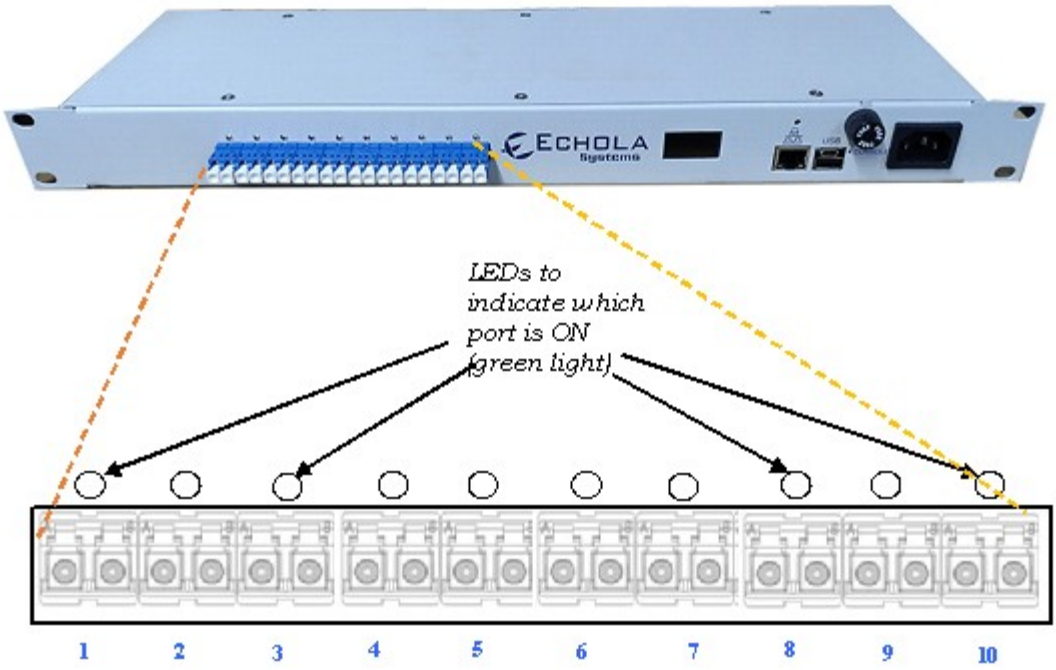
Installation (VFC & FC Series Fiber-cut switches)

While the examples in this guide reference the VFC1011-SM 10-port model, the software applies to all VFC-series and FC-series models. Commands that are exclusive to VFC are indicated in the notes.

The VFC Series fiber-cut switches use variable optical attenuators (VOAs) and can also serve as multi-channel VOAs for DWDM applications. A single chassis supports up to twenty VOAs in a compact 1U enclosure that's 5 inches deep, and each channel can be configured and monitored individually.



Connecting test equipment to VFC1011

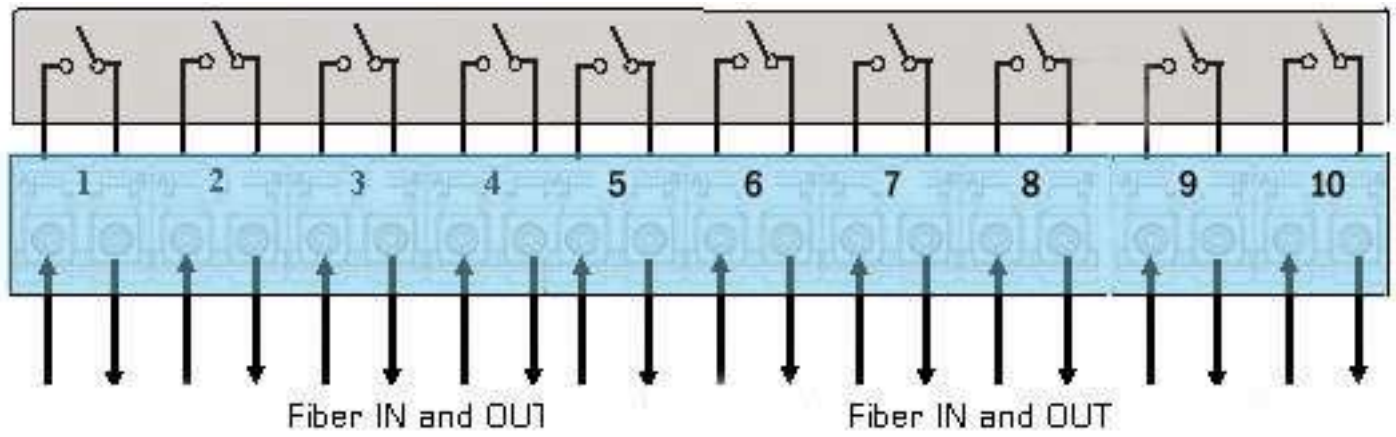
For example, if you want to simulate a fiber cut scenario between 2 optical devices using one fiber/one direction.

Duplex Fiber

Device1-TX----------➔----------Device2-RX

Device1-RX ----------➔----------Device2-TX

Each LC connector of VFC1011 has two inputs/outputs marked as B and A.



Then you need to disconnect one of the fibers connecting these two devices and connect them through the VFC1011 port, between A and B like the following:

Device1-TX ➔ [VFC1011-Port1B➔VFC1011-Port1A] ➔ Device2-RX

If you want to simulate a break between both TX and RX fibers of these devices under test (which may be the case in many scenarios), then you will have to use two ports of VFC1011, like the following

Device1-TX ➔ [VFC1011-Port1B➔VFC1011-Port1A] ➔ Device2-RX

Device1-RX ➔ [VFC1011-Port2B➔VFC1011-Port2A] ➔Device2-TX

UPSR, 2F-BLSR protection ring testing may require 2 VFC1011 ports, while 4F-BLSR might need four ports. To test 100Gbps ethernet devices, you will require a total of 20 ports (2x VFC1011s) for ten lanes in each direction. Similarly, for 40Gbps, you will need eight ports for four lanes in each direction.

Configuring VFC1011

VFC1011 provides a micro-USB console port and an Ethernet (10/100) port for management. USB console port is generally used in special situations such as to debug network connectivity if VFC1011 is not reachable through Ethernet.

If you use USB console port, then you will need a USB-A to micro-USB cable. Use either putty (windows) or screen (Linux) or equivalent terminal login software. The settings for the console port need to be **115200 baud rate with 8-N-1**. Also, make sure you are using the correct COM port number (For instance, you can find the correct COM port using Device Manager on Windows).

Using Ethernet, you can configure the PC or Laptop's IP to match VFC1011's default network. The default network configuration is DHCP, so you will see the IP address of the unit on the OLED display if Ethernet is connected to a network.

Default Account settings

Login: *admin*

Password: *admin*

The default root password is "osctl," but be careful while using root; we recommend using "sudo" instead to gain root access. Also, make sure to change the root password after the initial setup.

Configuring Static IP

Before configuring IP please make sure the date and time settings are correct. You can use Linux CLI 'timedatectl' or our GUI/Webpage 'clock' page to set the time. If you use the GUI/Webpage you will have to uncheck NTP and set the date and time.

Use "osctl" command to configure a static IP address after login as "root" user. "osctl -?" shows detailed osctl command options with examples.

```
$ sudo osctl -i 192.168.1.10 -m 255.255.255.0 -g 192.168.1.1
```

The above command configures the IP address of VFC1011 as 192.168.1.10 with mask 255.255.255.0 and gateway & DNS as 192.168.1. Once the IP is configured from a PC or a Laptop using Ethernet or serial port, you can connect VFC1011 to your network and access it using "telnet" or "ssh."

Configuring Dynamic IP

A DHCP server should be running on your network to configure dynamic IP. The DHCP client on the device then gets the IP from the server.

```
$ sudo osctl -D
```

Ensure you know the assigned IP address to log in using "telnet" or "ssh."

Configuring Date & Time

On the first login as **admin**, the system checks for internet access.

- **If online:** it enables NTP and synchronizes the clock automatically.

- **If offline:** you'll be prompted to set the **date**, **time**, and **timezone** manually.

Note: The device's RTC is **not battery-backed**, so the clock may be inaccurate after shipping or power loss. Please set the correct time to ensure accurate logs and scheduled tasks.

Configuring Hostname

To change the hostname of VFC1011 switch, use '-h' option.

```
$ sudo osctl -h VFC1011-SW-1
```

The above command changes the hostname of VFC1011 to VFC1011-SW-1.

