Avitech ASCII Z Commands

Sequoia Dual

Revision 1.0.0 (January, 2015)

AVITECH

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This reference guide contains information about how to use the Avitech ASCII Protocol (AAP) of the Sequoia Dual.

The following conventions are used to distinguish elements of text throughout the reference guide.

 *Provides additional hints or information that require special attention.*

 *Identifies warnings which must be strictly followed.*

Any name of a menu, command, icon or button on the screen is shown in a bold typeset. For example: On the **Start** menu select **Settings**.

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1. ASCII Z Command

The Sequoia Dual supports the ASCII Z command prompt interface through its serial port (RS-232) and Ethernet port (IP).

- The factory-default network settings are as follows:
  - ✓ IP address = 192.168.0.5
  - ✓ Network Mask = 255.255.255.0
  - ✓ Gateway = 192.168.0.254
- TCP port number is fixed at 20036, and UDP port number is fixed at 20037.
- The factory-default baud rate of the serial port is 115200.

This chapter discusses the use of the Avitech ASCII Protocol (AAP) of the Sequoia Dual.

1.1 ASCII Z Command Format

The ASCII Z command is comprised of the following segments:

Header	Group/Module/Window Assignment	Parameter 1	Parameter 2	…

Figure 1-1 Segments of ASCII Z Command

The following is a list of directions to follow when entering ASCII Z commands:

- *It is acceptable to enter a command in both lowercase and uppercase letters*
- *A space is required between any segments of a command.*
- ***Header** = **Z** + command character*
- ***Group/Module/Window Assignment** (**GGMMPP**):*
  - ✓ ***Group** (first two digits) ranges from "01" to "99". "00" is used to pertain to all group assignments.*
  - ✓ ***Module** (middle two digits) ranges from "01" to "15". "00" is used to pertain to all module assignments.*
  - ✓ ***Window** (last two digits) ranges from "01" to "02". "00" is used to pertain to all window assignments.*

For the Sequoia Dual, Group/Module/Window Assignment consists of fixed GGMM digits ("0000"), as it has no group and module designation.

- ***Parameter** is for advance setting of each Z command.*

1.2 Entering the ASCII Z Command Interface

1.2.1 Using the ASCII Test Utility

The proprietary Avitech ASCII Test Utility can simplify the creation of BIN files, load previously saved BIN files, as well as generating three types of text files for third-party programs.

To use the ASCII Test Utility, perform the following steps:

Step 1. Double-click the "ASCII_Test.exe" file.

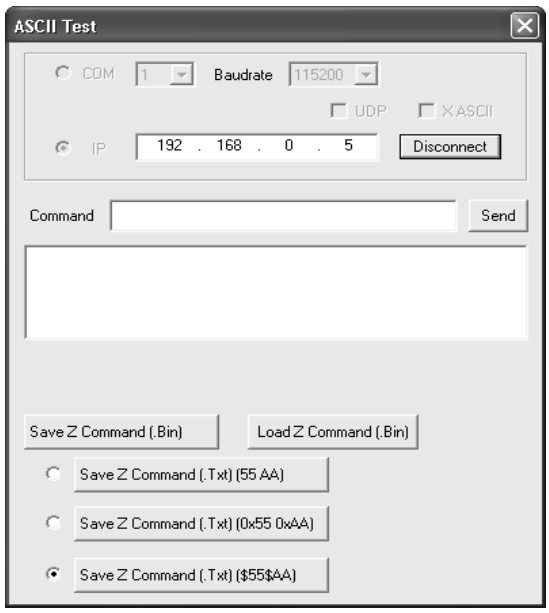

Figure 1-2 ASCII Test Utility

*Step 2. For the Sequoia Dual, select TCP/IP (Transmission Control Protocol – default) or **UDP** (User Datagram Protocol).*

Computer software can communicate via Ethernet with the control board's firmware (of an Avitech device). During communication via TCP or UDP, the control board's firmware functions as the TCP or UDP server while computer software functions as the TCP or UDP client. The TCP port number is fixed at 20036, while the UDP port number is fixed at 20037.

TCP is a connection-oriented protocol, which means that it requires handshakes between the client and server in advance to set up end-to-end communications. Once the connection is established, user data may be sent bi-directionally over the connection.

√ Reliable – TCP manages message acknowledgment, retransmission and timeout. If a message is lost (or not delivered in the given time limit defined by timeout) during the transmission, the server will re-request the lost part until the complete message is delivered. TCP ensures there's no missing data during any transmission; in cases when multiple timeouts occur, TCP will drop the connection.

