

Cello Hardware Installation Guide



Cellocat Division
Pointer Telocation Ltd.

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POINTER



Cello Hardware Installation Guide



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1 Introduction

This guide provides the necessary information for technicians to install the Cello Fleet unit (Cello-F) or a Cello Recovery unit (Cello-R). It describes how to install and verify the proper functioning of the Cello-F installation kit elements. Additional information, relevant to the Cello-R system kit elements, is provided throughout the guide.

1.1 Abbreviations

Abbreviation	Description
ACK	Acknowledge
CAN	Controller Area Network
CCC	Command and Control Center
DB	Database
FMS	Fleet Management System
OTA	Over the Air
PDU	Protocol Description Unit (Common name for data SMS)
PGN	Parameter Group Number
SMS	Short Message Service (GSM)

1.2 References

#	Reference	Description
1	Cellocator Wireless Protocol	This document explains the unit's wireless communication structure. It describes every byte of the incoming and outgoing packets, which can be sent or received by the unit over-the-air. To download the manual, access the support section of the Pointer Website (www.pointer.com).
2	Cello Programming Manual	This document describes the features supported by the Cellocator unit and provides details about the contents of the unit's internal EEPROM. To download the manual, access the support section of the Pointer Website (www.pointer.com).



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#	Reference	Description
3	Cello Harness Catalog	This document describes in details the different harnesses that can be used on this product.

1.3 Revision History

Version	Date	Description
1.0	15/3/10	Initial version.
1.1	10/10/10	Technical writer editing, change product name to Cello.
2.0	31 March 2011	Adding safety and installation practices, and photos.
2.1	24 July 2011	Technical writer editing.

2 Cello Overview

2.1 Introducing the Main Elements of the Cello Unit

Figure 1 below shows the main elements of a Cello unit.



Figure 1: Main Elements of a Cello unit

Figure 2 provides an internal view of the Cello unit and all relevant elements.

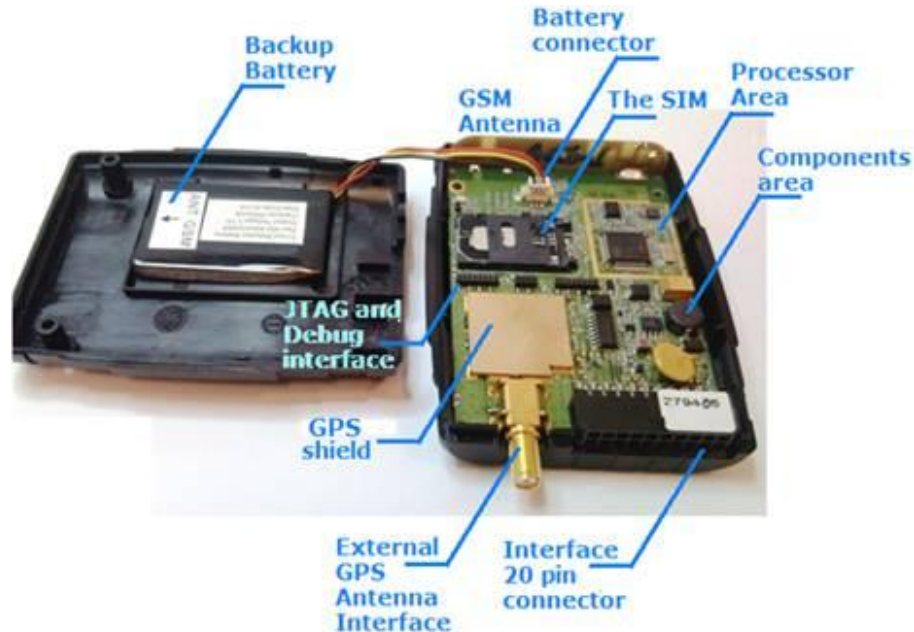




Figure 2: Cello unit – Internal View



2.2 Overview of the Hardware Installation Elements

The Cello-F Hardware Installation kit and the Cello-R Hardware Installation kit include the items listed in Table 1.

Table 1: Cello-F Hardware Installation Kit and Cello-R Hardware Installation Kit Elements

Name/Part Number	Description	Picture
Cello-F PN EFT6600170-TR3N Cello-R PN EST6600170-TR3N	Cello unit. Includes built in GSM modem and GPS antenna.	
External GPS Antenna (optional)	External GPS antenna has a 5 meter cable and magnetic base.	

Name/Part Number	Description	Picture
Dallas kit (optional) PN 712-20015	The Dallas button is an electronic component which provides driver identification. It is enclosed in a 16 mm stainless steel casing. The Dallas kit includes a reader and two different unique ID keys.	
Handsfree kit (optional) PN 712-20016	Used for vocal communication between the driver and assistance representatives or control center operators. Includes Cellocator Handsfree module, speaker and microphone.	
Vehicle harness (optional)	Wiring harness for vehicle installation. Several harness types are available for the Cello-F (please refer to Table 3). The Cello-R uses PN 711-00196.	
Fuse and Fuse housing PN 710-00001 PN 710-00002	3A Fuse and Fuse Housing for vehicle Installation.	
Distress button PN 711-20001	Push Button, used for connection to unit's input. Can serve as a distress button for example, or as a Voice call control button.	

Name/Part Number	Description	Picture
<p>12V Immobilizer relay with holder</p> <p>PN 711-20000 PN 711-20023</p>	<p>12V 40/30A relay supports immobilizing and general purpose applications.</p>	
<p>24V Immobilizer relay with holder</p> <p>PN 711-20006 PN 711-20023</p>	<p>24V 40/30A relay supports immobilizing and general purpose applications</p>	

2.3 Cello Unit Types

The Cello-F is an advanced integrated GPS/GPRS unit designed for fleet management. It includes a 32-bit processor and expanded memory providing storage for up to 9,000 events.

The Cello-R is an innovative integrated security tracking and fleet management unit which adds sophisticated car alarm logic to fleet management functionality.

2.4 Cello Harness Overview

Cellocator provides several types of harnesses as listed in Table 3. This section describes the installation of the full harness, PN 711-00196, which is applicable for both the Cello-F and the Cello-R. The other harnesses, relevant only for the Cello-F, utilize only some of the full harness wires and thus only the relevant wires should be referenced.

The harness is made up of 15 cables, 3 meters long, connected to a 20-pin connector that links to the Cellocator Cello unit. Refer to the following illustration for the cable and pin structure of the harness.

