Asymod®

Asymmetrical Hi-Fi AM / eSSB Modulator

RANGER RCI 2995 DXCF **ADR** USER MANUAL

Asymod - **D**emod - **R**ecoder FRONT PANEL CONTROLS

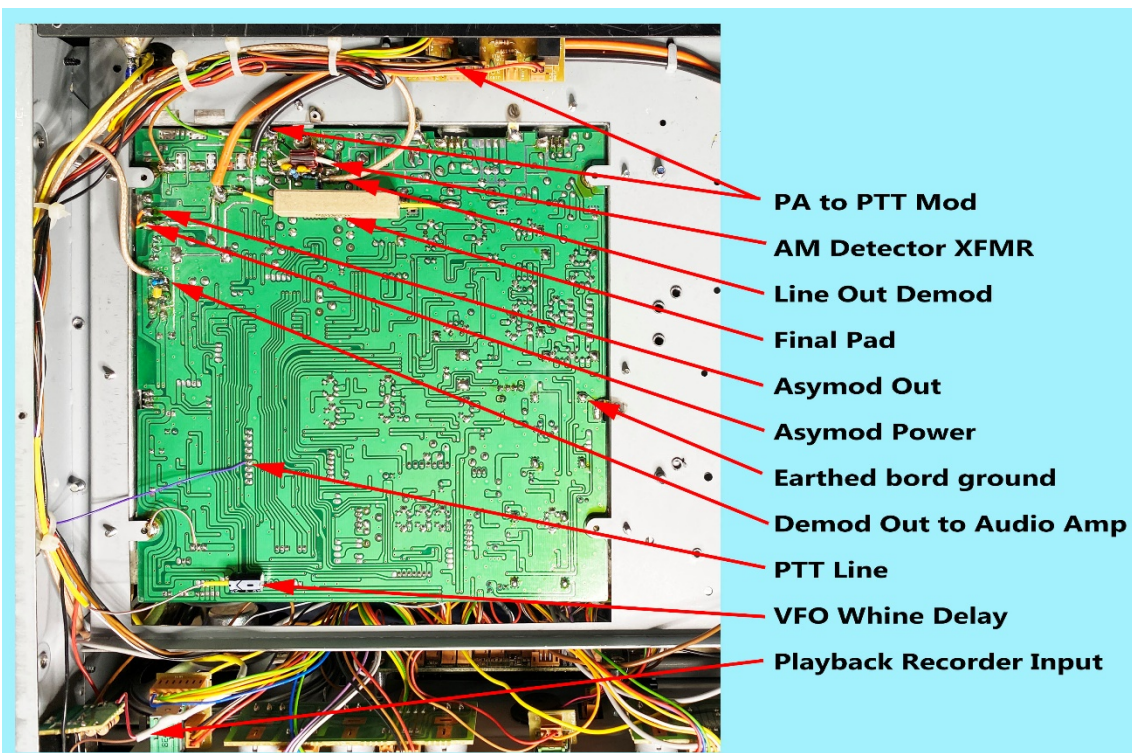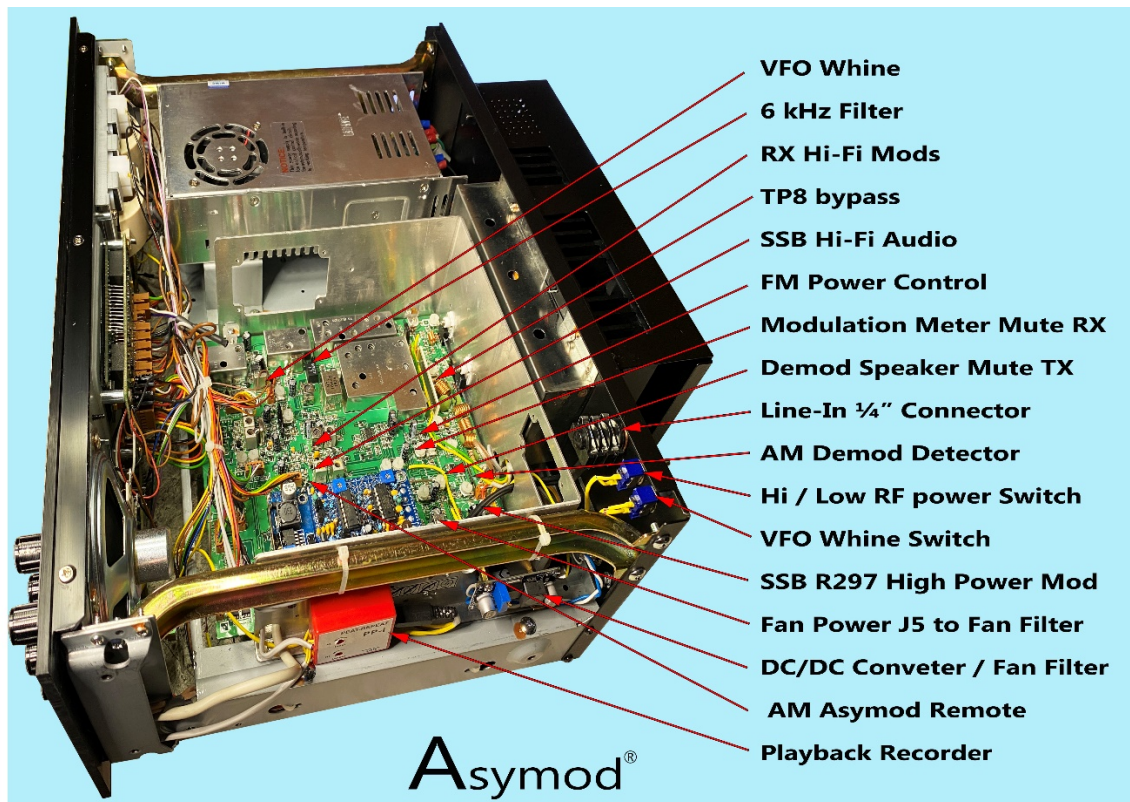Asymod products are available at www.asymod.am

