

6.7 Analog Input Alarm Command Set

Command Syntax	Command Name	Description
\$aaSiCjAhs	Set Alarm Mode	Sets the High/Low alarm in either Momentary or Latching mode.
\$aaSiCjAh	Read Alarm Mode	Returns the alarm mode for the specified channel.
\$aaSiCjAhEs	Enable/Disable Alarm	Enables or Disables the High/Low alarm of the specified channel
\$aaSiCjCh	Clear Latch Alarm	Resets a latched alarm
\$aaSiCjAhCSkCn	Set Alarm Connection	Connects the High/Low alarm of a specified input channel to a specified digital output channel
\$aaSiCjRhC	Read Alarm Connection	Returns the alarm limit output connection of a specified input channel
\$aaSiCjAhU(data)	Set Alarm Limit	Sets the High/Low alarm limit value for the specified input channel
\$aaSiCjRhU	Read Alarm Limit	Returns the High/Low alarm limit value for the specified input channel
\$aaSiCjS	Read Alarm Status	Reads whether an alarm occurred for a specified input channel

Note: This command set applies to the ADAM-5013, ADAM-5017, ADAM-5017H and the ADAM-5018.

Command Set

5013/5017/5017H/5018 Analog Input Alarm

	\$aaSiCjAhs	\$aaSiCjAhs
Name	Set Alarm Mode	
Description	Sets the High/Low alarm of the specified input channel in the addressed ADAM-5000 system to either Latching or Momentary mode.	
Syntax	<p>\$aaSiCjAhs(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of anADAM-5000 system.</p> <p>SiCj identifies the desired slot <i>i</i> (<i>i</i> : 0 to 3) and the desired channel <i>j</i> (<i>j</i> : 0 to 7).</p> <p>Ahs is the Set Alarm Mode command.</p> <p>h indicates alarm type and can have the value H = High alarm, L = Low alarm</p> <p>s indicates alarm mode and can have the value M = Momentary mode, L = Latching mode</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>	
Response	<p>!aa(cr) if the command was valid</p> <p>There is no response if the system detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>	

\$aaSiCjAhs

\$aaSiCjAhs

Example

command: **\$03S0C1AHL(cr)**

response: **!03(cr)**

Channel 1 of slot 0 in the ADAM-5000 system at address 03h is instructed to set its High alarm in Latching mode.

The module confirms that the command has been received.

5013/5017/5017H/5018

Command Set

Analog Input Alarm

\$aaSiCjAh

\$aaSiCjAh

Name Read Alarm Mode

Description Returns the alarm mode for the specified channel in the specified ADAM-5000 system.

Syntax **\$aaSiCjAh(cr)**

\$ is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

SiCj identifies the desired slot *i* (*i* : 0 to 3) and the desired channel *j* (*j* : 0 to 7).

Ah is the Read Alarm Mode command.

h indicates alarm type and can have the value H = High alarm, L = Low alarm

(cr) represents terminating character, carriage return (0Dh)

Response **!aas(cr)** if the command was valid

There is no response if the system detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicating a valid command was received.

aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.

s indicates alarm mode and can have the value M = Momentary mode, L = Latching mode

(cr) represents terminating character, carriage return (0Dh)

\$aaSiCjAh

\$aaSiCjAh

Example

command: **\$03S0C1AL(cr)**

response: **!03M(cr)**

Channel 1 of slot 0 in the ADAM-5000 system at address 03h is instructed to return its Low alarm mode.

The system responds that it is in Momentary mode.

5013/5017/5017H/5018

Command Set

Analog Input Alarm

\$aaSiCjAhEs

\$aaSiCjAhEs

Name Enable/Disable Alarm

Description Enables/Disables the High/Low alarm of the specified input channel in the addressed ADAM-5000 system

Syntax **\$aaSiCjAhEs(cr)**

\$ is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

SiCj identifies the desired slot *i* (*i* : 0 to 3) and the desired channel *j* (*j* : 0 to 7).

