Sensormatic

APPLICATION NOTE

ASCII CONTROL COMMANDS FOR MATRIX SWITCHING SYSTEMS

AN_0001

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1.0 GENERAL DESCRIPTION

This document defines the code structure necessary for the control and operation of an American Dynamics matrix switching system from an external device such as a computer or terminal.

Control of an American Dynamics matrix system is accomplished using ASCII command strings transmitted from the controlling device (keyboard, computer, terminal, etc.) to the matrix system CPU via RS-232. Operations described include camera-to-monitor switching, tour/sequence control, PTZ control (telemetry), recorder control, and alarm interface.

The matrix switching system's CPU, whether internal or external, has multiple full duplex RS-232 control ports. Each port is configurable through the matrix system's internal menus to accept data words with 7 or 8 data bits, 1 or 2 stop bits and parity selection (none, even or odd). Baud rates are selectable between 1200, 2400, 4800 or 9600 baud (**also 19200 and 38400 Baud for the AD168 and MP48 Matrix Switcher/Controllers**). Port use should be set to TERMINAL. The default port setting is for KEYBOARD at 1200 baud with 8 data bits, 1 stop bit and no parity. The 7-bit ASCII code set is used for control commands.

All commands must be followed by a terminating character such as carriage return <CR> (HEX **0D**). The system CPU will also recognize a lower case letter, specifically *"a", "b", "c",* or *"d"* to terminate all control and operation commands. Other ASCII control codes, such as *LF* (HEX **0A**) are ignored. For data flow control, the software handshake *Control Q* (ASCII **DC1** or HEX **11**) and *Control S* (ASCII **DC3** or HEX **13**), also known as *XON* and *XOFF,* is supported.

The examples in this document show how to perform various functions for control of the matrix switching system. Not all available functions are described. For a listing of interface codes, please refer to the code description table in the Appendix.

2.0 CAMERA TO MONITOR CALL-UP

In order to switch cameras to a monitor, the monitor must first be addressed. Once the monitor is selected all camera switch selections shall be for that monitor until another monitor is addressed. Subsequent camera selections to the same monitor do not require re-selecting that monitor. The following examples show how to select a monitor and call a camera.

Monitor Selection

The data string for selecting a monitor consists of the Monitor Number, Monitor Function Descriptor and the String Terminator.

Example: Select monitor 10 to initiate camera call-up

String: *Monitor Number* 10 Function *Descriptor M* **String** *Terminator* **a**

ASCII: **1 0 M a** HEX: **31 30 4D 61**

Camera Selection

The data string for calling a camera to a previously selected monitor consists of Camera Number, Camera Function Descriptor and the String Terminator.

Example: Call camera 25 to previously selected monitor

String: *Camera Number* **25** *Function Descriptor* **#** *String Terminator* **a**

ASCII: **2 5 # a** HEX: **32 35 23 61**

3.0 TOUR/SEQUENCE CONTROL

Tours or sequences of cameras are controlled by first addressing the monitor and selecting the appropriate action. There are two types of tours/sequences: Monitor Tours and Universal Tours. A description of the tour operation is located in the manuals for the individual matrix switching system.

Monitor Tour Operation

To run a Monitor Tour, two data strings must be sent. First, the monitor must be selected, and then the tour is initiated with the RUN command. The data string consists of the Monitor Number, Monitor Function Descriptor and the String Terminator followed by the Run Function Descriptor and the String Terminator.

Example: Run monitor tour (scratch pad tour) on monitor 10

String: *Monitor Number* **10** *Function Descriptor* **M** *String Terminator* **a**
Function Descriptor **S** *String Terminator* **a**

ASCII: **1 0 M a S a** HEX: **31 30 4D 61 53 61**

Universal Tour Operation

To run a Universal Tour, three data strings must be sent. First, the monitor must be selected, then the Tour Number and Run command must be sent, and finally the Acknowledge command is sent. The data string will consist of the Monitor Number, Monitor Function Descriptor and the String Terminator, the Tour Number, Run Function Descriptor and the String Terminator and the Acknowledge Function Descriptor and the String Terminator.

Example: Run Universal Tour 5 on monitor 10

String: *Monitor Number* **10** *Function Descriptor* **M** *String Terminator* **a**
Tour Number **5** *Function Descriptor* **S** *String Terminator* **a**
Function Descriptor **_** *String Terminator* **a**

ASCII: **1 0 M a 5 S a _ a** HEX: **31 30 4D 61 35 53 61 5F 61**

Holding a Tour Operation

To hold a tour that is presently running, two data strings must be sent. First select the monitor, and then initiate the Hold command. The data string will consist of the Monitor Number, Monitor Function Descriptor and the String Terminator followed by the Hold Function Descriptor and the String Terminator.

