



INSTALLING A BILGE BLOWER

Installing a bilge blower to ventilate the engine compartment was for the sole purpose of supplying cooling air to the engine alternator.

For several years, the alternator had done next to nothing as it controlled its own regulation. However, once a Belmar ARS-5 external alternator regulator was installed, the alternator was put to work and heated up quickly.



Fig. 1

The engine compartment on a Hunter 310 is particularly bad as it's the size of a Nike shoe box. Great for working on the engine from all sides but there is little clearance around the engine. With the engine running, the internal temperature quickly reaches 150° F. which is not particularly good for cooling the alternator.

DETMAR 3" IN-LINE BLOWER



Fig. 2

The solution to this overheating problem was to install an in-line bilge blower. The Detmar fan was chosen, not for its high output, but for its compactness. A better fan would have been a squirrel cage fan rotor blower but space was at a premium here.

Originally, I had installed a 3" diameter Yellow Tail bilge blower fan #227-3100. The fan came with lots of technical data so it just had to be a good fan. No, not exactly. Actually proved to be a disaster from a noise standpoint as the howl from this little bugger proved to be intolerable. It turns over at ~ 10K RPM and sets up a howl which is hard to take even after just a few minutes. Could easily double as an air raid siren. This is not to say it's not a quality fan in other areas. A question I had posted to SBO came back with the answer that the Detmar fan was actually being installed by Hunter in some of their later model big boats. The poster said that the noise from his Detmar fan was not noticeable. So a Detmar blower it was.

The Detmar fan is similar in size and RPM (@ 12.0 V) to the Yellow Tail fan so the Detmar can be roughly expected to exhaust somewhere in the realm of 1,000 CFM of air.



Fig. 3

This is the suction hose leading to the bilge fan. It's cheap, aluminum, clothes dryer vent hose to withstand the high heat after the engine and blower are shut down. It's been placed as high as possible with the idea of collecting the hottest air off the engine. However, with hurricane force winds whipping around in the engine compartment, being at the highest point really makes little difference. The more important thing is placing the inlet in a location that will sweep the entire compartment.



Fig. 4

This shows the suction hose from a lower angle.

Behind the engine is the blower relay which will be detailed later.



Fig. 5

The above view is from the rear berth looking forward. Floor boards have been removed.

The fan is mounted under the bulkhead on a convenient little overhang. Rubber isolation grommets were originally installed under the fan mounting base for noise control but in the long run, were found to make no difference.



Fig. 6

DON'T DO THIS !!!

I have to admit that the first time around for this installation, I went cheap and used aluminum dryer vent hose from the fan to the outside discharge vent. What could go wrong ??? Well, when this hose was combined with the original Yellow Tail bilge blower, the sound was like a high pitched jet engine. I wound up disconnecting the fan wiring ½ hour into its maiden voyage.

Along with the lower noise Detmar fan, I also opted for the more expensive (and quieter) fabric hose as shown in Fig 7.



Fig. 7

This shows the discharge hose from the fan being led out under the rear bulkhead.



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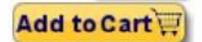
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Trident Air Vent / Blower Hose - 3 Inches
Item # : 500583
Diameter: 3" ID, Color: White
Material: PVC, Tolerance: 0° F - 160° F Operating Temperature Range
Sold by the Foot, Wire-Supported
Brand: **Trident Rubber**
Model Number: 400-300

Trident Vent Duct resists weather, sunlight and ozone. Features: Non-flammable Resistant to weather, sunlight and ozone 1 Year warranty
Specifications: Dimensions: 3" Diameter Thickness: 3 mil Material: Wire-supported PVC Operating Tempera

Our Price: \$1.09



Trident Polyduct Blower Hose - 3 Inches
Item # : 900022
Diameter: 3" ID, Color: Blue
Material: Polypropylene, Tolerance: -40° F - 225° F Temperature Range
Sold by the Foot, Wire-Supported
Brand: **Trident Rubber**
Model Number: 481-3000

Trident Polyduct Blower Hose is the most flexible, crush proof and rugged blower duct hose for Heat, Ventilation and Air Conditioning (HVAC). Features: Excellent flexibility and compressibility - excellent resistance to crushing, flex fatigue,... more...

