



PUR1 – I&C Upgrade

Technical Details

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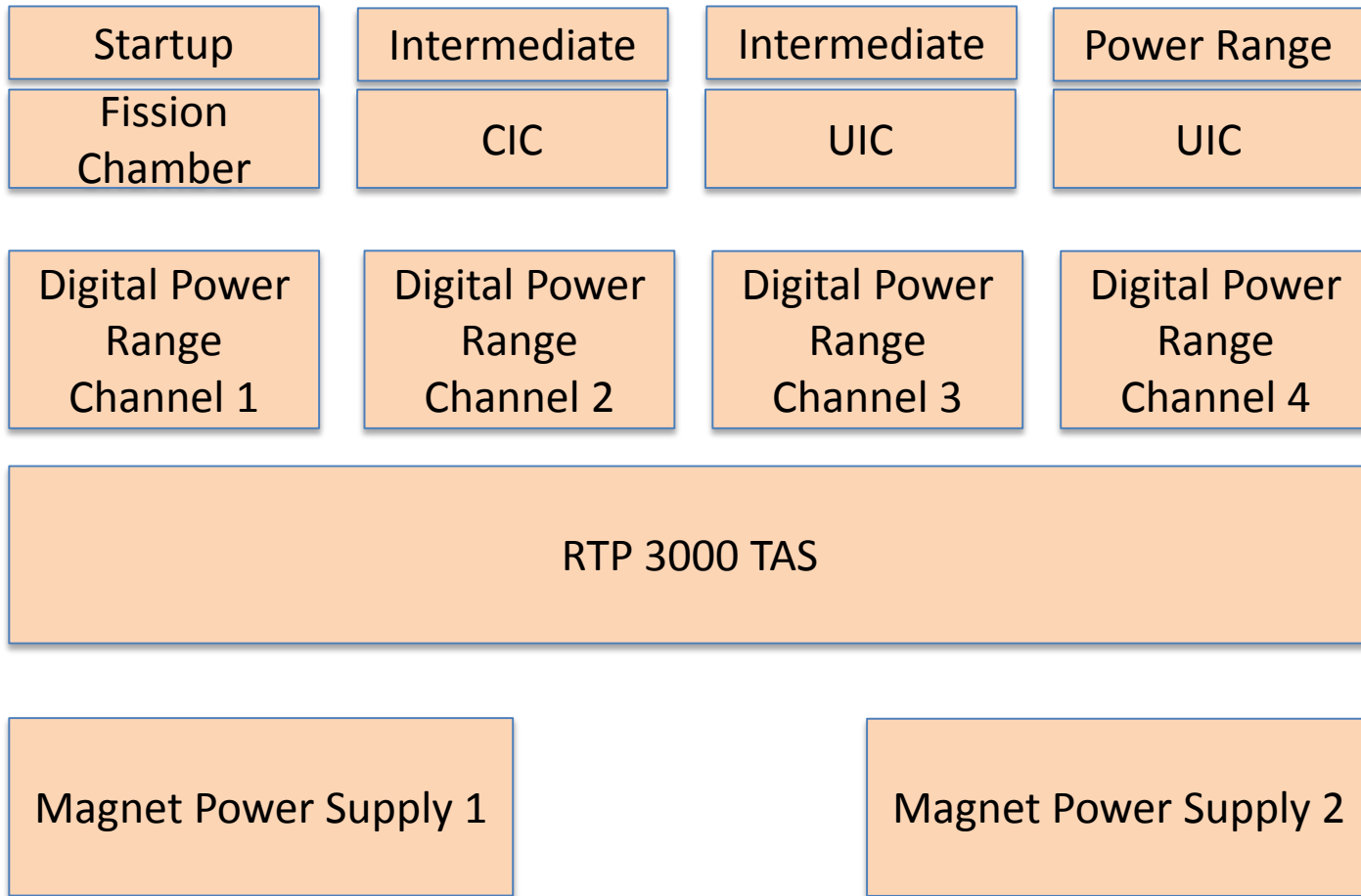
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Hardware Components

- Startup, Intermediate, and Power Range System
- Drive Assembly Interface Electronics
- RMS System Interface
- HVAC System Interface
- Makeup Water System Interface
- Trend Recorders
- Annunciator
- Elapsed Time Meter
- Indicator Lights
- Display Workstations
- Networking Hardware

Reactor Protection System

Flow Chart



Digital Power Range Monitors

Vendor Requirements

- Major Attributes
 - Modular Construction
 - Versatile Applications
 - Robust and Reliable
 - Proven by Operation Experience
- Will have pulse processing and Campbell signal processing

Digital Power Range Monitors

Features Necessary

- Cycle time of signal processing
- Analog & Binary output signals
 - Linear or Logarithmic
- Digital parameters that are lockable

Digital Power Range Monitors

Architecture

- Detector provides signal
- Signal is amplified by preamp if necessary
- Pulses filtered and discriminated
- Analog signal converted to digital
- Analog and binary signals can be sent to the RPS
- Binary outputs sent for non-safety applications (Scientific data)

Digital Power Range Monitors

Must Be SIMPLE

- Continuous non-variable signal processing
- Predictable signal processing time
- Manageable software size
- No operating system
- No reliance on outside time keeping
- Easy to implement testing protocol
- Exterior systems cannot change parameters or setpoints (read-only)



Main Items To Address

Logic Diagram

Overview

- Manual Trip Actions Cut Magnet Current
- External RMS System to provide 'slow' scram
- Count rate, period, linear power level and safety power level are inputs to PLC
- Any one trip signal will cause a setback or scram

Redundancy

Overview

- RTP 3000 TAS is a system critical piece of equipment
- Failure of processors will not affect the ability of the RSS to perform its function
- Each RTP 3000 TAS PLC I/O card is rated for SIL-3 operation
- Includes a significant number of features to identify or mitigate failures
- Console and Hallway scrams independent

Trips

Overview

- Startup and Shutdown handled by the CIC and Fission Chamber
- Overpower trips handled by all detectors
- Rate trips handled by all detectors

Rod Drop Times

Overview

- Any movement of rods or initiation of manual scrams are configured as Sequence of Events
- RTP 3000 TAS PLC time stamps each event to the nearest millisecond
- Full insertion (rod bottom indication) is another event
- Software will show time difference

Access Controls

Overview

- Current requirement is for room access and operator key switch
- Post-upgrade will require room access, operator key switch, and computer access credentials



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