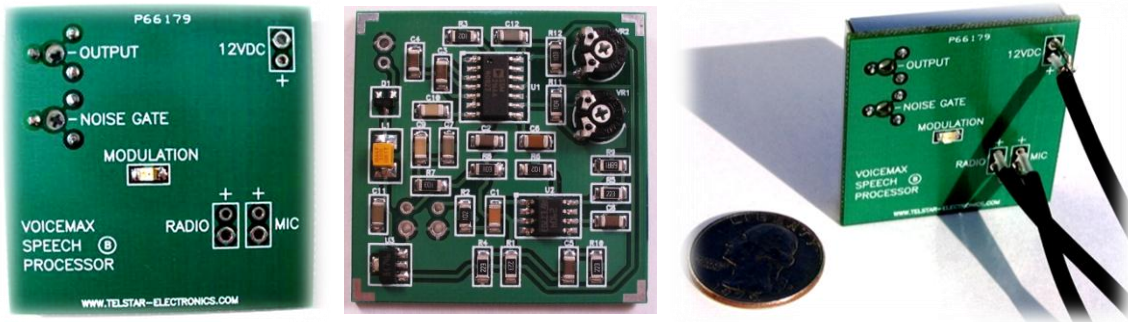


VoiceMax

Transceiver Speech Processor



www.telstar-electronics.com



Two-way radio communication relies on the modulation content within the signal. Maintaining a high modulation level is crucial in providing the highest possible range from any transmitter operating on AM, FM, or SSB modes. Two-way radios use microphones that inherently change audio levels delivered to the transmitter. This causes transmitter modulation to fluctuate greatly depending on voice level and pitch. **The average modulation of a typical voice signal is only about 40%.** This low percentage applied to the transmitter, results in less than optimal transmission range.

VoiceMax uses a sophisticated AGC (Automatic Gain Control) circuit that installs inside your transceiver to hold the audio level constant, with less than 0.3% total harmonic distortion. No "clipping" type processor can come close to this low distortion level. **Whether you're whispering or shouting, VoiceMax holds your transceiver at 100% modulation allowing you to punch through heavy channel traffic without sacrificing voice clarity.** VoiceMax incorporates a feature not offered on other processors. The adjustable noise gate allows the user to block unwanted ambient background sounds. This feature is especially helpful in mobile environments where wind and road noise can be an issue. VoiceMax works with your non-amplified dynamic microphone to give you tremendous audio punch without all the background noise associated with power microphones.

Features

- Automatic Gain Control Maintains Constant 100% Modulation Level
- Complete Audio Processing for Non-Amplified Dynamic Microphones
- High Compression Ratio and Dynamic Range
- Adjustable Output Limiter Prevents Over-Modulation
- Adjustable Noise Gate Eliminates Ambient Noise
- Extremely Low Total Harmonic Distortion
- Modulation Indicator LED
- Tiny Surface Mount Technology Mounts Inside Transceiver
- Completely Shielded for High RF Immunity
- Reverse Polarity Protected
- No Batteries Necessary
- 100% Production Tested
- 90 Day Limited Warranty

The VoiceMax module has an implied warranty to be free of defects in materials and workmanship for a period of 90 days from purchase. This warranty covers workmanship, parts, and labor. If it's determined that the module has been used for a purpose other than intended, abused, or altered in any way, the warranty shall be void. Telstar Electronics cannot be held liable for damages to equipment caused by improper installation. Specifications subject to change without notice. All Telstar products are designed and manufactured in the United States.

