

**MODEL SE-400**  
STEREO PARAMETRIC EQUALIZER  
**OPERATING MANUAL**  
Revision 1.0 22 September, 1986

Symetrix, Inc.  
4211 24th Ave West  
Seattle, WA 98199

Telephone (206)282-2555  
Telex 703282 SYMETRIX UD

**symatrix**SE-400 Stereo Parametric EqualizerInstruction ManualGENERAL DESCRIPTION

The SE-400 is a stereo (two channel) parametric equalizer. Each channel has four independent frequency "bands". The circuitry and functions of the four bands are all similar, but not identical. This will be explained in detail below. Each band has the following controls: variable frequency, variable bandwidth, and variable amplitude. Additional controls for each channel include the Input Level control, Parametric EQ in/out switch, the Subsonic Filter in/out switch. A master Power On/Off switch is found on the right hand side of the front panel. Visual indicators on the SE-400 include a green LED (light emitting diode) associated with the Parametric EQ in/out switch, a yellow LED associated with the sub-sonic filter switch, and a red +18dBm peak level indicator.

THE FREQUENCY BANDS

As mentioned above, each channel of the SE-400 has four frequency bands. The bands are labeled individually below each group of three (vertical) knobs. The four bands are: LOW, LOW-MID, HIGH-MID, and HIGH. As previously mentioned the three controls in each band are frequency, bandwidth, and amplitude. Color coded knob caps are used on the SE-400 to simplify identification of function. All frequency control knobs are blue, bandwidth control knobs are black, and amplitude control knobs are green.

Let's begin our discussion of the knob functions with the frequency control knob. This knob allows the user to vary the frequency of equalization across a certain spectrum of the audio frequency band. (usually considered to be 20 HZ to 20,000HZ ). With this knob we are able to choose the exact frequency at which we will boost (increase) or cut (decrease) the amplitude (volume level) in the particular band we are adjusting. The frequency controls for all the

## symetri:

### SE-400 Instruction Manual continued

bands are calibrated in Hertz (HZ) which is simply another name for cycles per second. If we take the low band for example we can see that the available range of frequencies with which we can deal with varies from 16 HZ to 512 HZ. Likewise, the high band frequencies are variable from 686 HZ up to 22K HZ (22,000 cycles per second).

Let us now move on to the discussion of the lower of the three knobs on each band, the Amplitude control knob. All the amplitude control knobs, as previously mentioned are green. The amplitude controls on the SE-400 are calibrated in dB (decibels). Each amplitude control is capable of boosting or cutting signals at the chosen frequency in it's band by 16 dB. When the pointer on the color cap is pointing straight up, we are at the "zero" dB position, or in other words our band is essentially out of the circuit. When the amplitude control is turned fully clockwise we are boosting the chosen frequency in that band by 16 dB. When the control is fully counter-clockwise, we are cutting (decreasing) by 16 dB.

The third control on each frequency band is the Bandwidth control. This control uses a black color cap (if you can call black a color!). The bandwidth control is calibrated in octaves, and is variable from .16 to 3.3 (a sixth of an octave to three and one-third octaves). Remember, an octave represents a doubling in frequency of a musical note (or a halving in frequency going downward). What the bandwidth control actually does is to allow us to choose how wide a range of frequencies, centered around the frequency selected by the positioning of the blue frequency select control, that we are going to effect when we adjust the green amplitude control. To clear this all up, let's look at a practical example. Assume we have made a tape recording and somehow there is a low frequency hum on the tape which we wish to eliminate. Assuming that the tape sounds fine except for the hum then our only task is to eliminate the hum and only the hum. First we would go to the low band and turn the amplitude control to some point

## symetriii

### SE-400 Instruction Manual continued

to the left of center to cause a decrease of volume in that band. Next, we would turn the frequency control and "tune in" on the problem frequency. Finally, the bandwidth control would be adjusted to some point where the hum is made inaudible, but the other musical information is not affected. This setting would probably be towards the far counterclockwise setting of the control. In general (but not always) narrow bandwidth settings (counter-clockwise positionings) will produce less audible effects than wide bandwidth settings.

