KK5DR reviews Array Solutions “PowerMaster®”

By Matt Erickson

I have owned a RF Applications VFD HF, for several years, and am very pleased with it. I recently decided to use my VFD as a “built-in” RF power/SWR meter for one of my home-brew HF amplifier projects. With this in mind, I needed a replacement outboard meter. RF Applications no longer manufactures the VFD,

much to my disappointment. The VFD was about $250 each, what I thought was a high price for a power meter at the time. I thought I would give the VFD's replacement a try, that being the Array Solutions "PowerMaster" 3kW. Its display is much like the VFD, but that is where the similarities end. The PowerMaster clocks in at $480 shipped to my door. Wow! There are much more expensive meters available on the market, but offer only a little more accuracy and resolution. Bird® makes a PEP reading model (4391A) that can match the PowerMaster® but costs over $1500 each, not including the couplers. Alpha also has a model that is priced the same as the Bird®. Array Solutions claims an ultimate accuracy of +/- 3%, this is very good considering that the typical Bird® 43P is +/- 5%. A new 43P will run you $520, and you still have not bought any slugs yet! The newest Bird® model 5000 runs $895 each, and the remote sensor will cost you another $600, and still the accuracy is +/-5%.
The highest RF power reading the PowerMaster® 3kW will display is 3005 watts. The lowest displayed RF power is 1 watt, which is a good bit better than the old VFD, which could not display RF power less than 7 watts with any accuracy. It can also be used via a PC connection and special software for VSWR and RF power analysis and display. There are a great many more features and abilities than the VFD.

Why?:
Many would ask "why", why buy such and expensive meter? Doesn't it read RF power just like my good old analog meter? Well, no, not really, the PowerMaster® is very different from any analog meter, and even many digital meters. It is a high speed RF voltage sampling unit, which converts the instantaneous RF voltage to a digital signal that can be displayed very accurately on a vacuum florescent display, which can display faster than any LED digital display, with a greater level of resolution. About the only way to get a faster, more accurate display of RF power, would be to use an oscilloscope and a RF line sampler. Easy to read at a glance, is what I would say, no squinting to see what the display says, and the peak hold function helps greatly in this area. RF forward power and VSWR are display at the same time, so there is not meter calibrating to calculate SWR. No analog "meter ballistics", inertia, no "over-shoot", & no lag-

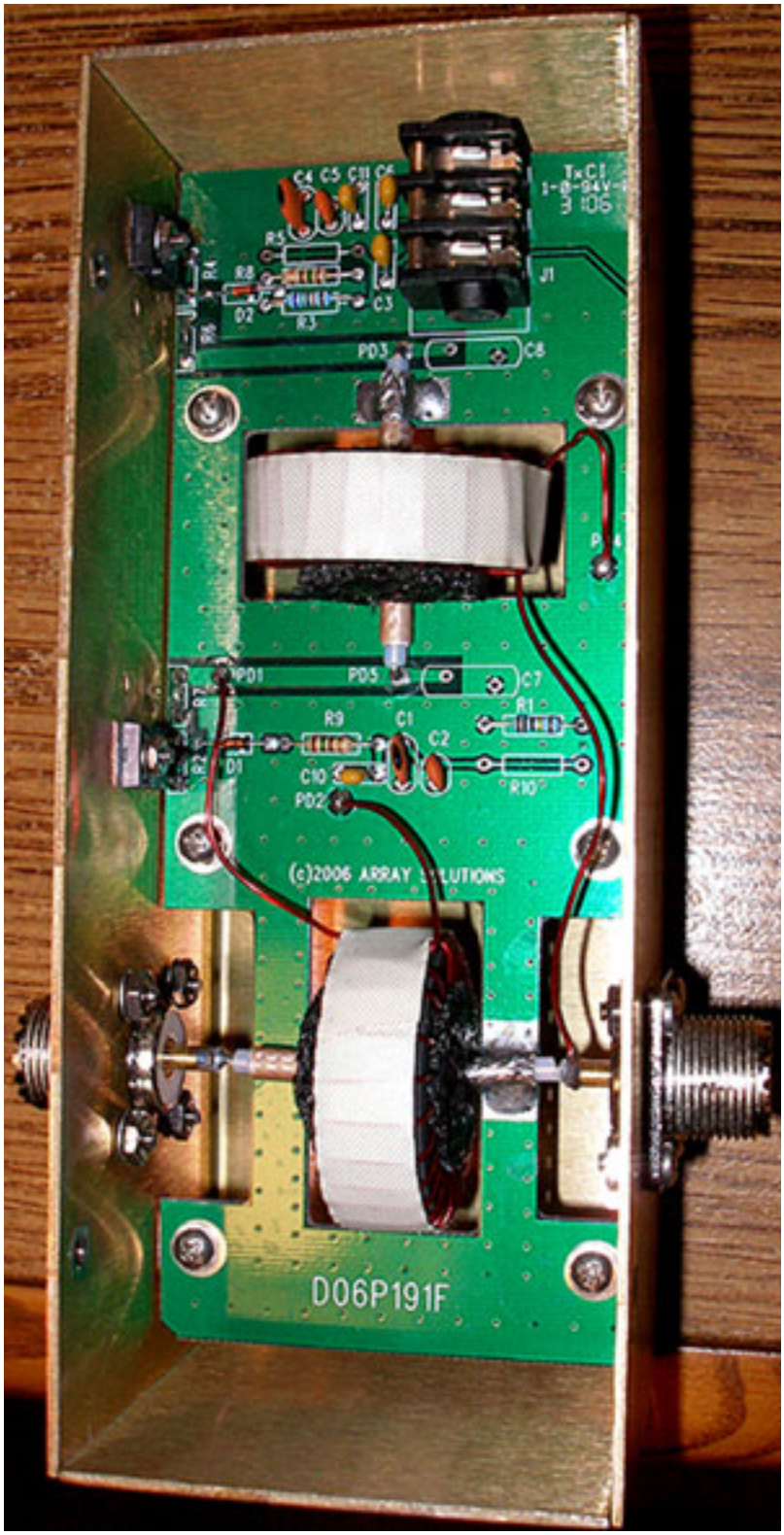
time.