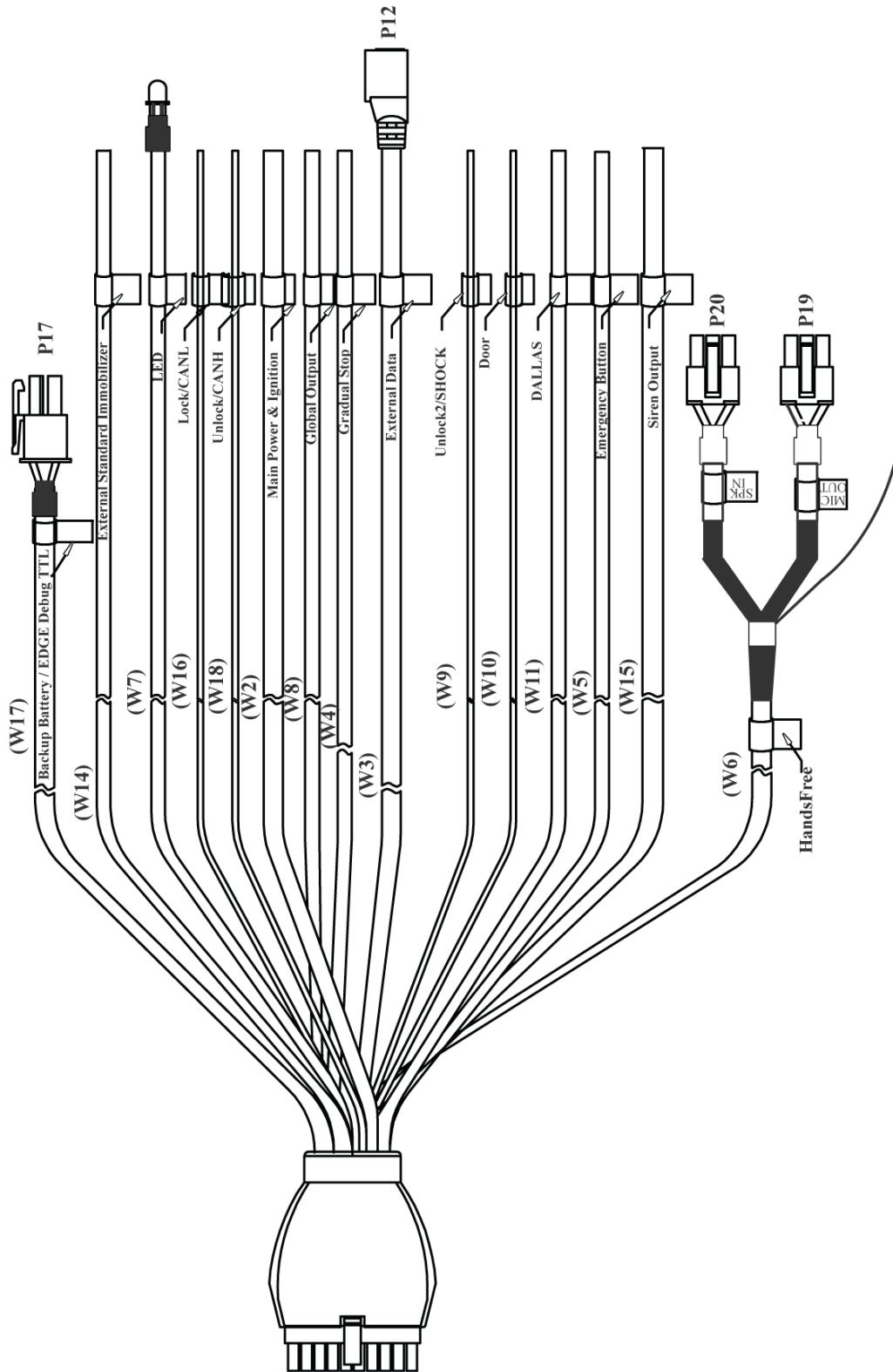


Figure 3: 711-00196 Full Harness Diagram



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The following inputs are configurable:

- ◆ Pin 14 – Doors
- ◆ Pin 15 – Unlock2/SHOCK

These internal resistor inputs can serve as digital or analog inputs as described in the following:

- ◆ Discrete dry contact (internal pull-up)
- ◆ Discrete normal (wet input, no internal resistor)
- ◆ Analog backward compatible (0-2.5V), reported with resolution of 9.8mA/bit
- ◆ Analog Full Range (0-30V), reported with resolution of 117.65 mV/bit
- ◆ Frequency meter - capable to measure frequency of pulses with an amplitude between 4 to 30V, up to 5kHz. Can serve as a general purpose frequency meter or as a system source of speed (Vss).

Default Value: zero (discrete dry contact)

The inputs Lock, Unlock and Panic button are discrete (internally pulled up). The Ignition input is internally pulled down.

The following table provides a description of the harness. Additional information can be found in the relevant sections dealing with the harness installation instructions.

Table 2: Cello Harnesses Pin-to-Pin Configurations

Wire Number	Wire Label	Wire Color	Cello unit Pin Number	Harness Adaptors Pin Number	Function
W2	Main Power and Ignition	Red	P1.2		Main Power
		Black	P1.3		Main GND
		Violet	P1.4		Ignition
W3	External Data	Black	P1.3	P12.1	RS232 GND
		Blue	P1.12	P12.3	RS232 TXD
		Green	P1.13	P12.4	RS232 RXD
W4	Gradual Stop	Red	P1.2		Power for Output
		Brown	P1.17		Gradual immobilizing, or global output, or Geo-Fence notification
W5	Emergency Button	Black	P1.3		GND
		Grey	P1.16		Global input, usage counter, or emergency voice call initiation



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Wire Number	Wire Label	Wire Color	Cello unit Pin Number	Harness Adaptors Pin Number	Function
W6	Handsfree	Red	P1.4		Power for Handsfree module
		Grey	P1.9	P20.3	Handsfree - Audio Out
		Yellow	P1.10	P19.1	Handsfree - Audio In
		Black	P1.19	P20.2	Handsfree - GND
		Green	P1.19	P19.3	Handsfree - GND
W7	LED	Red	P1.2		Power for output
		Black	P1.6		Global output, LED, or Geo-Fence notification
W8	Global Output	Red	P1.2		Power for global output
		Yellow	P1.18		Global output, system feedback, or Geo-Fence notification
W9	Unlock2/ SHOCK	Brown	P1.15		<p>Analog input, discrete input or frequency meter according to programming configuration</p> <p>It can be programmed for: Global input, standard voice call control, privacy mode control, usage counter input, or frequency counter</p>



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Wire Number	Wire Label	Wire Color	Cello unit Pin Number	Harness Adaptors Pin Number	Function
W10	Doors	White	P1.14		<p>Analog input, discrete input or frequency meter according to programming configuration</p> <p>It can be programmed for: door sensor, or global input, or usage counter input, or transparent data forwarding switch, emergency voice call initiation, or frequency counter</p>
W11	Dallas	Black	P1.3		GND for Dallas
		Orange	P1.20		Dallas
W14	External Standard Immobilizer	Red	P1.4		Power for output
		Green	P1.7		Global output, engine Immobilizer, or Geo-Fence notification
W15	Siren Output	Red	P1.2		Power for output
		Blue	P1.8		Global output, system feedback, or Geo-Fence notification
W16	Lock/CANL	Orange	P1.5		Global input or usage counter
W17	Debug/Backup Battery	Red	P1.1	P17.1	Debug line
		Black	P1.3	P17.2	GND for Debug
W18	Unlock/CANH	Green	P1.11		Global input or usage counter



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2.5 Harness Types

The following table provides a list of various harnesses that can be supplied with the Cello-F Hardware Installation kit.

Table 3: Cello Fleet Harnesses

PIN	Title	Function	711-00068	711-00088	711-00156	711-00196
1	Debug	Debug				X
2	Main Power	VCC	X	X	X	X
3	Main Power	Ground	X	X	X	X
4	Input	Ignition Switch	X	X	X	X
5	Input	Global Input				X
6	Output	LED				X
7	Output	External Standard Immobilizer			X	X
8	Output	Siren				X
9	Hands Free	Audio Output				X
10	Hands Free	Audio Input				X
11	Input	Global Input				X
12	Ext. Data	Tx				X
13	Ext. Data	Rx				X
14	Input	Door				X
15	Input	Global Input Unlock 2	X	X		X
16	Input	Emergency Button			X	X
17	Output	Gradual Output			X	X
18	Output	Global Output				X
19	Hands Free	Audio Ground				X
20	Dallas	Dallas	X			X

All installation instructions are relevant for harness 711-00196. All other harnesses are subsets of this harness and relevant guidelines are provided in the following paragraphs.

For harness 711-00088 (4 wires) refer to the relevant sections:

- ◆ Main Power and Ignition (Section 5.3.1)
- ◆ Global Input (Shock) (Section 5.2.1)
- ◆ Pin-Out Definition (Table 2) pin numbers: 2, 3, 4 and 15.



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For harness 711-00068 (6 wires) refer to the relevant sections:

- ◆ Main Power and Ignition (Section 5.3.1)
- ◆ Dallas button (Section 5.2.6)
- ◆ Global Input (Shock) (Section 5.2.1)
- ◆ Pin-Out Definition (Table 2) pin numbers: 2, 3, 4, 15 and 20.

For harness 711-000156 (6 wires) refer to the relevant sections:

- ◆ Main Power and Ignition (Section 5.3.1)
- ◆ External Standard Immobilizer Output (Section 0)
- ◆ Distress/Emergency Button (Section 5.2.4)
- ◆ Gradual Output (Section 5.2.1)
- ◆ Pin-Out Definition (Table 2) pin numbers: 2, 3, 4, 15 and 20.

These various harnesses are samples of the large variety of the available set of harnesses which should be treated as explained in this section.

If two frequency inputs are required, harness 711-00248, which utilized 2 shielded wires, shall be used.



3 Preparing for Installation

The following section explains the pre-installation steps you should perform before installing the Cello unit.

