MetroVNA Pro Touch, a Vector Network Analyser

PHOTO 1: The MetroVNA Pro Touch.

PHOTO 2: Inside the MetroVNA Pro Touch PCB.

Antenna analysers for the amateur market have come a long way. Twenty years ago we were buying analysers with analogue meters. They consumed dry cell batteries like they were going out of fashion.

In more recent models the number of batteries has come down in number, less power is consumed and liquid crystal displays have shown us things like the curves for SWR, impedance and reactance. Now Italian company MetroVNA has introduced a range of small, light VNAs with something extra. They sport all the things that some other modern VNAs do, namely a rechargeable battery, a USB connection and Bluetooth capability; but the 'something extra' is a colour touch screen display. Interestingly this doesn't result in them costing more than the close equivalent VNAs from some other manufacturers. There are three models in the range, covering up to 55MHz, 180MHz and 250MHz. The one provided for this review was the 180MHz model.

What's in the box

The MetroVNA Pro Touch (**Photo 1**) arrived in a fairly small box. On the outside there are QR codes that link to the User Guide in English and Italian on the company's website (German is also available). A QR code for the Wimo website (in Germany) is also on the box.

Inside the box the MetroVNA came with a peel-off screen protector, the unit as a whole being protected by bubble wrap. The only other thing is a 'quick user manual' – a single A4 page. Users have to provide their own USB cable and PC software. There are suggestions in the User Manual of what PC software can be used, but more about that later.

The entire instrument can be managed through convenient virtual screen keys, but to increase the flexibility of use a series of seven tactile buttons below the screen can be used to enter/change the operating frequencies or band, and activate or deactivate the virtual keys on the display.

Although the MetroVNA is designed for rapid teardown (as the User Guide puts it), it also says not to disassemble or attempt to repair the unit. Consequently I expected to be unable to include any photos of the innards, but I contacted the MetroVNA designer,

Antonio Ferrulli, IZ7LDG, who kindly sent **Photo 2**. It shows the PCB, with the display folded over to reveal more of the components.

As a testament to the tightness of the manufacturing tolerances, the seven tactile buttons on the PCB protrude through cut-outs on the front of the aluminium case to *just* touch the underside of the labelled membrane on the front (which is scratchproof). The colour display fits neatly into a cut-out in the membrane. Along the top edge there are two BNC sockets – one labelled DUT (Device Under Test) and the other labelled DET (DETector) – plus the power switch and a USB socket. The USB socket has a red LED built into it, which glows when the unit is being charged.

PHOTO 3: The MetroVNA main screen.

PHOTO 4. A good SWR at 3620kHz.

PHOTO 5: A full-wave delta loop for 40m, fed with a quarter-wave of 75-ohm coax to match the impedance.

PHOTO 6: The AutoSWR screen for a 20m dipole.

Capabilities

The MetroVNA is capable of measuring SWR and a whole lot more. Traps, filters, attenuators, RF lines, coax loss and field strength reading are all within its capability.

It arrived with a fully charged battery, so was ready to use 'out of the box'. When you switch it on the unit runs a diagnostic check, beeps twice, then displays the screen seen in **Photo 3**. There are ten options in the main menu and five in the service menu.

All the tests conducted in this review were 'real world' tests. I plugged in a variety of antennas and tested them. There isn't sufficient space for me to review every last aspect of such a comprehensive instrument, so I hope the following gives readers a flavour of its capabilities. There are two main modes of operation; Reflection Mode for measuring antennas and Transmission Mode for measuring filters etc.

Something that needs to be said early on is that the MetroVNA is very responsive. It refreshes the display ten times a second while tests are running, so any changes made to an antenna or a filter are immediately apparent. All button presses (tactile or on the touch screen) are confirmed with a beep.

