

# TPA-CH-1xx Vehicle Charger

## Installation and User's Guide

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## Contact Information

### Corporate Head Office New Zealand

Tait International Limited  
P.O. Box 1645  
Christchurch  
New Zealand

For the address and telephone number of regional offices, refer to the Tait website:  
Website: [www.taitradio.com](http://www.taitradio.com)

### Technical Support

For assistance with specific technical issues, contact Technical Support:  
Website: [www.support.taitradio.com](http://www.support.taitradio.com)

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# 1 Introduction

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The Tait TP9100 vehicle charger (TPA-CH-1xx) can be installed using any one of a number of recommended mounting methods. Choose the safest and most convenient mounting method available to you, and then follow the installation instructions provided in [Chapter 3 Before Installing the Vehicle Charger](#) and [Chapter 4 Installing the Vehicle Charger](#). To use the charger once installation is complete, please see [Chapter 2 Charging a Battery](#).

## Charger compliance information

The vehicle charger meets the following charger standards:

- EC Directive 2014/53/EU R&TTE
- EC Directive 2004/104/EC Automotive EMC
- EC Directive 2004/108/EC EMC Directive
- EN 301 489-1 V1.8.1 General Requirements and EN 301 489-5 V1.3.1 PMR calling the following standards:
  - EN55022 Conducted and Radiated emissions class B
  - EN61000-4-3 RF electromagnetic field
  - EN61000-4-6 RF common mode
  - ISO 7637-2:2004 Transients and Surges in the Vehicular Environment
- EN 62368-1:2014 Safety of Information Technology Equipment

## Document conventions

Please follow exactly any instruction that appears in the text as an 'alert'. An alert provides necessary safety information as well as instruction in the proper use of the product. This manual uses the following types of alert:



**Warning** This alert is used when there is a hazardous situation which, if not avoided, could result in death or serious injury.



**Caution** This alert is used when there is a hazardous situation which, if not avoided, could result in minor or moderate injury.

**Notice** This alert is used to highlight information that is required to ensure procedures are performed correctly. Incorrectly performed procedures could result in equipment damage or malfunction.



This icon is used to draw your attention to information that may improve your understanding of the equipment or procedure.

## Related documentation

The following documents provide instructions for the correct use and handling of a TP9100 radio and battery. The -xx represents the current issue number.

Title	IPN/Item code	Notes
Li-Ion Battery Safety Information	MPC-00006-xx	Supplied with every Li-ion battery. Multilingual. Essential reading if using a Li-ion battery.
Battery Charging Guide	MPA-00034-xx	Supplied with the charger. Multi-lingual. Basic charging instructions for Tait portable batteries.
Safety and Compliance Information	MTA-00011-xx	Supplied with every Tait portable and mobile. Multilingual. Includes instructions for safe and legal radio operation.
TP9135/TP9140 User's Guide TP9155/TP9160 User's Guide	MPA-00028-xx MPA-00001-xx	On the User Documentation CD supplied with every portable. Includes information on charging and caring for the battery.
TP9100 Service Manual	MPA-00005-xx	Available from the Tait Support website, <a href="http://support.taitradio.com">http://support.taitradio.com</a> . Servicing information for the TP9100 battery chargers, includes disassembly instructions, fault-finding, and PCB Information.

Always get the latest issue of a manual from the Tait Support website, <http://support.taitradio.com>. In addition to software release notes and the latest issue of a manual, useful downloads from the Support website include:

- Technical notes (TN), which provide technical details not yet in the manuals or solve any problems that may have arisen.
- User documentation in English and other languages.

## Publication record

Issue	Date	Description
1	September 2009	First release
2	November 2012	<ul style="list-style-type: none"><li>■ Li-ion IS battery added.</li><li>■ Leaving the battery in the charger added.</li><li>■ Cleaning the battery contacts added.</li><li>■ Vertical mounting as preferred method added.</li></ul>

## 2 Charging a Battery

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**Notice** Do not allow a radio battery to fully discharge every time you use it, or you will shorten the usable life ('service life') of the battery.

### Before using the charger

**Check compatibility** Check the battery label to see whether the battery is compatible with the charger. The charger supports the following batteries:

- 2500mAh Li-ion battery (TPA-BA-206)
- 2500mAh Li-ion Intrinsically Safe IS battery (TPA-BA-207)
- 2400mAh NiMH battery (TPA-BA-203)
- 2400mAh NiMH IS battery (TPA-BA-204, TPA-BA-209, TPA-BA-2A3)

**Handle the battery safely** Follow the proper care and handling instructions provided with the battery. The battery label identifies the battery chemistry as lithium-ion or nickel metal hydride.



**Warning** Before using a Li-ion battery, please read the Li-Ion Battery Safety Information (MPC-00006-xx) and follow the instructions it provides. Incorrect use of a Li-ion battery can cause explosion or fire and can result in personal injury and/or equipment damage.

For NiMH batteries, follow the care and handling instructions in the radio user's guide.

### Charging temperatures

**Normal** Normal ('rapid') charging takes place while the battery temperature is in the following ranges:

- Li-ion battery: 32°F to 104°F (0°C to 40°C)
- NiMH battery: 32°F to 131°F (0°C to 55°C)

Although normal charging will only start if the battery temperature is below 113°F (45°C), charging will continue up to 131°F (55°C).

**Optimal** Optimal charging takes place between 50°F and 77°F (between 10°C and 25°C).

**Extreme** The vehicle charger manages battery temperatures that are outside the above ranges in a seamless process that requires no intervention by you. For example:

- If a Li-ion battery is too hot for normal charging, the charger supplies current to the radio only. When the temperature drops to the required range for safe charging, charging starts automatically.
- If a NiMH battery returning to the vehicle is too cold for normal charging, the charger 'trickle-charges' the battery to warm it to the point where normal charging can start automatically.

**Notice** Do not expose a battery to very high or very low temperatures for extended periods of time. Doing so will shorten the usable life ("service life") of the battery.

When the battery temperature is outside the normal charging range, the orange (right) LED on the charger is lit. For information specific to your battery, see the relevant section below.

**Wet radio** Best practice is to wipe excess moisture from the radio before placing it in the charger.

## Inserting the battery in the charger

Place just a battery in the charger, or a radio with a battery attached.

1. For best charging performance, switch off the radio before placing it in the charger. There is no need to remove a belt clip, antenna, or any accessory that is attached to the accessory connector. (The vehicle charger does not connect the radio to the vehicle antenna.)



**Caution** When the TP9100 portable is used inside a vehicle, radio performance is degraded. Use a mobile radio for all critical communications. If the TP9100 portable must be left switched on while it is in the charger, removing the portable from the charger will improve radio performance.

2. Place the battery/radio in the charger:
  - If the battery is not attached to a radio, turn the battery so that its label faces the charger LEDs. Place the battery towards the back of the charger, behind the catches, and then press down lightly on the battery.
  - If the battery is attached to a radio, turn the radio so that the radio display faces the charger LEDs. Place the radio in the charger and then press down lightly on the radio.






### **Battery engaged**

There is an audible click as the catches engage. If the catches do not engage readily, remove the battery/radio. Press down once firmly on the release bar at the top of the vehicle charger and then try again.