Configuring DNS/Nameserver

To configure a DNS or Nameserver, use "-n" option of osctl.

```
$ sudo osctl -n 192.168.1.11
```

Configuring Syslog Server

To send system-generated events to an external Syslog server, use the "-S" option. In addition, you have to specify the address of the Syslog server which will receive these event logs. (Note: this option is only available in software version 2.0 and above).

```
$ sudo  osctl -S 192.168.1.200
```

Version Info

The following command shows hardware and software versions and the serial number of the switch.

```
$ osctl -V
```

Other Administrative commands

Most other administrative functions can be achieved using standard Debian Linux commands. For example, to change the password, use the "passwd" command from the Linux prompt, and to add a new user use the "useradd" command. You have to be a "root" user to add a new user.

Operation

To simply the operation, all functions are provided in a single command called "osctl." The osctl command provides three primary functions

1. **Network & Host configuration (allowed only in "root")**
2. **Switch Control & Status**
3. **Port group Management**

Network & Host configuration

The following are the commands used to configure the network.

1. **To configure static IP**

   $ sudo **osctl -i <ip> -m <mask> -g <gw>**

2. **To use DHCP (dynamic IP)**

   $ sudo **osctl -D**

3. **To configure hostname alone**

   $ sudo **osctl -h <hostname>**

4. **To configure a DNS or Nameserver, use "-n" option**

   $ sudo **osctl -n <dns-server-ip>**

5. **To configure syslog server to receive VFC1011's events**

   $ sudo **osctl -S <syslog-server-ip>**

For details, refer to the installation section as these are explained in that section.

Switching Control

To switch a particular port or ports or a group ON or OFF, you can use the following command:

$ osctl -p {<port#/s> | <port-range> | <port-group>} <on|off> [-t <secs>]

Note that the "{}" (braces) groups options, and "|" is equivalent to "or." If the options are in square brackets "[]" then it is optional. Wherever you see port# or in_port#, they are all the same and represent one of 8 ports of VFC1011.

For example:

$ osctl -p 4 on

➔ Switch port 4 to ON. LED on port 4 of VFC1011 lids when this command is issued confirms that the port is switched ON.

$ osctl -p "1 2 3" on

➔ switch ports 1, 2, and 3 to ON. Note the double quote; without that, it won't work.

$ osctl -p "1-4" off

➔ switch ports 1, 2, 3, and 4 to OFF (range 1 to 4). This is handy when you want to switch a bunch of ports together.

$ osctl -p gp1 off

➔ switch all ports in group "gp1" to OFF. You will have to create group before using it with "-c" option as explained in "Group Management" section.

$ **osctl -p 2 off -t 120**

➔ switch port 2 to OFF after 120 ***secs*** (delayed switching)

$ **osctl -p 2 off -T 120**

➔ switch port 2 to OFF gradually within 120 ***milliseconds***. *This option is only available with VFC series switch*. It differs from the above delay, where the switching happens almost immediately *after* 120 *secs of a wait. Still, switching* takes 120 milliseconds to come to a completely OFF state to simulate real-world fiber cuts. The default is ten *milliseconds*.

Switching Control - Advanced

osctl -f (flip):

The -f option switches a port OFF, waits for the specified time (in milliseconds), then switches it back ON.

Usage:

```
osctl -f {<port#|port_list|port_range|port_group>} [-T <msecs>]
```

Example:

```
osctl -f 4 -T 60
```

- Toggles port **4** OFF, waits **60 ms**, then switches it back **ON**.
- You can target a single port, a comma-separated list (e.g., 1,4,7), a range (e.g., 3-8), or a predefined group.

For 20-port models, the *osctl -f* option requires **software version 6.4 or later**.

Application Notes : Hold-off Threshold Verification (<50 ms) using -f option

Many optical protection schemes use a **hold-off** timer so that **very short interruptions (e.g., <50 ms)** do **not** trigger a path switchover.

Goal: Verify that brief cuts stay within the hold-off window and the network **does not** switch to the redundant path.

Procedure

1. Enable counters/logging for protection events on the relevant devices.
2. Try # 30 ms micro-cut (expect NO switchover)
   - **osctl -f 4 -T 30**
3. Try # 45 ms micro-cut (expect NO switchover if hold-off ≥50 ms)
   - **osctl -f 4 -T 45**

4. Check:
    - No protection state change (no APS/FRR/LAG failover).
    - Traffic continuity (brief loss acceptable per design) and stable path.
    - Event logs show link flap but **no** protection action.

Tip:

- If a switchover occurs below 50 ms, increase the **hold-off** (or equivalent debounce/filter) on the protection controller, or verify device/platform timer granularity (some platforms quantize timers in 10–25 ms steps).
- Re-test at **50 ms**, **60 ms**, etc., to precisely bracket the threshold.

Switch Status

The following command shows the status of a port or ports in a pre-defined group, whether it is on/off.

$ osctl -s [<port_group> | <in_port#>]
$ osctl -A [<port_group> | <in_port#>]
$ osctl -B [<port_group> | <in_port#>]

For example:

$ osctl -s

➔ shows all ports' & groups' status as follows. It shows first all ports and tells you which ports are part of a group

All Ports Status

==========

Port | Port Status

==========

1 | off
2 | off
3 | off
4 | off
5 | on
6 | on
7 | on
8 | on

```
        Group Status
=================================
  Group Name | Port Status
=================================
      gp1       |    off
---------------------------------
=============================================
          Group's Port Details
=============================================
GroupName: <gp1>
      Port Status: off
    Ports in the group: 1 2 3 4
```

$ **osctl -s gp1**

➔ shows group "gp1" status only. You will have to create group before using it with "-c" option as explained in "Group Management" section.

$ **osctl -s 3**

➔ shows port 3 status only

$ **osctl -A 2**

➔ displays port 2 attenuation in 1-256 range

$ **osctl -B 4**

➔ displays port 4 attenuation in dB

Port group Management

Port group management commands provide the convenience of switching many ports together identified by a name. The group name can be any alphanumeric name but cannot be a number alone or start with a number. For example, the group name cannot be "10" or 10gp1.

1. **To create a new group**

   $ osctl -c <port-group> {<in-port#/s> | <inport-range>}

2. **To update existing group**

   $ osctl -u <port-group> {-a | -r <in-port#/s>}

3. **To delete a group**

   $ osctl -d <port-group>

4. **To delete all groups**

   $ osctl -R

5. **To list ports in a group**

   $ osctl -l [<port-group> | <in-port#>]

For example:

$ osctl -c gp1 "1 3 4"

➔ Creates group named "gp1" with ports 1,3 and 4. The double quotes around space-separated port numbers are required. Note that when you make a group, all the ports in the gp1 will be in the OFF state by default.

$ osctl -c gp2 "5-8"

➔ creates a group named "gp2" with ports 5,6,7 and 8 (5 to 8 range)

$ **osctl -u gp1 -a "5 6"**

➔ adds ports 5 & 6 to existing group gp1

$ **osctl -u gp1 -a 7**

➔ adds port 7 to existing group gp1

$ **osctl -u gp1 -r "2 4"**

➔ removes ports 2 & 4 from group gp1

$ **osctl -d gp1**

➔ deletes group gp1 and release all ports which were part of the group.

$ **osctl -l**

➔ lists ports in group, like

GroupName: <gp1>

Ports in the group: 1 2 3 4

$ **osctl -R**

➔ delete all groups in the database.

Setting Attenuation (VFC series only)

-A option

The "-A" option is used to set the attenuation of any particular output port or group to a fraction of the input power. It takes a number from 1 to 256 as a divisor. Then, it attenuates the power output of the port by that number. The more the divisor, the more the attenuation is (256 is fully off & 1 is on).

The attenuation setting is nonlinear. So, if you set the attenuation to 128, it doesn't mean you are setting the attenuation to half of the source power. Please refer to the graph at the end of the manual, which shows the relationship between applied voltage and attenuation. The applied voltage is linear, but the VOA response is nonlinear. Currently, the attenuation setting is not saved; once you reset or reboot the switch attenuation setting is lost; you will have to configure it again.