1. EASY. This menu option displays the SWR and impedance of an antenna numerically and also on a strip. **Photo 4** is of my 80m dipole. In addition to the tactile buttons, there are soft buttons to change band and also to change frequency up and down. Steps are selectable down to as little as 1kHz. You can call-up a numeric keypad, to input a frequency directly, jump directly to a graphic curve of the SWR and return to the main menu.
2. METER. Displays antenna resistance, return loss, reactance and impedance, both numerically and on a strip type display. The frequency can be changed by inputting from a numeric keypad that can be called-up. Alternatively, use the 'band' buttons to cycle up/down through the amateur bands. **Photo 5** is of my 40m full-wave delta loop.
3. AUTOSWR. Cycle quickly through the amateur bands, to find which one an antenna is resonant on. The numbers tell you the frequency of the lowest SWR, plus the SWR at that frequency. Frequencies can be input directly and the span of the graphic display can be cycled though. **Photo 6** shows it testing a 20m Inverted-V dipole.
4. SMETER. A dual meter type display of SWR and impedance, along with numerical values. In this case (**Photo 7**) it is of a 10m quad loop.
5. MULTI. A six-band SWR meter. You can change each of the frequencies to whatever you want, simply by touching them and then calling-up the virtual keypad. I used a microwave dummy load for this test, to check how close to 1:1 the SWR was across a wide range of frequencies. As **Photo 8** shows, the indicated SWR is very slightly higher at 50MHz. In subsequent tests the indicated SWR gradually increased as the frequency was increased, but the instrument can be calibrated so that it indicates an SWR 1:1 at higher frequencies with the load connected. For me the real benefit of this setting is when testing multiband antennas, such as a fan dipole, because changing the length or position of one will often affect another.
6. SWMETER. **Photo 9** shows the single, large meter-type display of SWR of this menu option. In addition there are numerical values of SWR, resistance, impedance, and reactance. Incidentally, on none of the screens is the value of X given a sign (Xc or Xl).
7. GRAPH. Graphic display of the SWR of an 80m dipole. Readings for resistance, phase, impedance and reactance can

PHOTO 7: 10m quad loop, fed with a quarter-wave of 75-ohm coax to match the impedance.

Steve White, G3ZVW
steve.g3zvw@gmail.com

PHOTO 8: SWR across the HF bands of a 50-ohm dummy load.

PHOTO 9: 10m quad loop, fed with a quarter-wave of 75-ohm coax to match the impedance.

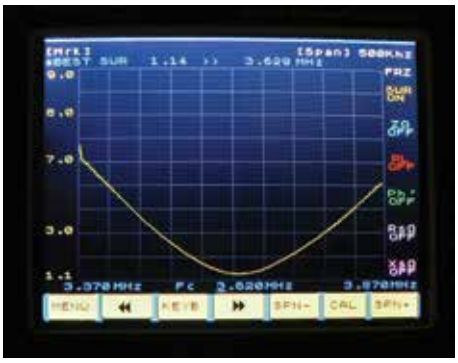

PHOTO 10: A good SWR dip on an 80m dipole.

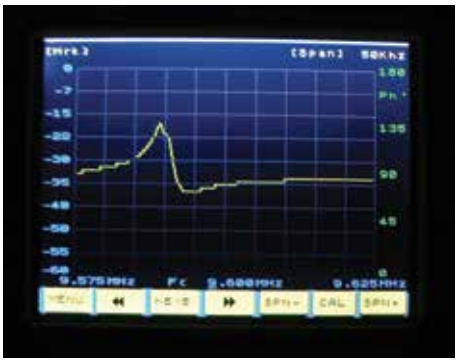

PHOTO 11: Resonance characteristic of a quartz crystal.

