Using the first strike meter

How to use the information displayed to your advantage.

What do the figures and numbers on the display actually mean.

Above we have the first strike meter display we are using factual satellites and factual equipment in this article.

As previously advised in my first article on the first strike meter upon switching on the first strike meter we are presented with approximately eight different sets of data which grows ten once we have locked onto the signal we require.

The first item is the Longitude of the satellite in my case OPTUS D 1 @160 degrees east. As long as my longitude 174 E and latitude 36 S has been entered correctly the meter will provide me with the following data.

1: The relative direction of the satellite from my location.
2: The elevation angle of the satellite from my location.
3: The off set angle for my LNBF. This data requires some explanation
If the satellite was sitting directly above me then there would be no deviation for horizontal and vertical polarity. Horizontal would be Horizontal and vertical would be vertical. The further your location is from the satellite orbital position the polarization of horizontal and vertical change .This is called “Skew “it happens because we are looking

at the satellite at an angle and not directly faces on. This is called the" Slant Angle "and these changes as our latitude and longitude changes in reference to the satellite location. In my case its approximately 18degrees skew to make sure the polarization provides clean horizontal and vertical signal separation.

Set up parameters

The first user display is termed **F** for frequency. In my case 12456 being Ku band 12456 is one of the half transponders operated by Free View NZ.

Next we have the **SR** symbol rate which can be any thing from 2,000 M/S to 45,000 M/S depending on the operator and whether the transponder is "MCPC" Multiple Channel per Carrier which will be denoted by a high symbol rate or a Single Channel per Carrier "SCPC"

Next we have **LO** which stands for Local Oscillator frequency. These changes depending on the LNBF type and the frequency band the satellite you are viewing. However more and more universal LNBF's are being used which use 9750 /10600 the latter with the 22K option active.

My Lo for the Optus D1 series satellites using 12250 to 12750 MHz either 11300MHz or 10750 MHz. The actual LNBF for this test was 11.300 MHz

The **22K function** was off in this case however it is used when using a universal LNBF which covers two frequency bands starting at 10 GHz and finishing at 12.75 GHz
The first band is accessed by using 9750 MHz for the Lo band and 10.600 for the high band.

The signal and quality meter

This is displayed as a bar graph **S "signal"** refers to the output from the meters tuner using the same principle as a satellite receiver. It is a reference to the amplified signal from the LNBF as an output to the QSPK demodulator stage.

Like wise **Q "Quality** "is referenced after the decoding process The "quality" reading is the inverse of received bit error rate, i.e., as errors rise - with falling signal levels the errors go up - so "quality" goes down.

Digital satellite receivers have operating parameters that are well described. The first strike is really a satellite receiver with out having A/V outputs. The point that we refer to as "lock" has two names. It is called the FP (failure point) by DVB standards and it is called the TOV (threshold of visibility) by the ATSC standards. It is defined as a bit error rate, it is defined by number of corrupted packets, and it is defined visually.

S/N or Signal to noise "SNR" Signal to Noise Ratio.

I n both analog and digital communications, signal-to-noise ratio, often written S/N or SNR, is the measurement signal strength relative to background noise The ratio is usually measured in decibels (dB).

The incoming signal strength is measured in microvolt's V_s, and the noise level, also in microvolt's, is V_n, then the signal-to-noise ratio, S/N, in decibels .Communications engineers always strive to maximize the S/N ratio.

In our case we can assume based upon the broadcast parameters what our IRD threshold will be for a specific satellite service. In My case the Free View transmissions use FEC ¾ which equates to an IRD threshold of under 6dB. Infact the turn on point is approximately 5.2db on paper.

By care full adjustment of the LNBF the actual IRD turn on point can be found you can vary the LNBF to make the first strike meter sit on the threshold point. This is where the meter will display "LOCK" / "UNLOCK" this point is your STB threshold point.

In my case the free view threshold point according to my first strike meter is 4.9 Db Being situated in a climatic zone which requires at least 3.5 Db rain fade margin my 12.6db S/N on a 35cm dish with a spitfire LNBF is more than adequate for home viewing.

Rule of thumb for digital satellite broadcasts, using full or partial transponders. These may vary slightly depending on the actual broadcasts themselves.

FEC Rate ½ = Threshold rate of 3.6 dB / FEC Rate 2/3 =Threshold rate of 4.2 dB

FEC Rate 3/4 =Threshold rate of 4.9 dB / FEC Rate 5/6 =Threshold rate of 5.2 dB

FEC Rate 7/8 =Threshold rate of 8.2 dB

S or Signal measured in dBuv below is a chart out lining the various signal strengths encountered when aligning or trouble shooting satellite installations. Of course the difference in received signal will impact upon the other meter readings.

49 dBuv = very low signal / 52 dBuv = low signal / 59 dBuv = marginal signal requirements / 63 dBuv = acceptable signal / 69 dBuv = good quality signal

72 dBuv = Very good signal / 78 dBuv = classed as optimum signal

80 dBuv and up = Very Very Very Good signal better than optimum signal.

In my case the free view signal was 78.9 dBuv which was also reflected by the high readings in the other displays.

78.9Dbuv = 12.6 SN

Lastly "BER" Bit Error Rate.

The bit Error "BER" expresses the performance level of a digital receiver .the higher the BER the greater the receive systems ability to perform well during marginal reception conditions, This simple relationship is the basis for all BER measurements and specifications. It assumes that all transmitted bits were sent error free. BER is usually specified as a number times 10 raised to a large negative exponent. Common requirements for serial links are generally in the range of 1x10-6 to 1x10-15. BER numbers by themselves do not represent any period of time. They are only a ratio of numbers of bits sent and received.

Our 1-0E- 05 BER seems to be standard on the first strike meter once acceptable signal strength has been obtained. The theory behind these calculations and displays take up several pages of reading. What I have attempted to achieve here is a understanding of how the various displays and the information is interrelated and how you can use your first strike and understand what in real life these displays mean.