Example: Hold a tour running on monitor 10

String: *Monitor Number* **10** *Function Descriptor* **M** *String Terminator* **a**
Function Descriptor **H** *String Terminator* **a**

ASCII: **1 0 M a H a** HEX: **31 30 4D 61 48 61**

4.0 PAN/TILT/LENS CONTROL

(for Pan/Tilt/Lens/Aux Control using the AD168 and MP48 see Section 6.0)

To request continuous real time actions such as pan, tilt, zoom, focus or iris control, the ASCII code for the desired action followed by a terminator must be sent a minimum of five times and repeated for as long as the action is desired. **To ensure smooth continuous action, the code must be repeated at a rate of approximately 15 times per second.** These commands will control the camera currently displayed on the addressed monitor.

Fixed Speed Pan/Tilt Control

For control of fixed speed pan/tilts, the desired Direction Function Descriptor must be sent followed by a String Terminator at a rate of 15 times per second.

Example: Pan currently displayed camera on selected monitor to the right

String: *Right Command* **R** *String Terminator* **a** (Repeat 15 times/second until target is reached)

ASCII: **R a R a** etc. HEX: **52 61 52 61** etc.

Variable Speed Pan/Tilt Control

For control of variable speed pan/tilt units, eight proportional speeds are available in each direction. The speeds are defined by a Speed Number from 0 to 6, where 0 is the slowest speed and 6 is the second highest speed. For full speed operation, no speed number is required (see example above). Commands must be sent at a rate of 15 times per second.

Example: Pan currently displayed camera on selected monitor to the left at half speed

String: *Speed Number* **4** *Left Command* **L** *String Terminator* **a** (Repeat 15 times/second until target is reached)

ASCII: **4 L a 4 L a** etc. HEX: **34 4C 61 34 4C 61** etc.

Diagonal Pan & Tilt Operation

To control both the pan and tilt functions simultaneously, ie. on a diagonal, the commands for both pan and tilt directions must be interleaved in the data stream at a rate of 15 times per second.

Example: For the camera currently displayed on the monitor, pan right and tilt up simultaneously

String: *Right Command* **R** *String Terminator* **a** *Up Command* **U** *String Terminator* **a** (Repeat 15 times/second until target is reached)

ASCII: **R a U a R a U a** etc. HEX: **52 61 55 61 52 61 55 61** etc.

Lens Control

For lens control, the desired Function Descriptor (zoom wide or telephoto, focus near or far, iris open or close) must be sent followed by the String Terminator at a rate of 15 times per second.

Example: Operate zoom lens in telephoto mode (ie. zoom in)

String: *Telephoto Command* **T** *String Terminator* **a** (Repeat 15 times/second until target is reached)

ASCII: **T a T a** etc. HEX: **54 61 54 61** etc.

Preset (Shot) Control

To call a preset scene (or shot) for the current camera, a previously defined preset scene number must be sent followed by the Call Shot Function Descriptor and a String Terminator.

Example: Call preset scene 3 on current camera

String: *Preset Scene Number* **3** *Call Shot Function Descriptor* **** *String Terminator* **a**

ASCII: **3 \ a** HEX: **33 5C 61**

Auxiliary Control

Auxiliary relays at suitably equipped camera sites are configured as either latching or momentary. To activate a momentary auxiliary relay, the Auxiliary Number and Aux On Function Descriptor must be sent at a rate of 15 times per second until the desired activity is completed. To turn on or turn off a latching relay, the Auxiliary Number and the Aux On or Aux Off Function Descriptor must be sent respectively to attain the desired result. Each command must be proceeded by a String Terminator.

Example: Activate momentary auxiliary relay 1

String: *Auxiliary Number* **1** *Aux On Function Descriptor* **A** *String Terminator* **a** (repeat at 15 times/second until action is completed)

ASCII: **1 A a 1 A a** etc. HEX: **31 41 61 31 41 61** etc.

Example: Turn on latching auxiliary relay 2

String: *Auxiliary Number* **2** *Aux On Function Descriptor* **A** *String Terminator* **a**

ASCII: **2 A a** HEX: **32 41 61**

Example: Turn off latching auxiliary relay 2

String: *Auxiliary Number* **2** *Aux Off Function Descriptor* **B** *String Terminator* **a**

ASCII: **2 B a** HEX: **32 41 61**

5.0 ALARM CALL-UP CONTROL

An alarm command can be used to automatically switch camera(s) to monitor(s) with the occurrence of an alarm condition. A user defined alarm/camera table is stored in the matrix switching system at system set-up, and is accessed by the alarm command data string. For information on alarms and alarm programming please review the respective matrix system manual(s). The following examples show how to initiate, clear and acknowledge an alarm.

New Alarm

This command initiates a new alarm for auto camera call-up. The data string consists of the Alarm Contact Number, Function Descriptor and the String Terminator.

