



Norsat
International Inc.

ATOMControl™

Web Interface User Manual

The screenshot displays the ATOMControl web interface for device BUC-Ku100-1234. The browser address bar shows the URL <http://192.168.0.146/index.htm>. The interface includes a navigation menu with tabs for Device Info, Mute, Attenuation, and Custom Commands. The main content area is divided into several sections:

- Identification:** Serial Number: BUC-Ku100-1234, Product Type: KU 100W BUC, Device Type: SAT-9000, Firmware Version: v1.1.4.1
- Status:** Fault Status: Faults Detected!, Temperature: 39 degC, RF Forward Power: +290.3 dBm
- Faults:** Over Temperature, Power, PLL, Device is Muted (all checked). A Reset button is present.
- SAT-7200:** Hardware Version: 0x004ea842, Firmware Version: 1.0.0.5
- Temperature Controls:** A row of buttons for PM1 through PM9 and Driver, each showing a temperature value (e.g., PM1: 20 degC, Driver: -40 degC).
- LOG OUTPUT:** A text area showing the message "Starting Version 1.1.2 Please wait while retrieving device data...". Below it are buttons for Logging Settings and Clear Log Output.



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110 – 4020 Viking Way | Richmond | British Columbia | Canada V6V 2L4
support@norsat.com | Tel: +1.604.821.2800 | Toll Free: +1.800.644.4562
www.norsat.com

Printed in Canada

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Preface

Purpose and Scope of the User Manual

This user manual explains the usage of the Norsat ATOMControl™ Web Interface monitor and control interface for ATOM Series Block Up Converters (BUCs) and Solid-State Power Amplifiers (SSPAs) equipped with an Ethernet Interface Board.

This user guide is specifically written for the ATOMControl™ Web Interface. Additional information can be found in the ATOMControl™ Software Manual and in the ATOM Series BUC or SSPA Operator Manuals.

Audience

The guide will be of interest to the following personnel:

- Field users
- Systems administrators (or IT; Lifecycle/Sustainment Managers)

Revision History

| Date | Nature of Revision | Release |
|----------------|--------------------|---------|
| September 2016 | Initial Release | 1.0 |

READ THIS MANUAL BEFORE USING THE ATOMControl™ Web Interface APPLICATION

CAUTION: Do not stand in front of the waveguide during operation. In particular, do not look into the waveguide.

CAUTION: Do not allow any items to fall into the unit from the waveguide opening.

CAUTION: Always ensure that the waveguide is properly terminated during operation.

CAUTION: Apply voltage to the DC input connector only as specified in the original configuration of this unit. Application of a voltage outside of the specified range may cause the unit to become damaged or non-functional.

WARNING: DO NOT ALLOW EQUIPMENT TO BE IN STANDING WATER.

While the BUC/SSPA is designed to be used outdoors, the equipment is not designed to operate in standing water. Failure to follow this precaution could result in electric shock and injury to persons.

1 ATOMControl Web Interface Basics

1 ATOMControl Web Interface Basics

ATOMControl Web Interface is a series of HTML pages designed for monitoring and controlling Norsat's ATOM Series of BUCs and SSPAs by interfacing with the devices through an internal web server.

Overview

Norsat's ATOMControl Web Interface features an intuitive User Interface that provides the ability to monitor and control Norsat's ATOM Series of Block Up-Converters and Solid-State Power Amplifiers. Basic device information can be monitored along with fault, temperature, and RF power data. The ATOMControl Web Interface also provides full control over an ATOM Series device's mute state, and gives users the ability to monitor and set the value of an ATOM BUC's digital attenuator. Users may also communicate directly with the BUC or SSPA using a custom communication protocol.

The ATOMControl Web Interface is a web browser application designed to replicate the User Interface of Norsat's ATOMControl stand-alone monitor and control software for computers running Microsoft Windows®. The Web Interface communicates with ATOM Series BUCs and SSPAs using the HTTP TCP/IP protocol through a common Ethernet network between the ATOM device and a host PC or laptop computer; this network may be local in scope, or may be a Wide Area Network if the corresponding routing resources are available.

The ATOMControl Web Interface currently supports the following web browsers:

| | |
|-------------------------------------|--------------------------------|
| Mozilla Firefox: | version 45.0.1 |
| Google Chrome: | version 4.0.2623.112 m |
| Microsoft Internet Explorer: | version 11.0.9600.17914 |

Other browsers (or other versions of the above browsers) may be used with the Web Interface, though full functionality is not guaranteed if browsers other than the above are used.

1 ATOMControl Web Interface Basics

System Limitations and Safe Operation

IMPORTANT NOTICES:

THE *ATOM CONTROL WEB INTERFACE* IS A PRACTICAL, TEMPORARY WAY TO CONTROL, CONFIGURE AND MONITOR NORSAT BUCS AND SSPAS. IT SHOULD NOT BE USED AS A MISSION-CRITICAL COMMUNICATION METHOD FOR ATOM DEVICES.

IF ATOM DEVICES ARE USED IN SENSITIVE OR DANGEROUS APPLICATIONS MAKE SURE THAT THERE IS ALWAYS A WORKING HARDWIRED SERIAL CONNECTION TO EACH ATOM DEVICE SO THAT IT MAY BE DIRECTLY CONTROLLED AT ANY TIME THROUGH THE SERIAL LINES.

DO NOT RELY ON THE *ATOMCONTROL WEB INTERFACE* AS THE ONLY MEANS OF MONITORING AND/OR CONTROLLING AN ATOM BUC OR SSPA WHEN THE FUNCTIONALITY PROVIDED BY AN ATOM DEVICE IS CRITICAL FOR SAFE OPERATION OF SENSITIVE OR DANGEROUS EQUIPMENT.

DO NOT USE THE *ATOM CONTROL WEB INTERFACE* AS THE ONLY MEANS OF MONITORING AND/OR CONTROLLING AN ATOM BUC OR SSPA IN APPLICATIONS WHERE THE OUT-OF-BAND CONTROL COMMUNICATION WITH THE ATOM DEVICE IS ESSENTIAL OR CRITICAL FOR EQUIPMENT THAT ASSIST THE SUPPORT OF HUMAN LIFE OR IN CASES WHERE THE FAILURE IN THE MONITORING AND/OR CONTROLLING OF THE ATOM DEVICES MAY ENDANGER PERSONNEL OR THE GENERAL PUBLIC.

PLEASE CONTACT NORSAT FOR ADDITIONAL INFORMATION CONCERNING MONITOR AND CONTROL SYSTEMS FOR ATOM BUCS AND SSPAS AND FOR OTHER COMMUNICATIONS SYSTEMS WHEN REQUIRED IN MISSION-CRITICAL TASKS.

