Interconnect Tester

Users Guide

Version 1.1
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i. Revision History

Revision	Date	Description
v1.0	12/19/07	Initial Version
v1.1	4/29/08	Updated with multi conn.

ii. Reference Documents

Document #	Title	Author
IEEE-1394b-2002	High Performance Serial Bus (Supplement)	IEEE

iii. Table of Contents

iv. Table of Figures

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1 Introduction

The Quantum Parametrics' Interconnect Tester (ICT) provides the ability to test one (1) to five (5) interconnect simultaneously. A interconnect could be a cable, cable with slip-ring, or a series of devices that include there own PHY devices. Each ICT connection provides outputs with amplitude control. Depending on the usage calibration of each output maybe required. Each unit is calibrated by the factory at IEEE-1394b defined test point three (TP3) using a 2 meter cable. Once calibration is complete the user may select a voltage that will be used when running the test. Each port transmits packets to the 1394 bus and receives data from the 1394 bus. Each packet is verified by the receiver of the packet. Currently the QP-ICT comes in an S400 (QP-ICT-4) and S800 (QP-ICT-8) versions. The S400 and S800 indicate the maximum data rate supported. The default configuration for the ICT is capacitive coupled for both the -4 and -8.

1.1 Interconnect Tester Components

1.1.1 Interconnect Tester

The Interconnect Tester (ICT) provides hardware capabilities to test transmit and receive signal compatibility.

1.1.2 ICT Application Software

The ICT application software controls the testing process and logs the test results.

1.1.3 DC Adaptor

A 12V DC power supply is included to power the ICT. The tester may also be powered by IEEE 1394 cable power.

1.2 Other Required Equipment

1.2.1 Host Computer

The ICT application runs on a PC running Microsoft Windows XP. Minimal hard disk space and memory is required.

1.2.2 1394 Interface

The ICT application communicates with the ICT instrument via IEEE-1394 (the Backchannel). The host computer must provide a 1394 open host controller interface (OHCI). PCI, PCMCIA, and integrated OHCI are acceptable. The ICT has one bilingual (port 1) and two beta only ports (port 0 and 2). The Backchannel uses VersaPHY™[1] technology for communication between the PC and the ICT. While VersaPHY is supported by most OHCI implementations QP has found the TI TSB82AA2B OHCI IEEE-1394b controller does not support VersaPHY packets.

The ICT application installation will install custom 1394 drivers. These drivers should allow applications currently using 1394 to continue to use the 1394. However, it is STRONGLY RECOMMENDED that the PC and ICT connection remain point-to-point while testing.

[1] VersaPHY™ is a trademark of Quantum Parametrics LLC, all rights reserved.

2 Interconnect Tester Tour

2.1 Front Panel

Figure 1 - Front Panel

2.1.1 Power Light

If the Interconnect Tester (ICT) is powered through the 12V jack and the on/off switch is in the *on* position, the Power LED should be illuminated.

2.1.2 Backchannel Connectors

The Backchannel connectors provide the IEEE-1394 connection between the ICT and the PC running the ICT application. The ports labeled 0 and 2 are beta only connections and port 1 is a bilingual connection. All ports support a maximum data rate of S400.

2.1.3 Connection 1 to n

The ICT supports one (1) to five (5) connections to the units under test (UUT). Each connection is label with Connection n a, where n represents the connection number (1 to 5). The ICT application will prompt the user to connect the UUT to the appropriate connection using the connection number.

2.2 Back Panel

Figure 2 - Back Panel

2.2.1 Tester Power

The ICT may be powered by the included 12 volt power supply connected to the back of the tester.

2.2.2 ON – OFF Switch

The ON – OFF switch connects and disconnects the 12 volt power supply of the ICT internal circuitry.

3 ICT User Interface

3.1 Start Application

Execute the QPIntrConT.exe file. This can be through the Windows START menu.

3.2 Initial Screen

If the ICT is not connect to the PC when QPIntrConT.exe is executed the user will be instructed to make the connection. In most cases when the ICT is connected the following screen will be presented. If not, please exit the ICT application using the Exit button.

