



VeriFire®

9002-021-200-INT

User Manual



Table of Contents

Table of Figures.....	3
Table of Tables.....	4
Equipment Overview	5
VeriFire® Panel.....	6
Battery Charger.....	6
I/O Cable	7
Perf Switch and Wireline Simulator Panel.....	8
VeriFire® Panel Specifications	9
VeriFire® Mechanical Description.....	10
VeriFire® Panel Operation	12
Battery Charger Operation	12
Turning VeriFire® Panel ON and OFF	13
Self-Test Screen.....	15
Verify Switch String.....	16
Connecting VeriFire® Panel to Gun String	19
FIRMWARE Updates	21
Interface Board Update	25
Display Board Update	27
VeriFire® Connecting to ControlFire Panel.....	28
Technical Assistance	29
Maintenance.....	29

Cleaning.....	29
Fuse	30
Battery.....	30
External Battery Charger.....	30
Revision History	30

Table of Figures

Figure 1 - Safety Precaution	4
Figure 2 - VeriFire® Panel.....	6
Figure 3 - Battery Charger	7
Figure 4 - VeriFire Wireline I/O Cable	7
Figure 5 - BNC Right Angle Adapter	8
Figure 6 Perf Switch and Wireline Simulator Panel	8
Figure 7 - VeriFire Front Panel	10
Figure 8 - Firmware Update Panel Features	11
Figure 9 - Battery Charging Screen	13
Figure 10 - First Splash Screen with Hunting Logo.....	14
Figure 11 - Second Splash Screen	14
Figure 12 - Home/Self-Test Screen	15
Figure 13 - Verify String	16
Figure 14 - Verify String Result with Errors.....	18
Figure 15 - Verify Switch String Result with no errors	19
Figure 16 - Self-Test Screen Result.....	20
Figure 17 - VeriFire System Drawing.....	21
Figure 19 ControlFire Home Screen.....	22
Figure 20 VeriFire Firmware Update Screen.....	23
Figure 21 HID Driver Installation	24
Figure 22 Interface Board Firmware Update	25
Figure 23 Interface Firmware Selection.....	26
Figure 24 Verifire Display Board Firmware Update	27
Figure 25 Display Board Firmware Selection	28
Figure 26 BNC to TNC Adapter.....	29

Table of Tables

Table 1 - Required Equipment	5
Table 2 - Optional Equipment	5
Table 3 - VeriFire® Environmental Specifications	9
Table 4 - VeriFire Physical Specifications	9
Table 5 - Electrical Specifications	9
Table 6 - Switch Data.	17

Safety Precautions When Using VeriFire® Panel

The following precautions must be followed when using the VeriFire® Panel

1. Never connect the VeriFire® directly to a detonator or igniter. A ControlFire® switch must be between the detonator and the leads of the VeriFire®.
2. The VeriFire® is only to be used on gun systems which contain ControlFire® switches and “resistorized” detonators/igniters (if armed).
3. Do NOT open the unit and try to service. If any service or repair is required the unit must be returned to the manufacturer, Hunting Energy Services, Titan Div.
4. Always use the recommended battery charger. Do not substitute with another external charger. A conventional USB C cable and 5V source can also be used. The 5 VDC source MUST be used to perform firmware updates.
5. Always use the recommended I/O cable between the VeriFire® Panel and the gun string being tested.
6. Never use in the presence of an approaching thunderstorm or during extreme weather conditions.
7. When charging battery, make sure you are in a safe area; NOT in a hazardous location as defined as a place where a concentration of flammable gases, vapors, or dusts is present.
8. If equipment is not used in a manner specified by the manufacturer, safety protection may become impaired.

Figure 1 - Safety Precaution



Equipment Overview

The minimum equipment required for running a VeriFire® panel is listed in Table 1.

Item	Equipment Description	Hunting Titan Part Number
1	VeriFire® Panel	9002-021-200-INT
2	Battery Charger	E4000-VF-DC-CHG-ASSY ^(B)
3	I/O Cable	E6000-MI031

Table 1 - Required Equipment

Optional equipment that can assist in troubleshooting and testing is listed in Table 2. See Appendix for more details.

Item	Equipment Description	Hunting Titan Part Number
¹ 1	Perf Switch Wireline Simulator Panel	9002-013-610
2	ControlFire® Switch	Various. See sales for P/N's
3	Hunting Gun System	Various. See sales for P/N's

Table 2 - Optional Equipment

¹Item 1 under Optional Equipment can be used for system verification at the shop or on a job location.

VeriFire® Panel

Figure 2 is a view VeriFire® Panel with the lid open. The purpose of the VeriFire® Panel is to test and confirm the proper operation of ControlFire® switches contained in an armed or unarmed perforating gun while on surface. This unit is self-contained, equipped with a rechargeable battery, built-in touch screen and a sunlight visible LCD.



Figure 2 - VeriFire® Panel

The front panel features a power switch, wall adapter charging port, a USB C charging port, a BNC connector for connecting the panel to the gun string, wireline fuse, and a Firmware Update access panel for updating the firmware of the two controllers used in the VeriFire®. One controller handles the display and the other handles the communication to the ControlFire® switches.

Battery Charger

Figure 3 is a photo of a representative VeriFire® Panel battery charger. The actual charger used may vary by brand and AC cord requirement. The battery charger input accepts AC voltage between 100VAC to 240VAC, 47 Hz to 63Hz. While the VeriFire® Panel battery is charging, the unit is in the battery charge mode and will not operate.



Figure 3 - Battery Charger

In lieu of the using the battery charger the VeriFire® battery can also be charged using a conventional USB C cable.

Note: Do not install both the VeriFire® charger and the USB C cable into the VeriFire® at the same time.

I/O Cable

Figure 4 is a photo of the suitable I/O cable (Hunting P/N E6000-MI031, Pico Technology P/N MI031) used to connect the VeriFire® Panel to a gun string being tested. The BNC connector interfaces to the Tool String I/O connector of the VeriFire® Panel, and the clips connect to the gun string being tested.



Figure 4 - VeriFire Wireline I/O Cable

Figure 5 is an optional 90-degree BNC to BNC adapter (Hunting P/N E2100-031-9-75RFX, Amphenol P/N 031-9-75RFX) can be used to allow the I/O cable to exit the VeriFire horizontally instead of vertically.



Figure 5 - BNC Right Angle Adapter

Perf Switch and Wireline Simulator Panel

Figure 6 is a Perf Switch Simulator that allows the user to perform demonstration and training exercises, as well as troubleshoot interconnections and equipment at the well site.

NOTE: When using the Wireline Simulator Panel with the VeriFire® Panel the W/L Simulator switch **MUST** be in the Bypass position.



Figure 6 Perf Switch and Wireline Simulator Panel

VeriFire® Panel Specifications

Table 3 lists the VeriFire® Panel Environmental Specifications.

Specification	Rating/Description	Conditions
Temperature	(-10° to +50°) C (+14° to +122°) F	Operating
	(-10° to +50°) C (+14° to +122°) F	Start Up
	(-20° to +65°) C (-4° to +149°) F	Storage
Humidity, RH%, Operating & Storage	10 to 95% RH	Non-Condensing

Table 3 - VeriFire® Environmental Specifications

The VeriFire® panel is suitable for outdoor use or in a wireline truck with a pollution degree of 3 or less. The environmental conditions must remain within the Table 3 limits. The case provides a IP67 rating only when the lid is fastened.

Table 4 lists the VeriFire® Panel Physical Specifications.

Item	Rating/Description
Dimensions	13.5" x 5.75"x11.75"
	34 cm x 14.6cm x 30cm
Weight	12 lbs./5.4 kgs

Table 4 - VeriFire Physical Specifications

Table 5 lists the VeriFire® Panel Electrical Specifications.

Item	Rating/Description
Maximum Wireline Current	20mA
Nominal Wireline Voltage	26.5 VDC
Maximum Wireline Voltage	30 VDC
Battery Charger Input	100 to 240 VAC, 50 Hz/60Hz, 1.3A MAX.
Battery Charger Output	13.5 VDC, 2.66A

Table 5 - Electrical Specifications

VeriFire® Mechanical Description

The following describes the various mechanical features of the VeriFire® Panel. Figure 7 is an overall view of the VeriFire Front Panel.

