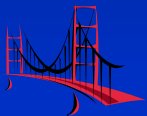


# DC Power Plants for Telecommunications and Data

Presented to

**INFOBATT 2005**

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Principal Engineer



CSI Telecommunication  
Engineers

# Introduction

- Engineering Requirements
- Applicable Standards

# Engineering Considerations

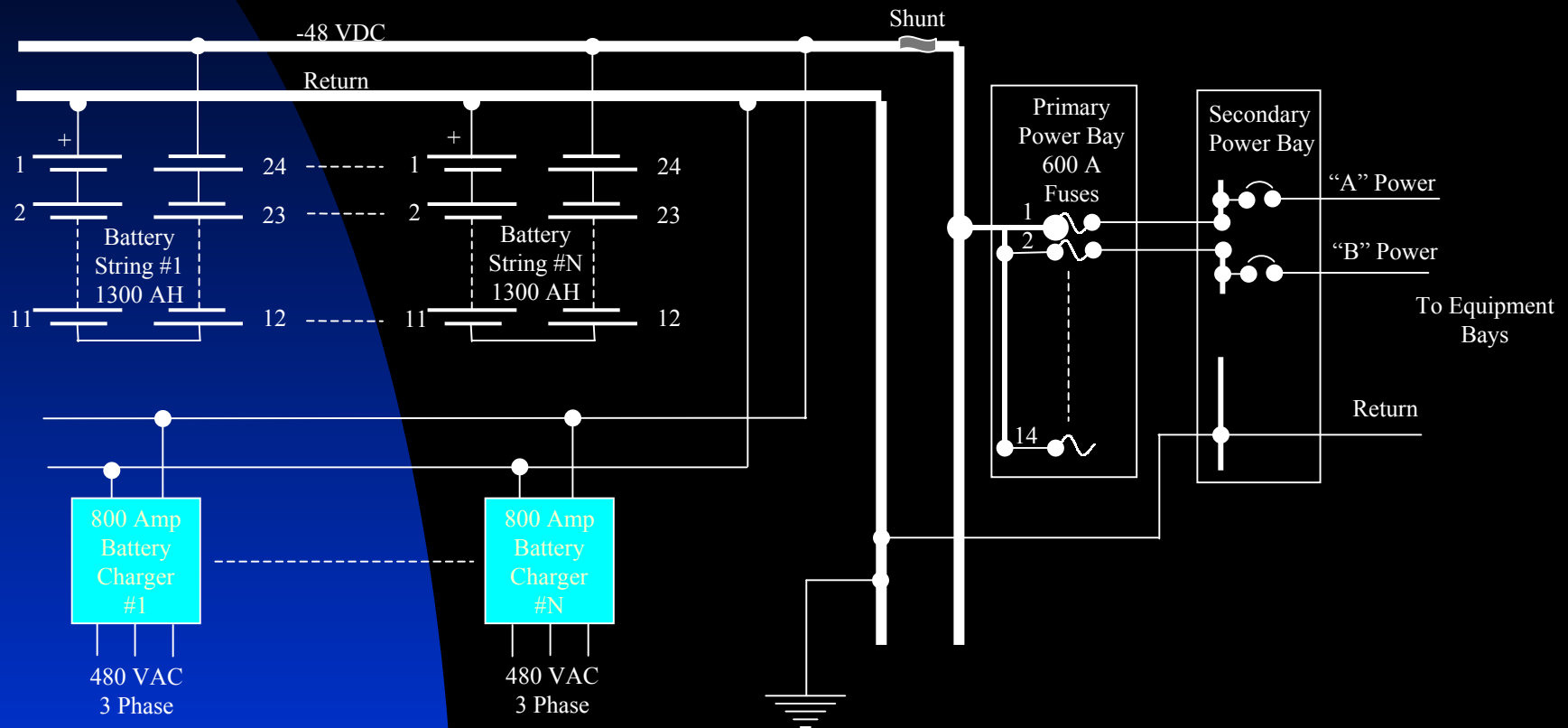
- Equipment to be Powered
- Required Reserve Time
- Minimum Operating Voltage
- Size of the Facility

# Plant Size and Design

- Load current
- Voltage operating range
- Required reserve time
- Recharge time
- Battery sizing
- Rundown problems
- Allowable plant voltage drop
- Grounded (+) conductor

# 2000 - 25,000 Amp DC Power Plant

## Dual Level Distribution



# Load Current

- At float voltage
- At end of discharge

# Voltage Operating Range

- See T1.315 for new equipment (40-57 VDC)
- Check specific equipment for its operating range
- Float voltage
- End of discharge voltage
- Equalize voltage

# Required Reserve Time

- Regulatory requirements
- Reliability requirements
- Economic issues

# Recharge Time

- Reliability Requirements
- Rundown Problem
- Charger sizing

# Rundown Problem

- The problem of more load than the chargers will support
- What happens with a 1000 Amp load at 54 VDC?
- Since the entire load is "constant power" the load at 40 VDC is:  $54 * 1000 / 40 = 1350$  Amps
- The MINIMUM amount of chargers must exceed 1350A.

