

W2IHY AUDIO EQUALIZER AND NOISE GATE



OPERATING MANUAL

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W2IHY

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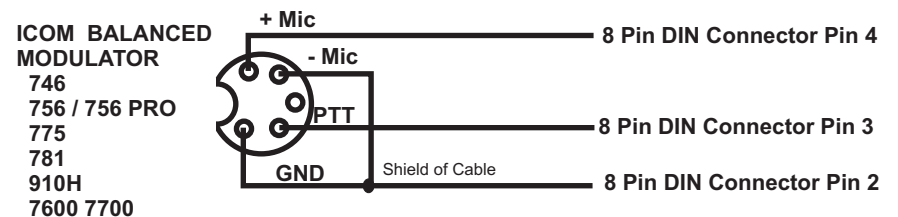
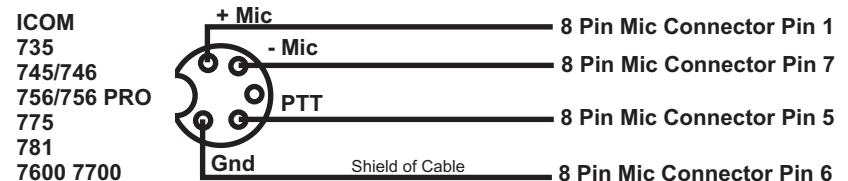
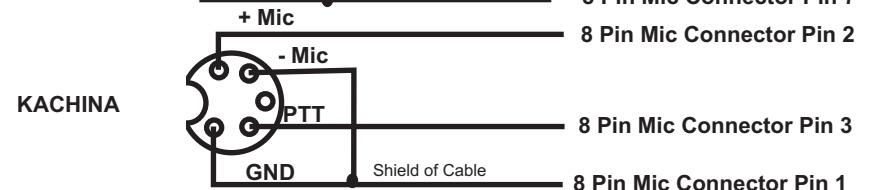
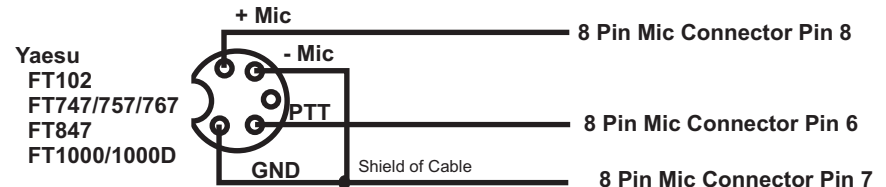
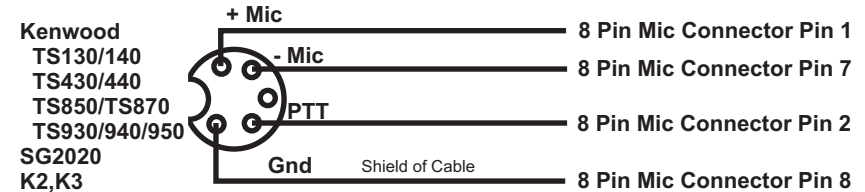
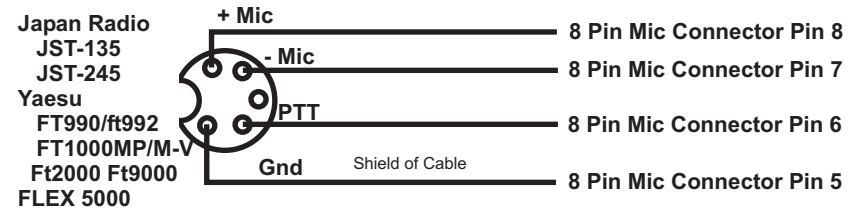
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Rev 4

