BBE® Sound Inc.

MODEL 322
USER MANUAL

5500 Bolsa Ave., Suite 245
Huntington Beach, CA 92649, (714) 897-6766
in USA (800) 233-8346, in CA (800) 558-3963
FAX (714) 895-6728

Important Safeguards

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.

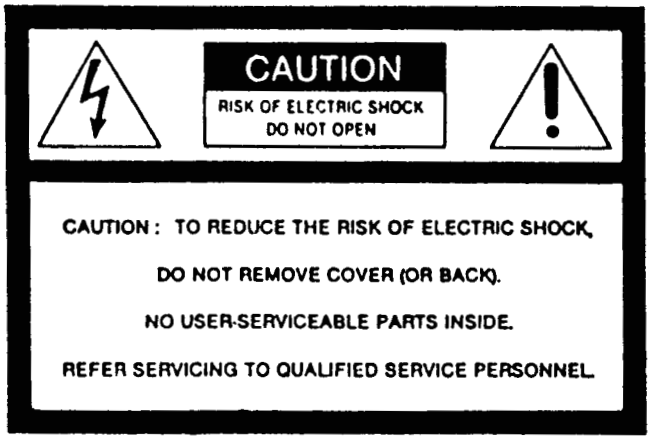
Foreign Objects — Be careful that foreign objects and liquids do not enter the enclosure through openings.

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.



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.

Congratulations!

Thank you for buying the BBE 322 Sonic Maximizer. You now own a very unique signal processing device with no other equal in the audio world. Whether you purchased the BBE 322 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 the BBE more effectively and in ways of which you may not be aware. Review 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 toll-free (in USA) 1-800-233-8346 or (in CA) 1-800-558-3963.

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 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 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 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 develope 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 a group delay within a passive low pass filter. The front panel control allows for either a flat response, a cut 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 in both positive and negative directions to the high frequencies.

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.

Product Description

The BBE 322 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 322 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 correction 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 322

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 322 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 322 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 322 drives load impedances down to about 1K Ohms and supplies a maximum level of +16dBu. Plugging a guitar or a microphone directly into the BBE 322 will not work, as the output level is much too low. In this application, a BBE 411 can be used as it accepts low level devices.

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 322 to roll off the noise first.

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.

The Controls

Operation of the BBE 322 is quite simple due to the sophisticated circuitry within the unit. Below are the names and purposes of each control on the BBE 322.

Front Panel

Lo Contour Control — Each channel shares a common lo contour control that regulates the amount of phase compensated bass equalization. This adjustment ranges from -10dBu (fully counterclockwise) to +10dBu (fully clockwise) at 50Hz relative to the input. The middle position is flat or unity gain.

Definition Control — Each channel shares a common definition control that regulates the amount of amplitude compensation as indicated by the process LED. 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.

Process LED Stack — Each channel is equipped with an LED indicator that constantly show the relative amount of high band compensation compared to the mid band. This LED shows the relative degree of processing in each channel going from red (no processing) to green (maximum processing).
CLIP LED: This LED indicates that the output of the BBE 322 has reached the maximum input level of +16dBu.

Function Switch — The 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 off.

Power Switch — This switch controls primary power to the BBE 322.

Rear Panel

AC Power Cord — Plugs into AC power receptacle.

Fuse — Turn cap on fuse holder counterclockwise to remove fuse. (Note: replace with 250VAC, ½A type fuse).

HI-Z Unbalanced ¼" Output — Each channel is equipped with a ¼" phone jack that is a high impedance unbalanced line level output and can deliver up to +16dBu into 10k Ohms.

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 level of -10dBu. (Note: +16dBu is the maximum input before clipping.)

Set-Up

The BBE 322 is connected into the audio 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 322. 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 322 will function perfectly.

Setting-up and using the BBE 322 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 322 is summed with the original source audio.

Applications

Various applications of the BBE process include:

Music and P.A. Systems

The BBE 322 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 322 between the console output buss and the amplification stage in the P.A. System.

The BBE 322 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 322.

The BBE 322 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 322.

With this in mind, the BBE 322 may be inserted in many places within the console's signal path to achieve specialized and dramatic results. In the case of non-VCA sub-groups, the BBE 322 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 322 is inserted in the normal "insert send and receive" points as a limiter or equalizer is patched.

If the P.A. mixer does not have "insert points" or if the mixer is a powered-type unit without any way of interrupting the signal path before the power amplifier, then the BBE 411 unit should be used. The BBE 411 accepts low levels direct from high impedance microphones, electric guitars, etc., and interfaces directly to the P.A. mixer.

Figure 1 shows the BBE 322 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 322 is inserted between the program out and graphic equalizer in. Figure 1B shows the BBE 322 in the insertion point of a mixing console for added clarity to that channel.

Home Studios

The BBE 322 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 322 between the tape track output and the mixer channel input. The BBE 322 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 322 reduces the mid-range "smear" and the associated masking effects.

Figures 2, 2A and 2B show applications of the BBE 322 in a home studio. Figure 2 shows that when recording, the BBE 322 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 322 can be applied to a previously recorded tape track by inserting the BBE 322 between the tape track output and the mixer input.

Cassette Copies

Since the BBE 322 is a single-ended playback process without encoding or decoding, the stereo BBE 322 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 322 in the cassette copy mode.

