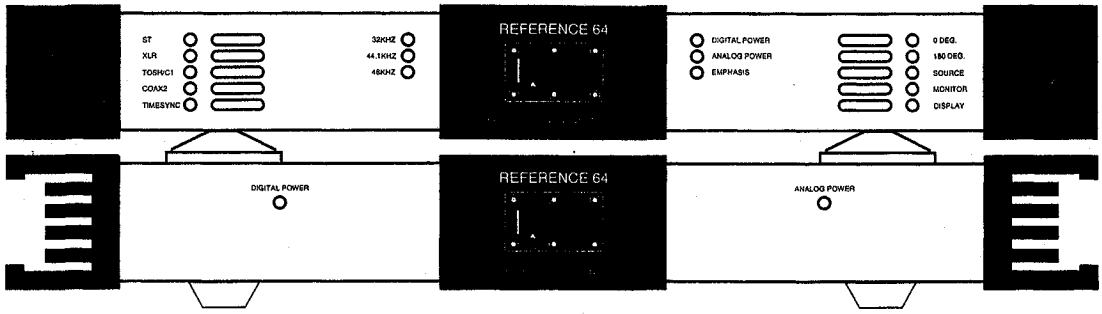
KRELL®
DIGITAL



REFERENCE 64

OWNER'S REFERENCE

INTRODUCTION

Thank you for your purchase of the Krell REFERENCE 64 Digital-to-Analog Processor and welcome to the Krell family of audio components. Krell is dedicated to the development of technologically advanced components for the reproduction of digitally recorded music. The REFERENCE 64 redefines excellence in the Krell tradition of uncompromising performance through leading-edge technology.

The REFERENCE 64 is designed to sound wonderful, but to look and function as a world-class, reference-caliber component. The REFERENCE 64 utilizes all proprietary Krell circuitry. The digital input is decoded by the Krell Data Recovery and Jitter Rejection Module, virtually eliminating jitter and associated clocking errors. To further reduce the potential of clocking errors, the TimeSync linking system allows the REFERENCE 64 to lock and operate with the CD transport's clock output. The data signal is run through four serial Motorola DSP-56001 processors (two per channel, in series) running Krell written software contained within socketed EPROMs. This method allows for simple installation of future software updates. Within the digital section, data is oversampled 64 times. Data then goes through Krell's own custom DAC modules. After conversion is complete, signal is passed through the DC coupled, discrete, complementary Class A output stage. The REFERENCE 64 utilizes separate highly regulated power supplies containing three 50VA toroidal transformers. All power supply circuitry is housed in a separate chassis, and mechanically linked to ensure proper thermal stability. Each digital input in the REFERENCE 64 has its own selection button and direct path to the processing stages. Assembly of this product is second to none. Every section is assembled within rigid quality control standards. The REFERENCE 64 is a pleasure to use and will bring many years of listening fulfillment.

This Owner's Reference is designed to ensure the clear, trouble free installation of your REFERENCE 64 processor. Basic Installation, Operation and Question and Answer sections are provided. Should you have any questions or comments, please feel free to contact your authorized dealer or the KRELL staff for assistance.

In the unlikely event that your REFERENCE 64 should require service, you will be pleased to know that it is backed by a comprehensive Customer Satisfaction policy and one of the most advanced service facilities in the industry. For detailed information on the terms and conditions of service, please consult the Warranty and Service section of this Reference, Warranty Registration Card, or an authorized KRELL Dealer/Distributor.

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1. Open the box and remove the top layer of foam. The following items will now be visible:

1 REFERENCE 64 D/A Processor
1 REFERENCE 64 Power Supply
1 Power Coupler
1 AC power cord
1 AT&T cable (1 mtr)
1 Packet containing the Owner's Reference and Warranty Card

NOTE: If any of these items are not included, please contact your authorized dealer immediately for assistance.

2. Carefully remove the Processor, Power Supply and accessories from the box. Remove the protective plastic wrap from the Processor and Power Supply.

NOTE: Save all packing materials. If you must ship your REFERENCE 64 in the future, repack the unit in its original packaging to prevent transit damage.

ASSEMBLY INSTRUCTIONS

1. The processor is designed to sit directly on top of its companion Power Supply. There is a mechanical interlock built into the front feet of the processor and the chassis cover of the Power Supply. The units are secured together in the rear by the power coupler.