√ Orderly – TCP labels its packets of messages and allows them to be re-ordered if arriving at the receiver in the wrong order. When data segments arrive in the wrong order, TCP buffers delay the out-of-order data until all data can be properly re-ordered based on their labels, and delivered to the receiver.

√ Heavy-weight – TCP requires 3 packets (handshakes to set up a socket connection before any user data can be sent. TCP also handles reliability and congestion control.

√ Streaming – Data is read as a byte stream; no distinguishing indicators are transmitted to signal message (segment) boundaries.

UDP is a simpler message-based connectionless protocol. Connectionless protocols do not set up a dedicated end-to-end connection. Communication is achieved by transmitting information in one direction from source to destination without verifying the readiness or state of the receiver. However, one primary benefit of UDP over TCP is the application to voice over internet protocol (VoIP) where latency and jitter are

the primary concerns. It is assumed in VoIP UDP that the end users provide any necessary real time confirmation that the message has been received.

√ Unreliable – A sent message cannot be determined whether it reaches its destination. There are no mechanisms of message acknowledgment, retransmission, or timeout, and a message could be lost during transmission.

√ Unorderly – When multiple messages are sent to one recipient, the order of them to arrive is variable and cannot be determined.

√ Light-weight – There is no ordering of messages, no tracking connections, etc. It is a small transport layer designed on top of IP.

√ Datagrams – Packets are sent individually and are checked for integrity only if they arrive. Packets have definite boundaries which are honored upon receipt, meaning a read operation at the receiver socket will yield an entire message as it was originally sent.

√ No congestion control – UDP itself does not avoid congestion, and it is possible for high bandwidth applications to trigger congestion collapse unless they implement congestion control measures at the application level.

*Step 3. Enter the **IP** address assigned to the Sequoia Dual.*

*Step 4. Click **Connect**.*

*Step 5. Type **ZA 000000 PIP** (load the default picture-in-picture (PIP) layout) in the **Command** box.*

*Step 6. Click **Send**.*

Performing the following actions allows users to save and load commonly used Z commands for later uses:

** Click* Save Z Command (.Bin) *to save the **ZA 000000 PIP** command into **ZA 000000 PIP.bin** file for later reuse with the ASCII Test Utility or other third-party program(s).*

** Click* Load Z Command (.Bin) *to load a previously saved BIN file. The corresponding Z command (in this case, **ZA 000000 PIP)** will automatically appear in the **Command** box.*

** Click* Save Z Command (.Txt) (55 AA) *to generate the sample (first type) binary text string (text file) as shown below for use with a third-party program(s).*

Figure 1-3 Sample Binary Text String – (First Type)

** Click* Save Z Command (.Txt) (0x55 0xAA) *to generate the sample (second type) binary text string (text file) as shown below for use with a third-party program(s).*

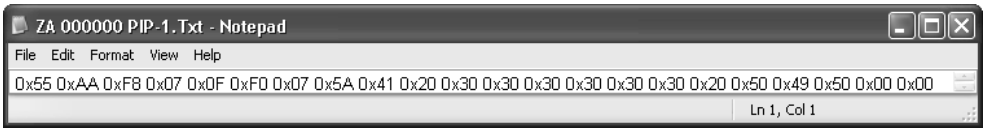

Figure 1-4 Sample Binary Text String – (Second Type)

** Click* Save Z Command (.Txt) (55AA) *to generate the sample (third type) binary text string (text file) as shown below for use with a third-party program(s).*

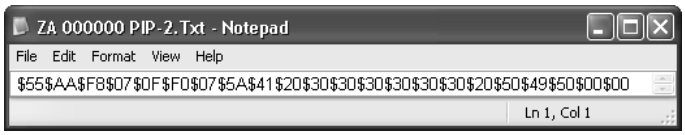

Figure 1-5 Sample Binary Text String – (Third Type)

1.2.2 Creating BIN File for Third-Party Program

To create a BIN file for a third-party program other than the ASCII Test Utility, perform the following steps:

Step 1. *Install a binary file editing program on the computer (example: HexEdit, http://www.hexedit.com).*

Step 2. *Run the binary file editing program and use the following command syntax to create and save the sample binary file.*

Example 1:

*To execute **ZA 000000 PIP** for the default picture-in-picture (PIP) layout, use:*
0x55 0xAA 0xF8 0x07 0x0F 0xF0 0x07 "ZA 000000 PIP" 0x00

The double quotes " " of sample string "ZA 000000 PIP" are for string expression; there are no quote characters (0x22) in the command contents (actual memory dump of command).