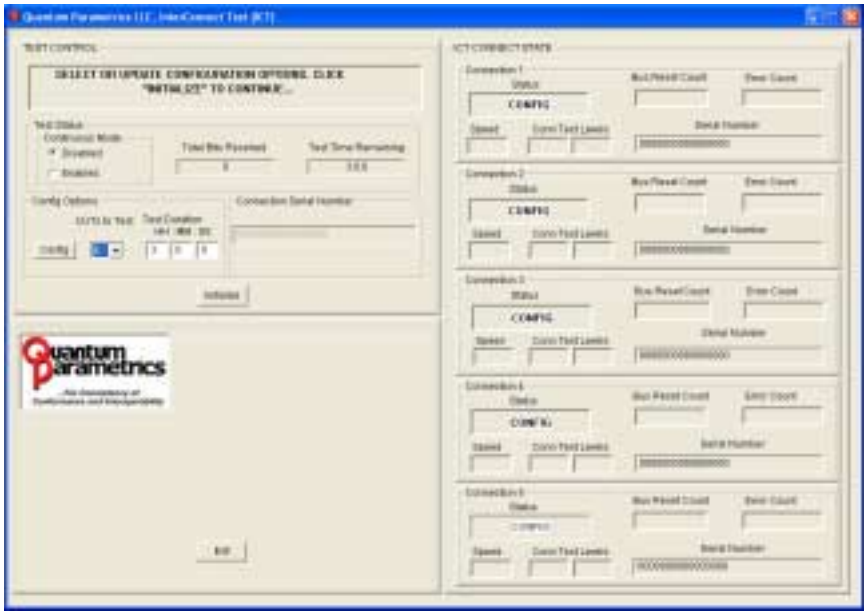

Figure 3 – Initial view after ICT application starts and ICT connected.

3.2.1 Test Control and Test Status

The user is given instructions and status through the Instruction and Status areas for the UI.

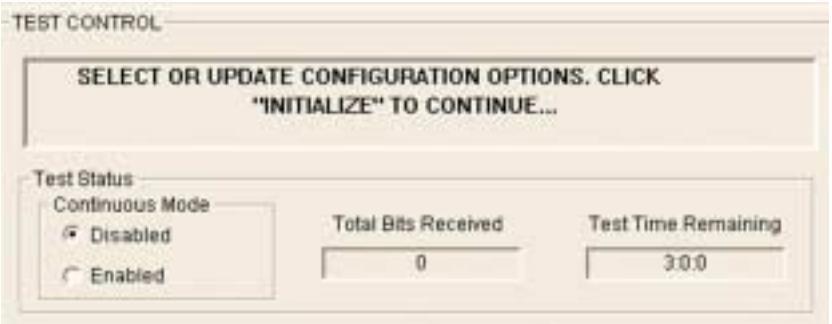

Figure 4 - Instruction and Status areas.

3.2.2 Configuration

QP-ICT is pre-configured and there will be a QPICT_MOD.cfg file located in the same directory as QPIntrConT.exe. If the QPICT_MOD.cfg is not present one will be created by QP-ICT using default values. Located on the main QP-ICT window in the, Config Options area, are two variables that maybe configured by the test person; the number of Unit Under Test (UUT) to test and how long the test will run (Test Duration). More test variables are configurable and they may be accessed through the Configure and Calibration Page. To create or alter the test configuration the SHIFT-ALT-C keys must be selected at the same time. Detail about the ICT configuration is provided later in this manual.

Figure 5 – Main UI configuration options.

3.2.3 Connect State

The ICT CONNECT STATE area indicates which Connections are available (highlighted) and which are not (greyed). This area indicates the state of the 1394 interface, test status for that connection, how many bus resets and errors were detected and the serial number for the UUT being tested.