2. Place the Power Supply on a clear work surface. Notice the locking shoes at the front top of the Power Supply cover and the lock pins at the rear top of the Power Supply cover.

3. Locate the Processor main unit. Carefully turn the unit over to expose the chassis feet. Observe the design of the feet. The feet have been carefully designed to slide into the shoes on the front top of the Power Supply cover. The rear feet on the processor unit fit directly over the pins protruding on the rear top of the Power Supply cover. The rear feet are self-centering over the rear protruding pins on the Power Supply cover.

4. Face the front of the Power Supply. Holding the front of the Processor with both hands and the faceplate of the Processor facing you, tilt the rear of the processor unit up and slide the unit into the shoes on the top of the Power Supply cover. Once the feet are in the cover shoes, gently set the rear of the processor down on the Power Supply. The self-centering feet should center themselves directly over the pins on the rear section of the Power Supply cover.

5. Locate the Processor/ Power Supply coupler assembly. This assembly can only be installed in one direction. The wider portion of the assembly with the male connectors goes into the female connectors in the center of the Power Supply. The female connectors on the power coupler go into the Processor's male connectors. Once the coupler has been firmly pressed into place, secure it, utilizing the four thumb screws provided. When properly seated, the coupler edges should be parallel with the rear and top panels of the supply and Processor chassis.

CAUTION: Do not attempt to operate the unit before inserting and tightening the four floating screws to the chassis. Failure to do so can cause damage to the unit.

PLACEMENT

Before you install the REFERENCE 64 into your system, we recommend that you follow these guidelines in choosing the location. This will facilitate a clean, trouble-free installation.

1. Although well shielded, the Processor should not be placed in close proximity to hum-sensitive components (i.e. preamps, turntables, tuners, etc.) that can create interference and induce hum.

2. As with any high quality component, ensure that the vent openings in the chassis are free from obstruction, allowing the Processor to dissipate heat created by its Power Supply and Class A output stage. Place the unit on a clean, level surface away from excessive dirt or moisture. Make sure the REFERENCE 64 has at least 2 inches of clearance on either side and 2-3 inches of space at the top. Components that are heat sensitive should not sit directly above the unit.

3. The REFERENCE 64 does not require additional mass coupling or isolation. You may experiment with feet or cones as long as they do not permanently affix to the chassis. Any unauthorized modifications to the electronics or chassis will void the warranty.

AC POWER CONSIDERATIONS

NOTE: While the REFERENCE 64 has superb regulation and does not require a dedicated AC circuit, we strongly advise against connections through extension cords or multiple AC adaptors. High quality 15 amp grounded AC strips are acceptable. High quality AC line conditioners or filters can be utilized if they are grounded and meet or exceed the unit's Power Supply rating of 300VA.

CAUTION: Do not remove or bypass the ground pin on the end of the AC cord. This may cause RFI (radio frequency interference) to be induced into your playback system.

INPUT AND OUTPUT CONNECTIONS

CAUTION: When making connections to this component or any other, make sure the power amplifier is OFF and the preamplifier is in the MUTE or STANDBY mode.

1. Connect the AC Mains cord to the back of the REFERENCE 64 Power Supply and plug the power cord into th AC Mains.

CAUTION: Only plug the Power Supply into the AC Mains after the power coupler joining the processor and Power Supply has been installed and secured.

NOTE: Once the unit has been connected to the AC Mains, the following LEDs on the front panels should be checked for illumination.

On the Power Supply:

Analog Power
Digital Power

On the Processor:

DAC Power
Digital Power
0 Degree
Source

NOTE: Frequency LEDs will not be lit unless an active source is connected and selected.

2. Connect the REFERENCE 64 analog output to the line level input of your preamplifier.

The REFERENCE 64 is equipped with two analog output configurations: Single-ended via RCA connectors and Balanced via XLR connectors. If your preamplifier has high level balanced inputs, we recommend the balanced outputs of the Processor be used. There are considerable sonic benefits associated with the use of balanced interconnection.

The XLR pin configuration is described below.

Pin 1	Ground
Pin 2	Non-inverting (0°)
Pin 3	Inverting (180°)

NOTE: The two outputs can be used to simultaneously feed different systems.

NOTE: If you decide to use the single-ended analog outputs, the type of interconnect cable should be chosen carefully. High quality shielded cable is suggested.

