

# Install LigoWave DLB 5-15ac Wireless Networking Equipment

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**NOTE** LigoWave support has notified us of a compatibility issue between the DLB 5-15ac covered in this bulletin, and the older DLB 5 and DLB 5-15b. It is recommended these radios not be mixed until we learn what the compatibility issue is, and it is corrected. This bulletin will be updated when the issue has been corrected, or a workaround is offered. These radios default to Dynamic IP method and must be changed to Static. See Setup a DLB 5-15ac.

## Purpose

The LigoWave DLB 5-15ac is used to create a wireless point-to-point or point-to-multipoint network communications link. The DLB 5-15ac is based on the IEEE 802.11ac standard and uses internal directional antennas. The DLB 5-15ac may be configured as an access point or a station.

As a minimum, two ends (an access point and station) of a wireless network must be set up, which must be accomplished with a PC/laptop connection. Firmware is built into the radios and is accessible with a browser; no other software is required. An AC receptacle at the mounting location is necessary for connection of the LigoWave power supply. The setup

procedures in this document cover basic setup of the wireless equipment with the features needed by most users. To see other available features and options, refer to <https://www.ligowave.com/wiki/wp-content/uploads/LigoDLB-7.54-UG-2016.pdf>.



Figure 1 LigoWave DLB 5-15ac (STS Part No. 265130)

Procedures are also included to configure the FMU network card for use with the wireless networking equipment and configuration of the FuelMaster software with the correct communications method and IP address.

## LigoWave DLB 5-15ac Equipment Description

An existing network need not be in place to use this wireless networking equipment. If there is a network card (standard with most PC purchases) in the PC, and a network card in the FMU, a simple wireless network may be created using the LigoWave equipment described in this bulletin.

The DLB 5-15ac has Signal Strength Indicator LEDs, a LAN Connect LED, and a Power Indicator LED (see Figure 1). All have an RJ45 POE connector at the bottom of the housing protected from the weather by a cable gland. The DLB 5-15ac uses a pole mount to a pole or mount bracket.

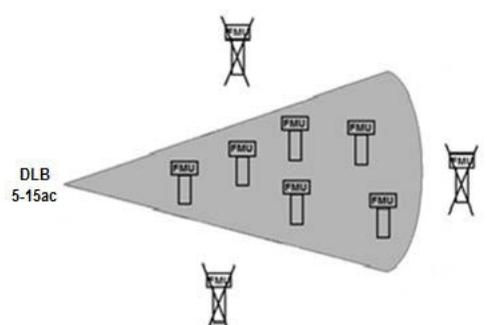


Figure 2 DLB 5 - 15ac Directional Antenna Coverage

## Directional Antennas

The DLB 5-15ac has an internal directional antenna and no external antenna connectors. For most applications, the DLB 5-15ac may be used at both ends of a wireless network. The directional antenna broadcasts in a cone shape similar to what is shown in Figure 2. The FMUs

inside the shaded cone are covered. Those outside the cone are not covered. The closer the FMUs are to the LigoWave radio, the narrower the cone area.

## Part Number

Kit part numbers originating with the Deliberant APC equipment have been carried over to the LigoWave DLB equipment. Individual part numbers have changed. The following part numbers apply to LigoWave and Deliberant components and kit parts:

### Complete Kits (Both Ends, Syntech Part Numbers):

Part #	Description
941H0221	Includes two individual kits; 941H0220 and 941H0220A (both with directional antenna)

### Individual Kits (One End Only, Syntech Part Numbers):

Part #	Description
941H0220	Kit w/DLB5-15ac for FMU (includes mount bracket, attach hardware, and fittings to route Cat 5 cable from inside FMU to outside FMU)
941H0220A	Kit w/DLB 5-15ac for building (includes mount bracket and attach hardware)

### Replacement Parts (Syntech Part Numbers):

Part #	Description
265130	DLB 5-15ac
257257	Mount Bracket
265132	24VDC POE Adapter and Power Supply

## Setup Procedures

There are setup procedures for a PC (Laptop and/or Central Controller), LigoWave, and the FuelMaster software.

