

CHILICON POWER GATEWAY

Visual User Manual

GATEWAY



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- [Specifications](#)
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The CP-GATEWAY is a user interactive device that serves multiple roles in the lifecycle of a solar photovoltaic installation and also provides extensions to access zWave enabled wireless peripherals. In relation to Chilicon Power microinverters, the CP-GATEWAY performs the following functions:

- Securely communicate with inverters and provide graphical feedback of current PLC line conditions
- Graphically represent PV module configuration and > 20 data fields associated with each inverter
- Relay data with cloud.chiliconpower.com
- Is remotely upgraded by Chilicon servers
- Performs inverter remote upgrades
- Displays PV array energy production information

The Chilicon Power communication stack employs advanced forward error correction and encryption. The system also implements a multi-rate physical layer that automatically adjusts throughput to maintain link reliability.

CP-Gateway Operating Specifications

INPUT (AC)

120V	Neutral and Phase
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MECHANICAL DATA

Ambient temperature range	-40° C to +65° C
Dimension (W x H x D) including connectors	8.5" x 6" x 1.75" (or x 0.2" if flush mount to wall)
Weight	0.63 kg (1.4 lbs)
Enclosure rating	Indoor by default / Outdoor with additional NEMA 4x enclosure

FEATURES

Communication	Power line (130.2 kHz carrier)
Monitoring	Free monitoring via gateway or online software
Compliance	FCC 15 Part B, CISPR 22 Class B



QUICK START GUIDE

HOME PAGE: AFTER GATEWAY BOOTS



Push on the
menu button

Push on the
Help button



ON SCREEN HELP PAGES

(IN CASE YOU DON'T HAVE THIS DOCUMENT WITH YOU AT JOB SITE)

Step 1: Gateway Configuration

Start by setting up Wi-Fi or plugging in Ethernet cable.
To configure Wi-Fi choose the network you would like to associate with.
Enter the pass phrase and click done.
To assist in entering the pass phrase, check the 'Pass Phrase Visible' box.
After the 'Successfully Joined Network' message is displayed, click Close.
The Network connection is now completed!

Step 2: Find a good socket

Push on the Advanced Settings icon and select the Survey Socket icon.
Click the checkbox for Split Phase or Tri-Phase.
(Most residential systems are split phase)
Click View Stats.
Confirm that at least one of the PLC success rates is > 90%. If not > 90%, try another socket.

Step 3: Connecting the Inverters

Push on the Inverter Wizard icon.
There, enter the number of microinverters installed and click start.
The Gateway will automatically discover and bind the microinverters.
A success message will appear when all micros are connected to the Gateway.

Step 4: Cloud Setup

This step is to allow the Gateway to connect to the Cloud.
Press Advanced Settings and push on Cloud Setup.
Obtain and write down the 8 digit "Authentication Code". This code must be used within 30 days to link the Gateway to your Cloud account.
Within 30 days you can then register this Gateway on the online portal.

Step 5: Configure the Array Layout

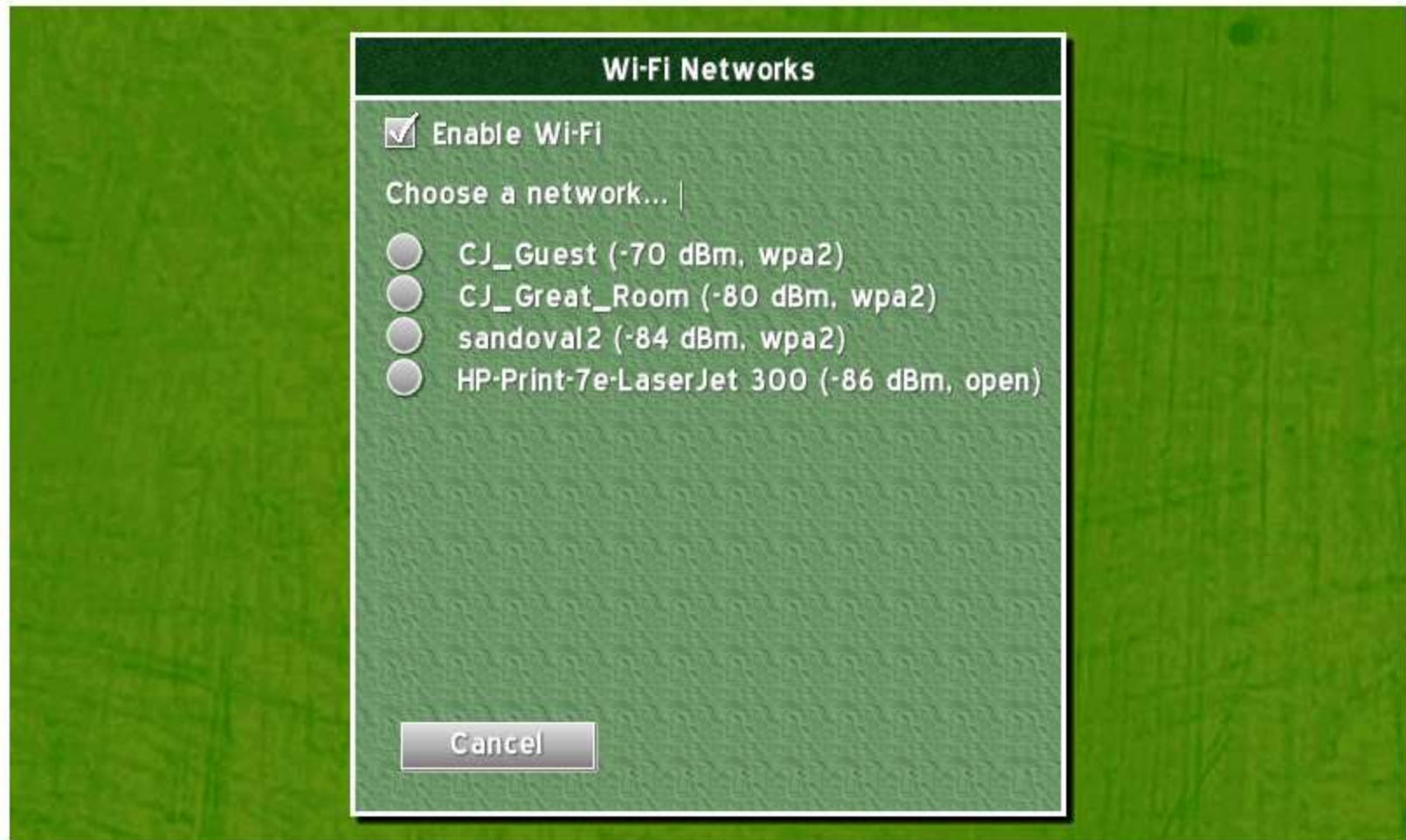
To configure the layout of the array for the first time, press on the gauge in the top right portion of the home screen.
Then select the "Setup" button and choose "Add".
Fill out the form and enter ok.
You can then arrange the individual panels by selecting "Arrange" icon.

More support can be obtained
online or by contacting
Chilicon Power by phone or email.
at (714) 878 6648
or info@chiliconpower.com



Skip this step if Ethernet is connected

CHOOSE, ENTER PASSWORD, AND JOIN WIFI NETWORK

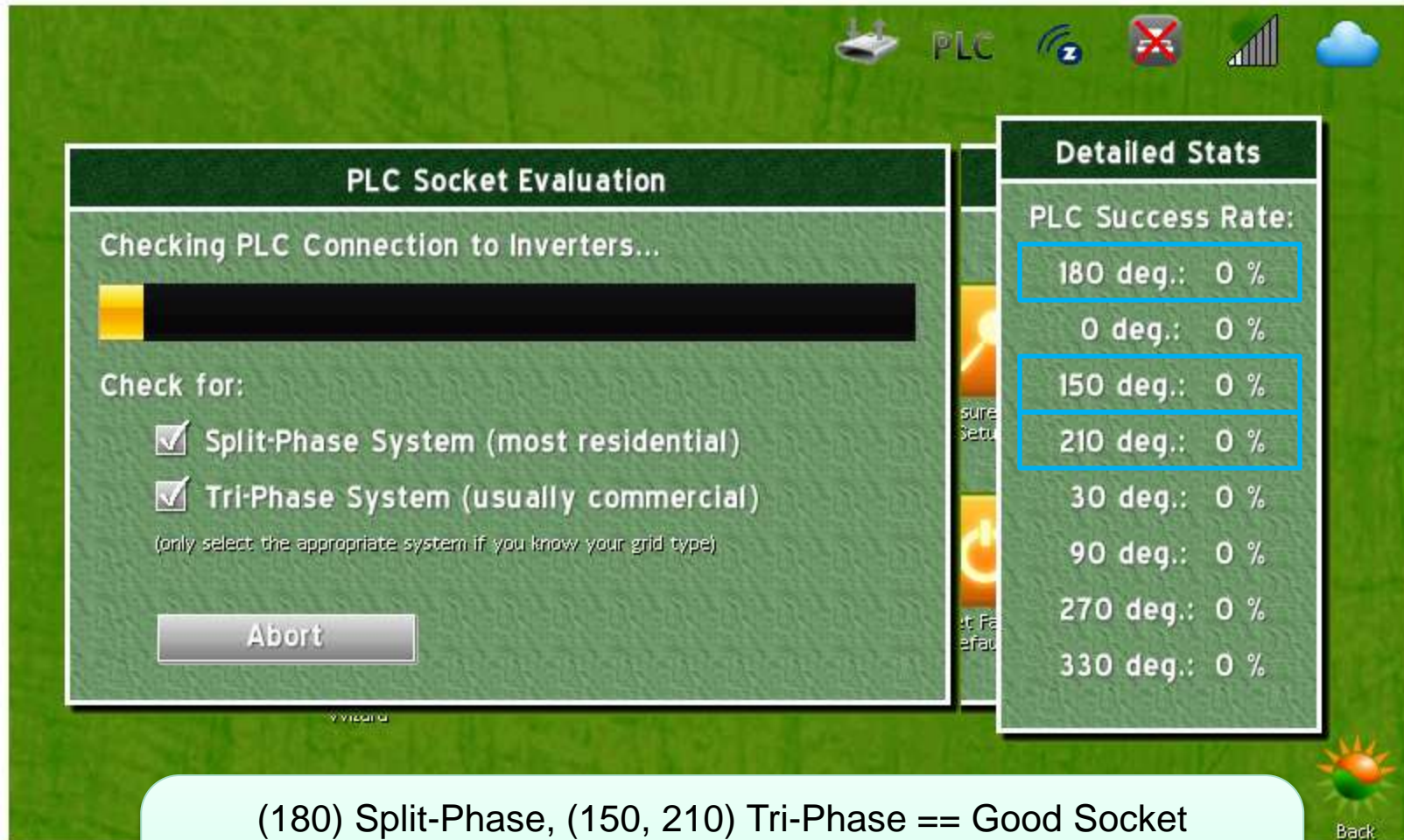


CONNECTING INVERTERS



Push on the Advanced
Settings Button





(180) Split-Phase, (150, 210) Tri-Phase == Good Socket
(0) Split-Phase, (30,90,270,33) Tri-Phase == Bad Socket
You should let the evaluation run to completion
or the phase will not be changed from the default (180 deg)

CONNECTING INVERTERS



Push on the Inverter
Wizard Button



Enter the number of inverters installed, and hit Start

CONNECTING TO CLOUD.CHILICONPOWER.COM



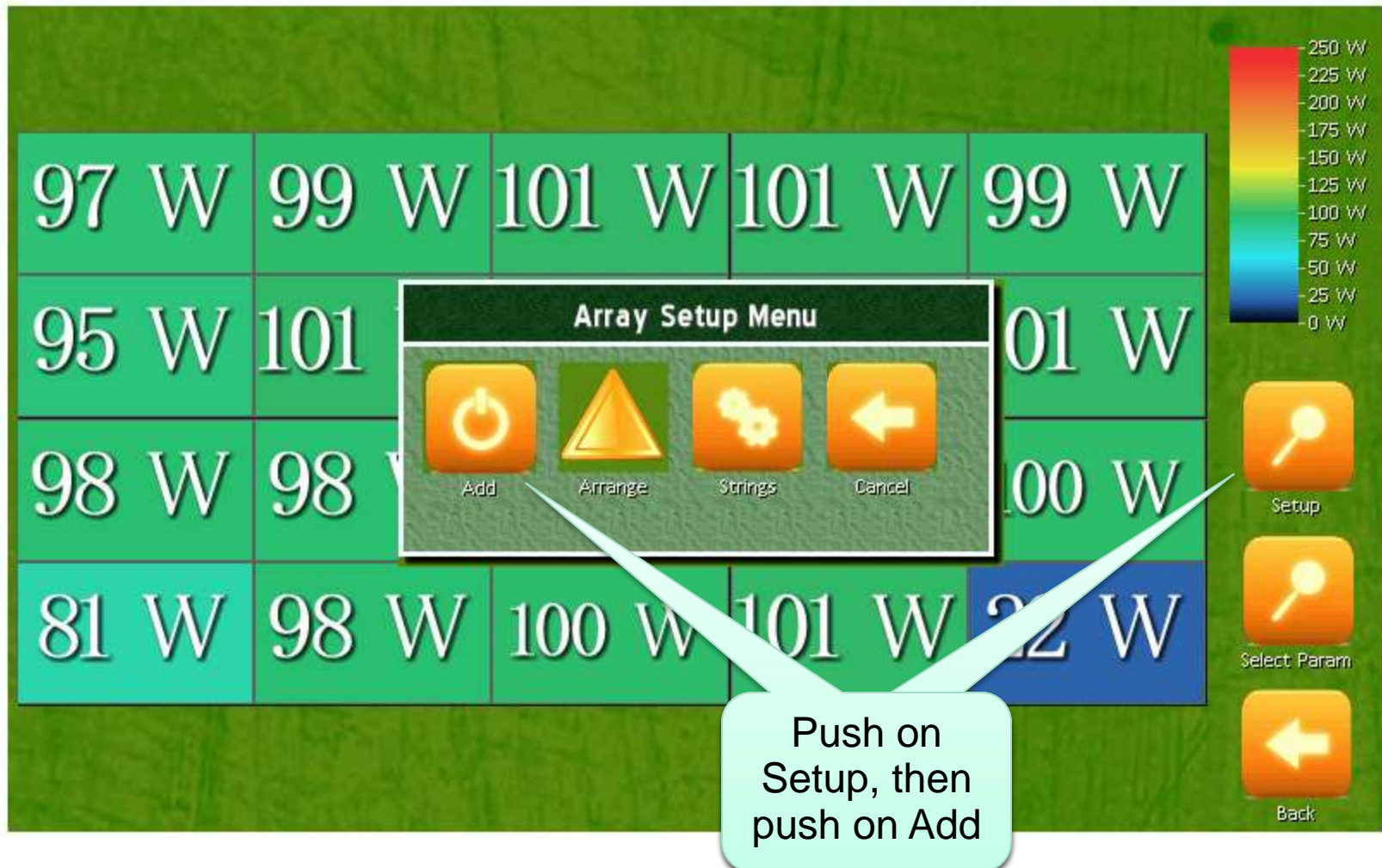
Push on the Cloud Setup Button



Record the Gateway ID and Authentication Code. Use them within 30 days to associate the gateway with cloud.chiliconpower.com

