

C-Start[®]

Installation Manual



Unitec

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C-START® INSTALLATION MANUAL

This manual provides installation instructions for the C-Start. It includes site planning, site preparation, the mechanical installation of the C-Start and the electrical wiring of the unit.

When calling for assistance, you must have the following information available:

C-Start Serial Number: _____

Distributor Name: _____

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DECLARATION OF COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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1 Site Planning and Preparation

This chapter provides guidelines for positioning the C-Start and preparing the site. Site preparation includes:

- Determining how and where the C-Start will be mounted
- Installing conduit runs and required wiring

These instructions serve as general guidelines only. If your wash manufacturer's installation requirements differ from these guidelines, always meet the wash manufacturer's requirements first.

Requirements specified in local electrical and building codes must be followed and shall take precedence over the guidelines provided within this document. All units should be installed by a professional electrician ONLY.

The C-Start is rated for the following environmental specifications:

- Temperature: -20° F to 115° F
- Humidity: 0% to 100%

The following ratings label denotes the use of 120V AC power, Single Phase, 8 Amps, and 50-60 Hz, and is used in the C-Start:

UNITEC ELECTRONICS

7125 Troy Hill Dr, Elkridge MD 21075

Model: C-Start

Rating: 120VAC/1Phase/8A/50-60Hz

The following symbol is used in the C-Start:



This symbol represents the presence of earth-grounded equipment.



This symbol represents the presence of high voltage in the unit.

1.1 Positioning the C-Start

When installed at the wash entrance, the C-Start should be located at least 12 feet from the wash. For curb mount applications, the front surface of the C-Start should be even with the edge of the curb. To achieve this dimension, the base frame should be installed so its leading edge is 7 in. from the edge of the curb as shown in the figure 1.

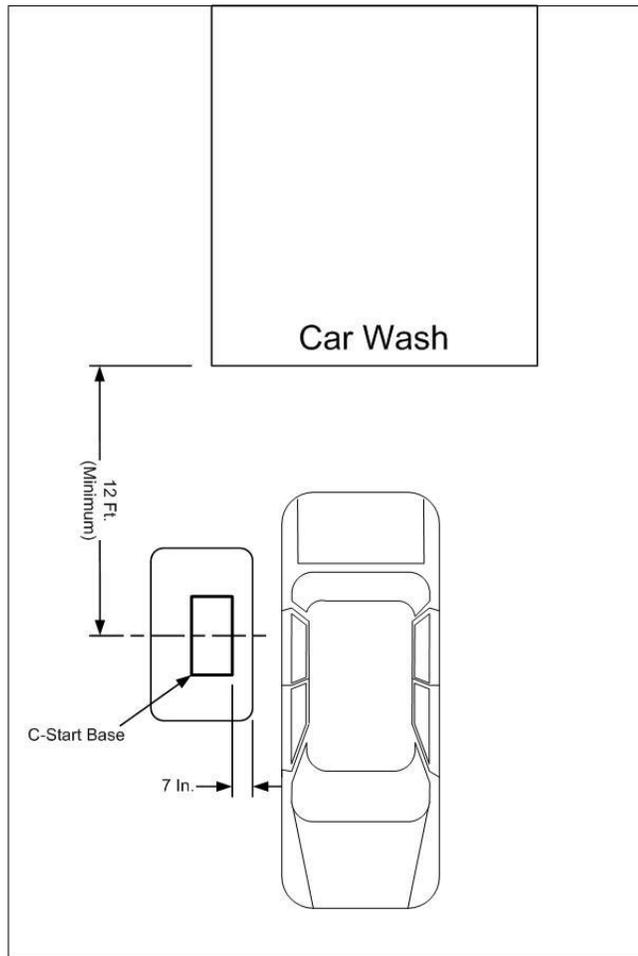


Figure 1. C-Start Position

1.2 Electrical

1.2.1 Power Requirements

C-Start requires 120 VAC, 8 Amps service with a dedicated circuit breaker.



Note:

Ensure the protective earth ground wires do not carry any motor return current. Only the neutral wire should carry return current. Follow local electrical code when wiring the C-Start.

1.2.2 Conduit Requirements

At a minimum, (3) conduit runs are typically required:

- Power – Conduit run from C-Start to AC Power Service Panel
- Control – Conduit run from C-Start to the Car Wash Controller
- Data – Conduit run to the network router location within the facility. This conduit may also house Intercom control wires and telephone lines (for dial credit applications).

Conduit size should be at least $\frac{3}{4}$ in. Refer to local and national electrical codes to select the proper conduit type and size. Conduit stubs should be installed to enter the C-Start base through the oblong conduit opening as shown in Figure 2 and extend at least 3" above the concrete surface.