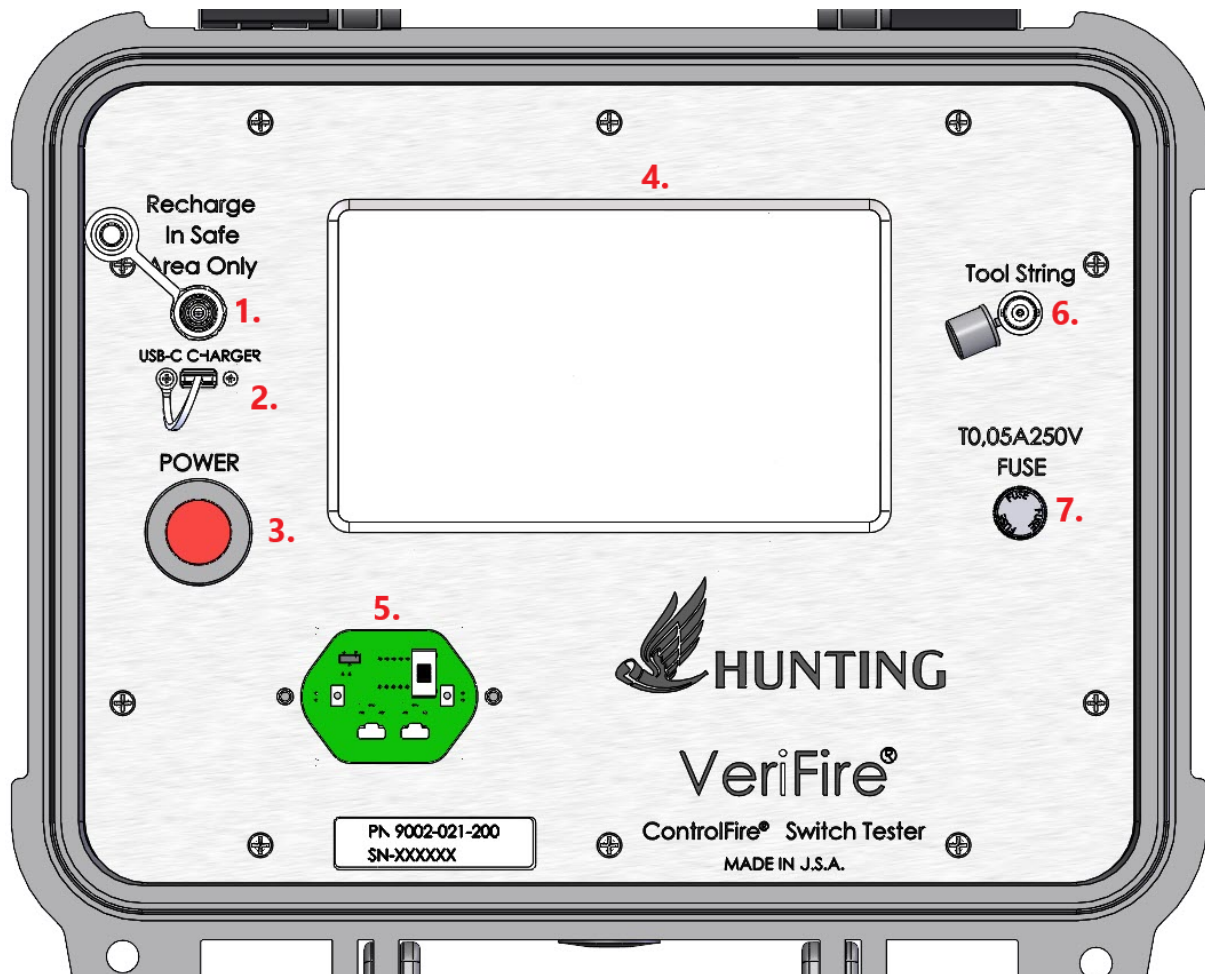


Figure 7 - VeriFire Front Panel

1. 12V charger input.
2. USB C charger only input. No data transfer can occur through this port.
3. Power Switch.
4. Touch Panel Display. For manipulating the VeriFire® operations.
5. Firmware Update Access Panel. For updating the two VeriFire® controllers' firmware and to control the battery power to the internal PCB assemblies (shown with Firmware Access Cover removed for clarity).
6. BNC Connection. For connecting the VeriFire® to the gun string to be tested.

7. 50mA wireline fuse. This fuse protects the wireline output from inadvertent shorts in the gun system being tested. Refer to the [Maintenance](#) section for the replacement fuse part number.

Removing the Firmware Update access panel reveals the following features shown in Figure 8:

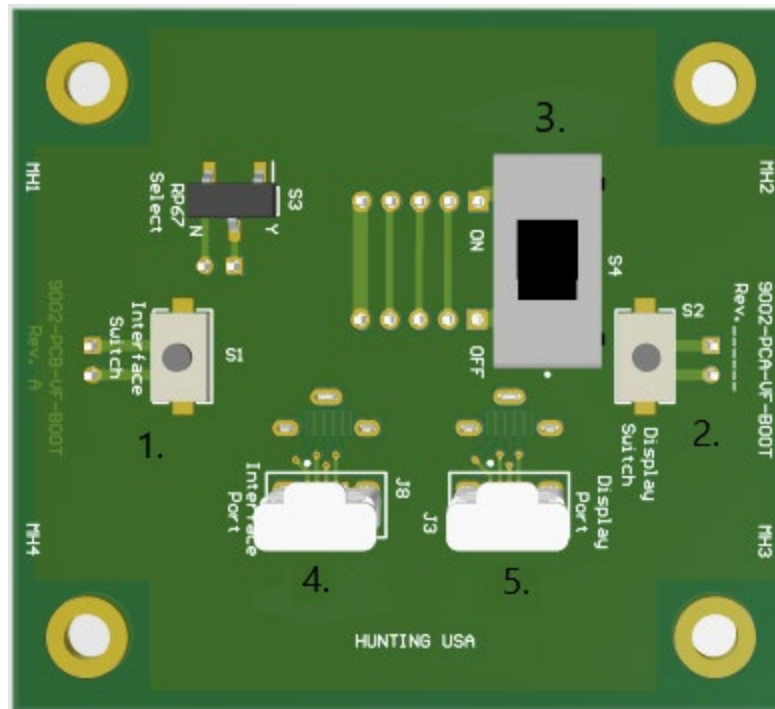


Figure 8 - Firmware Update Panel Features

1. S1 - Interface Switch. This switch is pressed while connecting a charger to the VeriFire panel. This will allow the interface board firmware to be updated.
2. S2 – Display Switch. This switch is pressed while connecting a charger to the VeriFire panel. This will allow the display board firmware to be updated.
3. S4 – Battery switch. See the [Battery Charger Operation section](#) for details.
4. J8 – Interface board programming port. This is a USB micro-B connection. Connect this to the host PC to facilitate updating the interface board firmware.
5. J3 – Display board programming port. This is a USB micro-B connection. Connect this to the host PC to facilitate updating the display board firmware.

VeriFire® Panel Operation

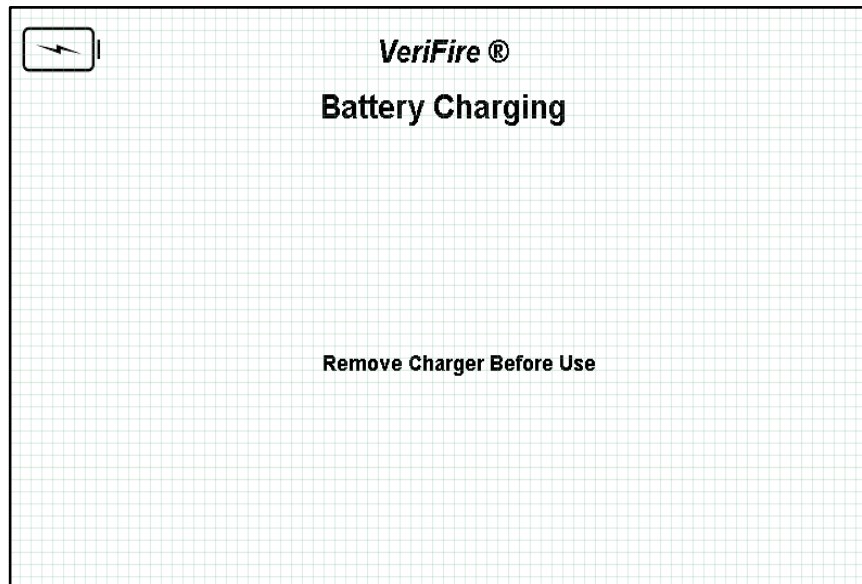
Be sure to understand all operations and screen descriptions in this section before trying to connect the VeriFire® Panel to a live gun string. During the learning process and demos, use the Wireline Simulator Panel in place of the gun string. The VeriFire® Tool String output cable connects to the Wireline Simulator Panel input (Red to Red and Black to Black). Make sure the W/L Simulator switch is in the Bypass position.

Battery Charger Operation

NOTE: It is highly recommended to fully charge the battery before the first use. The battery is shipped in a partially charged state.

