OMEGA-RF

OMNI-PROC

Owners Manual and Detailed Operating Instructions

Ver. 012020 rev.B

NOTICE TO CONSUMER:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules, as of date of manufacture. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio electronics technician for help.

ABOUT THIS MANUAL:

This manual is divided into chapters which are arranged in logical, operational order. The items in **Bold** are important notes, ***Italicized bold*** are even more important, and ***Italicized bold underlined*** notes are critical informational statements.

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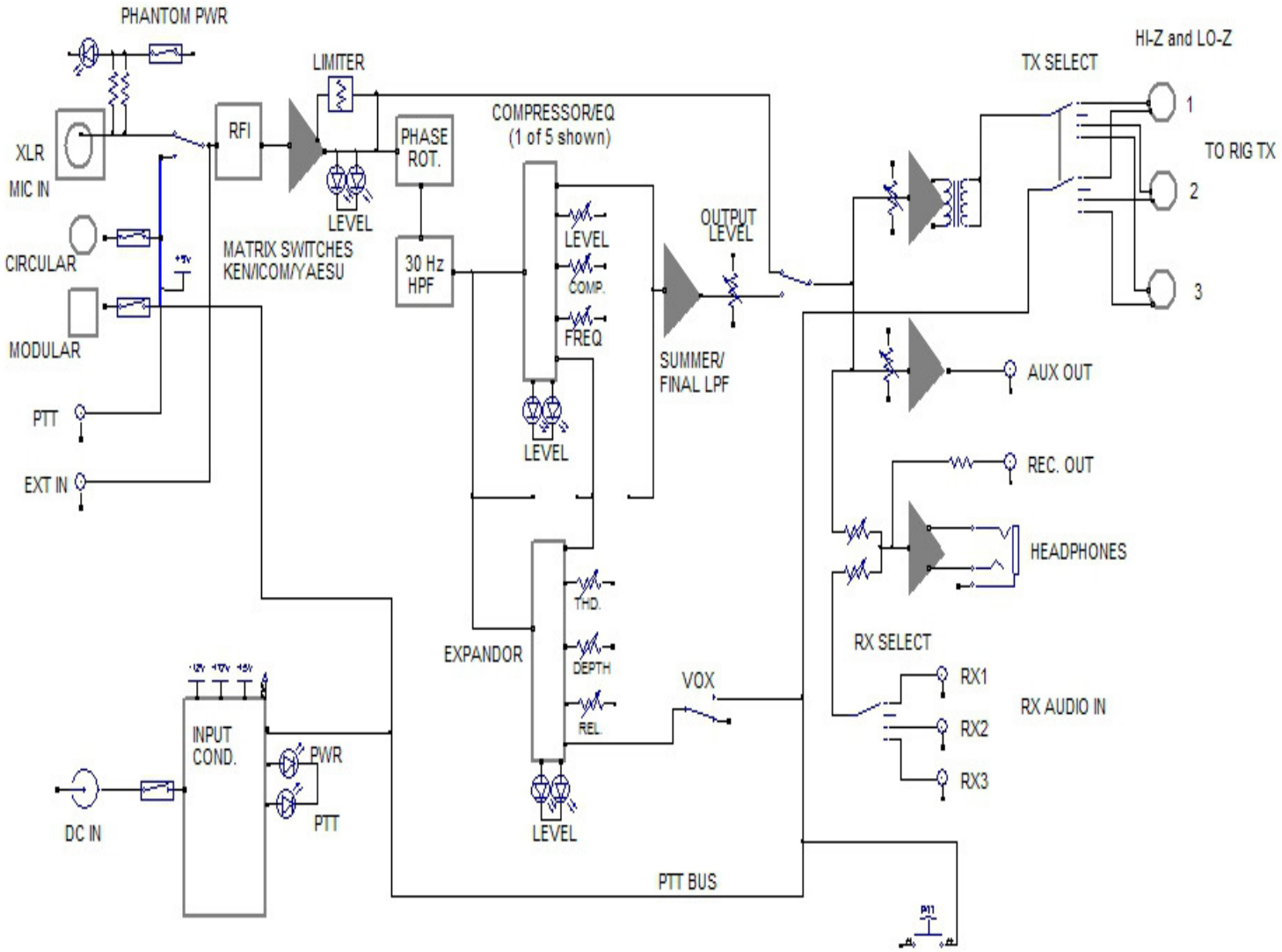
A- TECHNICAL DESCRIPTION/THEORY OF OPERATION:

OMNI-PROC is a self-contained voice processor for audio enhancement. It is specifically designed to be compatible with HF communications transmitting equipment, and contains a multitude of features that provides a virtuoso of audio processing features. It contains five independent adjustable frequency (parametric) equalizers, with adjustable compression on each band. In addition, an overall dynamic voice expandor, with adjustable threshold, release time, and expandor, and depth, which works in conjunction with the compressors. This provides a powerful tool for your voice enhancement. Utilizing professional broadcast technology, ***OMNI-PROC*** offers many options and features not found in modern-day comparable amateur radio processing equipment.