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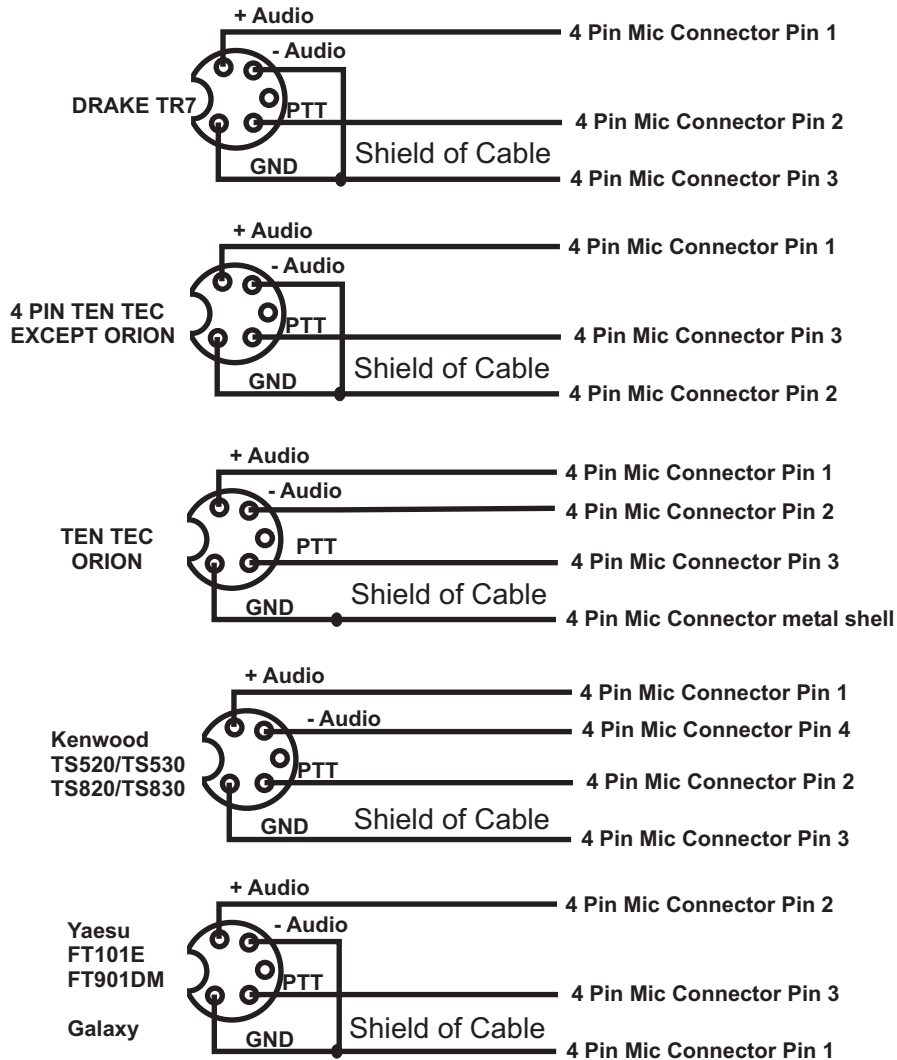
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MIC OUT & POWER CABLE WIRING



DIN connectors shown on the side to be soldered
DO NOT SOLDER TO SHIELD OF DIN

MIC OUT & POWER CABLE WIRING



DIN connectors shown on the side to be soldered
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INTERNAL WIRING

