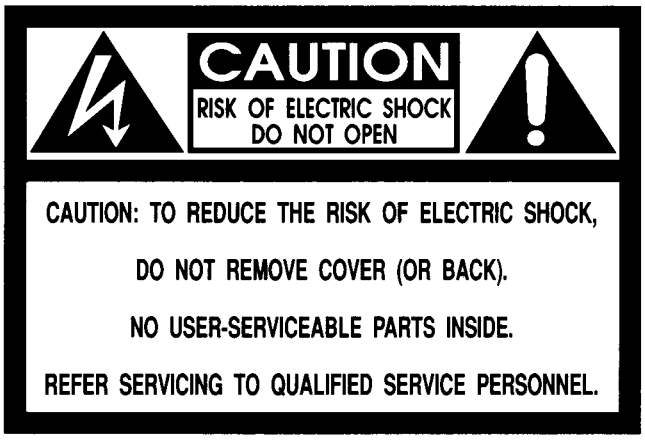
BBE™
Sound Inc.

MODEL 422
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.**

Congratulations!

Thank you for buying the BBE Model 422 MAXIE Sonic Maximizer. You now own a very unique signal processing device with no other equal in the audio world. Whether you purchased the BBE 422 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 422 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 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 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 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.

Product Description

The BBE 422 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 422 takes up one EIA standard rack space of 19 inches width and 1.75 inches height (1U). There are two completely separate channels to allow for either full stereo program or two independent mono channels such as 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. A variable front panel control for each channel allows the user to adjust the amount of process desired.

Using Your New BBE 422

BBE™ is a process to be added before all other mixing of reverb, special effects or equalization. The BBE 422 is used to increase the clarity and intelligibility of the program material.

Unlike many aural exciters or equalizers, the BBE 422 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.

Things To Remember

The BBE 422 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 422 drives load impedances down to about 1K Ohm and supplies a maximum level of +14dBu. The inputs and outputs are unbalanced types and input to the BBE 422 should be kept at maximum level. Plugging a guitar or a microphone directly into the BBE 422 will not work, as the output level is much too low. In this application a BBE 401 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 422 to roll off the noise first. Post-amplification of the BBE 422 is not necessary and not recommended, as the BBE 422 can drive any semi-pro gear with −10dBu input to full level directly. This assumes that the BBE 422 is operating in the aforementioned fashion with −10dBu input levels.

WARNING!

It is good practice 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 may result.

Applications

Various applications of the BBE™ process include:

Music and P.A. System

The BBE 422 has become a popular addition to many P.A. systems because it makes a drastic 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. The BBE 422 is inserted between the console output buss and the next stage of amplification in the P.A. system, if the BBE™ process is desired on the entire mix.

The BBE 422 unit is placed before any house graphic equalizers. All pink noise checks should be made with the BBE™ unit 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 422.

The BBE 422 is unbalanced input and output and the user should be aware of the level and impedance of the insert point to insure proper operation of the BBE 422.

With this in mind, the BBE 422 may be inserted in many places within the console's signal path to achieve specialized and dramatic result. In the case of non-VCA sub-groups, the BBE 422 is inserted between "buss out" and "sub-group fader in", for the application of the BBE™ process to a whole group of vocal microphones, for example.

If the BBE™ process is to be used on only one microphone source, the BBE 422 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 401 unit should be used. The BBE 401 accepts low levels direct from microphones, electric guitars,etc. and interfaces directly to the P.A. mixer.

Figure 1 shows the BBE 422 in a P.A. system application where the "A" channel is used for the main house mix and the "B" channel is used for the monitor mix feed when two different amounts of processing are needed in each mix. Figure 1A shows a powered mixer where the BBE 422 is inserted between the program out and the graphic equalizer in.

Home Studios

The BBE 422 gives a pro-edge to otherwise dull recordings on narrow-track width home 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 422 between the tape track output and the mixer channel input. The BBE 422 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 422 reduces the mid-range "smear" and the associated masking effects.

Figures 2 and 2A show two applications of the BBE 422 in a home studio. Figure 2 shows that when recording, the BBE 422 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 shows that when in playback, the BBE 422 process can be applied to a previously recorded tape track by inserting the BBE 422 between the tape track output and the mixer line input. This is a mixdown set up and can help restore lost clarity.

Cassette Copies

Since the BBE 422 is a single-ended playback process without encoding or decoding, the stereo BBE 422 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 422 in the cassette copy mode.

Industrial

The BBE 422 greatly improves intelligibilty in speech or music by improving the attack of the consonants that the human ear needs in order to recognize the difference between like sounding words and syllables. This makes the BBE 422 a natural for public address, intercom or wide area dispersion of pre-recorded music or voice announcements over an existing old and dull loudspeaker system.

Figure 4 shows the BBE 422 inserted between the telephone matching adapter and the auxiliary input to the public address intercom amplifier. Plugging a microphone directly into the BBE 422 will not work. If the existing P.A. amplifier has no provision for auxiliary input, then the BBE 401 unit should be used. The BBE 401 accepts a microphone directly and then interfaces with an existing P.A. amplifier without costly on-site modifications.

The Controls

Operation of the BBE 422 is quite simple due to the sophisticated circuitry within the unit. Below are the names and purposes of each control on the BBE 422.

Lo Contour Control — Each channel has a 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 has a definition control that 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.

