

CarNetix

CarNetix PSU-PC19 DC-DC Power Supply

Installation and Operation of the PSU-PC19 with the Xenarc SC8

Version 1.0

(applies to Version 2.0+ hardware)

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CarNetix full warranty and return policies are stated in Section 5 at the end of this document.

1.0 PSU-PC19 Introduction

NOTE: This manual and feature set apply to Rev 2.0 and above of the printed circuit board (PCB). The PCB revision number is printed on the top of the PCB in white lettering. Please make sure you are using the correct manual for the correct product revision.

1.1 Introduction

The PSU-PC19 is a 140 watt intelligent DC-DC power regulator designed to provide safe, reliable power to the Xenarc SC8.



Figure 1 CarNetix PSU-PC19

The PSU-PC19 provides two outputs. The primary output is jumper selectable for 18V, 19V, or 20V operation and can provide up to 6.32 amps (125 Watts @ 20V). The secondary output is jumper selectable to provide either +12V to power your Xenarc LCD screen, or +5V to power USB devices (such as the Audigy 2NX sound USB sound card or USB powered hubs) with up to 3 amps (15

Watts). The PSU-PC19 can accept battery input as low as 7 volts under full load (140 watts) during cranking while providing a well-regulated output so that your Xenarc SC8 not crash.

A third output can be added to the PSU-PC19 by installing the optional CNX-P5V regulator. This will allow the PSU-PC19 to power your Xenarc SC8 (Primary Output), your Xenarc LCD screen (+12V Secondary Output), and your USB devices (+5V from the P5V) simultaneously!

The PSU-PC19 includes all of the sophisticated features of its predecessors (P1260 and P1280/90) such as Startup/Shutdown controller, Pulse Start (remotely start the PSU-PC19 with door locks, car alarm, or wireless device), and DelayON (prevents speaker "thump" during booting). The PSU-PC19 fully and safely supports "Standby" mode and will automatically shut itself down (by detecting excess current drain) if the Xenarc SC8 fails to properly go into Standby mode.

The PSU-PC19 includes a power cable kit for "plug and play" installation with the Xenarc SC8 computer. This simplifies the installation and provides a safe, reliable connection for your Xenarc SC8.

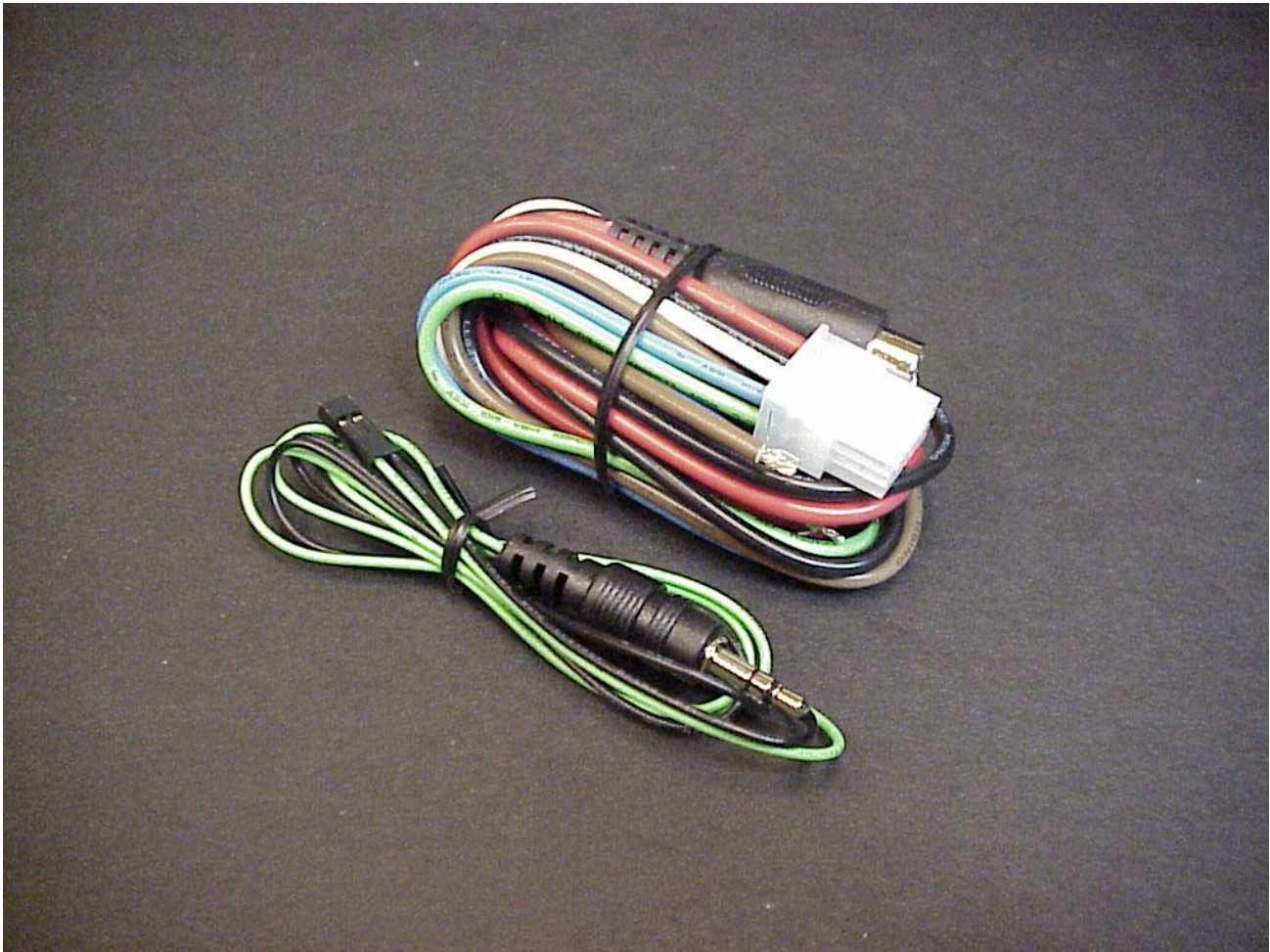


Figure 2 PSU-PC19 Power Cable Kit

PSU-PC19 V2.0 Features

- 140 Watt Dual Output Regulator
- Jumper selectable main output of +18/+19/+20V
- Jumper selectable secondary output of +12V/+13.5V or +5V
- **A THIRD output of +5V/15W can be added by installing the optional P5V regulator.**
- Survives Engine Cranking under full load over entire temperature range
- Includes sophisticated Startup/Shutdown Controller
- Includes sturdy aluminum chassis with variable speed fan suitable for car environment
- Field upgradeable flash microprocessor
- Low battery monitor prevents drained battery, even during Standby
- **“Deadman Timer” automatically exits Standby and turns the unit off after 3 days if jumper is set.**
- "Anti Thump" delayed remote control for audio amplifiers
- Remote "Pulse Start" from wireless device or car alarm/remote start system
- Over current protection on both outputs with graceful forced shutdown of main output
- Powers both your Xenarc SC8 AND your Xenarc LCD screen or USB devices
- Full, safe support for Windows Standby mode including auto shutdown if PC fails to shutdown
- Over voltage surge suppression on battery input for protection of harsh automotive environment
- User replaceable fuse on battery input to protect your car from internal short circuits
- **Now includes an internal ACPI isolation relay to provide full compatibility with the ACPI/power switch interfaces with Xenarc PCs. No need for an external relay!**
- **Now includes “plug and play” cable (CNX-CA-XSC8) for connecting power and ACPI (power button) to Xenarc SC8.**

