

# '01' SERIES

COMPUTER DIRECT-LINE™ PARAMETRIC EQUALIZER

**SAE**

Scientific Audio Electronics, Inc.

**OWNER'S MANUAL**

# TABLE OF CONTENTS

INTRODUCTION .....	2
UNPACKING .....	2
INSTALLATION .....	3
WIRING .....	3
QUICK SET-UP GUIDE .....	3
OVERVIEW .....	4
REAR PANEL CONNECTIONS .....	4
Main Out .....	4
Main In .....	4
Tape Out .....	4
Tape In .....	4
AC Cord .....	4
Typical Hook-up .....	5
WARNING .....	6
OPERATION (FRONT PANEL) .....	6
Power .....	6
Level .....	6
Frequency .....	7
Bandwidth .....	7
Memory Scan .....	7
EXP. 1 .....	7
EXP. 2 .....	7
EXP. 3 .....	7
pre-Tape-post .....	7
Line EQ .....	8
Low Filter .....	8
Output Level .....	8
EQ Adjust .....	8
HOW DO I ADJUST A PARAMETRIC? .....	8
Method 1 .....	8
Method 2 .....	8
Frequency Range of Music .....	9
Method 3 .....	10
SPECIFIC FREQUENCY RANGE CHARACTERISTICS .....	10
GLOSSARY .....	11
GENERAL MAINTENANCE .....	11
SERVICE .....	12
SERVICE COVERAGE .....	12
SPECIFICATIONS .....	13
PRODUCT RECORD .....	13
MEMORY CHARTS .....	14, 15
LIST OF ILLUSTRATIONS	
FIGURE 1. Typical Hookup .....	5
FIGURE 2. Level Control .....	6
FIGURE 3. Frequency Control .....	6
FIGURE 4. Bandwidth Control .....	7
FIGURE 5. Frequency Range of Music .....	9

# INTRODUCTION

This "01" product is the culmination of SAE's efforts to combine the latest audio and digital technology. From these efforts have sprung a group of products offering advanced sonic performance, unique flexibility and touch control convenience. The "01" products are designed as a system, providing complementary capabilities which when combined, provide flexibility far greater than conventional systems. But whether you own one "01" product or the entire system, you will have the pleasure of enjoying a truly unique experience.

# UNPACKING

As a routine part of our systematic quality control, your E101 was carefully inspected for flaws before it was packed. However, should you find any physical flaws after unpacking your unit, immediately notify your dealer and request the name of the carrier. A written claim to cover the damages must be initiated.

**THE RIGHT TO ANY CLAIM AGAINST A PUBLIC CARRIER CAN BE FORFEITED IF THE CARRIER IS NOT NOTIFIED PROMPTLY, AND IF THE SHIPPING CARTON AND PACKING MATERIALS ARE NOT AVAILABLE FOR INSPECTION BY THE CARRIER. SAVE ALL PACKING MATERIALS UNTIL THE CLAIM HAS BEEN SETTLED.**

# INSTALLATION

The E101 is designed so that it can be mounted in a standard 19 inch rack. In conventional rack-mounting applications, the E101 can be mounted by the front panel only. If extended shipping is anticipated, we suggest the addition of side or rear supports to protect the unit during rough handling.

The E101 also has rubber feet for shelf or counter placement. It will operate in a vertical or horizontal position.

Regardless of placement position, the E101 should not be totally enclosed with other heat-producing components. Adequate ventilation will extend the trouble-free life of your unit.

# WIRING

Your E101 is capable of sonic performance far beyond the realm of most conventional equalizers. However, in order to obtain such superior results, only stereo cables of the highest quality should be used.

# QUICK SET-UP GUIDE

Your selection of the SAE E101 equalizer indicates an advanced level of appreciation and knowledge of fine high fidelity components. Your new equalizer has been designed ergonomically to make operation easy and convenient. However, it is unlike any other equalizer ever produced; and careful reading of this owner's handbook is well worth the investment of time and concentration.

Since we know you are anxious to get your E101 up and running, we have included a quick set-up guide. By following the basic steps outlined below, you can enjoy a little music while you carefully study the remainder of this handbook.

- 1) Connect MAIN OUTPUT terminals to the EXT PROS or TAPE input of your preamplifier.
- 2) Connect MAIN IN terminals to EXT PROS or REC OUT of your preamplifier.
- 3) Plug the AC cord into an active wall socket. If the E101 has been properly coupled to the live socket, the red LED\* beside the front panel STANDBY control will light up.
- 4) Put your finger over the word STANDBY on the front panel switch, push and release. Its LED will turn off and the digital display will read "0 200 1.0 0 200 1.0". If this pattern does not appear, the E101 internal computer has not gone through its proper power-up sequence. Unplug the unit for 10 seconds and try again. If this situation persists, please read the more detailed connection guide beginning on page 6.
- 5) Press LINE EQ.
- 6) Program the LEVEL, BANDWIDTH and FREQUENCY you have selected by lightly pressing the appropriate front panel switch. The display will change to confirm the command.
- 7) Select a comfortable seat and carefully review the remainder of this handbook.

