PNUT REMOTE CONTROL SYSTEM

The PNUT remote control system contains the following items:

- H212 handheld
- C220 controller
- Antenna
- Charging cradle
- Wiring harness

POWERING ON THE HANDHELD

The H212 requires a special sequence to turn on. This sequence is used to verify that all the buttons are working correctly prior to start up. It also minimizes any accidental powering up of the handheld.

To power up the H212:

1. Press and hold the **red** button.
2. Press and hold the **green** button.
3. Release the **red** button.
4. Release the **green** button.
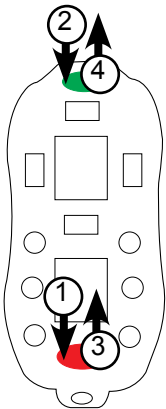
Regular flashing **green** LED: System turned on but no link.

Solid, or short flashes of **green** LED: System turned on and linked.

MATCHING

First Method

1. Turn off the H212.
2. Apply power to the C220.
3. Momentarily ("blip") the power off to the C220 six to seven times (i.e. power off for 1/2 second, power on for one second; six times). Leave the power on after the sixth blip.
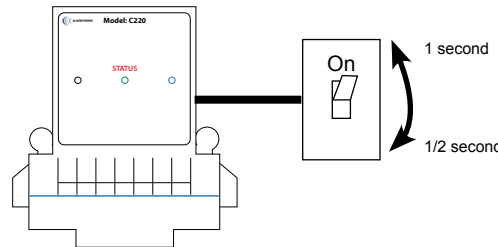
4. The LED on the C220 will light up **dark blue.**
5. Continue with steps five to eight below in second method.

Second Method

1. Turn off the H212.
2. Apply power to the C220.
3. Using a smooth motion, wave the H212 back and forth over the top left corner of the C220 so that the two magnets under the **red** and **green** button pass over the surface of the Aarcomm logo.

Or
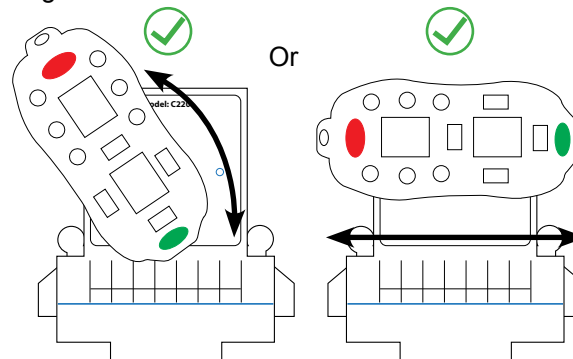
4. If the C220 successfully detects the magnets on the H212, the C220 LED will light up **dark blue.**
5. Press and hold the three round buttons on the bottom left side of the H212.
6. Press and release the **red** button on the H212
7. The C220 LED will turn white and a message will appear on the H212 indicating a successful match. If not, make sure the H212 and the C220 have compatible part numbers.
8. Power on the H212 normally to verify that the system is matched.

POWERING OFF THE HANDHELD

Pressing the **red** E-stop button will shut down the H212 handheld. The LCDs on the H212 will be put into in sleep mode and will not draw any power from the battery.

CHARGING THE BATTERY

The H212 is waterproof and completely sealed to IP67 rating. For improved reliability, it does not have a removable battery and is charged using the wireless charging cradle. The magnets on the back of the H212 are only used for alignment and not for electrical contact.

The **red** LED will begin to flash when the H212 should be charged. Place the H212 on the charging cradle to begin charging. The LCD screen will show the charge status; please allow a minute or two for the charge level to be calculated accurately.

A battery that is completely discharged will take approximately three hours to charge. The battery can be charged at anytime even if it is not depleted. A quick 30 minute charge will allow the handheld to operate for eight hours. A full battery will last approximately 50 to 120 hours, depending on the performance setting.

PNUT Remote Control System: Quick Start Guide

C220 MOUNTING

The C220 is waterproof and IP67 rated but the recommended mounting location should be protected from weather and vibration.

C220 WIRE HARNESS INSTALLATION

The C220 comes with a wire harness that is specific to your machine. Fully insert the connector into the bottom of the C220 and tighten the hex screw. Do not over tighten.

ANTENNA INSTALLATION

The mounting location should be chosen such that the C220 antenna has the best possible line of sight with the H212 handheld in order to maximize the operating range.

The standard antenna mount provided is an NMO type. It requires a 3/4" hole. When installing with a hole saw, remove any burrs, particularly on the under side of the hole. Remove paint in a narrow ring around the hole. Metal-to-metal contact between the vehicle and the mount is essential for best performance. An optional L-bracket can also be supplied if it is not possible to cut a 3/4" hole on the mounting surface.

Make sure the gold contact on the mount is clean before attaching the antenna.

For proper antenna contact, the supplied rubber gasket is required for metal thicknesses ranging from 0.030" to 0.050". The gasket is not required for thicknesses from 0.050" to 0.100".

