Ten-Tec brings back a 40-year-old concept with an outboard RF speech processor that not only makes your audio sound better but increases your average power output as well. WB6NOA has our review...

CQ Reviews:

Ten-Tec Model 715 RF Speech Processor

BY GORDON WEST,* WB6NOA

Every morning, 0830 to 0915 Pacific time, we conduct a 40-meter net on 7250 kHz, working stations up and down the West Coast. Our directed net encourages net members and visitors to experiment with their antenna and radio systems with fellow first-hop skywave operators. Almost every net, we hear from operators trying out something new at their stations, receiving multiple reports from others on the net.

One skywave net member regularly checked in, and I encouraged him to speak closer to the microphone, because the initial mic "click" indicated his voice output needed a boost. Close-talking the mic, he sounded better. We then asked him to turn on speech processing, and his signal came up a little bit more.

He then switched on his Ten-Tec model 715 speech processor, and his signal went instantly from a relatively normal-sounding signal to Wow! No splatter, no excessively wide signal, just powerful modulation with sparkling highs and booming lows, as well as an amazing increase in signal strength.

"There was little comparison between his rig's usual speech processor and the huge improvement with the Ten-Tec speech processor," comments Bill Alber, WA6CAX, one of the net regulars, adding, "you could tune either side of the signal and it was clean."

I contacted Ten-Tec and ordered one of these processors for evaluation. They explained I should see up to 6 dB increase in average power output on most low-priced and mid-priced rigs that may only offer built-in speech compression. It was indicated that simple built-in compression circuits may use just an audio frequency "clipper," without the capability to remove or change either harmonic distortion or intermodulation (IM) distortion. The simple rig's on/off compression circuit may not have a fraction of the audio characteristics found in the Ten-Tec 715.

If you have a high-priced transceiver, with menu selections for tailoring audio frequency levels, and you have matched your equipment to a high-quality microphone, then chances are your audio will be in good shape. However, the 715 does something even the audio tailoring on the high-priced rigs doesn't: It increases your average power output. Thus, it can help boost your signal regardless of what kind of rig you have.

The Ten-Tec Model 715 RF speech processor not only tailors your transmit audio but actually converts it into a low-level SSB signal before processing it and turning it back into audio to feed into your rig's mic input. This results in higher average output power along with better-sounding audio.

How it Works

The Ten-Tec model 715 mixes input audio from your microphone with a local

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About RF Speech Processing

The idea and basic technology of RF speech processing are not new. Ten-Tec credits Harold Collins, W6JES, in a January 1969 *QST* article, with first writing about its basic theory and use. A copy of that article is even included with the model 715. After reading it you will begin to understand how the internal mini-SSB modulator ultimately drives a purer audio signal into your own SSB transceiver.

Ten-Tec's Scott Robbins says the main advantage of converting audio to a low-level SSB signal, filtering it, and converting it back to audio is that low-gain, high-amplitude audio peaks are suppressed. These, he says, contribute to a loss of audio "punch" in a signal. Plus, he adds, with those low-gain peaks minimized, power is directed into higher gain audio peaks, which equals more power output from the radio.

According to Robbins, a couple of RF speech processors came onto the market in the 1970s but never gained popularity because they drove the duty cycle of a transmitter higher than is typically found in single sideband. Early solid-state transceivers had trouble handling the higher duty cycle, he said, so the RF speech processor idea fell out of favor and has been dormant for the last 25 years or so. Today's solid-state transmitters are much hardier, though, and Ten-Tec felt the time was right to bring the concept back into the ham marketplace.

oscillator to output a 455-kHz, double-sideband, suppressed-carrier signal inside the black box. Ten-Tec's specially selected filters remove the opposite sideband, and then the resulting signal is amplified, clipped, and fed to additional filters to remove harmonics and intermodulation distortion.

"Harmonic distortion tends to be more grating than IM distortion," comments Scott Robbins, W4PA, of Ten-Tec.

"The resulting amplified and clipped 455-kHz SSB signal is then converted back into audio, for output to almost any brand of transceiver, using our microphone-plug conversion assembly," adds Ten-Tec. (For more on the technology and its history, see the sidebar, "About RF Speech Processing.")

