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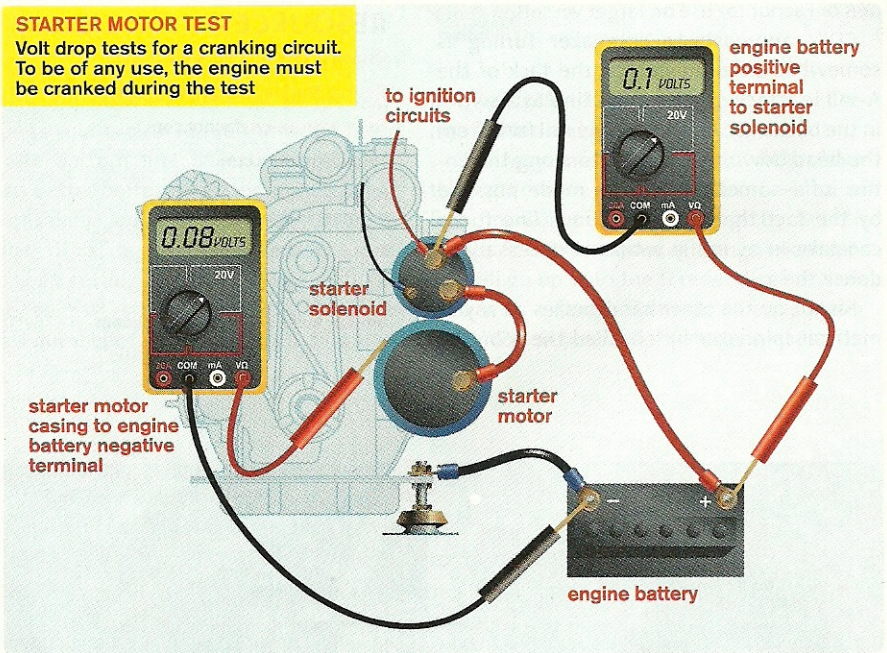
BoatWorks Special Section

What's Inside:

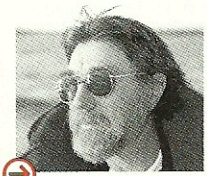
STARTER MOTOR TEST
Volt drop tests for a cranking circuit. To be of any use, the engine must be cranked during the test



Tech Notes WITH NIGEL CALDER

STARTING WOES

ENGINE RELUCTANT TO TURN OVER? TRY THESE TRICKS



Nigel Calder has written many technical articles and books, among them *Nigel Calder's Cruising Handbook*, published by International Marine

This is the time of year when I receive emails like this: "My engine ran fine when I laid it up last fall, but now it won't turn over..." it is also the time of year when that magical device, the digital multimeter, earns its keep.

Please note, I wrote *digital*. If you have a cheap analog meter (the one with a swinging needle) do yourself a favor and replace it with a decent digital one. If you can, buy one with a clamp-type DC ammeter that reads to 200 amps or more. These are now available for less than $100. I recently bought one from Sears for $60 that reads to 400 amps DC and AC. In any event, make sure the meter reads DC amps, as some only read AC amps.

BATTERY TEST

If your engine won't turn over or turns over sluggishly, two quick tests conducted with your multimeter in DC volts mode will identify most problems. To perform the first test, place your probes across the battery terminals, making sure you have a good contact with the terminals (not with the cable clamps) and have someone crank the engine. If the voltage crashes, the battery is either discharged or dead, or the starter motor has a dead short. The latter is unlikely, but easy to detect as you will smell the burned windings—a very distinctive odor!

Assuming the battery is the problem, recharge it and try again. If it crashes a second time it is dead and needs replacing. Most likely you forgot to charge it before laying up the boat, in which case it sat partially discharged all winter and has sulfated.

What *should* happen when you crank your starter is the voltage should dip from somewhere above 12.6 volts (a fully charged battery) to around 12.0 volts. The voltage should then slowly decline as you continue cranking.

If the engine doesn't turn over and there's no change in voltage, the problem lies in the starter's cranking circuit. Most likely it's in the switch or the solenoid—the round cylinder on top of the starter motor. It could also be the result of failed or stuck brushes in the starter motor. If the voltage dips, but doesn't crash, and the engine turns slowly or not at all, the most likely problem is excessive resistance in the cranking circuit, which means it's time for a negative voltage drop test.

WASTED ENERGY

To perform this second test, first take the voltmeter leads and place one probe on the engine block (you may need to scratch around to get a good contact) and the other on the negative battery post. Next, have someone crank the starter. The voltmeter will read the voltage drop on the negative side of the cranking circuit. This is basically a measure of the energy being dissipated in the wiring and connections that is not being put to useful work. The reading should be well under 1.0 volt. If it is higher, immediately feel the cable connec-