Trident Remote Control System

User's Manual

(Dxx-xxxxx-xx)

DRAFT
Revision 0

Applies to:

DEMO

January 10, 2019

Contents

1. Operating the H212 Handheld

The Handheld has 12 push-button controls and two graphical display screens for indicating button functions and displaying information, messages, alarms and warnings. Each Trident Remote-Control System has at least one Handheld. This section describes how the Handheld buttons and screens work.

1.1. General Operations

The Trident Quick Start Guide contains instructions for turning the Handheld on and off in normal operating mode (i.e. not Matching Mode or Configure Mode). After turning on, the Handheld will initially display a Logo for several seconds or until a button is pressed, after which the Handheld will display its primary functions, as shown in Figure 1. The choice of function layout, logo and time for which the logo is displayed may be adjusted through the Configure Mode described in **1.2. Configure Mode**.
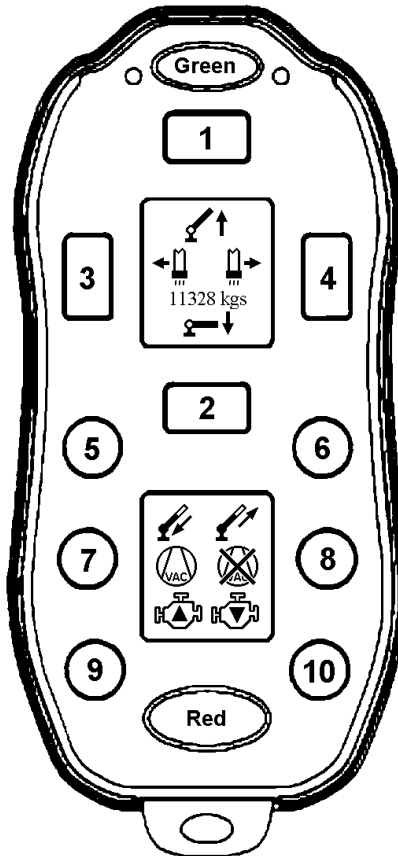
Figure 1 Handheld Primary Functions (Icons shown might be different on demo remote)

Each symbol on the two screens indicates the function of the nearest button. Each button corresponds to a specific digital (or analog) output on the receiver. For the purpose of this demo, the outputs will be activated as long as the button is held down. This behavior can be modified by customizing the software.

Pressing and holding the Green button will shift the Handheld to its secondary functions, as shown in Figure 2. If you prefer for the Handheld to stay in its shifted state without having to hold down the Green button, the shift behaviour may be made latching through the Configure Mode described in **1.2. Configure Mode**. If the shift is latched, pressing the Green button again will return the Handheld to the primary functions.
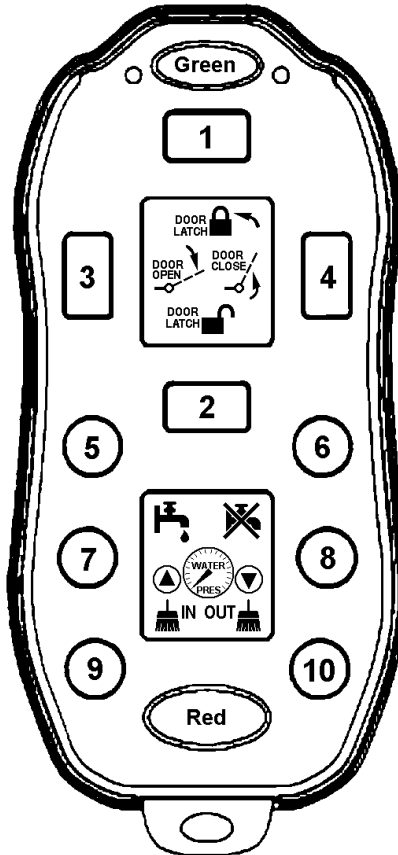
Figure 2 Handheld Secondary Functions (icons maybe be different on demo remote)

1.2. Configure Mode

Certain preferences may be changed in the Handheld by entering Configure Mode as follows:

1. Ensure the Handheld is turned off (press the Red button).

2. Proceed as though you were turning the Handheld on normally; but

3. Instead of releasing the Green button right away, continue to hold it down until both the green and red lamps light up together before releasing the button.

"Configure Mode" will be displayed on the upper screen for a few seconds, after which the "Machine" type parameter will be displayed. At this point, the left and right rectangular buttons may be used to select one of many parameters to be displayed and/or modified. The top and bottom rectangular buttons may be used to increment and decrement each parameter; holding a button will cause its action to repeat automatically (e.g. increment repeatedly). Pressing the Green button will cause changes to the parameters to be saved.

As an operator, you may change the following parameters: "Radio Perform.", "Auto-off", "Layout", "Splash Duration", "Shift Button", "Logo", "Brightness" and "Light". Other parameters might be available depending on the version of software that you are using. More information about these parameters may be found in the Installation and Service Manual.

