K2500

Service Manual

This service manual does not include schematics. The schematic set was removed to reduce the file size for improvement of email transfer and downloads. To obtain a .pdf file of the schematics contact us and ask for the K2500 schematic set.

KURZWEIL MUSIC SYSTEMS
AND Music Corp
9501 Lakewood Drive, SW Ste. D
Lakewood, Washington 98499
(253)589-3200

K2500

Service Manual



©1997 All rights reserved. Kurzweil is a product line of Young Chang Co.; V. A. S. T. is a registered trademark, and Kurzweil, K2500, K2500X, K2500R, KDFX, and K2000 are trademarks of Young Chang Co. All other products and brand names are trademarks or registered trademarks of their respective companies. Product features and specifications are subject to change without notice.

Part Number: 910292 Rev. B



DO NOT REMOVE THE COVER NO USER SERVICEABLE PARTS INSIDE REFER SERVICING TO QUALIFIED SERVICE PERSONNEL



The lightning flash with the arrowhead s within an equilateral triangle, is intended the user to the presence of uninsulated 'dangerous voltage' within the product's enclosure that may be of sufficient magnitude



triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the

IMPORTANT SAFETY & INSTALLATION INSTRUCTIONS

INSTRUCTIONS PERTAINING TO THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS

WARNING - When using electric products, basic precautions should always be followed, including the following:

- 1. Read all of the Safety and Installation Instructions and Explanation of Graphic Symbols before using the product.
- 2. This product must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This product is equipped with a power supply cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet which is properly installed and grounded in accordance with all local codes and ordinances.

DANGER - Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Do not modify the plug provided with the the product. If it will not fit the outlet, have a proper outlet installed by a qualified electrician. Do not use an adaptor which defeats the function of the equipment-grounding conductor. If you are in doubt as to whether the product is properly grounded, check with a qualified

- 3. WARNING This product is equipped with an AC input voltage selector. The voltage selector has been factory set for the mains supply voltage in the country where this unit was sold. Changing the voltage selector may require the use of a different power supply cord or attachment plug, or both. To reduce the risk of fire or electric shock, refer servicing to qualified maintenance personnel.
- 4. Do not use this product near water for example, near a bathtub, washbowl, kitchen sink, in a wet basement, or near a swimming pool, or the like.
- 5. This product should only be used with a stand or cart that is recommended by the manufacturer.
- 6. This product, either alone or in combination with an amplifier and speakers or headphones, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.
- 7. The product should be located so that its location or position does not interfere with its proper ventilation.
- 8. The product should be located away from heat sources such as radiators, heat registers, or other products that produce heat.
- 9. The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product.
- 10. This product may be equipped with a polarized line plug (one blade wider than the other). This is a safety feature. If you are unable to insert the plug into the outlet, contact an electrician to replace your obsolete outlet. Do not defeat the safety purpose of the plug.
- 11. The power supply cord of the product should be unplugged from the outlet when left unused for a long period of time. When unplugging the power supply cord, do not pull on the cord, but grasp it by the plug.
- 12. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
- 13. The product should be serviced by qualified service personnel when:
 - A. The power supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has been spilled into the product; or
 - C. The product has been exposed to rain; or
 - D. The product does not appear to be operating normally or exhibits a marked change in performance; or
 - E. The product has been dropped, or the enclosure damaged.
- 14. Do not attempt to to service the product beyond that described in the user maintenance instructions. All other servicing should be referred to qualified service personnel.
- 15. **WARNING** Do not place objects on the product's power supply cord, or place the product in a position where anyone could trip over, walk on, or roll anything over cords of any type. Do not allow the product to rest on or be installed over cords of any type. Improper installations of this type create the possibility of a fire hazard and/or personal injury.

RADIO AND TELEVISION INTERFERENCE

Warning: Changes or modifications to this instrument not expressly approved by Young Chang could void your authority to operate the instrument. Important: When connecting this product to accessories and/or other equipment use only high quality shielded cables.

Note: This instrument 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 instrument 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 instrument does cause harmful interference to radio or television reception, which can be determined by turning the instrument off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- · Reorient or relocate the receiving antenna.
- Increase the separation between the instrument and the receiver.
- · Connect the instrument into an outlet on a circuit other than the one to which the receiver is connected.
- If necessary consult your dealer or an experienced radio/television technician for additional suggestions.

This apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

SAVE THESE INSTRUCTIONS

K2500 Service Manual

Written and illustrated by:

Rob Huffman and James Middleton

Technical Advisors:

Lenny Andrade Bob Budd Hal Chamberlin **Jonathan Collins Tom Dunn Duane Garvin Chris Heaps Ken Hickey** Tim King **Peter Leahy Steve Lee Matt Lindi Jerry Merkley Dave Morrell Peter Munson Michael Richmond**

Table of Contents

Basic Oper	ations	1-1
_	Important Notice for Kurzweil Service Technicians	. 1-1
	Symbols: Note, Caution, and Warning	. 1-1
	Product Description	
	Front and Rear Panels	. 1-2
	Turning the K2500 on-LED Flashes	. 1-5
	Entering the Boot Loader	. 1-5
	Disk Operations	. 1-5
	Resetting the K2500	. 1-7
	Battery Selection and Replacement	. 1-8
	Scanner Diagnostics	. 1-8
	Basic Troubleshooting	. 1-9
	SCSI Guidelines	l-12
	Memory	
	Choosing and Installing SIMMs for Sample RAM	l-19
Diagnostic	S	2-1
	Important Notes and Warnings	. 2-1
	Running the Diagnostics	. 2-2
	LCD	. 2-4
	Engine Block (Engine Blk)	. 2-4
	Setup Block (Setup Blk)	. 2-4
	RAM/PRAM	. 2-5
	I/O Port	. 2-5
	Floppy Disk Drive Initialize (FDD Init)	. 2-5
	Scanner	. 2-6
	MIDI UART	
	Floppy Disk Drive Read/Write (FDD R/W)	. 2-7
	SCSI	. 2-7
	VLSI	. 2-9
	Sampling Option (SamplingOpt)	2-10
	Sine Wave	2-10
	Sound ROM	
	Sound RAM	
	Non-Volatile RAM (1st NVRAM / 2nd NVRAM)	
	KDFX Option	2-12
K2500R D	isassembly / Assembly	
	Important Notes and Warnings	
	Tools and Materials Required	
	Opening the K2500R	. 3-2
	Closing the K2500R	
	K2500R Part Removal and Replacement	
	AC Entry Module	. 3-5

	Audio Board (Audio/Power Board)	3-8
	Backlight Power Board	
	Battery Holder	
	Button Board (Control Panel Board)	
	Connector Board	
	Engine Daughter Board	
	Engine Mother Board	3-16
	Floppy Drive	3-17
	LCD	
	Scanner EPROM Chip	3-20
	Transformer	3-21
	Volume/Headphone Board	3-23
K2500/X	Keyboard Disassembly / Assembly	4-1
	Important Notes and Warnings	4-1
	Tools and Materials Required	4-2
	Opening the K2500/X Keyboard	
	Closing the K2500/X Keyboard	4-5
	K2500/X Keyboard Part Removal and Replacement	4-10
	AC Entry Module	4-12
	Audio Board (Audio Scanner Board)	4-14
	Audio I/O Board	
	Backlight Power Board (Digital I/O, Backlite Power Board)	
	Button Board (Main Control Panel Board)	
	Engine Daughter Board	
	Engine Mother Board	
	Floppy Drive	
	Keyboard	
	Keys	
	Keyboard Contact Boards	
	Key Contact Strips	
	Key Weights	
	LCD	
	Player Control Board	
	Power Supply Board	
	Scanner EPROM Chip	
	Slider Board	
7 5 11	Transformer	
Troubles	shooting	
	Power Problems	
	Front Panel Problems	
	Audio Problems	
	Keyboard Problems (K2500 and K2500X only)	5-6

Calibration	Tests	6-1
	Before Beginning a Test	6-1
	Important Notes and Warnings	
	Scanner Diagnostics	
	K2500/X Main Control Panel Board Test	
	K2500/X Player Control Board Test	
	K2500/X Slider Board Test	6-7
	K2500/X Digital I/O Board Test	
	K2500/X Power Supply Board Test	
	K2500/X Audio I/O Board Test	
	K2500/X Audio Board Test	6-14
	K2500R Power Supply Test	6-26
	K2500R Connector Board Test	6-27
	K2500R Main Control Panel Board Test	6-30
	K2500R Audio Board Test	6-30
Addenda:		
	K2500 Memory Protection Board Installation Kit	910273
	K2500 Active SCSI Termination Board Installation Kit	
ECO Updat	tes:	
_	RAMTECO	ECO 1
	SCSIECO	
	K25KECO1	ECO 3
	PWROKECO	ECO 5
	KF351ECO	ECO 7
Block Diag	rams	A-1
_	K2500 System Block Diagram (Keyboard Models)	A-1
	K2500 Audio Chain Block Diagram	
	K2500 Effects Unit Block Diagram	
Calibration	Test Fixtures (Fakes)	
	•	
	K2500 Mother Board Silkscreen: Rev. G	
	K2500 Mother Board Schematics: Rev. G (30-pin SIMMs)	
	K2500 Mother Board Silkscreen: Rev. K	
	K2500 Mother Board Schematics: Rev. K (72-pin SIMMs)	
	K2500 Daughter Board Silkscreen	B-8
	K2500 Daughter Board Schematics: Rev. 1,2,3	
	K2500 Daughter Board Schematics: Rev. 4	
	K2500 Audio Board Silkscreen	
	K2500 Audio Schematics	
	K2500 Audio I/O Silkscreen	·
	K2500 Audio I/O Schematic	

K2500 Digital I/O Silkscreen	B-21
K2500 Digital I/O Schematics	
K2500 Main Control Panel Silkscreen	B-24
K2500 Main Control Panel Schematics	
K2500 Player Control Silkscreen and Schematic	
K2500 Slider Silkscreen	
K2500 Slider Schematic	
K2500 Power Supply Silkscreen	B-30
K2500 Power Supply Schematic	
K2500 Audio and Power Supply Schematic	
K2500 Scanner Schematics	
K2500R Reverb and Audio Schematics	
K2500R Effects Processor and Audio	
K2500R Audio Path Schematics	
K2500R Audio I/O Connector Board Schematic	B-39
K2500R Power Supply Schematic	B-40
K2500 Sampling Option Silkscreen	
K2500 Sampling Option Schematic	
K2500 ROM Option Silkscreen	
K2500 ROM Option Schematic	
K2500 HDD Filter Silkscreen and Schematic	

Chapter 1 Basic Operations

This chapter provides Kurzweil service technicians with basic knowledge of K2500 series instruments. Included is a brief description of the K2500, plus steps on battery replacement, disk operations, basic troubleshooting, and SCSI. For complete K2500 operating instructions, see the K2500 Performance Guide (Part No. 910251) and Reference Guide (Part No. 910252.)

For more information on Kurzweil products and services, visit our world wide web site at www.youngchang.com.

Important Notice for Kurzweil Service Technicians

This manual is intended *only* for qualified Kurzweil service technicians. Unqualified personnel must not open the K2500, or they will void the warranty. K2500 owners *can* perform basic troubleshooting, run some Diagnostic tests, and reset the K2500, but they should bring the unit in for service if a serious problem exists.

Symbols: Note, Caution, and Warning

The following three symbols appear throughout this book. Here is an explanation of each:



Note

Indicates important information, to which you should give special consideration.



Caution

Indicates that the K2500 may be damaged if you do not follow the instructions.



Warning

Indicates that you may injure yourself or others if you do not follow the instructions.

Product Description

K2500R

The K2500R is a rack-mountable synthesizer, similar to the K2000R. The K2500RS includes a factory-installed Sampling Option.

K2500/X Keyboard

K2500 Keyboard models use the same operating system and ROM Objects as the K2500R, but have some features not found on rack units. These features include a piano-style keyboard, sliders, ribbon controllers, and additional rear panel jacks.

The standard K2500 has a semi-weighted, 76-note keyboard. The K2500X has a fully weighted, 88-note keyboard. The K2500S and K2500XS each include a factory-installed Sampling Option.

Front and Rear Panels

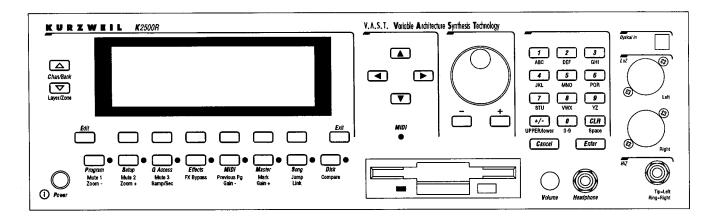


Figure 1-1. K2500R Front Panel.

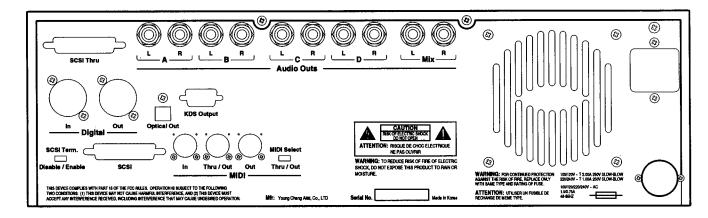
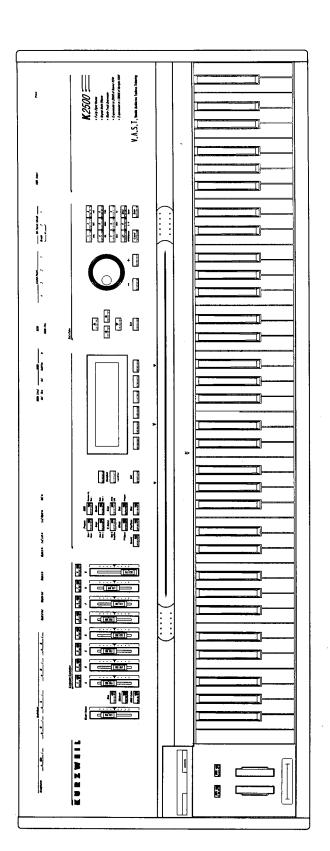


Figure 1-2. K2500R Rear Panel.



Front Panel

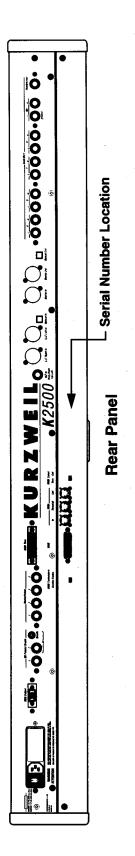


Figure 1-3. K2500 Keyboard (76-key model shown)

Front and Rear Panels

Front and Rear Panel Features

The following items appear on all K2500 rack and keyboard models:

- · Power button or switch
- · Channel/Bank select buttons
- · Eight mode select buttons
- Six soft buttons
- Edit and Exit buttons
- Cursor buttons (up, down, left, and right arrows)
- Data Wheel and +/- buttons
- · Alphanumeric keypad
- Floppy Disk Drive
- · Volume knob or slider
- AC Power jack
- MIDI jacks (In, Out, Thru)
- SCSI and SCSI Thru ports
- Audio Out jacks
- Headphone jack
- "SCSI Termination Enable/Disable" switch (only on later models)
- Sampling Option and Digital I/O holes (or jacks if Sampling Option installed)
- KDS Out hole (or jack if KDFX or KDSO Option installed)
- Battery Compartment (on bottom of K2500/X Keyboard)

Front and Rear Panel Features—K2500/X Keyboard Only

The following additional features appear on keyboard models:

Front Panel

- · Large and Small Ribbons
- · Pitch and Mod Wheels
- Panel Switches (above the Pitch and Mod Wheels)
- Solo, Mixdown, and MIDI Faders buttons
- Eight Programmable Sliders
- Eight Zone buttons (above the Programmable Sliders)
- · Play, Record, and Stop buttons

Rear Panel

- Switch Pedal jacks
- CC Pedal jacks
- Breath Controller jack

Turning the K2500 on-LED Flashes

When you turn the unit on, the front panel LEDs flash 1 to 4 times, depending on the conditions listed below:

- ONE FLASH Power is OK and the Scanner processor is running.
- TWO FLASHES Same as one flash, but the Scanner found that the Pitch Wheel is not centered and will not have a full range (see "Adjusting the Player Control Board Pots" on page 6-4.)
- THREE FLASHES The battery voltage is dangerously low. (See "Battery Selection and Replacement" on page 1-8.)
- **FOUR FLASHES** The battery voltage is low and the Pitch Wheel is not centered.

Entering the Boot Loader

From the K2500's Boot Loader, you can install the Operating System and the ROM Objects, perform a Hard Reset, or run the Diagnostic tests.

- 1. If the K2500 is on, press the Power button to turn it off.
- Press the Power button to turn the unit on.
- Press and release the Exit button while the "Please wait..." message is displayed. This will bring up the K2500 Boot Loader (shown below).



OK

4. The Boot Loader's Menus resemble K2500 dialog boxes. They consist of a series of labels and a highlight bar you use to select a label. Use the arrow buttons to highlight a label. Then press the **OK** soft button to invoke the highlighted function

Disk Operations

Formatting a Floppy Disk

Floppy disks must be formatted before they can be used with the K2500. The K2500 uses the MS-DOS format, so floppies formatted on DOS computers should work with the K2500. If you don't have a DOS-formatted disk, do the following:

- 1. Insert a blank floppy disk into the K2500's floppy drive. Make sure that the disk is unlocked (set the sliding switch on the back of the disk so that you can't see through the hole on that side of the disk).
- 2. Press the Disk button to enter Disk mode. Highlight "floppy" at the "Device to install from:" prompt, so that you don't accidentally format any SCSI devices you might have connected!
- 3. Press the **more>** soft button once, then press the **Format** soft button.

- 4. Press the **Yes** soft button.
- 5. Three soft buttons will appear, letting you choose between formatting the floppy as a 720K (double-density) or 1.4M (high-density) disk. Press the appropriate soft button, or press the Cancel soft button.

If the floppy you inserted is double-density and you press the 1.4M soft button, the format procedure will fail. This is also true if the disk is high-density and you press the 720K soft button. If the floppy is single-sided (SSDD), you can press the 720K soft button, and the floppy will be formatted as a double-sided disk. (The only difference between single- and double-sided floppies is that both sides of a double-sided floppy have been tested by the manufacturer.)

6. Once you choose between the 720K or 1.4M format, the K2500 will remind you that formatting will erase the floppy, and will give you two more chances to cancel the formatting procedure— we want to make sure you don't accidentally erase any disks. Press the Yes soft button to continue formatting. When formatting begins, the display will tell you that the disk is being formatted. You'll hear the disk drive turning, and the disk drive LED will light.

Formatting a 1.4M floppy disk takes just under three minutes, including the automatic verification. When formatting is finished, the display returns to the Disk mode page.

Backing Up the RAM Objects

- 1. Insert a blank, formatted disk into the K2500's floppy drive. You can save the objects to an internal or external hard drive instead, if you prefer.
- 2. Press the Disk button to enter Disk mode.
- 3. Highlight "floppy" at the "Device to install from:" prompt. If you are saving to a hard drive, choose that device's SCSI ID.
- 4. Press the Save soft button.
- Choose "Everything."
- 6. Press **OK**. After the objects have been saved and verified, the display will return to the Disk page.

Loading the Operating System

1. Insert the most up-to-date Operating System Disk into the K2500's floppy drive.



- Make sure that the Operating System you are installing matches this K2500. Units equipped with KDFX/KDSO Options require Software Version 2.3 or higher.
- 2. If you aren't already in the Boot Loader, power down and up again. Press the EXIT button while the "Please wait..." message is displayed.
- 3. Choose "Install System" from the Boot Loader menu.
- 4. Highlight "floppy" at the "Device to install from:" prompt. Press OK.

5. Highlight the file named "K25V***.KOS" (where *** is the version number). Press OK, then OK again to confirm. When the operating system has loaded, you will be returned to the Boot Loader menu.

Loading the Objects

1. Insert the appropriate Factory Objects Disk into the K2500's floppy drive.



- Make sure that the Objects you are installing match this K2500. Units equipped with any of the Sound ROM Options (Piano, Contemporary, or Orchestral) require a special Factory Objects Disk.
- 2. If you aren't already in the Boot Loader, power down and up again. Press the EXIT button while the "Please wait..." message is displayed.
- 3. Choose "Install Objects" from the Boot Loader menu.
- 4. Highlight "floppy" at the "Device to install from:" prompt. Press OK.
- 5. Highlight the file named "OBJ****.K25" (where **** is the version number). Press **OK**, then **OK** again to confirm.
- 6. When the objects have been installed, you will be returned to the Boot Loader menu. "Run System" will be highlighted. Press **OK** to return to normal K2500 operation.



You can check the version of the objects installed as follows: press the Master button to bring up the Master page, highlight the Intonation parameter, and note its setting. Then scroll to Intonation Table 18, which will list the version of the objects (e.g., "objFv012"). When you are done, scroll back to the Intonation parameter's original setting.

Resetting the K2500

By invoking a hard or Soft Reset, you can often clear up software problems without opening the K2500. The table below explains the four types of resets you can do.

Reset Type	Method	Program RAM Preserve/Erase	Sample RAM Preserve/Erase	Comments
Hard Reset, Boot Loader	Enter Boot Loader (see page 1-5) choose "Hard Reset."	Erase	Erase	Places the factory settings back into memory. Use when Master page is inaccessible.
Hard Reset, Master mode	Press Master button, choose Reset , press Yes twice.	Erase	Erase	Places the factory settings back into memory.
Soft Reset	Press +/-, 0, and Clear buttons all at once.	Preserve	Preserve	
Reboot	Turn the K2500 off and back on.	Preserve	Erase	

Battery Selection and Replacement

The K2500 uses batteries to preserve its internal memory when the power is turned off. The original batteries should last up to one year before they need replacing. Replacement is necessary when the LCD says "BATTERY VOLTAGE IS LOW" during power-up, or when you notice that the LEDs flash three times instead of once during power-up. Once these warnings begin to occur, the batteries should be replaced within a couple of weeks to ensure continued safety of the RAM objects.

Most quality brand-name batteries now have "sell by" dates printed on their packages. Carbon-zinc batteries will last for at least a year after installation; alkaline batteries should also last for about one year, provided they are installed before the date on the package. Don't use rechargeable batteries; the K2500 will not recharge them, and their life after charging on an external charger will be only a few months.

Battery life is not significantly increased by leaving the K2500 on all the time; batteries may even suffer heat degradation if the K2500 is left on continuously.

If batteries last much less than one year, and you have followed the guidelines above, there may be a problem with the K2500.

1. Opening the Battery Compartment

K2500R

Locate the battery compartment cover, at the lower right corner of the K2500 as you face the rear panel. Using a flat-head screwdriver, remove the battery compartment cover.

K2500/X Keyboard

Tilt the K2500 onto a soft surface, so that it rests on its rear panel. Open the battery compartment cover, which is located on the bottom center of the instrument.

2. Replacing the Batteries

Replace the old batteries with three high quality AA size "heavy duty" or alkaline batteries. A capacitor will keep the memory alive for about 30 seconds while changing the batteries, so don't remove the old ones until the new ones are available. Alternatively, you may leave the power cable plugged in and the power on while changing the batteries, in which case memory will be retained.

Be sure to insert the new batteries in the proper direction. On rack units, the positive terminals should point out; on keyboard units, see the inside of the battery holder. Incorrect insertion won't damage anything, but the memory won't get any power from the batteries.

Scanner Diagnostics

An onboard diagnostic program, called Scanner Diagnostics, enables you to check the batteries and confirm front panel button functions. Note that this program is not the same as the *Scanner* Diagnostic Test covered in Chapter 2.

To call up Scanner Diagnostics, simply press the 4, 5, and 6 buttons all at once when in Program mode. The K2500 will respond by lighting each LED in sequence and then displaying text such as the following on the LCD:

K2500 SCANNER DIAGNOSTICS VERSION 2.1 (PRESS"EXIT" AND "ENTER" TO EXIT) BATTERY=4.3VOLTS, WHEEL CENTER=128 XXXXXXXXXXXXXXXXXX

The Scanner Diagnostics can also be used to check out the front panel components. If you turn the Alpha Wheel clockwise, the numbers will go 0-1-2-3-0-1-2...while turning it counterclockwise should produce 3-2-1-0-3-2-1... If you press a button, its name will be shown and if it is one of the mode buttons, its associated LED should flash.

The third line of the display shows the results of two measurements that are made whenever your K2500 is turned on. The battery voltage will be about 4.3 volts for new batteries, gradually declining over time to 3.2 volts, at which point you will start to get warnings (see "Battery Selection and Replacement" on page 1-8). "Wheel Center" applies only to keyboard units.

The fourth line (represented by XXXX) gives a readout identifying the buttons you press.

Basic Troubleshooting

Make sure that the power supply is at the correct voltage, and is working properly.

Make sure that the power cable is plugged in properly.

Adjust the LCD contrast if necessary (with the Contrast parameter in Master mode). If for some reason you have trouble reading the display, even after adjusting the Contrast parameter, you can also adjust the contrast by holding down the ENTER button and turning the Data Wheel. If this improves the contrast, immediately return to the Contrast parameter and adjust it slightly. This will cause the K2500 to remember the current display contrast level, and should take care of any difficulties you may have been having. If this procedure doesn't work, there may be a more serious problem with the LCD.

Make sure your audio cables are fully connected to the K2500 and to your sound system. You may want to switch your audio cables, unless you're sure that they're working properly.

If you have any MIDI cables plugged in to the K2500, make sure that your MIDI connections are correct. Check that the MIDI cables work properly.

Check that the K2500's Volume knob or slider is at least partially up.

Check the volume level of your sound system.

Lower the volume of your sound system, then turn the K2500 off and on again.

Do a soft reset by pressing the +/-, 0, and Clear buttons (on the alphanumeric pad at the far right of the front panel) all at once.

As a last resort, save the RAM objects to disk, and perform a hard reset. Do this by pressing the Master Mode button, then pressing the "Reset" soft button (at the lower right of the display). The K2500 will warn you about deleting everything (only RAM objects will be deleted). Press Yes. After a few seconds, the power-up display should appear.

If all else fails, try the appropriate Diagnostic test (see Chapter 2.)

Other Possible Problems

Condition

Possible Cause

No sound, no display, no LEDs illuminated.

- 1. AC line cord not fully inserted into outlet or unit. If using a multiple outlet box, check its plug.
- 2. Power not on at AC power source (wall outlet). Check with a different appliance.
- 3. Power switch not on (either the unit or multiple outlet box).
- 4. Incorrect voltage selection setting.

No sound.

- Volume control turned all the way down on the K2500 or on amplifier or mixer.
- 2. Amplifier or mixer not turned on.
- 3. Cabling is not correct. Also check that amplifier, mixer and speaker cabling is correct.
- 4. MIDI volume has been assigned to a control source which has sent a value of 0. Pressing the Panic soft button will reset all controls, and resolve this problem.

No sound at MIX outputs or headphones.

1. Audio cables are plugged into some or all of the separate outputs. Cables plugged into of the separate outputs will remove some or all of the audio signal from the MIX and headphone outputs.

Left MIX output seems louder than Right MIX output when used individually.

1. This is normal. When a cable is plugged into the left MIX output alone, both the left AND the right audio signals are routed to the jack. When a cable is plugged into right MIX output alone, only the right channel audio signal is heard.

Volume knob has no effect.

- 1. Separate outputs are in use the volume knob does not affect the separate outputs.
- 2. MIDI volume has been assigned to a control source which has sent a value of 0.

Programs, Setups, Songs, etc. are missing.

1. Batteries have run down or have been disconnected. If the batteries have failed, the message "Battery voltage is low - X.X volts" (where X.X is less than 3.0) will appear in the display on power-up. All user data will be permanently lost if this occurs. See the information on battery selection and replacement elsewhere in this manual.

LCD is too dark or too light to read.

Contrast not adjusted. Select Master mode and adjust the Contrast parameter. If this fails, hold the ENTER button and turn the alpha wheel clockwise to make display darker; counterclockwise to make it lighter. Then adjust the Master mode Contrast parameter to a higher value if the LCD was too light, or to a lower value if it was too dark.

Cannot mount or read disk.

- 1. Disk is not MS-DOS (or Akai, Ensoniq, or Roland) format.
- 2. Disk is damaged.

Cannot write floppy disk.

- 1. Disk is not MS-DOS formatted.
- 2. Disk write protected.
- 3. Sample is copy protected.
- 4. Disk is damaged.

Cannot format disk.

- 1. Disk is damaged.
- 2. Disk is write protected.
- 3. You have instructed the K2500 to format a Double density (720K) disk as a high-density (1.4M) disk. NOTE: Punching a hole in a double-density disk case to try to make the K2500 read it as a high-density disk is not recommended.

SCSI Guidelines

The following sections contain information on using SCSI with the K2500, as well as specific sections dealing with the Mac and the K2500. The final section covers K2500 keyboards with internal hard drives.

Disk Size Restrictions

The K2500 accepts hard disks with up to 2 gigabytes of storage capacity. If you attach an unformatted disk that is larger than 2 gigabytes, the K2500 will still be able to format it, but only as a 2 gigabyte disk. If you attach a *formatted* disk larger than 2 gigabytes, the K2500 will not be able to work with it; you could reformat the disk, but this - of course - would erase the disk entirely.

Configuring a SCSI Chain

Here are some basic guidelines to follow when configuring a SCSI chain:

- Connect all SCSI cables before turning on the power on any equipment connected by SCSI cables. Plugging or unplugging SCSI cables while devices are powered on can cause damage to your devices or to the K2500.
- 2. According to the SCSI Specification, the maximum SCSI cable length is 6 meters (19.69'). You should limit the total length of all SCSI cables connecting external SCSI devices with Kurzweil products to 17 feet (5.2 meters). To calculate the total SCSI cable length one must add up the lengths of all SCSI cables, plus 8" for every external SCSI device connected. No single cable length in the chain should exceed 8 feet.
- 3. The first and last device in the chain must be terminated.

The K2500 comes with SCSI termination enabled. You must disable this termination if the K2500 will be in the middle of a SCSI chain, or if you are installing a hard drive into the K2500.

There are three ways to disable the K2500's termination, depending on the manufacture date of the unit. Newer K2500s have an external "SCSI Termination Enable/Disable" switch on the rear panel (see page 1-15). Older K2500s require either the removal of SCSI termination resistors or removal of a jumper.

Poor termination is a common cause of SCSI problems. Having more than two terminators on the bus will overload the bus drivers, but this should not cause permanent damage to the hardware. Poor termination can corrupt the data on your disk, however, as can bad SCSI cables.

For the K2500R, if it is not located at one end of a SCSI chain then all internal termination must be removed. This includes the three termination removal methods discussed above, plus terminator resistors or jumpers in the internal SCSI drive. It is much simpler to just make sure that the K2500R is at one end of the SCSI chain.

For a K2500 keyboard model, it must be at one end of the SCSI chain if it has an internal hard disk drive.

A note about active termination: the K2500 uses active termination of the SCSI bus. Active termination has some benefits over traditional passive termination. Some people have positioned active termination as a panacea for SCSI problems, but this is more hype than reality. Active terminators are available for use at the end of one's SCSI chain; all APS SR2000 series external drives use internal active termination that can be switched on or off.

4. Each device in the chain (including an internal hard drive) must have its own unique SCSI ID. The default K2500 ID is #6. Macintoshes use ID #7 and #0.

5. **Use only true SCSI cables**—high quality, twisted pair, shielded SCSI cables. Do not use RS432 or other non SCSI cables.

Many SCSI cables we've tested were poorly made and could damage data transferred to and from the disk. Most SCSI data problems encountered by Young Chang's engineering department have been due to bad cables that didn't twist pairs of wires properly. Good cables are essential to reliable data transfers to and from the disk drive. Correctly made SCSI cables have one ground wire for each signal wire, twisted together in signal/ground pairs. Young Chang manufactures high quality 1 and 2 meter 25-25 SCSI cables. We also recommend cables made by APS Technologies (800-233-7550).

- 6. You should buy all SCSI cables from a single source to avoid impedance mismatch between cables.
- 7. Theoretically, all eight SCSI IDs can be used. However, feedback from users has shown us that many people have problems with more than 5 or 6 devices in a chain. If a K2500 owner has 7 or 8 devices and is having problems, your best bet is to make sure that he has followed all of the previous information, especially with respect to cables.
- 8. When installing an internal drive, authorized service centers should terminate the drive, set its ID correctly, and disable termination on the K2500.
- 9. When using a Macintosh, power up the K2500 and other devices first.
- 10. The K2500 file format is a proprietary format; no other device will be able to read or write a Kurzweil file.
- 11. The floppy disk format of the K2500 is DOS. The SCSI disk format is a proprietary form that is close to, but is not, DOS. Nonetheless, the K2500 can read and write to a DOS formatted disk, provided it was formatted on the PC with no partitions.
- 12. You can use a PC or Macintosh to view, copy, move, name, and delete files on a K2500-formatted floppy disk or removable media hard drive. To do this, you must have a DOS mounting utility program such as Access PC.
- 13. As long as the SCSI bus is properly terminated, there is no way you can damage your hardware simply by operating it. There are a few hazards you should be aware of, though:

The only damage that usually occurs to SCSI hardware comes from static electricity "zapping" SCSI connector pins when the cables are disconnected. The silver-colored shell of the SCSI connector on the end of the cable is connected to ground and is safe to touch, but the brass colored pins inside eventually lead to the SCSI interface chip and are vulnerable. You should discharge static from your body before touching SCSI connectors by touching the 1/4" jacks on the rear of the K2500 or another grounded metal object. Any devices connected to the SCSI bus should be turned off when plugging or unplugging SCSI cables.

If the K2500 is connected to a Macintosh or PC you should make sure that the computer cannot access a SCSI disk at the same time the K2500 does (the next two sections have more information on this.) Those who occasionally want to share a drive, but don't want to take any risks, would be best served by disconnecting and connecting devices as needed. If you want to share drive(s) often and cannot constantly disconnect and reconnect devices, make sure the Mac or PC is really done with the disk before using the K2500. Furthermore, you should quit or exit from all running programs and disable screen savers, email, network file sharing, and any INITs or TSRs that run in the background. If the computer and K2500 access the disk at the same time there will be no damage to the hardware, but the bits on the disk, K2500 memory, and computer memory can easily be corrupted. You may not know that damage has been done to these bits until weird things start to happen for no apparent reason.

