



USER'S GUIDE

© COPYRIGHT 1991—GAMMA ELECTRONIC SYSTEMS, INC..

All rights reserved.

No part of this written material may be duplicated by
any method, electronic, computer, or by any
other means without written permission of
GAMMA ELECTRONIC SYSTEMS, INC..

TABLE OF CONTENTS

INTRODUCTION	1
UNDERSTANDING B.A.S.E. [™]	2-3
MONO COMPATIBILITY	4
FRONT PANEL FEATURES	5-6
REAR PANEL FEATURES	7
SET-UP & INSTALLATION	8-9
TROUBLE SHOOTING	10
APPLICATIONS	11-30
1) MIXING	11-23
A) Over the entire mix	11
1. Up-front stereo image	11
2. Out of speaker presence	11
B) Should I mix with B.A.S.E. [™] "in" or "out"?	12
C) Where in the signal chain should I place B.A.S.E. [™] ?	12-13
D) Auto stereo spread	13-14
E) Increasing the depth of a single instrument	15
F) Circular, spinning effect	15-16
G) Dynamic auto-pan	17-18
H) Add depth to reverbs	19
I) More perceived low end	19
J) B.A.S.E. [™] and vocal doubling	19
K) Repairing tracks for mixdown	20-21
1. Synthesizing stereo	20
2. Reflections or phasing problems	20
3. Three microphone configuration	20-21
L) Improving upon already-mixed programs or old tapes	21-23
1. Vocals too hot	21
2. Vocals too low	21

3. Vocals not directly in center	21-23
4. Correcting Hiss	23
5. Overcompressed tapes	23
L) Mono to stereo conversion	23
2) MASTERING & REMASTERING	24
3) TELEVISION	24
A) Commercials	24
B) Music Videos	24
4) BROADCASTING	25-26
A) Television	25-26
B) Radio	26
5) FILM MIXING	26-28
A) Mixing of the soundtrack	27
B) Mastering of the movie	27
C) Pre-dubbing sound effects	27
D) Six-track, 70 mm mixes	28
6) SOUND REINFORCEMENT	28-30
SPECIFICATIONS	31

Gamma Electronics Systems, Inc. would like to thank the following individuals who greatly assisted in the writing of this manual. Without their expertise, guidance and experience with B.A.S.E.™, there would be no User's Guide. To them and to all who accomplish extraordinary achievements with the B.A.S.E.™ technology, we thank you. Please feel free to add to this manual at any time by simply writing down your successes and mailing them to us.

Our kindest appreciation to:

Neil Henderson; Village Productions; Tornillo, TX

Ed Greene; Greene, Crowe & Company; Burbank, CA

Ed Anderson; Meridian Studios; Burbank, CA

Rex Harris; Independent Live Sound Engineer; Las Vegas, NV

Cal Perkins; Audio Designer and Engineer; Portland, OR

Alan Howarth; Electric Melody Studios; Glendale, CA

Glenn Hall; Sound B.A.S.E.™; London, England

Bob Margouleff; Independent Engineer and Producer; Los Angeles, CA

INTRODUCTION

B.A.S.E.[™] is an acronym for Bedini Audio Spacial Environment. This technology is the result of research and experimentation by John Bedini into the study of human audio perception and how the brain assimilates sound information.

His discovery concluded that more information exists on stereo source material than the brain can assimilate through current playback equipment. The B.A.S.E.[™] processor corrects this problem and allows the listener to hear more highs, better clarity, more accurate point source, better separation of instrumentation and an enlarged "sweet spot". All of this is accomplished without change in spectrum or sound pressure levels.

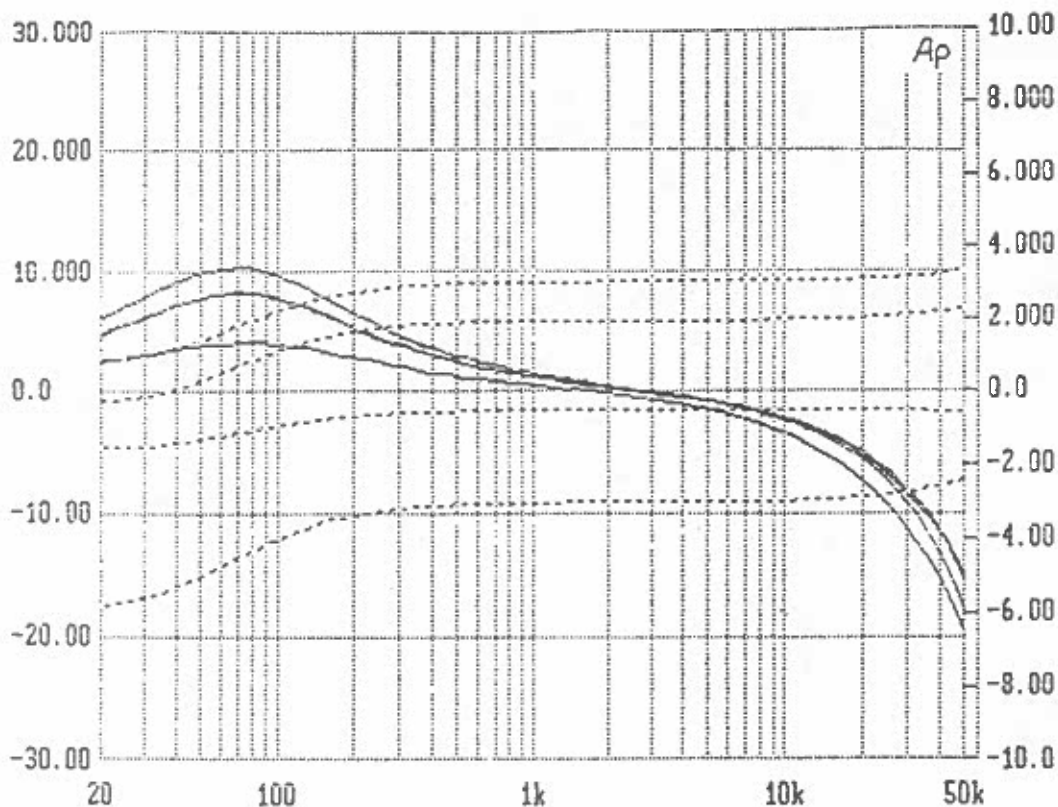
The circuit designs incorporated in the B.A.S.E.[™] unit enable the user to control the position, depth and spread of the sound image. The control of these specific parameters is not possible with conventional effects processors. Once B.A.S.E.[™] is applied to the program material, no additional processing is necessary to reproduce the effect during playback. The enhanced final product can be heard through any conventional stereo system. The result is a high-definition sound and a listening experience more true-to-life than stereo.

The B.A.S.E.[™] process can be used to enhance recordings, films, live broadcasts, concerts, cinemas and home playback. The process is mono compatible and complimentary with Dolby, Dolby Surround, Ultra Stereo Surround, DBX and 3-channel stereo. In addition, B.A.S.E.[™] processing tends to minimize the audible compression of higher frequencies inherent with many noise reduction methods creating a brighter, less colored end-product.

UNDERSTANDING B.A.S.E.™

Working entirely in the analog domain, B.A.S.E.™ separates a stereo input signal into both mono and stereo components. Stereo elements in the mix--instruments, vocals, stereo reverb, etc.--can be adjusted to appear at the outermost edge of the left/right soundstage. Mono, or information common to both left and right channels, can be adjusted to compensate for the enlarged stereo spread. These common sounds can be increased or decreased in overall volume and panned right or left. This results in placement of the center image left, right, near or far -- anywhere within a 360 degree area.

B.A.S.E.™ does not place certain discrete wavebands out-of-phase to achieve its dimensional acoustic effect. Instead, B.A.S.E.™ works on a "psychoacoustic" principle, cuing the brain with binaural signals, leading the listener to localize images from several directions. The graph below illustrates frequency response (broken line) against phase cancellation, demonstrating the lack of phase manipulation encountered with B.A.S.E.™.



