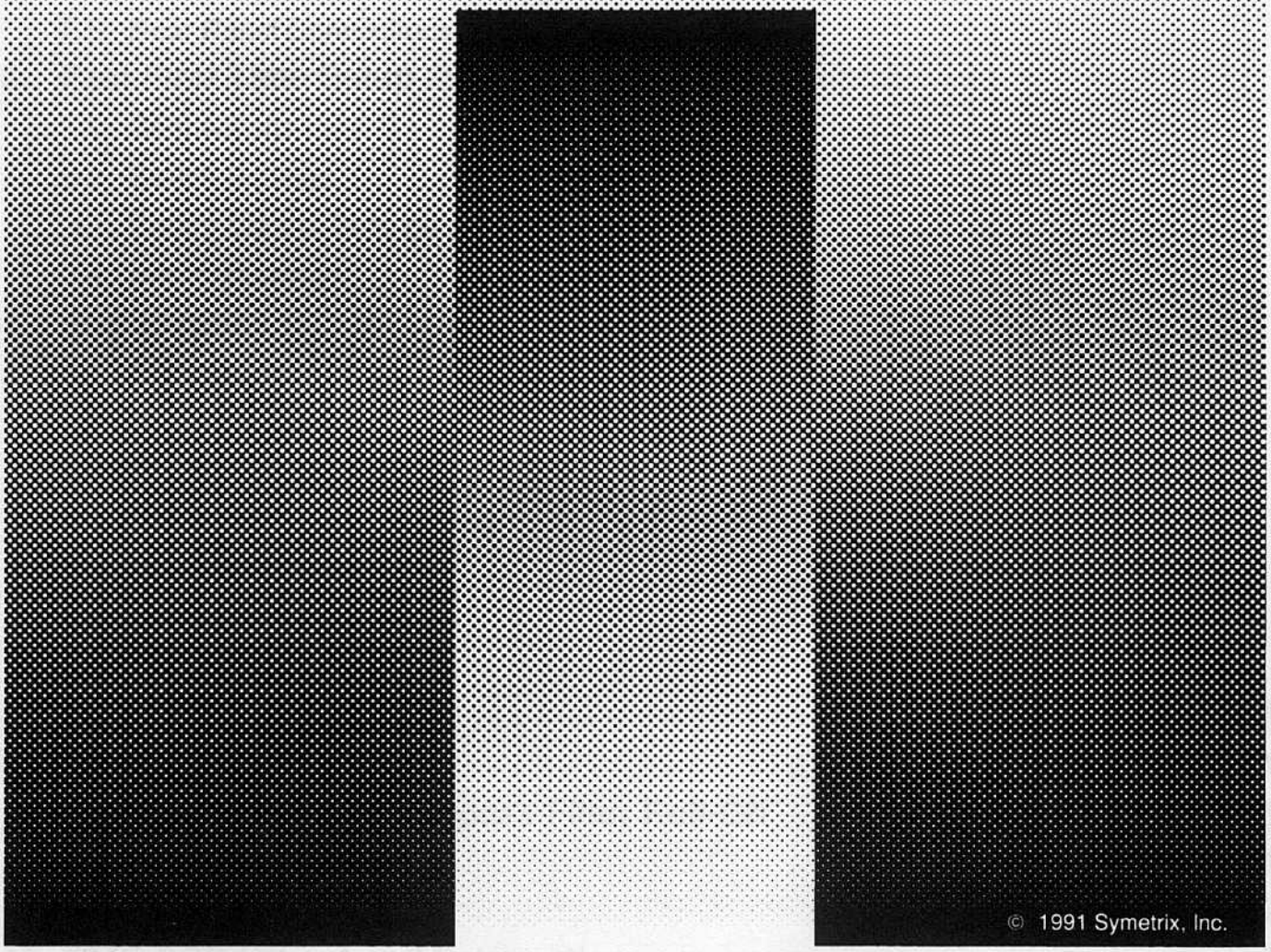
564E

Quad Expander/Gate

Operating Manual

Version 1.0
May 1/1991



4211 24th Ave. West Seattle, WA 98199 USA Telephone 206•282•2555 Fax 206•283•5504

Table of Contents

1. INTRODUCTION

Thank you for purchasing the Symetrix 564E. The following information in this manual may help you achieve optimum performance from your Quad/Expander Gate Processor.

The 564E Quad Expander/Gate has been designed to the highest professional standards for use in fixed or mobile sound systems. The use of a rugged steel chassis, double sided printed circuit boards, toroidal power transformer, and industrial grade electro/mechanical components throughout the 564E enable the product to provide years of dependable service in any and all professional audio applications.

While the 564E is easy to install and use it will greatly benefit the user to take the time necessary to read this entire manual. However, if you're going to jump right in and start using the 564E without reading the manual please, just take a minute to run through the Fast First Time Set UP - Section 3.

Any comments on our products or this manual are more than welcome.

1.1 Product Description

Each of the four channels may be individually operated in GATE or EXPander mode. Balanced or unbalanced signals may be applied to the XLR style input connectors. To further expand the 564E's functional possibilities, a control loop (send and return) is included for devices like delay lines and graphic equalizers (for enhancement of frequency sensitive operation). This allows special effects and manipulation of problem audio sources.

Wide range front panel control allows extensive signal manipulation to solve problems found in both studio and live environments. With all controls being fully variable, the level of performance you are able to extract from the 564E depends entirely on your understanding of these controls. For this reason, the following pages include a tutorial section to aid in understanding the various functions available from the 564E.

1.2 Control of Dynamic Range with Expanders and Gates

When dealing with audio signals, the term 'dynamic range' describes actual level changes, or the range over which signals fluctuate. The dynamic range of the human voice, from a whisper to a shout is well over 100dB. So a microphone will convert the sound pressure of a voice going from a whisper to a shout into an electrical output signal with a dynamic range of well over 100dB.

Expansion and gating are both derived from the same signal processing family of gain reduction. The heart of this process is based on amplifier circuitry in which the gain is dependent on the signal level passing through it. These amplifiers are known as VCA's (Voltage Controlled Amplifier). By changing the gain, based on signal conditions, the dynamic range of that signal can be automatically altered.

1.3 Threshold

The threshold is the level at which a dynamic range processor's activity begins. In operation, the dynamic range processor's sensing circuitry constantly 'looks' at the incoming signal and compares it to a reference level, which is called the threshold point. Remember, expanders and gates respond only when signals at the input are lower than the defined threshold.

1.4 Expanders & Ratio

A downward expander may be thought of as a device which causes automatic gain reduction *below* some definable signal level. In other words, an expander can be looked upon as the 'opposite' of a compressor/limiter.

Expanders typically operate at low ratios. Also, it is important to keep in mind that the ratio of an expander is the number of dB's of decrease in input level compared to the number of dB's of decrease in the output signal. At 1:3, 1dB of decrease (below threshold) at the input causes a 3dB decrease at the output.

1.5 Gates & Range

Gates can be thought of as high ratio (around 1:20) expanders. They are intended to shut out undesired signals that fall below threshold. Use the KEY input to create special effects. (See General Applications in Section 4).

