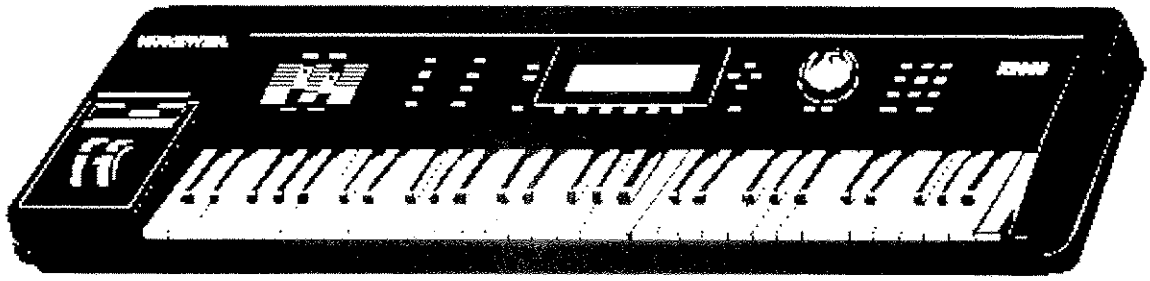
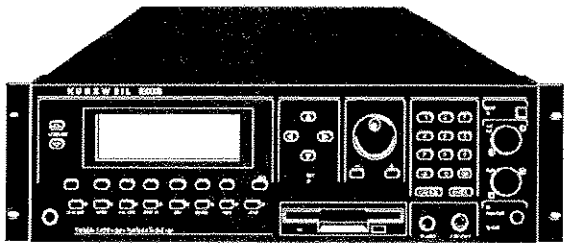
KURZWEIL

Music Systems

Kurzweil is a product line of Young Chang America, Inc.





SERVICE MANUAL
K2000/K2000R

A N D Music Corp.
10107 South Tacoma Way #A-3
Lakewood, WA 98499
Tel 253-589-3580 / Fax 253-589-3585

P/N 920020001

SERVICE NOTICE

This information is provided for a trained, competent, service technician. ***Untrained individuals should be advised that the parts contained in these units can be damaged by improper handling!***

This manual is an addendum to the K2000/K2000R (CALVIN) service manual. Servicer's should observe all of the normal servicing precautions and procedures when he/she removes the service access covers to these units. Owner's of this equipment should be advised that there are no user serviceable parts within the enclosures. Damage/s caused by or incurred by untrained individuals does not constitute a warrantable defect/s.

The technical information printed in this booklet was believed to be accurate as of 6/93. However, Young Chang America reserves the right to make those, hardware/software, changes that it feels are necessary during the course of the manufacturing process without being responsible for providing those, hardware/software, changes to earlier production units.

IMPORTANT

Option prices listed in this text are given for pricing and general availability to the servicer. The Option prices as listed are accurate as of 6/93. Prices and availability are subject to change without notice.

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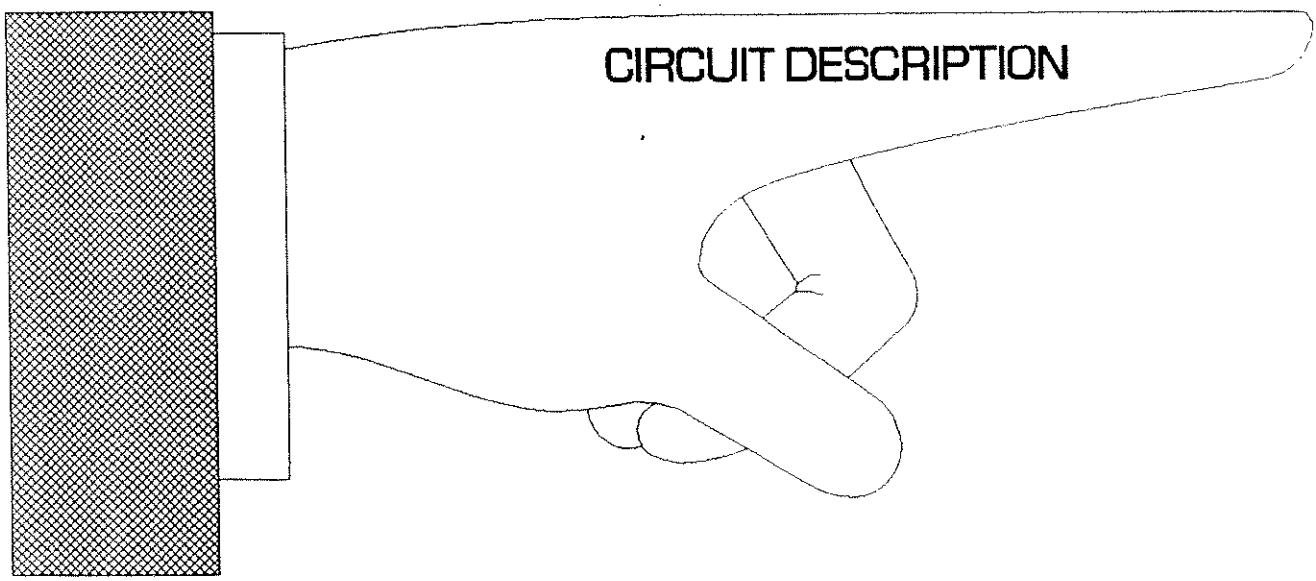
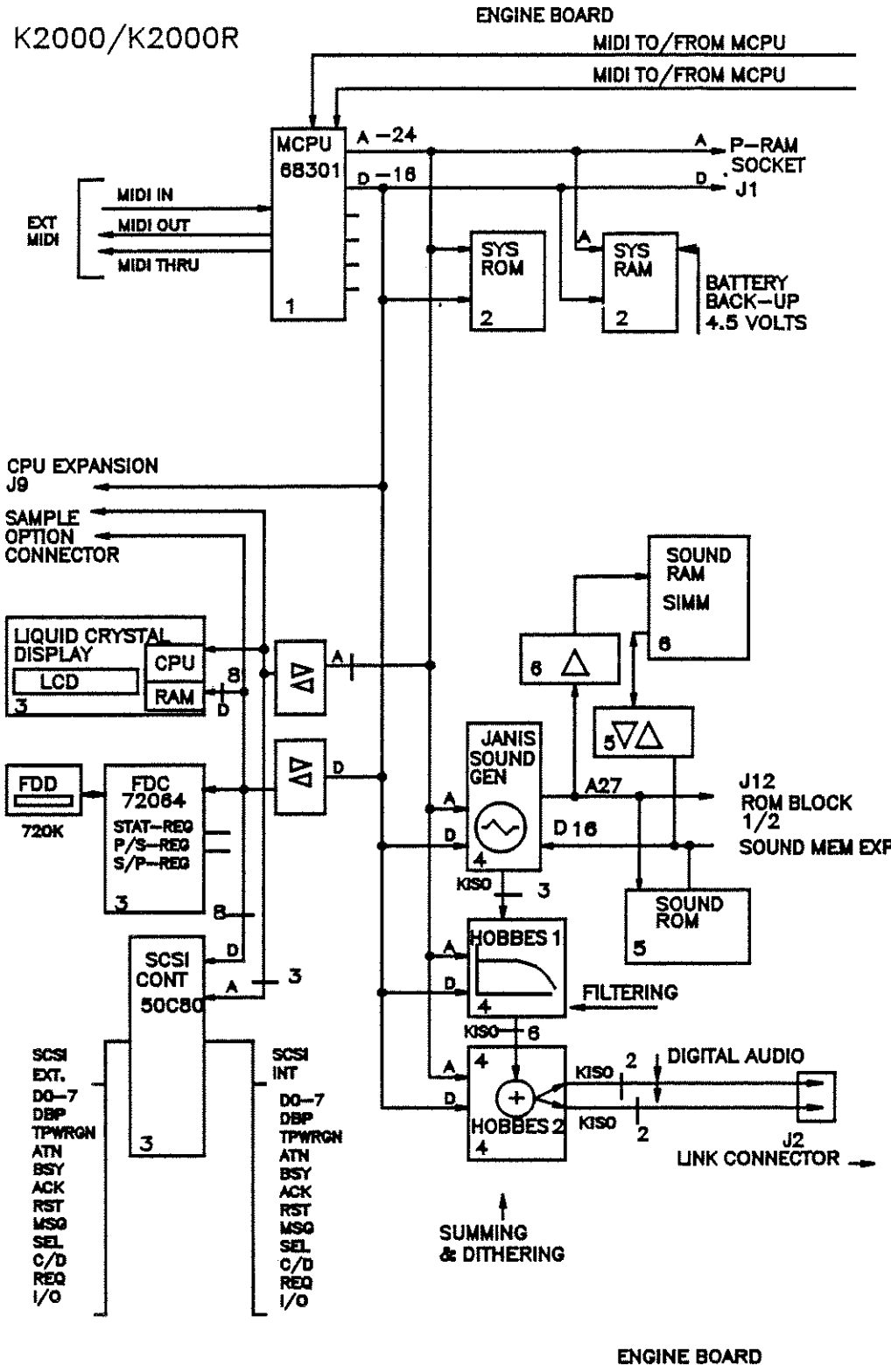


Using the block diagram format, this section presents circuit descriptions and functions for analytical use by the servicing technician when troubleshooting a problem in the field. This text pertains to the Engine/CPU circuitry. Consult the primary K2000 service manual for description of other circuits in these models.

Information presented in this section used in conjunction with section 6 & 7 will help the servicing technician localize a problem to specific area of the circuitry.

Section 2 provides information about K2000 options to help the technician understand overall operation of these instruments.

NOTES for SECTION 1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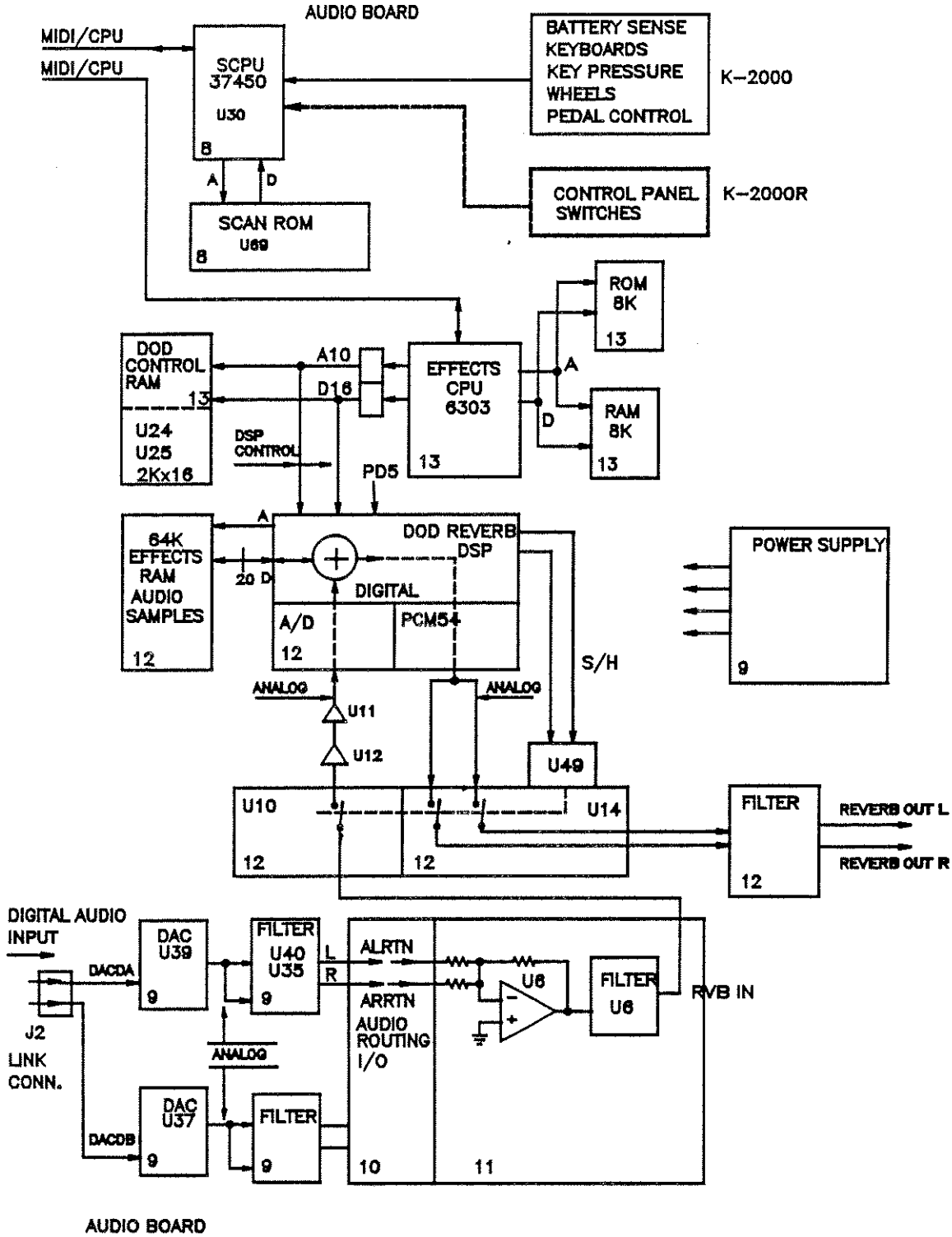
K2000/K2000R



INTRODUCTION

The K2000/K2000R units are basically sound generator systems, each unit possesses unique characteristics. The K2000/K2000R units require external power amplifiers and speaker units; however, each unit provides headphone output jacks.

BLOCK DIAGRAM K2000

The following system description generally uses the names as defined in the block diagram on the previous pages. The numbers in the lower corner of the blocks are the schematic sheet numbers, where you can find the detailed information on each circuit. This description is applicable to the Kurzweil K-2000 and K-2000R. The purpose of this description is to establish the fundamental ideas necessary to understand the JANIS sound generator system. The IC "JANIS" replaces the "CALVIN" IC in the early production of K-2000 and K-2000R units. The JANIS engine board is an exact pin for pin replacement for the earlier Calvin engine board.

Initially from power-on, the sound control registers in Janis have been reset to (zero) with an electronic signal (R). Consequently, the sound system is silent. The default system settings will be immediately registered in the display and panel lights, and the display should indicate the Kurzweil "Welcome Message", similar to the message below.

K2000 LCD MESSAGE

The presence/absence of this message is significant to the servicer. If the message is present, it means that the MCPU was able to successfully retrieve the message from system ROM, and it delivered the message to the display controller via the MCPU buss system (address, data and control). The message operation involves many electrical connections that must work absolutely perfect. If this message is successfully displayed, it is an indication that the main controller buss system is in good condition.

BASIC SOUND GENERATION

In order for the K2000 instrument to make a keyed sound, the following is a list of operations that will be needed. The MCPU must receive control panel switch (voice selection) data from the SCPU; also, the MCPU must receive keyboard data from the SCPU (key information). The MCPU stores these two sets of data in RAM (control panel and keyboard). Then, the MCPU retrieves Janis control information from ROM. The MCPU delivers to Janis control information via the Address and Data buss system.

Upon receiving "voice information" Janis starts reading voice samples from addresses in its sound memory system (ROM). These voice samples are then output on KISO (3) lines. Janis is capable of assembling 24 simultaneous discrete audio channels.

Hobbes receives the samples as they are output from Janis. Hobbes has been programmed by the MCPU prior to receiving voice samples from Janis, so that Hobbes 1 is preconditioned to handle the samples of that voice. At this point in the generator system, the samples are being improved by filtering. The channelized voice samples will continue to move along to Hobbes 2 where the channelized samples are combined to make composite left and right audio digital audio. The composite digital audio is subsequently directed to the Digital to Analog Converter IC's where the digital numbers are translated into analog voltage levels.

BASIC REVERBERATION CHANNEL

On the block diagram you can see that one of the converted analog signals (DACA L/R) is directed into the DOD reverberation chip. Subsequently, this analog signal is reconverted into digital format again by the DOD reverberation chip. The digital numbers are stored in Effects RAM. DACA L/R Audio are continuously written into RAM from beginning to end. At the end of memory, DOD starts overwriting audio from the beginning. Depending upon which program is operating in the DOD chip (reverb, chorus, symphonic, etc.), digital samples are being pulled out (read) of memory some time behind the write location. Subsequently, the DOD chip causes

the digital samples to be converted yet again by the Digital to Analog Converter (DAC) PCM54.

The analog signals are passed through a "brick wall" filter entering and leaving the digital/analog conversion points to reduce the chances of creating alias frequencies. Alias frequencies occur when the input frequencies are too high for the converter. "Brick Wall" filter describes the attenuation characteristics of the filter. Here, it means that frequencies above 20 kHz are virtually eliminated, and are not allowed to enter the input converters to the effects processor circuits. The reverberation (effects) signal exists in the analog circuitry at this point.

NORMAL START UP OPERATION

After the message "WELCOME TO THE K2000" has been shown, the display will come up with the voice selection which was registered when the instrument was last "powered-off". The program light will be illuminated. These events are significant since they are the first things that the processor will do at the power-up instant. If it does these properly, chances are that it will do all the rest right also. This is a major point to get past; that is, you have established that the internal buss system is clear. Hopefully, at this point you are looking for a problem in the output system (audio, lights or buttons). The output system implies: the sound generator (Janis), the filters (Hobbes) and the DAC system. From there you are into the analog sections of the instrument. In the analog areas of the instrument it is relatively simple to locate faults.

In the case of the K-2000: the next thing that is required is keyboard control data from the Scan CPU. The SCPU is scanning the keyboard to detect key closures. If you press a note, the SCPU will transmit that key number to the MCPU via the serial communication line as a MIDI key number for as long as the key is held at the keyboard location.

It maybe useful to try to control the K2000 sound generation circuits with an external MIDI instrument, since the other instrument provides a means of bypassing a significant amount of control circuitry, by inputting directly to the MCPU.

After receiving the keyboard switch number from SCPU, the Main CPU will retrieve instructions from system ROM, and the MCPU will send sound generation commands (several) to Janis. At the point of initialization, the MCPU has already loaded the default controls necessary to cause Hobbes 1 and 2 to operate properly. The control information which Janis receives is address locations of the voice to be sounded; also, in addition to the address information, Janis receives instruction in how to read the samples. Audio is a serial string of numbers retrieved by Janis from SOUND ROM. Janis will continue to output numbers for as long as the voice is to sound; that is, sound will continue as determined by the voice itself, or by the fact that the key is still being held.

Hobbes 1 receives the numbers from Janis and applies filter programs (algorithms) to the sample numbers as they pass through the Hobbes chip. The servicer should be aware that the filter functions are the result of numerical operations in the digital domain. The filter functions are programmable (variable), and they will depend upon the voice selection. Filter tables (numbers) necessary to operate Hobbes are loaded into the control registers at the point when a particular voice was selected. The servicer should be aware that all digital samples pass through the same electrical hardware, so that it is not likely that only one channel would be defective, unless it utilizes a unique storage register.

At Hobbes 2 the samples are summed; that is, the individual note samples exist as individual sounds until they reach Hobbes 2. Here, the channelized samples are summed to form left/right (composite) audio channels. In addition to the summing function, Hobbes 2 performs a dither function to left/right audio. From Hobbes 2 digital left/right audio is output to the system Digital to Analog Converters (DAC's) on the audio board.

NOTES:

There are some ideas the servicer should remember about the digital sound generation elements of the K-2000 instrument (Janis, Hobbes, DOD reverb). These circuits are all microprocessors basically, and they are doing what microprocessors do normally; that is, processors fetch, decode and execute

instructions (numbers) from memory devices. At times we may indicate that a device is capable of "X" number of audio channels; in these cases, we are indicating a number of separate numerical quantities that can be held and maintained at the same time, not the number of electrical channels through the device. All of the audio channels are provided by the same microprocessor hardware; that is, all audio channels are generated by one electrical channel. The only differences may be in actual memory registers where the separate quantities are held. The microprocessor is similar to a circus juggler with "X" number of balls in air. The microprocessor services each ball in its turn, while it gives each ball enough attention to keep it moving along its way.

DAC's

In the Digital to Analog Converter (DAC) the digital numbers are converted into analog voltage levels. Each digital number is converted into one analog voltage level. The digital samples are arriving at a very high rate, so that each recovered waveform has a large number of steps (time and amplitude). Ideally, the DAC would be capable of an infinite number of steps; that way, the recovered waveform would be an exact copy of the original, and the waveform would not require filtering. However, the DAC has a finite number of steps internally; such that the recovered waveform is only a reasonable replica of the original, but it requires some filtering to remove the steps from the recovered sample. Consequently, the staircase effects of conversion must be filtered out in the analog domain to smooth the waveforms.

"SEPOUT 1 and SEPOUT 2" are some of the first analog signals that exist in the K-2000 instrument. SEPOUT 1 and SEPOUT 2 are picked off and summed in a mixing amplifier, and subsequently converted back into digital (numbers) in the DOD reverberation chip. The digital reverberation process involves storing continuous audio, so that there is always a quantity of audio history in memory. Depending upon what kind of reverberant effect is to be produced, the DOD chip reads from some where in audio history so that there is always a lingering presence of an echo or chorus effect mixed in with real time audio. Synthesized stereo audio is generated in the DOD reverberation chip and output as digital audio. The left/right channels are separated externally at the A/D converter PCM54 (U16). The Sample and Hold (S/H) logic signals provide the necessary decode signals to separate left/right audio at the audio switch 4053 (U14).

Again DAC converted audio is filtered in the analog domain to remove the staircase effects caused be digital conversion (brick wall filters).

The preceding description indicates the path of audio from: the keyboard scanner SCPU, through the MCPU, through Janis, through Hobbes 1 and 2, through the DOD reverberation chip to the analog outputs Reverb 1 and 2. These are the main digital paths of the instrument. It is not our intention here to explain or explore all of analog paths through the K2000 instrument.

In the block diagram, you should notice that there is one additional microprocessor system. Immediately above the DOD reverberation chip is the Effects Control Processor Unit (RCPU). The RCPU's job is to load the Reverberation program into RAM, for the purpose of controlling the DOD chip, when it is directed to do so by the MCPU via internal MIDI. The RCPU has a dedicated ROM/RAM device to support free standing processor operations at this location. This means it has the ability to load a reverberation program into the reverb RAM. What it needs from MCPU is: "which reverb program". Notice that the address and data buss connection to the Reverb Program RAM can be controlled by either the RCPU or the DOD reverb chip. Once the reverberation programs reside in Reverb Program RAM, the DOD chip can read the programs from the contents of this RAM system by itself. If the RCPU is not loading the reverb program RAM, the DOD chip is free to access the reverb program RAM through the shared address buss system

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SHEET 1 MCPU

The Main CPU (MCPU) 68301 is main controller for the entire system. The MCPU operates from a program resident in the system ROM. This program provides for all system contingencies; that is, all

system issues have been defined and provided for in the system programs, and these programs will determine what the processor does to the various input signals.

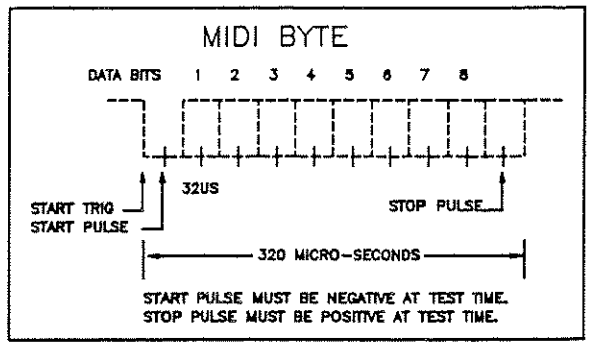
The system variables as they occur are stored in the system Random Access Memory (RAM): key closures, panel switches, key pressure data, wheels, pedal control, MIDI, etc. Keep in mind that many of these events are only momentary events, and the MCPU must analyze the switch closures and control the K-2000 according to the defined patterns indicated by the control information. Therefore, it must remember which switches have been operated, and when they were operated.

Important things the MCPU requires to operate: a precision +5 volt power supply, a very good ground connection, a precision high frequency clock signal (ck) (16 mHz), Reset must normally be high, Halt must normally be high, the MCPU must be able to reach the system ROM and RAM via the address, data and control buss systems on sheet 2.

The connection labeled "Test Socket" is the location of the P-RAM option connection.

MIDI (external)

A single MIDI byte (8 bits) is comprised of two, four bit bytes. This format arrangement makes it possible to transmit an enormous amount of control information over a serial data transmission line. External MIDI enters/leaves the K2000/K2000R system through the MCPU at pin 28/32 respectively. The format and the length of each byte is the same as was previously described in the SCPU section. Each bit period is equal to 32 μsec, and then each MIDI byte is 320 μsec (32μ sec x 10 bits = 320μ sec) in length (there are always 8 data bits plus a start and stop bit for each byte = 10 bits).



Since MIDI comes directly into the MCPU, the MIDI control connection provides an alternative control path that might be used when the SCPU is suspected of having problems. MIDI should be able to select voice and provide keynote control of the K-2000 sound generator system. If it's possible to operate the K2000 from external MIDI, but not from the control panel or keyboard, this information would help the servicer to locate the elements in the processor control system that might be causing problems. There is only one line difference between the two control systems.

It is important to understand how the MIDI receiver port functions: In the previous paragraph we described the data format of one MIDI byte. The first bit in every transmission is always a negative start bit. The falling edge of the start bit triggers the receive port. First, the receiver runs a valid start test at t+16 μsec: this involves testing the level present at the receiver in the middle of the start pulse. If it is still negative, the receiver port assumes it is a valid MIDI byte. From that point the receiver port tests the serial port every 32 μsec for 9 bit periods. The data can be any combinations of 1's and 0's, but the stop bit must be positive. If the start is negative, and the stop pulse is positive, the receiver accepts the data byte as a valid piece of data. Clocking the receiver port is relatively easy to do since the entire system is operating from a crystal generated clock system.

SHEET 2 SYSTEM ROM and RAM

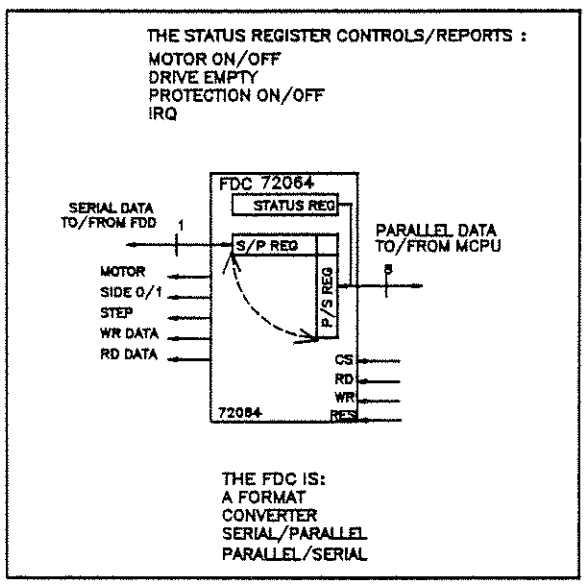
The main operating program of the K2000/K2000R resides in the Read Only Memory (ROM) chips on sheet 2. The data in this memory system controls how the K2000 instrument will respond to the various

input signals. It contains the control instructions for the instrument sound generation system (Janis, Hobbes, internal MIDI, external MIDI, etc.)

Random Access Memory (RAM) is the place where the MCPU will place are of the system variables: control panel switches, keyboards, system menu variables, etc. These quantities or inputs tend to be momentary inputs, and the MCPU must store them until it is able to use them in controlling the instrument. The RAM is the place it will put all of the events it needs to keep. The contents of the system RAM are protected for limited periods of time by the fact that the power to the RAM chips is maintained by the back-up power supply. This supply holds pin 32 on the RAM IC's above 3 volts even when the power is off. The K2000/K2000R units have a 4.5 volt battery source located at 4J3 on the audio board. The battery pack is accessible from the underside of the keyboard. The battery compliment is three AA alkaline cells in series.

Important things from the system memory viewpoint: the +5 volts power supply, the backup power supply at pin 32 on the RAM chips, address and data lines, chip select lines

SHEET 3 FLOPPY CONTROLLER



FDC

The floppy disk drive is a rotating 3.5 inch magnetic disk storage device, which can contain up to 720 K bytes of information. When the motor is turned "on", the magnetic medium is revolving at 300 RPM. A magnetic head is in physical contact with both sides of the magnetic medium, and the disk is written on both sides. Also, the magnetic heads are mounted on a servo-positioning arm, so that the magnetic heads may be moved to different tracks (cylinders) on the magnetic disk. Control of the read/write operations of the floppy disk is from the MCPU. In the case of the K-2000 instrument, all data transfers to/from the disk are to/from the MCPU; subsequently, data is placed in system RAM, or it is serially written onto the surface of the disk as magnetic flux reversals.

The Floppy Disk Controller (FDC) obviously controls the operation of the Floppy Disk Drive unit; that is, the controller turns on the motor and moves the magnetic head assembly. The FDC operates under control of the MCPU from the instructions contained in system ROM. In addition to the obvious control functions; then, the FDC is formatting data going to/from the floppy disk. From the MCPU to the floppy disk: the data in changed into serial format. In the other situation where data is being transferred from floppy disk to the MCPU, it is formatting serial data from the disk into 8 bit parallel data bytes. In this system data transfer to/from the floppy disk is to/from the MCPU. From the MCPU, the data is usually taken to/from the RAM.

The control program for the floppy disk resides in system ROM; that is, the control signals that are needed to operate the disk drive, write protect, index pulse detect, motor on/off, head select, step control, direction, write enable, are directed by the control program in the system ROM.

The control problem of the floppy disk revolves around knowing what track and sector the data information is to be written/read to/from. The control program initially starts the head at a known track (usually track 00). Knowing which track the head is starting from: it is a simple matter to count the track pulses to the head servo to know where the head is tracking, and then by sensing the index pulse, the control program is able to locate the correct sector location where data is located on the floppy

disk.

SHEET 3 FLOPPY DISK DRIVE (SERVICE)

If a fault in the FDD is suspected, the servicer should verify the presence/absence of the listed control signals at the connector of the FDD. If all signals seem to be present (highs and lows), it is possible the that the FDD or the magnetic disk can be defective. The control program is usually a standard FDD control program used by many people before you, so it is not likely to be wrong, unless the control buss of the instrument is defective. In the case of a defective control buss, a defective control buss is going to cause lots of problems besides the FDD. Only if control buss defects are isolated to the FDD (bad solder connections, broken wires, etc.) can the control buss be implicated here. However, unless you are setup for disk service, there is very little else that can be done to the FDD beyond checking the signals at the connector. If the control signals are applied correctly by the operating program, and the FDD does not respond properly to these signals. The FDD should be returned to KURZWEIL for service, since the FDD requires special equipment (special alignment test disks) to properly service and repair the device, Occasionally the magnetic head may require minor cleaning.

Important things to check:
+5 volts, all connections (plugs) need to be tight, etc.

DISK FORMATTING

All memory disks must be formatted before data can be stored on them. Be sure that you are using a disk that is capable of being formatted to 1.44 m/720 k (high density-double sided/double density-double sided), because there are 3.5 inch disks which cannot do this. Formatting is a process where the MCPU causes the surface of the disk to have magnetic tracks; subsequently, the tracks are then divided into sectors where data can be stored. The formatting program (FORMAT DISK) resides in the operating program of the main ROM. When a disk is formatted: Sectors are numbered, and there is a Table Of Contents (TOC) written on the disk that tells a reading program "file names", and where stored data is located (sectors). To format or write data on the magnetic disk, the write protect hole in the corner of the disk should be closed ("write protect off"). The hole in the opposite corner of the disk identifies the disk as a high density disk (1.44 meg) to the controller.

The operating control program from the MCPU reads/writes to status registers in U4 (72064) to find and change the status of the FDD. After it has determined the operating status (motor on, track, sector, write protect, disk present, etc.). The floppy disk controller 72064 performs three basic functions, and those are: the Status register reports/controls the basic movements and the status of the drive to the MCPU, the controller converts parallel data from the MCPU into serial data for magnetic disk, the controller converts serial data from the disk into parallel data to be sent to the MCPU via the data buss.

FLOPPY DISK DRIVE

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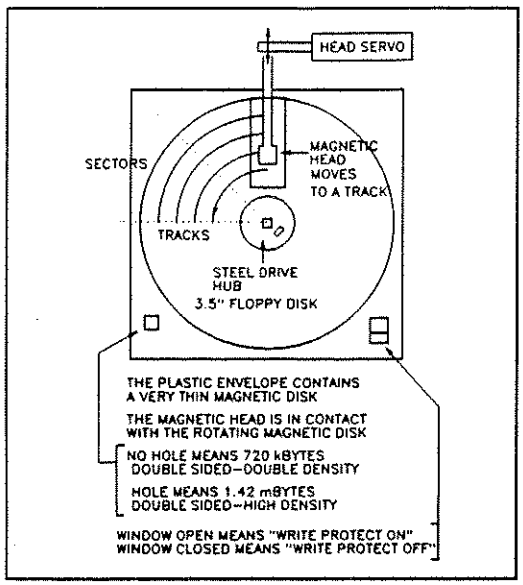


(usually track 00). Knowing which track the head is starting from: it is a matter of counting the track pulses to the head servo to know where the head is tracking, and then by sensing the index pulse, the control program is able to locate the correct sector where data is located on the floppy disk.

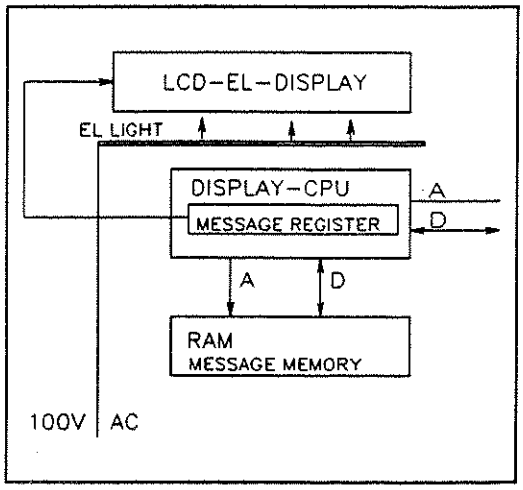
WHEN THE K2000/K2000R UNIT IS TO BE TRANSPORTED

WHEN THE UNIT IS TO BE TRANSPORTED, THIS PROCEDURE SHOULD BE PERFORMED: WITH NO DISK IN THE DRIVE UNIT, "PRESS LOAD SOFT BUTTON", THE DISPLAY WILL INDICATE "PLEASE INSERT DISK", DO NOTHING IN RESPONSE TO THE DISPLAY MESSAGE, BUT "TURN THE UNIT OFF". THE MAGNETIC HEAD IS NOW PARKED AT TRACK 00, AND IT IS SAFE TO TRANSPORT THE UNIT.

SCSI

The Small Computer Serial Interface (SCSI) is operated by the MCPU. All transfers are to/from MCPU and the SCSI integrated circuit (50C80). The transfers contain data from RAM and ROM, (D0-D7 and several control signals) . The SCSI IC is responsible for providing a SCSI-1 interface to any compatible disk drive. The device supports all SCSI-1 commands. The 68301 is responsible for reading/writing each data byte in read/write operations fast enough to prevent loss of data.

A special address is provided so that the 68301 automatically waits for availability of data. This "pseudo DMA" ties the assertion of DTACK to the availability of data through the GODOT PAL. When using "pseudo DMA" if the data never becomes available, the 68301 will wait indefinitely. SCSI is the port that a compatible hard disk or another computer can be connected to the K2000 instrument.



Liquid Crystal Display and Electroluniscent light

LCD-SCHEMATIC SHEET 3

A Liquid Crystal Display is an indicating device that uses a material that has the properties of both solid and liquid states. It is a crystalline material suspended in a fluid so that individual crystals (there are many) are free to orient themselves in what ever direction that is forced upon them by an array of electro-static voltage plates, (plate like a capacitor). When there is no plate voltage applied to the device the crystal orientation is random, and no light can be transmitted through the device (opaque). When plate voltage is impressed on the crystals, the crystals become uniformly oriented with the voltage on the plates of the LCD display. When the individual crystals come into alignment with the plates, the crystals in the areas adjacent to the plates become transparent. The LCD display requires very little power.

Generally, the LCD element is made from a material that will appear opaque when there is no voltage

impressed upon it, and it will appear transparent when voltage is impressed upon it. The display is made of a large number of electrical plates (pixels) that can cause patterns (alpha-numeric messages) in the liquid Crystal. It is the display controllers function (DCPU) to cause the voltage to appear on the appropriate electrical plates to cause the messages to appear.

The Liquid Crystal Display (LCD) and the LED indicators are the main feedback mechanism to the operator. The display should indicate what the control selection is, and it provides the means to allow the operator to interrogate the hidden menu's of the instrument. The LCD is one of the main indicators that the servicer can use to examine the condition of the MCPU. If the contents of the display are readable, and it indicates the changes of control; the condition of the main processor buss system is probably ok. The main processor buss condition is a very important issue when you may not know how much of the system is operating. Be advised that a small controller processor with RAM memory is resident on the display module, and it operates the Liquid Crystal Display (LCD). Normally, the MCPU delivers a display message from system ROM to the display controller. The display controller accepts the message from the port and stores it in display RAM. What can happen is that the MCPU goes to this port and waits for the display controller to become available, d-0 (usually) indicates when the display controller is busy; if the busy bit hangs up, the MCPU will wait indefinitely, or it will appear to have stopped.

This LCD display is the transmissive type; that is, it requires a backlight (color-violet) to produce a visible display. The Electroluminescent (EL) backlight is driven by an AC source derived from a free running oscillator-transformer. The EL backlight is a solid state device, and it glows when excited by an AC voltage source. Without this backlight, the LCD will appear blank, but can be fully functional; consequently, the diagnostics may indicate proper operation of the display and memory even when the display seems to indicate nothing. The instrument will sound and operate normally. The EL backlight requires approximately 100 volts, and the nominal frequency is 350 Hz.

If it has been determined that the display or the controller are defective, replace the display module as a unit, since there are no replacement parts for this unit.