Important Note: The B.A.S.E.™ processor is source dependant allowing the user to manipulate only information that is present. The better this material, the more positive the enhancement B.A.S.E.™ will produce. For example, if effects have been used prior to B.A.S.E.™ processing, the B.A.S.E.™ unit will exaggerate this imaging and can pull these effects apart. **A new, cleaner way of mixing is recommended when utilizing the B.A.S.E.™ technology. Less effects are needed to create the clear, life-like image that effects boxes only sometimes achieve.**

Because B.A.S.E.™ corrects the signal cancellation inherent in stereo, you are able to hear more of the original source information. This leads to a **perceived** increase in loudness. **This is only a perceived increase and not an actual voltage increase.** You can verify this by comparing processed and unprocessed information with either a Durrough or sound pressure meter. The sound pressure level comparisons should be very close.

MONO COMPATIBILITY

Mono compatibility is also easily verified by switching the control room monitors to mono playback. While the widely spread image diminishes, the overall balance of the processed and unprocessed mixes remain proportional. The out-of-phase content of B.A.S.E.™ processed material has been measured at considerably less than 5 degrees (usually approximately 1 degree) inferring complete mono compatibility. Surprisingly however, the depth that B.A.S.E.™ gave your stereo recording should remain constant even in mono.

Important Note: Ordinary interpretations of phase relationships on an oscilloscope do not hold true with a B.A.S.E.™ processed signal. Despite what an oscilloscope will show as the relationship between B.A.S.E.™ processed and unprocessed signals, the summation to mono will always be improved. The phase has been conditioned to create powerful spacial effects, yet when summed to mono the phase shifts adjust and create an improved mono signal. **Mono compatibility must be evaluated audibly.** The phase displayed by meters and X and Y scopes are misleading since those relationships change during the actual summation. **Listen to the summation and let your ears be the judge.**

For further insight into how B.A.S.E.™ redefines what you see on a phase scope, process two dissimilar sine waves through the B.A.S.E.™ unit. Take that output into the phase scope making any adjustments on the B.A.S.E.™ unit. The measurements will be what was once thought impossible. This should further illustrate how mono compatibility of a B.A.S.E.™ processed signal can not be accurately interpreted by conventional measuring devices.

FRONT PANEL FEATURES

1. Center Panner

This control is not a level panner as normally encountered. It is a left/right control for placement of the extracted common (mono) information. Along with the Center Image, common (mono) information can be placed anywhere within a perceived arc through the horizontal and vertical planes.

2. Center Image

A gain control for the common (mono) information effecting its apparent near/far position. Increasing the Center Image level can "bring out" the common information (i.e.: lead instruments or voices). Decreasing the Center Image level will "move back" the common information while allowing the extreme left/right signal information to remain constant.

3. Stereo Space

A control for increasing or spreading the ambient (stereo) information. This controls the stereo image width and can be used along with the Center Image and Center Panner to adjust the overall dimensions of the spacial environment. If this control is increased without simultaneously increasing Center Image to the "near" position, a gap will appear in the center of the mix. This may be filled either with unprocessed mono information (ie: vocal channel) routed through the "mono side chain" to create a sharply focused center, or if mono information is already present, by setting the Center Image level to 3 o'clock. This control will increase effects such as reverb and delay.

4. Output Level

Adjusts the overall signal output. Use the Output Level control to adjust the return signal level for matching equipment with various impedance levels.

5. Process LED

Green LED shows that B.A.S.E.™ processing is alive.

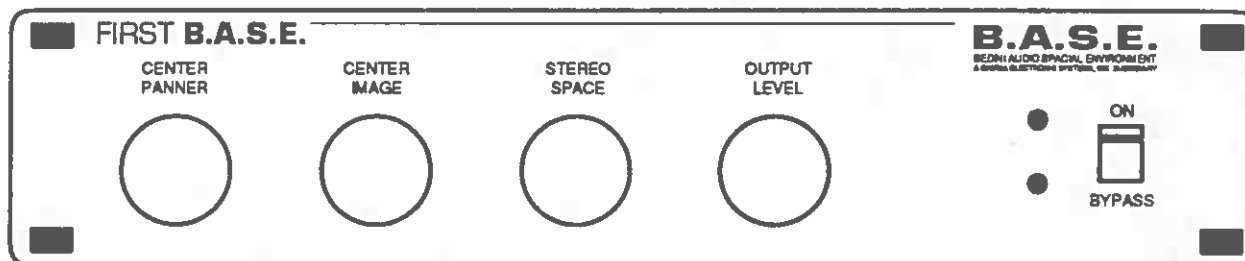
6. Bypass LED

Red LED shows bypass of B.A.S.E.™ processing. Because the bypass circuit is after the summing circuit, the output of the B.A.S.E.™ unit in bypass is not a true bypass. **We recommend that you use your board to bypass the B.A.S.E.™ processing.**

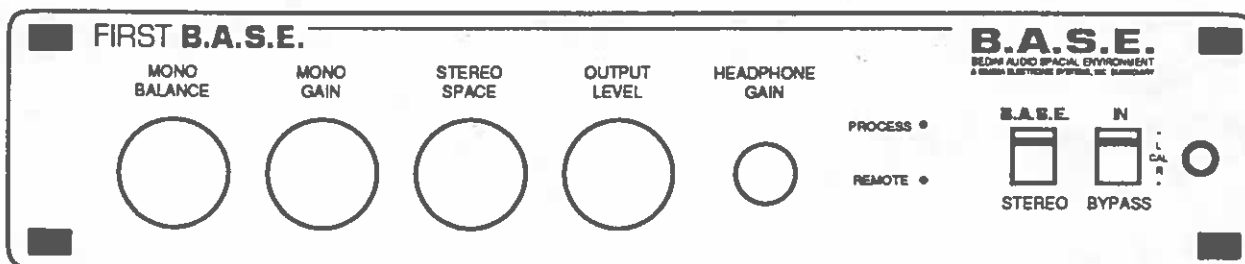
7. B.A.S.E.™ /Bypass Switch

Toggles between B.A.S.E.™ processing and bypass modes. Selection of B.A.S.E.™ will apply the B.A.S.E.™ effect to the stereo signal and make all front panel controls interactive.

Following is a diagram of the current model B.A.S.E.™ unit.



Please note the different nomenclature on the first model B.A.S.E.™ unit. Both units are alike sonically and all control functions are equivalent. The first unit (pictured below) contains a headphone gain, a headphone jack and an additional switch to engage the B.A.S.E.™ technology.



REAR PANEL FEATURES

1. Input Connectors Unbalanced XLR Female.
 Pin 3 hot.
 1&2 ground 1/4-inch phone jacks are in parallel.
2. Output Connectors Unbalanced XLR Male.
 Pin 3 hot.
 1&2 ground 1/4-inch phone jacks are in parallel.
3. Side Chain Out Extracts the derived common (mono) information out of the B.A.S.E.[™] unit for external effects processing (eg: limiting, de-essing, equalization, reverb, etc.).
4. Side Chain In Returns the extracted common (mono) information to the B.A.S.E.[™] unit for 1) B.A.S.E.[™] processing and positioning 2) for additional input that you want center or 3) to avoid the stereo spread circuit.

SET UP AND INSTALLATION

Place the B.A.S.E.[™] unit on a sturdy surface, rack mount it on the bottom of the rack or add increased support (eg: mount from the front and back) if the rack unit will be used for traveling purposes. The B.A.S.E.[™] processor will not generate heat and therefore ventilation is not necessary.

Important Note: Using a good patch cord, come into the B.A.S.E.[™] unit at the lowest possible voltage (eg: effects send). **A B.A.S.E.[™] processed signal will more than double in voltage. It is recommended that you come into B.A.S.E.[™] between -10 and +4 and use the Output Level on the B.A.S.E.[™] unit to increase the signal level.** The chart below illustrates what happens to the voltage of your signal when processed by B.A.S.E.[™].

-10 On Board	= 0.244 Volts	With B.A.S.E. [™]	= 0.535 Volts
0 On Board	= 0.775 Volts	With B.A.S.E. [™]	= 1.500 Volts
+04 On Board	= 1.228 Volts	With B.A.S.E. [™]	= 2.500 Volts
+08 On Board	= 1.946 Volts	With B.A.S.E. [™]	= 4.000 Volts
+10 On Board	= 2.450 Volts	With B.A.S.E. [™]	= 5.100 Volts

Connection is by means of two **Unbalanced** XLR or phone plug inputs. The B.A.S.E.[™] unit is also **pin 3 hot**. Finding the most suitable position for installation depends on the intended method of use. As a rule, the B.A.S.E.[™] unit should be placed as early as possible in the chain (for specific uses, see Applications beginning on page 11). B.A.S.E.[™] can also be employed on a stereo effects send or as an external processor.

