Technical Note

DLM/DCS/SGA/SGI SRQ Generation

AMETEK® PROGRAMMABLE POWER

Document No. M550536-TN Rev A • 10/17/2008

PURPOSE

To serve as an overview of the asynchronous status reporting via VXI-11 TCP/IP interface, for the Sorensen DLM, DCS, SGA and SGI test and measurement power supplies, supported with Master Firmware Version 2.12, Slave Firmware Version 1.83, and IVI-COM Driver Version 1.0.8.0, and later.

BACKGROUND

The message-based, SCPI-compliant, controllable output design of the power supplies is somewhat based on the original GPIB standard from IEEE 488. The LXI/VXI-11 standards have added a newer Ethernet-based interface used to control the power supply system. The basic operation of the power supply command interface is polled in character, and, following the lead of the VXI-11 Consortium standard, an asynchronous element is added to the messaging interface. The asynchronous element is named SRQ, following the original GPIB nomenclature for Service ReQuest. The idea of SRQ generation is to allow the system to selectively and asynchronously alert the connected user to specific events that have occurred in the system depending on which modules are SRQ-enabled. Because SRQs are asynchronous, polling the instrument or device is not required to discover certain changes in the power supply, which lowers overhead and bandwidth requirements.

The power supplies provide a command and control interface via Ethernet. Because the client side implementation of SRQ for Ethernet is implemented using SUN RPC™ (Remote Procedure Call) and VXI-11™ protocol, the Sorensen power supplies implement a VXI-11 Server.

SRQ SUPPORT

SRQ is only supported by a VISA Resource connection of instrument class, e.g., INST0.

SRQ is *not* supported in socket or RS232 connections.

TERMS AND DEFINITIONS

SRQ	Service ReQuest; when enabled, provides alerts when specific, anomalous events occur in the power supply.
LXI™	LAN eXtensions for Instrumentation, the Consortium authoring a conformance specification for compatibility among devices that use local area network with Ethernet protocols as the primary communications bus when operating in a test system environment.
VXI-11	VMEbus eXtensions for Instrumentation, a TCP/IP instrument protocol specification authored by the VXIbus Consortium, Inc., which defines a network instrument protocol to be used for controller - device communication over a TCP/IP network.
SCPI	Standard Commands for Programmable Instruments. Developed by the SCPI Consortium as a standard set of commands to control test and measurement devices in instrumentation systems.

THEORY OF OPERATION

The power supplies implement the RPC port 111-portmapper function for Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). This allows the client to acquire the port number for the VXI-11 Server. The VXI-11 Server connects to the client and translates the VXI-11 requests into a form that can be sent to the power supplies' Parser ("parser"), and receives the responses from the parser and formats them back into VXI-11 responses. The VXI-11 server can support two concurrent client connections. Both connections will receive the SRQ event notification. The power supplies are considered as one element, even though the DLM/DCS power supplies can have up to 31 attached slaves.

The VXI-11 server receives SRQ events from the power supply run-time logic and sends (if SRQ enabled) a "device interrupt" request to the client.

The parser implements an SRQ mechanism based on the software model of the Standard Commands for Programmable Instruments (SCPI) Status Register structure. There is only one SCPI status and SRQ structure per power supply.

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There are two classes of SRQs, the first class consists of events generated from the Standard Event Status Register, and the second class events originate from the Module Protection Event Register. The summary of all these events is located in the Status Byte register (STB).

EVENT STATUS REGISTER

The Standard Event Status Register (ESR) handles events that are generally caused by user commands. These include errors generated by command or execution errors. There is a corresponding enable register (ESE) that allows events to be enabled or masked off.

PROTECTION EVENT REGISTER

The Protection Event Register (PE) handles all the events that are hardware related. There is a corresponding Protection enable Register (PEV) that allows these hardware events to be enabled or masked off.

OPERATION

If a PE, ESR, and STB event is active and the corresponding event in the ESE, PEV and SRE is enabled, an SRQ will be generated. If several simultaneous events occur, the first one will set the SRQ; to clear the SRQ, all succeeding events will also need to be cleared.

CLEARING AN SRQ:

The query ***STB?** returns which class of interrupt has occurred: an Event Status Register, Error Queue, and or a Protection Event. Read (clear) the SRQ by issuing one or more of the following queries depending on the bits that are set in the Status Byte.

