PYRODIGITAL CONSULTANTS
PD Firing Module Continuity Reader

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DB9 and DB25 connectors and cable, Module XLR cable and Reader to Reader RJ11 cable.

1 Features

1. Measure the current drawn on each of the 2 power/communication lines of the 3-wire PD firing module interface.
2. Detect overload conditions and limit the current available to prevent igniters from being un-intentionally fired. Raises voltage to buss in 2 steps to detect defective modules.
3. Transmit sequential status requests on the 3-wire module interface buss and listen for a status reply. Stops on first reply and repetitively requests status.
4. Button to advance to the next module address that replies and repetitively request status.
5. Repetitively request status from the same module address and monitor current draw.
6. Single Step module address up and down during repetitive status tests.
7. Retain module status information after power down.
8. Download a firing script to store a list of modules and pins used in up to 8 stored tables of 2500 entries.
9. Select which table will be used for module status comparisons.
10. Compare the module reply against the stored list to detect any errors.
11. Review the list of module replies.
12. Configure the script table, language interface and user settings.
13. Warning tone sounds when 3-wire interface buss powers up.
14. Display internal battery voltage.
15. Low Battery warning and alarm tone.
16. Auto power-off after set interval of inactivity.
17. Turn off display back light to conserve battery life. Turn back light back on with any button press.
18. Powered from a single widely available 9V battery.
19. Backlit sunlight readable 16 character 2 line text display.
20. Rugged plastic case with optional **rubber boot** to protect from knocks and drops.
21. Dust sealed front controls and display.
22. Primary controls: **On/Off**, **Measure**, **Find**, **Check**.
23. RS232 port to assist in downloading/uploading firing script information.
24. Transfer firing scripts from Reader to Pyrodigital Field Controllers.
25. Upload scripts from Pyrodigital Field Controllers.
26. View firing script information as lines, or modules used.

2 Warning!

Power must never be applied to a firing module attached to active product when doing so would endanger proximate crew or spectators. While the PD Firing Module Reader is designed to prevent un-intentional setting off of attached igniters, safe practices absolutely requires that all personnel be clear of pyrotechnic product influenced by the module being energized for test. Modules connected to product must never be tested in locations that could cause the ignition of additional pyrotechnic material. This restriction holds true for any device that contains an energy source, including Multi-meters and continuity testers.

The PD Module Reader is designed to only access one module at a time. This is a deliberate design limit to restrict the amount of energy going out to the module interface to less than what will set off a Davie Fire igniter. Due to uncontrollable factors involved in how the firing module is designed and possible failure modes in the module, no assumptions can be made of the absolute safety of an energized firing module.

3 Intended Purpose for PD Firing Module Reader

The PD Firing Module Reader is designed to allow a safer and user friendly method of determining the condition/state of a PD firing module. It will locate the address setting and show the status of the pins that are connected to the module being tested. Being compact, light weight and capable of one handed operation makes it ideal for quick determination of a firing module's condition in the field. It will also allow an estimation of a module's health by measuring the amount of power that is being consumed. There is built in current limiting on the outputs going to the module under test to limit the accidental discharge of igniters for first fault conditions. It is powered by an easily replaceable and widely available 9V battery.

In addition to testing firing modules individually, the reader is also capable of containing the firing scripts of up to 8 tables of 2500 cues for comparison, viewing and loading into PD field controllers. These scripts can be downloaded from a computer or uploaded from a PD field controller into the reader. The utility of loading the scripts allows multiple larger scripts to be loaded into the reader and then later downloaded in the field without carrying a computer to the firing site.

The reader is specifically limited to testing one module at a time.

This single module testing method, known as bottom up testing is actually a very effective way to target a problem in a firing module network or to identify a problem with a pin connection at the module level. The user is still required to know how to isolate groups of modules in a network to reach the potential modules to be tested.

Each module can be tested before it is attached to active pyrotechnic product. This would determine if there is a first fault condition where the module would draw excessive power or not respond to commands from the controller. Once product is attached, care must be taken in any additional testing. Personnel should be withdrawn from proximity or trajectory paths of attached pyrotechnic product. The probability of accidental ignition is reduced if the module had already been checked before product attachment but not absolutely eliminated. Finally, the status of the attached pyrotechnic devices can be determined and the setting of the SHUNT/ARM switch verified.

