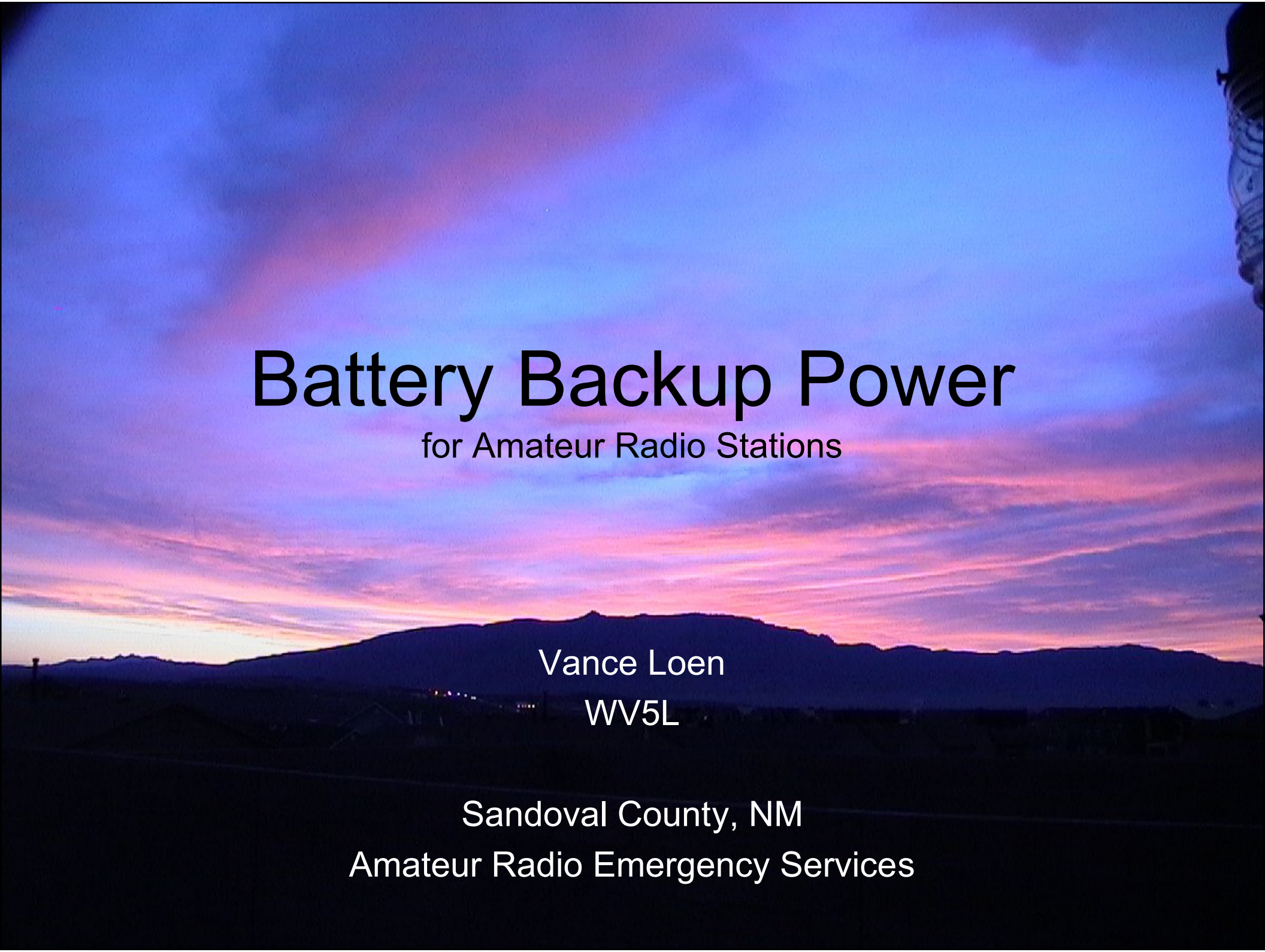

Battery Backup Power

for Amateur Radio Stations

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Sandoval County, NM

Amateur Radio Emergency Services

Battery Backup Power

Agenda

1. Assess station requirements
2. Design backup power system
3. Implement
4. Test
5. Maintain
6. Repeat 4 and 5 every 6 months