AhEs is the Set Alarm Mode command.

h indicates alarm type and can have the value H = High alarm, L = Low alarm

s indicates alarm enable/disable and can have the value E = Enable, D = Disable

(cr) represents terminating character, carriage return (0Dh)

Response **!aa(cr)** if the command was valid

There is no response if the system detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicating a valid command was received.

aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.

(cr) represents terminating character, carriage return (0Dh)

\$aaSiCjAhEs

\$aaSiCjAhEs

Example

command: **\$03S0C1ALEE(cr)**

response: **!03(cr)**

Channel 1 of slot 0 in the ADAM-5000 system at address 03h is instructed to enable its Low alarm function.

The module confirms that its Low alarm function has been enabled.

Note:

An analog input module requires a maximum of 2 seconds after it receives an Enable/Disable Alarm command to let the setting take effect. During this interval, the module cannot be addressed to perform any other actions.

Command Set

5013/5017/5017H/5018 Analog Input Alarm

\$aaSiCjCh
\$aaSiCjCh

Name	Clear Latch Alarm
Description	Sets the High/Low alarm to OFF (no alarm) for the specified input channel in the addressed ADAM-5000 system
Syntax	<p>\$aaSiCjCh(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.</p> <p>SiCj identifies the desired slot <i>i</i> (<i>i</i> : 0 to 3) and the desired channel <i>j</i> (<i>j</i> : 0 to 7).</p> <p>Ch is the Clear Latch Alarm command.</p> <p>h indicates alarm type and can have the value H = High alarm, L = Low alarm</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>
Response	<p>!aa(cr) if the command was valid</p> <p>There is no response if the system detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>

\$aaSiCjCh

\$aaSiCjCh

Example

command: **\$03S0C1CL(cr)**

response: **!03(cr)**

Channel 1 of slot 0 in the ADAM-5000 system at address 03h is instructed to set its Low alarm state to OFF.

The system confirms it has done so accordingly.

Command Set

5013/5017/5017H/5018 Analog Input Alarm

	\$aaSiCjAhCSkCn	\$aaSiCjAhCSkCn
Name	Set Alarm Connection	
Description	Connects the High/Low alarm of the specified input channel to the specified digital output in the addressed ADAM-5000 system	
Syntax	<p>\$aaSiCjAhCSkCn(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.</p> <p>SiCj identifies the desired slot i (i : 0 to 3) and the desired analog input channel j (j : 0 to 7).</p> <p>AhC is the Set Alarm Connection command.</p> <p>h indicates alarm type and can have the value H = High alarm, L = Low alarm</p> <p>SkCn identifies the desired slot k (k : 0 to 3) and the desired digital output point n (n : 0 to F). To disconnect the digital output, k and n should be set as ‘*’.</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>	
Response	<p>!aa(cr) if the command was valid</p> <p>There is no response if the system detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>	

\$aaSiCjAhCSkCn

\$aaSiCjAhCSkCn

Example command: **\$03S0C1ALCS1C0(cr)**

response: **!03(cr)**

Channel 1 of slot 0 in the ADAM-5000 system at address 03h is instructed to connect its Low alarm to the digital output of point 0 of slot 1 in the same ADAM-5000 system.

The system confirms it has done so accordingly.

Command Set

5013/5017/5017H/5018 Analog Input Alarm

	\$aaSiCjRhC	\$aaSiCjRhC
Name	Read Alarm Connection	
Description	Returns the High/Low alarm limit output connection of a specified input channel in the addressed ADAM-5000 system	
Syntax	<p>\$aaSiCjRhC(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.</p> <p>SiCj identifies the desired slot <i>i</i> (<i>i</i> : 0 to 3) and the desired analog input channel <i>j</i> (<i>j</i> : 0 to 7).</p> <p>RhC is the Read Alarm Connection command.</p> <p>h indicates alarm type and can have the value H = High alarm, L = Low alarm</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>	
Response	<p>!aaSkCn(cr) if the command was valid</p> <p>There is no response if the system detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.</p> <p>SkCn identifies the desired slot <i>k</i> (<i>k</i> : 0 to 3) and the desired digital output point <i>n</i> (<i>n</i> : 0 to F) to which the input alarm is connected. If the values of <i>k</i> and <i>n</i> are '*', the analog input has no connection with a digital output point.</p>	

\$aaSiCjRhC

\$aaSiCjRhC

(**cr**) represents terminating character, carriage return (0Dh)

Example

command: **\$03S0C1RLC(cr)**

response: **!03S1C0(cr)**

Channel 1 of slot 0 in the ADAM-5000 system at address 03h is instructed to read its Low alarm output connection.