$ osctl -A {<port_group> | <in_port#>} [<divisor [1-256]> | [<divisor range [1-256]> -T <msec>]]

For example:

$ osctl -A 1 128

-> set attenuation of port#1 to 128 (256 is fully off & 1 is on)

$ osctl -A 1

-> displays current attenuation of port#1

$ osctl -A gp1 64

-> set the attenuation of all ports in the group gp1 to 64

$ osctl -A 3-8 32

-> set the attenuation of ports 3,4,5,6,7 & 8 to 32

$ osctl -A 1 100-160 -T 5000 (requires sw. ver 3.0 and above)

-> set the attenuation of port#1 to 100 first and ramp up to 160 in 5000 milliseconds period. This option helps create ***packet errors*** as opposed to the clean fiber-cut scenario.

$ osctl -A 1 160-100 -T 5000 (requires sw. ver 3.0 and above)

-> set the attenuation of port#1 to 160 first and ramp down to 100 in a 5000 milliseconds period.

The osctl version 5.3 and above includes a default calibration setting, which allows you to set attenuation in **dB,** but it may not be accurate**.** Therefore, you need to calibrate all VOAs to get better accuracy. Please refer to the calibration section in this document for the details.

-B option

The -B option is used to set the attenuation in dB.

$ osctl -B {<port-group> | <in-port#>} [<dB [1-25]>]

Examples:

$ osctl -B 1 5

→ set attenuation of port#1 to 5 dB

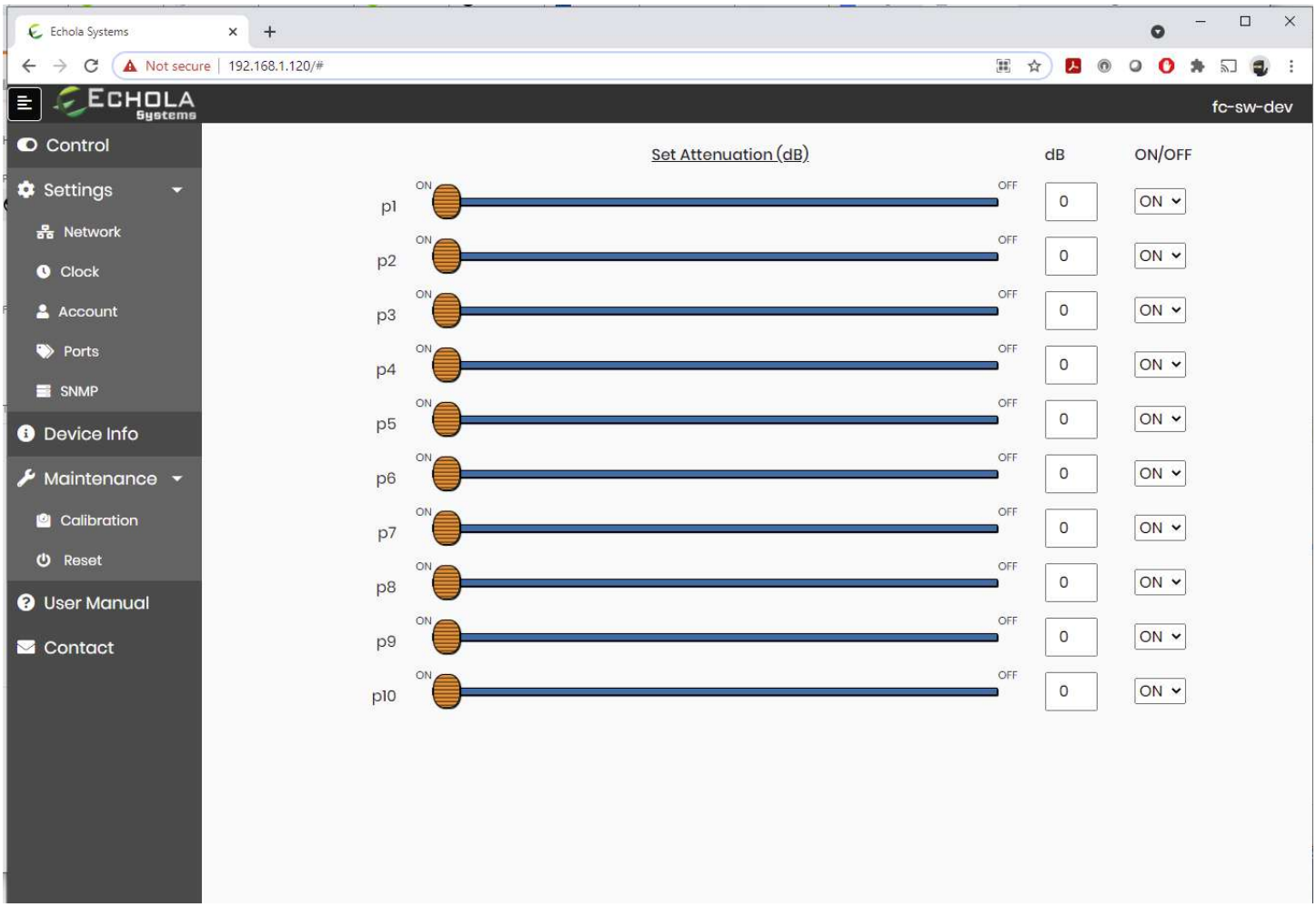
$ osctl -B 1

→ displays current attenuation of port#1

Web interface

To access the VFC1011 Web interface, just enter its IP address on the URL address bar of the web browser.

The following screenshot shows what the Web interface for VFC1011 looks like...



Secured HTTP (HTTPS) Setup

The Web interface for the Echola device is not secured by default as the browser doesn't trust the device's SSL self-signed certificate. Keeping your connection secure prevents cybercriminals from stealing sensitive data, such as your login credentials. To establish a secured HTTP connection to the Echola device, follow the following steps.

Step (1): Save the Certificate from Echola device to your Windows PC using Chrome Browser

- Click on the "Not Secure" Browser's URL tab
- Click on "Certificate not valid" from the pulldown menu
- Select the "Details" tab
- Click on the "Export" button to save the certificate.

Step (2): Import Saved Certificate to make it a trusted certificate by the Chrome browser

- Select Chrome's Settings -> Security -> Manage Certificates
- Click on the "Trusted Root Certificate Authorities" tab of "Managed Certificates."
- Click on the "Import" button to import the saved certificate

Step (3): Add the following line to the file 'C:\Windows\System32\drivers\etc\hosts'

192.168.1.62 echola.sys

After saving the hosts file, point your browser to https://echola.sys, and you should be able to establish a secured (HTTPS) connection to Echola device. Though the above steps are meant for Windows 11/Chrome, similar steps work for other OSs and Browsers.

