FilterMax IV
200W Bandpass Filter System

by Hamation

Introduction

- **Six bands in one integrated unit**
- **200W power rating**
- **SWR less than 1.25 across band**
- **Low insertion loss < 0.6db**
- **High rejection of adjacent bands**
- **Optional band outputs**
- **Hand tuned for maximum performance**
- **Cost effective filter solution**
- **Heavy duty extruded aluminum case with laser engraved panels**
- **Custom labeling available**
- **Size: 3.5H x 6.2W x 13.6D (inches)**
- **Weight: 5.5 pounds**

The FilterMax IV contains six high performance bandpass filters in a single package and comes standard with filters for 160, 80, 40, 20, 15 and 10 meters. All filters are elliptical designs (Cauer) which provide over 50db rejection of adjacent bands (excluding WARC bands). These filters are rated at 200 watts and can handle 100% duty-cycle modes, such as RTTY. These filters are designed be used between your radio and amplifier or antenna. They low insertion loss (less than 0.6 db) and low SWR (less than 1.25:1) across an entire band. The filters can be selected via front panel pushbutton switches, via our ShackLAN system or remotely by applying +12 for each individual band to the rear panel control connector. Bypass mode is automatically selected when no power is applied or no filters are selected. As is standard in all ShackLAN devices, the unit is protected against reverse polarity and over-voltage.

All filters in the FilterMax IV are constructed with high quality components using Micrometals toroid cores and low-dissipation, high Q TDK capacitors. All shunt (parallel) nodes are built with 2KV and 3KV capacitors while the series node uses 1KV, 2KV and 3KV capacitors. While these filters are rugged, you should be aware of problems that can arise when operating the unit into a high SWR which can cause unexpected high RF voltages, even at 200 watts. Also, the filters are designed for 50 ohms and a large departure from the design impedance can change the filter response and you may not achieve optimal band to band rejection. Be aware that the tuners built into many radios will not correct any high SWR presented to the FilterMax IV. If you must operate into high SWR loads you should use an external tuner connected between the FilterMax IV and your antenna or antenna switch. Most amplifiers have a reasonable match on the input and should not normally present any problems.

The FilterMax IV is packaged in a heavy duty (0.090 wall) extruded aluminum case. Front and rear panels are laser engraved so the lettering will not wear off with use. RF connectors have teflon insulation and gold plated center pins. Power requirements are 12-14 vdc at 150ma.

Shown below are typical performance plots of the filters. Solid vertical lines mark band edges.