Hi Contour LED stack — Each channel is equipped with a set of LED indicators that instantly show the relative amount of high band compensation compared to the mid band.
1) RED LED (marked "−"): Compression mode. The amplitude of the high band is too high compared to the mid band and compression is being applied to compensate.
2) AMBER LED (marked "O"): Flat mode. No amplitude compensation is needed. The program spectral content is correct.
3) GREEN LED (marked "+"): Expansion mode. The amplitude of the high band is too low compared to the mid band and the amplitude of the high band is being expanded to compensate.
4) CLIP LED: This LED indicates that the output of the BBE 422 has reached the maximum input level of +16dBu.

Function Switch — Each channel 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 amber "Out" LED lights.

Power Switch — This switch controls primary power to the BBE 422.

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.)

Remote Jack — An additional ¼" jack is provided for remote actuation of the function switch. Any push-on/push-off single pole switch will work as a remote. The front panel function switch must be in the process position in order for this jack to operate.

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

HI-Z Unbalanced ¼" or RCA Input — Each channel is equipped with a ¼" phone jack or RCA jack that accepts a high impedance unbalanced line level input with an average level of 0dBu. (Note: +16dBu is the maximum input before clipping.)

Set-Up

The BBE 422 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 422. Remember, outputs connect to inputs and as long as the signal source level is within the nominal range as mentioned in the previous section, the BBE 422 will function perfectly.

Setting-up and using the BBE 422 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 422 is summed with the original source audio.

The BBE 422 also has an additional quarter inch jack for remote actuation of the process in/out switch. Any single-pole, single-throw switch, such as a footswitch, will work.

Calibration Procedure for the BBE™ Model 422

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 0dBu (.775Vrms) except for the clip indicator check. The signal will be input into the ¼" connector marked INPUT. The DVM shall monitor the ¼" 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 controls (VR5L & VR5R) to minimum.
2. All other potentiometers 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 pin-4 of U2. You should read +12Vdc (±0.5Vdc).
2. With DVM set to DC volts, measure pin-11 of U2. You should read −12Vdc (±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:

1. Input a 500Hz signal (@ 0dBu) 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. Adjust VR3L [VR3R] until the DVM reads 0dBu.
4. Set generator to 5000Hz (0dBu).
5. Adjust VR4L [VR4R] until the DVM reads 0dBu.
6. Repeat steps 1 thru 5 until readings are correct since some interaction exists.

Lo-Contour Test:

1. Input a 50Hz signal (@ 0dBu) 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 approximately +10dBu.
4. Turn the LO-CONTOUR control completely counterclockwise (marked "−"). The DVM should read approximately −10dBu.
5. Turn the control to the middle position (marked "0"). The DVM should read approximately 0dBu or flat response.

Detector Balance:

(Note: The DEFINITION control must be completely minimum.)

1. Input a 500Hz signal (@ 0dBu) into the connector marked CHANNEL A [B] INPUT.
2. Measure TP1L [TP1R] with DVM set to DC volts and adjust VR1L [VR1R] until meter reads −1.00Vdc.

Bypass Test:

1. Switch the FUNCTION switch OUT (bypass mode).
2. Input a 500Hz signal (@ 0dBu) 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 0dBu (±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 ¼" shorting jack.
3. Ensure the FUNCTION changes to OUT or bypass.

LED Test:

1. Input a 500Hz signal (@ 0dBu) into the connector marked CHANNEL A [B] INPUT.
2. With the DEFINITION control to minimum, the amber HIGH CONTOUR LED (marked "0") should be lit.
3. Turn the DEFINITION control to maximum, the green HIGH CONTOUR LED (marked "+") should be lit.
4. Set generator to 5000Hz.
5. Turn the DEFINITION control to maximum the red HIGH CONTOUR LED (marked "−") should be lit.
6. With the FUNCTION switched to the IN position the corresponding green LED should be lit.
7. 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 INPUT CHANNEL A [B]. Ensure the corresponding CLIP LED is fully lit for each channel.

RCA Connector Test:

1. Ensure the RCA connectors function the same as the ¼" phone jacks since they are connected in parallel.

END TEST

Specifications BBE 422

Frequency Response	
Bypass	DC to 20kHz
Process Mode	program controlled
Noise in Process Mode	– 90dBu below rated max output of + 14dBu
Total Harmonic Distortion in Process Mode	less than 0.1% @ 1kHz. @ – 10dBu Level
Input Characteristics	
Input Impedance	50K Ohms
Nominal Input Level	– 10dBu
Maximum Input Level	+ 14dBu
Output Characteristics	
Minimum Load Impedance for full output level	1K Ohm
Nomimal Output Level	– 10dBu
Maximum Output Level	+ 14dBu

Power Requirements	
120 VAC (nominal) 50/60Hz A/C Line fused protected	10 Watts (220VAC available)
Terminations/Connectors	
Rear Panel	RCA Jacks and ¼" Phone Jacks
Dimensions	
1¾" H × 17" W × 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 422 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 422 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 422 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 422 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 422

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 0dBu (.775Vrms) except for the clip indicator check. The signal will be input into the ¼" connector marked INPUT. The DVM shall monitor the ¼" 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 controls (VR5L & VR5R) to minimum.
2. All other potentiometers 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 pin-4 of U2. You should read +12Vdc (±0.5Vdc).
2. With DVM set to DC volts, measure pin-11 of U2. You should read −12Vdc (±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:

1. Input a 500Hz signal (@ 0dBu) 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. Adjust VR3L [VR3R] until the DVM reads 0dBu.
4. Set generator to 5000Hz (0dBu).
5. Adjust VR4L [VR4R] until the DVM reads 0dBu.
6. Repeat steps 1 thru 5 until readings are correct since some interaction exists.

