OPERATOR'S MANUAL

Talon Instruments™

SR211

Data Probe

EADS NORTH AMERICA

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Before undertaking any troubleshooting, maintenance or exploratory procedure, read carefully the **WARNINGS** and **CAUTION** notices.

This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.

If this instrument is to be powered from the AC line (mains) through an autotransformer, ensure the common connector is connected to the neutral (earth pole) of the power supply.

Before operating the unit, ensure the conductor (green wire) is connected to the ground (earth) conductor of the power outlet. Do not use a two-conductor extension cord or a three-prong/two-prong adapter. This will defeat the protective feature of the third conductor in the power cord.

Maintenance and calibration procedures sometimes call for operation of the unit with power applied and protective covers removed. Read the procedures and heed warnings to avoid “live” circuit points.

Before operating this instrument:

1. Ensure the proper fuse is in place for the power source to operate.

2. Ensure all other devices connected to or in proximity to this instrument are properly grounded or connected to the protective third-wire earth ground.

If the instrument:

- fails to operate satisfactorily
- shows visible damage
- has been stored under unfavorable conditions
- has sustained stress

Do not operate until performance is checked by qualified personnel.

DOCUMENT CHANGE HISTORY

Revision	Date	Description of Change
A	06/12/2009	Document Control release

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1 Introduction

Talon's SR211 is the next generation data probe that compliments the SR192/SR192A's digital testing applications. The Data Probe extends certain user test applications from a "card edge" go/no-go analysis to a "component" or pin level pass or fail examination.

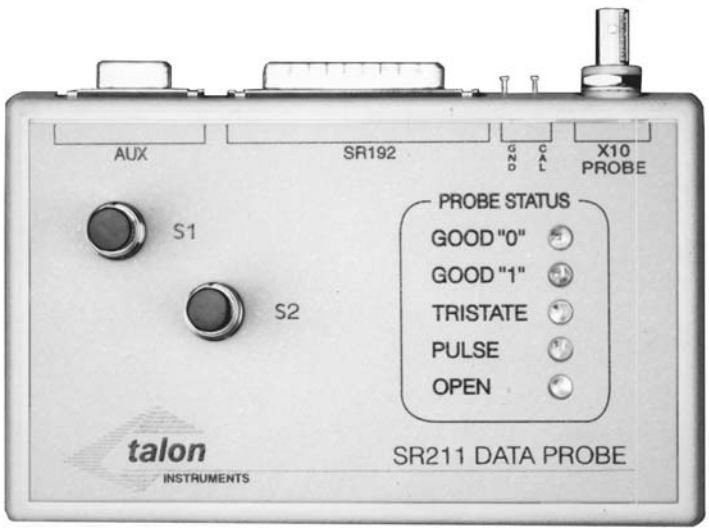

Figure 1-1 SR211 Data Probe

The SR211 Data Probe incorporates a high-speed/high-impedance buffer, high/low voltage comparator references, comparator and a line driver. The SR211 Data Probe module generates "GOOD0" and "GOOD1" data output by comparing probed signal levels against a "high" and "low" voltage thresholds established by programming the DAC references on the SR211 Data Probe module. This "GOOD0" and "GOOD1" data is sent via the SR211 PROBE CABLE to the SR210 Accessory module in the SR192/SR192A. The Record memory for "GOOD1" and "GOOD0" signals are located on SR210 Accessory module. This data is captured on the SR210 card under control of the Timing module installed in the SR192/SR192A, which provides address and timing for all Talon I/O modules..

SR211 Data Probe functions are programmed through SCPI commands, instrument driver functions or A24/A32 direct register access.

The layout of this manual is in five as sections described below:

- Introduction — This section.
- Specifications — Electrical and environmental specifications of the SR211.
- Description/Installation — SR211 description and installation into a SR192 system.
- Operation — Description of the SR211 operating modes.

Appendix A is a glossary of terms for the SR211 and SR192.

Appendix B is the SR211 command description.

2 Specifications

The following sections list the electrical and environmental specifications of the SR211 Data Probe.

2.1 Data Probe

Input High Threshold

Min	-10V
Max	+10V
Resolution	20mV

Input Low Threshold

Min	-10V
Max	+10V
Resolution	20mV

Voltage Measurement

Min	-10V
Max	+10V
Resolution	50mV

Pulse Detect

Minimum Pulse Width	10ns

Over Voltage Protection

Min	-100V
Max	+100V

Memory

GOOD0	131072 bits
GOOD1	131072 bits

Open Detect

Source	-3.75V @ 288nA

Probe

Impedance	10Mohm
Max Frequency	25MHz

2.2 Electrical

Probe Data

GOOD0/GOOD1 Delay	35ns

Power

+24V	148mA
-24V	106mA

Probe I/O

OC Output	20 mA
TTL Output	10 mA Source & Sink

2.3 Environmental

Temperature Range

Operating	0^{o}C to 50^{o}C
Storage	-10^{o}C to 70^{o}C

Altitude

Operating	Sea Level to 10,000 ft.
Storage	Sea Level to 40,000 ft.