2. Indicator Lamps

The Handheld has two indicator lamps—a red lamp to the left of the green button and a green lamp to the right of the green button. These lamps provide status information as described below:

Table 1 Handheld Green Lamp Indications

Green Lamp	Information Conveyed
Off	The unit is turned off.
On (bright) or Flashing (bright)	The unit is operating normally with a radio link established with the C220 Controller.
Slowly blinking (dim)	There is no radio link to the C220 Controller. This can occur if the machine is not turned on, the machine is out of range, or the Handheld was not matched with the C220 Controller.
Quickly blinking (dim)	A radio signal from the C220 Controller is present, but there is an incorrect mode or incorrect matching. This can occur if the C220 Controller is being configured with another Handheld or is in matching mode, or if the Handheld was not matched with the C220 Controller.
Pulsing (brighter and dimmer)	The unit is being charged.

Table 2 Handheld Red Lamp Indications

Red Lamp	Information Conveyed
Off while green lamp is on or flashing/blinking	The primary functions are active. Push the green button to shift to the secondary functions.
Flashing while green lamp is on or flashing/blinking	The battery charge is getting low. This indication occurs during normal operation, while the primary functions are active, and means the battery should be charged soon. A charger may be connected while you continue to work. Please refer to **3. Low Battery Indication, Charging** for more information.
On (bright) while green lamp is on or flashing/blinking	The secondary functions are active. Release the green button if it is being held, or push and release the green button, to change to the primary functions.
On (bright) while green lamp is off	The red button has been pressed and the unit is turning off.

| Red Lamp	Information Conveyed
Pulsing (brighter and dimmer)	A charger is connected, but is unable to charge the battery. Please refer to **3. Low Battery Indication, Charging** for more information.

3. Low Battery Indication, Charging

In the H212 Handheld, the red lamp to the left of the Green button will begin to blink when the unit's battery charge gets low; at this point the battery has enough charge for several more hours of operation, but should be recharged as soon as possible. A charger (even a portable "power bank") may be connected to the unit while you continue to operate the machine. The control system will not become erratic with a low battery; the Handheld will simply turn off and display "Charging Needed" when the battery voltage falls below the minimum operating level.

Note that, in the Handheld, the red lamp also serves as the "secondary functions" indicator, so it will indicate low battery only when the primary functions are selected.

The Handheld is equipped with non-removable internal batteries constructed with lithium iron-phosphate chemistry, the safest and most rugged type of rechargeable lithium-ion battery available today. We recommend that you charge the units whenever they are not in use, as doing so prolongs battery life; with normal use and keeping the battery topped-up, 10 years of useful battery life can be expected. Charging is easy because the Handheld may be charged wirelessly using the supplied charging pad; they may also be charged using any standard USB charger, and both 12/24VDC-automotive "cigar lighter" and universal-voltage (100-240 VAC) "wall adapter" chargers have been included with the Trident Remote Control System.

Three styles of Trident charging pads are available—a white desktop model, a black dashboard-mountable model, and a universal model. All have magnetic alignment features to securely hold the Handheld in the correct position for fast charging. To charge the Handheld, simply place it onto the charging pad in the orientation that makes it "grab" onto the charging pad; it is not necessary to remove the Handheld from its optional zipper-pouch.

During charging, the Handheld will slowly pulse (brighten and dim) its green light. Note that if the red light also pulses, the unit has detected a problem with its charging system and you should call for service if stopping and re-starting the charge does not remedy the problem. Additionally, the unit's display screen(s) will indicate charging progress with a battery symbol which gets filled in as the charge level increases, and the charging source as shown in Figure 3.

Wireless (Charging Pad)   USB Port (e.g. Computer)   USB Charging Adaptor
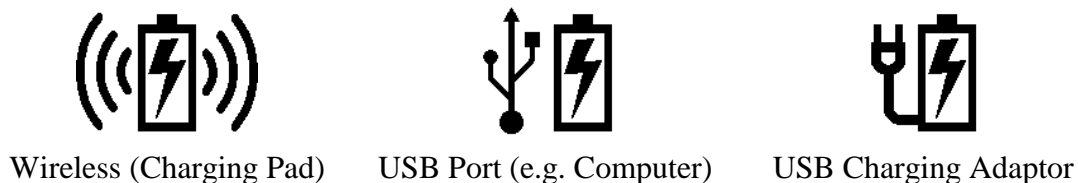
Figure 3 Charging Source Indications

Under certain conditions, the following symbols may be displayed to indicate the conditions described below:

Table 3 Battery Charging Indications

Symbol	Condition Indicated and Course of Action
	The unit is too cold (below freezing) to safely charge the battery. Please bring the unit and charger indoors to warm up. Charging will start when the temperature rises above 10° Celsius.
	The unit is too hot to safely charge the battery. Please place the unit and charger in a shady, cool area. Charging will start when the temperature drops below 60° Celsius.
	The charger is temporarily unable to charge the battery. This condition should not last more than a few seconds and occur only occasionally. If it persists, call for service.
	The charger has overheated and needs to cool off. Please place the unit in a cooler location. Charging will resume when the temperature has dropped.
	The USB charging cable has been plugged into a port or power adapter which is producing an abnormally high voltage. Please use a different charging source.
	An internal problem has developed. Please call for service.