\*LED — This is the small light to the side of some switches. LED stands for Light Emitting Diode. This is a solid-state device which provides light. The E101 uses LED's for all front panel indicators and the digital readout. These LED's have an average life expectancy of 100,000 hours!

# OVERVIEW

The E101 is a dual-band parametric equalizer featuring SAE's unique Direct-Line concept plus digital readout of Level, Frequency and Bandwidth for both bands and 10 memory locations for each band. For tape recording, it offers a tape monitor loop to replace the one used for the E101's operation, plus the capability to either pre-equalize, post-equalize or monitor the tape recorder in this loop. The E101 also provides fully electronic control of the parametric circuit through the use of two On-board computers and extensive C-MOS technology. It is an extremely flexible equalizer, and in the following pages we will discuss the proper hook-up, control operation and capabilities of the parametric concept to better acquaint you with the E101.

# REAR PANEL CONNECTIONS

Whenever rear panel connections are being made, the E101 and all associated components should be switched off.

The following discussion on rear panel connections has been designed to assist you during the set-up of your E101. Whenever a rear panel connection is indicated, it will be shown capitalized exactly as it appears on the rear of the E101.

Also the stereo channels of the E101 are marked channel A and channel B. These are normally used for left and right channels respectively.

**MAIN OUT** — Connect a cable from the Channel A input of the EXT PROS loop of the P101 to the MAIN OUT jack marked Channel A on the E101. Connect a cable from the CH B EXT PROS input on the P101 to the MAIN OUT jack Channel B on the E101. A tape circuit can be used if an EXT PROS circuit is not available on your product. In such a case, Channel A should be connected to the left tape or monitor in and Channel B to the right input.

**MAIN IN** — Connect an audio cable from the EXT PROS OUT CH A of the P101 to the MAIN IN CH A of the E101 and a cable from the EXT PROS OUT CH B to the MAIN IN CH B of the E101. If an EXT PROS circuit is not available, this input should be connected to the tape or rec output.

**TAPE OUT** — The tape out jacks provide output to a tape deck. The audio signal from the MAIN IN will always appear at these outputs. Whether the signal is modified by the E101 equalizer or not will depend on the programming of the front panel switches. Channel A and B output jacks on the E101 should be connected by audio cables to the corresponding left and right channel input jacks on your tape deck.

**TAPE IN** — These jacks accept input from your tape deck and complete the tape loop. Channel A and B input jacks on the E101 should be connected by audio cables to the corresponding left and right channel outputs of your tape deck.

**AC CORD** — The AC CORD is located on the rear panel. Once all cable connections have been made, plug the power cord into an unswitched AC outlet on the P101 or any active outlet, providing 105-125 volts AC, 50-60Hz.

**STANDBY CONTROL** — The E101 can be remotely turned on or off by the P101. Connect a cable from the STANDBY OUT on the P101 to the STANDBY IN on the E101. If you wish to control the T101 in the same manner, then connect a cable from the E101 STANDBY OUT to the T101 STANDBY IN. The order of E101 and T101 connection in this combination (P101-E101-T101) can be changed to P101-T101-E101 for installation convenience. However only the P101 can control the standby circuits. When so connected, switching the P101 to "standby" will cause the other product or products to switch to standby also (their standby LED will not light, indicating remote standby control).

