BBE® Sound Inc.

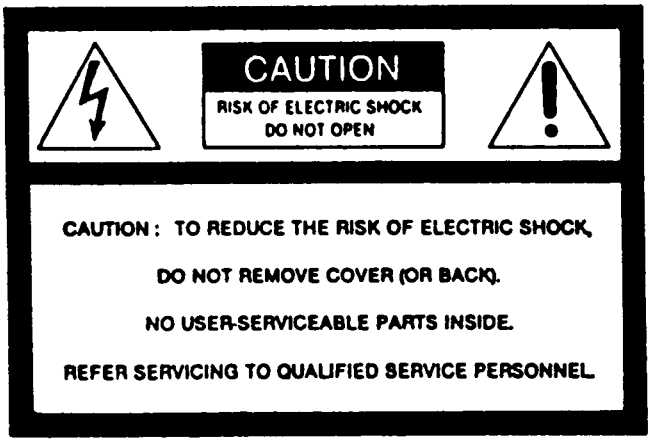
MODEL 411

SINGLE CHANNEL SONIC MAXIMIZER FOR GUITAR AND BASS

USER MANUAL

5500 Bolsa Ave., Suite 245
Huntington Beach, CA 92649 • (714) 897-6766
FAX (714) 895-6728

Important Safeguards



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

ATTENTION: RISQUE DE CHOC ELECTRIQUE – 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 an 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.

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.

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.

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 receptacle.

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.

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.

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.

Service

If the BBE 411 should require repair, please contact the dealer from whom you purchased the unit so that a "Return Authorization" number can be obtained from BBE Sound, Inc. If this is not possible, contact BBE Sound Inc. directly to obtain a "Return Authorization" number. Include with the unit a copy of the bill of sale together with a brief description of the problem so that the repair process can be expedited. Mark clearly on the outside of the shipping box, the "RA" number issued by BBE Sound Inc.

Congratulations!

Thank you for buying the BBE Model 411 Processor. You now own a very unique signal processing device with no other equal in the audio world. 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 the BBE 411 more effectively and in ways of which you may not be aware. Review of the information contained in this owner's 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 Is It"

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 have proved unsolvable and were thus relegated 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 the 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 order 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 can reach the listener's ear ahead of some or all of the harmonic components.

This change in the phase and amplitude relationship of 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 needs for 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 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 0.5 ms and passes through an active band-pass filter. The mid group is used as a point of reference to make dynamic amplitude corrections in both positive and negative directions to the high frequency group which has been passed through a high quality VCA (Voltage Controlled Amplifier).

Two 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.

BBE 411 Product Description

The BBE Model 411 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 single channel, rack-mountable device for use with guitars and bass guitars in live performances or home studio recording. The BBE Model 411 can handle both instrument and line level applications in any guitar or bass rig. The BBE Model 411 occupies one EIA standard rack space of 19 inches width and 1.75 inches height (1U).

Using Your New BBE 411

The BBE 411 is used to improve clarity and add edge to any guitar or bass system. The BBE 411 also compliments any existing effects or processors currently in use.

Unlike many exciters or equalizers, the BBE 411 will not add extra noise or harmonic distortion 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 of the signal.

To "A-B" the processed to unprocessed sound, use either the function in/out switch or the remote jack (see controls section) to adjust the amount of processing required to suit your own taste.

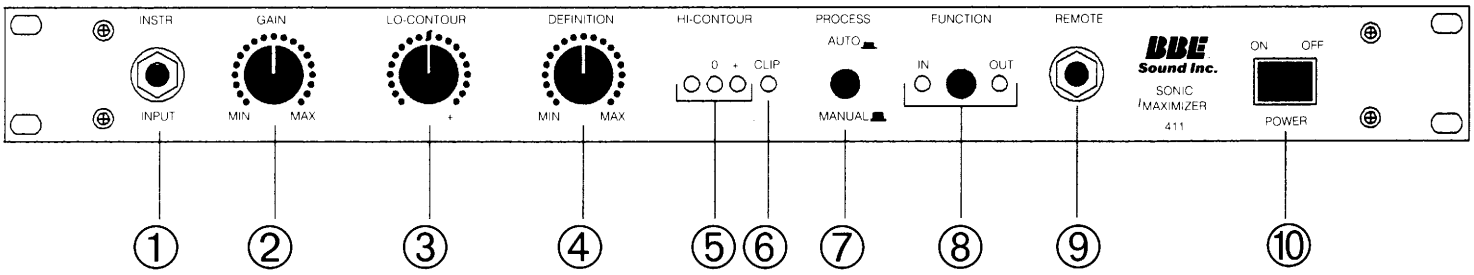
Things To Remember

The BBE 411 has two inputs and outputs to accommodate low instrument and line levels. Please consult the "Controls and Set-Up" section of this manual to determine which input and output connections are correct for your particular application. Proper operation of the BBE 411 depends on proper interfacing.

Installing the BBE 411 in an "effects loop" of a mixing board where the output of the BBE 411 is mixed back with the original source is **not** recommended.