### The Input Level Control

The input level control for each channel of the SE-400 is found just to the right of the high band amplitude control. The color coding cap used is light grey. The control is calibrated in dB. The purpose of the input level control is twofold: 1) the control can be used to raise the level of incoming signals to the equalizer by up to 10dB if these signals are weak or lower than standard "line level"; 2) the control can also be used to decrease the signal level coming into the equalizer by up to 20dB. This should be done when one is either dealing with very large level incoming signals or when the equalizer is being used to boost one or more frequency bands by significant amounts. In this case the input level control should be decreased (turned counter-clockwise) so that neither the output stage of the SE-400 nor the input stage of the following equipment is overloaded so as to cause distortion.

### The Peak Level Indicator

An excellent feature of the SE-400 which aids the user in adjusting the input level control to the correct or optimum position is a red LED labeled +18 dBm Peak. When the output level of the SE-400 equals or exceeds +18dBm this LED will flash. +18 dBm is 3dB lower than the SE-400's clip point. Thus, the user is warned in advance of a possible distortion condition. By turning the input level control downward until the LED stops flashing the

# **Symetrix**

## SE-400 Instruction Manual continued

proper setting of the input control will be reached.

### The Subsonic Filter

The subsonic filter switch which is positioned on each channel directly above the input level control has a yellow LED which lights when the filter is engaged in the circuit. The subsonic filter is actually a "high-pass" filter. This means that it cuts out low frequencies and only passes high frequencies above a certain cut-off frequency. In the SE-400 the cut-off frequency is fixed at 35 HZ, with a roll-off of 18dB per octave. This means that when the sub-sonic filter is switched in the level of a tone with frequency of 17.5 HZ is 18dB below that of a tone at 35HZ. More simply, when engaged the sub-sonic filter removes all super low tones, rumble, and low frequency vibrations. The subsonic filter switches in and out of the signal path totally independently of the parametric EQ switch.

### The Parametric EQ in/out switch

The parametric EQ in/out switch is located on each channel directly above the sub-sonic filter switch. As you may have already guessed, this switch is the master switch to engage or disengage the four parametric bands. When the switch is pressed inward a green LED lights, indicating the parametric is in the circuit.

### Input and Output Connections

The input and output connectors located on the rear panel of the SE-400 are clearly labelled for both channels. Connections should be made by using standard  $\frac{1}{4}$ " phone plugs, (tip-sleeve type).

**symatrix**

SE-400 Instruction Manual continued

Customer Service and Applications Assistance

If you have questions regarding applications or if you need assistance in learning how to use the SE-400 please consult your Symatrix dealer first. If you need additional information or if you have a defective unit, then call or write our factory directly ( sorry, we do not accept collect calls ). We pride ourselves in friendly, efficient customer service. Normal "turn-around time" is one working day. You must pre-pay freight to the factory. UPS is preferred. We pre-pay the return freight. In any case, please call first for RETURN AUTHORIZATION.

**symatrix**SE-400 Stereo Parametric EqualizerInstruction ManualGENERAL DESCRIPTION

The SE-400 is a stereo (two channel) parametric equalizer. Each channel has four independent frequency "bands". The circuitry and functions of the four bands are all similar, but not identical. This will be explained in detail below. Each band has the following controls: variable frequency, variable bandwidth, and variable amplitude. Additional controls for each channel include the Input Level control, Parametric EQ in/out switch, the Subsonic Filter in/out switch. A master Power On/Off switch is found on the right hand side of the front panel. Visual indicators on the SE-400 include a green LED (light emitting diode) associated with the Parametric EQ in/out switch, a yellow LED associated with the sub-sonic filter switch, and a red +18dBm peak level indicator.

