Symetrix

Model 620
20 Bit A/D Converter

User's Guide

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Contents

1 Introduction

Congratulations on your decision to use a Symetrix model 620 20 Bit A/D Converter. The 620 has been designed to give audio professionals unequaled A/D conversion performance combined with ease of use and reliability. This manual will guide you through the installation and operation of the 620, and provide valuable tips on how to interface the 620 with other equipment in your studio.

The 620 excels in three basic applications: 1) A/D conversion to 16 bit digital recorders like DAT's, modular digital multi-tracks (MDM's) and hard disk recorders, 2) A/D conversion to 20 bit recorders or greater than 20 bit digital signal processors and 3) digital word size conversion and sample rate conversion (44.1kHz to 22.05kHz) in multimedia mastering applications.

The 620 uses the latest in delta-sigma conversion technology coupled with advanced digital signal processing (DSP) algorithms. This combination produces a product that delivers an extremely high quality representation of analog audio signals in either 20 bit, 16 bit or 8 bit digital words with sample rate options at 48, 44.1, 32 and 22.05kHz. The extra attention to detail taken in the design of the 620 is typified by features such as the direct coupled signal path. There are no capacitors in the 620's analog signal path. DC which might decrease headroom and cause distortion is removed in the digital domain. Not a terribly obvious feature, but one that is indeed audible.

The 620's logical, easy to use control panel holds no hidden surprises. The product is easy to learn and simple to use. In the sections that follow you'll find information on installation, operation and specific applications of the 620. We follow this with a troubleshooting guide, warranty and service information and detailed specifications.

As with all Symetrix products the 620 has been designed and built to the highest standards of the professional audio industry. Our company is committed to excellence in product design, manufacturing and service. Please do not hesitate to contact us with your questions or comments.
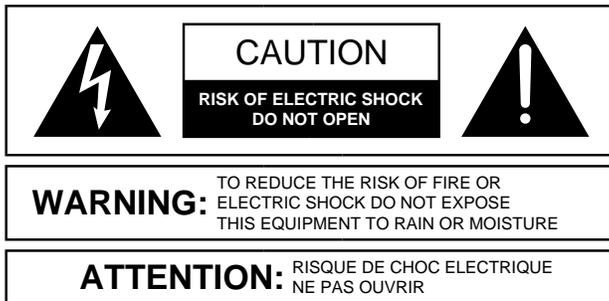
2 Safety Information

Operator safety summary

The information in this summary is intended for persons who operate the equipment as well as repair personnel. Specific warnings and cautions are found throughout this manual wherever they may apply; they do not appear in this summary.

The notational conventions used in this manual and on the equipment itself are described in the following paragraphs.

Equipment markings

⚡	**CAUTION** **RISK OF ELECTRIC SHOCK** **DO NOT OPEN**	❗
WARNING:	TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE	
ATTENTION:	RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR	

No user serviceable parts inside. Refer servicing to qualified service personnel.
Il ne se trouve a l'interieur aucune piece pourvant entre reparée l'usager.
S'adresser a un reparateur compétent.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user of the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the 620 (i.e. this manual).

Caution

To prevent electric shock, do not use the polarized plug supplied with the 620 with any extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Terms

Several notational conventions are used in this manual. Some paragraphs may use Note, Caution, or Warning as a heading. These headings have the following meaning:

Note — Identifies information that needs extra emphasis. A Note generally supplies extra information to help you to better use the 620.

Caution — *Indentifies information that, if not heeded, may cause damage to the 620 or other equipment in your system.*

Warning — **Identifies information that, if ignored, may be hazardous to your health or that of others.**

In addition, certain typefaces and capitalization are used to identify certain words. These are:

CAPITALS — Controls, switches or other markings on the 620's chassis.

Boldface — Strong emphasis.

Other safety information

Power source

This product is intended to operate from a power source that does not apply more than 255V rms between the power supply conductors or between either power supply conductor and ground. A protective ground connection, by way of the grounding conductor in the power cord, is essential for safe operation.

Grounding

The chassis of this product is grounded through the grounding conductor of the power cord. To avoid electric shock, plug the power cord into a properly wired receptacle before making any connections to the product. A protective ground connection, by way of the grounding conductor in the power cord, is essential for safe operation.

Danger from loss of ground

If the protective ground connection is lost, all accessible conductive parts, including knobs and controls that may appear to be insulated, can render an electric shock.