3. The Left and Right channel RCA outputs are labeled on the back panel. The balanced outputs are not labeled. The balanced connector closest to the Left RCA output is the left channel output and the connector closest to the RCA right output is the right balanced output. Care should be taken to insure that the channel orientation between the Processor and the high level inputs of your preamplifier is maintained.

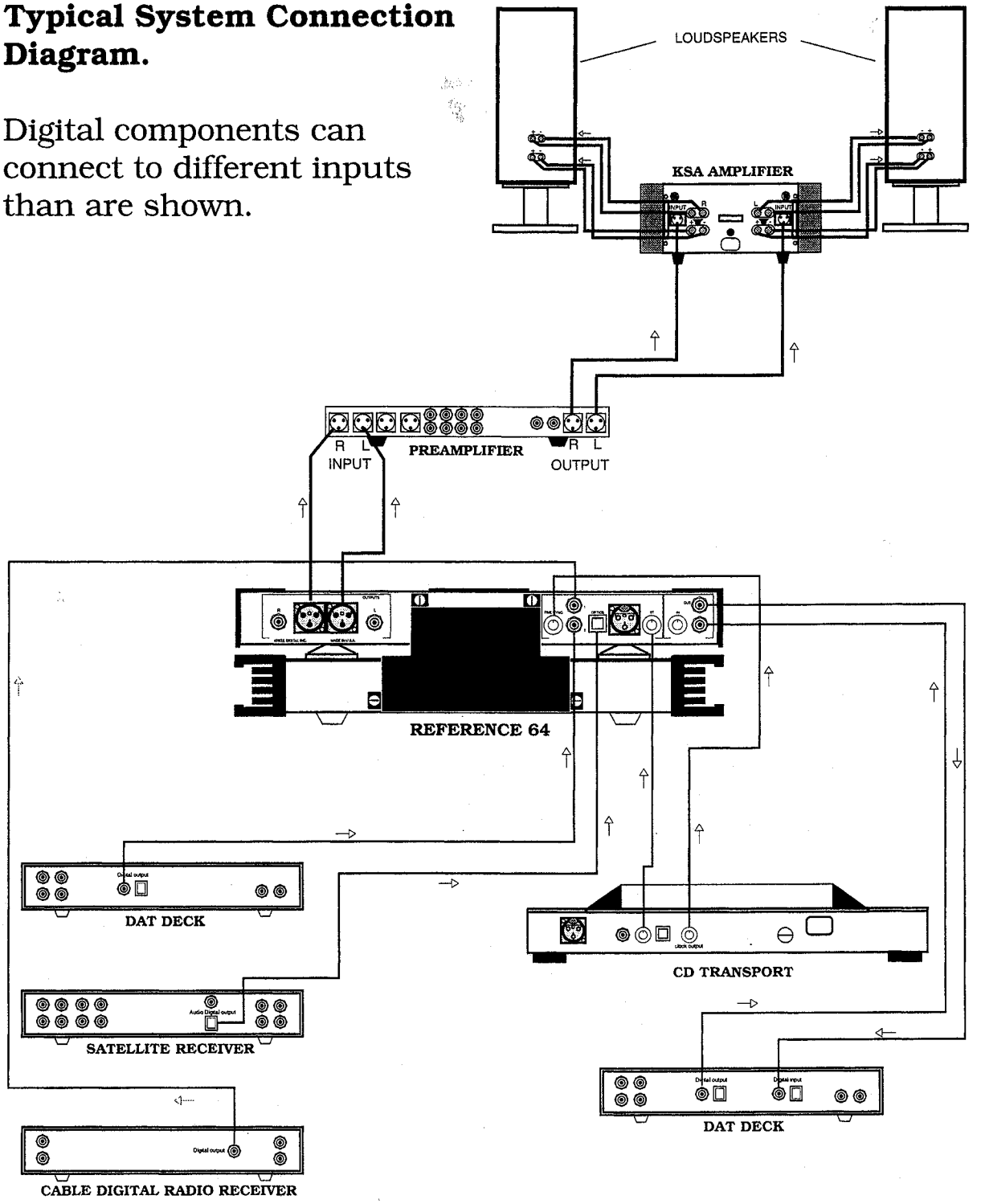
4. Connect the digital output of your CD transport and other digital sources to the inputs of the REFERENCE 64. If you are using multiple digital sources, take note of where each input and corresponding switch setting is located.