Our Price: \$5.99



Fig. 8

This is the hose purchased from Defender in the hopes that it wouldn't transmit any noise from the fan. It was a fabric covered in soft plastic as opposed to the hard aluminum which bounced the sound along until it hit the exhaust vent. A little pricey at \$6.00/ft. but it seems to have helped. I still believe the major source of noise reduction was getting rid of the original Yellow Tail bilge blower.

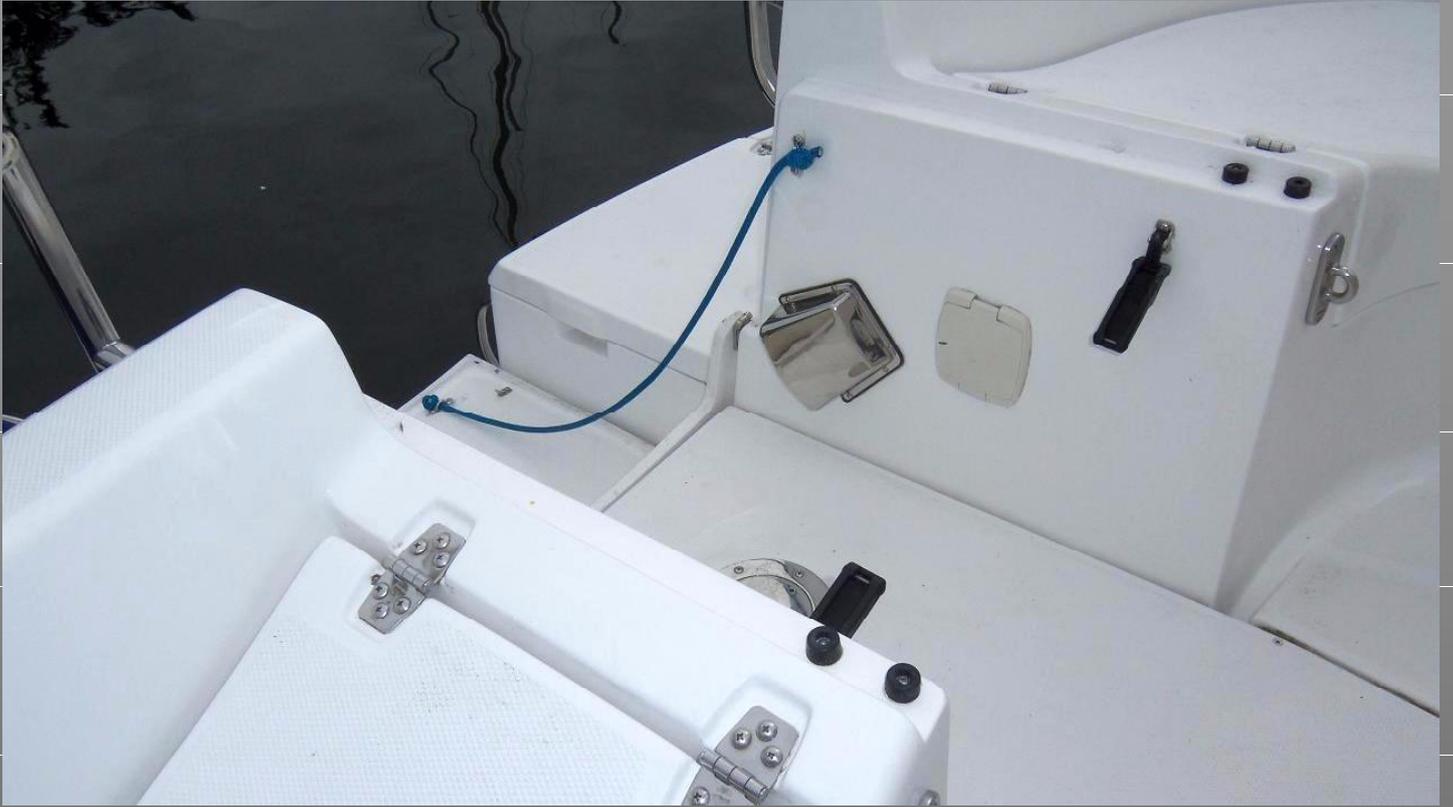


Fig. 9

The hot air from the engine compartment finally makes its way out through a Scirocco clam shell vent under the helm seat.

