

FlexRadio Systems

Maestro

Control Console



The Maestro is a standalone unit that enables full control of any FLEX-6000 series of transceivers.

Whilst SDR technology is setting the standard in new radio designs, many amateurs are reluctant to embrace the fully computerised radio station and prefer the tactile approach provided by traditional, analogue rigs.

This preference has spawned a market of add-on tuning knobs and the like as well as a few new SDR rigs fitted with conventional controls. FlexRadio Systems have been at the forefront of digital radio systems and have recently introduced their own tactile interface to their FLEX-6000 series of transceivers. The Maestro is a standalone unit that enables full control of any FLEX-6000 series rig through a mixture of touch screen and familiar analogue controls. In this review I will be concentrating on the features of the Maestro as the excellent FLEX-6000 series transceivers have been reviewed in previous editions of *RadCom*.

Connections

You can see from **Photo 1** that the Maestro has a very comprehensive set of interconnections on the rear panel. Starting with the power supply, there are a number of options. The most obvious is to use the coaxial power socket and supplied lead to connect the Maestro to the main shack 12V power supply.

An interesting alternative is to use a battery pack. Rather than use a specialist and expensive dedicated battery unit, the Maestro makes use of the popular 5V USB power packs that are used to charge mobile phones. Because there is a mass market for these power packs there's plenty of choice and the prices are very competitive. The maximum size for the Maestro battery is 6" x 3" x 0.75", which is a bit smaller than many of the common power packs so you will need to choose yours with this in mind.

One further point to remember is that the usable capacity of these power units is about 70% of the quoted capacity. Given the Maestro's power demand, a popular



PHOTO 1: The well-connected rear panel of the Maestro.

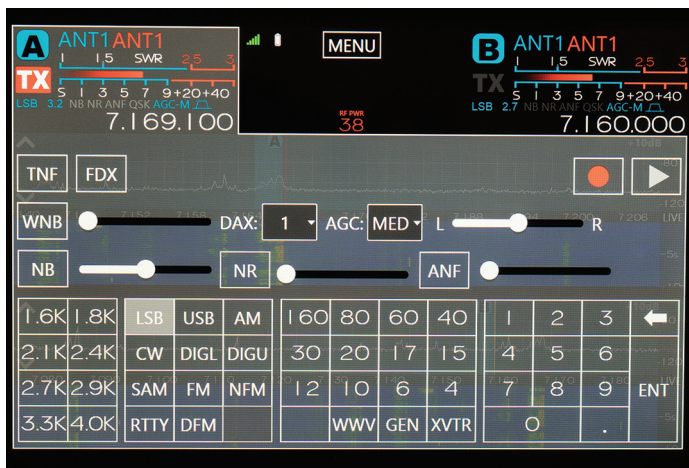


PHOTO 2: The pop-up slice receiver control panel

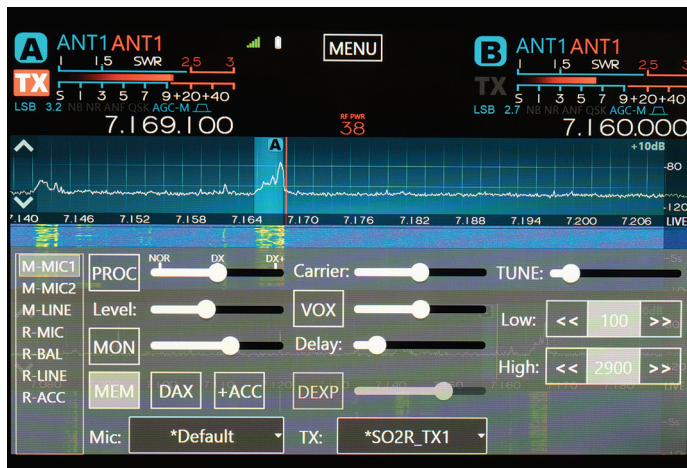


PHOTO 3: The pop-up transmit control panel

10,000mAh size unit should keep the Maestro running for at least 5 hours. The final power option was to use the supplied mains power pack.

Communication between the Maestro and network connected, FLEX-6000 series base units can be handled either via Wi-Fi or a hard-wired Ethernet connection. For the Wi-Fi option, the Maestro has an integrated Wi-Fi modem so there's nothing else to buy. Wi-Fi setup was very simple as it was presented as an option during the normal start-up. When using Wi-Fi, the security password was entered using the on-screen keyboard. As you would expect, the wired Ethernet option was completely automated and the Maestro negotiated its IP address using the DHCP server on my home network.

With the Maestro, you have three options for the microphone connection. If the FLEX-6000 base unit is nearby you can use its multi-pin Foster connector. However, to take full advantage of the Maestro's remote connection, you should use the (Yaesu-wired) RJ-45 microphone socket or the 3.5mm microphone sockets. The inputs are selectable via the Maestro's transmit control panel so you are free to use either option and the 3.5mm jack includes PTT and a DC bias facility for electret mics. The Maestro provides the usual, line-level, fixed audio output that is handy for recording or external audio processing/decoding systems.

