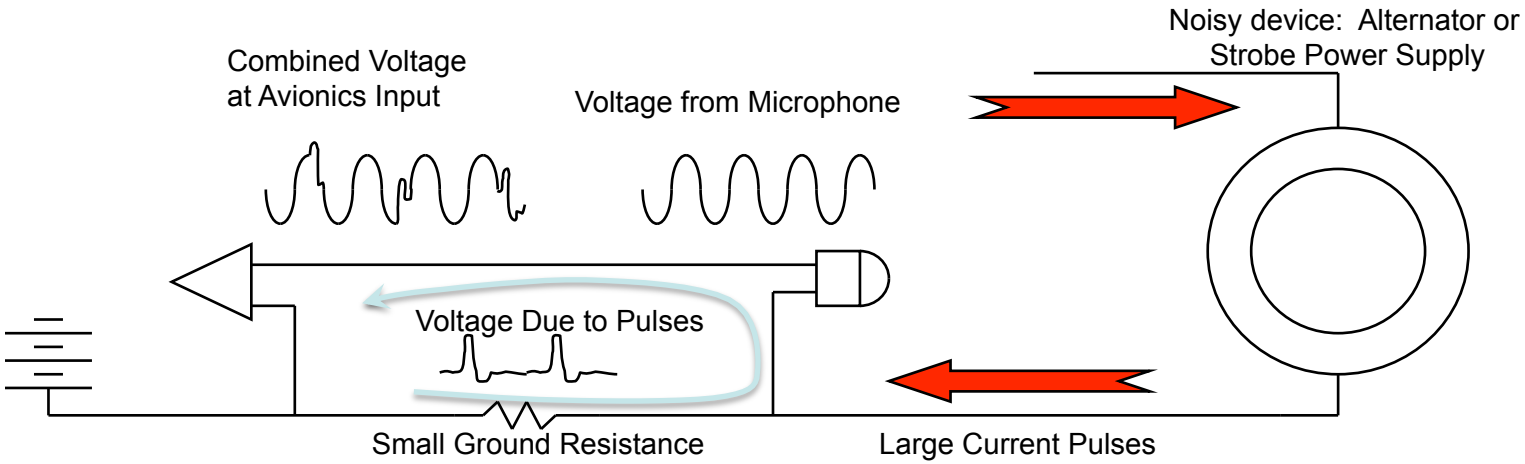
Wiring Tips

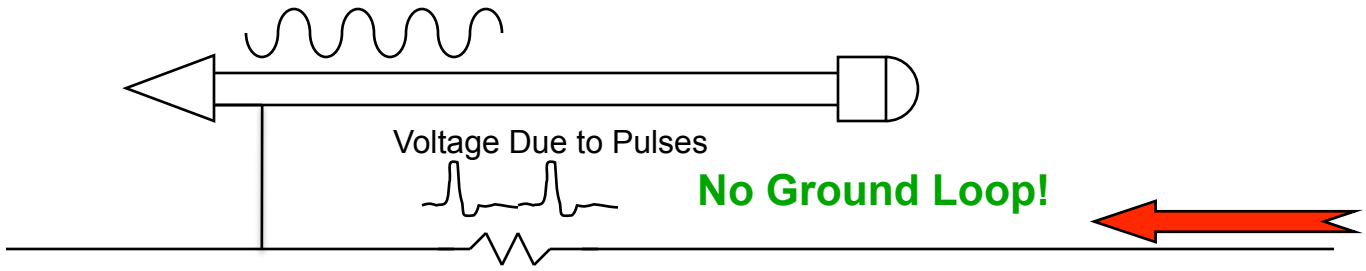
How to avoid unwanted sparks and radio silence

Ground Loops

(not the tail dragger kind!)