SHEET 4 JANIS

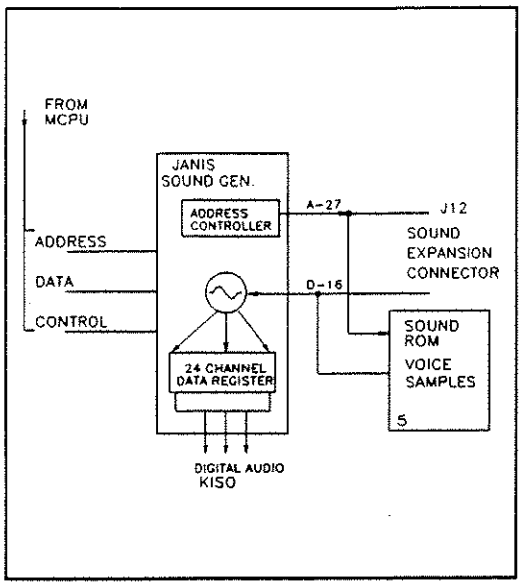
Janis is the sound generator in the K-2000 instrument as of 4/93. Janis replaces Calvin in both the K-2000 and the K-2000R. If you find schematics or units with a Calvin chip, these are early production units and have subsequently been replaced by Janis integrated circuits in newer production.

Janis requires instructions: the primary requirement for sound generation is: what voices are being called for from the control panel. Secondly, what notes are being called for from the keyboard. After it has received this information from the MCPU, Janis reads the addresses of up to 24 simultaneous sounds from sound ROM. During this process, Janis can assemble 24 concurrent number strings which reflect the sound requirements in 24 separate channels. The operating instructions from the MCPU tell Janis where to find the proper samples for each sound.

HEX ADDRESSES	DESCRIPTION
000 0000	On-board ROM
100 0000	Expansion ROM
200 0000	RAM block 1
300 0000	RAM block 2

Janis is reading prerecorded audio from ROM. This process is somewhat like a record player, only in this case the recording medium is a solid state memory, and the information is contained in the form of number sequences (samples). The sounds that the K-2000 is capable of making have been sampled and stored in the ROM system of the instrument. Notice that Janis is capable of addressing a large memory system (SMA 00-26) (128 mega bytes x 16 bits wide). These addresses have been allocated to internal and external memories.

Included in the function of Janis is "oldest note" arbitration function; that is, if the system is out of generator channels, Janis will truncate the oldest



SYSTEM SOUND GENERATOR

channel and reassign it to the newest note. Also, normal to this type of sound generation are a number of techniques necessary in dealing with different types of sound. For example when a sound is continuous: the control program can cause the addressing control in Janis to loop on the same addresses causing repetitious sound waves. Looping provides for economies in memory space. Also, every note is not necessarily actually sample recorded, since this would use up a lot of memory. Sometimes, the sample rate is changed to alter the pitch of notes of the same voice. The processor is also capable of creating numbers in between samples to make better samples (interpolation). When the harmonic content of a note varies from onset to a continuous level: the addresses of several sample strings can be chained together to produce a complex sound.

These examples are included only to remove some of the magical qualities of this type of generation, and to make it seem more plausible. The methods that are actually used are contained in proprietary algorithms, and they will not be discussed here.

Janis outputs a multichannel Kurzweil Interchip Serial (KIS) serial data stream. The channelized sample audio is output from Janis on three KISO lines (KISO-0 thru KISO-3), 8 channels on each output line, to the first 'Hobbes circuit.

Janis is capable of 24 simultaneous channels; that is, it is capable of recovering 24 individual voice sounds at the same time. However, we do not mean to imply to the servicer that there are 24 electrical channels through Janis; what we mean is, Janis can keep 24 separate numerical quantities at almost the same time, or at least as far as the operator is concerned, the channels sound like they are very separate. These are sounds that can begin and end at different times.

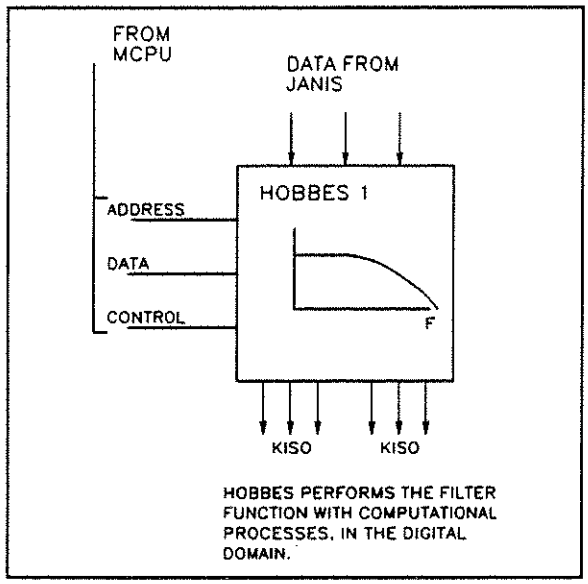
When Janis runs out of sound channels because there are too many notes sounding, it will determine which is the oldest channel and truncate, and reassign that channel to the newer sound. Individual voice sounds are located in the "Sound ROM" and "Sound RAM" systems of Janis. The MCPU tells Janis where each sound is located when it gives it the note commands of each key that is to be sounded. Janis's job then is: Janis must sequentially output a whole series of addresses to reconstruct each note of the sound. Consequently, a whole series of digital samples start to accumulate in the data stream from Janis. Notice that Janis's addressing capability is prodigious with 27 bits of address. Voice sample data bytes are 16 bits wide. The serial output signals are: CKIS0, CKIS1, CKIS2.

Important signals to/from Janis are: +5 volts, ground, 20 mHz ck, reset should be high. The servicer should be aware that the sound generation and processing circuits are referenced to the high frequency clock (20 mHz); therefore, if the crystal frequency were to change, the pitch of the instrument could be wrong, or perhaps there would be no sound at all.

HOBBES

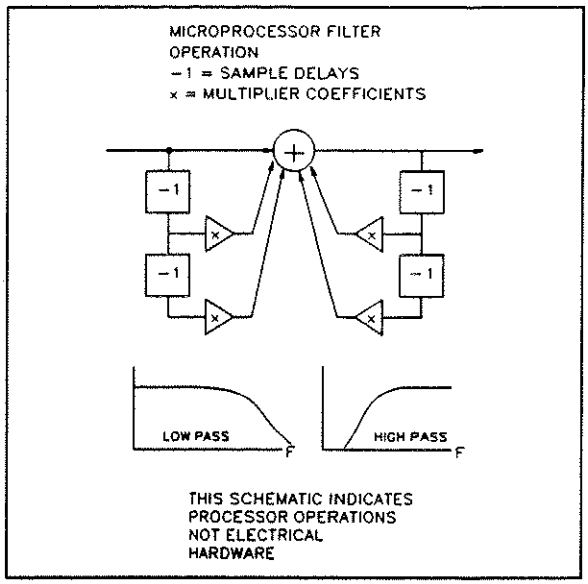
The first Hobbes chip (Hobbes 1) after the Janis chip is performing the filter function necessary to improve the quality of the sampled audio. The servicer should note that this function is occurring in the numerical domain; that is, the filtering that is occurring here is a math operation performed by the microprocessor circuits of the Hobbes chip. The actual math operation will be defined by the instructions from the

MCPU. Hobbes is also capable of synthesizing samples in order to improve the quality of sound that the K-2000 provides. Since Hobbes is only processing serial data, it is only necessary to pass the data through the processor operations, and it is not necessary to store any data at this location. Hence, the device is performing large scale serial math operations on the sampled audio as it is being generated by Janis. The outputs from this Hobbes chip are on two sets of three KISO (0-5) lines.



Filtering with microprocessors is made possible by using math operation like the bi-linear Z transform. Applications of the bi-linear Z transform can create all of the normal filter response curves familiar to you from analog "resistor-capacitor" combinations: low pass, high pass, band pass, band reject, etc. Each filter section to be performed by processor requires a set of coefficients (numbers) that are applied to the sampled audio. These filter coefficients are loaded from the MCPU during the instruction phase of operations. The filter sections like their analog counterparts produce negative or positive response versus frequency. Hence, by using combinations of multiple filter sections it is possible to build all types of filter response curves in the digital domain.

Hobbes 2 is performing the summation function. This is where the channelized audio samples are combined into two basic digital audio channels.



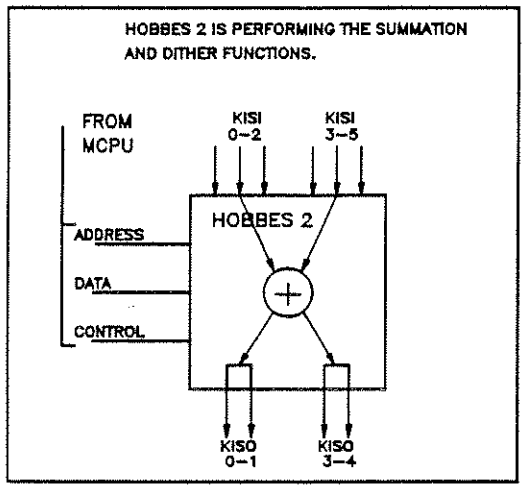
Summation simply means we algebraically "add" all individual channel samples to get a composite audio channel which contains real time audio. Summation is not difficult for a device which is basically built to handle addition and subtraction operations. In addition to summation, Hobbes 2 is also producing dither to the audio samples.

SHEET 4 HOBBES #1

Hobbes #1 is performing programmable digital filtering on the 24 channel digital audio. It is important to remember that those filter functions that you remember in analog circuits are being performed in the digital domain. Again there is only one microprocessor performing the filter operations on all 24 digital audio channels. The practical observation at this point is: if the Hobbes processor circuits have difficulties, all channels will be adversely affected. However, if the Hobbes processor is outputting samples, it may be difficult to ascertain what the problem is. Hobbes 1 is loaded with a control program from the MCPU via the address and data buss system. After it has received the control program it is simply performing mathematical operations on the digital audio samples. The serial output signals are: HKIS0-HKIS5.

SHEET 4 HOBBES #2

Hobbes #2 is performing the summation function; that is, the channelized audio coming from Hobbes #1 is being turned into two channels (left and right) by Hobbes #2. Digital summation is comparable to analog mixing. Furthermore, summation is not a problem for a device which is basically made to add numbers. In addition to the summation operation, Hobbes #2 will add a low frequency variation to the normal channel sums (dither). The serial output signals are: DAC1E0, DAC1E1, DACDA, DACDB.



Digital audio leaves the Engine board via connector J2, and it enters the audio board on sheet 8 at coordinates D-6. The serial output signals are: DACLE1, DACLE0, DACDA, DACDB.

Important signals to/from Hobbes: +5 volts, ground, ck-20 mHz, reset should be high.

SHEET 5 SOUND ROM

Address and control enter sheet 5 at the upper left at 5-B-1, while data leaves sheet five at 5-J-5 returning to the Janis sound generator chip. Janis drives the ROM system address buss, while the ROM data buss system is returned to the Janis chip via the unidirectional data buffers (U41 and U49). The sound ROM chips contain sampled audio of all the sounds that the instrument is capable of making without external ROM or RAM blocks. For each voice note, Janis must output an address sequence for as long as a voice is sounding. So, when there is sound in the system, there should be address activity in the memory system.

SHEET 6 SOUND RAM

Address and control enter sheet 6 at the upper left at 6-A-1, while data can enter or leave at 6-F-5. The address buss is driven by the Janis sound generator chip. The data buss system (D0-D15) is returned to the Janis sound generator on sheet 4. The sound samples stored here are obtained from disk memories (floppy or hard disk) or the sample option.

SHEET 7 SCAN CPU

The scan microprocessor (37450M8) U30 and scanner ROM device form the scanner mechanism, of the sound generation system, of the K2000 instrument. All of the operator controls enter the instrument through this device. The (37450M8) incorporates a built-in analog to digital converter at the upper left on the chip (AIN0-7). This causes all analog inputs connected to this port to be converted to digital values which can be stored in the memory system, and subsequently to be operated upon by the digital system. The inputs that enter through this port are: pedals, keyboard pressure sensor, wheels (pitch, modulation), battery sense, etc.

The key contacts, switch panel, key pressure, mod wheels and pedal controls are being sequentially tested (scanned) through the scanner ports and the analog converter ports of the SCPU. When there is activity on any of these input systems, the SCPU immediately notifies the Main CPU (MCPU) via internal MIDI. The SCPU contains a limited amount of Random Access Memory (RAM) to hold the system variables only until they are transferred to the MCPU. The SCPU is a stand alone device in respect to the scan program; that is, the SCPU will operate the scanner function without instructions from the MCPU. The SCPU operates the scanner program out of the on-board ROM device.

The SCPU is operating a scanner routine out of port 0 and port 1, bits 0-7. This process causes a pattern of positive pulses that occur sequentially in the keyboard switch matrix. The timing of these pulses makes it possible to determine which keyboard notes are being played. The servicer should be advised,

port (0-1) are also used as address lines from the SCPU during ROM addressing operations. Addressing operations occur at a different time than the scanner routine. On the right side of the sheet, the treble and bass sections of the keyboard are being scanned through ports: (P00-P07), (P10-17), (P20-27), (P60--67). These ports are the scanner output/input lines to the keyboard system. On the Row lines the SCPU outputs positive pulses, if a key switch is closed, the positive pulse returns to SCPU at P20-27. The SCPU determines what key is being pressed by the timing of the pulse and the signal line the pulse occurs on. These scanner ports are multiple purpose signal ports, since part of the time these same ports serve as general purpose address and data connections to the SCPU.

The control panel is being scanned in a similar fashion, as the keyboards, out of port 5 bits (0-7). The SCPU operates a 1/16 decoder (U31) to produce sequential negative logic levels in the panel switch matrix. The control panel contains 38 switches plus the Delta Wheel which are input to the SCPU in four groups (Row 0-3). The SCPU looks at each one of the groups one at a time, and it is able to determine which switches are being pressed by knowing the switch group the negative scan pulses are occurring, and the column scan pulse timing. Both of these variables it controls. The third variable is: is the switch closed or not. The voltage level at the row input lines tell the SCPU this.

At port 5 (P50-57) the scan microprocessor is operating the switch panel scanner system. The SCPU causes negative pulses to be generated in U31. These pulses are input to the switch panel, if they return on one of the "row" sense lines, it means that one of the panel switches is closed (the operator is calling for a control change.)

SHEET 7 KEYBOARD PRESSURE SENSOR

The keyboard of the K-2000 is pressure sensitive; that is, there is a conductive strip underneath the entire keyboard. The pressure exerted on any key will determine a single resistance value for the strip. The resistor strip is constantly monitored by the SCPU at the analog converter port. Other A/D conversions that are occurring at the A/D ports of the SCPU are: Battery sense, Pitch Wheel, Modulation Wheel and the Pedal Controls. The SCPU sequentially samples each analog input and creates a digital number that corresponds to the analog voltage that is present, at a high rate, continuously. Consequently, all analog variables are immediately converted to digital quantities that can be stored and transmitted in the digital systems of the K2000/K2000R.

SHEET 7 LCD CONTRAST CONTROL

At 7-F-7 the SCPU is able to control the LCD contrast by controlling the voltage on the capacitor at the collector of Q14. Q14 is normally "off", and the SCPU is pulsing the capacitor with positive pulses. The capacitor voltage tends to leak "off" through R140 and R143 (10k and 100k respectively) resistors at the collector of Q14. The inverting amplifier will convert the (±) input voltage into (±) voltage at the output of the amplifier (pin 5). The range of the amplifier output voltage will be determined by the setting of the "default contrast" potentiometer and the digital contrast control which can be viewed on the digital display. The range of numbers on the digital display is (+10 to -10). The operator can control contrast from the display.

At power-up the LCD contrast control line is held low by Q14 at F-7. After reset is "low", the contrast sensor (U59) at G-7 senses the voltage on the capacitor (C-196) at the collector of Q14. The SCPU outputs pulses which will determine the contrast voltage on the capacitor. The capacitor voltage is inverted by the amplifier (U59-7).

LCD CONTRAST CONTROL ADJUSTMENT PROCEDURE at R246

On the front panel call the Master Menu: Set the contrast control on the digital display (LCD) to (-10). Now adjust R246 so that the display is very dim, (just barely able to read display). The contrast adjustment is properly set at this time. This setting insures that the operator can control the display with the digital controller from very dim to very dark, or the maximum range of settings. At this initial setting, the amplifier output (U59-7) is approximately -9.6 volts. The contrast control was not included in early production units; consequently, the initial

contrast control is obtained by adjusting the +5 volt supply very slightly.

SHEET 8 POWER SUPPLY

The power supply is obvious for the most part; most of the parts are easily recognizable. The supplies being made from: an isolation transformer, diode rectifier bridge elements, series regulator IC's, and etc. Only a few parts need some mention here. The transistors Q18 and 19 and transformer T1 are parts of a free-running oscillator that convert low voltage DC into high voltage AC for the Electro-luminescent back-light for the LCD. Q18 will be on if the +5 volt bulk supply is "on", and if the +12 volt analog series regulator is "on". Q19, the transformer connections and the capacitors form an oscillator which will free-run at approximately 350 Hz. The voltage at the transformer secondary terminals is approximately 100 volts.

SHEET 8 BACK-UP Vdd

Q13 will be "on", if Q10 is "on" and +5 volts is high. These two quantities indicate that the digital and analog supplies are up, or that +12 volts ana is more positive than +5 volts. If the system is "off", the RAM system is being maintained by the battery pack at 8-J-3.

Q11 is a switch that is "on" if +12v is more positive than +5. However after the initial reset condition, it ensures Q9 is "off", and this condition will cause RESET to be "low". RESETb is the compliment of RESET, and it will be high at this time. Initially at "power-on", the capacitor will be discharged, and the capacitor will require approximately 1 second to approach 2.5 volts, after power is applied.

SHEET 8 UNMUTE

The logic (mute) signal enters the analog board at the link connector (J7 -5). "Mute" is generated by the MCPU on sheet 1. When the system is not muted, or the system is making sound, mute is low, and Q15 is "off". The collector of Q15 is high, and Q16 is "on". Consequently, Q17 is "on", and the collector of Q17 is low (-15 volts). The K2000 amplifier system should be gated-on at this point. In the opposite situation when the system is being muted, Q15 is "on", and Q17 is "off". The K2000 system amplifiers should be gated-off when the collector of Q17 is at +12 volts.

The link connector at 8-D-6 connects the Analog board and the Engine board. This is the main connector between the two circuit boards.

SHEET 9 DAC's and FILTERS

At the upper left the digital audio signal from Hobbes #2 enters the Digital To Analog Converters (DACS) at 9-B-2. All of the signals appearing at this point are provided by the sound generation system on sheet 4. The digital samples are subsequently converted into analog voltage by the DAC's, and then it is passed through the filter system immediately to the right of the DAC's. The analog signals are passed to the audio I/O jack connectors on sheet 10 and then returned to sheet 9. The analog signals are subsequently distributed to the left bottom of sheet 9 and also to sheet 11. The analog signals go to many places from this point; however, our main objective here is to illustrate the main digital parts of the K2000 instrument. So, lets continue to follow A (L/R) on to sheet 11. These two signals become (ARRTN and ALRTN).

SHEETS 10 AND 11, MIXING, MODULATION, REVERBERATION

The two signals (ARRTN and ALRTN) are mixed on sheet 10 at U6-7, and they become RVB_IN at 10-I-1. This signal then continues onto sheet 12 at coordinates A-4. The composite L/R analog audio signal progresses through to the DOD reverberation device via: U12-1, U10-12, U12-7, U11-3, U11-7 and subsequently U50-8. The DOD chip has an Analog to Digital Converter (A/D) built-into the input at U50-8. Consequently, the analog voltage is converted into digital numbers again at this location, and they are continuously stored in Reverberation RAM. When digital audio is recalled from REVERB RAM the numbers are output through U50 pins 12-19. The numbers continue through U17 and 18, and they are applied to the Digital to Analog Converter (PCM54). The recovered analog audio exits the DAC at pin 25. The signal is buffered by the amplifier U13, and it reenters the analog system at U13-6 via two resistors at 12-H-5 (R58-59). The two analog signals subsequently reenter the analog

switches (U14-14,15), and are subjected to more low-pass filtering at U7. The signals reenter the system as RVB_OUT L/R. Also, the reverberation signal is reentered into the analog input of the DOD A/D at U11-2.

SHEET 12 EFFECTS CPU (6303) REVERBERATION CONTROLLER

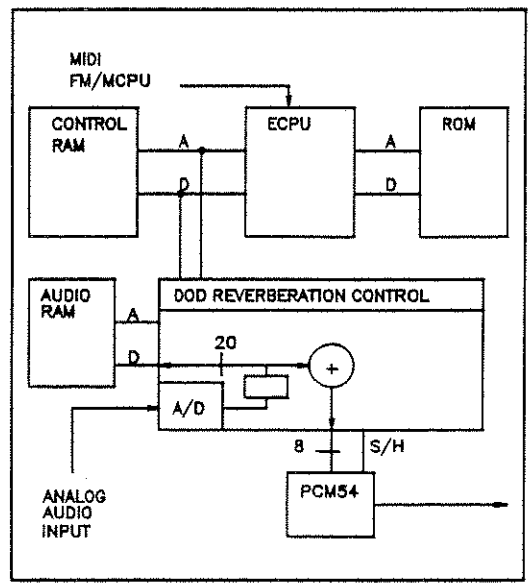
At 12-C-1 the Reverberation Control Processor Unit (RCPU) together with the control ROM and RAM, located at 13-H-1, comprise the controller for the DOD reverberation unit. After the RCPU (U52) receives a program command from the MCPU (large hall, chorus, etc.), the RCPU (6303) extracts the operating program for the DOD chip from R-ROM. Subsequently, the RCPU deposits the DOD operating program in the DOD control RAM (U24 and U25). After the operating program for reverberation resides in Reverb ROM, the DOD reverberation takes control of the addressing control of that RAM system and reads the operating program into its own registers. Notice that the Reverb RAM Addressing control can be from either the RCPU or the DOD reverberation chip. The address and data line arbitration is concluded at line buffers (U46, 26, 47, 29); this is the point where both the RCPU, or the DOD chip can control the address buss system of the reverberation RAM devices. When the RCPU is not controlling the Reverb RAM chip, the Reverb RAM addressing and data buss systems are being controlled by the DOD reverberation chip.

The Reverberation CPU (RCPU) has a resident control program which performs the house keeping functions of controlling the RCPU and the Digital Signal Processor (DSP), the DOD reverberation circuit. Communication between the RCPU, MCPU and DOD is defined by instructions in R-ROM. The ECPU places DOD command data in the RAM (U24, U25). Control change information (reverb, echo, symphonic, etc.) from the control panel is sent by the SCPU via the MCPU and finally to the ECPU via internal MIDI. All of the control data necessary to operate the DOD chip is stored in the RAMs (U24, U25). When the DOD is to be loaded with different control data, the RCPU places a different control program in the DOD Control RAM location.

On sheet 10, Sep out (1 & 2) are summed by the summing amplifier U6. These two outputs are the reverberation input signals to the DOD reverberation circuit.

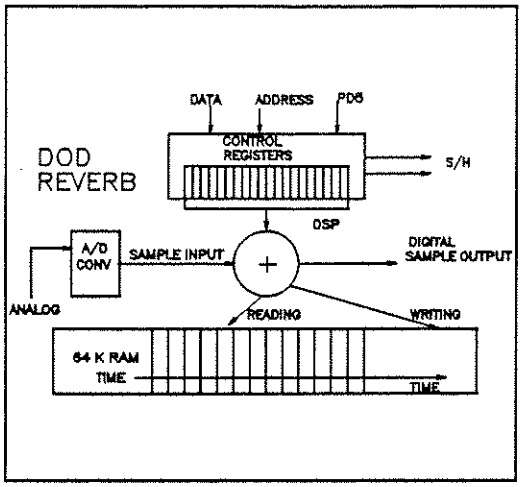
SHEET 11 DOD REVERBERATION

The DOD chip enters a new set of control parameters (reverberation, chorus, etc.) when it is commanded by the RCPU chip (PD5). When the DOD chip is inputting a new control program, the DOD chip takes over the control of the Control RAM address and data buss systems, notice that either device, ECPU or the DOD chip, can control the address and the data buss of the reverb program RAM. DOD loads its internal control registers from the control RAM. The DOD-DSP is a special purpose micro-processor; that is, the electronic structure lends its self to high speed serial math procedures. This characteristic allows it to be utilized in creating audio effects like: Reverberation, Chorus, Symphonic sound, etc. Control data is applied via the ECPU and REVERB RAM. System analog audio is continuously taken into the DSP and converted to digital numbers. These 16 bit numbers (samples) are continuously stored in the effects RAM.



The effects RAM is written to from beginning to end, and then it starts over writing the data at the beginning of memory. Consequently, what you have at this location is a limited audio history. The control program instructs the DOD to read from

audio history (delayed audio), or it is instructed to read somewhere behind real-time audio. This audio then is delayed in time, or equivalent to a sound that has traveled a longer path (reverberation-echo).

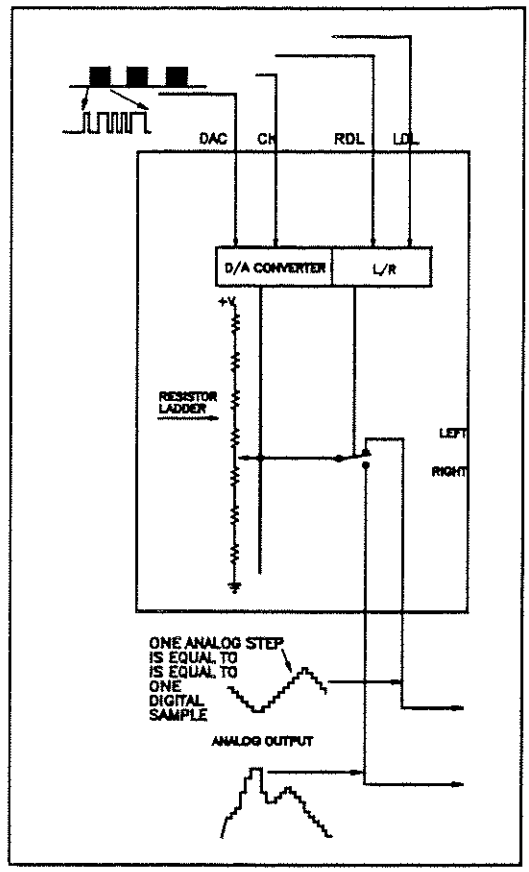


The delayed samples are added to real time audio. Furthermore, it is necessary that real time audio samples be present otherwise there would be no time reference to know what is direct sound and what is reflected. Digital audio is recovered by passing it through the Digital to Analog Converter (DAC-PCM54). Analog audio is filtered and output as stereo reverb L/R. The DOD chip also outputs sample and hold L/R signals, these are used to create L/R audio signals at the analog switch (U14).

SHEET 9 DAC 1864

U3-AD1864 receives serial digital audio samples via DACO from the sound generator (Janis). In addition to the digital samples, Janis also sends DCLK, LDL and RDL to cause the DAC to decode the digital audio samples properly; that is, the digital audio data stream contains left and right audio samples. The DAC IC outputs rough (sampling effects are present) analogue levels on pins (8-17).

The figure above is a basic Digital to Analogue Converter (DAC) device. In the example, the digital numbers, after they are received, cause a controller to pick off voltage levels from a resistor ladder network. The ladder voltage is transmitted through the relay contacts to the output. That's one sample. The next digital sample causes a new voltage to picked off the ladder network. From this you can see why the output has so many steps. The number of steps is determined by the number of resistor elements in the ladder network. Ideally, the resistor



DIGITAL to ANALOG CONVERTER (A/D)

ladder should have a large number of elements; however, in practical converters the number of elements are limited to maybe the number you can access through 18 bits (256K). The reason this mechanism works is that: the device can receive serial digital numbers at a very high rate. Furthermore, the resistor ladder has many more resistor elements than the one shown. In the case of the K-2000, the DAC is assembling two simultaneous audio channels; hence, the left and right digital channels are interlaced on the serial data transmission line.

SAMPLING OPTION (SMPK-SMPR)

The Sampling Option provides for: two input signals (analog-audio), (AES/SPD-digital audio); one output signal (AES/SPD-digital). The Sampling Option converts stereo analog audio signals into digital sampled audio. The Sampling Option board can receive AES/SPD audio samples from compatible equipment. The Sampling Option board can transmit AES/SPD digital audio samples.

INPUT SPECIFICATIONS:
Analog Input Impedance: > 10 k Ohms

Analog Input Sensitivity: Nominal - 0 dBm, ≈ 0.775 volts produces the best digital results; -10 dBm (≈ 0.250 volts) produces good digital sample results.

Selectable Sampling Rates: 29.4 kHz; 32 kHz; 44.1 kHz; 48 kHz.

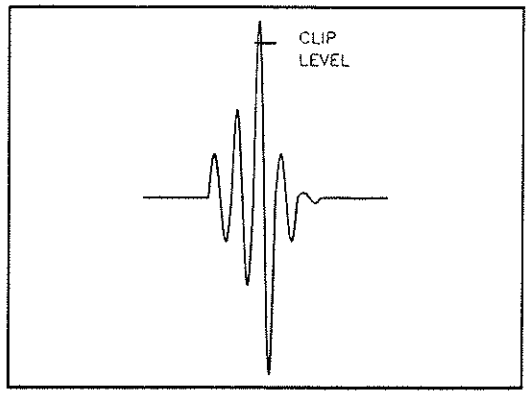
Digital Input formats: Optical DAT;
AES/SPD digital formats

Digital Output Formats: AES/SPD

If a detailed description of the Sampling Option operation is required, the servicer can review "Version 2" software in the options section of this text.

ELECTRICAL DESCRIPTION FOR SERVICE
This description generally follows the supplied block diagrams of the two units, (SMPK-K2000 keyboard, and SMPR-K2000R); however, the blocks are fairly close to the actual circuit schematics. However, if coordinates are given, they will refer to the circuit schematics.

ANALOG INPUTS
The SMPK provides two identical analog inputs for sample conversion at the selected sampling rate. The nominal input voltage amplitude is approximately 0.775 volts. The input signal is subjected to two inverting amplifier stages. The gain of the second



sage can be adjusted, for gain or attenuation, from the panel controls via the CPU. This is an operator control to allow for varying input signal levels. U4 is a binary controlled analog switch which connects "one" of the resistors, there are four, across the inverting amplifier stage U2. Signals from the second amplifier are applied to the Analog to Digital Converter (A/D) U5. Eventually, the digital samples from U5 are directed through a digital selector (U18). Assuming that U18 is selecting the A/D inputs, U18's serial output is directed to the Serial to Parallel converter "U16 and U23". Subsequently, the parallel outputs from the serial to parallel converter are available to the MCPU in the instrument.

At the data selector U18, word clock is selected from the A/D converter or the AES/SPD converter. Word clock is the signal that the MCPU is polling in the ouput register at U17. When the CPU sees word clock, it takes the parallel output data from U16 and U23. Word clock is the signal that measures out an entire sample. In this case, one cycle of Word Clock is going to be 16 bit cycles long, since this is the basic data word length of this instrument. In other words "Word Clock" is the signal that tells the MCPU when there is an entire data sample in the parallel output registers.

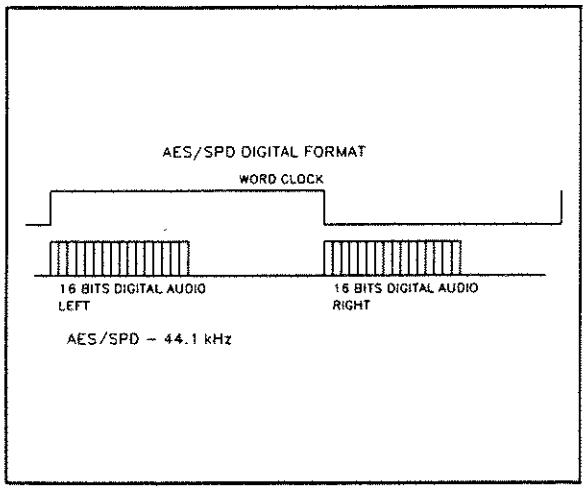
CLIP ERROR DETECTORS
At I-H-2 U11, the analog input signal peaks are monitored for amplitude. U11 is a dual comparator with +2.5 volts on the non-inverting input. When the analog input signal positive peaks exceed +2.5 volts on the inverting input, the output will pulse negative triggering the following flip/flop U9. Q output from U9 is called "over". This signal is

monitored through U13. The flip/flop U9 is reset by the MCPU. Since the flip/flop is being reset by the

MCPU, it is a simple matter to count the number of clip errors in a sample, and to indicate the number in the LCD display as a quality report on a sample attempt.

AES/SPD DIGITAL INPUT

The AES/SPD serial input will accept audio AES/SPD serial data formats from any compatible device. These formats have defined bit rates and word lengths. The input signal is serial-digital of known length. U20 converts line signals into digital



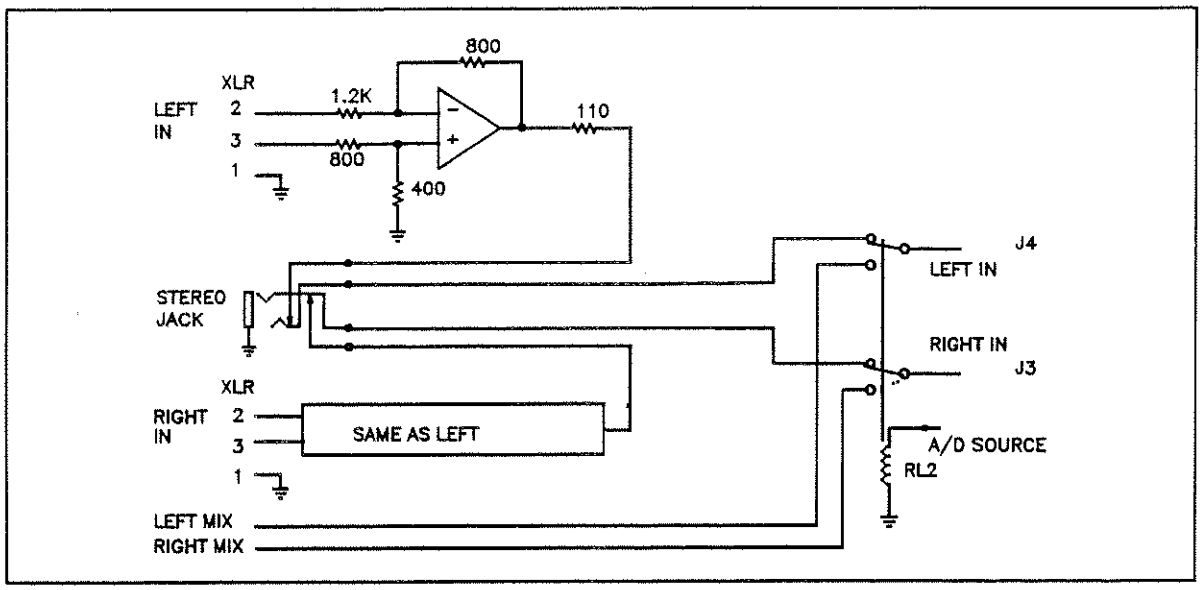
logic levels. U5 extracts Word Clock from the serial audio data format. The AES/SPD format includes user bits with the digital audio samples of known length. Word Clock from the AES/SPD formatter is extracted from serial data and placed in the polling register for the MCPU. The selector (U18) can select Word Clock from either the A/D or the AES/SPD formatter to place in the polling register at U17. "Word Clock" signals the MCPU that there is valid data in the output register. Data out from the AES/SPD formatter is 4 bits/parallel (E0-E1, F0-F1).

At data register U13 the MCPU is polling two status signals; clip (over); ERF (AES formatter error).

AES/SPD DIGITAL OUTPUT

U21 on the block diagram receives 4 bits parallel from the data buffer U22. U21 assembles AES/SPD audio format and transmits the same. The AES/SPD transmitter is controlled by the MCPU via U22.

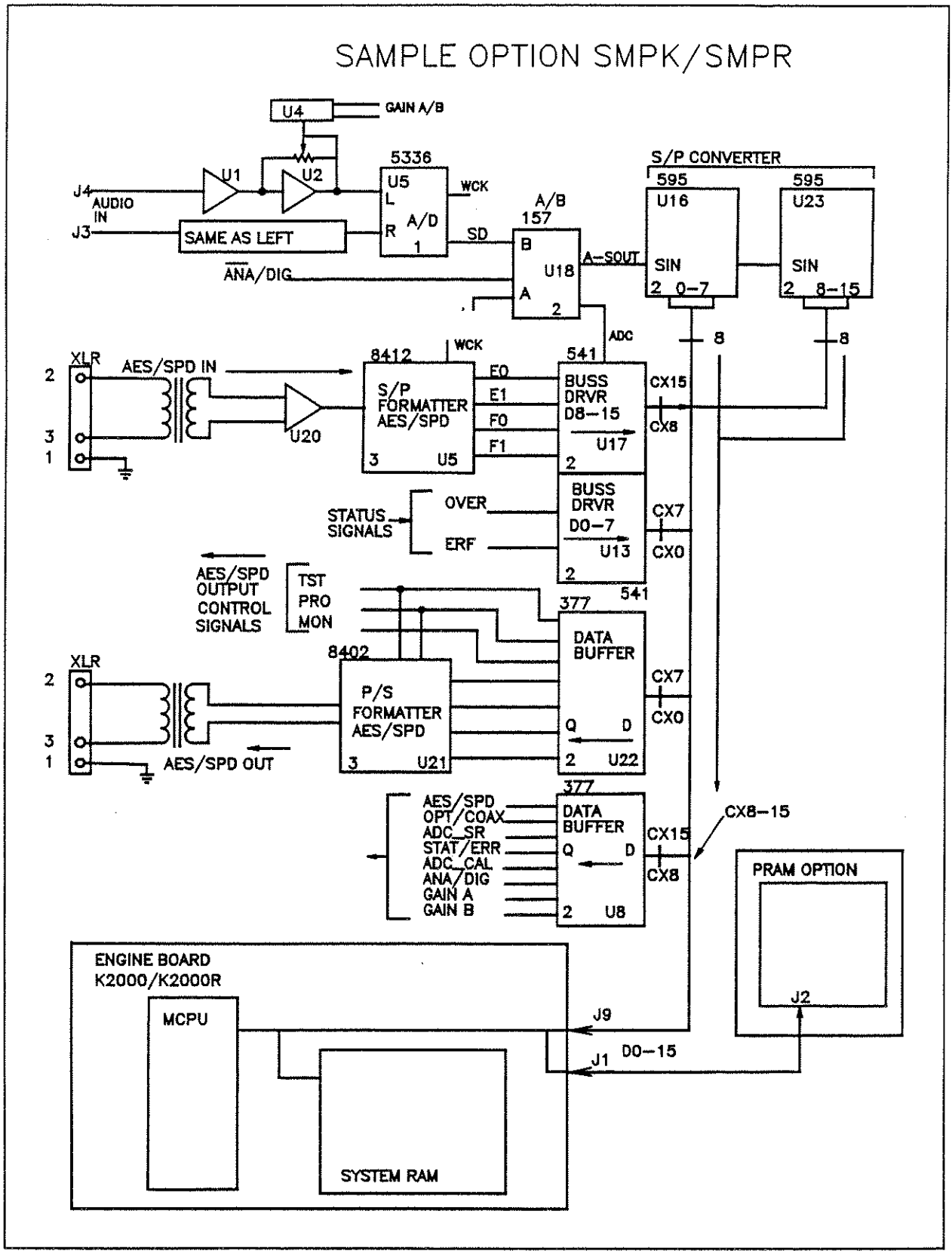
U8 is an octal D-flip/flop used to provide control signals to the sample option card via the MCPU.