K2500 and Macintosh Computers

- 1. The Mac really does not like having another SCSI master on the bus (i.e., the K2500.) It assumes that it owns the bus and its drives, therefore it will not tolerate the situation where the K2500 is trying to talk to its (the Mac's) disk. This suggests that you never want to select the ID of any drive mounted on the Mac's desktop. Even more fundamental is the problem that the Mac assumes that the bus is always free, so if it tries to do anything via SCSI when the K2500 is doing anything via SCSI, the Mac will freak. The only solution is, wait until your Mac is completely idle before accessing SCSI from the K2500.
- 2. The Mac and the K2500 cannot share a drive in any way, with or without partitions. If you are using a drive with removable media, you cannot easily switch back and forth between a Mac formatted volume and a K2500 formatted volume. To prevent problems, you will need to unmount the drive from the Mac desktop before switching to a K2500 format volume. The Mac will basically ignore the volume if it's not Mac format, but once you insert a Mac format volume, the Mac owns it. Don't forget about #1 above; inserting a cartridge will cause the Mac to access SCSI, so don't try to use the K2500 at that moment.
- 3. The only good reason for connecting the Mac and the K2500 on the same SCSI bus is to use Alchemy or equivalent software. If you're using a patch editor or librarian, you can just hook up via MIDI. Connecting via SCSI will allow fast sample transfers through the SMDI protocol. In this type of configuration the easiest solution is to let the K2500 have its own drive, and let the Mac have its own drive.

However, we have discovered that when using a K2500 with a Mac and a removable media drive in the middle of the chain, the following scenario will work:

Start with a Mac formatted cartridge in the drive. When you want to use the K2500, put the drive to sleep from the K2500. You can then change to a K2500 formatted cartridge and perform whatever disk operations you need. When you want to go back to the Mac, put the drive to sleep again, switch cartridges, and then wake up the disk by pressing **Load**. Of course the K2500 will tell you it can't read the cart, but the Mac will now access it fine.

Accessing a K2500 Internal Drive from the Mac

Access PC is one of the many programs for the Mac which allow it to format, read, and write to DOS floppy disks and removable SCSI cartridges. However, we have discovered that it is possible to format internal K2500 hard drives, even though the documentation claims to only support removable media (not fixed drives). Because the program claims not to be able to do this, we do not necessarily recommend it.

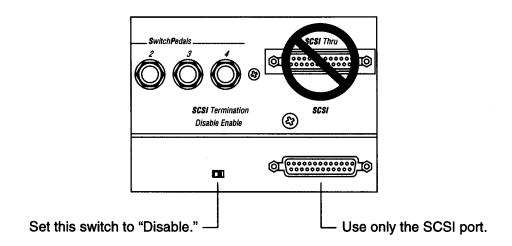
The main thing to remember is:

Never change the disk contents (i.e., save or delete files) from the K2500 when the disk is mounted by the Macintosh. If you do, this could easily trash files, directories, or even the entire disk. Access PC has no way of knowing when the K2500 has modified the disk structure, and it can just overwrite any state of the disk it thinks should be there. The safest thing is to connect a drive to either the K2500 or the Mac, but not both at the same time. Of course, you can't always predict when a Mac will access its drive, and it doesn't do SCSI bus arbitration. So using the Mac while using the SCSI bus from the K2500 (e.g., doing a disk mode operation) is also a bad idea, and can cause the Mac to hang.

K2500 Units with Internal Hard Drives

A K2500 keyboard unit with an internal hard drive should only be connected to **one end** of the SCSI chain. Use only the SCSI port; do not use the K2500's SCSI Thru port if the K2500 has an internal hard drive. Also, make sure that termination is enabled on the internal hard drive.

Some K2500 units have a switch labeled "SCSI Termination Enable/Disable," which sets termination for the K2500, but **not** the internal hard drive. Find this switch on the rear panel, as shown below, and set it to "Disable." Leave the switch in the disabled position as long as the unit has an internal hard drive (even if no external devices are connected to the K2500's SCSI port).



Enable termination on the internal hard drive.

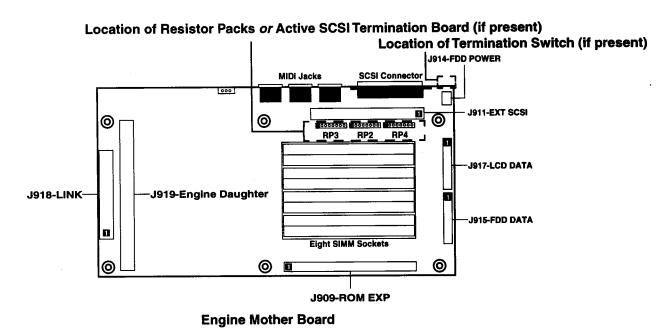
Figure 1-4. "SCSI Termination Enable/Disable" switch.

If a unit does not have the above switch, SCSI Termination should be disabled in one of three ways:

- Some K2500s have three SCSI terminator packs, located in RP2, RP3, and RP4 on the Engine Mother Board. Remove these from their sockets, and store for possible future use.
- Some K2500s have a termination switch located inside of the unit. Open the K2500R, locate this switch (shown in Figure 1-5), and set it to "Disable" (to the left away from the SCSI port as you're looking at the rear panel from the rear).
- Some K2500s have an Active SCSI Termination Board (located on the Engine Mother Board) in place of the terminator packs. Remove the jumper from JP 1 on the Active SCSI Termination Board.

SCSI Guidelines

Figure 1-5 shows the locations of RP 2, RP 3, and RP 4, the SCSI Termination Switch, and JP1 on the Active SCSI Termination Board; a K2500 will only have one of these termination options. For detailed steps on opening the K2500, see Chapter 3 (rack) or Chapter 4 (keyboard.)



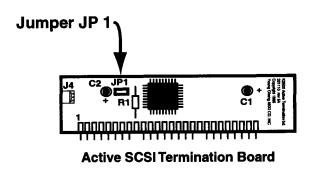
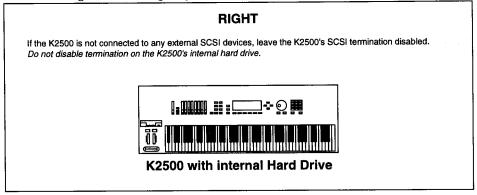
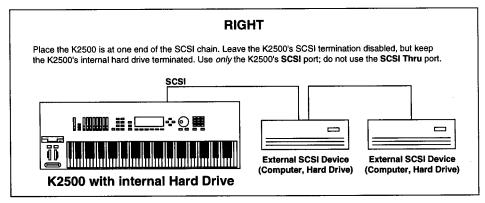
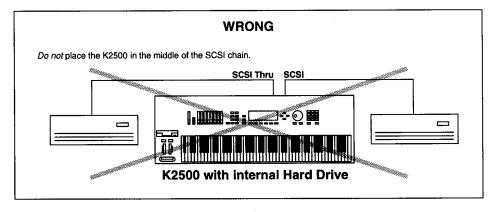


Figure 1-5. SCSI Termination locations.

The figure below shows the right and wrong ways to connect SCSI devices to a K2500 with an internal hard drive.







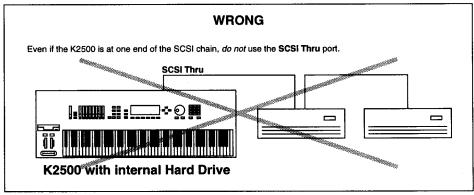


Figure 1-6. Attaching SCSI devices to K2500 with internal hard drive.

Memory

Memory

Program RAM vs. Sample RAM

There's an important distinction between Sample RAM and Program RAM. Sample RAM refers to any SIMMs that may be installed in the K2500. This RAM is reserved exclusively for sample storage; nothing else is stored there. Sample RAM is volatile; that is, when you power down the K2500, the data stored there will "evaporate" almost immediately. That's why you have to load RAM samples every time you power up.

As shown below, the amount of sample RAM in the K2500 is indicated on the Disk mode page. If the center of the display's top line is blank when you're on this page, it means that there is no sample RAM installed in this K2500 (or that the K2500 isn't recognizing it, in which case you should run the Sound RAM Diagnostic test described in Chapter 2).

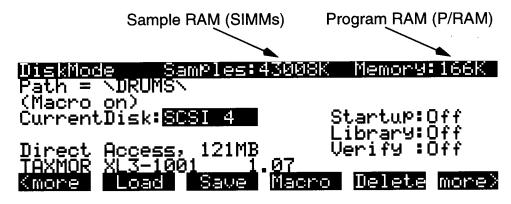


Figure 1-7. Viewing amount of RAM on Disk mode page.

Program RAM is where all the other RAM objects (programs, setups, QA banks, songs, keymaps, etc.) are stored. The K2500 comes from the factory with approximately 240K of available Program RAM. The amount of free Program RAM is indicated at the right side of the top line of the display in Song mode and Disk mode (as shown above). K2500 owners can add a Program RAM (P/RAM 2) option to increase the total available Program RAM to about 1250K.

Program RAM is battery-backed, so anything that's stored there will be preserved even when you power down (as long as the batteries have enough juice). Fresh alkaline batteries will last up to one year, so owners will have very few worries about losing RAM program information. Nonetheless, when opening the K2500, and especially when changing the batteries, we recommend that you back up programs, songs, etc. by saving them to disk (as described on page 1-6). This offers insurance in case the RAM becomes corrupted or the batteries take more than thirty seconds to change. Such things are unlikely, but still possible.

If there is a program that uses a disk-loaded sample, the program information (number of layers, keymap assignment, output group, algorithm, etc.) is stored in Program RAM. All RAM samples associated with the program are stored in Sample RAM. This means that when you power down, the RAM samples associated with all programs will disappear. The program information, however, will remain in Program RAM indefinitely. When you power up again, RAM programs will still appear in the display as you scroll through the program list, but they won't play if they use RAM samples, because the RAM samples are lost when you power down.

Viewing RAM Objects

Select Master mode and press the **Utility** soft button. Press the **Objects** soft button, and a list of RAM objects will appear. Use the Alpha Wheel to scroll through the list of objects. You'll see the type, ID, name, and size (in bytes) of each object.

Choosing and Installing SIMMs for Sample RAM

Single In-Line Memory Modules, commonly referred to by the acronym "SIMM", are the small memory cards that the K2500 uses for Sample RAM. Early K2500 models take up to eight 30-pin SIMMs; K2500s with a rev. K or later mother board take up to two 72-pin SIMMs. In either case, however, 128 Megabytes of Sample RAM is the maximum. To determine the SIMM requirements of a K2500 without disassembling the unit, check its serial number; a "Z" as the seventh character (e.g., 479501Z00001) indicates that the K2500 has a rev. K or later mother board and requires 72-pin SIMMs. K2500s with a "0" as the seventh character of the serial number use 30-pin SIMMs.

•

CAUTION: Do not use composite SIMMs in any K2500. A composite SIMM is one that uses a PAL or other additional circuitry to make multiple DRAM chips act like bigger chips. Non-composite SIMMs (acceptable) have no chips other than DRAM memory chips soldered to the board. SIMMs with PALs, buffers, or other logic components will not work in a K2500; do not use them. Composite SIMMs may appear to work in some cases, but they will be unreliable.

SIMMs for 30-pin sockets

K2500s with mother boards earlier than rev. K will only accept 30-pin non-composite SIMMs. Allowable sizes are 1 MB, 4 MB, and 16 MB, in either 8-bit or 9-bit configurations. The SIMMs must have an access time of 80 nanoseconds (ns) or faster. The maximum height and width of a 30-pin SIMM for the K2500 is 30mm x 90mm (approximately 1.2 inches x 3.5 inches). Below is a partial list of 30-pin SIMMs that work with the K2500:

Hitachi HB56A48A; 4Mx8

Hitachi HB56A49A; 4Mx9

TI TM124EU9B, TM124EU9C; 1Mx9

TI TM497EAD9B, TM4100EAD9; 4Mx9

TI TM4100GAD8, TM497GAD8A; 4Mx8

TI TM16100GBD8;16Mx8

TI TM16100EBD9;16Mx9

NEC MC-421000A8B; 1Mx8

NEC MC-424100A8B; 4Mx8

NEC MC-421000A9B; 1Mx9

NEC MC-424100A9B; 4Mx9

Tosh THM81000AS, Tosh THM81000BS, Tosh THM81070AS; 1Mx8

Tosh THM91000AS, Tosh THM91000BS, Tosh THM91070AS; 1Mx9

SIMMs are always installed in adjacent pairs, in the following slots: 1 and 2, 3 and 4, 5 and 6, 7 and 8.

SIMMs for 72-pin sockets

K2500s with rev. K or later mother boards will only accept 72-pin non-composite SIMMs, in sizes of 4 MB, 8 MB, 16 MB, 32 MB, 64 MB, and 128 MB. The SIMMs can be in either 32-bit or 36-bit configurations, and must have an access time of 80 nanoseconds (ns) or faster.

Although K2500s with rev. K or later mother boards have two SIMM sockets, some SIMMs cannot be paired with other SIMMs, whether of the same or a different size. The table below shows the acceptable 72-pin SIMM configurations, and indicates which sizes can be combined.

Size	Configuration	Pair with other SIMMs?
4 MB	1Mx32 or 1Mx36	Yes
8 MB	2Mx32 or 2Mx36	No
16MB	4Mx32 or 4Mx36	Yes
32MB	8Mx32 or 8Mx36	No
64MB	16Mx32 or 16Mx36	Yes
128MB	32Mx32 or 32Mx36	No

Figure 1-8. Configuration Chart for 72-pin SIMMs.

For example, a 4MB SIMM can be combined with another 4 MB SIMM to create 8 MB of sample memory. Similarly, a 4 MB SIMM could be paired with a 16 MB or 64 MB SIMM. It could not, however, be paired with an 8 MB, 32 MB or 128 MB SIMM. If you use an 8 MB, 32 MB, or 128 MB SIMM you cannot use the other SIMM socket.

Below is a partial list of 72-pin SIMMs that work with the K2500:

Mosel Vitelic	404J232	8MB
Hitachi	HB56U132 HB56A232BA/SBA HB56A832BA/SBA	4MB 8MB 32MB
Oki	MSC232B132A-xxBS2/DS2 MSC232B2321A-xxBS4/DS4 MSC232B2322A-xxBS4/DS4 MSC232B432A-xxBS8/DS8 MSC232B832A-xxBS16/DS16	4MB 8MB 8MB 16MB 32MB
TI	TM124BK32F TM248BK32F/BK32U TM497BBK32F/BBK32S TM893BBK32F/BBK32S	4MB 8MB 16MB 32MB

Chapter 2 Diagnostics

K2500 diagnostic tests help you determine whether a K2500's boards, chips, cables, and other parts are working properly. The tests can help you troubleshoot or make sure that you have installed parts correctly.

This chapter explains how to run the diagnostic tests, describes each test, and tells you what to do if a test fails.

Important Notes and Warnings

Protect Your Data

- Before entering the Diagnostics page, back up the K2500's RAM objects by pressing the Disk button to enter
 Disk Mode, pressing the Save soft button, and selecting the option "Everything." This saves all RAM objects
 to a floppy or hard disk.
- If possible, backup the contents of any internal or external hard disk connected to the K2500.
- When using a floppy disk for the FDD R/W test, be sure to use a blank, formatted 1.44M disk. *Do not* use disks containing data that you want to save; any disk used in this test may be corrupted.

See page 1-5 for disk formatting instructions.

See Removal and Replacement Steps for Damaged Parts

When a test fails, you may need to replace a damaged board or other part. See Chapter 3 (rack) or Chapter 4 (keyboard) for detailed removal and replacement steps.



WARNING:

Unless indicated otherwise, always unplug all external wires, cables, and connectors from the K2500 before opening the unit. Don't replace any cable or part if the K2500 is still plugged in.

Check Cable Connectors

Most cable connectors are keyed so that they will only plug into their sockets one way. You can often plug either end of a cable into a socket, if necessary.

Remember Pin 1

Ribbon cables (the flat, grey cables) may have connectors that aren't keyed, making it possible to plug the connectors in backwards. This can damage the K2500, and may also cause personal injury. Therefore, always plug the connector's **pin 1** side, marked with a <u>red line</u> on the cable, into the socket's **pin 1** side, marked by a "1" on the board silkscreen.

Running the Diagnostics

Running the Diagnostics

- 1. If the K2500 is on, turn it off, since you must restart the K2500 to enter the diagnostic tests.
- 2. Turn the unit on.
- 3. Press and release the Exit button (near the right end of the LCD) while the "Please wait..." message is displayed. This will bring up the K2500 Boot Loader (shown below), which lets you run diagnostics.

Install System Install Objects Run System



OK

- 4. The Boot Loader's Menus resemble K2500 dialog boxes. They consist of a series of labels and a highlight bar you use to select a label. Use the arrow buttons to highlight "Run Diags". Then press the **OK** soft button to enter the diagnostics page.
- 5. Press any button to continue when the RAM erasure message appears.
- 6. Using the arrow buttons, highlight the desired test. Then choose one of the following:
 - Press the **OK** soft button or the Enter key to run the selected test only once.
 - Press the **Forever** soft button or the "2" button to let the selected test run over and over again by itself.
 - Press the **Burnin** soft button or the "1" button to run the following tests in sequence: LCD, Engine Blk, Setup Blk, RAM/PRAM, I/O Port, FDD Init, Scanner, FDD R/W, Sound ROM, and Sound RAM.

To stop the **Forever** or **Burnin** tests, press the "Exit" button several times until a "User's Break..." message appears.

Test results show up on the LCD screen, where brief messages tell you if a test passes or fails. Once you finish using the diagnostic tests, just turn the K2500 off.

K2500 Diagnostic Tests

Test Name	Purpose of Test
LCD	Tests the LCD display
Engine Blk	Tests the operating system installed in Flash ROM
Setup Blk	Tests the setups installed in Flash ROM
RAM/PRAM	Tests the volatile, non-volatile, and expansion RAM
I/O Port	Tests the microcontroller's port pins
FDD Init	Tests the floppy drive controller
Scanner	Tests communications with the scanner
MIDI Uart	Tests MIDI In and Out
FDD R/W	Tests the floppy disk drive
SCSI	Tests drive(s) on the SCSI bus
VLSI	Tests Janis, Hobbes, and Lisa (not KDFX option)
SamplingOpt	Tests the Sampling Option
Sine Wave	Exercises the sound hardware with sine waves
Sound ROM	Tests the sound ROM
Sound RAM	Tests the sound RAM
1st NVRAM	Writes to the non-volatile and expansion RAM
2nd NVRAM	Checks the pattern written by 1st NVRAM test
KDFX	Tests the KDFX or KDS Output Option

LCD

LCD

When you run the LCD test, the following tests run automatically:

- 1. Data test on LCD character display memory
- 2. Address test on LCD character display memory
- 3. Data test on LCD graphics display memory
- 4. Address test on LCD graphics display memory

Data Tests

Each data test repeatedly writes the following 17-byte data pattern to the LCD:

00, FF, 00, 0F, F0, CC, 33, AA, 55, 11, EE, 22, DD, 44, BB, 88, 77

After the pattern is written, it is read back. If there are any differences, the test will fail.

Address Tests

Each address test writes consecutive values, starting at 30, to consecutive locations in the LCD. Then these values are read back. If there are any differences, the test will fail.

If the LCD Test Fails (or if the LCD Does Not Work at All)

- 1. Make sure that the LCD Data ribbon cable is connected properly. Test the LCD Data ribbon cable, inspect and reseat (if necessary), then run the test again.
- 2. If the test fails or if the LCD still doesn't work, there may be a problem with the LCD or with the Engine Mother Board. Inspect J917 on Engine Mother Board for poor or cold solder joints or open traces.

Engine Block (Engine Blk)

This test computes an observed 32-bit check value of the engine area of the flash memory. This value is then compared to the expected value, which is stored in the flash itself. If the values differ, an error will show.

If the Engine Blk Test Fails

- 1. Reinstall the Operating System (see page 1-6) using the latest K2500 Operating System disk.
- Select "Run System" from the Boot Loader menu, then press OK to run the Operating System. If it
 doesn't work, there may be a problem with the Engine Daughter Board. Inspect the the flash ROM
 chips (U3 and U5 on the Engine Daughter Board) for poor or cold solder joints or open traces.

Setup Block (Setup Blk)

This test computes an observed 32-bit check value of the setup area of the flash memory. This value is then compared to the expected value, stored in the flash itself. If the values differ, an error will show.

If the Setup Blk Test Fails

1. Reinstall the Operating System and the Objects (see page 1-6) using the latest K2500 Operating System and Objects disks.

 Select "Run System" from the Boot Loader menu, then press OK to run the Operating System. If it doesn't work, there may be a problem with the Engine Daughter Board. Inspect the the flash ROM chips (U3 and U5 on the Engine Daughter Board) for poor or cold solder joints or open traces.

RAM/PRAM



CAUTION:

This test erases all non-volatile user RAM! Before running the test, back up the K2500's RAM objects by entering Disk Mode, pressing the Save soft button, and selecting the option "Everything" to save all RAM objects to a floppy or hard disk.

The RAM/PRAM test performs a data test and an address test on each of the K2500 processor RAM sections. These sections include volatile RAM at addresses 2100000 through 213FFFF, non-volatile RAM at addresses 02000000 through 0203FFFF, and optional expansion non-volatile RAM at addresses 01F00000 through 01FFFFFF. If the P/RAM Option Board is installed, the message "PRAM Present" displays in the upper left-hand corner of the LCD. Otherwise, the message "PRAM Absent" displays.

Data Test

The K2500 writes a value, derived from a 23-word test sequence, to each RAM location. While the value is in memory, it is bitwise-inverted twice, which should bring the data back to its original value. This final state is then compared with the original data, and any difference will cause a data error.

Address Test

In this test, RAM addresses are written sequentially throughout RAM. These addresses are then read back, and any difference will cause an address error.

If the RAM/PRAM Test Fails

- 1. If P/RAM is not installed and this test fails, check U6, U7, U8, and U9 on the Engine Daughter Board for poor or cold solder joints or open traces.
- 2. If a "PRAM Absent" message displays, but a P/RAM Option board is installed, inspect that P/RAM is installed correctly, with all 45 pins fully inserted into connector J802. If test still fails, install a known good P/RAM Board and run the test again.
- 3. If the test fails with a new P/RAM board, there may be a problem with the Engine Daughter Board. Inspect J802 for poor or cold solder joints or open traces.

I/O Port

The I/O port test mutes and unmutes the audio circuitry, and verifies that the register inside the CPU chip changes.

If the I/O Port Test Fails

Replace the Engine Daughter Board.

Floppy Disk Drive Initialize (FDD Init)

This test tries to move the read/write head to its home position.

Scanner

If the FDD Init Test Fails

- 1. Check the ribbon cable that connects to the floppy drive. Run the test again.
- 2. If the test still fails, check the 4-pin power cable that connects to the floppy drive. Run the test again.
- 3. If the test still fails, connect a new floppy drive to properly working data and power cables. Run the test again.
- 4. If the test fails with a new floppy drive and working cables, there may be a problem with the Engine Mother Board.

Scanner

This test lights, in sequence, the LEDs for the eight mode select buttons (Program, Setup, Q Access, Effects, MIDI, Master, Song, and Disk.) Since these LEDs are controlled by the scanner, this test causes the engine and audio processors to communicate with each other.

If the Scanner Test Fails

Note that the LCD may say "Success" no matter what. If one of the LEDs doesn't light as described above, do the following:

- 1. Check the cable connecting the Button Board to J917 on the Audio Board.
- 2. If the test still fails, replace the Button Board. Run the test again.
- 3. If the test still fails, replace the Scanner EPROM chip. If possible, install the most up-to-date Scanner EPROM chip.
- 4. Run the test again. If the test fails with a new Scanner chip installed, there may be a problem with the Audio Board.
- 5. If the Audio Board is working properly and the test still fails, there may be a problem with the Engine Board.

MIDI UART

This test determines whether MIDI signals are properly being sent and received by the K2500. You will need a working MIDI cable to perform the test. This test will fail if no MIDI cables are plugged into the jacks.

- 1. Run test without MIDI cables plugged in; test should fail.
- 2. Plug one end of the MIDI cable into the rear panel MIDI Out jack.
- 3. Plug the other end of the MIDI cable into the rear panel MIDI In jack.
- 4. Run the MIDI UART test. A "success" message should appear on the screen.
- 5. Move the MIDI cable from the MIDI Out jack to the MIDI Out/Thru jack. Set the "Out/Thru" switch on the back panel to "Thru," then run test again; test should fail.
- 6. Set the "Out/Thru" switch on the back panel to "Out."

7. Run the MIDI UART test again. This time the test should pass.

If the MIDI UART Test Fails

- Run the test again using a new MIDI cable.
- 2. If the test still fails, there may be a problem with the Engine Mother Board or Engine Daughter Board. Inspect MIDI circuit on the Engine Mother Board for poor or cold solder joints or open traces.

Floppy Disk Drive Read/Write (FDD R/W)

Before running the FDD R/W test, format a floppy disk and insert the disk into the drive. This test initializes the floppy disk drive and performs a write/read test of the disk in the drive. Any data on the floppy disk may be corrupted.

If the FDD R/W Test Fails

- 1. Try a new floppy disk. Be sure to use a blank, formatted 1.44M disk.
- 2. Check the ribbon cable that connects to the floppy drive for correct connection. Run the test again.
- 3. If the test still fails, check the 4-pin power cable that connects to the floppy drive. Run the test again.
- 4. If the test still fails, connect a new floppy drive to properly working data and power cables. Run the test again.
- 5. If the test fails with a new floppy drive, there may be a problem with the Engine Mother Board.

SCSI

This test sets the K2500's SCSI ID to 7 and scans the SCSI bus. When it finds a connected SCSI device (such as an internal or external hard drive) the K2500 writes random data to each block, then checks to see if the data is still there.

The K2500 attempts to save the SCSI device's contents before testing. If it can be preserved, the original data is restored afterwards.

If the SCSI Test Fails

1. If this K2500 is connected to an external hard drive, make sure that termination is enabled on the external drive.

- 2. If this K2500 has an internal hard drive, make sure that SCSI Termination is enabled on the internal drive. Then make sure that SCSI Termination on the K2500 is disabled in one of the following ways:
 - Some rack units have three SCSI terminator packs, located in RP2, RP3, and RP4 on the Engine Mother Board. Remove these from their sockets, and store for possible future use.
 - Some K2500 units have an Active SCSI Termination Board (located on the Engine Mother Board) in place of the terminator packs. Remove the jumper from JP 1 on the Active SCSI Termination Board.
 - Some K2500 units have a SCSI termination switch on the Engine Mother Board. In most cases, this switch protrudes through a hole labeled "SCSI Termination Enable/Disable" on the rear panel, next to the SCSI port. Set this switch to "Disable." (On some units, the switch does not protrude through the rear panel and/or is not labeled. The switch is set to disabled when it is pushed to the left (i.e., away from the SCSI connector) as you are looking at the rear panel from the rear.)

You must disable termination, using one of the above methods. Not doing so can cause the K2500 to malfunction if an internal hard drive is present.

- 3. If there is *no* internal hard drive installed, make sure that SCSI Termination is *enabled* in one of the following ways:
 - Some rack units have three sockets for SCSI terminator packs, located in RP2, RP3, and RP4 on the Engine Mother Board. Make sure that these terminator packs are installed firmly in their sockets. Be sure to put the pin 1 side of the resistor into the pin 1 side of the connector.
 - Some K2500 units have an Active SCSI Termination Board (located on the Engine Mother Board) in place of the terminator packs. Make sure that there is a jumper over JP 1 on the Active SCSI Termination Board.
 - Some K2500 units have a SCSI termination switch on the Engine Mother Board. In most cases, this switch protrudes through a hole labeled "SCSI Termination Enable/Disable" on the rear panel, next to the SCSI port. Set this switch to "Enable." (On some units, the switch does not protrude through the rear panel and/or is not labeled. The switch is set to disabled when it is pushed to the right (i.e., towards the SCSI connector) as you are looking at the rear panel from the rear.)
- 4. If the test still fails, check the data and power cables that connect to the hard drive. Run the test again.
- 5. If the test still fails, connect a new hard drive to properly working data and power cables, then run the test again.
- 6. If the test fails with a new hard drive and working cables, there may be a problem with the Engine Mother Board.
- 7. Check for 2.8V on Engine Mother Board and check for cold solder joint on U34.

For more about SCSI and the K2500, see "SCSI Guidelines" on page 1-12.

VLSI

This test first writes data to the VLSI chip registers and internal RAM. Then the test confirms that the data is still in the registers and RAM. The following chips are tested:

- Janis channel registers (Both Janis chips)
- Janis sample cache (Both Janis chips)
- Hobbes time slot data (All Hobbes chips)
- Hobbes accumulator store (All Hobbes chips)
- Hobbes dither store (All Hobbes chips)
- Hobbes output unit-hold register (All Hobbes chips)
- Lisa microcode RAM (Only Engine Board Lisa, not KDFX Option)

Although test order varies, following are the error codes, grouped by their associated chips:

Janis

CROM Fail!! SPAN Fail!! Sample Cache JanMEM Signe JanREG Signe

Hobbes

Hob1 ch Regs Hob1 sum Reg Hob1 Dither Hob1 Hold Rg Hob2 ch Regs Hob2 sum Reg Hob2 Dither Hob2 Hold Rg H1 MEM Signe H2 MEM Signe H1 REG Signe H2 REG Signe Hobbes GCR

Lisa

Lisa Fail!!

The Janis and Hobbes chips in the K2500 are arranged in two chains: "B" chain and "P" chain. Each chain consists of one Janis and two Hobbes and outputs digital audio signals that are mixed and dithered by a single Lisa chip on the engine board (U9). The output of the Lisa chip is sent to the audio board for conversion into an analog signal.

You can determine which chip has failed during the VLSI test from the failure address that is displayed as part of the error message:

ADDRESS	CHIP
02Exxxxx	BJANIS (U4)
02Fxxxxx	BHOBBES1 (U5)
02Cxxxxx	BHOBBES2 (U3)
028 <i>xxxxx</i>	PJANIS (U7)
029 <i>xxxxx</i>	PHOBBES1 (U8)
02Axxxxx	PHOBBES2 (U6)
02Bxxxxx	PMIX LISA (U9)

Sampling Option (SamplingOpt)

If the VLSI Test Fails

Replace the Engine Mother Board.

Sampling Option (SamplingOpt)

See the Sampling Option installation manual (Part No. 910258.) If there is no Sampling Option installed, the test will fail.

Sine Wave

This test produces sine waves to test the Audio and Engine Boards. You will need a pair of headphones.



WARNING:

This test produces loud sustained sine waves! Be sure to set a low volume on your audio system or headphones before you run this test. Use only the Mix Audio Outputs or the Headphone Output; sound from the separate outs (A, B, C, and D) will be at full volume; you can't control the volume

- 1. Turn the volume all the way down on the K2500.
- 2. Plug headphones into the K2500's Headphones jack, or connect playback equipment to the "MIX" audio outputs.
- 3. Choose "Sine Wave" from the Diagnostics page, and press OK.
- 4. Slowly turn the volume up to a very low, audible level; you should hear a low-frequency sine wave.
- 5. Press any button on the front panel, and you will hear a new sine wave at a higher frequency. Do this four more times; the sine wave's pitch should increase each time. You should hear six sine waves in all, at the frequencies listed below:
 - · 100 Hz
 - 500 Hz
 - 1 KHz
 - 2.5 KHz
 - 5 KHz
 - 10 KHz

If the Sine Wave Test Fails

- 1. If you don't hear any sound, first make sure that you have properly plugged in the headphones.
- 2. Check cables to the Connector/Audio I/O Board. Then check the cable from the Volume/Headphone or Slider board to the Audio Board. If you are sending the K2500 audio outs to a mixing console, make sure that the volume is turned up on the mixer itself. Check for correct unmute voltage at D1 on output jack board; it should be approximately -15 volts. Refer to block diagram to trace audio path.

- 3. If you still hear no sound, or if any one of the sine waves doesn't sound, replace the Audio Board.
- 4. If the test still produces no sound, replace the Engine Board.

Sound ROM

This test performs a checksum of the data in each meg of sound ROM, then compares the total with the figure stored in the ROM itself. For each meg, a PASS or FAIL message will display. If a particular sound block is not installed (such as Orchestral or Contemporary ROM Options) the test for that sound block will fail.

If a Sound ROM Test Fails

- 1. If a "FAIL" message appears next to any one of the Base ROM megs, there may be a problem with the Engine Mother Board. Check ROMs U27, U28, U29, and U30 for poor or cold solder joints or open traces.
- 2. If a "FAIL" message appears next to an Option ROM meg (Orch, Contem, or Piano) that has been installed, check for proper installation and replace as necessary.

Sound RAM

This determines how much Sample RAM the unit has and displays the amount of memory in each bank. A bit pattern is then written to each sound RAM. After the pattern is confirmed, the inverse of the pattern is written into the RAM, and this second write is confirmed.

The test will take longer the more sound RAM is installed. 2 megabytes take about 20 seconds; 128 megabytes will take about 15 minutes to test.

If the Sound RAM Test Fails

- 1. Replace each SIMM in the Engine Mother Board, one at a time, and run the test after each replacement. Remember that SIMMs must be installed in adjacent matched pairs.
- 2. Try the SIMM pairs in different banks.
- 3. Check SIMM sockets for bent/broken pins or debris, as well as for poor or cold solder joints or open traces.
- 4. If the test still fails after replacing all the SIMMs with known good ones, there may be a problem with the Engine Mother Board. Check for cold solder joints on sockets and Janis chips.

Non-Volatile RAM (1st NVRAM / 2nd NVRAM)

Non-Volatile RAM (1st NVRAM / 2nd NVRAM)

CAUTION:

These tests erase non-volatile RAM! Before running the tests, back up the K2500's RAM objects by entering Disk Mode, pressing the Save soft button, and selecting the option "Everything" to save all RAM objects to a floppy or hard disk.

The 1st NVRAM test writes a bit pattern to the battery-backed RAM. When the test finishes, turn the unit off and wait for 2–5 minutes. Then turn the unit back on, re-enter diagnostics, and immediately run the 2nd NVRAM test. The second test confirms that RAM has retained the bit pattern.



When running these tests, do not perform any operation that writes to the non-volatile RAM, such as running the engine code. If you write to non-volatile RAM between 1st NVRAM and 2nd NVRAM, the second test will fail.

If the 2nd NVRAM Test Fails

- Locate the battery holder. On rack units, it's in the lower right corner of the rear panel. On keyboard units, it's on the bottom of the instrument. Check the battery orientation. On rack units, the positive battery terminals should face out; on keyboard units, see the inside of the battery holder for correct orientation.
- 2. Check the cable between the battery box and the power supply.
- 3. Remove all of the batteries, then use a voltmeter to check each battery. If any are lower than 1.2V, replace them with fresh batteries.



NOIE:

If low voltage is the problem there will be a message to that effect and the LEDs will flash 3 times whenever the unit is turned on.

- 4. Reinsert the batteries into the K2500 and run the test again.
- 5. If the test still fails, there may be a problem with the Power Supply Board (K2500) or the Audio Board (K2500R).
- 6. If the test still fails, there may be a problem with the Engine Daughter Board.

KDFX Option

See the KDFX Option/KDS Output Option Installation Manual (Part No. 910287.) If there is no KDFX/KDSO Option installed, the test will fail.

Chapter 3 K2500R Disassembly / Assembly

This chapter shows you how to open and close the K2500R, and contains instructions for removing and replacing standard parts, including printed circuit boards, the floppy drive, and the LCD. If you are installing an option kit, such as an internal hard drive or a KDFX Option Board, see the instructions that come with that kit.