Proper power cord

Use only the power cord and connector specified for the product. Use only a cord that is in good condition.

Proper fuse

The fuse is mounted internally and is not considered user servicable. The fuseholder accepts American size fuses (1/4 inch diameter) or European size fuses (5mm diameter). For 117 VAC operation, the correct value is 1/2A, 250VAC, fast blowing (Bussman type AGC). For 230VAC operation, the correct value is 1/4A, 250VAC, slow blowing (Bussman type MDL or GDC).

Operating location

Do not operate this equipment under any of the following conditions: in explosive atmospheres, in wet locations, in inclement weather, with improper or unknown AC mains voltage, or if improperly fused.
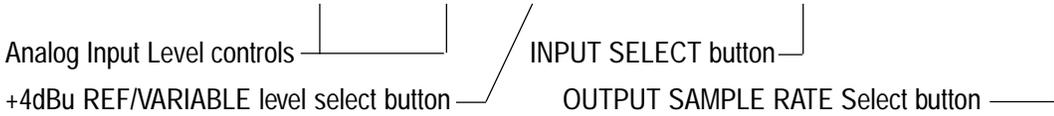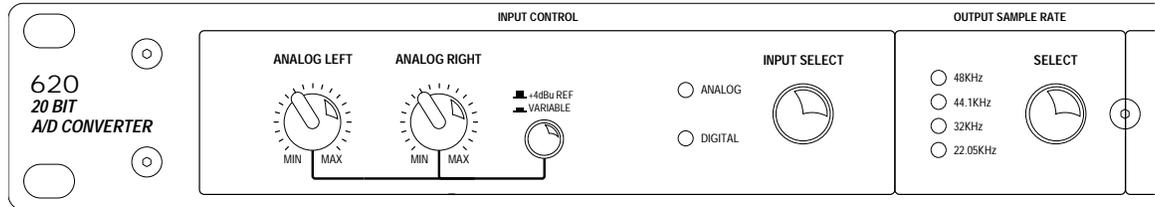
Stay out of the box

To avoid personal injury or injury to others, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

3 Summary Product Description

This chapter provides a basic overview of the 620 by describing the input and output connections, power connection, operating controls and LED indicators. Use this information to acquaint yourself with the product. Chapter 4 (Installation) gives details on installing the 620 in your system and Chapter 5 (Operation) gets into specific applications and uses of the 620 in detail.

Front panel view (left)

Analog Input Level controls

+4dBu REF/VARIABLE level select button

INPUT SELECT button

OUTPUT SAMPLE RATE Select button

• +4dBu REF/VARIABLE button activates the analog input level controls when placed in the VARIABLE position. When in the +4dBu REF position the 620 provides a fixed 18dB of head-room for a 0 VU signal at the analog inputs.

• The ANALOG LEFT and ANALOG RIGHT controls allow independent left and right fine adjustment of input signals over a 15dB range.

• The INPUT SELECT button chooses either analog or digital inputs. The associated green LEDs show which input is active. If digital input is selected and no digital input signal is present, the DIGITAL LED will flash. A solid DIGITAL LED indicates proper syncronization to a digital input signal.

• SAMPLE RATE select button chooses one of four possible digital output sample rates: 48kHz, 44.1kHz, 32kHz, 22.05kHz. The associated green LEDs indicate which of the four sample rates has been selected. If the 620 is receiving a digital input the LED's indicate the incoming sample rate.

Front panel view (right)

OUTPUT MUTE button

OUTPUT WORD SIZE select button

LEFT & RIGHT CHANNEL HEADROOM meters
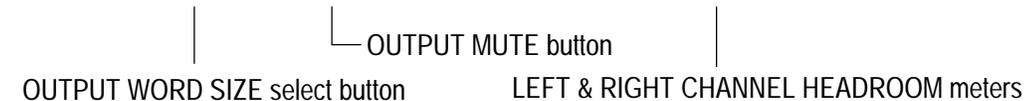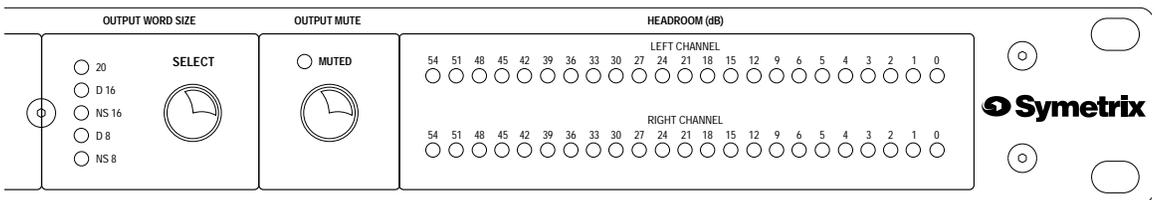
• OUTPUT WORD SIZE select button chooses one of five possible digital output word formats. The associated green LEDs indicate which option has been selected. The possiblities are: 20 bit (20), dithered 16 bit (D16), noise shaped 16 bit (NS16), dithered 8 bit (D8) and noise shaped 8 bit (NS8).

