



CNC Technical Solutions - Custom Phase 1 Training Outline

Phase 1 Training 136 hours

Electronics / Electricity Class Room Training

This is an instructor lead class which covers both the Electrical and Electronic theory and practice applications.

Note - There are two text books being used for this training and they cover the following areas although not all areas listed below may be covered.

Electricity 10th Edition

1. The Electron
2. Volts, Amperes, Ohms
3. Meters, Reading a Meter
4. Ohm's Law
5. Power
6. Series Circuits
7. Parallel Circuits
8. Sources of Electricity— Batteries
9. Sources of Electricity— Friction, Heat, Pressure, Light
10. Magnetism
11. Motors
12. Direct Current Generators
13. Alternating Current
14. Capacitance
15. Inductance
16. Transformers
17. Semiconductors
18. Integrated Circuits
19. Electrical/ Electronic Projects



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Electricity: Principles and Applications

1. Basics concepts of electricity
2. Electrical Quantities and units
3. Basic Circuits, Laws and Measurements
4. Circuit components
5. Multiple - Load Circuits
6. Complex - Circuit Analysis
7. Magnetism and Electromagnetism
8. Alternating Current and Voltage
9. Power in AC Circuits
10. Capacitance
11. Inductance
12. Transformers
13. R,C, and L Circuits
14. Electric Motors
15. Instruments and Measurements
16. Wiring Concepts

Instrumentation review and practical applications class

By course completion the student will be exposed to and familiar with the use of:

1. The Digital Volt Meter
2. The Oscilloscope
3. The Amp Meter
4. The Hi Potential Tester
5. The Insulation Tester



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Practical Electrical Theory, Soldering and Electronic Project Build & Test Class

Practical Electrical Theory

Electrical theory, basic electrical safety and fundamentals of electronics.

Electronic components review -

Identifying common electronic components found in modern Controls systems, Servo Amplifiers, Power supplies and related key industrial controls hardware. i.e. IGBT or *insulated-gate bipolar transistor*, **Darlington transistor** (often called a **Darlington pair**) High wattage Resistors, Capacitors, Inductors, transistors, power diodes, Operational Amplifiers or Op Amps etc.

Soldering & Project Build

Students will learn proper soldering techniques by direct hands practice and through physically building their own power supply, scale servo drive, Siren Oscillator and finally by building their own digital voltmeter. This segment is designed to teach proper soldering techniques, component identification and practical operation of electronic components.

Project Test and Debug

Student will test and ultimately debug the projects they build using test equipment that they learned previously in the course.

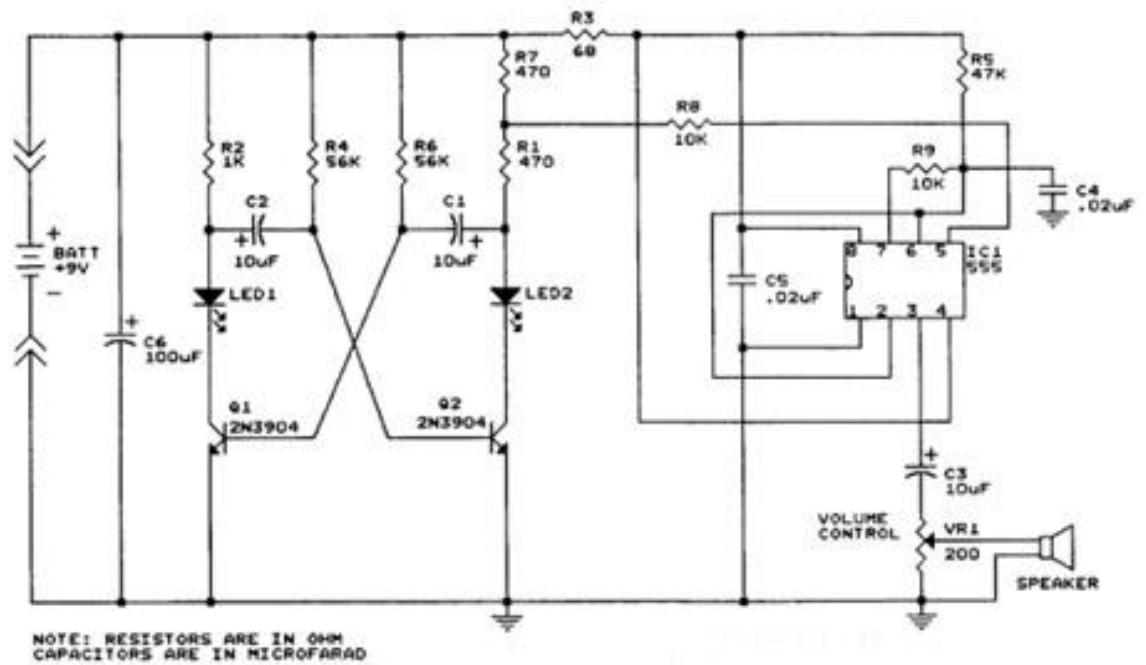
Student will identify failed electronic components through trouble shooting - i.e. Identifying bad capacitors, IGBT, transistors, etc.

