Gage House Best Practices

What happens when you have to troubleshoot the gage…..

- You start out with a wiring nightmare.
- You can’t unhook parts and pieces to diagnose the problem.
- So you start replacing parts and sensors till you finally get it fixed.
- Then you realize your not sure what part fixed the problem.
- Now you have an assortment of parts and your not sure which one is the faulty component.

General Cleanup

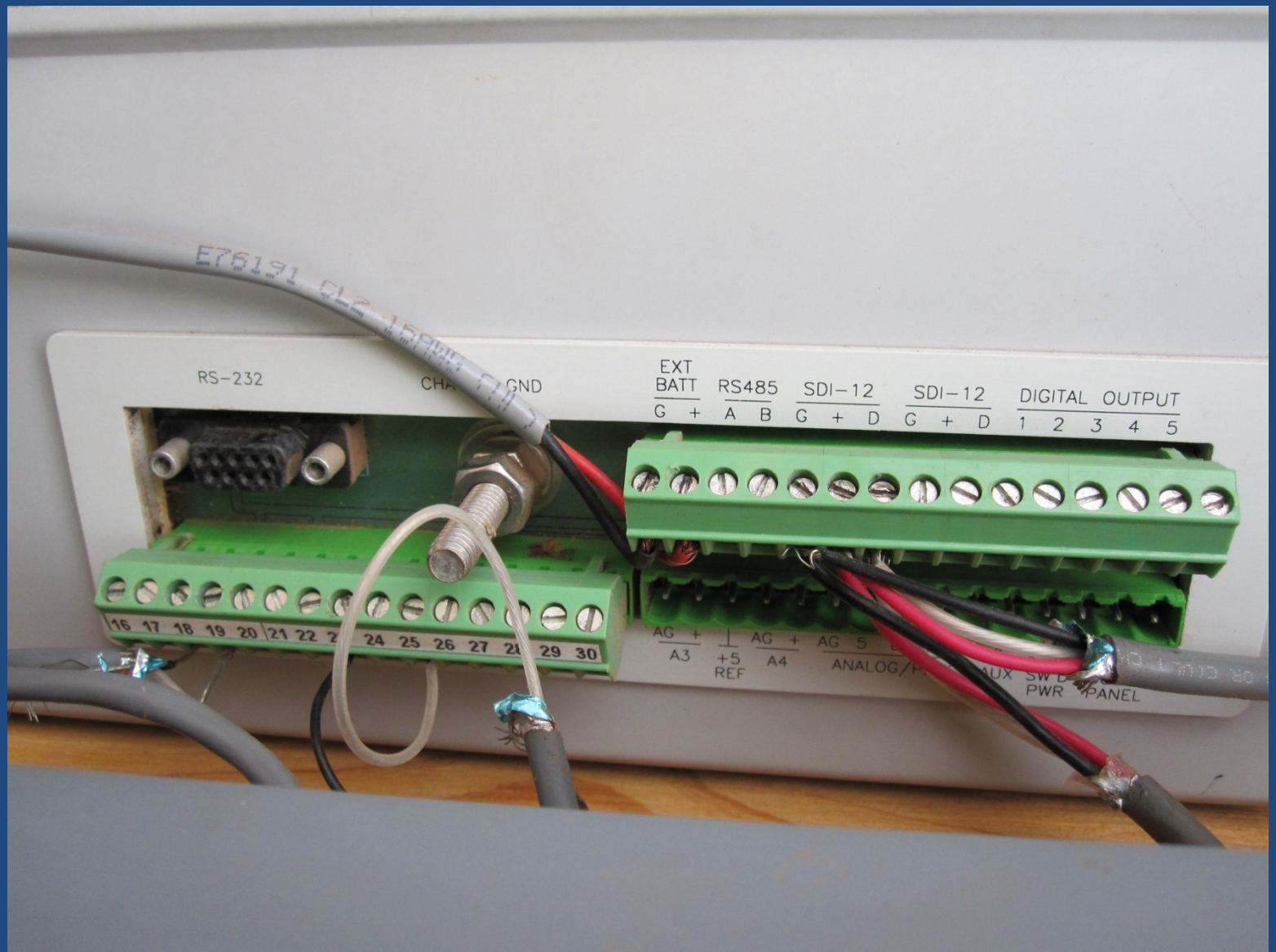
Before

After

Wiring Practices in the Gagehouse

- Screw terminal blocks
  - Power distribution
  - Multiple sensor connections
  - Stainless steel parts, lock washers, etc…
- Proper crimping and soldering
- Keeping connections tight and corrosion-free
- Proper wire types and sizes
- Shielding of cables
- Routing and securing wires and cables

Power distribution. Why use terminal strips?



Multiple power connections to battery.

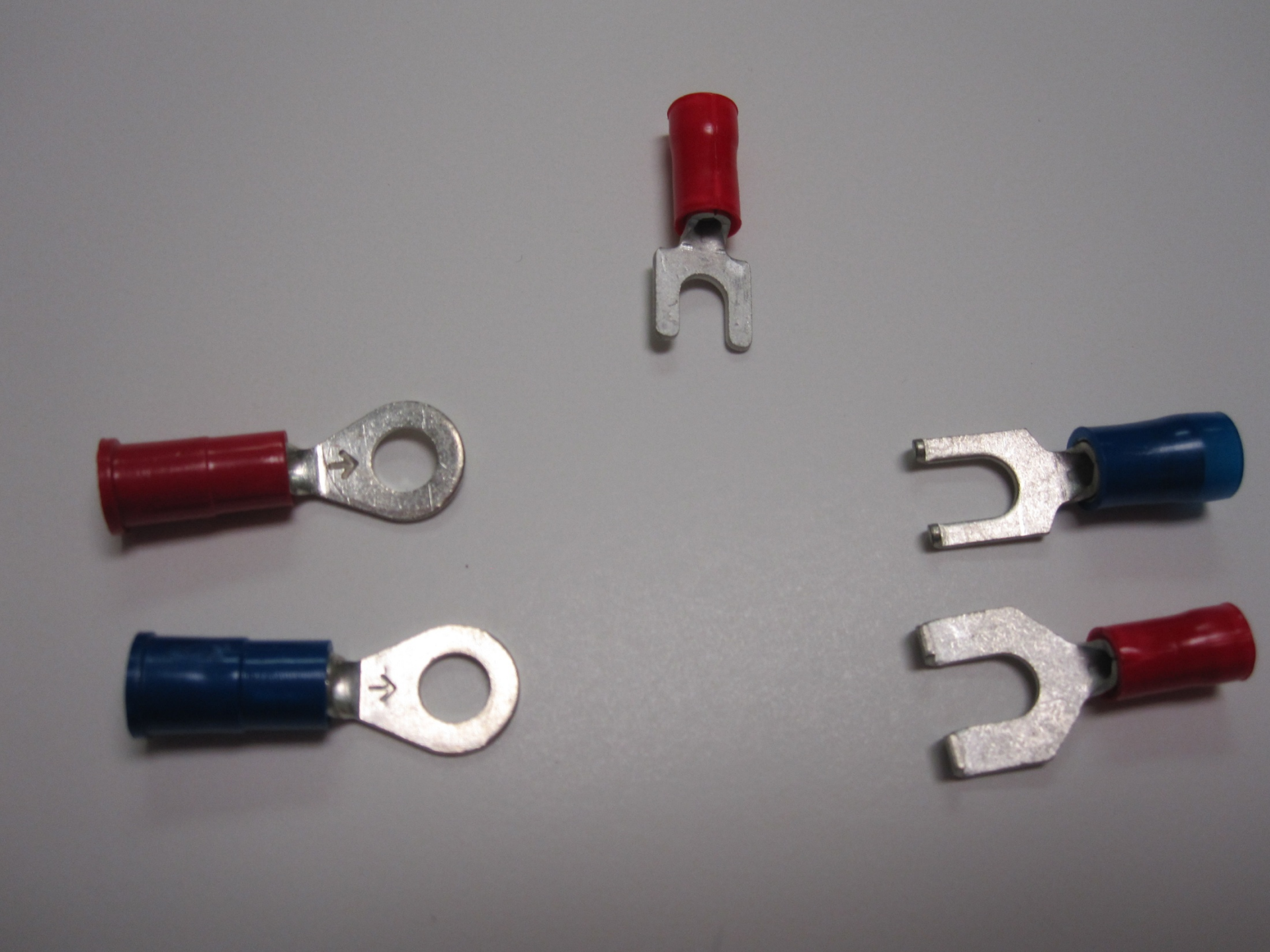
Frayed wire ends, prevented by tinning with solder.