FIGURE 1

LIVE SOUND SYSTEM

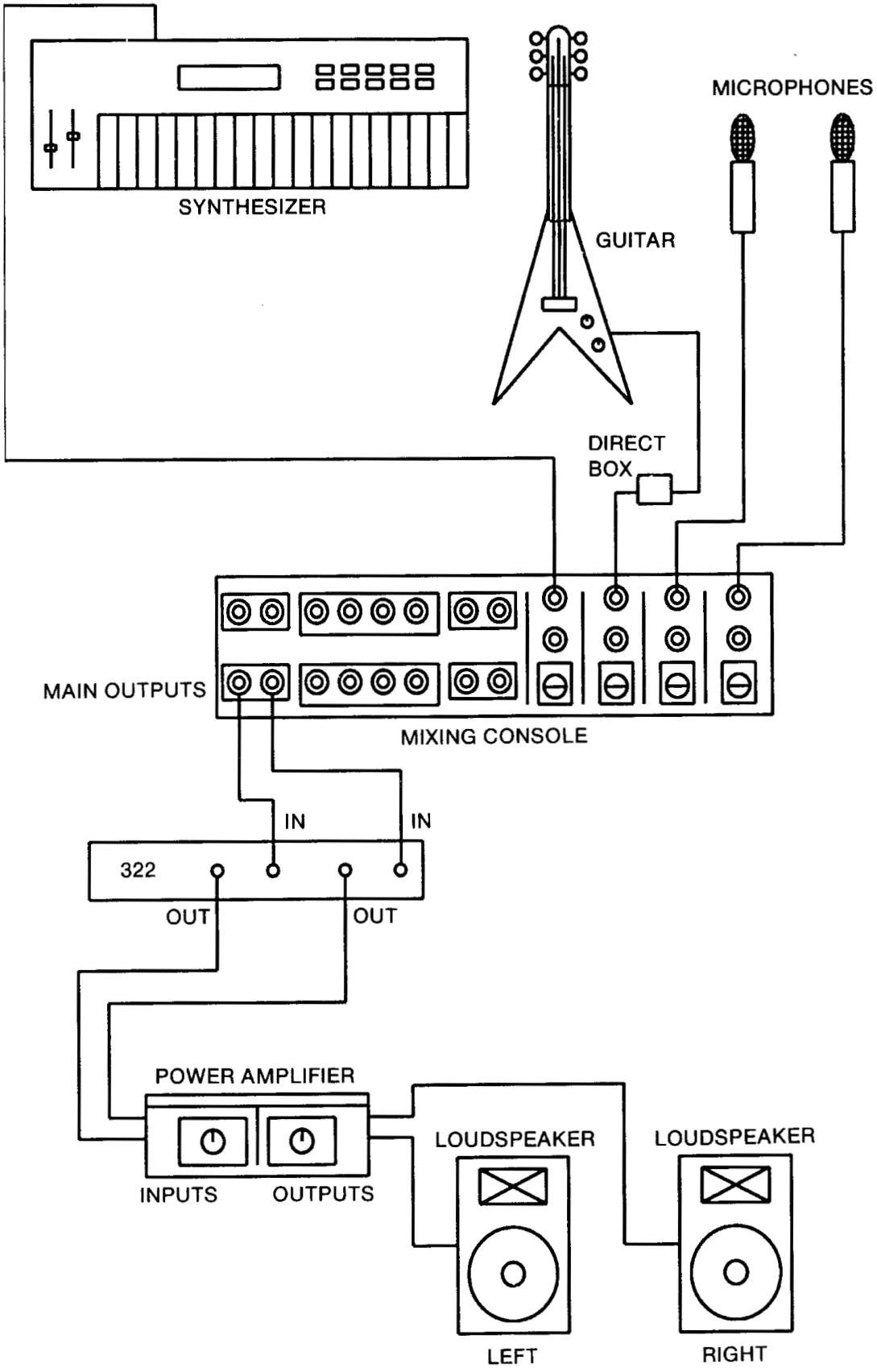


FIGURE 1A

POWERED MIXER SYSTEM APPLICATION

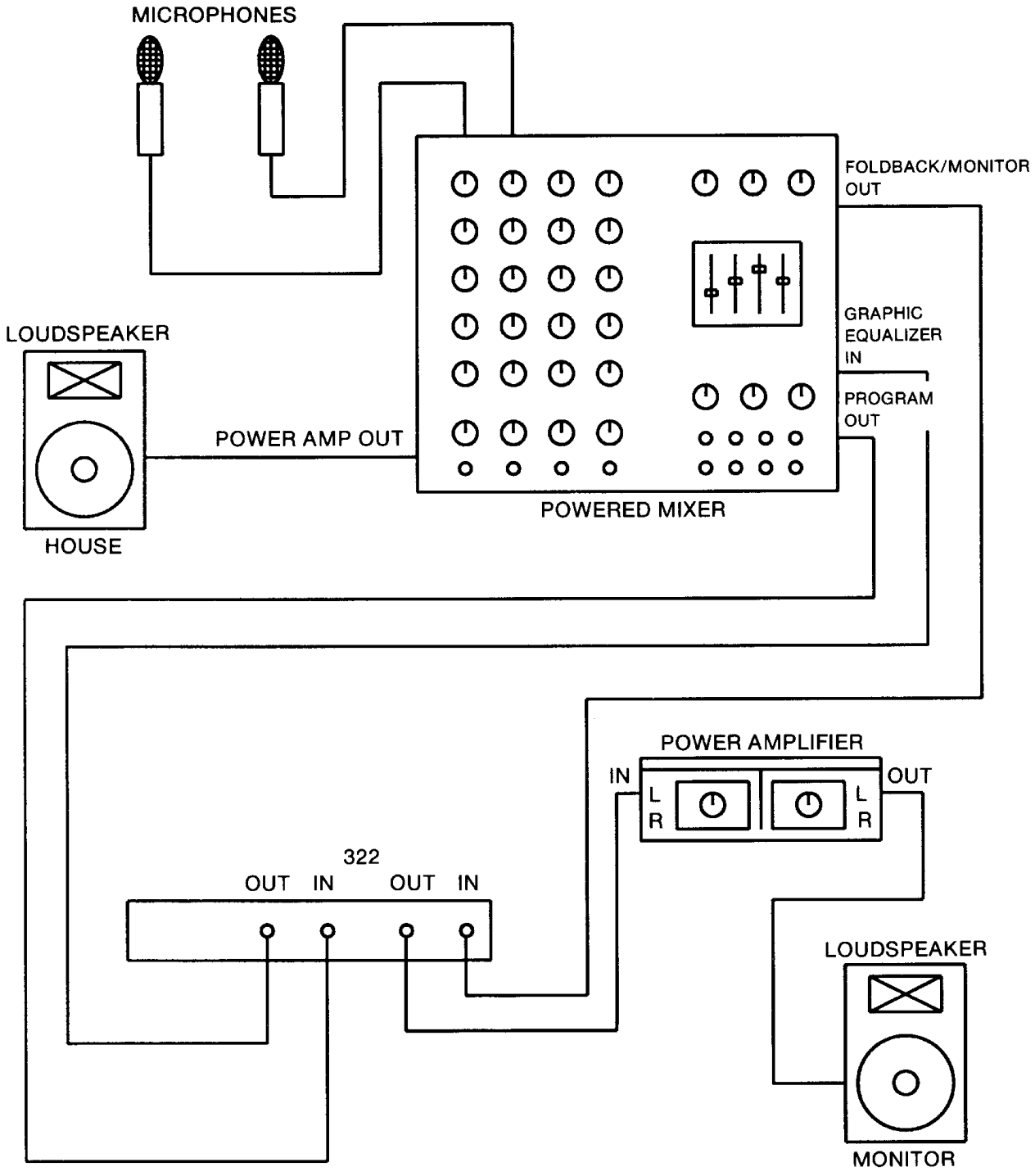


FIGURE 1B

POWERED MIXER SYSTEM APPLICATION

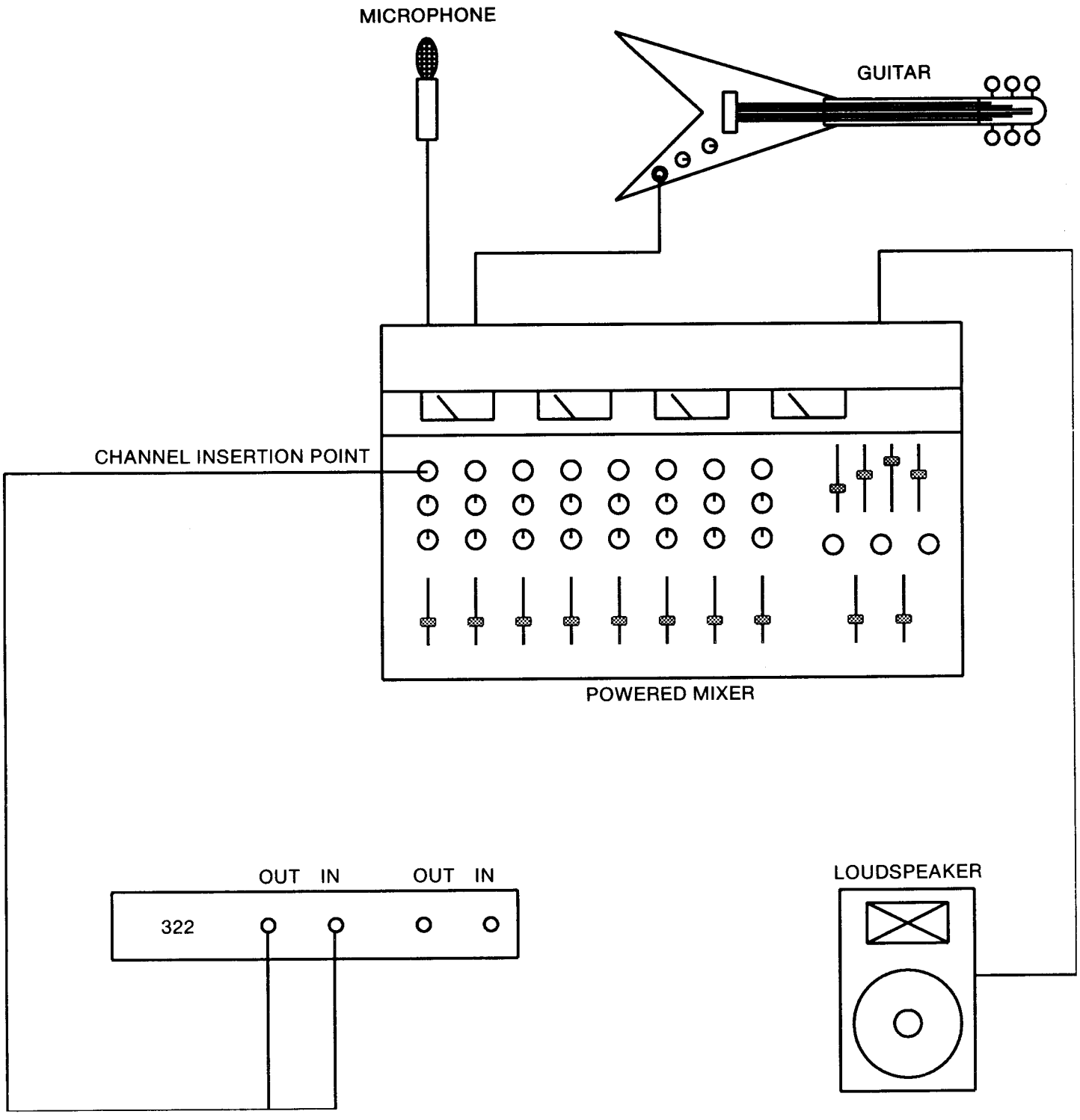


FIGURE 2

RECORDING
HOME STUDIO APPLICATION

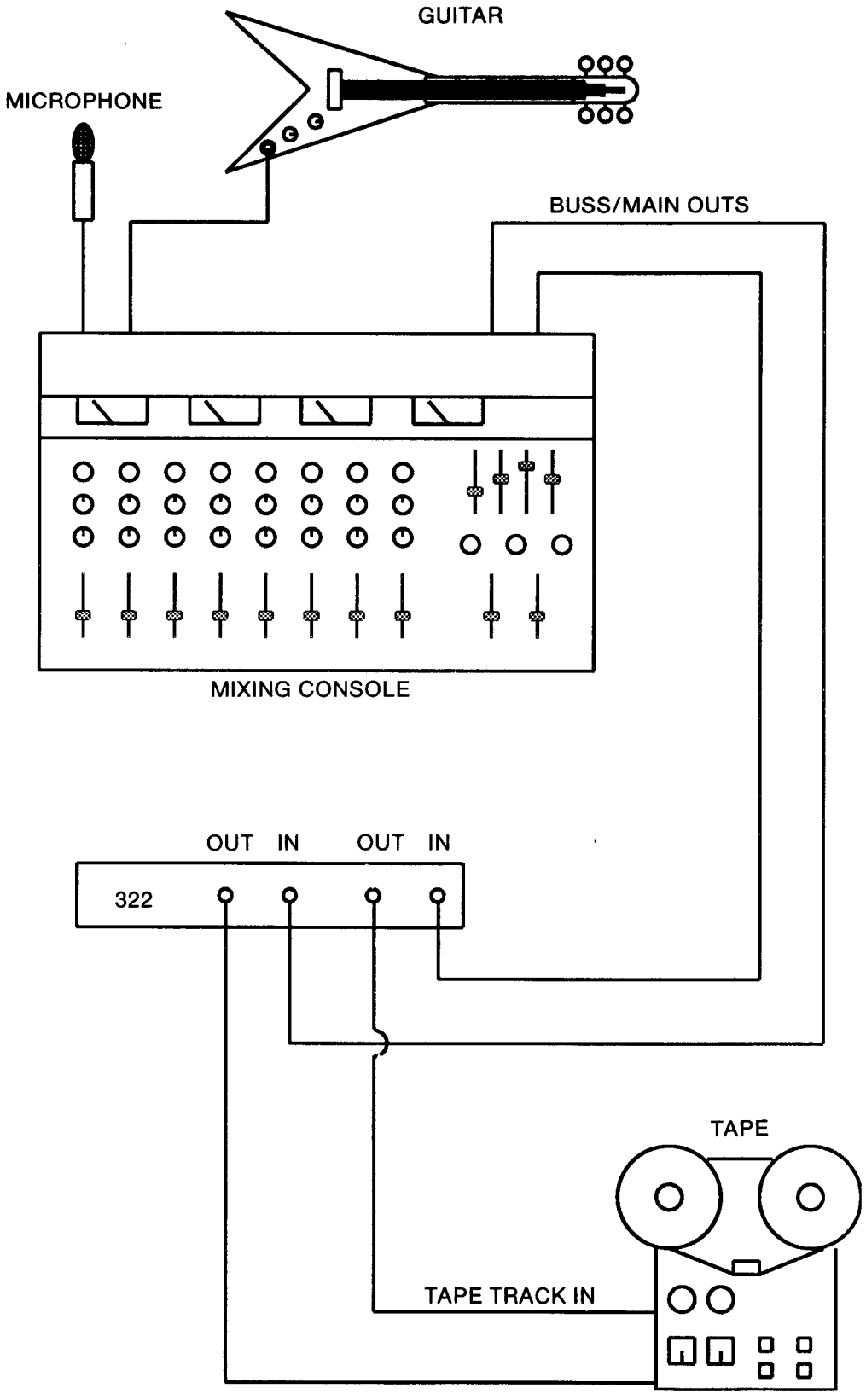


FIGURE 2A

RECORDING MIX DOWN

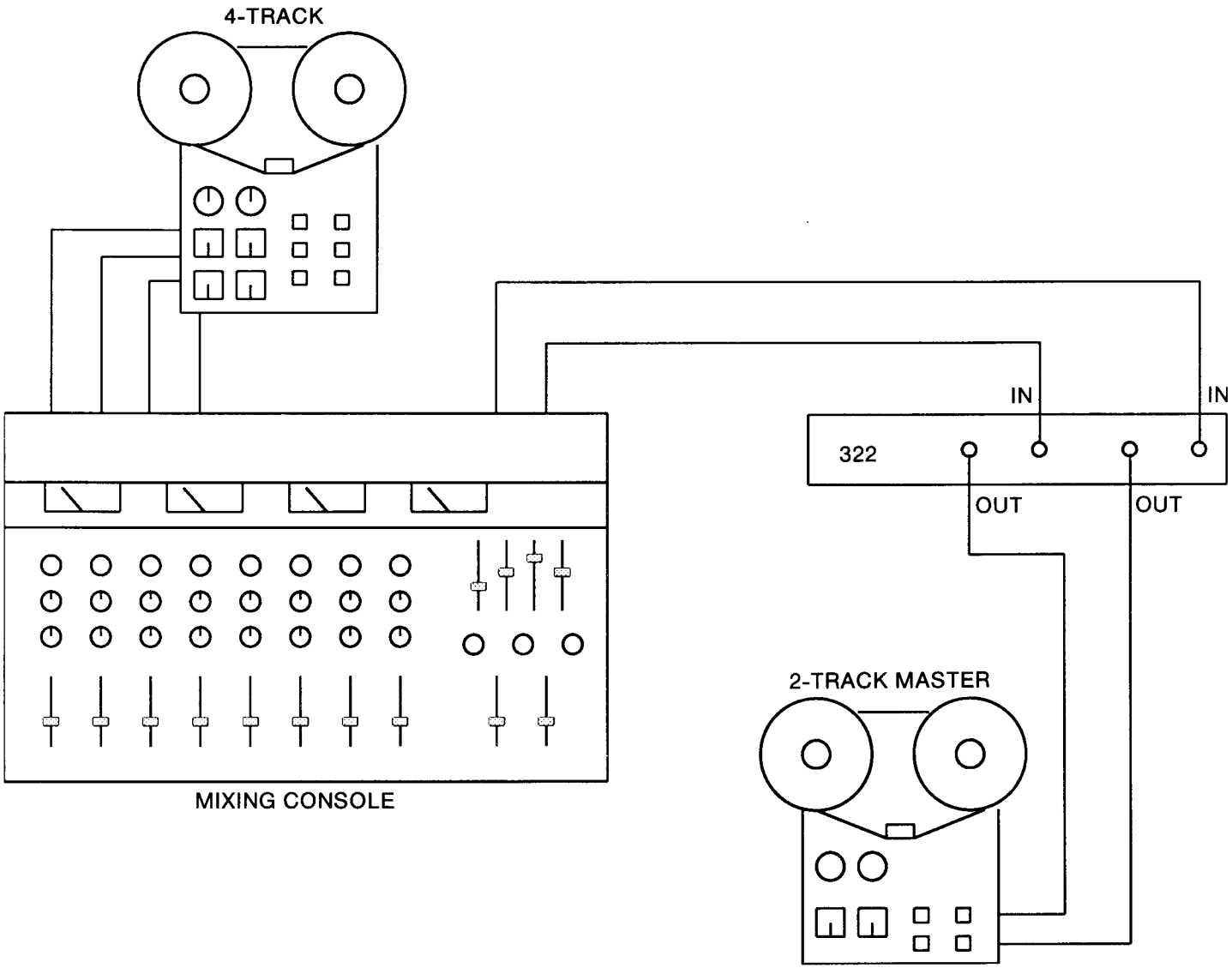


FIGURE 2B

PLAYBACK
HOME STUDIO APPLICATIONS

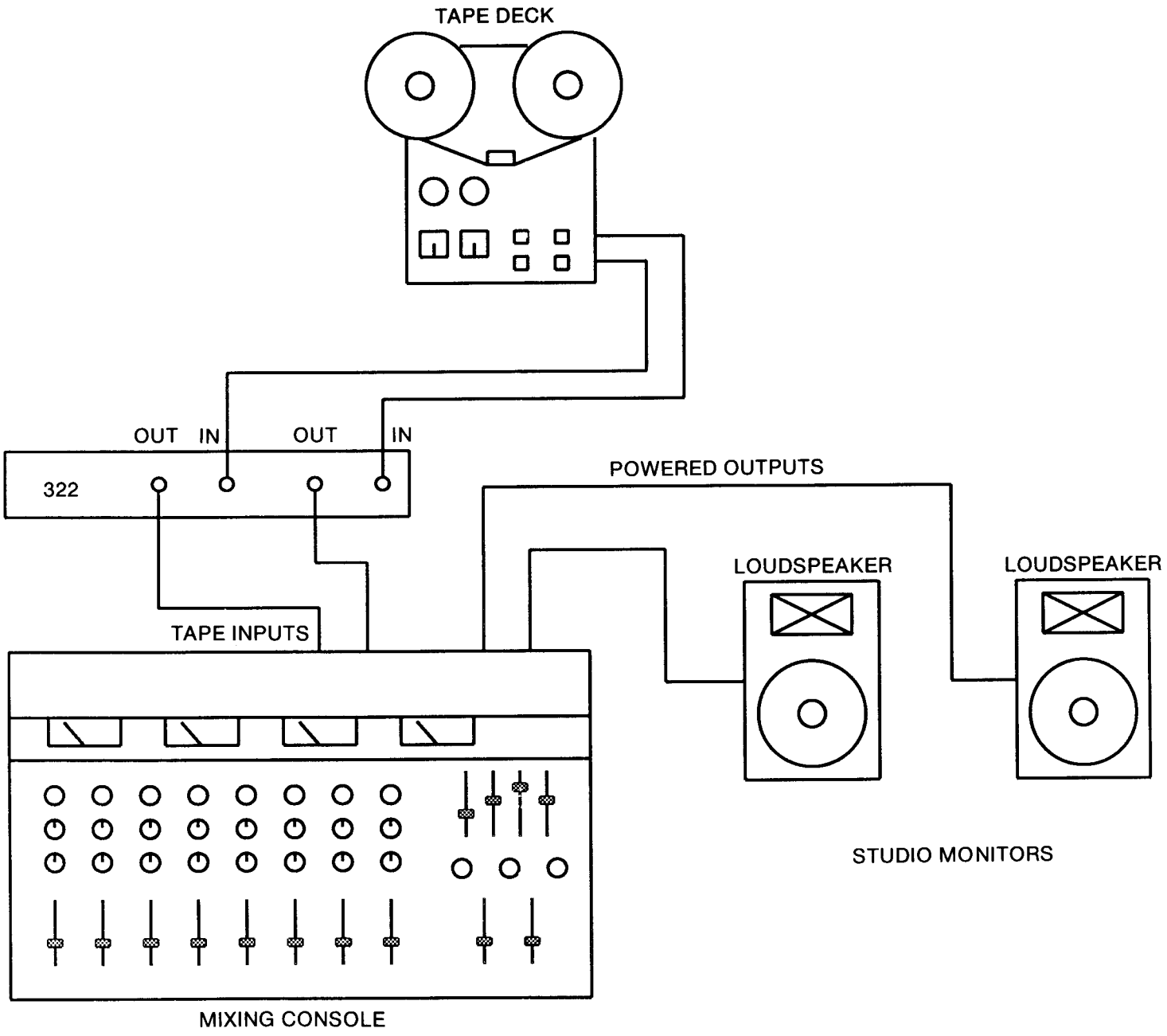
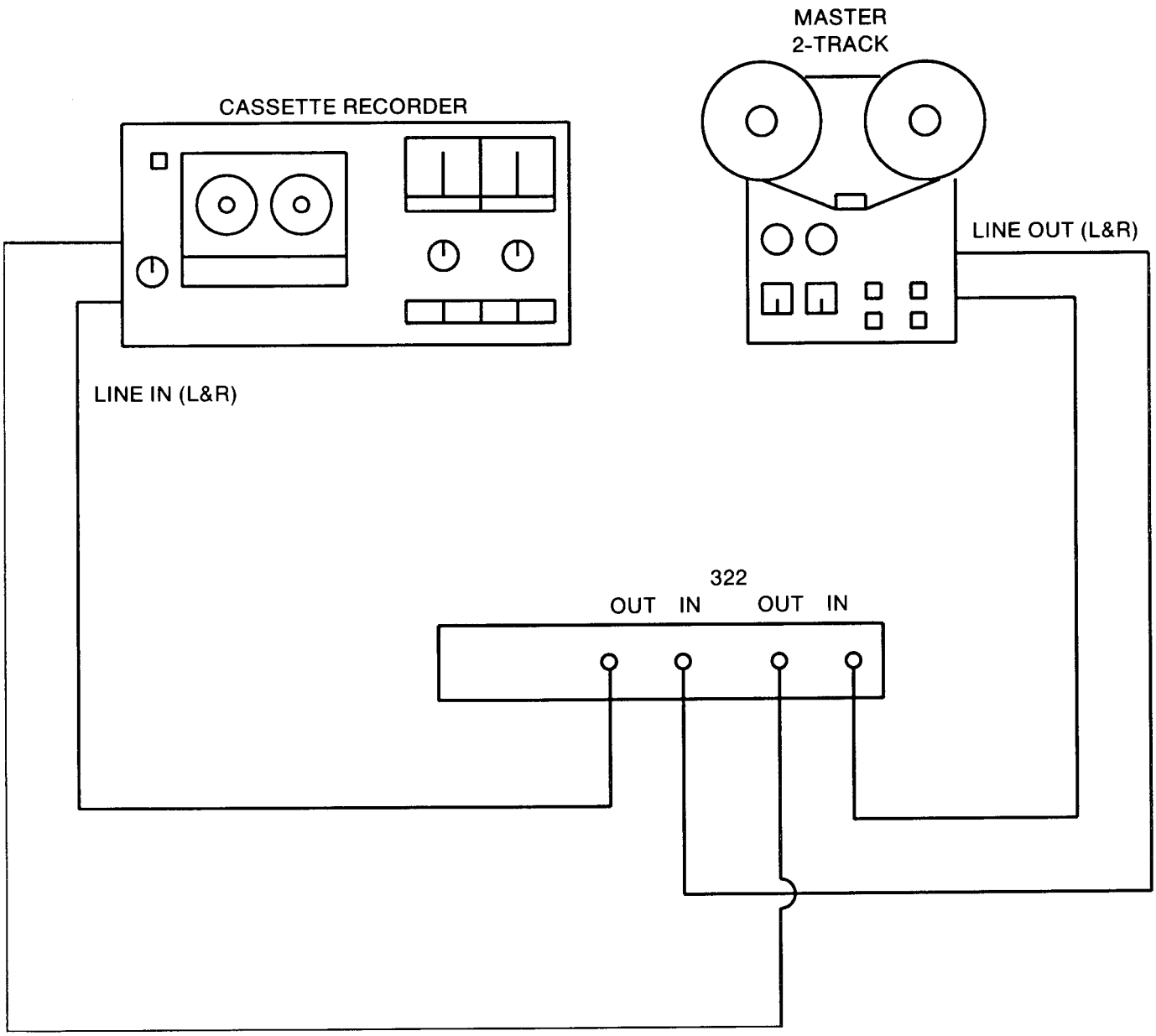


FIGURE 3

CASSETTE COPIES



Specifications BBE 322

Frequency Response	
Bypass	DC to 20kHz
Process Mode	program controlled
Absolute Noise in Process Mode	– 87dBu below rated max output of 0dBu
Total Harmonic Distortion in Process Mode	less than 0.1% @ – 10dBu Level
Input Characteristics	
Input Impedance	50K Ohms
Nominal Input Level	– 10dBu
Maximum Input Level	+ 16dBu