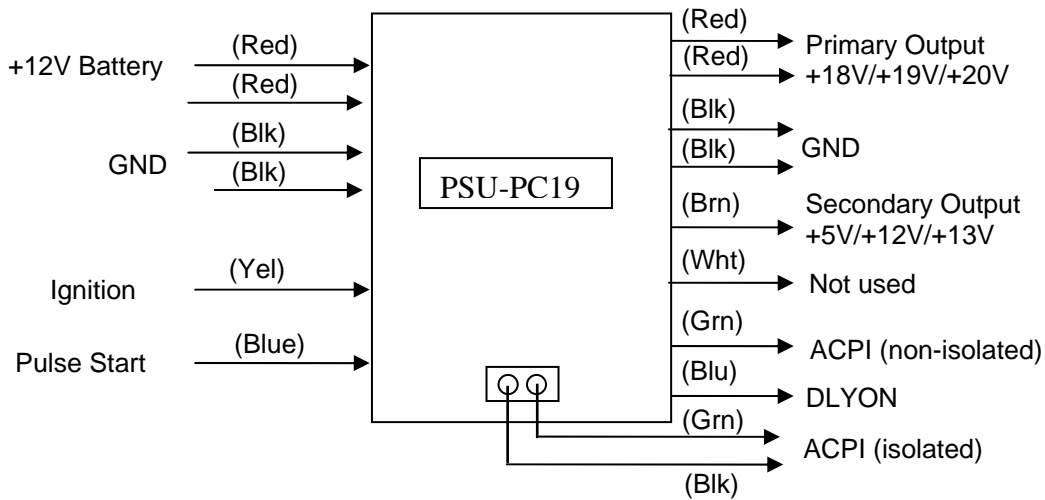


Figure 3 PSU-PC19 Block Diagram

1.2 Primary Output Power

The PSU-PC19 Primary Output can provide +18V, +19V, or +20V (note: these voltages have actually been designed to be about .5V higher to overcome wiring losses in a typical installation) via jumper selections on the PCB. The total current available on the primary output is 6.32 amps (120 watts at +20 Volts). *The primary output of +19V is used to power your Xenarc SC8*

1.3 Secondary Power Output

The PSU-PC19 also provides a Secondary Output of either +5V, +12V or +13V via jumper selections. The total current available on the Secondary Output is 3 amps at +5 Volts, or about 1.3 amps at +12V (15 watts total). If you exceed the current or power limit of the secondary output it will automatically shut down to protect itself from damage.

Note: a third output of +5V @ 3 amps (15 watts) can now be added to the PSU-PC19 by installing the optional CNX-P5V regulator. This will allow the PSU-PC19 to simultaneously power your Xenarc SC8, Xenarc LCD screen, and USB devices. Download the CNX-P5V Installation Manual from our website for instructions and details.

Using the Secondary Output for +5V devices

The +5V selection is typically used to power USB devices such as external USB sound cards (ie Audigy 2NX) or powered USB hubs. The +5V output can provide up to 3 Amps. When jumpered for +5V operation, the secondary output does not de-rate the total power available on the primary output (see +12V Secondary Output below).

Using the Secondary Output for +12V devices

When the secondary output is jumpered for either +12V or +13V operation it derives its input from the primary (+19V) output. Since the total power available from the primary output is 120 Watts, when using the +12V/+13V secondary option, the primary output must be de-rated by current consumed by the secondary output.

The secondary output can be jumpered to provide +12V at up to 1.3Amps for powering your Xenarc LCD screen or other low powered +12V devices. However, since the Xenarc LCD screens come with a cigarette lighter adapter using the secondary output to power the screen is optional.

1.4 Startup/Shutdown Controller (SSC) Overview

The PSU-PC19 contains a sophisticated, PIC microprocessor-based Startup/Shutdown Controller (SSC). Its main job is to automatically start and stop your Xenarc SC8 when you turn ON or OFF your ignition switch. However, it is also designed to help prevent HDD (hard disk drive) problems by inadvertently removing power while your Xenarc SC8 is accessing the drive. The timing of the bootup and shutdown signals are carefully designed to help prevent unwanted booting or shutdown if the user turns ON or OFF the ignition while the Xenarc SC8 is already in the process of booting or shutting down. Once the Xenarc SC8 begins its bootup or shutdown process, the SSC enters a “bootup lockout” state that prevents the user from attempting to reverse this process until it has completed.

In addition, the SSC provides control and monitoring to allow the Xenarc SC8 to safely enter “Hibernation” or “Standby Mode”. These modes are selected jumpers on the PSU-PC19 and are described in more detail in Section 3.

The SSC also contains a battery monitor which will shut the PSU-PC19 down in the event the battery voltage drops below approximately 10.6 volts. This will help prevent deep discharge and damage to your battery.

The SSC has a “Pulse Start” input that allows you to start the PSU-PC19 by using an externally applied “pulse” from a device such as your car alarm, remote starter, or wireless device.

The various operating states of the SSC are described in more detail in Section 7 of this manual.

2.0 Installing the PSU-PC19

The following section is a summary of the installation of the PSU-PC19 and Xenarc SC8 computer.

2.1 Before You Begin

Before you begin the installation, make sure you take the time to read through these instructions. The PSU-PC19 is a sophisticated, microprocessor-based device. Please read these instructions carefully and contact us either in our Support Forum (www.carnetix.com/forum) or via email (support@carnetix.com) if you have any questions or problems.

It is assumed that you have a basic to advanced understanding of electronics. It would be helpful, and is highly recommended (especially if you plan to get much further involved in CarPCs) that you purchase, as a minimum, a simple VOM (volt-ohm meter) or DMM (Digital Multi-Meter). These devices are inexpensive (starting around \$20) and will save you and me a great deal of time. They can be purchase over the web or at your local retail electronics store (Radio Shack, Home Depot, some hardware stores, some auto parts stores).