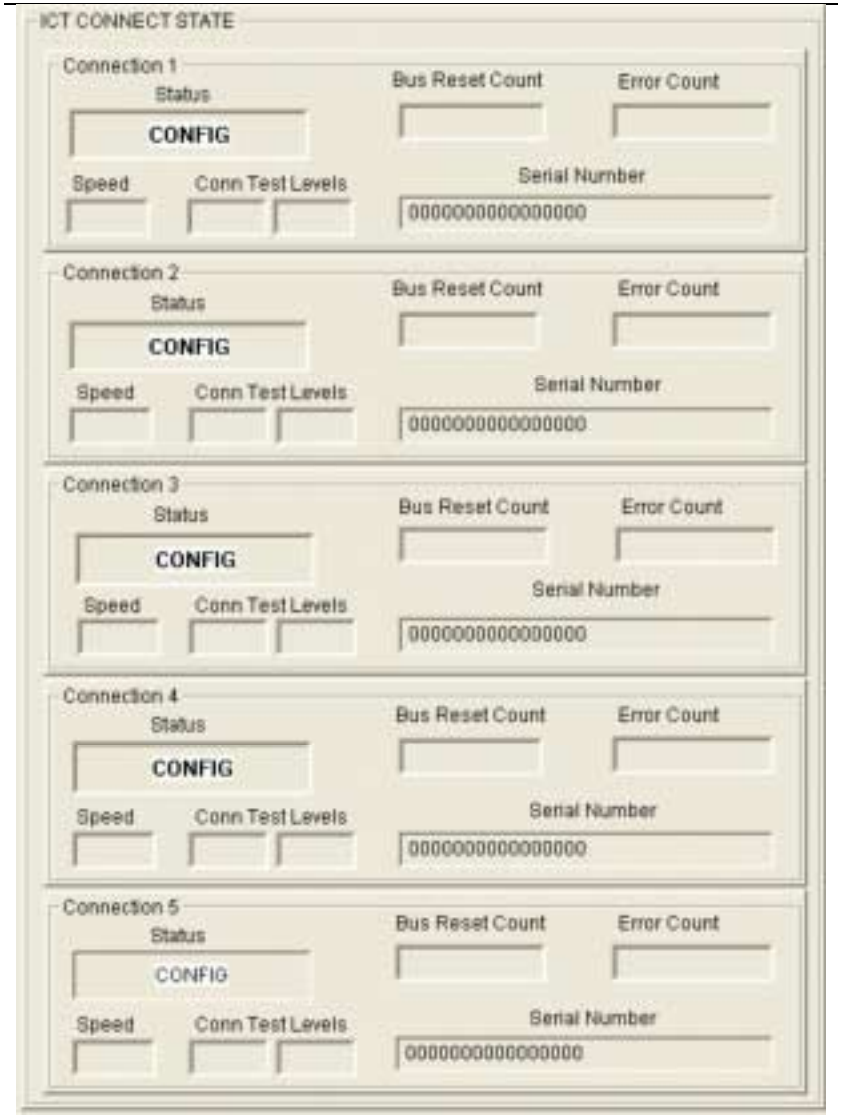

Figure 6 - ICT Connect State area.

4 Log File

Each time the ICT application is started it creates a log file in the C:\Program Files\Quantum Parametrics\QPICT directory. The file name is uniquely named using the following format:

Results000842_022908.log

With the first 6 digits representing the time of day and the last 6 representing the data (Feb. 29, 2008).

Each log file represents a test session. Each test run within a test session is appended to the previous. The following information is recorded for each active connection for each test.

```
Connection No: 1
SN: 1
Test Run Status: PASS
Start Time: 12/27/07 11:02:20
Stop  Time: 12/27/07 11:02:52
    Max_port_speed: S400
    Total Bits Received: 7.344644e+009
    Test Levels:
        PHY1 @ 562mV
        PHY2 @ 560mV
    Topology: Connection successful
        Port Errors: 0
        Busreset Errors: 0
```


5 Configure and Calibration Panel

The Configure and Calibration Panel is designed to allow restricted access. It is entered using the Alt-Shift-C key combination. The restricted access allows the engineers with specific knowledge about the test to configure and calibrate the ICT, save the information and then provide a secure configuration to the test floor.