Relative Humidity

Operating	0 to 95% non condensing

3 Description/Installation

The SR211 Data Probe kit consists of an SR211 DATA PROBE module, a Tektronix oscilloscope probe and an SR211 PROBE CABLE. The SR211 requires an SR210 be installed in the SR192/SR192A. It is recommended that all probe installations for older motherboards, Rev. A PCB and earlier, be performed at the factory.

The SR211 Data Probe requires SR192 firmware revision 1.27 or later for proper operation. All SR192A firmware revisions support the SR211. Contact Talon Instruments for information on firmware upgrades.

Field installation of the SR211 Data Probe Kit is described in the installation section further in this section.

3.1 Hardware Description

Figure 1 below is a hardware diagram for the SR211 Data Probe module.

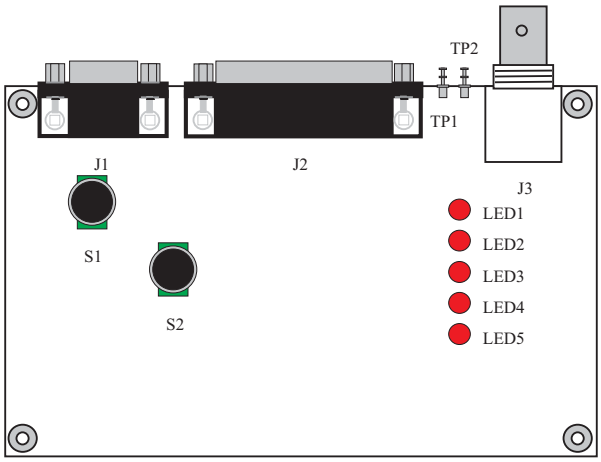

Figure 3-1 SR211 Data Probe Module

3.1.1 Test Points

The following tables describe the test points and jumper locations on the SR211.

Switch	Description
TP1	GND
TP2	Probe calibration

Table 3-1 Test Point Description

3.1.2 Switch Description

The following table describes each switch on the SR211.

Switch	Description
S1	General purpose switch 1
S2	General purpose switch 2

Table 3-2 Switch Description

3.1.3 Connector Description

The following table describes each connector on the SR211.

Connector	Description
J1	Auxiliary Connector (DB9)
J2	SR192/SR192A Connector (DB25)
J3	Probe (BNC)

Table 3-5 Connector Description

3.1.3.1 Auxiliary (J1) Connector Pinout

The auxiliary connector is provided so that a user can install a foot switch or other input device for S1 and S2 triggering. Three programmable outputs are also provided (2 TTL and 1 open collector). The following table describes the AUX connector.

Pin	Description	Pin	Description	Pin	Description
1	NC	2	OC Output	3	TTL1 Output
4	GND	5	S1 Input	6	NC
7	TTL2 Output	8	GND	9	S2 Input

Table 3-3 J1 Connector Pinout

3.1.3.2 SR192/SR192A (J2) Connector Pinout

The SR192/SR192A connector provides data/control and power pins to the SR211 data probe.

Pin	Description	Pin	Description	Pin	Description
1	D7	2	D5	3	D3
4	D1	5	SEL	6	ODS-
7	DOR	8	GOOD1-	9	GND
10	+24V	11	GND	12	-24V
13	GND	14	D6	15	D4
16	D2	17	D0	18	IDS-
19	PRBINT	20	DIR	21	GOOD0-
22	+24V	23	GND	24	-24V
25	GND	X	X	X	X

Table 3-4 J2 Connector Pinout

3.1.3.3 BNC X10 (J3) Connector

The SR211 Data Probe is shipped with a Tektronix P6137 X10 probe.

The probe is installed via the BNC connector and enables the probe switch to be used as a trigger input.

3.1.4 LED Description

The 5 LED indicators provide signal status to the user and are described below.

LED	Mnemonic	Description
LED1	GOOD “0"	Auto mode = Good 0 true, Pulse detect = low pulse detected
LED2	GOOD “1"	Auto mode = Good 1 true, Pulse detect = high pulse detected
LED3	TRISTATE	Tristate true
LED4	PULSE	Auto mode = Pulse true, Pulse detect = pulse detected
LED5	OPEN	Auto mode = Open true, Acquire mode = flashing

Table 3-6 LED Indicator Description

3.2 Installation

The SR211 probe cable must be installed between the J2 connection of the SR211 Data Probe module and a J9 connector of the SR192/SR192A front panel.

Warning:
The SR192/SR192A front panel connector, J9, assigned to the SR211 probe carries +24/-24 volts. Be careful not to connect any of the cables or fixturing to this connector, or severe damage to the SR192/SR192A and fixture would be possible.

INSTALLATION OF THE SR210 Accessory Module if necessary:

- Remove SR192/SR192A top cover.
- Install SR210 Accessory Module in slot MFC (slot 15 between TSB and CPU).
- Re-install top cover
- Connect 28 pin end of cable into the SR192/SR192A front panel J9 connector from.
- Connect DB25 end of cable in SR211 Data Probe module

Warning:
Do not connect the SR211 Cable (DB25 to 28 pin cable) while power is turned on. Permanent component damage will occur.

