Review (and Modifications): MFJ-706 Emergency Communications Center
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Introduction

MFJ recently introduced an interesting "grab-and-go" assembly designed for the popular IC-706 series of transceivers for emergency communications and portable operation. It includes an innovative voltage conditioner and a wide-range automatic antenna tuner in a compact 6 3/4W x 4 1/2H x 13 1/2D inch package – which also houses your IC-706 transceiver. A 5-foot pendant power cable terminated in a standard automotive accessory plug is stored in a convenient rear cable-housing assembly. And a compartment underneath the transceiver may be used to stow your microphone, key, logbook and other small accessories. When you're ready to operate portable, just grab the handle and go - the MFJ-706 is perfectly balanced for carrying. Finally, a removable front cover fully protects your IC-706 transceiver.

Photo A: Closed-up MFJ-706

Photo B: Front Panel Removed

Inside the MFJ-706

As previously mentioned, the MFJ-706 includes both a voltage conditioner and a wide-range antenna tuner. The unique voltage conditioner uses MFJ's PeakPowerBoost™ circuitry to provide a full 100 Watts SSB/CW signal when powered from a light-duty 10-15 Amp 13.8 VDC power supply, or even a standard vehicle accessory socket. It accomplishes this with a 4-***FARAD*** bank of super capacitors which supplies the peak current needed for low duty cycle SSB and CW modes. As long as the external power source can supply more current than the idling current of the transceiver, the capacitor bank will continually recharge between speech and CW peaks. The voltage conditioner also includes a 70-amp 15V transient suppressor diode which clamps any input voltage transients that exceed 15 volts. And there is also reverse-voltage protection should you accidentally connect the input power source improperly. Input and output automotive blade fuses are accessible through a bottom access plate.

Connecting an input DC source directly to a discharged 4-farad capacitor bank would blow the input fuse due to the high charge current that would occur. Therefore, pushing the ON/OFF switch on the front panel of the MFJ-706 begins a super-capacitor charging sequence that lasts 30-60 seconds before full power is available. An internal current-

limiting resistor controls the charging current to the capacitor bank. When the capacitor bank is charged, an internal relay shorts the current-limiting resistor so full input voltage and current is available to the charged capacitor bank. A “Charging” LED glows while the capacitor bank is charging, and goes out when the capacitors are charged.

The internal automatic antenna tuner will tune most random wire or coax-fed antennas. Automatic tuning is enabled by a ½-1 second push of the transceiver’s TUNER button. Besides the EXTERNAL back-mounted SO-239 HF output connector, the MFJ-706 also includes a top mounted ON BOARD 3/8x24 antenna mount for a loaded whip (such as a Hamstick), and a top-mounted SO-239 connector for attaching a VHF/UHF antenna. A front-panel slide switch selects either the ON-BOARD or EXTERNAL HF antenna port.

Photo C: Front view with IC-706MKII mounted. Note storage space under radio

As you can see in the photo, the IC-706 speaker is fully exposed so receiver audio is unimpaired, and you still have full access to the headphone jack. Ventilation slots in the case ensure plenty of air flow to prevent transceiver overheating. And the IC-706 control head can still be removed and placed in a convenient location while the larger MFJ-706 box can be placed in the trunk, on the floor, or in the backseat of your vehicle.

<u>Installing the IC-706 in the MFJ-706 Box</u>

Mounting your IC-706 into the MFJ-706 box only requires a few minutes. You begin by removing the top handle plate and the finned access plate. Inside you’ll find a HF/6M

coax cable, a VHF/UHF coax cable, a DC power cable and a tuner interface cable. Simply connect these MFJ-706 internal cables to the appropriate connectors on your IC-706. The IC-706 is then mounted in the box using the ICOM-supplied mounting screws normally used with a mobile mount. Now you simply re-attach the handle and access plates, connect the DC cable to an external source of power and you are ready to go.