THE FREQUENCY BANDS

As mentioned above, each channel of the SE-400 has four frequency bands. The bands are labeled individually below each group of three (vertical) knobs. The four bands are: LOW, LOW-MID, HIGH-MID, and HIGH. As previously mentioned the three controls in each band are frequency, bandwidth, and amplitude. Color coded knob caps are used on the SE-400 to simplify identification of function. All frequency control knobs are blue, bandwidth control knobs are black, and amplitude control knobs are green.

Let's begin our discussion of the knob functions with the frequency control knob. This knob allows the user to vary the frequency of equalization across a certain spectrum of the audio frequency band (usually considered to be 20 HZ to 20,000 HZ ). With this knob we are able to choose the exact frequency at which we will boost (increase) or cut (decrease) the amplitude (volume level) in the particular band we are adjusting. The frequency controls for all the

## symetriX

### SE-400 Instruction Manual continued

bands are calibrated in Hertz (HZ) which is simply another name for cycles per second. If we take the low band for example we can see that the available range of frequencies with which we can deal with varies from 16 HZ to 512 HZ. Likewise, the high band frequencies are variable from 686 HZ up to 22K HZ (22,000 cycles per second).

Let us now move on to the discussion of the lower of the three knobs on each band, the Amplitude control knob. All the amplitude control knobs, as previously mentioned are green. The amplitude controls on the SE-400 are calibrated in dB (decibels). Each amplitude control is capable of boosting or cutting signals at the chosen frequency in it's band by 16 dB. When the pointer on the color cap is pointing straight up, we are at the "zero" dB position, or in other words our band is essentially out of the circuit. When the amplitude control is turned fully clockwise we are boosting the chosen frequency in that band by 16 dB. When the control is fully counter-clockwise, we are cutting (decreasing) by 16 dB.

The third control on each frequency band is the Bandwidth control. This control uses a black color cap (if you can call black a color!). The bandwidth control is calibrated in octaves, and is variable from .16 to 3.3 (a sixth of an octave to three and one-third octaves). Remember, an octave represents a doubling in frequency of a musical note (or a halving in frequency going downward). What the bandwidth control actually does is to allow us to choose how wide a range of frequencies, centered around the frequency selected by the positioning of the blue frequency select control, that we are going to effect when we adjust the green amplitude control. To clear this all up, let's look at a practical example. Assume we have made a tape recording and somehow there is a low frequency hum on the tape which we wish to eliminate. Assuming that the tape sounds fine except for the hum then our only task is to eliminate the hum and only the hum. First we would go to the low band and turn the amplitude control to some point



## **symetrix**

### SE-400 Instruction Manual continued

to the left of center to cause a decrease of volume in that band. Next, we would turn the frequency control and "tune in" on the problem frequency. Finally, the bandwidth control would be adjusted to some point where the hum is made inaudible, but the other musical information is not affected. This setting would probably be towards the far counterclockwise setting of the control. In general (but not always) narrow bandwidth settings (counter-clockwise positionings) will produce less audible effects than wide bandwidth settings.

### The Input Level Control

The input level control for each channel of the SE-400 is found just to the right of the high band amplitude control. The color coding cap used is light grey. The control is calibrated in dB. The purpose of the input level control is twofold: 1) the control can be used to raise the level of incoming signals to the equalizer by up to 10dB if these signals are weak or lower than standard "line level"; 2) the control can also be used to decrease the signal level coming into the equalizer by up to 20dB. This should be done when one is either dealing with very large level incoming signals or when the equalizer is being used to boost one or more frequency bands by significant amounts. In this case the input level control should be decreased (turned counter-clockwise) so that neither the output stage of the SE-400 nor the input stage of the following equipment is overloaded so as to cause distortion.

### The Peak Level Indicator

An excellent feature of the SE-400 which aids the user in adjusting the input level control to the correct or optimum position is a red LED labeled +18 dBm Peak. When the output level of the SE-400 equals or exceeds +18dBm this LED will flash. +18 dBm is 3dB lower than the SE-400's clip point. Thus, the user is warned in advance of a possible distortion condition. By turning the input level control downward until the LED stops flashing the

## **symetrix**

### SE-400 Instruction Manual continued

proper setting of the input control will be reached.