4 Operation

There are five LEDs that show the immediate status of the probe node. The “GOOD ‘0’” LED indicates the probe node is in contact with a signal less than the programmed low reference. During the period when the GOOD “1" LED is illuminated, the probe is in contact with a signal that is greater than the programmed high reference. When the TRISTATE LED is illuminated, the probe node is in contact with a signal that is in between a ”high" and a “low”. In other words it is considered “tristate”. The illumination of the PULSE LED indicates the probe node is in contact with a signal that is constantly altering states, either changing from a high to a low or from a low to a high. The OPEN LED is constantly lit when the probe node is not in contact with a signal, and flashes during acquire mode

The user can select five basic modes through SCPI commands. These five basic modes are auto, acquire, pulse, manual, and reset. (The full syntax of these commands as well as their definitions are provided in Appendix C of this manual.)

The “auto” mode will inform the user of the status of the probe node attached to the SR211 by illuminating one of the five visible LEDs.

The “acquire” mode disables node detect and causes the OPEN LED to flash.

The “pulse” mode detects for a pulse.

The “manual” mode disables the pulse mode and turns the LEDs off.

“Reset” puts the SR211 in manual mode and sets the high and low reference voltages to 0V.

4.1 SR211 Programming

Operation control of the SR211 is done through either SCPI commands sent via the VXI controller or the SR192/SR192A instrument driver functions. The SCPI commands are parsed by the SR192/SR192A and then passed to the SR211.

The SR192/SR192A instrument driver functions are described in the on-line help.

The following sections describe the SCPI commands for the SR211.

4.1.1 SCPI Fundamentals

SCPI formats (version 1994.0) are used in this instrument to provide a general purpose programming structure.

4.1.2 SCPI Command Structure

The basic structure of a SCPI command is:

<COMMAND_HEADER> <PARAMETER_LIST>

4.1.2.1 Command Header Definition

The <COMMAND_HEADER> consists of two distinct types, IEEE 488.2 common commands and Talon SCPI instrument commands.

4.1.2.1.1 IEEE 488.2 Common Command Header

A common command header is a command keyword preceded by an asterisk (*). The command keyword is a string of ASCII characters that represent a specific command.

Examples:

```
*RST
*IDN?
```

4.1.2.1.2 Talon SCPI Instrument Command Header

An instrument control header is a hierarchical command keyword list separated by colons (:).

Each instrument control command keyword is a string of ASCII characters that represent a specific command or subsystem.

The upper case letters of each keyword are the short form of the keyword, the upper and lower case letters are the long form of the keyword. Only the entire short or long form of each keyword is valid. Command keywords enclosed within square brackets [ ] are default and may be excluded from the header.

Examples:

```
INP:PROB:REF:LOG TTL
INPUT:PROBE:REFERENCE TTL
```

4.1.2.2 Parameter List Definition

The parameter list defines the settings for the specified command. Some commands may not require any parameters whereas other commands may have several parameters.

4.1.2.2.1 Parameter List Symbols

The following symbols are used in the parameter list definitions:

Comma ,	Parameter separator: If a command has more than one parameter then each parameter is separated by a comma.
Square Brackets [ ]	Optional parameter: The square brackets indicate an optional parameter entry.
Curly Brackets { }	Repeating parameter: The curly brackets represent one or more repeating parameter(s) separated by commas.
Parenthesis ( )	Parameter option: The parentheses will enclose a list of parameter choices separated by vertical lines.
Vertical Line |	See Parenthesis above.

4.1.2.2.2 Parameter List Types

The following list describes the parameter list types and their restrictions where applicable:

Ascii	Pre-defined list of ASCII strings used to represent a valid setting. For example, in the “PROBE:MODE <mode>”, <mode> can be AUTO, ACQuire, PULSe, MANual or RESet.
Boolean	This parameter is used as a shorthand for ON | OFF | 0 | 1. ON | 1 specifies a true setting and OFF | 0 specifies a false setting.
Numeric	Represents a formatted numeric entry. Numeric values can be entered as ASCII, hexadecimal (#H), octal (#Q) or binary (#B).

Examples:

ASCII	256, 69, 42, 2.54, -3.89, 10.35e5
Hexadecimal	#H100, #H45, #H2A
Octal	#Q400, #Q105, #Q52
Binary	#B100000000, #B1000101

4.1.3 Events and Queries

All commands, unless otherwise noted, have an event form and a query form.

The event form of a command programs a setting or sets a mode, i.e., performs an event. For example the command “INPUT:PROBE:SWITCH S1,AUTO" defines the S1 SR211 switch to set the auto mode when depressed.

The query form returns the associated event’s current setting or value. A query is a command header with a question mark appended. For example the query “INPUT:SWITCH? S1” returns the S1 switch mode.

All ASCII numeric results are returned in decimal.

4.2 Input Subsystem

The INPut subsystem controls the input ports and resources of the SR211.