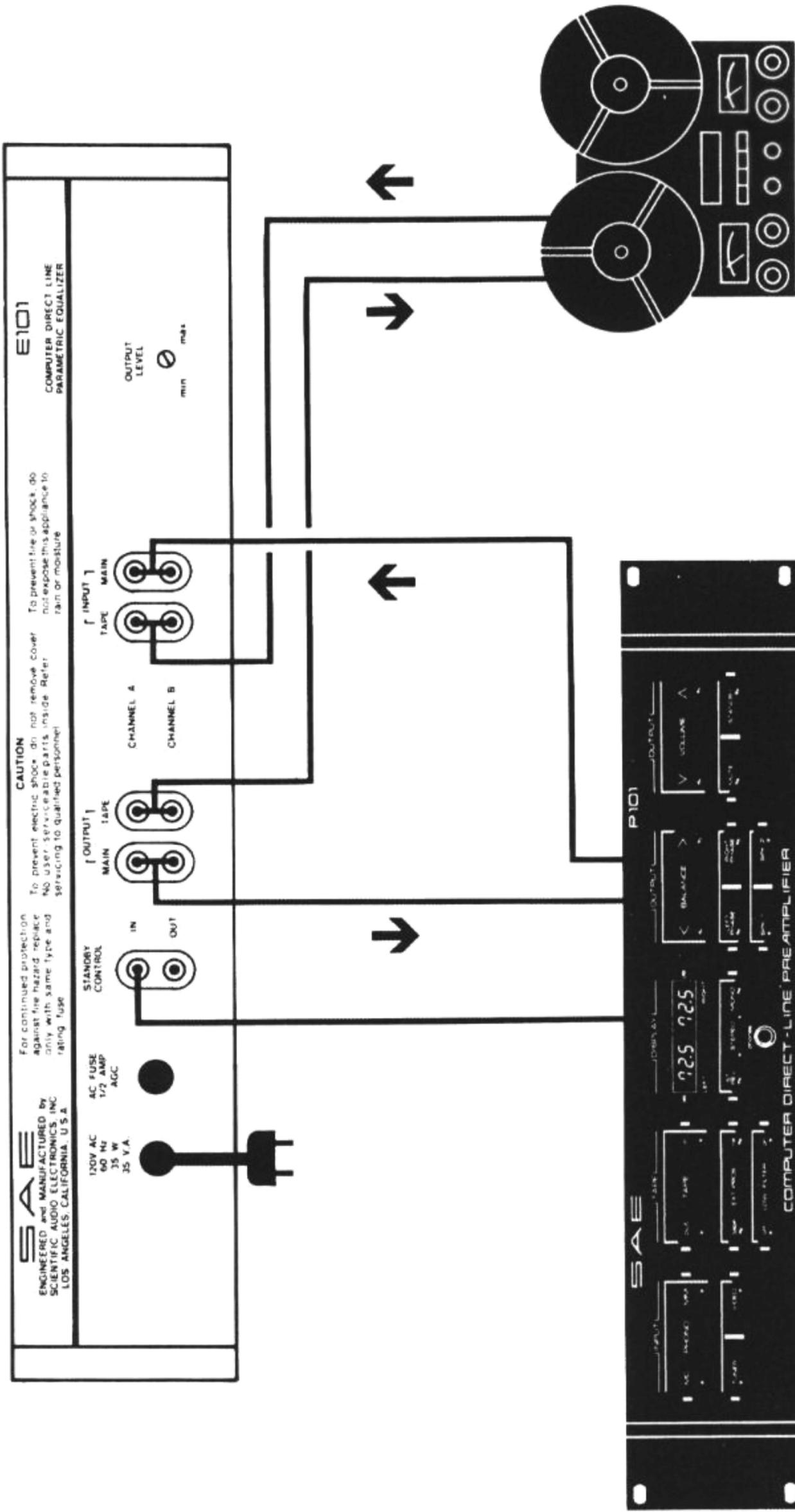


FIGURE 1 — TYPICAL HOOK-UP

## WARNING:

The E101's on-board memory is contained in the computers. Should AC power be lost for any reason, the computers will power down and lose their memory. When power is restored, the E101 will be in the standby mode and the computers will reset to their start-up condition.

## OPERATION (FRONT PANEL)

**POWER.** The E101's internal computers must have power at all times in order to retain the instructions you have programmed into them. Therefore, there is no ON/OFF control on the E101. Instead, there is a STANDBY switch which controls power to the front panel lights and switches. Power consumption in the STANDBY mode is minimal.

When the red LED to the right of the STANDBY switch is on, power is being fed to the internal circuits only. Pushing any of the other switches will not affect any changes in the existing program; nor will you be able to play any music.

To power up the E101 front panel, push and release the STANDBY switch (put your finger over the word "STANDBY" to push). The standby LED will shut off and the digital readout will light up. If this is the first time you have powered up your unit, or if it has completely lost power (i.e., it has been unplugged or the wall socket has gone dead) for more than 1 second the digital display will read "0 200 1.0 0 200 1.0." This means that any instructions previously programmed into the E101 have been cleared. If the unit has already been in use and the internal computer has not lost power, the digital display will indicate the settings you have previously programmed into it.

The appearance of this pattern upon initial power-up (or after the unit has been without power for more than 1 second) is your assurance that all is proceeding correctly within the E101. If the pattern does not appear the first time you turn on your E101 (or after a power loss), unplug the unit, wait ten seconds, and plug it back in. Now when you release the standby switch, the pattern should appear. If it still does not appear, contact your dealer for service.

### Parametric Control Group

The primary controls of the E101 equalizer are grouped in two banks of four, each consisting of Level, Frequency, Bandwidth and Memory controls. Each will be referred to as a "control group". These control groups are designated as low frequency and high frequency to indicate their primary area of use.

The Level, Frequency and Bandwidth controls in a control group are inter-dependent. Any sonic effect you wish to create will require that you adjust not only the level control, but also the frequency and bandwidth controls of a particular control group. Adjusting these

controls for a desired effect will be discussed in the section under "EQ Adjustment". Here we will discuss the purpose of each control in a control group and its effect on the control group.

