



Liberator™
Credit Card System
User Manual

Ver 4.1



Security Notice

It is IMPERATIVE that you take steps to safeguard your business and your customers from fraud! Don't be a victim of cyber crime! Protect your sensitive data!

You will be storing sensitive merchant information and consumer credit card information on your computer. Although VeriFone has gone to great lengths to secure PCCharge™, it is the merchant's responsibility to secure the system on which PCCharge resides and the environment in which it is used. Criminals continuously find new ways to commit fraud, and therefore it is crucial that you take an ongoing and layered approach to security. Use multiple tools and protect all areas (your network, individual PCs, laptops, servers, databases, backup data, etc.) that contain or transmit sensitive data.

At a minimum, VeriFone recommends that you read and implement the following suggestions:

1. If your computer has any kind of Internet connection, install a firewall prior to processing financial transactions. Even if you already have a firewall, check for new versions to ensure that you have the most up-to-date firewall available. Follow industry standards for hardening your firewall prior to processing financial transactions.
2. Hard copy documentation containing sensitive merchant information, such as your Merchant ID (MID) and Terminal ID (TID), should be safeguarded.
3. Keep software up to date, including Operating Systems (ex. Windows®), Email Programs (ex. Outlook), and Internet Browsers (ex. Internet Explorer). You can download Microsoft security updates and patches by visiting www.microsoft.com.
4. Control access to your computer equipment during open and closed hours.
5. If a remote user accesses your computer through a program such as pcAnywhere™, take measures to lock the program down (see pcAnywhere Manual). You must set up user names and passwords or change the settings to allow for Windows-based security. You should also disable the default users "Guest" and "Anonymous".
6. For more information related to security, visit the following sites.

http://usa.visa.com/business/merchants/cisp_index.html

<http://www.sans.org/resources>

<http://www.microsoft.com/security/default.asp>

Warranty Policy

ExpressKey, GinSan, IVS, & Trusco Group of Companies (Company) provides a limited one year warranty on components and piece of equipment produced by the Company to be free from defects in material and workmanship. Electrical assemblies see Appendix A, have a limited two year warranty on the controller to be free from defects in material and workmanship. This limited warranty does not cover equipment that has been damaged due to misuse, misapplication, modification, altered, neglected, attempted theft, vandalism, connection to improper voltage supply, modification, or such parts that are commonly recognized to be subject to wear in normal usage. Normal use products are, but not limited to, those listed on Appendix B; which are warranted for 90 days. Every component and piece of equipment is packaged to assist in safe handling of the product.

Claims must be submitted in writing within the appropriate coverage period as covered by this warranty, from date of shipment, to the Company's warranty/repair department. If the return is approved an RMA and labeling instructions will be issued and the product can be returned. Returned product without the appropriate RMA and label will be issued to scrap and all warranties/replacements will be considered null and void. A testing fee of \$15.00 will be applied, if the product passes all tests related to the written claim, then the fee will be applied and paid prior to return of the product. If the product fails the test then the fee will not be applied. The Company may charge a 20% restocking fee for returned product and/or an order, which is canceled, and material has already been ordered and/or received to fill such order.

The Company's warranty/repair department will inspect all components, submitted under warranty. Warranty replacement will be based solely on the analysis and confirmation that the product defect was caused by material and/or workmanship. The company reserves the right to change the design of the product without assuming any obligation to modify any product previously manufactured or to replace warranted product other than with redesigned product.

In some cases it is easier for the customer to send a Company purchased product direct to the manufacturer for replacement. In those cases the customer will be notified that their product falls under that process and should work with that manufacturer directly. Appendix C shows the purchased parts that falls under this case.

This warranty covers the product replacement only; charges for damages, freight and/or labor will not be accepted. There are no warranties expressed or implied which extend beyond this Limited Warranty. The loss of use of the product, loss of time, inconvenience, commercial loss, incidental or consequential damages is not covered. The Company shall not be liable for incidental, special, or consequential damages including without limitation damages resulting from personal, bodily injury or death or damages to or loss of use of property.

APPENDIX A

2-Year Warranty Controllers

Sensortron	Multitron	Touchtron	Timers
Liberator			

APPENDIX B

90-Day Warranty Components

Pressure Hoses	Swivels	Nozzles	Safety Shut-off Guns
Seals	O-Rings	Shop Vac	

APPENDIX C

Purchased Products that are Handled Direct with the Manufacturer

Shop Vac	Bill Acceptors	PcCharge Software	

Introduction and System Operation

Congratulations on your purchase of the GinSan Liberator® Credit Card System, the most versatile credit card system available for your car wash.

The Liberator® System does not replace your timer. It works in conjunction with your timer in much the same way as a coin acceptor or bill acceptor. When a card is accepted the Credit Card Device Control (CCDC) will pulse the timer according to how you have configured the CCDC to operate.

You can configure the CCDC to operate in one of two ways, Running Charge with Stop or Charge per Swipe using the Liberator® Credit Card Device control software.

In the “Running Charge with Stop” mode you configure your CCDC to give the timer the number of pulses it takes to start if the customer was using cash or coin. When the time runs down to approximately one second left the CCDC will give the timer another pulse to keep it running. This will continue until the customer either presses the “End Transaction” button or the amount of the charge reaches the preset maximum charge.

In the “Charge per Swipe” mode, the CCDC is configured to give the timer a pre-determined number of pulses per swipe. Once the card is approved the customer will have thirty seconds to swipe their card additional times to increase the amount of time they have purchased. This will then be processed as one transaction. If the customer swipes their card after the thirty seconds has expired, it will be treated as a new transaction.

To provide maximum flexibility to the Carwash owner the Liberator® Credit Card System employs PCCharge Payment Server Software as it's processing software. A list of licensed processors can be found at http://www.pccharge.com/products/pccharge_certs.asp . You will need to set up a merchant account with one of the processors before you can use this system. A convenient worksheet for setting up your PCCharge software can be located at <http://www.verifone.com/PDF/ActivationWorksheet.pdf>

For security reasons, GinSan Industries cannot provide technical assistance with your PCCharge Payment Server software. For technical assistance please contact Verifone at (877) 659-8981.

Please review any applicable Federal, State and local laws relating to the acceptance of Electronic Payments before activating this or any other Electronic Payments system. The Liberator must be used in compliance with all Federal, State and Local requirements.