The steps for charging the battery are as follows:

1. Remove the two screws that hold the Firmware Update access panel in place. Refer to Figures 7 and 8.
2. **Ensure the Battery switch S4 located on the board has been moved to the ON position.**
 - a. This switch is set in the OFF position when shipped from the factory to maximize battery life while the VeriFire® is not used. This switch connects the battery to the PCB assemblies.
 - b. Move to the OFF position if the VeriFire® is not going to be used for an extended period to maintain battery life.
3. Reinstall the access panel.
4. Before connecting the battery charger, make sure the area is safe; NOT in a hazardous location, defined as a place where concentrations of flammable gases, vapors, or dusts are present.
5. Plug the Battery Charger input into either a 120VAC or 240VAC outlet. Make sure the AC power cord is compatible with the AC receptacle.
6. Plug the Battery Charger output plug into the VeriFire® Panel. A USB C cable can optionally be used instead to charge the VeriFire. **Note: Only one charger cable should be connected at a time.**
 - a. The VeriFire® Panel turns ON and boots up followed by the Battery Charging screen as shown in Figure 9.
 - b. The Battery Charging screen indicates that the battery is charging and shows a battery icon along with the percentage of battery charge.
7. The battery charger must be disconnected from the VeriFire® Panel before using the panel. The panel remains inoperative while the battery charger is connected.
8. After disconnecting the battery charger, the VeriFire® Panel goes through a self-test and displays the VeriFire® home screen shown in Figure 12. A full description of the VeriFire® home screen is given in the Self-Test Section.



Turning VeriFire® Panel ON and OFF

Figure 9 - Battery Charging Screen

- 1) Before using the VeriFire® Panel to test a gun string, make sure that a Battery Charger cable is NOT connected to the unit.
- 2) The VeriFire® Panel is turned on by briefly pressing and the releasing the RED Power button^(B).
- 3) Two splash screens are initially displayed as shown in Figures 10 and 11. It takes about 6 seconds for the unit to boot up and present the VeriFire self-test screen shown in Figure 12.
- 4) To turn the unit off, press and hold the power button for at least three seconds. The display will go blank. Afterward the screen goes blank, the power button can be released. Pressing the power button for less than three seconds will not allow the unit to complete the power down procedure.
- 5) A VeriFire® Panel will turn OFF automatically if there is no activity for about 5 minutes.



Figure 10 - First Splash Screen with Hunting Logo

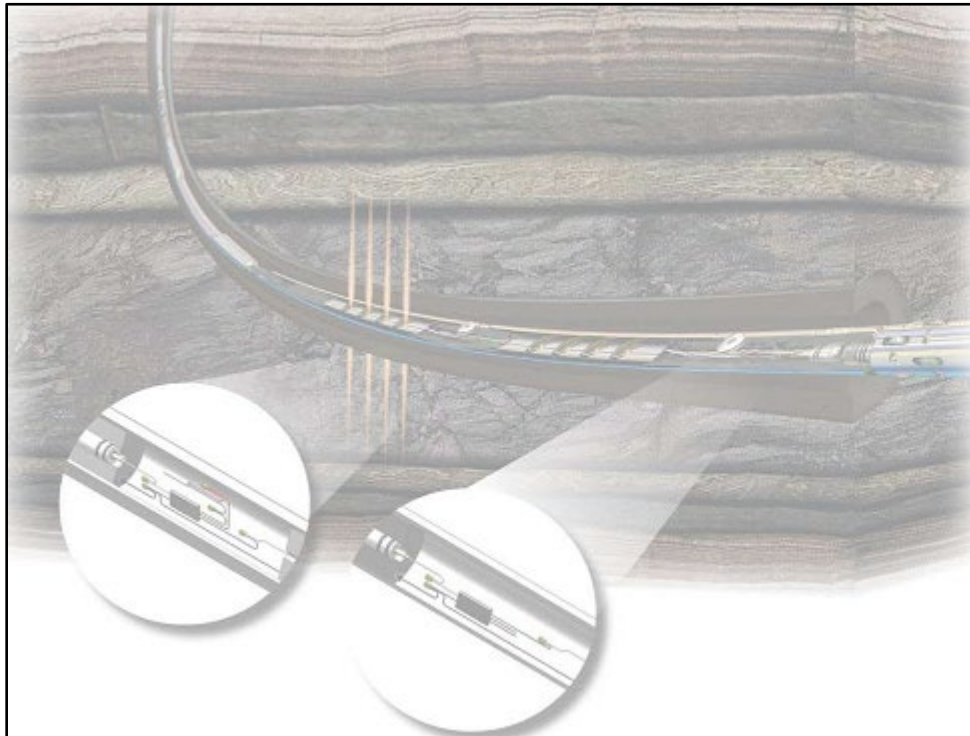


Figure 11 - Second Splash Screen

Self-Test Screen

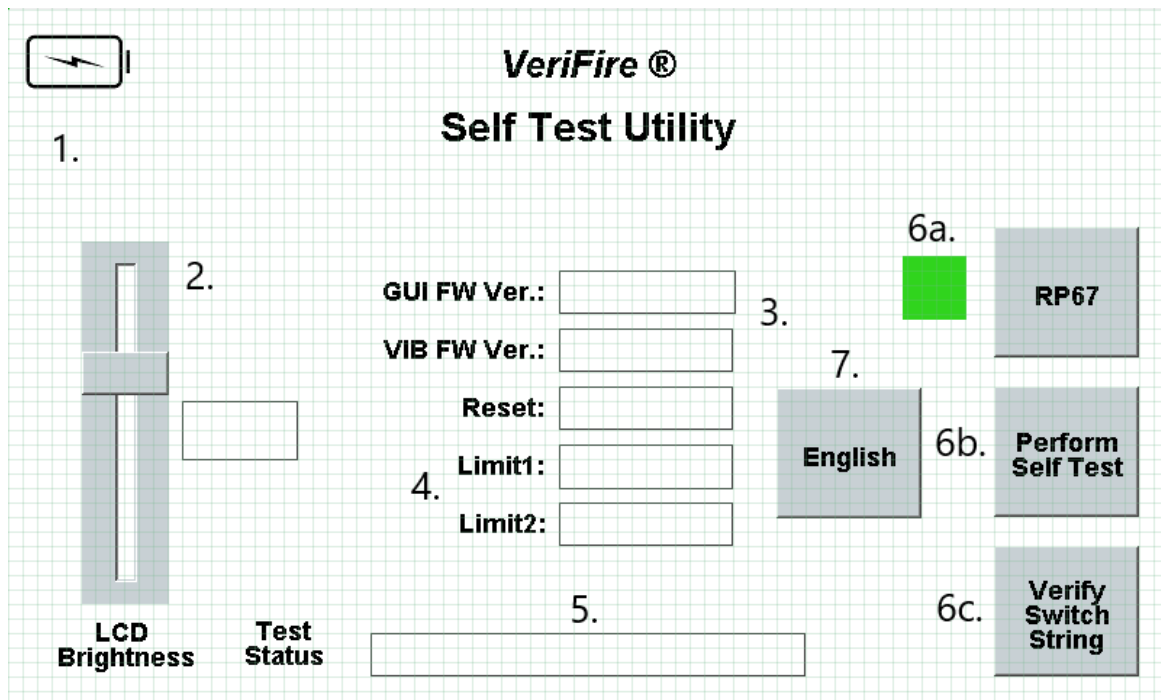


Figure 12 - Home/Self-Test Screen

Shown in the self-test screen in Figure 12 are:

1. Battery Icon along with remaining battery life as a percentage.
2. LCD brightness adjustment.
3. Firmware revisions for the display and interface boards.
4. Validation that the controller reset and both current limits, Limit 1, and Limit 2, passed.
5. A successful boot up and self-test is also indicated by the Test Status line; "COMPLETED". If any of the tests fail, a FAILED message is displayed for that test.
6. Three Menu buttons
 - a. RP67 – Inactive icon on this model. Green square indicates RP67 compliance.
 - b. Perform Self-Test – Perform the self-test again.
 - c. Verify Switch String – Provides a means to test any gun string.
7. Language Display – Pushing this toggles the language between English, Spanish and Chinese. The language choice is stored in memory.

LCD Brightness Adjustment

The LCD brightness is adjusted by moving the slider bar up for brighter, or down for dimmer. It is recommended to keep the LCD brightness at a reasonable level for a given ambient light. This will help maximize the battery life. The display will automatically dim after 30 seconds of non-use. The display can be brought to the original brightness by pushing a button or hitting the upper right corner of the screen.

Verify Switch String

Figure 13 shows the Verify Switch String screen. It is accessed from the Self-Test screen by touching the “Verify Switch String” button.