The BBE Model 411 Controls And Connectors

(Note: Consult Specifications Section For Proper Usage)



Front Panel

① **Instr. Input** — This 1/4" jack accepts high impedance guitar or bass outputs or other low level unbalanced devices such as microphones or synthesizers. This jack is directly controlled by the **Gain** control.

② **Gain** — Controls the amount of gain or volume level of the device plugged into the instr. input jack. When turned to min, the output is muted. Turning towards max increases the output or volume level.

③ **Lo-Contour** — Controls the phase-compensated bass equalization. This adjustment ranges from –10dBu below input (fully counterclockwise to the "–" mark) to +10dBu above input (fully clockwise to the "+" mark). The middle position marked "0" is flat or unity gain.

④ **Definition** — Regulates the amount of amplitude compensation as indicated by the **Hi-Contour** LED Stack. The minimum (fully counterclockwise) position yields a flat frequency response with phase compensation only. Turning clockwise increases the amplitude of the high frequency band relative to the mid band amplitude providing an improved spectral balance between the high and mid bands.

⑤ **Hi-Contour LED Stack** — This LED Stack indicates instantly the relative amount of high band compensation compared to the mid band.

A. **Red LED (marked "–")** — Compression Mode. When this LED is lit, the amplitude of the high band is too high as compared to the mid band and compression is being applied to compensate.

B. **Amber LED (marked "0")** — Flat Mode. When this LED is lit, no amplitude compensation is needed. The program spectral content is correct.

C. **Green LED (marked "+")** — Expansion Mode. When this LED is lit, the amplitude of the high band is too low as compared to the mid band and the amplitude of the high band is being expanded to compensate.

⑥ **Clip Indicator** — When lit, this red LED indicates clipping or distorting of the output. If this occurs, reduce the **Gain** control of the BBE 411 or reduce the input to the BBE 411 if you are connected to the line in/out jacks of the BBE 411.

⑦ **Process Switch** — In the "Auto " mode, the BBE411 provides dynamic response to the high frequency band in relation to the mid band. This in turn will allow the BBE process to either expand or compress the high band.

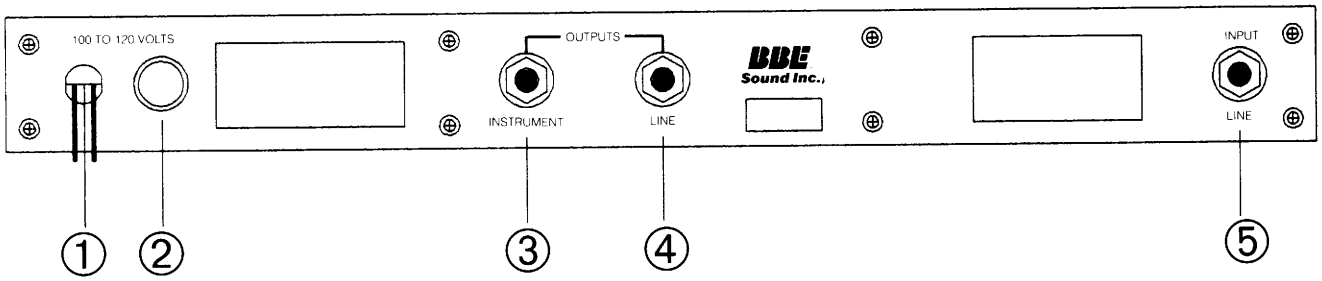
The "Manual" mode, on the other hand, provides for a factory preset expansion ratio for the high band. Both modes are controlled by the definition and lo-contour controls. "Auto" mode would be considered normal operation.

⑧ **Function Switch And Indicators** This switch allows the user to quickly compare or "A-B" the processed to the unprocessed sound.

A. **Green LED (marked "in")** Illuminates when the **Function** switch is pushed in and the process circuitry is activated.

B. **Amber LED (marked "out")** Illuminates when the **Function** switch is in the out position which bypasses the BBE circuitry.

⑨ **Remote Jack** This 1/4" jack is provided for remote actuation of the **Function** switch. Any standard on/off footswitch can easily be connected here with a standard guitar cord. The function switch must be **in** before the remote footswitch will operate.



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 counterclockwise 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 **Instrument Output** This 1/4" jack is a low-level unbalanced connector designed to be connected to a guitar amplifier input or to another low level input such as that found on a P.A. console.

④ **Line Output** This 1/4" jack is a line level unbalanced output designed to be connected into any line level device such as a power amplifier input, effects return on a guitar amplifier, tape recorder input or a P.A. console input capable of line levels.

⑤ **Line Input** This 1/4" jack accepts any unbalanced line level outputs such as the effects send of a guitar amplifier or any other line level device such as a synthesizer or mixing console output.

Set-Up

Using Other Effects With The BBE 411

BBE Sound Inc., recommends connecting effects devices prior to or **before** the BBE 411 since the BBE 411 enhances most effects giving them a more "real" quality. As BBE Sound Inc., cannot predict all possible combinations of electronic gear, some experimentation may be necessary to determine the exact placement in the chain to achieve the desired effect.

Volume And Gain Considerations

Set the volume control of the guitar amplifier to a typical level, adjust all tone controls to the "flat" position, install the BBE 411 and then readjust all tone controls to their desired level.