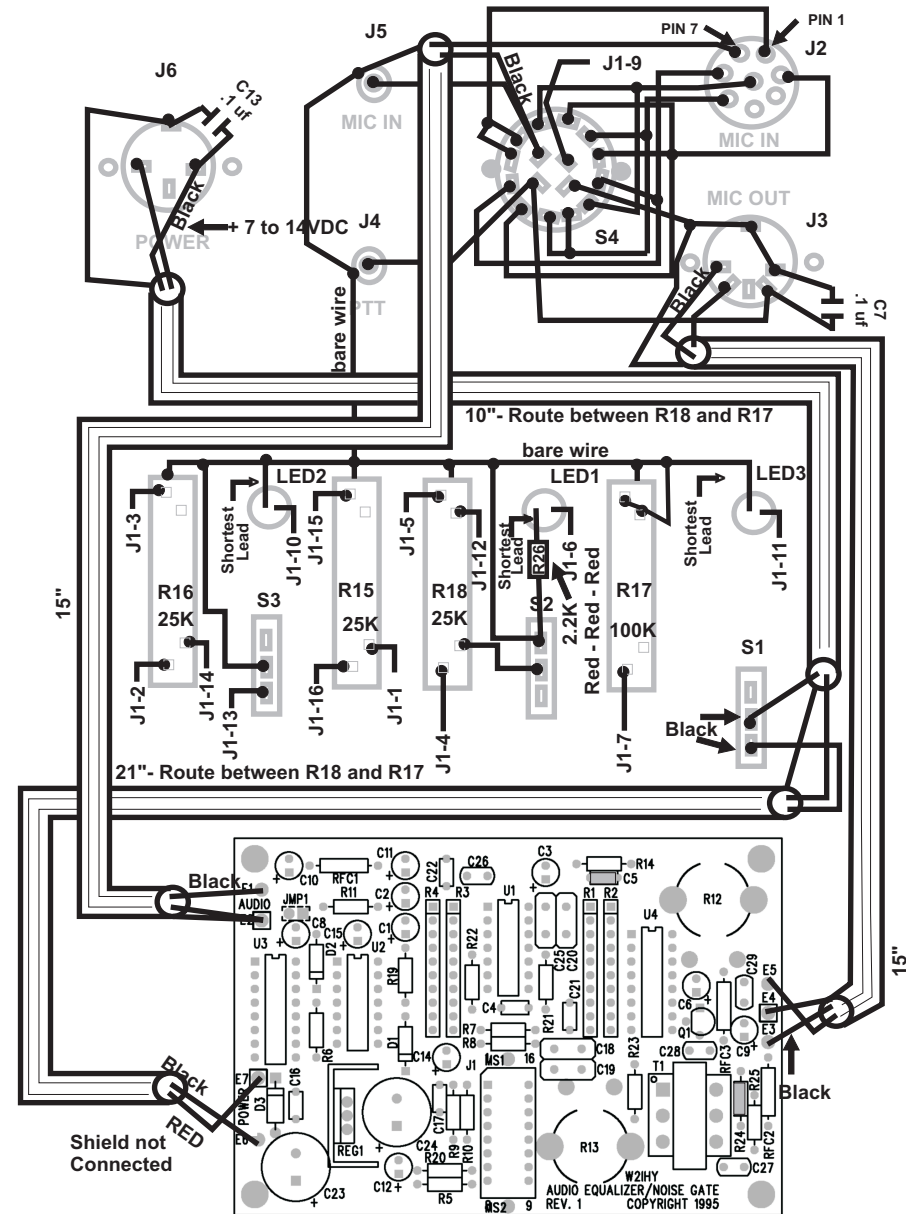
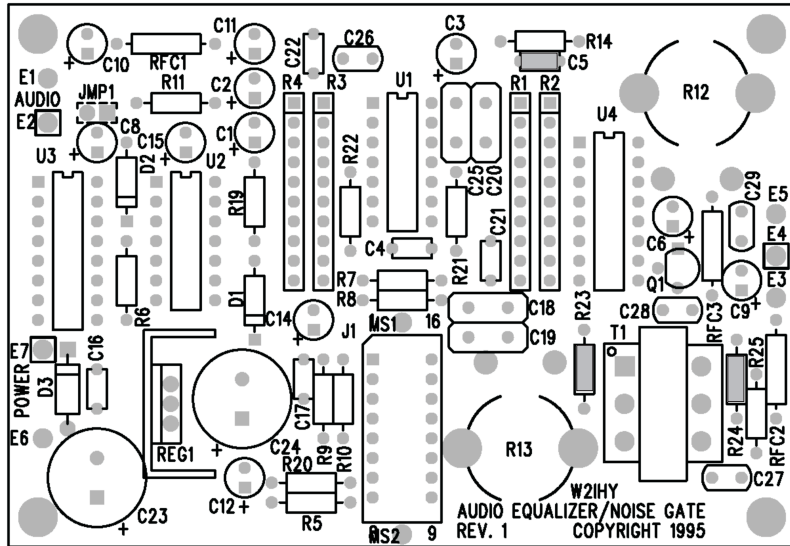


FIGURE 1

PC BOARD LAYOUT AND PARTS



No part installed in parts filled in GREY (C5,R23,R24)