• OUTPUT MUTE button mutes and unmutes the digital output. When the output is muted the associated red LED is illuminated.

•LEFT AND RIGHT CHANNEL HEADROOM meters display the headroom remaining before the digital clip level is reached. The meters are active for both digital and analog inputs.

Rear panel view (left)
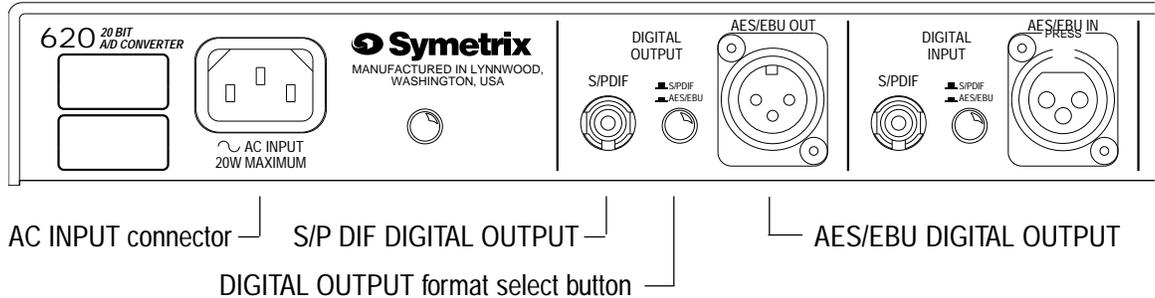
• The AC INPUT connector accepts nominal AC power sources of 117 volts or 230 volts [see Appendix A (Specifications) for voltage tolerance ranges].

• The DIGITAL OUTPUT format select button chooses either AES/EBU or S/P DIF digital audio format.

• The S/P DIF DIGITAL OUTPUT is a two channel coaxial output conforming to the IEC 958 standard. S/P DIF is an acronym for 'Sony/Phillips Digital Interface'. When using this output the output format select switch should be in the S/P DIF position.

• The AES/EBU DIGITAL OUTPUT is a two channel balanced output conforming to the Audio Engineering Society standard known as AES-3. When using this output the output format select switch should be in the AES/EBU position.

Rear panel view (right)
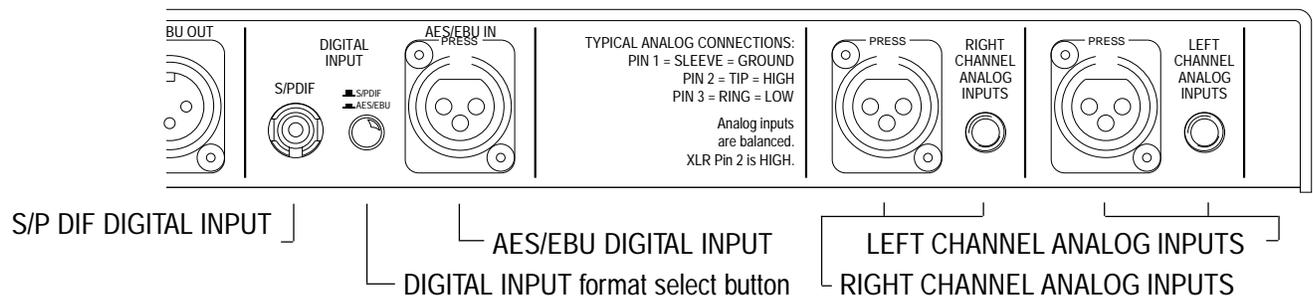
• The DIGITAL INPUT format select button chooses either AES/EBU or S/P DIF digital audio format.

