West Marine 12 Volt Model 143268

COMBINER 50, Installation Instructions

SUMMARY

The West Marine Combiner 50 is a voltage-sensing relay (13.3 volts) which connects two batteries together when either is receiving a charge. When the charging ceases, the relay opens so that each battery operates independently. Supplemental battery banks can be added by using an additional combiner for each bank.

FEATURES

- ? 50 amps continuous rating, 200 amps closing current (2 seconds), 100 amps for 5 minutes
- ? Suitable for alternators up to 100 amps, up to 18 volts. Larger charging sources should use the Combiner 150.
- ? Waterproof
- ? Insignificant voltage drop so batteries reach full charge
- ? Electronic thermal monitoring with shutdown
- ? Minimal wasted power, no heat sink or cooling required
- ? Can be used on alternators with internal regulators
- ? No special wiring for alternators with external sense
- ? Simple basic installation, two battery wires and ground
- ? Complete with all cables and terminals for basic hookup
- ? Green LED indicates when combined
- ? Red LED indicates thermal overload shutdown
- ? Draws only 0.00005 amps when batteries are not being charged - That's only 1 amp-hour every 2 years
- ? Draws less than 150 milliamps from the alternator when charging is in progress
- ? Optional external remote control for **off, automatic, 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
- ? No diodes to burn out if accidentally shorted

SAFETY CONSIDERATIONS

DANGER: On all alternator/regulator circuits with an external sense wire it is critical that the sense wire can never be disconnected from the alternator output. Damaging, self-destruct voltages can be produced. Installation of a ***Zap-Stop*** will ***not*** protect against damage if this happens.

WARNING: If there are switches which can disconnect the alternator output from the battery a ***Zap-Stop*** or similar protection diode can reduce the chance of alternator damage and it is recommended for all installations.

Since the connections made in the battery circuits can 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.

INSTALLATION

1. Connect the black ground wire to the common negative of your battery banks. Shorten if necessary.

2. The red cables connect to the positive terminals of the batteries. ***SHORTENING THESE POWER CABLES WILL VOID THE WARRANTY.*** You can cut off the terminals if necessary. Extending is OK.

The connection can be made on the selector switch or directly to the batteries. Make sure the second lead is not touching ground when you connect the first since the combiner sometimes closes momentarily when initially connected.

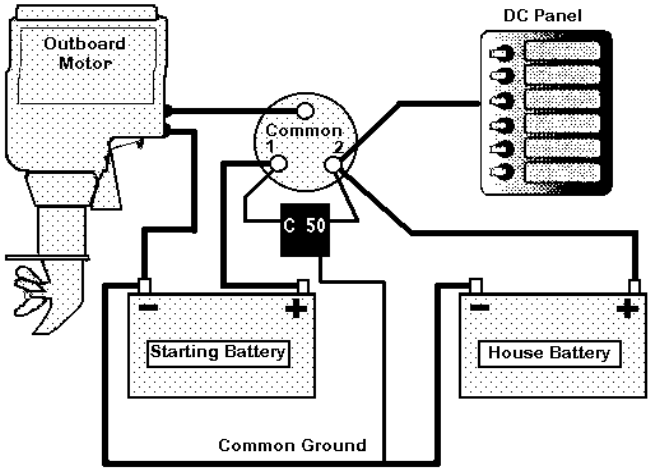
3. The green REMOTE wire is usually left unconnected for automatic operation. It may be cut short if desired.

It can be connected through a single pole, center off, double throw switch for remote control. (West Marine Switches 192163, 191785 or 211854) Switching it to ground forces the Combiner 50 off, connecting to +12 forces it on. ***The response of the Combiner 50 to remote operations is slowed by turn on and turn off time delays.*** When disconnected in the center position you are in automatic. If you only need one function, a simple on/off switch will do. The remote control input must be well protected from salt water as leakage currents to +12 or ground can be mistaken as a switch closure and disrupt normal operation.

SCHEMATICS

1. Single engine powerboats:

With the Combiner 50 you can use an **OFF-1-BOTH-2** switch to select the engine power source and leave the DC loads permanently on battery 2. Starting power is normally

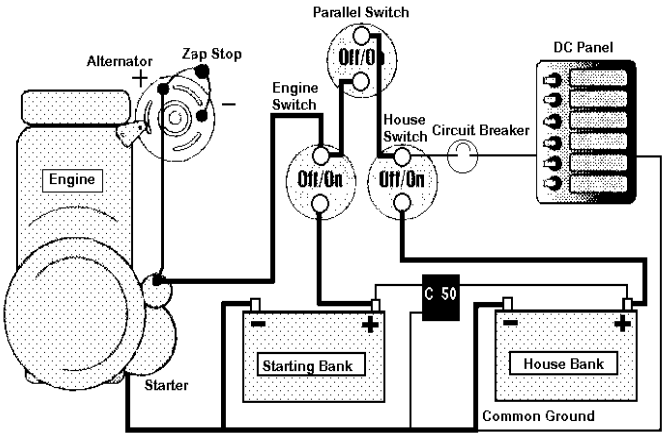


supplied from the starting battery in position 1 but battery 2 or both can be selected in an emergency. In all cases, both batteries are being charged when the engine is running.
WARNING: If you use this circuit, turning the switch to "OFF" while the engine is running can damage your alternator.