### Login to a DLB 5-15ac with a PC/Laptop

**NOTE** These radios default to Dynamic IP method Every radio must be changed to the Static IP method. LigoWave indicated some users had experienced problems with Internet Explorer, and more reliable connections were possible with Firefox and Google Chrome.

As you connect to these devices to configure them, power one device at a time unless instructed to do otherwise. Setup procedures use a wired connection to the device, and every unit defaults to an IP address of 192.168.2.66. If the PC or laptop being used for the setup also has wireless, you should disable wireless until these setup procedures are complete. Wireless from your PC/laptop could connect to another device as you are making settings and unknowingly change the wireless radio setup.

1. Record and save the Serial Number and Radio MAC address from the ID label.
2. Run a patch cable from the power injector POE connector to the radio.
3. Run another patch cable from the LAN connector on the power injector to an active RJ-45 LAN receptacle in the PC/laptop.

- Plug the power supply into a 110 VAC outlet. A green power-on light should illuminate on the power supply and, after it boots, the PWR and LAN LEDs should illuminate on the radio.
- Open your browser, and type the URL **http://192.168.2.66/** in the address box. A Login window will open (Figure 3).

Figure 3 LigoWave Login

- Type **admin** into the top line, and **admin01** into the second line. If English is not shown on the third line, use the dropdown to select **English**. The Login username and password may be changed at SYSTEM CONFIGURATION > User accounts.
- Select **Login**. An OPERATING COUNTRY window will open (Figure 4).

Figure 4 Operating Country

**NOTE** To eliminate the need for FCC licensing, the signal strength of each wireless radio must remain below a maximum Effective Isotropic Radiated Power (EIRP). For a detailed explanation, see Adjusting Effective Isotropic Radiated Power (EIRP) at the end of this bulletin.

- Upon reading the User agreement, select **I agree**.

**NOTE** If Point-to-Point was configured for one access point and one station, the access point must be reconfigured to Point-to-Multipoint to connect to two or more stations.

- Select **Usage scenario**. Point-to-point covers the use of one access point and one station. Point- to-multipoint covers the use of one access point and multiple stations. If

you must change from Point-to-Point to Point-to-Multipoint after the firmware program has been accessed, the radio must be reset to factory defaults, and configuration started over with the new setting.

10. Select **Change** to move to the next screen. A Please wait.... box will open while the firmware saves your inputs and then display the initial firmware screen (**Error! Reference source not found.**). The sample page has been labeled to show the various options available during setup.

The screenshot shows the LigoWave web interface. At the top, there are navigation buttons: UPDATE FIRMWARE, STATUS, SETTINGS, TOOLS, SUPPORT, and LOGOUT. The main content area is titled 'INFORMATION' and displays the following details:

- Product name:** LigoDLB 5-15ac
- Device serial No.:** DF2A16310000232
- Network mode:** Bridge
- Wireless mode:** Access point (auto WDS)
- Operating country:** US (PTP scenario)
- Friendly device name:** LigoDLB 5-15ac
- Device location:** Device location
- Latitude/Longitude:** 0 / 0

**Radio**

- Channel:** 153 (5765 MHz)
- Channel width, MHz:** 40 Lower
- Tx power, dBm:** 21
- Noise level, dBm:** -95
- Protocol:** 802.11a/n/fac
- Radio mode:** MIMO 2x2
- Antenna gain, dBi:** 15

**Wireless (Access point (auto WDS))**

Network SSID	Security	Broadcast SSID	VLAN	Stations
LigoDLB	Open	Yes	--	1

**Network**

- IP method:** Dynamic
- IP address:** 192.168.2.66
- Subnet mask:** 255.255.255.0
- Default gateway:** 192.168.2.1
- IPv6 method:** Disabled

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Figure 5 Information Window

## Setup DLB 5-15ac

Following are procedures for setting up a DLB 5-15ac. Some procedures such as updating firmware, loading a stored configuration file, changing an IP address, setting up wireless network security, and saving a backup configuration file may not be required for everyone or every application. They are preceded by headings in parentheses and may be omitted if not required.

