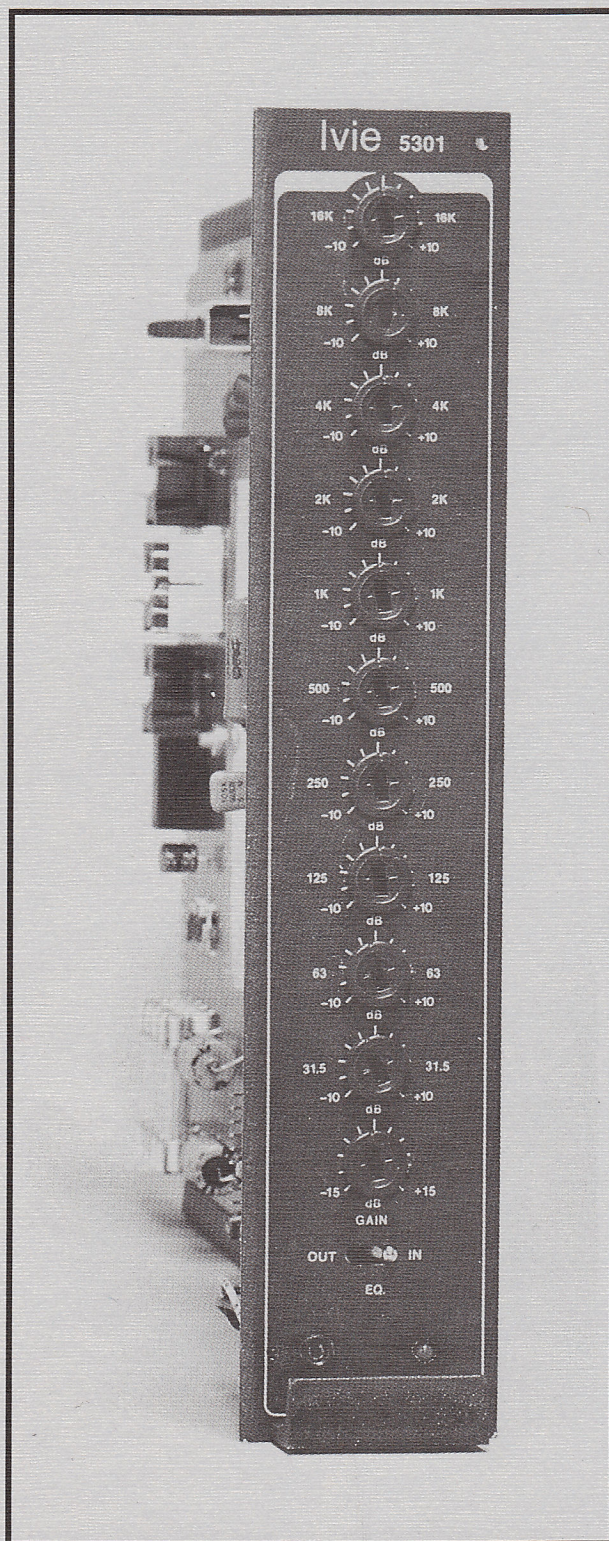


# 5301 MANUAL



**Operation and  
Owners Manual  
for the  
5301 Octave EQ  
5000 Modular Sound System**



# INTRODUCTION

The model 5301 is a state-of-the-art octave-band equalizer designed to provide accurate, flexible broad-band equalization of audio systems. Design criteria assure maximum signal to noise ratio and circuit stability.

The 5301 utilizes 10 filters in ISO standard octave-band centers, ranging from 31.5 Hz to 16 KHz. Each filter section provides 10 dB of boost or cut. The 10 active filters are minimum phase networks whose skirts combine to provide minimized ripple and phase shift. The stable design of the 5301 assures reliability and performance under the most demanding professional conditions.

A number of other features combine to make the 5301 Octave-Band Equalizer module a versatile tool in all areas of audio and sound system equalization. An EQ IN/OUT, bypass switch allows for pre and post equalization comparisons. A front panel master gain control provides for gain changes during and after the equalization process.

An optional accessory relay allows the 5301 to be remotely switched in and out of the circuit. This feature could allow for several equalizers with different settings to be remotely switched in and out of the system, providing different EQ for varying acoustics or input requirements.