Plug in the B.A.S.E.[™] unit. The unit should be grounded. Only in case of a hum, should the ground be lifted.

Set all controls at the 12-o'clock position with the B.A.S.E.[™] switch ON (green LED should

be illuminated). Feed a **stereo** signal to the unit and adjust the volume level on your board. Slowly increase the Center Image and Stereo Space controls to achieve the desired sound. Now switch your console so that you bypass B.A.S.E.™. There should be a noticeable "flattening" and "shrinking" of the sound.

The calibrations or numbers on the controls are reference points only and will vary depending on the source material. Let your ears be the judge.

To produce a mirror image of the source, set the controls at 12-o'clock and the output level at 1-o'clock. The comparison should be close.

TROUBLE SHOOTING

Here is a list of the most common problems encountered with the B.A.S.E.™ processor and some easy solutions.

1. **PROBLEM:** HUMMING. A "hum" exists only when the B.A.S.E.™ processor is connected.

SOLUTION: Lift the ground on the AC cord with a UL approved ground lifter where the B.A.S.E.™ unit AC cord is plugged into the wall.

2. **PROBLEM:** DISTORTION OR GHOST LIKE IMAGE.

SOLUTION: a) Remember, the B.A.S.E.™ unit is Pin 3 hot (not Pin 2 hot) and has an unbalanced output.

b) Check controls--reduce Stereo Space and/or increase Center Image.

3. **PROBLEM:** CLIPPING.

SOLUTION: Try putting the B.A.S.E.™ unit on an effects-send or sub group. If you come into B.A.S.E.™ too "hot" this will cause your amp to clip. Come into the B.A.S.E.™ unit between -10 and +4 and use the Output Level on the B.A.S.E.™ unit to increase the signal level. (See voltage chart on page 8 for further insight.)

4. **PROBLEM:** NO APPARENT ENHANCEMENT.

SOLUTION: a) Make sure the B.A.S.E.™ unit is receiving a stereo signal.

b) Increase Stereo Space, Center Image and Output Level controls. There should be a perceived loudness difference when the B.A.S.E.™ unit is on.

c) For a quick check, engage B.A.S.E.™ and turn the Output Level up and down, the signal should vary accordingly.

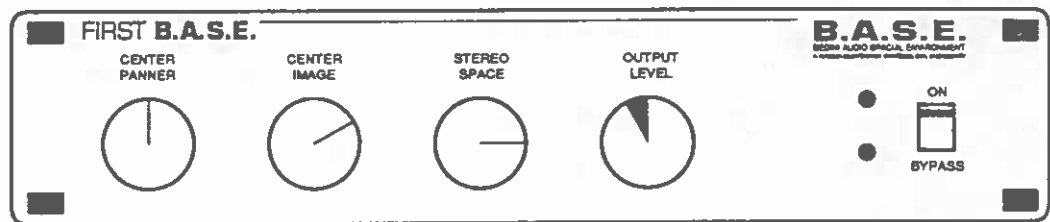
APPLICATIONS

While reading the following application section, please remember that these are examples written by individual B.A.S.E.™ users. These are ideas and suggestions on how to use the B.A.S.E.™ unit. They are meant as springboards for your own creativity, not as mandatory rules.

1) MIXING

A) Over the entire mix

The simplest method for using B.A.S.E.™ is to run the entire mix through the unit. This can be achieved by connecting the unit up to the stereo insert jacks found on most mixing consoles or in the case where channels must be assigned to busses, it may be connected to the buss send/return loop. Settings of approximately 1 o'clock on the Center Image control and 3 o'clock on the Stereo Space control are good starting points for this application. In this configuration, an output level setting of somewhere between 11 o'clock and 12 o'clock should achieve unity gain.



1. Up-front stereo image

To achieve an up-front stereo image and to fill in any gaps which may have occurred in a mix, turn the Center Panner to 12 o'clock, the Center Image to 5 o'clock and the Stereo Space to 2 o'clock.

2. Out of speaker presence

To achieve greater separation and clarity in a mix, set the Center Panner at 12 o'clock, the Center Image at 3 o'clock and the Stereo Space at 5 o'clock. This will achieve a much wider soundstage and an out-of-speaker reference mode.

B) Should I mix with the B.A.S.E.™ "in" or "out"?

While many devices used over the entire mix (like peak limiters, stereo compression or program de-essing) are kicked in after the mix is completed, it is recommended that the B.A.S.E.™ unit remain engaged throughout the mix. This enables the engineer to monitor the effect on the mix in real time and make adjustments as necessary. Keeping it out until later will not be detrimental. However, due to the dramatic effect the unit has on other elements that may be employed in the mix, the user may find that some adjustments on levels, panning, reverbs, etc. may be needed once the unit is engaged.

If B.A.S.E.™ is left in over all aspects of balancing and monitoring of the "wet" mix, the signal to noise penalty inherent with an analogue insertion (in the present day predominantly digitally interfaced chain) can be minimized by holding back slightly on the widened or dimensional image to a very workable -80 dB.

B.A.S.E.™ enhancement applied to any stereo signal path tends to widen the acoustics naturally, creating a "softer" more ambient soundstage with which to equalize the various channels. Once a dimensional image of the mix (or of an individual channel) has been encoded, it may be limited or boosted conventionally without incurring further noise penalties.

C) Where in the signal chain should I place B.A.S.E.™?

The B.A.S.E.™ processor can be used anywhere in the signal chain, from individual channels, such as drum overheads, or multiple backup vocal tracks, to group or buss send/return networks, to the overall mix. When using the unit on the entire mix, it is recommended that it is the last in line before the mastering deck, even when using program compression or peak limiting devices such as the Aphex Dominator. These devices tend to diminish the effect of the B.A.S.E.™ unit and while the effect is not severe,

it is noticeable (which is only logical, since if they are limiting the program, they tend to limit all aspects of it). This configuration will not result in a lack of control over your limiting area. If your program has a very wide dynamic range there may be a slight increase in the metering levels (although not more than 1 dB). Remember, this is only in extreme cases as described above.

