Physicists develop unique new calibration tool for radio frequencies

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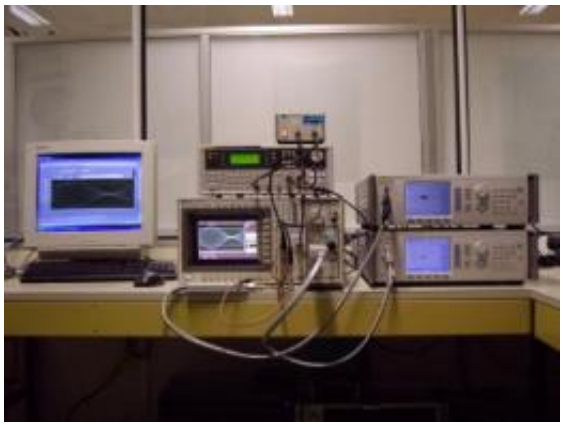

This is a sampling oscilloscope (model HP54750A) being used to measure the AM of a 9640A. A second 9640A is used to supply a reference signal. Credit: NPL/Fluke

A scientist from the National Physical Laboratory (NPL) has helped Fluke Precision Measurement to prove the effectiveness of a unique new tool for calibrating radio frequency (RF) devices.

Calibration of radio frequency (RF) devices has typically required several different pieces of equipment such as a signal sources, power meters and reference sensors. Fluke Precision Measurement, an international company that specialises in electrical calibration equipment, spotted a gap in the market for a single device to provide accurate RF calibration signals - the result is the Fluke 9640A RF Reference Source.

Traceable calibrations are vital in order to demonstrate and give confidence in an instrument's technical capabilities. However, in the case of amplitude modulation (AM), Fluke had a measurement problem. The usual methods of measuring AM have too high an uncertainty to be able to verify that the instrument is as good as Fluke believe it to be. A technique to accurately and traceably demonstrate the AM performance of the Fluke 9640A RF Reference Source needed to be found.

To achieve this, NPL's Matthew Harper spent two weeks on secondment to Fluke in Norwich investigating the application of a new technique, in-phase quadrature (IQ), developed at NPL. By exploiting a timing characteristic in the operation of certain sampling oscilloscopes, IQ enables NPL to correct for timebase errors in the oscilloscope and greatly enhance the accuracy of measured waveforms. Matthew succeeded in establishing that this technique had the potential to provide AM traceability at the low uncertainty levels that Fluke required. Fluke were left with a system and software that allowed them to further refine the measurements through collaboration with NPL.

Users can now be even more confident that the Fluke 9640A RF Reference Source can be used to calibrate a broad range of RF test equipment including spectrum analyzers, modulation meters and analysers, RF power meters and sensors, measurement receivers, frequency counters and attenuators.

Paul Bunyan, Head of Metrology, Fluke Precision Measurement Ltd, said:
"Working together with a member of NPL staff on-site was a significant factor in understanding and demonstrating the potential for this novel measurement technique in our particular application. The two-week secondment has saved Fluke between three to six months of internal engineering development work."

Dr Matthew Harper from NPL said:
"I was seconded to Fluke under a government-funded programme called Measurement for Innovators (MfI). This is designed to promote innovation by linking businesses with the world class expertise and facilities contained within organisations like NPL that make up the UK's

National Measurement Institutes."

NPL's MfI programme helps industry achieve business goals through utilising the facilities and expertise at NPL. The first 200 participants in the programme saw a total annual sales increase of £5.3 million and a total annual profit increase of £5 million. The programme presents a unique and exciting opportunity for innovative research for business to take place through consultancies, secondments and Joint Industry Projects to:

- Develop and improve innovative new products, processes and services
- Provide solutions to generic measurement problems
- Develop new test methods or standards

Source: National Physical Laboratory