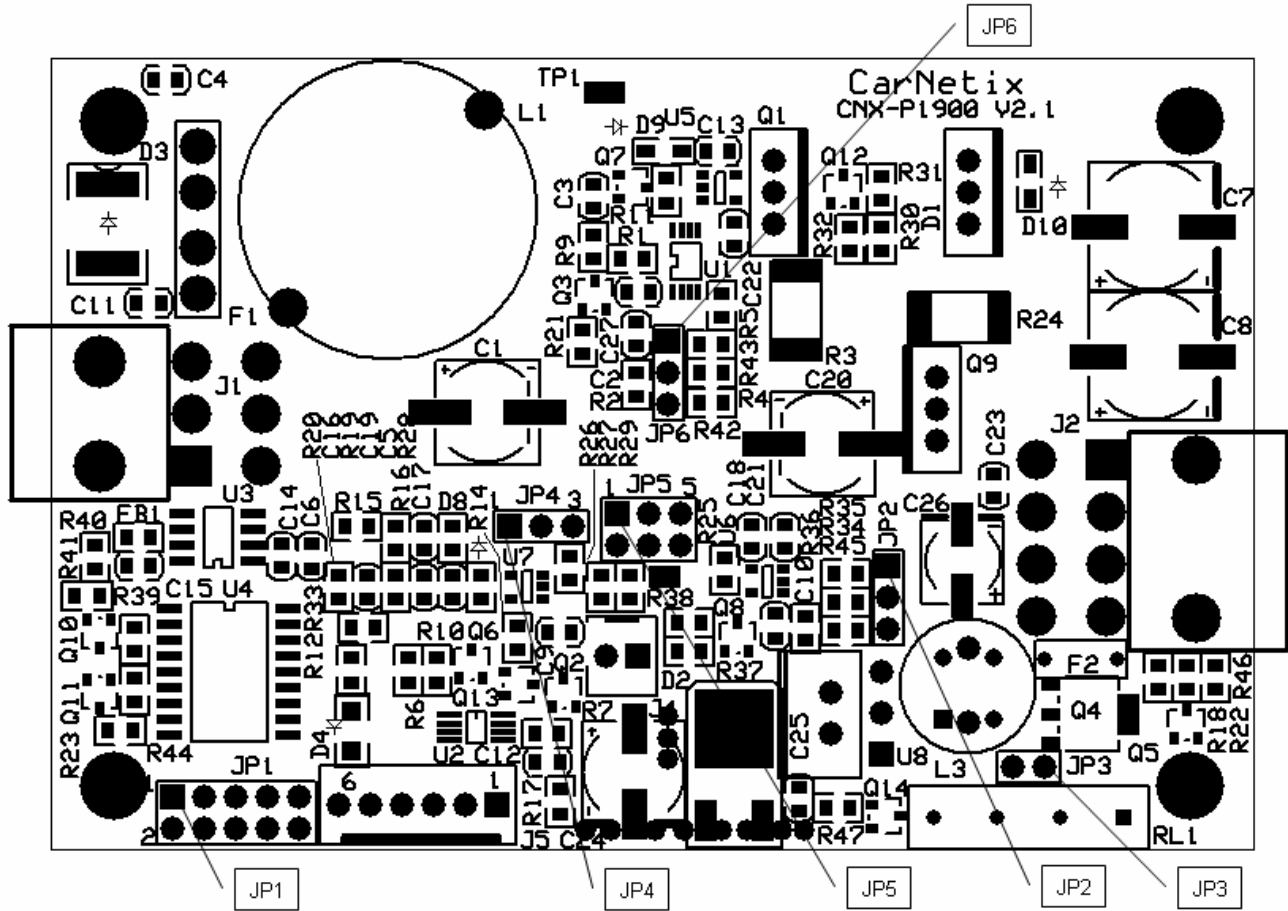
Installation of the PSU-PC19 consists of :

- Setting the Jumpers
- Connecting the Wires.

2.2 Setting the Jumpers

It is very important to set the jumpers before applying power to the PSU-PC19. The location and function of the jumpers is presented below. More detail on the specific operation of each jumper selectable function appears later paragraphs.

Jumper	Functions
JP1	Pulse Start Input
	Deadman Timer
	Hibernate/Standby
	Shutdown Delay Time
JP2	+5V/+12V/+13V Select
JP3	ACPI Relay Output
JP4	Secondary Output Control
JP5	Secondary Output Source
JP6	+18V/+19V/+20V Select



2.2.1 Setting JP1 Jumpers

Below is a table with the jumper selectable options that appear on JP1. To move a jumper from its factory default position (open), use a pair of tweezers or needle nose pliers. Be careful to place the jumper in the correct position or erratic behavior could result. Double-check your settings before replacing the lid.

	Pins				
	1-2	3-4	5-6	7-8	9-10
Function	Pulse Start Input	Deadman Timer	Hibernate/ Standby	Not Used	Shutdown Delay Time
Open (default)	Connect to external contact closure	Deadman Timer Disabled	Hibernate	Not Used	6 Seconds
Jumpered	Connect to external contact closure	Deadman Timer Enabled	Standby	Not Used	15 minutes

Table 1 JP1 Settings

3.1.1.1 Pulse Start – See section 4.0

3.1.1.2 – Deadman Timer

When enabled, the Deadman Timer will automatically exit Standby mode after 3 days (72 hours) and shut down the Primary Output power. This feature will allow you to use Standby without worrying about leaving your car in Standby for extended periods of time and draining your battery. When the Deadman Timer is disabled the PSU-PC19 remains in Standby until: 1) the ignition is turned ON, 2) the low battery fault voltage (10.6V) is reached, or 3) an overcurrent condition exists. In the latter two cases the PSU-PC19 exits the Standby mode automatically.

3.1.1.3 Hibernate/Standby – this jumper allows you to select either the Hibernate or Standby mode for the PSU-PC19 after the ignition is turned off.

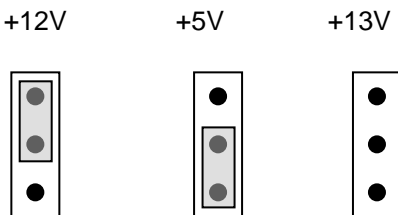
If Hibernate is selected the PSU-PC19 cuts all output power after the Shutdown Delay and Shutdown Sequence have expired. This mode is used when you have set your PC to enter hibernation via your BIOS settings.

If Standby is selected the PSU-PC19 will continue to provide output power on the Primary and Secondary outputs after the Shutdown Delay and Shutdown Sequences have expired. This state is used when your Xenarc SC8 is set to go into Standby when its ACPI (“power button”) is pressed. This state is designed to provide a low level of power to the Xenarc SC8 to maintain the system state in RAM. If the power demanded by the Xenarc SC8 during this time exceeds approximately 1 amp the PSU-PC19 will automatically shut down to prevent damage. Also, while in standby, the PSU-PC19 continues to monitor the battery voltage. If the battery voltage drops below approximately 10.6 volts, the PSU-PC19 will automatically shut itself down.

3.1.1.4 Shutdown Delay – this is the delay between the time you turn off your ignition and when the SSC begins the Shutdown Sequence. It is jumper selectable for either 6 seconds (default) or 15 minutes.

2.2.2 Setting JP2 (Secondary Output Voltage)

JP2 allows you to select the output voltage that appears on the Secondary Power Output (J2 Pin 1). If you choose to set the Secondary Output to +12V you need to make sure JP5 is set to the correct position (see section 3.2.5).



2.2.3 Using JP3 ACPI Relay Output

JP3 is the output of the ACPI relay. These are “dry contacts” and act as a short circuit to produce the ACPI pulse for starting (booting) your Xenarc SC8. These contacts simulate the power switch on the chassis of your Xenarc SC8. When connecting to JP3 polarity does not matter since the relay acts as a simple short circuit. This means that you can connect the GRN wire or BLK wire to either pin.

2.2.4 Setting JP4 (Secondary Output Control)

The JP4 jumper gives you the flexibility to use the Secondary Output in different ways depending upon your CarPC system configuration. The Secondary Output can be turned ON or OFF based on two different control signals: 1) DLYON or, 2) the signal that controls the Primary Output (PRI OUT).

- **DLYON**

Jumpering DLYON will turn your Secondary Output ON or OFF with the DLYON signal. This means that your Secondary Output will come on 3 seconds after your Primary Output comes ON, and will go OFF when your ignition is turned OFF.

If you use the Secondary Output to power your screen (+12V) and want your screen to turn on and off with your CarPC’s main power, then select DLYON to control your Secondary Output.