Custom Self-signed Certificate

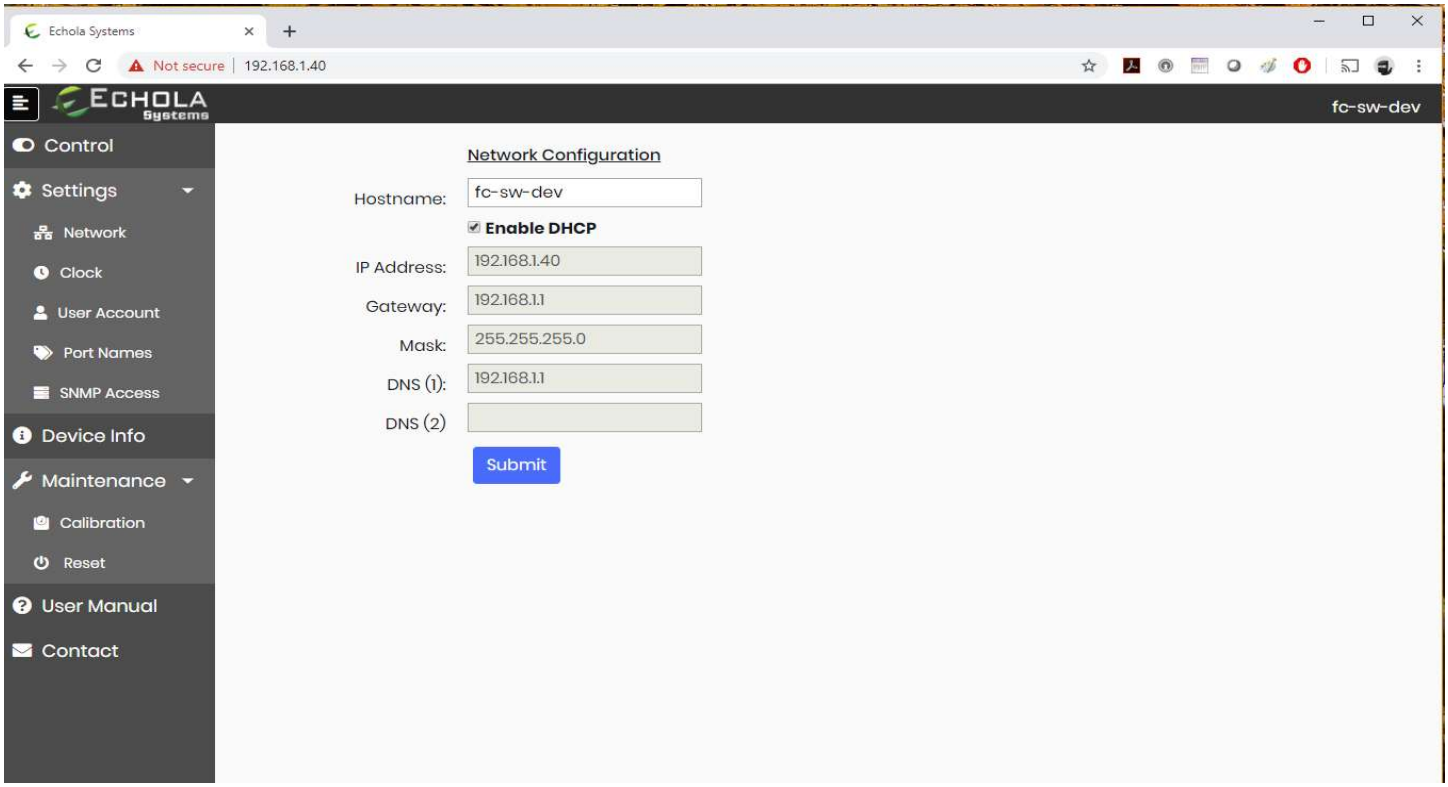
To create your custom self-signed certificate, you can run a helper script “ss_cert.sh” from the Echola device command line. This way, you can use the Echola device IP address or a domain name of your choice. You must follow the first two steps to use an IP address as your common name. If you select a domain name, follow all three steps above to reinstall the certificate on your Windows system.

Control page

The default page for the Web Application is the 'Set Attenuation' page. If you set it to the lowest attenuation, the switch is complete 'ON'. Similarly, the highest attenuation sets it to 'OFF.’ Using the text input box, you can also set the attenuation in increments of 1 dB using the slider or 1/10th of a dB. Each port must be calibrated to get the required accuracy you want. The Calibration is a little laborious, but it is a one-time task done at the time of deployment. There is a web page under maintenance which helps to make this Calibration easier.

Setup page

The setup page allows you to change the Hostname, Static IP address configuration, and Dynamic IP (DHCP). Initially, it shows the current set of values. Then, you can change them by clicking on the corresponding field. Note that changing the IP, Gateway, Mask, or DHCP setting will make the switch reboot!



Device Info page

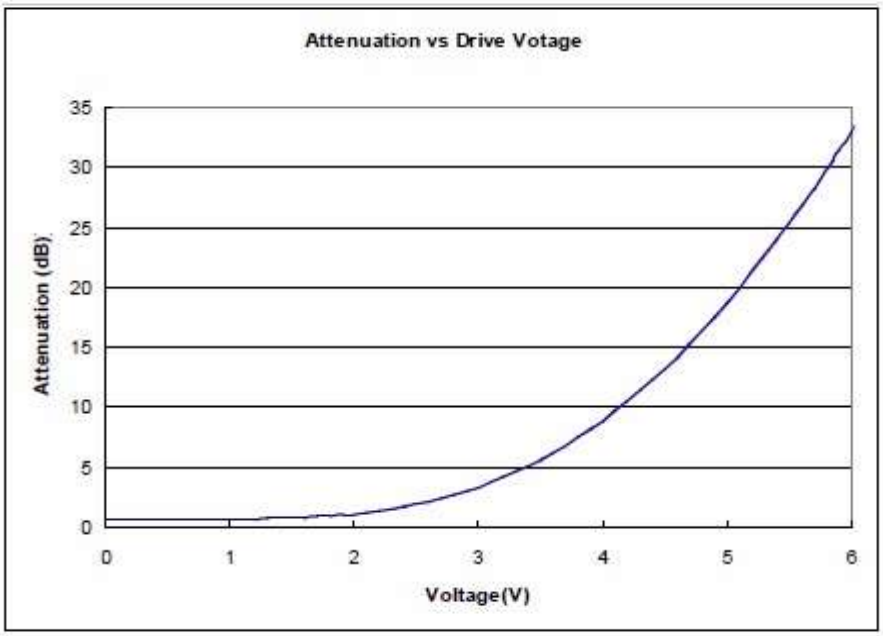
The device Info page shows hardware and software information such as model and version.

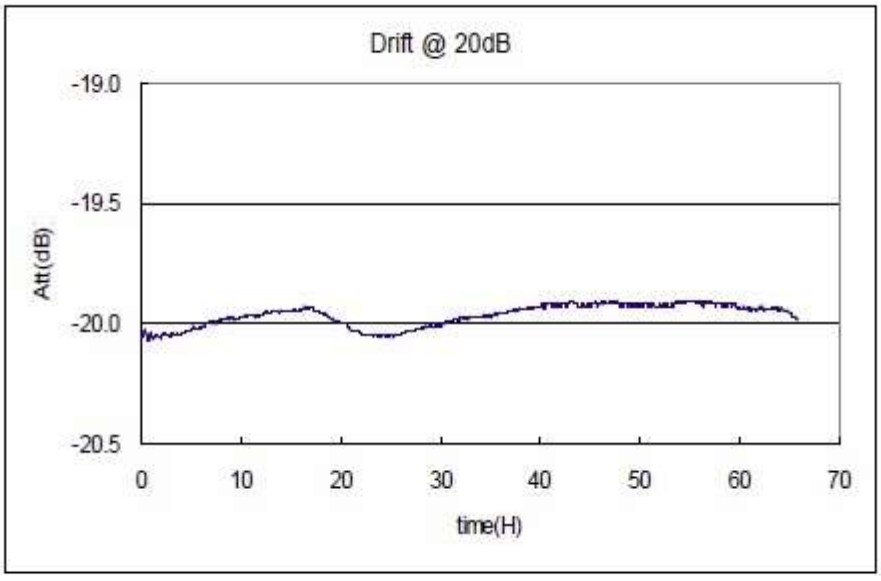
Maintenance page

This page provides "Reset/Reboot" and VOA calibration options. The Calibration of the VOA requires a laser source and an optical meter. Please get in touch with support@echola.com for calibration details.

VOA Attenuation vs Drive Voltage graph

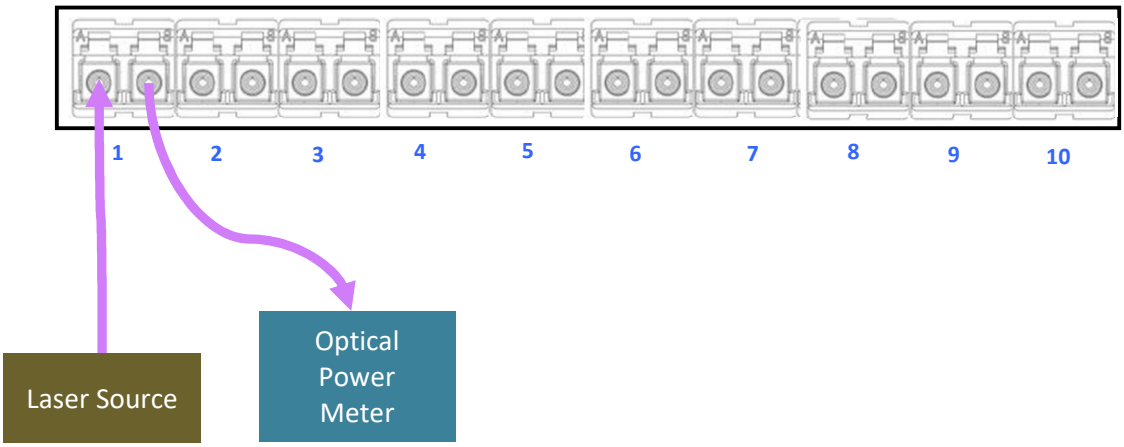
The VOA drive voltage is 0-5V, and the hardware is capable of 256 steps resolution. You can see from the below graph that they are not linear and varies between each VOAs