OMEGA RF OMNI-PROC
BLOCK DIAGRAM

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Audio input sources

There are four audio input sources. The first is a 3 pin professional microphone, which utilizes the standard XLR input jack. Both dynamic and condenser mics are supported, as a switchable 48v phantom powered circuit can inject the standardized 48v DC power on pins 2 & 3 of the mic jack. *Note: although this is a balanced input, it is unbalanced into the preamp, and an audio isolation transformer may be desired for optimum performance on the XLR mic input, particularly in long cable runs, or very high RF fields of operation.*

The second source is either a modular (RJ-45 type) connector, and a standardized 8 pin circular connector. Both connectors support a range of manufacturers, particularly Kenwood, Icom, and Yaesu. The proper pin configuration for each manufacturer is selected by configuration switches on the rear of the unit, one for each type of connector.. Both connections are in parallel, so either jack is available for use, ***but both may not work simultaneously***.

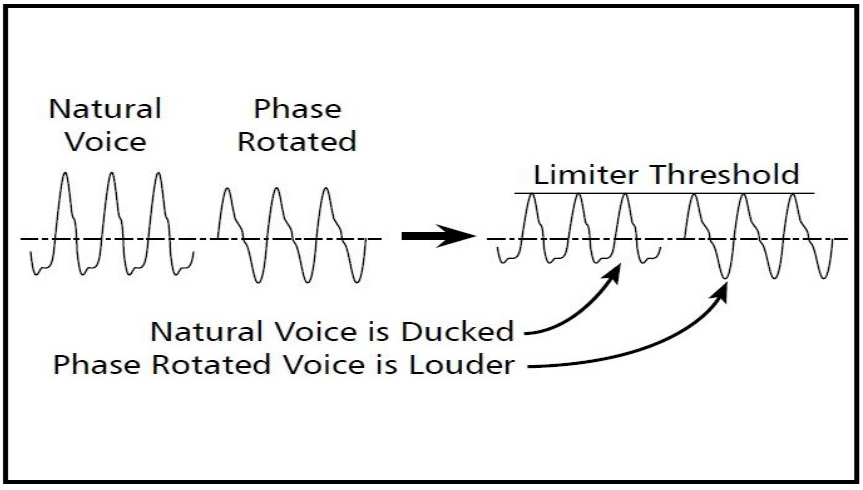
The fourth mic input is the RCA plug on the rear panel **(8)**, which parallels the mic inputs.

All inputs contain RFI and DC blocking protection to the microphone preamplifier circuit.

Self-limiting mic preamplifier

The microphone signal is passed through a variable-gain mic preamp, which operates over a wide dynamic range. The front panel control adjusts the gain for optimized operation, and a dual-colored LED provides a visual indicator of the proper level. Included in the mic preamplifier is a self-limiting circuit, which provides automatic gain-reduction of the circuit, and helps protect against audio outside the optimal level.

Phase roatator:



The microphone preamplifier output is then passed through a phase rotator circuit. The phase rotator concept was originally patented for use in AM radio broadcast processing, and is commonly found in modern commercial broadcast processing equipment. Human speech waveforms exhibit substantial asymmetry. When the human speech is processed to control modulation levels, many negative effects occur. The asymmetrical waveform does not get processed equally on the positive and negative peaks, due to the asymmetry of the voice peaks. This asymmetry causes some distortion of the voice during peak compression, as well as lower overall peak modulation. The phase rotator shifts the phase of the voice such that the asymmetry is reduced, allowing processing to occur without the adverse side effects. The result is optimized loudness, as well as reduced processing distortion. *The phase rotator circuit does not affect the frequency response of the waveform, and is virtually inaudible.*

30Hz HPF

After leaving the phase rotation circuit, the audio signal passes through an active high-pass filter. This circuit removes any low-frequency components (rumble, table bumps, etc), which if allowed through, would significantly reduce overall loudness. It has a rolloff of -6dB at 30Hz, and increases in attenuation as low frequencies decrease.

Band processing/EQ band boards (refer to panel controls diagram)

After the 30Hz HPF circuit, the audio is split into six different paths. Five of the paths are passed into five distinct EQ/compressor circuits ('bands').

For each EQ section, the audio is first routed to a variable-frequency active bandpass filter. Each band has a distinct range of frequencies, ranging from 60Hz, up to 6kHz overall. Each section contains some overlap, so that no frequency 'holes' occur between bands.

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The center frequency of each band is marked on the front panel **(6)**, indicating the approximate center bandpass frequency. The absolute setting of this control is completely subjective, and will vary from voice to voice.

Each equalizer section is then passed through an audio compression circuit. ***OMNI-PROC*** utilizes Pulse-width-modulated (PWM) digital gain control, with optimized attack and release time constants for each band. The PWM signal is modulated around 120kHz, which is filtered before exiting each compressor stage.

The amount of compression can be varied by the compression control **(7)**, and is indicated by the two-colored compression indicator **(5),** which changes from green to red with regard to the amount of compression.

The overall output of each band board can be adjusted by the processing mix level **(8)**, which can vary +/- 12dB of processed audio.

Expandor board

The sixth path from the 30Hz HPF is routed to the audio expandor board. This board controls the expansion of audio (or dynamic gating), which effectively mutes the processed audio for the purpose of background noise-reduction. The expandor can be adjusted by sensitivity, release time, and depth. A two-colored LED **(9)** shows the operational status of the expandor board, where red indicates muting/gating (stops audio), and green indicates open (allows audio). When muted, it reduces the gain of the PWM stages to a level determined by the expansion depth **(12)** control.

Output mix

The output of all the bands are mixed (“summed”) together, and sent to various output drivers.

Output drive (refer to rear panel)

The signal output is split to three. One signal passes to the auxiliary output jack,(**16)** and controlled by the audio control **(18)**. The output of this signal is an unbalanced, line level type, 1k output impedance.