• The S/P DIF DIGITAL INPUT is a two channel coaxial input conforming to the IEC 958 standard. S/P DIF is an acronym for 'Sony/Phillips Digital Interface'. When using this input the input format select button should be in the S/P DIF position.

• The AES/EBU DIGITAL INPUT is a two channel balanced input conforming to the Audio Engineering Society standard known as AES-3. When using this input the input format select button should be in the AES/EBU position.

• Female 'XLR' and tip-ring-sleeve 1/4" connectors are provided for the LEFT & RIGHT CHANNEL ANALOG INPUTS. See Chapter 4 (Installation) for details on recommended input cable wiring.

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4 Installation

Before you plug the 620 into a wall socket, carefully read the information in the following chapter.

AC Line connection

A sticker on the right end of the unit (as viewed from the front) indicates the nominal voltage setting for the unit as it left the Symetrix factory. If this does not correspond to the voltage setting for your locale then do not attempt to apply power to the 620. Instead, return the unit to your local Symetrix distributor for modification.

The 620 is shipped from the Symetrix factory with a detachable AC power cable (IEC standard) included. Depending on the intended destination, the power plug is either the US type (intended for 117vac use), or the Europlug type. If the power cable's plug is not right for your locale, then please contact your local Symetrix distributor for the proper cable.

Once you have determined that the 620's operating voltage matches that of your locale and you are ready to begin, follow these steps:

1   Plug the socket end of the power cable into the recessed AC power receptacle on the back of the 620.

2   Plug the other end of the power cable into a three-hole grounded outlet or power strip.

WARNING The 620 is intended to be electrically grounded. It has been provided with a three-wire grounding plug - a plug that has a third (grounding) pin. This plug will fit only a grounded AC outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact a licensed electrician to replace the outlet with a properly grounded outlet. Do not defeat the purpose of the grounding plug!

Mounting in an equipment rack

The 620 occupies one rack space (1U) in a standard equipment rack with a width of 19" (48.3cm), a depth of 7.5"(19.1cm), and a height of 1.75"(4.45cm). Allow at least 4"(10.16cm) behind the unit for the protrusion of connectors. We recommend you take care not to mount the 620 next to devices that emit large electromagnetic fields, such as audio power amplifiers. To do so may compromise the noise performance of the 620. The 620 has been designed to conform to mechanical guidelines as described in EIA Standard RS-310-C and IEC Recommendation 297.

Analog audio input connections

The 620's analog input connections are via standard female XLR and 1/4" tip-ring-sleeve jacks located on the rear panel. The jacks are internally wired in parallel. For optimum performance we recommend that the 620 be connected to balanced analog sources. If this is not practical in your situation, then you may connect to unbalanced analog sources. The following diagram illustrates recommended analog cable wiring practices:

Analog Source   620 Analog Input

Female XLR
Pin 1 = ground
Pin 2 = high
Pin 3 = low

Male XLR
Pin 1 = ground
Pin 2 = high
Pin 3 = low

Male 1/4" tip-ring-sleeve plug
Tip = high
Ring = low
Sleeve = ground

Tip
Ring
Sleeve

Male XLR
Pin 1 = ground
Pin 2 = high
Pin 3 = low

Male 1/4" tip-ring-sleeve plug
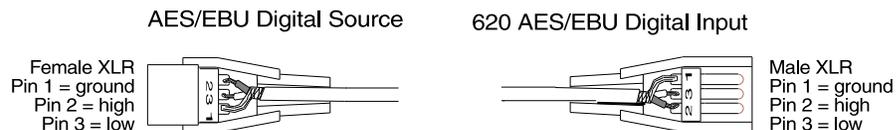Tip = high
Ring = low
Sleeve = ground

Tip
Ring
Sleeve

Tip
Ring
Sleeve

Male 1/4" tip-ring-sleeve plug
Tip = high
Ring = low
Sleeve = ground

Male 1/4" tip-sleeve plug
Tip = high
Sleeve = ground

Tip

Sleeve

Tip

Male 1/4" tip-sleeve plug
Tip = high
Sleeve = ground

Digital audio input connections

The 620 receives digital audio in either AES/EBU or S/P DIF (Sony/Phillips Digital Interface) formats. The AES/EBU input is a standard 3-pin XLR female and the S/P DIF connector is a standard RCA female. The position of the DIGITAL INPUT select button should be set to correspond to the format of the incoming digital audio.