2. Small boat version with three switches:

Although this requires three single throw switches it has the distinct advantage that no switching operations are required under normal operation. The starter motor runs off the starting battery, the house runs off the house battery but in an emergency, either load can be removed from its normal source and switched to, or connected in parallel with the other battery.

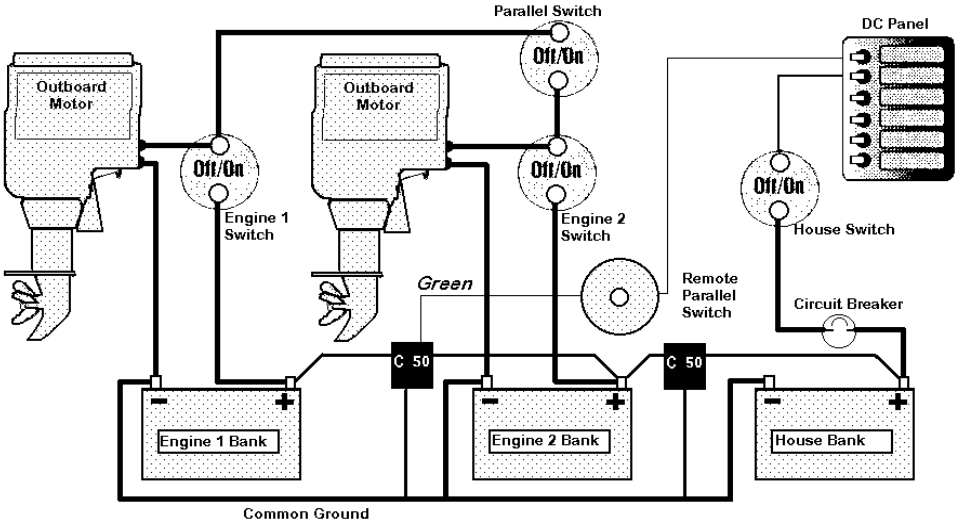
In this circuit the alternator is going through the switch(es) to get to the battery. This means that turning a switch off while the engine is running will risk damage to the alternator. Using a "Zap Stop" will reduce the risk. A safe alternative,



if the alternator output is accessible, is to remove it from the starter circuit and connect it directly to the house battery positive. The starting battery will now be charged through the combiner.

3. Twin engines and adding extra banks:

The following wiring diagram shows how Combiner 50s can be daisy chained to add extra banks. In this



example there are twin engines, each with their own starting battery, and one house bank for auxiliary loads. Either engine can be started from either starting battery, or both in parallel. A remote parallel switch or push button can located on the control panel to be used for assistance in an emergency. If any engine is running, all batteries will be charged.

4. BATTERY CHARGERS

A single output shore power charger can be directly connected to the house battery. Multi-bank chargers can be connected to each of the battery banks.

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 being charged and its initial state of charge. When the initial bank reaches 13.3 volts (±2%) the other bank(s) will be placed in parallel by the Combiner 50. If one bank is very low, the Combiner 50 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 "float" voltage above 13.3 volts left over from the charging. The small current drawn by the Combiner 50 will slowly absorb this float and turn off. There is no significant power wasted in this process and the float would dissipate internally in the batteries if the combiner were not there.

If the internal temperature of the Combiner 50 rises too high, the red "Overload" light will come on and the relay will turn off to protect itself. After it cools by about 10?F (6?C), it will turn back on automatically. The overload condition should not be permitted as a regular occurrence as charging capacity is being lost.

FUSES & CIRCUIT BREAKERS

Marine wiring practice guidelines dictate that all 12 volt circuits except starter motor leads should be fused, however there is no path to ground inside a battery combiner which can carry any significant current should it suffer an internal failure. Fuses in the battery leads to the combiner only provide protection from a short to ground on the battery cables themselves which must pierce the insulation. Conduit covering can reduce this risk.

If it is a metal boat 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 ***which must not be shortened***. A slow blow fuse of approximately 30% to 50% of the total Cold Cranking Amp capacity of the batteries in the smaller bank is a guide to value. Although the risks are minimal without a fuse, the results of an accident can be catastrophic and even life threatening.

All battery circuits should have a disconnect switch located close to the positive battery terminal to allow isolation for emergencies and regular maintenance.

West Marine **WARRANTY 1 year.**

WARRANTY VOID IF RED POWER LEADS ARE SHORTENED

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