



## Expanded Troubleshooting Guide: DB18/DB18E

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#### I ---- Intro

The DB18 is basically our 3 element antenna with 2 loop elements for 40 m. It performs extremely well and will outperform antennas twice its size.

This performance comes at a price, it is one of our more complex antennas with 3 different driven elements and 2 or 3 (depending on model) loop elements.

If you are careful and understand how the antenna works trouble shooting is not difficult, but you can certainly get confused if you just start pressing buttons when it is not work correctly.

It bears repeating that the controller has no way of initially knowing where the elements are so if an element gets out of sync it will stay out of sync until the antenna is calibrated. It should also be noted the elements are much more likely to get out of sync between 30 and 40M than on any other band.

#### 1 ---- Coax switch

The DB18 uses Pins 23, 24 of the DB25 connector to switch the driven element when you are on 30 and 40M (DB18E only switches on 40M) the rest of the time there should be no voltage on these pins.

Pin 23 is used to select the director as the driven and pin 24 selects the reflector as the driven.

We will avoid talking about 30M because it is different between the DB18 and DB18E. If the antenna works on the rest of the bands then it will work on 30 m.

The Relay control voltages are generated by a small option board plugged into the top of the Motor Driver board. You should check that the board is present and plugged in correctly if no relay voltages are measured below.

You can check the resistance between pins 13 (common) and 23, 24. It should be between 400 and 700 ohms depending on the age of the antenna.

Unfortunately this does not test if the coax switch is connected, just the element relays.

If the SWR is very high (greater than 4:1) in only one of the 3 possible Coax Switch Selections (6 m through 18 m; 40 m Normal; or 40 m 180 mode) it means something has gone wrong with the process of switching the feed point.

If the SWR is very high in all 3 selections then the problem is most likely not with the antenna.



## DB18/DB18E (Continued)

When on 6 m through 20 m the following should be true:

1. There is no voltage (less than 1V) between pins 13 and 23 on the 25 pin connector.
2. There is no voltage present between pins 13 and 24.
3. The resistance across the coax (center pin to shield) it should be less than 4 ohms (basically a short).

So here is what you should see when in 40 m Normal mode:

1. There is a voltage (at least 20V) between pins 13 and 23 on the 25 pin connector.
2. There is no voltage present between pins 13 and 24.
3. There is voltage present on the coax switch between R1 and GND
4. There is voltage present on the blue and brown wires going to the Director and that the polarity of the wires is correct (the correct wire colors are matched up).
5. There is NO voltage present on the blue and brown wires going to the Reflector and that the polarity of the wires is correct (the correct wire colors are matched up).
6. The resistance across the coax it should be less than 4 ohms (basically a short).

And this is what to check for in the 40 m 180 mode:

1. There is voltage (at least 20V) between pins 13 and 24 on the 25 pin connector.
2. There is no voltage present on pin 23.
3. There is voltage present on the coax switch between R2 and GND
4. There is voltage present on the blue and brown wires going to the Reflector and that the polarity of the wires is correct (the correct wire colors are matched up).
5. There is NO voltage present on the blue and brown wires going to the Director and that the polarity of the wires is correct (the correct wire colors are matched up).

Measure the resistance across the coax it should be less than 4 ohms (basically a short).

In all cases if the resistance from the center of the coax to the shield is high (greater than 4 ohms) there could be a bad connection (most common), bad coax or a bad relay in the coax switch.

With no control voltages connected to the coax switch it connects the feed line to the center element (DVR) which is uses 20 m through 6 m.

2 ---- High SWR on 40 m

Since the loop element does not make a good passive director we use a passive reflector with a driven director. This requires the feed point to be switched when switching to the 180 Mode.

If the Antenna gets out of calibration when going to 40 m it will be out of calibration on all bands until the antenna is homed or a calibrate is done.

If you know what the SWR should be on the high bands and the SWR changes after using the antenna on 40M then one of the elements is not fully extending to 40 m.