The system responds that the Low alarm output connects to the digital output at point 0 of slot 1 in the same ADAM-5000 system.

Command Set

5013/5017/5017H/5018 Analog Input Alarm

\$aaSiCjAhU(data)
\$aaSiCjAhU(data)

Name	Set Alarm Limit
Description	Sets the High/Low alarm limit value for the specified input channel of a specified ADAM-5000 system.
Syntax	<p>\$aaSiCjAhU(data)(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.</p> <p>SiCj identifies the desired slot <i>i</i> (<i>i</i> : 0 to 3) and the desired analog input channel <i>j</i> (<i>j</i> : 0 to 7).</p> <p>AhU is the Set Alarm Limit command.</p> <p>h indicates alarm type and can have the value H = High alarm, L = Low alarm</p> <p>(data) represents the desired alarm limit setting. The format is always in engineering units.</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>
Response	<p>!aa(cr) if the command was valid</p> <p>There is no response if the system detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>

\$aaSiCjAhU(data)

\$aaSiCjAhU(data)

Example command: **\$03S0C1AHU+080.00(cr)**
 response: **!03(cr)**

Channel 1 of slot 0 in the ADAM-5000 system at address 03h is configured to accept type-T thermocouple input. The command will set its High alarm limit to +80°C.

The system confirms the command has been received.

Note: *An analog input module requires a maximum of 2 seconds after it receives a Set Alarm Limit command to let the settings take effect. During this interval, the module cannot be addressed to perform any other actions.*

5013/5017/5017H/5018

Command Set

Analog Input Alarm

\$aaSiCjRhU

\$aaSiCjRhU

Name Read Alarm Limit

Description Returns the High/Low alarm limit value for the specified input channel in the addressed ADAM-5000 system

Syntax **\$aaSiCjRhU(cr)**

\$ is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

SiCj identifies the desired slot *i* (*i* : 0 to 3) and the desired analog input channel *j* (*j* : 0 to 7).

RhU is the Read Alarm Limit command.

h indicates alarm type and can have the value H = High alarm, L = Low alarm

(cr) represents terminating character, carriage return (0Dh)

Response **!aa(data)(cr)** if the command was valid

There is no response if the system detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicating a valid command was received.

aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.

(data) represents the desired alarm limit setting. The format is always in engineering units.

(cr) represents terminating character, carriage return (0Dh)

\$aaSiCjRhU

\$aaSiCjRhU

Example

command: **\$03S0C1RHU(cr)**

response: **!03+2.0500(cr)**

Channel 1 of slot 0 in the ADAM-5000 system at address 03h is configured to accept 5V input. The command instructs the system to return the High alarm limit value for that channel.

The system responds that the High alarm limit value in the desired channel is 2.0500 V.

Command Set

5013/5017/5017H/5018 Analog Input Alarm

\$aaSiCjS	\$aaSiCjS
Name	Read Alarm Status
Description	Reads whether an alarm occurred for the specified input channel in the specified ADAM-5000 system
Syntax	<p>\$aaSiCjS(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.</p> <p>SiCj identifies the desired slot i (i : 0 to 3) and the desired analog input channel j (j : 0 to 7).</p> <p>S is the Read Alarm Status command.</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>
Response	<p>!aahl(cr) if the command was valid</p> <p>There is no response if the system detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>aa represents the 2-character hexadecimal address of the corresponding ADAM-5000 system.</p> <p>h represents the status of High alarm. ‘1’ means the High alarm occurred, ‘0’ means it did not occur.</p> <p>l represents the status of Low alarm. ‘1’ means the Low alarm occurred, ‘0’ means it did not occur.</p> <p>(cr) represents terminating character, carriage return (0Dh)</p>

\$aaSiCjS

\$aaSiCjS

Example

command: **\$03S0C1S(cr)**

response: **!0301(cr)**

The command instructs the system at address 03h to return its alarm status for channel 1 of slot 0.