Band	Frequency Plots
160M	
80M	

15M

10M
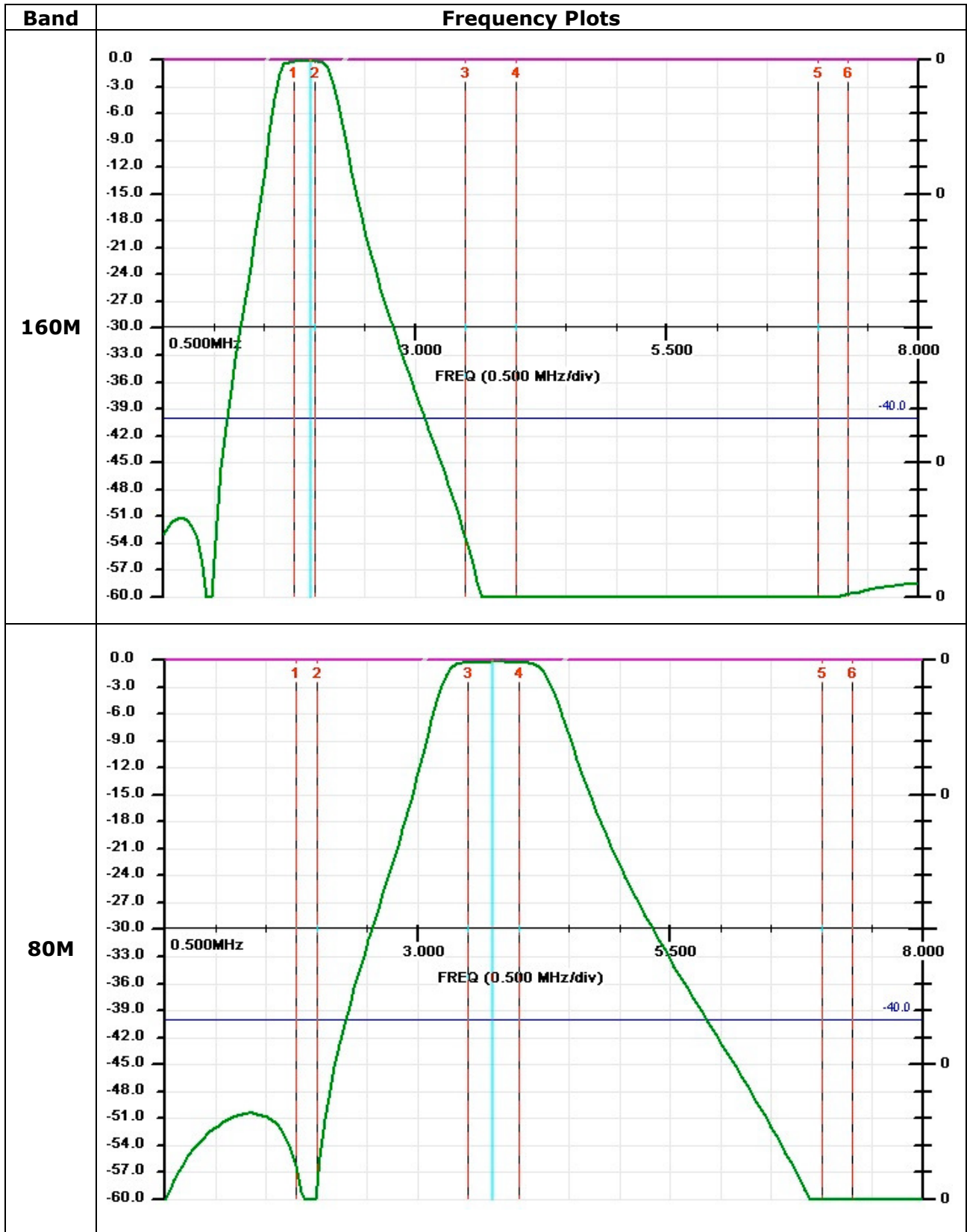