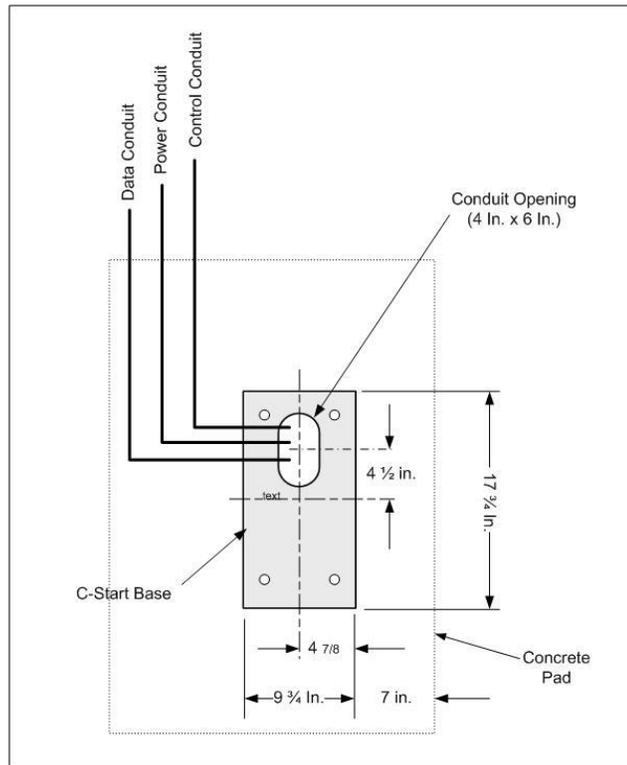


Figure 2. Conduit Runs

1.2.3 Wiring Requirements

Wiring requirements are summarized in the following table. As wires are pulled through conduit, ensure there is at least 6 ft. of wire extending from the end of the conduit stub. The Network (CAT-5) cable will need to be terminated with 8 position RJ-45 connectors per Ethernet standard 568B.

Circuit Description	Wire Qty	Wire Description
Power (115-120 VAC, 8 Amps).	3	16 AWG (black/white/green)
Network connection (to router)	1	Cat 5 communications cable, 295 ft max length
Wash Control	Varies	Per wash equipment manufacturer's instructions
Intercom (Optional)	2-4	22 AWG minimum, Qty varies by intercom model

2 Installation

2.1 Installation Hardware

Prior to beginning the installation, take the time to verify that all the following required parts are present and accounted for.

- Key set for door
- Allen Wrench For Door
- (4) Bolts and washers to secure the C -Start terminal to its mounting base.
- (4) Anchor bolts for securing the base to concrete (supplied with base)

Additional parts that may be needed include:

- Shims for leveling the base
- Cable straps (or “Tie Wraps”)
- (2) RJ-45 8 Pin Cable Plugs (for Cat 5 cable termination)

2.2 Recommended Tools

The following tools are recommended for the typical mechanical installation of this C-Start unit and base:

- Hammer drill with ½” concrete drill bits
- ¾” deep well socket and socket wrench
- Open end 9/16” wrench
- Hammer
- Small, thin blade, flat-tip screwdriver
- Wire Strippers (capable of 10 – 22 AWG wire)
- Modular plug crimp tool (if CAT 5 cable needs to be terminated)
- Diagonal Cutters
- Needle Nose Pliers
- Dual-plane Level

2.3 Base Installation



Note:

Pull all wires through conduits before mounting the base. See Electrical Planning for wiring requirements.

The C-Start bases are available in (2) heights as shown in the illustration below. This document describes the procedure for installing the straight base. Angled bases are also available and they are supplied with a manual addendum (MN1001), which provides additional instructions.