The signal output also passes through the TX output level control **(17)**, then the TX output select switch **(13)**, then to the selected TX output jack **(11)**. The output of this signal is a transformer-isolated, 600 ohm impedance, and is DC blocked up to 30v. A high-impedance (22k) output is also available on each jack **(11)**. Both high, and low impedance outputs share a common (-) connection.

The TX output selector switch also routes the PTT bus to the selected output jack. This allows three independent transmitters to be connected simultaneously, with no interaction between transmitters.

Monitor/record (refer to front panel unless noted)

The master output is routed to a TX monitor control **(6)**, which adjusts the audio output to a headphone jack **(7)**. Selected receive audio from (rear panel **(12)**) jacks accept a line-level signal, selected by RX audio (rear panel **(14)**) switch into front panel RX control **(5)**. The RX and TX monitor controls provide a mix between the bypass/operate switch of the processor, and the received audio.

This mixed signal also passes through an independent record output jack (rear panel **(15)**), providing a line-level output of the headphone mix.

PTT control / LED

The PTT signal from the selected front-panel mic input jacks passes to a rear panel PTT jack**(10)** then to the TX output selector switch. This allows for both microphone and external keying of the PTT signal. Along with this PTT 'bus' is a top-panel button**(4)**, which allows momentary or locking PTT control locally, or rear-panel footswitch PTT control.

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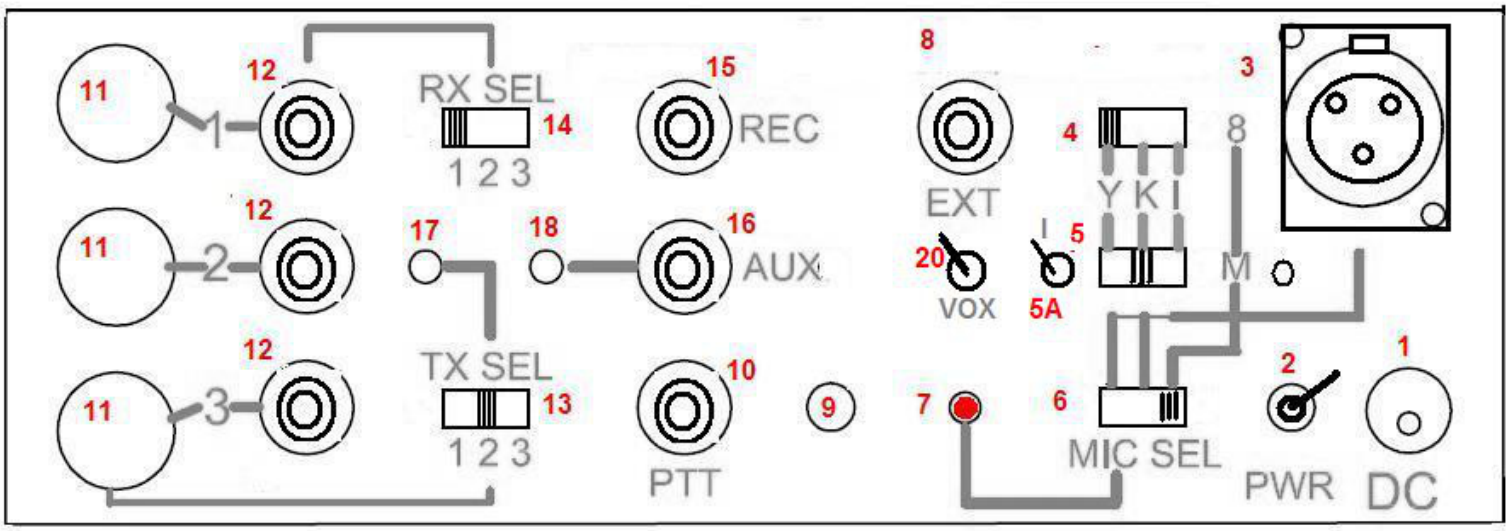
B- CONTROLS



B1 REAR PANEL DESCRIPTION-

1) POWER IN-This connection is a 2.1mm round coaxial-style connector, and requires a ***minimum*** 1A, at 16v AC/DC power source. *Note this input jack is **NOT** polarity-sensitive, and will operate with either AC or DC in (**do NOT Exceed 20v DC or 18v AC in!**). **It is recommended you use the recommended power supply that was included with your unit.***

2) DC POWER SWITCH- This switch supplies power to the entire unit. The front panel power LED will illuminate when power is applied.

3) XLR MIC IN- This connection is for a 3 pin XLR type microphone, with the following wiring; pin1- ground, pin 2-positive, pin 3-negative. Any microphone (dynamic or condenser) will connect to this jack, as **48v** phantom power is available, when switched on **(6).(*NOTE- PHANTOM POWER IS AT 48v, DO NOT USE MICS THAT DO NOT MEET THIS STANDARD, OTHERWISE YOU WILL DAMANGE YOUR MICROPHONE!***

4) & 5)- FRONT PANEL MIC CONFIGURATOR SWITCHES- These three position switches are associated with the front panel connectors (modular and 8 pin circular), and configure the pins to either Icom, Kenwood, or Yaesu pin-outs. **(4)** selects the 8 pin configuration, and **(5)** selects the modular configuration. *Note: you should select the correct switch position before plugging in the mic.(When using KENWOOD pinout on the modular jack, set mini-toggle switch to "K" position).**NOTE- when using Icom modular jack, set switch 6B to "I" position, and down for Yaesu/Kenwood.***

YOU SHOULD ONLY USE ONE FRONT PANEL MIC AT A TIME!