4 Primary Controls:

4.1 On/Off

Pressing this button when the unit is off will turn it on. The display will illuminate and be readable in dark environments. A short beep will sound to indicate power up.
Pressing this button while the unit is powered on will show the current state of the internal battery and the currently selected module address. If the button is held down for over 3 seconds while the battery information is showing, the unit will enter power down mode and shutoff when the button is then released.

The display shows the information in the following format:

Conditions	Text Display
Internal battery is full and the current module address is 00	Bat 100% @9.00 Module 00 Select

This button is the gateway to the secondary operations. They include Review Modules, Review List, Select Table, Clear Modules, Clear List and User Settings.

4.2 Measure - INFORMATION

This primary button function initiates a measurement of the 3-wire module interface. It can detect excessive loading on either of the 2 active wires. Pressing and holding this button will cause the reader to energize the 3-wire interface. A warning tone will sound to indicate that the buss is powering up. The reader applies power to the 3-wire module interface and determines if either active wire is drawing excessive current for a single module. The results are displayed on the text display.

The second line displays the current draw of each of the communications/power lines into the firing module. The each value is displayed in $1/10^{th}$ milliamp resolution. A typical value for a attached module is between 40 to 80 on P2, and ~0 on P3. If the P2 and P3 values are not ~0 when no module is attached, they can be zeroed by using the Zero AB Current option in the Configure User Settings Menu. The new zero point values will be retained when power is shut off.

The display shows the information in the following format:

Conditions	Text Display
This shows that the battery voltage is dropping and that no module is present	Bat 8.75 +24.00 P2 0 P3 0

This button has alternate functionality under other active modes.

4.3 Find - FIND NEXT

Pressing and holding this button will cause the reader to initiate a search for the first module to answer an addressed status request. A warning tone will sound indicating that the 3-wire module interface is being energized. The reader issues sequential status requests, starting after the currently selected module and wrapping around to 00 and continuing. When a request is answered, the reader will stop at that module address. Releasing and pressing the button again will cause the reader to start searching beginning after the last requested address.

The display shows the information in the following format:

Conditions	Text Display
This is the display as the reader sends out the status requests, xx is numeric	`Trying Module xx`
This example show that Module Address 01 replied with all pins attached.	`Module 01 Status` `0123456789ABCDEF`
This is an example of a module that has a script entry, is missing 1 and has 2 extra	`Module 3E Status` `01234x56--?---?-`
This shows that module 7F responded to a request but is probably set to shunted	`Module 7F Status` `----------------`
This example shows that Module 43 sent a garbled reply. Module probably bad.	`Module 43 Status` ` Invalid Reply!`

This button has alternate functionality under other active modes.

4.4 Check - REQUEST STATUS

Pressing and holding this button will cause the reader to initiate a repetitive request of status from the currently selected module address. A warning tone will sound to indicate that the 3-wire module interface is being energized. Repetitive clicks indicate each status request being sent. The text display will indicate the success or failure of each status request.

The display shows the information in the following format:

Conditions	Text Display
This example show that Module Address 1C replied with eight pins attached.	`Module 1C Status` `01234567--------`
This shows that module 22 responded to a request but is probably set to shunted	`Module 22 Status` `----------------`
This shows that the module address is not responding to requests.	`Module 37 Status` `  No Response!`
This example shows that Module 43 sent a garbled reply. Module probably bad.	`Module 00 Status` `  Invalid Reply!`

This button has alternate functionality under other active modes.

Primary controls Matrix

Pressed > *Held*	On/Off	Measure	Find	Check
On/Off	*Battery status and shutoff* *	Review Menu functions	Clear Tables, Set Options	Restart Reader at Module 00
Measure		*Continuously Measure load* *	Transition to Searching for Module	Transition to Repetitive Request status
Find	Restart search at address 00		*Search for next status reply* *	Increment address by one and restart
Check	Set request address to 00	Decrement request address by one	Increment request address by one	*Repetitive Request status* *

*The grayed boxes in the table indicate single key press operations.

5 Secondary Functions

These secondary functions are selected thru the **On/Off** button gateway. The **On/Off** button is the only primary control that doesn't apply power to the 3-wire module interface as part of it primary function. To enter the secondary menus, Press and hold the **On/Off** button then press one of the other three buttons. Release the other button then release the **On/Off** button. This must happen before the 3 second shutdown timeout occurs. Pressing the **On/Off** button while in the secondary modes will exit the secondary modes and return to the PRIMARY functions.

5.1 Review Menus
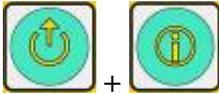
This mode is entered with the **On/Off + Measure** button combination. Once this mode is entered, pressing the **Find** button will step thru the choices of review available. To select the review option, press the **Check** button.