Important Notes and Warnings

When removing or installing K2500 standard parts, keep the following things in mind:

Protect Your Data

Before opening the K2500, back up all RAM objects by entering Disk Mode, pressing the **Save** soft button, then selecting the option "Everything" to save all RAM objects to a floppy or hard disk.

Save the Screws

Unless indicated otherwise, save all screws, standoffs, and cables from the parts you remove. K2500 replacement parts don't ship with these items. Save retaining clips for cables as well.

Check Cable Connectors

Most cable connectors are keyed so that they will only plug into their sockets one way. You can often plug either end of a cable into a socket, if necessary.

Remember Pin 1

Ribbon cables (the flat, grey cables) may have connectors that aren't keyed, making it possible to plug the connectors in backwards. This can damage the K2500, and may also cause personal injury. Therefore, always plug the connector's **pin 1** side, marked with a <u>red line</u> on the cable, into the socket's **pin 1** side, marked by a "1" on the board silkscreen.

The figures in this chapter show pin 1 with a **1** symbol on sockets where appropriate.

Tools and Materials Required

- #1 Phillips screwdriver, at least 3" shank length, no greater than 3/8" in diameter
- #2 Phillips screwdrivers (medium and long)
- · Flat-head screwdriver
- 1/2" nut driver
- 5mm nut driver
- #2 Phillips offset screwdriver
- 10mm deep-well nut driver
- Allen wrench (1.5mm)
- Chip puller (only when removing the Scanner EPROM Chip)

We recommend the Amp PLCC Extraction Tool, Amp Part Number 822154-1 00. You can order it from Digikey; the catalog number is A2139-ND.

Opening the K2500R

- 1. Unplug all external wires, cables, and connectors from the K2500R and turn the unit so the front panel faces you.
- 2. Using a #2 Phillips screwdriver, remove the six long screws on the left and right sides of the K2500R, towards the front of the unit.
- 3. Using a #2 Phillips screwdriver, remove the two short screws on the left and right sides of the K2500R, towards the rear of the unit. Then remove the two short screws located on the top edge of the rear panel.



WARNING:

The rear screws on each side of the K2500R are shorter than the other side screws. Make sure to keep these screws separate from the others so that you will use the shorter screws in the back side positions when you reassemble the unit. Using the longer screws in these positions could short out some of the components in the K2500R and damage the unit.

4. Lift the top cover from the back, slide it off, and place it aside. Notice that there is a groove on the top edge of the front panel that the top cover fits snugly into. Figure 3-1 shows a top view of the opened K2500R.

Closing the K2500R

- 1. When you have completed servicing the K2500R, slide the top cover back on. Be sure to fit the front top edge of the cover into the groove on the top of the front panel.
- 2. Replace the six long screws and the two short screws in the left and right sides of the unit. Then replace the two short screws along the top edge of the rear panel.



WARNING:

Remember, the rear screws on each side of the K2500R are shorter than the other side screws. Make sure to use the shorter screws in the back side positions when you reassemble the unit. Using the longer screws in these positions could short out some of the components in the K2500R and damage the unit.

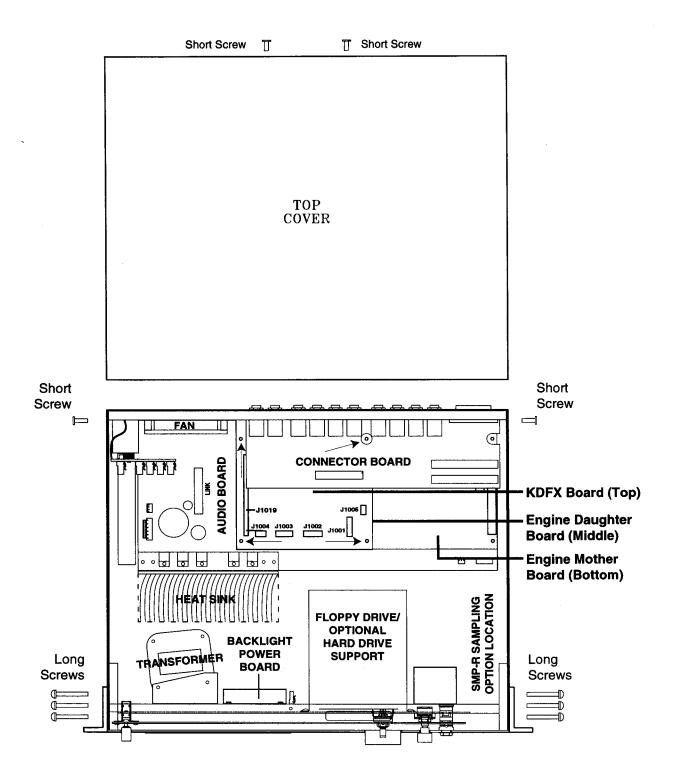


Figure 3-1. Top view of opened K2500R, showing locations of KDFX/KDSO Board screws.

K2500R Part Removal and Replacement

The following sections cover removal and replacement of K2500R standard parts. Refer to Figure 3-2 whenever you need to locate a part.

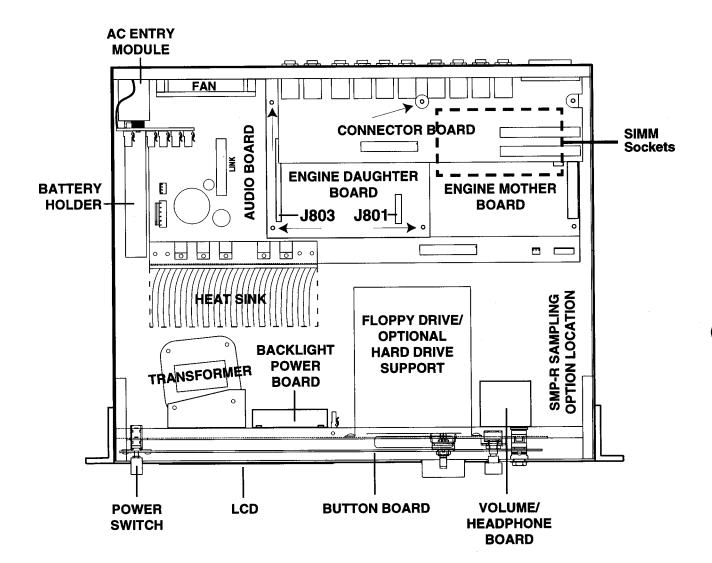


Figure 3-2. Top view of opened K2500R, showing part locations.

The parts are organized alphabetically within this chapter, as follows:

- AC Entry Module
- · Audio Board (Audio/Power Board)*
- . Backlight Power Board
- Button Board (Control Panel Board)
- · Connector Board
- · Engine Daughter Board
- · Engine Mother Board
- Floppy Drive
- · LCD
- Scanner EPROM Chip
- Transformer
- Volume/Headphone Board

AC Entry Module

Removing the AC Entry Module—K2500R

- 1. Locate the AC Entry Module, to the left of the fan as you face the front of the K2500.
- 2. Unplug the Transformer Primary cable from socket J2 (100V), J3 (120V), J4 (220V), or J5 (240V), depending on which socket this cable is connected to.

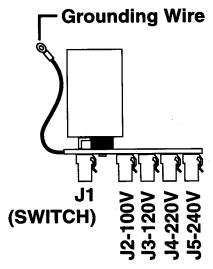


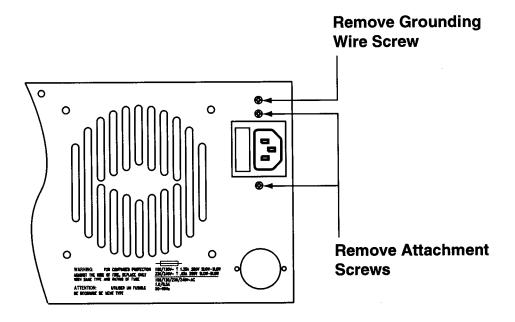
Figure 3-3. AC Entry Module.

3. Unplug the AC Entry Module switch wire from J1.

^{*} Names in parentheses appear on schematics.

AC Entry Module

4. Using a #2 Phillips screwdriver, remove the screw holding the green grounding wire in place; be careful not to let the nut attached to this screw fall into the K2500.



Rear Panel

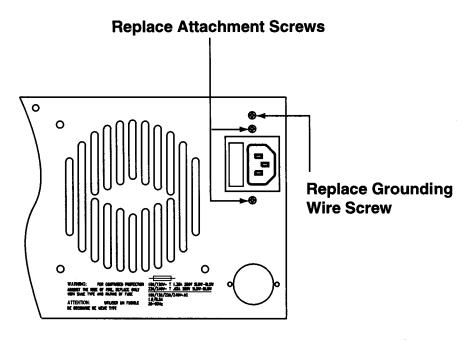
Figure 3-4. AC Entry Module removal.

- 5. Using a #2 Phillips screwdriver, remove the two attachment screws above and below the rear panel AC Power socket.
- 6. Remove the AC Entry Module.

Replacing the AC Entry Module —K2500R

1. Position the AC Entry Module through the rear panel AC Power hole, with the circuit board inside of the K2500.

2. Replace the two attachment screws above and below the rear panel AC Power socket. Then replace the lock washers and nuts on these screws.



Rear Panel

Figure 3-5. AC Entry Module replacement.

- 3. Insert the grounding wire screw into the remaining hole above the AC Power socket. While holding the screw in place, slip the unconnected end of the green grounding wire over the screw.
- 4. Use the nut that you removed earlier to secure the grounding wire to the rear panel.
- 5. Plug the unconnected end of the AC Entry Module switch wire into J1.
- 6. Plug the unconnected end of the Transformer Primary cable into socket J2 (100V), J3 (120V), J4 (220V), or J5 (240V), depending on which socket this cable was connected to.

Audio Board (Audio/Power Board)

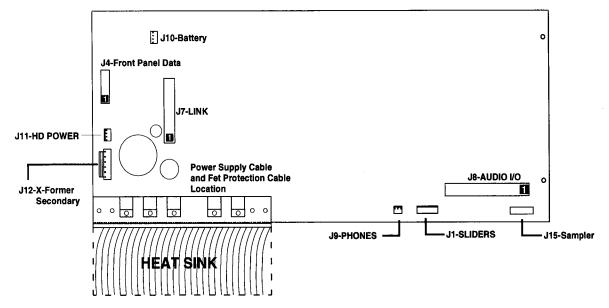


Figure 3-6. Audio Board

Removing the Audio Board—K2500R

NOTE:

The Power Supply's components are located on the Audio Board, next to the Heat Sink.

- Follow the Engine Daughter Board and Engine Mother Board Removal steps.
- 2. Unplug the Front Panel Data cable from J4.
- 3. Unplug the Transformer Secondary cable from J12.
- 4. Unplug the HD Power cable from J11.
- 5. Unplug the Battery Connector cable from J10.
- 6. Unplug the Audio I/O cable from J8.
- 7. Unplug the Transformer Primary cable from socket J2 (100V), J3 (120V), J4 (220V), or J5 (240V) on the AC Entry Module Board, depending on which socket this cable is connected to.
- 8. Unplug the AC Entry Module switch wire from J1 on the AC Entry Module Board.
- Unplug the Headphone cable from J9.
- 10. Unplug the Volume Control cable from J1 (SLIDERS) on the Audio Board, next to J9.
- 11. Locate the Backlight Power Board, to the right of the Transformer. Using a #2 Phillips offset screwdriver, remove the four screws holding this board in place.
- 12. Unplug the Power Supply cable (the red & black twisted pair) from J1 on the Backlight Power Board.

- 13. Unplug the FET-Protection power cable (the red & white twisted pair) from J415 on the Connector Board.
- 14. Using a 1/4" nut driver, remove the six standoffs from the Audio Board.
- 15. Use a #2 Phillips screwdriver to remove the four M3 screws on either side of the Heat Sink.
- 16. Use a long #2 Phillips screwdriver to remove the short M3 screw from the Audio Board, near the fan. Set this screw aside for reassembly; note that it is shorter than the other Audio Board screws.
- 17. If this unit has a Sampling Option Board installed, remove the four front panel screws holding this board in place. Then remove the plastic nut, washer, and optical connector cap from the Sampling Option Board. Pull the Sampling Option Board out and place it aside.
- 18. Now remove the Audio Board by grasping the Heat Sink, tilting the Audio Board up, and pulling it forward.
- 19. Remove the Filter Shield from the right side of the Audio Board. The shield attaches with two-sided tape, so you should be able to pull it off easily.

Replacing the Audio Board—K2500R

- 1. Reattach the Filter Shield over the eight filters on the right side of the Audio Board. Use a new strip of two-sided tape, if necessary.
- 2. Position the Audio Board on the bottom of the K2500R, so that the heat sink is on the left, next to the Transformer.
- 3. Replace the short M3 screw in the hole near the fan on the Audio Board.
- 4. Replace the four M3 screws in the holes on either side of the heat sink.
- 5. Using a #2 Phillips screwdriver, tighten all of the screws.
- 6. Replace the six standoffs on the Audio Board. Using a 1/4" nut driver, tighten the standoffs.
- 7. Replace the Engine Mother and Engine Daughter Boards.
- 8. Plug the unconnected end of the Power Supply cable (the red & black twisted pair) into J1 on the Backlight Power Board.
- 9. Position the Backlight Power Board over the four standoffs on the front wall of the unit, then replace the four attachment screws you removed earlier. Using a #2 Phillips offset screwdriver, tighten the screws.
- 10. Plug the unconnected end of the FET-Protection power cable (the red & white twisted pair) into J415 on the Connector Board.
- 11. Plug the unconnected end of the Headphone cable into J9 on the Audio Board.
- 12. Plug the unconnected end of the Volume Control cable into J1 on the Audio Board, next to J9.
- 13. Plug the unconnected end of the AC Entry Module switch wire into J1 on the AC Entry Module Board.

- 14. Plug the unconnected end of the Transformer Primary cable into J2 (100V), J3 (120V), J4 (220V), or J5 (240V) on the AC Entry Module Board, depending on which socket this cable was connected to.
- 15. Plug the unconnected end of the Battery Connector cable into J10.
- 16. Plug the unconnected end of the HD Power cable into J11.
- 17. Plug the unconnected end of the Transformer Secondary cable into J12.
- 18. Plug the unconnected end of the Front Panel Data cable into J4.
- 19. Plug the unconnected end of the Audio I/O cable into J8.

Backlight Power Board

Removing the Backlight Power Board—K2500R

- 1. Locate the Backlight Power Board, to the right of the Transformer as you face the front of the K2500.
- 2. Using a #2 Phillips offset screwdriver, remove the four screws holding the Backlight Power Board in place.
- 3. Remove the shield from the Backlight Power Board.

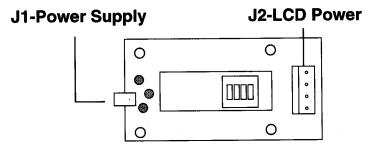


Figure 3-7. Backlight Power Board with Shield removed.

- 4. Unplug the Power Supply cable (the red & black twisted pair) from J1.
- 5. Unplug the four-pin LCD power cable from J2.

Replacing the Backlight Power Board—K2500R

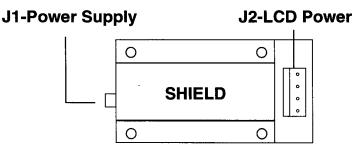


Figure 3-8. Backlight Power Board-Shield placement.

- 1. Plug the Power Supply cable (the red & black twisted pair) on the Audio Board into J1 on the Backlight Power Board.
- 2. Feed the 4-pin LCD power cable through the gap to the right of the LCD Display. Then plug this cable into J2 on the Backlight Power Board.
- 3. See Figure 3-8. Replace the shield on the Backlight Power Board, so that the screw holes on the shield and the board line up. The shield should cover all of the components on the board except for J2, the four-pin power socket.
- 4. Line up the holes on the Backlight Power Board with the four standoffs on the inside of the front panel. J1 on this board should be next to the Transformer; J2 should be next to the Floppy Drive.
- 5. Replace the four Backlight Power Board attachment screws you removed earlier. Using a #2 Phillips offset screwdriver, tighten the screws.

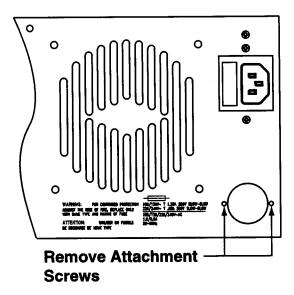
Battery Holder

Removing the Battery Holder—K2500R

- 1. Open the K2500.
- 2. Turn the K2500 so that the rear panel faces you.

Button Board (Control Panel Board)

3. See Figure 3-9. Using a #1 Phillips screwdriver, remove the two screws holding the battery holder to the rear panel.



Rear Panel

Figure 3-9. Battery Holder removal.

- 4. Using a flat-head screwdriver, open the battery holder's cover. Then remove the batteries.
- 5. Unplug the battery cable from J10, near the fan on the Audio Board.

Replacing the Battery Holder—K2500R

- 1. Position the battery holder through the rear panel battery hole. The leads of the battery cable wires should face up.
- 2. Using the two screws you removed earlier, attach the battery holder to the rear panel. Using a #1 Phillips screwdriver, tighten the screws.
- 3. Plug the battery cable into J10, near the fan on the Audio Board.
- 4. Replace the batteries in the battery holder, making sure that the positive terminals face out.
- 5. Replace the battery holder's cover, and close it with a flat-head screwdriver.

Button Board (Control Panel Board)

Removing the Button Board—K2500R

1. Using a #2 Phillips screwdriver, remove the six screws holding the front panel cover in place. Two of these screws are on the top of the front panel cover, and the remaining four are on the bottom.

- 2. If this unit has a Sampling Option Board installed, remove the four front panel screws holding this board in place. Then remove the plastic nut, washer, and optical connector cap from the Sampling Option Board.
- 3. Using a 1/2" nut driver, remove the nut from the front panel Headphone jack.
- 4. Slide the front panel cover off of the K2500.
- 5. Remove the retaining clip from J4 (PANEL) on the Audio Board. Then unplug the ribbon cable from J4.
- 6. Find the 1.5mm Allen-head screw on the side of the Data Wheel. Using a 1.5mm Allen wrench, loosen this screw.
- 7. Remove the Data Wheel by grasping it and pulling it toward you. If this doesn't work, carefully pry the Data Wheel off with a screwdriver. Be careful not to damage the Button Board (or yourself) as you do this.
- 8. Locate the power switch, on the lower left corner of the Button Board. Using a #2 Phillips screwdriver, remove the two screws holding the power switch in place.
- 9. Using a #2 Phillips screwdriver, remove the 16 screws holding the Button Board to the K2500.
- 10. Gently pull the Button Board toward you until it is free. Be careful not to damage the ribbon cable as you do this.

Replacing the Button Board—K2500R

- 1. Position the Power Switch through the hole on the lower left corner of the Button Board. Using two M3 screws, secure this switch to the Button Board.
- 2. Line the holes on the Button Board with the screw holes along the front of the K2500. Then replace the 16 Button Board attachment screws you removed earlier. Using a #2 Phillips screwdriver, tighten the screws.
- 3. Replace the Data Wheel on its shaft. Then replace the 1.5mm Allen screw that holds the Data Wheel in place. Using a small Allen wrench, tighten the screw.
- 4. Plug the unconnected end of the ribbon cable into the PANEL socket on the Audio Board. Make sure that the cable's red line is on the pin 1 side of the socket, marked by a "1" on the Audio Board silkscreen. Be careful not to damage the cable while reconnecting it.
- 5. Replace the front panel cover on the K2500, being careful to line up the holes on the front panel cover with the buttons, Data Wheel, and LCD Display. Make sure that the buttons move freely within their holes. Also, be careful not to bend the MIDI LED.
- 6. Reinsert and tighten the six screws on the top and bottom of the front panel cover.
- 7. If this unit has a Sampling Option Board, reattach it to the front panel, using the four screws you removed earlier. Then replace the optical connector cap and the plastic nut and washer.

Connector Board

Connector Board

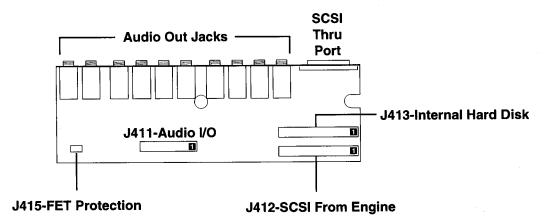


Figure 3-10. K2500R Connector Board.

Removing the Connector Board—K2500R

- 1. Locate the Connector Board, in the right rear corner of the K2500R.
- 2. If this unit is equipped with an internal hard drive, remove the retaining clip from J413. Then unplug the ribbon cable from J413. Make sure that the cable's red line is on the pin 1 side of the socket. If you plug the cable in backwards, it won't hurt anything, but the LCD will be blank when you turn the unit on.
- 3. Unplug the FET-protection power cable from J415.
- 4. Using a flat-head screwdriver, remove the retaining clips from J411 and J412; then unplug the ribbon cables from J411 and J412.
- 5. Using a 1/2" nut driver, remove the nuts from the Audio Out jacks on the rear panel of the unit.
- 6. Remove the washers from the rear panel Audio Out jacks.
- 7. With a 5mm nut driver, remove the two 5mm bolts on either side of the SCSI Thru port, also on the rear panel.
- 8. Remove the Connector Board.

Replacing the Connector Board—K2500R

- 1. Position the Connector Board through the rear panel Audio Out and SCSI Thru holes.
- 2. Replace the washers on the Audio Out jacks.
- 3. Replace the nuts on the Audio Out jacks. Using a 1/2" nut driver, tighten the nuts.
- 4. Insert the 5mm bolts into the holes on either side of the SCSI Thru port. Using a 5mm nut driver, tighten the bolts.
- 5. Insert the unconnected end of the Audio I/O ribbon cable into J411.

- 6. Insert the unconnected end of the SCSI ribbon cable into J412.
- 7. Replace the retaining clips on J411 and J412.
- 8. Plug the unconnected end of the FET-protection power cable into J415.
- 9. If this unit is equipped with an internal hard drive, plug the unconnected end of the hard drive data cable into J413. Then replace the retaining clip on J413.



NOTE

Make sure that the cable's red line is on the pin 1 side of the socket. If you plug the cable in backwards, you won't hurt anything, but the LCD will be blank when you turn the unit on.

Engine Daughter Board

Removing the Engine Daughter Board—K2500R

Determine if this K2500R is equipped with a KDFX Board or a KDS Output Option Board. If installed, the KDFX/KDSO Board is attached to the top of the Engine Daughter Board (see Figure 3-1). Remove the four screws that hold the KDFX/KDSO Board in place. Arrows in Figure 3-1 point to the four screws.

Grasp the sides of the KDFX/KDSO Board, then remove it from the Engine Daughter Board by gently rocking it back and forth until the pins are pulled out of the socket on the Engine Daughter Board. The KDFX/KDSO Board is attached to the Engine Daughter Board by pins located below connector J1019, which is on the left side of the KDFX/KDSO Board as you view it from the front of the unit. Don't remove it too quickly or you might bend the pins.

Locate the Engine Daughter Board (see Figure 3-2). Using a #2 Phillips screwdriver, remove the
four screws that hold the Engine Daughter Board in place. If this K2500 is
KDFX/KDSO-equipped, the Engine Daughter Board is held in place by four standoffs. Using a
flat-head screwdriver, remove these standoffs and set them aside. You will use them to reattach the
board later.

Arrows in Figure 3-2 point to the four screws/standoffs. One of these screws/standoffs is reachable by inserting a long, thin screwdriver through a hole in the Connector Board.

3. If this unit has a Sampling Option Board installed, remove the Ribbon Cable Retaining Clip from J801 on the Engine Daughter Board. Then remove the Sampling Option data ribbon cable from J801.



CAUTION:

Units equipped with a KDFX or KDS Board do not have a Retaining Clip on J801. If this unit is KDFX/KDSO-equipped, **do not** put a Retaining Clip on J801 when you replace the Engine Daughter Board; doing so will cause the KDFX/KDSO Board to short out when you turn the K2500 on.

4. Grasp the sides of the Engine Daughter Board, then remove it from the Engine Mother Board by gently rocking it back and forth until the pins are pulled out of the connector on the Engine Mother Board. The Engine Daughter Board is attached to the Engine Board by pins located below connector J802, which is on the left side of the Engine Daughter Board as you view it from the front of the unit. Don't remove it too quickly or you might bend the pins.

Replacing the Engine Daughter Board—K2500R

1. Insert the pins on the bottom of the Engine Daughter Board into J919 on the Engine Mother Board.

The best way to do this is to slightly angle the board so that you can position the rear pins first. Then inspect the four holes on the board to make sure that they line up with the Engine Mother Board standoffs. When the pins and holes are correctly located, carefully insert the pins into J919. Apply even pressure to the board, so that all of the pins are firmly seated.

2. If this unit has a Sampling Option Board installed, plug the unconnected end of the Sampling Option data ribbon cable into J801 on the Engine Daughter Board.



CAUTION:

If this unit is KDFX- or KDS-equipped, **do not** use a Ribbon Cable Retaining Clip on J801. Using a Retaining Clip will cause the KDFX/KDSO Board to short out when you turn the K2500 on. The KDFX/KDSO Board will hold the cable in place without a Retaining Clip.

3. Make sure that the Engine Mother Board standoffs are on tightly. Then reinsert and tighten the four Engine Daughter Board attachment screws/standoffs that you removed earlier.

Engine Mother Board

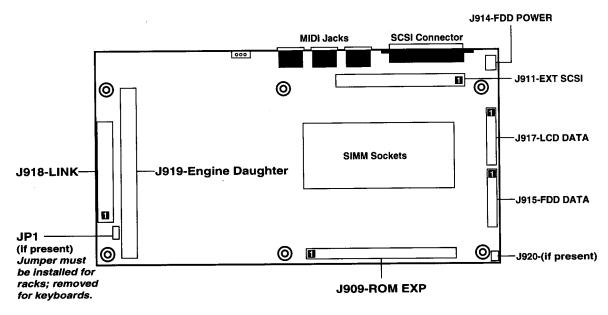


Figure 3-11. Engine Mother Board with Engine Daughter Board removed.

Removing the Engine Mother Board—K2500R



If any of the Sound ROM Option Boards are installed (Stereo Piano, Orchestral or Contemporary ROM Option Boards), leave them in their sockets while you remove the Engine Mother Board.

- 1. Follow the Engine Daughter Board Removal steps.
- 2. Check for the presence of J920. Remove the +5V extension cable from this connector, if present.
- 3. Unplug the Link cable from J918.
- 4. Remove the retaining clip from J915. Then unplug the FDD Data cable from J915.

- 5. Remove the retaining clip from J917. Then unplug the LCD Data cable from J917.
- 6. Remove the retaining clip from J914. Then unplug the Floppy Power cable from J914.
- 7. Using a flat-head screwdriver, remove the four standoffs.
- 8. Using a #2 Phillips screwdriver, remove the 2 screws on the right side of the Engine Mother Board as you face the front of the K2500.
- With a #1 Phillips screwdriver, remove the two screws from each of the three rear panel MIDI connectors.
- 10. Use a 5mm nut driver to remove the bolts from the SCSI port on the rear panel.
- 11. Remove the Engine Mother Board.

Replacing the Engine Mother Board—K2500R

- 1. Position the Engine Mother Board so that the six holes on the board line up with the standoffs on the Audio Board. Position the SCSI connector, the SCSI switch, and the MIDI jacks through the rear panel. Be careful not to damage the SCSI switch or the MIDI jacks; they break easily.
- 2. Replace the two screws on the right side of the Engine Mother Board as you face the front of the K2500. Using a #2 Phillips screwdriver, tighten the screws.
- 3. Replace the four standoffs on the Engine Mother Board. Using a flat-head screwdriver, tighten the standoffs.
- 4. Replace the six screws on either side of the three rear panel MIDI jacks. Using a #1 Phillips screwdriver, tighten the screws.
- 5. Replace the 5mm bolts on either side of the SCSI port. Using a 5mm nut driver, tighten the bolts.
- 6. Plug the unconnected end of the Floppy Power cable into J914. Then replace the retaining clip on J914.
- 7. Plug the unconnected end of the FDD Data cable into J915. Then replace the retaining clip on J915.
- 8. Plug the unconnected end of the LCD Data cable into J917. Then replace the retaining clip on J917.
- 9. Plug the unconnected end of the Link cable into J918.
- 10. If it were removed earlier, reconnect the +5V extension cable at J920.

Floppy Drive

Removing the Floppy Drive—K2500R

- 1. Locate the Floppy Drive/Optional Hard Drive Support in the front of the K2500.
- 2. Using a #2 Phillips screwdriver, remove the four screws that hold the drive support to the K2500's bottom. Notice that each screw attaches with an insulating washer; save all the screws and washers for reassembly.

- 3. Unplug the 4-pin power cable from the Floppy Drive power socket.
- 4. Unplug the FDD Data cable from the Floppy Drive data socket.
- 5. If this K2500 is equipped with an internal hard drive, remove the power cable and data ribbon cable from the sockets on the hard drive.
- 6. Make sure that no cables are blocking the drive support. Then lift the support out of the K2500.
- 7. Turn the drive support over so that the bottom of the Floppy Drive faces you. Hold the Floppy Drive from underneath with one hand, and use a #2 Phillips screwdriver to remove the four screws holding the drive to the support.
- 8. Remove the Floppy Drive from the support.

Replacing the Floppy Drive—K2500R

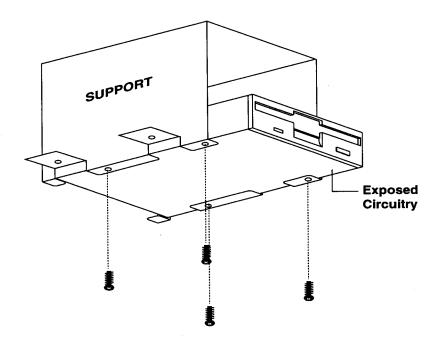


Figure 3-12. Attaching Floppy Drive to drive support.

- 1. Set the Floppy Drive ID to "0". (Some drives use an ID of "1", but in the K2500R it should be "0".) Drives from Kurzweil come preset to "0".
- 2. See Figure 3-12. Carefully insert the Floppy Drive into the drive support, as shown in Figure 3-12. The exposed circuitry should face the open end of the support.
- 3. Using the four screws you removed earlier, reattach the Floppy Drive to the support. With a #2 Phillips screwdriver, tighten the screws.
- 4. Position the support inside the K2500, so that the drive door fits through the front panel. The Floppy Drive connectors should face toward the rear of the K2500R, and the exposed circuitry should face down.
- 5. Plug the unconnected end of the 4-pin power cable into the Floppy Drive power socket.

- 6. Plug the unconnected end of the FDD Data cable into the Floppy Drive data socket. Be sure that the red line, indicating pin 1, is on the side closest to the 4-pin power cable.
- 7. If this K2500 has an internal hard drive installed, plug the unconnected ends of the data ribbon cable and the 4-pin power cable into the sockets on the hard drive. Be sure that the red line, indicating pin 1, is on the side closest to the 4-pin power cable.
- 8. Reinsert the four screws and insulating washers into the Floppy Drive support mounting holes. With a #2 Phillips screwdriver, tighten the screws.

LCD

Removing the LCD—K2500R

- 1. Follow the Button Board Removal steps.
- 2. Locate the LCD, in the top left corner of the front panel.
- 3. Unplug the LCD Data cable from J917, in the back right corner of the K2500, on the Engine Mother Board.
- 4. Remove and set aside the two tie-wraps holding the 4-pin LCD power cable in place. Then unplug the power cable from J2 on the Backlight Power Board, located directly behind the LCD.
- 5. Using a #2 Phillips screwdriver, remove the four screws holding the LCD in place.
- 6. Remove the LCD by gently pulling it toward you.

Replacing the LCD—K2500R

- 1. Feed the LCD Data cable through the rectangular LCD Display hole in the front panel.
- 2. Make sure that the white "UP" arrow on the LCD silkscreen faces up. Then line up the LCD screw holes with the four standoffs on the K2500R's front panel.
- 3. Replace the four LCD attachment screws you removed earlier. Using a #2 Phillips screwdriver, tighten the screws.
- 4. Plug the unconnected end of the LCD Data cable into J917, in the back right corner of the K2500, on the Engine Mother Board.
- 5. Run the 4-pin LCD power cable through the gap to the right of the LCD (make sure not to damage the cable as you do this.) Then plug this cable into J2 on the Backlight Power Board.
- 6. Reattach the LCD power cable to the K2500R, using the two tie-wraps that you removed earlier.

Scanner EPROM Chip

Removing the Scanner EPROM Chip—K2500R

You will need a chip puller for this procedure. (see "Tools and Materials Required" on page 3-1 for a recommended model.)

- Follow removal steps for the following boards:
 - Engine Daughter Board
 - Engine Mother Board
- 2. Locate the Scanner EPROM Chip, the 28-pin chip in U69 on the Audio Board.
- 3. Using a chip puller, remove the Scanner EPROM Chip from the Audio Board.

Replacing the Scanner EPROM Chip—K2500R

1. Insert the Scanner EPROM Chip into U69 on the Audio Board. Make sure that pin 1 on the chip (located in the notched end) is on the pin 1 side of U69, marked by a notch on the board silkscreen.

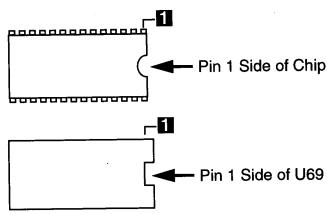


Figure 3-13. Scanner EPROM Chip placement.

2. Make sure that all of the pins are in their sockets. Then press down gently on the chip so that all of its pins are seated properly. Be careful not to press too hard; doing so may bend the pins.

Transformer

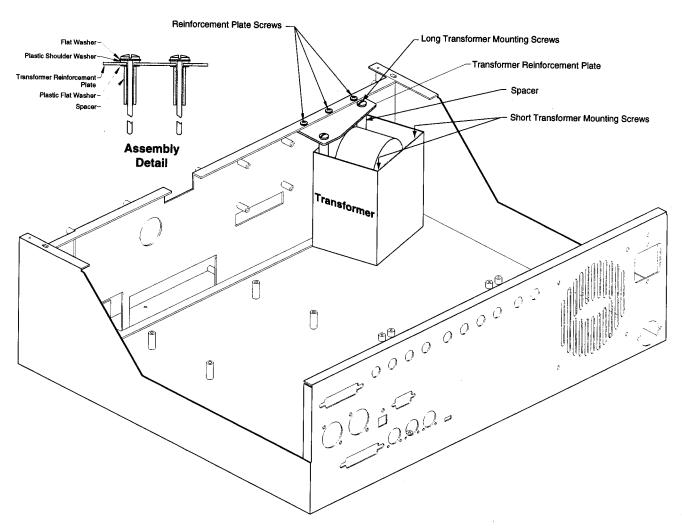


Figure 3-14. Transformer (some units do not have the reinforcement plate pictured above.)