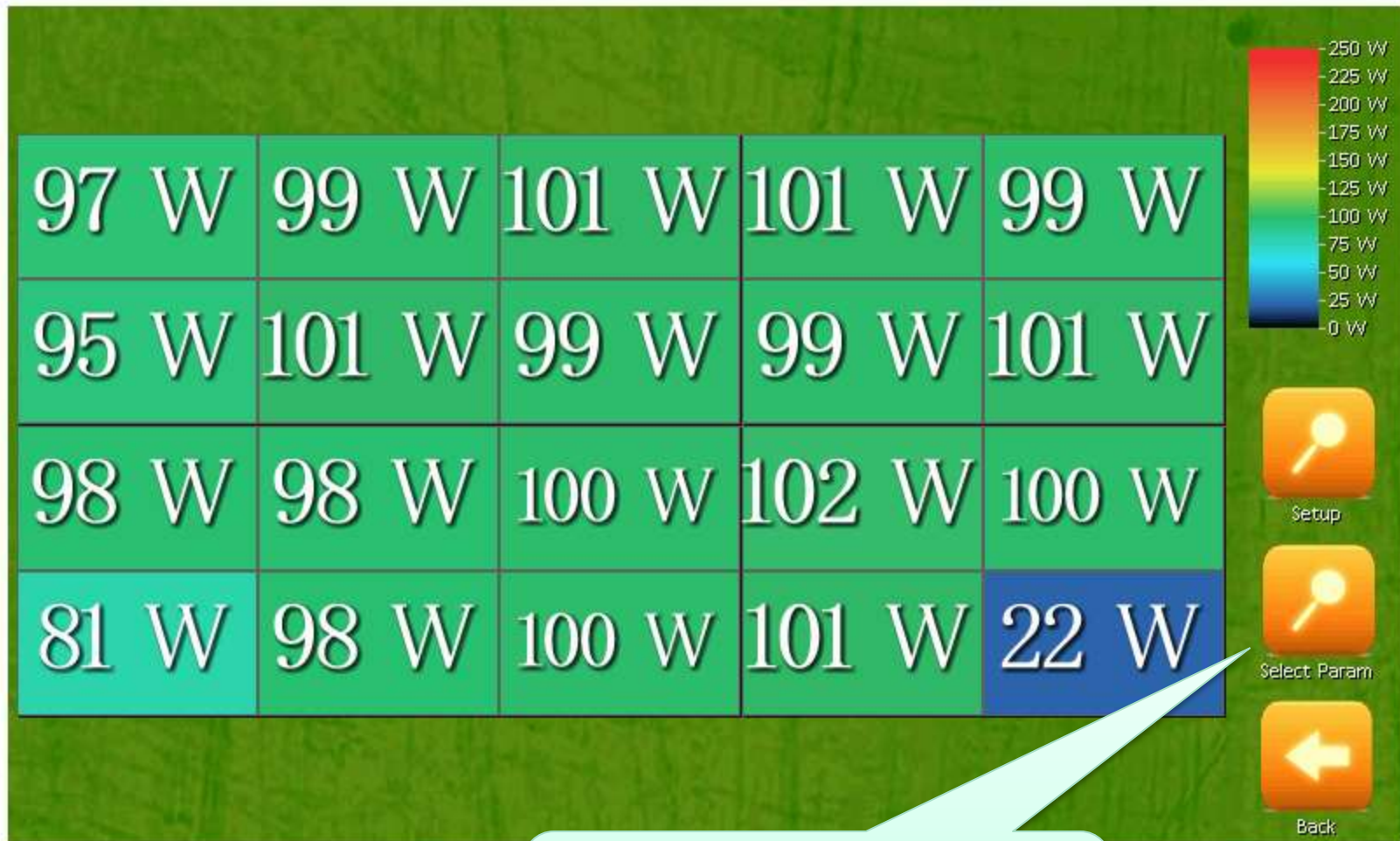


SETTING UP ARRAY DISPLAY



After pushing add, read the on screen information to draw the array.

SELECTING PARAMETER TO DISPLAY



Push on Select Param to
change the inverter
parameter displayed



IN-WALL INSTALLATION

Front view when placed



Rear View when Placed (if you could see from inside the wall)

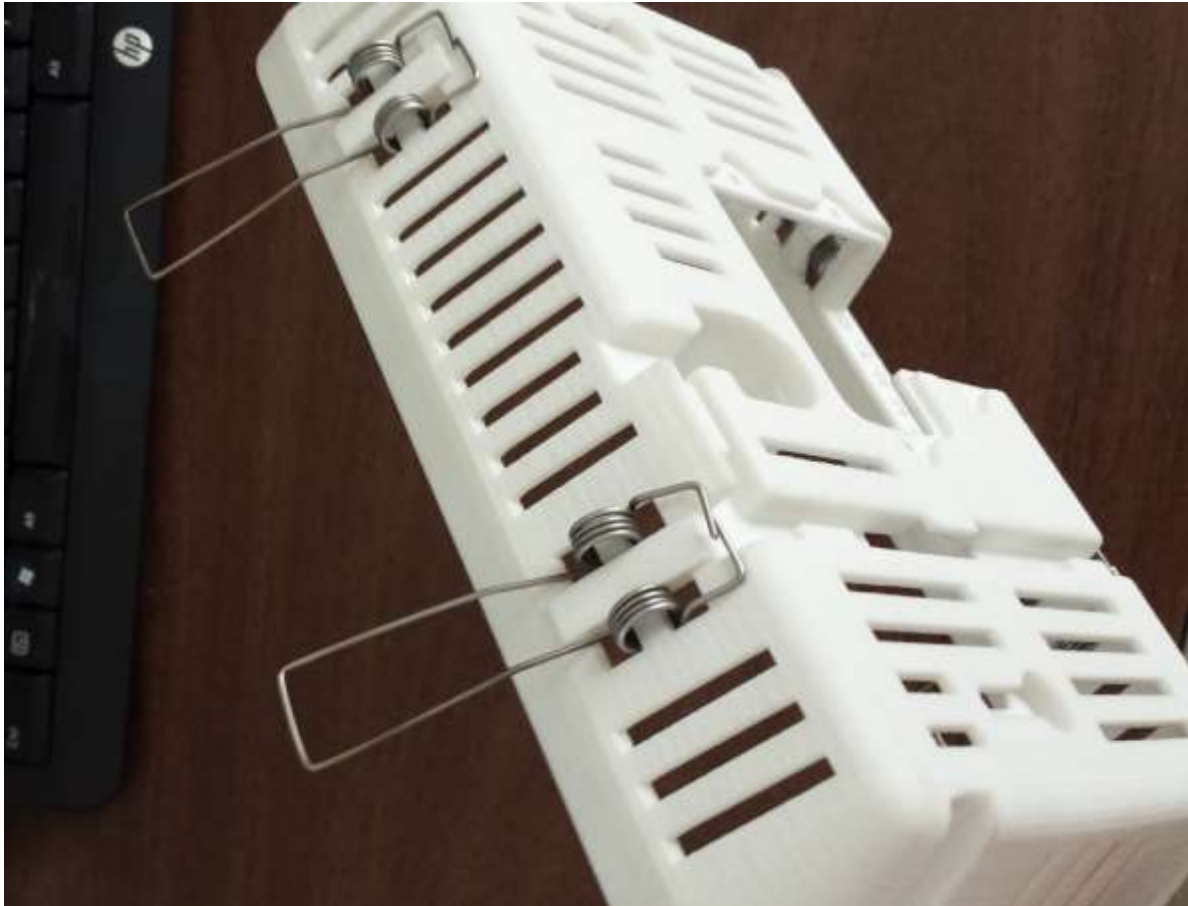


Open rear panel, remove plug and wire in ROMEX *before placing in wall*. Then Replace rear panel and screws.

Step1: Spring Placement



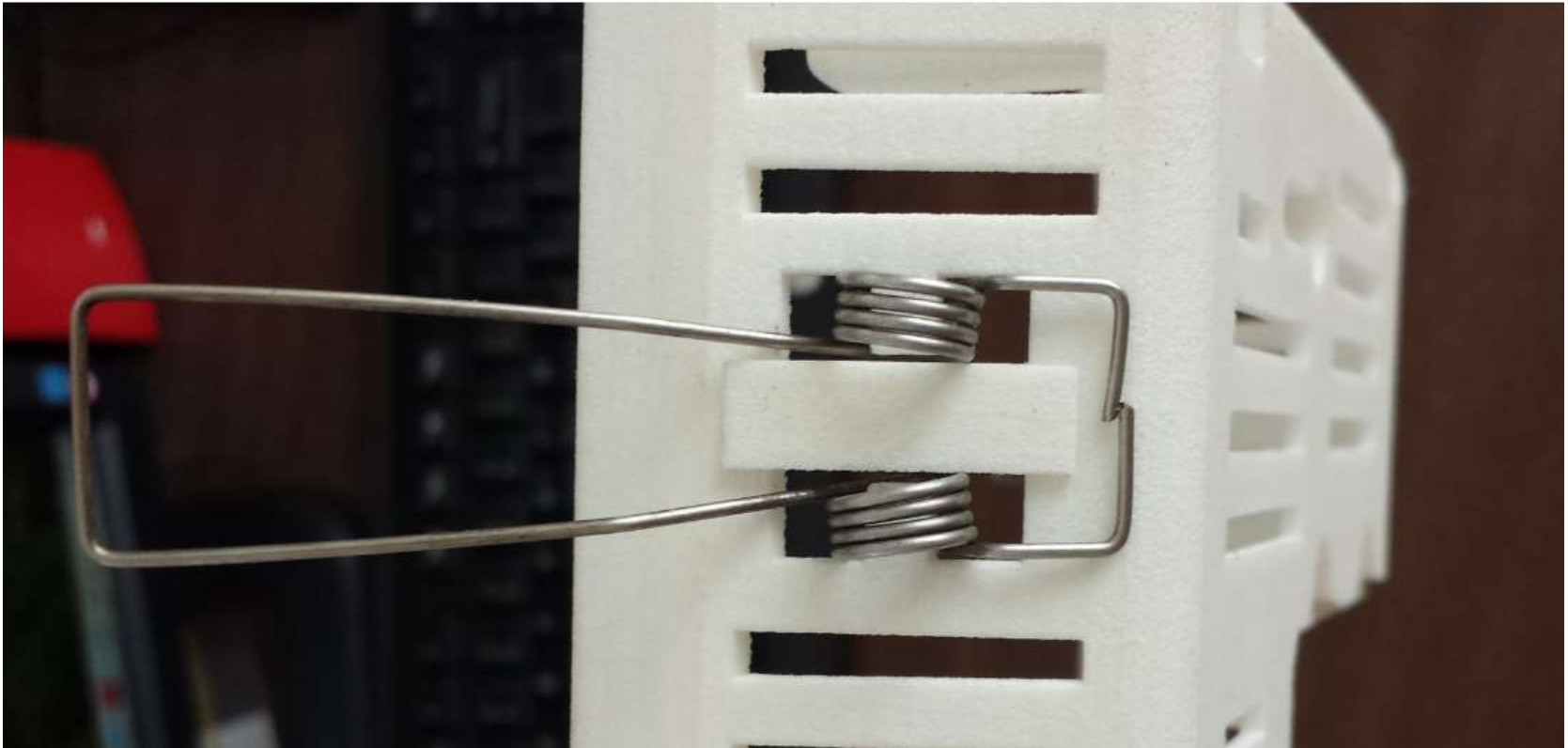
Step1: Spring Placement



Step1: Spring Placement



Step1: Spring Placement



Step2: Wall Hole



Step3: Lower pair of springs placed first



Warning! Make sure removable rear socket is connected to ROMEX and plugged into unit, and rear cover is fixed back in place, before installing in wall

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Step4: Retract and place upper pair of springs



Warning! Make sure removable rear socket is connected to ROMEX and plugged into unit, and rear cover is fixed back in place, before installing in wall

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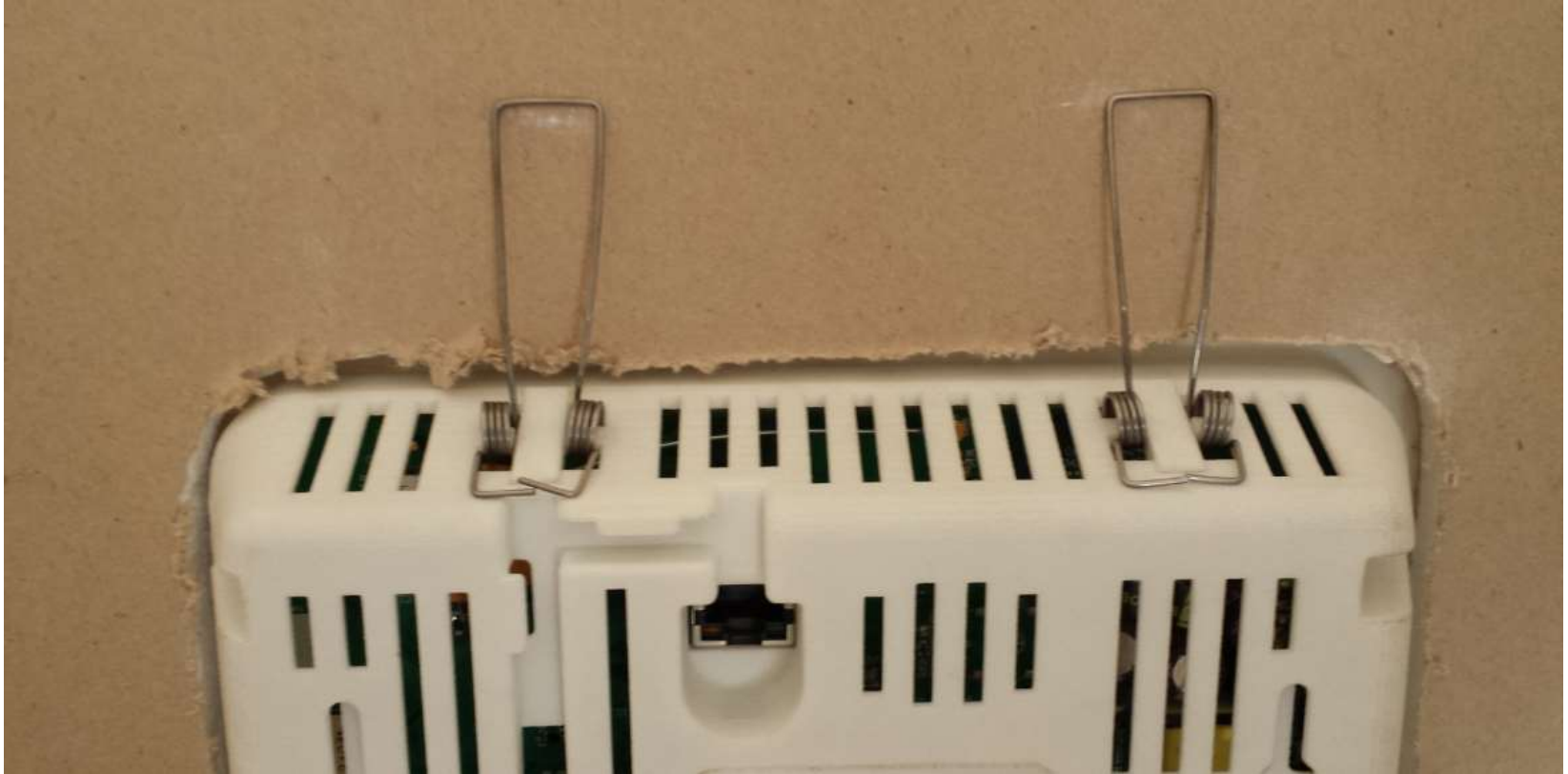
Step5: Let unit come to rest inside wall