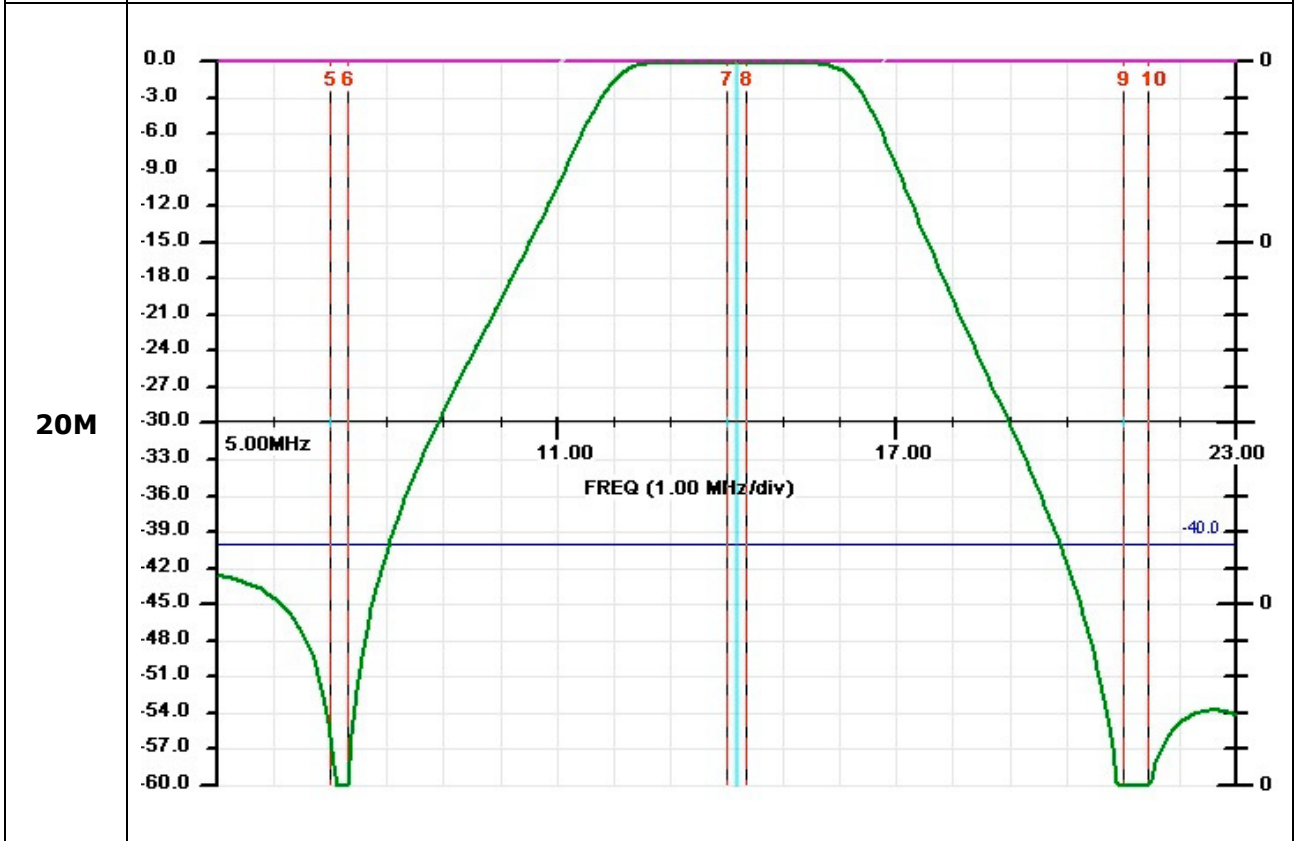