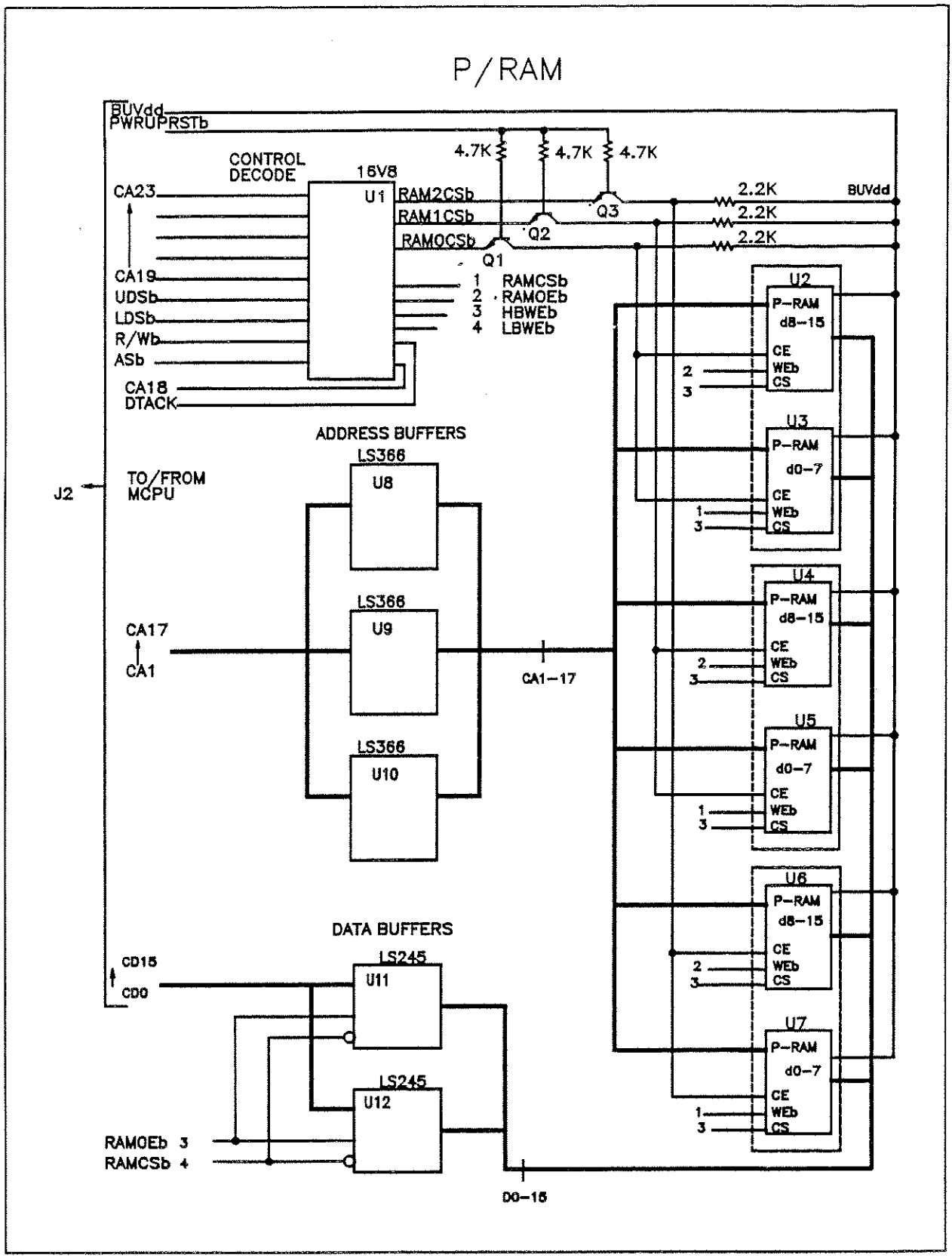


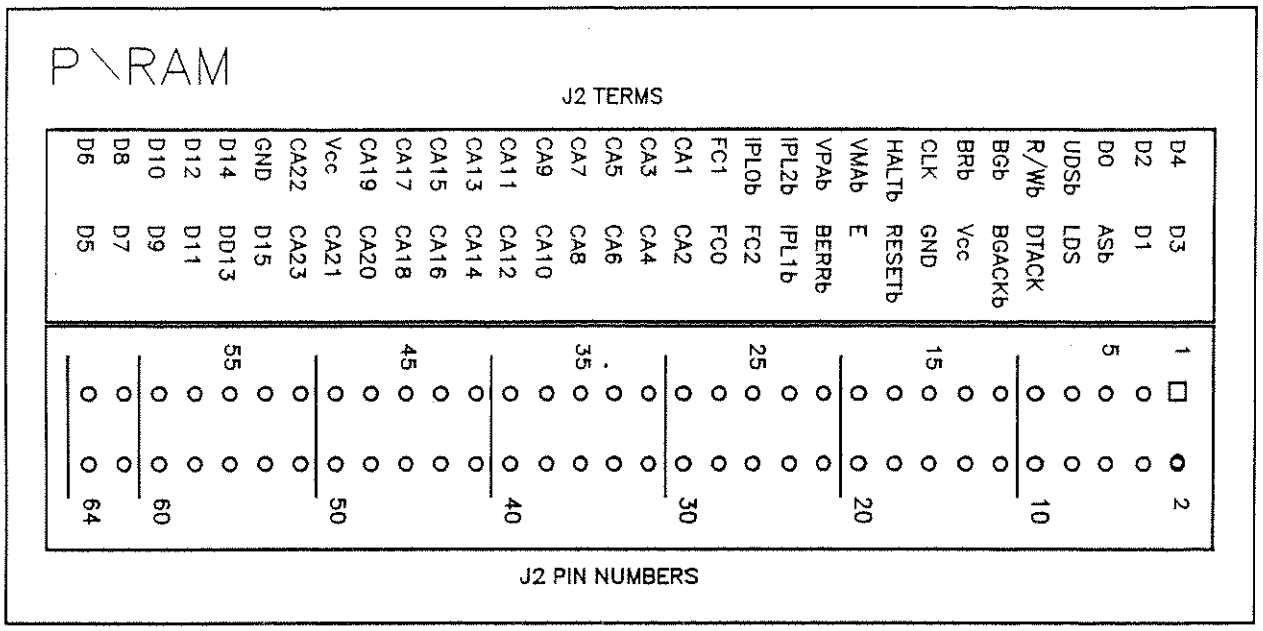
INPUT CIRCUITRY OF THE K2000R

SMPR

If the K2000 unit in question is a K2000R (rack unit), and it contains the Sampling Option. The sampling option in the rack unit will include the circuitry above. These circuits provide additional input choices for the rack unit. The output from this circuitry connects to the locations where the normal inputs would connect in the K2000 keyboard unit.


SAMPLE OPTION SMPK/SMPR
U4
GAIN A/B
U1
U2
5336
U5
L
R A/D
1
WCK
SD
J4
AUDIO IN
J3
SAME AS LEFT
ANA/DIG
A/B
157
B
U18
A
2
A-SOUT
S/P CONVERTER
595
U16
SIN
2 0-7
595
U23
SIN
2 8-15
ADC
8
8
XLR
2
3
1
AES/SPD IN
U20
8412
WCK
S/P FORMATTER AES/SPD
3 U5
E0
E1
F0
F1
541
BUSS DRVR D8-15
U17
2
CX15
CX8
BUSS DRVR D0-7
U13
2
CX7
CX0
STATUS SIGNALS
OVER
ERF
AES/SPD OUTPUT CONTROL SIGNALS
TST
PRO
MON
541
377
DATA BUFFER
Q D
2 U22
CX7
CX0
8402
P/S FORMATTER AES/SPD
3 U21
XLR
2
3
1
AES/SPD OUT
377
DATA BUFFER
Q D
2 U8
CX15
CX8
CX8-15
AES/SPD
OPT/COAX
ADC_SR
STAT/ERR
ADC_CAL
ANA/DIG
GAIN A
GAIN B
PRAM OPTION
J2
ENGINE BOARD
K2000/K2000R
MCPU
SYSTEM RAM
J9
J1
D0-15


P/RAM
BUVdd
PWRUPRSTb
4.7K
4.7K
4.7K
CONTROL DECODE
16V8
U1
CA23
CA19
UDSb
LDSb
R/Wb
ASb
CA18
DTACK
RAM2CSb
RAM1CSb
RAM0CSb
Q1
Q2
Q3
2.2K
2.2K
2.2K
BUVdd
1 RAMCSb
2 RAMOEb
3 HBWEb
4 LBWEb
U2
U3
U4
U5
U6
U7
P-RAM
d8-15
d0-7
CE
WEb
CS
ADDRESS BUFFERS
LS366
U8
U9
U10
J2
TO/FROM MCPU
CA17
CA1
CA1-17
DATA BUFFERS
LS245
U11
U12
CD15
CD0
RAM0Eb 3
RAMCSb 4
D0-15



PRAM connector/Terms

P/RAM OPTION

The figure above is the connector that connects the P/RAM Option card to the MCPU system. On the P/RAM Option card, the address buffers drive the P/RAM address buss system. The data buffers direct data to/from the P/RAM memory system. The memory IC's are dynamic memory elements that require periodic refresh cycles. Refresh is accomplished internally by each memory IC by WEb and CS inputs when the devices are not being enabled at the CE inputs. Consequently, it is normal to see activity here even when the device is not being accessed by the MCPU. Normally after the K2000 has been powered "on", PWRUPRSTb is "high". When the MCPU accesses the P/RAM Option, RAMxCSb goes "low". Consequently, CE and CS inputs to the respective memory array become asserted enabling the output registers of the respective devices in the "read" mode. In addition to the previous CE and CS signals, the memory IC's also require the WEb signal in the write mode.

The control signals necessary to accomplish these requirements are decoded from the address buss by the control decode IC (U1-16V8). U1 is a user programmable logic array, so that it is programmed by the user to provide the required control signals for any application; therefore, the servicer will be required to obtain this part from the equipment manufacturer that uses it. When the MCPU initializes the system, it outputs an extended address to the P/RAM connector. If it receives a reply on DTACK and CA18, the MCPU is aware of the P/RAM option (memory expansion), and the MCPU will adjust the available memory size on the K2000 LCD to 761K. Normally with out the P/RAM option, the K2000 LCD indicates 121K. When the K2000 unit is powered "off", backup power is provided to the P/RAM memory system from the battery pack included in the K2000 instrument. During those periods when the unit is "off", current drain to the P/RAM Option should be less than 10μ amperes.

KURZWEIL MEMORY HISTORY CHART
MODEL: K2000 SERIES / 6-93

K2000	STAND	H.D.	SIMM	PRAM	V2.0	SAMPLER	ROM-1	ROM-2	ROM-3
CALVIN 1-92 V1.0	Y	Y/f	Y/f	Y/f					
CALVIN 9-92 V1.30	Y	Y/f	Y/f	Y/f					
JANIS 9-92 1.30J	Y	Y/f	Y/f	Y/f					
CALVIN 6-93		Y/f	Y/f	Y/f	Y/f	Y/f			
V2.07/V1.30									
ENGINE/SETUP									
A/ENGINE							Y/f	X	X
A/SETUP							Y/f	Y/V1.XX	Y/V1.XX
JANIS 6-93		Y/f	Y/f	Y/f	Y/f	Y/f			
V2.07J/V1.30J									
ENGINE/SETUP									
A/ENGINE							Y/f	Y/f	Y/f
A/SETUP							Y/J/f V1.XX	Y/J/f V1.XX	Y/J/f V1.XX

A/ -DENOTES ADDITIONAL HARDWARE NEEDED FOR SELECTED OPTIONS.

YJ/f = YES-JANIS-FAN REQUIRED

THE LEFT HAND COLUMN REPRESENT HARDWARE MOSTLY, WHILE THE COLUMNS ACROSS THE TOP REPRESENT HARDWARE AND SOFTWARE OPTIONS.

KURZWEIL MEMORY HISTORY CHART
MODEL: K2000R SERIES / 6-93

K2000R	STAND	H.D.	SIMM	PRAM	V2.0	SAMPLER	ROM-1	ROM-2	ROM-3
CALVIN 9-92 V1.30	Y	Y	Y	Y					
JANIS 6-92 V1.30J	Y	Y	Y	Y					
CALVIN 1-92		Y	Y	Y	Y	Y			
V2.07/V1.30									
ENGINE/SETUP									
A/ENGINE							Y	N	N
A/SETUP							Y	Y/V1.XX	Y/V1.XX
JANIS 6-92		Y	Y	Y	Y	Y			
V2.07J/V1.30J									
ENGINE/SETUP									
A/ENGINE							Y/	Y/	Y/
A/SETUP							Y/J/ V1.XX	Y/J/ V1.XX	Y/Jf V1.XX

A/ -DENOTES ADDITIONAL HARDWARE NEEDED FOR SELECTED OPTIONS.

YJ = YES-JANIS.

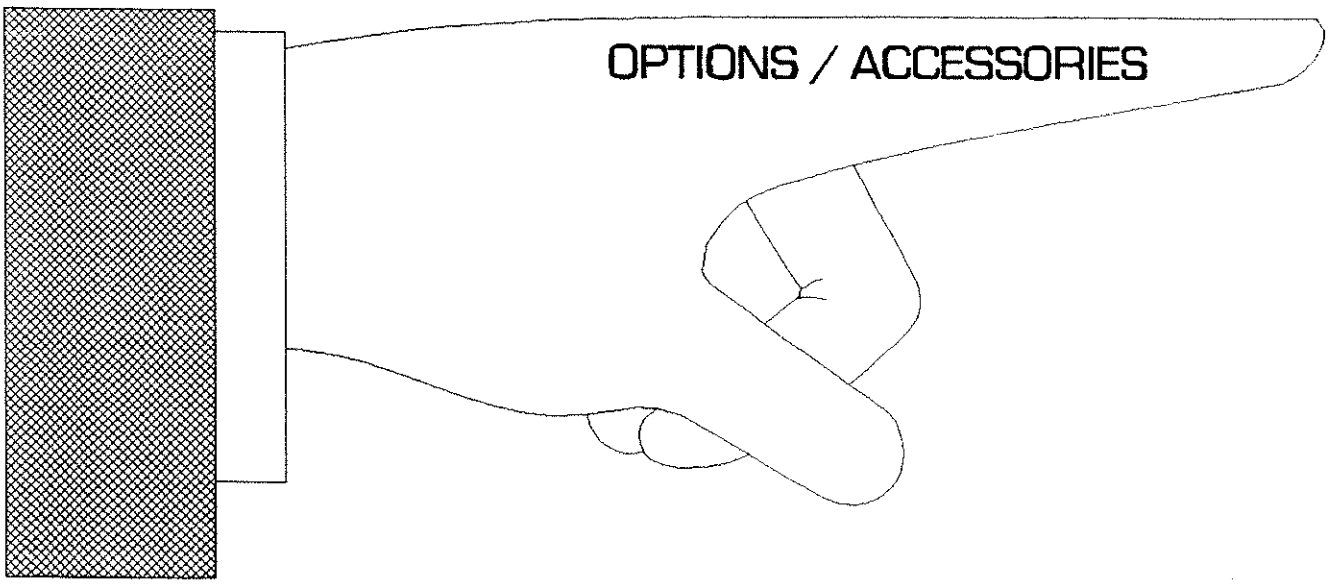
N = NO

THE LEFT HAND COLUMN REPRESENT HARDWARE MOSTLY, WHILE THE COLUMNS ACROSS THE TOP REPRESENT HARDWARE AND SOFTWARE OPTIONS.

SECTION 2

K2000 and K2000R ADDENDUM

This section presents an overview of the available options for the K2000 and K2000R models and special considerations where applicable.



The information presented in this section provides a comprehensive overview of the available options and excerpts of the installation manuals. This information is helpful for the service who may not have performed a specific option installation.

Used with your conclusions drawn from sections 1 & 6 this section could help the technician define a given circuit fault and or component fault within that circuit.

KURZWEIL K2000 / K2000R OPTIONS, ACCESSORIES AND MISCELLANEOUS INFORMATION

NOTES for SECTION 2

TABLE OF CONTENTS FOR THE OPTIONS SECTION:

INTRODUCTION

The K2000 keyboard and K2000R rack mount version are extremely powerful instruments which offer a wealth of possibilities right out of the box. However, we have also left room for growth, and with the following options and accessories, you can bring the K2000 into a whole new world of sonic potential.

OPTIONS

The following options will be available to enhance the K2000 or K2000R. In most cases, these options work with either keyboard or rack version, with the following exceptions: FK1 FAN KIT (keyboard only); SMP-Sampling option:-K (keyboard version), -R (rack version); HDC Hard Disk Cable Kit: -1 (keyboard), -2 (rack version). Some options are manufactured by Kurzweil Music Systems, while others are available through third party companies. These options must be installed by an authorized Kurzweil service center. Unauthorized installation may void your warranty.

NOTE FOR K2000 KEYBOARD OWNERS:
Kurzweil recommends that the FK1 fan kit be installed in Kurzweil K2000's that contain any of the following options. Use of an internal hard drive and/or SIMMs larger than 4 MBytes makes use of a FK1 fan kit mandatory. Failure to do so may result in damage to both the options and/or the K2000, and may also void the warranty.

ITEM and DESCRIPTION

FK1
Fan Kit - This kit includes an ultra low noise fan plus all necessary cables and hardware to install the fan (K2000 keyboard only). Available May 1992. List price $69.95

SMP-K/SMP-R
Sampling Option - These powerful new options for: the K2000 (SMP-K) at $595.00; or K2000R (SMP-R) at $645.00; allow for stereo sampling and direct digital input/output. The inputs can be used for digital outputs.

This option will also add version 2.0 firmware, a new operating system featuring sample editing screens and many other enhanced functions. Also included is the ability to read: Ensoniq EPS; EPS16; EPS 16+; AKAI S900; 950; 1,000; sample disk, as well as Ensoniq, AKAI, and Roland SCSI formatted media. For those who do not wish to do their own sampling but still want access to this new operating system, Version 2.0 firmware will be separately available at $150.00. Available January 1993.

P-RAM
Battery backed program RAM upgrade. This upgrade will increase program loading and saving of all information such as programs, setups, songs, etc. Note: this option is not to be confused with SIMMs memory, which is for loading of samples only. Available at $395.00.

ROM-1
Soundblock 1. The first of two ROM soundblocks. Each will add an additional 8 Mb of samples to the K2000. This first soundblock is mostly orchestral in nature and will include: Solo Violin, Solo Cello, Oboe, Bassoon, Timpani and other Orchestral instruments, as well as new contemporary sampled instruments. All ROM soundblock samples are different from the ones being made available as part of the Kurzweil disk library. Available at $459.00. Available March 1993.

ROM-2
Soundblock 2. The second ROM soundblock like the first, it will add an additional 8 Mb of samples. The contents of this soundblock are not available for release at this time. All ROM samples are different from the ones being made available as part of the Kurzweil disk library. Available at $459.00 in the Autumn 1993.

NOTE: Either of these ROM Soundblocks requires an RMB-K Soundblock daughter board to be installed first (see below). It is not necessary to install ROM-1 in order to install ROM-2.

RMB-K
Soundblock Daughter Board holds the ROM-1/ROM-2 upgrades. Only one board is necessary and will accommodate either or both ROM-1 AND ROM-2. Available at $175.00 in March 1993.

SCSI HARD DRIVES
The K2000/K2000R SCSI ports will accommodate

both external SCSI devices and/or specified internal hard disk drives, for large-scale storage of programs, setups, songs and samples

For external drives, any standard SCSI-compatible device should function correctly, although it is always wise to test a drive before purchasing it.

The K2000 will also accommodate a limited selection of internal SCSI hard drives. Only Kurzweil Music Systems approved SCSI hard drives may be used inside the K2000. The following are the current KMS tested and approved internal hard drives:

Quantum LPS 52, 105, 120, 210, 240,
Quantum ELS 41, 85, 127, 170
Conner CP3040, CP30100
Seagate ST360N (K2000R only)

You may order these drives through your local Kurzweil dealer, or from a computer peripherals dealer.

Kurzweil cannot guarantee that other internally installed hard disk drives will be compatible with the K2000's connectors, that they will operate properly with K2000 software, or that they will conform to power consumption and heat generation limitations.

HDC-1, HDC-2
Hard Disk Cable Kits. These kits include all necessary hardware to install a hard drive in K2000 or K2000R
K2000-HDC-1; K2000R-HDC-2. Note: A hard drive is not included in this kit. Available at $14.95 in May 1992.

SIMMs
Sampling Memory Modules. The K2000 and K2000R can accommodate up to 64 megabytes of dynamic RAM memory for the purpose of loading and processing samples. This is accomplished via the installation of standard Macintosh-type SIMM's (Single in line Memory Modules). The K2000/K2000R can use any size standard SIMM's from 256k to 16mB. However, for sizes larger than 4 mB, only SIMMs from Kurzweil-approved vendors should be installed. Contact Kurzweil/Young Chang for the latest information on approved vendors for these larger sized SIMMs.

There are four slots for the SIMMs. They must be installed in pairs of the same size, but you may have two different sized pairs. Note: SIMMs MEMORY Cannot be used for program, Setups and Song storage; see P-RAM upgrade.

SM-1: 1 mB SIMM, available from Kurzweil at $83.25
SM-2: 4 mB SIMM, available from Kurzweil at $229.95

FET PROTECTION BOARD:
K2000 and K2000S
K2000R and K2000RS

ACCESSORIES

FS-1
Footswitch for Sustain, Sostenuto, or any switch function. Available at $29.95.

CC-1
Continuous Control Pedal for Volume Change, Filter Sweeps, etc.

SBC
Soft Bag Case for transporting the K2000. Available at $199.00

HSC
Hard Shell Case for transporting the K2000. Non ATA approved. Available at $295.00

KURZWEIL K2000 VIDEOS
In an ongoing effort to provide the finest level of customer support in the music industry, Kurzweil will be producing a series of videos designed to help you delve into the rich programming potential of the K2000. Estimated availability Summer 1993.

YCA-12: K2000 intermediate programming tutorial video at $25.00
YCA-13: K2000 advanced programming tutorial video at $25.00.
YCA-14: K2000 sampling tips and techniques video at $25.00

DISK LIBRARIES
The following disk libraries contain many fine samples, some of them converted from the original 250 sample library. The libraries are sold in volumes

of 10 disks and feature a wide variety of sounds. List price for a 10 disk set is $29.95.

DL VOLUME 1 - PERCUSSION
SD-001 Exotic Percussion (Rain Stick, Gong, Waterphone, Chimes)
SD-002 Castle Drums
SD-003 Cymbal 1 (stereo scrapes)
SD-004 Cymbal 2 (more stereo scrapes)
SD-005 Cymbal Rolls
SD-006 Perc1 (tambourine, clave, guiro, shaker, marimba)
SD-007 Perc2 (temple block, glockenspiel, metal hits)
SD-008 Chapel Ambience (bottle blow, tom hit)
SD-009 Sansa
SD-010 Orchestra Hits

DL VOLUME 2 - MIXED BAG
SD-011 Stratocaster
SD-012 Mandolin (single pick and tremelo)
SD-013 Lute
SD-014 K250 Electric Bass
SD-015 Ooh Choir
SD-016 Solo Strings (violin and cello, both with and without vibrato)
SD-017 Pipe Organ/Handbells (cathedral and church settings)
SD-018 Tremolo Flute
SD-019 Flugelhorn
SD-020 Bass Clarinet

DL VOLUME 3 - FILM SCORE
SD-021 FMLA (classic DX-7 and D-50 patches)
SD-022 Synth (a wide variety of different synths)
SD-023 Synvox (synth vocal pads)
SD-024 Industry
SD-025 Can/Kid (kicking a can/baby talking)
SD-026 Glass (rubbing the rim, bottle blow, breaking)
SD-027 Stereo Car (car driving by)
SD-028 Hammond B-3
SD-029 Shakuhachi
SD-030 Choir/Harp (Aah choir, plucked harp, harp gliss)

DL VOLUME 4 - ORCHESTRAL
SD-031 Violin 1
SD-032 Violin 2
SD-033 Viola
SD-034 Cello
SD-035 Double Bass
SD-036 French Horn
SD-037 French Horn Mutes (consordino, hand)
SD-038 Trombone Mutes 1 (cup, harmon with the tip out)
SD-039 Trombone Mutes 2 (bucket, straight)
SD-040 Best of K250 (harpsichord, celeste, vibes, oboe, baritone horn)

MISCELLANEOUS INFORMATION
Many fine companies have responded to the K2000 with enthusiasm and are now supporting or are working on support for the instrument. Here is a listing of those we are currently aware of. Some of these companies already have product available for purchase; others are planning on release of their product in the near future. Please contact your local Kurzweil dealer for more information on obtaining these products.

Alexander Publishing-Workbooks, Sequencer Disks
AT Work Software-PC Editor/Librarian
Club 50-Samples on CD-ROM
Custom Samples-Samples
East-West/Sound Warehouse-Samples on CD-ROM
Eye and I-Programs and Samples
Greyt Sounds-Programs and Samples
InVision-Programs and Samples on CD-ROM
Opcode-Macintosh Editor Libra Module + Galaxy
Passport-Sample Editing Software
Pro-Rec-Programs and Samples
ProSonus-Programs and Samples
Q UP Arts-Samples on CD-ROM
Sound Sources Unlimited-programs and Samples
Stratus Sounds-Samples
Sweetwater Sound-Samples, also "K2000 Diskmaker."
Valahalla-Programs

KURZWEIL USER GROUP
Just a few months after the release of the K2000, there is already a Kurzweil user group: the K2000 owner group (KOG). For information, contact Glen Workman, 5451 Watercress Place, Columbia MD 21045-2455, (410) 964-3548.

ONLINE BULLETIN BOARD SUPPORT
Kurzweil now maintains a strong daily presence on computer bulletin boards (BBSs), answering questions, posting information, and uploading files of patches, software programs, samples, tec. Current BBSs include: Compuserv (in the MIDI Vendor Forum), PAN, MIDILINK and GEnie (in the MIDI Roundtable).

FREE PAN MEMBERSHIP
PAN (Performing Arts Network) is the worlds only BBS devoted exclusively to the music and

entertainment profession. PAN has waived the initial membership fee of $225 for Kurzweil users. PAN can be reached by a local call from over 750 U.S. cities and 70 foreign countries, via Telenet or Tymnet. To sign up, please contact Customer Support at Kurzweil for signup information and a User ID.

All prices and availability subject to change without notice.
Date: 5/93

K2000 FK1 FAN KIT OPTION INSTALLATION MANUAL

INTRODUCTION

This document will instruct K2000 service technicians in the installation of the FK1 fan kit. It is intended only for qualified K2000 service technicians. Installation by unqualified personnel will void the warranty.

IMPORTANT NOTICE TO DEALERS AND TECHNICIANS

The FK1 fan kit must be installed if you are installing any of the following options or combinations of options:

a. Sample RAM SIMMs (single in-line Memory Modules).

b. A Kurzweil-approved hard disk drive.

c. SMP-K Option-the sampling Option, which enables the K2000 to sample via analog stereo 1/4" line level input and digital inputs accommodating three digital formats: AES-EBU, SPDIF, and optical digital. Digital out formats include AES-EBU and SPDIF.

d. ROM-1 or ROM-2 Options-Sound Block upgrades. Each of these consists of 8 megabytes of additional samples permanently residing in internal memory. Either or both may be installed, increasing the ROM TO 16 OR 24 megabytes. RMB-k, the daughter board that holds both of these upgrades, must be installed to accommodate the ROM-1 and ROM-2 options.

P/RAM Option-Program RAM upgrade, to boost the amount of battery-backed RAM from 116K to 760K.

IMPORTANT

If you install any of the above options without a fan, you may seriously damage both the K2000 and the option, and the warranty may not be honored.

TOOLS REQUIRED FOR INSTALLATION

#1 phillips screwdriver
#2 phillips screwdriver
Sharp-pointed tool for piercing the fan vent screen
6-mm socket, box, or open-end wrench, or adjustable wrench

COMPONENTS FOR FK1 FAN KIT INSTALLATION

Item 1 four long bolts (M3), for mounting the fan assembly
Item 2 Eight flat silver washers
Item 3 Fan filter assembly (three pieces, pre-assembled)
Item 4 Fan/cable assembly
Item 5 Sheet metal fan shroud
Item 6 Four lock washers, for the fan mounting bolts
Item 7 Four M3 hex nuts for the fan mounting bolts
Item 8 Two adhesive-backed side clips, for the fan/hard disk drive power cable

PART 1 FK1 FAN KIT INSTALLATION

1. Unplug all external wires, cables and connectors from the K2000.

2. Turn the unit face down on a soft carpet or foam pad, with the keys pointing toward you.

3. Using a #2 phillips screwdriver, remove the six screws that fasten the bottom enclosure to the top enclosure (the enclosure is the K2000's outer case). There is one screw in each corner of the bottom enclosure, and two in the middle.

4. Slide the unit away from you and remove the bottom enclosure, rotating it toward you. Place it on your work surface so that the inside of the bottom enclosure faces up. The back of the enclosure should be toward you, as shown in figure 1 (the KURZWEIL logo should be facing you).

5. IMPORTANT: Be sure that the floppy disk drive ribbon cable is routed as shown in figure 2. It's necessary to route the cable as shown, in order to ensure that the cable does not interfere with the fan's airflow. If the cable is not routed as shown, then:

a. Disconnect the floppy disk drive ribbon cable from the engine board. Disconnect the power cable from the floppy disk drive (this will make it easier to reroute the ribbon cable). IMPORTANT: These connectors are not keyed, so you must take careful note of their

orientations when you disconnect them. The floppy disk drive will not function if the cables are not connected correctly.

b. Route the cable between the floppy disk drive mounting brackets and the top enclosure, then pull the loose end of the ribbon cable between the legs of the mounting bracket on the left side of the floppy disk drive (see figure 2). Be sure that the ribbon cable lays flat against the inside of the top enclosure. This ensures that it will not interfere with the installation of the sampling option board. (The sampling option board is fastened between the floppy disk drive and the engine board). If you plan to install the sampling option, the FK1 fan kit should be installed before the sampling option board.

6. Locate the circular fan vent opening toward the right of the bottom enclosure, as shown in figure 1. The fan vent opening is covered with a square wire screen.

7. Pierce the fan screen with a sharp pointed tool, pressing the tool down through each of the four small holes surrounding the fan vent opening. This will allow clearance for the bolts that hold the fan assembly in place.

8. Locate the four long bolts (item 1) and four of the flat silver washers (item 2). Place a washer on each of the bolts, then insert them-from the outside of the bottom enclosure-through the fan vent screen. See figure 3.

9. Slide the fan filter (item 3) onto the four bolts so that it rests against the screen. Note that the fan filter has a removable panel that holds the foam mesh in place. Be sure to install the fan filter so the removable panel is facing down. This will keep the foam mesh positioned properly.

10. Take the remaining four flat silver washers (item 2) and place one on each of the bolts. Slide them down against the fan filter.

11. Slide the fan/cable assembly (item 4) onto the four bolts. Make sure that the flow indicator, rotation indicator, and fan/hard disk drive power cable are oriented correctly, as shown in figure 3. The flow indicator should be pointing up, the rotation indicator should be pointing away from you, and the cable should extend from the left side of the fan/cable assembly.

12. Locate the sheet metal fan shroud (item 5). The fan shroud is a one-piece metal stamping with two fastening flanges and a raised center portion. Orient the fan shroud so the narrow flange faces toward you, and the wide flange faces away from you. The opening created by the raised portion should be to the left. At figure 3, slide the fan shroud onto the four bolts.

13. Put one lock washer (item 6) on each of the four bolts.

14. Place one hex nut (item 7) on each the four bolts, and tighten them securely, using a #1 phillips screwdriver. DO NOT OVER TIGHTEN, AS YOU CAN DAMAGE THE ENCLOSURE!

15. Locate the two adhesive-backed side clips (item 8). Remove the paper backing from each clip, and fasten the clips to the bottom enclosure, locating them approximately as shown in figure 4. Be sure that the openings in the clips face either toward or away from you (not to the left or right). These clips cannot be repositioned once they are in place; the adhesive is very strong. (Note that in figure 4, the top and bottom enclosures are oriented as they will be when you complete step 17).

16. Secure the fan/hard disk drive power cable in the side clips as shown in figure 4.

The final step in the installation is to connect the fan/hard disk drive power cable and reassemble the unit, as described in part 2.

PART 2 REASSEMBLY

17. Lift the bottom enclosure, place its back edge (the edge with the Kurzweil logo) on the back edge of the top enclosure, and hold the unit partially open as shown in figure 5.

18. Take the smaller four-pin keyed connector for the fan/hard disk drive power cable and plug it into the connector on the audio board, as shown in figure 4.

19. Carefully close the unit and replace the six enclosure fastening screws.

20. Plug the power cable into the K2000 and turn the unit on. Place your hand over the fan intake to make sure that it is pulling air into the enclosure. You should also feel a slight movement of air out of the pitch and mod wheel openings.

PART 3 MAINTENANCE

IMPORTANT: BE SURE TO INSTRUCT THE OWNER OF THE UNIT THAT THE FAN VENT OPENING SHOULD BE VACUUMED EVERY TWO OR THREE MONTHS TO CLEAN THE FAN FILTER. PLEASE SEE THE NEXT PAGE.

NOTICE TO SERVICE TECHNICIANS

Please detach this sheet and return it to the K2000 owner. It contains important information regarding the maintenance of the fan filter.

NOTICE TO K2000 OWNERS

Thanks for purchasing the K2000 FK1 fan kit. It will enable you to add several options to your K2000, and will protect it from overheating. Please take note of the following important information.

FAN FILTER MAINTENANCE

Every two or three months, vacuum the fan filter to rid it of dust. Depending on conditions, you may have to clean the fan filter more often. Failure to keep the fan filter clean can result in serious damage to your K2000!

