

# Balmar & CMI alternator upgrade

## Parts ordering & delivery

Tired to have to replace my belts twice a season, I decided it was time to fix this recurring alternator belt issue. The PO installed an alternator too big for my M25XPB engine. So after some research and a lot of help from Mainsail on Catalina 36 forum and on <https://marinehowto.com> I decided it was time to start with this project!

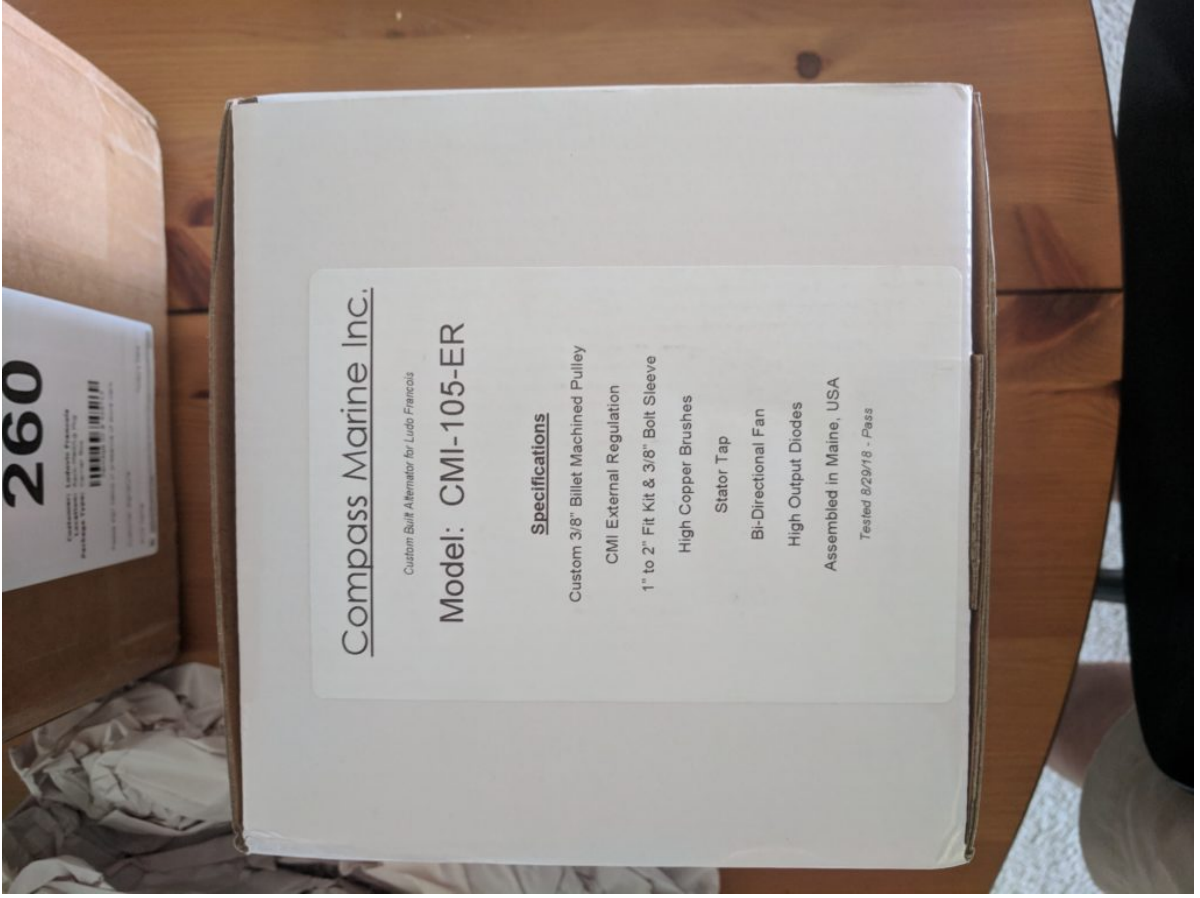
Pulled the trigger and I bought a Balmar regulator MC-614H and an alternator CMI-105-ER on <https://marinehowto.com/>.

- CMI-105-ER – 105A Motorola/Prestolite/ Leece-Neville Externally Regulated Alternator
- Balmar Regulator MC-614H
- □□ Balmar MC-TS-A Alternator Temperature Sensor

Very happy with Rod customer service during the decision process and the very fast delivery.







Compass Marine Inc.

*Custom Built Alternator for Ludo Francois*

Model: CMI-105-ER

Specifications

Custom 3/8" Billet Machined Pulley

CMI External Regulation

1" to 2" Fit Kit & 3/8" Bolt Sleeve

High Copper Brushes

Stator Tap

Bi-Directional Fan

High Output Diodes

Assembled in Maine, USA

*Tested 8/29/18 - Pass*





**BALMAR**  
DC CHARGING SOLUTIONS

MaxCharge Regulator

**MC-614-H**

12V, Multi-Stage, Programmable, w/Harness

www.balmar.net  
www.cdielelectronics.com  
Customer Service: 1.800.467.3371  
Tech Support: 1.866.423.4832



A division of **CDI Electronics**

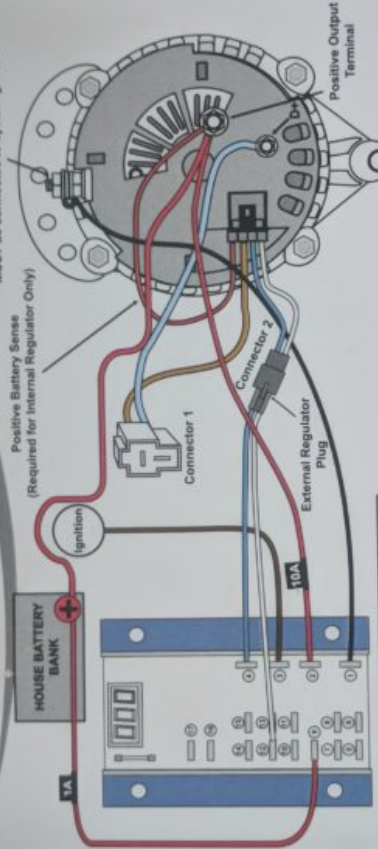


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# MC-614 QUICK START GUIDE

**BALMAR**  
DC CHARGING SOLUTIONS

Isolated Ground Terminal  
MUST be connected to system ground



The wire diagram above shows a typical set-up for a 6-Series alternator to a MC-614 regulator. Connector 1 is for use with the internal regulator which connects to a Yanmar Engine harness. Connector 2 is used with the MC-614 or ARS-5 (as shown).

Alternators other than the 6-Series have similar, but slightly different connections. If programming for specific battery type, 12.5 volts on the battery are necessary. Please refer to the Alternator Installation Guide for specific connections.

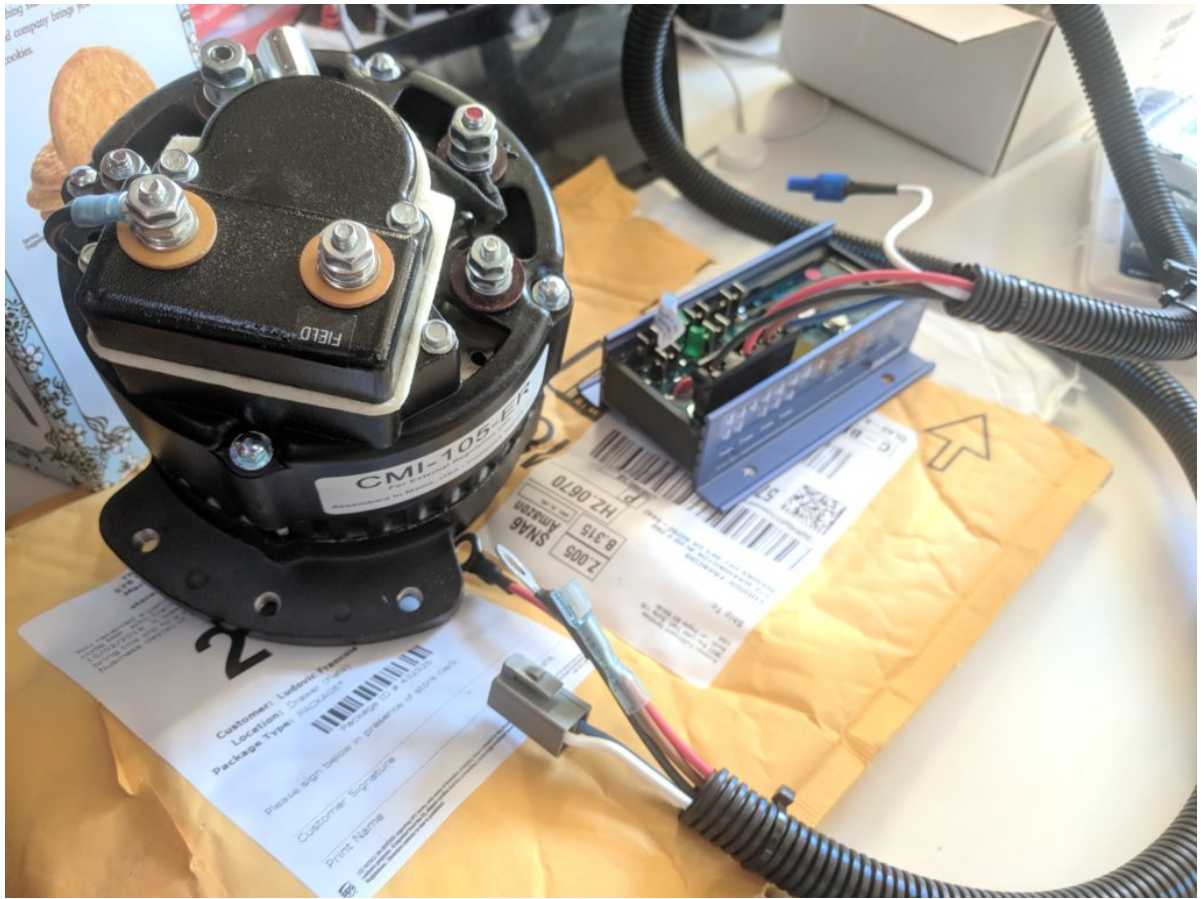
**FLIP OVER FOR MORE INFORMATION**

- |                            |                       |
|----------------------------|-----------------------|
| 1. Ground Input            | 10. Data TX           |
| 2. Power Input             | 11. Data RX           |
| 3. Ignition Input          | 12. Stator In         |
| 4. Field Output            | 13. Tach. Out         |
| 5. Alt. Temp. (-)          | 14. Bat. #2 Temp. (-) |
| 6. Alt. Temp. (+)          | 15. Bat. #2 Temp. (+) |
| 7. Bat. #1 Temp. (-)       | 16. Aux. #1 Lamp      |
| 8. Bat. #1 Temp. (+)       | 17. Dash Lamp         |
| 9. Positive Voltage Sensor |                       |



