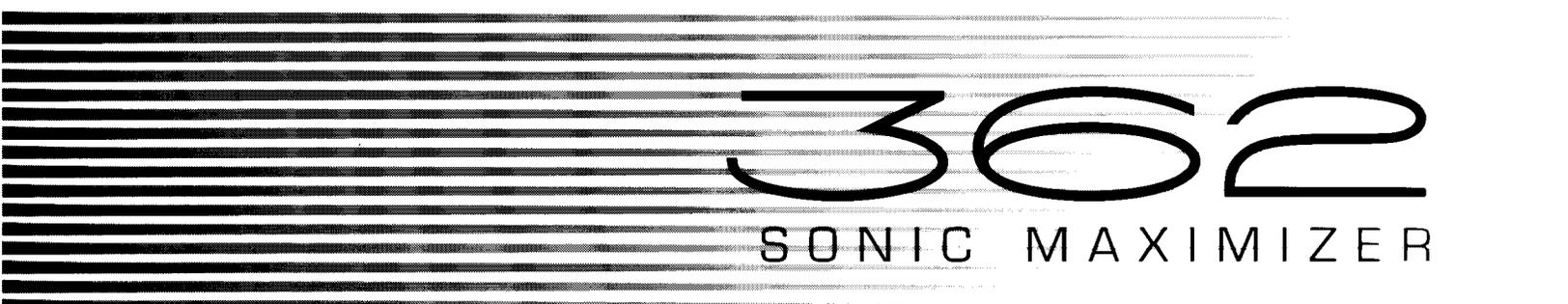


**BBE<sup>®</sup>**  
**Sound Inc.**

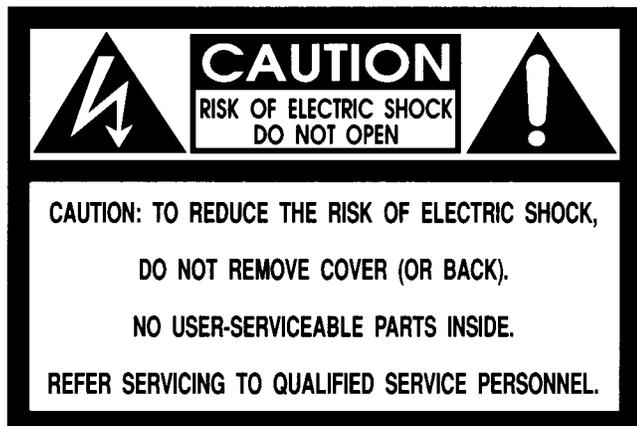


**302**

SONIC MAXIMIZER

**USER MANUAL**

# Important Safeguards



## WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

**ATTENTION: RISQUE DE CHOC ELECTRIC- NE PAS OUVRIR.**



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to 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 a equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

For your protection, please read these safety instructions completely before operating the appliance, and keep this manual for future reference.

Carefully observe all warnings, precautions and instructions on the appliance and described in the operating instructions supplied with the appliance.

## INSTALLATION

**Water and Moisture** - Do not install the appliance near water: for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.

**Heat** - Do not install the appliance near sources of heat such as radiators, heat registers, stoves, or other appliances that produce heat.

**Ventilation** - Situate the product so its location or position does not interfere with its proper ventilation. For example, you should not place the product on a bed, sofa, rug, or similar surface that might block the vent openings, or placed in a built-in installation, such as a bookcase or cabinet that might impede the flow of air through the ventilation openings.

**Wall or Ceiling Mounting** - If your appliance can be mounted to a wall or ceiling, mount it only as recommended.

## USE

**Power Source** - Connect the appliance to a power supply only of the type described in the operating instructions or as marked on the appliance.

**Power-Cord Protection** - Route the power cord so that it is not likely to be walked on or pinched by having objects placed on it, paying particular attention to the plugs, receptacles, and the point where the cord exits from the appliance.

**Grounding or Polarization** - Do not defeat the grounding or polarization feature of the AC power cord. If your AC receptacle will not accept the power cord plug, contact your electrician to install a proper AC receptacle.

**When not in use** - Unplug the power cord of the appliance from the outlet when left unused for a long period of time. To disconnect the cord, pull it out by grasping the plug. Never pull the plug out by the cord.

**AC Receptacle** - Check to make sure that the AC receptacle holds the power cord plug firmly and securely. If the power cord plug is loose, contact your electrician to replace the defective and unsafe AC

**Foreign Objects** - Be careful that foreign objects and liquids do not enter the enclosure through openings.

## SERVICE

Unplug the appliance from the wall outlet and consult qualified service personnel when:

- the power cord or the plug has been damaged.
- a solid object or liquid has fallen into the cabinet.

- the appliance has been exposed to rain or moisture.
- the appliance does not appear to operate normally or exhibits a marked change in performance.
- the appliance has been dropped, or the enclosure damaged.

Do not attempt to service the appliance beyond that described in the operating instructions. For all other servicing, refer to qualified service personnel **only**.



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Congratulations on your purchase of the BBE 362 Sonic Maximizer, a two channel signal processor that will benefit any sound reproduction system. You now own a very unique signal processing device with no other equal in the audio world. Whether you purchased the BBE 362 for your home studio or club P.A. system, you will find the unit's rugged construction and careful electronic design a welcome addition to your audio system.

This manual will help you use BBE more effectively and in ways of which you may not be aware. Reviewing of the information contained in this manual will answer most of the common questions that our service department receives. But if you still have questions, please feel free to call (714) 897-6766.

---

## The BBE Process--"What it is"

Loudspeakers have difficulty dealing with the electronic signals supplied by an amplifier. These difficulties cause such major phase and amplitude distortion that the sound reproduced by a speaker differs significantly from the sound produced by the original source.

In the past, these problems proved unsolvable and were thus delegated to a position of secondary importance in audio system design. However, phase and amplitude integrity is essential to accurate sound reproduction. Research shows that the information which the listener translates into the recognizable characteristics of a live performance are intimately tied into complex time and amplitude relationships between the fundamental and harmonic components of a given musical note or sound. These relationships define a sound's "sound".

When these complex relationships pass through a speaker, the proper order is lost. The higher frequencies are delayed. A lower frequency may reach the listener's ear first or perhaps simultaneously with that of a higher frequency. In some cases, the fundamental components may be so time-shifted that they reach the listener's ear ahead of some or all of the harmonic components.

This change in the phase and amplitude relationship on the harmonic and fundamental frequencies is technically called "envelope distortion." The listener perceives this loss of sound integrity in the reproduced sound as "muddy" and "smeared." In the extreme, it can become difficult to tell the difference among musical instruments, for example, an oboe and a clarinet.

BBE Sound, Inc. conducted extensive studies of numerous speaker systems over a ten year period. With this knowledge it became possible to develop an ideal speaker and to distill the corrections necessary to return the fundamental and harmonic frequency structures to their correct order. While there are differences among various speaker designs in the magnitude of their correction, the overall pattern of correction needed is remarkably consistent.