- **PRI OUT**

Jumpering PRI OUT will make the Secondary Output follow the control used to turn ON and OFF the Primary Output. Thus, when the Primary Output is ON, the Secondary Output will also be ON. If the Primary Output is OFF, the Secondary Output will be OFF.

This setting is affected by the jumper setting of the Shutdown Delay AND Hibernate/Standby jumpers on JP1 as described in the next sections.

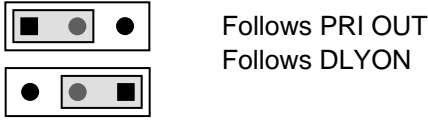
Shutdown Delay Effects on JP4

If you have set the Shutdown Delay jumper to the default position (6 seconds), both the Primary and Secondary Outputs will be turned OFF 6 seconds after the Ignition is turned OFF. If you have set the Shutdown Delay jumper for 15 minutes, both the Primary and Secondary Outputs will remain ON for 15 minutes after the Ignition is turned off. This setting is useful for keeping certain USB devices powered during the Shutdown Delay time. For example, if you use the Secondary Output to power your USB WiFi card and you want to keep your WiFi card powered during the Shutdown Delay time to transfer files, then set the jumper JP4 for PRI OUT.

Hibernate/Standby Effects on JP4

If you have the Hibernate/Standby jumper (JP1 Pins 5-6) set to Standby, the primary output is never turned off (see Standby section). If you also have JP4 jumpered to follow the Primary Output, the Secondary Output will also NOT be turned off when the unit goes into Standby mode. (ie Ignition is turned off). Hence any devices connected to the Secondary Output will remain powered in Standby.

You should be very careful not to drain your battery when using Standby. It is highly advised that, if you are using Standby, that you jumper your Secondary Output to follow DLYON.

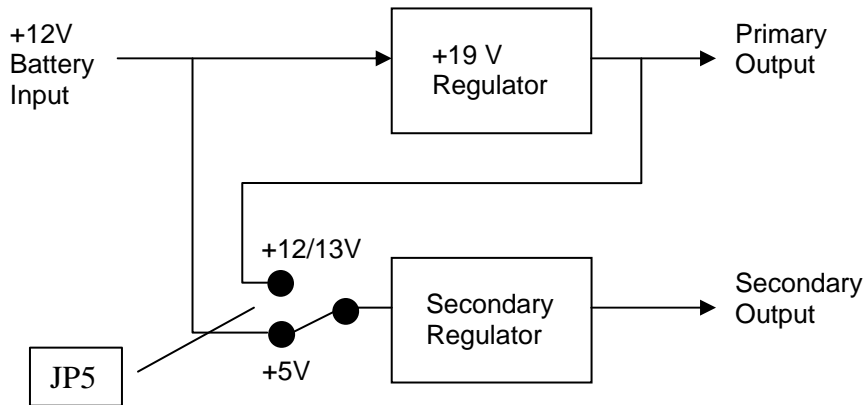


2.2.5 Setting JP5 (Secondary Power Input Select)

**** WARNING ****

IT IS EXTREMELY IMPORTANT TO MOVE BOTH JP5 JUMPERS TOGETHER WHEN SETTING JP5. IF YOU MOVE ONE JUMPER AND NOT THE OTHER, YOU WILL DAMAGE YOUR PRIMARY OUTPUT REGULATOR!!!

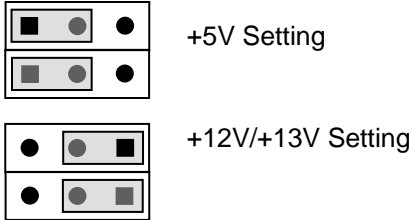
JP5 controls which power input is applied to the Secondary Output regulator. Below is a simple diagram which illustrates the concept.



The following rules apply to this jumper setting:

- 1) If you have set JP2 (Secondary Output Voltage) to +5V, you MUST set JP5 to the “+5V Setting” which routes the +12V battery input to the Secondary Output regulator.
- 2) If you have set JP2 (Secondary Output Voltage) to +12V or +13V, you MUST set JP5 to the “+12V/+13V Setting”. This will route the output of the Primary Output (+19V) to the input of the Secondary Output regulator.

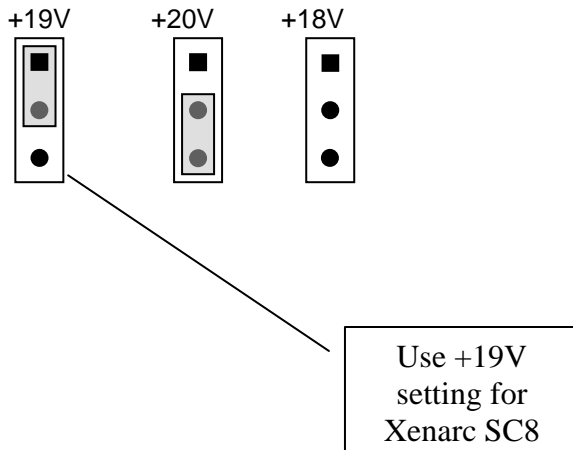
Again, it is very important that you move BOTH jumpers on JP5 together or you will damage your Primary Output regulator!



2.2.6 Setting JP6 (Primary Output Voltage Selection)

JP6 allows you to select the output voltage that appears on the Primary Output (J2 Pin 4). The selections are +18V, +19V, or +20V as shown below. Note: the actual voltage is set approximately .5 Volts higher to compensate for any wiring losses you may have in your installation.

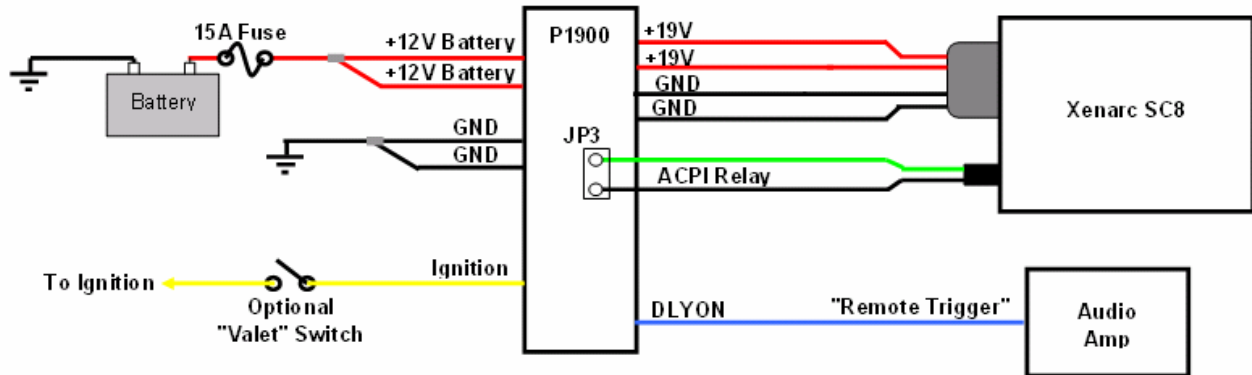
This jumper should be set for +19V operation for the Xenarc SC8.



2.3 Connecting the Wiring

After you have set the jumpers for the options and performance of the PSU-PC19 you can connect the input and output wiring. The steps outline below should be followed to insure proper operation of the PSU-PC19 and Xenarc SC8.

Xenarc SC8/CarNetix PSU-PC19 Connection Diagram



Step 1 – Connect the input power and ignition to the PSU-PC19.