The type of cable you use to make digital audio connections to and from the 620 is important. Wide band digital signals must follow low impedance, low capacitance paths from source to destination. Low quality cables can cause persistant or intermittant noise problems. The following diagram illustrates recommended digital input cable wiring practices:

AES/EBU Digital Source   620 AES/EBU Digital Input

Female XLR
Pin 1 = ground
Pin 2 = high
Pin 3 = low

Male XLR
Pin 1 = ground
Pin 2 = high
Pin 3 = low

Digital audio output connections

The 620 outputs digital audio in either AES/EBU or S/P DIF (Sony/Phillips Digital Interface) formats. The AES/EBU output is a 3-pin XLR male and the S/P DIF connector is an RCA female. The position of the DIGITAL OUTPUT select button should be set to correspond to the desired format of the outgoing digital audio.The following diagram illustrates recommended digital output cable wiring practices:

620 AES/EBU Digital Output   Destination AES/EBU Digital Input

Female XLR
Pin 1 = ground
Pin 2 = high
Pin 3 = low

Male XLR
Pin 1 = ground
Pin 2 = high
Pin 3 = low

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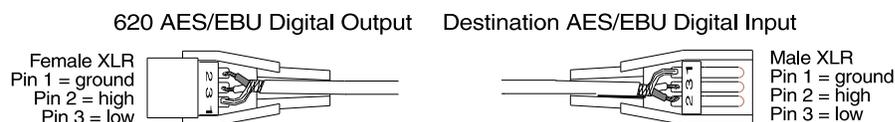
5 Operation

Digital or analog input selection

Push the INPUT SELECT button to toggle between the 620's analog or digital inputs. The associated LED will indicate which input is currently chosen.

Using the AES/EBU or S/P DIF inputs.

If you are using the 620's digital inputs, make sure the DIGITAL INPUT select button, on the 620's back panel, is set to match the digital format of your source (AES/EBU or S/P DIF).

Please note that the DIGITAL LED acts as a "signal present" indicator. If the 620 is receiving a valid digital signal, the LED will be steadily lit. The absence of a valid signal will cause the LED to flash. Most AES/EBU or S/P DIF equipped digital audio devices (such as DAT recorders and CD players) will output what's known as "digital silence" or "digital black". This means that the DIGITAL INPUT LED will light steadily as soon as you connect these devices and set the switches, even if no tape or disc is playing in your source machine. If the DIGITAL INPUT LED never indicates the presence of a valid digital signal regardless of how you set the switches, check the troubleshooting guide in 'Chapter 6' of this manual.

Using the AES/EBU and S/P DIF outputs

Set the DIGITAL OUTPUT select button (on the 620's back panel) in the appropriate position for operation with either AES/EBU or S/P DIF inputs on your destination device.

You may find that some devices equipped with AES/EBU inputs will lock to the 620's digital output even if the DIGITAL OUTPUT select button is in the S/PDIF position (and vice-versa). This is because the 620's AES/EBU and S/P DIF outputs are both constantly transmitting regardless of where you set the DIGITAL OUTPUT select button. The button's function is to set the appropriate line impedance for either AES/EBU or S/P DIF and to set the channel status format for AES/EBU (professional mode) or S/P DIF (consumer mode).

Analog input level controls

The 620 has two *Analog Input Level Control* options. Select these using the *Fixed Reference/ Variable Level Select* button.

• *Fixed Reference* - This option disables the input level controls and precisely matches the sensitivity of the left and right analog inputs. The +4dBu Ref mode sets the 620's input sensitivity so that there is 18dB of headroom for a 0 VU signal applied to the analog inputs. When in +4dBu Ref mode use the output level control on the analog device feeding the 620 to avoid clipping in the 620.

• *Variable* - The input level controls vary the 620's input sensitivity over a 15dB range. In the fully clockwise position (maximum), a nominal -10 dBV signal will have about 18dB of headroom. In the fully counter-clockwise position (minimum), a nominal +4dB signal will have about 18dB of headroom.

Sample rate selection

• *Analog In* - The 620 provides four sample rate options when converting from analog to digital: 48 kHz, 44.1 kHz, 32 kHz and 22.05kHz. Push the SAMPLE RATE select button until the desired sample rate is indicated.

