

- **Introduction**
- **Basics**
 - Ohms Law
 - Volts
 - Amps
 - Ohms
 - Conventional Current
- **Power**
 - The power Formula
 - Converting from Watts
 - Converting to Watts
- **Testing**
 - The multimeter
 - Safe use
 - Types
 - Measuring DC Voltages
 - Autorange
 - 20v range
 - mV range
 - Measuring Resistance
 - Ohm Scale
 - The clamp meter
 - Measuring DC Amps
 - Measuring AC Amps
- **Batteries**
 - Introduction to technology
 - Lead Acid
 - VRLA
 - FLA
 - AGM
 - Gel
 - Lithium
 - Introduction to type
 - Cranking
 - Deep Cycle
 - Introduction to ratings
 - CCA
 - AH
 - Voltage
 - State of charge
 - Open Circuit voltage
 - Measuring Specific gravity
 - Safety
 - Overcharging
 - Overloading
 - Cell failure
 - Gassing
 - Overtemp
 - Explosion & Fire prevention
 - Monitoring
 - Interconnection
 - Series
 - Parallel
 - Balancing
 - Effects on voltage
 - Effects on Current
- **Busbars**
 - Definition
 - What is a busbar
 - Purpose
 - Why we need them
 - Where they are located
 - Safety
 - Dangers of loose connection
 - How to test
 - The mV Drop test
 - Fuse placements
 - ISO Regulations
 - ABYC regulations

- **Cable Sizing**
 - Voltage drop
 - Importance of low voltage drop
 - How to calculate
 - How to reduce
 - Use of tables
 - Use of formulas
 - How cables are measured
 - CSA mm²
 - AWG
 - Circular Mils
 - How cables are rated
 - Strands
 - Ampacity / Nominal ratings
 - Insulation temperature
 - Types of conductor
 - Copper
 - Tinned copper
 - ISO 10133 regulations
 - Cable sizing
 - Cable nominal ratings
 - Bundling of cables
 - Ambient temperatures
 - ABYC Regulations
 - Cable sizing
 - Cables nominal ratings
 - Bundling of cables
 - Ambient temperatures
 - The cable sizing process and general safety ethos.
- **Switches**
 - Types of switches
 - SPST
 - SPDT
 - DPST
 - DPDT
 - Momentary
 - Latching
 - 3 way
 - The 2 Way Switching circuit
 - Relays & Contactors
 - What are they
 - How they work
 - SPST
 - SPDT
 - DPST
 - DPDT
 - Common uses
- **DC Circuit protection**
 - Importance of
 - Sizing considerations
 - DC Voltage rating
 - Ignition rating
 - Disconnection time rating
 - Max Current disconnect
 - Tripping current
 - Type
 - Fuse
 - MCB
 - Trip free
 - Placement
 - Regulatory
 - Advisory
 - Discrimination
 - Dangers
 - Too large
 - Too small
 - Incorrect placement
 - No DC Ratings
 - Loose connections

- **The Engine Alternator**
 - Main components
 - Stator
 - Rotor
 - Regulator
 - Rectifier
 - Connections
 - Main power
 - Sensing
 - Ignition
 - Rev Counter
 - Excitation
 - Wiring configurations
 - Main cables
 - Battery Sensing
 - Machine Sensing
 - Trip free
 - Battery Warning light
 - Basic Testing
 - The Ripple test
 - Voltage Output test
 - Voltage field test
 - Current output test
 - Voltage field test
- **Charging (from the engine)**
 - Battery isolation methods
 - 3 Way Battery switch
 - Safety concerns
 - Uses of different positions
 - Alternator Damage prevention
 - Fire prevention
 - Voltage drop test
 - Disadvantages v Advantages
 - ACR
 - Advantages / Disadvantages
 - Dangers of the ACR
 - Paralleling batteries
 - How the ACR interfaces into the charging system
 - Diode
 - Disadvantages v Advantages
 - Voltage drop
 - Importance of battery sensing
 - New FET technology v old
 - How to test
- **Engine starting wiring**
 - Engine starting process
 - Start button
 - Start relay
 - Start solenoid
 - Starter motor
 - Faultfinding
 - Voltage drop test
 - Methodical component testing
 - Bypassing
 - Start button
 - Start relay
- **Monitoring Voltage & Current**
 - On board voltmeter
 - Monitoring Current
 - The shunt
 - How to test a shunt
- **Engine Gauges**
 - How they work
 - How to test cabling
 - Sensors
- **Basic crimping**
 - Types of crimp
 - Methods
- **Course completion and optional final exam.**