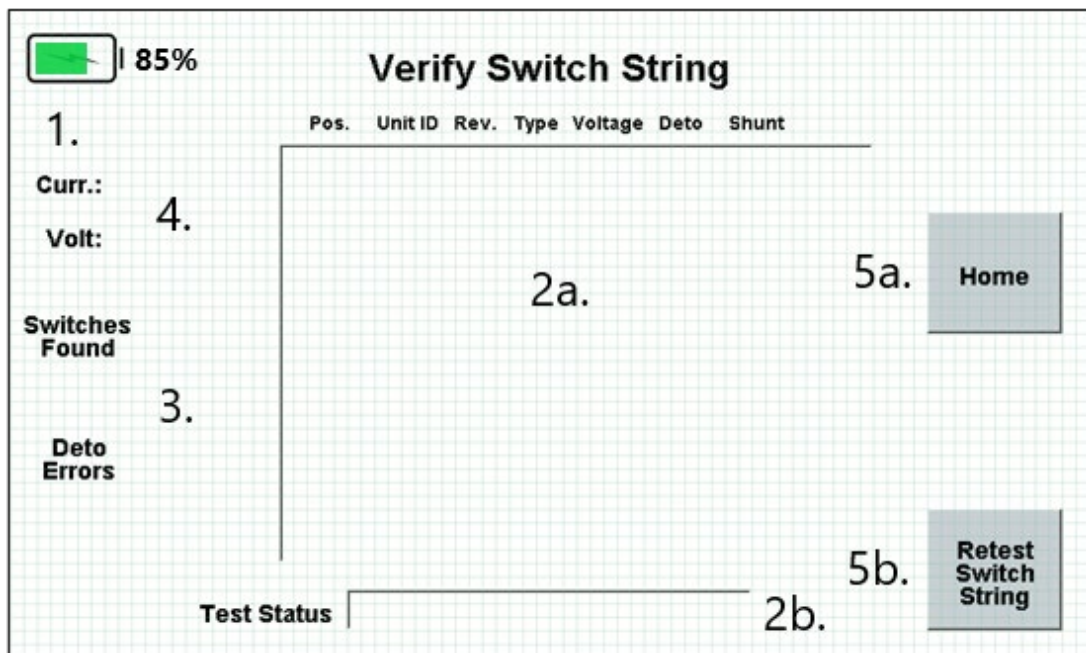


Figure 13 - Verify String

Shown in the Verify Switch String screen are:

1. Battery Icon along with remaining % or battery life.
2. Two text areas:
 - a. This area shows the information retrieved from a given switch.

- b. This area shows any specific test messages. A successful switch verification is indicated by the Test Status line; “Completed”. If any of the tests fail, a FAILED message is displayed for that test.
3. Area for the number of switches found along with the number of detonator errors.
4. The wireline current and voltage as the test progresses. Generally, the wireline current will increase, and the voltage will decrease as the number of switches read increases.
5. Two Menu buttons:
 - a. Home – Returns to the Self-Test Screen.
 - b. Retest Switch String – Perform the string test again.

Table 6 shows the definitions for the switch data.

Name	Function		
Pos.	Switch Position in the gun string starting at the top of the tool.		
Unit ID	8-bit ID number for a switch.		
Rev.	Switch Firmware Revision.		
Type	Switch type, 1.8, 2 or 3.		
Voltage	Voltage at the top of the switch. Type 2 or 3 only.		
Deto	Detonator Status Type 2 and 3 only	Type 2 – checks for detonator open circuit only.	Detonator good displays “Pass”
			Detonator open displays “Fail”
		Type 3 – Checks detonator resistance	Between 40 to 70 ohms displays “Value” in ohms.
			Less than 40 ohms displays “Low”
			Greater than 70 ohms displays “Open”
Shunt	Shunt Status Type 3 only	Shunt good displays “Pass”	
		Shunt open displays “Fail”	

Table 6 - Switch Data.

Any results that would display a “Low”, “Open” or “Fail” will cause that line to be highlighted in red.

The following sequence of events occurs during the first Switch Test:

1. A switch string or Switch Simulator must be connected to the VeriFire® Panel before conducting a Switch Verify test.
2. The Verify Switch String touch button on the Self-Test Screen initiates the Verify Switch Test. The Verify Switch String screen is displayed.

3. The process starts by sending a short message, a Rev# request, and switch type, to a given switch. **NOTE: If the switch type is a 2 or 3, additional commands about the switch detonator status are sent. If the switch type is a 3, an additional command about the shunt status is sent.** Finally, a W/L On/Hibernate command is sent to the switch.
4. During a process of communication to each switch, the W/L current is displayed and increases as switches are being brought online. The current displayed is not the initializing current but rather the steady state current following the initial current transient.
5. The process in steps (3 & 4) above repeats for each switch found in string. An end of string is defined by either an over-current or a Test Complete.

Additional Switch Checks can be initiated by pressing the “Retest Switch String” button. In this manner the operator can perform as many Switch checks as needed to verify/repair the string. The touch buttons are inactive during a test. An example of the switch test with errors is shown in Figure 15.

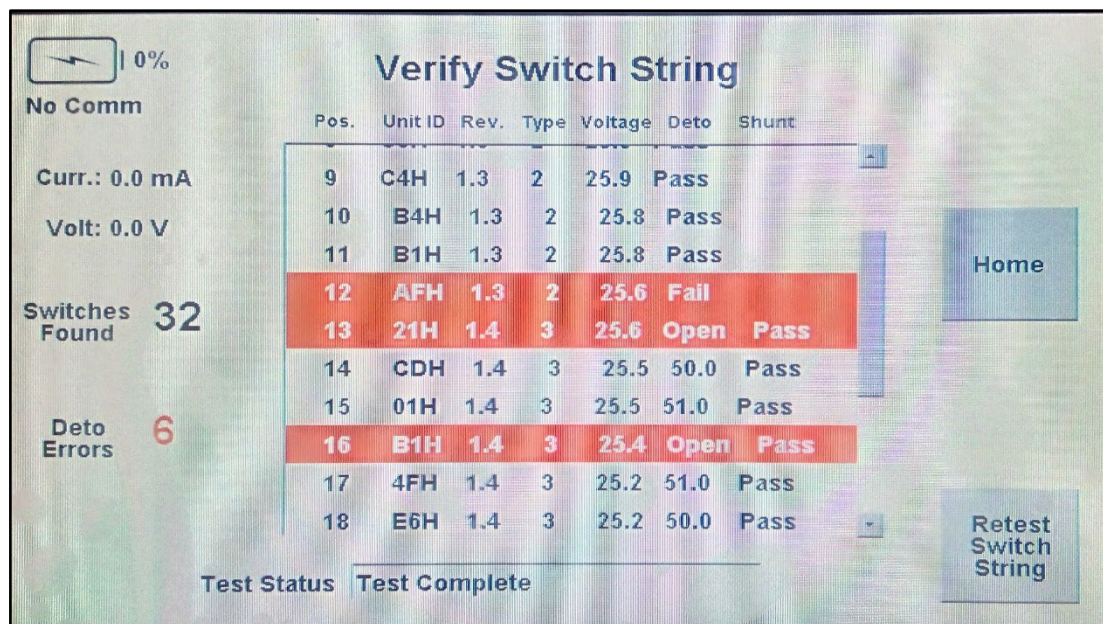


Figure 14 - Verify String Result with Errors

Switch results highlighted in red indicate an issue with the detonator when the switch is a Type 2 or 3. A scrollbar to the right of the results appears if more than ten switches are tested at a time. This allows the user to review all the test results. The switch position listed starts at the top of the string. Figure 15 shows the result when all the switches are good.