• *Digital In* - The 620 automatically senses and syncs to incoming digital signals. The SAMPLE RATE LED will display the sample rate frequency of the incoming signal.

• *Sample rate conversion* - The 620 performs sample rate conversion from 44.1kHz to 22.05kHz. When the SAMPLE RATE LED indicates that you are receiving a 44.1kHz signal, tap the SAMPLE RATE select button once. The 22.05 LED will illuminate, indicating that the 620 is receiving a 44.1kHz signal while sending a 22.05kHz signal.

Output Word Size

Perhaps the most powerful feature of the 620, OUTPUT WORD SIZE selection gives you the ability, through dither and noise shaping, to greatly improve the clarity, stereo imaging and apparent dynamic range of your digital recordings. An internal DSP runs proprietary software that optimizes the digital audio output code for a variety of recording and storage formats. There are five options:

20 (unprocessed 20 bit) In this mode, the 620 samples a 20 bit word and passes it straight through to it's digital outputs without applying any dither or noise-shaping. Use this mode to feed 20-bit recording, processing or broadcast transmission systems.

D16 (dithered 16 bit) Dither is the process of injecting a small amount of noise into the quantization process and should be used when converting from analog to digital or when re-quantizing from 20 bit to 16 bit. The proper amount and type of dither greatly improves the converter's perceived dynamic range and allows the listener to hear sounds below the noise floor of the converter. The 620's internal DSP generates triangular probability density function (TPDF) dither. You'll immediately notice better stereo imaging, more detail in low-level sounds, more realism in reverb-tails, cymbal decays, etc.

Use **D16** mode when:

• Recording to a 16 bit workstation.

• Recording onto DAT (when further editing/master processing will be done later).

• Mastering a CD sample library.

NS16 (noise-shaped dither, 16 bit) This process is similar to D16 mode. However, in NS16 mode the DSP shapes the noise of the quantized, dithered signal according to optimized psychoacoustic curves. This process results in less noise in the midrange where the human ear is most sensitive and more high frequency and low frequency noise where your ears are less sensitive. This process greatly decreases "masking" of low level material in the midrange and further increases the clarity, imaging and apparent dynamic range of your recording.

Note - Since NS16 shapes the noise to precisely match the sensitivity of the human ear, we recommend that you only use NS16 when preparing your final masters. If you perform any further processing (and we mean any...) on a track that has been NS16'ed, you run the risk of changing the shape of the noise and thus reducing (or losing) the psychoacoutic benefits of this process. In spite of this, you may find that NS16 sounds better anyway. As in most things audio, our recommendations are just a starting point and you are bound to find exceptions, so try experimenting a bit with this feature.

Use **NS16** mode when:

• Preparing final masters for CD production.

• Preparing final DAT masters for cassette duplication.

• You know that no further processing will be done to the audio track in the digital production chain. Copying is fine, as long as you do not change relative frequency content (EQ, pitch shift, reverb, etc.).

D8 (dithered 8 bit) This mode is very similiar to the D16 mode except that the output word is dithered at the 8 bit level.

Note The HEADROOM(dB) output meters display the true peak content of the 620's output word. You'll see the 8-bit noise floor displayed on the HEADROOM(dB) meters when you use either D8 or NS8.

NS8 (noise shaped 8 bit) Very similar to NS16 except that the signal is noise shaped and dithered to the 8 bit level. Again, we recommend that you use the NS process only when preparing your final product, though experimentation will no doubt reveal exceptions to this rule. Notice that the NS8 noise floor registers higher on the HEADROOM(dB) meters than the D8 noise floor. This is because the 620 uses peak metering that registers the highest peak of the waveform. The overall noise power is the same (as mentioned in the NS16 section) even though the meters may show a higher level.

Use D8 or NS8 for:

• Preparing audio files for CD-ROM or multimedia computer applications.

• Recording sounds on an 8 bit sampler (DS8 only).

• Realtime monitoring of 8 bit results, while working on 16 bit files.

• One-step conversion of 16 bit 44.1 kHz sound files to 8 bit 22.05kHz in realtime.

Output Mute

This is a DSP function which sets the output word to all zeros regardless of input material. When the Output Mute LED is lit, the 620 acts as a "digital silence" generator, muting all audio output including dither and noise shaping functions.

6 Troubleshooting

Solutions to common problems

There is no digital output signal.