NORSAT INTERNATIONAL
Global Customer Support

support@norsat.com

www.norsat.com

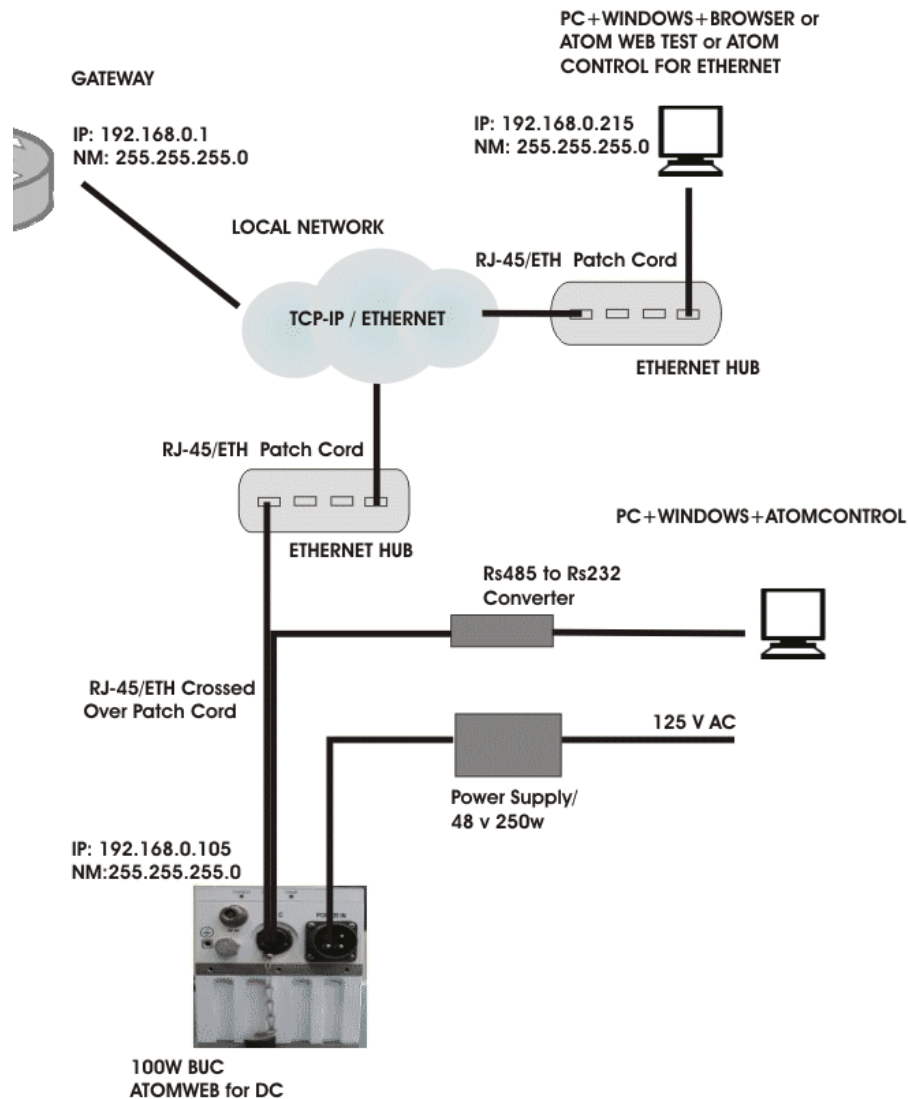
1-800-644-4562

1-604-821-2800

1 ATOMControl Web Interface Basics

Accessing the ATOMControl Web Interface

The ATOMControl Web Interface can be accessed from a web browser running on a host PC or laptop. Proper network configuration is required in order for a host PC or laptop to connect to the ATOMControl Web Interface: the ATOM device must be physically connected to the network, and must be on the same subnet as the host computer (unless there is a routing device or DNS server operating between the ATOM device and the host computer). Figure 1 shows a sample network containing an ATOM device:



1 ATOMControl Web Interface Basics

Figure 1: ATOM Device in a Network

All Ethernet-equipped ATOM devices initially share the same default IP Address, Subnet Mask, and Default Gateway, though each of these may be changed as required.

The default values are:

| | |
|-------------------------|---------------|
| IP Address: | 192.168.77.30 |
| Subnet Mask: | 255.255.255.0 |
| Default Gateway: | 192.168.77.3 |

If the ATOM device's IP configuration has not changed from the factory defaults, the following URL can thus be used to access the ATOMControl Web Interface:

<http://192.168.77.30/index.html>

The default IP Address, however, may not be compatible with the way your network has been set up. It is thus possible for the IP Address to be changed on the ATOM device; please refer to the *Using the ATOMControl Web Interface*

As illustrated in Figure 2 above, the ATOMControl Web Interface has three main sections: the Title Section, the Controls Section, and the Log Output Section.

The Title Section displays the device's serial number, the ATOMControl Web Interface title graphic, and the Web Interface's version number.

The Controls Section provides a series of pages that can be used to monitor and/or control various aspects of the ATOM device's functionality. The *Device Info* page displays identification information, status information, fault information, and temperature information for the device. The *Mute* page allows the device's mute state to be monitored and mute configuration to be changed. The *RF* page allows the device's output attenuation to be specified. The *Custom Commands* page allows any supported command to be sent to the ATOM device directly. Please consult the appropriate ATOM Operator Manual for details concerning the custom ATOM communication protocol.

The Log Output section contains a text field that will display messages related to ATOMControl Web Interface operations performed on the ATOM BUC or SSPA. Any errors encountered by the Web Interface will result in error messages being printed in this text field. Status information may also be printed in the text field. Text may be copied from this field so that it can be pasted into a text editor; the text field can also be cleared using the **Clear Log Output** button.

Configuring the ATOMControl Web Interface section for details concerning the procedure for changing an ATOM device's network parameters.

1 ATOMControl Web Interface Basics

If the ATOM device's IP address has changed, then replace **192.168.77.30** in the above URL with the new IP Address to get the URL for the ATOMControl Web Interface. For example, if the device's IP Address has been changed to 192.168.1.15 then the ATOMControl Web Interface can be accessed via the following URL:

`http://192.168.1.15/index.html`

Once the correct URL has been provided to your web browser, the ATOMControl Web Interface should load after a few seconds. The Web Interface will display the **Device Info** page by default as shown in Figure 2 below; this page provides basic status information about the device. (Please refer to the *Monitoring Device Information* section for more information concerning the Device Info page.) The on-screen values will automatically start updating themselves, and will be refreshed automatically every few seconds.

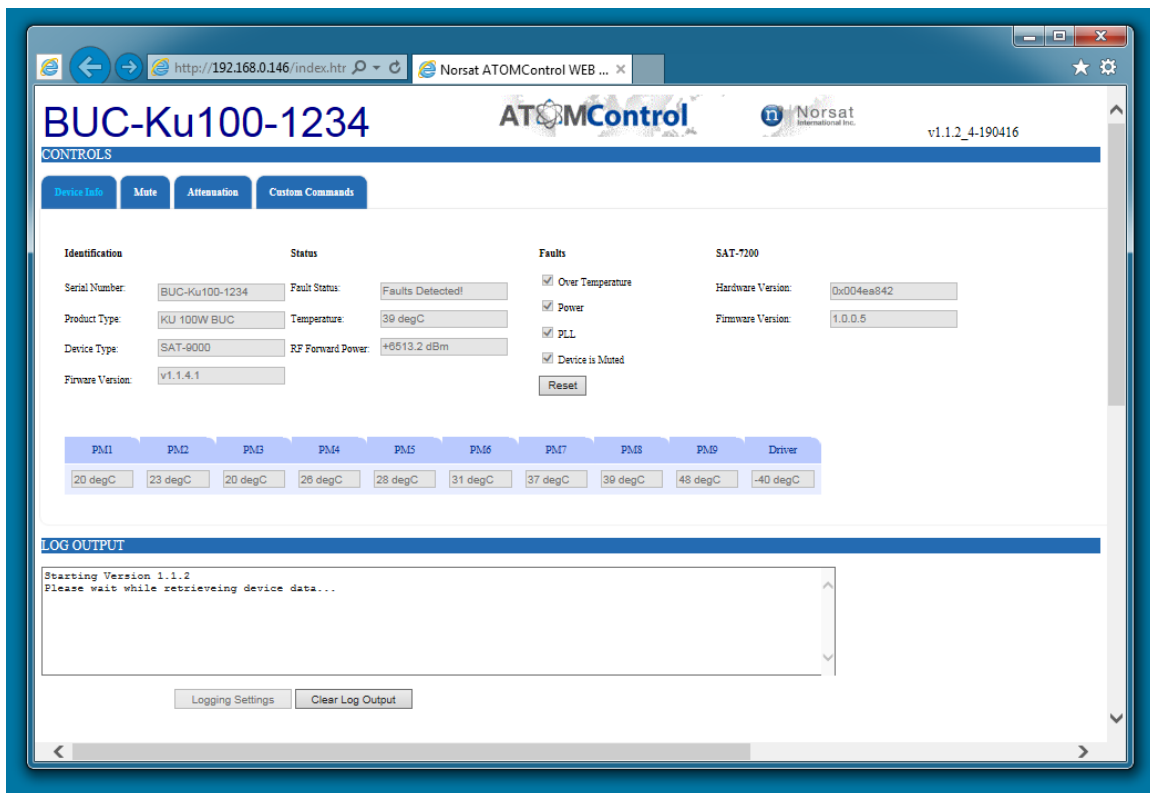


Figure 2: ATOMControl Web Start Page

The ATOMControl Web Interface is designed to be accessed only by a single user at any given time. Attempting to access the Web Interface while the Web Interface is in use will result in denied access. While it is possible to send commands to an ATOM device

1 ATOMControl Web Interface Basics

via the serial interface while the Web Interface is active, it is not recommended to do so. SNMP functionality, if supported by the ATOM device, may also be used simultaneously with the Web Interface, though it is also not recommended to do so.