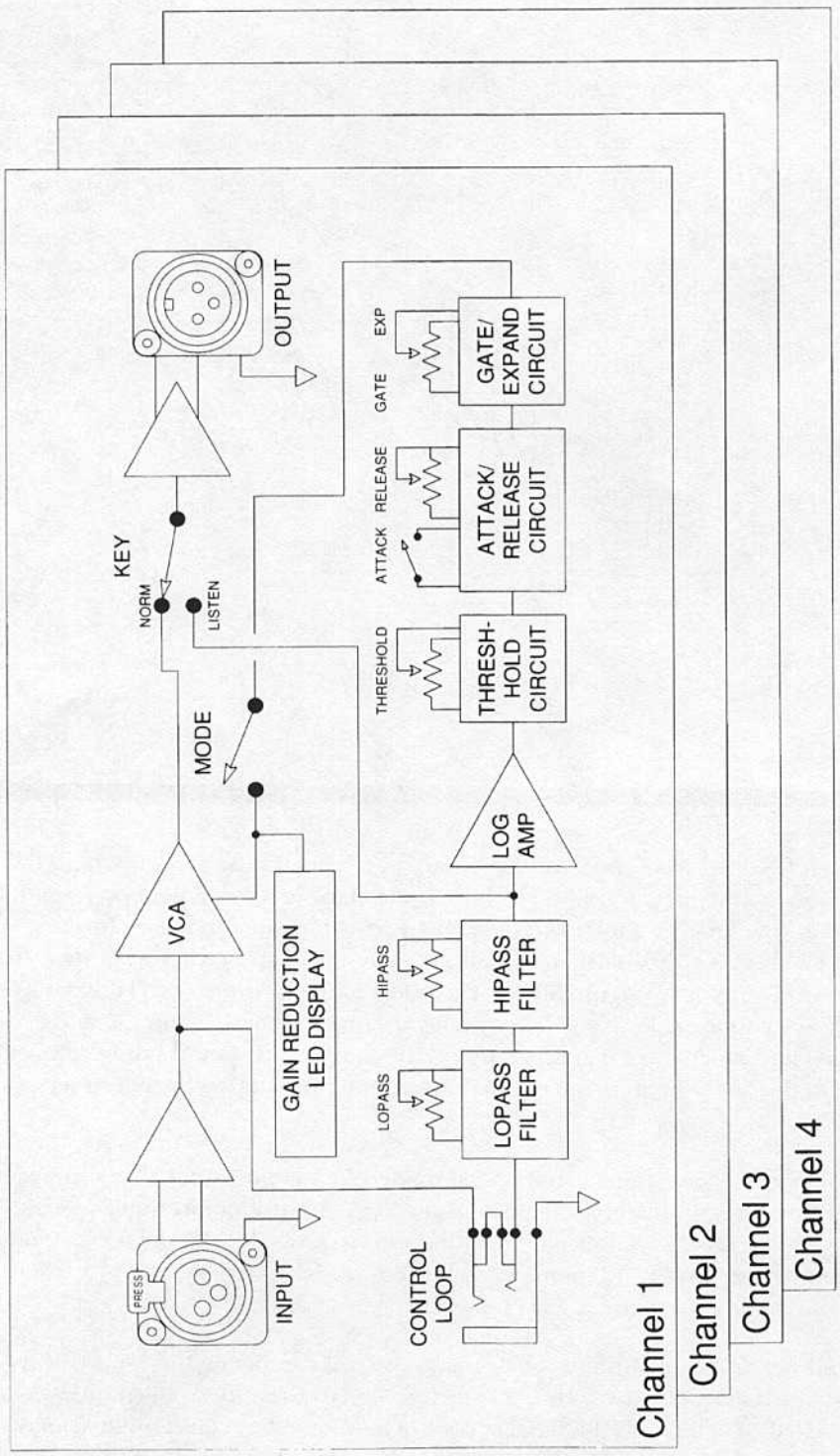
1.6 Frequency Conscious Gating

The KEY LISTEN, HIPASS and LOPASS controls together provide a feature which is commonly referred to as "Frequency Conscious Gating". Expanders and gates are built from two basic circuit elements: (1) the Voltage Controlled Amplifier [VCA] which causes the actual changes in the audio level and (2) the Control Loop which is basically a little analog computer that 'looks' at the incoming audio, the user's control panel settings, and then 'tells' the VCA what to do.

In a frequency conscious expander or gate, Lopass and Hipass controls are added to the Control Loop in order to restrict the range of frequencies fed to the analog computer. By doing so the expander or gate can be told to be very selective about which sounds it is triggered by. These signals are sometimes referred to as 'KEY' signals which is just another name for trigger. Hence, the front panel switch which allows you to listen to these signals is labelled 'KEY LISTEN'.

For example— Let's say a full drum kit is being recorded. A microphone has been positioned above the head of a floor tom. A channel of the 564E has been inserted into the console input channel for that microphone. The 564E is set in gate mode for the purpose of removing leakage from a cymbal which is in close proximity to the floor tom. Even with the directional mic positioned to reject as much cymbal as possible the 564E gate 'opens' when the drummer strikes either the floor tom or cymbal. The engineer now pushes the 564E's KEY LISTEN switch allowing him to listen to the CONTROL LOOP audio. (This is NOT the gated signal— just the audio being fed to the analog computer!) He tunes the HIPASS and LOPASS controls until the cymbal is tuned out and he is hearing primarily the floor tom. This is now the signal the analog computer will use to decide when to turn the gate on and off after the KEY LISTEN switch is released to normal position.

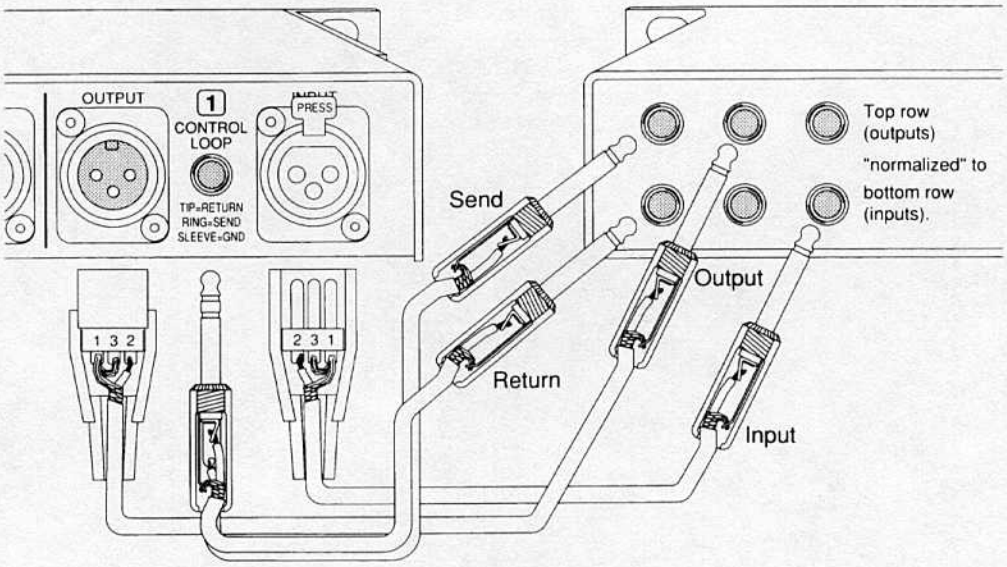
2.1 Block Diagram



This functional block diagram illustrates the signal flow into, inside of, and out of the 564E. The levels and impedance at the INPUTs and OUTPUTs are designed to match all common line level systems. All connectors are located on the rear panel, all switches and controls are located on the front panel. In the block diagram, control and switch names are enclosed with a box.

2.2 Installation

The 564E is designed for mounting in a standard 19" rack and requires only one rack space (1U). The 564E's INPUTs, OUTPUTs, and CONTROL LOOPs should be wired to a patch bay for ease of operation. A suggested arrangement for **unbalanced** operation with a **mono** patchbay is shown below. **If the 564E is used with a patchbay, the connections from the control loop must go to normalled jacks.**



2.3 Signal Levels

The 564E is designed to be used post-preamp, at a place in the system where the signals have already been amplified to line levels. 'Line level' is a generic term that's been used at one time or another to describe signals ranging anywhere from -40dBV to +20dBV. As a result there's really no way for us to predict what the actual operating levels in your system will be. The 60dB range of the 564's THRESHOLD control allows you to make it work with a wide range of line level input signals. Microphone and guitars, for example, are not line level and should not be plugged directly into the 564E. Doing so will not damage the unit, but will result in excessive noise.

The overall level in any signal chain is determined to a large extent by the transient content of the program material. Transients are very short duration signals. Peak reading LED type meters will usually respond to transients, but VU meters are designed to indicate average levels and therefore will not respond to transients. As a result, transients are long gone before a VU meter can respond.

Drums, and percussive instruments like piano or banjo, generate the kind of very large transients which are not shown by a VU meter. Signals from these instruments may trigger the 564E when the THRESHOLD control is set at +10 even though your VU meter says the level never goes above '0'. (If precise metering of short transient peaks is neccessary for your needs, Symetrix' digital SX205 Precision Audio Meter will meet the most demanding situations.) On the other hand, instruments like violins do not create large transients, so the correlation between the VU meter reading and the indicated threshold appears to be more accurate.

① **KEY - LISTEN/NORM** - Push IN to listen to the control loop HIPASS and LOPASS filter setting. OUT for normal operation (see section 1.6 for a complete explanation of KEY LISTEN)

② **ATTACK - FAST/SLOW** - Push IN to "open" the expander or gate instantaneously (FAST ATTACK) . OUT to remove the 'rising edge' from signals (SLOW ATTACK).

③ **MODE - IN/BYPASS** - Push IN to engage operation of the EXPAND or GATE effect. OUT to bypass operation.

④ **GAIN REDUCTION -** The LED meter indicates the actual level change being controlled by the VCA (voltage controlled amplifier). The meter is calibrated in dB.