PCI Compliance:

As of June 2008, PCCharge Version 5.7.1 SP8 ships with your liberator system. This version is PCI certified and compliant. The Liberator software reads the card data and passes it directly to the PCCharge software, no card data is retained by the Liberator software. For more information on PCI compliance go to:

<https://www.pcisecuritystandards.org>

Parts and Tools:

Provided:

- a) Credit Card Device Control (CCDC) – one per access point
- b) Liberator Credit Card Device Control Software (CCS)
- c) PCCharge Payment Server Software
- d) User Manual

Not provided:

- a) Shielded CAT5 cable
- b) RJ45 connectors for shielded CAT5 cable
- c) Broadband router (**must provide DHCP server function**)
 - a. Linksys model BEF1SR4
 - b. Or compatible device
- d) Multiport Ethernet switch (necessary if you will be using 4 or more CCDCs)
 - a. Linksys model SD216
 - b. Or compatible device
- e) Windows PC

Windows Vista Business Edition (32-bit), XP Professional, 2000,

- 512MB minimum of RAM, 1GB preferred
- 125 MB of available hard-disk space, 1GB preferred
- A high speed Internet connection (**strongly suggested**) OR a Hayes compatible modem (capable of 56K or more) and an analog phone line
- CD-ROM drive
- 1.2 GHz or higher processor
- Latest Microsoft service pack updates installed
- **Merchant Account with a PCCharge-certified processor**
- SSL updates if required
- Latest version of Microsoft's Internet Explorer (version 6 or later)

****NOTE: IT IS STRONGLY RECOMMENDED THAT ANY COMPUTER RELATED DEVICE BE PLUGGED INTO A HIGH QUALITY SURGE SUPPRESSOR OR UPS.**

NOTE: Installation of the Liberator[®] software and hardware will involve setting up and configuring computer network devices and making connections to them. If you are unsure of taking on these activities, you should seek out and retain the services of a local computer networking services provider. Look in your local telephone book under "Computers" or visit your local computer store such as Best Buy.

ATTENTION: Do not install the Liberator[®] software until instructed to do so.

Hardware Installation:

*****NOTE*** Shielded CAT5 cable is required. This is not provided.**

Run your shielded CAT5 cable from your access point (i.e. bay, vacuum, etc) back to the location in your equipment room where the PC will be placed. These must be direct runs. They cannot be a daisy chain configuration. Terminate the cable(s) in the equipment room with a male RJ45 connector. The cables should be wired as a direct connection, NO CROSSOVER. You will want to label what access points these cables came from (i.e. Bay 1, Vac 4, etc.)

DO NOT PLUG THESE IN UNTIL INSTRUCTED.

For some helpful tips on installing CAT5 cable see Appendix E in the back of this manual.

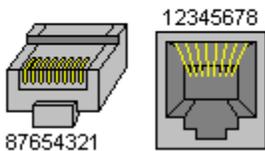
Terminate the shielded CAT5 cable using the connector provided on the Ethernet cable extending out from the CCDC.

Unscrew the black end from the round 4 pin circular connector on the CAT5 cable from the CCDC to reveal the insulation displacement connection points. Connect your CAT5 wires as follows:

Pin 1 on RJ45 to Brown on circular connector
Pin 2 on RJ45 to Black on circular connector
Pin 3 on RJ45 to Blue on circular connector
Pin 6 on RJ45 to White on circular connector

Where is pin #1?

RJ45 Jack and Plug Pinout



NOTE: Pins 1 & 2 and 3 & 6 need to be twisted pairs



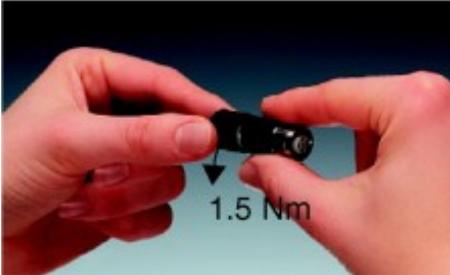
1. Remove the conductor sheath to approximately 1.5"
2. Slide into the connector as far as it will go.



3. Snap the wires into the marked entry points

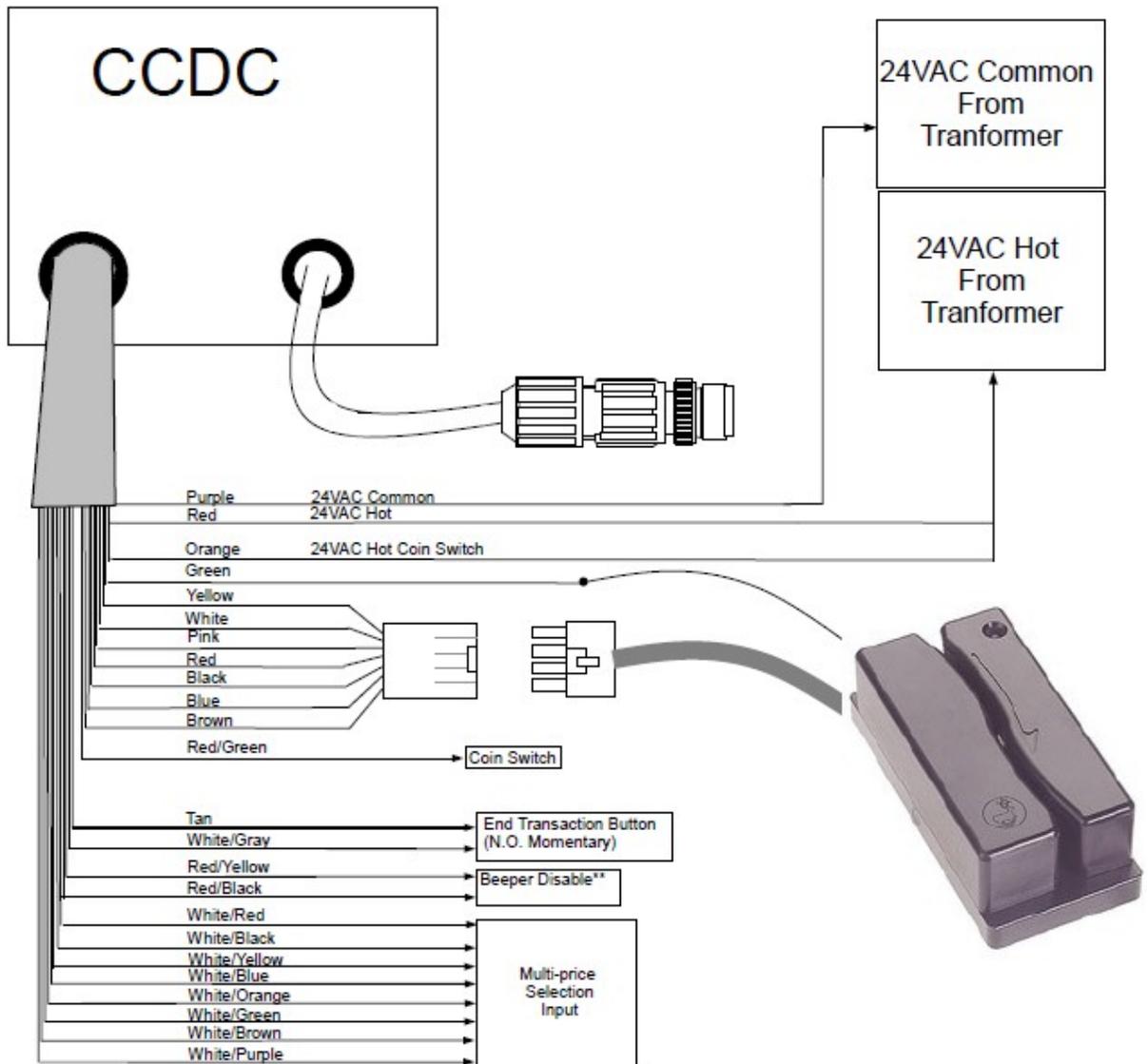


4. Cut off the projecting wire so that there is no overhang.



5. Push the union nut onto the contact carrier and tighten.

Wire the CCDC into your equipment using the wiring diagram provide is Fig 3:



**If you wish to disable the beeper on your timer when the Liberator System is in "Running Charge" mode, hook according to the following:

Red/Yellow → To input of Beeper

Red/Black → Remove wire from input of beeper and connect here.