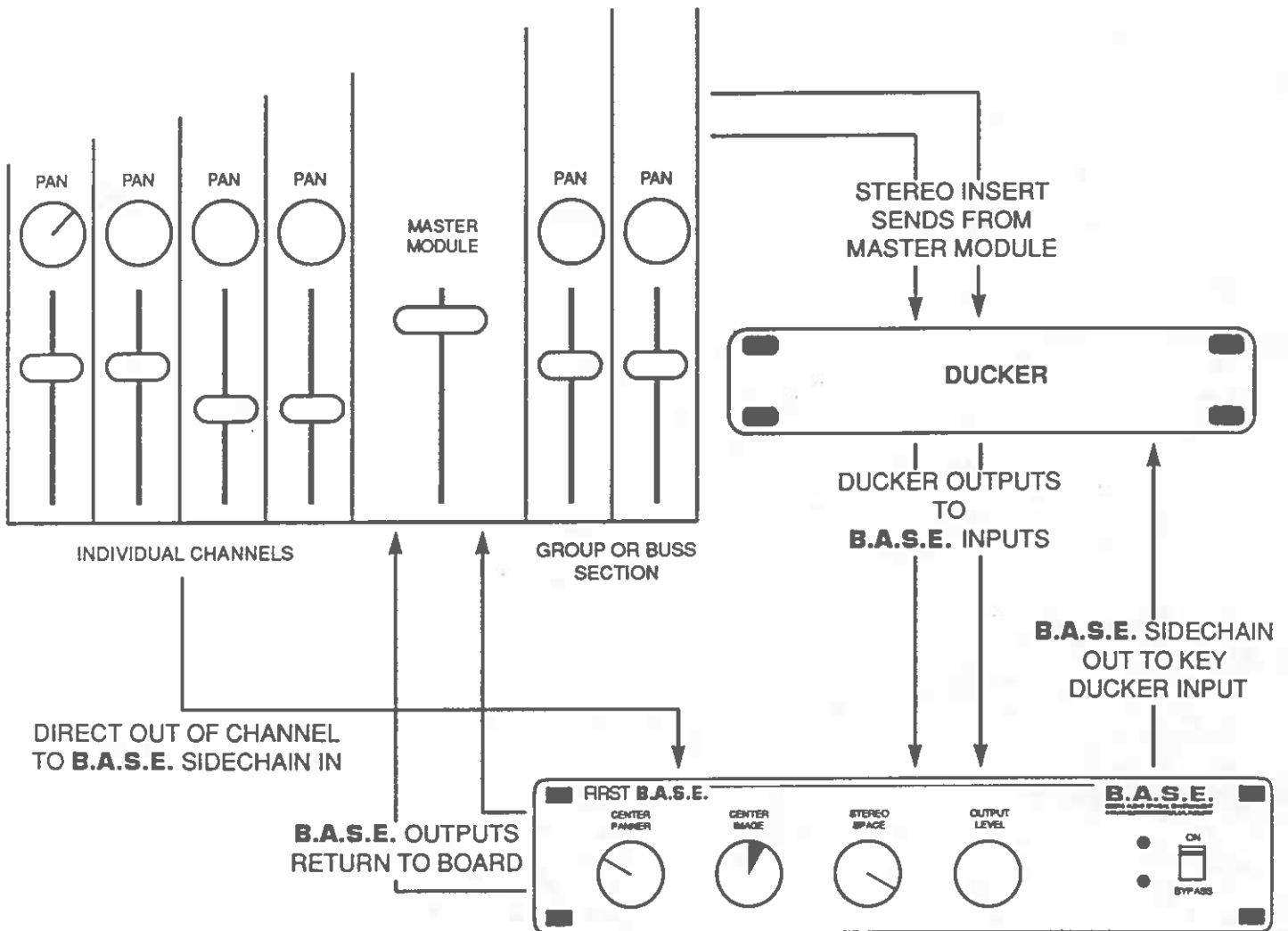
D) Auto stereo spread

An auto stereo spread can be achieved with the use of a ducker in conjunction with a B.A.S.E.[™] unit. Connect the stereo insert outs or buss sends from your console to the inputs of the ducker. Patch the outputs from the ducker into the B.A.S.E.[™] inputs and return the B.A.S.E.[™] to the board to complete that circuit. Next, pick a channel that has a non-reoccurring signal, any intermittent signal from a snare, guitar, keyboard or any vocal line of short duration. Take a direct out from that channel and patch it into the sidechain input of the B.A.S.E.[™]. Now, patch the sidechain out into the key input of your ducker (most stereo devices that have ducking capability have a master/slave switch, but if your does not, split the signal to go to both key inputs of the ducker). Adjust the controls on the respective devices to give the desired effect. A good starting point is: Ducker--Attack, 1/2 second; Hold Time, 1 - 1 1/2 seconds; Release Time, 2 - 3 seconds; Depth & Ratio, 50% - 75%. The threshold will be dependent upon the triggering level. B.A.S.E.[™]--Center Panner, slightly opposite the pan direction of the original signal channel; Center Image, 12 o'clock - 1 o'clock; Stereo Space, 4 o'clock +.

The effect is dramatic and you may only want to use it on certain instruments or groups of channels, as opposed to the entire program as described.

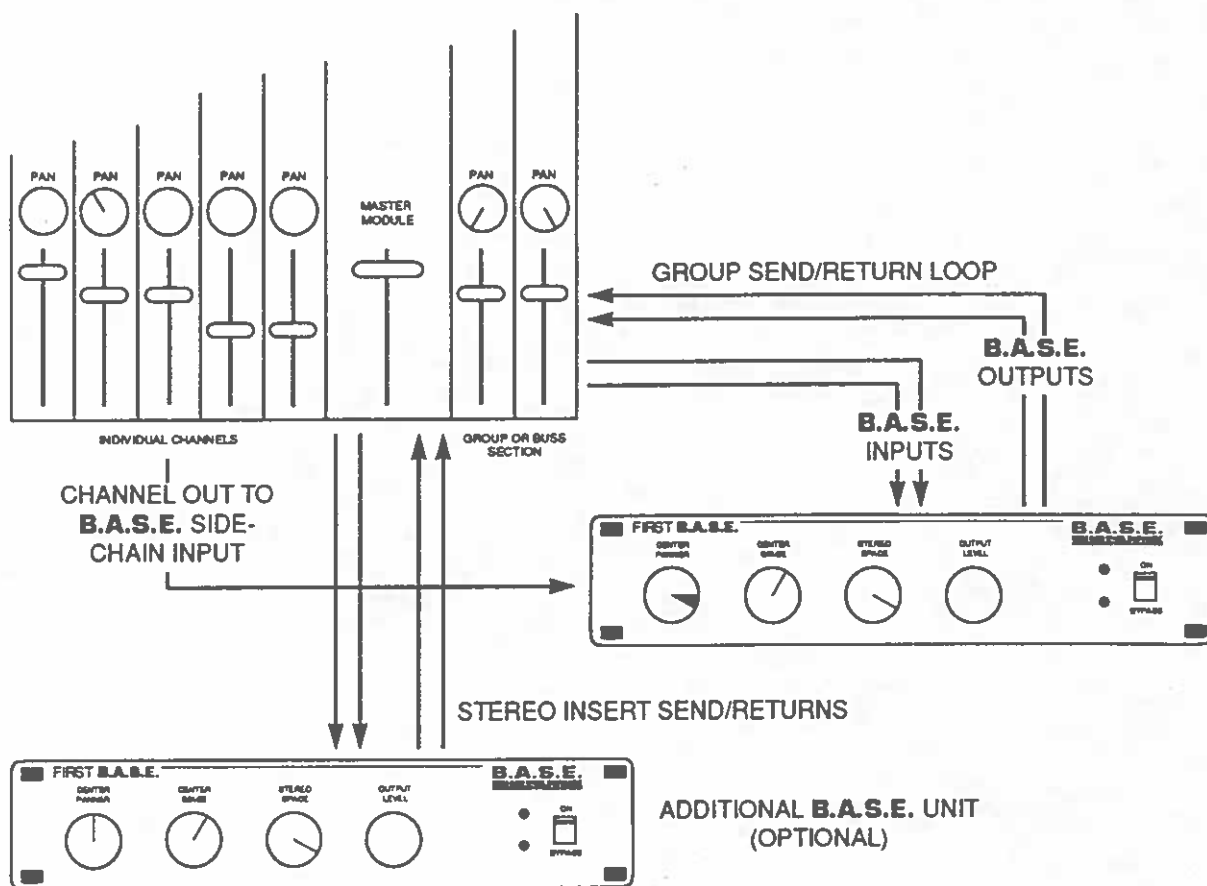
With two B.A.S.E.[™] units, it is possible to use this effect on just certain

elements and run the entire program through the second B.A.S.E.[™] unit.
The Connections Are Shown Below.