More information about charging may be found in the Trident Quick Start Guide.

4. Changing Handhelds

        The Trident system allows for one or more Handhelds (depending on software version) to be matched with the C220 Controller. Occasionally a Handheld becomes damaged or lost, and must be replaced. The replacement of a Handheld is as easy as matching the new Handheld with the C220 Controller. Once a new Handheld is matched to the receiver, the previous Handheld will no longer communicate-with or control the receiver.

Trident Remote-Control System

Installation and Service Manual

(Dxx-xxxxx-xx)

DRAFT
Revision 0

Applies to:

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January 07, 2019

Contents

1. Introduction

The Trident Remote Control System is a high performance, customizable remote control system designed for a variety of different machinery. It consists of a single C220 Controller (to be installed into the machine), and one or more remote Handheld units.

Sophisticated firmware programs contained in the Handheld and C220 Controller contain custom logic and algorithms for operating different types of machines. Operator commands from the Handheld are combined with interlock logic to create a seamless and convenient control experience for the user.

The C220 Controller and Handheld all have IP67 ratings and are sealed against dust, dirt, water and most chemicals up to a submersion depth of one metre. Note, however, that pressure-washing must not be used for cleaning the units. The Handheld is shock-, drop- and crush-resistant against the most common rigors encountered in industrial-use scenarios. Electrical connections to the C220 Controller are accomplished through a sealed 30-way rectangular connector with retaining screw.

The Trident system can be used with several machine variants by way of parameters which can be configured by the installer. This manual describes considerations and procedures for installation, and gives instructions for adjusting parameters to suit the machine being commissioned.

2. Precaution for Welding

Provided that the ground clamp is affixed to the machine close to the point of the weldment to be placed, electro-welding may be performed with the Trident Remote Control System installed. However, as a precaution against electrical damage, please disconnect the 30-way and antenna connectors from the C220 Controller and secure them at least 10 cm away from the C220 prior to any welding operation on the machine.

3. Affixing the C220 Controller and Antenna

Please refer to the Trident Quick Start Guide for instructions to mount the C220 and external antenna (unless the C220 was supplied with an internal antenna). While the C220 Controller has an IP67 rating and is completely waterproof, a covered location is preferred for ease in matching (see below), servicing, and viewing of the controller's status lamp.

4. Wiring the C220 Controller

The Trident Remote Control System is supplied with a wiring harness that is appropriate for the system option. The harness has a 30-way rectangular connector which mates with the C220 Controller, and, depending on the system option, a blunt-cut cable or connectors which mate to existing connectors in the truck. The main power (+12 volt, red) wire must be fused externally to a maximum of 12 ampères for either harness. The main ground (black) wire must be connected to the vehicle's battery negative circuit or to a solid vehicle ground (positive-ground systems are *not* supported). The LOOP OUT is a safety circuit and *must* be used to enable (usually by closing a normally-open hydraulic dump valve) machine functions which have the potential to cause damage or injury.

5. Matching the Handheld with the C220 Controller

The Trident Remote Control System requires at least one H212 Handheld to be matched with the C220 Controller.

The Trident Quick Start Guide contains instructions for matching the H212 Handheld with the C220 Controller. New systems are delivered with the Handheld already matched with the controller. However, any Handheld may be re-assigned to another system simply by matching it with the other system's C220 Controller. There is no harm in re-matching a remote unit which has already been matched with a given C220 Controller.

6. Configuring the System

The H212 Handheld's Configure Mode may be used to adapt the Trident Remote Control System to a specific machine variant. To enter Configure Mode, proceed as follows:

1. If the system does not yet have a Handheld, match a Handheld with the C220 Controller as described in the Quick Start Guide.

2. Ensure the Handheld is turned off.

3. Proceed as though you were turning the Handheld on normally; but

4. Continue to hold the Handheld's green button until both the red and green LEDs illuminate together.

5. Release the green button. The Handheld is now in Configure Mode.

While in Configure Mode, the left and right rectangular buttons around the upper display screen may be used to select one of many parameters to be displayed and/or modified. The top and bottom rectangular buttons may be used to increment and decrement each parameter; holding a button will cause its action to repeat automatically (e.g. increment repeatedly). Pressing the green button will cause changes to the parameters to be saved.

Some parameters (e.g. Splash screen display time, Shift button momentary/latched) are local to the Handheld and are available for viewing and modification when the Handheld is in communication with a C220 Controller. Other parameters (e.g. Machine type) are stored in the C220 Controller; when it is desired to view or modify a parameter that is stored in the machine controller, the Handheld must be matched with a C220 Controller and the Controller must be powered. Some parameters are protected against modification with an access code; if an attempt is made to increment or decrement a protected parameter, the lower screen will display a message asking for a numeric access code to be entered. Once the access code has been entered, all protected parameters may be modified.