Lo-Contour Test:

1. Input a 50Hz signal (@ 0dBu) 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 approximately +10dBu.
4. Turn the LO-CONTOUR control completely counterclockwise (marked "−"). The DVM should read approximately −10dBu.
5. Turn the control to the middle position (marked "0"). The DVM should read approximately 0dBu or flat response.

Detector Balance:

(Note: The DEFINITION control must be completely minimum.)

1. Input a 500Hz signal (@ 0dBu) into the connector marked CHANNEL A [B] INPUT.
2. Measure TP1L [TP1R] with DVM set to DC volts and adjust VR1L [VR1R] until meter reads −1.00Vdc.

Bypass Test:

1. Switch the FUNCTION switch OUT (bypass mode).
2. Input a 500Hz signal (@ 0dBu) 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 0dBu (±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 ¼" shorting jack.
3. Ensure the FUNCTION changes to OUT or bypass.

LED Test:

1. Input a 500Hz signal (@ 0dBu) into the connector marked CHANNEL A [B] INPUT.
2. With the DEFINITION control to minimum, the amber HIGH CONTOUR LED (marked "0") should be lit.
3. Turn the DEFINITION control to maximum, the green HIGH CONTOUR LED (marked "+") should be lit.
4. Set generator to 5000Hz.
5. Turn the DEFINITION control to maximum the red HIGH CONTOUR LED (marked "−") should be lit.
6. With the FUNCTION switched to the IN position the corresponding green LED should be lit.
7. 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 INPUT CHANNEL A [B]. Ensure the corresponding CLIP LED is fully lit for each channel.

RCA Connector Test:

1. Ensure the RCA connectors function the same as the ¼" phone jacks since they are connected in parallel.

END TEST

FIGURE 1

LIVE SOUND SYSTEM

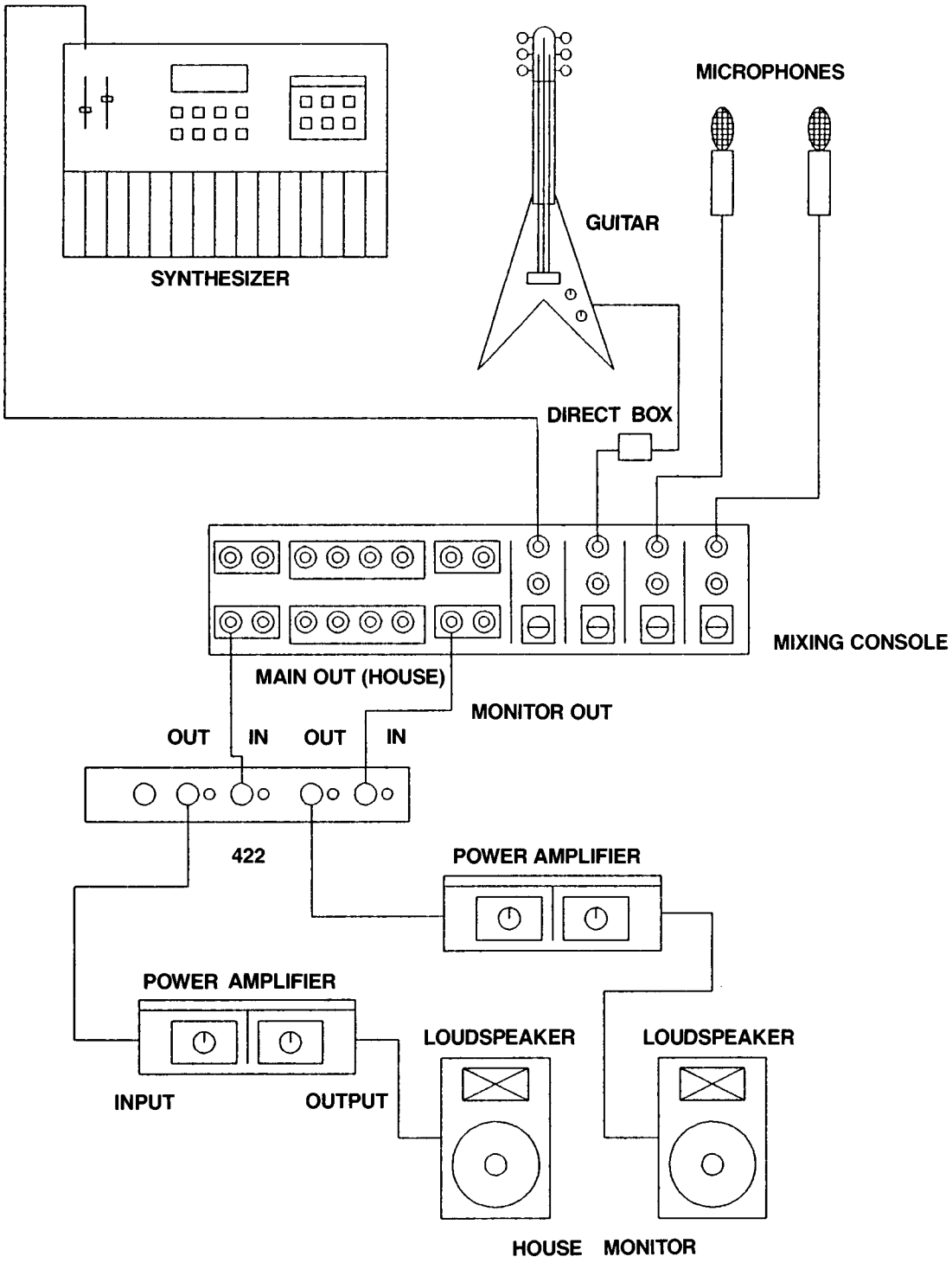


FIGURE 1A POWERED MIXER SYSTEM

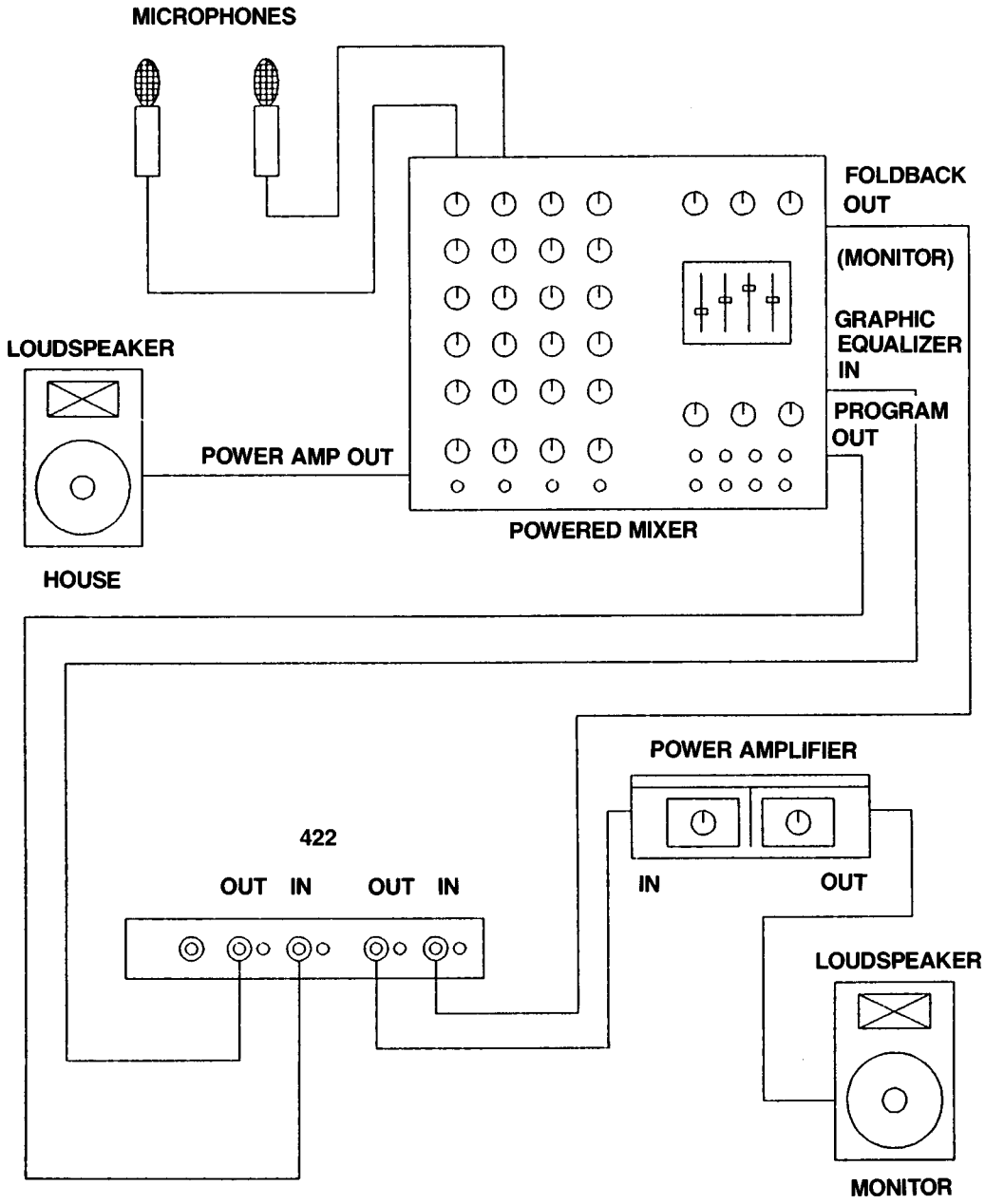


FIGURE 2

RECORDING
HOME STUDIO APPLICATION