The command is composed of the following segments:

0x55 0xAA *//command head*
0xF8 0x07 *//command ID*
0x0F = (A) + (B) = 15 bytes *//command length*
0xF0 = 0xff – [(A) + (B)]
0x07 = 1 byte (A)
ZA 000000 PIP = 0x5A 0x41 0x20 0x30 0x30 0x30 0x30 0x30 0x30 0x20 0x50 0x49 0x50 0x00(end of string)
= 14 bytes (B) *//Avitech ASCII Z command*
0x00 *//command tail*

Example 2:

*To execute **ZW 000000** to display information of windows, use:*
0x55 0xAA 0xF8 0x07 0x0B 0xF4 0x07 "ZW 000000" 0x00

The double quotes "" of sample string "ZW 000000" are for string expression; there are no quote characters (0x22) in the command contents (actual memory dump of command).

The command is composed of the following segments:

0x55 0xAA *//command head*
0xF8 0x07 *//command ID*
0x0B = (A) + (B) = 11 bytes *//command length*
0xF0 = 0xff – [(A) + (B)]
0x07 = 1 byte (A)
ZW 000000 = 0x5A 0x41 0x20 0x30 0x30 0x30 0x30 0x30 0x30 0x20 0x32 0x20 0x31 0x00 (end of string)
= 10 bytes (B) *//Avitech ASCII Z command*
0x00 *//command tail*

1.2.3 Release the Ethernet Connection from the Sequoia Dual

In case the third-party program that is currently connected (through Ethernet) to the Sequoia Dual needs to be disconnected, use the below binary text string:

Execute "exit" to release Ethernet connection from the Sequoia Dual:
0x55 0xAA 0xF8 0x07 0x06 0xF9 0x07 "exit" 0x00

The double quotes " " of sample string "exit" are for string expression; there are no quote characters (0x22) in the command contents (actual memory dump of command).

The command is composed of the following segments:

0x55 0xAA	*//command head*
0xF8 0x07	*//command ID*
0x06 = (A) + (B) = 6 bytes	*//command length*
0xF9 = 0xff – [(A) + (B)]	
0x07 = 1 byte (A)	
exit = 0x65 0x78 0x69 0x74 0x00 (end of string)	
= 5 bytes (B)	*//Avitech ASCII Z command*
0x00	*//command tail*

1.3 ASCII Z Command SummaryError! Reference source not found.

The followings are lists of ASCII Z commands for the Sequoia Dual.

1.3.1 Sequoia Dual

ZA	
Function	Load default layout PIP/POP/PBP/FS (FS for Source 1 window).
Format	**ZA GGMMPP PIP**[Picture In Picture]/**POP**[Picture Over Picture]/**PBP**[Picture By Picture]/**FS**[Full Screen]
Example	**ZA 000000 PIP** Load default layout PIP. **ZA 000000 FS** Load default layout FS for Source 1 window.

Table 1-1 ZA Command

ZB	
Function	Set the border width of a window(s).
Format	**ZB GGMMPP 0/2/4/6**
Example	**ZB 000000 2** Set the border width of all windows to 2 pixels. **ZB 000002 6** Set the border width of Source 2 window to 6 pixels.

Table 1-2 ZB Command

ZC	
Function	Set the border color/label background color of a window.
Format	**ZC GGMMPP B**[order]/**L**[abel] **RRRGGGBBB**
Example	**ZC 000001 B 000255000** Set the border color of Source 1 window to pure green. **ZC 000002 L 255000000** Set the label background color of Source 2 window to pure red. *Note: **ZC** does not support **GGMMPP** = "000000"; **PP** must be assigned as either "01" or "02".*

Table 1-3 ZC Command

ZF	
Function	Turn on/off a window's full screen mode (and set it to background).
Format	**ZF GGMMPP** [full screen mode **1**(on)/**0**(off)] [background **1**(on)/**0**(off)]
Example	**ZF 000002 1** Set Source 2 window to full screen. **ZF 000002 0** Disable full screen mode for Source 2 window (revert it back to its non-full-screen size and position).

ZF	
	ZF 000001 1 1 Set Source 1 window to full screen and set it to background. *Note: **ZF** does not support **GGMMPP** = "000000"; **PP** must be assigned as either "01" or "02".*

Table 1-4 ZF Command

ZH	
Function	Display basic information of the Sequoia Dual.
Format	**ZH GGMMPP**
Example	**ZH 000000** Display basic information (IP address, module name, output mode, and firmware version) of the Sequoia Dual.