Use heavy gauge wire directly connected to the battery (via 15A fuse and distribution block). 4-8 GA wire is recommended if the SC8 runs a 2-3GHz processor. 8-10 GA wire is recommended for lower speed processors. Using wire that is too small will cause the SC8 to not survive engine cranking. Connect the battery wire to BOTH red input wires on J1 (pins 3 & 6).

Step 2 – Connect Ground to the PSU-PC19.

We recommend that you either run another wire directly to the battery, or connect directly to the car chassis for grounding the PSU-PC19. If you run a wire to the battery, make sure it is that same size as your +12V battery wire used in step 1. If you run a ground wire to the car's chassis, make sure to find a secure ground that is not corroded or painted and use the same size wire as your +12V battery wire used in step 1.

Step 3 – Install optional Valet Switch.

A simple SPST switch installed in series with the ignition wire will allow you to manually disable the PSU-PC19 so that it does not come on when the ignition is turned on. This is optional and for convenience only

Step 4 – Connect the CNX-CA-XSC8 power cable kit

The CNX-CA-XSC8 power cable kit contains two pieces. The main power cable should be inserted into the PSU-PC19 J2 connector (white 8-pin Molex connector). The green & black “ACPI” (power button) cable should be attached to JP3 inside the PSU-PC19. You must remove the lid of the PSU-PC19 to get access to JP3. Below is a diagram of the PSU-PC19 PCB showing the location of the JP3 jumper header. Replace the lid after you have attached the connection.

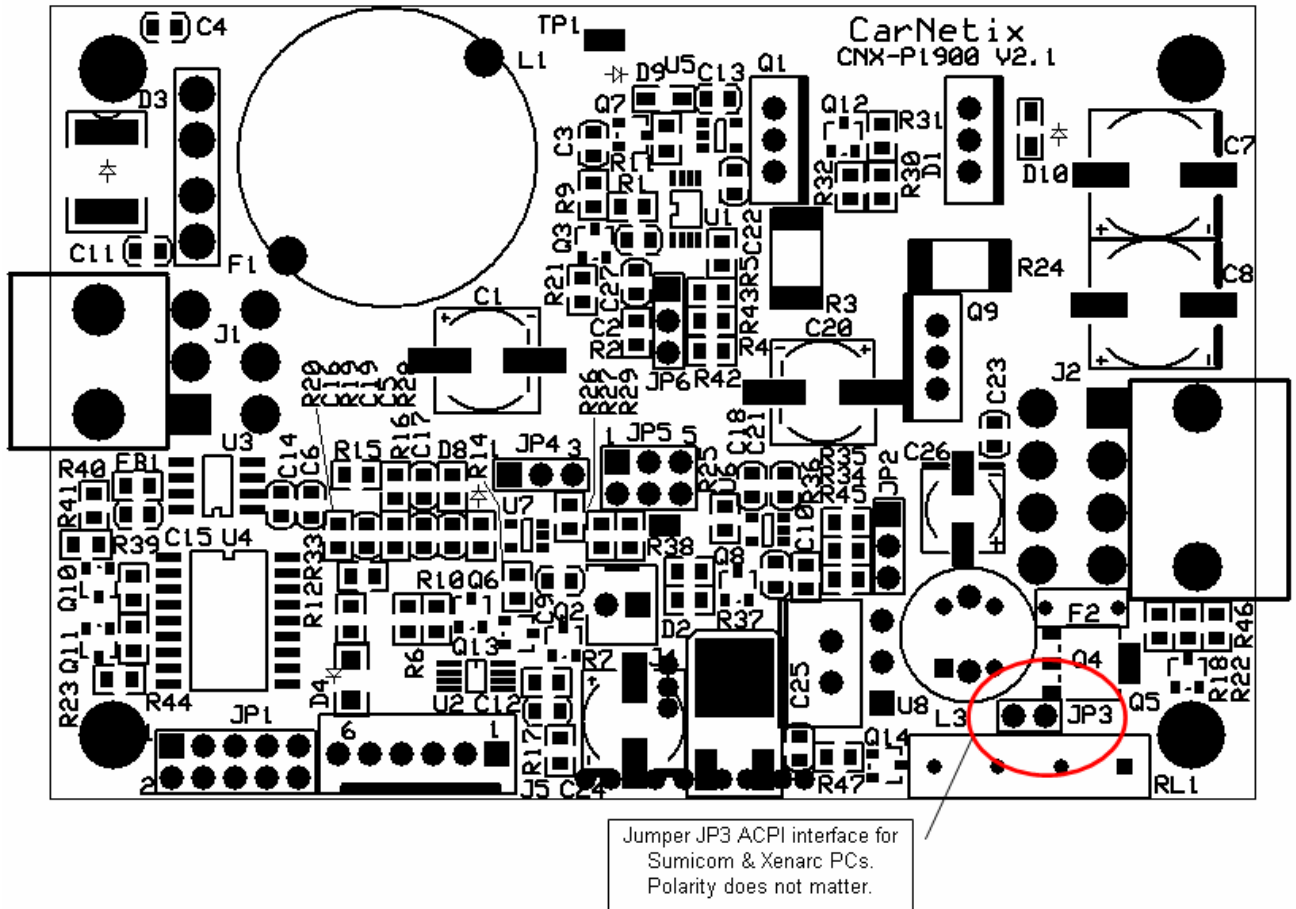
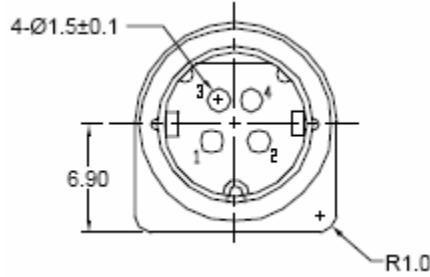


Figure 4 ACPI Relay Jumper JP3

Step 5 – Test the PSU-PC19 before connecting the Xenarc SC8

It is recommended that you test the output of the PSU-PC19 before proceeding to the next steps. Turn on the ignition and measure the voltage on the power connector pins 1 & 2 as shown in the diagram below. The voltage should read approximately +19.4 volts.



<i>Pin</i>	<i>Wire Color</i>	<i>Function</i>
1	RED	+19V
2	WHITE	+19V
3	BLACK	GND
4	YELLOW	GND

Step 6 – Connect the CNX-CA-XSC8 power cable to the Xenarc SC8

Insert both the power connector and the ACPI connector into the SC8 as shown in the diagram below.

