Sleeper Cell
Alarm System

By Haute Solutions

(www.haute-solutions.com)

SIM7600 (4G): 2022-06-08

What is the "Sleeper Cell" Alarm System:

The Sleeper Cell Alarm System is a unique alarm system designed specifically for owners of vehicle which require long term storage. The Sleeper Cell is not a "Low Power" alarm system - it is, in fact, a "No Power" alarm system (until tripped). The Sleeper Cell not only provides the traditional flashing lights and siren, it also provides remote SMS Text notification and real-time GPS location reporting if so configured.

Unique capabilities of the Sleeper Cell:

- The Sleeper Cell draws absolutely no power until the alarm is activated/tripped. This is ideal for installations where the protected vehicle may sit for a very long time with no draw or charge to its onboard battery system. This will ensure that the alarm system will never draw down the charge on an otherwise idle battery (unless tripped). Perfect for Car/Race/Travel Trailers, Boats, etc…

- There are no monthly fees required to use the Sleeper Cell Alarm. You may use a GSM compatible SIM card from the provider with a service plan of your choice. There are multiple GSM cellular providers who offer pay-as-you-go service and do not charge a monthly fee. In fact, you can use the sleeper cell as a standalone alarm system without any GSM service at all.

- Similarly, the Sleeper Cell does not require any subscription service to monitor the status or location of your vehicle. It communicates directly with your cell phone via SMS text messages.

- The Sleeper Cell will send an SMS (Text) Alert Message to designated cell phones (up to 5) when the alarm is activated. This is ideal for vehicles which are stored remotely, or in an isolated location, with no one to watch them. Providing multiple SMS notification contacts helps ensure the closest individual can respond. (GSM/SMS function can be disabled).

- The Sleeper Cell will provide real-time GPS Location information within the SMS Alert Message. It will continue to send real-time GPS Vehicle Location updates on a user defined interval (every 5 min, 10 min, etc). GPS location is not only provided in raw Latitude and Longitude coordinates, but a custom clickable link is also included in each SMS message. Clicking this URL will automatically bring up a graphical map which pin points the real-time location of the vehicle. This is ideal for real-time tracking of a stolen vehicle. (GPS Function can be disabled).

- Once activated/tripped, the Sleeper Cell will accept SMS input from any of the "authorized users" on the SMS notification list. This includes simple commands to remotely disable the siren/lights, remotely reset the alarm system itself, or interactively request a real-time GPS location of the vehicle.

- Once activated/tripped, the Sleeper Cell will also act as an SMS communication hub for all users on the Notification List. An SMS Recipient can send a simple SMS reply back to the Sleeper Cell and it will forward that message to everyone on the Notification List. This is useful if one recipient wishes to inform all others that he/she will be investigating the issue or perhaps tripped the alarm by mistake.

- The Sleeper Cell may be configured as a "Silent Alarm" if desired. This will prevent any local indication that the alarm has been tripped (no flashing lights or siren). It will, however, send SMS Alert Messages when the alarm is tripped/activated and continue to send real-time GPS position updates at the user specified interval. This feature is useful to implement a more stealthy profile which may prevent thieves or vandals from locating/disconnecting the alarm.

- The Sleeper Cell Alarm is completely configurable via simple SMS text messages (unless configured for "standalone" operation). No need to download/install proprietary "Apps" for your smart phone. In fact, any phone that supports text messaging can be used to configure and receive alerts from the Sleeper Cell.

- The Sleeper Cell can be configured for multiple levels of functionality: as a standalone alarm (requiring no GSM or GPS functionality), for simple SMS Text Alert capability, or with full SMS Text Alerts which contain real-time GPS location information. Start simple and add functionality as desired. No change in the core hardware or software is required.

- Maybe best of all, the Sleeper Cell is based on Open Source Hardware (Arduino) and we have released the firmware under Open Source licensing. Haute Solutions will maintain the firmware source code on our web site for public access. The Alarm System is easy to update and program (using a free toolset and a common USB cable). Individual customers can download the firmware source code to make changes to the core functions if so desired. Haute Solution encourages all users of the product to upload any variations in the firmware code so we can make this alternate firmware available to the entire owner community (in the spirit of Open Source). The source code, however, may NOT be used or modified for use in any commercial products other than the Sleeper Cell Alarm.

Accessories required for specific Sleeper Cell Alarm functionality:

Depending on how you wish to install, configure, and operate the alarm, you may want to consider some additional accessories:

		Configuration			
		Local Alarm	Full Functionality	Silent Alarm (With GPS)	Silent Alarm (Without GPS)
Function	Lights/Siren	Enabled	Enabled	Disabled	Disabled
	GSM/SMS	Disabled	Enabled	Enabled	Enabled
	GPS	Disabled	Enabled	Enabled	Disabled
Accessories	Door Switches	Yes	Yes	Yes	Yes
	Keylock Switch	Yes	Yes	Yes	Yes
	Motion Sensor	Opt	Opt	Opt	Opt
	SIM Card	No	Yes	Yes	Yes
	Siren	Yes	Yes	No	No
	GPS Antenna	No	Yes	Yes	No
	GSM Antenna	No	Yes	Yes	Yes