The 40 m elements are essentially the same element as we use for the loop Dipole on the 2E, 3E and 4E so you should be able to get a good SWR with just one element working on 40M if the length is correctly adjusted. There is also a caution here, you should be trouble shooting your 40M problem using factory default lengths.



## DB18/DB18E (Continued)

This is because it is possible to turn your 2 element 40M beam into a Dipole and not know it by adjusting the element lengths.

When trying to trouble shoot 40 m on the DB18 you should first determine whether the antenna is working in both Normal and 180 modes 20 m through 6 m.

Set the antenna on 20 m, calibrate it then verify SWR in normal and 180 modes are close to being the same.

After you are sure it is working correctly 20 through 6 m set the antenna to 40 m and verify the SWR. If it is extremely high (greater than 4:1) try the 180 mode, if it is also extremely high verify the coax switch is working. If you set the antenna back to 20 m and the SWR in normal and 180 is still the same then it is for sure that the problem is in the feed system, don't count out any part of the system, try to connect a MFJ259 like device as close to the antenna as possible to make sure it is the problem.

If the SWR is High (1.5:1 to 4:1) and gets worse as you tune around than most likely one element is not operating correctly.

Set the antenna back to 20 m and then use the Create Modify mode to retract the Director to its minimum length wait for tuning to stop and return it to the original length. Check the SWR, if it is back to normal then the director is out of calibration.

If the SWR is still High repeat test using the Reflector.

4 ---- Intermittent High SWR on 40 m.

Variable SWR on 40 m is almost always because one of the elements is getting out of calibration.

This can happen for several reasons see 30/40 loop information but the bottom line is that one of the elements is not working correctly.

Use create modify mode, like above, to isolate which one is out of calibration.

Refer to loop element trouble shooting for details.

5 ---- 6 m Operation

With most of our antennas it is not possible to get less than 2:1 SWR on 6 m without the optional 6 m passive element Kit.

If you have the passive element kit the 6 m option must be set to YES in the controller options menu.

The Passive element kit is designed to operate 50 to 50.5 MHz only, outside this range the Passive element(s) have no effect.

If the SWR is a little off on 6 m, this is normal, you should be able to adjust the DVR using create modify to compensate.

Since 6 m (50 MHz) is so far above 10 m it can have many problems that you would not experience on other bands.

A coax that works well up to 10 m may quit working on 6 m.

## DB18/DB18E (Continued)

Many HF Filters cut off after 10 m effectively filtering out 6 m.

A few radios use a different coax connector for 6 m than the lower bands.

Vertical whips mounted on the top of the tower will often interfere with 6 m.

Unbonded tower sections, guy wires, unused wire antennas, linear amps, coax switches have all at one time or another caused 6 m to have poor performance.

### 5 ---- Element Relays

The DB18 loop elements differ from our loop dipole in that they are switched from a passive element to a driven element using relays.

There are two additional wires (6 total) going to a DB18 loop element, the DB18E center element is one of our normal loop Dipole elements from the 3 element. These wires control the relay in the element and are polarity sensitive so the correct wire needs to go to the correct terminal.

The default condition (no relay voltage) for the DB18 loop element is a passive element so with no relay signals connected the antenna will still work 20 m through 6 m normally.

There should only be voltage going to one set of element relays at a time, Director or Reflector but not both.

### 6 ---- Are all the switches working

To test if the coax is being switched correctly can be done with 3 simple tests.  
Do this after you have confirmed the elements are operating correctly.

First: Is the SWR good (the same) in Normal and 180 modes on 20 m?

Next: Set the antenna to 40 m Normal.

Use create modify mode to retract the Reflector to its minimum length.  
Now adjust the Director length longer until you have a good match.

Last: Set the antenna to 40m 180 mode.

Use create modify mode to retract the Director to its minimum length.  
Now adjust the Reflector length longer until you have a good match.

If this is possible then the switching and coax connections should all be good.

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