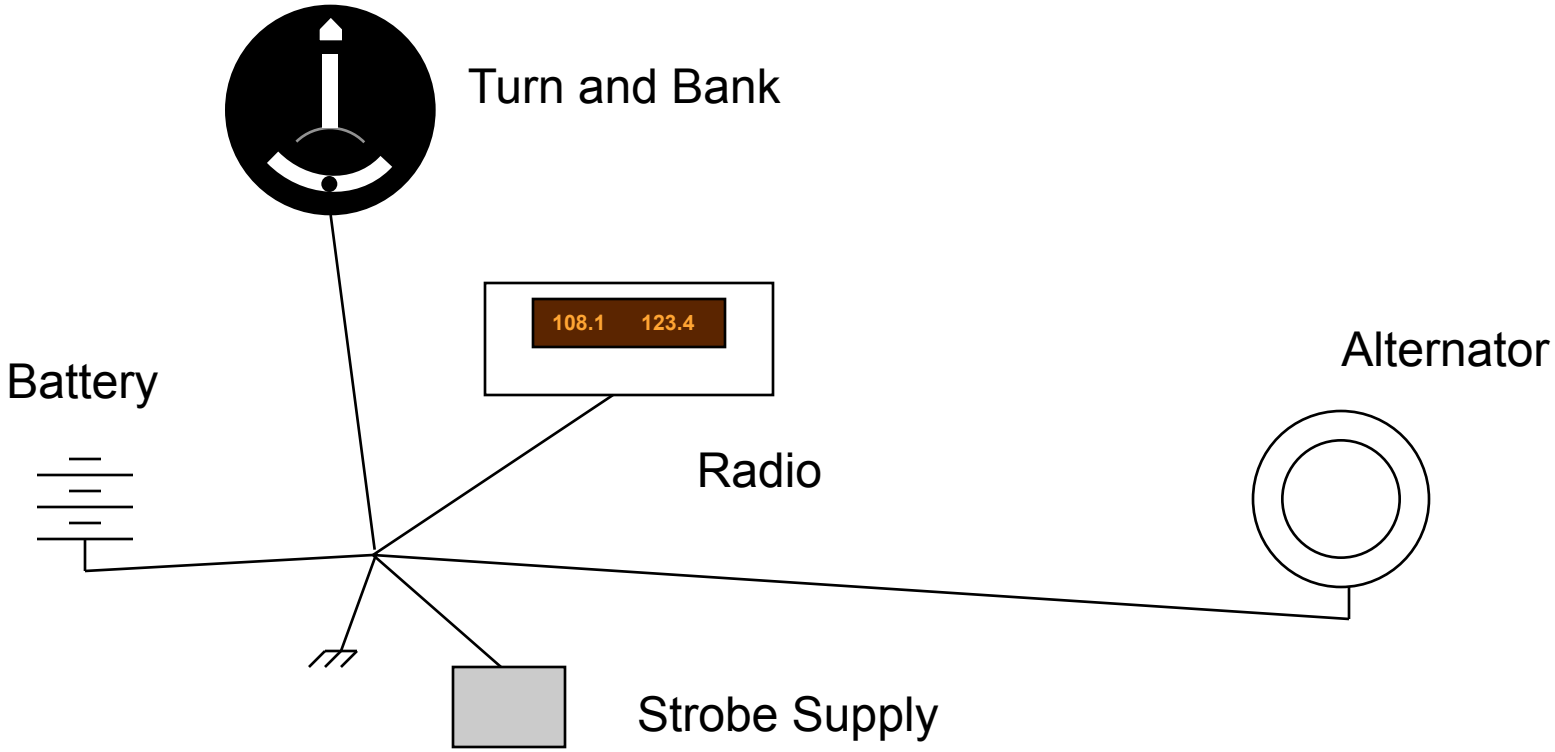
- Ground is not zero resistance
- Big currents through small resistance can cause measurable voltages
- Voltage at Avionics Input is sum of voltages from ground current and signal when multiple grounds create loop