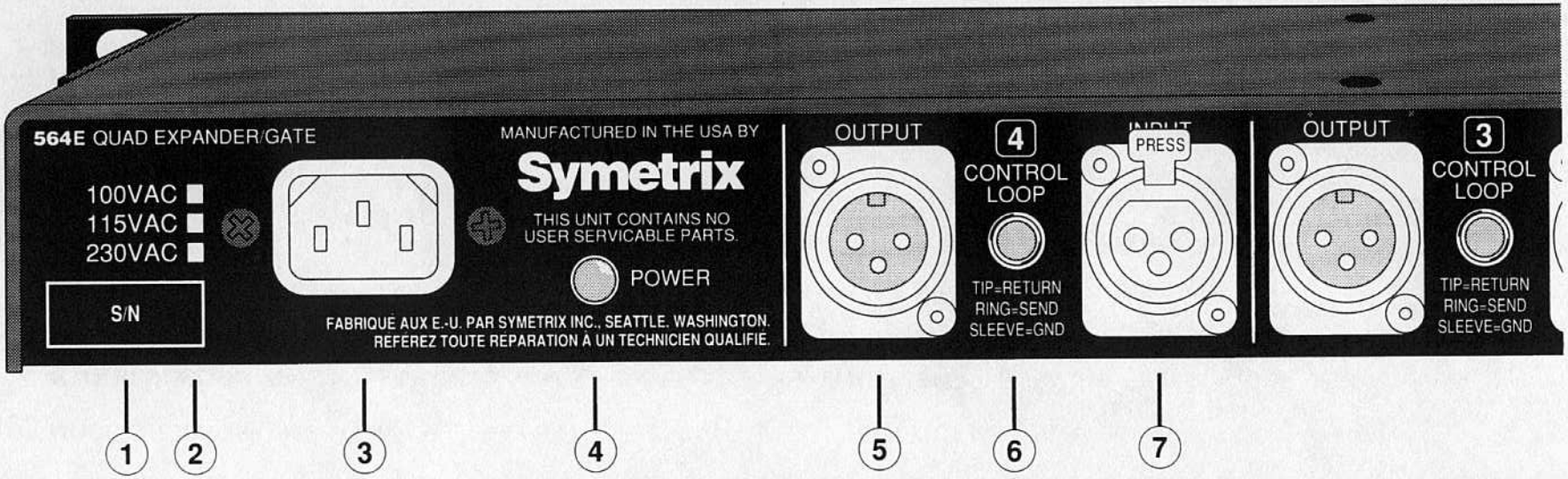
⑤ **HIPASS** - Sets the roll-off frequency of the control loop high pass filter. (see section 1.6 Frequency Conscious Gating)

⑥ **LOPASS** - Sets the roll-off frequency of the control loop low pass filter. (see section 1.6 Frequency Conscious Gating)

⑦ **THRESHOLD** - Sets the level below which expander/gate activity is initiated.

⑧ **RELEASE** - Determines how quickly (or slowly) the 564E attenuates when the signal goes below threshold.

⑨ **GATE/EXPAND** - Determines whether the 564E operates as either an expander (clockwise) or a gate (counter-clockwise). The expander ratio is increased as the control is rotated clockwise. The gate range is increased as the control is rotated counter-clockwise.



① **SERIAL NUMBER** - Take a moment and record this serial number on the upper half of the warranty card enclosed with your unit. Store the card upper portion and your manual for future reference. **Mail Us the lower half Warranty Card!!!**

② **VOLTAGE INDICATOR** - Before you plug in this unit, check that the indicated voltage is the same as the power in your area.

③ **POWER PLUG CONNECTOR** - Mates with the power cable enclosed with unit.

④ **POWER SWITCH** - See power supply schematic for placement of optional power switch.

⑤ **INPUT** - 3-pin 'XLR' type female accepts balanced or unbalanced signals. The pin connections are:

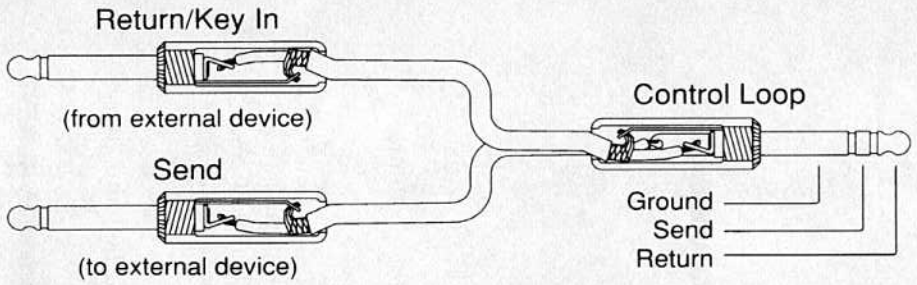
1 = Signal Ground

2 = High

3 = Low

(For unbalanced input signals pin 3 be must grounded (connect pins 1 and 3 of the mating connector.) The input impedance is greater than 45K Ω. The maximum input level is +20dBm.

⑥ **CONTROL LOOP** - This connector is unusual, and should be studied carefully. Rear panel space constraints require the use of a single TRS (tip-ring-sleeve) connector for both the in/out SIDECHAIN access to the VCA's control loop, and for external ('key') input signals. This jack accepts 1/4" 3-conductor (stereo type) plugs (Switchcraft #292 or equivalent).



CONTROL LOOP patchcord wiring. [Tip = return/key in, Ring = send, Sleeve = ground (shield)]

The CONTROL LOOP output impedance is 300Ω and the minimum load impedance is 600Ω. The CONTROL LOOP input impedance is 30K Ω and the maximum input level is +18dBm.

CAUTION

Patch cords used with the CONTROL LOOP connector must be wired as shown above. Using either 'military' type plugs or 2-conductor (mono) plugs will cause the unit to malfunction.

NOTE

Assembled patch cords are available from Switchcraft. Part numbers are:
1. 381T1 - right angle 3-conductor male TRS connector with about 6' of wire, terminated in two 2-conductor male (TS) connectors.
2. 353CP1 - straight 3-conductor male TRS connector with about 6' of wire terminated in two 2-conductor female (TS) connectors.

When the CONTROL LOOP connector is used as a send/receive patch point, the 564E's activity can be made frequency dependent, or offset in time, because the sidechain provides a signal path for the insertion of equalizers or time delays between the 564E's input and its VCA.

⑦ **OUTPUT** - 3-pin 'XLR' type male drive balanced or unbalanced loads. The pin connections are:

1 = Signal Ground

2 = High

3 = Low

In situations where the 564E drives an unbalanced load pin 3 must be grounded. The balanced output source impedance of the 564E is 200Ω. The minimum load impedance is 600Ω.

3. FAST FIRST TIME SETUP

3.1 Connections

Follow this sequence to get the 564E up and running:

INPUT - Connect to the output of the signal source to be processed.

OUTPUT - Connect to the input of the following device.

CONTROL LOOP (OPTIONAL) - Connect to and from external processing (EQ, key (trigger audio tracks), etc.

3.2 Switch Settings

KEY - This switch is normally in the out position. Leave it alone for now.

ATTACK - Push IN (fast ATTACK).

MODE - Push IN (puts system in circuit).

3.3 Rotary Control Settings

HIPASS - Set to 30Hz (fully counterclockwise).

LOPASS - Set to 30KHz (fully clockwise).

RELEASE - Set the RELEASE control to fast (fully counterclockwise).

GATE/EXP - Set to GATE (-60dB -fully counterclockwise).

THRESHOLD - To find a beginning setting for the THRESHOLD control, patch the 564E into your system and feed a normal level signal to its input.

Set the THRESHOLD control fully clockwise at +20. If you've put the unit in gate mode as instructed above you should hear nothing and all six gain reduction LEDs should be on. Slowly turn the THRESHOLD control counterclockwise until the LEDs flash and you begin to hear something. Tune the RELEASE control until you obtain the desired sound.

Use this beginning setting as a starting point whenever the 564E is patched into your system.

3.4 Meter Readings

The LED meter on each channel will not light when the GATE/EXP control is centered. The meter is peak reading and will accurately track the attenuation of the VCA (voltage controlled amplifier). Slower RELEASE times will keep the metering LED's lighted longer because they track the control voltage as it's applied to the VCA.

Note

Although the 564E's meter will not show any activity when the GATE/EXP control is in it's center position, we do not recommend this control position as a method of bypassing GATE/EXP action. Small amounts of gain reduction (less than 2dB) may occur with no indication on the meter. Use the Bypass switch to bring the signal out of the 564E circuitry.