## LED behavior – all batteries


If there is a battery in the charger when power is supplied to the charger, the LEDs behave as follows:

-  Initially, all three LEDs are lit for 2 seconds.
-  The red (middle) LED stays lit while the battery charges.
-  The green (left) LED stays lit once normal charging is complete.
-  A steady orange (right) LED requires no action by you. It indicates that normal charging has temporarily stopped but will automatically be resumed when conditions are suitable.
-  If the orange LED continues to flash, there is a fault. See "[Orange LED continues to flash](#)" on page 12.

For LED behavior specific to each battery type, see the relevant section below.



### Li-ion and LEDs

When the green LED remains lit, normal charging of the Li-ion battery is complete. No further charging will take place at this time. You can remove the battery or leave it in the charger.


-  The steady orange LED requires no action by you. It indicates that normal charging has temporarily stopped but will automatically be resumed when conditions are suitable. The steady orange LED is lit when the battery temperature is out of the range 32°F to 104°F (0°C to 40°C):
  - At out-of-range battery temperatures up to 140°F (60°C) or down to 14°F (-10°C), the charger supplies current to the radio but no battery charging takes place.
  - At more extreme battery temperatures, the charger suspends all activity.

### NiMH and LEDs

When the green LED remains lit, normal charging is complete. Although the charger continues to supply current to the radio, no further charging of the battery will take place at this time. You can remove the battery or leave it in the charger.

-  The red LED is lit while normal charging takes place. At out-of-range battery temperatures down to 14°F (-10°C), the charger trickle-charges the battery to warm it. Normal charging starts automatically when the battery temperature reaches the required range. No action is required by you.
-  The red LED flashes if priming is in progress. For more information about priming, see "[NiMH charging requirements](#)" on page 11. Priming takes place between 41°F (5°C) and 113°F (45°C). A flashing red LED does not indicate a fault. If possible, do not interrupt charging until the green LED is lit.

**Notice** Tait recommends that you use a desktop charger or multicharger, not the vehicle charger, to prime a battery.

 A steady orange LED requires no action by you. It indicates that normal charging has temporarily stopped but will automatically be resumed when conditions are suitable. The steady orange LED is lit when the battery temperature is too high for normal charging:

- If the battery temperature is too high for normal charging but is less than 140°F (60°C), the charger supplies current to the radio but no battery charging takes place.
- If the battery temperature is higher than 140°F (60°C) the charger suspends all activity.

## Leaving the battery on charge

It is safe to switch off the ignition while there is still a battery in the charger. But if the vehicle will not be used again for some time, check whether charging will continue while the ignition is off, and consider what effect this might have on the vehicle battery. To check, place the battery in the charger and switch off the vehicle ignition:

- If no charger LED stays lit, the charger will resume charging only when the ignition is switched on again. Minimal charger standby power will be drawn from the vehicle battery until then.
- If a charger LED stays lit, the charger will continue to charge the radio battery even while the ignition is off, and will continue to draw power from the vehicle battery. Once the battery is charged, the charger draws minimal current and has little effect on a healthy vehicle battery.

TP9100 battery contacts are self-cleaning. The act of placing the battery/radio in the charger and then removing it is normally sufficient to keep the contacts clean. However, self-cleaning cannot occur if the battery/radio is not regularly removed from the charger. When combined with other environmental factors, such as dust and vibration, this can lead to dirty battery contacts and potentially a drop in charging performance.

**Notice** A battery may not charge properly if the contacts are dirty.

If you intend to leave a battery/radio in the vehicle charger for extended periods (longer than one week) best practice is to remove the battery from the charger at regular intervals, wipe the battery contacts with a dry lint-free cloth, and replace the battery in the charger. Do not forget to do this if you 'store' a battery in a charger that is mounted out of sight (for example, in the boot or trunk).


### Cleaning the battery contacts

If charging does not take place as expected, clean the battery contacts. You may also need to clean the contacts on the vehicle charger. To clean, wipe the contacts with a dry lint-free cloth to remove any dirt, oil or grease.

## Removing the battery from the charger

To remove a battery/radio from the charger, press down once firmly on the release bar at the top of the vehicle charger and then lift out the battery/radio.

You can remove a battery/radio from the charger at any time without harming the battery, the radio, or the charger. When you return the battery/radio to the charger, charging is automatically resumed. You can also leave a battery/radio in the charger once charging is complete.

-  Batteries charged in the vehicle charger do not require regular additional charging in a desktop charger or multicharger.

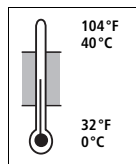
## Li-ion batteries



**Warning** Incorrect use of a Li-ion battery can cause explosion or fire and can result in personal injury and/or equipment damage. Please read the Li-Ion Battery Safety Information (MPC-00006-xx) and follow the instructions it provides.

### Li-ion charging requirements

- Fully charge a Li-ion battery before using it for the first time.
- A Li-ion battery should not be completely discharged. Li-ion batteries, unlike NiMH batteries, do not require conditioning.
- If possible, charge a Li-ion battery when its temperature is in the range shown in the figure.
- Fully charge a Li-ion battery before storing it for a short time (about a month). Charge the battery to about 30% before storing it for a longer time. Store at a cool temperature and charge the battery before use.



## NiMH batteries

For information about the proper care and handling of NiMH batteries, please refer to the radio user's guide.

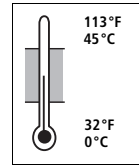
### NiMH charging requirements

- Fully charge (prime) a new NiMH battery before using it for the first time. Priming takes up to 14 hours and is most effective if completed without interruption. See also "[NiMH and LEDs](#)" on page 9.

**Notice** Tait recommends that you use a desktop charger or multicharger, not the vehicle charger, to prime a battery.

- 'Condition' a NiMH battery every three months to extend its shift life. Conditioning enables a battery to hold its charge for longer. To condition a battery, leave the radio switched on and ignore the Battery Low warnings. When the radio switches itself off, the battery is fully discharged and ready to be recharged.

- If possible, charge a NiMH battery when its temperature is in the range shown in the figure. Although normal charging will only start if the battery temperature is below 113°F (45°C), charging will **continue** up to 131°F (55°C).
- Before storing a NiMH battery for one month or longer, remove the battery from the radio. There is no need to charge or discharge the battery. Store the battery in a cool dry place. Charge the battery before using it.



## Charger care and maintenance

If necessary, wipe the vehicle charger casing with a clean, damp cloth. Avoid detergents, alcohols, aerosol sprays, or petroleum-based products, as these substances may permanently damage the casing. If the contacts are dirty, wipe them with a clean lint-free cloth.

## Troubleshooting

### Battery does not engage

When the catches engage, there is an audible click. If the catches do not engage, remove the battery/radio. Press down once firmly on the release bar at the top of the vehicle charger and then try again.

### No LEDs are lit

- If the charger is connected to **switched accessory power** (recommended): All three LEDs should be lit for 2 seconds when you turn on the ignition, whether there is a battery in the charger or not. If no LEDs are lit when you turn on the ignition, check that the power cable is firmly connected to the charger. If the problem persists, have the charger and the power cable checked by your Tait dealer.
- If the charger is connected directly to the vehicle battery (the charger is **continuously powered**): No LEDs should be lit when you turn on the ignition. The red LED should be lit when you place a battery/radio in the charger and charging starts. If no LED is lit when you place a battery in the charger, check that the power cable is firmly connected to the charger. If the problem persists, have the charger and the power cable checked by your Tait dealer.