The BBE process is so unique that 42 patents have been awarded by the U.S. Patent Office.

---

## "How It Works"

The BBE Process imparts a pre-determined phase correction to the high frequencies where most harmonic information exists. This is done by breaking the signal into three sub-bands or groups: the low frequency group which is crossed over at 150Hz, the mid-range group which is crossed over at 1200Hz and the high frequency group that handles everything else up to 20kHz.

The low group is delayed about 2.5 ms (milliseconds) via a group delay within a passive low pass filter. The front panel control allows for either a flat response or a boost of the lows at 50Hz.

The mid-range group is delayed only about 0.5ms and passes through an active band-pass filter while the high frequency group is passed through a high quality VCA (Voltage Controlled Amplifier). The high group is used as a point of reference to make dynamic amplitude corrections to the high frequencies.

The RMS average loudness detectors continuously monitor both the mid-range and high frequencies to compare the relative harmonic content levels of the two bands and apply the appropriate amount of control voltage to the VCA, thereby determining the amount of high frequency harmonic content present at the final output of the BBE processor.



---

## PRODUCT DESCRIPTION

The BBE 362 is an intelligent audio processor designed to solve a series of complex problems as described in the previous section. It is, however, very simple to set-up and operate and once installed will function flawlessly without further attention.

It is a dual channel, rack-mountable device for use in -10dBu unbalanced line level applications such as those found in semi-professional and musical instrument applications. The BBE 362 takes up one EIA standard rack space of 19 inches width and 1.75 inches height (1U). There are two separate channels that share common front panel controls to allow for either full stereo program or two independent mono channels: A house P.A. mix feed for one channel and the stage monitor feed for the other channel.

BBE applies different phase and algorithms to three separate frequency bands. The variable front panel control allows the user to adjust the amount of process desired.

---

### Using Your New BBE 362

BBE is a process to be added before all other mixing of reverb, special effects or equalization in order to increase the clarity and intelligibility of the program material.

Unlike many aural exciters or equalizers, the BBE 362 does not add any extra noise or harmonics to the sound. Thus, there will be no future problems in duplication or mastering caused by aberrant high frequency distortion. Since the BBE technology is a single-stage process, there is no need for encoding or decoding.

Always "A-B" the processed to unprocessed sound with the Process In/Out Switch to adjust the amount of processing required to suit your own musical tastes.

---

### Things to Remember

The BBE 362 is designed to work in -10dBu levels. This is suitable for most semi-pro mixers, P.A. consoles, home stereos or disco equipment. The BBE 362 drives load impedance down to about 1K Ohms and supplies a maximum level of +16dBu. Plugging a guitar or a microphone directly into the BBE 362 will not work, as the impedance level is much too low.

If the program material has excessive background noise, the noise may be modulated with the program. In this case, an equalizer or some type of noise reduction system should be inserted in front of the BBE 362 to roll off the noise first.

---

### Set-Up

The BBE 362 is connected into the chain in series with the signal path--the same way a graphic equalizer or limiter is connected. The output of the mixer, pre-amp or tape recorder feeds the input of the BBE 362. Remember, source outputs connect to the BBE's inputs and as long as the signal source level is within the nominal range as mentioned in the previous section, the BBE 362 will function perfectly.

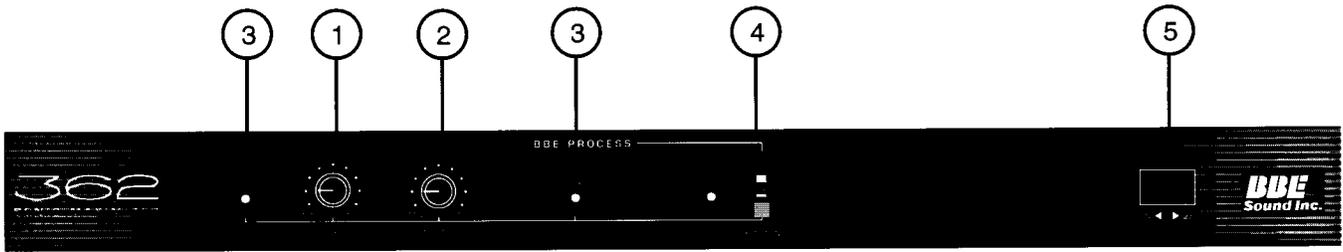
Setting-up and using the BBE 362 as an echo send device like a digital reverb is **not** recommended. The processing effect is not fully realized when the output of the BBE 362 is summed with the original source audio.

### WARNING!

It is good to turn on any effects boxes such as BBE, equalizers, expanders, surround sound accessories, etc, and the preamp **BEFORE** turning on the power amplifier. Otherwise damage to the speakers or amplifier may result.

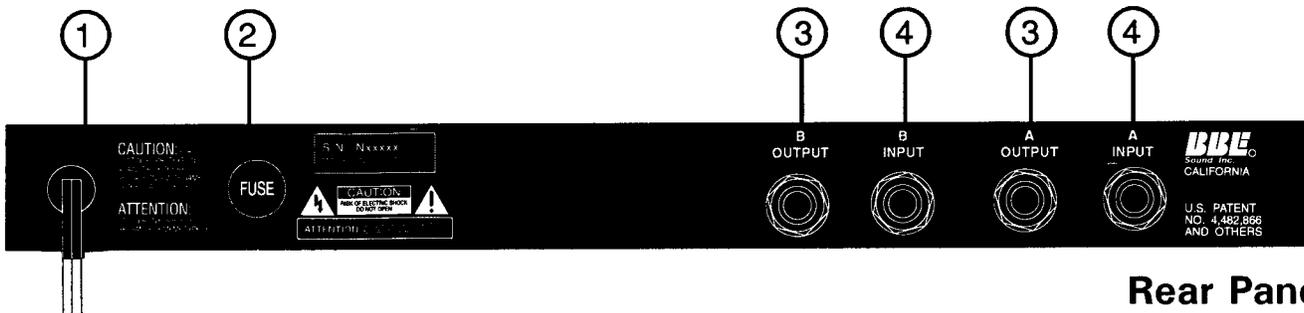
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## PANEL CONTROLS



### Front Panel

1. **LO CONTOUR:** Each channel shares a common **Lo Contour** control that regulates the amount of phase compensated bass equalization. This adjustment ranges from 0dBu (fully counter-clockwise) to +10dBu (fully clockwise) at 50Hz relative to the input.
2. **PROCESS:** Each channel shares a common **Process** control that regulates the amount of phase compensated high frequency equalization. This adjustment ranges from 0dB (fully counter clockwise) to +10dB (fully clockwise) at 2.5kHz relative to the input.
3. **CLIP LED:** This LED indicates that the output of the BBE 362 has reached the maximum output level of +15dBu.
4. **FUNCTION:** This unit is equipped with a function push-button switch which allows for a quick comparison of processed with unprocessed sound. When the switch is depressed, the green "In" LED lights. When the switch is out, the LED will be red.
5. **POWER:** This switch controls primary power to the BBE 362.