5.1.1 Module History

Selecting this option will allow the review of all modules that have returned a valid status since the last Clear Modules action. The module information is formatted to show intelligent status if a script has been downloaded and selected. When a script is present and a module has sent status information, the two are compared. Pins that are attached and have script entry are shown as a hexadecimal number (0-9 and A-F). If the module pin is empty and the script module/pin is empty the pin position is a dash. If the module pin is attached and the script/pin is empty the pin position is a question mark.

5.1.2 Scripted Modules

Selecting this option will allow the review of all modules that have downloaded to the current Script memory space. The script module pin information is organized as discrete modules and formatted to show the presence of a active pin as the pin number 0-9 and A-F, or as a dash character '-' if not active. This information is captured from the download script.

5.1.3 View Script

Selecting this option will allow the review of firing script lines for the currently selected and downloaded Script memory. The script line information is organized as discrete lines containing the **line** number, **shot** number, **time** in HH:MM:SS.FF format, **prefire**, **caliber** and module/pin **address**. Pressing the Find button will advance the line number. Pressing the Measure button will decrease the line number until the 1st entry is reached. The next decrement will roll over to the end of the script. This is a good way to quickly see the last entry in the script.

5.1.4 Select Script

This menu option allows the operator to choose one of the script choices. They are No Script, Script1 thru Script8. No Script is the choice when no script information is available. This is used if there are no applicable scripts loaded into the script modules memories. Script 1-8 will compare Script1-8 modules memory against the currently selected module in any of the modes that query or review a module. Each script memory space retains the scripted lines, the modules used by the script and also the firing modules located with the **Find** or **Check** functions while the script was selected.

5.1.4.1 Select No Script

This is the default selection. When this option is selected, modules found by **Find** or **Check** are not compared against any script information. Instead, the modules are shown with a pin number to indicated connection or a dash to indicate open.

5.1.4.2 Select Script 1-8

These select options choose one of 8 possible download script storage spaces to use for comparing and storing module and script information. Use the Measure button to choose a script space and then select it with the Check button. Module history for the selected space is viewable when selected.

5.2 Other Actions

 +
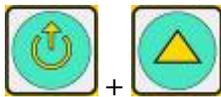
This sub-menu mode allows access to clear tables and User settings. It is accessed with the POWER+NEXT button combination. The sub menu modes are accessed by pressing the NEXT button to bring the menu into view and the pressing the SELECT button to enter that menu.

5.2.1 Clear a Table?

This menu mode is used to clear the module status memory as well as script modules memories. This mode differs from the Select mode in that a confirmation step is required to complete the selected action.

5.2.1.1 Clear Modules

Clearing module memory will not affect Selected Script setting. In addition to selecting this option with the SELECT button a confirmation is required by pressing the Measure button . This is to prevent the accidental clearing of captured status.

5.2.1.2 Clear Script 1-8

In addition to selecting one of these 8 options with the SELECT button a confirmation is required by pressing the INFO button . This is to prevent the accidental clearing of a loaded script.

5.2.2 Set User Options

5.2.2.1 Serial Number

Accessing this option will display the unit serial number.

5.2.2.2 Serial Port Auto On/Forced

This is used to turn on the serial port output when there isn't an active serial port attached. Use this option to temporarily allow connection to another Reader for the purpose of cross loading scripts. The serial port normally senses another active serial port before turning on when set to auto to save battery power. The setting reverts back to Auto when the Reader turns off.

5.2.2.3 Power Off Time

This configuration option is used to change the default power off time for the continuity reader. The default time for idle to power off is 1 minute. The adjustments are in 1 minute additions up to 5 minutes. The tradeoff is reduced battery life.

5.2.2.4 Lamp Off time

This configuration option is used to change the default time off period for the display backlight to longer durations. The tradeoff is reduced battery life. The default value is 10 seconds with steps of 10 second up to 50 seconds. The last setting is on until power off.

5.2.2.5 Lamp Brightness

This configuration option is used to change the default brightness for display backlighting of the continuity reader. The default display brightness is set to 50% as factory default settings. The adjustments are in 10% increments with a range of 10% to 100%. The tradeoff is reduced battery life vs. display brightness in lower light conditions.

5.2.2.6 Zero AB Current

This configuration option is used to set a current zero point for the measurement of the power/communication interface. With no module connected, the Measure function should show values around +/- 1 or 0.