As long as the CCDC is running a charge, the contacts across the red/yellow and red/black wires will be open, disabling the beeper. When the transaction is finished the contacts will close allowing the beeper to work as normal.

Fig 3:

****Note:** If you purchased your equipment prewired from the factory this step will not be necessary.

When power is properly applied to the CCDC, a red LED on the circuit board will be illuminated and slowly flashing and a green led will be on steady. The CCDC will be displaying "Credit Card Not Available"

F) Computer setup

****NOTE: You must have the following for the system to operate properly:**

- PC with Windows Vista Business Edition (32-bit), Windows XP Professional, 2000, or 2003
- 512 MB minimum of RAM, 1GB preferred
- 125MB of available hard-disk space, 1GB preferred
- A high speed Internet connection (strongly suggested) OR a Hayes compatible modem (capable of 56K or more) and an analog phone line(A dialup connection may take 60 seconds or longer to obtain an authorization.)
- CD-ROM drive
- 1.2GHz or higher processor
- Latest Microsoft service pack updates installed
- Merchant Account with a PCCharge-certified processor
- SSL updates if required
- Latest version of Microsoft's Internet Explorer (version 6 or later)
- Latest DotNet Framework updates

****NOTE: IT IS STRONGLY RECOMMENDED THAT ANY COMPUTER RELATED DEVICE BE PLUGGED INTO A HIGH QUALITY SURGE SURPPRESSOR OR UPS.**

Section 1: Hardware and software installation:

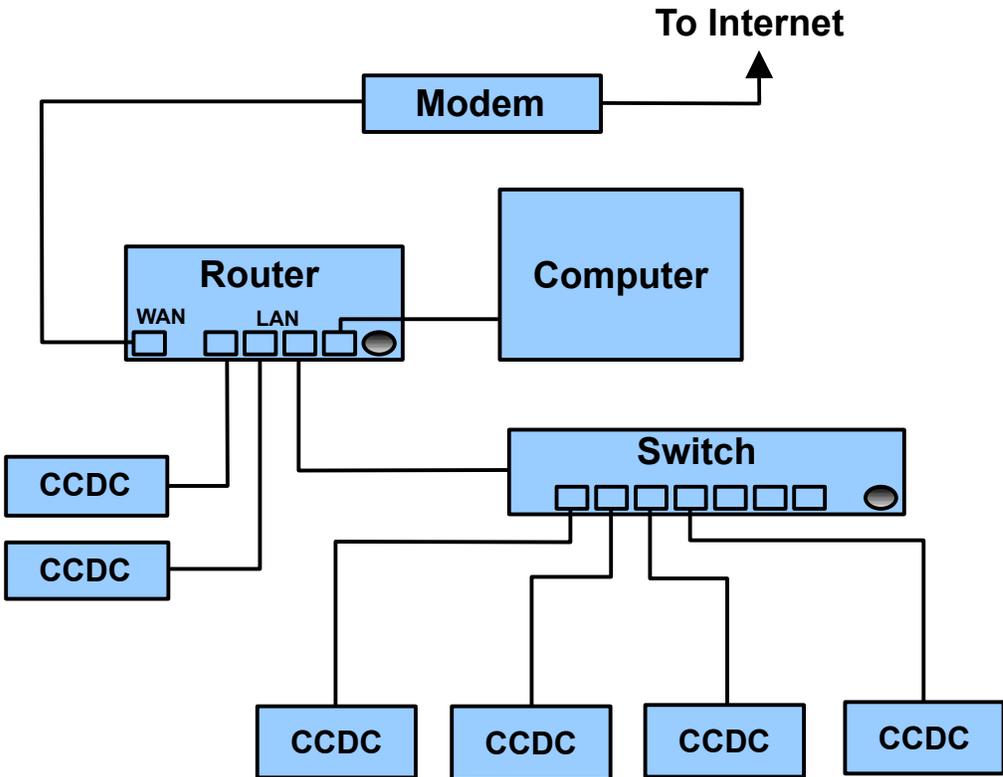
******NOTE: Due to the limitations of consumer grade Ethernet devices, for CAT5 cable runs in excess of 130 feet the installer/owner should consult with a computer networking professional for assistance in planning and/or installing the Ethernet network for the Liberator.**

If your Liberator will need to co-exist with other wash control systems, such as a PDQ Laserash, please refer to the diagram in Appendix D page 23.

Install your broadband router per manufacturer's instructions. You may need an active internet connection to initialize this device. ***This router must provide DHCP server function.***

Most broadband routers only come equipped with 4 available ports. If you will be connecting more than 3 CCDCs to this system you will need to use a Multiport Ethernet switch (not provided). The switch must be installed between the CCDCs and the router (Fig 4)

Figure 4

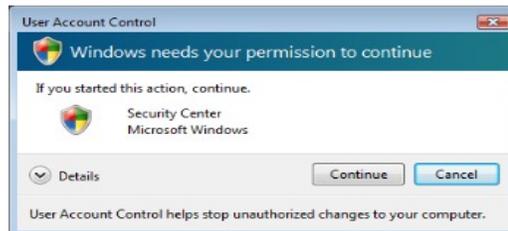


*NOTE: The router **must** provide the DHCP function
**NOTE: The switch is optional and only used in instances where you have more devices to connect than available ports on your router.

Install and configure your **PCCharge Payment Server** software per manual. **You *MUST* have your merchant service account established and active.** For a list of PCCharge licensed processors go to: <http://www.verifone.com/PDF/ActivationWorksheet.pdf>

NOTE: This software takes some time to load, both at install and when starting the program. Please be patient.

NOTE: During the installation you may be prompted by a window entitled “User Account Control”. This is a new Vista feature that helps to maintain the integrity of your operating system. If this window appears, select “Continue” and proceed with the installation process.