3.1 Pre-Installation Information

IMPORTANT:

- You must be a certified technician and qualified to install the Cello system.
 - Please make sure you have the correct documentation for the devices you install. The devices and documentation change frequently, which may impact the installation procedures.
 - Make sure you know the installation procedures and restrictions of the vehicle; consult with the dealer or manufacturer to get any specific instructions. These may refer to locations in the vehicle where you can install the device, connections to the electrical system, use of fuses, etc. Not following these instructions and restrictions may create false alarms and malfunctions in the vehicle systems and may even void the vehicle warranty.
 - Modern vehicles have many computerized systems that may be sensitive to radio transmissions from the device you install and may also generate interferences to the device. Carefully read the manufacturer's instructions and restrictions regarding these systems.
-

3.2 Safety

WARNING:

- Use protective goggles during the installation.
 - Disconnect the vehicle battery during installation. Working on live wires can be dangerous and can, for example, result in airbags inflating or fuses burning out. Some devices (e.g. the radio) may require reprogramming after a power disconnect.
 - Do not install any wires (except the fuel sensor wires) near the fuel system or fuel pipes. Make sure you never work near the fuel system with the battery connected.
 - Installation in vehicles with computerized systems may have unexpected results. Please consult with your local car dealer before performing any vehicle OEM invasive installation.
 - Do not disconnect any connectors in the vehicle while the ignition switch is turned on. This may result in damage to sensitive vehicle subsystems.
 - Use special care when handling the backup battery of the Cello unit. Refer to Section 8 for details.
-

3.3 Tools and Equipment Required

To correctly install the device and accessories, you may need the following equipment and tools:

- ◆ A wire cutter
- ◆ Pliers (2 sizes may be required)
- ◆ Screwdrivers of several sizes
- ◆ Professional insulation remover
- ◆ Crimping tool for wire lugs
- ◆ Digital multi-meter
- ◆ Utility (razor) knife
- ◆ Flash light or other light source
- ◆ Tools to remove the vehicle trims (panel popper, sockets, ratchet etc.)

3.4 Materials Required

- ◆ Soldering wire
- ◆ Insulation tape of good quality (which can withstand the high temperatures in a vehicle on a hot summer day)
- ◆ Wire lugs with star washers
- ◆ Grommets, plastic tubes – as needed



Figure 4: Materials Required

3.5 Installation Best Practices

This section lists the Best Practices you should follow for installing the unit.

- ◆ Put protective covers on the front seats before you start the installation, to prevent damage to the upholstery. Use other covers for sensitive areas in the vehicle (LCD display, radio etc.).

- ◆ Do not use a cutter to expose the conductor in the wire, use a professional insulation remover that will not damage the delicate copper conductors.
- ◆ Use soldering for all of your connections. Do not connect a new wire to an existing wire (without soldering it) to make a connection. These types of connections, as shown in the following picture, are typically of poor quality and sooner or later will disconnect or will make intermittent connections.

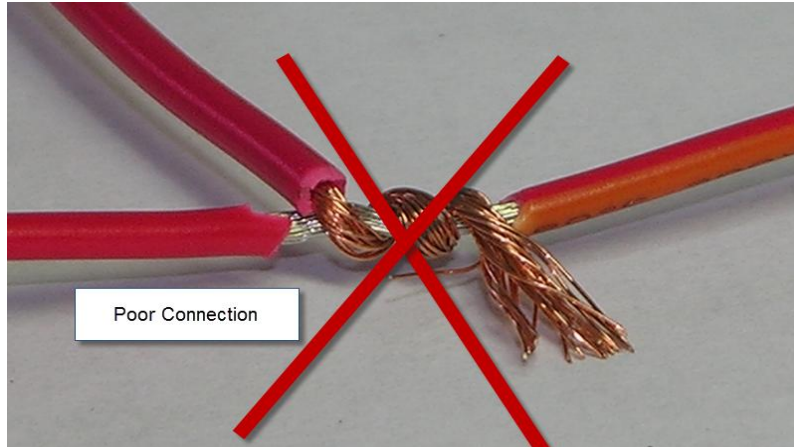


Figure 5: Poorly Soldered Connection

A good connection has to be properly soldered, as in the picture below:

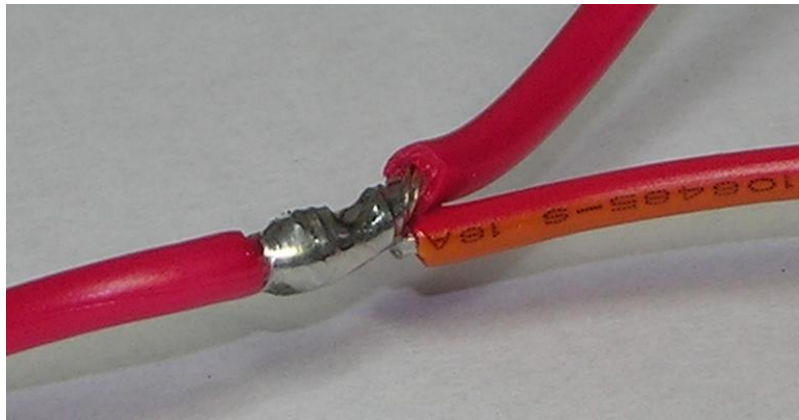


Figure 6: Correctly Soldered Connection

- ◆ Isolate the connection with a plastic cover or a professional insulation tape so that no wires remain exposed.



Figure 7: Isolate the Connection

- ◆ Use existing wire ducts, openings and holes to pass wires between different areas in the vehicle. Do not punch or drill new openings or holes to pass wires between different zones in the vehicles, as this will create permanent damage to the vehicle, and other wires or pipes. Make sure the opening is properly protected by a grommet or a plastic sleeve to prevent damage to the wires.



Figure 8: Preventing damage to the wires

- ◆ Use only a voltmeter or LED based test lamp (that uses a very small current) to test the existence of voltage in a wire or accessory. Do not use a regular test lamp to test the existence of voltage in a wire. These testers take quite a lot of current and may damage the equipment in the vehicle (for example it can trigger an airbag or damage a communication bus).
- ◆ When you want to test the voltage on a wire, do not expose the existing wires or use a sharp edge to make an electrical connection to a wire through the insulation sleeve around it. Make the connection at the end of the wire, near the connector.
- ◆ Do not insert the multi-meter probe tip into the female pin in the connector. This may widen it and prevent a proper connection when the male connector is plugged in.

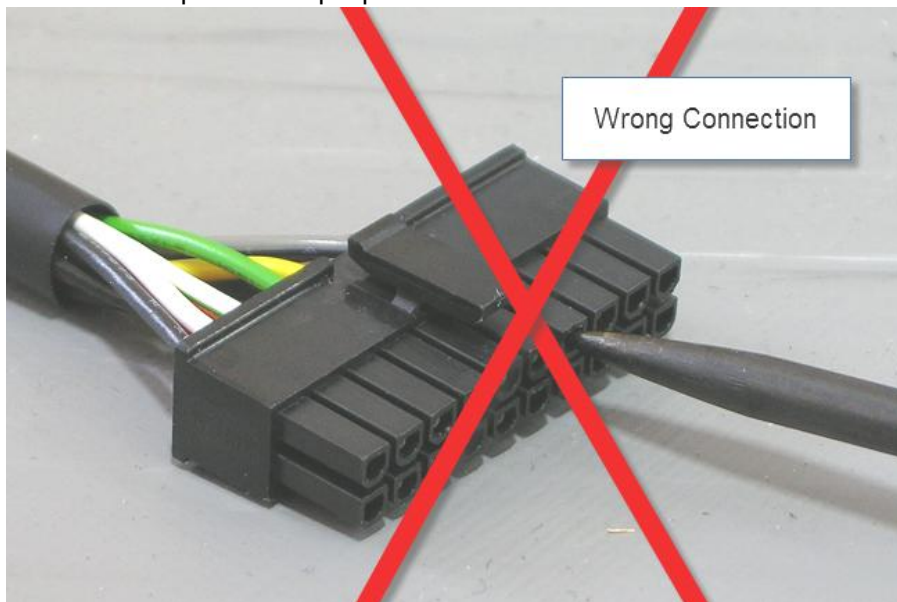


Figure 9: Incorrect probe insertion

The correct way to connect the probe of a voltmeter or tester to the connector is shown below:

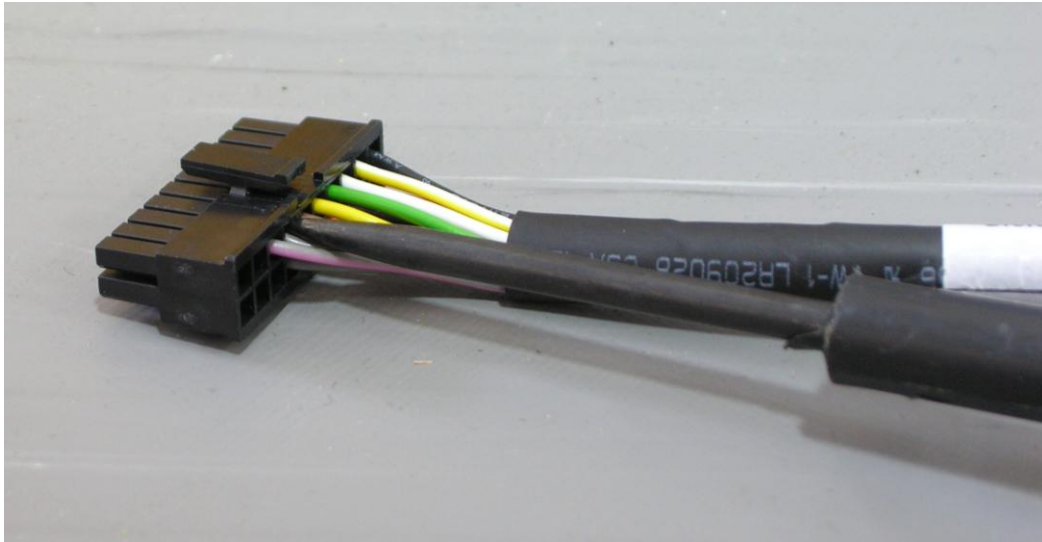


Figure 10: Correct connection

- ◆ To connect the negative power wire of the device, connect a lug properly crimped (or soldered) to the negative wire of the device (pin 3 in the 20 pin connector) and screw it to the chassis using an existing screw. Ensure the connection is good and stable.



Figure 11: Connecting negative power wire

- ◆ After all wires are connected, use plastic straps (cable ties) or insulation tape to secure all the wires and cables to fixed elements in the vehicle (such as existing stable cables, metal parts or other fixed parts of the vehicle, but not parts that are removed during regular vehicle service). Loose cables and wires may cause irritating noises while the vehicle is in motion.
- ◆ Do not lay cables and wires on the floor of the vehicle where people can step on them. Always route the cables in areas where they will not be stepped on or otherwise damaged by other activities.
- ◆ All wires and cables should be hidden.
- ◆ Make sure the device is receiving power with a properly fused connection. The fuse is supplied with the harness.
- ◆ To attach the device to its location use a thick, two sided, adhesive tape, between the device and the fixed support and then use two plastic straps (cable ties) to secure the device to its location. Make sure the device is well positioned and will not become loose (it may either fall or create irritating noises if not properly secured).

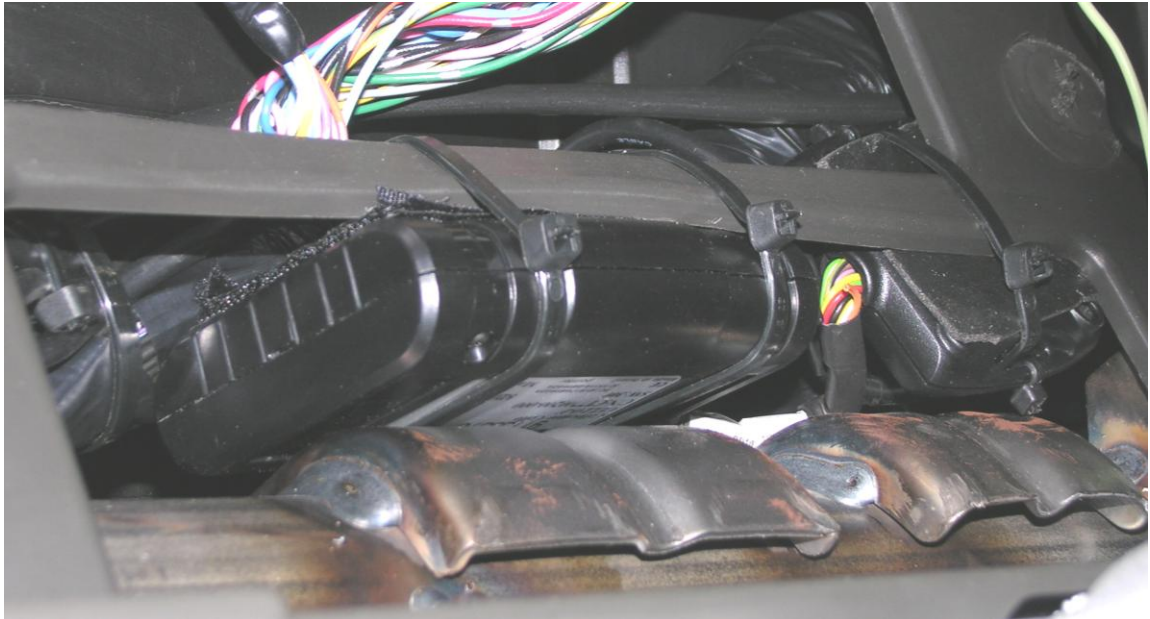


Figure 12: Attaching the device

- ◆ When you finish your work, clean the vehicle and return all the items you removed into their original positions, using all the original screws and connectors.
- ◆ Test the functioning of all the vehicle systems: they should all perform as is before you installed the device.
- ◆ Test the connectivity of the device with the system server to ensure proper operations.



4 Cello-F Unit Installation Instructions

Before installing, please read the Pre-Installation Information and Safety sections.

4.1 General

The following table describes the type of vehicle in which you can install the device, and which vehicles you should NOT install it in.

Table 4: Compatible and incompatible Vehicles

You can install the device in...	Do NOT install the device in...
<ul style="list-style-type: none"> • Passenger cars of all types • Light and heavy trucks • Buses 	<ul style="list-style-type: none"> • Motorcycles • Snowmobiles • Tractors • Boats, jet skis and other marine units • The carriage of a semi-trailer or full trailer • Containers and other assets <p>Installation in these environments requires special protection materials and is not covered in this guide.</p>

- ◆ The device has internal GPS and GSM antennas and usually does not require an external GPS antenna. However, in certain cases, such an external antenna can be used to enhance GPS reception.
- ◆ The device has no external GSM antenna.

4.2 Location of the Device in the Vehicle

When locating the device in the vehicle please consider the following:

- ◆ The device is not weather proof. It is specified as an IP40 device and thus is not immune to penetration of water, rain, dust, dirt and smoke. If you need special solutions to special environmental conditions, please consult your customer support or account manager.
- ◆ The device receives and transmits radio energy in the GSM frequency bands.
- ◆ The device receives radio energy in the GPS frequency band from GPS satellites above.
- ◆ In SVR applications it is recommended to conceal the device so that it will not be easy for thieves to find and disconnect it.
- ◆ The device will not function well in excessive temperatures (see the specifications for details).
- ◆ The device requires minimal maintenance.

The following table describes both the preferred locations for installing the device and a list of locations where the device should NEVER be installed.



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Table 5: Where to install the device

Preferred location in vehicle...	NEVER install the device (or the external GPS antenna)...
<ul style="list-style-type: none">• Behind the dashboard.• In or behind the glove compartment.• Anywhere in the front of the passenger compartment under the console and above the leg space.• In a protected area under the driver's seat.• Less preferable: in the trunk of a passenger car (the radio signals penetrate the trunk mostly through the rear window and rear seat: you may have to find the best location and orientation through trial and error). You can use the external GPS antenna to achieve greater flexibility – the external GPS antenna should be located close to the rear window.	<ul style="list-style-type: none">• Outside of the passenger compartment or vehicle trunk.• In the engine compartment.• Inside the bumpers/fenders (note that in some cases you may install the GPS antenna inside the front or back bumpers (fenders, or collision absorbers), however, do it only if you do not have any other reasonable location).• Behind the front lights.• In air ducts.• Close to airbags.• Under the vehicle.• Under the roof of the vehicle (note that you may install the device under the roof only if you use an external GPS antenna).• In a location susceptible to rain or water.• Inside a metal pocket or box.• In the loading area of a truck or pickup.• Near the fuel tank.• Near the wheels.• Near any radio transmitter or its antenna.

