



WHITE PAPER

SignalScout

Model 40





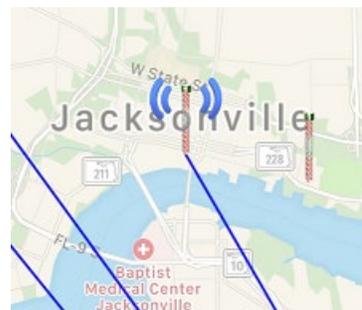
Purpose

Digital TV antennas provide viewers free access to Over-The-Air (OTA) Broadcast TV (ATSC 1.0). Availability of major network broadcasts has made “Cord Cutting” a popular trend that allows users to reduce or eliminate high cost paid services. Obtaining the maximum signal for each channel requires proper test tools like the SignalScout Signal Level Meter from Psiber Data Systems.

In this White Paper, the SignalScout will test signal strength at various distances from the FOX Channel 30 tower in Jacksonville, Florida. The tower is a 1000 KW transmitter on RF Channel 32. The SignalScout will also be tested against a high accuracy Trilithic 860 DSP meter to verify measurement readings. The test will show that the lower cost SignalScout has the same and even better signal accuracy than the higher priced meter.



Fox Channel 30 Signal



Location of Transmitter

Background

The FOX Ch 30 tower in Jacksonville, Florida is one of the more difficult stations to receive in this community north of Jacksonville. The starting point will be approximately 50 miles from this antenna.

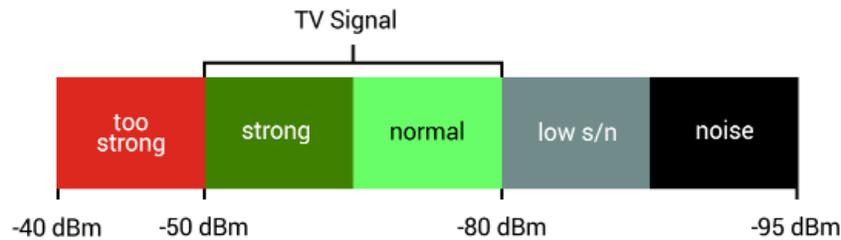


FOX Ch 30 Transmitter



ATSC Power typically ranges from a noise floor of -85 dBm to a high of about -25 dBm

ATSC SNR typically ranges from a minimum of 16 dB to a high of about 35 dB



Test Procedure

We loaded the truck with the following equipment and tested at distances of 50 miles, 40 miles, 25 miles, 15 miles, 10 miles, and 1 mile from the antenna above.



Equipment List

- Psiber Data Systems **SignalScout SS40** with V20.06.19 Firmware
- Trilithic 860 DSP. This is a QAM/ATSC meter that retailed for \$2000 and was one of the very first ATSC meters made that used a Broadcom 3510 Demodulation Receiver Chip
- Laptop for Data Logging
- 10 dB Gain Yagi antenna centered around 600 MHz and homemade handle kit
- Various cables
- Generator to power the 860 DSP meter

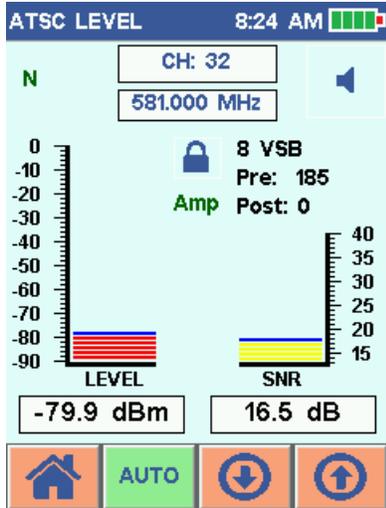


Approximately 50 miles from the Antenna

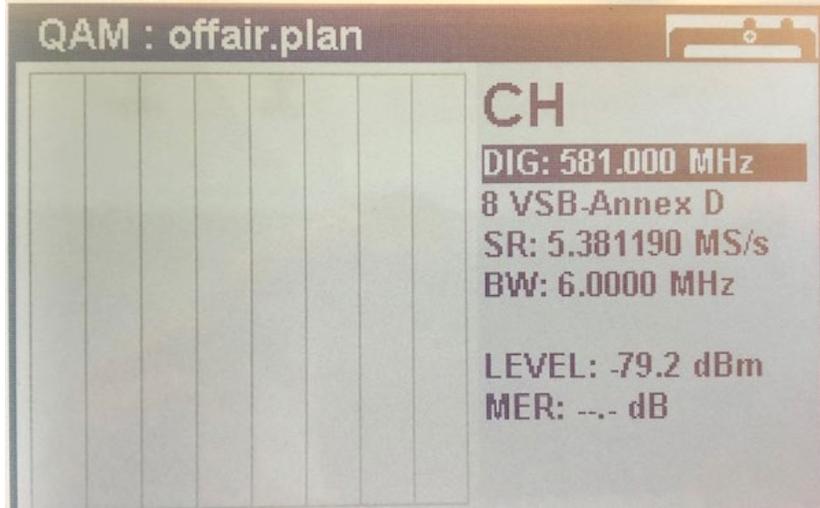
The Signal Scout locked on to the channel but was getting occasional Pre-Bit Errors as can be seen in the image below. This is consistent with a TV occasionally tiling on this channel. The 860 DSP with a 15-year-old receiver chip could not lock on at all at this distance.