Assess Station Requirements

- Type of operation
  - Monitoring?
  - ARES/RACES at home?
  - DXing/Contesting?
  - Ragchewing?
- Radio/computer equipment
- Duration and duty cycle
- Consider other household needs

Radio/computer equipment

- List all components
  - Transceiver/tuner/interfaces
  - Computer/monitor/network/phone
  - Lighting
- For each component, determine:
  - Voltage requirement
  - Average current consumption
  - Peak current consumption and duty cycle

Example Inventory

Item	Voltage	Average current	Peak current x Duty cycle	Total avg current
FT-897 transceiver, SSB	13.5 Vdc	1.1 A	22 A x 5%	2.2 A
Laptop computer	120 Vac	0.6 A		0.6 A
Phone, cable modem, router	120 Vac	0.5 A		0.5 A
Desk lamp, 40W	120 Vac	0.4 A		0.4 A

13.5 VDC Peak current = 22A Peak power = 295W

Total average current = 2.2A Total average power = 30W

120 VAC Total current = 1.5A Total power = 180W

Total average power consumption, all loads = 210 W

Total peak power consumption, all loads = 475W

Design

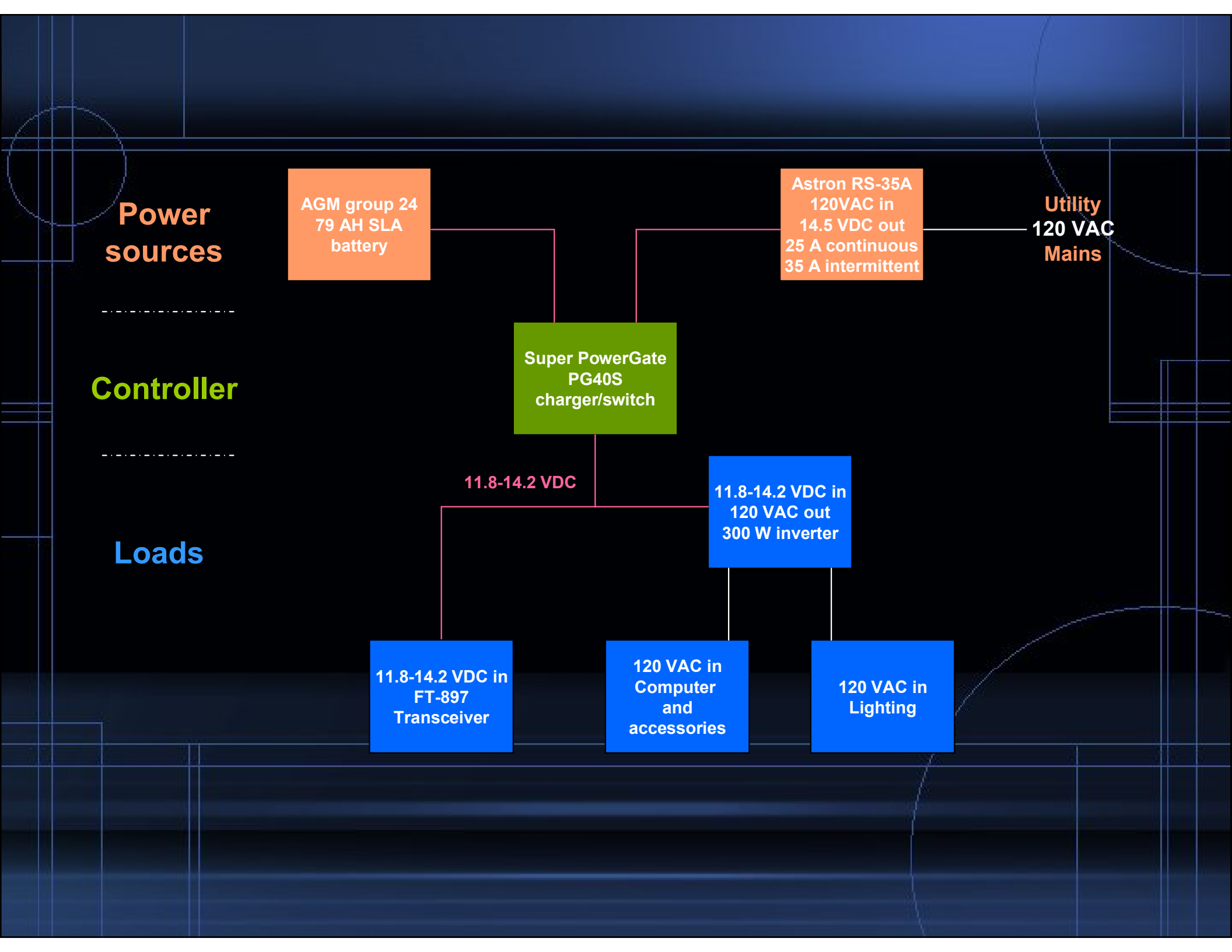
- Provide uninterrupted service if mains fail
- Automatic switchover
- 2 hour running time
- Automatic battery charging
- 12 VDC and 120 VAC outputs
  - DC supply peak transmit current 35 A
  - DC supply average current 16 A
- Full RF power out