#### The Subsonic Filter

The subsonic filter switch which is positioned on each channel directly above the input level control has a yellow LED which lights when the filter is engaged in the circuit. The subsonic filter is actually a "high-pass" filter. This means that it cuts out low frequencies and only passes high frequencies above a certain cut-off frequency. In the SE-400 the cut-off frequency is fixed at 35 HZ, with a roll-off of 18dB per octave. This means that when the sub-sonic filter is switched in the level of a tone with frequency of 17.5 HZ is 18dB below that of a tone at 35HZ. More simply, when engaged the sub-sonic filter removes all super low tones, rumble, and low frequency vibrations. The subsonic filter switches in and out of the signal path totally independently of the parametric EQ switch.

#### The Parametric EQ in/out switch

The parametric EQ in/out switch is located on each channel directly above the sub-sonic filter switch. As you may have already guessed, this switch is the master switch to engage or disengage the four parametric bands. When the switch is pressed inward a green LED lights, indicating the parametric is in the circuit.

#### Input and Output Connections

The input and output connectors located on the rear panel of the SE-400 are clearly labelled for both channels. Connections should be made by using standard  $\frac{1}{4}$ " phone plugs, (tip-sleeve type).

**symetrix**

SE-400 Instruction Manual continued

Customer Service and Applications Assistance

If you have questions regarding applications or if you need assistance in learning how to use the SE-400 please consult your Symetrix dealer first. If you need additional information or if you have a defective unit, then call or write our factory directly ( sorry, we do not accept collect calls ). We pride ourselves in friendly, efficient customer service. Normal "turn-around time" is one working day. You must pre-pay freight to the factory. UPS is preferred. We pre-pay the return freight. In any case, please call first for RETURN AUTHORIZATION.

# SE-400

## Stereo Parametric Equalizer

Data Sheet

The Symetrix SE-400 Stereo Parametric Equalizer is a professional signal processing tool which offers the user state of the art sonic performance from a device which has been painstakingly designed and constructed with the professional in mind. The same attention to quality, uncompromising performance, and workingman's

economy which typifies the entire line of Symetrix signal processing devices has been built into the SE-400.

The SE-400 overcomes the lack of flexibility inherent in graphic equalizers (octave and third octave). With the SE-400's parametric controls it is

the user that determines the exact parameters of equalizer operation, not the manufacturer. You select the exact frequency centers and bandwidths for your own application.

### Features

Each channel of the SE-400 has four overlapping frequency bands: low, low-mid, high-mid, high (see reverse side for exact specifications).

The controls per band include: frequency (sweepable over a 3½ octave range), bandwidth (variable from a twentieth of an octave to over 3 octaves), and amplitude (+/- 16dB).

A master in/out switch with a green LED status indicator switches the equalizer in or out of the circuit.

In addition to four band fully parametric equalization the SE-400 features an independently switchable sub-sonic filter. This filter is especially useful for correcting the results of unsatisfactory acoustical conditions either in the studio or on stage. The sub-sonic filter has a sharp 18dB/octave slope with roll-off beginning at 35 Hz. Acoustical or mechanical "rumble" or proximity effects

caused by super close micing techniques are just some of the problems easily corrected with the SE-400's sub-sonic filter. A yellow LED indicates "in circuit" status of the sub-sonic filter.

Each channel of the SE-400 also incorporates an input level control which is variable over a 30dB range. Up to 10dB of gain or 20dB of attenuation is available for matching incoming signal levels to the SE-400's input. Proper setting of the input level controls is simplified by the SE-400's peak level LEDs which flash at an equalizer output level of +18dBm (approximately 2 or 3 dB below the equalizer's clip point) letting the user know of a potential overload condition.