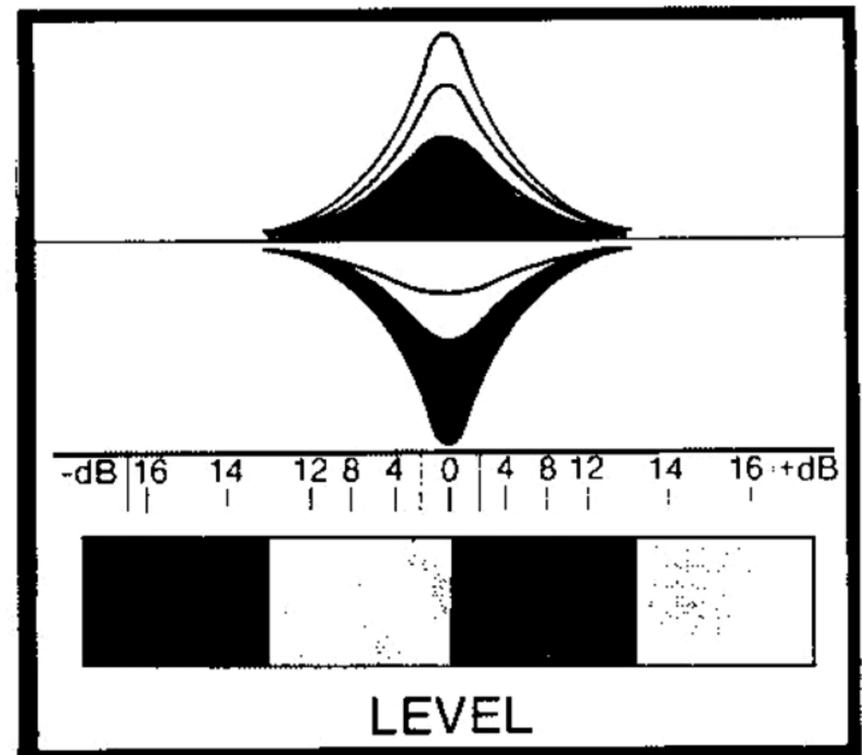


FIGURE 2 — LEVEL CONTROL



**LEVEL** — The level control determines the amount of boost or cut the control group will provide. Pressing the "▲" side will cause the signal to increase, while pressing the "▼" side will decrease the signal level. The actual level is indicated by the digital readout marked level in each control group. The display readout is in dB. (For further discussion see dB in the glossary.)

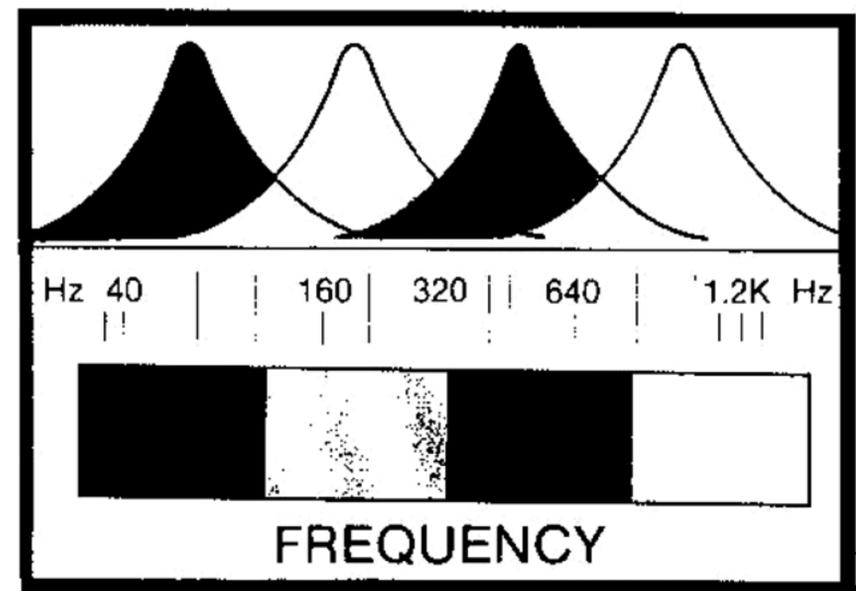


FIGURE 3 — FREQUENCY CONTROL



**FREQUENCY** — This control is used to determine the center frequency of the frequencies at which the EQ will take effect. The digital readout marked FREQUENCY displays this control setting and is

calibrated in Hz (cycles/second) for the low frequency control group and kHz (thousand cycles/second) for the high frequency control group. To increase the frequency, press the ">" side of the control; to decrease the frequency, press the "<" side of the control.

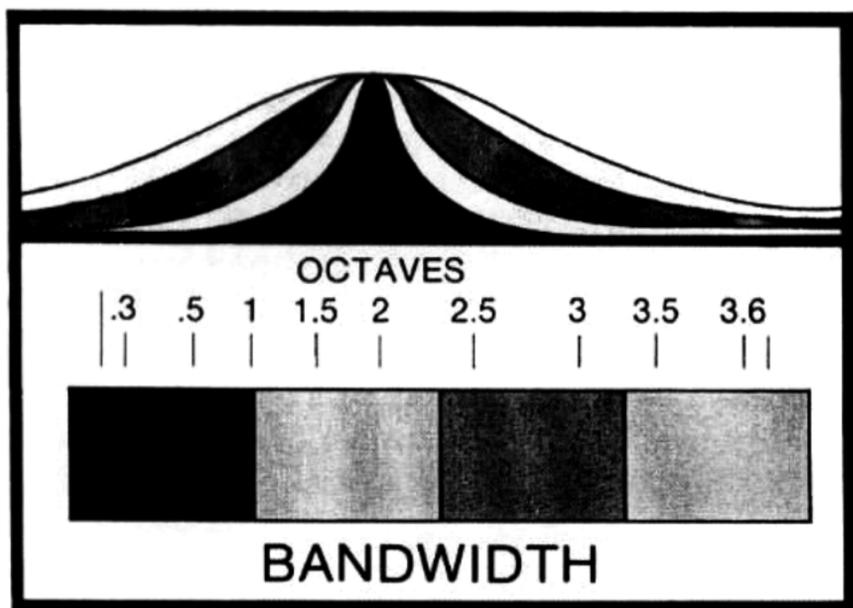


FIGURE 4 — BANDWIDTH CONTROL



**BANDWIDTH** — The setting of the bandwidth control determines how broad a region of the audio spectrum will be affected. The digital readout displays the bandwidth setting in octaves. An octave is a musical term defined as the range from an initial frequency to twice that frequency (for example, 440Hz to 880Hz is one octave.)