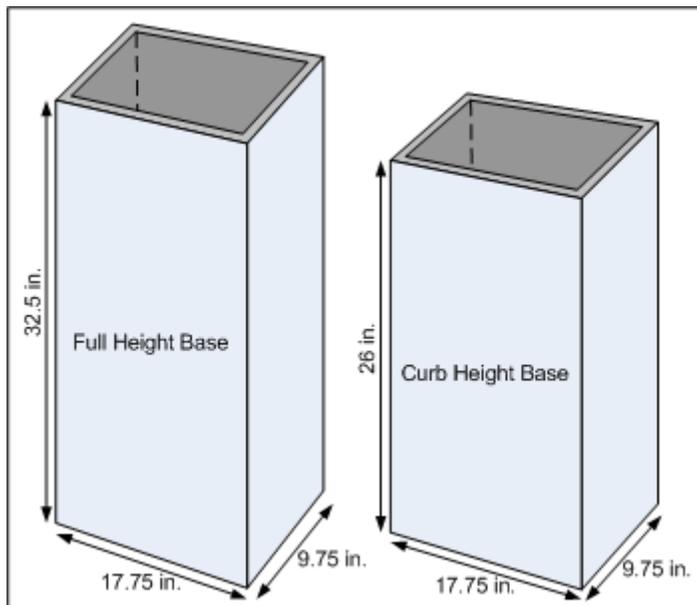


Figure 3. Straight Bases Dimensions

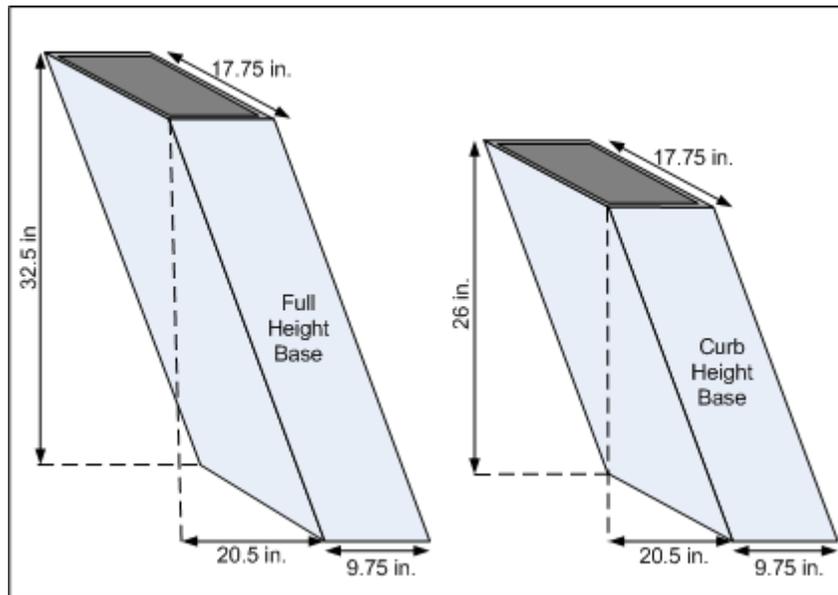


Figure 4. Angled Base Dimensions

1. Position the base in place and mark the locations of the (4) mounting holes on the concrete surface. Remove the base and drill (4) $\frac{1}{2}$ " diameter holes, 2" to 2 $\frac{1}{2}$ " deep in the marked locations.
2. Insert the anchor bolts (supplied with the base) in these holes and carefully drive them into place with a hammer. When the anchor bolts have been set, tighten the nut to secure the bolts in the concrete. Remove the nuts from the anchor bolts
3. Place the base on the anchor bolts, while ensuring the wires pulled through the conduit are not pinched under the base. Pull the wires through the top opening of the base and ensure there is at least 48 inches of wire draped over the top edge of the base.
4. Place the level on top of the base, and verify its level in both directions (front to back and side to side). Use shims as needed to level the base. Once the base is level, place the nuts on the anchor bolts and secure the base to the concrete.

2.4 Mounting the C-Start

1. Rest the C-Start enclosure on top of the base and feed the wires through the rectangular opening in the bottom the enclosure. This opening is partially covered by a metal plate which can be slid forward or removed completely to provide greater access.
2. Align the (4) mounting holes on the bottom of the enclosure with the threaded inserts on the top of the base. Secure the enclosure to the base with the (4) bolts and washers supplied with the C-Start unit.

3 Electrical Connections

3.1 General

Before starting, verify all required wires have been routed to the C-Start (as specified in section 1.2.3). The following figure shows the locations inside the C-Start where the field wires will connect.