- | | |
|---|---|
| C1-C3,C6, C14 -- 4.7 uf Miniature Radial Electrolytic 50V | REG1 --7805 +5V Linear Regulator in T220 Case (Use Heat Sink) |
| C5 -- not used | RFC1- RFC3 -- 470 uh Miniature (Epoxy Coated) R.F. Choke |
| C8 -- 22 uf Miniature Electrolytic 16 V | R1-R2 -- 10K ohm 10 Pin, 5 Resistor SIP Network |
| C9-C12,C15 --100uf Miniature Radial Electrolytic 50V | R3 -- 100 ohm 10 Pin, 5 Resistor SIP Network |
| C7,C13,C16-C17 -- .1 uf monolithic or Disc Ceramic 50V | R4 -- 1K ohm 10 Pin, 5 Resistor SIP Network |
| C18, C19 -- .1 uf Mylar Capacitor | R5-R6 -- 10 ohm 1/4 Watt 5 % Resistor |
| C20, C21 -- .01 uf Mylar Capacitor | R25 -- 1K ohm 1/4 Watt 5% Resistor |
| C26 - C29 --.001 uf Mylar Capacitor | R7, R19 -- 6.8K ohm 1/4 Watt 5% Resistor |
| C22 -- .033 uf Mylar Capacitor | R20 -- 10K ohm 1/4 Watt 5% Resistor |
| C4 -- 120 pf Ceramic Disc | R8 -- 5.6K ohm 1/4 Watt 5% Resistor |
| C25 -- 560 pf Ceramic Disc | R9-R10 -- 47K ohm 1/4 Watt 5% Resistor |
| C23-C24 -- 470 uf Miniature Radial Electrolytic 16V | R11,R21, R26 -- 2.2K ohm 1/4 Watt 5% Resistor |
| D1-D2 -- 1N914 or 1N4148 Switching Diodes | R23, R24 -- not used |
| D3 -- 1N4001 | R22 -- 3.8M 1/4 Watt 5% Resistor |
| JMPR -- 2 Pin Strip Line Plug (.100") and Shorting Block | R12*, R13 -- 100K ohm Horizontal Mounted P.C. Trimmer |
| J1 -- 16 Pin IDC DIP Flat Ribbon Cable | R14 -- 0K ohm 1/4 Watt 5% Resistor |
| J2 -- 8 Pin Male Microphone Connector | R15 R16, R18 -- 25K ohm Slide Potentiometer |
| J3 -- 5 Pin Female DIN Socket | R17 -- 100K ohm Slide Potentiometer |
| J4-J5 -- RCA Chassis Mounted Phono Jack | S1-S3 -- SPST Miniature Toggle Switch |
| J6 -- 5 Female Din Socket (with 2 Pins removed) | S4 -- 4 Pole 3 Position (non-shortng) Rotary Switch |
| LED1 -- Panel Mount 5mm Green LED | U1 -- TL074 or JRC2060D |
| LED2 -- Panel Mount 5mm Red LED | U2 -- 74HC00 |
| LED3 -- Panel Mounted 5mm Orange (or yellow) LED | U3 -- 74LS123 |
| Q1 -- 2N3417 Switching Transistor | U4 -- 74HC4053 |
| | T1 -- 600 ohms Primary: 600 ohms Secondary audio transformer |

BOLD printed parts mounted in case not on P.C. board * Parts mounted on Pin side of P.C. board

INTRODUCTION

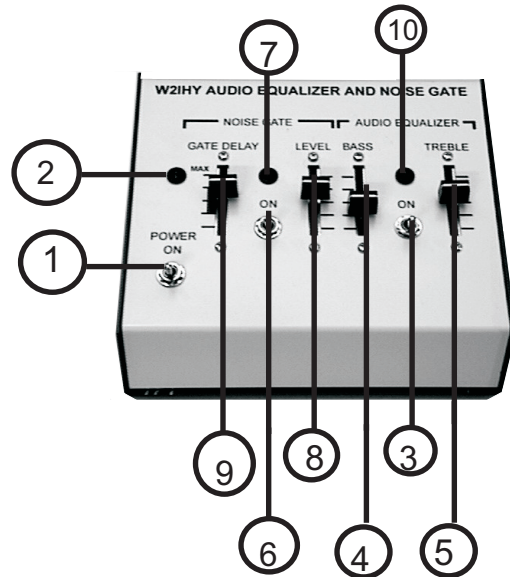
W2IHY AUDIO EQUALIZER AND NOISE GATE

Analog and digital technology have for many years been used in the audio industry to do audio equalization and noise reduction. Many amateurs have purchased audio equalizers and other equipment with the hope of improving their transmitted audio signal. The amateurs who have succeeded have in many cases had to pay premium prices for audio equipment that not only required modifying, to properly interface with their amateur stations, but also had to be hardened to tolerate R.F.