Some vehicles, (for example, some Renault Kangoo models) have solar windows with transparent metallic coating that blocks the solar radiation. Unfortunately they also block most of the radio radiation required for the GPS reception. In these cases, you may have to use the external GPS antenna and consult with the dealer about the best locations for the device and GPS antenna. If such support is not available, use trial and error to find a reasonable place for both the device and the antenna.

Locating the device in a prohibited location may significantly affect the functionality of the device, will shorten its lifetime and will create malfunctions and expensive service calls.

Note that the space inside the doors is not a very good location. It is more exposed to outside temperatures and will force you to install the device vertically and not horizontally. If you have to install the device there make sure to locate the device in the area that is not exposed to rain and water and has reasonable reception.

Keep at least 30 cm between the device and any computerized system in the vehicles, to avoid mutual interference.

Do not install the device or any wire near a moving or rotating part of the vehicle.

4.3 Device Orientation

The device direction (orientation) is important when the external GPS antenna is not used. In this case the device uses the internal GPS antenna that should have a good GPS reception. To ensure this, the side marked "This side Up" should face upwards and should have a clear sky view, unobstructed by any metal or shields. Plastic and glass do not usually affect reception.



Figure 13: Device orientation

The GPS receiver in the device is sensitive enough to allow reasonable reception even in cases where the top side of the device (marked 'This Side Up') deviates up to 60 degrees from the ideal direction.



Figure 14: Ensuring the device is located with 30cm free radius

In any case, this side should have a free space (with no metal obstructions) of approximately 30cm radius, with the device in the center of it.



4.4 External GPS Antenna Direction

The following list describes Best Practices for using an external GPS antenna:

- ◆ Make sure the antenna is as close as possible to the (unshielded) glass of the front windshield. The antenna cannot be mounted outside the passenger compartment (except where otherwise specified). The antenna should face upwards and should have a clear view of the sky, unobstructed by any metal. The antenna should not block the driver's view.
- ◆ If you want to conceal the antenna put it directly under the front console, facing upwards.
- ◆ Consider the antenna cable length when you locate it in the vehicle. It is not recommended to extend this cable.
- ◆ Make sure you do not bend the coaxial cable to a radius smaller than 3 cm. Doing so may increase the signal loss in the cable.
- ◆ The antenna cable should be hidden, secure (to avoid rattling noises) and should not be squeezed or pressed by doors or other moving parts.
- ◆ You can use the antenna magnetic base as a way to attach it to a metal surface but it is better to secure it to the location using Velcro tape or double-sided adhesive tape.

4.5 Installing the SIM Card

To install the SIM card, perform the following steps:

NOTE: Make sure that your SIM card PIN is identical to the PIN programmed in the unit, or disabled. The default value of the unit PIN code is 1234. If the SIM PIN and the unit pin differ, insert the SIM card into a regular cellular phone and either change its PIN to the unit PIN (1234) or disable it.

SIM PIN protection and value (locking the SIM) can be activated automatically providing PIN synchronization between the SIM and the unit.

1. Remove the back cover of the Cello-F unit by removing the two securing screws.



Figure 15: Back of Unit Showing Two Securing Screws

2. Gently slide the SIM card into the SIM holder as shown below.

SIM Card in Slot



Figure 16: Inserting the SIM Card



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4.6 Installing the Battery

See Section 8 for information about the battery and its handling instructions.

If you received the device without the battery or you received the device with the battery inside but not connected, please open the device, connect the battery cable to the on-board connector (as shown in Figure 2) and close the device. When you connect the vehicle battery to the device, the device will start working normally. Do not reverse the order of connections; the correct order is to first connect the battery then connect the vehicle power to the device.

5 Main Harness Installation Instructions

5.1 Harness Outputs Installation Specifications

5.1.1 General

The harness contains a special cable for each one of the following outputs:

- ◆ LED
- ◆ External Standard Immobilizer Output
- ◆ Siren Output
- ◆ Special Immobilizer (Gradual) Output
- ◆ Global Output

The following information is common for all the outputs:

- ◆ Each Output cable (with the exception of the External Standard Immobilizer cable) is comprised of two wire bundles that are configured as follows:
 - The red wire is a permanent Main Power connection.
 - The Cello output wires have the following colors: brown, yellow, green, and blue respectively to the selected outputs.
- ◆ All Outputs are Open Collector type and can sink up to 300 mA continuous.
- ◆ External devices (not OEM) that consume more than 300mA should be powered by a relay. In such cases, the output implementation requires an external relay.
- ◆ The outputs can be activated or deactivated from the control center using the OTA command.

5.1.2 Relay Pin-Out

The relay is provided to serve as an adaptor between the harness output and a device in the vehicle (immobilizer, siren, etc.). The following figure shows the pin-out location of the relay. The pin numbers are also printed on the Relay itself.

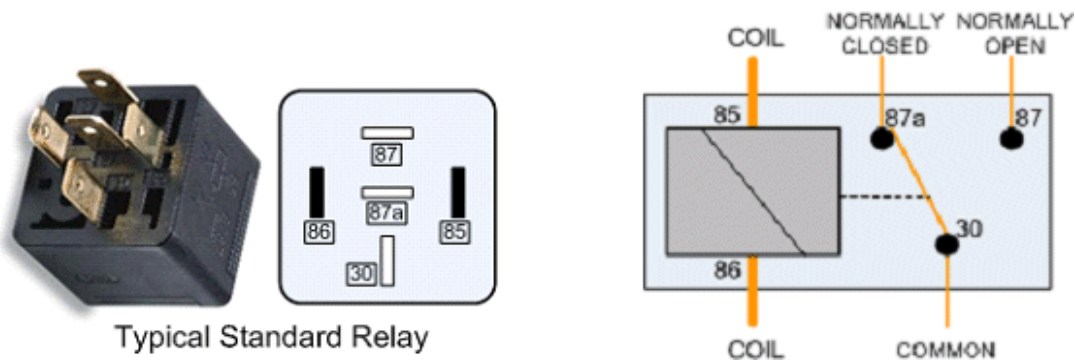


Figure 17: Relay Pin-Out

The relay figure and the pins numbers are used when describing harness outputs installations.

5.1.3 LED Output

The harness LED wire is connected to the Cello unit pin no. 6. The LED itself is already connected to the LED wire and is a part of the harness. The LED provides an indication of



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system status. A full description of LED indications in the Cello-F and Cello-R units is presented below.

The LED output can be used as general purpose open collector output, or as a Geo-Fence notification, if configured accordingly.

No installation is required for the LED, apart from positioning in the vehicle.

The LED output involves a sophisticated blinking pattern which provides monitoring status of both GPS and GSM status. The blinking pattern is constructed of repeated cycles of two blinking zones each. The first zone represents GSM functionality and the second zone, GPS functionality.

- ◆ Each zone lasts for 3 seconds with a 1-second LED off interval between them.
- ◆ A 5 second LED off interval separates each cycle.

GSM Monitoring Zone - 3 seconds	Interval - 1 second	GPS Monitoring Zone - 3 seconds	Interval - 5 seconds	GSM Monitoring Zone - 3 seconds	Interval - 1 second	GPS Monitoring Zone - 3 seconds
---------------------------------	---------------------	---------------------------------	----------------------	---------------------------------	---------------------	---------------------------------

IMPORTANT: To ensure backward compatibility during the voice call, the LED will continually glow from the moment a voice call is triggered until hang up. The cycles of two blinking zones is renewed subsequent to the end of the voice call.



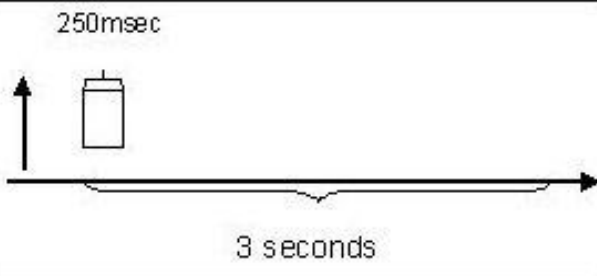
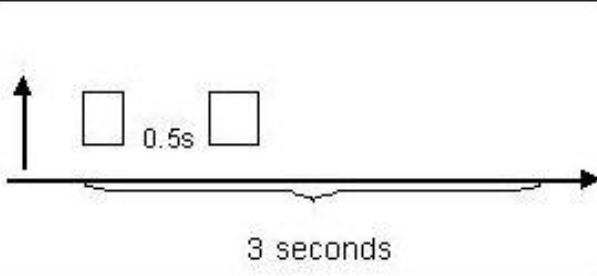
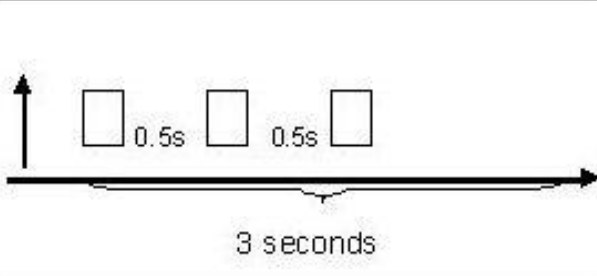
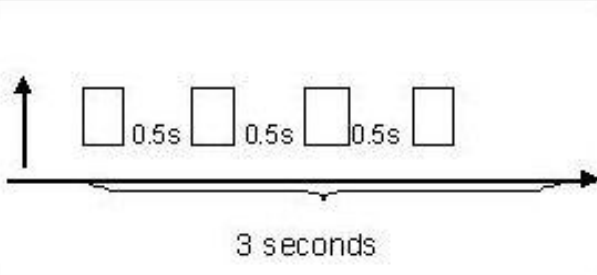
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5.1.3.1 GSM Monitoring Zone Definition

Status	Blinking Pattern
GSM modem off	off
Not registered to GSM / No SIM	<p>200msec</p> <p>3 seconds</p>
Registered in Home GSM network (not attached to GPRS)	<p>0.5s</p> <p>3 seconds</p>
Registered in Roaming GSM network (not attached to GPRS)	<p>0.5s</p> <p>0.5s</p> <p>3 seconds</p>
Attached to GPRS/home	<p>0.5s</p> <p>0.5s</p> <p>0.5s</p> <p>3 seconds</p>
Attached to GPRS/roaming	<p>0.5s</p> <p>0.5s</p> <p>0.5s</p> <p>0.5s</p> <p>3 seconds</p>

5.1.3.2 GPS Monitoring Zone Definition

Status	Blinking Pattern
GPS module off	off
GPS is unplugged / faulty	 <p>250msec</p> <p>3 seconds</p>
GPS communicating, but not navigating	 <p>0.5s</p> <p>3 seconds</p>
GPS is in navigation mode	 <p>0.5s</p> <p>0.5s</p> <p>3 seconds</p>
GPS is in GYRO mode	 <p>0.5s</p> <p>0.5s</p> <p>0.5s</p> <p>3 seconds</p>

5.1.4 External Standard Immobilizer Output

The harness External Standard Immobilizer Output wire is connected to the Cello pin no. 7.

This cable has two wires: red and green and **External Standard Immobilizer** is printed on the wire bundle tag.

The output functionality is defined according to programming parameters (PL).

In most cases the output is used by the Cello unit to activate/deactivate the vehicle engine immobilizer. In this case, the output shall be connected to the vehicle engine as shown in the following installation diagram. Alternatively, the External Standard Immobilizer Output can be used as a general purpose output, or for Geo-Fence notification, if configured accordingly.

This External Standard Immobilizer can be activated/deactivated via an OTA command from the control center. The following illustration provides the External Standard Immobilizer output installation when deployed for engine immobilizer application.

NOTE: The original wire must be cut and the relay connected between the original relay and the vehicle power.

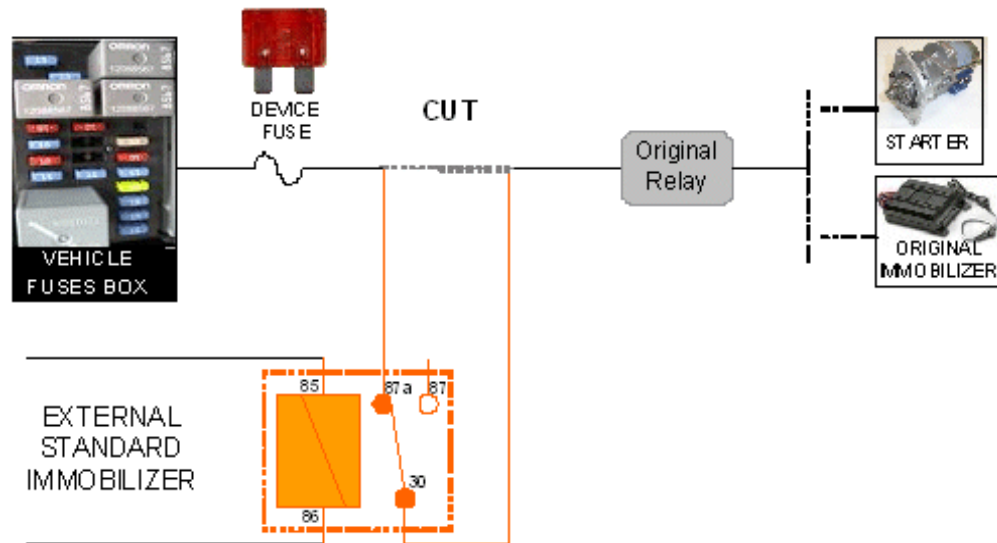


Figure 18: External Standard Immobilizer Output Installation Diagram

Normally, the power for the immobilizer relay is taken from the ignition switch wire (and configured so that power is provided only when the ignition switch is in the ON position).

If the External Standard Immobilizer output is configured to work while the ignition is in the OFF position, then the red wire should not be used and a permanent connection (car battery) should be used instead for the relay (pin 85).

5.1.5 Gradual Output

The harness Gradual Output wire is connected to the Cello pin no. 17. This cable has two wires: red and brown and **Gradual Stop** is printed on the wire bundle tag.

The output functionality is defined according to programming parameters (PL). It can be programmed for gradual immobilizing of the vehicle. In this case the output shall be connected to the fuel pump, as shown in the following installation diagram, providing the Cellocator unit with control over the fuel supply to the engine.

This output can also be used as a global output, or for Geo-Fence notification, if configured accordingly.

The External Gradual Output can be activated/deactivated by an OTA command from the control center. The following illustration provides the Gradual Output installation when deployed for fuel pump control.

NOTE: The original wire must be cut and the relay connected between the original relay and the vehicle power.

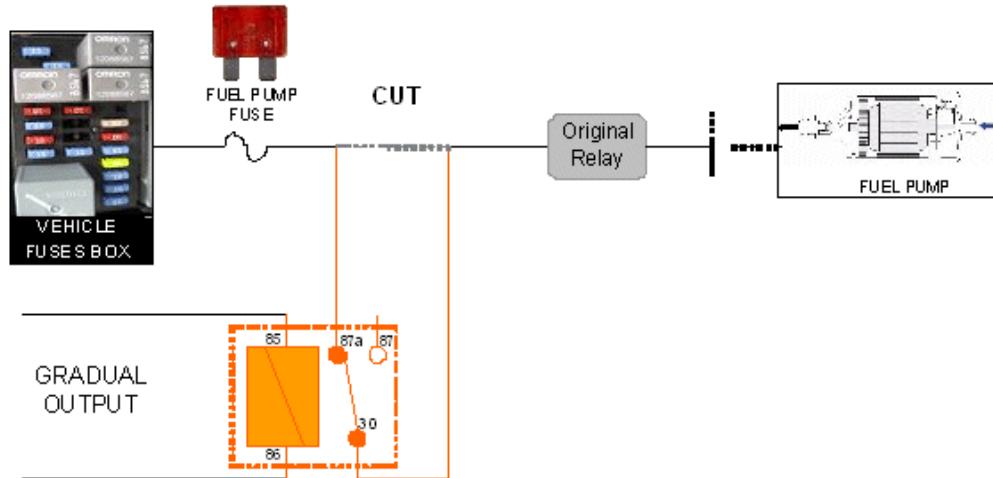


Figure 19: Gradual Output Installation Diagram

5.1.6 Global Output

The harness Global Output wire (designated as Blinkers) is connected to the Cello Pin no. 18. This cable has two wires: red and yellow and **Global Output** is printed on the wire bundle tag.

