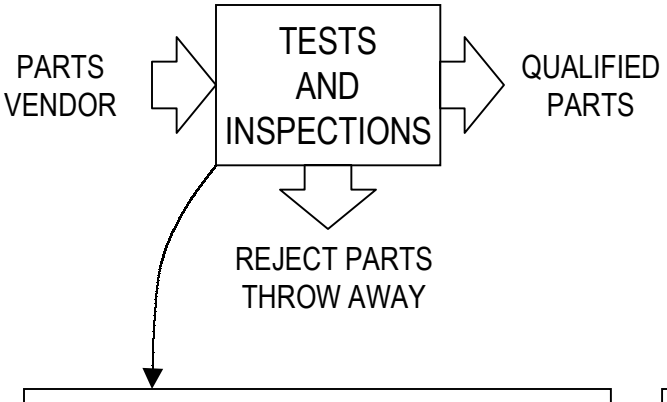
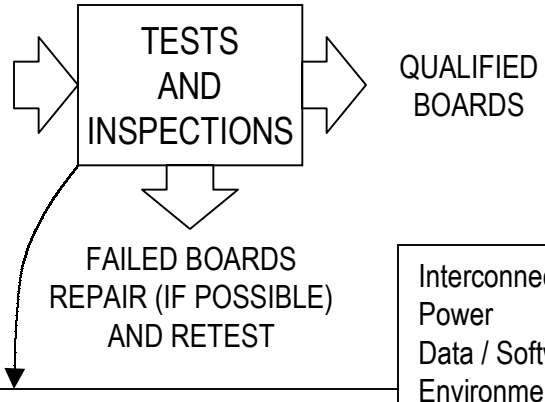
Parts Qualification



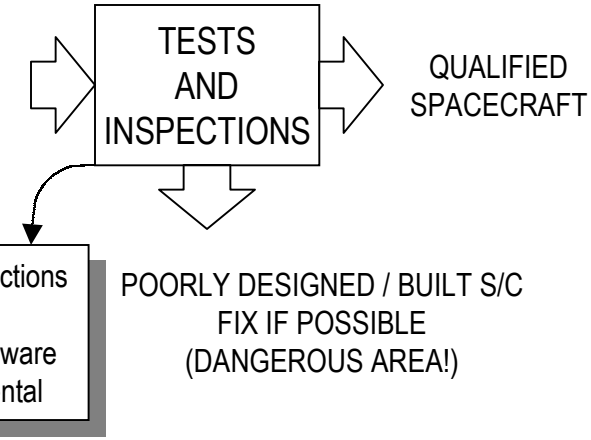
- Batteries
- Capacitors
  - many problems (AMSAT)
  - visual inspection
  - powered burn-in
    - record values
    - 120% rated V
    - 1 week, +65°C
    - accept / reject based on new values
  - don't abuse
- Resistors
  - few problems (AMSAT)
  - visual inspection, test, record, go
  - don't abuse
- Semiconductors
  - few problems (AMSAT)
  - **don't abuse (ESD!)**
  - visual inspection
  - test parts to Mil D-level? or board level?

Board Qualification



- Visual Inspection
- Functional
  - test 100% of board functionality
  - should lead to software tests
- Thermal Stress Test
  - full functional before
  - 25 cycles
  - nonoperating
  - -50°C to +100°C
  - 25°C / minute delta
  - full functional after
- Random Vibration
  - full functional before
  - operating
  - 15g RMS
  - 10 minutes / axis
  - 3 axis or thrust only?
  - full functional after
  - perform at system level?

System Qualification



TOP CAUSES OF SPACECRAFT FAILURE (AMSAT):

1. Poor design
2. Misjudgement of environment
3. Human "touch" factors
4. Interconnections
   - soldering
   - wiring
   - connections
5. Piece-part failures

- Notes:
  - Test 100% of parts / boards / functionality
  - Minimal but complete documentation
  - Early detection is cheaper than late (careful design is cheapest of all)
  - ESD is a serious issue
  - Most parts are OK, *craftsmanship is what counts*