The REFERENCE 64 is equipped with the following inputs: two coaxial, one AT&T wide bandwidth fiber optic, one TOSH fiber optic, and one AES/EBU. All inputs can accept a signal from any digital source such as Compact Disc players, Laser Disc players, DATs or satellite receivers. The REFERENCE 64 is also equipped with a single AT&T and single coax digital tape return input. When a powered digital source is introduced to an input and that input is selected with the specific Input switch, the corresponding signal LED will illuminate.

5. Once you have completed the necessary input and output connections, select the input of your choice. For each input selected, the corresponding LED will illuminate to indicate which input is active (or has been selected). You will know if the input selected is active by observing if one of the frequency input LEDs is illuminated. If a CD transport is selected the 44.1 KHz LED will be lit.
NOTE: If the digital source is ON and one of the frequency LEDs does not illuminate, check to make sure the digital interconnect cable is secure at both ends or is not in need of repair. Make sure the component supplying the digital source is active.

Typical System Connection Diagram.

Digital components can connect to different inputs than are shown.



TAPE MONITOR INPUTS AND OUTPUTS

1 Digital only tape output: Intended for CD-R or DAT
2 Digital monitor inputs using auto selection system
    1 AT&T normally active, priority over coax input
    1 coax selected by default system

The digital signal at the tape output is the active digital input signal selected. The use of external clock or TimeSync feature does not interfere with the output of the selected digital signal to the tape output RCA.

The digital TAPE MONITOR input allows either an AT&T input or a coax input. The AT&T is the active input if there is digital data present at the AT&T receiver. If no data is present at the AT&T receiver, the internal default logic automatically selects the coax input.

The use of the MONITOR button on the front panel selects the TAPE IN inputs on the rear panel. The use of this input does not interfere with the input selection being sent to the Digital tape output.

NOTE: The Tape input can also be used as an additional source input, without use of the digital record output. This input signal cannot appear at the digital tape output jack.

CAUTION: The Tape output is a digital signal and can not be used as an analog output to drive front end components such as a preamplifier or cassette recorder.

NOTE: The selected digital input is always routed to the tape output regardless of the SOURCE/MONITOR button position.

DIGITAL SOURCE TO D/A CONVERTER INTERLINK CONSIDERATIONS

Care should be taken in selecting the type of cable used to link the digital source to your Processor. We suggest the AT&T wide-band width fiber optic cable be used. The AT&T format has a bandwidth of approximately 50 MegaBit. This allows accurate transmission of the digital bit stream without data corruption and proves to be sonically superior. If the AT&T format is not available, a high quality quartz fiber optic (Toshiba format) link can work well. Using a fiber optic interconnect reduces ground loop problems often associated with quality audio systems.

If coaxial cable is used, it should be non-capacitive and have a bandwidth in excess of 10MHz to prevent drop-out errors. For best results with coaxial cable we recommend the AES/EBU balanced format. The AES/EBU format is a ± 5 volt balanced digital transmission. Because of the high voltage balanced format, this system allows for accurate data transmission and has great sonic advantages over standard single-ended coaxial or Tosh fiber optic terminations. The AES/EBU coaxial cable must have two conductors and a shield for balanced termination.

SPECIAL NOTE: When the Tosh/C1 input is used, the Processor will default and acknowledge the Tosh input first if cables are inserted in both the Tosh and Coax 1 inputs. When using the Coax 1 input you must remove the Tosh cable from the Processor or turn that unit off before Coax 1 can be used. If the Tosh input is not in use, the Coax 1 input will not be effected.

TIMESYNC

TimeSync is a proprietary interlink system that enables a Krell CD transport and REFERENCE 64 to link and run on the CD transport clock. The TimeSync system can only be had on specific Krell transports. The DT-10 and MD-10 CD Transports come standard with the TimeSync output. The MD-20 can have the TimeSync installed as a new or additional purchase option.

The TimeSync input allows the clock of selected Krell transports to become the system clock. The jitter normally induced into the system, due to the recovery module that separates the data and the clock, is eliminated. The recovered clock is ignored and the clock in the transport will be the clock used in the Processor.

The use of the TIMESYNC input requires that the CD transport used be a Krell equipped with the TimeSync/Special AT&T/ ST output transmitter. It also requires that the TimeSync output of the CD Transport be connected to the TimeSync input of the REFERENCE 64 processor using an AT&T/ ST optics cable. The TimeSync is in addition to the connections used to carry CD disc data. The CD data can be carried via any other of the outputs, coax, balanced XLR, or AT&T optics.