Customer support: asymod@asymod.am

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Release Date: 5-30-2020

BLUTHUNDER **Technologies**

Please refer to the Ranger RCI-2995 DXCF User Manual for basic usage and care of this unit.

VFO Whine
6 kHz Filter
RX Hi-Fi Mods
TP8 bypass
SSB Hi-Fi Audio
FM Power Control
Modulation Meter Mute RX
Demod Speaker Mute TX
Line-In ¼" Connector
AM Demod Detector
Hi / Low RF power Switch
VFO Whine Switch
SSB R297 High Power Mod
Fan Power J5 to Fan Filter
DC/DC Conveter / Fan Filter
AM Asymod Remote
Playback Recorder

Asymod®

PA to PTT Mod
AM Detector XFMR
Line Out Demod
Final Pad
Asymod Out
Asymod Power
Earthed bord ground
Demod Out to Audio Amp
PTT Line
VFO Whine Delay
Playback Recorder Input

Asymod

- The modulation Level control allows for final audio control and is set in combination with the Carrier and Asymmetry controls to achieve the level on modulation desired.

- Carrier control sets the reference carrier level (dead key) to set the modulation and asymmetry levels.

- The Asymmetry control maintains the negative peaks at -100% modulation while allowing for positive peaks of excess of 300% without pinching or clipping.

For Asymod adjustments, settings and more, please refer to the manuals below:

[Asymod 6 Manual.pdf](#)
[Asymod 6 Description.pdf](#)

For all Asymod manuals, please visit our [Downloads](#) page.

As reference, follow the below modulation chart on page 7 for proper operation.

The transceiver/radio is only the exciter and should not be expected to generate high levels of RF power, it should be expected, however, to generate a clean, perfectly modulated wide-band Hi-Fi audio RF signal well within the limits of the headroom available without pinching or clipping at the crest or troughs of the modulation envelope which can be later amplified with a class AB, RF power amplifier and is best heard or monitored using the Demod function or on a good quality receiver equipped with a 6 kHz AM wideband filter while monitored on an oscilloscope.

The Asymod is not an audio processor, but it does allow for full bandwidth usage control with Pro Tools, a combination of rack gear, a multi band mastering processor, such as the DEQ2496 or an AM broadcast processor.

Audio processing and a high quality microphone is necessary for optimum performance.

Audio processing for mobile or base operation is possible with the use of the iRig PRE or iRig PRO interface using the companion IK Multimedia's VocalLive Vocal Processor app (not the free version) on your iOS device.

Audio processing for base operation is possible with the use of rack audio processing gear or computer based processing such as Pro Tools for PC or Mac along with its

companion interface such as the Mbox 2 Mini or newer. Pro Tools is the best choice and is highly recommended. Pro Tools sessions are free and available for download.

The Asymod 6 is NOT designed to give transceivers more RF power, more swing, or loud distorted modulation. It is however, to be used in conjunction with a properly set audio processing scheme to produce the loudness, punch, depth, and audio bandwidth with enhanced performance in tone, smoothness and dynamic range of a broadcast quality transmission which is what makes it stand out from the rest.

A Word about Audio Processing

Loudness and coverage are increased by reducing the peak-to-average ratio of the audio. If peaks are reduced, the average level can be increased within the permitted modulation limits. The effectiveness with which this can be accomplished without introducing objectionable side effects (like clipping distortion) is the single best measure of audio processing effectiveness.