The 5301 provides a front panel LED to indicate signal output and EQ IN/OUT status. An audio test point is available on the front panel which allows access for test instruments. The 5301 has provision to accept optional plug-in crossover cards, making it a two way crossover in addition to its octave-band equalizer function. An 18dB per octave, hi-pass filter with selectable rolloff frequencies is easily accessible on the PC board. The front panel controls of the equalizer use Ivie's unique, screwdriver operated knobs which "grip" the blade of the screwdriver over a wide range of blade sizes. These features are discussed in more detail later.

## INSTALLATION INSTRUCTIONS

*(Note: Bracketed numbers in the text refer to item numbers found in Figure 1)*

Installation of the 5301 into the 5000 system requires only three steps. First, "dial up" the appropriate input and output bus selections on the black, rotary type



selectors labeled "IN" (5) and "NORMAL OUT" (HIGH) (3) on the PC board (The third rotary selector marked "OUT" (LOW) (4) will be discussed in the **CROSSOVER INSTRUCTIONS** section of this manual). Make sure that you have selected the proper buses. . . improper bus selection will not damage the module or system, but distortion or erratic operation may result. (See 5001 manual for details on operation and selection of the bus system). Next, set the Hi-pass filter (1). Finally, insert the 5301 into one of the "slots" in the Mainframe and firmly push the module into the Mainframe until it sets in the fully inserted position. The 5301 should now be operational as an integral part of the system.

It is possible to bring external signals (phone lines, delayed lines, etc.) directly into the 5000 system via the 5301. This is accomplished by using a TB-40 plugged onto the back of the 5301. Access to the sound system bus structure via the 5301 is detailed by the TB-40 diagram on the inside rear cover of this manual.

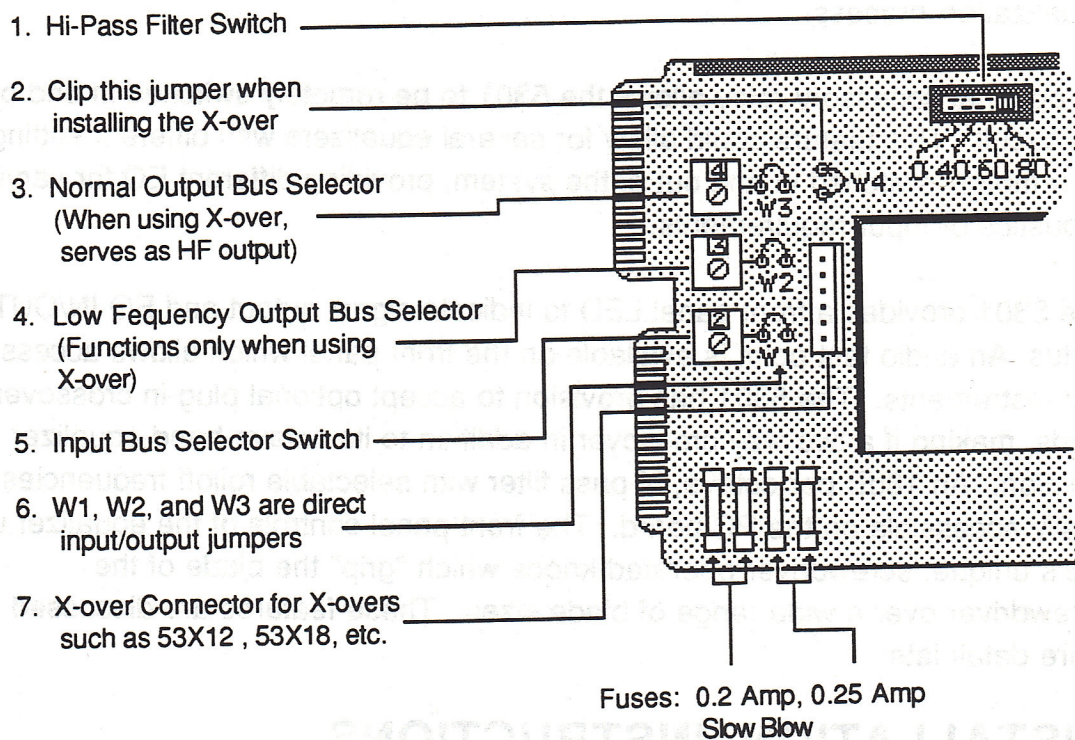


Figure 1

Should you desire to bring signal into the 5301, and then go back out of the 5301 without allowing the signal to appear within the rest of the 5000 system, it can be



accomplished the same way it is with other modules. Cutting the jumpers at the bus select switches will prevent the 5301 from accessing the motherboard bus structure which feeds into the rest of the 5000 system.