Using the ATOMControl Web Interface

As illustrated in Figure 2 above, the ATOMControl Web Interface has three main sections: the Title Section, the Controls Section, and the Log Output Section.

The Title Section displays the device's serial number, the ATOMControl Web Interface title graphic, and the Web Interface's version number.

The Controls Section provides a series of pages that can be used to monitor and/or control various aspects of the ATOM device's functionality. The *Device Info* page displays identification information, status information, fault information, and temperature information for the device. The *Mute* page allows the device's mute state to be monitored and mute configuration to be changed. The *RF* page allows the device's output attenuation to be specified. The *Custom Commands* page allows any supported command to be sent to the ATOM device directly. Please consult the appropriate ATOM Operator Manual for details concerning the custom ATOM communication protocol.

The Log Output section contains a text field that will display messages related to ATOMControl Web Interface operations performed on the ATOM BUC or SSPA. Any errors encountered by the Web Interface will result in error messages being printed in this text field. Status information may also be printed in the text field. Text may be copied from this field so that it can be pasted into a text editor; the text field can also be cleared using the **Clear Log Output** button.

Configuring the ATOMControl Web Interface

An ATOM device's default network settings may not be compatible with pre-existing networks. As such, ATOM devices provide the ability to change the IP Address, Subnet Mask, and Default Gateway. The current values of these parameters may also be obtained from the device.

Network settings are obtained or specified through the ATOM device's serial interface, which may be accessed in one of three ways:

1. Through the *Custom Commands* page in the ATOMControl Web Interface (as described in the Sending Custom Commands section of this document)
2. Through the *Custom Commands* tab of the ATOMControl stand-alone program running on a host computer connected to the ATOM device's M&C port (as described in the ATOMControl Software Manual)

1 ATOMControl Web Interface Basics

3. Through a terminal program running on a host computer connected to the ATOM device's M&C port (as described in the appropriate ATOM Operator Manual)

All three options use the same set of commands to obtain or specify network parameter values. Please refer to the appropriate ATOM Operator Manual for details concerning the format used for ATOM Commands and Responses.

Note that if the ATOM device's IP Address is changed using the ATOMControl Web Interface's Custom Commands page, it will be necessary to reload the Web Interface using the new IP Address.

Obtaining and Specifying the Device's IP Address

The *ns getipaddress* command is used to obtain the current value of the device's IP Address parameter. The format for this command is:

```
ns getipaddress<CR>
```

The corresponding response for this command is:

```
<CR><LF>ok ipaddress <IP Address><CR><LF>
```

where <IP Address> is a sequence of four numbers separated by a period, each of which ranges between 0 and 255.

Example:

```
ns getipaddress<CR>  
<CR><LF>ok ipaddress 192.168.77.30<CR><LF>
```

The *ns setipaddress* command is used to specify a new value for the device's IP Address parameter. The format for this command is:

```
ns setipaddress ipaddress <IP Address><CR>
```

where <IP Address> is a sequence of four numbers separated by a period, each of which ranges between 0 and 255.

The corresponding response for this command is:

```
<CR><LF>ok<CR><LF>
```

Example:

1 ATOMControl Web Interface Basics

```
ns setipaddress ipaddress 192.168.0.15<CR>
<CR><LF>ok<CR><LF>
```

Obtaining and Specifying the Device's Subnet Mask

The *ns getsubnet* command is used to obtain the current value of the device's Subnet Mask parameter. The format for this command is:

```
ns getsubnet<CR>
```

The corresponding response for this command is:

```
<CR><LF>ok subnet <Subnet Mask><CR><LF>
```

where <Subnet Mask> is a sequence of four numbers separated by a period, each of which ranges between 0 and 255.

Example:

```
ns getsubnet <CR>
<CR><LF>ok subnet 255.255.255.0<CR><LF>
```

The *ns setsubnet* command is used to specify a new value for the device's Subnet Mask parameter. The format for this command is:

```
ns setsubnet subnet <Subnet Mask><CR>
```

where <Subnet Mask> is a sequence of four numbers separated by a period, each of which ranges between 0 and 255.

The corresponding response for this command is:

```
<CR><LF>ok<CR><LF>
```

Example:

```
ns setsubnet subnet 255.255.0.0<CR>
<CR><LF>ok<CR><LF>
```

Obtaining and Specifying the Device's Default Gateway

1 ATOMControl Web Interface Basics

The *ns getgateway* command is used to obtain the current value of the device's Default Gateway parameter. The format for this command is:

```
ns getgateway<CR>
```

The corresponding response for this command is:

```
<CR><LF>ok gateway <Default Gateway><CR><LF>
```

where <Default Gateway> is a sequence of four numbers separated by a period, each of which ranges between 0 and 255.

Example:

```
ns getgateway<CR>  
<CR><LF>ok gateway 192.168.77.3<CR><LF>
```

The *ns setgateway* command is used to specify a new value for the device's Default Gateway parameter. The format for this command is:

```
ns setgateway gateway <Default Gateway><CR>
```

where <Default Gateway> is a sequence of four numbers separated by a period, each of which ranges between 0 and 255.

The corresponding response for this command is:

```
<CR><LF>ok<CR><LF>
```

Example:

```
ns setgateway gateway 192.168.0.1<CR>  
<CR><LF>ok<CR><LF>
```

Obtaining All Network Parameters

The *ns getipdata* command is used to obtain the current value of the device's IP Address, Subnet Mask, and Default Gateway parameters. The format for this command is:

```
ns getipdata<CR>
```

The corresponding response for this command is:

1 ATOMControl Web Interface Basics

```
<CR><LF>ok ipaddress <IP Address> subnet <Subnet Mask> gateway  
<Default Gateway><CR><LF>
```

where <IP Address>, <Subnet Mask>, and <Default Gateway> are each a sequence of four numbers separated by a period, each of which ranges between 0 and 255.

Example:

```
ns getipdata<CR>  
<CR><LF>ok ipaddress 192.168.77.30 subnet 255.255.255.0 gateway  
192.168.77.3<CR><LF>
```


2 Monitoring Device Information

2 Monitoring Device Information

This chapter explains how to use the ATOMControl Web Interface to monitor identification, status, fault, and temperature data for an ATOM Series BUC or SSPA.

Monitoring Device Information

Four web pages make up the Controls Section of the ATOMControl Web Interface: the Device Info page, the Mute page, the RF page, and the Custom Commands page. The Device Info page can be used to monitor basic information for the BUC or SSPA.