### Orange LED continues to flash



If the orange LED flashes and continues to flash, there is a fault that requires action by you.

Starting the engine can cause a temporary drop in the voltage that the vehicle battery supplies to the vehicle charger. The orange LED flashes briefly but stops once the engine is running. No action is required by you. Once the engine is running, the orange LED will no longer flash.

If the orange LED continues to flash, the voltage that the vehicle is supplying to the charger may be too low. Try to reduce the total amount of power being drawn from the vehicle battery. For example, switch off any non-essential lights or air conditioning.

If the orange LED still continues to flash, remove the battery from the charger until the fault is resolved. Perform the following checks:

- If possible, check that the power cable is firmly connected to the charger.
- Make sure that the battery is approved for use with the charger. See "[Check compatibility](#)" on page 7.
- Make sure that the contacts on the battery, and the contacts in the charger, are clean and making contact.
- Place a different battery in the charger:
  - If the orange LED does not flash, there may be a problem with the first battery. Have the battery checked and replace it if necessary.
  - If the orange LED flashes again, there may be a problem with the vehicle charger or the power supplied to the charger. Have the charger and the power cable checked by your Tait dealer.

**Orange LED is lit**



A steady orange LED does not indicate a fault condition and requires no action by you. Normal charging has temporarily stopped but will automatically be resumed when conditions are suitable.

**Red LED is flashing**



A flashing red LED does not indicate a fault condition. It indicates that the NiMH battery in the charger is being primed. If possible, do not interrupt charging until the green LED is lit.

**Notice** Tait recommends that you use a desktop charger or multicharger, not the vehicle charger, to prime a battery.

**Radio will not turn on**

If the green LED on the charger indicates that the battery is fully charged, but the radio will not turn on:

- Make sure that the battery is firmly attached to the radio.
- Attach a different battery to the radio. If the radio works, there is a problem with the battery. If the radio does not work, there may be a problem with the radio.
- Charge the battery in a different charger. If the radio works, there is a problem with the vehicle charger.

**Unsure whether to charge the battery**

If a battery is low or empty, charge it as soon as possible. Placing a fully or partially charged battery in the vehicle charger will not harm the battery or the radio. You can safely:

- remove a battery/radio from the charger at any time
- leave a battery/radio in the charger once charging is complete

When the battery is low, the radio may display an empty battery icon and emit a high-pitched beep. The status LED on the **radio** slowly flashes red. When the battery is empty, the radio may display a 'battery is flat' error message, emit a long low-pitched beep, and stop working.



## 3 Before Installing the Vehicle Charger

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Before starting to install a TP9100 vehicle charger, make sure that:

- the installation will meet all safety requirements identified below
- the charger package is correct for the mounting method to be used
- you have the appropriate tools and templates

Then:

- choose the best path for the power cable
- decide how power will be supplied to the charger and, if necessary, enable the ignition sense signal
- test the proposed position

**Notice** Tait recommends that you mount the vehicle charger in a vertical orientation if possible. Vertical mounting minimizes the build-up of dirt that can occur if the contacts are not cleaned regularly.



If using the ignition sensed (recommended) connection method, enable the ignition sense signal before mounting the charger.

### Important safety requirements



**Warning** Check before drilling holes in the vehicle. Select points where drilling will not damage existing wiring, fuel tanks, fuel lines, brake pipes, or battery cables.



**Warning** Avoid obstructions. When mounted, the charger must not obstruct or endanger the occupants of the vehicle. The charger must not obscure the driver's vision, interfere with control of the vehicle, or obstruct any airbags.



**Warning** Mount the charger securely. The charger must not break loose in the event of a collision. An unsecured charger can seriously injure vehicle occupants.



**Warning** If the vehicle is a fuel or gas tanker, observe the special conditions that must be observed when installing radio equipment on fuel or gas tankers. For details, contact your radio provider or a Tait-accredited service center.



**Warning** If the vehicle is powered by LPG (liquefied petroleum gas), observe LPG requirements. If the LPG container is in a sealed-off space within the interior of the vehicle, a radio equipment installation must conform to the National Fire Protection Association Standard NFPA 58. The standard states that the radio equipment installation must meet the following requirements:

The space containing the radio equipment shall be isolated by a seal from the space containing the LPG container and its fitting. Outside filling connections shall be used for the LPG container and its fittings.

The LPG container space shall be vented to the outside of the vehicle.



**Warning** Avoid interference with vehicle electronics. Install the charger and the power cable clear of all other electronic systems and cables. Some electronic devices in the vehicle may malfunction when a radio is transmitting. Devices that can be affected include electronic fuel injection systems, electronic anti-skid braking systems, electronic cruise control systems, and vehicle indicators (turn signals). Interference can occur if the electronic device is not adequately protected against RF energy. If the vehicle contains such equipment, consult the vehicle manufacturer or vehicle dealer to determine whether these electronic circuits will perform normally when a radio is transmitting.



## Check the charger package

Note the item code on the vehicle charger box and then use Table 3.1 to check that all parts are present. Make sure that you have the correct charger package for the intended mounting method. To purchase a different package, or if anything is missing or damaged, please contact your Tait dealer.

**Notice** If the vehicle has a 24V power supply, or if the power supplied by the vehicle may be unstable, Tait recommends that you use the vehicle charger with a 24V to 12V DC-DC converter. See "[Voltage converter](#)" on page 18.

**Table 3.1 TP9100 vehicle charger packages**

Charger package	Contents	Mounting methods
TPA-CH-100  TP9100 vehicle charger with no additional brackets	<ul style="list-style-type: none"> <li>■ TP9100 vehicle charger</li> <li>■ Power cable see <a href="#">page 19</a></li> <li>■ M5x12 button head screw<sup>1</sup> 4x</li> <li>■ M5 spring washer 4x (353-00010-30)</li> <li>■ M5 flat washer 4x (353-00010-29)</li> <li>■ TPA-CH-1xx Vehicle Charger Installation and User's Guide</li> </ul>	<ul style="list-style-type: none"> <li>■ <a href="#">Mounted against a vertical surface see page 25</a></li> <li>■ <a href="#">Mounted against a vertical surface (no access) see page 26</a></li> <li>■ <a href="#">Mounted using a third-party mount see page 31</a></li> <li>■ <a href="#">Panel mounted into a horizontal surface see page 32</a></li> </ul>
TPA-CH-101  TP9100 vehicle charger with right-angle ('L') bracket and two U-brackets	<ul style="list-style-type: none"> <li>■ All items in TPA-CH-100 and:</li> <li>■ Right-angle mounting bracket (302-06017-00)</li> <li>■ Single height U-bracket<sup>2</sup> (TOPA-VK-020)</li> <li>■ Double height U-bracket (TOPA-VK-030)</li> <li>■ M5x8 button head screw<sup>1</sup> 2x</li> </ul>	All recommended mounting methods.
TPA-CH-102  TP9100 vehicle charger with right-angle ('L') bracket	<ul style="list-style-type: none"> <li>■ All items in TPA-CH-100 and:</li> <li>■ Right-angle mounting bracket (302-06017-00)</li> </ul>	<ul style="list-style-type: none"> <li>■ Any method supported by the TPA-CH-100 charger package.</li> <li>■ <a href="#">Mounted using the right-angle bracket see page 29.</a></li> </ul>
TPA-CH-103  TP9100 vehicle charger with two U-brackets	<ul style="list-style-type: none"> <li>■ All items in TPA-CH-100 and:</li> <li>■ Single height U-bracket<sup>2</sup> (TOPA-VK-020)</li> <li>■ Double height U-bracket (TOPA-VK-030)</li> <li>■ M5x8 button head screw<sup>1</sup> 2x</li> </ul>	<ul style="list-style-type: none"> <li>■ Any method supported by the TPA-CH-100 charger package.</li> <li>■ <a href="#">Mounted using the two U-brackets see page 30.</a></li> </ul>

<sup>1</sup> For more information see "[Screws](#)" on page 24.

