3.3 Init Disk Operation

CAUTION!

INIT DISK IS DESTRUCTIVE TO BOTH THE AUDIO DATA ON THE DISK AND THE FILE SYSTEM—THEREFORE IT SHOULD ONLY BE USED UNDER DIRECTION OF OTARI TECHNICAL SUPPORT!

WHEN is Init Disk effective? — Init Disk removes the operating system and formatting information from the selected disk. This action is sometimes necessary if the disk has soft errors that cannot be repaired with RADAR's Repair Disk procedure. **This action is also necessary when installing new SCSI disks into RADAR.**

Init Disk also removes all audio from the disk, and all project information. This information is not recoverable!

Init Disk Procedure:

1. **Unmount RADAR's operating system (described in §B.2.2), if you have not already done so.**

2. **From the Diagnostics menu, select INIT DISK.** The system will respond with:

```
INIT DISK: 0
```

3. **Use the cursor up/down keys (or the jog wheel) to select the desired disk to check, then press ENTER.** The system will respond with:

```
INIT DISK: 2
NO YES
```

4. **Press ENTER to continue (or select NO to abort).** The system processes for a moment, then responds with a confirmation:

```
INIT DISK: 2
+WORKING+

ERASE OLD DATA?
NO YES
```

CAUTION!

IF YOU PROCEED WITH THIS OPERATION, ALL AUDIO AND PROJECT DATA WILL BE ERASED FROM THE DISK. YOU WILL THEN NEED TO RE-INSTALL RADAR'S OPERATING SOFTWARE FROM FLOPPY DISK.

5. **To abort the operation, select NO, then press ENTER. To proceed, select YES, then press ENTER.** The system responds with:

```
INIT DISK: 2
+INITIALIZING+
```

and then finally,

```
INIT COMPLETE
PRESS ANY BUTTON
```

6. **Press any button to continue.** Proceed to re-mounting the file system as described in §B.2.2.

Please Note: After an INIT of Disk 0, the system must have software re-installed from floppy disk. If you cycle power without the boot disk, the system responds with:

```
Startup Code
Not Present
```

Refer to the software upgrade/installation information in Appendix A for assistance if necessary.

B.2.4 Show Free RAM

This menu item displays the amount of free RAM available on RADAR.

Why show free RAM? — If there is a problem with the RAM allocation on the system, or a problem with the RAM hardware, this test will probably pick it up; this information may be helpful to Otari Technical Support when troubleshooting.

If you select this item from the Diagnostics menu, the system responds with:

```
FREE RAM: 1639K
# REGIONS: 00187
```

The amount of Free RAM will depend on the size requirements of the current version of software and the amount of active project information on the system, so it is impossible to provide a guideline here. However, any unaccountable decrease (or increase!) in this number is suspicious.

The number of regions has to do with the current project activity on the system.

B.2.5 Configure Debug

Please Note: This information is provided for users who have a debug monitor setup available to be installed in their RADAR system.

Why use Configure Debug? — RADAR's software provides drivers for an optional Debug monitor card, which can be installed into one of the motherboard card slots. Connected to a VGA monitor, RADAR's debug driver provides many diagnostic readouts including CPU and SCSI activity. Debug setup is provided through the Diagnostics menu to select which system parameters are displayed on the monitor.

Configure Debug Procedure:

1. **Select CONFIGURE DEBUG from the Diagnostics menu.** The system will respond with these default values:

```
SYSTEM:Y  SCSI:N
BUF:030K  SYNC:N
```

2. **Use the cursor left/right keys to move between these four items; use cursor up and down to make choices to see System information, SCSI information, and/or Sync information.** The buffer size (BUF:030) describes the amount of space devoted to a "capture" buffer for message and error logging.

Please Note: SYSTEM is an overall configuration value—If this is set to N, no debug messages of any kind will be logged. If set to Y, messages are logged. The SCSI and SYNC debug messages are only logged if SYSTEM is set to Y.

B.2.6 Show Debug (Messages on LCD)

As RADAR operates, it records its various internal status messages into the buffer described above. The Show Debug item allows you to view the contents of this buffer—text messages describing RADAR’s recent activity—without requiring an external debug monitor setup. If your system is not functioning properly, check these messages, and record them for Otari technical support.