Untinned wire ends

Tinned wire ends

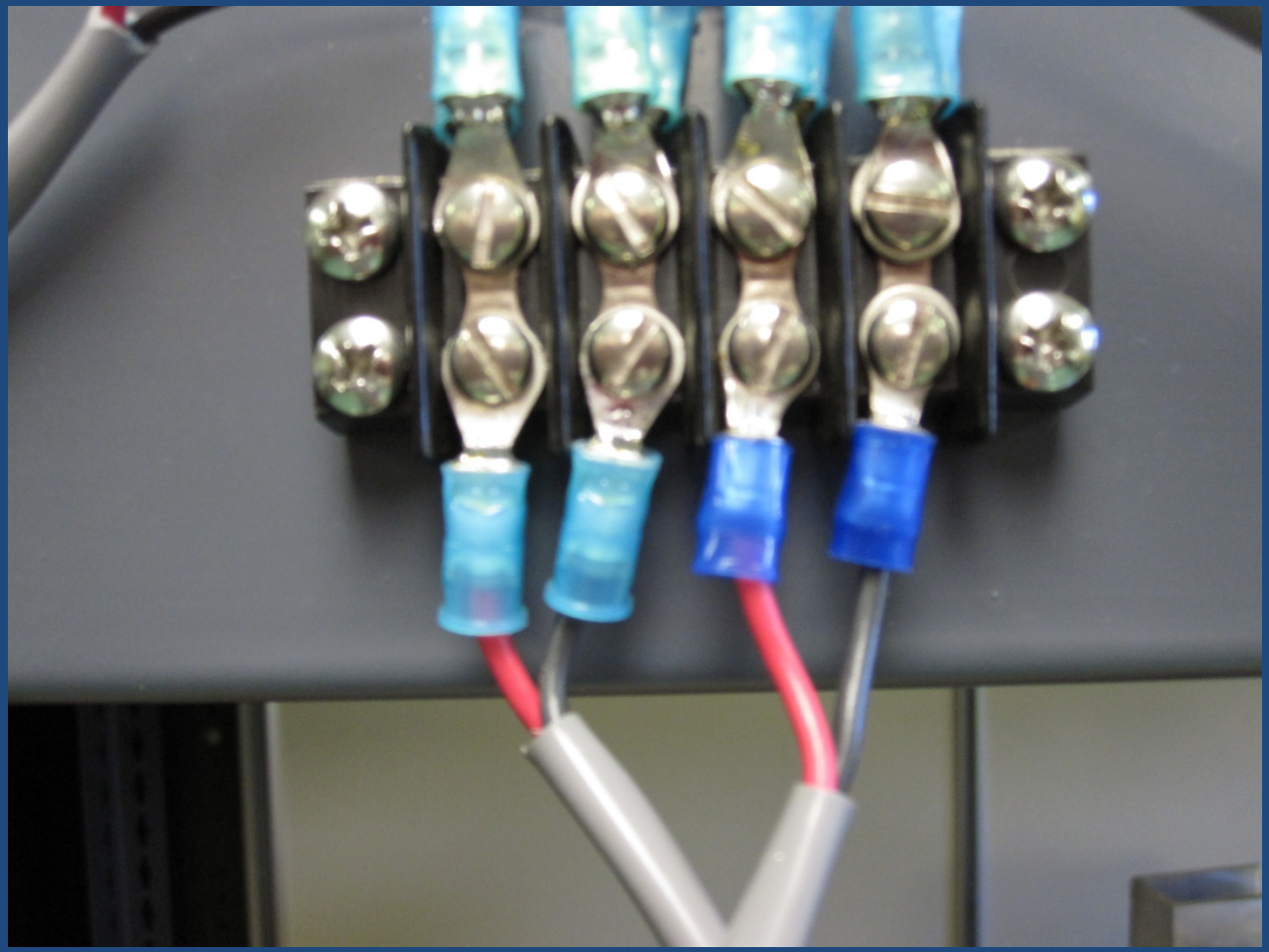
Various Types of Crimp-On Wire Terminals