☞ Check the AC power connections to the 620.

☞ Check input and output cables and connections.

☞ Determine that there really is a signal coming from the source and that it is getting to the 620.

☞ Has the 620's MUTE function been pressed?

Distortion in the digital output signal.

☞ Check the input signal. Is it over-ranging the 620's input. Is it distorting before reaching the 620's input?

Hum or buzz in the output.

☞ Check input and output connector wiring.

☞ Check for ground loops between interconnected system equipment.

☞ Are all system components on the *same* AC ground?

Noise (hiss)

☞ Check input signal levels and input level control settings. The input may be too low in level. If so, boost the signal from your console or input source.

☞ Is the input signal already noisy?

Less common problems

The 620 doesn't power up or doesn't respond properly.

☞ Consult a qualified service technician or the Symetrix factory.

The 620 is not plugged in, but works great anyway.

☞ Consult your doctor or therapist.

DAT player will not lock to 620's digital output.

☞ Check the digital format settings settings on both the 620 and the recorder, looking for unequal sample rates or incompatible digital formats.

620 doesn't 'remember' last settings before power down.

☞ The 620 uses non-volatile memory to recall the last settings before power-down. If it appears these settings have become corrupted, power down and hold both the INPUT SELECT and OUTPUT MUTE buttons in while re-applying power. This will re-initialize the system memory.

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Warranty and Service

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The Symetrix 620 Limited Warranty

Symetrix, Inc. expressly warrants that the product will be free from defects in material and workmanship for one (1) year. Symetrix's obligations under this warranty will be limited to repairing or replacing, at Symetrix's option, the part or parts of the product which prove defective in material or workmanship within one (1) year from date of purchase, provided that the Buyer gives Symetrix prompt notice of any defect or failure and satisfactory proof thereof. Products may be returned by Buyer only after a Return Authorization number (RA) has been obtained from Symetrix. Buyer will prepay all freight charges to return the product to the Symetrix factory. Symetrix reserves the right to inspect any products which may be the subject of any warranty claim before repair or replacement is carried out. Symetrix may, at its option, require proof of the original date of purchase (dated copy of original retail dealer's invoice). Final determination of warranty coverage lies solely with Symetrix. Products repaired under warranty will be returned freight prepaid by Symetrix via United Parcel Service (surface), to any location within the Continental United States. At Buyer's request the shipment may be returned via airfreight at Buyer's expense. Outside the Continental United States, products will be returned freight collect.

The foregoing warranties are in lieu of all other warranties, whether oral, written, express, implied or statutory. Symetrix, Inc. expressly disclaims any IMPLIED warranties, including fitness for a particular purpose or merchantability. Symetrix's warranty obligation and buyer's remedies hereunder are SOLELY and exclusively as stated herein.

This Symetrix product is designed and manufactured for use in professional and studio audio systems and is not intended for other usage. With respect to products purchased by consumers for personal, family, or household use, Symetrix **expressly disclaims all implied warranties, including but not limited to warranties of merchantability and fitness for a particular purpose.**

This limited warranty, with all terms, conditions and disclaimers set forth herein, shall extend to the original purchaser and anyone who purchases the product within the specified warranty period.

Warranty Registration must be completed and mailed to Symetrix within thirty (30) days of the date of purchase.

Symetrix does not authorize any third party, including any dealer or sales representative, to assume any liability or make any additional warranties or representation regarding this product information on behalf of Symetrix.

This limited warranty gives the buyer certain rights. You may have additional rights provided by applicable law.

Limitation of Liability

The total liability of Symetrix on any claim, whether in contract, tort (including negligence) or otherwise arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair, replacement or use of any product will not exceed the price allocable to the product or any part thereof which gives rise to the claim. In no event will Symetrix be liable for any incidental or consequential damages including but not limited to damage for loss of revenue, cost of capital, claims of customers for service interruptions or failure to supply, and costs and expenses incurred in connection with labor, overhead, transportation, installation or removal of products or substitute facilities or supply houses.

Servicing the 620

If you have determined that your 620 requires repair services and you live *outside* of the United States please contact your local Symetrix dealer or distributor for instructions on how to obtain service. If you reside in the U.S. then proceed as follows:

Return authorization

At the Symetrix factory, Symetrix will perform in-warranty or out-of-warranty service on any product it has manufactured for a period of five years from date of manufacture.