KEYWORDPARAMETER LIST

```
INPut
    :PROBe
        :MODE                   <mode>
```

```
:ORDelay                <ord_state>
:REFerence
    :HIGH
        [:DATA]         <vih_value>
    [:LOGic]            <logic>
    :LOW
        [:DATA]         <vil_value>
:STATus?
:STRObe
    :DELay              <delay>
    [:SOURce]           <probe_strobe>
:SWITch                 <switch>,<function>
:VERSion?
```

4.2.1 INPut:PROBe

The PROBe subsystem allows the user to program and query the SR211 probe functions and results.

4.2.1.1 INPut:PROBe:MODE

The MODE command defines the run mode of the SR211 probe pod.

SYNTAX

INPut:PROBE:MODE <mode>
INPut:PROBe:MODE?

PARAMETER LIST

Parameter	Type	Values	Description	Default
<mode>	Ascii	AUTO	Enables the node detect mode enabled, i.e., LED indicators on the SR211 pod are active.	MANual
		ACQuire	Disables the node detect mode, OPEN LED on probe pod flashes.	
		PULSe	Places the SR211 probe into a standby status, i.e., node and pulse detect disabled and LEDs off.	
		MANual	Set the SR211 manual mode.	
		RESet	Resets the references to zero and places the SR211 into MANual mode.	

RETURNED PARAMETER SYNTAX

<mode>

Parameter	Type	Value	Description
<mode>	Ascii	AUTO	AUTO mode is set.
		ACQ	ACQuire mode os set.
		PUL	PULse mode is set.
		MAN	MANual mode is set.

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.

4.2.1.2 INPut:PROBe:ORDelay

This command allows SR211 output register delay mode to be enabled or disabled.

SYNTAX

INPut:PROBe:ORDelay <ordelay_state>
INPut:PROBe:ORDelay?

PARAMETER LIST

Parameter	Type	Values	Description	Default
<ordelay_state>	Boolean	OFF | 0	Sets output register delay mode off.	OFF
		ON | 1	Sets output register delay mode on.	

RETURNED PARAMETER SYNTAX

<ordelay_state>

Parameter	Type	Value	Description
<ordelay_state>	Numeric	0	SR211 output register delay state is turned off.
		1	SR211 output register delay state is turned on.

COMMENTS

1. A “Execution error” error will be generated if a timing module is not selected.
2. The output register delay is used to align the probe memory with I/O module memory.

4.2.1.3 INPut:PROBe:REFerence

This subsystem allows the user to program or query the SR211 probe reference levels.

4.2.1.3.1 INPut:PROBe:REFerence:HIGH[:DATA]

This command sets the high reference levels for the SR211 pods GOOD0/GOOD1 receiver.

SYNTAX

INPut:PROBE:REFerence:HIGH[:DATA] <vih>
INPut:PROBe:REFerence:HIGH[:DATA]?

PARAMETER LIST

Parameter	Type	Values	Description	Default
<vih>	Numeric	-10.0 to +10.0	Programs the GOOD0/GOOD1 high level.	0.0

RETURNED PARAMETER SYNTAX

<vih>

Parameter	Type	Value	Description
<vih>	Numeric	-10.0 to +10.0	SR211 high reference setting.

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.

4.2.1.3.2 INPut:PROBe:REFerence[:LOGic]

This command sets the high and low reference levels for the SR211 pods GOOD0/GOOD1 receiver.

SYNTAX

INPut:PROBE:REFerence[:LOGic] <logic>

PARAMETER LIST

Parameter	Type	Values	Description	Default
<logic>	Ascii	TTL	Programs the GOOD0/GOOD1 high and low levels to TTL. VIH = +2.4V, VIL = +0.8V.	NA
		ECL	Programs the GOOD0/GOOD1 high and low levels to ECL. VIH = -0.87V, VIL = -1.48V.	
		LV	Programs the GOOD0/GOOD1 high and low levels to LV. VIH = +2.0V, VIL = +0.8V.	

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.

4.2.1.3.3 INPut:PROBe:REFerence:LOW[:DATA]

This command sets the low reference levels for the SR211 pods GOOD0/GOOD1 receiver.

SYNTAX

INPut:PROBE:REFerence:LOW[:DATA] <vil>
INPut:PROBe:REFerence:LOW[:DATA]?

PARAMETER LIST

Parameter	Type	Values	Description	Default
<vih>	Numeric	-10.0 to +10.0	Programs the GOOD0/GOOD1 high level.	0.0

RETURNED PARAMETER SYNTAX

<vil>

Parameter	Type	Value	Description
<vil>	Numeric	-10.0 to +10.0	SR211 low reference setting.

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.

4.2.1.4 INPut:PROBe:STATus?

This command returns the SR211 probe pod status.

SYNTAX

INPut:PROBe:STATus?

RETURNED PARAMETER SYNTAX

<status>

Parameter	Type	Value	Description
<status>	Numeric	32767 to -32768 (0_h-$FFFF_h$)	SR211 probe pod status code

COMMENTS

1. The upper byte of the status code is the module ID, refer to the specific modules reference manual, appendix B for the unique ID code. The table below lists the bit definition of the lower byte of the status code for the different module types.