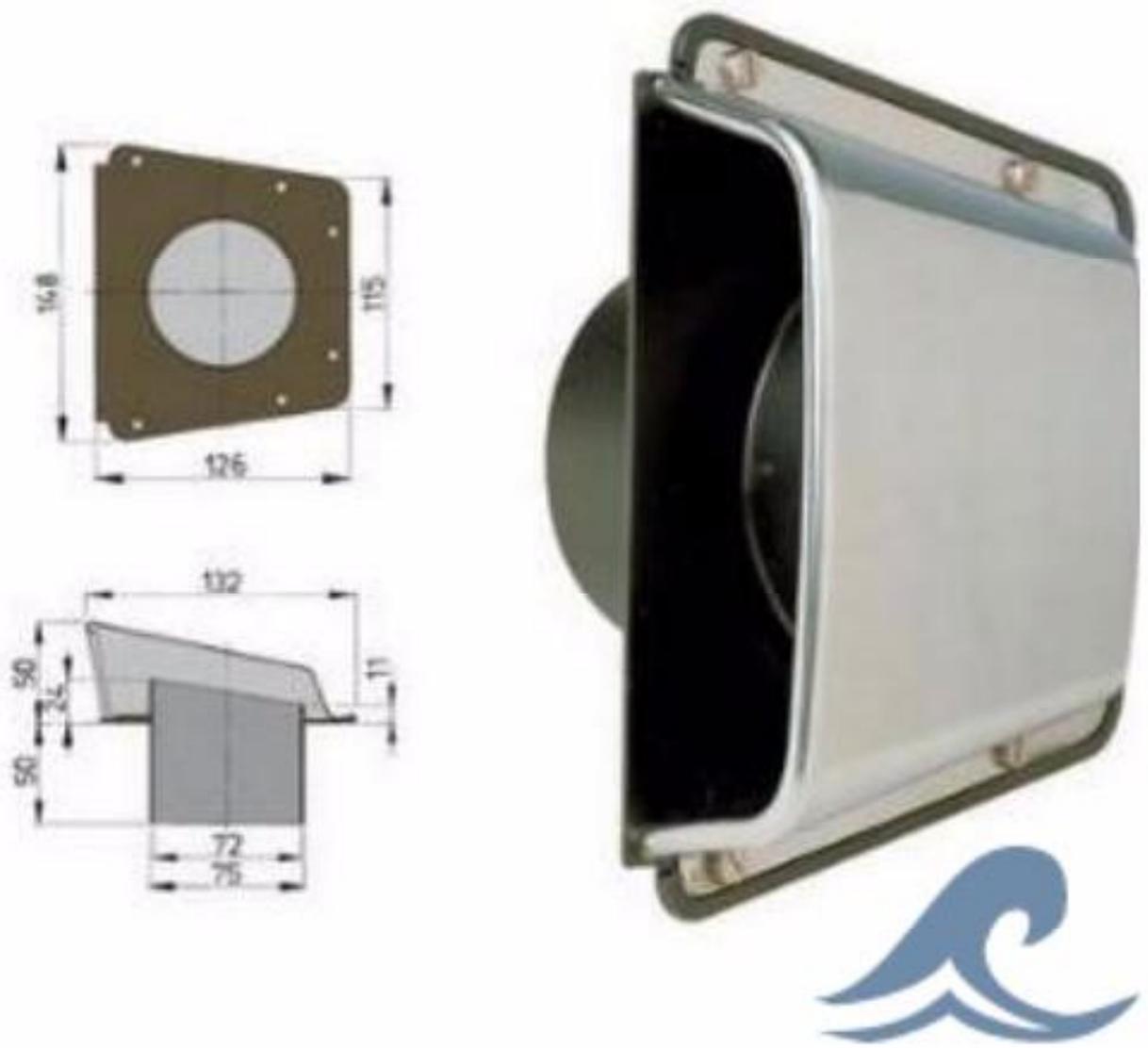


Fig. 10

Here we see the dimensions of the Scirocco shell vent.



