

Review: The Array Solutions AS-43A Digital Conversion Kit for the Bird Model 43 Wattmeter
Phil Salas – AD5X

Introduction

Almost since it was introduced in 1952, the Bird Model 43 wattmeter has been the de-facto power measuring standard in commercial and ham radio environments. And since its introduction, the Bird 43 has not really experienced any major changes in design, even retaining its analog meter. But today's accurate power meters employ digital read-outs to eliminate analog interpolation and parallax reading uncertainties. This seemingly leaves the Bird 43 behind the competition. However, this deficiency has been corrected with the introduction of the Array Solutions AS-43A Digital read-out conversion kit.



Photo A: Bird 43/AS-43A (left) vs Bird 43/analog meter (right). Which do you prefer to read?

The AS-43A

The AS-43A is a self-contained LCD digital read-out that fits into the analog meter position in the Bird 43. It converts the normal Bird 43 element analog read-out to a 3-digit digital display on a large, easy to read screen. Power is provided by an integrated battery holder that holds four AA batteries. Just three buttons are included on the AS-43A: Power (On/Off), Backlighting (Light), and element power selection (Scale). Repeatedly pushing the “Scale” button cycles through all Bird element power levels, and the selected element power level is displayed in the

lower left corner of the digital display. The backlighting, normally not needed except in low light conditions, comes on when the AS-43A is first turned on but automatically shuts off after 90 seconds. Backlighting can be turned on or off anytime by pressing the “Light” button. The entire unit shuts off automatically after 90 minutes. The expected life with alkaline AA cells is 400 hours with the backlight off, and 50 hours with the backlight on.

Installation details can be reviewed prior to obtaining the AS-43A by downloading the manual from the Array Solutions website (www.arrayolutions.com). The installation manual is very detailed and includes plenty of pictures for clarification. Installation requires no more than a Phillips screwdriver and a small adjustable wrench (or pliers), and will take the average ham less than 30 minutes. There are also instructions included for modifying the AS-43A so you can easily adjust the calibration of an out-of-calibration element, or trim the calibration of an element for best accuracy at your normal power level – such as improving accuracy of a 100 watt reading on a 250-watt element. However, adjusting the calibration on one element will undoubtedly throw off the calibration of other elements. So I would recommend this modification only if you have a single element that you use most of the time, and you have an accurate detector so you can precisely calibrate the AS-43A readout.

Testing Results

My home lab includes a MiniCircuits PWR-6GHS+ power sensor which is calibrated against NIST standards and has a typical measurement uncertainty of ± 0.1 dB from 1-3000 MHz, or about $\pm 2.3\%$. Using this power sensor, I’ve calibrated attenuators necessary for accurate power measurements up to 150 watts from 1 MHz to 1050MHz. Using my precision measuring set-up shown in Figure 1 and Photo B, I checked the readings of the AS-43A using 100H 2-30 MHz 100 watt and 250H 250 watt Bird elements.