Appearance, exterior:
The outside of the unit is very nice, polished aluminum. The cabinet is very heavy plate, not the kind of stuff that cheap “project” boxes are made of. The metal work is top-notch. The display itself is much larger than the old VFD, making it easier to read from a greater distance. For those of us with vision that does not seem to be improving with the passage of time, this is good news. The physical size of the PM is about twice the size the old VFD; the coupler is nearly twice the size too.

The photo of the rear shows the connectors.
The coupler is a large box of the same heavy aluminum plate as well.

Appearance, interior:
The circuit boards inside the unit are high grade, first-rate design and construction. See the photo below.

The inside the coupler is a sparse space, but for two very large toroid coils that pick up the forward and reflected RF current.



The size of the RF coils is impressive, and should handle huge amounts of RF power without saturation.

Setup:

On my old VFD, there was not very much setup after the DC power was applied,

the SWR alarm level had to be set each time the unit was powered up, otherwise the default is 3.0:1 SWR. The PowerMaster has many settings that can be setup, and are retained until changed by the user. The setup can be done via the front panel <Menu> & <Mode Select> buttons, or by connecting the RS-232/DB-9 to your PC and use the enclosed software that came with the unit. Using the PC method allows the user to enter a call sign that will be displayed at power up, this can't be done by the front panel method.
I will not go into great detail of further setup; the reader can read the user manual that can be downloaded from the web site.
I can say that the menu system allows the user a great deal of flexibility to tailor the PM operation to his/her type of operation, or desired display features.
A note from a friend who has an older version of the PM said that the newer version has a few more features, but he has updated his unit to the current level with the software downloadable from the company web site. So, features will likely be added as the software is developed, however, this it limited to the hardware's ability to perform the software's commands. Also, CPU processing capacity and available memory will be limiting factors for future updates.

Accuracy:
I tested the PM against my other meters, and found that it did show a higher level of accuracy, better than +/- 5% as advertised, and when the "trim" feature is adjusted to compensate for the coupler variations, the accuracy improved to the claimed +/- 3%, however, this was only for the band that the trim is set for, either HF, or 6 meters, not both. The band that is not "trimmed" suffers a slight degradation in accuracy, so the user must decide which band it the greater accuracy concern. Not to worry, the trim can easily be adjusted via the menu change.
The speed of the display is truly fast, blazing fast. Much faster than the old VFD.

Conclusion:
Is the PM worth the price? I would say yes, if you want the most accurate, fastest display this side of extremely expensive lab test units. The added bonus of PC control, updates, and analysis are icing on the cake. Do you need it? Well, do we

truly need any of this radio stuff we hams use? Do you want it? Sure you do. I really like it, if I had to do it over again, I would, at the same price.