

Model ASC

4 BAND PARAMETRIC EQUALIZER

Reference Manual



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electronics**

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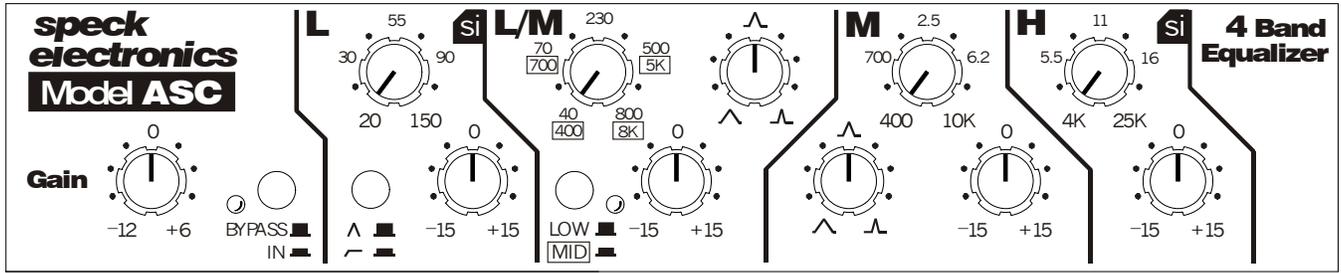


Figure 1a. Front Panel Layout

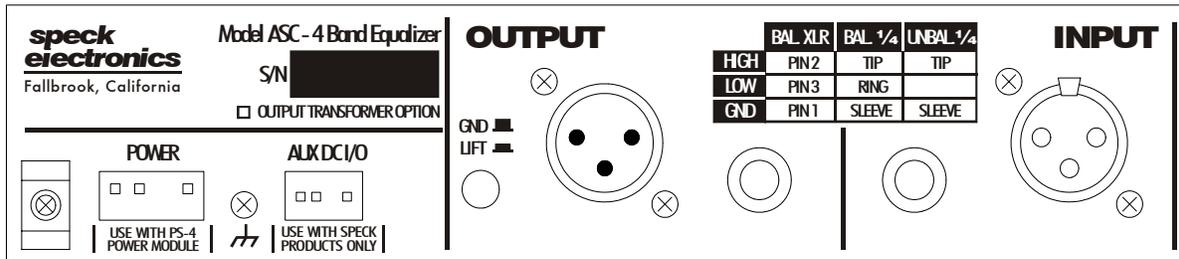


Figure 1b. Rear Panel Layout

Introduction

General

Thank you for purchasing our Model ASC Equalizer. The Model ASC has operational features that are easy to understand and you should be up and running in no time. If you are unfamiliar with audio equipment or audio signal flow, it is recommended that you read this manual. If you have any questions regarding the Model ASC or any Speck product, do not hesitate to contact Speck Electronics. Our phone number is +760-723-4281.

The Model ASC is a four band parametric equalizer that is housed in a 1/2 rack space chassis. It is well suited in audio applications from professional recording, sound contracting, touring, or any application where equalization is required.

The Model ASC is available in four models:

<u>ASC-NA</u>	The standard Model ASC (North American Power supply)
<u>ASC-EU</u>	The standard Model ASC (European Power supply)
<u>ASC-T-NA</u>	The Model ASC with output transformer option (North American Power supply)
<u>ASC-T-EU</u>	The Model ASC with output transformer option (European Power supply)

One of the unique features of the Model ASC is that it integrates two types of filter circuit design. The Low and High bands use a simulated inductor (SI) circuit design, and the Low/Mid and Mid bands are of a state-variable filter design.

The Model ASC is divided into 4 bands that cover a total frequency range of 20Hz to 25kHz:

- L - The Low frequency band (Simulated inductor)
- L/M - a selectable Low or Mid frequency band (State variable filter)
- M - the Mid frequency band (State variable filter)
- H - the High frequency band (Simulated inductor)

The Model ASC with its balanced input and output will accept a wide variety of signal levels and has been designed with a generous amount of headroom.

The Model ASC is shipped with an external 16 VAC, 1.1 amp power

Standard Accessories

Model PS-4 power module

module. The power module has a 6' two conductor cable and is fitted with a special 4 pin Molex connector for mating to the "Power" input on the rear of the ASC. All AC rectification, filtering, and DC regulation is performed within the chassis of the Model ASC.

The PS-4 power module is available in 2 versions; a North American version and European version. The North American version is designed to operate with 120 VAC power and the European version is designed to operate with 220, 230 or 240 VAC power.

Hardware

(4) rubber bumpers are supplied when used for table top mounting, (2) 6-32 x 1/2" machine screws are supplied to mount the ASC to an optional rack shelf, and a nylon wire to secure the power supply cable to the nylon holder adjacent to the power supply connector.

Operator Safety Summary

Power source

The external power module is intended to operate from an AC power source that does not apply more than 120 Volts RMS (North American Version) or 240 Volts RMS (European Version) between the supply conductors.

Grounding the product

To avoid electrical shock, plug the power module into a properly wired receptacle before making any audio connection to the ASC. A protective ground connection, by way of the ground terminal on the rear panel of the ASC, is essential for safe operation.

Use the proper power module

Use only the PS-4 power module, cable, and connector that is supplied with your Model ASC. Using any other power module or power supply will most definitely damage the Model ASC.

IMPORTANT!