The operation of the Processor utilizing the TimeSync feature requires that the data input be selected first and then the TimeSync input be selected. The TimeSync and the DATA input selected must be from the same source. If the DATA and TimeSync are from different sources the processor will, after a very short period, go into a MUTE mode. The MUTE mode can be cleared by pressing the TimeSync button again, reselecting a DATA input, and then optionally selecting the TimeSync if this input is connected to the same data source.

NOTE: The use of the TimeSync feature does eliminate the jitter normally encountered in the normal decoding of the digital data stream; however, the proprietary Krell DATA RECOVERY AND JITTER REJECTION MODULE reduces jitter to an almost unmeasurable level. TimeSync provides an additional level of Jitter reduction.

NOTE: The use of the TimeSync button without having an actual TimeSync input or a mismatched input(different input selected than the input from which the TimeSync signal originates) will cause the processor to go into MUTE mode. The TimeSync input select LED will flash when the mismatch condition or no input is present. The frequency indicator LED will still indicate the input frequency of the selected input.

NOTE: The TimeSync system is connected with an AT&T ST type fiber optic cable.

HOW TO CONNECT AT&T CABLES:

a. Remove the plastic cover from the outside of the AT&T transmitter (located on Transport) and receiver (located on Processor).

b. Locate the slot on the top of the AT&T receptacle.

c. Locate the key on the top of the AT&T cable.

d. Remove the plastic cap from both ends of the AT&T cable.

e. Slide the cable connector into the AT&T receptacle with the key sliding into the designated slot.

f. Gently push the connector into place, depressing the internal spring, and twist the outer collar clockwise to secure the connection.

g. Use the same procedure for the transport and D/A Processor

INPUT SELECT SWITCHING

The REFERENCE 64 has multiple digital inputs. Each input has its own input switch and direct path to the digital Processor. When an input is selected, the corresponding LED will illuminate.

ST	AT&T fiber optic input
XLR	Balanced AES/EBU digital input
TOSH/C1	Toshiba fiber optic input (Priority) and Coaxial input
COAX 2	Coaxial input

INPUT FREQUENCY INDICATORS

When the input signal locks with the Processor, the corresponding input frequency LED will illuminate. The input frequency is automatically selected by the Processor. As an example, if you select the AT&T input from a CD transport, the 44.1 KHz LED will illuminate.

FREQUENCY	TYPICAL SOURCE
32.0 KHz	Satellite Decoder digital output
44.1 KHz	Compact disc player
48.0 KHz	D.A.T. Player

SOURCE AND MONITOR SELECTION

The SOURCE button directs the signal from the Processor input selection section to the DAC and analog output stage. The source button must be depressed to listen to the selected input through the main audio system.

The MONITOR button routes the output of the component connected to the digital tape loop input to the DAC and analog output stage. This enables you to listen to the digital tape recorder output while recording.

PHASE SWITCH

The analog output phase of the REFERENCE 64 can be changed. In some recordings the master tape was recorded out of phase, creating unusually poor sounding recordings.

The REFERENCE 64 can shift the absolute output phase 180 degrees to correct for this anomoly. To change the phase from 0 degrees to 180 degrees, press the 180 DEG button. To change back to normal phase, press the 0 DEG button. Utilizing the Phase Shifting can, in some instances, restore life to a previously dull sounding recording.

EMPHASIS LED

Emphasis is a recording technique that accentuates the treble region of recorded music. Discs and/or Tracks that were recorded with Pre-emphasis will cause the Emphasis LED to illuminate. When the Emphasis LED is lit the appropriate complementary circuitry (De-emphasis) is activated to provide a flat output response.

OPERATING INSTRUCTIONS

1. Select an input with the Input switch. Notice the Signal LED will illuminate when the digital source is turned on and has linked with the Processor. Once this link is complete, the Processor is ready to pass a signal. If you are utilizing the TimeSync interlink, press the TimeSync button at this time. The TimeSync LED will illuminate.

2. Be sure that your preamplifier's volume control is turned completely to the OFF (lowest volume) position.

3. Turn ON your components, remembering that the last component to be energized should be your amplifier. The amplifier should only be turned ON after all other components in the system have been on for at least two minutes. This will insure that there will not be any large pulse created when the amplifier is turned on.