**MC-614**  
Installation &  
Operation Manual



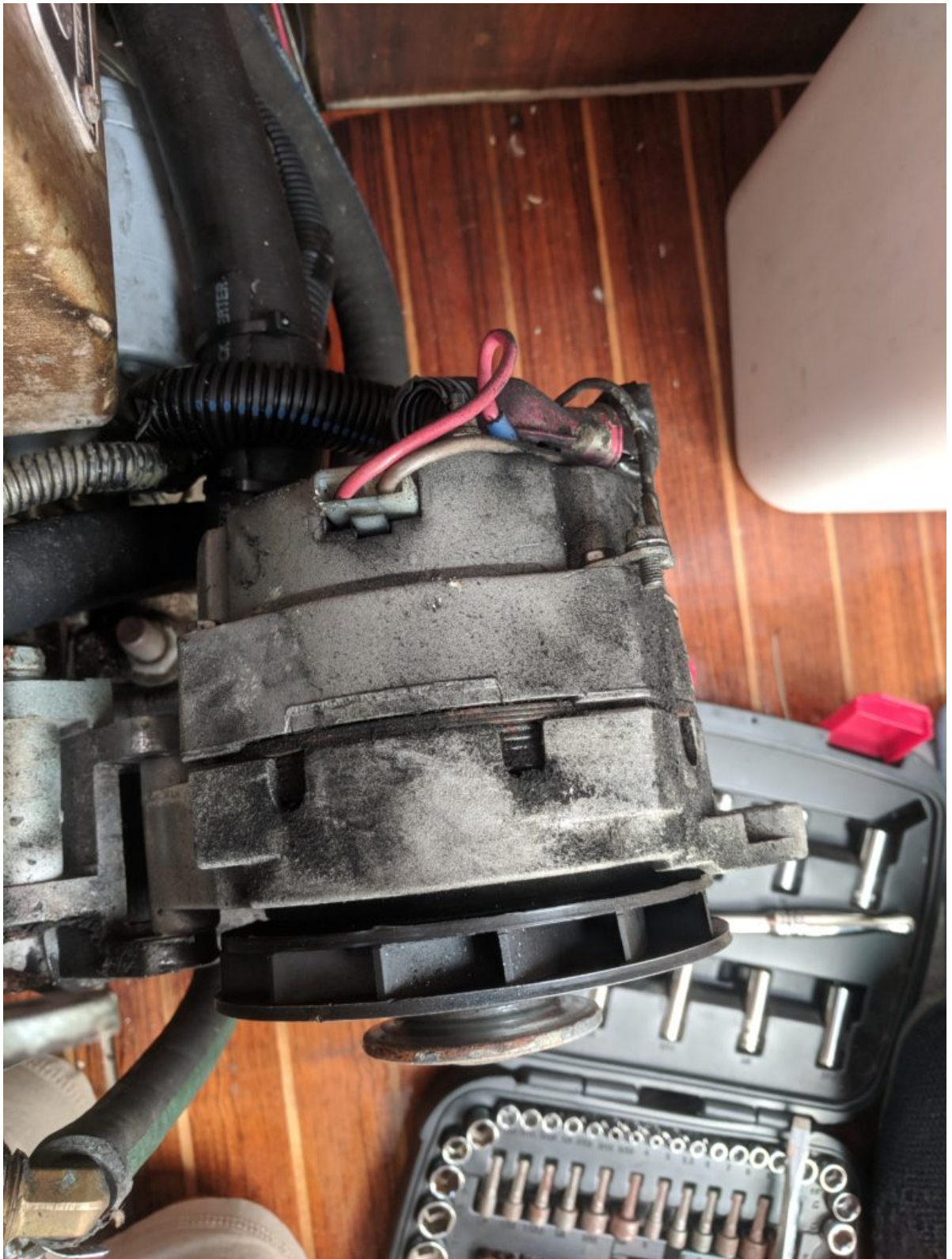




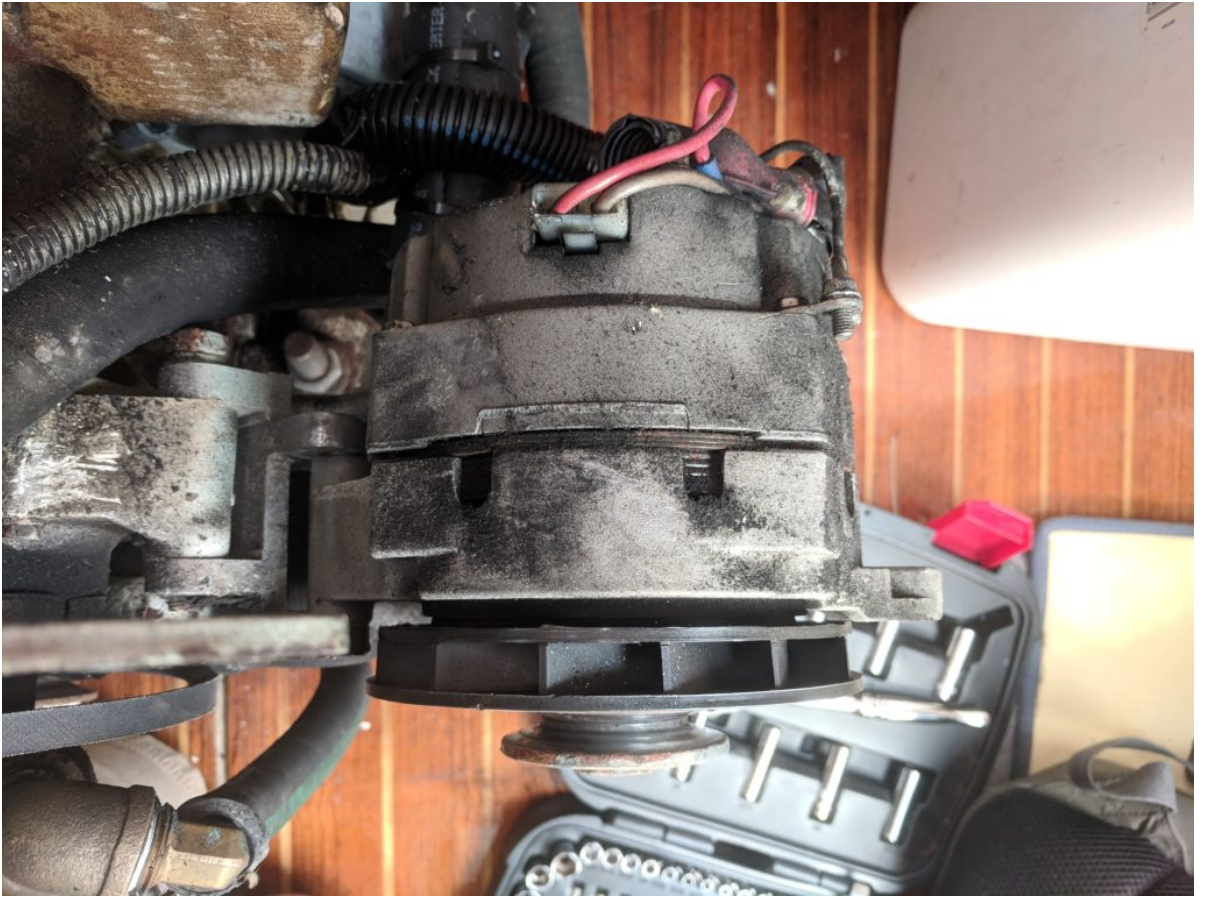




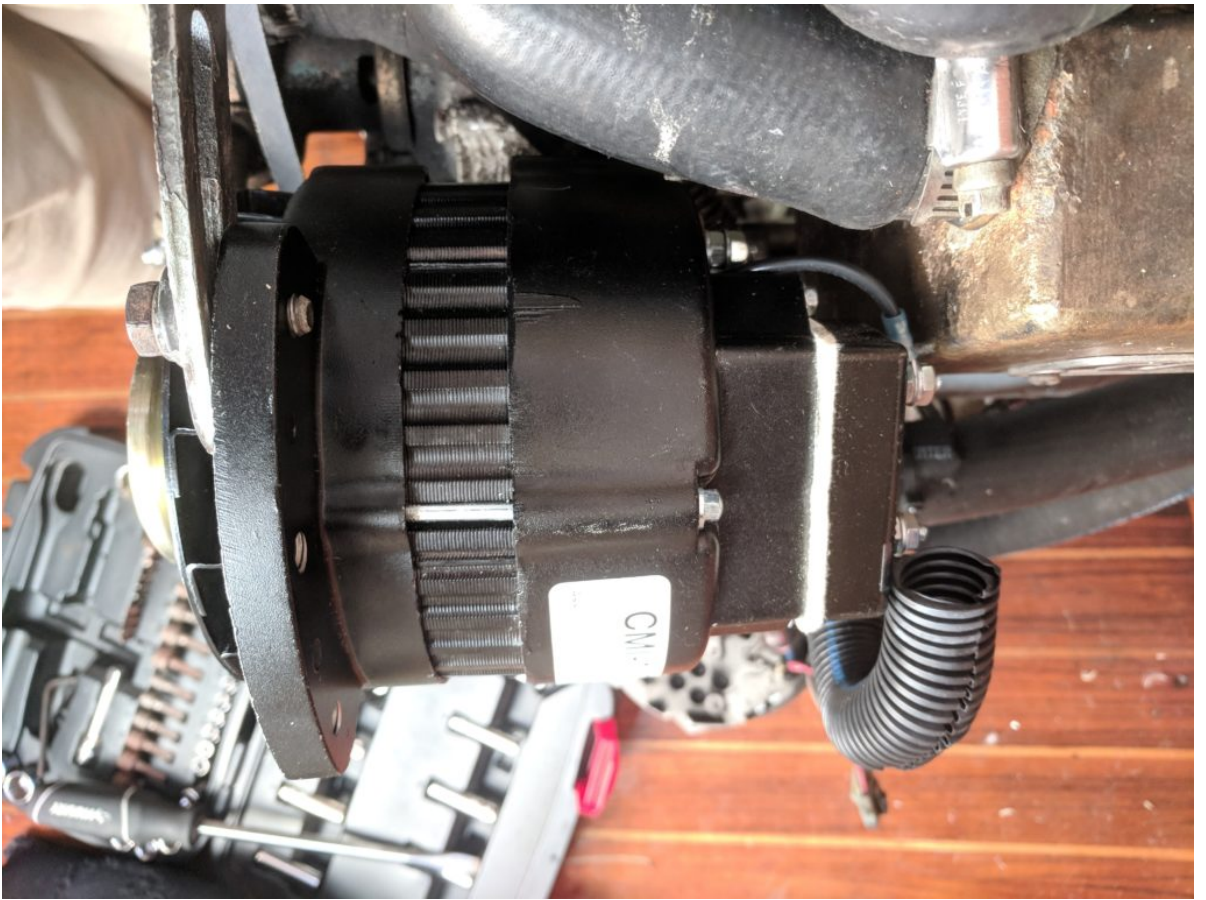
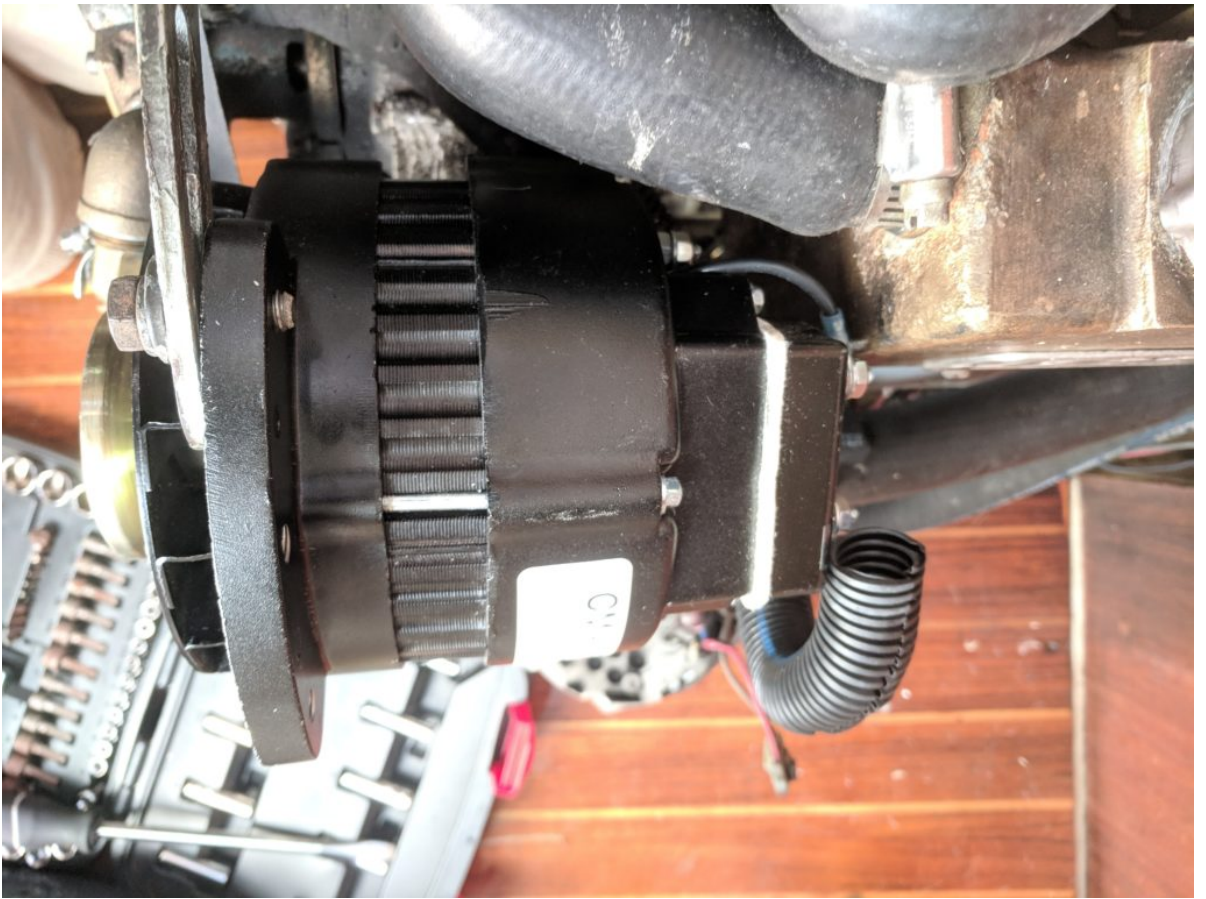
Replacing old with new!











## **Where do I put the mc-614 regulator?**

As soon as I received all parts, the first question was to decide where to put the regulator. I decided to take advantage of the space available on aft of the engine, against the central water tank. Another option was to put the regulator on the port side of the engine bulkhead.