Status Code Bit Definition															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
NU	LS2	LS1	LPRB	NU	S2	S1	PRB	NU		NODE	P1	P0	HI-Z	G1	G0

Bit Description

G0	GOOD0 signal; 0 = false, 1 = true.
G1	GOOD1 signal; 0 = false, 1 = true.
HI-Z	Tristate signal; 0 = false, 1 = true.
P0	Pulse low signal; 0 = false, 1 = true.
P1	Pulse high signal; 0 = false, 1 = true.
NODE	Node detect signal; 0 = false, 1 = true.
PRB	Probe switch depressed; 0 = false, 1 = true.
S1	S1 switch depressed; 0 = false, 1 = true.
S2	S2 switch depressed; 0 = false, 1 = true.
LPRB	Probe switch transition flag; 0 = false, 1 = true.
LS1	S1 switch transition flag; 0 = false, 1 = true.
LS2	S2 switch transition flag; 0 = false, 1 = true.
NU	Not used bits, always 0.

2. The switch transition (LBRP, LS1, LS2) and pulse (P0, P1) flags are reset by the query and “INPut:PROBe:MODE RESet” command.
3. A “Execution error” will be generated if the SR211 pod is not installed.

4.2.1.5 INPut:PROBe:STRobe

This subsystem allows the user to program and query the SR211 input probe signal.

4.2.1.5.1 INPut:PROBe:STRobe:DELay

This command is used to specify the serial/multiplex data strobe for algorithmic I/O modules.

SYNTAX

INPut:PROBe:STRobe:DELay <delay>
INPut:PROBe:STRobe[:DELay]?

PARAMETER LIST

Parameter	Type	Values	Description	Default
<delay>	Numeric	0 to 7	Selects strobe delay from 0 to 28ns in increments of 4ns.	0

RETURNED PARAMETER SYNTAX

<delay>

Returned Parameter	Type	Value	Description
<delay>	Numeric	0 to 7	Selected probe strobe delay.

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.

4.2.1.5.2 INPut:PROBe:STRobe[:SOURce]

This command is used to specify the SR211 probe strobe signal.

SYNTAX

INPut:PROBe:STRobe[:SOURce] <strobe>
INPut:PROBe:STRobe[:SOURce]?

PARAMETER LIST

Parameter	Type	Values	Description	Default
<strobe>	Ascii	TSSTrobe1	Selects timing module “A” strobe 1.	TSOUT5
		TSSTrobe2	Selects timing module “A” strobe 2.	
		FCNTI1	Selects front panel “FCNTL1” signal.	
		FCNTI2	Selects front panel “FCNTL2” signal.	
		TSOut5	Selects timing module “A” TSOUT5.	
		PRBDat	Selects front panel PRBDAT.	

RETURNED PARAMETER SYNTAX

<strobe>

Returned Parameter	Type	Value	Description
<strobe>	Ascii	TSST1	Timing module “A” TSSTROBE1 selected.
		TSST2	Timing module “A” TSSTROBE2 selected.
		FCNT1	Front panel FCNTL1 selected.
		FCNT2	Front panel FCNTL2 selected.
		TSO5	Timing module “A” TSOUT5 selected.
		PRBD	Front panel PRBDAT selected.

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.

4.2.1.6 INPut:PROBe:SWITch

This command is used to program the SR211 switch function.

SYNTAX

INPut:PROBe:SWITch <switch>,<function>
INPut:PROBe:SWITch? <switch>

PARAMETER LIST

Parameter	Type	Values	Description	Default
<switch>	Ascii	PROBE	The selected switch to program or query.	All switches set to NONE.
		S1		
		S2		
<function>	Ascii	NONE	Selected switch set has no function.	
		AUTO	Set the SR211 to AUTO mode.	
		ACQuire	Set the SR211 to ACQuire mode.	
		PULSe	Set the SR211 to PULSe mode.	

RETURNED PARAMETER SYNTAX

<function>

Returned Parameter	Type	Value	Description
<function>	Ascii	NONE	Selected switch has no function assigned.
		AUTO	Selected switch assigned AUTO mode.
		ACQ	Selected switch assigned ACQuire mode.
		PULS	Selected switch assigned PULSe mode.

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.

4.2.1.7 INPut:PROBe:VERsion?

This command returns the SR211 probe pods installed firmware version.

SYNTAX

INPut:PROBe:VERSion?

RETURNED PARAMETER SYNTAX

<version>

Returned Parameter	Type	Value	Description
<version>	Numeric	0.00 to 9.99	SR211 firmware version.

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.

4.3 Measure Subsystem

The MEASure subsystem is used to measure voltages through the SR211 probe pod.

COMMAND HEADERPARAMETER LIST

MEASure
:VOLTage?

4.3.1 MEASure:VOLTage?

Returns the voltage at the SR211 probe tip.

SYNTAX

MEASure:VOLTage?