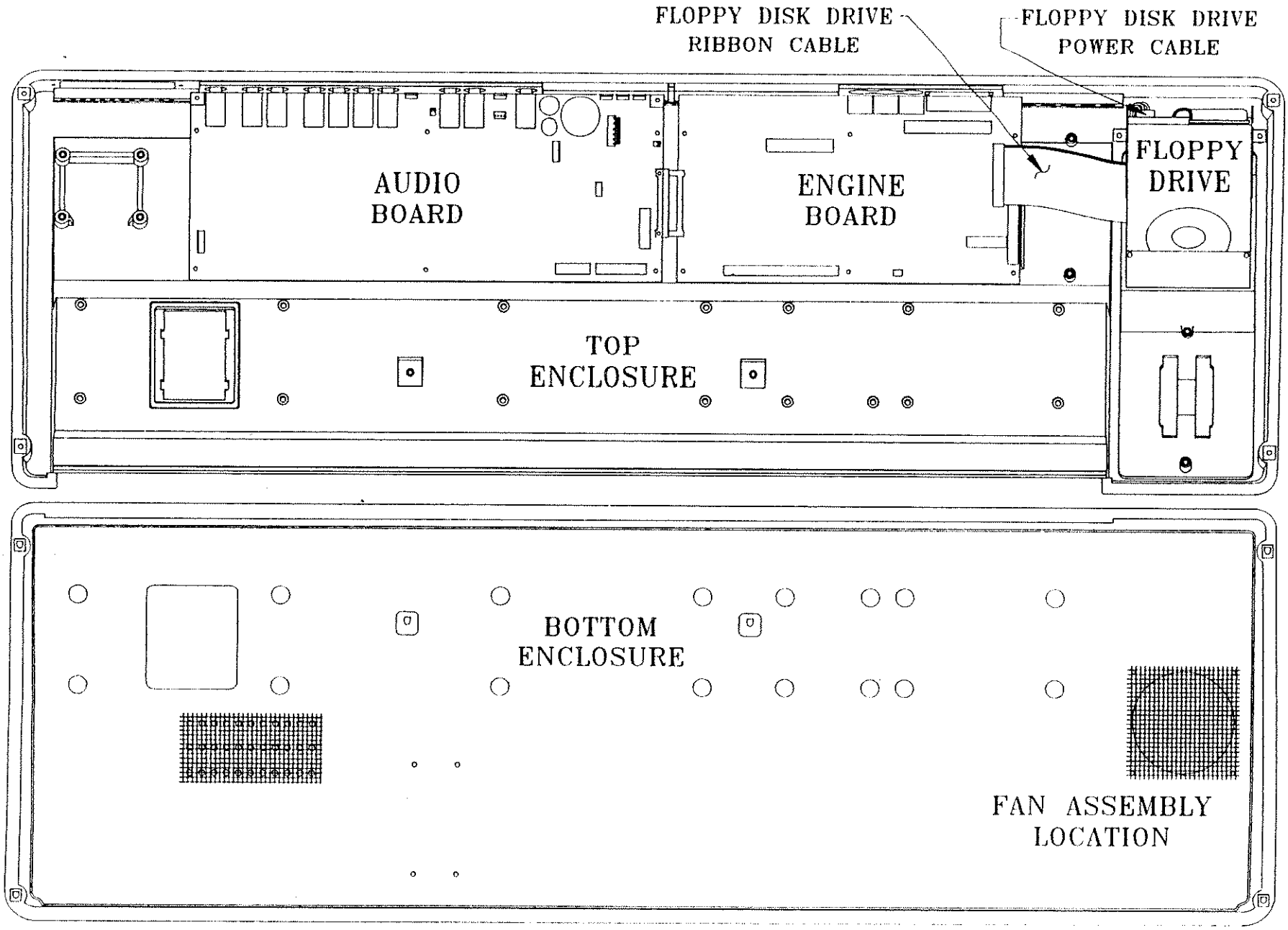

FLOPPY DISK DRIVE
RIBBON CABLE
FLOPPY DISK DRIVE
POWER CABLE
AUDIO
BOARD
ENGINE
BOARD
FLOPPY
DRIVE
TOP
ENCLOSURE
BOTTOM
ENCLOSURE
FAN ASSEMBLY
LOCATION

FIGURE 1

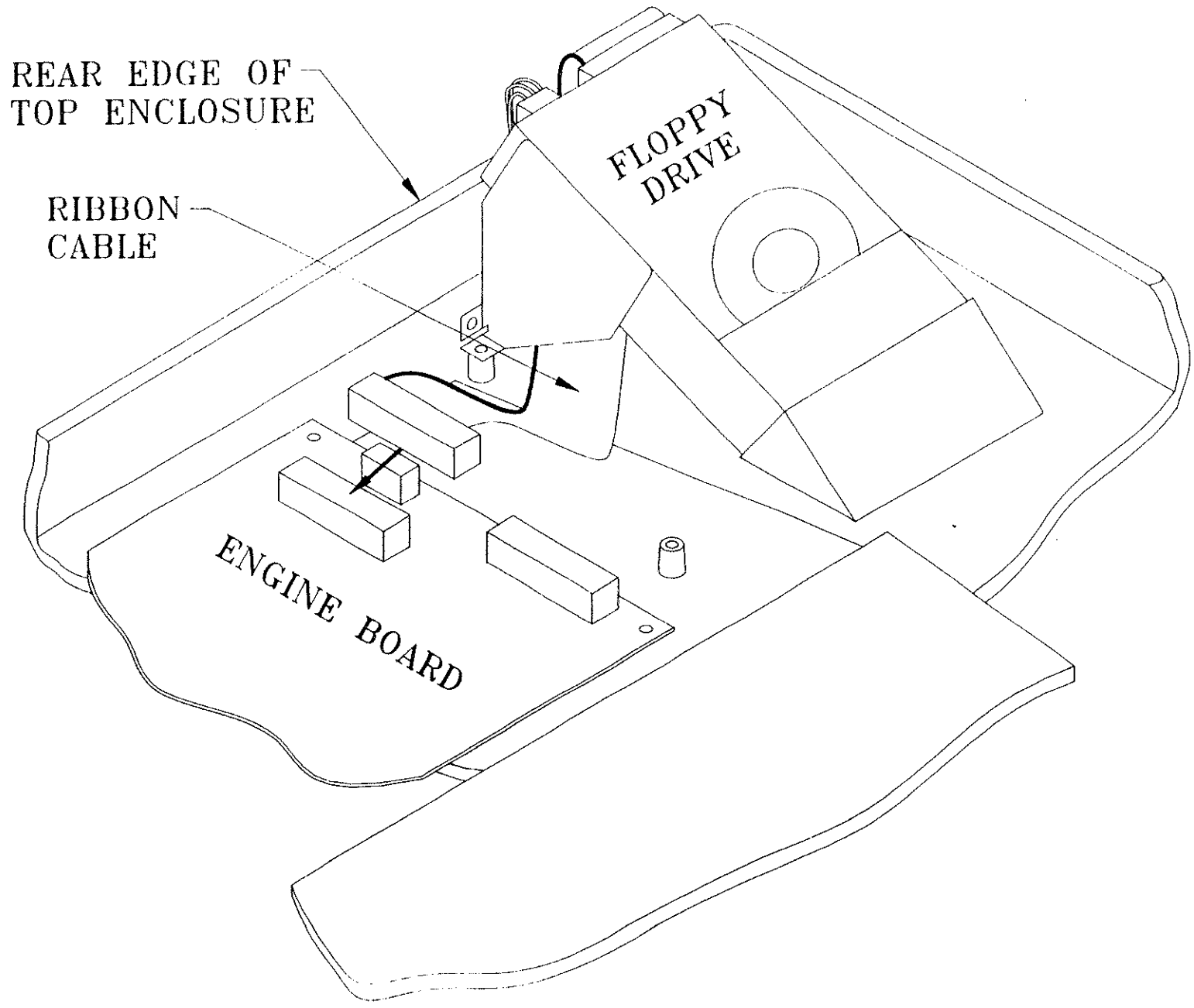

REAR EDGE OF
TOP ENCLOSURE
RIBBON
CABLE
FLOPPY
DRIVE
ENGINE BOARD

FIGURE 2

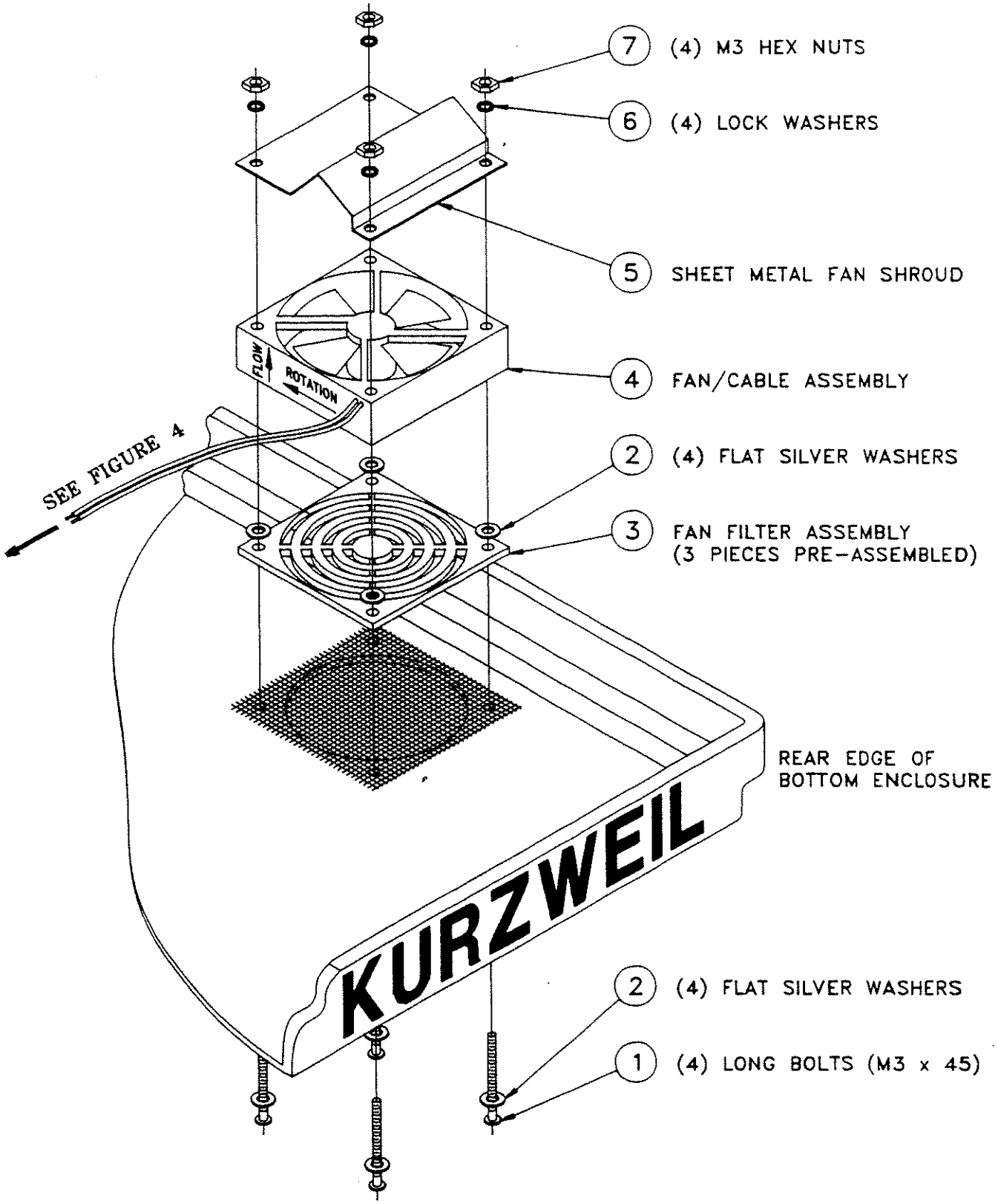

7
(4) M3 HEX NUTS
6
(4) LOCK WASHERS
5
SHEET METAL FAN SHROUD
4
FAN/CABLE ASSEMBLY
FLOW
ROTATION
SEE FIGURE 4
2
(4) FLAT SILVER WASHERS
3
FAN FILTER ASSEMBLY
(3 PIECES PRE-ASSEMBLED)
REAR EDGE OF
BOTTOM ENCLOSURE
KURZWEIL
2
(4) FLAT SILVER WASHERS
1
(4) LONG BOLTS (M3 x 45)

FIGURE 3

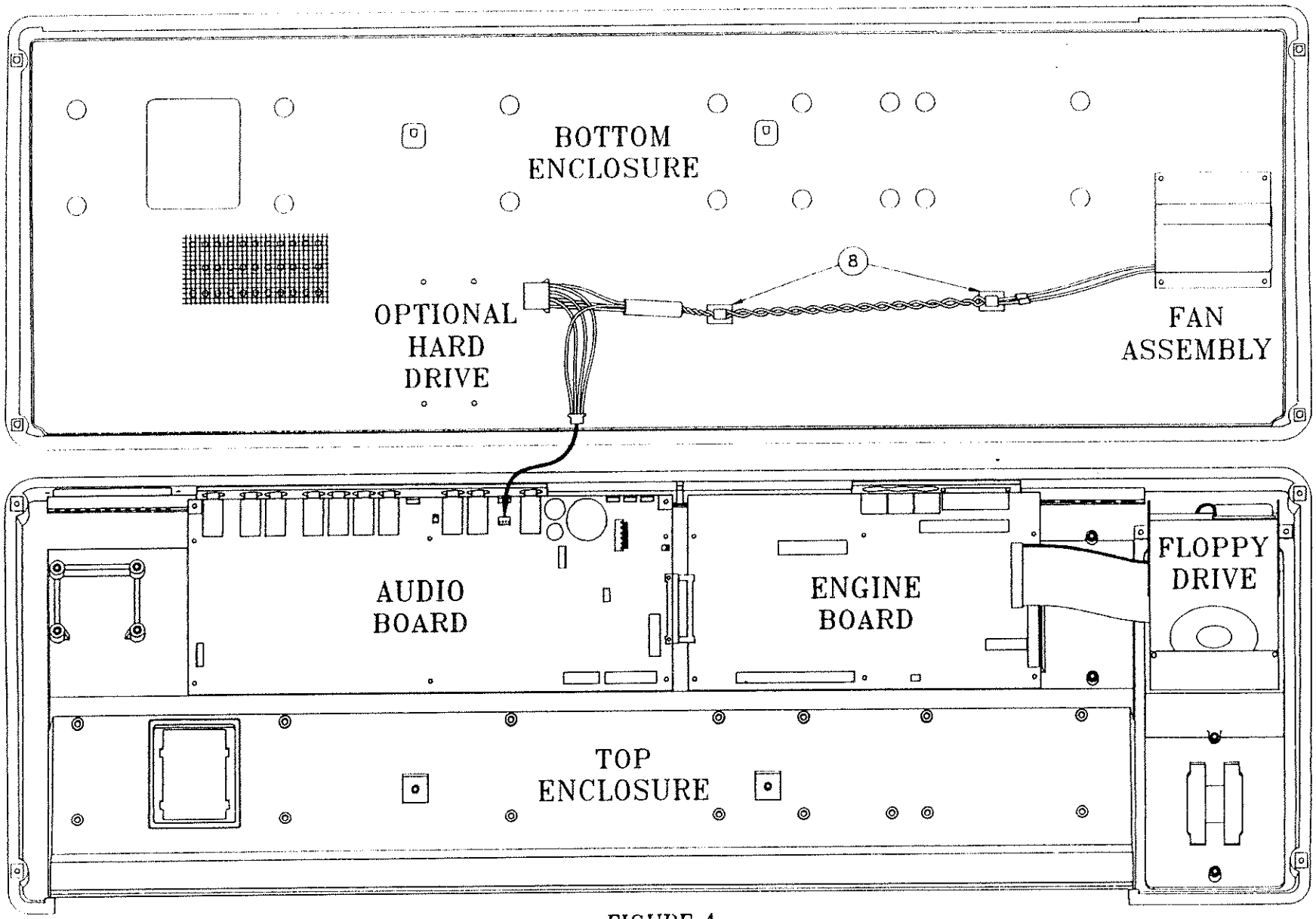

BOTTOM
ENCLOSURE
8
OPTIONAL
HARD
DRIVE
FAN
ASSEMBLY
AUDIO
BOARD
ENGINE
BOARD
FLOPPY
DRIVE
TOP
ENCLOSURE

FIGURE 4

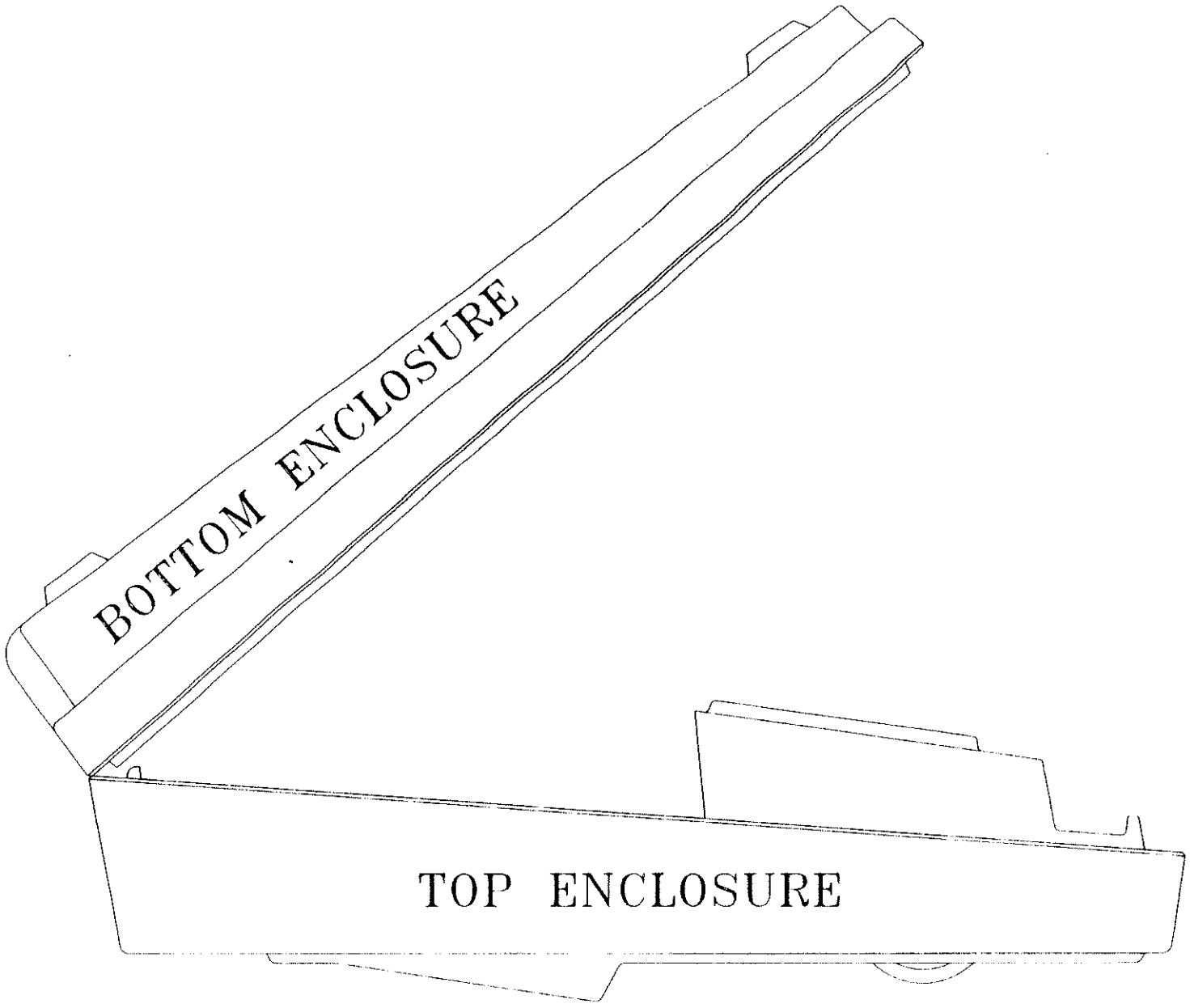


FIGURE 5

NOTICE TO SERVICE TECHNICIANS

Please detach the last sheet in this installation manual and give it to the K2000R owner, along with item 8, the front panel label. This sheet contains information regarding the installation of the front panel label.

SAMPLING OPT _____ _____

DIAGNOSTIC TEST CHECKLIST

TechnicianName:.....

Date: ...../...../.....

Serial No: .....

Customer name: .....

before Installation
after Installation

Test name: before/after	Pass	Fail
1. LCD/b	_____	_____
LCD/a	_____	_____
2. BOOT EPROM/b	_____	_____
BOOT EPROM/a	_____	_____
3. SETUP EPROM/b	_____	_____
SETUP EPROM/a	_____	_____
4. PSRAM/b	_____	_____
PSRAM/a	_____	_____
5. I/O PORT/b	_____	_____
I/O PORT/a	_____	_____
6. INTERRUPT/b	_____	_____
INTERRUPT/a	_____	_____
7. AUDIO BOARD/b	_____	_____
AUDIO BOARD/a	_____	_____
8. FLOPPY/b	_____	_____
FLOPPY/a	_____	_____
9. SCSI/b	_____	_____
SCSI/a	_____	_____
10 SOUND ROM/b	_____	_____
SOUND ROM/a	_____	_____

SAMPLING OPTION KIT INSTALLATION MANUAL

K2000/K2000R OPTIONS:

SMP-R SAMPLING OPTION INSTALLATION KIT
This document will instruct Kurzweil service technicians of the SMP-R Sampling Option Kit. It is intended only for qualified Kurzweil service technicians. Installation by unqualified personnel will void the warranty.

IMPORTANT NOTICES
You must install Engine Software Version 2.x before installing the SMP-R Sampling Option. The SMP-R Sampling Option will not function without it.

Two 256K SIMMs are the minimum amount of sampling RAM required for the SMP-R Sampling Option to function. We recommend installing at least two one megabyte SIMMs as a starting point for the sampling RAM. You can install up to a maximum of 64 Megabytes of RAM. See the chart below for some typical sampling RAM configurations.

MAXIMUM SAMPLING TIME

SAMPLING RAM		SAMPLING RATE (kHz) 29.4 k	32.0 kHz	44.1 kHz	48 kHz
2 x 256K	Mono	8.9 sec	8.2 sec	5.9 sec	5.5 sec
	Stereo	4.5 sec	4.1 sec	3.0 sec	2.7 sec
2 x 1 Meg	Mono	35.7 sec	32.8 sec	23.8 sec	21.9 sec
	Stereo	17.8 sec	16.4 sec	11.9 sec	10.9 sec
2 x 4 Meg	Mono	142.7 sec	131.1 sec	95.1 sec	87.4 sec
	Stereo	71.3 sec	65.5 sec	47.6 sec	43.7 sec
2 x 16 Meg	Mono	570.7 sec	524.3 sec	380.4 sec	349.5 sec
	Stereo	285.3 sec	262.1 sec	190.2 sec	174.8 sec

As always it is a good idea to be safe and back up the K2000R's P/RAM before opening it. This can be easily done 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.

WARNING
You must install the K2000R Engine Software Version 2.x before installing the SMP-R Sampling OPTION KIT IN THE K2000R. The SMP-R Sampling Option will not function without the new engine software.

TOOLS AND MATERIALS REQUIRED FOR INSTALLATION

#1 Phillips screwdriver (small)
#2 Phillips screwdriver (medium)

COMPONENTS OF THE SMP-R SAMPLING OPTION KIT

Item 1 SMP-R Sampling Option PCB Assembly
Item 2 Digital I/O PCB Assembly
Item 3 Input/Output Monitoring Cable (short)
Item 4 Digital I/O PCB Cable (long)
Item 5 Data Cable (ribbon)
Item 6 Four (M3.0 x 10 mm) Black Flat Head Screws
Item 7 Four (M3.0 x 10 mm) Black Pan Head Screws
Item 8 Two Rubber Bumpers (one small & one large)
Item 9 Front Panel Label

BEFORE INSTALLING

You will need to run diagnostic tests before and after installing the SMP-R Sampling Option Kit. This will ensure that the K2000R is functioning properly before the installation, and will help you to identify any difficulties you might encounter with the installation.

The diagnostic test requires a blank Kurzweil-formatted (DOS 1.44M) blank floppy disk to be inserted into the floppy disk drive. If you don't already have a formatted disk, now would be a good time to format one. It is also recommended that you connect a SCSI device (like an external hard disk drive) to the unit's SCSI port, to enable you to test the operation of the SCSI link.

To run the internal diagnostic software, start with the unit's power off. Press and hold the 1, 2, 3 buttons on the alphanumeric buttonpad, and turn the unit on. A short menu will appear, prompting you to select a hard reset or diagnostics. Use the Alpha Wheel to select "DIAGNOSTICS", then press ENTER.

A menu of tests will appear. The test you will be running is called "Burnin", and includes most of the test on the diagnostic menu. To run the "Burnin" test, press number "1" on the alphanumeric buttonpad to start the test.

NOTE: If you do not insert a Kurzweil-formatted (DOS 1.44M) blank floppy into the floppy disk drive before starting the diagnostics, the sequence of tests will freeze at the floppy test. If this happens, you will have to turn the unit off, then start the diagnostics again, inserting the floppy disk before starting the test.

The time required for the entire burn-in test depends on the amount of sample RAM installed in the unit. The Sound RAM test requires approximately 20 seconds per megabyte of sample RAM, and the remaining test take a total of approximately 5 minutes. As each test is run, the display will indicate the status of the test. Mark the results of each test on the checklist included at the end of this manual.

All of the diagnostic tests should pass the first burn-in test (if you do not connect an SCSI device to the scsi port the SCSI test will fail). A failure of any of the tests indicates that the component in question is either malfunctioning or is not installed. Malfunctioning components should be repaired before proceeding further. Refer to the K2000R service manual. When the faulty component is repaired or replaced, the diagnostics should be run again. Repeat this process until all tests have passed.

IMPORTANT:
Although the SCSI test will fail if you do not have a SCSI device connected to the SCSI port, this does not necessarily indicate a malfunction in the SCSI link. If there is a SCSI device in the unit and you get a fail indication try writing a file to and reading a file from the device. Not all SCSI devices are alike and the SCSI diagnostic test may not recognize it and give you a false fail indication.

When you have corrected any malfunctions that may have occurred, and run a successful diagnostic test, you are ready to proceed with the SMP-R Sampling Option Kit installation.

BEGINNING THE INSTALLATION

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

IMPORTANT:

You must install the K2000R Engine Software Version 2.x before installing the SMP-R Sampling Option Kit in the K2000R. The SMP-R Sampling Option will not function without the new engine software.

DISASSEMBLY

1. Unplug all external wires, cables and connectors from the K2000R and turn the unit so the front panel is facing you.

2. Using a #2 phillips screwdriver, remove the four large truss head screws on the left and right sides of the unit. Then using a #1 phillips screwdriver remove the two small pan head screws located on the top edge of the rear panel.

3. See figure 1. Lift the cover from the back, slide it off and place it aside. Note: notice that there is a groove on the top edge of the front panel that the top cover fits snugly into.

INSTALLATION

4. See figure 2. Remove the plate behind the rear panel Digital In and Digital Out holes by removing the four screws shown in the figure. The plate should then fall in. Remove plate from inside of unit and discard it.

5. See figure 2. Remove the plate behind the rear panel Digital In and Digital Out holes by removing the four screws shown in the figure. The plate should then fall in. Remove plate from inside of unit and discard it.

6. See figure 3. Plug one end of item 4, the Digital I/O PCB Cable, into connector J7 on item 2, the I/O PCB Assembly. Note: The Digital I/O PCB Cable is the longer of the two 5 pin cables in the kit. Note the connectors are keyed. Also, it does not matter which end you plug into the I/O PCB Assembly.

7. See figure 3. Take item 2, the Digital I/O PCB assembly, and position the connectors in the holes in the rear panel. Using the M3.0 x 10.0 mm black pan head screws, item 7, secure the digital I/O PCB to the rear panel.

8. Take item 1. The SMP-R Sampling Option PCB Assembly, and remove the nut and washer from the 1/4" phone jack and the plastic plug from the optical connector. Set them aside.

9. See figure 3. Take item 1, The SMP-R Sampling Option PCB assembly, and position the connectors through the front panel. Using the four M3.0 x 10.0 mm black flat head screws, item 6, secure the SMP-R Sampling Option PCB assembly to the front panel. If the front panel mounting brackets are not attached, the screws will need spacer washers. WARNING: Without the front panel mounting brackets or spacer washers, the mounting screws will cause shorts on the sampling option PCB.

10. Replace the washer and nut on the 1/4" phone jack and put the plastic plug back into the optical connector.

11. See figure 3. Take item 3, the Input/Output Monitoring cable, and plug one end into connector J8 on the SMP-R Sampling Option PCB Assembly near the back of the board down close to the audio PCB. Then plug the other end into connector J15 on the audio PCB, located in the front right-hand side of the audio PCB.

12. Take the unconnected end of the item 4, the

Digital I/O PCB cable, and plug it into connector J9 and the SMP-R sampling option PCB assembly, item 3, directly behind the front panel connectors.

13. See figure 3. Take item 5, the Data Ribbon cable, and plug it into connector J10 on the SMP-R Sampling Option PCB assembly near the back of the board toward the top. Plug the SMP-R sampling option PCB assembly near the back of the board toward the top. Plug the end into connector J9 on the engine PCB, located near the front right-hand side of the engine PCB. Note: be sure that red boarder on the ribbon cable, indicating pin one, is plugged into the pin one side of the connectors, indicated by a "1" on the silk screen of the PCB. WARNING: the cable connections as shown in figure 3 are not correct; that is, the cable will need to be twisted 180 degrees at one end to make pin 1 of J10 match up with pin 1 on J9. Note: the cable can be connected oriented in either direction. However, if the cable is connected wrong, it will cause damage to the electronic components on the PCB's. The red stripe on the ribbon cable should be toward pin 1 on both connectors.

14. See figure 4. Install item 8, rubber bumpers, as shown. The large bumper is stuck to the bottom of the enclosure near the back of the SMP-R sampling option PCB assembly, and the smaller bumper is stuck to the right side of the enclosure, about one inch from the bottom of the enclosure. Note: the purpose of the bumpers is to prevent the SMP-R sampling option PCB assembly from moving freely within the unit.

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

REASSEMBLY

15. Reassemble the unit by sliding the top cover back on, being sure that the front top edge of the cover goes into the groove on the top of the front panel.

16. Replace the four large truss head screws in the left and right sides of the unit and the two small pan head screws along the top edge of the rear panel.

17. Run the diagnostic tests again. To enter diagnostic mode, press and hold buttons 1,2 and 3 on the alphanumeric buttonpad, and turn the unit on. Use alpha wheel to select the "DIAGNOSTICS" option, and press ENTER. Run the "Burnin" test by pressing 1 on the alphanumeric keypad. Mark the results of each test in the second column of the checklist. The results for each test of the second diagnostic test should match those of the first. If any test fails the second diagnostic test after passing the first, check the installation thoroughly, particularly the data ribbon cable (step 13), repair or replace the component indicated, and run the 'Burnin" test again. Repeat this process until all tests have passed.

18. Once the K2000R has passed the Burn-In diagnostics you can do a specialized Sampling Option test. Follow the steps below.

19. IMPORTANT: Remove all cables from your K2000R except the AC power cord. The specialized Sampling Option Test generates high amplitude sounds which could harm you and your system. The test will also give you false fail results if all cables are not removed.

Use the Alpha Wheel to select the "Sampling Opt" test and press enter. The test will pause and show "Insert Cable to Test...". All test results at this point should show "PASS " except RMS 44.1 AND 32 right which will be blank. If any of the fields at this point show "FAIL", turn off power and review the installation procedure for any errors. If careful review of the installation process does not reveal any

problems, the SMP-R Sampling Option may be defective and should be repaired. If none of the fields show "FAIL", to complete the test turn the Alpha Wheel to execute parts 4 and 5. These sections are factory diagnostics and will fail in the field unless special test equipment is attached to the K2000R. Ignore these "FAIL" indications.

20. After completion of the diagnostic check, power down and up again, going into normal operation. Press the "MASTER" key followed by the "SAMPLE" softkey. You should now be on the sampling page. Insert a stereo analog source into the 1/4 " phone jack on the front panel of the option board. This could be from a CD or tape player. The headphone output of a CD, tape payer, or receiver may also be used. Select "Input:Analog" with the Alpha Wheel, then select "GAIN" and adjust the Alpha Wheel until the level meters indicate a signal with no "CLIP" indication (LED's will also flash when clipping). Insert headphones into the K2000R headphone jack or playback equipment into the "MIX" outs. Source material should go on and off when "MON" is changed from "ON" to "Off" with the Alpha Wheel. Make sure right/left channel input is coming out of the right/left channel output and that the signal is not distorted. If channels are reversed, missing, or distorted, check the cable connections to the audio, Engine, and SMP-R Boards.

    This completes the testing of the SMP-R Sampling Option.

NOTICE TO SERVICE TECHNICIANS

Please detach the last sheet in this installation manual and give it to the K2000R owner, along with item 8, the front panel label. This sheet contains information regarding the installation of the front panel label.

DIAGNOSTIC TEST CHECKLIST

TechnicianName:.....

Date: ...../...../.....

Serial No: .....

Customer name: .....

Before Installation, After Installation

Test name: before/after

	Pass	Fail
1. LCD/b	———	———
LCD/a	———	———
2. BOOT EPROM/b	———	———
BOOT EPROM/a	———	———
3. SETUP EPROM/b	———	———
SETUP EPROM/a	———	———
4. PSRAM/b	———	———
PSRAM/a	———	———
5. I/O PORT/b	———	———
I/O PORT/a	———	———
6. INTERRUPT/b	———	———
INTERRUPT/a	———	———
7. AUDIO BOARD/b	———	———
AUDIO BOARD/a	———	———
8. FLOPPY/b	———	———
FLOPPY/a	———	———
9. SCSI/b	———	———
SCSI/a	———	———
10. SOUND ROM/b	———	———
SOUND ROM/a	———	———
SAMPLING OPT	———	———

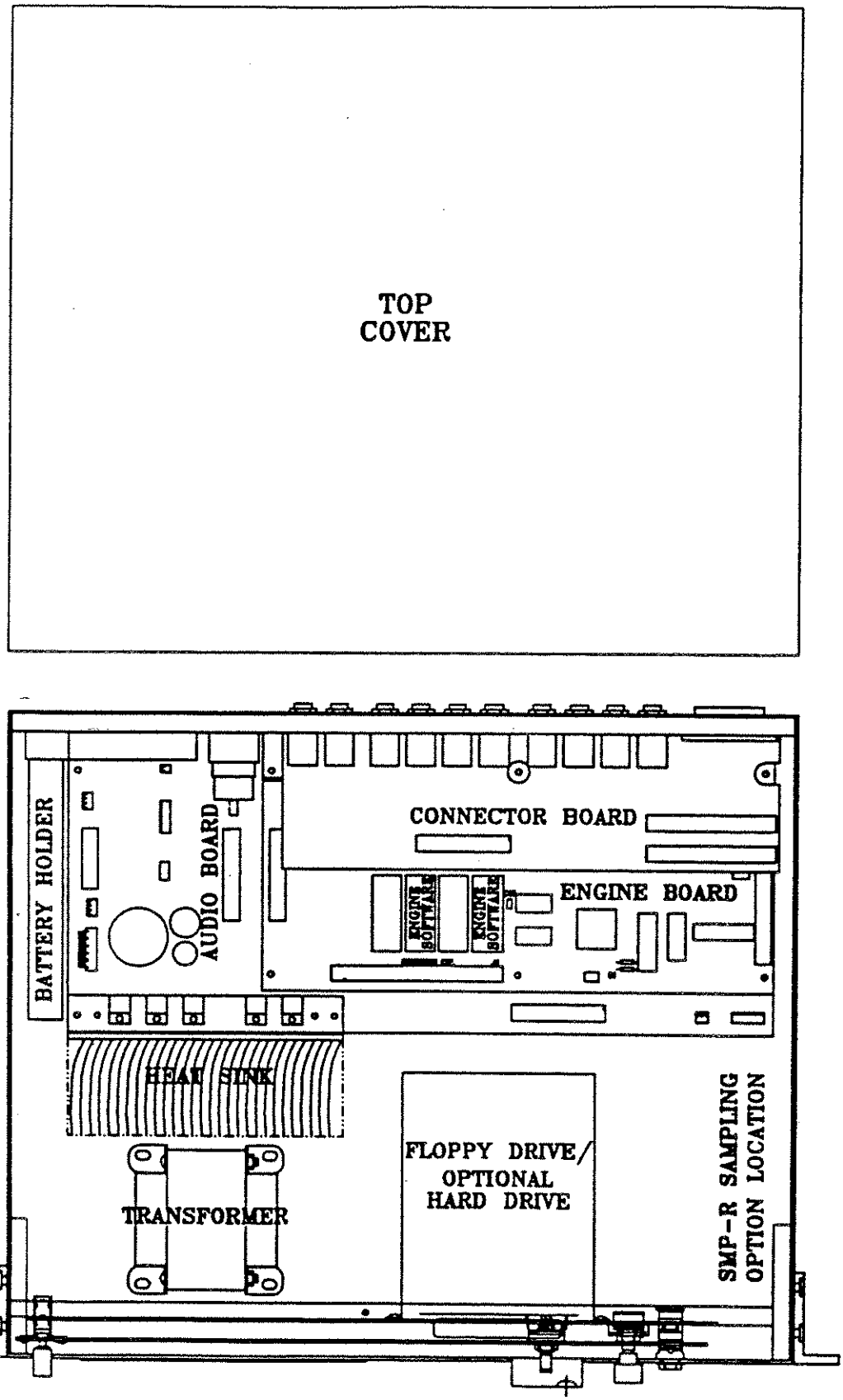
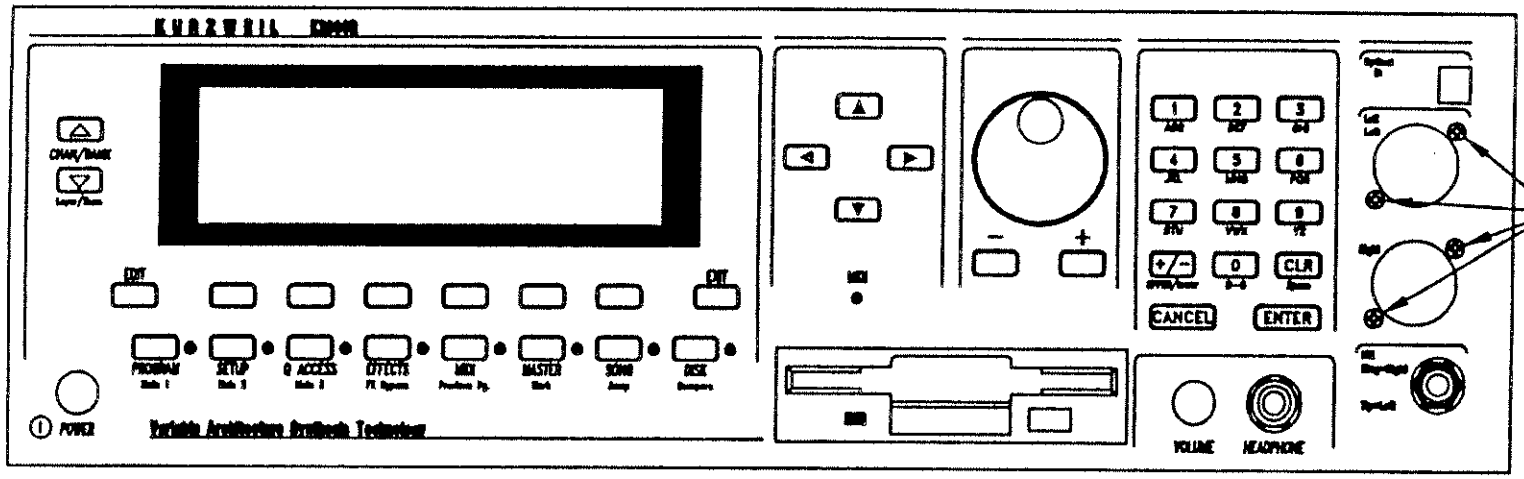
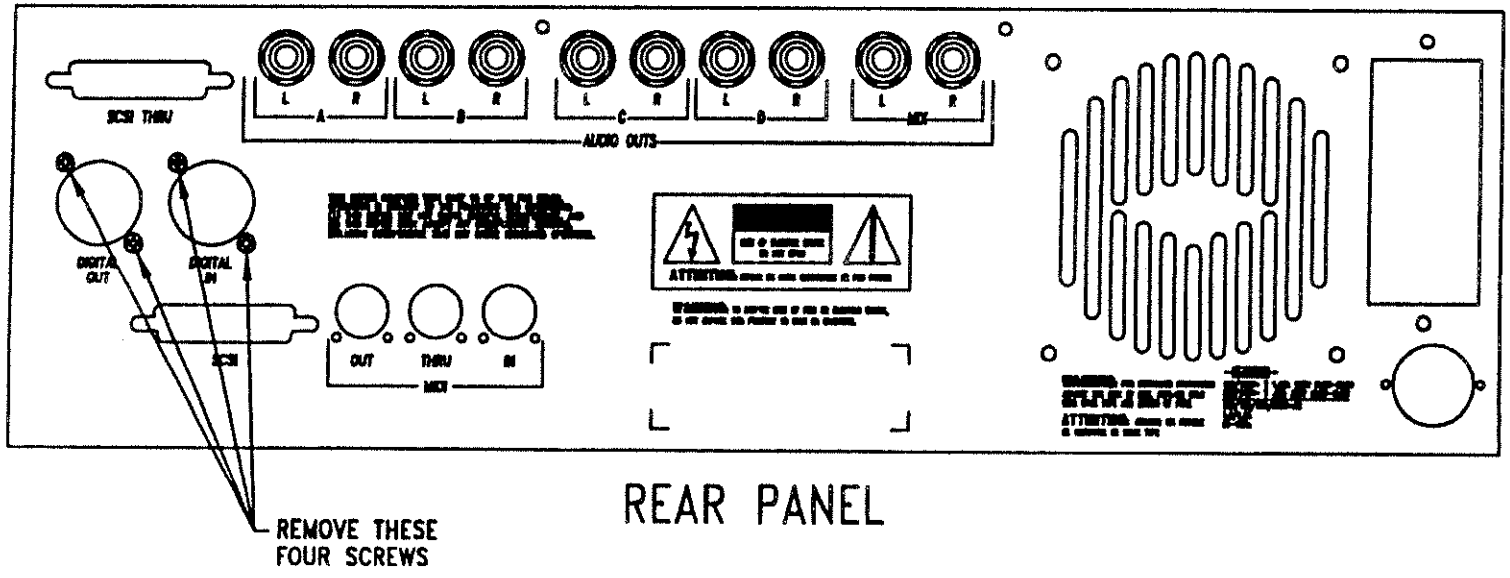