<sup>2</sup> The double-height U-bracket is longer than the single-height U-bracket. To order a triple-height U-bracket, see "[Optional extras](#)" on page 18. U-brackets are always used in pairs.

## Optional extras

These items are compatible with the charger but are not included in any TP9100 vehicle charger packages. To purchase them please contact your Tait dealer.

### Voltage converter

The Tait **24 V to 12 V DC-DC converter (TA2761-02)** takes input between 10V and 30V and regulates it to 14.4V at up to 6A. Use a voltage converter if the vehicle has a 24 V power supply or if the power supplied by the vehicle may be unstable (for example, while the battery in a fire tender is being charged at the station).

### Additional mounting hardware

**TOPA-VK-040 triple height U-bracket.** This longer U-bracket can be attached to either of the U-brackets supplied in a charger package. Use the M5x8 button head screw (346-00005-08) supplied with the bracket to join any two U-brackets. Different combinations of U-brackets enable you to mount the charger in a suitable position in most situations.

**TOPA-VK-050 mounting plate.** This mounting plate can be attached to the outside of the mounting surface for added stability. For example, it can be used to secure the two-piece U-bracket assembly to the vehicle. Use the four M5x20 screws (346-0005-20) and four M5 spring washers (353-00010-30) provided with the mounting plate to secure the mounting plate to the vehicle.

## Third-party installation requirements

Selected third-party mounts are compatible with the main mounting bracket on the vehicle charger. For example, the RAM-202U ball head mount from RAM Mounting Systems, Inc. The RAM-202U has a 2 1/2 inch diameter flat base with pre-drilled holes and a 1 1/2 inch ball head that attaches to a mounting arm. For details of recommended mounting arms, and to order these parts, go to [www.ram-mount.com](http://www.ram-mount.com) and search for 'RAM-202U'. Before starting the installation, make sure that you have a suitable TP9100 vehicle charger package (TPA-CH-100) and a compatible third-party mount. You will also need instructions, a drill template, and the fasteners needed to secure the mount to the vehicle. These should be supplied with the third-party mount. See "[Mounted using a third-party mount](#)" on page 31.

## Check tools and templates

No tools are supplied in the charger packages. Check that you have the tools and templates needed for the installation.

**Table 3.2** Installation tools

Tool	Purpose
3mm hexagonal driver	Required to remove and fasten the screws listed in <a href="#">Table 4.1 on page 24</a> .
Portable drill and drill bits; (optional) center punch, hammer	Required for all mounting methods.
Saw	Required if the charger is mounted into a hole in a horizontal surface.
Side cutters or wire strippers; (optional) cable ties	Required when connecting the charger power cable to vehicle power.
Spanner (wrench)	Required if using bolts (not supplied) to secure a bracket to the vehicle.

**Drill templates** Templates are at the back of this manual. To attach third-party mounting hardware to the vehicle, use the templates and documentation provided with that hardware.

## Decide how power will be connected to the charger

**Power cable** The power cable (219-02668-xx) supplied in all charger packages has red, black, and blue leads and a DC power plug for connection to the charger. Plan how you will install the power cable and then see ["Test the proposed installation" on page 22](#).


**Fuses** The red and black leads in the power cable each have a built-in 3A automotive blade fuse. The fuses are plugged into inline fuse holders and are easily replaced if necessary. When installing the power cable, make sure that the fuses are near the battery and accessible. To remove a fuse, slide it from the holder. (If the fuse has blown, the 'S' is no longer visible through the plastic body of the fuse.) To order a replacement fuse from your Tait dealer, quote part number 265-00000-64.

**Vehicle power source** Make sure that the vehicle power source can supply the power required by the charger. The charger is designed to operate from a 12V nominal supply but will tolerate a supply voltage range of 11V to 20V. The charger will draw a maximum of 2.3A.

**Notice** If using a 24V to 12V converter to supply power to the charger, make sure that the converter maintains output regulation to 12V when the load current is 0mA. See ["Voltage converter" on page 18](#).

## Connection method

Decide how to connect the charger to the power source.

-  If using the ignition sensed (recommended) method, enable the ignition sense signal before mounting the charger.

**Table 3.3 Connection methods: charger to vehicle power source**


Method	Description
Ignition <b>sensed</b> (recommended)	The charger is switched off when the vehicle ignition is switched off. Charging resumes when the ignition is switched on again. Until then, the charger draws only minimal standby power from the vehicle battery. To use this method, enable the ignition sense signal as described below. Then see " <a href="#">Ignition sensed</a> " on page 34.
Ignition <b>switched</b>	The charger is switched off when the vehicle ignition is switched off. See previous. An easier installation than 'ignition sensed' because the ignition sense signal does not have to be enabled. The source of switched accessory power (for example, the fuse box in the vehicle) must have a current rating of at least 3A. If the charger and multiple in-vehicle systems are connected to the same source of switched accessory power, the total power drawn can trigger a charger 'under voltage' event. This will not harm the charger but charging will be temporarily suspended and the orange LED will flash until the voltage returns to normal. See " <a href="#">Ignition switched</a> " on page 34.
Continuously powered	An easier installation than 'ignition sensed' because the ignition sense signal does not have to be enabled. The charger is on at all times. Even when the vehicle ignition is switched off, the charger continues to operate and to draw power from the vehicle battery. If the charger is left on when the vehicle is not in regular use, the vehicle battery could be drained. See " <a href="#">Continuously powered</a> " on page 34.

**Cigarette lighter** If the cigarette lighter works only when the ignition is switched on, connection to the lighter has the same effect as 'ignition switched'. If the cigarette lighter works even when the ignition is switched off, connection to the lighter has the same effect as 'continuously powered'.

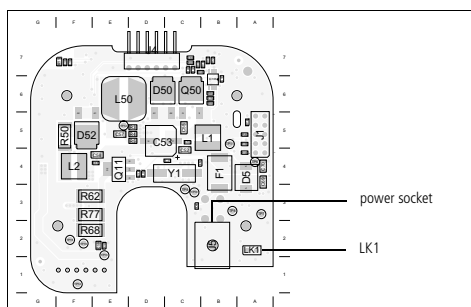
## Enabling the ignition sense signal

The vehicle charger is supplied with the ignition sense signal disabled. To use the recommended connection method, enable the ignition sense signal.

1. Use a 3 mm hexagonal driver to remove the four M4x20 socket head screws from the perimeter of the charger, and then remove the charger from its lower casing.
2. Use your fingers to remove the black plastic jumper LK1 from the main charger board. LK1 is located beside the power socket, see [Figure 3.1](#).

