



COMBINER 600 12 Volt Model C600 FOR ALTERNATORS UP TO 600 AMPS.

SUMMARY

The Combiner600 is a precision voltage-sensing relay (13 volts) which connects two batteries together when either is receiving a charge. When the charging ceases, it disconnects so that each battery operates independently and prevents accidental discharge of the starting battery. Supplemental battery banks can be added by using an additional Combiner for each bank. It eliminates manual switching every time you start the engine to parallel batteries for charging. Never again forget to switch it back. No diodes so no voltage drop, and batteries get a full charge.

FEATURES

Suitable for alternators up to 600 amps, up to 18 volts. 500-amp continuous rating, 750-amp intermittent current (5 minutes), 2,500-amp cranking, One year factory-direct limited warranty from date of purchase
Waterproof
Ignition rated for explosive atmospheres
No voltage drop so batteries reach full charge. Electronic thermal monitoring with shutdown & restart. Minimal wasted power, no heat sink or cooling required. Can be used on alternators with internal regulators. Protects alternator against overload from low batteries. No special wiring for alternators with external sense. Simple basic installation, two battery cables and ground. Comes with mounting hardware and cable terminals **Green LED** indicates when combined, **Red LED** indicates thermal overload or low voltage.
Draws no current when batteries are not being charged.
Uses about 150 milliamps from the alternator when charging is in progress
No diodes to burn out if accidentally shorted

Optional external remote feature for **Off, Automatic, and On**

Remote "ON" can be used for assisted engine starting
Withstands ambient temperature to over 175°F (80°C) for exposed or engine compartment mounting

SAFETY CONSIDERATIONS

When using a Combiner any alternator external sense should be connected directly to the alternator output terminal.

WARNING: Disconnecting the output from the alternator should be avoided when the engine is running.

carry hundreds of amps, it is imperative that you have low resistance connections. This means having clean metal-to-metal contact, the right size ring terminals, properly crimped terminals (preferably soldered also), and secure mechanical fastenings.

Put your heaviest cable terminals on the bottom of the terminal for maximum contact area, with lighter ones above. The 2 red wires should be on top, above all other terminals and just under the nut and washers.

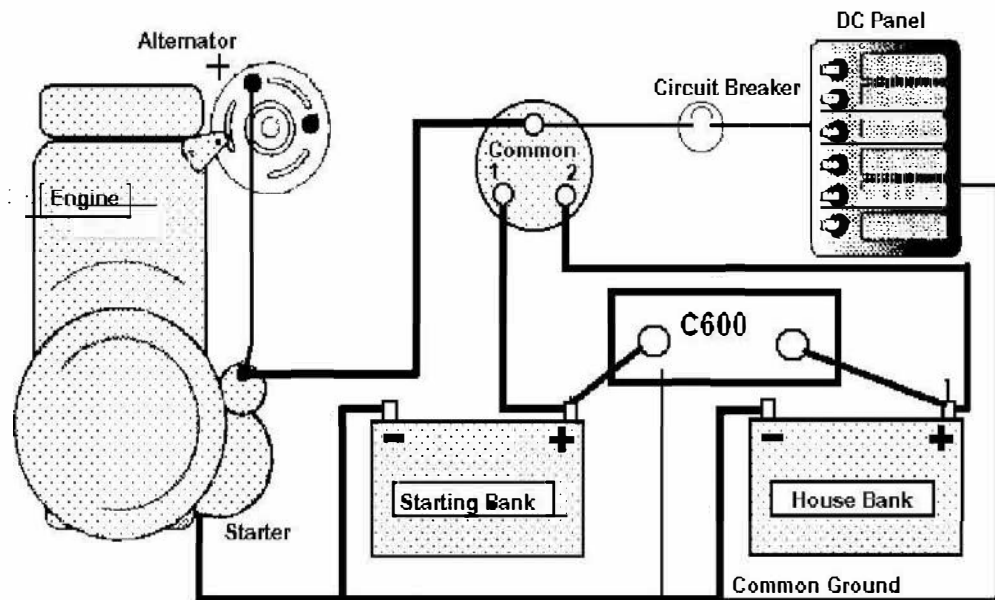
BASIC INSTALLATION

1. Connect the "12-Volt Negative" ground terminal to the common negative of your battery banks.
2. Connect the large terminals to the positive terminals of the batteries. **USE A CABLE GAUGE RATED AT LEAST 75% OF THE ALTERNATOR OUTPUT RATING.**
The Combiner600 may close momentarily when initially connected causing a spark.
3. That completes the basic installation. The two remaining terminals are not normally used. See Appendix
4. The battery negative terminals must be connected together with a cable large enough to handle starter motor and alternator currents.