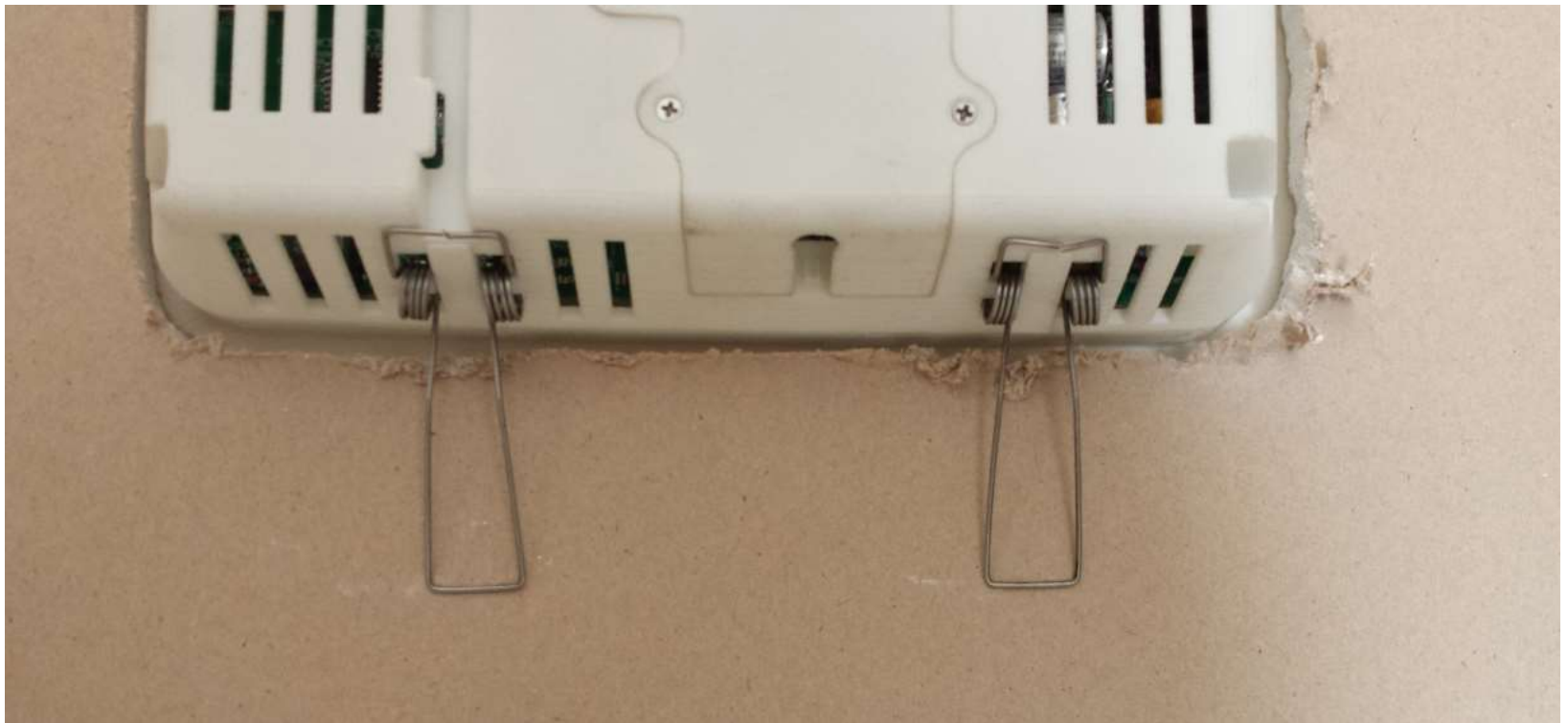
Warning! Make sure removable rear socket is connected to ROMEX and plugged into unit, and rear cover is fixed back in place, before installing in wall

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Rear View Detail



Rear View Detail





CONFIGURING MICROINVERTER EXTENDED RANGES

CONFIGURING MICROINVERTER EXTENDED RANGES

- The following slides show the step-by-step instructions to enable (forever) extended AC voltage and frequency ranges on the micros bound to the gateway
- Prerequisite:
 - Gateway powered up
 - All microinverters connected to the Gateway and communicating with it
- The procedure takes about 2 minutes if the power line communication link is good.
- The next slides show instructions. Note that the bubbles point to the region of the screen where the user has to push with his finger.



Push in the very top-left corner of the screen to bring up the DEV menus

SETTING SCREEN





A password prompt appears to gate access to the DEV menus. Enter the password “revolution” (10 letters) to access the DEV menus.

Firmware Build 3730

Gateway ID: 0x0010E002
 Uptime: 2 days, 21:52:47
 msTicks: 1006270091
 Firmware: 3730
 Filesystem: 1151

Grid Voltage Avg.: 121.7 Vrms
 Grid Voltage Inst.: 121.7 Vrms
 Grid Voltage Max.: 124.7 Vrms
 Grid Voltage Min.: 117.3 Vrms

Grid Avg. Freq.: 60.024 Hz
 Grid Period: 16.66937 ms
 Grid Avg. Jitter: 1.7 us (Max: 360.2 us)

Flyback PWM: 44.14%

6/16/2014 09:27:25 Monday

nextKeyEventToStore: 31
 capacitiveTouchI2cTimeoutCount: 0
 saveInv File: 0 ms
 FS Last Wait Time: 114 ms
 FS Write (last/max): 228 ms / 439 ms
 FS Read (last/max): 199 ms / 199 ms
 FS Reset Count: 7
 WiFi Reset Count: 0

Main() Timing (last/avg/max) [ms]: 0.0, 0.4, 4966

Inverter Build 163

RAM MEMORY:
 # Memory Chunks: 470
 Heap Top: 0xA0FF7000
 Heap Lowest: 0xA088499C
 Heap Bottom: 0xA01771C8
 Free Heap Lwst: 0x70D7D4
 Heap Avail.: 7534 kB
 Heap Usage: 7312 kB (49% full)
 Stack Available: 11520 bytes

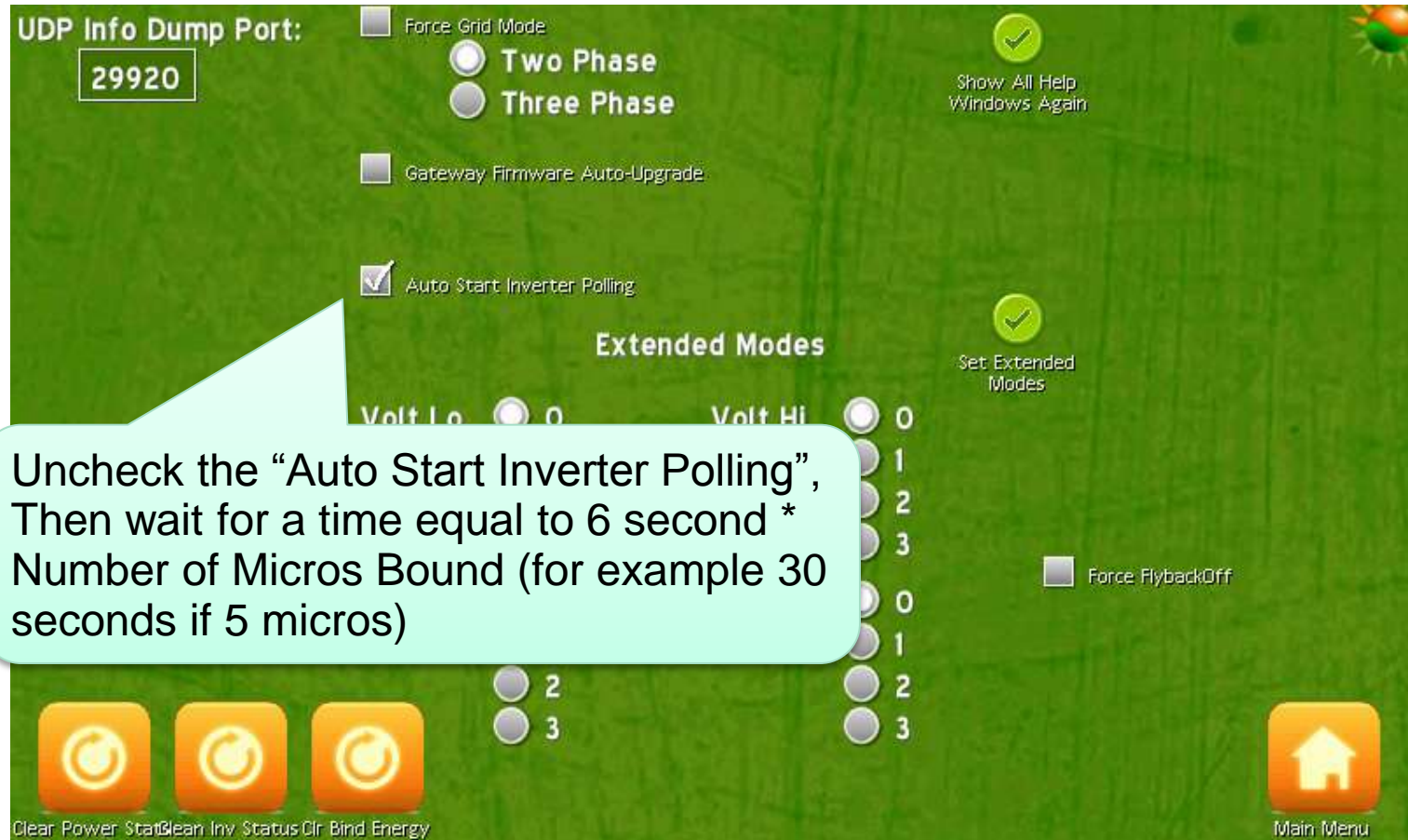
PROCESS TIMING:

Process Name	CPU	Total (s)	Max (us)
Frame IRQ	22%	4969	14
Systick IRQ	02%	304	169
MCI IRQ	00%	0	2
DMA IRQ	00%	0	4
LCD IRQ	75%	18346	142878
RTC IRQ	00%	2	27
ENET-IRQ	00%	0	0
Cron	00%	31	406887
Wi-Fi	00%	75	34458
Wired EMAC	00%	7	8
lwIP stack	00%	89	4788
Controller	00%	47	2544294
Model	00%	38	54
BG Tasks	00%	744	300995
Watchdog	00%	39	5
zWave	00%	243	2708968

Clear Stats **OOK Menu** **IP Menu** **Filesystem** **Settings** **Tests** **Console** **Z-Wave** **New Firmware** **User Menu**

Select the Settings Menu

DEV SETTINGS MENU – DISABLE POLLING





Set the 4 Volt and Freq
buttons as shown



DEV SETTINGS MENU – DISABLE POLLING





PLC ADVANCED MODES

In some cases it's useful to get a more detailed view of power line communication operation and/or to fine-tune power line communication settings. Functionality provided by the gateway for this includes:

- Communication rate and phase offset adjustment settings
- Communication quality measurements
- Communication noise oscilloscope view
- Communication packet view
- Manual Inverter Discovery and Binding
- Changing the gateway default Local or Global ID

RATE AND PHASE OFFSET SELECTION



Push on the
menu button

RATE AND PHASE OFFSET SELECTION

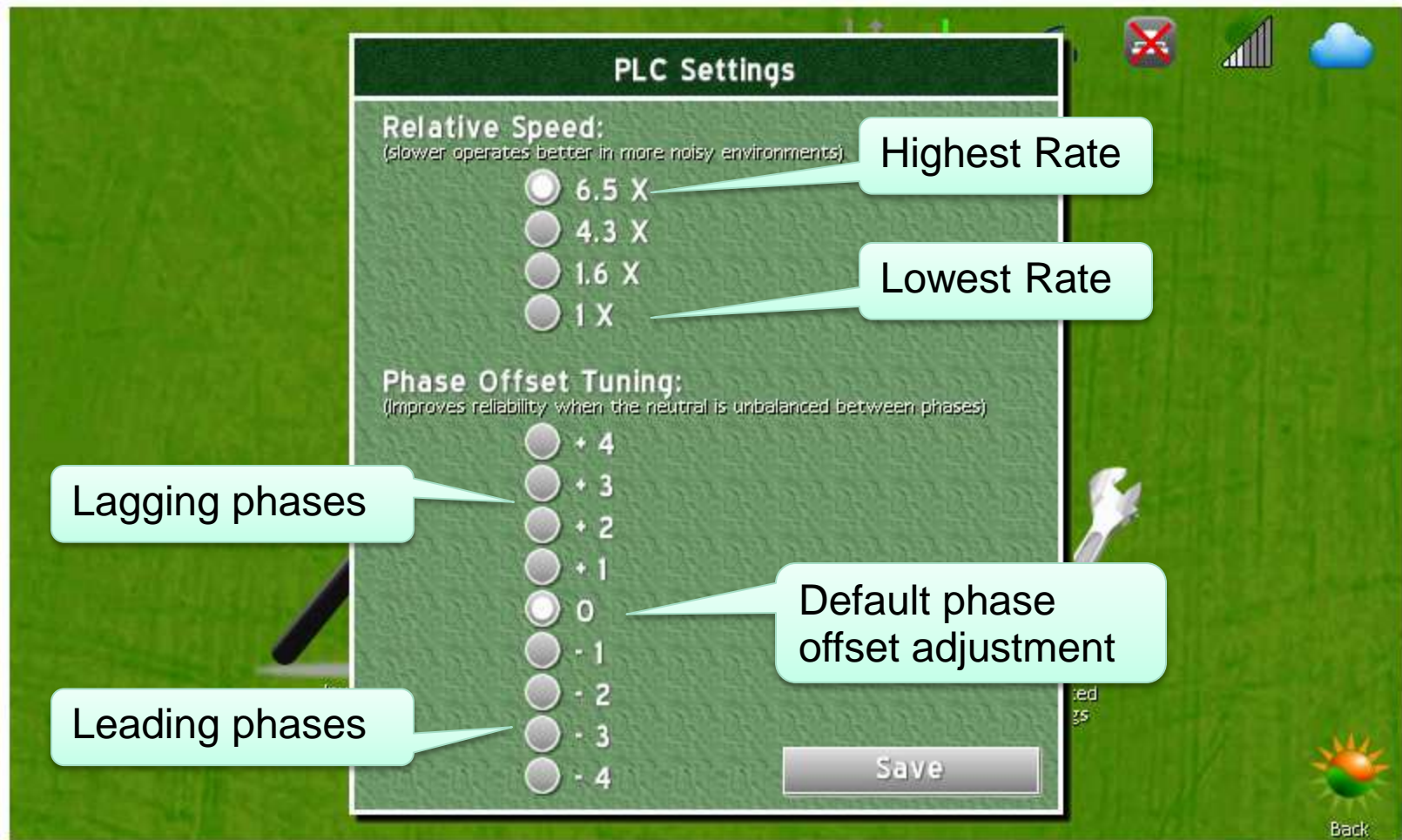


Push Advanced Settings

RATE AND PHASE OFFSET SELECTION



RATE AND PHASE OFFSET SELECTION



Push in the very top-left corner of the screen to bring up the DEV menus

VIEWING LINK QUALITY MEASUREMENTS



VIEWING LINK QUALITY MEASUREMENTS



A password prompt appears to gate access to the DEV menus. Enter the password “revolution” (10 letters) to access the DEV menus.

