Ryan Wallace, Residential Manager

ASI Environmental

all opinions presented represent the presenter and not NOWRA.

Presented at the 2025 Mega-Conference, October 19-22, 2025

Who We Are

ASI Environmental services, repairs and installs residential aeration systems in several counties throughout Ohio. Since 1989, our customers have trusted our quality service which is completed according to manufacturer specifications.

We sell, service and maintain a wide selection of aerobic treatment systems, and other wastewater equipment, including class 1 blowers and sump pumps.

Our Service Professionals regularly attend industry seminars to keep current with new developments in servicing and maintaining household sewage treatment systems.

Who I AM…

Ryan Wallace

Manager ASI environmental

3 departments within residential – OM, Excavation and service.

OSHA Equipment operator

ODH water contractor

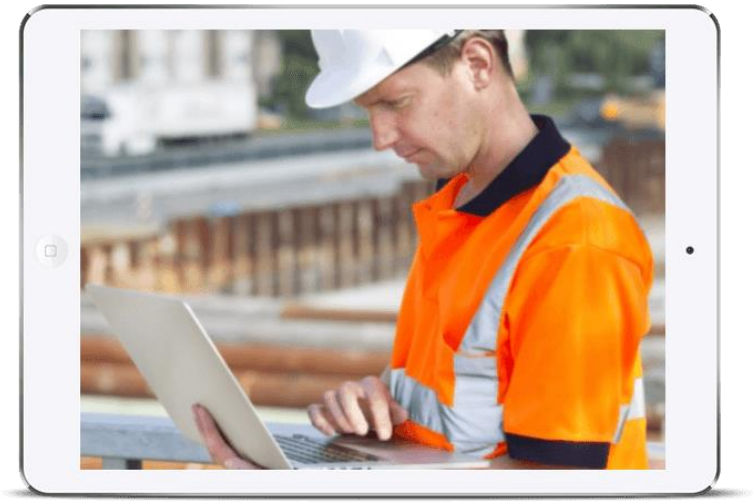
OEPA WW operator

Proud member of 811

Husband & Father (:

Residential Services

ASI Environmental offers both Point of Sale and Routine Maintenance Inspections of septic systems in the counties we serve. We also offer maintenance agreements to maintain your septic system and report to County Health Departments to maintain compliance with all health regulations. Our service professionals are equipped with the experience and tools to make repairs and ensure your system is functionally properly.



Commercial Services

ASI Environmental also offers a full range of services for commercial septic systems. We specialize in maintenance and repair of wastewater treatment plants and can handle nearly any job big or small on your behalf. We also work with many municipalities and commercial businesses to install, repair and maintain lift stations and wet wells.

Ryan Wallace, Residential Manager
ASI Environmental

CONTROL PANEL DIAGNOSTICS

Course Outline

Control panel DIAGNOSTICS

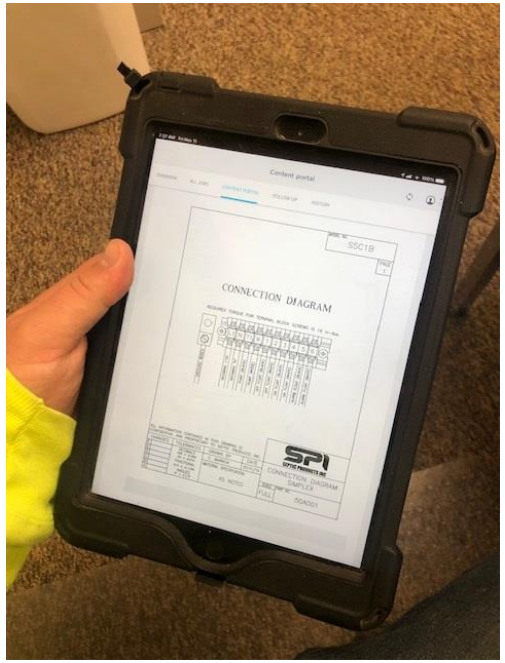
- Be Prepared and Versatile
- Completing the Work
- Understanding Electrical Basics
- Panel Components & Issues
- Most common level alarms
- PART 2
- UNDERSTANDING PANEL PARTS
- WIFI-TELEMENTRY TECHNOLOGIES
- Q&A

Be Prepared and Versatile

Parts Prep and Coordination of Data

These items help with being prepared for all occasions…

- Database of panel schematics available through technology/content portal
- Information from all previous visits on-hand, onsite through database; customer phone calls are recorded to easily be reviewed in the office & in the field
- Extensive inventory to cover all situations
- Backup plans available for emergency calls: solids handling pumps with quick connects, self starting grinders pre-plumbed to get through long weekends, solid relationships with pumpers you can count on in those last-minute situations



Completing the Work

Tools

SNIFFER / VOLTAGE SENSORS

- Not a diagnostic tool
- Does not determine quality of circuit
- Does not keep you safe
- Does not indicate much useful information

Completing the Work

Tools

FLUKE t5-600 Multi meter

- Auto ranging
- OHMS
- AMPERES
- VOLTAGE AC/DC

Why auto ranging? Why 600+ Volt capable?

Transformers/Control circuits

Completing the Work

Tools

Jumper wires

- 15 amp rated
- Insulated ends
- Color coded

Completing the Work

Tools

Insulated Tools

- High voltage rated insulation
- Made for electrical work
- Avoid unintended arching

Electrical Work

Understanding the Basics

Amperage – An ampere is the unit used to measure electric current. Current is a count of the number of electrons flowing through a circuit.

Resistance (ohms) -the resistance of the flow of electricity.

Voltage – A volt is the unit of electric potential difference, or the size of the force that sends the electrons through a circuit.

Continuity - the ability for electricity to flow from point a to point b. UNBROKEN PATHWAY OR OUT OF LIMITS! (O/L)

Panel Components

Break Down the Panel Into Parts to Simplify Your Situation

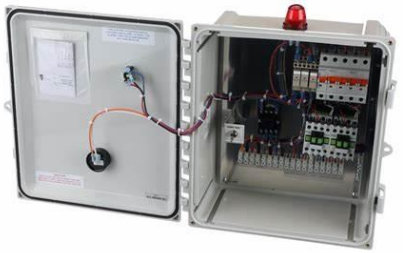
Understanding panel components is half the battle to understanding panel issues