The system responds that a High alarm has not occurred and that a Low alarm has occurred.

6.8 Analog Output Command Set

Command Syntax	Command Name	Description
\$aaSiCjArrff	Configuration	Sets the output range, data format and slew rate for a specified channel in a specified analog output module in a specified system.
\$aaSiCjB	Configuration Status	Returns the configuration parameters of a specified channel in a specified analog output module of a specified system.
#aaSiCj(data)	Analog Data Out	Sends a digital value from the host computer to a specified channel of a specified slot in a specified ADAM-5000 system for output as an analog signal.
\$aaSiCj4	Start-Up Output Current/Voltage Configuration	Stores a default output value in a specified channel. The output value will take effect upon startup or reset.
\$aaSiCj0	4 mA Calibration	Directs the specified channel to store parameters following a calibration for 4 mA output
\$aaSiCj1	20 mA Calibration	Directs the specified channel to store parameters following a calibration for 20 mA output
\$aaSiCj3hh	Trim Calibration	Trims the specified channel a specified number of units up or down
\$aaSiCj6	Last Value Readback	Returns either the last value sent to the specified channel by a #aaSiCj(data) command, or start-up output current/voltage.

\$aaSiCjArrff		\$aaSiCjArrff	
Name	Configuration		
Description	Sets the output range, data format and slew rate for a specified channel of a specified analog output module in a specified system.		
Syntax	<p>\$aaSiCjArrff(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system you want to configure.</p> <p>SiCj identifies the I/O slot i (i : 0 to 3) and the channel j (j : 0 to 3) of the module you want to configure.</p> <p>A is I/O module configuration command.</p> <p>rr represents the 2-character hexadecimal code of the output range. (See Appendix B)</p> <p>ff is a hexadecimal number that equals the 8-bit parameter representing the status of data format and slew rate. Bits 0 and 1 represent data format. Bits 2,3,4,5 represent slew rate. The layout of the 8-bit parameter is shown in Figure 6-4. The other bits are not used and are set to 0.</p> <p>(cr) is the terminating character, carriage return (0Dh)</p>		
Response	<p>!aa(cr) if the command is valid.</p> <p>?aa(cr) if an invalid operation was entered.</p> <p>There is no response if the module detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p>		

Command Set

5024 Analog Output

\$aaSiCjArrff

\$aaSiCjArrff

? delimiter character indicating the command was invalid.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

(cr) is the terminating character, carriage return (0Dh)

Example

command: \$35S3C0A3110(cr)

response: !35(cr)

The analog output channel 0 in slot 3 of the ADAM-5000 system at address 35h is configured to an output range 4 to 20mA, engineering units data format, and a slew rate of 1.0mA/sec.

The response indicates that the command has been received.

Note:

An analog output module requires a maximum of 20 milliseconds to perform auto calibration and ranging after it is reconfigured. During this time span, the module cannot be address to perform any other actions.