The SE-400 is packaged in a rugged painted steel chassis with black anodized aluminum front panel. Knob caps are color coded for easy identification of function. The chassis is standard 19" rack mounted width but occupies only 3½" of vertical rack space.

The SE-400 is normally supplied with unbalanced inputs and outputs using standard ¼" phone jax. For those applications requiring balanced line operation the model SE-400B may be ordered. The SE-400B utilizes transformerless electronically balanced inputs and outputs which give transparent, distortionless performance along with the hum and noise rejection advantages of balanced operation. 3-pin, XLR-type connectors are used on the SE-400B.

For more information or a demonstration, connect with your local Symetrix dealer.



# Symetrix

4211 24th Avenue West  
Seattle, Washington, 98199, USA  
Telephone (206) 282-2555  
Telex 703282 SYMETRIX UD

# SE-400

## Stereo Parametric Equalizer

Data Sheet

The Symetrix SE-400 Stereo Parametric Equalizer is a professional signal processing tool which offers the user state of the art sonic performance from a device which has been painstakingly designed and constructed with the professional in mind. The same attention to quality, uncompromising performance, and workingman's

economy which typifies the entire line of Symetrix signal processing devices has been built into the SE-400.

The SE-400 overcomes the lack of flexibility inherent in graphic equalizers (octave and third octave). With the SE-400's parametric controls it is

the *user* that determines the exact parameters of equalizer operation, *not* the manufacturer. *You* select the exact frequency centers and bandwidths for your own application.

### Features

Each channel of the SE-400 has four overlapping frequency bands: low, low-mid, high-mid, high (see reverse side for exact specifications).

The controls per band include: frequency (sweepable over a 3½ octave range), bandwidth (variable from a twentieth of an octave to over 3 octaves), and amplitude (+/-16dB).

A master in/out switch with a green LED status indicator switches the equalizer in or out of the circuit.

In addition to four band fully parametric equalization the SE-400 features an independently switchable sub-sonic filter. This filter is especially useful for correcting the results of unsatisfactory acoustical conditions either in the studio or on stage. The sub-sonic filter has a sharp 18dB/octave slope with roll-off beginning at 35 Hz. Acoustical or mechanical "rumble" or proximity effects

caused by super close micing techniques are just some of the problems easily corrected with the SE-400's sub-sonic filter. A yellow LED indicates "in circuit" status of the sub-sonic filter.

Each channel of the SE-400 also incorporates an input level control which is variable over a 30dB range. Up to 10dB of gain or 20dB of attenuation is available for matching incoming signal levels to the SE-400's input. Proper setting of the input level controls is simplified by the SE-400's peak level LEDs which flash at an equalizer output level of +18dBm (approximately 2 or 3 dB below the equalizer's clip point) letting the user know of a potential overload condition.

The SE-400 is packaged in a rugged painted steel chassis with black anodized aluminum front panel. Knob caps are color coded for easy identification of function. The chassis is standard 19" rack mounted width but occupies only 3½" of vertical rack space.

The SE-400 is normally supplied with unbalanced inputs and outputs using standard ¼" phone jax. For those applications requiring balanced line operation the model SE-400B may be ordered. The SE-400B utilizes transformerless electronically balanced inputs and outputs which give transparent, distortionless performance along with the hum and noise rejection advantages of balanced operation. 3-pin, XLR-type connectors are used on the SE-400B.

For more information or a demonstration, connect with your local Symetrix dealer, or call or write: Symetrix, 109 Bell Street, Seattle, WA 98121 U.S.A. (206) 624-5012.



# Symetrix

109 Bell Street  
Seattle, Washington 98121, USA  
Telephone (206) 624-5012

Professional Audio Products

# SE-400

## Stereo Parametric Equalizer

Data Sheet

The Symetrix SE-400 Stereo Parametric Equalizer is a professional signal processing tool which offers the user state of the art sonic performance from a device which has been painstakingly designed and constructed with the professional in mind. The same attention to quality, uncompromising performance, and workingman's

economy which typifies the entire line of Symetrix signal processing devices has been built into the SE-400.