The W2IHY Audio Equalizer and Noise Gate solves two basic problems many hams experience. The Audio Equalizer allows the user to change the transmitted audio frequency response without changing microphones or microphone cartridges. Transmitted audio, that has a significant amount of high frequencies present, can be used to work DX or communicate in band conditions where there is a significant amount of noise. A balanced frequency response may be more desirable in strong signal, full noise quieting environments. Many amateur operators transmit audio in high ambient noise environments. Typical high noise sources include linear amplifier fans, dehumidifiers, room air conditioners, road and wind noise during mobile operation,... The Noise Gate eliminates the aforementioned noise from being transmitted. On the air tests in high ambient noise conditions have shown the Noise Gate to be very effective. The removal of moderate to very high levels of ambient noise, from the transmitted audio signal, results in audio with increased clarity and presence.

Extensive testing was done of the Noise Gate and Equalizer. The unit has been designed to work in high RF environments. We feel so confident that you will be delighted with the unit we offer a 30 day money back , no questions asked, guarantee. The W2IHY Audio Equalizer and Noise Gate represents affordable audio technology designed for amateur radio use.

FRONT PANEL CONTROLS



This section describes each of the controls on the front panel. You can read through this section now. Some of the descriptions will be more meaningful after you first work through the getting started tutorial.

(1) Power On/Off Switch (S1)

This switch turns the unit's power on and off.

(2) Power on LED (LED3)

This LED goes on when power is on in the unit.

(3) Equalizer On/Off Switch (S3)

This switch turns the equalizer on and off. When the equalizer is off adjusting the equalizer's bass and treble controls has no effect on the output audio.

GETTING STARTED TUTORIAL

The **Noise Gate Delay** control sets the decay time of the trailing edge of the **Mic Out** Audio, when the noise gate turns off. This circuitry exponentially reduces the audio output when there is no audio present in the **Mic In**. (The delay circuitry helps to make the transitions of gating and not gating of audio smooth and more pleasing to the ear.) The duration of the exponential decay is dependent on the setting of the **Noise Gate Delay** control. The delay control set at a minimum value (the slide pot all the way down) will exponentially decay the audio in about 100 milliseconds. The delay control set at a maximum value will allow the audio to decay over several seconds. On the air tests show the mid part of the Noise Gate Delay range gives very pleasing audio transitions (decay time of about .3 to .8 second). You can experiment on your own to find the best setting for you.

If you have medium-to-high levels of ambient noise present when you are transmitting, with the **Noise Gate Switch** in the off position, when you stop talking your power meter will indicate R.F. still being transmitted. (set power meter on avg. power to do this experiment). When the noise gate is turned on and properly adjusted when you stop talking the power output will drop to the bottom of the scale (no power output). People who listen to your signal will be able to hear the difference and they will wonder where the noise went.

Adjusting The Audio Equalizer

Turn the **Equalizer Switch** on. Pushing the Treble control up will increase the amount of high frequencies present in the Mic Out audio. Pushing the Bass control up will increase the amount of low frequencies present in the Mic Out audio. On the air experimentation will be required to find the optimal settings based upon band conditions.

GETTING STARTED TUTORIAL

Before plugging the power transformer into the wall preset the following controls as indicated:

Power, Equalizer and Noise Gate switches all off.

Mic Select to select microphone you will be using.

Connect your microphone into the **Mic In** rear connector. Plug the power transformer (module) into the wall and into the **Power** connector of the unit. Attach the microphone cable between your transceiver/transmitter and the **Mic Out** of the unit. If the microphone being used is an electret mic (ICOM HM12, SM6,...) and requires D.C. on the mic line plug the shorting jumper supplied onto the **MIC Jumper** pins at the bottom of the case otherwise leave it off. Turn the **Power** switch on. The orange **Power on LED** should go on.