Table 1-5 ZH Command

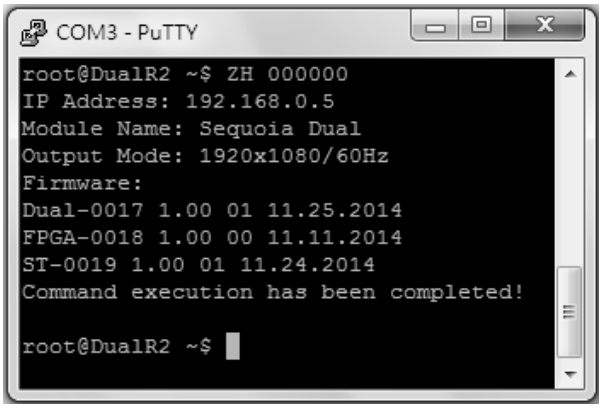

Figure 1-6 Device Information (RS-232)

ZI	
Function	Designate an input video port as the input video source of a window(s); or set an input video port's label.
Format	**ZI GGMMPP I**[nput video source] **1**-**4**(input video port) **1**: DVI-L, **2**: DVI-R, **3**: HDMI-L, **4**: HDMI-R **ZI GGMMPP L**[set input video port's Label] **1**-**4**(input video port) **"TEXT"** TEXT supports 20 ASCII characters maximum.
Example	**ZI 000001 I 1** Designate DVI-L as the input video source of Source 1 window. **ZI 000000 I 2** Designate DVI-R as the input video source of both Source 1 and Source 2 window. **ZI 000000 L 2 "Oscar's Workstation"** Set input video port 2's label ("DVI-R" by default) to "Oscar's Workstation".

Table 1-6 ZI Command

ZL	
Function	Set the (label) blending level, (label) text color, label (background) color, and (label) text of a window.
Format	**ZL GGMMPP 0-7**(blending level) **RRRGGGBBB**(text color) **RRRGGGBBB**(label color) **"TEXT"**(text is always center-aligned; TEXT supports 31 ASCII characters maximum).
Example	**ZL 000001 2 000255000 000000255 "News"** Set Source 1 window's label blending level to 2, label text color to pure green, label color to pure blue, and label text ("Source 1" by default) to "News". **ZL 000002 0 255000000 000000255 "Lesson 1"** Turn off Source 2 window's label blending feature; set Source 2 window's label text color to pure red, label color to pure blue, and label text ("Source 2" by default) to "Lesson 1".

Table 1-7 ZL Command

ZM	
Function	Set the output resolution. The resolution number refers to the list of resolutions the Sequoia Dual supports.

Resolution	Vertical Frequency			
	50 Hz	59.94 Hz	60 Hz	75 Hz
640 × 480	N/A	N/A	69	N/A
800 × 600	42	N/A	1	47
1024 × 768	31	N/A	2	11
1280 × 720	30	68	15	48
1280 × 768	32	N/A	22	49
1280 × 1024	29	N/A	9	12
1360 × 768	38	N/A	20	21
1400 × 1050	34	N/A	35	50
1440 × 900	46	N/A	45	51
1600 × 1200	39	N/A	10	52
1680 × 1050	41	N/A	40	53
1920 × 1080	28	N/A	26	N/A
1920 × 1200	37	N/A	36	N/A

Format	**ZM GGMMPP ##** (resolution number)
Example	**ZM 000000 10** Set the Sequoia Dual to display at 1600×1200, 60Hz vertical frequency, and automatically arrange all windows to the proper size and position.

Table 1-8 ZM Command

ZN	
Function	Turn on/off the following features: The OSD/label/streaming/audio/fading/display background image/lock window priority/aspect ratio detect/keep aspect ratio/display video alarm/display signal format/audio follow video/full screen with audio output/display label when switch to full screen. Or, set video fading effect (for window overlays).
Format	**ZN GGMMPP option 1**(on)/**0**(off) option: **O**[SD]/**L**[abel]/**S**[treaming]/**A**[udio]/**B**[ack]**G**[round]/**W**[indow]**P**[riority]/**A**[spect]**R**[atio]**D**[etect]/**K**[eep]**A**[spect]**R**[atio]/**V**[ideo]**A**[larm]/**S**[ignal]**F**[ormat]/**A**[udio]**F**[ollow]**V**[ideo]/**F**[ull]**S**[creen with]**A**[udio]**O**[utput]/**D**[isplay]**L**[abel when switch to]**F**[ull]**S**[creen]

ZN

*Note: **VA**/**SF**/**L**/**ARD** can be applied to all windows or a single one, while the others can only be applied to all windows (**PP** = "00").*

ZN GGMMPP FADE 0-15

FADE: video fading effect

ZN 000000 O 0
Turn off the OSD (on screen display) of all windows. This ASCII Z command serves as the overall switch for label, border, and signal format display.