VOA In-house Calibration

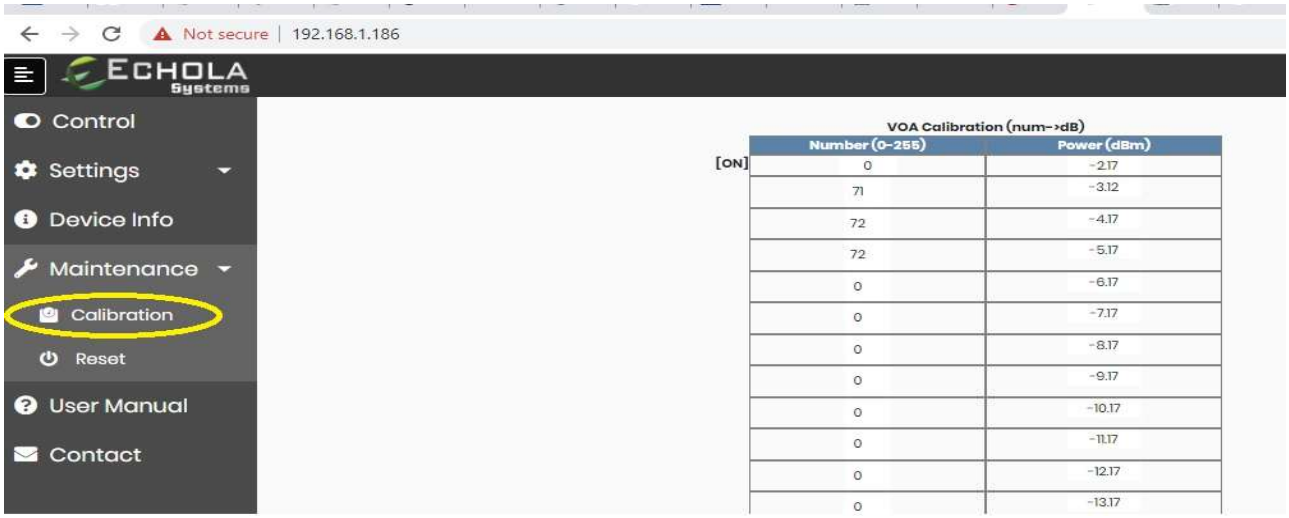
Please note that the accuracy of the Calibration depends on the quality of the laser source/reference, optical power meter, and fiber connectors/coupling/adapter that you use in the calibration setup. Also, try to use wavelength and CW/modulation settings of the laser source close to

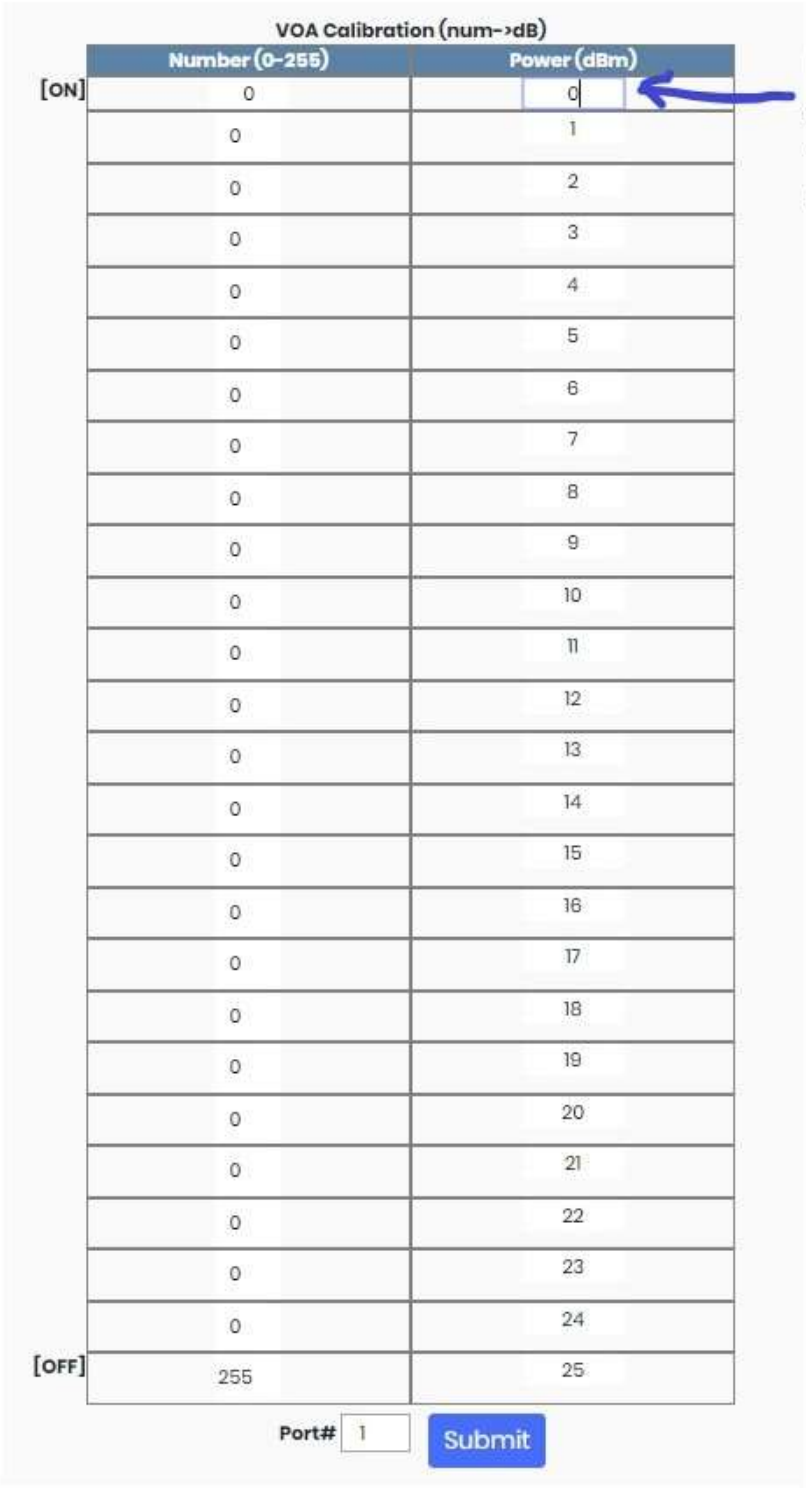


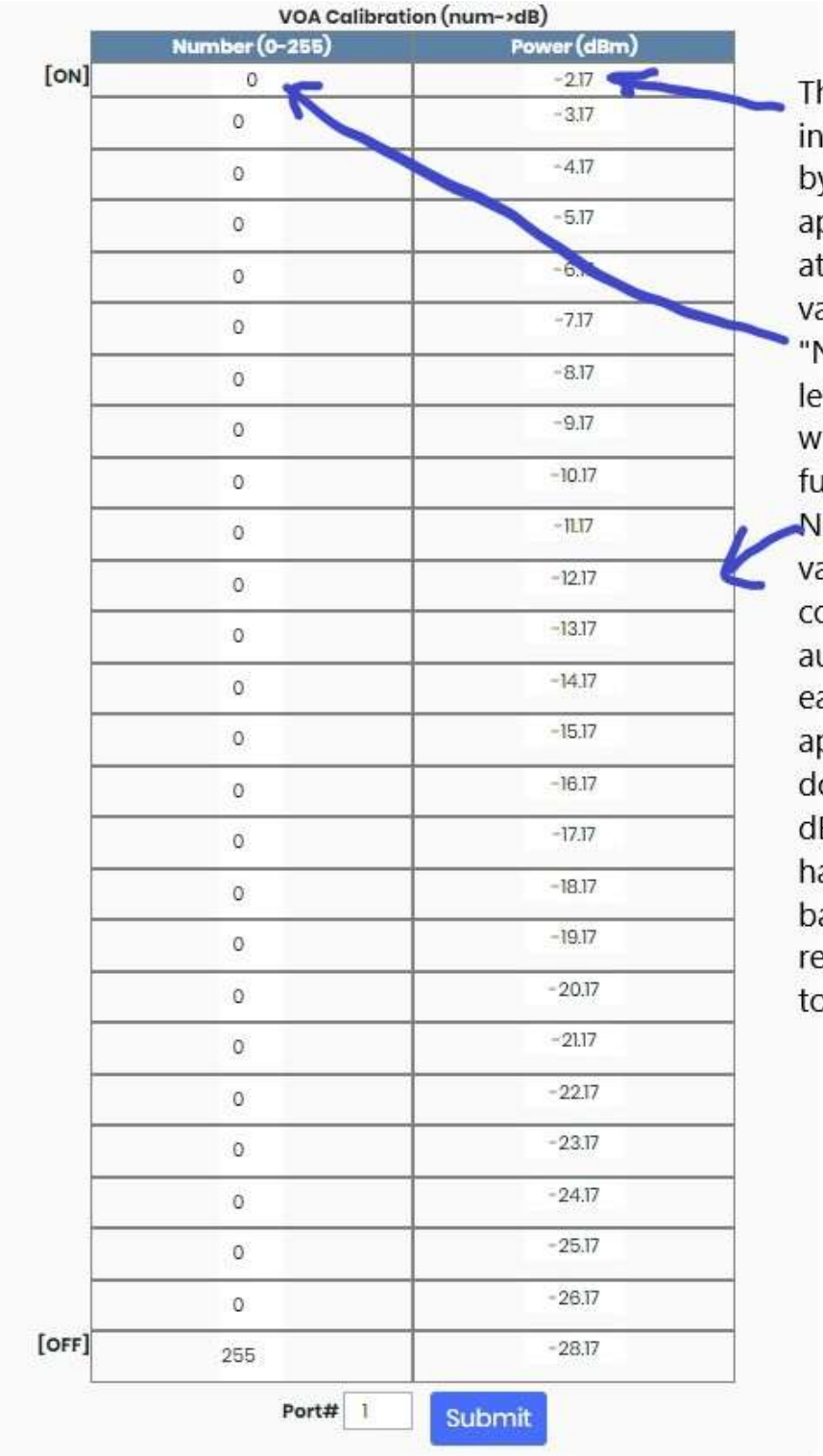
production.