5.2.2.7 Adjust Ref Voltage

This configuration option is used to set the MARK/SPACE threshold level for module replies. The default is 200, and should not require adjustment for the majority of usage. The range is limited to 100 to 255. Modifying this value the default may prevent the reader to from receiving module replies.

5.2.2.8 Reset to Factory defaults

This configuration option is used to restore the factory default settings to the continuity reader configuration and calibration default values.

5.2.2.9 Set Language

This configuration option is reserved for future language options other than English.

6   Serial Modes

The serial modes are accessed by plugging in a serial cable attached to an active serial port. An active serial port will have voltage potential on pin 3 of the DB9 connector. When this condition is met and the reader buttons are not depressed, the serial mode options become available.

6.1 Select Serial Baud

A serial baud rate must be selected before any serial communications can occur. Pressing the Check button will use the baud rate offered. Pressing the Find button will alternate between 9600 and 1200 baud.

6.1.1 Serial Baud 9600

Select this serial baud rate when downloading scripts from a PC to the reader, or when transferring a script from the reader to a PD field controller.

6.1.2 Serial Baud 1200

Use this serial baud rate when transferring a script from a field controller to the reader. Using this rate to download from a PC while possible, is painfully slow for larger firing scripts.

6.2 Download Script

Once this Serial mode is selected, the options available to it are accessed by pressing the Find button. The download script modes scan the script and capture module and pin information for comparison to module status replies and also store the firing list for transfer to field controllers.

6.2.1 Download Script 1-8

This download option is initiated by using the Measure button to select the script space to load into, then pressing the Check button. Confirmation to proceed with the download by pressing the Measure button to start the download is required. Pressing the SELECT button after initiating the download will abort the download and return to the next level up.

6.3 Upload Script

This Serial mode is selected using the Find button. The upload script modes are used to transfer the Reader stored firing scripts to field controllers.

6.3.1 Upload Script 1-8

This upload option is initiated by using the Measure button to select the script space to load from, then pressing the Check button. Upload begins immediately. Pressing the SELECT button after initiating the upload will abort the download and return to the next level up.

6.3.2 Inspect Script

Selecting this option will allow the review of firing script lines for the currently selected and downloaded Script memory during serial operations. The script line information is organized as discrete lines containing the **line** number, **shot** number, **time** in HH:MM:SS.FF format, **prefire**, **caliber** and module/pin **address**. Pressing the Find button will advance the line number. Pressing the Measure button will decrease the line number until the 1st entry is reached. The next decrement will roll over to the end of the script. This is a good way to quickly see the last entry in the script.

6.4 Transferring scripts

6.4.1 Steps to download a script

The process occurs in steps.
1. Attach the serial transfer cable with the female DB9 connector to the Reader.
2. Turn on the reader
3. Ready the download device (PC, FC or another reader)
4. Attach the end of the serial cable to the download device.
5. Verify that the Reader displays the Serial Baud message
6. Select the proper serial baud rate for the download device (9600 for PC or Reader, 1200 for uploading from FC) by using the Find button to alternate rate and the Check button to select it.
7. Select the script to download to using the Measure button and then enter the download function by pressing the Check button.
8. Confirm the download by pressing the Measure button.
9. Start the download from the download device.
10. As the transfer progresses, the reader will display the transferred lines as line, shot and address.
11. When the download is complete the reader will beep and display transfer complete message.
12. Another script can now be loaded using the Measure button to select it and repeating the above steps.

6.4.2 Process to load a script from Reader into FC

The process occurs in steps.
1. Attach the serial transfer cable with the male DB9 connector to the Reader.
2. Turn on the reader
3. Prepare the FC by turning it on and setting it up to receive a script
4. Attach the end of the serial cable to the FC serial connector.
5. Verify that the Reader displays the Serial Baud message

6. Select the proper serial baud rate for the download device, 9600 for PC or Reader by using the Find button to alternate rate and the Check button to select it.
7. Select the script to upload to using the Measure button and then begin the upload function by pressing the Check button.
8. As the transfer progresses, the reader will display the transferred lines as line, shot and address.
9. When the download is complete the reader will beep and display transfer complete message.
10. Another script can now be loaded using the Measure button to select it and repeating the above steps.