Fig. 11

As a safety measure, an internal loop in the hose is provided to avoid any chance of water finding its way back to the fan.

ENGINE COMPARTMENT EXHAUST FAN POWER SUPPLY AS BUILT WIRING DIAGRAM

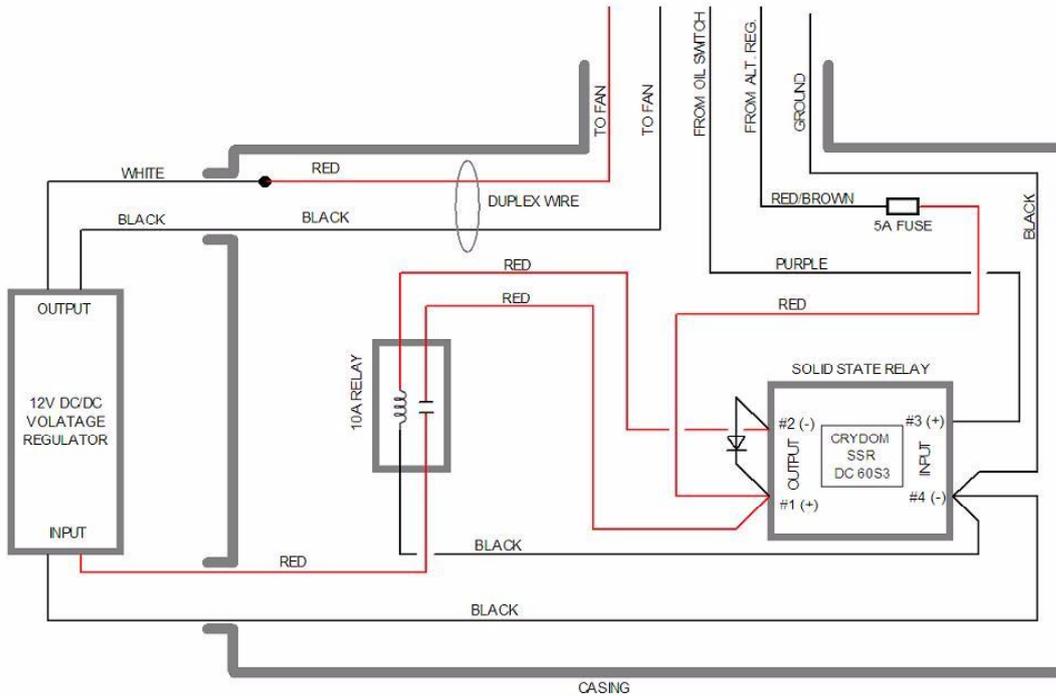


Fig. 12

Figure 12 shows the wiring diagram which activates the fan when the ignition key is turned, supplies power to the fan. and finally controls the supply voltage to a constant 12.0 V. An additional wire was not run to the ignition switch as this would be very difficult in the H-310. The trigger to start the fan is taken from the oil alarm. A solid state relay (Crydom SSR DC6053) drawing only 2 ma (fig.12) was used to avoid pulling too much amperage from the alarm circuit which would activate the alarm horn.

DC60 Series

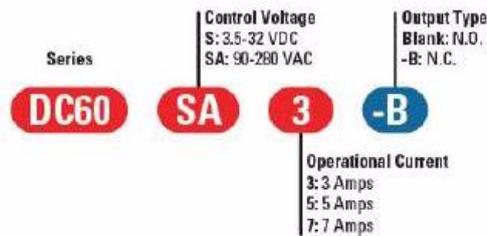


- Bi-polar transistor output
- Ratings from 3A to 7A @ 60 VDC
- AC or DC control
- UL and cUL Recognized (E116950)

PRODUCT SELECTION

Control Voltage	3A	5A	7A
3.5-32 VDC	DC60S3	DC60S5	DC60S7
90-280 Vrms/VDC	DC60SA3	DC60SA5	DC60SA7

AVAILABLE OPTIONS



OUTPUT SPECIFICATIONS (1)