### Rear Panel

1. **AC POWER CORD:** Plugs into AC power receptacle. U.S. Model, 100-120Vac, 50/60Hz. Standard Model, 200-240Vac, 50/60Hz.
2. **FUSE:** Turn cap on fuse holder counter-clockwise to remove fuse. (Note: For U.S. Model, replace with 250Vac, ½A Fastblow type fuse. For standard Model, replace with 250Vac, .125A Fastblow type fuse.)
3. **HI-Z UNBALANCED ¼" OUTPUT:** Each channel is equipped with a ¼" phone jack that is a low impedance unbalanced line level output and can deliver up to +16dBu into 1K Ohms.
4. **HI-Z UNBALANCED ¼" INPUT:** Each channel is equipped with a ¼" phone jack that accepts a high impedance unbalanced line level input with an average of -10dBu. (Note: +16dBu is the maximum input before clipping.)



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## APPLICATIONS

### Music and P.A. Systems

The BBE 362 has become a popular addition to many P.A. systems because it makes a dramatic improvement to the clarity of the vocals without the usual excessive brightness associated with equalizers. In addition, the intelligibility of the monitor mix is greatly improved with the BBE process. To add the BBE process to the entire mix, insert the BBE 362 between the console output buss and the amplification stage in the P.A. System.

The BBE 362 unit is placed before any house graphic equalizers. All pink noise checks should be made with the BBE units switched "out" to obtain the desired house curve. The BBE process is then dialed in to suit the music production. Extreme console equalization normally used during live performance may be reduced due to the dynamic enhancement effect of the BBE 362.

The BBE 362 has unbalanced inputs and outputs and the user should be aware of the level and impedance of the insert point to insure proper operation on the BBE 362.

With this in mind, the BBE 362 may be inserted in any places within the console's signal path to achieve specialized and dramatic results. In the case of non-VCA sub-groups, the BBE 362 is inserted between "buss out" and "sub-group fader in". If the BBE process is to be used on only one microphone source, the BBE 362 is inserted in the normal "insert send and receive" points as a limiter or equalizer is patched.

Figure 1 shows the BBE 362 in a P.A. system application where both channels are used for the main house mix. Figure 1A shows a powered mixer where the BBE 362 is inserted between the program out and graphic equalizer in. Figure 1B shows the BBE 362 in the insertion point of a mixing console for added clarity to that channel.

---

### Home Studios

The BBE 362 gives a pro-edge to otherwise dull recordings on multi-track recorders. Snare drums and guitars take on a brighter tonal quality without equalization. Tape tracks recorded without BBE can be processed after the fact by placing the BBE 362 between the tape track output and the mixer channel input. The BBE 362 saves poorly recorded low-level instruments and brightens them without bringing up the tape hiss as equalizers do. The program transients are audibly improved on just about any sound source because the BBE 362 reduces the mid-range "smear" and the associated masking effects.

Figure 2, 2A and 2B show applications of the BBE 362 in a home studio. Figure 2 shows that when recording, the BBE 362 is inserted between "buss out" and "tape track in." By monitoring the tape track the amount of processing can be adjusted to suit your needs. Figure 2A illustrates the hook-up configuration for mastering a multi-track recording down to a two-track format. This is a mixdown set up and can help restore lost clarity.

Figure 2B shows that when in playback, the BBE 362 can be applied to a previously recorded tape track by inserting the BBE 362 between the tape track output and the mixer input.

---

### Cassette Copies

Since the BBE 362 is a single-ended playback process without encoding or decoding, the stereo BBE 362 is inserted between the master two-track and the cassette recorder for punchier and crisper cassette copies. If you are very careful of the amount of processing you are using and know the material, you should never have any trouble with "thin" sounding copies. Figure 3 shows the BBE 362 in the cassette copy mode.