Show Debug operation:

1. **Select SHOW DEBUG from the Diagnostics menu.** The system responds with the two most recent internal text messages:

```
CTL: No system c
DLG: System diag
```

2. RADAR’s LCD only provides two lines of 16 characters each; however the messages are of variable length. **Use the cursor left/right keys to move horizontally to read the messages in their entirety, and use cursor up/down to move vertically through the list, as shown:**

↑
Scroll vertically with cursor up/down ↓

```
CTL: SetCrystalFreq:0000bb80
CTL: SetCrystalFreq:0000bb80
CTL: XfadeTime:00000005
CTL: Cue:04000000
CTL: No system c [onversion required.]
DLG: System diag [nostics: OK]
```

← Scroll horizontally with cursor L/R →

3. **Record any error messages that are recurrent; report these to Otari Technical Support.**

B.2.7 Save Debug

RADAR enables you to save the contents of the capture buffer to a DOS-formatted floppy disk, for later use by technical support personnel. This data is written to a text file for later review using any text-processor software.

Save Debug Procedure:

1. **Insert a DOS-formatted floppy disk into RADAR’s floppy drive.** (*Make sure the disk is not write-protected!*)
2. **Select SAVE DEBUG from the Diagnostics menu.** The system responds with:

```
SAVE DEBUG INFO
DEBUG.OUT
```

3. The system uses “DEBUG.OUT” as a default file name—you may change this if desired. **Press ENTER to continue.**
The file is then written to the formatted floppy disk in the drive. If no disk is present, or the disk is write-protected, the system will state:

```
CAN'T SAVE FILE
PRESS ANY BUTTON
```

B.2.8 Error Logging

Two error logging modes are provided:

- Playlist Errors
- Realtime Errors

Information from these modes may be useful to Otari Technical Support when troubleshooting.

B.2.8.1 Playlist Errors

These errors indicate an overall number of errors detected in the system's current projects (playlists), and also break the errors down on a track-by-track basis.

Playlist Error Readout Procedure:

1. **Select PLAYLIST ERRORS from the Diagnostics menu.** The system will respond with:

```
PLAYLIST ERRORS:
OVERALL :  OK
```

2. **If there are any errors detected (i.e. "Overall" does not say "OK"), use the cursor up/down keys to scroll through the tracks on the system—attempt to isolate errors to a particular track or set of tracks.**

B.2.8.2 Real Time Errors

This diagnostic detects problems with the system in operation, and logs the errors encountered.

Real Time Errors Readout Procedure:

1. **Select REALTIME ERRORS from the Diagnostics menu.** The system will respond with:

```
REALTIME ERRORS:
TOTAL :  0
```

2. **If the total is greater than zero, use the cursor up/down keys to scroll through the error source breakdowns.** These items are:
 - ASSERT errors
 - 386 errors (actually, all RADAR CPU's are now 486's)
 - RECORD errors
 - PLAY errors
 - WRITE errors
 - READ errors