4. Switch the source selector of your preamp to the position correlating to your chosen input connection for the REFERENCE 64.

5. You may now start playing your digital source, DAT, CD or satellite.

6. Slowly turn the volume control up to the lowest level you can hear. Check to see that both channels are working correctly before advancing the volume.

NOTE: While your REFERENCE 64 will perform beautifully from the moment you turn it on, it requires a minimum warm-up period of 8 hours before it begins to show its strongest sonic qualities. It will continue to improve over time. Discrete components are utilized in the analog output stage and the warm-up period allows them to reach thermal equilibrium.

Your installation is now complete. Should you have any further questions which are not covered in the remainder of this Reference, contact your authorized Krell dealer. We wish you many hours of listening fulfillment.

Q. My CD player has both fiber optic and coaxial outputs. Which one should I use?

A. Given a choice, we prefer the AT&T optical link due to its ability to completely isolate the grounds between the digital source component and the Processor. This minimizes the possibility of ground loops in the digital components. The AT&T format also has the added benefit of substantially higher bandwidth than coax or the standard fiber optic interface. If a coax cable must be used, we suggest the AES/EBU balanced format. This interconnection utilizes a ± 5v digital format and has the additional benefit of balanced termination.

Q. Will I damage my REFERENCE 64 if I leave the power ON all the time?

A. No. The Class A discrete analog circuits perform more consistently once they reach thermal equilibrium. This Processor has been designed to be left on at all times. The REFERENCE 64 draws less than 50 watts out of the AC mains socket.

NOTE: For the protection of your Processor, we recommend disconnecting the AC cord from the wall outlet before any electrical storms or if you plan on being away from home for prolonged periods of time.

Q. Do I have to switch the Sampling Frequency when I go between my CD and DAT?

A. No. Your REFERENCE 64 automatically senses the input frequency and does all necessary switching.

Q. I am not getting any sound through the Processor. What could be wrong?

A. Most likely there has been a simple mistake in installation. Check all connections IN and OUT of the Processor. Is the digital source component powered? Check all power connections. Have you selected the correct source on your preamp? Check the front panel LED's for Power Supply stability. If you still have no sound, turn off the power and contact your dealer.

Q. I have some very fine audiophile interconnect cable which has superior sonic characteristics. Can I use this for my coaxial digital input?

A. You may experiment with any high quality cable. Do note that most audio interconnect cable is not designed to carry the ultra-high frequency information of the digital bit stream.

NOTE: For the REFERENCE 64, we recommend non-capacitive coaxial cable which has a bandwidth in excess of 10MHz and excellent shielding properties.

Q. While listening to my REFERENCE 64 I experience occasional periods of silence through my speakers. Is my Processor malfunctioning?

A. Drop outs are caused by two primary reasons. First, drop outs can be caused by data corruption. Corruption in the data may be due to a poor input connection, damaged or dirty source material, or interconnects which do not have enough bandwidth. The second item that causes the Processor to reset is the presence of a transient spike on the incoming AC power line. The Processor is resetting all of its digital processing circuits so that it can be assured all are properly synchronized. Try changing your source material and check your connections. If these are not the cause, speak with your dealer about obtaining different cabling. If you are using fiber optics, and source material and connections are not the problem, speak with your authorized dealer.

Q. Since I installed the Processor in my system I have a low level hum that increases as I turn up the volume. There was no hum in my system until I added the Processor. Is the Processor malfunctioning?

A. The fact that there was no hum in your system until you added the Processor indicates that you have a ground-loop problem. Often changing the interconnect to a fiber optic cable will eliminate this problem. The way the digital Processor and digital source are connected to the AC mains often can be the cause of grounding problems. Check for loose interconnect cables and/or bad electrical connections. Consult your dealer or Krell for individual system suggestions if this hum persists.

