



## **MOT-TVS-2-GP**

**High Level Rolling Code Scrambler**

## **MOT-VPU-15-GP**

**Voice Inversion Scrambler**

**Manual Revision: 2008-08-05**

**Covers Software Revisions:**

**TVS-2:** 4.97 & Higher

**VPU-15:** 4.97 & Higher

**Covers Hardware Revisions:**

**MOT-GP:** 277F

**This manual supports the following Midian scramblers:**

MOT-TVS-2-GP & MOT-VPU-15-GP

**This manual supports the following radios:**

GP-300, GP-350, GP-88, P-110

## SPECIFICATIONS

Operating Voltage	5 VDC
Operating Current	14 mA
Operating Temperature	-30 - +60 C
Frequency Response	300-2600 Hz
Input Impedance	20 k $\Omega$
Input Level (TX)	70 mV RMS
Input Level (RX)	500 mV RMS min.
Carrier Suppression	55 dB < Peak Voice
Audio Output Impedance (RX)	24 K $\Omega$
Audio Output Impedance (TX)	30 K $\Omega$

### Encryption Specifications

<b>TVS-2:</b> Encryption Sequences	+40 Trillion
<b>TVS-2:</b> Random Number Generator	64 bits
<b>TVS-2:</b> Sequence Length (est.)	84 billion years

<b>VPU-15:</b> Inversion Codes Available	37
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## GENERAL INFORMATION

The MOT-TV2S-2-GP is a high-level rolling code scrambler that wires into the Motorola GP-300/350/88 & P-110 radios. The TVS-2 uses hopping type rolling code encryption for higher security rather than sweeping code type and offers 4 user-programmable hop rates and is down gradable to voice inversion. The scrambler is capable of features such as ANI, ENI, OTAR, Deadbeat Disable, Spy, and more when using Midian's Kryptic Signaling format with the CAD-300/DDU-300/TRC-300.

The MOT-VPU-15-GP is an entry level voice inversion scrambler that wires into the Motorola GP-300/350/88 & P-110 radios. The scrambler is capable of features such as ANI, ENI, OTAR, Deadbeat Disable, Spy, and more when using Midian's Kryptic Signaling format with the CAD-300/DDU-300/TRC-300.

For more detailed information on the scramblers' features, troubleshooting and system information please reference the TVS-2 Technical Reference Manual.

## INSTALLATION OVERVIEW

1. Test the radio for functionality.
2. Program the scrambler per the Product Programming Section of this manual.
3. Install the scrambler into the radio per the Hardware Installation Section of this manual.

Note: Midian is not responsible for any damage/loss resulting from the use of Midian's products.

## RADIO PROGRAMMING

No special programming is required.

## HARDWARE INSTALLATION

Be certain to follow standard anti-static procedures when handling any of Midian's products.

**P1-1 – Green** – COR Input – Connect to the junction of R-475, C-458 and CSQ DET.

**P1-2 – Red** – VIN +5.5-15 VDC – Connect to Motorola P1 connector Pin 2.

**P1-3 – Brown** – RX Audio In – Connect to Motorola P1 connector Pin 7. Remove R-455 from the radio to break the RX audio.

**P1-4 – Black** – Ground – Connect to Motorola P1 Connector Pin 8.

**P1-5 – Blue** – TX Audio In – Connect to Motorola P1 connector Pin 5. Remove R-506 from the radio to break the TX audio.

**P1-6 – Orange** – RX Audio Out – Connect to Motorola P1 connector Pin 6.

**P1-7 – Yellow** – TX Audio Out – Connect to Motorola P1 connector Pin 4.

**P1-8 – Green/White** – PTT In - Remove the radio's PTT switch PB403 and snip off the ears on the two connector pins. Clean out both holes in the board and reinsert the switch. Resolder the ground side of the PTT switch. On the other side of the PTT switch, install a piece of shrink tubing over the pin and solder the green/white wire from Midian's connector Pin #8 to the floating pin protected by the shrink tubing. This input requires a logic low from PTT switch.