TOP
COVER
BATTERY HOLDER
AUDIO BOARD
CONNECTOR BOARD
ENGINE BOARD
ENGINE SOFTWARE
ENGINE SOFTWARE
HEAT SINK
TRANSFORMER
FLOPPY DRIVE/
OPTIONAL
HARD DRIVE
SMP-R SAMPLING
OPTION LOCATION

FIGURE 1



FRONT PANEL



REAR PANEL

FIGURE 2

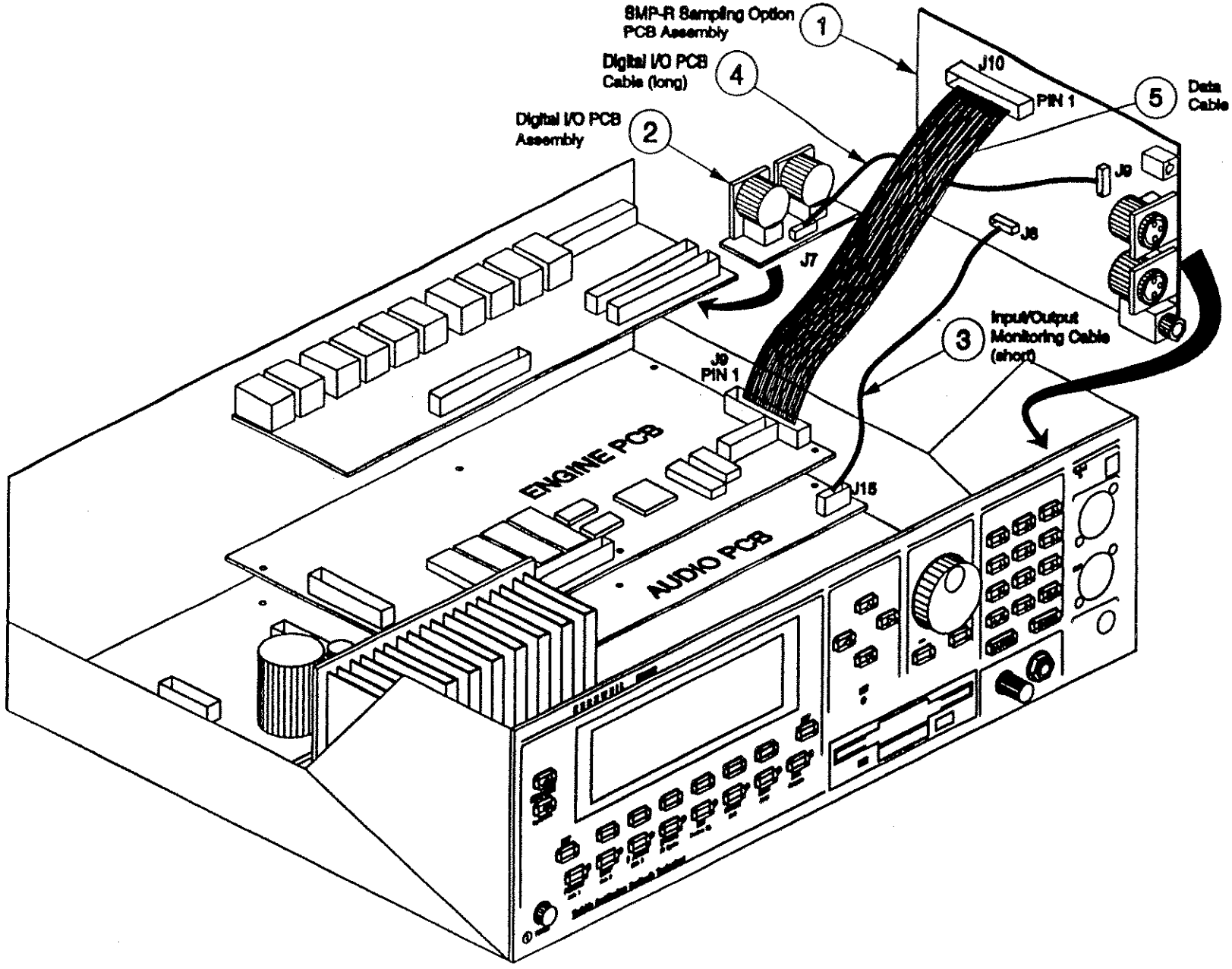

SMP-R Sampling Option
PCB Assembly
1
Digital I/O PCB
Cable (long)
4
Digital I/O PCB
Assembly
2
J10
PIN 1
5
Data
Cable
J9
J8
J7
3
Input/Output
Monitoring Cable
(short)
J9
PIN 1
J15
ENGINE PCB
AUDIO PCB

FIGURE 3

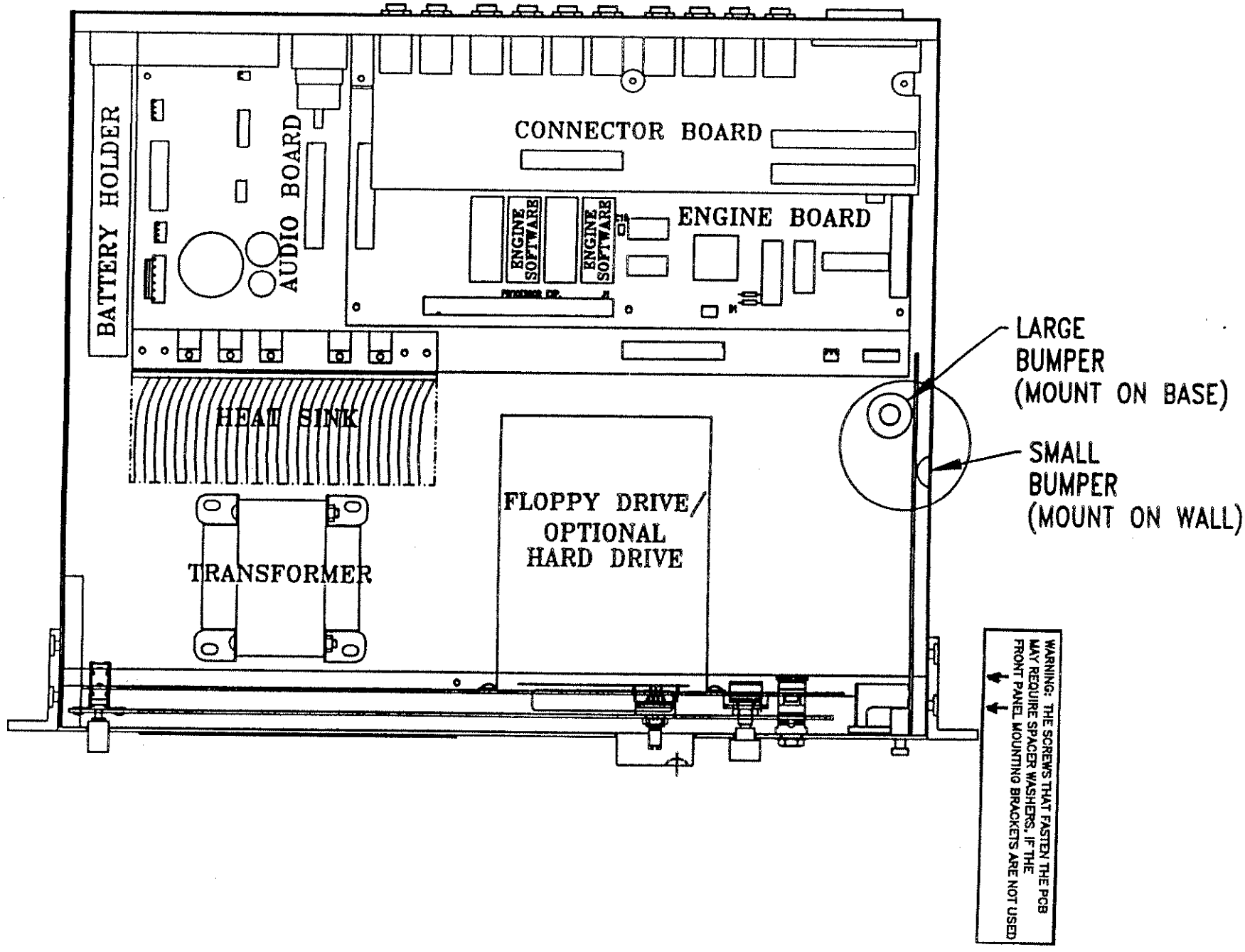
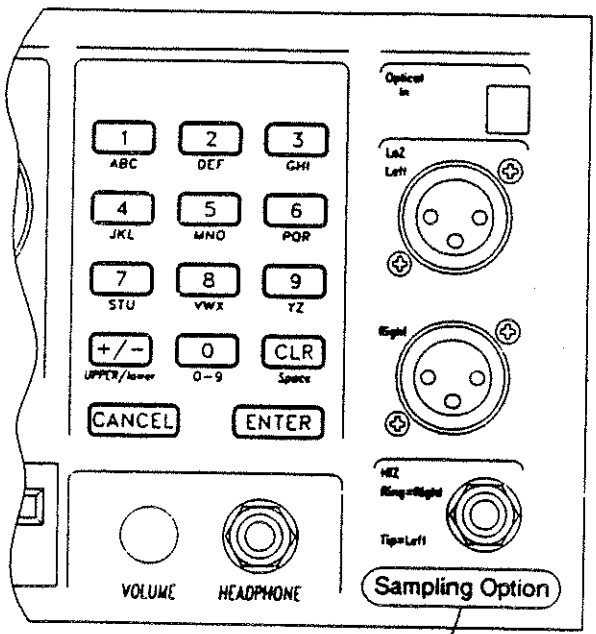

BATTERY HOLDER
AUDIO BOARD
CONNECTOR BOARD
ENGINE SOFTWARE
ENGINE SOFTWARE
ENGINE BOARD
HEAT SINK
TRANSFORMER
FLOPPY DRIVE/
OPTIONAL
HARD DRIVE
LARGE
BUMPER
(MOUNT ON BASE)
SMALL
BUMPER
(MOUNT ON WALL)
WARNING: THE SCREWS THAT FASTEN THE PCB
MAY REQUIRE SPACER WASHERS, IF THE
FRONT PANEL MOUNTING BRACKETS ARE NOT USED

FIGURE 4

Please Detach this sheet and give to K2000R Owner

Front Panel Label Installation

We have provided you with a Sampling Option identification label. See the label location figure below for recommended placement.



Recommended Label Location

SMP SAMPLING OPTIONS VERSION 2 SOFTWARE

FOR THE KURZWEIL K2000/K2000R
and THE K2000S/K2000RS

INTRODUCTION

This manual is a supplement to the K2000/K2000R Musicians Guide. It describes the new features introduced by Version 2 system software. It does not replace the Musicians Guide. You should be at least somewhat familiar with the K2000/K2000R Musician's Guide before reading this supplement.

This supplement applies to both the K2000 keyboard and the rack-mount version, the K2000R. It also applies to the K2000S and K2000RS, the keyboard version and the rack mount versions of the K2000 with the sampling option built in at the factory. To avoid repetition, we will simply refer to the K2000 to indicate all of the various versions, except where a particular version differs from the others.

Version 2 System software was developed primarily for use with the K2000 sampling option, but does not require its installation. There are several new features in Version 2 that enhance K2000 operation even without the sampling option. Features related to the recording of samples are activated only when the sampling option is installed.

VERSION 2 FEATURES

The major changes to the System software pertain to the sampling option:

There's an enhanced sample editor, with graphic waveform display, cut/copy/paste sample editing, non-real time DSP functions, and numerous miscellaneous improvements.

Use the new Sample Mode page for recording and auditing samples. This page is reached with the Sample soft button in Master mode, or by pressing the MIDI mode button while in the Keymap Editor.

You can read samples of the following formats from floppy and/or SCSI disks:

Ensoniq EPS and EPS-16+ floppy and SCSI disks (and disks for similarly-formatted instruments);

AKAI S900, S950 and S1000 series floppy and SCSI disks (and disks for similarly-formatted instruments);

Roland S750 and S770 SCSI disks.

If you are loading these samples from floppy disks, chapter 13 of the Musicians's Guide will tell you most of what you need to know to load these samples. See the section in this supplement called "Reading Samples" for information about loading these samples via SCSI.

SAMPLING FEATURES:

Sampling from digital or line level analog sources

Phase locked stereo sampling, as well as mono left and mono right

Four analog sampling rates: 29.44, 32.0, 44.1 and 48.0 kHz.

Gain control for analog sample input

Monitor feature for analog sampling lets you listen to your sampling source through the K2000

SPDIF and AES/EBU digital input formats, using optical or coaxial cable

Stereo input meters (dB) with peak hold and clipping indicators

Post-sampling clip report

Direct sampling or triggered sampling with pre-triggering and programmable threshold level.

Auto-stop sampling (programmable sampling time), as well as manual cancel

Immediate auditioning of new and existing samples, and preview feature to build a keymap and program from any sample (including ROM SAMPLES)

User-friendly design for quick sampling and retakes

SAMPLE EDITING FEATURES:

Graphic display of sample waveform, with zoom and gain control, calibrated in dB

View and edit samples either by a numerical index of the individual sample elements, or by the sample's length in seconds

Shortcut for finding zero crossings for looping and truncating

A loop window display showing the loop transition point

Audible cueing of start and end points, audible loop editing

Forward, backward, and bidirectional looping, and loop bypass

Simultaneous processing of both channels of stereo samples

Sample splitting to make mono samples from stereo samples

Multi-root soundblocks (K2000 ROM objects are configured this way) may be split up into individual samples

Cut/copy/paste editing

Crossfade looping with selectable curves

Sample rate conversion, time compression and expansion, pitch shifting

Sample mixing: merge two samples, with selectable gain and fade in/fade out times, and a choice of fade curves

Sample insert feature: "splice" whole or partial samples (or silence) into any part of existing samples

Preview sample edits before saving

DSP functions to manipulate any portion of a sample, including reverse, invert, clear, delete, auto normalize, volume adjust, volume adjust with ramp

Automatic truncate feature for smooth starts and stops, and for seamless sample inserts

Programmable decay and release rates for RAM samples using the "NATURAL" amplitude envelope setting (The decay parameter will affect only the last decay segment of ROM samples)

RECORDING SAMPLES

Before you begin sampling, you will need to connect the proper cables from your sample source to your K2000. The cables and input jacks you use depend on the sample format you choose, and the output configuration of you sample source.

CABLES and INPUT JACKS

If you are going to be sampling from an analog source, connect a standard 1/4" mono or stereo cable (a typical guitar cable) from the output of your sample source to the 1/4" analog input on the K2000. Using a mono cable will send the signal to the K2000's left channel. If you use a mono cable, be sure to set the Mode parameter on the Sample mode page to a value of Mono (L).

If you are going to be making stereo samples, avoid

sending a balanced signal, which can cause phase cancellations in your samples. (Balanced signals are ok if you are using the XLR analog inputs on the front panel of the K2000R or K2000RS.)

If you are using a digital sample source, you can use either a coaxial cable or an optical cable, depending on the output format of your sample source. The coaxial input on the K2000 accepts a standard male XLR fitting. You don't have to worry about phase cancellations from a balanced digital signal, since the K2000's digital inputs will phase-lock stereo input. Depending on your sample source (a commercial DAT deck, for example), you may need to use a cable (or a cable and adaptor) with an RCA connector on one end and an XLR connector on the other.

If your digital sample source has an optical output, connect your cable to the optical input jack above the coaxial jack on the K2000's rear panel. This jack is covered by a small plug which is easily removed.

When you are ready to record samples, you will go to the Sample mode page. There are two ways to get to it: by pressing the Sample soft button in Master mode, and by pressing the MIDI mode button while in the Keymap Editor. The appearance of this page will differ slightly depending on whether you are doing analog or digital sampling.

ANALOG SAMPLING

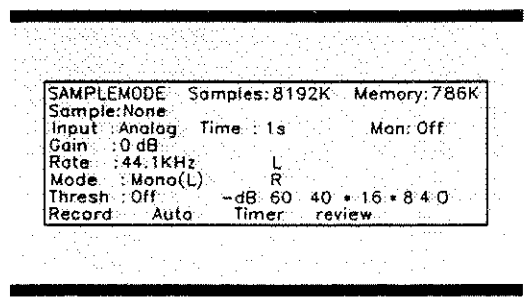
The K2000's analog sampling input is optimized for a low-impedance line level signal (-10 dBm). With a line level signal, an input gain setting of 0 dB should prevent any clipping of the sample even at maximum output from the source. You can compensate for lower input levels with the Gain parameter on the Sample mode page.

If you are sampling through a microphone, you will probably want to use a preamp to optimize your signal-to noise ratio. If you do not have a preamp, you can adjust the Gain parameter. A setting of 21 dB will give you reasonable results for many applications. This will increase the noise level as well, however.

Running your sample signal through a mixer before sending it to the K2000 will give you the most flexibility in controlling your signal level, since you can use its gain or pad if needed. This may add noise to the signal, however. For the cleanest possible signal, you will want to connect your sample source directly to the K2000. The best results will be achieved by sampling from a digital source, using one of the K2000's digital sample inputs.

Assuming your connections are made, you are ready to set up your first sample recording. Select the sample mode page (press the sample soft button in the master mode, or the MIDI mode button in the keymap editor). The top line of the sample mode page gives you the amount of free sample memory, and the amount of free program memory.

On the sample mode page, you will set the conditions for your sample recording. Depending on the input type you select, a different set of parameters will appear on this page. When you have selected analog input, the page appears as in the diagram below. The differences between analog and digital sampling are discussed in the section called "Digital Sampling".



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The digital meters at the lower right of the display give a good approximation of your sample level. When you send a signal from your sample source, you should see the meters respond.

The meters are calibrated in -dB units. A level of 0 dB indicates the maximum signal without clipping. The sample will be free of clipping as long as the meter levels don't exceed 0 dB. For optimum results, you should adjust the K2000's gain parameter (or the gain from your sample source) so that the signal stays below 0 dB. Otherwise, the signal will be clipped, causing the loss of sample data, and usually resulting in audible distortion of the resulting sample. A few clips (fewer than 100) may not cause any appreciable distortion. You will get the best signal-to-noise ratio with meter levels as close to 0 dB as possible, although you will find that samples with maximums meter readings as low as -12 dB can sound remarkably noise-free.

The relatively slow LCD output of the meter levels cannot show every peak in the incoming signal, therefore, you will not necessarily see every transient in every sample you take. You will be able to see any transient that is clipped, however, since whenever a clip occurs, the K2000 will display the word "CLIP" above the meters, and will flash the Master mode LED. It will also give you the number of clips in each sample before you save it.

The meters are inoperative during actual sampling, so make a few tests of your levels before you begin to record. After you have set your levels, you need to select the sample rate. You have four rates to choose from. The trade-offs that determine your best sampling rate are frequency response and storage requirements. Higher sample rates will capture more frequency content from your samples, but will take up more memory. Lower rates give you more sample time, but don't give the same frequency response as higher rates. Rates of 29.4 or 32 kHz will yield a flat response up to about 14 and 15 kHz, respectively. 44.1 and 48 kHz yield a flat response beyond 20 kHz, which is the upper limit of audibility for most humans. The lower rates may be adequate for most sounds, since many sounds have little content above 15 kHz. Sounds with a great deal of high-frequency content, such as cymbals, should probably be sampled at the higher rates. You can save memory by using lower sample rates for sounds without much high-frequency content-acoustic or electric bass, for example.

Another consideration in selecting sample rate is the K2000's transposition range during sample playback. The K2000, like all sample playback devices, transposes samples by changing the sample playback rate; the higher the playback rate, the higher the pitch of the sample. The K2000 can achieve a maximum sample playback rate of 96 kHz. A sample made at 48 kHz can be transposed up only one octave, since the playback rate doubles for every octave of upward transposition. A sample made at 29.4 kHz can be transposed up approximately 21 semitones (an octave and a sixth). There is no limit on downward transposition, regardless of the sample rate.

Each portion of a sample (each individual sample element made by the K2000 during the sampling process) takes up two bytes of sample memory. A one-second stereo sample at 48 kHz consists of 96,000 individual samples, taking up 192,000 bytes (about 188k) of sample memory. The same sample taken at 32 kHz takes up about 63k. A one-second mono sample taken at 32 kHz takes up about 31k.

MODE

Use the Mode parameter to select mono or stereo sampling. (Keep in mind that stereo samples take up twice as much memory as mono samples.) You can use the Mode parameter to isolate either the left or right side of the incoming signal.

TIME

The "Time" parameter lets you determine how long the sample will be. The available sample time is a function of the sample rate and the amount of available sample memory. The K2000 calculates this automatically, and limits the maximum value of the Time parameter accordingly. At a value of zero for this parameter, the K2000 will not record.

THRESHOLD

The "Threshold" parameter controls when the K2000 actually begins sampling incoming signals. If you set it to a value of "off", sampling begins immediately when you press the "record" soft button. Otherwise the K2000 waits for the incoming signal to exceed a specified threshold before beginning to record. You can set the threshold from -90 to 0 dB, in 6 dB increments.

The K2000 has a pre-trigger feature; that is, the K2000 records the 3,000 samples immediately before the point at which the threshold is exceeded. This prevents early transients from being missed. This feature is automatic whenever the "Threshold" parameter is set to a non-zero value. You will want to adjust this parameter if your samples are missing these transients; the lower the threshold, the more certain you will be of capturing every element of the signal. In some cases, you may get better results if you set the "Threshold" signal. In some cases, you may get better results if you set the "Threshold" parameter to a value of "off", then press the "Record soft button and wait briefly before beginning the sound to be sampled. This will guarantee that every element of the sample is captured. You can always adjust the starting point on the TRIM page, to remove silence at the start of the sample.

SAMPLE SELECTION (SAMP)

The "Samp" parameter lets you select any sample in memory for auditioning. This is a convenient way to listen to the samples you have made without having to manually create keymaps and programs for them. With a value of None for this parameter, the K2000 plays the last program or setup you selected before entering Sample mode. The list of values includes all ROM and RAM samples.

When you select a sample for auditioning, the K2000 automatically creates a temporary keymap and program, based on the settings for default program 199; with one exception, the effects are set to 100% dry. Any edits you have made to program 199 are reflected in the sample you audition. When you exit the sample mode page, The temporary keymap and program are deleted. You can create regular RAM keymaps and programs using the preview soft button; see the discussion of the preview button in the section called "recording samples."

If you do not have enough free program RAM, you may be unable to audition samples, since the K2000 won't have enough RAM to create the temporary keymap and program. In this case, deleting a few objects from RAM will restore the audition feature.

The "Monitor" (Mon) parameter provides a convenient way to listen to what you are recording. When set to a value of "on", any signal received at the analog sample input will appear at the K2000's MIX outputs and the headphone jack. Adjusting the input gain will affect the monitor gain as well. A clean monitor signal, however, does not guarantee a distortion-free sample. Always check the meters on the Record page and look for the CLIP indicator to ensure that your samples are free of clipping. Note that the Mon parameter is not visible when the input parameter is set to a value of Digital. This won't affect the monitor feature for the analog sampling input, but keep in mind that the Monitor feature applies only to the analog sampling inputs.

RECORDING

Pressing the "record soft button" will begin the sample recording process. If the "Threshold" parameter is set to a value of "off", recording will begin immediately, and will continue for the number of seconds indicated by the "Time" parameter. The display will indicate that recording is in process. Any other value for the "Threshold" parameter will cause the K2000 to wait until the specified threshold is exceeded, then recording will proceed normally. The display won't indicate that recording is in progress until the threshold is exceeded.

When recording is complete, the K2000 will prompt you to strike a root key. The sample is assigned to

the key you strike. This "root" is the key at which the sample will be played back without transposition. When sampling pitched sounds, it generally makes sense to assign a root key that matches the pitch of the original sample, although you can set the root key anywhere you like. If you press the "default soft button", the K2000 uses C4.

When the root key has been assigned, the K2000 asks you if you want to save the sample. At this point the display will show one of two things---the number of clips, or if no clips occurred, the maximum level (in dB) of the sample signal.

You can listen to the sample before deciding whether to save it. If you decide not to keep the sample, press the "no soft button", and you will return to the Sample mode page. If you press "yes", you will see the normal Save dialog. When you have saved the sample, you will return to the Sample mode page.

Once the sample is recorded and saved, you may want to edit it, using the TRIM or LOOP page, or any of the sample DSP functions.

THE AUTO SOFT BUTTON

To save time when sampling with either the Analog or digital inputs, you can use the "Auto soft button". This will begin sampling immediately (or when the sample threshold is exceeded if you have the Threshold parameter set to a value other than "off", and will return you to the Sample Recording page when the sample is compete. The root key is automatically assigned at C4, and the sample is automatically saved at the next available ID above 200.

THE TIMER SOFT BUTTON

If you need to delay the beginning of your sample recording, you can press the "Timer soft button" instead of the Record or Auto soft buttons. This will begin a ten-second countdown before sample recording actually starts. The display will show the countdown. When the countdown reaches zero, the program , Setup, MIDI, and Master mode LEDs will flash three times. If you have the Threshold parameter set to a value of "off", sample recording will start immediately after the LEDs flash. If you have the Threshold parameter set to a value other than "off". sample recording will begin when the threshold level is exceeded.

THE PREVIEW SOFT BUTTON

When you have finished taking a sample, you can press the "Preview soft button" to automatically created a keymap and program using the sample. It uses the settings for the Default program 199 as a template. Unlike the temporary keymap that's created when you audition a sample (and disappears when you select another sample,) the preview keymap and program are stored in RAM and can be selected at a later time.

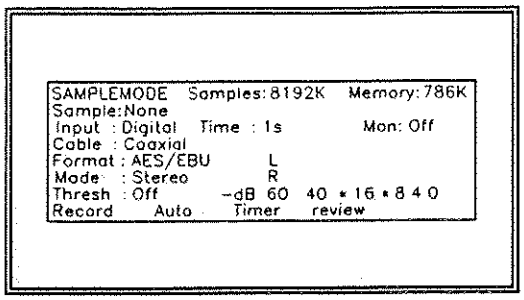
When you press the "Preview soft button", the Bank dialog appears, prompting you to select a bank where the preview program will be stored. Select a bank, then press the "ok soft button". The K2000 will create a keymap and a program, using the lowest available ID numbers in that bank for both the keymap and the program. The display will tell you the ID number of the new program.

DIGITAL SAMPLING

The process for sampling through either of the digital inputs is essentially the same, although there are a few additional parameters associated with digital sampling formats.

You will notice that the Sample mode page changes considerably when you change the value of the Input parameter from Analog to Digital. There are a few more settings to be made before you start recording.

The first difference is the fact that there are no parameters for gain and sample rate. There is no need for a gain parameter because with digital sampling, there is no control over the input level. The Rate parameter is excluded because the K2000



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automatically recognizes the source sampling rate and sets its own rate accordingly. Also, the Mon parameter does not appear when sampling digitally. Any monitoring you wish to do must be done from the sample source.

CABLE

Set the Cable parameter to a value of Coaxial or Optical, depending on the type of cable you are using. Many consumer products with digital output provide an optical jack. There is a small plug covering the K2000's optical input; this plug must be removed before you can connect the optical cable to the K2000.

If you plan to use a coaxial cable, select a value of Coaxial for the Cable parameter. If you are sampling from a consumer product like a CD player, you will probably need to get an adaptor, or a cable with an RCA fitting on one end and an XLR(MALE) FITTING ON THE K2000 end. Some professional products have an XLR fitting for their outputs, so an ordinary microphone cable will be suitable in most cases. Longer cables can cause signal loss, however, so if you need to use a long cable, you may need to get a special cable designed for digital information transfers.

FORMAT

Use the Format parameter to tell the K2000 the format of the incoming sample. Most consumer products use SONY/PHILIPS digital Interface Format), while most professional machines use the AES/EBU (Audio Engineering Society/European Broadcast Union) format. Refer to the owner's manual of your sample source for information regarding its sample format.

The Mode, Time, and Threshold parameters function for digital sampling just as they do for analog sampling.

EDITING SAMPLES

Most of the functions within the Sample Editor follow a general pattern. Start by entering the Sample Editor: Select a program---usually the program containing the sample you want to edit. Press the EDIT button to enter the Program Editor. Press the "KEYMAP soft button" to view the KEYMAP page. The KeyMap parameter is selected (highlighted) when the page appears. Press the EDIT button to enter the KeyMap Editor. The KeyRange parameter is selected when the page appears. The notes within the currently selected key range are the only ones that will be affected by your edits.

If you want to select a different sample, use the cursor buttons to select the Sample parameter. Use the Alpha Wheel to select a sample. Press the EDIT button once more, and you will enter the Sample Editor. (Pressing the EDIT button while in the Keymap Editor will enter the Sample Editor regardless of which parameter is selected.)
The TRIM page appears when you enter the Sample Editor. There are three basic sample edition pages---Trim, Loop, and Miscellaneous. The soft buttons for these pages are visible when you enter the Sample Editor. The DSP soft button is visible as well if you are edition a RAM sample; pressing it will take you to the DSP function page. (The DSP soft button does not appear if you are viewing a ROM sample.) The "more" soft buttons will take you to the soft buttons for the other functions.

THE FUNCTION SOFT BUTTONS IN THE SAMPLE EDITOR

In addition to the MISC, TRIM, and LOOP soft buttons, which select Sample Editor pages, there are several function soft buttons. As with other K2000 editors, the function soft buttons are labeled with upper and lower case letters, to distinguish them from the page selection soft buttons, which are labeled in all capital letters. The "more" soft buttons enable you to select the different soft buttons that are available.

ZOOM- and ZOOM+

these buttons are active only when you are viewing the TRIM and LOOP pages. They increase or decrease the resolution of the waveform display, enabling you to see a larger or smaller segment of the waveform of the currently selected sample. The top line of the display indicates the zoom position in terms of a fraction---for example, 1/256---which indicates the number of individual sample elements represented by each display pixel. A value of 1/256 means that each pixel represents 256 individual sample elements. The maximum zoom setting of 1 shows you a very small segment of the sample. The minimum setting of 1/16384 shows you the largest possible segment of the sample. Each press of a Zoom soft button increases or decreases the zoom by a factor of 4.

As a convenience, the Program and Setup mode buttons also serve as zoom buttons while in the Sample Editor.

GAIN- and GAIN+

Also active only for the TRIM and LOOP pages, these buttons increase or decrease the magnification of the currently displayed sample waveform, enabling you to see the waveform in greater or lesser detail. At the left of the display, you will see the magnification setting, which is expressed in dB units. You can adjust the magnification from -72 dB (maximum magnification) to 0 dB. This does not affect the actual amplitude of the sample, only the magnification of the display.

The simplest way to think of the Zoom and Gain buttons is to remember that the ZOOM buttons control the left/right magnification of the waveform, while the Gain buttons control the up/down magnification. Neither button has any affect on the sound of the sample. You will often use the Zoom and Gain soft buttons together to focus in on a particular sample segment, then magnify it to see it in close detail.

For example, you might want to zoom out to view an entire sample waveform, to decide which segment you want to edit. You could then zoom in to focus on a particular segment. Once you have zoomed in, you may want to boost the Gain to enable you to set a new start point with greater precision, or ensure that you get a smooth loop transition.

As a convenience, the MIDI and Master mode buttons also serve as gain adjustment buttons while in the Sample Editor.

ABORT

Use the Abort soft button to cancel a sample dump before it is complete. You will be prompted to verify whether you really want to cancel the dump.

SPLIT

The Split soft button enables you to create two mono samples from a single stereo sample. This button is available only when the currently selected sample is a stereo sample. When you press this button, you will be prompted to select the starting ID for the new samples.

UNITS

With the Units soft button you can change the units used to display the locations of the current sample's Start, Alt Start, Loop and End points.. The default setting displays these points in seconds, that is, the number of seconds from the physical start of the sample. Pressing the Units soft button will change

the units to samples, that is the number of individual sample elements from the physical start of the sample. Press it again to return to a view of the sample in seconds.

As a convenience, the Quick Access mode button also serves as a units button while in the Sample Editor.

LINK

The Link soft button lets you fix the interval between the Start, Alt Stat, Loop and end points of the current sample, so it remains constant when you move one or more of the points. This is done by selecting the desired parameter with the cursor buttons, then pressing the Link soft button. The colon(:) following the parameter's name will change to an arrow(>) to indicate that it is linked. You can link any or all of the four sample points. When sample points are linked, moving one of them will move the linked pints correspondingly. For example, suppose the current sample's Start point is 0.0 seconds, and its Alt Start point is 0.5 seconds. The interval between the sample's Start and Alt Start pints is exactly half a second. If you select the Start(S) parameter, then press the Link soft button, the Start point will be linked. This will not have any effect until you link at least one more point. If you select the Alt Start (A) parameter and press the Link soft button, the Start and Alt Start points will be linked. Now is you move the Start point to 1.0 seconds, the Alt Start point will automatically move to 1.5 seconds, preserving the half-second interval between Start and Alt Start. To remove the link on any of the points, select the point again, and press the Link soft button again. The arrow will change to a colon, indicating that the link has been removed.

As a convenience, the Up and Down cursor buttons and the Song mode button also serve as zoom buttons while in the Sample Editor.

NAME, SAVE, DELETE, and DUMP

These soft buttons are similar to the Name, Save, Delete, and Dump soft buttons in the other editors, initiating the corresponding dialogs to name, save, delete, or dump the currently selected sample.

When you press the Save soft button, and choose to save the sample to a new ID, the K2000 will ask you if you want to copy the sample data. If you answer Yes, the K2000 will make a separate copy of the sample. If you answer No, the K2000 will simply mark the location of the original sample data and share the sample between the original and the edited sample. This can save a great deal of memory space. If you delete a sample that is partially or completely shared with another, the K2000 deletes only the portions that are unused by the shared sample, always optimizing its memory for maximum storage capacity.

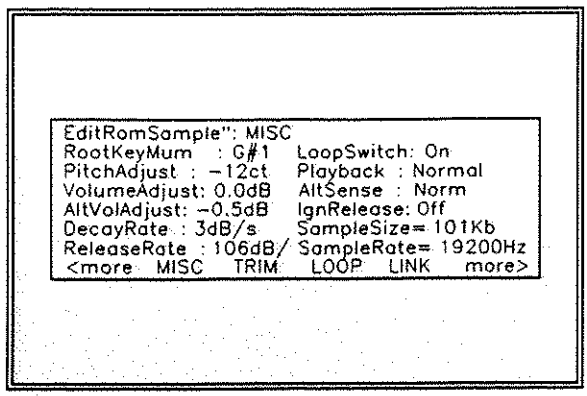
THE PAGE BUTTONS

The soft buttons labeled in all capital letters select the various pages in the Sample Editor: MISC, TRIM, and LOOP (as well as DSP when you are editing RAM samples.)

MISCELLANEOUS (MISC)

On the MISC page, you will set several parameters that affect the behavior of the current sample. These parameters affect the entire sample. Compare this page, which shows a ROM sample, to the TRIM page in the next section, which shows a RAM sample. The DSP soft button is not available for the ROM sample. In its place is the Link soft button, which enables you to maintain equal times between various points in the sample---Start and Alt Start, for example.

The default values shown on this page reflect the settings for the Default program 199.



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PARAMETERS-RANGE OF VALUES-DEFAULT

ROOT KEY NUMBER C1 TO G9 -G#1
PITCH ADJUST VARIABLE -12 CT dB
VOLUME ADJUS -64.0 TO 63.5 dB -0.0 dB
ALT VOL ADJ -64.0 TO 63.5 dB -0.5 dB
DEC RATE 0 TO 5000 dB PER SEC -3 dB/s
REL RATE 0 TO 5000 dB PER SEC -106 dB/s
LOOP SWITCH OFF,ON -ON
PLABAC MODE: NORM, REVER, BIDIRECT; -NORMAL
ALT SAMPL SENSE: NORM, REV; -NORMAL
IGNORE RELEASE: OFF, ON - OFF

ROOT KEY NUMBER

The root key number represents the key at which the sample will play back without transposition (at the same pitch as the pitch of the original sample). When you are creating your own samples, the key you strike as the root key will be the key you see as the value for this parameter.

PITCH ADJUST

Use this parameter to change the pitch of the sample relative to the key from which it is played. Setting a value of 100 cts, for example, will cause the sample to play back one semitone higher than normal. This parameter is handy for fine tuning samples to each other if they are slightly out of tune.

VOLUME ADJUST

Uniformly boost or cut the amplitude of the entire sample. Compare this to the DSP Volume Adjust parameter, which lets you boost or cut the amplitude of a specified segment of a RAM sample.

ALTERNATIVE START VOLUME ADJUST (ALTVOLADJUST)

This parameter sets the amplitude of the sample when the alternative start is used. See the Musician's guide for a discussion of Alternative Sample Start.

DECAY RATE

Use this parameter to specify how long the sample will take to decay (fade) to zero amplitude when a note is sustained, either by holding the key (or other note trigger), or with the sustain pedal. The higher the value, the faster the sample will decay.

RELEASE RATE

The release rate determines how long the sample will take to decay to zero amplitude when the note trigger is released. The higher the value, the faster the release rate.

LOOP SWITCH

This parameter activates or deactivates the looping of the currently selected sample. When set to "on", the sample will loop according to the settings on the LOOP page. When set to "off", the sample will play through to its End point and stop.