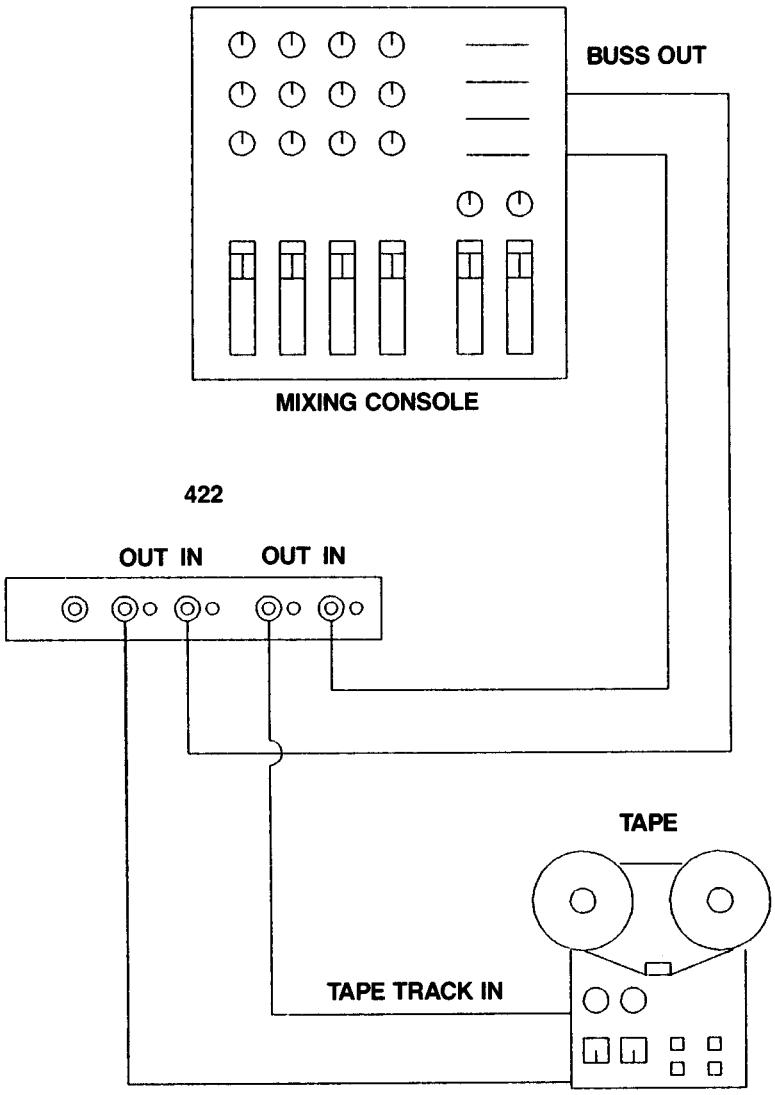


FIGURE 2A

PLAYBACK
HOME STUDIO APPLICATION

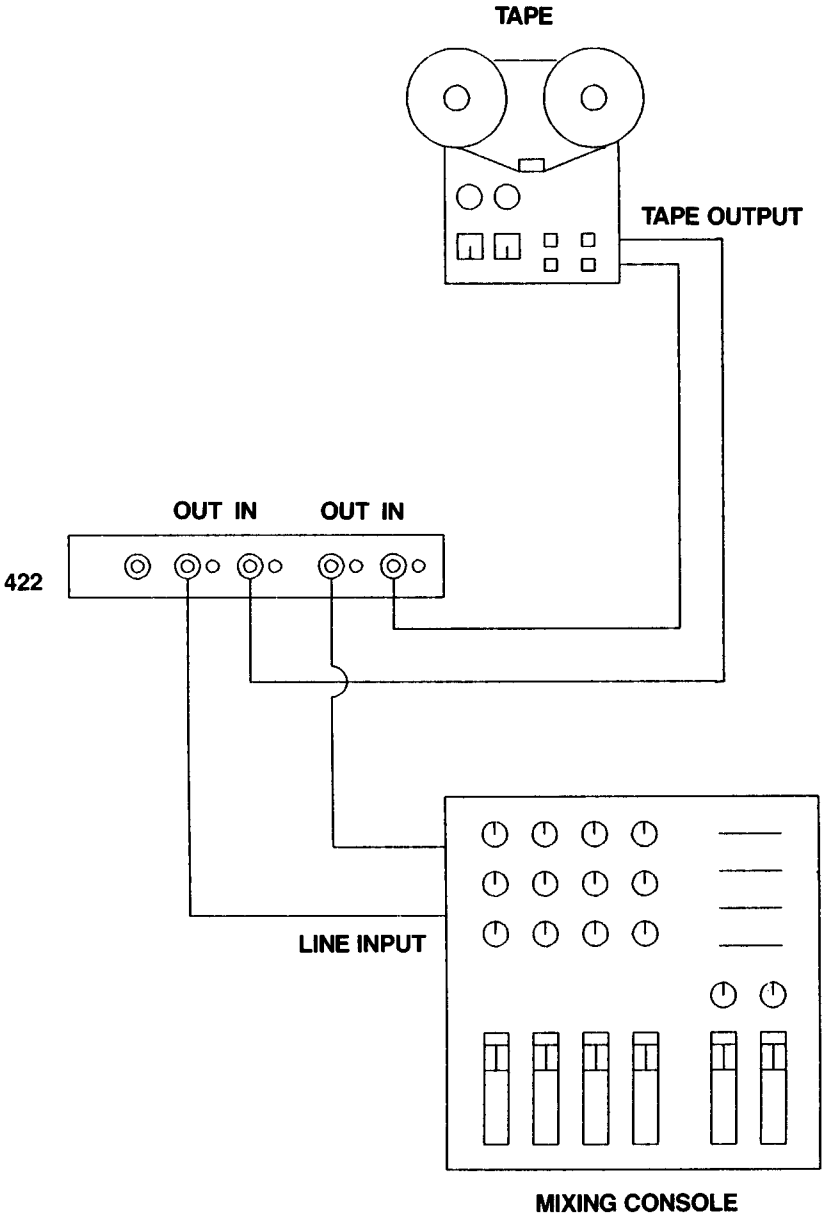


FIGURE 3

CASSETTE COPIES