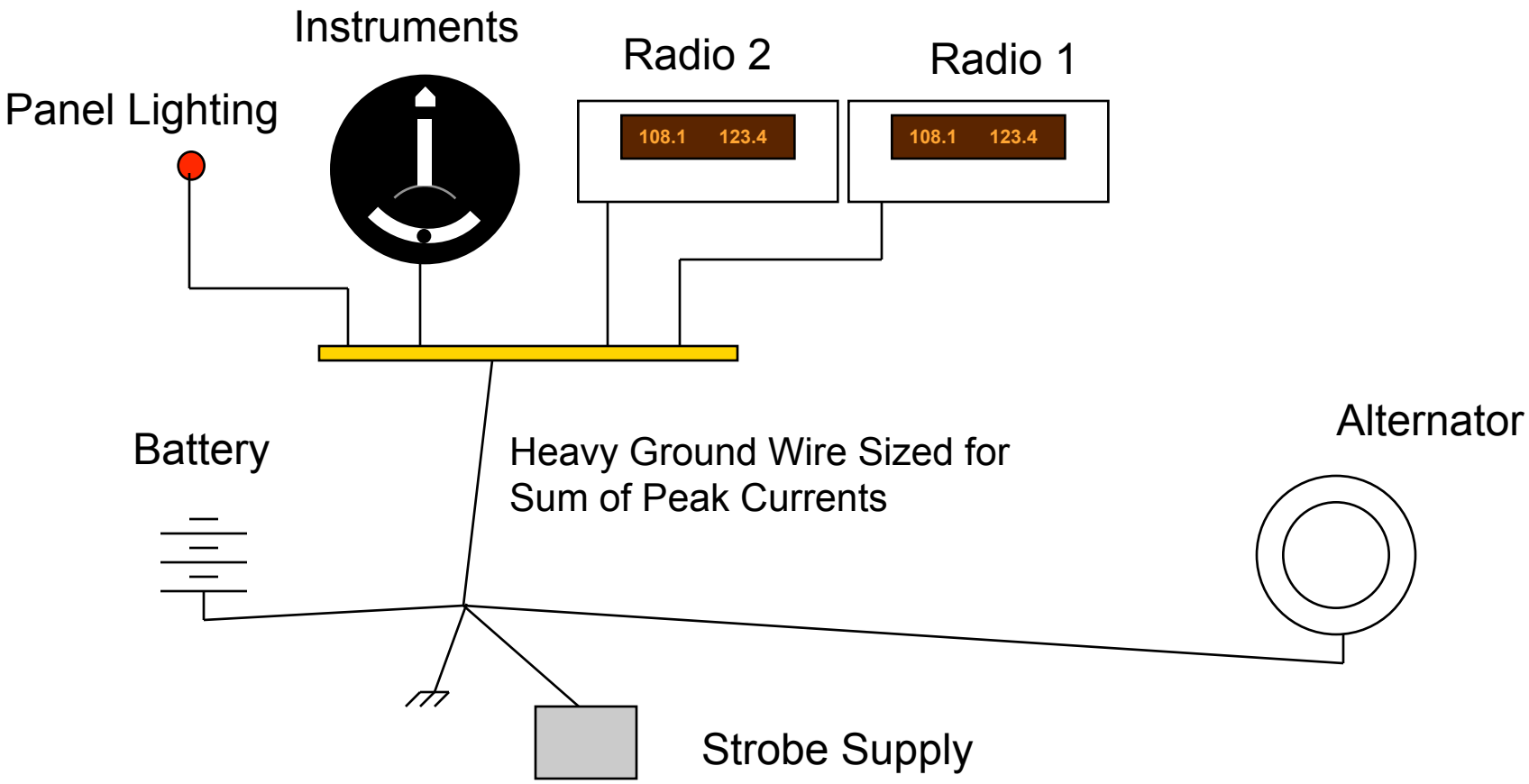
Single Point “Star” Ground

- Connect all “-” supplies to common ground point.
- Works even if cases are grounded. Ground wire is much lower resistance than airframe if properly sized
- When in doubt, make ground wires 1 or 2 gauges larger than minimum required for current