# APPLICATIONS

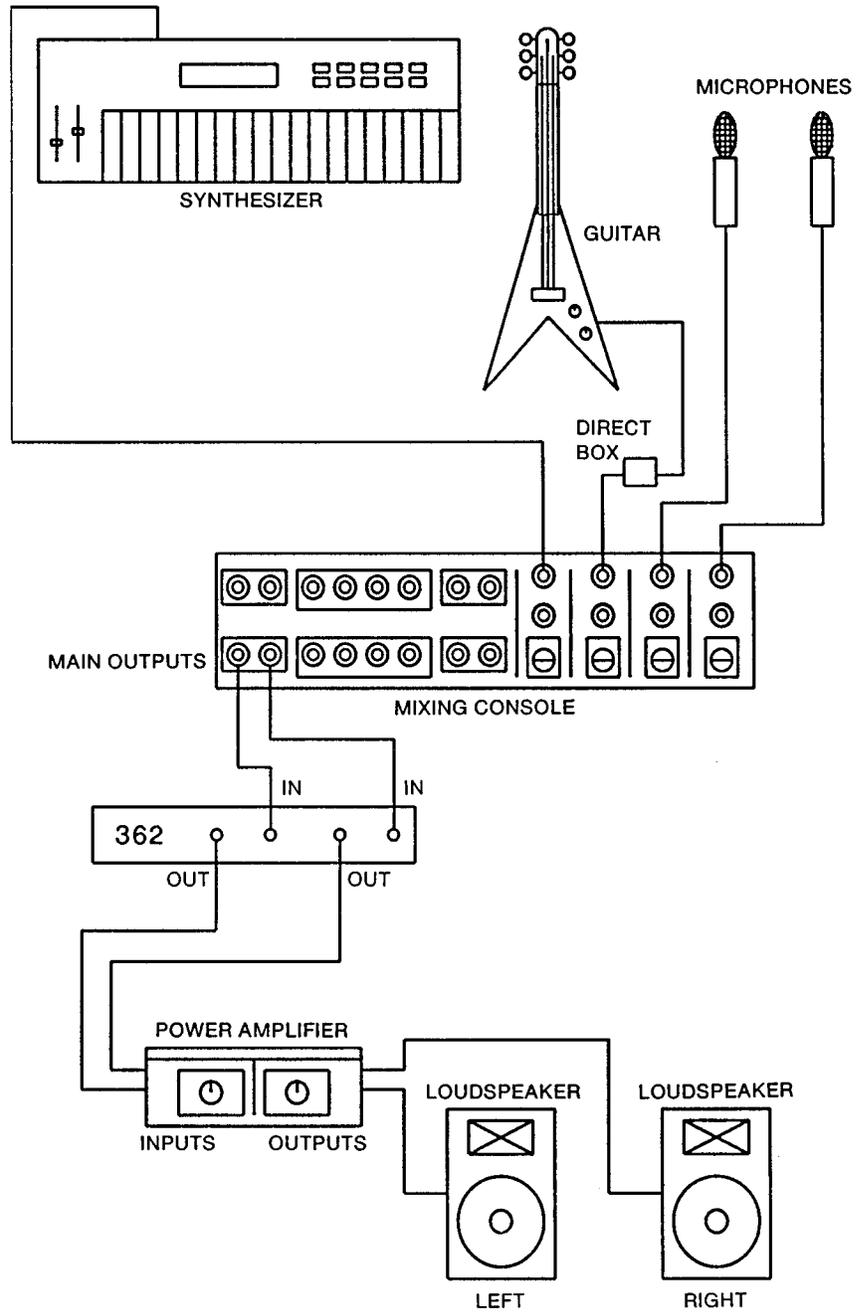


Figure 1: Live Sound System

▲  
**APPLICATIONS cont.**

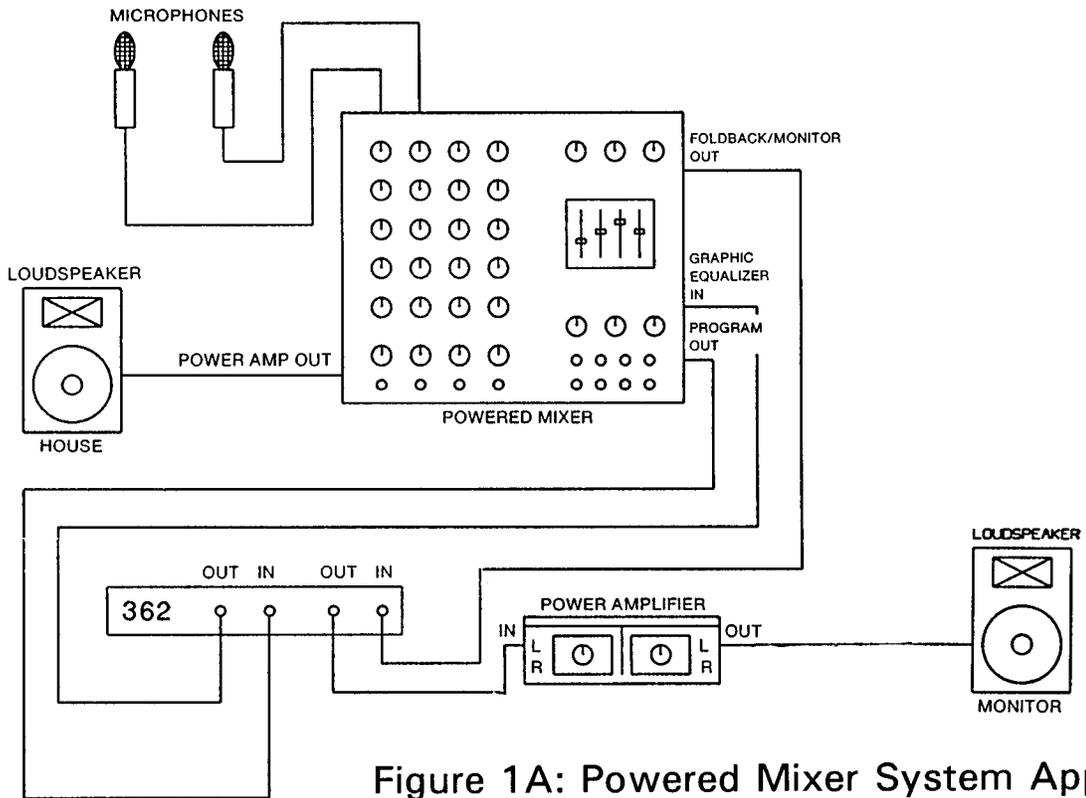


Figure 1A: Powered Mixer System Application