Description	3A	5A	7A
Operating Voltage [VDC]	3-60	3-60	3-60
Maximum Off-State Leakage Current @ Rated Voltage [mA]	0.1	0.1	0.1
Maximum Load Current [ADC] (2)	3	5	7
Minimum Load Current [mA]	20	20	20
Maximum Surge Current [Adc] (10ms)	6	10	14
Maximum On-State Voltage Drop @ Rated Current [Vdc]	1.3	1.5	1.7
Thermal Resistance Junction to Case (Rjc) [°C/W]	2.2	2.2	2.2

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Fig. 13

Crydom SSR DC6053 relay specifications.

INPUT SPECIFICATIONS (1)

Description	DC60Sx	DC60SAx
Control Voltage Range	3.5-32 VDC	90-280 Vrms/VDC
Minimum Turn-On Voltage (3)	3.5 VDC	90 Vrms/VDC
Minimum Turn-Off Voltage (4)	1.0 VDC	10 Vrms/DC
Typical Input Current	2.2 mA @ 5 VDC	2 mA @ 120 V, 4 mA @ 240 V
Nominal Input Impedance	1500 Ohm	80K
Maximum Turn-On Time [msec] (5)	0.1	10
Maximum Turn-Off Time [msec] (6)	0.3	40

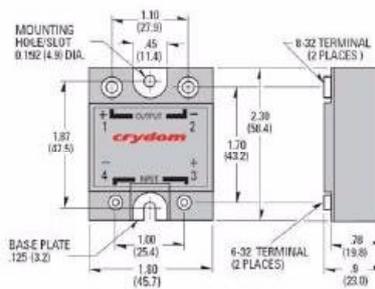
GENERAL SPECIFICATIONS

Description	Parameters
Dielectric Strength, Input/Output/Base (50/60Hz) [Vrms]	4000
Minimum Insulation Resistance (@ 500 V DC)	10 ⁹ Ohm
Maximum Capacitance, Input/Output	8 pF
Ambient Operating Temperature Range	-30 to 80°C
Ambient Storage Temperature Range	-40 to 125 °C
Weight (typical)	3.0 oz (86.5g)
Encapsulation	Thermally conductive Epoxy
Terminals	Screws and Saddle Clamps Furnished, Unmounted
Recommended Terminal Screw Torque Range:	6-32 Screws - 10 in. lbs. 8-32 and 10-32 Screws -20 in. lbs. (Screws dry without grease)

GENERAL NOTES

- 1) All parameters at 25°C unless otherwise specified.
- 2) Heat sinking required, see derating curves.
- 3) Minimum turn-on voltage for -B, DC control is 1VDC and AC control is 10Vrms/VDC.
- 4) Minimum turn-off voltage for -B, DC control is 3.5VDC and AC control is 90Vrms/VDC.
- 5) Turn-on time for -B version is 300 µs
- 6) Turn-off time for -B version is 100 µs.

MECHANICAL SPECIFICATIONS



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Fig. 14

Further Crydom SSR DC6053 relay specifications.

DC DC Converter Regulator Voltage Reducer 24V Step Down to 12V 20A 240W

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Description

Features:

- Brand new and high quality
- Industry grade DC 24V to 12V step-down converter
- More than 90% power conversion efficiency
- Built-in over/under voltage input, overload, overhead, and short circuit full protection
- Used in vehicles, security systems, telecommunications, medical equipments, instruments etc
- 100% waterproof & anti-shock protection
- Ultra compact size, light weight
- Auto-recovery when device is back to normal operating
- Stable and reliable performance
- Simple to install

Specifications:

- Input voltage: 24V DC
- Input range: 12-40V DC
- Output voltage: 12V DC
- Output current: 20A (Max) / 240W
- Case material: die-cast aluminum
- Potting material: epoxy sealed

Fig. 15

A DC/DC voltage controller was used to prevent the blower from launching itself once the alternator voltage reached 14.7 V.

Don't try to make sense of input voltage and input range. The input range was varied from 12v to 15V and controlled the output voltage to 12.0V +/- 0.1 V.