**MEMORY SCAN** — This switch controls your selection of memory. Memory on the E101 is handled on a "Rotating Stack" basis. The E101 provides 10 memories per band, numbered 0-9. To select a higher number memory simply press the "Λ" side of the memory scan switch. Press the "V" side to select a lower number of the memory. Because of the "Rotating Stack" design if you reach the highest or lowest memory location of the E101, it will continue on to the opposite limit. For example, if you are scanning up and reach memory 9, the E101 will not stop, it will proceed on to 0 and continue to scan up. The opposite is true also. Using a memory location is quite simple. When the E101 is powered up, the computer sets the bands to their "0" memory location. To store settings in this or any memory, requires simply setting the level, bandwidth and frequency controls to your desired settings. Moving to another memory will

leave those settings in the previous memory. To change the settings in a memory, simply scan to that memory and change the settings.

We recommend that the "0" memory location act as your "scratch pad," the place where you can make experimental changes or where your reference settings are stored, the other locations can then be used for dedicated equalizer settings. These could include special settings for background music, 'FM' reception, the audio portion of video sources, etc.

Here are some recommendations:

**EXP. 1 (TYPICAL SETTINGS)**

mem 1	am
mem 2	fm
mem 3	tape
mem 4	background
mem 5	jazz
mem 6	tv audio
mem 7	video disc
mem 8	video tape

**EXP. 2 (HOW TO SET A MEMORY)**

Now let us assume you wish to change the settings of memory 9. Simply scan from the current memory location to memory 9, indicated by the memory digital readout. Now adjust the bandwidth, frequency and level controls as you desire. The memory is now stored. Scanning to another location and then returning to memory 9 you will find your new setting still there.

For your convenience, we have included a memory page in this book. Once you have decided on the settings for any memory, please list them on that page for future reference or in case of a power shortage.

**EXP. 3 (ANOTHER WAY TO USE WITH RECORDS OR TAPES)**

You may find certain artists you prefer with a certain type of equalization. We suggest you jot down the memory location or control settings on the record cover. This will make it very convenient when playing your records to gain the full enjoyment from your system.

**NOTE:** To obtain the fullest enjoyment of the E101, please read the section on EQ adjustment.



**Pre-TAPE-Post** — This switch determines how the equalizer will affect a tape deck or other component connected in the E101's tape loop. When the "pre" side is depressed, the LED lights and the equalizer is connected between the MAIN IN and the TAPE OUT. This provides the ability to modify your tapes as they are being recorded. This is particularly useful for car tapes or

background music. When the line EQ is depressed, the MAIN OUT of the E101 will also be equalized but remember adjusting the equalizer while recording will affect the tape!

The "post" position places the EQ between the TAPE and the MAIN OUT. The MAIN IN is connected to the TAPE DECK input unequalized. (Changing the EQ while recording in this position will not affect the recording.)



**TAPE MONITOR** — This switch provides access to the output of the tape loop. If you wish to listen to the tape recorder, simply depress this button. It will in no way affect the input to the tape deck.



**LINE EQ** — Whenever this button is pushed, the EQ will modify the source (either main in or tape monitor) and will appear at the main output. (Remember, if "pre-TAPE" is selected, changing the parametric settings will affect the input to the tape deck.)



**LOW FILTER** — A special low-phase shift, low frequency filter is included in the E101. This filter should be engaged whenever acoustic feedback is noticed or when you have a high boost setting at low frequencies. (Below 40Hz.)

**OUTPUT LEVEL** — The E101 provides rear panel rotary potentiometers to adjust its output level.

**EQ ADJUST** — In this section we will discuss the basics of Parametric Equalization and three methods we have found that provide convenient and proper setting of the equalizer.

The role of any equalizer is to modify portions of the audible spectrum, either; a) to compensate for deficiencies in other components in the audio system; or b) to create special sonic effects. The first area (a) is much broader than this simple statement implies. It includes the entire recording process, the entire playback chain, the room, the limitation of car stereos, the audio portion of video and yes, even our ears. You will find the E101 an extremely powerful tool in overcoming the limitation in your system components. The second (b) is a matter of personal taste. The recording engineer, producer and artist apply their personal taste to the "mix down" of a record. You have the same freedom in applying your personal taste to the record when you play it.