USE ONLY THE POWER MODULE THAT IS SPECIFIED FOR YOUR PRODUCT.
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Do not remove covers or panels

To avoid personal injury, do not remove the top cover of the Model ASC. Never operate the Model ASC or power module without the cover panel properly installed. If it becomes necessary to remove the cover panel of the Model ASC for service, always unplug the AC power and disconnect the power cable before proceeding.

The power module is a "Class 2 transformer" device and can only be used indoors. The ASC and power module should never be exposed to rain or moisture.

Specifications

	<u>Normal</u>	<u>Maximum</u>
Input Level	+4 dBu	+24dbu
Output Level: (Active Balanced) (Transformer Balanced)	+4 dBu +4 dBu	+28dbu +24dBu
Input Impedance		20K Ohms
Output Impedance (Active Balanced) (Transformer Balanced)		120 Ohms 600 Ohms
Output Distortion(THD+n) 22Hz to 22KHz @ +24dBu		.0014%
Frequency Response	<p><i>Test Conditions:</i> AP balanced +4dBu signal connected to input. Gain control set to "0" position. All Boost/Cut controls set to "0" Bypass switch set "In" All other controls and switches "Don't care" AP analyzer connected at output</p>	
Measured at active balanced output	5Hz(-0.5dB) to 103kHz(-0.5dB) 2Hz(-3dB) to 154kHz(-3dB)	
Measured at transformer output	10Hz(-0.5dB) to 110kHz(-0.5dB) 10Hz(-3dB) to 154kHz(-3dB)	
Residual Noise Measurement	<p><i>Test Conditions:</i> AP balanced signal connected to input. AP Generator set "Off" Gain control set to "0" position. All Boost/Cut controls set to "0" Bypass switch set "In" All other controls and switches "Don't care" AP analyzer connected at output</p>	
Residual Noise Measurement (22Hz-22kHz) (10Hz-80kHz)		-93 dBu -87 dBu
Power requirements (Power Module)		16 VAC, 1.1 Amp
Dimensions	HxWxD = 1.75" x 8.5" x 7.25" (45mm x 216mm x 190mm)	
Shipping weight		Approximately 5 lbs (2.27Kg)

Installation

General The following information should give you the basics on how to install the Model ASC and PS-4 power module. The proper installation of the Model ASC as part of a larger system requires a clear understanding of audio wiring, AC distribution, grounding, and shielding techniques.

When the Model ASC is being installed into a larger system it may be necessary to retain the services of someone experienced in these matters.

Unpacking and Inspection The Model ASC is delivered in a special, protective container and was carefully inspected both mechanically and electrically before shipment. It should be physically free of marks and scratches and in perfect electrical order upon receipt. To confirm this, the product should be inspected for physical damage that may have occurred in transit. Any damage should be reported to your delivery company as soon as possible.

Environmental Considerations The Model ASC will operate satisfactorily over a wide range of ambient temperatures. The Model ASC will operate from 10 to 50 degrees C and the external power module will operate from 0 to 30 degrees C. If installed in an equipment rack that also contains heat producing equipment, adequate ventilation should be provided. This will prolong component life and maximize operational stability.

While the internal circuitry of the ASC is fully shielded by the steel chassis, installation should nevertheless be planned to avoid locating it or any low level audio equipment immediately adjacent to power amplifiers, power supplies, or any source of low frequency electromagnetic emissions.

Electrical Grounding Safety To protect operating personnel, the National Electrical Manufacturers Association (NEMA) recommends that the instrument panel and rack cabinet be grounded.

Merely affixing the Model ASC into an equipment rack is no guarantee that the product is making a reliable ground connection. The mounting rails in the equipment rack should never be depended upon for a ground connection.

Upon loss of the protective ground connection, all accessible conductive parts, including knobs and controls that may appear to be insulating, can render an electric shock.

Because the power module uses a 2 bladed AC plug, audio signal grounds and DC common at the Model ASC are isolated from the AC safety earth. The chassis of the ASC can be connected to earth by way of the chassis ground terminal on the rear panel.

Mechanical Installation

The location of the Model ASC should be such that the operator has a clear, unobstructed view of the front panel from his/her normal operating position. The unit should also be within easy reach of the operators normal position in order to facilitate the use of the front panel controls

The 1/2 rack form factor of the ASC allows a single unit to be mounted on a table top with the (4) rubber bumpers supplied with the unit, multiple units stacked, or two units mounted side-by-side on a 1U rack shelf manufactured by Middle Atlantic Products (Model UTR1).

When attaching the ASC to the rack shelf, it should be secured with the (2) 6-32 x 1/2" machine screws supplied with the unit. Do not use screws that are longer than 1/2" in length as they could damage the internal circuit board. When the ASC or multiple ASC's are mounted to the rack shelf, they may be installed into any 19" wide equipment rack that uses standard E.I.A. universal spacing.

Connecting the power module

In order to provide power to the Model ASC, it is necessary to connect the 4 pin rectangular plug of the power module to the rear panel. Before connecting the 4 pin rectangular plug to the ASC, make certain the power module is not connected to an AC receptacle.

To connect the power supply, fit the rectangular white Molex plug from the power supply cable into the rectangular shaped opening on the rear panel that is labeled "Power" (not "Aux DC I/O"). The respective connectors are keyed so the plug and its receptacle can fit in only one direction. Push the plug into the header until it stops.

After the power module plug has been connected, place the power supply cable over the nylon wire tie holder to the left of the hole and secure with the wire tie that has been included.