Removing the Transformer—K2500R

- 1. Locate the Transformer, in the left front corner of the K2500R, near the LCD.
- 2. (Units with the Transformer reinforcement plate only.) See Figure 3-14. If this unit has a Transformer reinforcement plate, use a #2 Phillips screwdriver to remove the 3 screws holding this plate to the Front Panel. Notice that the plate fits under the edge of the Front Panel.

Remove the two long Transformer Mounting screws; these screws attach through shoulder washers, plastic washers, and spacers.

Remove and set aside the screws, washers, spacers, and reinforcement plate.

- 3. (Units **without** the Transformer reinforcement plate only.) If this unit does not have a reinforcement plate, just remove the four screws holding the Transformer in place. Each screw has two metal washers and one plastic washer.
- 4. There is a bundle of cables that attach to the Transformer. Remove the two tie-wraps holding these cables together.
- 5. Unplug the Transformer Primary cable from socket J2 (100V), J3 (120V), J4 (220V), or J5 (240V), depending on which socket this cable is connected to.
- 6. Unplug the Transformer Secondary cable from J12 on the Audio Board.
- 7. Lift the Transformer out of the K2500R.

Replacing the Transformer—K2500R

- 1. Place the Transformer over the four standoffs on the bottom of the K2500R. Be sure that the Transformer mounting holes line up with the standoffs.
- 2. (Units **without** the Transformer reinforcement plate only.) Replace the four screws, with the metal and plastic washers, in the Transformer mounting holes.
- (Units with the Transformer reinforcement plate only.) See Figure 3-14. Replace the two short mounting screws, plastic washers, and metal washers into the Transformer mounting holes toward the rear panel.

Place the two spacers and plastic washers over the remaining mounting holes, near the Front Panel.

Carefully position the reinforcement plate, so that all the screw holes and spacers line up. The plate should fit over the spacers, but under the edge of the Front Panel, as shown in Figure 3-14.

Replace the long mounting screws, plastic washers, and shoulder washers. Then replace the three small screws that hold the mounting plate to the Front Panel.

- Tighten all the screws with a #2 Phillips screwdriver.
- 5. Plug the Transformer Primary cable into socket J2 (100V), J3 (120V), J4 (220V), or J5 (240V), depending on which socket this cable was connected to.
- 6. Plug the Transformer Secondary cable into J12 on the Audio Board.
- 7. Replace the two tie-wraps holding the Transformer cables together.

Volume/Headphone Board

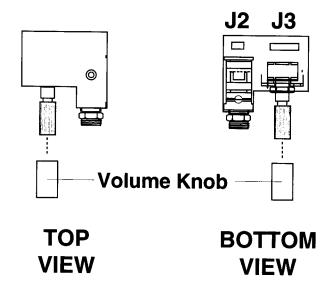


Figure 3-15. Volume/Headphone Board.

Removing the Volume/Headphone Board—K2500R

- 1. If this unit has a Sampling Option Board installed, remove the four front panel screws holding this board in place. Then remove the plastic nut, washer, and optical connector cap from the Sampling Option Board.
- 2. Using a #2 Phillips screwdriver, remove the six screws holding the front panel cover in place. Two of these screws are on the top of the front cover, and the remaining four are on the bottom. When you have removed the screws, pull the front cover free.
- 3. Using a 1/2" nut driver, remove the nut from the front panel Headphone jack.
- 4. Grasp the plastic Volume knob and pull it off of its metal shaft.
- 5. Slide the front panel cover off of the K2500.
- 6. Using a 10mm deep-well nut driver, remove the nut and washer holding the Volume/Headphone Board in place.
- Pull the Volume/Headphone Board out.
- 8. Remove the PHONES cable from J2 on the Volume/Headphone board.
- 9. Remove the SLIDERS cable from J3 on the Volume/Headphone board.

Replacing the Volume/Headphone Board—K2500R

- 1. Plug the unconnected end of the PHONES cable into J2 on the Volume/Headphone board.
- 2. Plug the unconnected end of the SLIDERS cable into J3 on the Volume/Headphone board.

Volume/Headphone Board

- 3. Position the Volume/Headphone board so that the metal Volume knob shaft fits through the front panel Volume hole. The shaft is keyed, so it should only fit through the bracket one way.
- 4. Replace the washer and nut over the metal Volume knob shaft. Using a 10mm deep-well nut driver, tighten the nut, making sure that the board stays level.
- 5. Replace the front panel cover on the K2500, being careful to line up the holes on the front panel cover with the buttons, Data Wheel, and LCD. Make sure that the buttons move freely within their holes. Also, be careful not to bend the MIDI LED.
- 6. Reinsert and tighten the six screws on the top and bottom of the front panel cover.
- 7. Turn the Volume knob's metal shaft to the left until it stops. Then slide the plastic Volume knob onto this shaft, so that the indicator line points down and slightly to the left, as shown below.



Volume

Figure 3-16. Volume Knob Replacement

8. If this unit has a Sampling Option Board, reattach it to the front panel, using the four screws you removed earlier. Then replace the optical connector cap and the plastic nut and washer.

Chapter 4 K2500/X Keyboard Disassembly / Assembly

This chapter shows you how to open and close the K2500/X Keyboard, and contains instructions for removing and replacing standard parts, including printed circuit boards, the floppy drive, and the LCD. If you are installing an option kit, such as an internal hard drive or a KDFX Option Board, see the instructions that come with that kit.

Important Notes and Warnings

When removing or installing K2500 standard parts, keep the following in mind:

Protect Your Data

Before opening the K2500, back up all RAM objects by entering Disk Mode, pressing the **Save** soft button, then selecting the option "Everything" to save all RAM objects to a floppy or hard disk.

Save the Screws

Unless indicated otherwise, save all screws, standoffs, and cables from the parts you remove. K2500 replacement parts don't ship with these items.

Put Self-Threading Screws In One of Three Holes

Several boards inside the Top Cover have groups of three screw holes OOO . This is because these boards are held in place by self-threading screws. After a board has been removed and replaced several times, the metal rails in the Top Cover can become stripped. To avoid this, always follow these steps for replacing self-threading screws:

- Put the screw on your screwdriver.
- Line up the screw in the hole.
- · Slowly turn the screw counter-clockwise until you feel a slight click.
- Tighten the screw.

If a rail becomes stripped, use any one of the three holes of each group. If the rail is *not* stripped, put each screw in the center hole.

Check Cable Connectors

Most cable connectors are keyed so that they will only plug into their sockets one way. You can often plug either end of a cable into a socket, if necessary.

Remember Pin 1

Ribbon cables (the flat, grey cables) may have connectors that aren't keyed, making it possible to plug the connectors in backwards. This can damage the K2500, and may also cause personal injury. Therefore, always plug the connector's **pin 1** side, marked with a <u>red line</u> on the cable, into the socket's **pin 1** side, marked by a "1" on the board silkscreen.

The figures in this chapter show pin 1 with a **1** symbol on sockets where appropriate.

Tools and Materials Required

Tools and Materials Required

- #1 Phillips screwdriver, at least 3" shank length, no greater than 3/8" in diameter
- . #2 Phillips screwdrivers (medium and long)
- 5mm nut driver
- 1/2" nut driver
- Needle-nose pliers
- Flat-head screwdriver
- Chip puller (only when removing the Scanner EPROM Chip)

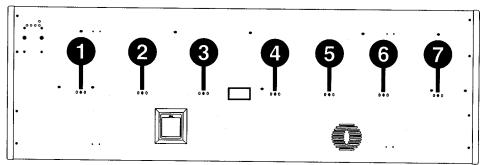
We recommend the Amp PLCC Extraction Tool, Amp Part Number 822154-1 00. You can order it from Digikey; the catalog number is A2139-ND.

Two 3" high foam blocks

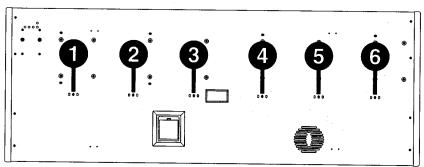
You will need a flat work area large enough to open the K2500 onto. A table top that measures at least 60" by 40" is recommended. We also recommend that you place the K2500's top on a pair of 3" high foam blocks while you work. This allows access to the rear panel, keeps it from getting scratched, and minimizes pressure on the alpha wheel and sliders.

Opening the K2500/X Keyboard

- 1. Unplug all external wires, cables, and connectors from the K2500 and turn the unit so that the keyboard faces you.
- 2. Tilt the entire unit onto a soft surface, so that it rests on its rear panel. Using a #2 Phillips screwdriver, remove the screws on the bottom of the unit, as shown in Figure 4-1. The K2500 has six screws, while the K2500X has seven; each screw may be in any one of the three slots of each group along the bottom of the unit.



K2500X (88 Keys)



K2500 (76 Keys)

Figure 4-1.

3. Tilt the K2500 so it again rests on its bottom. Then use a #2 Phillips screwdriver to remove the 11 screws on the rear panel of the unit, as shown in Figure 4-2. Be careful to remove only the screws shown.



Figure 4-2.

4. Place two 3" high foam blocks (or other soft items) behind the K2500; again, these blocks will prevent damage to the K2500's sliders and alpha wheel. This will also give you access to the rear-panel jacks.

5. Push the Top Cover with your thumbs, as shown below. You will feel the top become unlocked, and it should slide back about 1/2".

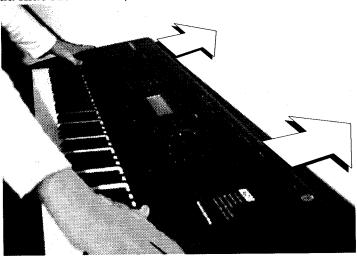


Figure 4-3.

6. Lift the Top Cover up, then slide it to the right, as shown below. This protects the floppy drive, which is located in the left end of the Top Cover.

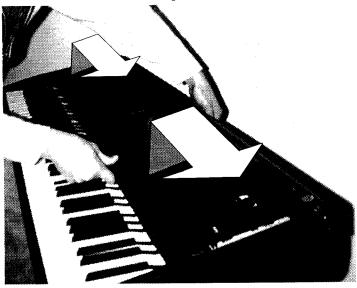


Figure 4-4.

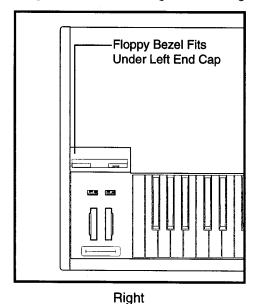
7. Once the Top Cover is free, slide your fingers under the felt attached to the front edge of the top, as shown below. Then tilt the Top Cover back, placing it up-side down on the two foam blocks. The underside of the K2500's top should now face you, exposing the circuit boards for service.



Figure 4-5.

Closing the K2500/X Keyboard

1. When you have finished working on the unit, tilt the Top Cover back onto the body of the K2500. First, slide the left end into place, making sure to fit the Floppy Disk Bezel under the left end cap. Figure 4-6 shows the right and wrong way to fit the Floppy Disk Bezel.



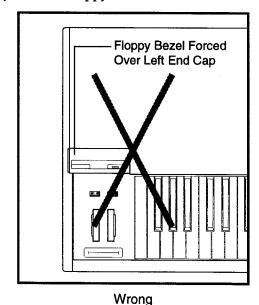


Figure 4-6.

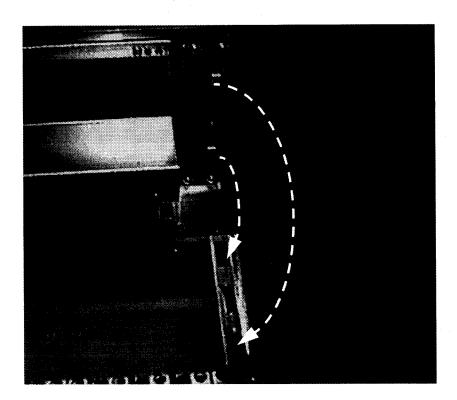
Closing the K2500/X Keyboard

2. Be sure to avoid damaging any cables as you close the unit. Cables must not get caught between the edges of the body and the Top Cover. Also, check to see that no cables get pinched under the support wall in the Top Cover. The Keyboard cable should line up with the indentation in the support wall.

CAUTION: Before you lower the right end of the Top Cover, check to see that no ribbon cables cover the fan on the right side of the K2500.

3. Now lower the right end until it falls into place; be careful not to scratch the right end cap. If you feel any resistance, lift the Top Cover and look for cables which may be blocking it.

The spring fingers that hold the top to the bottom should fit into the slots on the bottom, as shown below.

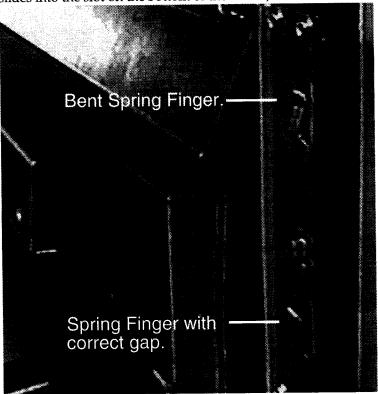


4. Making sure that the spring fingers are in the slots, pull the top toward you until it locks securely in place.

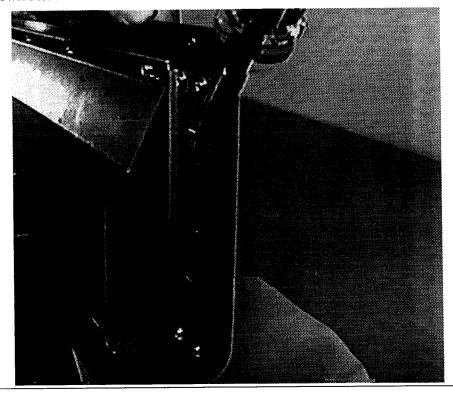


Closing the K2500/X Keyboard

5. If the top does not readily slide shut, one of the spring fingers may have become bent, closing the gap that slides into the slot on the bottom of the K2500, as shown below:



6. If the spring fingers are bent, use a flat-head screwdriver to widen the spring finger's gap, as shown below:



- 7. Once the top is closed, replace the 11 screws you removed from the rear panel of the K2500. Then tilt the unit back, and replace the screws in the bottom of the unit. The bottom screws are self-threading, so to avoid stripping the threads, do the following:
 - · Put the screw on your screwdriver.
 - Line up the screw in the hole.
 - · Slowly turn the screw counter-clockwise until you feel a slight click.
 - Tighten the screw.

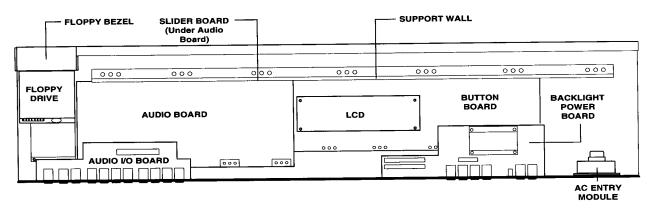
If a thread does become stripped, use an adjacent screw hole.

K2500/X Keyboard Part Removal and Replacement

K2500/X Keyboard Part Removal and Replacement

The following sections cover removal and replacement of K2500/X Keyboard standard parts. Refer to Figure 4-7 whenever you need to locate a part. Note that the 76-key K2500 is pictured below; part locations are the same in the 88-key K2500X.

Underside of Top Cover



Body with Top Cover Removed

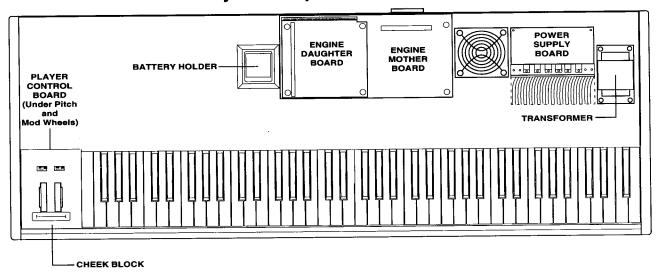


Figure 4-7. Top view of opened K2500 Keyboard, showing part locations

The parts are organized alphabetically within this chapter, as follows:

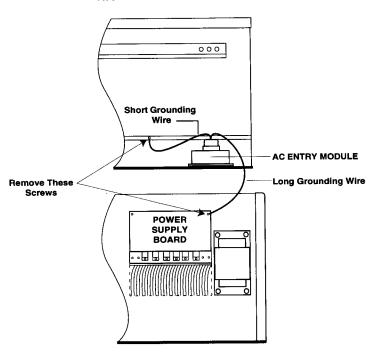
- · AC Entry Module
- Audio Board (Audio Scanner Board)*
- · Audio I/O Board
- Backlight Power Board (Digital I/O, Backlite Power Board)
- Button Board (Main Control Panel Board)
- Engine Daughter Board
- Engine Mother Board
- · Floppy Drive
- Keyboard
- · LCD
- · Player Control Board
- Power Supply Board
- Scanner EPROM Chip
- Slider Board
- Transformer

^{*} Names in parentheses appear on schematics.

AC Entry Module

Removing the AC Entry Module—K2500/X Keyboard

RIGHT END OF TOP COVER



RIGHT END OF REAR PANEL

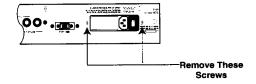


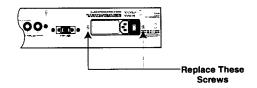
Figure 4-8. AC Entry Module removal.

- 1. Locate the AC Entry Module, in the right end of the rear panel.
- 2. See Figure 4-8. Locate the screw holding the grounding wire to the Top Cover. Use a pair of needle-nose pliers to hold the nut behind this screw, then use a #2 Phillips screwdriver to remove the screw.
- 3. Locate the screw holding the grounding wire to the Power Supply Board. Use a #2 Phillips screwdriver to loosen the screw. Then remove this screw and the two star washers.
- 4. See Figure 4-8. Using a #1 Phillips screwdriver, remove the screws on either side of the three-prong AC Power socket and power switch.

- 5. Unplug the 6-pin power cable from the Transformer's power cable.
- 6. Remove the AC Entry Module.

Replacing the AC Entry Module—K2500/X Keyboard

RIGHT END OF REAR PANEL



RIGHT END OF TOP COVER

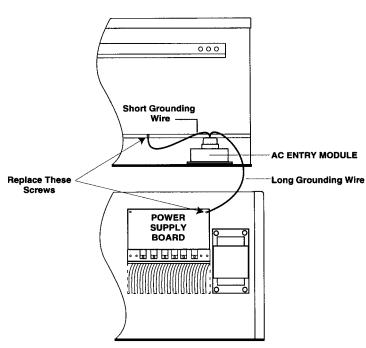


Figure 4-9. AC Entry Module replacement.

- 1. See Figure 4-9. Position the AC Entry Module through the rear panel AC Power hole, so that the power switch is on the right.
- 2. Replace the two screws on either side the three-prong AC Power socket and power switch. Then replace the two lock washers and nuts over these screws. Use a #1 Phillips screwdriver to tighten the screws.
- 3. With the screw that you removed earlier, attach the short grounding wire to the rail in the Top Cover. Then use a #2 Phillips screwdriver to tighten the screw.

Audio Board (Audio Scanner Board)

4. With the screw and the star washers you removed earlier, attach the long grounding wire to the Power Supply Board, as shown below:

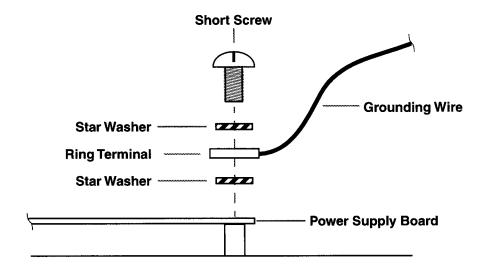


Figure 4-10. Power Supply Board-side view showing grounding wire replacement.

5. Plug the unconnected end of the 6-pin power cable into the Transformer's power cable.

Audio Board (Audio Scanner Board)

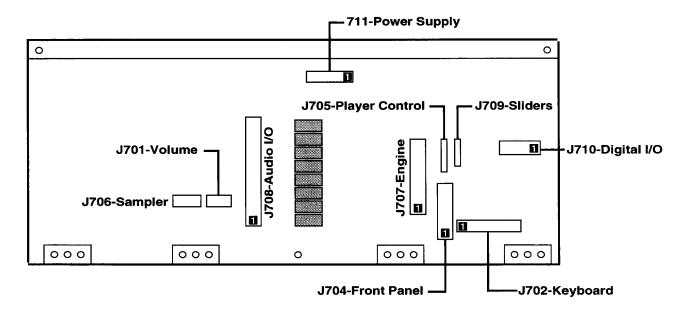


Figure 4-11. Audio Board.

Removing the Audio Board—K2500/X Keyboard

- 1. Follow the Audio I/O Board Removal steps.
- 2. If this K2500 has a Sampling Option Board installed, do the following:
 - Locate the Sampling Option and Digital I/O Boards, to the left of the Backlight Power Board
 in the Top Cover. With a #1 Phillips screwdriver, remove the screws holding the Sampling
 Option Board and the Digital I/O Board to the rear panel.
 - Unplug the 5-pin I/O Monitoring Cable from J706, located next to the Audio Output socket.

Remove the Sampling Option Board and Digital I/O Board, placing them carefully aside. Leave the cables attached to these boards.

- 3. With a flat-head screwdriver, remove the retaining clips from J711, J708, J707, J704, J702, and J710, all on the Audio Board.
- 4. Unplug the Power Supply cable from J711.
- 5. Unplug the Volume cable from J701.
- 6. Unplug the Engine cable from J707.
- 7. Unplug the Front Panel cable from J704.
- 8. Unplug the Keyboard cable from J702.
- 9. Unplug the Player Control cable from J705.
- 10. Unplug the Sliders cable from J709.
- 11. Unplug the Digital I/O cable from J710.
- 12. Use a #2 Phillips screwdriver to remove the 4 screws holding the Audio Board in place.
- 13. Remove the Audio Board by tilting it up and pulling it forward.

Replacing the Audio Board—K2500/X Keyboard

- 1. Position the Audio Board on the left side of the K2500's Top Cover, so that component side of the board faces up. Slide the back edge of the board under the groove on the support wall along the edge farthest from you.
- 2. Replace the four Audio Board attachment screws you removed earlier. Use a #2 Phillips screwdriver to tighten the screws.
- 3. If this K2500 has a Sampling Option Board installed, plug the unconnected end of the 5-pin I/O Monitoring Cable into J706, located to the left of the 50-pin Audio Output socket on the Audio Board.
- 4. Plug the unconnected end of the Power Supply cable into J711.
- 5. Plug the unconnected end of the Volume cable into J701.
- 6. Plug the unconnected end of the Engine cable into J707.

- 7. Plug the unconnected end of the Front Panel cable into J704.
- 8. Plug the unconnected end of the Keyboard cable into J702.
- 9. Plug the unconnected end of the Player Control cable into J705.
- 10. Plug the unconnected end of the Sliders cable into J709.
- 11. Plug the unconnected end of the Digital I/O cable into J710.
- 12. Replace the retaining clips on J711, J708, J707, J704, J702, and J710.

Audio I/O Board

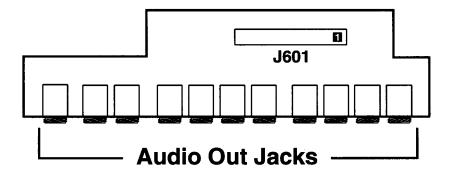


Figure 4-12. Audio I/O Board.

Removing the Audio I/O Board—K2500/X Keyboard

- 1. Locate the Audio I/O Board, on the left-hand side of the rear panel as you face the front of the K2500.
- 2. Using a flat-head screwdriver, remove the retaining clip from the 50-pin ribbon cable in J601. Then unplug the cable from J601.
- 3. Using a #1 Phillips screwdriver, remove the four screws holding the Audio I/O Board to the rear panel.
- 4. Remove the Audio I/O Board.

Replacing the Audio I/O Board—K2500/X Keyboard

- 1. Position the Audio I/O Board through the rear panel Audio Out holes.
- 2. Replace the four screws that hold the Audio I/O Board to the rear panel. Using a #1 Phillips screwdriver, tighten the screws.
- 3. Plug the unconnected end of the 50-pin ribbon cable into J601 on the Audio I/O Board. Then replace the retaining clip on J601.

Backlight Power Board (Digital I/O, Backlite Power Board)

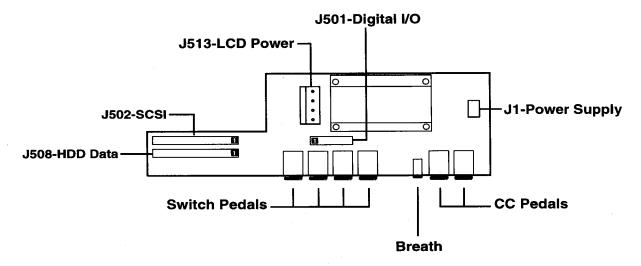


Figure 4-13. Backlight Power Board.

Removing the Backlight Power Board—K2500/X Keyboard

- 1. Locate the Backlight Power Board, on the right side of the rear panel.
- 2. Using a flat-head screwdriver, remove the retaining clip from J501. Then unplug the Digital I/O cable from J501.
- 3. Using a flat-head screwdriver, remove the retaining clip from J508. Then unplug the 16-pin SCSI ribbon cable from J502.
- 4. If this K2500 is equipped with an internal hard drive, use a flat-head screwdriver to remove the retaining clip from J502. Then unplug the HDD Data Ribbon Cable from J508.
- 5. Unplug the Power Supply cable from J1.
- 6. Unplug the 4-pin LCD Power cable from J513. Then remove and set aside the tie-wraps holding this cable in place.
- 7. Using a #1 Phillips screwdriver, remove the four screws holding the Backlight Power Board to the rear panel.
- 8. Remove the Backlight Power Board.

Replacing the Backlight Power Board—K2500/X Keyboard

- 1. Position the Backlight Power Board through the rear panel CC Pedal, Switch Pedal, and SCSI Thru holes.
- 2. Replace the four Backlight Power Board attachment screws through the holes in the rear panel. Using a #1 Phillips screwdriver, tighten the screws.
- 3. Plug the unconnected end of the Power Supply cable into J512.

Button Board (Main Control Panel Board)

- 4. Plug the unconnected end of the 4-pin LCD Power cable into J513. Then secure the cable to the Top Cover, using the tie-wraps you removed earlier.
- 5. Plug the unconnected end of the Digital I/O cable into J501. Make sure that the red line is on the pin 1 side of J501, marked by a "1" on the Backlight Power Board silkscreen.
- 6. Plug the unconnected end of the 16-pin SCSI ribbon cable into J508. Make sure that the red line is on the pin 1 side of J508, marked by a "1" on the Backlight Power Board silkscreen.
- 7. If this K2500 has an Internal Hard Drive, plug the unconnected end of the HDD Data Ribbon Cable into J508 on the Backlight Power Board. Make sure that the red line is on the pin 1 side of J508, marked by a "1" on the Backlight Power Board silkscreen.
- 8. Replace the retaining clips on J501 and J502.

Button Board (Main Control Panel Board)

Removing the Button Board—K2500/X Keyboard

- 1. Follow removal steps for the following boards:
 - Backlight Power Board
 - Audio I/O Board
 - · Audio Board
 - LCD Display
- 2. Loosen, but do not remove, the screws holding the support wall in place.
- Using a #2 Phillips screwdriver, remove the seven screws holding the Button Board in place.
- 4. Remove the retaining clip from J303 on the Slider Board. Then unplug the Sliders cable from J303.
- 5. Remove the retaining clip from J 704 on the Audio Board. Then unplug the Front Panel cable from J704.
- 6. Remove the Button Board by tilting it up and pulling it toward you.

Replacing the Button Board—K2500/X Keyboard

- 1. Plug the unconnected end of the Sliders cable into J303 on the Slider Board. Then replace the retaining clip on J303.
- 2. Plug the unconnected end of the Front Panel cable into J704 on the Audio Board. Then replace the retaining clip on J704.
- 3. Position the Button Board in the Top Cover, so that the buttons and Data Wheel fit through their holes. The bottom edge of the board should fit under the groove along the support wall. Make sure that all the buttons work properly (they should move freely within their holes.)



CAUTION: The buttons can break easily; don't force the button board into place. If you feel any resistance, check under the board for cables that may be blocking it.

- 4. Replace the 7 Button Board attachment screws you removed earlier. Using a #2 Phillips screwdriver, tighten the screws.
- 5. Plug the unconnected end of the Front Panel cable into J704 on the Audio Board. Then replace the retaining clip on J704.
- Retighten the support wall screws.

Engine Daughter Board

Removing the Engine Daughter Board—K2500/X Keyboard

Determine if this K2500 is equipped with a KDFX or KDSO Board. If installed, the KDFX/KDSO
Board is attached to the top of the Engine Daughter Board (see Figure 4-14) Remove the four
screws that hold the KDFX/KDSO Board in place. Arrows in Figure 4-14 point to the four screws.

Grasp the KDFX/KDSO Board at socket J1019, then rock the board back and forth until the pins are pulled out of the socket on the Engine Daughter Board. The KDFX/KDSO Board is attached to the Engine Daughter Board by pins located below connector J1019, which is on the left side of the KDFX/KDSO Board as you view it from the front of the unit. Don't remove it too quickly or you might bend the pins.

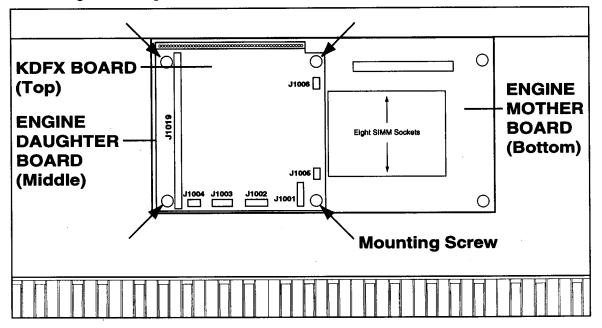


Figure 4-14. K2500 Keyboard with top removed, showing location of KDFX/KDSO Board screws.

Engine Daughter Board

2. Locate the Engine Daughter Board (see Figure 4-15). Using a #2 Phillips screwdriver, remove the four screws that hold the Engine Daughter Board in place. If this K2500 is KDFX/KDSO-equipped, the Engine Daughter Board is held in place by four standoffs. Using a flat-head screwdriver, remove these standoffs and set them aside. You will use them to reattach the board later.

Arrows in Figure 4-15 point to the four screws/standoffs.

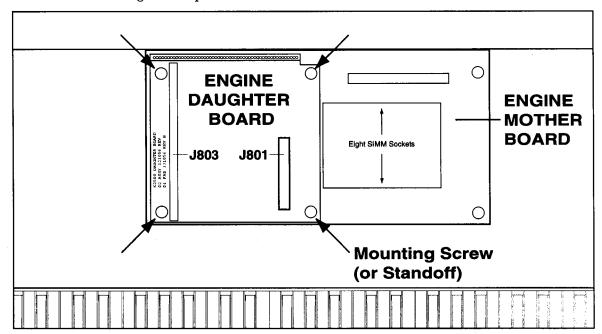


Figure 4-15. K2500 Keyboard with top removed, showing location of Engine Daughter Board screws/standoffs.

3. If this unit has a Sampling Option Board installed, remove the Ribbon Cable Retaining Clip from J801 on the Engine Daughter Board. Then remove the Sampling Option Data ribbon cable from J801.

CAUTION: Units equipped with a KDFX or KDSO Board will not have a retaining clip on J801. Do not put a retaining clip on J801 when you replace the Engine Daughter Board; doing so will cause the KDFX /KDSO Board to short out when you turn the K2500 on.

4. Grasp the Engine Daughter Board at socket J803, then remove the board by gently rocking it back and forth until the pins are pulled out of the socket on the Engine Mother Board. The Engine Daughter Board is attached to the Engine Mother Board by pins located below connector J803, which is on the left side of the Engine Daughter Board as you view it from the front of the unit. Don't remove it too quickly or you might bend the pins.

Replacing the Engine Daughter Board—K2500/X Keyboard

- 1. Make sure that the Engine Mother Board standoffs are fully tightened.
- 2. Insert the pins on the bottom of the Engine Daughter Board into connector J919 on the Engine Mother Board.

The best way to do this is to slightly angle the board so that you can position the rear pins first. Then inspect the four holes on the board to make sure that they line up with the Engine Mother Board standoffs. When the rear pins are correctly located and the holes are lined up, carefully

insert the remaining pins into connector J919. Apply even pressure to the board, so that all of the pins are seated properly. Then make sure that the board rests on the standoffs.

3. If this unit has a Sampling Option Board installed, plug the unconnected end of the Sampling Option data Ribbon cable into J801 on the Engine Daughter Board.



WARNING:

If this is a KDFX/KDSO-equipped unit, **do not** use a Ribbon Cable Retaining Clip on J801. Using a retaining clip will cause the KDFX/KDSO Board to short out when you turn the K2500 on. The KDFX/KDSO Board will hold the cable in place without a retaining clip.

4. Reinsert and tighten the four Engine Daughter Board attachment screws/standoffs that you removed earlier.

Engine Mother Board

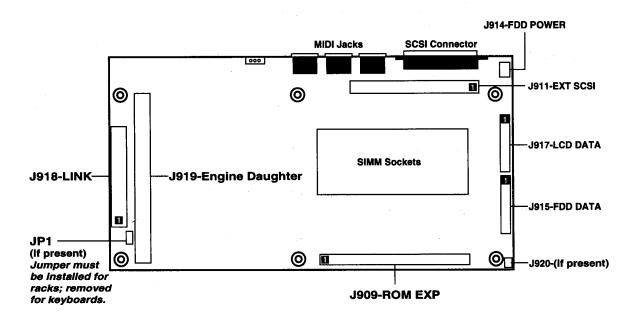


Figure 4-16. Engine Mother Board with Engine Daughter Board removed.

Removing the Engine Mother Board—K2500/X Keyboard



NOTE:

If any of the Sound ROM Option Boards are installed (Stereo Piano, Orchestral or Contemporary ROM Option Boards), leave them in their sockets while you remove the Engine Mother Board.

- 1. Follow the Engine Daughter Board Removal steps.
- 2. Check for the presence of J920. Remove the +5V extension cable from this connector, if present.
- 3. Remove the retaining clip from J918. Then unplug the LINK cable from J918.
- 4. Unplug the LCD Data cable from J917.
- 5. Unplug the FDD Data cable from J915.
- 6. Unplug the Floppy Power cable from J914.

- 7. Using a flat-head screwdriver, remove the four standoffs.
- 8. Using a #2 Phillips screwdriver, remove the 2 screws on the right side of the Engine Mother Board as you face the front of the K2500.
- 9. With a #1 Phillips screwdriver, remove the six screws from the three rear panel MIDI connectors.
- Use a 5mm nut driver to remove the bolts and washers from the remaining SCSI port.
- 11. Now remove the Engine Mother Board.