RETURNED PARAMETER SYNTAX

<voltage>

Returned Parameter	Type	Value	Description
<voltage>	Numeric	-10.0 to +10.0	Probe tip voltage.

COMMENTS

1. A “Execution error” will be generated if the SR211 pod is not installed.
2. ”999.99” will be returned if the voltage is out of range.

4.4 Programming Examples

The following sections are operational examples. In the following instrument driver examples, the SR192 <prefix> is “tasr192” and the SR192A <prefix> is “tasr192a”.

4.4.1 Example 1

A. Program the input threshold for TTL levels
On power-up the SR211 resets both GOOD0 and GOOD1 input references to zero. The input references must be programmed before the Auto Mode can be used.

INP:PROB:REF:LOGIC TTL

Or

<prefix>_probeSetup with parameter 2 set to <PREFIX>_PRB_TTL

B. Program the probe switch to execute the Acquire mode when pressed

INP:PROB:SWIT PROBE,ACQ

Or

<prefix>_probeSetup with parameter 5 set to <PREFIX>_PRB_ACQ

Any time the tektronix probe switch is pressed the SR211 will go into the Acquire mode (Open LED flashes).

The SR192 does not collect data at this point. You must then execute your probe data sequence.

C. Read the switch status register to execute a subsequence (timing set, data table)

INP:PROB:STAT?

Or

<prefix>_queryProbeStatus

By testing for the return data from the above command you could then execute a probe data sequence.

When the sequence is complete the probe memory can be queried and compared to expected values.

<prefix>_queryProbeMemory

4.4.2 Example 2

A. Program the input threshold levels

INP:PROB:REF:HIGH 2.4

INP:PROB:REF:LOW .8

Or

<prefix>_probeSetup with parameter 3 set to 2.4 an 4 set to 0.8

B. Program the SR211 for Pulse mode

INP:PRO:MODE PULSE

or

<prefix>_probeMode with parameter 2 set to <PREFIX>_PRB_PULS

The above command programs the SR211 for Pulse detect. Upon detection of a pulse, the Pulse LED will illuminate and the GOOD0 or GOOD1 LED will illuminate indicating the polarity of the detected pulse.

4.4.3 Example 3

A. Measure a static voltage

MEAS:VOLT?

Or

<prefix>_measVolt

The above command will measure a static voltage between -10Vdc and +10Vdc.

Appendix A: GLOSSARY OF TERMS

A16/A24/A32	The VXI address is segmented into three separate areas by a group of VXI signals called the address modifiers (AM0-AM5). These three areas are called A16, A24 and A32. Every VXI module is mapped into 64 bytes of the A16 memory. VXI modules, in addition, may request additional memory map space in the A24 or A32 space. The SR192/SR192A maps all the Timing and I/O modules registers into the A24/A32 space.
FMA	Field Memory Address. This group of signals is generated by the word generator and broadcast to the I/O modules. The FMA directly selects the stimulus/response memory word.
FUNCTION CODE	Each module in an SR192/SR192A is assigned a 256K segment of the A32/A24 address map. The 256K can be split into sixteen unique areas via an additional four bits (F0-F3) which is routed to each module. The binary weighted value of the four signals generates sixteen function codes. Each module can define a single register for each function code or an array of 256K registers. Appendix B lists the function code for this module.
GOOD0	Signal passed from the SR211 data probe that indicates that the signal is less than the programmed low reference.
GOOD1	Signal passed from the SR211 data probe that indicates that the signal is greater than the programmed high reference.
I/O MODULE	Any of Talon's Stimulus/Response cards for the SR192/SR192A.
RESPONSE	The response data of the SR192/SR192A is comprised of EXPECT, MASK and RECORD memory in five memory I/O modules and just RECORD memory in three memory I/O modules.
SEQUENCE	A sequence is the link between the timing sets and the tables.
STIMULUS	The stimulus data of the SR192/SR192A is comprised of OUTPUT and TRISTATE memory located on the I/O modules.
TABLE	A table is the structure that defines a FMA range for the subsequence. The FMA range is broadcast to all the I/O modules connected to the timing module.
TIMING MODULE	Any of Talon's Timing Modules for the SR192/SR192A.
TIMING SET	A timing set is the structure that is created that defines the stimulus/response timing.
TRANSFER	See WORD.
TSOUT5	Timing Set Output Five. General purpose output channel generated by the timing generator that can be used to strobe the probe data..
VECTOR	See WORD.
WORD	A word is a single element of a table. The width of a word depends on the number and type of I/O modules installed in the SR192/SR192A.

Appendix B: Command Description

The interface between the SR211 and the SR192/SR192A is a command/response protocol. The SR192/SR192A must send a command word to the SR211. The SR211 will respond by writing the response data into the output buffer or the SR211 will receive program data from the SR192/SR192A.