Each port has to be calibrated individually. Although the above diagram shows the setup for one port, you will have to repeat the same calibration procedure for all ten ports. The laser source can be either 1310nm or a 1510nm wavelength or a tunable laser depending on production requirement.

You will need a PC, a Laptop, or a Tablet right in front of the setup to run the calibration web application from the device web page (under the Maintenance tab, select Calibration). This web page allows changing attenuation in real time. There are 26 values need to be entered to complete each port's Calibration. The software will interpolate the other values to fill in the whole 0 to 255 range.


Not secure | 192.168.1.186
ECHOLA Systems
Control
Settings
Device Info
Maintenance
Calibration
Reset
User Manual
Contact
VOA Calibration (num->dB)
[ON]
Number (0-255)
Power (dBm)
0 -2.17
71 -3.12
72 -4.17
72 -5.17
0 -6.17
0 -7.17
0 -8.17
0 -9.17
0 -10.17
0 -11.17
0 -12.17
0 -13.17

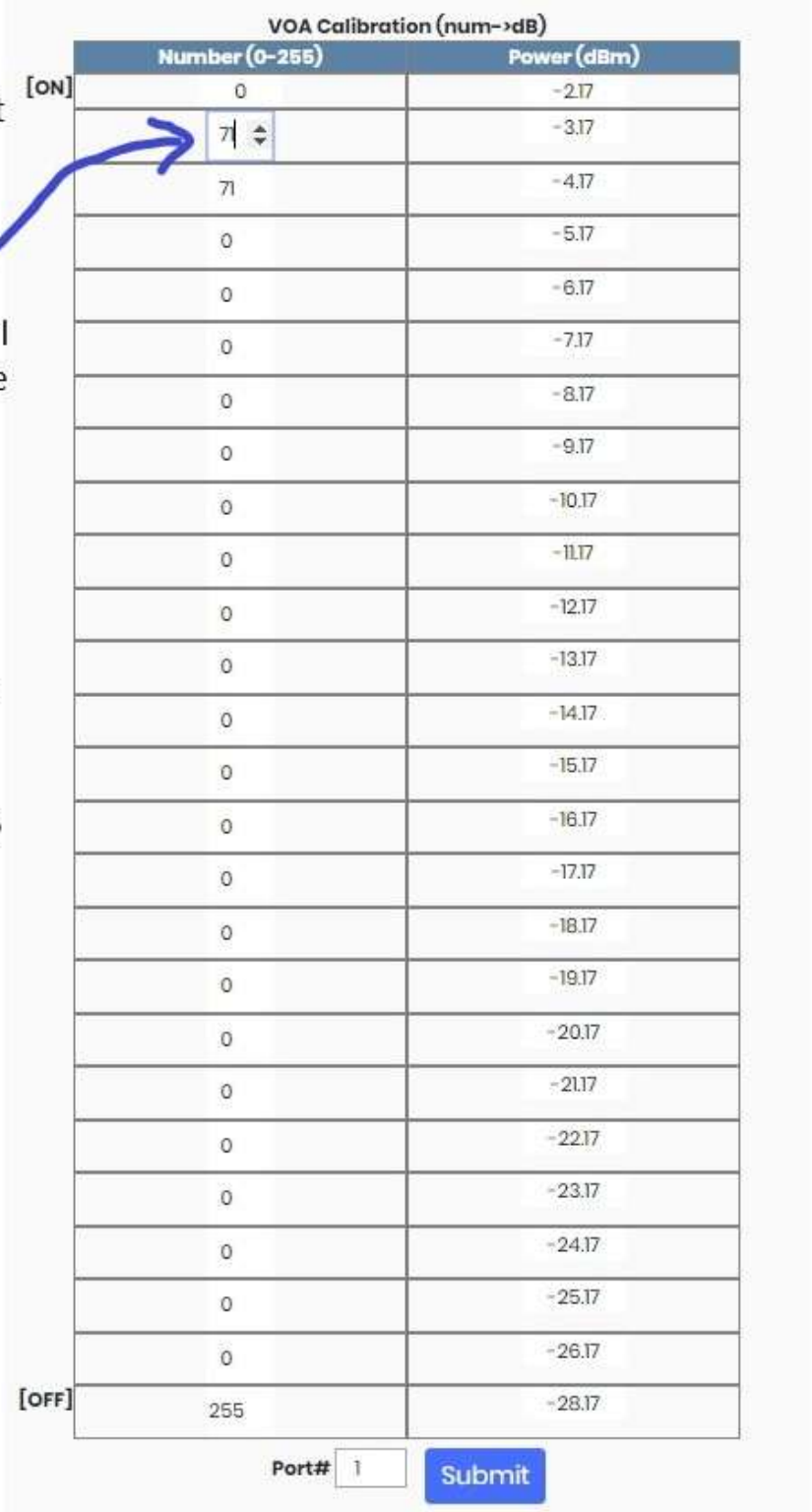

VOA Calibration (num->dB)
Number (0-255)
Power (dBm)
[ON]
[OFF]
255
Port# 1
Submit
Enter initial value shown on OPM with out applying any attenuation.



The 2.17 dBm is the initial value shown by OPM with out applying any attenuation, so the value of the "Number" on the left should be "0" which represents fully ON position. Note the other values of "Power" column is filled out automatically with each value 1 dBm apart. This value doesn't need to 1 dBm apart as we will have to fine tune based on actual reading as we move to the next value.

For the 2nd value, you start from the "Number". You can either enter a number or just use the up/down button to increase or decrease this value. You will have to keep increasing the value until you read close to -3.17 on OPM. In this case at value ("Number") 71 we were able to get close to -3.17 ("Power").

In the next picture you will see that the actual value read by the OPM which is -3.12. So you will have to adjust the value accordingly.