The student will be supplied (4) electronic project kits and will be required to build, solder, tune and test each project. The student will then model the projects on a bread board and demonstrate their knowledge and technical understanding of the project. At this point the instructors will add failed Components & Wiring (install bugs) into the project and the student will be tasked with debugging the project using the appropriate reasoning and test equipment. The final project being a Digital Voltmeter that will be the students upon successful completion of the build and test class.

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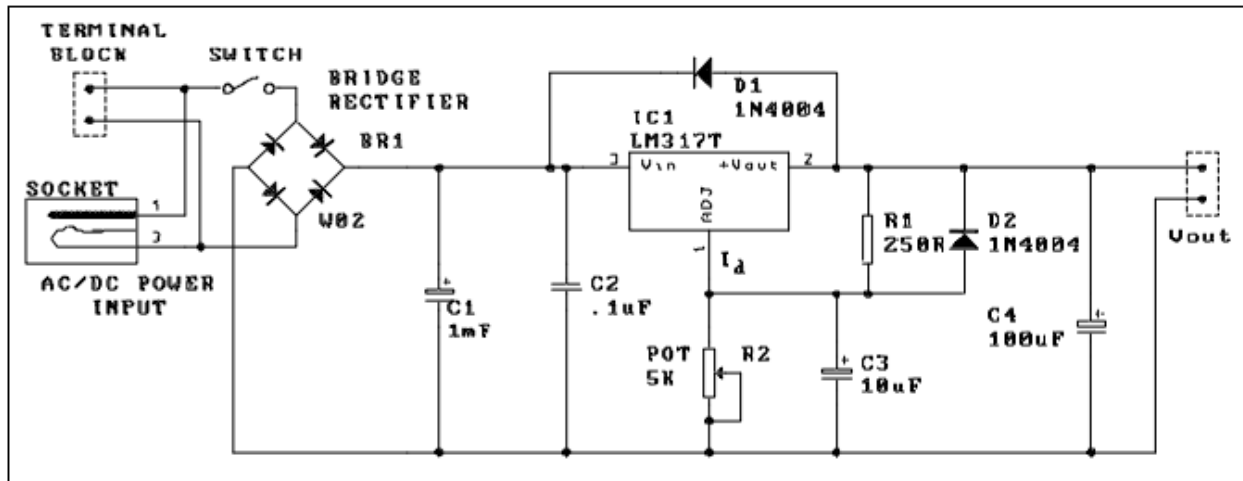
The electronic projects are listed below:

1. 555 Timing & Oscillator Circuit / Siren



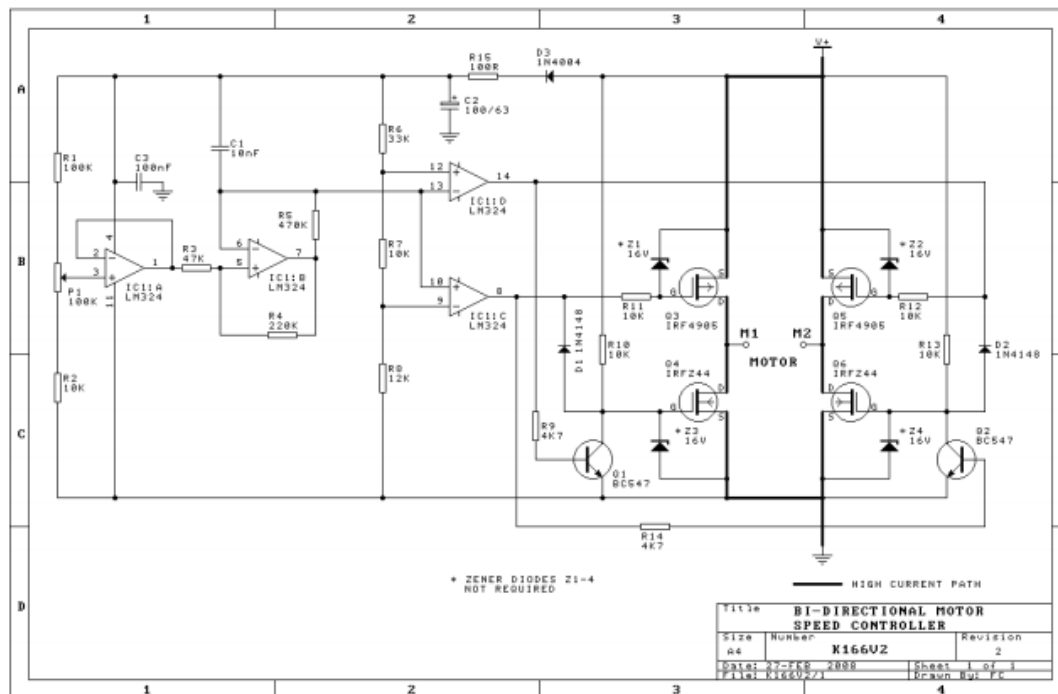
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2. Ac to DC power supply - W' Full Wave Bridge Rectifier



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3. Bi- Directional Motor Driver



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4. Digital Multi-Meter - Build & Test

SCHEMATIC DIAGRAM