Set the Gain and the Lo-Contour control on the BBE 411 to their middle positions and the definition to minimum. With the Function switch in the out position adjust the Gain to a suitable level. If the clip indicator lights, distortion in the sound is occurring and the Gain control of the BBE 411 must be reduced.

Push the Function switch in to activate the processor. Increase the definition control until the desired amount of compensation is achieved. If the BBE 411 is installed properly, the green (+) LED indicator of the Hi-Contour LED Stack will be lit while playing. If the green LED does not light while playing, the gain or definition control needs to be increased in order for the BBE circuitry to be operating at its optimum level. Some experimentation may be necessary since guitar pickups vary greatly in the amount of output.

Applications Of The BBE Model 411

Connecting the BBE 411 Between An Instrument And Amplifier

Note: This set-up should be used only if your guitar amplifier does not have an effects loop.

Figure 1 shows how to install a BBE 411 with a bass or a guitar using the instrument input on the front panel of the BBE 411. (Note: Use one or the other. Do not mix instruments with the BBE 411.) The instrument output on the rear panel should be connected to the input of the guitar amplifier.

Connecting the BBE 411 In The Effects Loop Of An Amplifier

Figure 2 is the **preferred** method of connecting a bass or guitar. (Note: Use one or the other. Do not mix instruments with the BBE 411.) The line input of the BBE 411 should be connected to the effects send or pre amp out of the guitar amplifier. The line output of the BBE 411 should be connected to the effects return or power amp in jack of the guitar amplifier.

Connecting the BBE 411 To A Stage Monitor And To The House P.A.

Figure 3 shows how to install a BBE 411 with a bass or guitar while simultaneously feeding a P.A. console and a stage monitor. (Note: Use one or the other. Do not mix instruments with the BBE 411.) With this set-up the instrument output of the BBE 411 will allow the guitar amplifier to be used as a stage monitor. At the same time the line output can be used to feed the P.A. console.

Connect the bass or guitar to the instrument input on the front panel of the BBE 411. Connect the instrument output on the rear panel of the BBE 411 to the input of the guitar amplifier. The line output on the rear of the BBE 411 will be connected to the channel input of a P.A. console.