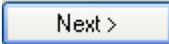
PCCharge Payment Server Setup Requirements:

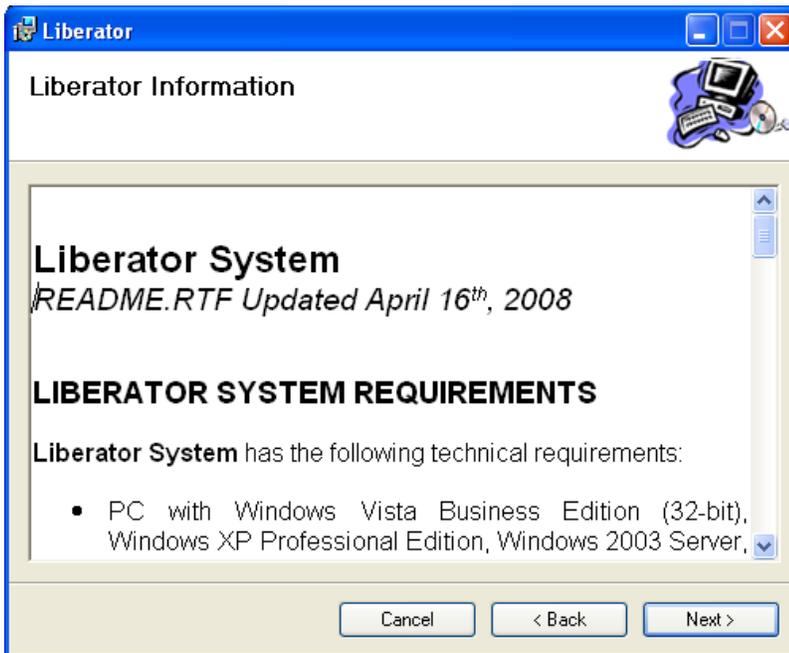
- Must be installed to the default directory
- Must be configured with **ONLY ONE** user
- Must be configured with **ONLY ONE** card processor
- Must be configured to “use default card processor” and Merchant ID

NOTE: For security reasons, GinSan Industries does not provide technical support for PCCharge software. For technical support please contact VeriFone at (877) 659-8981. For questions related to your merchant account and PCCharge software please contact your merchant service account provider.

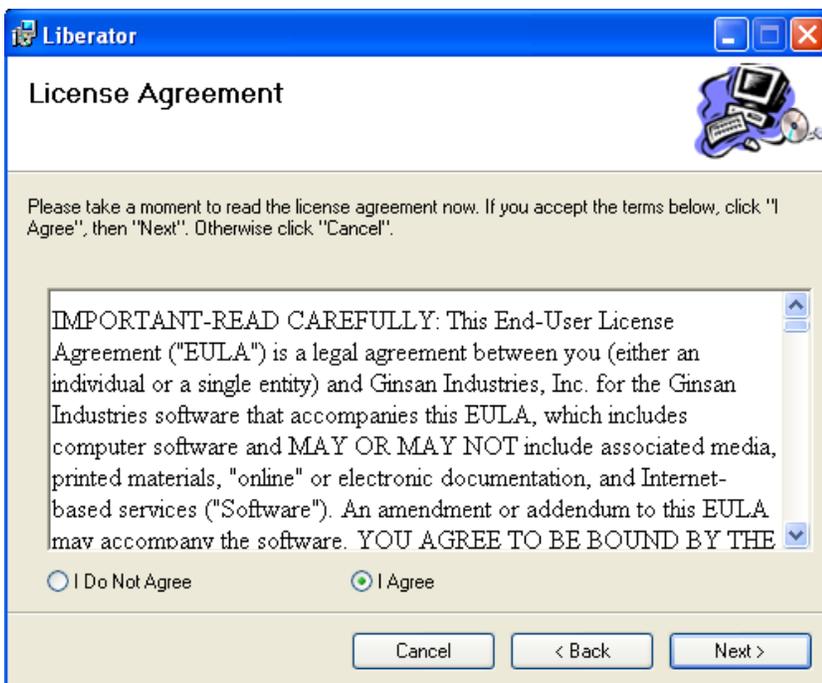
Place the CD labeled Liberator Control Software in your CD drive. The CD will autorun. If it does not, browse to your CD drive and double left click on the GinSanSetup.exe file. Follow the onscreen prompts.



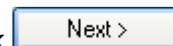
Click 

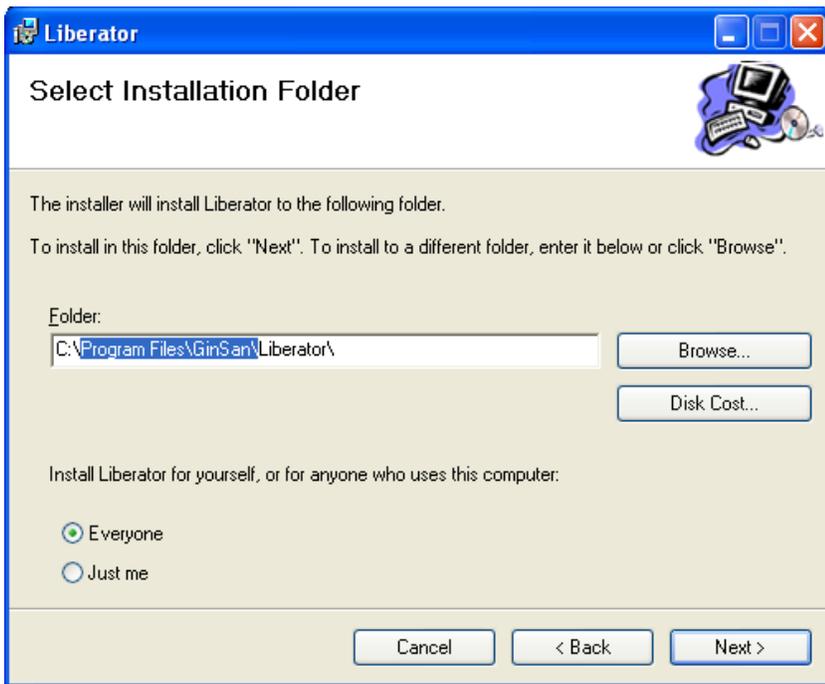


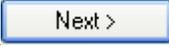
Please read carefully before clicking

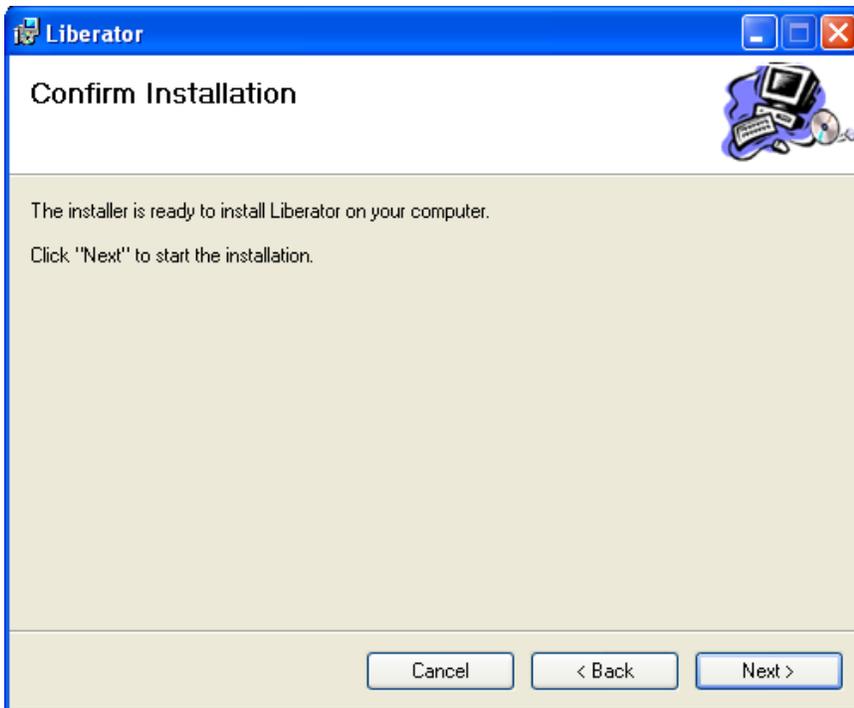


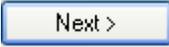
Please read the License Agreement, Choose I Agree , and then click