Appendix C Exploded View Drawings and Parts Lists

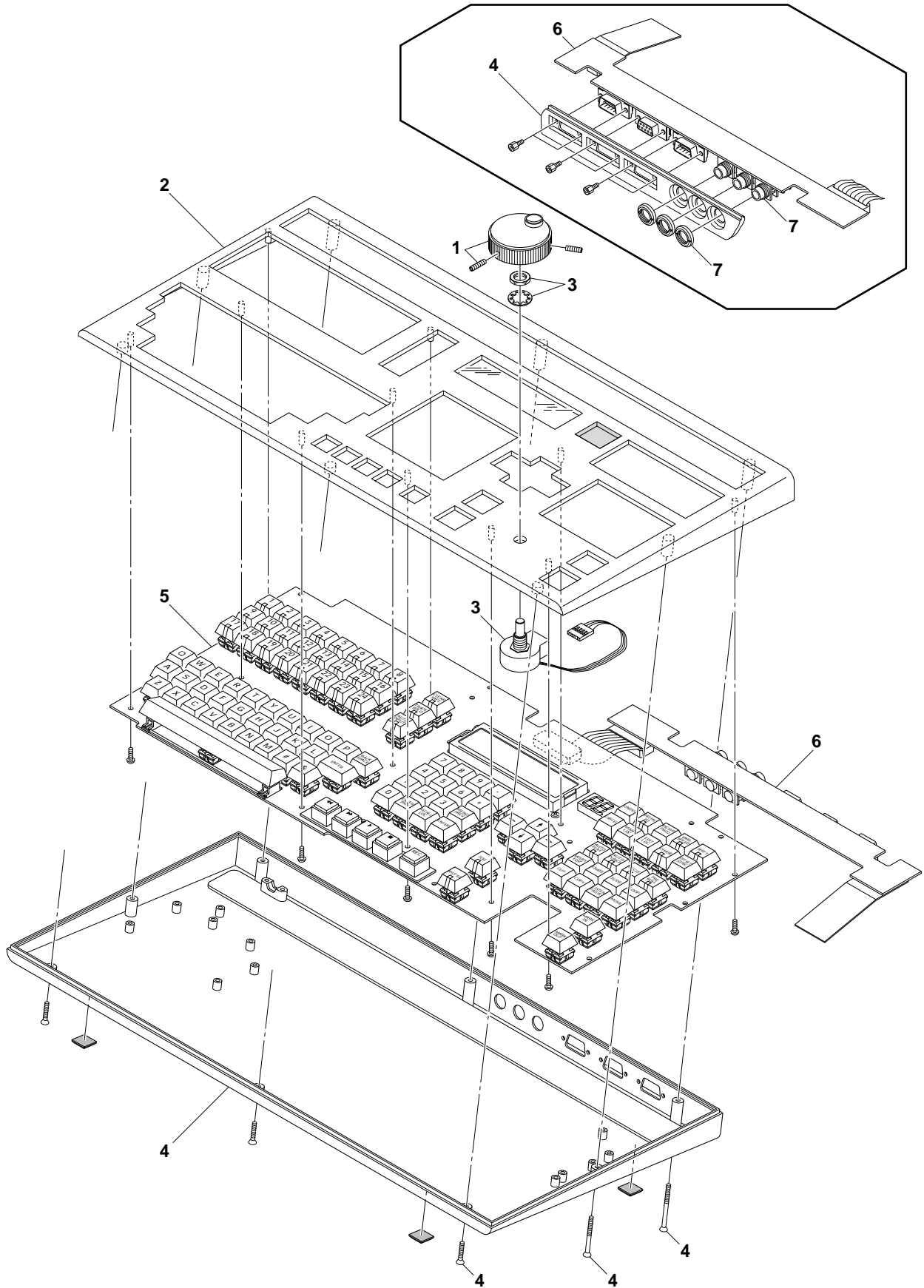
The following exploded view drawings and parts lists are provided for service reference.

When ordering parts, give a full description, using both the part number (if available) and the name of the part. If there seems to be a discrepancy between the drawing herein and your model, contact Otari; we assume no liability for improper servicing due to changes and improvements which we may make that subsequently render certain of these documents obsolete. the following subsections.

