

TOAD-CHARGE™

Towed Vehicle Battery Charger

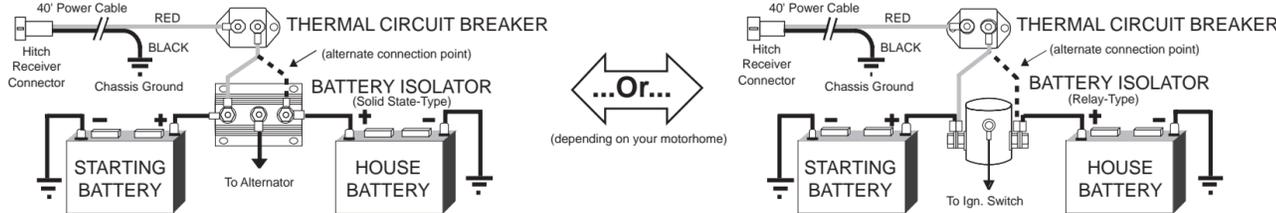
GENERAL INFORMATION — TOAD-CHARGE™ is designed to keep the battery in your towed vehicle (or "Toad") charged while it is being towed behind your motorhome, thereby solving the battery discharge problems often caused by auxiliary braking systems. The TOAD-CHARGE™ kit connects between your motorhome's starting (or chassis) battery(s) and the towed vehicle's battery, using the motorhome's alternator to supply up to 5 amps of charge to the towed vehicle's battery.

The TOAD-CHARGE™ kit consists of several components: A charge regulator installed in the towed vehicle's engine compartment monitors the charging current, and prevents reverse current flow when the motorhome engine is started. A thermal circuit breaker installed near the motorhome starting battery protects against excessive current flow due to wiring faults or a dead battery. A 40 foot (12.2 M) power cable in the motorhome and a 10 foot (3.0 M) towed vehicle cable are connected by a 7 foot (2.1 M) cable that can be permanently attached to the tow bar. Detachable connectors on both ends of this cable allow it to be stowed along with the tow bar when not needed. The cable includes its own ground wire, thereby minimizing the voltage drop that might otherwise be present when relying on the motorhome's trailer hitch wiring.

Step-By-Step Installation Instructions

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STEP ONE: Identify a suitable point for connecting the 40' power cable to the Positive and Negative sides of your motorhome's starting battery(s), but don't make any connections yet. Generally, the best connection point for the Positive side is at your motorhome's battery isolator or relay, which is already connected to both battery banks (see "HOW TO FIND THE ISOLATOR" on the next page). The Negative connection can go to any nearby chassis ground. Connecting directly to the battery posts is a less desirable option, due to the prospect of eventual corrosion. **NOTE:** If desired, the kit can instead be connected to the motorhome's house batteries (shown below as "alternate connection point"). This has the advantage of allowing the towed vehicle to be recharged overnight when parked with AC hookups.



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STEP TWO: For safety's sake, disconnect the battery cable from the Positive post on the motorhome starting (or house) battery(s) before proceeding. Install the 40' power cable, starting at the back of the motorhome, with the connector end near your motorhome's receiver hitch. Leave about a foot at the connector end of the cable dangling near the hitch before securing the cable to the underside of your motorhome chassis, using the black Nylon tie-wraps (included in the kit) as the means of attachment every few feet or so. Route the cable to the motorhome battery connection point that you previously identified in STEP ONE,

CAUTION!
USE CARE AROUND BATTERIES — SPARKS CAN IGNITE HYDROGEN GAS. SHORT CIRCUITS CAN CAUSE BURNS OR FIRE. CORROSIVE ACID CAN CAUSE SKIN BURNS OR BLINDNESS.

taking care to keep the cable from touching hot exhaust parts, sharp edges or moving parts of the motorhome drivetrain. If desired, the electrical tape (included) can be applied at any points along the power cable's run where insulation chafing might otherwise be a problem (but save some tape for STEP FIVE).

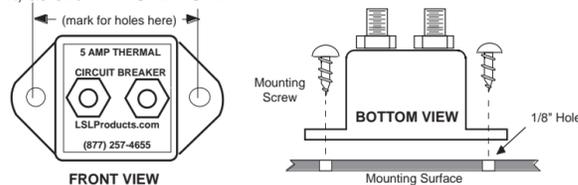
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STEP THREE: Mount the Thermal Circuit Breaker immediately next to your chosen motorhome battery connection point, using two sheet metal screws (included) in 1/8" drilled holes. Cut off any excess wire from the 40' power cable, leaving enough to reach the Positive and Negative connection points previously identified in STEP ONE, remembering that the Red wire needs to connect to Positive through the Thermal Circuit Breaker.