FIGURE 1

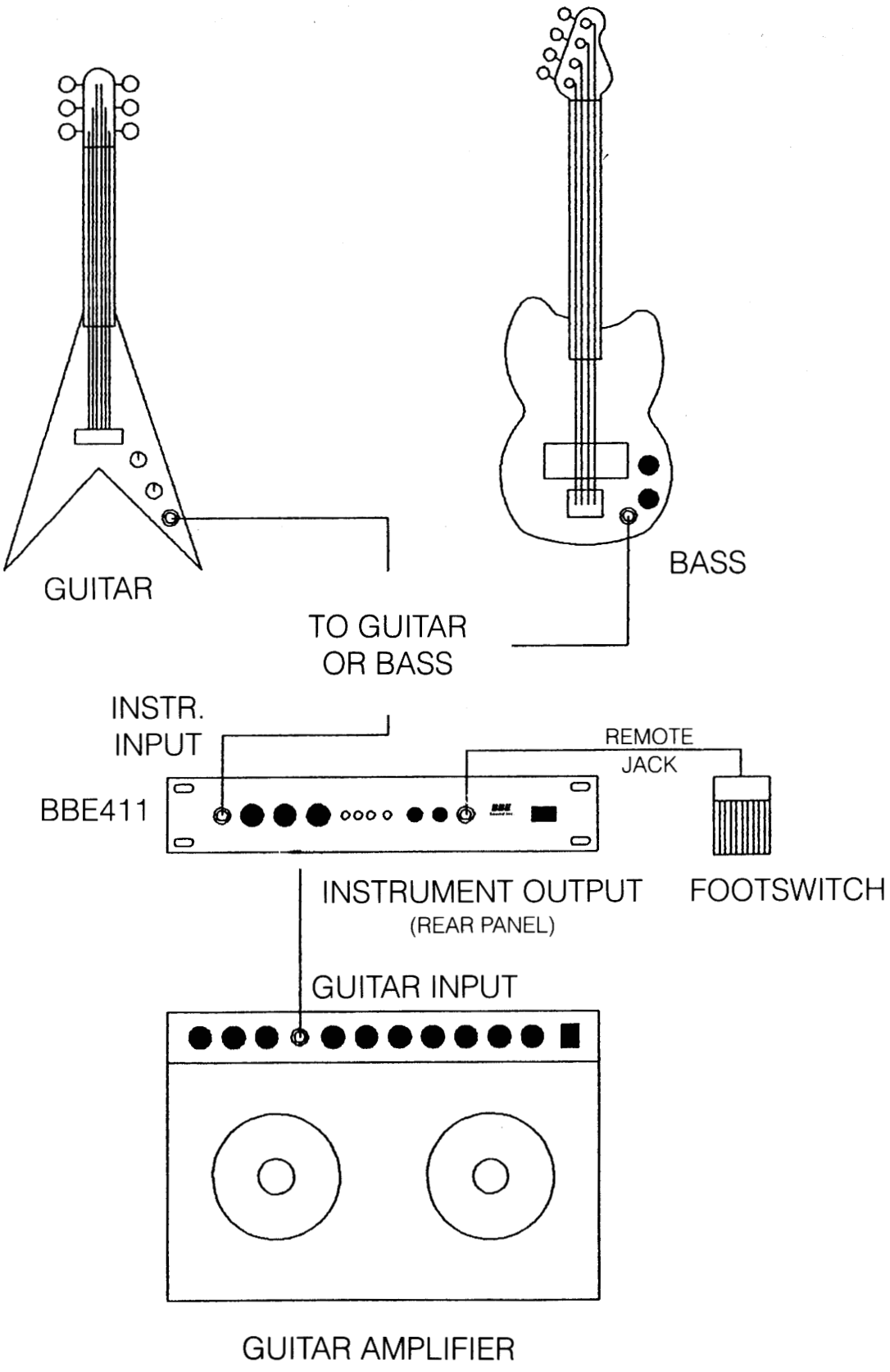

GUITAR
BASS
TO GUITAR
OR BASS
INSTR.
INPUT
REMOTE
JACK
BBE411
INSTRUMENT OUTPUT
(REAR PANEL)
FOOTSWITCH
GUITAR INPUT
GUITAR AMPLIFIER

FIGURE 2

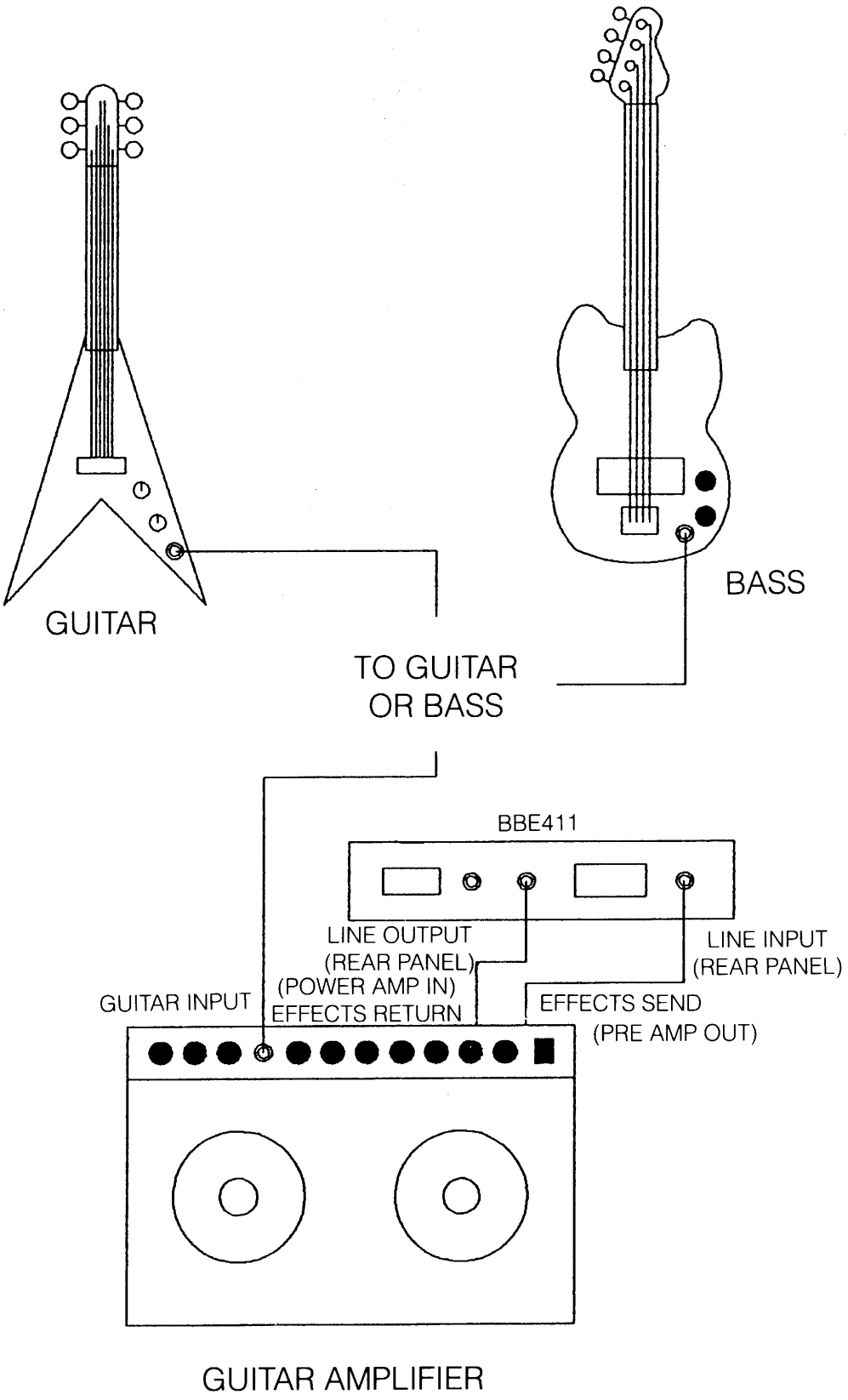
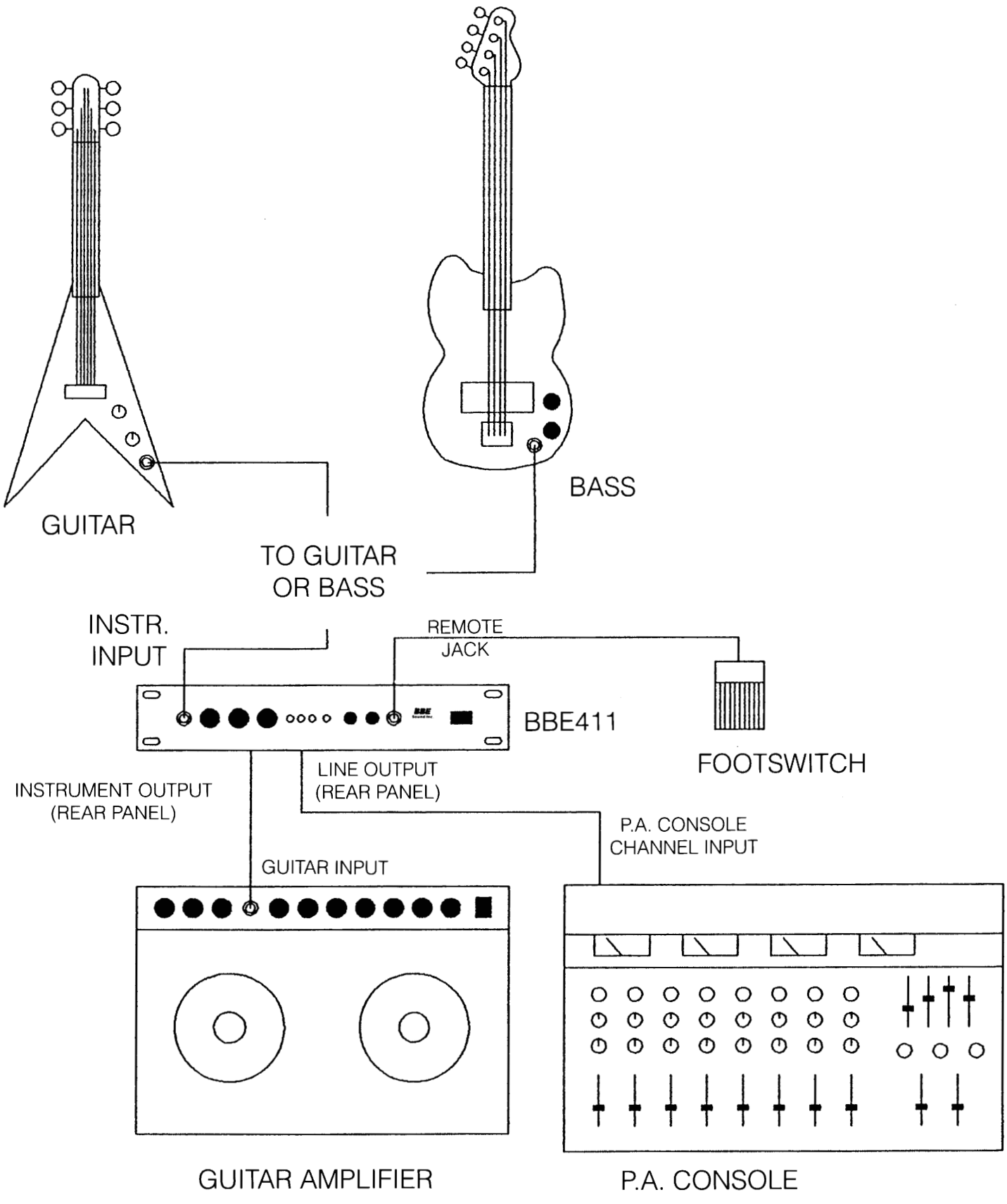