**Important Note:** In order to enable features such as deadbeat disable, the PTT path must be broken as described above. If these features are not needed, the path may be left unbroken and you will not have to remove the switch as described above. If you do not break the PTT path, you should connect both PTT In and PTT Out to the solder pad on high side of the PTT switch. If you do this you must program the scrambler for common PTT. If common PTT is not programmed, the radio will remain keyed indefinitely.

**P1-9 – White** – Mode Input – Connect to the top of C-467, which is connected to the OPT 2 switch.

**P1-10 – Gray/White** – Audio Enable – Connect to the base of Q-411. Cut the trace from the base of Q-411 to Pin 3 of U-402. Then install a 47K resistor across the cut trace.

**P1-11 – Gray** – Alert Tone Speaker Audio – Connect to the junction of R464, R465 and R466. If a higher level of audio is needed, R-12 on the scrambler should be lowered. This lead can also be hooked to the top of R460, so that the level can be adjusted.

**P1-12 – Orange/White** – Mode LED – This wire can be used to indicate scramble mode by increasing the brightness of the green/red status LED on top of the radio. To use this feature, connect to Pin #3 of DS401.

**P1-13 – Violet** – PTT Out – See the instructions for P1-8 PTT In. Connect this wire to the eyelet surrounding the other pin on the PTT switch that has been protected by shrink tubing.

The following wires are located immediately to the side of the P1 connector on the scrambler.

**Pad 1 – Red/White** – Emergency Input – When momentarily grounded the unit will send an emergency ANI.

**Pad 2 – Green/White** – Program Out – Connect this wire to the yellow clip lead on the KL-3 programming cable.

**Pad 3 – Orange/White** – Program In – Connect this wire to the green clip lead on the KL-3 programming cable.

## HARDWARE ALIGNMENT

The hardware is pre-aligned for installation into the GP-300/350/88 and P-110.

## PRODUCT PROGRAMMING

Midian's MOT-TVS-2-GP is programmed via Midian's KL-3 programming cable. Please reference the KL-3 manual for setup instructions of the KL-3 software and hardware. From the product selection screen on the KL-3 UP software, select the TVS-2 from the list and click OK.

Set the parameters of the TVS-2 software to fit the application. If any clarifications on a feature are required, move the mouse cursor over the feature name until the question mark appears and right click, a definition of the feature will be shown.

After entering the parameters, save the file by going to File - Save As. Enter the file name in the File Name block and click Save. Saving the file will allow for quick and easy reprogramming of units.

**KL-3 Programming:** Only the Black and Green KL-3 leads need to be connected to the TVS-2 for product programming. Connect the green KL-3 lead to P2-8 on the TVS-2 and the black KL-3 to a common ground. With power on to the scrambler, click ProgramUnit! in the KL-3 UP software.

**KL-3 Reading:** The Yellow KL-3 lead, along with the Black and Green leads, is required for reading the unit. Connect the yellow KL-3 lead to P2-10 on the TVS-2. With power on to the scrambler, click ReadUnit! in the KL-3 UP software.

After programming or reading the TVS-2 turn off the scrambler for 3 seconds and then turn back on.

**Important Note:** Do not attempt to 'clone' the scrambler by reading one and then programming another. When the scrambler is read, the security codes will be read out as zeroes. If another scrambler is then cloned with this information, the scramblers will be incompatible because they have different security codes. To ensure scramblers communicate with each other, program them from a saved *file*.

## OPERATION

### Mode Select:

**Momentary Switch:** When using a momentary switch, pressing and then releasing the switch will cause the scrambler to switch modes. A medium tone followed by a high tone indicates the scrambler has been switched into scrambled mode. A medium tone followed by a low tone indicates the scrambler has been switched into clear mode.

### Code Select:

**Momentary Switch:** When using a momentary switch, pressing and holding the switch will toggle the scrambler through the programmed codes (1-4 codes). The scrambler will emit a number of tones corresponding to the code that is being switched to. When the desired code is reached simply release the switch.

## TECHNICAL NOTES

**Radio Compatibility:** Midian has taken the utmost care to ensure the option board integrates into the radio with minimal impact to the features of the radio. However, some features may not be available in the radio when an option board is used. If a feature is not available, please contact Midian to see if the feature can be added.

## MIDIAN CONTACT INFORMATION

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