Replacing the Engine Mother Board—K2500/X Keyboard

- 1. Position the Engine Mother Board so that the six holes on the board line up with the standoffs on the K2500's bottom. Position the SCSI connector through the rear panel SCSI hole. Be careful not to damage the SCSI switch as you do this.
- 2. Replace the two screws on the right side of the Engine Mother Board as you face the front of the K2500. Using a #2 Phillips screwdriver, tighten the screws.
- 3. Replace the four standoffs on the Engine Mother Board. Using a flat-head screwdriver, tighten the standoffs.
- 4. Insert the 5mm bolts into the holes on either side of the SCSI port. Using a 5mm nut driver, tighten the bolts.
- 5. Replace the screws on either side of the three rear panel MIDI connectors. Using a #1 Phillips screwdriver, tighten the screws.
- 6. Plug the unconnected end of the Floppy Power cable into J914.
- 7. Plug the unconnected end of the FDD Data cable into J915. Then replace the retaining clip on J915.
- 8. Plug the unconnected end of the LCD Data cable into J917.
- 9. Plug the unconnected end of the LINK cable into J918. Then replace the retaining clip on J918.
- 10. If it were removed earlier, reconnect the +5V extension cable at J920.

Floppy Drive

Removing the Floppy Drive—K2500/X Keyboard

1. Locate the floppy drive, in the left end of the Top Cover.

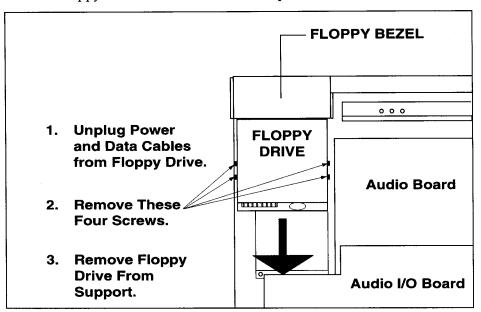


Figure 4-17. Floppy Drive removal.

- Unplug the FDD Data cable from the floppy drive data socket. Note the cable's orientation; on some early K2500s, the cable connector is keyed, making it possible to plug the cable in backwards. When you plug the cable back in, make sure that the red line is closest to the 4-pin power socket.
- 3. Unplug the 4-pin power cable from the floppy drive power socket.
- 4. See Figure 4-17. Using a #2 Phillips screwdriver, remove the four screws that hold the floppy drive to the metal support on the Top Cover.
- 5. Remove the floppy drive from the support. Be careful not to damage the floppy bezel as you do this.

6. See Figure 4-18. Using a #2 Phillips screwdriver, remove the two screws and washers holding the floppy bezel to the floppy drive. Then slide the bezel off and place it aside.

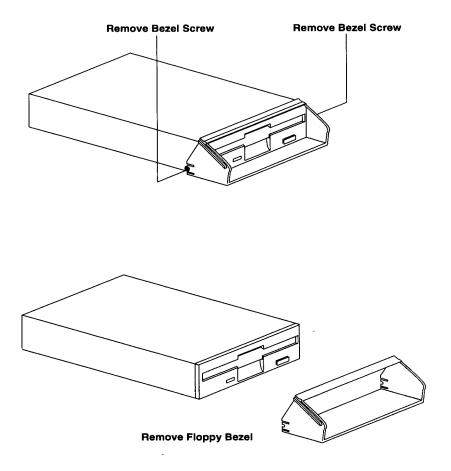
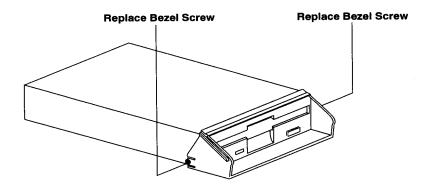


Figure 4-18. Floppy Bezel removal.

Replacing the Floppy Drive—K2500/X Keyboard

1. Set the Floppy Drive ID to "0". (Some drives use an ID of "1", but in the K2500 it should be "0".) Drives from Kurzweil come preset to "0".

2. Using the two floppy bezel screws and washers you removed earlier, reattach the floppy bezel to the front of the floppy drive. Hand-tighten the screws; don't tighten them fully until you complete the following steps.



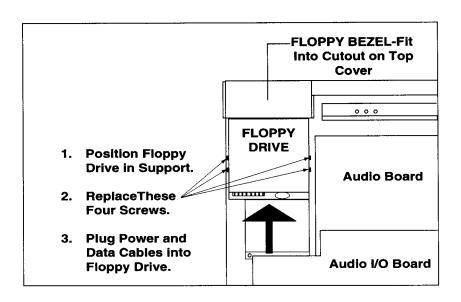


Figure 4-19. Replacing Floppy Drive.

- 3. Place the floppy drive in the metal support on the Top Cover, with the exposed circuitry facing up. Fit the floppy bezel into the cutout on the left side of the Top Cover; then make sure that the bezel is flush with the Top Cover's surface.
- 4. Using the four floppy drive attachment screws, secure the floppy drive to the metal bracket.
- 5. Plug the unconnected end of the 4-pin power cable into the floppy drive power socket. Make sure that the red cable, indicating pin 1, is closest to the data socket.
- 6. Plug the unconnected end of the FDD Data cable into the floppy drive data socket. Be sure that pin 1, indicated by a red line on the cable, is on the side closest to the 4-pin power cable.
- 7. Using a #2 Phillips screwdriver, tighten the floppy bezel screws you inserted in step 2.

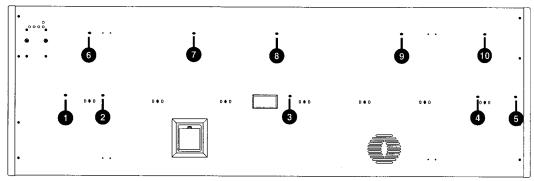
Keyboard

Keyboard

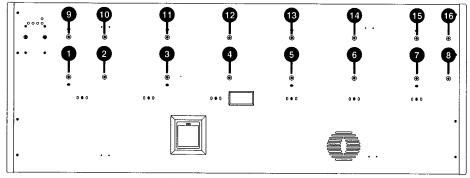
Detaching/Removing the Keyboard

Some procedures require complete removal of the keyboard. If you're just replacing keys, do steps 1 through 6 below. If you're replacing contract strips or contact boards, do all of the steps in this section.

- 1. Open the K2500.
- 2. The picture below shows the locations of the keyboard mounting screws. The K2500X has ten of these screws, while the 76-key K2500 has sixteen.



K2500X (88 Keys)



K2500 (76 Keys)

Figure 4-20. Keyboard mounting screws.

- 3. Tilt the K2500 onto its rear. With a #2 Phillips screwdriver, remove the screws that are closest to the rear panel.
- 4. Tilt the unit back onto the work area, and slide the front edge out over the edge of the work area. With a #2 Phillips screwdriver, remove the screws that hold the front edge of the keyboard to the bottom of the K2500.

5. With a #1 Phillips screwdriver, remove the four screws holding the Cheek Block in place. Arrows in Figure 4-29 show the locations of the four screws.

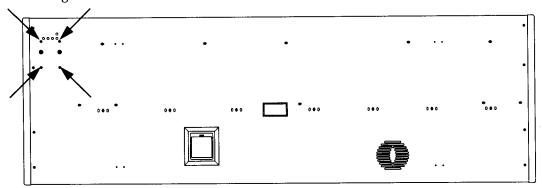


Figure 4-21. Bottom of K2500, showing Cheek Block screw locations.

6. Slide the cheek block back about an inch, then pull it out of the K2500.

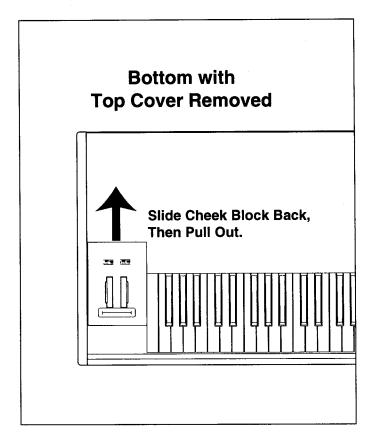


Figure 4-22. Cheek Block removal.

Do the remaining steps *only* if you are removing the entire keyboard.

7. Locate the Player Control Board, under the Cheek Block. and unplug the P-Strip-B cable from J404. If this is an 88-key K2500, unplug the P-Strip-W cable from J403.

- 8. You will notice that the Bass and Treble ribbon cables coming from the underside of the keyboard are taped to the bottom chassis. Simply pull back the tape to free the cable. You should lay the tape flat against the bottom so that it can be reapplied to the cables once the keyboard is re-installed.
- 9. Tilt the keyboard up from the back, so that you can see the Treble and Bass contact boards. Unplug the Bass and Treble ribbon cables from their sockets on these boards.
- 10. Lift the keyboard out of the K2500.

Replacing/Reattaching the Keyboard

If you have only replaced keys, but not Contacts, Weights, or Contact Boards, skip steps 1–3.

- Place the keyboard inside of the K2500.
- 2. Tilt the keyboard up from the back, so that you can see the Bass and Treble contact boards.
- 3. Plug the unconnected ends of the Bass and Treble ribbon cables into their sockets on the Bass and Treble contact boards.
- 4. Slide the front of the K2500 out over the edge of the work area.
- 5. Line up the keyboard mounting holes with the holes on the bottom of the K2500.
- 6. Replace the screws that hold the front edge of the keyboard to the K2500, as shown in Figure 4-20. With a #2 Phillips screwdriver, tighten the screws.
- 7. Locate the Player Control Board, under the Cheek Block. Plug the unconnected end of the P-Strip-B cable into J404 on this board. If this is an 88-key K2500, plug the unconnected end of the P-Strip-W cable into J403.
- 8. Slide the Cheek Block into the left end of the K2500, making sure that the pressure strip is not under the Cheek Block.
- 9. Make sure that the Cheek Block lines up with the holes in the bottom of the unit. Then replace the four Cheek Block mounting screws shown in Figure 4-29. With a #1 Phillips screwdriver, tighten the screws.
- 10. Tilt the K2500 onto its rear. Replace the screws that are closest to the rear panel, as shown in Figure 4-20. With a #2 Phillips screwdriver, tighten the screws.
- 11. Tilt the unit back onto the work area.

Keys

1. Follow steps 1 through 6 under Keyboard Removal.



NOTE:

Don't completely remove the keyboard from the K2500. Once you remove the screws holding the keyboard to the chassis, just slide the keyboard back towards the rear about 1/2 inch.

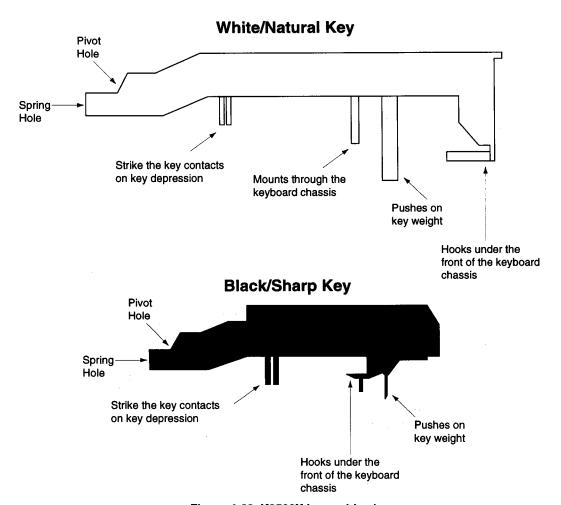


Figure 4-23. K2500X keys, side view.

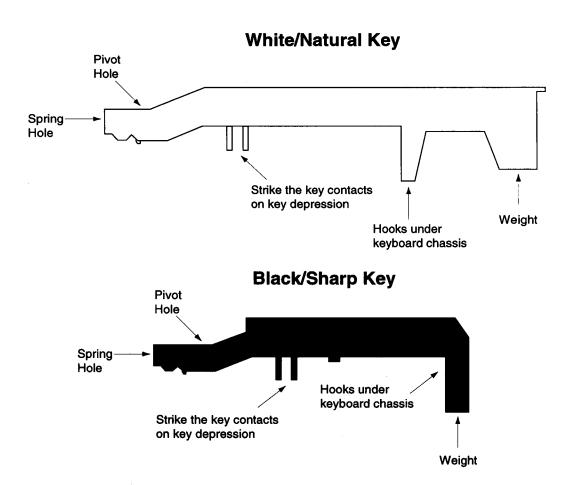
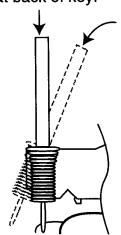


Figure 4-24. 76-note K2500 keys, side view.

White/Natural Key Removal

- Locate the spring at the rear of the key. This spring attaches between the key and the keyboard chassis.
- 2. Using a 3mm diameter dowel (a chopstick can easily be adapted for this purpose), detach the spring by pushing down on it slightly, then unhooking the spring from the keyboard chassis. Figure 4-25 shows how this is done.
- 3. Notice the plastic pivot piece coming through the top of the key.
- 4. Insert a small flat screwdriver at the bottom of the pivot, then carefully since the clips inside the key are breakable press towards the front edge of the keyboard. While doing so, lift the back end of the key (where the spring was). This frees the key.
- 5. Remove the screwdriver.
- 6. Lift the key up slightly, then forward. Each key hooks onto the keyboard chassis, so be sure the hooks are free before lifting the key completely out.

1. Push down slightly with tool (3mm dowel) through spring at back of key.



2. Pull top of tool towards front of keyboard to pry spring loop from hook.

Figure 4-25. Removing spring from back of key (K2500X shown).

Black/Sharp Key Removal

NOTE:

Before removing a black key, you must first remove the two adjacent white keys.

- 1. Follow the Keyboard Removal steps.
- 2. Locate the spring at the rear of the key. This spring attaches between the key and the keyboard chassis.
- 3. Using a 3mm diameter dowel (a chopstick can easily be adapted for this purpose), detach the spring by pushing down on it slightly, then unhooking the spring from the keyboard chassis. Figure 4-25 shows how this is done.
- 4. Notice the plastic pivot piece coming through the top of the key.
- 5. Insert a small flat screwdriver at the bottom of the pivot, then carefully since the clips inside the key are breakable press towards the front edge of the keyboard. While doing so, lift the back end of the key (where the spring was). This frees the key.
- 6. Remove the screwdriver.
- 7. Lift the key up slightly, then forward. Each key hooks under the keyboard chassis, so be sure the hooks are free before lifting the key completely out.

Key Replacement (Any Key)



NOTE:

Remember to replace black keys first, then white keys.

- 1. Hook the key under the keyboard chassis.
- 2. Position the key over its pivot.

- 3. Check that the mounting peg is correctly positioned, and that the pivot lines up with the hole at the rear of the key. Then push down on the key until it snaps into place.
- 4. Replace the key spring.

Keyboard Contact Boards

- 1. Open the K2500.
- 2. Follow the Keyboard Removal steps.
- 3. Pull the keyboard completely out of the K2500.
- 4. Place the keyboard chassis upside down on a flat soft surface. Be sure that the keys are resting on a soft surface so that they will not be scratched or damaged.
- 5. Under the keyboard are two printed circuit boards, connected by a small cable. These are the Keyboard Contact Boards.

Removing the Treble Contact Board

- 1. Remove the 26 screws (K2500X) or 24 screws (76-key K2500) that secure the Treble Contact Board to the keyboard.
- 2. Unplug the small ribbon cable that connects the Treble Contract Board to the Bass Contact Board.
- 3. Remove the Treble Contact Board from the keyboard chassis.
- 4. You will notice black spacer brackets mounted between the Keyboard Contact Boards and the keyboard chassis. It is not necessary to remove them. However, if you need to remove the spacer brackets, lift them horizontally. The spacer brackets mount to the chassis by small pegs that fit into position on the keyboard chassis. If you lift from one end to the other, you could easily break off one of the pegs.

Replacing the Treble Contact Board

- Position the Treble Contact Board on the keyboard chassis. Be sure that the Rubber Key Contacts line up properly through the holes in the keyboard chassis.
- 2 Replace the 26 screws (K2500X) or 24 screws (76-key K2500) that secure the Treble Contact Board to the keyboard chassis.
- 3. Plug in the small ribbon cable that connects the Bass Contact Board to the Treble Contact Board.

Removing the Bass Contact Board

- 1. Remove the 22 screws (K2500X) or 18 screws (76-key K2500) that secure the Bass Contact Board to the keyboard chassis.
- 2. Unplug the small ribbon cable that connects the Bass Contact Board to the Treble Contact Board.
- 3. Remove the Bass Contact Board from the keyboard chassis.

4. You will notice black spacer brackets mounted between the Keyboard Contact Boards and the keyboard chassis. It is not necessary to remove them. However, if you need to remove the spacer brackets, lift them horizontally. The spacer brackets mount to the chassis by small pegs that fit into position on the keyboard chassis. If you lift from one end to the other, you could easily break off one the pegs.

Replacing the Bass Contact Board

- 1. Position the Bass Contact Board on the keyboard chassis. Be sure that the Rubber Key Contacts line up properly through the holes in the keyboard chassis.
- 2. Replace the 22 screws (K2500X) or 18 screws (76-key K2500) that hold the board to the keyboard chassis.
- 3. Plug in the small ribbon cable that connects the Bass Contact Board to the Treble Contact Board.

Key Contact Strips

Removing the Key Contact Strips

- 1. Open the K2500.
- 2. Follow the steps for removing the Keyboard and the Keyboard Contact Boards.
- 3. Before you remove a contact strip, look at the design of the individual contact. Notice that the top of the contact has two indents, and that the deeper indent is located to the rear of the key.
- 4. Remove the contact strip, by gently lifting and freeing the strip from its position. Be careful not to damage any contacts in the process.

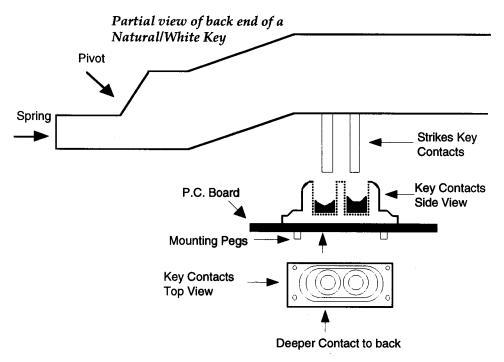


Figure 4-26. Key Contact Strip.

Replacing the Key Contact Strips

- 1. Place the Contact Strip's rubber pegs over the mounting holes on the Contact Board. The deeper indent of the Contact Strip should be close to the rear of the key, as shown in Figure 4-26.
- 2. Using a small blunt-end tool (i.e. a Q-Tip or toothpick) gently push the mounting pegs through the holes. Be careful not to poke through the mounting pegs when doing this.

Key Weights

The following sections apply only to the 88-key K2500X.

Removing a Key Weight

The K2500X's keyboard uses the following components for weighted action: 88 key weights (one for each key), two rods, and a key weight/rod support bracket (seven 12-key brackets and one 4-key bracket).

The key weights are held in place by a two-piece rod that runs the length of the keyboard. The Bass rod starts at low A and extends to G# above middle C. The Treble rod starts at A above middle C and extends to High C.

- 1. Follow the Keyboard Removal steps. Pull the entire keyboard out of the K2500.
- 2. Remove all of the keys from the section with the broken key weight.

- 3. Once you've removed the keys, take a look at the key weights. Notice that they come in two sizes; always use the small key weights for black keys, and the large weights for white keys.
- 4. Each key weight should be examined for cracks. Replace any key weight that shows severe cracks. You should also check the key weight bracket for damage.
- 5. Notice the rod support bracket holding the key weight rod in place. This support bracket may or may not have a locking clip attached to the top of the bracket (an example of each is shown below.) Take a moment to determine which type of rod support bracket this K2500 has.

Side View of Support Brackets

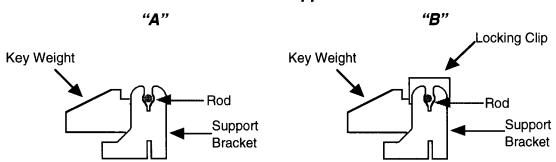


Figure 4-27. Rod support brackets.

The following steps describe key weight removal for support brackets with and without locking clips. Be sure to complete the steps above before going any further.

A. Rod Support Brackets Without Locking Clips

- 1. Pry the rod up out of the support bracket at one end. Be aware that the key weights will stay attached to the rod.
- 2. Once the rod is free, pull out the broken key weight.

B. Rod Support Brackets With Locking Clips



NOTE:

Removing a key weight requires you to break the locking clips. You do not need to replace them, since the clips are provided for shipping purposes only.

- 1. Use a pair of diagonal cutters to remove each of the ten locking clips. Use a utility knife to break the glue bond on the edge clips. Discard the clips.
- 2. Pry the rod up out of the support bracket at one end. Be aware that the key weights will stay attached to the rod.
- 3. Once the rod is free, pull out the broken key weight.

Replacing a Key Weight

- 1. Each key weight has a strip of red felt attached to it with pliable adhesive. Be sure that the red felt extends onto the upper surface of the key weight's top.
- 2. Place the key weight against the rod and snap it onto the rod with slight pressure.
- 3. Place the rod and key weights into position over the support brackets, then snap the rod into the brackets. Be sure that the rod fits securely into the support bracket. Also check to ensure that the two key weight rods are both clipped into place at the point where they meet in the middle of the keyboard.
- 4. Before replacing the keys and springs, check that each key weight moves freely.

LCD

Removing the LCD—K2500/X Keyboard

- 1. Locate the LCD, in the center of the Top Cover.
- 2. Unplug the LCD Data cable from J917 on the Engine Mother Board.
- 3. Unplug the 4-pin power cable from J2 on the Backlight Power Board, located to the right of the LCD.
- 4. Using a #2 Phillips screwdriver, remove the four screws holding the LCD in place.
- 5. Remove the LCD by gently pulling it out of the Top Cover.
- 6. Remove and set aside the plastic lens that attaches to the LCD.

Replacing the LCD—K2500/X Keyboard

- 1. Using two-sided tape, mount the plastic lens to the front of the LCD. Make sure that the four sides of the lens are flush with the LCD.
- 2. Position the LCD so that the display screen fits through the hole in the Top Cover. The "UP" arrow on the silkscreen of the board should point toward the rear panel.
- 3. Replace the four LCD attachment screws you removed earlier. Using a #2 Phillips screwdriver, tighten the screws.
- 4. Plug the unconnected end of the LCD data cable into J917 on the Engine Mother Board.
- 5. Plug the unconnected end of the 4-pin LCD power cable into J2 on the Backlight Power Board.

Player Control Board

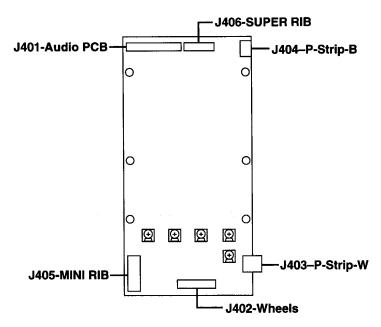


Figure 4-28. Player Control Board

Removing the Player Control Board—K2500/X Keyboard

- 1. Tilt the bottom of the K2500 onto a soft surface, so that it rests on its rear panel.
- 2. Using a #1 Phillips screwdriver, remove the four screws holding the Cheek Block in place. Arrows in Figure 4-29 show the locations of the four screws.

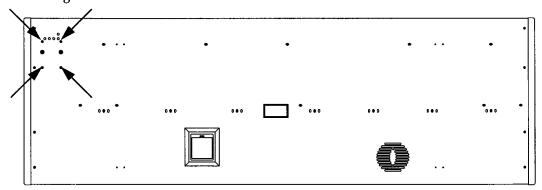


Figure 4-29. Bottom of K2500, showing Cheek Block screw locations.

3. Slide the cheek block back about an inch, then pull it out of the K2500.

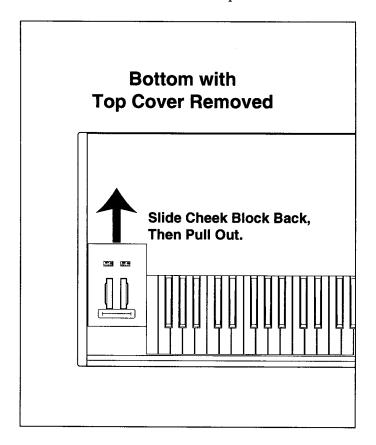


Figure 4-30. Cheek Block removal.

- 4. Unplug the Mini Ribbon cable from J405.
- Unplug the Wheels cable from J402.
- 6. Unplug the P-Strip-W cable from J403.
- 7. Unplug the Audio PCB cable from J401.
- 8. Unplug the Super Ribbon cable from J406.
- 9. Unplug the P-Strip-B cable from J404 (88-key K2500 only.)
- 10. Using a #2 Phillips screwdriver, remove the two screws holding the Player Control Board to the Cheek Block support.
- 11. Using a #2 Phillips screwdriver, remove the screws holding the metal plate to the underside of the Player Control Board. Place the screws and the metal plate aside.

Replacing the Player Control Board—K2500/X Keyboard

1. Using the two screws you removed earlier, attach the metal plate to the underside of the Player Control Board. With a #2 Phillips screwdriver, tighten the screws.

- 2. Line the holes on the Player Control Board's metal plate with the holes in the Cheek Block support. Using the two screws you removed earlier, attach the Player Control Board to the Cheek Block support. With a #2 Phillips screwdriver, tighten the screws.
- 3. Plug the unconnected end of the P-Strip-B cable into J404 (88-key K2500 only.)
- 4. Plug the unconnected end of the Super Ribbon cable into J406.
- 5. Plug the unconnected end of the Audio PCB cable into J401.
- 6. Position the Player Control Board inside the support on the underside of the Cheek Block.
- 7. Plug the unconnected end of the P-Strip-W cable into J403.
- 8. Plug the unconnected end of the Wheels cable into J402.
- 9. Plug the unconnected end of the Mini Ribbon cable into J405.
- 10. Replace the Cheek Block inside the left end of the K2500. Make sure that no cables are caught between the Cheek Block and the keyboard.
- 11. While holding the Cheek Block in place, tilt the K2500 so that it again rests on its rear panel.
- 12. Replace the four Cheek Block attachment screws and washers you removed earlier. With a #1 Phillips screwdriver, tighten the screws.

Power Supply Board

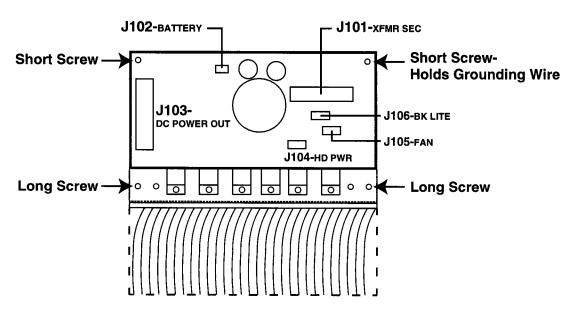


Figure 4-31. Power Supply Board.

Removing the Power Supply Board—K2500/X Keyboard

- 1. Locate the Power Supply Board, the small board with a heat sink in the bottom of the K2500.
- 2. If this K2500 has an internal hard drive installed, unplug the 4-pin HD Power cable from J104.

Power Supply Board

- 3. Unplug the DC Power Out cable from J103.
- 4. Unplug the Fan Power cable from J105.
- 5. Unplug the Backlight Power cable from J106.
- 6. Unplug the Transformer Secondary cable from J101.
- 7. Unplug the Battery cable from J102.
- 8. See Figure 4-31. Using a #1 Phillips screwdriver, remove the four screws holding the Power Supply Board to the K2500. Note that the two rear screws are shorter; the back right screw holds a long grounding wire in place, plus two star washers. Set these washers aside.
- 9. Remove the Power Supply Board.

Replacing the Power Supply Board—K2500/X Keyboard

- 1. Position the Power Supply Board over the four standoffs in the bottom of the K2500.
- 2. Replace the two long Power Supply Board attachment screws you removed earlier; make sure to put the longer screws toward the front of the board, next to the heat sink.
- 3. Replace the two short Power Supply Board attachment screws you removed earlier. Reattach the long grounding wire with the back right screw, as shown below:

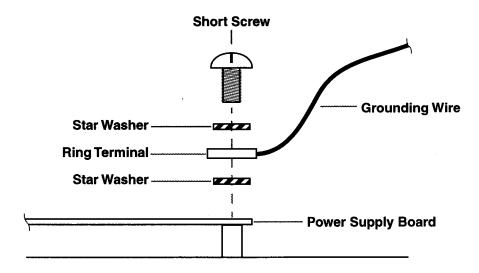


Figure 4-32. Power Supply Board-side view showing grounding wire replacement.

- 4. Using a #1 Phillips screwdriver, tighten all the screws.
- 5. Plug the unconnected end of the Battery cable into J102.
- 6. Plug the unconnected end of the Transformer Secondary cable into J101.
- 7. Plug the unconnected end of the Backlight Power cable into J106.

- 8. Plug the unconnected end of the Fan Power cable into J105.
- 9. Plug the unconnected end of the DC Power Out cable into J103.
- 10. If this K2500 has an internal hard drive installed, plug the unconnected end of the 4-pin HD Power cable into J104.

Scanner EPROM Chip

Removing the Scanner EPROM Chip—K2500/X Keyboard

You will need a chip puller for this procedure (see "Tools and Materials Required" on page 4-2 for a recommended model.)

- 1. If this K2500 has a Sampling Option Board installed, remove the four screws and the plastic nut and washer holding this board to the rear panel. Then place the board aside so that you can access the Audio Board.
- 2. Locate the Scanner EPROM Chip, the 28-pin chip in U2 on the Audio Board.
- 3. Using a chip puller, remove the Scanner EPROM Chip from the Audio Board.

Replacing the Scanner EPROM Chip—K2500/X Keyboard

1. Insert the Scanner EPROM Chip into U2 on the Audio Board. Make sure that pin 1 on the chip (located in the notched end) is on the pin 1 side of U2, marked by a notch on the board silkscreen.

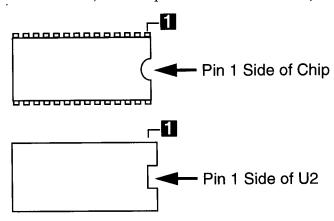


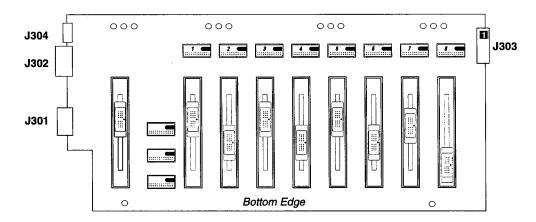
Figure 4-33. Scanner EPROM Chip placement.

2. Make sure that all of the pins are in their sockets. Then press down gently on the chip so that all of its pins are seated properly. Be careful not to press too hard; doing so may bend the pins.

Slider Board

Slider Board

Front of Board



Back of Board

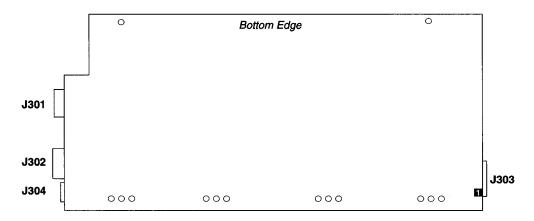


Figure 4-34. Slider Board.

Removing the Slider Board—K2500/X Keyboard

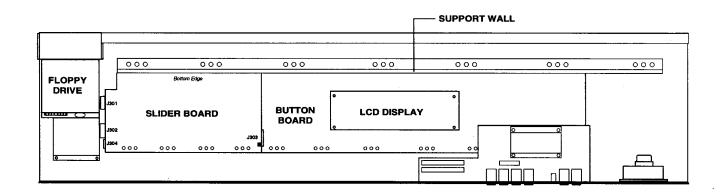


Figure 4-35. Underside of Top Cover, showing Slider Board location (Audio Board has been removed.)

- 1. Follow removal steps for the following boards:
 - Audio I/O Board
 - Audio Board
- 2. See Figure 4-35. Locate the Slider Board, in the left end of the Top Cover.
- 3. Using a #2 Phillips screwdriver, loosen the support wall screws behind the Slider Board.
- 4. Remove the four screws holding the Slider Board in place.
- 5. Unplug the 16-pin ribbon cable from J303, on the right side of the board, next to the Button Board.
- Unplug the 4-pin cable from J304.
- Unplug the 7-pin cable from J302.
- 8. Unplug the 6-pin cable from J301.
- 9. Remove the Slider Board.

Replacing the Slider Board—K2500/X Keyboard

- 1. Plug the unconnected end of the 16-pin ribbon cable into J303 on the Slider Board. Make sure that the red line is on the pin 1 side of J303, marked by a "1" on the Slider Board silkscreen.
- 2. Plug the unconnected end of the end of the 6-pin cable into J301.
- Plug the unconnected end of the end of the 7-pin cable into J302.
- 4. Plug the unconnected end of the 4-pin cable into J304.
- 5. Position the Slider Board inside the Top Cover, so that the sliders and buttons fit through their slots. The buttons should move freely. The bottom edge of the board should fit under the groove on the Support Wall.

Transformer

- 6. Replace the four Slider Board attachment screws you removed earlier. Using a #2 Phillips screwdriver, tighten the screws.
- 7. Using a #2 Phillips screwdriver, tighten the support wall screws behind the Slider Board.

Transformer

Removing the Transformer—K2500/X Keyboard

- 1. Locate the Transformer, in the right end of the K2500, next to the Power Supply Board.
- 2. Unplug the 6-pin power cable from the AC Entry Module's power cable.
- 3. Unplug the 8-pin Transformer Secondary cable from J101 on the Power Supply Board.
- Remove the four screws and washers holding the Transformer in place.
- 5. Lift the Transformer out of the K2500.

Replacing the Transformer—K2500/X Keyboard

- 1. Place the Transformer over the four standoffs on the bottom of the K2500, making sure that the Transformer mounting holes line up with the standoffs. The Transformer's cables should be next to the rear panel.
- 2. Replace the four screws and washers in the Transformer mounting holes.
- 3. Tighten all the screws with a #2 Phillips screwdriver.
- 4. Plug the unconnected end of the 8-pin Transformer Secondary cable into J101 on the Power Supply Board.
- 5. Plug the unconnected end of the 6-pin power cable into the AC Entry Module's power cable.

Chapter 5 Troubleshooting

You must open the K2500 to perform these tests. It's best to avoid this if possible, so always remember to do the following things first:

- Be sure that you understand the owner's complaint.
- Hard-reset the K2500 (see page 1-7) This may clear things up right away.
- Check the Basic Troubleshooting steps on page 1-9.

If the problems persist, then go ahead with the troubleshooting tests.

Power Problems

On Power Up No Audio, LEDs or LCD

- 1. Check that the power cable is properly connected to the unit and a power source.
- 2. Check fuse.

Rack: Pry out the fuse holder near the power cable socket on the back of the unit. There are two 2 Amp slow blow 250 Volt fuses. Replace if necessary.

Keyboard: Pry out the fuse holder near the power cable socket on the back of the unit. There are two 2 Amp slow blow 250 Volt fuses. Replace if necessary. To use a single 1 1/4" 2 Amp slow blow 250 Volt fuse, remove the screw and reverse the fuse holder.