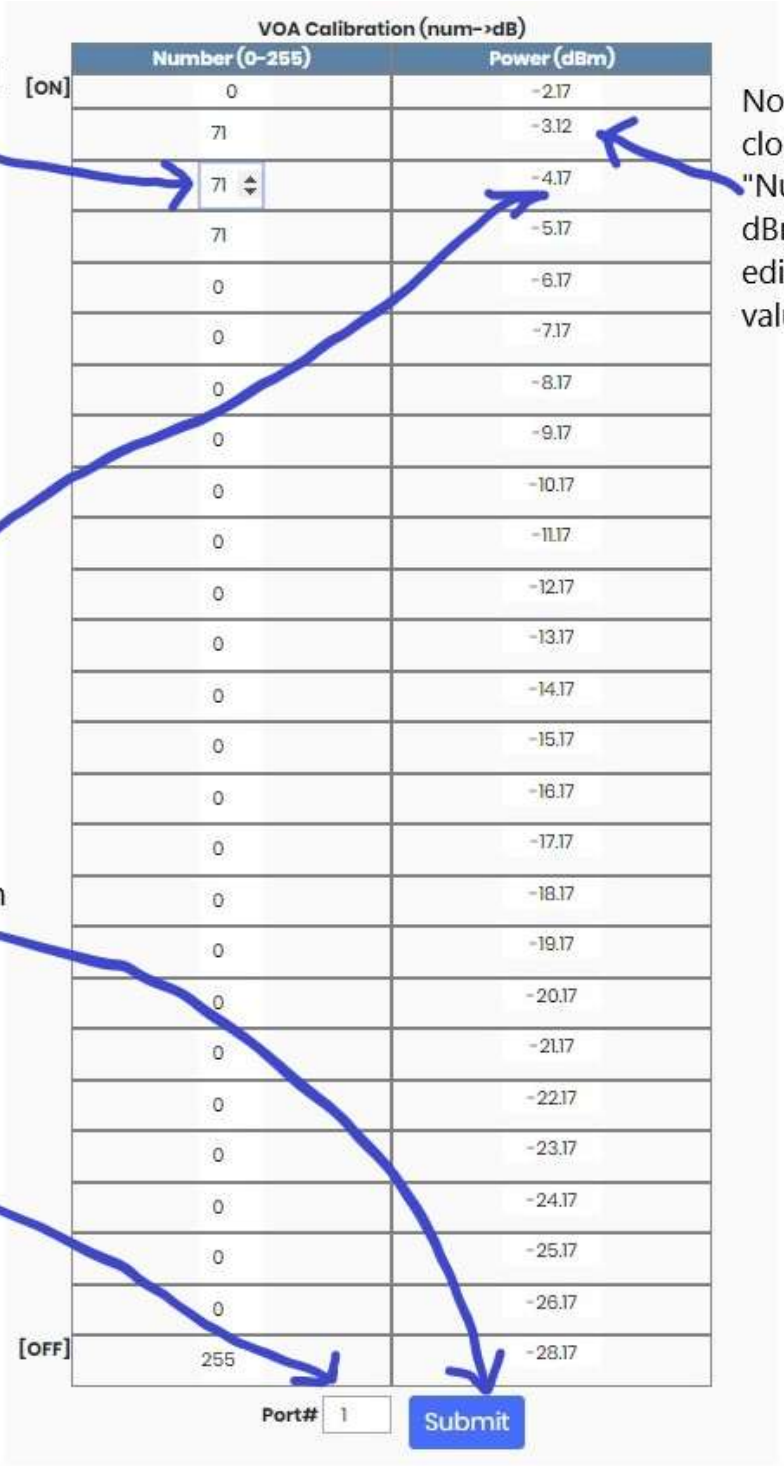
Now proceed to 3rd value by repeating same procedure. Keep increasing the value of "Number" until you get Power reading closer to -4.17 dbM (value on right).

Edit the "Power" valus to reflect actual reading from the OPM.

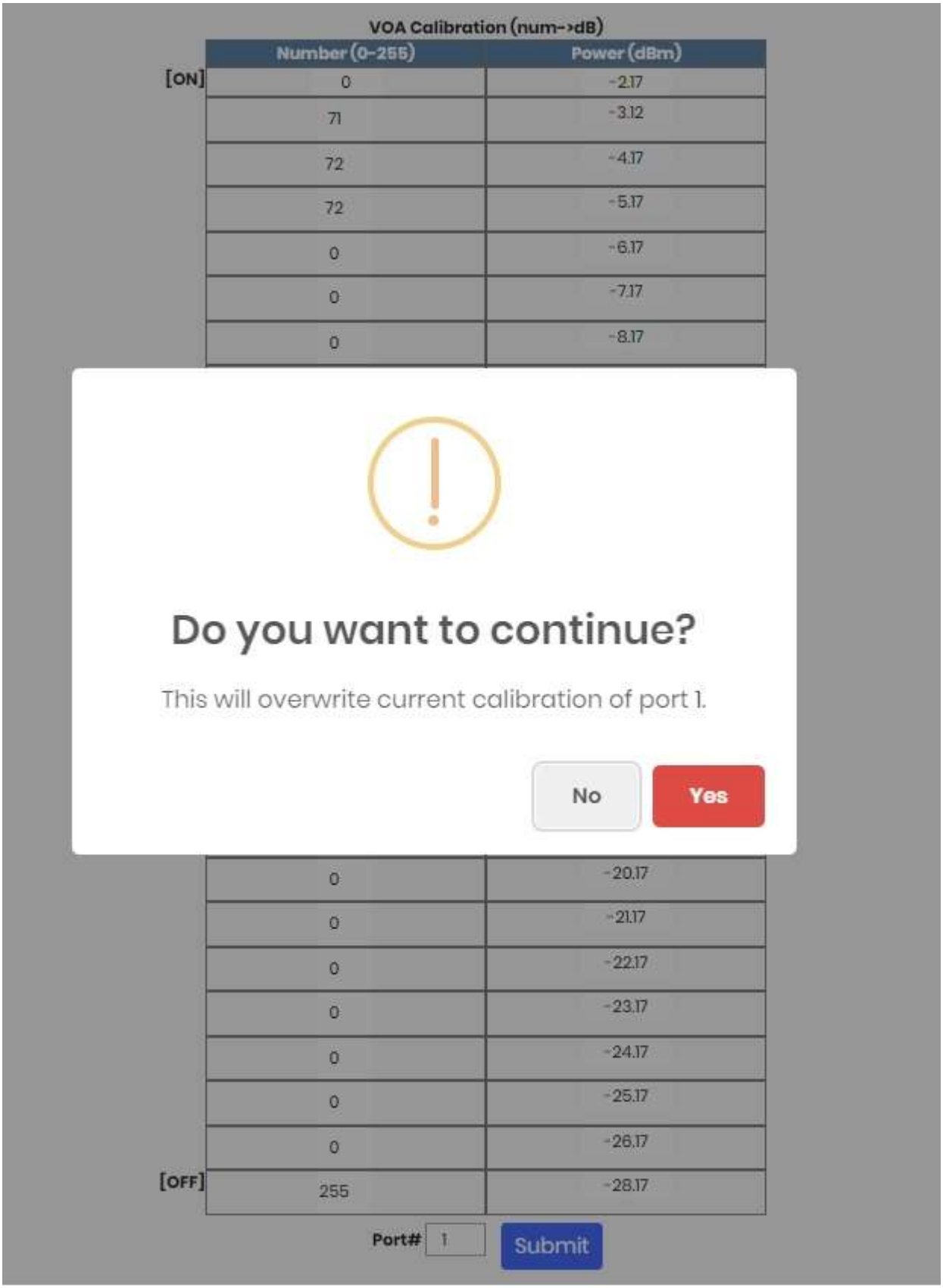
Repeat same procedure for all remaining values.

Use "Submit" button to save the calibration for port 1.

In order to start the next port, enter the port number "2" before proceeding with the calibration.



Note here the actual closest value for "Number" 71 is -3.12 dBm. So you will have to edit it to refelect actual value.


VOA Calibration (num->dB)
Number (0-255)
Power (dBm)
[ON]
0 -2.17
71 -3.12
72 -4.17
72 -5.17
0 -6.17
0 -7.17
0 -8.17
Do you want to continue?
This will overwrite current calibration of port 1.
No
Yes
0 -20.17
0 -21.17
0 -22.17
0 -23.17
0 -24.17
0 -25.17
0 -26.17
[OFF] 255 -28.17
Port# 1
Submit

Automating Echola's Optical Fiber-cut Switches

Using RESTful API

REST APIs accept JSON request bodies, returns JSON-encoded responses, and use standard HTTP response codes, authentication (basic), and verbs (GET and PUT only). The following table summarizes the available APIs.