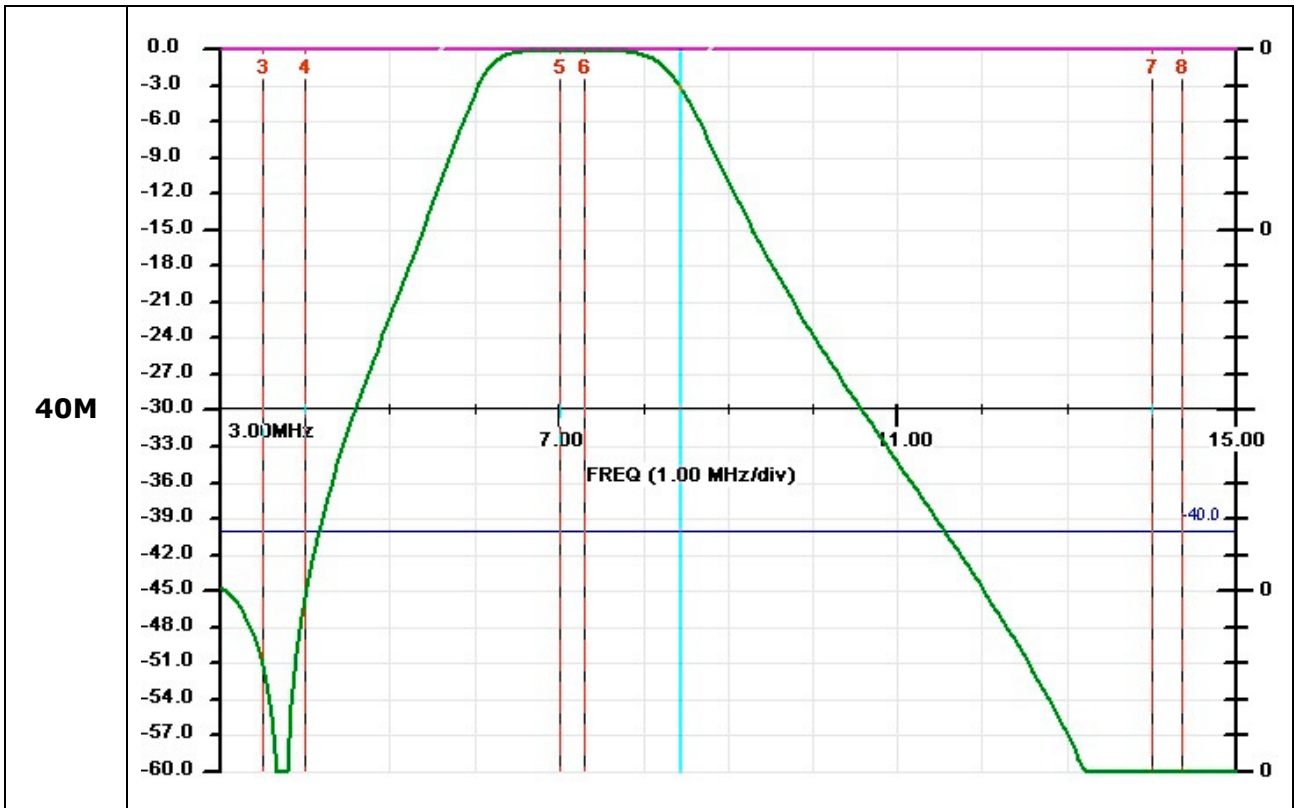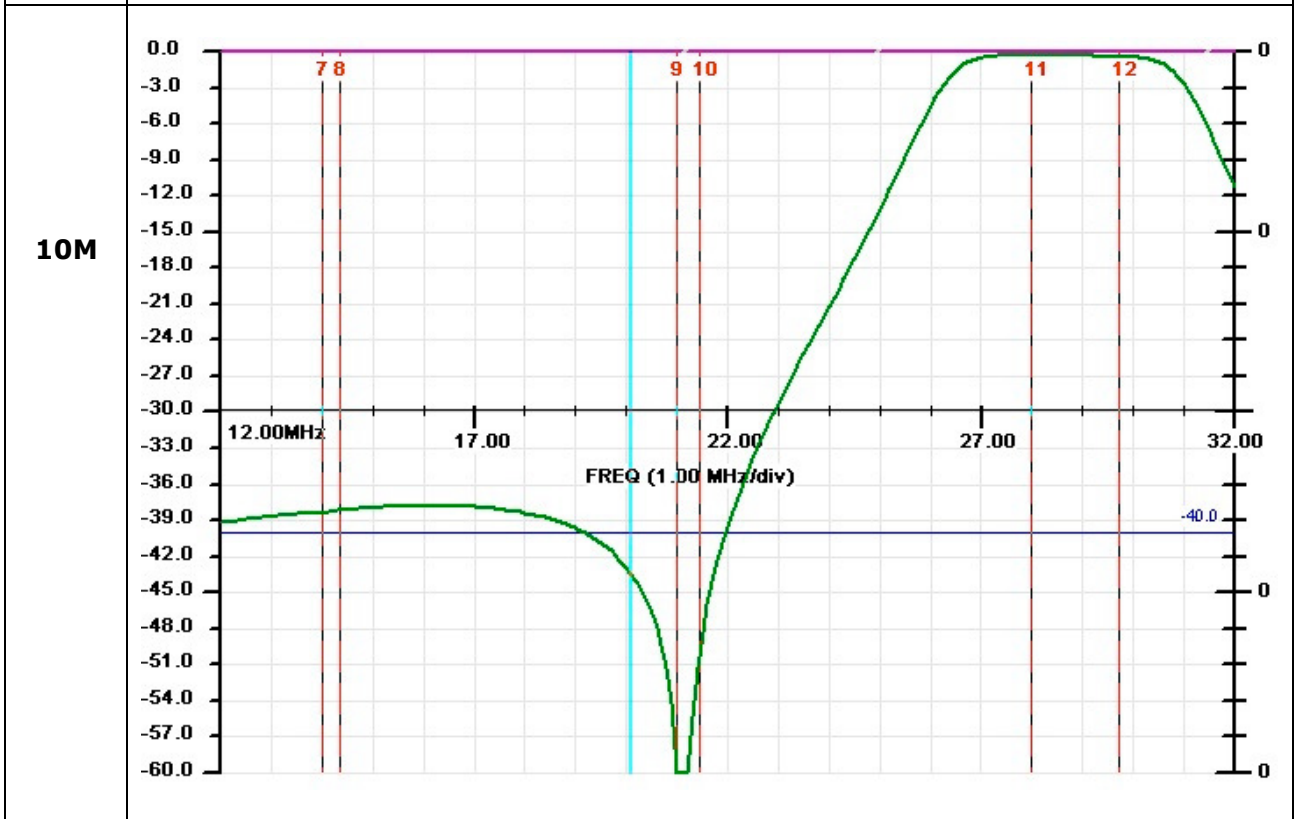