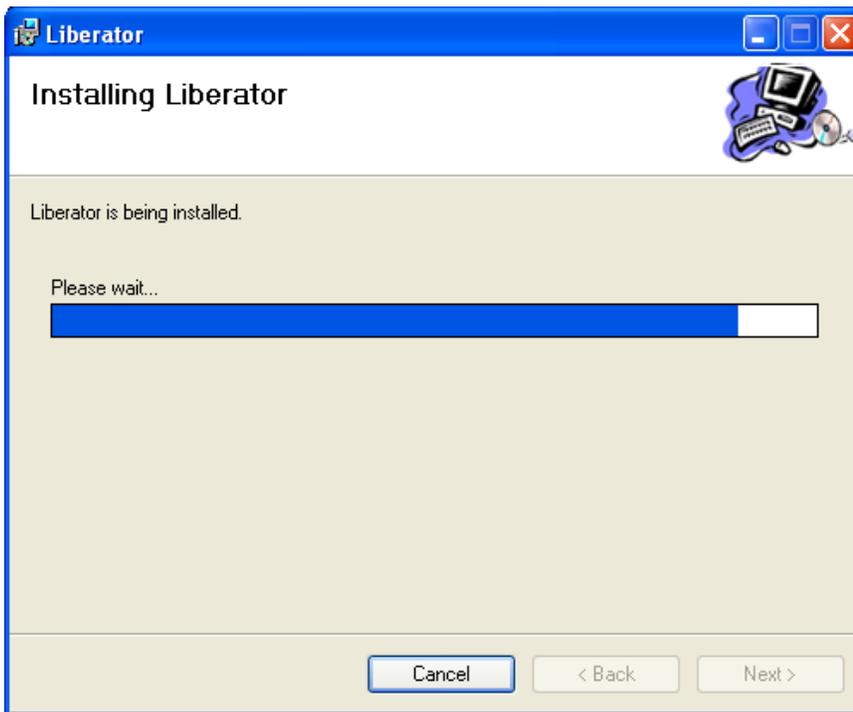




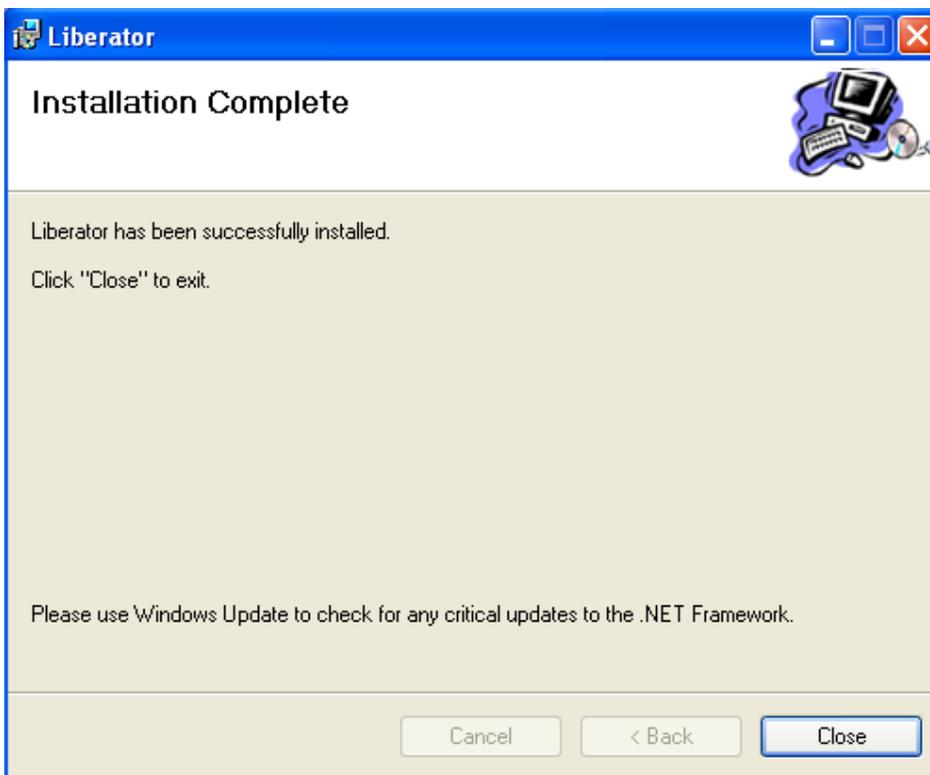
Highlight "Program Files\GinSan\" and delete. Click . This will ensure that the software is installed in the proper directory.

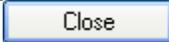


Click  to begin installation.



The software will now be installed.



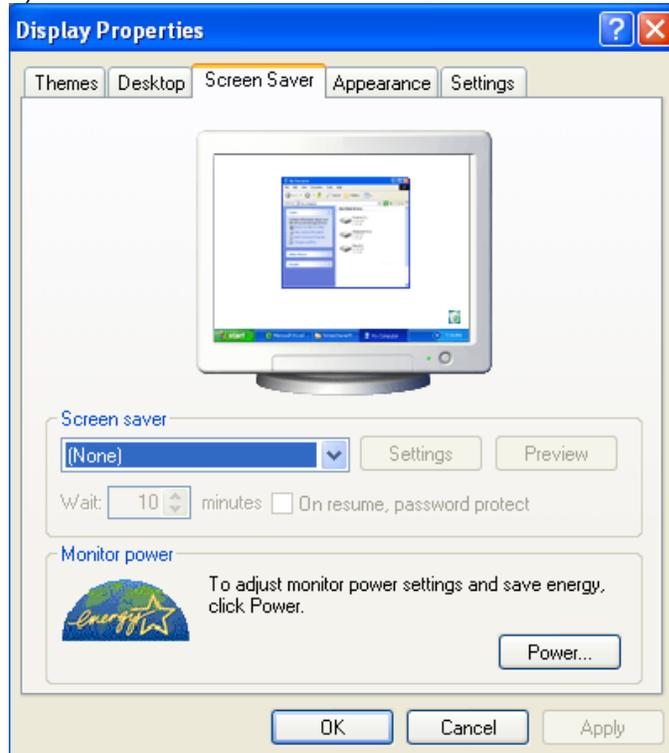
Click on  to end the installation session.