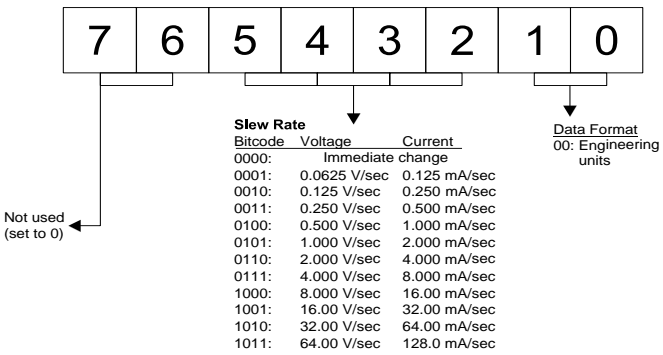


Figure 6-4 Data format of 8-bit parameters

\$aaSiCjB	\$aaSiCjB
Name	Configuration Status
Description	Returns the configuration parameters of a specified channel in a specified analog output module of a specified system.
Syntax	<p>\$aaSiCjB(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system you want to interrogate.</p> <p>SiCj identifies the I/O slot i (i : 0 to 3) and the channel j (j : 0 to 3) you want to read.</p> <p>B is configuration status command.</p> <p>(cr) is the terminating character, carriage return (0Dh)</p>
Response	<p>!aarrff(cr) if the command is valid.</p> <p>?aa(cr) if an invalid operation was entered.</p> <p>There is no response if the module detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>? delimiter character indicating the command was invalid.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.</p> <p>rr represents the 2-character hexadecimal code of the output range.</p> <p>ff is a hexadecimal number that equals the 8-bit parameter representing the status of data format and slew rate.</p>

\$aaSiCjB**\$aaSiCjB**

Bits 0 and 1 represent data format. Bits 2, 3, 4 and 5 represent slew rate. The other bits are not used and are set to 0. (See Configuration command \$aaSiCjArrff)

(cr) is the terminating character, carriage return (0Dh)

Example

command: **\$24S1C1B**

response: **!243210**

The analog output channel 1 in slot 1 of the ADAM-5000 system at address 24h responds with an output range 0 to 10V, engineering units data format, and a slew rate of 1.0mA/sec.

#aaSiCj(data)

#aaSiCj(data)

Name Analog Data Out

Description Sends a digital value from the host computer to a specified channel of a specified slot in a specified ADAM-5000 system for output as an analog signal. Upon receipt, the analog output module in the specified slot will output an analog signal corresponding to the digital value received.

Syntax #aaSiCj(data)(cr)

is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.

SiCj identifies the I/O slot *i* (*i* : 0 to 3) and the channel *j* (*j* : 0 to 3) of the analog output module that is to output an analog signal.

(data) is a digital value incoming to the module, which corresponds to the desired analog output value (always in engineering units) to be output from the module. The analog value output will depend on the module's range configuration. (See also Appendix B, Data Formats and I/O Ranges)

(cr) is the terminating character, carriage return (0Dh)

Response >(cr) if the command is valid.

?aa(cr) if a value was sent that is out of range. Note that when the analog output module receives such a value, it will try to use a value that is close to the one received, but within the module's configured range.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

> is a delimiter character indicating a valid command was received.

#aaSiCj(data)**#aaSiCj(data)**

? delimiter character indicating the command was invalid.

(**cr**) is the terminating character, carriage return (0Dh)

Example

command: **#33S1C115.000(cr)**

response: **>(cr)**

The command instructs the module in slot 1 of the ADAM-5000 system at address 33h to output a value of 15 mA from it's channel 1. The module should be an analog output module with it's channel 1 configured for a range of 0-20 mA or 4-20 mA. If it is an analog output module configured for the range 0-10 V, it's output value will be 10 V and the response will be **?33(cr)**.

\$aaSiCj4

\$aaSiCj4

Name	Start-Up Output Current/Voltage Configuration
Description	Stores a default output value in a specified channel. The output value will take effect upon startup or reset.
Syntax	<p>\$aaSiCj4(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.</p> <p>SiCj identifies the I/O slot <i>i</i> (<i>i</i> : 0 to 3) and the channel <i>j</i> (<i>j</i> : 0 to 3) of the module you want to set.</p> <p>4 is the Start-Up Output Current/Voltage Configuration command.</p> <p>(cr) is the terminating character, carriage return (0Dh)</p>
Response	<p>!aa(cr) if the command is valid.</p> <p>?aa(cr) if an invalid operation was entered.</p> <p>There is no response if the module detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>? delimiter character indicating the command was invalid.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.</p> <p>(cr) is the terminating character, carriage return (0Dh)</p>

\$aaSiCj4**\$aaSiCj4****Example** command: **\$0AS1C14(cr)**response: **!0A(cr)**

Presume the present output value of channel 1 of slot 1 in the ADAM-5000 system at address 0Ah is 9.4 mA. The command tells the analog output module to store the present output value in its non-volatile memory. When the system is powered up or reset, its default output value will be 9.4 mA.

The response from the ADAM-5000 system at address 0Ah indicates the command has been received.