GUITAR
BASS
TO GUITAR
OR BASS
BBE411
LINE OUTPUT
(REAR PANEL)
(POWER AMP IN)
EFFECTS RETURN
LINE INPUT
(REAR PANEL)
EFFECTS SEND
(PRE AMP OUT)
GUITAR INPUT
GUITAR AMPLIFIER

FIGURE 3


GUITAR
BASS
TO GUITAR
OR BASS
INSTR.
INPUT
REMOTE
JACK
BBE411
FOOTSWITCH
INSTRUMENT OUTPUT
(REAR PANEL)
LINE OUTPUT
(REAR PANEL)
P.A. CONSOLE
CHANNEL INPUT
GUITAR INPUT
GUITAR AMPLIFIER
P.A. CONSOLE

Service

We recommend that if at all possible a BBE 411 which requires service be sent to our facility in Huntington Beach, CA. We request that a "RETURN AUTHORIZATON" be issued by the dealer from whom you purchased the unit. If this is not possible, call BBE Sound, Inc. directly at (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 revisions 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 RESPONSIBLIITY 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 411 is warranted against defects in material and workmanship for a period of one (1) year 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., 5500 Bolsa Ave., Suite 245, 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 1 Year factory warranty.

This warranty will be considered 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 sale 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 411 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 **411** 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.