VIEWING LINK QUALITY MEASUREMENTS

Firmware Build 3754 **Inverter Build 166**

Gateway ID: 0x0010E00F
Uptime: 0 days, 1:45:12
msTicks: 25249243
Firmware: 3754
Filesystem: 1151

Grid Voltage Avg.: 122.1 Vrms
Grid Voltage Inst.: 122.1 Vrms
Grid Voltage Max.: 122.3 Vrms
Grid Voltage Min.: 121.9 Vrms

Grid Avg. Freq.: 60.024 Hz
Grid Period: 16.66545 ms
Grid Avg. Jitter: 0.5 us (Max: 1.9 us)

Flyback PWM: 44.14%

6/25/2014 18:37:11 Wednesday

nextKeyEventToStore: 77
capacitiveTouchI2cTimeoutCount: 0
saveInv File: 441 ms
FS Last Wait Time: 0 ms
FS Write (last/max): 4 ms / 489 ms
FS Read (last/max): 2 ms / 0 ms
FS Reset Count: 2
WiFi Reset Count: 0

Main() Timing (last/avg/max) [ms]: 76.2, 0.4, 945

RAM MEMORY:
Memory Chunks: 471
Heap Top: 0xA0FF7000
Heap Lowest: 0xA088499C
Heap Bottom: 0xA01771C8
Free Heap Lwst: 0x70D7D4
Heap Avail.: 7730 KB
Heap Usage: 7117 KB (47% full)

Stack Available: 11064 bytes

PROCESS TIMING:

Process Name	CPU	Total (s)	Max (us)
Frame IR0	21%	1	50
Systick IR0	01%	0	168
MCI IR0	00%	0	3
DMA IR0	00%	0	3
LCD IR0	77%	3	63856
RTC IR0	00%	0	24
ENET-IR0	00%	0	0
Cron	00%	0	36418
Wi-Fi	00%	0	4964
Wired EMAC	00%	0	6
lwIP stack	00%	0	1123
Controller	00%	0	69
Model	00%	0	2
BG Tasks	00%	0	514905
Watchdog	00%	0	4
zWave	00%	0	3312

Menu Bar: Clear Stats, OOK Menu, IP Menu, Filesystem, Settings, Tests, Console, Z-Wave, New Firmware, User Menu

Select the OOK Menu

LINK QUALITY AT GATEWAY



Reliable links: Barker Soft Correlation Sum, Avg > 80%.
Data Soft Correlation Sum, Avg > 80%
If lower, then decrease the default rate (11.5 to 5.75 for example)

LINK QUALITY AT INVERTERS

PARAMETERS	ID: 0	ID: 1	ID: 2	ID: 3	ID: 4	ID: 5	ID: 6
Global ID	0x80000044	0x800000C1	0x80000064	0x8000004E	0x80000087	0x80000088	0x80000058
Power (W)	96	21	93	94	92	89	91
PV Voltage (V)	28.60	34.43	29.40	29.39	29.27	28.91	28.56
PV Current (A)	3.40	0.71	3.43	3.50	3.39	3.37	3.22
Input Power (W)	99	24	102	104	101	99	93
Total Energy (kWh)	320.9	314.5	313.4	321.0	311.7	311.5	317.6
Grid Voltage (Vrms)	244.0	243.5	242.7	243.5	243.3	243.6	243.5
Grid Voltage THD (%)	1.97	2.01	2.01	2.01	1.99	2.04	1.99
Grid Current THD (%)	2.39	16.00	5.02	4.60	3.21	2.61	4.50
Jitter Avg (us)	0.00	0.04	0.00	0.00	0.00	0.00	0.02
Jitter Max (us)	0.02	0.00	0.02	0.00	0.02	0.00	0.02
DC FETs Temp (C)	40.8	37.2	41.8	40.1	41.1	43.9	43.9
PCB Temp (C)	34.3	34.1	34.7	34.4	35.6	38.0	37.4
Gain %	78.03	63.37	76.08	76.23	76.30	76.79	77.70
Flyback Voltage (V)	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Flyback PWM %	60.5	60.5	60.0	61.0	59.0	59.0	61.5
Process	HARVEST	HARVEST	HARVEST	HARVEST	HARVEST	HARVEST	HARVEST
Over I (Lst/Mx/Ttl)	9/44/463	7/33/416	8/27/420	8/28/336	10/52/514	9/40/436	8/27/410
Good Packets	6655	48911	13813	25715	57711	29525	12257
Bad Checksum Packets	12450	2471	2950	4104	4201	19830	64104
Packet Error Rate (%)	65.16	4.80	17.59	13.76	6.78	40.17	83.94
decodedGolayWordCnt	52046	50484	50664	51580	51836	50404	50446
decodedGolayBitErr	10952	9992	11858	14113	11286	14857	10242
Last Uptime	12h51m16s	12h51m08s	12h51m00s	12h51m32s	12h51m24s	12h51m16s	12h51m49s
Total Uptime	2443h08m52s	2454h31m24s	2459h04m20s	2497h45m56s	2463h37m48s	2481h49m56s	2477h17m25s
Total Harvest Time	2430h	2441h	2446h	2484h	2450h	2468h	2464h
firmwareVersionId	165H	165L	165L	165L	165L	165L	165H
Hardware Revision	v6.4	v6.4	v6.4	v6.4	v6.4	v6.4	v6.4
status	0x86107426	0x86106426	0x86106426	0x86107026	0x86107426	0x86107426	0x86107426
statusSave	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
status2	0x82000000	0x82000000	0x82000000	0x82000000	0x82000000	0x82000000	0x82000000
status2Save	90.9% 94.2%	91.4% 100.0%	90.9% 91.3%	85.4% 90.5%	91.4% 86.9%	84.8% 91.3%	91.6% 100.0%
Last OKK Received	01m02s	01m04s	01m06s	01m01s	01m00s	57s	54s
Sleep Time Left	36s	29s	38s	41s	44s	47s	50s

Status: Automated Info Dump for Inv 0x800000AC (local ID 0), string 0-9
Local Gateway ID: 0

List Polling

Single Poll

Cont. Poll

Auto Poll

Previous Page

Next Page

Page/Word

OOK Menu

Reliable links: Data Soft Correlation Sum, Avg > 80%
If lower, then decrease the default rate (11.5 to 5.75 for example)

*** GRID ***
cycleCounter: 382546
PHASE LOCKED
ABNORMAL-GRID-FREQUENCY
ABNORMAL-GRID-JITTER
TX-FRAME-OVERRUN
VGRID-UNDERVOLTAGE-EVENT
VGRID-OVERVOLTAGE-EVENT

*** 00K DEBUG SCREEN ***

Decoded Golay 23-Bit Words: 114909
Detected/Corrected Golay Bit Errors: 3162
Detected BER: 0.11% FEC Loc: 0000001 0000000 0000000 0000000 1
Barker Soft Correlation: 118 123 124 130 130 -124 -118 130 118 -117 116 -118 118
Barker Soft Correlation Sum: 88.2% Avg: 89.6%
Data Soft Correlation: 15 6 5 -6 5 0 0 -6 5 -6 -6 6 -6
Data Soft Correlation Sum: 85.5% Avg: 89.5%

Successful Packet Count: 2127
Packet Checksum Err Count: 0
Packet Success Rate: 100.00

Local Gateway IDs: 0000000000000000

udpTxPayloadCount: 0
frameCounterOffset: 256
Word Threshold: low
Carrier Wave Tx: off
Has Active Repeaters: no

Chip Modulation ☒
Responds to Pings ☐
Phase Offset (in frames): 256
Hex Display ☐

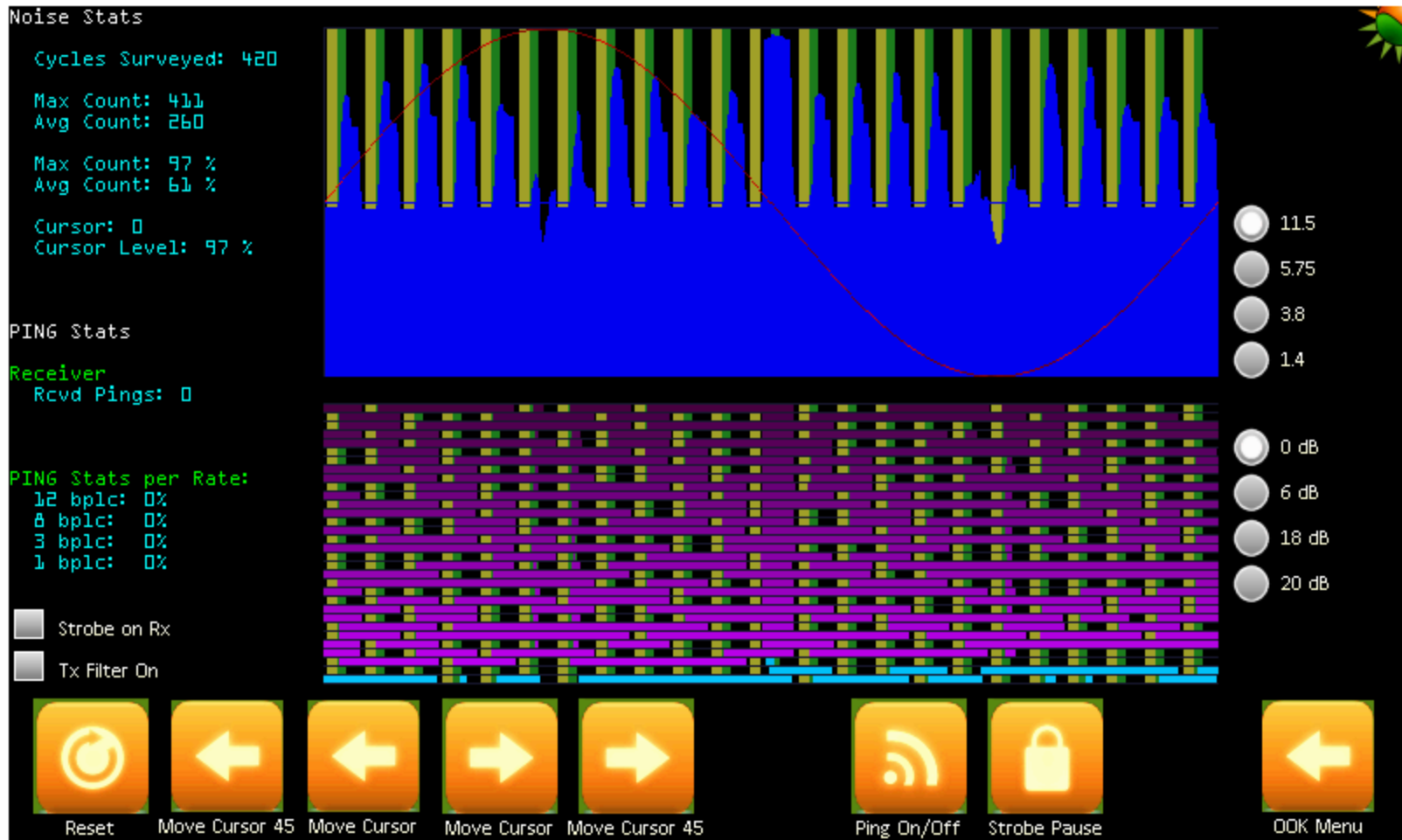
Tx Count: 2135

Rx: I1->60 CMD-PAGE-DUMP
Rx: I2->60 CMD-PAGE-DUMP
Rx: I3->60 CMD-PAGE-DUMP
Rx: I4->60 CMD-PAGE-DUMP
Rx: I5->60 CMD-PAGE-DUMP
Rx: I6->60 CMD-PAGE-DUMP
Rx: I7->60 CMD-PAGE-DUMP
Rx: I8->60 CMD-PAGE-DUMP

Auto 11.5
Low 5.75
High 3.8
1.4
L1 0 dB
L2 6 dB
L3 18 dB
20 dB

Reset Discovery Info Dump Gateway ID Upgrade Inv. Cont. CW TX Noise Survey Timing Survey Exp. Waveform Main Menu

Press to see oscilloscope view



Displays the average carrier energy detected in one grid line cycle
Interferers can be visualized when blue energy appears even when no transmission is occurring. Sinks can be visualized when no energy appears at some part of the cycle even though transmission is occurring.

**** 00K DEBUG SCREEN ****

*** GRID ***
cycleCounter: 382546
PHASE LOCKED
ABNORMAL-GRID-FREQUENCY
ABNORMAL-GRID-JITTER
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Data Soft Correlation Sum: 85.5% Avg: 89.5%

Successful Packet Count: 2127
Packet Checksum Err Count: 0
Packet Success Rate: 100.00

Local Gateway IDs: 0000000000000000

udpTxPayloadCount: 0
frameCounterOffset: 256
Word Threshold: low
Carrier Wave Tx: off
Has Active Repeaters: no

*** 00K ***
RX-SYNCHRONIZED
RX-CURRENTLY-RECEIVING
TX-PACKET-READY
TX-PACKET-IN-PROGRESS

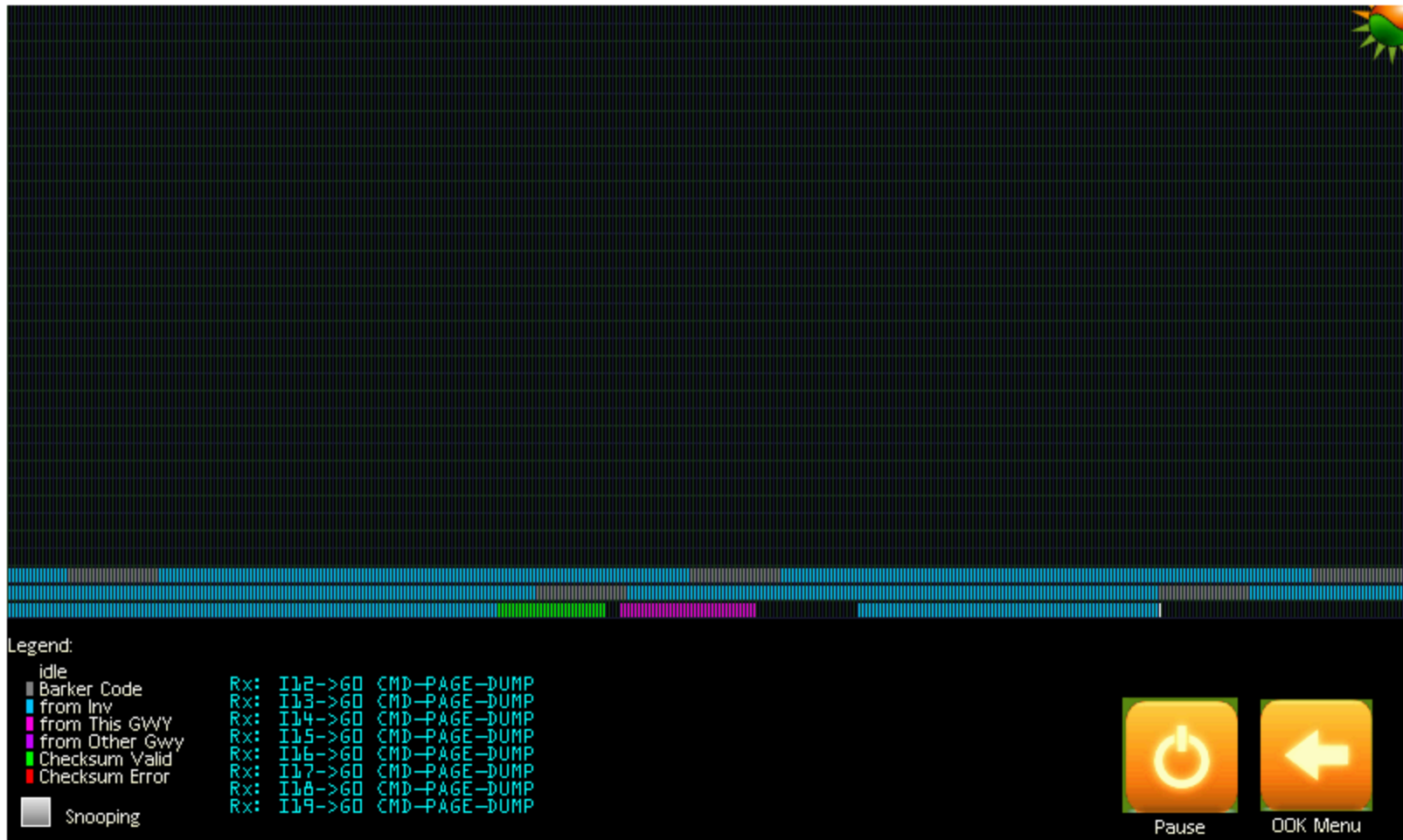
☒ Chip Modulation
☐ Responds to Pings
Phase Offset (in frames): 256
☐ Hex Display

Tx Count: 2135
Rx: I1->60 CMD-PAGE-DUMP
Rx: I2->60 CMD-PAGE-DUMP
Rx: I3->60 CMD-PAGE-DUMP
Rx: I4->60 CMD-PAGE-DUMP
Rx: I5->60 CMD-PAGE-DUMP
Rx: I6->60 CMD-PAGE-DUMP
Rx: I7->60 CMD-PAGE-DUMP
Rx: I8->60 CMD-PAGE-DUMP

Auto 11.5
Low 5.75
High 3.8
1.4
L1 0 dB
L2 6 dB
L3 18 dB
20 dB

Reset Discovery Info Dump Gateway ID Upgrade Inv. Cont. CW TX Noise Survey Timing Survey Exp. Waveform Main Menu

PLC Packet View



Packets fields being decoded by the gateway are displayed in real time, each small rectangular 'cell' is one grid line cycle of time. The legend on left color codes the part of the packet that is being decoded.