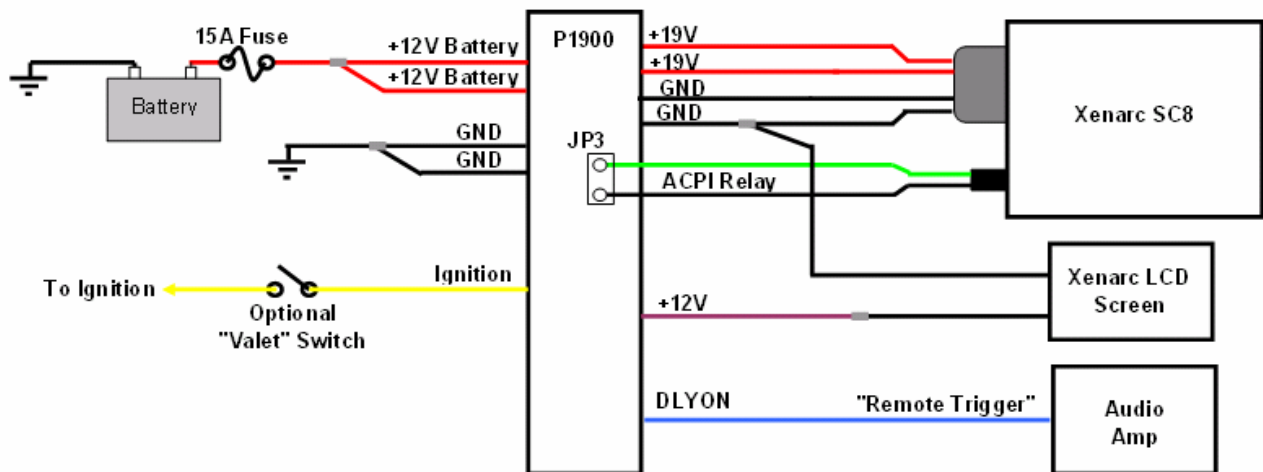


Figure 5 Xenarc SC8/PSU-PC19 connections

2.4 Optionally Connecting the Xenarc LCD Screen

The Xenarc LCD screen comes from the manufacturer with a cigarette lighter power adapter so that it can be powered separately from the PSU-PC19. However, you can optionally use the secondary output of the PSU-PC19 to provide +12V regulated power to the Xenarc LCD screen. Below are the steps you should follow if you choose to do this. These steps assume that you have already installed the PSU-PC19/Xenarc SC8 using the power cable kit outlined in the previous section.

Xenarc SC8/CarNetix PSU-PC19 Connection Diagram



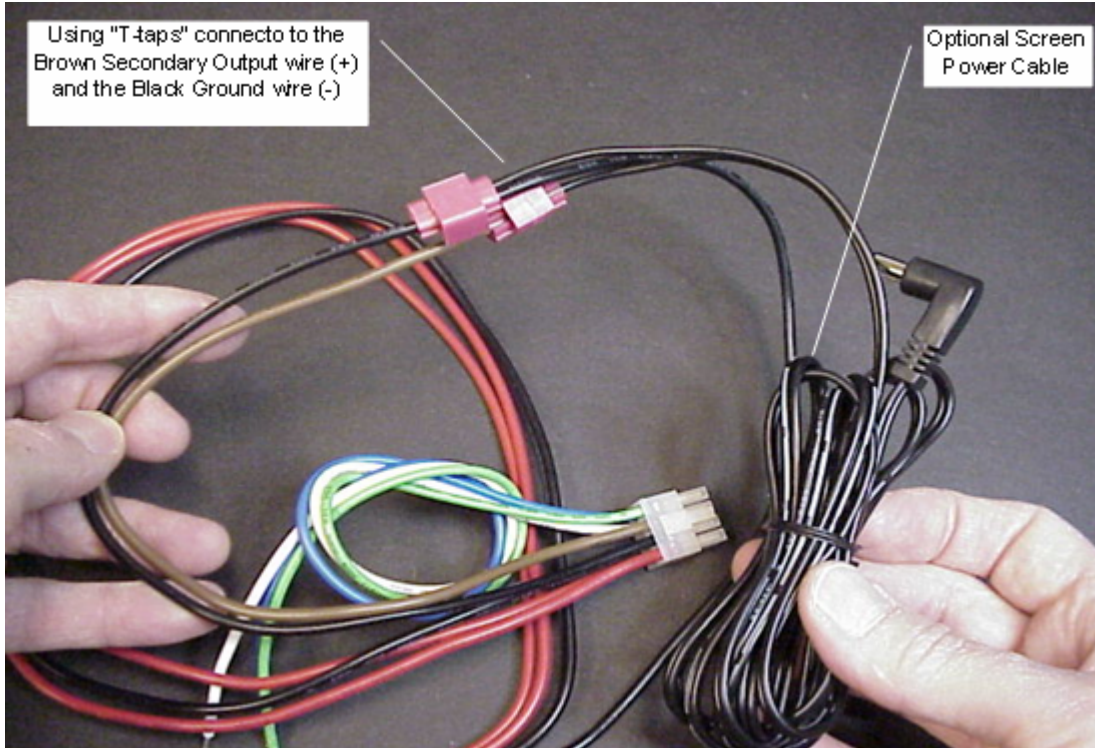
Step 1 – Set the jumpers for +12V secondary output.

Set the jumpers as outlined in section 3.2.3 (JP3) and 3.2.5 (JP5) above for a +12V output on the Secondary Output.

Step 2 – Connect the LCD screen power cable to the PSU-PC19 Secondary Output

Here you have two options; 1) Cut off the Xenarc LCD screen cigarette adapter and splice the screen power cable into the PSU-PC19 Secondary Output. 2) Purchase the optional CarNetix Screen Power Cable and splice it into the Secondary Output of the PSU-PC19.

The Secondary Output of the PSU-PC19 appears on the BROWN wire of the CNX-CA-XSC8 power cable. You should connect this BROWN Secondary Output to the “+” (positive) lead of your screen power cable. The “-“ (negative) lead of the screen power cable should be splice into the BLACK ground wire of the CNX-CA-XSC8 power cable. These connections are show in the picture below.



3.0 Using the Pulse Start Feature

The PSU-PC19 includes a feature that allows you to remotely start and stop the PSU. This feature is called “Pulse Start”. This feature would normally be used in conjunction with a wireless device such as a car alarm with auxiliary inputs/outputs or a WiFi device with Wake-On-LAN (WOL) features.

3.1 Pulse Start Connections

The Pulse Start input can either be an externally applied voltage (ie +5v or +12V) pulse, or a momentary relay contact closure. The externally applied voltage pulse is connected to Pin 1 of J1 using the Blue wire. The momentary relay contact closure is connected to Pins 1&2 of JP1 (see Section 2.2 for location). You can use either or both of these connections to start/stop the PSU.

3.2 Pulse Start Operation

3.2.1 What is a pulse?

Voltage Pulse on Pin 1 of J1

When connecting to Pin 1 of J2, the “pulse” must be a voltage that transitions from 0V to +V, ***and then transitions back to 0V***. The SSC will wait (hang) if the voltage stays high without going back to 0V after the initial transition from 0V to +V.

The value of the +V can be any voltage from approximately +2V to +20V. Typical voltages are +5V or +12V. The value of 0V must be below +.2V or open circuit (ie you could drive this input with a relay that momentarily connects to a +12V source and then provides an open circuit).

The current required to drive this input is very low (milliamps).

Contact Closure Pulse on Pins 1&2 of JP1

When connecting to Pins 1&2 of JP1, the “pulse” must be a low resistance metallic contact closure (ie relay) that transitions from OPEN to CLOSED, ***and then back to OPEN***. The SSC will wait (hang) if the contact closure remains CLOSED after the initial transition from OPEN to CLOSED.

The current passing through this relay is very small (milliamps) so a low power relay can be used.

Pulse Width

The pulse width can be any value from a minimum of approximately 100mSec to several seconds. As mentioned above, if the pulse is very long the SSC will wait for the transition back to the normal state before continuing.

3.2.2 Starting the PSU with a pulse

When the PSU is in Idle State (both LEDs off) and an externally applied pulse is applied to the Pulse Start input, the PSU will power up normally, as it would if the Ignition line had gone high. During the Bootup Lockout State any input pulse is ignored.