The SE-400 overcomes the lack of flexibility inherent in graphic equalizers (octave *and* third octave). With the SE-400's parametric controls it is

the user that determines the exact parameters of equalizer operation, *not* the manufacturer. *You* select the exact frequency centers and bandwidths for your own application.

### Features

Each channel of the SE-400 has four overlapping frequency bands: low, low-mid, high-mid, high (see reverse side for exact specifications).

The controls per band include: frequency (sweepable over a 3½ octave range), bandwidth (variable from a twentieth of an octave to over 3 octaves), and amplitude (+/-16dB).

A master in/out switch with a green LED status indicator switches the equalizer in or out of the circuit.

In addition to four band fully parametric equalization the SE-400 features an independently switchable sub-sonic filter. This filter is especially useful for correcting the results of unsatisfactory acoustical conditions either in the studio or on stage. The sub-sonic filter has a sharp 18dB/octave slope with roll-off beginning at 35 Hz. Acoustical or mechanical "rumble" or proximity effects

caused by super close micing techniques are just some of the problems easily corrected with the SE-400's sub-sonic filter. A yellow LED indicates "in circuit" status of the sub-sonic filter.

Each channel of the SE-400 also incorporates an input level control which is variable over a 30dB range. Up to 10dB of gain or 20dB of attenuation is available for matching incoming signal levels to the SE-400's input. Proper setting of the input level controls is simplified by the SE-400's peak level LEDs' which flash at an equalizer output level of +18dBm (approximately 2 or 3 dB below the equalizer's clip point) letting the user know of a potential overload condition.

The SE-400 is packaged in a rugged painted steel chassis with black anodized aluminum front panel. Knob caps are color coded for easy identification of function. The chassis is standard 19" rack mounted width but occupies only 3½" of vertical rack space.

The SE-400 is normally supplied with unbalanced inputs and outputs using standard ¼" phone jax. For those applications requiring balanced line operation the model SE-400B may be ordered. The SE-400B utilizes transformerless electronically balanced inputs and outputs which give transparent, distortionless performance along with the hum and noise rejection advantages of balanced operation. 3-pin, XLR-type connectors are used on the SE-400B.

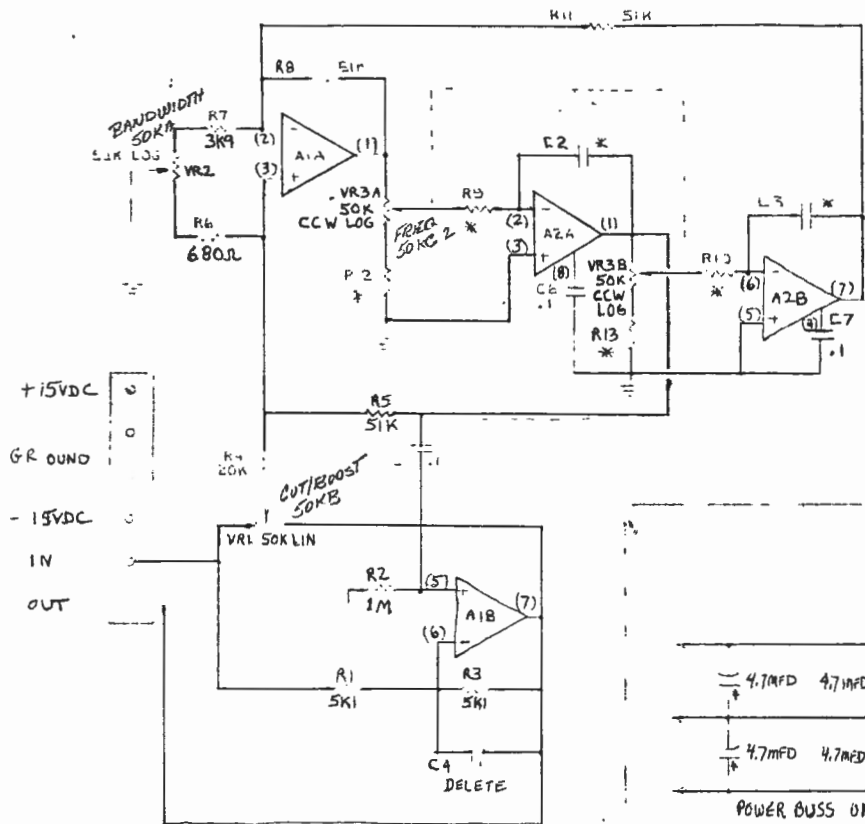
For more information or a demonstration, connect with your local Symetrix dealer, or call or write: Symetrix, 109 Bell Street, Seattle, WA 98121 U.S.A. (206) 624-5012.