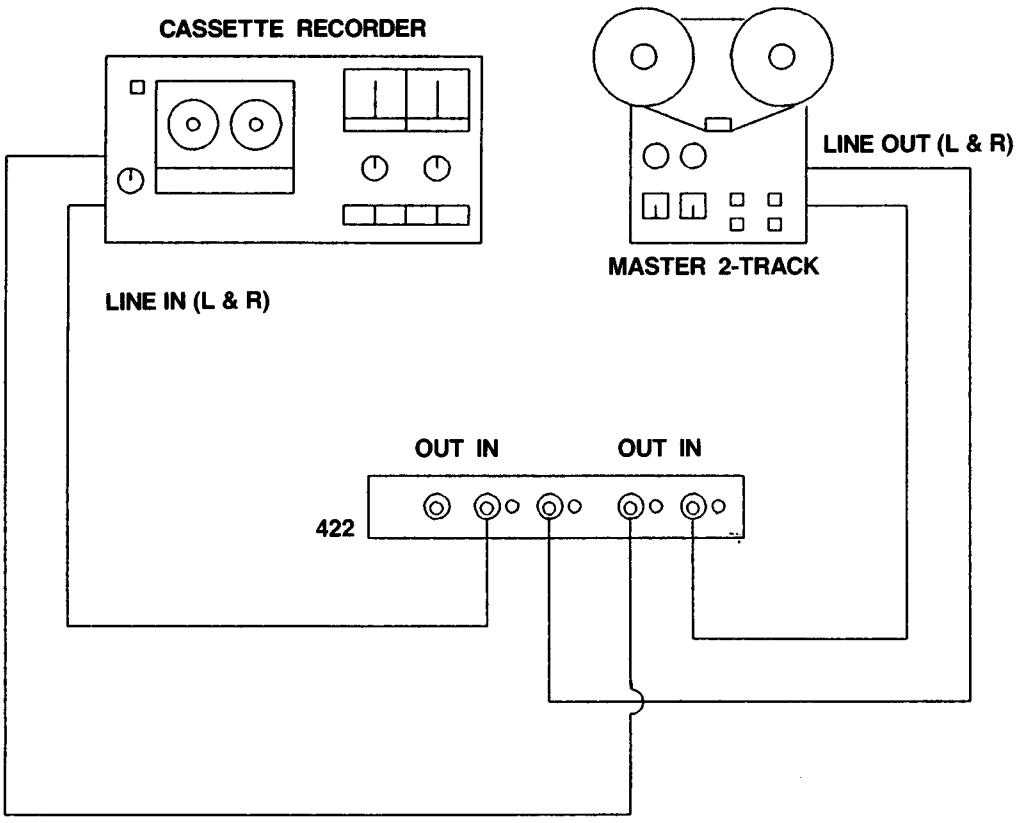
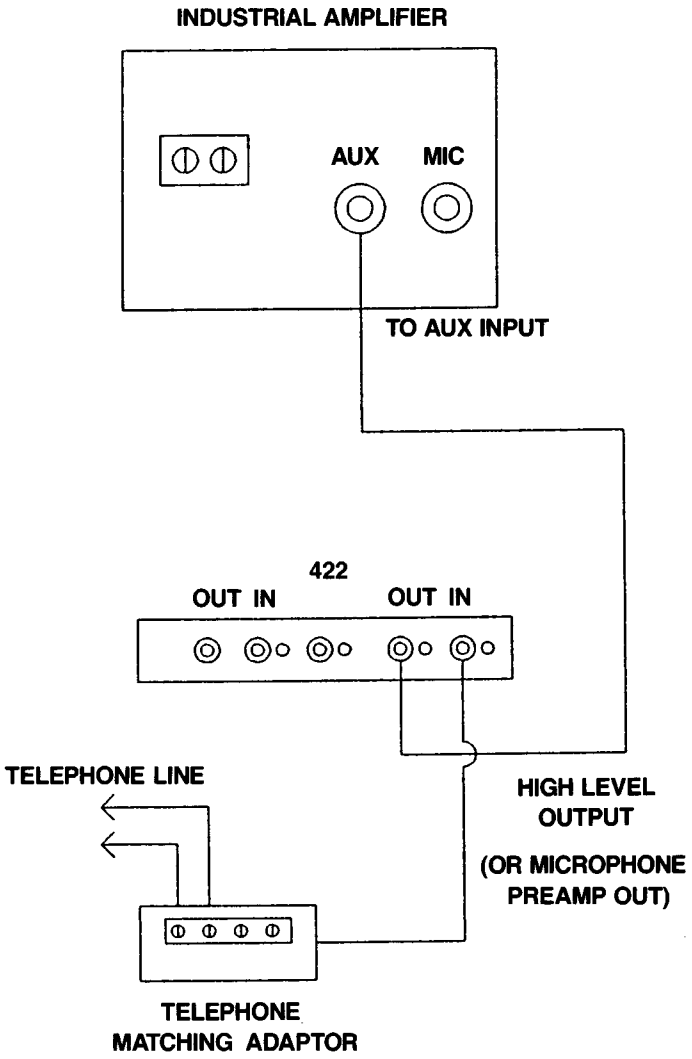
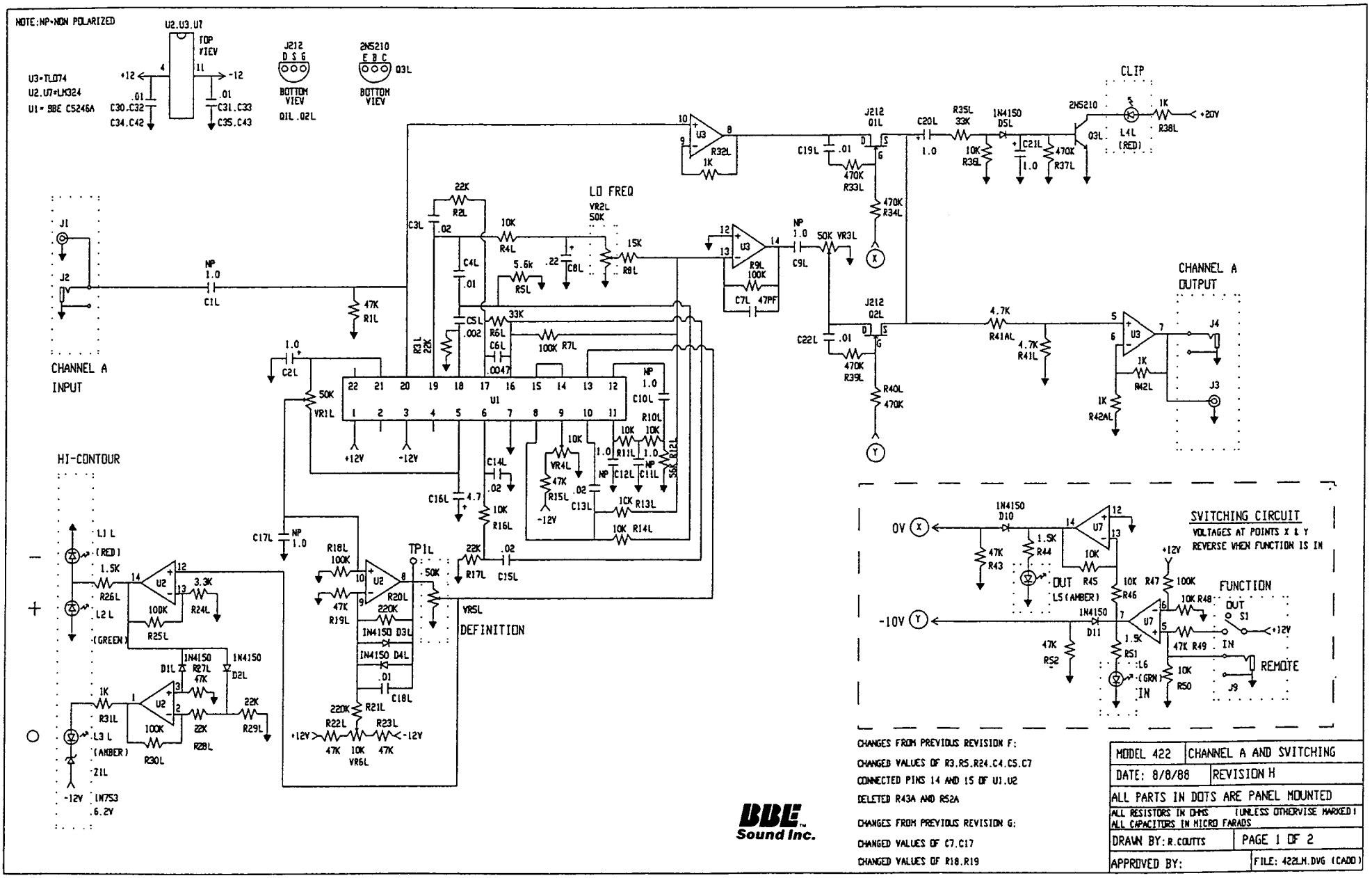
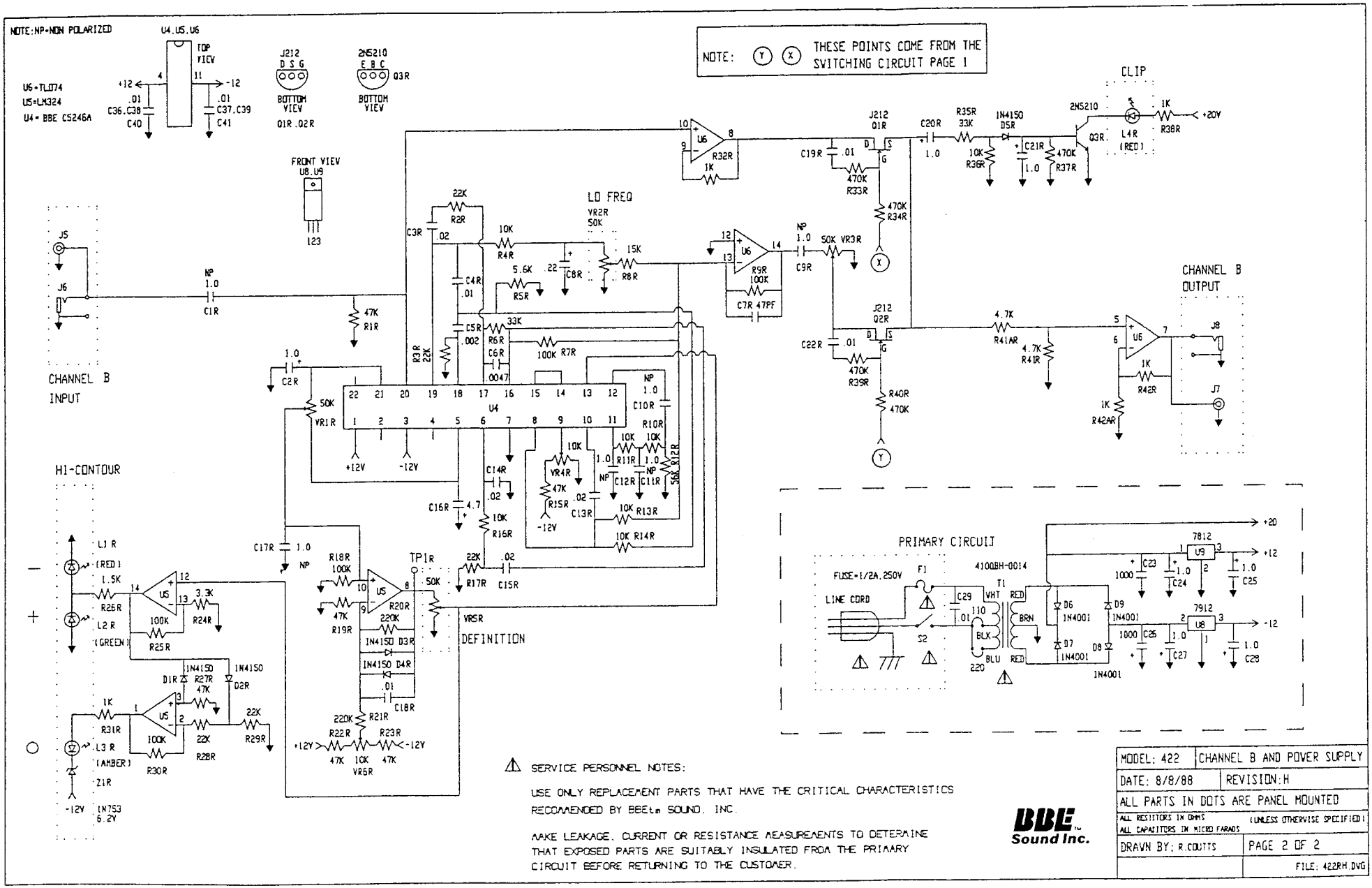