4. APPLICATIONS

4.1 Introduction

The 564E can provide production signal processing capabilities ranging from essential to esoteric. Some of the techniques described below are standard and straightforward. Others may be used less commonly but are hopefully worthy of your investigation. The following 'patches' are intended to give you some setups you can use right away, but are not intended to represent everything you can do with the 564E.

Perhaps the most common use for gates in music production is on drum and percussion tracks. In addition gates may be used on virtually any type of musical instrument or audio sound effect to remove unwanted room noise and ambience, to modify reverb and other time related effects, and to create special effects.

A downward expander is similar to a gate but there are some major differences. Most noteworthy is this: When a signal falls below a set threshold on a gate, it falls to a predetermined level as set by the RANGE control. Not so when using a downward expander. Since we are now dealing with a RATIO setting instead of RANGE, the attenuation is still variable even when it falls below threshold. In other words the 564E will still follow the dynamic movement of the signal no matter how far the signal moves below threshold. This makes the EXPand mode ideal for tasks requiring more subtle control. Expanders can provide single-ended noise reduction for tape recorders, workstations, and effects devices, companding (when used with a compressor in situations that do not require accurate tracking), and noise and interference suppression for studio and live sound.

Note

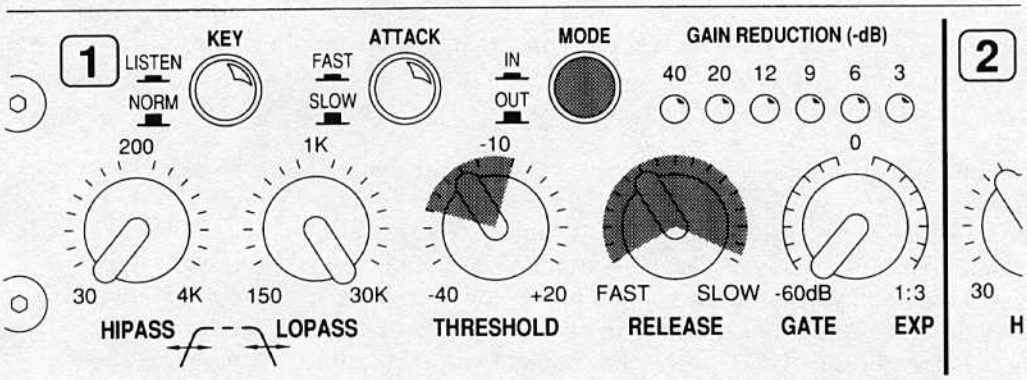
The shaded areas shown on the knobs in the following application descriptions indicate the range of settings most commonly used for that particular job.

Switches in depressed mode (not mood) are indicated with gray shading.

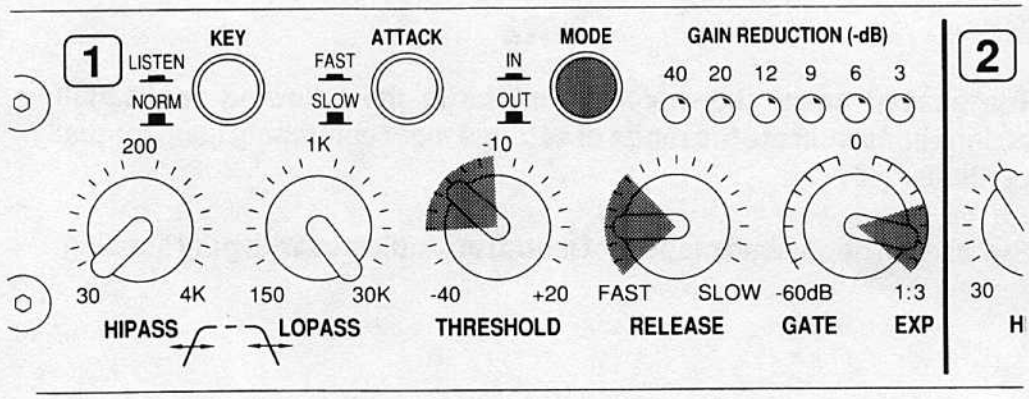
For easy access, each of the applications described in this section begins on its own page. We recommend that you use the empty space for your own notes.

4.2 Noise Elimination

It's assumed here that there's noise on the track or channel that becomes objectionable when not masked by the desired signal. Use GATE mode, with the THRESHOLD set above the background level, but just below the level of the desired signal. The gate closes whenever the signal falls below threshold, so only the desired signals are allowed to pass.



Control settings for noise elimination in GATE mode.



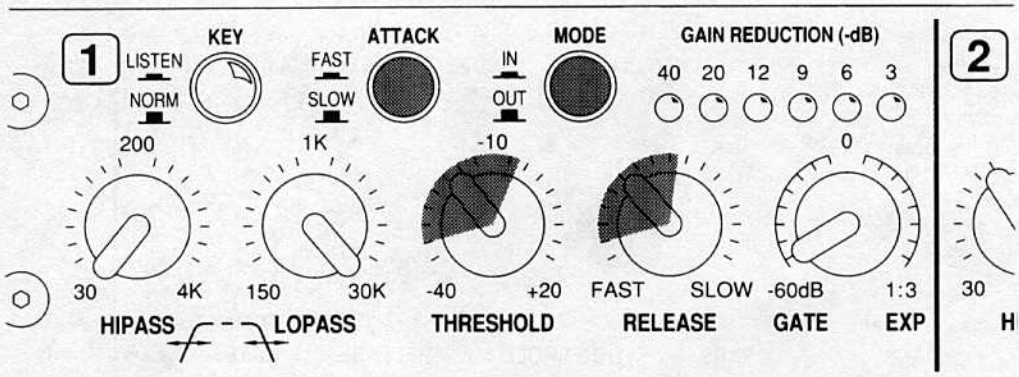
Control settings for noise elimination in EXPand mode.

For more general and gentle noise suppression (especially on voice tracks) use the EXPand mode, and set the THRESHOLD relatively low.

4.3 Tightening Up Drum Sounds

The damping effect you get by taping your wallet to the drum head is very similar to the effect achieved by gating or expanding the drums. The wallet reduces the decay (sustain) of the instrument, and helps get rid of annoying ring frequencies. Using the gate as an electronic wallet allows the drummer to play with the full power of his instruments at live performance levels, while providing the engineer with the kind of control necessary for a good, tight track.

Careful adjustment of EXPAND or GATE functions allows the relative balance between the drum's impact and decay to be changed. You can reduce the overhang (decay) as much, and as quickly, as necessary; shortening the decay makes the impact noise a much more prominent component of the total sound.



Start with the settings indicated, and be prepared for serious fine tuning. The GATE RANGE will affect the ATTACK and RELEASE so use as much attenuation as needed, but no more than necessary. FAST ATTACK TIME will sometimes create an audible turn-on click. Sometimes the click can be used to enhance the percussive effect of the sound, sometimes it's not desirable. Try SLOW ATTACK TIME if necessary.

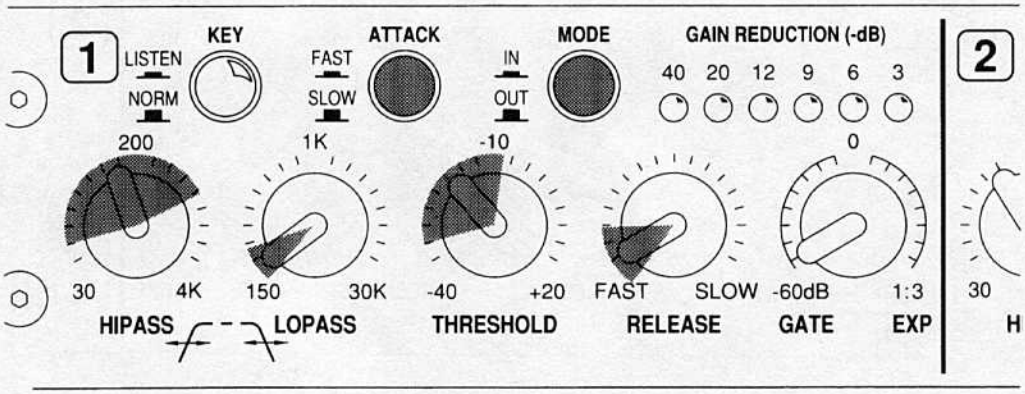
NOTE

The ability of the EXPANDER/GATE to discriminate between wanted and unwanted signals is determined in part by mic technique. Be particularly careful when high frequency instruments are located to the side or rear of a cardioid mic. Most cardioids exhibit a sharply rising off-axis response characteristic at higher frequencies. If there's only a 2 dB or 3 dB difference between the on-axis and off- axis response in the 5 kHz to 10 kHz region, cymbals may leak like crazy into your tom mics, and you may have hi-hat all over the snare mic. Use the mic's directional pattern to keep other sources as far off-axis as possible. Remember - the idea is to do everything you can to extract all the source-to source discrimination possible through good mic technique. The sounds picked up by the individual mics have to be primarily the sound of the individual drums, or the gate won't be able to tell the difference.