While in Configure Mode, the lower buttons and display screen will also permit certain machine functions to be operated for the purpose of testing the performance of certain parameter values.

Additional parameters can be configured on the handheld depending on the type of system that is being used. Please contact us for further information. Below are some general parameters that can be configured.

6.1. Radio Perform.

This parameter allows trade-off between radio range, control responsiveness, and run-time per battery charge, as follows:

Table 1 Radio Perform. Parameter Values

Radio Perform.	Operating Characteristics
Best	Best range and responsiveness, shortest run-time
High (Initial Value)	Very good range and responsiveness, better battery life than Best
Good	Good range and responsiveness, slightly longer battery life than "High"
Save Power	Good range, reasonable responsiveness, more battery life than "Good"
Long Run	Longest run-time, reasonable range and responsiveness

The actual-run time depends on temperature and whether the night-time display illumination is used. In practical use, only small differences are noticeable between the different settings above.

This parameter is local to the Handheld on which it is configured.

No access code is required to change this parameter.

6.2. Auto-Off

If no buttons are pressed on the Handheld, the Handheld will automatically turn itself off after a prescribed period of time determined by this parameter:

Table 2 Auto-Off Parameter Values

Auto-Off	Time With no Buttons Pressed Before Automatic Power-off
Never (Initial Value)	As long as the remaining battery charge allows for
5 min.	One-twelfth of an hour
10 min.	One-sixth of an hour
30 min.	Half an hour

This parameter is local to the Handheld on which it is configured.

No access code is required to change this parameter.

6.3. Reset all params to default?

This Config Mode screen will, if the YES (top rectangular) button is pressed twice (the second time to confirm) cause all of the parameters to be changed to their initial values. Then, the green button may be pressed to commit to the reset operation.

This function is protected and may be access only after entering the correct access code (provided by Aarcomm Systems Inc. in a separate communication).

6.4. Splash Duration

When the Handheld is turned on in normal operating mode, the configured company logo (cf. **6.6. Logo**) will show for a period of time determined by this parameter.

This parameter can be adjusted from 0.2 to 20.0 seconds in increments of 0.1 seconds; it has an initial value of 2.0 seconds.

This parameter is local to the Handheld on which it is configured.

No access code is required to change this parameter.

6.5. Shift Button

This parameter determines how the Handheld's green button must be used to access ("shift to") the secondary functions, as follows:

Table 3 Shift Button Parameter Values

Shift Button	Green Button Action For Shift
Momentary (Initial Value)	Must be held down
Latched	Need only be pressed and released to toggle between primary and secondary functions

This parameter is local to the Handheld on which it is configured.

No access code is required to change this parameter.

6.6. Logo

This parameter determines the type of logo displayed when the Handheld is first turned on:

Logo	Splash Screen
Customer (Initial Value)	Customer logo
Aarcomm	The Aarcomm logo is displayed.

This parameter is local to the Handheld on which it is configured.

No access code is required to change this parameter.

6.7. Brightness

Handhelds equipped with lighted displays will show this parameter.

This parameter can be adjusted from 0 to 9 seconds to select 10 levels of brightness; it has an initial value of 4. Higher brightness levels consume more battery power and yield less run-time per charge.

This parameter is local to the Handheld on which it is configured.

No access code is required to change this parameter.

6.8. Light

Handhelds equipped with lighted displays will show this parameter.

This parameter determines how long the display lights will stay on for, as follows, after a button is pressed; it has an initial value of 10.

Light	Duration
Off	The displays are non-illuminated. This value is selected by pressing the "-" button once more after decreasing the value to 1 second. The battery run-time is maximized with this value.
1 through 60	The display light will illuminate for this many seconds after a button is pressed.
Always On	The displays are always illuminated. This value is selected by pressing the "+" button once more after increasing the value to 60 seconds. This setting uses the most battery power.

This parameter is local to the Handheld on which it is configured.

No access code is required to change this parameter.

mm Systems Inc. in a separate communication).

7. Servicing the System

The Trident Remote Control Systems is capable of detecting many issues with both the machine and itself. To help with servicing and repairs, the Trident provides detailed information via the C220 Controller's status lamp and a special Diag Mode in the handheld. We will describe these two facilities in this section.

7.1. C220 Controller Status Lamp

The C220/C920 controller contains a single red/green/blue LED which indicates the operational status of the controller using various colours and blink rates. Note that the colour mixing may not be ideal when the LED is viewed at certain angles, due to the clear (undiffused) construction of the LED's lens; nonetheless, the following codes are used:

Table 4 C220 Controller Status Lamp Indications

Lamp State	Interpretation
Steady Frosty White	The controller is operating properly and waiting for a radio link from a portable remote controller.
Steady Green	The controller has a radio link from a portable remote controller.
Steady Turquoise	Some applications feature a colour change of the status lamp from Steady Green to Steady Turquoise to indicate that the controller has a radio link from a portable remote controller and is being commanded to turn on an output aside from LOOP OUT.
Steady Deep Blue	The controller has been placed into Matching Mode, and is waiting for another device to match with it. Normal operation will resume after a device has attempted to match with the controller, or after one minute if no device attempts to match.
Quickly Blinking Green	1. An activated output is overloaded (the connected load is drawing too much current) or the output is short-circuited to ground; or 2. The current-controlled output I/O16 has detected a solenoid with unusual inductance or resistance. This is a warning indication and the controller will continue to operate, with the possible exception of an output that has excessive load or is shorted to ground.