Adjusting the Mic Levels

While talking into the microphone, using a screwdriver, turn the **Mic In Level Control** (located at the bottom of the unit) clockwise until the **Mic LED** just goes on. The LED should go on 1 or 2 times in a sentence.

While talking into the microphone, using a screwdriver, turn the **Mic Out Level** control clockwise until the audio level, as shown by your transceiver's/ transmitters metering is at the proper level. If you are using push to talk on your transceiver you will have to push the PTT switch on your microphone while making this adjustment.

Noise Gate Adjustments

Turn the **Noise Gate Switch** on. (Please note that when the **Noise Gate Switch** is off the **Noise Gate LED** should always go on indicating audio is being sent / gated to the **Mic Out**. When the **Noise Gate Switch** is turned on the **Noise Gate LED** may be on or off depending on the position of the **Noise Gate Level** control and the **Mic In** audio level.) Adjust the Noise Gate Level control until the Noise Gate LED just goes off. This adjustment should be made with the level of ambient noise that will be present when you will be talking into the microphone. (If audio is coming from your transceiver's/ receiver's speaker you should turn off the audio.) When you now talk into your microphone the **Noise Gate LED** should go on indicating audio is being sent to the **Mic Out**. When you stop talking the **Mic Out LED** should turn off indicating that audio is not being sent and background noise is not being sent / gated to the **Mic Out**.

FRONT PANEL CONTROLS

(4) Equalizer Bass (R15)

This slide potentiometer works only when the equalizer is on. Pushing the control up increases the amount of bass boost. Pushing this control down decreases the amount of bass boost.

(5) Equalizer Treble (R16)

This slide potentiometer works only when the equalizer is on. Pushing this control up increases the amount of treble boost. Pushing this control down decreases the amount of treble boost.

(6) Noise Gate On / Off Switch (S2)

This switch turns the noise gate on and off. When the noise gate is off the changing the gate delay or level controls has no effect on the audio. When the noise gate is off audio is always being gated through the noise gate / equalized to the output.

(7) Noise Gate LED (LED1)

This LED is used to help properly adjust the noise gate level control and to indicate when audio is being sent (gated) to the output. The LED being on (green) indicates that audio is being gated through the unit to the output. The LED being off indicates that audio is not being gated through to the output. When the noise gate switch is in the off position (6) the noise gate LED is on.

(8) Noise Gate Level (R18)

This slide pot. works only when the noise gate is on. This control sets the level at which background noise will be not gated to the audio output. Pushing this control up will make the unit less sensitive to higher background (ambient) noise. Pushing this control down will make the unit more sensitive to background noise.

FRONT PANEL CONTROLS

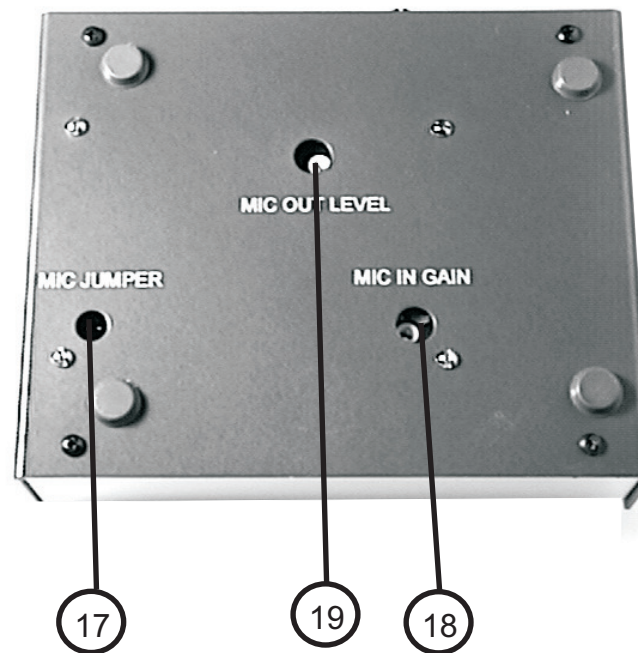
(9) Noise Gate Delay (R17)

This control adjusts the length of time audio will be gated to the output after the noise gate has automatically turned off (Noise gate LED off). Pushing the delay slide pot. up increases the delay (decay) time. Pushing the pot. down decreases the delay time.