4.4 Preventing False Triggering by Hi-hat and Kick While Gating a Snare

It doesn't matter if it's live or in the studio— sometimes you just don't have as many mics as you would like for your drum setup. Typically one of the first places a compromise is made is on the snare and high-hat. Well , we can just use one mic for both... right? This is all fine and well if there is no concern for bleed-through, but if you want to gate the snare drum, the chances are better-than-good that the hi-hat is going to give your patience a run for the money when it comes to setting the threshold without false triggering by the hi-hat.

This example will show you the basic procedure to applying the Hipass and Lopass filters to gating a signal. It's a little bit of a "tweaky" procedure as the filters are somewhat interactive with the Attack and Threshold controls but the extra effort is well worth it.



Start off with the Hipass filter in the full counter-clockwise position and the Lopass filter in the full clockwise position. The remaining controls are set as shown above. Have the drummer play just the snare and hi-hat. Adjust the Threshold to allow gating to occur (even though the hi-hat may trigger the gate at this point).

Now push in the Key Listen switch. Rotate the Lopass filter control to it's full counter-clockwise position. For all practical purposes, the hi-hat should be much less audible and the snare should be a muffled "thud."

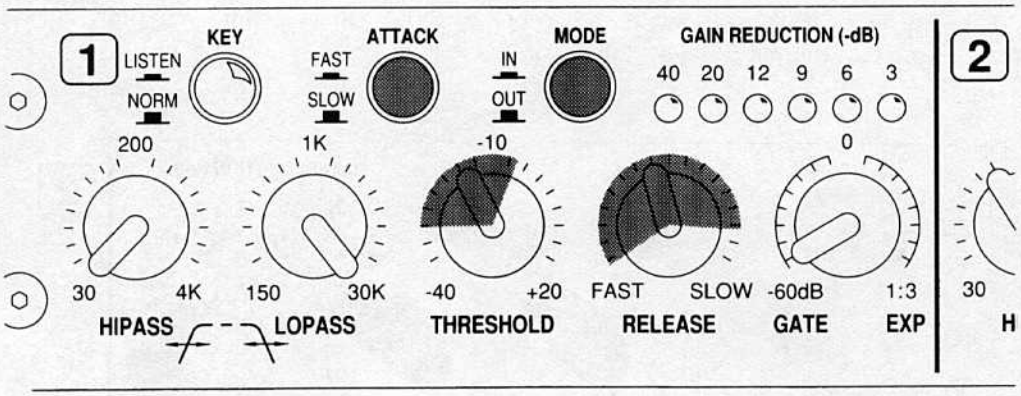
Release the Key Listen switch to it's NORM position. You may have to re-adjust the Threshold control slightly at this point. The snare should be gated now without any false triggering by the hi-hat.

With the Key switch still in NORM mode, have the drummer play the snare again, but this time with kick accompaniment. If the kick drum is triggering the snare gate rotate the Hipass control clockwise until the gate no longer triggers by the kick drum.

4.5 Sound Re-enforcement Console Sub-Outs

Two 564E's can greatly improve the over-all signal-to-noise ration of sound re-enforcement consoles. One could just gate the final output of the board, but with the flexibility of four channels of either gating or downward expansion available on a 564E, a cost effective method of enjoying a noise-free sound system is at your finger tips without gating every individual channel.

Most of the consoles on the road out there are of the eight subgroup output variety. Assign each subgroup output to one channel of the 564E's. When the subs are carrying a fast transient signal like drums or percussion, use the gate mode with the appropriate attack and release times.



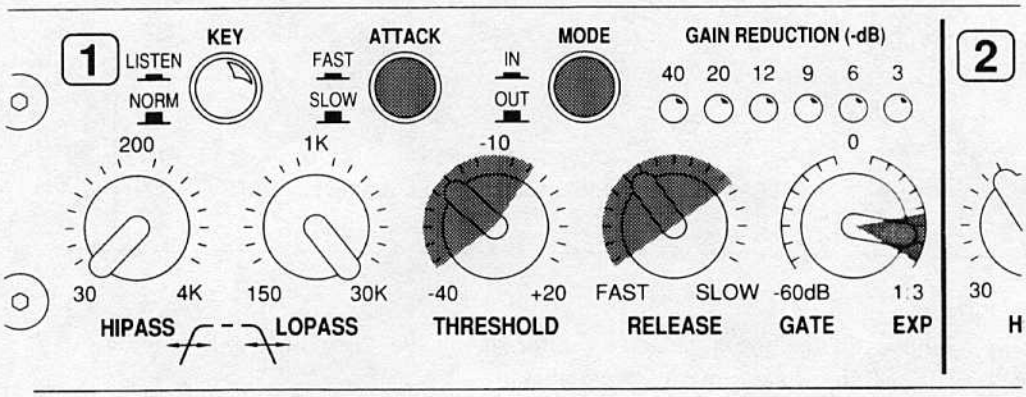
On other sub-outs that are dedicated to softer signals like vocals use slower release times when gating or use downward expansion.

4.6 EFFECTS RETURNS

One of the most overlooked noise sources in a full sound re-enforcement or recording system is the signal processing racks. The very nature of compressors and limiters raises the apparent noise floor of a signal as the dynamic range is squashed. Devices like reverbs, delay lines, harmonizer, etc. have come down drastically in price over the last years so they are now common tools in small studios and home recording set-ups. Unfortunately, as neat as a lot of these toys are, its all too easy to end up with processing in your rack that sounds great but the signal-to-noise ratio is less than desirable.

Sometimes one would listen to a processing device and say "Well that's pretty quiet." —but it's collective noise that is the culprit. Once you have five, six or more pieces of gear running, you can easily end up with an objectionable noise floor.

Try patching the 564E between the EFX outputs and the EFX RETURNS on the console. Use the 564E in it's EXPand mode as shown below. Slower Release times are preferable here to retain the natural decay times of reverbs etc.



4.7
Vocal Monitors

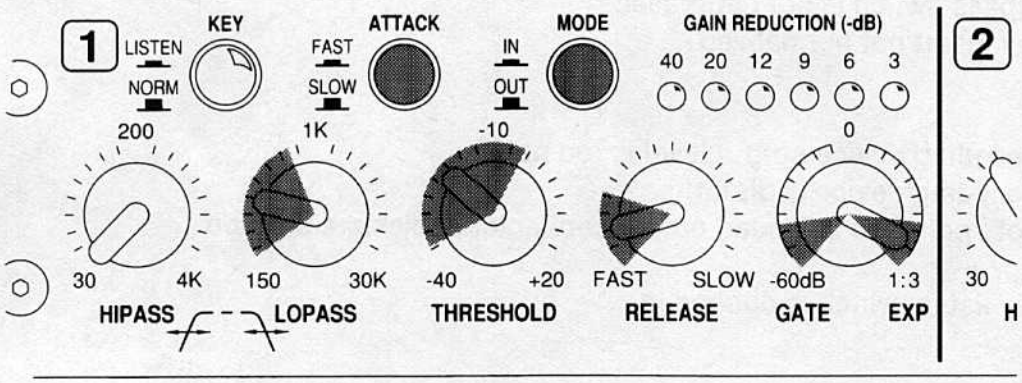
Here's one of the golden uses of the 564E— increasing gain and cleaning up the main vocal mic in stage monitor systems. Again, prepare yourself for a little fine tuning, but you sound guys in clubs with medium size stages will be pleased you took the time.

First set up the 564E in the EXPand mode as shown below with a fairly fast release time. The threshold should be set to trigger on normal level speech.

Next, with the KEY switch in Listen mode, roll off some of the high frequencies. This will take care of a lot of drum cymbal leakage. In small to medium size club stages it is not uncommon for the center mic singer to be just 2-4 feet in front a the drum set bashing away directly behind him (okay... *or her*). If you wish, apply some roll-off to the lows. This will help prevent the downward expander from triggering if the singer likes to rock the mic stand.

Get back to the KEY NORM mode and do your final threshold adjustments as well as any filter fine tuning.

You may prefer to use the GATE mode if the EXP mode is not enough signal attenuation for you.



5. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE
NO SOUND AT OUTPUT	Does the meter show attenuation? If so check your threshold setting, as it may be too high to ever let any signal through. Are all connections solid and correct? (99.9% of all problems in the audio field are due to wiring and patching!)
NO APPARENT EFFECT FROM GATE	Threshold too high? Release time is set to long? Hipass filter is set fully clockwise while Lopass filter is set fully counter-clockwise. (The VCA thinks the signal has been nulled out to the point it is considerably below threshold minimum. [see appendix on page 16]) Bypass switch is not depressed? Key insert not normalized?
DISTORTION AT OUTPUT	Preceding device output level is too hot? Preceding device is distorting? 'Hot ' points of balanced output connector cables are shorted.
OUTPUT SOUNDS COLORED OR EQ'D	Key listen switch is pushed in.

6. 564 SPECIFICATIONS

S/N Ratio	92 dB at 0dBv in, 0dBv out
Dynamic Range	110dB
THD at 1kHz, into 600Ω	.03% 0dB g/r .05% 10dB g/r
Freq. Response (+0dB, -1dB)	20Hz to 20kHz
Input	Electronically balanced
Impedance	>20kΩ
Max Input Level	+18dBv Bal., +18dBv Unbal.
CMRR at 1kHz	>40dB
Output	
Impedance	200Ω Bal., 100Ω Unbal.
Max level into 600Ω bal.	+24dBm
Max level into 600Ω Unbal.	+18dBm
Control Loop Input (Key Input)	Unbalanced
Impedance	30kΩ
Max Input	+18dBv
Control Loop Output	Unbalanced
Impedance	300Ω
Control Voltage Rejection Measured at output with 100Hz square wave applied to key input	80dB
Threshold	-40dBv to +20dBv
Expander	Soft-knee
Attack (Fast)	50dB/2mS
Attack (Slow)	50dB/2mS
Release (Fast)	50dB/.7 sec
Release (Slow)	50dB/8.5 sec
Ratio	1:1 to 1:3
Max. Attenuation	>50dB
Gate	
Max. Attack	50dB/50uS
Min. Attack	50dB/200uS
Max. Release	50dB/2mS
Min. Release	50dB/3 sec
Range	0-60dB
Lopass/Hipass Filters	
Response	12dB/octave
Frequency Response (fully open)	30Hz - 30kHz
Hipass Filter Range	30Hz to 4kHz
Lopass Filter Range	150Hz to 30kHz
Crosstalk	>90dB @ 20kHz
Power Requirements	117VAC, 140ma 220VAC, 70ma

Physical

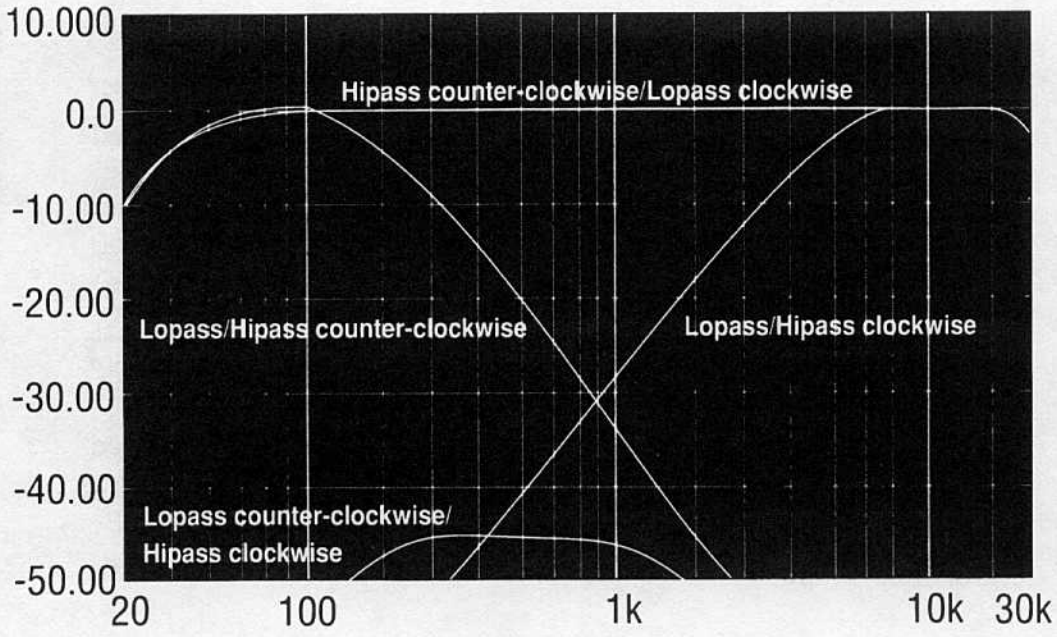
Size Chassis: 1.7"H x 17.4"W x 9.6 "D (4.3cm H x 45cm W x 24.4cm D)
Front Panel: 19"W x 1.75"H (48.3cm W x 4.5cm H)

Shipping Weight 11lbs (5kg)

7. APPENDIX A Hipass & Lopass Filter Roll-off

A look at Table 7.1 shows one position of Hipass and Lopass filter controls that will result in redundancy: If you rotate the Hipass control fully clockwise, and the Lopass control fully counter-clockwise, the signal is almost totally filtered out of the VCA's "eye."

With this setting, a signal entering the 564E at 0dB will appear at a -45dB level at the control circuit. This is below the minimum threshold point of the 564E so no signal processing can occur.



Bandpass vs Frequency

Input: 20Hz-30kHz sweep at 0db.

8. SERVICE INFORMATION

6.1 Return Authorization

Symetrix will service any of its products, no matter when it was manufactured or what condition it's in. However, no goods will be accepted without a Return Authorization number.

BEFORE SENDING ANYTHING TO SYMETRIX, CALL FOR AN R/A NUMBER. JUST ASK, WE'LL GLADLY GIVE YOU ONE! CALL (206) 282-2555 WEEKDAYS, 8 AM TO 4:30 PM PACIFIC TIME.

6.2 In-Warranty Repairs

To get your unit fixed:

1. Call for an R/A number.
2. Pack the unit in its original packaging materials
3. Put the R/A number on the outside of the box.
4. Ship it to Symetrix freight pre-paid.

Just do those four things, and repairs made in-warranty will cost you only the one-way freight fee. We'll pay the return freight.

However, if you send it to us in some kind of flimsy non-Symetrix packaging we'll have to charge you for proper shipping materials. We won't return the unit in anything but the original Symetrix packaging. And of course, if the problem turns out to be operator inflicted, you'll have to pay for both parts and labor. In the event there is a charge, you will pay for the return freight. All charges will be C.O.D. (and we do mean CASH on delivery).

6.3 Out-of-Warranty Repairs

We'll gladly service any Symetrix product, any time. If the warranty period is passed you'll be billed for all necessary parts, labor, packaging materials, as well as any applicable freight charges.

Remember, you must call for an R/A number before you send the unit to Symetrix.

9. LIMITED WARRANTY

The Symetrix 564E Quad Expander/Gate is designed and manufactured for use in professional and studio audio systems. Symetrix, Inc., warrants that the 564E manufactured by Symetrix, when properly installed, used and maintained in accordance with instructions contained in the manufacturer's operator's manual, will perform according to the specifications set forth in the operator's manual.

Symetrix expressly warrants that the 564E will be free from defects in material and workmanship for one (1) year. Symetrix' obligations under this warranty will be limited to repairing or replacing, at Symetrix' option, the part or parts of the 564E which prove defective in material or workmanship within one (1) year from the 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 and Buyer will prepay all freight charges to return any products 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 via United Parcel Service by Symetrix, to any location within the Continental United States. 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, INC.'S WARRANTY OBLIGATION AND BUYER'S REMEDIES HEREUNDER ARE SOLELY AND EXCLUSIVELY AS STATED HEREIN.

The Symetrix 564E 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, limitations 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, Inc. within thirty (30) days of the date of purchase.