Operation

Operation is very straightforward. Connect your DC voltage source, attach an antenna to the appropriate port, and depress the power button on the MFJ-706. The green POWER LED and the yellow CHARGING LED will both light. When the CHARGING LED goes out, you can turn on the IC-706. When the IC-706 is turned on, it automatically recognizes the MFJ-706 internal auto-tuner. The internal auto-tuner comes up in the bypassed mode. It also automatically bypasses itself when you change bands, or when you momentarily press the IC-706 TUNER button. To initiate a tune, simply push the TUNER button on the IC-706 for about ½-second. The auto-tuner has 2500 memories, so it will memorize your tuning solutions. Therefore subsequent tuning requests on memorized frequencies will result in an almost instantaneous tune. If something has changed in the antenna system and the memorized tuning solution results in an SWR greater than 2:1, a new tuning solution will automatically be found.

Modifications to the MFJ-706

While the MFJ-706 works well as designed, I like to optimize my ham equipment and MFJ products are easy to modify. First of all, EmComm and RACES standard DC connectors are Anderson PowerPoles. But the MFJ-706 must be powered from an accessory socket as the pendant DC cable is terminated in an automotive accessory plug. There are two solutions: Either cut the cable and add two pairs of PowerPole connectors, or just put a PowerPole connector on the rear of the MFJ-706 and let folks add their own cable. I initially took the easiest way and cut the cable and installed PowerPole interfaces. The results are illustrated in Photos D and E.

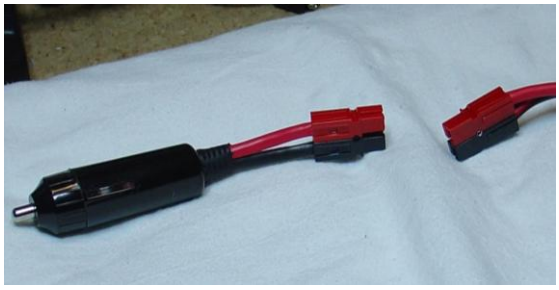

Photo D: Cut cable with PowerPoles

Photo E: Modified pendant cable

Later I decided to go ahead and put an Anderson PowerPole connector right on the MFJ-706. This is a little more work as you must disassemble the MFJ-706 to get inside, and you must nibble out the DC input hole so it will take the PowerPole connector pair. However, I decided this was worth the effort. I also wound up cleaning up the wiring inside the unit a bit, as the 10-gauge wire was overkill and the DC wires were not routed to my satisfaction due to the gauge. 14-gauge wire is plenty good enough for this application. Figure F shows the original DC wiring, and Photo G shows the new wiring

using 14-gauge wire. Note the PowerPole connector pair in the lower right of Photo G. I also eliminated the ferrite beads on the +13.8V DC wires as these were no longer needed since the DC wires now go around, rather than across, the antenna tuner. Finally, Photo H shows a view of the back panel with the PowerPole DC input.

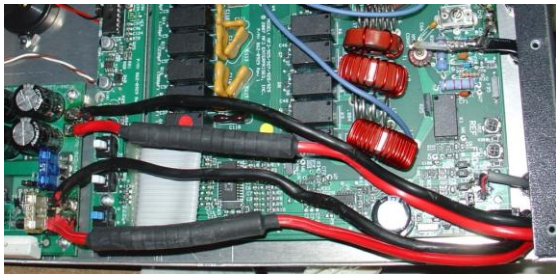

Photo F: Original 10-gauge DC wiring

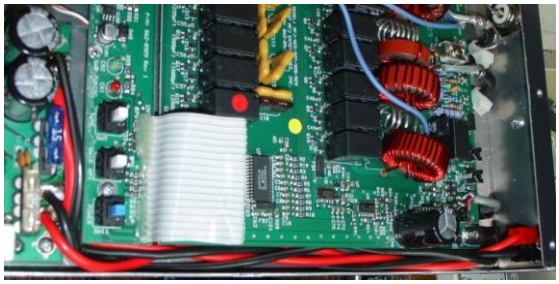

Photo G: New 14-gauge wiring

Photo H: PowerPole DC interface

Next I added an external key jack. Since I am an almost 100% CW operator, I didn't like having to remove the access panel to access the CW jack on the transceiver. Therefore I added a 1/8" stereo jack just below the VHF/UHF SO-239 connector on the top panel. An internal pendant cable terminated with a ¼" stereo plug interfaces with the key jack on the IC-706 as you can see in Photo I. Photo J shows an external view of the new key jack mounted on the MFJ-706.