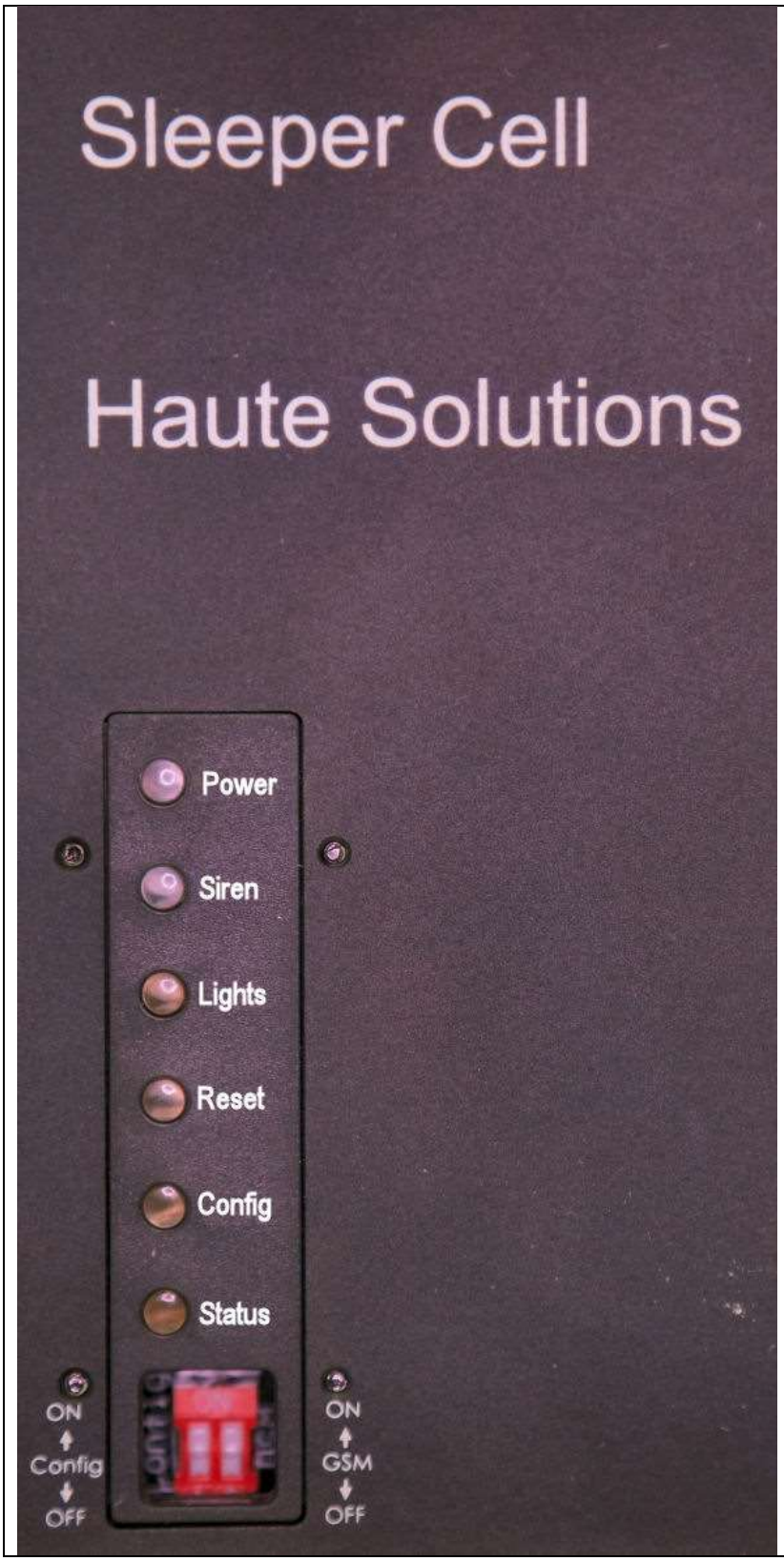
Notes:

1. At least one type of trigger (Door Switch, Motion, etc) is required for use as an alarm.

2. Although a direct connect GSM antenna is included with the Super Cell (primarily for testing), an externally mounted antenna is recommended for optimum cellular reception.

Introduction to the Sleeper Cell Alarm:

Configuration switches and status lights can be seen and accessed from the front of the alarm enclosure.



Here is a close-up of the status lights and configuration switches.

POWER LED: This LED will illuminate any time the alarm is powered up and active.

SIREN LED: This LED will illuminate whenever the SIREN circuit is providing power to the siren.

LIGHTS LED: This LED will flash whenever the LIGHTS circuit is providing power (flashing) the lights.

RESET LED: This LED will illuminate momentarily as the alarm shuts down and resets itself.

CONFIG LED: This LED will be illuminated any time the alarm is powered up in configuration mode (GSM service required).

STATUS LED: This LED will illuminate or flash to indicate connectivity or status of the GSM (cellular) connection. More information is provided in the troubleshooting section of this document.

CONFIG SWITCH: Turn this switch on to enable configuration of the alarm via SMS messages.

GSM SWITCH: Turn this switch on if you wish to enable GSM (cellular) SMS messaging. If this switch is off, the alarm will operate as a standalone alarm (lights and siren only).

Here is a close-up of the audio and antenna ports on the side of the enclosure. The Speaker and Mic ports are reserved for future expansion and are not currently in use. There is also a connector for a GSM (cellular) and GPS antenna.

On the other end of the enclosure we have the USB port used for programming and updating the alarm.

Preparing for GSM/Cellular Functionality:

If you wish to enable GSM service on the Sleeper Cell, you will need to establish an account with a GSM Carrier and obtain a SIM card. Since the traffic requirements are very low for this device, we recommend a "Pay as you go" type cell service for the device. There are several Cellular providers which offer a very cost effective "Pay as you go" service without any monthly fee. The SIM7600 based Sleeper Cell is a Multi-Band 4G GSM device optimized for North American cellular frequencies.

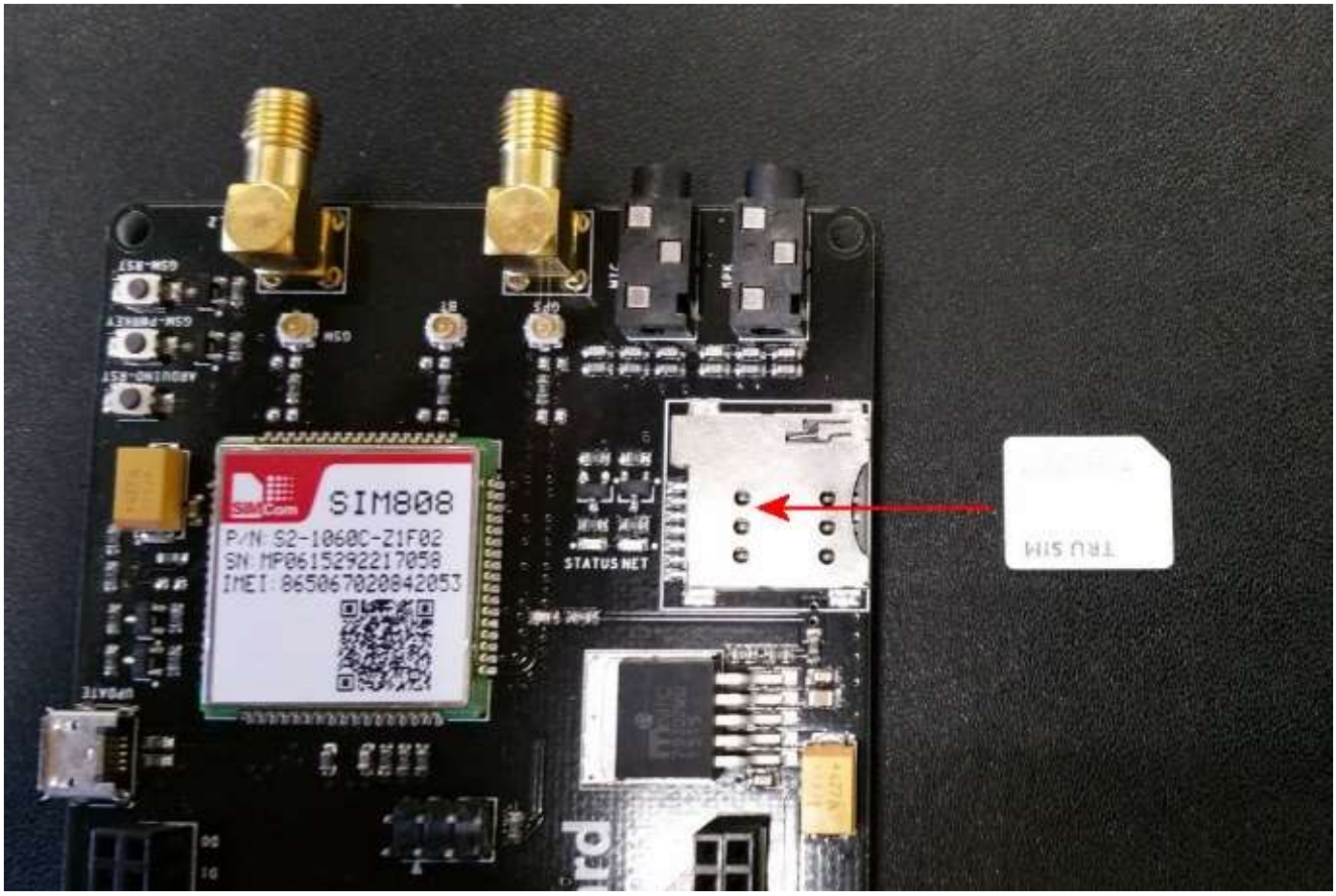
If you decide to enable GSM services on the device, you can obtain a SIM card from any 4G GSM provider. The Sleeper Cell requires the middle size "Micro" SIM card. Not the larger "Standard" SIM or the smaller "Nano" SIM card (as used by some Apple devices).

The registration process for each GSM carrier will be slightly different. However, you must register with your provider in order to obtain a SIM card and have a unique phone number associated with your Sleeper Cell.

Please note that the Firmware in the Sleeper Cell will automatically forward any inbound SMS messages from unknown sources to everyone on the "Notification" list if it is up and running in Config mode when the SMS message arrives. You may find this useful as some service providers (T-Mobile for instance) will require that you enter a validation code sent to your device in order to complete Pre-Paid Account Registration. If this is the case, just make sure the Sleeper Cell is up and running in Config mode, and that your cell number is already on the Notification list, when the SMS message arrives. (Config Mode and the Notification List is discussed later in the documentation).

If you have an unlocked GSM cell phone, you may wish to temporarily install your SIM card into your phone to ensure that service has been properly established by your provider prior to installing the SIM into the alarm system. Send/Receive a few SMS text messages to confirm SIM registration and activation if you have the opportunity to do this.

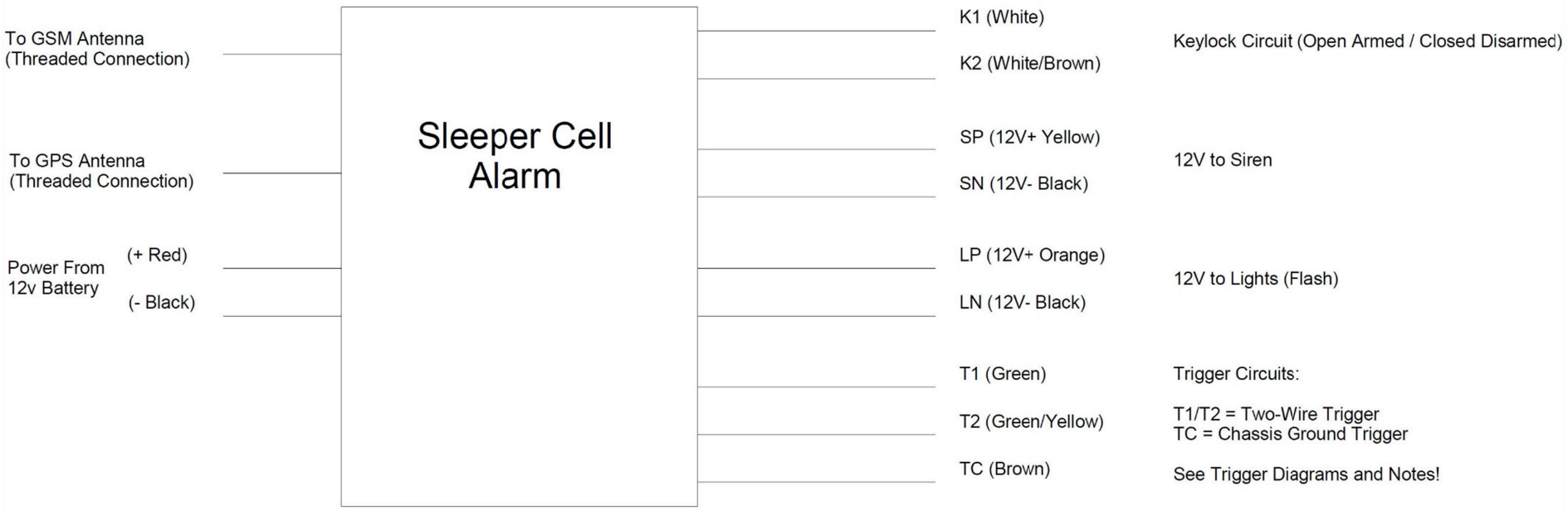
In order to install/replace the SIM card in the Sleeper Cell, you will need to unscrew all 6 screws on the sides and bottom near the end with the antenna connectors. You will also have to remove 4 screws on the sides of the enclosure near the harness end of the enclosure. (You DO NOT need to remove the 2 screws on the bottom of the enclosure near the harness end). Please note that there are 2 different types of screws and that they should be re-installed appropriately. There are 8 course threaded screws which screw into the plastic end caps, and there are 2 fine threaded screws which screw into the metal baseplate. Also note that 2 of the course threaded screws must be accessed from the underside of the base plate. Once all 10 screws are removed, pull the antenna end cap outward and set aside. Tilt the enclosure upwards at the antenna end to about 45 degrees and then pull the cover off to the open side. (Be careful not to drag the clear "light pipes" across the upper circuit board. You will then have easy access to the SIM card slot on the side of the bottom board. Push the SIM card fully into the slot until it clicks in place. Note that it is possible to install the SIM card into the holder in the WRONG orientation. Please refer to the photo below to ensure the SIM card is installed properly.



(The upper board has been removed in the photo to aid in clarity. We do not recommend separating the two boards as it is quite easy to misalign the upper board during reinstallation. Note that this is an older PCB in the photo although the SIM Card Orientation is identical.)

Once the SIM card is installed/replaced, assembly is simply the reverse of disassembly. Be careful to slide the enclosure cover in place onto the harness end cap at an angle so as not to disturb the “light pipes” during re-assembly. Once the enclosure cover is fully re-seated onto the base, re-attach the antenna end cap and carefully re-install the screws.

Sleeper Cell Alarm Installation Wiring



Installing the Sleeper Cell:

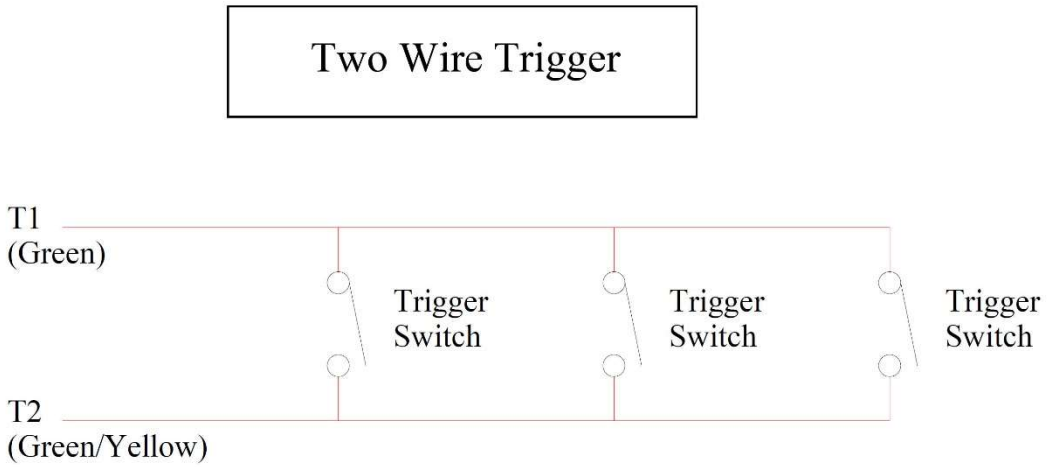
Wire Designator	Wire Color	Function
12P	Red	12V Pos from Battery
12N	Black	12V Neg from Battery
K1	White	Keylock 1
K2	White/Brown	Keylock 2
T1	Green	Trigger 1
T2	Green/Yellow	Trigger 2
TC	Brown	Chassis Ground Trigger
SP	Yellow	Siren Pos (12v)
SN	Black	Siren Neg (12v)
LP	Orange	Lights (Flashing) Pos (12v)
LN	Black	Lights (Flashing) Neg (12v)

(Note that all Black Wires are a common ground and interchangeable)

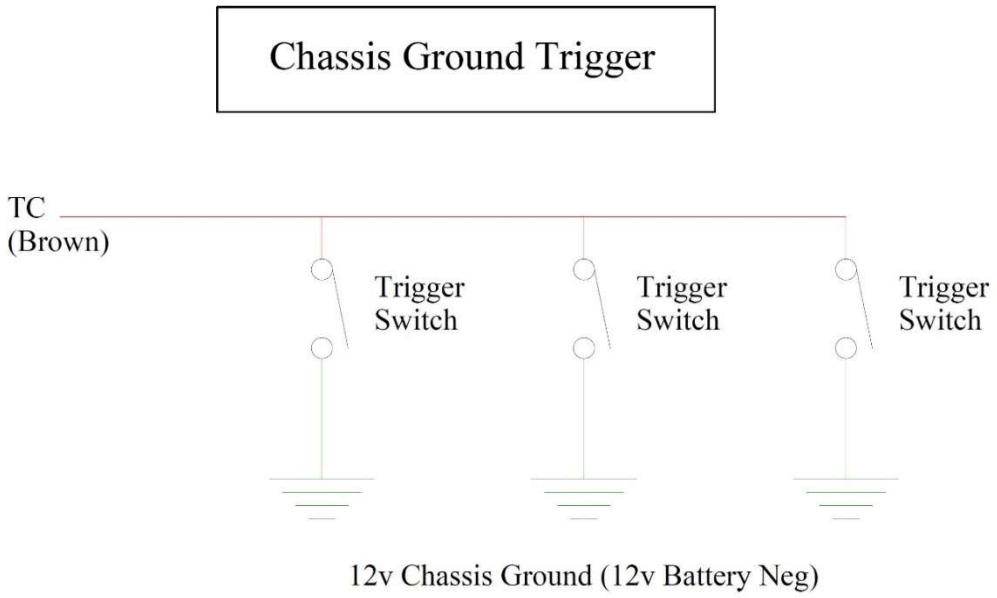
12V Power (12P, 12N): The Sleeper Cell requires a 12V battery source for power once it is activated. It draws absolutely no power until it is triggered. Once the alarm is tripped, the 12v power source will be used to power the alarm itself as well as the Siren and Flashing Lights.

Trigger Circuits (T1, T2, TC): The Sleeper Cell uses an "Open Loop" trigger system. An Open Loop alarm system is designed to have all triggers/switches in an OPEN state until an event is triggered. The Sleeper Cell may use any type of trigger switch which is maintained in an OPEN configuration until tripped. To trip the alarm, the trigger switch should CLOSE the trigger circuit. For example: When a door is fully shut on your vehicle, the trigger switch should keep the circuit OPEN. When the door is opened, the switch should CLOSE the trigger circuit. The Sleeper Cell may use any trigger switch designed for use in an Open Loop System including Door, Window, Reed, Motion, and Vibration switches. In addition, any trigger switch used with this system should be a passive switch which does not require any power when secured.

The Sleeper Cell supports two different types of Trigger Circuits. The following trigger circuits can be used independently or simultaneously:



- Two-Wire Trigger (T1, T2): Closing/completing the circuit between the two T1 and T2 wires will activate the alarm. Multiple trigger switches can be configured in parallel. A "Two-Wire Trigger" is ideal if you vehicle does not have a chassis/common ground or if you are using a dedicated battery for the alarm. You should NOT use a two wire trigger if the trigger switch contacts cannot be fully isolated from the vehicle chassis.



- Chassis Ground Trigger (TC): A "Chassis Ground Trigger" is ideal for vehicles which have an existing battery with an established chassis ground. This will allow a single trigger wire (TC) to be run from the alarm system to one or more trigger switches. The trigger switches should then complete the TC circuit to the vehicle ground when the alarm is to be triggered. Traditional vehicle door jamb pin switches (for the overhead courtesy light) usually work in this manner. Only use a Chassis Ground Trigger if your vehicle has a negative chassis ground connected to the 12v battery.

Keylock (K1, K2): The K1 and K2 wires should be connected to a security keylock switch installed on the exterior of the vehicle. This switch should be an SPST (Single Pole Single Throw) key operated switch with a simple OPEN/CLOSED function. When the K1/K2 circuit is CLOSED the alarm will be armed. When the K1/K2 circuit is OPEN, the alarm will be disarmed/deactivated.

Siren (SP, SN): Connect the SP/SN wires to your 12V electronic siren. The SP Wire provides 12V positive power. The SN wire is the negative/ground. (Note that this circuit may also be used to lock the brakes on vehicles which support a 12v brake circuit. However an isolation diode should be used in the wiring between the siren circuit and the brake circuit to prevent the siren from sounding every time the brakes are applied during normal operations. A simple, cheap ($1) 10A Schottkey diode would work nicely for this. The diode would be oriented with the "Banded/Marked" side of the diode on the brake circuit side and the "Unbanded/Unmarked" side towards the siren circuit).

Lights (LP, LN): Connect the LP/LN wires to the 12V Clearance or Emergency Flashers on your Vehicle. The LP Wire provides 12V positive power. The LN wire is the negative/ground. The LP/LN circuit will provide 12v power to flash the connected lights approximately once every second. Please ensure you have the lights wired properly. You MUST connect the LP (Positive) wire to the Trailer/Vehicle Positive lights terminal/wire. Reversing these wires could cause a major short in the wiring.

* Note: All BLACK wires are a common Ground. They may be used interchangeably.

Configuring the Sleeper Cell:

The Sleeper Cell may be configured to connect to the GSM network and provide SMS Alert messages or to operate in complete isolation (as a traditional Alarm). If you DO NOT have a SIM card or DO NOT wish to enable GSM connectivity, simply place the S1 (GSM) dip switch into the OFF position. To enable full GSM/SMS connectivity, place the S1 (GSM) dip switch into the ON position.

- S1/GSM ON = GSM/SMS Enabled (Full GSM/SMS Connectivity. Requires Active SIM Card)
- S1/GSM OFF = GSM Disabled (Traditional Alarm. Lights/Siren Only)

All other configuration options require two-way SMS messaging. If you are using the alarm in "Isolated Mode" (GSM Disabled) then no further configuration is available (without code modification). The default configuration options are set as follows when the alarm is isolated:

Default Configuration (GSM Disabled /Isolated)	
Option	Setting
Alarm ID	N/A (GSM Disabled)
Silent Alarm	No
Siren Delay	No
Alarm Reset	5 Minutes
GPS Update Interval	0 Minutes (GPS Disabled)

GSM/SMS Configuration Options:

Alarm ID: The name of the Alarm to be displayed in the SMS Alert Message. The factory default value is "Trailer". Useful if you have multiple vehicles and want each alarm to be uniquely identified. "Blue Trailer", "Red Boat", etc

Silent Alarm: Some users may wish to use a Silent Alarm. When Silent Alarm is set to YES, the lights or Siren will NOT be activated but SMS Text Alert messages (with GPS location) will continue to be sent. This option might be helpful if you

want to get a continuing stream of real-time GPS location notifications without making it obvious that a vehicle alarm has been activated.

Siren Delay: When the alarm is running with full GSM capabilities. It can take up to a minute or more for the alarm to connect and register with a Cell Tower and then get a full GPS Satellite Fix. Setting the "Siren Delay" option to "YES" will inform the alarm not to sound the siren (or flash the lights) until AFTER the alarm has connected to the GSM Network, established a GPS position fix, and sent the initial SMS Alert message. If you choose to use the Siren Delay function, it might help prevent a thief or vandal from trying to locate and disable the alarm before an SMS Text Alert can be sent. Of course, this also means that the lights and siren would not be activated immediately to try and scare the thief/vandal away.

Alarm Reset: This is the time (minutes) that the alarm will run before it resets itself. It should be noted that if one or more triggers remains CLOSED (i.e. Door Open), the alarm will not actually reset, but rather put itself into a Silent Alarm state (Lights/Siren Off, but SMS/GPS messages will continue to be sent). For Example: A setting of "5" will reset the alarm after 5 minutes. A setting of "0" will prevent the alarm from resetting.

GPS Update Interval: This parameter defines the interval (minutes) between SMS messages. For Example: A setting of "15" would continue to send SMS messages with real-time GPS position information every 15 minutes (or until the Alarm is reset). A setting of "0" will disable the GPS functionality (and updates) altogether.

Configuration Commands:

The Sleeper Cell is fully configured via SMS Text messages using very simple commands. The Sleeper Cell will only enter "Configuration Mode" when the S2/CONFIG dip switch is set to ON. The alarm will not listen or respond to any configuration options if the S2/CONFIG switch is not set. Putting the S2/CONFIG switch will power up the Alarm into configuration mode without activating the lights and siren. You may have to wait a minute or so for the alarm to establish a connection to a cell tower (STATUS LED Lit Steady) before it will accept SMS Configuration Commands.

The phone number of your Sleeper Cell Alarm System is determined at the time your SIM card is registered or your account is established. Each alarm will have its own unique phone number. Do not lose this phone number. This is the number to which you will send SMS configuration messages and from which you will receive SMS Alerts.

The Sleeper Cell uses a Notification List to send messages. All numbers in the Notification List are sent SMS Messages not only when an alarm condition is triggered, but also whenever the alarm comes online in config mode, and also if a unknown message (invalid config command) comes in to the alarm from an unknown source (while in config mode). This is useful if you need to get an SMS message forwarded to you from your GSM provider.

When you first take the Sleeper Cell out of the box, the Notification List is entirely empty. Once you power up the Sleeper Cell in Config Mode, the first cell phone to send a text message to the Sleeper Cell will automatically be added as the first number on the notification list. You may have up to 5 numbers in the SMS Notification List, but only the first one is automatically populated when the device is initially configured.

You will want to initially configure the Sleeper Cell from the same phone on which you wish to receive SMS alert messages. The easiest way to initially establish your cell phone as the first notification number is to simply send a valid configuration command ("STATUS") to the alarm once it first powers up in Config mode. To add additional numbers to the Notification List use the "NOTIFY:" command. To display all numbers in the Notification List, use the "SHOWNOTIFY" command. To clear ALL numbers from the Notify List use the "CLEARNOTIFY" command. (Don't forget to add your phone again!)

When specifying numbers to be added to the Notification list always include a plus sign ("+") and the country code (USA = "1") as a prefix to the number. Do not include any dashes, parenthesis, letters, or spaces in the number. For example:

- To add the following USA number to the Notification List: 262-555-1212
- The command would be: NOTIFY: +12625551212
- (Note that there is a space between the colon and the plus sign)

A maximum of 5 numbers for SMS Notification can be accepted. The Sleeper Cell will tell you if you try and add more than five numbers. If you need to change the numbers on the list simply delete the list ("CLEARNOTIFY") and start over.

You can also send a "HELP" command to the Sleeper Cell for a very short message which lists the available commands.

The following is a set of Configuration Options (above) and their respective commands and parameters which can be provided. Each configuration command is a single word followed by a colon (":"), a space, and the desired parameter. A full "Status" message is always sent back after a command is accepted to indicate the current setting of all configuration parameters. If an invalid or mis-typed command is specified the alarm will respond with a "What?" message.

Sleeper Cell Configuration Commands				
Option	Command	Parameter	Notes	Example
Alarm ID	ALARMID:	{string}	19 Chars Max	ALARMID: John's Trailer
Silent Alarm	SILENT:	YES or NO		SILENT: NO
Siren Delay	DELAY:	YES or NO		DELAY: YES
Alarm Reset	RESET:	{number}	Number of Minutes	RESET: 5
GPS Update Interval	GPSUPDATE:	{number}	Number of Minutes	GPSUPDATE: 15
Get Config Status	STATUS	N/A	No Colon	STATUS
Show Notification List	SHOWNOTIFY	N/A	No Colon	SHOWNOTIFY
Add Notification Number	NOTIFY:	{SMS Number}	See Number Format	NOTIFY: +12625551212
Clear Notification List	CLEARNOTIFY	N/A	No Colon	CLEARNOTIFY
Request Help	HELP	N/A	No Colon	HELP

Configuration Considerations:

If you configure the alarm to disable GSM functionality (S1/GSM OFF):

- No SIM or Cell Phone Account is Required
- No further configuration can be performed (except by code modification)
- No Internal/External GSM Antenna is required
- No External GPS Antenna is required

While the included GSM antenna (connected directly to the alarm itself) may be sufficient to send/receive SMS messages inside the trailer, an externally mounted GSM (Cell Phone) Antenna will generally provide better signal transmission/reception. You may want to consider an external GSM antenna for best performance.

You must install an external GPS antenna on the roof of the vehicle if you wish to use the real-time GPS Locator capability. GPS requires an unobstructed view of the sky. If you do not wish to install an external GPS antenna on your vehicle, or maybe just want to do it at a later time, simply configure the "GPSUPDATE" parameter as "0" (zero) to disable GPS functionality.

Using the Sleeper Cell:

Arming the Sleeper Cell: Secure the vehicle and turn the Keylock to the CLOSED position

Disarming/Deactivating the Sleeper Cell: Turn the Keylock to the OPEN position.

Operational Commands:

Once the Sleeper Cell is Activated/Tripped, authorized users may send several additional SMS commands to control its operation. The Sleeper Cell uses the Notification list to determine if a caller is authorized. (…and you can only update the Notification List if the alarm is physically in Config mode). We don't want the bad guys silencing your alarm with a text message now do we?

The "QUIET" command will remotely disable all lights and siren activity once the alarm is activated. However, It will continue to process GPSUpdate and Notification events.

The "RESET" command will request that the alarm immediately shutdown completely and reset/rearm itself. Note that if a trigger remains closed (ie: a door remains open) the alarm cannot fully reset itself but will still disable all lights and siren.

The "GPSLOC" command can be used to request real-time GPS location information from the Sleeper Cell. Even if GPS functionality was initially disabled (GPSUPDATE: 0), this command can still be used to request position information (an external GPS antenna will still be required). Note that if GPS functionality was not initially enabled, it can take a couple of minutes for the alarm to power up the GPS function and obtain a fix. This command can also be used to obtain GPS location information at any time (between automatic GPSUPDATE Intervals).

While in an Alarm Condition, the Sleeper cell is also an SMS Communication Hub! ANY message sent as a reply to an alarm notification, which is NOT one of the above commands, will be sent to everyone on the Notification List. This makes it very easy for everyone on the Notification List to use the Sleeper Cell as a messaging hub. If someone accidentally sets of the alarm a simple reply of "OOPS!" or "My Bad!" will let everyone else on the list know that the situation is not urgent. If several recipients are far away, and one is very close, the close recipient might reply with a message like "I'll take care of it" so everyone else can rest easy. The cell number of the individual who is responding to a SMS Alert message is included at the beginning of the group notification to assist in identification of the responder.

Sleeper Cell Operational Commands				
Function	Command	Parameter	Notes	Example
Disable Lights/Siren	QUIET	N/A	No Colon	QUIET
Shutdown/ReArm	RESET	N/A	No Colon	RESET
Request GPS Location	GPSLOC	N/A	No Colon	GPSLOC
Send Msg to Everyone	{Anything Else}	N/A		I'll take care of it

Testing the Sleeper Cell:

1. Secure the vehicle (Close all doors, etc)
2. Turn the Keylock to the CLOSED/ARMED position
3. Wait to ensure that the alarm HAS NOT been activated
4. Open a door or otherwise trip an alarm trigger switch
5. Confirm that the alarm HAS been activated. (Be aware that it may take approximately 30 seconds for the GSM chipset to lock onto a cell tower and an additional 30 seconds for GPS location be acquired).
6. Deactivate the alarm by turning the keylock switch to the OPEN/DISARMED position.

Troubleshooting:

1. Test the alarm without GSM (cellular) function enabled. Turn the CONFIG switch OFF and the GSM switch OFF to set the alarm in isolated mode. Enable the alarm (keylock) and try tripping one of the triggers (doors, motion, etc). Does the alarm function as expected when isolated?

2. If you think it might have been possible for an "outside" message to have gotten into your alarm and automatically authorized itself in the first position, just boot the alarm in "CONFIG" mode and send it a "CLEARNOTIFY" message. Once you get confirmation, you can then send a "STATUS" message to automatically load your number in the first position. (Although the first notify position is the only one that gets loaded automatically, you can also add a number any time in CONFIG mode by using the NOTIFY command). Note that numbers can only be added (automatically or manually) while in CONFIG mode, and that the only time you might have this happen is when you first insert a new SIM card and the cell network sends you a welcome or authorization message before you can send your first text the device. If in doubt, just send a CLEARNOTIFY commend and start as new.

3. The status LED on the alarm basically tracks GSM (cellular) functionality. In order to test GSM functionality turn the CONFIG switch ON. Once you turn the CONFIG switch on the alarm should power up in configuration mode (regardless of keylock position). It may take a minute or so for the GSM chipset to lock onto and register with the cellular network. Once the alarm is registered on the network and functioning properly, the STATUS LED should be lit steady. If the STATUS LED is flashing, the following flash codes can be used to assist in troubleshooting the status of the alarm:

    - **Steady Off = GSM Off / No Service**
    - **Steady On = GSM Service Connected (Normal)**
    - **2 Flashes = No Recipient(s) Identified:** This is normal for an alarm "fresh out of the box". The alarm is simply waiting for your cell phone to send it a text message to start the configuration process. No need to power off the alarm. Just send it a text message (i.e. "STATUS") and the light should come on steady.
    - **3 Flashes = SIM Not Detected:** Either a SIM card is not inserted or it is inserted incorrectly. Turn the CONFIG switch off. The alarm should power down. Insert or reorient the SIM card properly (see photo in this document).
    - **4 Flashes = Network Registration Failure:** This generally indicates that the alarm cannot connect to the cellular network. This is usually caused by lack of cellular coverage, a bad antenna connection, or even possibly an issue with the SIM card. Confirm your antenna is connected and working properly. Try relocating your alarm to a better coverage area. Try installing the SIM card in an unlocked GSM cell phone and check coverage.

Open Source Firmware:

Haute Solutions developed the software/firmware for the Sleeper Cell completely from the ground up. We have also designed the hardware (both boards) used in the alarm system. Both the hardware and the software used in this device is completely and uniquely of our own design. We could have chosen to keep all of this proprietary, but we believe that products can improve with community participation. We also believe it is better to provide a really good product at a fair price, rather than an expensive proprietary product which requires continually reoccurring fees for proprietary services. We believe this cultivates happier customers. …and happy customers are loyal customers!

If you are so inclined, Haute Solutions provides the source code for the device at the Haute Solutions Website (www.haute-solutions.com). We could provide a direct link to the "Software Page" but we would rather have you look around a bit on the website. ;-) Currently, compilation of the firmware requires the base source, and also a GSMSMS library, both of which are developed and maintained by Haute Solutions. You can find these on our web site if you wish to modify the behavior and capabilities of YOUR alarm. This may not be a trivial endeavor unless you are a programmer, but it also might be a really interesting learning experience.

The firmware can be compiled and uploaded to the Sleeper Cell using a free open source programming environment. Documentation which describes how to obtain the free programming environment, and the compilation/upload process, can be found on our web site.

This software is made available under the spirit of the Open Source License. This software is freely downloadable and modifiable for individual use only. It may not be downloaded and used or modified for inclusion in any other commercial products. This source code may only be used for non-commercial purposes and is intended only for use with the Sleeper Cell Alarm product.

If you decide to download the software and make some modifications to our base functionality, all we ask is that you email us a copy of your updated code, with a brief explanation of your modifications, so we can make it available to other users in the Sleeper Cell Alarm community. Sharing is good!

Advanced Operation (Programming and Modification)

Programming the Sleeper Cell Alarm:

The ability to update the firmware in the field can be very useful if you wish to download and upgrade the latest firmware without removing the device from its installed location. If you wish to upgrade the firmware without removing the device, you will need a Windows laptop. If you wish to use a Windows PC, you will need to remove the device from its installation location.

Although programming it is not required, advanced users may also wish to modify the capabilities or behavior of the device. This is easily supported, even encouraged, and the code has been made publicly available for download and modification. If you come up, and implement, an interesting modification, please upload the code so that other users may take advantage of the enhancements!

SOFTWARE Installation (Arduino IDE and GSM Library):

1. Download the latest Arduino development environment (*.EXE): http://arduino.cc/en/Main/Software

2. Install the Arduino Development Environment (*.EXE)

3. Download the latest "GSMSMS" Library from the Haute Solutions Sleeper Cell Support Page (*.ZIP): http://www.haute-solutions.com/sleepercell

4. Extract the contents of the GSMSMS library archive (GSMSMS.ZIP) to your "Documents\Arduino\Libraries" folder. You should have a folder named GSMSMS with at least two files in it (GSMSMS.CPP and GSMSMS.h). (Every Arduino library MUST be located in its own dedicated folder under "Documents\Arduino\Libraries").

5. Download the latest Sleeper Cell Alarm Firmware (SleeperCell.ZIP) from the Haute Solutions Web Site (*.ZIP): http://www.haute-solutions.com/sleepercell

6. Create a folder named “SleeperCell” under "Documents\Arduino".

7. Extract the contents of the SleeperCell.ZIP archive to the "Documents\Arduino\SleeperCell" folder you just created. (Every Arduino sketch/program (*.ino) MUST be located in its own dedicated folder which has the EXACT same name as the sketch itself).

8. Double click on the SleeperCell.ino file which was just extracted and it should load automatically into the Arduino Development Environment.

9. Open the Tools Menu in the Arduino Development Environment, select the “Board” option, and choose “Arduino/Genuine Mega or Mega 2560”.

10. Click on the VERIFY toolbar icon (check button) in the Arduino IDE and confirm that the program will compile properly

11. If the program does NOT Verify (compile) properly check to ensure the GSMSMS library is properly installed

12. If the program Verifies (compiles) without error, all software, libraries, and code should now be properly installed!

Programming the HARDWARE (ESP324G):

1. The Sleeper Cell Alarm DOES NOT need to be removed or disconnected in order to update or reprogram the firmware.

2. Disable the alarm by turning the security keylock to the off position.

3. Place the CONFIG dipswitch to the “ON” position. This small switch is located through the little cutout in the front of the enclosure. (Placing this switch in the CONFIG position will ensure that the alarm DOES NOT sound the lights and siren when it receives power from the USB cable we will plug in).

4. DO NOT attach the USB cable to the device yet…

5. Open up the Arduino Development Environment on your laptop (or PC) if not already open. Go to the TOOLS menu and open the PORT option. Note the COM ports currently visible to your system (if any).

6. Now attach a “mini” USB cable between your laptop and the usb port accessible on the side of the device enclosure. (Note that the USB cable must have the larger “MINI” connector and not the smaller “MICRO” connector which is common to charge most modern cell phones).

7. If your computer asks for a USB driver, you should point it to the "C:\Program Files (x86)\Arduino\drivers" folder. Ensure the driver search is set to include sub-folders as well...

8. Go back to the Arduino Development Environment, open the TOOLS menu, and select the PORT option. You should now see a **new/additional** COM port listed. This should be the COM your Sleeper Cell is using. Select the new COM port.

9. Load the SleeperCell.ino project into the Arduino IDE (if not already done so).

10. Under TOOLS menu, set the BOARD type to "ESP32 Wrover Module" (if not already done so). If you do not find any ESP32 board options available, please select the “Board Manager” and scroll down to select “ESP32” to load them.

11. Click on the UPLOAD toolbar icon (right arrow button) in the Arduino IDE and confirm that the program compiles and uploads properly.

12. If the UPLOAD function does NOT work properly, check the following items:

    - Is the USB Driver installed properly? (Any USB devices NOT being loaded properly in your hardware manager?)

    - Does the COM Port selected in the IDE properly correspond to the USB port being used by the Sleeper Cell Alarm?

    - Is the board properly selected in the IDE ("ESP32 Wrover Module”)?

    - Is the GSMSMS Library properly installed?

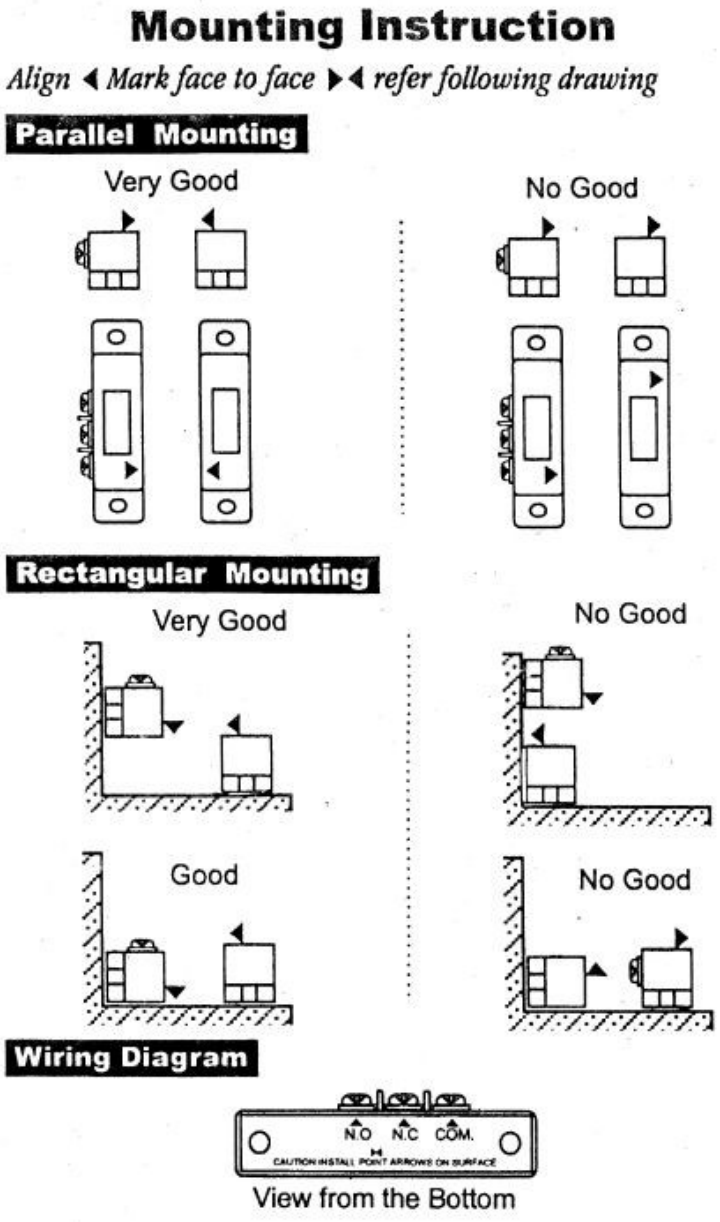
13. If the UPLOAD function works properly, then all the software was properly installed, all the HARDWARE properly attached, all the configuration settings successful, and your Sleeper Cell was successfully updated!

14. You can now modify the source code and program the device if you wish! (You can always flash it back!)

Magnetic Reed Switch Installation Notes:

Connect Trigger Wires to "COM" (Common) and "NC" (Normally Closed) connectors. If you are configuring for a "Two Wire" trigger, then connect one wire to "COM" and one wire to "NC". If you are configuring for a "Common Ground" trigger, then connect your alarm trigger wire to "NC" and run a short wire from "COM" to the nearest place you can get a good chassis ground. Terminals are labeled on the back side of the switch. If you already have your switch mounted, "NC" is the middle terminal and "COM" is the terminal on the same side as the little arrow molded onto the front of the switch.

(We want our circuit to be OPEN when our doors are closed with the magnet next to the switch. However, the switch manufacturer considers the "Normal" state to be when the magnet is NOT nearby. So we want to use "NC" such that the circuit is closed when the magnet is moved away from the switch (to its "normal" state).)



Motion Sensor Installation, Adjustment and Usage Notes:

The Haute Solutions Motion Sensor is specifically designed for use with this alarm system. While most modern motion sensors are electronic devices which require a constant supply of power, our sensor is a specially designed mechanical device which does require any power. (A primary feature of the Sleeper Cell Alarm is that it does not draw any power until triggered so it will not draw down your battery during long term storage).

Initial Assembly: The Motion Sensors require a little bit of assembly. We ship them with the steel ball isolated and in a small plastic bag to protect the clear cover during shipping. Also note that the RAM Ball Mount in the photo is NOT included with the alarm

- Remove the three screws which hold the clear cover on the sensor and take the cover off.
- Remove the little plastic bag containing the steel ball from inside the sensor. Set the ball aside.
- Check to ensure the bottom of the spring is NOT touching the metal surface on the bottom of the sensor. Sometimes the spring will migrate during shipping. It should be close to the metal bottom, but it should NOT TOUCH the bottom. If the spring is touching the bottom, gently slide the spring up a bit by using your finger to slide it up a bit along the wall near the top of the cavity. This is typically fairly straight forward and should only need to be done once during initial assembly. (If desired, you can also check this with a multimeter. Make sure the circuit between the two wires is OPEN).
- Now that that the spring is checked/adjusted as necessary, carefully drop the little steel ball down into the sensor in the middle of the spring cavity.
- Reattach the clear top using the three screws.
- If desired, you can confirm the sensor is set up and working properly by using a multimeter to confirm that the circuit between the two sensor wires is OPEN when the ball is in the center of the cavity (and NOT touching the spring), and that the circuit is CLOSED when the sensor is tipped slightly so ball touches the spring.
- A RAM Ball Mount (NOT Included) can now be attached to the Motion Sensor using the two provided screws.

Motion Sensor Installation, Adjustment, and Usage Notes (Continued):

Mounting and wiring: The mounting bracket for the motion sensor should be attached to a flat horizontal or vertical surface inside the vehicle where you have easy access to it. You don't want it to be in the way, but you will need access to the sensor each time you relocate your vehicle. The motion sensor should be mounted with the clear plastic window face up. If you are configuring for a "Two Wire" trigger, then connect the two wires from the motion sensor to the two wires in your trigger circuit (polarity doesn't matter). If you are configuring for a "Common Ground" trigger, then connect one of the sensor wires to your trigger circuit and the other wire to the nearest place you can get a good chassis ground.

Usage: Each time you move or park your vehicle you will need to re-adjust the motion sensor to its neutral position before arming the alarm. In order to do this, loosen the mounting bracket while looking down through the top window, adjust the orientation of the sensor so the steel ball is in the middle of the spring cavity and NOT touching the spring in any way, and then tighten the mounting bracket back up. Verify the steel ball is properly centered after tightening the mounting bracket. Any movement of the trailer will cause the steel ball to move and contact the spring. This will close the alarm circuit and trigger the alarm. (Basically, the steel ball will complete the electrical circuit between the dished/curved metal base and the spring).

Troubleshooting: If you are continually getting false alarms, make sure the ball is properly centered in the MIDDLE of the spring cavity before you arm the alarm. If the alarm is immediately activated every time you arm it, make sure the spring is NOT touching the metal bottom of the sensor (You will have to remove the clear cover and take out the ball to do this as discussed above).