Lamp State	Interpretation
Quickly Blinking Blue	A recently activated output was overloaded for long enough to trigger the over-temperature protection of the associated output driver. The controller will continue to operate, and the affected output will resume operation when the driver cools down sufficiently.
Slowly Blinking Turqoise	The controller has detected that its supply voltage is below 8.0 volts. The controller will attempt to continue operating, but some outputs may not be available or the controller may restart itself if the voltage drops further (e.g. due to turning on an output function connected to a load). Check the wiring and/or the machine's battery and charging system.
Quickly Blinking Turqoise	The controller has detected that its supply voltage exceeds 34.0 volts. The controller has turned off its output functions and will resume operation when the supply voltage decreases to an acceptable level.
Alternating Blue and Red	1. The controller has detected power being fed back into one of its outputs, and it is not a normal condition for that output to be powered externally in the machine involved; or 2. The controller has detected that an internal power driver has failed in the active state. If the condition was transient, power-cycling the controller will restore it to operation.
Alternating Green and Red	1. The LOOP OUT signal has been short-circuited to ground; or 2. The controller has detected an internal fault in its safety loop (E-Stop) system . If the condition is transient, power-cycling the controller will return it to normal operation.
Quickly Blinking Violet	The controller has detected an internal error condition that prevents it from operating. This condition may occur temporarily after reprogramming the controller's firmware via the USB programming cable, in which case power-cycling the controller will return it to normal operation.

Lamp State	Interpretation
Quickly Blinking Orange	1. The controller is unable to communicate with its base (ELR) board; or
	2. The controller has detected an error with the PWM driver chips.
	This condition may occur while updating the firmware of the base (ELR) board using the USB programming cable, in which case there is no reason for concern. This condition will clear by itself once the communications and/or PWM driver has returned to normal.
Steady Violet	1. The controller's radio module is not programmed; or
	2. The controller's radio module has failed.
	Programming or replacing the radio module is required for the controller to operate.
Steady Orange	1. The controller has not been assigned a radio key; or
	2. The controller has been programmed with an incorrect firmware image.
	Configuration or reprogramming is required for the controller to operate.
Very Slowly Blinking Red	The controller has detected a hardware failure with its base (ELR) board. Replace the controller.
Steady Red	1. The controller is not being fed power and ground properly. The power and/or ground wire(s) is loose or disconnected, or the 30-way connector is not completely mated--check the 1/4" hexagonal-head securing screw; or
	2. The base ELR board's processor is not programmed.
	The wiring or programming problem must be remedied in order for the controller to operate.

7.2. Diag Mode

The H212 Handheld can be used as a wireless data terminal to read useful information from the C220 Controller. To enter Diag Mode, proceed as follows:

1. If the H212 Handheld has not been matched with the C220 Controller, match it as described in the Quick Start Guide.

2. Ensure that the machine controller (e.g. C220) is powered, and start the H212 in Config Mode as instructed above. Note that the initial display upon entering Config Mode will include the message "< & > for Diagnostics".

3. Once in Config Mode, simultaneously press the left rectangular (<) and right rectangular (>) buttons together, then release them.

When in Diag Mode, the left rectangular and right rectangular buttons may be used to select one of several information pages for display. Pages contain live data from the machine controller and may be useful during commission (to view input states) and trouble-shooting (to view fault details). Other information such as the machine controller's firmware revision are also available in Diag Mode. Pressing the green button will toggle to (and back from) a legend display which explains the button functions and fault code abbreviations.

8. CAN-Bus Messages

The C220 Controller is inter-operable with a SAE J1939 CAN network for reading the gross vehicle weight from an Air-Weigh® LoadMaxx™ on-board weigh scale.

This section describes the J1939 message formats used by the C220 Controller.

8.1. J1939 Address Claim and Name Field

Upon power-up, the C220 Controller issues a J1939 Address-Claim PDU message to inform the network of its J1939 Name and Preferred Address. A J1939 Address Claim message is sent with priority = 6, PF = 238, DA = 255, SA = 113 (the Preferred Address), and 64 bits of Name information formatted as follows:

Table 5 C220 Controller J1939 Name

Field	Bits	Value
Arbitrary Address Capable	1	0
Industry Group	3	0
Vehicle Systems Instance	4	0
Vehicle System	7	0
Reserved	1	0
Function	8	52
Function Instance	5	0
ECU Instance	3	0
Manufacturer Code	11	689 (Aarcomm Systems Inc.); this may be overridden; contact Aarcomm for more information.
Identity Number	21	The lowest 21 bits of the 28-bit radio key (labelled in hexadecimal on the back of the C220 Controller).