6.4.3 Process to load a script between two Readers

The process occurs in steps.
1. Attach the serial transfer cable marked reader2reader to the source Reader and destination Reader.
2. Prepare the destination Reader by turning it
3. Turn on the reader source Reader and enter the Set User Options menu.
4. Advance to the Serial Auto On option and use the Measure button to change to Serial forced on setting.
5. Verify that both Readers displays the Serial Baud message
6. Select the proper serial baud rate for the download device, 9600 Reader by using the Find button to alternate rate and the Check button to select it for both readers.
7. Select the script to download to using the Measure button and then enter the download function by pressing the Check button on the destination Reader.
8. Confirm the download by pressing the Measure button on the destination reader.
9. Select the script to upload to using the Measure button and then begin the upload function by pressing the Check button on the source reader.
10. As the transfer progresses, both readers will display the transferred lines as line, shot and address.
11. When the download is complete the readers will beep and display transfer complete message.
12. Another script can now be loaded by repeating the above steps from 20-24.

7 Troubleshooting Firing Networks

There is an art to finding and correcting a problem with a firing module network. One of the principle tools to locating the problem is "divide and conquer".

But remember, Safety first.

7.1 Module not responding

There are two typical causes to this condition. One is that the module is set to the wrong address. The other is that the module is not connected to the network. There are several first fault conditions that can also occur: bad cables, modules that have bad pass-thru connectors, bad modules and temperature sensitive modules.

There is also an operational issue that may occur if the cable network is too long and/or there are too many modules connected. This will cause some modules out at the ends of some cable runs to not reliably respond to status requests.

Going out to the position where the missing module is located and reading the module status directly will quickly determine if the module is correctly set to the expected address.

After that check, comes the verification that the cable is plugged in and that all pass thru connectors in the chain are functional. The pass thru connector on the module can be checked by attaching a XLR gender changer to the end of the reader cable and plugging it into the pass thru. The module should be readable. *You can't connect and test more than one module at a time. Don't even try. The start up current for multiple connected modules exceeds the no-fire safety current margin, so the reader will not supply it*.

7.2 Module Response Erratic

The typical cause of this type of module error seen at the firing panel is that more than one module is responding to the module address status request. If multiple modules are deliberately set to the same address, then this is not a defect but an operational challenge. It requires that each module be tested separately to verify that the pins are connected and that the SHUNT/ARM switch is in the correct position.

There is also an operational issue that may occur if the cable network is too long and/or there are too many modules connected. This will cause some modules out at the ends of some cable runs to not reliably respond to status requests.

Going out to the position where the erratic module is located and reading the module status directly will quickly determine if the module is correctly responding reliably to the expected address. If not, it could be temperature sensitive. Removing the module from the network and then checking to see if it still appears will catch another module that is

incorrectly addressed. When that happens, use the divide and conquer method to isolate it.

7.3 Module pins not visible

This condition is most often caused by the SHUNT/ARM switch set to SHUNT, which disconnects the firing pin from the firing circuit and places a 2 ohm resistor across it. In some cases, the switch can be damaged by applying excessive force to it and shearing the position stop. Then the position indicator will not correctly show what the SHUNT/ARM setting is. The module reader can determine the setting if possible, by rotating the switch while and then testing the status.

7.4 Short or Over Current Condition Present

If the short condition as reported by the firing panel is not caused by having too many modules attached a divide and conquer approach can isolate the defective module or cable quickly. A properly set up firing network with liberal application of network splitters allows groups of modules to be isolated. A long string of daisy chained modules is the worst possible method of setting up a firing network.

First step is to determine if the reported short is a overloading issue. Breaking the network in approximately half and testing each half will show if it is a loading issue. If the short persists in one group, then it is probably caused by equipment failure, either module or cable or in rare cases a splitter. Break the defective group in half again and retest. When a small cluster is isolated as the problem, the 3YR module reader can be attached to the individual modules and the power consumption measured.

A shorted cable sometimes is the cause. Cable connectors should also be inspected to verify that they are not packed with wet mud, earth or sand and that splitters and joined cables connectors are not sitting in puddles of water. A cable or connector that was previously contaminated with material and then gets wet will often short when it rains or a sprinkler system turns on and wets it.