There's also a (stereo-wired) powered speaker output where the level is controlled by the receiver volume controls. This was ideal for connecting a good quality external speaker system and worked very well with my Mackie CR4s.

The 3.5mm stereo headphone works as expected and automatically muted the internal speaker.

For CW operators, the key jack employed a 3.5mm stereo socket and had provision for connecting straight or paddle keys.

Power-Up

The Maestro was started by pressing and holding the top-panel power button for about 5 seconds and then, about 40 seconds later, the radio selection appeared. If you're fortunate enough to have multiple FLEX-6000 series rigs on your network, you can use this menu to select the desired rig. The next screen provided a software version option with two choices available in the review model. I opted for the latest version. This screen is also used to advise you of software updates and also to download and install those updates. That completed the power-up sequence and the Maestro burst into life.

Using the Maestro

I found the Maestro interface to be very intuitive and I was soon scooting around the bands without having to plough through the manual. This is always a good sign that the interface has been well designed. Just before I cover the mechanics of the operation, I ought to explain a couple of key operational principles behind the FLEX-6000 series transceivers. This product range does all the RF and digital processing in the main unit, which means, the connected computer, or in this case, the Maestro, simply has to display the results and handle the audio signal routing. Handling all the heavy processing within the main unit greatly reduces the computer loading and also makes it possible to access and control the advanced features of these transceivers via a simple 100Mb/s Ethernet or even a home Wi-Fi link. The second point to appreciate is that the Maestro operates with a maximum of two slice receivers. In this case, a slice receiver is a virtual receiver that can be up to 20kHz wide and can be placed anywhere in the spectrum. It is individually controllable and the mode, frequency and filter settings, etc can all be changed independent of

other slices. Think of it as a VFO or an independent, full-function, receiver. The net result is that you can manually tune either slice receiver over the entire spectrum without any gaps or settings to change. The beauty of the two slice receivers is that each one can be tuned anywhere in the digitised spectrum from around 10kHz to 72MHz! When it comes to transmitting you can link the transmit section to either one of the receivers but not both.

Hopefully, you can see from the photos that the Maestro is a good sized control panel with a very crisp 8" (diagonal) display. The main tuning knob (slice receiver A) is probably the most used control and the Maestro uses a 55mm diameter knob with a good weight. This makes the knob highly spinnable, which is a feature missing from many digital systems! I was also delighted to see that there are no detents on any of the Maestro's rotary controls. Of course, the controls still operate using discrete steps but the removal of detents makes operation feel so much smoother. The main tuning knob uses a 64 steps per turn device and produces a very smooth tuning effect. Tuning step selection for the main tuning could be very easily adjusted using the Step button right next to the tuning knob. The second slice receiver employs a slightly smaller knob at 40mm diameter but it is also spinnable. In addition to the excellent manual tuning system, the Maestro's touch-screen control is very powerful. The screen reacts to all the usual touch-screen gestures so a double-tap on a signal will cause the receiver to instantly re-tune. I could also swipe across the display to move the central tuning ribbon plus both the horizontal

Mike Richards, G4WNC
mike@photobyte.org

(frequency) and vertical (signal level) axis could be zoomed, either by pinching or spreading two fingers.

Immediately above the two main tuning knobs is a row of buttons that were used to enable each slice receiver and to toggle the transmit option between the two receivers. These buttons were also used to active the Tx and Rx incremental tuning. Moving up the control panel revealed a set of three, dual-mode, function buttons that could be customised via the main menu. These buttons had a wide range of potential uses, eg to switch-in your favourite noise reduction or maybe to activate split working. It's easy to overlook the function buttons but with a bit of planning, they can be a real time saver.

Each of the slice receivers has a carefully chosen pair of dual concentric controls at the top of the main panel. The left-hand control gives direct access to volume and the AGC threshold or squelch. The latter two are dependent on the mode selected. The central knob can also be depressed to activate a Solo mode that mutes the other slice receiver. The right-hand concentric pair provide full control of the receive bandwidth using an ingeniously simple system. The inner knob is used to adjust the LF cut-off frequency whilst the outer knob adjusts the overall filter width. In practice, this was a wonderfully simple way to adjust the excellent filtering and far easier than trying to drag the side of the passband with a computer mouse! By clicking and turning the central knob, the receiver would also alternate between two or more pre-settable bandwidth values. A duplicate set of controls were provided for the B slice receiver.

Accessing the mode selection and the wide range of receive controls for each slice receiver could be done ether by tapping the frequency readout or by depressing the appropriate tuning knob. This activated the on-screen control panel shown in **Photo 2**. As you can see, this provides quick band selection, direct frequency entry, bandwidth, mode selection, noise reduction and more. I found the touch screen very responsive and easy to use.