## **USING THE EQUALIZER**

With the 5301 Octave-Band Equalizer Module properly installed in the Mainframe, and its input and output buses properly assigned, it is ready to be used for adjusting the response curve, or making any desired octave-band alterations to the audio spectrum.

The 5301 is an ideal low-cost alternative to 1/3 octave-band equalization when only limited equalization is required, or when expense is a factor. The 5301 may also be used as a sophisticated tone control for enhancing various input signals.

When beginning the process of room equalization, it is generally a good idea to start with the individual octave controls in the "flat" position. If you have access to a real time analyzer, insert the test probe lead from the analyzer into the test point on the front panel of the 5301, and inject pink noise into the system input. You will be able to see the overall response of the equalizer on the screen of the analyzer, and will be able to adjust the controls accordingly. Of course, for room equalization, a probe plugged into the real time analyzer would not be used. A microphone would be connected to the real time analyzer instead, and would be placed at a desired location in the room.

## **FRONT PANEL CONTROLS**

On the front panel of the 5301 are the octave-band filter controls, the gain control, the status LED, the EQ IN/OUT switch, and the test point. Adjusting any of the rotary controls is done by means of Ivie's unique, screwdriver operated knobs. The knobs are designed to "grip" even the smallest screwdriver blade without "play" that could otherwise make it very difficult to fine-tune filter amplitude. Standard knobs are also available as optional accessories.

### **EQ IN/OUT**

The EQ IN/OUT switch, located on the front panel, can completely remove all active circuitry from the signal path in the 5301. In the "OUT" position, the signal is routed only through the PC board trace and is not affected in any way by the



filters or gain of the 5301. This also allows the 5301 to be bypassed in the event of module failure. The optional crossover, if used, is *not* switched out of the circuit.

## **GAIN ADJUSTMENT**

The front panel GAIN control is intended for use in adjusting for changes in apparent overall level due to the equalization process. When switching the equalizer out of the circuit with the EQ IN/OUT switch, the unequalized level will be apparent in the the system. The gain control should be used to adjust the equalized level. In this way, any removal of the equalizer from the circuit will not affect the apparent sound level of the system being operated.

## **LED INDICATOR**

The LED on the front panel serves two purposes: 1) It is an output signal presence indicator which flashes as it is modulated by the signal present at the output of the 5301, and, 2) when the filters are bypassed with the EQ IN/OUT switch, the LED will pulse on and off at a rate of about 3Hz, as a reminder that the filters are bypassed.

## **TEST POINT**

The test point on the front panel is connected through a 600  $\Omega$  resistor to the output of the 5301. This test point allows the use of oscilloscopes, real time analyzers, AC volt meters, etc., for system documentation and trouble shooting. The 600  $\Omega$  resistor will not affect the accuracy of the measurement when the test instrument input impedance is greater than 50k ohms.

## **HIGH PASS FILTER USE**

The 5301 is equipped with a Hi-pass filter that allows selection of one of four Hi-pass rolloff frequencies. The normal position of the switch selects a rolloff beginning at 4Hz, but rolloffs beginning at 40Hz, 80Hz, or 160Hz are also selectable. The switch positions are labeled on the 5301 motherboard for easy, visual selection. The skirt of this filter is 18 dB/octave. The Hi-pass filter may be activated to roll off low frequencies for numerous purposes including alleviation of "P-popping", breath and wind noise, and other low frequency problems.