# Plant Type

- Single or Dual Level Distribution Architecture
- Small plants use single level distribution
- Large plants use dual level distribution

# DC Power – Single Point Ground

- Minimal current in framework
- Balanced distribution to cancel fields

# Applicable Standards

- T1.311 DC Power Systems – Telecommunications Environment Protection
- T1.315 Voltage Levels for DC-Powered Equipment in the Telecommunications Environment
- NFPA 70 National Electrical Code
- Applicable Local Standards

# Allowable Plant Voltage Drop

- 2 volts - battery to load
- 0.25 volts - between battery and primary distribution
- 1.0 volt - between primary and secondary distribution
- 0.5 volts - between secondary distribution and load bay
- 0.25 volts - allocated for fuse, circuit breaker, and shunt loss
- Other allocations are possible

# Battery Sizing Considerations

- Average Discharge Current
- Average Discharge Voltage used for calculating Average Discharge Current
- 45 VDC is a good value  $(42-48)/2=45\text{VDC}$
- If the load is 1000 ADC at Float (54 VDC), the load at 45 VDC is  $1000*54/45 = 1200 \text{ ADC}$
- **USE THIS VALUE TO SIZE YOUR BATTERY**

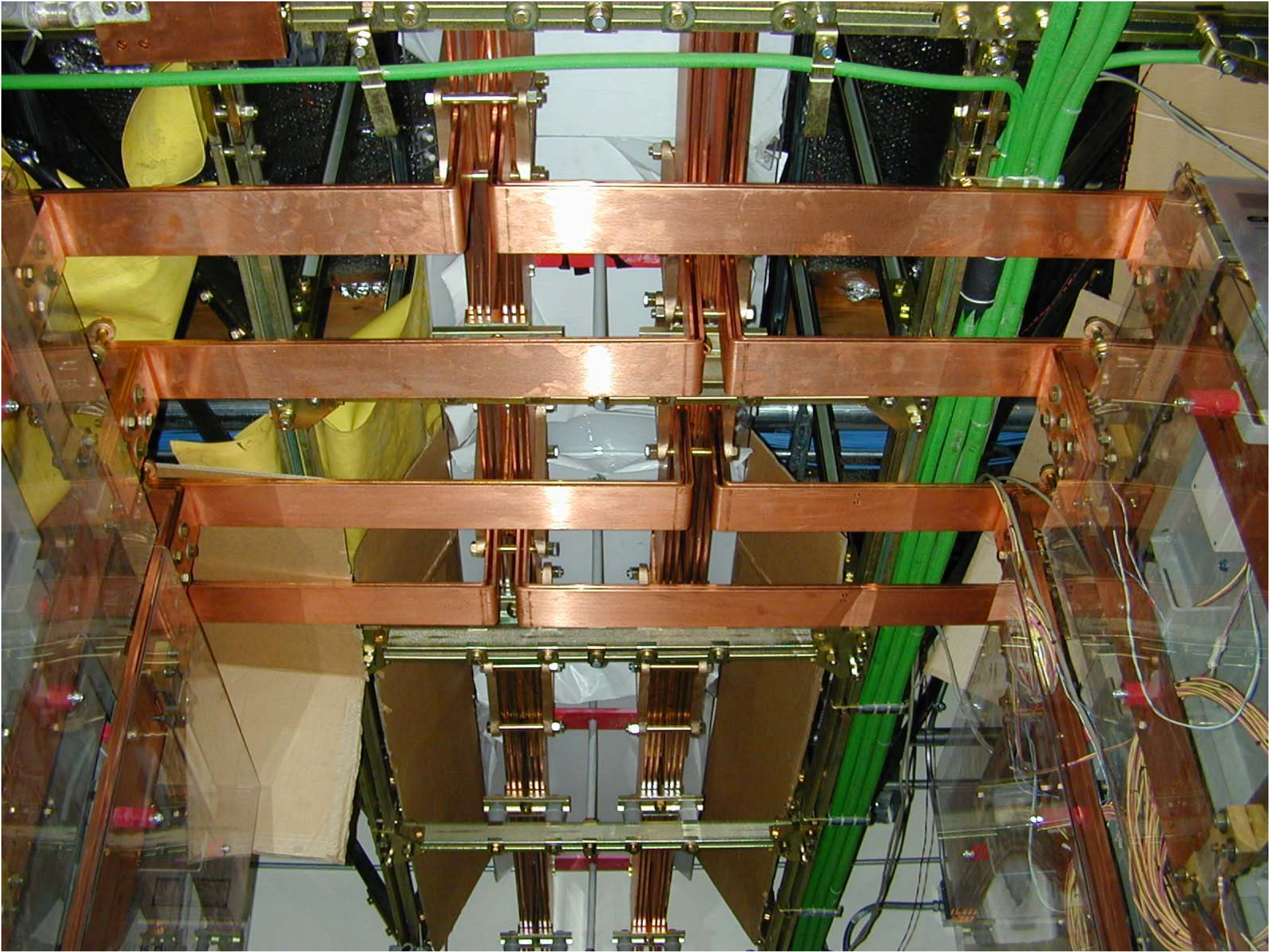
# Battery Disconnect

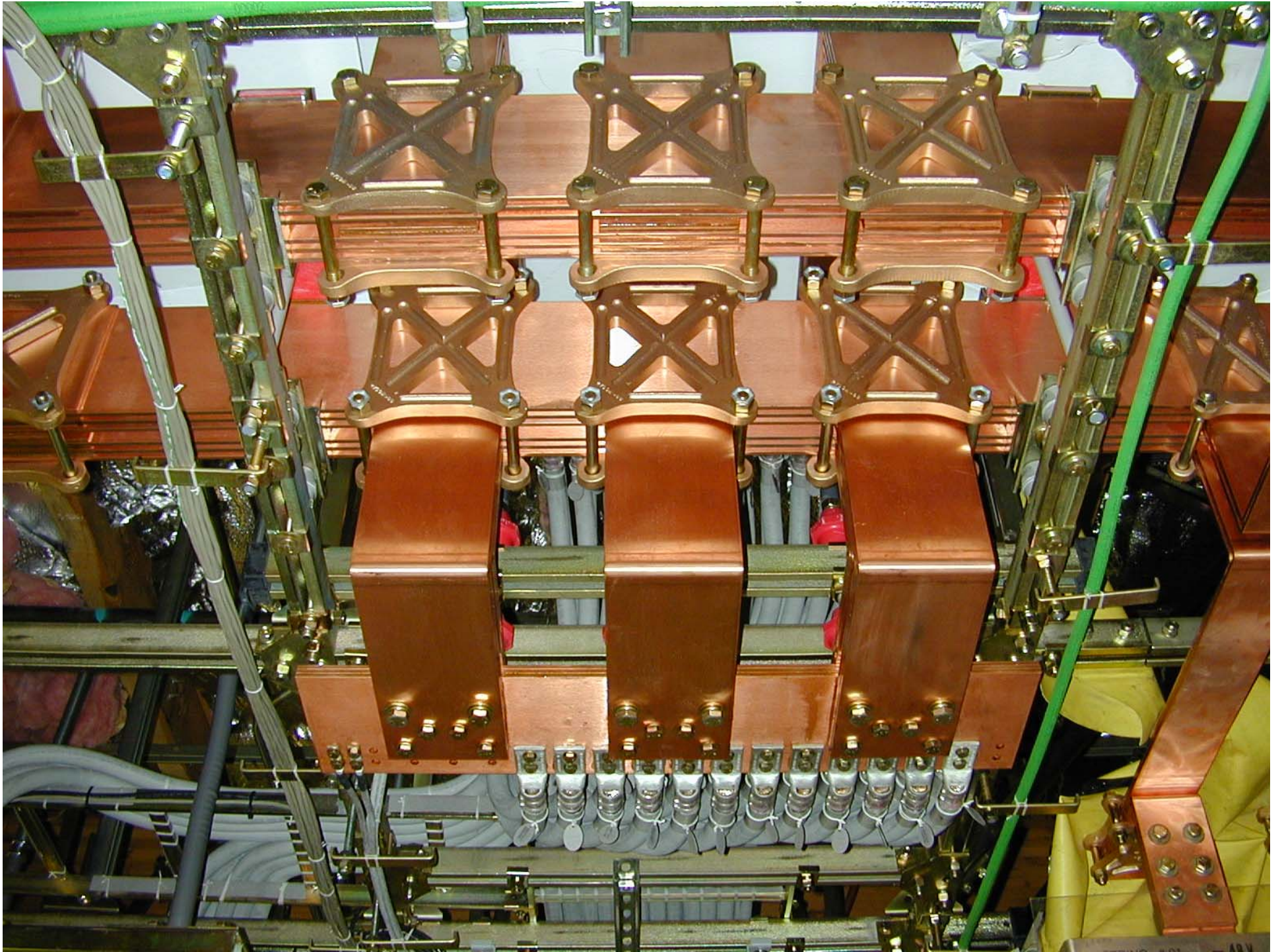
- Not generally used in the telecom industry.
- If used, it should be 2-pole to ***completely*** isolate the battery.
- Each string should have a separate disconnect so one failure will not fail the plant.