The C220 Controller has a default Preferred Address of 113 (71 hexadecimal), and is not arbitrary-address capable. If the C220 Controller detects it has lost the address-claim process, it will not send any further messages on the CAN bus. In case of an address conflict, please contact Aarcomm for instructions on how to configure the C220 Controller for a different Preferred Address.

8.2. LoadMaxx Messages

The C220 Controller assumes that the Air-Weigh® LoadMaxx™ scale is using its default address of 180 (B4 hexadecimal). If the scale is using another address, contact Aarcomm for instructions for configuring the C220 Controller to find the scale on a different address. (Note: Newer C220 firmware may be able to search-for and find the address of the scale, in which case configuration is unnecessary.)

During operation, the C220 Controller sends a request for Gross Combination Vehicle Weight (PGN 64872), once per second, to the scale using a standard J1939 Request PGN (59904, EA00 hexadecimal). The weight information contained in PGN 64872 returned from the scale is used to generate the weight display in the H212 Handheld's primary function display.

Additionally, the C220 Controller monitors the Active Diagnostic Trouble Codes (PGN 65226) which the scale automatically sends once per second, and extracts the Amber Warning Lamp (AWL) and FMI (within DM1) values in order to tell when to indicate the approaching-weight-limit warning and over-weight alarm. Note that the scale must be configured properly via its dashboard-mounted display with the weight warning and alarm limits.

9. Warranty

     Aarcomm Systems Inc. ("Aarcomm") warrants, to the <u>original purchaser,</u> that the Trident Remote <u>Control System</u> is free from defects in materials and workmanship, subject to normal use and service, for a period of TWO YEARS from the original date of delivery as evidenced by a copy of the sales invoice. This warranty covers <u>parts</u> (excluding crystals, parts subjected to unauthorized repair or modification, and wear and tear on switches, knobs, and joysticks) and <u>labour</u>.

     Aarcomm's entire liability and your exclusive remedy shall be, at Aarcomm's option, either the <u>repair</u> or <u>replacement</u> of the Trident Remote Control System, which must be returned with a copy of the original sales invoice to Aarcomm <u>freight prepaid</u>. If failure resulted from accident, abuse or misapplication, Aarcomm shall have no responsibility to repair or replace the Trident Remote Control System. Under no circumstances shall Aarcomm be responsible for incidental or consequential damage or loss caused by defects in its products, whether such damage or loss occurs or is discovered before or after replacement or repair, and whether or not such damage may be caused by the negligence of Aarcomm Systems Inc.

     Neither Aarcomm nor its Distributor shall be liable for any delay or failure in the performance of any of its obligations under this agreement caused by acts of God, strikes, other labour disturbances, embargoes, boycotts, shortage of parts or any cause beyond its reasonable control.

Application Note

Trident Wireless Battery Charger with Alarm (PAT-83884-02)

The Trident Wireless Charger is designed to be connected directly to a vehicle's battery system and can be configured to provide an alarm if the handheld unit is not attached to the charger.

Wire Colour	Name	Notes
Red	Battery	12V or 24V
Black	Ground	
Yellow	Alarm Enable	Connect to battery to enable alarm. Can be left unconnected if unused.
Green	Alarm Output	If the **Alarm Enable** is connected to the battery, the **Alarm Output** will output the battery voltage if the handheld is NOT attached to the charger. If the handheld is on the charger, the **Alarm Output** wire will be at 0V. This output can provide up to 500mA.

Alarm Option:

The use of the **Alarm Output** is optional and is enabled by connecting **Alarm Enable** to the battery voltage. If the handheld is not on the charger, the **Alarm Output** wire will provide battery voltage. This can be used to power an LED, buzzer, or a relay.

Location

The controller's (e.g. C220's, C200's) antenna should be mounted such that it has the best possible line-of-sight to the remote unit (e.g. H212, H106), in order to maximise the operating range. It is usually best to locate the antenna **above metal structures** of the machine that may otherwise obstruct the radio signal; best performance is achieved when **surrounding metal is at least 20 cm away** from the side of the antenna whip.

The mounting **surface must be metallic**, no more than 2.5 mm (0.1 inch) thick and preferably permit the **antenna whip to stand vertically above the metal mounting surface**. In instances where a vertical surface must be used, it is best to attach the antenna to an outside corner where the metal surface turns away from the antenna; a pre-drilled bracket has been provided for this purpose.

Assembly and Adjustment

Turn off power to the controller before performing the following procedure.

