

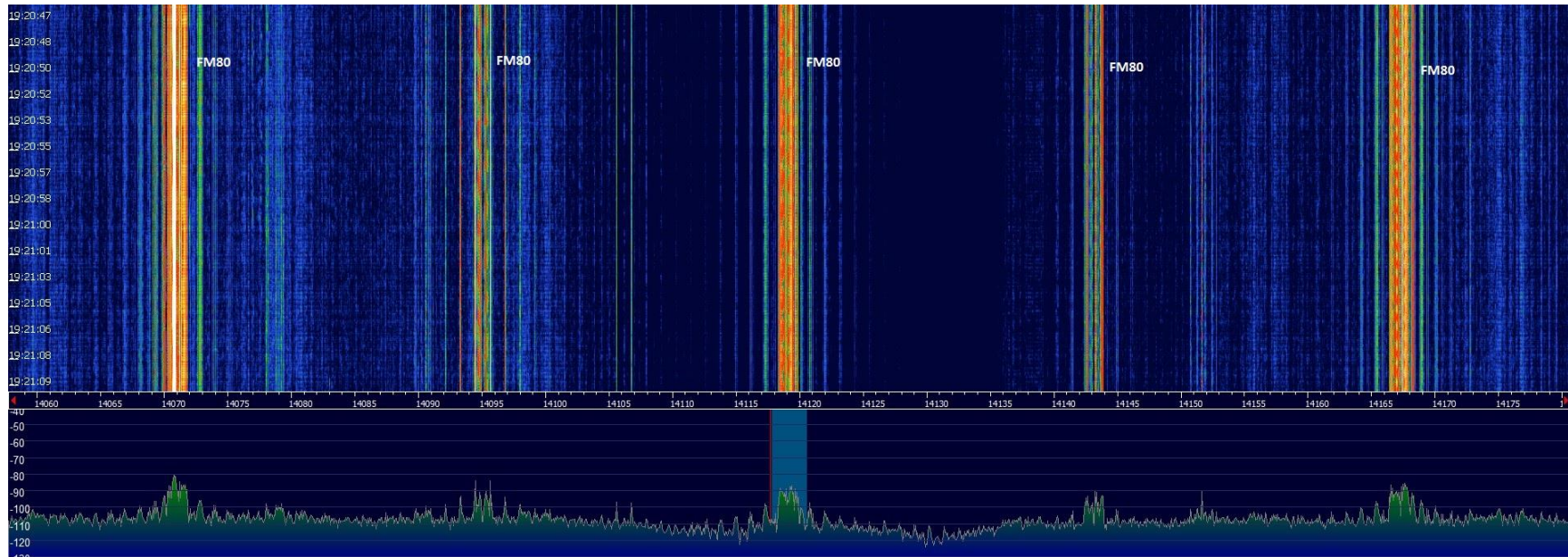
**Radio Frequency Interference Charge Controller Comparison Report**  
**Outback Power FM-80 vs. Midnite Solar Classic 150**  
**from an Amateur Radio HF Perspective by David Bottomley, KB9OKB, Amateur Extra**

**Environment and Test Conditions**

- 7.65kW Astronergy solar array, 2 charge controllers charging a 19.2 KAH 48V battery bank
- Outback Radian 8048 inverter system
- 4 wraps around mix 31 ferrites of all charge controller PV outputs, and 2 wraps on charge controller battery outputs
- 132' Windom Dipole antenna, approximately 40 ft. above the solar array and 50 ft. above the charge controllers
- Rural home, no other significant nearby RF interference with the exception of some Ethernet network interference
- These test conditions and criteria were identical for both tests
- I invited both Outback Power and Midnite Solar to participate in this test, having requested two Outback Extreme charge controllers from Outback Power, and two Midnite Solar Classic 150s to test from Midnite Solar. Outback Power declined. Midnite Solar accepted.