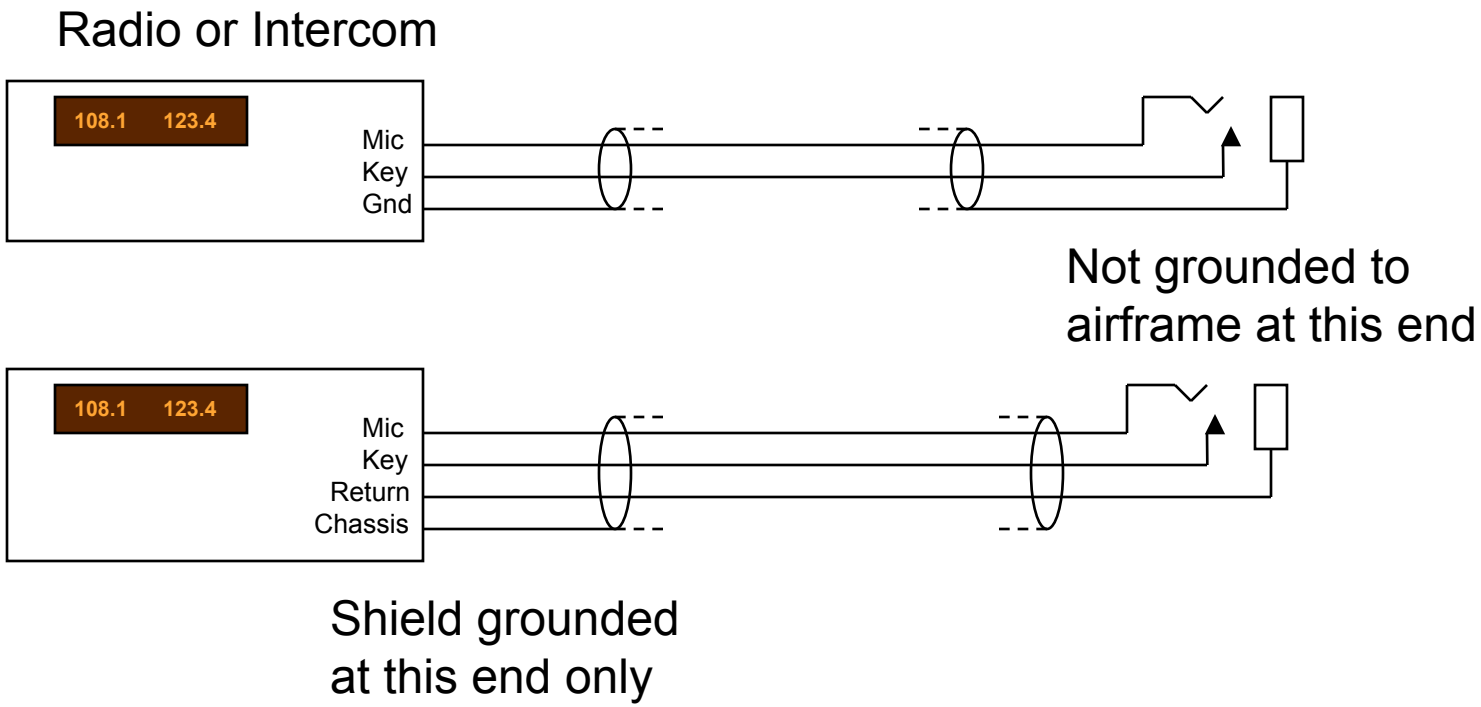
Modified “Star” Ground

- Connect “-” supplies of devices not likely to interfere together.