**NOTE** At the time of this writing, a repeater configuration was not successfully tested. See Troubleshooting for a workaround. If a change is made on any page, a Save changes button will appear in the upper right corner of the window. Select **Save changes** before exiting the page to ensure changes are saved. If Save changes doesn't appear after making a change, clear the cache (rebooting will clear the cache) or change browsers; then repeat the procedure to ensure changes are saved.

1. (Update firmware) To download a new version of the firmware, go to <https://www.ligowave.com/downloads>. The firmware version is displayed in the upper left corner of each firmware screen, which opens when logging in with a PC/laptop.
2. (Load a stored configuration file) If a configuration file was previously saved, the radio may be configured using this file, perform the following:

- Select **Settings** > **System** icon. A SYSTEM CONFIGURATION window will open.
- Under System functions, select **Restore** . A File Upload window will open.
- Browse to and then open the desired \*.cfg file. The device will be configured with the information contained in the selected \*.cfg file.
- Select **Save changes**, then **Logout**. The device is configured.

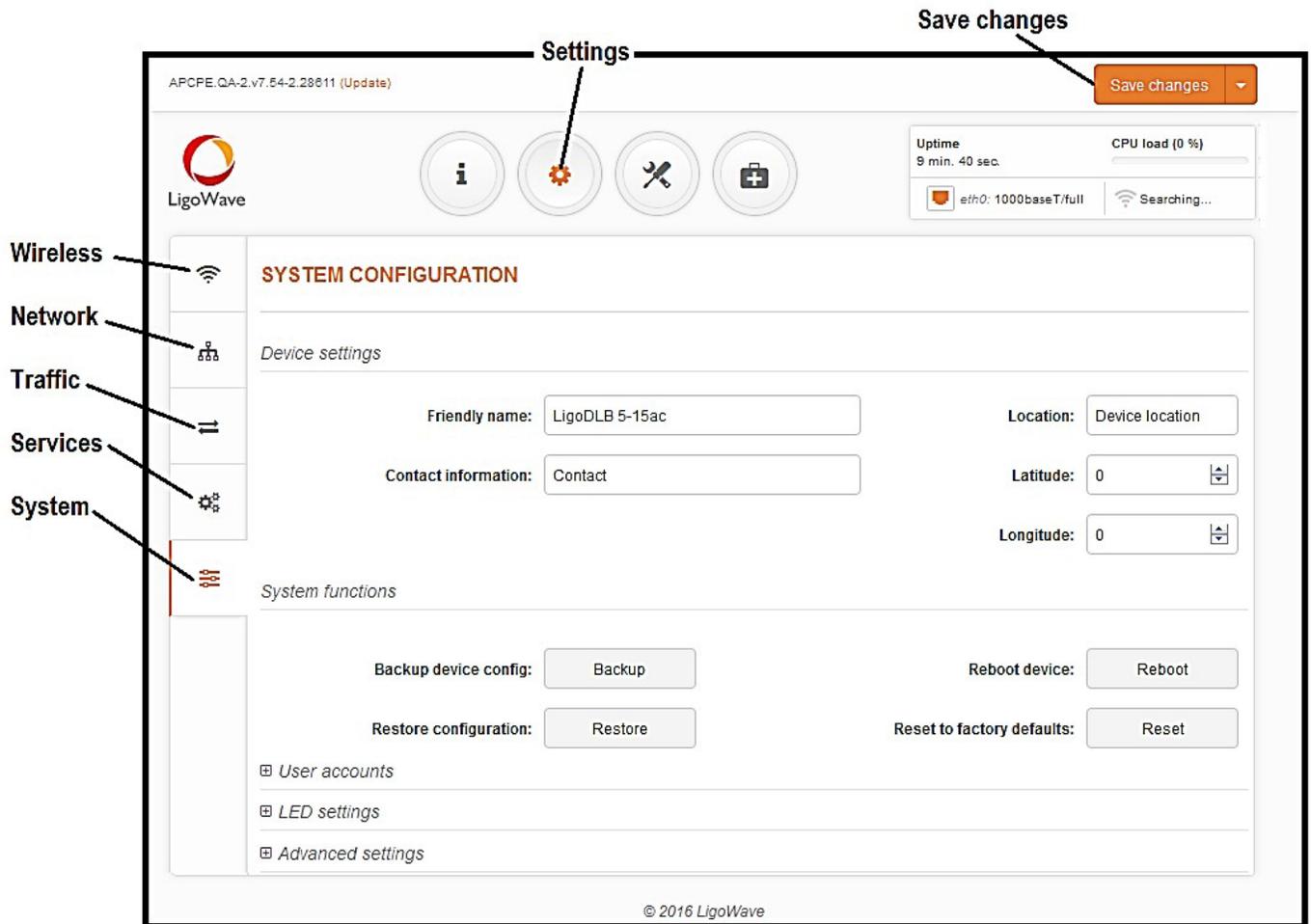


Figure 6 System Configuration

- Select **Settings**. A WIRELESS CONFIGURATION window will open.
- Under WIRELESS CONFIGURATION, Operating mode: select the dropdown arrow, and as required, change the Operating mode to the desired setting. Only one Access Point may be configured for each network. iPoll3 is a network protocol that only accepts access to other iPoll3 radios. iPoll3 is a point-to-multipoint application. ARP NAT, in short, is a method for encrypting transmitted IP addresses.



Figure 8 Wireless Network Security Setup