Good terminals, designed to “stay in place” when screw is loose

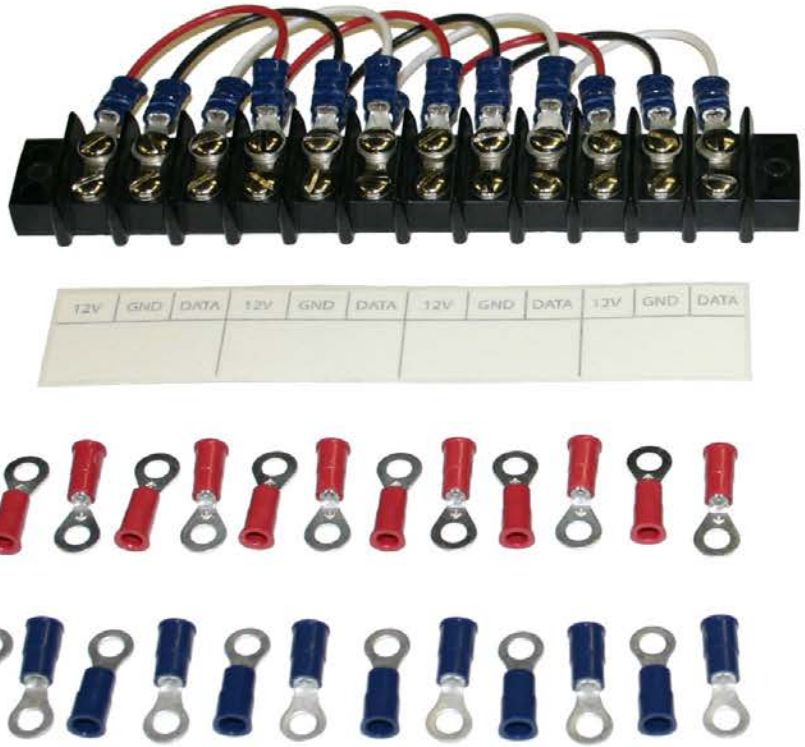


12-Volt Power Distribution Block

Properly double-crimped and soldered ring terminals



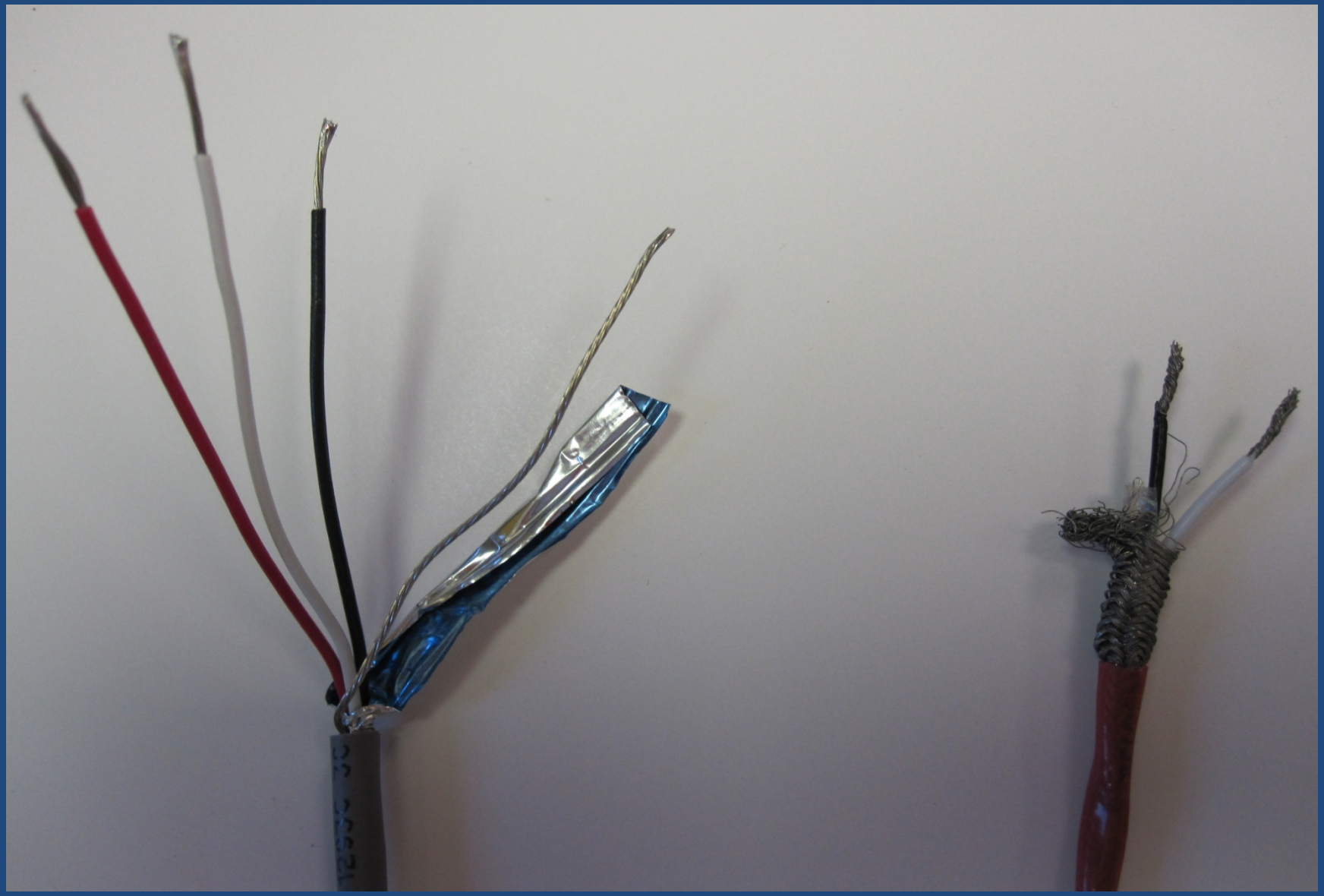
SDI-12 Sensor Connection Block



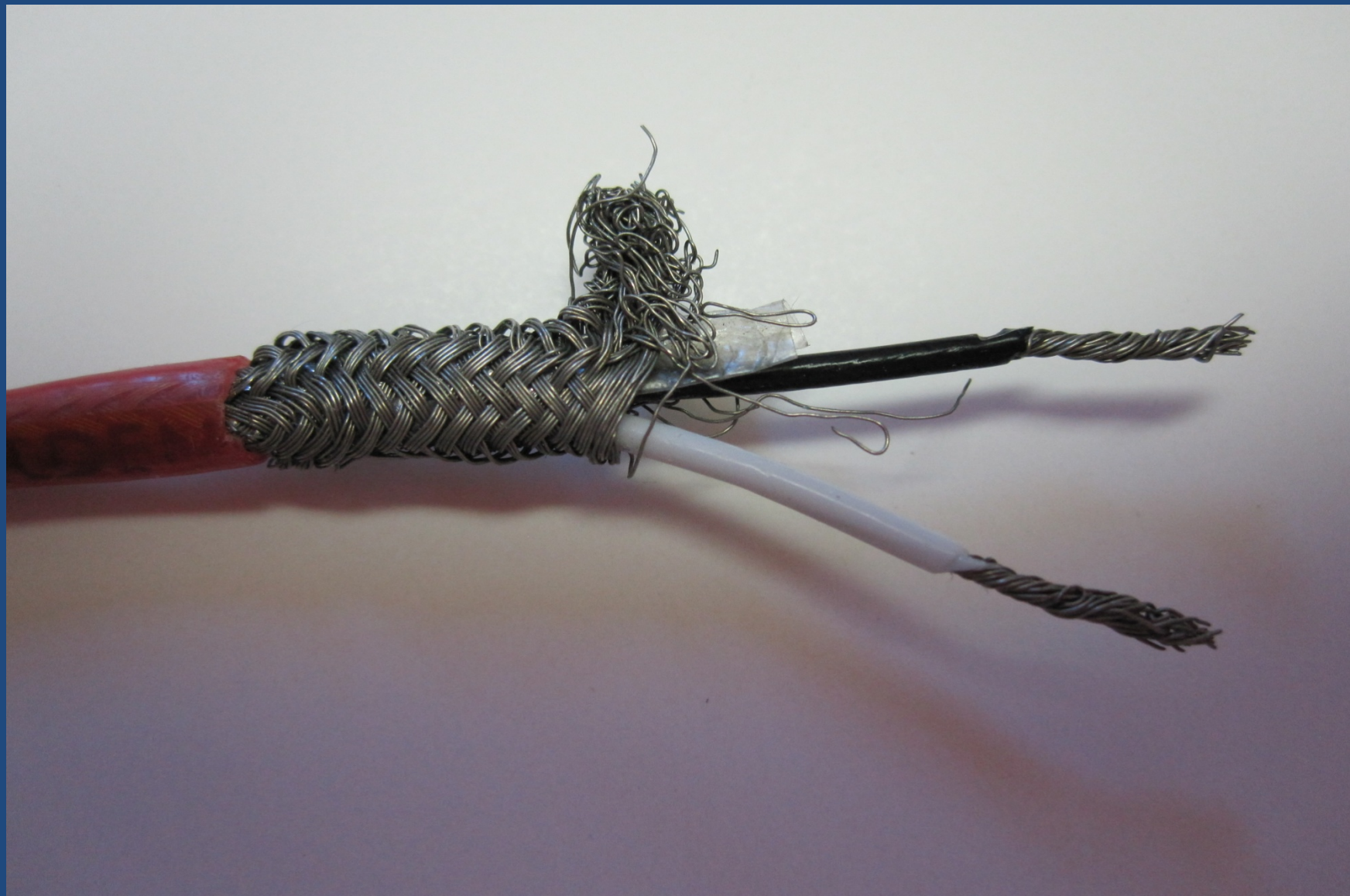
2-Conductor Tinned Copper for 12-Volt Power (18 AWG and 16 AWG, 100’ and 500’ spools)

3-Conductor 22 AWG Tinned Copper Cable with Foil Shield and Drain Wire for SDI-12 Wiring

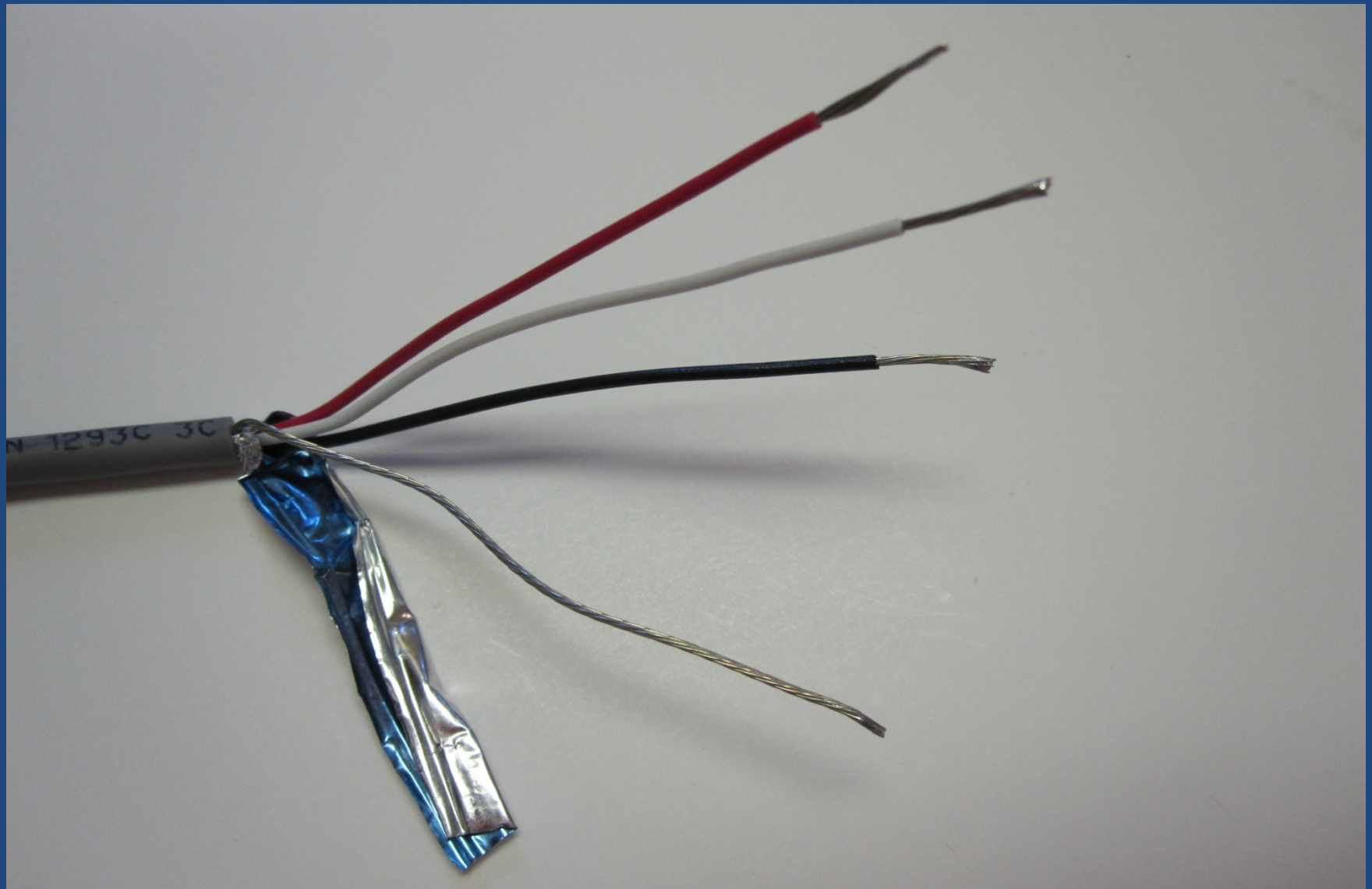
Cable shields should be grounded for noise immunity and equipment protection

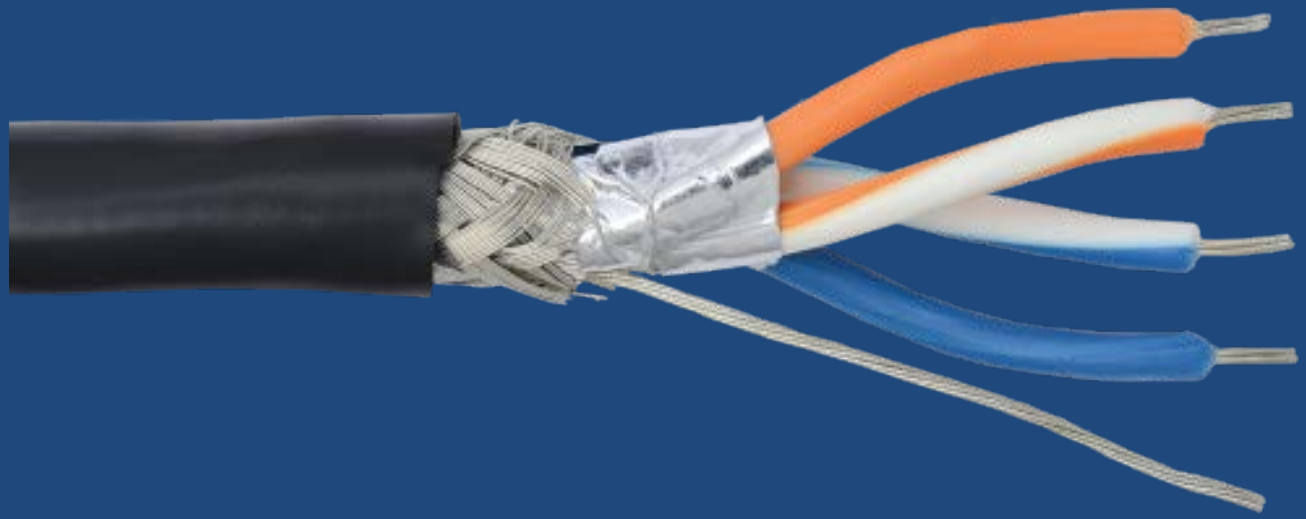


Braided shield: Only partial coverage and difficult to connect



Foil shield with drain wire: Full coverage; Easy to connect





Soldered Connections
(Greatly reduces corrosion and eliminates moisture wicking into wire)

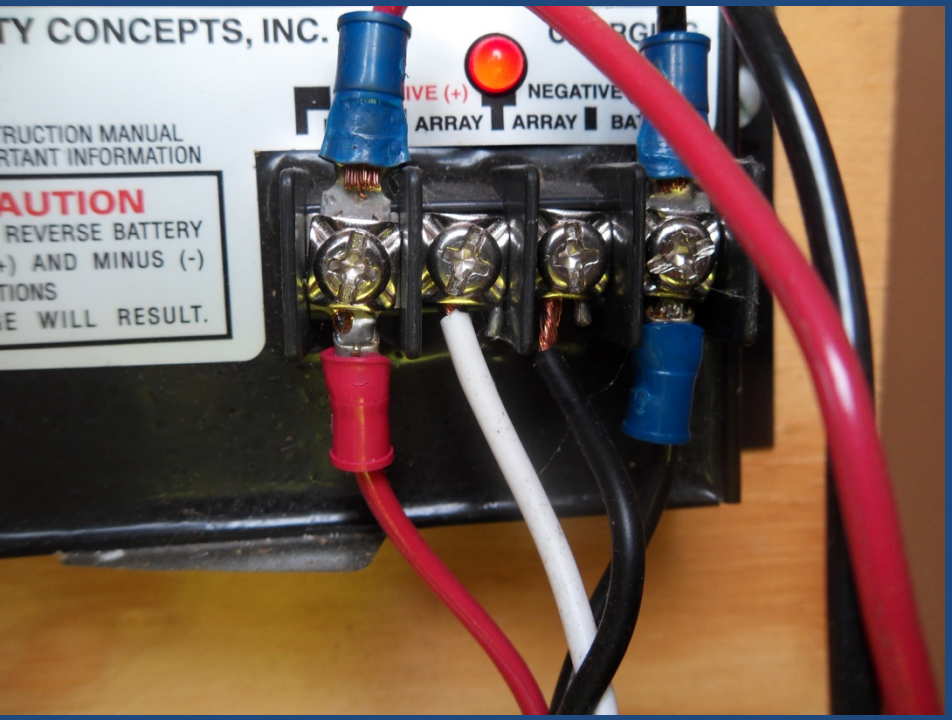
Solar Charge Regulators

•Should never use the "Load" output from regulator to power our equipment

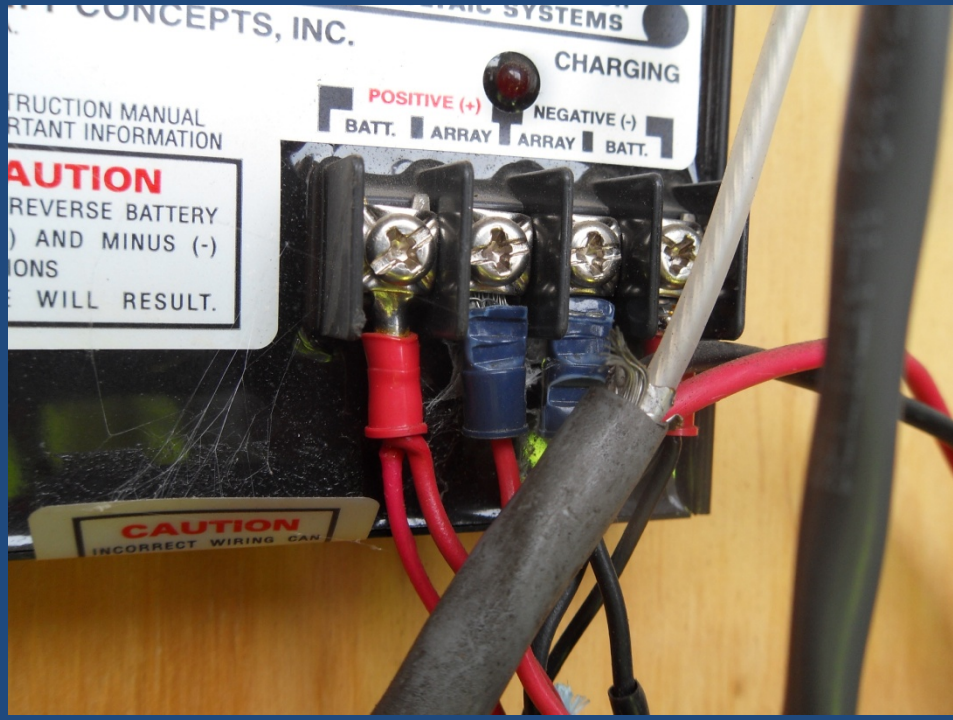
•If the regulator includes a selection for battery type (sealed or flooded, for example), use correct setting (follow battery manufacturer's guidelines, not Morningstar)

“Bad” Regulator Wiring

No terminals on wire ends, and not using tinned copper

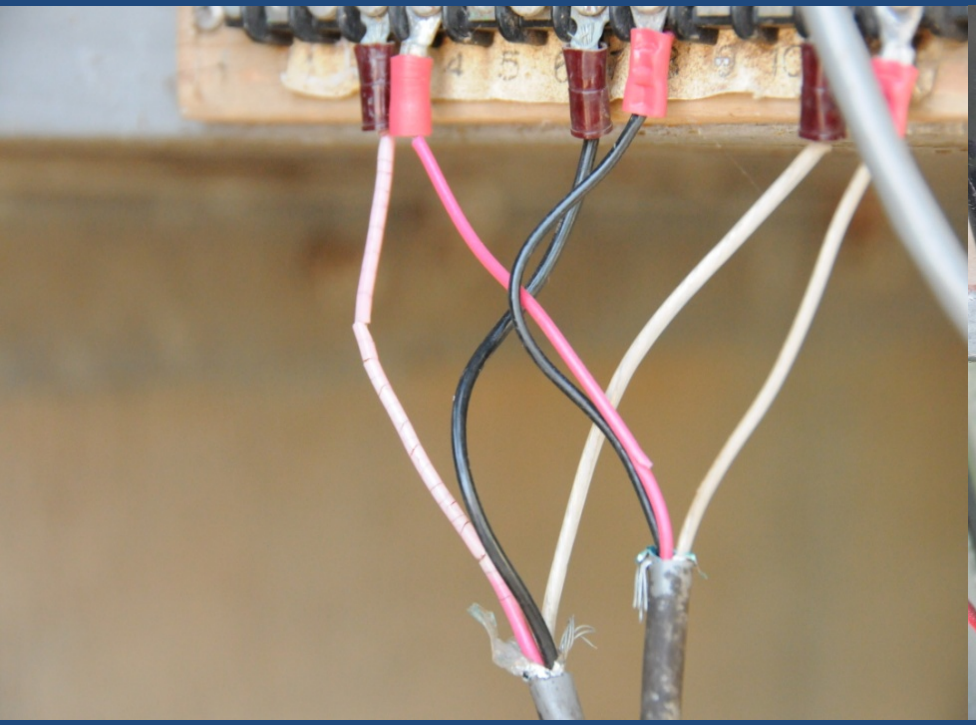


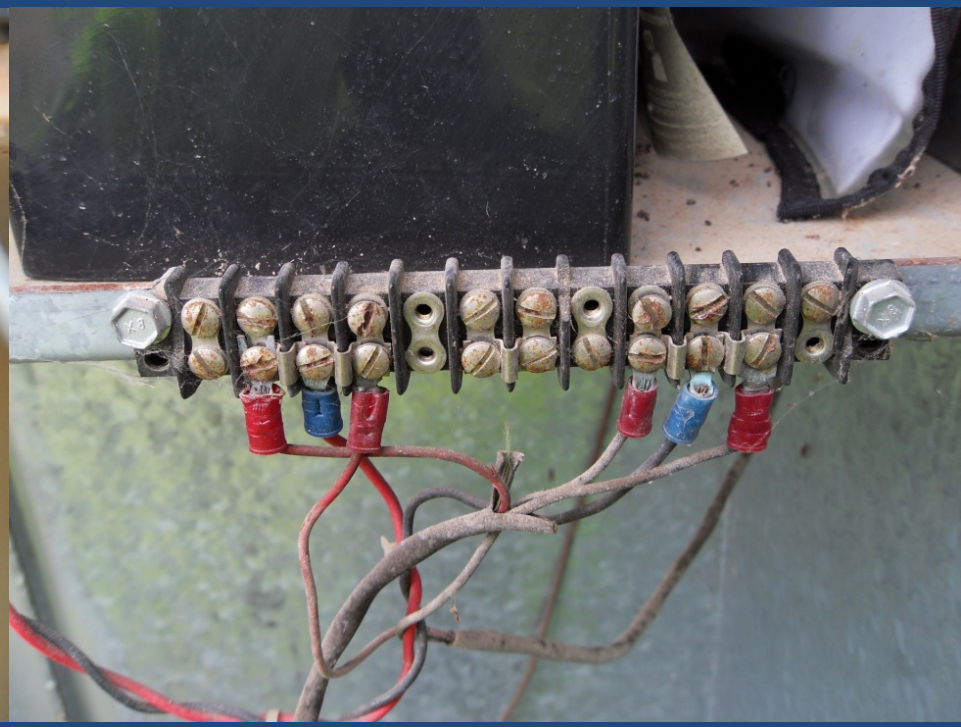
Multiple wires in a single crimped terminal connector



Old corroded/brittle wiring

(Must be replaced completely)



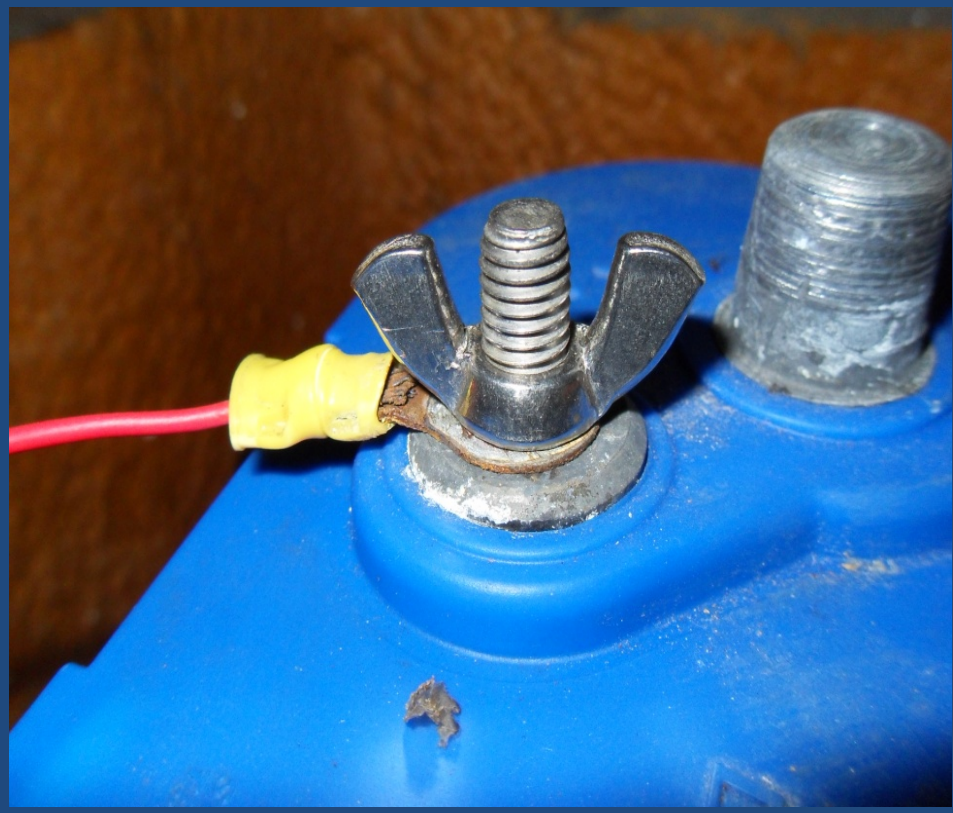


Corrosion

Can add resistance and voltage drops to your system

Disconnect; clean battery and ring terminals; spray when reconnected

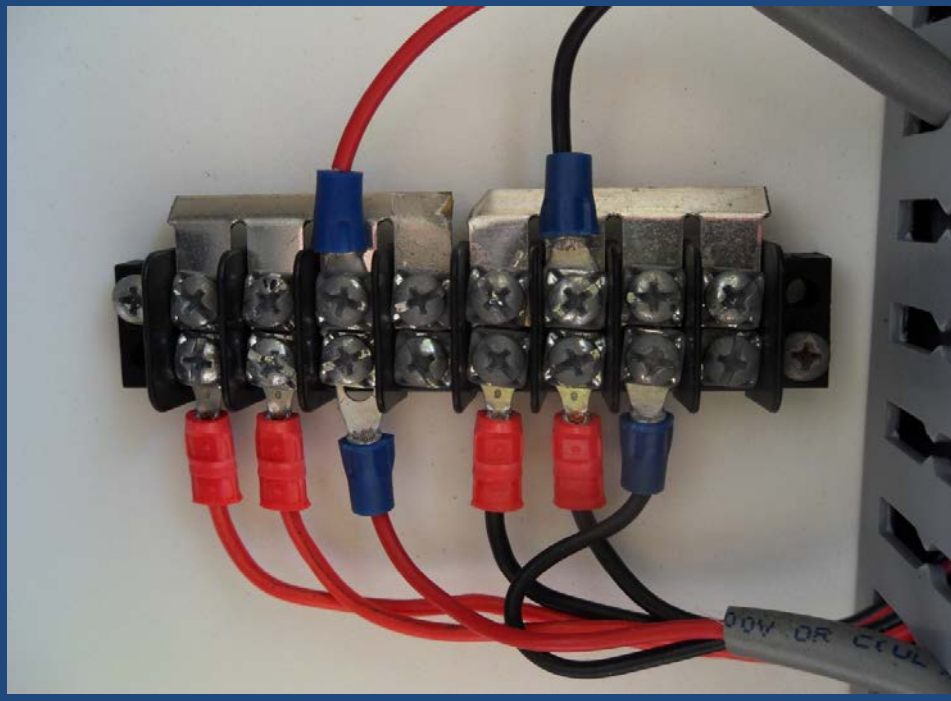
Double crimped terminal good, but should also be soldered



Loose Connections

Tighten thoroughly; use stainless steel hardware, including lock washers

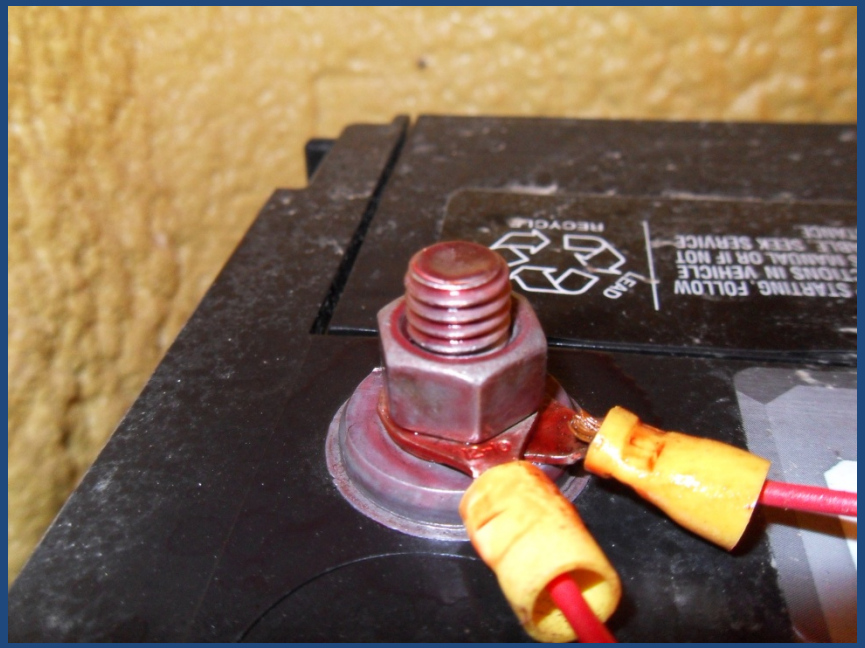
Terminals should be fully inserted/engaged. Ring terminals best for long-term



Corrosion issues/remedies

Good to use corrosion inhibitor sprays/coatings

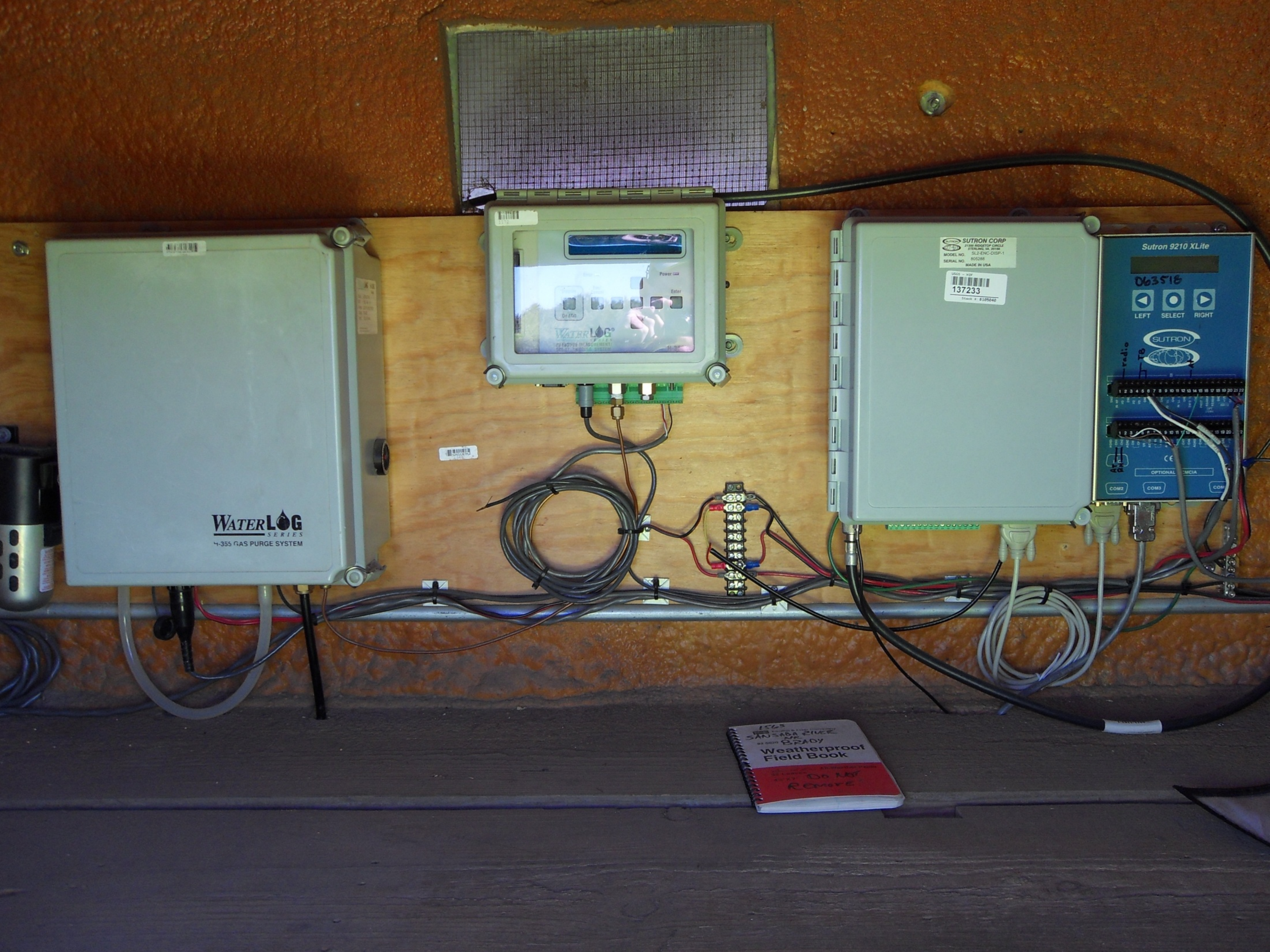
Not good to use wrong size terminal for wire size



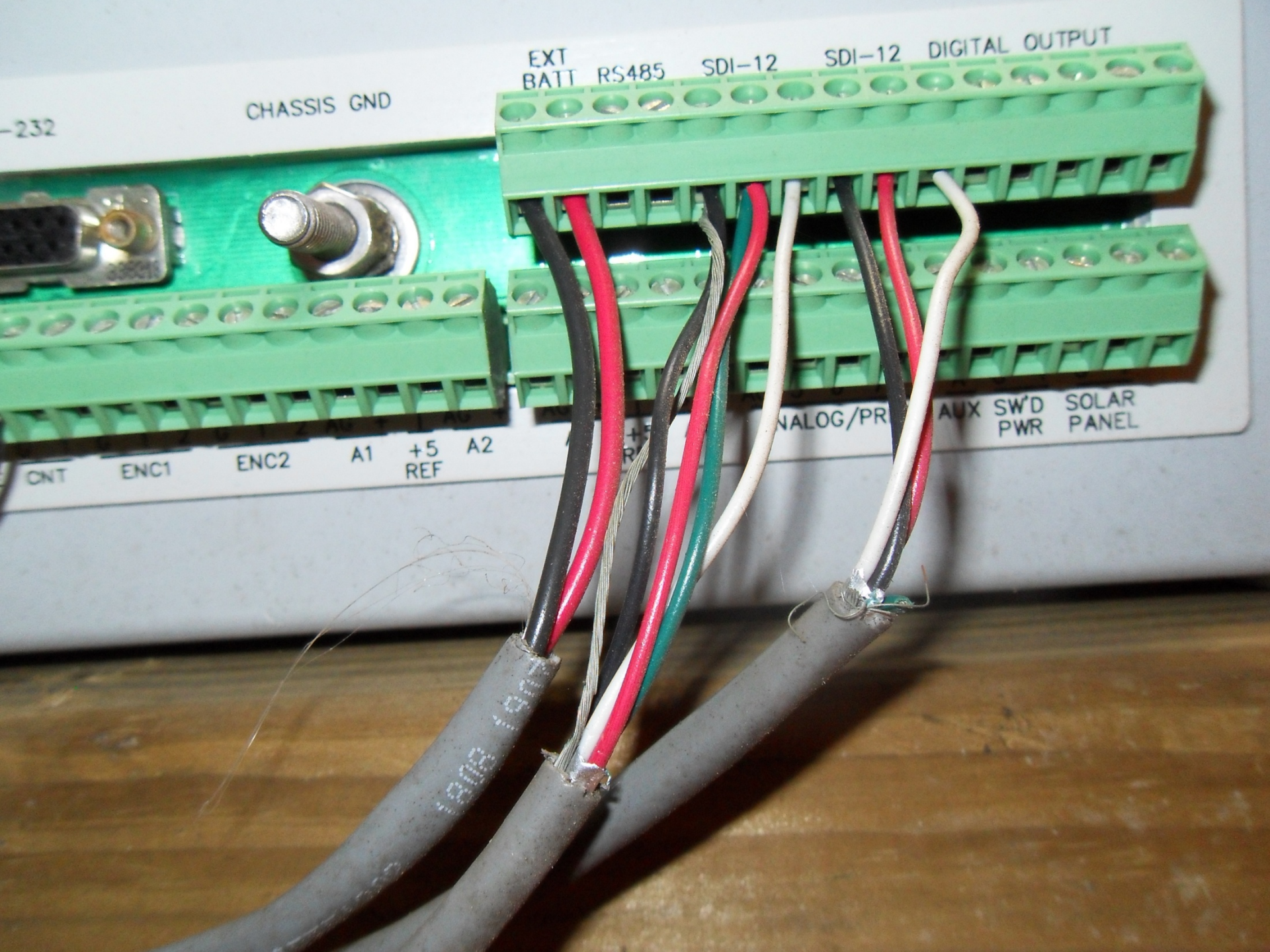
Plastic cable ties are very handy for routing wires and cables and holding them in place in the gagehouse. Black cable ties are UV resistant and tend to last longer.