The Configure and Calibration Panel has two primary purposes:

- Configuration of the ICT
- Calibration of the ICT

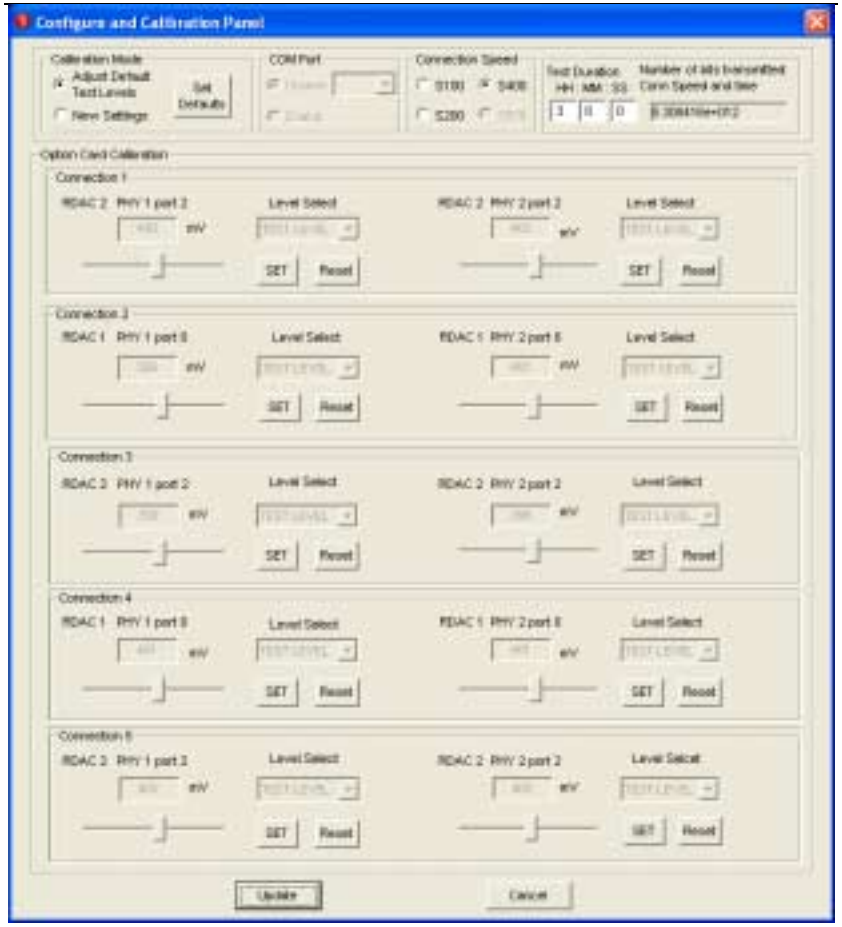

Figure 7 – Configure and Calibration Panel

5.1 Configure the ICT

The Configure and Calibration Panel allows the following ICT options to be configured:

- COM Port
- Data Rate
- Test Duration
- Test Amplitude Level

5.1.1 COM Port

The ICT application can be configured to send a “RUN<CR>” and “END<CR>” string on either communication port 1, 2 or 3 of the PC running the ICT application (only the ports found will be present in the pull down). To enable this functionality the Enable button must be selected in the COM Port area. The user can then select the desire communication port. When the Update button is selected the selected configuration will be saved to the configuration file for use in future tests. If the communication port is transitioned from disable to enable the ICT application must be exited and restarted after the Update button has been selected.

The “RUN<CR>” string is delivered when the ICT begins transmission of packets for testing. The “END<CR>” string is delivered when the ICT stops transmitting packets for testing.

The run and end strings can be used by systems external to ICT that need to be activated for the test.

The communication port(s) are configured as follows:

Baud rate: 9600
Data bits: 8
No parity
Stop bits: 1

When the Update

5.1.2 Data Rate

The ICT option -4 (QP-ICT-4) supports S100, S200 and S400 data rates and option -8 (QP-ICT-8) supports S400 and S800 operation. The Data Rate buttons are highlighted for the data rates support for the ICT model. The user may select any one of

the highlighted Data Rate buttons. When the Update button is selected the selected data rate will be saved to the configuration file for use in future tests.

5.1.3 Test Duration

The Test Duration field allows the user to enter how long the test will be run. The duration is entered in terms of hours, minutes and seconds. Once configured and the Update button is selected the Test Duration will be saved to the configuration file for use in future tests.

5.1.4 Test Amplitude Level

The Test Amplitude and Calibration and the ICT amplitude are intermixed so both are discussed in this section.