## CMI Alternator fitting issue?

As soon as the regulator situation was fixed, I realized the

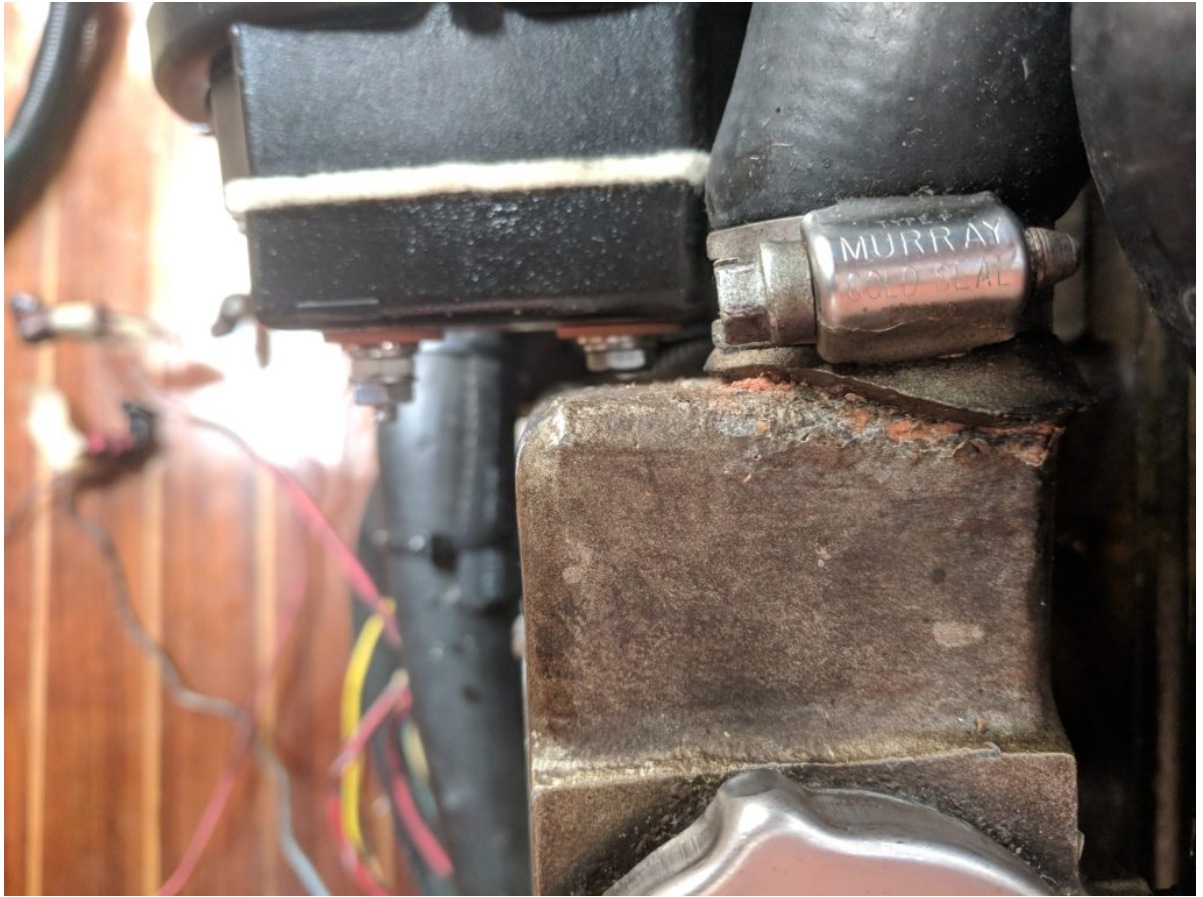
alternator didn't fit as expected. Time for a quick conversation with Rod @ marine how-to, I can't say enough how helpful Rod has been in the success of this project). Rod explained me I was able to make one of the alternator bolt shorter, 30 seconds with the dremel and I was good for the next step!



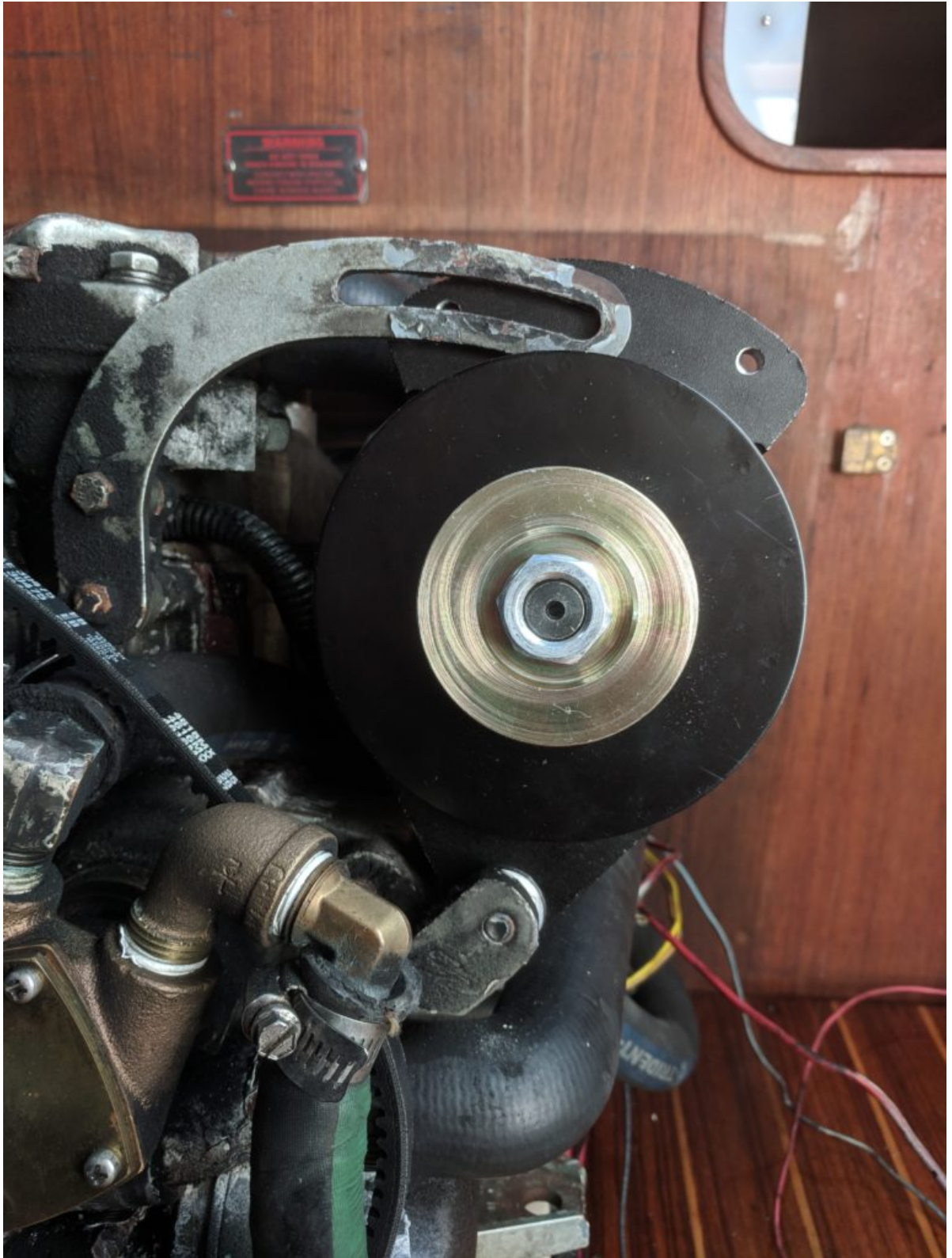








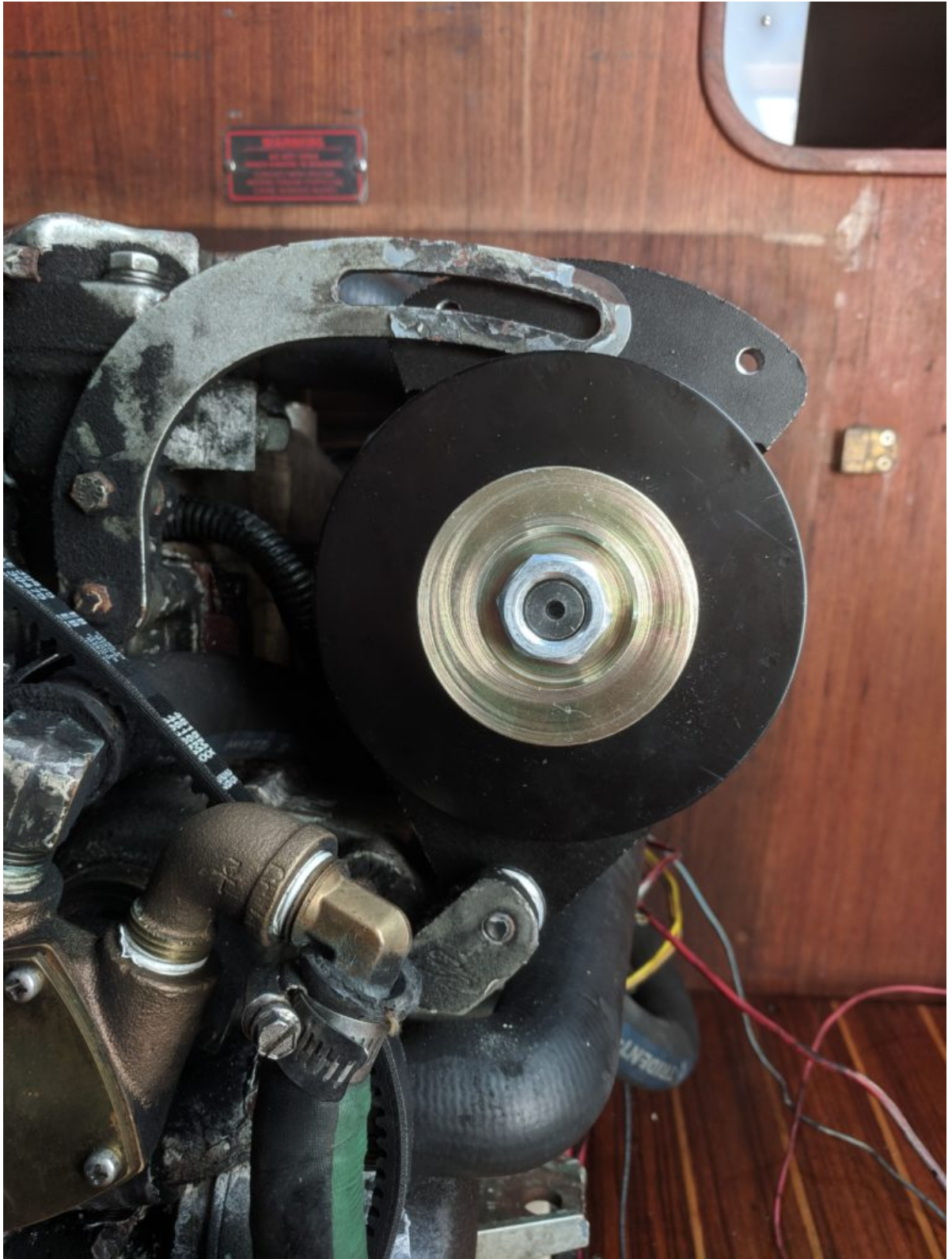




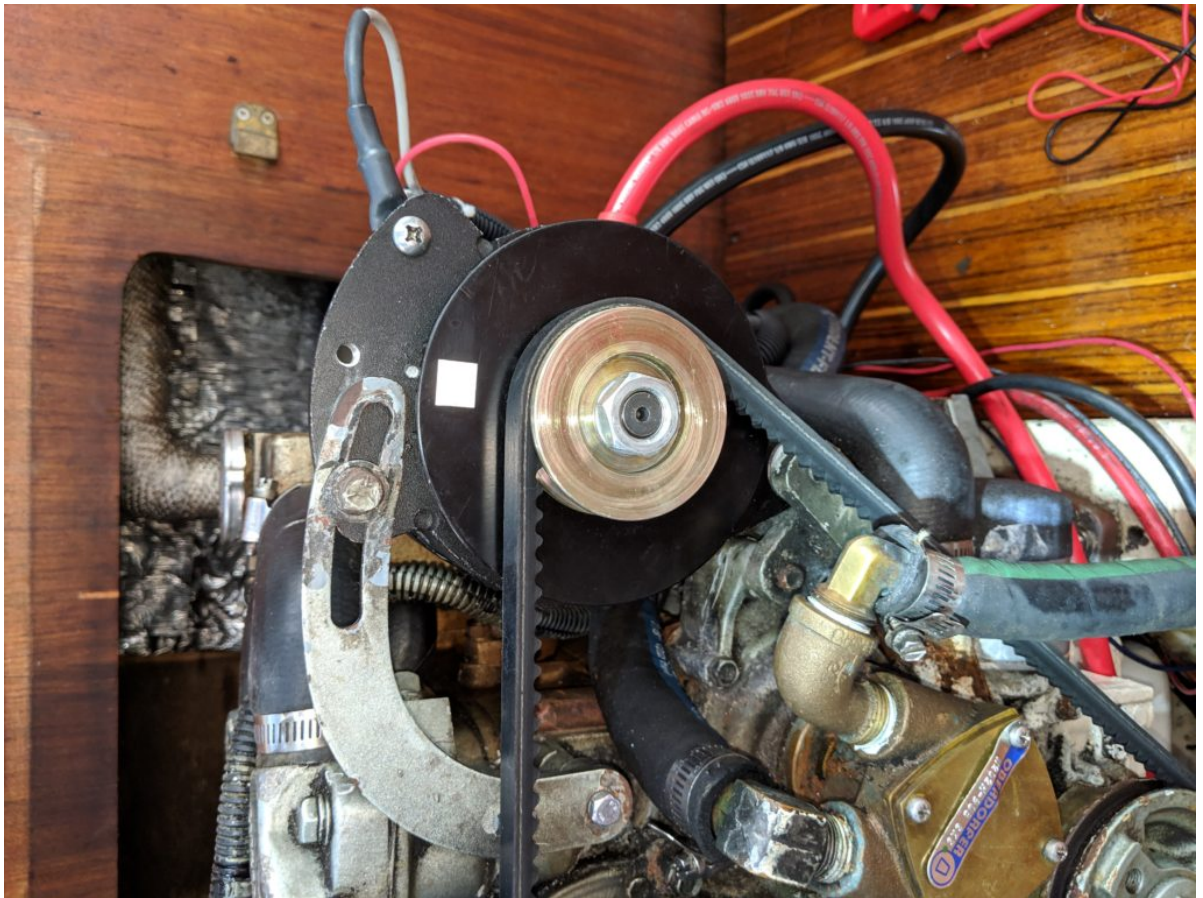
## Alternator adjustable arm grinding

Next issue □ After a quick grinding, it fits perfectly!