ZN 000000 L 1
Turn on labels of all windows.

ZN 000000 S 0
Turn off video streaming.

ZN 000000 A 1
Turn on audio.

ZN 000000 A 0
Turn off audio (Audio Mute).

ZN 000000 FADE 0
Turn off video fading effect.

ZN 000000 FADE 7
Set video fading speed to 7.

ZN 000000 BG 1
Turn on background image.

Example

ZN 000000 WP 1
Lock the current display layout (two windows are locked in size and position).

ZN 000000 ARD 0
Switch Aspect Ratio Detect to auto detect mode. This will confine all windows to the aspect ratios corresponding to their input video sources.

ZN 000000 ARD 1
Switch Aspect Ratio Detect to custom mode. This will confine all windows to the customized aspect ratios (please refer to **ZR**).

ZN 000000 KAR 1
Turn on Keep Aspect Ratio**.** Both windows will be confined to their corresponding aspect ratios (auto detect/custom) if each individual window's aspect ratio setting is also enabled (please refer to **ZR**). This ASCII Z command serves as the overall switch for the aspect ratio locking feature.

ZN 000000 KAR 0
Turn off Keep Aspect Ratio for all windows. The width and height of any window can then be arbitrarily changed.

ZN 000000 VA 1
Turn on Video Alarm (an alert message(s) for any window that does not receive an input signal) for all windows. This ASCII Z command serves as the overall switch for the video alarm feature; each window's video alarm

ZN	
	can be individually turned off by **ZN 0000PP VA 0**, where **PP** is either “01” or “02”. **ZN 000001 VA 0** Turn off Video Alarm for Source 1 window. **ZN 000000 SF 1** Turn on Signal Format for all windows. This ASCII Z command serves as the overall switch for signal format display; each window’s signal format can be turned off individually by **ZN 0000PP SF 0**, where **PP** is either “01” or “02”. **ZN 000002 SF 0** Turn off Signal Format for Source 2 window. **ZN 000000 AFV 1** Turn on Audio Follow Video. When a different input video port is selected on a window, the audio output would also switch its source accordingly. **ZN 000000 FSAO 0** Turn off Full Screen with Audio Output. **ZN 000000 DLFS 1** Turn on Display Label when switching to Full Screen.

Table 1-9 ZN Command

ZO	
Function	Set audio volume; select audio input source from input ports; or set audio fade in time.
Format	**ZO GGMMPP V**[olume] **0**-**100** **0**: Mute **ZO GGMMPP I**[nput port] **1**-**8** **1**: DVI-L, **2**: DVI-R, **3**: HDMI-L, **4**: HDMI-R, **5**: analog 1, **6**: analog 2, **7**: analog 3, **8**: analog 4. **ZO GGMMPP F**[ade in time] **0**-**4** Audio fade in time: 0-4 second(s).
Example	**ZO 000000 V 20** Set audio volume to 20. **ZO 000000 I 8** Select input port 8 (analog 4) as the audio input source. **ZO 000000 F 2** Set audio fade in time to 2 seconds.

Table 1-10 ZO Command

ZP	
Function	Load/Save user-defined layout and settings to latest/preset. Load latest recalls the user-defined layout and settings that was last saved to latest; this layout and settings will also become the default when the Sequoia Dual is booted up.
Format	**ZP GGMMPP L**[oad]/**S**[ave]

ZP	
	ZP GGMMPP L[oad]/**S**[ave] **"Filename"** Filename supports 32 ASCII characters maximum.
Example	**ZP 000000 S** Save the current layout and settings to the Sequoia Dual's flash memory (save to latest). **ZP 000000 L** Load the latest layout and settings that were saved (**ZP 000000 S**) to the Sequoia Dual's flash memory (load latest). **ZP 000000 S "layout_1"** Save the current layout and settings to the Sequoia Dual's flash memory as preset file "layout_1" (save preset). **ZP 000000 L "layout_2"** Load the existing preset file "layout_2" from the Sequoia Dual's flash memory (load preset).