# Symetrix

109 Bell Street  
Seattle, Washington 98121, USA  
Telephone (206) 624-5012

Professional Audio Products

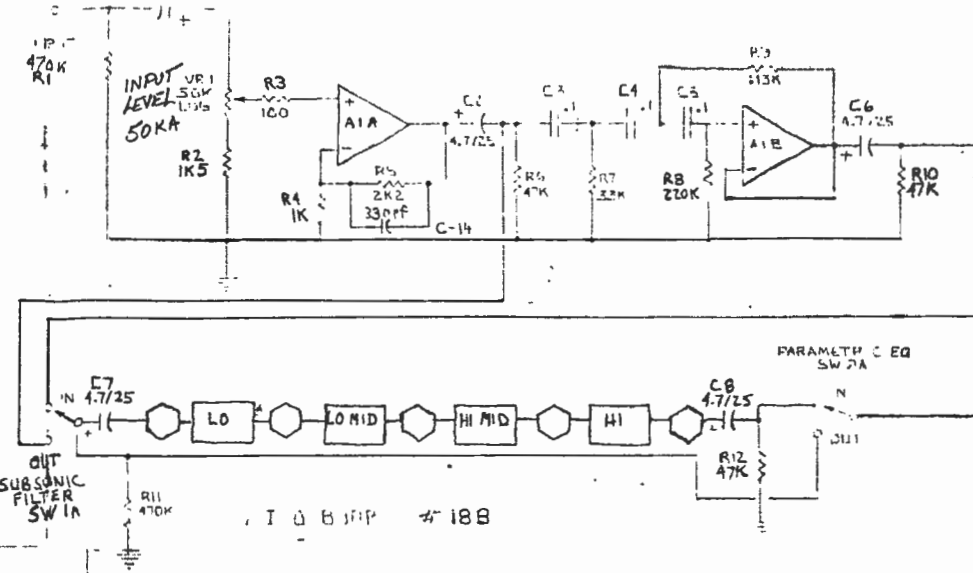


+15VDC  
GROUND  
-15VDC  
IN  
OUT

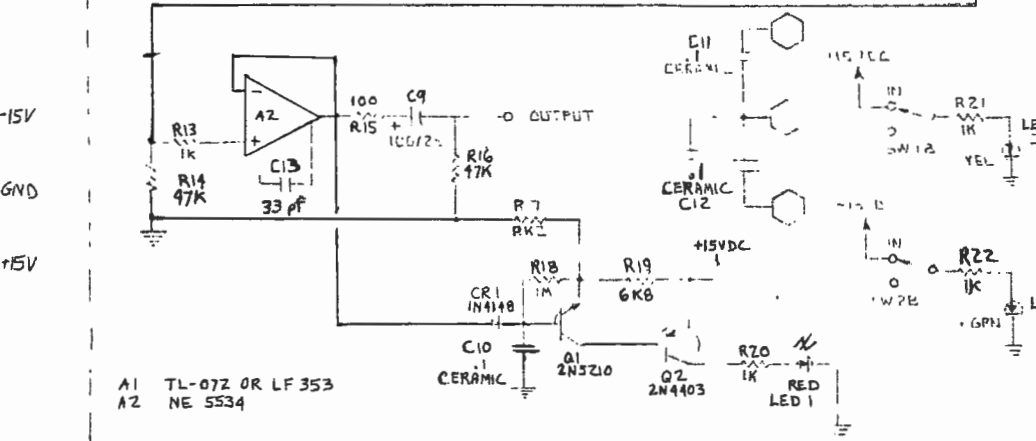
BAND	C1, C2	R1, R2	R3, R4
LO	.1	3K	2K4
LO-MID	.022	3K9	2K2
HI-MID	.007	5K6	1K8
HI	.0022	3K3	2K4

