Radio Frequency

Andy Butterworth AB/RF

Accelerator Controls Renovation WS

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Overview

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- Work Packages
- Resources
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Motivation

- Renewal of RF equipment
- Renewal of obsolete equipment controls hardware and legacy systems
  - CAMAC, 1980s Simatic, relay logic…
  - Reliability, availability of spares
  - Chaotic evolution due to backward compatibility, responsibility split across groups
  - Obsolescence of some CO HW modules
    - Pentek synthesizer…
- Renewal of CO HW platforms
  - Performance limitations of RIO2
- “New model” for controls
  - Clarifies responsibilities
  - Migration to current SW standards will enhance maintainability
  - More standardization of controls across RF group

Work packages: SPS (1/2)

Work Package:	**SPS Front-end & Application software**
Scope:	All SPS Front-End SW to FESA on new PC platform; MMI application eradication
Motivation:	Obsolescence: HP-UX no longer supported.
Target date:	Q2/2009
kCHF:	10 Budgeted: No
FTE:	1.3

Work Package:	**SPS Travelling Wave 800 MHz power and cavity controls**
Scope:	New PLC systems + FESA for 800MHz transmitters and TW200/800 cavities
Motivation:	Upgrade of 800MHz power plant, obsolete relay logic in cavity controllers
Target date:	Q2/2010
kCHF:	30 Budgeted: Yes
FTE:	0.8

Work Package:	**SPS Travelling Wave 200MHz cavity controls**
Scope:	New PLC systems + FESA for 800MHz Tx and TW200/800 cavities
Motivation:	Obsolete Simatic logic controllers, spares availability becoming critical
Target date:	Q1/2011 ?
kCHF:	30 Budgeted: Yes
FTE:	0.8

Work packages: SPS (2/2)

Work Package:	**SPS Schottky (CAMAC/Equipment Module)**
Scope:	New controls solution for plates movement (BA1) and amplifiers (BA2)
Motivation:	Obsolescence: CAMAC/Equipment Module
Target date:	2012 ? (Currently not used)
kCHF:	? Budgeted: No
FTE:	0.3

Work packages: CPS

Work Package:	**CPS 40MHz cavities tuning**
Scope:	Install missing controls functionality for cavity tuners (timings, GFAS)
Motivation:	Tuning becoming critical for efficient operation
Target date:	Q2/2009
kCHF:	5 Budgeted: No
FTE:	0.1

Work Package:	**CPS Timing distribution**
Scope:	Replace CAMAC Timing Surveillance Modules with VME version. Or upgrade timing modules to CTRVs (internal diagnostics).
Motivation:	Obsolete CAMAC HW. Reduce complexity and increase reliability.
Target date:	2012 ?
kCHF:	20 Budgeted: No
FTE:	0.3

Work packages: PSB, ADE, REX-ISOLDE

Work Package:	**PSB Digital upgrade for beam control**
Scope:	Replace all beam control HW with DSP-based systems
Motivation:	Performance for high intensity LHC beams, LINAC4
Target date:	2010
kCHF (controls):	50 Budgeted: Yes
FTE (controls):	1.0

Work Package:	**ADE Stochastic cooling pickup motor control**
Scope:	Replace existing analogue system with new digital controllers
Motivation:	Motion controller HW obsolete; spares & reliability issues.
Target date:	Q2/2009 ?
kCHF:	30 Budgeted: Yes
FTE (controls):	0.3

Work Package:	**REXTRAP RF control**
Scope:	New HW and SW for RF signal generation for the REXTRAP Penning trap
Motivation:	Legacy system (stand-alone) from REX collaboration. Alignment with CO standards.
Target date:	Q2/2010
kCHF (controls):	25 Budgeted: Yes (REX budget?)
FTE (controls):	1.2 (Technical student)

Work packages: CTF3

Work Package:	**CTF3 Low Level RF and interlocks PLC control**
Scope:	Develop new FESA class to interface new PLC software; new PC platform
Motivation:	PLC & existing front-end overloaded
Target date:	Q2/2009
kCHF (controls):	3.5 Budgeted: No
FTE (controls):	0.2

Work Package:	**LPI klystron modulator controls**
Scope:	New PLC system + interface electronics for 7 modulators; 1 new FESA class
Motivation:	Obsolete HW (CAMAC/G64), from multiple groups. Operational problems: loses data after power cut etc.
Target date:	2011
kCHF:	250 (Eq. HW + cabling) Budgeted: Not yet
FTE (controls):	0.8

Work packages: Front-End software

Work Package:	**Redevelopment of RF specific front-end software**
Scope:	14 additional GM classes (CPS, PSB, ADE and CTF) to migrate to FESA
Motivation:	CO migration of front-ends to new CPUs + Linux. Responsibility for these classes passes to RF group as agreed in CO3.
Target date:	2009-2012, following CO front-end HW upgrades
kCHF:	
FTE:	3.5

GM classes for renovation

LIN	PSB	LN3	LEI	CPS	SPS	ADE	ISO	CTF	Acc	ClassName	Creator	Description
	1			1					CPS	RFBURST	V.ADORNI	RF BURST generator
	1			2		1				RFPS	L.MERARD	Control cavities RF for PS, PSB , EPA & ADE
				1						PERTU	M.GOURBER	CVM for C200MHz radial perturbation
				2						RFMAT	C.H.SICARD	CPS RF Matrix Control (9.5 & 200 MHz)
	1			2		1		1		RFMEAS	J.M. BOUCHE	Train RF Measurements
	1								PSB	HP5335A	J. SERRANO	Measures frequency with Universal Counter HP5335A
1		1							LIN	RFLNP	L.MERARD	LINAC 2 radio frequency (PLC)
		1				1			LN3	RFLIN	DAVYDENKO	control for LINAC 2 radio frequency
						1			ADE	STOCAMP	V.ADORNI	Stochastic cooling AD
						1				STOCPOW	V.ADORNI	Stochastic cooling AD
								1	CTF	CGUN	L.MERARD	CTF control du gun Clio
								1		FDELAY	S.DEGHAYE	Fine-delay crate control (Jonathan Sladen)
								1		HP8665B	J.M.NONGLATON	GPIB ENET control HP8665B Synthesizer
								1		MDK	L.MERARD	LPI modulator klystrons
								1		MDKP	L.MERARD	CTF3 modulator (PLC)
								1		RFMKSP	J-M.NONGLATON	CTF3 modulateur controle de phase

- POW: Currently responsibility of PO – will change in future?

Resources

- AB/RF/CS section comprises:
  - Software: 3 staff + 1.5 associates (→ 2+1 in 2010)
  - Controls hardware & PLCs: 2.5 staff
- Total of 8.1 FTEs needed over 2009, 2010, 2011 to complete the above WPs
  - Of which 3.5 for Front End SW renovation
  - Will have to be found within the section or using additional manpower (PJAS, students)

Conclusions

- A number of renovations driven by equipment renewal, obsolescence and operational requirements
- A large proportion of the software renovation driven by HW platform upgrade
- Human resources will be the limiting factor
  - Will probably need additional manpower (PJAS…)
  - Software renovation will need to be carefully staged