Table 1-11 ZP Command

ZR	
Function	Customize the aspect ratio of a window (need to set Aspect Ratio Detect to custom mode (**ZN 000000 ARD 1**) in advance). Or, turn on/off aspect ratio setting for a window(s).
Format	**ZR GGMMPP** [**1** to **20** width ratio] [**1** to **20** height ratio]
Example	**ZR 000001 4 3** Set the aspect ratio of Source 1 window to 4:3. **ZR 000000 16 9** Set the aspect ratio of all windows to 16:9. **ZR 000001 0 0** Disable aspect ratio setting for Source 1 window.

Table 1-12 ZR Command

ZS	
Function	Display information of the images associated with the two windows.
Format	**ZS GGMMPP**
Example	**ZS 000000** Display information of the images (video type, video resolution and frame rate, H.frequency, V.frequency, H.total, V.total, H.start, V.start, timing flag) associated with the two windows.

Table 1-13 ZS Command

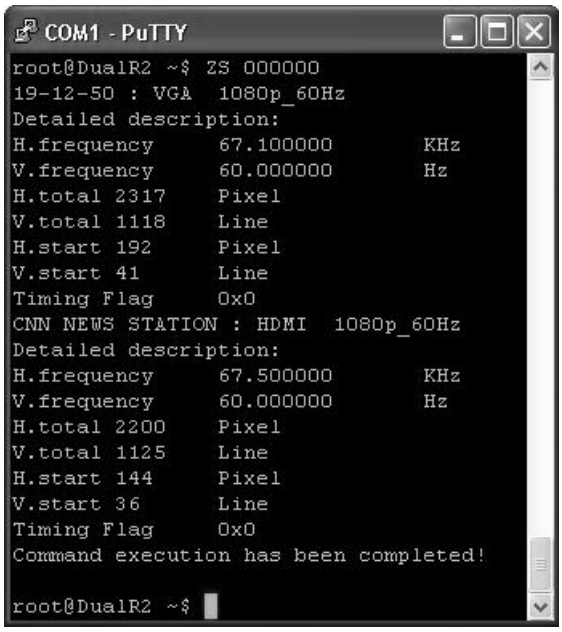

Figure 1-7 Signal Type Information (RS-232)

ZW	
Function	Display information of both windows; set the top-most window; make two windows swap their positions; or set a window's position and size.
Format	**ZW GGMMPP** **PP** as "00" displays information of both windows; **PP** as "01"/"02" sets the assigned window to be the top-most one. **ZW GGMMPP S**[wap] **PP** should be either "01" or "02". **ZW GGMMPP X** position **Y** position **W**(idth) **H**(eight) **ZW** does not support W = 0 or H = 0.
Example	**ZW 000000** Display information of both windows (top-left corner position, width, and height). **ZW 000001** Set Source 1 window as the top-most window. **ZW 000001 S** Swap Source 1 window with Source 2 window. **ZW 000001 100 200 300 400** Set Source 1 window's top-left position at (100,200), and its width and height to (300,400) respectively.

Table 1-14 ZW Command

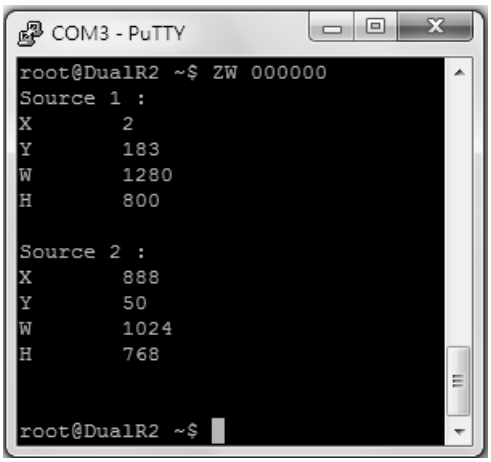

Figure 1-8 Window Information (RS-232)

ZX	
Function	Set the label text or label font size of a window.
Format	**ZX GGMMPP L**[abel] **"TEXT"** TEXT supports 31 ASCII character maximum. **ZX GGMMPP F**[ontsize] **8-96**
Example	**ZX 000001 L "Input 1"** Set the label text of Source 1 window (“Source 1” by default) to “Input 1”. **ZX 000001 F 8** Set the label font size of Source 1 window to 8.

Table 1-15 ZX Command

Appendix A Sending ASCII Z Command Through RS-232

Aside from the Ethernet port (IP), the serial port (RS-232) on the Sequoia Dual can also be used to interface with a third-party controller for control over RS-232.