The output functionality is defined according to programming parameters (PL). In most cases, the Cello unit uses this output as a global output, allowing activation/deactivation of several devices, such as blinkers, parking lights, an additional siren, etc. In this case the output shall be connected to the required device as shown in the following installation diagram. The Global output can also be used for system feedback, or for Geo-Fence notification, if configured accordingly.

It can be activated/deactivated by an OTA command from the control center. The following illustration provides the Global Output installation.

NOTE: The original wire must be cut and the relay connected between the original relay and the vehicle power.

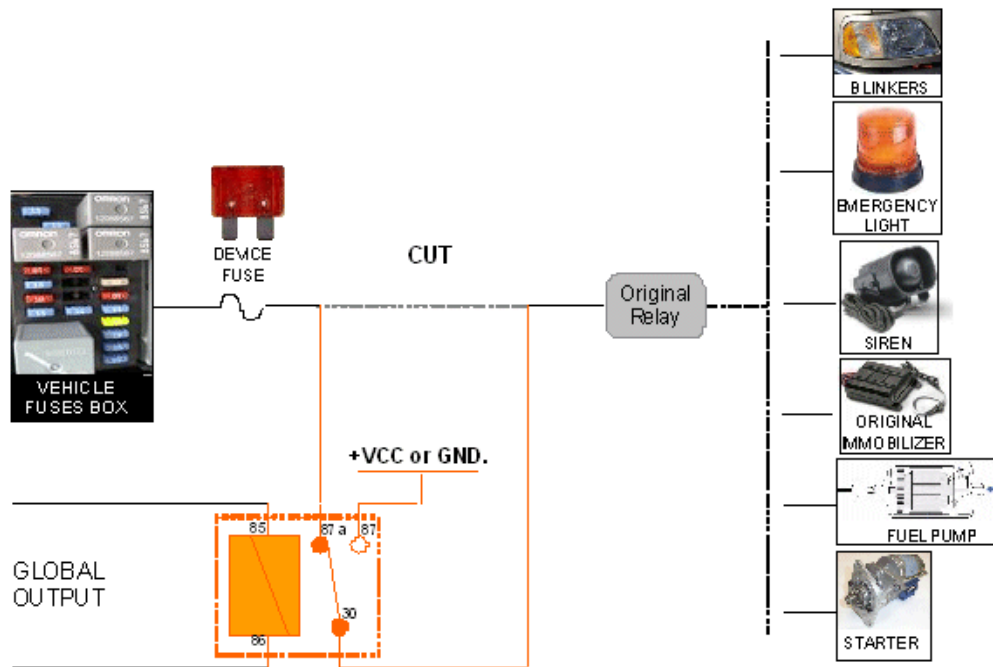


Figure 20: Global Output Installation Diagram

5.1.7 Siren Output

The harness Siren Output wire is connected to the Cello Unit pin no. 8. This cable has two wires: red and blue and **Siren** is printed on the wire bundle tag.

The output functionality and installation diagram for the siren are the same as those of the Global Output.

5.2 Harness Inputs Installation Specifications

5.2.1 Global Purpose Input (Shock)

The harness Global Purpose Input (Shock) wire is connected to the Cello pin no. 15. This cable has one brown wire and **UNLOCK2** is printed on the wire tag.

When set in a configuration as an analog input in backward compatible range, it can be used to connect an analog device (0 V to 2.5 V), such as a fuel gauge, thermometer, and so on.

When set in a configuration as an analog input in full range, it can be used to connect to any analog device (0 V to 30 V).

When set in a configuration as a frequency meter input, it can be used to connect to a source of pulses, such as Vss for example (amplitude from 4 to 30V, frequency up to 5kHz).

When set in a configuration as a digital input, its functionality is defined according to programming parameters (PL). Thus, it can perform:

- ◆ General purpose input
- ◆ Standard voice calls control
- ◆ Privacy mode control



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- ◆ Usage counter input
- ◆ Analog input
- ◆ Frequency counter input (with FW Ver. 31 and higher)

5.2.2 *Global Input 1*

The harness Global Input 1 wire is connected to the Cello pin no. 5. This orange wire is labeled as **Lock/CANL**.

In the case of the 6-input Cello configuration, this input can be used as a general purpose input or as a usage counter.

5.2.3 *Global Input 2*

The harness Global Input 2 (designated as Unlock) wire is connected to the Cello pin no. 11. This green cable is labeled as **Unlock/CANH**.

In the case of the 6-input Cello configuration, this input can be used as a general purpose input or as a usage counter.

5.2.4 *Distress/Emergency Button Input*

The harness Distress/Emergency/Panic Button Input wire is connected to the Cello pin no. 16. This cable has two wires: gray and black and is labeled **Emergency Button**.

The input functionality is defined according to programming parameters (PL) and can be used as:

- ◆ General purpose input
- ◆ Usage counter
- ◆ Emergency voice call initiation

When serving as a trigger for emergency voice call initiation, each wire is connected to one of the connection poles of the distress button.

5.2.5 *Doors Sensor Input*

The harness Doors Sensor Input wire is connected to the Cello pin no. 14. The cable has one white wire and is labeled as **Door Sensor**.

When set in a configuration as an analog input in backward compatible range, it can be used to connect an analog device (0 V to 2.5 V), such as a fuel gauge, thermometer, etc.

When set in a configuration as an analog input in full range, it can be used to connect to any analog device (0 V to 30 V).

When set in a configuration as a frequency meter input, it can be used to connect to a source of pulses, such as Vss for example (amplitude from 4 to 30V, frequency up to 5kHz).

When set in a configuration as a digital input, its functionality is defined according to programming parameters (PL). Thus, it can serve as:

- ◆ General purpose input
- ◆ Transparent data forwarding switch
- ◆ Emergency voice call initiation
- ◆ Usage counter input

When used as a door sensor, the wire should be connected to the doors-open indicator light of the dashboard control panel.

5.2.6 Dallas Button Input

The harness Dallas Button Input wire is connected to the Cello pin no. 20.

This cable is labeled as **Dallas** and has two wires, orange and black, which are connected to the Dallas Reader. The black wire is connected to the Dallas Reader's brown wire (ground) and the orange wire is connected to the blue wire (or white wire depends on the Dallas reader model) on the Dallas Reader.

5.3 Harness Power Installation Specifications

5.3.1 Main Power and Ignition

This input cable has three wires: red, black and purple.

- ◆ Red – the red wire is connected to the Cello pin no. 2 and should be connected to the car's battery (12V / 24V) (refer to Installation Drawing, Section 5.7).
- ◆ Black – the black wire is connected to the Cello pin no. 3 and should be connected to vehicle ground (at dedicated points) (refer to Installation Drawing, Section 5.7).
- ◆ Purple – the purple wire is connected to the Cello pin no. 4 and should be connected to the ignition switch (in the ON position).

NOTE: The Cello unit must be protected by means of a 3A fast blow fuse. The fuse should be installed either between the red wire and the vehicle battery or between the black wire and the vehicle ground.

5.4 Debug Port

Connector P17 is configured as a debug line which can be used for monitoring purposes. When connected to a PC, a debugging tool can be deployed to record the internal communications of the unit.

5.5 Serial Port Connector

The harness supports an RJ45 female connector allowing external devices communication to the Cello via its RS232 interface (Cello pins 12 and 13). The connector is illustrated in Figure 21.

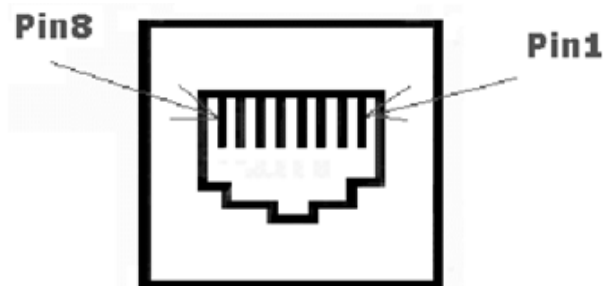


Figure 21: Serial Port Adaptor Connector – Front View



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The serial port adaptor connector pin out is:

- ◆ Pin 1: ground
- ◆ Pin 3: TXD
- ◆ Pin 4: RXD

The following devices can be connected to the Cello RS232 interface:

- ◆ A PC for updating the firmware or the configuration (PL file) of the Cello unit. In this case the Programming cable (PN 711-00078) and Cross Plug (PN 711-20055) are used to connect the RJ45 connector on the harness to the PC COM port. The cross plug DB9 connector supplies the following signals:
 - TXD – PIN 2
 - RXD – PIN 3
 - GND – PIN 5
- ◆ A handheld device, such as the Garmin PNA, or a Pocket PC. The device is supplied with an RS232 cable and it is the installer's responsibility to connect the cable to the RJ45 connector on the harness.
- ◆ Mobile Data Terminal (MDT) for message exchange with the control center. The MDT is supplied with a cable adapter which connects the RJ45 connector on the harness to the MDT connector.