E) Increasing width and depth of a single instrument

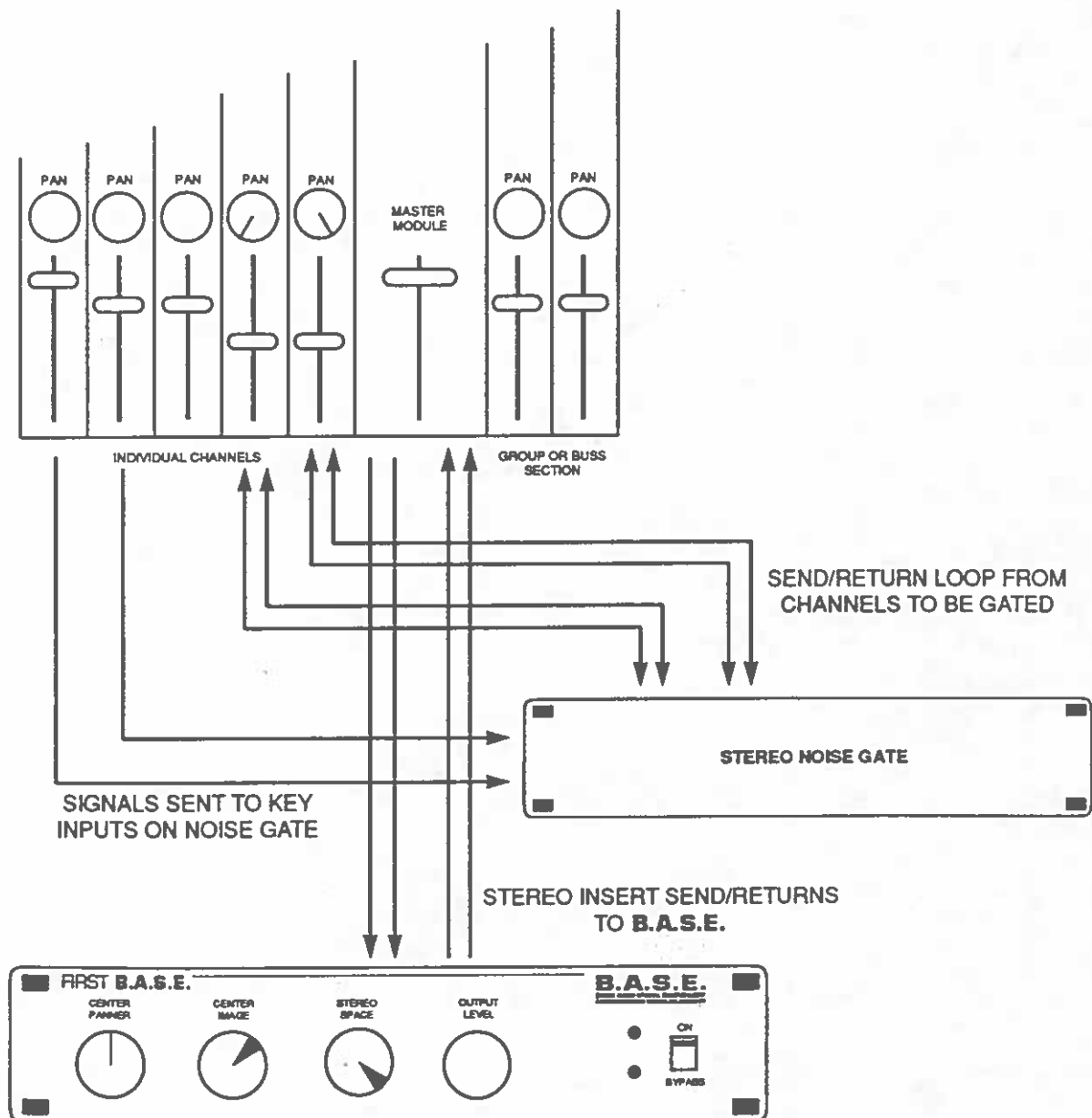
The sidechain can be used to increase the width or spatial depth of a single instrument or voice without having to dominate the mix. Send the signal to both channels of the B.A.S.E.™ unit via a group or buss assignment, or in the case of inline consoles, an open channel's send/return loop. Take a direct out of the original channel and send it to the B.A.S.E.™ sidechain input. Adjust the unit's Center Image control as necessary to obtain desired depth, while using the B.A.S.E.™ return level to regulate the overall volume of that signal in the mix. With two B.A.S.E.™ units it is possible to run the entire program through the second unit while processing the desired single instrument as described above. The connections are shown below.



F) A circular, spinning effect

Take a constant signal, such as a keyboard or guitar rhythm line, preferably something occupying two channels, or two separate instruments that you may want process with B.A.S.E.™. Send each side through a separate noise gate with a key input. Adjust the gate so when the unit is not receiving a key signal some of the gated signal will pass through. (You will

need a gate with at least a depth control, a simple threshold and release time will not work with this example). Next, key the gates with a kick for one side and a snare for the other; for example, adjust the gates for the degree of level change desired when keyed and run the whole setup through the B.A.S.E.[™] unit. With some adjustments, a very circular, spinning effect can be achieved, especially if the gated signals are sent to a reverb or delay unit (post-gate) and that reverb or delay is run through the B.A.S.E.[™] unit. The Connections Are Shown Below.



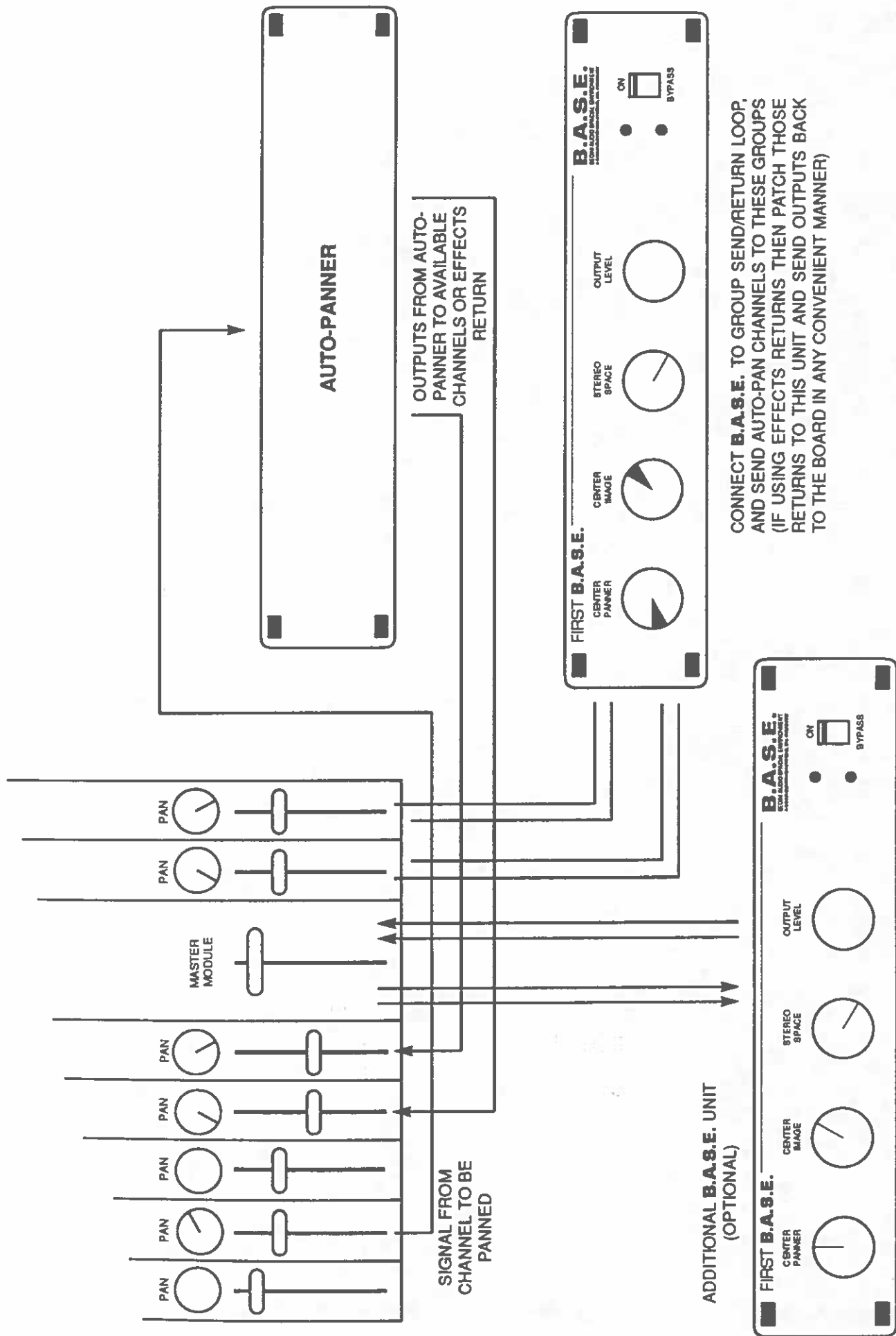
G) Dynamic auto-pan

You will need a device that will perform an auto-panning function. Pick a channel, possibly a solo keyboard, guitar line or a backup vocal (or a rhythm instrument track if you decide to use this effect in a more subtle manner). Send this stereo signal to the B.A.S.E.™ via either a group, buss or creative patching and return the B.A.S.E.™ to the board through either the group/buss network or to individual channels. Send the instrument to the device which is to perform the auto-pan, return that effect to the board and send it to the B.A.S.E.™ in the same manner as the original signal. Between the various level and pan controls, you should be able to achieve a very three-dimensional effect that is not attainable with an auto-panner alone. For a more enhanced effect use a second B.A.S.E.™ unit over the entire mix.