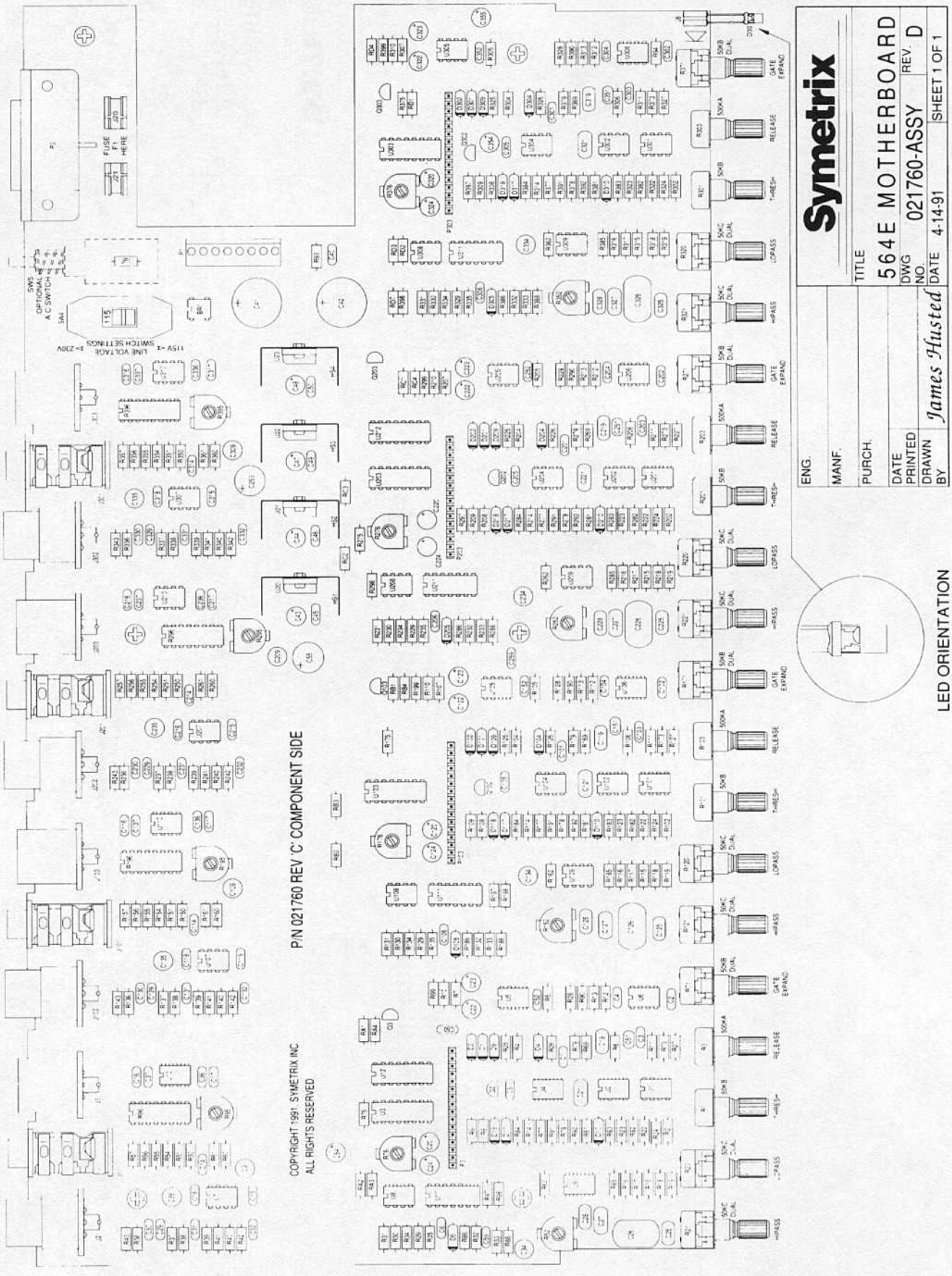
Symetrix does not authorize any third party, including any dealer or sales representative, to assume any liability or make any additional warranties or representation regarding this product performance on behalf of Symetrix.

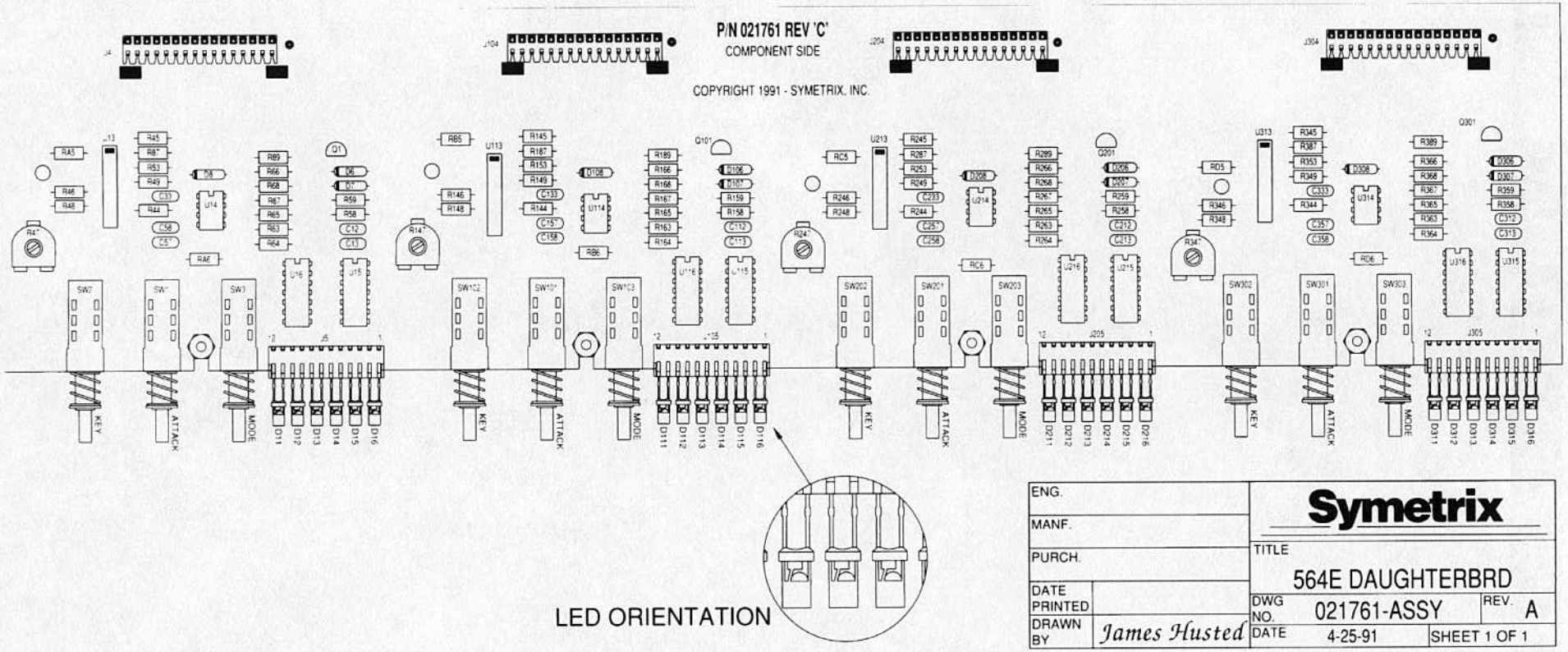
This limited warranty gives the buyer certain rights. You may have additional rights provided by applicable law.