A.1 Connecting the Sequoia Dual's RS-232 Port

Before using the ASCII Z command interface, make sure that the connection between the serial port (RS-232) on the Sequoia Dual and the COM port (RS-232) on the computer is well-established. The pin description of the Sequoia Dual is shown in Figure A-1.

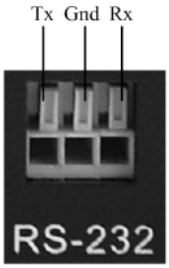

Figure A-1 Pin Description

A.2 Setting the HyperTerminal's COM Port

*Step 1. Click **Start→All Programs→Accessories→Communications→HyperTerminal** to run the Windows® HyperTerminal function.*

Step 2. Set the HyperTerminal's COM port to the followings:

- *Baud Rate = 115200*
- *Data Bits = 8*
- *Parity = None*
- *Stop Bits = 1*
- *Flow Control = None*

A.3 Entering the ASCII Z Command Interface

Step 1. Connect the HyperTerminal's COM port (computer) to the RS-232 serial port (Sequoia Dual). The default baud rate (115200 bps) must be used to transmit the startup signal.

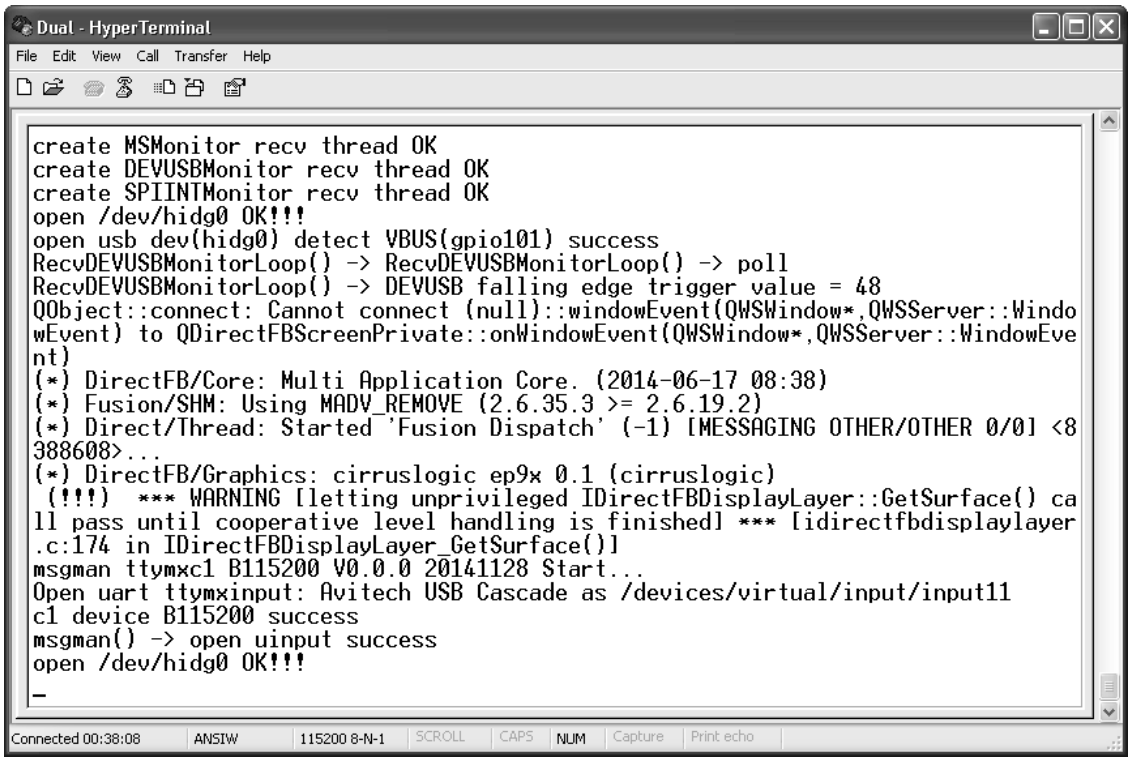

Figure A-2 Initializing

*Step 2. Type **root** in the HyperTerminal's command prompt and press **Enter** to log in to the ASCII Z command interface. ASCII Z commands can then be entered after the "~$" symbol appears in the command prompt.*