Note: *An analog output module requires a maximum of 6 milliseconds after it receives a Startup Output Current/Voltage Configuration command to let the settings take effect. During this interval, the module cannot be addressed to perform any other actions.*

\$aaSiCj0

\$aaSiCj0

Name 4 mA Calibration

Description Directs the specified channel to store parameters following a calibration for 4 mA output

Syntax **\$aaSiCj0(cr)**

\$ is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.

SiCj identifies the I/O slot *i* (*i* : 0 to 3) and the channel *j* (*j* : 0 to 3) of the module you want to calibrate.

0 is the 4 mA calibration command.

(cr) is the terminating character, carriage return (0Dh)

Response **!aa(cr)** if the command is valid.

?aa(cr) if an invalid operation was entered.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicating a valid command was received.

? delimiter character indicating the command was invalid.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

(cr) is the terminating character, carriage return (0Dh)

Note: *Before issuing the 4 mA Calibration command, the analog output module should be trimmed to the correct value using the Trim Calibration command. Either a mA meter or a resistor and voltmeter should*

\$aaSiCj0

\$aaSiCj0

be connected to the module's output. (See also the analog output module's Trim Calibration command in Chapter 4, Section 4.5, Analog Output Module Calibration for a detailed description.)

\$aaSiCj1

\$aaSiCj1

Name 20 mA Calibration

Description Directs the specified channel to store parameters following a calibration for 20 mA output

Syntax **\$aaSiCj1(cr)**

\$ is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.

SiCj identifies the I/O slot *i* (*i* : 0 to 3) and the channel *j* (*j* : 0 to 3) of the module you want to calibrate.

1 is the 20 mA calibration command.

(cr) is the terminating character, carriage return (0Dh)

Response **!aa(cr)** if the command is valid.

?aa(cr) if an invalid operation was entered.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicating a valid command was received.

? delimiter character indicating the command was invalid.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

(cr) is the terminating character, carriage return (0Dh)

Note: *Before issuing the 20 mA Calibration command, the analog output module should be trimmed to the correct value using the Trim Calibration command. Either a mA meter or a resistor and voltmeter should*

\$aaSiCj1**\$aaSiCj1**

be connected to the module's output. (See also the analog output module's Trim Calibration command in Chapter 4, Section 4.5, Analog Output Module Calibration for a detailed description.)

\$aaSiCj3hh

\$aaSiCj3hh

Name Trim Calibration

Description Trims the specified channel a specified number of units up or down

Syntax **\$aaSiCj3hh(cr)**

\$ is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.

SiCj identifies the I/O slot *i* (*i* : 0 to 3) and the channel *j* (*j* : 0 to 3) of the module you want to calibrate.

3 is the trim calibration command.

hh is the 2-character twos complement hexadecimal value that represents the number of counts by which to increase or decrease the output current. Each count equals approximately 1.5μA. Values range from 00 to 5F and from A1 to FF (hexadecimal), where 00 represents 0 counts, 5F represents +95 counts, A1 represents -95 counts and FF represents -1 counts. Negative values decrease and positive numbers increase the output current according to the number of counts.

(cr) is the terminating character, carriage return (0Dh)

Response **!aa(cr)** if the command is valid.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicating a valid command was received.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

\$aaSiCj3hh**\$aaSiCj3hh**

Example (**cr**) is the terminating character, carriage return (0Dh)
command: **\$07S1C2314(cr)**
response: **!07(cr)**

The command tells channel 2 of the analog output module in slot 1 of the ADAM-5000 system at address 07h to increase its output value by 20 (14h) counts which is approximately 30 μ A.

The analog output module confirms the increase.

Note: *In order to perform a Trim Calibration, either a mA meter or a resistor and voltmeter should be connected to the module's output prior to calibration. (See also the 4 mA and 20 mA Calibration commands of the analog output module's command set. Refer also to Chapter 4, Section 4.5, Analog Output Calibration for a detailed description.)*

\$aaSiCj6

\$aaSiCj6

Name Last Value Readback

Description Returns either the last value sent to the specified channel by a #aaSiCj(data) command, or the start-up output current/voltage.