PLAYBACK MODE (PLAYBACK)

This parameter lets you modify the direction in which the sample is played. Set it to a value of Reverse if you want the sample to play from its End point to its Start point. Choose a value of Bidirectional to cause the sample to play from Stat to End, then reverse direction and play again from End to Loop and back, repeating until the note trigger is released.

ALTERNATIVE SAMPLE SENSE (ALTSENSE)

This provides a convenient way to activate the alternative start of a sample. When set to Normal, the alternative start will be used when the Alt Switch control is "on"(this is set on the LAYER page), or when the control source assigned to it is above its midpoint. When set to Reverse, the alternative start

will be used when the Alt Switch control is "off", or when the control source assigned to it is below its midpoint.

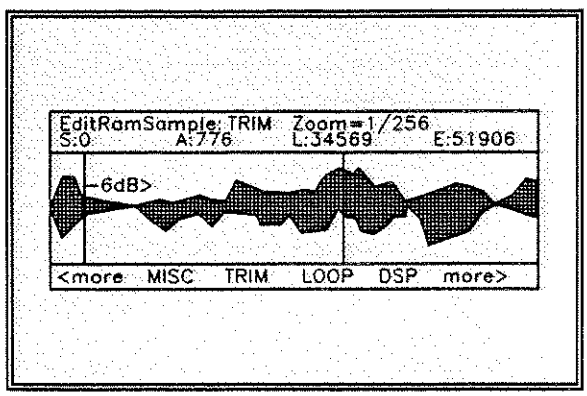
IGNORE RELEASE (IGNRELEASE)

When set to a value of "off", the sample will release normally when the note trigger is released. When set to "on", the note will not release, even when the note trigger is release. This setting should be used only with samples that normally decay to silence; non-decaying samples will play forever at this setting. This parameter is equivalent to the IgnRelease parameter on the LAYER page, but affects only the currently selected sample.

TRIM

The TRIM page lets you set the Start, Alt Start, Loop and End points of the current sample. The top line tells you whether you are editing a ROM or RAM sample, and indicates the zoom setting. At the left of the display, on the fourth line, is the gain (display magnification) setting.

The four parameters on this page are Start (S), Alternative Start (A), Loop (L), and End (E). Selecting these parameters and adjusting their values enables you to modify how the sample plays back when notes are triggered.



There are four vertical lines that indicate the four points. You will see all four lines only if the values for each of the four parameters are different; otherwise, the lines will overlap. Selecting one of the parameters will move the line corresponding to that point to the center of the display. The line corresponding to the currently selected parameter will flash. Tuning the Alpha Wheel will move the line to indicate the repositioning of the point. You can also use the alphanumeric button pad to enter new values directly. Press the "enter" button to register the values you enter. The points will not move until you press "enter".

The start point determines the beginning of the current sample. You can trim the beginning of the sample by increasing the value of the "start" parameter. You might do this to remove silence at the beginning of a sample, or to remove some or all of the attack. You cannot decrease the "start" point of RAM samples below zero, but if you want to add silence at the beginning of a RAM sample to create a delay, you can use the "Insert Zero DSP" function to add as much silence as you like.

Note that for RAM samples, you will not see any waveforms displayed to the left of the "start" point, but you will for ROM samples.

The "Alternative Start" parameter lets you set a second, optional start point for the current sample. The Alt Start will be used when the Alt Switch parameter on the LAYER page is set to "on", or when it is set to a specific control source and that control source is generating a value of more than +0.5 (for example, if you assign MWheel as the control source for the Alt Switch parameter, the Alt Start will be used when the Mod Wheel---or whatever control source you have set to send MWheel---is above its halfway point).

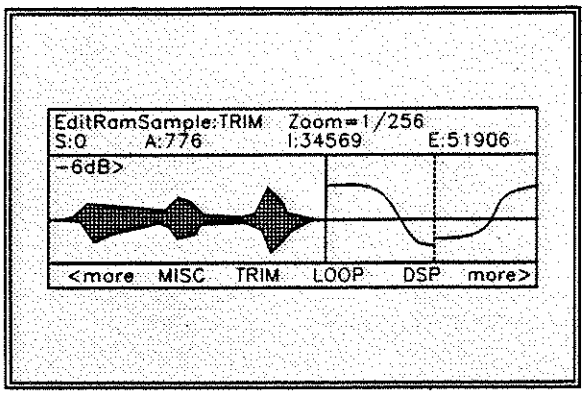
The Loop parameter sets the beginning of the looped portion of the current sample. Although you can adjust this parameter while you are on the TRIM page, you will normally want to adjust it while viewing the LOOP page, so you can see the loop transition points, enabling you to create as smooth a loop as possible.

The End parameter sets the point at which the current sample will stop playback. Typically you will use this parameter to trim unwanted silence off the end of a sample, although you can use it to shorten a sample as much as you want.

On the page shown below, the sample points are expressed in individual sample elements. Pressing the Units soft button will display them in seconds.

LOOP

The LOOP page features the same four parameters as the TRIM page, but the waveform display is quite different. The best way to understand what you see on the LOOP page is to switch back and forth between the TRIM and LOOP pages and study the waveform displays.



On the TRIM page you see the entire waveform, or as much as the waveform as your current zoom setting allows. When you move to the LOOP page, you will notice that the page is split into two sections, left and right, divided by a vertical bar in the center. This bar is thicker than the vertical lines representing the Start, Alt Start, Loop, and End points, and does not move when you adjust any of these points.

To the left of the dividing bar you see the same segment of the current sample that you see on the TRIM page. The four vertical lines representing the Start, Alt Start, Loop, and End points are visible. The right of the dividing bar you see the entire loop segment of the sample. (Remember, you will see all four vertical lines only if the values for the Start, Alt Start, Loop, and End parameters are different.)

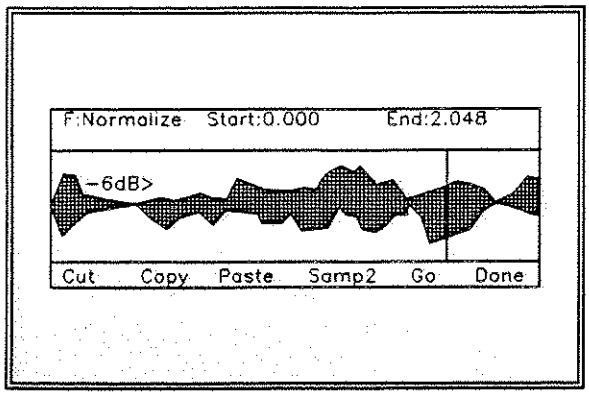
In the center of the loop segment is a dotted vertical bar that represents the loop transition point; that is, the point at which the sample reaches its End point and loops back to the Loop point. You can visualize the loop segment by starting at the vertical transition point; this is the beginning of the loop, as defined by the setting for the Loop parameter. The waveform progresses to the right, representing the initial portion of the loop segment. The waveform "disappears" off the far right side of the display, and "reappears" at the thick dividing bar at the center of the display. The waveform again progresses to the right, representing the final portion of the loop segment. It reaches the dotted vertical transition line, representing the End point of the sample, where it jumps once again to the loop point and repeats the cycle.

If you select the Loop parameter and change its value, you will see the segment of the waveform to the right of the transition point shift its position. If you select the End parameter and change its value, you will see the segment of the waveform to the left of the transition point shift its position.

When you are setting a loop segment for a sample, you will want to adjust both the loop and End parameters so the two ends of the waveform meet (or come as close as possible) at the transition point. The closer you can get the two ends of the waveform, the better the sound quality of your loop will be. With a bit of experimentation, you will develop the ability to create smooth loop transitions. You will notice an audible click in your sample loop if the ends of the waveform do not meet at the transition point.

DSP (RAM samples only)

Select the DSP page with the DSP soft button. This gives you access to a long list of non-real time DSP functions, with which you can modify your RAM samples. You will see the page shown below.



All of the DSP functions operated on a segment of the current on a segment of the current sample that you select before executing the function. In most cases, you will use the Start and End parameters to define the start point and end point of the segment you want to modify. There are two exceptions to this rule: the Mix function and the Crossfade Loop function, which will be explained below.

Use the cursor buttons to select the start and end points of the selected sample segment. You can audition the selected sample segment by triggering any note within the current key range. The sample will not be affected permanently until you press the Go soft button. When you do, the K2000 will ask you if you want to keep the change you have made. Press the "no" soft button to return to the page for the currently selected DSP function. Press the "yes" soft button to make the change. The Save dialog will appear. You can save to a different ID than the one displayed, if you want to preserve the original sample. Pressing the Cancel soft button will return you to the Sample mode page without saving the sample.

Several of the DSP functions involve selecting a second sample segment (Sample2) to be processed with the currently selected sample. In these cases, a Samp2 soft button will be available. When you press it, another page appears, enabling you to select a second RAM sample using the Alpha Wheel or the alphanumeric button pad. Once you have selected Sample 2, use the Start and End parameters to define the start and end points of the segment of Sample 2 that you want to process. When these points are defined, press the "ok" soft button to return to the DSP page where you can continue your editing.

Once you have selected a sample on the Samp2 page to copy the selected segment to a buffer, then paste the segment into Sample 1 when you return to the DSP page.

THE SOFT BUTTONS ON THE DSP PAGE

CUT

This button will cut (remove) the currently selected sample segment from the currently selected sample, and store it in a buffer. This is equivalent to cutting a section out of a piece of audio tape and splicing the remaining ends together. The cut segment is then available for pasting elsewhere in the sample. The segment you cut will remain in memory until you replace it with another copy or copy command, or until the K2000 is shut off. If you accidently cut a sample segment, you can restore it by immediately pressing the Paste soft button.

Compare this function to the Delete DSP function, which removes the selected sample segment, but does not store it in a buffer. If you delete a sample segment, it's gone.

COPY

Use this button to store the selected sample segment in a buffer without altering the current sample. The copied segment will remain in memory until you replace it with another cut or copy command, or until the K2000 is shut off.

PASTE

This button has an effect only after you have cut or copied a sample segment using the Cut or Copy soft buttons. The Paste soft button inserts the contents of the Cut/Copy buffer after the Start point of the currently selected sample segment. This is like splicing a section of audio tape into another section;

it extends the length of the sample.

SAMP2

The Samp2 button, as described earlier in the DSP page section, enables you to select a segment of a second sample to be processed with the currently selected sample.

GO

Press the Go soft button when you want to execute the currently selected DSP function on the currently selected sample. You will be prompted to save your changes.

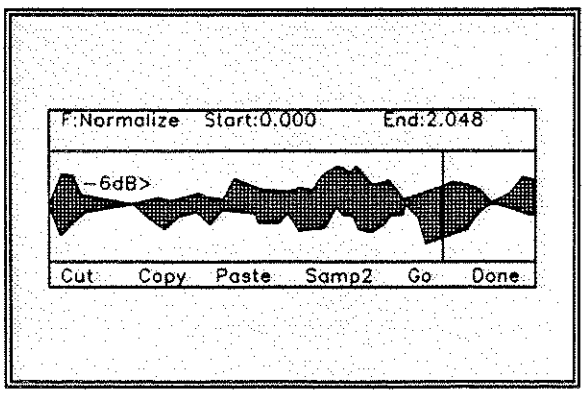
DONE

Press the Done soft button to return to the previously selected Sample Editor page when you are finished with the DSP functions.

DSP FUNCTIONS

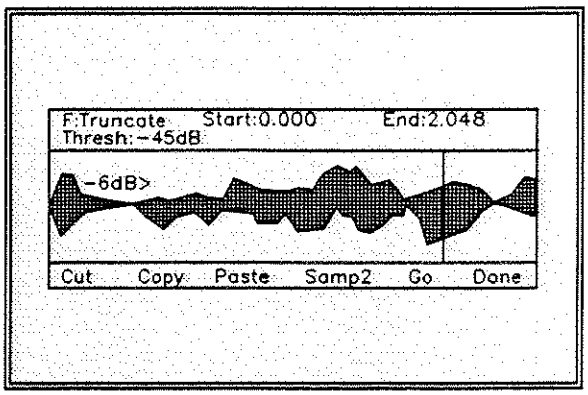
Once you have entered the Sample Editor, press the DSP soft button to gain access to the DSP functions. The DSP function parameter will be highlighted, allowing you to scroll through the list of functions with the Alpha Wheel or Plus/Minus buttons.

Remember that the DSP functions work only on RAM samples. You will notice that if you are editing a ROM sample, there is no DSP soft button: instead there is an extra Link soft button for your convenience.



NORMALIZE

With the Normalize function, you can rescale the amplitude of the selected sample segment to optimize your signal-to-noise ratio. The Normalize function will uniformly boost the amplitude of the current sample segment as high as possible without clipping, stopping just before the loudest element of the sample would be clipped. You might want to use the Volume Adjust function to boost the current segment manually, but the Normalize function does it automatically, and prevents you from boosting the amplitude too much.



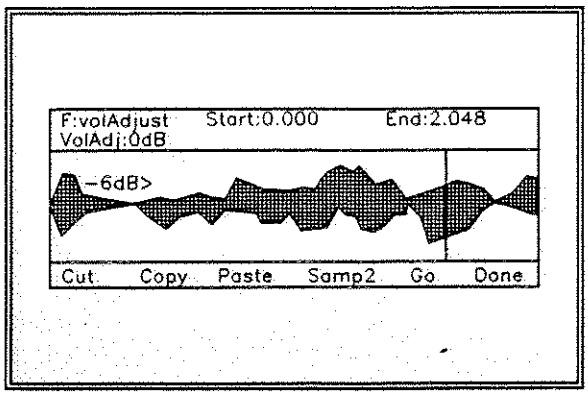
TRUNCATE

Use the function to set precise start and end points for the selected sample segment. Set the thresh parameter from -96 to 0dB to set the noise floor. Portions of the selected sample outside the Start and End points that do not exceed this threshold will be removed.

If you are planning to cut a portion of a sample for pasting into another sample, this function is a convenient way to get a clean start and end point for the portion to be cut, and to match the amplitude of the start and/or end points with the amplitude of the sample into which you plan to paste.

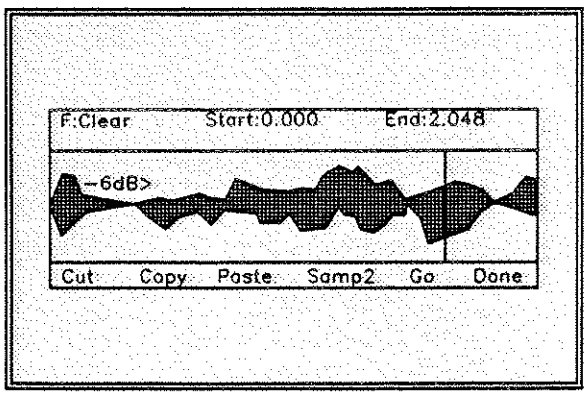
VOLUME ADJUST

Use this function for a uniform cut or boost in the amplitude of the selected sample segment. This function will clip samples if you adjust the volume too high. This will not hurt the K2000, and you may



find it useful in some applications. In any case, you will need to choose your start and end points carefully, if you want to avoid abrupt changes in volume.

When you have selected the segment to be adjusted, select the VolAdjust parameter with the cursor buttons, and use the Alpha Wheel to adjust the volume of the selected segment. You can cut/boost the volume from -96 to 96 dB.

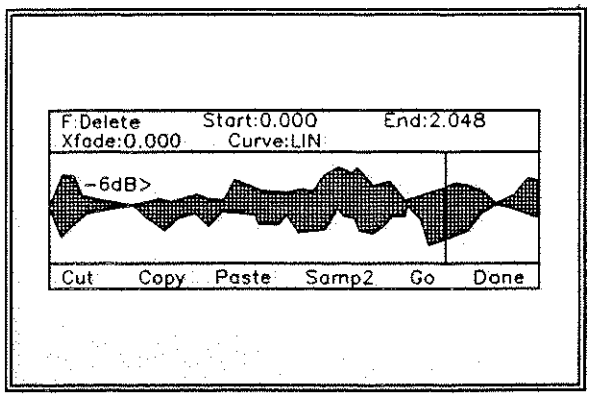


CLEAR

The result of this function is like erasing a section of recording tape. Use it to create sections of silence without changing the overall length of the sample. Compare this function to the Delete function.

DELETE

Unlike the Clear function, this will erase the samples within the selected segment and bring the start and end points of the segment together, like cutting a section out of a tape and splicing the ends. Compare this function with the Clear function.

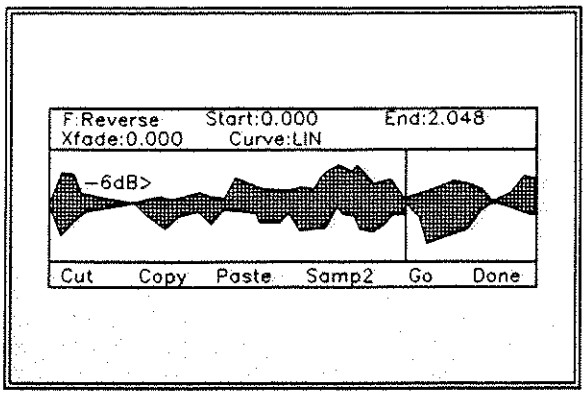


The Crossfade (Xfade) parameter enables you to smooth the transition from the deleted sample segment to the remaining sample segments. The value of the Xfade parameter defines the amount of time the sample will take to fade to silence at the beginning of the deleted segment, and to ramp back up to the volume of the remaining portion of the sample.

The Curve parameter lets you choose from a variety of crossfade curves that affect the nature of the crossfade. A value of LIN gives a straight linear curve that fades uniformly from start to finish. A value of EXP sets an exponential curve that starts gradually and steepens toward the finish. A value of COS sets a Cosine curve. A value of EQL applies an equal crossfade that is the same at both ends of the deleted segment. A value of MIX assigns a curve that will start the crossfade before the start point of the deleted segment, and after the end point of the deleted segment. This differs from the other curves, which apply crossfade only to the deleted segment.

REVERSE

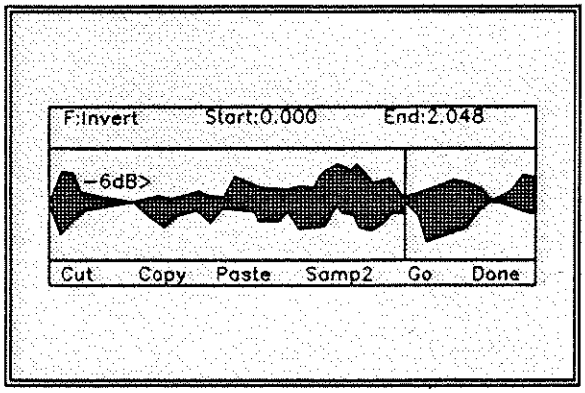
With this function you can reverse the order of the samples in the selected segment. The Xfade parameter lets you apply a crossfade to the start and end points of the reversed segment. The Curve parameter lets you select a crossfade curve. The available values are LIN, EXP, COS, EQL and MIX. These are the same curves that are available for the



Delete DSP function.

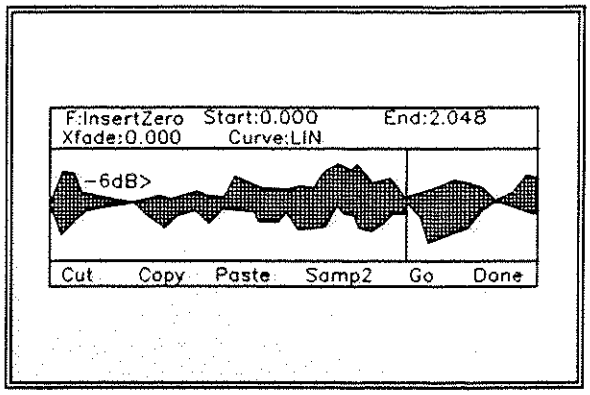
INVERT

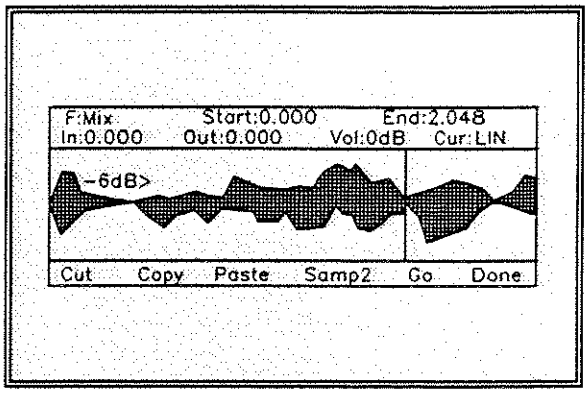
Use this function to invert the waveform of the selected sample segment. The results will vary depending on the type of sample. For an interesting phase effect, make a copy of a sample, then invert the copy, then assign it to the keymap of a second layer in a program that uses the original sample in the keymap of the first layer.



INSERT ZERO

Insert a period of silence of up to 10,000 seconds in length. This function is equivalent to splicing a section of blank tape into an existing segment of recorded tape. Adjust the Start and End parameters to determine the interval into which the period of silence will be inserted. Adjust the Length parameter to specify how long the silence will be.





MIX

With this function you select a segment from Sample2, and merge it with the selected segment from Sample1. This is equivalent to mixing two audio signals through a mixing board. If the segment from Sample 2 is longer than the segment from Sample1, the mixed sample will be longer.

Use the Fade In and Fade out (Out) parameters to specify the length of time it takes Sample2 to reach full amplitude and to fade to silence. The Curve parameter selects the type of crossfade curve. The available values are LIN, EXP, COS, EQL and MIX. These are the same curves that are available for the Delete DSP function.

The Volume Adjust parameter will cut or boost the amplitude of Sample 2 from -96 to 96 dB before merging.

If the sample rate of Sample 2 is different from that of Sample 1, the K2000 will ask you if you want to

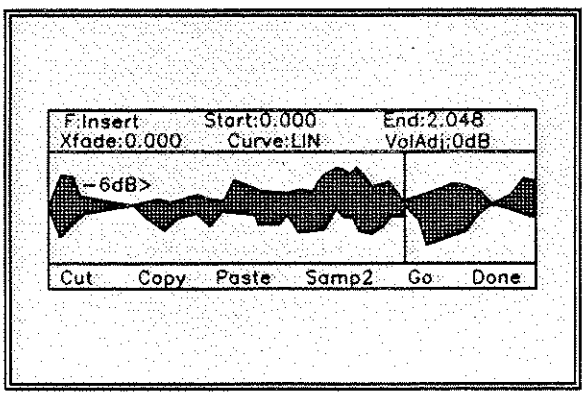
convert the rate of Sample2 to match Sample 1. Pressing the "yes" soft button will automatically resample Sample 2. If you want to preserve the rate of the original sample you are using for Sample2, you should make a copy of it before mixing.

MIXING SAMPLES, STEP-BY-STEP

First select a segment within the current sample. This will be the segment into which the second sample will be mixed. Then press the SAMP2 soft button, and a page will appear enabling you to view the list of ROM and RAM samples. Select a sample as the value for the Sample parameter, then use the cursor keys to select the Start parameter. Turn the Alpha Wheel to adjust the start point of the selected segment. Repeat this process for the end point of the sample. You can audition the sample as you are setting the segment. Once the start and end points are set, press "ok" to return to the DSP page. Then press "GO" to initiate the mix.

INSERT

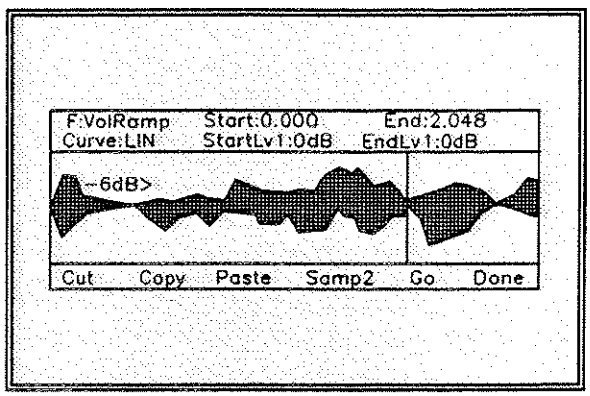
Use this function to insert the selected segment from Sample 2 into Sample 1. This is like splicing a section of tape into an existing tape. Compare this with the Mix function, which merges the two samples into one.



Use the Crossfade parameter to control the crossfades at the start and end of the inserted sample. The Curve parameter selects the type of crossfade curve. The available values are LIN, EXP, COS, EQL and MIX. These are the same curves that are available for the Delete DSP function.

The Volume Adjust parameter will cut or boost the amplitude of Sample 2 from -96 to 96 dB before merging.

If the sample rate of Sample 2 is different from that of Sample 1, the K2000 will ask you if you want to convert the rate of Sample 2 to match sample 1. Pressing the "yes" soft button will automatically resample Sample Secondly, if you want to preserve the rate of the original sample you are using for Sample 2, you should make a copy of it before inserting.

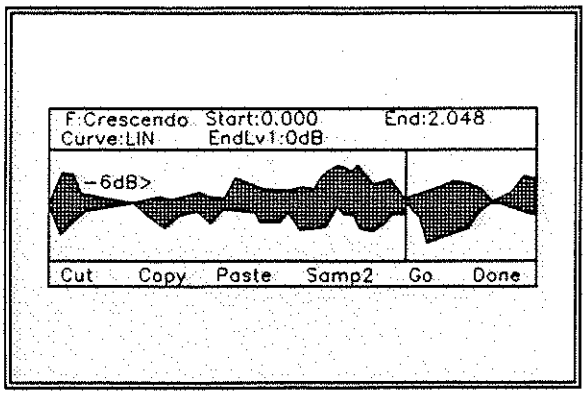


VOLUME RAMP

This function lets you scale the volume of the selected sample segment. The Start Level and End Level parameters let you set the amount of cut or boost at the start and end points of the segment. The Curve parameter determines the shape of the ramp that scales the amplitude of the sample between the start and end amplitudes. The available values are LIN, EXP, COS, EQL and MIX. These are the same curves that are available for the Delete DSP function.

The VolRamp function affects only those samples within the start and end points. This may cause abrupt changes in volume at the transition between the adjusted segment and the remainder of the sample, so be sure to select your sample segments carefully (placing the end point at a location with

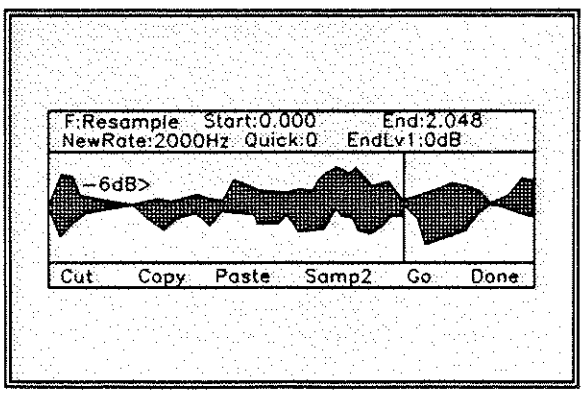
silence or low amplitude), or limit your volume adjustments to slight amounts. Compare this function with the Crescendo function.



CRESCENDO/DECRESCENDO (CRESCENDO)

Similar to Volume Ramp, this function applies a curve that scales the amplitude of the selected sample segment. Unlike Volume Ramp, however, you simply select a start and end point, and a single level. The amount of cut or boost starts at 0dB at the start point, and reaches the level you specify when it reaches the end point. The samples after the end point are scaled to the amplitude level of the end point.

Use the Curve parameter to select the shape of the curve within the selected segment. The available values are LIN, EXP, COS, EQL and MIX. These are the same curves that are available for the Delete DSP function.



RESAMPLE

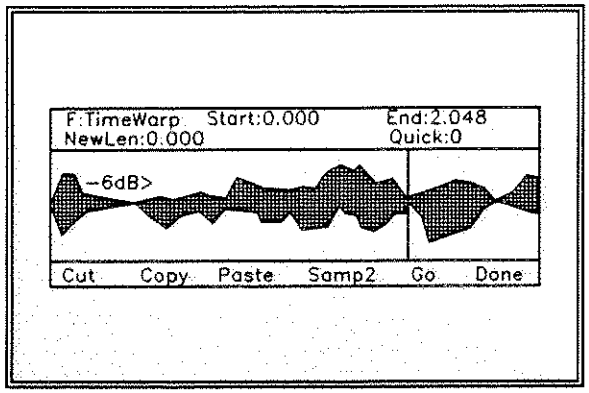
Use this function to change the sample rate of the samples in the selected segment. The primary purpose of this function is to convert samples to new rates matching those of other samples to be mixed with or inserted into.

If you include the entire sample in the segment, the new rate will be applied to the entire sample, and will be saved with the sample. If you select a shorter segment, only that segment will be modified, and it will sound pitch shifted relative to the remainder of the sample. This is because the K2000 applies the same playback rate to the entire sample, and can't compensate for the differing sample rates of the sample segments.

If the loop points of a looped sample are included in the segment to be converted, the K2000 will ask you if you want to include the loop in the conversion. Press the "no" soft button if you don't want the loops points included. If you press the "yes" soft button, the K2000 will automatically make a slight adjustment in the New Rate parameter and the loop settings, optimizing them to prevent clicks in the loop transition.

The EndLvl parameter lets you adjust the amplitude of the end of the resampled segment, enabling you to smooth the transition to the original sample.

You can use the Quick parameter to select from three resampling routines. A value of 0 for this parameter represents the fastest routine, while a value of 2 represents the slowest. You get better results with the slower routines, but the fastest routine may provide adequate results in a shorter time.

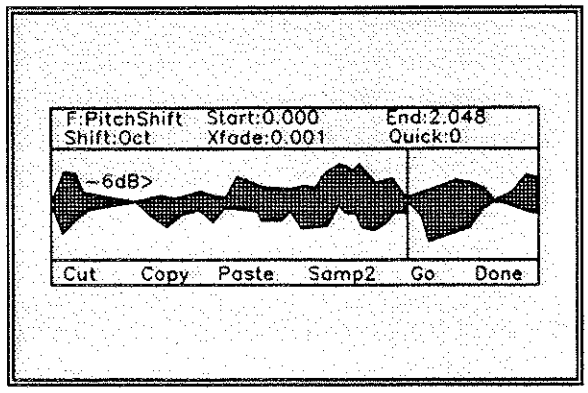


TIME WARP

With this function you can change the length of the selected sample segment without affecting the pitch. This function applies sophisticated routines that "stretch" the selected sample segment to play it back over an extended time period, modifying the playback rate so the pitch remains unchanged.

The Start and End parameters define the segment to be warped. The New length (NewLen) parameter determines the amount of warping to be applied. While the warp is in progress, the display will indicated the percentage of individual sample segments that have been processed.

The Quick parameter lets you select one of three warping routines; a value of 0 is the fastest, while a value of 2 is the slowest (but will give the best results).

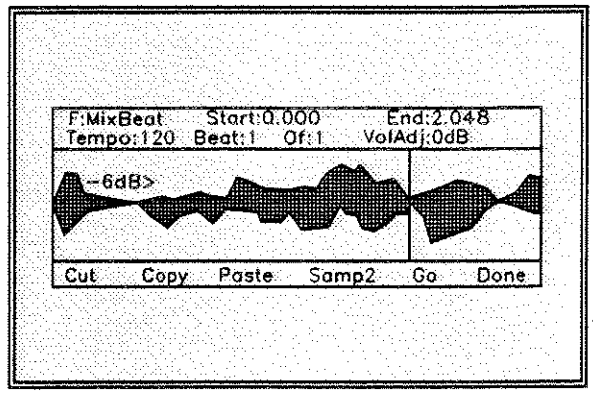


PITCH SHIFT

The Pitch Shift function is the counterpart of the TimeWarp function; it shifts the pitch of the selected sample segment without changing the playback time---very useful for tuning samples when the playback time is crucial. Use the Start and End parameters to define the segment to be shifted. The Shift parameter determines the amount of pitch shifting, from 0 to 30,000 cents. While the shift is in progress, the display will indicate the percentage of individual sample elements that have been processed.

The Xfade parameter determines the length of time over which the ends of the shifted segment will be crossfaded to smooth the transition between the original sample and the ends of the shifted segment.

The Quick parameter lets you select one of three warping routines; a value of 0 is the fastest, while a value of 2 is the slowest(but will give the best results).



MIX BEAT

With this function you can mix the selected segment of Sample 2 into the selected segment of Sample 1, starting at the start point, and repeating the segment of Sample 2 throughout the selected segment of Sample 1. Only as many repetitions as will fit into the Sample 1 segment will be mixed in.

If the "Of" parameter is set to a value "of" 0, the Sample 2 segment will be mixed in on every beat, regardless of the setting for the Beat parameter. If

the Beat parameter is set to a negative value, the segment of Sample 2 that is mixed in will be moved forward in time for the length of one beat each time it is mixed in; that is, you will hear a later portion of the sample. Another way to accomplish this is to use the Increment (Incr) parameter on the Samp2 page. Set it to a positive value to use a later portion of Sample 2 with each repetition, or a negative value to use an earlier portion. The Beat parameter must be set to a value of 0 or higher for this to work.

The most natural application of this function is to add percussion samples, but it can be used to mix any sample at regular programmable intervals (beats). Here's how it works.

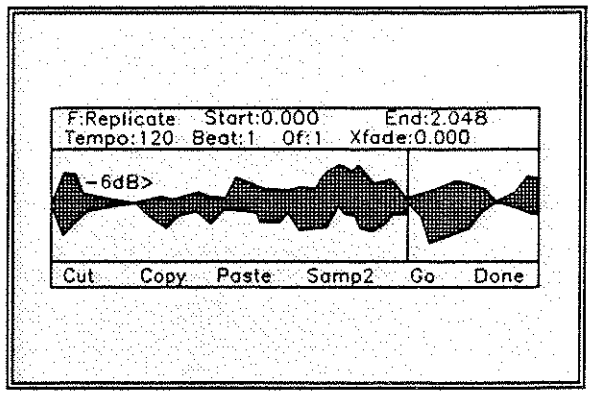
First select the desired segment of Sample 1 using the Start and End parameters. Then press the Samp2 soft button to select the sample to be mixed in, and the selected segment of that sample. Press the "ok" soft button to return to the Mix Beat page.

Next, use the Tempo parameter to select the beat tempo of the sample segment to be mixed in. You can choose a tempo from 1 to 9999 beats per minute.

Next you will set the values of the Beat of parameters to determine how the mixed sample will repeat. The Beat parameter determines the beat on which the mixed sampled will be played back---from 1 to 000. The Of parameter determines how many beats will be used---also from 1 to 999.

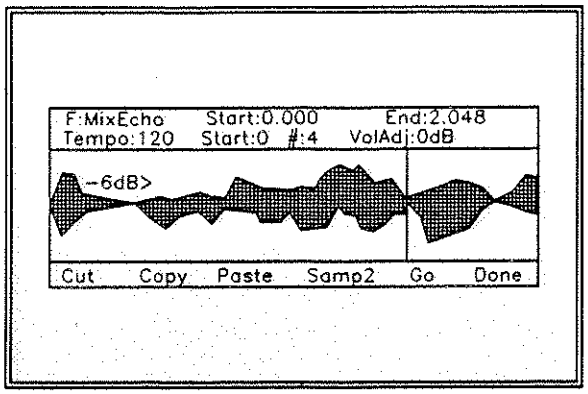
Finally, use the VolAdjust parameter to set the volume of the mixed sample segment---from -96 to 96 dB.

For example, suppose you have chosen a six-second sample as Sample 1, and you use the entire sample as the selected segment. You also select a half-second segment of Sample 2 to be mixed in. If you choose a Tempo value of 120 beats per minute (2 beats per second), there will be 12 beats within your six-second Sample 1 segment. If you set the Beat parameter to 1 and the Of parameter to 4, then Sample 2 will play on the first, fifth, and ninth beat of your six-second Sample 1 segment. If you change Beat to 3, Sample 2 will play on beats 3, 7 and 11. If you set Beat to 1 and Of to 6,Sample 2 will play on beats 1 and 7. If you set Beat to -1, Sample 2 will still play on beats 1 and 7, but the sound of the sample will change each time, as the start point of the Sample 2 segment is moved forward by one beat each time it is mixed in.



REPLICATE

With the exception of two differences, the replicate function is similar to the Mix Beat function. The primary difference is that the replicate function uses the selected Sample 2 segment to overwrite (replace) the selected Sample 1 segment, instead of merging the two segments like the Mix Beat function. This makes it run faster. The other difference is that there is a crossfade parameter instead of a Volume Adjust parameter. The crossfade parameter lets you remove clicks that may occur at the transition points from Sample 1 to Sample2.

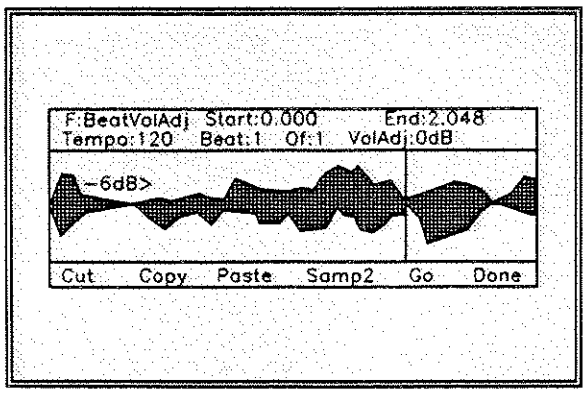


MIX ECHO

This function operates much like Mix Beat, but instead of the Beat and Of parameters, you have Start and "#" parameters. The Start parameter sets the point at which the selected Sample 2 segment begins being mixed with the selected Sample 1 segment, while the "#" parameter determines how many times the Sample 2 segment is repeated.

The Volume Adjust parameter will affect the volume of each repetition of Sample 2. It sets the relative level of the last beat, and boosts or cuts each repetition by a proportionate amount from the starting level.

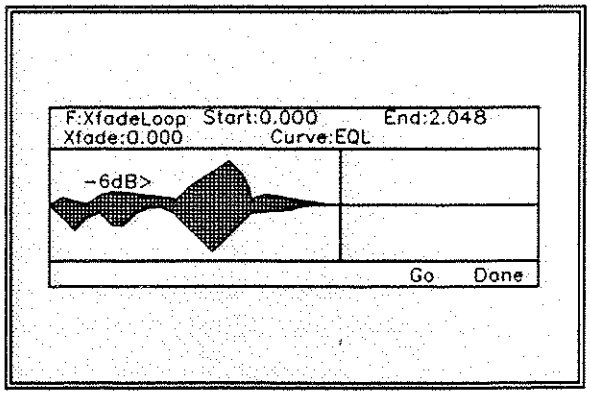
If you set the "#" parameter to a negative value, the



first mix of Sample 2 will be reduced by the Vol adjust amount.