Power Module Mounting location

One of the primary reasons that the PS-4 power module is external is to insure that its power transformer maintains a safe distance from the active electronics of the Model ASC. It is recommended that the power module be located at a reasonable distance from the ASC, mixers, and audio cables.

The power module normally generates a small amount of heat during operation. It is important that adequate ventilation is provided when planning the mounting location.

The external power module does not provide an AC power switch. It is recommended the power module be plugged into an AC power strip that uses a power switch.

Fuse replacement The PS-4 power module has an internal “one shot” thermal fuse. Fuse replacement is not possible with this module.

If it has been determined that the power module has failed, contact Speck Electronics for a factory replacement at +760-723-4281.

Physical Placement of Adjacent Equipment

Any device that emits a high EMI (Electro Magnetic Interference) or RFI (Radio Frequency Interference) energy field should be treated with suspicion. EMI is considered any unwanted signal which adversely affects the operation of the Model ASC or the audio system. This subject is discussed in Chapter 4.

Electronic equipment such as power amplifiers, power supplies (including the PS-4 wall mount type), video monitors, computers, certain synths and samplers must be located away from the Model ASC and its associated audio cables. It may be necessary to alter the positions of certain equipment that you feel would cause buzzes or hums in the audio system.

Default Control Settings

Before any attempt is made to operate the Model ASC, it would be a good idea to set all the controls to their neutral positions. This gives you a reference point to work from when adjusting controls and switches. All “Frequency Sweep” controls should be set to their full counter-clockwise setting. All “Boost/Cut” controls should be set to their “0” center detented position. The “bypass” switch should be set to the “In” position, the “Low/Mid” and “Peak/Shelf” switches set out, and the “Gain” control set to its “0” center detent position.

When any future reference is made to the controls or switches of the ASC, it will be assumed that they have been set to their neutral positions.

Cleaning

The front and rear panels are a high quality painted surface and the panel lettering is applied using a silkscreen printing technique.

To clean the front or rear panel, wipe the surface gently using a soft lint-free cloth to avoid scratching the panel or markings. Paper towels are not recommended. Commercially available window cleaner solutions may be used; however, the solution should be applied to the cloth and not the panel to avoid the seepage of liquid to the inside of the enclosure.

Repacking For Shipment

The following information is provided as a general guide for repackaging your Model ASC for shipment. If you have any questions, contact Speck Electronics at +760-723-4281.

If the product is to be shipped to Speck Electronics for service or repair, attach a tag to the product identifying the owner and indicating the service or repair to be accomplished. Include the model number and serial number of the product. Place the product in the original container if available. If the original container is not available, a suitable one can be purchased from Speck Electronics.

If the original container is not used, wrap the product in heavy plastic before placing in an inner container. Use plenty of packing material around all sides of the product and protect panel faces with cardboard strips. Mark shipping container with "Delicate Instrument" or "Fragile", and insure the shipment for the proper amount.

Note: Speck Electronics cannot be responsible for equipment that arrives damaged or uninsured.

Interfacing to the Model ASC

The ASC is a very flexible product and there are many places it may be interfaced - too many to enumerate in the manual. Virtually any line level signal may be connected to the inputs and outputs of the Model ASC; Synths and samplers, mixing consoles (patch points, line inputs/ outputs effects sends/returns), multitrack DAT recorders, hard disk recorders, analog tape recorders, cassette recorders, CD players, and external mike preamps.

A basic rule to follow is that inputs always connect to outputs, and outputs always connect to inputs. This rule applies regardless of the type or brand of product that is interfaced to the ASC. Each manufacturer may have their own recommendation for interfacing to external equipment.

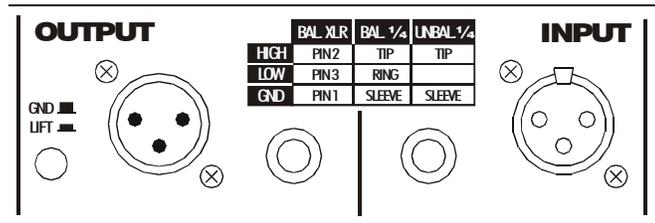


Figure 2. Input & Output Connectors

The Input The input of the ASC has a balanced 1/4" jack and a balanced XLR connector (Figure 2). These inputs are internally wired in parallel and there is no operational difference between one or the other. The two inputs can not be used simultaneously. The 1/4" input jack will accept a 1/4" TRS plug for balanced operation, or a 1/4" mono plug for unbalanced operation.

The Output The output of the ASC has a balanced 1/4" jack and a balanced XLR connector (Figure 2). These inputs are internally wired in parallel and there is no operational difference between one or the other except on the Model ASC-T (see below).

A legend is provided on the rear panel to be used as a guide for the proper configuration of input and output connectors.

Transformer Option (for Model ASC-T only) The ASC with the optional output transformer gives you two choices of balanced outputs; electronic active balanced at the 1/4" TRS jack or transformer balanced at the XLR connector. On the Model ASC-T, the transformer is wired only to the XL connector and the balanced active output is wired only to the to the 1/4" TRS jack.

To prevent the transformer from loading the electronic active output circuit, the XL output is automatically disabled when the 1/4" TRS output jack is used on the ASC-T version.