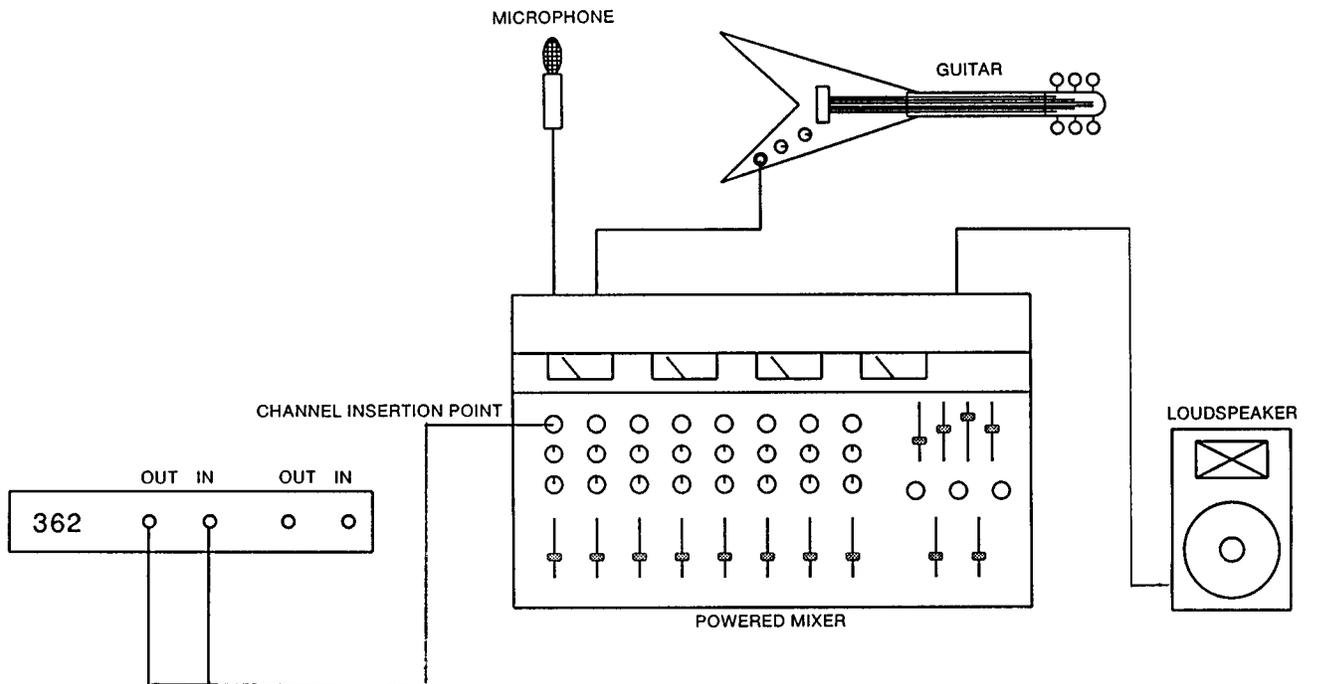


Figure 1B: Powered Mixer System Application

**▲**  
**APPLICATIONS cont.**

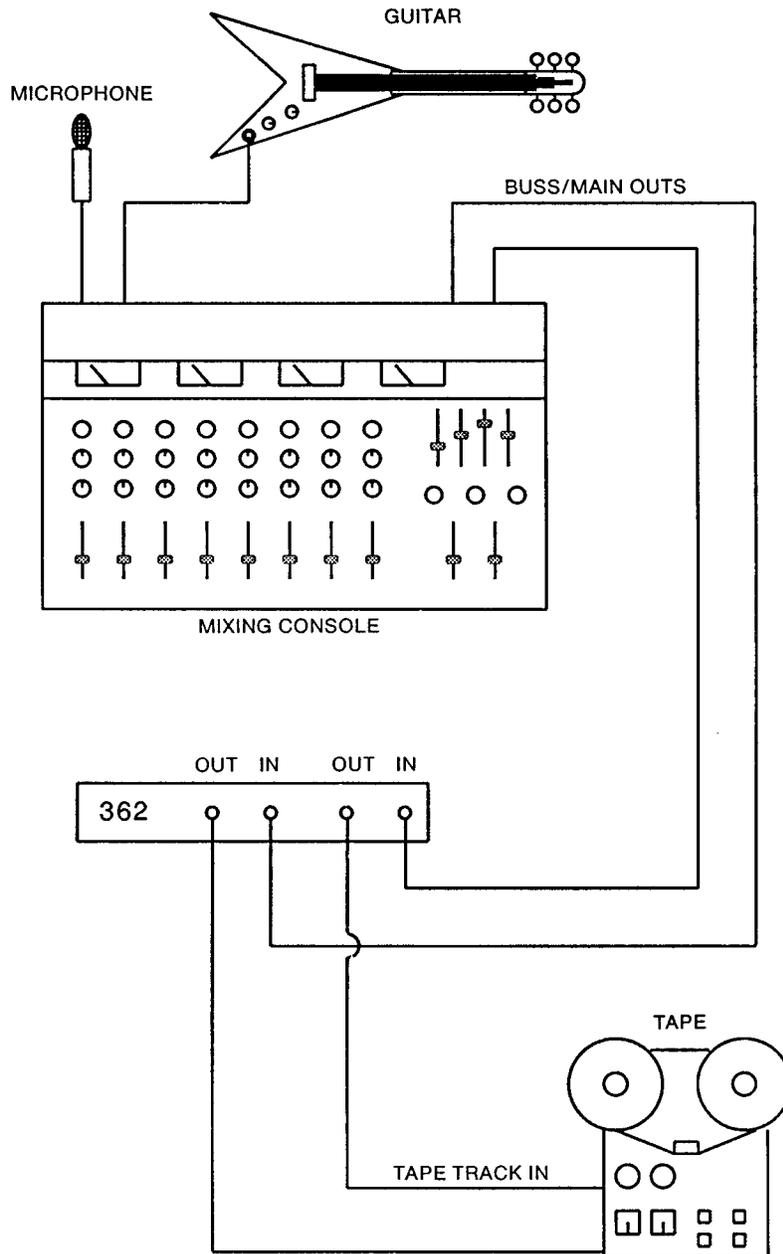
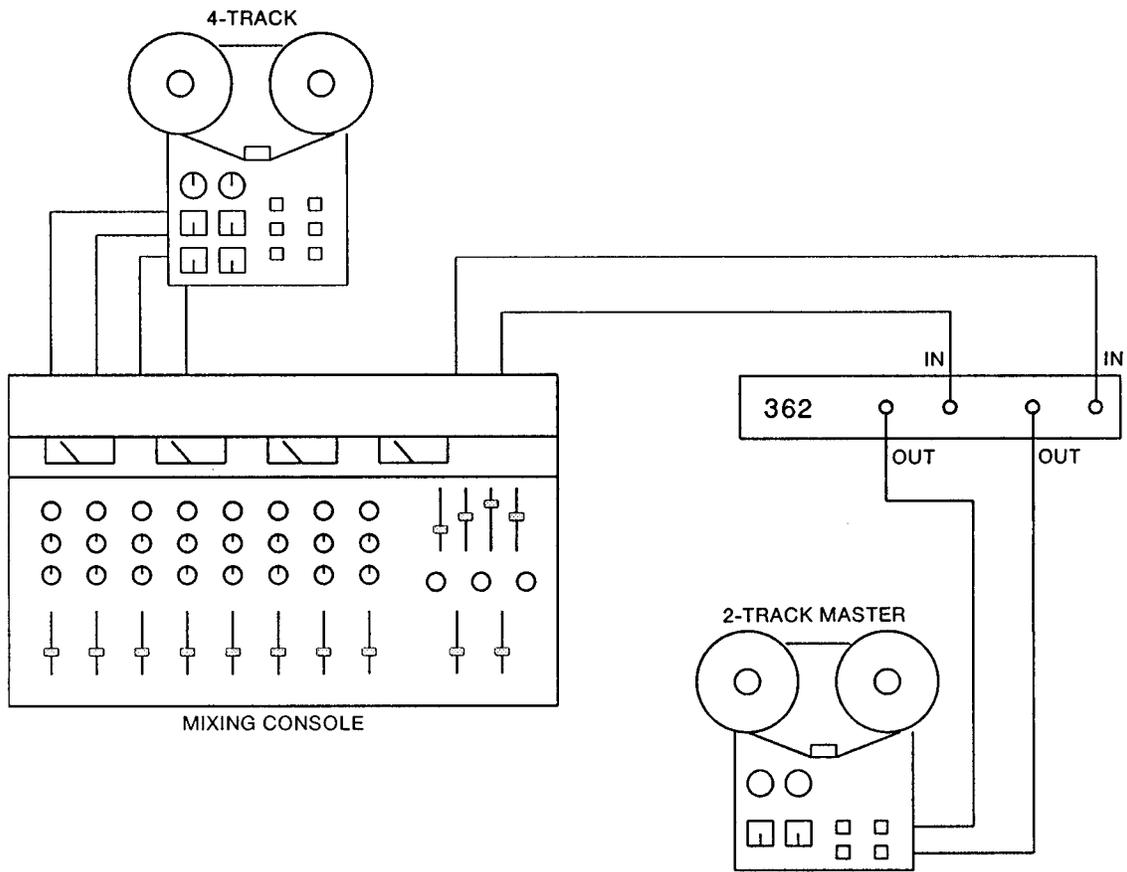