Remember, if everything in your system is performing perfectly, but the record or tape still doesn't sound right, it doesn't mean you're wrong, it means it's time to use the E101! As stated above the role of an equalizer is to modify portions of the audible spectrum. To accomplish this, two things must be controlled: 1) where in the audio spectrum you want to modify; and 2) how much. The first is a function of two factors: (1) the center frequency of the modified region; and (2) how broad an area around that region. These aspects are the controlling factors in EQ. Conventional equalizers have the region of effect preset at the factory and you control level only. With the E101, you have total control over all aspects of equalization. **LEVEL**—how much you want to affect (cut or boost) the region. **FREQUENCY**—the center of the region you ask to modify. **BANDWIDTH**—how broad a region you wish to modify. Remember, the reason conventional equalizers have so many bands is to attempt to compensate for their lack of flexibility. When EQ'ing you face a limited number of problems you need to correct, but they may occur in a wide variety of places. The ability of the E101 with its frequency and bandwidth controls to tailor the E101 to your requirements makes it eminently more suited to your needs than the hit or miss approach of conventional EQ's.

**How do I adjust a Parametric?** This is a common question, the surprising part is that it is much easier than it looks. Our years of developing and producing parametrics have led to three methods of adjusting the equalizer. (The first and last step is the same for all three; First—decide what you want changed; and Last—listen and make the final adjustment to satisfy your own taste.)

#### METHOD 1 — The Chart System

Step 1 — decide what you wish to modify.

Step 2 — included in this manual is the chart called the **FREQUENCY RANGE of MUSIC**.

On the chart find the instrument or vocalist you wish to modify. Look at the bottom of the chart to find the proper frequency setting. It will also indicate which band should be used. The length of the instrument's line will indicate the proper **BANDWIDTH SETTING**. Now increase the level ("▲" on the level control) if the instrument is too weak or decrease the level, ("▼" on the level control) if the instrument is overbearing. Step 3 — final adjustment or fine tuning of level, bandwidth and frequency can now be done by ear to satisfy personal taste.

#### METHOD 2 — The Ear Method

Step 1 — decide what you wish to modify.

Step 2 — decide if it falls in the high or low band.

Step 3 — adjust the level control to +10dB, and the bandwidth control to 1.0 octaves. Now, using the frequency control, move up or down the audible band, listening to the program source. When you have tuned to the instrument you are after, it will appear louder than normal.

Step 4 — adjust level and bandwidth controls until the desired effect is obtained.

# THE FREQUENCY RANGE OF MUSIC

(Fundamental ranges for the principal instruments and voices)

