**ICS
ELECTRONICS**
division of Systems West Inc.

Better Solutions for GPIB and VXIbus Systems

VXIbus

APPLICATION BULLETIN

CONTROLLING MULTIPLE VXIbus CHASSIS
## WITH THE VXI-5543 SLOT ZERO CONTROLLER

INTRODUCTION

Many VXIbus systems require more than one chassis to contain all of the modules. As each chassis requires its own controller in slot zero, this presents a problem as to how to control all of the modules with one control program. Until now the most common solution to the was to use a MXI chassis extension system. This solution requires a Slot Zero Controller and a MXI module in the first chassis with a large multi-conductor cable connected to a second MXI module in slot zero of the next chassis. The main problem with this approach is that 2 slots are used in the first chassis with a single slot controller or 3 slots with a 2 slot controller. In addition the cost of the two MXI modules and the cable are added to the system cost.

ALTERNATIVE SOLUTION

ICS Electronics Corporation has developed an alternative solution that only uses only one slot in each chassis and is lower in cost. With the ICS approach, a single slot wide VXI-5543 controller is placed in slot zero of each chassis as shown in Figure 1. The controllers are linked serially using a standard, low cost cable. The control program runs in the first controller and passes the commands to the second chassis via the serial interface. The controller in the second chassis runs a standard Serial-to-VXI control program supplied by ICS with the VXI-5543. Figure 2 shows the older approach to linking two VXI chassis using MXI Extenders.

Directing the commands to the VXI modules is facilitated with ICS's new VXI Plug&Play VISA-2 control library. This industry standard I/O control library allows modules to be controlled via several interfaces with the same I/O function calls. Once the modules are "opened", the same commands are used to control all modules. Modules may be moved from chassis to chassis with only a minor software change.

VXI-5543 Ctlr
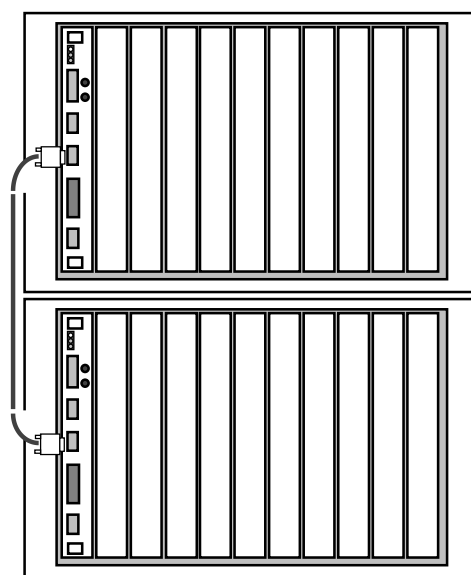
Figure 1   Two VXI Chassis linked by a serial cable uses only two VXI slots.

VISA TRANSITION LIBRARY

The VXI Plug&Play Alliance has defined VISA (Virtual Instrument Software Architecture) as a standard interface for the I/O control functions to promote software compatibility between different vendors in the VXIbus marketplace. The VISA I/O Transition Library allows programs to control devices on VXIbus, GPIB and GPIB-VXI interfaces with the same function calls in the program. Programs written with VISA function calls are also transportable to other VISA compatible systems without rewriting the software. All that is required is to re-link the program with the library supplied

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VISA TRANSITION LIBRARY cont'd

with the new system. ICS has implemented the VISA-2 Transition Library as defined under VXI Plug&Play specification VPP-4.2.

SYSTEM SETUP AND OPERATION

The system modules may be setup with either fixed logical addresses or with dynamic addressing. If fixed addressing is used, care must be taken not to duplicate addresses in the system. With dynamic addressing a configuration file is setup on each controller's Flash Disk specifying the first address to be used in that chassis for assigning dynamic configured modules. These addresses should be selected to prevent duplication of addresses in the second chassis. The configuration file also specifies the serial interface parameters, such as baud rate to use for inter-chassis communication.

At power turn on or system reset, each Slot Zero Controller runs a Resource Manager which resets and initializes the modules in its chassis and saves the Resource Manager table on the Flash Disk in the controller. In the first chassis the application program is run after the Resource Manager is finished. In the second chassis, the Serial Control program (ser_cntl.exe) is run after the Resource Manager is finished. When the application program attempts to locate its first module in the second chassis with the SER1-VXI parameter, the Resource Manager table is requested and down loaded to the first controller. This table is combined with the table from the first chassis and saved for future use in memory. Subsequent find functions can then access this table.

PROGRAMMING WITH VISA

ICS has added two new interface definitions to VISA-2 and is proposing that they be added to the specification. These interfaces are Serial 1 to VXI and Serial 2 to VXI ("SER1-VXI" and "SER2-VXI"). This allows up to three chassis to be controlled with the present system. If more chassis are required, other control systems may be easily be added to the library.

The VISA library provides functions to find and open modules for use. When the find function is called, a parameter is passed to the function specifying the interface such as VXI, GPIB or SER1-VXI. The find function returns a "handle" which is passed to the open function. An instrument must be opened before it can be controlled. In a multiple chassis system, the modules in the first chassis are located using the VXI interface parameter. The modules in the second chassis

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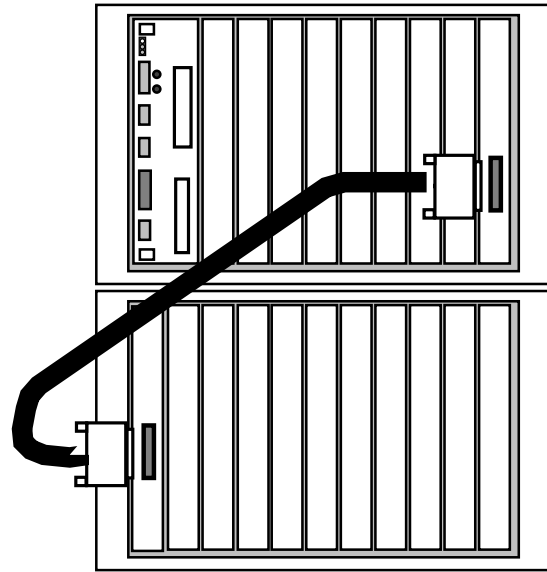
Figure 2   Prior approach to linking two VXI Chassis uses two MXI Extenders and an extra VXI slot.

are located with the SER1-VXI interface parameter. If a third chassis is used, the modules would be located with the SER2-VXI parameter. Except for the code to find and open the modules, the body of the program is be written with out regard to the location of the modules.

Modules may be relocated between chassis without rewritting the program. The only software change required is changing the location parameter passed to the find function at the begining of the program. The VISA library also facilitates the use of an initialization or INI file in the users application program to specify the location of each module.

EXTERNAL SYSTEM CONTROL

An alternate to running the application program in the first chassis would be to control the system from a remote computer. This could be done in one of several ways: over a serial link using the ICS's SERIAL-VXI capability, over a GPIB bus using GPIB-VXI or over an Ethernet system using LAN-VXI. Multiple chassis may also be controlled using the VXI-5543's RS-485 interface and chassis addressing. In all cases, the user's application program would be able to take advantage of the ease of programming offered by the VISA library concept.