Syntax \$aaSiCj6(cr)

\$ is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.

SiCj identifies the I/O slot i (i : 0 to 3) and the channel j (j : 0 to 3) for the module you want to return a prior value.

6 is the last value readback command.

(cr) is the terminating character, carriage return (0Dh)

Response !aa(data)(cr) if the command is valid.

?aa(cr) if an invalid operation was entered.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicating a valid command was received.

? delimiter character indicating the command was invalid.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

(data) is the value that is returned by the analog output module. The format of the data depends on the module's configured data format.

(cr) is the terminating character, carriage return (0Dh)

\$aaSiCj6**\$aaSiCj6****Example** command: **\$0AS2C16(cr)**response: **!0A03.000(cr)**

The command tells channel 1 of the analog output module in slot 2 of the ADAM-5000 system at address 0Ah to return the last output value it received from an Analog Data Out command, or its start-up output current /voltage.

The analog output module returns the value 3.000 mA (this assumes that the module was configured for the range 0-20 mA).

6.9 Digital Input/Output Command Set

Command Syntax	Command Name	Description
\$aaSi6	Digital Data In	Returns the values of digital I/O channels for a specified module
#aaSiBB(data)	Digital Data Out	Sets output values of a single digital output channel or of all digital output channels simultaneously for a specified module.
\$aaSiM	Read Channel Masking Status	Asks the specified module to return the masking status of all digital output channels.

Command Set	5050/5051/5052/5056/ 5060/5068 Digital I/O
--------------------	---

\$aaSi6

\$aaSi6

Name Digital Data In

Description This command requests that the specified module in an ADAM-5000 system at address **aa** return the status of its digital input channels and a readback value of its digital output channels.

Syntax **\$aaSi6(cr)**

\$ is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.

Si identifies the I/O slot of the system you want to read.

6 is the Digital Data In command.

(cr) is the terminating character, carriage return (0Dh)

Response **!aa(datainput)(datainput)00(cr)** if the command is valid. (ADAM-5051)

!aa(dataoutput)(dataoutput)00(cr) if the command is valid. (ADAM-5056)

!aa(dataoutput)0000(cr) if the command is valid. (ADAM-5060, ADAM-5068)

?aa(cr) if an invalid operation was entered.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicating a valid command was received.

? delimiter character indicating the command was invalid.

\$aaSi6

\$aaSi6

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system.

(datainput) a 2-character hexadecimal value representing the input values of the digital input module.

(dataoutput) a 2-character hexadecimal value which is the readback of a digital output channel or relay.

(cr) is the terminating character, carriage return (0Dh)

Example

command: **\$33S26(cr)**

response: **!33112200(cr)**

The command asks the digital input module in slot 2 of the ADAM-5000 system at address 33h to return the values of all of its channels.

The first 2-character portion of the response indicates the address of the ADAM-5000 system. The second 2-character portion of the response, value 11h (00010001), indicates that digital input channels 8 and 12 are ON, channels 9, 10, 11, 13, 14 and 15 are OFF. The third 2-character portion of the response, value 22h (00100010), indicates that digital input channels 1 and 5 are ON, and channels 0, 2, 3, 4, 6 and 7 are OFF.

#aaSiBB(data)

#aaSiBB(data)

Name Digital Data Out

Description This command either sets a single digital output channel or sets all digital output channels simultaneously.

Syntax #aaSiBB(data)(cr)

is a delimiter character.

aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.

Si identifies the slot *i* (*i*:0 to 3) of the ADAM-5000 system which contains the module whose output values you want to set.

BB is used to indicate which channel(s) either single or all will be set.

Writing to all channels (write a byte): both characters should be equal to zero (**BB=00**).

Writing to a single channel (write a bit): first character is 1, second character indicates channel number which can range from 0h to Fh. The ADAM-5056 can range from 0h to Fh, and the ADAM-5060/5068 can range from 0h to 7h).

(data) is the hexadecimal representation of the digital output value(s).

When writing to a single channel (bit) the first character is always 0. The value of the second character is either 0 or 1.