Design

- Energy storage – lead acid battery
  - Safe, rugged, available, economical
  - Construction
    - Flooded cell or valve regulated
    - Valve regulated gel cell or absorbed glass mat (AGM)
    - Automotive (starting) vs. deep cycle (traction) battery
    - Lead/calcium or lead/antimony plates
  - Limited charge/discharge cycles
  - Best performance with 3 or 4-stage charger
  - Keep at room temperature for maximum life

Design

- Use 14.5 VDC 35A AC-DC supply with charge controller/solid state transfer switch
- Use DC-AC inverter for 120 VAC output
  - 300 W consumer unit should be adequate for 200 W continuous load
- Operating time
  - Total average power 220W = 13.5V @ 16 A
  - 80 Amp-hour battery would discharge in 5 hours, run it for 3 hours max
  - Use that time to get your generator running!


Power sources
Controller
Loads
AGM group 24
79 AH SLA
battery
Astron RS-35A
120VAC in
14.5 VDC out
25 A continuous
35 A intermittent
Utility
120 VAC
Mains
Super PowerGate
PG40S
charger/switch
11.8-14.2 VDC
11.8-14.2 VDC in
120 VAC out
300 W inverter
11.8-14.2 VDC in
FT-897
Transceiver
120 VAC in
Computer
and
accessories
120 VAC in
Lighting

Implement

- Buy parts
  - Super PowerGate PG40S $120
  - 79AH AGM battery $140
  - Inverter $40
  - Astron RS35A $150
  - Misc. cable, powerpoles $30
- Spend weekend assembling parts - Priceless

Implement

- Powerpole 30 amp connectors
  - Tongue Top, Red Right
  - Use a touch of superglue to assemble shells
  - Use tie-wraps to secure mating connectors
- #12 stranded cable with 30 amp contacts
- Use cables less than 6 feet long
- Install a 40 A fuse near the battery

Test

- Verify charging voltage for battery type
- Insert DC ammeter into each controller leg to verify operation
- Test operation during battery charging, normal and powerfail modes
- Record readings to aid later troubleshooting
- Handy gizmos from West Mountain Radio
  - Computerized battery analyzer $100
  - Whattmeter $70
  - RigRunner $60-$140
- Also see Saratoga and MFJ

Test

- Record discharge time under real conditions
  - Check battery voltage at ½ hour intervals
  - 12.1 V is 50% charge
  - Don’t go below 11.75 V
  - Battery is fully discharged at 10.5 V and possibly damaged

Maintain

- Discharge/charge cycle
  - Compare with previous test results
- Clean dirty contacts
- Inspect cables
- Check for corrosion or white dust
  - Signs of overcharging and venting
- Got spare fuses?