6) MIC SELECTOR/PHANTOM POWER-This three position switch selects either the front panel mics, or the XLR mic **(3)**. When using this switch, the position to the extreme left will enable 48v phantom power to the mic jack, and power to the phantom supply will be indicated by the illuminated led (**7).** When to the extreme right, it selects the front panel mics.

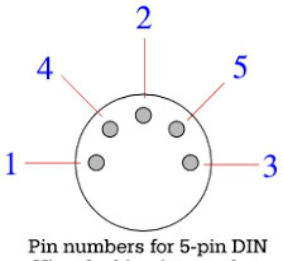
7) PHANTOM POWER LED- This LED will illuminate when the phantom power is enabled by switch **(6)**.

8) EXT MIC IN- This RCA jack will accept an unbalanced external mic in. *NOTE: If you use a condenser mic on this input, you will need to attach the internal DC mic power selection- see notes*

9) GROUND POST- An optional connection to a station or chassis earth for additional grounding.

10) PTT JACK- Connect this to an external PTT switch or footswitch. Grounding this switch will ground the PTT bus.

11) TX OUTPUT (3 connections)-This connection provides three separate TX output signals, selectable by switch **(13)**. It is wired as follows: 1- Low-Z audio +, 2- HI-Z audio, 3- Ground, 4- Audio common, 5-PTT. *Note- When connecting audio, you must connect audio common to either ground, or audio negative lead in transmitter.* HI-Z output is 22k ohms, resistive. The output level can be adjusted by screwdriver control item **(17)**.



Pin numbers for 5-pin DIN
View looking into socket

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12) RX AUDIO IN (3 connections)- These RCA jacks will accept line level (0.25v-2v RMS) audio input from a receiver, selectable by switch**(14)**. This input is a 10k resistive load on the source when selected, and high-impedance when not selected.

13) TX SELECT SWITCH- This switch selects which TX OUTPUT **(11)** is used. It selects both audio and PTT lines, so that multiple transmitters can be connected simultaneously, and have independent selection, further described in **(11)** above.

14) RX SELECT SWITCH- This switch selects which receiver input will be sent to the internal headphone monitor RX AUDIO control. It is further described in **(12)** above.

15) RECORD OUTPUT- This is a line level output (1v RMS) of the front panel headphone mix controls, and the level is followed by the adjustment of the RX and TX audio controls on the front panel, **(5)** and **(6)**.

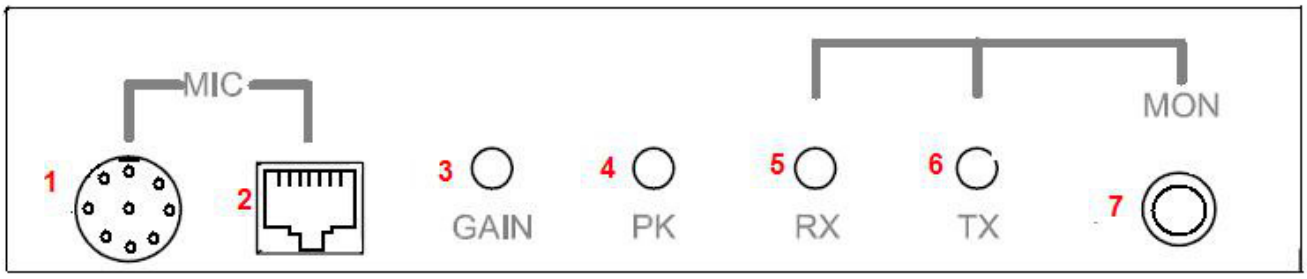
16) AUXILLARY OUTPUT- This RCA jack provides an independent audio output, adjustable with the screwdriver control, item **(18)**.

17) TX AUDIO OUTPUT CONTROL- This screwdriver control will adjust the DIN plug TX audio output

18) **AUX AUDIO OUTPUT CONTROL-** This screwdriver control will adjust the RCA AUX output level, item **(16)**.

20) VOX PTT- When ON, PTT will occur whenever the Expandor circuit activates. *Note: If the Expandor is set to fully OPEN, the PTT will remain keyed.*

B2 FRONT PANEL DESCRIPTION-



1) 8 PIN MIC INPUT- This input jack accepts 8 pin microphones, and is configured by the rear panel selector switch item **(4)**

2) MODULAR CONNECTOR MIC INPUT- This input jack accepts the RJ-45 type microphones, and is configured by the rear panel selector switch, items **(5) & (5A)**.

3) MIC GAIN- This control adjusts the microphone gain. The proper level is indicated by the dual-colored LED, item **(4).**

4) LED MIC INPUT LEVEL INDICATOR- This dual colored LED will illuminate when the microphone input level is properly adjusted. The mic gain control (3) should be adjusted so that the green led flashes, and the LED should not solidly and constantly flash red. *NOTE- The built-in mic limiter will activate if the level is too high, but continued high levels may cause the audio to become 'choppy' or distorted sounding when the LED is constantly solid red.*

5) RX AUDIO GAIN- This control adjusts the selected RX audio input level to the headphones **(7)**, and RECORD OUTPUT(16) on the rear panel

6) TX AUDIO GAIN- This control adjusts the audio output of the ***OMNI-PROC*** to the headphones **(7)**, and RECORD
OUTUT (**16)** on the rear panel.