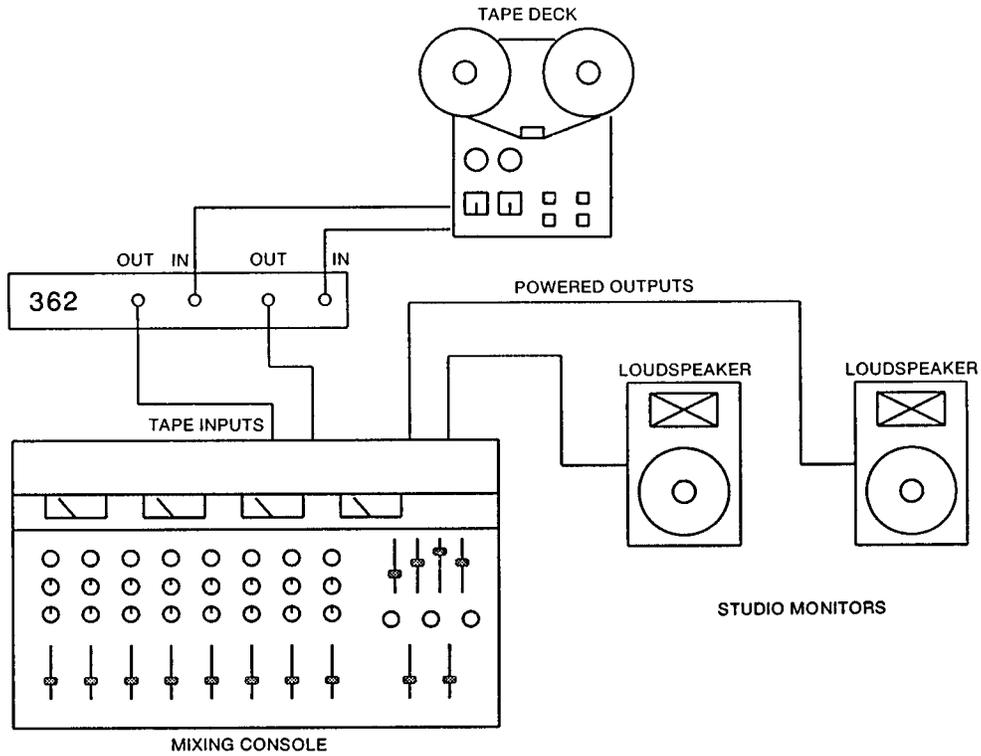
Figure 2: Recording Home Studio Application

**▲**  
**APPLICATIONS cont.**

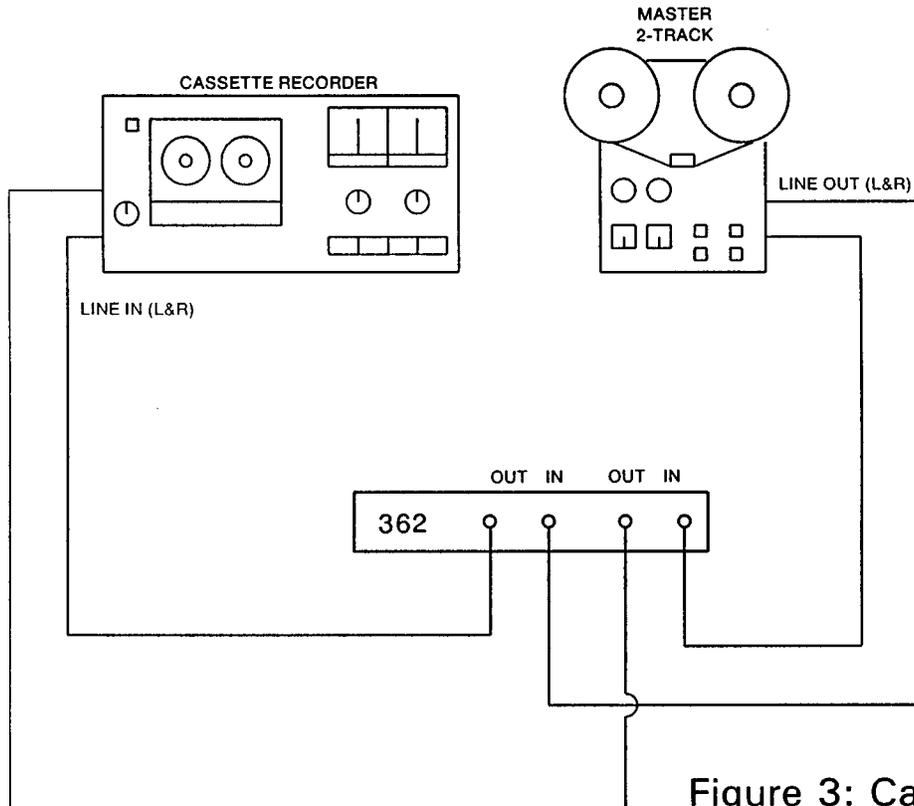


**Figure 2A: Recording Mix Down**

**APPLICATIONS cont.**



**Figure 2B: Playback/Home Studio Application**



**Figure 3: Cassette Copies**



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# SPECIFICATIONS

Frequency Response		Power Requirements	
Bypass .....	DC to 20kHz	U.S. Model .....	100-120Vac, 50/60Hz, 10 Watts
Process .....	program controlled	Standard Model .....	200-240Vac, 50/60Hz, 10 Watts
Absolute Noise in Process Mode .....	-90dBu below rated max output of 0dBu	AC Line fuse protected .....	U.S. Model: 250Vac/1/2A Fastblow type fuse Standard Model: 250Vac/.125A Fastblow type fuse
Total Harmonic Distortion in Process Mode .....	less than 0.1% @ -10dBu level	Terminations/Connectors-rear panel	1/4" Phone jacks
Input Characteristics		Dimensions .....	Standard 1U single rack 1 3/4" H x 19" W x 5 3/4" D
Input Impedance .....	50K Ohms	Weight .....	4 1/2 lbs. (2.5Kgs)
Nominal Input Level .....	-10dBu		
Output Characteristics .....	+16dBu	Note: 0dBu = 0.775 Vrms	
Minimum Load Impedance for full output level .....	1K Ohm		
Nominal Output Level .....	-10dBu		
Maximum Output Level .....	+16dBu		

Note: Due to continuing product improvement, specifications and design are subject to change without notice.

## Service

We recommend that if at all possible, a BBE 362 which requires service be sent to our facility in Huntington Beach, California. We request that a "RETURN AUTHORIZATION" be issued by the dealer from whom you purchased the unit. If this is not possible, call BBE Sound, Inc. directly (714) 897-6766, to obtain a "RETURN AUTHORIZATION", include a copy of the bill of sale with the unit when it is shipped to BBE Sound, Inc. so that the service can be expedited.

As the repair turnaround time is minimal, we request that the unit be sent to BBE Sound, Inc. We also need to add reliability data to our files so that future revision may be undertaken, if necessary, to improve the product.

---

## Warranty

Warranty registration of the unit to BBE Sound, Inc. is not necessary. It is strongly recommended that you retain a copy of the bill of sale for future reference.

**IT IS THE SOLE RESPONSIBILITY OF THE END USER TO PROVIDE THE BILL OF SALE OR OTHER MEANS OF PROOF OF PURCHASE TO VALIDATE THE WARRANTY IF WARRANTY SERVICE IS REQUESTED.**

The BBE 362 is warranted against defects in material and workmanship for a period of five (5) years from date of purchase from BBE Sound Inc. or from an authorized dealer. During this period, we will repair units free of charge providing that they are shipped prepaid to BBE Sound, Inc. 5381 Production Drive, Huntington Beach, CA 92649. We will pay return UPS shipping charges within the USA. All charges related to non-UPS shipping, including customs clearance, will be billed. The warranty will be honored for the longer of either 90 days from the date of any service or the remainder of the original 5 Year factory warranty.

