Power Conversion
Solutions for Challenging Problems

AIP 67-2901/02 Review

LINAC Sectors 22 and 23
Quadrupole Magnet Power System Reliability Upgrades

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SCOPE AND MOTIVATIONS

Scope

- Upgrade “QE” magnet power supplies and controllers in LINAC Sectors 22 and 23
- Two new “bulk” power supplies and sixteen new “boost” supplies
- New Ethernet power supply controllers, new zero flux current transductors, new PPS chassis

Motivations

- Equipment more than 20 years old and at end of useful life. Unreliable, lack of available parts will affect future LINAC operations
- Better short and long-term current stability
- Interface with new EPICS-based control system for better diagnostics
- Lower line harmonics, noise, power consumption

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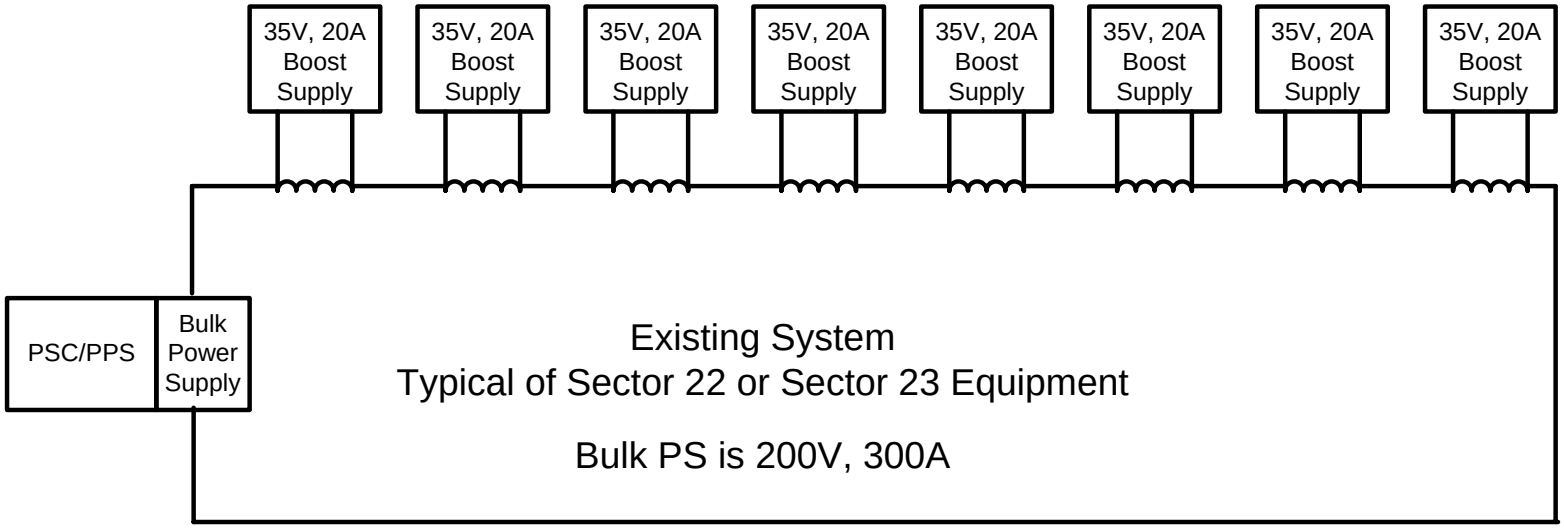
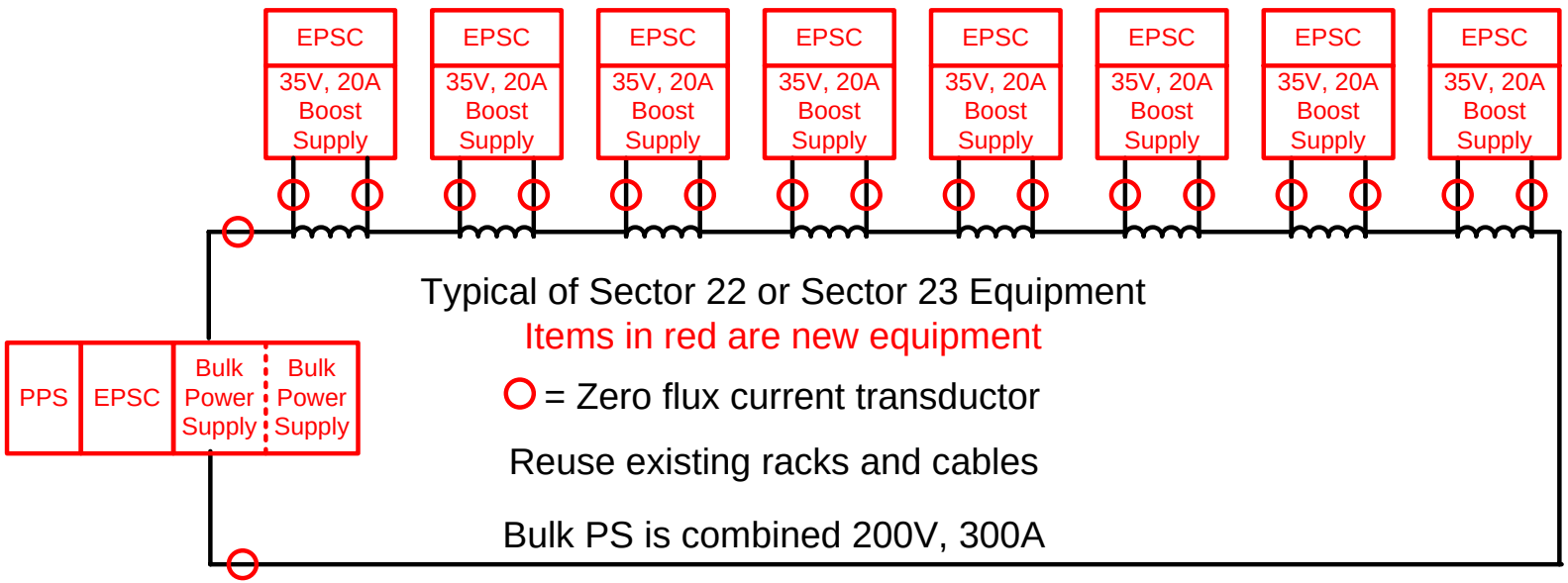
System Diagram