# CROSSOVER INSTRUCTIONS

The 5301 Octave-Band Equalizer may be converted for additional use as a 2-Way crossover. Ivie supplies, as optional accessories, a variety of small plug-in cards which attach to the gold plated connector pins (See Figure 1) on the 5301 PC board. These cards can be crossovers, horn equalization, or a combination of both on the same card. All these plug in cards and their descriptions are outlined on Ivie price lists under the Model 5000 Accessories section.

## PREPARING A CROSSOVER FOR USE

To prepare one of the crossover boards for operation, it is necessary to select a crossover frequency. Common selections include 800Hz and 500Hz, but whatever frequency point is chosen, some resistors will need to be soldered onto the crossover PC board. The number of resistors will vary, depending on the crossover selected. Below is an example of a 53X18, 18dB per octave, crossover board, which requires three resistors of the same value to be soldered onto it. Solder posts are provided on the crossover PC board, and instructions for calculating a resistor value based on the crossover frequency desired is shown on the following page:

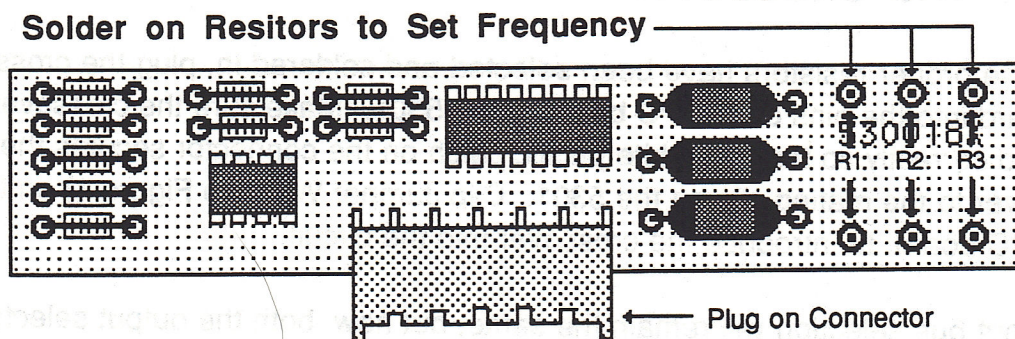


Figure 2

The three resistors required are soldered at the locations marked R1, R2, and R3. **All resistors should be the same value, and 1% tolerance resistors should be used. All resistors should be 1/4 watt or larger.**



Any reasonable crossover frequency may be selected by using the appropriate value resistor. The formula:

$$R_{\Omega} = \frac{1.592 \times 10^7}{f(\text{Hz})}$$

allows calculation of the values needed for any frequency. Assume we required a 400Hz crossover point. We would divide 15,920,000 by 400 to calculate the appropriate value for the needed resistors. The calculated value is 39.8K ohms. We would choose the nearest 1% standard value for optimal results. (In this case, 40.2K ohm resistors would be used).

For your convenience, some common crossover frequencies with the appropriate values for required resistors are shown below:

800Hz = 20K ohms

500Hz = 31.6K ohms

400Hz = 40.2K ohms

## USING THE CROSSOVER

Once the proper resistors have been selected and soldered in, plug the crossover PC board into the pins on the PC board of the 5301. Make sure the crossover is oriented correctly so that the white plastic catch on the connector secures the crossover to the mating clip on the 5301. Clip Jumper W4 (see Figure 1) on the 5301 PC board to introduce the crossover into the circuit.

The input bus selection will remain the same, but now, both the output selectors must be used. (These are the square, rotary switches shown in Figure 1. *Notice the labeling on the PC board, next to the switches*). The top output bus selector is now the high frequency output, and the center bus selector is now the low frequency output. When the crossover is not plugged in to the 5301, the LF output is not connected to anything and is not active.

After the proper output buses have been selected (one bus feeding the HF amplifiers, and another bus feeding the LF amplifiers) the 5301 may be inserted into the Mainframe for operation.



## OPTIONAL REMOTE EQ SWITCHING

The 53REQ Remote Equalization Kit may be fitted to the 5301 to provide remote switching of the equalization in and out of the circuit. There are numerous applications where it may be necessary to have more than one pre-set equalization in a given system, to handle changing acoustical conditions. The addition for the 53REQ kit to a model 5301 octave-band equalizer allows it to be remotely switched to "bypass."