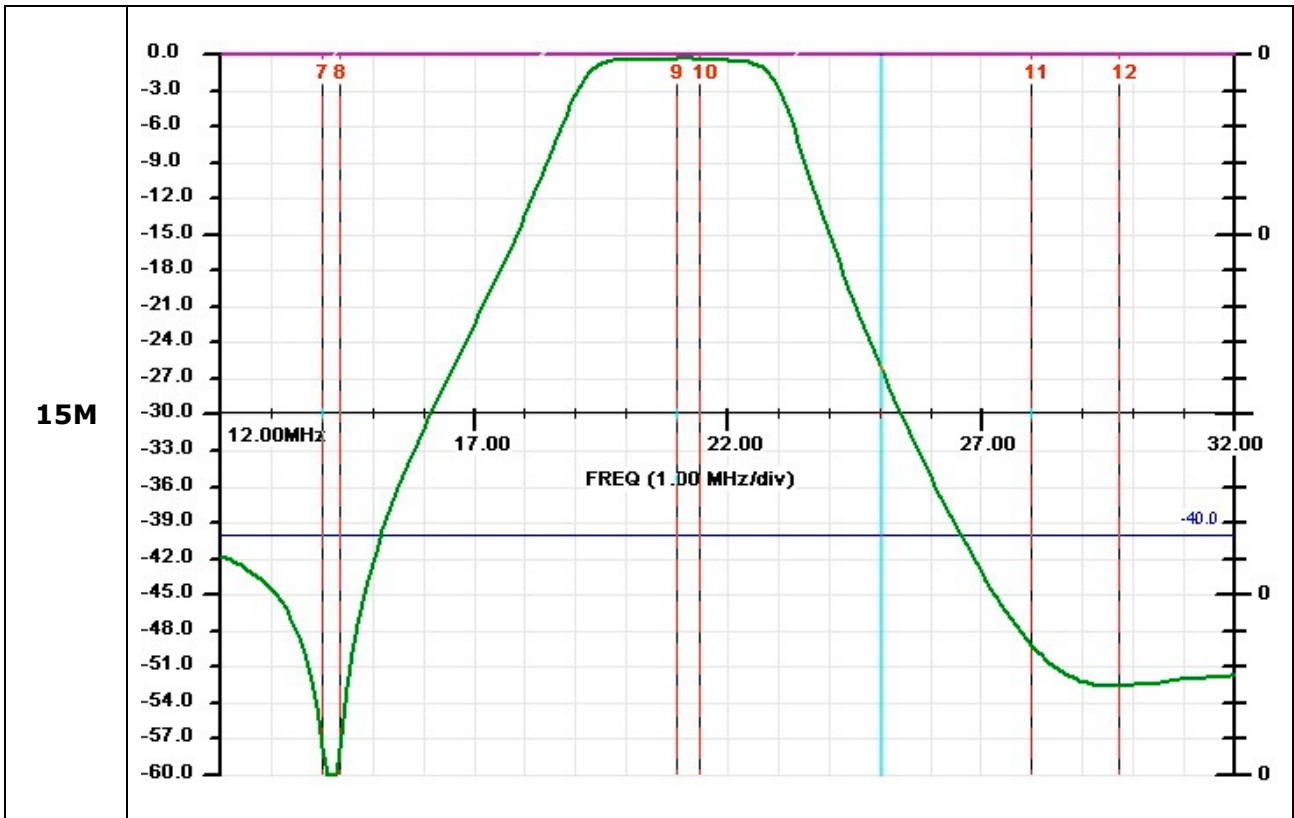
FilterMax IV Installation