Finally, split a piece of the left over cable, and cut the resulting Red wire so that it is long enough to connect between the remaining terminal on the Thermal Circuit Breaker and your previously-chosen Positive connection point. Strip both wire ends, attach appropriate-sized crimp-type ring terminals (included), and connect this wire between the Thermal Circuit Breaker and your chosen Positive connection point. Reconnect the Positive post(s) of the motorhome starting (house) battery(s) to its battery cable(s). This completes the installation on the motorhome side.

CAUTION!
USE CARE IN DRILLING HOLES NOT TO CONTACT ANY ELECTRICAL WIRING — HAZARD OF SHOCK, FIRE, BURNS.

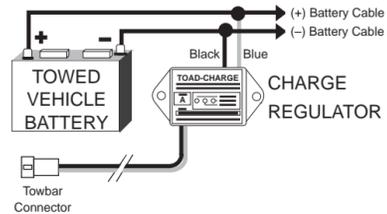


WARNING: DO NOT OMIT THE THERMAL CIRCUIT BREAKER, OR A FIRE HAZARD WILL RESULT! Split the cable's Red and Black wires apart, strip approximately 1/4" of insulation off the end of each one (see wire strip chart), and attach them to the appropriate sized crimp-type ring terminals (included). Connect the Red cable wire to either terminal on the Thermal Circuit Breaker, and connect the Black cable wire to your previously-chosen Negative/Chassis Ground connection point, as shown in STEP ONE.

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STEP FOUR: Inside your towed vehicle's engine compartment, identify points for connecting the Charge Regulator to the Positive and Negative sides of the vehicle's battery. The TOAD-CHARGE™ kit contains parts for splicing the connections to the battery cables (the preferred method), or bolting directly to the battery terminals (not preferred, due to eventual corrosion problems). For safety's sake, disconnect the vehicle's battery cable from the Positive post on the battery before proceeding.

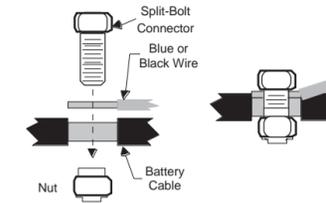
Mount the Charge Regulator near your chosen connection points, using either two sheet metal screws (same manner as Thermal Circuit Breaker above) or Nylon tie wraps (included). Cut any excess off the ends of the Charge Regulator's Blue and Black wires, leaving enough wire to reach your chosen connection points. (The Blue wire goes to battery Positive; the Black wire goes to battery Negative).



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STEP FIVE: If connecting the Charge Regulator to your vehicle's battery cables, cut approximately 3/4" of insulation off the positive and negative battery cables (see wire strip chart) at whatever point the new connections are to be made. Use care to avoid cutting or nicking the small wire strands inside the cable. Strip approximately 3/4" off the ends of the Blue and Black Charge Regulator wires. Next, install a copper split bolt (included in the kit) over the stripped area of the Positive battery cable (flattening the cable



enough to make it fit inside the slot in the bolt), put the bare end of the Charge Regulator's Blue wire under it, thread the companion copper nut over the bolt (grooved side of nut insert facing the wire) and tighten the nut firmly. Do the same thing with the Negative battery cable and the Black wire. Tightly wrap each bolt with several feet of plastic electrical tape (included), so that both connections are completely covered with many layers of tape (i.e., so that no part of the bolt or bare wire is visible).

If connecting directly to the battery posts instead, strip approx. 1/4" from the ends of both the Blue and Black wires on the Charge Regulator, attach them to the appropriate sized crimp-type ring terminals (included), and then attach these terminals to the bolts on the battery cable clamps (Blue to Positive; Black to Negative).

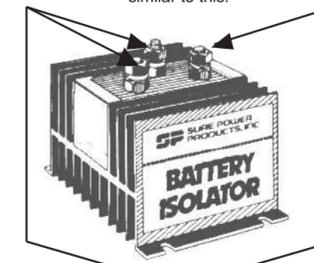
Route the Charge Regulator's power cable to the outside front of the towed vehicle, securing it with Nylon tie wraps (included) every foot or so. Use care to keep the cable clear of hot exhaust manifolds, sharp edges and moving parts. Leaving about a foot of cable at the connector end dangling near the tow bar mount, secure any excess cable under the vehicle or behind the front grille/bumper with a Nylon tie wrap. Reconnect the Positive post of the vehicle starting battery to its battery cable. This completes the installation on the towed vehicle side.