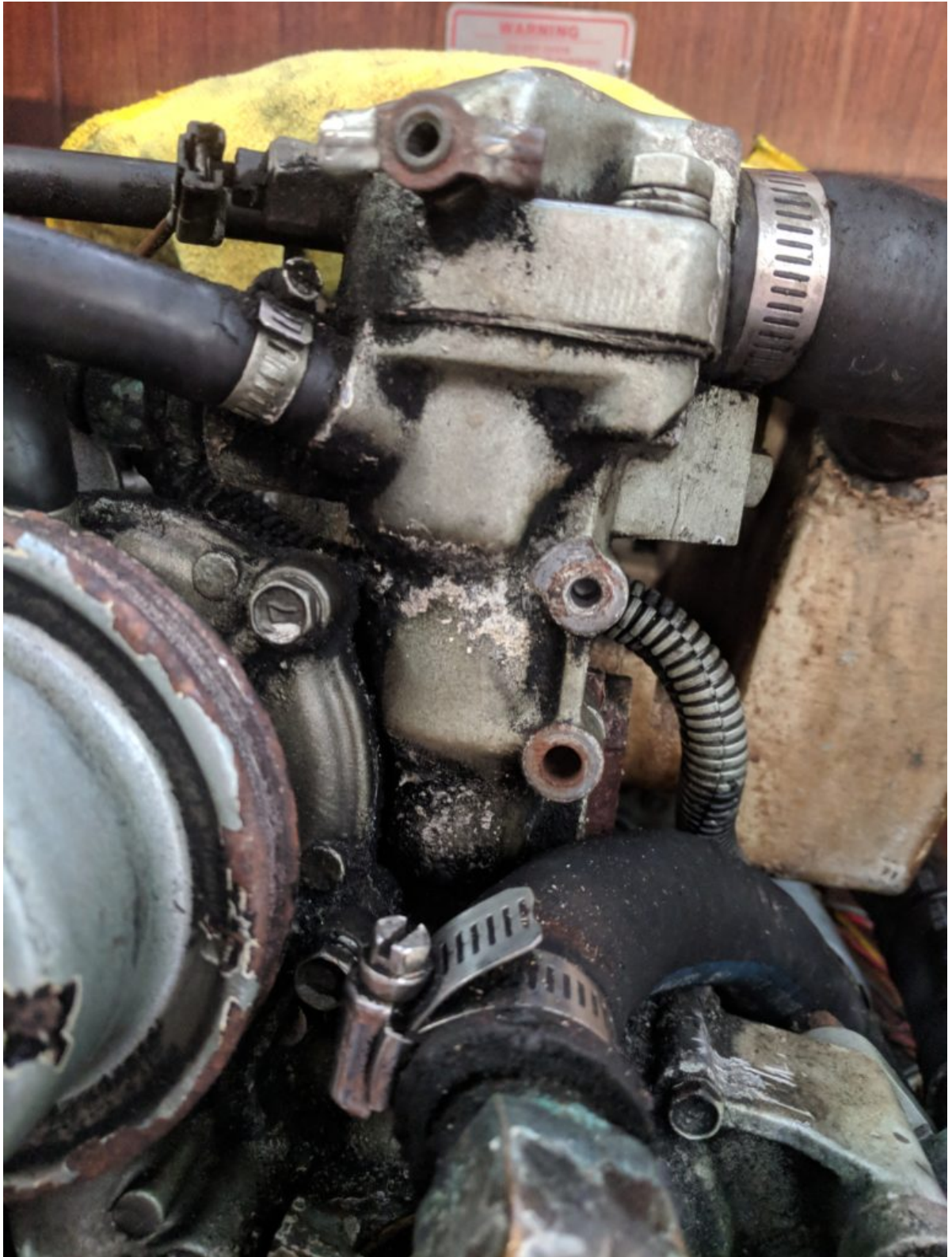




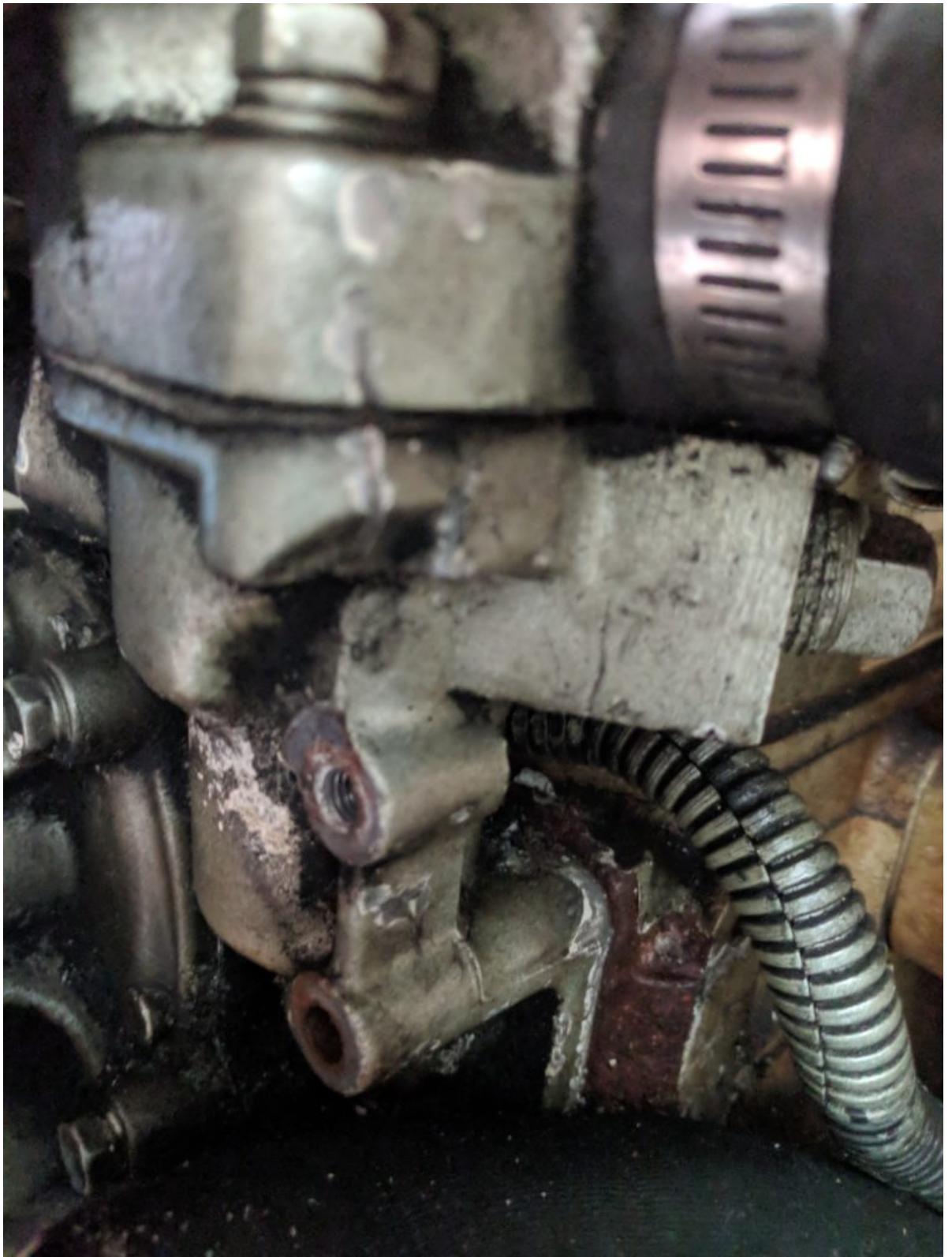


## Broken bolt □

Almost too easy! The alternator arm decided to break inside the engine block, after some clean up and rethreading, I was able to get a new bolt in.









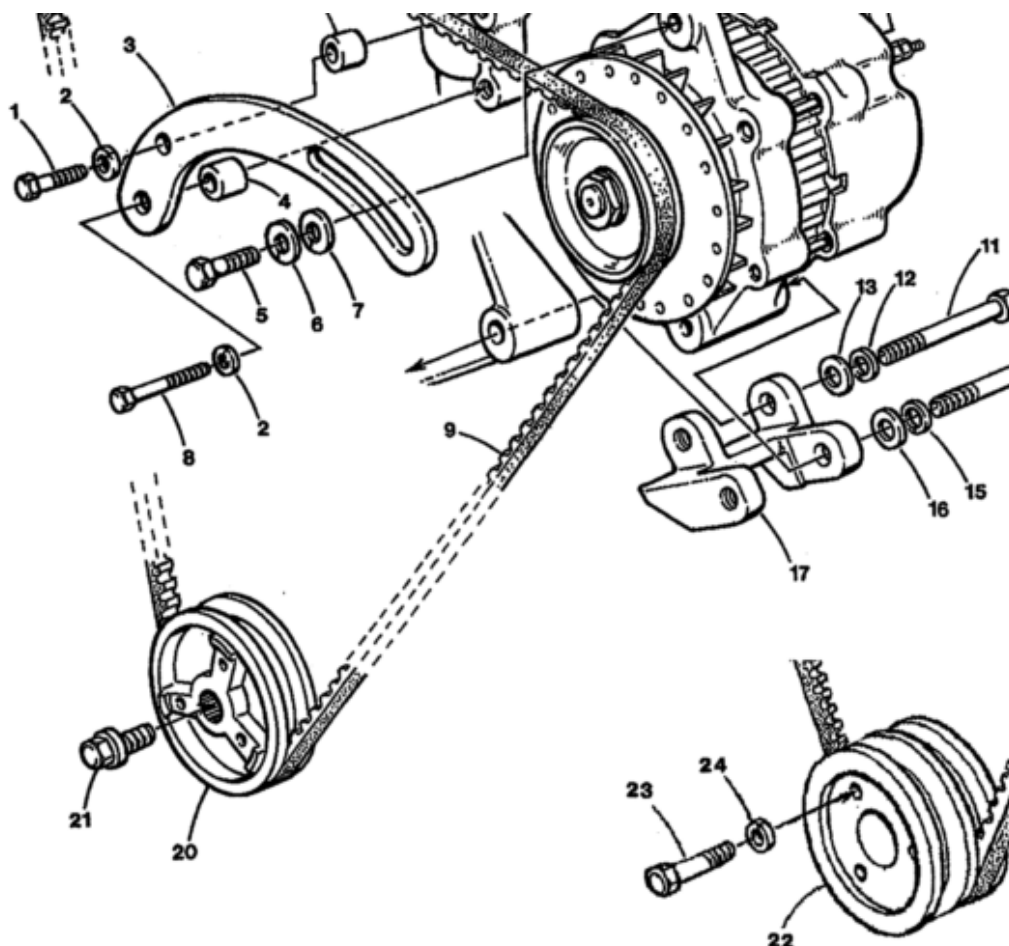












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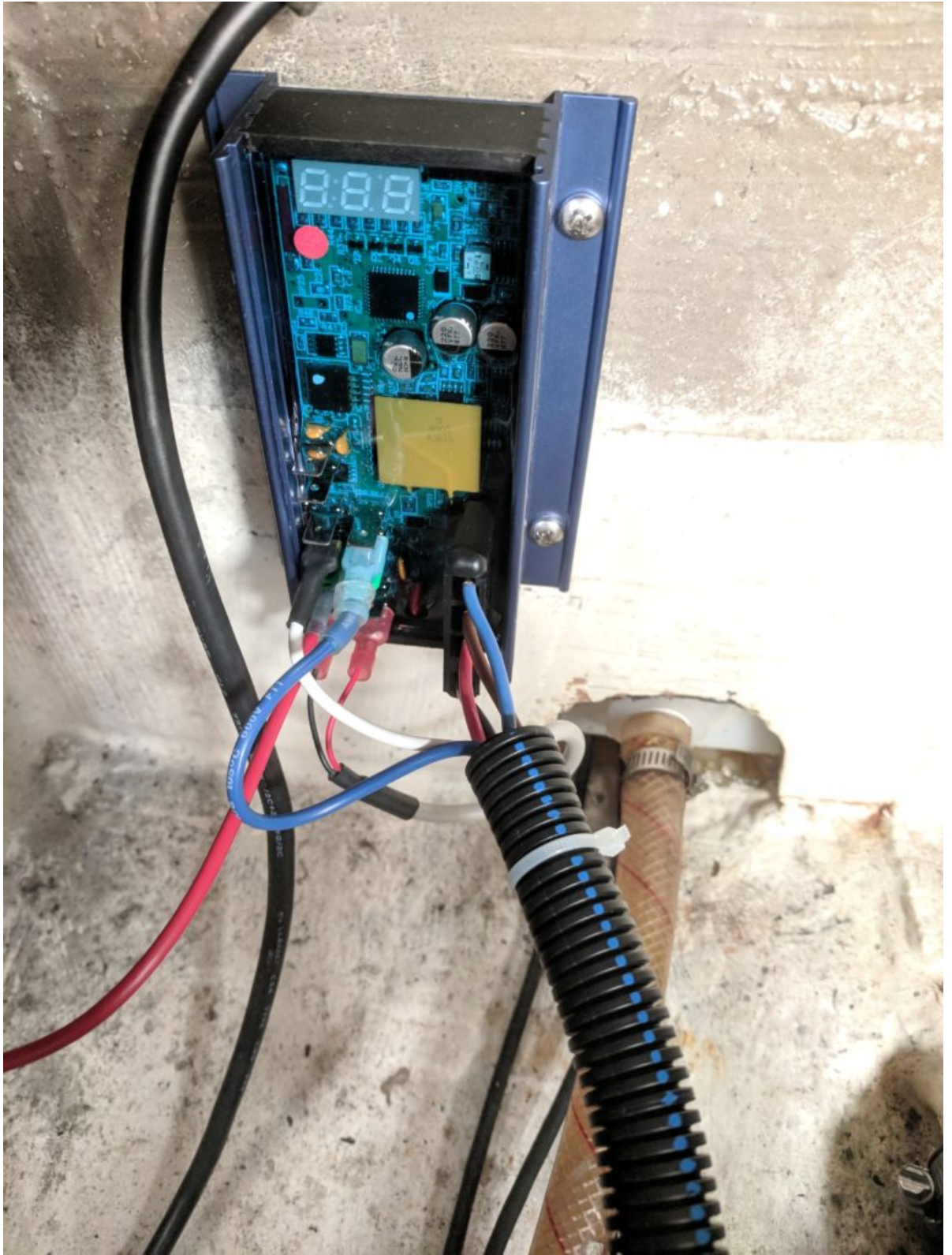
## ALTERNATOR ASSEMBLY