Hints:

- 1) Slower pans work best.
- 2) If you find this effect too predominant near the edges of the spectrum, you can control that by adjusting the left/right percentage of the auto-panner. If your device does not have this function, then try pulling the pans on the returns from that device a little more to the center, leaving the B.A.S.E.™ Stereo Space as far out as possible for greater depth. (Pans of 120 degrees seems to be a good percentage, as opposed to the hard pans of 180 degrees.)
- 3) Try having the pans on the original instrument channel and your B.A.S.E.™ in slightly opposite directions for best results.

Connections For This Configuration Are Shown On The Following Page.



H) Add depth to reverbs

In addition to the enhanced space and depth B.A.S.E.[™] will lend to your mix, B.A.S.E.[™] gives more depth and life to reverbs as well. You will also have to use less return signal from any reverb units you may employ. In a non-automated console, or when using nongated effects returns, (especially in a complex mix where you might not have as many hands as you would like) less return signal translates into less noise when a particular device is not operating, so if you are not able to mute or gate everything, the benefit here is obvious.

I) More perceived low end

Because of the effect B.A.S.E.[™] has on perceived depth and dimension, certain stereo low-end effects can be achieved without potential mastering problems. Using B.A.S.E.[™] you can create more perceived low-end without actually sending levels that would make a cutting stylus bounce off the disk. (Of course, this is less of a problem since the popularity of CD's and cassettes, but as long as LP's are still around, you can use this to your advantage).

J) B.A.S.E.[™] and vocal doubling

B.A.S.E.[™] can also allow you to use certain vocal-doubling effects such as very short delays (1 or 2 milliseconds, for example) without the comb-filter effects that are normally associated with such setups. Try this for yourself: take a microphone, or solo a vocal from your multitrack and send a one-millisecond delay panned hard to one side, and a two-millisecond delay panned hard to the other side (single repeats on both) with the B.A.S.E.[™] in bypass. Now sing or talk, you should notice the comb-filter effect. Now engage the B.A.S.E.[™], even with the delays at the same level as the direct signal, the comb-filtering is not apparent at all.

K) Repairing tracks for mixdown

1. Synthesizing stereo

If, for example, you are presented with a tape for a mixdown where the drums had been tracked using only one room microphone instead of a pair of overheads and the particular positioning of this microphone had not lent itself to a very favorable dimensional quality, B.A.S.E.[™] can aid in correcting this. Try running that channel through one side of the B.A.S.E.[™] unit while panning the unit to the opposite side. Use the output from that side to track the signal onto an available track. This synthesizes "stereo" in a way that simply bouncing the microphone signal onto another track would never accomplish.

2. Reflections or phasing problems

If you are recording a string section using a stereo microphone pair, but due to the room size, reflections or phasing problems you are not able to get the kind of depth or spread you want, simply run both microphones through the B.A.S.E.[™] unit. Adjust it to obtain the desired effect and then track it with the B.A.S.E.[™] unit engaged. This method can also be used on a guitar amp with a close microphone and a room microphone combination, whether or not you plan on using one or two tracks to record. Using the B.A.S.E.[™] unit during this stage will allow you to use it during mixdown as well.

3. Three microphone configuration

With a three microphone configuration, try running two of the microphones through the stereo section of the B.A.S.E.[™] unit and the third microphone into the sidechain. Some very interesting balances and imaging can be obtained with this configuration. You can also compensate for certain room inadequacies. Even if you are

going to one channel on your deck with a multiple microphone setup, the B.A.S.E.[™] unit can help with level balancing and room inadequacies that would normally cause phase or reflection problems. This allows for creative microphone placement even in restrictive environments.

L) Improving upon already-mixed programs or old tapes

1. Vocals too hot

If the vocal level is too hot, this can be corrected by simply running the program through the B.A.S.E.[™] unit while slightly turning down the Center Image and the Stereo Spread.

2. Vocals too low

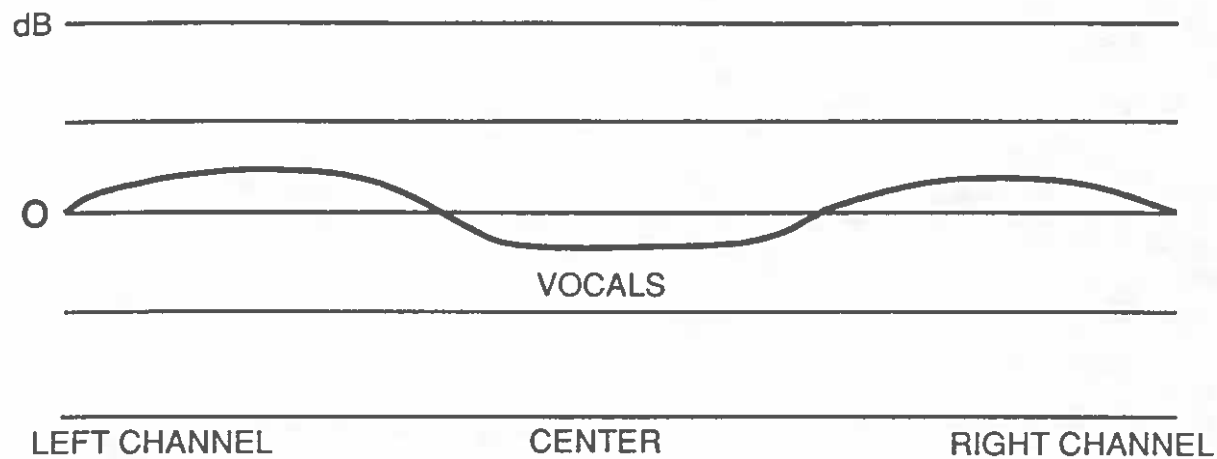
B.A.S.E.[™] can "bring out" these lower level signals very effectively. Run the program through the B.A.S.E.[™] unit and turn up the Center Image control until the vocal is heard at an acceptable level. Often this will shrink the stereo image of the program. To correct this, increase the Stereo Spread control.

In extreme cases, you may end up with a large center image and a slight "dip" in the spectrum to the left and right with a larger stereo image to the hard left and right. (See the center graph on the following page for illustration of this phenomenon, the dB scale is arbitrary in this case.) This is one circumstance where a compressor or peak limiter can be placed after B.A.S.E.[™] in order to even out the exaggerated spectrum that occurred when the vocals were brought out. Only in extreme cases of very low vocals will this occur.