Output Characteristics	
Minimum Load Impedance for full output level	1K Ohm
Nominal Output Level	– 10dBu
Maximum Output Level	+ 16dBu

Power Requirements	
120VAC (nominal) 50/60Hz	7 Watts (220 VAC available)
A/C Line fused protected	
Terminations/Connectors	
Rear Panel	¼" Phone Jacks
Dimensions	
1¾" H x 19" W x 5¾"D	Standard 1U single rack
Weight	
4½ lbs. (2.5Kgs)	

NOTE: 0dBu = 0.775 Vrms

Service

We recommend that if at all possible a BBE 322 which requires repair be sent to our facility in Huntington Beach, CA. 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 to obtain a "Return Authorization" and include with the unit a copy of the bill of sale so that this process 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

The BBE 322 Processor 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 pre-paid to BBE Sound, Inc., 5500 Bolsa Ave., Suite 245, Huntington Beach, CA 92649. We will pay return UPS shipping charges within the U.S.A. All charges related to non-U.S. shipping, including customs clearance, will be billed.

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

1. Equipment has been physically damaged.
2. Equipment shows sign 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.

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

Maintenance

Maintenance of the BBE 322 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 322 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 PROCEDURE FOR THE BBE MODEL 322

NOTE: THIS UNIT WAS CALIBRATED AT THE FACTORY. THIS PROCEDURE IS FOR QUALIFIED SERVICE PERSONNEL ONLY.
Revision A, March 28, 1990

Equipment Required:

Audio Signal Generator (sine wave)
Digital Voltmeter (DVM)

This procedure details the calibration of channel A. Comments [in brackets] pertain to channel B. All tests are done with a signal level of -10dBu (.245Vrms) except for the clip indicator check. The signal will be input into the 1/4" connector marked INPUT. The DVM shall monitor the 1/4" connector of each corresponding channel marked OUTPUT.(Note: The L & R after the part reference number designates Left(A) and Right(B).

Initial Settings:

1) DEFINITION control VR5 to minimum.
2) Turn VR4L [VR4R] and VR6L [VR6R] to their middle positions.
3) POWER switch ON and FUNCTION switch IN (process on).

PROCEDURE:

Power Supply Test:
1) With DVM set to DC volts measure the positive end of C23. It should be less than **+30VDC**.
2) With DVM set to DC volts measure the negative end of C26. It should be greater than **-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)**.

Offset Adjustment:
1) With no signal present at the input (open) measure TP1L [TP1R] with the DVM set to DC volts.
2) Adjust VR6L [VR6R] until DVM reads **0.00VDC**.