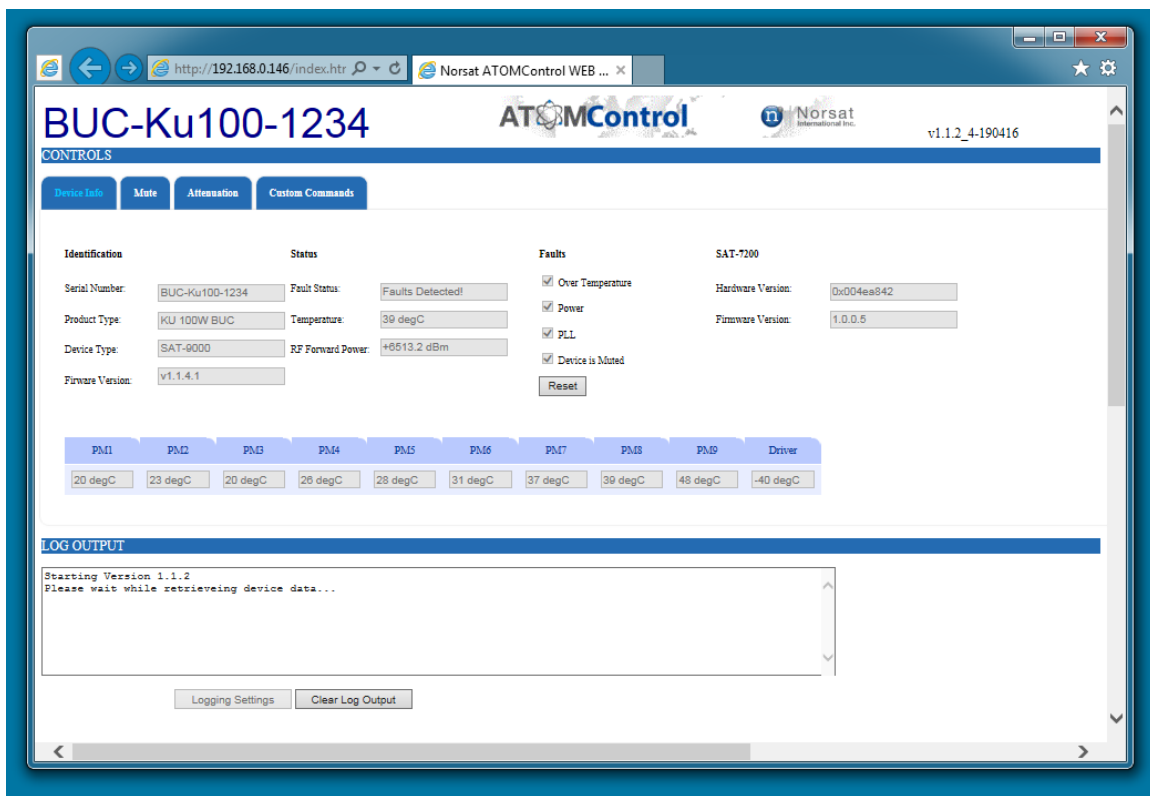


Figure 3: The Device Info Page

Device information monitoring will begin automatically once the Device Info page is loaded. The page contains five sets of data: Identification data, Status data, Faults data, Synthesizer data, and Temperature Readings data. Data for each set will be populated automatically and continuously updated while the Device Info page is shown.

The *Identification* data set contains information that can be used to identify a BUC or SSPA. The **Serial Number** field will list the unique serial number for the device. The **Product Type** field indicates the maximum output power and the device type; possible values are provided in Table 1 below. The **Device Type** field indicates the type of

2 Monitoring Device Information

Distribution Board used in the ATOM device, and can be set to SAT-7500, SAT-8500, or SAT-9000. The **Firmware Version** field provides the four-part version number for the firmware running on the ATOM device's Distribution Board.

| Type of BUC | Type of SSPA |
|-------------|--------------|
| Ku 25W BUC | Ku 25W SSPA |
| Ku 40W BUC | Ku 40W SSPA |
| Ku 50W BUC | Ku 50W SSPA |
| Ku 100W BUC | Ku 100W SSPA |
| Ka 25W BUC | Ka 25W SSPA |
| Ka 50W BUC | Ka 50W SSPA |

Table 1: Product Type Values

The *Status* data set contains basic status information for the ATOM BUC or SSPA. The **Fault Status** field indicates whether any fault has been detected on the device; detailed fault information is available in the *Faults* data set described below. The **Temperature** field indicates the system temperature for the device. This is the temperature of Power Module 8 for 100W BUCs and SSPAs, or Power Module 2 for all other ATOM devices. The **RF Forward Power** field shows the current output power for the device in dBm.

Detailed fault information is provided in the *Faults* data set. A checkbox is shown for each of the four faults that can be detected for a device. If the checkbox is checked, then the corresponding fault has been detected. Table 2 below shows the detectable faults and their cause:

| Fault | Cause |
|------------------|---|
| Over Temperature | The system temperature exceeds 90°C |
| Power | The Voltage Monitor has detected that one of the input voltages is too low. |
| PLL | At least one Phase Lock Loop (PLL) Lock has been lost |
| Mute | The device has been muted |

Table 2: Detectable Faults

Note that the Power Fault is only detected on 100 W BUCs and SSPAs.

Also note that the PLL Fault is only detected for BUCs, not for SSPAs.

The *SAT-7200* data set for Ku BUCs (or *SAT-8200* data set for Ka BUCs) provides version information for the Synthesizer board used only with ATOM BUCs. SSPAs do not use a Synthesizer and thus do not provide any version information, keeping this field empty. The **Hardware Version** field shows the hardware version for the Synthesizer

2 Monitoring Device Information

board, while the **Firmware Version** field shows the version of the firmware running on the board.

The *Temperature Readings* data set shows the current temperature for each of the Power Modules contained within the ATOM device in addition to the current temperature of the device's Driver Module. Measured temperatures range from -40°C to 125°C. Table 3 below shows the expected number of Power Modules for each type of ATOM device:

| Device Type | Number of Power Modules |
|---------------------|-------------------------|
| Ku 25W BUC or SSPA | 2 + 1 Driver Module |
| Ku 40W BUC or SSPA | 4 + 1 Driver Module |
| Ku 50W BUC or SSPA | 4 + 1 Driver Module |
| Ku 100W BUC or SSPA | 8 + 1 Driver Module |
| Ka 25W BUC or SSPA | 5 + 1 Driver Module |
| Ka 50W BUC or SSPA | 10 + 1 Driver Module |

Table 3: Number of Expected Power Modules for Each ATOM Device Type

3 Controlling ATOM Devices

3 Controlling ATOM Devices

This chapter explains how to use the ATOMControl Web Interface to configure the Mute State of an ATOM BUC or SSPA, how to configure the Digital Attenuator for an ATOM BUC, and how to send custom commands to an ATOM device.

Controlling the Mute State

Four web pages make up the Controls Section of the ATOMControl Web Interface: the Device Info page, the Mute page, the RF page, and the Custom Commands page. The Mute page can be used to monitor and control the Mute configuration for the BUC or SSPA.

Mute Configuration monitoring will begin automatically once the Mute page is loaded. Figure 4 below shows the Mute page controls:

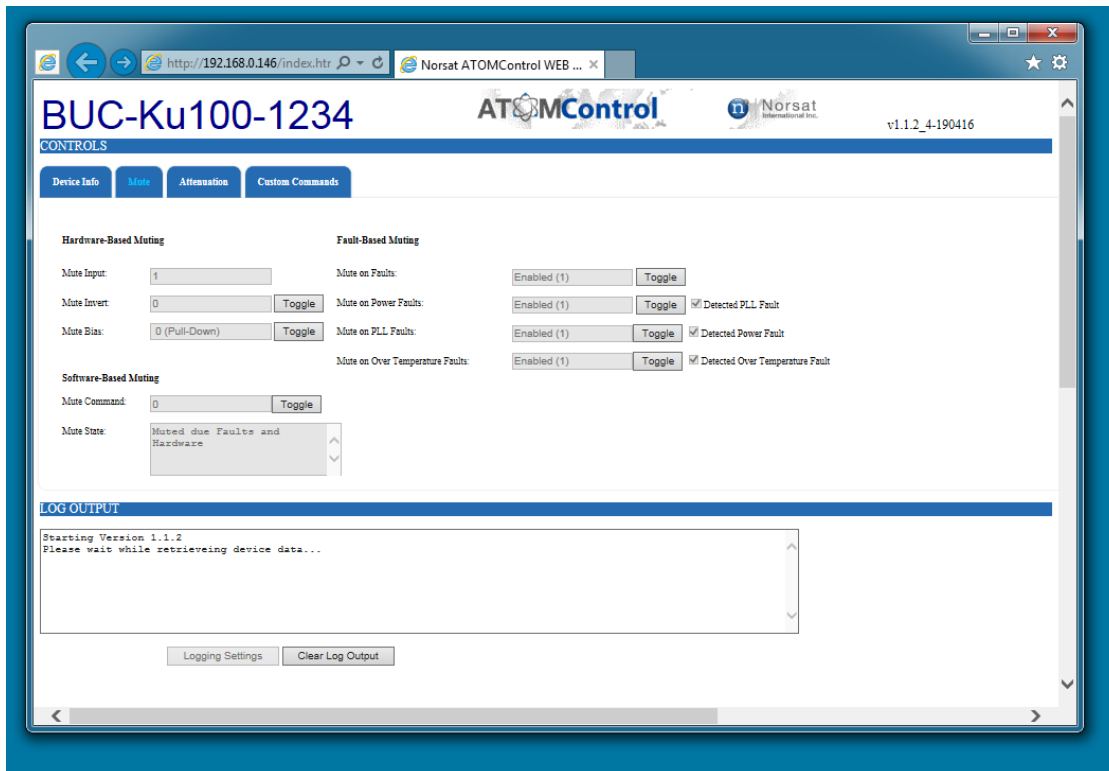


Figure 4: Mute Tab Controls

An ATOM Series device's Mute State is controlled by one hardware input signal, four user-controllable software parameters, and three fault indicators. The ATOMControl Web Interface monitors the values of all of these and displays them on the Mute page of the Web Interface.