As you can see, they both measured similar power levels but it was difficult to hold the Yagi antenna in the exact same position for both tests.

Note: MER on a digital channel is SNR. The Signal Scout auto-selected its pre-amp.



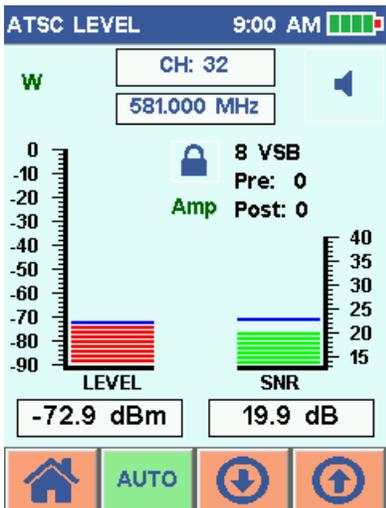
SignalScout Locked Screen



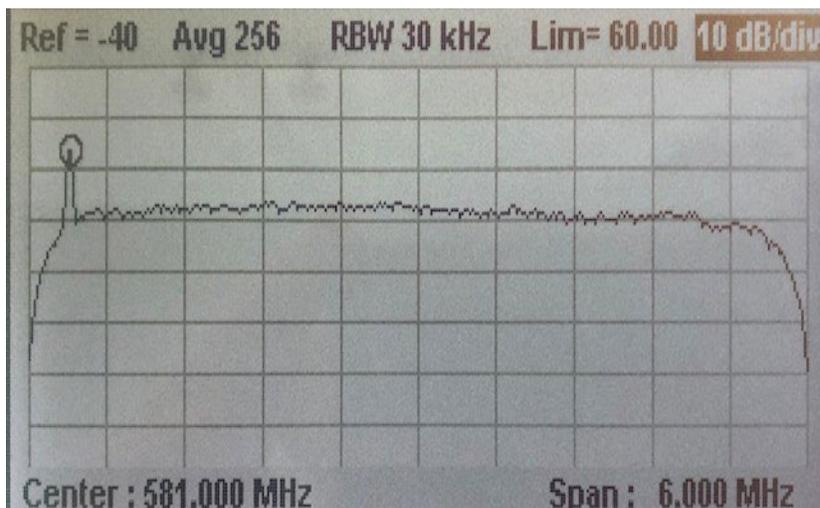
860 DSP Meter cannot lock onto the Signal

Approximately 40 miles from the Antenna

The Signal Scout SNR is now getting up to an acceptable range with no Bit Errors. The 860 DSP still cannot lock on to this channel. However, the 860 DSP was seeing a good ATSC spectrum with appropriate pilot carrier.



SignalScout Locked Screen

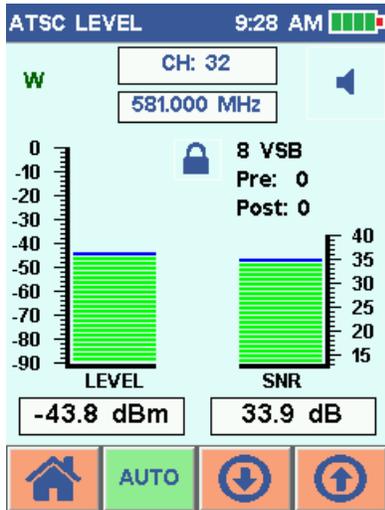


860 DSP meter still cannot lock onto the Signal



Approximately 25 miles from the Antenna

We are now in the sweet spot of power and signal quality. This is almost the ideal distance from the antenna. Both meters were measuring similar power and signal to noise. The Signal Scout receiver chip is a newer design and it is to be expected that it can handle multi-path and noise interference better than the older chip.