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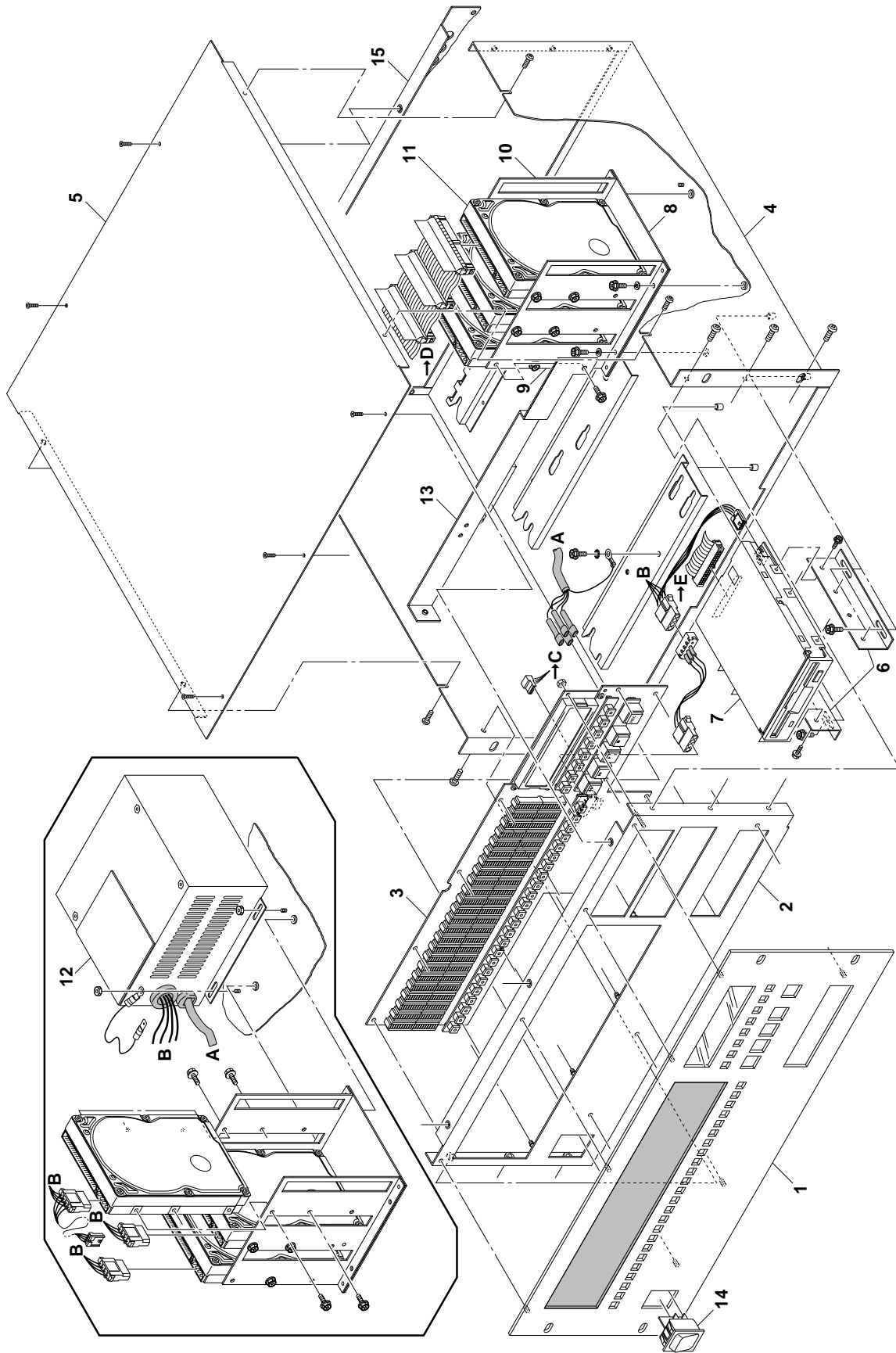
C.1 RE-8 SESSION CONTROLLER

No.	Description	Part No.	Note
1.	Jog Wheel Knob, black anodized	2405-4070	
2, 4.	RADAR RE-8 Remote Case Top/Bottom Painted/Printed	1406-4070	
3.	Optical Shaft Encoder with Flex Cable	2409-0000	
5, 6.	RADAR RE-8 Remote PCB Assembly	1710-4070	
7.	RE'AN 1/4" ST. Jack PCB Mount w/Nut and Washer	2109-8804	