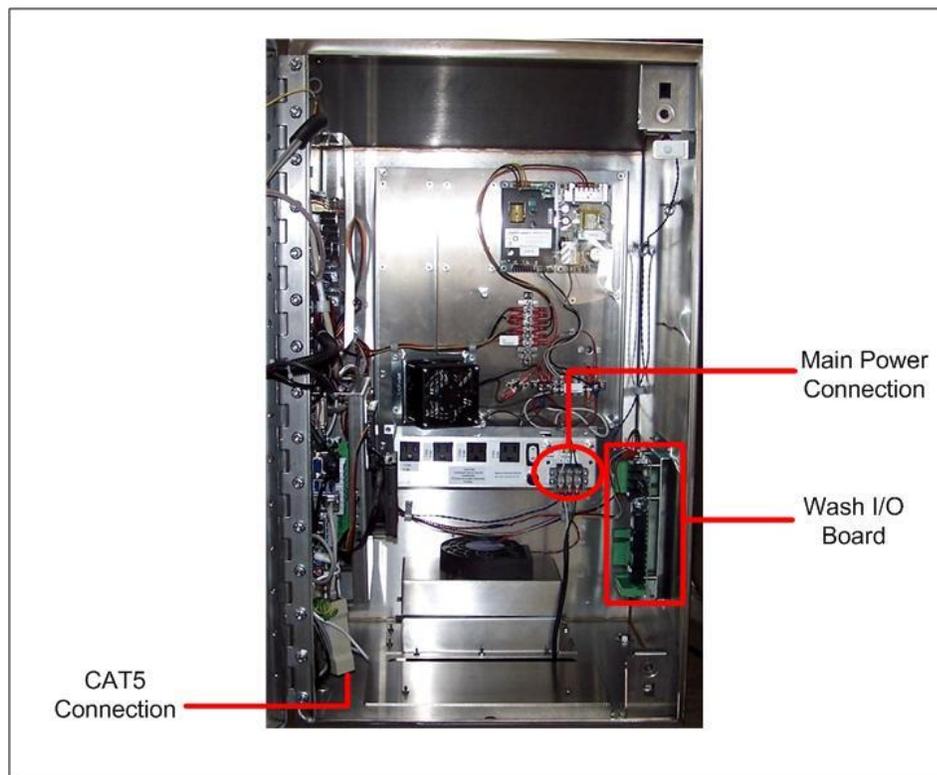
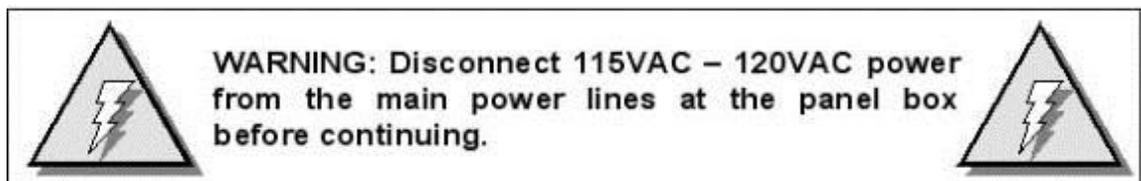


Figure 5. C-Start Interior Connections

3.2 Connecting Power



1. Route the main power wires to the AC terminal strip on C-Start's power panel (as shown below) and trim the wire to remove excess. Strip the insulation approximately $\frac{1}{4}$ " on each conductor.

2. Remove the plastic shield on the power terminal block and loosen the 3 screws where the wires are to be connected. Install the Neutral (White), Ground (Green), and Line (Black) wires under the screw clamps in the correct positions (as shown below) and re-tighten the screws to hold the wires in place.
3. Use wire ties to route and secure any extra cable. Replace the plastic shield.

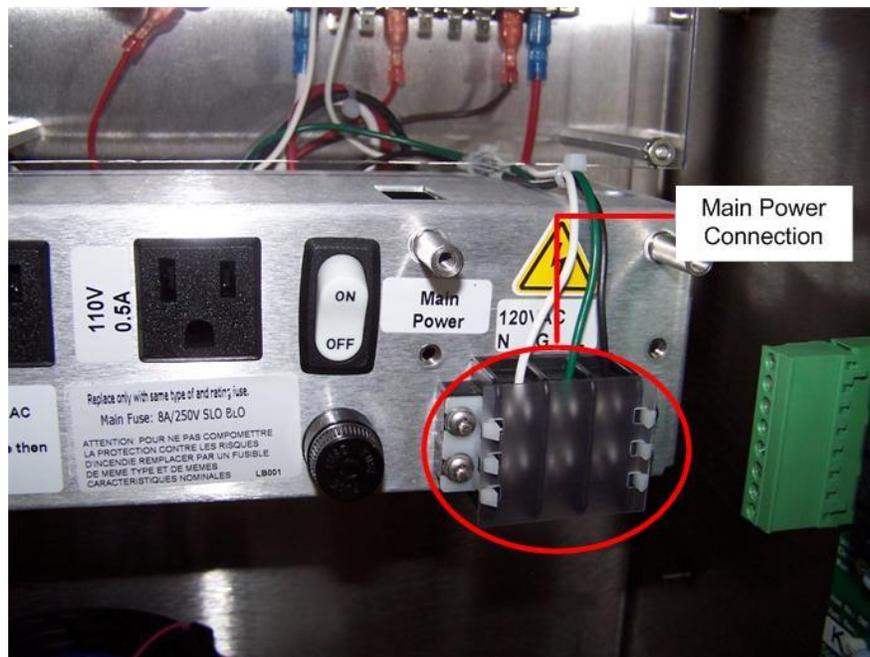


Figure 6. Neutral - Ground – Line Connections



Warning!

For continued protection against risk of fire, replace only with the 8 amp/250V 3AG SLO BLO fuse for C-Start.

3.3 Wash Control Wiring

3.3.1 Overview

In applications where the C-Start will communicate with the Wash Controller, the wash control wires will need to be connected to the Wash I/O Board. This board is located on the right wall of the enclosure and is shown in the picture below. The board is supplied with screw terminal plugs (not shown) installed in the green connectors to accommodate field wiring. You will need a thin tipped, flat head screwdriver to open and tighten the screw terminals.