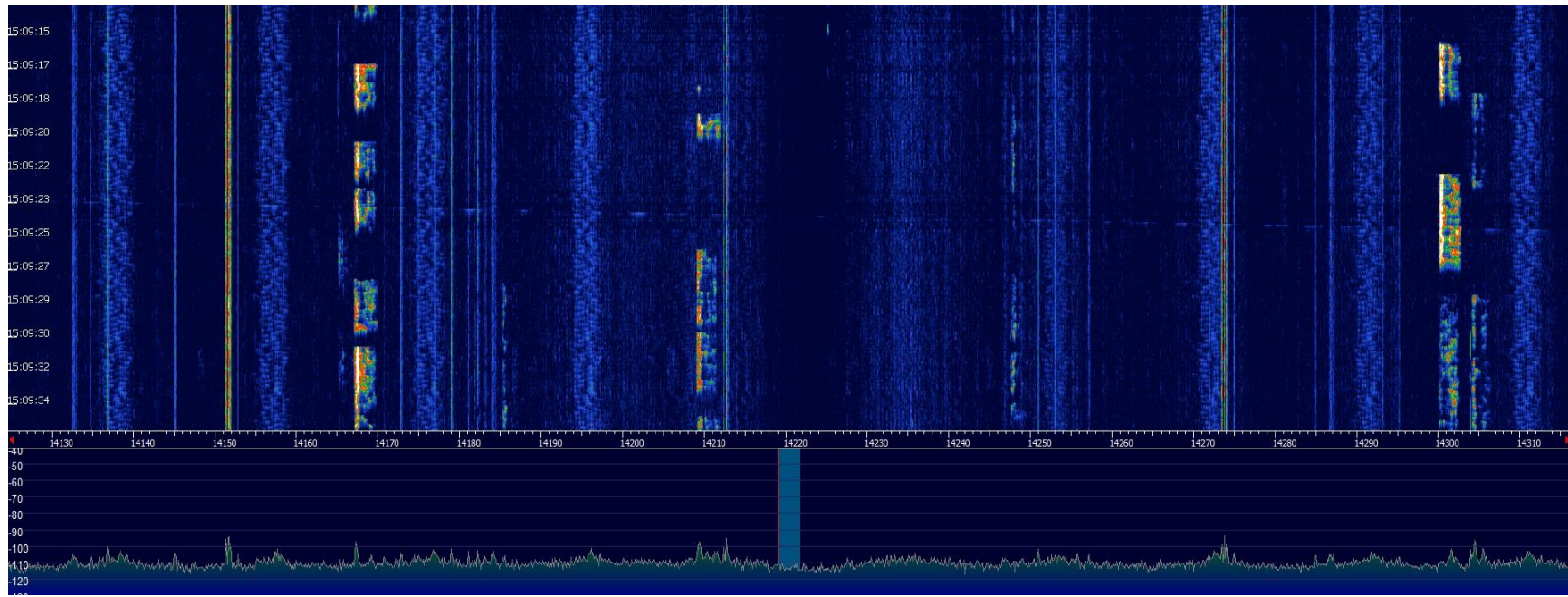
### Test Subject 1 – Outback Power FM-80 x2

At approximately 5kw power generation, the interference is substantial. On the 20M band, substantial RF emissions approximately 3 kHz wide are received every 24.5 kHz at the switching frequency of the FM-80s. Also, substantial harmonics can be plainly seen on either side of the primary interference frequencies as well. The primary interference is producing an S9+10 signal level on a Kenwood TS-480 HF transceiver. This interference is present throughout the HF spectrum, from 160M to 12M and only starts to attenuate at about the 10M band and up.