WRITE example

1. Set function code to 15 (hex F).
2. Read from SR210 until DIR low.
3. Set function code to 7.
4. Write 5 to SR210 (reset command)
5. The SR211 has now been reset

READ example

1. Set function code to 15 (hex F).
2. Read from SR210 until DIR low.
3. Set function code to 7.
4. Write 9 to SR210(selftest command)
5. Set function code to 15 (hex F).
6. Read from SR210 until DOR high.
7. Set function code to 7.
8. Read data response from SR210

The power-up sequence of the SR192/SR192A performs the following if it detects a SR210 installed:

A. Test SR210 ram.
B. Send SR211 Pod reset command (0x5).
C. Verify SR211 Pod installed via ID read command (0x1C).
D. Send SR211 Pod Selftest command (0x9).
E. Re-send Reset command (0x5).

KEY DEFINITIONS

Command word	Sent by the SR192/SR192A to the SR211 to indicate the type of data transfer. The command word is followed by program data, no program data or will force the SR211 to write data into the output buffer.
Program data	Sent by the SR192/SR192A after sending a command word.

1 COMMAND/RESPONSE LISTING

1.1 The following sections describes the SR211's command/responce codes.

1.2 Set Auto Mode

Command Value: 0x01
Parameter data: none
Response data: none
Description: Auto mode performs the following operation:
A. node scan every 200mS
B. LED update every 200mS

1.3 Set Acquire Mode

Command Value: 0x02
Parameter data: none
Response data: none

Description: Pulse mode performs the following operation:
A. node detect — off
B. node LED toggles at 200mS rate to indicate acquire mode.

1.4 Set Pulse Detect Mode

Command Value: 0x03
Parameter data: none
Response data: none
Description: Pulse mode performs the following operation:
A. node detect — off
B. node LED latched on pulse detect
Pulse mode will scan for a rising or falling edge until detected. Both GOOD1 and GOOD0 threshold voltage must be set (pulses down to 10nS will be detected)

1.5 Set Manual Mode

Command Value: 0x04
Parameter data: none
Response data: none
Description: Manual mode allows the user to control all functions of the SR211 probe.

1.6 Reset

Command Value: 0x05
Parameter data: none
Response data: none
Description:
A. DAC levels GOOD0 = 0vdc, GOOD1 = 0vdc
B. Node detect — off
C. All LEDs — off
D. Pulse detect — reset
E. Data I/O register set to receive
F. Open collector output — off
G. TTI1, TTI2 — low

1.7 Program Dac

Command Value: 0x08
Parameter data: 24bits
Response data: none
Description: The DAC is programmed using a 24bit word. 12bits are for GOOD1 and 12bits are for GOOD0. Data format is MSB (bit 23 - GOOD1) to LSB (bit 0 - GOOD0). Three 8bit writes are required for programming the DAC. Byte 3 is written first then byte 2 and byte 1 last. Byte 3 — MSB Byte 2 Byte 1 — LSB
Parameter Format: If desired set voltage level is between 0 and +10 then
DACdata = 0x800 + ((V / 10) x 3) / 0.00244
Where V is the desired set voltage.
If desired set voltage level is between 0V and -10 then
DACdata = 0x800 - ((V / 10) x 3) / 0.00244
Where V is the desired set voltage.
Example: Program GOOD1 for 2.4vdc and GOOD0 for .8vd
GOOD1data = 0x800 + ((2.4 / 10) x 3) / 0.00244 = 0x927
GOOD0data = 0x800 + ((.8 / 10) x 3) / 0.00244 = 0x862
byte 3 = 0x92, byte 2 = 0x78, byte 1 0x62

1.8 Selftest

Command Value: 0x09
Parameter data: none
Response data: 8bits
Description: The following areas are tested:
A. CPU (internal memory, registers, etc.)
B. Node detect

C. LEDs
D. EEPROM
E. Switch (S1, S2, Probe)
F. Pulse detect
G. Dual comparator
H. DAC

Response format: L — Fail, H — Pass
Bit 0 - Memory test
Bit 1 - Node test
Bit 2 - LED test
Bit 3 - EEPROM test
Bit 4 - Switch test
Bit 5 - Pulse test
Bit 6 - Comparator test
Bit 7 - DAC test

1.9 DAC Offset Value

Command Value: 0x0A
Parameter data: none
Response data: 24bits
Description: This command word reads/writes the DAC offset value to the EEPROM. This offset is used to compensate for offset and drift errors in the input section of SR211. The offset can be set from -99mV to +99mV.
Parameter Format: 1st byte = msb (ASCII 0 - 9).
2nd byte = lsb (ASCII 0 - 9).
3rd byte = polarity (ASCII + or -)

1.10 Read Static Voltage Level

Command value: 0x0B
Parameter data: none
Response data: 12bits
Description: This command word returns a static voltage value.
Response format: Byte 1 — MSB Byte 2 — LSB (upper 4bits are not used)
0x800 - 0xFFE — positive voltage reading
0x800 - 0x000 — negative voltage reading
0xFFF = out of range
The equation to convert the response data to a voltage is:
Voltage = ((Response data - 0x800) / 3) x .0244
Example: Byte 1 = C8, Byte 2 = 00
Voltage = ((0xC80 - 0x800) / 3) x 0.0244
Voltage = 9.36Vdc