The processor comes with a heavy transformer-type wall-wart power supply, 15 volts DC output, center pin hot. Twelve volts coming from your station's DC voltage source will work, too, and this way you don't have the wall-wart constantly on in circuit, giving off heat. However, Ten-Tec says it designed the system this way on purpose for two reasons. First, it hopes that having a separate power source will eliminate the possibility of setting up a ground loop with the transceiver, which can introduce hum or noise into the audio. Second, it gave them more control over the power supply quality, as the 715's performance may be affected by running off even a somewhat "dirty" 12-volt supply. Therefore, if you get great results with your rig's power supply, great. If there's hum or noise on your signal, try Ten-Tec's wall-wart before calling technical support.

It Should Work with Your Rig

They tell me this Ten-Tec processor works with virtually any high-frequency SSB ham rig. There's a supplied jumper for use with ICOM and ICOM-wired microphones that share the audio line and polarizing voltage for powering the mic element on the same pin. There have been changes in ICOM mic plug wiring over the years, so if you have an ICOM transceiver, you will need to check your rig's manual to see how to

set up that jumper, depending on the model you're using.

As the equipment is shipped with the stock microphone connector, it will fit metal 8-pin Ten-Tec and Yaesu products, and Ten-Tec supplied me with the Kenwood mic adapter. The ICOM jumper is included, too.

If your transceiver needs greater drive power—especially if it's a very old one—an internal potentiometer can take output higher. I recommend that you specify which transceiver you plan to use with this equipment, and this way you end up with all the right cables between the black box and your microphone input.

Off-Air Testing First!

If you have a pair of HF transceivers, you can conduct your own off-air adjustment. The transceiver with the new speech processor will transmit into a dummy load, adjusting power all the way down. Some older radios do not have a power control, so make sure your dummy load can handle 100 watts for a few seconds if you can't turn down the output power.

The other transceiver, which is going to be your test receiver, is best operated with a set of headphones, absolutely no antenna, and the noise blanker turned off. Dial in to the same frequency on both, and with the Ten-Tec box set in the OUT position, test your normal microphone setting with any built-in transceiver processing turned off as well. If the receiver's meter pegs on signal strength, you somehow need to reduce sensitivity to get about an S-5 reading.

OK, you're transmitting 5 watts of power into the dummy load, your other transceiver without an antenna picks up your signal about S-5, and your headphones keep the audio from going into feedback. Listen to your transmit signal with your stock mic and no built-in speech compressor. Next turn on your rig's built-in compression (if it has it), and hear your voice with a little more bravado. Now switch off the built-in compression. With all levels on the black box turned to minimum, turn on the Ten-Tec speech processor. Now adjust the front-panel processing gain control and get enough LED bars to light about two or three. My! Your voice sounds majestic, doesn't it?

Next, on the rear of the Ten-Tec black box adjust processing LEVEL while monitoring the ALC level on your transceiver. Then readjust the front-panel processing GAIN control. Wow, sounds good, right?

It can get even better. . . . Now work with the PASSBAND control on the Ten-Tec 715. This lets you add more bass or treble when speaking into your microphone. This passband control internally sets the beat frequency oscillator in relation to the ceramic filters used for SSB generation, and helps eliminate distortion. It has no effect on the amount of clipping. The amount of clipping is determined with the processor gain control.

OK, you now sound like the Voice of America. Switch the Ten-Tec processor out and listen to yourself with and without your transceiver's processing circuit. Wimpy!

You won't see any increase in *peak* output power, as this speech processor removes low-energy, high-amplitude peaks, which do not contribute to articulation. It specifically leaves in speech-level components to increase *average* power output, and that, says Ten-Tec, is what sets the 715 apart from anything else in the ham market today, including its own transceivers!

Before switching over to a live antenna and your buddy 400 miles away on 40 meters, listen again to your modulation and make sure you're not sounding like a CBer "good buddy" with a power mic turned all the way up with room echoes all over the place. This you don't want.

You are now on the air, and your 40-meter friends will definitely hear the difference. Have them tune to each side of your signal to ensure that you are remaining clean on the air. Keep track of your ALC, and everyone will be amazed at the quality of your voice, and your signal, from this Ten-Tec speech-processing product.

Thus, if you are a regular on high frequency, and especially if you are using equipment more than a couple of years old, minus graphic equalization on mic input, consider the boost in your voice quality and your average power that will come with the Ten-Tec processor.

Just be sure to order the correct plug for your brand and model of transceiver. Ten-Tec even has 4-pin plugs, too! Then get some amazing signal reports that begin with, "Wow, great audio!"

Retail price for the model 715 is $249 plus shipping and includes one cable of your choice. For more info, or to order, go to <www.tentec.com>.