| Reference # | Part # | Part Name  | Remarks                                       | Quantity |
|-------------|--------|------------|---|----------|
| 1           | 031824 | CAPSCREW   | M 6 X 35 DIN 933                              | 1        |
| 2           | 031783 | LOCKWASHER | M6 DIN 127                                    | 2        |
| 3           | 200438 | STRAP      | ALTERNATOR ADJUSTING                          | 1        |
| 4           | 044098 | SPACER     |   | 2        |
| 5           | 031555 | CAPSCREW   | 5/16NC X 1                                    | 1        |
| 6           | 031758 | LOCKWASHER | SPLIT, 5/16 MED (STEEL)                       | 1        |
| 7           | 033381 | WASHER     | FLAT  | 1        |
| 8           | 034212 | CAPSCREW   | M 6 X 75 DIN 931                              | 1        |
| 9           | 030475 | BELT       | FAN, 39.5 X0                                  | 1        |
| 10-1        | 041017 | ALTERNATOR | 12VDC, 51A                                    | 1        |
| 10-2        | 300746 | ALTERNATOR | 12VDC, 72A W/AC TAP - OPTIONAL                | 1        |
| 10-3        | 042835 | SPACER     | 72AMP ALT MOUNT EXPANSION 1" to 2"            | 1        |
| 10-4        | 055047 | SPACER     | Front 72A factory installed post date code KH | 1        |
| 10-5        | 055046 | SPACER     | Rear 72A factory installed post date code KH  | 1        |
| 11          | 031822 | CAPSCREW   | M 10 X 1.25 X 75 DIN 960                      | 1        |
| 12          | 019262 | LOCKWASHER | M 10 DIN 127                                  | 1        |
| 13          | 031789 | WASHER     | M 10 DIN 125                                  | 1        |
| 14          | 031613 | CAPSCREW   | 3/8NC X 3                                     | 1        |