8 Pin outs for cables:

Reader to Module cable –

XLR to RJ11	Signal Name
XLR-1 to RJ11-3	Ground
XLR-2 to RJ11-2	Line Out +
XLR-3 to RJ11-1	Line Out -

Reader Serial cable Female DB9 direct to PC

DB9 to RJ11	Signal Name
DB9-1 to RJ11-4 green	DCD
DB9-2 to RJ11-6 blue	RD (output)
DB9-3 to RJ11-5 yellow	TD (input)
DB9-5 to RJ11-3 red	GND
DB9-7 to DB9-8	RTS/CTS
DB9-4 to DB9-6	DTR/DSR

Reader Serial cable Male DB25 direct to FC

DB25 to RJ11	Signal Name
DB25-2 to RJ11-6 blue	RD (output)
DB25-3 to RJ11-5 yellow	TD (input)
DB25-8 to RJ11-4 green	DCD
DB25-7 to RJ11-3 red	GND
DB25-4 to DB25-5	RTS/CTS
DB25-6 to DB25-20	DTR/DSR

PD Continuity Reader Button Quick Reference

Measure *(Hold for continuous operation)*
    [Measure] + [Find] Switch to Search
    [Measure] + [Check] Switch to Test

Find *(Hold for continuous operation)*
    [Find] + [Measure] Begin Search at 00
    [Find] + [Check] Continue Search

Check *(Hold for continuous operation)*
    [Check] + [Measure] Set to 00
    [Check] + [Measure] Last Module
    [Check] + [Find] Next Module

Power On/Off *(Hold for 3 seconds to turn off)*

    [Power] + [Measure] **Review Sub Menus**
        [Measure] **Next Script**
          [Find] **Modules History** [Check]
            [Power] Up one level
            [Measure] Last module
            [Find] Next module
          [Find] **Modules Scripted** [Check]
            [Power] Up one level
            [Measure] Last module
            [Find] Next module
          [Find] **Review Script** [Check]
            [Power] Up one level
            [Measure] Last Line
            [Find] Next Line
          [Find] **Select Script** [Check]
          [Measure] **Exit Info Sub Menus**

    [Power] + [Find] **Clear/Set Sub Menus**
        [Find] **Clear Table** [Check]
          [Power] Begin Clear Table Sub Menu
          [Find] Clear Modules [Check]
            [Power] Begin Clear Table Sub Menu
            [Measure] Confirm to begin
          [Find] Clear Script 1...8 [Check]
            [Power] Begin Clear Table Sub Menu
            [Measure] Confirm to begin

PD Continuity Reader Button Quick Reference

🔼 **Set User Options** ▶️

    🔼 **View Serial Number** ▶️

    🔼 **Serial Auto On/Forced** ▶️

        ⏱️ Begin Set User Options Sub Menu

        ⏺️ Alternate between Auto and Forced (always Auto after turn on)

        ▶️ Next Option

    🔼 **Power Off Time** ▶️

        ⏱️ Begin Set User Options Sub Menu

        ⏺️ Decrease Time 1 minute *(minimum 1 minute)*

        🔼 Increase Time 1 minute *(maximum 5 minutes)*

        ▶️ Next Option

    🔼 **Lamp On Time** ▶️

        ⏱️ Begin Set User Options Sub Menu

        ⏺️ Decrease Time 10 seconds *(minimum 10 seconds)*

        🔼 Increase Time 10 seconds *(maximum 60 seconds)*

        ▶️ Next Option

    🔼 **Lamp Brightness** ▶️

        ⏺️ Begin Set User Options Sub Menu

        ⏺️ Decrease Level 10% *(minimum level 10%)*

        🔼 Increase Level 10% *(maximum level 100%)*

        ▶️ Next Option

    🔼 **Zero AB currents** ▶️

        ⏺️ Begin Set User Options Sub Menu

        ▶️ Request Zero Capture

            ⏺️ Confirm to begin

    🔼 **Adjust Ref Voltage** ▶️

        ⏺️ Begin Set User Options Sub Menu

        ⏺️ Decrease Level 1 *(minimum level 100, 200 default)*

        🔼 Increase Level 1 *(maximum level 255, 200 default)*

        ▶️ Next Option

    🔼 **Factory Defaults** ▶️

        ⏺️ Begin Set User Options Sub Menu

        ▶️ Request factory defaults

            ⏺️ Confirm to begin

    🔼 **Language**

⏺️ **Exit User Settings Sub Menus**

PD Continuity Reader Button Quick Reference

Serial Sub Menu (serial port connected)

⬤ **Select Baud Rate**

▲ 9600/1200 Baud ▶

⬤ Begin Select Baud Sub Menu

⬤ **Script 1…8**

▲ **Download Script** ▶

⬤ Confirm to begin

▶ Abort download

▲ **Upload Script** ▶

▶ Abort send

▲ **Inspect Script** ▶

⬤ Up one level

⬤ Last Line

▲ Next Line

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