Connecting the Model ASC to inserts

When connecting to an audio mixer, you may choose to connect the ASC to the insert points of the input channel. A mixer's insert point (access point) exist exclusively for the access of devices such as the Model ASC, limiters, compressors, gates, etc. These aforementioned devices are regarded as "processing" equipment and are normally connected (inserted) into a single channel. Processing equipment differs from "effects" devices in that effects such as reverb and delay are connected into the send/return jacks and may be accessed from all channels via the effects (aux) send controls and blended to the main groups with the effects (aux) returns controls.

Some larger recording consoles that lack a patchbay may use two jacks for the channel's insert points; one jack for insert output, and another for the insert input. Although, many mixers have a stereo (TRS) jack for the insert points. For these mixers it will be necessary to utilize a special "Y" cable with a stereo plug at one end and two mono plugs at the other ends. (See figure 3)

When patch points are not available, such is the case with many smaller mixers, the source signal (recorder or sampler) may be connected directly to the inputs of the Model ASC. The outputs of the Model ASC would then be connected to the line inputs of the mixer.

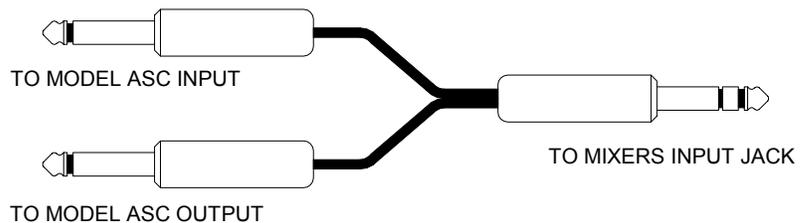


Figure 3a. "Y" Cable

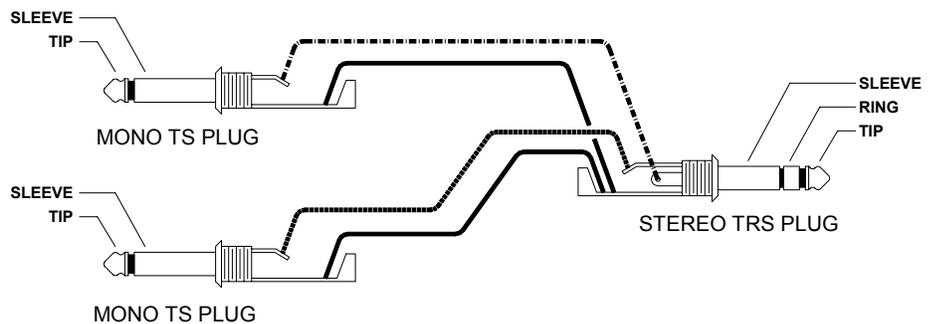


Figure 3b. "Y" Cable Schematic

Operation

General We hope to give you basic information on the operation of the Model ASC and adequately describe its controls, switches, and connectors.

The information in this manual is intended to help with the technical process when using your Model ASC. Words alone could not adequately describe how to adjust the controls on the Model ASC. Your ears should be your best gauge of how to adjust the equalizer controls to make the sound fit your requirements.

Basic Theory of Equalizers

A parametric equalizer falls into the generic category called a “filter”. A filter is an electronics circuit that allows signals of certain frequencies to be transmitted through a system, while preventing the transmission of other frequency ranges.

There are 3 basic types of passive or active filters; low-pass, high-pass and bandpass.

Low-pass filter A low-pass filter is a circuit that passes all low frequency signals and rejects high frequency signals. The crossover point that low frequencies pass through can be either fixed at a specific point or variable.

High-pass filter A high-pass filter is a circuit that passes all high frequency signals and rejects low frequency signals. The crossover point that high frequencies pass through can be either fixed at a specific point or variable.

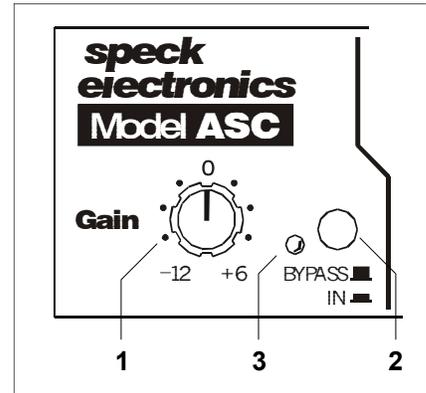
Bandpass filter A bandpass filter is a circuit that will pass only a fixed frequency band and reject signals above and below the selected band.

A parametric equalizer is a very elaborate bandpass filter that offers the ability to control the filter's basic parameters - hence the term "Parametric Equalizer". These controllable parameters are the bandpass center frequency, the amplitude of the bandpass frequency, and the width of the bandpass frequency. These previously mentioned parameters as found on audio parametric equalizers are commonly known as the sweep control, boost/cut control, and bandwidth (Q) adjust respectively.

The Model ASC utilizes all the previously mentioned parametric controls.

FRONT PANEL CONTROLS

- 1. Gain Control** This control is used to adjust the input sensitivity between -12dB and +6dB relative to the level that is present at the input connector. The center detented position is “0” unity gain. Under normal operation with a balanced input and balanced output, this control can be set to the “0” position. In cases when the ASC is interfaced to an unbalanced device, a 6dB loss may occur. The gain control can be set to +6dB to compensate for this loss of signal.