Before you begin

   Installing and configuring the FilterMax IV is a simple process which involves connecting the unit to your radio. You will need a length of 50 ohm coax with PL-259 connectors (not supplied). If you are using a ShackLAN equipped band decoder, such as the Array Solutions Bandmaster 3, any Hamation decoder or Integrated Controller, automatic band selection is as simple as plugging in a network cable between the FilterMax IV and the decoder. No other connections are required. For stand-alone operation or use with a non-ShackLAN equipped band decoder you will also need to connect the unit to a +12vdc power source. Control from an external device is done via the Remote connector on the rear panel. Apply +12v to the pin for the desired band selection. Connector pinouts are engraved on the rear panel for easy reference. Installation steps are listed below.

FilterMax IV Rear Panel

WARNING: The FilterMax IV is designed to be installed between your radio and amplifier. If you install the filters on the output of your amplifier, the filters will be destroyed the first time you transmit through them.

Power connection

   A power connection is only required when operating the FilterMax IV stand-alone or with a non-ShackLAN equipped band decoder. Power requirements are +12-14vdc at 150 ma. The Power connector is a standard 2.1mm jack with the center pin positive. No power connection is required when operating with a ShackLAN equipped decoder as power is distributed over the network cables.

Network connection

   Connecting the FilterMax IV to a ShackLAN equipped band decoder is done by simply plugging a 6-conductor modular cable from one of the network jacks to the decoder. Older decoders use a 4-pin screw

terminal connector and an adaptor is available to facilitate operation with older decoders. Two network jacks are provided to allow easy daisy-chaining of other ShackLAN units. The two jacks are connected in parallel internally and either may be used.

External Control Wiring

   This step can be skipped if controlling the FilterMax IV with a ShackLAN compatible band decoder or only with the front panel controls. For external control you need to apply +12v to the pin on the Remote connecter for the desired band. Current required for each band is 150 milliamps. The pinouts of the Remote connector are shown to the right and also on the rear panel. The Remote connector is a standard 9-pin subminiature female D connector. The mating male plug and a connector hood are supplied with each unit.
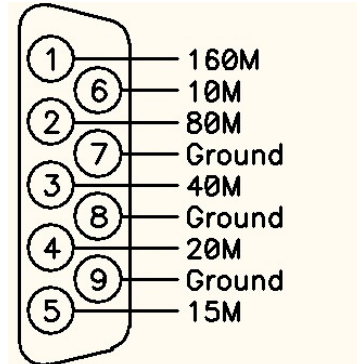
Apply +12 to select band

Optional Band Outputs

The band connections on the Remote connector may also be used as band outputs when controlling the FilterMax IV from the front panel controls or with a ShackLAN compatible band decoder. The FilterMax IV will provide approximately +10 vdc on pin for the selected band. Current on these pins should be limited to no more than 100 ma which is enough for most relays.