If the 5301 should lose power through failure, it automatically switches to "bypass" without affecting any other module, thus maintaining full system performance.

In the example below, two 5301 octave-band equalizers have been fitted with 53REQ kits. By remotely activating the respective relays, we can select which of the two equalizers is in the circuit. In this particular example, two 5301's are connected in series. Only one of the two equalizers at a time is "in the circuit," while the other is bypassed. When terminal "R" of the TB-40 is taken to ground the equalizer is bypassed.

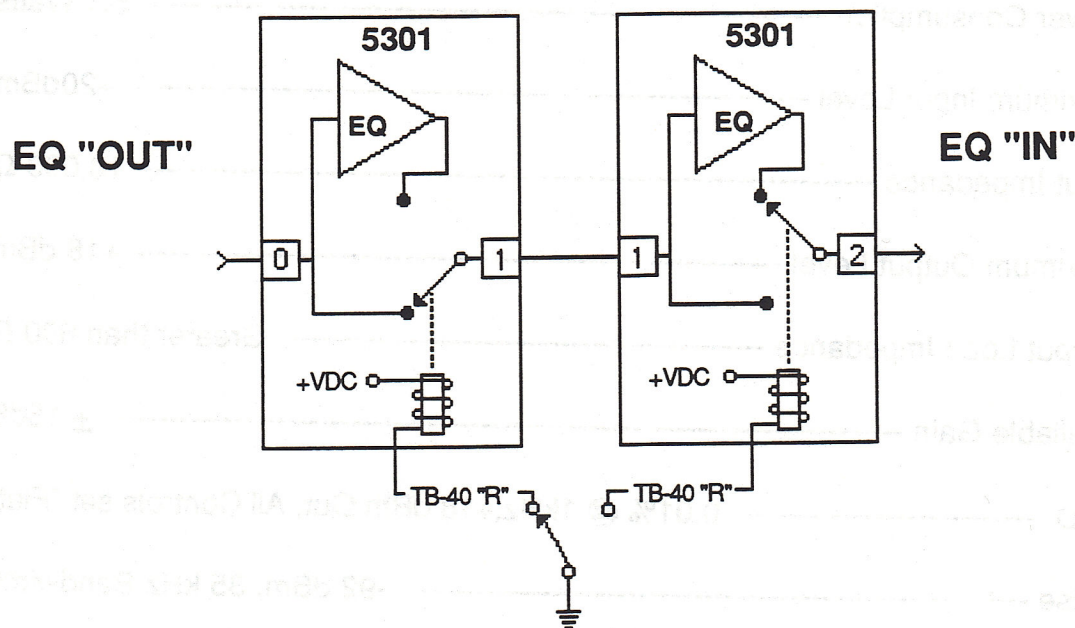


Figure 3

Detailed installation instructions come with the 53REQ kit. The relay is soldered



to the 5301 PC board, and the two jumpers are clipped. Activation of the relay occurs when pin "R" is taken to ground on the TB-40 connected to the 5301.

## SECURITY COVER ACCESSORY

The model SC-1 Security Cover may be ordered to secure the 5301 from panel from unauthorized tampering. The SC-1 attaches to the front of the 5301, covering the adjustment knobs. It is attached with small Allen screws, which maybe removed easily, but are inconvenient to the casual "tinkerer."

## FUSES

The 5301 is protected by four fuses, two 0.2 amp slow blow fuses, and two 0.25 amp slow blow fuses. Refer to Figure 1 for the proper placement of these fuses on the circuit board. Should it become necessary to replace these fuses, an exact duplicate must be used. ***Substituting higher rating fuses may cause extensive damage and will be cause to VOID THE WARRANTY.***

## SPECIFICATIONS

Power Consumption	5.1 Watts
Maximum Input Level	+20dBm
Input Impedance	10,000 $\Omega$
Maximum Output Level	+18 dBm
Output Load Impedance	Greater than 600 $\Omega$
Available Gain	$\pm 15$ dB
THD	0.01% @ 1kHz,+18 dBm Out, All Controls set "Flat"
Noise	-92 dBm, 35 kHz Bandwidth
Filter Accuracy	$\pm 5\%$ of Center Frequency
High-pass Filter	18dB/octave, Switch Selectable @ 4, 40, 80, and 160 Hz