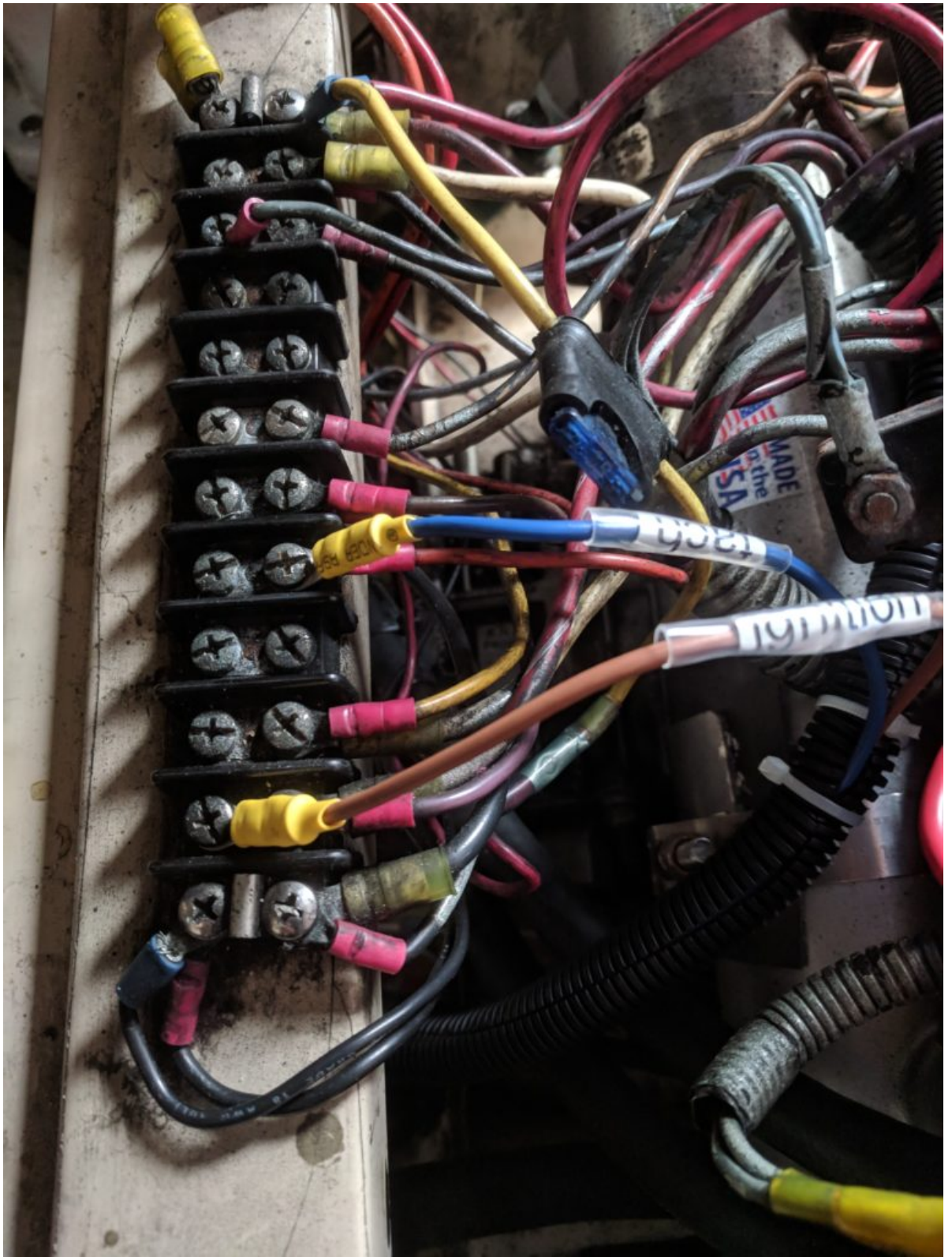




**Back on track. Let's wire!**





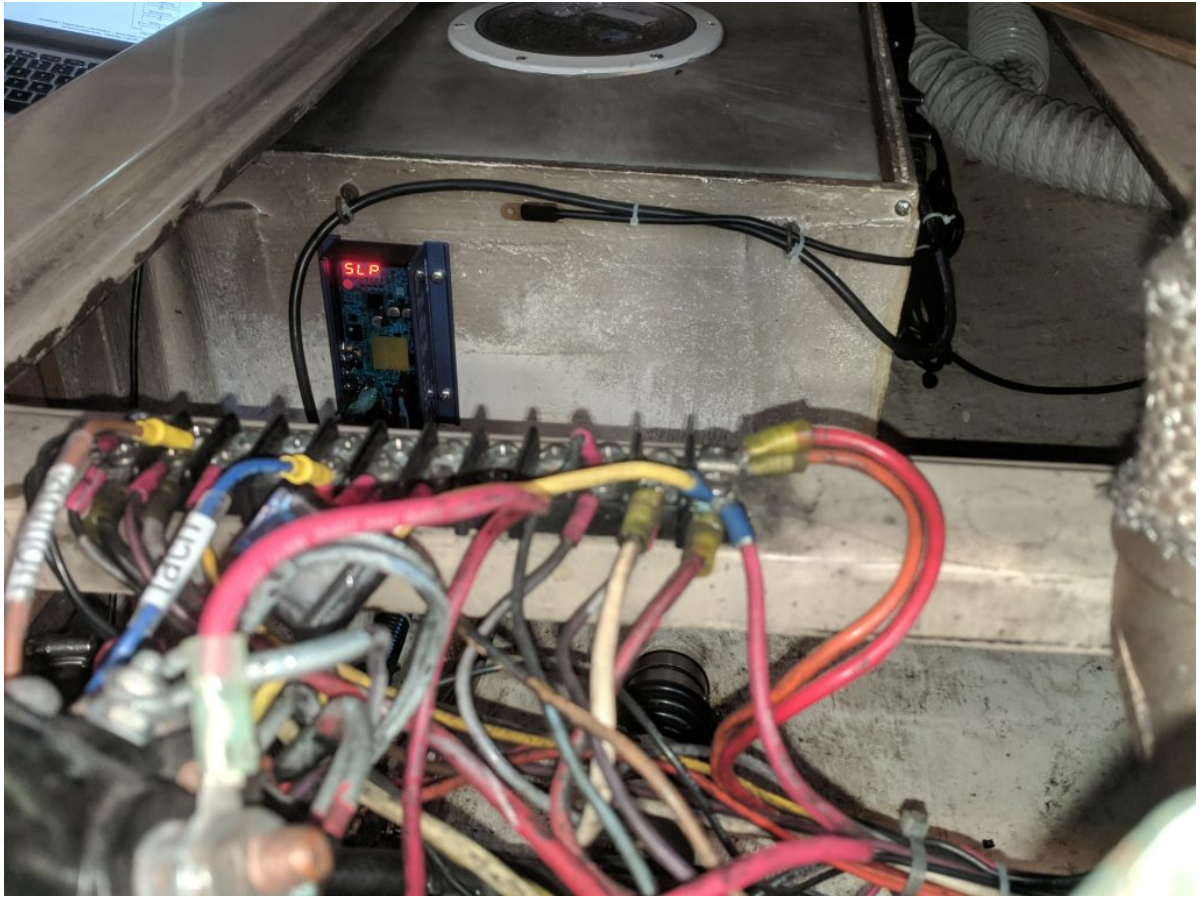




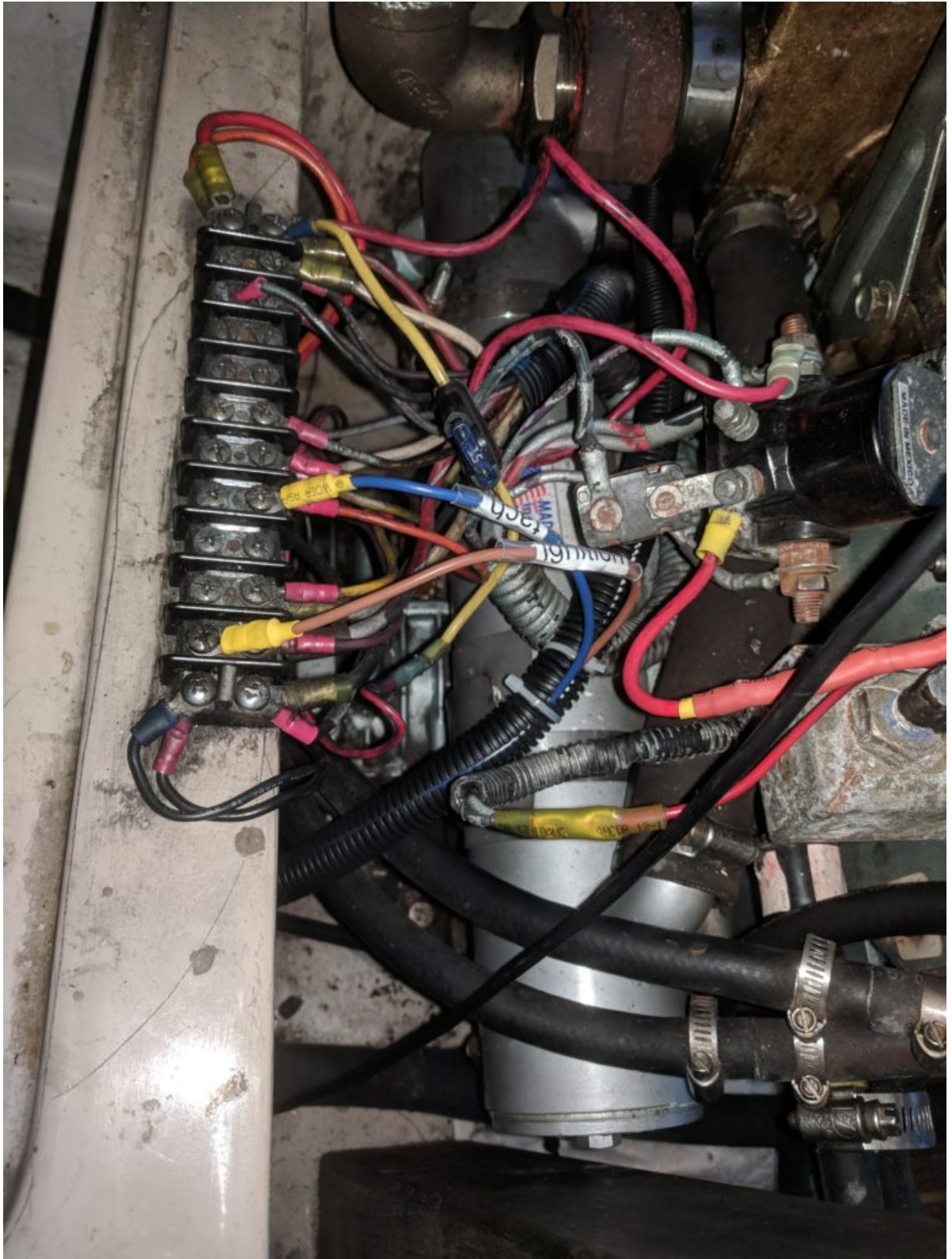




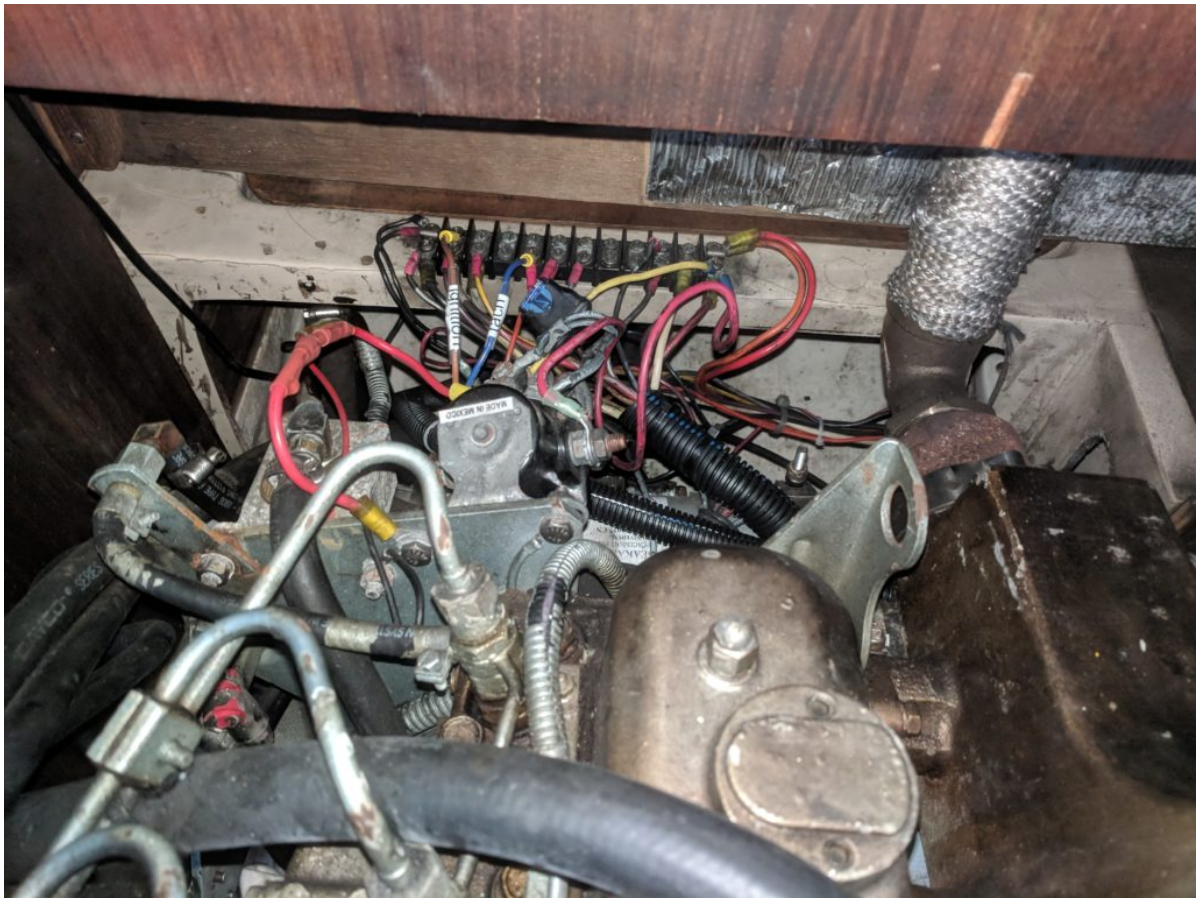




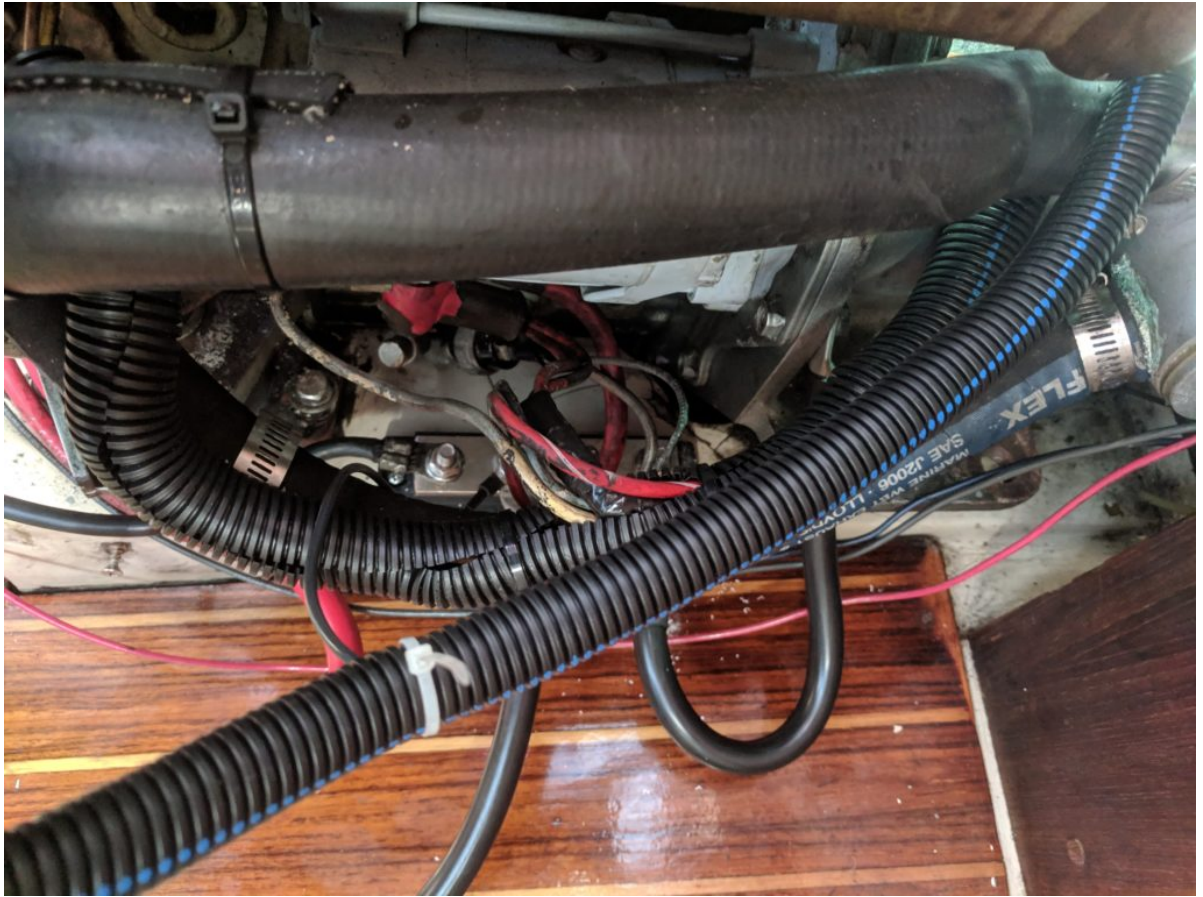