Density is the extent to which the short-term RMS amplitude of audio envelope peaks is made uniform (at the expense of dynamic range). Programs with large amounts of short-term dynamic range have low density; highly compressed programs have high density. Reducing the peak-to-average ratio of the audio increases loudness. If peaks are reduced, the average level can be increased within the permitted modulation limits. The effectiveness with which this can be accomplished without introducing objectionable side effects (such as pumping or intermodulation distortion) is the single best measure of audio processing effectiveness.

Compression reduces the difference in level between the soft and loud sounds to make more efficient use of permitted peak level limits, resulting in a subjective increase in the loudness of soft sounds. It cannot make loud sounds seem louder. Compression reduces dynamic range relatively slowly in a manner similar to riding the gain: Limiting and clipping, on the other hand, reduce the short-term peak-to average ratio of the audio.

Limiting increases audio density. Increasing density can make loud sounds seem louder, but can also result in an unattractive busier, flatter, or denser sound. It is important to be aware of the many negative subjective side effects of excessive density when setting controls that affect the density of the processed sound.

Clipping sharp peaks does not produce any audible side effects when done moderately. Excessive clipping will be perceived as audible distortion.

Look-ahead limiting is limiting that prevents overshoots by examining a few milliseconds of the unprocessed sound before it is limited. This way the limiter can anticipate peaks that are coming up.

Demod

- The AM Demodulator allows real time monitoring of the transmitted signal. The audio output of the AM detector / demodulator is transparent. The AM audio is extracted from the RF output stage via the Demod's AM detector providing exact sampling of the TX audio to the headphone jack in the front panel. The Level control is the Demod's volume control while the Filter control provides a tone control of the Demod's audio.

  The Demod's audio is only available at the front panel's headphone jack. When the headphones are disconnected the RX audio will come out the speaker as expected but the Demod's audio will not. This is to avoid feedback while TX.

Playback Recorder

- The Playback Recorder allows for recording the RX audio up to 30 seconds at a time and play back instantly.

  To record, tune in a station and press the RECORD (red) button for any amount of time up to a maximum of 30 seconds.

  The TX audio can be recorded and played back as well since the Demod audio is routed to the recorder's input.

  To playback, key up the radio (press the PTT) and press the PLAYBACK (green) button. The playback OUTPUT level on the recorder must be set according to the Asymod settings. This adjustment may be needed only once as it needs to be matched to the average Asymod levels set by the operator. It may be needed to change the recorder's output level, is, if for example:

  1- Where the Asymod is run at 1 watt carrier and the Modulation and Asymmetry levels are set to match that of a 1 watt carrier. Here, the modulation will have to be set fairly

low as the 1 watt carrier does no need that much audio to be fully modulated. This may require the recorder's playback output audio level to be set lower than that of operating a 10 watt carrier.

2- Where the Asymod is run at 10 watt carrier and the Modulation and Asymmetry levels are set to match that of a 10 watt carrier. Here, the modulation level will have to be set higher to properly reach 100% modulation. This may require the recorder's playback output audio level to be set higher than that of operating a 1 watt carrier.

In some cases adjustments of the recorder levels may not be needed. When leaving all the same Asymod settings and switching from LOW to HIGH power or High to LOW.

The Asymod Hi-Fi recorder and playback module is currently under development and will be introduced and will replace the one currently being used soon after the release of this manual.

High / Low RF Power

- Hi and low power control is achieved by disabling the transceiver's PA (RF power amplifier), bypassing it. When the Power switch on the rear panel is switched to the ON position, the PA is enabled and when in the OFF position, the PA is bypassed.

- On low power the transceiver operates as a standard single final radio. Where you can do a maximum of a 4 watt carrier at 100% modulation which will take up all of the 16 watts PEP of available headroom. To be able to increase audio level with the Asymmetry control, is to operate under 2 watts of carrier to have the headroom for 200% modulation which is 16 watts PEP. On low power, DO NOT exceed 4 watts of carrier on LOW POWER.

- On High power the transceiver operates as a standard single final radio driving its 150 watt PEP PA. Where you can do a maximum of a 35 watt carrier at 100% modulation which will take up 140 out of the 150 watts PEP of available headroom. To be able to increase audio level with the Asymmetry control, operation should be on average under 25 watts. For headroom of 200% modulation the carrier has to be set at 18.75 watts PEP. On high power, DO NOT exceed 35 watts of carrier on HIGH POWER.