- 2. Equalizer bypass switch** This switch is used to enable or disable the equalization circuit. In the “out” position all equalizer bands are bypassed. When in the bypass position, the active balanced input stage, the gain control, the active balanced output stage, and the optional transformer remains operational. This allows the levels to match when comparing the equalized signal to the unequalized signal, even when the gain control has been set higher or lower than 0 db.

When this switch is depressed, the equalizer is enabled.

- 3. Power/Bypass LED** This dual colored LED will illuminate red indicating that the ASC is powered and active. It also indicates that the equalizer is in the “bypass” mode. When the switch is depressed, this LED will change from red to green indicating that the equalizer is enabled.

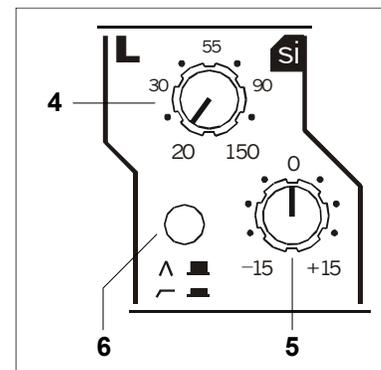
L (LOW) BAND

- 4. Low frequency sweep** The low frequency sweep control is used in conjunction with the low boost/cut control and provides continuous adjustment of the center frequency from 20Hz (fully counterclockwise) to 150Hz (fully clockwise).

Bandwidth (Q)

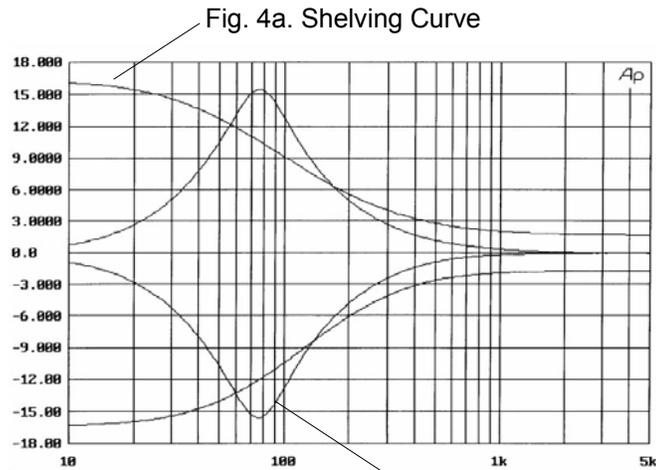
The bandwidth for the selected frequency of the low band is automatically adjusted with the selection of the frequency sweep control. The 20Hz setting on the sweep control will result in a narrow bandwidth of approximately .25 octave ($Q=4$).

As the frequency sweep control is adjusted to its highest setting (150Hz), the bandwidth widens to approximately 1.6 octaves ($Q=.6$).



5. Low boost/cut The boost/cut control provides a reciprocal volume adjustment of the selected frequency control. This means that whatever frequency is "boosted" with the boost/cut adjusted from its center position clockwise, an identical but opposite result is achieved when that same frequency selection is "cut" from its center position counterclockwise. Once the desired frequency has been selected with the low frequency sweep control, that frequency may be continuously accentuated or attenuated (boost or cut) from 0 to +15dB or -15dB. 0dB (flat) is obtained when this control is set to its center detented position.

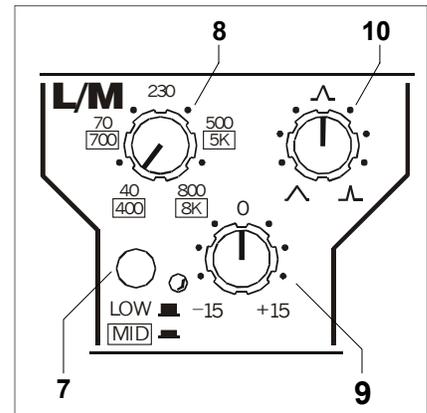
6. Peak/Shelf Switch This switch changes the low frequency band from a peak/dip curve (as shown in Figure 4a) to shelving curve (as shown in Figure 4b).



L/M (Low/Mid) BAND

7. Low/Mid select switch This switch selects the frequency range of the Low/Mid band. In the "out" position, the low range of 40Hz-800Hz is selected. When depressed, this switch selects the mid band of 400Hz-8kHz.

A yellow LED to the right of this switch illuminates indicating that the mid band has been selected.



- 8. Low/Mid frequency sweep** The low/mid frequency sweep control is used in conjunction with its respective boost/cut control and provides continuous adjustment of the center frequency from 40Hz (fully counterclockwise) to 800Hz (fully clockwise) for the low range selection or 400Hz (fully counterclockwise) to 8kHz (fully clockwise) for the mid range selection.
- 9. Low/Mid Boost and cut** This control provides 15dB of bell shaped boost or cut for the low/mid band frequency range, and is used in conjunction with the low/mid frequency sweep adjust. 0dB (flat) is obtained when this control is set to its center detented position.
- 10. Low/Mid bandwidth adjust** For the low/mid band, a continuously adjustable bandwidth control is provided. This control sets the width of the frequency that has been selected on the Low/Mid sweep control. When set fully CCW, the bandwidth is a wide 2 octaves ($Q=.5$). When set fully CW, the bandwidth narrows to .25 octave ($Q=3.8$). The center position is approximately .6 octaves ($Q=1.6$).

In addition to the ability to contour low band audio, the low frequency controls may be used to reduce or eliminate low frequency hum or buzz. Low hum is typically 60Hz, whereas buzz is typically 120Hz and 240Hz. If there is a hum or buzz on an audio track, the low sweep control and associated boost/cut control can be used to remove this.