5.6 Cellocator Handsfree installation

The harness supports connection of the Cellocator Handsfree via the Handsfree extension cable labeled as **HANDSFREE**. The Handsfree extension cable includes: an SPK 2 pin jack, a MIC 2 pin jack and a Power-In red wire.

Please refer to the *Cellocator Handsfree Product Overview* for installation instructions.



6 Information Specific to the Installation of Cello-R

The Cello-R firmware utilizes car alarm logic, including recognition of alarm arming and disarming.

Three inputs – Lock, Unlock and Unlock2 – are used to detect the car comfort (remote control) system lock and unlock commands. These commands generally lock/unlock the doors and the trunk, and activate the siren and vehicle lights in different sequences. These three inputs allow the Cello-R unit to sense and study the special sequences activated by the car as a result of the lock/unlock commands. Once the unit has learned to identify the lock/unlock activation, these inputs enable entering arm/disarm states in the Cello-R unit's built in alarm system upon detecting lock/unlock commands from the remote control.

For this mechanism to function, it must be connected to the wires that activate the car's lock and unlock device and to an additional device that indicates that a lock/unlock command has been issued, such as the siren or the lights.

The installation of Lock, Unlock and Unlock2 inputs – for the learning and detection of arm / disarm states – is displayed in the installation diagram (Section 5.7).



7 Post-Installation

When you have finished installing and testing the device you have to record the relevant details. These details will help you or your colleagues to maintain the device in the future.

The best way to do this is to register all the details in an easily accessible application with a database. This application should be accessible by a PC at the installation location or even via smartphone. A less efficient solution is an Excel file or even handwritten records.

The details that should be recorded are:

- ◆ Name of the customer
- ◆ ID of the vehicle
- ◆ Type of the device installed
- ◆ Accessories installed (sensors, antenna etc.)
- ◆ Cables/Harnesses used
- ◆ Location of the device in the vehicle
- ◆ Direction and inclination of the device
- ◆ Name of the installer
- ◆ Location where the installation took place
- ◆ Date of installation
- ◆ Results of installation test/issues found
- ◆ Results of communication test to the server/issues found
- ◆ Picture(s) of the installed device, antenna and accessories, as installed
- ◆ Other comments



8 Battery Handling Procedure

8.1 Introduction

8.1.1 Scope

Lithium-Ion (Li-Ion) / Lithium-Polymer (Li-Poly) batteries are characterized by small size, high capacity and extended life time. These characteristics have turned these battery types into a preferred choice for many applications. However, Li-Ion / Polymer demands applying a unique charging algorithm and handling precautions that should be followed precisely in order to lengthen the battery life time together with ensuring installer and user safety.

8.1.2 Purpose

This section should be used as guidelines for backup battery maintenance in Cellocator devices equipped with Li-ion / Li-Poly backup batteries.

8.2 Battery Handling Guidelines

8.2.1 General

- ◆ Do not keep unused batteries for long periods of time, either installed in the product or in storage. When a battery has been unused for 6 months, check its charge status and charge it or dispose of it, if it cannot be charged to a sufficient charge level as outlined in the following sections.
- ◆ The typical estimated life time of a Lithium-Ion battery is up to 3 years or up to 500 charge cycles - whichever comes first. One charge cycle is a period of use from fully-charged, to fully-discharged, and fully charged again. Apply a 2-3 year life expectancy for batteries that do not run through complete charge cycles.
- ◆ Rechargeable Lithium-Ion batteries have limited life time and gradually lose their capacity to hold a charge. This loss of capacity (aging) is irreversible. As the battery loses capacity, the length of time it will power the product (run time) naturally decreases.
- ◆ Lithium-Ion batteries continue to slowly discharge (self-discharge) when not in use or while in storage. Routinely check the battery's charge status while in storage for long time periods. Best charge level of the battery while stored is 40-60% of maximum capacity, in which self discharge is minimal.
- ◆ A 1-year warranty is granted by Pointer for Li-ion / Li-Poly backup batteries installed in Cellocator devices (assuming battery was operated according to the manufacturer's instructions).

8.2.2 Handling Precautions

- ◆ Do not disassemble, modify, crush, or puncture the battery.
- ◆ Do not short the external contacts of the battery.
- ◆ Do not try to burn a battery or put it in a hot place
- ◆ Do not place the battery in water.
- ◆ Do not expose the battery to temperatures above 60 °C (140 °F).



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- ◆ Do not expose the battery to very low temperatures - most Li-Ion / Li-Poly battery electrolytes freeze (irreversibly) at approximately $-40\text{ }^{\circ}\text{C}$ (-40°F)
- ◆ Do not use a damaged battery.
- ◆ If a battery pack leaks, do not touch the fluid. Dispose of a leaking battery pack (see Section 8.2.7).
- ◆ In the event of eye contact with fluid, do not rub eyes. Immediately flush eyes thoroughly with water for at least 15 minutes, lifting upper and lower lids, until no evidence of the fluid remains. Seek immediate medical attention.
- ◆ Keep the battery away from children.

8.2.3 Storage

- ◆ Charge or discharge the battery to approximately 50% of capacity before storage. This is the charge level in which Cellocator backup batteries are shipped to the customer.
- ◆ Charge the battery to approximately 50% of capacity (i.e. 3.7 V) at least once every six months.
- ◆ Remove the battery from the product and store it separately, or disconnect the battery installed in the product, following Pointer's instructions.
- ◆ It is recommended to store the battery at temperatures between $5\text{ }^{\circ}\text{C}$ and $25\text{ }^{\circ}\text{C}$.

NOTE: The battery self-discharges during storage at temperatures above $25\text{ }^{\circ}\text{C}$. This reduces the effective storage lifetime of the battery.

8.2.4 Preparing New Li-Ion / Li-Poly Batteries for Use

- ◆ A new battery pack does not need cycling through charging and discharging before usage.
- ◆ Inspect the battery manufacturing date. Batteries in storage more than 2 years should be disposed of.
- ◆ Measure battery voltage and verify that it is above 3V level per cell. A battery under 3V should be disposed of. Otherwise, recharge the battery.

8.2.5 Charging

- ◆ Always follow your product's documentation for detailed information about charging a backup battery inside a Cellocator device.

8.2.6 Transportation

- ◆ Always check all applicable local, national, and international regulations before transporting a Li-Ion / Li-Poly battery.
- ◆ The battery temperature during transporting should not exceed the allowed storage temperature. Recommended transportation temperatures are $5\text{ }^{\circ}\text{C}$ to $25\text{ }^{\circ}\text{C}$.
- ◆ Transporting an end-of-life, damaged, or recalled battery may, in certain cases, be specifically limited or prohibited. Please consult with your account manager at Pointer in such cases.



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8.2.7 Replacement, Disposal and Recycling

- ◆ Do not transfer a used backup battery from one Cellocator device to another if the battery has been in use for more than 1 year. This process might affect capacity and cause low performance of the battery in its "second life cycle".
- ◆ It is highly recommended to replace backup batteries more than 2 years old as a standard maintenance procedure for Cellocator devices. This ensures high reliability and proper functionality in case of external power loss or disconnection.
- ◆ Replace a backup battery in Cellocator devices only with an approved model as specified by Pointer technical support.

WARNING: There is a serious risk of battery explosion if a battery of incorrect type is used in the device.

- ◆ Li-Ion / Poly batteries are subject to disposal and recycling regulations that vary by country and region. Always check and follow your applicable regulations before disposing of any battery. Contact Rechargeable Battery Recycling Corporation (www.rbrc.org) for U.S.A. and Canada, or your local battery recycling organization.
- ◆ Many countries prohibit the disposal of waste electronic equipment in standard waste containers.
- ◆ Place discharged batteries in a battery collection container only. Use electrical tape or other approved covering over the battery connection points to prevent short circuits.