BEAT VOLUME ADJUST

This function works much like Mix Beat. The difference is that each beat is adjusted in volume by the amount specified for the VolAdj parameter, not each repetition as with the Mix Beat function.



CROSSFADE LOOP (XfadeLoop)

The Crossfade Loop function lets you create smoother loops by crossfading the beginning segment of the loop with a segment of equal length at the end of the loop. These segments are defined by the Loop and End parameters as set on the TRIM page for the current sample. Changing the Loop and End points on the XfadeLoop page will change the Loop and End points on the TRIM page as well.

The Xfade parameter determines the length of the crossfade, while the Curve parameter sets the shape of the crossfade curve. The available values are LIN, EXP, COS, EQL and MIX. These are the same curves that are available for the Delete DSP function.

READING SAMPLES

The K2000 will load numerous samples from Akai, Roland, EPS-16+ and SCSI drives using Version 2's enhanced Disk mode operations. The displays you see will vary depending on the samples you are loading, but several features are the same. We will describe the similarities first, then elaborate on the differences.

First, enter Disk mode by pressing the Disk mode

button. Select the disk to be loaded from, described in chapter 13 of the Musician's Guide. (You will notice that the disk page looks somewhat different from the diagram in the Musician's Guide; the soft buttons have changed somewhat to accommodate the new features.) The K2000 automatically recognizes the type of disk when you select it.

Press the Load soft button, and you will see a page prompting you to select something to load (we will call them objects, since different manufacturers give them different names). The top line of the display will tell you the number of objects available of the currently selected type, as well as the index number of the currently selected object. You can select any object in the list by typing its index number on the alphanumeric button pad and pressing Enter. The next step is to use the soft buttons to select the type of object to be loaded.

Once you have selected the type of object to load, press the "ok" soft button, and the band dialog will appear, enabling you to select the bank into which the object(s) will be loaded. When you have selected a bank, press the "ok" soft button, and the loading process will begin. At the center of the display you will see the object currently being loaded. The top line of the display will fill with asterisks to indicate the status of the current object. The bottom line will tell you the total number of kilobytes already loaded, and the total number to be loaded.

When the load is complete, the Disk mode page will reappear. You can now proceed with another load, or go to any other mode. You can abort a load by pressing one of the Plus/Minus buttons under the Alpha Wheel.

Akai DISKS

The first page to appear is the page for loading files. The soft buttons name the operations: HDrive, Volume and File on the left, and OK and Cancel on the right.

The hierarchy of objects is shown by the three soft buttons on the left. The display prompts you: "File to load." the HDrive button selects the partition on the currently selected disk. The Volume button in the currently selected volume. The file button selects an individual sample file from within a volume. The "ok" button, toward the right, executes the displayed function: partition selection, or loading a volume or file. The Cancel button returns you to the Disk mode page.

When you press the HDrive button, the center of the display's top line shows the currently selected volume in the currently selected partition. The prompt at the center of the display will read: HD Partition." The list of available partitions will appear following the prompt. They are usually named A through F. Use the cursor buttons or numeric entry to highlight a different partition. Pressing the "ok" soft button will select the highlighted partition. Pressing the Volume button will change the prompt to "Volume to load." The list of available volumes in the current partition will appear. The center of the top line will show the current partition. The Layer buttons will scroll through the list of available partitions. Use the cursor buttons or numeric entry to select a different volume. Pressing the "ok" button will load the entire highlighted volume, unless the volume is larger than your available sample RAM. The Bank dialog will appear, enabling you to select the bank that will receive the volume. Press "ok" again, and you will be prompted to press either the Progs soft button, which will load program information in addition to the samples, or the Samps soft button, which will load only the sample information. Programs are identified by the suffix "p," and are stored in program RAM. Samples have the suffix "s." You can press Cancel to return to the Disk mode page without loading the volume.

When you edit samples or programs, then save them as Kurzweil objects, you will find that they can be loaded and backed up much faster than in their original format.

If you press the File button, the prompt will change to "File to load." You can view the list of files with the cursor buttons, or use numeric entry. The top line of the display will show the currently selected volume. Select different volumes with the Layer button. The size of the currently selected file, in Kilbytes, is shown just above the soft buttons on the left. Press the "ok" button to load the highlighted file.

Press "ok", and the Bank dialog will appear. Press "ok" again, and the file will be loaded into the highlighted bank.

ROLAND DISKS

For Roland disks, the hierarchy is a bit different; the objects that can be loaded are called volumes, performances, patches, and samples. The page that was selected last time a SCSI load was executed will appear when you initiate the load operation. Following the prompt is the list of available objects, with the size of the object in Kilobytes displayed as well.

The top line of the display will show the number of samples in the currently selected patch, the number of patches in the currently selected performance, and so on, depending on the page you are viewing.

Use the soft buttons to highlight the object to be loaded, and press "ok" to execute the load. The Bank dialog will appear. Press "ok" again, and the object will be loaded. The display will update you on the progress of the load. When you return to the load operation after exiting Disk mode, the K2000 will remember the file that was selected the last time you were in Disk mode.

EPS DISKS

For EPS disks, the hierarchy consists of files and directories. Directories can be nested several layers deep. When you press the Load soft button, the single of this operation appears, prompting you to select a file to load from the list of available files and directories. The currently highlighted object will be either a file or a directory. If it is a file, its name and size will be shown following the prompt. If it is a directory, its name appears, followed by "dir" to indicated its type. The Layer buttons will scroll through the list of the currently selected directory.

When a file is highlighted and you press "ok", the Bank dialog appears; press "ok" again to load the file. When a directory is highlighted and you press "ok", you enter that directory, and the list of files and subdirectories in that directory appears, each file followed by its size, and each subdirectory, if any, followed by "dir".

Pressing the Exit soft button will take you one level back up the hierarchy. Pressing it repeatedly will take you to the root directory---the directory at the top of the hierarchy. The quickest way to the root directory is to press the Root soft button. The top line of the display shows you the name of the currently selected directory, or subdirectory.

Pressing the All soft button will load all files in the current directory, but not any subdirectories. The Bank dialog will appear, and when you press "ok", you will be prompted to press the Progs button to load program information in addition to the samples, or the Samps button to load only the samples.

FILE COPYING and DISK BACKUP

In addition to giving you the ability to load multiple sample formats, Version 2 also lets you make copies individual files and backups of entire hard disks or floppy disk sets in Disk mode. Press either <more> soft button to view the Copy and Backup soft buttons.

FILE COPYING

The first step in copying a file is to enter Disk mode and select a disk to be read from (the source disk). This can be the K2000's floppy drive, its internal disk drive, or a SCSI device connected to the K2000. Next press the Copy soft button, and the list of files

on the current disk will appear. Use the cursor buttons or Alpha Wheel to highlight a file, then press "ok". You will be prompted to select a disk to which to copy the file (the destination disk). Press "ok" again. If a file with the same name already exists on the destination disk, you will be asked if you want to replace the existing file. Press Replace or Cancel, depending on what you want to do.

DISK BACKUP

The first step in backing up files is to enter Disk mode and select a disk to be read from. This can be the K2000's floppy or internal hard disk drive, or another SCSI device connected to the K2000. When you have selected a disk, press the Backup soft button, then select a file from the list of available files. This will become the first file in the list of files to be backed up. All subsequent files in the list will be included in the backup.

Press the "ok" button, and you will be prompted to select a destination disk. Use the cursor buttons or Alpha Wheel to highlight a disk, and press "ok". You will be prompted to select a backup mode: incremental or overwrite. If you press the Increm soft button, the K2000 will back up only those files that do not have the same name as files that already exist on the destination disk. If you press the Overwrite button, the selected file and all the files below it will be copied to the destination disk, replacing any files with the same name.

OTHER VERSION 2 FEATURES

INTONATION TABLE EDITOR

The Intonation Table Editor has been changed to make edition more intuitive. When you enter the Intonation Table Editor, a graphic representation of a C octave appears, replacing the parameter list shown in previous software versions. Each note on the page contains a parameter that indicates the amount of detuning applied to that note. The low C always represents the tonic. The intervals between notes of the octave are detuned by using the cursor keys to select the note to be detuned, then assigning a detuning value with the Alpha Wheel or alphanumeric entry.

ATTACK CONTROL

The AltAttackCtl parajeter on the KEYMAP page in the Program Editor has been renamed. Since it now can be assigned to designate an alternative sample end as well as an alternative sample start, its name has been simplified to "AltSwitch."

NOTE TRIGGERING

Notes may be triggered on key-up. This is done in the Program Editor by setting the Trigger (Trig) parameter on the LAYER page to a value of Reverse (Rvrs.)

EXTENDED SAMPLE LOOPS

You can also play data after the sample's loop on key-up. This is done by setting the Alt sample pointer after the sample end pointer, then setting a relatively low value for the release parameter on the MISC page in the Sample Editor.

SAMPLE LOOP PLAYBACK

Reversed and bidirectional sample loop playbacks are now supported, using the Playback parameter on the MISC page in the Sample Editor. this is somewhat similar to the PlayBackMode parameter on the KEYMAP page in the Program Editor; the difference is that the PlayBackMode parameter affects the entire currently selected layer, while the Playback parameter affects only the currently selected sample.

MUTING LAYERS IN DRUM PROGRAMS

In the Program Editor, when editing a "drum" program (a program with more than three layers), the Program mode button (Mute Layer 1) will mute the currently displayed layer. Pressing either the Setup or Quick Access mode button (Mute Layers 2 or 3) will solo the currently displayed layer. If you move to the Keymap Editor or Sample editor while muting or soloing, the muting or soloing will remain in effect, even though the LEDs will not remain lit. This is true for normal programs, as well.

P-RAM OPTION KIT

K2000 and K2000R
INSTALLATION MANUAL

P-RAM OPTION INSTALLATION KIT

This document will instruct Kurzweil service technicians in the installation of the P-RAM Option kit. It is intended only for qualified Kurzweil service technicians. Installation by unqualified personnel will void the warranty.

IMPORTANT NOTICES

Installation of the P-RAM Option kit will completely erase the K2000's or K2000R's RAM. unlike a normal power-down, which clears only the sample RAM, this installation will delete all user-defined objects: programs, setups, songs, intonation tables, velocity and pressure maps, etc. Please be sure that the contents of RAM have been backed up before you begin this installation. If the owner of the unit has not already done it, you can quickly back up all of these 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.

If you are installing the P-RAM Option kit in a K2000 (the keyboard version of the K2000), you must also install Kurzweil 2000 series Engine software Version 1.1 or later. The P-RAM Option kit will not function without this software update. You can check the Engine software version of any K2000 by turning it on. The software version will be displayed briefly as the unit is powering up. The K2000R (the rack mount version of the K2000) ships with Engine software Version 1.1 or later, so the update is not necessary.

WARNING

If you are installing the P-RAM kit. Failure to comply with this requirement may seriously damage the unit, and may void the warranty. The K2000R is equipped with a fan as a standard component.

TOOLS REQUIRED FOR INSTALLATION

#1 phillips screwdriver
#2 phillips screwdriver
Soldering iron

COMPONENTS FOR P-RAM OPTION KIT INSTALLATION

Item 1--P-RAM Option PCB (printed circuit board)
Item 2--P-RAM Option board cable
Item 3--Two "Z-bend" mounting brackets
Item 4--Two fastening screws (M3.0 x 14 mm). These are for the K2000 only.
Item 5--Two lock washers

BEFORE INSTALLING

You will need to run diagnostic tests before and after installing the P-RAM option kit. This will ensure that the unit is functioning properly before the installation, and will help you to identify any difficulties you might encounter with the installation.

The diagnostic test requires a blank Kurzweil-formatted floppy disk (DOS 1.44m) to be inserted into the floppy disk drive. If you do not already have a formatted disk, now would be a good time to format one. It is also recommended that you connect a SCSI device (like an external hard disk drive) to the unit's SCSI port, to enable you to test the operation of the SCSI link.

IMPORTANT

Be sure that the units's volume is all the way down, or that it is disconnected from any audio system. The Sound ROM and Sound RAM tests generate high-amplitude signals which could damage your sound system.

To run the internal diagnostic software, start with the unit's power off. Press and hold the 1, 2 and 3 buttons on the alphanumeric buttonpad, and turn the

unit on. A short menu will appear, prompting you to select a hard reset or diagnostics. Use the Alpha Wheel to select diagnostics, then press "ENTER".

A menu of tests will appear. The test you will be running is called the "burn-in" test, and includes most of the tests on the diagnostic menu. To run the diagnostics, press the leftmost soft button. This starts the burn-in test. See the note on the following page before proceeding with the test.

NOTE

If you do not insert a blank floppy disk drive before starting the diagnostics, the sequence of tests will freeze at the floppy test. If this happens, you will have to turn the unit off, then start the diagnostics again, inserting the floppy disk before starting the test.

The time required for the entire burn-in test depends on the amount of sample RAM installed in the unit. The Sound RAM test requires approximately 20 seconds per megabyte of sample RAM, and the remaining tests take a total of approximately 5 minutes. As each test is run, the display will indicate the status of the test. Mark the results of each test on the checklist included at the end of this manual.

All of the diagnostic tests should pass the first burn-in test (unless you do not connect a SCSI device to the SCSI port, in which case the SCSI test will fail). A failure of any of the tests indicates that the component is question is either malfunctioning or is not installed. Malfunctioning components should be repaired before proceeding further. Refer to the K2000 service manual. When the faulty component is repaired or replaced, the diagnostics should be run again. Repeat this process until all test have passed.

Although the SCSI test will fail if you do not have a SCSI device connected to the SCSI port, this does not necessarily indicate a malfunction in the SCSI link.

When you have corrected any malfunctions that may have occurred, and run a successful diagnostic test, you are ready to proceed with the P-RAM Option kit installation.

BEGINNING THE INSTALLATION

The installation procedure is divided into three parts: disassembly, installation and reassembly. Parts 1A-4A explain the P-RAM Option kit installation for the K2000. Pars 1B-3B describe the installation for the K2000R. Part 1B begins on page 6.

PART 1A K2000 DISASSEMBLY

Important: You must install the FK1 fan kit before installing the P-RAM Option kit. Failure to comply with this requirement can seriously damage the K2000 and can void the warranty.

1. Unplug all external wires, cables and connectors from the K2000.

2. Turn the unit face down on a soft carpet or foam pad, with the keys pointing toward you.

3. Using a #2 phillips screwdriver, remove the six screws that fasten the bottom enclosure to the top enclosure (the enclosure is the K2000's outer case). There is one screw in each corner of the bottom enclosure, and two in the middle.

4. Lift the edge of the bottom enclosure that is closest to you. See figure 1. If the fan kit has already been installed, be sure to disconnect the fan/hard disk drive power cable from the K2000's audio board before removing the bottom enclosure completely. See figure 4. Be sure that there are no cables connected between the bottom and top enclosure. If there are any ribbon cables to be disconnected, make note of the orientation of the red boarder of the ribbon cable so you can reconnect it properly. Set the bottom enclosure aside.

PART 2A K2000 P-RAM OPTION INSTALLATION

5. Figure 2 shows a closeup of the K2000 Engine board. Refer to figure 2 and locate Pin 30 on the Engine board connector labeled J2. Pin 30 is located toward the rear of the unit. (It is the second pin from the back edge of J2, in the row toward the center of the board.) Take the P-RAM Option kit cable (item 2) and solder its green wire to Pin 30.

6. Locate the diode labeled D1, near the right front corner of the Engine board. Solder the Option kit cable's white wire to the lead of the left side of the diode. You may want to disconnect the ribbon cable leading to the audio board for easier access. If you do so, be sure to note the orientation of the red border of the ribbon cable so you can reconnect it properly.

7. Locate the 64-pin connector labeled "PROCESSOR EXP" (J1) near the left front corner of the Engine board. See figure 2.

8. Remove the two screws to the left and right of connector J1 (see figure 3). You can discard these screws, as they will not be reused.

9. Take the P-RAM Option board (item 1) and with the components facing up, press its connector into connector J1 on the Engine board. See figure 3. The P-RAM Option board connector is keyed to prevent improper connections.

10. Put one lock washer (item 5) on each of the supplied screws (item 4).

11. Insert one screw and washer through the hole in each of the mounting brackets (item 3).

12. Carefully thread the screws into the holes on either side of connector J1. Tighten the screws until the mounting brackets press against the P-RAM Option board. Do not overtighten the screws or you may damage the enclosure.

13. Take the P-RAM Option board cable (item 2) and plug it onto the keyed connector on the P-RAM Option board cable (item 2) and plug it onto the keyed connector on the P-RAM Option board. See figure 3.

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

PART 3A K2000 REASSEMBLY

14. Lift the bottom enclosure, place its back edge (the edge with the Kurzweil logo) on the back edge of the top enclosure and hold the unit partially open as shown in figure 4.

15. Reconnect the fan/hard disk drive power cable, and if a hard disk drive is present, reconnect the hard disk drive ribbon cable. Make sure the red border of the cable is on the Pin 1 side of the connector.

16. Carefully close the unit and replace the six enclosure fastening screws.

17. Plug the power cable into the K2000 and turn the unit on. Place your hand over the fan intake to make sure that it is pulling air "INTO" the enclosure. You should also feel a slight movement of air "out" of the Pitch and Mod Wheel openings. Turn the unit off again.

18. Run the diagnostic tests again. To enter diagnostic mode, press and hold buttons 1, 2 and 3 on the alphanumeric buttonpad, and turn the unit on. Use the Alpha Wheel to select the Diagnostics option, and press "enter". Select the burn-in test and press "enter". Mark the results of each test in the second column of the checklist.

    The results for each test of the second diagnostic

test should match those of the first. If any test fails the second diagnostic test after passing the first, repair or replace the component indicated, and run the burn-in test again. Repeat this process until all tests have passed. If the PSRAM test fails the second diagnostic test, turn off the unit, remove the bottom enclosure, and check that your solder joints and connections are in place, and that the P-RAM board is seated properly. If the test still fails after reassembly, the P-RAM Option kit may be defective, and should be replaced.

19. If all tests pass, check the amount of program RAM by entering either Song mode or Disk mode and viewing the amount of available RAM shown in the top line of the display. There should be approximately 760K of available RAM. If the display shows a smaller amount of available RAM, CHECK THE P-RAM installation again.

PART 4A K2000 MAINTENANCE

Important: Be sure to instruct the owner of the unit that the fan vent opening should be vacuumed every two or three months to clean the fan filter. Please see the last page of this section.

PART 1B K2000R DISASSEMBLY

1. Unplug all external wires, cables and connectors from the K2000R. Place it on a worktable with the front panel facing you.

2. Remove the ten screws which secure the cover. There are four screws on each side of the K2000R, and two at the top edge of the rear panel.

3. Slide the cover away from you and lift it off. See figure 5.

PART 2B K2000R P-RAM OPTION INSTALLATION

4. Locate the P-RAM Option cable (item 2). Refer to figures 5 and 6, and locate the capacitor labeled C15 on the Engine board. Solder the cable's green wire to the side of the capacitor toward the rear of the unit (the side closest to the label "C15".

5. Locate diode labeled D1, near the right front corner of the Engine board. Solder the Option kit cable's white wire to the lead toward the left side of the diode (the side nearest the label "D1").

6. Locate the 64-pin connector labeled "PROCESSOR EXP" (j1) near the left front corner of the Engine board. See figures 5 and 6.

7. Remove the two screws to the left and right of connector J1. Save these screws, as you will reuse them to secure the P-RAM Option board. Disregard item 4 (the M3 x 14 mm screws) as they are intended for the K2000 only.

8. Take the P-RAM Option board (item 1) and with the components facing up, press its connector into connector J1 on the Engine board. The P-RAM Option board (item 1) and with the components facing up, press its connector J1 on the Engine board. The P-RAM Option board connector is keyed to prevent improper connections.

9. Put one lock washer (item 5) on each of the screws that you removed in Step 7.

10. Insert on screw and washer through the hole in each of the mounting brackets (item 3).

11. Thread the screw into the holes on either side of connector J1. Tighten the screws until the mounting brackets press against the P-RAM Option board.

12. Take the P-RAM Option board cable (item 2) and plug it onto the keyed connector on the P-RAM Option board. The installation is now complete, and you can reassemble the unit.

PART 3B K2000R REASSEMBLY

13. Slide the K2000R's cover on from the rear, and tighten the ten fastening screws.

14. Run the diagnostic tests again. To enter diagnostic mode, press and hold buttons 1, 2 and 3 on the alphanumeric buttonpad, and turn the unit on. Use the Alpha Wheel to select the Diagnostics option, and press "ENTER". Select the burn-in test and press "ENTER". Mark the results of each test in the second column of the checklist.

    All tests should pass the second diagnostic operation. If any test fails, repair or replace the component indicated, and run the burn-in test again. Repeat this process until all tests have passed. If the PSRAM test fails the second diagnostic test, turn off the unit, remove the bottom enclosure, and check that your solder joints and connections are in place, and that the P-RAM board is seated properly. If the test still fails after reassembly, the P-RAM Option kit may be defective, and should be replaced.

15. If all tests pass, check the amount of program RAM by entering either Song mode of Disk mode and viewing the amount of available RAM shown in the top line of the display. There should be approximately 760K of available RAM. If the display shows a smaller amount of available RAM, check the P-RAM installation again.

Diagnostic Test Checklist

Technician's name: _____ Date: ___/___/___

Model: ____ **K2000** ____ **K2000R** **Serial No.** _____

Customer's Name: _____

Before Installation

Test Name:	PASS	FAIL
LCD	____	____
Boot EPROM	____	____
Setup EPROM	____	____
PSRAM	____	____
I/O Port	____	____
Interrupt	____	____
Audio Board	____	____
Floppy	____	____
SCSI	____	____
Sound ROM	____	____
Sound RAM	____	____

After Installation

Test Name:	PASS	FAIL
LCD	____	____
Boot EPROM	____	____
Setup EPROM	____	____
PSRAM	____	____
I/O Port	____	____
Interrupt	____	____
Audio Board	____	____
Floppy	____	____
SCSI	____	____
Sound ROM	____	____
Sound RAM	____	____

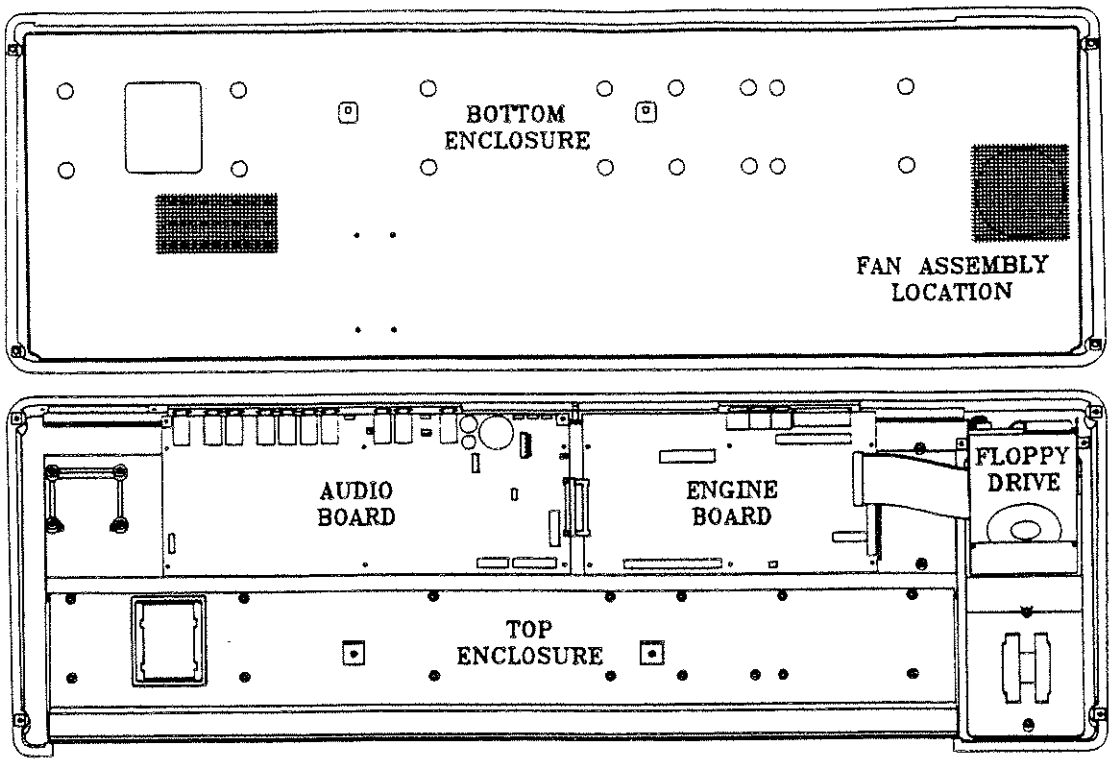


FIGURE 1

K2000
ENGINE BOARD

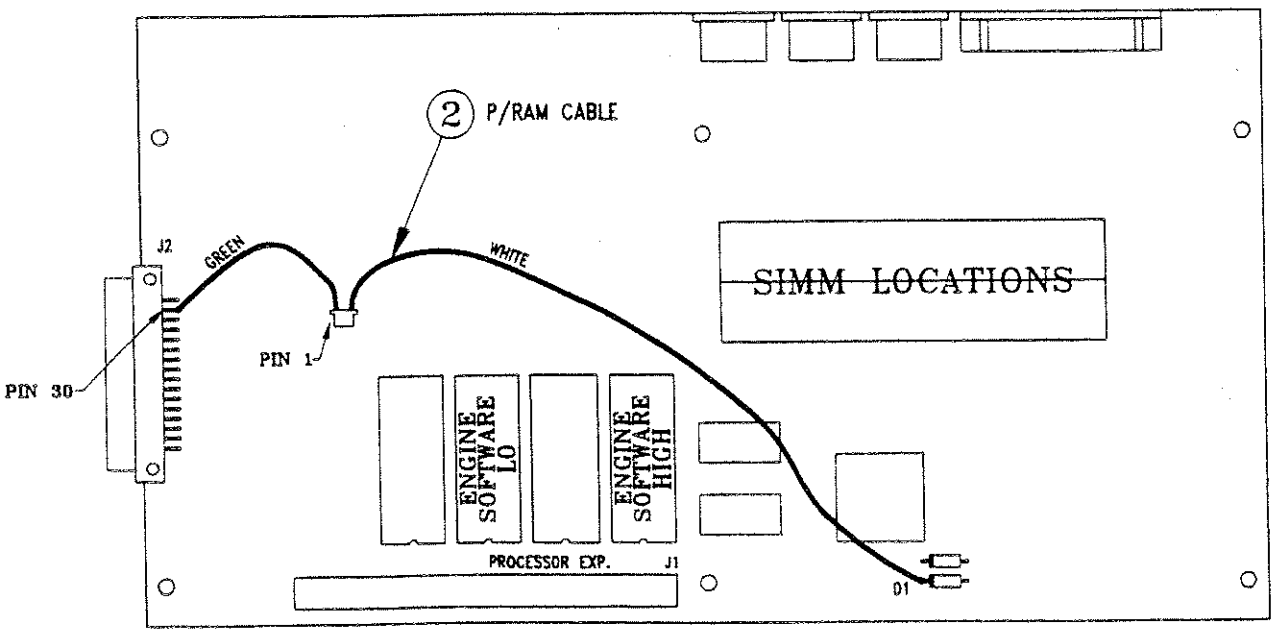


FIGURE 2

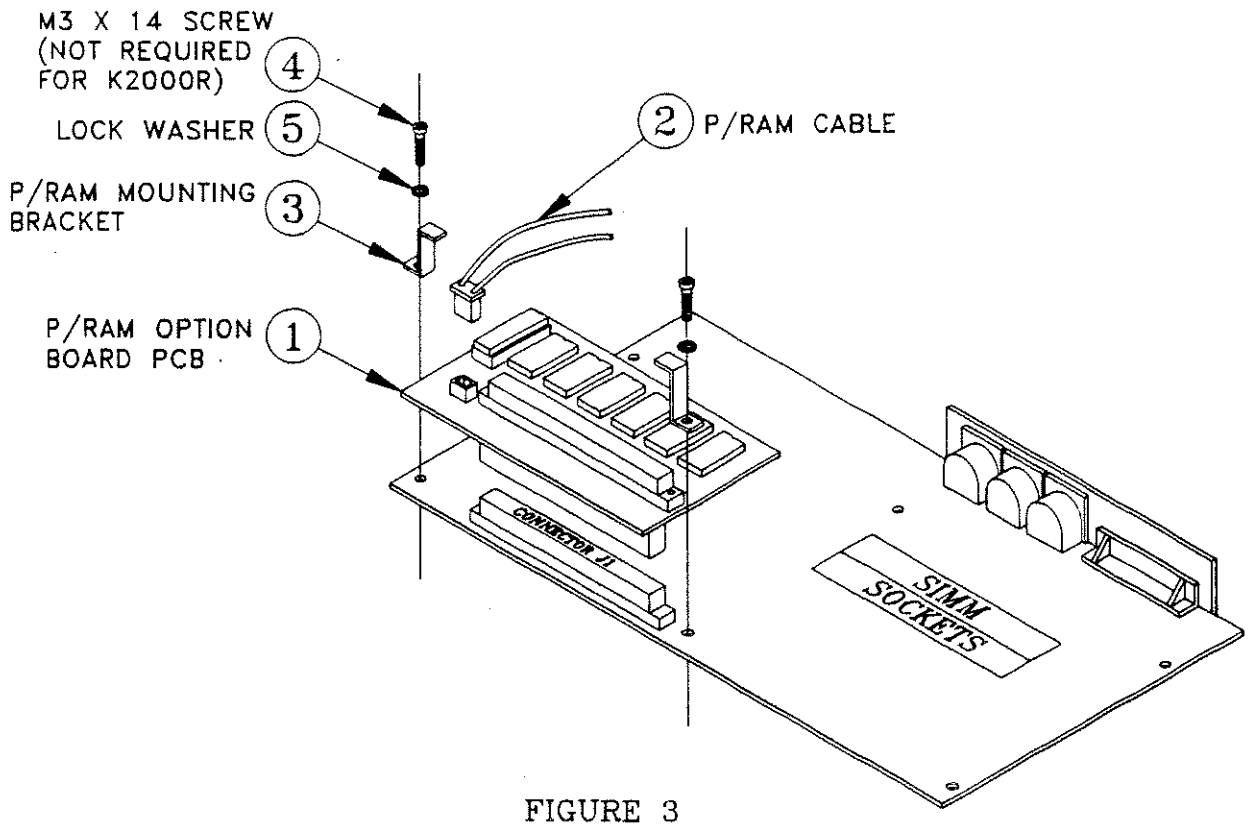


FIGURE 3

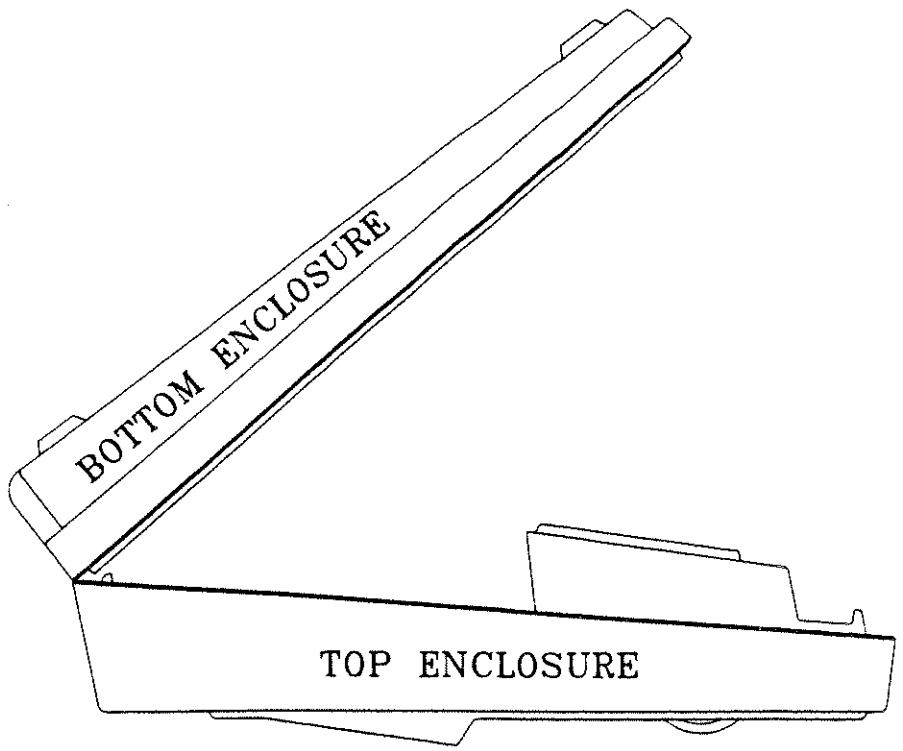


FIGURE 4

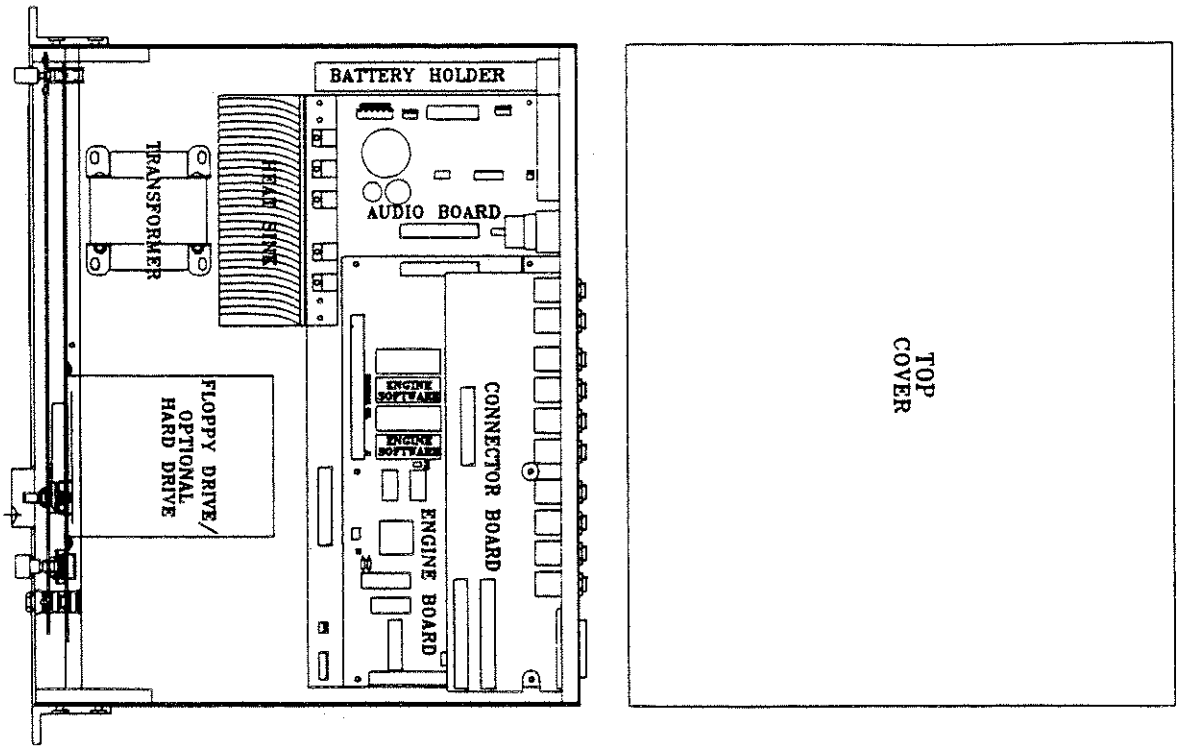


FIGURE 5

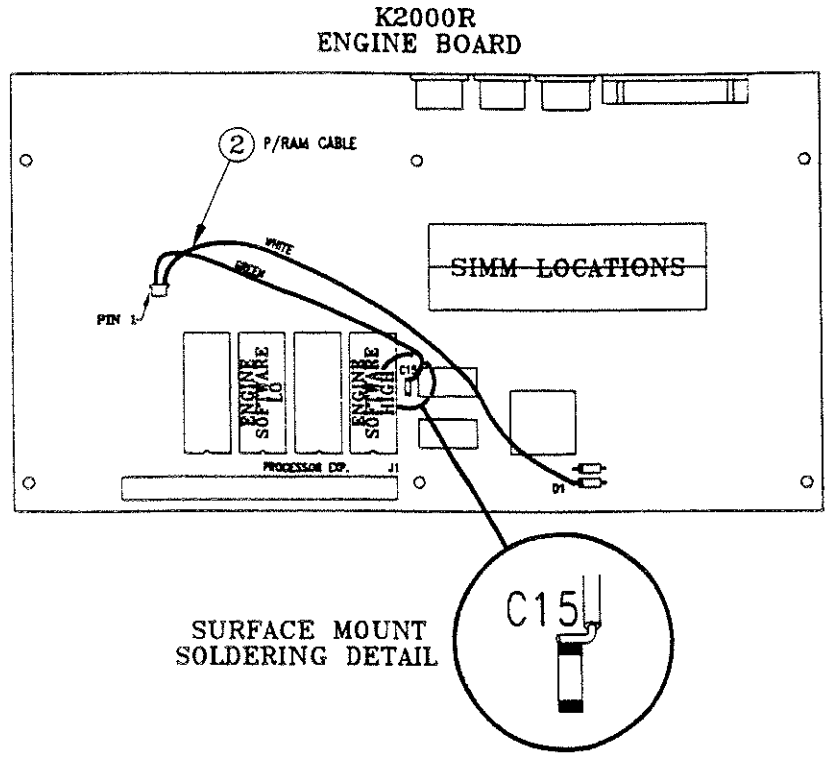


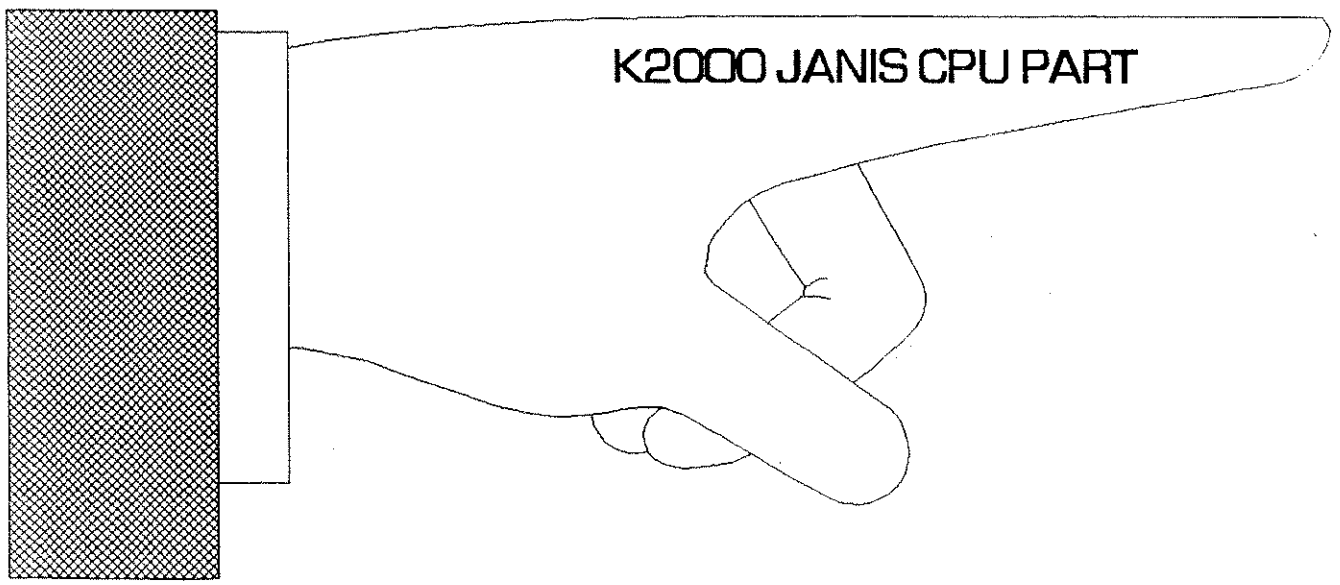
FIGURE 6

SECTION 3

K2000
JANIS Engine/CPU assembly

This parts listing is presented specifically for the K2000 keyboard Engine/CPU assembly. Consult the primary service manual for a parts listing for the other assemblies used in this model.