8. (Change IP Method). See Figure 10. The DLB radios default to Dynamic IP method. Dynamic must be changed to Static IP method in every radio:
  - a. Select **Settings > Wired Network** icon.
  - b. Under IPv4 configuration, in the box to the right of IP method select the dropdown arrow and change **Dynamic** to **Static**.
  - c. Select **Save Changes**.
  - d. Select **Save**. A progress window will open with a Please wait... prompt while the changes are being saved.
9. (Change IP address) If an IP address change is necessary, perform the following (Figure 10):
  - a. Select Settings > Wired Network icon.
  - b. Under IPv4 configuration, change the **IP address**, **Subnet mask**, **Default gateway**, **DNS server 1**, and **DNS server 2** as needed.
  - c. Select **Save Changes**.
10. (Turn Off Client Isolation) If you are working with an application requiring a Station to communicate to a Station (example: using Access Point like a repeater between two Stations that are not line of sight with each other), Client Isolation must be turned off in the Access Point. Perform the following:
  - a. With a connection to the Access Point, go to the WIRELESS CONFIGURATION window as shown in **Error! Reference source not found.**, and select the symbol in the lower right-hand corner of the window. A WIRELESS AP SETTINGS window will open as shown in Figure 9.
  - b. Select **Advanced** settings to view **Client isolation**. If there is a checkmark in the box to the right, select the checkmark to turn off Client Isolation.
  - c. Select **Done**.

**WIRELESS AP SETTINGS**

SSID:  Broadcast SSID:

Security settings

Security:

WACL

Advanced settings

Client isolation:  Multicast enhancement:

Map to data VLAN ID:

Max connected clients:

Min client signal (dBm):

Management over wireless:

Figure 9 Wireless AP Settings

AP/PE 0M-1 v7.51.9320 (Update)

LigoWave

Uptime: 2 hours 46 min. 55 sec. CPU load (10 %)

eth0: 100baseT/full Searching...