This warranty will be consider null and void by BBE Sound, Inc. if any of the following is found:

1. The equipment has been physically damaged.
2. The equipment shows signs of abuse.
3. The equipment has been electrically damaged by improper connection or attempted repair by the customer or a third party.
4. The equipment has been modified without authorization.
5. The bill of sales indicates that the purchase date of the equipment is not within the warranty period.

All non-warranty repairs are warranted for a period of 90 days from the date of service.

BBE Sound, Inc. is NOT LIABLE FOR CONSEQUENTIAL DAMAGES. Should the unit fail to operate for any reason, our sole obligation is to repair it as described above.

DO NOT RETURN ANY PRODUCT TO THE ABOVE ADDRESS WITHOUT INSTRUCTIONS AND AUTHORIZATION ISSUED BY THE ABOVE LOCATION.

---

## Maintenance

Maintenance of the BBE 362 is limited to proper cleaning of the unit with mild household cleaner such as Formula 409™ or Windex™. The chassis and cover are steel finished with a durable polyurethane paint, while the front panel is an anodized aluminum extrusion.

There are no user replaceable parts and the unit should not be opened for any reason unless you are a qualified technician. Calibration should be performed if parts are replaced or if a performance check-out indicates a problem with calibration. Long term use has shown that over the life of this unit there is little or no drift of the components in the BBE 362 which would cause a change in calibration. A very conservative design philosophy has resulted in a piece of equipment which runs very cool and should give years of trouble-free service.



---

## CALIBRATION PROCEDURES FOR THE BBE 362

**NOTE: THIS UNIT WAS CALIBRATED AT THE FACTORY. THIS PROCEDURE IS FOR QUALIFIED SERVICE PERSONNEL ONLY.**

### **INITIAL SETTINGS:**

1. BBE Process control VR2 and Lo Contour control VR1 to minimum (fully C.C.W.).
2. Power switch on and Function switch in (Process on).

### **POWER SUPPLY TEST:**

1. With DVM set to DC volts, measure the positive end of C1. You should read less than +30 VDC.
2. With DVM set to DC volts, measure the negative end of C2. You should read less than -30 VDC.
3. Measure DC voltage on JMP 4. Reading should be +12 VDC, (+/-1.5 VDC).
4. Measure DC voltage on JMP 11. Reading should be -12 VDC, (+/-1.5 VDC).

### **BBE PROCESS TEST:**

1. Input a 5kHz signal @ -10dBu into Channel A [B] input.
2. Measure the Channel A [B] output with the DVM set to AC volts.
3. With Process control at minimum (fully C.C.W.), DVM should read -10.5dBu (+/- 0.5dBu).
4. With Process control at maximum (fully C.W.), DVM should read -2dBu (+/- 0.5dBu).

### **LO CONTOUR TEST:**

1. Input a 50Hz signal @ -10dBu into channel A [B] input.
2. Measure the channel A [B] output with the DVM set to AC volts.
3. With Lo Contour control at minimum (fully C.C.W.) DVM should read -10dBu (+/- 0.5dBu).
4. With Lo Contour control at maximum (fully C.W.) DVM should read -1.5dBu (+/- 0.5dBu).

### **BYPASS TEST:**

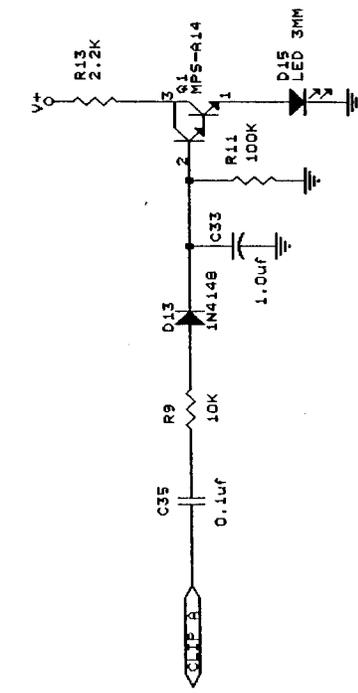
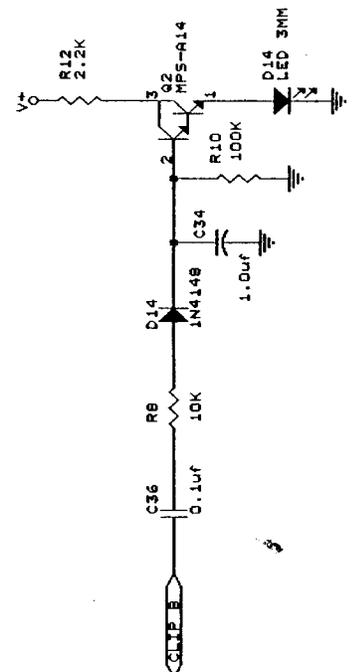
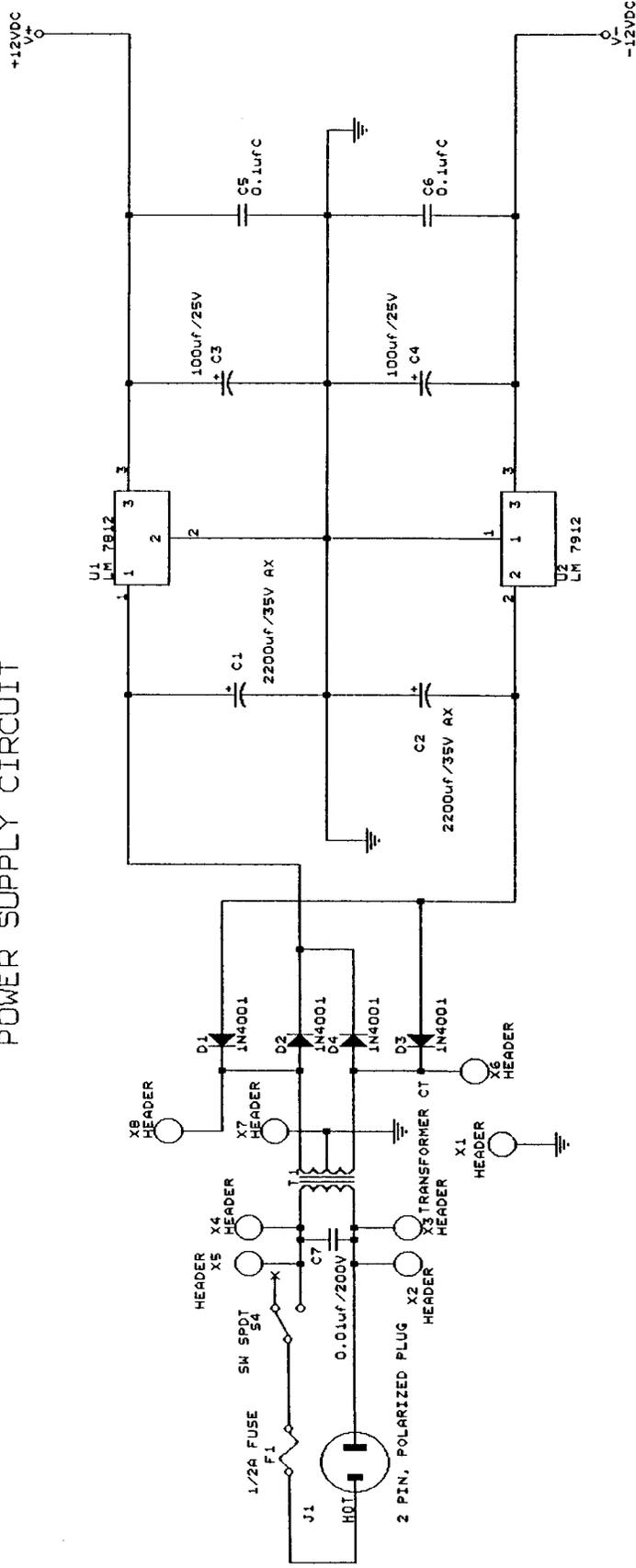
1. Input a 500Hz signal @ -10dBu into channel A [B] input.
2. Measure the channel A [B] output with the DVM set to AC volts.
3. With the Process in, the DVM should read -11dBu (+/- 0.5dBu) and the Process LED should illuminate green.
4. With the Process out, the DVM should read -10.5dBu (+/- 0.5dBu) and the Process LED should illuminate red.