Specifications For the BBE Model 411

Note 0dBu=0.775Vrms

Frequency Response (@ 0dBu Input)
- Bypass (20Hz to 20kHz) ..... 0dBu +/-0.5dBu
- Process
  - Auto ..... Program Controlled
  - Manual ..... +9.0dBu @10kHz

Absolute Noise in Process Mode
- (Line In to Line Out) ..... -87dBu below 0dBu

Total Harmonic Distortion
- (Line In to Line Out) ..... less than 0.1% (20Hz to 20kHz,@ 0dBu)

Lo-Contour Control
- Maximum ..... +10dBu Above Input
- Minimum ..... -10dBu Below Input
- Center Position ..... Flat

Input Characteristics
- Instrument Input Impedance ..... 1meg Ohms
- Line Input Impedance ..... 220k Ohms
- Maximum Input Level (Clip) ..... +16dBu
- Maximum Gain to Instrument Input ..... +23dBu
- Nominal Input Range ..... -10dBu

Output Characteristics
- Minimum Load Impedance
  - for Full +16dBu Output ..... 1k Ohms
- Maximum Output Before Clip ..... +16dBu

Power Requirements
- U.S. Model ..... 100-120Vac, 50/60Hz, 6 Watts
- Standard Model ..... 200-240Vac, 50/60Hz, 6 Watts

AC Line Fuse Protected
- U.S. Model ..... 250Vac, 1/2A Fastblow type fuse
- Standard Model ..... 250Vac, .125A Fastblow type fuse

Connectors ..... 4 Unbalanced 1/4" Phone Jacks

Dimensions ..... 1-3/4"H x 19"W x 5-3/4"D
Standard 1U Single Rack Space

Weight ..... 4-1/2 lbs. (2.5Kgs)

Calibration Procedure For The BBE® Model 411

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

Revision D September 13, 1989

Equipment Required:

Audio Signal Generator (sine wave)

Digital Voltmeter (DVM)

Initial Settings

1) DEFINITION control VR5 to minimum.
2) Turn LO CONTOUR (VR2) and VR3 to their middle positions.
3) POWER switch ON and FUNCTION switch IN (process on).
4) PROCESS switch to AUTO.

PROCEDURE:

Offset Adjustment:

1) Unit should be on and the regulators should be warm to the touch.
2) With no signal present at the input (open) measure TP1 with the DVM set to DC volts.
3) Adjust VR4 until DVM reads **0.00VDC.**

Power Supply Test:

1) With DVM set to DC volts measure the positive end of C22. It should be less then **+30VDC.**
2) With DVM set to DC volts measure the negative end of C23. It should be less then **-30VDC.**
3) With DVM set to DC volts measure pin-4 of U2. You should read **+15VDC (+/- 0.5VDC).**
4) With DVM set to DC volts measure pin-11 of U2. You should read **-15VDC (+/- 0.5VDC).**

Unity Adjustment:(Note:VR5 DEFINITION to minimum)

1) Input a 5000Hz signal (@ -10dBu) into the connector marked LINE INPUT.
2) Measure the connector marked LINE OUTPUT with the DVM.
3) Adjust VR3 until the DVM reads **-11.0 dBu.**
4) Set generator to 500Hz (@ -10dBu).
5) The DVM should read **-11.0 (+/-0.75dBu).**

Lo-Contour Test:

1) Input a 50Hz signal (@ -10dBu) into the connector marked LINE INPUT.
2) Measure the connector marked LINE OUTPUT with the DVM set to AC volts.
3) Turn the LO-CONTOUR control completely clockwise (marked "+"). The DVM should read **0dBu (+/- 1.0dBu)**
4) Turn the LO-CONTOUR control completely counter-clockwise (marked "-"). The DVM should read **-22dBu.(+/-2.0dBu)**
5) Turn the control to the middle position (marked "0"). The DVM should read approximately **-8.0dBu (+/- 1.0dBu).**

Detector Check:

(Note: The DEFINITION control must be completely minimum)

1) Input a 500Hz signal @ -10dBu into the connector marked LINE INPUT.
2) With DVM set for DC volts measure TP1. It should read **+0.560VDC (+/- 0.040VDC)**
3) Change source to 5000Hz (@ -10dBu). With DVM measure TP1. It should read **+0.260VDC (+/- 0.040VDC)**

Manual Process Switch Test:

1) Switch the PROCESS switch to MANUAL.
2) Turn the DEFINITION control to MAXIMUM. With the DVM measure TP1.
3) The DVM should read **-0.410VDC (+/-0.50VDC)**
4) Input 5000Hz into the LINE INPUT jack and with the DVM measure the LINE OUTPUT jack. It should read **-2.00dBu (+/- 1dBu).**
5) Return the DEFINITION control to MINIMUM.

Bypass Test:

1) Switch the FUNCTION switch OUT (bypass mode).
2) Input a 500Hz signal (@ -10dBu) into the connector marked LINE INPUT.
3) Measure the connector marked LINE OUTPUT with the DVM set to AC volts.
4) The DVM should read **-10dBu (+/-0.5dBu).**
5) Return the FUNCTION switch to the IN position (process mode).