7) HEADPHONES Connect either a mono or stereo headphone to this jack. Controls **(5)** and **(6)** provide a mixed feed to the headphones, and can be independently adjusted to desired headphone levels.

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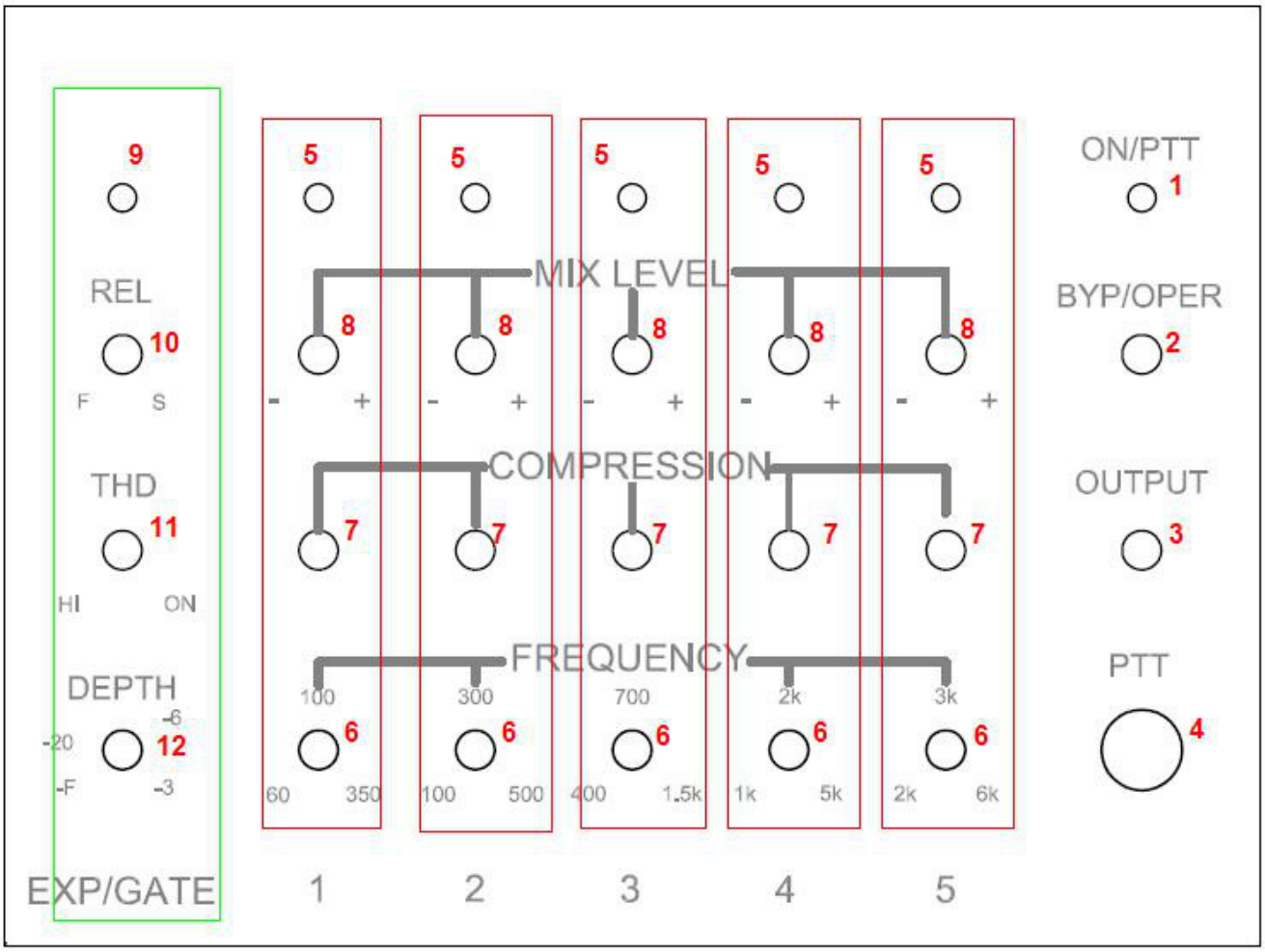
B3 TOP PANEL CONTROLS-



1) POWER/PTT LED- This LED will indicate green when power is applied, and turn red when the PTT button is pressed.

2) BYPASS/OPERATE SWITCH- This switch selects if the output is bypassed or operating. In bypass mode, the audio is routed directly from the mic preamp output to the selected TX output jack.

3) PROCESSOR OUTPUT LEVEL- This control adjusts the audio output of the processor.

4) PTT BUTTON- This button will active the PTT bus. It can be operated momentary, or latching.

5) COMPRESSOR LED'S- These dual-colored LEDS indicate the level of compression of each band. When green, this is normal compression level, and when red, it is high compression. *NOTE- Excessive red flashing may cause the audio to sound over-processed, and fatuiging.*

6) FREQUENCY ADJUSTMENT- This control adjusts the center frequency of each band. The controls have been designed such that some overlap exists between bands, so that no frequency 'holes' occur.

7) COMPRESSION LEVEL- This control adjusts the amount of compression on each band, indicated by the compressor LED's (5).

8) MIX LEVEL- This set of controls provides an overall mix of the five bands. This control provides +/- 12dB of output level for each band.

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9) EXPANDOR LED- This dual-colored LED indicates the status of the expandor. When red, the expandor is active, and is muting the audio. When green, the expandor is open, allowing audio to pass.
NOTE:- The brightness of the red portion of the LED is dependent on the EXP DEPTH control, and the brighter the LED, the more that expansion is occurring.