Section 2 Software setup and system operation

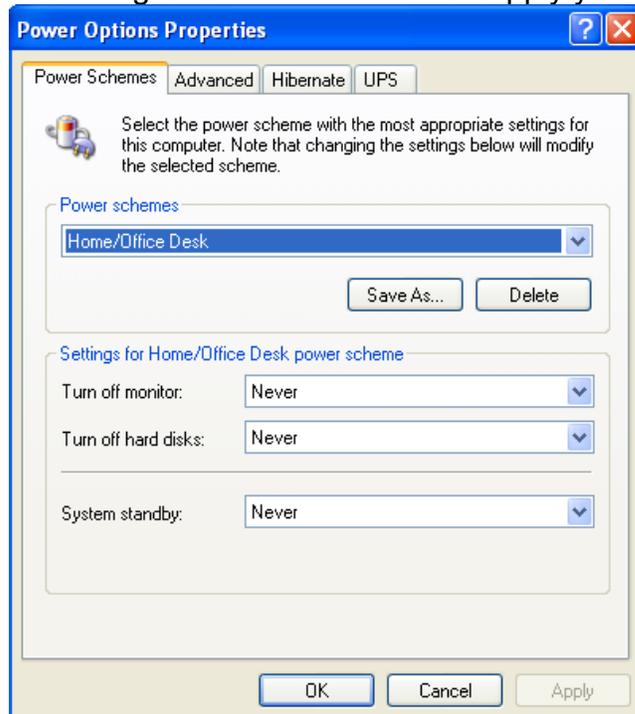
*****NOTE*** IT IS IMPORTANT THAT YOUR COMPUTER POWER MANAGEMENT PROPERTIES ARE SET SO THAT THE HARD DRIVE AND OPERATING SYSTEM ARE SET TO NEVER SHUT DOWN, HIBERNATE OR SLEEP.**

To access your power management settings in Windows XP or 2000:

- a) Right click on an open space on your desktop and choose "Properties"
- b) Click on the "Screen Saver" tab



- c) Click on  button on the lower right corner of the window and set all your settings to "Never". Be sure to apply your settings.



Click "Ok"



Double click on the Liberator software icon on your desktop:

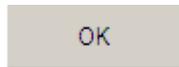
Create a master password. This must be 6 to 10 characters in length.

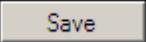
****Note:** Password is case sensitive. It is recommended that you document your passwords and keep them in a secure location. PCI Standards Compliance has specific requirements regarding passwords and software access. Review these requirements to ensure your compliance at:

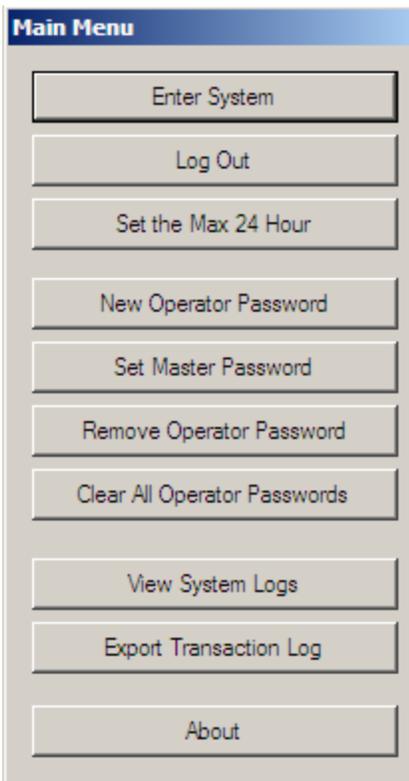
<https://www.pcisecuritystandards.org>

A dialog box titled "Enter Password" with a close button (X) in the top right corner. The text inside reads: "Create and Verify Master Password. 6 to 10 characters. Case Sensitive". Below this text are two text input fields: "Enter password" and "Verify password". At the bottom of the dialog are two buttons: "OK" and "Cancel".

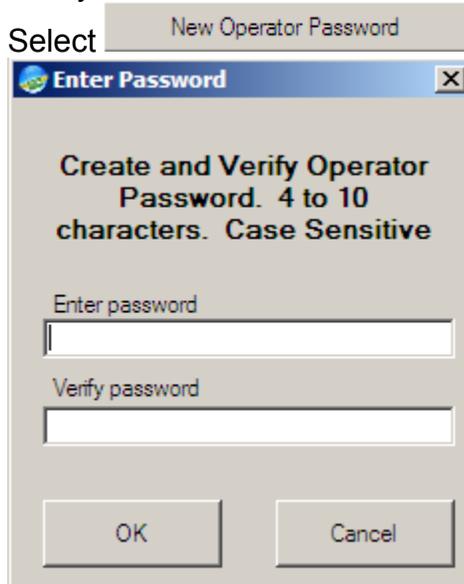
Re-enter password to confirm and select

A dialog box titled "Set the 24 hour Max Charge". The text inside reads: "Please enter the maximum charge amount for 24 hour time frame." Below this text is a text input field containing the value "\$50.00". At the bottom of the dialog is a button labeled "Save".

You will need to enter your "Maximum 24 hour Max Charge" This is the maximum that can be charged to one card over 24 hours. Click  when finished.



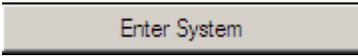
An operator password can be created to allow limited access to the system. An operator password will allow someone to view, but not change, settings. It will also not allow access to any reports. If you do not wish to set an operator password at this time, skip this section. If desired, once setup the Liberator software will operate without anyone being logged into the system.



Enter operator password. This must be 4 to 10 characters in length and is case sensitive.

Re-enter password to confirm. Select 

If you wish to create more operator passwords select 

If you wish to enter to the main system select 

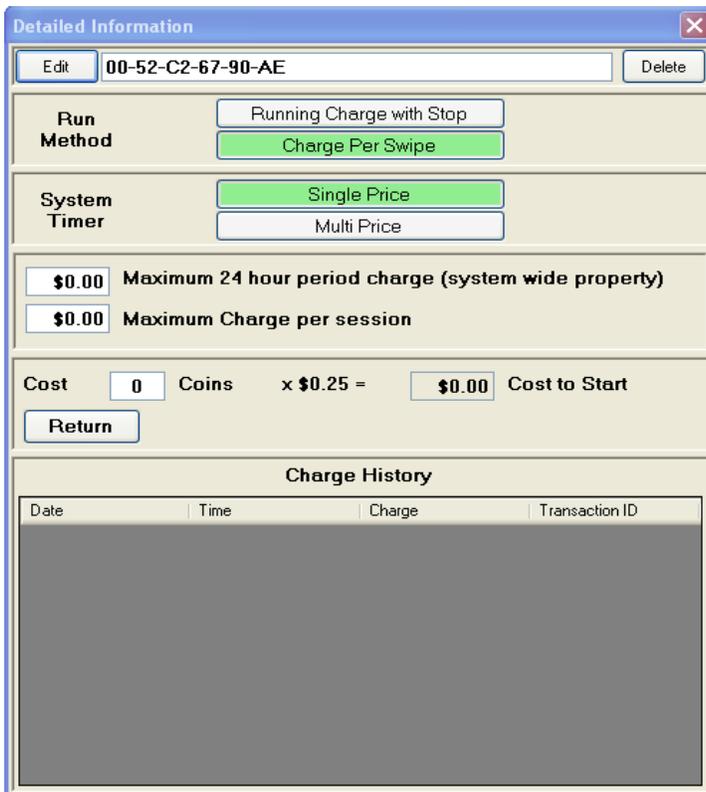
You are now able to start setting up your devices.

Plug in the cable from your first CCDC into the router (or switch if present)

The software should automatically recognize your device and display a box indicating such. This box will be yellow until your device is setup.