3 Controlling ATOM Devices

The signals are:

- Mute Input: The hardware input line corresponding to pin D of the MIL-C-26482 control interface
- Mute Invert: Determines which value of the Mute Input line represents Mute and which value represents Unmute
- Mute Bias: Determines the value of the Mute Input line if the hardware input is left floating
- Mute Command: Software mute setting
- Mute On Faults: Indicates whether the device will be muted if a fault is detected

Muting can thus be caused by three potential sources: a hardware-based mute triggered through the Mute Input hardware signal, fault-based muting triggered by one of three faults, and software-based muting triggered using the Mute Command parameter. Software-based muting will override both fault-based muting and hardware-based muting. Fault-based muting will also override hardware-based muting.

The hardware signal, four software parameters, and three faults interact with each other to produce the overall Mute State in one of two ways. While most devices will use the Standard Mute Logic shown in Figure 5, some 100 W devices (running firmware version 1.1.0.1 or higher) will use the Revised Mute Logic shown in Figure 6.

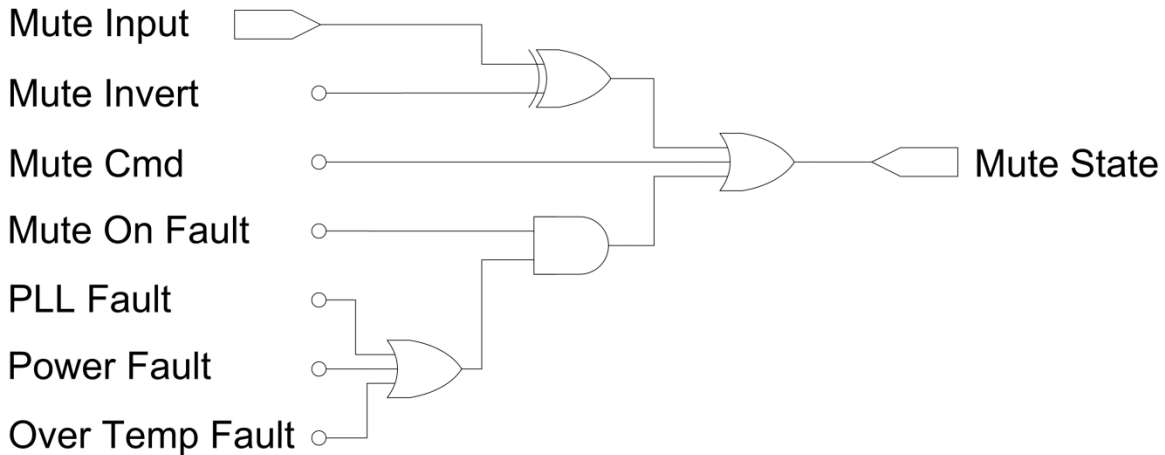


Figure 5: Standard Mute State Logic

3 Controlling ATOM Devices

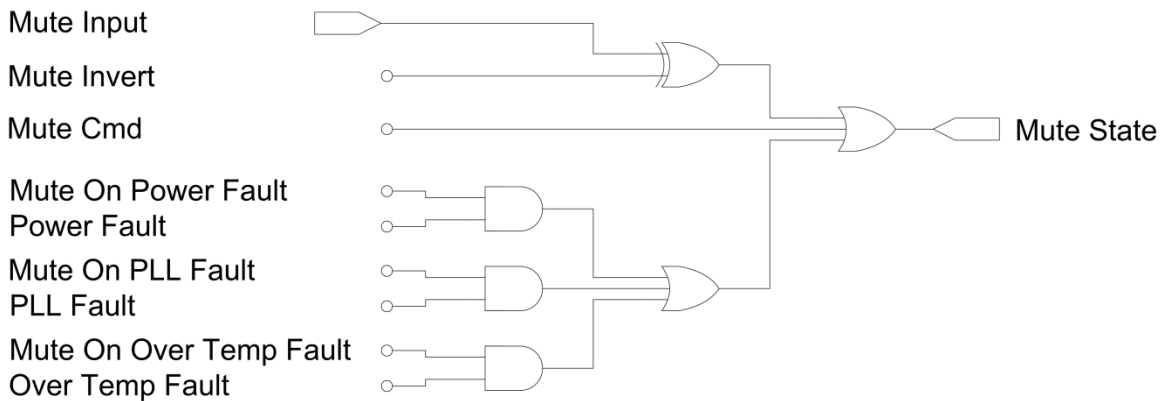


Figure 6: Revised Mute State Logic

Hardware-Based Muting

Hardware-based muting is controlled by three values: the Mute Input hardware line, the Mute Invert software parameter, and the Mute Bias software parameter. The Mute Input line allows external devices to control whether the ATOM Series BUC or SSPA is muted or unmuted. The signal value required to mute or unmute the ATOM device is determined by the value of the Mute Invert parameter. If Mute Invert is 0, then setting Mute Input to 0 Volts will unmute the device and setting Mute Input to 5 Volts will mute the device. If Mute Invert is 1, then setting Mute Input to 0 Volts will mute the device and setting Mute Input to 5 Volts will unmute the device.

The Mute Bias signal controls the value of the Mute Input hardware line if the hardware line is left floating. If Mute Bias is 0, then a floating Mute Input line will be pulled down to 0 Volts. If Mute Bias is 1, then a floating Mute Input line will be pulled up to 5 Volts.

Note that in the above logic diagrams, the **Mute Input** signal is assumed to already take the Mute Bias into account.

By default, both Mute Bias and Mute Invert are set to 0.

The hardware-based muting parameter interactions are summarized in Table 4 below:

3 Controlling ATOM Devices

| Mute Input Voltage | Mute Input Logical Value | Mute Invert Logical Value | Mute Bias Logical Value | Hardware Mute Result |
|--------------------|--------------------------|---------------------------|-------------------------|----------------------|
| 0V | 0 | 0 | 0 | Unmuted |
| 0V | 0 | 0 | 1 | Unmuted |
| 0V | 0 | 1 | 0 | Muted |
| 0V | 0 | 1 | 1 | Muted |
| 5V | 1 | 0 | 0 | Muted |
| 5V | 1 | 0 | 1 | Muted |
| 5V | 1 | 1 | 0 | Unmuted |
| 5V | 1 | 1 | 1 | Unmuted |
| Floating | Z | 0 | 0 | Unmuted |
| Floating | Z | 0 | 1 | Muted |
| Floating | Z | 1 | 0 | Muted |
| Floating | Z | 1 | 1 | Unmuted |

Table 4: Hardware-Based Muting

The ATOMControl Web Interface shows all of the values relevant to hardware-based muting in the top-left portion of the Mute page. The logical value of the Mute Input line, the Mute Invert parameter, and the Mute Bias parameter are all displayed along with buttons that allow the Mute Invert and Mute Bias signal values to be toggled between 0 and 1. Figure 7 below shows the hardware-based muting controls:

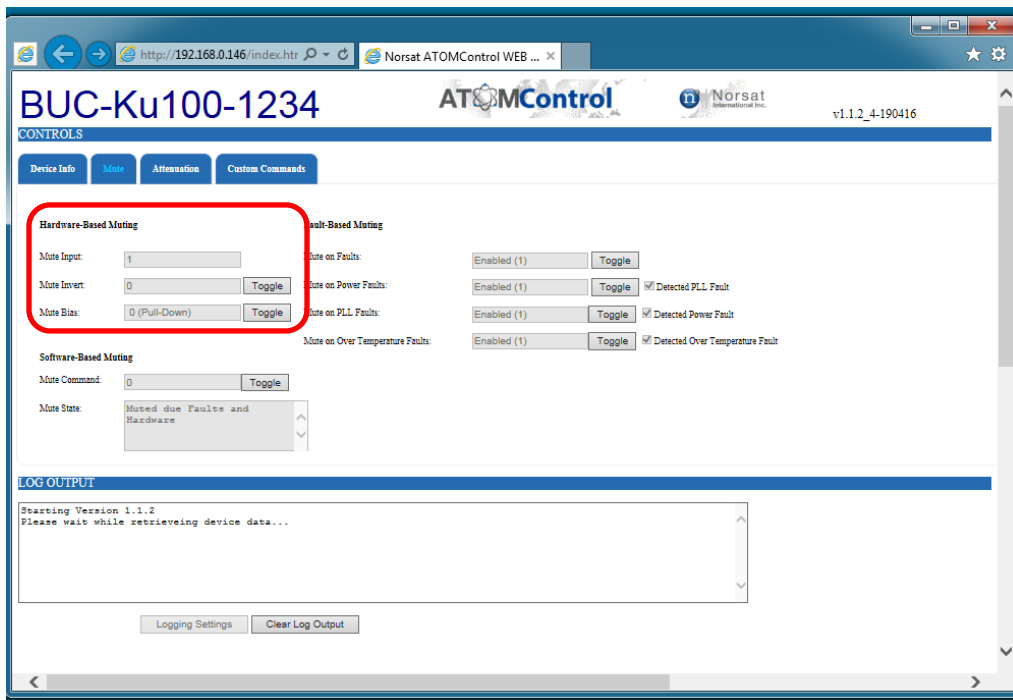


Figure 7: Hardware-Based Mute Controls

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The value represented in the Mute Input field depends on the type of device that ATOMControl is monitoring. If the device is a 25 W, 40 W, or 50 W BUC or SSPA, then the Mute Input field will display the value of the Mute Input hardware line. A value of 0 represents 0 Volts, and a value of 1 represents 5 Volts. For 100 W BUCs and SSPAs, the value shown will represent the overall Mute State, with 0 indicating that the device is unmuted and 1 indicating that the device is muted.

Fault-Based Muting

Fault-based muting automatically mutes the device if one of three faults is detected on the ATOM Series BUC or SSPA. A PLL Fault, a Power Fault, and an Over Temperature Fault can all trigger automatic muting. These faults will only mute the device, however, if the appropriate Mute On Fault software parameter is set to 1. If the appropriate Mute On Fault parameter is set to 0 then the device will not be automatically muted if the fault is detected on the device. By default, all Mute On Fault parameters are set to 1.

Most devices use a single parameter (labelled **Mute On Faults**) to control the muting behavior for the three detectable faults. Some 100 W devices (running firmware version 1.1.0.1 or higher) have the ability to configure the mute behavior for each of the three faults individually. ATOMControl will automatically detect whether the connected device can use the individual settings and will enable or disable the individual Mute On Fault controls appropriately.

Note that if the device does support the individual Mute On Fault controls, the **Mute On Faults** parameter will be set to 1 if any of the individual Mute On Fault settings are set to 1.

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Table 5 below shows the interaction of the standard fault-based muting parameters:

| Mute On Faults | Power Fault | OverTemp Fault | PLL Fault | Fault Mute Result |
|----------------|-------------|----------------|-----------|-------------------|
| 0 | 0 | 0 | 0 | Unmuted |
| 0 | 0 | 0 | 1 | Unmuted |
| 0 | 0 | 1 | 0 | Unmuted |
| 0 | 0 | 1 | 1 | Unmuted |
| 0 | 1 | 0 | 0 | Unmuted |
| 0 | 1 | 0 | 1 | Unmuted |
| 0 | 1 | 1 | 0 | Unmuted |
| 0 | 1 | 1 | 1 | Unmuted |
| 1 | 0 | 0 | 0 | Unmuted |
| 1 | 0 | 0 | 1 | Muted |
| 1 | 0 | 1 | 0 | Muted |
| 1 | 0 | 1 | 1 | Muted |
| 1 | 1 | 0 | 0 | Muted |
| 1 | 1 | 0 | 1 | Muted |
| 1 | 1 | 1 | 0 | Muted |
| 1 | 1 | 1 | 1 | Muted |

Table 5: Standard Fault-Based Muting

Table 6 below shows the interaction of the individual fault-based muting parameters:

| Mute On Power Fault | Mute On PLL Fault | Mute On OverTemp Fault | Power Fault | PLL Fault | OverTemp Fault | Fault Mute Result |
|---------------------|-------------------|------------------------|-------------|-----------|----------------|-------------------|
| 0 | 0 | 0 | 0 | 0 | 0 | Unmuted |
| 0 | 0 | 0 | 1 | 0 | 0 | Unmuted |
| 1 | 0 | 0 | 0 | 0 | 0 | Unmuted |
| 1 | 0 | 0 | 1 | 0 | 0 | Muted |
| 0 | 0 | 0 | 0 | 0 | 0 | Unmuted |
| 0 | 0 | 0 | 0 | 1 | 0 | Unmuted |
| 0 | 1 | 0 | 0 | 0 | 0 | Unmuted |
| 0 | 1 | 0 | 0 | 1 | 0 | Muted |
| 0 | 0 | 0 | 0 | 0 | 0 | Unmuted |
| 0 | 0 | 0 | 0 | 0 | 1 | Unmuted |
| 0 | 0 | 1 | 0 | 0 | 0 | Unmuted |
| 0 | 0 | 1 | 0 | 0 | 1 | Muted |

Table 6: Individual Fault-Based Muting

The ATOMControl Web Interface shows all of the values relevant to fault-based muting in the top-right portion of the Mute page. The value of the Mute On Faults parameter is displayed along with a button that allows the Mute On Faults value to be toggled between 0 and 1.

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Controls are also provided for each of the individual Mute On Fault parameters (Mute On Power Fault, Mute On PLL Fault, Mute On Over Temperature Fault) though the controls are automatically disabled if the device does not support the individual parameters. There are additionally three read-only checkboxes that indicate whether each of the three mute-inducing faults has been detected. Figure 8 below shows the hardware-based muting controls:

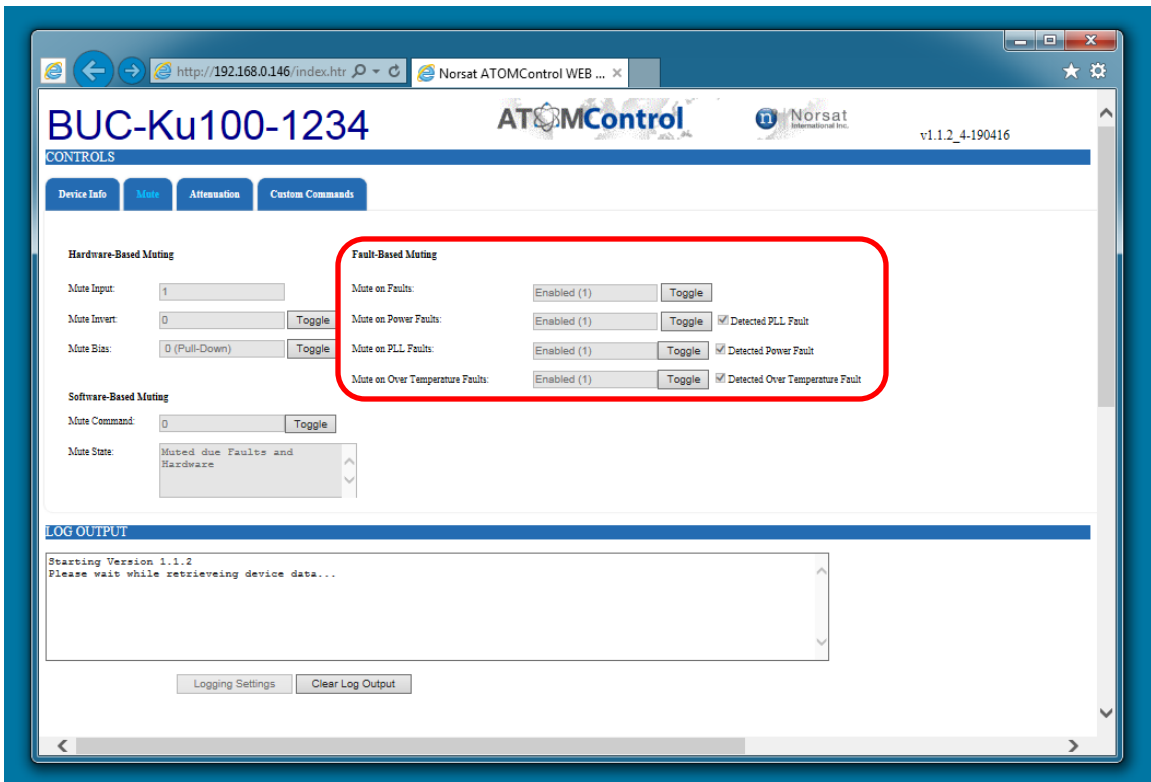


Figure 8: Fault-Based Mute Controls

Software-Based Muting

Software-based muting is controlled by a single parameter that overrides all other muting controls: the Mute Command parameter. If Mute Command is set to 1 then the ATOM Series device will be muted. If the Mute Command signal is set to 0 then the device will be unmuted (assuming it is not muted by hardware or by faults). By default, the Mute Command parameter is set to 0.

ATOMControl shows all of the values relevant to software-based muting in the bottom-left portion of the Mute page. The value of the Mute Command parameter is displayed

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along with a button that allows the Mute Command value to be toggled between 0 and 1. Figure 9 below shows the software-based muting controls:

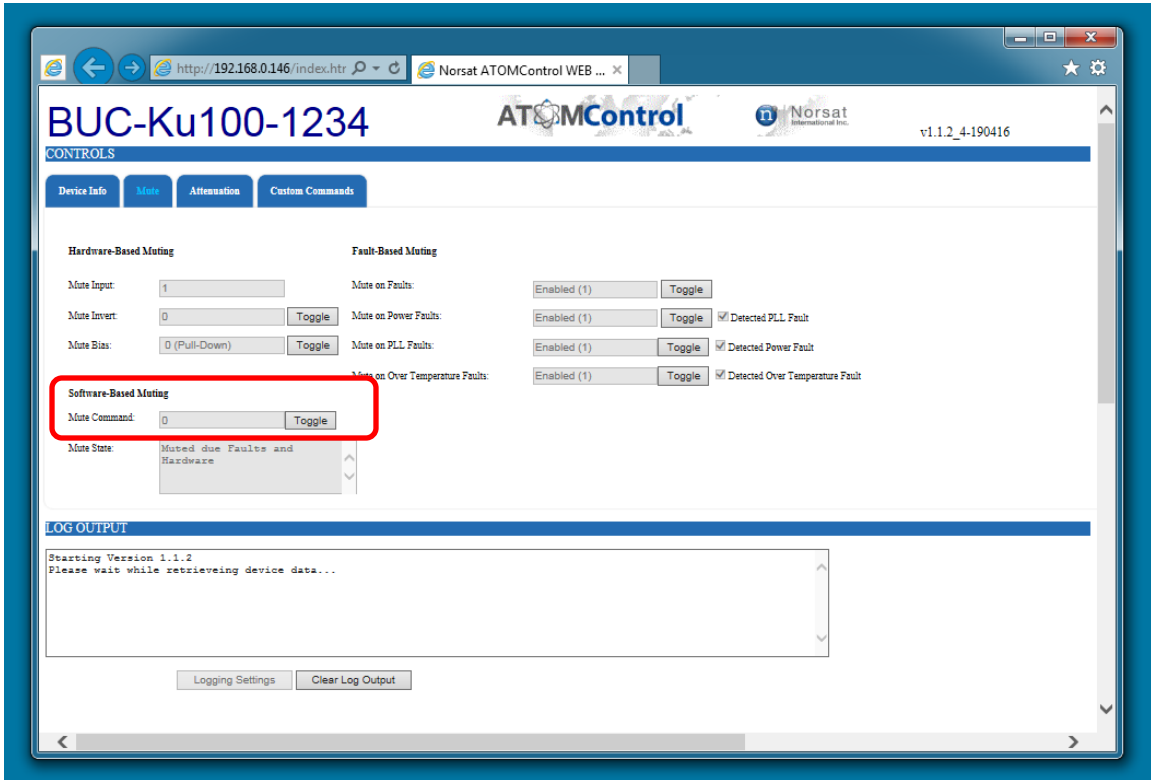


Figure 9: Software-Based mute Controls

Unmuting the Device

ATOM Series devices are unmuted only if nothing is causing them to be muted. The parameters for hardware-based muting, fault-based muting, and software-based muting must **all** be in a state that does not cause the BUC or SSPA to be muted in order for the device to be in an unmuted state. ATOMControl displays the overall Mute State below the Software-Based muting portion of the Mute page as shown in Figure 10 below:

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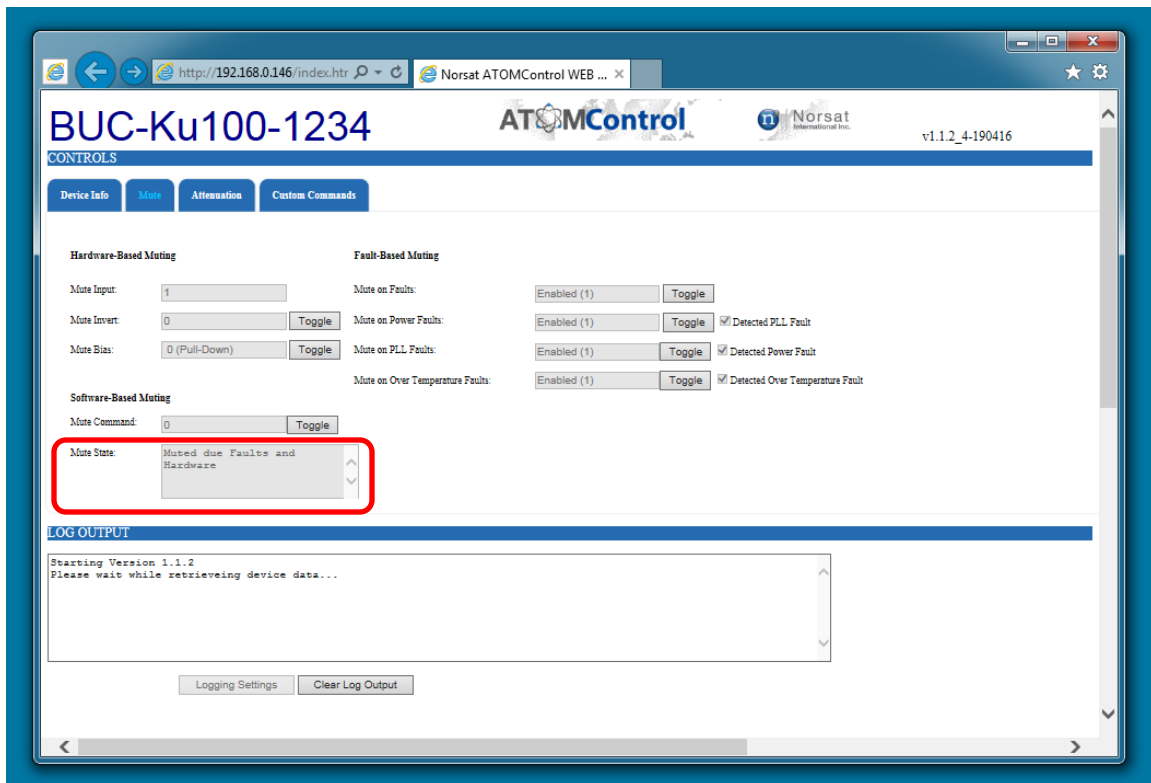


Figure 10: Mute State

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Attenuation Control

Four web pages make up the Controls Section of the ATOMControl Web Interface: the Device Info page, the Mute page, the RF page, and the Custom Commands page. The RF page can be used to monitor and control the Digital Attenuator for an ATOM BUC.