(10) Mic Gain LED (LED2)

This LED is used to help adjust the MIC In Gain pot. When the LED goes on this indicates that the Mic gain is set near the maximum recommended setting.

BOTTOM PANEL CONTROLS



(17) Mic Jumper

Plugging shorting block in puts +5V on the mic In line of the microphone's cartridge (12 & 13). Required for mic's like HM12, Hm36, SM6 and Heil HM-i and electret microphones.

(18) Mic In Gain (R12)

Changes the microphone amplifier's gain. Gain is increased, while speaking into microphone until Mic LED (10) just barely goes on (LED should turn on 1 or 2 times in a sentence.) (Clockwise rotation increases gain.) **Microphone cartridges with very low output (Like a Heil HC4 or Heil HC5) may require the Mic In Gain Control to be adjusted to maximum gain.**

(19) Mic Output Level (R13)

Changes the unit's audio output. (Clockwise rotation increases output.) This input is also low impedance (600 ohms).

REAR PANEL CONTROLS

(13) Mic Input (J5)

RCA female connector for auxiliary microphone input. This connector works independently of the mic select switch and may be used for another audio source or microphone. This input is also low impedance. Do not use if mic is connected to J2

(14) PTT INPUT (J4)

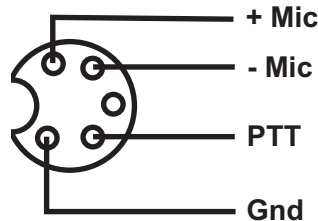
RCA female connector for auxiliary push to talk control. A foot switch or other control may be connected to this connector. Grounding the center jack of the connector grounds the push to talk line on the Mic Out.

(15) Mic Output (J3)

5 Pin female DIN connector that has noise gate / equalizer audio plus push to talk outputted. The audio output is transformer driven and designed to connect to a low impedance (600 ohms).

MIC OUT 5 Pin Male DIN

Din connectors shown on side to be soldered

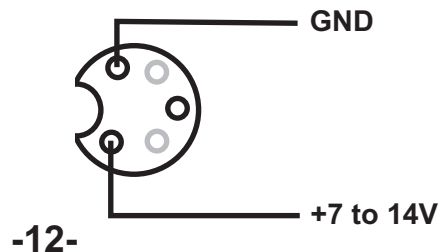


(16) Power

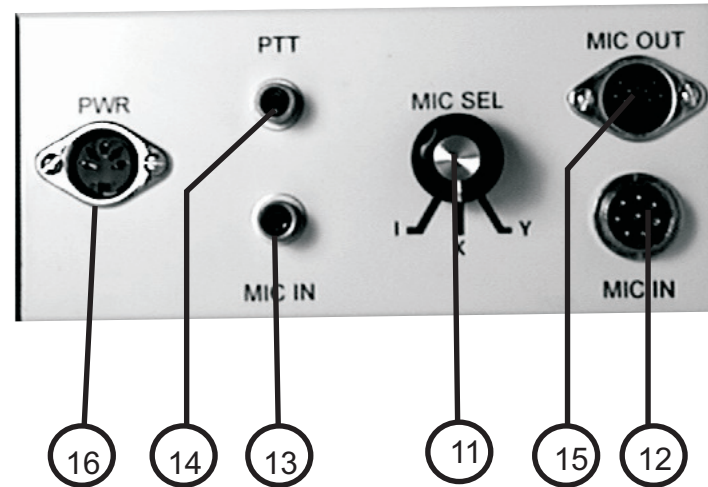
5 Pin Din connector. 7 - 14 VDC input at 100 ma.

Power 5 Pin Male DIN

Din connectors shown on side to be soldered



REAR PANEL CONTROLS



(11) Mic Select (S4)

Three position switch that selects the ICOM, KENWOOD or YAESU microphone plugged into the Mic Input.

(12) Mic Input (J2)

8 Pin microphone male connector. Low impedance microphone (600 ohms) plugs into here.

J2 Pin	Icom	Ken	Yaesu
1	+Mic	+Mic	
2	+5V	PTT	+5V
5	PTT	+5V	PTT Gnd
6	PTT Gnd		PTT
7	Gnd	- Mic	Gnd
8		Gnd	+Mic