 The jumper covers two pins. Exposing either pin will enable the ignition sense signal. Leave the jumper on the other pin to store it.

**Figure 3.1** Position of LK1 jumper on main charger board



3. Replace the charger in its lower casing, and then replace and fasten the four M4x20 socket head screws. Use a 3 mm hexagonal driver and torque sensibly.

**Notice** Do not overtighten these screws or you will damage the plastic.

## Test the proposed installation

1. Attach an antenna to the radio and place the radio in the vehicle charger.
2. Hold the charger, with any mounting bracket to be used, in the intended position.
3. Make sure that the proposed installation will satisfy all conditions identified below.

- The installation will meet all important safety requirements.**  
See "[Important safety requirements](#)" on page 15.
- The charger will not be subjected to direct sunlight once mounted.  
**Notice** Direct sunlight will heat the battery and may interfere with normal charging. Tait recommends that you install the charger low in the vehicle cabin.
- There is clearance below the charger so that cool air can flow between the bottom of the vehicle charger and the nearest surface. To prevent overheating, the bottom of the charger must be at least 3/16 inch (5mm) from the surface below it.
- The charger will not be upside down once mounted. A battery or radio placed loosely in the charger will remain in the charger even if the catches are not engaged. A battery or radio, when ejected from the charger, will not fall on or injure occupants of the vehicle.
- If it is expected that the radio/battery remains in the charger for extended periods, the charger is mounted in a vertical orientation. Vertical mounting minimizes the build-up of dirt that can occur if the contacts are not cleaned regularly.
- The charger can be used when seatbelts are secured, and will not obstruct airbags. See "[Important safety requirements](#)" on page 15.
- The radio can conveniently be placed in and removed from the charger. There is clearance above the charger, and the antenna will not be bent or bumped.
- Any accessories attached to the radio can still be used.
- The glove box can be opened without obstruction.
- The power cable can comfortably reach both the power source and the charger, and can be plugged into the power socket on the charger. (If there will be no access to the socket once the charger is mounted, connect the power cable before mounting the charger.)
- The power cable can be safely routed from the power source to the charger. The power cable is protected from engine heat and sharp edges, and will not be pinched or crushed.
- If the 'ignition sensed' (recommended) power connection method is to be used, the ignition sense signal has been enabled.
- If the charger is to be flush mounted, the surface around the charger is strong enough to support the charger. The charger fits comfortably on the mounting surface.

## 4 Installing the Vehicle Charger

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Prepare for the installation as described in the previous chapter. When you have tested the proposed installation, mount the charger and connect it to power.

**Notice** Tait recommends that you mount the vehicle charger in a vertical orientation if possible. Vertical mounting minimizes the build-up of dirt that can occur if the contacts are not cleaned regularly.

### Main mounting bracket

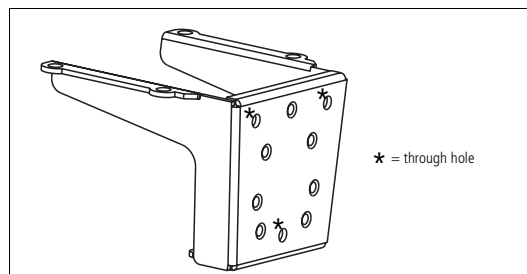
Most mounting methods make use of the main mounting bracket that is built into the back of the charger, and require no disassembly of the charger. If partial disassembly of the charger is required, either to enable the ignition sense signal or to mount the charger, follow the instructions and do not disassemble the charger beyond what is required.

#### Pre-drilled holes

Pre-drilled holes on the main mounting bracket enable you to attach the charger to other brackets and mounts, providing a wide range of possible mounting methods.

- Most of the pre-drilled holes are 'threaded' holes with built-in nuts. A threaded hole fits an M5 bolt or screw. Use these holes and the supplied screws to secure items to the charger.
- Three pre-drilled holes are unthreaded or 'through' holes that have no built-in nuts. See [Figure 4.1](#). Some mounting methods use these holes and self-tapping screws or bolts (not supplied) to secure the charger to the vehicle surface.

**Figure 4.1** Main mounting bracket



**Notice** Do not drill additional holes into the charger or main mounting bracket. Additional holes may damage components.

## Screws



**Warning** Before drilling any holes in the vehicle surface see "[Important safety requirements](#)" on page 15.

**Notice** When inserting a screw through the main mounting bracket and into the charger, do not use a screw that will penetrate the charger by more than 15mm (37/64 inch) or you will damage components in the charger.

**Notice** Do not over tighten the M4x20 socket head screws that secure the charger to its lower casing or you will damage the plastic.

Table 4.1 identifies screws that may be supplied in a charger package. Use a 3mm hexagonal driver (not supplied) to remove or fasten these screws.

**Table 4.1** Screws

Screw	Item code	Qty	Notes
M5x12 button head screw	346-00005-12	4x	12mm (15/32 inch) screws in all charger packages. Used to secure the main mounting bracket: <ul style="list-style-type: none"><li>■ directly to the vehicle surface</li><li>■ to the right-angle bracket</li><li>■ to a U-bracket</li></ul> Used with washers (supplied). These screws screw into the threaded holes on the main mounting bracket.
M4x20 socket head screw	345-00050-21	4x	20mm (25/32 inch) screws pre-installed in the vehicle charger. Used to secure the charger to its lower casing. Attached to nuts built into the lower casing of the charger. <b>Do not overtighten these screws.</b>
M5x8 button head screw	346-00005-08	2x	8mm (10/32 inch) screw supplied if the charger package includes U-brackets. Used to join two U-brackets. See also " <a href="#">Optional extras</a> " on page 18.

The charger package does not supply the fasteners that pass via the 'through' holes on the main mounting bracket and attach to the vehicle surface. If you have access to both sides of the mounting surface, you can use bolts and nuts to secure the charger to the surface. Otherwise, use self-tapping screws. A mounting plate adds strength to a mounting surface. See "[Optional extras](#)" on page 18.

The size of the hole to be drilled in the vehicle surface depends on whether the holes are for bolts or for self-tapping screws. For a self-tapping screw, consider both the size and thread form. Also consider the material and construction of the mounting surface. For example, thin metal, thick metal, wood, or plastic.

For some surfaces, you may need to prepare the holes. Use a punch and then drill the hole.



## Mounting methods

Install the charger using one of the following recommended mounting methods.



**Warning** The installation must meet all requirements identified in **"Important safety requirements" on page 15**. Do not drill holes until you have read these requirements.

**Notice** If using the ignition sensed (recommended) connection method, enable the ignition sense signal before mounting the charger. See **"Enabling the ignition sense signal" on page 21**.

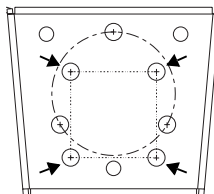
### Mounted against a vertical surface

This method requires no disassembly of the charger and no additional brackets or fasteners. The thickness of the vertical surface must not exceed 15/64 inch (6mm). You will need access to the mounting surface from behind.