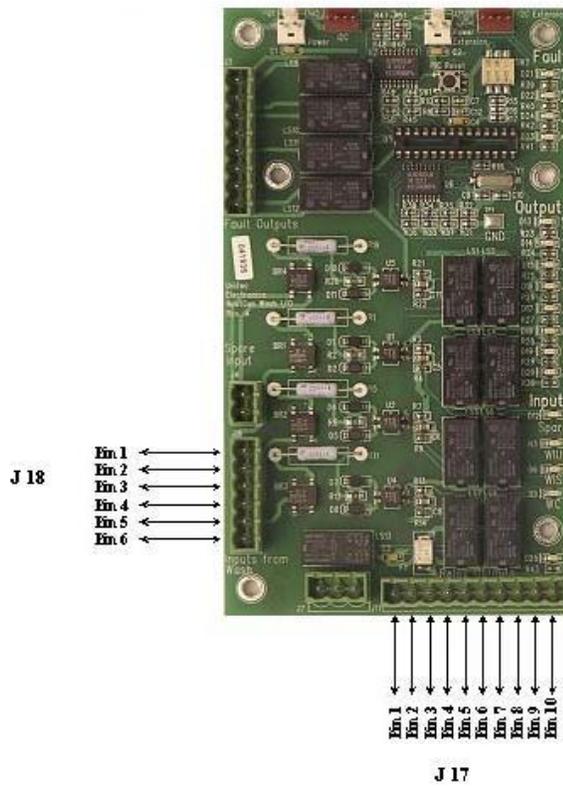


Figure 7. Wash I/O Board Connector Pinouts

Most wash manufacturers use a five-wire system to provide the arming signals for the selected wash packages. One common line and four arming input wires are fed from the wash’s PLC to the Wash I/O board. In addition to these five wires, a Wash-In-Use (WIU) Hot and WIU Neutral are required to reset the wash electronics. Typically, these are also provided by the PLC.

Each wash manufacturer has its own specific color code system and wash relay pin-outs; therefore, it is important to review the appropriate wash documentation prior to beginning this portion of the installation.

3.3.2 Wiring the Wash Relay Interface

WARNING: Car Wash Equipment Wiring can carry 20 – 150VDC, or 20-115VAC. Disconnect power from all car wash equipment before wiring the Wash I/O Board.

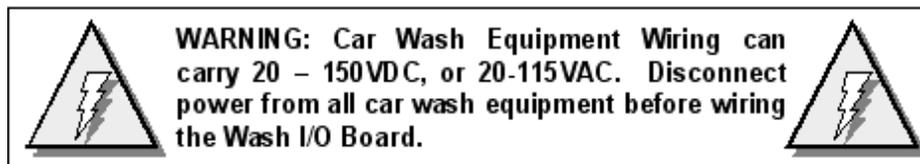
To wire the wash relays, remove the screw terminal plug from the J17 connector and install the wires from the PLC to the appropriate pin numbers per the table below. Replace the plug in J17 when finished.

Table 1. Wash Relays

Pin	Signal
Pin 1	Wash Output #1
Pin 2	Wash Output #2
Pin 3	Wash Output #3
Pin 4	Wash Output #4
Pins 5-8	Spare Option Relays (Outputs 5-8 respectively)
Pin 9	Wash Relay Common
Pin 10	N/A

3.3.3 Wiring the Wash-In-Use Interface

Wash equipment requires a reset circuit. This circuit is generally identified as the “Wash-In-Use” (WIU) signal. It is not uncommon for values of this voltage to be as much as 115-120 VAC, so it is extremely important to verify that there is no power applied to any of the wash components before proceeding.



To wire the wash in use and fault inputs, remove the screw terminal plug from the J18 connector and install the wires from the PLC to the appropriate pin numbers per the table below. Replace the plug in J18 when finished.



Note:

Wash equipment wiring may vary, and not all equipment manufacturers use the wash-fault interface. Refer to the manufacturer’s documentation for additional information.

Table 2. Wash-In-Use Connections

Pin	Signal
Pin 1	Wash-In-Use Hot
Pin 2	Wash-In-Use Neutral

Pin 3	Wash-Fault-Hot
Pin 4	Wash-Fault-Neutral
Pin 5	Wash-Complete-Hot
Pin 6	Wash-Complete-Neutral

3.4 Network Cable Connection

The Cat 5 cable will need to be terminated at each end with an RJ-45 modular plug. This termination should be performed by a technician who is experienced in assembling network cables, because a slight misalignment in the wire termination can cause communications problems. For reference, Appendix B provides guidelines for terminating a network cable with a modular RJ-45 plug.

The Network (Ethernet) connection is located at the bottom edge of the processor assembly on the left-side wall. There should be a surge suppressor installed in the Ethernet port. Insert the terminated CAT 5 cable into the other end of the surge protector. The facility end of the Cat-5 cable connects to one of the LAN ports on the Unitec router. Refer to 0 for details on connecting devices to the router.