No matter what style gage house you use…keep it in “tip top” shape.

Remember:
Cooperators and customers may be visiting gage houses to look at what they are paying for.


WATERLOG SERIES
H-355 GAS PURGE SYSTEM
SUTRON CORP
137233
Sutron 9210 XLite
063518
LEFT
SELECT
RIGHT
SUTRON
COM2
COM3
SAN SABA RIVER
BRADY
Weatherproof Field Book
DO NOT REMOVE


WATERLOG
SERIES
H-355 GAS PURGE SYSTEM
SUTRON CORP
137248
Sutron 9210 XLite
LEFT
SELECT
RIGHT
SUTRON
OPTIONAL PCMCIA
COM2
COM3
COM1
WATERLOG
H-350XL
STATPOWER
Weatherproof
Field Book
Remote


EXT
BATT
RS485
SDI-12
SDI-12
DIGITAL OUTPUT
CHASSIS GND
-232
CNT
ENC1
ENC2
A1
+5
REF
A2
AUX
SW'D
PWR
SOLAR
PANEL

In-Line RF Surge Protectors (for antenna cables)

Not grounded = Not protected

Protected

Equipment Installation at Field Sites

- Masts or conduit for protection of cables
- Drip loops and drain holes
- Sealing of external connectors
- Keeping a clear view for antennas
- Solar panels
- Antenna aiming
- Raingage mounting considerations
- Orifice lines and outdoor cable runs

Field Site Maintenance Practices

- Tightening and coating of connections
- Load testing of batteries
- Checking solar panels
- GOES antenna
- GPS antenna
- Desiccants and vent tubes
- General cleanup

Standardization of Setups and Data Collection

- A few setups/programs would cover most all sites in most offices
- Troubleshooting different sites becomes very “routine” and simplified
- Only a few DECODES configurations needed
- Compare “apples to apples” when looking at data from different sites
- Familiarity with “what to watch for” at sites

Protection of wires

All wires protected

Access port

Installation of rain gage on arm. Notice use of weather head on mast to pass cabling through mast. Solar panel bracket uses bayonet style U-bolts. Waterproofed GOES antenna connector with drip loop.

External Antenna Connections

Not weatherproofed

Weatherproofed

GOES Antenna Installation

Don’t do this…..

Or this…

Raingage mounting considerations

GOES Antenna

Before

After

GPS Antenna

Good. Antenna on end of “arm”. Almost full view of sky.

Bad. Antenna losing view of at least half of the sky.

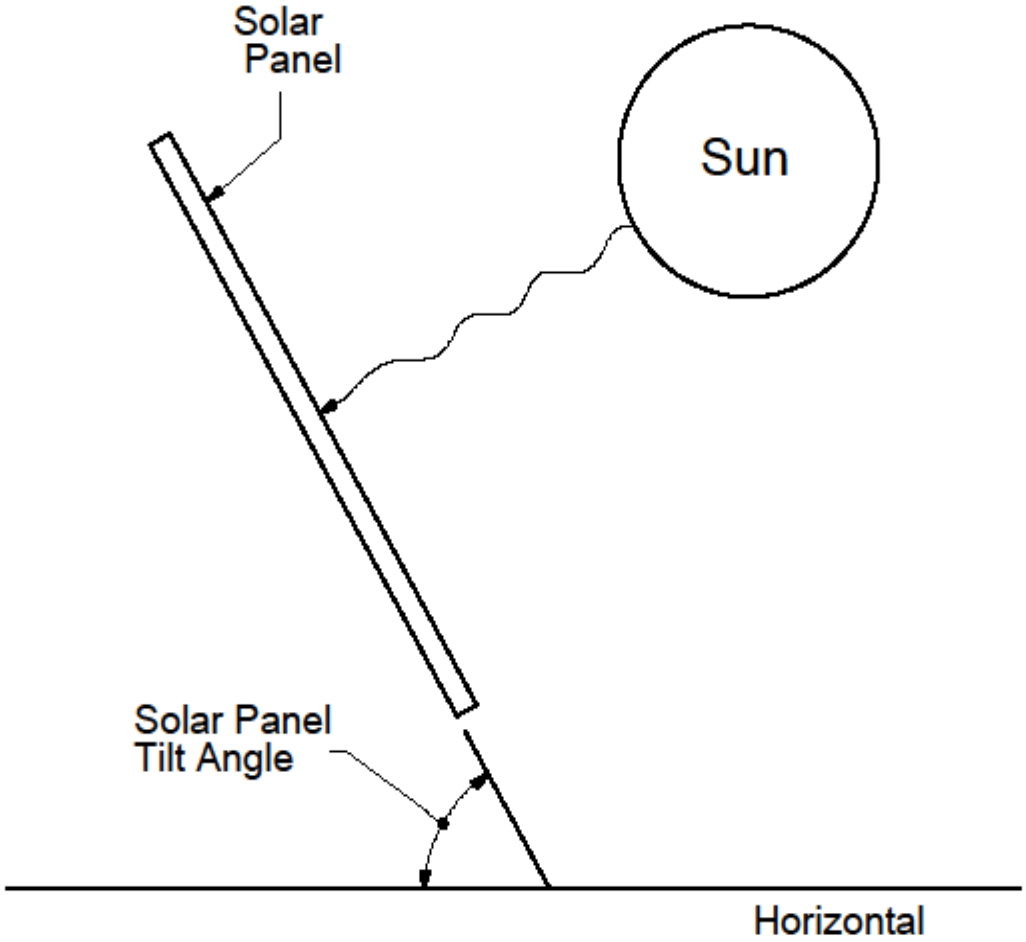


Figure 1: Measuring the Solar Panel Tilt Angle

Testing Solar Panels

Solar Panel Specifications:

Open-Circuit Voltage V_{OC} = _____ Volts

Short-Circuit Current I_{SC} = _____ Amps