Moving on to the transmit controls, there was a pair of concentric controls to the right of the panel that provided quick adjustment of the mic gain and drive level. However, when operating CW, the Mic control changes to adjust the internal keyer speed. Pressing the Tx power indicator in the centre of the display activated the main transmit control panel, **Photo 3**. This gave quick access to all the vital transmit controls including speech processing, VOX, tune power, delay, bandwidth, mic selection and more. To help with optimising the transmit controls, the Maestro includes a handy audio recorder that can be used to record and play back the

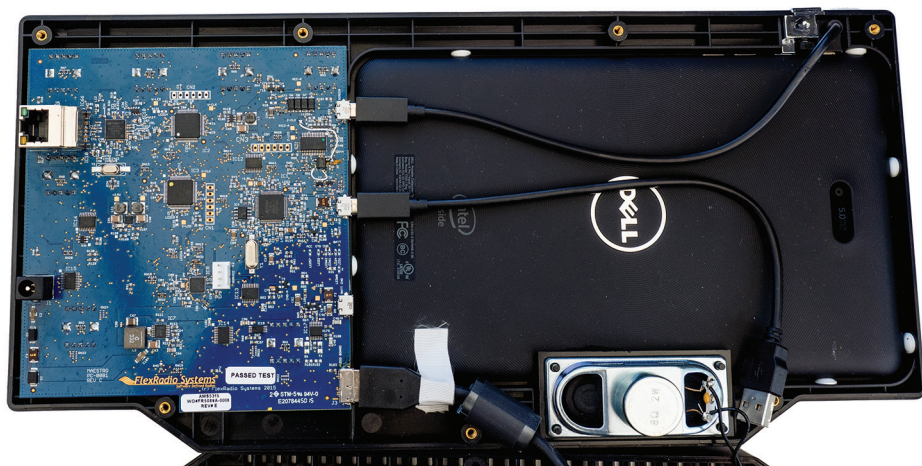


PHOTO 4: A look inside the Maestro with the Dell tablet on the right and the custom control board on the left.

processed audio. I found this a great aid for getting the speech processing just right for your voice/mic combination.

Persistence

To help speed general operation, the Maestro conveniently remembers the settings you last used on any given band. FlexSystems call this feature 'persistence' and I found it to be a great time-saver. In addition to automatically saving the last used settings for each band, you can also save global profiles which, as the names suggests, captures and saves the settings for all bands. I'm sure most operators will find this very useful, especially if you have a range of operating interests. I find that I alternate between different operating interests, ie Data Modes, Phone, Contests, etc and the Maestro's global profiles let me create a separate profile for each operating mode that I could easily recall. This likely to be a real bonus for contest stations as each operator could have their own profile.

A peek inside

As I mentioned earlier, the Maestro is simply an interface to the FLEX-6000 series transceivers so it provides a dedicated computing platform for those rigs. As a result, there is no RF circuitry in the Maestro as all the RF interconnections take place on the FLEX-6000 main unit. At the heart of the Maestro is a Dell Venue 8 Pro tablet that is mounted inside the Maestro's case, see **Photo 4**. This is a clever idea and a very convenient and cost-effective way to achieve a high quality display combined with good touch-screen controls. The LCD type used in the Dell Venue 8 is an IPS (In-Plane Switching) panel that is known to produce good colour with excellent viewing angles. Processing power for the tablet comes from an Intel Atom Z3740 processor, which is a

quad-core unit that runs at up to 1.8GHz. Although not quoted, the underlying operating system appears to be Windows 8.

Whilst the tablet runs the rig management software and the display interaction, a custom board looks after the physical controls. This board used standard devices for managing communications with the Ethernet port and the USB link to the tablet based software. All the rotary and push-button controls on the Maestro employed digital rotary encoders and the LED control was managed by a pair of PIC 8-bit microcontrollers coupled with a number of logic latches.

Summary

The new FlexSystems Maestro is extremely easy to use and provides a very effective control system for the FLEX-6000 series transceivers. I particularly liked the feel and interaction of the tuning knobs and touch screen. The Maestro's display was impressive with just the right amount of touch sensitivity, a very crisp display and a wide viewing angle. I felt the range of manual controls was very well thought through with all the key controls to hand and backed up with rapid access to the more advanced features through the simple menu system. Although many will buy the Maestro for its traditional rotary controls, the touch-screen interface is well implemented and should not be overlooked. Combining a FLEX-6000 series transceiver with the FlexSystems Maestro creates a wonderfully simple to operate but powerful station with the flexibility to take the Maestro wherever your home Wi-Fi permits. This added flexibility could be particularly attractive to radio clubs or demonstration stations.

The Maestro costs £1199.95 and is available from all FlexSystems dealers. My thanks to FlexSystems for the loan of the review model.