3.5 Intercom Systems

3.5.1 Overview

The use of an intercom system allows two-way communications between customers at the C-Start and staff elsewhere on site. A customer activates the C-Start's intercom output by pressing the help button. Without an intercom, the intercom output can be used to activate a bell, light or other device to alert an attendant that help is needed.

The intercom wires connect to the Display IO board on the back of the main door. Jumpers and adjustments to control its operation are also located on that board. 2, 3, and 4 wire intercoms are supported. A digital intercom is recommended if the intercom wiring is sharing conduit with other communications wiring, but not required. Unitec does not supply intercom systems.

3.5.2 Intercom Connections

The Intercom has two connectors which control the way in which the intercom is wired and the mode of operation. J17 is the interface and connects to the customer's intercom unit. J23 is used to select mode of operation (two, three, or four wire intercom systems). Twisted pair / fully shielded cable is recommended for optimum performance.

3.5.3 Intercom Adjustments

The Intercom system has the ability to sense when voice band audio signals are present. This allows the speakers in the unit to revert to a passive intercom mode. This bypasses the internal audio section and allows the left speaker to be used as an intercom.

3.5.4 Connection Overview

Call Function: The unit will initiate a call function by closing the contacts on RL5. By default, J17-Pin 1 (H1) and J17-Pin 2 (H2) will always reflect the contact closure of RL5. This is the default for the four-wire mode when both the call function and audio are completely separated. More detailed instructions on this follow.

Audio: When the C-Start intercom mode is active, the audio section is floating and is not relative to ground. By default, J17-Pin 3 (SP+) and J17-Pin 4 (SP-) will always be connected to the audio section.

Four Wire Intercom Configuration: Two separate pairs (four wires) are used for both the call function and audio in the four-wire configuration. In this mode, J23 receives no jumpers.

3 Wire Intercom Configuration: This mode requires two conductors for audio and one additional conductor for the call function. This mode uses a common ground for both audio and the call function (SP-). Jumper pins 3&4 (bottom 2 pins) of J23 and connect H1, SP+ and SP- .

2 Wire Intercom Configuration: This type of intercom system has both the Call Function and audio sharing the two conductors. Jumper pins 3&4 (bottom 2 pins) and 1&2 (top 2 pins) of J23 and connect the two conductors to SP+ & SP-.

4 System Startup

For fully detailed instructions, please see the *Sierra Management Application Programming Manual* on the www.StartwithUnitec.com website.

1. Power up the C-Start.
2. Using a laptop, login into the Sierra Management System.
3. Enter the Site information and credit networking information, wash information, and setup a device profile.
4. Download the device profile.
5. The C-Start will reboot and be in full operational mode.

5 System Test

Once the installation is complete, a thorough test should be performed to ensure all C-Start functions are operational. This test should verify:

- Functionality of hardware devices (through diagnostic tests in maintenance mode).
- Washes and added services are properly configured and wash outputs are properly wired.
- The wash fault (Out of Service) signal places the C-Start out of service.
- C-Start Ethernet communications (through the Cat 5 cable).
- Credit card processing (**Note:** The merchant should confirm credit card revenues are being properly deposited to their account).
- Functionality of any peripherals (gate/gate controller, RFID Option, etc.).

Appendix A - POS Interface Option

The external POS option allows wash codes to be purchased at Point of Sale (POS registers or gas pumps). This option includes a port conversion device, which connects between the Unitec router and the C-store POS System. A 3ft Ethernet cable is included for connecting the Ethernet port of the converter to the Unitec router (see Appendix B). A standard 9-pin serial cable is included for connecting the Serial port of the converter to the C-Store POS however, some POS systems may require an alternate cable (or adapter). Contact the POS manufacturer for their cabling requirements.