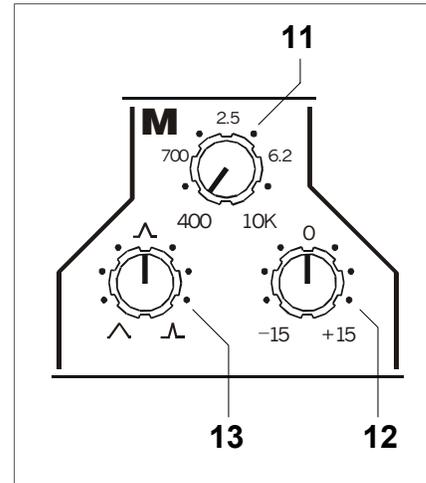
To reduce 60Hz hum, start by setting the bandwidth control to its fully (CW) position, the low frequency sweep control to its fully counterclockwise (CCW) position; this is about 40Hz. Turn the Boost/Cut control fully CCW. Return to the frequency sweep control, and turn clockwise a little until the 60Hz hum has been reduced. This setting is the 60Hz point. Now go back to the Boost/Cut control and adjust as necessary.

In some extreme cases, it may be necessary to use the Low band and the Low/Mid band of equalization in order to remove the undesirable affects of 60Hz or 120Hz hum.

M (Mid) BAND

11. Mid frequency sweep The mid frequency sweep control is used in conjunction with the mid boost/cut control and provides continuous adjustment of the center frequency from 400Hz (fully counterclockwise) to 10KHz (fully clockwise).

12. Mid boost/cut This control provides 15dB of bell shaped boost or cut for the mid band (400Hz to 10kHz) frequency range, and is used in conjunction with the high frequency sweep adjust. 0dB (flat) is obtained when this control is set to its center detented position.



13. Mid bandwidth adjust

For the mid band, a continuously adjustable bandwidth control is provided. This control sets the width of the frequency that has been selected on the Mid sweep control. When set fully CCW, the bandwidth is a wide 2 octaves ($Q=.5$). When set fully CW, the bandwidth narrows to .25 octave ($Q=3.8$). The center position is approximately .6 octaves ($Q=1.6$).

H (High) BAND

14. High frequency sweep

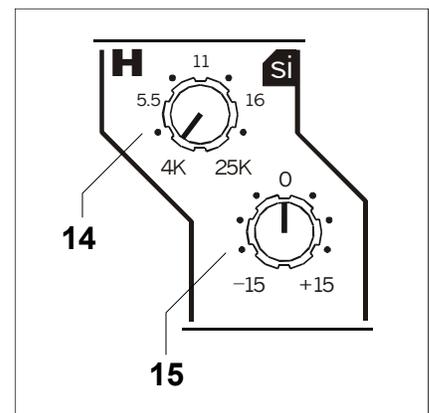
The high frequency sweep control is used in conjunction with the high boost/cut control and provides continuous adjustment of the center frequency from 4kHz (fully counterclockwise) to 25kHz (fully clockwise).

Bandwidth (Q)

The bandwidth for the selected frequency of the high band is automatically adjusted with the selection of the frequency sweep control. The 4kHz setting on the sweep control will result in a narrow bandwidth of

approximately .5 octave ($Q=1.8$). As the frequency sweep control is adjusted to its highest setting (25kHz), the bandwidth widens to approximately 1.8 octaves ($Q=.6$).

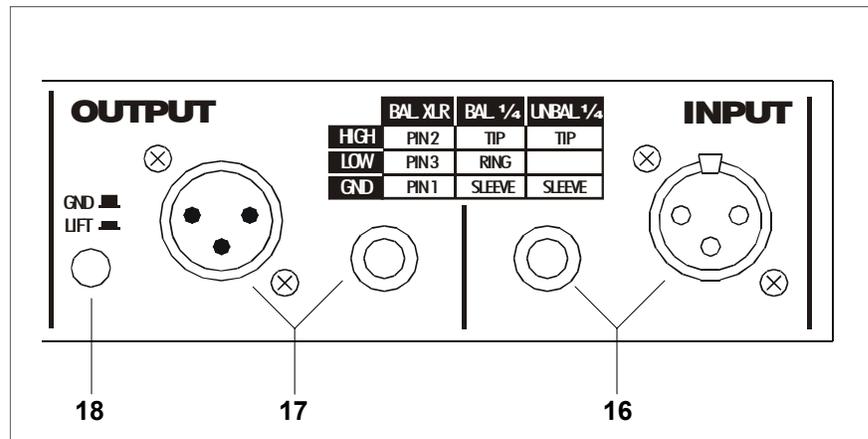
This control provides 15dB of bell shaped boost or cut for the high



15. High boost/cut frequency range (4kHz to 25kHz), and is used in conjunction with the high frequency sweep adjust. 0dB (flat) is obtained when this control is set to its center detented position.

In addition to the ability to contour high band audio, the high band controls can reduce hiss that is present on low frequency information. If there is high frequency hiss or digital noise on a kick drum or bass track, the high sweep control may be set to its higher clockwise setting (16kHz-25kHz) and its associated boost/cut control "cut" a few dB's. As long as you don't dramatically change the sound of the low frequency audio, this could remove a little noise. Every little bit improves the overall quality of your sound.

