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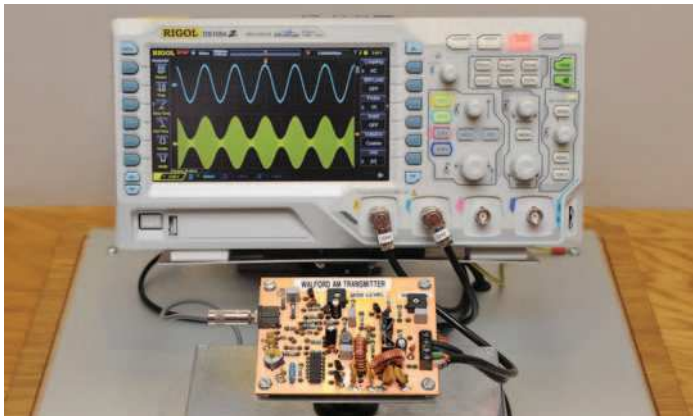
New Products

Graham, G7OSR receives the donated Rigtol DS1054Z digital oscilloscope from Doug Lovell of Telonic Instruments Ltd.



The DS1054Z is part of the amplitude modulation display at the NRC.

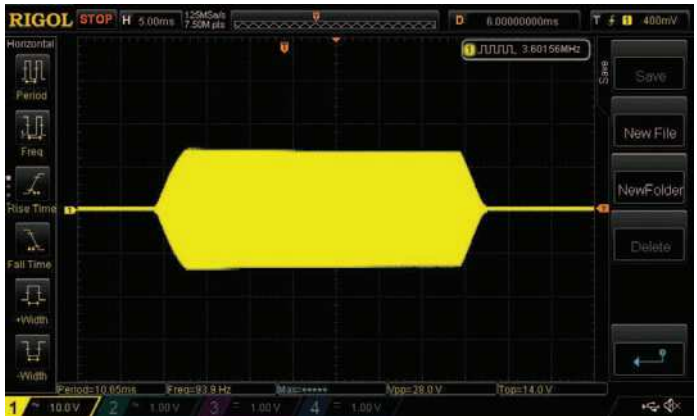


FIGURE 1: CW keying waveform.

Rigol oscilloscope donated to the NRC

In April, Doug Lovell of Telonic Instruments Ltd kindly donated a Rigol DS1054Z digital oscilloscope for use in one of the displays in the National Radio Centre.

We asked Martin Atherton, G3ZAY to explain how the equipment would be used in the NRC and for a description of his early impressions of this scope, having recently purchased one as an upgrade from his old analogue equipment.

The Rigol DS1054Z is an entry level digital oscilloscope that retails for around £330 and is a good choice for general amateur electronics use. It has four channels and comes with four Rigol 150MHz probes. The 3dB bandwidth is 50MHz, vertical sensitivity is up to 1mV per division and the horizontal scan goes down to 5ns per division. It comes with a 7" WVGA colour display (800 x 480) giving excellent image quality, though reading glasses may be required as some of the text fonts and symbols are quite small. There is a wide range of trigger options, a network port, and a USB port that can be used to record screenshots to a memory stick.

The key difference between digital and analogue scopes is that digital ones have to sample the analogue waveform at a high rate, store the samples in memory, carry out computations, and regularly refresh the display. These requirements lead to a number

of design and architecture choices that have to be made in the face of cost constraints at the lower end of the price spectrum. The DS1054Z has a maximum sample rate of 1GSa/s (giga samples per second) split between the channels in use; so with 4 active channels the maximum sample rate would be 250MSa/s. The standard unit can store 12M waveform points which again must be shared between the active channels. In practical amateur use you are unlikely to be significantly constrained by these factors.

The DS1054Z is a small unit, which means that many of the controls have to be multi-function. Radio amateurs are used to this so it shouldn't be a problem – though it would be nice to have separate controls for each channel rather than having to select one channel at a time to modify. Menus are a little complicated so new users should expect to have to read the manual.

The huge benefit of a digital scope is that vertical and horizontal measurements on the waveform(s) being displayed become trivial. Peak to peak and RMS voltages, rise times, period and frequency, phase differences, and other parameters can be displayed on screen, colour coded to the trace colour of each channel. There is even a range of maths functions such as the Fast Fourier Transform which turns the scope into a very basic spectrum analyser. In practice the FFT may be limited by the number of samples in the time-span of the trace and is not good enough to replace a proper spectrum analyser. A hardware frequency counter is included in the scope to provide a more accurate value than the software counter in some situations.

I used mine to display a CW keying waveform (**Figure 1**) as well as the phase difference between output ports of an 80m antenna phasing box. You can see the hardware frequency measurement in the top right of the screen. Comparison with a 500MHz 2GSa/s scope showed little difference in the accuracy of the trace for a 1.5MHz signal – very small defects in the signal generator output were clearly visible.

If your interests are in the HF part of the spectrum and you want to check an oscillator is running, measure signal levels and frequencies, or compare signals in different parts of a circuit then this is probably the scope for you.

The DS1054Z can be ordered direct from Telonic Instruments Ltd via their dedicated Rigol website www.rigol-uk.co.uk

Donation to the National Radio Centre

Telonic/Rigol has donated a DS1054Z to the National Radio Centre where it is part of the amplitude modulation display. The display itself explains how a radio signal in its original state carries no information. To carry information, the size of the signal (amplitude) has to be changed. The process where information such as speech, music or data is added to a radio transmission is called modulation. Demodulation is the reverse process, where a receiver recovers the information from the radio signal.

The oscilloscope shows the modulation envelope of an AM transmitter on one channel with the modulating signal on another channel, and alternates between no modulation or an audio sine wave. When visitors push the red button on the display case they can speak into the microphone and observe both the audio and the corresponding RF envelope.

Graham, G7OSR showed Doug Lovell how this all works when they connected the scope to the display.

The RSGB would like to thank Telonic Instruments Ltd, and Doug Lovell for delivering this generous donation that will be enjoyed by many visitors to the NRC.