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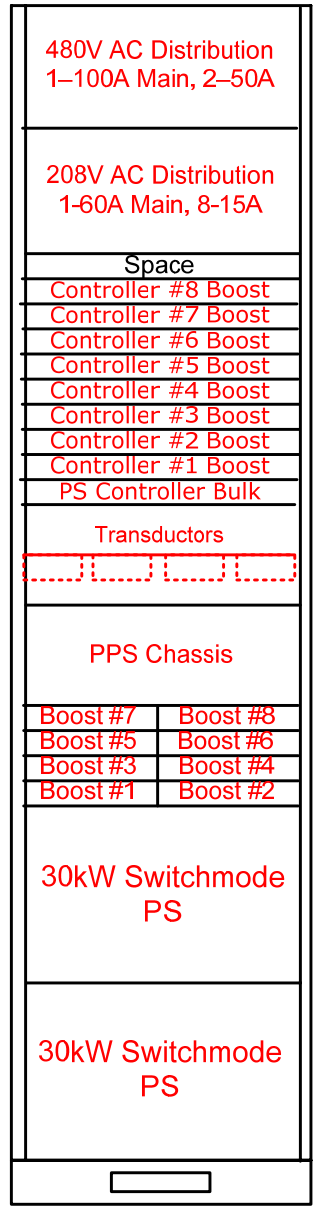
The Existing and New



New power supplies will have better PF

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Reliability / Diagnostic Enhancements

Power Supply	Present Reliability	New Reliability
Bulk	Aging transformers, chokes	> 100,000 hours
Boost	At end of life, parts unavailable	> 100,000 hours
Power Supply	**Present Diagnostics**	**Expanded Diagnostics**
Bulk	Remote on/off, I_O, ground fault	Remote on/off, I_O, ground fault, **V_O, I_{Ripple}, I_G**
Boost	Remote on/off, I_O	Remote on/off, I_O, **V_O, I_{Ripple}**

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Stability Improvements

	Short Term/ Noise (%RMS)			Long Term (%)		
Power Supply	Spec	Present	New	Spec	Present	New
Bulk	0.05	0.05	0.0005	0.5	0.3	0.006
Boost	0.05	0.01	0.0005	0.5	0.3	0.006
Composite	0.05	0.05	0.0005	0.5	0.3	0.006

- Short term 1 second, noise 0.1 Hz to 10Hz
- Long term based on 100ppm/C versus 2ppm/C with 30C maximum LINAC temperature deviation

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Breakout of Estimated M & S and Other Costs

M & S Item Description	Quantity	Cost in k$
Bulk/Boost Power Supplies	2/16	100 + 32
EPSC	18	45
Transductors	36	25
PPS Chassis	2	6
Misc Parts and Services	1 Lot	121
M & S (Materials / Install Shop)		**329**
EDIA (PT Engrs, Designer, Tech)		**170**
Burden		**118**
Contingency		**123**
Grand Total		**740**