NOTE: If no Configuration File exists the Set Defaults button must be selected before any operation can performed.

5.1.4.1.1 Adjust Test Levels

When the Adjust Test Levels button is selected the user may adjust the test levels for each side of a connection. The Output Level (mV) slider is used to adjust the levels which will be for the test. After adjusting to the desired level the user should select the SET button. When the Update button is selected all test level values are saved in the configuration file and will be used for future tests.

5.1.4.1.2 Calibrate

Calibration should only be necessary once for a given media type and length. For example, if the unit under test is a 2 meter cable the user would need to calibrate to at the far end of the 2

meter cable. The calibration values should be good for testing of all 2 meter cables of the same type (gauge, shielding, etc…).

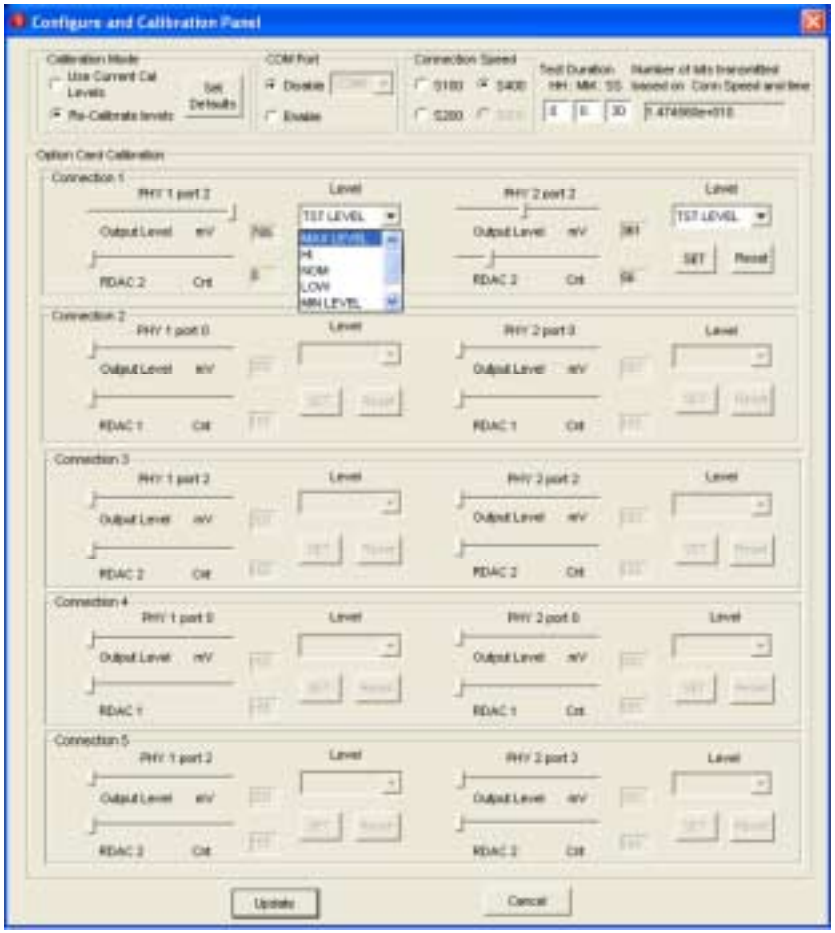

Figure 8 - Calibration Area.

If the cable type or length changed then re-calibration would be required.

To calibrate an oscilloscope must be used to measure the voltage level for 5 points:

- MAX LEVEL – RDAC = 10
- HI – RDAC = 70
- NOM – RDAC = 130
- LOW – RDAC = 190
- MIN LEVEL = 250

The user selects one of the 5 levels, measures the voltage, moves the slider to the appropriate voltage level and then selects the SET button. This process is repeated for all 5 points.

From these 5 points, software can calculate the output voltage level for a given RDAC value for that specific cable type/length. Changing the media type or length would require re-calibration.

Quantum Parametrics pre-calibrates the ICT for a 2 meter cable before shipping it to the customer.

