Upgrading Yanmar Diesel engine starter wiring to ensure starting the engine every time you push the starter switch

My T3500 was built in 2001 and commissioned at the start of 2002. She was fitted with a Yanmar 3GM30F engine with the 'B' type control panel in the cockpit. She had 63 hours on the engine when I bought her in June 2009.

The following article is in response to a universally observed fault with these particular engines and their control panels.

Problem: once the battery voltage has dropped a tad (you've been motoring and sailing for a bit) the push switch would not start the starter motor on the first push, but needed several, increasingly nervous, actuations to activate the starter. This could always be fixed by changing the battery switch from "1", the house batteries (which I normally run on), to "BOTH" or "2", the exclusive starter motor battery. I do not consider this a long term solution.

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Various Solutions: there are quite a few solutions suggested on bulletin boards, blogs, forums, engine maintenance books etc. These range from:

1. Spreading the connector pins on the two connectors in the wiring harness near the control panel to get better contacts.
2. Spraying all the connections with contact cleaner.
3. Adding another relay/solenoid (!) before the starter motor and supplying additional current through a large gauge wire to that.
4. Replacing the wiring harness with a new Yanmar harness.
5. Running new, heavier, wires to the starter motor from the switch.

I tried numbers 1 and 2 because they were easy. They didn't seem to help significantly, but I suppose that they might help at the beginning of the problem. Number 3 seems ridiculous since it adds complexity and just palliates the problem rather than cures it. Number 4 is just as daft; you know the wire will degrade in a few years and will then need to be fixed. So I tried the obvious favorite, number 5, running new wires. This worked perfectly. The original wires in the Yanmar harness are not tinned and so have corroded (increased resistance, lower voltage deliverable) over time. Now with new wires my starter engages at the first push of the switch every single time.

Implementation of a Solution: There are two wires to "replace". I have that word "replace" in inverted commas because there is no need at all to remove the old wires. They will be automatically and totally ignored if they offer more resistance, but will continue to perform the secondary tasks you don't know about (such as the alternator connection). What you need to do is figure out the wire length you need and buy a suitable gauge of tinned marine wire (I used 10 AWG Ancor from http://genuinedealz.com/ $17.85 for

17', free shipping). The wire is going to run, on my boat, between the key switch (red), the starter switch (white) and the two terminals on the starter motor solenoid.

Back of the control panel before adding new wires

On the key (or ignition) switch there are two terminals on my T3500, one has a white wire that goes to the starter switch, a red wire with a black stripe that goes to the warning lights and a black wire that connects the buzzer. The other terminal has one thicker, red wire that comes from the wiring harness. I connected my red wire to the latter terminal.

On the starter switch there are also two terminals, sort of obscured by their slick manufacturing process. One is the wire from the ignition switch the other, also a white wire, goes to the wiring harness. This latter is where I connected my new white wire by splicing it into the accessible tail.

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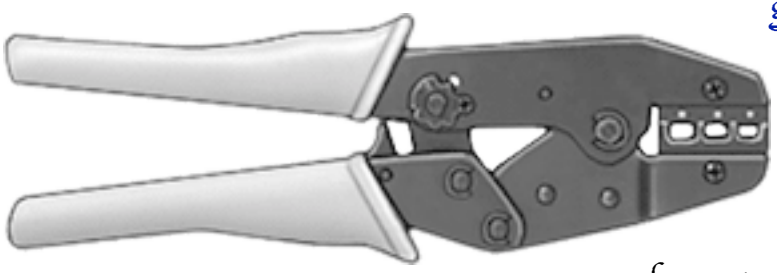
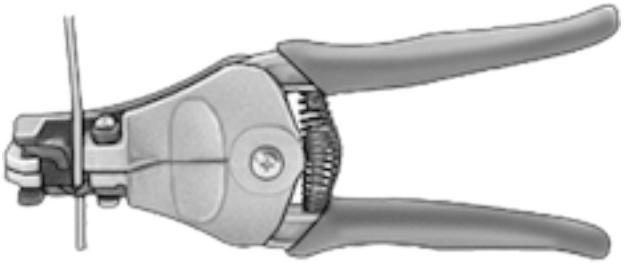
Now I ran my 2-wire cable down with the wiring harness and into the engine compartment, cable-tying as I went till I got to the starter motor and solenoid. There I added a new 30 amp fuse to my red wire and connected it to the big connection with the two red wires on it. I connected my white wire to the small connection with the one white wire.

For connections I (again) bought crimp-on connectors from http://genuinedealz.com/ and used the 12-10 AWG heat shrink ring terminals and the 1/4" quick disconnect females for the in-line automotive fuse. I use a proper ratchet crimper ($59.00 McMaster Carr) rather than a hardware store crimper/stripper. The difference in the security of the crimp is literally night and day.





I also use a Squeeze-n-Strip (really!) wire stripper, again, $34.00 from McMaster Carr. This stripper prevents any nicking of the conductors, which I consider absolutely critical in the 12VDC marine environment.