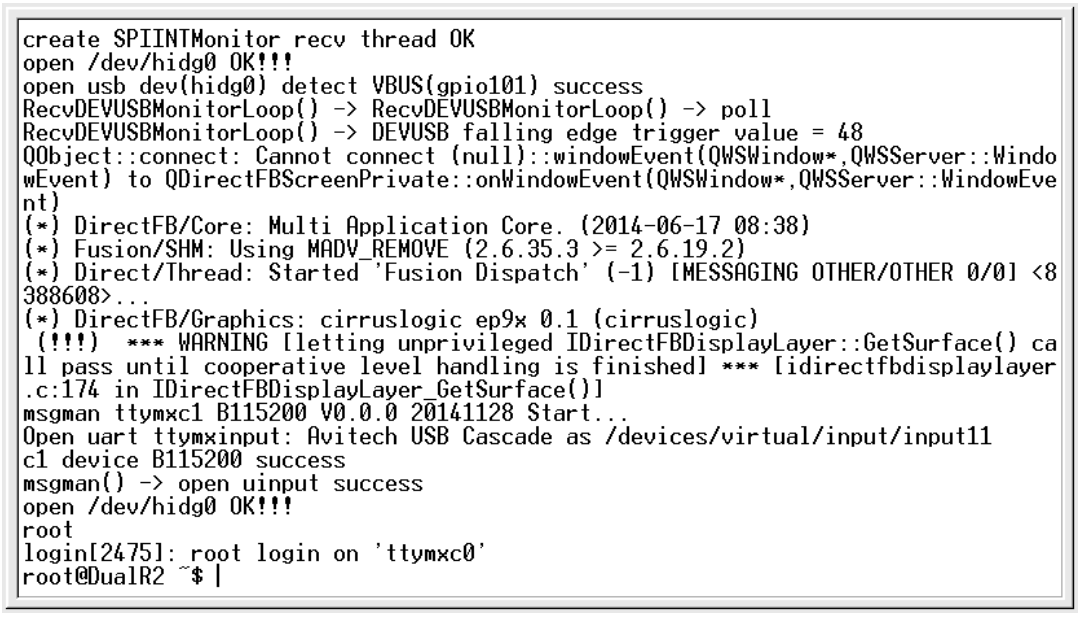

Figure A-3 Press **Enter** to Login

*Step 3. To log out of the ASCII Z command interface, type **exit**.*

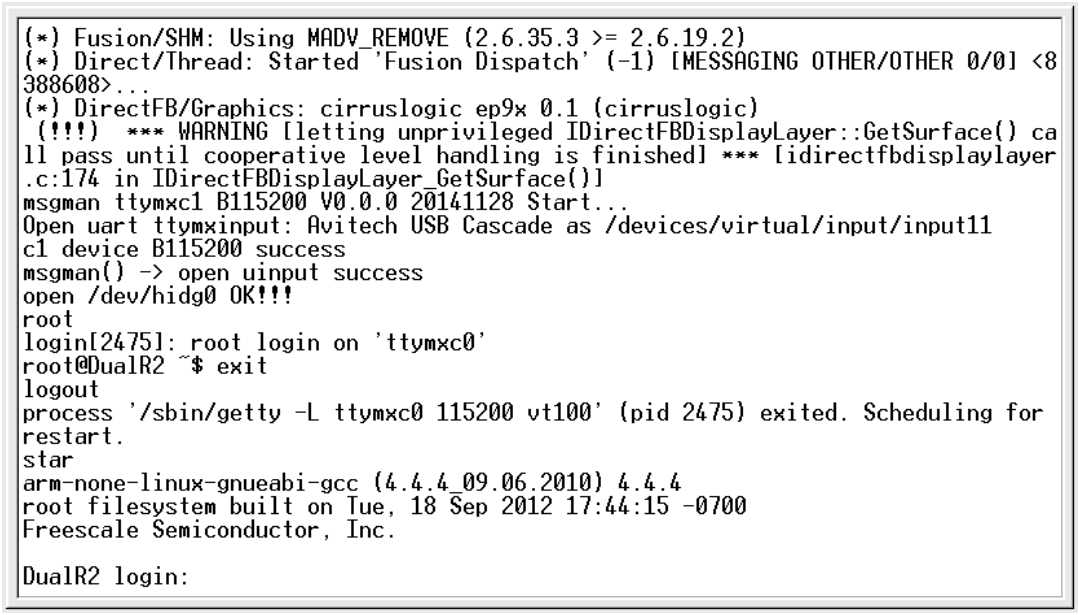

Figure A-4 Type **exit** to Logout