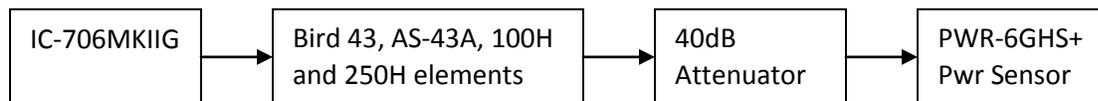


Figure 1: Power Measuring Set-up

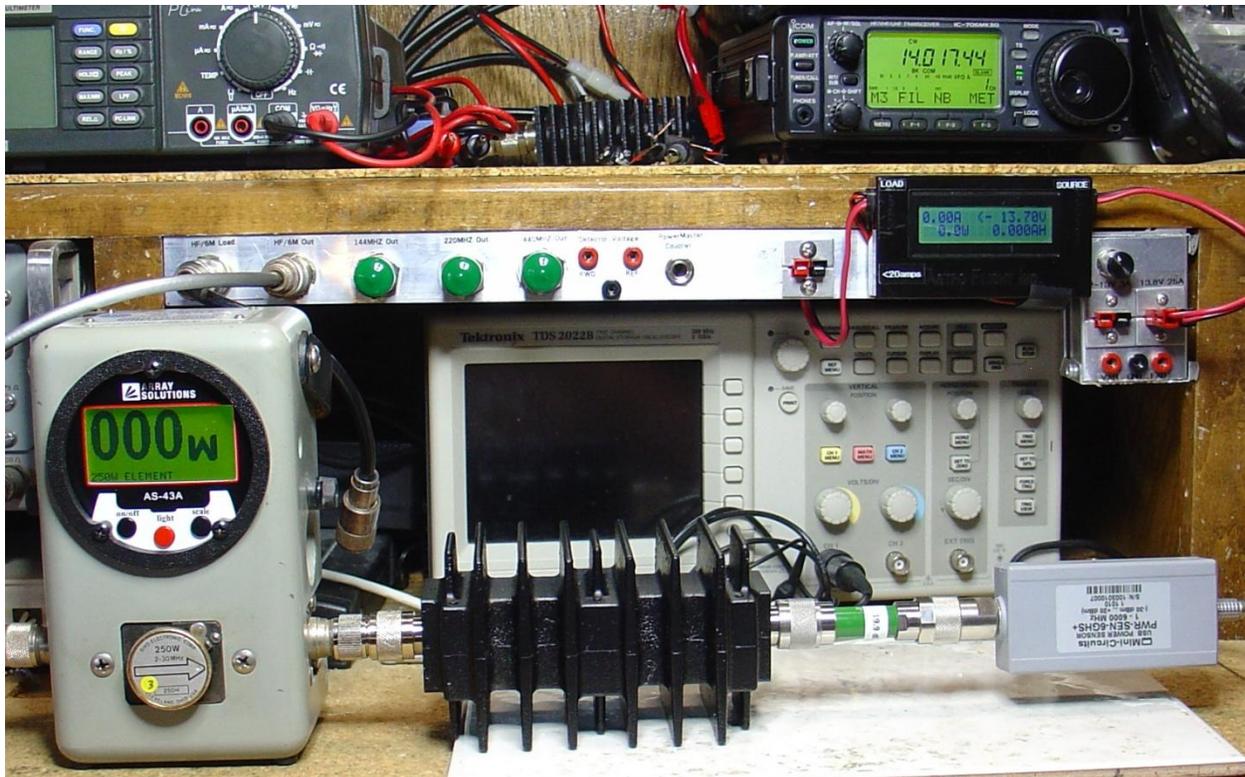


Photo B: Author's Test Set-up

The data for the 100 watt element is shown in Table 1. I was very surprised to see just how accurate the AS-43A readings were across the 100H Bird element range, even at a low power level of 5 watts.

Table 1: Minicircuits PWR-6GHS+(MC) vs Bird 43/AS-43A readings. Bird 100H 100 watt element. Power is in watts.

<u>Band</u>	<u>MC</u>	<u>Bird 43</u>						
80M	100	97	50	48	10	10	5	6
40M	100	99	50	49	10	10	5	6
20M	100	100	50	50	10	10	5	6
15M	100	100	50	50	10	11	5	6
10M	96	95	50	49	10	10	5	6

The data for the 250 watt element is shown in Table 2. After the initial measurements, I modified the AS-43A with the adjustment pot and re-cal'd the meter reading at 100 watts on 20 meters so as to attempt to make the readings slightly more accurate at my normal power level. The measured power of the modified AS-43A is shown in parenthesis. Again, note the accuracy of the AS-43A readings across the 250H Bird element range from 100 watts to 20 watts. The re-calibration slightly improved the accuracy at my 100 watt power level, but very slightly degraded accuracy at the lower power levels. So as you can see, in most cases this modification is not really necessary unless you have an out-of-tolerance element.

Table 2: Minicircuits PWR-6GHS+(MC) vs Bird 43/AS-43A readings. Bird 250H 250 watt element. Power is in watts.

<u>Band</u>	<u>MC</u>	<u>Bird 43</u>	<u>MC</u>	<u>Bird 43</u>	<u>MC</u>	<u>Bird 43</u>
80M	100	94 (97)	50	48(52)	20	20(21)
40M	100	96(99)	50	49(53)	20	20(21)
20M	100	97(100)	50	52(53)	20	21(21)
15M	100	98(101)	50	52(54)	20	21(21)
10M	97	96(98)	50	53(54)	20	21(22)

Summary

The Array Solutions AS-43A digital meter upgrade kit turns the Bird 43 analog-reading wattmeter into an accurate digital-reading wattmeter. Is it worth the price? Certainly if you have a Bird 43 with a damaged analog meter, the AS-43A really makes sense. But even if you have a good analog meter in your Bird 43, it just might be time to put that analog meter in storage and convert your Bird 43 to a digital read-out. You'll be very happy with the results.

Available from Array Solutions www.arrayolutions.com

Price: \$189.00