Remote Test:

1) Switch the FUNCTION switch to the IN position.
2) Plug into the connector marked REMOTE a 1/4" shorting jack.
3) Insure the FUNCTION changes to OUT or bypass.

LED Test:

1) Input a 500Hz signal (@ -10dBu) into the connector marked LINE INPUT. The green (+) LED should light.
2) Input a 5000Hz signal (@ -10dBu) into the connector marked LINE INPUT. The red (-) LED should light.
3) Disconnect the signal input and the amber (0) LED should light.
4) With the FUNCTION switched to the IN position, the corresponding green LED should be lit.
5) With the FUNCTION switched to the OUT position, the corresponding amber LED should be lit.

Clip Indicator Test:

1) Input a 500Hz signal with an amplitude of +16dBu (4.887Vrms) into the connector marked LINE INPUT.
2) Adjust VR6 until the CLIP LED just turns on.
3) Change the amplitude to +15dBu and the CLIP LED should turn off.

Gain Test:

1) Input 500Hz with an amplitude of -20dBu in the INSTRUMENT INPUT. Turn the GAIN control completely maximum or clockwise.
2) Measure the INSTRUMENT OUTPUT jack with the DVM set for AC Volts. The DVM should read **-14.0dBu (+/- 1dBu).**
3) Turn the GAIN control to minimum. The DVM should read **< -60dBu.**

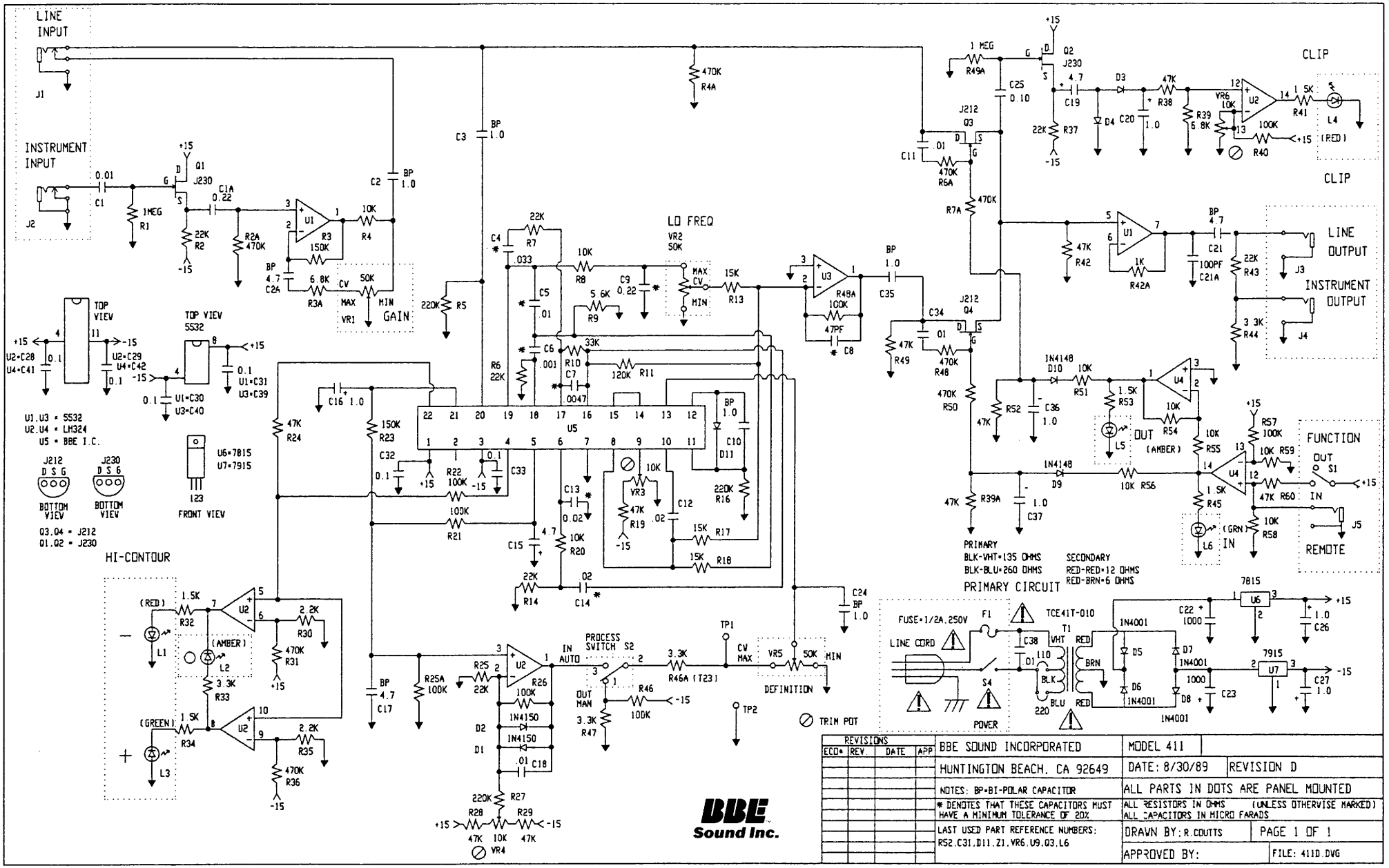
DC Voltage at Output Test:

1) With no signal at the inputs, measure the output jacks to ground with the DVM set to DC volts. The voltage must be less than **10mVDC.**

Offset Drift Test: (PROCESS Switch to AUTO)

1) With no signal present at the input (open), measure TP1 with the DVM set to DC volts.
2) Insure this voltage is **0.00VDC (+/- 25mVDC)**

END TEST


LINE INPUT
J1
INSTRUMENT INPUT
J2
C1 0.01
R1 1MEG
Q1 J230
C1A 0.22
R2 22K
R2A 470K
U1
R3 150K
R4 10K
C2 BP 1.0
C3 BP 1.0
R4A 470K
C2A BP 4.7
R3A 6.8K
VR1 50K GAIN
MAX CV
MIN
LO FREQ
VR2 50K
C4 22K R7 .033
C5 .01
C6 .001
R6 22K
R5 220K
C7 .0047
R8 10K
C9 0.22
R9 5.6K
R10 33K
R11 120K
R13 15K
U3
R48A 100K
C8 47PF
C35 BP 1.0
TOP VIEW 5532
U2:C28 U4:C41 0.1
U2:C29 U4:C42 0.1
U1:C30 U3:C40 0.1
U1:C31 U3:C39 0.1
U1.U3 = 5532
U2.U4 = LM324
U5 = BBE I.C.
U6=7815
U7=7915
FRONT VIEW
J212 D S G BOTTOM VIEW
J230 D S G BOTTOM VIEW
Q3,Q4 = J212
Q1,Q2 = J230
HI-CONTOUR
U5
C16 1.0
R24 47K
R23 150K
C32 0.1
R22 100K
C33 0.1
R21 100K
C13
C15 4.7
R20 10K
R14 22K
C14 .02
C10 BP 1.0
D11
R16 220K
VR3 10K
R19 47K
C12 .02
R17 15K
R18 15K
C24 BP 1.0
TP1
CV MAX
VR5 50K MIN
DEFINITION
TRIM POT
TP2
PROCESS SWITCH S2
IN AUTO
OUT MAN
R46 100K
R46A (T23) 3.3K
R47 3.3K
R25 22K
R26 100K
R25A 100K
C17 BP 4.7
D1 1N4150
D2 1N4150
C18 .01
R27 220K
R28 47K
R29 10K
R28 47K
VR4
Q2 J230
R49A 1 MEG
C25 0.10
C19 4.7
D3
D4
C20 1.0
R38 47K
R37 22K
VR6 10K
R39 6.8K
R40 100K
R41 1.5K
L4 (RED)
CLIP
CLIP
Q3 J212
C11 .01
R6A 470K
R7A 470K
U1
R42 47K
R42A 1K
C21 100PF
C21A BP 4.7
LINE OUTPUT
J3
INSTRUMENT OUTPUT
J4
R43 22K
R44 3.3K
Q4 J212
C34 .01
R48 470K
R49 47K
R50 470K
R52 47K
C36 1.0
D10 1N4148
R51 10K
R53 1.5K
L5 OUT (AMBER)
U4
R54 10K
D9 1N4148
R56 10K
R39A 47K
C37 1.0
R55 10K
R45 1.5K
L6 IN (GRN)
R57 100K
R59 10K
FUNCTION
OUT S1 IN
J5
REMOTE
R58 10K
R60 47K
PRIMARY
BLK-VHT=135 OHMS
BLK-BLU=260 OHMS
SECONDARY
RED-RED=12 OHMS
RED-BRN=6 OHMS
PRIMARY CIRCUIT
FUSE=1/2A,250V
F1
LINE CORD
S4
POWER
TCE41T-010
T1
C38
D1
110
VHT
RED
BRN
BLK
BLU
220
RED
D5 1N4001
D6 1N4001
D7 1N4001
D8 1N4001
C22 1000
C23 1000
U6 7815
C26 1.0
U7 7915
C27 1.0
+15
-15
(RED) L1
(AMBER) L2
(GREEN) L3
R32 1.5K
R30 2.2K
R31 470K
R33 3.3K
R34 1.5K
R35 2.2K
R36 470K
BBE Sound Inc.
REVISIONS
ECO# REV. DATE APP
BBE SOUND INCORPORATED
MODEL 411
HUNTINGTON BEACH, CA 92649
DATE: 8/30/89
REVISION D
NOTES: BP=BI-POLAR CAPACITOR
ALL PARTS IN DOTS ARE PANEL MOUNTED
* DENOTES THAT THESE CAPACITORS MUST HAVE A MINIMUM TOLERANCE OF 20%
ALL RESISTORS IN OHMS (UNLESS OTHERVISE MARKED)
ALL CAPACITORS IN MICRO FARADS
LAST USED PART REFERENCE NUMBERS: R52,C31,D11,Z1,VR6,U9,Q3,L6
DRAWN BY: R.COUTTS
PAGE 1 OF 1
APPROVED BY:
FILE: 411D.DVG

BBE®
Sound Inc.

902-1003 Rev. A 3/91