When writing to all channels (byte) 2 or 4-characters are significant. The digital equivalent of these hexadecimal characters represent the channels' values. Note that the number of channels on the ADAM-5056 and ADAM-5060/5068 differ.

#aaSiBB(data)

#aaSiBB(data)

A 4-character hexadecimal value is used to set the channels, from 15 thru 0, of the ADAM-5056. A 2 character hexadecimal value is used to set the channels, from 5 thru 0, of the ADAM-5060. Bits 6 and 7 always default to 0 in the ADAM-5060. A 2 character hexadecimal value is used to set the channels, from 7 thru 0, of the ADAM-5068.

Response

>(cr) if the command was valid.

?aa(cr) if an invalid command has been issued.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

> delimiter character indicating a valid command was received.

? delimiter character indicating the command was invalid.

aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system that is responding.

(cr) is the terminating character, carriage return (0Dh)

Example

command: **#15S11201(cr)**

response: **>(cr)**

An output bit with value 1 is sent to channel 2 of a digital output module in slot 1 of the ADAM-5000 system at address 15h - either ADAM-5056 or ADAM-5060/5068. Channel 2 of the digital output module is set to ON.

command: **#14S1001234(cr)**

response: **>(cr)**

An output byte with value 1234h (0001001000110100) is

#aaSiBB(data)

#aaSiBB(data)

sent to the digital output module (ADAM-5056) in slot 1 of the ADAM-5000 system at address 14h. Channels 2, 4, 5, 9 and 12 will be set to ON, and all other channels are set to OFF.

command: **#15S0003A(cr)**

response: **>(cr)**

An output byte with value 3Ah (00111011) is sent to the digital output module (ADAM-5060) in slot 0 of the ADAM-5000 system at address 15h. Channels 0, 1, 3, 4 and 5 will be set to ON while channel 2 is set to OFF. Bits 6 and 7 are not used and always default to 0.

Note: *If any channel of the digital output module is configured as the output for an analog input alarm, it cannot be reconfigured via digital output commands. Channels used for analog input alarms always have a higher priority.*

\$aaSiM	\$aaSiM
Name	Read Channel Masking Status
Description	Asks the specified module to return the masking status of digital output channels
Syntax	<p>\$aaSiM(cr)</p> <p>\$ is a delimiter character.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of the ADAM-5000 system.</p> <p>Si identifies the I/O slot of the system you want to read.</p> <p>M is Channel Masking Status command.</p> <p>(cr) is the terminating character, carriage return (0Dh)</p>
Response	<p>!aa(data)(cr) if the command is valid.</p> <p>?aa(cr) if an invalid operation was entered.</p> <p>There is no response if the module detects a syntax error or communication error or if the specified address does not exist.</p> <p>! delimiter character indicating a valid command was received.</p> <p>? delimiter character indicating the command was invalid.</p> <p>aa (range 00-FF) represents the 2-character hexadecimal address of an ADAM-5000 system that is responding.</p> <p>(data) is the hexadecimal value representing the status of all digital output channels. A 4-character value represents the output channels in sequence from 15 thru 0 in an ADAM-5056 module. A 2-character value represents the output channels in sequence from 5 thru 0 in an ADAM-5060 module. And a 2-character value represents the output channels in sequence from 7 thru</p>

\$aaSiM**\$aaSiM**

0 in an ADAM-5068 module. Each bit represents a channel. A value of 1 means the channel is masked, while a value of 0 means the channel is valid.

(cr) is the terminating character, carriage return (0Dh)

Example

command: **\$19SiM(cr)**

response: **!191322(cr)**

The command asks the digital output module in slot 1 of the ADAM-5000 system at address 19h to return the masking status of all of its channels.

The first 2-character portion of the response indicates the address of the ADAM-5000 system. The second 2-characters portion of the response, value 13h (00010011), indicates that digital output channels 8, 9 and 12 are masked, while channels 10, 11, 13, 14 and 15 are valid. The third 2-character portion of the response, value 22h (00100010), indicates that digital output channels 1 and 5 are masked, while channels 0, 2, 3, 4, 6 and 7 are valid.