Provox Migration Training

Overview

The QTS-CLX-PVX product provides a quick, simple and cost effective migration solution for replacing Provox controllers with ControlLogix systems while retaining the existing Provox IO system.

The following is a quick list of the QTS-CLX-PVX module's design criteria:

➢ Automatically capture IO configuration from Provox controller.
➢ Integration with RSLogix software through alias export to csv file.
➢ Operate as scanner, card emulator or in listen only ghost mode.
➢ Switch control system from Provox controller to ControlLogix controller or back again in minutes.
➢ Supports Provox Control IO bus redundant media
➢ Supports 20 series and 10 series IO families
➢ Supports a maximum of 64 cards in card files 1-16.
➢ Configured as generic module type in RSLogix 5000. Configured as INT (16-bit) data type with status (250 words input, 248 words output and 250 words status).
➢ Analog IO modules return standard Provox percent format (conversion routines available from RA web site).

Reference materials, software and brochures available at qtsusa.com

Tutorial Test System

The Provox controller uses several levels of configuration to define IO type and parameters. The QTS-CLX-PVX module is designed to capture the IO configuration from the existing Provox controller. This procedure insures that new ControlLogix based control system configures the existing Provox Control IO bus hardware with the identical IO configuration used by the Provox controller.

The QTS-CLX-PVX module can capture this complicated IO configuration in minutes as compared to hours or days using traditional methods that are also prone to errors. The trade off is the need for access to a live Provox system.

For test purposes, an emulated system can be constructed using three QTS-CLX-PVX modules – one QTS module running as a scanner (emulated Provox controller), one running as a card emulator (can emulate up to 64 Provox IO cards) and the QTS-CLX-PVX module under test.
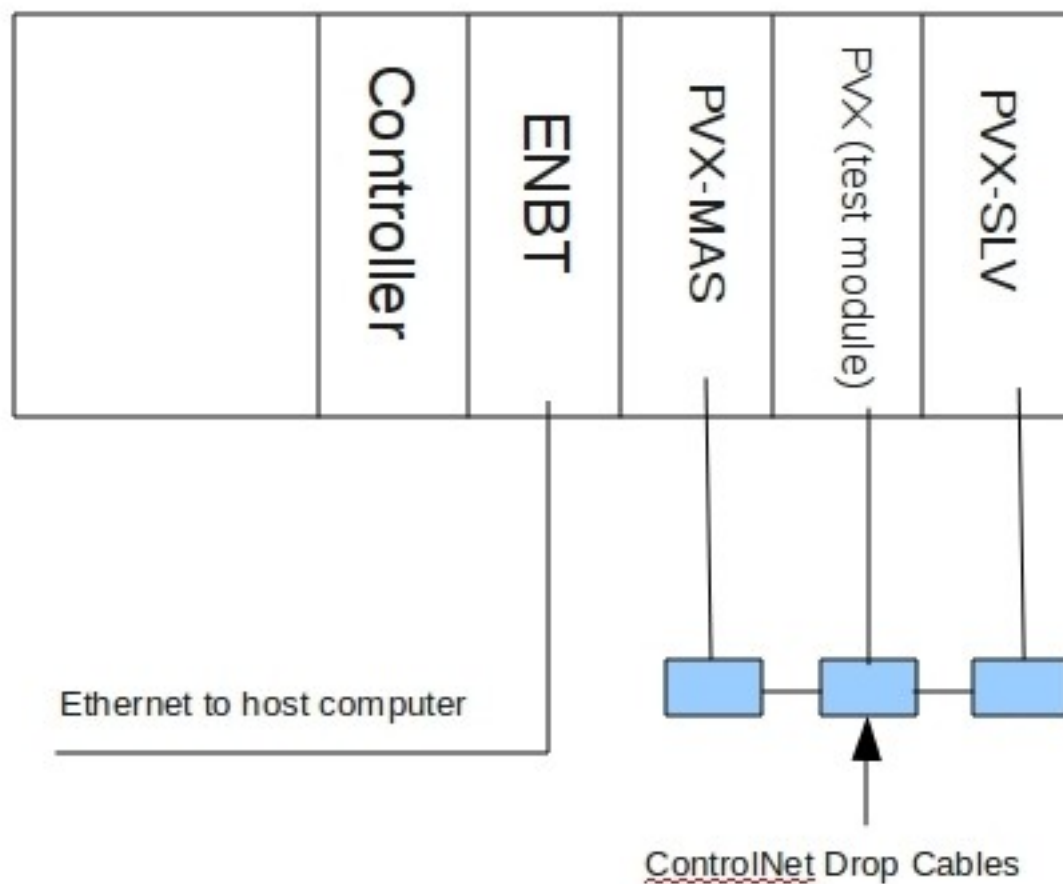
Minimum hardware for test system:

➢ ControlLogix rack with power supply, Ethernet module and Ethernet cabling
➢ ControlLogix controller
➢ 3 QTS-CLX-PVX modules and Provox Control IO bus cables (see QTS-CLX-PVX User's Manual for details).

Tutorial Test System

Provox Demo Rack

Controller | ENBT | PVX-MAS | PVX (test module) | PVX-SLV

Ethernet to host computer

ControlNet Drop Cables

Tutorial Test System Continued

Software requirements for tutorial:

➢ Installation CD included with each QTS-CLX-PVX module.
➢ ClxPvxSlv_v1.1.1.zip file containing all the software and documentation for the QTS-CLX-PVX card emulation mode.
➢ RSLogix 5000 with RSLinx v2.54 or higher

This tutorial often refers to the QTS-CLX-PVX User's Manual. Exact step by step details pertaining to configuration and operation of the QTS-CLX-PVX module are covered in the User's Manual and will not be repeated in this tutorial.

Test System Hardware Setup

Included with this presentation are the files required to configure the test system:

- ➢ QTS-PVX-CLX scanner configuration file – PvxTutorialScanner.pfg
- ➢ QTS-PVX-CLX card emulator configuration is contained in the RSLogix 5000 project file – PvxTutorial.acd. The card emulation firmware is configured using data that is sent to the QTS-CLX-PVX module in the configuration data array.

The test system hardware set up procedure is as follows:

1) Insert two of the QTS-CLX-PVX modules in the ControlLogix rack.
2) Extract the contents of the ClxPvxSlv_v1.1.1.zip archive to your host computer.
3) Using the software CD that came with your QTS-CLX-PVX module, install the QtsPvx.msi file to your host computer.
4) Refer to QTS-CLX-PVX User's manual page 7 for details on cable requirements and connect both the primary and secondary network cables for the two installed modules.
5) Run the QTS-CLX-PVX configuration tool and refer to QTS-CLX-PVX User's manual page 16 for details on how to set one of the installed modules to ClxPvxMas (master) mode.
6) Find the SetPvxMode.exe application located in the QTS-CLX-PVX slave (card emulator) directory created in step 2. Set the other module to QtsPvxSlv mode.

Test System Software Setup

The test system hardware is now installed and ready to emulate a Provox controller and a network of Control Bus IO cards. To complete the test system, the master and IO network configurations are loaded to the installed modules:

1) Open the PvxTutorialScanner.pfg file using the QTS-CLX-PVX configuration tool and download the file to the module in master (mas) mode. See page 20 of the User's manual ("Uploading and Downloading Configuration") for details.
2) Start RSLogix 5000 and open the PvxTutorial.acd project file. Adjust the configured slot numbers for the two QTX-CLX-PVX modules contained in the IO configuration to match the placement of the two install PVX modules.
3) Download the project file to the ControlLogix controller.

The test system is now configured and both Provox modules should show all green LEDs

If not... skip ahead to the trouble shooting section of this presentation...

Typical Migration Process

Page 8 of the QTS-CLX-PVX User's Manual outlines the 12 typical steps involved in migrating a Provox controller to ControlLogix system using the QTS-CLX-PVX.