MANUAL DISCOVERY AND BINDING

**** 00K DEBUG SCREEN ****

*** GRID ***
cycleCounter: 382546
PHASE LOCKED
ABNORMAL-GRID-FREQUENCY
ABNORMAL-GRID-JITTER
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udpTxPayloadCount: 0
frameCounterOffset: 256
Word Threshold: low
Carrier Wave Tx: off
Has Active Repeaters: no

*** 00K ***
RX-SYNCHRONIZED
RX-CURRENTLY-RECEIVING
TX-PACKET-READY
TX-PACKET-IN-PROGRESS

☒ Chip Modulation
☐ Responds to Pings
Phase Offset (in frames): 256
☐ Hex Display

Tx Count: 2135

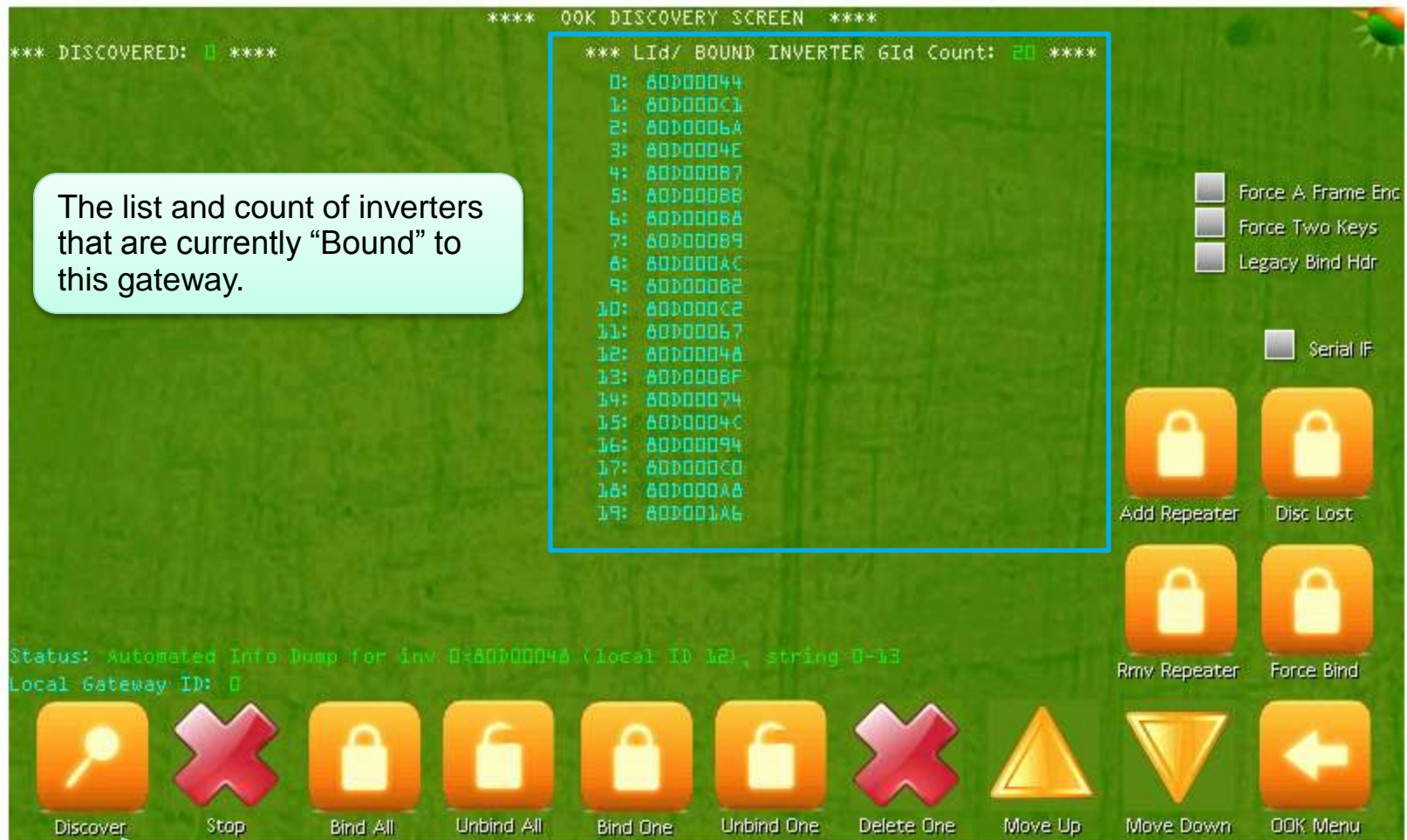
Rx: I1->60 CMD-PAGE-DUMP
Rx: I2->60 CMD-PAGE-DUMP
Rx: I3->60 CMD-PAGE-DUMP
Rx: I4->60 CMD-PAGE-DUMP
Rx: I5->60 CMD-PAGE-DUMP
Rx: I6->60 CMD-PAGE-DUMP
Rx: I7->60 CMD-PAGE-DUMP
Rx: I8->60 CMD-PAGE-DUMP

Auto 11.5
Low 5.75
High 3.8
1.4
L1 0 dB
L2 6 dB
L3 18 dB
20 dB

Reset Discovery Info Dump Gateway ID Upgrade Inv. Cont. CW TX Noise Survey Timing Survey Exp. Waveform Main Menu

Press for manual Discovery menu

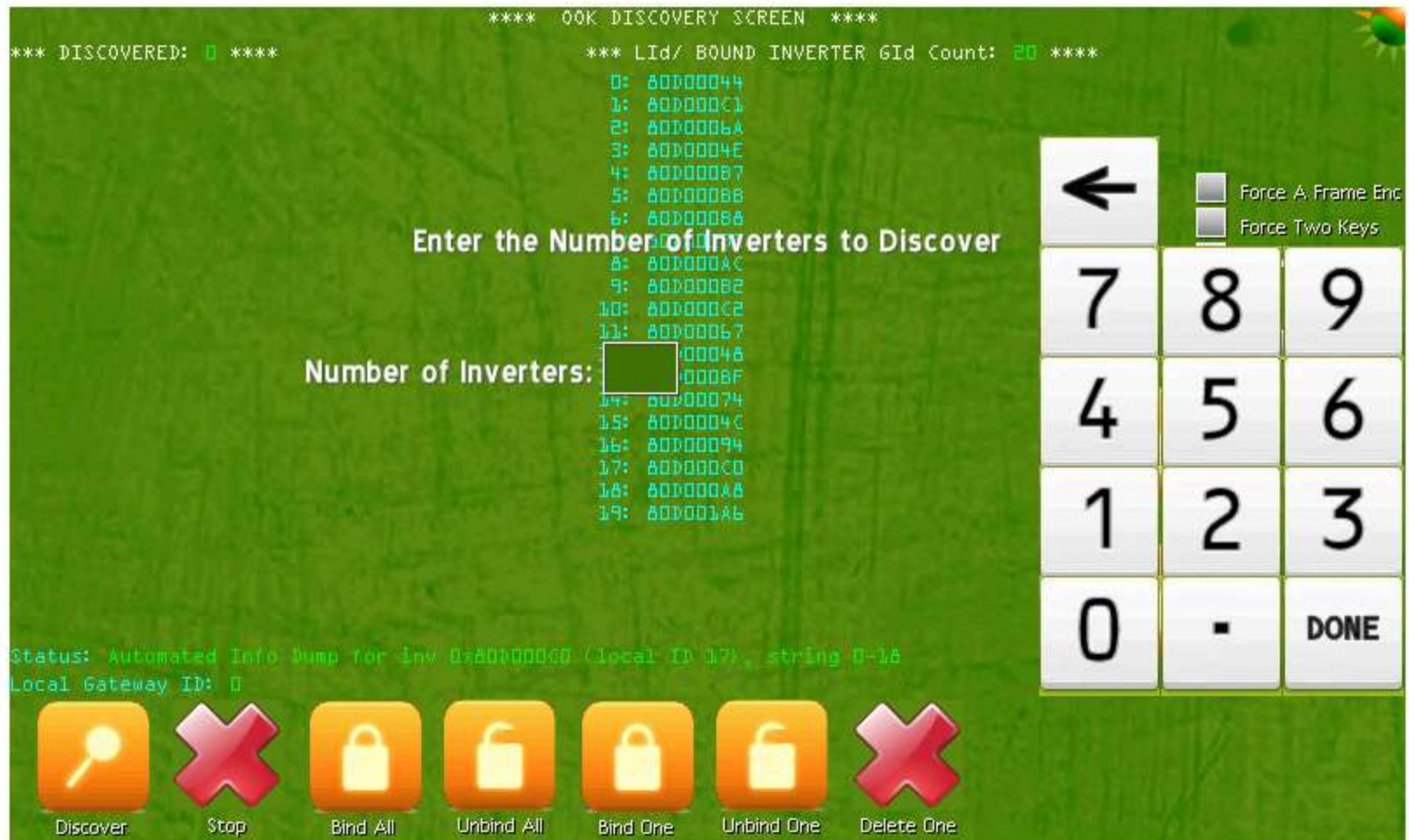
MANUAL DISCOVERY AND BINDING



The list and count of inverters that are currently “Bound” to this gateway.

Press to enter manual Discovery mode

MANUAL DISCOVERY AND BINDING



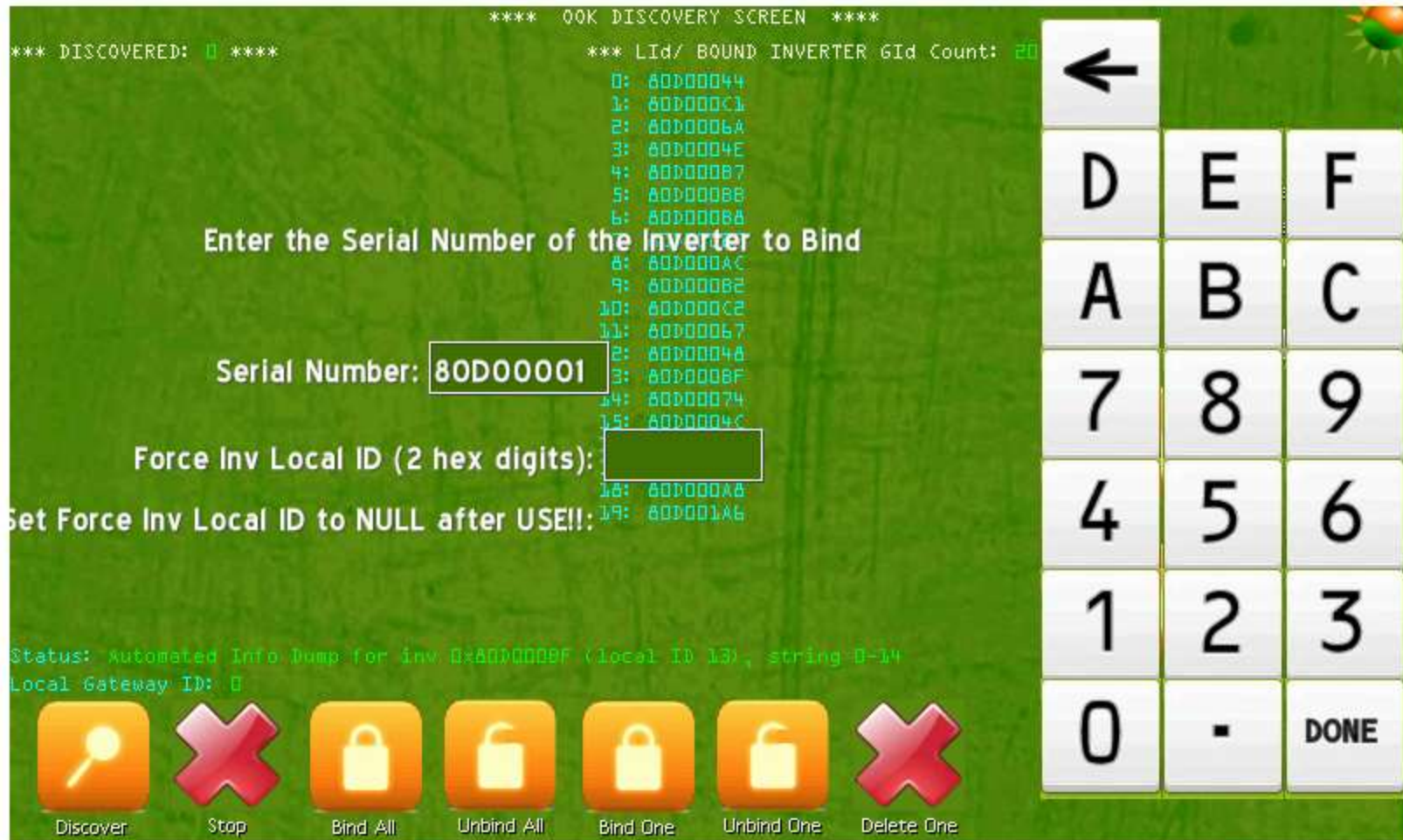
Enter the number of inverters you would like to discover. Only UnBound inverters can be discovered this way, Bound inverters can be rediscovered using the 'Disc Lost' icon. Discovered inverters will appear in a list on left. Then 'Bind All' to pair them with the gateway.

MANUAL DISCOVERY AND BINDING



Press to Force Bind a single inverter

MANUAL DISCOVERY AND BINDING



Force Bind overrides any existing inverter state (bound or unbound) and forces an inverter to pair with the gateway. You can specify a Local ID for the inverter in the second field, or leave this field blank to have the gateway automatically assign an inverter local ID (Lid).

CHANGE LOCAL OR GLOBAL GATEWAY ID

**** OOK DEBUG SCREEN ****

*** GRID ***
cycleCounter: 382546
PHASE LOCKED
ABNORMAL-GRID-FREQUENCY
ABNORMAL-GRID-JITTER
TX-FRAME-OVERRUN
VGRID-UNDERVOLTAGE-EVENT
VGRID-OVERVOLTAGE-EVENT

Decoded Golay 23-Bit Words: 114909
Detected/Corrected Golay Bit Errors: 3162
Detected BER: 0.11% FEC Loc: 000001 000000 000000 000000 1
Barker Soft Correlation: 118 123 124 130 130 -124 -118 130 118 -117 116 -118 118
Barker Soft Correlation Sum: 88.2% Avg: 89.6%
Data Soft Correlation: 5 6 5 -6 6 0 0 -6 5 -6 -6 6 -6
Data Soft Correlation Sum: 85.5% Avg: 89.5%

Successful Packet Count: 2127
Packet Checksum Err Count: 0
Packet Success Rate: 100.00

Local Gateway IDs: 0000000000000000

udpTxPayloadCount: 0
frameCounterOffset: 256
Word Threshold: low
Carrier Wave Tx: off
Has Active Repeaters: no

*** OOK ***
RX-SYNCHRONIZED
RX-CURRENTLY-RECEIVING
TX-PACKET-READY
TX-PACKET-IN-PROGRESS

☒ Chip Modulation
☐ Responds to Pings
Phase Offset (in frames): 256
☐ Hex Display

Tx Count: 2135
Rx: I1->60 CMD-PAGE-DUMP
Rx: I2->60 CMD-PAGE-DUMP
Rx: I3->60 CMD-PAGE-DUMP
Rx: I4->60 CMD-PAGE-DUMP
Rx: I5->60 CMD-PAGE-DUMP
Rx: I6->60 CMD-PAGE-DUMP
Rx: I7->60 CMD-PAGE-DUMP
Rx: I8->60 CMD-PAGE-DUMP

Auto 11.5
Low 5.75
High 3.8
1.4
L1 0 dB
L2 6 dB
L3 18 dB
20 dB

Reset Discovery Info Dump Gateway ID Upgrade Inv. Cont. CW TX Noise Survey Timing Survey Exp. Waveform Main Menu

Change Local or Global
Gateway ID

CHANGE LOCAL OR GLOBAL GATEWAY ID





Valid IDs are [0,14].
This is useful if a
neighboring building
also has a Chilicon
system installed

Current Gateway Local ID

Gateway Global ID

Approval Code

This is used only in the
event of a gateway RMA
procedure. Contact
info@chiliconpower.com
for support.

Unassign GWY Auto GWY ID Manual GWY ID OK Menu



zWAVE WIRELESS POWER METER INSTALLATION

WIRELESS ENERGY METER CONFIGURATION

The Chilicon Power gateway interfaces with up to 16 wireless energy meter modules. Each energy meter comes with 2 clamps and one voltage sensor.