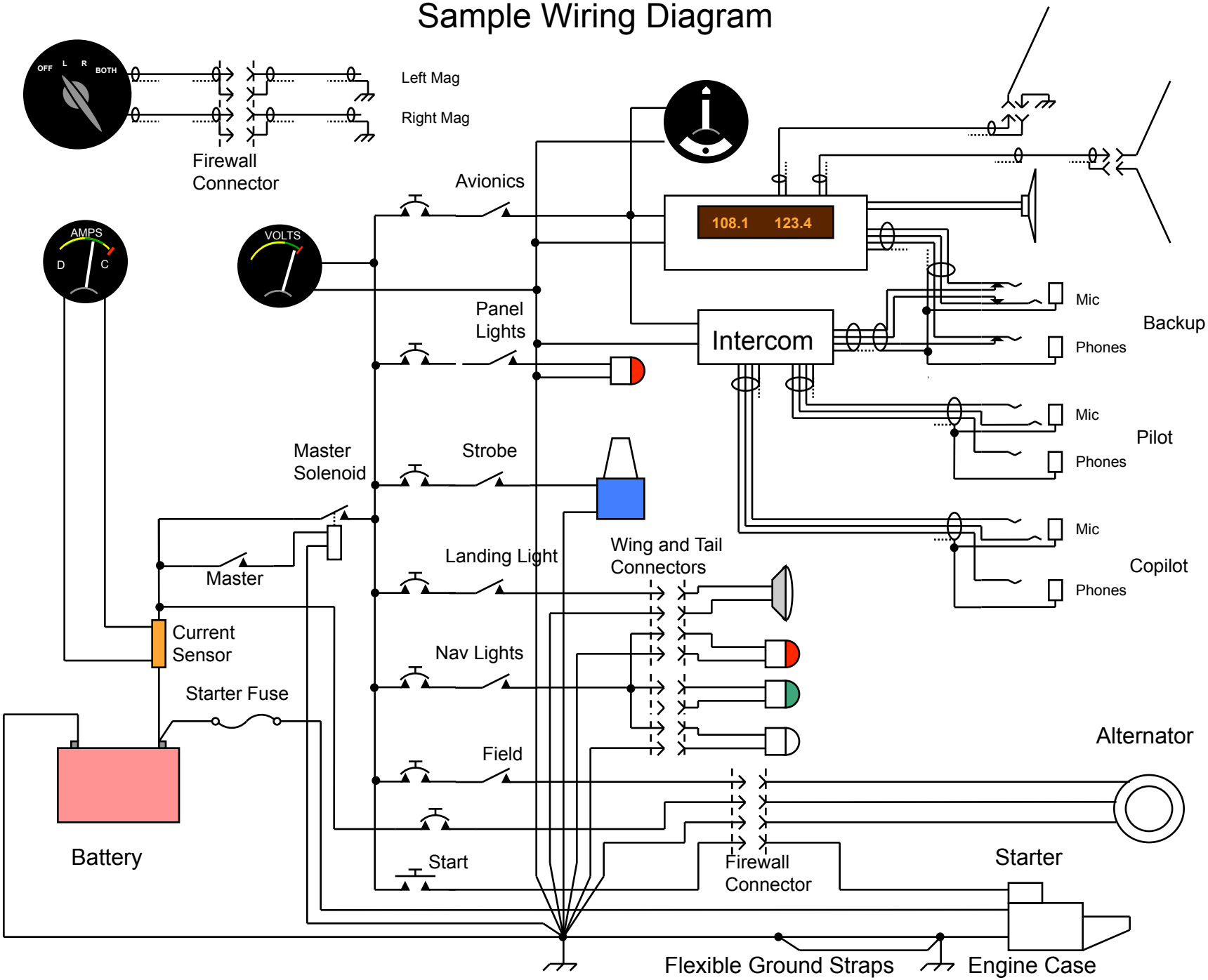


Shielding

- Follow equipment manufacturer's directions
- Shield attached to airframe or chassis ground at one end only
- Use non-conductive (plastic or wood) sub-panel or insulating washers under jacks



Sample Wiring Diagram



A First Class Job

- Plan your work. Draw a neat, thorough diagram
- Use connectors between parts of airframe that may be disassembled.
- Use breakers, not fuses if possible.
- Fuses in proper holders if used. Cheap in-line fuses are simply unacceptable.
- Plan for future expansion and service.
- Include redundancy, especially if you're going to do night or IFR flight.
- Place electrical system controls and indicators neatly on a removable sub panel.
- Label switches, fuses, and breakers clearly

Safety

- Remember, current flows in a loop. Return path just as important as supply.
- Size wiring for peak load, not average.
- Make sure all power wires down stream of a fuse or breaker can safely handle its rated current.
- Use high quality, redundant grounds for engine. Current will find a path, could be p-leads, throttle cable, or fuel line!
- Use the right tool. Nicked or poorly attached wires will likely fail over time
- Always use aircraft quality wire with flame resistant (Tefzel) insulation.
- Always provide strain relief in wiring harness.
- Keep wiring far away from any moving parts. Use conduit if needed

Sources for Electrical Parts and Tools

- Vans http://www.vansaircraft.com/cgi-bin/webstore.cgiants
- Aircraft Spruce http://www.aircraftspruce.com/menus/el/index.html
- Wicks http://www.wicksaircraft.com/catalog/product_cat.php/subid=6095/index.html
- Chief Aircraft http://www.chiefaircraft.com/airsec/index1.html
- Techni-Tool http://www.techni-tool.com/
- Digikey http://www.digikey.com/
- Mouser Electronics http://www.mouser.com/
- McMaster-Carr http://www.mcmaster.com/
- Grainger http://www.grainger.com/

Other Useful Information

- DesignWorks Express for diagrams: http://www.capilano.com/html/products.html
- AC 43.13-1B on FAA Web Site: http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/99c827db9baac81b86256b4500596c4e/$FILE/CONTENTS.pdf