The QTS-CLX-PVX has two modes of operation:

➢ Monitor Mode – listens to Control IO bus and reports inputs and outputs to ControlLogix data areas. ***Does not transmit on Control IO Bus***
➢ Master Mode – takes control of the Control IO bus hardware. ***Provox controller must be removed from the network***

Typical Migration Con't

Migration Using Monitor Mode

1) Set the QTS-CLX-PVX module to Monitor mode (ghost mode).
2) Use the auto-configure command to capture the Provox controller's IO configuration. Control IO bus inputs and outputs are mapped to the ControlLogix data space.
3) Develop the new ControlLogix control application that write outputs to a temporary data array.
4) The new control application can now use the real process inputs, calculate outputs and compare the calculated outputs to the real process outputs.
5) When new ControlLogix application is tested and verified, the QTS-CLX-PVX is switched to master mode, the Provox controller is removed from the network and the migration is complete.

*** At any point, the process can be switched back to the Provox controller in seconds. This further reduces the risk of migration.

Of course, steps 3 and 4 could be skipped and the system can be migrated to the ControlLogix controller directly.

Data Mapping

Monitor Mode

Inputs → I.Data
Outputs → S.Data

Master Mode

Inputs → I.Data then S.Data
Outputs → O.Data

Data Formats

Page 25 of the User's Manual covers in detail the format of analog data. Specific, analog data is presented in "Provox percent format". Conversion routine can be obtained from the RA web site and the manual gives details on those conversions.

Data Access

Data should be accessed using the alias names that can be imported from the configuration tool created csv file. This assures that switching between monitor and master mode works smoothly.

Diagnostic Data

Diagnostic information is presented using the following 3 means (see page 27 of User's Manual) :

Primary and Secondary File Error Table

I.Data[0]   →   Primary network file error table (bit 0 = card file 1, bit 15 = card file 16)
I.Data[1]   →   Secondary network file error table

*** A logical 1 represents an error exists with at least one card in the designated card file

Integrity Bits and Channel Status Bits

Integrity bits and channel status bits are returned by each configured channel of the Control IO Bus cards. Again, use the alias names created by the configuration tool to access these diagnostic bits.

*** A logical 1 represents an error with the indicated card channel

Integrity and channel status bits indicate that either a configuration or runtime error exists on the indicated card channel. For example, a runtime card fault or input signal out of range, etc.

Diagnostic Data Con't

Diagnostic Counters

Two set of counters are reported (one for each the primary and secondary channels) that are designed to keep track of network traffic and, more importantly, network errors.

These counters can be used to diagnose network wiring and runtime physical layer errors and alias names are created by the configuration tool for each network counter. See page 28 of the User's Manual for details.

Module LEDs

Page 32 of the User's Manual covers the three module LEDs (NET, CLX and module heath).

Module 4-Character Display

Page 33 of the User's Manual outlines the format of the messages that appear on the 4-character display.

Generally, the display is used to identify the firmware revision and name of the loaded configuration.

Troubleshooting

Configuration

Since the configuration process is based on the capture of the runtime data sent from the Provox controller, misconfiguration is not a likely problem.

However, a few configuration errors can be encountered:

➢ All cards that are present in the Provox controller's configuration must be active on the Control IO bus or a "monitor only" file will be created.
➢ Specialty card types are not supported – see page 2 of User's Manual for details.

Trouble Shooting At Runtime

➢ Use the diagnostic data to track down the specific cards that have errors.
➢ LogMon (log monitor) application can be used to retrieve a buffer that is stored on the QTS-CLX-PVX module. This debug log will contain more specific error messages.
➢ Generally, LogMon is used by QTS technical support staff.
➢ LogMon has a copy command that allows the user to copy and then paste the entire debug log to a text document. This text can be emailed to QTS technical support staff (support@qtsusa.com)

QTS Migration Products

Quest Technical Solutions has a wide range of products that are designed with the same powerful set of migration oriented features as presented in this tutorial. Additionally, these products target HMI applications, network diagnostics via network capture/logging tools and full gateway solutions for bridging legacy automation networks.

A full list of QTS products can be found at http://www.qtsusa.com – the following is a list of automation networks that are currently supported:

➢ Allen Bradley – DH+ and 1771 Remote I/O
➢ Automax – DCSNet and Remote I/O
➢ Modicon – S908 Remote I/O
➢ GE – Genius Bus
➢ TI – 505 Remote I/O
➢ Profibus – DP Multislave
➢ Honeywell – IPC-620 Serial Remote I/O