- Event Status Register query. (***ESR?**)
- Protection Event query at the Modules Status level (**STATus<n>:PROTection:EVENt?)** and then followed by the Summary Status level (**STATus:PROTection:EVENt?)**
- System Error query (**SYSTem:ERRor?**)

SCPI COMMANDS

***STB?**	Query User's **St**atus **B**yte
***ESR?**	Query User's Standard **E**vent **S**tatus **R**egister
***ESE?**	Query User's **E**nable **S**tandard **E**vent Status Register
***ESE <Ni>**	Set the enable bits in the **ESE**.
STATus<n>:PROTection	Module Status subsystem
:CONDition?	Dynamic copy of the module protection event bits
:EVENt?	A summation of the module protection event bits, cleared on read.
:ENABle?	Query the module protection event enable bits
:ENABle<Ni>	Set the module protection event enable bits
STATus:PROTection	Summary Status
:EVENt?	Returns a summary of the user's module protection event bits, cleared on read.
:ENABle?	Query the user's protection event enable bits
:ENABle<Ni>	Set the user's protection event enable bits

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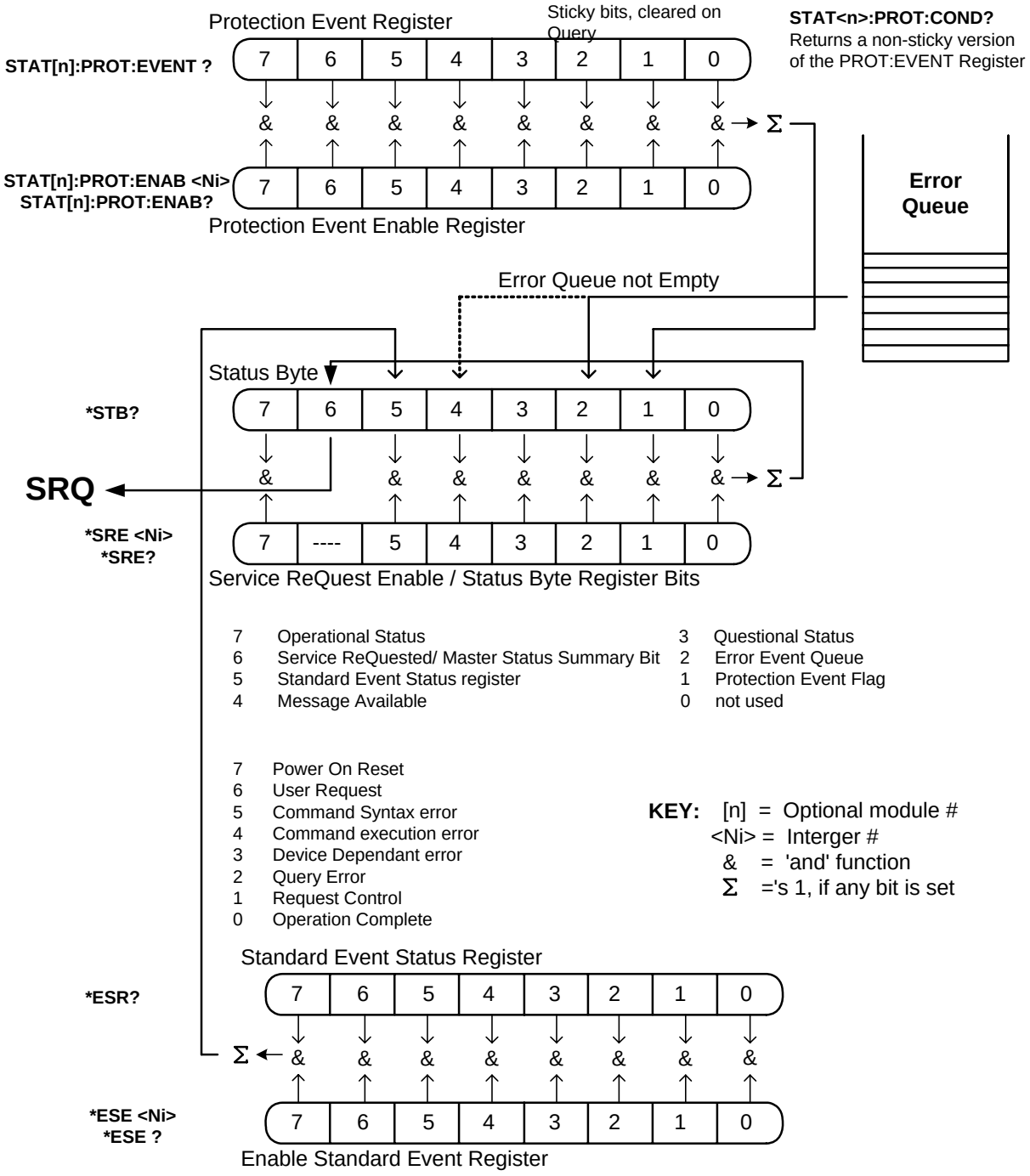
SCPI REGISTER

Ver 0.0

7 Remote Program Error
6 Volt|Curr Mode Fault
5 External Shutdown
4 Over Temperature Fault
3 Over Voltage Fault
2 Hardware Fault
1 Constant Current Operation
0 Constant Voltage Operation



7 Operational Status
6 Service ReQuested/ Master Status Summary Bit
5 Standard Event Status register
4 Message Available
3 Questional Status
2 Error Event Queue
1 Protection Event Flag
0 not used

7 Power On Reset
6 User Request
5 Command Syntax error
4 Command execution error
3 Device Dependant error
2 Query Error
1 Request Control
0 Operation Complete

KEY: [n] = Optional module #
<Ni> = Interger #
& = 'and' function
Σ ='s 1, if any bit is set

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