Port Converter of External POS Interface Option

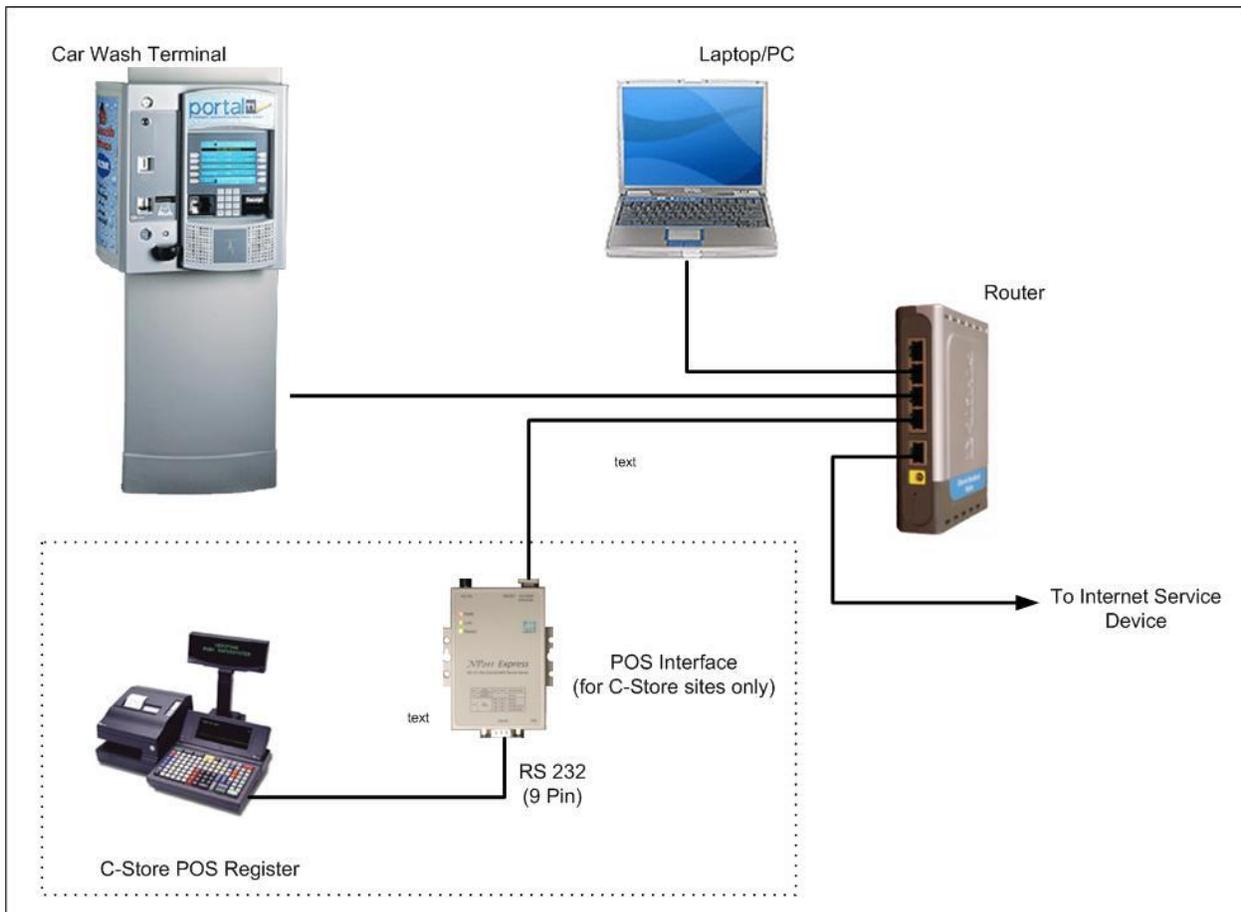
Appendix B - C-Start Networking

Unitec supplies a pre-programmed router for connecting devices as a local network. The networked devices will vary based on options ordered and may include:

- One or more C-Start units
- A C-Start Console
- A POS Interface device (to communicate with a C-store POS System)
- A print server (for connecting a local report printer)

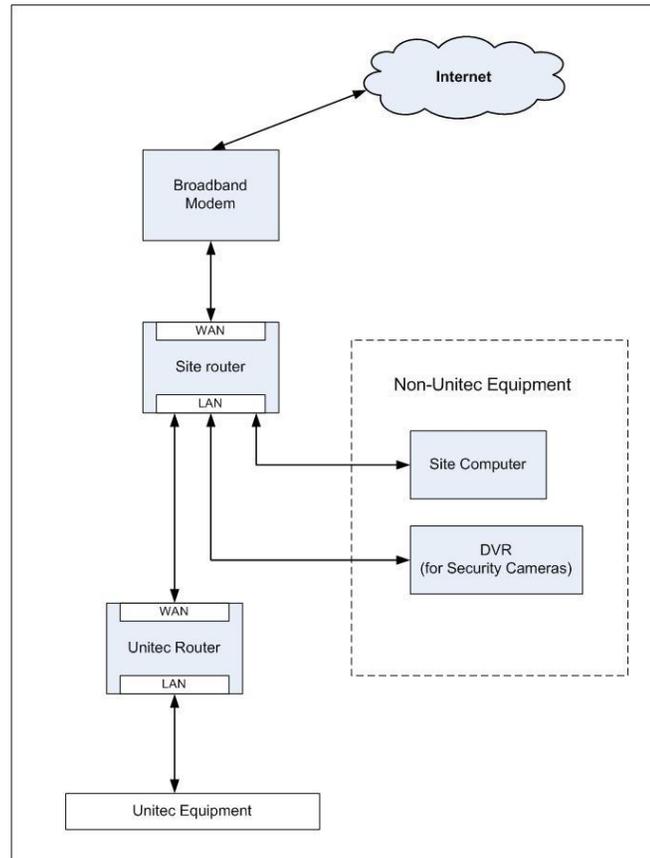
In cases where there will be more than (4) Unitec devices on the network, an Ethernet switch will need to be added. The WAN port of the switch connects to one of the LAN ports of the Unitec router. The additional devices can then be connected to the LAN ports of the switch.