The antenna base will be installed into a **19-mm (¾-inch) diameter hole** which must be drilled into the metal mounting surface, or the supplied bracket may be used. After deburring the hole, **pass the small end (gold connector) of the cable through the hole from the upper side** as shown below:

Manoeuvre the antenna base so that bottom of the base "catches" under the hole, the gold button on top of the antenna base is facing up and the base is centred in the hole:

The **O-ring gasket of the locking ring should seal to the mounting surface** when threaded onto the base:

Adjust the cable to face in a direction such that it does not become kinked. The locking ring should be tightened about one-quarter turn after the O-ring makes contact:
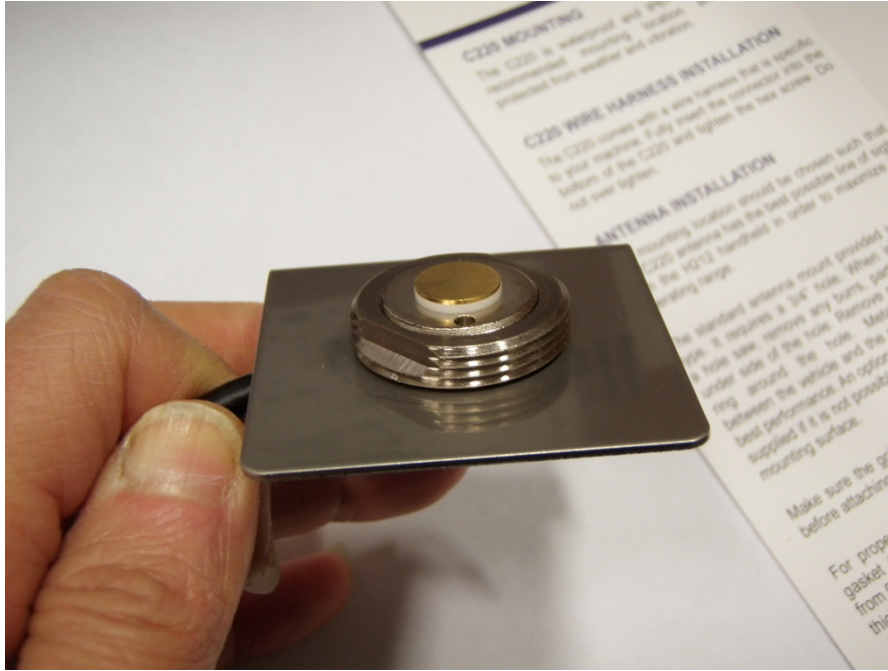
The underside of the installed antenna base should look like this:

Only if the mounting surface is less than 1.25 mm (0.05 inch) thick or if using the bracket, install the supplied flat rubber washer as shown below (do NOT install the rubber washer if the mounting surface is thicker than 1.25 mm):

The bottom end of the antenna whip should be **slightly proud of the convex side of the bushing** under the base-cap of the whip. Use the supplied Allen key to adjust and/or tighten the set screw in the bushing:
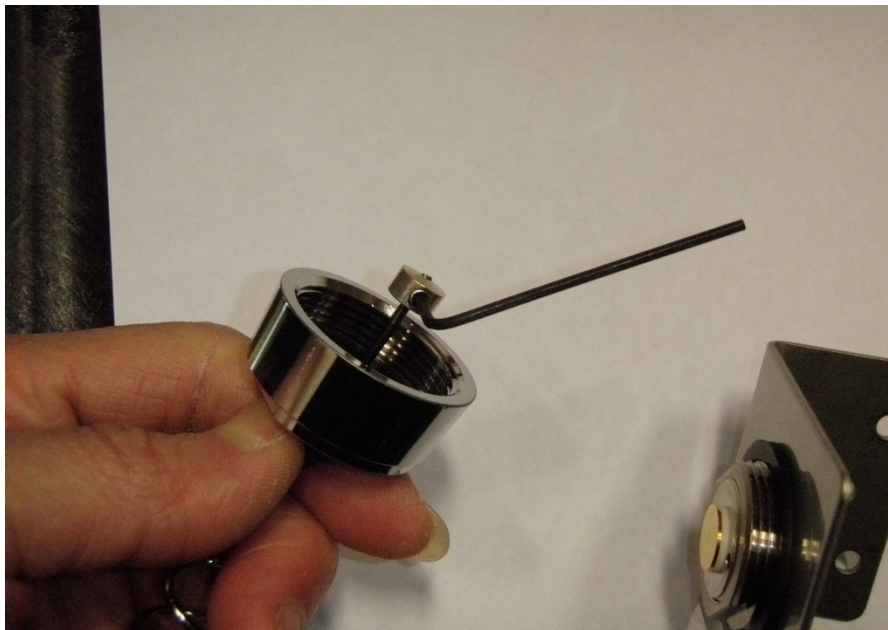
Pull the antenna whip so that the bushing seats into the rubber insulator of the base-cap:

Thread the base-cap onto the antenna base, using a rubber washer only if the mounting surface is less than 1.25 mm thick, then **tighten another one-eighth to one-quarter of a turn**. *Note: If the antenna whip feels loose to the touch, remove the rubber washer and/or adjust the bushing so that the bottom end of the antenna whip protrudes further from the bushing.*

Route the cable to the antenna port of the controller and mate the connectors by threading **finger-tight, then tighten another one-tenth to one-eighth of a turn**.

A properly mated antenna-cable connector looks like this: