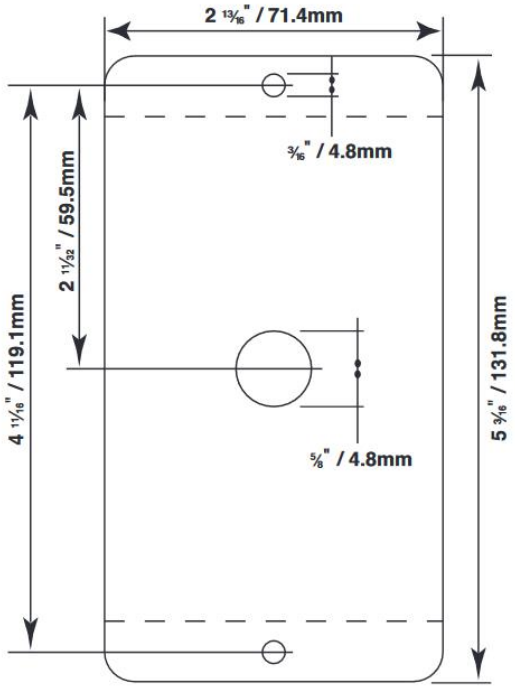
MOUNTING TEMPLATE



PSL plus
PROGRAMMABLE CODE SWITCH

OPERATION INSTRUCTIONS

Read and Save

FEATURES:

The PSL+ ™ Programmable Security Lock is an enhanced version of the PSL ™ product with several additional features. Like the original, this version is primarily designed for use with both battery and I.C. engine powered vehicles to prevent unauthorized operation of the vehicle.

Expanded Voltage Range
- The PSL+ is rated for nominal input voltages from 12 to 90VDC.

Expanded User Capability
The PSL+ can be programmed for up to 99 unique users. Once installed, the PSL+ requires entry of a two-digit user number and valid four-digit access code before the vehicle or equipment can be operated. All user codes can be reprogrammed and unused user numbers can be temporarily disabled for additional security.

Last User Identification
The PSL+ can identify to the supervisor the user number of the last user of a vehicle.

Automatic Shut-Off
The PSL+ incorporates a feature that detects vehicle activity. If the vehicle has been inactive beyond a specified period of time, the PSL+ will deactivate securing the vehicle. This feature is optional and can be activated or deactivated as desired.

Maintenance Alert
The PSL+ can accumulate vehicle usage time and provide audible and visible signals indicating when vehicle maintenance is due. After maintenance is performed, the cycle can be reset as desired. This feature is optional and can be activated or deactivated by supervisor.

Accumulated Time
The PSL+ accumulates total vehicle usage time. This accumulated time can be accessed through the Supervisor Code.

Even the supervisor's access code can be changed using the factory programmed reset code.

Installation of the PSL+ remains simple with just 4-5 wires to connect. Diagrams showing typical wiring schemes are included in this manual.

SPECIFICATIONS:

Case: ABS plastic
5 3/16"H x 2 13/16"W x 1.0"D
Two (2) 3/16" mounting holes, 4 11/16" center to center

Keypad: Contacts internally sealed, moisture resistant

Voltage: Input range 12-90VDC

Current: Less than 30 mA with unit inactive; less than 90 mA with unit active.

Output: Contact rating up to 10A maximum through 48V
Maximum 1A contact rating above 48V
For loads greater than 10A use external relay

Instruction Booklet with Reset Code and Quick Reference

PSL+™
Reset Code and Quick Reference Instruction Insert

Serial # _____ Reset Code _____

User Access:	Enter User # + User Code + "on"
Supervisor Access:	Enter "00" + Supervisor Code
Reset Procedure:	Enter "00" + "0000" + Reset Code

SUPERVISOR MENU

Key	Display	Function
1	Flashing Red	Program User Numbers
2	(none)	Last User Function
3	1 amber + 3	Enable/Disable ASO function
4	1 amber + 4	Set ASO Delay Time:
5	1 amber + 5	Enable/Disable MC function
6	1 amber + 6	MC Control Internal/External:
7	1 amber + 7	Set Maintenance Cycle Length
8	1 amber + 8	Set time between MC alerts
9	1 amber + 9	Check various times
ON	(none)	Turn on Output (and exit menu)
0	(none)	Reset Maintenance Cycle
OFF	(none)	Exit Supervisor Menu

III. SUPERVISOR MODE:

This mode is used to program user codes and set up advanced functions of the PSL+. From this mode each key initiates a specific configuration procedure or function in the supervisor menu. These options are explained one by one in the following sections and listed in the table below.

Supervisor Function Menu

Function 1	Allows programming of up to 99 unique user codes
Function 2	Displays last user of vehicle
Function 3	Activates/deactivates automatic shut-off
Function 4	Sets automatic shut-off time delay
Function 5	Enables maintenance cycle counter
Function 6	Sets maintenance cycle activation mode
Function 7	Sets maintenance cycle period
Function 8	Sets frequency of maintenance reminder tone
Function 9	Allows display of maintenance and accumulated times
Function 0	Resets maintenance cycle

Function 1 – User Programming

The "1" key initiates user code programming mode. When you press the "1" key, the red "program" LED will begin flashing to indicate the unit has entered user code programming mode. To program a user code, follow the two step procedure below. Like the supervisor code, user codes must consist of four numerical digits and may not include "on" or "off" keys. If you wish to disable a user number, then program its access code to 0000. All user numbers are disabled initially and remain disabled until programmed using this function. You may abort the entry procedure at any time and return to supervisor mode by pressing the "off" key.

Step 1: Enter the two-digit user number. User numbers must be two digits so those numbers less than 10 must be entered as "01", "02", etc. When you have entered a (valid) user number, the red "program" LED will stop flashing and stay on indicating the unit is ready for you to enter the new access code.

Step 2: Enter a four-digit user access code. Upon completion of the entry of a valid access code, the amber "accept" LED will be illuminated for one long flash and then the unit will go back to supervisor mode.

Quick Steps – Function 1

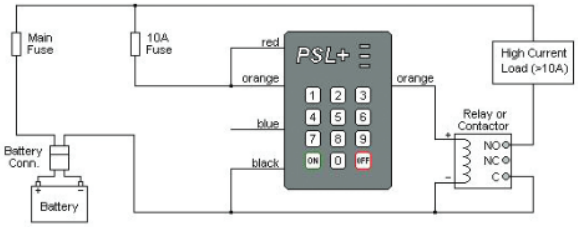
1. While in supervisor mode press1. Unit will indicate Function 1 configuration mode active.
2. Enter two-digit user number followed by four-digit access code. Amber LED will indicate acceptance of code and unit will return to supervisor mode.

Function 2 – Last User Identification

The "2" key initiates the last user function. This function will tell you which user number was the last one to activate this unit. If the supervisor was the last one to turn on the output, then an error signal (short then long tone) beep will sound and the unit will go back to supervisor mode.

WIRING AND INSTALLATION (CONTINUED):

Using External Relay for High Current Load with No Activity Monitoring



FINAL INSTALLATION CHECKS:

After installation and set up of the PSL+, the unit should be checked for proper operation under normal vehicle operating conditions. If automatic shut-off function has been activated, it is imperative that this function be tested after installation. This is why it is suggested to set a short shut-off time delay until correct operation of this function has been verified. A recommended test procedure would be to raise the drive wheels and operate unit for a period of time greater than the automatic cut-off time. During this period, the PSL+ should not deactivate the vehicle under any circumstance. After exceeding the ASO period, leave the vehicle in non-active mode (seat switch inactive, etc.). After the automatic shut-off period has expired, the PSL+ should deactivate automatically. If the unit operates as described, the PSL+ ASO function has been installed correctly. At this point, the desired ASO delay time can be configured as desired through supervisor Function 4.

WIRING AND INSTALLATION:

The PSL+ utilizes the same basic package as the original PSL product and may be mounted with the hardware provided in most any accessible flat location where you can put the required mounting holes. As mentioned earlier, the PSL+ has five color-coded lead wires. The functions of all five wires are listed below and several wiring diagrams for typical applications are included.

Black – The black wire is connected to ground (B-).

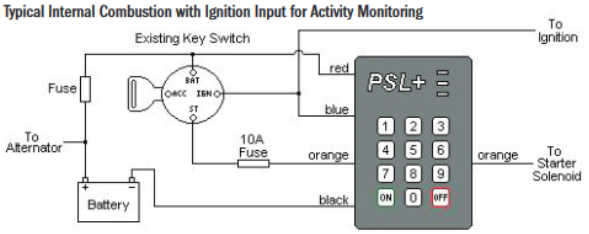
Red – The red wire is connected to B+.

Orange (2) – The orange wires are the output. When the output is turned on, they are connected together by an internal relay. When the output is off, they are disconnected. The maximum current through these leads is 10 amps. If you wish to control a load, which draws more than 10 amps, you must use these leads to control an external relay or contactor, which in turn controls the actual load. In 48V and above applications, maximum relay current should not exceed 1 amp.

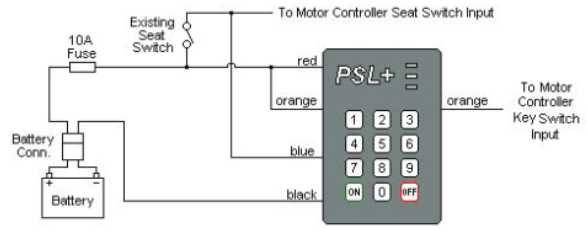
Blue – The blue wire is the VSI (Vehicle Status Input) used to control the automatic shut off function and the maintenance cycle function if so configured. If you are not planning to use these features, then the blue wire does not need to be connected.

Wiring Diagrams

Typical Internal Combustion with Ignition Input for Activity Monitoring



Typical Electric Vehicle with Seat Switch Input for Activity Monitoring



Function 4 – ASO Delay Time

The "4" key initiates a procedure to set how long the Automatic Shut Off (ASO) function will wait after the Vehicle Status Input (VSI) input becomes inactive before shutting off the output. Entry into this mode is signified by a flash cycle consisting of 1 amber flash followed by 4 red ones. You may change this setting whether or not the ASO function is enabled however it has no effect until it is enabled. Settings are retained if the ASO function is disabled, and then enabled again at a later date. You may set the delay in one minute increments from 1 to 999 minutes (16.5 hours), but all entries must be 3 digits (Example: 1 minute = 001, 10 minutes = 010, etc.) Each digit entered is acknowledged with a short beep. Once the third digit has been entered, the unit will save the setting and acknowledge that fact with a long flash of the amber "accept" LED and return to the supervisor mode. Pressing the "on" key during this process will generate an error signal (short then long tone) and the procedure will be aborted, returning to supervisor mode. You may manually abort the process and return to supervisor mode by pressing the "off" key. The default setting for the ASO delay time is 5 minutes. For safety reasons, we recommend setting the delay for 1 minute and testing to make sure everything operates as intended before setting the desired shut-off delay.

Quick Steps – Function 4

1. While in supervisor mode press 4. Unit will indicate Function 4 configuration mode active.
2. Enter 3-digit delay time in minutes (i.e. 120 minutes = 120). Pressing "on" produces error and returns to supervisor mode; pressing "off" aborts procedure and returns to supervisor mode.
3. Unit returns to supervisor mode after valid 3-digit input.

Function 5 – Maintenance Cycle Enable/Disable

The "5" key initiates a procedure to enable or disable the Maintenance Cycle (MC) function. Entry into this mode is signified by a flash cycle consisting of 1 amber flash followed by 5 red ones. In this mode, the "on" key enables the MC function and "off" key disables it. Pressing any other key will generate an error signal (short then long tone) and the procedure will be aborted, returning you to supervisor mode. A single long flash of the amber "accept" LED will acknowledge the new setting and then the unit will go back to supervisor mode. New units start with 1000 hours remaining in the MC unless changed with Function 7. Units that previously used the MC cycle will revert to the point where they were when the MC function was last disabled. Activating the MC function does NOT reset the cycle. The default setting for the MC function is disabled so you only need to worry about this procedure if you want to use this function.

Quick Steps – Function 5

1. While in supervisor mode press 5. Unit will indicate Function 5 configuration mode active.
2. Press "on" to enable maintenance cycle or press "off" to disable maintenance cycle.

Note: Pressing any other key than "on" or "off" aborts process and returns unit to supervisor mode.

Otherwise, the unit will sound four short beeps to indicate the last user information is coming followed by a series of flashes of the red and/or amber LEDs. Each red flash counts as 10 and each amber flash counts as one. For example, if user 27 were the last one to activate the unit, you would see 2 red flashes followed by 7 amber flashes. Upon completion of the flashes there will be about a ¾ second pause, and then the unit will return to supervisor mode. You may repeat this procedure as many times as you wish if you want to make sure that you counted the flashes correctly.

Quick Steps – Function 2

1. Press 2. Unit flashes last user code (red=10, amber=1, i.e. user 37 would be displayed as 3 red flashes and 7 amber flashes) and unit returns to supervisor access mode after displaying user code.

Function 3 – Automatic Shut Off

The "3" key initiates a procedure to enable or disable the Automatic Shut Off (ASO) function. Entry into this mode is signified by a flash cycle consisting of 1 amber flash followed by 3 red ones. (Note that the number of red flashes corresponds to the supervisor menu selection.) In this mode the "on" key enables the automatic shut off function and the "off" key disables it. Pressing any other key will generate an error signal (short then long tone) and the procedure will be aborted returning you to the supervisor mode. If you are disabling the ASO function, a single long flash of the amber "accept" LED will acknowledge the change and then the unit will go back to supervisor mode. The default setting for the ASO function is disabled so you only need to worry about this procedure if you want to use this function. The default delay time is 5 minutes. (This may be changed using Function 4.)

The ASO function monitors the vehicle through the blue wire that is known as the Vehicle Status Input (VSI). Typically, this wire would be connected to a seat or foot switch so the unit can tell when the vehicle or equipment is being left unattended. Due to the number of different possible wiring configurations (switch to ground, switch to B+, normally open, normally closed, etc.), the VSI input must be configured when the first function using it is enabled. If the VSI input has already been configured for the maintenance cycle function, the unit will acknowledge your entry and return to supervisor mode when the ASO function is enabled. Otherwise, it will automatically go into the Vehicle Status Input configuration procedure (described on Page 8-9). This procedure must be successfully completed or the ASO function will not be enabled.

Quick Steps – Function 3

1. While in supervisor mode press 3. Unit will indicate Function 3 configuration mode active.
2. Depress the "on" key to activate automatic shut off. Amber indicates selection acceptance. Unit returns to supervisor access mode after selection if VSI is already configured or goes to 3 if not

OR

Depress the "off" key to deactivate automatic shut off. Amber indicates selection acceptance. Unit returns to supervisor access mode after selection.

3. Set up VSI – See VSI Configuration Instructions (described on Page 8-9)

V. USER OPERATION:

Previously programmed users may activate the output of the PSL+ by following the three-step procedure below. All key entries in this process are acknowledged with a short beep and are timed to protect against the user leaving the unit with a partially entered access code. If a period of 15 minutes elapses between keystrokes, the unit will abort the procedure and sound an error beep. The entry process may also be aborted manually at any time by pressing the "off" key. The three-step process is as follows:

Step 1: Enter the two-digit user number. (All user numbers must be two digits, i.e. "01", "02", etc.)

Step 2: Enter the four-digit access code for that user. Upon completion, the entry is checked and the amber "accept" LED is illuminated if the entry is correct. If the entry is incorrect, then the error beep is sounded and the entry procedure is aborted.

Step 3: Press the "on" key. The "accept" LED will go off and both the output and "on" LED will be activated. Press the "off" key or remove power to turn the output off.

VI. RESETTING THE SUPERVISOR CODE:

Follow the procedure below to reset the supervisor code. This process may be aborted at any time during the procedure by pressing the "off" key. The output must be off before beginning this procedure. Using this procedure to reset the supervisor code will NOT affect any programmed user codes or any of the function settings.

Step 1: Enter "00". This identifies you as the supervisor.

Step 2: Enter "0000". After entering the sixth zero, the unit will begin alternately flashing the amber LED twice and the red LED twice to indicate reset code entry mode.

Step 3: Enter the four-digit reset code. If the correct code is entered, the unit will acknowledge the entry with one long flash of the amber "accept" LED and then power must be interrupted before proceeding. The unit will automatically go into the supervisor code entry mode (as described in Part 1) when power is restored. If an incorrect reset code is entered, then the error beep will sound and the unit will go back to access code entry mode (the supervisor code will not be reset).

Step 1: The unit will indicate entry into this procedure by repeating a display cycle that consists of 2 amber flashes, 1 red flash, 1 amber flash and a pause. If the signal you are monitoring is powered by the PSL+ output, you may turn the output on temporarily by pressing the "on" key. Move the switch or whatever the VSI input is connected to into the position or setting it will be at when you want the unit to consider the input to be active. For example, if you are using a seat switch, then you should sit on the seat. When you are sure the input is in the active state, press any numerical key. The unit will read the input and memorize what it "sees" and then acknowledge with a long flash of the amber "accept" LED. You may also abort the configuration procedure by pressing the "off" key if you notice that something isn't right.

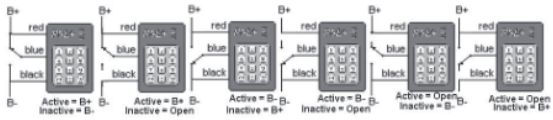
Step 2: After an acknowledge flash the display cycle will change to 3 amber flashes, 1 red flash, 1 amber flash and a pause. At that point you need to change the switch or setting to the inactive position (in the previous example you would get off of the seat). When you are sure the input is inactive, press a numerical key. This will prompt the unit to again read the input. If the unit can detect a difference between the two states, another acknowledge flash of the "accept" LED will be displayed and then the unit will return to supervisor mode. If the unit can not detect a difference between the two settings, then an error signal (short then long tone) will be sounded and the process will be aborted (including the setting change you were making) and the unit will return to super visor mode. If the output was turned on in step one; it will automatically go off upon completion on this procedure.

Note: If you are having trouble getting the VSI input to configure properly, consider the following: The VSI input is designed to detect three states: connected to ground, connected to the positive supply voltage (B+) or open (not connected to anything). You may use any combination of those three. The VSI input is not designed to detect voltage level changes within the supply range. Check the wiring to make sure the input is being driven (or released) into a different one of the three states listed for the active and inactive settings. Many vehicles draw power for such switches from the "key switch" line, so you may need to turn the PSL+ on during configuration. If the problem still persists, please call for assistance.

Quick Steps – VSI (Vehicle Status Input)

1. Unit flashes 2 amber flashes, 1 red flash, 1 amber flash and a pause to indicate unit is ready to receive vehicle input.
2. Apply vehicle active signal to blue wire. If this requires the PSL+ output to be on, press the "on" key.
3. Press any numerical key (0-9). Amber LED indicates acceptance of active input.
4. Unit then flashes 3 amber flashes, 1 red flash, 1 amber flash and a pause to indicate unit is ready to receive vehicle inactive input.
5. Apply vehicle inactive signal to blue wire.
6. Press any numerical key (0-9). Amber LED indicates acceptance of inactive input. Unit returns to supervisor access mode after inactive input is accepted. If the output was turned on, it will go back off.

Acceptable VSI Input States



Function 6 - Maintenance Cycle Activation Control

The "6" key initiates a procedure to set whether the Maintenance Cycle (MC) function is controlled internally (time accumulates whenever the output is on) or externally (time accumulates only if the output is on AND the Vehicle Status Input (VSI) input is active). Entry into this mode is signified by a flash cycle consisting of 1 amber flash followed by 6 red ones. In this mode, the "1" key sets the MC function control to internal and the "2" key sets it to external. Pressing any other key will generate an error signal (short then long tone) and the procedure will be aborted, returning you to supervisor mode. If you are setting the MC control type to internal and/or the Automatic Shut Off (ASO) function is enabled, a single long flash of the amber "accept" LED will acknowledge the new setting, and then the unit will go back to supervisor mode. If the ASO function is disabled, and you are setting the MC control to external, then the unit will automatically go into the VSI configuration procedure (described on Page 8-9) which must be completed successfully or the change will not be saved. The default setting for the MC control is internal.

Quick Steps – Function 6

1. While in supervisor mode press 6. Unit will indicate Function 6 configuration mode active.
2. Press 1 to set maintenance counter to internal. Amber LED will indicate acceptance of selection and unit will return to supervisor mode. Maintenance time will subsequently accumulate when ever PSL+ activates vehicle.

Or

Press 2 to set maintenance counter to external mode. Maintenance time will Accumulate only when Vehicle Status Input is active. Note: If Vehicle Status Input was not previously configured, unit will immediately enter the VSI configuration procedure. (See instruction on Page 8-9 of manual.)
Note: Pressing any other key than "1" or "2" aborts process and returns to supervisor mode.

Function 7 – Maintenance Cycle Period

The "7" key initiates a procedure to set the maintenance cycle time. Entry into this mode is signified by a flash cycle consisting of 1 amber flash followed by 7 red ones. You may change this setting whether or not the Maintenance Cycle (MC) function is enabled, but if not it won't have any effect until that function is enabled. Settings are retained if the MC function is disabled and enabled at a later date. You may set the maintenance cycle time in one hour increments from 1 to 9999 hours (14 months if running 24/7), but all entries must be 4 digits (Example: 1 hour = 0001, etc.). Each digit entered will be acknowledged with a short beep. Once the fourth digit has been entered the unit will save the setting and acknowledge that fact with a long flash of the amber "accept" LED and then return to the supervisor mode. Pressing the "on" key during this process will generate an error signal and the procedure will be aborted, returning to supervisor mode. You may manually abort the process and return to supervisor mode by pressing the "off" key. A new cycle is started automatically when the MC time is changed.

Quick Steps – Function 7

1. While in supervisor mode press 7. Unit will indicate Function 7 configuration mode active.
2. Enter 4-digit maintenance period in hours (Example: 0510 = 510 hours until maintenance remainder). Unit saves period upon depression of fourth digit and returns to supervisor mode.

Note: Pressing "off" aborts procedure returning to supervisor mode.

Function 8 – Maintenance Reminder Frequency

The "8" key initiates a procedure to set how often the unit will sound the reminder sequence (5 short beeps) if the maintenance cycle has expired and the output is on. Entry into this mode is signified by a flash cycle consisting of 1 amber flash followed by 8 red ones. You may change this setting whether or not the maintenance cycle function is enabled however; it has no effect until it is. Settings are retained if the function is disabled and then enabled at a later date. You may set the time between maintenance alerts in increments of 1 minute from 1 to 99. To set the time, simply enter a two-digit numerical setting. Entries must be two digits (i.e. use 01 for 1, etc.) You may manually abort the process by pressing the "off" key. After the second digit is entered, the setting will be saved and acknowledged with a long flash of the amber "accept" LED and then the unit will return to supervisor mode. The default setting is 15 minutes.

Quick Steps – Function 8

1. While in supervisor mode press 8. Unit will indicate Function 8 configuration mode active.
2. Enter two-digit number. Amber LED will indicate acceptance of selection and unit will return to supervisor mode after second digit is entered. When maintenance time expires, unit will output maintenance tone based on delay input in this function.

Function 9 – Display of Maintenance and Accumulated Time

The "9" key initiates a procedure which allows you to check the current maintenance cycle times and total accumulated unit usage (in hours). Entry into this mode is signified by a flash cycle consisting of 1 amber flash followed by 9 red ones. Upon entry into this mode you may choose one of these three options:

1. Remaining time in current maintenance cycle
2. Elapsed active usage time since last MC reset
3. Total accumulated usage time of unit

Pressing any other key will generate an error and the function will be aborted returning you to the supervisor menu. Upon making a legal selection 2 short beeps are sounded and then the requested time is displayed by flashing the amber and red LEDs. Each digit is given by a number of amber LED flashes followed by a red flash to indicate moving to the next digit. For example, a time of 20,406 hours would be indicated by 2 amber + 1 red + (no amber) + 1 red + 4 amber + 1 red + (no amber) +1 red + 6 amber. (Zero is indicated by absence of amber flashes and will result in consecutive red LED flashes.) Upon completion of these flashes, there will be a long pause and then the unit will return to the supervisor menu. Like Function 2, you may repeat Function 9 as many times as you like if you wish to double check the number of flashes. All time indications are in hours and are rounded down to the last (next for #1) full hour. Selection options 1 or 2 will produce an error beep if the maintenance cycle function is disabled. Option 1 will also produce an error beep if the maintenance cycle is expired. In both cases, the function will be aborted after the error has been indicated and the unit will return to the supervisor menu. The time that is displayed for option 3 is the total accumulated time that the unit's output has been on regardless of any other function settings or the status of the VSI input. Time spent programming functions or entering access codes is not counted.

Quick Steps – Function 9

1. Press 9. Unit will indicate Function 9 mode active.
2. Press 1. Unit will indicate remaining time in current maintenance cycle.
   Or
   Press 2. Unit will indicate usage time since last maintenance cycle reset.
   Or
   Press 3. Unit will display total accumulated usage time.

Note: Each digit is indicated by a number amber LED flashes followed by a red flash to indicate moving to the next digit. For example, a time of 20,406 hours would be indicated by: 2 amber + 1 red + (no amber) + 1 red + 4 amber + 1 red + (no amber) + 1 red + 6 amber. Zero is indicated by the absence of amber flashes and will result in consecutive red LED flashes.

Function 0 – Maintenance Cycle Reset

The "0" key resets the maintenance cycle time remaining to the last setting entered using the "7" key function (or the default of 1000 hours if it has never been changed). You may do this if the MC function is disabled; however it will have no effect until the function is enabled. If the MC time had expired, the warning beeps will cease (until the new cycle expires). The amber "accept" LED is flashed once to acknowledge the change was saved and then the unit returns to the supervisor mode.

Quick Steps – Function 0

1. Press 0 in supervisor mode. Unit will clear time since last maintenance cycle reset and start new cycle.

On and Off Key Functions

On – The "on" key turns on the output and moves the unit to "on" mode. The supervisor becomes the last user. The unit will not return to supervisor mode unless the output is turned off with the "off" key and the procedure to enter supervisor mode is repeated (including entering the supervisor code).

Off – The "off" key is used to exit supervisor mode and return to access code entry mode when you have finished using the supervisor functions. The unit will also exit supervisor mode automatically if no entries have been made for a period of 15 minutes.

IV. VSI (VEHICLE STATUS INPUT) CONFIGURATION PROCEDURE:

As mentioned earlier, the Vehicle Status Input (VSI) must be configured before enabling the Auto Shut Off (ASO) function or setting the Maintenance Cycle (MC) function for external control. Both functions may use the VSI input at the same time, but the input will remain in the configuration that was set when it was first activated. If both functions are deactivated at the same time, the input will have to be configured again to use it. The VSI configuration procedure is automatically triggered when needed and can not be initiated manually. If you change wiring and need to reconfigure the input, disable ASO and set the MC control to internal then set them back to force a new configuration. The VSI configuration procedure is a two step process. This procedure allows the input to be flexible enough for use in a number of different types of applications and wiring configurations.