Now you need to define how the CCDC is going to operate. Select [Details](#)



Detailed Information

Edit Delete

Run Method

System Timer

Maximum 24 hour period charge (system wide property)

Maximum Charge per session

Cost Coins x \$0.25 = Cost to Start

Charge History

Date	Time	Charge	Transaction ID

Select [Edit](#) to label your device. The label is the location that the particular CCDC is installed (i.e. Bay 1, Vacuum 5, etc).

Next you need to decide how you want your system to charge customers. You have two options:

Running Charge with Stop

If you choose this option, when the customer swipes their card, the system will preauthorize the Maximum Charge per session and then pulse the timer the correct amount of pulses to start. The amount of coins and time per coin must match your timer**. As the time counts down and nears shutoff, the CCDC will continue to pulse the timer to keep it running until one of two actions occur: the customer selects the “End Transaction” button or the maximum running charge is reached.

**Note: In the event your Liberator credit card system is set up for running charge and you have customers using it for prolonged periods of time you may experience a timing tolerance issue where the timer times out before the Liberator gives the next pulse to keep going. If you are experiencing this problem the solution is very simple. Set the Liberator time cycle for 1 second less than the timer cycle. If the timer is set for 8 coins for 4 minutes, set the Liberator for 8 coins for 3 minutes 59 seconds.

The customer will still receive full value as the timer controls the bay or vacuum, not the CCDC

Charge Per Swipe

If you choose this option the customer will be charged a set price for each swipe of their card. For example, if the customer swipes their card the CCDC will charge the card \$5 for each swipe and pulse the timer 20 times. With this option, after the card is authorized, the customer will have 30 seconds to re-swipe their card one or more times to add additional time. This will be processed as one transaction.

Now you need to select how your system timer works.

Single Price

Used in most bays and standard vacuums. The customer needs to deposit a certain amount of money to start up the timer. Time is given on a per coin basis.

Multi price:

This option is used in combination vacuums and requires the use of a multi price timer.

After choosing how your bay or vacuum timer works, you need to define your pricing.

Running Charge with Stop :

Start up Charge – This is how much a customer would have to deposit to start your timer if they were using cash. You can set this to be higher but your time per coin **must** match the time per coin of your timer

Minutes to Start – This is how much time the customer would receive when starting the timer using cash. This can be set higher but your time per coin **must** match the time per coin of your timer.

Charge per minute – This is automatically calculated by the software.

Maximum charge per session – This is the maximum charge that can be applied to a card at one time. This is for those situations where a customer swipes their card, washes their vehicle, and forgets to push the “End Transaction” button when finished.

Running Charge with Stop (Multi price timer):

Select the first function.

Set your Start up Charge

Set your Minutes to Start

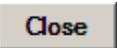
Repeat for each additional function

When finished, verify your selections

Charge per swipe:

If this is the option you choose, all you will need to enter is your charge per swipe.

****Note:** If you have your system set up as a “Charge per swipe” the customer will have a 30 second window to swipe their card to add more time and still have it count as one transaction.

When you complete the setup of your device, select 

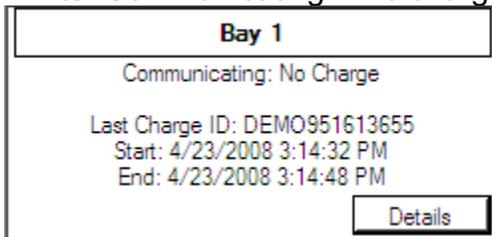
The function box will flash red signifying the settings have been transferred to the CCDC and the box will turn white.

Once the device is properly setup the CCDC will display “Please Swipe Card”

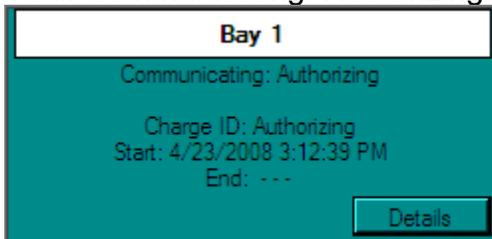
Repeat the above steps for each CCDC. **ONLY PLUG IN AND CONFIGURE ONE CCDC AT A TIME.**

When completed, each CCDC will be shown in its own block on the main screen of the interface software. These blocks will be have one of four backgrounds:

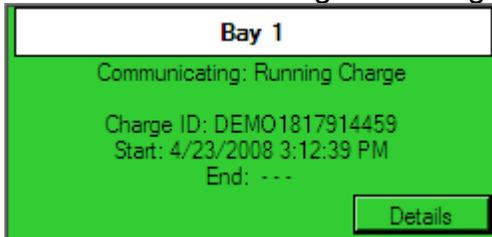
White: Communicating – No charge



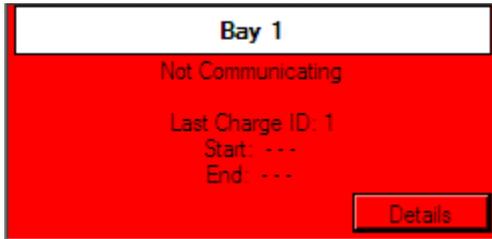
Teal: Communicating- Authorizing



Green: Communicating – Running Charge



Red: No Communication



If you wish to delete a device, click on the “Details” button for the selected device.

Disconnect the CCDC you wish to delete and select the  button:

You will receive a confirmation screen:



Select  to delete the device.

Section 3: CCDC Operation

While at idle the CCDC will display "Please Swipe Card"

When a customer swipes their card the CCDC will read the their name from the card and display a personalized greeting "Welcome John Smith"

The next thing the customer will see is "Authorizing". This is displayed for 2 seconds and then alternate with "One Moment"

If the card is authorized the CCDC will display "Authorized" for 2 seconds.

****Note:** If you have your system set up as a "Charge per swipe" the customer will have a 30 second window after the display reads "Authorized" to swipe their card to add more time and still have it count as one transaction. At the end of 30 seconds the CCDC will display "Final Charge \$XX.XX"

If the card is not read, for any reason, the CCDC will display "Card Read Error" for 1½ seconds and then return to displaying "Please Swipe Card"

If the card is not authorized, the CCDC will display "Authorization Failed".

After 2 seconds the CCDC will alternate every 1½ seconds between "Press Cancel to End" and "Accumulated charge, \$XX.XX".