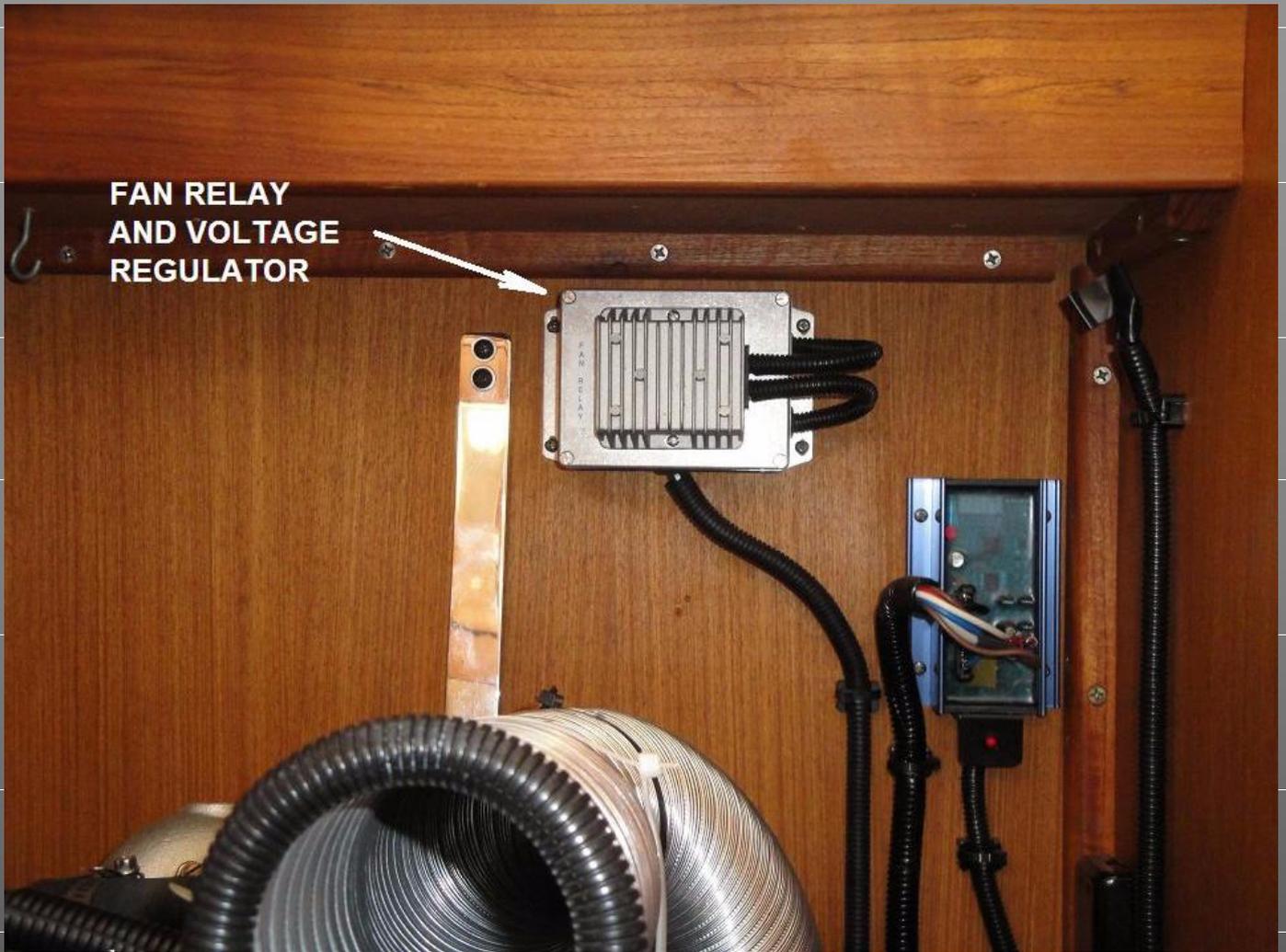


Fig. 16

The solid state relay is enclosed in an aluminum box and the 12V dc regulator is attached to the top of the box. The blue box to the right is the Balmar ARS-5 external alternator regulator which started the whole thing.