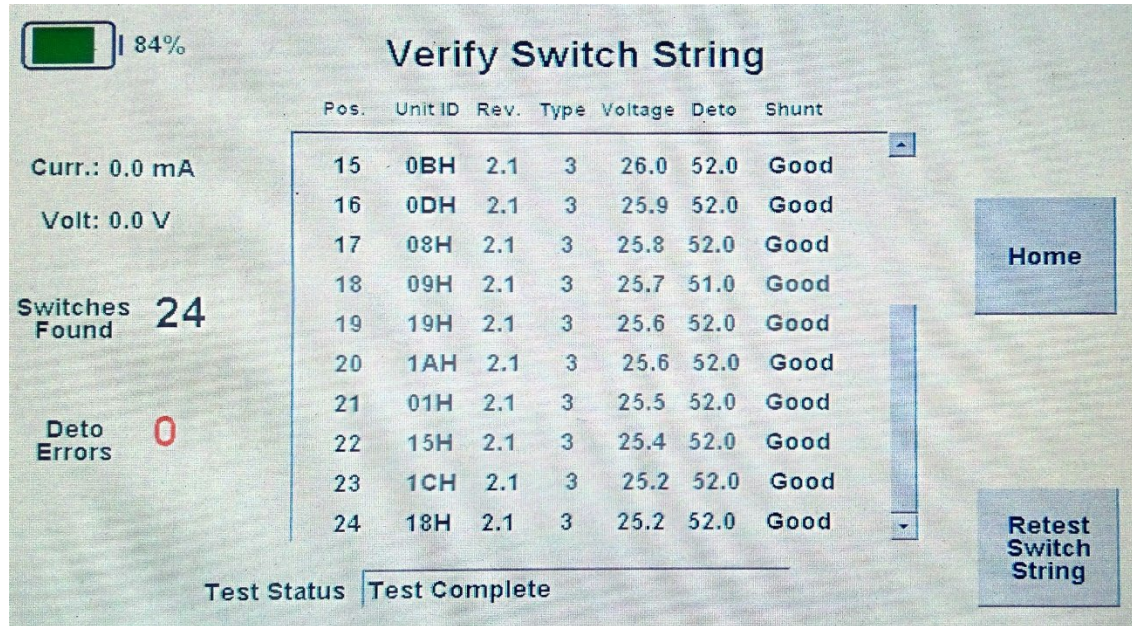


Figure 15 - Verify Switch String Result with no errors

Connecting VeriFire® Panel to Gun String

It is imperative that preceding sections be read and understood before connection to any gun string.

Before connecting the VeriFire® Panel to any gun, first do the following:

1. Turn the VeriFire® Panel to ON.
2. Verify the following on the "Self-Test" screen:
 - a. Reset: Passed.
 - b. Limit1: Passed.
 - c. Limit2: Passed.

Remaining Battery is greater than 10%. An example of a proper start is shown in Figure 16.

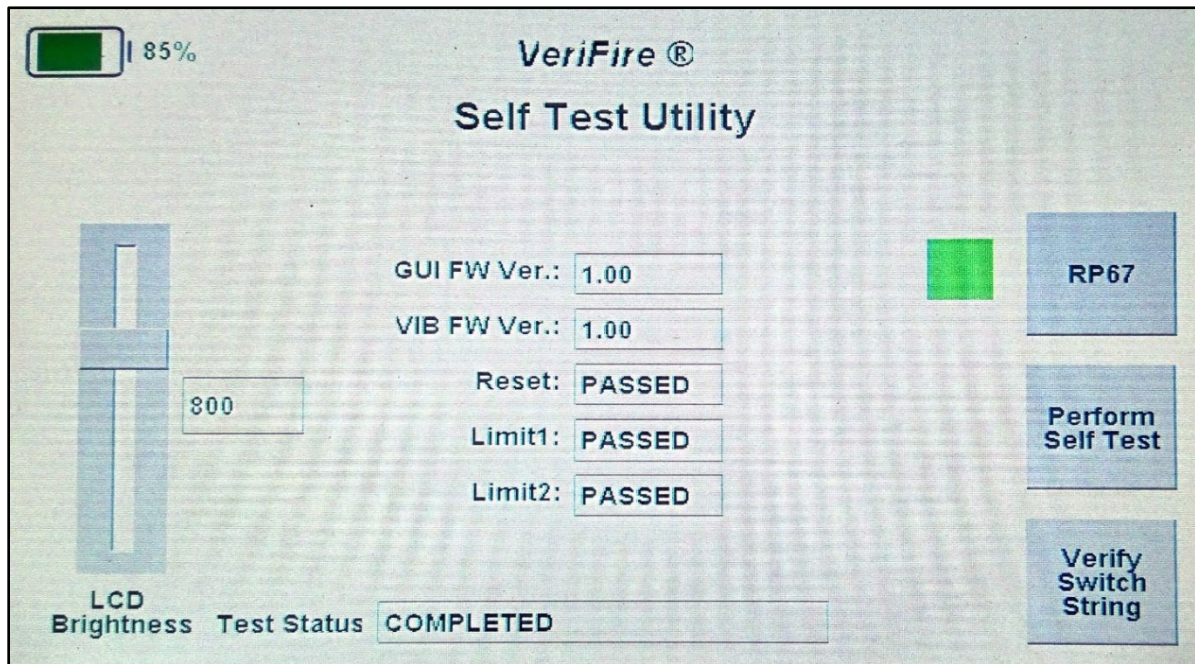


Figure 16 - Self-Test Screen Result

Shown in Figure 18 is a diagram depicting a typical connection of the VeriFire® Panel to a gun string. The Tool String output cable connects to the gun string:

- RED Wire connects to W/L input
- BLK Wire connects to Armor/Gun Housing

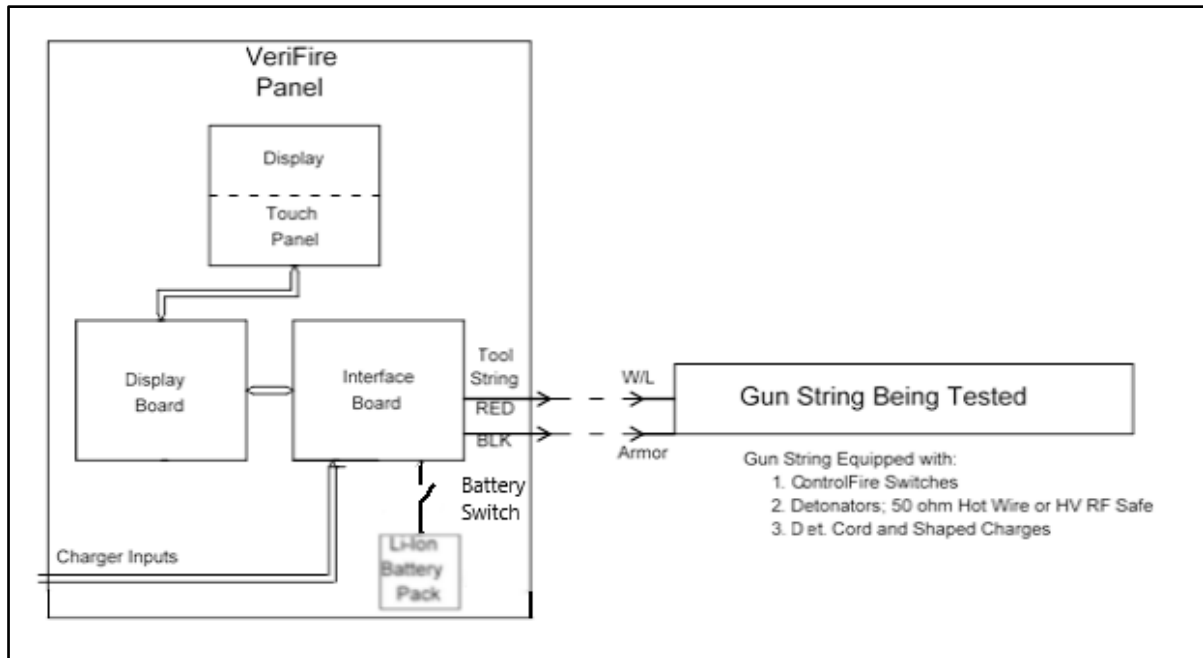


Figure 17 - VeriFire System Drawing

FIRMWARE Updates

The firmware for both the display board and interface board can be updated through USB micro-B connectors provided under the Firmware Update access panel on the unit. Hunting will put out notices when firmware updates are available. Contact your local Hunting Titan sales representative for details.

The firmware update program can be installed anywhere on a PC. The ControlFire+ software can also access the firmware update functions. Refer to the ControlFire+ software manual for more information on installing and using the software. The following sections assume the update is through the ControlFire+ software.

NOTE: The USB C charger port must be used to facilitate the firmware update. DO NOT USE the conventional 12VDC charger. This could result in a failure in the charging circuit.

This section covers installing the program code into the interface board controller. Launch the ControlFire+ software and go to the home screen. See Figure 19. Select the VeriFire Firmware Update.