Unity Adjustment:(Note:VR5 DEFINITION to minimum)
1) Input a 5000Hz signal (@ -10dBu) into the connector marked CHANNEL A [B] INPUT.
2) Measure the connector marked OUTPUT CHANNEL A [B] with the DVM
3) Adjust VR4L [VR4R] until the DVM reads **-13.0 dBu**.
4) Set generator to 500Hz (@ -10dBu).
5) The DVM should read **-10.0 (+/-0.5dBu).**

Definition Test:
1) With 5000Hz (@-10dBu) at the input turn the DEFINITION control to maximum the output should read **-2.75dBu (+/- 0.5)**
2) Return the DEFINITION control to minimum.

Lo-Contour Test:
1) Input a 50Hz signal (@ -10dBu) into the connector marked CHANNEL A [B] INPUT.
2) Measure the connector marked OUTPUT CHANNEL A [B] 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 **-21dBu.(+/-1.0dBu)**
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 CHANNEL A [B] INPUT.
2) With DVM measure TP1L [TP1R] you should read **+0.135VDC (+/- 0.040VDC)**
3) Change source to 5000Hz (@ -10dBu). With DVM measure TP1L [TP1R] you should read **+0.480VDC (+/- 0.040VDC)**

Bypass Test:
1) Switch the FUNCTION switch OUT (bypass mode).
2) Input a 500Hz signal (@ -10dBu) into the connector marked CHANNEL A [B] INPUT.
3) Measure the connector marked OUTPUT CHANNEL A [B] 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).

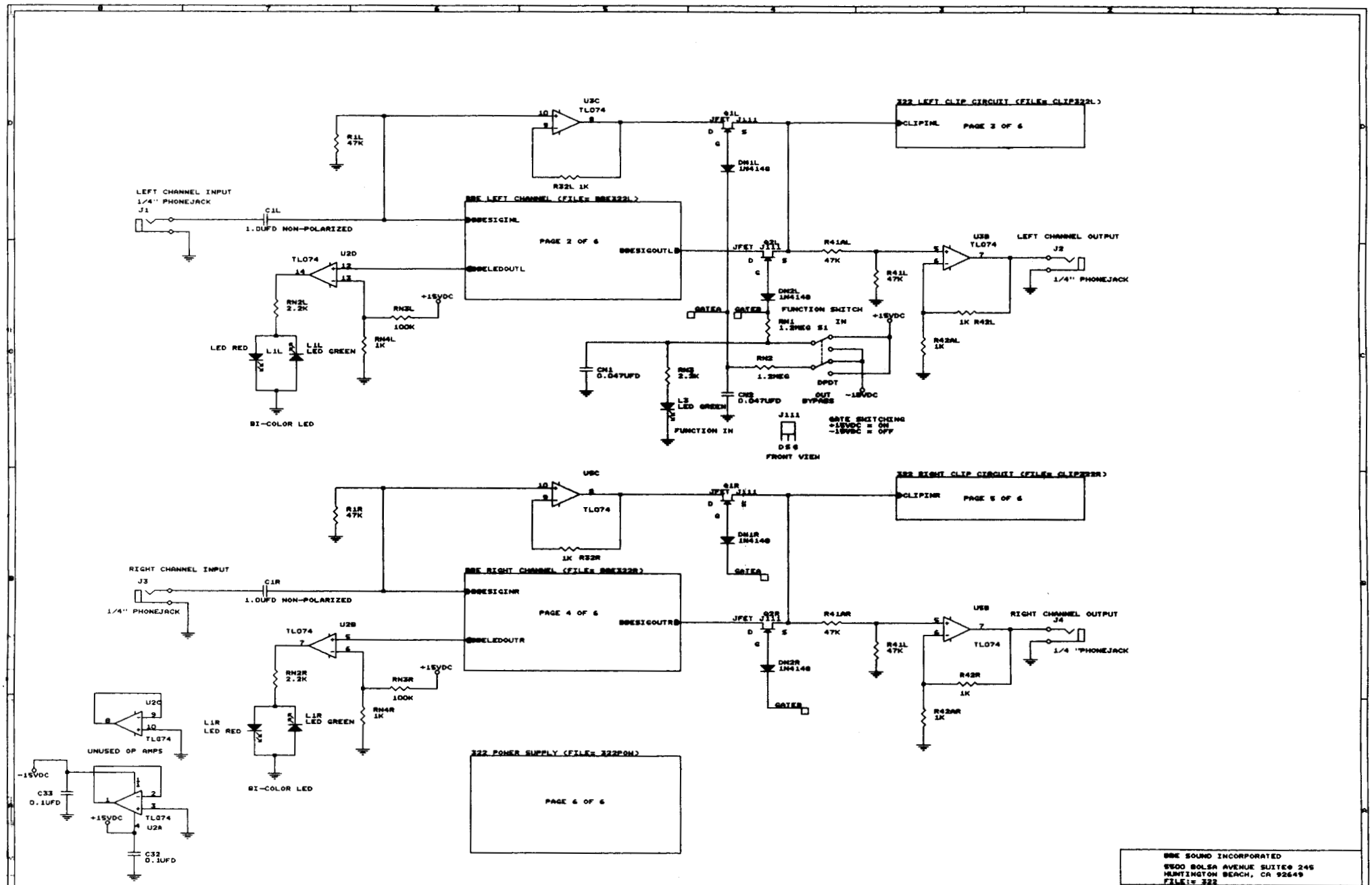
LED Test:
1) Input a 5000Hz signal (@ -10dBu) into the connector marked CHANNEL A [B] INPUT. The PROCESS LED should turn green.
2) Input a 500Hz signal (@ -10dBu) into the connector marked CHANNEL A [B] INPUT. The PROCESS LED should turn red.
4) With the FUNCTION switched to the IN position the corresponding green LED should be lit.

Clip Indicator Test:
1) Input a 500Hz signal with an amplitude of +16dBu (4.887Vrms) into the connector marked INPUT CHANNEL A [B]. Insure the corresponding CLIP LED is fully lit for each channel.

DC Voltage at Output Test:
1) Measure the output jacks to ground with the DVM set to DC volts the voltage must be less then **10mVDC.**

Offset drift test:
1) With no signal present at the input (open) measure TP1L [TP1R] with the DVM set to DC volts.
2) Insure this voltage is **0.00VDC (+/- 25mVDC)**