3.2.3 Stopping the PSU with a pulse

After the normal power up sequence, and while in Runs State, the SSC monitors the Pulse Start input for a shutdown pulse. If a single shutdown pulse is sensed, the PSU goes into the Shutdown Delay State. However, if control has been passed to the Ignition line (see Ignition Override below) the Pulse Start input is ignored.

3.2.4 Prolonging the Shutdown Delay State

If, while in the Shutdown Delay State, a single pulse is detected, the Shutdown Delay is restarted at its original value in order to prolong the Shutdown Delay. This is useful for occasionally downloading large files that would take longer than the normal Shutdown Delay time.

Once the Shutdown Delay has timed out, the PSU enters the Shutdown Lockout State. At this point the SSC ignores any pulse input until the PSU enters the Idle State.

3.2.5 Shutting down the PSU with double pulses

If two pulses are detected within a 5 second window during the Shutdown Delay State the PSU will skip any remaining Shutdown Delay Time and immediately enter the Shutdown Lockout Sequence. This feature is useful for shutting down the CarPC when your file transfer process is completed.

3.2.6 Ignition Override

If, after the PSU has been started by a pulse, the Ignition is turned on, control is passed to the Ignition line. Once the Ignition line has gained control of the SSC it will be able to shutdown the PSU as if it had initially started it. This feature is useful when you wish to remotely start the CarPC with your wireless device, but then get into your car and drive.

4.0 Startup/Shutdown Controller

The PSU-PC19 includes an intelligent, microprocessor-based startup/shutdown controller. The PSU-PC19 Startup/Shutdown Controller (SSC) provides safe, reliable control over your Xenarc SC8 bootup and shutdown (full shutdown, Standby, or hibernation) processes. The chief concerns of the SSC are protecting your hard drive from corruption, protecting your car battery from being discharged, and protecting the PSU from overheating.

4.1 Hibernate/Standby Operation

The PSU-PC19 supports both Hibernate and Standby operation of your Xenarc SC8. This option is jumper selectable with Pins 5 & 6 on JP1.

When supporting Hibernation the PSU-PC19 completely shuts down all power to the CarPC after the Shutdown Lockout State. However, if Standby mode is selected, the PSU-PC19 continues to provide primary and secondary output power after the Shutdown Lockout State is completed, but turns off its fans to conserve power. This has several very important ramifications.

- 1) In Standby your Xenarc SC8 continues to receive power from the PSU-PC19 so that it can retain the processor state in RAM. If for some reason the Xenarc SC8 did not properly shut down when it received the ACPI shutdown pulse from the PSU-PC19, it will continue to draw current from the PSU-PC19. If this current exceeds approximately 1 amp the PSU-PC19 will automatically shut itself down.
- 2) Any USB devices connected to your Xenarc SC8 via the USB connector will continue to draw current in the Standby state. **THIS COULD POTENTIALLY DRAIN YOUR BATTERY IF THE CURRENT DEMAND OF YOUR USB DEVICES IS VERY HIGH.** Exercise caution when using USB devices in the Standby mode, or connect your USB devices to the secondary output of the PSU-PC19 and jumper the Secondary Output to “follow DLYON”.

4.2 SSC Operation States

4.2.1 Idle State

While idle, the SSC monitors your car battery while waiting for the ignition switch to be turned on. If the battery is below approximately 10.6 volts, the SSC will not allow the Xenarc SC8 to boot. If the battery is above 10.6 volts, the SSC will allow the Xenarc SC8 to boot normally.

4.2.2 RunDelay State

When you turn on your ignition, the SSC briefly (approx. 1 second) enters the RunDelay state. During this time the SSC checks to make sure the battery is stable, the ignition stays on, and then turns on its PSU output to the Xenarc SC8.

4.2.3 Bootup Lockout State

After the Xenarc SC8 is powered, the ACPI (PWRON) strobe is sent to the motherboard. At this point the SSC enters a "Lockout" state. In this state the SSC will not allow the PSU to be turned off until after a Lockout Time period. This state is designed to prevent damage or corruption of a user's hard drive during bootup or shutdown by premature loss of power. The Lockout Time is set to 60 seconds.

4.2.4 Run State

After the Lockout period ends, the SSC enters the Run state. During this time your Xenarc SC8 is running normally and the SSC continues to monitor your car battery, the PSU fan, and the output current. If the battery dips below approximately 10.6volts for more than 10 seconds, or if the fan fails, or if the user is drawing more than the specified maximum output current, the SSC enters a "ForcedShutdown" state (described below). Under normal conditions, you exit the Run State either by turning off the ignition switch or with a remotely applied pulse. After normally exiting the Run State, the SSC enters the Shutdown Delay State.

4.2.5 Shutdown Delay State

After you turn off your ignition, or apply a remote pulse, the SSC enters a Shutdown Delay state. This state allows you to keep your Xenarc SC8 running for a jumper selectable time after the ignition is turned off. The selectable time periods are 6 seconds (default) and 15 minutes. During this Shutdown Delay State, turning the ignition switch back on will cause the SSC to re-enter the Run State and cancel the shutdown sequence. Also, a remotely applied pulse can either prolong the Shutdown Delay State, or send the PSU immediately into Shutdown Sequence State (see Section 6 Remote Start Pulse).

When this Shutdown Delay time has elapsed, the SSC enters the Shutdown Sequence state (see below).

The SSC timing is designed to accommodate the use of the ACC wire instead of the IGN wire to control the SSC. Note that during engine cranking, the ACC wire drops from +12V to zero volts. The SSC has a minimum 6 second delay to accommodate this temporary interruption in input voltage if the Xenarc SC8 was already running when you start (or re-start) your engine. This delay will also give you time to briefly turn off the ignition switch to stop your engine (ie at a gas station) and immediately turn the ignition switch back on to keep the Xenarc SC8 running indefinitely.

4.2.6 Shutdown Sequence State

At the beginning of this state the SSC issues an ACPI (PWRON) strobe to the motherboard. After the ACPI strobe is sent the SSC enters a Shutdown Lockout time period, in which the SSC prevents the PSU from being turned on again. This is to prevent the SSC from issuing multiple ACPI strobes to the Xenarc SC8 motherboard while it is shutting down. The Shutdown Lockout time is the same length as the Bootup Lockout time (approx 60 seconds). After the Shutdown Sequence State, the SSC re-enters the Idle State and waits for the ignition switch to be turned on.

4.2.7 Forced Shutdown State

If the SSC detects either 1) a low battery (<10.6volts for >10seconds), 2) a fan fault, or 3) an Over Current condition, the SSC enters a Forced Shutdown state. During this state the SSC immediately begins a Shutdown Sequence without first entering the Shutdown Delay State. The Shutdown Sequence cannot be exited by turning on (or leaving on) the ignition. After a Forced Shutdown State is completed, the ignition switch must be turned off to unlock the state and re-start the Xenarc SC8.

4.3 Fault Indicator LEDS

The PSU-PC19 V2 has one status LED that gives an indication of the status and states of the SSC. The pattern and blink-rates of these LED have different meanings depending upon what state the SSC is in. The table below give the details of the LED codes.