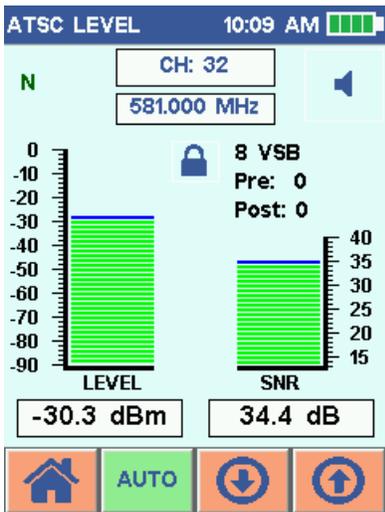
SignalScout Ideal Levels



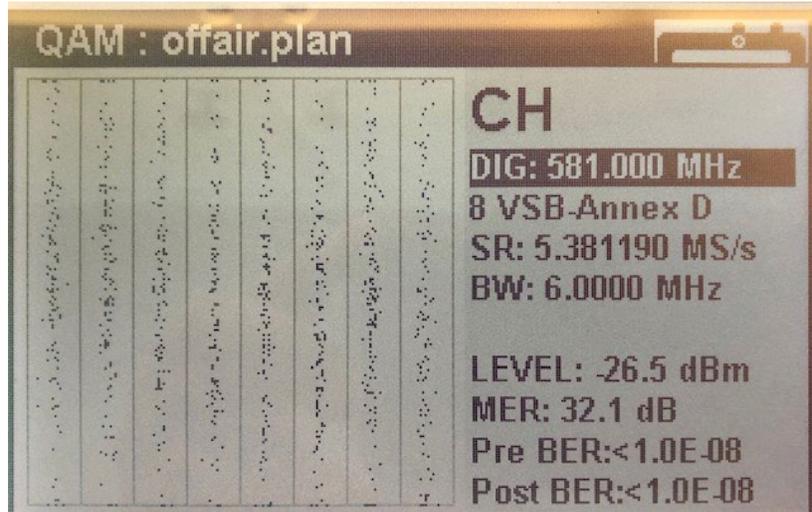
860 DSP Meter Signal and Power Quality similar to SignalScout

Approximately 15 miles from the Antenna

We are now peaking on both power and signal quality.



SignalScout Peak Levels

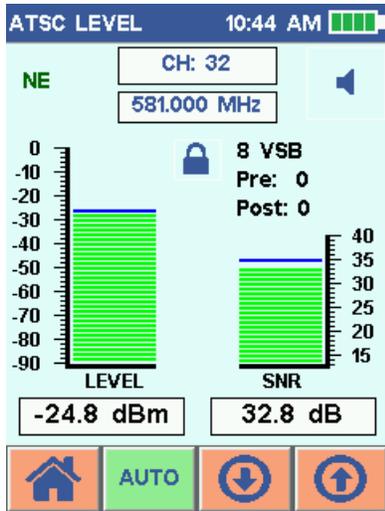


860 DSP Meter Peaking Signal and Power Levels

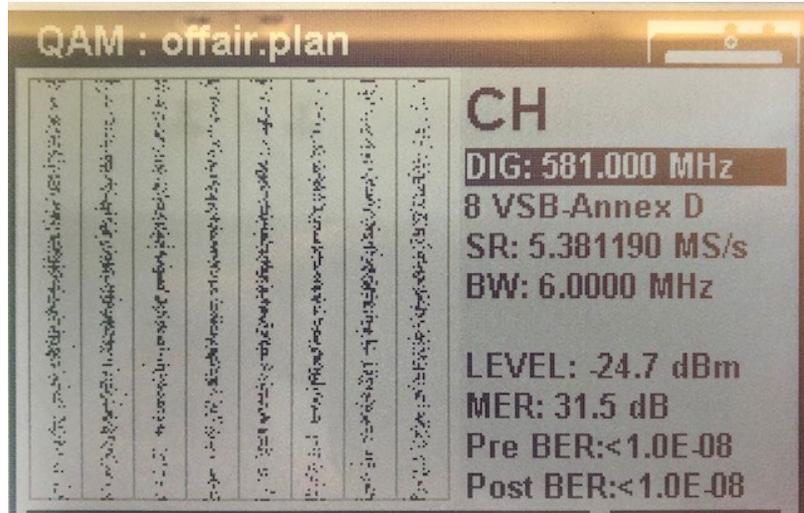


Approximately 10 miles from the Antenna

Both meters are seeing very powerful signals with comparable power levels and comparable SNR's. Although we are still in a great range, both meters showed a slight dip in SNR which could be due to multipath reflections or other signal interference.



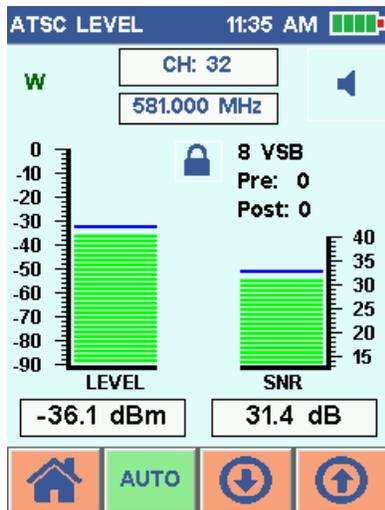
SignalScout Power Levels



860 DSP Meter Signal Quality with slight dip in SNR

Approximately 1 mile from the Antenna (Field across where the picture above was taken)

The Signal Scout and 860 DSP are seeing a power level drop off probably because the majority of the antenna transmitter signal is pointed horizontal and away. This test was done looking up at the tower. The 860 DSP could no longer lock and its RF front end was probably overloaded at this point. They are both showing similar power readings



SignalScout Power Levels



860 DSP meter cannot lock onto the Signal



Conclusion

The Signal Scout provided signal level and SNR measurements at a much farther range and with an accuracy equal to or better than the Trilithic 860 DSP meter that cost about \$2000. It had more dynamic range, better low end and high-end performance. The Signal Scout clearly provides the features and accuracy required for professional OTA system installation. The SignalScout \$395 price makes it a must have tool for OTA installers and technicians.