RF Connections

   There are two standard SO-239 (UHF) connectors on the rear panel for RF connections. Connect a 50 ohm cable from the RADIO connect to the antenna connector on your radio. Simarly, connect another 50 ohm cable from the AMP/ANT connector to your amplifier input or antenna switch, if no amplifier is used. **DO NOT CONNECT THE FILTERMAX IV TO THE OUTPUT OF AN AMPLIFIER OR SEVER DAMAGE WILL OCCUR.**

FilterMax IV Operation

Each time the FilterMax IV is powered on it will step through each band and then flash two of the band LEDs three times. The 160M, 80M, 40M or 20M LEDs will flash to indicate the radio number (1-4) and flash either the 15M LED to indicate Auto mode locked or the 10M LED to indicate all modes available. After the self-test is complete the FilterMax IV is ready to go.

Operation of the FilterMax IV is simple and straightforward. There are three mode of operation. These are Auto, Manual and Bypass. You can step through the three modes by pressing the Mode button. Aslo, pressing any of the Band buttons will automatically place the unit into Manual mode.

Auto Mode

The Auto mode is used when you want band selection to be done from an external source either from a ShackLAN compatible band decoder via the network or other type of band decoder via the Remote connector. Select Auto mode by pressing and releasing the the Mode button until the Auto LED is on.

Manual Mode

This mode is used when manually selecting filters from the front panel controls. Pressing any of the Band buttons will cause the unit to automatically enter Manual mode or you may press and release the Mode button until the Mode LED is on.

Bypass Mode

This mode is self-explanatory. In Bypass mode, no filters are selected. Note that you cannot enter Bypass mode when the unit is configured for external control. The Bypass LED will also indicate no filters selected when in Auto or Manual modes.

Radio Number

When used in a ShackLAN system, you will need to set the radio number of the FilterMax IV so it tracks the band on the desired radio. This is done by pressing and holding the Mode button while pressing one of the band buttons for the desired radio number. The band buttons, from left to right, are numbered radio 1 to radio 4. Upon releasing the buttons the green LED for the selected radio will flash three times along with either the 15M LED or 10M LED to indicate Auto mode lock status. The FilterMax IV then returns to normal operation.

Locking Auto Mode

When controlling the unit via the Remote connector it is possible for the external decoder to select one band while you select a different band with the front panel controls. For this reason, it is advisable to lock the FilterMax IV in Auto mode when controlling via the Remote connector. To lock the unit in Auto mode, press the 15M button while holding down the Mode button. The unit will acknowledge the command by flashing the 15M LED three times. Unlock the unit by pressing the 10M button while holding down the Mode button. The 10M LED will flash three time to indicate a successful operation.

In Case of Difficulty

No signals can be heard in receiver or high SWR

Check to be sure you have selected the proper band. Due to the high rejection of other bands you must select the correct filter.
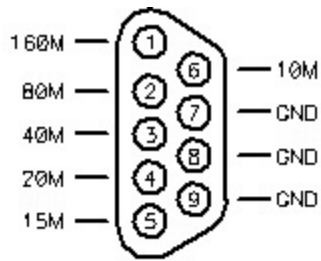
Unit appears dead

Check your power supply and connections. If all is good then check in the internal 315 ma fuse.

Bands not being selected by decoder

For ShackLAN type decoders, verify you have programmed the radio number to match the decoder.
For other decoders, verify your decoder is applying +10 to +12 to the appropriate pin on the Remote connector.

Bands buttons not working

Disable the Auto Mode Lock by pressing the 10M button while pressing the Mode button.

```
         160M ──┤①  ⑥├── 10M
          80M ──┤②  ⑦├── GND
          40M ──┤③  ⑧├── GND
          20M ──┤④  ⑨├── GND
          15M ──┤⑤
```

External Inputs/Outputs

To Amp or
Antennas
↑

Output
Bandpass Filters
Input

+12
B
A
GND

To Network

↑

| **Ant** |
| **HF Transceiver** |