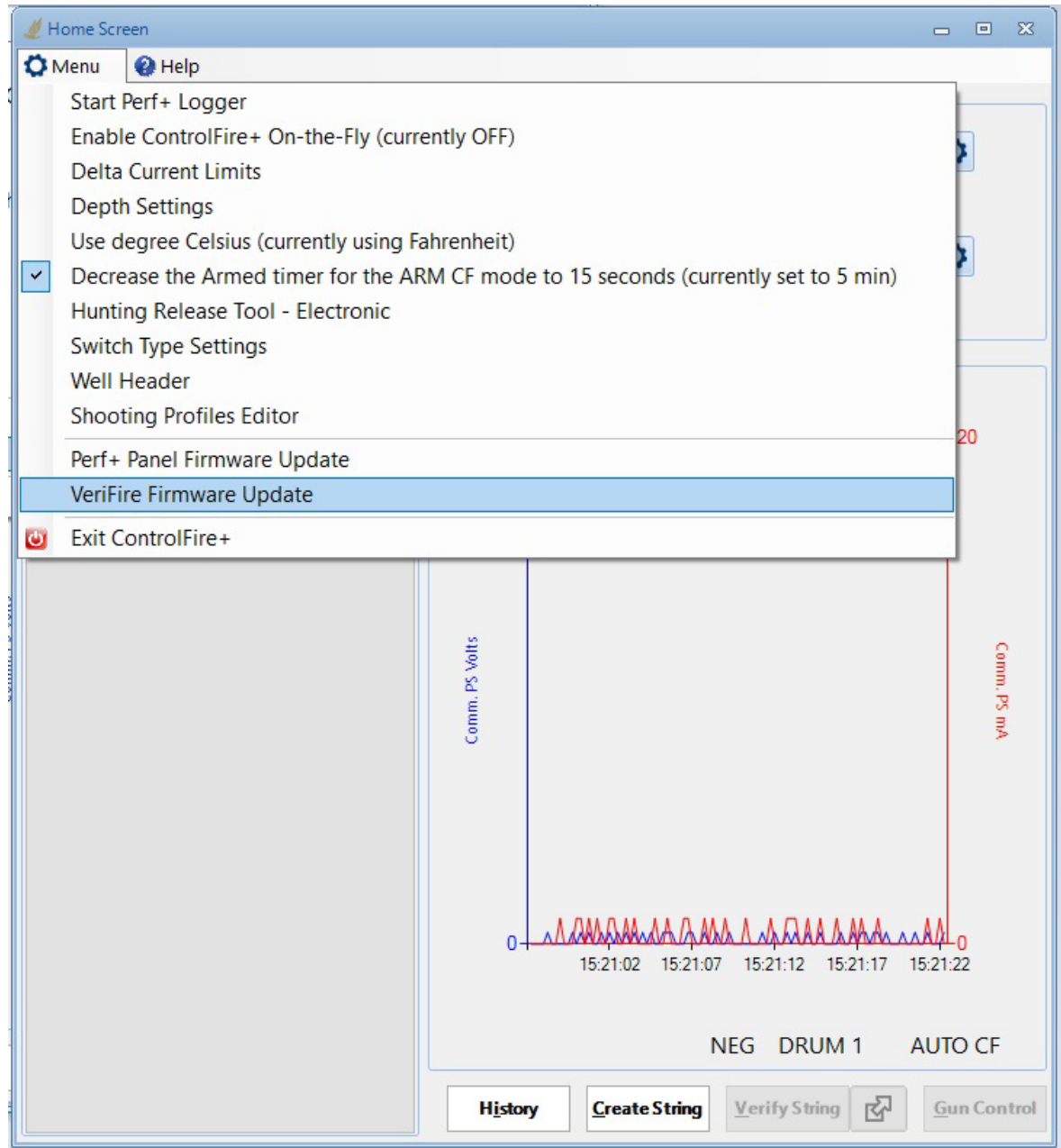


Figure 18 ControlFire Home Screen

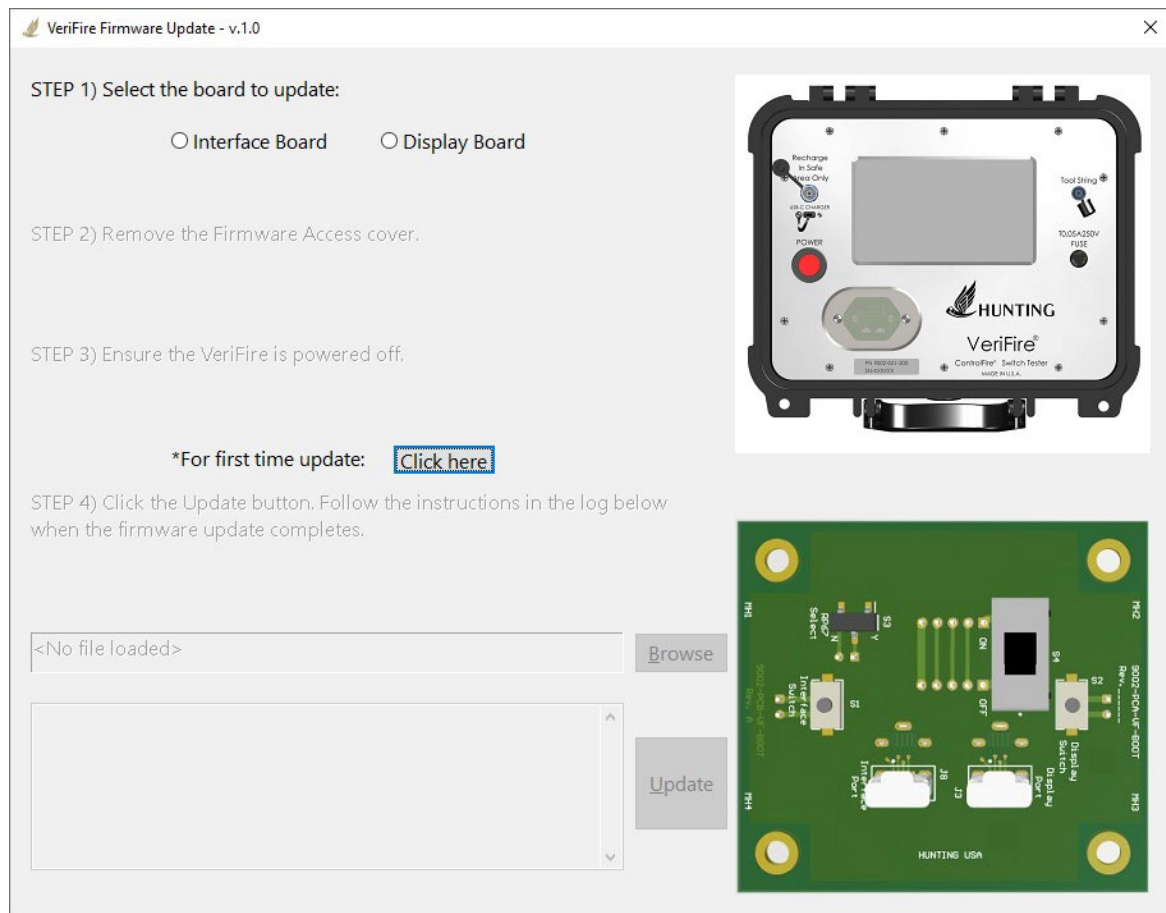


Figure 19 VeriFire Firmware Update Screen

When it is the first time to update either board, press the Click here button shown in Figure 20. A pop-up will appear as shown in Figure 21.