### **CLIP INDICATOR TEST:**

1. Input a 500Hz signal @ +15dBu into the channel A [B] input.
2. Verify that the channel A [B] clip indicator is on.
3. Change signal input level to +13dBu and verify that the channel A [B] clip indicator turns off.

**END TEST**

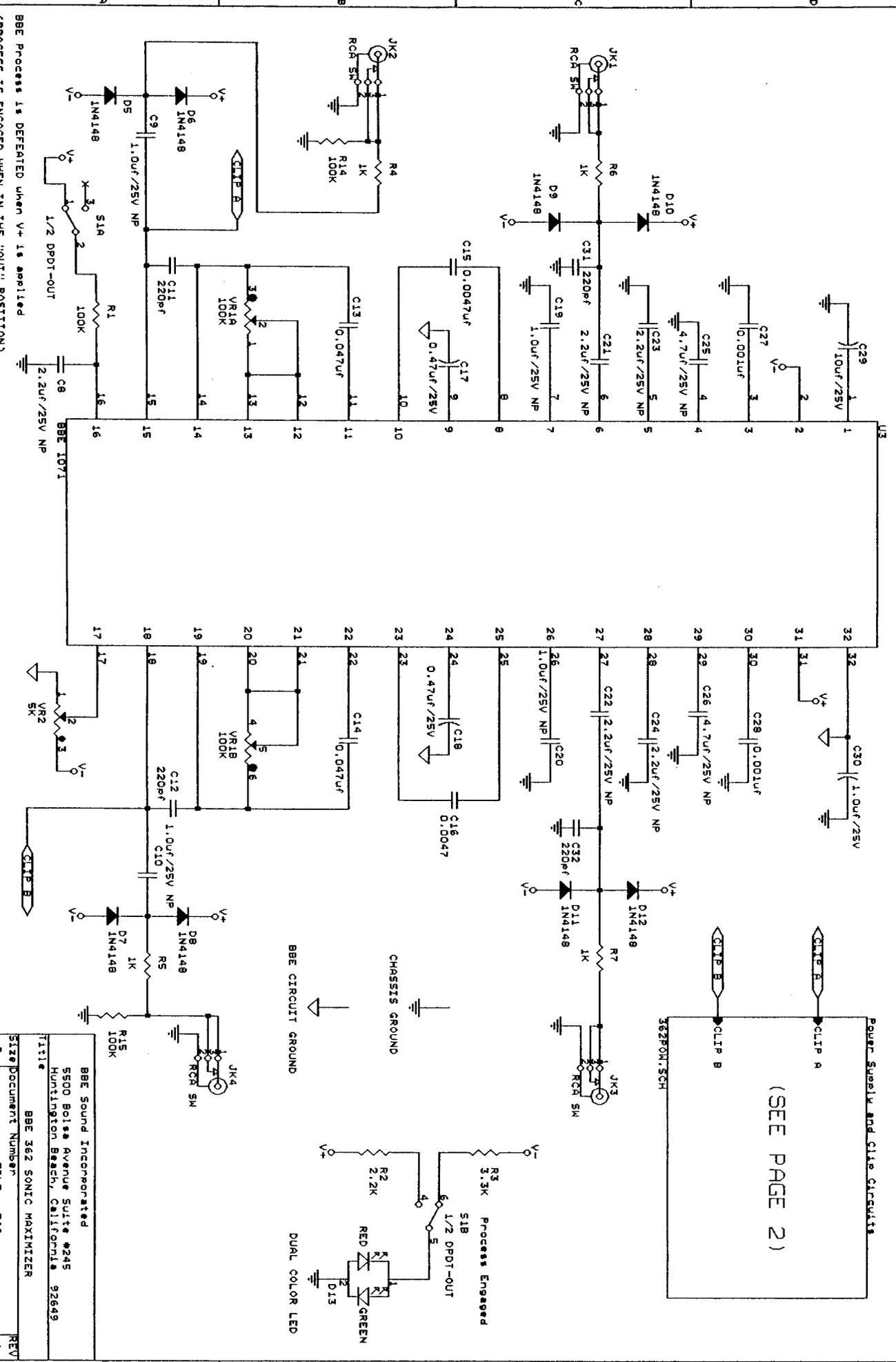
# POWER SUPPLY CIRCUIT



CLIP CIRCUIT CHANNEL A

CLIP CIRCUIT CHANNEL B

BBE Sound, Incorporated	
5500 Boies Avenue #245	
Huntington Beach, California 92649	
Title	BBE 362 POWER SUPPLY AND CLIP CIRCUITS
Size	Document Number
REV	FILE = 362POM.SCH
B	
Date:	FEBRUARY 23, 1993 Sheet 2 of 2



(SEE PAGE 2)

BBE Process is DEFERRED when V+ is applied  
(PROCESS IS ENGAGED WHEN IN THE "OUT" POSITION)

Title		BBE 362 SONIC MAXIMIZER	
Site Document Number		FILE = 362	
Date:	February 23, 1993	Sheet	1 of 2
BBE Sound Incorporated 5500 Bolise Avenue Suite #245 Huntington Beach, California 92649			
REV	A		



**BBE<sup>®</sup>**  
**Sound Inc.**

**5381 Production Drive**  
**Huntington Beach, CA 92649**  
**714-897-6766 • FAX 714-896-0736**

**[www.bbесound.com](http://www.bbесound.com)**

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*BBE is the registered trademark of BBE Sound, Inc.*