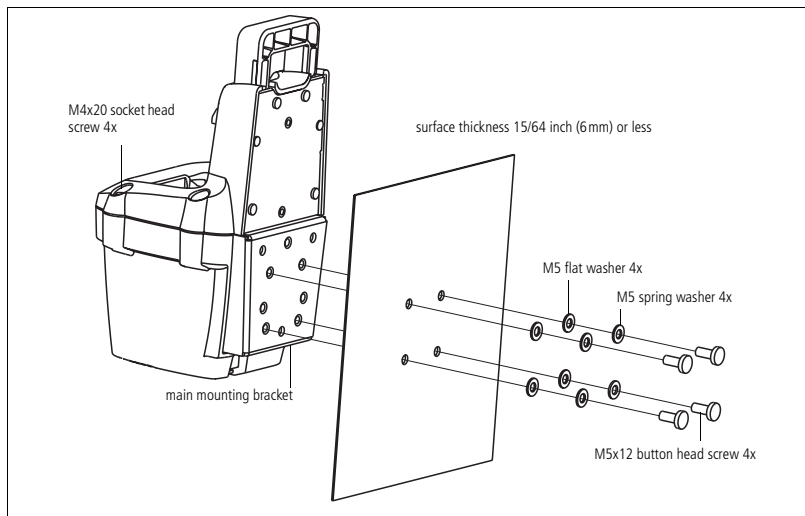
1. If applicable, see **"Enabling the ignition sense signal" on page 21**.
2. Mark the vertical surface with the location of the four threaded holes shown here. Use the drill template provided at the end of this manual.



**Warning** Before drilling any holes read **"Important safety requirements" on page 15**.



**Figure 4.2 Mounted against a vertical surface**



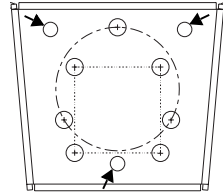
3. If access to the power socket on the charger will be restricted once the charger is mounted, connect the power cable to the charger now. Otherwise connect it once the charger is mounted.
4. Drill four 7/32 inch (5.4mm) holes in the vertical surface.
5. Fit the four screws, spring washers, and flat washers as shown.
6. Use a 3mm hexagonal driver to fasten the screws.

### **Mounted against a vertical surface (no access)**

This method requires partial disassembly of the charger. You will need three self-tapping screws (not supplied) to secure the charger to the vehicle. The screws must fit the through holes on the main mounting bracket (see figure).

1. See [Figure 4.3 on page 28](#). Use a 3mm hexagonal driver to remove the four M4x20 socket head screws from the perimeter of the charger compartment. Remove the charger from its lower casing, and remove the main mounting bracket from the charger.
2. If applicable, see ["Enabling the ignition sense signal" on page 21](#).
3. Hold the main mounting bracket against the vertical surface in the required orientation. Make sure that the bracket is the right way up, and that the arms of the bracket extend into the vehicle.

4. Use the main mounting bracket to mark the vertical surface with the location of the three **through** holes that the self-tapping screws (not supplied) will pass through. Alternatively, use the drill template on [page 39](#).

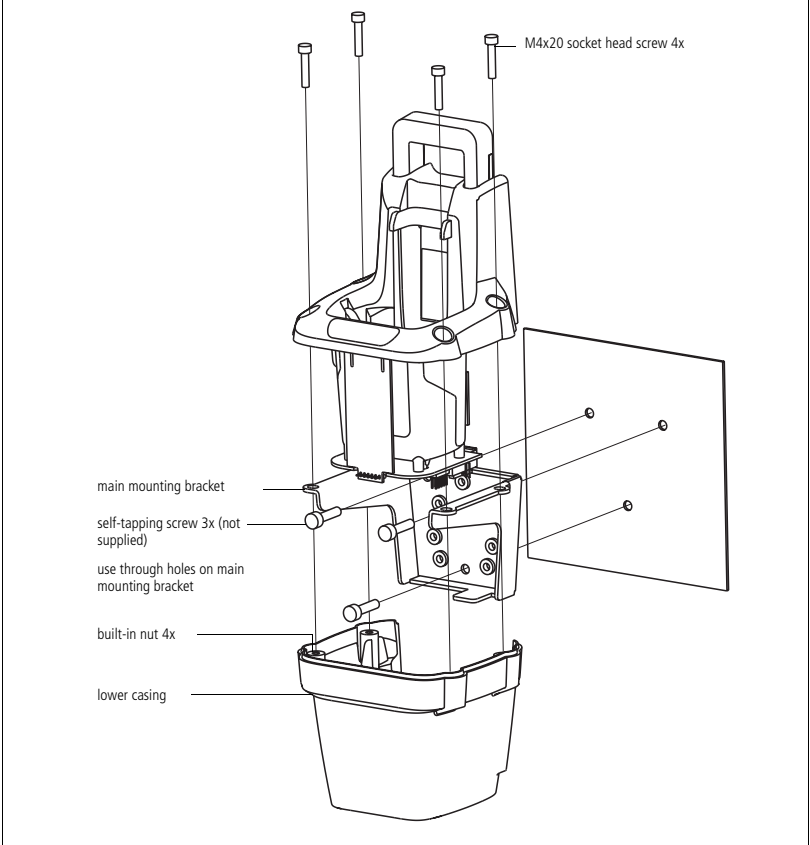


**Warning** Before drilling any holes read "[Important safety requirements](#)" on [page 15](#).

5. If access to the power socket on the charger will be restricted once the charger is mounted, connect the power cable to the charger now. Otherwise connect it once the charger is mounted.
6. Drill the holes and use the three self-tapping screws and the through holes in the main mounting bracket to secure the main mounting bracket to the vertical mounting surface.
7. Reassemble the vehicle charger. Position the charger on the arms of the main mounting bracket. Hold the lower casing in position below the main mounting bracket as you reposition and fasten the four M4x20 socket head screws around the perimeter of the charger. Use a 3mm hexagonal driver to fasten the screws.

**Notice** Do not over tighten these screws or you will damage the plastic.

**Figure 4.3 Mounted against a vertical surface (no access from behind)**

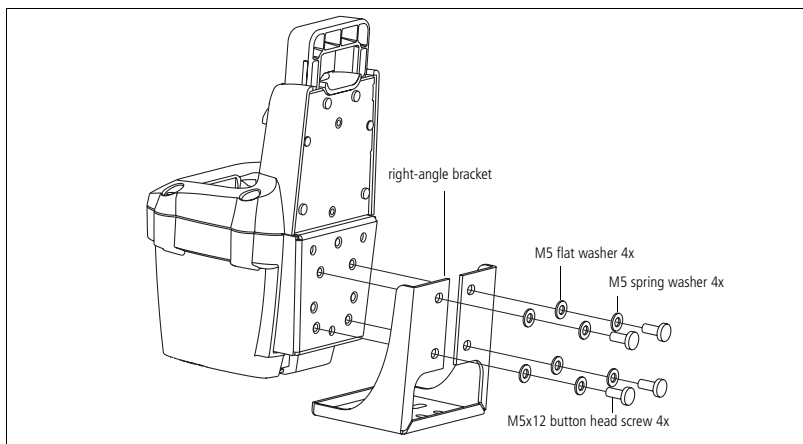


## Mounted using the right-angle bracket

This method requires no disassembly of the charger. You will need fasteners (not supplied) to secure the right-angle bracket to the vehicle.