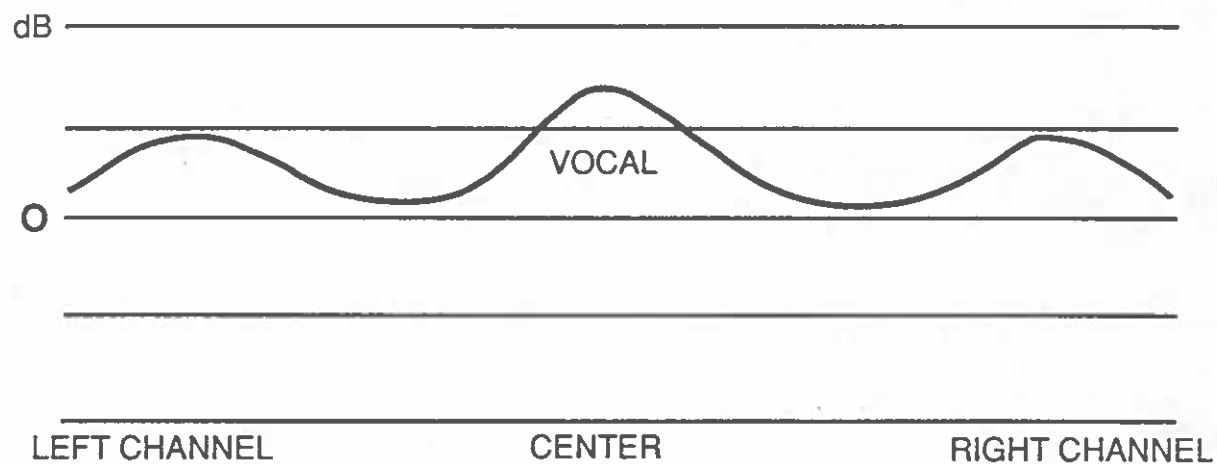
3. Vocals not directly in the center

In those instances where the vocals might not be directly in the

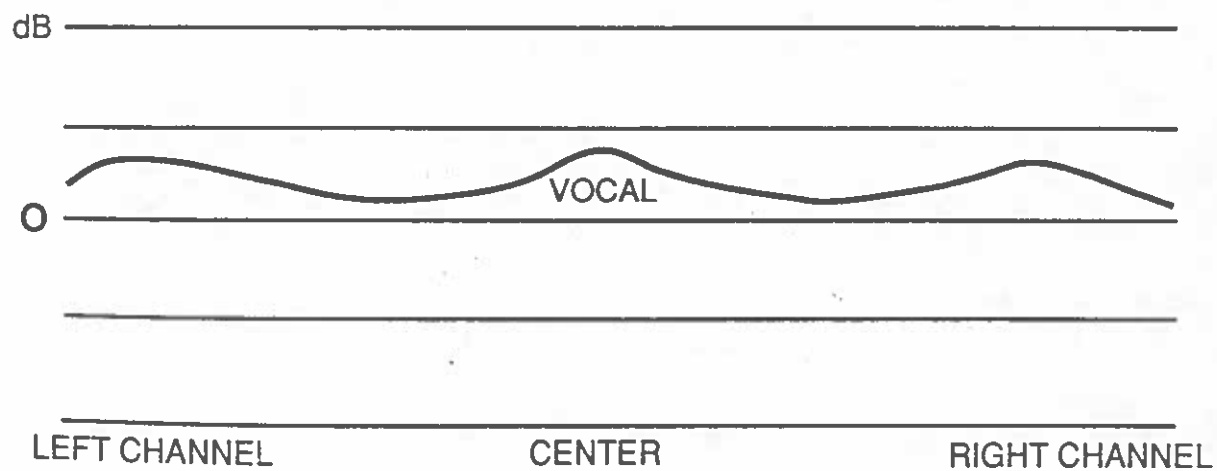
SPECTRUM BEFORE B.A.S.E.™



SPECTRUM AFTER B.A.S.E.™



SPECTRUM AFTER B.A.S.E.™ & COMPRESSION



center adjust the Center Panner to one side or the other to isolate the vocal without boosting other parts of the program that may not need boosting.

4. Correcting hiss

If you have a tape that has a high level of hiss, using a de-esser to minimize this oftentimes creates a gap in the program. The same also occurs with EQ'ing. You can use the B.A.S.E.[™] unit to fill in these gaps. Put the B.A.S.E.[™] in line after the EQ or de-esser and adjust the Stereo Spread and Center Image controls as needed to fill in the holes.

5. Overcompressed tapes

Overcompressed or "dead" tapes can now be fixed with B.A.S.E.[™]. While exciters can somewhat correct this problem, they only work on a particular frequency center. Since B.A.S.E.[™] works on the entire frequency spectrum, you are not limited to smaller ranges of boost here and there. When using dynamic expansion to solve this problem, the percussion sounds tend to benefit the most while the more subtle sounds tend to be less corrected. While B.A.S.E.[™] by itself can be used to bring these tapes back to life, using it in conjunction with exciters and expanders can bring out the best in these devices without ending up with an over-processed sound on the finished product.

M) Mono to stereo conversion

There now exists an extremely simple process for converting an existing mono signal to stereo. Take the mono signal to either the right or left input of the B.A.S.E.[™] unit and pan this signal to the opposite side by using the Center Panner until you have a balanced stereo image. This stereo image can now be sent to the B.A.S.E.[™] unit for enhancement.

2) MASTERING & RE-MASTERING

When used in mastering B.A.S.E.[™] gives the mix better clarity, more perceived highs, better separation of instrumentation and an enlarged sweet spot. When re-mastering material for CD or other digital medium, B.A.S.E.[™] processing can give an increased stereo space and ambience to otherwise confined and static stereo mixes. It now becomes possible to re-balance vocals on top of an enhanced mix without changing the original balance (see page 21 for procedure). This dimensional quality was never before attainable. To gain maximum dimensional benefit from the final mix, certain selected channels or frequency bands should be routed through B.A.S.E.[™] or overlaid during the re-equalization process. When digitally remastering analog recordings it should be remembered that B.A.S.E.[™] is an analog process and does not have an EBU type digital interface.

3) TELEVISION

A) **Commercials**

Stereo commercial soundtracks when processed through B.A.S.E.[™], will seem to "jump out" of the stereo television. The processed commercial will have increased clarity and a defined separation between the announcer and the music track. (For specific techniques, see Mixing, beginning on page 11.)

B) **Music videos**

B.A.S.E.[™] creates a never before possibility for video sweetening. With B.A.S.E.[™] processing an engineer can separate the center information (vocal) from a pre-existing completed mix and actually track the left/right and near/far on screen movement of the singer.

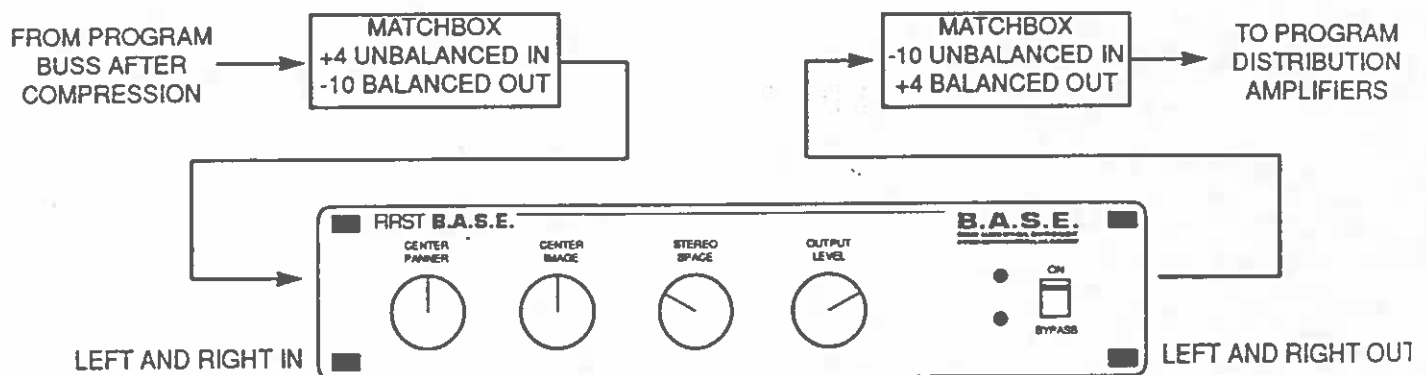
4) BROADCASTING

A) Television

B.A.S.E.[™] will greatly improve the degree of separation that occur from a stand-alone stereo receiver when used during the broadcast of stereo television. It has been tested on a number of prominent television broadcasts with an overwhelming positive reaction from both technical and non-technical persons. However, because the unit was not originally designed for broadcast there are a few cautions to be exercised when using the unit in this way.

Cautions: While the television world runs at either a +4 or +8 dB nominal operating level it is important to note that B.A.S.E.[™] should be operated at no more than -10 dB. The unit will exhibit clipping if driven higher than this level. This can be avoided by lowering the signal that comes into the B.A.S.E.[™] unit and boosting the volume with the Output Level of the B.A.S.E.[™] unit. (For demonstration on how B.A.S.E.[™] processing more than doubles voltage, see page 8.)

It should also be noted that the unit is pin 3 hot and is unbalanced. This (as well as the operating level caution described above) can all be compensated for by using a device called a "Matchbox". The diagram for this application is shown below.



Important Note: Care must be taken to monitor the increase of stereo information so that automatic phase correction devices are not triggered. If too much Stereo Space is used, it is possible to obtain an excess of out-of-phase information. If this occurs while using certain automatic devices these devices may automatically switch polarity during broadcast. This can be monitored by listening, but it is suggested that the output of the B.A.S.E.[™] unit be monitored on a scope so that severe stereo/mono imbalances do not trigger these phase correction devices.