**NETWORK CONFIGURATION**

Network mode:  Management VLAN ID:

IPv6:

IPv4 configuration

IP method:

IP address:  DNS server 1:

Subnet mask:  DNS server 2:

Default gateway:  Secondary IP:

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Figure 10 Network Configuration

11. (Configure a Secondary IP) This setting can be very useful if your PC/laptop is normally used with a different subnet than what you have set in the LigoWave radios. You won't have to reconfigure the network settings in your PC/laptop to connect to these radios.
  - a. In the Settings > NETWORK CONFIGURATION window, Figure 10, select the box to the right of **Secondary IP**. IP Address: and Subnet mask: boxes will appear.
  - b. Enter the desired **IP address** and **Subnet Mask**.
  - c. Select **Save Changes**.
12. (Save backup configuration file) If needed, perform the following:
  - a. Select **Settings > System** icon. A SYSTEM CONFIGURATION window will open.
  - b. Under System functions, select **Backup**.
  - c. Select **Save > OK**. The \*.cfg file will be saved in the Downloads folder.

- d. Select **Save changes**. The backup file is created and saved to the Downloads location.
13. Select **Logout**.
14. Repeat steps 1 through 13 as required for additional LigoWave radios.
15. Remove power from the power supply, and disconnect the cables connected to the radio(s) and the PC.
16. Configure the FMU Network Interface Card (NIC).

## Install/Mount LigoWave

### Install Repeater

Repeater option not presently available with the DLB 5-15ac.

### Antenna Alignment

Whenever a radio with a directional antenna (DLB 5-15ac) has been installed, an antenna alignment should be performed to attain the best signal strength and to confirm connectivity. This antenna alignment procedure requires two radios be installed, powered, and aligned towards each other. The access point must be addressable through a PC. Perform the following:

1. Log in to the Access Point in accordance with Login to a DLB 5-15ac with a PC/Laptop.
2. From the INFORMATION screen, select **TOOLS** 
3. In the TOOLS, SITE SURVEY screen, select **Antenna Alignment**  The Antenna Alignment screen will open (see Figure 11).
4. Select **Save**. The antenna alignment will begin, and the Signal Strength, dBm will be displayed.

**NOTE** The closer the two Deliberant devices are to each other; the less change will be observed when moving the station.

5. Monitor the antenna alignment display, and adjust one device until it achieves the greatest signal strength. Signal strength indications don't change instantaneously. A few seconds are necessary to refresh the display when the device is turned. When the greatest signal strength is attained, firmly anchor the device in place.
6. If applicable, repeat step 5 for the second device.
7. Select **Stop > Logout**, and disconnect.