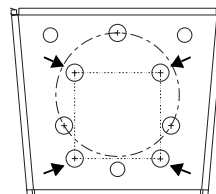
1. If applicable, see ["Enabling the ignition sense signal" on page 21](#).
2. Use the base of the right-angle bracket to mark the location of the fasteners that will secure the right-angle bracket to the vehicle.

**Figure 4.4** Mounted using the right-angle bracket



**Warning** Before drilling any holes read ["Important safety requirements" on page 15](#).

**Notice** If access to the back of the right-angle bracket will be restricted once the bracket is installed, complete Step 3 before Step 2.



3. Drill the holes in the vertical surface and then use the fasteners (not supplied) to secure the base of the right-angle bracket to the mounting surface.
4. Fit the four screws, spring washers, and flat washers, and then secure the right-angle bracket to the main mounting bracket as shown.
5. Use a 3mm hexagonal driver to fasten the screws.
6. Connect the power cable to the charger.

## Mounted using the two U-brackets

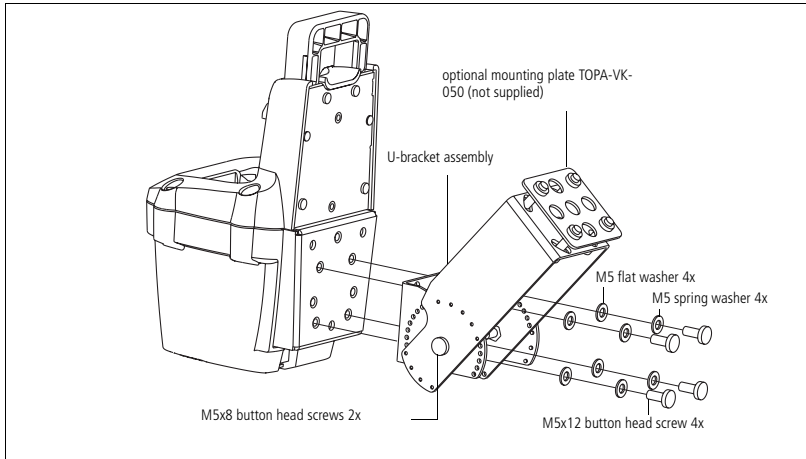
This method requires no disassembly of the charger. You will need fasteners (not supplied) to secure the U-bracket assembly to the vehicle.

1. Use the two M5x8 button head screws to join the two U-brackets at the required orientation. Make sure that the half shears engage, locking the bracket in that orientation and then use a 3mm hexagonal driver to fasten the screws.
2. Use the base of the U-bracket assembly to mark the location of the fasteners that will secure the U-bracket to the vehicle.

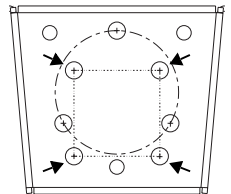


**Warning** Before drilling any holes read "**Important safety requirements**" on page 15.

Figure 4.5 Mounted using the two U-brackets



3. Drill the holes and then use the fasteners (not supplied) to secure the base of the U-bracket assembly to the vehicle. Optional: Include a mounting plate (TOPA-VK-050, not supplied).
4. If applicable, see "[Enabling the ignition sense signal](#)" on page 21.
5. Fit the four M5x12 screws, spring washers, and flat washers, and secure the U-bracket assembly to the main mounting bracket as shown.
6. Use a 3mm hexagonal driver to fasten the screws.
7. Connect the power cable to the charger.



## Mounted using a third-party mount

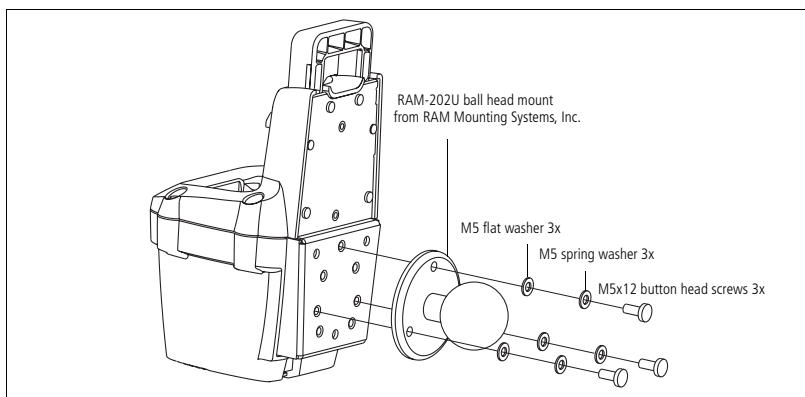
Use this method to mount the charger using a RAM-202U mount attached to a third-party arm. No disassembly of the charger is required. You will need fasteners to secure the arm to the vehicle. See "[Third-party installation requirements](#)" on page 18.

1. Use the base of the third-party mounting arm, or a template provided with the arm, to mark the location of the fasteners that will secure the mounting arm to the vehicle.

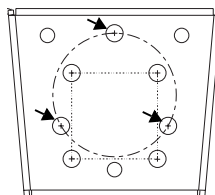


**Warning** Before drilling any holes read "[Important safety requirements](#)" on page 15.

Figure 4.6 Mounted using a third-party RAM-202U mount



2. Drill the holes and secure the mounting arm to the vehicle using suitable fasteners. Follow the instructions provided with the mounting arm.
3. If applicable, see "[Enabling the ignition sense signal](#)" on page 21.
4. Use **three of the four** M5x12 button head screws, spring washers, and flat washers supplied in the package to attach the flat base of the RAM-202U to the main mounting bracket on the charger.
5. Securely attach the ball head of the RAM-202U to the mounting arm. Follow the instructions provided with the mount.
6. Connect the power cable to the charger.



## Panel mounted into a horizontal surface

Use this method to panel mount (flush mount) the charger into a hole cut from a mounting plate or other horizontal surface. Partial disassembly of the charger is required:

- If you have access to the underside of the mounting plate, you will need four nuts that fit the M4x20 socket head screws. Choose nuts of a locking type or use the nuts with locking washers. (The nuts that normally support the M4x20 screws are built into the lower casing, which you discard in this installation.)
- If you do not have access to the underside of the mounting plate, you will need to replace the four M4x20 screws with four self-tapping screws appropriate to the mounting surface. The screws must fit the 11/64 inch (4.3mm) diameter holes previously used by the M4x20 screws.



**Warning** Before drilling any holes or cutting the hole, read "[Important safety requirements](#)" on page 15.



**Caution** Do not mount the charger in a fully 'upside down' orientation. A battery or radio placed loosely in the charger should remain in the charger even if the catches are not engaged. When ejected from the charger, a battery or radio must not fall on or injure occupants of the vehicle.

1. Make sure that the surface can support the charger properly. Mark the size and position of the hole to be cut and the position of the four screws that will secure the charger. See "[Cutout Template: Horizontal Mounting Plate](#)" on page 41. Check that the template is printed to scale, and that the charger will face the right way.

**Notice** When the charger is installed, the LED PCB at the front of the charger must not be in contact with anything that might bump or damage it. Cut a clean hole.