Before sending anything to Symetrix, please contact our Customer Service Department for a return authorization (RA) number. The telephone number is (206) 787-3222, Monday through Friday, 8AM (800 hours) though 4:30 PM (1630 hours), Pacific Time.

In-warranty repairs

To get your 620 repaired under the terms of the warranty:

1. Call us for an RA number.

2. Pack the unit in its original packaging materials.

3. Include your name, address, daytime telephone number, and a brief statement of the problem.

4. Write the RA number on the outside of the box.

5. Ship the unit to Symetrix, freight prepaid. We do *not* accept freight collect shipments.

Just do these five things, and repairs made in-warranty will cost you only one way freight charges. We'll prepay the return (surface) freight.

If you choose to send us your product in some sort of flimsy packaging, we'll have to charge you for proper shipping materials. If you don't have the factory packaging materials, then do yourself a favor by using an oversize carton, wrap the unit in a plastic bag, and surround it with bubble-wrap. Pack the box full of Styrofoam peanuts. Be sure there is enough clearance in the carton to protect the rack ears (you wouldn't believe how many units are returned with bent ears). We won't return the unit in anything but Symetrix packaging for which we will have to charge you. Of course, if the problem turns out to be operator inflicted, you'll have to pay for both parts and labor. In any event, if there are charges for the repair costs, you will pay for the return freight. All charges will be COD unless you have made other arrangements (prepaid, Visa or Mastercard).

Out-of-warranty repairs

If the warranty period has passed, you'll be billed for all necessary parts, labor, packaging materials, and freight charges. Please remember, you must call for an RA number before sending the unit to Symetrix.

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A   Specifications

appendix

Architects and engineers specifications

The analog to digital converter shall be a high performance unit occupying a single rack space (1U).

The unit shall have two line level, balanced analog inputs. Input gain shall be controlled via two variable potentiometers over a 15dB range. Alternatively, a fixed input gain reference of +4dBu may be selected.

The a/d converter shall provide a digital output signal conforming to the AES/EBU digital audio format (AES-3) as well as a second digital output conforming to the S/P DIF format (IEC-958).

The a/d converter shall accept digital input signals conforming to the AES/EBU digital audio format (AES-3) as well as a second digital input conforming to the S/P DIF format (IEC-958).

The unit shall internally generate sample rates of 48kHz, 44.1kHz, 32kHz and 22.05kHz. When converting from analog to digital, the converter shall quantize 20 bits.

Means shall be provided to select the following output word formats: 20 bit, 16 bit dithered (using a triangular probability random noise generator), 16 bit noise shaped and dithered, 8 bit noise shaped and 8 bit dithered.

The a/d converter shall provide means to accept incoming digital audio signals at a 44.1kHz sample rate and output the same signals at a 22.05Hz sample rate.

The a/d converter shall be a Symetrix, Inc. model 620 20 bit A/D converter.

Technical specifications

Audio

Quantization	20 bits/sample
Analog Inputs	two, balanced bridging
Maximum analog input level **	+ 24dBu, balanced
Digital Inputs	AES/EBU and S/P DIF(Sony/Phillips)
Digital Outputs	AES/EBU and S/P DIF (Sony/Phillips)
Frequency Response**	+0/-.5dB, 20Hz-20kHz
THD+noise**	>104dBFS
Dynamic Range	see graph below
Crosstalk @1kHz,+22dBu input	<-90dB
Common mode rejection @1kHz, 1v RMS	>80dB
Sample rates:	48kHz, 44.1kHz, 32kHz, 22.05kHz
Headroom LEDs:	-54dBFS to 0dbFS (clip)

** measured in accordance to the standards established in AES17-1991.

Physical

Analog Inputs	XLR (pin 2 high) and 1/4" tip-ring-sleeve
Digital Input & output connector	XLR (AES/EBU) and RCA jack (S/P DIF)
Chassis size	1.75"H x 19" W x 7.5" D
	4.45cm H x 48.3cm W x 19.1cm D
Shipping weight	8 lbs, 3.64kg

Electrical

Power	117V ac, nominal, 95-130V ac, 50-60Hz
	230V ac, nominal, 165-255V ac, 50Hz
Power Consumption	20 watts, maximum

In the interest of continuous product improvement, Symetrix, Inc. reserves the right to alter, change, or modify these specifications without prior notice.

Performance graphs