3. Check Power Supply Voltage Regulators, as described in the following sections.

Rack:

5 volt power circuit

- 1. Set voltmeter to DC, 20 volts. With negative probe at ground, check TP16 on the audio board; voltage should be approximately 5 volts. If voltage is 7 volts or higher, turn K2500R off immediately, as damage to unit could result.
- 2. If voltage appears incorrect, check TP17 with oscilloscope. Value should be +9 volts with no excessive AC ripple (should be 1/2 volt or less, peak-to-peak); if there is excessive ripple, check D19. Figure 3-1 shows typical AC ripple measured at the input to the voltage regulators.
- 3. Check D9 zener diode for a voltage of 6.2 volts at cathode.
- 4. Check digital 5 volt adjustment circuit.

Power Problems

- +12 volt power circuit
- 1. Set voltmeter to DC, 20 volts. With negative probe at ground, check TP23 on the audio board; voltage should be approximately +12 volts (+/- .25 volts).
- 2. If voltage appears incorrect, check TP25 with oscilloscope. Value should be +21 volts (+/- 2 volts), with no excessive AC ripple (should be 1 volt or less, peak-to-peak). Figure 3-1 shows typical AC ripple measured at the input to the voltage regulators.
- 3. If there is excessive AC ripple at TP25, check bridge rectifier diodes D17 and D18, as well as the input smoothing capacitor C192.
 - -12 volt power circuit
- 1. Set voltmeter to DC, 20 volts. With negative probe at ground, check TP24 on the audio board; voltage should be approximately -12 volts (+/- .25 volts).
- 2. If voltage appears incorrect, check TP22 with oscilloscope. Value should be -21 volts (+/- 2 volts), with no excessive AC ripple (should be 1 volt or less, peak-to-peak). Figure 3-1 shows typical AC ripple measured at the input to the voltage regulators.
- 3. If there is excessive AC ripple at TP22, check bridge rectifier diodes D15 and D16, as well as the input smoothing capacitor C190.

Keyboard:

5 volt power circuit

- 1. Set voltmeter to DC, 20 volts. With negative probe at ground, check TP102 on the audio board; voltage should be approximately 5 volts. If voltage is 7 volts or higher, turn K2500 off immediately, as damage to unit could result.
- 2. If voltage appears incorrect, check TP111 with oscilloscope. Value should be +9 volts with no excessive AC ripple (should be 1/2 volt or less, peak-to-peak). If there is excessive AC ripple, check D1. Figure 3-1 shows typical AC ripple measured at the input to the voltage regulators.
- 3. Check D9 zener diode for a voltage of 6.2 volts at cathode.
- 4. Check digital 5 volt adjustment circuit.
 - +12 volt power circuit
- 1. Set voltmeter to DC, 20 volts. With negative probe at ground, check TP104 on the audio board; voltage should be approximately +12 volts (+/- .25 volts).
- 2. If voltage appears incorrect, check TP110 with oscilloscope. Value should be +21 volts (+/- 2 volts), with no excessive AC ripple (should be 1 volt or less, peak-to-peak). Figure 3-1 shows typical AC ripple measured at the input to the voltage regulators.
- 3. If there is excessive AC ripple at TP25, check bridge rectifier diodes D2 and D3, as well as the input smoothing capacitor C1.

- -12 volt power circuit
- 1. Set voltmeter to DC, 20 volts. With negative probe at ground, check TP105 on the audio board; voltage should be approximately -12 volts (+/- .25 volts).
- 2. If voltage appears incorrect, check TP112 with oscilloscope. Value should be -21 volts (+/- 2 volts), with no excessive AC ripple (should be 1 volt or less, peak-to-peak). Figure 3-1 shows typical AC ripple measured at the input to the voltage regulators.
- 3. If there is excessive AC ripple at TP22, check bridge rectifier diodes D4 and D5, as well as the input smoothing capacitor C2.



NOTE: If any ripple waveform is 60 Hz or irregular, check transformer secondary wire crimps and plug/socket contacts for an open circuit.

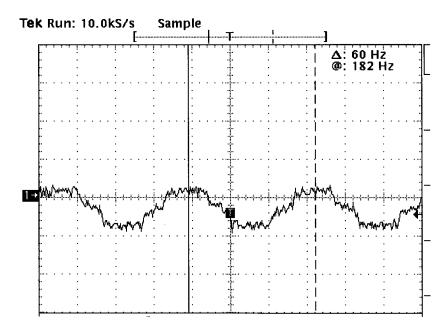


Figure 3-1. Typical AC ripple of power supply at input to voltage regulators

Front Panel Problems

LCD Not Readable

The K2500 LCD contrast ranges between the extremes of solid blue and solid white. When adjusting the LCD, make sure you are looking straight at it; this is the only way to judge that the contrast is correctly set. There are two factors contributing to the LCD contrast. The first is an internal circuit that must be set to the appropriate reference voltage, (i.e., the coarse adjustment). The second is an adjustment of the contrast about the coarse level using the instrument software, (i.e., the fine adjustment.) To change the coarse adjustment, the unit must be opened.

The fine adjustment can be changed without opening the unit:

- A. To temporarily change the LCD contrast fine adjustment, hold down the Enter key while turning the data wheel. Contrast will return to previous setting when you reset or power cycle the unit.
- B. To change the LCD contrast fine adjustment such that it is retained when resetting or power cycling the unit, change the setting of the Contrast parameter on the Master page. (Access the Master page by pressing the Master button.) This setting will be saved when you reset or power cycle the unit.

To change the LCD coarse adjustment:

- A. Adjust the Contrast Adjustment trim pot on the audio board (R72 on keyboard; R246 on rack) while looking at the LCD.
- B. Check for voltage at U59 pin 7 (TP13, labeled LCDvee). The voltage should be approximately -8.10 volts, and may range between -7 and -10 volts.

LCD Solid Blue

- 1. Check P/RAM option (if present) for proper insertion. Remove P/RAM and Engine Daughter board then reseat P/RAM. Engine Daughter Board must be removed so that middle pins on P/RAM can be fully seated.
- 2. Remove all options (e.g., ROMs, sample option, P/RAM, internal hard disk). Check for clock signals at processor on Engine Daughter Board (U2).
- 3. Check technical notes for memory protection board and SCSI modifications.

LCD Dim, Unreadable

Keyboard:

- 1. Check backlight cable at J106 on power supply board. Reseat if necessary.
- 2. Check for DC voltage of +15V to +20V at pin 2 on J106.
- Check U2, VR1, and associated circuits on Digital I/O Board.

Audio Problems

No Audio, Distortion/Crackling on Output(s)

1. If audio doesn't appear at Mix or Headphone outputs, check the individual outs (A-D). (Refer to Chapter 18 of the *K*2500 *Performance Guide* for instructions on using the individual outs.)



CAUTION: The individual outs are always at full volume; turn down your sound system before checking these.

- 2. If there is audio at the individual outs but not at the Mix or Headphone outs, check the signal path between the individual outs and the volume slider.
- 3. If there is no audio at the individual outs, check activity at the 4 DACs on the audio board:

Keyboard: A: U14, B: U17, C: U25, D: U26

Rack: A: U39, B: U37, C: U67, D: U68

Noisy Output

- 1. Noisy output may be caused by a problem with the K2500's effects processor. Determine this by removing the effects from the audio path in one of the ways described below:
 - A. Check the audio at one of the pairs of individual outs (e.g., "A"). Caution: The individual outs are always at full volume; turn down your sound system before checking these. The output from the individual outs is before the effects processor in the audio path.
 - B. Press the Edit button to enter Edit Mode. Press the Effects button (in Edit Mode this acts as FX Bypass) to remove effects from the audio path.

If the noise goes away when the effects are removed from the audio path, the effects processor may be the source of the noise. Replacement of the audio board may be required.

Distortion on Expansion ROM Sounds

1. Check for insulator between PCB and mounting bracket. If no insulator is present, add fiber washer between PCB and mounting bracket.

Intermittent Audio

- 1. Check cable from slider board to audio board.
- 2. Check for cold solder joints on volume control and output board.
- Check ring connector of individual output jacks. Connector should normally be closed when no plug is inserted.
- 4. Check for secure connections on both ends of ribbon connector from the audio board to the output board.

Keyboard Problems (K2500 and K2500X only)

Keyboard Problems (K2500 and K2500X only)

1. Check U1 scanner chip on the audio board for keyboard signals.

Only Bass or Treble Keys Working

1. Remove the keyboard as shown on page 4-26. Check the cable connections under the keyboard. The keyboard signals are sent to the audio board via a split ribbon cable; this cable has one connector at the audio board, but two connectors (bass and treble) at the keyboard end.

Velocity Problems

1. Remove the keyboard contact PCB associated with the problem key or group of keys (as shown on page 4-32). Inspect the rubber contact strip for debris and make sure it is properly seated.

Noisy Keys (noise not audible through outputs)

- 1. Remove noisy key (as shown on page 4-30) and inspect key/key weight/key weight bracket for damage. Inspect rubber "nipple" key guide on keybed frame.
- 2. "Sticky" sound on extreme high or low keys may be caused by an unglued pressure strip. Remove keyboard and reglue ends of pressure strip, as described in Chapter 4.

Chapter 6 Calibration Tests

You may need to make adjustments to the K2500 for optimal performance. In these calibration tests, you will use the K2500's Scanner Diagnostics to help you check boards and Front Panel components.

Before Beginning a Test

Some of these tests require opening the K2500. It's best to avoid this if possible, so always remember to do the following things first:

- Be sure that you understand the owner's complaint.
- Hard-reset the K2500 (see page 1-7.) This may clear things up right away.
- Check the basic troubleshooting steps on page 1-9.

If the problems persist, then go ahead with the appropriate calibration tests.

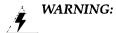
Test Problem Areas Only

The calibration tests are intended to fix specific problems, so don't run through all of them systematically. For example, if the Pitch wheel is not bending notes properly, just do the Player Control Board test.

Important Notes and Warnings

See Removal and Replacement Steps for Damaged Parts

When there is a problem with a test, you may need to replace a damaged board or other part. See Chapter 3 (rack) or Chapter 4 (keyboard) for detailed removal and replacement steps.



Always unplug all external wires, cables, and connectors from the K2500 before opening the unit. Don't replace any cables or parts if the K2500 is still plugged in. Once the keyboard is open, you must then reconnect the power cable to run these tests.

Check Cable Connectors

You may need to replace or disconnect certain cables. Most cable connectors are keyed so that they will only plug into their sockets one way. You can often plug either end of a cable into a socket, if necessary.

Remember Pin 1

Ribbon cables (the flat, grey cables) may have connectors that aren't keyed, making it possible to plug the connectors in backwards. This can damage the K2500, and may also cause personal injury. Therefore, always plug the connector's **pin 1** side, marked with a <u>red line</u> on the cable, into the socket's **pin 1** side, marked by a "1" on the board silkscreen.

Scanner Diagnostics

Scanner Diagnostics

Every test in this chapter requires use of Scanner Diagnostics. To call up this program, simply press the 4, 5, and 6 buttons (on the alphanumeric keypad) all at once when in Program mode. The K2500 will respond by lighting each LED in sequence and then displaying text such as the following on the LCD:

K2500 SCANNER DIAGNOSTICS VERSION 3.5
(PRESS"EXIT" AND "ENTER" TO EXIT)
BATTERY=4.3VOLTS, WHEEL CENTER=128
XXXXXXXXXXXXXXXXXXX

The first line shows which version of the Scanner EPROM Chip is installed. If the display doesn't show the most up-to-date Scanner version, you should replace the Scanner EPROM Chip (see page 3-20 for rack units, or 4-41 for keyboard units.) If you have an early version Scanner and cannot replace it, heed the notes in square brackets [] throughout this chapter.

The Scanner Diagnostics can be used to check out the front panel components. If you turn the Alpha Wheel clockwise, the numbers will go 0-1-2-3-0-1-2...while turning it counterclockwise should produce 3-2-1-0-3-2-1... If you press a button, its name will be shown and if it is one of the mode buttons, its associated LED should flash.

The third line of the display shows the results of two measurements that are made whenever your K2500 is turned on. The battery voltage will be about 4.3 volts for new batteries, gradually declining over time to 3.2 volts, at which point you will start to get warnings (see "Battery Selection and Replacement" on page 1-8). "Wheel Center" applies only to keyboard units.

The fourth line (represented by XXXX) gives a readout identifying the buttons you press.

K2500/X Main Control Panel Board Test



WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500 off!

- Turn the K2500 on.
- 2. Wait for system initialization.
- 3. Press buttons 4,5, & 6 simultaneously to enter Scanner Diagnostics.

4. Press each button listed below twice. The LCD will identify each button pressed. Most of these buttons are located to the right of the eight sliders; the panel switches (PC 1 and PC 2) are located above the Pitch and Mod wheels.

Buttons with a LED (shown below in bold print) will light up in red both times. Buttons with dual-color LEDs (shown below in italics) will alternately light up red and green. Only the LED for that button should turn on. [For early version scanners, dual color LEDs will light red when Slider 2 is down and green when Slider 2 is up.]

If there is a problem with this test, then there may a problem with the Main Control Panel Board.

RECORD	CHANNEL	DOWN	6
STOP	LAYER	LEFT	7
PLAY	EXIT	UP	8
EFFECT	Α	RIGHT	9
Q ACC	В	-	0
SETUP	С	+	EDIT
PROGRAM	D	1	CLEAR
DISK	E	2	ENTER
SONG	F	3	CANCEL
MASTER	PC 1	4	+/-
MIDI	PC 2	5	

- 5. Turn the Data Wheel clockwise.
- 6. The LCD should continuously count 0-1-2-3-0-1-2...
- 7. The Control Panel test is now complete. Turn the K2500 off.

K2500/X Player Control Board Test

Equipment Required For Test

- 15mm Diameter Cylinder (a thick marking pen will work)
- Small flat-head screwdriver

Beginning the Test



WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500 off!

- 1. Turn the K2500 on.
- 2. Wait for system initialization.
- 3. Press buttons 4,5, and 6 simultaneously to enter Scanner Diagnostics.

K2500/X Player Control Board Test

Adjusting the Player Control Board Pots

The Player Control Board, located under the Pitch and Mod wheels, has five pots that you use to adjust the response for the Wheels, Ribbons, and Keys. Whenever you are instructed to make an adjustment, insert a small flat-head screwdriver into the appropriate hole under the K2500; then use the screwdriver to turn the pot until the correct reading shows up on the LCD.

Figure 6-1 shows the holes, located on the bottom left corner of the K2500 as you face the keyboard.

Here is a list of the pots and their functions:

- R13 Ribbon–Adjusts the Small Ribbon's pressure sensitivity.
- R21 Pitch–Adjusts the Pitch Wheel's center.
- · R25 Mod-Adjusts the Mod Wheel's center.
- R15 Black-Adjusts Black Key pressure sensitivity (K2500X only).
- R17 White–Adjusts White Key pressure sensitivity on K2500X; adjusts White *and* Black Key pressure sensitivity on 76-key K2500.



E: Do **not** apply glue to any Player Control Board pots. They are user-adjustable.

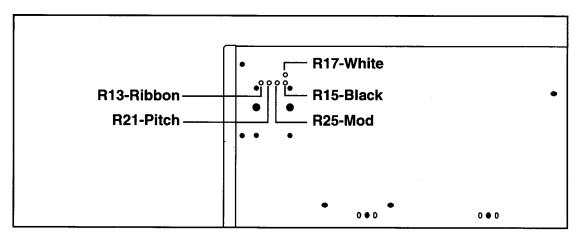


Figure 6-1. Bottom of K2500, showing pot locations.

Adjusting the PITCH and MOD Wheels

- 4. Move and release the Pitch wheel; the LCD should identify the Pitch wheel.
- 5. Adjust R21 for a reading of 127. (+/-1)
- 6. Align the Mod wheel by laying the cylinder (or marking pen) across the two wheels. The LCD should identify the Mod wheel.
- 7. Adjust R25 for a reading of 127. (+/-1)

PITCH/MOD Wheel Interface

- 8. Move the Pitch wheel from bottom to top. The LCD should identify the wheel, and read 0 at the bottom and increase to 255 at the top. (+/- 1)
- 9. Move the Mod wheel from bottom to top. The LCD should identify the wheel, and read 0 at the bottom and increase to 255 at the top. (+/- 1)

Adjusting Black/White Key Pressure (88-key K2500X)

- 10. Press any black key.
- 11. Adjust R15 so that a reading of 255 occurs with moderate finger pressure.
- 12. Press any white key.
- 13. Adjust R17 so that a reading of 255 occurs with moderate finger pressure.

Adjusting Black/White Key Pressure (76-key K2500)

- 14. Press the white and black keys.
- 15. Adjust R17 so that a reading of 255 occurs with moderate finger pressure on both the white and black keys.

Adjusting Small Ribbon Pressure

- 16. Set R13 to the center position.
- 17. Press the Small Ribbon in one spot. The LCD should show "PRESS=" and "POS=" values. [Early scanners only show one value at a time. If "SHORT PRESS" does not show, press any panel button once to switch between Position and Pressure display mode.]
- 18. Adjust R13 so that a PRESS value of 255 occurs with moderate finger pressure. You should not have to press hard to get to 255.

Small Ribbon Position

- 19. Press the Mini Ribbon in one spot. The LCD should show "PRESS=" and "POS=" values.
- 20. Slide your finger from left to right. The LCD POS value should read 0 at the left and increase to 255 at the right.

Super Ribbon Position

The Super Ribbon is divided into three sections, each having 256 steps of resolution. The two smaller arrows above the ribbon show where the sections end. [Early version scanners show just one section at a time, and may flicker when two sections are activated together.]

- 21. Slide your finger across section 1 of the Super Ribbon from left to right. The LCD should indicate section 1, reading 0 at the left and increasing to 255 at the right. (+/-1)
- 22. Slide your finger across section 2 of the Super Ribbon from left to right. The LCD should indicate section 2, reading 255 at the left and decreasing to 0 at the right. (+/- 1)
- 23. Slide your finger across section 3 of the Super Ribbon from left to right. The LCD should indicate section 3, reading 0 at the left and increasing to 255 at the right. (+/-1)

Calibration Tests

K2500/X Player Control Board Test

Super Ribbon Touch Bits

- 24. Press and hold any point on the first section. The LCD should read the section and position of your finger. The LCD reading should disappear right away when you release your finger.
- 25. Repeat this test for the second and third sections.

Super Ribbon Center

26. Press the center of the middle ribbon section (indicated by a down arrow.) You should see a reading of 127 when your finger is within +/- 3mm (1/8 inch) of the point marked by the arrow.

The test is now complete. Turn the K2500 off.

K2500/X Slider Board Test

Equipment Required For Test

Stereo Headphones

Test



WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500 off!

- 1. Plug headphones into the rear panel Headphones jack.
- 2. Turn the K2500 on.
- 3. Wait for system initialization.
- 4. Play the keyboard while you move the Volume slider up and down. The volume should increase and decrease evenly, smoothly, and without static.
- 5. Press buttons 4,5, & 6 simultaneously to enter Scanner Diagnostics.
- 6. Move Sliders 1 to 8 from bottom to top. The LCD should identify each slider, reading 0 at the bottom and increasing to 255 at the top. (+/-1) [With early scanner versions, Slider 1 will also change the display contrast so it may not be possible to see its bottom and top readings.]
- 7. Press each button listed below twice; the LCD will identify the button pressed, and the LED will alternately turn red and green. Only the LED for that button should light up.

The SLIDER buttons are located above the eight sliders; the MIDI FADERS, MIXDOWN, and SOLO buttons (AUX 1-3) are located to the left of these sliders. [For early version scanners, dual color LEDs will light red when Slider 2 is down and green when Slider 2 is up.]

AUX 1 (MIDI FADERS)	SLIDER 4
AUX 2 (MIXDOWN)	SLIDER 5
AUX 3 (SOLO)	SLIDER 6
SLIDER 1	SLIDER 7
SLIDER 2	SLIDER 8
SLIDER 3	

- 8. Press each of the Panel Switches (the buttons above the Pitch and Mod wheels). The LCD will identify PC1 (left) and PC2 (right), and the LED will turn red. Only the LED for that switch should turn on.
- 9. The test is now complete. Turn the K2500 off.

K2500/X Digital I/O Board Test

K2500/X Digital I/O Board Test

Equipment Required For Test

- Switch Pedal
- Control Pedal
- Breath Controller

If any of the above items is not available, you must build a fake pedal or controller; see Appendix A for instructions.

Beginning the Test



WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500 off!

- 1. Turn the K2500 on.
- 2. The LCD should light up with no dark areas.
- 3. Wait for system initialization.
- 4. Press buttons 4,5, & 6 simultaneously to enter Scanner Diagnostics.

Switch Pedal Test

- 5. Plug the switch pedal into J503, Switch Pedal 1.
- 6. Press the pedal, the LCD should identify Switch Pedal 1.
- 7. Repeat test for J504-Switch Pedal 2, J505-Switch Pedal 3, and J506-Switch Pedal 4.

Control Pedal Test

- 8. Plug the control pedal into J509, CONTROL 1.
- 9. Move the control pedal, the LCD should identify CTRL PEDAL 1.
- 10. With the control pedal all the way down, the LCD should read 0. (+/-1)
- 11. With the control pedal all the way up, the LCD should read 255. (+/-1)
- 12. Repeat test for J510-CONTROL 2.

Breath Controller Test (Real Breath Controller)

This test requires a breath controller.

- 13. Plug the breath controller into J511, BREATH.
- 14. Blow into the breath controller; the LCD should identify CTRL PEDAL 2.
- 15. Without blowing into the breath controller, the LCD should read 0. (+/-1)
- 16. Blow enough air into the breath controller so that the LCD reads 255. (+/-1)
- 17. The test is now complete. Turn the K2500 off.

Breath Controller Test (Fake Breath Controller)

- 18. Plug the fake breath controller into J511, BREATH. (See Appendix A for a fake breath controller schematic.)
- 19. Move the fake breath controller; the LCD should identify CTRL PEDAL 2.
- 20. With the fake breath controller all the way down; the LCD should read 0. (+/-1)
- 21. With the fake breath controller all the way up; the LCD should read 255. (+/-1)
- 22. The test is now complete. Turn the K2500 off.

K2500/X Power Supply Board Test

Equipment Required For Test

- DVM with 2 decimal places minimum
- · Variac with rating of 3 Amps or higher

Inspection

- 1. If the K2500 is on, turn it off.
- 2. Open the K2500 (see Chapter 4.)
- 3. Inspect the Board for obvious electrical problems, such as frayed cables, melted components, etc.

Test



WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500 off!

- 4. Connect the AC mains of the K2500 to the variac.
- 5. Set the variac output to 0.
- 6. Connect the "-" lead of the DVM to TP101 (Digital Ground) on the Power Supply Board.
- 7. Connect the "+" lead of the DVM to TP107 (Battery Voltage) on the Power Supply Board. The voltage must be +3.5 to +4.3Vdc.
- 8. If you don't have a variac, do steps 9 and 10, cross your fingers, and turn the K2500 on.
- 9. Connect the "-" lead of the DVM to TP101 (Digital Ground) on the Power Supply Board.
- 10. Connect the "+" lead of the DVM to TP108 (Reset-Out) on the Power Supply Board. The voltage should be below +0.25VDC.
- 11. Slowly turn the variac to 100VAC. The Fan will start to spin.
- 12. The voltage on TP108 should be +4.75 to +5.25VDC.
- 13. Connect the "-" lead of the DVM to J103.1 of the power supply.
- 14. Connect the "+" lead of the DVM to J103.2 of the power supply.

K2500/X Power Supply Board Test

- 15. Adjust R6 for +5.09 to +5.11 Vdc
- 16. Connect the "-" lead of the DVM to TP101 (Digital Ground) on the Power Supply Board.
- 17. Connect the "+" lead of the DVM to the following test points. The voltage at each test point must be in the ranges specified below:

TP107	+5.00	to	+5.10 Vdc
TP104	+11.75	to	+12.25 Vdc
TP105	-11.75	to	-12.25 Vdc
TP106	-14.75	to	-15.25 Vdc

- 18. Connect the "-" lead of the DVM to J105, pin 1 of the Power Supply Board.
- 19. Connect the "+" lead of the DVM to the following test points. The voltage at each test point must be in the ranges specified below:

TP109 +6.50 to +7.50 Vdc

TP114 +15.7 to +22.5 Vdc
$$\text{w}/700\text{mVrms}$$
 ripple max.

TP113 +11.75 to +12.25 Vdc

- 20. Slowly turn the variac up to 125VAC.
- 21. Let the power supply warm up for 1 minute.
- 22. Connect the "+" lead of the DVM to TP113. The voltage should still be +11.75 to +12.25 Vdc
- 23. Connect the "-" lead of the DVM to TP101 (Digital Ground) on the Power Supply Board.
- 24. Connect the "+" lead of the DVM to TP108 (Reset-Out) on the Power Supply Board. The voltage should be +4.75 to +5.25VDC. (HIGH)

The remaining steps require a variac.

- 25. Turn the variac down until TP108's voltage trips LOW.
- 26. Slowly turn up the variac until TP108's voltage trips HIGH and doesn't toggle.
- 27. Measure the AC voltage at the variac. The voltage should be less than 93.0VAC
- 28. The test is now complete. Turn the K2500 off.

K2500/X Audio I/O Board Test

Equipment Required For Test

- Audio Mute Jumper (you must make a special test jumper for the MUTE Tests; see Appendix A for instructions.)
- Oscilloscope
- Two 1/4" Stereo Plugs
- Kurzweil Test Disk (included with your K2500 Service Manual)

Beginning the Test



WARNING:

If smoke or a burning smell occurs during this test, quickly shut the K2500 off!



WARNING:

This test produces loud sustained sine waves! No audio system or headphones should be connected to the K2500 while you run this test.

- 1. Turn the K2500 on.
- 2. Wait for system initialization.
- 3. Insert the Kurzweil K2500 Test Disk into the Floppy Drive. (Your manual should have come with this disk. If you didn't get one, contact your local Kurzweil Representative.)
- 4. Press the Disk button on the Control Panel.
- 5. Choose "Floppy." Press LOAD.
- 6. Choose "HOTSINES," press **OK** twice.
- 7. Press APPEND.

Hot Sines Test

- 8. Move the Volume slider all the way down.
- 9. Press the Program button.
- 10. Using the Data Wheel, scroll to and highlight the "Hot Sep Sines NR" program.

CAUTION:

The "Hot Sines" programs will produce maximum volume sine waves on all the separate outputs. They are non-release; press **PANIC** to stop.

11. Press any key on the keyboard.

K2500/X Audio I/O Board Test

12. Using one 1/4" Stereo plug check each separate audio output.

A Left	110Hz	>11.6Vpp
A Right	165Hz	>11.6Vpp
B Left	220Hz	>11.6Vpp
B Right	330Hz	>11.6Vpp
C Left	440Hz	>11.6Vpp
C Right	660Hz	>11.6Vpp
D Left	880Hz	>11.6Vpp
D Right	1320Hz	>11.6Vpp

MUTE Test

You must open the unit to perform this test (see Chapter 4 for instructions.)

- 13. Turn the K2500 off.
- 14. Attach the MUTE jumper between Q1-base and Q1-collector (see Appendix A for a MUTE jumper schematic.)
- 15. Turn the K2500 on.
- 16. Press the Program button.
- 17. Using the Data Wheel, scroll to and highlight the "Hot Sep Sines NR" program.



CAUTION:

The "Hot Sines" programs will produce maximum volume sine waves on all the separate outputs. They are non-release; press **PANIC** to stop.

- 18. Press any key on the keyboard.
- 19. Recheck the separate audio outputs; the signal should be less than 0.16Vpp (35dB reduction).
- 20. Remove the MUTE jumper from Q1-base and Q1-collector.
- 21. Press PANIC.
- 22. Put the two stereo 1/4" plugs into the Mix Outputs.
- 23. Choose "Hot Mix Sines" from the Program page.



CAUTION:

The "Hot Mix Sines" program will produce maximum volume sine waves on all the mix outputs. They are non-release; press **PANIC** to stop.

- 24 Press any key on the keyboard.
- 25. Move the Volume slider all the way up.

26. Using the 1/4" Stereo Plug, check the following audio outputs:

Mix Left

110Hz >7.25Vpp

Mix Right

165Hz >7.25Vpp

27. Move the Mix Right Stereo Plug to the Headphone jack.

Phones Left

110Hz >18.4Vpp

Phones Right 165Hz >18.4Vpp

28. Check the Mix Left audio output. Mix Left should be a mixture of 110 and 165Hz, and not clipping (see Figure 6-2.)

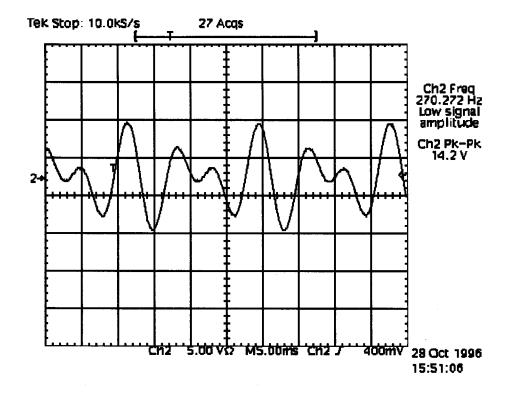


Figure 6-2. Mixture of 110Hz and 165Hz.

- 29. Move the 1/4" Stereo Plug back into the Mix Right jack.
- Attach the MUTE jumper between Q1-base and Q1-collector.
- 31. Recheck the Mix & Phones outputs. The signal should be approximately 100mVpp, with a 35dB reduction.
- 32. Remove the MUTE jumper from Q1-base and Q1-collector.
- 33. Press PANIC.
- 34. The test is now complete. Turn the K2500 off.

K2500/X Audio Board Test

Equipment Required For Test

- Oscilloscope with 1X Probe
- DMM with 2 decimal places minimum.
- Pot Glue (do not use permanent glue)
- Audio Mute Jumper (you must make a special test jumper for the MUTE Tests; see Appendix A for instructions.)
- · Sampler Audio Fake Cable (see Appendix A for instructions.)
- Two 1/4" Load Plugs 10K ohm (see Appendix A for instructions.)
- One 1/4" Stereo Load Plug 100 ohm (see Appendix A for instructions.)
- · High Quality Headphones

Distortion, Clipping, and DC Offset

In the following tests, you will measure signals coming from the K2500's Audio Outputs. These signals should not have distortion, clipping, or DC offset. Distortion and clipping typically appear as a flat-top on the positive and/or negative peaks of a waveform. DC offset is measured in volts; more than 0.10V of DC offset is too much.

Test



WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500 off!

- 1. Turn the K2500 off.
- 2. Open the K2500.
- 3. Insert the 10K ohm load plugs into the "A" Audio outputs.
- 4. Insert the 100 ohm load plug into the Headphone output.
- 5. If this unit has a Sampling Option Board installed, remove the four screws holding this board to the rear panel. Carefully place the board aside, being careful not to short the board to any other board or to the K2500's chassis. Then unplug the 5-pin Sampler cable from J706 on the Audio Board.
- 6. Plug the 5-pin Sampler Fake cable into J706 on the Audio Board.
- 7. Connect the "-" lead of the DMM to the K2500's chassis.
- 8. Turn the K2500 on.
- 9. The Control Panel and Slider LEDs will flash. Wait for system initialization.

LCD Contrast Calibration

- 10. Press the Master button to enter Master mode. Set the Contrast parameter to "0".
- 11. Connect the "+" lead of the DMM to TP13.
- 12. Connect the "-" lead of the DMM to the K2500's chassis.
- 13. Adjust R72 to -8.89 to -8.91 volts for Samsung display, or -8.64 to -8.66 for Optrex display.
- 14. Glue R72.

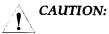
Check Audio Chain



WARNING:

This test produces loud sustained sine waves! No audio system or headphones should be connected to the K2500 while you run this test.

- 15. Press the Disk button on the Control Panel.
- 16. Insert the Kurzweil K2500 Test Disk into the Floppy Drive.
- 17. Press the Disk button on the Control Panel.
- Choose "Floppy." Press LOAD.
- Choose "AUDIOTST," press **OK** twice.
- 20. Press APPEND.
- 21. Press the Program button.
- 22. Using the Data Wheel, find and highlight the "CLIP Sep Sine NR" program.



The "CLIP Sep Sine" program will produce maximum volume sine waves on all the separate outputs. They are non-release; press PANIC to stop.

- 23. Move the Volume slider all the way down.
- Press PANIC.
- 25. Press any key on the keyboard.
- 26. Move the load plugs into the B, C, and D separate audio outputs. Check for a 110Hz signal, greater than 9.85Vpp, from each output. All the waveforms should be free from distortion, clipping, and DC offset.
- 27. Choose "CLIP Fon Sine NR" from the Program page.



CAUTION:

The "CLIP Fon Sines NR" program will produce maximum volume sine waves on the headphone output. They are non-release; press PANIC to stop.

- Press PANIC.
- 29. Move the load plugs from the separate outputs into the "Mix" outputs.
- 30. Press any key on the keyboard.
- 31. Move the Volume slider all the way up.
- 32. Check the left and right headphone output on the Audio I/O for a 110Hz signal, greater than 10.25Vpp. All the waveforms should be free from distortion, clipping, and DC offset.
- Press PANIC.
- 34. Choose "CLIP Mix Sine NR" from the Program page.



CAUTION:

The "CLIP Mix Sine NR" program will produce maximum volume sine waves on all the Mix outputs. They are non-release; press PANIC to stop.

K2500/X Audio Board Test

- 35. Press PANIC.
- 36. Press any key on the keyboard.
- 37. Move the Volume slider all the way up.
- 38. Check each mix output on the Audio I/O for a 110Hz signal, greater than 8.55Vpp. Both waveforms should be free from distortion, clipping, and DC offset.
- 39. Remove the "Right Mix" load plug and check the Left Mix audio output.
- 40. Mix Left should be a 110 Hz signal, greater than 18.0Vpp, and not clipping.
- 41. Replace the "Right Mix" load plug.
- 42. Check Pin 1 and 2 of J706 (Sampler) for a 110Hz signal, greater than 9.85Vpp. Both waveforms should be free from distortion, clipping, and DC offset.
- 43. Remove the Right and Left Mix load plugs, Then plug the 1/4" ends of the Sampler Fake Cable into the Mix audio outputs.
- 44. Check each Mix output for a 110Hz signal, greater than 8.55Vpp. Look for a flat-top on the positive and negative peaks.
- Press PANIC.
- 46. Replace the load plugs in A Left and A Right.
- 47. Choose "FR Sep Square NR" from the Program page.



CAUTION: The "FR Sep Square NR" program will produce maximum volume square waves on all the separate outputs. They are non-release; press **PANIC** to stop.

- 48. Press PANIC.
- 49. Move the Volume slider all the way down.
- 50. Press any key on the keyboard.
- 51. Move the load plugs to each separate output on the Audio I/O board. Check each separate output for a 207Hz signal, greater than 4.0Vpp. All the waveforms should look as shown in Figure 6-3. The top and bottom should not slope, and the ringing should be present before and after the rising and falling edges.