FIGURE 4

INDUSTRIAL PAGING SYSTEM




NOTE:NP=NON POLARIZED
U3=TL074
U2,U7=LM324
U1= BBE C5246A
U2,U3,U7
TOP VIEW
+12
-12
.01 C30,C32
C34,C42
.01 C31,C33
C35,C43
J212
D S G
BOTTOM VIEW
D1L .D2L
2N5210
E B C
Q3L
BOTTOM VIEW
CLIP
J1
J2
CHANNEL A INPUT
NP 1.0 C1L
47K R1L
22K R2L
C3L .02
10K R4L
5.6k R5L
.22 C8L
LO FREQ
VR2L 50K
15K R8L
C4L .01
C5L .002
33K R6L
C6L .0047
100K R7L
R3L 22K
1.0 C2L
50K VR1L
U1
+12V
-12V
NP 1.0 C10L
R10L 10K
10K R11L
1.0 C11L
NP C12L
10K VR4L
47K R15L
.02 C13L
10K R13L
10K R14L
C14L .02
C16L 4.7
10K R16L
C17L NP 1.0
R18L 100K
47K R19L
220K R20L
IN4150 D3L
IN4150 D4L
.01 C18L
220K R21L
R22L 47K
10K VR6L
R23L 47K
TP1L
50K VR5L
DEFINITION
22K R17L
.02 C15L
HI-CONTOUR
L1 L (RED)
1.5K R26L
3.3K R24L
100K R25L
L2 L (GREEN)
IN4150 D1L
IN4150 D2L
R27L 47K
1K R31L
22K R29L
100K R28L
R30L
L3 L (AMBER)
Z1L
-12V
1N753 6.2V
U3 R32L 1K
J212 Q1L
C19L .01
470K R33L
470K R34L
C20L 1.0
R35L 33K
1N4150 D5L
10K R36L
C21L 1.0
470K R37L
2N5210 Q3L
L4L (RED)
1K R38L
+20V
NP 1.0 C9L
50K VR3L
R9L 100K
C7L 47PF
J212 Q2L
C22L .01
470K R39L
R40L 470K
4.7K R41AL
4.7K R41L
1K R42L
1K R42AL
CHANNEL A OUTPUT
J4
J3
1N4150 D10
0V
-10V
1.5K R44
47K R43
OUT LS(AMBER)
10K R45
10K R47
100K
+12V
FUNCTION
10K R48
OUT
S1
+12V
IN
47K R49
REMOTE
J9
1N4150 D11
47K RS2
1.5K RS1
L6 (GRN) IN
10K R50
SWITCHING CIRCUIT
VOLTAGES AT POINTS X & Y REVERSE WHEN FUNCTION IS IN
CHANGES FROM PREVIOUS REVISION F:
CHANGED VALUES OF R3,R5,R24,C4,C5,C7
CONNECTED PINS 14 AND 15 OF U1,U2
DELETED R43A AND R52A
CHANGES FROM PREVIOUS REVISION G:
CHANGED VALUES OF C7,C17
CHANGED VALUES OF R18,R19
BBE Sound Inc.
MODEL 422
CHANNEL A AND SWITCHING
DATE: 8/8/88
REVISION H
ALL PARTS IN DOTS ARE PANEL MOUNTED
ALL RESISTORS IN OHMS (UNLESS OTHERWISE MARKED)
ALL CAPACITORS IN MICRO FARADS
DRAWN BY: R.COUTTS
PAGE 1 OF 2
APPROVED BY:
FILE: 422LH.DVG (CADD)



⚠ SERVICE PERSONNEL NOTES:

USE ONLY REPLACEMENT PARTS THAT HAVE THE CRITICAL CHARACTERISTICS RECOMMENDED BY BBE Sound, INC.

MAKE LEAKAGE, CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE SUITABLY INSULATED FROM THE PRIMARY CIRCUIT BEFORE RETURNING TO THE CUSTOMER.

BBE Sound Inc.

MODEL: 422	CHANNEL B AND POWER SUPPLY
DATE: 8/8/88	REVISION: H
ALL PARTS IN DOTS ARE PANEL MOUNTED	
ALL RESISTORS IN OHMS ALL CAPACITORS IN MICRO FARADS	(UNLESS OTHERWISE SPECIFIED)
DRAWN BY: R.COUTTS	PAGE 2 OF 2
	FILE: 422RH.DWG

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