SAMPLE INSTALLATION EXAMPLES

1. Single engine powerboats:

With the Combiner600 you can use an (optional) **OFF-1-BOTH-2** switch to select the engine power source and leave the DC loads permanently on battery 2. Starting power is



normally supplied from the starting battery in position 1, but battery 2 or both can be selected in an emergency. In all

Since the connections made in the battery circuits can

cases, both batteries are being charged when the engine is running.

A common alternative is to have the DC Panel connected directly to the House Bank battery through the Circuit Breaker, dedicating the second battery to just house loads. The selector switch would then stay on 1 all the time except for emergencies.

Frequently the OFF,1,BOTH,2 switch is omitted dedicating the Starting Bank battery to the engine and the House Bank connected to handle the auxiliary loads.

Auxiliary battery for commercial vehicles or mobile sound systems.

Make sure the alternator is rated for 600 amps or less. The auxiliary battery must be securely mounted in a convenient location. If mounted in the passenger compartment it should be separately enclosed and vented outside the compartment, or you can purchase batteries with built-in vents to which vent tubing can be attached.

Use cables of adequate size for the installed alternator. The Combiner600 can be mounted safely in battery compartments. For protected environments fuses or circuit breakers are typically only used if the cables are subject to external damage.

Travel trailers and motor homes.

These vehicles typically have a "house" battery already installed. Make sure the alternator is rated for 600 amps or less. By connecting the Combiner600 between the starting battery and the house battery, the unused capacity of the alternator will be automatically directed to the house battery while underway. Since the Combiner600 is bi-directional, a shore power charger on the house battery will also make certain the starting battery is at full charge. Neither system will draw power from the other battery through the Combiner600 so there is no risk of discharging the starting battery.

BATTERY CHARGERS

A single output shore power charger can be directly connected to the house battery to charge both batteries. Multi-bank chargers are no longer required but can remain connected to each of the battery banks if already installed.

OPERATION

The **GREEN** "Combined" light will come on some time after charging has commenced. The time delay depends on how much current is being delivered to the bank connected to the alternator and its initial state of charge. When the initial bank reaches 13.0 volts the other bank(s) will be placed in parallel by the Combiner600. If one bank is very low, the Combiner600 may turn off and on a number of times as it brings it up to voltage.

After charging has ceased, the **green** light may remain on for quite some additional time if there is no load on the batteries due to the artificially high voltage above 13 volts left over from the charging.

If the internal temperature of the Combiner600 rises too high, the **red "Overload" light** will come on and the Combiner600 will turn off to protect itself. After it cools by about 10F (6C), it will turn back on automatically. The overload condition should not be permitted as a regular

occurrence as charging time is being lost.

FUSES & CIRCUIT BREAKERS

Accepted wiring practice guidelines dictate that all 12 volt circuits except starter motor leads should be fused, however the only path to ground inside the Combiner600 is fused internally should it suffer an internal failure. Fuses in the battery leads to the Combiner600 only provide protection from a short to ground on the battery cables themselves. Conduit covering can reduce this risk and is much cheaper..

If it is a metal vehicle and the unprotected cables are close to grounded metal the risk of a short is much higher and fuses may be a good protection. The size of the fuses has to be much higher than the charging current available because when the Combiner first closes quite large currents can flow from one battery to another. These battery to battery currents are limited by the wire gauge and length. A slow blow fuse of approximately 30% to 50% of the total Cold Cranking Amp capacity of the batteries in the larger bank is a guide to value.

APPENDIX

REMOTE CONTROL TERMINAL

(Upper "**REMOTE**" terminal on left.)

This feature is very rarely needed. We suggest you run without it for a while to see if there are any situations where you would use it. This terminal is left unconnected for automatic operation.

It can be connected through a single pole, center off, double throw switch for remote control. Switching it to negative 12 forces the Combiner600 off, switching it to +12 forces it on. **The response of the Combiner600 to remote operations is delayed by turn on and turn off timers.** If you only need one function, a simple on/off switch will do. The remote control input is purely voltage sensing so a light gauge wire is sufficient.

VOLTAGE LIMIT TERMINAL

(Lower "**LIMIT HIGH V**" terminal on left.)

This feature is rarely used. If connected to the battery to be charged by the Combiner600 it will limit that battery to 14.2 volts maximum. This would be used to prevent a sealed battery being damaged by "lead acid" voltages that cause gassing. The **RED OVERLOAD LED** will flash slowly when it is regulating voltage.

The **RED LED** may turn on to indicate LOW BATTERY VOLTAGE.

* WARRANTY

We offer a one year factory-direct limited warranty from date of purchase

Visit smartshoremarine.com to get the all the warranty details.

INSTALLATION HELP www.smartshoremarine.com

TECHNICAL EMAIL QUERY tech@smartshoremarine.com

Call 901-382-8888 | Tech Support Hours: 8:00am-5:00pm CST. Mon-Fri