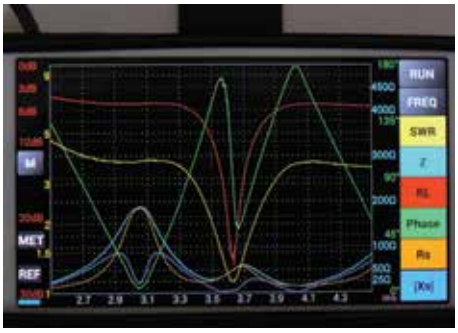

PHOTO 12: Smartphone display of 80m dipole, from 2.5 to 4.5MHz.

all be switched on/off. I returned to measuring the characteristics of my 80m dipole for this test. **Photo 10** shows the result.

8. RFMETER. On this setting the MetroVNA can function as a field strength meter (attach a short antenna). The maximum input level is +5dBm.
9. TLGRAPH. mStanding for 'Transmission Loss Graphic', this is the setting used for measuring filters and attenuators. **Photo 11** shows the resonance obtained when I connected a quartz crystal between the DET and DUT sockets.
10. RFGEN. Through the RF Generator menu option the DDS frequency synthesiser of the MetroVNA can be used as a signal generator.
11. dBMETER. In this mode, connecting a signal to the DET socket enables the MetroVNA to work as an RF meter. Its uses are for measuring RF noise, antenna gain. It can also be used to measure the gain of an RF amplifier. The input level is -70 to +5dBm and overloading the input could damage the instrument, so care is called for.

Other menus

The MetroVNA also had a number of utility/service menus. In addition to a diagnostic menu, there's a Table of dBm/Voltage/Wattage, screens on which you can calibrate the frequency and reflected power, and info such as hardware and firmware versions, battery state, etc.

So far all the tests in this review been done with the MetroVNA as a standalone instrument, but there are two other options – to link it to your smartphone via Bluetooth or your computer via USB.

Bluetooth operation

Pairing my smartphone to the Metro VNA was straightforward. I then used the phone to access the MetroVNA web site, found the link to the Android app and downloaded it from the PlayStore. Upon running the app it linked immediately to the MetroVNA and it was easy to get things running. I was able to pinch and stretch the phone's touchscreen to move the centre frequency and set the limits I wanted, and enable/disable various measurements by pressing the buttons on the right. The characteristics of my 80m dipole are shown in **Photo 12**. The smartphone app does not provide the same functionality as the VNA itself. Nor does it update continually. What it provides is a snapshot of what is being tested, up to 10m from the VNA. Please note that if you are displaying any of the measuring screens on the VNA when you press 'RUN' on the smartphone, the VNA reverts to the main menu.

PC software

Software for a personal computer is not provided with the MetroVNA, but the User Guide points to VNAJ, by DL2SBA. I downloaded it (it is free) and used it in conjunction with the MetroVNA. It is a *very* powerful tool that could easily be the subject of an extensive review in its own right, so here I will only say that it worked.

The MetroVNA is also compatible with BlueVNA, IG/VNA, and other programs.

Conclusions

I certainly found the MetroVNA to be a very useful tool. In operation it is responsive and versatile. I got the impression that the English language User Guide was a translation of the original Italian. It wasn't perfect, but it certainly got the point across. There were some differences between the menus of the instrument and the menus in the User Guide, which leads us to something that is important to note. Coming from a fledgling company, the product – and especially the firmware – is still being developed. I received a MetroVNA with firmware version 3.05. I updated it to version 3.10, but by the time this review was finished it was up to 3.22. I did not find updating it a simple process, but with the cooperation of Antonio we got the job done and I think he learned that something he sees as simple (because he does it frequently), isn't simple for everyone else! Clear, step-by-step instructions on the website would make this process a lot easier. My PC runs Windows 7 and I also needed to install the driver for the USB chip used in the MetroVNA. If you're running Windows 10 this may not be necessary. Battery life was good and the display is bright enough to see in sunlight.

I would like to thank the designer and producer of the MetroVNA, Antonio Ferrulli, IZ7LDG, for his assistance in this review and of course Nevada for the review sample. The 180MHz MetroVNA is available from them, priced £249.95