Normal Operation				
	PSU Output	LED1	State	Description
	OFF	OFF	Idle State	<i>PSU is idle and waiting for ignition/accessory switch to be turned on. It is monitoring battery voltage during this time.</i>
	ON	Fast Blink	Run Delay State	<i>PSU is on and waiting for output voltages to stabilize before turning on CarPC</i>
	ON	BLINK50%*	Bootup Lockout	<i>PSU is on and has sent ACPI pulse to motherboard. No changes can occur until after boot period. This time period is set to 60 seconds.</i>
	ON	ON	Run State	<i>PSU is on and motherboard is running. No faults have been detected.</i>
	ON	BLINK10%*	Shutdown Delay	<i>PSU is waiting before going into shutdown cycle. This delay period is jumper selectable for 6 sec (default) or 15 min. After this delay PSU goes into shutdown Lockout state.</i>
	ON	BLINK50%*	Shutdown Lockout	<i>PSU is in the process of shutting down and has sent ACPI pulse to motherboard. No changes can occur until after shutdown lockout period (same as Boot Lockout period 60sec). After Shutdown Lockout state, PSU shuts down power and goes into Idle State, waiting for IGN/ACC to be turned on.</i>

Fault Conditions				
	PSU Power	LED1	Fault Condition	
	OFF	ON	Low Battery	Low battery voltage detected (<10.6V). PSU will not start unless battery voltage is greater than 10.6V.
	ON	BLINK10%*	Major Fault Pending	Low battery, Fan Fault, or over current condition is detected. PSU will wait 10 seconds for condition to clear. If condition persists for more than 10 seconds, PSU goes into Forced Shutdown state.
	ON	BLINK50%*	Forced Shutdown	A major fault has occurred (persistent low battery, fan fault, over current fault) and the PSU is in Forced Shutdown state. There is no Shutdown Delay before shutdown begins. Shutdown time is set to approximately 60 seconds. Once Forced Shutdown begins, clearing the fault condition will not abort the Forced Shutdown cycle. After Forced Shutdown, PSU waits for IGN/ACC switch to be turned off, then on, before it will attempt to restart.
	OFF	BLINK10%*	Abnormal Shutdown	A major fault has occurred (persistent low battery, fan fault, over temperature fault) and the PSU was forced to shutdown. IGN/ACC switch must be turned off, then back on, before PSU will attempt to restart. You should check the status of the battery, fan, and ventilation if this fault occurs.

Table 2 Status/Fault Indicator LED

5.0 Conditions of Use

90-Day Limited Warranty

CarNetix warrants that the products it manufactures will be free from defects in materials and workmanship. The warranty term for all products is 90 days beginning on the date of invoice. During the warranty period CarNetix will repair or replace, at our discretion, products covered under this limited warranty that are returned to CarNetix using a valid RMA number.

Service & Support

CarNetix provides a free on-line technical support forum for diagnosing hardware problems with your system throughout the warranty period. Free technical support service is limited to configuration and operation of hardware sold by CarNetix.

Returning Merchandise

If we determine that a part is defective a replacement can be after Purchaser obtains a Return Merchandise Authorization (RMA) number. Purchaser must first contact us to obtain an RMA number before attempting to return any part. Parts returned without first obtaining an RMA number shall not be accepted, repaired, or replaced.

To obtain an RMA number, Purchaser must follow these procedures

1. Email us at support@carnetix.com to receive your RMA number;
2. The RMA Number must be used within TEN (10) DAYS, or it will not be honored;
3. The RMA Number MUST BE SHOWN CLEARLY ON YOUR SHIPPING LABEL;
4. CarNetix must receive all Returns before a replacement will be sent, unless a valid credit card number has been given to secure payment for the replacement part;
5. Include a copy of the Invoice on which the product(s) was shipped to you;
6. All RMA Returns must be shipped to CarNetix with freight PREPAID. Any Returns with freight collect or COD will be refused and returned to you;
7. CarNetix must RECEIVE all returned goods within the warranty period.

CarNetix can send the replacement part before you return the defective part if you provide us with your valid credit card number to cover the cost of the replacement. You must return the defective part within fourteen (14) days from date of delivery of the new part, or your credit card will be charged for the cost of the replacement part. Please retain your shipping information, including tracking number. This will serve as your proof of return. A replacement part will be sent to you after we receive the defective part from you if you cannot provide us with a valid credit card number.

Limitation Of Liability

This limited warranty is contingent upon proper and normal use and installation, and does not cover damage due to external causes, including but not limited to, accident, problems with electrical power, improper installation techniques or materials, liquids, chemicals, oxidation, corrosion, exposure to the elements, servicing not authorized by CarNetix, usage not in accordance with product instructions or specifications, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by CarNetix.

CarNetix makes no express warranties or conditions beyond those stated in this warranty statement. CarNetix disclaims all other warranties and conditions, express or implied, including without limitation implied warranties and conditions of merchantability and fitness for a particular purpose. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

CarNetix does not accept liability beyond the remedies set forth in this warranty statement or liability for incidental

or consequential damages, including without limitation any liability for products not being available for use or for lost data or software.

Shipping & Returns

Shipping Locations and Methods

We ship both domestically (via UPS) and to most international locations (via USPS). Shipping charges do not include import taxes or customs fees. We are not responsible for loss or damage to uninsured packages. If you have a special shipping requirement or request, please notify us when you place your order or via email at sales@carnetix.com.

Return Shipping Policy

The Purchaser must pre-pay shipping and costs including insurance for any defective system or parts returned under our warranty. CarNetix shall not be liable for risk of loss or damage during shipment of your returned system or parts if you fail to insure the shipment. All products must be shipped back to CarNetix in their original or equivalent packaging. CarNetix will ship the repaired or replacement product(s) to Purchaser via Ground Service (freight prepaid) if you use an address in the continental United States. For shipments to other locations, Purchaser must pre-pay any shipping charges, insurance, export taxes, custom duties and taxes including VAT taxes, or any other charges associated with transportation of your CarNetix products. Purchaser assumes the risk of loss. CarNetix shall not be responsible for failure of the delivery service to make on-time delivery. If Purchaser requests a shipping method other than Ground Service, Purchaser must pre-pay the difference in cost before CarNetix will ship the replacement product.

Product Return Policy

If you are an end-user customer who purchased products directly from CarNetix, you may return the product to CarNetix within thirty (30) days of the purchase date for a refund of the purchase amount minus a 15% re-stocking fee. Shipping charges and insurance are not included and will not be refunded to you.

Returned products must be in as-new condition, and include all components, cables and all other items that were included with product. Failure to meet this requirement will result in an additional 10% restocking fee (25% total) being deducted from your refund. You must follow the conditions outlined below in order to obtain your refund: *Before any return, an RMA number must be obtained from CarNetix in accordance with the aforementioned RMA Policy.*

To receive a refund, the returned product must be received at our factory within fourteen (14) days from the date that the RMA is issued and within thirty (30) days from the purchase date. If your product is not received within fourteen (14) days of the RMA being issued, but it is received within thirty (30) days of your purchase date, then you shall be charged 25% of your invoice amount as a restocking fee. If your product is not received within thirty (30) days of your purchase date, then you shall not be entitled to any refund.

Upon CarNetix receipt of your returned product and verification that same has not been damaged, altered or is missing any other original shipping items, you will receive a refund minus re-stocking fee, normally within fourteen (14) days from the date the system is received. Your refund amount will be reduced for any missing parts, components, other original shipping items or damage or alteration to the product. CarNetix will not accept any unauthorized returns. Any merchandise returned without first obtaining an RMA number shall be rejected and returned to you at your expense.