REAR PANEL



16. Input Connectors Two types of input connectors are available on the ASC; a standard 1/4" TRS balanced jack and a female XLR connector. These inputs are internally wired in parallel and identical in every aspect except for the connector.

The 1/4" jack will accept a balanced TRS plug or a mono TS unbalanced plug. For unbalanced operation a standard mono plug should be used. A legend on the rear panel can be used as a guide for the proper configuration of input and output connectors.

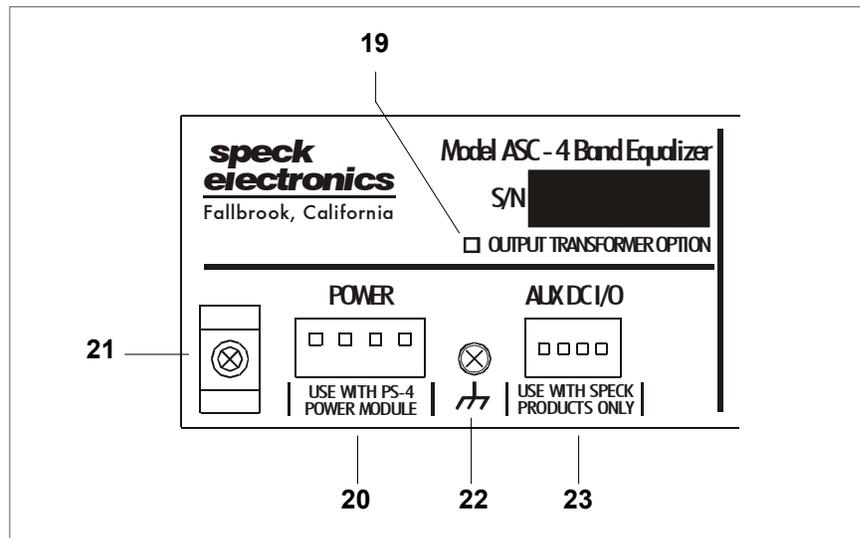
17. Output Connectors Two types of output connectors are available on the ASC; a standard 1/4" TRS balanced jack and a male XLR connector. These connectors are internally wired in parallel except on the transformer output version. (See item 19 on the "Transformer Option")

18. Ground lift Switch When depressed, this switch disconnects the ground of the ASC from pin 1 of the balanced XL output connector thereby inducing any piece of gear interfaced to this connector to search out a ground path external to the Model ASC. This can reduce the chance of ground loops and eliminate unwanted hums or buzzes.

A few words about hums, buzzes, and the role of a ground lift.

Not to suggest that the reasons for hums in an audio system can't be explained...they can... but the explanation, cure, and costs are very often out of the reach of the average project studio. This is why manufacturers sometimes include a ground lift switch on their products. It just saves you the trouble of clipping or soldering ground wires on your cables.

Hence, there is not a right or wrong position for a ground lift switch. If either position improves an otherwise hummy-buzzy situation, that is the right position.



**19. Transformer Option
(for Model ASC-T only)**

The ASC with the optional transformer gives you two choices of balanced outputs; electronic active balanced at the 1/4" TRS jack or transformer balanced at the XL connector. On the Model ASC-T, the transformer is wired only to the XL connector and the balanced active output is wired only to the to the 1/4" TRS jack.

To prevent the transformer from interacting with the electronic active output circuit, the XL output is automatically disabled when the 1/4" TRS output jack is used on the ASC-T version.

20. Power Supply Connector

This connector will accept the 4 pin rectangular plug of the power module cable. This connector and respective plug are keyed so they will fit in only one direction. For installation instructions refer to "Connecting the Power Module" as described in Chapter 2.

21. Wire Tie Holder

For installations where the ASC is subject to extreme vibration or movement, the wire tie holder may be used to secure the power cable.

- 22. Chassis Ground** Because the ASC uses an external power module, the chassis is not automatically earth grounded. If you experience hums or buzzes, this screw may be used to connect the chassis of the ASC to known earth such as an AC receptacle cover plate.
- 23. Aux DC I/O** This connector is available to provide a source of dual regulated DC voltage to an external device. This connector is reserved for future Speck products.

Wiring and Other

General The following information is not specific to the operation of the Model ASC, but rather general information regarding the “care and feeding” of an audio system.

A general discussion about AC, AC grounding, audio grounding, EMI, and quality wiring is discussed in this section. These subjects are very often overlooked or misunderstood, and should be given consideration when interfacing your equipment to any audio product.

Start simple A “quality” installation is essential when wiring any audio system. When the time comes to actually interconnect your equipment, proceed slowly. Interfacing the many pieces of electronic equipment to your ASC and audio system should be a logical, methodical process.

Start by connecting only your headphones or monitor power amp to the mixer, and then add one line signal to the mixer at a time; carefully listening and monitoring your progress. If a problem arises, such as a buzz, hum, intermittent signal, or nonexistent signal, stop at that point and solve the problem before proceeding.

Audio Cable

Due to the high performance of the Model ASC, it is recommended that you use only the highest quality audio cable. A high quality cable by definition, is a cable that provides good mechanical strength, high microphonic noise immunity, high frequency response, low crosstalk and 100% shielding ability. All audio cable used with the Model ASC should be a 3 conductor foil shield type (2 inner conductors and a shield drain conductor). It is not recommended that the 2 conductor "off the shelf cables" be used.