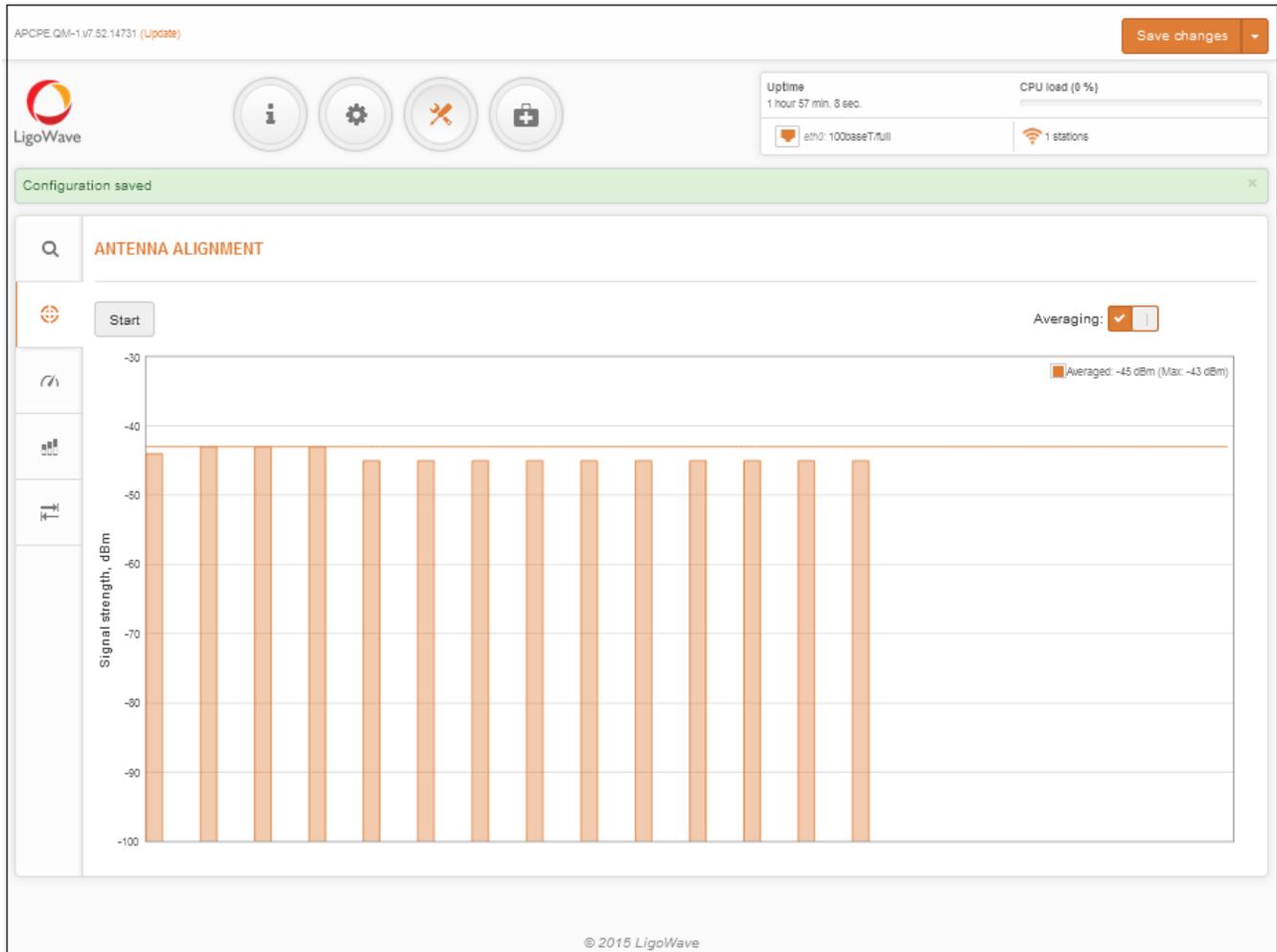


Figure 11 Antenna Alignment

## Troubleshooting

LigoWave has a very informative Wiki which may be found at:

<https://www.ligowave.com/wiki/>.

The Wiki contains much more information than can be found in this product bulletin, and will provide the newest information on updates to the equipment and firmware.

Unlike previous Deliberant radios, these LigoWave radios are defaulted to Dynamic IP method. All radios must be configured to Static IP method to work with the available FuelMaster software settings.

If you are unable to connect to a LigoWave device with any IP address, perform Resetting to Defaults. The procedure will restore LigoWave to the manufacturer's original default configuration.

A satisfactory Repeater configuration has not yet been found, but alternatives to a Repeater have been discovered.

When you make a PC connection to a LigoWave device, remember it takes a moment for the device to boot up. It is not immediately available as soon as the connections are made and power is applied.

Verify two (or more) units are configured correctly. They, and the devices they are connected to, must be on the same subnet. They must be using the same SSID. They must be using the same security settings. They cannot be using the same IP address.

The DLB 5-15ac has a directional antenna. If being used as an access point for several FMUs, and not communicating to all of them, the signal may not be reaching all the FMUs. This may be tested by performing the Antenna Alignment procedure. If the PC is presently on a network, it may have to be reconfigured with a static IP address as opposed to Obtain an IP address automatically. The static IP address must be on the same subnet as the LigoWave radios.

After any changes are made to the configuration of the radios, be sure they are saved correctly. Do not remove power while a save or reboot is in progress.

If wireless security is enabled, verify it is configured with the same settings, so the two devices will communicate with each other. Wireless security passkeys are case sensitive.

If troubleshooting doesn't resolve communication conflicts, reset both devices to their default settings, and accomplish configuration of both devices. A simple typographical error in one setting can be very difficult to find and can prevent communications.