## SPECIFICATIONS CONTINUED

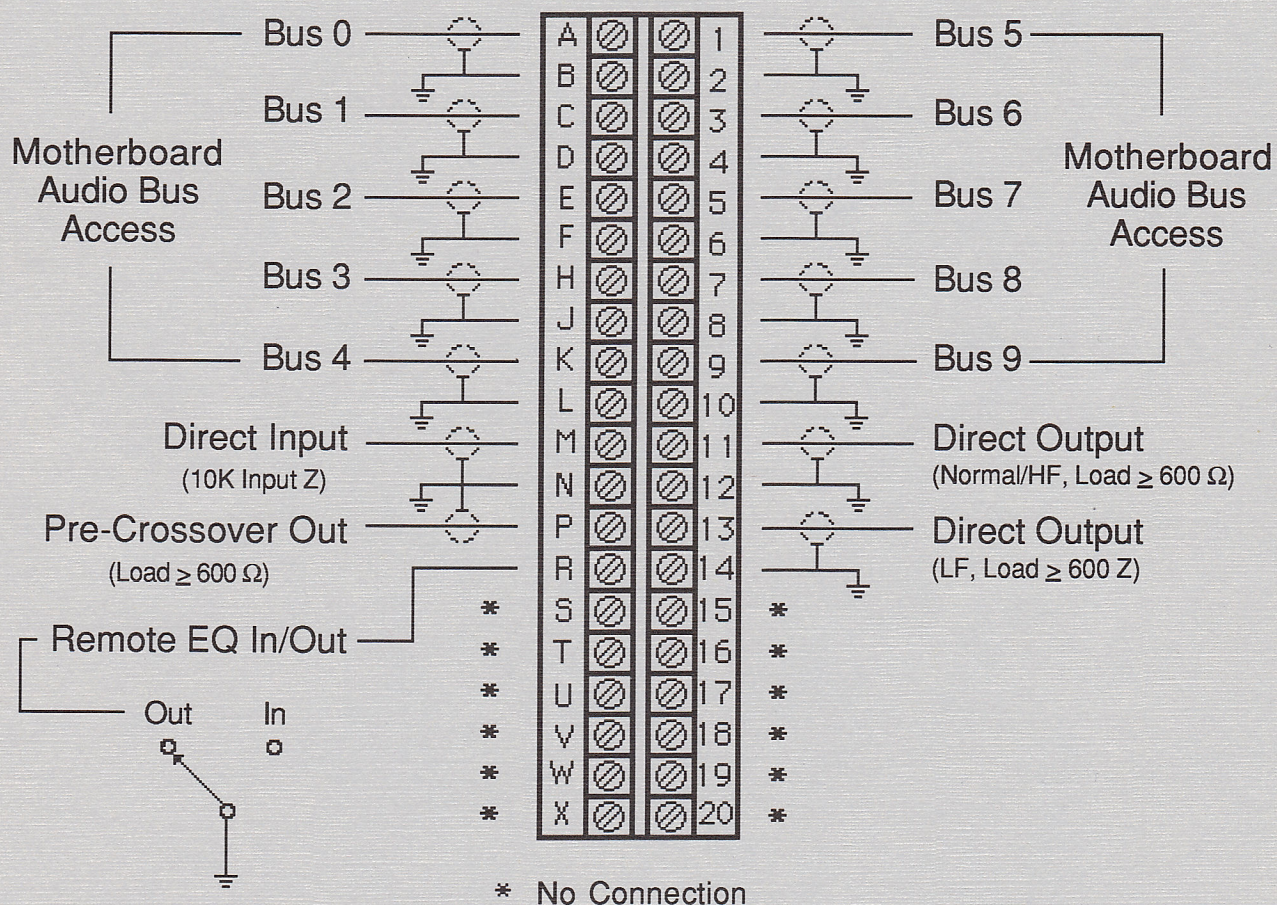
Weight ----- 1.4 Lbs.

Size ----- 8.5 X 14.2 X 1.7 Inches

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## 5301 TB-40 Connections