A1, A2 TL072 OR LF353

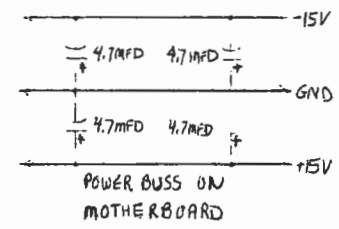
BANDPASS MODULE BOARD #178



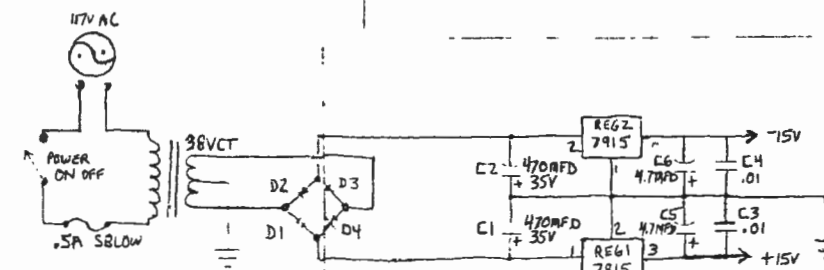
POWER SUPPLY MODULE BOARD #15A



A1 TL-072 OR LF353  
A2 NE 5534



POWER BUSS ON MOTHERBOARD



SCALE: 1:1  
DATE: 1/22/70  
SE-400  
DRAWING NUMBER: 178503

# **symetrix**

PROFESSIONAL AUDIO PRODUCTS

## **SE-400**

### **Specifications**

Input impedance:	47K ohms, unbalanced (SE-400) 10K ohms, balanced bridging (SE-400B)
Output impedance:	100 ohms, unbalanced (SE-400) 400 ohms, balanced (SE-400B)
Maximum input level:	+20 dBm
Maximum output level:	+20 dBm (into 10K ohms) +18.5 dBm (into 600 ohms)
Total Harmonic Distortion:	(measured with all equalizer controls centered, EQ and Sub-sonic switches "in", 0 dBv signal levels)
400 Hz to 50K Hz passband:	.007% THD
Broadband:	.012% THD
Crosstalk, either channel driven at +10 dBv into 600 ohms:	-86 dBv
Hum and Noise:	(measured with input terminated in 600 ohms, 20K Hz test bandwidth, EQ and Sub-sonic switches "in", all controls centered): -86 dBv (Measured with EQ and Sub-sonic switches "out":) -95 dBv
Sub-sonic Filter:	Maximally flat frequency response, 3 dB down at 35 Hz, 18dB/Octave roll-off
Amplitude control:	± 16 dB, all bands
Bandwidth control:	.16 octave to 3.3 octaves, all bands
Frequency control:	16 Hz to 512 Hz, low band 56 Hz to 1.8K Hz, low-mid band 196 Hz to 6.3K Hz, high-mid band 686 Hz to 22K Hz, high band
Size:	Standard 19" rack mount, 3.5" high, 7.9" deep (48.25 x 8.9 x 20.1 cm)
Shipping weight:	12 lbs (5.4 kg)
Power requirements:	117 VAC ± 10% mains fused, internally current limited (other voltages available upon request)

Prices and specifications of Symetrix products are subject to change without notice.