It is best to interface the B.A.S.E.[™] unit into the program channel after compression and just prior to program distribution. It is advised to set the Center Panner and the Center Image at 12 o'clock, the Stereo Space at 10 o'clock and the Output Level at 1 o'clock.

B) Radio

B.A.S.E.[™] will enhance any stereo radio program and make it appear to "jump off" the dial. There will be an increase in height and clarity of the program as well as an apparent increase in volume. Because this is a perceived increase in loudness and not an actual increase (see page 3 for further explanation), the station will not be in violation of F.C.C. regulations. Preliminary testing has shown that where there exists multi-path problems, B.A.S.E.[™] enhances this effect. This is not due to the processor but instead due to the fast gate on some limiters used by radio stations. This can be corrected by eliminating the gate or by slowing the speed of the gate.

5) FILM MIXING

B.A.S.E.[™] processing can be applied in mastering or during the pre-dub steps of the post-production process. Because you are hearing more of the source

material with B.A.S.E.[™], there will be an apparent increase in volume. This perceived increase will allow for lower mixing levels and aid greatly with the volume constraints associated with film mixing.

A) Mixing of the soundtrack

By decreasing the center image of all background information (music and other background information) and increasing the Stereo Space, more information will be sent to the surround speakers thus creating a seamless audio image while simultaneously allowing an "uncluttered space" for the placement of the dialogue. Using 4-channel Dolby optical stereo matrix encoding, the apparent stereo spread of the left/right behind-the-screen channels can be widened by applying B.A.S.E.[™] processing to the music and sound effects, while the center (mono) channel, which usually carries the majority of the dialogue information, remains unchanged.

B) Mastering of the movie

Mastering of the entire movie with B.A.S.E.[™] can be processed and applied in the 2-channel print masters. The enhanced effect--better clarity, more width and depth--will transport the movie-goer into the middle of the action. Every seat in the house will become the "sweet spot". Any music that is processed can be spread across all 4 channels evenly, while more ambient information will be sent to the surround speakers creating a seamless surround. In addition, all enhancement will transfer directly to videocassette and will remain apparent when heard through a stereo VCR.

C) Pre-dubbing sound effects

Pre-dubbing specific stereo sound effects through B.A.S.E.[™] will make those sound effects, when played through the surround matrix, "jump out" into the theater. Left/right information can be separated from the center information and the apparent space can be increased.

D) Six-track, 70-mm mixes

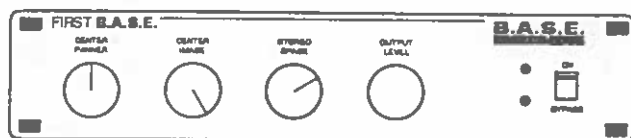
Six-track, 70-mm mixes can be encoded with B.A.S.E.™ on both the outermost left/right channels, as well as the stereo-surround channels, to create a seamless, 360-degree spacial environment.

6) SOUND REINFORCEMENT

Insert B.A.S.E.™ in the breakout (also called insert or interstage) patch points on the console. When using one B.A.S.E.™ unit, it is recommended to patch B.A.S.E.™ to the left right inserts common to most consoles. If more than one B.A.S.E.™ unit is available you may want to insert the B.A.S.E.™ unit directly into the channel insert of an instrument. If the B.A.S.E.™ signal is the only out-going source it is acceptable to interface the unit through an echo or an auxiliary send. B.A.S.E.™ may also be connected to the main out from the console if sent at -10. While it will work with a padded +4, the addition of gain noise may be objectionable and the unit may not be as effective. If B.A.S.E.™ is post console, it must be before the EQ or any other outboard process.

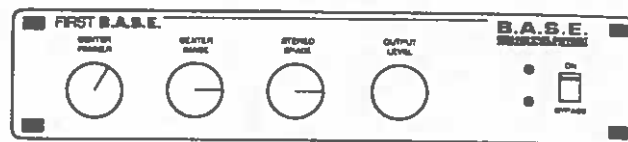
The preferred application utilizes three B.A.S.E.™ units patched to six sub-groups. Each additional B.A.S.E.™ unit adds flexibility by allowing independent settings and panning for each section. A possible example follows. B.A.S.E.™ units 1, 2 and 3 interfaced to sub groups 1 & 2, 3 & 4, 5 & 6 respectively; with sub-groups 1 & 2 being vocal/rhythm/percussion, 3 & 4 being brass/woodwind and 5 & 6 being strings/effects. The vocal/rhythm group could be panned center (using the Center Panner) with high mono (using the Center Image) and low space (using the Stereo Space). The brass/woodwind group could be panned slightly to the right (using the Center Panner) and have a medium mono setting (using the Center Image) and a medium space setting (using the Stereo Space). The strings could be panned slightly to the left (using the Center Panner) with a low mono (using the Center Image) and maximum space (using the Stereo Space). See top of next page for diagram.

SUB-GROUPS 1 & 2



VOCALS/RHYTHM

SUB-GROUPS 3 & 4



BRASS/WOODWINDS

SUB-GROUPS 5 & 6



STRINGS/EFFECTS

To achieve a somewhat different effect than is accomplished by using B.A.S.E.™ on sub-groups, try mixing with either one B.A.S.E.™ unit or multiple B.A.S.E.™ units on various sections.

The B.A.S.E.™ unit can be utilized to correct logistical limitations of the room you are working in. If, for example, the speakers are too far apart, you can tighten the point source by increasing the Center Image and decreasing the Stereo Space. If the speakers are too close together, you can widen the stereo image by decreasing the Center Image and increasing the Stereo Space. You may also compensate for a band that is too loud (where voices are being lost) by increasing the Center Image. Another method for eliminating excessive stage volume utilizes the Side Chain of the B.A.S.E.™ unit. To accomplish this, use a limiter on the Side Chain of the B.A.S.E.™ unit and connect the output into an EQ. This will bring the vocals out in front and leave the drums or other mono information behind. Because the actual sound pressure level lowers with all these applications (see page 3 for further explanation) slap back is improved or eliminated.

B.A.S.E.™ also improves the sonics of the existing system. By increasing the Stereo Space you can create an out-of-speaker presence for the music. This increases the proximity of the sound making it more realistic. B.A.S.E.™ also

eliminates the need for multiple delay devices to create fullness. Oftentimes, B.A.S.E.™ will eliminate the need for any delay stacks. However, an Aural Exciter in conjunction with B.A.S.E.™ can greatly improve a P.A. system. B.A.S.E.™ has been found to improve the functions on the Aural Exciter while requiring much less drive. Please also note that signal processing devices are more effective if inserted after B.A.S.E.™, while B.A.S.E.™ is most effective when utilized closest to the original source.

Remember that all effects are drastically enhanced by the use of B.A.S.E.™. It is necessary to rethink your use of effects while utilizing B.A.S.E.™. Try experimenting with B.A.S.E.™ on effects only. Let your ears be the judge.

B.A.S.E.™ - First B.A.S.E.™ Specifications

Frequency Response:	+0.2,-2.5 dB 10 Hz to 150 kHz
Phase Response:	$\pm 10^\circ$ 10 Hz to 20 kHz
Rated Maximum Output:	+10 dBm
THD 20-20 kHz @: +10 dBu (ref 0.775v)	<0.03%
SMPTE IMD: -20 dBu to +10 dBu	<0.06%
DIM 30: -20 dBu to +1 dBu	<0.06%
Channel Balance:	Within ± 0.1 dB
Nominal Input Level:	-10 dBu
Input Impedance:	Unbalanced, 27 k Ω Shunted by 39 pF
Output Impedance: 10 Hz to 200 kHz	Unbalanced 150 Ω (4.3 Ω in series with 47 MF)
Minimum Load Impedance:	600 Ω
Maximum Overall System Gain:	8 dB
Residual Output Noise: (with Output Level centered) 22-22 kHz Band with IHF A Weighting	<-93 dBu <-99 dBu
Dynamic Range:	103 dB
Slew Rate:	Greater than 5V/microsecond
Signal Processing Delay:	1.5 micro seconds
Dimensions:	19.0 inches wide 3.22 inches high 13.0 inches deep