CMD	URI	Action	Request (body) data
GET	https://[host_ip]/api/ports	Get all ports state	
GET	https://[host_ip]/api/ports/[port#|list]	Get port/s state	
PUT	https://[host_ip]/api/ports/[port#|list]	Switch On | Off port/s	{"state":<on | off>}
GET	https://[host_ip]/api/voa	Get all ports attenuation (0-255)	
GET	https://[host_ip]/api/voa/[port#|list]	Get port/s attenuation	
PUT	https://[host_ip]/api/voa/[port#|list]	Set attenuation of port/s	{"attenuation":<data>}
GET	https://[host_ip]/api/voadb	Get all ports attenuation in dB	
GET	https://[host_ip]/api/voadb/[port#|list]	Get port/s attenuation in dB	
PUT	https://[host_ip]/api/voadb/[port#|list]	Set attenuation of a port/s in dB	{"attenuation":<data>}
PUT	https://[host_ip]/api/flip/[port#|list]	Switch Off then On after a delay	{"delay_ms": <data>}

* Port could be just port number or a range (eg. 1-20) or a comma separated list (eg. 2,5,6)

Examples:

1. The following example shows how the attenuation of port 1 can be set using a 'curl' command-line script. ***Please note it is not a good practice to use the password on the command line directly, as shown below. Alternatively, you could use curl's netrc option "-n <user_password_file>" instead of the "-u" option and protect the password file with the appropriate permissions.***

```
curl -X PUT \
    -u admin:admin \
    -H "Content-Type: application/json" \
    -d '{"attenuation": "159"}' \
```

-k https://192.168.1.120/api/voa/1

2. Following command returns the state of port 2 (whether it is ON or OFF)

```
curl -u admin:admin \
    -H "Content-Type: application/json" \
    -k https://192.168.1.120/api/ports/2
```

responds with

```
{"state":"on"}
```

3. Following command returns the attenuation of port 1

```
curl -u admin:admin \
    -H "Content-Type: application/json" \
    -k https://192.168.1.120/api/voa/1
```

responds with

```
{"attenuation":"159"}
```

4. Following command switches port 2 to OFF

```
curl -u admin:admin -X PUT \
    -H "Content-Type: application/json" \
    -d '{"state": "off"}' \
    -k https://192.168.1.120/api/ports/2
```

5. Following command sets, the attenuation of port 1 with an endpoint that accepts input in dB

```
curl -X PUT \
    -u admin:admin \
    -H "Content-Type: application/json" \
    -d '{"attenuation": "10"}' \
    -k https://192.168.1.120/api/voadb/1
```

Using osctl CLI to automate

VFC1011 configuration or monitoring can be automated using the osctl command available on the switch using external terminal automation tools such as Tcl/Expect. Unlike RESTful API, which supports limited configurations, the osctl command supports all configurations, including the network.

Running scripts from Unix/Linux systems.

1If you want to run the script from a Unix/Linux-based machine, then there is a possibility that you may have these tools on your system. First, check if it's already been installed by typing "expect" from the Unix/Linux prompt. If it is not installed, you will have to install it using the package install tool for that variant of Unix/Linux. For instance, on Fedora core Linux, you can use "yum install tcl expect" to install Tcl and Expect.

Running scripts from Windows.

For Windows-based systems, you can install the Windows free community version of ActiveTcl from Activestate, then make sure to install "expect" using the command "teacup install Expect."

Also, you need to enable the "telnet" client on Windows before running any scripts. To enable telnet on Windows, follow these steps.

1. Click on Start
2. Control Panel
3. Programs and Features
4. Turn Windows features on or off
5. Check Telnet Client Hit OK

After that, you can start Telnet via Command Prompt to check if it works.

The following sample script logs into VFC1011/VFC1011 switch, issues a switch command, checks whether the switch command was successful, and returns the result before terminating the telnet session. This script takes an argument (port number and state of the port (on/off)) from the command line argument. Cut and paste the following script onto any editor and save it as "rosctl". Then you can run the script by issuing "rosctl -p <port#> on|off. For instance, to switch port 2 to ON, you can call the script rosctl -p 2 on". Ensure you have a proper path set for Expect on the first line "#!/usr/bin/expect" for Unix/Linux-based systems. For Windows, you will have to uncomment 'exec' and 'package' commands, as the script mentions. All comments inside '#' provide more info on what the script is doing.

Sample Tcl/Expect script Using 'osctl' CLI

```
#!/usr/bin/expect
##################################################################
##############
  # This script switches the given port and verifies if the port is switched from a
  remote machine
  #          Command Usage: rosctl -p <port#> on|off
##################################################################
##############
  # For windows uncomment following
  #   exec tclsh "$0" ${1+"$@"}
  #   package require Expect

  # Check number of arguments passed to this command if < 3 then spit out
  error & exit

 if { $argc < 3 } {
          puts "Usage: rosctl -p <port#> on|off\n"
      exit 1
    }

  # Set telnet host, username, password and other parameters, modify these to
  reflect your setup
 set hostname "192.168.2.20"
 set username "osctl"
 set password "osctl"
 set prompt "osctl@.*\$"
 set port [lindex $argv 1]
 set status [lindex $argv 2]
 set commandcontrol "osctl -p $port $status"
```

```
set commandstatus "osctl -s $port"

# Display info.

puts "Connecting to $hostname."

# Connect to the telnet server using the "spawn" command.
   spawn telnet $hostname
#spawn C:\Putty\putty.exe -telnet $hostname
# Wait for a login prompt.
   expect -re "(Name|login|Login|Username).*:.*" {
      # Login prompt received. Send user name to VFC1011/VFC1011.
      send "$username\r"
} eof {
      # No login prompt received. Display an error.
   puts "could not connect\n"
   }

# Wait for a password prompt from the Unix server.
   expect "Password:" {
      # Password prompt received. Send the password.
      send "$password\r"
   }

# Wait for the switch prompt.
   expect -re $prompt {
      # Issue osctl command to switch given port
      send "$commandcontrol\r"
   }

# Wait for the switch prompt again to check status.
```

```
    expect -re $prompt {
        # Issue osctl command to check status
        send "$commandstatus\r"
    }

# Discard echoed command - we need only the status
    expect "$commandstatus\r"
# Discard unwanted prompt as well
    expect -re "(.*)$prompt"
 #Debug
 #puts "\nGOT*****$expect_out(buffer)***************\n"
 #puts "\n GOTS ####$expect_out(1,string)#####\n"
# Save remaining to buffer 'data'
 set data $expect_out(1,string)
# Check return status and display result accordingly
 switch -re $data {
       "off" { puts "Port $port is OFF" }
        "on"  { puts "Port $port is ON" }
         default { puts "Port $port status is unknown" }
    }

# Terminate telnet
send "exit\r"
```

Hardware Specifications	
Electrical	
Input Power	100-240 AC
Total Power Consumption	< 7 Watts
Serial Console Port	1x micro-USB
Networking	1x 10/100 Ethernet
Optical Specification for FC Series	
Connectivity	10 duplex LC connectors
Data rate	Any data rate - Physical Layer Switch, no limitation
Display	OLED (1 inch)
Optical Technology	1x1 MEMS
Insertion Loss (**dB**)	0.5 Typical, 0.8 Max. (without connectors)
Switching Time (**ms**)	≤ 10
Crosstalk (**dB**)	≤ -80
Repeatability (**dB**)	≤ 0.1
Optical Specification for VFC Series (SM)	
Connectivity	10 duplex SM LC connectors
Data rate	Any data rate - Physical Layer Switch, no limitation
Display	OLED (1 inch)
Wavelength (**nm**)	1310±50nm & 1550±50nm
Optical Technology	MEMS VOA
Insertion Loss (**dB**)	< 0.8 dB (without connectors)
Switching Time (**ms**)	≤ 5
Crosstalk (**dB**)	≥ 65
Attenuation Dynamic Range (**dB**)	> 30
Attenuation Resolution (**steps**)	256 steps
Optical Power Handling (**mW**)	≤ 250mW/channel
Environmental	
Operating Temperature (**ºC**)	-5 ~ +75
Storage Temperature (**ºC**)	-40 ~ +85
Relative Humidity Range (**%**)	0 ~ 85

General Software Info

➔ This device runs the Debian distribution of the Linux OS. Most of the Debian tools can be used as-is for debugging purposes.

➔ All the group information is stored in a hidden XML database file. If this file is corrupt, the system will recover from this error by trying to copy the backup database file. If this happens, it will throw a warning message, but it is not guaranteed that all the group information will be restored correctly. In that case, you may need to recreate missing groups.

➔ For adding additional users, you can use Linux's "sudo useradd" command.

➔ Contact Info

If you have any technical questions and need help, you can send an email to support@echola.com. You can also download the latest documents and software from our website www.echola.com.