FREQUENCY RESPONSE
-.1dB at 4Hz & 20 KHz

SIGNAL TO NOISE
100 dB A weighted

DIGITAL-TO-ANALOG CONVERTER
KRELL DAC Modules in custom THERMAL STABALIZATION SHIELD

PROCESSING
KRELL written software calculated through 4 custom configured Serial Motorola 560001 processors running at 34MHz, two per channel in series configuration

LINEARITY
±.3dB at -90dB

THD +N
.011%

CHANNEL SEPARATION
≥ 111dB at 1KHz

ANALOG OUTPUT VOLTAGE
2.4 volts

DIMENSIONS
19.10" WIDE
14.00" DEEP
5.63" TALL (stacked with feet)

SHIPPING WEIGHT
54 pounds

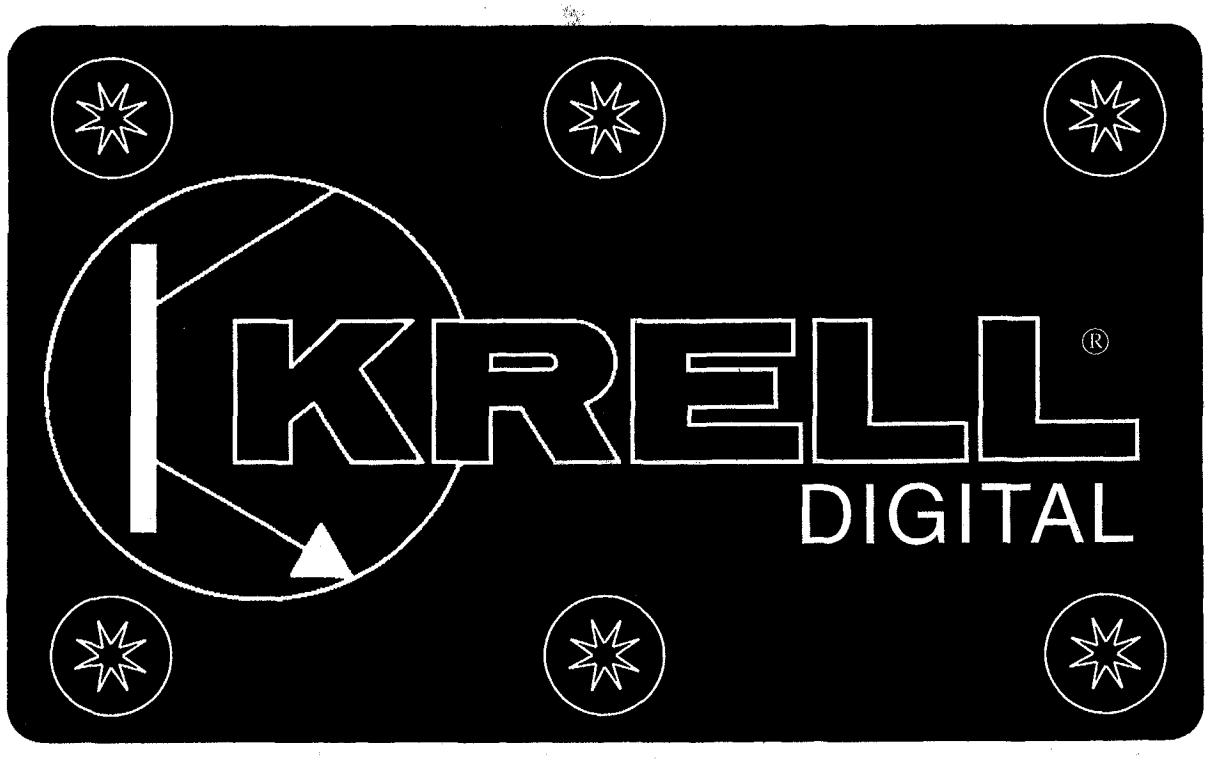
WARRANTY AND SERVICE INFORMATION

There are no user-serviceable parts inside the REFERENCE 64. The REFERENCE 64 has a limited warranty of five years parts and labor. Return freight is included in the warranty. The warranty period begins on the date of purchase and is activated with the return of the enclosed Warranty Card and a copy of the Sales receipt. Please return the Warranty Card immediately after successful installation and operation are completed.

The warranty for Krell products is valid only in the country to which they were originally shipped and at the factory. If you think there are problems with your unit, please contact your dealer, distributor or the factory immediately.

The operating voltage of this unit is determined by the factory and can only be changed by an authorized KRELL distributor or the KRELL factory. Any unauthorized voltage conversion will void the warranty. Should the operating voltage of your REFERENCE 64 require changing, contact KRELL Industries.

Please do not return any unit to KRELL for repair without first calling to discuss the problem and to obtain a Return Authorization number. Freight to the factory or distributor is your responsibility. Return freight to you will be paid by the factory or distributor. Any unauthorized disassembly, updates or modifications performed to the unit will void the warranty.



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