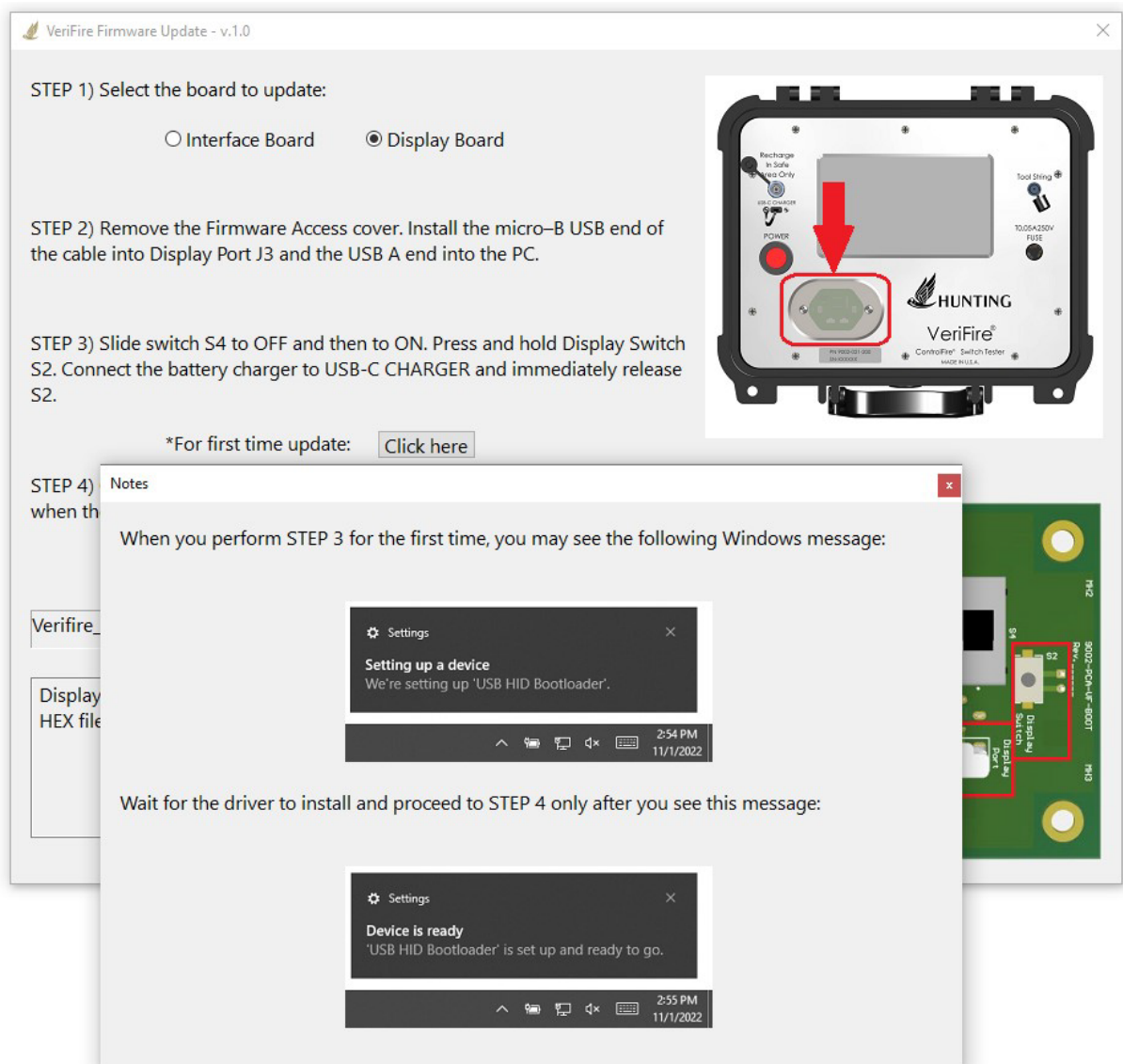


Figure 20 HID Driver Installation

After the HID firmware drivers are installed, proceed on with the steps shown in Figure 22.

Interface Board Update

Follow the steps shown in Figure 22.

VeriFire Firmware Update - v.1.0

STEP 1) Select the board to update:

☒ Interface Board
 ☐ Display Board

STEP 2) Remove the Firmware Access cover. Install the micro-B USB end of the cable into Interface Port J8 and the USB A end into the PC.

STEP 3) Slide switch S4 to OFF and then to ON. Press and hold Interface Switch S1. Connect the battery charger to USB-C CHARGER and immediately release S1.

*For first time update: [Click here](#)

STEP 4) Click the Update button. Follow the instructions in the log below when the firmware update completes.

<No file loaded> [Browse](#)

Interface board selected

Update


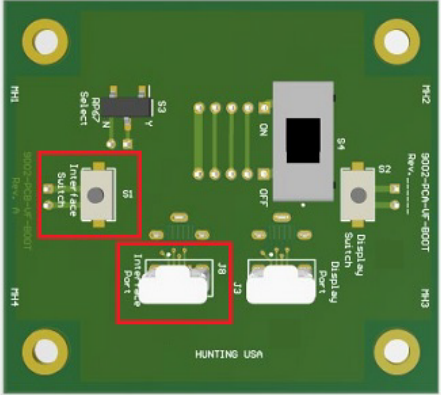



Figure 21 Interface Board Firmware Update

Clicking the Browse button brings up the screen shown in Figure 23:

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Page 25 of 30

Last Modified: July 19, 2023

Rev: B

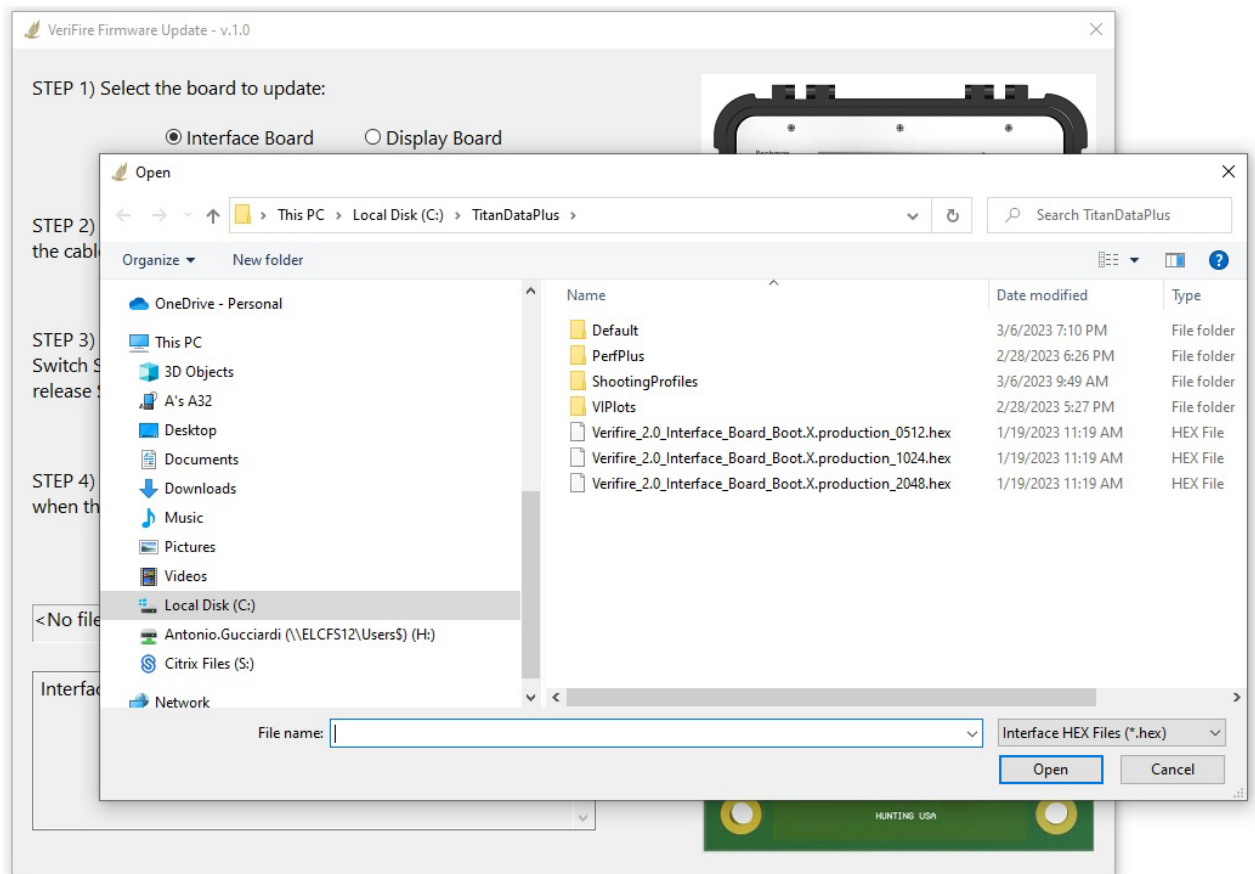


Figure 22 Interface Firmware Selection

!!NOTE: The first digit of the Interface board FW version shown in the self-test screen determines which version to use. 1.XXX uses the 0512 version; 2.XXX uses the 1024 version; 3.XXX uses the 2048 version.

Once the firmware is selected, click the Update button, and follow the instructions.

Display Board Update

This section covers installing the program code into the display board controller. Launch the ControlFire Software, select the Verifire Firmware Update and then follow the instructions.