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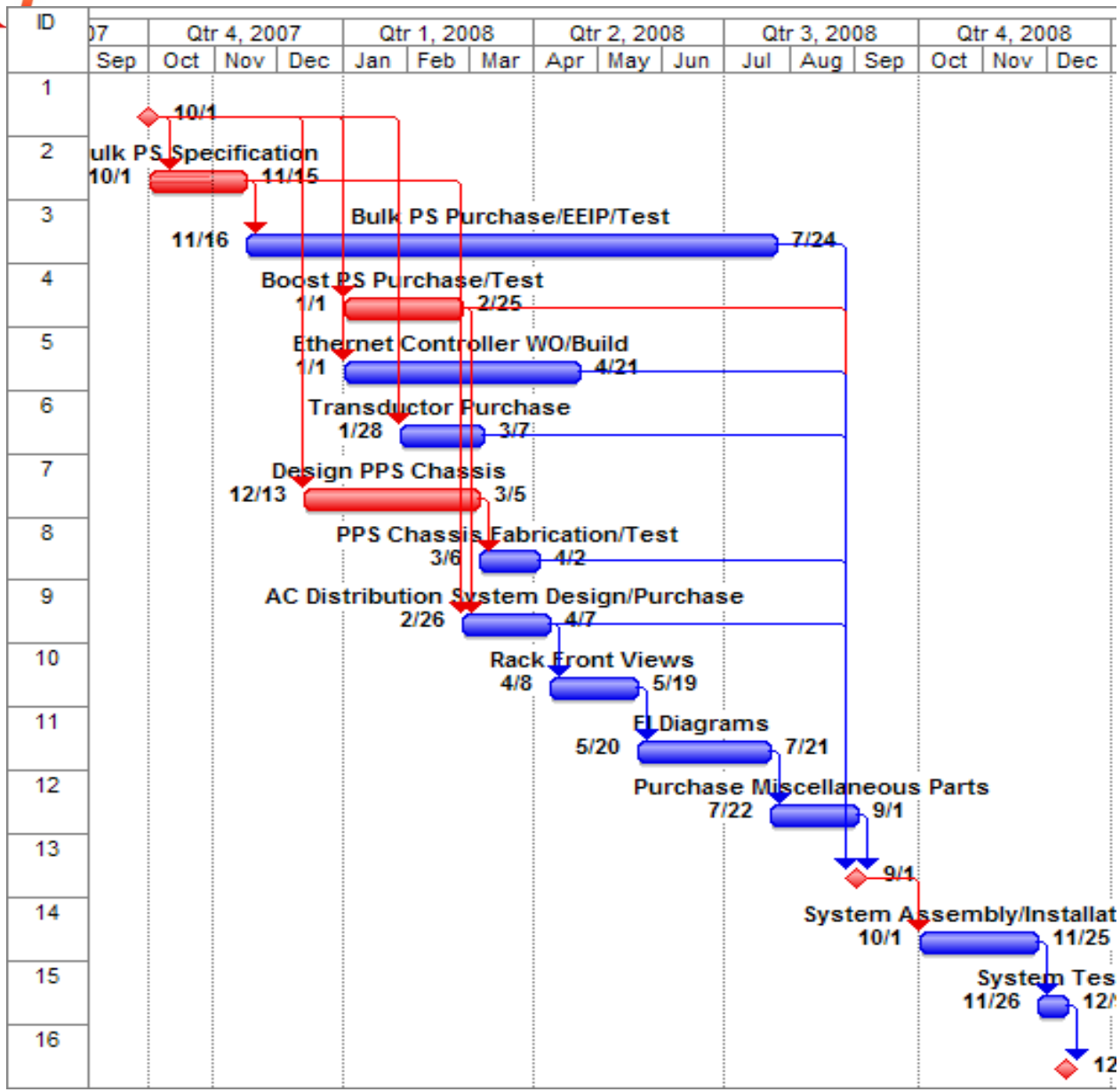
Acquisitions, Builds, Challenges, Schedule



No charges to date, but will start EDIA November 1, 2007

Last Slide – Personnel Identification

• Serge Ratkovsky	Project Manager
• Engineer (to be assigned)	PS Specs / PPS Chassis
• Dave MacNair / Controls Dept	EPSC/Controls and Database Issues
• Phil Seward / Ray Wallace	Designer/Coordinators
• PCD Installation Shop / Technicians	Assembly, bench test, field test