DOUG'S DESK

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CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORYs

Enhanced Audio Quality On Transmit

If one tunes across his or her favorite phone band a few times, it becomes apparent that audio quality is not everyone's most important product. Some signals are so badly distorted that it's nearly impossible to extract intelligence from the person's transmission. Other signals have excessive high- or low-frequency response, and depending upon the operator's voice, the lack of sufficient "lows" or "highs" can render the signal difficult to read. In this context, horrendous audio quality is heard all too often from rigs the operators of which can't resist using the speech processor, which, if adjusted correctly, can add some worthwhile "presence" to a signal without compromising the audio quality. Most processed signals sound like trash because the operator cranks up his mic gain excessively and uses 20 or more dB of compression. Not only does the signal sound bad on the operating frequency, but it spreads out across a wide frequency range because of distortion products. This unfairly interferes with communications that are in progress up and down the band from the offender's operating frequency. Ironically, we often hear the offender's brethren tell him that he sounds great and has no distortion. I have spoken in person to some operators who can't seem to operate without a lot of compression and excessive mic gain, only to be told that "I get out better that way." No amount of well-intentioned counsel can change their minds about this common misuse of the transmitter audio circuit.

Speech Processing in General

A speech processor increases the *average* output power of the transmitter, which in effect fills in the valleys between signal peaks. It is easy to detect heavy processing by observing your S meter when copying such a signal. In a worst-case example the S meter remains constant (receiver slow AGC setting) as the person talks, whereas normally (no processing or light processing) there will be a decline in the S-meter reading between words. This excessive or heavy signal processing destroys the audio quality and makes the signal difficult to copy, even when the signal is 20 or more dB above S9. Excessive processing is hard on a linear amplifier because the duty cycle is such that the tubes have little chance to rest between words. Many a 3-500Z tube has had its life shortened by many hours because the operator used too much processing most of the time.

Most modern transmitters or transceivers are designed to permit reading the processing level in dB. If the operator sets his mic level correctly and uses no more than 6 dB of compression during processing, the signal will sound great and will have just enough added punch to make it stand out in QRM. This assumes, or course, that the unprocessed audio sounds good in the first place. I have often wished that equipment manufacturers were required to limit the amount of compression to 10 dB by means of a built-in governor circuit!

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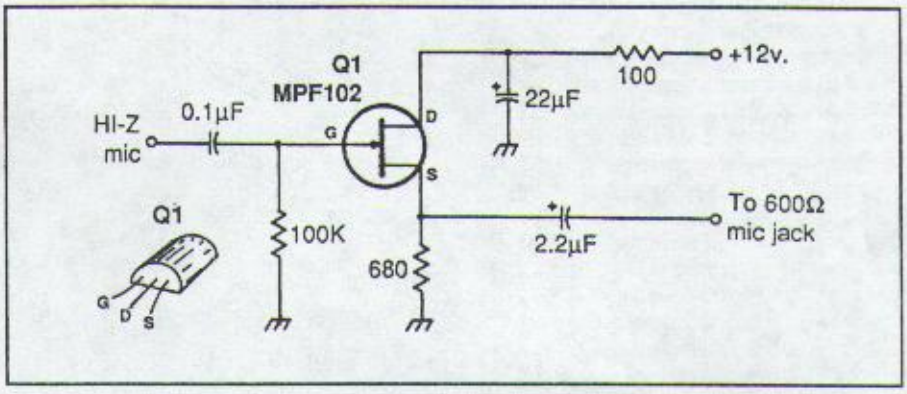

Fig. 1– Circuit for a simple microphone step-down impedance matcher for using a 50K ohm mic, such as a D-104, with a modern transmitter that has a 600 ohm mic input circuit. Any N-channel JFET may be used at Q1.

Match the Mic Impedance

The wrong mic with a specified transmitter can make it sound as if it has a "screech" amplifier rather than a speech amplifier. Most modern equipment is designed for a 600 ohm microphone. Despite this fact there are a number of operators who prefer, for example, the once-famous D-104 desk microphone. These "lollipop" mics have excellent output quality if they are connected to the right load. However, they have a characteristic impedance on the order of 50K ohms. Interfacing the D-104 to a 600 ohm port not only spoils the low-frequency response, it effectively reduces the mic output level. Here again we must recognize that maximum power transfer can only occur when unlike impedances are matched. Some operators have applied a simple-fix "bandaid" to overcome the mismatch problem by placing a 100K ohm resistor in series with the audio line from the mic. This provides a better load for the mic, but the resistor attenuates the high-frequency response somewhat. A better method for obtaining an impedance match is seen in fig. 1, where a JFET is utilized as an impedance transformer.

Hand-Held Microphones

Audio response is often restricted by the elements found in hand-held mics that come as standard equipment with transceivers. Most of the elements are the dynamic type and they seem to favor the lower frequencies. Persons with bassy voices (I am one) are told that their audio is difficult to copy because there are no "highs." I find it incredible that $1500 (or more) transceivers don't come equipped with mics that deliver the same audio quality as the desk mics made by the same manufacturer. Part of the problem is that the desk mics generally contain electret elements, which produce excellent audio quality. I have heard some hand-held mics on new rigs that sound no better than a carbon mic, no matter how the operator adjusts the mic level of the rig. If you are told that you have "tinny" audio with your hand-held mic, then give