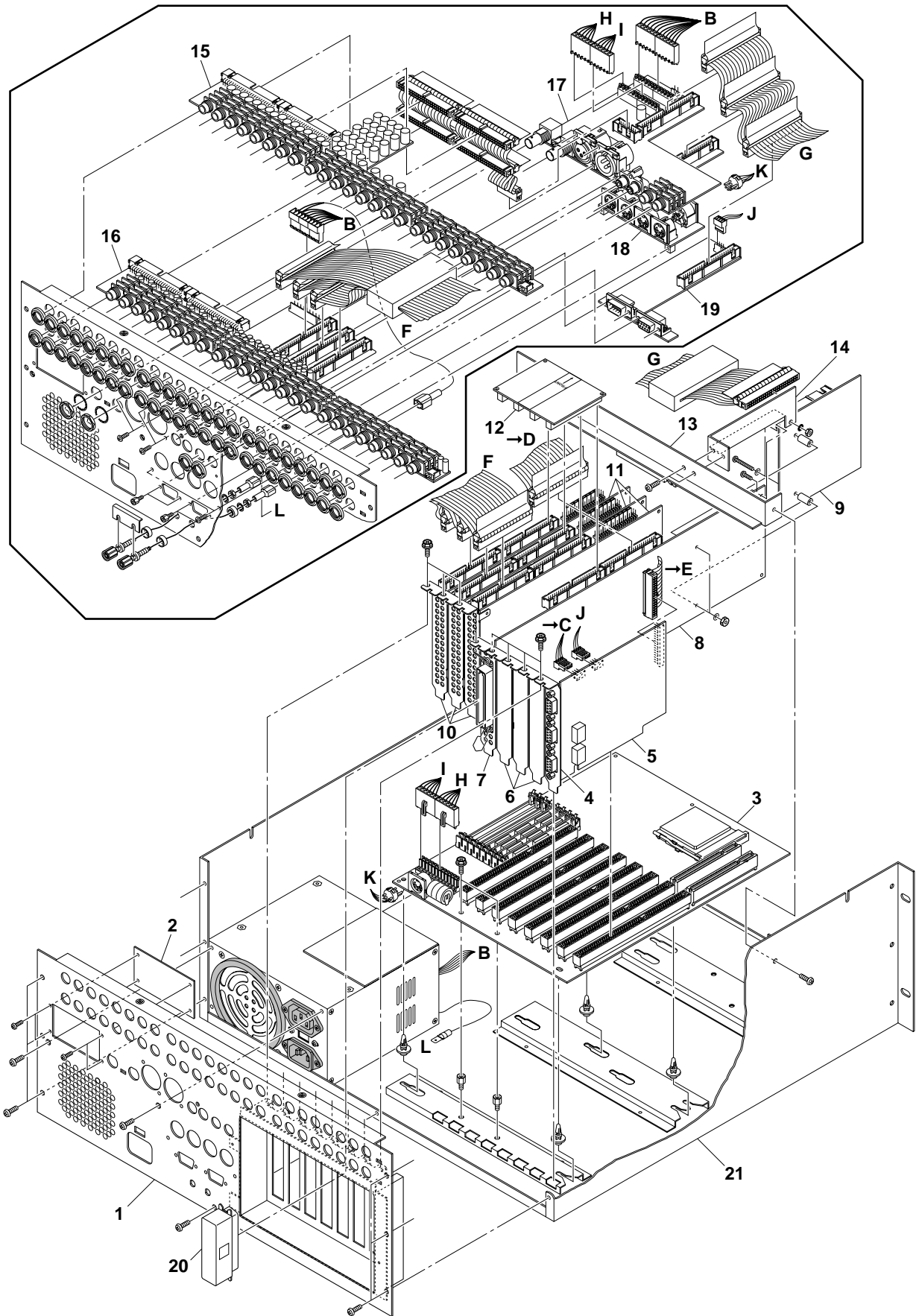
C.2 RADAR (FRONT)

No.	Description	Part No.	Note
1.	Panel, Outer Front		
2.	Panel, Inner Front		
3.	PCB Assembly, Front Panel Display	1710-0006	
4.	Panel, Side and Bottom		
5.	Lid, Top Panel		
6.	Bracket, Floppy Drive	3154-0016	
7.	3.5 inch, 1.44 MB Floppy Drive	2007-3638	
8.	Mount Base, Hard Drive		
9.	Left Bracket, Hard Drive		
10.	Right Bracket, Hard Drive		
11.	1 gigabyte Hard Drive	2007-1009	
12.	Power Supply	4005-3707	
13.	Bracket, Hold Down		
14.	Power Switch, RADAR	5104-0638	
15.	Panel, Back	3154-4010	



C.3 RADAR (REAR)

No.	Description	Part No.	Note
1.	Panel, Back	3154-4010	
2.	Cover, Rear Panel		
3.	PCB Assembly, Mother	2007-0386	
4.	Bracket, MF3 PCB		
5.	PCB Assembly, MF3 Serial Interface and Floppy Controller	1710- 0014	
6.	Bracket, Blank PCB		
7.	Bracket, CM24	2007-3638	
8.	PCB Assembly, CM24 24ch. IDI/DSP/SCSI Router	1710-0017	
9.	PCB Assembly, KS-1	1710-0019	
10.	Bracket, EM8B		
11.	PCB Assembly, EM8B 8 ch. Analog I/O and DSP	1710-0016	
12.	PCB Assembly, IDI	1710-0018	
13.	Bracket, Hold Down		
14.	CM24 Hold Down Arm Ext		
15.	PCB Assembly, Audio Output Jack	1710-0002	
16.	PCB Assembly, Audio Input Jack	1710-0001	
17.	PCB Assembly, Digital I/O	1710-0005	
18.	PCB Assembly, MIDI I/O	1710-0004	
19.	PCB Assembly, RADARLINK Control	1710-0003	
20.	SCSI Terminator		
21.	Panel, Side and Bottom		



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