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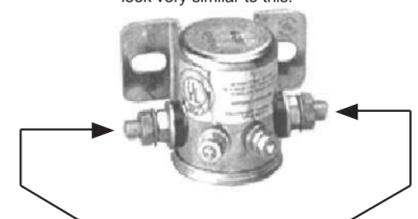
STEP SIX: Attach your tow bar to your tow vehicle or motorhome, and extend it to the towing position (if applicable). Using a Nylon tie wrap, secure one end of the 7' Tow Bar Cable to the motorhome end of the tow bar, leaving enough slack to provide unrestricted motorhome movement during hard turns. Route the Tow Bar Cable down the outside edge of the tow bar, securing it with Nylon tie wraps every few inches. Leave enough slack on the other end to allow unrestricted movement as the tow bar flexes up and down or folds against the tow vehicle (if applicable), securing any excess cable with a tie wrap. (NOTE: If your tow bar folds sideways or telescopes, be sure to attach the cable to it in such a manner that the cable isn't pinched when folded or retracted). This completes the entire installation process.

HOW TO FIND THE ISOLATOR — The isolator is often located either inside or immediately next to the engine compartment:

If a solid-state isolator is present, it will look very similar to this:



If a relay (or solenoid)-type isolator is present, it will look very similar to this:



Wire Strip Gauge
3/4" (19 mm)
1/2" (13 mm)

At the factory, the manufacturer has connected one of these terminals to the positive terminal of your house battery bank. Another terminal is connected to the positive terminal on your starting battery(s), and the last terminal is connected to the DC output from your engine's alternator. You want to connect Toad-Charge's RED wire to the terminal that goes to either the HOUSE or STARTING batteries, and connect Toad-Charge's BLACK wire to chassis ground (which is also connected to the NEGATIVE side of the batteries). Some isolators show connections on an attached sticker or label.

At the factory, the manufacturer has connected one of these large terminals to the positive terminal of your house battery bank. The other large terminal is connected to the positive terminal on your starting battery(s). You want to connect Tri-L-Start's RED wire to the terminal that goes to either the HOUSE or STARTING batteries, and connect Toad-Charge's BLACK wire to chassis ground (which is also connected to the NEGATIVE side of the batteries).

Note: Occasionally, more than one similar-looking relay is present. The isolator relay (also sometimes labeled "EMERGENCY START RELAY") is the one that will "click" whenever the engine ignition switch is turned from the "off" to "run" positions.

Operation & Maintenance

With the tow vehicle cable connected to the motorhome, the yellow CHARGING light will illuminate whenever a high charge is being delivered to the towed vehicle battery. As the battery reaches a full state of charge, the current will taper off until the green MAINTAINING light is illuminated instead. (NOTE: If the kit is connected to the motorhome's starting battery(s), neither light will typically illuminate until shortly after the motorhome engine is started. If the kit is connected to the motorhome's house batteries instead, the lights may also illuminate whenever AC shore or generator power is present.). The red REVERSE POLARITY light will only illuminate if the unit is wired incorrectly.

When the motorhome engine is shut off (and, in installations where the kit is wired to receive power from the house batteries, shore power is also removed), all charging will soon cease, and virtually no power will be drained from the motorhome's batteries. There is no need to disconnect the cable whenever the hitched motorhome/towed vehicle combination are parked overnight. When the power cable is unplugged, the Charge Regulator is effectively disconnected, and virtually no current is drawn out of the towed vehicle's battery. There is no need to disconnect the Charge Regulator when driving the towed vehicle by itself.

The Charge Regulator has a built-in blocking diode that prevents reverse current flow in the event that the motorhome's starting or house batteries are discharged. This ensures that the towed vehicle can always be started, even if both battery banks on the motorhome are completely dead. This blocking diode is also used in conjunction with a thermal circuit breaker to ensure that a short circuit occurring at any point along the power cable will not cause excessive current to flow from either the motorhome or towed vehicle batteries — an important safety benefit.

Maintenance consists of periodically removing dirt and road grease from the cable connectors (a spray can of WD-40® works well for this task), and occasional inspection of the cable for frayed or damaged insulation.

Warranty

LSL Products warranties this unit for a period of **ONE YEAR** from the date of purchase against defects in materials and workmanship. Please save your receipt as proof of warranty coverage. LSL Products will, at its option, repair or replace any defective components, at no charge to the owner. Please contact us prior to returning the unit. This warranty does not cover damage due to improper installation or unreasonable use of the product. In no event shall LSL Products nor any of its representatives be responsible for incidental or consequential damages. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

LSL PRODUCTS • 5807 BABCOCK RD. # 108 • SAN ANTONIO, TX 78240 • 877-257-4655 • FAX: (210) 699-9702 • www.lslproducts.com

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