The illustration below provides a sample network diagram.



Example of Networked Unitec Devices

Third party devices should not be connected directly to the Unitec router. The broadband device supplied for Internet service (e.g. DSL or Cable modem) will often have a built-in router that can be used to connect these devices. In some cases however, a separate router will need to be installed between the broadband modem and the Unitec router. The following illustration shows the use of a 2nd router for 3rd party device connections.



When a router (or modem with built-in router) is used between the Unitec router and broadband connection, it must be configured to allow external connections to and from the C-Start. The router should be configured to:

- Forward the ports assigned to the C-Start(s) to the Unitec router. For a single unit installation the port is 9810. In multi-unit sites, the ports would increment for each C-Start i.e. 9811, 9812 etc..).
- Provide a static/reserved IP address to the Unitec router reserved so that the forwarded ports will always be directed to it.

Appendix C – Terminating Ethernet Cables

1. Carefully remove the outer jacket of the cable. Be careful when stripping the jacket as to not nick or cut the internal wiring. One good way to do this is to cut lengthwise with snips or a knife along the side of the cable, away from yourself, about an inch toward the open end. This reduces the risk of nicking the wires' insulation. Locate the string inside with the wires, or if no string is found, use the wires themselves to unzip the sheath of the cable by holding the sheath in one hand and pulling sideways with the string or wire. Cut away the unzipped sheath and cut the twisted pairs about 1 1/4" (30 mm). You will notice 8 wires twisted in 4 pairs. Each pair will have one wire of a certain color and another wire that is white with a colored stripe matching its partner (this wire is called a tracer).



2. Inspect the newly revealed wires for any cuts or scrapes that expose the copper wire inside. If you have breached the protective sheath of any wire, you will need to cut the entire segment of wires off and start over at step one. Exposed copper wire will lead to cross-talk, poor performance or no connectivity at all. It is important that the jacket for all network cables remains intact.

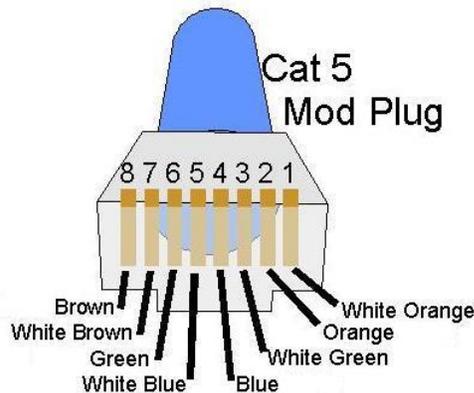


3. Untwist the pairs so they will lay flat between your fingers. The white piece of thread can be cut off even with the jacket and disposed (see Warnings). For easier handling, cut the wires so that they are 3/4" (19 mm) long from the base of the jacket and even in length.



4. Arrange the wires in the following order (from left to right):

- white/orange
- orange
- white/green
- blue
- white/blue
- green
- white/brown
- brown



5. Press all the wires flat and parallel between your thumb and forefinger. Verify the colors have remained in the correct order. Cut the top of the wires even with one another so that they are 1/2" (12.5 mm) long from the base of the jacket, as the jacket needs to go into the 8P8C connector by about 1/8", meaning that you only have a 1/2" of room for the individual cables. Leaving more than 1/2" untwisted can jeopardize connectivity and quality. Ensure that the cut leaves the wires even and clean; failure to do so may cause the wire not to make contact inside the jack and could lead to wrongly guided cores inside the plug.
6. Keep the wires flat and in order as you push them into the RJ-45 plug with the flat surface of the plug on top. The white/orange wire should be on the left if you're looking down at the jack. You can tell if all the wires made it into the jack and maintain their positions by looking head-on at the plug. You should be able to see a wire located in each hole, as seen at the bottom right. You may have to use a little effort to push the pairs firmly into the plug. The cabling jacket should also enter the rear of the jack about 1/4" (6 mm) to help secure the cable once the plug is crimped. You may need to stretch the sleeve to the proper length. Verify that the sequence is still correct before crimping.



7. Place the wired plug into the crimping tool. Give the handle a firm squeeze. You should hear a ratcheting noise as you continue. Once you have completed the crimp, the handle will reset to the open position. To ensure all pins are set, some prefer to double-crimp by repeating this step.



8. Repeat all of the above steps with the other end of the cable. Test the cable to ensure that it will function in the field. Mis-wired and incomplete network cables could lead to headaches down the road. Also, crossed wire pairs could lead to physical damage of computers or phone system equipment, making it even more crucial that the pairs are in the correct order. A simple cable tester can quickly verify that information for you. Should you not have a network cable tester on hand, simply test connectivity pin to pin.