Short to Ground, Short to Neutral, Open, Residual Voltages, Surges and Over Draw

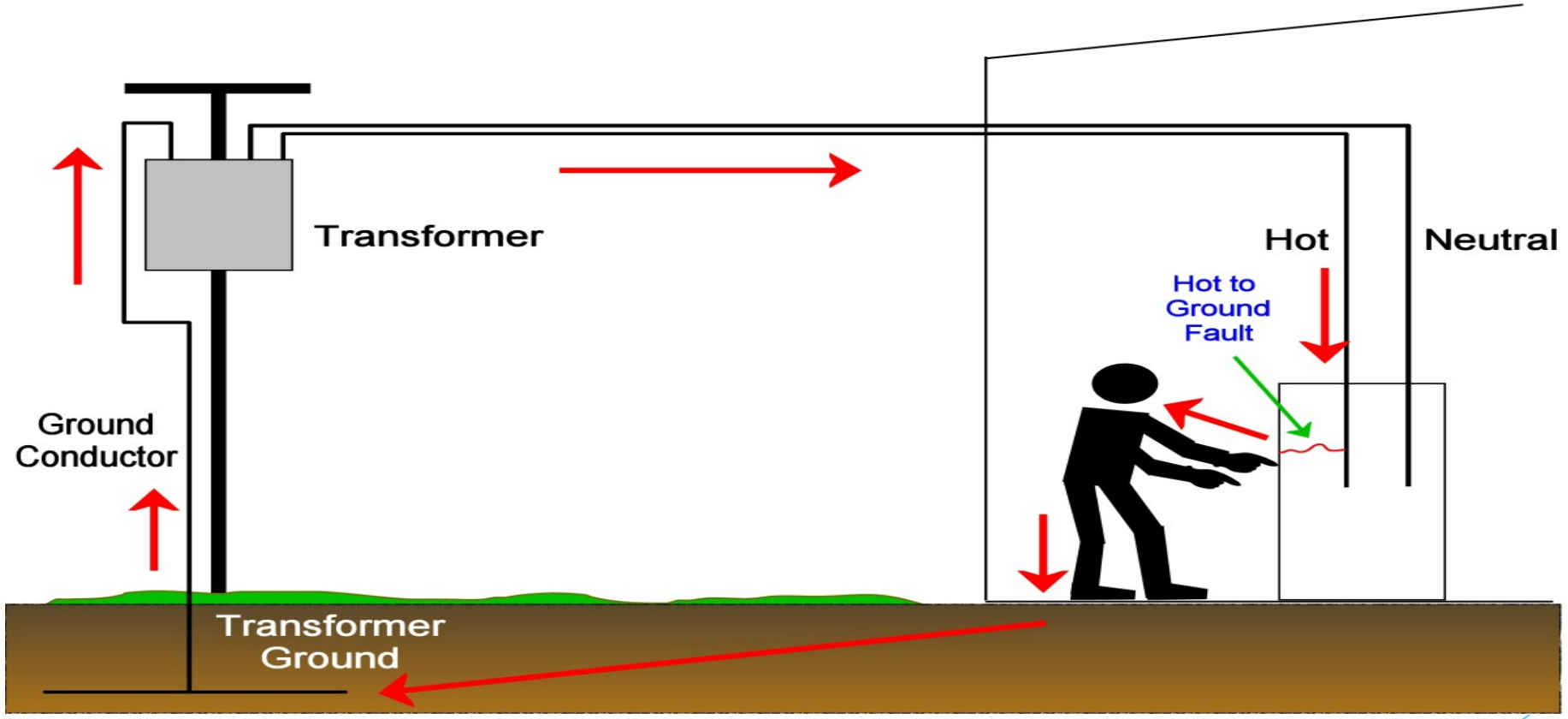
Diagnosing Issues

Mechanical Failure

Electrical Failure



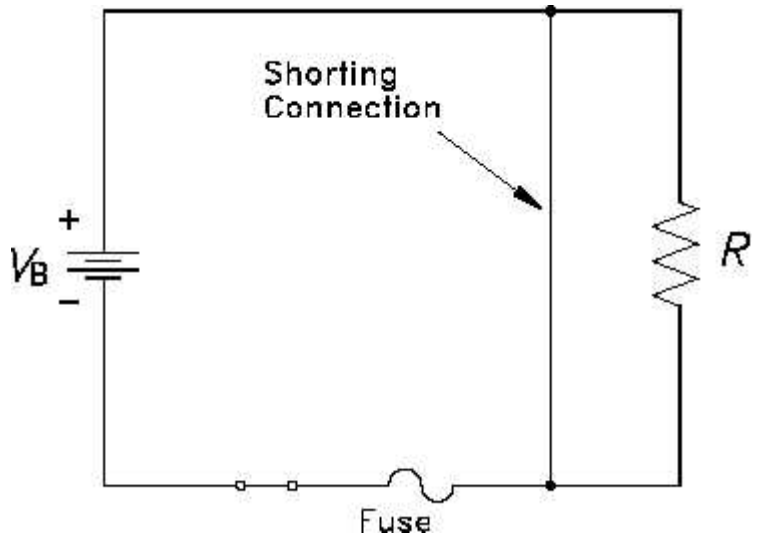
Diagnosing Issues



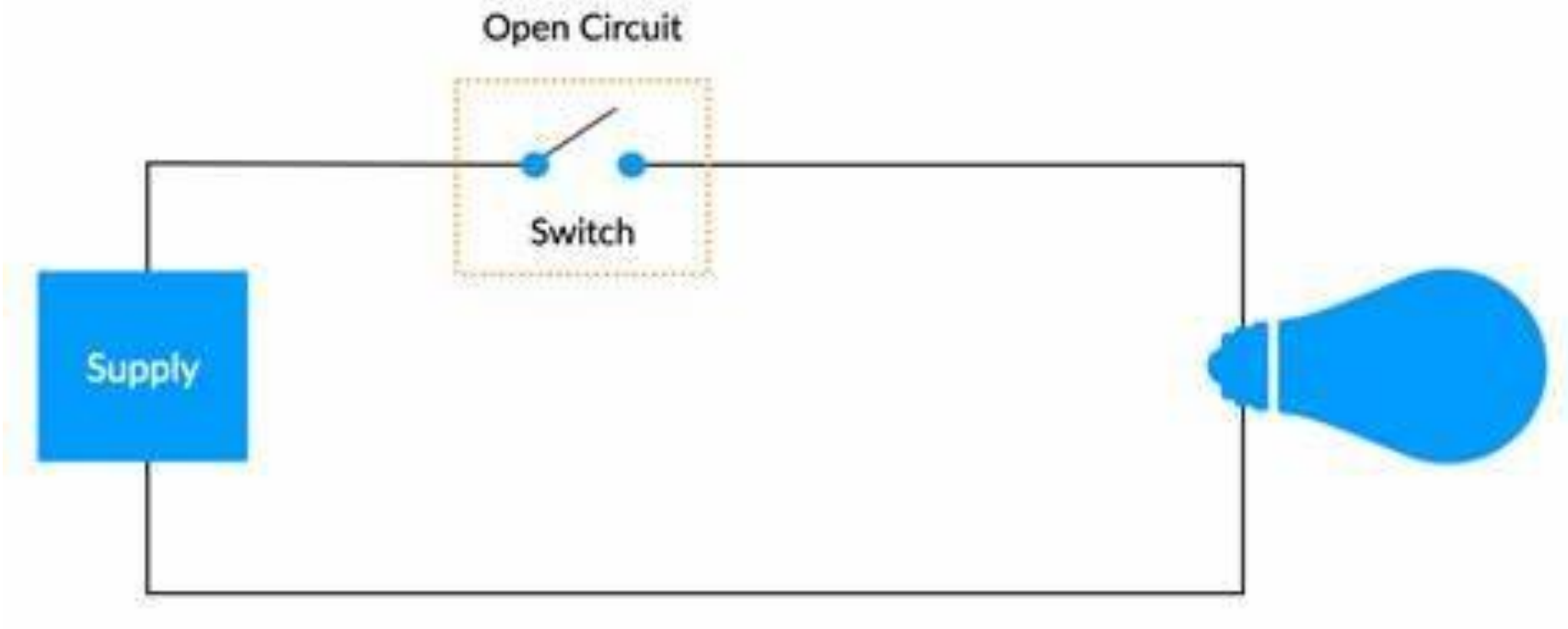
Diagnosing Issues

Short to neutral (short circuit)

The resistance / load has been bypassed due to short fault.



Open Circuit



Diagnosing issues

Float down

0 OHMS

Float UP

1 OHM

Diagnosing issues

OUTGOING 120

INCOMING/RETURNING 120?

PROCCESS OF ELIMINATION , NEVER MAKE MORE THAN 1 CHANGE AT A TIME.

ISOLATE CIRCUITS UNTILL THE PROBLEM STARES YOU IN THE FACE!

Diagnosing issues

Case ground

Checking neutral

Checking earth ground

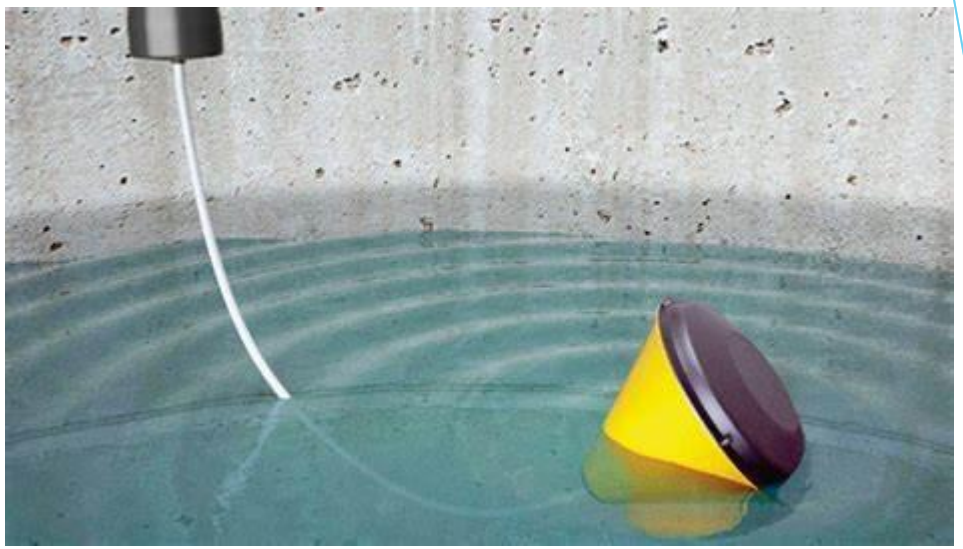
Diagnosing issues

Create a training center

Most common high level alarms

Float switches

1. Loose tether
2. Broken free of tree
3. Improper placement
4. Full of water (short to hot)



Most common panel alarms

System over full

1.Pump failsafe (LOCKOUT)

Check all aerators, disinfection systems and current sensing relays for function.

2.Pump cannot keep up (too much flow per day)

verify daily flow does not exceed HSTS design(spray/drip), verify flow per hour is within parameters. (only goes off at night situation?)(intermittent alarms)

3.Pump mechanical fail. (CB trip OR no water moving)

Check OHMS on windings of pump(can do without pulling pump), check amperage draw on startup and run FLA. Run for 15 minutes checking amps! If in spec but not moving water, check impeller is clear of debris. (or hasn't fallen off)

4.Blockage in outgoing line (gravity)

Inspect final outfall line in tank and at discharge point (creek, swale, storm drain etc.) Verify clear of debris and flowing. Invest in a camera if unsure.

PART 2

Most common panel types

A quick review of a MASSIVE market of panels.

SIMPLEX

DUPLEX

AERATION

TIME DOSE

MULTI PHASE/SINGLE PHASE

SImplex

Most basic type pump operation panel.

Simplex, one single pump with or without a timer. Single float or multiple float operations of liquid depth discharging control.

DUPLEX

Two pumps operated from one panel.

- Duplex, two pumps, with or without timers. single or multiple floats. Alternating relay often with LAG pump options for over use and emergencies.

Aeration panel

Controls an aerator on protected circuit

Aeration panels, operating you guessed it AERATOR/s often dropping down amperes allowed on the circuit by means of additional breakers. Alarm functions for failure to operate. Lockout features now standard for pump systems seen ABOVE! All in one or integrate with Either Telemetry or FAILSAFE lockout pump panels.

Time Dosing

Operates pump on timer (mound application?)

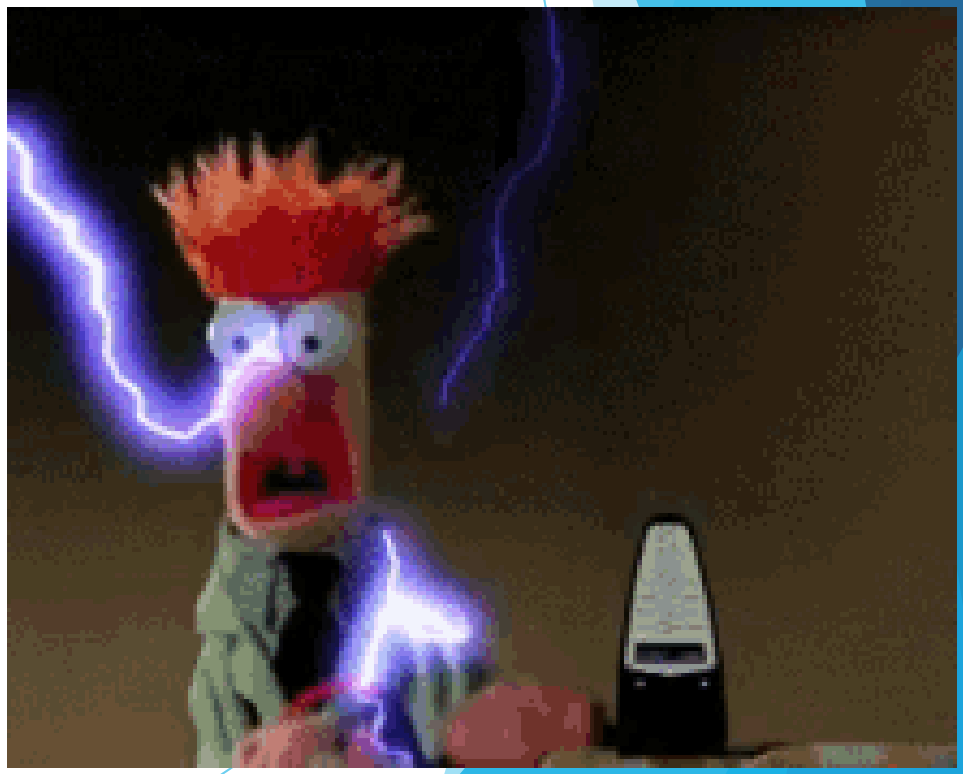
Time dose panels rely on a timer system that locks the pumps operation out for operation until the assigned time and fluid level criteria has been met (Example: Most Spray irrigation timers only allow the pump to turn on during early morning hours often between 2AM and 5AM. Dosing for 15-60 minutes and allowing 15-60 minute intervals between doses to allow the effluent to permeate into soils)*soil absorption rates will determine these numbers* ** Customers appreciate this timing feature the most when they get to mow their lawn and have cookouts without taking a bath**

KNOW YOUR TIMING AND STICK WITH IT! DOUBLE CHECK YOUR WORK!

START / RUN PANELS

more components, be aware!

Be aware of these panels and its components. Start components can knock you down and on some occasions be fatal. Energized start/run capacitors are an aggressive form of stored energy that is bottled up tight and waiting to do work! Don't let yourself be the work it does!



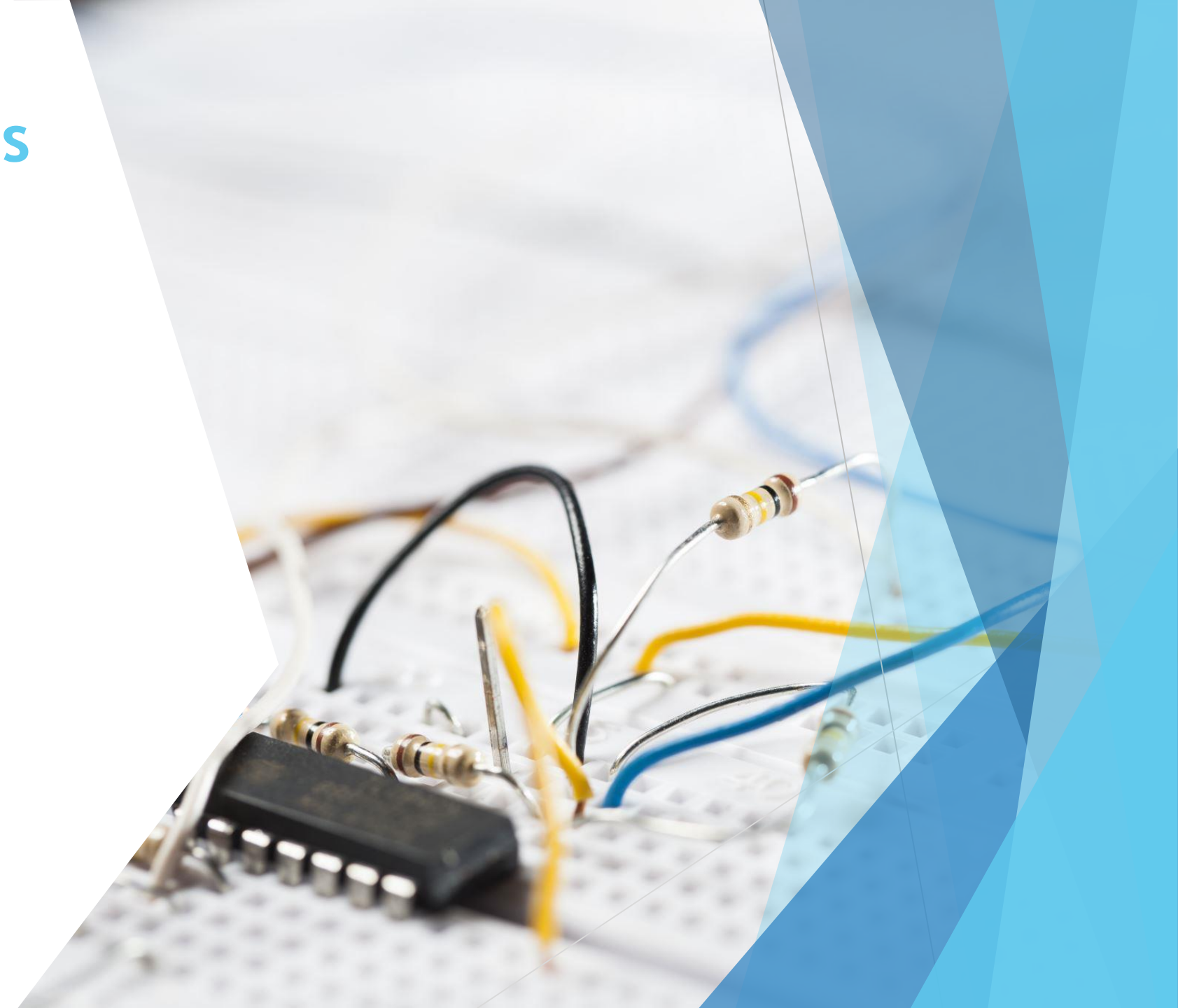
Why so many different panels?

Many applications, why so complicated?

- No one control panel can cover every application without costing more money than any one person or household could possibly afford. Every application is custom to the property by setting timers according to size of a leach field, number of bedrooms and expected water usage to not over saturate. Size of pumps needing different breakers, switches capable of higher loads, single or multiple alarm functions, electronic valves etc. Sure we could make one panel that does nearly everything, but then we would be spending upwards of 10,000 to operate a 1/3HP pump and basic alarm for a 2 bedroom house having nearly every component available bypassed or capped off. Seams wasteful.

Review of what's inside

- *Quick overview of panel components*



Panel components

- ***TRANSFORMERS!!!***

Transformers (for real this time)

STEP UP, STEP DOWN… variable voltages

In many ways transformers run our lives. Transformers convert dangerous power to safe usable energy at the street. They create amazing fireworks display when they fail also!

Transformers are a fascinating tool used to turn High voltage into low and low into high. Also, sometimes to protect vulnerable electrical components from being damaged by unstable electrical sources..

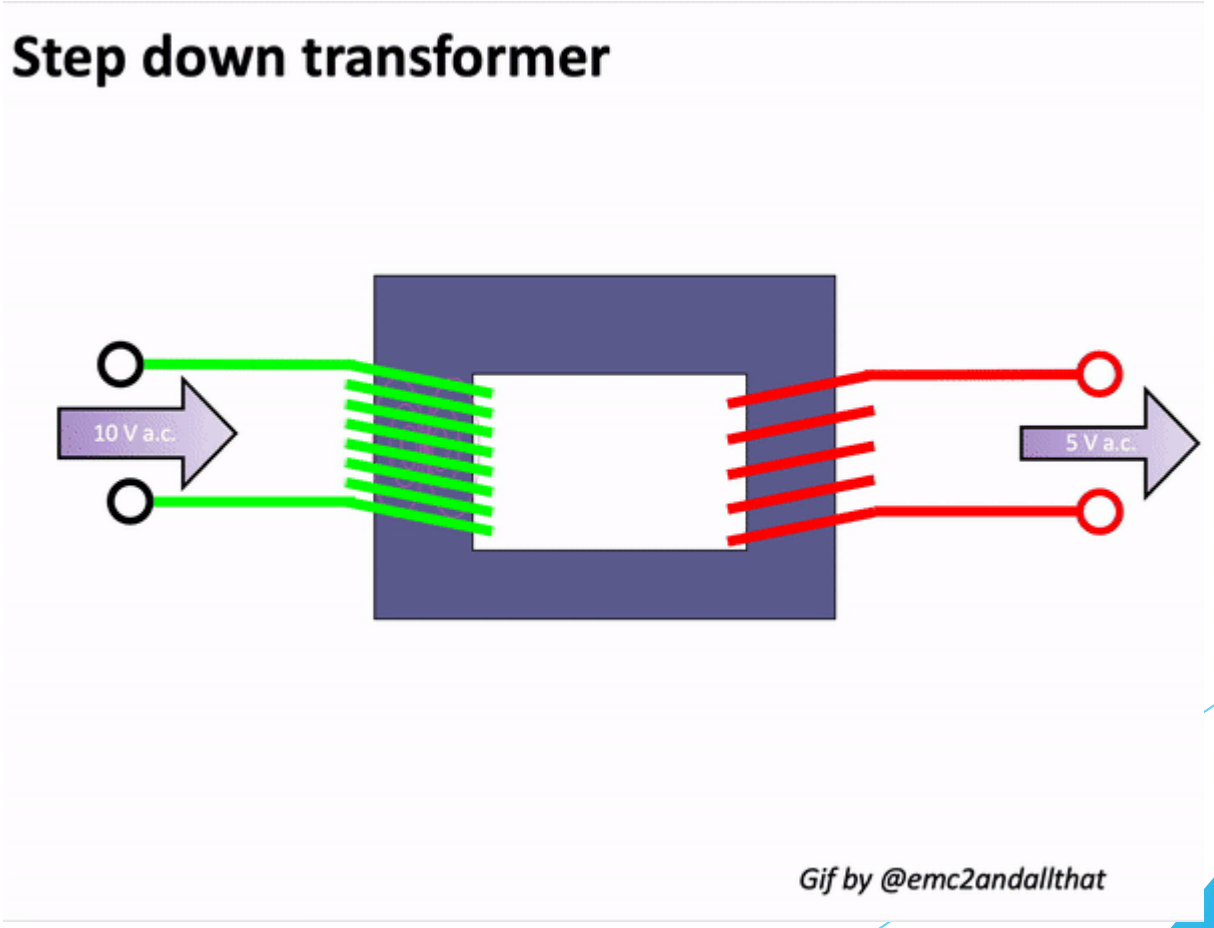
Transformers (for real this time)

STEP UP, STEP DOWN… know your voltages

IN EXAMPLE:

10VAC IN

5VAC OUT



MOST COMMON:

120VAC IN-> 12VDC OUT

Transformers

Lets make a mess of things!

Items to be aware of with transformers:

1. Transformers require some nominal energy consumption to work (amperage draw)
2. Transformers can fail causing total chaos and often destruction of solid state components not individually protected.
3. Transformers have their OWN return/neutral. What goes up must come down. WHAT GOES OUT MUST COME BACK!
4. Transformers can produce a lot of heat if expected to operate loads.
5. Transformers do not function well in HOT or WET environments.

RELAYS AND CONTACTORS

Control and load side. Control and load side!!

Divided into TWO main groups internally.

CONTROL SIDE- Can be lower voltage, typically not capable of carrying high amperage. Often linked to a series of switches to manipulate the LOAD SIDE ON and OFF (closed or open)

LOAD SIDE- makes all the magic happen! Energizes your motors, bells and whistles. Caries all the amperage and does the heavy lifting.

RELAYS AND CONTACTORS

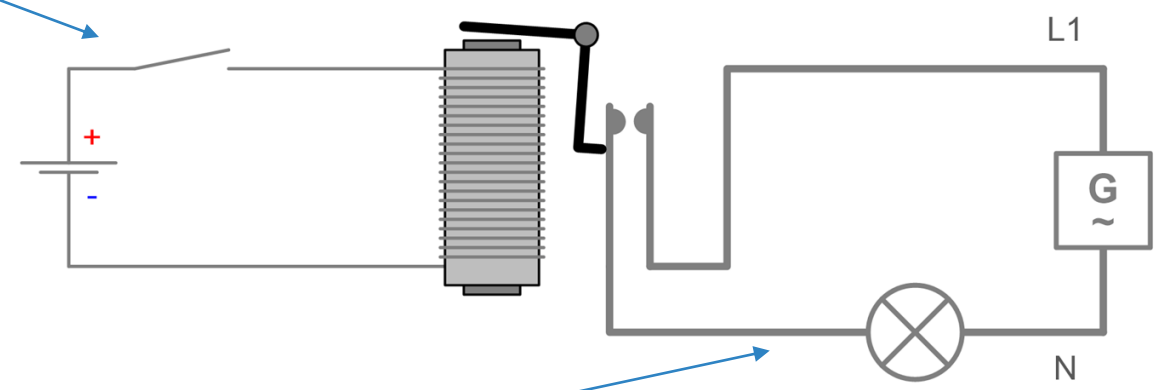
Control and load side. Control and load side!!

CONTROL SIDE

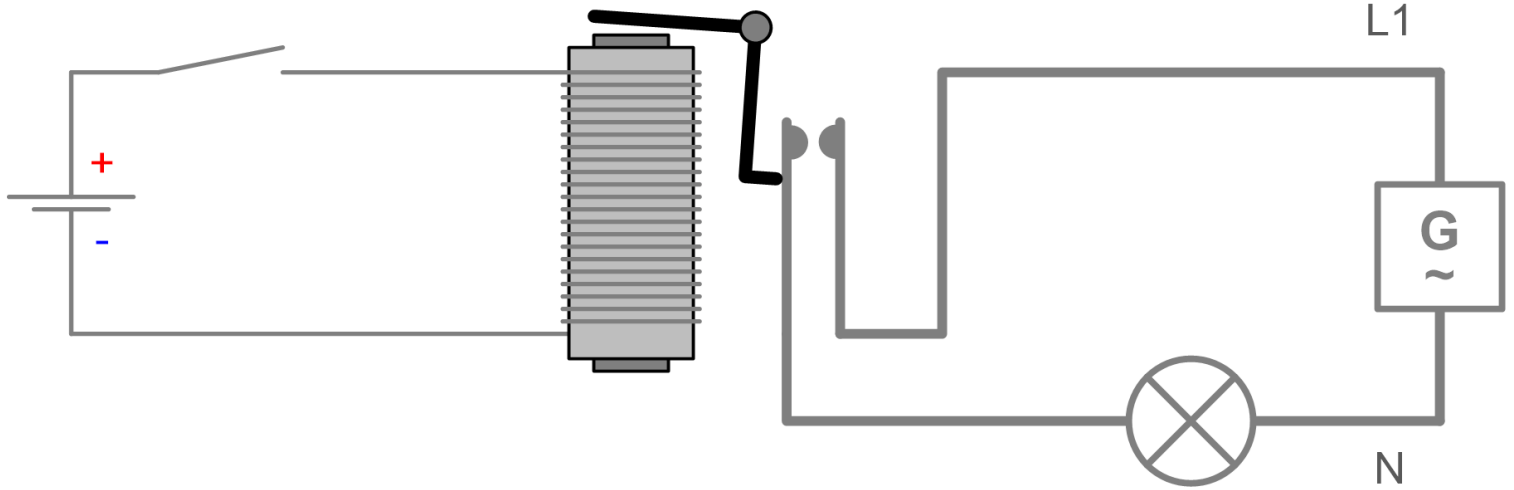
12,24VDC

120,240VAC

LOW VOLTS OFTEN CONTROL HIGH VOLTS!



LOAD SIDE



RELAYS AND CONTACTORS

Control and load side. Control and load side!!

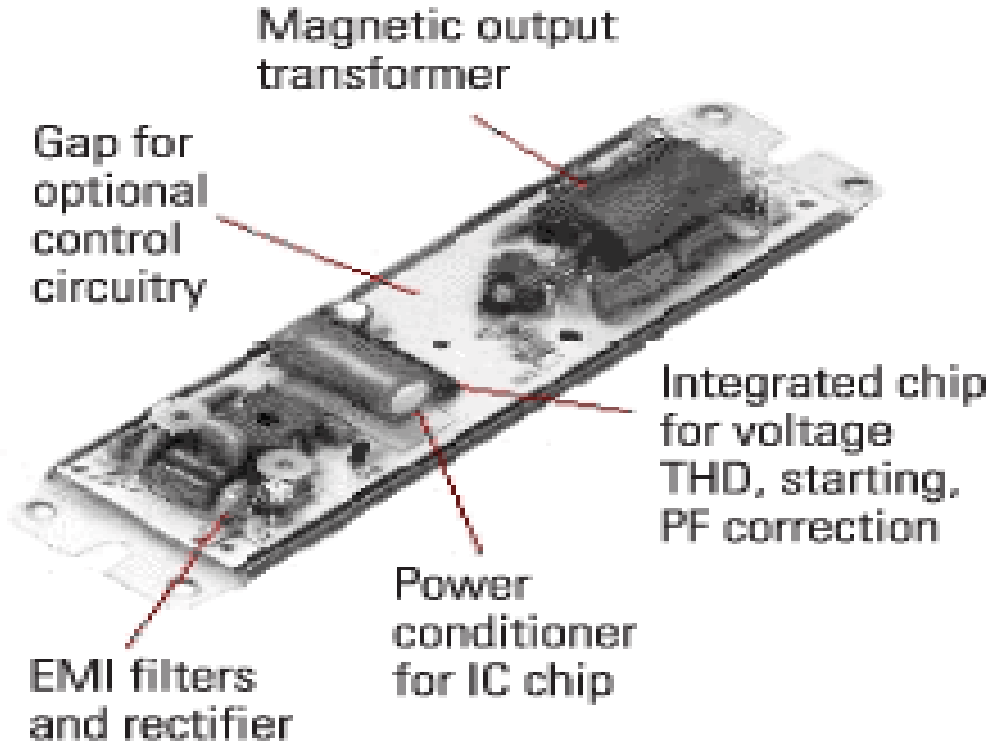
RELAYS AND CONTACTORS

Little magic boxes seen below.

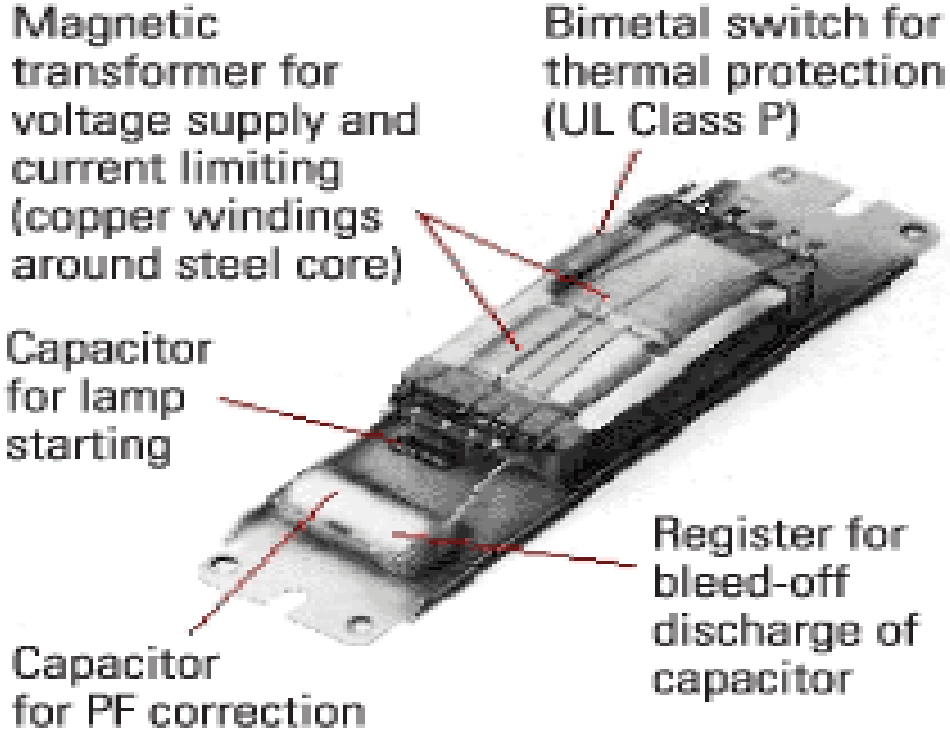
BALLASTS

Another use of transformer!! Shocking! *Pun Intended.*

Integrated-circuit electronic ballast



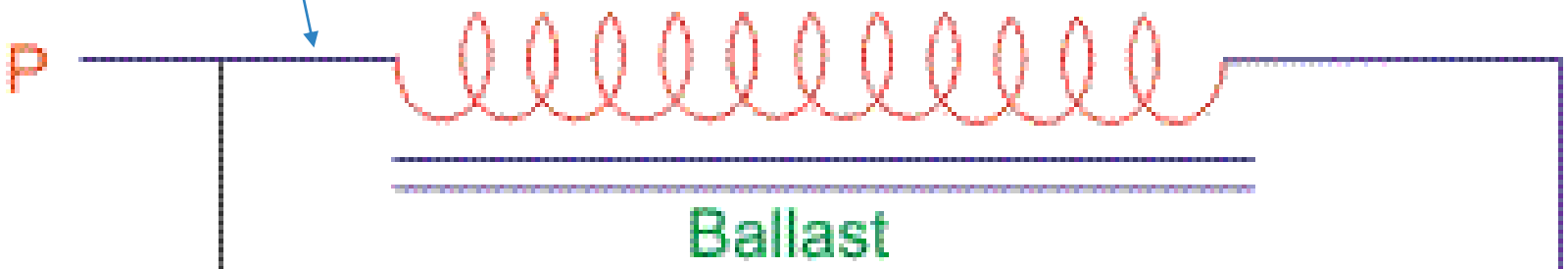
Standard magnetic ballast

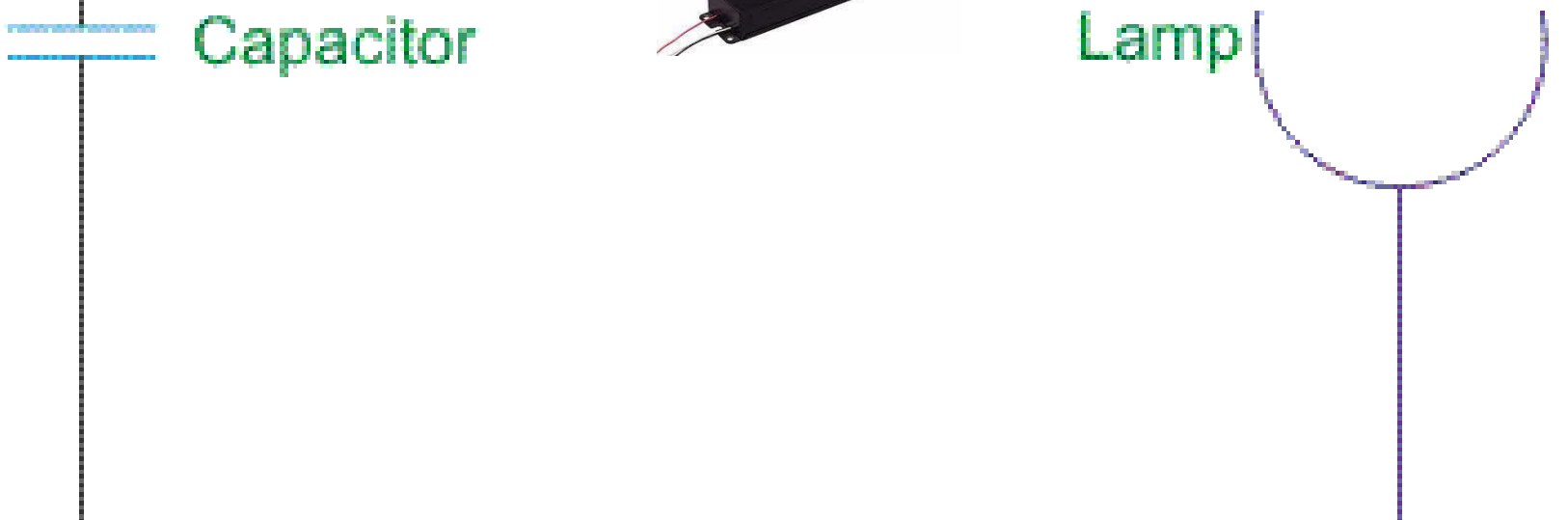


Notes: EMI = electromagnetic interference;
IC = integrated circuit; PF = power factor;
THD = total harmonic distortion;
Underwriters Laboratories

Source: E SOURCE

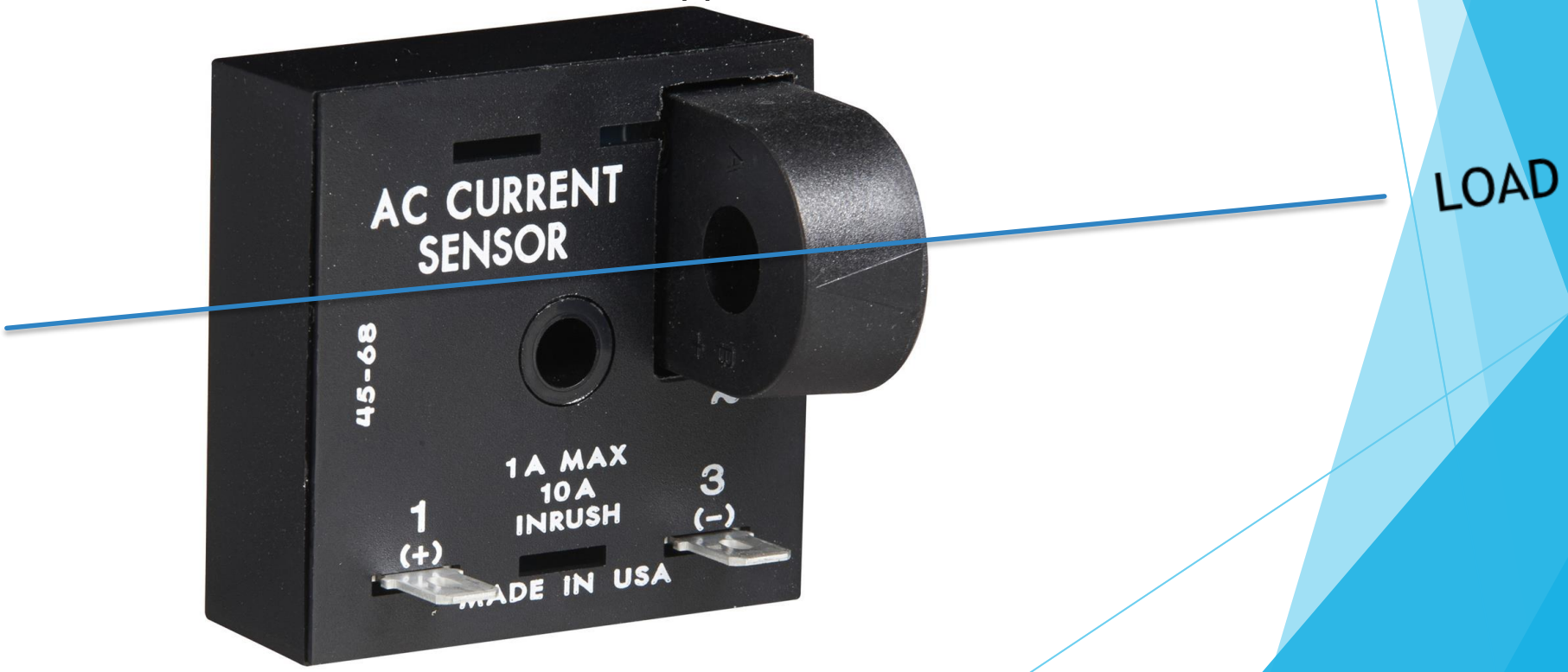
START SWITCH





CSR
CURRENT SENSING RELAYS

A coil of copper wire wrapping around an IRON core captures electro magnetic field from LOAD wire.
The Sensor has set parameters for field it CAN and CANNOT see. All CSR's are not the same and must be chosen SPECIFICALLY based on application.

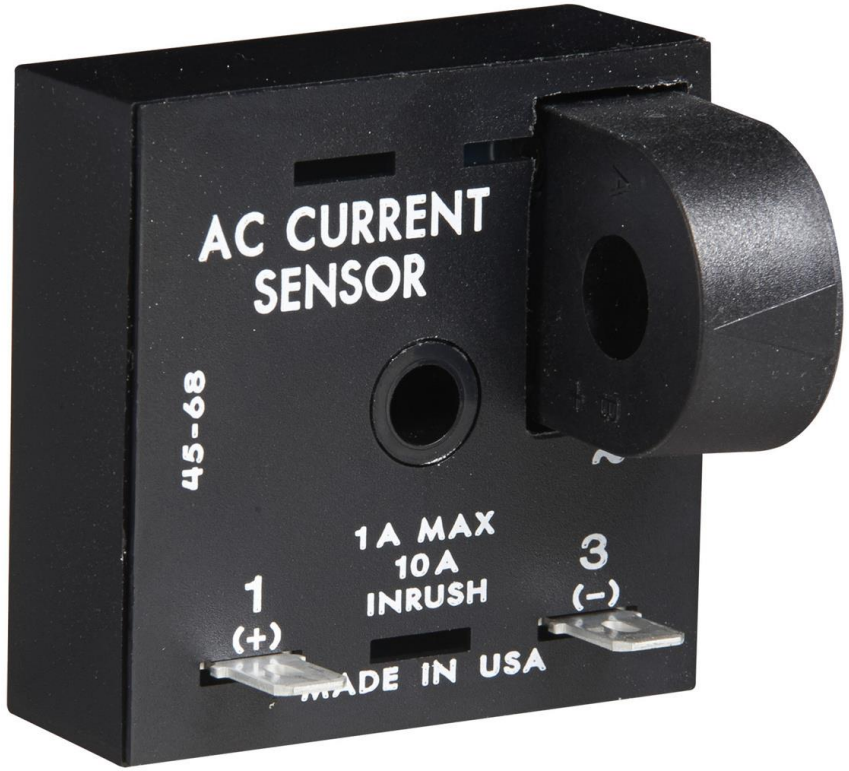


CSR
CURRENT SENSING RELAYS

OFTEN TO MULTIPLY THE LOAD WIRES OUTPUT AMPERAGE CAPTURED BY THE FIELD COIL, MULTIPLE WRAPS TAKE PLACE. THIS IS COMMON WHEN THE LOAD WIRE HAS AN AMPERAGE LOAD LESS THAN THE CSR CAN DETECT.

LOAD

LOAD



PLC’s

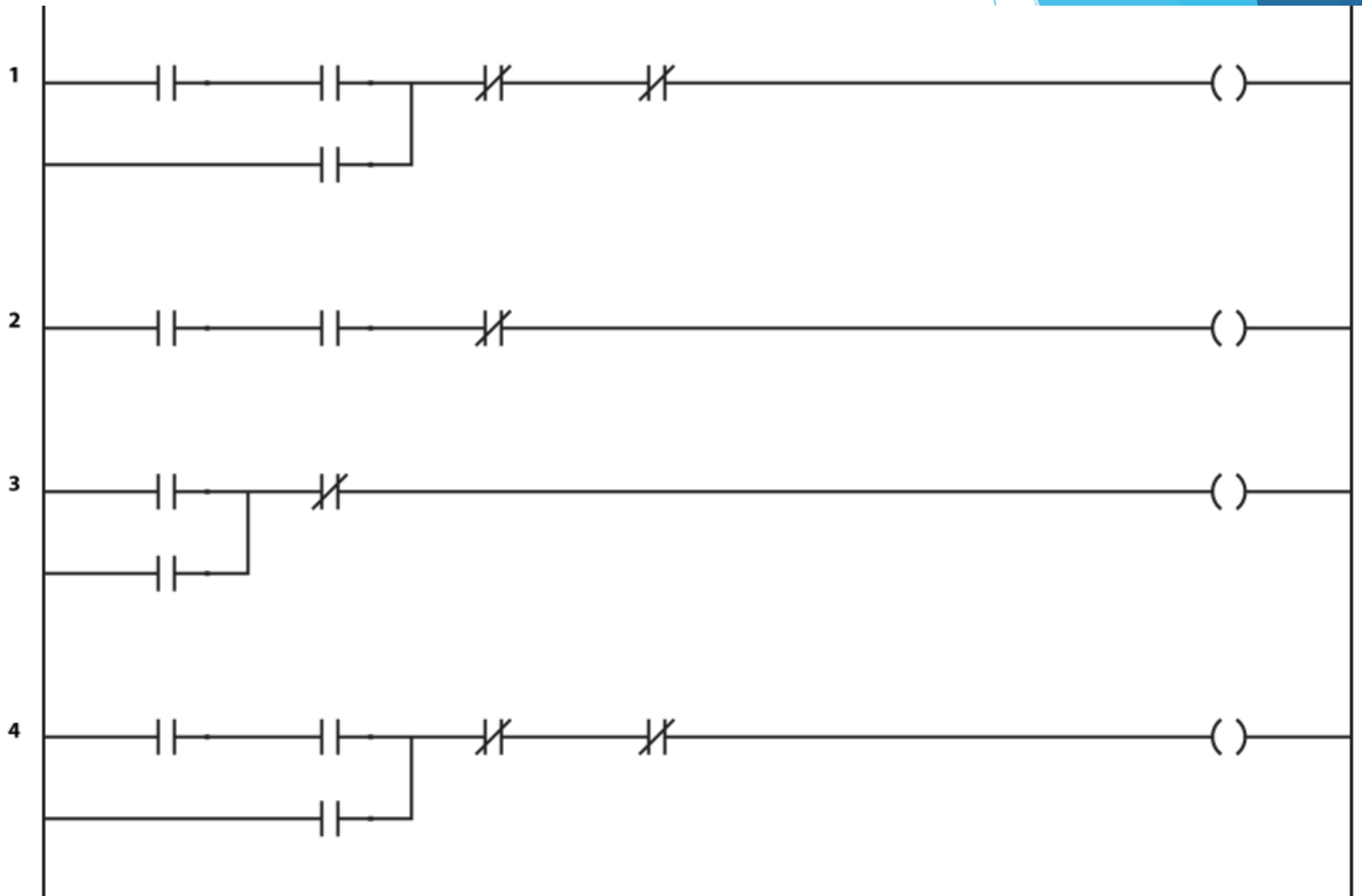
What does PLC stand for?

PLC’s

A series of inputs and outputs.

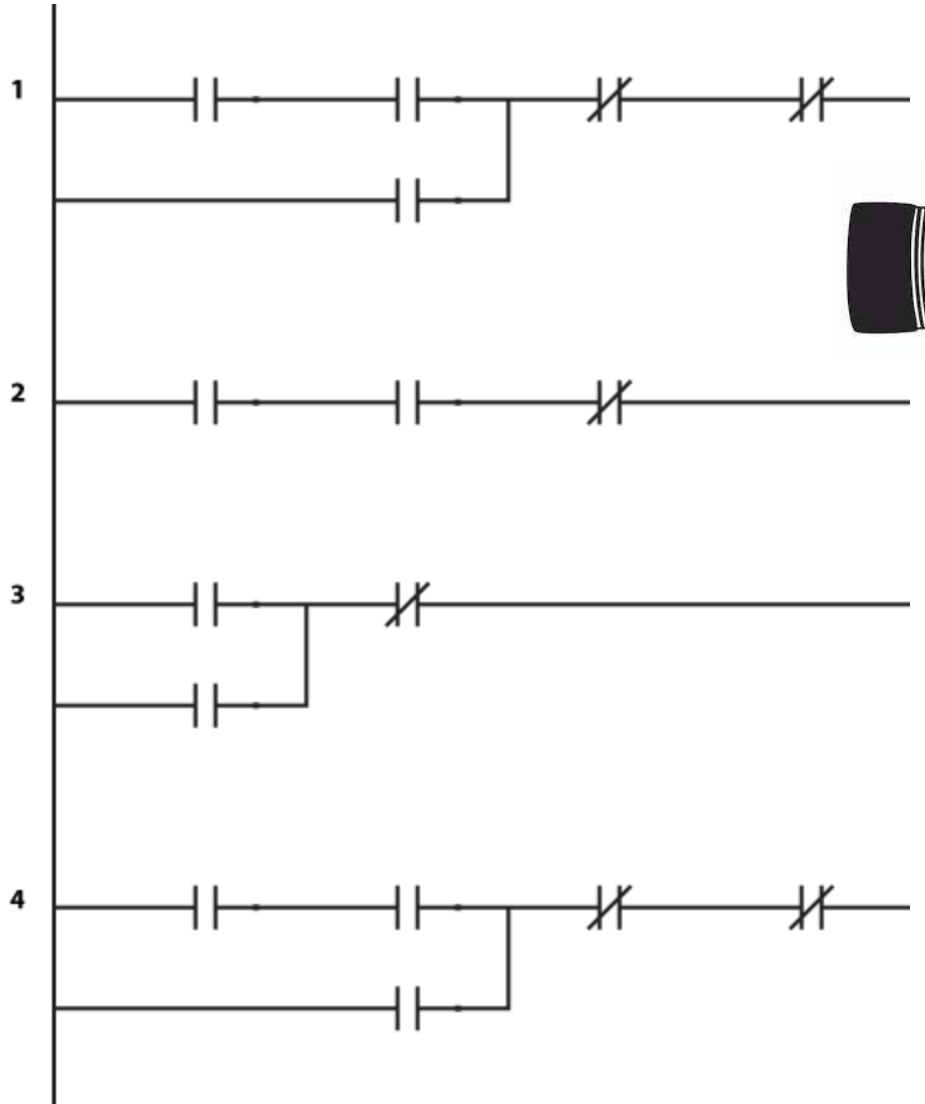
- Each input can have multiple outputs and Vise versa.
- Outputs can be on digital time delays depending on Logic programing.
- PLC’s have maximum AMP output capabilities
- PLC’s are prone to damage from voltage surges and/or incorrect voltage applications.

Most PLC manufactures have simple 3-4 step procedures that can be performed to determine if a PLC has failed or not. Without needing a lap-top, or programming experience.



PLC's

LADDER LOGIC. EACH RUNG HAS A NEW SET OF COMMANDS, DEPENDING ON INPUT< OUTPUTS WILL CHANGE.

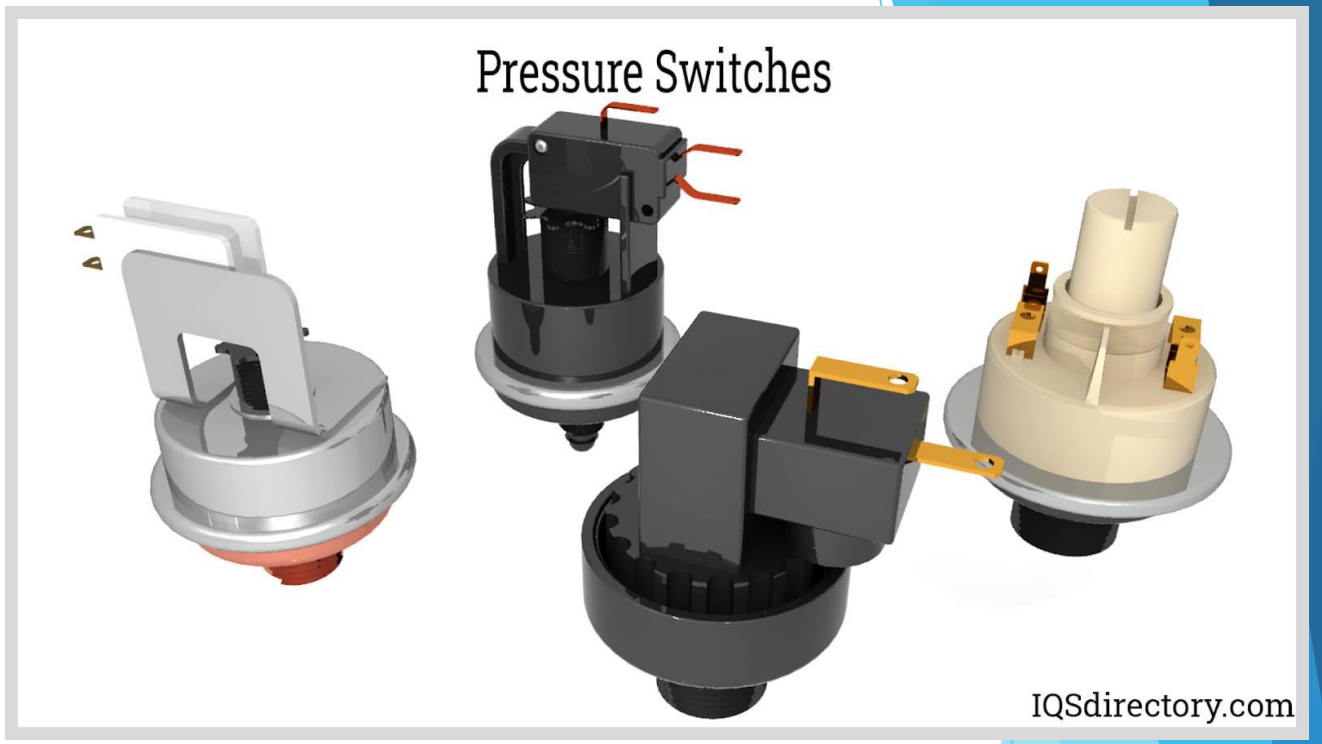


SWITCHES

Pressure switches and toggle switches

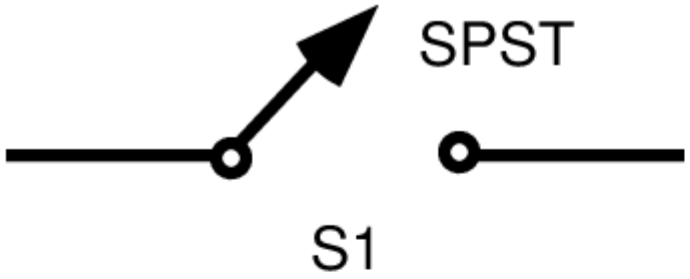
SWITCHES

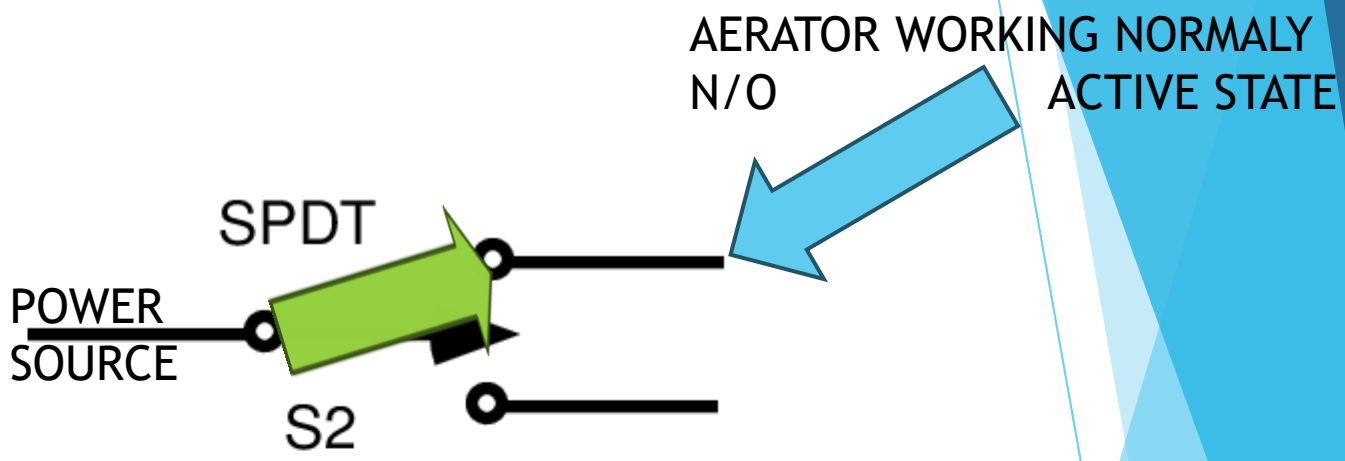
SPDT, DPST, DTSP DTDP

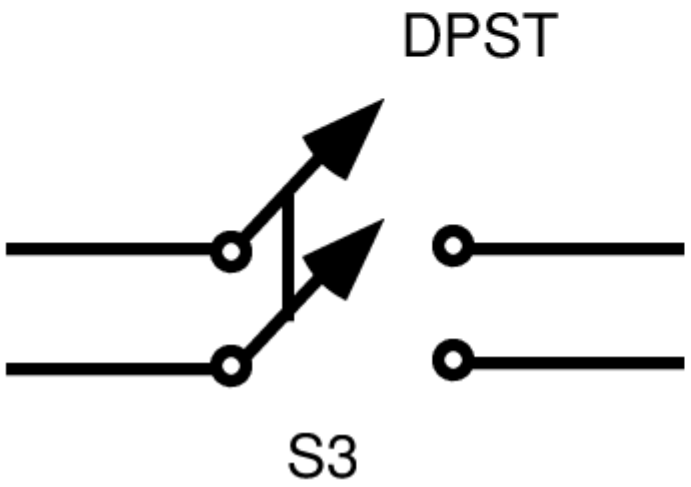


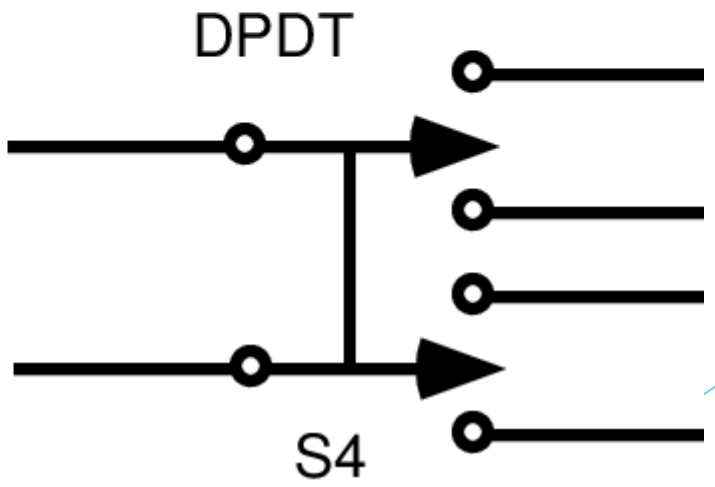
SWITCHES

SPDT, DPST, DTSP DTDP



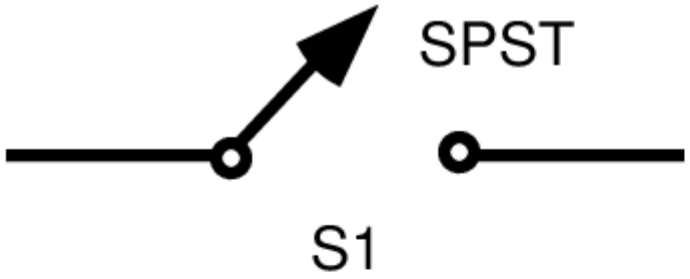


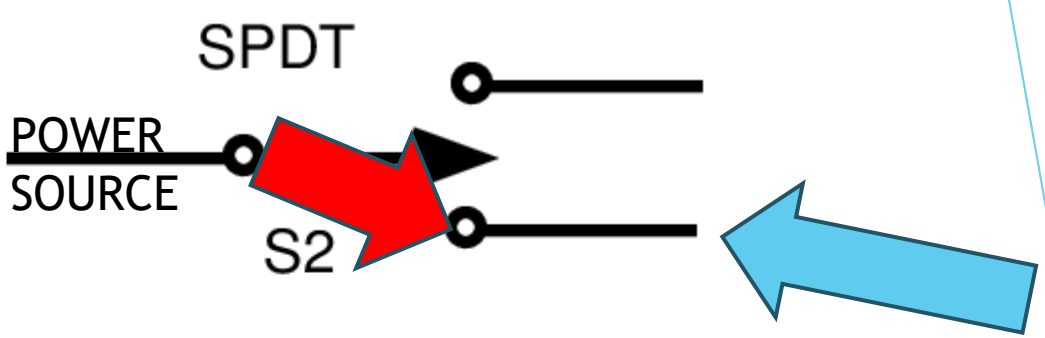




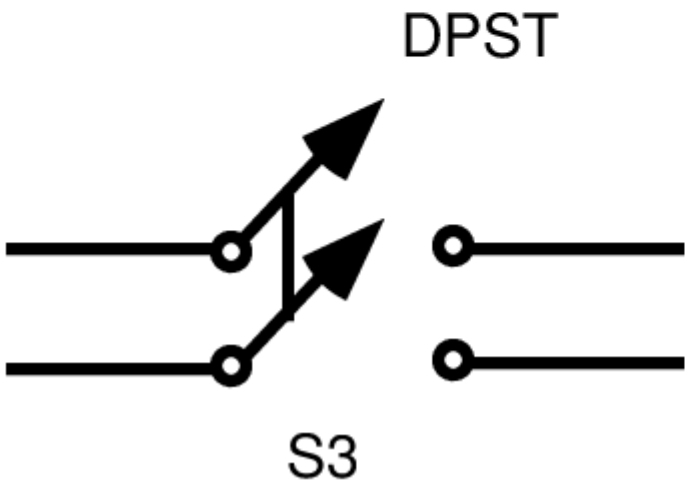
SWITCHES

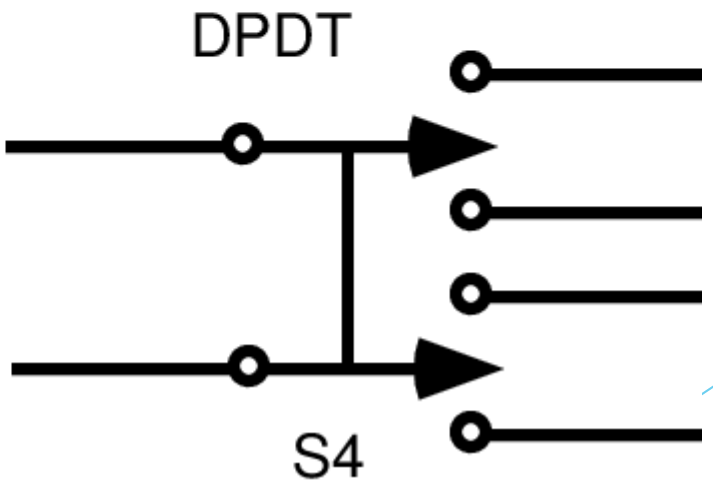
SPDT, DPST, DTSP DTDP





AERATOR FAILED, SWITCH IN RESTING STATE N/C





SWITCHES

IN APPLICATION

COMMON POWER SOURCE, 120V

WILL HAVE POWER WHEN AERATOR IS OPERATING PROPERLY, NO POWER WHEN FAILED AERATOR N/O

AERATOR FAILED, SWITCH ENGAGED POWER SENT TO ALARM LIGHT AND HORN!!!- NO POWER HERE WHEN AERATOR WORKING N/C

ALARMS—Most common reasons for alarms…

FLOAT SWITCHES NO NC

Water infiltration
Worn out
Improperly spec’d capability
13A standard
15A preferred
MERCURY VC MECHANICAL
NOT ENOUGH BOYANCE

ALARMS

Burned up pump

Drawing amperage outside normal parameters (tripping breaker)

Low flow (impeller damage or blockage)

Separated discharge line(faulty Check)

Improper sizing TDH (100-10 RULE)

Improper TYPE (Ejector, effluent, grinder)

AGE…

<u>Buy the best cry once, Buy the cheapest cry twice.</u>

ALARMS

LIGHTS

Lights come in many shapes and sizes. Can be tested by OHMS RESISTANCE testing and multi function meter.

Should never be overlooked as “NOT IMPORTANT” In the event a horn/siren fails this is your only secondary means of attention.

May also be your only way of dissipating residual voltage on alarm circuit.

ALARMS

HORNS AND BUZZERDS

Often not testable with meter and continuity. Activate with required energy in isolated circuit.
OFTEN has voltage activation range, so BEWARE you may get false alarms if your not sending residual voltage somewhere else.

ALARMS

HORNS AND BUZZERS

ALARMS

BLOWER/AERATOR FAILURE

MOST OFTEN DIAPRAGM OR ACTIVIATING ARM FAILURE. REBUILDABLE.

WHY IT MATTERS!

Components :

CONTACTOR

BREAKER

BALLAST

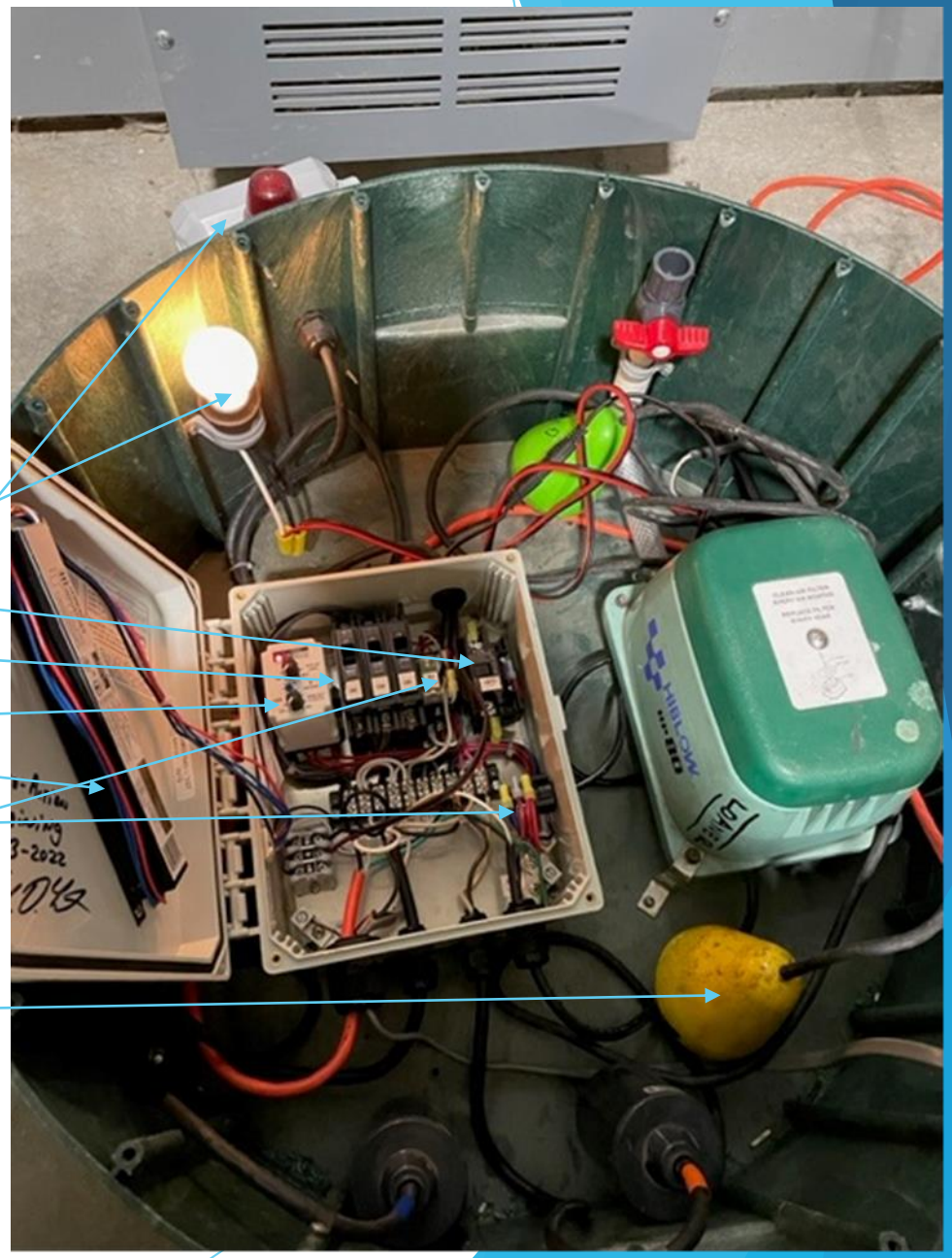
CSR

PRESSURE SWITCH

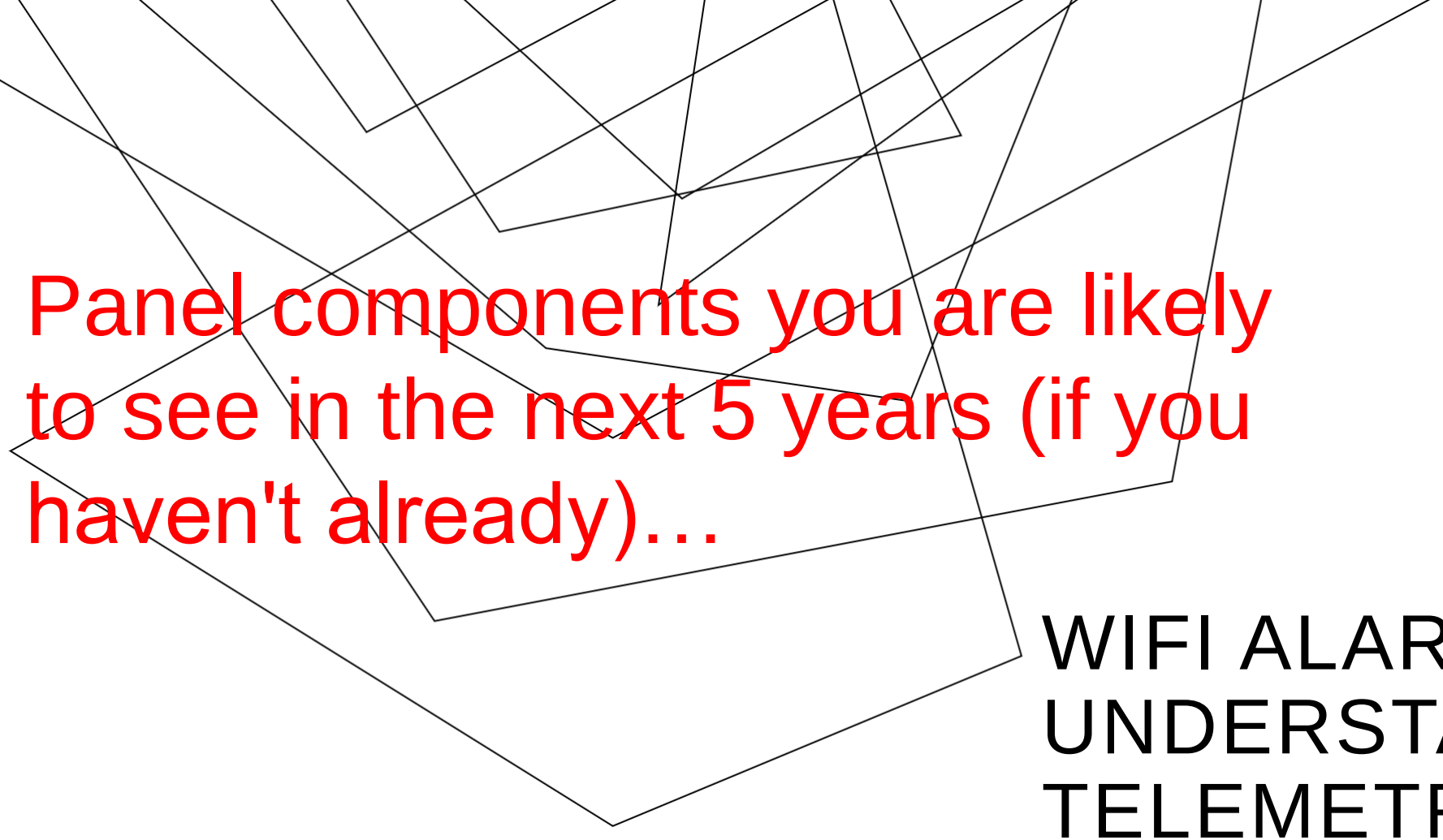
RESISTOR

SWITCH (TEST MUTE) + FLOAT!

RELAY



Instead of focusing on A panel, focus on understanding components and electrical basics. This way you can master nearly ALL panels.



Panel components you are likely to see in the next 5 years (if you haven't already)…

WIFI ALARMS & UNDERSTANDING TELEMETRY SYSTEMS

Larry copen

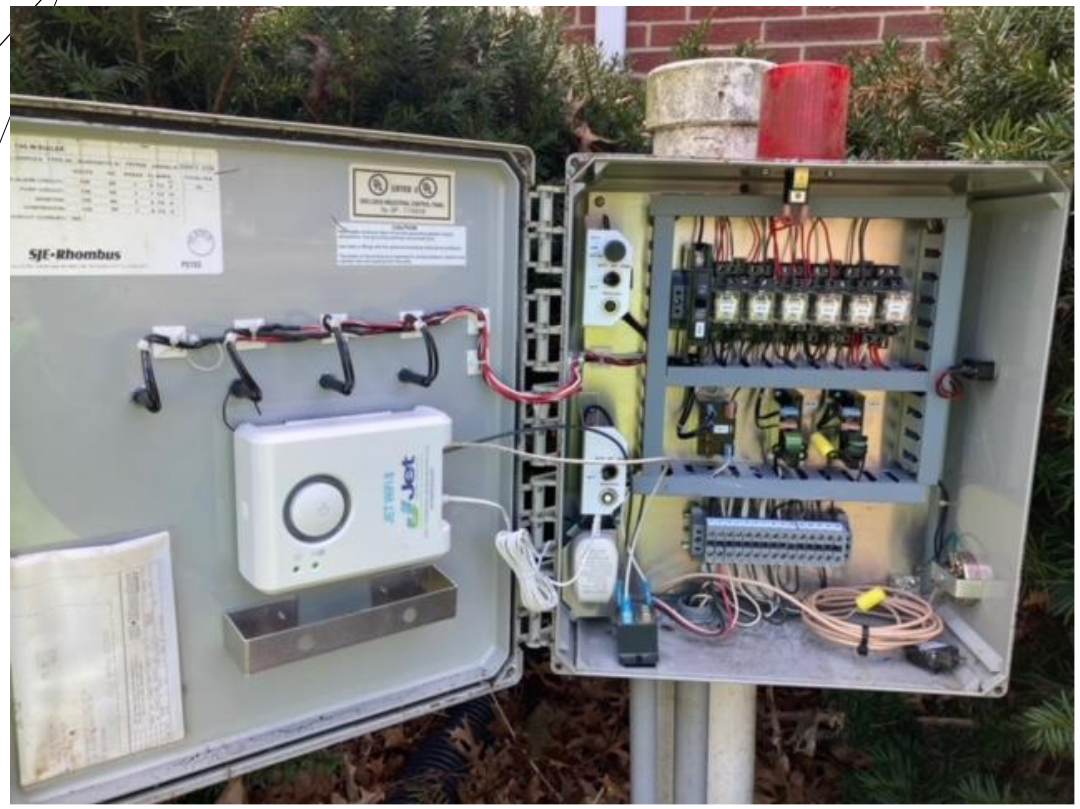
WHAT IS A TELEMETRY SYSTEM?!?

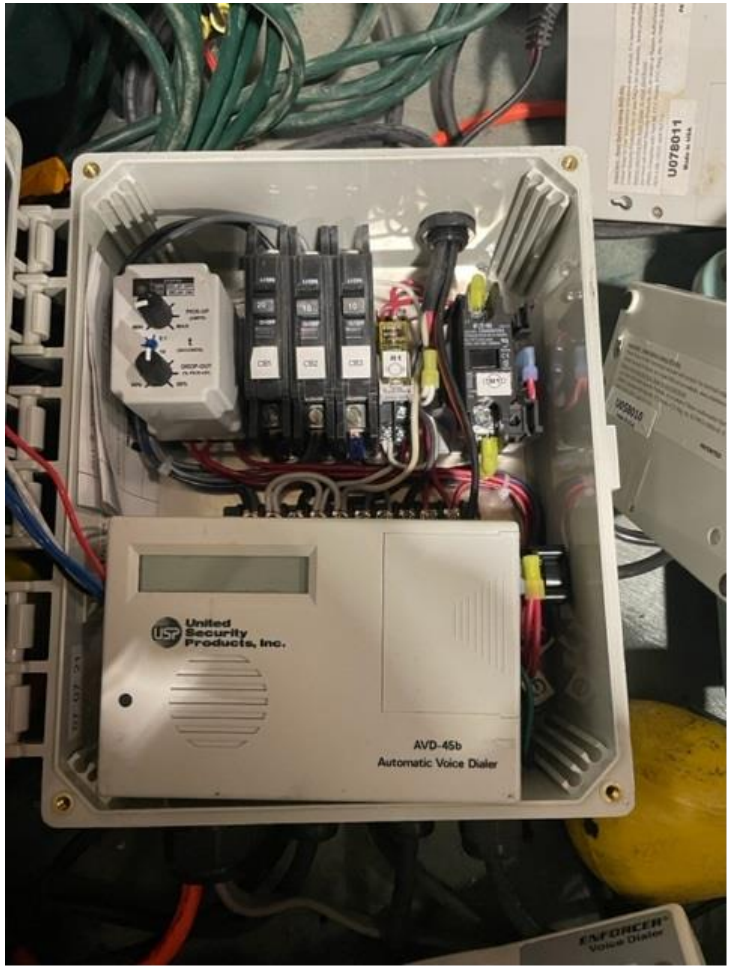
What are Telemetry systems? A telemetry septic system is any septic that has a way of dialing out to its service provider via Phone line.

IS THIS IMPORTANT?

Why is it so important? Nearly all Telemetry adapted systems in Ohio have been designed specifically for gravity discharging septic systems. This type of gravity discharge septic system when ignored will allow untreated fluid to leave the property in the event of malfunction
”assuming homeowner doesn’t take action”. Health authorities want a way to inform the service provider in the event of an alarm or malfunction. This telemetry update is a strong option.

WIFI VS TELEMTRY





WIFI- SCION MODULE

One of the most advanced residential solution for remote monitoring septic systems. No annual fees, low cost hardware. Easy to install and program.

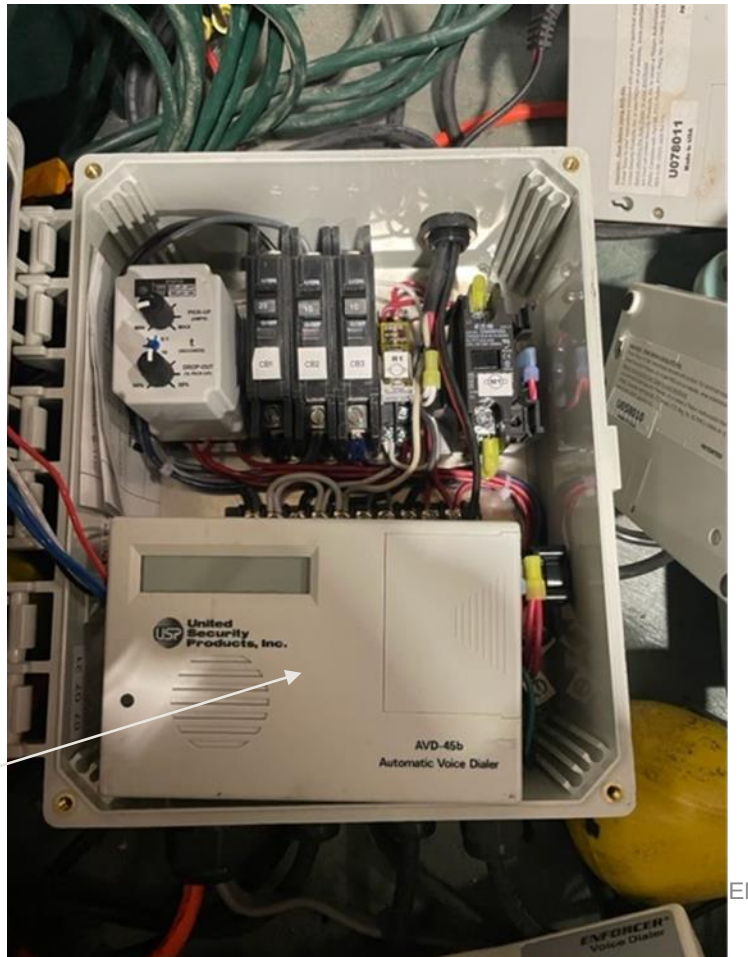
WI-FI EXTENDER/REPEATER

Should only be used 1 time, cannot be extended multiple times, signal loss of integrity will cause failure. Can typically extend reach of existing Wi-Fi approximately 100-150’

TP LINK AV 1000 (CONSISTENT 50% SIGNAL WITH MY TESTS AT 300+ FT FROM MODEM)

IDENTIFYING TELEMETRY SYSTEMS

Its pretty simple, if you see this in, on or around the panel. Its likely telemetry. You should log that data in the customer file and submit an estimate for updating the system if the module does not work. Always fallow factory recommended parts and procedures for module updates. Call your distributor or parts supplier and ask.



YOUR TWO OPTIONS EXIST.

Lockout failsafe pump and chamber…….. Or telemetry WIFI.

Lockout pump, Tank and panel update

$$$$$$$

TIME

PERMITS

Wi-Fi = 1-2 hour labor and a few hundred bucks in parts

But here's the catch, you need a team to fallow up and log all data. A separate email inbox that’s monitored during business hours. You must BE the or find the service provider to monitor this module actively.

Questions?

Ryan Wallace, Residential Manager

330-854-4405

RWallace@Aeration-Septic.com

THANK YOU!

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