1.11 Switch Status Register

Command Value: 0x0C
Parameter data: none
Response data: 8bits
Description: This command word reads the switch status register.
Response Format: 0 — off, 1 — on
Bit 0 - Probe switch
Bit 1 - S2
Bit 2 - S1

1.12 LED Status

Command Value: 0x0D
Parameter data: 8bits
Response data: none
Description: This command word writes data to the LEDs.
Parameter Format: 0 — off, 1 — on

Bit 0 - GOOD0 LED
Bit 1 - GOOD1 LED
Bit 2 - TRISTATE
Bit 3 - PULSE LED
Bit 4 - OPEN LED

1.13 Hardware Status

Command Value: 0x0E
Parameter data: none
Response data: 8bits
Description: This command word reads the following hardware functions:
Response Format: 0 — signal false, 1 — signal true
Bit 0 - GOOD0
Bit 1 - GOOD1
Bit 2 - TRISTATE
Bit 3 - PULSE0
Bit 4 - PULSE1
Bit 5 - NODE

1.14 Open Collector Output

Command Value: 0x0F
Parameter data: 8bits
Response data: none
Description: Enable/disable the open collector output (20mA maximum).
Parameter Format: 1 — on, 0 — off

1.15 TTL Output 1

Command Value: 0x18
Parameter data: 8bits
Response data: none
Description: TTL 1 output high/low (2mA/4mA maximum).
Parameter Format: 1 — high, 0 — low

1.16 TTL Output 2

Command Value: 0x19
Parameter data: 8bits
Response data: none
Description: TTL 2 output highlow (2mA/4mA maximum).
Parameter Format: 1 — high, 0 — low

1.17 Node Detect

Command Value: 0x1A
Parameter data: 8bits
Response data: none
Description: Enable/disable node detect when in the manual mode.
Parameter Format: 1 — enable, 0 — disable

1.18 Pulse Reset

Command Value: 0x1B
Parameter data: none
Response data: none
Description: Reset the pulse detect circuit.

1.19 ID Read

Command Value: 0x1C
Parameter data: none
Response data: 24bits

Description: Returns the following ascii characters:
byte 1 — 'W' byte 2 — 'L' byte 3 — 'D'

1.20 Set Switch Mode

Command Value: 0x1D
Parameter data: 8bits
Response data: none
Description: Programs the mode register for all three SR211 Probe switches.
Parameter Format:

Bit 1	Bit 0	Probe switch function
0	0	None
0	1	Run Auto Mode
1	0	Run Acquire Mode
1	1	Run Pulse Detect

Bit 3	Bit 2	S1 switch function
0	0	None
0	1	Run Auto Mode
1	0	Run Acquire Mode
1	1	Run Pulse Detect

Bit 5	Bit 4	S2 switch function
0	0	None
0	1	Run Auto Mode
1	0	Run Acquire Mode
1	1	Run Pulse Detect

1.21 Read Switch Mode

Command Value: 0x1E
Parameter data: none
Response data: 8bits
Description: Returns the mode register for all three SR211 Probe switches.
Response Format:

Bit 1	Bit 0	Probe switch function
0	0	None
0	1	Run Auto Mode
1	0	Run Acquire Mode
1	1	Run Pulse Detect

Bit 3	Bit 2	S1 switch function
0	0	None
0	1	Run Auto Mode
1	0	Run Acquire Mode
1	1	Run Pulse Detect

Bit 5	Bit 4	S2 switch function
0	0	None
0	1	Run Auto Mode
1	0	Run Acquire Mode
1	1	Run Pulse Detect

2 PROGRAMMING EXAMPLES

Below is a number of programming examples.

1. Reset the SR211
   A. Set function code to 0xF
   B. Wait until DIR low
   C. Set function code to 0x7
   D. Write 0x05 to A24/A32 offset 0x70000
2. Run the SR211 selftest
   A. Set function code to 0xF
   B. Wait until DIR low
   C. Set function code to 0x7
   D. Write 0x09 to A24/A32 offset 0x70000

E. Set function code to 0xF
F. Wait until DOR high
G. Read response at A24/A32 offset 0x70000
H. Compare data to [selftest] data format above.

3. Program GOOD1 to 2.4 and GOOD0 to 0.8 input threshold.
   A. Using the formula GOOD1 = 0x927 and GOOD0 = 0x862
   B. Set function code to 0xF
   C. Wait for DIR low
   D. Set function code to 0x7
   E. Write 0x06 to A24/A32 offset 0x70000
   F. Set function code to 0xF
   G. Wait for DIR high
   H. Set function code to 0x7
   I. Write 0x92
   J. Write 0x78
   K. Write 0x62
4. Run auto mode
   A. Set function code to 0xF
   B. Wait until DIR low
   C. Set function code to 0x7
   D. Write 0x1 to A24/A32 offset 0x70000.
5. Run acquire mode
   A. Set function code to 0xF
   B. Wait until DIR low
   C. Set function code to 0x7
   D. Write 0x2 to A24/A32 offset 0x70000