Example: Activate alarm contact 25

String: *Alarm Contact Number* **25** *Function Descriptor* **E** *String Terminator* **a**

ASCII: **2 5 E a** HEX: **32 35 45 61**

End (Clear) Alarm

This command is used to End (Clear) an alarm from automatic camera call-up, and the resulting action depends on the method of alarm clearance selected. In Instant Clearance mode, the alarm is removed from the system. In Auto Clearance mode, the 20 second time-out timer is activated. In Manual Clearance mode this command is ignored (see Acknowledge Alarm below). The data string will consist of the Alarm Contact Number, Function Descriptor and the String Terminator.

Example: End (Clear) alarm number 25

Send: *Alarm Contact Number* **25** *Function Descriptor* **I** *String Terminator* **a**

ASCII: **2 5 I a** HEX: **32 35 49 61**

Acknowledge Alarm

This command can be used to acknowledge the alarm currently displayed on a monitor prior to the contact clearing if the Instant Clear with Acknowledge, Auto Clear with Acknowledge or Manual Acknowledge modes of alarm clearance have been selected in the matrix system. The data string will consist of the Function Descriptor and the String Terminator.

Example: Clear the alarm displayed on the currently addressed monitor

Send: *Function Descriptor* _ *String Terminator* **a**

ASCII: _ **a** HEX: **5F 61**

6.0 AD168 & MP48 'Make-Break' Communications

Make/Break for the AD2079, AD2088 & ADTTE Keyboard

To reduce network traffic on the backplane of the AD168 and MP48, the typical 15 hertz repeat of commands from keyboards for pan/tilt lens and auxiliary is being replaced by a 'make/break' type of control. The following changes have been made to the AD2078 software:

Lens Control

Originally, the lens functions had no parameters. A character has been added in front of the lens command to indicate make or break : 1 means make, 0 means break.

FUNC	**make**	**break**
Near	1Na	0Na
Far	1Fa	0Fa
Tele	1Ta	0Ta
Wide	1Wa	0Wa
Open	1Oa	0Oa
Close	1Ca	0Ca

Under this coding scheme, there are 2 OFF commands for each axis. Either OFF command will be honored as the off for that axis. It is not necessary to implement both. As an example, 0Ta will stop ZOOM motion in either direction.

Pan/Tilt Control

All commands now have a parameter. A command without a speed will not be considered max speed anymore.

Left	0La = STOP PAN	
	1La , 2La ….8La	speeds 1 through 8
Right	0Ra = STOP PAN	
	1Ra, 2Ra .. 8Ra	speeds 1 through 8
Up	0Ua = STOP TILT	
	1Ua , 2Ua ….8Ua	speeds 1 through 8
Down	0Da = STOP TILT	
	1Da , 2Da ….8Da	speeds 1 through 8

Under this coding scheme, there are 2 OFF commands for each axis. Either OFF command will be honored as the off for that axis. It is not necessary to implement both. As an example, 0Ra will stop PAN motion in either direction.

Auxiliary Control

The AUX-ON button will behave as follows:

For example, if it is required to activate 1 - AUXON and a receiver/driver is set to **latching mode,** send

AUXON
1Aa0Aawhere 1Aa = make
0Aa = break
AUXOFF
1Ba0Aawhere 1Ba = make
0Aa = break

If it is required to activate 2 - AUXON and a receiver/driver is set to **momentary latch mode,** send

2Aa0Aawhere 2Aa = make
0Aa = break

Note: When key is pressed for momentary latch, transmit '2Aa'. When key is released, transmit '0Aa' to unlatch.

7.0 AD1024 and MP48 RECORDER CONTROL COMMANDS

The following information pertains only to the AD1024 and MP48 Matrix Switching System.
The data string for controlling a recorder is the Recorder Number (valid recorder numbers are 1 to 2048), comma, Command Number, comma, Recorder Function Descriptor followed by the String Terminator.

There are seven valid Recorder commands; their command numbers and respective functions are as follows:

FUNCTION	COMMAND NUMBER
Eject	**0**
<no valid command uses number 1>	
Stop	**2**
Record	**3**
Pause	**4**
Play	**5**
Rewind	**6**
Fast Forward	**7**

Example: Tell Recorder 23 to Play

String: Recorder number **23 comma** Command Number **5 comma** Function Descriptor **V** String Terminator **a**