Connectors All wire and cable interfaced to the Model ASC should be terminated with high quality connectors. A 1/4" plug or XL connector should make a positive connection to its respective mating jack and provide adequate strain relief to its cable. All connectors should also have a metal shell to provide 100% shield for exposed conductors.

Feel free to check with Speck Electronics for recommendation when selecting cable and connectors.

AC Distribution and Safety

- Proper AC grounding** When you are evaluating voltage and current requirements for your audio system, it is important that your Model ASC equalizer and/or audio system does not exceed the capacity of your AC service. You should make certain that the earth (green) wire for the AC system makes a reliable earth connection, and determine as best as possible that the AC system is free of noise that could generate unwanted audible sounds or cause problems in microprocessor based equipment.
- Quality AC system** When using a larger rack system it is recommended that a dedicated and isolated AC service be provided. This service should have its own AC wires, isolated receptacle, and breaker and not be shared with other unrelated equipment.
- Even with an isolated AC system, it may still be necessary to make use of surge protectors, line filters, isolation transformers, or all of the above. Power conditioners should be selected with care, since they sometimes generate undesirable switching noises in audio systems.
- AC distribution** When connecting many pieces of electronic equipment to an AC system it is important that the AC is properly distributed. It is better to connect all plugs to a common AC source than to have AC receptacles in different locations.
- When installing a large audio system, it may be necessary to consult a qualified electrician that is familiar with the specialized style of electrical wiring required for recording studios.
- Clock noise and AC** Clock noise is one of the greatest enemies of the audio racks AC system. If a computer or any microprocessor based device (most samplers and effects are) emits or somehow couples its clock signal with the neutral or earth of its own power cable, it will contaminate your AC system and carry the clock noise into other equipment; almost always with undesirable results.
- Safety earth connection** The AC earth connection exists to protect you, your equipment and possibly your building from an electrical disaster. In a properly wired system, if a 120 volt AC wire were to break within your equipment's chassis, it should make contact with the Safety Earth Wire that is connected to the chassis, and blow the fuse or trip the circuit breaker until the problem has been corrected. Given the same circumstances, if the AC safety ground has been defeated with a ground lift or the AC service is incorrectly wired, the equipment's chassis and quite possibly everything attached in that rack would be "live" with 120 volts.

Electronics earth In an electronics context, an earth provides a path for unwanted EMI noise to be carried away from your audio equipment. If you disable your earth with a ground lift or do not have a reliable earth connection, the unwanted noise (EMI or RFI), will find an electrical path of least resistance. That will most likely be your audio equipment and would result in unwanted buzzes or hums.

Proper Audio Grounding and Shielding

In order for any audio signal to get from “Point A” to “Point B” requires a cable with a minimum of 2 conductors. One conductor is the hot, or high, or whatever you are familiar with; the other conductor is the ground or common. Additionally, all audio wires must be protected from environmental occurrences such as EMI (Electro Magnetic Interference) and RFI (Radio Frequency Interference) with an outer shield. An outer shield protects the 2 inner conductors from outside interference, and prevents that cable from inducing its signal onto adjacent audio cables.

One common misconception is that the shield of a cable should act as the common. This may be acceptable for guitar cords or semi-professional applications, but not for professional applications. The audio signals must be carried only by the 2 inner conductors and the shield must act only to cover these 2 conductors without transmitting the signal from one location to another. It is recommended that the shield be attached to the common (ground) at one connector's end, and the shield not be connected at the other connector's end. It is recommended that all shields be connected at the mixer end, and the shields not be connected at the other ends (synths, effects, power amps, etc.).

If a patchbay is utilized in your mixing system, the rules for shielding change. With a patchbay, normally all shields are connected at the patchbay jacks, and not connected at the mixer or external audio equipment.

EMI and RFI

The occurrence of EMI (Electro Magnetic Interference) and RFI (Radio Frequency Interference) in a contemporary studio system should be of great concern and not overlooked when installing the Model ASC. EMI is defined as any unwanted signal which adversely affects the operation of the ASC or your audio system.

Stated simply, the undesirable effects of EMI may be perceived as a low frequency smooth sounding 60Hz hum; a low frequency "edgy" sounding 120Hz buzz; or a higher frequency "whine" caused by the timing circuits in microprocessor based devices.

Almost every electronic device generates some amount of EMI emissions. These emissions can be transmitted as electromagnetic radiation or simply conducted through audio cables and power cords. In the same respect, most electronic devices are also very susceptible to the EMI emissions generated by other electronic devices.

Sources of EMI There are natural and man made sources of EMI that you can't do anything about. These sources include radio, TV, and radar transmitters, as well as motors, lights, and computers. Even the Sun and atmospheric conditions can be contributors to noise that you experience in your audio system.

Reducing EMI There are generally 3 elements that must be present for EMI to exist. These include the source of the EMI (conducted or radiated), the propagation medium by which EMI is transmitted (directly on the cables or through the air), and the receptor that suffers the adverse affects of EMI. If any of these 3 elements are eliminated or reduced, the EMI interference will be eliminated or reduced.

The more electronic equipment operating within a studio or equipment rack, the higher the EMI emissions. The more audio cable and low level audio equipment that exists within the same proximity, the greater possibility of unwanted noise. The result of EMI in an audio system manifests itself as a buzz, hum, whine, or all three.

The most common EMI occurrence in an audio system is radiated emissions from microprocessors in computeres, samplers, and magnetic field sources from transformers and power supplies.