10) RELEASE TIME- This control adjusts the release time of the expandor, from approx 250mS, and up to 3 seconds. Rotating the control clockwise increases the release time.

11) EXP. THRESHOLD- This control adjusts the sensitivity of the expandor. Rotating the control clockwise increases the sensitivity, and fully clockwise places the expandor in an constant open mode, particularly useful when you want to bypass the expandor circuitry.

12) EXP. DEPTH- This control adjusts the depth (amount) of expansion. Turning the control clockwise decreases the depth. When rotating clockwise, the background noise level will increase, because the amount of expansion is being reduced. Fully counter-clockwise will provide maximum expansion, completely removing all background noise.

C- OPERATION

POWER SUPPLY
Connect the factory-supplied power supply into the power jack**(1),** and plug power supply into a standard AC outlet.
IT IS RECOMMENDED TO USE THE FACTORY SUPPLPIED POWER SUPPLY. INCORRECT SUPPLIES WILL VOID YOUR WARRANTY. *Recommended replacement supply should range between 16-20V DC, or 16-18v AC 2.1mm plug*

The **rear panel power switch (1)** supplies power to the entire unit. The front-panel power LED will illuminate green when power is applied.

Microphone setup and operation
Choose the input source for your desired microphone, using **MIC selector switch (6)** on the rear panel. If you select either one of the front panel modular/circular jacks, the corresponding **rear-panel mic configurator switches (4,5)** must be set for the make and model of your microphone. *Note: you should select the correct switch position before plugging in the mic. YOU SHOULD ONLY PLUG IN ONE FRONT PANEL MIC AT A TIME!* Operating more than one microphone at a time may result in double-loading of the microphone elements, or could damage any sensitive circuitry inside the microphone,

If you select the rear panel XLR jack, connect the microphone to the **female XLR jack (3)**, If you are using a microphone with phantom power, adjust the **MIC selector switch (6)** so that the phantom power is ON. When the power is applied, the rear panel **phantom power indicator (7)** will illuminate,

Mic gain adjustment
The microphone gain control is adjusted by the front-panel **mic gain control (3)**, and should be adjusted until the dual-colored **LED (4)** flashes green on voice peaks. Occasional red flashing is acceptable, but excessive red flashing should be avoided as to cause the audio limiter from activating beyond its normal operating range. *NOTE: Operating the gain with continuous red flashing may cause the audio to sound choppy, possibly distorted, and over-processed*.

Internal mic preamp limiter
The internal mic preamp limiter reduces the need to be concerned with high voice peaks, by gain-riding the voice peaks above a pre-determined threshold. The internal mic preamp limiter will start to activate when the front-panel LED flashes just prior to transitions of the LED from green to red. It helps keep you from having to adjust your gain on voice peaks, keeping the main compressors operating optimally.

The pre-amplified microphone audio is divided and routed to each of the five bands of equalization and compression.

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C1- PARAMETRIC EQUALIZER

Each band board contains an adjustable, 'sweepable' center-frequency bandpass filter. The center frequency of each band board is marked on the front panel **(6)**, indicating the approximate center bandpass frequency. The absolute setting of this control is completely subjective, and will vary from voice to voice. You can use these controls to shape your voice to the sound that is most pleasing to your ears, as well as those listening to your transmitted audio. Each band contains some overlap on both ends, so that frequency 'holes' do not occur. The slope is a gentle 6dB/octave.

C2-Compressor

Each band board uses a PWM-controlled compressor, to add 'punch' to your voice, as well as enhancement of the bandpass filter. Each band uses a per-determined, optimized 'attack' (to begin compression), and 'release' (compression remains held) time, such that the audio compression is as close to natural sounding as possible in the normal operating range of each compressor.

Compression level

The amount of compression on each band can be adjusted with the compression level control **(7)**, which increases with clockwise rotation of the control. The compression level is indicated by the dual-colored LED **(5)**, and will flash green with normal compression, and red with high compression. Adjust this control for desired audio “punch” in this band, but setting the control for continuous red indication may cause the audio to sound over-processed, and/or fatiguing.

Mix level

This set of controls provides an overall mix of the five bands. This control provides +/- 12dB of output level for each band.

Variation between the frequency, amount of compression, and mix level is subjective in nature, and desired result may take some listening time to get the most satisfactory performance of your audio.

C3- NOISE EXPANDOR

The expandor board controls the amount of noise reduction (or dynamic 'gating”) that can be set to help eliminate background sound, such as fans, equipment noise, or other background audio noise. *The operation of the expandor board works in conjunction with the compressor/EQ boards, and overrides the effective compression during the expansion process, acting like a dynamic noise-reduction system*.

The **threshold control (11)** adjusts the sensitivity of the audio input level. Clockwise operation of the control increases the sensitivity, and fully clockwise, the expandor circuit is fully open, allowing all audio to pass through unaffected by the expandor. The LED indicator will turn from red to green when the expandor 'gating' is open (full output of the signal) and turn red when gating (or noise reduction) occurs.

The **release time (10)** adjusts how quickly the audio level drops down to the reduced (gated) level. Clockwise rotation increases the release time.

The **expansion depth control (12)** adjusts how low the audio is reduced. This control drops the background level as to how far gating occurs, and clockwise rotation will *reduce* the amount of dynamic gating cut-off point, and indicated by the red intensity of the LED. Fully counter-clockwise is full gating (no output below threshold), completely shutting down any audio background noise. *NOTE:- The brightness of the red portion of the LED is dependent on the EXP DEPTH control, and the brighter the* LED, the more expansion is occurring. Note this is a relative visual indication only, and not calibrated to any specific level.