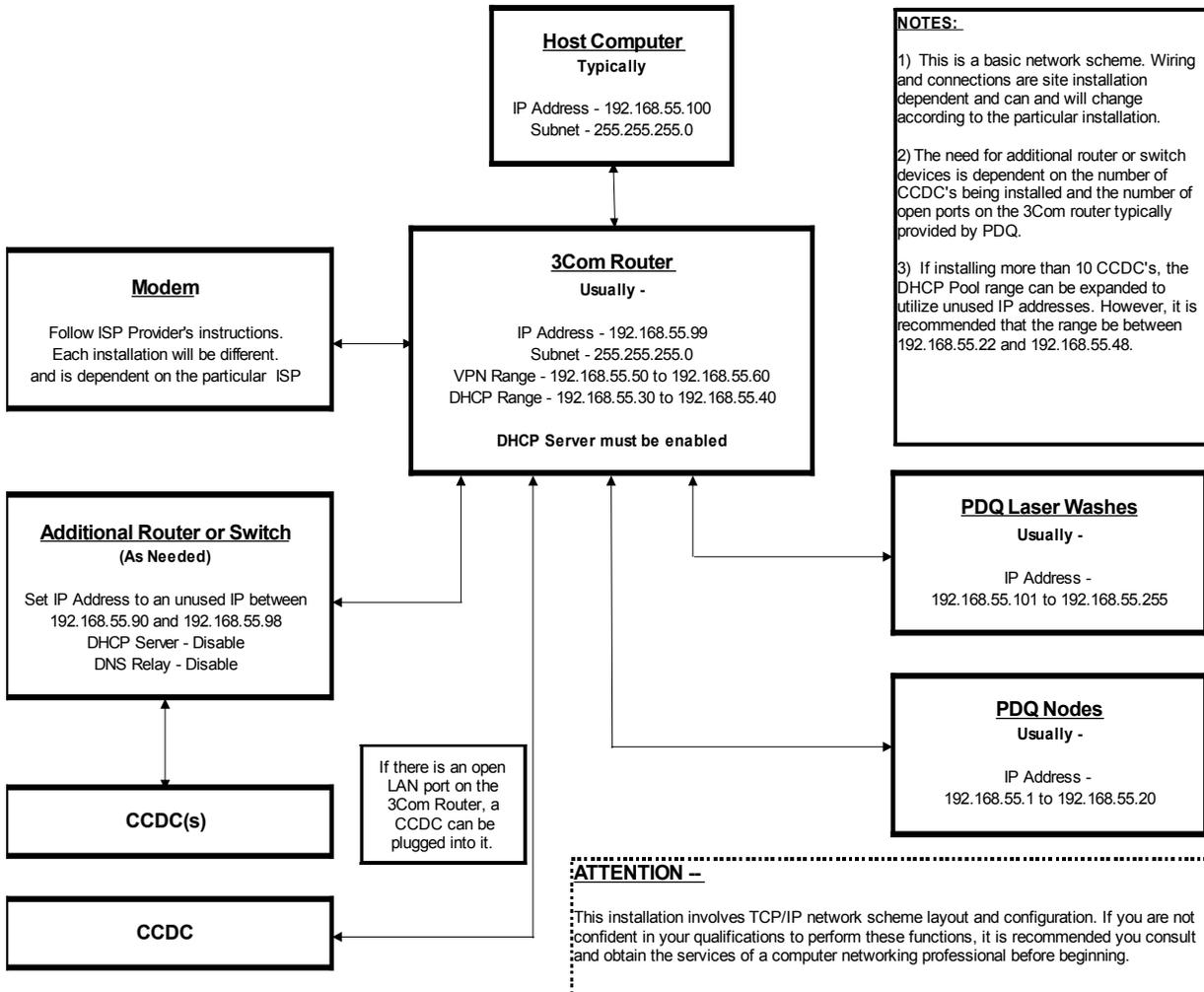
When the customer is finished and pushes the "End Transaction" button, the CCDC will display "Final Charge. \$XX.XX" for 5 seconds before returning to it's idle message of "Please Swipe Card".

Troubleshooting

Symptoms	Issue	Resolution
"Card Read Error"	The head on the reader is dirty	Clean head of reader – The manufacturer recommends that the reader be cleaned weekly using a card reader cleaning card or soft cloth with rubbing alcohol.
	Reader has failed	Contact GinSan Technical Support 1-800-446-7267
	Loose connections on 8 pin plug.	Contact GinSan Technical Support 1-800-446-7267
No Communication	Wiring is bad	Inspect and repair all connections on shielded CAT5 cable
	Make sure network is setup properly	See Fig 4
"Authorization Failed"	PCCharge Payment Server is not running	Start PCCharge Payment Server
	PCCharge cannot access internet	Check internet connection
	Bad credit card	Use different card
	24 hour maximum charge reached	Use different card or wait 24 hours
Bay shuts off and cc still running	Timing issue between CCDC and timer	Set your startup time to 1 or 2 seconds less than the start up time of your timer
Display blank	No power to CCDC	Check connections on red and purple wires. You should have 22- 30 VAC accross these two wires
	Display bad/damaged	Contact GinSan Technical Support 1-800-446-7267

Appendix D

Ginsan Liberator CCDC Network Layout With PDQ Laser Wash Equipment



Appendix E Installing Cat5

Cat 5 cable requires careful and precise installation to maximize efficiency and system performance. Anything that kinks the cable or disturbs the precise alignment of the wire pairs inside the cable has the potential to create future performance problems. The following installation practices can help minimize such problems.

Handle carefully. To avoid stressing conductors, limit pulling tension to 25 pounds or less as specified by the EIA/TIA-568-A standard. In addition, pull cables gradually and with constant tension, taking care not to crush or pinch bundles.

Be particularly careful when pulling cables around corners, watching out for nails and sharp edges that could damage the insulation.

When cable lubricant is used, read instructions to be sure it is compatible with the cable's jacket material (PVC or FEP).

Do not step on Cat 5 cable during installation.

Support carefully. If cable supports crush or compress Category 5 cable, the conductor pairs inside stand a good chance of being damaged. To avoid this:

Use plastic stand-off cable staples rather than metal cable staples or staple guns.

Apply cable ties loosely, with random spacing. Don't overtighten ties or install them at regular intervals.

Support horizontal cable bundles using broad supports like J-hooks or cable trays. Avoid using narrow "bridle rings" since they tend to crush the delicate cables.

Terminate carefully. Improper terminations are another leading cause of Category 5 performance problems. For proper termination, use the proper punch down tool for the connector involved-either 110 or 66 style-and untwist the wire pairs no more than 1/2 inch to avoid crosstalk (unwanted signals that appear in one wire pair as a result of inductive coupling from other pairs).

Remove as little of the outer cable jacket as possible; the rule of thumb is 3 inches.

Match wire color codes at all connector blocks, outlets, and other hardware.

More Tips:

Besides taking care with the cable, its supports, and termination procedures, following these do's and don'ts can help assure proper installation of Cat 5 cabling:

Do keep cable length from telecom closet to outlet (jack) to within 295 feet (90 meters).

Don't splice or repair damaged cables between the telecom closet and outlet locations. Instead, pull a new cable if there's a problem. To minimize induced interference, don't allow Category 5 cables to cross power cables at right angles. Likewise, don't run telecommunications cabling in the same conduit or through the same metal stud opening as power wiring.

Do follow the grounding and bonding requirements established by the Electrical Code, TIA standard 607, and equipment manufacturer specifications. Proper grounding and bonding not only protects personnel and equipment from hazardous voltages, but also reduce the effects of electromagnetic interference (EMI) to and from the telecommunications network.

Don't lay data cables directly across ceiling tiles, grids, or fixtures. Use cable tray or other methods to support the cables and keep them at least 6 inches away from fluorescent or HID light fixtures.

Don't bend Category 5 cable more tightly than eight times the cable diameter (a 2-inch bend radius).

Do keep installations as neat as possible and document connections carefully. This pays off later by simplifying system administration and maintenance.