Voltage Lines : Connect across 120V and Grid Neutral. (DO NOT CONNECT TO 240Volts)

Clamp 1: Connect to any producing or consuming circuit of interest, up to 200 Amps

Clamp 2: Connect to any producing or consuming circuit of interest, up to 200 Amps

General placement guidelines

- Do not install the power meter inside a metal electrical panel or box.
- When installed indoors, terminals on power meter can face up or down
- When installed outdoors, terminals MUST face down to prevent slow water ingress

EXAMPLE: INDOOR INSTALLATION



EXAMPLE: OUTDOOR INSTALLATION





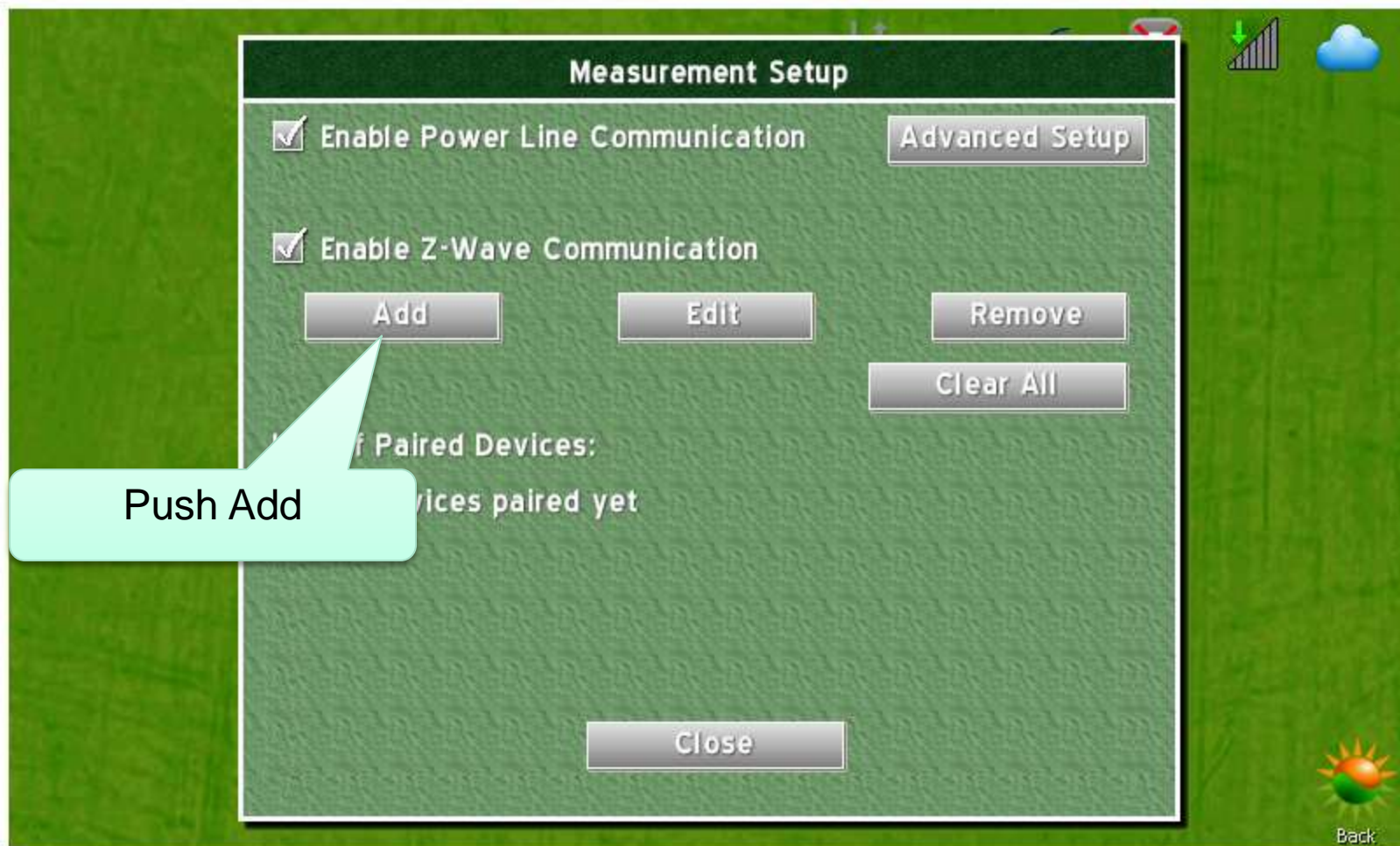
Push on the
menu button



Push Advanced Settings



Push Measurement
Setup

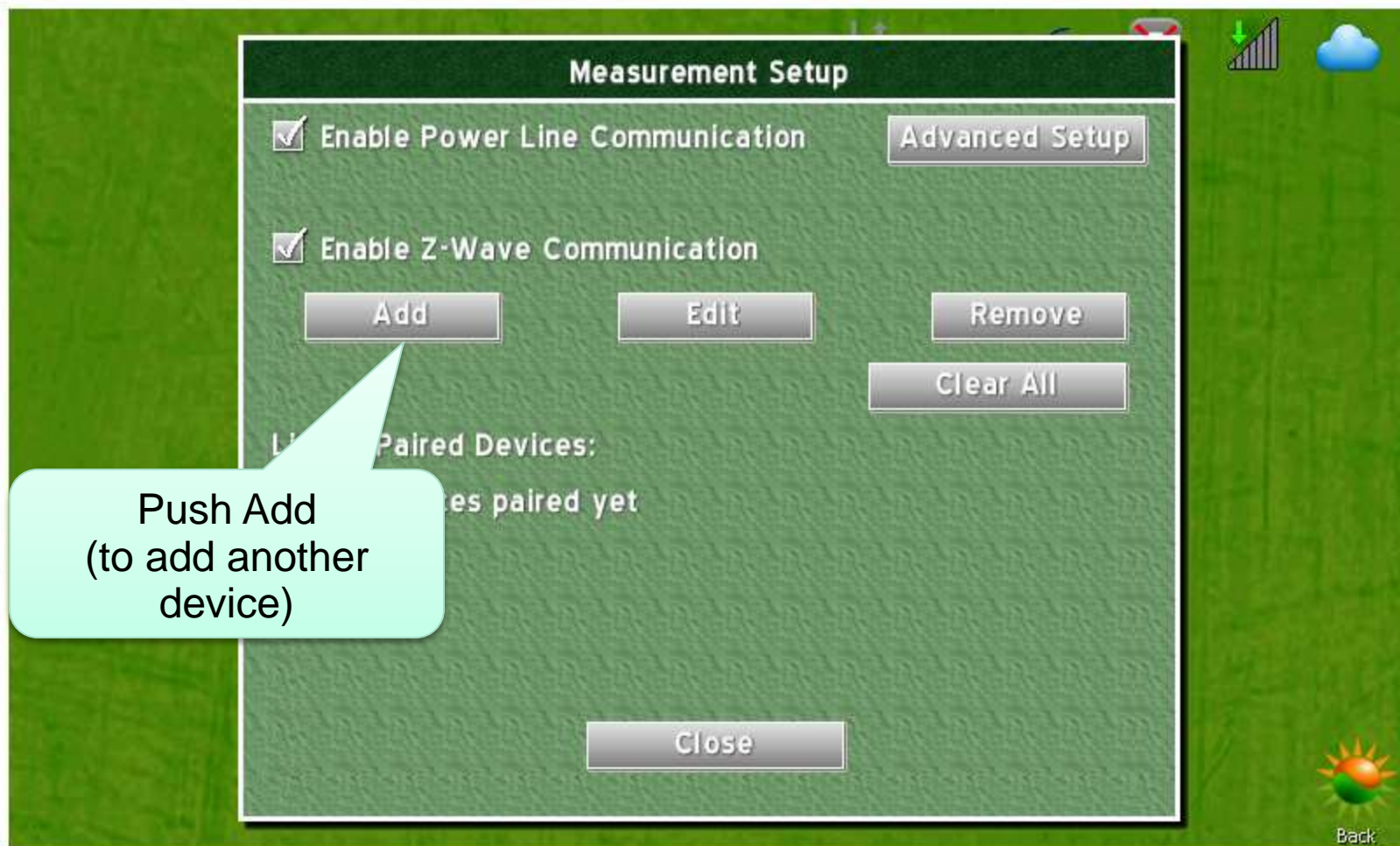


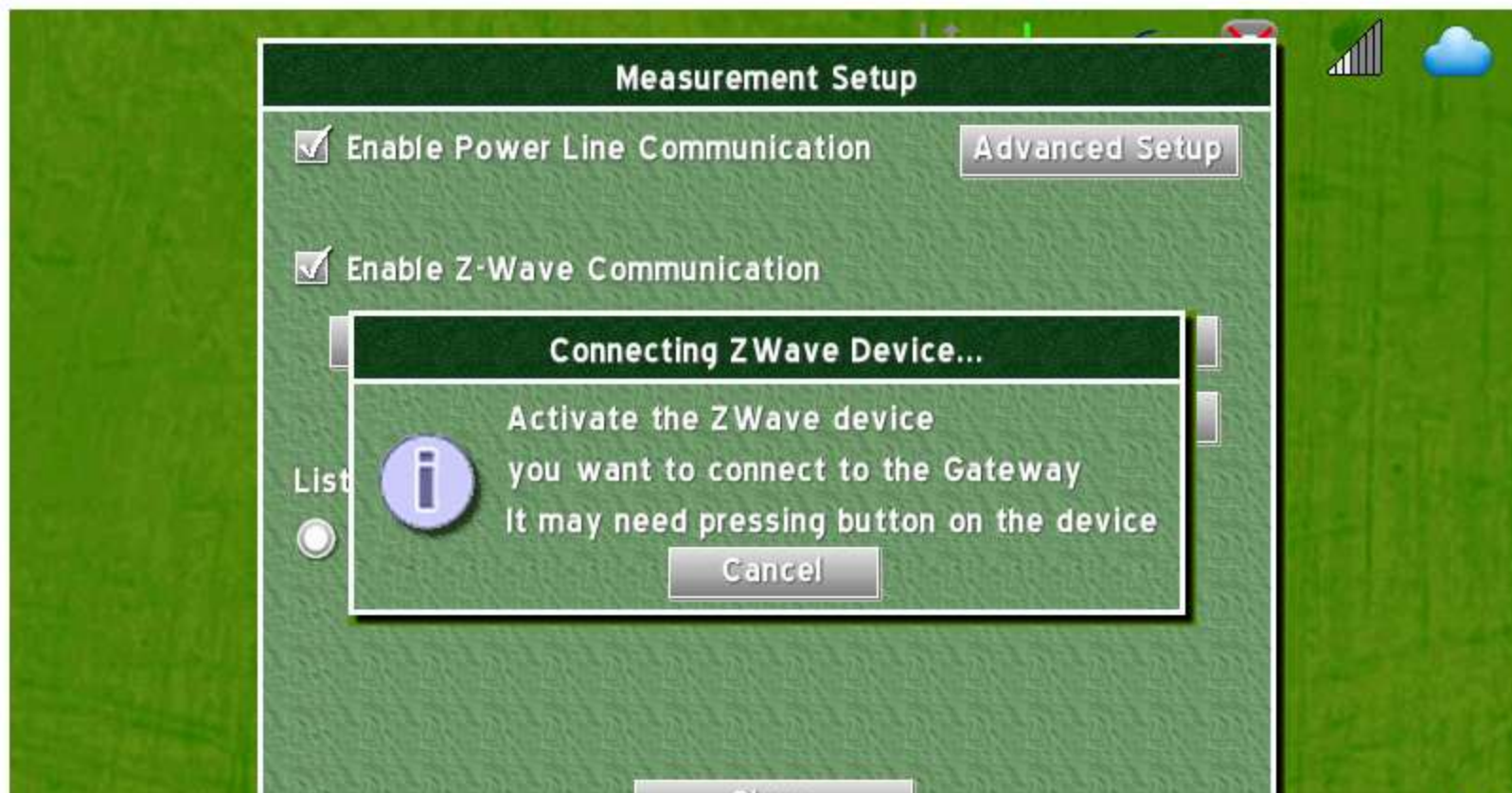


Press the button the zWave device to pair it, device must be within range of Gateway. Repeaters can be used to extend the range, but repeaters must be paired in proximity to the Gateway, we first pair a repeater



Confirmation of pairing appears as a message, hit OK

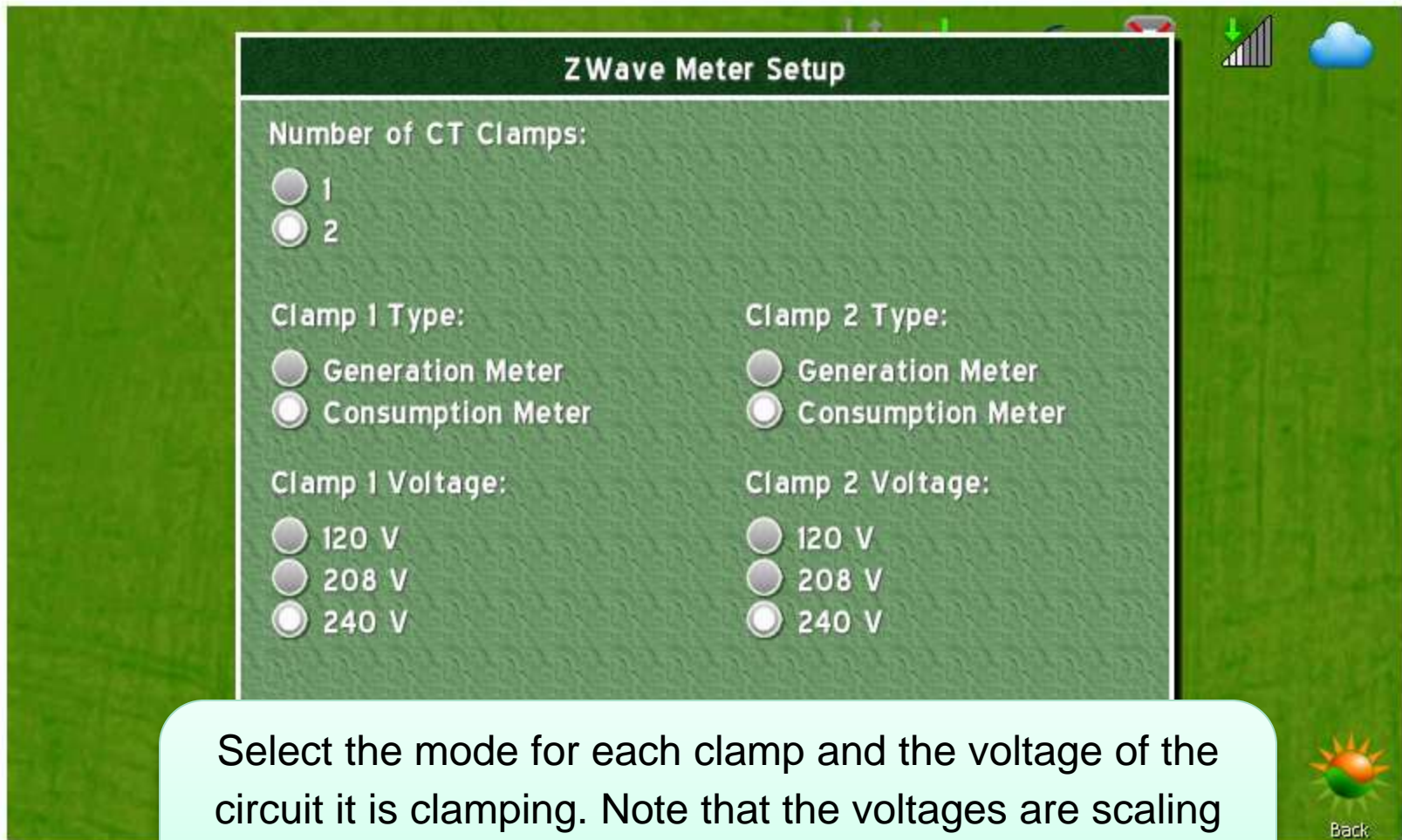




Press the button the zWave device to pair it, device must be within range of Gateway. This time, we pair an Energy Meter. The order was not important, the repeater could be paired second, or there could be no repeater at all.