ASCII: **23,5,Va** Hex: **32 33 2C 35 2C 56 61**

APPENDIX A

FUNCTION	ASCII	HEX	DEFINITION

Ack	_ (underscore)	**5F**	Removes alarmed camera displayed on currently addressed monitor (refer to matrix programming manual for specific details), or to run a universal tour.
Alarm End/Clear	**I**	**49**	Notifies the system that the alarm condition has cleared. This command must be preceded by an alarm contact number.
Alarm New	**E**	**45**	Initiates an alarm condition. This command must be preceded by an alarm contact number.
Alarm Refresh	**G**	**47**	Maintains an alarm condition, i.e. notifies the system that the alarm condition has not cleared. This command must be preceded by an alarm contact number. Used on older systems.
Camera	#	**23**	Calls the addressed camera to the selected monitor. This command must be preceded by the camera number.
Cam Arm	**(**	**28**	Places the camera into auto call-up mode for the selected monitor in the event of an alarm.
Cam Disarm	**)**	**29**	Removes the camera from auto call-up mode for the selected monitor .
Cam Hold	**H**	**48**	Stops the tour/sequence on the selected monitor.
Cam Next	**+**	**2B**	Advances to the next camera in the tour/sequence.
Monitor	**M**	**4D**	Addresses the monitor for camera call-up and control. This command must be preceded by a monitor number.
Mon Arm	**[**	**5B**	Places the selected monitor into auto call-up mode for display of alarmed cameras. This command is preceded by a number for selection of the display type.
Mon Disarm	**]**	**5D**	Removes the selected monitor from auto call-up mode.
Program	**P**	**50**	Places the current camera on the current monitor into the sequence. Must be preceded by a dwell time (0-61).

Run Sequence	**S**	**53**	Activates camera switching (i.e. tour/sequence) on the addressed monitor. This command may be preceded by a number to call a Universal Tour.
Salvo	**$**	**24**	Calls the salvo group of cameras, starting with the currently selected monitor. This command must be preceded by a number.
Site	**;**	**3B**	Selects a satellite matrix switcher for control of remote site. This command is usually preceded by the site number.
F1	**%**	**25**	Used to address special features of the Matrix switcher. This command is usually preceded by the specific special command number.
1F1	**J**	**4A**	Unlocks the PTZ control of currently viewed camera to other keyboards on the system.
2F1	**K**	**4B**	Locks the PTZ control of currently viewed camera from other keyboards on the system.

Pan/Tilt/Lens/Aux Control Commands (**refer to Section 6.0 for AD168 and MP48)**

The commands listed below enable control of suitably equipped camera sites. These commands, with the exception of the Shot Commands, must be issued a minimum of five times at a rate of 15 times per second to maintain smooth continuous operation of the function selected.

FUNCTION	**ASCII**	**HEX**	**DEFINITION**
Aux Off	**B**	**42**	Turns an auxiliary off. This command must be preceded by the auxiliary number
Aux On	**A**	**41**	Turns an auxiliary on. This command must be preceded by the auxiliary number
Focus Far	**F**	**46**	Focus lens far
Focus Near	**N**	**4E**	Focus lens near to maintain smooth continuous operation of the function selected.

FUNCTION	**ASCII**	**HEX**	**DEFINITION**
Iris Close	**C**	**43**	Close lens iris

Iris Open	**O**	**4F**	Open lens iris
Lens Wide	**W**	**57**	Zoom lens wide
Lens Tele	**T**	**54**	Zoom lens telephoto
Pan Left	**L**	**4C**	Pan camera left (may be preceded by a speed number)
Pan Right	**R**	**52**	Pan camera right (may be preceded by a speed number)
Tilt Up	**U**	**55**	Tilt camera up (may be preceded by a speed number)
Tilt Down	**D**	**44**	Tilt camera down (may be preceded by a speed number)
Call Shot	****	**5C**	Calls a preposition scene. This command must be preceded by a scene number
Set Shot	**^**	**5E**	Sets (stores) a preposition scene. This command must be preceded by a scene number

VCR Control Commands

The commands listed below enable control of compatible Video Recorders with the AD1024 Matrix Switcher System.

FUNCTION	**ASCII**	**HEX**	**DEFINITION**
VCR	**V**	**56**	Enables the selection of recorder mode of operation. This command must be preceded by the recorder address and by the recorder command number. Refer to the AD1024 Recorder Control Command Section for further details.
Eject	**0**	**30**	Ejects the cassette from the recorder in the recorder operate mode.
Stop	**2**	**32**	Stops recorder in the recorder operate mode.
Record	**3**	**33**	Starts recording in recorder operate mode.
Pause	**4**	**34**	Pauses recorder in recorder operate mode.
Play	**5**	**35**	Plays recorder in recorder operate mode.
Rewind	**6**	**36**	Rewinds recorder in recorder operate mode.
Fast Forward	**7**	**37**	Fast forwards recorder in recorder operate mode.

Numbers

Zero	**0**	**30**
One	**1**	**31**
Two	**2**	**32**
Three	**3**	**33**
Four	**4**	**34**
Five	**5**	**35**
Six	**6**	**36**
Seven	**7**	**37**
Eight	**8**	**38**
Nine	**9**	**39**