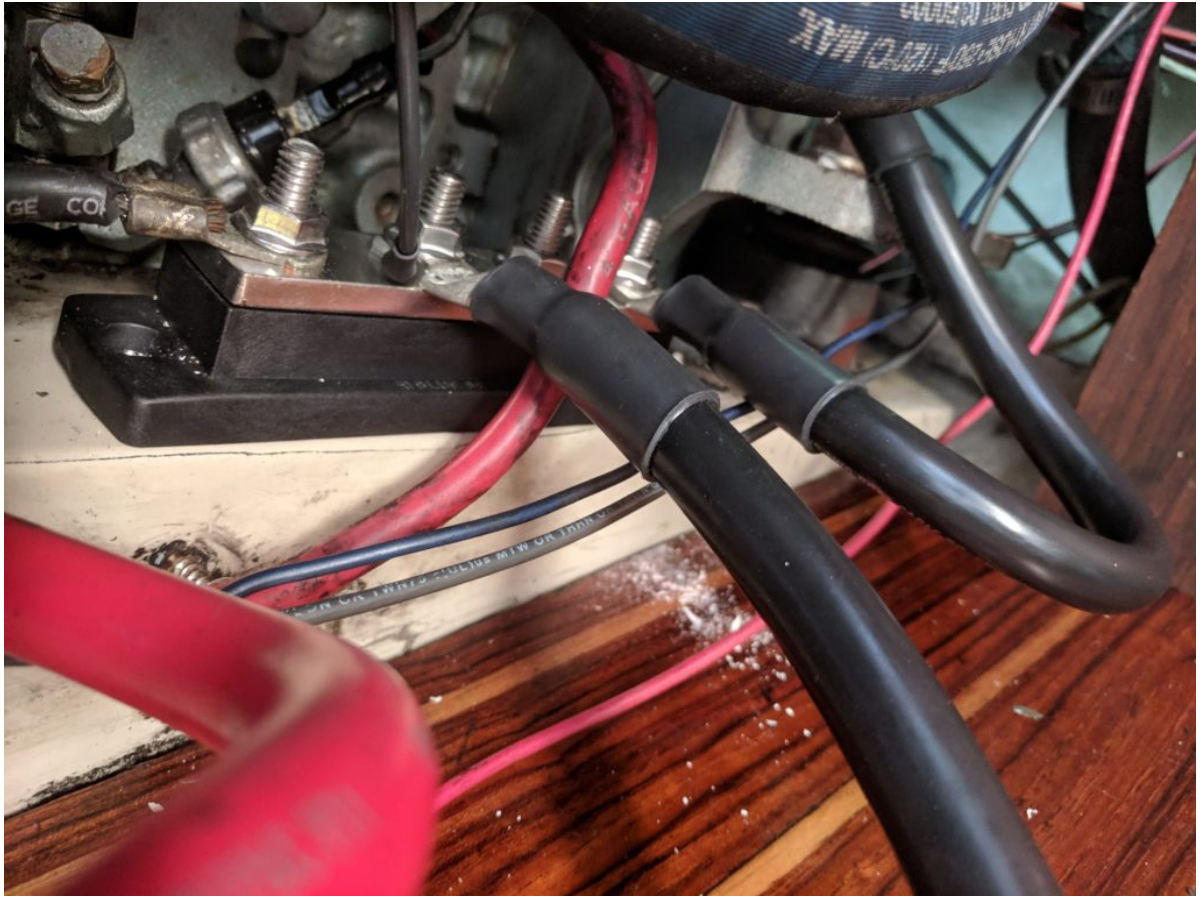




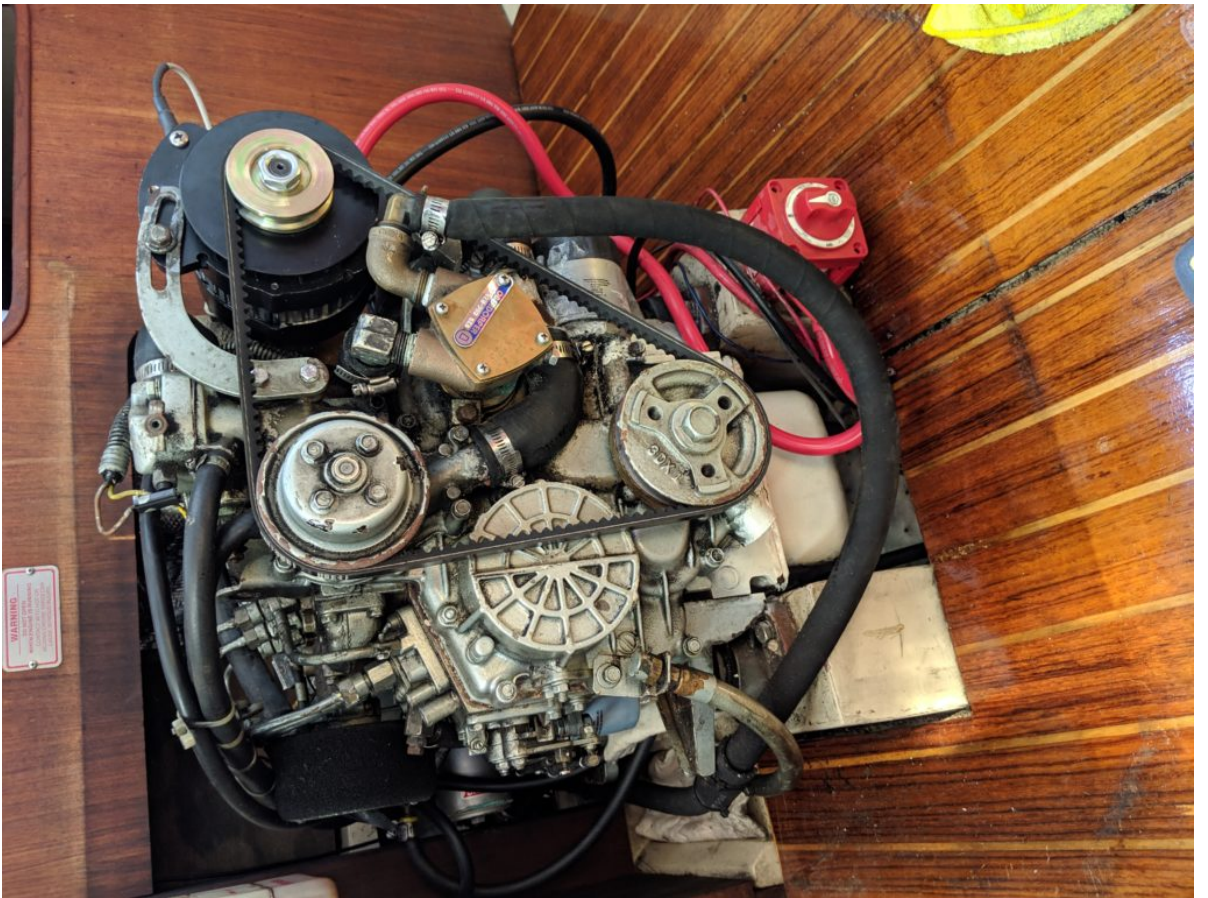
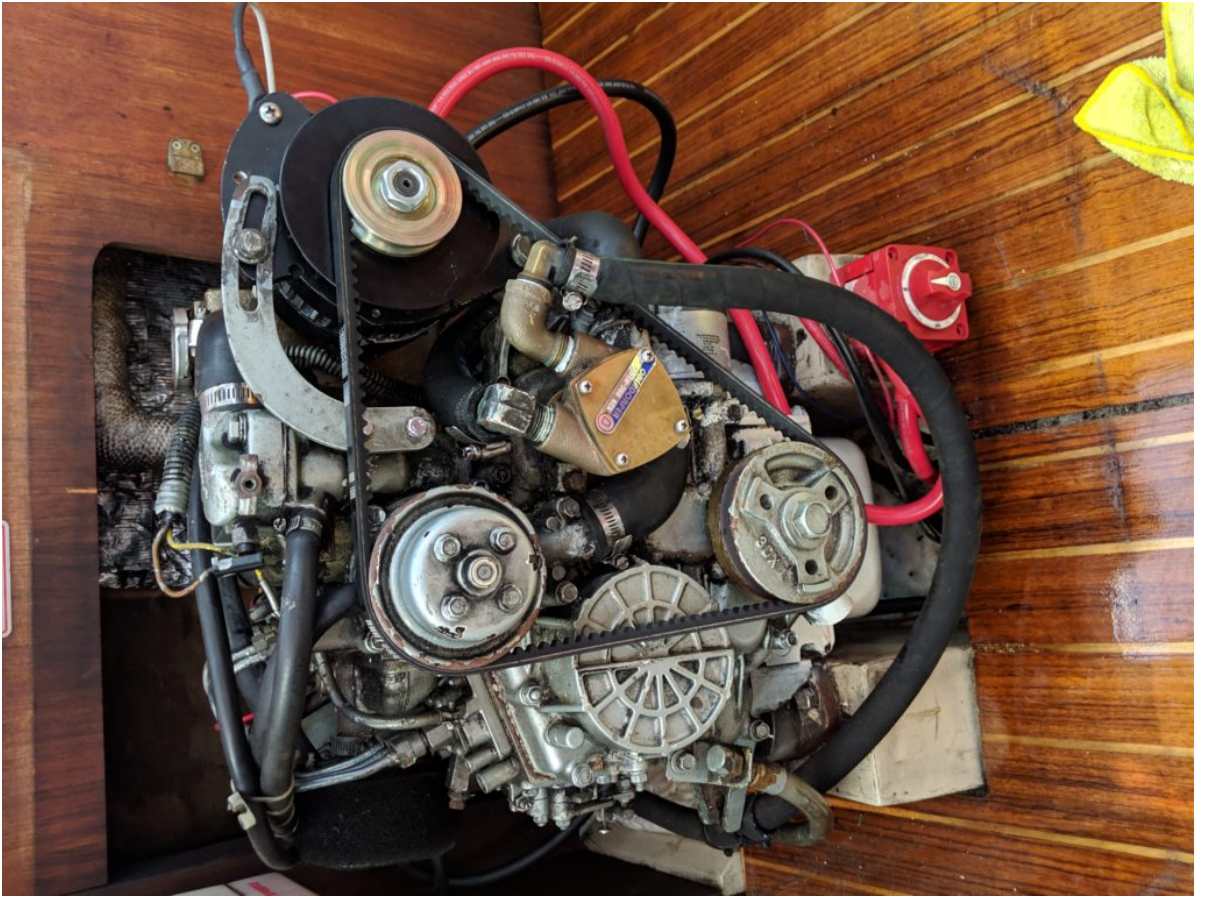
















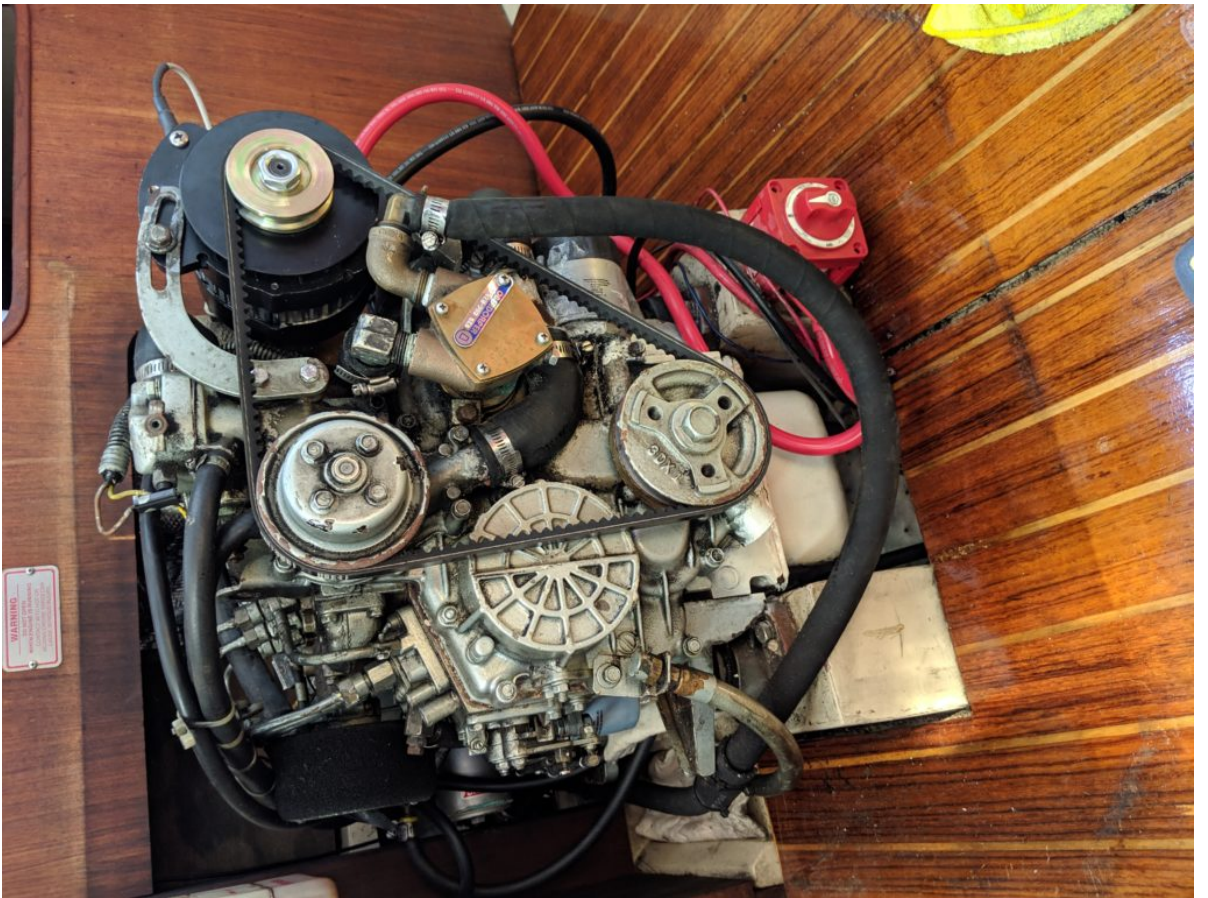
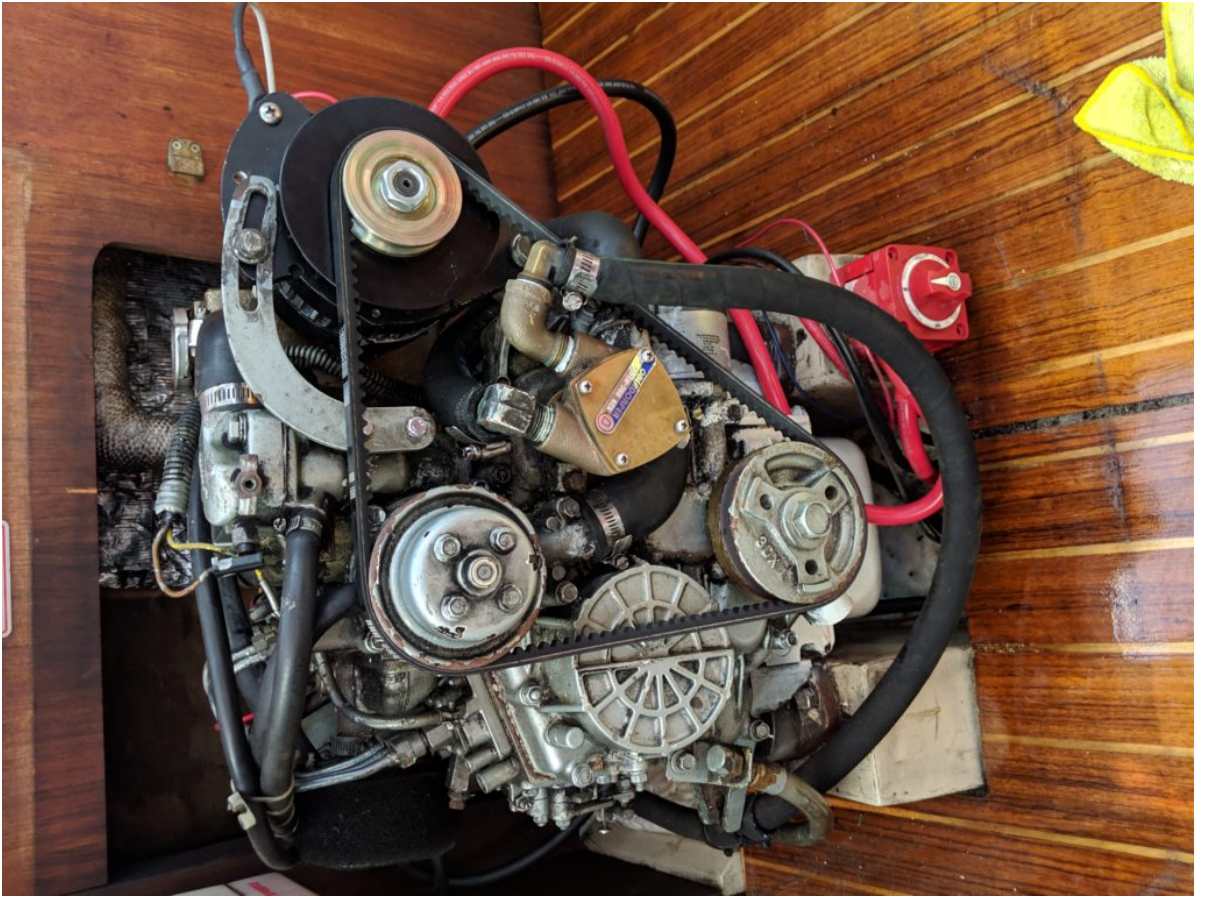
**Maintenance switch?**