C4- OUTPUT/BYPASS MODE

The five mix level outputs are “summed” together, so that all the band boards will be mixed into one signal, and adjusted by a master **output level control (3)**. The master output signal routes to the bypass/operate switch **(2)**. In bypass mode, the audio signal heard is from the microphone preamp output, and in operate, the audio signal heard is from the master output level. The switched output passes to the auxiliary and TX output drivers, which are independently adjustable output driver circuits.

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The auxiliary output is an unbalanced, line level signal, and the TX output is a low/high impedance output, wired by the selected pins on the corresponding 5-pin DIN plug.

The TX output is routed through the **TX select switch (13)**, which selects audio and PTT signals to the transmitter. Three separate transmitters can be selected to operate with full isolation.

Connecting the audio output to the transceiver can be through the microphone connector, or the rig auxiliary audio input, *which will yield a cleaner audio sound through the external audio input port of the transmitter*.

C5- HEADPHONE MIXER

The processed audio signal from the bypass switch also routes to the **TX monitor level control (6)** on the front panel. Stereo or mono headphones with a 1/4" stereo jack plugs into the **front panel jack (7)**.

Three distinct external, line level receive audio signals enter through the RX audio **(12)** input jacks on the rear panel, and selected to the **Rx select switch (14).** This signal selects which receiver input will be sent to the internal headphone monitor RX AUDIO control. You can mix the levels between the TX and RX audio independently, to your desired levels.

This mixed signal from the headphone controls is a line level output (1v RMS) is sent to the REC out jack on the rear panel**(15).** This output can be useful to record "what you hear" in the headphones.
Note: the mix levels affect both the headphone and REC OUT levels simultaneously

C6- PTT OPERATION

The microphone PTT signal routes directly to the selected TX output switch, so that keying the microphone also sends this same keying signal to the selected DIN socket TX output jack.

The **PTT jack (10)** on the rear panel connects to the PTT bus. This jack can be used for an external PTT switch or footswitch. Shorting this jack will activate the PTT bus.

The top panel **PTT button (4)** also connects to the PTT bus. When pressed, the power/PTT LED (item 1) will change color from green to red This button will operate either as a momentary or latching type PTT button.

D- TX OUTPUT MIC WIRING DETAIL

The TX OUTPUT connectors on the rear panel round DIN connector **(11)** is wired as follows:
1=MIC LO-Z+ 2=MIC HI-Z+ 3=GND 4=AUDIO - 5=PTT
The factory supports multiple rig types, and the exact cabling may vary from one model to another. Refer to the wiring diagram in section **C-1**.

Yaesu: FT102/FT107, FT747/757/767, FT847,FT1000/1000D 8 pin connector

DIN	RIG PIN
1	8
4	7
5	6
3	7

YAESU: FT990/ft992, FT1000MP/M-V 8 pin connector

DIN	RIG PIN
1	8
4	7
5	6
3	5

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Alinco DX77

Kenwood: TS130/140, TS430/440, TS850/TS870, TS930/940/950, SG2020,K2 8 pin connector

DIN	RIG PIN
1	1
4	7
5	2
3	8

Kenwood: TS140/440/450, TS680/690, TS570/711/790, TS811/850/870, TS940/950 13 pin ACC connector

DIN	RIG PIN
1	11
4	12
5	9
3	8

ICOM 735, 745/746, 756/756 PRO, 775, 781

DIN	RIG PIN
1	1
4	7
5	5
3	6

E- SAFETY FEATURES

The power input jack is protected against surges and overvoltage.

F- GENERAL SPECIFICATIONS:

AC/DC power supply:	AC:16-18VRMS AC or DC:16-20V, @ 1A
Frequency bands:	5, parametrically adjustable center frequency
Compression levels	adjustable for each band
Compressor attack/release times	factory set per band
Expansion depth range	-6dB to -60dB
Input frequency response	20-20,000Hz*
HPF cutoff	-6dB@30Hz
Mix level:	+/- 12dB per band
Max. PTT load :	1A , 50v DC
Headphone drive impedance	22 ohms, stereo
Operating Temp. range:	-10 to +50 degrees, C

* Processed frequency response internally limited by filtering for optimized performance.

ONE-YEAR LIMITED WARRANTY ON PARTS AND LABOR-

Covers Product purchased as new only.

JT COMMUNICATIONS LLC provides a warranty to the original purchaser of new

Products against defects in materials and workmanship for a period of

One (1) year *of normal consumer (non-commercial) usage.*

This warranty is not transferable.

If a Product covered by this warranty is determined to be defective within the warranty period, JT COMMUNICATIONS LLC will, unless otherwise required by applicable law, either repair or exchange the Product at its sole option and discretion.

How to Obtain Warranty Service

(An RMA required) To obtain warranty service, contact JT COMMUNICATIONS LLC Technical Support via email: TechSupport@jtcomms.com or by telephone at 352-236-0744(USA) from 8:00AM to 6:00PM Monday through Friday (holidays excluded), Eastern Time zone.

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PRE-AUTHORIZATION MUST BE OBTAINED BEFORE SENDING PRODUCT TO A JT COMMUNICATIONS LLC SERVICE CENTER. Proof of purchase in the form of a purchase receipt or copy thereof is required to show that a Product is within the warranty period.