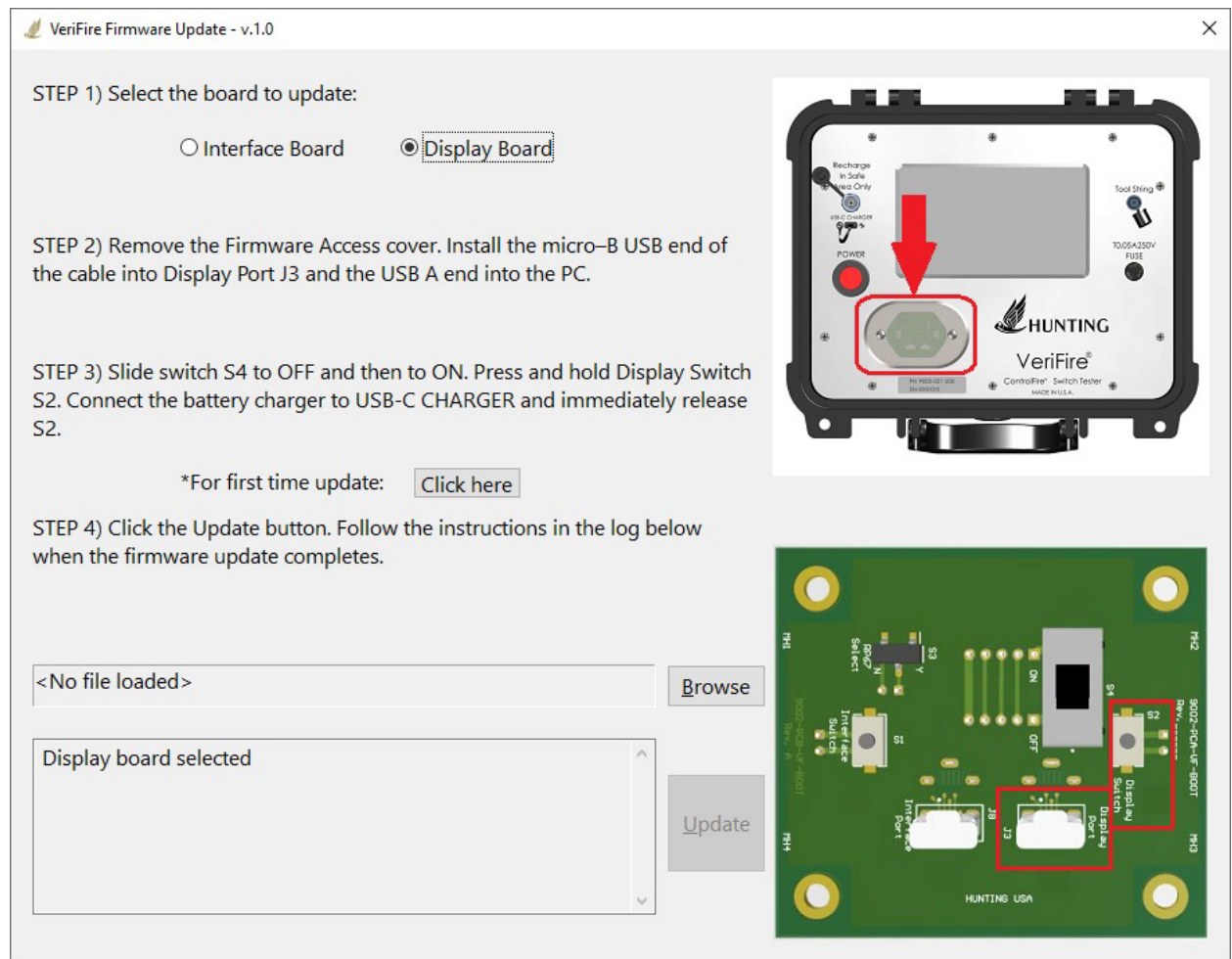


Figure 23 Verifire Display Board Firmware Update

Clicking the Browse button brings up the screen shown in Figure 25:

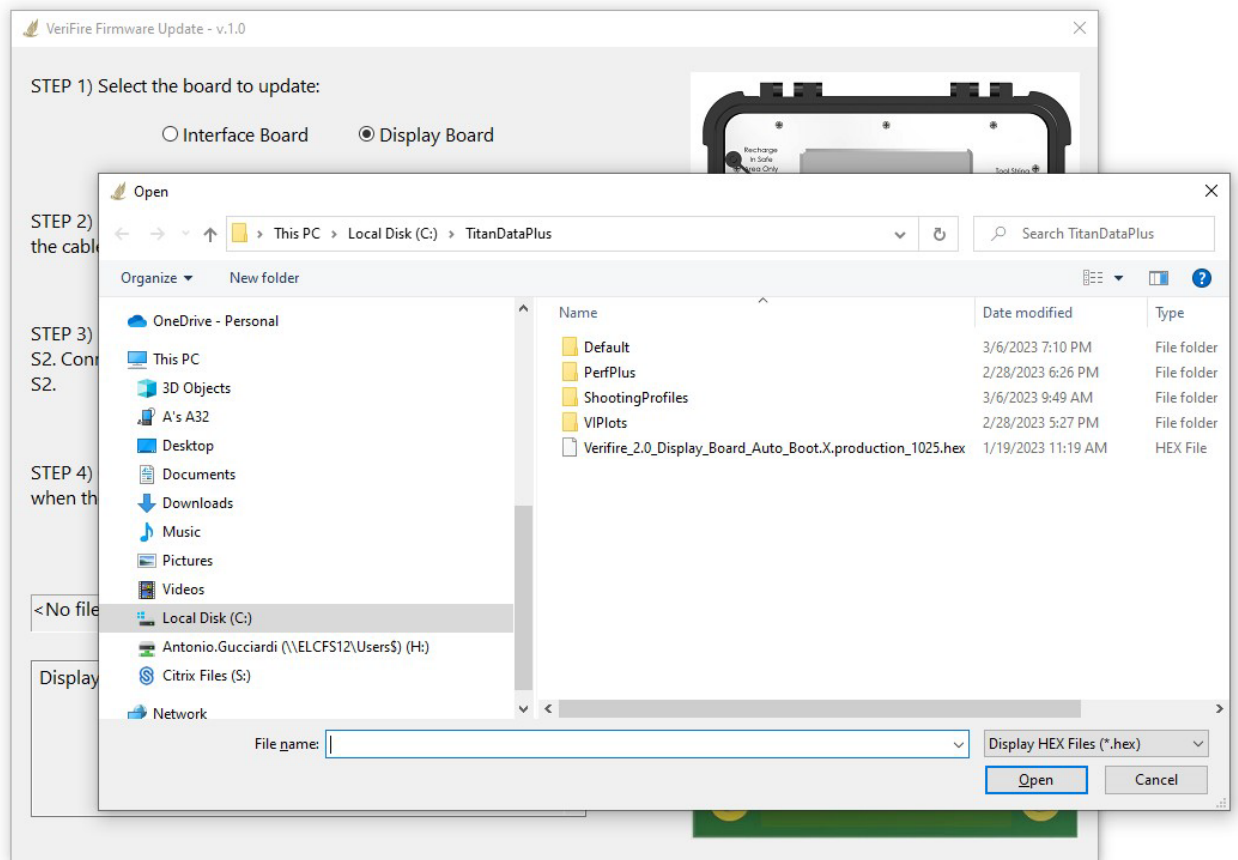


Figure 24 Display Board Firmware Selection

!!NOTE: The first digit of the Display board FW version shown in the self-test screen determines which version to use. 1.XXX uses the 1025 version; 2.XXX uses the 2064 version.

Once the firmware is selected, click the Update button, and follow the instructions.

VeriFire® Connecting to ControlFire Panel

The VeriFire® can also be used to test a gun string via connection to the ControlFire® Perf + Panel (9002-021-100). The normal BNC to clip cable cannot be used here. A BNC-to-BNC cable along with a BNC to TNC adapter is required. A suitable BNC to TNC adapter is Amphenol 242149, Hunting P/N E2100-242149. See Figure 26. This is useful to verify a gun string before it

goes downhole. Note that the VeriFire® must have the RP67 feature disabled to account for the added resistance of the Perf+ Panel, wireline, and CCL.



Figure 25 BNC to TNC Adapter

The VeriFire® may not be able to detect switches in some situations. The length and impedance of the wireline cable can attenuate the VeriFire communication signals too much under some conditions. The VeriFire has been tested successfully with 35,000 feet of Schlumberger Streamline cable. 24 Version 3 switches were correctly detected.

Technical Assistance

Technical assistance can be obtained through your local sales representative. Your representative will be able to acquire the assistance you need in the timeliest manner. You can also contact technical assistance via the website:

<http://www.hunting-intl.com/titan/contact-titan>

Maintenance

This section covers periodic maintenance and replacement parts. There are no internal field serviceable parts.

Cleaning

The panel requires little maintenance to maintain proper operation. When required, the panel can be cleaned with a damp cloth and mild detergent. The panel should be off when cleaning it. Ensure all surfaces are dry before turning the panel on.

Fuse

One fuse is used to protect the wireline output circuitry. It is listed here.

Wireline Fuse: 250V, 0.05A, 5mm x 20mm Fast Blow Part No.: 0216.050MXP. Hunting P/N: E4300-0216.050MXP.

Battery

The internal battery pack is not field serviceable. The unit must be returned to Hunting for repair or replacement.

External Battery Charger

In the event the battery charger becomes damaged or needs replacement, it must be replaced with a Hunting unit. The part number is: E4000-VF-DC-CHG-ASSY.

Revision History

Rev: B	Date: 4/25/2023
Description:	
Updated battery charger part number in Equipment Overview section, row 2 of Table 1 - Required Equipment. Added Technical Assistance and Maintenance sections. Listed same part number in Maintenance section, External Battery Charger subheading. Updated self-test screen section with new image and description of Language button. Allows choices between English, Spanish and Chinese.	