

## **The Calibration System at Cirris**

In the past suppliers of cables for military contracts were required to use test and measurement equipment that had been calibrated by a calibration laboratory meeting the requirements of MIL-STD-45662A. In February of 1995 the United States Department of Defense cancelled MIL-STD-45662A in favor of either ANSI/NCSL Z540-1 or ISO 10012-1. Although cancelled in 1995, MIL-STD-45662A continued in many cases to be an interim standard while calibration laboratories made the transition to Z540-1 and ISO 10012-1.

Many commercial cable suppliers also want evidence of compliance to formal calibration standards.

At present, Cirris Systems is in compliance with both the MIL-STD-45662A and Z540-1 standards, and all certificates of calibration issued at this time reflect this calibration status. In addition, since June 1995 Cirris' quality system has been registered by KEMA to ISO 9001 (registration #10125.01). Therefore, Cirris' quality procedures, including calibration, are continually reviewed by both internal Cirris auditors and the external auditors representing KEMA.

Cirris Cable testers are designed and manufactured to function within published specifications, without the need of adjustments in the calibration process. If a Cirris tester fails to pass calibration, there are no adjustable components that can bring the cable tester back into calibration. Rather, the faulty tester module must be repaired or replaced before the unit will pass calibration.

Cirris provides calibration services for its test equipment; however, Cirris customers may elect to personally verify calibration of their own cable testers by purchasing the appropriate performance check kit. Each performance check kit consists of calibration adapters made with passive components, which have values traceable to the National Institute of Standards and Technology (NIST) in the United States. The performance check kits used to calibrate Cirris *hipot* cable testers require an adequate customer supplied voltmeter. Since the calibration adapters in performance check kits have only passive components and receive minimal wear in the field, a 5-year calibration interval is assigned to these adapters. At the end of the 5-year calibration interval, the calibration adapters must be replaced rather than recalibrated.

Cirris cable testers have shorter calibration intervals than performance check kit adapters. The Cirris line of continuity testers -1000M, 2000, 500, 1000LC – have a calibration interval of 2 years. This is due to the fact that continuity testers, which distinguish between opens and shorts, essentially are making very basic resistance measurements. More advanced Cirris testers, such as the Cirris 1000R+, 1000RX, 1000HN, 1000H+, CH+, and Touch1 have been assigned a standard 1-year calibration period. These testers perform very accurate resistance, voltage, and/or capacitance measurements requiring a shorter interval.

## **General Elements of Calibration Programs**

Calibration programs, such as those described in MIL-STD-45662A, Z540-1, and ISO 10012-1, require that the procedure used to test and calibrate test equipment be *written* and that the *personnel follow* the written procedure. Generally any test instrument used to calibrate another must be *at least four times as accurate* as the instrument being calibrated. In addition, an instrument used to test another instrument must be *traceable* to the NIST standards. MIL-STD-45662A defines traceability as, "The ability to relate individual measurement results to

national standards, or nationally accepted measurement systems through an unbroken chain of comparisons.”

Each year calibration labs throughout the U.S. send a relatively small number of test instruments back to the NIST (National Institute of Standards & Technology) for calibration to extremely accurate specifications. Having the government provide the standard assures, in essence, that everyone uses the same yardstick. When the NIST confirms the accuracy of a test instrument’s ability to measure a given unit, a NIST number is assigned to that instrument for that unit of measure. When returned to the calibration labs, these *highly accurate* test instruments are used by the calibration labs to calibrate other pieces of test equipment, which in turn are often used to test still other instruments, and so forth.

Maintaining the chain of traceability back to the NIST is more complex than what might seem on the outset. For example, detailed calibration records must be kept, and the four-to-one accuracy ratio described above must be insured. Calibration intervals for each piece of equipment in the traceability chain must be maintained current. In addition, successive calibrations must be made under controlled conditions, with qualified personnel, who use valid and well-defined procedures.

NIST numbers are sometimes displayed on calibration certificates to demonstrate some evidence of NIST traceability. In recent years some calibration laboratories have discontinued displaying NIST numbers on calibration certificates in order to reduce calibration costs. At this time Cirris does not receive NIST numbers on certificates for instruments used in calibration, and therefore cannot provide NIST numbers on calibration certificates for Cirris test equipment. Please note there is nothing in MIL-STD-45662A, Z540-1, or ISO 10012-1 that requires NIST numbers be maintained for each successive calibration to demonstrate traceability.

## **Assuring Traceability to NIST**

If you desire to audit the calibration system at Cirris, you may fax us the certificate of calibration for *one* of your Cirris cable testers. Cirris will return to you the paperwork trail of Z540-1/MIL-STD-45662A calibration certificates for that Cirris cable tester, back to a reputable calibration lab, such as Fluke or Hewlett Packard, which calibration laboratory Cirris has found in compliance with Z540-1 and MIL-STD-45662A. These calibration laboratories are traceable to the NIST, thus completing the calibration links back to the NIST. Additional requirements for traceability documentation for more than a single unit can be provided for an additional fee. Cirris customers may also receive a current copy of our ISO controlled calibration procedures. These procedures are frequently reviewed by Cirris internal auditors as well as by KEMA. Cirris customers may also arrange to visit Cirris for an on-site audit.

Some customers require calibration data for units calibrated by Cirris. A *calibration data report* is a record of the actual values read during the calibration, along with the high and low acceptable limit values. A *calibration data report* for H+ and R+ and New H analyzers is currently sent with *units sent to Cirris for calibration*, but this data report is not sent on new units. Some Cirris testers, such as the 1000M, 2000, LC, and 500 continuity testers provide only go-no-go calibration test results and therefore have no *calibration data report*. If a *calibration data report* is desired for other Cirris Calibration analyzers, or for calibration adapters, the request should be made at the time of order.

## **Fee Schedule for Special Calibration Services**

Traceability audit of 1 <sup>st</sup> Tester	No Charge
Traceability audit of successive testers after 1 <sup>st</sup>	75.00 (per successive tester)
Copy of calibration procedure	No Charge
Calibration data report for PCHK kits	35.00 (per calibration adapter in the kit)
Calibration data report for R+, H+, and NH	Sent to customers free on units sent back to Cirris for calibration. Not provided on new units, but may be provided if the customer requests prior to shipment.
Calibration data report for CH+, and Touch 1	Calibration data is recorded in data files. Not provided on recalibrated units, nor on new units; however, may be requested by the customer free of charge.
Calibration data report 1000M,2000,5000,LC,500	Test results are go-no-go type. No data report available
Replace lost calibration certificate	No Charge

Sincerely,

Gene Vought  
Calibration Supervisor (801) 973-4600