Many of the individual electronic components are the same as used in the K2000R engine/CPU assembly presented in this manual.



Place any parts order using the model number, serial number, assembly name and component number of the component required.

NOTES for SECTION 3

	NAME	PART #	DESCRIPTION
1	ENGINE	25333420	MACHINE SCREW RH M3X20 BLK
2	ENGINE	25874300	HEX NUT M3 WHITE
3	ENGINE	26263105	TAPPING SCREW-2 PH
4	ENGINE	32022911	REAR PANEL,DIGITAL PCB
5	ENGINE	41010302	CONN JUMPER .1"SP 2PIN
6	ENGINE	41021005	JACK MIDI 5PIN FEMALE(PCB)
7	ENGINE	41021120	SOCKET IC .3W 20PIN
8	ENGINE	41021122	SOCKET IC .3W 24PIN
9	ENGINE	41021132	SOCKET IC .6W 32PIN
10	ENGINE	41030002	HEADER .1"SP SGL ROW 2PIN
11	ENGINE	41030003	HEADER .1"SP 3PIN(22-03-2031)
12	ENGINE	41031220	HEADER .1"SP DUAL ROW
13	ENGINE	41031234	HEADER .1"SP DUAL ROW
14	ENGINE	41031250	HEADER .1"SP DUAL ROW
15	ENGINE	41032425	CONN DB-25 PLASTIC
16	ENGINE	41032564	CONN EUROCARD B 64P FEMALE
17	ENGINE	41032732	CONN EUROCARD B MALE R/A 32P
18	ENGINE	41032848	CONN EUROCARD C 48P
19	ENGINE	41033208	SOCKET .1"SP SIP 8PIN
20	ENGINE	41033330	SOCKET .3"SP SIMM DUAL 30PIN
21	ENGINE	41034004	HEADER .098"SP 4PIN(22-03-5045)
22	ENGINE	42005405	JUMPER 5MM
23	ENGINE	51001202	RESNET BUSSED 120X7
24	ENGINE	52002406	CAP ELECT 470UF 16V 20% .2 SP
25	ENGINE	52005102	CAP ELECT 22UF 6.3V RADIAL
26	ENGINE	53000401	DIODE (1N270)
27	ENGINE	53000701	DIODE 1N4001 DO-41
28	ENGINE	53000801	DIODE SWITCH (1N4148)
29	ENGINE	55002001	INDUCTOR (BLO2RN2-R62)
30	ENGINE	55004301	EMI FILTER,DUAL EXC-EMT470BT
31	ENGINE	55004302	EMI FILTER DUAL (EXC-EMT101BT)
32	ENGINE	59010002	CRYSTAL 19.968MHZ
33	ENGINE	59010103	CRYSTAL 32.000MHz 3rd OT, SERIES
34	ENGINE	62001201	SIMM MODULE RAM 1MB K2000RJ
35	ENGINE	62004201	IC EPROM 512KX8 120NS DIP32
36	ENGINE	62005702	IC PAL GAL16V8-15LP
37	ENGINE	62005902	IC PAL GAL20V8-15LP
38	ENGINE	62100901	IC EPROM 128KX8 120NS DIP32
39	ENGINE	63002301	IC OPTO COUPLER (PC-910)
40	ENGINE	63010501	IC TL SCSI 1285KC (2.85VREG)
41	ENGINE	25333420	MACHINE SCREW RH M3X20 BLK
42	ENGINE	25874300	HEX NUT M3 WHITE
43	ENGINE	26263105	TAPPING SCREW-2 PH
44	ENGINE	32022911	REAR PANEL,DIGITAL PCB (YELLOW)
45	ENGINE	41010302	CONN JUMPER .1"SP 2PIN
46	ENGINE	41021005	JACK MIDI 5PIN FEMALE(PCB)
47	ENGINE	41021120	SOCKET IC .3W 20PIN
48	ENGINE	41021122	SOCKET IC .3W 24PIN
49	ENGINE	41021132	SOCKET IC .6W 32PIN
50	ENGINE	41030002	HEADER .1"SP SGL ROW 2P
51	ENGINE	41030003	HEADER .1"SP 3PIN(22-03-2031)
52	ENGINE	41031220	HEADER .1"SP DUAL ROW
53	ENGINE	41031234	HEADER .1"SP DUAL ROW

	NAME	PART #	DESCRIPTION
54	ENGINE	41031250	HEADER .1"SP DUAL ROW
55	ENGINE	41032425	CONN DB-25 PLASTIC SHORT R/A
56	ENGINE	41032564	CONN EUROCARD B 64P
57	ENGINE	41032732	CONN EUROCARD B MALE R/A 32P
58	ENGINE	41032848	CONN EUROCARD C 48P
59	ENGINE	41033208	SOCKET .1"SP SIP 8PIN
60	ENGINE	41033330	SOCKET .3"SP SIMM DUAL 30PIN
61	ENGINE	41034004	HEADER .098"SP 4PIN(22-03-5045)
62	ENGINE	42005405	JUMPER 5MM
63	ENGINE	51001202	RESNET BUSSED 120X7
64	ENGINE	52002406	CAP ELECT 470UF 16V 20% .2 SP
65	ENGINE	52005102	CAP ELECT 22UF 6.3V RADIAL
66	ENGINE	53000401	DIODE (1N270)
67	ENGINE	53000701	DIODE 1N4001 DO-41
68	ENGINE	53000801	DIODE SWITCH (1N4148)
69	ENGINE	55002001	INDUCTOR (BLO2RN2-R62)
70	ENGINE	55004301	EMI FILTER,DUAL EXC-EMT470BT
71	ENGINE	55004302	EMI FILTER DUAL (EXC-EMT101BT)
72	ENGINE	59010002	CRYSTAL 19.968MHZ
73	ENGINE	59010103	CRYSTAL 32.000MHz 3rd OT, SERIES
74	ENGINE	62004201	IC EPROM 512KX8 120NS DIP32
75	ENGINE	62005702	IC PAL GAL16V8-15LP
76	ENGINE	62005902	IC PAL GAL20V8-15LP
77	ENGINE	63002301	IC OPTO COUPLER (PC-910)
78	ENGINE	63010501	IC TL SCSI 1285KC (2.85VREG)
79	ENGINE	25333420	MACHINE SCREW RH M3X20 BLK
80	ENGINE	25874300	HEX NUT M3 WHITE
81	ENGINE	26263105	TAPPING SCREW-2 PH
82	ENGINE	32022911	REAR PANEL,DIGITAL PCB (YELLOW)
83	ENGINE	41010302	CONN JUMPER .1"SP 2PIN
84	ENGINE	41021005	JACK MIDI 5PIN FEMALE (PCB)
85	ENGINE	41021120	SOCKET IC .3W 20PIN
86	ENGINE	41021122	SOCKET IC .3W 24PIN
87	ENGINE	41021132	SOCKET IC .6W 32PIN
88	ENGINE	41030002	HEADER .1"SP SGL ROW 2PIN
89	ENGINE	41030003	HEADER .1"SP 3PIN(22-03-2031)
90	ENGINE	41031220	HEADER .1"SP DUAL ROW
91	ENGINE	41031234	HEADER .1"SP DUAL ROW
92	ENGINE	41031250	HEADER .1"SP DUAL ROW
93	ENGINE	41032425	CONN DB-25 PLASTIC SHORT R/A
94	ENGINE	41032564	CONN EUROCARD B 64P
95	ENGINE	41032732	CONN EUROCARD B MALE R/A 32P
96	ENGINE	41032848	CONN EUROCARD C 48P
97	ENGINE	41033208	SOCKET .1"SP SIP 8PIN
98	ENGINE	41033330	SOCKET .3"SP SIMM DUAL 30PIN
99	ENGINE	41034004	HEADER .098"SP 4PIN(22-03-5045)
100	ENGINE	42005405	JUMPER 5MM
101	ENGINE	51001202	RESNET BUSSED 120X7
102	ENGINE	52002406	CAP ELECT 470UF 16V
103	ENGINE	52005102	CAP ELECT 22UF 6.3V RADIAL
104	ENGINE	53000401	DIODE (1N270)
105	ENGINE	53000701	DIODE 1N4001 DO-41
106	ENGINE	53000801	DIODE SWITCH (1N4148)

	NAME	PART #	DESCRIPTION
107	ENGINE	55002001	INDUCTOR (BLO2RN2-R62)
108	ENGINE	55004301	EMI FILTER,DUAL EXC-EMT470BT
109	ENGINE	55004302	EMI FILTER DUAL (EXC-EMT101BT)
110	ENGINE	59010002	CRYSTAL 19.968MHZ
111	ENGINE	59010103	CRYSTAL 32.000MHz 3rd OT, SERIES
112	ENGINE	62001201	SIMM MODULE RAM 1MB K2000RJ
113	ENGINE	62004201	IC EPROM 512KX8 120NS DIP32
114	ENGINE	62005702	IC PAL GAL16V8-15LP
115	ENGINE	62005902	IC PAL GAL20V8-15LP
116	ENGINE	62100901	IC EPROM 128KX8 120NS DIP32
117	ENGINE	63002301	IC OPTO COUPLER (PC-910)
118	ENGINE	63010501	IC TL SCSI 1285KC (2.85VREG)
119	ENGINE	25333420	MACHINE SCREW RH M3X20 BLK
120	ENGINE	25874300	HEX NUT M3 WHITE
121	ENGINE	33100402	PCB ENGINE K2000J/K2000JR
122	ENGINE	51001001	RESNET BUS 10Kx15 SOP16
123	ENGINE	51001004	RESNET BUS 2.2Kx15 SOP16
124	ENGINE	51001102	RESNET BUS 120X15
125	ENGINE	51101708	RES CF 56 5% THICK FILM 1206
126	ENGINE	51101714	RES CF 110 5% THICK FILM 1206
127	ENGINE	51101715	RES CF 120 5% THICK FILM 1206
128	ENGINE	51101724	RES CF 470 5% THICK FILM 1206
129	ENGINE	51101738	RES CF 2.2K 5% THICK FILM 1206
130	ENGINE	51101741	RES 3K 5% THICK FILM 1206
131	ENGINE	51101745	RES CF 4.7K 5% THICK FILM 1206
132	ENGINE	51101748	RES 6.2K 5% THICK FILM 1206
133	ENGINE	51101797	RES MF 1/8W 5% 10M SURF.MNT.1206
134	ENGINE	52007001	CAP CER 15pF 100V 5% NPO 1206
135	ENGINE	52007002	CAP CER 22pF 100V 5% NPO 1206
136	ENGINE	52007003	CAP CER 47pF 100V 5% NPO 1206
137	ENGINE	52007402	CAP CER 1000PF X 7R 1206
138	ENGINE	52007503	CAP CER 1206 .1uF 50V 10%
139	ENGINE	54000802	TRANS MMBT2222L SOT-23
140	ENGINE	61000202	IC LOGIC 74LS138 SOP
141	ENGINE	61001502	IC LOGIC 74LS74A SOP
142	ENGINE	61002202	IC LOGIC 74LS139 SOP16
143	ENGINE	61003002	IC LOGIC 74LS245 SOP
144	ENGINE	61010302	IC LOGIC 74HCU04D SOP
145	ENGINE	61018302	IC LOGIC 74HC08D SOP
146	ENGINE	61018502	IC LOGIC 74F139 SOP
147	ENGINE	62001002	IC MICROPROCESSOR 68301
148	ENGINE	62100801	IC PSRAM TC518128S
149	ENGINE	63010201	IC L53C80JC2 PLCC44
150	ENGINE	63010401	IC FLOPPY CONTROLLER UPD72064
151	ENGINE	66000302	IC CUSTOM HOBBES CHIP
152	ENGINE	66000701	IC CUSTOM JANIS QEP128
153	ENGINE	83010601	IC MASKROM (106) 1A
154	ENGINE	83010701	MASK ROM (108) 1B
155	ENGINE	83010801	MASK ROM (110) 2A
156	ENGINE	83010901	MASK ROM (112) 2B
157	ENGINE	83011001	MASK ROM (107) 3A
158	ENGINE	83011101	MASK ROM (109) 3B
159	ENGINE	83011201	MASK ROM (111) 4A

	NAME	PART #	DESCRIPTION
160	ENGINE	83011301	MASK ROM (113) 4B

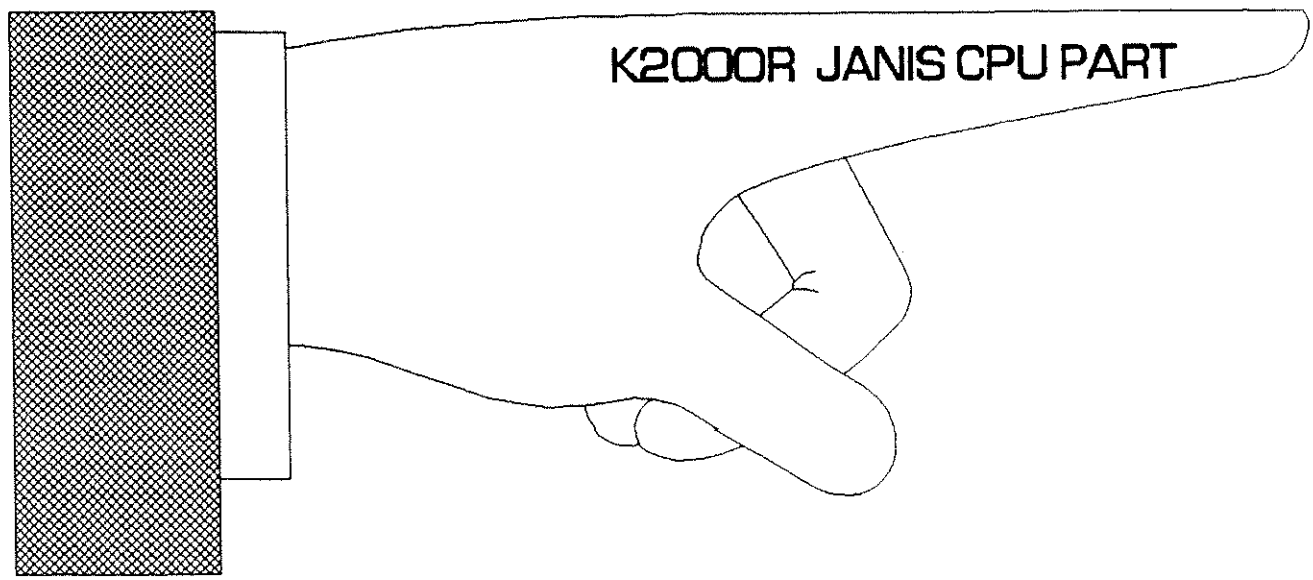
SECTION 4

K2000R
JANIS Engine/CPU assembly

This parts listing is presented specifically for the K2000R rack mount Engine/CPU assembly. Consult the primary service manual for a parts listing for the other assemblies used in this model.

Many of the individual electronic components are the same as used in the K2000R engine/CPU assembly presented in this manual.

Place any parts order using the model number, serial number, assembly name and component number of the component required.



NOTES for SECTION 4

	NAME:	PART #	DESCRIPTION
1	ENGINE	25323306	MACHINE SCREW BH M3X6
2	ENGINE	41010302	CONN JUMPER .1"SP 2PIN
3	ENGINE	41021005	JACK MIDI 5PIN FEMALE
4	ENGINE	41021120	SOCKET IC .3W 20PIN
5	ENGINE	41021122	SOCKET IC .3W 24PIN
6	ENGINE	41021132	SOCKET IC .6W 32PIN
7	ENGINE	41030002	HEADER .1"SP SGL ROW 2PIN
8	ENGINE	41030003	HEADER .1"SP 3PIN
9	ENGINE	41031220	HEADER .1"SP DUAL ROW
10	ENGINE	41031234	HEADER .1"SP DUAL ROW
11	ENGINE	41031250	HEADER .1"SP DUAL ROW
12	ENGINE	41032425	CONN DB-25
13	ENGINE	41032564	CONN EUROCARD B 64P
14	ENGINE	41032848	CONN EUROCARD C 48P
15	ENGINE	41033208	SOCKET .1"SP SIP 8PIN
16	ENGINE	41033330	SOCKET .3"SP SIMM DUAL 30PIN
17	ENGINE	41034004	HEADER .098"SP 4PIN
18	ENGINE	42005405	JUMPER 5MM
19	ENGINE	51001202	RESNET BUSSED 120X7
20	ENGINE	52002406	CAP ELECT 470UF 16V
21	ENGINE	52005102	CAP ELECT 22UF 6.3V
22	ENGINE	53000401	DIODE (1N270)
23	ENGINE	53000701	DIODE 1N4001 DO-41
24	ENGINE	53000801	DIODE SWITCH (1N4148)
25	ENGINE	55002001	INDUCTOR (BLO2RN2-R62)
26	ENGINE	55004301	EMI FILTER,DUAL
27	ENGINE	55004302	EMI FILTER DUAL
28	ENGINE	59010002	CRYSTAL 19.968MHZ
29	ENGINE	59010103	CRYSTAL 32.000MHz
30	ENGINE	62001201	SIMM MODULE RAM 1MB K2000RJ
31	ENGINE	62004201	IC EPROM 512KX8 120NS
32	ENGINE	62005702	IC PAL GAL16V8-15LP
33	ENGINE	62005902	IC PAL GAL20V8-15LP
34	ENGINE	62100901	IC EPROM 128KX8 120NS
35	ENGINE	63002301	IC OPTO COUPLER
36	ENGINE	63010501	IC TL SCSI 1285KC
37	ENGINE	25323306	MACHINE SCREW BH M3X6 BLK
38	ENGINE	41010302	CONN JUMPER .1"SP 2PIN
39	ENGINE	41021005	JACK MIDI 5PIN FEMALE
40	ENGINE	41021120	SOCKET IC .3W 20PIN
41	ENGINE	41021122	SOCKET IC .3W 24PIN
42	ENGINE	41021132	SOCKET IC .6W 32PIN
43	ENGINE	41030002	HEADER .1"SP SGL ROW
44	ENGINE	41030003	HEADER .1"SP 3PIN
45	ENGINE	41031220	HEADER .1"SP DUAL ROW
46	ENGINE	41031234	HEADER .1"SP DUAL ROW
47	ENGINE	41031250	HEADER .1"SP DUAL ROW
48	ENGINE	41032425	CONN DB-25
49	ENGINE	41032564	CONN EUROCARD B 64P
50	ENGINE	41032848	CONN EUROCARD C 48P
51	ENGINE	41033208	SOCKET .1"SP SIP 8PIN
52	ENGINE	41033330	SOCKET .3"SP SIMM DUAL 30PIN
53	ENGINE	41034004	HEADER .098"SP 4PIN
54	ENGINE	42005405	JUMPER 5MM
55	ENGINE	51001202	RESNET BUSSED 120X7
56	ENGINE	52002406	CAP ELECT 470UF 16V
57	ENGINE	52005102	CAP ELECT 22UF 6.3V
58	ENGINE	53000401	DIODE (1N270)

	NAME:	PART #	DESCRIPTION
59	ENGINE	53000701	DIODE 1N4001 DO-41
60	ENGINE	53000801	DIODE SWITCH (1N4148)
61	ENGINE	55002001	INDUCTOR (BLO2RN2-R62)
62	ENGINE	55004301	EMI FILTER,DUAL
63	ENGINE	55004302	EMI FILTER DUAL
64	ENGINE	59010002	CRYSTAL 19.968MHZ
65	ENGINE	59010103	CRYSTAL 32.000MHz
66	ENGINE	62004201	IC EPROM 512KX8 120NS
67	ENGINE	62005702	IC PAL GAL16V8-15LP
68	ENGINE	62005902	IC PAL GAL20V8-15LP
69	ENGINE	63002301	IC OPTO COUPLER
70	ENGINE	63010501	IC TL SCSI 1285KC
71	ENGINE	25323306	MACHINE SCREW BH
72	ENGINE	41010302	CONN JUMPER .1"SP 2PIN
73	ENGINE	41021005	JACK MIDI 5PIN FEMALE
74	ENGINE	41021120	SOCKET IC .3W 20PIN
75	ENGINE	41021122	SOCKET IC .3W 24PIN
76	ENGINE	41021132	SOCKET IC .6W 32PIN
77	ENGINE	41030002	HEADER .1"SP SGL ROW
78	ENGINE	41030003	HEADER .1"SP 3PIN
79	ENGINE	41031220	HEADER .1"SP DUAL ROW
80	ENGINE	41031234	HEADER .1"SP DUAL ROW
81	ENGINE	41031250	HEADER .1"SP DUAL ROW
82	ENGINE	41032425	CONN DB-25
83	ENGINE	41032564	CONN EUROCARD B 64P
84	ENGINE	41032848	CONN EUROCARD C 48P
85	ENGINE	41033208	SOCKET .1"SP SIP 8PIN
86	ENGINE	41033330	SOCKET .3"SP SIMM DUAL
87	ENGINE	41034004	HEADER .098"SP 4PIN
88	ENGINE	42005405	JUMPER 5MM
89	ENGINE	51001202	RESNET BUSSED 120X7
90	ENGINE	52002406	CAP ELECT 470UF 16V
91	ENGINE	52005102	CAP ELECT 22UF 6.3V
92	ENGINE	53000401	DIODE (1N270)
93	ENGINE	53000701	DIODE 1N4001 DO-41
94	ENGINE	53000801	DIODE SWITCH (1N4148)
95	ENGINE	55002001	INDUCTOR (BLO2RN2-R62)
96	ENGINE	55004301	EMI FILTER,DUAL
97	ENGINE	55004302	EMI FILTER DUAL
98	ENGINE	59010002	CRYSTAL 19.968MHZ
99	ENGINE	59010103	CRYSTAL 32.000MHz
00	ENGINE	62001201	SIMM MODULE RAM 1MB K2000RJ
01	ENGINE	62004201	IC EPROM 512KX8 120NS
02	ENGINE	62005702	IC PAL GAL16V8-15LP
03	ENGINE	62005902	IC PAL GAL20V8-15LP
04	ENGINE	62100901	IC EPROM 128KX8 120NS
05	ENGINE	63002301	IC OPTO COUPLER
06	ENGINE	63010501	IC TL SCSI 1285KC
07	ENGINE	33100402	PCB ENGINE K2000J/K2000JR
08	ENGINE	51001001	RESNET BUS 10Kx15
09	ENGINE	51001004	RESNET BUS 2.2Kx15
10	ENGINE	51001102	RESNET BUS 120X15
11	ENGINE	51101708	RES CF 56 5%
12	ENGINE	51101714	RES CF 110 5%
13	ENGINE	51101715	RES CF 120 5%
14	ENGINE	51101724	RES CF 470 5%
15	ENGINE	51101738	RES CF 2.2K 5%
16	ENGINE	51101741	RES 3K 5%

	NAME:	PART #	DESCRIPTION
17	ENGINE	51101745	RES CF 4.7K 5%
18	ENGINE	51101748	RES 6.2K 5%
19	ENGINE	51101797	RES MF 1/8W 10M
20	ENGINE	52007001	CAP CER 15pF 100V 5% NPO
21	ENGINE	52007002	CAP CER 22pF 100V 5% NPO
22	ENGINE	52007003	CAP CER 47pF 100V 5% NPO
23	ENGINE	52007402	CAP CER 1000PF X 7R
24	ENGINE	52007503	CAP CER .1uF 50V 10% X7R
25	ENGINE	54000802	TRANS MMBT2222L
26	ENGINE	61000202	IC LOGIC 74LS138
27	ENGINE	61001502	IC LOGIC 74LS74A
28	ENGINE	61002202	IC LOGIC 74LS139
29	ENGINE	61003002	IC LOGIC 74LS245
30	ENGINE	61010302	IC LOGIC 74HCU04D
31	ENGINE	61018302	IC LOGIC 74HC08D
32	ENGINE	61018502	IC LOGIC 74F139
33	ENGINE	62001002	IC MICROPROCESSOR 68301
34	ENGINE	62100801	IC PSRAM TC518128S
35	ENGINE	63010201	IC L53C80JC2
36	ENGINE	63010401	IC FLOPPY CONTROLLER UPD72064
37	ENGINE	66000302	IC CUSTOM HOBBES CHIP
38	ENGINE	66000701	IC CUSTOM JANIS QEP128
39	ENGINE	83010601	IC MASKROM (106)
40	ENGINE	83010701	IC MASK ROM (108)
41	ENGINE	83010801	IC MASK ROM (110)
42	ENGINE	83010901	IC MASK ROM (112)
43	ENGINE	83011001	IC MASK ROM (107)
44	ENGINE	83011101	IC MASK ROM (109)
45	ENGINE	83011201	IC MASK ROM (111)
46	ENGINE	83011301	IC MASK ROM (113)

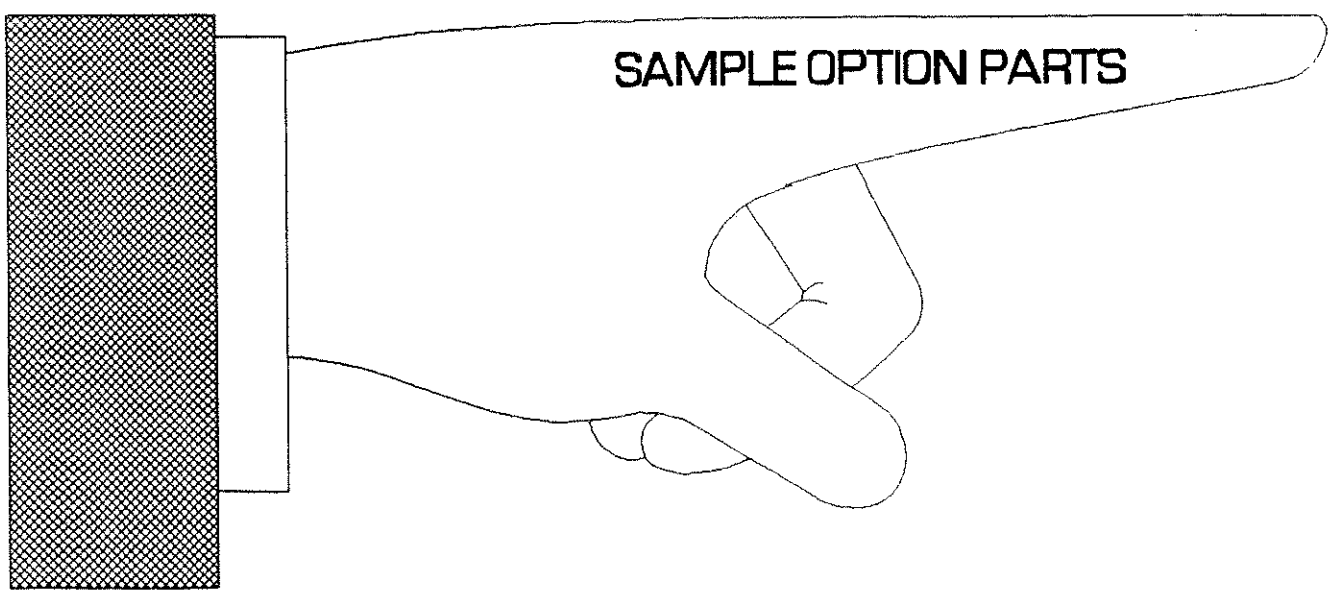
SECTION 5

K2000 and K2000R

Sample Option

This section outlines the parts listing for the sample option in both models.

When placing a parts order, you must provide the specific model number and specific part required as there are some variances in parts dependent on model.



NOTES for SECTION 5

KURZWEIL K2000/K2000R SAMPLING OPTION

	NAME:	PART #	DESCRIPTION
1	P/RAM OPTION	13023801	CABLE P/RAM OPTION
2	P/RAM OPTION	25323314	M3.0X14MM PAN HD PHILIPS
3	P/RAM OPTION	27213131	M3 LOCK WASHER
4	P/RAM OPTION	32028501	P/RAM OPTION BOARD BRACKET
5	P/RAM OPTION	33100702	PCB P/RAM OPTION BOARD
6	P/RAM OPTION	38040034	PACKING MATERIAL
7	P/RAM OPTION	39000401	SHIPPING BOX
8	P/RAM OPTION	39000402	STATIC PROTECTION POLY BAG
9	P/RAM OPTION	41021120	SOCKET IC .3W 20PIN
10	P/RAM OPTION	41030502	CONN HEADER .098SP SGL ROW
11	P/RAM OPTION	41032664	CONN EUROCARD B MALE
12	P/RAM OPTION	41032764	CONN EUROCARD B FEMALE
13	P/RAM OPTION	51000906	RES 10KX9 10PIN
14	P/RAM OPTION	51101738	RES CF 2.2K 5%
15	P/RAM OPTION	51101745	RES CF 4.7K 5%
16	P/RAM OPTION	52007101	CAP CER .1uF 50V 5%
17	P/RAM OPTION	52010401	CAP ELECT 10UF 16V
18	P/RAM OPTION	54000802	TRANS MMBT2222L
19	P/RAM OPTION	61003002	IC LOGIC 74LS245
20	P/RAM OPTION	61005502	IC 74LS366
21	P/RAM OPTION	62005702	IC PAL GAL16V8-15LP
22	P/RAM OPTION	62200002	IC SRAM 128KX8-85
23	P/RAM OPTION	91020103	MANUAL P/RAM OPTION INSTALLATION
24	P/RAM OPTION	91020501	WARRANTY CARD
25	SAMPLING OPTION	13023101	CABLE SMP-K INPUT/OUTPUT
26	SAMPLING OPTION	13023201	CABLE SMP-K DATA
27	SAMPLING OPTION	13023301	CABLE SMP-K/R XLR TO FEM.RCA
28	SAMPLING OPTION	13023401	CABLE SMP-K/P XLR TO FEM.RCA
29	SAMPLING OPTION	15000105	AES XFRMR. 1 SHEILD
30	SAMPLING OPTION	25313310	MACHINE SCREW FH M3X10' BLK
31	SAMPLING OPTION	25365308	M3.0X8MM PAN HD PHILIPS
32	SAMPLING OPTION	25365316	M2.5X16MM PAN HD PHILLIPS
33	SAMPLING OPTION	32022401	SAMPLING OPTION BD. REAR PANEL
34	SAMPLING OPTION	32029501	SAMPLING OPTION BD. SCREW PLATE
35	SAMPLING OPTION	33100701	PCB Fab Sampling Option Board
36	SAMPLING OPTION	39000401	SHIPPING BOX
37	SAMPLING OPTION	39000402	STATIC PROTECTION POLY BAG
38	SAMPLING OPTION	39000403	PACKING MATERIAL
39	SAMPLING OPTION	41031103	1/4" Stereo Jack
40	SAMPLING OPTION	41031234	HEAD DUAL ROW .1SP
41	SAMPLING OPTION	41033605	5 PIN CONN.
42	SAMPLING OPTION	41040201	TOS RECEIVER(GP1F31R)
43	SAMPLING OPTION	41040301	XLR FEMALE(PQG3FRA212)
44	SAMPLING OPTION	41040302	XLR MALE(PQG3MRA012)
45	SAMPLING OPTION	42005201	JUMPER 24 AWG BUS BAR WIRE
46	SAMPLING OPTION	42005203	LONG HOOK UP WIRE 24 AWG
47	SAMPLING OPTION	51101797	RES CF 10M 5%
48	SAMPLING OPTION	51102103	RELAY, 5v dpdt
49	SAMPLING OPTION	51103002	RES MF 10. 1/8W
50	SAMPLING OPTION	51103004	RES MF 51 1/8W
51	SAMPLING OPTION	51103006	RES MF 82 1/8W
52	SAMPLING OPTION	51103009	RES MF 237 1/8W
53	SAMPLING OPTION	51103012	RES MF 604 1/8W
54	SAMPLING OPTION	51103014	RES MF 750 1/8W

	NAME:	PART #	DESCRIPTION
55	SAMPLING OPTION	51103016	RES MF 806 1/8W
56	SAMPLING OPTION	51103018	RES MF 1.00K 1/8W
57	SAMPLING OPTION	51103020	RES MF 2.21K 1/8W
58	SAMPLING OPTION	51103024	RES MF 3.09K 1/8W
59	SAMPLING OPTION	51103030	RES MF 4.22K 1/8W
60	SAMPLING OPTION	51103032	RES MF 4.75K 1/8W
61	SAMPLING OPTION	51103043	RES MF 6.98K 1/8W
62	SAMPLING OPTION	51103048	RES MF 8.45K 1/8W
63	SAMPLING OPTION	51103054	RES MF 10.0K 1/8W
64	SAMPLING OPTION	51103057	RES MF 15.4k 1/8W
65	SAMPLING OPTION	51103059	RES MF 20.0K 1/8W
66	SAMPLING OPTION	51103061	RES MF 34.8K 1/8W
67	SAMPLING OPTION	51103070	RES MF 100K 1/8W
68	SAMPLING OPTION	51107008	RES MF 110 1/4W
69	SAMPLING OPTION	51107013	RES MF 130 1/4W
70	SAMPLING OPTION	52002403	CAP ELECT 6.8uF 16V
71	SAMPLING OPTION	52004503	CAP ELECT 10uF 50V
72	SAMPLING OPTION	52007501	CAP CER .01uF 50V
73	SAMPLING OPTION	52007503	CAP CER .1uF 50V
74		52007101	
75	SAMPLING OPTION	52007512	CAP CER .047uF 100V
76	SAMPLING OPTION	52008001	CAP CER 15pF 50V NP0
77	SAMPLING OPTION	52008003	CAP CER 47pF 50V NP0
78	SAMPLING OPTION	52008006	CAP CER 68pF 50V NP0
79	SAMPLING OPTION	52012103	CAP CER .0047uF 50V NP0
80	SAMPLING OPTION	52012122	CAP CER .22uF 50V
81	SAMPLING OPTION	53020401	DIODE 914 SURF. MNT.
82	SAMPLING OPTION	54010901	NFET surf. mnt.
83	SAMPLING OPTION	55002001	INDUCTOR (BLO2RN2-R62)
84	SAMPLING OPTION	55002102	FERRITE BEAD (BLM32A07)
85	SAMPLING OPTION	55002201	CHOKE COIL TRIPLE TORROID
86	SAMPLING OPTION	55004201	EMI FILTER EXC-EMT101BT
87	SAMPLING OPTION	59010104	CRYSTAL 11.2896MHz
88	SAMPLING OPTION	59010106	CRYSTAL 12.295MHz
89	SAMPLING OPTION	61010302	IC LOGIC 74HCU04
90	SAMPLING OPTION	61010603	IC LOGIC MC74HC4053DW
91	SAMPLING OPTION	61014003	IC LOGIC MC74HC541DW
92	SAMPLING OPTION	61015602	IC LOGIC MC74HC02
93	SAMPLING OPTION	61016002	IC LOGIC MC74HC00
94	SAMPLING OPTION	61018302	IC LOGIC 74HC08
95	SAMPLING OPTION	61019303	IC LOGIC MC74HCT377DW
96	SAMPLING OPTION	61019402	IC LOGIC MC74HC595
97	SAMPLING OPTION	61020202	IC LOGIC MC74HC74
98	SAMPLING OPTION	61020302	IC LOGIC MC74HC157
99	SAMPLING OPTION	61020603	IC LOGIC MC74HC4052DW
100	SAMPLING OPTION	61040102	IC LOGIC MC74HCT32
101	SAMPLING OPTION	61600102	A/D CONV.SURF.MNT(CS5336-KS)
102	SAMPLING OPTION	61600202	AES XMITTER (CS8402-CS)
103	SAMPLING OPTION	61600302	AES RCVR (CS8412-CS)
104	SAMPLING OPTION	61700102	RS 422 RCVR (SN75157D)
105	SAMPLING OPTION	64001202	IC LINEAR -5V (79L05ACM)
106	SAMPLING OPTION	64001302	IC LINEAR +5V (78L05ACM)
107	SAMPLING OPTION	64001802	IC LIN.OP-AMP DUAL LO NOISE
108	SAMPLING OPTION	64001902	IC LIN.OP-AMP DUAL LO OFFSET
109	SAMPLING OPTION	64003602	IC DUAL COMPARATOR LM393

KURZWEIL K2000/K2000R SAMPLING OPTION

	NAME:	PART #	DESCRIPTION
110	SAMPLING OPTION	91020501	WARRANTY CARD
111	SAMPLING OPTION	91021301	MANUAL K2000 SAMPLING OPTION KIT