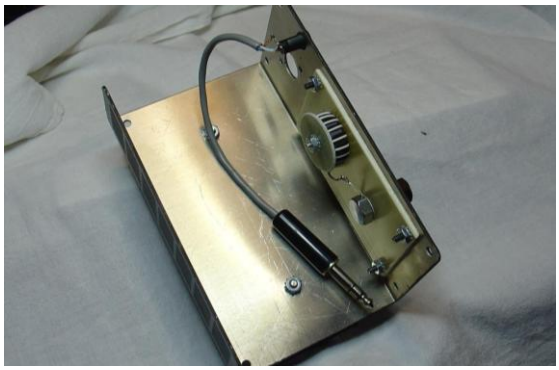

Photo I: Key jack wiring

Photo J: New key jack on MFJ-706

And last but not least, I wanted a ground lug on the case. I added this by removing one of the rear #8 spacer screws and replacing it with a 1-1/2” #8 screw. The head of the screw goes inside the case. The rubber spacer has an aluminum recessed spacer and a #8 nut and lockwasher fit nicely into the recessed area. This permits the screw to be held tightly to the case, making a good electrical contact. An outside nut, two lockwashers, two flat washers and a #8 wing nut finish up the ground post. In order to ensure that the rear panel makes good electrical contact with the rest of the box, I scraped the paint away from the six rear-panel screw-head mounting locations and replaced the original black screws with stainless steel screws and split-ring lock-washers. You can see these details in Photo K.

Photo K: New ground lug and stainless steel mounting screws on rear cover

Additional Accessories

I put the log-book, writing pad and a DC cable inside the MFJ-706 box as you can see in Photo L. The rest of my accessories easily fit into an 11.5” x 7.5” x 4.5”aluminum tool case (Harbor Freight 36870 @ $14) as seen in Photo M. These accessories include my paddle, mic, MFJ-4125 power supply, 40-10 meter dipole, 25-feet of RG-174, earphones, Leatherman tool, masking tape and extension cord - making a compact, ready-to-go portable station. Details on the portable 40-10 meter dipole can be found in the “Articles” section at www.ad5x.com.

Photo L: Logbook, pad and DC cable

Photo M: Rest of needed accessories

Conclusion

The MFJ-706 is a neat package for EMCOM and portable operation. I bet it is only a matter of time before we see a MFJ-857 and a MFJ-7000 version!

Addendum: Modifications to support the IC-7000 by W8CRH

Steve W8CRH wanted to use the MFJ-706 with his IC-7000. The IC-7000 fits fine, however the DC connector on the IC-7000 is different than the connector on the IC-706. Steve handled this by cutting the internal MFJ-706 DC cable, and the cable on the IC-7000, and then mounted PowerPole connectors on both cables. Now he can interface the internal DC cable with the short IC-7000 cable. See Photos O and P below.

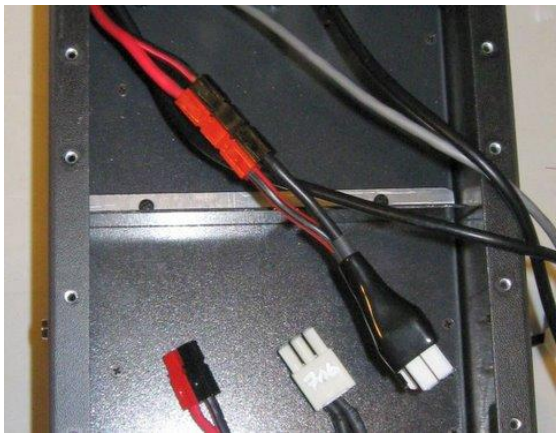

Photo O: IC-7000 DC Interface

Photo P: Another view, IC-7000 DC Intfc