END TEST


322 LEFT CLIP CIRCUIT (FILE= CLIP322L)
CLIPINL
PAGE 3 OF 6
U3C
TL074
Q1L
JFET J111
R1L 47K
R32L 1K
DN1L 1N4148
LEFT CHANNEL INPUT
1/4" PHONEJACK
J1
C1L
1.0UFD NON-POLARIZED
BBE LEFT CHANNEL (FILE= BBE322L)
BBESIGINL
BBELEDOUTL
BBESIGOUTL
PAGE 2 OF 6
U2D
TL074
RN2L 2.2K
RN3L 100K
RN4L 1K
+15VDC
LED RED
L1L
LED GREEN
BI-COLOR LED
Q2L
JFET J111
R41AL 47K
R41L 47K
U3B
TL074
LEFT CHANNEL OUTPUT
J2
1/4" PHONEJACK
1K R42L
R42AL 1K
DN2L 1N4148
GATEA
GATEB
FUNCTION SWITCH IN
RN1 1.2MEG S1
-15VDC
CN1 0.047UFD
RN2 1.2MEG
DPDT
RN3 2.2K
CN2 0.047UFD
OUT BYPASS
L3 LED GREEN
FUNCTION IN
J111
DS6
FRONT VIEW
GATE SWITCHING
+15VDC = ON
-15VDC = OFF
322 RIGHT CLIP CIRCUIT (FILE= CLIP322R)
CLIPINR
PAGE 5 OF 6
U3C
TL074
Q1R
JFET J111
R1R 47K
1K R32R
DN1R 1N4148
GATEA
RIGHT CHANNEL INPUT
J3
1/4" PHONEJACK
C1R
1.0UFD NON-POLARIZED
BBE RIGHT CHANNEL (FILE= BBE322R)
BBESIGINR
BBELEDOUTR
BBESIGOUTR
PAGE 4 OF 6
U2B
TL074
RN2R 2.2K
RN3R 100K
RN4R 1K
+15VDC
L1R
LED RED
L1R
LED GREEN
BI-COLOR LED
Q2R
JFET J111
R41AR 47K
R41L 47K
U3B
TL074
RIGHT CHANNEL OUTPUT
J4
1/4 "PHONEJACK
R42R 1K
R42AR 1K
DN2R 1N4148
GATEB
U2C
TL074
UNUSED OP AMPS
-15VDC
C33 0.1UFD
+15VDC
U2A
TL074
C32 0.1UFD
322 POWER SUPPLY (FILE= 322PSM)
PAGE 6 OF 6
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9500 BOLSA AVENUE SUITE# 245
HUNTINGTON BEACH, CA 92649
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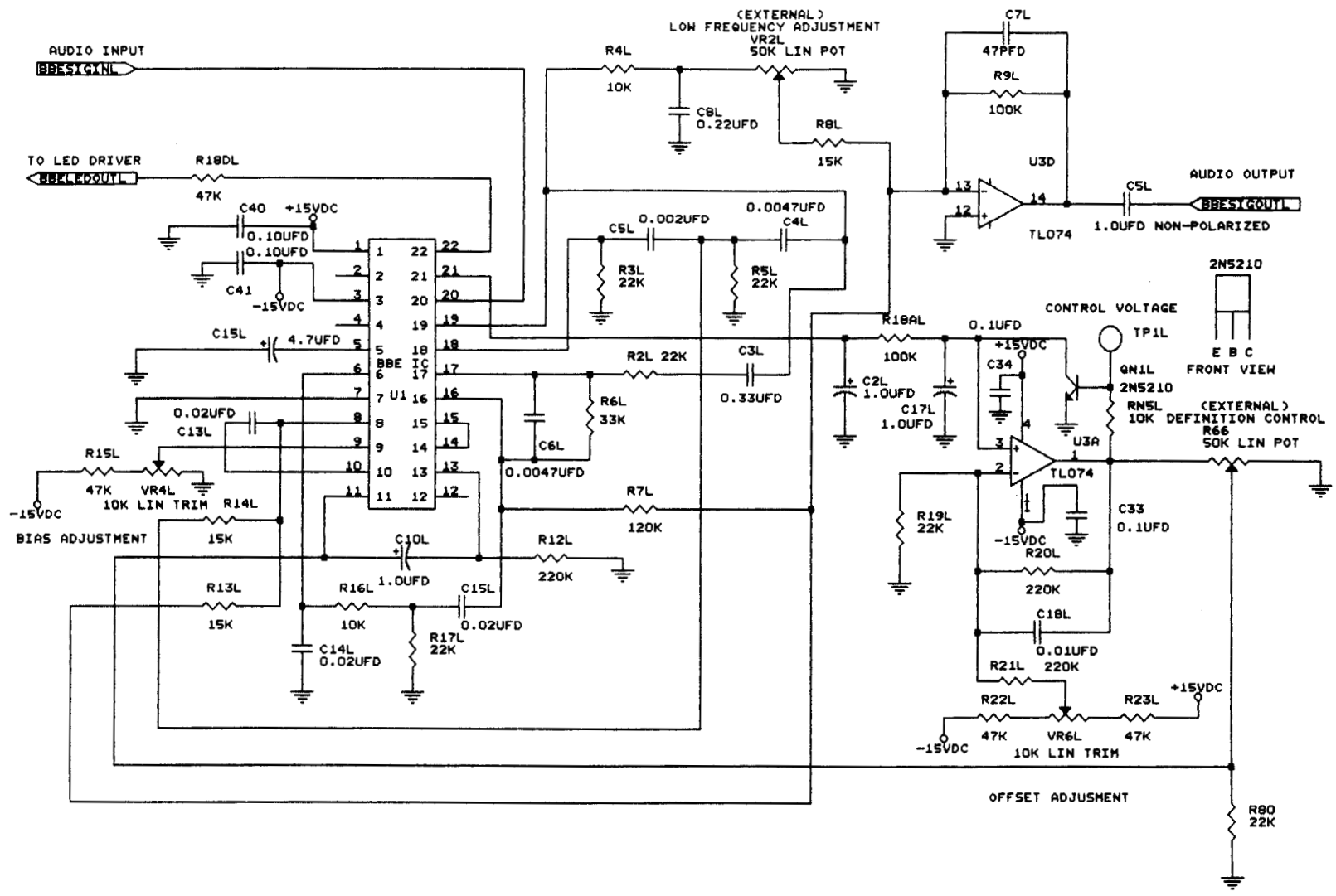
Size C
Document Number 322-1-S
REV A
Date March 30, 1990
Sheet 1 of 6