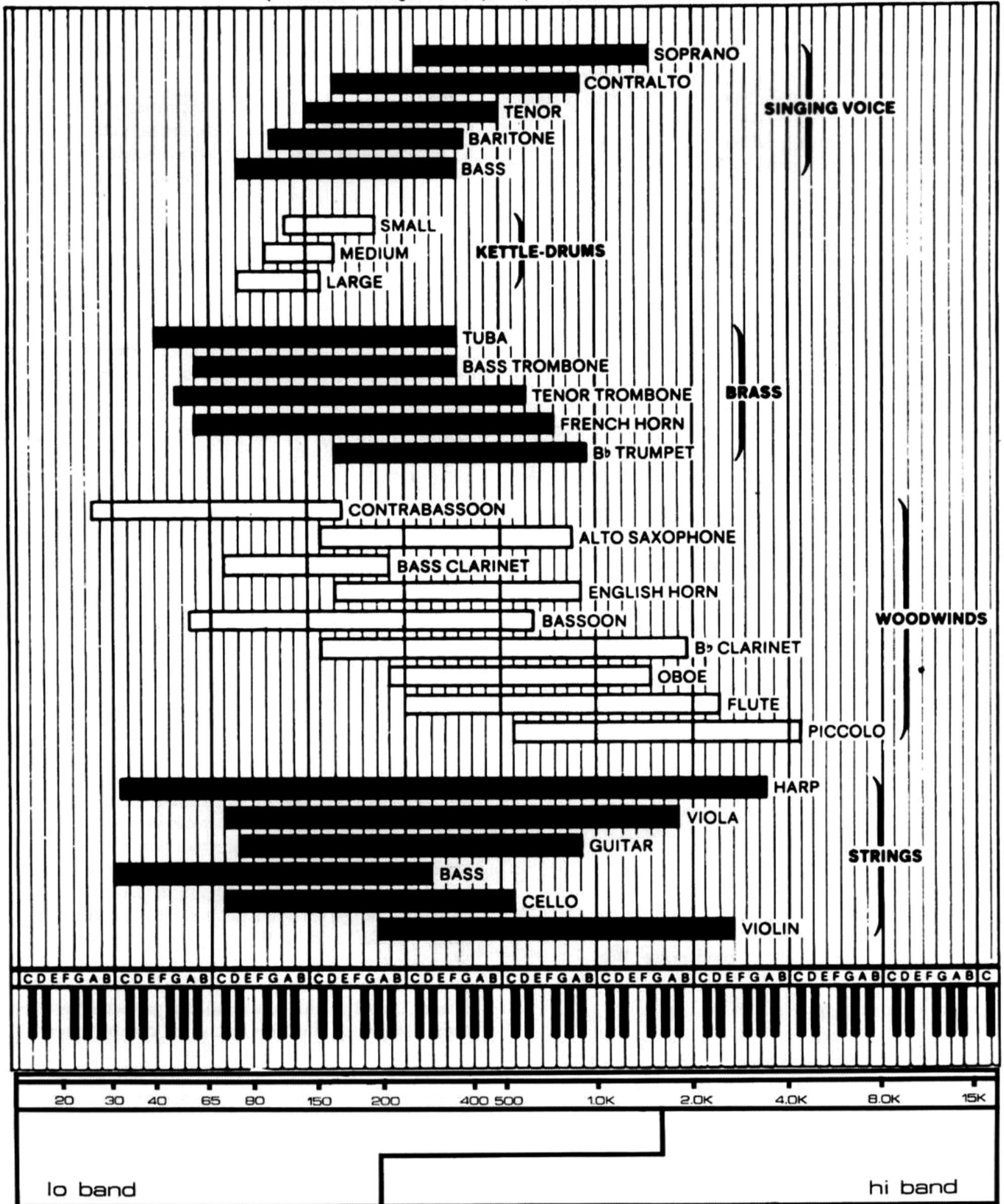


FIGURE 5 — FREQUENCY RANGE OF MUSIC

### METHOD 3 — The Studio Approach

Step 1 — decide what you wish to modify.

Step 2 — read through the chart on specific frequency range characteristics. It outlines how different sonic effects are created.

Step 3 — set E101 to create your desired effect.

Step 4 — final adjust is done by ear.

As you can see, each method is slightly different. As you use your E101, you will probably find that certain methods meet certain needs and that your solutions may combine parts of all three. Of course, if you find some new method easier, please drop us a line, so we can pass it along to other Parametric users.

None of this can begin to tell you of the capabilities of the E101, only your own experimenting will show you that. Good luck.

We have provided some recommendations of how a few typical problems are solved, to help you get started.

**Background Music** — You intend to play some quiet music at low levels for a party, dinner, whatever — this is known as background music. The ear has a natural tendency to be less sensitive to low frequency and high frequency music at low levels. This means your background music may sound dull or lack bass. To compensate for this adjust the E101 as follows:

BAND	LO	HI
Level	+6 - +8	+2
Band	2.0	3.0
Freq	100 Hz	6.5kHz

**AUDIO from a VCR** — The audio portion of a VCR is recorded in the same way as a cassette recorder. Unfortunately, the noise or hiss from the audio falls in the same region where our hearing is most sensitive. To reduce the hiss, adjust as follows:

BAND	LO	HI
Level	-16	-4
Band	1.0	.3
Freq	60 Hz	6.5kHz

Low Filter On

**CAR TAPES** — Car sound systems have many problems, but the most prominent are limited response from the system (although this has much improved with today's car audio systems) and road noise. We recommend:

BAND	LO	HI
Level	+10	+6
Band	0.7 octaves	3.0 octaves
Freq	80 Hz	5.0kHz

Low Filter On

Remember, if you have a sonic problem, refer to the chart and use the E101. Its powerful room equalization, speaker correction and program modification capabilities are now at your finger tips.

## SPECIFIC FREQUENCY RANGE CHARACTERISTICS

The following discussion localizes common problematic conditions into specific frequency ranges. Use this information and the chart on the "Frequency Range of Music" to assist you in setting your parametric equalizer.

**20Hz to 80Hz** — This range is primarily low frequency instrument fundamentals (bass, drum, and pipe organ). By increasing this range, the bass will take on a deep rich "sock" without booming or blurring the sound. Decreasing the controls will weaken and muddy the bass.

**120Hz to 320Hz** — This area is the major harmonic range of low frequency material. Increasing this range results in muddy bass sound lacking definition and clean-transient response. However, some material in recording may lack these overtones; and therefore, sound extremely tight to the point of being strident. Proper use of controls in this range can offer good bass warmth without sacrificing definition.

**320Hz to 1280Hz** — The majority of fundamental notes exists in this frequency band. Therefore, this range can result in the most dramatic changes in overall program energy. Increasing this range can give the sound more impact. However, if the material has too much impact, you can balance it out by decreasing the controls for smoother overall quality. The human ear is very sensitive to this range. You will find only a minor change is required to have major effects on the program material.

**1280Hz to 5000Hz** — This region controls those instruments that we generally consider to be high in frequency. The result is they can offer brightness to these instruments and clarity to the sound. The human ear has added sensitivity to this region; therefore, care must be taken since overzealous use of controls in this range can introduce a brittle or dry sound. This characteristic occurs because the harmonic structure of these instruments is not being affected, only the fundamentals are being changed. Therefore, an instrument inner-imbalance can occur. This region is also the common crossover range for loudspeakers; and therefore, many "peaks" and "valleys" can occur, because of crossover characteristics which could be exaggerated by different program material. The flexibility of the E101 is very useful in this situation. By proper adjustment, these frequency aberrations can be compensated for.

**5000Hz to 20,000Hz** — This region is composed almost entirely of the harmonic structures that give instruments their unique sounds. This range offers proper balance to many of the percussion instruments, since they are very rich in harmonic content. This area can also add to the sparkle and brilliance that many audiophiles seek, especially from high frequency string and woodwind instruments.

## SERVICE

SAE has a Customer Service Department to answer all questions pertinent to the installation and operation of your unit. Please feel free to write us at any time and we shall endeavor to offer prompt and complete advice regarding your unit. If a problem arises which cannot be resolved through our combined efforts, we will refer you to a local authorized repair agency or the factory. To aid us in selecting a service station convenient to you, please indicate which major city is closest to your home.