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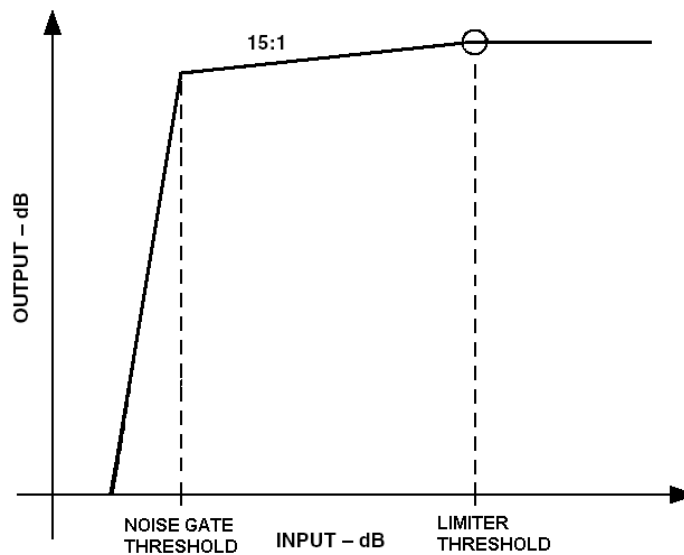
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Specifications

PARAMETER	VALUE	NOTES / CONDITIONS
Voltage	8-16V _{DC}	-
Current	10mA	Maximum
Bandwidth	200 _{HZ} - 20K _{HZ}	Typical
Power	50mW	Maximum
Input Voltage	2.8V _{Peak to Peak}	Maximum
Input Impedance	10K Ohms	Typical
Output Limiting Threshold	60mV - 200mV _{Peak to Peak}	Adjustable
Output Impedance	100 Ohms	Drive >1K Ohm Loads
Audio Compression Ratio	15:1	Fixed
Compressor Release Time	500mS	Typical
Limiter Attack Time	1mS	Typical
AGC* Dynamic Range	60dB	Maximum
Total Harmonic Distortion	0.3% at 1K _{HZ} = -52dB	Typical
Noise Gate Threshold	1.5mV - 6mV _{Peak to Peak}	Adjustable
Operating Temperature Range	-20C to +70C	Non-Condensing Humidity
Weight	50 Grams	Typical
Dimensions	1.6" x 1.6" x 0.32"	Length x Width x Height
Input / Output Cables	RG-174/U	Coaxial (shielded)
Power Cable	RG-174/U	Coaxial (shielded)
PCB Material	Premium Grade FR4	0.062" Thickness



VOICEMAX CHARACTERISTICS

* Automatic Gain Control

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Installation

EQUIPMENT REQUIRED

- Transceiver Schematic
- Soldering Equipment
- Exacto® Knife or Equivalent
- Wire or Coax Stripper
- Bubble Bag (provided)
- Screwdriver

IMPORTANT - The VoiceMax module requires a minor modification to the audio section of the transceiver before installation. This modification involves breaking the audio path from the microphone connector to the first audio amplifier in the transceiver. Telstar Electronics highly recommends that a schematic diagram of the transceiver be consulted before this operation is performed.

1. Remove transceiver cover(s) to gain access to internal circuitry.
2. **IMPORTANT** – Make certain a suitable place exists within transceiver for VoiceMax module before proceeding with installation.
3. Using schematic diagram, locate audio path from the microphone connector to the first audio amplifier in transceiver. With an Exacto® knife or equivalent carefully cut trace/connection as close to the microphone connector as possible. The audio path has now been separated into two sections.
4. Locate **MIC** cable on VoiceMax module. Solder center conductor of the coaxial cable to audio path that leads directly to microphone connector. Locate nearest ground and solder outer braid to that point.
5. Locate **RADIO** cable on VoiceMax module. Solder center conductor of the coaxial cable to audio path that leads directly to first audio amplifier stage. Locate nearest ground and solder outer braid to that point.
6. Locate **12VDC** cable on VoiceMax module. Solder center conductor of the coaxial cable to a switched DC voltage source between 8-16V_{DC}. Locate nearest ground and solder outer braid to that point.
7. With VoiceMax module safely insulated from transceiver circuitry, continue to adjustment procedure on page #4.
8. **IMPORTANT** - After adjustment procedure is complete, insert the VoiceMax module into the provided bubble bag[†]. Carefully position enclosed module inside transceiver in the planned location. Make certain module placement doesn't interfere with the transceiver cover(s). Secure bag in position with tape if necessary.
9. Re-install transceiver cover(s).