Now we'll setup the clamps on the Energy Meter

The image shows a screenshot of a 'ZWave Meter Setup' interface. The background is a green field with a small house and a car in the distance. In the top right corner, there are icons for signal strength (a bar graph with a green arrow) and weather (a blue cloud). The setup screen is a white box with a dark green header. It contains several sections with radio button options. The 'Number of CT Clamps' section has options for 1 and 2, with 2 being selected. The 'Clamp 1 Type' and 'Clamp 2 Type' sections each have options for 'Generation Meter' and 'Consumption Meter', with 'Consumption Meter' selected for both. The 'Clamp 1 Voltage' and 'Clamp 2 Voltage' sections each have options for 120 V, 208 V, and 240 V, with 240 V selected for both. In the bottom right corner of the green background, there is a 'Back' button with a sun icon.

ZWave Meter Setup

Number of CT Clamps:

☐ 1
☒ 2

Clamp 1 Type:

☐ Generation Meter
☒ Consumption Meter

Clamp 2 Type:

☐ Generation Meter
☒ Consumption Meter

Clamp 1 Voltage:

☐ 120 V
☐ 208 V
☒ 240 V

Clamp 2 Voltage:

☐ 120 V
☐ 208 V
☒ 240 V

Back

Select the mode for each clamp and the voltage of the circuit it is clamping. Note that the voltages are scaling factors, the voltage the meter is plugged into with the supply lines must not exceed 150 Vrms)



PERFORMING MICROINVERTER FIRMWARE UPGRADE

- The following slides show the step-by-step instructions to upgrade the firmware of microinverters connected to a Gateway
- Prerequisite:
 - Gateway powered up
 - All microinverters connected to the Gateway and communicating with it
- The procedure takes about 25 minutes if the power line communication link is good. It may take longer otherwise.
- The next slides show instructions. Note that the bubbles point to the region of the screen where the user has to push with his finger.



Push on the
menu button

Push in the very top-left corner of the screen to bring up the DEV menus

SETTING SCREEN





A password prompt appears to gate access to the DEV menus. Enter the password “revolution” (10 letters) to access the DEV menus.

Firmware Build 3730

Gateway ID: 0x0010E002
 Uptime: 2 days, 21:52:47
 msTicks: 1006270091
 Firmware: 3730
 Filesystem: 1151

Grid Voltage Avg.: 121.7 Vrms
 Grid Voltage Inst.: 121.7 Vrms
 Grid Voltage Max.: 124.7 Vrms
 Grid Voltage Min.: 117.3 Vrms

Grid Avg. Freq.: 60.024 Hz
 Grid Period: 16.66937 ms
 Grid Avg. Jitter: 1.7 us (Max: 360.2 us)

Flyback PWM: 44.14%

6/16/2014 09:27:25 Monday

nextKeyEventToStore: 31
 capacitiveTouchI2cTimeoutCount: 0
 saveInv File: 0 ms
 FS Last Wait Time: 114 ms
 FS Write (last/max): 228 ms / 439 ms
 FS Read (last/max): 199 ms / 199 ms
 FS Reset Count: 7
 WiFi Reset Count: 0

Main() Timing (last/avg/max) [ms]: 0.0, 0.4, 4966

Inverter Build 163

RAM MEMORY:
 # Memory Chunks: 470
 Heap Top: 0xA0FF7000
 Heap Lowest: 0xA088499C
 Heap Bottom: 0xA01771C8
 Free Heap Lwst: 0x70D7D4
 Heap Avail.: 7534 kB
 Heap Usage: 7312 kB (49% full)

Stack Available: 11520 bytes

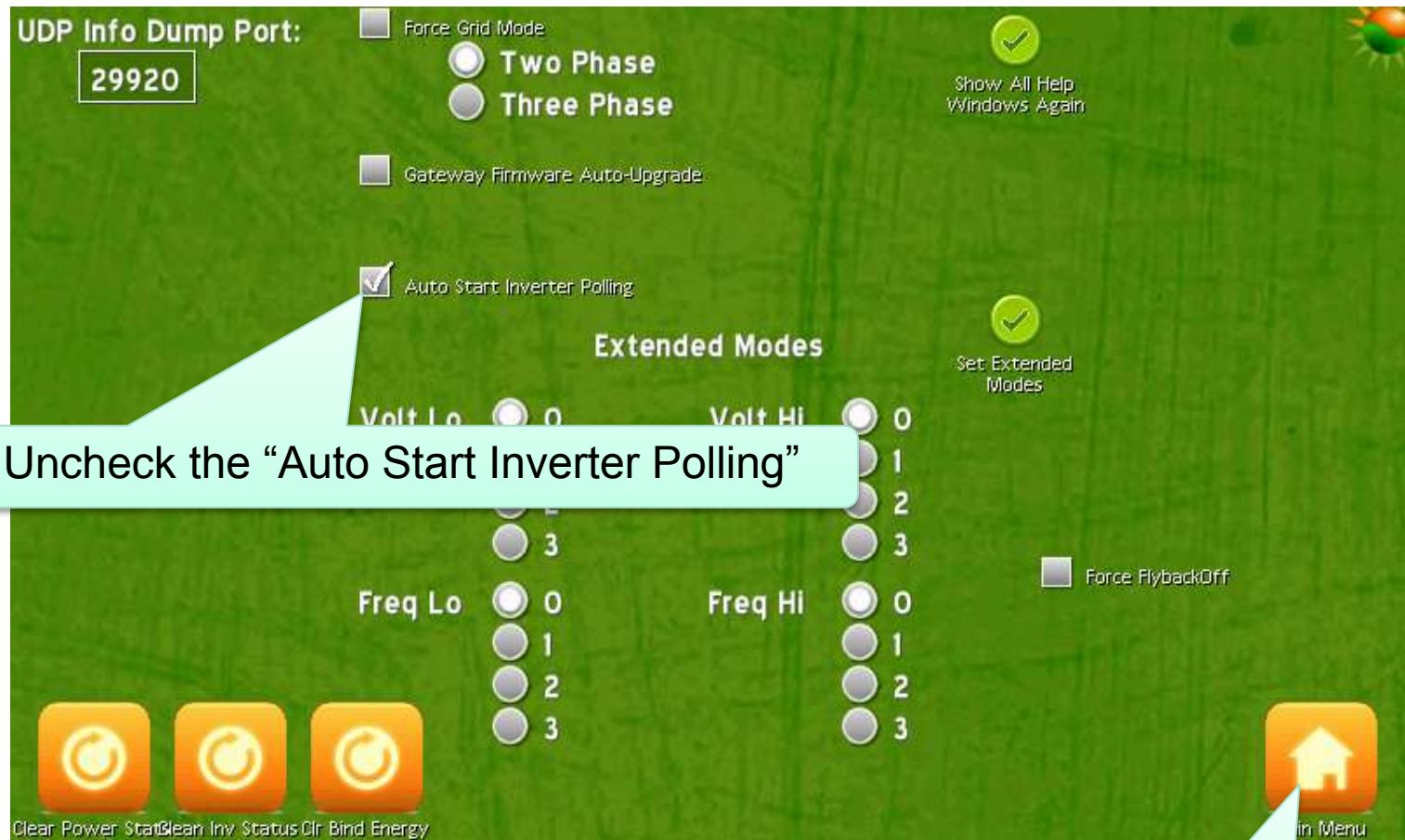
PROCESS TIMING:

Process Name	CPU	Total (s)	Max (us)
Frame IRQ	22%	4969	14
Systick IRQ	02%	304	169
MCI IRQ	00%	0	2
DMA IRQ	00%	0	4
LCD IRQ	75%	18346	142878
RTC IRQ	00%	2	27
ENET-IRQ	00%	0	0
Cron	00%	31	406887
Wi-Fi	00%	75	34458
Wired EMAC	00%	7	8
lwIP stack	00%	89	4788
Controller	00%	47	2544294
Model	00%	38	54
BG Tasks	00%	744	300995
Watchdog	00%	39	5
zWave	00%	243	2708968

Clear Stats **OOK Menu** **IP Menu** **Filesystem** **Settings** **Tests** **Console** **Z-Wave** **New Firmware** **User Menu**

Select the Settings Menu

DEV SETTINGS MENU – DISABLE POLLING



Uncheck the “Auto Start Inverter Polling”

Then revert to the
Main Menu

Firmware Build 3730

```

Gateway ID: 0x0010E002
Uptime: 2 days, 21:52:47
msTicks: 1006270091
Firmware: 3730
Filesystem: 1151

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Grid Voltage Inst.: 121.7 Vrms
Grid Voltage Max.: 124.7 Vrms
Grid Voltage Min.: 117.3 Vrms

Grid Avg. Freq.: 60.024 Hz
Grid Period: 16.66937 ms
Grid Avg. Jitter: 1.7 us (Max: 360.2 us)

Flyback PWM: 44.14%

6/16/2014 09:27:25 Monday

nextKeyEventToStore: 31
capacitiveTouchI2cTimeoutCount: 0
saveInv File: 0 ms
FS Last Wait Time: 114 ms
FS Write (last/max): 228 ms / 439 ms
FS Read (last/max): 199 ms / 199 ms
FS Reset Count: 7
WiFi Reset Count: 0

Main() Timing (last/avg/max) [ms]: 0.0, 0.4, 4966
        
```

Inverter Build 163

```

RAM MEMORY:
# Memory Chunks: 470
Heap Top: 0xA0FF7000
Heap Lowest: 0xA088499C
Heap Bottom: 0xA01771C8
Free Heap Lwst: 0x70D7D4
Heap Avail.: 7534 kB
Heap Usage: 7312 kB (49% full)

Stack Available: 11520 bytes

PROCESS TIMING:
Process Name CPU Total (s) Max (us)
Frame IRQ 22% 4969 14
SysTick IRQ 02% 304 169
MCI IRQ 00% 0 2
DMA IRQ 00% 0 4
LCD IRQ 75% 18346 142878
RTC IRQ 00% 2 27
ENET-IRQ 00% 0 0
Cron 00% 31 406887
Wi-Fi 00% 75 34458
Wired EMAC 00% 7 8
lwIP stack 00% 89 4788
Controller 00% 47 2544294
Model 00% 38 54
BG Tasks 00% 744 300995
Watchdog 00% 39 5
zWave 00% 243 2708968
        
```

Clear Stats
 Menu
 IP Menu
 Filesystem
 Settings
 Tests
 Console
 Z-Wave
 New Firmware
 User Menu

Select the OOK Menu

**** OOK DEBUG SCREEN ****

*** GRID ***
 cycleCounter: 15095167
 PHASE LOCKED
 ABNORMAL-GRID-FREQUENCY
 ABNORMAL-GRID-BITTER
 ZC-FRAME-OVERRUN
 VGRID-UNDERVOLTAGE-EVENT
 VGRID-OVERVOLTAGE-EVENT

Decoded Golay 23-Bit Words: 0
 Detected/Corrected Golay Bit Errors: 0
 Detected BER: 0.00% FEC Loc: 000010 000000 000010 100000 3
 Barker Soft Correlation: 8 5 24 24 0 -5 -22 7 6 -1 17 -4 15
 Barker Soft Correlation Sum: 7.6%
 Data Soft Correlation: -9 -4 0 -9 -6 -6 -6 11 12 -10 8 -6 6
 Data Soft Correlation Sum: 47.1%

Successful Packet Count: 0
 Packet Checksum Err Count: 0
 Packet Success Rate: 0.00

Local Gateway IDs: 0000000000000000

udpTxPayloadCount: 0
 frameCounterOffset: 0
 Word Threshold: low
 Carrier Wave Tx: off
 Has Active Repeaters: no

Chip Modulation ☒
 Responds to Pings ☐
 Phase Offset (in frames): 0
 Hex Display ☐

Tx Count: 0
 Rx:
 Rx:
 Rx:
 Rx:
 Rx:
 Rx:
 Rx:

Auto 12/2 (5.75)
 Low 8/3 (3.8)
 High 3/8 (1.4)
 1/13 (0.88)
 0 dB
 6 dB
 18 dB
 20 dB

Reset Discovery Info Dump Gateway ID Upgrade Inv. Cont. CW TX Noise Survey Timing Survey Exp. Waveform Main Menu

Press the Upgrade
Inv. button

INVERTER UPGRADE SELECTED

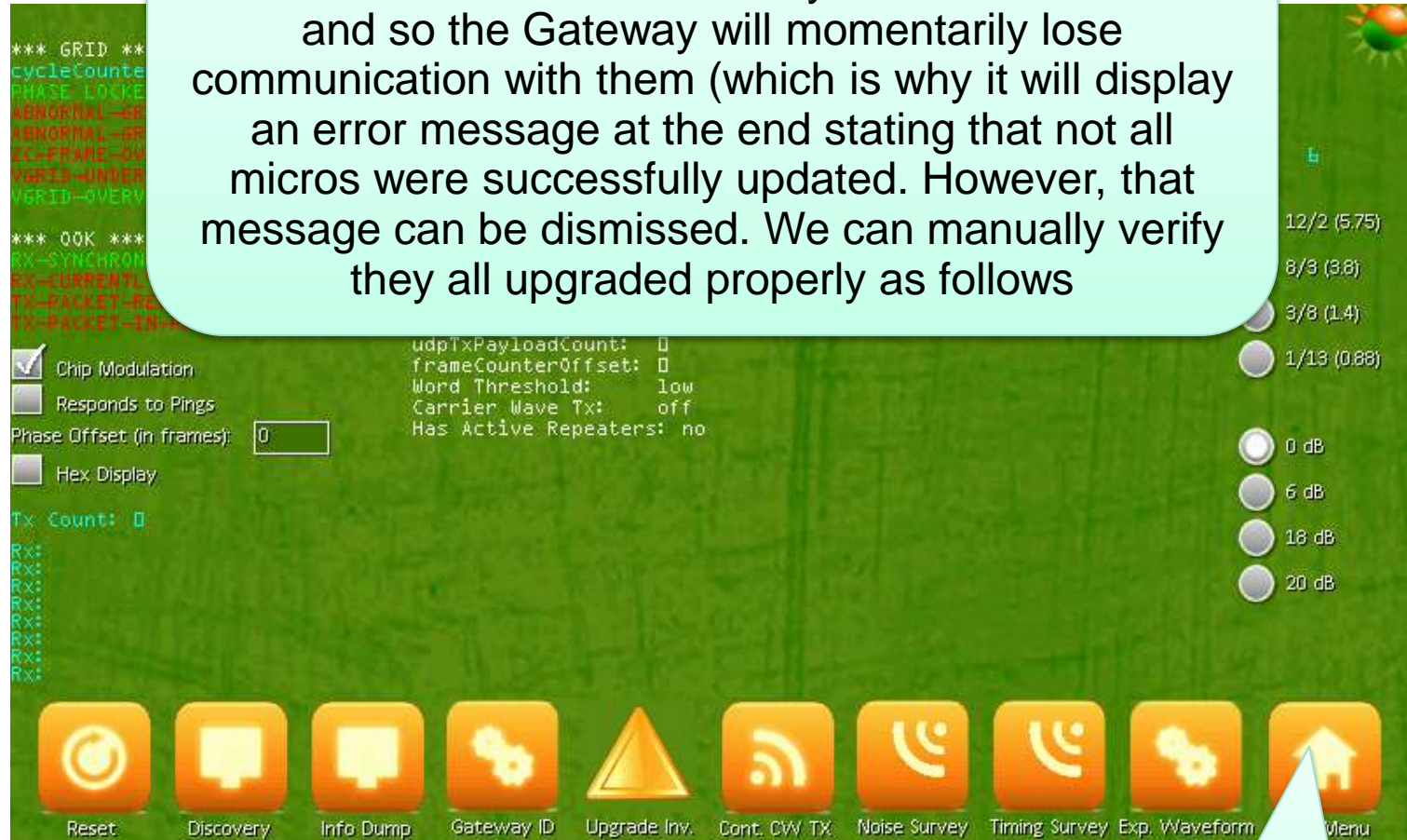


A dialog info box appears. Wait a few seconds for the latest firmware to get downloaded from the Cloud server and press the OK button