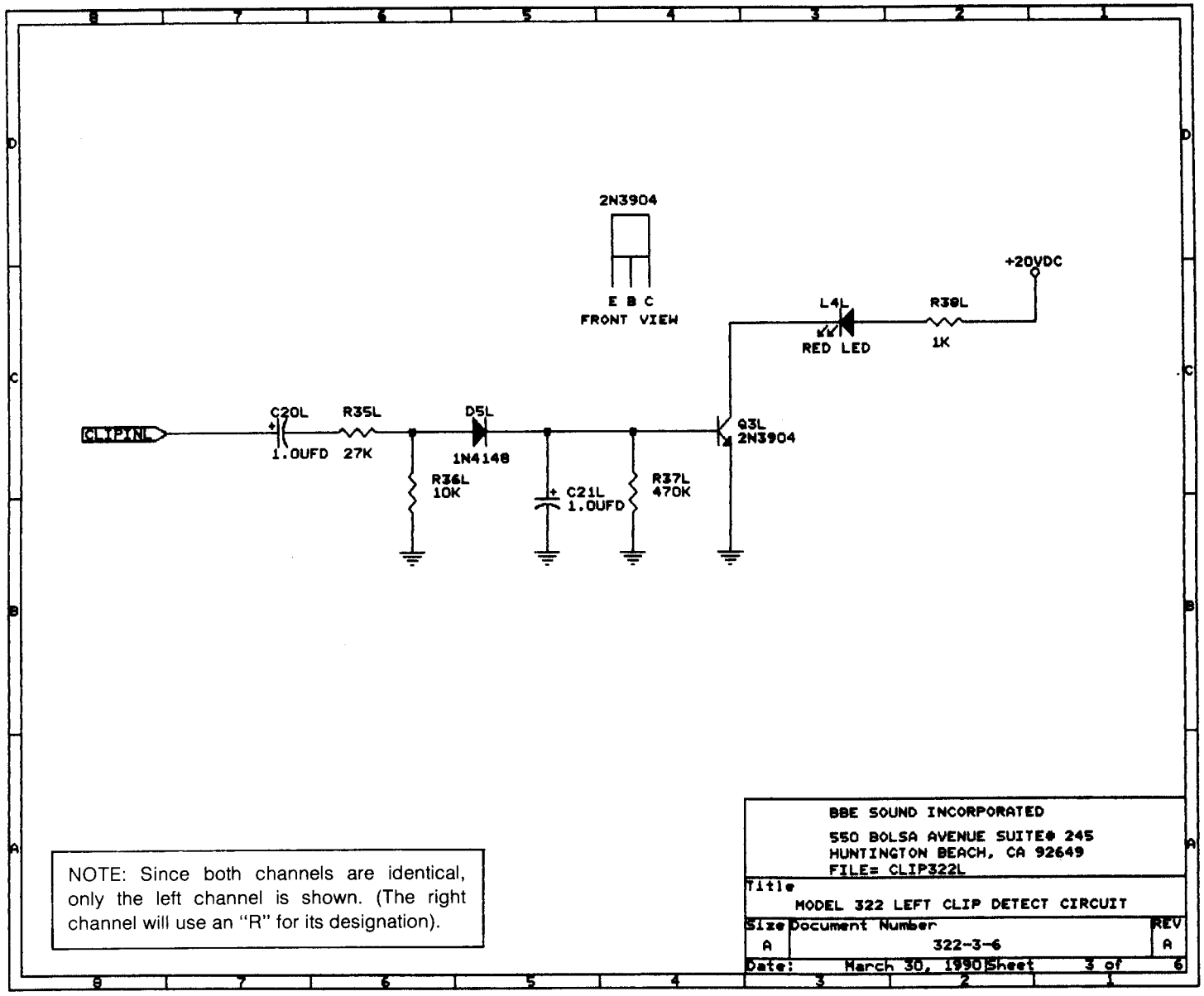
NOTE: Since both channels are identical, only the left channel is shown. (The right channel will use an "R" for its designation).

BBE SOUND INCORPORATED
5500 BOLSA AVENUE SUITE# 245
HUNTINGTON BEACH, CA 92649
FILE= BBE322L

Title: LEFT CHANNEL BBE CIRCUIT

Size	Document Number	REV
B	322-2-6	A

Date: March 30, 1990 Sheet 2 of 6



NOTE: Since both channels are identical, only the left channel is shown. (The right channel will use an "R" for its designation).

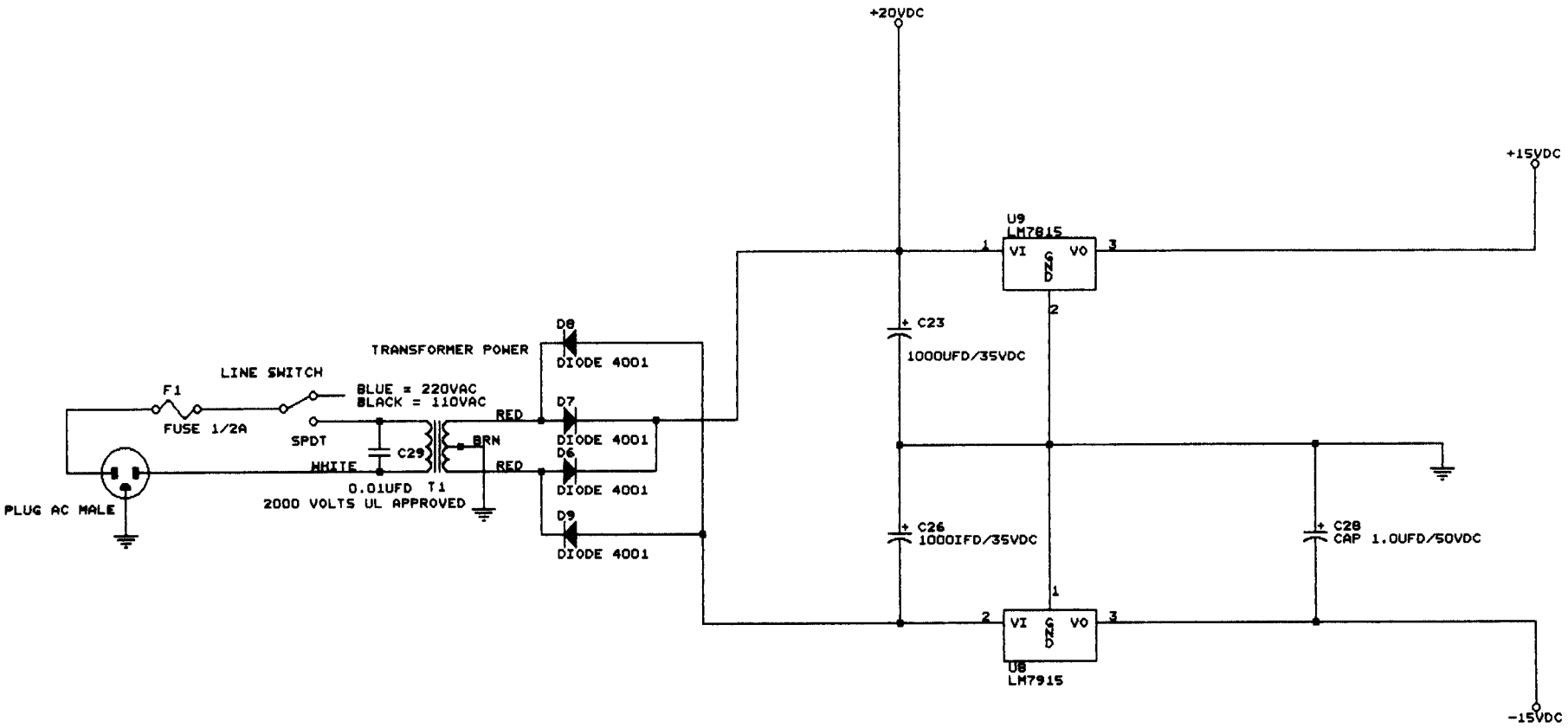
BBE SOUND INCORPORATED

550 BOLSA AVENUE SUITE# 245
HUNTINGTON BEACH, CA 92649
FILE= CLIP322L

Title
MODEL 322 LEFT CLIP DETECT CIRCUIT

Size	Document Number	REV
A	322-3-6	A

Date: March 30, 1990 Sheet 3 of 6



BBE SOUND INCORPORATED		
FILE:= 322POW		
Title: MODEL 322 POWER SUPPLY		
Size: B	Document Number: 322-6-6	REV: A
Date: March 30, 1990	Sheet 6 of 6	

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