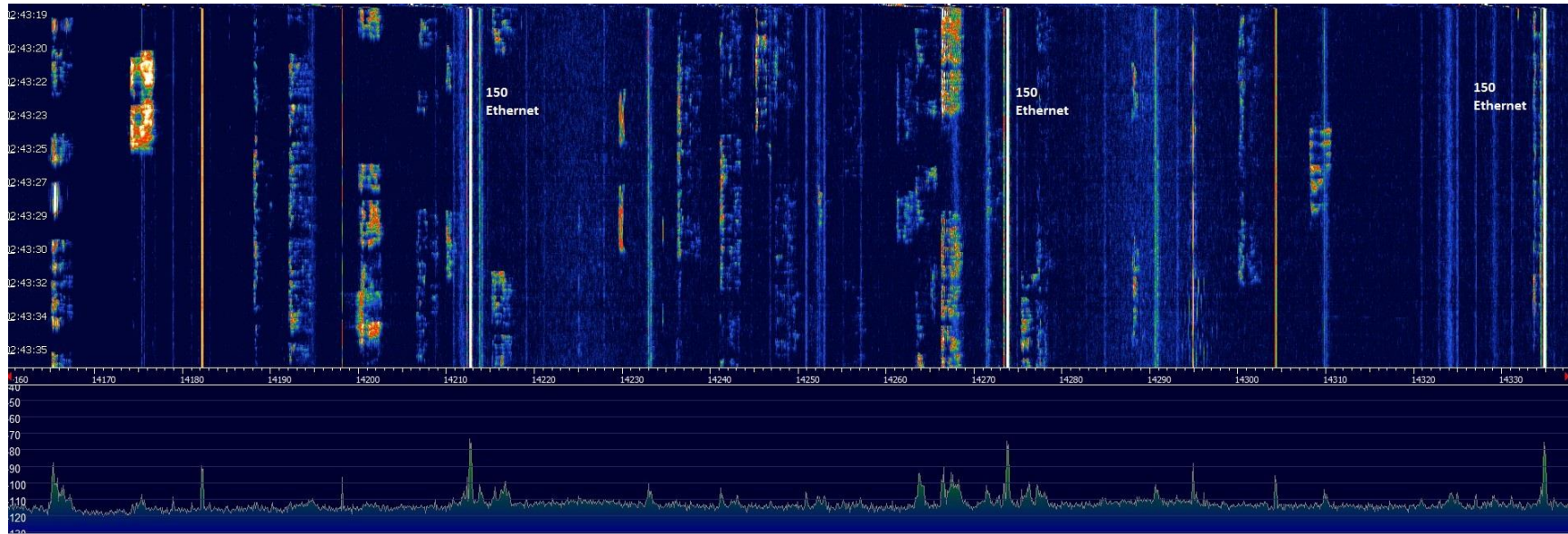
## Test Subject 2 – Midnite Solar Classic 150 x2

At approximately 5kw power generation, without cables attached to the Ethernet ports, there was no perceptible interference generated by the Classic 150s, other than perhaps a low level broadband interference that typically falls within the background noise. As you can see from the below spectrum analysis image on the 20M band, the only visible interference (aside from some unrelated Ethernet noise) is now from the inverters, which were effectively drowned out by the substantial interference from the FM80s in prior tests. Clearly the performance of the Midnite Solar Classic 150 charge controllers is vastly superior to the Outback FM80 charge controllers, from an RF interference perspective.



One caveat to note with the Classic 150s is that when the Ethernet ports were connected to a switch, there was very powerful RF interference radiated, even at night while the charge controllers were resting, at the same frequencies as above, but with much stronger emissions. Therefore, if Ethernet connectivity of the Classic 150s is desired, steps must be taken to mitigate the radiation over Ethernet cabling, such as using shielded and grounded Ethernet cables, ferrite filters, or using a wireless adapter to transmit data instead. Below, this interference via Ethernet cables only 6 ft. long can be seen at night, while no power is being generated.





Another note on the performance of the Midnite Classic 150, unrelated to RFI: I have observed a 5-10% increase in power harvesting by the Classic 150s vs. the FM80s. The 150s seem to start producing earlier in the morning and continue producing later in the evening, when the FM80s would have gone into sleep mode.