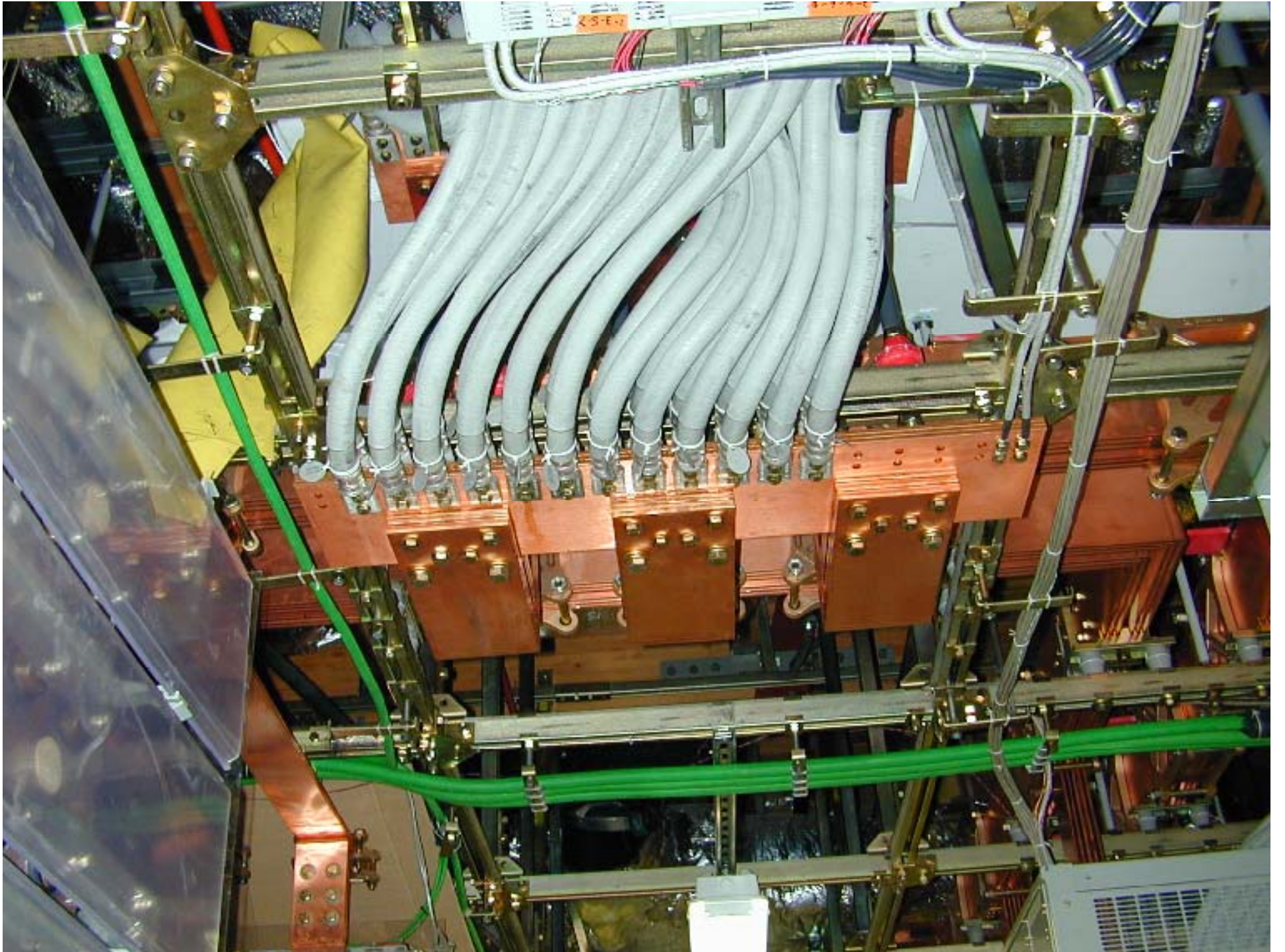


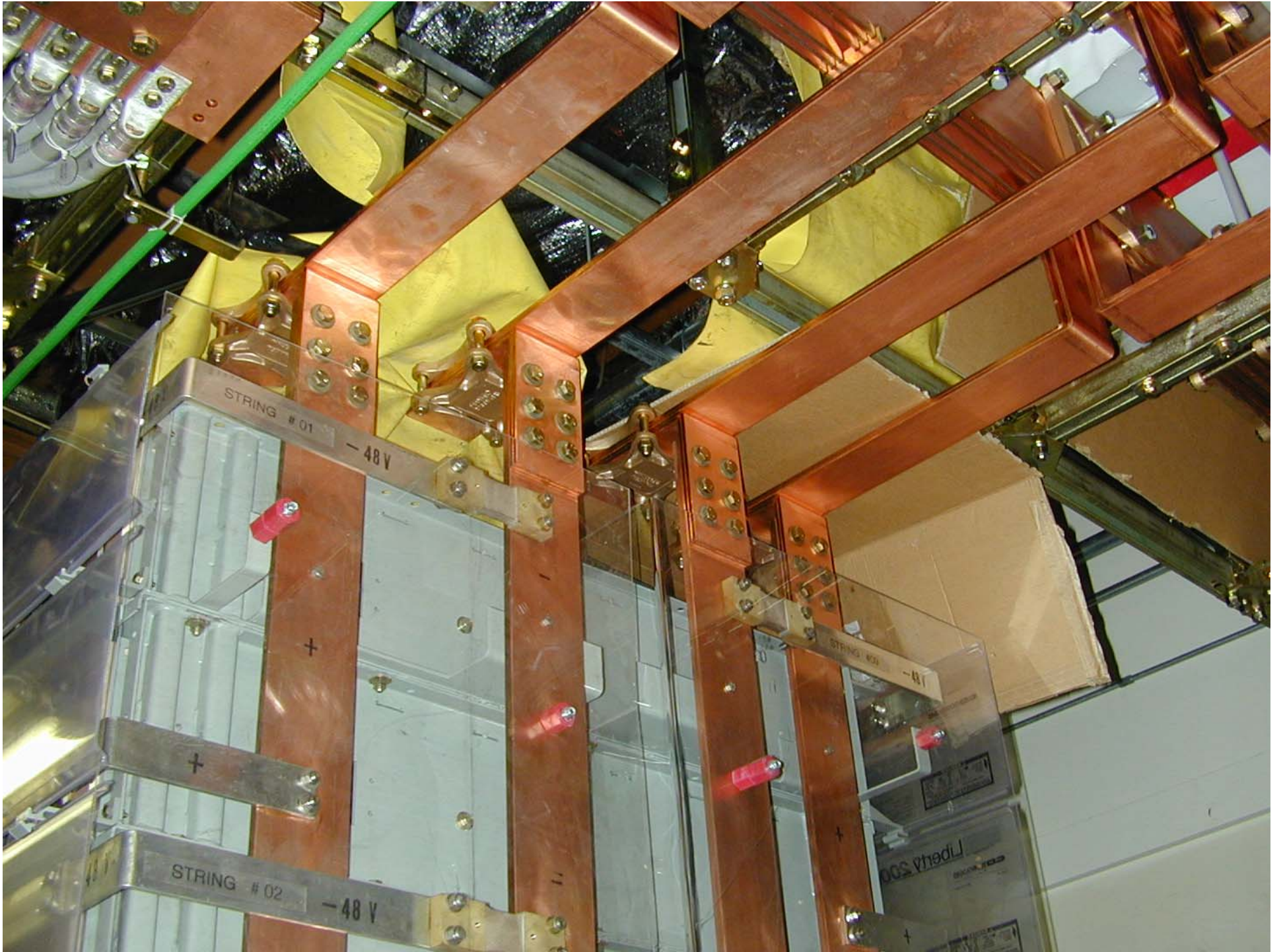
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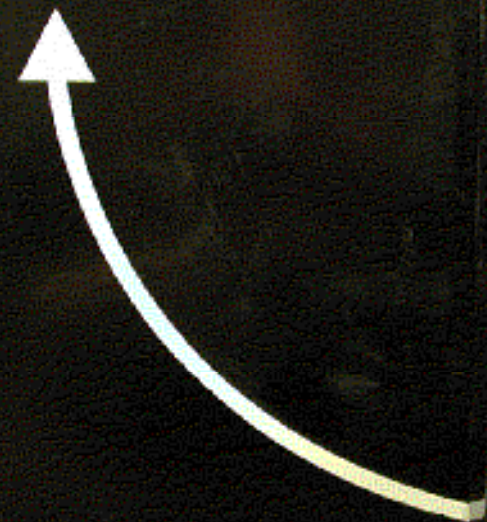




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# Questions?

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