LIMITATION OF LIABILITY

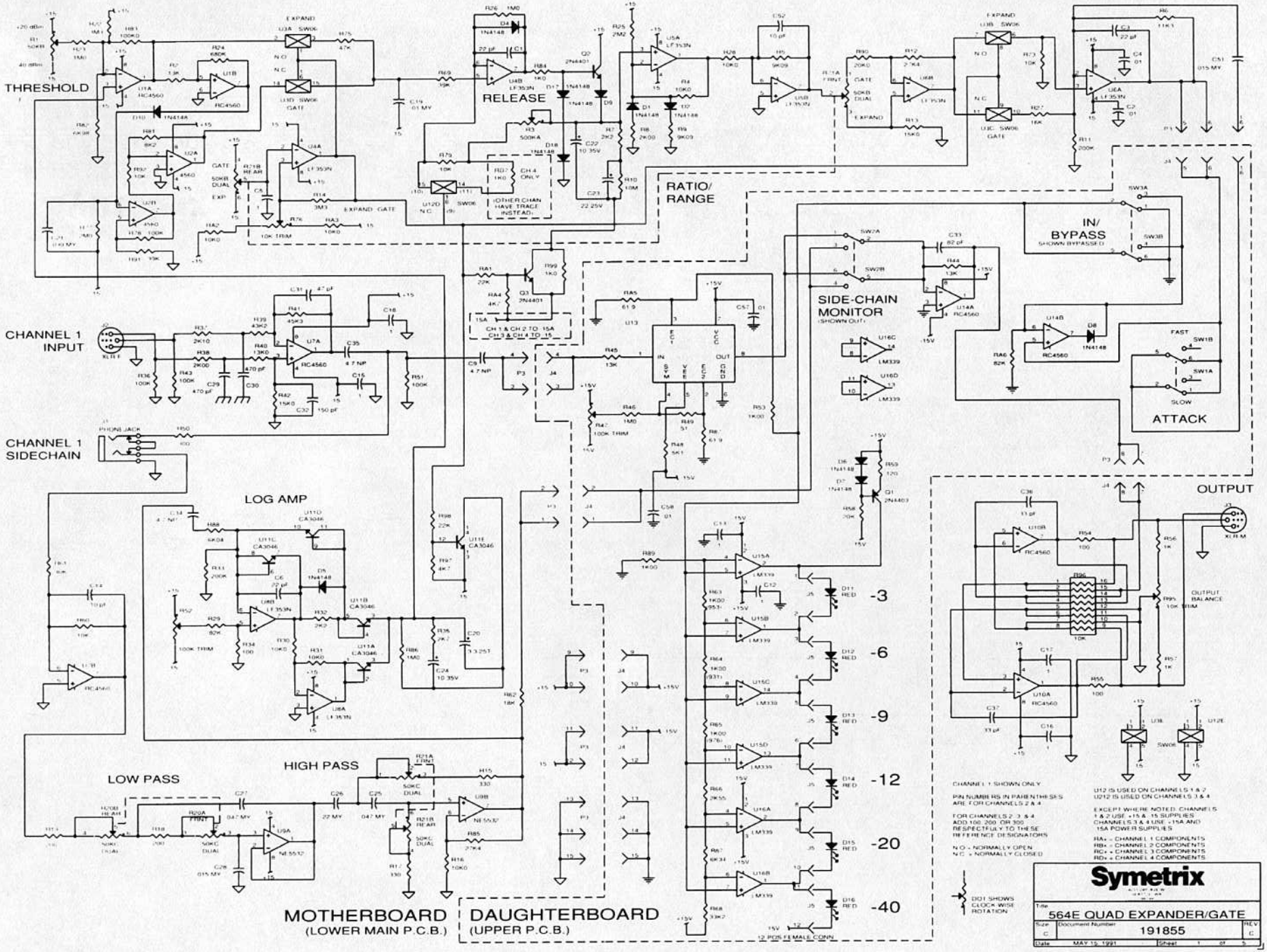
The total liability of Symetrix, Inc. on any claim, whether in contract, tort (including negligence) or otherwise arising out of, connected with, or resulting from the manufacture, sale delivery, resale, repair, replacement or use of any product will not exceed the price allocable to the product or part thereof which gives rise to the claim. In no event will Symetrix, Inc. 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 sources.

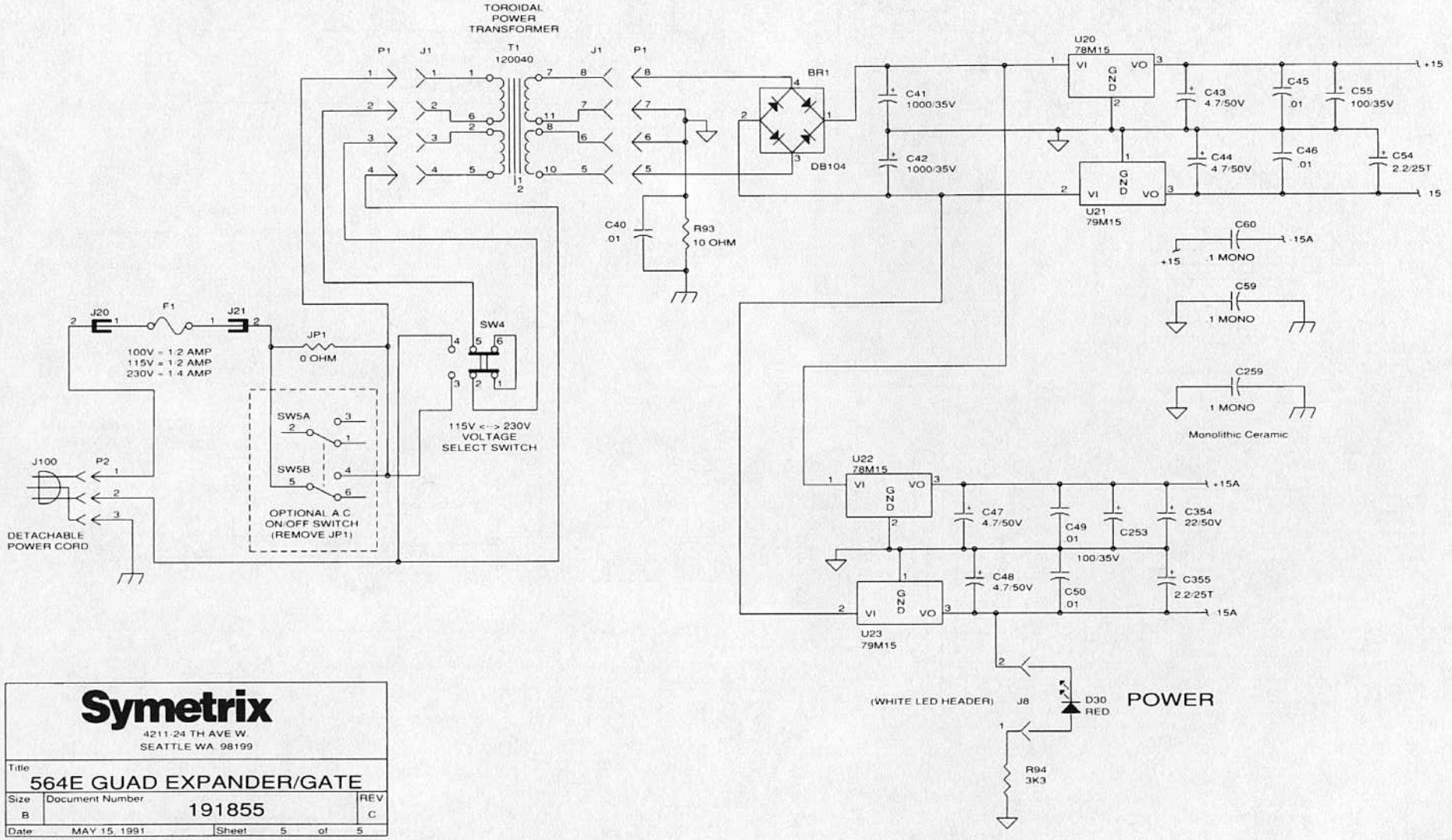
10. 564 PCB LAYOUT & SCHEMATICS





ENG.		Symetrix	
MANF.		TITLE	564E DAUGHTERBRD
PURCH.		DWG NO.	021761-ASSY REV. A
DATE PRINTED		DATE	4-25-91 SHEET 1 OF 1
DRAWN BY	James Husted		


THRESHOLD
RELEASE
RATIO/
RANGE
IN/
BYPASS
SHOWN BYPASSED
SIDE-CHAIN
MONITOR
(SHOWN OUT)
ATTACK
FAST
SLOW
CHANNEL 1
INPUT
XLR F
CHANNEL 1
SIDECHAIN
PHONE JACK
LOG AMP
LOW PASS
HIGH PASS
OUTPUT
XLR M
OUTPUT
BALANCE
TRIM
-3
-6
-9
-12
-20
-40
MOTHERBOARD
(LOWER MAIN P.C.B.)
DAUGHTERBOARD
(UPPER P.C.B.)
12 POS FEMALE CONN
CHANNEL 1 SHOWN ONLY
PIN NUMBERS IN PARENTHESES
ARE FOR CHANNELS 2 & 4
FOR CHANNELS 2, 3 & 4
ADD 100, 200 OR 300
RESPECTIVELY TO THESE
REFERENCE DESIGNATORS
N.O. = NORMALLY OPEN
N.C. = NORMALLY CLOSED
DOT SHOWS
CLOCK WISE
ROTATION
U12 IS USED ON CHANNELS 1 & 2
U212 IS USED ON CHANNELS 3 & 4
EXCEPT WHERE NOTED, CHANNELS
1 & 2 USE +15 & -15 SUPPLIES
CHANNELS 3 & 4 USE +15A AND
-15A POWER SUPPLIES
RA= - CHANNEL 1 COMPONENTS
RB= - CHANNEL 2 COMPONENTS
RC= - CHANNEL 3 COMPONENTS
RD= - CHANNEL 4 COMPONENTS
Symetrix
Title
564E QUAD EXPANDER/GATE
Size
C
Document Number
191855
REV
C
Date
MAY 15, 1991
Sheet
1
of
5



Symetrix 4211-24 TH AVE W. SEATTLE WA 98199		
Title: 564E GUAD EXPANDER/GATE		
Size: B	Document Number: 191855	REV: C
Date: MAY 15, 1991	Sheet 5 of 5	