5.1.4.1.3 Calibration Procedure

1. Open the QP ICT application and make sure the ICT box is connected.
2. Press Shift + Alt + C
3. Click the Set Defaults button in the Calibration Mode area (top left)
4. Click the Calibrate levels button
5. For Connection 1, PHY1, port 2 do the following:
    a. Select the Level pull down menu and select MAX LEVEL
        i. The value of RDAC2 should change to 10
        ii. Using an oscope, please measure the amplitude of the waveform on screen using the method defined below.

        iii. Using the Output Level Slider, adjust the slider to the amplitude measured on the oscope.
        iv. Press the Set button
    b. Select the Level pull down menu and select HI
        i. The value of RDAC should have changed to 70
        ii. Follow the steps ii – iv as was done in part a.
    c. Follow the same process for NOM, LOW, and MIN LEVEL
6. Repeat Step 5 for all Connections, and all PHY's (calibrate PHY1 and PHY2 for connection 1, PHY1 and PHY2 for connection 2, and so on)[2]
7. Once calibration is complete, the Test Level may be set if necessary.
8. To set the test level, select the TST LEVEL option in the Level drop down menu.
9. Use the RDAC n slider to select the desired test amplitude/level. The voltage level, as indicated by the Output Level mV slider, is calculated using the 5 calibration points established previously.
10. Once the desired amplitude is set, select the Set button.
11. This must be configured for each end of each connection. Example: Connection 2 would need to have both PHY1, port0 and PHY2, port 0 set to the desired level)
12. Click the Update button at the bottom of the calibration page; this will save all values to the configuration file and take you back to the application

[2] Only available connections can be calibrated.

5.1.4.1.4 Measuring Amplitude procedure

This test procedure assumes toning will be used to measure signal amplitude and a QP far-end test fixture is used to terminate the signal and provide oscope connection points.

1. Set the scope to trigger on CHn, rising edge, >50mV.
2. Set the scope so that the measurement is taken 333us after trigger (usually through horizontal delay)
3. Set the horizontal scale to 50ns/div.
4. Attach the far-end test test fixture to the DUT
5. Attach CHn probe to the TPB's signal test points.
6. The scope should now be triggering on tones (~50Mhz ~50% duty cycle square wave) and displayed to the screen.
7. Now set up the scope to measure amplitude for CHn (scope dependent) and divide the mean value by 2.
8. This is the value the slider should be adjusted to, select the SET button to save the value. NOTE: make sure to clear out the previous amplitude measurement between measurements.

6 System Requirements and Installation

QP-JSFSQT runs on the IBM PC compatible family of computers with a 500MHz Pentium III processor or greater. Currently QP-JSFSQT only runs under Windows XP.

A National Instruments IEE488 GPIB or compatible adaptor is required.

A digital sampling oscilloscope with appropriate probes is required.

MS Excel version Office 2003 is required.

Oscilloscope support is limited. Please contact QP for the most recent list of supported oscilloscopes.

6.1 Software Installation

1. This installation requires any version of Win-XP to be installed on the target PC.
2. If previous version of "QP JSF Tester" is present on the target system first perform an un-install of the "QP JSF Tester" using the Win-XP "Add or Remove Programs" application from the Control Panel. See note below.
   - To enter Control Panel select start | Control Panel | Add or Remove Programs. If the start menu is in the classic setting then select start | settings | Control Panel | Add or Remove Programs.
3. Insert the "QP JSF Tester" CD. If target computer is configured for Autorun from CD media then the setup and installation will begin automatically.
   - If Autorun is not enabled on your computer you can start setup by going to Windows

Explorer and right clicking on the installation CD drive icon and selecting 'autoplay' from the drop down menu. This will automatically run the installation.

4. Follow all prompts.

5. If multiple OHCI devices are detected, the QPInstaller will prompt for a device selection after the "QP JSF Tester" installation completes. Select the OHCI device that you want to install the driver for and click 'OK'.

- The first run of the application will install the QPTntVdrv virtual device driver. You will be prompted through this operation with the "Found New Hardware Wizard". This installation will only occur on the initial run of the "QP JSF Tester"
- You are now ready to start using the "QP JSF Tester"

7 How to Contact Quantum Parametrics LLC

Quantum Parametrics LLC may be contacted by phone at:

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