Exchange: Should JT COMMUNICATIONS LLC elect to exchange a Product due to a covered defect during the warranty period, the replacement unit may at JT COMMUNICATIONS LLC's Sole option and discretion, be new or one which has been recertified, reconditioned, refurbished or otherwise remanufactured from new or used parts and is functionally equivalent to the original Product.

Repair: Parts and Labor There will be no charge for parts or labor to repair a Product for a covered defect during the warranty period. Replacement parts may, at JT COMMUNICATIONS LLC's sole option and discretion, be new, used, reconditioned, refurbished or otherwise remanufactured or recertified as functionally equivalent replacement parts.

Remaining Warranty: Repaired or exchanged units are warranted for the remaining portion of the Product's original warranty or for ninety (90) days from warranty service or exchange, whichever is longer. Any upgrade to the original Product will be covered only for the duration of the original warranty period.

Returning a Product for Warranty Service: After obtaining pre-authorization from JT COMMUNICATIONS LLC Technical Support (see above), defective Products within the warranty period must be sent to a JT COMMUNICATIONS LLC service center to obtain warranty service. JT COMMUNICATIONS LLC is not responsible for transportation costs to the service center, but JT COMMUNICATIONS LLC will cover return shipping to the customer. Products returned to JT COMMUNICATIONS LLC's service centers must be shipped in either the original carton box and shipping material or packaging that provides an equal degree of protection. JT COMMUNICATIONS LLC Technical Support will provide instructions for packing and shipping the covered Product to the JT COMMUNICATIONS LLC service center.

Exclusions- This warranty does not cover, for example: abuse, accident, acts of God, and protective coatings, cosmetic damage (e.g. scratches, dents, cracks), odor, damage caused by misuse with other products (e.g. accessories, housing, parts or software), damages from shipping, improper installation or operation, failure to follow installation/operation instructions, improper voltage supply or power surges, operating with higher than rated fuse, lack of reasonable use, misuse, modifications or alterations, normal wear and tear or aging, as well as installation and set-up issues or any tampering. Product repairs attempted by anyone other than by a JT COMMUNICATIONS LLC authorized service center. Products with unreadable or removed serial numbers or requiring routine maintenance are not covered.

This one year limited warranty does not cover Products sold "AS IS", "FACTORY RE-CERTIFIED", or by a non-authorized reseller.

Limitations- THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE LISTED OR DESCRIBED ABOVE. ANY IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL BE LIMITED IN DURATION TO THE PERIOD OF TIME SET FORTH ABOVE. JT COMMUNICATIONS LLC'S TOTAL LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM ANY CAUSE WHATSOEVER INCLUDING JT COMMUNICATIONS LLC'S NEGLIGENCE, ALLEGED DAMAGE, OR DEFECTIVE GOODS, WHETHER SUCH DEFECTS ARE DISCOVERABLE OR LATENT, SHALL IN NO EVENT EXCEED THE PURCHASE PRICE OF THE PRODUCT. JT COMMUNICATIONS LLC SHALL NOT BE RESPONSIBLE FOR LOSS OF USE, IINFORMATION OR DATA INCLUDING THAT CONTAINED IN OR STORED ON ANY DEVICE RETURNED TO JT COMMUNICATIONS LLC, WORK STOPPAGE, SYSTEM FAILURE OR MALFUNCTION, FAILURE OF OTHER EQUIPMENT OR PRODUCTS TO WHICH THE PRODUCT IS CONNECTED, COMMERCIAL LOSS, LOST REVENUE OR LOST PROFITS, LOSS OF GOODWILL, LOSS OF REPUTATION, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES.

NO ORAL OR WRITTEN REPRESENTATIONS MADE BY JT COMMUNICATIONS LLC OR ANY SELLER, RESELLER OR DISTRIBUTOR OF THE PRODUCT, INCLUDING EMPLOYEES AND AGENTS THEREOF, SHALL CREATE ANY ADDITIONAL WARANTY OBLIGATIONS, INCREASE THE SCOPE, OR OTHERWISE MODIFY IN ANY MANNER THE TERMS OF THIS LIMITED WARRANTY. TO THE EXTENT PERMITTED BY APPLICABLE LAW, JT COMMUNICATIONS LLC DOES NOT WARRANT THAT THE OPERATION OF ANY PRODUCTS OR SOFTWARE COVERED UNDER THIS LIMITED WARRANTY WILL MEET THE REQUIREMENTS, WORK IN COMBINATION WITH ANY HARDWARE OR SOFTWARE APPLICATIONS OR THIRD PARTY SERVICES, BE UNINTERRUPTED, ERROR FREE, OR WITHOUT RISK TO, OR LOSS OF, ANY INFORMATION, DATA, SOFTWARE OR APPLICATIONS CONTAINED THEREIN, OR THAT DEFECTS IN THE PRODUCTS OR SOFTWARE WILL BE CORRECTED.

SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION S OR EXCLUSIONS MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RADIOHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE.

THIS LIMITED WARRANTY IS SUBJECT TO CHANGE WITHOUT NOTICE.

In the event that any term or provision contained in this limited warranty is found to be invalid, illegal or unenforceable by a court of competent jurisdiction, then such provision shall be deemed modified to the extent necessary to make such provision enforceable by such court, taking into account the intent of the parties. The invalidity in whole or in part of any portion of this limited warranty shall not impair or affect the validity or enforceability of the remaining provisions of this limited warranty.

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