References

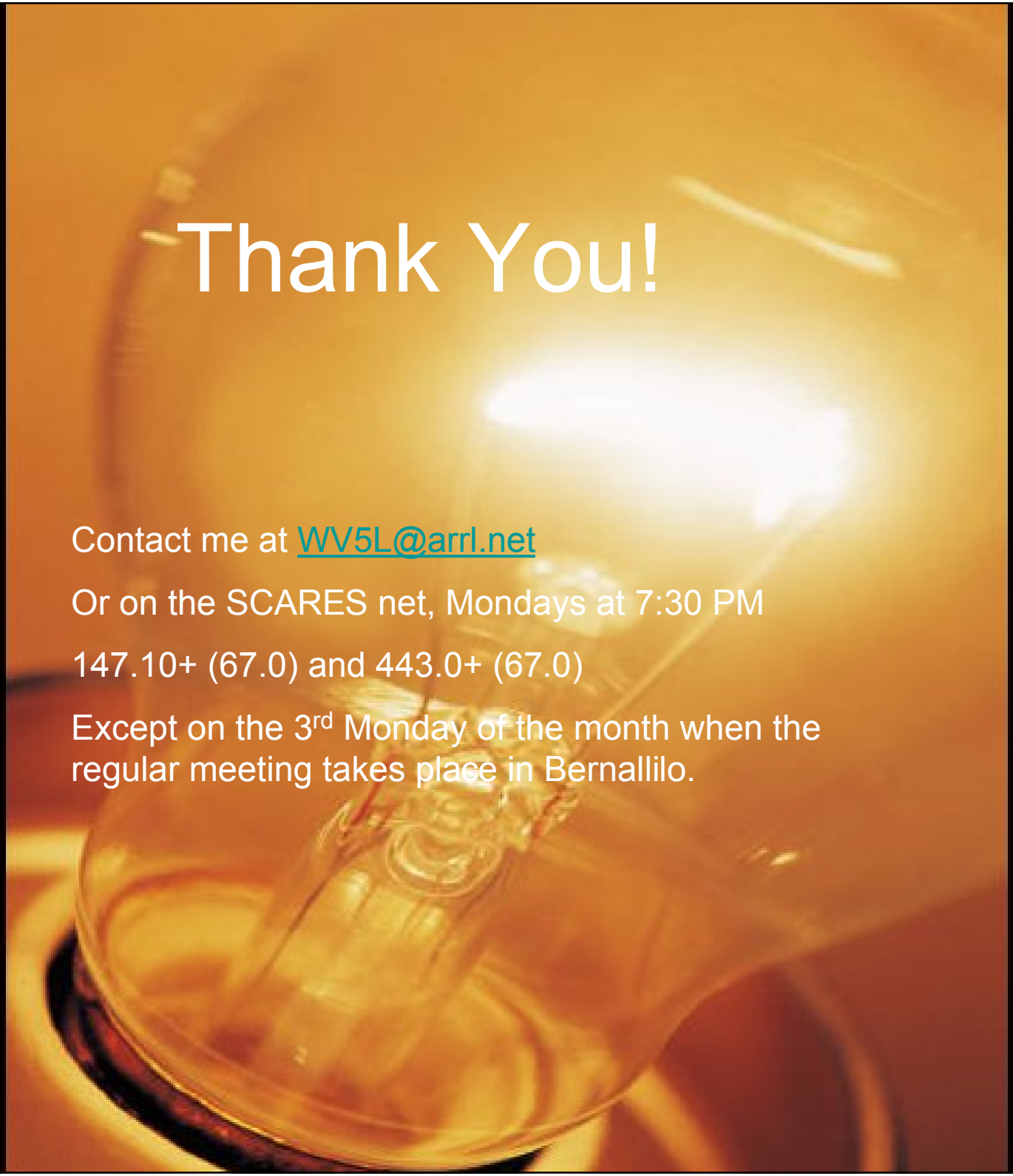
For information on battery characteristics and chemistry,
http://www.powerstream.com

For information on rechargeable batteries for portable radios and battery testing and conditioning,
http://www.buchman.ca

For information on photovoltaic power with battery storage,
http://www.windsun.com/Batteries/Battery_FAQ.htm

For information on the PWRgate,
http://www.westmountainradio.com/

For information on other PowerPole accessories,
http://www.mfjenterprises.com/products.php?prodid=MFJ-1124
http://www.saratogaham.com/powerpanel/
http://www.qsradio.com/PowerPals.htm
http://www.powerwerx.com



Thank You!

Contact me at WV5L@arrl.net

Or on the SCARES net, Mondays at 7:30 PM

147.10+ (67.0) and 443.0+ (67.0)

Except on the 3rd Monday of the month when the regular meeting takes place in Bernallilo.