Follow the modulation chart for proper operation.
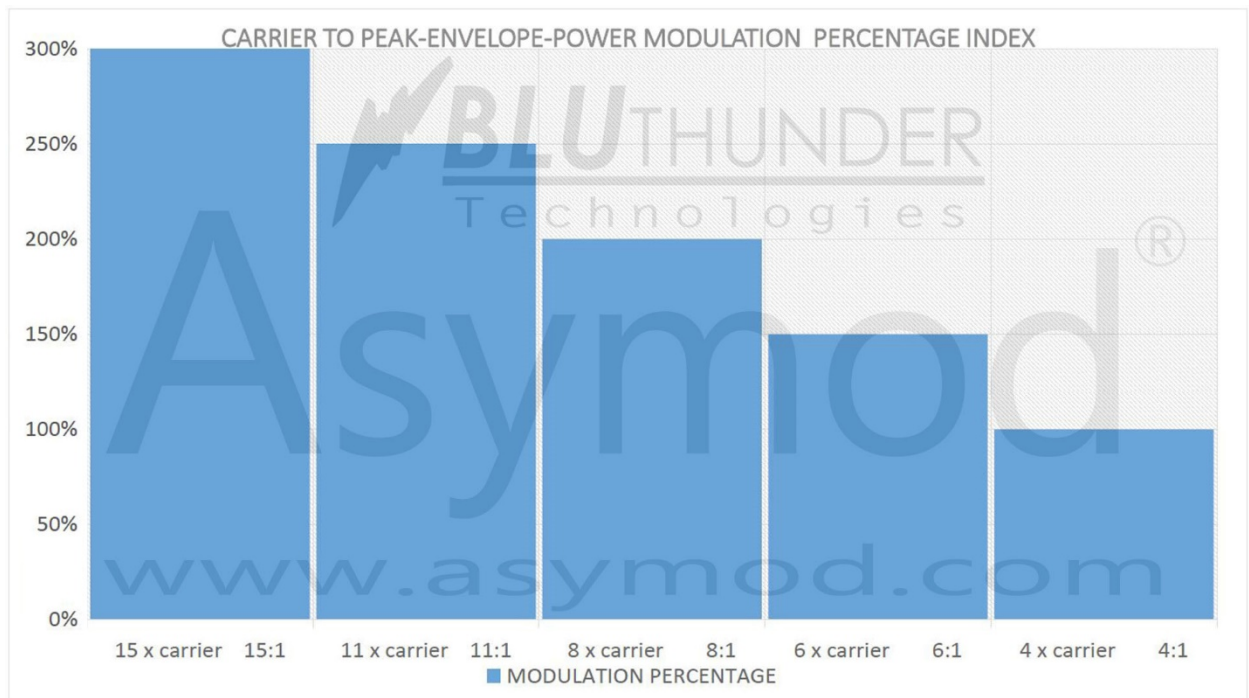
VFO Whine Effect

The VFO whine is enabled by the switch in the rear panel. This will only work while on AM mode. This causes the TX frequency to start off about 5 kHz from the channel's assigned frequency and move toward the channel's assigned frequency within about 3 seconds after the PTT is pressed. Once the PTT is pressed again, the process repeats. This drift in frequency causes what is known as the heterodyne effect once the TX signal clashes against another RF signal, giving the receiving station that is receiving both signals simultaneously, the sound of a squealing whine. This was originally aroused due to the capacitor glitch in the Browning Golden Eagle radio's feedback squeal when keying up back in the 70's.

Front Panel

Rear Panel

Specifications

Asymod 6 absolute maximum ratings

Audio input:
+4 dBu, 1.74 VPK or 1.23 VRMS

Power supply:
+15 volt supply @ 5A

 Remote control sensitivity:
+8V ~ +12 V

Asymod 6 Specifications:
Audio Input Range: Audio input: -30 dBu to +4 dBu

Frequency response:
Input: 20 Hz – 11 kHz.   Expandable to 20 kHz.
Output: 20 Hz – 11 kHz.   Expandable to 20 kHz.

 Total System Distortion (@ 300% modulation):
<0.01% THD 20 Hz – 1 kHz
<0.02% THD 1 kHz – 5 kHz
<0.03% THD 5 kHz – 14 kHz
<0.05% THD 14 kHz – 24 kHz

Input & Output Passive Low Pass Filter:
Selectable: 5 kHz, 8 kHz, 11 kHz or 20 kHz

Preamplifier Active Low Pass Filter:
Selectable: 8 kHz, 16 kHz

Transceiver Specifications:

AM TX:

Carrier: 1 - 10 Watts
Peak Envelope Power: 11 - 150 Watts
Modulation: 100% – 350%
TX Bandwidth: Up to 20 kHz (dependent on audio process roll-off)

AM RX:
Bandwidth: +/- 7.5 kHz

Att Band Width: +/- 15 kHz
Stop Band Att 455/ +/- 100 kHz: 40 dB
Audio amp response: 15+ kHz

SSB TX:
Peak Envelope Power: 10 - 150 Watts
TX Bandwidth: Up to 4.7 kHz (dependent on audio process roll-off)

SSB RX:
Bandwidth: +/- 2.5 kHz
-3dB Bandwidth: +/- 4.5 kHz
Audio Amplifier Frequency Response: 15+ kHz

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