FINISHING THE UPGRADE PROCESS

After the upgrade process is completed, the microinverters will automatically reboot on their own and so the Gateway will momentarily lose communication with them (which is why it will display an error message at the end stating that not all micros were successfully updated. However, that message can be dismissed. We can manually verify they all upgraded properly as follows



GO TO RE-ENABLE THE AUTOMATIC POLLING

Firmware Build 3730

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Firmware: 3730
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Grid Voltage Inst.: 121.7 Vrms
Grid Voltage Max.: 124.7 Vrms
Grid Voltage Min.: 117.3 Vrms

Grid Avg. Freq.: 60.024 Hz
Grid Period: 16.66937 ms
Grid Avg. Jitter: 1.7 us (Max: 360.2 us)

Flyback PWM: 44.14%

6/16/2014 09:27:25 Monday

nextKeyEventToStore: 31
capacitiveTouchI2cTimeoutCount: 0
saveInv File: 0 ms
FS Last Wait Time: 114 ms
FS Write (last/max): 228 ms / 439 ms
FS Read (last/max): 199 ms / 199 ms
FS Reset Count: 7
WiFi Reset Count: 0

Main() Timing (last/avg/max) [ms]: 0.0, 0.4, 4966

Inverter Build 163

RAM MEMORY:

Memory Chunks: 470
Heap Top: 0xA0FF7000
Heap Lowest: 0xA088499C
Heap Bottom: 0xA01771C8
Free Heap Lwst: 0x70D7D4
Heap Avail.: 7534 kB
Heap Usage: 7312 kB (49% full)

Stack Available: 11520 bytes

PROCESS TIMING:

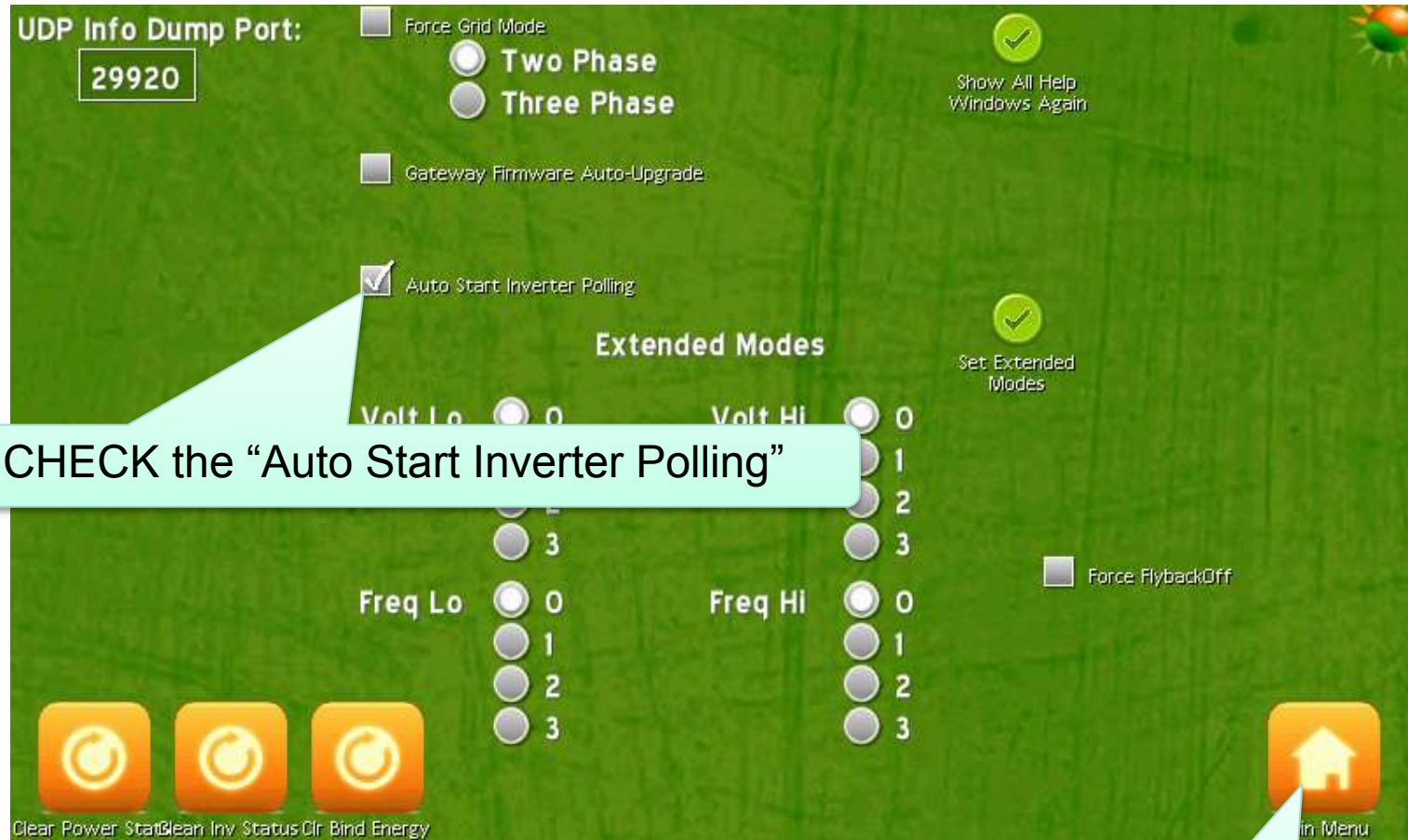
Process Name	CPU	Total (s)	Max (us)
Frame IRQ	22%	4969	14
Systick IRQ	02%	304	169
MCI IRQ	00%	0	2
DMA IRQ	00%	0	4
LCD IRQ	75%	18346	142878
RTC IRQ	00%	2	27
ENET-IRQ	00%	0	0
Cron	00%	31	406887
Wi-Fi	00%	75	34458
Wired EMAC	00%	7	8
lwIP stack	00%	89	4788
Controller	00%	47	2544294
Model	00%	38	54
BG Tasks	00%	744	300995
Watchdog	00%	39	5
zWave	00%	243	2708968

Navigation Menu:

- Clear Stats
- OOK Menu
- IP Menu
- Filesystem
- Settings (highlighted)
- Tests
- Console
- Z-Wave
- New Firmware
- User Menu

Select the Settings Menu

ENABLE INVERTER POLLING



Firmware Build 3730

Gateway ID: 0x0010E002
 Uptime: 2 days, 21:52:47
 mSticks: 1006270091
 Firmware: 3730
 Filesystem: 1151

Grid Voltage Avg.: 121.7 Vrms
 Grid Voltage Inst.: 121.7 Vrms
 Grid Voltage Max.: 124.7 Vrms
 Grid Voltage Min.: 117.3 Vrms

Grid Avg. Freq.: 60.024 Hz
 Grid Period: 16.66937 ms
 Grid Avg. Jitter: 1.7 us (Max: 360.2 us)

Flyback PWM: 44.14%

6/16/2014 09:27:25 Monday

nextKeyEventToStore: 31
 capacitiveTouchI2cTimeoutCount: 0
 saveInv File: 0 ms
 FS Last Wait Time: 114 ms
 FS Write (last/max): 228 ms / 439 ms
 FS Read (last/max): 199 ms / 199 ms
 FS Reset Count: 7
 WiFi Reset Count: 0

Main() Timing (last/avg/max) [ms]: 0.0, 0.4, 4966

Inverter Build 163

RAM MEMORY:

Memory Chunks: 470
 Heap Top: 0xA0FF7000
 Heap Lowest: 0xA088499C
 Heap Bottom: 0xA01771C8
 Free Heap Lwst: 0x70D7D4
 Heap Avail.: 7534 kB
 Heap Usage: 7312 kB (49% full)

Stack Available: 11520 bytes

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MCI IRQ	00%	0	2
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ENET-IRQ	00%	0	0
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Controller	00%	47	2544294
Model	00%	38	54
BG Tasks	00%	744	300995
Watchdog	00%	39	5
zWave	00%	243	2708968


 Clear Stats


 OOK Menu


 IP Menu


 Filesystem


 Settings


 Tests

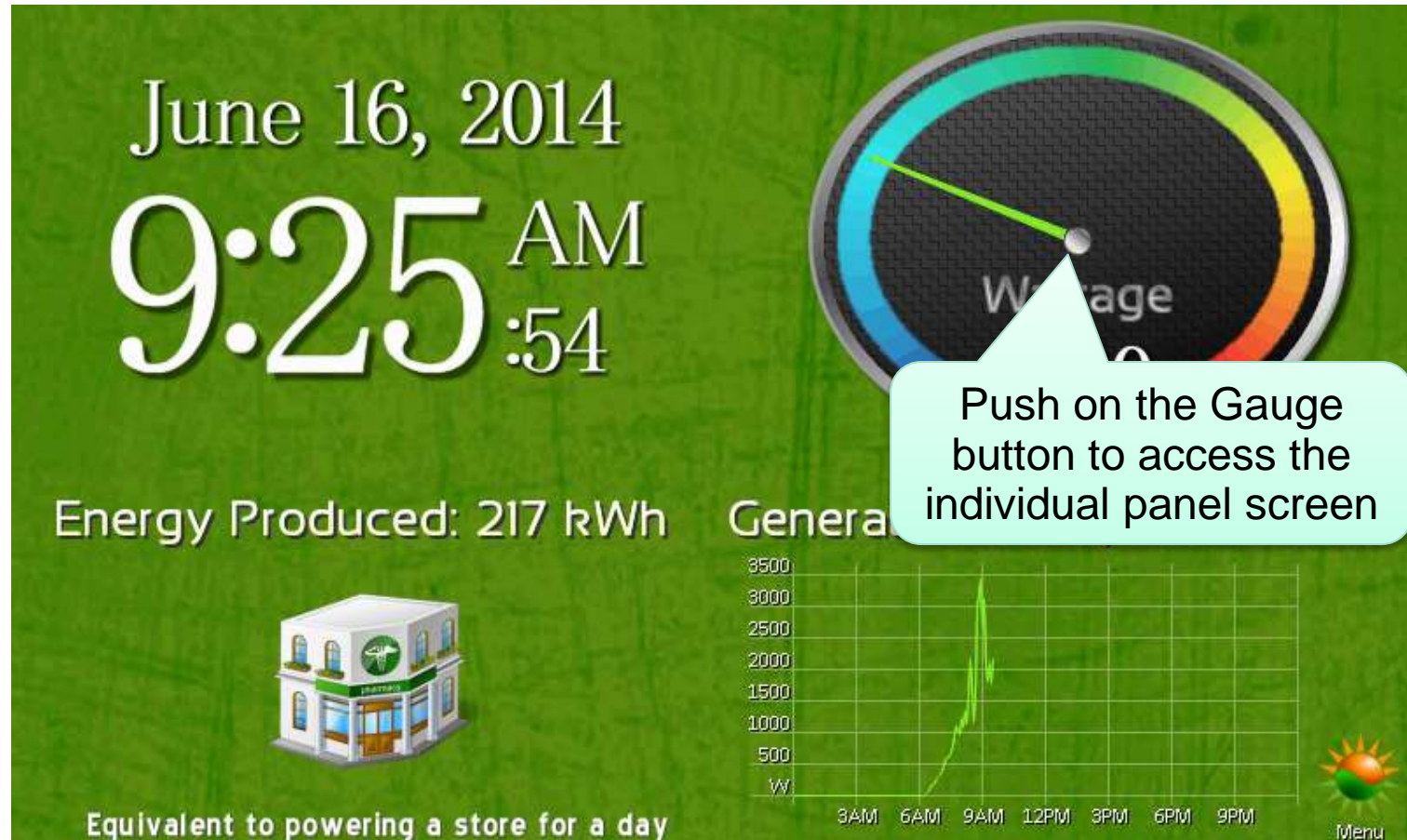

 Console


 Z-Wave


 New Firmware

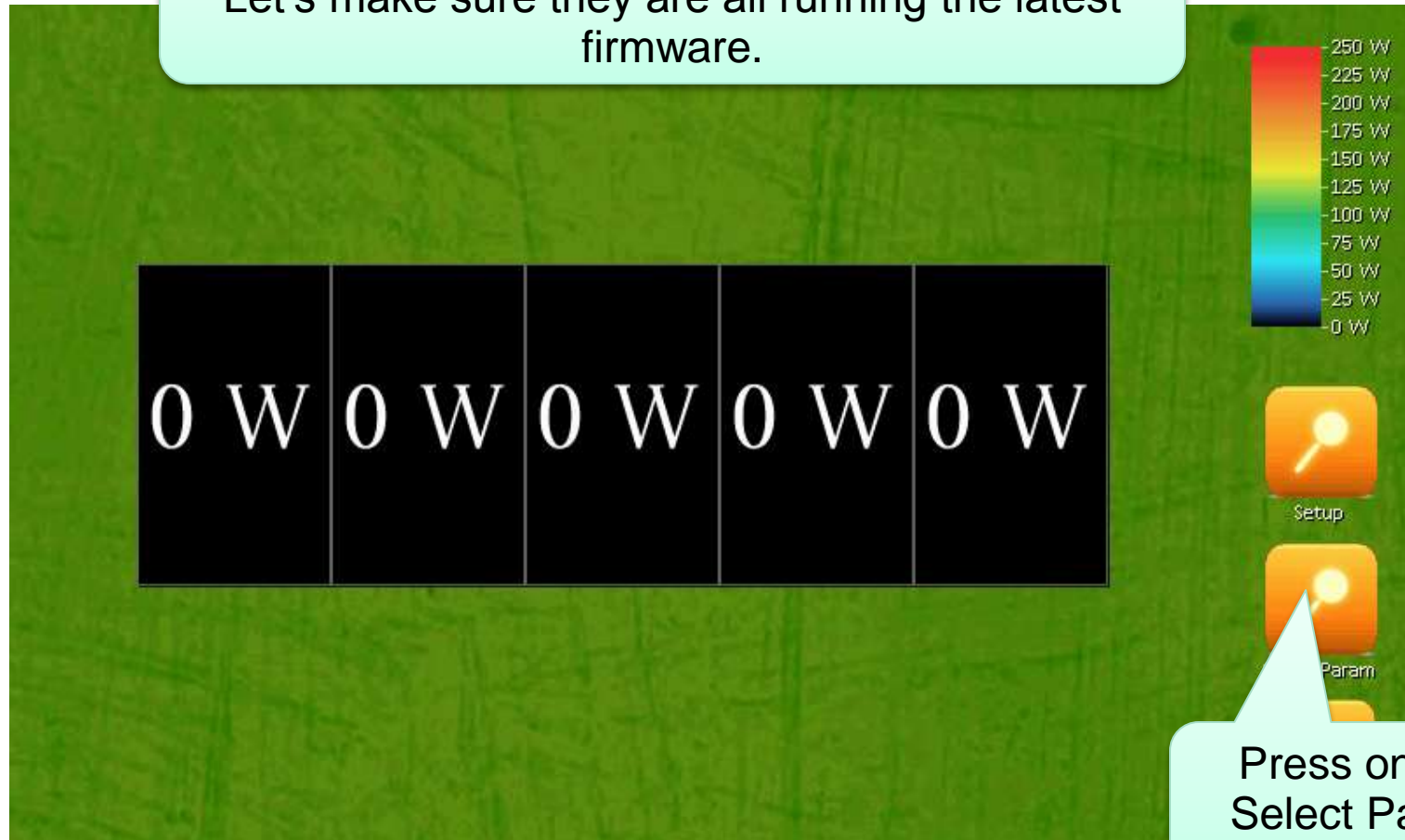

 Menu

Press on the
User Menu
button



INDIVIDUAL MODULE SCREEN

This screen will show the individual modules.
Let's make sure they are all running the latest
firmware.







This screen finally displays the firmware version of all microinverters.

Make sure to wait a few minutes so that all micros have had time to get polled by the Gateway so they show their latest firmware version.

It should show 163 followed by a “L” or a “H”. If it does not, some micros did not get upgraded properly and we need to restart the procedure.