Customer Self-paced E-learning Sequence for
Keithley Model 4500-MTS Multi-Channel I-V Test System

Overview:

This document specifies Keithley's best-practices sequence for customer self-paced e-learning and tooling setup that new users of the Keithley Model 4500-MTS Multi-Channel I-V Test System, including optional Model 4510-QIVC Low Power Quad I/V Card or Model 4511-QIVC High Power Quad I/V Card.

Time required: 20 hours minimum for an engineer with a background in programming in Visual Basic or C. Potentially 40 hours of time required for an engineer with minimal experience in programming instruments.

Prerequisites:

1. It assumes the reader knows SMU (SourceMeter® Unit) measurement basics, and basics of SCPI programming on the level of this course:
   http://www.keithley.com/events/training/2400seriesusercourse
2. It assumes the reader has general knowledge of best practices for structured software programming.

Recommended training sequence:

1. Start by reading the *Model 4500-MTS Modular Test System Quick Setup Guide* (Rev. B), available on the Web at http://www.keithley.com/data?asset=13626. This document is two pages long and provides critical information for basic setup and operation of the system.

2. Next, read the *Model 4500-MTS Modular Test System Mainframe User's Manual* (Rev. B), at http://www.keithley.com/data?asset=13623. It is only 43 pages in length and has three sections:
   o Section 1 – Provides more detail than the Quick Setup Guide and lists approved PCI cards.
   o Section 2 – Provides important information and guidance regarding the installation of approved PCI and ISA cards.
   o Section 3 – provides an overview of operation as well as details regarding the hardware and software interface.

3. Read the 4510-QIVC and 4511-QIVC Quad IV Cards User's Manual (Rev. A), at http://www.keithley.com/data?asset=15468. It covers the installation, operation, and programming of the Quad IV Cards. In particular, understand the information in these sections:
   o *Important section to understand:* Section 4 provides important QIVC programming guidance including details regarding remote operation via Ethernet. It describes the primary method for using and controlling the 4500.
   o Section 2 explains the architecture and operation of the QIVC including guidance on interconnecting to the Device Under Test (DUT).

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- o Section 3 explains the software operation and shows how to use the "embedded sweep example" to verify operation of the installed QIVCs.
- o *Appendix B – Terms, Concepts and Definitions* is critical reading to understand the overall operation and capability of the 4500-MTS and 451x-QIVC cards.

4. The 4500 Help Files which are on the system itself are a handy reference when programming the 4500:
    a. For programming the 4500 in C, use Windows Start meny → Programs → Keithley Instruments → 4500-MTS → C Help File.
    b. For programming the 4500 in Visual Basic, use Start → Programs → Keithley Instruments → 4500-MTS → VB Help File.
    c. Simple examples for Labview, VB and C are included in "C:\Program Files\Keithley Instruments\4500-MTS\Examples" folder.

5. The 4500 Software CD that ships with the system can be installed on any Windows 2000 / XP PC. The installation of this software allows the new user to explore the 4500 software control and communications concepts independently or in conjunction with a 4500-MTS system. The installation CD is shipped with the system, and is also available for download at http://www.keithley.com/data?asset=50672 . (33 MB zip file).