Please address inquiries to:

Customer Service Department  
SAE Inc.  
P.O. Box 60271 Terminal Annex  
Los Angeles, California 90060

Be sure to include the model number and the serial number of your unit. In the event your unit must be returned, an authorization **MUST BE OBTAINED** from SAE prior to its return.

**UNDER NO CIRCUMSTANCES SHOULD YOUR UNIT BE SHIPPED TO THE FACTORY WITHOUT PRIOR AUTHORIZATION.**

If the original shipping carton has been lost or discarded, or if the carton is not in good condition, a duplicate carton may be obtained from our Service Department for a minimal charge.

Always ship via recognized freight carriers. Suggested carriers will be given in SAE's Customer Service Department reply. Do not ship via Parcel Post. **ALL PARCEL POST SHIPMENTS WILL BE REFUSED.**

## SERVICE COVERAGE

U.S. (ONLY)

SAE is proud to offer you a three-year limited warranty on your component. In order to receive this valuable protection, please observe the following:

- 1) **RETAIN YOUR BILL OF SALE OR OTHER PROOF OF PURCHASE** — In the unlikely circumstance that your unit should require service, the bill-of-sale will act as your proof of ownership and effective date of warranty.
- 2) **SEND IN THE WARRANTY CARD** — To ensure your name is on file as owner of this unit please send in the warranty card. This is one way to enable SAE to establish the date of purchase of your product, as well as provide you with better customer service and improvements in future products. Failure to return the card **WILL NOT** affect your rights under this warranty so long as you retain other proof of purchase such as bill-of-sale.
- 3) **READ THE WARRANTY** — SAE has offered you certain rights under the warranty, **AND** required certain conditions be met by you. Please read the warranty to understand it thoroughly.
- 4) **FILL OUT THE PRODUCT RECORD** — In this manual is a product record. Please fill it out. It will provide a convenient reference for future needs.

## INTERNATIONAL

As stated above, the SAE 3 year limited warranty is valid only in the United States. Service in other countries will be provided by the exclusive SAE representative or his agents. Because of varying governmental regulations and conditions, the service period may differ from country to country. However, in every instance, the service agreement can be honored only in the country where the unit was purchased. In the event that there is no SAE representative in your country, please contact SAE or in

**CANADA:**

The Pringle Group  
30 Scarsdale Road  
Don Mills, Ontario  
Canada M3B 2R7

# SPECIFICATIONS

Frequency Response .....  $\pm 0.25\text{dB}$  20Hz to 20kHz  
T.H.D. (Total Harmonic Distortion) at any level to rated output from 20Hz to 20kHz ... less than 0.02%  
I.M. (Intermodulation Distortion) at any level of rated output with any 2 mixed frequencies between 20Hz to 20kHz at 4/1 voltage ratio ..... less than 0.02%  
Signal-to-Noise Ratio ..... greater than 100dB below rated output  
Rated Output ..... 2.50 Volts RMS  
Output at Clipping ..... greater than 9 volts into 10K Ohms, greater than +14dBm  
Input Impedance ..... 100K Ohms  
Output Source Impedance ..... 500 Ohms  
Output Load Impedance ..... 600 Ohms minimum  
Insertion Loss ..... less than 1dB with level at 0dB  
Power Consumption: 110-125 VAC, 50Hz to 60Hz ..... 20 Watts  
Shipping Weight ..... 20 lbs.  
Dimensions ..... 19"W (48.3 cm) x 3.5"H (8.89 cm) x 12.5"D (31.75 cm)

# PRODUCT RECORD

Serial No. \_\_\_\_\_

Purchased From: \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

Date Purchased \_\_\_\_\_

Sales Invoice No. \_\_\_\_\_

Salesman \_\_\_\_\_

Date Warranty Card Mailed \_\_\_\_\_

## MEMORY CHART

### LOW FREQUENCY CONTROL GROUP

Memory 0	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 1	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 2	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 3	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 4	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 5	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 6	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 7	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 8	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 9	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)

### HIFREQUENCY CONTROL GROUP

Memory 0	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 1	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 2	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 3	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 4	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 5	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 6	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 7	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 8	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 9	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)

## MEMORY CHART

### LOW FREQUENCY CONTROL GROUP

Memory 0	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 1	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 2	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 3	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 4	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 5	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 6	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 7	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 8	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 9	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)

### HI FREQUENCY CONTROL GROUP

Memory 0	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 1	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 2	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 3	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 4	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 5	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 6	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 7	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 8	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)
Memory 9	Level _____ (dB)	Bandwidth _____ (octave)	Frequency _____ (Hz)

Main office: **SCIENTIFIC AUDIO ELECTRONICS, INC.**

**P.O. Box 60271, Terminal Annex, Los Angeles, California 90060. Tlx: 674061 SAE LSA.**

**In Canada: The Pringle Group, 30 Scarsdale Road, Don Mills, Ontario, Canada M3B 2R7. Tlx: 06966865 PRINGLE TOR.**

**In Europe: SAE EUROPE, Via Respighi, 99 41106 Modena, Italy**