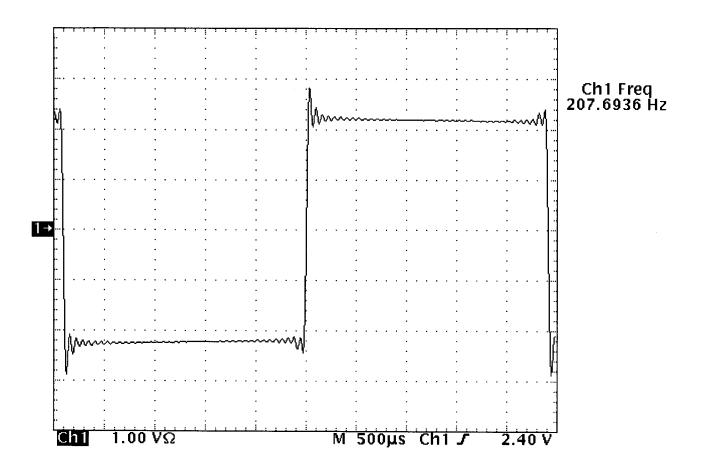


Figure 6-3. Separate Out Frequency Response Test Wave.

52. Choose "FR Mix Square NR" from the Program page.



CAUTION:

The "FR Mix Square NR" program will produce maximum volume square waves on the mix outputs. They are non-release; press **PANIC** to stop.

- 53. Press PANIC.
- 54. Move the load plugs from the separate outs into the "Mix" outs.
- 55. Press any key on the keyboard.
- 56. Move the Volume slider all the way up.
- 57. Check each Mix and Headphone output on the Audio I/O for a 207Hz signal, greater than 5.0Vpp. The waveforms should look as shown in Figure 6-4. The waveform's top and bottom should not slope more than 3/4 of a division. The rise and fall should not slope or curve, and the ringing should be present.

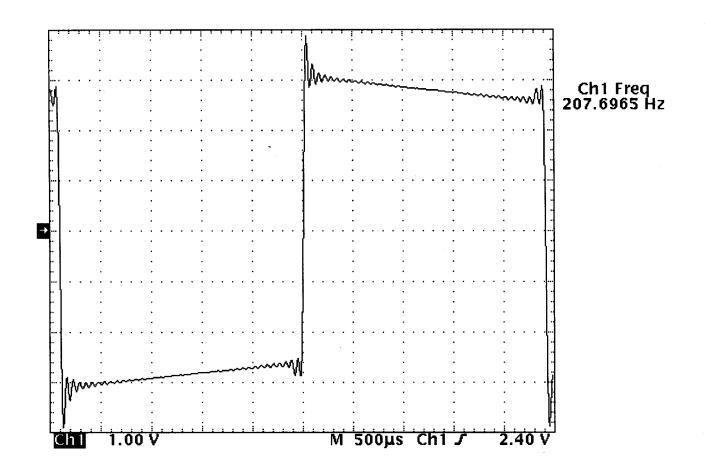


Figure 6-4. Mix/Phones Output Frequency Response Test Wave.

58. Select "FR FX Square NR" from the Program page.



CAUTION: The "FR FX Square NR" program will produce maximum volume square waves on the mix outputs. They are non-release; press **PANIC** to stop.

- Press PANIC.
- 60. Press any key on the keyboard.
- 61. Move the Volume slider all the way up.
- 62. Check each mix and headphone output on the Audio I/O for a 207Hz signal, greater than 5.25Vpp. The waveforms should look as shown in Figure 6-5. The waveform's top and bottom should not slope more than 1 1/2 divisions. The rise and fall should not slope or curve, and there should be no perceptible ringing around the rising and falling edges.
- 63. Press PANIC.

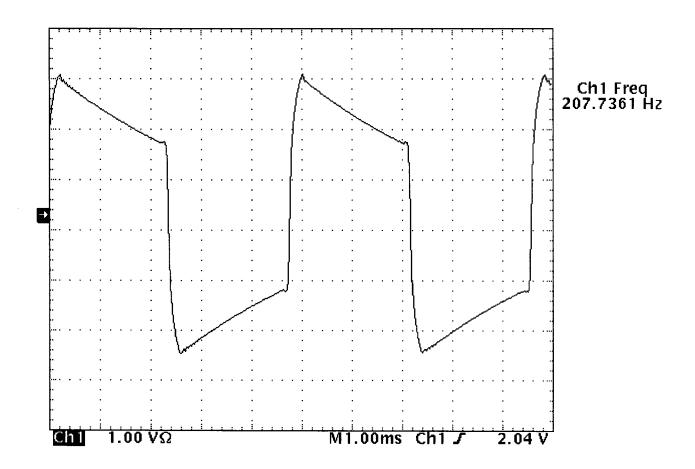


Figure 6-5. FX Mix Frequency Response Test Wave.

Check Mute circuit

- 64. Connect the "+" lead of the DMM to TP15.
- 65. TP15 should be -14.65 to -15.15 volts.
- 66. Attach the MUTE jumper between Q1-base and Q1-collector.
- 67. TP15 should be 11.75 to 12.25 volts.
- 68. Remove the MUTE jumper from Q1-base and Q1-collector.

Adjust DOD Effects

- 69. Press the Program button on the Control Panel.
- 70. Choose "SINELOW NR"

Adjust Gain and Offset

- 71. If the scope has a "Bandwidth limit" switch, turn it on to see the low level waveforms more clearly. In the following steps, be sure to ground the scope probe where indicated with a short ground lead for a clear display.
- 72. Place the scope CH1 ground on TP2, and the tip on TP6, set for 2v/div, 5us.
- 73. Adjust R168 (gain) for 4v peak.
- 74. Adjust R167 (offset) for equal pos/neg fluctuations (see Figure 6-6.)

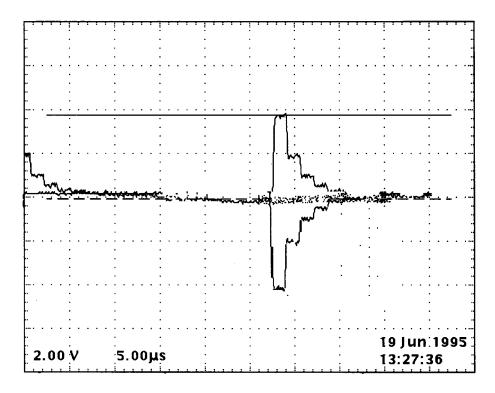


Figure 6-6. Gain and initial offset adjustment.

Adjust the MSB

- 75. Place the scope CH1 ground on TP2, and the tip on TP4. Set the scope for 5mv/div 1ms DC coupling.
- 76. Play any note. Press **PANIC** to stop the note.
- 77. Adjust R169 for best sine wave shape (see Figure 6-7 and Figure 6-8.) There should be no DC offset.
- 78. Check TP5, it should be the same as TP4.

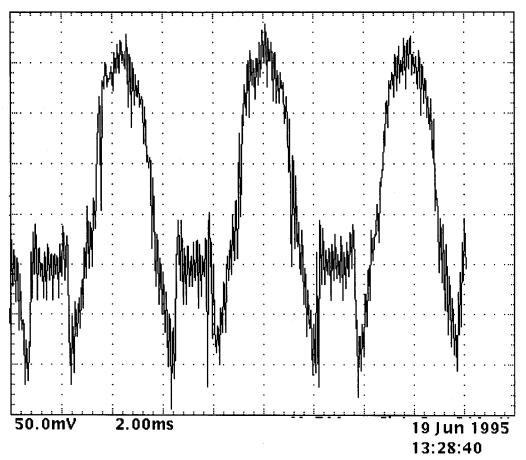


Figure 6-7. MSB before adjustment (with distortion)

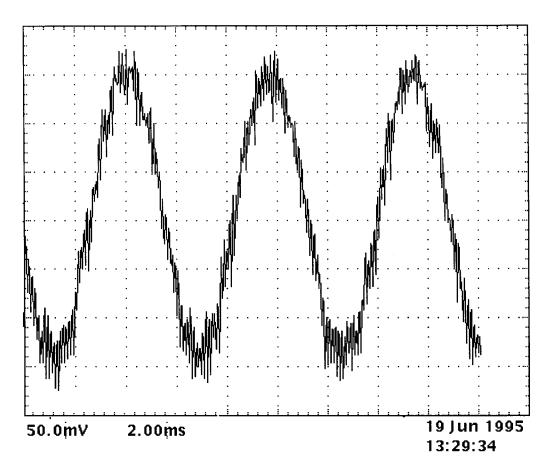


Figure 6-8. MSB after adjustment (no distortion)

Offset Final Adjust

- 79. Attach scope CH 1 to TP6. Set scope channel 1 for 2vdiv,2ms.
- 80. Play any key on the keyboard.
- 81. Adjust R167(offset) for 75:25% duty cycle (see Figure 6-9.)
- 82. Press PANIC.
- 83. Glue R167, R168, & R169.

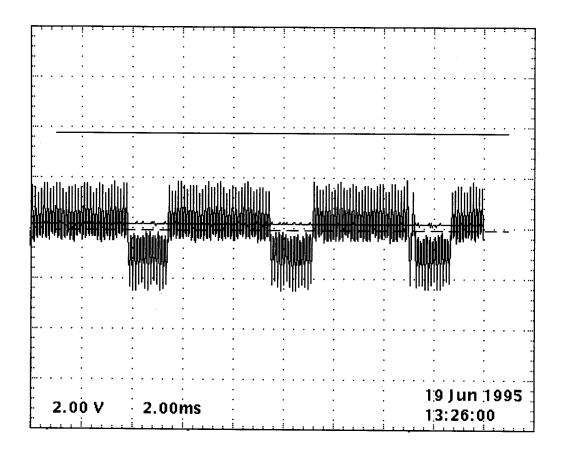


Figure 6-9. Final Offset adjustment

Check FX Quality

- 84. Press the Program button.
- 85. Choose "Long Echo"
- 86. Set the volume to half level.
- 87. Put the headphones on, then strike any key. You should hear C4 (261Hz), passing from left to right to left...etc until it decays approximately 20 seconds. Listen for distortion through the entire decay.
- 88. Choose "Huge Room"
- 89. Strike any key. You should hear C4 (261Hz) then a long reverberation as in a very large room. Listen for distortion throughout the entire decay.
- 90. Choose "Flange NR"

CAUTION:

The "Flange NR" program will produce a non-release 130Hz sawtooth wave. Press PANIC to stop.

K2500/X Audio Board Test

- 91. Strike any key. You should hear a clear flanging sound.
- 92. This test is now complete.

Check Control Panel Interface

93. Press the 4, 5, and 6 buttons on the alphanumeric keypad simultaneously to enter Scanner Diagnostics. Press each button listed below; the LCD will identify the button pressed. If the switch has an LED (as indicated by bold print) it will light up red. Only the LED for that switch should turn on.

PROGRAM	Е	AUX3 (SOLO)
Q ACCESS	F	SLID 4
A	EXIT	SLID 8
В	RIGHT	
С	+	
D		

94. Press each of the following buttons twice; the LED will alternately light up red and green. Only the LED for that switch should turn on. [For early version scanners, dual color LEDs will light red when Slider 2 is down and green when Slider 2 is up.]

AUX1 (MIDI FADERS)
SLID 4
SLID 8

95. Turn the Data Wheel clockwise. The LCD should continuously count 0 - 1 - 2 - 3 - 0 - 1 - 2...

Check Slider Board Interface

- 96. Press and hold Button A, and move Slider 1 from bottom to top. The LCD contrast should blank out at the bottom, and increase to completely washed out at the top. [With early scanner versions, it is not necessary to press Button A.]
- 97. Re-adjust Slider 1 so that the LCD is readable. Release Button A.
- 98. Move Sliders 1 to 8 from bottom to top. The LCD should identify each slider, reading 0 at the bottom and increasing to 255 at the top. (+/-1) [With early scanner versions, Slider 1 will also change the display contrast so it may not be possible to see its bottom and top readings.]

Check Player Control Interface

- 99. Move the PITCH wheel from bottom to top. The LCD should identify the wheel, reading 0 at the bottom and increasing to 255 at the top. (+/-1)
- 100. Move the MOD wheel from bottom to top. The LCD should identify the wheel, reading 0 at the bottom and increasing to 255 at the top. (+/-1)

Check Key Pressure

101. Press any white key. The LCD should identify the KEY PRES, read 0 with light force, then increase to 255 when changing to moderate force.

Check Mini Ribbon Position

- 102. Press the Mini Ribbon in one spot. The LCD should show "PRESS=" and "POS=" values. [Early scanners only show one value at a time. If "SHORT PRESS" does not show, press any panel button once to switch between Position and Pressure display mode.] A PRESS value under 25 should occur with light force, and increases to 255 when changing to moderate to heavy force. You should not have to press hard to get to 255. (+/-1)
- 103. Slide your finger from left to right. The POS value should be 0 at the left and increase to 255 at the right. (+/-1)

Switch Pedal Test

- 104. Insert the switch pedal into J503, PEDAL 1.
- 105. Press the pedal. The LCD should identify PEDAL 1.
- 106. Repeat the test for J504-PEDAL 2, J505-PEDAL 3, and J506-PEDAL 4.

Control Pedal Test

- 107. Insert the control pedal into IJ509, CONTROL 1.
- 108. Move the control pedal; the LCD should identify CTRL PEDAL 1.
- 109. With the pedal all the way down, the LCD should read 0, and increase to 255 at the top. (+/-1)
- 110. Repeat this test for J510-CONTROL 2.

Check Keyboard Interface

111. Slowly press each of the following notes on the keyboard. As you press each note the LCD will identify the key pressed, and the key number, indicating the first switch contact (break). As you continue to press the note, the LCD will identify the key pressed and the key number a second time, indicating the second switch contact (make). The LCD should only identify the key pressed and should not say ** ERROR **.

KEY	KEY#	KEY	KEY#
A 0	21	D4	62
A# 0	22	D#4	63
B 0	23	E4	64
C1	24	F4	65
C#1	25	F#4	66
D1	26	G4	67
D#1	27	G#4	68
E1	28	A4	69
F1	29	F5	77
C#2	37	C#6	84
A2	4 5	A6	93
F3	53	F 7	101
C#4	61		

K2500R Power Supply Test

K2500R Power Supply Test

NOTE

In rack units, the Power Supply's components are located on the Audio Board, next to the Heat Sink.

Equipment Required For Test

- DVM with 2 decimal places minimum
- Variac

Beginning the Test

- If the K2500R is on, turn it off.
- 2. Open the K2500R (see Chapter 3.)
- 3. Connect the AC mains of the test fixture to the variac.
- 4. Set the variac output to 0.

Inspection

5. Inspect the Board for obvious electrical problems, such as frayed cables, melted components, etc.

Test



WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500R off!

- 6. Connect the "-" lead of the DVM to the anode of D9 (Digital Ground) on the Audio Board.
- 7. Connect the "+" lead of the DVM to the cathode (banded) of D11 (Battery Voltage) on the Audio Board. The voltage must be +3.5 to +4.3Vdc.
- 8. If you don't have a variac, do steps 9 and 10, cross your fingers, and turn the K2500R on.
- 9. Connect the "-" lead of the DVM to the anode of D9 (Digital Ground) on the Audio Board.
- 10. Connect the "+" lead of the DVM to U61-2 (Reset-Out) on the Audio Board. The voltage should be below +0.25VDC.
- 11. Slowly turn the variac to 100VAC. The Fan will start to spin.
- 12. The voltage on U61-2 should be +4.75 to +5.25VDC.
- 13. Connect the "-" lead of the DVM to the anode of D9 on the Audio Board.
- 14. Connect the "+" lead of the DVM to the anode of D11 on the Audio Board.
- 15. Adjust R180 for +5.09 to +5.11 Vdc
- 16. Connect the "-" lead of the DVM to the anode of D9 (Digital Ground) on the Audio Board.

17. Connect the "+" lead of the DVM to the following test points. The voltage at each test point must be in the ranges specified below:

TP16	+5.00	to	+5.10 Vdc
TP19	+11.75	to	+12.25 Vdc
TP24	-11.75	to	-12.25 Vdc
Pin 3 VR1	-14.75	to	-15.25 Vdc
TP21	+4.75	to	+5.25 Vdc

- 18. Connect the "-" lead of the DVM to J105, pin 1 of the Audio Board.
- 19. Let the power supply warm up for 1 minute.
- 20. Connect the"+" lead of the DVM to TP19. The voltage should still be +11.75 to +12.25 Vdc.
- 21. Connect the "-" lead of the DVM to the anode of D9 (Digital Ground) on the Audio Board.
- 22. Connect the "+" lead of the DVM to U62 Pin 2 (Reset-Out) on the Audio Board. The voltage should be +4.75 to +5.25Vdc. (HIGH)

The remaining steps require a variac.

- 23. Turn the variac down until U61 Pin 2's voltage trips LOW (<0.5 Vdc).
- 24. Slowly turn up the variac until U61 Pin 2's voltage trips HIGH (>4.75 Vdc) and doesn't toggle.
- 25. Measure the AC voltage at the variac. The voltage should be less than 93.0Vac.
- 26. The test is now complete. Turn the K2500R off.

K2500R Connector Board Test

Equipment Required For Test

- Audio Mute Jumper (you must make a special test jumper for the MUTE Tests; see Appendix A for instructions.)
- Oscilloscope
- Two 1/4" Stereo Plugs
- Kurzweil Test Disk (included with your K2500 Service Manual)

Beginning the Test



WARNING:

If smoke or a burning smell occurs during this test, quickly shut the K2500R off!



WARNING:

This test produces loud sustained sine waves! No audio system or headphones should be connected to the K2500R while you run this test.

- 1. Turn the K2500R on.
- 2. Wait for system initialization.

K2500R Connector Board Test

- Insert the Kurzweil K2500R Test Disk into the Floppy Drive.
- 4. Press the Disk button on the Control Panel.
- 5. Choose "Floppy." Press LOAD.
- 6. Choose "HOTSINES," press **OK** twice.
- 7. Press APPEND.

Hot Sines Test

- 8. Turn the volume all the way down.
- 9. Press the Program button.
- 10. Using the Data Wheel, scroll to and highlight the "Hot Sep Sines NR" program.
- CAUTION: The "Hot Sines" programs will produce maximum volume sine waves on all the separate outputs.

 They keep playing by themselves, so press PANIC to stop.
 - 11. Press and hold the "Cancel" button, then press any other button on the keypad.
 - 12. Using one 1/4" Stereo plug check each separate audio output.

A Left	110Hz	>11.6Vpp
A Right	165Hz	>11.6Vpp
B Left	220Hz	>11.6Vpp
B Right	330Hz	>11.6Vpp
C Left	440Hz	>11.6Vpp
C Right	660Hz	>11.6Vpp
D Left	880Hz	>11.6Vpp
D Right	1320Hz	>11.6Vpp

MUTE Test

You must open the unit to perform this test (see Chapter 3 for instructions.)

- 13. Turn the K2500R off.
- 14. Attach the MUTE jumper between Q15-base and Q15-collector (see Appendix A for a MUTE jumper schematic.)
- 15. Turn the K2500R on.
- 16. Press the Program button.

17. Using the Data Wheel, scroll to and highlight the "Hot Sep Sines NR" program.



CAUTION:

The "Hot Sines" programs will produce maximum volume sine waves on all the separate outputs. They keep playing by themselves, so press **PANIC** to stop.

- 18. Press and hold the "Cancel" button, then press any other button on the keypad.
- 19. Recheck the separate audio outputs; the signal should be approximately 200mVpp.
- 20. Remove the MUTE jumper from Q15-base and Q15-collector.
- 21. Press PANIC.
- 22. Put the two stereo 1/4" plugs into the Mix Outputs.
- 23. Choose "Hot Mix Sines" from the Program page.



CAUTION:

The "Hot Mix Sines" program will produce maximum volume sine waves on all the mix outputs. They are non-release, so press **PANIC** to stop.

- 24. Press and hold the "Cancel" button, then press any other button on the keypad.
- 25. Turn the Volume all the way up.
- 26. Using the 1/4" Stereo Plug, check the following audio outputs:

Mix Left

110Hz

>7.25Vpp

Mix Right

165Hz

>7.25Vpp

27. Move the Mix Right Stereo Plug to the Headphone jack.

Phones Left

110Hz

>14.4Vpp

Phones Right

165Hz

>14.4Vpp

- 28. Check the Mix Left audio output. Mix Left should be a mixture of 110 and 165Hz, and not clipping (see Figure 6-2.)
- 29. Move the 1/4" Stereo Plug back into the Mix Right jack.
- 30. Attach the MUTE jumper between Q15-base and Q15-collector.
- 31. Recheck the Mix & Phones outputs, the signal should be approximately 150mVpp.
- Remove the MUTE jumper from Q15-base and Q15-collector.
- 33. Press PANIC.
- 34. The test is now complete. Turn the K2500R off.

K2500R Main Control Panel Board Test

K2500R Main Control Panel Board Test

4

WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500R off!

- 1. Turn the K2500R on.
- 2. Wait for system initialization.
- 3. Press buttons 4, 5, & 6 simultaneously to enter Scanner Diagnostics.
- 4. Press each button listed below; the LCD will identify the button pressed. If the switch has an LED (as indicated by bold print) it will light up red. Only the LED for that switch should turn on.

If there is a problem with the test, then there may a problem with the Control Panel Board.

EXIT
CLEAR
ENTER
CANCEL

+/-

PROGRAM	Α	+
SETUP	В	1
Q ACC	C	2
EFFECT	D	3
MIDI	E	4
MASTER	F	5
SONG	DOWN	6
DISK	LEFT	7
CHANNEL	UP	8
LAYER	RIGHT	9
EDIT	-	0

- 5. Turn the Data Wheel clockwise.
- 6. The LCD should continuously count 0 -1 2 3 0 1 2...
- 7. The Control Panel test is now complete. Turn the K2500R off.

K2500R Audio Board Test

Equipment Required For Test

- Oscilloscope with 1X Probe
- DMM with 2 decimal places minimum.
- Pot Glue (do not use permanent glue)
- Audio Mute Jumper (you must make a special test jumper for the MUTE Tests; see Appendix A for instructions.)
- Sampler Audio Fake Cable (see Appendix A for instructions.)
- Two 1/4" Load Plugs 10K ohm (see Appendix A for instructions.)
- One 1/4" Stereo Load Plug 100 ohm (see Appendix A for instructions.)
- High Quality Headphones

Distortion, Clipping, and DC Offset

In the following tests, you will measure signals coming from the K2500R's Audio Outputs. These signals shouldn't have distortion, clipping, or DC offset. Distortion and clipping typically appear as a flat-top on the positive and/or negative peaks of a waveform. DC offset is measured in volts; more than 0.10V of DC offset is too much.

Test



WARNING: If smoke or a burning smell occurs during this test, quickly shut the K2500R off!

- 1. Turn the K2500R off.
- 2. Open the K2500R (see Chapter 3.)
- 3. Insert the 10K ohm load plugs into the "A" Audio outputs.
- 4. Insert the 100 ohm load plug into the Headphone output.
- 5. If this unit has a Sampling Option Board installed, unplug the Sampler Data Ribbon Cable from J801 on the Engine Daughter Board. Then unplug the 5-pin Sampler cable from J15 on the Audio Board.
- 6. Plug the 5-pin Sampler Fake cable into J15 on the Audio Board.
- 7. Connect the "-" lead of the DMM to the K2500R's chassis.
- 8. Turn the K2500R on.
- 9. The Control Panel LEDs will flash 1 time. Wait for system initialization.

LCD Contrast Calibration

- 10. Press the Master button to enter Master mode. Set the Contrast parameter to "0".
- 11. Connect the "+" lead of the DMM to TP13.
- 12. Connect the "-" lead of the DMM to the K2500R's chassis.
- 13. Adjust R246 to -8.89 to -8.91 volts for Samsung display, or -8.64 to -8.66 for Optrex display.
- 14. Glue R246.

Check Audio Chain



WARNING:

This test produces loud sustained sine waves! No audio system or headphones should be connected to the K2500R while you run this test.

- 15. Press the Disk button on the Control Panel.
- 16. Insert the Kurzweil K2500R Test Disk into the Floppy Drive.
- 17. Press the Disk button on the Control Panel.
- 18. Choose "Floppy." Press LOAD.
- 19. Choose "AUDIOTST," press **OK** twice.

K2500R Audio Board Test

- 20. Press APPEND.
- 21. Press the Program button.
- 22. Using the Data Wheel, find and highlight the "CLIP Sep Sine NR" program.
- 23. The "CLIP Sep Sine" program will produce maximum volume sine waves on all the separate outputs. They are non-release. Press **PANIC** to stop.
- 24. Turn the volume all the way down.
- 25. Press PANIC.
- Press and hold the "Cancel" button, then press any other button on the keypad.
- 27. Move the load plugs into the B, C, and D separate audio outputs. Check for a 110Hz signal, greater than 9.85Vpp, from each output. All the waveforms should be free from distortion, clipping, and DC offset.
- 28. Choose "CLIP Fon Sine NR" from the Program page.

CAUTION: The "CLIP Fon Sines NR" program will produce maximum volume sine waves on the headphone output. They are non-release. press **PANIC** to stop.

- Press PANIC.
- 30. Move the load plugs from the separate outputs into the "Mix" outputs.
- 31. Press and hold the "Cancel" button, then press any other button on the keypad.
- 32. Turn the volume all the way up.
- 33. Check the left and right headphone output on the Audio I/O for a 110Hz signal, greater than 10.25Vpp. All the waveforms should be free from distortion, clipping, and DC offset.
- 34. Press PANIC.
- 35. Choose "CLIP Mix Sine NR" from the Program page.

CAUTION: The "CLIP Mix Sine NR" program will produce maximum volume sine waves on all the Mix outputs. They are non-release, press **PANIC** to stop.

- Press PANIC.
- 37. Press and hold the "Cancel" button, then press any other button on the keypad.
- 38. Turn the volume all the way up.
- 39. Check each mix output on the Audio I/O for a 110Hz signal, greater than 8.55Vpp. Both waveforms should be free from distortion, clipping, and DC offset.
- Remove the "Right Mix" load plug and check the Left Mix audio output.
- 41. Mix Left should be a 110 Hz signal, greater than 18.0Vpp, and not clipping.
- 42. Replace the "Right Mix" load plug.

- 43. Check Pin 1 and 2 of J706 (Sampler) for a 110Hz signal, greater than 9.85Vpp. Both waveforms should be free from distortion, clipping, and DC offset.
- 44. Remove the Right and Left Mix load plugs, Then plug the 1/4" ends of the Sampler Fake Cable into the Mix audio outputs.
- 45. Check each Mix output for a 110Hz signal, greater than 8.55Vpp. Look for a flat-top on the positive and negative peaks.
- 46. Press PANIC.
- 47. Replace the load plugs in A Left and A Right.
- 48. Choose "FR Sep Square NR" from the Program page.
- **CAUTION:** The "FR Sep Square NR" program will produce maximum volume square waves on all the separate outputs. They are non-release, press **PANIC** or the two right soft buttons to stop.
 - 49. Press PANIC.
 - 50. Turn the volume all the way down.
 - 51. Press and hold the "Cancel" button, then press any other button on the keypad.
 - 52. Move the load plugs to each separate output on the Audio I/O board. Check each separate output for a 207Hz signal, greater than 4.0Vpp. All the waveforms should look as shown in Figure 6-3. The top and bottom should not slope, and the ringing should be present after the rising and falling edges.
 - 53. Choose "FR Mix Square NR" from the Program page.
- **!** CAUTION: The "FR Mix Square NR" program will produce maximum volume square waves on the mix outputs. They are non-release, press PANIC to stop.
 - 54. Press PANIC.
 - 55. Move the load plugs from the separate outs into the "Mix" outs.
 - 56. Press and hold the "Cancel" button, then press any other button on the keypad.
 - 57. Turn the volume all the way up.
 - 58. Check each Mix and Headphone output on the Audio I/O for a 207Hz signal, greater than 5.0Vpp. The waveforms should look as shown in Figure 6-4. The waveform's top and bottom should not slope more than 3/4 of a division. The top and bottom should not slope or curve, and the ringing should be present after the rising and falling edges.
 - 59. Select "FR FX Square NR" from the Program page.
- CAUTION: The "FR FX Square NR" program will produce maximum volume square waves on the mix outputs. They are non-release, press PANIC to stop.
 - 60. Press PANIC.
 - 61. Press and hold the "Cancel" button, then press any other button on the keypad.

K2500R Audio Board Test

- 62. Turn the volume all the way up.
- 63. Check each mix and headphone output on the Audio I/O for a 207Hz signal, greater than 4.5Vpp. The waveforms should look as shown in Figure 6-5. The waveform should not slope more than 1 1/2 divisions. The rise and fall should not slope or curve, and there should be no perceptible ringing around the rising and falling edges.
- 64. Press PANIC.

Check Mute circuit

- 65. Connect the "+" lead of the DMM to TP15.
- 66. TP15 should be -14.65 to -15.15 volts.
- 67. Attach the MUTE jumper between Q15-base and Q15-collector.
- 68. TP15 should be 11.75 to 12.25 volts.
- 69. Remove the MUTE jumper from Q15-base and Q15-collector.

Power Supply Test

- 70. Remove the following boards:
 - Connector Board
 - Digital I/O Board (if Sampling Option is installed)
- 71. Remove the screws and standoffs holding the Engine Daughter and Engine Mother Boards to the K2500R. Leave all the cables on these boards connected to the K2500R, and leave the boards connected to each other.
- 72. Stand the Engine Daughter/Engine Mother Boards on end near the LINK socket, near the left side of the Audio Board as you face the front of the unit.
- 73. Put a piece of paper or other insulating material under the Engine Daughter/Engine Mother Boards to prevent shorting. Use an elastic band or insulated wire to hold the boards in place.
- 74. Remove the Filter Shield Plate from the Audio Board by grasping the plate and pulling it upwards. The Filter Shield Plate is attached to the Audio Board with two-sided tape, so it should detach easily.
- 75. Connect the "-" lead of the DVM to TP3 on the Audio Board.
- 76. Connect the "+" lead of the DVM to TP20 on the Audio Board. The DVM should read -4.75 to +5.25 Vdc.
- 77. Connect the "+" lead of the DVM to Pin 3 of VR5 on the Audio Board. The DVM should read +4.75 to +5.25 Vdc.

Adjust DOD Effects

- 78. Press the Program button on the Control Panel.
- 79. Choose "SINELOW NR"

Adjust Gain and Offset

- 80. If the scope has a "Bandwidth limit" switch, turn it on to see the low level waveforms more clearly. In the following steps, be sure to ground the scope probe where indicated with a short ground lead for a clear display.
- 81. Place the scope CH1 ground on TP2, and the tip on TP6, set for 2v/div, 5us.
- 82. Adjust R69 (gain) for 4v peak.
- 83. Adjust R122 (offset) for equal pos/neg fluctuations (see Figure 6-6.)

Adjust the MSB

- 84. Place the scope CH1 ground on TP2, and the tip on TP4. Set the scope for 5mv/div 1ms DC coupling.
- 85. Press and hold the "Cancel" button, then press any other button on the keypad. Press **PANIC** to stop the note.
- 86. Adjust R63 for best sine wave shape (see Figure 6-7 and Figure 6-8.) There should be no DC offset.
- 87. Check TP5, it should be the same as TP4.

Offset Final Adjust

- 88. Attach scope CH 1 to TP6. Set scope channel 1 for 2vdiv,2ms.
- 89. Press and hold the "Cancel" button, then press any other button on the keypad.
- 90. Adjust R122 (offset) for 75:25% duty cycle (see Figure 6-9.)
- 91. Press PANIC.
- 92. Glue R63, R69, & R122.

Check FX Quality

- 93. Press the Program button.
- 94. Choose "Long Echo"
- 95. Set the volume to half level.
- 96. Put the headphones on, then press and hold the "Cancel" button and press any other button on the keypad. You should hear C4 (261Hz), passing from left to right to left...etc until it decays approximately 20 seconds. Listen for distortion through the entire decay.
- 97. Choose "Huge Room"
- 98. Press and hold the "Cancel" button, then press any other button on the keypad. You should hear C4 (261Hz) then a long reverberation as in a very large room. Listen for distortion throughout the entire decay.

K2500R Audio Board Test

99. Choose "Flange NR"

CAUTION: The "Flange NR" program will produce a non-release 130Hz sawtooth wave. Press PANIC to stop.

- 100. Press and hold the "Cancel" button, then press any other button on the keypad. You should hear a clear flanging sound.
- 101. The test is now complete. Turn the K2500R off.