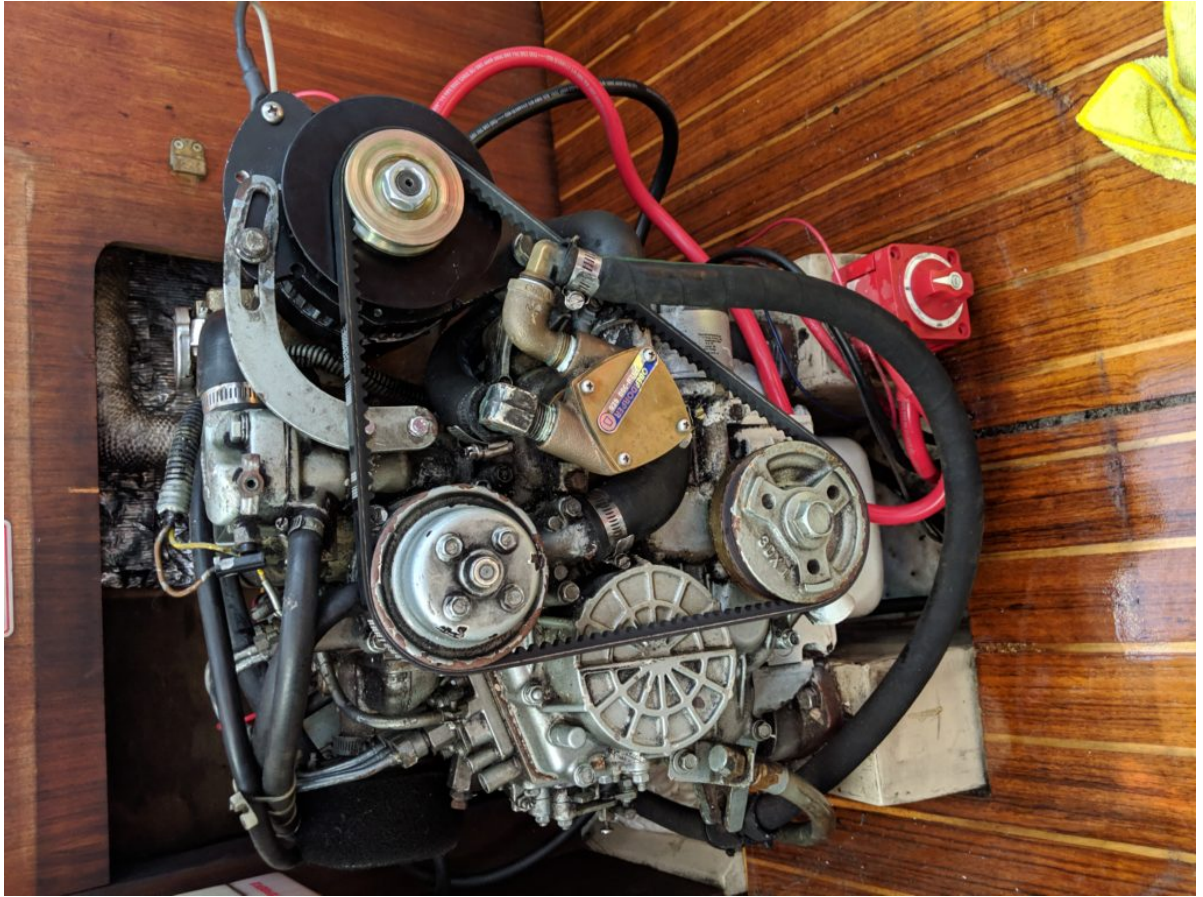


## Negative bus bar setup



## Which belt?

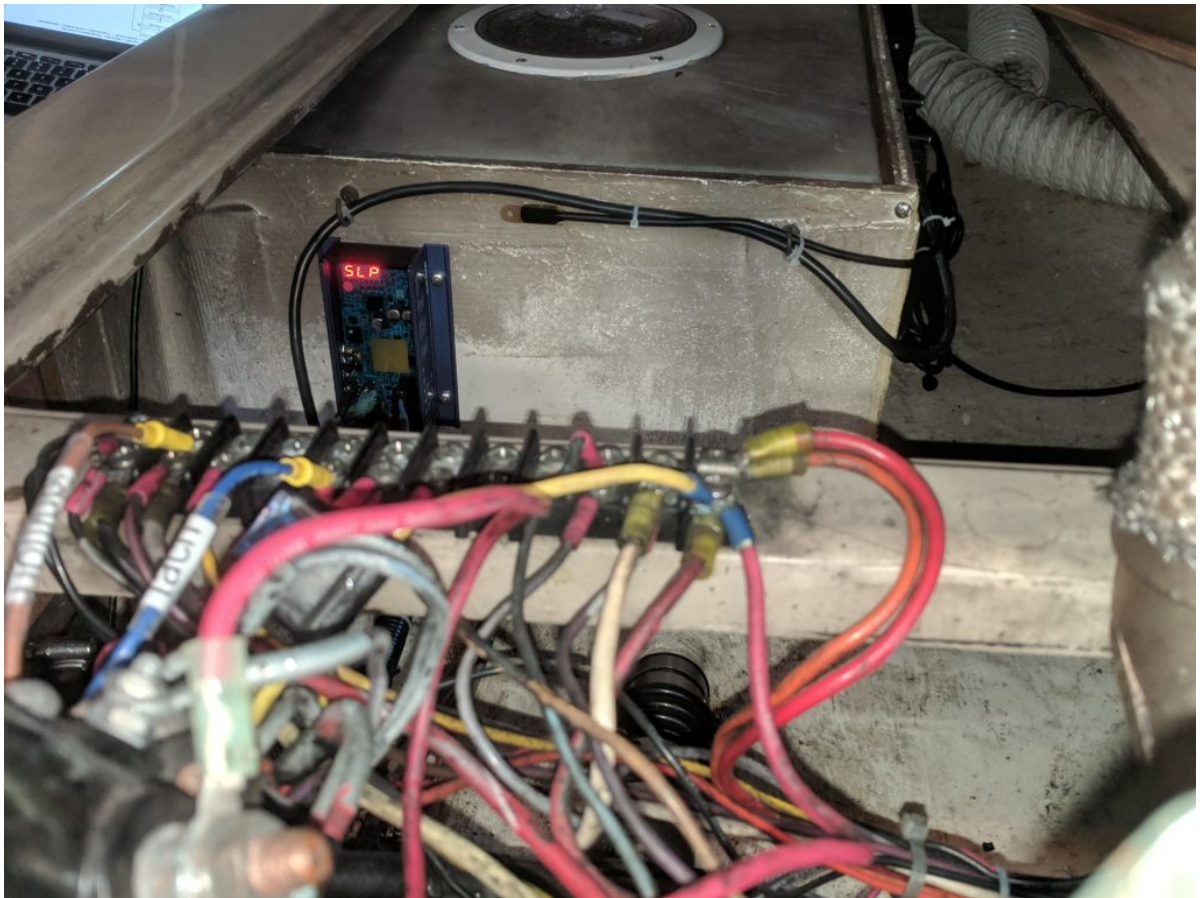
After few tests, it looks like the 17420 is a good fit! Time to order a couple of them for spare.





# Ready for testing?

## Configure the Balmar mc-614



The tuning of the Balmar MC-614 is pretty challenging, I just followed RC recommendations for your alternator and your battery. You can find everything about Balmar Tuning in the article below.

*Programming a Balmar External Voltage Regulator*



|                      |           | BASIC PROGRAMMING                       |   | BASIC PROGRAMMING    |  |
|----------------------|-----------|---|---|----------------------|--|
| DISPLAY              | SETTINGS  | DESCRIPTION                             | ACTION WITH MAGNET  |                      |  |
| Touch Dot            |           | Touch at Any Point in Screen Rotation   | Press & Hold  |                      |  |
| PRO                  |           |   | Continue Press & Hold   |                      |  |
| bA                   |           |   | Continue Press & Hold   |                      |  |
| UFP                  |           | Default Battery Type Program            | Release at Desired Battery Type   |                      |  |
| FDc                  |           | Flooded Deep Cycle                      | Release at Desired Battery Type   |                      |  |
| gEL                  | GEL       | Gell Batteries                          | Release at Desired Battery Type   |                      |  |
| AgL                  |           | AGM Battery                             | Release at Desired Battery Type   |                      |  |
| OPS                  |           | Optima Spiral Wound Batteries           | Release at Desired Battery Type   |                      |  |
| FSB                  |           | Standard Flooded Batteries              | Release at Desired Battery Type   |                      |  |
| HAL                  |           | Halogen Systems                         | Release at Desired Battery Type   |                      |  |
| bEL                  | b-4       | Wait until scroll comes back to bEL     | Press & Hold bEL>Release at b-4   |                      |  |
| dSP                  | SD        | Wait until scroll comes back to dSP     | Press & Hold dSP>Release at SD  |                      |  |
| bDL                  | ON        | Wait until scroll comes back to dSP     | Press & Hold bDL>Release at ON  |                      |  |
|                      |           |   |   |                      |  |
|                      |           |   |   |                      |  |
| ADVANCED PROGRAMMING |           |   |   | ADVANCED PROGRAMMING |  |
| DISPLAY              | SETTINGS  | DESCRIPTION                             | ACTION WITH MAGNET  |                      |  |
| Three Dashes         |           | Scrolls through AP0 to AP5              | Press & Hold at Three Dashes>Release at AP5   |                      |  |
| Three Dashes         |           | After Release three dashes appear again | Wait for PrA to Appear  |                      |  |
| PrA                  |           | Indicates Advanced Programming          | Wait for dLC to Appear  |                      |  |
| dLC                  | 15        | Start Delay Programming                 | Press & Hold>Number Scrolls Up>Release at 15  |                      |  |
| AHL                  | 14.6      | Set High Voltage Limit                  | Press & Hold>Voltage Scrolls Up>Release>Pause for AHL>Re-Touch>Voltage Scrolls Down>Release at 14.6V              |                      |  |
| CL                   | 14.5      | Batt Temp Voltage Compensation Limit    | Press & Hold>Voltage Scrolls Up>Release>Pause CL>Re-Touch>Voltage Scrolls Down>Release at 14.5V                   |                      |  |
| bu (bv)              | 14.2      | Bulk Voltage Limit                      | Press & Hold>Voltage Scrolls Up>Release>Pause for Bv>Re-Touch>Voltage Scrolls Down>Release at 14.2V               |                      |  |
| b1C                  | .2        | Minimum Bulk Voltage Duration           | Press & Hold>Duration Scrolls Up>Release, Pause for b1C>Re-Touch>Duration Scrolls Down>Release at .2 (12 Min)     |                      |  |
| Au (Av)              | 14.1V     | Absorption Voltage Limit                | Press & Hold>Voltage Scrolls Up>Release>Pause for Av>Re-Touch>Voltage Scrolls Down>Release at 14.1V               |                      |  |
| A1c                  | 3.0       | Minimum Absorption Voltage Duration     | Press & Hold>Duration Scrolls Up>Release at 3.0 (3 Hours)   |                      |  |
| Fu (Fv)              | 13.8V     | Float Voltage Limit                     | Press & Hold>Voltage Scrolls Up>Release at 13.8V  |                      |  |
| F1c                  | No Change | Min Float Voltage Duration              | Press & Hold>Duration Scrolls Up>Release>Pause for F1c>Re-Touch>Duration Scrolls Down>Release at Desired Duration |                      |  |
| ALL                  | No Change | Low Voltage Alarm For Dash Lamp         | Press & Hold>Voltage Scrolls Up>Release>Pause for ALL>Re-Touch>Voltage Scrolls Down>Release at Desired Voltage    |                      |  |
| FbA                  | No Change | Field Threshold for Bv to Av Transition | Press & Hold>% Scrolls Down>Release>Pause for FbA>Re-Touch>% Scrolls Up>Release at Desired Percentage             |                      |  |
| FfL                  | No Change | Field Threshold for Av to Fv Transition | Press & Hold>% Scrolls Down>Release>Pause for FfL>Re-Touch>% Scrolls Up>Release at Desired Percentage             |                      |  |
| AL1                  | 108       | Max Alternator Temperature              | Press & Hold>Temp Scrolls Down>Release>Pause for AL1>Re-Touch>Temp Scrolls Up>Release at 108 Celcius              |                      |  |
| b1L                  | 46        | Battery Over Temp Limit                 | Press & Hold>Temp Scrolls Down>Release at 46 Celcius  |                      |  |
| SLP                  | No Change | Battery Temp Compensation Slope         | Press & Hold>Slope Scrolls Down>Release>Pause for SLP>Re-Touch>Slope Scrolls Up>Release at Desired Slope          |                      |  |

## Why no RPM?

Checking the RPM, I realized it was not showing up, after a bit more help from Rod I started a quick troubleshooting session to realize one fuse failed during the setup.

## Troubleshooting

|   | reg primary power wire #2 | alternator power wire | reg pos sens power wire #9 | reg brown ignition wire #3 | reg blue field wire #4 | stator | rpm  |
|---|---------------------------|-----------------------|----------------------------|----------------------------|------------------------|--------|------|
| shorepower off / ignition off / engine off                    | 12.6                      | 12.6                  | 12.6                       | 0                          | 0                      | 0      | 0    |
| shorepower off / ignition on / engine off                     | 12.6                      | 12.6                  | 12.6                       | 12.6                       | 9.7                    | 0      | 0    |
| shorepower off / ignition on / engine on (idle)               | 12.6                      | 12.6                  | 12.6                       | 12.6                       | 9.6                    | 6.19   | 500  |
| shorepower off / ignition on / engine on (forward - 1500 rpm) | 14.5                      | 14.5                  | 14.5                       | 14.03                      | 3.96                   | 7.25   | 1500 |

## 5 days cruise update

The week-end of Thanksgiving was a perfect time to validate the new alternator setup. Everything worked as expected! Next step upgrade our battery bank for our next long cruise to Catalina.