Note that only ATOM BUCs have a Digital Attenuator; the attenuation controls are greyed out for ATOM SSPAs.

Attenuation monitoring will begin automatically once the Mute page is loaded. Figure 11 below shows the Attenuation tab controls:

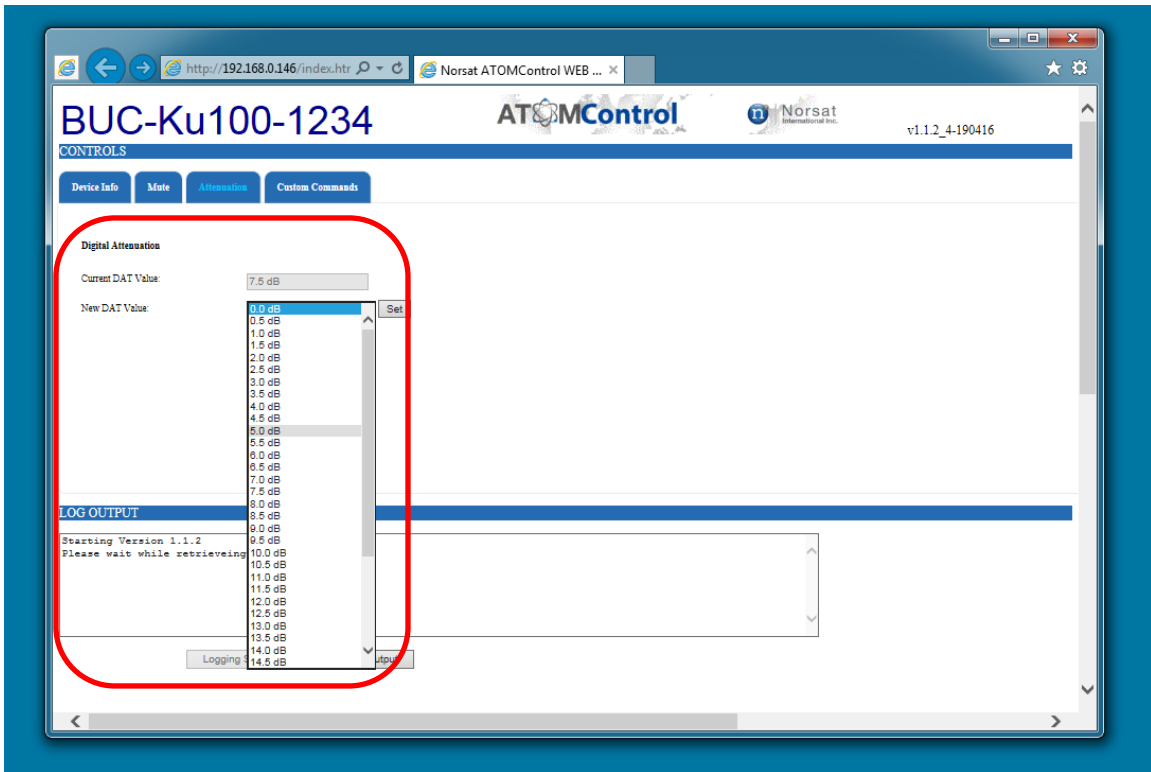


Figure 11: Attenuation Tab Control

The current attenuation provided by the Digital Attenuator (DAT) will be updated automatically in the **Current DAT Value** field. To change the attenuation value, select a new attenuation from the **New DAT Value** pull-down menu and then click on the **Set** button.

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Sending Custom Commands

Four web pages make up the Controls Section of the ATOMControl Web Interface: the Device Info page, the Mute page, the RF page, and the Custom Commands page. The Custom Commands page can be used to communicate with the ATOM BUC or SSPA directly using a series of command strings that follow the ATOM Communication Protocol.

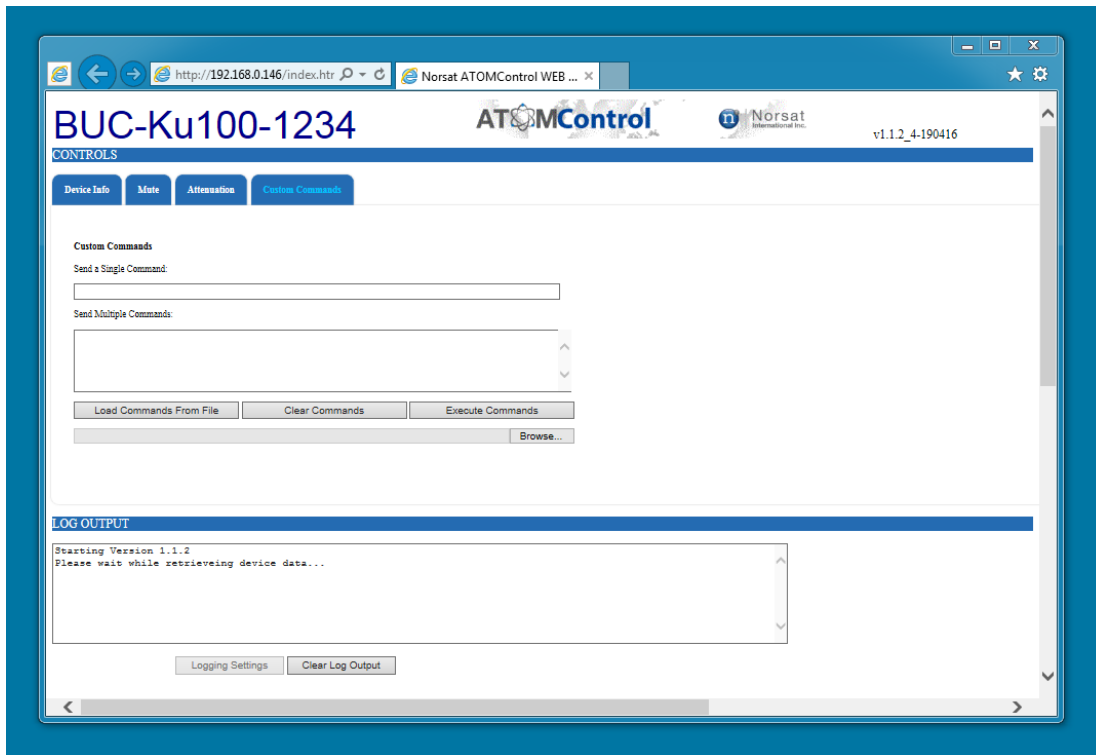


Figure 12: Custom Command Tab

ATOM Series BUCs and SSPAs are controlled using character-based command strings sent over a serial interface. The ATOMControl Web Interface provides users with the ability to send command strings to an ATOM Series device and to see the corresponding response string received from the device. A single response string will be generated for all commands sent to the device, but improperly-formatted or invalid command strings will produce error response strings. Response strings are typically received immediately after sending the command string, though some response strings are received only after a short delay.

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All command strings follow the same basic format: a Command Name followed by zero or more pairs of Command Parameters and Values. Sample commands include:

```
getident  
  
setmute cmd 1  
  
setmute value 0
```

All response strings also follow a common format: a status string followed by zero or more pairs of Response Parameters and values. Sample response strings (and the commands that generated them) are as follows:

```
getstatus  
ok fault 0x0 fwdpwr +17.3 revpwr -15.8 temp 42  
  
setmute cmd 1  
ok  
  
bad command  
err "Invalid Command"
```

Please consult the ATOM device's Operator Manual for more details concerning the command strings that can be sent down and the expected corresponding response strings.

The ATOMControl Web Interface provides two sets of controls that can be used to send command strings to an ATOM Series BUC or SSPA. The **Send a Single Command** text field allows the user to type in a single command string to be sent to the device. Pressing the Enter key while in this field will send the contents of the field to the device.

Multiple commands can be sent one after the other using the **Send Multiple Commands** multi-line text field. Commands may be typed into this field, copied-and-pasted into this field, or loaded into the field from a text file using the **Load Commands From File** button. All text can be removed from the field using the **Clear Commands** button. Pressing the **Execute Commands** button will send each non-blank line in the field down to the device.

Command strings that are sent to an ATOM BUC or SSPA will be displayed in the Log Output text field, as will the corresponding response string.

*****End of Document*****