## Adjusting Effective Isotropic Radiated Power (EIRP)

To eliminate the need for FCC licensing, the signal strength of each wireless radio must remain below a maximum Effective Isotropic Radiated Power (EIRP). The EIRP is measured by adding the antenna dBi to the radio output power (example: 7 dBi antenna + 29 dBm radio output power = 36 EIRP).

Point-to-point (one access point to one station) cannot exceed 53 EIRP. Point-to-multipoint (one access point to multiple stations) cannot exceed 36 EIRP. When first logging in to the DLB radios, you will be asked to enter the gain of the antenna, as well as whether it will be used for point-to-point, or point-to-multipoint. The maximum transmit power of the DLB radios is 29 dBm when the EIRP is not exceeded. The radio firmware will automatically reduce the maximum transmit power to keep the EIRP within the maximum permitted by the FCC.

## Resetting to Defaults

If the IP address is unknown and assuming the POE cable is connected, reset the DLB radios by pressing and holding the reset button for 5-10 seconds. Then, release. The radio will reboot. If the reset button was not closed long enough, the radio will still reboot but will not reset. After it completes the reboot, it will be accessible using the default IP address of 192.168.2.66.

LigoWave offers a free downloadable reset tool. This reset tool functions differently from the Deliberant reset tool. It will not show the current IP address of the radio. It will only reset the radio to the default IP address. The reset button shown in Figure 12 is much faster and easier.



Figure 12 Reset

## Hold Harmless Agreement

Users of wireless networking equipment should be aware there is a potential for hackers to access a wireless network. The best network security cannot stop the best hackers. Though the FuelMaster fuel management system and software should contain no secure information, the PC may be connected to a network, which may contain secure information. Syntech Systems, Inc., cannot be responsible for unauthorized access achieved through the use of this equipment. A Hold Harmless Agreement (form attached to the end of this document) is provided for the installer to present to the customer. Installation should not be completed until the Agreement is acknowledged. The setup procedures herein cover the setup of network security with this wireless networking equipment.

**TIP**

If any questions arise, contact Syntech Systems, Inc.'s Customer Satisfaction Center (CSC) at 1-800-888-9136, ext. 2, or email [support@myfuelmaster.com](mailto:support@myfuelmaster.com).

## Change Log:

Date	Description
2/2/2017	Original
12/4/2020	Rebranded/reformatted
6/23/2021	Edited for conciseness

# HOLD HARMLESS AGREEMENT

(to be completed when installing wireless networking equipment)

**TO:**

**SUBJECT:** Potential Security Breaches Through Wireless Network Connections to FuelMaster

FuelMaster Fuel Management Units (FMUs) and software do not contain personal information subject to the Privacy Act of 1974. However, when added to a network, the FMU may provide a link to other resources, which do contain personal or privileged information. Cable or fiber optic network connections are not easily accessible. Wireless networks operate on radio waves that can be intercepted by anyone with the right equipment and within range of the transmitter. Without proper wireless network security, outside users can access your network to attain such valuable information as social security numbers, credit card numbers, bank account numbers, and countless other private information sources stored on your network. If accessibility is achieved, outside users can access anything stored in your network, not just FuelMaster® related information.

Though the physical installation of the equipment may be accomplished by anybody with knowledge and experience, the responsibility for the network, IP addresses, wireless components and devices, access points and network configuration rests entirely on the customer, and where applicable, his/her Information Technology (IT) person(s) or Network Administrator(s) for that site.

Syntech Systems, Inc., cannot emphasize enough the potential damage that may result from a breach in network security. When a wireless network connection to FuelMaster is established, Syntech Systems, Inc, cannot prevent accessibility by outside users. As such, this HOLD HARMLESS AGREEMENT is prepared to remove liability from Syntech Systems, Inc. and the installer/installing company for any breach of security resulting from the development of a wireless network connection to FuelMaster. Please acknowledge receipt and concurrence with the terms of this agreement by signing below. Thank you.

**ACKNOWLEDGEMENT:**

I acknowledge receipt and concurrence with the terms of this agreement:

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(Signature of Authorized Representative)