Index

K2500R 3-12

Button Board Test keyboard 6-2 rack 6-30 AC Entry Module K2500/X Keyboard 4-12 K2500R 3-5 C AC ripple 5-3 Active SCSI Termination Board 1-16 Calibration Tests 6-1 **Audio Board** Clipping 6-14, 6-31 K2500/X Keyboard 4-14 Closing the K2500R 3-2 K2500R 3-8 Composite SIMMs **Audio Board Test** No, No, No! 1-19 keyboard 6-14 Connector Board rack 6-30 K2500R 3-14 Audio Chain, checking Connector Board Test 6-27 keyboard 6-15 Control Panel Board 3-12 rack 6-31 Control Panel Interface, checking 6-24 Audio I/O Board Control Pedal Test 6-25 K2500/X Keyboard 4-16 Audio I/O Board Test 6-11 Audio Problems 5-5 D Audio Scanner Board K2500/X Keyboard 4-14 DC Offset 6-14, 6-31 Audio/Power Board 3-8 Diagnostic Tests 2-3 Diagnostics 2-1 В Digital I/O Board Test 6-8 Digital I/O, Backlite Power Board K2500/X Keyboard 4-17 Backing Up RAM Objects 1-6 Disassembly / Assembly **Backlight Power Board** keyboard units 4-1 K2500/X Keyboard 4-17 rack units 3-1 K2500R 3-10 **Disk Operations 1-5 Basic Operations 1-1** Distortion 6-14, 6-31 **Battery Holder** audio problems 5-5 K2500R 3-11 Battery Selection and Replacement 1-8 Boot Loader 2-2 Ε Boot Loader, entering 1-5 **Breath Controller Test 6-9** Effects quality, checking Burnin soft button 2-2 keyboard 6-23 **Button Board** rack 6-35 K2500/X Keyboard 4-18

Effects, adjusting keyboard 6-19	Hard Reset 1-7
rack 6-34 Engine Blk Diagnostic Test 2-4 Engine Daughter Board	l
K2500/X Keyboard 4-19	I/O Port Diagnostic Test 2-5
K2500R 3-15	Intermittent Audio 5-5
Engine Mother Board	
K2500/X Keyboard 4-21	• •
K2500R 3-16	K
F	K2500/X Keyboard Product Description 1-1 K2500R
	opening and closing 3-2
FDD Init Diagnostic Test 2-5	K2500R Product Description 1-1
FDD R/W Diagnostic Test 2-7	KDFX Option
Floppy Drive	Diagnostic Test 2-12
K2500/X Keyboard 4-23	Key Contact Strips 4-33
K2500R 3-17	Key Pressure 6-5
Forever soft button 2-2	Key Pressure adjustments
Formatting a Floppy Disk 1-5	76-key K2500 6-5
Front and Rear Panels 1-2	88-key K2500 6-5
Front Panel Problems 5-4	Key Pressure, checking 6-25
Fuses 5-1	Key Weights 4-34
FX Quality 6-23	Keyboard Contact Boards 4-32
	Keyboard detachment and removal 4-26
G	Keyboard Interface, checking 6-25
G	Keyboard Problems 5-6
	Keyboard reattachment and replacement 4-28
Gain and Offset, adjusting	Keys 4-28
keyboard 6-20	
rack 6-35	· •
Н	I CD
•	LCD
Hard Drives	Diagnostic Test 2-4
Internal Hard Drive and Mac 1-14	K2500/X Keyboard 4-36 K2500R 3-19
K2500/X with Internal Hard Drive 1-15	
K2500/X with Internal Hard Drive 1-15	LCD contrast calibration
	keyboard 6-14
	rack 6-31

LCD Dim, Unreadable 5-4 Opening the K2500/X Keyboard 4-2 Opening the K2500R 3-1, 3-2 LCD Not Readable 5-4 **Operating System** LCD Solid Blue 5-4 **LED Flashes** loading 1-6 at startup 1-5 P M Pin 1 2-1 Macintosh, K2500 and 1-14 Pitch Wheel, adjusting 6-4 Main Control Panel Board PITCH/MOD Wheel Interface 6-5 K2500/X Keyboard 4-18 Player Control Board Main Control Panel Board Test K2500/X Keyboard 4-37 keyboard 6-2 pots, adjusting 6-4 rack 6-30 troubleshooting 6-3 Player Control Board Test 6-3 Memory 1-18 Player Control Interface, checking 6-24 MIDI Uart Diagnostic Test 2-6 Mod Wheel, adjusting 6-4 Power Problems 5-1 MSB, adjusting Power Supply Board keyboard 6-20 K2500/X Keyboard 4-39 rack 6-35 **Power Supply Board Test** Mute circuit, checking keyboard 6-9 keyboard 6-19 **Power Supply Test** rack 6-34 rack 6-26, 6-34 Program RAM 1-18 Ν R Noisy Keys 5-6 Noisy Output 5-5 RAM objects, viewing 1-18 Non-Volatile RAM Diagnostic Tests 2-12 RAM/PRAM Diagnostic Test 2-5 Rebooting the K2500 1-7 Removing and Replacing Parts keyboard units 4-10 rack units 3-4 Resetting the K2500 1-7 **Objects** Ribbons backing up 1-6 loading 1-7 Mini Ribbon adjustments 6-5 Mini Ribbon Position, checking 6-25 viewing RAM objects 1-18 Offset Final Adjust Super Ribbon Center test 6-6 keyboard 6-22 Super Ribbon Position test 6-5

rack 6-35

Super Ribbon Touch Bits test 6-6

Slider Board Interface, checking 6-24 Running the Diagnostics 2-2 Slider Board Test 6-7 Soft Reset 1-7 S Sound RAM Diagnostic Test 2-11 Sound ROM Diagnostic Test 2-11 Switch Pedal Test 6-25 Sample RA 1-18 Sampling Option Board Diagnostic Test 2-10 Т Scanner Diagnostic Test 2-6 EPROM Chip—K2500/X Keyboard 4-41 Transformer EPROM Chip—K2500R 3-20 K2500/X Keyboard 4-44 Scanner Diagnostics 1-8 K2500R 3-21 Scanner Diagnostics 6-2 Trim pots (Trimmers) Player Control Board 6-4 SCSI Diagnostic Test 2-7 Troubleshooting Disk Size Restrictions 1-12 advanced 5-1 Guidelines 1-12 audio problems 5-5 basic 1-9 Internal Hard Drive and Mac 1-14 front panel problems 5-4 Termination 1-12, 2-8 keyboard problems 5-6 SCSI Chain, configuring 1-12 power problems 5-1 SCSI Termination Enable/Disable switch 1-12, 1-15 Setup Blk Diagnostic Test 2-4 **SIMMs 1-18** for Sample RAM 1-19 Sine Wave Diagnostic Test 2-10 Velocity Problems Slider Board keyboard 5-6 K2500/X Keyboard 4-42 VLSI Diagnostic Test 2-9 Volume/Headphone Board K2500R 3-23

Y

Young Chang Distributors iii

K2500R Memory Protection Board Installation Kit

This document explains the installation of the K2500R Memory Protection Board. This procedure is intended only for qualified Kurzweil service technicians. Installation by unqualified personnel will void the warranty.

Before Beginning the Installation

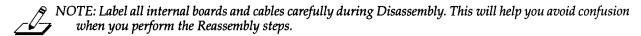
Back up the K2500R's RAM objects before installing the Memory Protection Board. To do this, press the Disk button to enter Disk Mode, press the **Save** soft button, and select the option "Everything" to save all RAM objects to a floppy or hard disk.

Tools and Materials Required For Installation

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- Flat-head screwdriver
- 1/2" nut driver
- 1/4" nut driver
- 5mm nut driver
- Soldering iron
- De-soldering tool
- Eco wire, 30 gauge
- Wire clipper

Beginning the Installation

The installation procedure is divided into three parts: Disassembly, Installation, and Reassembly.



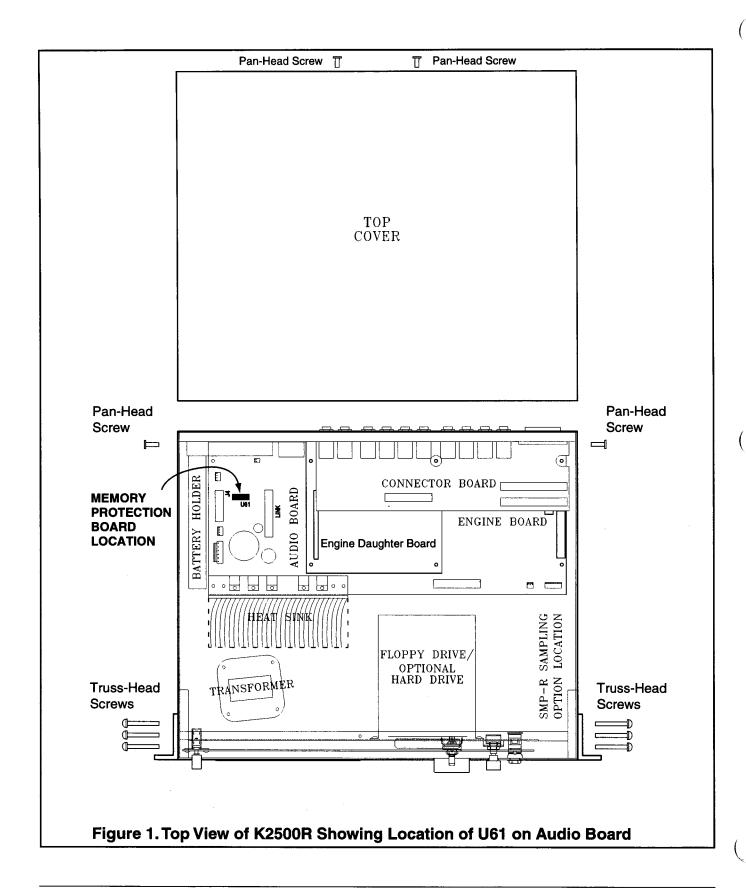
Disassembly

- 1. Unplug all external wires, cables, and connectors from the K2500R and turn the unit so the front panel is facing you.
- 2. Using a #2 Phillips screwdriver, remove the six large truss-head screws on the left and right sides of the K2500R, towards the front of the unit.
- 3. Using a #1 Phillips screwdriver, remove the two small pan-head screws on the left and right sides of the K2500R, towards the rear of the unit. Then remove the two small pan-head screws located on the top edge of the rear panel.



WARNING: The rear screws on each side of the K2500R are shorter than the other side screws. Make sure to keep these screws separate from the others so that you will use the shorter screws in the back side positions when you reassemble the unit. Using the longer screws in these positions could short out some of the components in the K2500R and damage the unit.

4. See Figure 1. Lift the top cover from the back, slide it off and place it aside. Notice that there is a groove on the top edge of the front panel that the top cover fits snugly into.



Follow steps 5 through 9 to remove the Connector Board.

- 5. Locate the K2000/2500R Connector Board, and disconnect the FET-protection power cable from J450.
- 6. Using a flat-head screwdriver, remove the retainer clips from J411 and J412; then disconnect the ribbon cables from J411 and J412.
- 7. Using a 1/2" nut driver, remove the nuts from the Audio Out jacks on the rear panel of the unit.
- 8. With a 5mm nut driver, remove the two 5mm bolts on either side of the SCSI Thru port, also on the rear panel.
- 9. Remove the Connector Board and place it aside.

Follow steps 10 through 16 if this K2500R is equipped with the SMP-R2 Sample Option Board.

- 10. Locate the SMP-R2 Digital I/O board on the right side of the rear panel. With a #2 Phillips screwdriver, remove the four M3 screws that hold this board in place.
- 11. Using a flat-head screwdriver, remove the retainer clip from J801 on the Engine Daughter Board. Then disconnect the 34-pin ribbon cable from J801.
- 12. Remove the Digital I/O Board and place it aside. Leave it attached to the Sample Option Board.



- CAUTION: When you reassemble the K2500R, be sure that the red border on the ribbon cable, indicating pin one, is plugged into the pin-one side of the connectors. Pin 1 is indicated by a "1" on the silk screen of the Engine Daughter Board. Since pin one on the Sampling Option Board is towards the front of the K2500R, and pin one on the Engine Daughter Board is towards the back, the ribbon cable should have a half-twist in it as it goes from J1101 to J801. Serious damage can result if the cable is not plugged in correctly.
- 13. With a #2 Phillips screwdriver, remove the four M3 front-panel screws that hold the Sample Option Board in place.
- 14. Hand-loosen and remove the plastic nut from the Sample Option Board.
- 15. Disconnect the cables from J15 on the Audio Board.
- 16. Now remove the Sample Option Board and place it aside.

Follow steps 17 through 20 to remove the Engine Daughter Board.

- 17. Using a #2 Phillips screwdriver, remove the four screws on the Engine Daughter Board.
- 18. Grasp the sides of the Engine Daughter Board. Then rock it back and forth gently until all the pins are pulled out of socket J919 on the Engine Mother Board. Don't remove it too quickly or you might bend the pins.
- 19. Determine the Engine Daughter Board's revision level, which is printed in white lettering to the left of socket J805. If this K2500R's Engine Daughter Board is REV B, C, D, or E, locate resistor R55, between socket J801 and the 14-pin chip in U18. Remove resistor R55 by de-soldering its connections on the underside of the Engine Daughter Board. Then discard this resistor.
- 20. Place the Engine Daughter Board aside.

Follow steps 21 through 29 to remove the Engine Mother Board.

NOTE: If any of the Sound ROM Option Boards are installed (Stereo Piano, Orchestral or Contemporary ROM Option Boards), leave them in their sockets while you remove the Engine Mother Board.

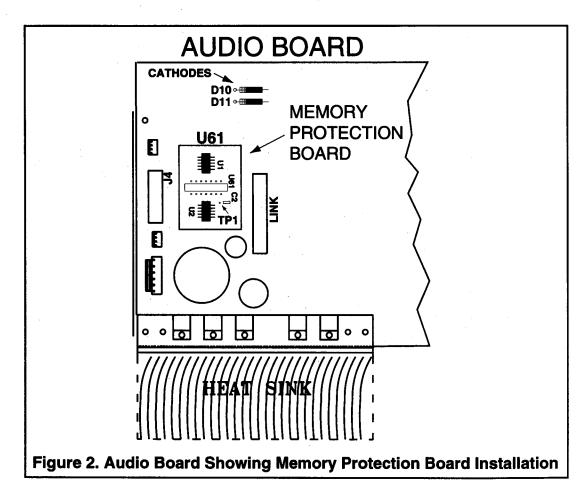
- 21. Disconnect the ribbon cable from J918.
- 22. Disconnect the FDD Data cable from J915.
- 23. Disconnect the LCD Data cable from J917.
- 24. Disconnect the Floppy Power cable from J914.
- 25. Using a 1/4" nut driver, remove the four standoffs.
- 26. Using a #2 Phillips screwdriver, remove the 2 screws on the right side of the Engine Mother Board as you face the front of the K2500.
- 27. With a #1 Phillips screwdriver, remove the two screws from each of the three MIDI connectors on the rear panel.
- 28. Use a 5mm nut driver to remove the bolts from the remaining SCSI port.
- 29. Now remove the Engine Mother Board and place it aside.

Follow steps 30 through 41 to remove the Audio Board.

- 30. Disconnect the Front Panel Data cable from J4.
- 31. Disconnect the X-Former Secondary cable from J12.
- 32. Disconnect the HD Power cable from J11.
- 33. Disconnect the Battery Connector cable from J10.
- 34. Disconnect the Transformer Primary cable from socket J2, J3, J4 or J5 on the AC Entry Module Board, depending on which socket this cable is connected to.
- Disconnect the Headphone cable from J9.
- 36. Disconnect the AC Entry Module switch wire from J1 on the AC Entry Module Board.
- 37. Disconnect the red & black twisted pair from J1 on the Back Light Power Board.
- 38. Using a 1/4" nut driver, remove the six standoffs from the Audio Board.
- Next, use a #2 Phillips screwdriver to remove the four M3 screws on either side of the Heat Sink.
- 40. Using a long #2 Phillips screwdriver, remove the M3 screw from the Audio Board, near the fan.
- 41. Now pull the Audio Board out by holding the Heat Sink and tilting the entire assembly up and forward.

Installation

- 1. Locate the 14-pin chip in U61 on the left side of the Audio Board, between socket J4 (PANEL) and socket J7 (LINK). Remove this chip by de-soldering all of its connections on the underside of the Audio Board. Then discard this chip.
- 2. Use the wire clipper to remove the resistor from R156, near U61 on the Audio Board; then discard this resistor.
- 3. Cut a 3 inch piece of 30 gauge Eco wire and strip it 1/8" at both ends.
- 4. Insert one end of the wire through TP1 on the Memory Protection Board from the bottom. Then solder it to TP1 from the top.
- 5. See Figure 2. Insert the Memory Protection Board into the holes for U61.
- 6. Solder the Memory Protection Board in place from the underside of the Audio Board, using the orientation shown in Figure 2.
- 7. Solder the other end of the wire to the cathode (the striped end) of D10 or D11 on the Audio Board. Either cathode will work.



The installation is now complete, and you can reassemble the unit.

Reassembly

- 1. Reassemble the K2500R by performing the Disassembly steps in reverse order.
- ! CAUTION: Be sure to replace the Filter Shield Plate if it has become detached from the Audio Board. Not replacing this Shield Plate will cause a high-pitched squeal to sound when the K2500 is played.
 - 2. When you have completed all connections, slide the top cover back on. Be sure to fit the front top edge of the cover into the groove on the top of the front panel.
 - 3. Replace the six large truss-head screws and the two small pan-head screws in the left and right sides of the unit. Then replace the two small pan-head screws along the top edge of the rear panel.
- WARNING: Remember, the rear screws on each side of the K2500R are shorter than the other side screws.

 Make sure to use the shorter screws in the back side positions when you reassemble the unit. Using the longer screws in these positions could short out some of the components in the K2500R and damage the unit.
 - 4. Insert the AC power cord and plug the K2500R in. Press the Power button to turn the unit on.
 - 5. Press and release the Exit button while the "Please wait..." message is displayed. This will bring up the K2500 Boot Loader (as shown below), which lets you run diagnostics.

----- K2500 Boot Loader v1.01 -----Install System Hard Reset Install Objects **Run Diags** Run System Fixed Diags

OK

- 6. The Boot Loader's Menus resemble K2500R dialog boxes. They consist of a series of labels and a highlight bar you use to select a label. Use the arrow buttons to highlight "Run Diags". Then press the **OK** soft button to run the diagnostic tests.
- 7. Press any button to continue when the RAM erasure message appears.
- 8. Choose "1ST NVRAM" from the K2500R Diagnostic menu, then press **OK**. A message will appear, instructing you to power off and on again.
- 9. Turn the K2500R off.
- 10. Press the Power button to turn the unit on again. Then press and release the Exit button while the "Please wait..." message is displayed. Use the arrow buttons to highlight "Run Diags". Then press the **OK** soft button.
- 11. Press any button to continue when the RAM erasure message appears.
- 12. Choose "2ND NVRAM" from the K2500R Diagnostic menu, then press **OK**.
- 13. When the diagnostic tests finish running, a message will appear telling you if the tests passed or failed. If any of the tests have failed, turn off the power and review the installation procedure for errors. When the diagnostics complete successfully, continue with the next step.
- 14. Power down and up again, going into normal operation.

This completes the installation of the Memory Protection Board.

K2500R Active SCSI Termination Board Installation Kit

This document explains the installation of the K2500R Active SCSI Termination Board. This procedure is intended only for qualified Kurzweil service technicians. Installation by unqualified personnel will void the warranty.

Before Beginning The Installation

Back up the K2500R's RAM objects before installing the Active SCSI Termination Board. To do this, press the Disk button to enter Disk Mode, press the **Save** soft button, and select the option "Everything" to save all RAM objects to a floppy or hard disk.

Tools and Materials Required For Installation

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- · Flat-head screwdriver
- 1/2" nut driver
- 1/4" nut driver
- 5mm nut driver
- Soldering iron
- De-soldering tool

Components of the Active SCSI Termination Board Installation Kit

- K2500R Active SCSI Termination Board
- Wire Connector (3-pin connector with Red, White, and Black wires)

Beginning The Installation

The installation procedure is divided into three parts: Disassembly, Installation, and Reassembly.

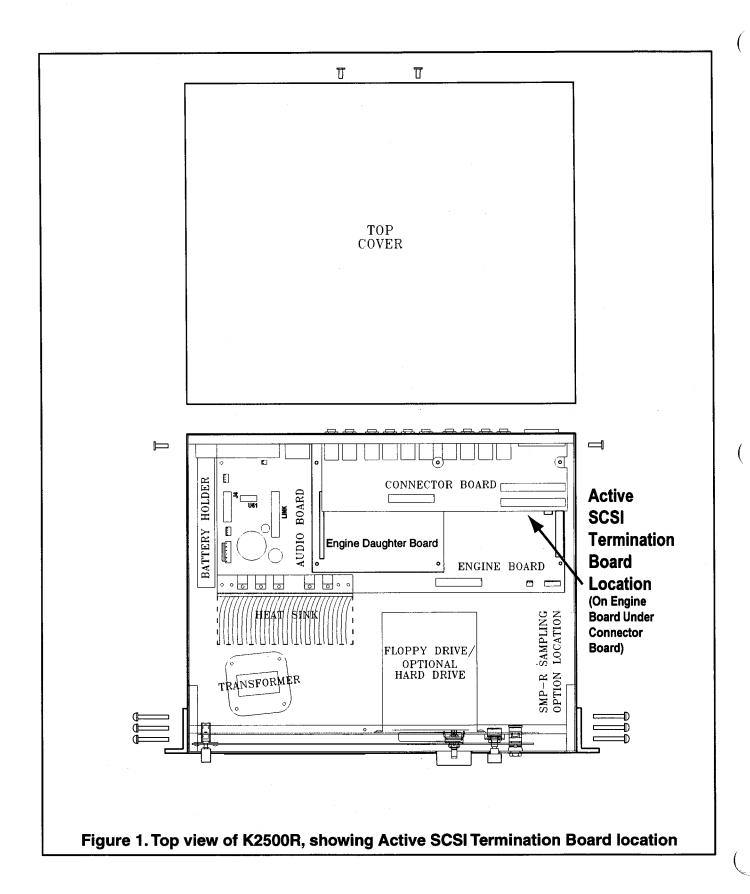
Disassembly

- 1. Unplug all external wires, cables, and connectors from the K2500R and turn the unit so the front panel is facing you.
- 2. Using a #2 Phillips screwdriver, remove the six large screws on the left and right sides of the K2500R, towards the front of the unit.
- 3. Using a #1 Phillips screwdriver, remove the two small screws on the left and right sides of the K2500R, towards the rear of the unit. Then remove the two small screws located on the top edge of the rear panel.



WARNING: The rear screws on each side of the K2500R are shorter than the other side screws. Make sure to keep these screws separate from the others so that you will use the shorter screws in the back side positions when you reassemble the unit. Using the longer screws in these positions could short out some of the components in the K2500R and damage the unit.

4. See Figure 1. Lift the cover from the back, slide it off and place it aside. Notice that there is a groove on the top edge of the front panel that the top cover fits snugly into.



Follow steps 5 through 9 to remove the Connector Board.

- 5. Locate the K2000/2500R Connector Board, and disconnect the FET-protection power cable from J450.
- 6. Using a flat-head screwdriver, remove the retainer clips from J411 and J412; then disconnect the ribbon cables from J411 and J412.
- 7. Using a 1/2" nut driver, remove the nuts from the Audio Out jacks on the rear panel of the unit.
- 8. With a 5mm nut driver, remove the two 5mm bolts on either side of the SCSI Thru port, also on the rear panel.
- 9. Remove the Connector Board and place it aside.

Follow steps 10 through 11 if this K2500R is equipped with the SMP-R2 Sample Option Board.

- 10. Locate the SMP-R2 Digital I/O board on the right side of the rear panel. With a #2 Phillips screwdriver, remove the four M3 screws that hold this board in place.
- 11. Using a flat-head screwdriver, remove the retainer clip from J801 on the Engine Daughter Board. Then disconnect the 34-pin ribbon cable from J801.
- 12. Remove the Digital I/O Board and place it aside. Leave it attached to the Sample Option Board.



CAUTION: When you reassemble the K2500R, be sure that the red border on the ribbon cable, indicating pin one, is plugged into the pin one side of the connectors. Pin 1 is indicated by a "1" on the silk screen of the Engine Daughter Board. Since pin one on the Sampling Option Board is towards the front of the K2500R, and pin one on the Engine Daughter Board is towards the back, the ribbon cable should have a half-twist in it as it goes from J1101 to J801. Serious damage can result if the cable is not plugged in correctly.

Follow steps 13 through 15 to remove the Engine Daughter Board.

- 13. Using a #2 Phillips screwdriver, remove the four screws on the Engine Daughter Board.
- 14. Grasp the sides of the Engine Daughter Board. Then rock it back and forth gently until all the pins are pulled out of socket J919 on the Engine Mother Board. Don't remove it too quickly or you might bend the pins.
- 15. Now place the Engine Daughter Board aside.

Follow steps 16 through 24 to remove the Engine Mother Board.



NOTE: If any of the Sound ROM Option Boards are installed (Stereo Piano, Orchestral or Contemporary ROM Option Boards), leave them in their sockets while you remove the Engine Mother Board.

- 16. Disconnect the ribbon cable from J918.
- 17. Disconnect the FDD Data cable from J915.
- 18. Disconnect the LCD Data cable from J917.
- 19. Disconnect the Floppy Power cable from J914.
- 20. Using a 1/4" nut driver, remove the four standoffs.

- 21. Using a #2 Phillips screwdriver, remove the 2 screws on the right side of the Engine Mother Board as you face the front of the K2500R.
- 22. With a #1 Phillips screwdriver, remove the two screws from each of the three MIDI connectors on the rear panel.
- 23. Use a 5mm nut driver to remove the bolts from the remaining SCSI port.
- 24. Now remove the Engine Mother Board.

Installation

1. Locate the J911-SIP resistors in sockets RP2, RP3 and RP4 on the Engine Mother Board. Then remove these resistors and discard them. Next, *carefully* de-solder the connections which hold sockets RP2, RP3 and RP4 in place on the underside of the Engine Mother Board.



NOTE: If this K2500R is equipped with an internal hard drive, the J911-SIP resistors should have been removed during hard drive installation.

2. Take a look at the Active SCSI Termination Board. Notice that the socket labeled "J4" is on only one side of the board. This side should face <u>in</u> toward the eight SIMM sockets on the Engine Mother Board, and Pin 1 should be aligned with the left-most pad of RP3.

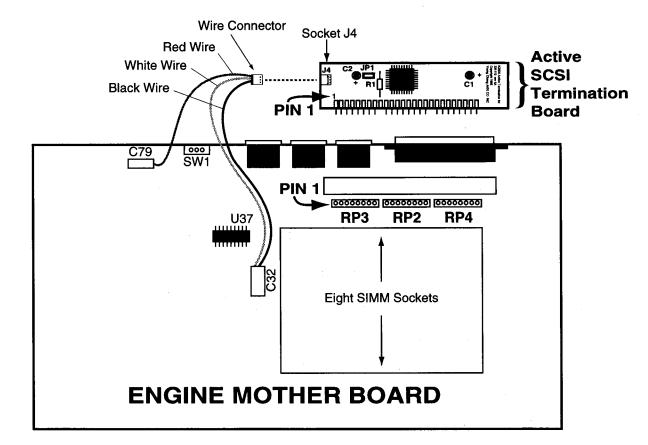
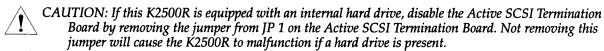


Figure 2. Engine Mother Board and Active SCSI Termination Board, showing location of connectors

- 3. Position the Active SCSI Termination Board so that socket J4 on the left side of the board faces the eight SIMM sockets. Again, be sure to align Pin 1 with the left-most pad of RP3.
- 4. Insert the Active SCSI Termination Board in place of RP2, RP3 and RP4, as shown in Figure 2.
- Solder the Active SCSI Termination Board into place from the underside of the Engine Mother Board.
- 6. Insert the Wire Connector into socket J4 on the Active SCSI Termination Board, as shown in Figure 2.
- 7. Solder the Red Wire to C79 on the end closest to socket SW1.
- 8. Solder both the White Wire and the Black Wire to C32, on the end closest to 16-pin chip U37.



The installation is now complete, and you can reassemble the unit.

Reassembly

1. Reassemble the K2500R by performing the Disassembly steps in reverse order.



CAUTION: Be sure to replace the Filter Shield Plate if it has become detached from the Audio Board. Not replacing the Filter Shield Plate will cause a high-pitched squeal to sound when the K2500R is played.

- 2. When you have completed all connections, slide the top cover back on. Be sure to fit the front top edge of the cover into the groove on the top of the front panel.
- 3. Replace the six large screws and the two small screws in the left and right sides of the unit. Then replace the two small screws along the top edge of the rear panel.



WARNING: Remember, the rear screws on each side of the K2500R are shorter than the other side screws. Make sure to use the shorter screws in the back side positions when you reassemble the unit. Using the longer screws in these positions could short out some of the components in the K2500R and damage the unit

- 4. Insert the AC power cord and plug the K2500R in. Press the Power button to turn the unit on.
- 5. Press and release the Exit key while the "Please wait..." message is displayed. This will bring up the K2500 Boot Loader (as shown below), which lets you run diagnostics.

Install System Hard Reset
Install Objects Run Diags
Run System Fixed Diags

OK

- 6. The Boot Loader's Menus resemble K2500R dialog boxes. They consist of a series of labels and a highlight bar you use to select a label. Use the arrow keys to highlight "Run Diags". Then press the **OK** soft button to run the diagnostic tests.
- 7. Press any key to continue when the RAM erasure message appears.
- 8. Choose "SCSI" from the K2500R Diagnostic menu, and press **OK**.
- 9. When the diagnostic tests finish running, a message will appear telling you if the tests passed or failed. If any of the tests have failed, turn off the power and review the installation procedure for errors. When the diagnostics complete successfully, continue with the next step.
- 10. Power down and up again, going into normal operation.

This completes the installation of the Active SCSI Termination Board.

RAMTECO

Engineering Change Order: RAMTECO

Effective Date:

26-SEP-95

Author:

B. Budd

PRODUCT:

K2500R

PERFORM ON:

Audio Board, Rev, A

PROBLEM SOLVED:

RAM trashing on K2500 Rack models.

CHANGE:

Install K2500R Memory Protection Board. using instructions in Document 910273.

SCSIECO

Engineering Change Order: SCSIECO

Effective Date:

15-OCT-95

Author:

B. Budd

PRODUCT:

K2500R

PERFORM ON:

All Revs. of Mother Board

PROBLEM SOLVED:

RAM trashing when SCSI bus is active and K2500 is off.

CHANGE:

Install K2500 Active SCSI Termination Board as described in Document 910274.

K25KECO1

Engineering Change Order: **K25KECO1**

Effective Date:

29-JAN-96

Author:

H. Chamberlin

PRODUCT:

K2500 and K2500X

PERFORM ON:

All Rev. audio boards

PROBLEM SOLVED:

Some units, on rapid power cycling after warmup, display comes up blank. Condition persists until unit is allowed to cool for 15 seconds or more. Program RAM may be trashed after recovery.

DIAGNOSIS:

During power up transient, VR3 in power supply (+12ana) may enter current limit or thermal limit mode thus reducing +12ana considerably. +5dig is likewise reduced because its reference is powered by +12ana. +5ref, which is powered from +12ana, may pass considerable current into +5dig through D5 on the audio board thus maintaining the heavy load on VR3 which continues operating in shutdown mode.

CHANGE:

- 1. On Audio board, all revs, replace VR1 with a 78L05.
- 2. On power supply board, all revs, replace rubber pad under VR3 and VR5 with mica pad and silicone grease.

ANALYSIS

Changing VR1 from 7805 to to 78L05 reduces the transient current that can be drawn from +5ref to a value well below the current limit of VR3 in the power supply. Since the normal drain on +5ref is small, this change is allowable. Using a mica insulator for VR3 and VR5 in the power supply increases the thermal margin of this regulator when units are equipped with sampling option and balanced output option.

K25KECO1

REWORK:

- 1. Remove VR1 (7805 or LM34OT5) from Audio board.
- 2. Install 78L05 into VRl position. Watch pin connections.
- 3. Remove rubber pad from VR3 in Power Supply board.
- 4. Replace with mica pad, same kind as under VR4 and Q2.
- 5. Remove rubber pad from VR5 in Power Supply board.
- 6. Replace with mica pad, same kind as under VR4 and Q2.

PWROKECO

Engineering Change Order: **PWROKECO**

Effective Date:

12-FEB-97

Author:

H. Chamberlin

PRODUCT:

MARK-5, 10, 12, 110, 150, 152 Audio Board

K2000, K2000R, K2500R Audio Board K2500, K2500X Power Supply Board

DMTi Main Board

PERFORM ON:

Any rev of the boards listed above

PROBLEM SOLVED:

POWER OK signal not deasserted on power-down with some boards. Likely only with recent date boards. Effect of this is mute failure on power down (observed) and possible RAM trashing (not seen so far). Problem only observed in Mark-10/12 Audio Board but potential exists in all boards listed above which all use the same circuit.

DIAGNOSIS:

The POWER OK signal may not be deasserted even though the 5-volt regulator is saturated and +5 is outside the operating range of digital logic. Apparently some brands of the error amplifier (LF351) in the regulator circuit have a different output stage design which causes this problem. Solution is to change a voltage divider which makes the POWER OK circuit more sensitive to error amplifier saturation.

CHANGE:

Change the following resistor on all boards as listed. In all cases except the DMTi its present value should be 2.2K 5%. The replacement resistor may be either 1/4 watt or 1/8 watt. For DMTi, the present value is 10K 5% and the replacement must be a 1206 surface-mount type.

MARK- 5, 10, 12, 110, 150, 152 Audio Board K2000, K2000R, K2500R Audio Board K2500, K2500X Power Supply Board DMTi Main Board

Change R6 to 4.7K 5%. Change R178 to 4.7K 5%.

Change R9 to 4.7K 5%.

Change R164 to 22K 5%.

PWROKECO

ANALYSIS:

The POWER OK signal is intended to be asserted when the 5-volt regulator error amplifier is in its linear region and deasserted when its output has swung to its positive supply rail which indicates saturation and loss of regulation. Using the Mark 10, 12, 110 audio board as an example (the exact same circuit is found in the other boards), transistor Q1 is intended to cut off when the output of U1 swings to within 1.0 volt or closer to its positive supply rail. The ratio of R5 and R6 determines what this voltage threshold is.

When designed, it was observed that the op-amp output would swing very close to the positive rail when "pulled up" toward it by R5 and R6 Apparently some alternate source LF35ls have output stages that remain linear even though the input stage may be saturated. Thus, even though pulled up, their output will not swing more positive than about 1.2 volts below the positive rail. This results in Q1 remaining partially on even though the regulation loop is saturated.

The effect of this is that digital circuits may not receive RESET before +5 volts decays below 4.75 volts on power-down. This in turn may prevent MUTE from being asserted before the digital circuits crash and make a loud noise. It could also theoretically cause RAM trashing since Writes won't be locked out when the digital circuits crash.

The change to R6 will raise the threshold voltage of the R5, R6, Q 1 circuit from 1.0 volt to 1.6 volts. On units without the op-amp problem, the low-line dropout voltage will increase a tenth of a volt or so; an insignificant change.

KF351EC0

Engineering Change Order: KF35IECO

Effective Date:

19-FEB-97

Author:

H. Chamberlin

PRODUCT:

Mark-5, 10, 150 Audio Boards

K2000, K2000R, K2500R audio boards; K2500, K2500X Power Supply board

PERFORM ON:

All revs, all models

NEW BOARDS:

Change the BOM to specify change

PROBLEM SOLVED:

+5 volt digital regulator may break into oscillation after any kind of transient such as static discharge, power line spike, sudden change in +5 loading, perhaps even high temperature or spontaneously. Oscillation will cause increased audio noise, may affect CPU operation, and may increase error rates in the floppy or hard drive, if used.

DIAGNOSIS:

KF351 op-amps (Samsung) can support sustained oscillation after a transient drives either of its inputs below its common mode range because of output phase reversal.

CHANGE:

If KF351 or other non-approved LF351 replacement is in the +5 regulator circuit, replace with National Semiconductor LF351N. At this time, the LF35I is the only approved replacement.

Mark-5, 10, 12, 150

Audio - Ul

K2000, K2000R, K2500R

Audio - U62

K2500K

Power Supply - Ul

ANALYSIS:

Response to exceeding the negative common-mode voltage range can cause problems if it results in phase reversal of the output. What was a negative-feedback situation can become positive and lead to sustained oscillation. In the 5-volt regulator application, a circuit shock such as probing certain points, static discharge. or hot plugging of 5-volt loads can cause an oscillation to start and persist when the amplifier exhibits phase reversal.

KF351ECO

Samsung KF351 amplifiers exhibit this phase reversal and can oscillate in 5-volt regulator applications when shocked. This may or may not cause overt symptoms in the unit and can be corrected by power cycling (with enough off time for filter capacitors to thoroughly discharge). I have not been able to devise a simple circuit change that will permit proper operation with the KF351 amplifier.

For the present, only National Semiconductor LF351 amplifiers are approved for use in our products. The Samsung KF351 is specifically disapproved. If a unit is seen with a KF351 installed, it should be replaced unconditionally.