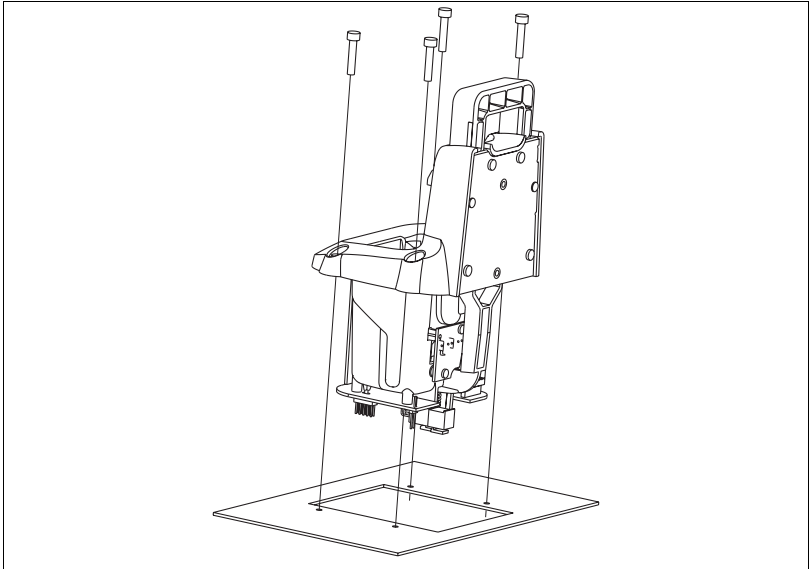
2. Partially disassemble the charger. See [Figure 4.7 on page 33](#). Use a 3mm hexagonal driver to remove the four M4x20 socket head screws from the perimeter of the charger and then remove the charger from its lower casing.
3. If applicable, see "[Enabling the ignition sense signal](#)" on page 21.
4. Connect the power cable to the charger.
5. Place the charger in the hole and align the screw holes. Check that the LED PCB is clear of anything that might bump or damage it.
6. Secure the charger to the mounting plate or horizontal surface as follows:

**Notice** Do not over tighten the screws or you will damage the plastic.

- If re-using the four M4x20 socket head screws from Step 2, use four M4 nuts (not supplied). Use a 3mm hexagonal driver to fasten the screws.
- Alternatively, use self-tapping screws.



**Figure 4.7 Panel mounted (flush mounted) into a horizontal surface**



## Connecting power to the charger

Connect the power cable to vehicle power, and then connect the power cable to the charger. If mounting the charger will restrict access to the power socket on the charger, connect the power cable to the charger before mounting the charger.

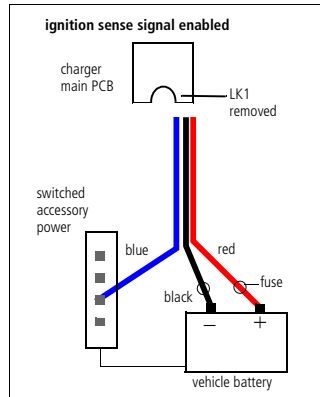
### Connecting to vehicle power

Leave the vehicle battery connected during the installation. Disconnection is not necessary and may disrupt other electronic systems in the vehicle.

1. Run the supplied power cable (219-02668-xx) from the charger location to the power source, following the best route available.
2. Remove the in-line fuses from the fuse holders in the power cable. Using your fingers or a pair of rubber-nosed pliers, slide the fuses from the fuse holders. If using pliers, do not crush the fuse.
3. Position the power cable so that the fuse holders are as close to the power source as possible. This makes it easier to change a fuse later if necessary.
4. Cut the power cable to length. If connecting the power cable to the vehicle battery, leave approximately 8 inches (200mm) of excess lead at the vehicle battery end. Split the leads, strip the ends, and connect the leads according to the chosen connection method: see "[Ignition sensed](#)", "[Ignition switched](#)", or "[Continuously powered](#)" on page 34.

### Ignition sensed

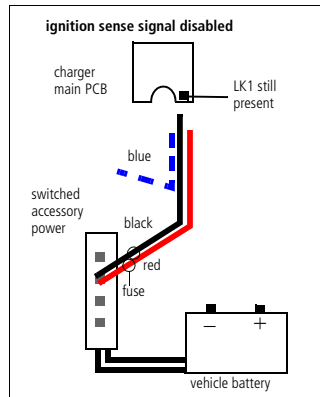
1. Make sure that you have enabled the ignition sense signal. See "[Enabling the ignition sense signal](#)" on page 21.
2. Connect the power cable to vehicle power as shown here.
3. Replace the fuses in the power cable.



### Ignition switched

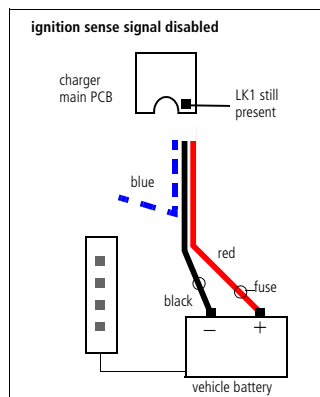
1. Connect the power cable to vehicle power as shown here. The blue lead carries no signal: tie it back.
2. Replace the fuses in the power cable.

**Notice** The source of switched accessory power (for example, the fuse box in the vehicle) must have a current rating of at least 3A. If the charger and multiple in-vehicle systems are connected to the same source of switched accessory power, the total power drawn can trigger a charger 'under voltage' event.



### Continuously powered

1. Connect the power cable to vehicle power as shown here. The blue lead carries no signal: tie it back.
2. Replace the fuses in the power cable.



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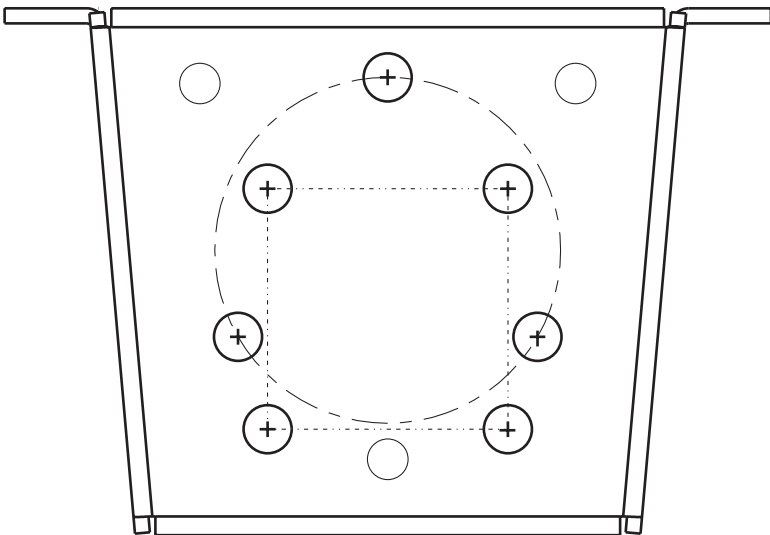
# Drill Template: Main Mounting Bracket

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This template shows the position and size of the pre-drilled holes in the main mounting bracket. Because the layout is symmetrical about the vertical axis, the template can be used for all mounting options.

**Notice** The template must be printed with the printer set to no scaling (100%). To check, measure the sides of the dotted square. Both sides must be exactly 1.26 inches (32mm).

top of vehicle charger







# Cutout Template: Horizontal Mounting Plate

**Notice** This template must be printed with the printer set to no scaling (100%). To check, measure the cutout area and compare your measurements with those shown here. The vehicle charger measures 4 1/8 inches (105 mm) from front to back, and is 4 1/2 inches (111 mm) wide.