[†] The VoiceMax module must be insulated from other connections and components when mounted inside the transceiver, to avoid electrical short-circuits.

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Adjustment

EQUIPMENT REQUIRED

- DC Power Source (transceiver)
- Oscilloscope (optional)
- RF Load
- Small Phillips Screwdriver (blade width 1/16")

1. Connect a suitable RF dummy load to transceiver.

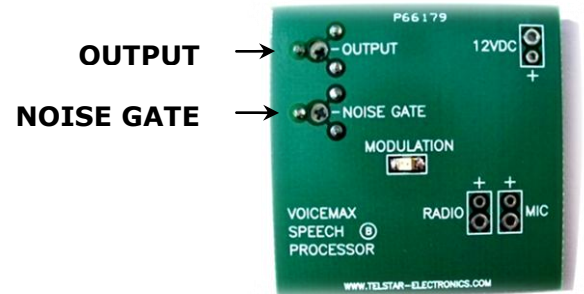
HINT - If an oscilloscope is available, connect to transceiver output. This will enable precise adjustment of VoiceMax output limiting to avoid over-modulation.

2. Rotate **OUTPUT** control fully counter-clockwise.

3. Rotate **NOISE GATE** control fully counter-clockwise.

4. With VoiceMax module safely insulated from transceiver circuitry, apply power to transceiver.

5. Key transmitter and speak into microphone in a normal voice.



HINT - If an oscilloscope is available, monitor the output of the transceiver. Rotate **OUTPUT** control clockwise until oscilloscope shows a modulation envelope constant at 100% during speech[‡].

6. Have an assistant monitor your voice transmission with another receiver while you rotate **OUTPUT** control clockwise. The optimal position of **OUTPUT** control is at a point of maximum modulation without audible distortion[§].

7. Key transmitter again and simulate anticipated level of ambient noise. The **MODULATION** indicator should be lit or flickering.

8. With transceiver keyed and ambient noise present, rotate **NOISE GATE** control clockwise until the **MODULATION** indicator goes off. This effectively has squelched the ambient background noise. Now speak normally into the microphone. The **MODULATION** indicator should flash on and off in sync with the voice applied^{**}.

9. Continue to step #8 of installation section on page #3.

[‡] Transceivers have built-in circuitry that automatically limits modulation to levels accepted by the Federal Communication Commission. If you are unable to adjust VoiceMax for the desired modulation level, the transceiver's internal limiter circuitry must be adjusted or disabled.

[§] Audio distortion is characterized by a fuzzy or unclear sound.

^{**} This step may need to be repeated several times to strike a balance between background sounds and voice levels.

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Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
No modulation from transceiver.	Poor connection.	Check all coaxial cable connections from VoiceMax module to transceiver.
	VoiceMax module has no DC power.	Check power source from transceiver.
Modulation indicator doesn't illuminate during transmission.	Noise gate threshold too high.	Refer to adjustment procedure on page #4.
	VoiceMax module has no DC power.	Check power source from transceiver.
	Poor connection.	Check all coaxial cable connections from VoiceMax module to transceiver.
Modulation indicator illuminated constantly during transmission.	Noise gate threshold too low.	Refer to adjustment procedure on page #4.
Modulation sounds choppy.	Noise gate threshold too high.	Refer to adjustment procedure on page #4.
Modulation is distorted.	VoiceMax output level too high and modulation from transceiver exceeding 100%.	Refer to adjustment procedure on page #4.
Unable to adjust output for 100% modulation level.	Limiting circuitry inside transceiver.	1.) Adjust or disable transceiver internal modulation limiting. 2.) Refer to adjustment procedure on page #4.

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